



XPS Unified

Universal High-Performance
Motion Controller/Driver



 **Newport®**

Programmer's Manual

V1.8.x

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Universal High-Performance Motion Controller/Driver ~~XPS-D Controller~~

1.0 Note

This XPS Programmer's Manual describes all the functions available for the XPS family of controllers.

NOTE

Not all below described functions are available for XPS standard controller. If you are interested in a function that is described but not available for your controller, please contact Newport.

NOTE

For more details on XPS features, please refer to XPS User's Manual.

2.0 TCP/IP Communication

XPS is based on a 10/100/1000 Base-T Ethernet communication link with TCP/IP protocol and uses a web site as the Graphical User Interface (GUI) to access all the software tools and an FTP server for file transfer. This makes the XPS controller independent of the user's operating system. When networked, Unix, Linux or Windows users can access the same controller from any place in the world for remote control, code development, file transfer or diagnostics. The completely object oriented approach of the XPS firmware with powerful, multi-parameter Functions (commands) is also much more consistent and intuitive to use than old-style mnemonic commands.

To connect to the XPS controller you must open a socket. The XPS allows up to 100 open sockets with 30 sockets communicating simultaneously.

Each Function returns a complete or error code. If successful, the return is 0 (zero). In case of an error, the returned error code can be used for diagnosing the.

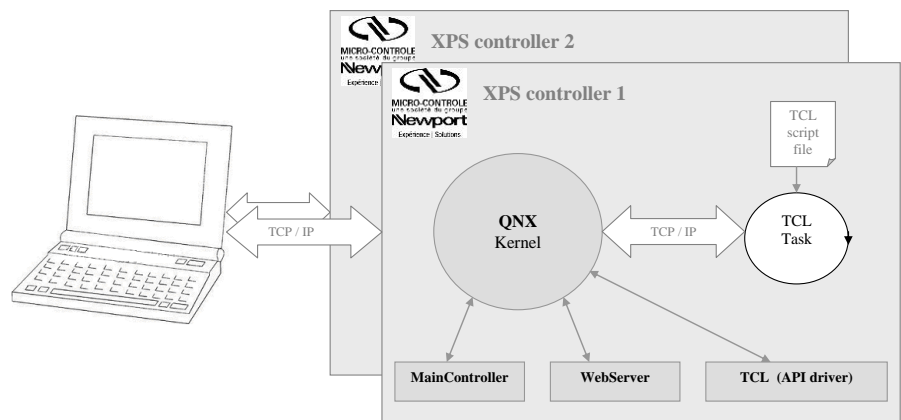
The function call is blocked until a reply is sent by the XPS, or until the timeout value is reached. Running several processes in parallel (for instance getting the position while a stage is moving), several sockets can be used in parallel. When using the XPS controller with programming languages that do not support multiple sockets, the timeout value of the function can be set to a low value (20 ms), in that case you cannot capture errors.

NOTE

When a communication ends with a time out fault, it could be caused by some hardware failure or the timeout value is lower than the time needed by the controller to execute the requested function.

For example, setting a timeout of one second and requesting a motion that requires 2 seconds will end with a timeout. In this situation the controller will continue the move and when accomplished will send the response back to the host.

It is the host responsibility to take the appropriate actions to handle properly these situations.



3.0 XPS .NET Software Drivers

3.1 How to Install .NET Drivers for XPS Controller

3.1.1 Requirements

.Net Framework is a programming infrastructure created by Microsoft for building, deploying, and running applications and services that use .NET technologies such as custom desktop applications.

The Windows PC computer requires having at least the .NET Framework installed and you need to install either 32 bit (x86) or 64 bit (x64) .NET assembly depending on the Windows version you are using.

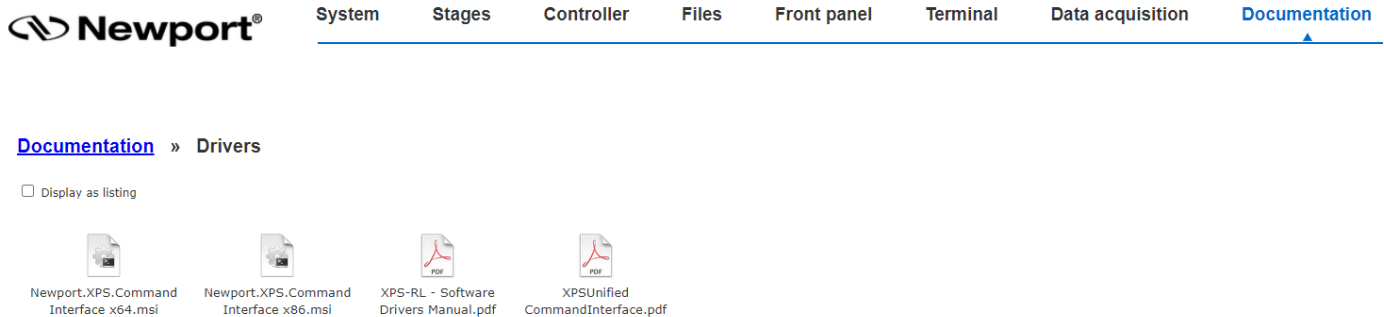
When developing your application, refer to the programming environment documentation to make the installed .NET assembly visible.

To communicate with the XPS controller you will need to:

- Use the **OpenInstrument** method to connect to the controller
- Communicate with the controller using any of its API e.g. **FirmwareVersionGet**
- Once your application terminates it needs to disconnect from the controller using the **CloseInstrument** method. If it doesn't close the communication channel and runs many connections to the controller, it can run out of free channels and gets an error.

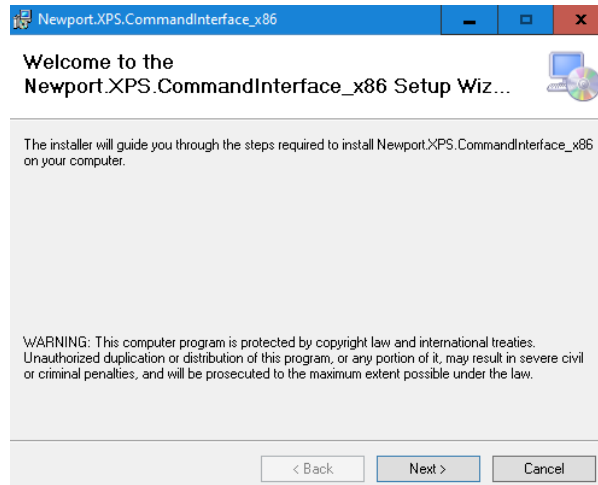
3.1.2 Installation

The .NET assembly is in the website under tab Documentation -> Drivers “, refer to the controller user’s manual for more details.

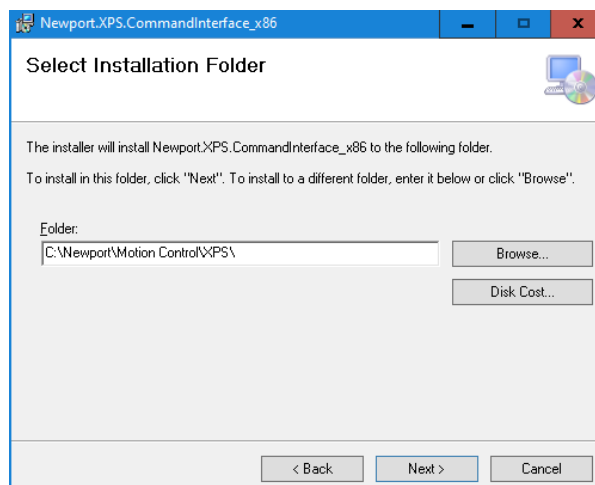


Download the “Newport.XPS.CommandInterface_x86.msi” or “Newport.XPS.CommandInterface_x64.msi” depending on your windows platform to your computer.

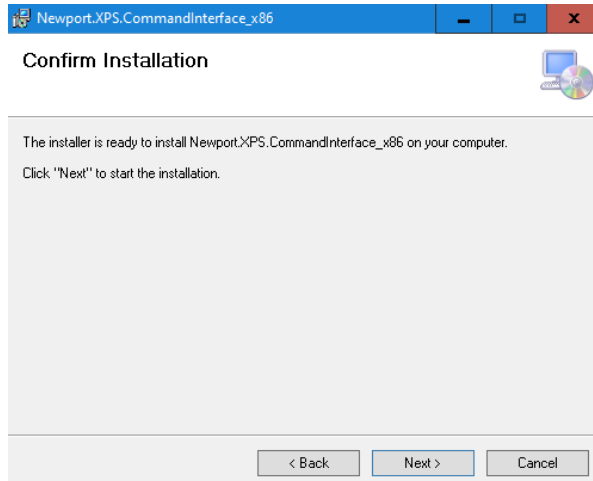
Once downloaded, run it.



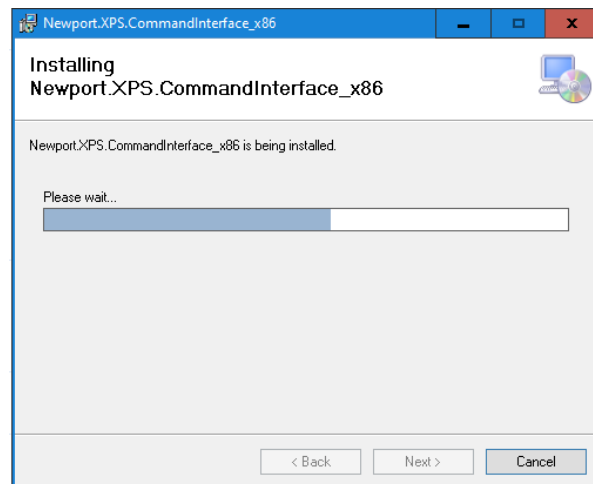
Click on next to continue the install.



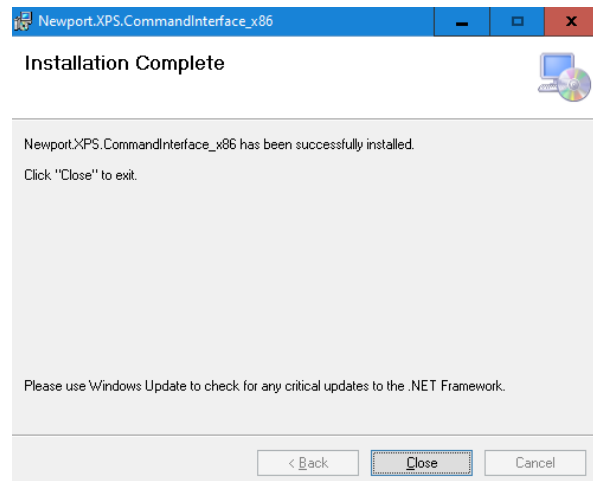
Select the folder to install a csharp project example and documentation. Click on next to continue the install.



Click on next to continue the install.



Wait until the installation is complete.








The installation is complete. Click on close.

The x86 “Newport.XPS.CommandInterface.dll” is installed in C:\Windows\Microsoft.NET\assembly\GAC_32\Newport.XPS.CommandInterface\.




The x64 “Newport.XPS.CommandInterface.dll” is installed in C:\Windows\Microsoft.NET\assembly\GAC_64\Newport.XPS.CommandInterface\.

3.2 Variables Equivalent for Programming Languages

The table below describes a simple of a prototype model for different languages:

| | |
|--|--|
| Prototype | int FunctionName (double inputParam, double * outputParam) |
| C++  | int FunctionName (int SocketID, double inputParam, double * outputParam) |
| VBasic  | Long FunctionName (ByVal SocketID As Long, ByVal inputParam As Double, outputParam As Double) |
| Matlab  | [Error, outputParam] FunctionName (int32 SocketID, double inputParam) |
| Python  | [Error, outputParam] FunctionName (integer SocketID, double inputParam) |
| TCL  | set Error [catch " FunctionName SocketID inputParam outputParam "] |

The table below shows parameters types needed for different languages:

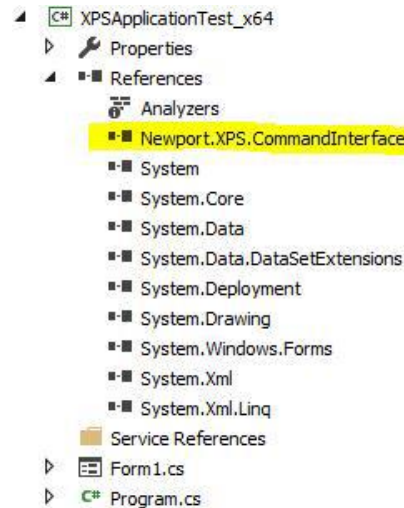
| Parameter Types | C++ | VBasic | Python |
|--------------------------------|---|---|---|
| Input/Output Parameters |  |  |  |
| bool | Bool | Boolean | bool |
| float | Float | Single | float |
| double | Double | Double | double |
| short | Short | Short | short |
| unsigned short | unsigned short | UShort | unsigned short |
| int | Int | Integer | integer |
| unsigned int | unsigned int | UInteger | unsigned int |
| long | Long | Long | long |
| unsigned long | unsigned long | ULong | unsigned int |
| long long int | long long int | Long | long long |
| unsigned long long | unsigned long long | ULong | unsigned long long |
| char * / char[] | char * | String | string |
| charhex32 | char * | String | string |

3.3 How to Use XPS .NET Assembly from Visual Studio C#?

Refer to [Microsoft](#) for more information on how to load and use a .NET assembly depending on your Visual Studio version.

3.3.1 Add Reference to Newport XPS .NET Assembly

In your project add Newport.XPS.CommandInterface.dll in References from Windows GAC:



3.3.2 C# Code Sources

C# Header

```
using CommandInterfaceXPS; // Newport.XPS.CommandInterface .NET Assembly
                           access
```

Add a Variable to Declare an “XPS” Object

```
CommandInterfaceXPS.XPS m_xpsInterface = null;
```

Create an Instance of “XPS” Object

```
m_xpsInterface = new CommandInterfaceXPS.XPS();
if (m_xpsInterface != null)
...

```

Open XPS Connection

```
if (m_xpsInterface != null)
int returnValue = m_xpsInterface.OpenInstrument(m_IPAddress, m_IPPort,
DEFAULT_TIMEOUT);
```

Call “XPS” Functions

```
if (m_xpsInterface != null)
{
    string XPSVersion = string.Empty;
    string errorString = string.Empty;
    int result = m_xpsInterface.FirmwareVersionGet(out XPSVersion, out
errorString);
    if (result == CommandInterfaceXPS.XPS.FAILURE)
    ...
}
```

Close XPS Connection

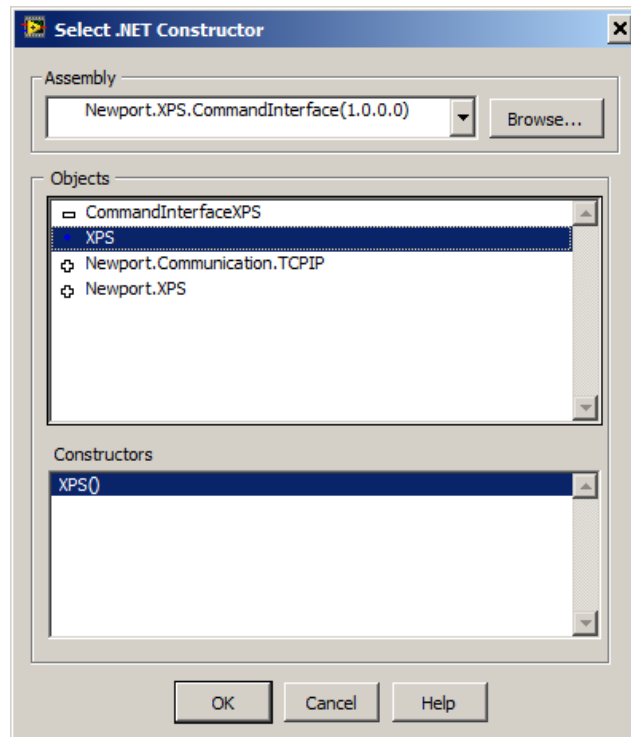
```
if (m_xpsInterface != null)
    m_xpsInterface.CloseInstrument();
```

3.4 How to Use XPS .NET Assembly from LabVIEW?

Refer to [LabVIEW](#) for more information on how to load and use a .NET assembly depending on your LabVIEW version.

3.4.1 Add Reference to .NET Assembly

Select **CommandInterfaceXPS** and **XPS** constructor from a **.Net Constructor Node** (refer to Connectivity panel):



3.4.2 LabVIEW Code Sources

The instance of “XPS” object is created after configuration of **.Net Constructor Node**:

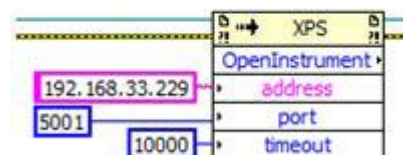
> Connectivity > .NET >

.Net Constructor Node

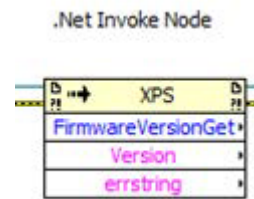


Open XPS connection (Use a **.Net Invoke Node** to select the XPS method “OpenInstrument”):

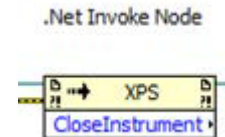
.Net Invoke Node



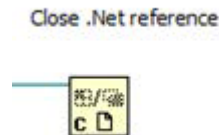
Call “XPS” functions (Use a **.Net Invoke Node** to select a XPS method):



Close XPS connection (Use a **.Net Invoke Node** to select the XPS method “CloseInstrument”):



Close .NET Reference:



3.5 How to Use XPS .NET Assembly from IronPython?

Refer to [IronPython](#) for more information on how to load and use a .NET assembly depending on your IronPython version.

3.5.1 Add Reference to .NET Assembly

Add **Newport.XPS.CommandInterface.dll** in **References** of your script:

x86:

```
import sys
sys.path.append(r'C:\Windows\Microsoft.NET\assembly\GAC_32\Newport.XPS.CommandInterface\v4.0_1.0.0.0__9a267756cf640dcf')
```

x64:

```
import sys
sys.path.append(r'C:\Windows\Microsoft.NET\assembly\GAC_64\Newport.XPS.CommandInterface\v4.0_1.0.0.0__9a267756cf640dcf')
```

3.5.2 IronPython Code Source

IronPython Header

```
# The CLR module provide functions for interacting with the underlying
# .NET runtime
import clr
# Add reference to assembly and import names from namespace (IronPython)
clr.AddReferenceToFile("Newport.XPS.CommandInterface.dll") from
CommandInterfaceXPS import *
```

Create an Instance

```
# Create XPS interface myXPS = XPS()
```

Open XPS Connection

```
def XPS_Open (address, port):
# Create XPS interface
myXPS = XPS()
# Open a socket
timeout = 1000
result = myXPS.OpenInstrument(address, port, timeout)
if result == 0:
    print 'Open ', address, ":", port, " => Successful"
else:
    print 'Open ', address, ":", port, " => failure ", result
return myXPS
```

Call XPS Functions

```
def XPS_GetControllerVersion (myXPS, flag):
result, version, errString = myXPS.FirmwareVersionGet()
if flag == 1:
    if result == 0:
        print 'XPS firmware version => ', version
    else:
        print 'FirmwareVersionGet Error => ',errString
        return result, version
def XPS_GetControllerState (myXPS, flag):
result, state, errString = myXPS.ControllerStatusGet()
if flag == 1:
    if result == 0:
        print 'XPS controller state => ', state
    else:
        print 'ControllerStatusGet Error => ',errString
return result, state
```

Close XPS Connection

```
def XPS_Close(myXPS):
myXPS.CloseInstrument()
```

3.6 How to Use XPS .NET Assembly from Matlab?

Refer to [Matlab](#) for more information on how to load and use a .NET assembly depending on your Matlab version.

3.6.1 Add Reference to .NET Assembly

```
% Make the assembly visible from Matlab
asmInfo = NET.addAssembly('Newport.XPS.CommandInterface')
```

3.6.2 Matlab Code Source

Create an Instance

```
% Make the instantiation
myxps=CommandInterfaceXPS.XPS();
```

Open XPS Connection

```
% Connect to the XPS controller
code=myxps.OpenInstrument('192.168.254.254',5001,1000);
```

Call XPS Functions

```
% Use API's
[code Version]=myxps.FirmwareVersionGet [code]=myxps.GroupKill('Group1')
[code]=myxps.GroupInitialize('Group1')
[code]=myxps.GroupHomeSearch('Group1')
```

Close XPS Connection

```
% Disconnect from the XPS controller
code=myxps.CloseInstrument;
```

3.7 How to Use XPS .NET Assembly from Python?

Refer to [Python](#) and [Pythonnet](#) for more information on how to load and use a .NET assembly depending on your Python version.

3.7.1 Install pythonnet

Install `pythonnet` using `pip` package manager:

```
pip install pythonnet
```

3.7.2 Add Reference to .NET Assembly

Add `Newport.XPS.CommandInterface.dll` in **References** of your script:

x86:

```
import sys
clr.AddReference(r'C:\Windows\Microsoft.NET\assembly\GAC_32\Newport.XPS.C
ommandInterface\v4.0_1.0.0.0__9a267756cf640dcf')
```

x64:

```
import sys
clr.AddReference(r'C:\Windows\Microsoft.NET\assembly\GAC_64\Newport.XPS.C
ommandInterface\v4.0_1.0.0.0__9a267756cf640dcf')
```

3.7.3 Python Code Source

Python Header

```
import sys
# The CLR module provide functions for interacting with the underlying
# .NET runtime
import clr
# Add reference to assembly and import names from namespace (IronPython)
clr.AddReferenceToFile("Newport.XPS.CommandInterface.dll") from
CommandInterfaceXPS import *
```

Create an Instance

```
# Create XPS interface
myXPS = XPS()
```

Open XPS Connection

```
def XPS_Open (address, port):
    # Create XPS interface
    myXPS = XPS()
    # Open a socket
    timeout = 1000
    result = myXPS.OpenInstrument(address, port, timeout)
    if result == 0:
        print('Open ', address, ":", port, " => Successful")
    else:
        print('Open ', address, ":", port, " => failure ", result)
    return myXPS
```

Call XPS Functions

```
def XPS_GetControllerVersion (myXPS, flag):
    result, version, errString = myXPS.FirmwareVersionGet("", "")
    if flag == 1:
        if result == 0:
            print('XPS firmware version => ', version)
        else:
            print('FirmwareVersionGet Error => ', errString)
    return result, version
```

Close XPS Connection

```
def XPS_Close(myXPS):
    myXPS.CloseInstrument()
```

4.0 TCP/IP Support Functions

To ease the use of the TCP/IP communication, few functions have been developed by Newport. These functions use the Microsoft System.Net.Sockets.

4.1 OpenInstrument

Name

OpenInstrument – Create and open a socket.

Description

This function is used to create and open a socket. Send Timeout is set to 1 second

Prototype

int **OpenInstrument** (string IP_Address, int Port, int ReceiveTimeout)

Input parameters

| | | |
|------------|--------|---------------------------------|
| IP_Address | string | IP address of instrument. |
| Port | int | Port number. |
| Timeout | int | ReceiveTimeout in milliseconds. |

Output parameters

None.

Return

- 0: No error.
- -1: Error of socket open.

4.2 CloseInstrument

Name

CloseInstrument – Closes the current socket.

Description

This function is used to close the current socket.

Prototype

int CloseInstrument ()

Input parameters

None.

Output parameters

None.

Return

- 0: No error.
- -1: Error of socket close.

4.3 SetTimeout

Name

SetTimeout – Configures socket timeout.

Description

This function is used to configure socket timeout for sending and reading.

Prototype

int **SetTimeout** (int SendingTimeout, int ReadingTimeout)

Input parameters

| | | |
|----------------|-----|----------------------------------|
| SendingTimeout | int | Sending timeout in milliseconds. |
| ReadingTimeout | int | Reading timeout in milliseconds. |

Output parameters

None.

Return

- 0: No error.
- -1: Error of set timeout.

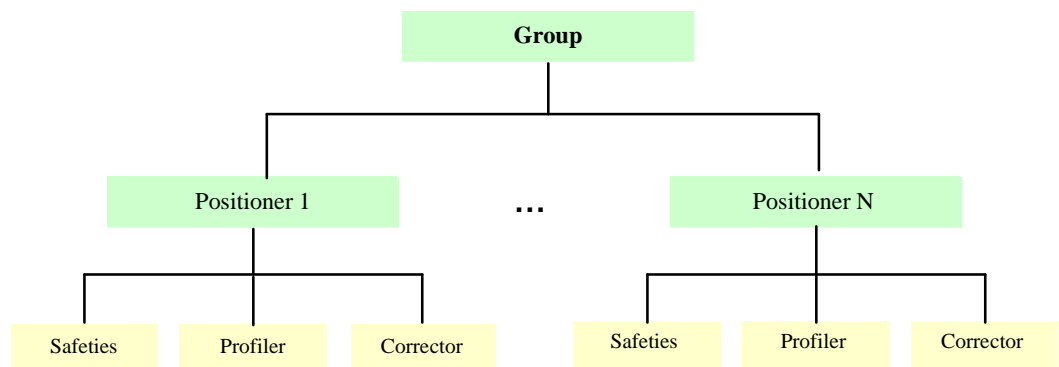
5.0 XPS Standard Firmware Architecture (Base Version)

5.1 Group Definition

The “Group” objects are used to define one or several “positioners” in the same motion group. The available motion groups are defined in the section [GROUPS] in the system.ini file and the group types are:

- **SingleAxis** (1 positioner)/“Gantry” **SingleAxis** (2 positioners)
- **SingleAxisWithClamping** (1 positioner)
- **SingleAxisTheta** (1 positioner)
- **Spindle** (1 positioner)
- **XY** (2 positioners)/“Gantry” **XY** (3 or 4 positioners)
- **XYZ** (3 positioners)
- **Hexapod** (6 positioners)
- **MultipleAxes**/“Gantry” **MultipleAxes** (1 to 8 positioners)
- **TZ** (3 positioners)

5.1.1 Object Structure



A motion “**Group**” is created in relation to a **group type** (SingleAxis, SingleAxisWithClamping, SingleAxisTheta, Spindle, XY, XYZ, TZ, Hexapod or MultipleAxes).

A group is defined by a **group name**.

NOTE

The maximum number of positioners in the same group is limited to 8.

5.2 Positioner Definition

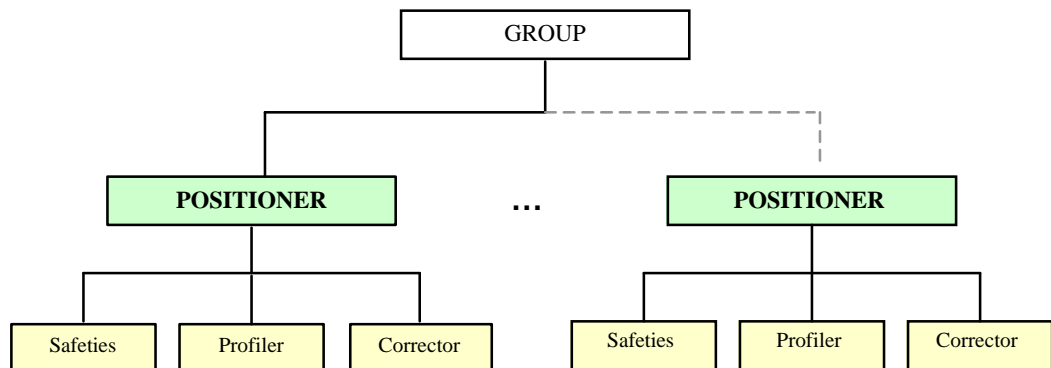
Positioner objects are used to define all motion specific configuration parameters.

The positioner includes a mapping correction: $X = f(X)$

The positioner includes the SGamma profile.

The maximum number of positioners is limited to ControllerAxesNumber (4, 8, 12 or 16, depending on type of the XPS controller hardware).

5.2.1 Object Structure



To use a **positioner**, it must belong to a motion group. Positioners are defined by their **full positioner name**. The full positioner name is composed of the group name and the positioner name separated by a character “.”.

Example:

GroupName.PositionerName or

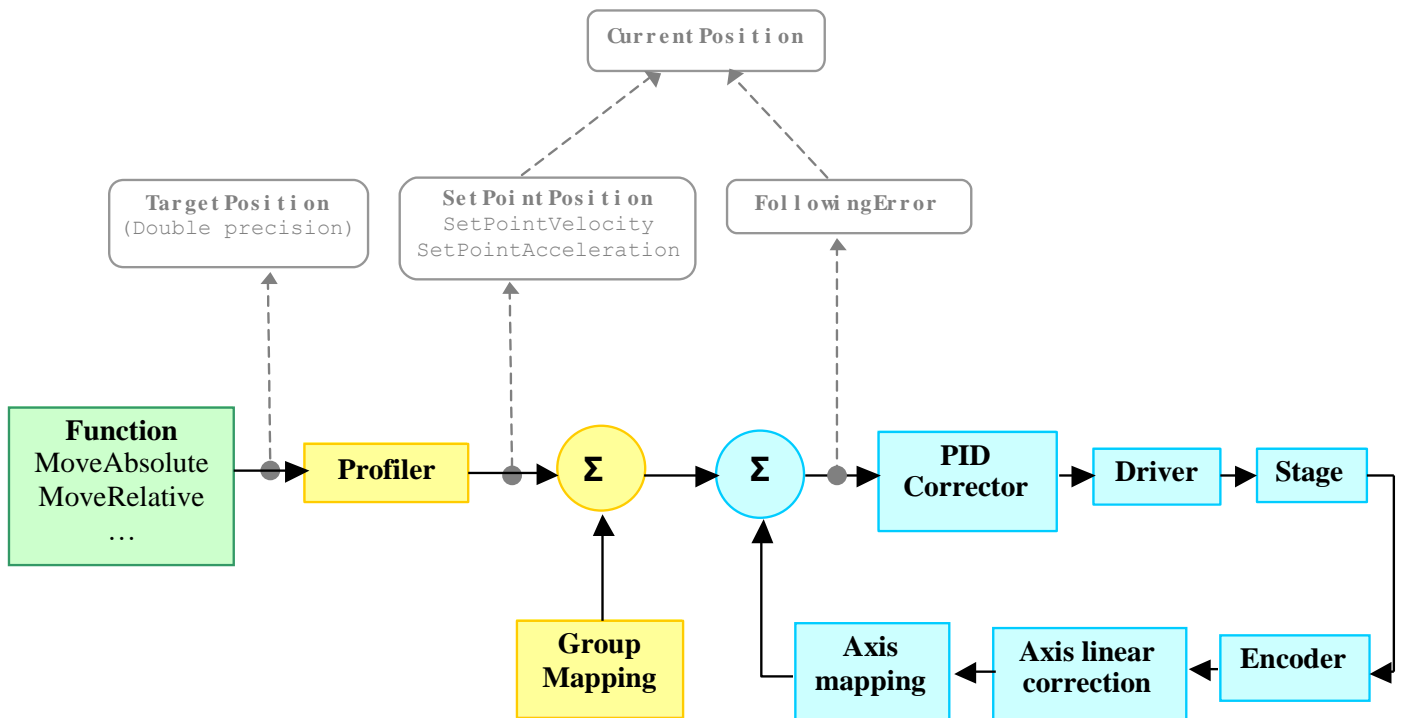
3-Axis system.X-axis

5.2.2 Definition of the Positions Available for Each Positioner

For each positioner, three different positions can be called:

1. The **SetpointPosition** is the profiler position. This is the position where the positioner should be according to the ideal theoretical motion profile.
2. The **CurrentPosition** is the encoder position of the stage after mapping corrections are applied. This is the actual position of the positioner at this moment of the query.
3. The **TargetPosition** is the final target position commanded by the user.

The difference between the SetpointPosition and the CurrentPosition is called the following error.



For example, during a motion from the position 0 (units) to 100 (units), a query in the middle of the motion could have the following result:

SetpointPosition = 50

CurrentPosition = 49.998 (*FollowingError* = 50 – 49.998 = 0.002 unit)

TargetPosition = 100.

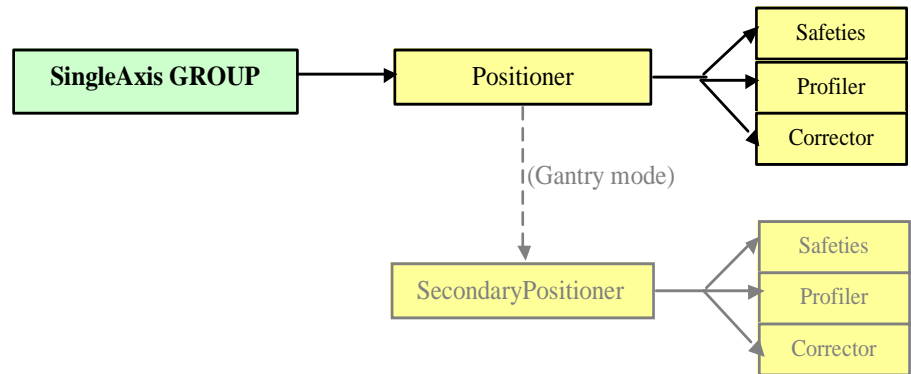
5.3 SingleAxis Group

The SingleAxis group is composed of one single positioner for the execution of motion commands.

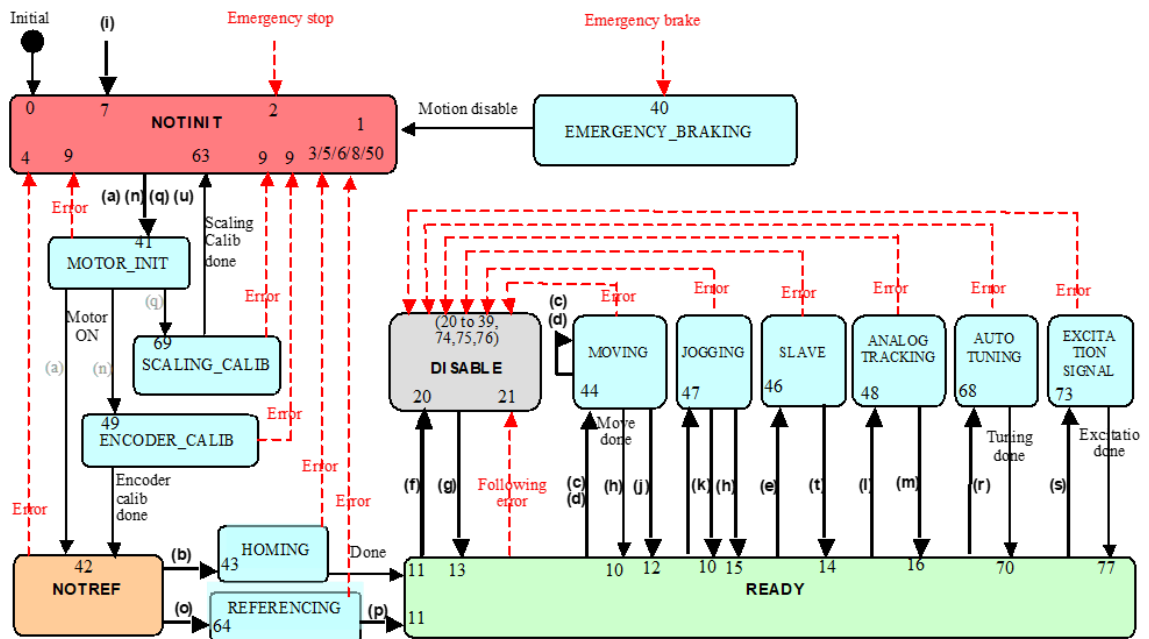
A SingleAxis group can be used in GANTRY mode (dual positioner).

The XPS controller can handle several SingleAxis objects.

There is no relation between SingleAxis objects and other objects handled by the controller.



5.3.1 State Diagram

**Called functions:**

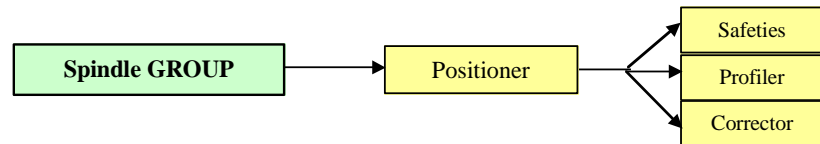
- | | |
|--------------------------|---|
| (a) GroupInitialize | (l) GroupAnalogTrackingModeEnable |
| (b) GroupHomeSearch | (m) GroupAnalogTrackingModeDisable |
| (c) GroupMoveAbsolute | (n) GroupInitializeWithEncoderCalibration |
| (d) GroupMoveRelative | (o) GroupReferencingStart |
| (e) GroupSlaveModeEnable | (p) GroupReferencingStop |
| (f) GroupMotionDisable | (q) PositionerAccelerationAutoScaling |
| (g) GroupMotionEnable | (r) PositionerCorrectorAutoTuning |
| (h) GroupMoveAbort | (s) PositionerExcitationSignalSet / PositionerPreCorrectorExcitationSignalSet |
| (i) GroupKill or KillAll | (t) GroupSlaveModeDisable |
| (j) GroupJogModeEnable | (u) GroupInitializeNoEncoderReset |
| (k) GroupJogModeDisable | |

5.4 Spindle Group

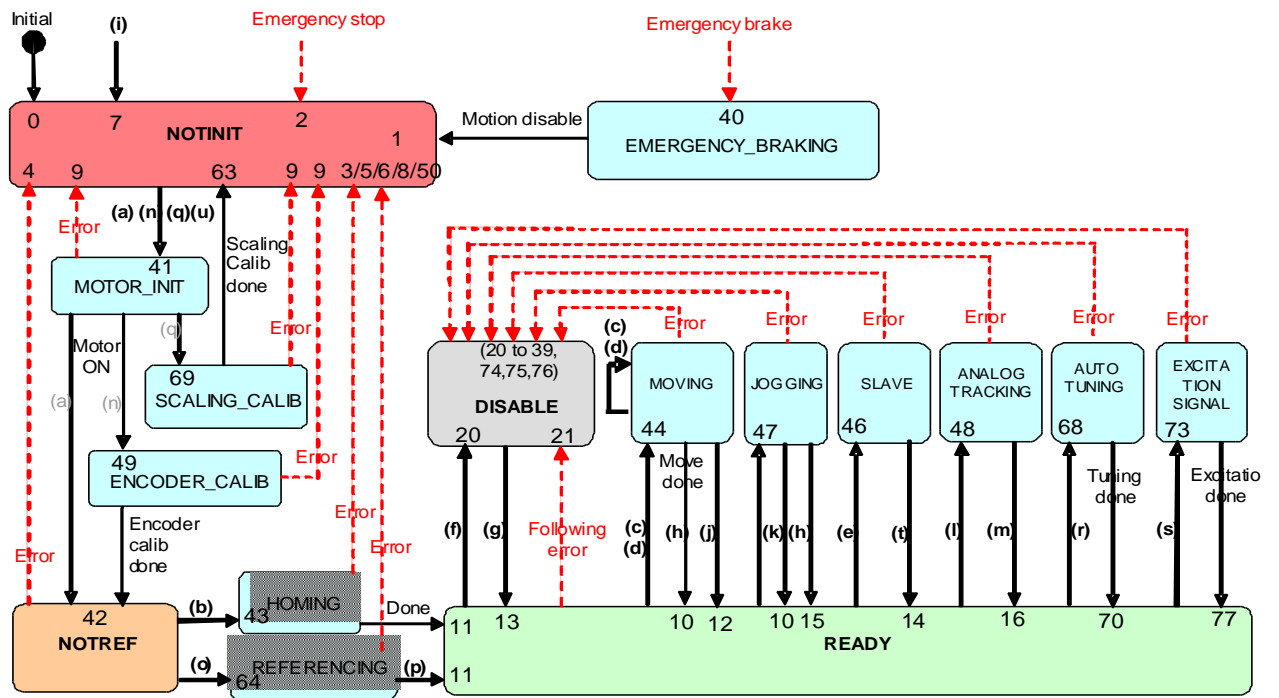
A Spindle group is very similar to the SingleAxis group. It is composed of only one positioner with one main difference, it does not handle software or hardware end of runs. Therefore, it is allowed to spin indefinitely in any direction. The SingleAxis group motion commands are still allowed (except jog, which is replaced by spin).

The controller can handle several Spindle groups.

There is no relation between Spindle groups and other objects handled by the controller.



5.4.1 State Diagram



Called functions:

- | | |
|--------------------------|---|
| (a) GroupInitialize | (l) GroupAnalogTrackingModeEnable |
| (b) GroupHomeSearch | (m) GroupAnalogTrackingModeDisable |
| (c) GroupMoveAbsolute | (n) GroupInitializeWithEncoderCalibration |
| (d) GroupMoveRelative | (o) GroupReferencingStart |
| (e) GroupSlaveModeEnable | (p) GroupReferencingStop |
| (f) GroupMotionDisable | (q) PositionerAccelerationAutoScaling |
| (a) GroupInitialize | (r) PositionerCorrectorAutoTuning |
| (b) GroupHomeSearch | (s) PositionerExcitationSignalSet / PositionerPreCorrectorExcitationSignalSet |
| (c) GroupMoveAbsolute | (t) GroupSlaveModeDisable |
| (d) GroupMoveRelative | (u) GroupInitializeNoEncoderReset |
| (e) GroupSlaveModeEnable | |

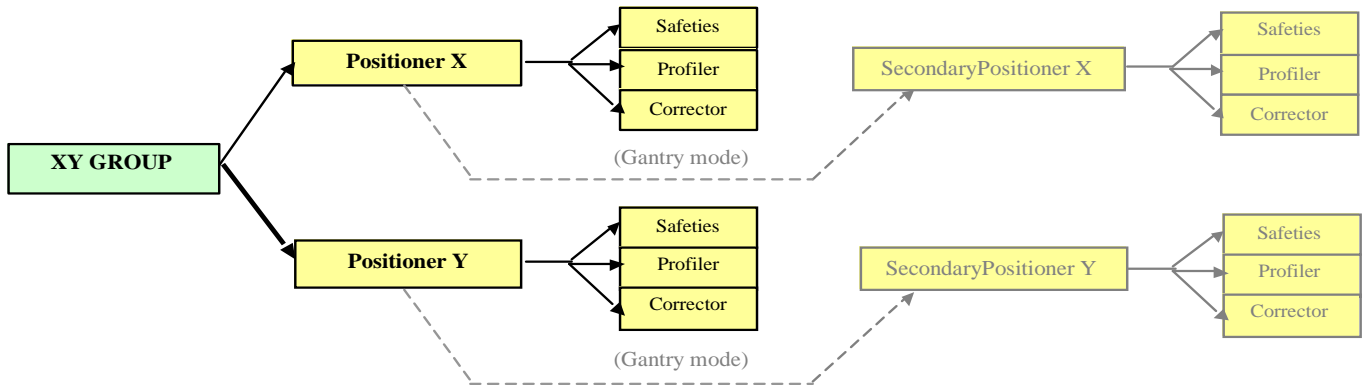
5.5 XY Group

An XY group is composed of two positioners, typically in an orthogonal XY configuration.

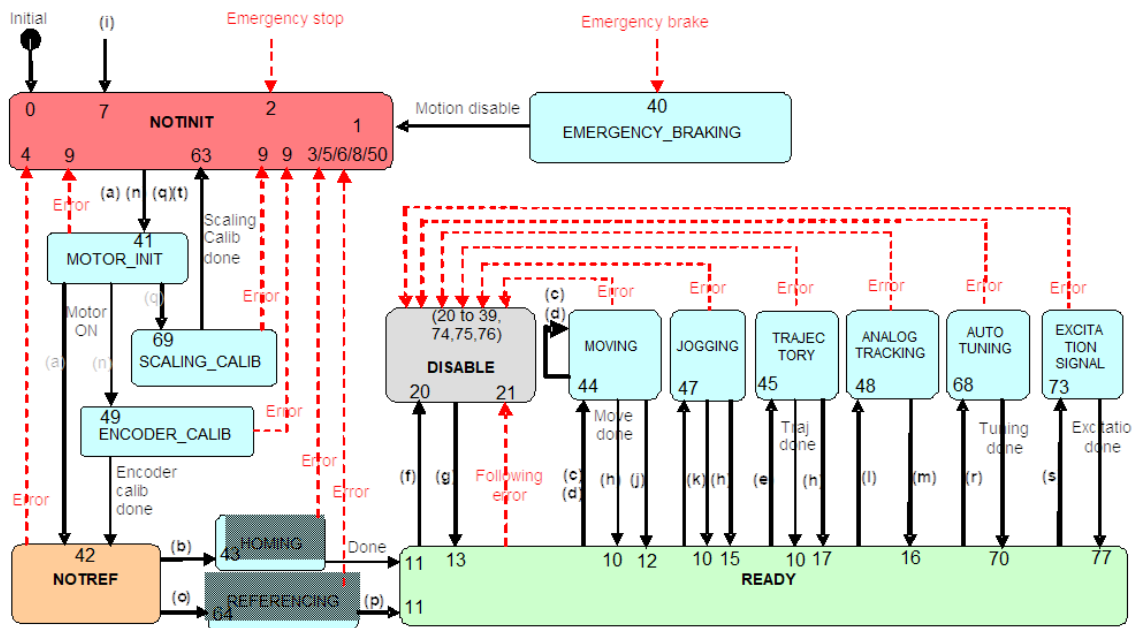
An XY group can be used in GANTRY mode (dual positioner for X or for Y).

It includes an XY mapping feature: $XY = f(XY)$

It includes a line-arc and a PVT (PositionVelocityTime) two-dimension trajectories.



5.5.1 State Diagram



Called functions:

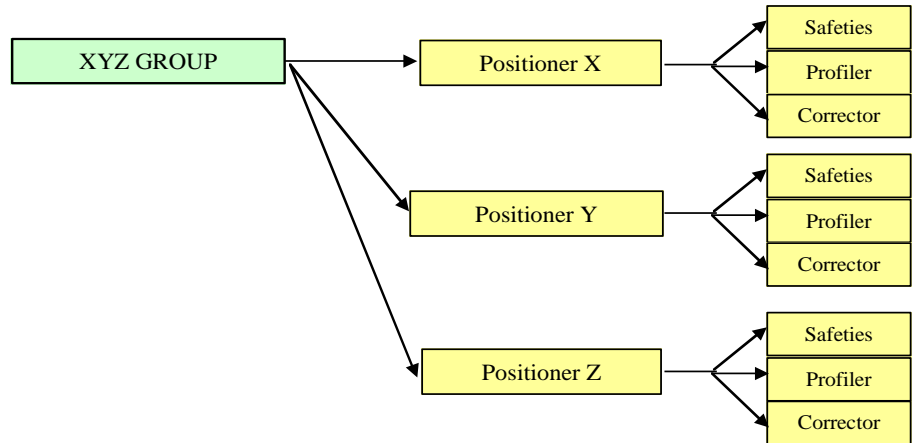
- | | |
|-----------------------------------|---|
| (a) GroupInitialize | (k) GroupJogModeDisable |
| (b) GroupHomeSearch | (l) GroupAnalogTrackingModeEnable |
| (c) GroupMoveAbsolute/...Relative | (m) GroupAnalogTrackingModeDisable |
| (d) MoveSlice | (n) GroupInitializeWithEncoderCalibration |
| (e) XYLineArcExecution | (o) GroupReferencingStart |
| (f) GroupMotionDisable | (p) GroupReferencingStop |
| (g) GroupMotionEnable | (q) PositionerAccelerationAutoScaling |
| (h) GroupMoveAbort | (r) PositionerCorrectorAutoTuning |
| (i) GroupKill or KillAll | (s) PositionerExcitationSignalSet / PositionerPreCorrectorExcitationSignalSet |
| (j) GroupJogModeEnable | (t) GroupInitializeNoEncoderReset |

5.6 XYZ Group

An XYZ group is a three positioner object, typically in an orthogonal XYZ configuration.

It includes an XYZ mapping feature: $XYZ = f(XYZ)$

It also includes 3D spline trajectories.

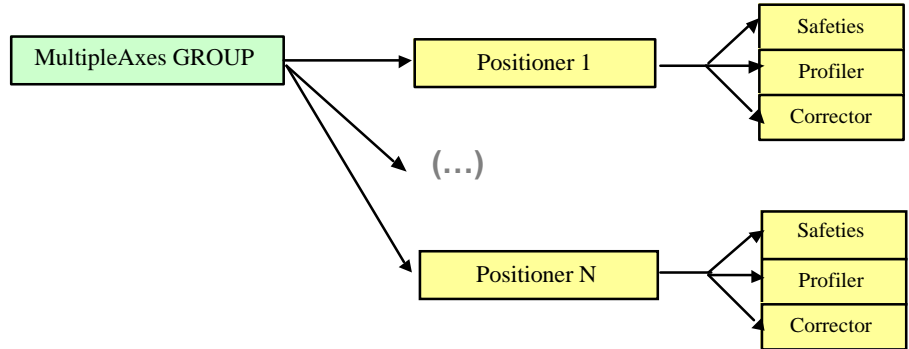


5.7 MultipleAxes Group

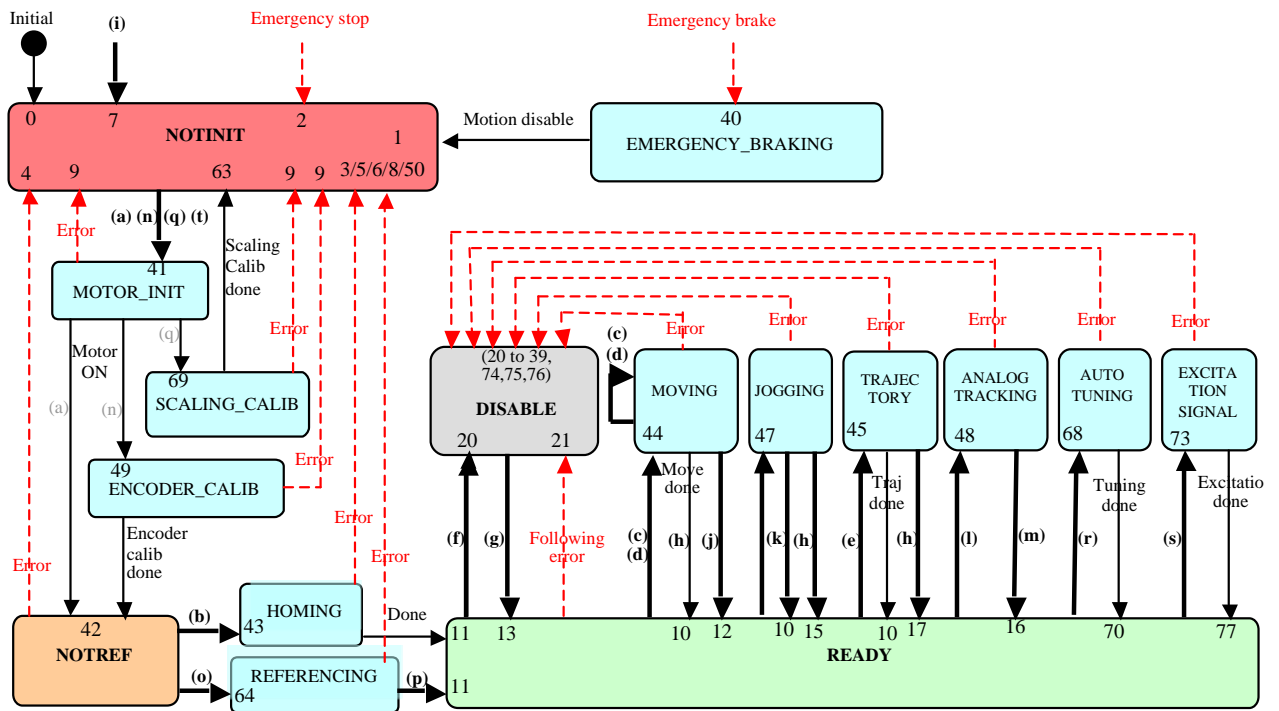
A MultipleAxes group is an n-positioner object, where n can be any number from 1 to 8.

A MultipleAxes group can be used in GANTRY mode (dual positioner for one or several positioners).

It includes the PVT (PositionVelocityTime) and PT (PositionTime) trajectories.



5.7.1 State Diagram



Called functions:

- (a) GroupInitialize
- (b) GroupHomeSearch
- (c) GroupMoveAbsolute
- (d) GroupMoveRelative
- (e) MultipleAxesPVTExecution
- (f) GroupMotionDisable
- (g) GroupMotionEnable
- (h) GroupMoveAbort
- (i) GroupKill or KillAll
- (j) GroupJogModeEnable
- (k) GroupJogModeDisable
- (l) GroupAnalogTrackingModeEnable
- (m) GroupAnalogTrackingModeDisable
- (n) GroupInitializeWithEncoderCalibration
- (o) GroupReferencingStart
- (p) GroupReferencingStop
- (q) PositionerAccelerationAutoScaling
- (r) PositionerCorrectorAutoTuning
- (s) PositionerExcitationSignalSet
- (t) GroupInitializeNoEncoderReset

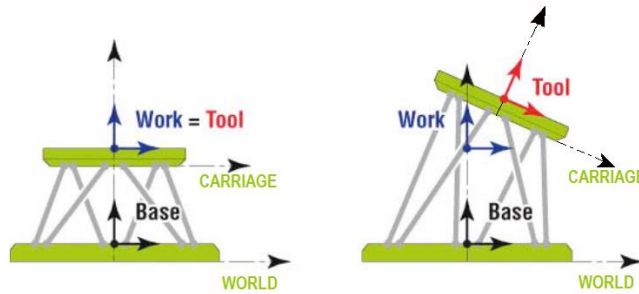
5.8 Hexapod Group (Contact Newport)

NOTE

Contact Newport to obtain an HXP-D controller that manages an Hexapod group with the following features.

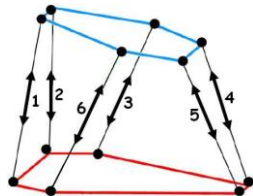
5.8.1 Definition of hexapod coordinate systems

- **Work** is defined in **WORLD**
- **Base** is defined in **WORLD**
- **Tool** is defined in **CARRIAGE**



5.8.2 Hexapod group real system (Legs)

The real system allows to move each positioner “legs” (1,2,3,4,5,6) in the real coordinate (units).

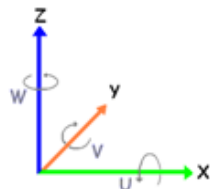


5.8.3 Hexapod coordinate system

The hexapod system allows to move all positioners in the hexapod coordinate (X,Y,Z,U,V,W) Tool in Work.

X,Y,Z (units) and U,V,W (degrees) with

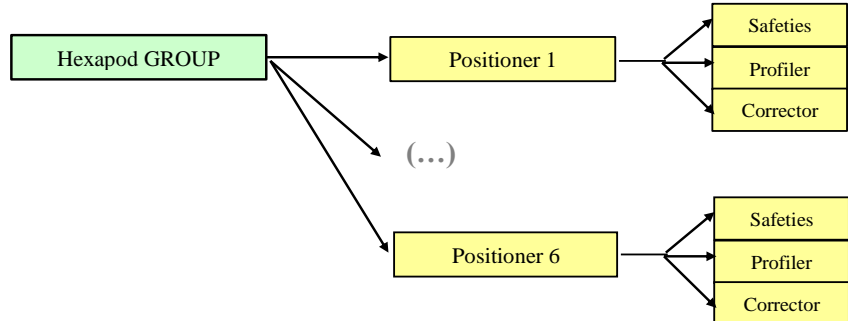
- U being the rotation around axis X
- V being the rotation around axis Y
- W being the rotation around axis Z



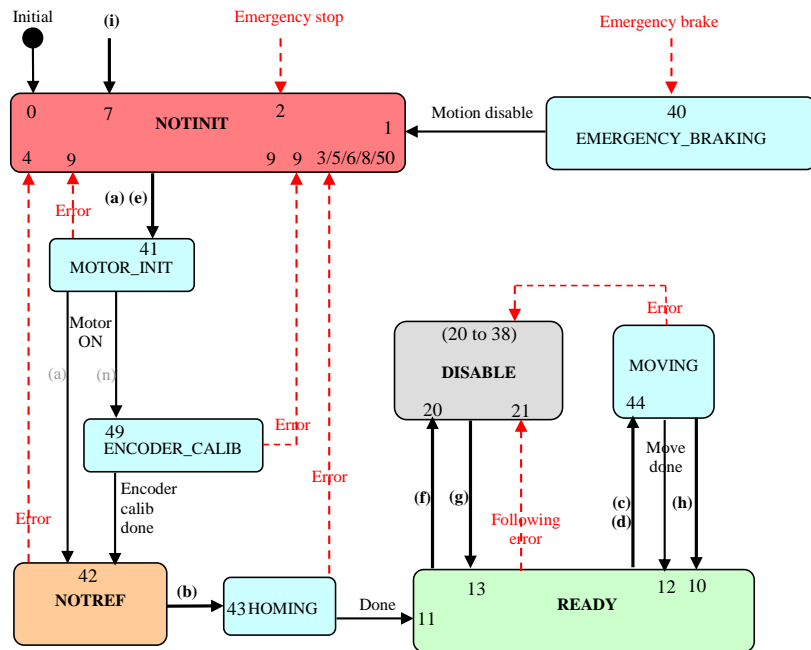
5.8.4 Hexapod group

A Hexapod is a motion device with 6 degrees of freedom.

The Hexapod Group is composed of six positioners (legs) that allows execution of motion commands.



5.8.4.1 State Diagram



Called function :

- (a) GroupInitialize
- (b) GroupHomeSearch
- (c) GroupMoveAbsolute
GroupMoveRelative
- (d) HexapodMoveAbsolute
HexapodMoveIncremental
HexapodMoveIncrementalControl
HexapodMoveIncrementalControlWithTargetVelocity
- (e) GroupInitializeWithEncoderCalibration
- (f) GroupMotionDisable
- (g) GroupMotionEnable
- (h) GroupMoveAbort
- (i) GroupKill or KillAll

5.9 Analog and Digital I/O

5.9.1 GPIO Name List

5.9.1.1 XPS-Q Hardware

Digital inputs

| | |
|-----------------|---|
| GPIO1.DI | Digital Input of the I/O board connector #1 (8 bits) |
| GPIO2.DI | Digital Input of the I/O board connector #2 (6 bits) |
| GPIO3.DI | Digital Input of the I/O board connector #3 (6 bits) |
| GPIO4.DI | Digital Input of the I/O board connector #4 (16 bits) |

Digital outputs

| | |
|-----------------|--|
| GPIO1.DO | Digital Output of the I/O board connector #1 (8 bits) |
| GPIO3.DO | Digital Output of the I/O board connector #3 (6 bits) |
| GPIO4.DO | Digital Output of the I/O board connector #4 (16 bits) |

Analog inputs

| | |
|-------------------|---|
| GPIO2.ADC1 | Analog Input #1 of the I/O board connector #2 |
| GPIO2.ADC2 | Analog Input #2 of the I/O board connector #2 |
| GPIO2.ADC3 | Analog Input #3 of the I/O board connector #2 |
| GPIO2.ADC4 | Analog Input #4 of the I/O board connector #2 |

Analog outputs

| | |
|-------------------|--|
| GPIO2.DAC1 | Analog Output #1 of the I/O board connector #2 |
| GPIO2.DAC2 | Analog Output #2 of the I/O board connector #2 |
| GPIO2.DAC3 | Analog Output #3 of the I/O board connector #2 |
| GPIO2.DAC4 | Analog Output #4 of the I/O board connector #2 |

5.9.1.2 XPS-RL or XPS-D Hardware

Digital inputs

| | Basic GPIO board | Extended GPIO board |
|----------------------|--------------------|--|
| <i>GPIO Board #1</i> | GPIO1.DI (8 bits) | GPIO3.DI (8 bits) GPIO5.DI (16 bits) GPIO6.DI (16 bits) |
| <i>GPIO Board #2</i> | GPIO12.DI (8 bits) | GPIO32.DI (8 bits) GPIO52.DI (16 bits) GPIO62.DI (16 bits) |
| <i>GPIO Board #3</i> | GPIO13.DI (8 bits) | GPIO33.DI (8 bits) GPIO53.DI (16 bits) GPIO63.DI (16 bits) |
| <i>GPIO Board #4</i> | GPIO14.DI (8 bits) | GPIO34.DI (8 bits) GPIO54.DI (16 bits) GPIO64.DI (16 bits) |

Digital outputs

| | Basic GPIO board | Extended GPIO board |
|----------------------|--------------------|--|
| <i>GPIO Board #1</i> | GPIO1.DO (8 bits) | GPIO3.DO (8 bits) GPIO5.DO (16 bits) GPIO6.DO (16 bits) |
| <i>GPIO Board #2</i> | GPIO12.DO (8 bits) | GPIO32.DO (8 bits) GPIO52.DO (16 bits) GPIO62.DO (16 bits) |
| <i>GPIO Board #3</i> | GPIO13.DO (8 bits) | GPIO33.DO (8 bits) GPIO53.DO (16 bits) GPIO63.DO (16 bits) |
| <i>GPIO Board #4</i> | GPIO14.DO (8 bits) | GPIO34.DO (8 bits) GPIO54.DO (16 bits) GPIO64.DO (16 bits) |

Analog inputs

| | Basic GPIO board | Extended GPIO board |
|----------------------|------------------|---------------------|
| <i>GPIO Board #1</i> | GPIO2.ADC | GPIO4.ADC |
| <i>GPIO Board #2</i> | GPIO22.ADC | GPIO42.ADC |
| <i>GPIO Board #3</i> | GPIO23.ADC | GPIO43.ADC |
| <i>GPIO Board #4</i> | GPIO24.ADC | GPIO44.ADC |

Analog outputs

| | Basic GPIO board | Extended GPIO board |
|----------------------|------------------|---------------------|
| <i>GPIO Board #1</i> | GPIO2.DAC | GPIO4.DAC |
| <i>GPIO Board #2</i> | GPIO22.DAC | GPIO42.DAC |
| <i>GPIO Board #3</i> | GPIO23.DAC | GPIO43.DAC |
| <i>GPIO Board #4</i> | GPIO24.DAC | GPIO44.DAC |

6.0 XPS Extended Firmware Architecture (Contact Newport)

NOTE

Contact Newport to obtain the extended firmware version that includes the following features.

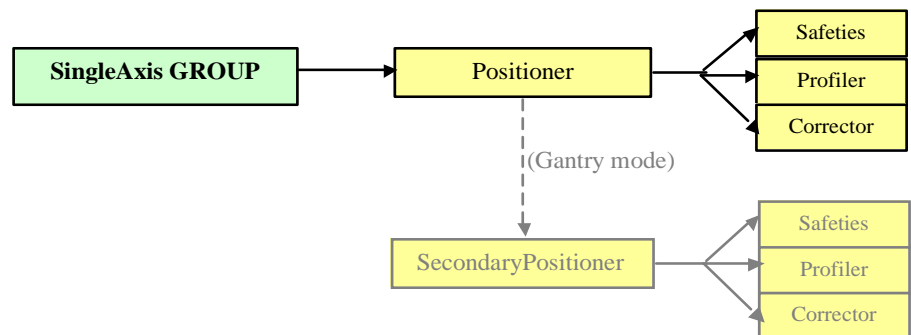
6.1 SingleAxisWithClamping Group

The SingleAxisWithClamping Group is composed of one single positioner that allows execution of motion commands.

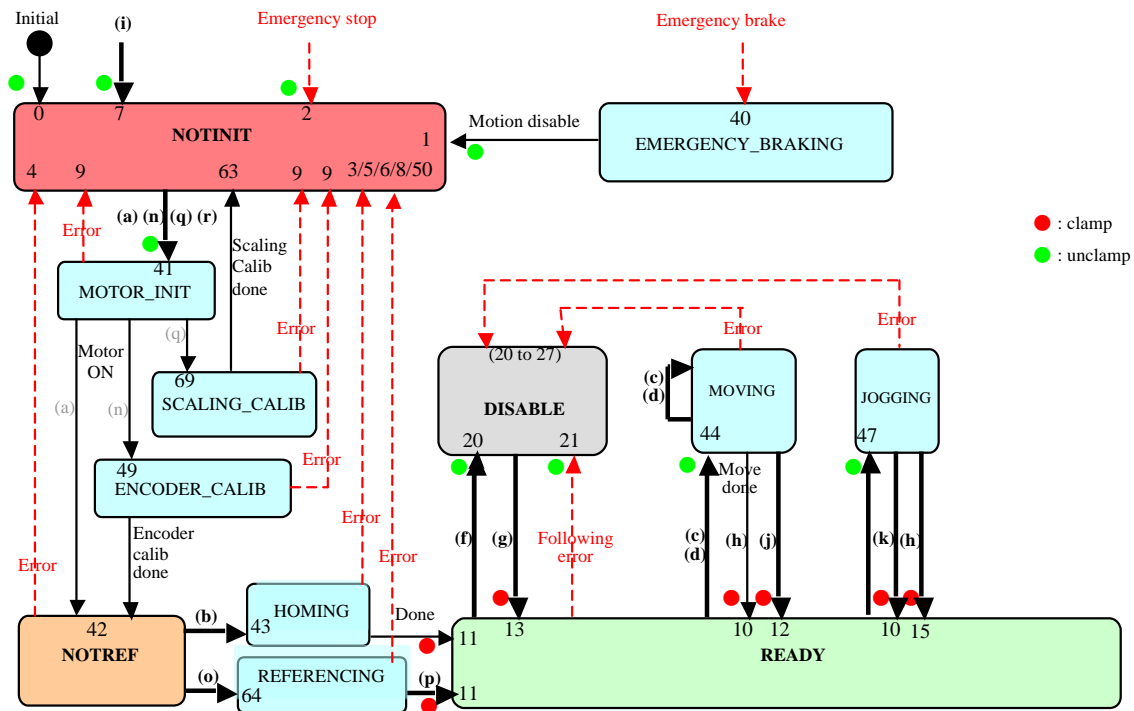
In general, it is similar to SingleAxis group, the only difference is the support of clamping: axis is clamped before moves, unclamped during moves and reclamped at stop. This enhances the stability at a position.

A SingleAxisWithClamping group CANNOT be used in GANTRY mode (*secondary positioner is impossible*).

The XPS controller can handle several SingleAxisWithClamping objects.



6.1.1 State Diagram

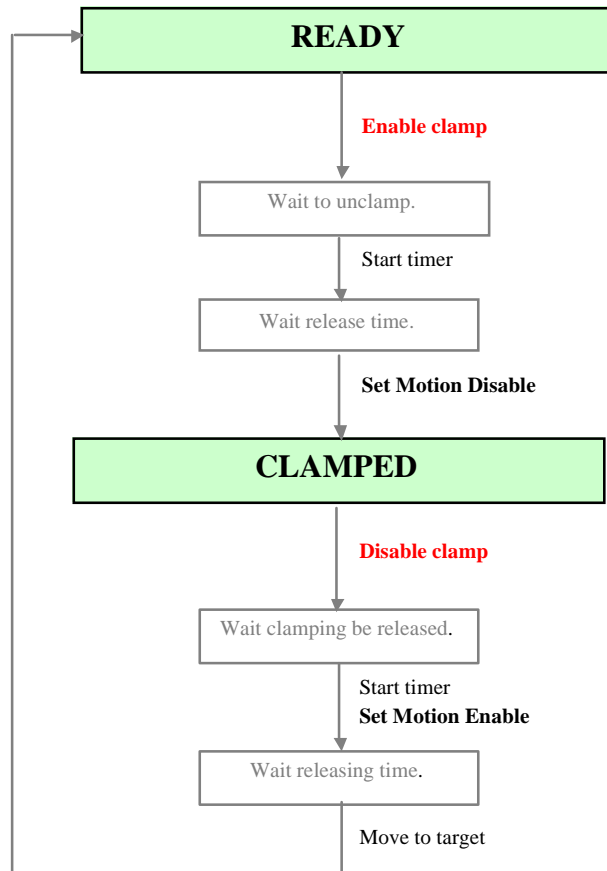


Called functions:

- (a) GroupInitialize
- (b) GroupHomeSearch
- (c) GroupMoveAbsolute
- (d) GroupMoveRelative
- (f) GroupMotionDisable
- (g) GroupMotionEnable
- (h) GroupMoveAbort
- (i) GroupKill or KillAll
- (j) GroupJogModeEnable
- (k) GroupJogModeDisable
- (l) GroupAnalogTrackingModeEnable
- (m) GroupAnalogTrackingModeDisable
- (n) GroupInitializeWithEncoderCalibration
- (o) GroupReferencingStart
- (p) GroupReferencingStop
- (q) PositionerAccelerationAutoScaling
- (r) GroupInitializeNoEncoderReset

6.1.2 Group Clamping Sequence

6.1.2.1 Clamping State Diagram



NOTES

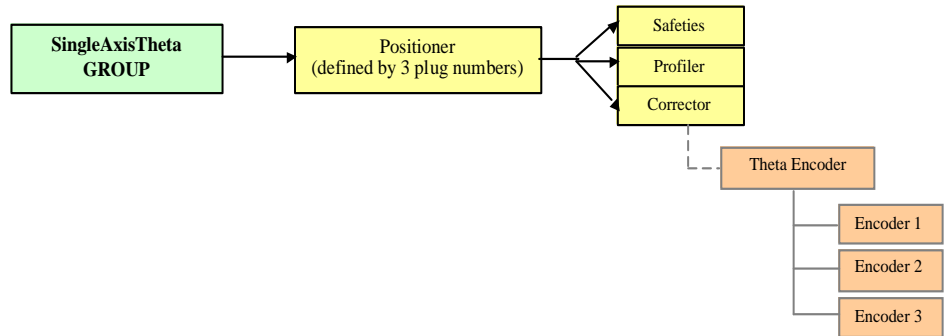
In case of recoverable errors (go to DISABLE state or go to READY state), the clamp is unclamped.

In case of fatal errors (go to NOT INIT state), the clamp stays in the current state (clamped).

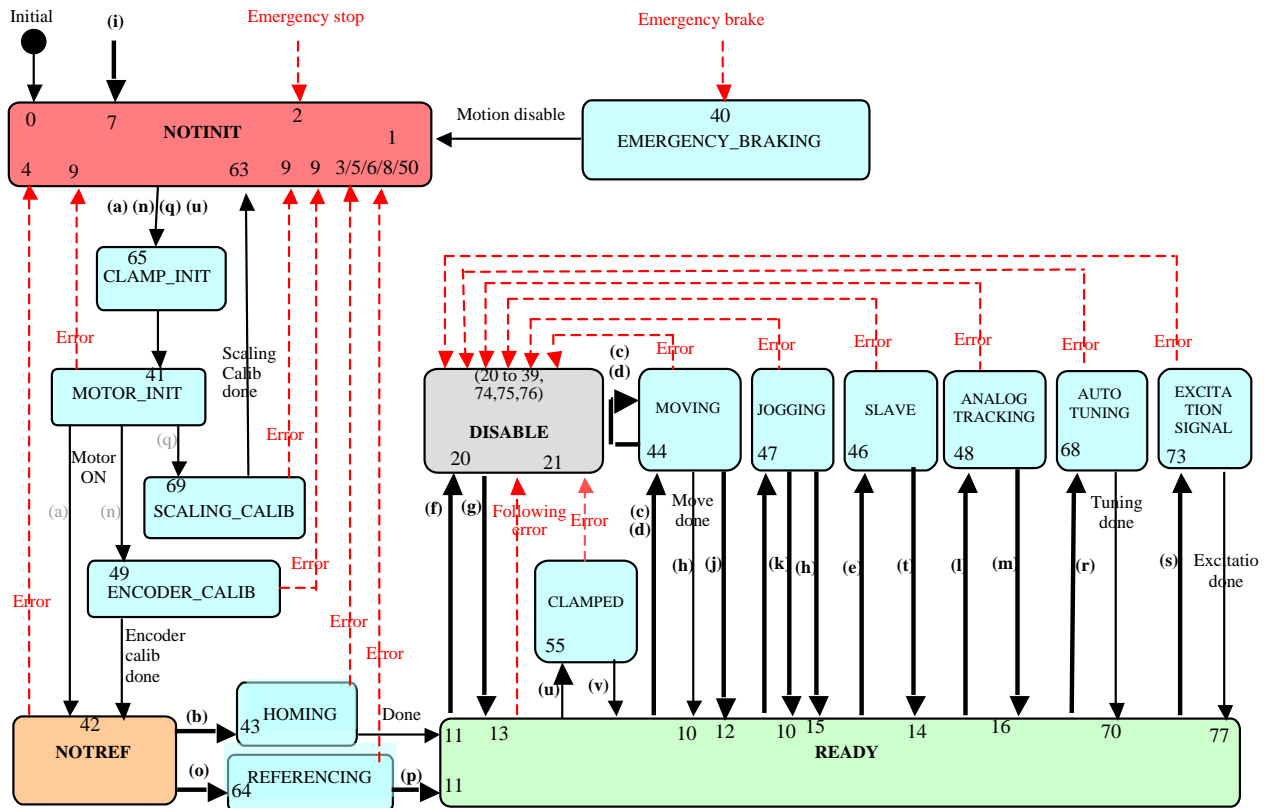
6.2 SingleAxisTheta Group

The SingleAxisTheta is composed of one single positioner object with three encoders (Theta encoder) for the execution of motion commands. It includes a “Yaw” mapping and a “Theta” correction on an XY group.

A SingleAxisTheta group CANNOT be used in GANTRY mode (*secondary positioner is impossible*).



6.2.1 State Diagram

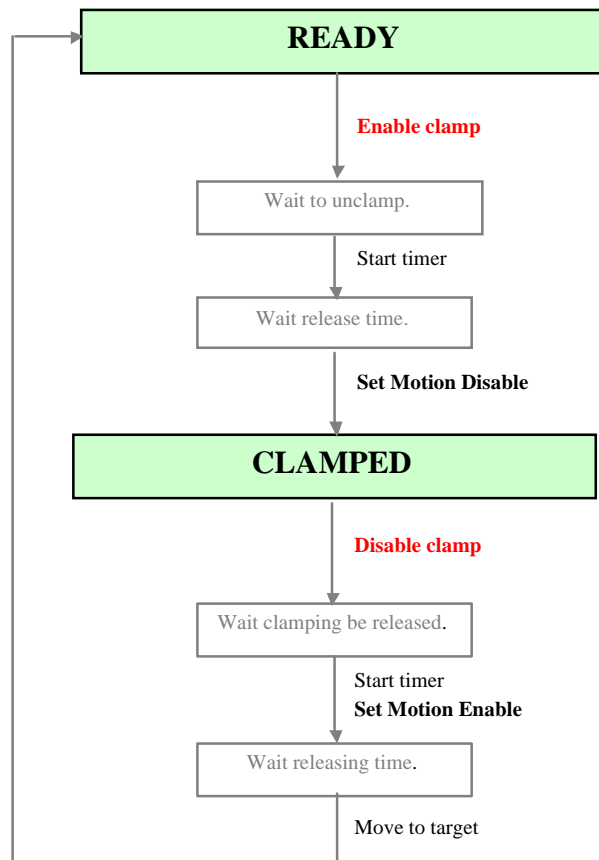


Called functions:

- (a) GroupInitialize
- (b) GroupHomeSearch
- (c) GroupMoveAbsolute
- (d) GroupMoveRelative
- (e) GroupSlaveModeEnable
- (f) GroupMotionDisable
- (g) GroupMotionEnable
- (h) GroupMoveAbort
- (i) GroupKill or KillAll
- (j) GroupJogModeEnable
- (k) GroupJogModeDisable
- (l) GroupAnalogTrackingModeEnable
- (m) GroupAnalogTrackingModeDisable
- (n) GroupInitializeWithEncoderCalibration
- (o) GroupReferencingStart
- (p) GroupReferencingStop
- (q) PositionerAccelerationAutoScaling
- (r) PositionerCorrectorAutoTuning
- (s) PositionerExcitationSignalSet / PositionerPreCorrectorExcitationSignalSet
- (t) GroupSlaveModeDisable
- (u) GroupInitializeNoEncoderReset

6.2.2 Group Clamping Sequence

6.2.2.1 Clamping State Diagram



NOTES

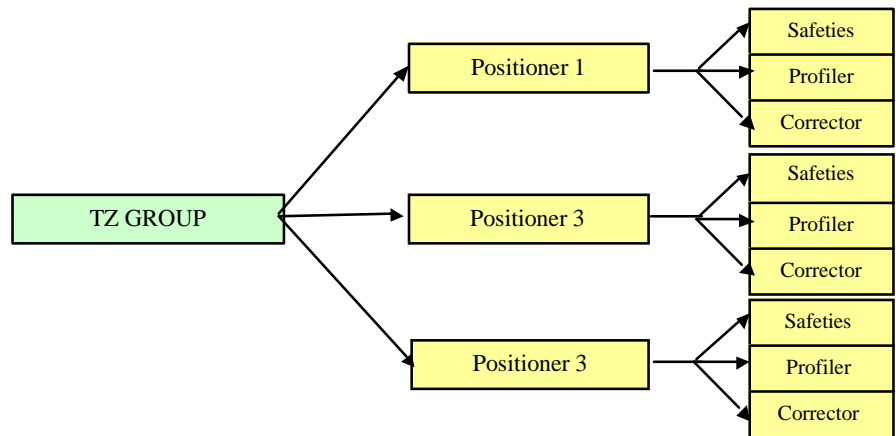
In case of recoverable errors (go to DISABLE state or go to READY state), the clamp is unclamped.

In case of fatal errors (go to NOT INIT state), the clamp stays in the current state (clamped).

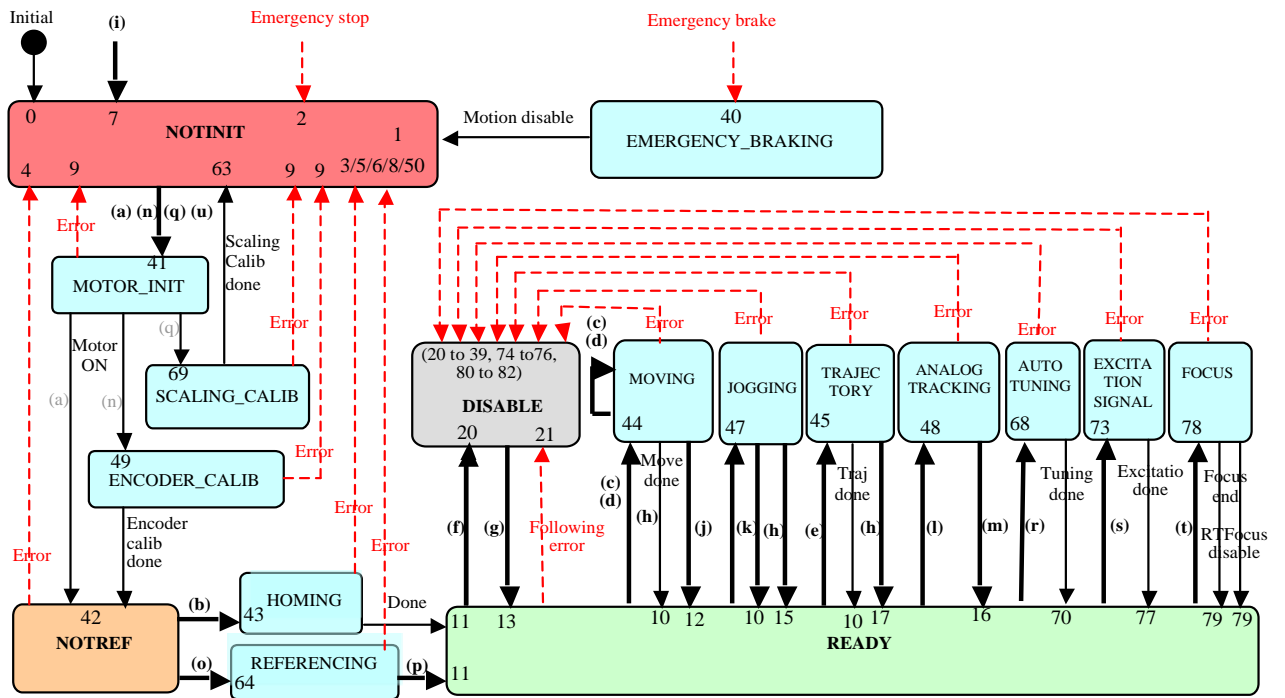
6.3 TZ Group

A TZ group is a 3-positioner object, like the XYZ group, but with the following differences:

- It supports the **PVT** trajectories.
- It does not support 3D **spline** trajectories.
- It supports **TZDecoupling**, **XYtoZZZAccelerationFeedforward** and **TZTracking** functionalities.
- It supports **Focus process** via the XPS focus interface board and focus process module (focus.out).
- It has a specific way of initialization
(*MotorDriverInterface = AnalogAccelerationTZ*).



6.3.1 State Diagram



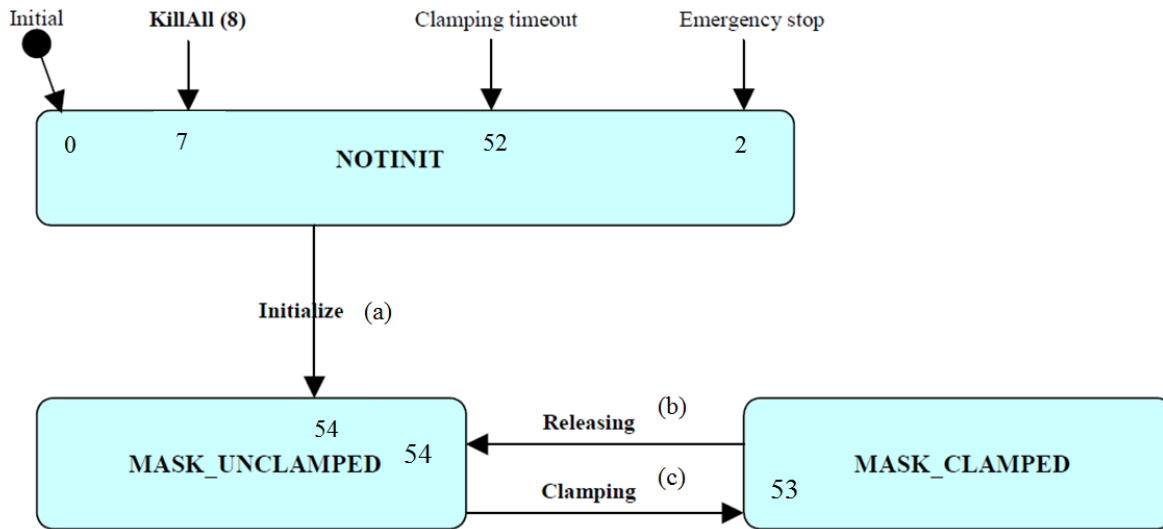
Called functions:

- | | |
|------------------------------|---|
| (a) GroupInitialize | (l) GroupAnalogTrackingModeEnable |
| (b) GroupHomeSearch | (m) GroupAnalogTrackingModeDisable |
| (c) GroupMoveAbsolute | (n) GroupInitializeWithEncoderCalibration |
| (d) GroupMoveRelative | (o) GroupReferencingStart |
| (e) MultipleAxesPVTExecution | (p) GroupReferencingStop |
| (f) GroupMotionDisable | (q) PositionerAccelerationAutoScaling |
| (g) GroupMotionEnable | (r) PositionerCorrectorAutoTuning |
| (h) GroupMoveAbort | (s) PositionerExcitationSignalSet |
| (i) GroupKill or KillAll | (t) TZFocusModeEnable |
| (j) GroupJogModeEnable | (u) GroupInitializeNoEncoderReset |
| (k) GroupJogModeDisable | |

6.4 Mask Group

Mask object defines a clamper drive with real time state monitoring.

6.4.1 State Diagram



functions:

- | | |
|---------------------|----------------------|
| (a) GroupInitialize | (c) MaskClampDisable |
| (b) MaskClampEnable | |

6.5 User External Module Programming

The user external module programming manages the written by user program blocks (*ExternalModules*) in the XPS controller, with the following conditions:

- Every user external module is written in C language (GNU with QNX Momentics IDE).
- The user ExternalModule (*.so) must be stored in the “/Admin/UserOptionalModules/” in the XPS controller.
- Every user external module is loaded and executed at boot in adding the external module name in the **SharedLibraryModuleNames** line of the *[GENERAL]* section of system.ref file.

system.ref :

```
[GENERAL]
```

```
[...]
```

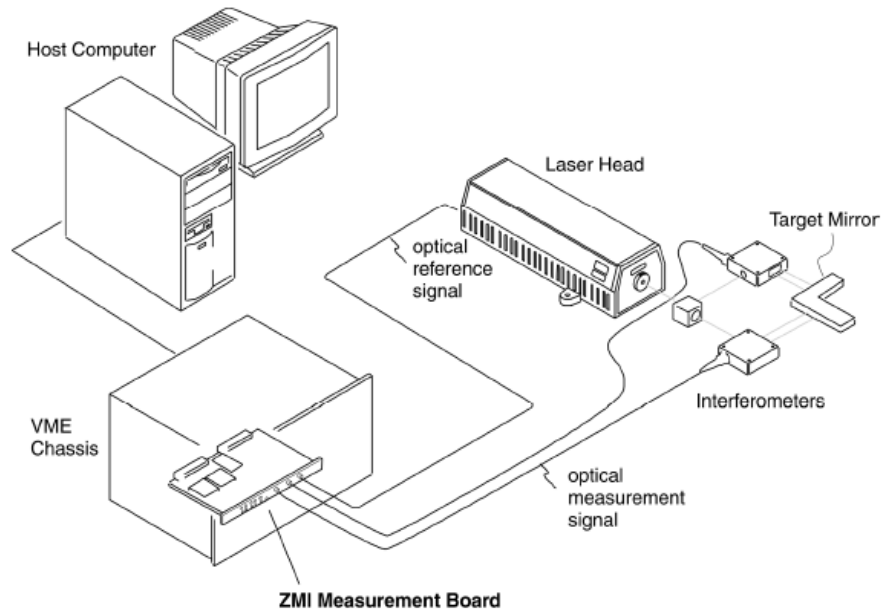
```
SharedLibraryModuleNames = ExternalModule1, ExternalModule2
```

```
[...]
```

6.6 ZYGO Interferometer

6.6.1 ZMI Measurement System

Refer to **ZMI 2400 series manual - OMP 0537_F**



6.6.2 ZYGO P2 Interface Registers

| | P2 Registers | Read | Write |
|----------------|--------------|--------------|------------------|
| Axis #1 | 0 | Axis status | <i>Read only</i> |
| | 2 | Position | |
| | 4 | Velocity | |
| | 6 | Time | |
| Axis #2 | 8 | Axis status | <i>Read only</i> |
| | 10 | Position | |
| | 12 | Velocity | |
| | 14 | Time | |
| General | 16 | Board status | Command |
| Info | 18 | Revision | <i>Read only</i> |
| | 20 | ID | |

6.6.3 Status, Error, and High Nibble P2 Interface Register

This register contains the status bits, error bits, and the 4 high order position data bits. The table below lists the bit positions of these signals in the register. See “Error Detection and Status Reporting” section for more information. The bits that correspond to fatal errors are indicated by “(F)”.

Table 3-4 Status, Error, and High Nibble P2 Interface Register Bit Positions

| Bit | Description | XPS group state after detection |
|-----|------------------------------|---------------------------------|
| 0 | 1 (not used) | |
| 1 | 1 (not used) | |
| 2 | 1 (not used) | |
| 3 | 1 (not used) | |
| 4 | 1 (not used) | |
| 5 | 1 (not used) | |
| 6 | 1 (not used) | |
| 7 | 1 (not used) | |
| 8 | 1 (not used) | |
| 9 | 1 (not used) | |
| 10 | 1 (not used) | |
| 11 | User Bit | |
| 12 | Position Data bit 32 | |
| 13 | Position Data bit 33 | |
| 14 | Position Data bit 34 | |
| 15 | Position Data bit 35 | |
| 16 | Reference Signal Present | |
| 17 | Reference PLL Locked | |
| 18 | System OK | |
| 19 | Measurement Signal Present | |
| 20 | Position Reset Complete | |
| 21 | (F) Reference Signal Missing | Not init |
| 22 | (F) Reference PLL Error | Not init |
| 23 | (F) System Error | Not init |
| 24 | (F) Measure Signal Missing | Not init |
| 25 | (F) Measure Signal Dropout | Not init |
| 26 | (F) Measure Signal Glitch | Not init |
| 27 | (F) Velocity Error | |
| 28 | User Velocity Error | |
| 29 | (F) Acceleration Error | |
| 30 | (F) 36 bit Position Overflow | Not init |
| 31 | 32 bit Position Overflow | Not init |

The high nibble bits are latched at the same time as the P2 Position register, and should be read after the position is read. The error bits (21-31) have the same meaning as the corresponding errors in the VME Error Status register (bits 0-10). The P2 Error register is set and reset separately from the VME Error Status register.

The status bits (16-20) have the same meaning as the corresponding status bits in the VME Status Register (bits 0-4). The *User Bit* shows the state of the *User P2* bit in VME Control Register 1.

6.6.4 ZYGO Error Code Table

| Error Code | Description |
|------------|--|
| -10000 | Successful Zygo command |
| -10001 | Syntax error in command or unrecognized command |
| -10002 | Internal error occurred while parsing request |
| -10003 | Invalid character detected in command input |
| -10004 | Un-terminated string |
| -10005 | Invalid hex number |
| -10020 | Error accessing the Measuring Board |
| -10021 | Operation not supported for ZEC-Measuring Board set |
| -10022 | Invalid Register offset detected |
| -10023 | Invalid axis number detected |
| -10024 | Invalid ADC Mux value detected |
| -10025 | ADC operation timed out |
| -10026 | Invalid EEPROM offset detected |
| -10027 | EEPROM operation timed out |
| -10028 | Invalid register type specified |
| -10029 | Value to write too large for register type |
| -10030 | Value to write missing |
| -10031 | Invalid operation type specified |
| -10032 | Value to write invalid |
| -10033 | Internal error saving Ethernet Card configuration data |
| -10034 | Invalid IP address |
| -10035 | Invalid Subnet mask |
| -10036 | Invalid Gateway IP address |
| -10037 | UDP Measurement Data transmission already in progress |
| -10050 | Another Firmware update is already in progress |
| -10051 | Firmware update irrecoverable file transfer error |
| -10052 | Firmware update file data received is incomplete |
| -10053 | Firmware update error performing a PROM operation |

The error description is returned by the “ErrorStringGet” function.

All error code list is returned by the “ErrorListGet” function.

6.6.5 PEG Control Register

The bit assignments of the PEG Control register are listed below. The *PEG Enable Control* and *PEG Disable Control* fields control the overall operation of the PEG subsystem.

| Bit | Description |
|-------|---|
| 1:0 | PEG Pulse Width (00 = 25 ns, 01 = 50 ns, 10 = 75 ns, 11 = 100 ns) |
| 2 | Enable P1->P2 operation |
| 3 | Enable P2->P1 operation |
| 4 | PEG Axis Select (0 = axis 1, 1 = axis 2) |
| 5 | PEG Output Enable |
| 6 | PEG Output Polarity (0 = Low pulse, 1 = High pulse) |
| 7 | Enable Delta 2 |
| 10:8 | PEG Disable Control 0 = NO_EXIT = Don't disable 1 = P1_EXIT = Disable at P1 exit 2 = P2_EXIT = Disable at P2 exit 3 = ANY_EXIT = Disable at P1 or P2 exit 4 = IMM_EXIT = Disable immediately |
| 11 | PEG P2 Delta (0 = Delta 1, 1 = Delta 2) |
| 13:12 | PEG Enable Control 0 = NO_ENT = Don't enable 1 = P1_ENT = Enable at P1 entry 2 = P2_ENT = Enable at P2 entry 3 = ANY_ENT = Enable at P1 or P2 entry |
| 15:14 | Reserved |

6.6.6 ZYGO Axis Error Status List

| code | Error Status description | Error mask |
|--------|-----------------------------|------------|
| 0 | Success | |
| 0x0001 | Reference signal is missing | 1 |
| 0x0002 | Reference PLL Error | 1 |
| 0x0004 | System Error | 1 |
| 0x0008 | Measure Signal Missing | 1 |
| 0x0010 | Measure Signal Dropout | 0 |
| 0x0020 | Measure Signal Glitch | 1 |
| 0x0040 | Velocity Error | 1 |
| 0x0100 | Acceleration Error | 0 |
| 0x0200 | 36 bit Position Overflow | 1 |
| 0x0400 | 32 bit Position Overflow | 1 |
| 0x0800 | P2 External Sample | 0 |
| 0x1000 | Not used | 0 |
| 0x2000 | PEG Error | 0 |
| 0x4000 | Not used | 0 |
| 0x8000 | IRQ Pending | 0 |

The axis error status register is read via Ethernet. A XPS controller error is generated when one or several bits of Error mask are ON. In this case, the group goes to NOTINIT state.

6.6.7 ZYGO Axis Status List

| code | Status description |
|--------|------------------------------|
| 0 | Success |
| 0x0001 | Reference signal present |
| 0x0002 | Reference PLL |
| 0x0004 | System OK |
| 0x0008 | Measure Signal present |
| 0x0010 | Position Reset Complete |
| 0x0020 | ADC Ready |
| 0x0040 | ADC Mux = 0 |
| 0x0100 | External Sample Flag (SCLK0) |
| 0x0200 | Not used |
| 0x0400 | Not used |
| 0x0800 | Not used |
| 0x1000 | System Type ST0 |
| 0x2000 | System Type ST1 |
| 0x4000 | System Type ST2 |
| 0x8000 | System Type ST3 |

The axis status register is read via **Ethernet**.

7.0 XPS Functions Description

7.1 Input Tests Common to all XPS Functions

For all commands, general input tests are the following:

General:

- 20 Controller initialization failed.
- 21 XPS initialization in progress.

Check the command format:

- 7 Wrong format in the command string.

Check the number of parameters:

- 9 Wrong number of parameters in the command.

Check input/output parameter type:

- 10 Wrong parameter type in the command string.
- 11 Wrong parameters type in the command string: word or word * expected.
- 12 Wrong parameter type in the command string: bool or bool * expected.
- 13 Wrong parameter type in the command string: char * expected.
- 14 Wrong parameter type in the command string: double or double * expected.
- 15 Wrong parameter type in the command string: int or int * expected.
- 16 Wrong parameter (value < 0) or wrong type in the command string: unsigned int or unsigned int * expected.
- 128 Wrong parameter (value < 0) or wrong type in the command string: unsigned short or unsigned short * expected.
- 129 Wrong parameter (value < 0) or wrong type in the command string: unsigned long or unsigned long * expected.
- 132 Wrong parameter (value < 0) or wrong type in the command string: unsigned long long or unsigned long long * expected.

7.2 XPS Functions Lists

7.2.1 Standard Functions

7.2.1.1 CleanCoreDumpFolder

Name

CleanCoreDumpFolder – Cleans the folder “/Admin/Public/CoreDump” to delete all debug core dump (*.core) files.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if “/Admin/Public/CoreDump” exists: (-22)
- Checks error code returned by shell system command: (-100)

Description

This function cleans the “/Admin/Public/CoreDump” folder to delete all core files and to free memory.

Prototype

```
int CleanCoreDumpFolder(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -22: Not allowed action.
- -100: Internal error.

7.2.1.2 CleanTmpFolder

Name

CleanTmpFolder – Cleans the folder “tmp” to delete all temporary files.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks error code returned by shell system command: (-100)

Description

This function cleans the “tmp” folder to delete all temporary files.

Prototype

int **CleanTmpFolder**(int SocketID)

Input parameters

SocketID int Socket identifier gets by the
“TCP_ConnectToServer” function.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -100: Internal error.

7.2.1.3 CloseAllOtherSockets

Name

CloseAllOtherSockets – Closes all sockets beside the one used.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks “Administrator” rights: (-107)

Description

This function allows an administrator to close all user sockets except the socket used to call this function.

All other user sockets are closed. So, ERR_SOCKET_CLOSED_BY_ADMIN error is sent to each running (on an user socket) process before the socket is really closed.

Prototype

```
int CloseAllOtherSockets()
```

Input parameters

None.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -107: This function requires Administrator rights.

NOTE

Call the “Login” function to identify the user as “Administrator”.

CAUTION



If some TCL scripts are in progress (after a “TCLScriptExecute” function or a “TCLScriptExecuteAndWait” function), do not use CloseAllOtherSockets to function to kill these TCL scripts. Use the “TCLScriptKill” function to stop the TCL execution and only after can you use the “CloseAllOtherSockets” function to close sockets.

7.2.1.4 ControllerMotionKernelTimeLoadGet

Name

ControllerMotionKernelTimeLoadGet – Gets controller motion kernel time load.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function gets the last exact value of the controller’s motion kernel time load (total , corrector, profiler and servitudes calculation time).

$$\text{CorrectorTimeLoad} = \text{CorrectorCalculationTime} / \text{CorrectorISRPeriod}$$

$$\text{ProfilerTimeLoad} = \text{ProfilerCalculationTime} / \text{CorrectorISRPeriod} / \text{ProfileGeneratorISRRatio}$$

$$\text{ServitudesTimeLoad} = \text{ServitudesCalculationTime} / \text{CorrectorISRPeriod} / \text{ServitudesISRRatio}$$

$$\text{TotalTimeLoad} = \text{CorrectorTimeLoad} + \text{ProfilerTimeLoad} + \text{ServitudesTimeLoad}$$

NOTE

Refer to system.ref file to get **CorrectorISRPeriod**, **ProfileGeneratorISRRatio** and **ServitudesISRRatio**.

Prototype

```
int ControllerMotionKernelTimeLoadGet(
    int SocketID,
    double * CPUTotalLoadRatio,
    double * CPUCorrectorLoadRatio,
    double * CPUProfilerLoadRatio,
    double * CPUServitudesLoadRatio
)
```

Input parameters

SocketID int Socket identifier used in each function.

Output parameters

| | | |
|------------------------|----------|--|
| CPUTotalLoadRatio | double * | Controller motion kernel total CPU time load. |
| CPUCorrectorLoadRatio | double * | Controller motion kernel corrector CPU time load. |
| CPUProfilerLoadRatio | double * | Controller motion kernel profiler CPU time load. |
| CPUServitudesLoadRatio | double * | Controller motion kernel servitudes CPU time load. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.5 ControllerRTTimeGet

Name

ControllerRTTimeGet – Gets the controller corrector period and corrector calculation time.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function gets the last exact value of the controller’s corrector period and the corrector calculation time.

NOTE

The default value of XPS controller corrector period is 0.125 ms (corresponding to an 8 kHz controller corrector frequency).

Prototype

```
int ControllerRTTimeGet(
    int SocketID,
    double * CurrentRTPeriod,
    double * CurrentRTUsage
)
```

Input parameters

SocketID int Socket identifier used in each function.

Output parameters

CurrentRTPeriod double * Controller corrector period (seconds).

CurrentRTUsage double * Controller corrector calculation time (seconds).

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.6 ControllerSlaveStatusGet [Extended]

Name

ControllerSlaveStatusGet – Gets the slave controller status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function, called from the master controller, gets the status of its slave controller(s). The slave controller status codes can take the following values:

- 0: All slave controllers are externally synchronized with the master controller.
- 1: The synchronization cable is not connected to any slave controller.
- 2: At least one slave controller is not externally synchronized with the master controller.

The description of slave controller(s) status codes can be obtained by “ControllerSlaveStatusStringGet” function sent from the master controller.

Prototype

```
int ControllerSlaveStatusGet(
    int SocketID, int * SlaveControllerStatus
)
```

Input parameters

SocketID int Socket identifier used in each function.

Output parameters

SlaveControllerStatus int * Slave status of the controller.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.7 ControllerSlaveStatusStringGet [Extended]

Name

ControllerSlaveStatusStringGet – Gets the slave controller's status description from a slave controller status code.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".

Description

This function returns the slave controller status description corresponding to a slave controller status code.

If the slave status code is not referenced then the function returns (-17) error.

Prototype

```
int ControllerSlaveStatusStringGet(  
    int SocketID,  
    int SlaveControllerStatus,  
    char * SlaveControllerStatusString  
)
```

Input parameters

| | | |
|-----------------------|-----|--|
| SocketID | int | Socket identifier used in each function. |
| SlaveControllerStatus | int | Slave controller status code. |

Output parameters

| | | |
|-----------------------------|--------|--------------------------------------|
| SlaveControllerStatusString | char * | Slave controller status description. |
|-----------------------------|--------|--------------------------------------|

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.

7.2.1.8 ControllerStatusGet

Name

ControllerStatusGet – Gets the controller status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Returns the controller status code. The controller status codes are listed in section 8.10: “Controller Status List”.

The description of the controller status code can be obtained with the “ControllerStatusStringGet” function.

The controller status flag is automatically reset after a controller status reading using the *ControllerStatusGet()* command.

Prototype

```
int ControllerStatusGet(
    int SocketID,
    int SlaveControllerStatus,
    char * SlaveControllerStatusString
)
```

Input parameters

| | | |
|-----------------------|-----|--|
| SocketID | int | Socket identifier used in each function. |
| SlaveControllerStatus | int | Slave controller status code. |

Output parameters

| | | |
|-----------------------------|--------|--------------------------------------|
| SlaveControllerStatusString | char * | Slave controller status description. |
|-----------------------------|--------|--------------------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.9 ControllerStatusRead

Name

ControllerStatusRead – Reads the controller status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Returns the controller status code. The controller status codes are listed in section “Group Status List”.

The description of the controller status code can be obtained with the “ControllerStatusStringGet” function.

Prototype

```
int ControllerStatusRead(int SocketID, int * ControllerStatus)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier used in each function. |
|----------|-----|--|

Output parameters

| | | |
|------------------|-------|---------------------------|
| ControllerStatus | int * | Status of the controller. |
|------------------|-------|---------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.10 ControllerStatusStringGet

Name

ControllerStatusStringGet – Gets the controller's status description from a controller status code.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".

Description

This function returns the controller status description corresponding to a controller status code (see section "Group Status List").

If the status code is not referenced then the "Unknown controller status code" message will be returned.

Prototype

```
int ControllerStatusStringGet(
    int SocketID,
    int ControllerStatusCode,
    char * ControllerStatusString
)
```

Input parameters

| | | |
|----------------------|-----|--|
| SocketID | int | Socket identifier used in each function. |
| ControllerStatusCode | int | Controller status code. |

Output parameters

| | | |
|------------------|--------|--------------------------------|
| ControllerStatus | char * | Controller status description. |
|------------------|--------|--------------------------------|

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.

7.2.1.11 ControllerSynchronizeCorrectorISR [Extended]

Name

ControllerSynchronizeCorrectorISR – Synchronizes the corrector ISR for master-slave controllers system.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function sets the mode of corrector ISR synchronization between master controller and its slave controllers.

Possible synchronization mode (*ModeString*) values:

“*MasterWithEcho*”: Turns a controller in the corrector ISR synchronization mode as Master. The master generates a synchronization signal (derived from its corrector ISR frequency) on a pin of the INHIBIT connector.

“*SlaveOnEcho*”: Turns a controller in the corrector ISR synchronization mode as Slave. The slave receives a synchronization signal (on a pin of INHIBIT connector) coming from its master and uses it as its corrector frequency.

“*Master*”: Return to local mode (each controller generates and uses its own corrector ISR frequency).

CAUTION



This function must be called on each controller (master and its slaves) in the following order: *Master first, then 1st, 2nd... slaves.*

Call this function only if every group is in the NOTINIT state.

If the controller has just rebooted, wait 300 seconds before calling this function (the necessary time to have the controller corrector ISR frequency stabilized).

Prototype

```
int ControllerSynchronizeCorrectorISR(
    int SocketID,
    char * ModeString
)
```

Input parameters

| | | |
|------------|--------|--|
| SocketID | int | Socket identifier used in each function. |
| ModeString | char * | Synchronization mode. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.12 ConvertLineARCtoPTTrajectory

Name

ConvertLineARCtoPTTrajectory- Converts LineArc trajectory to PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks File: (-61)
- Checks message queue: (-71)

Description

This function returns start and stop positions of the window used to synchronize the start or the stop of the pulses on absolute positions.

Prototype

```
int ConvertLineARCtoPTTrajectory (
    int SocketID,
    char GroupName[255],
    char* FileName,
    double Velocity,
    double Acceleration,
    double DeltaT,
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | MultipleAxes group,XYZ group, XY group, TZ group, Hexapod. |
| FileName | char* | LineARC Trajectory File Name. |
| Velocity | double | Maximum trajectory velocity. |
| Acceleration | double | Maximum trajectory Acceleration. |
| DeltaT | double | Time interval. |

Output parameters

| | | |
|--------------------|---------|------------------------|
| StartPositionArray | double* | Window Start position. |
| EndPositionArray | double* | Window End position. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.13 DataCollectionBufferReset [Extended]

Name

DataCollectionBufferReset – Reset data collection buffer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function clears any data in the data collection buffer.

Prototype

```
int DataCollectionBufferReset(  
    int SocketID,  
    )
```

Input parameters

SocketID string Socket identifier used in each function.

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.14 DataCollectionBufferAndTimeReset [Extended]

Name

DataCollectionBufferAndTimeReset – Reset data collection buffer and time stamp.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function clears the data collection buffer and resets the data collection time stamp. It allows to reset data and time stamp at once with a function call only.

Prototype

```
int DataCollectionBufferAndTimeReset(  
    int SocketID,  
    )
```

Input parameters

SocketID string Socket identifier used in each function.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.15 DataCollectionRequest [Extended]

Name

DataCollectionRequest – Gets frame of data collection.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check output data length: (-3)

Description

This function return a frame that contains the requested first blocks (max 500) of current data collection.

The frame length can be from 0 (no block) to 500 blocks depending on the time between the successive calls of DataCollectionRequest function. If the number of available blocks is smaller than the requested blocks in the function call, the actual number of blocks will be returned without error.

Example of a frame containing 4 data blocks :

```
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD;0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD;0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD;0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
0x1234ABCD 0x1234ABCD 0x1234ABCD 0x1234ABCD
```

Prototype

```
int DataCollectionRequest(
    int SocketID,
    int NbRequestBlocks,
    int *NbReturnBlocks,
    char *Frame
)
```

Input parameters

| | | |
|-----------------|--------|--|
| SocketID | string | Socket identifier used in each function. |
| NbRequestBlocks | int | Number of data blocks to get. |

Output parameters

| | | |
|----------------|--------|-------------------------------------|
| NbReturnBlocks | int * | Number of actually returned blocks. |
| Frame | char * | Blocks of collected data. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long (data too long to return)

7.2.1.17 DataCollectionTimeStampReset [Extended]

Name

DataCollectionTimeStampReset – Reset data collection time stamp.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function resets internal millisecond counter used as time stamp for data collection.

Prototype

```
int DataCollectionTimeStampReset(  
    int SocketID,  
    )
```

Input parameters

SocketID string Socket identifier used in each function.

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.18 DoubleGlobalArrayGet

Name

DoubleGlobalArrayGet – Gets the value of the global array of type “double”.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies the index number [0:1000]: (-17)

Description

This function gets the variable value from the global array of type “double”, related to a “Number” index. So, the first variable value from the global array is related to the index “0”.

The returned value is returned in a double format.

NOTE

The number of data points in the global array of type “double” is limited to 1000.

Prototype

```
int DoubleGlobalArrayGet(
    int SocketID,
    int Number,
    double * DoubleValue
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Number | int | Index in the global array. |

Output parameters

| | | |
|-------------|----------|-----------------|
| DoubleValue | double * | Variable value. |
|-------------|----------|-----------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.19 DoubleGlobalArraySet

Name

DoubleGlobalArraySet – Sets a value for the global array of type “double”.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies the index number [0:1000]: (-17)

Description

This function sets a new value in the global array located at the “Number” index and the new value is set in a double format.

NOTE

The first variable value from the global array is always located at index “0”.

The number of data points in the global array is limited to 1000, so the last index is “999”.

Prototype

```
int DoubleGlobalArraySet(
    int SocketID,
    int Number,
    double DoubleValue
)
```

Input parameters

| | | |
|-------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Number | int | Index in the global array. |
| DoubleValue | double | Variable value. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.20 ElapsedTimeGet

Name

ElapsedTimeGet – Gets the elapsed time since the controller was powered on.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the time in seconds that elapsed since the controller was powered on.

Prototype

```
int ElapsedTimeGet(  
    int SocketID,  
    double * ElapsedTime  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-------------|----------|-------------------------|
| ErrorString | double * | Elapsed time (seconds). |
|-------------|----------|-------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.21 ErrorStringGet

Name

ErrorStringGet – Gets the error description from a function error code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

The function returns the error description corresponding to a function error code (see section 8.7: “Positioner Driver Status List”).

If the error code is not referenced then the “Unknown error code” message will be returned.

Prototype

```
int ErrorStringGet(int SocketID, int ErrorCode, char * ErrorString)
```

Input parameters

| | | |
|-----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ErrorCode | int | Error code. |

Output parameters

| | | |
|-------------|--------|--------------------|
| ErrorString | char * | Error description. |
|-------------|--------|--------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.22 EventActionSetAndStart

Name

EventActionSetAndStart – Defines a combination of one event and one action in buffer, it launches the event and action configuration and gives an ID of the set event.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Event parameters: (-40), (-8).
- Action parameters: (-17), (-8)
- Action to execute: (-32) “Gathering” action.
- Action name: (-39)
- Last action configured in memory: (-81)

Description

Defines a combination of one event and one action, it activates the event and the action. See event specification to see which are necessary. The actions are defined in section “Events and Actions” in the XPS user’s manual.

Refer to section 8.2: “Actions List”.

EventActionSetAndStart() is useful to avoid conflict between Events/Actions configurations set from many processes that run in parallel.

NOTE

For the “ExecuteTCLScript” action, the “ActionParameter3” represents a list of arguments, which must be separated with a semicolon (;).

Prototype

```
int EventActionSetAndStart (
    int SocketID,
    char * ExtendedEventName,
    char * EventParameter1,
    char * EventParameter2,
    char * EventParameter3,
    char * EventParameter4
    char * ExtendedActionName,
    char * ActionParameter1,
    char * ActionParameter2,
    char * ActionParameter3,
    char * ActionParameter4
    int*   EventId)
```

Input parameters

| | | |
|--------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ExtendedEventName | char * | event name (maximum size = 250) . The events are defined in section “Events and Actions” in the XPS user’s manual. |
| EventParameter1 | char * | optional event’s parameter #1 (maximum size = 250). |
| EventParameter2 | char * | optional event’s parameter #2 (maximum size = 250). |
| EventParameter3 | char * | optional event’s parameter #3 (maximum size = 250). |
| EventParameter4 | char * | optional event’s parameter #4 (maximum size = 250). |
| ExtendedActionName | char * | action full name (maximum size = 250). |
| ActionParameter1 | char * | optional action’s parameter #1 (maximum size = 250). |
| ActionParameter2 | char * | optional action’s parameter #2 (maximum size = 250). |
| ActionParameter3 | char * | optional action’s parameter #3 (maximum size = 250). |
| ActionParameter4 | char * | optional action’s parameter #4 (maximum size = 250). |

Output parameters

| | | |
|---------|------|----------|
| EventId | int* | event Id |
|---------|------|----------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -32: Gathering not configured.
- -39: Mnemonic action doesn't exist.

7.2.1.23 EventExtendedAllGet

Name

EventExtendedAllGet – Gets all “event and action” identifiers in progress.

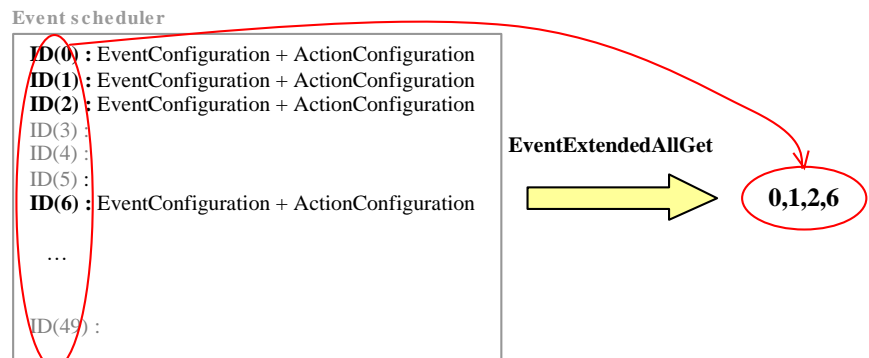
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Event ID: (-83).

Description

Gets the list of all “event and action” combination identifiers from the event scheduler (filled by the **ExtendedEventStart** or **ExtendedEventWait** functions).

The list separator is a comma. If no “event and action” combination is in progress (in the event scheduler) then the error (-83) is returned.



Prototype

```
int EventExtendedAllGet(
    int SocketID,
    int EventID,
    char * EventIdentifiersList
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| EventID | int | “Event and action” identifier from “ExtendedEventStart”. |

Output parameters

| | | |
|----------------------|--------|--|
| EventIdentifiersList | char * | List of “event and action” identifiers in scheduler. |
|----------------------|--------|--|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -83: Event ID not defined.

7.2.1.24 EventExtendedConfigurationActionGet

Name

EventExtendedConfigurationActionGet – Gets the action combination defined in buffer.

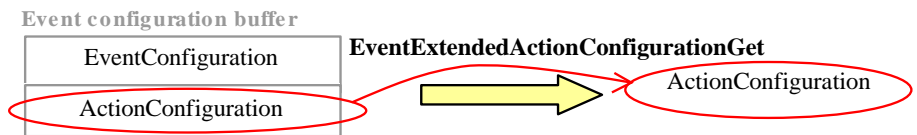
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks last action configuration in memory: (-81)

Description

Returns the combination of action(s) defined by “EventExtendedConfigurationActionSet” function.

If no action is configured in the buffer, (-81) error is returned.



NOTE

This function doesn't return the last activated action. A combination of action(s) can be defined in the buffer but not activated.

Prototype

```
int EventExtendedConfigurationActionGet(
    int SocketID,
    char * ActionConfiguration
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| EventID | int | “Event and action” identifier from “ExtendedEventStart”. |

Output parameters

| | | |
|---------------------|--------|--|
| ActionConfiguration | char * | Action combination configured in buffer. |
|---------------------|--------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -81: Action not configured.

7.2.1.25 EventExtendedConfigurationActionSet

Name

EventExtendedConfigurationActionSet – Defines a combination of one or several actions in buffer.

Input tests

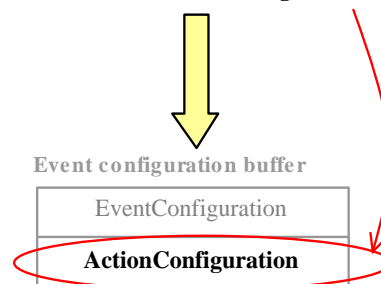
- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Action parameters: (-17), (-8)
- Action to execute: (-32) “Gathering” action.
- Action name: (-39)
- Last action configured in memory: (-81)

Description

Defines a combination of one or several actions but does not activate the actions. Use the “EventExtendedStart” function to activate these defined actions. For each action, 4 parameters can be configured ... see event specification to see which are necessary. The actions are defined in section “Events and Actions” in the XPS user’s manual.

The number of actions in a combination is limited to 10 actions.

EventExtendedActionConfigurationSet



Refer to section 8.2: “Actions List”.

NOTE

Before activating the defined actions, you must configure the events. Only then, can you use the “EventExtendedStart” or “EventExtendedWait” function.

For the “ExecuteTCLScript” action, the “ActionParameter3” represents a list of arguments, which must be separated with a semicolon (;).

Prototype

```

int EventExtendedConfigurationActionSet(
    int SocketID,
    int NbElements,
    char * ExtendedActionName,
    char * ActionParameter1,
    char * ActionParameter2,
    char * ActionParameter3,
    char * ActionParameter4)
  
```

Input parameters

| | | |
|---------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of events in configuration. |
| ExtendedActionName | char * | Event full name (maximum size = 250). The events are defined in section “Events and Actions” in the XPS user’s manual. |
| ActionConfiguration | char * | Action combination configured in buffer. |
| ActionParameter1 | char * | optional action’s parameter #1 (maximum size = 250). |
| ActionParameter2 | char * | optional action’s parameter #2 (maximum size = 250). |
| ActionParameter3 | char * | optional action’s parameter #3 (maximum size = 250). |
| ActionParameter4 | char * | optional action’s parameter #4 (maximum size = 250). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -32: Gathering not configured.
- -39: Mnemonic action doesn't exist.

7.2.1.26 EventExtendedConfigurationTriggerGet

Name

EventExtendedConfigurationTriggerGet – Gets the trigger defined in the buffer.

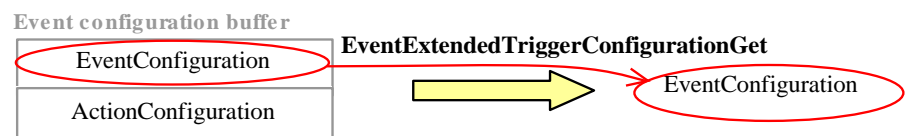
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Last event configuration in memory: (-80)

Description

Returns the last event defined in buffer by “EventExtendedConfigurationTriggerSet” function.

If no event is defined in buffer, (-80) error is returned.



NOTE

This function doesn't return the last activated event. An event can be configured but not activated.

Prototype

```
int EventExtendedConfigurationTriggerGet(
    int SocketID,
    char * EventTriggerConfiguration
)
```

Input parameters

SocketID int Socket identifier gets by the “TCP_ConnectToServer” function.

Output parameters

EventTriggerConfiguration char * Event combination configured in buffer.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -80: Event not configured.

7.2.1.27 EventExtendedConfigurationTriggerSet

Name

EventExtendedConfigurationTriggerSet - Defines a combination of one or several events in buffer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Event actor: (-8)
- Event name: (-40)

Description

Defines one trigger (combination of one or several events). To activate the trigger, use the “EventExtendedStart” function. For each event, 4 parameters can be configured... see event specification to see the necessary parameters. The events are defined in section “Events and Actions” in the XPS user’s manual.

The number of events in a combination is limited to 10 events.

EventExtendedTriggerConfigurationSet



Each full event name is defined as **[actor].[category].event** (see Event list):

[actor] - Optional actor name (Group name, Positioner name, GPIO name or Nothing)

[category] - Optional category name (Event category or Nothing)

event - Event name

NOTE

Before activating this event combination, you must define one or several action(s) with the “EventExtendedConfigurationTriggerSet” function. Next, use the “EventExtendedStart” or “EventExtendedWait” function to launch these defined “event and action”.

Prototype

```

int EventExtendedConfigurationTriggerSet(
    int SocketID,
    int NbElements,
    char * ExtendedEventName,
    char * EventParameter1,
    char * EventParameter2 ,
    char * EventParameter3,
    char * EventParameter4
)
  
```

Input parameters

| | | |
|-------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of events in configuration. |
| ExtendedEventName | char * | list of event full names (maximum size = 250) – separator is ‘;’. |
| EventParameter1 | char * | list of optional event’s parameter #1 (maximum size = 250). |
| EventParameter2 | char * | list of optional event’s parameter #2 (maximum size = 250). |
| EventParameter3 | char * | list of optional event’s parameter #3 (maximum size = 250). |
| EventParameter4 | char * | list of optional event’s parameter #4 (maximum size = 250). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -40: Mnemonic event doesn't exist.

7.2.1.28 EventExtendedGet

Name

EventExtendedGet – Gets the details of “event and action” combinations in scheduler defined by an identifier.

Input tests

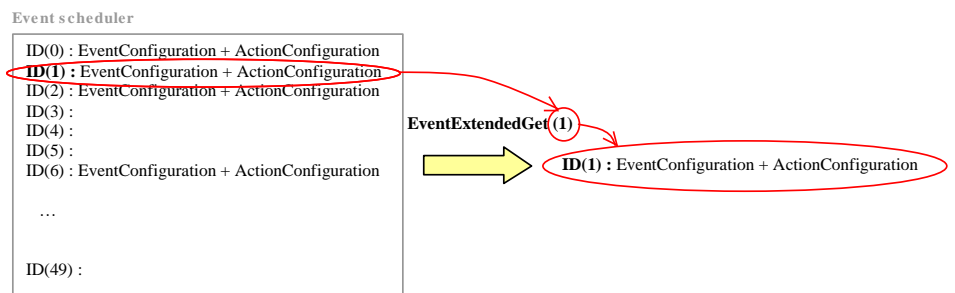
- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Event identifier [0:49]: (-83)

Description

Returns the composition of events and actions in progress defined by an identifier. This identifier is defined in the “EventExtendedStart” function.

The identifier must be defined between 0 and 49, if its value is “-1” then it’s not defined.

If the configured event is already deleted, (-83) error is returned.



Prototype

```
int EventExtendedGet(
    int SocketID,
    int EventID,
    char * EventConfiguration,
    char * ActionConfiguration
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| EventID | int | “Event and action” identifier from “ExtendedEventStart”. |

Output parameters

| | | |
|---------------------|--------|--|
| EventConfiguration | char * | Event combination defined in scheduler. |
| ActionConfiguration | char * | Action combination defined in scheduler. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -83: Event ID not defined.

7.2.1.29 EventExtendedRemove

Name

EventExtendedRemove – Removes an “event and action” combination in the scheduler defined by an identifier.

Input tests

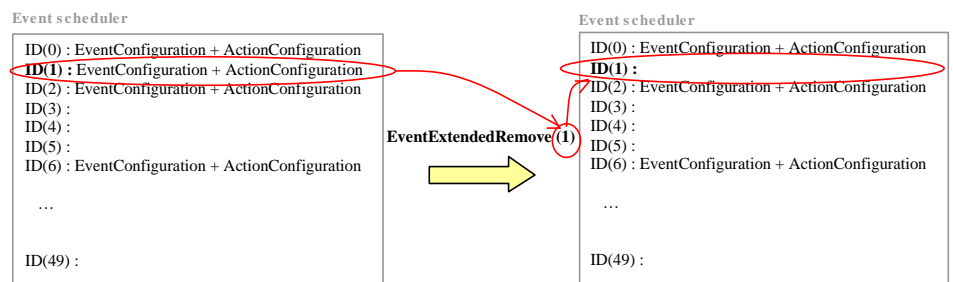
- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor event: (-8)
- Event identifier [0:49]: (-17), (-83)

Description

Deletes the “event(s) and action(s)” combination in the scheduler defined by an event identifier. This identifier is defined in the “EventExtendedStart” function.

The identifier must be defined between 0 and 49, or -1. If the identifier is equal to “-1”, the EventExtendedRemove function removes all current “event and action” combinations.

If the configured event is already deleted, (-83) is returned.



Prototype

```
int EventExtendedRemove(
    int SocketID,
    int EventID
)
```

Input parameters

- | | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| EventID | int | “Event and action” identifier. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -83: Event ID not defined.

7.2.1.30 EventExtendedStart

Name

EventExtendedStart – Activates the “event and action” defined in the buffer.

Input tests

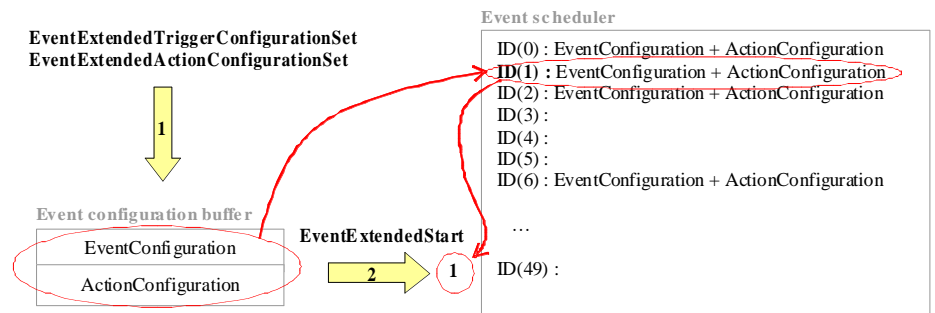
- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Event name to execute: (-8), (-40)
- Last event configuration in memory: (-80)
- Last action configuration in memory: (-81)
- Number of compositions in execution: (-82)

Description

Launches the configured event(s) and action(s) from the event configuration buffer into the event scheduler and gets an event identifier. The identifier must be defined between 0 and 49, if its value is “-1” then that means it’s not defined.

If no event is configured in buffer, (-80) error is returned.

If no action is configured in buffer, (-81) error is returned.



NOTE

In the event scheduler, when a configured event has occurred it is deleted from the event scheduler.



CAUTION

If the configured event is PERMANENT then it is not deleted after it occurs, and must use the “EventExtendedRemove” function to delete it.

Prototype

```
int EventExtendedStart(
    int SocketID,
    int EventID
)
```


Input parameters

SocketID int Socket identifier gets by the
"TCP_ConnectToServer" function.

Output parameters

EventID int * "Event and action" identifier.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -40: Mnemonic event doesn't exist.
- -80: Event not configured.
- -81: Action not configured.
- -82: Event buffer is full.

7.2.1.31 EventExtendedWait

Name

EventExtendedWait – Activates the last “event” configuration in memory and wait until it occurs.

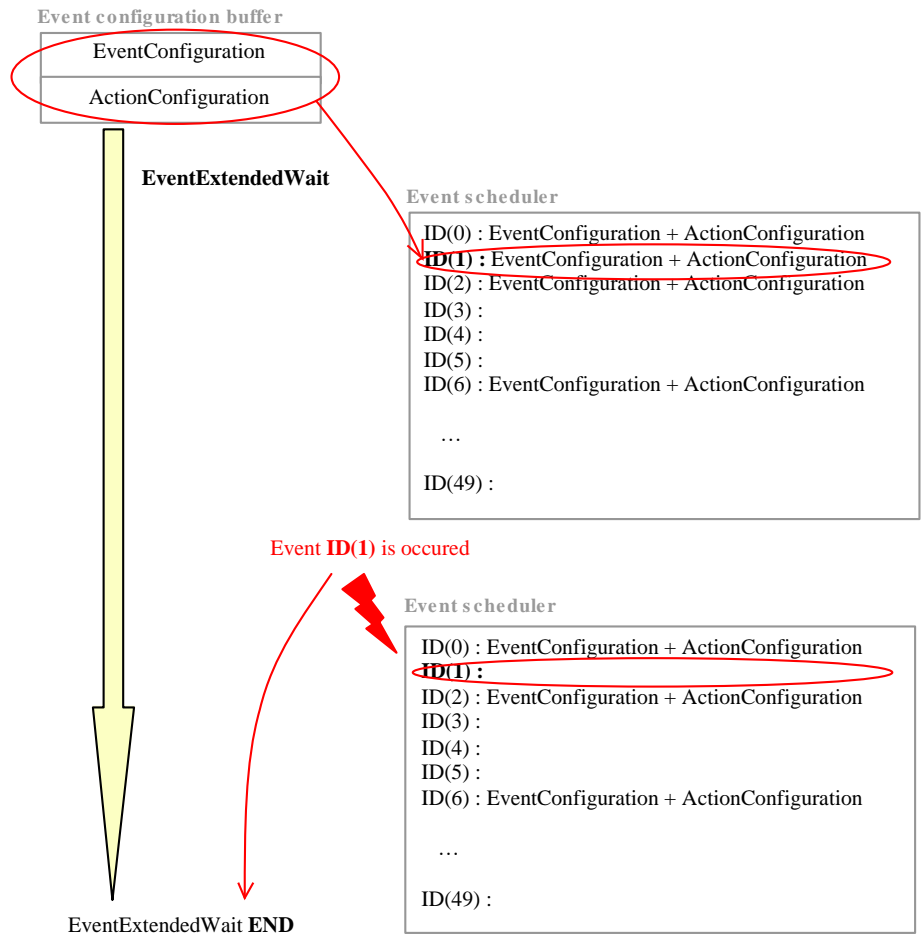
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Event actor: (-8)
- Last event configuration in memory: (-80)
- Number of compositions in execution: (-82)

Description

Launches the last configured event(s) into the event scheduler and wait until it occurs to unlock the socket.

If no “event and action” combination is configured in the event configuration buffer, (-80) error is returned.



Prototype

```
int EventExtendedWait(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -40: Mnemonic event doesn't exist.
- -80: Event not configured.
- -82: Event buffer is full.

7.2.1.32 ExternalInterlockErrorStringGet [MODULE]

Name

ExternalInterlockErrorStringGet – Gets the external interlock error description.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Optional module load in memory: (-97)

Description

This function returns an external interlock error description from an external interlock error code. This external interlock error code value is between 0 to 65535 and is represented on 16 bits as following:

| Error code | Error Bit # | Error description |
|------------|-------------|-------------------|
| 0 | - | No error |
| 1 | 0 | Error #1 |
| 2 | 1 | Error #2 |
| 4 | 2 | Error #3 |
| 8 | 3 | Error #4 |
| 16 | 4 | Error #5 |
| ... | ... | ... |
| 32768 | 15 | Error #15 |

NOTE

Error #x is defined in relation to the referenced errors managed by the External Interlock optional module load in memory.

See section 8.11: “Positioner Error List”.

Prototype

```
int ExternalInterlockErrorStringGet (
    int SocketID,
    int ErrorCode,
    char * ErrorDescription
)
```

Input parameters

SocketID int Socket identifier gets by the “TCP_ConnectToServer” function.

ErrorCode int * External interlock error code.

Output parameters

ErrorDescription char * External interlock error description.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -98: Error of loading an optional module

7.2.1.33 ExternalInterlockGroupErrorGet [MODULE]

Name

ExternalInterlockGroupErrorGet – Gets the current external group interlock error code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Valid group type: (-8)
- Valid Group name: (-19)
- External group interlock configuration: (-205)

Description

This function returns the current external group interlock error code. It must be used after the erreur -202 to get interlock error description.

The external group interlock error code is a 16 bit word and its value is between 0 to 65535.

NOTE

See section 8.11: “Positioner Error List”.

Prototype

```
int ExternalInterlockGroupErrorGet (
    int SocketID,
    char GroupName[250],
    int *CurrentErrorCode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|------------------|-------|--|
| CurrentErrorCode | int * | Current external group interlock error code. |
|------------------|-------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -205: Not enable in your configuration

7.2.1.34 ExternalInterlockLiftPinErrorGet [MODULE]

Name

ExternalInterlockLiftPinErrorGet – Gets the current external lift pin interlock error code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Valid SingleAxis group type: (-8)
- Valid Group name: (-19)
- External group interlock configuration: (-205)

Description

This function returns the current external lift pin interlock error code. It must be used after the erreur -202 to get interlock error description. This command is compatible with SingleAxis group only.

The external lift pin interlock error code is a 16 bit word and its value is between 0 to 65535.

NOTE

See section 8.11: “Positioner Error List”.

Prototype

```
int ExternalInterlockLiftPinErrorGet (
    int SocketID,
    char GroupName[250],
    int *CurrentErrorCode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name (SingleAxis only). |

Output parameters

| | | |
|------------------|-------|---|
| CurrentErrorCode | int * | Current external lift pin interlock error code. |
|------------------|-------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -205: Not enable in your configuration

7.2.1.35 ExternalModuleErrorStringGet

Name

ExternalModuleErrorStringGet– Gets the external interlock error description.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Optional module load in memory: (-97)

Description

This function returns an error description from an error code. This error code value is between 0 to 65535 and is represented on a 16 bit word:

| Error code | Error Bit # | Error description |
|------------|-------------|-------------------|
| 0 | - | No error |
| 1 | 0 | Error #1 |
| 2 | 1 | Error #2 |
| 4 | 2 | Error #3 |
| 8 | 3 | Error #4 |
| 16 | 4 | Error #5 |
| ... | ... | ... |
| 32768 | 15 | Error #15 |

NOTE

Error #x is defined in relation to the referenced errors managed by the optional module load in memory.

If **Error #x** is not referenced by the optional module then the function returns “Unknown error”

Prototype

```
int ExternalModuleErrorStringGet (
    int SocketID,
    int ModuleNumber,
    int ErrorCode,
    char * ErrorDescription
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ModuleNumber | int | External module number [1:4] |
| ErrorCode | int | Error code. |

Output parameters

| | | |
|------------------|--------|--------------------|
| ErrorDescription | char * | Error description. |
|------------------|--------|--------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.36 ExternalModuleFirmwareVersionGet

Name

ExternalModuleFirmwareVersionGet – Gets the firmware version of an ExternalModule.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the module number (must ≥ 1 and $\leq NbExternalModules$): (-17)
Here: *NbExternalModules* is the number of modules declared in the line *SharedLibraryModuleNames* of *system.ref*

Description

This function gets the firmware version of an ExternalModule.

Prototype

```
int ExternalModuleFirmwareVersionGet(
    int SocketID,
    int ModuleNumber,
    char *Version
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ModuleNumber | int | External module number |

Output parameters

| | | |
|---------|--------|-----------------------------------|
| Version | char * | External module firmware version. |
|---------|--------|-----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.37 ExternalModuleTemplateNumberGet

Name

ExternalModuleTemplateNumberGet – Gets the expected external module template number managed by the XPS controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function gets the expected external module template number. All user external modules must be developed from this template to be compatibles.

If one of the user external modules is not compatible then an XPS boot error will be generated.

Prototype

```
int ExternalModuleTemplateNumberGet (
    int SocketID,
    char *TemplateNumber
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|----------------|--------|---|
| TemplateNumber | char * | Expected external module template number. (“Nx” with x the template number) |
|----------------|--------|---|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.38 ExternalModuleScanFuncTimeDurationsGet

Name

ExternalModuleScanFuncTimeDurationsGet – Gets the current and the maximum scan executing time for an ExternalModule.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the module number (must ≥ 1 and $\leq NbExternalModules$): (-17)
- Here: *NbExternalModules* is the number of modules declared in the line *SharedLibraryModuleNames* of *system.ref*

Description

An ExternalModule has a scan function that is called periodically by Newport MotionKernel. This function gets the current and the maximum scan executing time for an ExternalModule.

Prototype

```
int ExternalModuleScanFuncTimeDurationsGet(
    int SocketID,
    int ModuleNumber,
    double *CurrentDuration,
    double *MaximumDuration
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ModuleNumber | int | External module number |

Output parameters

| | | |
|-----------------|--------|----------------------------------|
| CurrentDuration | char * | Current scan executing duration. |
| MaximumDuration | char * | Maximum scan executing duration. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.39 ExternalModuleSocketFree

Name

ExternalModuleSocketFree – Free the socket previously reserved for an ExternalModule.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the module number (must ≥ 1 and $\leq NbExternalModules$): (-17)
Here: *NbExternalModules* is the number of modules declared in the line *SharedLibraryModuleNames* of *system.ref*

Description

This function frees the socket previously reserved for an ExternalModule. If the function is executed successfully via this socket all the controller functions (*like FirmwareVersionGet(), ElapsedTimeGet(), ErrorStringGet(), ...*) become active, while ExternalModule functions (*like ExternalModuleTZPositionCurrentGet(), ExternalModuleGPIONDigitalInputGet(), ...*) become inactive.

(*return error -18: Positioner Name doesn't exist or unknown command*).

Prototype

```
int ExternalModuleSocketFree(
    int SocketID,
    int ModuleNumber
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ModuleNumber | int | External module number |

Output parameters

None

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.40 ExternalModuleSocketReserve

Name

ExternalModuleSocketReserve – Reserves the current socket for an ExternalModule.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the module number (must ≥ 1 and $\leq NbExternalModules$): (-17)
Here: *NbExternalModules* is the number of modules declared in the line *SharedLibraryModuleNames* of *system.ref*
- Checks if the current socket is already reserved for another ExternalModule: (-22)
- Checks if the ExternalModule has already been linked with another socket: (-22)

Description

- To be able to execute the own API functions of an ExternalModule via a TCP Terminal, the user must reserve a socket for this ExternalModule.
- This function reserves the current socket for an ExternalModule. If the function is executed successfully, via this socket the own ExternalModule functions (like *ExternalModuleTZPositionCurrentGet()*, *ExternalModuleGPIODigitalInputGet()*, ...) become functioning, whereas the controller functions (like *FirmwareVersionGet()*, *ElapsedTimeGet()*, *ErrorStringGet()*, ...) become inactive (return *Unknown command*).

Prototype

```
int ExternalModuleSocketReserve(
    int SocketID,
    int ModuleNumber
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ModuleNumber | int | External module number |

Output parameters

None

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.

7.2.1.41 FileGatheringRename

Name

FileGatheringRename – Renames “Gathering.dat” file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This API renames the “Gathering.dat” file with another .dat file name.

Prototype

```
int FileGatheringRename(  
    int SocketID,  
    char * NewFileName  
)
```

Input parameters

| | | |
|-------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NewFileName | char * | New file name used to rename “Gathering.dat”. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.42 FileScriptHistoryRename

Name

FileScriptHistoryRename – Renames “history.tcl” file

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This API renames the “history.tcl” file with another tcl file name.

Prototype

```
int FileScriptHistoryRename(  
    int SocketID,  
    char * NewFileName  
)
```

Input parameters

| | | |
|-------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NewFileName | char * | New file name used to rename “history.tcl”. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.43 FirmwareBuildVersionNumberGet

Name

FirmwareBuildVersionNumberGet – Gets the built firmware version

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function gets the controller name and the firmware version.

Example of returned version string:

“XPS Unified Firmware V1.0.0”

- Controller name is **XPS**.
- Firmware version is **V1.0.0**.

Prototype

```
int FirmwareBuildVersionNumberGet(  
    int SocketID,  
    char * Version  
)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
|----------|-----|--|

Output parameters

| | | |
|---------|--------|------------------------------|
| Version | char * | Controller firmware version. |
|---------|--------|------------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.44 FirmwareVersionGet

Name

FirmwareVersionGet – Gets the version of the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function gets the controller version defined in firmware.ref.

Example of returned version string: “XPS-Q8 V2.1.0”

Prototype

```
int FirmwareVersionGet(  
    int SocketID,  
    char * Version  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------|--------|---------------------|
| Version | char * | Controller version. |
|---------|--------|---------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.45 GatheringConfigurationGet

Name

GatheringConfigurationGet – Gets the current configuration of internally triggered data gathering.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)

Description

This function returns the current configuration of internally triggered data gathering. Use the “GatheringListGet” function to retrieve a complete list of allowed gathering types.

For a more thorough description of the internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringConfigurationGet(int SocketID, char * TypeList)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|----------|--------|--|
| TypeList | char * | List of configured gathering types (separator is semicolon). |
|----------|--------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.

7.2.1.46 GatheringConfigurationSet

Name

GatheringConfigurationSet – Sets a data gathering action.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input gathering mnemonic: (-29)
- Gathering must not be in progress: (-43)

Description

Defines one or several types of data gathered during the internal triggered data gathering.

Maximum of 1000000 points can be acquired.

Maximum of 25 data types can be configured in a gathering.

Refer to section 8.3: “Gathering Data Types”.

The “GatheringListGet” function can be used to retrieve a complete list of gathering types.

For a more thorough description of the internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringConfigurationSet(
    int SocketID,
    int NbElements,
    char * TypeArray
)
```

Input parameters

| | | |
|------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of types. |
| TypeArray | char * | Array of configured gathering types. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -29: Mnemonic gathering type doesn't exist.
- -32: Gathering not configured.
- -43: Gathering running.

7.2.1.47 GatheringCurrentNumberGet

Name

GatheringCurrentNumberGet – Gets the current and maximum number of gathered data points.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)

Description

This function returns the current and maximum number of data points gathered during the internal triggered data gathering.

For more thorough description of the internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringCurrentNumberGet(
    int SocketID,
    int * CurrentNumber,
    int * MaxSamplesNumber
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|------------------|-------|------------------------------------|
| CurrentNumber | int * | Current number during acquisition. |
| MaxSamplesNumber | int * | Maximum number of samples. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.

7.2.1.48 GatheringDataAcquire

Name

GatheringDataAcquire – Manually Acquires one data set.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)
- Gathering must not be in progress: (-43)
- Checks gathering buffer size: (-111)

Description

This function manually acquires one data set configured by “GatheringConfigurationSet” function.

Prototype

int **GatheringDataAcquire**(int SocketID)

Input parameters

SocketID int Socket identifier gets by the “TCP_ConnectToServer” function.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.
- -43: Gathering running.
- -111: Gathering buffer is full.

7.2.1.49 GatheringDataGet

Name

GatheringDataGet – Reads one data line from the current gathering buffer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks index number: (-17)
 - IndexPoint ≥ 0 .
 - IndexPoint < currently gathered data number.
- Checks gathering state: (-32)

Description

This function reads a line of data from the current gathering buffer. The buffer line number is defined by the index of an acquired point.

The separator is “;” in the returned data line.

Gathering must be configured in order to use this function, otherwise (-32) error is returned.

Prototype

int **GatheringDataGet**(int SocketID, int IndexPoint, char * DataBufferLine)

Input parameters

| | | |
|------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| IndexPoint | int | Index of an acquired data from the current gathering buffer. |

Output parameters

| | | |
|----------------|--------|---|
| DataBufferLine | char * | String contains values from the current buffer at the selected index. |
|----------------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.

7.2.1.50 GatheringDataMultipleLinesGet

Name

GatheringDataMultipleLinesGet – Reads several data lines from the current gathering buffer in memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks index number: (-17)
 - IndexPoint ≥ 0 (**Note:** index #0 = line #1)
 - IndexPoint < currently gathered data number.
- Checks gathering state: (-32)
- Check gathering output data lines length (-3)

Description

This function reads one or several data lines from the current gathering buffer. The buffer line number is defined by the index of an acquired point.

The separator is “;” in the returned data line and the end of each line is carriage return “\n”.

Gathering must be configured in order to use this function, otherwise (-32) error is returned.

If the requested lines number is too grand that make output data exceeds limit (65535), (-3) error is returned.

Example of gathering buffer in memory:

| index | Data1 | Data2 | Data3 | Data4 | Data5 |
|-------|-------|-------|-------|-------|-------|
| 0 → | 1 | 10 | 0.1 | 21 | 100 |
| 1 → | 2 | 20 | 0.2 | 22 | 102 |
| 2 → | 3 | 30 | 0.3 | 23 | 103 |
| 3 → | 4 | 40 | 0.4 | 24 | 104 |
| 5 → | 5 | 50 | 0.5 | 25 | 105 |

GatheringDataMultipleLinesGet(1, 4, char *), here :

1 => the start line is #2

4 => the number of lines to read is 4

char * => buffer to get the data (65535 characters maximum)

| index | Data1 | Data2 | Data3 | Data4 | Data5 |
|-------|-------|-------|-------|-------|-------|
| 1 → | 2 | 20 | 0.2 | 22 | 102 |
| 2 → | 3 | 30 | 0.3 | 23 | 103 |
| 3 → | 4 | 40 | 0.4 | 24 | 104 |
| 4 → | 5 | 50 | 0.5 | 25 | 105 |

Data result:

2;20;0.2;22;102
 3;30;0.3;23;103
 4;40;0.4;24;104
 5;50;0.5;25;105

Prototype

```
int GatheringDataMultipleLinesGet(
    int SocketID,
    int IndexPoint,
    int NbLines,
    char * DataBufferLine
)
```

Input parameters

| | | |
|------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| IndexPoint | int | Index of an acquired data from the current gathering buffer. |
| NbLines | int | Number of lines to get. |

Output parameters

| | | |
|----------------|--------|---|
| DataBufferLine | char * | String contains values from the current buffer at the selected index. |
|----------------|--------|---|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -32: Gathering not configured.
- -3: String too long.

7.2.1.51 GatheringExternalConfigurationGet

Name

GatheringExternalConfigurationGet – Gets the current configuration of an externally triggered data gathering.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)

Description

This function returns the current configuration of an externally triggered data gathering.

Use the “GatheringExternalListGet” function to retrieve a complete list of external gathering types.

For a more thorough description of the external data gathering capability, please refer to section Data Gathering/External Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringExternalConfigurationGet(int SocketID, char * TypeList)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|----------|--------|--|
| TypeList | char * | List of configured gathering types (separator is semicolon). |
|----------|--------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.

7.2.1.52 GatheringExternalConfigurationSet

Name

GatheringExternalConfigurationSet – Sets an external data gathering.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input external gathering mnemonic: (-29)
- Gathering must not be in progress: (-43)

Description

Defines one or several types of data gathered during externally triggered data gathering.

Maximum of 1000000 points can be acquired.

Maximum of 25 data types can be configured in a gathering.

Refer to section 8.4: “External Gathering Data Types”.

The “GatheringExternalListGet” function can be used to retrieve a complete list of gathering types.

For more thorough description of the external data gathering capability, please refer to section Data Gathering/External Data Gathering XPS Motion Tutorial.

Prototype

```
int GatheringExternalConfigurationSet(
    int SocketID,
    int NbElements,
    char * TypeArray
)
```

Input parameters

| | | |
|------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of types. |
| TypeArray | char * | Array of configured gathering types. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -29: Mnemonic gathering type doesn't exist.
- -43: Gathering running.

7.2.1.53 GatheringExternalCurrentNumberGet

Name

GatheringExternalCurrentNumberGet – Gets the current and maximum number of externally gathered data points.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- External gathering must be configured: (-32)

Description

This function returns the current and maximum number of data points gathered during an externally triggered data gathering.

For more thorough description of external data gathering capability, please refer to section Data Gathering/External Data Gathering XPS Motion Tutorial.

Prototype

```
int GatheringExternalCurrentNumberGet(
    int SocketID,
    int * CurrentNumber,
    int * MaxSamplesNumber
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|------------------|-------|------------------------------------|
| CurrentNumber | int * | Current number during acquisition. |
| MaxSamplesNumber | int * | Maximum number of samples. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.

7.2.1.54 GatheringExternalDataGet

Name

GatheringExternalDataGet – Reads one line of data from current external gathering buffer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks index number: (-17)
 - $\text{IndexPoint} \geq 0$.
 - $\text{IndexPoint} < \text{currently gathered data number}$.
- Checks gathering state: (-32)

Description

This function reads a line of data from current gathering gathering buffer. The buffer line number is defined by the index of an acquired point.

The separator is “;” in the returned data line.

Gathering must be configured in order to use this function, otherwise (-32) error is returned.

Prototype

```
int GatheringExternalDataGet(
    int SocketID,
    int IndexPoint,
    char * DataBufferLine
)
```

Input parameters

| | | |
|------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| IndexPoint | int | Index of an acquired data from the current gathering buffer. |

Output parameters

| | | |
|----------------|--------|---|
| DataBufferLine | char * | String contains values from the current buffer at the selected index. |
|----------------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -32: Gathering not configured.

7.2.1.55 GatheringExternalStopAndSave

Name

GatheringExternalStopAndSave – Stops externally triggered data gathering and saves the data into the XPS controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of data (>0): (-30)
- Checks file opening: (-60)

Description

This function stops externally triggered data gathering and saves the data into the XPS controller. Gathered data is stored in the “GatheringExternal.dat” file under “.\Public” folder of XPS controller.

For more thorough description of external data gathering capability, please refer to section Data Gathering/External Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringExternalStopAndSave(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -30: Gathering not started.
- -60: Error during file writing or file doesn't exist.

7.2.1.56 GatheringReset

Name

GatheringReset – Resets gathered data to start new gathering.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must not be in progress: (-43)

Description

This function resets to start a brand new gathering.

The number of gathered data is set to zero.

For more thorough description of internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringReset(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -43: Gathering running.

7.2.1.57 GatheringRun

Name

GatheringRun – Starts to gather data.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)
- Gathering must not be in progress: (-43)

Description

This function starts data gathering.

Data gathering needs to be configured before using this function (See GatheringConfigurationSet function)

The parameters are the number of data points to be gathered and the divisor of the frequency (servo frequency) at which the data gathering will be done.

For more thorough description of the internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringRun(
    int SocketID,
    int DataNumber,
    int Divisor
)
```

Input parameters

| | | |
|------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| DataNumber | int | The number of data line to gather. |
| Divisor | int | The divisor of the servo frequency. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.
- -43: Gathering running.

7.2.1.58 GatheringRunAppend

Name

GatheringRunAppend – : Restarts gathering from the point it was stopped.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Gathering must be configured: (-32)
- Gathering must not be in progress: (-43)

Description

Restarts gathering from the data point it was stopped as long as gathering current data number has not reached the *DataNumber* previously specified by *GatheringRun()* function This function repeats the gathering from the data point that was previously stopped, while the gathering current data number has not reached the *DataNumber* previously specified using the *GatheringRun()* function.

The gathering must be configured, executed and stopped before using this function (see *GatheringConfigurationSet*, *GatheringRun*, *GatheringStop* functions)

For more thorough description of the internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringRunAppend(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -32: Gathering not configured.
- -43: Gathering running.

7.2.1.59 GatheringStop

Name

GatheringStop – Stops internally and externally triggered data gathering.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of data (>0): (-30)
- Checks file opening: (-60)

Description

This function stops internally and externally triggered data gathering. To save to a file, use GatheringStopAndSave function.

For more thorough description of data gathering capability, please refer section Data Gathering/ of XPS Motion Tutorial.

Prototype

```
int GatheringStop(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -30: Gathering not started.
- -60: Error during file writing or file doesn't exist.

7.2.1.60 GatheringStopAndSave

Name

GatheringStopAndSave – Stops internally triggered data gathering and saves data into the XPS controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of data (>0): (-30)
- Checks file opening: (-60)

Description

This function stops internally triggered data gathering as well as saves the data to the XPS controller. Data is stored in GATHERING.DAT file under “.\Public” folder of the XPS controller.

For more thorough description of internal data gathering capability, please refer to section Data Gathering/Internal Data Gathering of XPS Motion Tutorial.

Prototype

```
int GatheringStopAndSave(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -30: Gathering not started.
- -60: Error during file writing or file doesn't exist.

7.2.1.61 GetLibraryVersion

Name

GetLibraryVersion – Gets the version of the DLL library.

Input tests

None.

Description

This function returns the version of DLL library.

The library version represents the firmware version that was used to build the library.

Prototype

```
int GetLibraryVersion(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|--|

Output parameters

| | | |
|------------|--------|----------------------|
| LibVersion | char * | DLL library version. |
|------------|--------|----------------------|

Return

None.

7.2.1.62 GlobalArrayGet

Name

GlobalArrayGet – Gets the variable value from the global array.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies the index number [0:100[: (-17)

Description

This function gets the variable value from the global array, related to “Number” index in a string format.

The first variable value from the global array is referenced to index “0”.

NOTE

The number of data points in the global array is limited to 100.

NOTE

The maximum string length is fixed to 100 characters.

Prototype

```
int GlobalArrayGet(
    int SocketID,
    int Number,
    char * StringValue
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Number | int | Index in the global array. |

Output parameters

| | | |
|-------------|--------|--|
| StringValue | char * | Variable string value (100 characters max).. |
|-------------|--------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.63 GlobalArraySet

Name

GlobalArraySet – Sets the value of the global array.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies the index number [0:100[: (-17)
- Check input string not null: (-17)
- Check input string length (100 characters max): (-3)

Description

This function sets a new value in the global array related to the “Number” index and the new value is set to a string.

NOTE

The first variable value of the global array is always referenced to the index “0”. The number of data points in the global array is limited to 100, so the last index is “99”.

NOTE

The maximum string length is fixed to 100 characters.

Prototype

```
int GlobalArraySet(
    int SocketID,
    int Number,
    char * StringValue
)
```

Input parameters

| | | |
|-------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Number | int | Index in the global array. |
| StringValue | char * | Variable string value (100 characters max). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long
- -17: Parameter out of range or incorrect.

7.2.1.64 GPIOAnalogGainGet

Name

GPIOAnalogGainGet – Gets the gain for one or several analog inputs (ADC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks board: (-8)
- GPIO name (ADC): (-8)
- Hardware compatibility or XPS initialization in progress: (-22)

Description

Gets the gain value for one or several analog inputs. Please refer to Appendix *B.5 Analog I/O* of the XPS Motion Tutorial for further information about ADC gain.

The gain value must be 1, 2, 4 or 8.

The maximum number of INT boards that can be plugged inside the XPS controller is 2, increasing the number of analog inputs (ADC) from 4 to 8.

Prototype

```
int GPIOAnalogGainGet(
    int SocketID,
    int NbElements,
    char * GPIONameList,
    double * AnalogGainValueArray
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of analog GPIO to read. |
| GPIONameList | char * | List of analog input names – separator is comma. |

Output parameters

| | | |
|----------------------|-------|-----------------------------|
| AnalogGainValueArray | int * | Value of analog input gain. |
|----------------------|-------|-----------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.65 GPIOAnalogGainSet

Name

GPIOAnalogGainSet – Sets a gain for one or several analog inputs (ADC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks board: (-8)
- GPIO name (ADC): (-8)
- Checks output value (1, 2, 4 or 8): (-17)
- Hardware compatibility or XPS initialization in progress: (-22)

Description

Sets a gain value for one or several analog inputs.

The gain value can be 1, 2, 4 or 8

If the conversion of the gain value to bits fails then (-22) error is returned.

The maximum number of INT boards, that can be plugged inside the XPS controller, is 2, increasing the number of analog inputs from 4 to 8.

Prototype

```
int GPIOAnalogGainSet(
    int SocketID,
    int NbElements,
    char * GPIONameList,
    int * AnalogGainValueArray
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of analog GPIO to read. |
| GPIONameList | char * | List of analog input names – separator is comma. |
| AnalogGainValueArray | int * | Value of analog input gain. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.

7.2.1.66 GPIOAnalogGet

Name

GPIOAnalogGet – Reads one or several analog inputs (ADC) or outputs(DAC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- GPIO name (ADC or DAC): (-8)
- Hardware compatibility or XPS initialization in progress: (-22)

Description

Reads one or several analog IO and returns the value(s) in an array.

NOTE

In case of multiple GPIO boards controller, don't mix GPIO names of different boards in the same command (error -8).

Example:

- GPIOAnalogGet(GPIO21.DAC1,double*,GPIO21.DAC2,double*) => 0 (OK)
 - GPIOAnalogGet(GPIO21.DAC2,double*,GPIO42.DAC2,double*) => -8 (Error)
-

Prototype

```
int GPIOAnalogGet(
    int SocketID,
    int NbElements,
    char * GPIONameList,
    double * AnalogValueArray
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of analog GPIO to read. |
| GPIONameList | char * | List of analog GPIO names separated with a comma. |

Output parameters

AnalogValueArray double * Analog GPIO value array (DAC or ADC).

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.67 GPIOAnalogRangeConfigurationGet

Name

GPIOAnalogRangeConfigurationGet – Gets GPIO DAC range configuration for analog output (DAC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the GPIO type is DAC: (-8)

Description

This API returns the DAC range value.

Prototype

```
int GPIOAnalogRangeConfigurationGet(
    int SocketID,
    char * GPIOName,
    double * DACRange
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GPIOName | char * | GPIO name. |

Output parameters

| | | |
|----------|----------|------------------|
| DACRange | double * | DAC range value. |
|----------|----------|------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.68 GPIOAnalogRangeConfigurationSet

Name

GPIOAnalogRangeConfigurationSet – Sets GPIO DAC range configuration for analog output(DAC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the GPIO type is DAC: (-8)

Description

This API sets the DAC range value. Set values are:

Input value = 0 => Disabled

Input value ≥ 12.0 V => DAC range = 12.288 V

Input value $\in [10.0, 12.0]$ => DAC range = 10 V

Input value $\in [5.0, 10.0]$ => DAC range = 5 V

Prototype

```
int GPIOAnalogRangeConfigurationSet(
    int SocketID,
    char * GPIOName,
    double DACRange
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GPIOName | char * | GPIO name. |
| DACRange | double | DAC range value. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.69 GPIOAnalogSet

Name

GPIOAnalogSet – Sets one or several analog outputs (DAC).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the GPIO type is DAC: (-8)
- Checks input parameters number: (-17)

Description

Sets analog value array for DAC type of GPIO.

NOTE

In case of multiple GPIO boards controller, don't mix GPIO names of different boards in the same command (error -8).

Example:

- GPIOAnalogSet(GPIO21.DAC1,5.06,GPIO21.DAC2,3.01) => 0 (OK)
 - GPIOAnalogSet(GPIO21.DAC2,5.08,GPIO42.DAC2,4.02) => -8 (Error)
-

Prototype

```
int GPIOAnalogSet(
    int SocketID,
    int NbElements,
    char * GPIONameList,
    double * AnalogValueArray
)
```

Input parameters

| | | |
|----------------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| NbElements | int | Number of analog GPIO to read. |
| GPIONameList | char * | List of analog GPIO names separated with a comma. |
| AnalogGainValueArray | double * | Analog GPIO value array (DAC or ADC). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Not allowed action.
- -22: Not allowed action.

7.2.1.70 GPIODigitalGet

Name

GPIODigitalGet – Reads one digital input or output.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- GPIO name (DI or DO): (-8)
- Hardware compatibility or XPS initialization in progress: (-22)

Description

Returns the value of digital input (DI) or digital output (DO).

Prototype

```
int GPIODigitalGet(
    int SocketID,
    char * GPIOName,
    unsigned int * DigitalValue
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GPIOName | char * | Digital GPIO name (maximum size = 250). |

Output parameters

| | | |
|--------------|------------------|--------------------------------|
| DigitalValue | unsigned short * | Digital GPIO value (DI or DO). |
|--------------|------------------|--------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.71 GPIODigitalSet

Name

GPIODigitalSet – Sets one digital output.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- GPIO name (DO): (-8)
- Hardware compatibility or XPS initialization in progress: (-22)

Description

Sets the value of the selected digital output (DO).

Prototype

```
int GPIODigitalSet(
    int SocketID,
    char * GPIOName,
    unsigned short Mask,
    unsigned short DigitalOutputValue
)
```

Input parameters

| | | |
|--------------------|----------------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GPIOName | char * | Digital GPIO name (maximum size = 250). |
| Mask | unsigned short | Mask. |
| DigitalOutputValue | unsigned short | Digital output value. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.72 GPIODigitalPulseWidthGet

Name

GPIODigitalPulseWidthGet – Reads current GPIO digital I/O pulse width.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks GPIO name and type (must be Digital I/O): (-8)

Description

This function reads the current GPIO digital I/O pulse width defined in microseconds.

Prototype

```
int GPIODigitalPulseWidthGet(
    int SocketID,
    char GPIOName,
    double * PulseWidth
)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| GPIOName | int | GPIO digital I/O name. |

Output parameters

| | | |
|------------|----------|----------------------------------|
| PulseWidth | double * | Current GPIO pulse width (µsec). |
|------------|----------|----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.73 GPIODigitalPulseWidthSet

Name

GPIODigitalPulseWidthSet – Sets GPIO digital I/O pulse width (µsec).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks GPIO name and type (must be Digital I/O): (-8)

Description

This function configures the GPIO digital I/O pulse width defined in microseconds.

Prototype

```
int GPIODigitalPulseWidthSet(
    int SocketID,
    char GPIOName,
    double PulseWidth
)
```

Input parameters

| | | |
|------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| GPIOName | int | GPIO digital I/O name. |
| PulseWidth | double | GPIO digital I/O pulse width (µsec). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.74 GroupAccelerationCurrentGet

Name

GroupAccelerationCurrentGet – Gets the current acceleration for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type: (-8)
- Checks positioner name: (-18)
- Checks group name: (-19)

Description

Gets the current acceleration for one or all positioners of the selected group.

Prototype

```
int GroupAccelerationCurrentGet(
    int SocketID,
    char * GroupName[250],
    int NbPositioners,
    double * CurrentAcceleration
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group or positioner name. |
| NbPositioners | int | Number of positioners in the group. |

Output parameters

| | | |
|---------------------|----------|-----------------------------|
| CurrentAcceleration | double * | Current acceleration array. |
|---------------------|----------|-----------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner name doesn't exist or unknown command.
- -19: Group name doesn't exist or unknown command.

7.2.1.75 GroupAccelerationSetpointGet

Name

GroupAccelerationSetpointGet – Gets the setpoint acceleration for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the setpoint acceleration for one or all positioners of the selected group.

Prototype

```
int GroupAccelerationSetpointGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * SetpointAcceleration
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|----------------------|----------|------------------------------|
| SetpointAcceleration | double * | Setpoint Acceleration array. |
|----------------------|----------|------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.76 GroupAnalogTrackingModeDisable

Name

GroupAnalogTrackingModeDisable - Exits the analog tracking mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group name: (-19)
- Group status must be “ANALOG TRACKING”: (-22)

Description

Disables the analog tracking mode.

The group exits the “ANALOG TRACKING” state returning to “READY” state.

If the group state is not “ANALOG TRACKING”, (-22) error is returned.

NOTES

The tracking mode interprets ADC value as a position command or as a velocity command.

To enable the analog tracking mode use “GroupAnalogTrackingModeEnable” function.

Prototype

```
int GroupAnalogTrackingModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.77 GroupAnalogTrackingModeEnable

Name

GroupAnalogTrackingModeEnable - Enables the analog tracking mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates tracking type (“Position” or “Velocity”): (-8)
- Invalid group name: (-19)
- Group status must be “READY”: (-22)
- Configured tracking: (-22)

Description

Enables the analog tracking mode. To use this function, the group must be in READY state and tracking must be configured before, otherwise an error (-22) is returned.

Once the tracking mode is enabled, the group status must be “ANALOG TRACKING” (48 is the code for Analog tracking state due to a TrackingEnable command).

“Position” analog tracking

In case of “Position” tracking type, the analog input is interpreted as a position command. The parameters must be set by “AnalogTrackingPositionParametersSet” function and can be read by “AnalogTrackingPositionParametersGet” function.

“Velocity” analog tracking

In case of “Velocity” tracking type, the analog input is interpreted as a velocity command. The parameters must be set by “AnalogTrackingVelocityParametersSet” function and can be read by “AnalogTrackingVelocityParametersGet” function.

NOTE

To disable the analog tracking mode use “GroupAnalogTrackingModeDisable” function.

Prototype

```
int GroupAnalogTrackingModeEnable(
    int SocketID,
    char * GroupName,
    char * Type
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| Type | char * | Tracking type (“Position” or “Velocity”). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -9: Wrong number of parameters in the command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.78 GroupBrakeStateGet [Extended]

Name

GroupBrakeStateGet – Gets current brake command state.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if GPIO board number: (-17)
- Checks if GPIO board is present: (-100)
- Checks if “Brake” mode is enabled: (-205)

Description

This function reads the current brake command signal state from Inhibit or GPIO connector. Refer to section [BRAKE] in System.ini configuration file. The feature is developed to avoid a run away after hardware error detection (XY group only).

Brake command signal:

- 1) BrakeCommandSignalState parameter is defined “Direct” in System.ini
 - 0 = Brake OFF.
 - 1 = Brake ON.
- 2) BrakeCommandSignalState parameter is defined “Inverted” in System.ini
 - 0 = Brake ON.
 - 1 = Brake OFF.

Prototype

```
int GroupBrakeStateGet(
    int SocketID,
    char * GroupName,
    int * BrakeCommand,
)
```

Input parameters

| | | |
|-----------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| GroupName | char * | Group name (XY). |

Output parameters

| | | |
|--------------|-------|-------------------------|
| BrakeCommand | int * | Brake command (0 or 1). |
|--------------|-------|-------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.
- -100: Internal error (memory allocation error ...).

7.2.1.79 GroupBrakeSet [Extended]

Name

GroupBrakeSet – Sets brake command.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks GPIO board number / Checks brake command value: (-17)
- Checks if GPIO board is present: (-100)
- Checks if “Brake” mode is enabled: (-205)

Description

This function sets brake command signal from Inhibit or GPIO connector. Refer to section [BRAKE] in System.ini configuration file. The feature is developed to avoid a run away after hardware error detection (XY group only).

Brake commands:

- 1) BrakeCommandSignalState parameter is defined “Direct” in System.ini
 - 0 = Brake OFF.
 - 1 = Brake ON.
- 2) BrakeCommandSignalState parameter is defined “Inverted” in System.ini
 - 0 = Brake ON.
 - 1 = Brake OFF.

Prototype.

```
int GroupBrakeSet(
    int SocketID,
    char * GroupName,
    int BrakeCommand,
)
```

Input parameters

| | | |
|--------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| GroupName | char * | Group name (XY). |
| BrakeCommand | int | Brake command (0 or 1). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.
- -100: Internal error (memory allocation error ...).

7.2.1.80 GroupCorrectorOutputGet

Name

GroupCorrectorOutputGet – Gets corrector output for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Returns corrector output for one or all positioners of the selected group.

The input parameter “group name” can be a positioner name.

For a group, this function returns the corrector output for each positioner from the selected group.

For a positioner, this function returns only the corrector output associated with the selected positioner.

Prototype

```
int GroupCorrectorOutputGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * CorrectorOutput
)
```

Input parameters

| | | |
|---------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group (1 if positioner). |

Output parameters

| | | |
|-----------------|----------|-------------------------|
| CorrectorOutput | double * | Corrector output array. |
|-----------------|----------|-------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.81 GroupCurrentFollowingErrorGet

Name

GroupCurrentFollowingErrorGet – Gets the current following error for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the current following error for one or all positioners of the selected group.

Prototype

```
int GroupCurrentFollowingErrorGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * CurrentFollowingError
)
```

Input parameters

| | | |
|---------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group (1 if positioner). |

Output parameters

CurrentFollowingError double * Current following error array.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.82 GroupExternalProfilerDisable

Name

GroupExternalProfilerDisable – Stops and disables the external profile generator.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid group name: (-19)
- Group status must be “EXTERNAL PROFILER ENABLED”: (-22)

Description

Stops and disables the external profile generator. To use this function, the group must be in “EXTERNAL PROFILER ENABLED” state and all positioners must be idle (i.e. velocity equal to 0).

This function exits the “EXTERNAL PROFILER ENABLED” state and returns to “READY” state.

If the group state is not in “EXTERNAL PROFILER ENABLED” state, or the profiler velocity is not null, error (-22) is returned.

NOTE

To enable the external profile generator, use “GroupExternalProfilerEnable” function.



CAUTION

The external profile generator can be used only with TZ group.

Prototype

```
int GroupExternalProfilerDisable (
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.83 GroupExternalProfilerEnable

Name

GroupExternalProfilerEnable – Enables and starts the external profile generator.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8), (-18)
- Invalid group name: (-19)
- Group status must be “READY”: (-22)
- Backlash must not be activated: (-46)

Description

Enables and starts the external profile generator. To use this function, the group must be in “READY” state and all positioners must be idle (i.e velocity equal to 0).

This function enters “EXTERNAL PROFILER ENABLED” state.

If the group state is not “READY”, (-22) error is returned.

NOTE

To disable the external profile generator, use the “GroupExternalProfilerDisable” function.



CAUTION

The external profile generator can be used only with TZ group.

Prototype

```
int GroupExternalProfilerEnable (
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.84 GroupGantryModeGet [Extended]

Name

GroupGantryModeGet – Gets current gantry option.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the set option mode (Option0, Option1 or Option2): (-17)
- Checks the group name is valid (must be XY group): (-19)
- Checks gantry mode getting is allowed: (-22)
- Checks if XY dual gantry mode is enabled: (-205)

Description

Gets the current gantry option. This function is allowed only with a Gantry XY group.

Three “Gantry” options are available:

- **Option0** =>Gantry standard.
- **Option1** =>Gantry force balance.
- **Option2** =>Gantry force balance with dual encoder.

Refer to XY group section from system.ini file to enable “XYDualMode” and to configure it.

Prototype

```
int GroupGantryModeGet(
    int SocketID,
    char * GroupName,
    char * Option
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY group name. |

Output parameters

| | | |
|--------|--------|------------------------------|
| Option | char * | Option0, Option1 or Option2. |
|--------|--------|------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -205: Not enable in your configuration.

7.2.1.85 GroupGantryModeSet [Extended]

Name

GroupGantryModeSet – Sets gantry option.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the user option value (Option0, Option1 or Option2): (-17)
- Checks the group name (must be XY group): (-19)
- Checks if the gantry mode getting is allowed: (-22)
- Checks the current gantry option: (-201)
- Checks if XY Dual Gantry mode is enabled: (-205)

Description

Sets the gantry option. It's possible to configure the gantry option only when the XY group is in “READY” or “DISABLE” state.

Three “Gantry” options are available:

- **Option0** =>Gantry standard.
- **Option1** =>Gantry force balance.
- **Option2** =>Gantry force balance with dual encoder.

Refer to XY group section from system.ini file to enable “XYDualMode” and to configure it.

Prototype

```
int GroupGantryModeSet(
    int SocketID,
    char * GroupName,
    char * Option
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY group name. |
| Option | char * | Option0, Option1 or Option2. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -201: The group is already in this mode.
- -205: Not enable in your configuration.

7.2.1.86 GroupGoToNotReferenced

Name

GroupGoToNotReferenced – Change group status to NOTREF.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group name (must be a XY): (-19)
- Group status must be "READY": (-22)

Description

Change group status from READY to NOTREF.

If the current group status is not in “READY” state, error (-22) is returned.

NOTE

This command is effective only for XY group.

Prototype

```
int GroupGoToNotReferenced (
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.87 GroupHomeSearch

Name

GroupHomeSearch - Initiates a home search.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- The actor must be a valid group name: (-19)
- Group status must be "Not referenced": (-22)

Description

This function initiates a home search for each positioner of the selected group.

The group must be initialized and in "NOT REFERENCED" state otherwise error (-22) is returned .

The home search can fail due to:

- a following error: (-25).
- a ZM detection error: (-49).
- a motion done time out, when a dynamic error of the positioner is detected during home search process (-33).
- a home search timeout, when the complete (and complex) home search procedure was not executed in the allowed time: (-28).
- a home search index error in case of XY group: (-86).

For all these errors, the group returns to "NOTINIT" state.

After the home search sequence, each positioner error is checked. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is always present, (-35) error is returned and the group becomes "NOTINIT".

Once the home search is successful, the group is in "READY" state.

NOTES

The home search routine for each positioner is defined in "*stages.ini*" file by "HomeSearchSequenceType" parameter.

The homesearch time out is defined in "*stages.ini*" file by "HomeSearchTimeOut" parameter.

The home search sequence is defined in "*system.ini*" file by "InitializationAndHomeSearchSequence" parameter for each group with several positioners.

XY group

The home search sequence can be "Together", "XthenY" or "YthenX" in a standard XY configuration.

If the XY group is "Gantry" (dual positioner on X or on Y axis) only "XthenY" or "YthenX" are allowed.

XYZ group

The home search sequence can be "Together" or "XthenYthenZ".

MultipleAxes group

The home search sequence can be "Together", "OneAfterAnother" or "OneAfterAnotherInReverseOrder".

If the **MultipleAxes** group has at least one “Gantry” positioner (dual positioner on one axis or some axes) only “OneAfterAnother” or “OneAfterAnotherInReverseOrder” is allowed.

Prototype

```
int GroupHomeSearch(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -28: Home search timeout.
- -33: Motion done timeout.
- -35: Position is outside of travel limits.
- -49: Inconsistent mechanical zero during home search.

7.2.1.88 GroupHomeSearchAndRelativeMove

Name

GroupHomeSearchAndRelativeMove - Initiates a home search followed by a relative move.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Invalid group name: (-19)
- Group status must be "Not referenced": (-22)

Description

This function initiates a home search followed by a relative move at the end of the home search.

The group must be initialized and in "NOT REFERENCED" state otherwise (-22) error is returned.

If there is no error, the group status changes to "HOMING".

The home search sequence can fail due to:

- a following error: (-25).
- a ZM detection error: (-49).
- a home search time out: (-33).

For all these errors, the group returns to "NOTINIT" state.

Once the home search is completed, a relative move is executed. After this sequence each positioner is checked for error. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is always present, ERR_TRAVEL_LIMITS (-35) is returned and the group state becomes "NOTINIT".

If the home search is successful, the group will be in "READY" state.

NOTES

The home search routine for each positioner is defined in *stages.ini* file by "HomeSearchSequenceType" parameter.

The home search time out is defined in *stages.ini* file by "HomeSearchTimeOut" parameter.

The home search sequence is defined in *system.ini* file by "InitializationAndHomeSearchSequence" parameter for each group with several positioners:

XY group

The home search sequence can be "Together", "XthenY" or "YthenX" if the XY group is standard configuration. If the XY group is Gantry (dual positioner on X or on Y axis) only the "XthenY" or "YthenX" are allowed.

XYZ group

The home search sequence can be "Together" or "XthenYthenZ".

MultipleAxes group

The home search sequence can be "Together", "OneAfterAnother" or "OneAfterAnotherInReverseOrder".

If the MultipleAxes group has at least one "Gantry" positioner (dual positioner on one axis or some axes), only "OneAfterAnother" or "OneAfterAnotherInReverseOrder" are allowed.

Prototype

```
int GroupHomeSearchAndRelativeMove(  
    int SocketID,  
    char * GroupName  
)
```

Input parameters

| | | |
|-----------|--------|--|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -28: Home search timeout.
- -33: Motion done timeout.
- -35: Position is outside of travel limits.
- -49: Inconsistent mechanical zero during home search.

7.2.1.89 GroupInitialize

Name

GroupInitialize - Initializes the motor and activates the servo loop of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)
- Group status must be "NOTINIT": (-22)
- Checks state of physical ends of run: (-113)

Description

The selected group must be in not initialized “NOTINIT” state, otherwise (-22) error is returned.

This function begins to check the positioner error. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is always present, the motor is turned off, (-5) error is returned and the group state becomes “NOTINIT”.

If there is no positioner error, then the group status becomes “MOTOR_INIT”. The master-slave error is cleared, the encoder is reset (update encoder position) and the user travel limits are checked.

If a travel limit error is detected then the motor is turned off, the error (-35) is returned and the group state becomes “NOTINIT”.

Moreover, the function checks the state of the physical ends of run. If both physical ends of run are activated, then the motor is turned off, the error (-113) is returned and the group state becomes “NOTINIT”.

If no error detected, the motor is initialized in case of “AnalogSinAcc” or “AnalogDualSinAcc”. The error (-50) is returned, if the initialization failed and the group state becomes “NOTINIT”.

If successful, the positions are reset, the servo loop is activated and the motor is on. The group is now in “NOT REFERENCED” state.

NOTES

In Master-Slave mode, after an emergency stop, the master group and the slave group are in “NOTINIT” state.

To restart a master-slave relation the slave group(s) must be reinitialized before the master group.

Prototype

```
int GroupInitialize(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|--|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -35: Position is outside of travel limits.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.

7.2.1.90 GroupInitializeNoEncoderReset

Name

GroupInitializeNoEncoderReset - Initializes the motor without encoder reset and activates the servo loop of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)
- Group status must be "NOTINIT": (-22)
- Checks state of physical ends of run: (-113)

Description

The selected group must be in “NOTINIT” state, otherwise (-22) error is returned.

This function begins to check the positioner error. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is always present, the motor is turned off, (-5) error is returned and the group state becomes “NOTINIT”.

If there is no positioner error, then the group status becomes “MOTOR_INIT”. The master-slave error is cleared, the encoder is reset (update encoder position) and the user travel limits are checked. If a travel limit error is detected then the motor is turned off, the error (-35) error is returned and the group becomes “NOTINIT”.

Moreover, the function checks the state of the physical ends of run. If both physical ends of run are activated, then the motor is turned off, the error (-113) error is returned and the group state becomes “NOTINIT”.

If no error detected, the motor is initialized in case of “AnalogSinAcc” or “AnalogDualSinAcc”. The error (-50) is returned if the initialization has failed and the group state becomes “NOTINIT”.

If successful, the positions are not reset, the servo loop is activated and the motor is on. The group is now in “NOT REFERENCED” state.

NOTES

In Master-Slave mode, after an emergency stop, the master group and the slave group are in “NOTINIT” state.

To restart a master-slave relation the slave group(s) must be reinitialized before the master group.

Prototype

```
int GroupInitializeNoEncoderReset(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -35: Position is outside of travel limits.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.

7.2.1.91 GroupInitializeWithEncoderCalibration

Name

GroupInitializeWithEncoderCalibration - Initializes motor, calibrates encoder and activates servo loop.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)
- Group status must be "NOTINIT": (-22)
- Checks state of physical ends of run: (-113)

Description

If the selected group is not in "NOTINIT" state, error (-22) is returned

Initializes the motor, calibrates the encoder and activates the servo loop of each positioner of the selected group. To get the calibration results for each positioner, use the "PositionerEncoderCalibrationParametersGet" function.

This function checks the positioner error. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is always present, the motor is turned off, (-5) error is returned and the group state becomes "NOTINIT".

If no positioner error detected, then the group status becomes "MOTOR_INIT". The master-slave error is cleared, the encoder is reset (update encoder position) and the user travel limits are checked. If a travel limit error is detected then the motor is turned off, the error (-35) is returned and the group state becomes "NOTINIT".

Moreover, the function checks the state of the physical ends of run. If both physical ends of run are activated, then the motor is turned off, the error (-113) is returned and the group state becomes "NOTINIT".

If no error detected, the motor is initialized in case of "AnalogSinAcc" or "AnalogDualSinAcc". The error (-50) is returned if the initialization has failed and the group state becomes "NOTINIT".

After the group initialization the group status is "MOTOR_INIT", next the encoder undergoes calibration and the group status becomes "ENCODER_CALIBRATING". If a following error occurs during calibration, (-25) error is returned and the group state becomes "NOTINIT".

If successful, the motor is initialized, the encoder is calibrated and the servo loop is activated. The group is now in "NOT REFERENCED" state.

NOTE

In Master-Slave mode, after an emergency stop, the master group and the slave group are in "NOTINIT" status.

To restart a master-slave relation the slave group(s) must be reinitialized before the master group.

Prototype

```
int GroupInitializeWithEncoderCalibration(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|--|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -35: Position is outside of travel limits.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.

7.2.1.92 GroupInterlockDisable [Extended]

Name

GroupInterlockDisable – Disables group interlock mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)

Description

This function removes the dependency between a group and the groups that are included in GroupInterlock mode. So, when it is executed, the group can initialize, home or move independent of all errors coming from other interlocked groups.

GroupInterlock mode: Actions that a group takes based on the activities of other groups: execute actions (like stop axis, power-off, change state...) immediately after an error (or an user command Disable/KillGroup) detected from one of its interlocked groups.

Example: The list of interlocked groups is G1, G2, G3, this means:

- G1 depends on G2 and G3 (G1 in action if an error occurs on G2 or G3)
- G2 depends on G1 and G3 (G2 in action if an error occurs on G1 or G3)
- G3 depends on G1 and G2 (G3 in action if an error occurs on G1 or G2)

The interlocked groups are listed in the [GROUPS] section of *system.ini* file:

InterlockedGroups = ...; Names of groups involved in the GroupInterlock mode.

The GroupInterlock mode is enabled by default at boot of the XPS controller.

Prototype

```
int GroupInterlockDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.93 GroupInterlockEnable [Extended]

Name

GroupInterlockEnable – Enables group interlock mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)

Description

This function enables the dependency between a group and the groups that are involved in GroupInterlock mode. So, if this function executes, the group cannot initialize, home or move without correcting the errors coming from its interlocked groups.

GroupInterlock mode: Activities that a group takes are dependant on the activities of other groups. For example , execute actions like stop axis, power-off, change state immediately after an error or Disable/KillGroup command sent by user detected from one of its interlocked groups.

Example: The list of interlocked groups is G1, G2, G3 , this means:

- G1 depends on G2 and G3 (G1 in action if an error occurs on G2 or G3)
- G2 depends on G1 and G3 (G2 in action if an error occurs on G1 or G3)
- G3 depends on G1 and G2 (G3 in action if an error occurs on G1 or G2).

The interlocked groups are listed in the [GROUPS] section of *system.ini* file:

InterlockedGroups = ...; Names of groups involved in the GroupInterlock mode.

The GroupInterlock mode is enabled by default at boot of the XPS controller.

Prototype

```
int GroupInterlockEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.94 GroupJogCurrentGet

Name

GroupJogCurrentGet – Gets the current velocity and acceleration from the jog profiler.



CAUTION

The jog mode cannot be used with a spindle group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function returns the current velocity and acceleration from the jog profiler for one positioner or for all positioners of the selected group.

It must be called when the group is in “JOGGING” mode, otherwise the returned current velocity and current acceleration values will be null.

Prototype

```
int GroupJogCurrentGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|---------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group (1 if a positioner). |

Output parameters

| | | |
|--------------|----------|-----------------------------|
| Velocity | double * | Current velocity array. |
| Acceleration | double * | Current Acceleration array. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.95 GroupJogModeDisable

Name

GroupJogModeDisable – Disables the jog mode *

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid group name: (-19)
- Group status must be “JOGGING”: (-22)

Description

Disables the Jog mode. To use this function, the group must be in “JOGGING” state and all positioners must be idle (i.e velocity equal to 0).

This function exits the “JOGGING” state and returns to “READY” state.

If the group state is not in “JOGGING” state, or the profiler velocity is not null, error (-22) is returned.

NOTE

To enable the jog mode use “GroupJogModeEnable” function.



CAUTION

The jog mode cannot be used with spindle group.

Prototype

```
int GroupJogModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.96 GroupJogModeEnable

Name

GroupJogModeEnable – Enables the jog mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8), (-18)
- Invalid group name: (-19)
- Group status must be “READY”: (-22)
- Backlash must not be activated: (-46)

Description

Enables the Jog mode. To use this function, the group must be in “READY” state and all positioners must be idle (i.e velocity equal to 0).

This function enters “JOGGING” state.

If the group state is not “READY”, (-22) error is returned.

NOTE

To disable the jog mode use the “GroupJogModeDisable” function.



CAUTION

The jog mode cannot be used with spindle group.

Prototype

```
int GroupJogModeEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -46: Not allowed action due to backlash.

7.2.1.97 GroupJogParametersGet

Name

GroupJogParametersGet – Gets the velocity and acceleration set by “GroupJogParametersSet”.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function returns the velocity and acceleration in jog mode set by the user for one positioner or for all positioners of the selected group.

It must be called when the group is in “JOGGING” mode, otherwise both the velocity and the acceleration will be null.

To change the velocity and the acceleration on the fly in jog mode, use “GroupJogParametersSet” function.



CAUTION

The jog mode cannot be used with spindle group.

Prototype

```
int GroupJogParametersGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|----------|----------|--------------------------|
| Velocity | double * | User jog velocity array. |
|----------|----------|--------------------------|

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.98 GroupJogParametersSet

Name

GroupJogParametersSet – Changes the velocity and acceleration on the fly, in jog mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be “JOGGING”: (-22)
- Input parameters for each positioner:
 - Velocity >MaximumVelocity =>Velocity = MaximumVelocity
 - Velocity <-MaximumVelocity =>Velocity = -MaximumVelocity
 - Acceleration ≤0 (-42)
 - Acceleration >MaximumAcceleration => Acceleration = MaximumAcceleration

Description

This function changes the velocity and acceleration in jog mode on the fly. If an error occurs, each positioner stops and the velocity value is set to zero.

To use this function, the jog mode must be enabled (requires call of the “GroupJogModeEnable” function).

If the group status is not “JOGGING”, error (-22) is returned.

If a slave or following error are detected during the jog setting, then (-25) or (-44) errors are returned. In this case, the motion is stopped, the jog mode is disabled and the group status becomes “DISABLE”.



CAUTION

The jog mode cannot be used with spindle group.

Prototype

```
int GroupJogParametersSet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double Velocity,
    double Acceleration
)
```


Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |
| Velocity | double | User jog velocity array. |
| Acceleration | double | User jog Acceleration array. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -42: Jog value out of range.
- -44: Slave error disabling master.

7.2.1.99 GroupKill

Name

GroupKill - Kills the selected group.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Invalid object type (group): (-8), (-18)
- Invalid group name: (-19)

Description

Kills the selected group to stop its action. The group returns to "NOTINIT" state. If the group is already in this state then it stays there.

The GroupKill is a high priority command that is executed in any condition.

NOTE

If an initialization, encoder calibration, homing, referencing, motion or trajectory process is in progress, an "emergency stop" will be executed.

Error (-26) will be generated, for each of these functions.

Prototype

```
int GroupKill(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "Input Tests Common to all XPS Functions")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.100 GroupMotionDisable

Name

GroupMotionDisable – Disables a “READY” group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)
- Group status must be "READY": (-22)

Description

Turns OFF the motors, stops the corrector servo loop and disables the position compare mode, if active. The group status becomes “DISABLE”.

If the group is not in “READY” state, error (-22) is returned.

NOTE

In the “DISABLED” state the encoder is still read.

To return to “READY” state, call “GroupMotionEnable” function.

Prototype

```
int GroupMotionDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.101 GroupMotionEnable

Name

GroupMotionEnable – Enables a group in DISABLE state to turn the motors on and to restart corrector loops.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Actor must be a group: (-8), (-18)
- Invalid group name: (-19)
- Group status must be "DISABLE": (-22)

Description

Turns ON the motors and restarts the corrector servo loops. The group state becomes “READY”.

If the group is not in “DISABLE” error (-22) is returned.

Prototype

```
int GroupMotionEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.102 GroupMotionStatusGet

Name

GroupMotionStatusGet – Gets the motion status for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the motion status for one or all positioners of the selected group.

The motion status possible values are:

- 0: Not moving state (group status in NOT_INIT, NOT_REF or READY).
- 1: Busy state (positioner in moving, homing, referencing, spinning, analog tracking, trajectory, encoder calibrating, slave mode).

Prototype

```
int GroupMotionStatusGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    int * Status
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|--------|-------|--------------------|
| Status | int * | Positioner status. |
|--------|-------|--------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.103 GroupMoveAbort

Name

GroupMoveAbort – aborts the motion or the jog in progress for a group or a positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be "MOVING" or "JOGGING": (-22)

Description

This function aborts a motion or a jog in progress. The group state must be “MOVING” or “JOGGING”, otherwise error (-22) is returned.

For a group:

If the group status is “MOVING”, this function stops all motion in progress.

If the group status is “JOGGING”, this function stops all “jog” motions in progress and disables the jog mode. After this “group move abort” action, the group status becomes “READY”.

For a positioner:

If the group status is “MOVING”, this function stops the motion of the selected positioner.

If the group status is “JOGGING”, this function stops the “jog” motion of the selected positioner.

If the positioner is idle, an error (-22) is returned.

After “positioner move abort” action, if all positioners are idle, the group status changes to “READY”, otherwise it stays in the same state.

NOTE

If the “move abort” action fails, error (-27) is returned.

This error is generated when GroupMoveAbort is used to abort a motion of a positioner in a group and the name of the positioner is incorrect.

This error will also be returned by “GroupMove” function.

Prototype

```
int GroupMoveAbort(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -27: Move Aborted.

7.2.1.104 GroupMoveAbortFast [Extended]

Name

GroupMoveAbortFast – aborts with user-defined deceleration a motion or a jog in progress for a group or positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Validates UserDecelerationMultiplier value (≥ 1 and ≤ 100): (-17)
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be "MOVING" or "JOGGING": (-22)

Description

This function aborts a motion or a jog in progress with a deceleration value defined by user (*UserDeceleration*):

$UserDeceleration = DecelerationMultiplier * MaximumAcceleration.$

Here: *DecelerationMultiplier*: GroupMoveAbortFast function parameter

MaximumAcceleration: Stage parameter, defined in the stages.ini file.

The group state must be “MOVING” or “JOGGING”, otherwise error (-22) is returned.

For a group:

If the group state is “MOVING”, this function stops all motion.

If the group state is “JOGGING”, this function stops all “jog” motion and disables the jog mode. After this “group move abort” action, the group state becomes “READY”.

For a positioner:

If the group state is “MOVING”, this function stops the motion of the selected positioner.

If the group state is “JOGGING”, this function stops the “jog” motion of the selected positioner.

If the positioner is idle, error (-22) is returned.

After “positioner move abort” action, if all positioners are idle, the group state becomes “READY”, otherwise it stays the same

NOTE

If the “move abort” action fails, error (-27) is returned.

Prototype

```
int GroupMoveAbortFast(
    int SocketID,
    char * GroupName
)
```


Input parameters

| | | |
|------------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| DecelerationMultiplier | int | Braking deceleration multiplier. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -27: Move Aborted.

7.2.1.105 GroupMoveAbsolute

Name

GroupMoveAbsolute - Initiates an absolute move for a positioner or a group.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Invalid object type (group or positioner): (-8)
- Verifies target position in relation with the travel limits: (-17)
 - $TargetPosition \geq MinimumTargetPosition$.
 - $TargetPosition \leq MaximumTargetPosition$.
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be "READY" or "MOVING": (-22)

Description

This function initiates an absolute move to one or all positioners of the selected group. The group state must be "READY" or "MOVING", otherwise error (-22) is returned. If the group is "READY" then the group state becomes "MOVING".

An absolute motion is defined by the distance between the zero position and the target position. If the current position is the same as the target position then no move will be done.

Each "positioner" move refers to the acceleration, velocity, minimum jerkTime and maximum jerkTime as defined in the "Stages.ini" file or as redefined by the "PositionerSGammaParametersSet" function.

If a slave or following error is detected during the move then (-25) or (-44) errors are returned. In this case, the motion in progress is stopped and the group state becomes "DISABLE".

If the "MotionDoneMode" is defined as "VelocityAndPositionWindowMotionDone" error (-33) will be returned when the time out (defined by "MotionDoneTimeout" in the stages.ini file) is reached before the motion is done. The group state will change to "DISABLE".

In case of "GroupMoveAbort", error (-27) is returned., The motion in progress is stopped and the group state becomes "READY".

During a move with PositionCompare (or TimeFlasher) scan enabled, if the current following error exceeds *WarningFollowingError* value inside the PositionCompare (or TimeFlasher) scan zone, a *WarningFollowingErrorFlag* is latched. In this case the motion continues and finishes normally (the group status becomes "READY"), but the *GroupMoveAbsolute* function returns (-120) error instead of SUCCESS (0). To reset *WarningFollowingErrorFlag* for next moves, execute *PositionerPositionCompareDisable*(or *PositionerTimeFlasherDisable*) function.

If in "GroupKill" command an emergency brake or an emergency stop has occurred, error (-26) is returned. In this case, the motion in progress is stopped and the group state becomes "NOTINIT".

NOTE

Asynchronous moves for positioners of the same group are possible through the use of different sockets to send functions.

Prototype

```
int GroupMoveAbsolute(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * TargetPosition
)
```

Input parameters

| | | |
|----------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |
| TargetPosition | double * | Target position array. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -120: Warning following error during move with position compare enabled.

7.2.1.106 GroupMoveEndWait

Name

GroupMoveEndWait– Wait for the end of move (XY group only).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group is “XY”: (-8)
- Checks expected position after motion: (-211)

Description

This function allows waiting for the true end of the move (after a GroupMoveAbsolute, GroupMoveRelative or GroupMoveSlice).

It is only available for an XY group.

Prototype

```
int GroupMoveEndWait(
    int SocketID,
    char * GroupName,
    double TimeOutMs,
    double XPosition,
    double YPosition
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY Group name. |
| TimeOutMs | double | Time out in milliseconds. |
| XPosition | double | X position to check in controller unit. |
| YPosition | double | Y position to check in controller unit. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -211: Not expected position after motion.

7.2.1.107 GroupMoveRelative

Name

GroupMoveRelative - Initiates a relative move for a positioner or a group.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Invalid object type (group or positioner): (-8)
- Verifies target displacement in relation with the travel limits: (-17)
 - $TargetPosition \geq MinimumTargetPosition$.
 - $TargetPosition \leq MaximumTargetPosition$.
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be "READY" or "MOVING": (-22)

Description

This function initiates a relative move defined by the target displacement to one or all positioners of the selected group. The group state must be "READY" or "MOVING". otherwise error (-22) is returned. If the group is in "READY" state, then it turns into "MOVING".

The target displacement and the current position define the new target position to reach:

$$NewTargetPosition = CurrentTargetPosition + TargetDisplacement$$

Each "positioner" move refers to the acceleration, velocity, minimum jerkTime and maximum jerkTime as defined in the "Stages.ini" file or as redefined by the "PositionerSGammaParametersSet" function.

If a slave or following error is detected during the move then errors (-25) or (-44) are returned. In this case, the motion in progress is stopped and the group status becomes "DISABLE".

If "MotionDoneMode" is defined as "VelocityAndPositionWindowMotionDone", error (-33) is returned when the time out (defined by "MotionDoneTimeout" in the stages.ini file) is reached before the motion is done. The group state becomes "DISABLE".

In case "GroupMoveAbort" is executed, error (-27) is returned. The motion in progress is stopped and the group state becomes "READY".

During move with PositionCompare (or TimeFlasher) scan enabled, if the current following error exceeds *WarningFollowingError* value inside the PositionCompare (or TimeFlasher) scan zone, a *WarningFollowingErrorFlag* is latched. In this case the motion continues and ends normally (the group status becomes "READY"), but the *GroupMoveRelative* function returns (-120) error instead of SUCCESS (0). To reset *WarningFollowingErrorFlag* for the next moves, execute *PositionerPositionCompareDisable* (or *PositionerTimeFlasherDisable*) function.

If in "GroupKill" command an emergency brake or an emergency stop has occurred, error (-26) is returned. In this case, the motion in progress is stopped and the group state becomes "NOTINIT".

NOTE

Asynchronous moves for positioners of a same group are possible through the use of different sockets to send the functions.

Prototype

```
int GroupMoveRelative(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * Displacement
)
```

Input parameters

| | | |
|---------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |
| Displacement | double * | Relative displacement array. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -120: Warning following error during move with position compare enabled.

7.2.1.108 GroupMoveRelativeSimulated

Name

GroupMoveRelativeSimulated – Calculate the Sgamma motion parameters for a distance of a positioner or a group without moving the positioners.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Calculate the Sgamma motion parameters for a distance of a positioner or a group without moving the positioners.

The target displacement and the setpoint position define the new target position to reach:

$$\text{NewTargetPosition} = \text{SetpointPosition} + \text{TargetDisplacement}$$

Each “positioner” move refers to the acceleration, velocity, minimum jerkTime and maximum jerkTime as defined in the “Stages.ini” file or as redefined by the “PositionerSGammaParametersSet” function.

The command can be executed in any state of the group.

After this command is executed, PositionerSGammaMoveResultGet() command can be used to get the motion parameters of the last move.

Prototype

```
int GroupMoveRelativeSimulated(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * Displacement
)
```

Input parameters

| | | |
|---------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |
| Displacement | double * | Relative displacement array. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.109 GroupPositionCurrentGet

Name

GroupPositionCurrentGet – Gets the current position for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the current position for one or all positioners of the selected group.

The current position is defined as:

$$\text{CurrentPosition} = \text{SetpointPosition} - \text{FollowingError}$$

Examples of use in a Terminal with an XY group:

For a positioner (example with an XY group):

- GroupPositionCurrentGet(XY.X, double *)
- Gantry system: GroupPositionCurrentGet(XY.X.SecondaryPositioner, double *)

For a group (example with an XY group):

- GroupPositionCurrentGet(XY, double *, double *)
- Gantry X1X2Y: GroupPositionCurrentGet(XY, double *, double *, double *)

Description [HXP-D only]

*Function used with a **GroupName**:*

This function returns the CurrentPosition for all actuators (**Hexapod.1 to Hexapod.6**) of the selected hexapod group.

The current position of **Hexapod.1 to Hexapod.6** is defined as:

$$\text{CurrentPosition} = \text{SetpointPosition} - \text{FollowingError}$$

*Function used with a **PositionerName**:*

- 1) This function returns the CurrentPosition for one positioner (an Hexapod actuator position) if *PositionerName* is:
 - Hexapod.1
 - Hexapod.2
 - Hexapod.3
 - Hexapod.4
 - Hexapod.5
 - Hexapod.6

- 2) This function returns the X, Y, Z, U, V or W coordinate of the Hexapod platform (the position of the **Tool** coordinate system in the **Work** coordinate system) if *PositionerName* is:
 - Hexapod.X
 - Hexapod.Y
 - Hexapod.Z
 - Hexapod.U
 - Hexapod.V
 - Hexapod.W

Examples of use in a Terminal with an “HXP” Hexapod group:

For an Hexapod group = current positions of Hexapod.1 to Hexapod.6 actuators only:

- GroupPositionCurrentGet(HXP,double*,double*,double*,double*,double*,double*)

For an Hexapod positioner :

- GroupPositionCurrentGet(HXP.1, double*) = current position of Hexapod.1 actuator
- GroupPositionCurrentGet(HXP.X, double*) = current coordinate X of Tool in Work

NOTE [HXP-D only]

Use the “HexapodPositionCurrentGet” function to get X, Y, Z, U, V, W coordinates system position of **Tool** in **Work** for an Hexapod group.

Prototype

```
int GroupPositionCurrentGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * CurrentPosition
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name or Positioner name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|-----------------|----------|-------------------------|
| CurrentPosition | double * | Current position array. |
|-----------------|----------|-------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.110 GroupPositionSetpointGet

Name

GroupPositionSetpointGet – Gets the setpoint position for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the setpoint position for one or all positioners of the selected group.

The “setpoint” position is calculated by the motion profiler and represents the “theoretical” position to reach.

NOTE [HXP-D only]

Use the “HexapodPositionSetpointGet” function to get X, Y, Z, U, V, W coordinates system position of **Tool** in **Work** for an Hexapod group.

Prototype

```
int GroupPositionSetpointGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * SetpointPosition
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|------------------|----------|--------------------------|
| SetpointPosition | double * | Setpoint position array. |
|------------------|----------|--------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.111 GroupPositionTargetGet

Name

GroupPositionTargetGet – Gets the target position for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the target position for one or all positioners of the selected group. The target position represents the “end” position after the move.

For instance, during a move from 0 to 10 units, the position values are:

GroupPositionTargetGet => **10.0000**

GroupPositionCurrentGet => **5.0005**

GroupPositionSetpointGet => **5.0055**

NOTE [HXP-D only]

Use the “HexapodPositionTargetGet” function to get X, Y, Z, U, V, W coordinates system position of **Tool** in **Work** for an Hexapod group.

Prototype

```
int GroupPositionTargetGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * TargetPosition
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|----------------|----------|------------------------|
| TargetPosition | double * | Target position array. |
|----------------|----------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.112 GroupReferencingActionExecute

Name

GroupReferencingActionExecute – Initiates the given action, with the given sensor and parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates action name and sensor name: (-8)
- Input parameter coherence: (-17)
 - For a “LatchOnHighToLowTransition” or “LatchOnLowToHighTransition” or “LatchOnIndex” or “LatchOnIndexAfterSensorHighToLowTransition” or “MoveToPreviouslyLatchedPosition” action.
 - Parameter \leq MaximumVelocity.
 - Parameter \neq 0.
 - Referencing state: (-22)
 - Latch must be done since referencing start for a “MoveToPreviouslyLatchedPosition” action.
- Invalid positioner name: (-18)
- Group status must be “NOT REFERENCED”: (-22)

Description

Initiates a referencing action for a positioner. A referencing action is defined by a given action name (see “Action list” below), with a given sensor name (see “Sensor list” below) and parameters. For more detail, see XPS User’s manual referencing section.

| Action list | Sensor to be defined |
|--|----------------------|
| LatchOnHighToLowTransition | Yes |
| LatchOnIndex | None |
| LatchOnIndexAfterSensorHighToLowTransition | Yes |
| LatchOnLowToHighTransition | Yes |
| MoveRelative | None |
| MoveToPreviouslyLatchedPosition | None |
| SetPosition | None |
| SetPositionToHomePreset | None |

Sensor list

MechanicalZero
 MinusEndOfRun
 PlusEndOfRun
 None.

If a following error occurs during the referencing and motion is in progress, an emergency brake is applied and error (-25) is returned. The group state becomes “NOTINIT”.

If the home search time out is reached, error (-28) is returned. The group state becomes “NOTINIT”.

After referencing is done, to exit the “REFERENCING” state and to go to “READY” state use “GroupReferencingStop” function.



CAUTION

This function must be used with a positioner.

Prototype

```
int GroupReferencingActionExecute(
    int SocketID,
    char * PositionerName,
    char * Action,
    char * Sensor,
    double Parameter
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | Positioner name. |
| Action | char * | Referencing action name. |
| Sensor | char * | Referencing sensor name. |
| Parameter | double | Referencing parameter (related to the referencing action). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -28: Home search timeout.

7.2.1.113 GroupReferencingStart

Name

GroupReferencingStart – Starts the referencing mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group name: (-19)
- Group status must be “NOT REFERENCED”: (-22)

Description

Starts the referencing mode and sets the group status to “REFERENCING”.

To use this function, the selected group must be in “NOT REFERENCED” state, or error (22) is returned.

To stop the referencing mode and go to “READY” state, use “GroupReferencingStop” function.

Prototype

```
int GroupReferencingStart(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.114 GroupReferencingStop

Name

GroupReferencingStop – Stops the referencing mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group name: (-19)
- Group status must be “REFERENCING”: (-22)

Description

Stops the referencing mode and sets the group state to “READY”.

To use this function, the selected group must be in “REFERENCING” state, otherwise error (-22) is returned.

The travel limits are checked before stopping referencing mode. Error (-35) is returned, if the profiler position is out of range of the software travel limits and the group stays in the “REFERENCING” state.

Prototype

```
int GroupReferencingStop(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -35: Position is outside of travel limits.

7.2.1.115 GroupSpinCurrentGet

Name

GroupSpinCurrentGet – Gets the spin mode parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a Spindle group): (-8)
- Checks the positioner name: (-18)

Description

This function returns the current (or actual) velocity and acceleration used by the SPIN mode.

Prototype

```
int GroupSpinCurrentGet(
    int SocketID,
    char * GroupName,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

| | | |
|--------------|----------|---------------------------------------|
| Velocity | double * | Velocity (units/s). |
| Acceleration | double * | Acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.116 GroupSpinModeStop

Name

GroupSpinModeStop – Stops the motion of the spindle group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a Spindle group): (-8)
- Checks the positioner name (must be a group name): (-18)

Description

This function stops the motion of a spindle group and sets the group state to READY.

To use this function, the group must be in SPINNING state, otherwise error (-22) is returned.

Prototype

```
int GroupSpinModeStop(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.117 GroupSpinParametersGet

Name

GroupSpinParametersGet – Gets the spin profiler parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a spindle group): (-8)
- Checks the function (must be a spindle function): (-18)

Description

This function returns the “Setpoint” (theoretical) velocity and acceleration used in SPIN mode.

Prototype

```
int GroupSpinParametersGet(
    int SocketID,
    char * GroupName,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

| | | |
|--------------|----------|--|
| Velocity | double * | Setpoint Velocity (units/s). |
| Acceleration | double * | Setpoint Acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.118 GroupSpinParametersSet

Name

GroupSpinParametersSet – Sets the spin profiler parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a spindle group): (-8)
- Checks input parameter value: (-17)
 - $Velocity \leq MaximumVelocity$.
 - $Velocity \geq -MaximumVelocity$.
 - $Acceleration > 0$.
 - $Acceleration \leq MaximumAcceleration$.
- Checks the function (must be a spindle function): (-18)

Description

This function starts the SPIN mode and allows on-the-fly changes to the velocity and acceleration used by this mode. If an error occurs, the positioner stops and the velocity value is set to zero.

After the tests on input values:

If $Velocity > MaximumVelocity = > Velocity = MaximumVelocity$

If $Velocity < -MaximumVelocity = > Velocity = -MaximumVelocity$

If $Acceleration \leq 0 = > ERROR$ and stop motion

If $Acceleration > MaximumAcceleration = > Acceleration = MaximumAcc.$

Prototype

```
int GroupSpinParametersSet(
    int SocketID,
    char * GroupName,
    double Velocity,
    double Acceleration
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |
| Velocity | double | Setpoint Velocity (units/s). |
| Acceleration | double | Setpoint Acceleration (units/s ²). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.119 GroupStatusGet

Name

GroupStatusGet – Gets the group status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group name: (-19)

Description

Returns the group status code. The group status codes are listed in section 8.8: “Group Status List”.

The description of group status code can be retrieved from “GroupStatusStringGet” function.

Prototype

```
int GroupStatusGet(
    int SocketID,
    char * GroupName,
    int * GroupStatus
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|-------------|-------|----------------------|
| GroupStatus | int * | Status of the group. |
|-------------|-------|----------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.120 GroupStatusStringGet

Name

GroupStatusStringGet – Gets the group status description from a group status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the group status description corresponding to a group status code (see section 8.10: “Controller Status List”).

If the group status code is not referenced, “Error: (“ undefined status”) will be returned.

Prototype

```
int GroupStatusStringGet(
    int SocketID,
    int GroupStatusCode,
    char * GroupStatusString
)
```

Input parameters

| | | |
|-----------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupStatusCode | int | Group status code. |

Output parameters

| | | |
|-------------------|--------|---------------------------|
| GroupStatusString | char * | Group status description. |
|-------------------|--------|---------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.121 GroupVelocityCurrentGet

Name

GroupVelocityCurrentGet – Gets the current velocity for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

Returns the current velocity for one or all positioners of the selected group.

Prototype

```
int GroupVelocityCurrentGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    double * CurrentVelocity
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|-----------------|----------|-------------------------|
| CurrentVelocity | double * | Current Velocity array. |
|-----------------|----------|-------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.122 GroupVelocitySetpointGet

Name

GroupVelocitySetpointGet – Gets the setpoint velocity for one or all positioners of the selected group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type: (-8)
- Checks positioner name: (-18)
- Checks group name: (-19)

Description

Gets the setpoint velocity for one or all positioners of the selected group.

Prototype

```
int GroupVelocitySetpointGet(
    int SocketID,
    char * GroupName[250],
    int NbPositioners,
    double * SetpointVelocity
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group or positioner name. |
| NbPositioners | int | Number of positioners in the group. |

Output parameters

| | | |
|------------------|----------|--------------------------|
| SetpointVelocity | double * | Setpoint velocity array. |
|------------------|----------|--------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner name doesn't exist or unknown command.
- -19: Group name doesn't exist or unknown command.

7.2.1.123 HardwareDateAndTimeGet

Name

HardwareDateAndTimeGet – Gets the current date and time.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the current date and time of XPS controller with the format “WeekDay Month Day Hour:Minute:Second Year “, for example “Tue Jan 15 10:28:06 2008”.

NOTE

The date and time returned by the controller are not guaranteed and should not be used as a reference.

Prototype

```
int HardwareDateAndTimeGet(
    int SocketID,
    char * DateAndTime
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-------------|--------|---------------------------|
| DateAndTime | char * | Controller date and time. |
|-------------|--------|---------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.124 HardwareDateAndTimeSet

Name

HardwareDateAndTimeSet – Sets the date and time.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function sets the date and time of the XPS controller. The date format must be “WeekDay Month Day Hour:Minute:Second Year “, for example “Tue Jan 15 10:28:06 2008”.

Prototype

```
int HardwareDateAndTimeSet(
    int SocketID,
    char * DateAndTime
)
```

Input parameters

| | | |
|-------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| DateAndTime | char * | Controller date and time. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.125 HardwareDriverAndStageGet

Name

HardwareDriverAndStageGet – Gets smart hardware.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks plug number: (-17)
- Checks if the group is not in NOTINIT state: (-22)

Description

This function reads the driver reference and the smart stage name (only for a smart stage) from board EEPROMs for the selected positioner plug number.

Prototype

```
int HardwareDriverAndStageGet(
    int SocketID,
    int PlugNumber,
    char * DriverName,
    char * StageName,
)
```

Input parameters

| | | |
|------------|-----|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PlugNumber | int | Positioner plug number. |

Output parameters

| | | |
|------------|--------|-------------------|
| DriverName | char * | Driver reference. |
| StageName | char * | Smart stage name. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.

7.2.1.126 HexapodCoordinatesGet [HXP-D]

Name

HexapodCoordinatesGet – Takes a point X, Y, Z, U, V, W as input in a specified coordinate system (Work, Tool, Base) and give its position in another coordinate system (Work, Tool, Base)

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type because not an hexapod group: (-8)
- Invalid group name: (-19)
- Input/Output coordinate systems must be Work, Tool or Base: (-17)
- Check coordinate systems to convert: (-1116)

Description

This function transform an input hexapod position specified in one coordinate system (Work, Tool or Base) into its hexapod position in one other coordinate system (Work, Tool or Base). The input coordinate system must be different to the output coordinate system.

Prototype

```
int HexapodCoordinatesGet (
    int SocketID,
    char *GroupName ,
    char * CoordinateSystemIn,
    char * CoordinateSystemOut,
    double Xin, double Yin, double Zin,
    double Uin, double Vin, double Win,
    double *Xout, double *Yout, double *Zout,
    double *Uout, double *Vout, double *Wout)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Hexapod group name |
| CoordinateSystemIn | char * | Input coordinate system: Work, Tool or Base |
| CoordinateSystemOut | char * | Output coordinate system: Work, Tool or Base |
| Xin, Yin, Zin | double | Input Hexapod positions (units) |
| Uin, Vin, Win | double | Input Hexapod positions (degrees) |

Output parameters

| | | |
|------------------|----------|------------------------------------|
| Xout, Yout, Zout | double * | Output Hexapod positions (units) |
| Uout, Vout, Wout | double * | Output Hexapod positions (degrees) |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system

7.2.1.127 HexapodCoordinateSystemGet [HXP-D]

Name

HexapodCoordinatesSystemGet – Get the position of a coordinate system

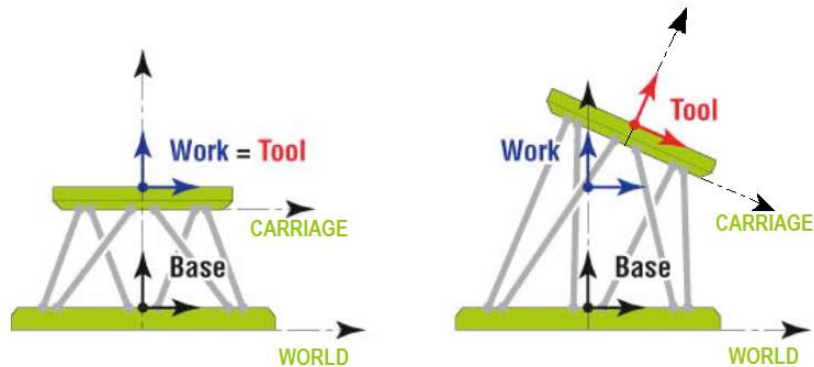
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type because not an hexapod group: (-8)
- Invalid group name: (-19)
- Coordinate systems must be Work, Tool or Base: (-17)
- Check coordinate systems to convert: (-1116)

Description

This function allows you to get the position of a coordinate system in its predecessor.

- **Work** is defined in **WORLD**
- **Base** is defined in **WORLD**
- **Tool** is defined in **CARRIAGE**



Prototype

```
int HexapodCoordinateSystemGet (
    int SocketID,
    char *GroupName,
    char *CoordinateSystem,
    double *X, double *Y, double *Z,
    double *U, double *V, double *W)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Hexapod group name |
| CoordinateSystem | char * | Coordinate system: Work, Tool or Base |

Output parameters

| | | |
|---------|----------|---------------------------------------|
| X, Y, Z | double * | Coordinate system positions (units) |
| U, V, W | double * | Coordinate system positions (degrees) |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system

7.2.1.128 HexapodCoordinateSystemSet [HXP-D]

Name

HexapodCoordinatesSystemSet – Modify on-the-fly the position of a coordinate system

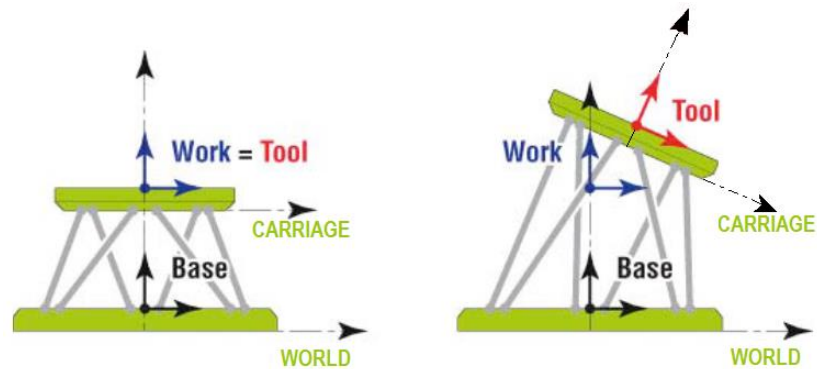
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type because not an hexapod group: (-8)
- Invalid group name: (-19)
- Coordinate systems must be **Work**, **Tool** or **Base**: (-17)
- Check coordinate systems to convert: (-1116)

Description

This function allows you to set the position of a coordinate system in its predecessor.

- **Work** is defined in **WORLD**
- **Base** is defined in **WORLD**
- **Tool** is defined in **CARRIAGE**



This function does not change the settings in the system.ini file. It only changes the current positions of **Tool** and **Work**. After booting the HXP controller, always the default values from the system.ini are used.

In the default configuration of the HXP, the center of the **Tool** coordinate system is at the center of the upper surface of the Hexapod **carriage**, Z is orthogonal to the carriage, and X is in the direction of the motor cables, when the Hexapod is at its reference Home position.

This means the default pivot point for all absolute moves (HexapodMoveAbsolute ()) and for all incremental rotations around **Tool** (HexapodMoveIncremental (GroupName, Tool)) is the **center of the top surface of the carriage**. To change this pivot point, one must change the position of the Tool coordinate system.

Prototype

```
int HexapodCoordinateSystemSet (
    int SocketID,
    char *GroupName ,
    char * CoordinateSystem,
    double X, double Y, double Z,
    double U, double V, double W)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Hexapod group name |
| CoordinateSystem | char * | Coordinate system: Work, Tool or Base |
| X, Y, Z | double | Coordinate system positions (units) |
| U, V, W | double | Coordinate system positions (degrees) |

Output parameters

None

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system

7.2.1.129 HexapodMoveAbsolute [HXP-D]

Name

HexapodMoveAbsolute – Do an absolute move of the Tool coordinate system in the Work coordinate system.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Verifies leg target position in relation with the positioner travel limits: (-17)
 - $LegTargetPosition \geq MinimumTargetPosition$.
 - $LegTargetPosition \leq MaximumTargetPosition$.
- Invalid group name: (-19)
- Invalid coordinate system must be **Work**: (-17)
- Group status must be "READY": (-22)

Description

This function moves the Hexapod to the target position (X Y Z U V W).

To be more precise, it moves the Tool coordinate system, and hence the carriage of the Hexapod that moves with the Tool coordinate system, to the position (X Y Z U V W) in the **Work** coordinate system.

The group state must be “READY” else the (-22) error is returned. If the group is “READY” then the group status becomes “MOVING”.

Each “positioner” move refers to the acceleration, velocity, MinimumJerkTime and MaximumJerkTime as defined in the “Stages.ini” file or as redefined by the “PositionerSGammaParametersSet” function.

If a “MotionDoneMode” is defined as “VelocityAndPositionWindowMotionDone” then an (-33) error can be returned if the time out (defined by “MotionDoneTimeout” in the stages.ini file) is reached before the motion done.

If “AbortMove” or “GroupMoveAbort” is done, an (-27) error is returned. In this case, the motion in progress is stopped and the group status becomes “READY”.

If a “GroupKill” command, an emergency brake or an emergency stop is occurred, an (-26) error is returned. In this case, the motion in progress is stopped and the group status becomes “NOT INITIALIZED”.

NOTE

As the motion is synchronized on the Hexapod struts, the motion does not follow an ideal “straight” trajectory in the work coordinate system. For a 1 mm long trajectory, for example, this may result in a deviation of ~2 μm from the ideal trajectory in the work coordinate system.

Prototype

```
int HexapodMoveAbsolute (
    int SocketID,
    char *GroupName,
    char * CoordinateSystem,
    double X, double Y, double Z, double U, double V, double W)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Hexapod group name |
| CoordinateSystem | char * | Has to be Work |
| X, Y, Z | double | Hexapod target positions in Work (units) |
| U, V, W | double | Hexapod target positions in Work (degrees) |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -120: Warning following error during move with position compare enabled.

7.2.1.130 HexapodMoveIncremental [HXP-D]

Name

HexapodMoveIncremental – Performs an incremental move along and around the axis of the Work or Tool coordinate system.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group type and group name (group or positioner): (-8) (-19)
- Verifies leg target position in relation with the positioner travel limits: (-17)
 - $\text{LegTargetPosition} \geq \text{MinimumTargetPosition}$.
 - $\text{LegTargetPosition} \leq \text{MaximumTargetPosition}$.
- Invalid coordinate system must be **Work** or **Tool**: (-17)
- Group status must be "READY": (-22)

Description

This function performs an incremental move along and around the axis of the **Work** or **Tool** coordinate system.

The group state must be “READY” else the (-22) error is returned. If the group is “READY” then the group status becomes “MOVING”.

Each “positioner” move refers to the acceleration, velocity, MinimumJerkTime and MaximumJerkTime as defined in the “Stages.ini” file or as redefined by the “PositionerSGammaParametersSet” function.

If a “MotionDoneMode” is defined as “VelocityAndPositionWindowMotionDone” then an (-33) error can be returned if the time out (defined by “MotionDoneTimeout” in the stages.ini file) is reached before the motion done.

If “AbortMove” or “GroupMoveAbort” is done, an (-27) error is returned. In this case, the motion in progress is stopped and the group status becomes “READY”.

If a “GroupKill” command, an emergency brake or an emergency stop is occurred, an (-26) error is returned. In this case, the motion in progress is stopped and the group status becomes “NOT INITIALIZED”.

Although this function is very well defined and can be used to increment all 6 coordinates at the same time, it is recommended to increment either only linear coordinates (XYZ), or only one angular coordinate (U, V, or W) at a time.

Prototype

```
int HexapodMoveIncremental (
    int SocketID,
    char *GroupName,
    char * CoordinateSystem,
    double X, double Y, double Z, double U, double V, double W)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Hexapod group name |
| CoordinateSystem | char * | Has to be Work or Tool |
| X, Y, Z | double | Linear increments (units) |
| U, V, W | double | Angular increment (degrees) |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -120: Warning following error during move with position compare enabled.

7.2.1.131 HexapodMoveIncrementalControl [HXP-D]

Name

HexapodMoveIncrementalControl – Hexapod trajectory (Line, Arc or Rotation) execution.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group type and group name (group or positioner): (-8) (-19)
- Check the coordinate system (must be **Work** or **Tool**)(-1116)
- Check the trajectory type (must be “**Line**”, “**Arc**” or “**Rotation**”): (-1117)

Description

This function allows executing a hexapod trajectory (Line, Arc or Rotation) with the maximum velocity.

Line: the displacement value is not limited (only by a double format)

Rotation: the displacement value is between -90° and $+90^\circ$ (the limitation is due to Bryant representation)

Arc: the displacement value is between -90° and $+90^\circ$ (the limitation is due to Bryant representation) if the arc is defined with 3 axis. And if the rotation is defined with only one axis, a value greater 90° could be used.

The **units** in case of “**Arc**” and “**Rotation**” (U,V,W) are **Degrees**.

Prototype

```
int HexapodMoveIncrementalControl (
    int SocketID,
    char GroupName [250],
    char CoordinateSystem [250],
    char HexapodTrajectoryType[250],
    double dX,
    double dY,
    double dZ)
```

Input parameters

| | | |
|-----------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | Group name |
| CoordinateSystem | char * | Coordinate System (Work or Tool) |
| HexapodTrajectoryType | char * | Hexapod Trajectory Type (Line, Arc or Rotation) |
| dX (or dU) | double | incremental displacement value (units) |
| dY (or dY) | double | incremental displacement value (units) |
| dZ (or dW) | double | incremental displacement value (units) |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system
- -1117: Wrong trajectory type

7.2.1.132 HexapodMoveIncrementalControlLimitGet [HXP-D]

Name

HexapodMoveIncrementalControlLimitGet – Returns the maximum velocity of carriage and the percent of the trajectory executable

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid group type and group name (group or positioner): (-8) (-19)
- Check the coordinate system (must be **Work** or **Tool**): (-1116)
- Check the trajectory type (must be “**Line**”, “**Arc**” or “**Rotation**”): (-1117)

Description

This function allows getting the maximum velocity of **Tool** and the percent of the trajectory executable.

The **units** in case of “**Arc**” and “**Rotation**” (U,V,W) are **Degrees**.

Prototype

```
int HexapodMoveIncrementalControlLimitGet (
    int SocketID,
    char GroupName[250],
    char CoordinateSystem[250],
    char HexapodTrajectoryType[250],
    double dX,
    double dY,
    double dZ,
    double *MaximumVelocity,
    double *TrajectoryPercent)
```

Input parameters

| | | |
|-----------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | Group name |
| CoordinateSystem | char * | Coordinate System (Work or Tool) |
| HexapodTrajectoryType | char * | Hexapod Trajectory Type (Line, Arc or Rotation) |
| dX (or dU) | double | incremental displacement value (units) |
| dY (or dV) | double | incremental displacement value (units) |
| dZ (or dW) | double | incremental displacement value (units) |

Output parameters

| | | |
|-------------------|----------|---|
| MaximumVelocity | double * | Maximum velocity of Tool (units/sec) |
| TrajectoryPercent | double * | Percent of the trajectory executable |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system
- -1117: Wrong trajectory type

7.2.1.133 HexapodMoveIncrementalControlPulseAndGatheringSet [HXP-D]

Name

HexapodMoveIncrementalControlPulseAndGatheringSet – Configure gathering with pulses

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check the divisor value (must be positive): (-17)

Description

This function allows configuring gathering with pulses: gathered data are X, Y, Z, U, V, W and pulses will be generated during only constant velocity.

Once gathering with pulses is configured, the customer could send *HexapodMoveIncrementalControl* API to activate it.

The gathered data are the Tool/Work position:

Hexapod.X, Hexapod.Y, Hexapod.Z, Hexapod.U, Hexapod.V, Hexapod.W

The pulses are generated during only SGamma Constant Velocity (Window) and at the same time the data'll be gathered at each pulse.

The interval between 2 pulses: *Divisor * CorrectorISRPeriod (sec)*

So at the end of the displacement, the customer could send the *GatheringStopAndSave* API, and see the gathered data and know exactly at which position a pulse has been generated.

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | Extended GPIO board |
|--------------|---------------------|
| Window | GPIO5.DO14 |
| Pulses | GPIO5.DO15 |

Prototype

```
int HexapodMoveIncrementalControlPulseAndGatheringSet (
    int SocketID,
    char GroupName[250],
    int Divisor)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | Group name |
| Divisor | int | Divisor * CorrectorISRPeriod = interval in sec between 2 pulses |

Output parameters

None

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command

7.2.1.134 HexapodMoveIncrementalControlWithTargetVelocity [HXP-D]

Name

HexapodMoveIncrementalControlWithTargetVelocity – Hexapod trajectory (Line, Arc or Rotation) execution.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check the coordinate system (must be **Work** or **Tool**): (-1116)
- Check the trajectory type (must be “Line”, “Arc” or “Rotation”): (-1117)

Description

This function allows executing a hexapod trajectory (Line, Arc or Rotation) with the specified velocity.

Line: the displacement value is not limited (only by a double format)

Rotation: the displacement value is between -90° and $+90^\circ$ (the limitation is due to Bryant representation)

Arc: the displacement value is between -90° and $+90^\circ$ (the limitation is due to Bryant representation) if the arc is defined with 3 axis. And if the rotation is defined with only one axis, a value greater 90° could be used.

The **units** in case of “**Arc**” and “**Rotation**” (U,V,W) are **Degrees**.

Prototype

```
int HexapodMoveIncrementalControlWithTargetVelocity (
    int SocketID,
    char GroupName[250],
    char CoordinateSystem [250],
    char HexapodTrajectoryType[250],
    double dX,
    double dY,
    double dZ,
    double Velocity)
```

Input parameters

| | | |
|-----------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | Group name |
| CoordinateSystem | char * | Coordinate System (Work or Tool) |
| HexapodTrajectoryType | char * | Hexapod Trajectory Type (Line, Arc or Rotation) |
| dX (or dU) | double | incremental displacement value (units) |
| dY (or dV) | double | incremental displacement value (units) |
| dZ (or dW) | double | incremental displacement value (units) |
| Velocity | double | motion velocity (units / seconds) |

Output parameters

None

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18 : Positioner Name doesn't exist or unknown command
- -19: GroupName doesn't exist or unknown command.
- -1116: Wrong coordinate system
- -1117: Wrong trajectory type

7.2.1.135 HexapodPositionCurrentGet [HXP-D]

Name

HexapodPositionCurrentGet – When queried for a group, returns current position of the **Tool** coordinate system in the **Work** coordinate system with X, Y, Z, U, V, W values.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check group type and group name: (-8) (-19)
- Check hexapod positioner: (-18)

Description

This function returns the current X, Y, Z, U, V, W coordinates of the Hexapod platform (the position of the **Tool** coordinate system in the **Work** coordinate system).

In case of *PositionerName*, it must be defined like following:

- Hexapod.X
- Hexapod.Y
- Hexapod.Z
- Hexapod.U
- Hexapod.V
- Hexapod.W

Prototype

```
int HexapodPositionCurrentGet (
    int SocketID,
    char *GroupName,
    int NbPositioners,
    double * HexapodCurrentPosition)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name / Positioner name |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

| | | |
|------------------------|----------|--------------------------------|
| HexapodCurrentPosition | double * | Hexapod current position array |
|------------------------|----------|--------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18 : Positioner Name doesn't exist or unknown command
- -19: GroupName doesn't exist or unknown command.

7.2.1.136 HexapodPositionSetpointGet [HXP-D]

Name

HexapodPositionSetpointGet – When queried for a group, returns setpoint position of the **Tool** coordinate system in the **Work** coordinate system with X, Y, Z, U, V, W values.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check group type and group name: (-8) (-19)
- Check hexapod positioner: (-18)

Description

This function returns the setpoint X, Y, Z, U, V, W coordinates of the Hexapod platform (the position of the **Tool** coordinate system in the **Work** coordinate system).

In case of *PositionerName*, it must be defined like following:

- Hexapod.X
- Hexapod.Y
- Hexapod.Z
- Hexapod.U
- Hexapod.V
- Hexapod.W

Prototype

```
int HexapodPositionSetpointGet (
    int SocketID,
    char *GroupName,
    int NbPositioners,
    double * HexapodSetpointPosition)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name / Hexapod positioner name |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

HexapodSetpointPosition double * Hexapod setpoint position array

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18 : Positioner Name doesn't exist or unknown command
- -19: GroupName doesn't exist or unknown command.

7.2.1.137 HexapodPositionTargetGet [HXP-D]

Name

HexapodPositionTargetGet – When queried for a group, returns target position of the **Tool** coordinate system in the **Work** coordinate system with X, Y, Z, U, V, W values.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check group type and group name: (-8) (-19)
- Check hexapod positioner: (-18)

Description

This function returns the target X, Y, Z, U, V, W coordinates of the Hexapod platform (the position of the **Tool** coordinate system in the **Work** coordinate system).

In case of *PositionerName*, it must be defined like following:

- Hexapod.X
- Hexapod.Y
- Hexapod.Z
- Hexapod.U
- Hexapod.V
- Hexapod.W

Prototype

```
int HexapodPositionTargetGet (
    int SocketID,
    char *GroupName,
    int NbPositioners,
    double * HexapodTargetPosition)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name / Hexapod positioner name |
| NbPositioners | int | Number of positioners in the selected group. |

Output parameters

HexapodTargetPosition double * Hexapod target position array

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18 : Positioner Name doesn't exist or unknown command
- -19: GroupName doesn't exist or unknown command.

7.2.1.138 HexapodSGammaParametersDistanceGet [HXP-D]

Name

HexapodSGammaParametersDistanceGet – Returns distance during acceleration phase and distance during constant velocity phase in the virtual SGamma profiler used to define a hexapod trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Check group type and group name: (-8) (-19)
- Check hexapod positioner: (-18)

Description

This function allows getting the distance during acceleration phase and the distance during constant velocity phase of the SGamma motion profile used to define a hexapod trajectory.

Prototype

```
int HexapodSGammaParametersDistanceGet (
    int SocketID,
    char FullPositionerName[250],
    double Displacement,
    double Velocity,
    double Acceleration,
    double MinJerkTime,
    double MaxJerkTime,
    double *DisplacementDuringAcc,
    double *DisplacementDuringVel)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name |
| Displacement | double | displacement value (units) |
| Velocity | double | motion velocity (units / seconds) |
| Acceleration | double | motion acceleration (units / seconds ²) |
| MinimumJerkTime | double | minimum jerk time (seconds) |
| MaximumJerkTime | double | maximum jerk time (seconds) |

Output parameters

| | | |
|-----------------------|----------|---|
| DisplacementDuringAcc | double * | displacement value during acceleration phase (units) |
| DisplacementDuringVel | double * | displacement value during constant velocity phase (units) |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command
- -19: GroupName doesn't exist or unknown command.

7.2.1.139 InstallerVersionGet

Name

InstallerVersionGet– Gets the installer pack version installed in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the installer pack version used for the current firmware installation.

Prototype

```
int InstallerVersionGet(  
    int SocketID,  
    char * Version  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------|--------|-------------------------|
| Version | char * | Installer pack version. |
|---------|--------|-------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.140 INTServitudesCommandGet [ISA]

Name

INTServitudesCommandGet – Reads INT servitudes command.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the INT servitudes command register value.

Prototype

```
int INTServitudesCommandGet(  
    int SocketID,  
    short * INTServitudesCommand  
)
```

Input parameters

SocketID int Socket identifier gets by the
“TCP_ConnectToServer” function.

Output parameters

INTServitudesCommand short * INT servitudes command.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -126: Wrong parameter type in the command string: short or short * expected.

7.2.1.141 INTServitudesStatusGet [ISA]

Name

INTServitudesStatusGet– Reads INT servitudes status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the INT servitudes status register value.

Prototype

```
int INTServitudesStatusGet(  
    int SocketID,  
    short * INTServitudesStatus  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------------------|---------|------------------------|
| INTServitudesStatus | short * | INT servitudes status. |
|---------------------|---------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -126: Wrong parameter type in the command string: short or short * expected.

7.2.1.142 KillAll

Name

KillAll – Kills all groups.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function kills and resets all groups as well as all analog and digital I/O's. The following sequence of steps is performed by KillAll function.

- 1) An “emergency stop” is executed if the group state is defined as:
 - HOMING
 - REFERENCING
 - MOVING
 - JOGGING
 - ANALOG_TRACKING
- 2) The motor is turned off, the motion done is stopped and the control loop is stopped.
- 3) “ERR_EMERGENCY_SIGNAL” is returned by each function in progress, and for groups that are in following states:
 - MOTOR_INIT
 - ENCODER_CALIBRATING
 - HOMING
 - REFERENCING
 - MOVING
 - TRAJECTORY
 - ERR_EMERGENCY_SIGNAL
- 4) the group state is not initialized “NOTINIT” for all groups.

Prototype

```
int KillAll(
    int SocketID
)
```

Input parameters

SocketID int Socket identifier gets by the “TCP_ConnectToServer” function.

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.143 Login

Name

Login – Self-identification.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the user name and the password: (-106)

Description

This function allows a user to identify himself as “SuperUser”, “Administrator” or “User”.

The user account must be exited, otherwise error (-106) is returned.

This function is not meant to be used from the “terminal” web page.

NOTE

To add a new user account, you must use the XPS web site with “Administrator” rights. In the main menu, select “Controller ” and go to the “Users management” page.

Prototype

```
int Login(
    char * Name,
    char * Password
)
```

Input parameters

| | | |
|----------|--------|----------------|
| Name | char * | User name. |
| Password | char * | User password. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -106: Wrong user name or password.
- -123: Action not allowed, an Administrator is already logged in.

7.2.1.144 LoginS

Name

LoginS – Self-identification in secured mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the user name and the crypted password: (-106)

Description

This function allows a user to identify himself as “SuperUser”, “Administrator” or “User”.

The user account must be exited, otherwise error (-106) is returned.

This function is not meant to be used from the “terminal” web page.

NOTE

To add a new user account, you must use the XPS web site with “Administrator” rights. In the main menu, select “Controller ” and go to the “Users management” page.

Prototype

```
int Login(
    char * Name,
    char * CryptedPassword
)
```

Input parameters

| | | |
|-----------------|--------|------------------------|
| Name | char * | User name. |
| CryptedPassword | char * | Crypted User password. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -106: Wrong user name or crypted password.
- -123: Action not allowed, an Administrator is already logged in.

7.2.1.145 MultipleAxesPDSAAxisByAxisExecution

Name

MultipleAxesPDSAAxisByAxisExecution – Executes an axis by axis search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

This function executes from the current position, stages execute axis by axis a relative move in both directions, and then returns to the location of the highest power found.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSAAxisByAxisExecution (
    int SocketID,
    int *IsTresholdReached,
    double *SignalValue,
    char PositionerNameList [255],
    double RangeArray,
    double *PositionerPeakLocationArray,
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerNameList | char * | List of axes, up to 6 axes names in the desired order. |
| Range array | double | Range value for each axis. |

Output parameters

| | | |
|-----------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| PositionerPeakLocationArray | double* | Value of the PeakLocation of each axis. |

Return

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.

7.2.1.146 MultipleAxesPDSASpiralStepExecution

Name

MultipleAxesPDSASpiralStepExecutionAPI – Executes a spiral step search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (Range must > Step): (-1057)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

This function used to find first-light or peak power, stages are moved in an outward “spiral” until reaching the power threshold or to the highest power position after completing the scan without reaching the power threshold “Step by step” motion allows stopping as soon as the power threshold is reached.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSASpiralStepExecutionAPI (
    int SocketID,
    char PositionerName[255],
    char PositionerName[255],
    double Step,
    double Range,
    int *IsTresholdReached,
    double *SignalValue,
    double *FirstPositionerPeakLocation,
    double *SecondPositionerPeakLocation,
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | First Axis. |
| PositionerName | char * | Second Axis. |
| Step | double | Spiral step size. |
| Range | double | Spiral total range. |

Output parameters

| | | |
|------------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| FirstPositionerPeakLocation | double* | Value of the PeakLocation of the first axis. |
| SecondPositionerPeakLocation | double* | Value of the PeakLocation of the second axis. |

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1057: Range must be higher than step.

7.2.1.147 MultipleAxesPDSASpiralContinuousExecution

Name

MultipleAxesPDSASpiralContinuousExecution – Executes a spiral continuous search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (Range must > Step): (-1057)
- Checks input value (Speed must > 0): (-17)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

This function used to find first-light or peak power, stages are moved in an outward “spiral” until reaching the power threshold or to the highest power position after completing the scan without reaching the power threshold “Continuous” motion completes the whole spiral in a smoother way and returns to the highest power position.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSASpiralContinuousExecution(
    int SocketID,
    char PositionerName[255],
    char PositionerName[255],
    double Step,
    double Range,
    double Speed,
    int *IsTresholdReached,
    double *SignalValue,
    double *FirstPositionerPeakLocation,
    double *SecondPositionerPeakLocation,
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | First Axis. |
| PositionerName | char * | Second Axis. |
| Step | double | Spiral step size. |
| Range | double | Spiral total range. |
| Speed | double | Speed on spiral |

Output parameters

| | | |
|------------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| FirstPositionerPeakLocation | double* | Value of the PeakLocation of the first axis. |
| SecondPositionerPeakLocation | double* | Value of the PeakLocation of the second axis. |

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1057: Range must be higher than step.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.148 MultipleAxesPDSARasterExecution

Name

MultipleAxesPDSARasterExecution – Executes a raster search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (Length must > Step): (-1059)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

This function used to find first-light or peak power, stages are moved in a raster scan way until reaching the power threshold or to the highest power position after completing the scan without reaching the power threshold.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSARasterExecution (
    int SocketID,
    char PositionerName[255],
    char PositionerName[255],
    double Length,
    double Step,
    double Width,
    int *IsTresholdReached,
    double *SignalValue,
    double *FirstPositionerPeakLocation,
    double *SecondPositionerPeakLocation,
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | First Axis. |
| PositionerName | char * | Second Axis. |
| Length | double | 2 nd axis lenght. |
| Step | double | 2 nd axis step. |
| Width | double | 1 st axis width. |

Output parameters

| | | |
|------------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| FirstPositionerPeakLocation | double* | Value of the PeakLocation of the first axis. |
| SecondPositionerPeakLocation | double* | Value of the PeakLocation of the second axis. |

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1059: Length must be higher than step.

7.2.1.149 MultipleAxesPDSADichotomyExecution

Name

MultipleAxesPDSADichotomyExecution – Executes a dichotomy search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (MaxReductionFactor must > ReductionFactor): (-1058)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

In this function stages are moved axis by axis on a wide range using large steps to find a “summit” and return to it. Then the principle is repeated with smaller steps, until finding the peak power position.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSADichotomyExecution (
    int SocketID,
    double ReductionFactor,
    double MaxReductionFactor
    int *IsTresholdReached,
    double *SignalValue,
    char PositionerNameList [255],
    double StepArray,
    double *PositionerPeakLocationArray,
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ReductionFactor | double | |
| MaxReductionFactor | double | |
| PositionerNameList | char * | List of axes, up to 6 axes names in the desired order. |
| Steparray | double | Initial step value for each axis. |

Output parameters

| | | |
|------------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| FirstPositionerPeakLocation | double* | Value of the PeakLocation of the first axis. |
| SecondPositionerPeakLocation | double* | Value of the PeakLocation of the second axis. |

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1058: Max reduction factor must be higher than reduction factor.

7.2.1.150 MultipleAxesPDSAEscaladeStepExecution

Name

MultipleAxesPDSAEscaladeStepExecution – Executes an escalate step search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (Range must > Step): (-1057)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

In this function after completing a first spiral search, a half size second spiral is executed at a different Z position, then stages moves step by step (by a quarter of Z motion) on the axis defined by the two spiral peak power until reaching a maximum or the threshold.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

This algorithm works only on X, Y and Z axes

Prototype

```
int MultipleAxesPDSAEscaladeStepExecution (
    int SocketID,
    char GroupName[255],
    double XYStep,
    double XYRange,
    double Zstep
    int *IsTresholdReached,
    double *SignalValue,
    double *SearchTime,
    double *FirstPositionerPeakLocation,
    double *SecondPositionerPeakLocation,
    double *ZPeakLocation,
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | GroupName. |
| XYStep | double | First spiral step size. |
| XYRange | double | First spiral total range. |

ZStep double First Z motion.

Output parameters

IsTresholdReached int * 1 if the threshold is reached 0 if not.

SignalValue double * Value of the highest power found.

SearchTime double * Value of the search time.

FirstPositionerPeakLocation double* Value of the PeakLocation of the first axis.

SecondPositionerPeakLocation double* Value of the PeakLocation of the second axis.

ZPeakLocation double * Value of the Peak location of Z axis.

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1057: Range must be higher than step.

7.2.1.151 MultipleAxesPDSAEscaladeContinuousExecution

Name

MultipleAxesPDSAEscaladeContinuousExecution – Executes a spiral continuous search algorithm.

Input tests

- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (Range must > Step): (-1057)
- Checks input value (Speed must > 0): (-17)
- Group state must be "READY": (-22)
- Checks message queue: (-71)

Description

In this function after completing a first spiral search, a half size second spiral is executed at a different Z position, then stages moves step by step (by a quarter of Z motion) on the axis defined by the two spiral peak power until reaching a maximum or the threshold.

During the algorithm execution, if a positioner reaches one of its travel limits, the execution stops and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPDSAEscaladeContinuousExecution (
    int SocketID,
    char GroupName[255],
    double XYStep,
    double XYRange,
    double Zstep
    double Speed
    int *IsTresholdReached,
    double *SignalValue,
    double *SearchTime,
    double *FirstPositionerPeakLocation,
    double *SecondPositionerPeakLocation,
    double *ZPeakLocation,
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | GroupName. |
| XYStep | double | First spiral step size. |
| XYRange | double | First spiral total range. |
| ZStep | double | First Z motion. |
| Speed | double | Speed on spiral |

Output parameters

| | | |
|------------------------------|----------|---|
| IsTresholdReached | int * | 1 if the threshold is reached 0 if not. |
| SignalValue | double * | Value of the highest power found. |
| FirstPositionerPeakLocation | double* | Value of the PeakLocation of the first axis. |
| SecondPositionerPeakLocation | double* | Value of the PeakLocation of the second axis. |
| ZPeakLocation | double * | Value of the Peak location of Z axis. |

Return

- 0: No error.
- -3 String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -1056: Signal below threshold.
- -1057: Range must be higher than step.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.152 MultipleAxesPTExecution

Name

MultipleAxesPTExecution – Executes a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)

Description

This function executes a PT (Position Time) trajectory. The trajectory file must be stored in “\Admin\Public\Trajectory” folder of the XPS controller. If the trajectory cannot be initialized (message queue or task error) , error (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “MultipleAxesPTVerification” and “MultipleAxesPTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and error (-25) is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.153 MultipleAxesPTLoadToMemory [Extended]

Name

MultipleAxesPTLoadToMemory – Loads some lines of PT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTES

- All of the PT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PT trajectory in RAM as it does from a disk.

Example:

```
MultipleAxesPTLoadToMemory(socketId,myGroup,"dT1,dX11,dX12#...dTn,dXn1,dXn2#")
```

```
MultipleAxesPTVerification (socketId,myGroup,FromMemory)
```

```
MultipleAxesPTExecution(socketId,myGroup,FromMemory,1).
```

Prototype

```
int MultipleAxesPTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.154 MultipleAxesPTParametersGet

Name

MultipleAxesPTParametersGet – Gets PT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PT): (-22)

Description

This function returns the PT trajectory parameters (trajectory name and current executing element number) of the current PT trajectory.

Prototype

```
int MultipleAxesPTParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.155 MultipleAxesPTPulseOutputGet

Name

MultipleAxesPTPulseOutputGet – Gets the configuration of pulse generation for PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)

Description

This function returns the last configuration of pulse generation of a PT trajectory, that was previously set by *MultipleAxesPTPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

```
MultipleAxesPTPulseOutputSet(MyGroup, 3, 5, 0.01)
```

```
MultipleAxesPTPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is the error return, meaning “no error”)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int MultipleAxesPTPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.156 MultipleAxesPTPulseOutputSet

Name

MultipleAxesPTPulseOutputSet – Sets the configuration of pulse generation for PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)

Description

This function configures and activates the pulse generation of a PT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PT trajectory then this function returns error -22 (“Not allowed action”).

Please note, that the pulse output settings are automatically removed, when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PT trajectory. The pulses are generated between the first and the last trajectory element. The minimum possible time interval is `CorrectorISRPeriod` value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to Appendix / General I/O Description of XPS User's Manual,.

Example:

MultipleAxesPTPulseOutputSet(Group1, 3, 5, 0.01)

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int MultipleAxesPTPulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.157 MultipleAxesPTResetInMemory [Extended]

Name

MultipleAxesPTResetInMemory – Deletes the content of PT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes the PT trajectory buffer, that was previously loaded with “MultipleAxesPTLoadToMemory” function, in the controller memory.

Prototype

```
int MultipleAxesPTResetInMemory(
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.158 MultipleAxesPTVerification

Name

MultipleAxesPTVerification – Checks the PT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (Minimum Velocity \leq Velocity \leq Maximum Velocity): (-68)
- Checks acceleration (Minimum acc. \leq acceleration \leq Maximum acc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of a PT trajectory. The results of the verification can be obtained by “MultipleAxesPTVerificationResultGet” function. The trajectory file must be stored in “\ADMIN\Public\Trajectory” folder of XPS controller. If the trajectory cannot be initialized (task error), error (-72) is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, 1) the required travel per positioner, 2) the maximum possible trajectory velocity and 3) the maximum possible trajectory acceleration. This function helps to define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero and not to the current position. So before executing a PT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTES

Because of the PT trajectory internal calculation of elements end velocity, a correct PT trajectory file must have at least two lines with zero displacements at the trajectory end. Otherwise, the “MultipleAxesPTVerification” function returns error (-70).

The “MultipleAxesPTVerification” function is independent from the “MultipleAxesPTExecution” function, but it is highly recommended to execute this function before executing the PT trajectory.

Prototype

```
int MultipleAxesPTVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Acceleration on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.159 MultipleAxesPTVerificationResultGet

Name

MultipleAxesPTVerificationResultGet – Gets the results of the “MultipleAxesPTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last MultipleAxes PTVerification (must be done): (-22)

Description

This function returns the results of the previous “MultipleAxesPTVerification” function, for every positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done , error (-22) is returned.

Prototype

```
int MultipleAxesPTVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.160 MultipleAxesPVTExecution

Name

MultipleAxesPVTExecution – Executes a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)

Description

This function executes a PVT (Position Velocity Time) trajectory. The trajectory file must be stored in “\Admin\Public\Trajectory” folder of XPS controller. If the trajectory cannot be initialized (message queue or task error), error (-72) is returned.

Before the trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “MultipleAxesPVTVerification” and “MultipleAxesPVTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of its travel limits, the trajectory execution stops and error (-25) error is generated under positioner errors.

NOTE

In case of errors (-33), (-25) and (-44) , , the group state changes to DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int MultipleAxesPVTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.161 MultipleAxesPVTLoadToMemory [Extended]

Name

MultipleAxesPVTLoadToMemory – Loads some lines of PVT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PVT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PVT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTES

All of the PVT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PVT trajectory in RAM as it does from a disk.

Example:

MultipleAxesPVTLoadToMemory(socketId,myGroup,"dT1,dX11,Vout11,dX12,Vout12#...dTn,dXn1,Voutn1,dXn2,Voutn2#")

MultipleAxesPVTVerification (socketId,myGroup,FromMemory)

MultipleAxesPVTExecution(socketId,myGroup,FromMemory,1).

Prototype

```
int MultipleAxesPVTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.162 MultipleAxesPVTPParametersGet

Name

MultipleAxesPVTPParametersGet – Gets PVT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PVT): (-22)

Description

This function returns the PVT trajectory parameters (trajectory name and current executing element number) of the current PVT trajectory.

Prototype

```
int MultipleAxesPVTPParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.163 MultipleAxesPVPulseOutputGet

Name

MultipleAxesPVPulseOutputGet – Gets the configuration of pulse generation for PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)

Description

This function returns the last configuration of pulse generation for a PVT trajectory, that was previously set by *MultipleAxesPVPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

```
MultipleAxesPVPulseOutputSet(MyGroup, 3, 5, 0.01)
```

```
MultipleAxesPVPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is error return, means OK)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int MultipleAxesPVPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.164 MultipleAxesPVTpulseOutputSet

Name

MultipleAxesPVTpulseOutputSet – Sets the configuration of pulse generation for PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)

Description

This function configures and activates the pulse generation of a PVT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PVT trajectory, error (-22) is returned

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PVT trajectory. The pulses are generated between the first and the last trajectory elements. The minimum possible time interval is CorrectorISRPeriod value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual

Example:

MultipleAxesPVTpulseOutputSet(Group1, 3, 5, 0.01)

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int MultipleAxesPVTpulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```


Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.165 MultipleAxesPVTResetInMemory [Extended]

Name

MultipleAxesPVTResetInMemory – Deletes the content of the PVT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes the PVT trajectory buffer, that was previously loaded with the “MultipleAxesPVTLoadToMemory” function, from the controller memory.

Prototype

```
int MultipleAxesPVTResetInMemory(
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.166 MultipleAxesPVTVerification

Name

MultipleAxesPVTVerification – Checks the PVT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (Minimum Velocity \leq Velocity \leq Maximum Velocity): (-68)
- Checks acceleration (Minimum acc. \leq acceleration \leq Maximum acc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of the PVT trajectory. The results of the verification can be obtained by “MultipleAxesPVTVerificationResultGet” function. The trajectory file must be stored in “\ADMIN\Public\Trajectory” folder of the XPS controller. If the trajectory cannot be initialized (task error) , error (-72) is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, 1) the required travel per positioner, 2) the maximum possible trajectory velocity and 3) the maximum possible trajectory acceleration. This function helps to define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero and not to the current position. So before executing a PVT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTE

The “MultipleAxesPVTVerification” function is independent from the “MultipleAxesPVTExecution” function, but it is highly recommended to execute this function before executing a PVT trajectory.

Prototype

```
int MultipleAxesPVTVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Acceleration on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.167 MultipleAxesPVTVerificationResultGet

Name

MultipleAxesPVTVerificationResultGet – Gets the results of the “MultipleAxesPVTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last MultipleAxes PVTVerification (must be done): (-22)

Description

This function returns the results of the previous “MultipleAxesPVTVerification” function, for every positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done, error (-22) is returned.

Prototype

```
int MultipleAxesPVTVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.168 MultipleAxesDisableShutter [Extended]**Name**

MultipleAxesDisableShutter – disables the shutter.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Check shutter existence (-22)
- Checks group status must be "READY": (-22 otherwise)

Description

This function forces the group in “ready” state if its status is in “shutter enable” state.

Prototype

```
int MultipleAxesDisableShutter (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.169 MultipleAxesScanPositions [Extended]

Name

MultipleAxesScanPositions – Set the new scan positions.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Check shutter group existence (-22)
- Check parameter values coherence (-17 or -68)
- Checks group status must be "READY": (-22 otherwise)

Description

This function sets the shutter new scan positions before making a shutter scan.

Prototype

```
int MultipleAxesScanPositions (
    int SocketID,
    char GroupName[250],
    double XStartOpeningPosition,
    double XStartOpeningVelocity,
    double XEndOpeningPosition,
    double XEndOpeningVelocity,
    double XStartClosingPosition,
    double XStartClosingVelocity,
    double XEndClosingPosition,
    double XEndClosingVelocity,
    double BeamOpeningPercentage
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| XStartOpeningPosition | double | X start opening position. |
| XStartOpeningVelocity | double | X start opening velocity. |
| XEndOpeningPosition | double | X end opening position. |
| XEndOpeningVelocity | double | X end opening velocity. |
| XStartClosingPosition | double | X start closing position. |
| XStartClosingVelocity | double | X start closing velocity. |
| XEndClosingPosition | double | X end closing position. |
| XEndClosingVelocity | double | X end closing velocity. |
| BeamOpeningPercentage | double | Laser beam opening percentage. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter is out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -68: Velocity on trajectory is too big.

7.2.1.170 MultipleAxesGetShutterPositions [Extended]**Name**

MultipleAxesGetShutterPositions – gets shutter positions.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)

Description

This function gets positions of the shutter.

Prototype

```
int MultipleAxesGetShutterPositions (
    int SocketID,
    char GroupName[250],
    double * BeamBlockMin,
    double * BeamBlockMax,
    double * ShutterPosition2,
    double * ShutterPosition3,
    double * ShutterPosition4,
    double * ShutterPosition5
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|------------------|----------|------------------------------|
| BeamBlockMin | double * | Beam block minimum position. |
| BeamBlockMax | double * | Beam block maximum position. |
| ShutterPosition2 | double * | Shutter position 2 |
| ShutterPosition3 | double * | Shutter position 3 |
| ShutterPosition4 | double * | Shutter position 4 |
| ShutterPosition5 | double * | Shutter position 5 |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.171 MultipleAxesSetShutterPositions [Extended]

Name

MultipleAxesSetShutterPositions – sets shutter positions.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Check parameter values coherence (-17)

Description

This function sets shutter new positions.

Prototype

```
int MultipleAxesSetShutterPositions (
    int SocketID,
    char GroupName[250],
    double BeamBlockMin,
    double BeamBlockMax,
    double ShutterPosition2,
    double ShutterPosition3,
    double ShutterPosition4,
    double ShutterPosition5
)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| BeamBlockMin | double | Beam block minimum position. |
| BeamBlockMax | double | Beam block maximum position. |
| ShutterPosition2 | double | Shutter position 2 |
| ShutterPosition3 | double | Shutter position 3 |
| ShutterPosition4 | double | Shutter position 4 |
| ShutterPosition5 | double | Shutter position 5 |

Output parameters

None

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.172 MultipleAxesTraceNextScan [Extended]

Name

MultipleAxesTraceNextScan – Trace the next scan.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a MultipleAxes group): (-8)
- Checks group name: (-19)
- Check shutter group existence (-22)

Description

This function enables trajectory trace during the next scan.

Prototype

```
int MultipleAxesTraceNextScan (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.173 OpenConnection

Name

OpenConnection – opens a socket to connect to TCP server (local).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of used sockets (Max = 100): if no free socket then the SocketID is set to -1.

Description

This function opens a socket in a TCL script located in the “Scripts” directory of the XPS controller.

The TCP/IP communication is configured as:

Local Host Address = 127.0.0.1

IP Port = 5001

This function returns a socket identifier to use for each function call. The socket identifier is defined between 0 to 99. If the TCP/IP connection fails then the “SocketID” value is -1.

Prototype

```
int OpenConnection(
    int TimeOut,
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|--|
| TimeOut | int | Timeout in seconds used for each function execution. |
| SocketID | int | Socket identifier used in each function. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.1.174 PositionerAccelerationAutoScaling

Name

PositionerAccelerationAutoScaling –Executes Auto-scaling process to determine the stage scaling acceleration.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner”: (-8)
- Checks group type: (-8)
- Checks positioner name: (-18)
- Group status must be not initialized: (-22)
- Control loop type must be “PIDFFAcceleration”: (-24)

Description

This function executes an auto-scaling process and returns the calculated scaling acceleration. The selected group must be in “NOTINIT” state, otherwise error (-22) is returned.

It only works, if the positioner control loop type is “PIDFFAcceleration” (acceleration control), otherwise error (-24) is returned

This function checks the positioner error. If an error is detected, the hardware status register is reset (motor on) and the positioner error is cleared before checking it again. If a positioner error is present, the motor is turned off, error (-5) is returned and the group status becomes “NOTINIT”.

If there is no positioner error, then the master-slave error is cleared, the encoder is preset (update encoder position) and the user travel limits are checked. If a travel limit error is detected then the motor is turned off, error (-35) is returned and the group status becomes “NOTINIT”.

If no error is detected, the motor initializes. If motor initialization fails, the error (-50) is returned and the group status becomes “NOTINIT”.

If motor initialization is successful, the positions are preset, the motion is enabled (the motor is powered) permitting the process to auto-scale if the motion cannot be enabled, error (-22) is returned.

If the auto-scaling fails error (-105) is returned or if the motion becomes disabled, error (-26) is returned.

The auto-scaling process is executed in 5 periods. At the end of each period, the auto-scaling process estimates the auto-scaling quality by calculating the signal to noise ratio. If it is very close to zero, it means there is no oscillation, so error (-101) is returned. if the signal to noise ratio > MaximumNoiseRatio defined in system.ref (normally between 0.1 and 0.2), error (-102) is returned.

If the number of acquired data points (minimum = 9) or the number of acquired signal periods (minimum = 5) is not enough for a good estimate then error (-103) is returned.

At the end of this function, the new value of scaling acceleration is returned and the group status becomes “NOTINIT” once again.

Prototype

```
int PositionerAccelerationAutoScaling(
    int SocketID,
    char * PositionerName,
    double * Scaling
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Name of a positioner. |
| FrequencyTicks | int | Number of frequency ticks. |

Output parameters

| | | |
|---------|----------|--|
| Scaling | double * | Calculated scaling acceleration value. |
|---------|----------|--|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -35: Position is outside of travel limits.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -101: Relay Feedback Test failed: No oscillation.
- -102: Relay Feedback Test failed: Signal too noisy.
- -103: Relay Feedback Test failed: Signal data not enough for analyse.
- -105: Error of scaling calibration initialization.

7.2.1.175 PositionerAnalogTrackingPositionParametersGet

Name

PositionerAnalogTrackingPositionParametersGet – Gets the parameters of the current tracking position mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter: (-8), (-18)

Description

This function returns the current analog input name, the current offset and the current scale used by analog tracking position mode.

NOTE

“Velocity” and “Acceleration” define the maximum velocity and acceleration used in the position tracking mode.

Prototype

```
int PositionerAnalogTrackingPositionParametersGet(
    int SocketID,
    char * FullPositionerName,
    char * GPIOName,
    double * Offset,
    double * Scale,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name FrequencyTicks. |

Output parameters

| | | |
|--------------|----------|---------------------------------------|
| GPIOName | char | Analog input name (ADC). |
| Offset | double * | Offset in volts. |
| Scale | double * | Scale (Units/Volts). |
| Velocity | double * | Velocity (Units/s). |
| Acceleration | double * | Acceleration (Units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.176 PositionerAnalogTrackingPositionParametersSet

Name

PositionerAnalogTrackingPositionParametersSet – Sets the parameters of the current tracking position mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Positioner and GPIO type (ADC): (-8)
- Checks velocity and acceleration: (-17)
- Checks input parameter: (-18)

Description

This function modifies the analog input name, the offset and the scale used by the analog tracking position mode. To use this function, the group state must be READY otherwise error (-22) is returned.

The “Offset” and the “Scale” parameters are used to calculate the target tracking position:

$$\text{TrackingPosition} = \text{InitialPosition} + (\text{AnalogValue} - \text{Offset}) * \text{Scale}$$

The “Velocity” and “Acceleration” parameters define the maximum velocity and acceleration used in the position tracking mode.

NOTE

The parameters for analog tracking position mode can be reset, if the “GPIOName” parameter is blank.

Prototype

```
int PositionerAnalogTrackingPositionParametersSet(
    int SocketID,
    char FullPositionerName,
    char * GPIOName,
    double Offset,
    double Scale,
    double Velocity,
    double Acceleration
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char | Positioner name FrequencyTicks. |
| GPIOName | char * | Analog input name (ADC). |
| Offset | double | Offset in volts. |
| Scale | double | Scale (Units/Volts). |
| Velocity | double | Velocity (Units/s). |
| Acceleration | double | Acceleration (Units/s ²). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.177 PositionerAnalogTrackingVelocityParametersGet

Name

PositionerAnalogTrackingVelocityParametersGet – Gets the parameters of the current tracking velocity mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter: (-8), (-18)

Description

This function returns the analog input name, the offset, the scale, the deadband threshold and the order used by analog tracking velocity mode.

NOTE

“Velocity” and “Acceleration” define the maximum velocity and acceleration used in the velocity tracking mode.

Prototype

```
int PositionerAnalogTrackingVelocityParametersGet(
    int SocketID,
    char FullPositionerName,
    char * GPIOName,
    double * Offset,
    double * Scale,
    double * DeadBandThreshold,
    int * Order,
    double * Velocity,
    double * Acceleration
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name FrequencyTicks. |

Output parameters

| | | |
|-------------------|-----------|---------------------------------------|
| GPIOName | char * | Analog input name (ADC). |
| Offset | double * | Offset in volts. |
| Scale | double * | Scale (Units/Volts). |
| DeadBandThreshold | double * | Dead band threshold (Volts). |
| Order | integer * | Order (No unit). |
| Velocity | double * | Velocity (Units/s). |
| Acceleration | double * | Acceleration (Units/s ²). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.178 PositionerAnalogTrackingVelocityParametersSet

Name

PositionerAnalogTrackingVelocityParametersSet – Sets the parameters of tcurrent tracking velocity mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks GPIO type (ADC): (-8)
- Checks Positioner: (-8), (-18)
- Checks velocity and acceleration: (-17)

Description

This function allows modifying the GPIO name, offset, scale, deadband threshold and the order used by analog tracking velocity mode. To use this function the group state must be READY, otherwise error (-22) is returned.

The “velocity” and “acceleration” define the maximum velocity and acceleration used in the velocity tracking mode.

The target tracking velocity is defined as follows:

InputValue = GPIOAnalogInput – Offset

MaxADCAmplitude = 10/GPIOAnalogGain

if (InputValue ≥ 0) then

InputValue = InputValue - DeadBandThreshold

if (InputValue < 0) then InputValue = 0

else

InputValue = AnalogInputValue + DeadBandThreshold

if (InputValue > 0) then InputValue = 0

OutputValue = (|InputValue|/MaxADCAmplitude)^{Order}

TrackingVelocity = Sign(InputValue) * OutputValue * Scale * MaxADCAmplitude

NOTE

The analog tracking velocity mode can be reset if the “GPIOName” parameter is blank.

Prototype

```
int PositionerAnalogTrackingVelocityParametersSet(
    int SocketID,
    char * FullPositionerName,
    char * GPIOName,
    double Offset,
    double Scale,
    double DeadBandThreshold,
    int Order,
    double Velocity,
    double Acceleration
)
```

Input parameters

| | | |
|--------------------|---------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name FrequencyTicks. |
| GPIOName | char * | Analog input name (ADC). |
| Offset | double | Offset in volts. |
| Scale | double | Scale (Units/Volts). |
| | double | Dead band threshold (Volts). |
| Order | integer | Order (No unit). |
| Velocity | double | Velocity (Units/s). |
| Acceleration | double | Acceleration (Units/s ²). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.179 PositionerBacklashDisable

Name

PositionerBacklashDisable – Disables the backlash compensation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function disables the backlash compensation.

In the “stages.ini” file the parameter “Backlash” will enable or disable this feature as follows:

Backlash = 0 —>Disable backlash

Backlash >0 —>Enable backlash

NOTE

The backlash compensation is not allowed with a secondary positioner (gantry mode).

The backlash must be disabled to execute a trajectory, use a jog mode or analog tracking mode.

Prototype

```
int PositionerBacklashDisable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.180 PositionerBacklashEnable

Name

PositionerBacklashEnable – Enables the backlash compensation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group status must be “NOTINIT”: (-22)
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function enables the backlash compensation defined in the “stages.ini” file or by “PositionerBacklashSet” function. If the backlash compensation value is null then this function will have no effect, and backlash compensation will remain disabled..

The group state must be NOTINIT to enable the backlash compensation. If it is not the case error (-22) is returned.

The parameter “Backlash in the “stages.ini” file” allows the user to enable or disable the backlash compensation.

Backlash = 0 —> Disable backlash

Backlash >0 —> Enable backlash

NOTE

The backlash must be disabled to execute a trajectory use the jog mode or analog tracking mode.

CAUTION



It is not possible to use backlash compensation with positioners that have one of the following:

1) “HomeSearchSequenceType” defined as “CurrentPositionAsHome”

2) “PositionerMappingFileName” defined in the stages.ini file.

Prototype

```
int PositionerBacklashEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.181 PositionerBacklashGet

Name

PositionerBacklashGet – Gets the backlash compensation value.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function returns the backlash compensation value, defined in the “stages.ini” file or by “PositionerBacklashSet” function, and the backlash status (“Enable” or “Disable”).

Prototype

```
int PositionerBacklashGet(
    int SocketID,
    char * FullPositionerName,
    double * BacklashValue,
    char * Status
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------|----------|--|
| BacklashValue | double * | Backlash compensation value (units). |
| Status | char * | Backlash status (“Enable” or “Disable”). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.182 PositionerBacklashSet

Name

PositionerBacklashSet – Sets the backlash compensation value.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- The “BacklashValue” must be positive: (-17)

Description

This function changes the backlash compensation value.

NOTE

This function can be used only if a backlash compensation is defined in “stages.ini” file (Backlash >0) , otherwise error (-22) is returned.

Prototype

```
int PositionerBacklashSet(
    int SocketID,
    char * FullPositionerName,
    double BacklashValue
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| BacklashValue | double | Backlash compensation value (units). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.

7.2.1.183 PositionerCompensatedFastPCOAbort

Name

PositionerCompensatedFastPCOAbort – Aborts the CIE fast compensated PCO puls generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)

Description

This function aborts the CIE fast compensated PCO pulses generation. The pulses generation is stopped immediately; no more pulses will be generated even if the scanning positioner continues to move across the predefined firing positions. To stop the scanning move, use GroupMoveAbort() function.

Prototype

```
int PositionerCompensatedFastPCOAbort(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.184 PositionerCompensatedFastPCOCurrentStatusGet

Name

PositionerCompensatedFastPCOCurrentStatusGet – Gets current status of CIEFAST compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function gets the current status of CIEFAST compensated PCO pulses generation.

Status possible values:

0: Pulses generation inactive (idle, no error)

1: Pulses generation activated (running)

-1: Pulses generation aborted with errors.

Prototype

```
int PositionerCompensatedFastPCOCurrentStatusGet(
    int SocketID,
    char * FullPositionerName,
    int * Status
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------|-------|-------------------------------|
| Status | int * | PCO pulses generation status. |
|--------|-------|-------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Function is not allowed due to configuration disabled.

7.2.1.185 PositionerCompensatedFastPCOEnable

Name

PositionerCompensatedFastPCOEnable – Activates the CIEFAST compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function activates the CIE Fast compensated PCO pulses generation (status becomes running (value 1)). The pulses will be generated when the scanning positioner moves across the predefined positions. When the last pulse is generated, the CIE Fast compensated PCO mode will become inactive (status becomes inactive (value 0)). To get status of the CIE Fast compensated PCO pulses generation, use `PositionerCompensatedFastPCOCurrentStatusGet()` function.

Note that only the scanning positioner positions are used to fire pulses: if you prepare a set of positions at a given location and then enable the pulses generation and start the move from a different location, the pulses could be generated but their accuracy will be impacted by the mapping difference between the two locations.

This function must be used after the firing pulses data preparation with the `PositionerCompensatedFastPCOPrepare()`, elsewhere the function fails and the error (-122) will be returned.

Prototype

```
int PositionerCompensatedFastPCOEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -115: Function is not supported by current hardware.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.186 PositionerCompensatedFastPCOFromFile

Name

PositionerCompensatedFastPCOFromFile – Reads firing positions from a data file to controller's memory.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function reads firing positions from a data file to the controller's memory.

The data file contains lines of data, formatted as follows:

Position_i

Example:

Position₁

Position₂

... ..

Position_N

Data conditions:

Position_i > Position_{i-1}, Width_i < Position_{i+1} - Position_i.

NOTE

Position_i (i = 1...N) are the offset values relative to the scanning positioner start position that is defined in the PositionerCompensatedFastPCOPrepare().

Prototype

```
int PositionerCompensatedFastPCOFromFile(
    int SocketID,
    char * PositionerName,
    char * DataFileName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | Positioner name. |
| DataFileName | char * | Data file name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -61: Error file corrupt or file doesn't exist.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.187 PositionerCompensatedFastPCOLoadToMemory

Name

PositionerCompensatedFastPCOLoadToMemory– Appends firing positions to controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function appends firing positions to controller memory from input parameters.

To reset the controller memory, the `PositionerCompensatedFastPCOMemoryReset()` function is provided.

The data line format can be a single or several offset positions as in `PositionerCompensatedFastPCOSet()` function:

Example:

```
Positioni
Positioni Positioni+1 Positioni+2
PositionerCompensatedLoadToMemory(XY.X, 0 0.1 0.2 0.3 0.4 0.5)
```

Prototype

```
int PositionerCompensatedFastPCOLoadToMemory(
    int SocketID,
    char * PositionerName,
    char * DataLine
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| DataLine | char * | Some data lines. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.188 PositionerCompensatedFastPCOMemoryReset

Name

PositionerCompensatedFastPCOMemoryReset – Resets CIEFast compensated PCO data memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function resets the CIE fast compensated PCO data memory. This function is useful to remove the data that was previously entered with the `PositionerCompensatedFastPCOLoadToMemory()` function.

Prototype

```
int PositionerCompensatedFastPCOMemoryReset(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Function is not allowed due to configuration disabled.

7.2.1.189 PositionerCompensatedFastPCOPrepare

Name

PositionerCompensatedFastPCOPrepare – Prepares data for CIEFast compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks direction value: (-17)
- Checks the positioner name: (-18)
- Checks if first and last PCO positions are within positions limits: (-35)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)

Description

This function calculates the firing for absolute positions, *in user's coordinate system* and converts them to firing absolute raw PCO positions, *in encoder's coordinate system*. It will use the supplied start positions and the offset positions set with *PositionerCompensatedFastPCOSet()* or *PositionerCompensatedFastPCOFromFile()* or *PositionerCompensatedFastPCOLoadToMemory()* function.

When mappings are enabled, the correction between user's coordinate system position and raw encoder position will be different at each location. For this reason, the prepare function must know the location (*positions of all positioners in the scanning group*) where the scan will be done.

This function must be called before the use of *PositionerCompensatedFastPCOEnable()* function.

Parameters:

- ScanDirection: Scan direction,(value: 1 (*positive*) or -1 (*negative*)).
- StartPosition1: Group 1st positioner start position
- StartPosition2: Group 2nd positioner start position
- StartPosition3: Group 3rd positioner start position
- etc

Prototype

```
int PositionerCompensatedFastPCOPrepare(
    int SocketID,
    char * PositionerName
    int ScanDirection,
    double StartPosition1,
    double StartPosition2,
    double StartPosition3,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| ScanDirection | int | Scan direction (1 or -1). |
| StartPosition1 | double | Group 1 st positioner start position (units). |
| StartPosition2 | double | Group 2 nd positioner start position (units). |
| StartPosition3 | double | Group 3 rd positioner start position (units). |
| | | |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -35: Position is outside of travel limits.
- -115: Function is not supported by current hardware.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.190 PositionerCompensatedFastPCOPulseParametersGet

Name

PositionerCompensatedFastPCOPulseParametersGet – Gets pulse configuration to compensated PCO.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks pulses generation status: (-22)
- Checks if CIEFAST compensated PCO pulses generation is supported: (-115)

Description

This function returns the set values of parameters: Pulse width, Pulse polarity and Pulse toggle.

Prototype

```
int PositionerCompensatedFastPCOPulseParametersGet(
    int SocketID,
    char * PositionerName,
    double * PulseWidth,
    int * PulsePolarity,
    bool * PulseToggle
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------|----------|---------------------------------------|
| PulseWidth | double * | Width of pulse enable signal (units). |
| PulsePolarity | int * | |
| PulseToggle | bool * | |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -115: Function is not supported by current hardware.

7.2.1.191 PositionerCompensatedFastPCOPulseParametersSet

Name

PositionerCompensatedFastPCOPulseParametersGet – Sets pulse configuration to compensated PCO.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks pulses generation status: (-22)
- Checks if CIEFAST compensated PCO pulses generation is supported: (-115)

Description

This function sets values of parameters: Pulse width, Pulse polarity and Pulse toggle.

Prototype

```
int PositionerCompensatedFastPCOPulseParametersGet(
    int SocketID,
    char * PositionerName,
    double PulseWidth,
    int PulsePolarity,
    bool PulseToggle
)
```

Input parameters

| | | |
|----------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PulseWidth | double * | Width of pulse enable signal (units). |
| PulsePolarity | int * | |
| PulseToggle | bool * | |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -115: Function is not supported by current hardware.

7.2.1.192 PositionerCompensatedFastPCOSet

Name

PositionerCompensatedFastPCOSet – Calculates a set of evenly spaced firing positions to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks $\text{Start} < \text{Stop}$, $\text{Step} > 0$, and $(\text{Stop} - \text{Start}) < \text{Step}$: (-17)
- Checks the positioner name: (-18)
- Checks if CIEFAST compensated PCO pulses generation is enabled: (-121)
- Checks data number $\text{NData} = \text{floor}(\text{Stop} - \text{Start}) / \text{Step} + 1$, if $\text{NData} > 1000000$: (-122)

Description

This function calculates a set of evenly spaced firing positions to the controller memory.

Parameters:

- Start: Relative offset where first PCO trigger is generated. Start must be less than Stop.
- Stop: Relative offset where last PCO pulses can be generated.
- Step: Distance between two consecutive pulses. Step must be positive.

This function will create a table of points that has as first point Start value and last point Stop value:

| | |
|-------------|------------------|
| Index = 0 | Start |
| Index = 1 | Start + Step |
| Index = 2 | Start + 2 * Step |
| Index = 3 | Start + 3 * Step |
| Index = 4 | Start + 4 * Step |
| Index = ... | ... |
| Index = N | Start + N * Step |

Example:

Send `PositionerCompensatedFastPCOSet(XY.X, 0, 10, 1)` will generate points table below:

| | |
|-------------|-----|
| Index = 0 | 0 |
| Index = 1 | 1 |
| Index = 2 | 2 |
| Index = 3 | 3 |
| Index = 4 | 4 |
| Index = ... | ... |
| Index = 10 | 10 |

Prototype

```
int PositionerCompensatedFastPCOSet(
    int SocketID,
    char * PositionerName,
    double Start,
    double Stop,
    double Step
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| Start | double | Start position (units). |
| Stop | double | Stop position (units). |
| Step | double | Distance between two consecutive pulses (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.193 PositionerCompensatedPCOAbort [Extended - ISA]

Name

PositionerCompensatedPCOAbort – Aborts the CIE08 compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks the positioner name: (-18)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)

Description

This function aborts the CIE08 compensated PCO pulses generation. The pulses generation is stopped immediately; no more pulses will be generated even if the scanning positioner continues to move across the predefined firing positions. To stop the scanning move, use *GroupMoveAbort()* function.

NOTE

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), elsewhere (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOAbort(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware
- -121: Function is not allowed due to configuration disabled.

7.2.1.194 PositionerCompensatedPCOCurrentStatusGet [Extended - ISA]

Name

PositionerCompensatedPCOCurrentStatusGet – Gets current status of CIE08 compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)

Description

This function gets the current status of CIE08 compensated PCO pulses generation.

Status possible values:

- 0: Pulses generation inactive (idle, no error)
- 1: Pulses generation activated (running)
- -1: Pulses generation aborted with errors.

Prototype

```
int PositionerCompensatedPCOCurrentStatusGet(
    int SocketID,
    char * FullPositionerName,
    int * Status
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------|-------|-------------------------------|
| Status | int * | PCO pulses generation status. |
|--------|-------|-------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware
- -121: Function is not allowed due to configuration disabled.

7.2.1.195 PositionerCompensatedPCOEnable [Extended - ISA]

Name

PositionerCompensatedPCOEnable – Activates the CIE08 compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)
- Checks if data have been prepared by PositionerCompensatedPCOPrepare(): (-122)
- Checks current position is out and at the good side of scanning zone (left of scanning zone if ScanDirection positive, right of scanning zone if ScanDirection negative): (-22)
- Checks CIE08 compensated PCO mode is running: (-22)

Description

This function activates the CIE08 compensated PCO pulses generation (*status becomes running (value 1)*). The pulses will be generated when the scanning positioner moves across the predefined positions. When the last pulse is generated, the CIE08 compensated PCO mode will become inactive (*status becomes inactive (value 0)*). To get status of the CIE08 compensated PCO pulses generation, use *PositionerCompensatedPCOCurrentStatusGet()* function.

Note that only the scanning positioner positions are used to fire pulses: if you prepare a set of positions at a given location and then enable the pulses generation and start the move from a different location, the pulses could be generated but their accuracy will be impacted by the mapping difference between the two locations.

This function must be used after the firing pulses data preparation with the *PositionerCompensatedPCOPrepare()*, elsewhere the function fails and the error ERR_CHECK_DATA_INCORRECT (-122) will be returned. With XPS-Q if the settings are out of range, the user might experience pulses spaced unevenly without getting any error messages.

NOTE

The PCO pulses generation depends on the ScanVelocity and the pulse settling time (set by *PositionerPositionComparePulseParametersSet()*)

Valid settings are shown in the table below:

| Pulse settling time (μs) | PCO encoder frequency (kHz) | | | |
|--------------------------|-----------------------------|----|-----|-------|
| | 25 | 50 | 125 | > 500 |
| 0.075 | / | / | OK | OK |
| 1 | / | OK | OK | / |
| 4 | OK | OK | / | / |
| 12 | OK | / | / | / |

How to determine the PCO encoder frequency :

- For AquadB encoder :
PCO encoder frequency = Velocity / EncoderResolution
- For analog interpolated encoder :
PCO encoder frequency = Velocity * HardInterpolatorFactor / EncoderScalePitch

Example: XML310 stage (EncoderScalePitch=0.004 mm, HardInterpolatorFactor=200). With ScanVelocity=10mm/s => PCO encoder frequency = $10 * 200 / 0.004 = 500$ kHz

NOTE

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.196 PositionerCompensatedPCOFromFile [Extended - ISA]

Name

PositionerCompensatedPCOFromFile – Reads firing positions from a data file to controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)
- Checks data file exists: (-61)
- Checks data from file (must be $Position_i > Position_{i-1}$, $Width_i < Position_{i+1} - Position_i$): (-122)

Description

This function reads firing positions from a data file to the controller memory.

The data file contains lines of data, formatted as follows:

$Position_i < \text{Space or Tabulation} > Width_i < \text{CRLF or LF} >$

Example :

```
Position1Width1
Position2Width2
... ..
PositionNWidthN
```

Data conditions: $Position_i > Position_{i-1}$, $Width_i < Position_{i+1} - Position_i$

NOTE

Position_i (i=1..N) are the offset values relative to the scanning positioner start position that is defined in the PositionerCompensatedPCOPrepare().

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOFromFile(
    int SocketID,
    char * PositionerName,
    char * DataFileName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| DataFileName | char * | Data file name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -61: Error file corrupt or file doesn't exist.
- -115: Function is not supported by current hardware
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.197 PositionerCompensatedPCOLoadToMemory [Extended - ISA]

Name

PositionerCompensatedPCOLoadToMemory– Appends firing positions to controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)
- Checks data lines (must be $Position_i > Position_{i-1}$, $Width_i < Position_{i+1} - Position_i$): (-122)

Description

This function appends firing positions to controller’s memory from *DataLines* parameter.

To reset the controller’s memory, the *PositionerCompensatedPCOMemoryReset()* function is provided.

The data line format must be :

$Position_i < \text{Space or Tabulation} > Width_i < \text{CRLF, LF or ;} >$

Example :

Position₁Width₁

Position₂Width₂

... ..

Position_NWidth_N

Or :

Position₁Width₁;Position₂Width₂; ...;Position_NWidth_N

Data conditions: $Position_i > Position_{i-1}$, $Width_i < Position_{i+1} - Position_i$

Example: Send PositionerCompensatedLoadToMemory (XY.X,0 0.1;1 0.1;2 0.1;3 0.1)

NOTE

Position_i (i=1..N) are the offset values relative to the scanning positioner start position that is defined in the PositionerCompensatedPCOPrepare().

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOLoadToMemory(
    int SocketID,
    char * PositionerName,
    char * DataLine
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| DataLine | char * | Some data lines. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.198 PositionerCompensatedPCOMemoryReset [Extended - ISA]

Name

PositionerCompensatedPCOMemoryReset – Resets CIE08 compensated PCO data memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)

Description

This function resets the CIE08 compensated PCO data memory. This function is useful to remove the data that was previously entered with the *PositionerCompensatedPCOLoadToMemory()* function.

NOTE

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOMemoryReset(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware

- -121: Function is not allowed due to configuration disabled.

7.2.1.199 PositionerCompensatedPCOPrepare [Extended - ISA]

Name

PositionerCompensatedPCOPrepare – Prepares data for CIE08 compensated PCO pulses generation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*):
ERR_NOT_ALLOWED_MODE_DISABLED (-121)
- Checks data have been set, loaded or read from file to buffer (DataNumber must > 0 and < CIE08CompensatedPCOMaximumDataNumber (*system.ini*):
ERR_CHECK_DATA_INCORRECT (-122)
- Checks scanning zone exceed stage travel limits: (-35)
- Checks input parameter values (ScanDirection value must equal to 1 (*positive direction*) or -1 (*negative direction*)): (-17)

Description

This function calculates the firing for absolute positions, *in user's coordinate system* and converts them to firing absolute raw PCO positions, *in encoder's coordinate system*.

When mappings are enabled, the correction between user's coordinate system position and raw encoder position will be different at each location. For this reason, the prepare function must know the location (*positions of all positioners in the scanning group*) where the scan will be done.

This function must be called before the use of *PositionerCompensatedPCOEnable()* function.

Parameters :

- ScanDirection: Scan direction,(value: 1 (*positive*) or -1 (*negative*)).
- StartPosition1: Group 1st positioner start position.
- StartPosition2: Group 2nd positioner start position
- StartPosition3: Group 3rd positioner start position
- etc

NOTE

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled)..

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

```
int PositionerCompensatedPCOPrepare(
    int SocketID,
    char * PositionerName
    int ScanDirection,
    double StartPosition1,
    double StartPosition2,
    double StartPosition3,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| ScanDirection | int | Scan direction (1 or -1). |
| StartPosition1 | double | Group 1 st positioner start position (units). |
| StartPosition2 | double | Group 2 nd positioner start position (units). |
| StartPosition3 | double | Group 3 rd positioner start position (units). |
| | | |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect
- -18: Positioner Name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -35: Position is outside of travel limits.
- -115: Function is not supported by current hardware.
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.200 PositionerCompensatedPCOSet [Extended - ISA]

Name

PositionerCompensatedPCOSet – Calculates a set of evenly spaced firing positions to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Start < Stop, Distance > 0, Width > 0, Width < Distance, Width < Stop-Start: (-17)
- Checks the positioner name: (-18)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the CIE board supports this function: (-115)
- Checks CIE08CompensatedPCOMode = Enabled (*system.ini*): (-121)
- Checks data number NData = integer((Stop-Start)/Distance) + 1, if NData > 1000000: (-122)

Description

This function calculates a set of evenly spaced firing positions to the controller memory.

Parameters :

- Start: Relative distance to the start position where PCO pulses start.
- Stop: Relative distance to the start position where PCO pulses stop.
- Distance: Step of pulses (distance between two consecutive pulses)
- Width: Width of the pulse enable signal at the firing positions.

Example: Send PositionerCompensatedPCOSet (XY.X, 0, 3, 1, 0.1)

NOTE

Start and Stop are the offset values relative to the scanning positioner start position that is defined in the PositionerCompensatedPCOPrepare().

The function works only when the CIE08 compensated PCO mode configuration is enabled (*system.ini*: CIE08CompensatedPCOMode = Enabled).

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”), otherwise (-24) error is returned.

Prototype

int PositionerCompensatedPCOSet (int SocketID, char PositionerName[250] , double Start, double Stop, double Distance, double Width)

Input parameters

| | | |
|----------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| PositionerName | char * | Positioner name |
| Start | double | Start position (units) |
| Stop | double | Stop position (units) |
| Distance | double | Distance between two consecutive pulses (units) |
| Width | double | Width of pulse enable signal (units) |

Output parameter

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner name doesn't exist or unknown command.
- -24: Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware
- -121: Function is not allowed due to configuration disabled.
- -122: Data incorrect (wrong value, wrong format, wrong order or inexistent).

7.2.1.201 PositionerCompensationDisturbanceDisable [Extended]

Name

PositionerCompensationDisturbanceDisable – Disables disturbance compensation for selected direction (DisabledDirection = Both, Positive or Negative)

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)

Description

This function disables the compensation of disturbance for the selected direction (Both, Positive or Negative).

Prototype

```
int PositionerCompensationDisturbanceDisable(
    int SocketID,
    char *PositionerName,
    char *DisabledDirection
)
```

Input parameters

| | | |
|-------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| DisabledDirection | char* | “Both”, “Positive” or “Negative” |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.202 PositionerCompensationDisturbanceEnable [Extended]

Name

PositionerCompensationDisturbanceEnable– Enables disturbance compensation for selected direction (EnabledDirection = Both, Positive or Negative)

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: -17
- Checks if a disturbance compensation file is loaded: -22

Description

This function enables the compensation of disturbance for the selected direction (Both, Positive or Negative). The disturbance compensation can be enabled only if a file was loaded (refer to API PositionerCompensationDisturbanceFileLoad).

Prototype

```
int PositionerCompensationDisturbanceEnable(
    int SocketID,
    char *PositionerName,
    char *EnabledDirection
)
```

Input parameters

| | | |
|------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| EnabledDirection | char* | “Both”, “Positive” or “Negative” |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action

7.2.1.203 PositionerCompensationDisturbanceFileLoad [Extended]

Name

PositionerCompensationDisturbanceFileLoad – Loads file to compensate disturbance in requested direction (Positive or Negative).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)
- Checks if the disturbance compenstion feature is allowed in the firmware: -205
- Checks if the disturbance compenstion is enabled in the requested direction: -22

Description

This function loads a file that contains the compensation of disturbance in one direction. The file cannot be loaded if the disturbance compenstion in the requested direction is already enabled. In this case, it can be disabled with the PositionerCompensationDisturbanceDisable API.

Prototype

```
int PositionerCompensationDisturbanceFileLoad(
    int SocketID,
    char *PositionerName,
    char *Direction,
    char *FileName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| Direction | char* | “Positive” or “Negative”. |
| FileName | char * | File name located in \Config folder. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action
- -61: Error file corrupt or file doesn't exist
- -205: Not enable in your configuration

7.2.1.204 PositionerCompensationDisturbanceStatusGet [Extended]

Name

PositionerCompensationDisturbanceStatusGet – Gets status of disturbance compensation in both directions.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the filter number: (-17)

Description

This function returns the “Enabled” status of the disturbance compensation in both positive and negative directions.

Prototype

```
int PositionerCompensationDisturbanceStatusGet(
    int SocketID,
    char *PositionerName,
    char * PositiveCompensationEnabledStatus,
    char * NegativeCompensationEnabledStatus
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------------------------|--------|--|
| PositiveCompensationEnabledStatus | char * | Current “Enabled” status in the positive direction |
| NegativeCompensationEnabledStatus | char * | Current “Enabled” status in the negative direction |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.205 PositionerCompensationDualLoopNotchFilterGet [Extended]

Name

PositionerCompensationDualLoopNotchFilterGet – Gets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the notch filter number: (-17)
- Checks the positioner name: (-18)
- Checks dual corrector is enabled: (-205)

Description

This function returns the parameters defined for the selected notch filter in dual loop.

Notch filters parameters:

- NotchFrequency.
- NotchBandwidth.
- NotchGain.

Prototype

```
int PositionerCompensationDualLoopNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter. |

Output parameters

| | | |
|----------------|----------|--------------------------------------|
| NotchFrequency | double * | Frequency (Hertz) for notch filter. |
| NotchBandwidth | double * | Band width (Hertz) for notch filter. |
| NotchGain | double * | Gain for notch filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enabled in your configuration.

7.2.1.206 PositionerCompensationDualLoopNotchFilterSet [Extended]

Name

PositionerCompensationDualLoopNotchFilterSet – Sets the notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - NotchFrequency $\hat{\Gamma} \hat{e} : \frac{0.5}{\text{CorrectorPeriod}} \hat{u}$ with CorrectorPeriod = 0.0001 s
(10 kHz) = > [0 : 5000]
 - NotchBandwidth with CorrectorPeriod = 0.0001 s (10 kHz) = > [0 : 5000]
 - NotchGain $\hat{\Gamma} [0 : 100]$
- Checks the positioner name: (-18)

Description

This function configures the parameters defined for selected notch filter in dual loop. If the “NotchFrequency” value is NULL or the “NotchGain” value is NULL then the notch filter is not activated.

Notch filters parameters:

- NotchFrequency.
- NotchBandwidth.
- NotchGain.

Prototype

```
int PositionerCompensationDualLoopNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double NotchFrequency,
    double NotchBandwidth,
    double NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter. |
| NotchFrequency | double | Frequency (Hertz) for notch filter. |
| NotchBandwidth | double | Band width (Hertz) for notch filter. |
| NotchGain | double | Gain for notch filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.207 PositionerCompensationDualLoopPhaseCorrectionFilterGet [Extended]

Name

PositionerCompensationDualLoopPhaseCorrectionFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the notch filter number: (-17)
- Checks the positioner name: (-18)
- Checks dual corrector is enabled: (-205)

Description

This function returns the system compensation parameters defined for selected phase correction filter in dual loop.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationDualLoopPhaseCorrectionFilterGet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected selected phase correction filter. |

Output parameters

| | | |
|---------------------|----------|--|
| PhaseCorrectionFn | double * | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double * | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double * | Gain for phase correction filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enabled in your configuration.

7.2.1.208 PositionerCompensationDualLoopPhaseCorrectionFilterSet [Extended]

Name

PositionerCompensationDualLoopPhaseCorrectionFilterSet – Sets the notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - PhaseCorrectionFn with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionFd with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionGain ≥ 0
- Checks the positioner name: (-18)

Description

This function configures the parameters defined for the selected phase correction filter in dual loop. If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationDualLoopNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double PhaseCorrectionFn,
    double PhaseCorrectionFd,
    double PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected selected phase correction filter. |
| PhaseCorrectionFn | double | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double | Gain for phase correction filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.209 PositionerCompensationEncoderPhaseCorrectionFilterGet [Extended]

Name

PositionerCompensationEncoderPhaseCorrectionFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the notch filter number: (-17)
- Checks the positioner name: (-18)
- Checks dual corrector is enabled: (-205)

Description

This function returns the system compensation parameters defined for selected phase correction filter.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationEncoderPhaseCorrectionFilterGet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected selected phase correction filter. |

Output parameters

| | | |
|---------------------|----------|--|
| PhaseCorrectionFn | double * | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double * | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double * | Gain for phase correction filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enabled in your configuration.

7.2.1.210 PositionerCompensationEncoderPhaseCorrectionFilterSet [Extended]

Name

PositionerCompensationEncoderPhaseCorrectionFilterSet – Sets the notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - PhaseCorrectionFn with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionFd with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionGain ≥ 0
- Checks the positioner name: (-18)

Description

This function configures the parameters defined for the selected phase correction filter. If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationEncoderNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double PhaseCorrectionFn,
    double PhaseCorrectionFd,
    double PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected selected phase correction filter. |
| PhaseCorrectionFn | double | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double | Gain for phase correction filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.211 PositionerCompensationEncoderNotchFilterGet [Extended]

Name

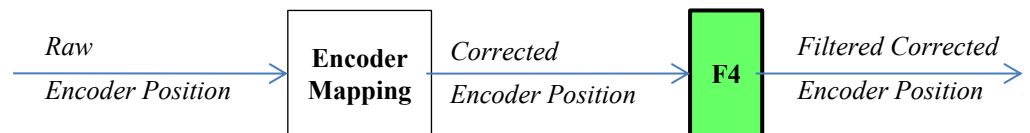
PositionerCompensationEncoderNotchFilterGet – Gets Encoder compensation notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks parameter values: (-17)
- Notch Frequency number $\hat{1}$ [1:5]

Description

This function returns parameters defined for the *[Dual]EncoderFilter* frequency notch filter from the encoder compensation (F4 compensation block) configured in encoder.



Encoder Notch filters parameters:

- NotchFrequency (Hertz).
- NotchBandwidth (Hertz).
- NotchGain.

Prototype

```

int PositionerCompensationEncoderNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain
)
  
```

Input parameters

| | | |
|----------------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter (1 to 5). |

Output parameters

| | | |
|----------------|----------|--|
| NotchFrzquency | double * | Frequency (Hertz) for Encoder Notch filter. |
| NotchBandwidth | double * | Band width (Hertz) for Encoder Notch filter. |
| NotchGain | double * | Gain for Encoder Notch filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.212 PositionerCompensationEncoderNotchFilterSet [Extended]

Name

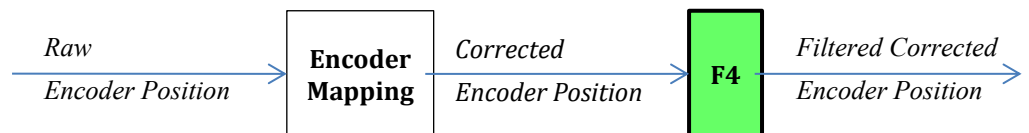
PositionerCompensationEncoderNotchFilterSet – Sets Encoder compensation notch filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks parameter values: (-17)
 - Notch Frequency number $\hat{I} [1:5]$
 - NotchFrequency $\hat{I} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}}\right]$ with CorrectorPeriod = 0.0001 s
(10 kHz) => $[0:5000]$
 - NotchBandwidth $\in \left[0 : \frac{0.5}{\text{CorrectorPeriod}}\right]$ with CorrectorPeriod = 0.0001 s
(10 kHz) => $[0:5000]$
 - NotchGain $\hat{I} [0:100]$
- Checks the motion status (Motion status must be disable): (-117)

Description

This functions sets the selected *[Dual]EncoderFilter* frequency notch filter parameters from the encoder compensation (F4 compensation block) configured in encoder.



Encoder Notch filters parameters:

- NotchFrequency (Hertz).
- NotchBandwidth (Hertz).
- NotchGain.

Prototype

```

int PositionerCompensationEncoderNotchFilterSet(
    int SocketID,
    char * FullPositionerName,
    int NotchFrequencyNumber,
    double NotchFrequency,
    double NotchBandwidth,
    double NotchGain
)
  
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter (1 to 5). |
| NotchFrequency | double | Frequency (Hertz) for Encoder Notch filter. |
| NotchBandwidth | double | Band width (Hertz) for Encoder Notch filter. |
| NotchGain | double | Gain for Encoder Notch filter. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.213 PositionerCompensationFrequencyNotchsGet [Extended]

Name

PositionerCompensationFrequencyNotchsGet – Gets pre-feedforward compensation notch filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)
- CompensationFilterType = Default or XPS-Q

Description

This function returns the *CompensationSystemPreFeedForward* frequency notch filters parameters. These notch filters allow the user to reduce external perturbations such as base motion or floor vibrations. Note that the *CompensationSystemPreFeedForward* feature is available for all corrector types (acceleration, velocity, voltage or position) functioning *in closed loop configuration*.

- NotchFrequency1
- NotchsBandwidth1
- NotchsGain1
- NotchFrequency2
- NotchsBandwidth2
- NotchsGain2
- NotchFrequency3
- NotchsBandwidth3
- NotchsGain3

Prototype

```
int PositionerCompensationFrequencyNotchsGet(
    int SocketID,
    char * FullPositionerName,
    double * NotchFrequency1,
    double * NotchBandwidth1,
    double * NotchGain1,
    double * NotchFrequency2,
    double * NotchBandwidth2,
    double * NotchGain2,
    double * NotchFrequency3,
    double * NotchBandwidth3,
    double * NotchGain3
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|-------------------------------------|
| NotchFrequency1 | double * | Notch frequency for filter #1 (Hz). |
| NotchBandwidth1 | double * | Notch bandwidth for filter #1 (Hz). |
| NotchGain1 | double * | Notch gain for filter #1. |
| NotchFrequency2 | double * | Notch frequency for filter #2 (Hz). |
| NotchBandwidth2 | double * | Notch bandwidth for filter #2 (Hz). |
| NotchGain2 | double * | Notch gain for filter #2. |
| NotchFrequency3 | double * | Notch frequency for filter #3 (Hz). |
| NotchBandwidth3 | double * | Notch bandwidth for filter #3 (Hz). |
| NotchGain3 | double * | Notch gain for filter #3. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.214 PositionerCompensationFrequencyNotchsSet [Extended]

Name

PositionerCompensationFrequencyNotchsSet – Sets pre-feedforward compensation notch filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: ERR_WRONG_OBJECT_TYPE (-8)
- Checks parameter values: ERR_PARAMETER_OUT_OF_RANGE (-17)
 - NotchFrequency $\hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{0} \\ \hat{e} \end{matrix} : \frac{0.5}{\text{CorrectorISRPeriod}} \hat{u}$
 - NotchBandwidth $\hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{0} \\ \hat{e} \end{matrix} : \frac{0.5}{\text{CorrectorISRPeriod}} \hat{u}$
- Checks the motion status (Motion status must be disable): (-117)

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This function sets the *CompensationSystemPreFeedForward* frequency notch filters parameters. These notch filters allow the user to reduce external perturbations such as base motion or floor vibrations. Note that the *CompensationSystemPreFeedForward* feature is available for all corrector types (acceleration, velocity, voltage or position) functioning *in closed loop configuration*.

NotchFrequency1
 NotchsBandwidth1
 NotchsGain1
 NotchFrequency2
 NotchsBandwidth2
 NotchsGain2
 NotchFrequency3
 NotchsBandwidth3
 NotchsGain3

Prototype

```
int PositionerCompensationFrequencyNotchsSet(
    int SocketID,
    char * FullPositionerName,
    double NotchFrequency1,
    double NotchBandwidth1,
    double NotchGain1,
    double NotchFrequency2,
    double NotchBandwidth2,
    double NotchGain2,
    double NotchFrequency3,
    double NotchBandwidth3,
    double NotchGain3
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| NotchFrequency1 | double | Notch frequency for filter #1 (Hz). |
| NotchBandwidth1 | double | Notch bandwidth for filter #1 (Hz). |
| NotchGain1 | double | Notch gain for filter #1. |
| NotchFrequency2 | double | Notch frequency for filter #2 (Hz). |
| NotchBandwidth2 | double | Notch bandwidth for filter #2 (Hz). |
| NotchGain2 | double | Notch gain for filter #2. |
| NotchFrequency3 | double | Notch frequency for filter #3 (Hz). |
| NotchBandwidth3 | double | Notch bandwidth for filter #3 (Hz). |
| NotchGain3 | double | Notch gain for filter #3. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.215 PositionerCompensationLowPassTwoFilterGet [Extended]

Name

PositionerCompensationLowPassTwoFilterGet – Gets the post-feedforward compensation second order low-pass filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)

Description

This function returns the system compensation parameters defined for the post-feedforward compensation second order low-pass filter.

Prototype

```
int PositionerCompensationLowPassTwoFilterGet(
    int SocketID,
    char * FullPositionerName,
    double * CutOffFrequency
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| CutOffFrequency | double * | Second order filter cut-off frequency (Hertz). |
|-----------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.216 PositionerCompensationLowPassTwoFilterSet [Extended]

Name

PositionerCompensationLowPassTwoFilterSet – Sets the post-feedforward compensation second order low-pass filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)
- Checks parameter values: (-17)

- CutOffFrequency $\hat{=}$ 0: $\frac{0.5}{\text{CorrectorISRPeriod}}$

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This function configures the parameters defined for the post-feedforward compensation second order low-pass filter.

NOTE

If the “CutOffFrequency” value = 0 then the second order low-pass filter is not activated.

Prototype

```
int PositionerCompensationLowPassTwoFilterSet(
    int SocketID,
    char * FullPositionerName,
    double CutOffFrequency
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| CutOffFrequency | double | Second order filter cut-off frequency (Hertz). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.217 PositionerCompensationNotchFilterGet [Extended]

Name

PositionerCompensationNotchFilterGet – Gets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks phase correction number: (-17)
- Checks the positioner name: (-18)

Description

This function returns the parameters defined for the selected notch filter.

Notch filters parameters:

- NotchFrequency.
- NotchBandwidth.
- NotchGain.

Prototype

```
int PositionerCompensationNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter. |

Output parameters

| | | |
|----------------|----------|--------------------------------------|
| NotchFrequency | double * | Frequency (Hertz) for notch filter. |
| NotchBandwidth | double * | Band width (Hertz) for notch filter. |
| NotchGain | double * | Gain for notch filter. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enable in your configuration.

7.2.1.218 PositionerCompensationNotchFilterSet [Extended]

Name

PositionerCompensationNotchFilterSet – Sets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - NotchFrequency $\in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - NotchBandwidth $\in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - NotchGain $\hat{=} [0:100]$
- Checks the positioner name: (-18)
- Checks compensation preFeed forward mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for the selected notch filter. If the “NotchFrequency” value is NULL or the “NotchGain” value is NULL then the notch filter is not activated.

Notch filter parameters:

- NotchFrequency.
- NotchBandwidth.
- NotchGain.

Prototype

```
int PositionerCompensationNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double NotchFrequency,
    double NotchBandwidth,
    double NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected phase correction filter. |
| NotchFrequency | double | Frequency (Hertz) for notch filter. |
| NotchBandwith | double | Band width (Hertz) for notch filter. |
| NotchGain | double | Gain for notch filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -117: Function is only allowed in DISABLED state.
- -205: Not enabled in your configuration.

7.2.1.219 PositionerCompensationNotchModeFiltersGet [Extended]

Name

PositionerCompensationNotchModeFiltersGet – Gets the post-feedforward compensation notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)

Description

This functions returns the system compensation parameters defined for two post-feedforward compensation notch mode filters.

First notch mode filter parameters:

- NotchModeFr1.
- NotchModeFa1.
- NotchModeZr1.
- NotchModeZa1.

Second notch mode filter parameters:

- NotchModeFr2.
- NotchModeFa2.
- NotchModeZr2.
- NotchModeZa2.

Prototype

```
int PositionerCompensationNotchModeFiltersGet(
    int SocketID,
    char * FullPositionerName,
    double * NotchModeFr1,
    double * NotchModeFa1,
    double * NotchModeZr1,
    double * NotchModeZa1,
    double * NotchModeFr2,
    double * NotchModeFa2,
    double * NotchModeZr2,
    double * NotchModeZa2
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------------|----------|--|
| NotchModeFr1 | double * | Resonance frequency (Hertz) for notch mode filter #1. |
| NotchModeFa1 | double * | Anti-resonance frequency (Hertz) for notch mode filter #1. |
| NotchModeZr1 | double * | Resonance damping factor for notch mode filter #1. |
| NotchModeZa1 | double * | Anti-resonance damping factor for notch mode filter #1. |
| NotchModeFr2 | double * | Resonance frequency (Hertz) for notch mode filter #2. |
| NotchModeFa2 | double * | Anti-resonance frequency (Hertz) for notch mode filter #2. |
| NotchModeZr2 | double * | Resonance damping factor for notch filter #2. |
| NotchModeZa2 | double * | Anti-resonance damping factor for notch mode filter #2. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.220 PositionerCompensationNotchModeFiltersSet [Extended]

Name

PositionerCompensationNotchModeFiltersSet – Sets the post-feedforward compensation notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)
- Checks parameter values: (-17)
 - NotchModeFr $\hat{\Gamma} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \grave{u}$
 - NotchModeFa $\hat{\Gamma} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \grave{u}$
- Checks the motion status (Motion status must be disable): (-117)

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This functions configures the parameters defined for two post-feedforward compensation notch mode filters.

First notch mode filter parameters:

- NotchModeFr1.
- NotchModeFa1.
- NotchModeZr1.
- NotchModeZa1.

Second notch mode filter parameters:

- NotchModeFr2.
- NotchModeFa2.
- NotchModeZr2.
- NotchModeZa2.

NOTE

If the “NotchModeFr” value = 0 or the “NotchModeFa” value = 0, then the notch mode filter is not activated.

Prototype

```
int PositionerCompensationNotchModeFiltersSet(
    int SocketID,
    char * FullPositionerName,
    double NotchModeFr1,
    double NotchModeFa1,
    double NotchModeZr1,
    double NotchModeZa1,
    double NotchModeFr2,
    double NotchModeFa2,
    double NotchModeZr2,
    double NotchModeZa2
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| NotchModeFr1 | double | Resonance frequency (Hertz) for notch mode filter #1. |
| NotchModeFa1 | double | Anti-resonance frequency (Hertz) for notch mode filter #1. |
| NotchModeZr1 | double | Resonance damping factor for notch mode filter #1. |
| NotchModeZa1 | double | Anti-resonance damping factor for notch mode filter #1. |
| NotchModeFr2 | double | Resonance frequency (Hertz) for notchmode filter #2. |
| NotchModeFa2 | double | Anti-resonance frequency (Hertz) for notch mode filter #2. |
| NotchModeZr2 | double | Resonance damping factor for notch mode filter #2. |
| NotchModeZa2 | double | Anti-resonance damping factor for notch mode filter #2. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -117: Function is only allowed in DISABLED state.

7.2.1.221 PositionerCompensationPhaseCorrectionFilterGet [Extended]

Name

PositionerCompensationPhaseCorrectionFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks phase correction number: (-17)
- Checks the positioner name: (-18)

Description

This function returns the system compensation parameters defined for selected phase correction filter.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPhaseCorrectionFilterGet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected Notch Frequency filter. |

Output parameters

| | | |
|---------------------|----------|--------------------------------------|
| PhaseCorrectionFn | double * | Frequency (Hertz) for notch filter. |
| PhaseCorrectionFd | double * | Band width (Hertz) for notch filter. |
| PhaseCorrectionGain | double * | Gain for notch filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -15: Wrong parameter type in the command string: int, short, int * or short * expected.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.222 PositionerCompensationPhaseCorrectionFilterSet [Extended]

Name

PositionerCompensationPhaseCorrectionFilterSet – Sets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - $\text{PhaseCorrectionFn} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - $\text{PhaseCorrectionFd} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - $\text{PhaseCorrectionGain} \geq 0$
- Checks the positioner name: (-18)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for the selected phase correction filter. If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPhaseCorrectionFilterSet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double PhaseCorrectionFn,
    double PhaseCorrectionFd,
    double PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected Notch Frequency filter. |
| PhaseCorrectionFn | double | Frequency (Hertz) for notch filter. |
| PhaseCorrectionFd | double | Band width (Hertz) for notch filter. |

PhaseCorrectionGain double Gain for notch filter.

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -117: Function is only allowed in DISABLED state.
- -205: Not enabled in your configuration.

7.2.1.223 PositionerCompensationPhaseCorrectionFiltersGet [Extended]

Name

PositionerCompensationPhaseCorrectionFiltersGet – Gets the post-feedforward compensation phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)

Description

This function returns the system compensation parameters defined for two post-feedforward compensation phase correction filters.

First phase correction filter parameters:

- PhaseCorrectionFn1.
- PhaseCorrectionFd1.
- PhaseCorrectionGain1.

Second phase correction filter parameters:

- PhaseCorrectionFn2.
- PhaseCorrectionFd2.
- PhaseCorrectionGain2.

Prototype

```
int PositionerCompensationPhaseCorrectionFiltersGet(
    int SocketID,
    char * FullPositionerName,
    double * PhaseCorrectionFn1,
    double * PhaseCorrectionFd1,
    double * PhaseCorrectionGain1,
    double * PhaseCorrectionFn2,
    double * PhaseCorrectionFd2,
    double * PhaseCorrectionGain2
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|----------------------|----------|---|
| PhaseCorrectionFn1 | double * | Numerator frequency (Hertz) for phase correction filter #1. |
| PhaseCorrectionFd1 | double * | Denominator frequency (Hertz) for phase correction filter #1. |
| PhaseCorrectionGain1 | double * | Gain for phase correction filter #1. |
| PhaseCorrectionFn2 | double * | Numerator frequency (Hertz) for phase correction filter #2. |
| PhaseCorrectionFd2 | double * | Denominator frequency (Hertz) for phase correction filter #2. |
| PhaseCorrectionGain2 | double * | Gain for phase correction filter #2. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.224 PositionerCompensationPhaseCorrectionFiltersSet [Extended]

Name

PositionerCompensationPhaseCorrectionFiltersSet – Sets the post-feedforward compensation phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)
- Checks parameter values: (-17)
 - $\text{PhaseCorrectionFn} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - $\text{PhaseCorrectionFd} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
- Checks the motion status (Motion status must be disable): (-117)

NOTE

Refer to *system.ref* file to get **CorrectorISRPeriod** value.

Description

This functions configures the parameters defined for two post-feedforward compensation phase correction filters.

First phase correction filter parameters:

- PhaseCorrectionFn1.
- PhaseCorrectionFd1.
- PhaseCorrectionGain1.

Second phase correction filter parameters:

- PhaseCorrectionFn2.
- PhaseCorrectionFd2.
- PhaseCorrectionGain2.

NOTE

If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Prototype

```
int PositionerCompensationPhaseCorrectionFiltersSet(
    int SocketID,
    char * FullPositionerName,
    double PhaseCorrectionFn1,
    double PhaseCorrectionFd1,
    double PhaseCorrectionGain1,
    double PhaseCorrectionFn2,
    double PhaseCorrectionFd2,
    double PhaseCorrectionGain2
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| PhaseCorrectionFn1 | double | Numerator frequency (Hertz) for phase correction filter #1. |
| PhaseCorrectionFd1 | double | Denominator frequency (Hertz) for phase correction filter #1. |
| PhaseCorrectionGain1 | double | Gain for phase correction filter #1. |
| PhaseCorrectionFn2 | double | Numerator frequency (Hertz) for phase correction filter #2. |
| PhaseCorrectionFd2 | double | Denominator frequency (Hertz) for phase correction filter #2. |
| PhaseCorrectionGain2 | double | Gain for phase correction filter #2. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.225 PositionerCompensationPositionFilterGet [Extended]

Name

PositionerCompensationPositionFilterGet – Gets the Position filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)

Description

This function returns the parameters defined for the selected position filter.

Position filters parameters:

- Frequency.
- DampingFactor.

Prototype

```
int PositionerCompensationPositionFilterGet(
    int SocketID,
    char * PositionerName,
    int PositionFilterNumber,
    double * Frequency,
    double * DampingFactor
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PositionFilterNumber | int | Number of the selected Position. Frequency filter. |

Output parameters

| | | |
|---------------|----------|-------------------------------------|
| Frequency | double * | Frequency (Hertz) for notch filter. |
| DampingFactor | double * | Damping factor for Position filter. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.226 PositionerCompensationPositionFilterSet [Extended]

Name

PositionerCompensationPositionFilterSet– Sets the Position filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for selected Position filter. If the “Frequency” value is NULL then the Position filter is not activated.

Position filters parameters:

- Frequency.
- DampingFactor.

Prototype

```
int PositionerCompensationPositionFilterSet(
    int SocketID,
    char * PositionerName,
    int PositionFilterNumber,
    double Frequency,
    double DampingFactor
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PositionFilterNumber | int | Number of the selected Position. Frequency filter. |
| Frequency | double | Frequency (Hertz) for notch filter. |
| DampingFactor | double | Damping factor for Position filter. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.227 PositionerCompensationPostExcitationFrequencyNotchFilterGet [Extended]

Name

PositionerCompensationPostExcitationFrequencyNotchFilterGet – Gets Notch filter parameters from F3 compensation block.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Notch Frequency number (1 to 10): (-17)

Description

This function returns the parameters defined for the selected notch filter from the post excitation compensation (F3 compensation block) configured in the current corrector (Option0, Option1 or Option2).

Notch filters parameters:

- NotchFrequency (Hertz).
- NotchBandwidth (Hertz).
- NotchGain.

Prototype

```
int PositionerCompensationPostExcitationFrequencyNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter (1 to 10). |

Output parameters

| | | |
|----------------|----------|--------------------------------------|
| NotchFrequency | double * | Frequency (Hertz) for notch filter. |
| NotchBandwidth | double * | Band width (Hertz) for notch filter. |
| NotchGain | double * | Gain for notch filter. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.228 PositionerCompensationPostExcitationFrequencyNotchFilterSet [Extended]

Name

PositionerCompensationPostExcitationFrequencyNotchFilterSet – Sets Notch filter parameters from F3 compensation block.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Notch Frequency number (1 to 10): (-17)
- Checks parameter values: (-17)
 - NotchFrequency $\hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorPeriod}} \hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix}$ with CorrectorPeriod = 0.0001 s
(10 kHz) => [0 : 5000]
 - NotchBandwidth $\hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorPeriod}} \hat{\Gamma} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix}$ with CorrectorPeriod = 0.0001 s
(10 kHz) => [0 : 5000]
 - NotchGain $\hat{\Gamma} [0:100]$
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for selected Notch filter from the post excitation compensation (F3 block) configured in the current corrector (Option0, Option1 or Option2).

If the “NotchFrequency” value is NULL or the “NotchGain” value is NULL then the notch filter is not activated.

Notch filter parameters:

- NotchFrequency (Hertz).
- NotchBandwidth (Hertz).
- NotchGain.

Prototype

```
int PositionerCompensationPostExcitationFrequencyNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double NotchFrequency,
    double NotchBandwidth,
    double NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter (1 to 10). |
| NotchFrequency | double | Frequency (Hertz) for notch filter. |
| NotchBandwith | double | Band width (Hertz) for notch filter. |
| NotchGain | double | Gain for notch filter. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.229 PositionerCompensationPostExcitationLowPassFilterGet [Extended]

Name

PositionerCompensationPostExcitationLowPassFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the positioner name: (-18)

Description

This function returns the system compensation parameters defined for the second order low-pass filter.

Prototype

```
int PositionerCompensationPostExcitationLowPassFilterGet(
    int SocketID,
    char * PositionerName,
    double * CutOffFrequency
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| CutOffFrequency | double * | Second order filter cut-off frequency (Hertz). |
|-----------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.230 PositionerCompensationPostExcitationLowPassFilterSet [Extended]

Name

PositionerCompensationPostExcitationLowPassFilterSet – Sets second order low-pass filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - CutOffFrequency with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
- Checks the positioner name: (-18)
- Checks compensation post excitation mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for the second order low-pass filter. If the “CutOffFrequency” value = 0 then the second order low-pass filter is not activated.

Prototype

```
int PositionerCompensationPostExcitationLowPassFilterSet(
    int SocketID,
    char * PositionerName,
    double CutOffFrequency
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| CutOffFrequency | double | Second order filter cut-off frequency (Hertz). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.

7.2.1.231 PositionerCompensationPostExcitationNotchModeFilterGet [Extended]

Name

PositionerCompensationPostExcitationNotchModeFilterGet – Gets the notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks phase correction number: (-17)
- Checks the positioner name: (-18)

Description

This functions returns the system compensation parameters defined for two notch mode filters.

Notch mode filter parameters:

- NotchModeFr: Resonance frequency (Hertz)
- NotchModeFa: Anti-resonance frequency (Hertz)
- NotchModeZr: Resonance damping factor.
- NotchModeZa: Anti-resonance damping factor.

Prototype

```
int PositionerCompensationPostExcitationNotchModeFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchModeNumber,
    double * NotchModeFr,
    double * NotchModeFa,
    double * NotchModeZr,
    double * NotchModeZa
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchModeNumber | int | Number of the selected notch mode filter. |

Output parameters

| | | |
|-------------|----------|---|
| NotchModeFr | double * | Resonance frequency (Hertz) for notch mode filter. |
| NotchModeFa | double * | Anti-resonance frequency (Hertz) for notch mode filter. |
| NotchModeZr | double * | Resonance damping factor for notch mode filter. |
| NotchModeZa | double * | Anti-resonance damping factor for notch mode filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.232 PositionerCompensationPostExcitationNotchModeFilterSet [Extended]

Name

PositionerCompensationPostExcitationNotchModeFilterSet – Sets the notch mode filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - NotchModeFr with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - NotchModeFa with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
- Checks the positioner name: (-18)
- Checks compensation post excitation mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This functions returns the system compensation parameters defined for two notch mode filters.

Notch mode filter parameters:

- NotchModeFr: Resonance frequency (Hertz)
- NotchModeFa: Anti-resonance frequency (Hertz)
- NotchModeZr: Resonance damping factor.
- NotchModeZa: Anti-resonance damping factor.

Prototype

```
int PositionerCompensationPostExcitationNotchModeFilterSet(
    int SocketID,
    char * PositionerName,
    int NotchModeNumber,
    double * NotchModeFr,
    double * NotchModeFa,
    double * NotchModeZr,
    double * NotchModeZa
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchModeNumber | int | Number of the selected notch mode filter. |
| NotchModeFr | double | Resonance frequency (Hertz) for notch mode filter. |
| NotchModeFa | double | Anti-resonance frequency (Hertz) for notch mode filter. |
| NotchModeZr | double | Resonance damping factor for notch mode filter. |
| NotchModeZa | double | Anti-resonance damping factor for notch mode filter. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.

7.2.1.233 PositionerCompensationPostExcitationPhaseCorrectionFilterGet [Extended]

Name

PositionerCompensationPostExcitationPhaseCorrectionFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the phase correction filter number: (-17)
- Checks the positioner name: (-18)

Description

This function returns the system compensation parameters defined for selected phase correction filter.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPostExcitationPhaseCorrectionFilterGet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected phase correction filter. |

Output parameters

| | | |
|---------------------|----------|-----------------------------------|
| PhaseCorrectionFn | double * | Numerator frequency (Hertz). |
| PhaseCorrectionFd | double * | Denominator frequency (Hertz). |
| PhaseCorrectionGain | double * | Gain for phase correction filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.234 PositionerCompensationPostExcitationPhaseCorrectionFilterSet [Extended]

Name

PositionerCompensationPostExcitationPhaseCorrectionFilterSet – Sets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - $\text{PhaseCorrectionFn} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - $\text{PhaseCorrectionFd} \in \left[0 : \frac{0.5}{\text{CorrectorPeriod}} \right]$
 - $\text{PhaseCorrectionGain} \geq 0$
- Checks the positioner name: (-18)
- Checks compensation post excitation mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for the selected phase correction filter. If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPostExcitationPhaseCorrectionFilterSet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|----------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected phase correction filter. |
| PhaseCorrectionFn | double * | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double * | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double * | Gain for phase correction filter. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.

7.2.1.235 PositionerCompensationPreFeedForwardFrequencyNotchFilterGet [Extended]

Name

PositionerCompensationPreFeedForwardFrequencyNotchFilterGet – Gets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameter value: (-17)
- Checks the positioner name: (-18)

Description

This function returns the parameters defined for the selected notch filter.

Notch filters parameters:

- UserNotchFrequency.
- UserNotchBandwidth.
- UserNotchGain.

Prototype

```
int PositionerCompensationPreFeedForwardFrequencyNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter. |

Output parameters

| | | |
|----------------|----------|--------------------------------------|
| NotchFrequency | double * | Frequency (Hertz) for notch filter. |
| NotchBandwidth | double * | Band width (Hertz) for notch filter. |
| NotchGain | double * | Gain for notch filter. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.236 PositionerCompensationPreFeedForwardFrequencyNotchFilterSet [Extended]

Name

PositionerCompensationPreFeedForwardFrequencyNotchFilterSet – Sets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - NotchFrequency with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - NotchBandwidth with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - NotchGain
- Checks the positioner name: (-18)
- Checks compensation preFeed forward mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for selected notch filter. If the “NotchFrequency” value is NULL or the “NotchGain” value is NULL then the notch filter is not activated.

Notch filters parameters:

- UserNotchFrequency.
- UserNotchBandwidth.
- UserNotchGain.

Prototype

```
int PositionerCompensationPreFeedForwardFrequencyNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int NotchFrequencyNumber,
    double NotchFrequency,
    double NotchBandwith,
    double NotchGain
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| NotchFrequencyNumber | int | Number of the selected Notch Frequency filter. |
| NotchFrequency | double | Frequency (Hertz) for notch filter. |
| NotchBandwith | double | Band width (Hertz) for notch filter. |
| NotchGain | double | Gain for notch filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.

7.2.1.237 PositionerCompensationPreFeedForwardPhaseCorrectionFilterGet [Extended]

Name

PositionerCompensationPreFeedForwardPhaseCorrectionFilterGet – Gets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks phase correction number: (-17)
- Checks the positioner name: (-18)

Description

This function returns the system compensation parameters defined for selected phase correction filter.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPreFeedForwardPhaseCorrectionFilterGet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double * PhaseCorrectionFn,
    double * PhaseCorrectionFd,
    double * PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected phase correction filter. |

Output parameters

| | | |
|---------------------|----------|--|
| PhaseCorrectionFn | double * | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double * | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double * | Gain for phase correction filter. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.238 PositionerCompensationPreFeedForwardPhaseCorrectionFilterSet [Extended]

Name

PositionerCompensationPreFeedForwardPhaseCorrectionFilterSet – Sets the phase correction filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters number: (-17)
 - PhaseCorrectionFn with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionFd with CorrectorPeriod = 0.0001 s (10 kHz) => [0 : 5000]
 - PhaseCorrectionGain ≥ 0
- Checks the positioner name: (-18)
- Checks compensation preFeed forward mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for the selected phase correction filter. If the “PhaseCorrectionFn” value = 0 or the “PhaseCorrectionFd” value = 0 then the phase correction filter is not activated.

Phase correction filter parameters:

- PhaseCorrectionFn.
- PhaseCorrectionFd.
- PhaseCorrectionGain.

Prototype

```
int PositionerCompensationPreFeedForwardPhaseCorrectionFilterSet(
    int SocketID,
    char * PositionerName,
    int PhaseCorrectionFilterNumber,
    double PhaseCorrectionFn,
    double PhaseCorrectionFd,
    double PhaseCorrectionGain
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | Positioner name. |
| PhaseCorrectionFilterNumber | int | Number of the selected phase correction filter. |
| PhaseCorrectionFn | double | Numerator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionFd | double | Denominator frequency (Hertz) for phase correction filter. |
| PhaseCorrectionGain | double | Gain for phase correction filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -117: Function is only allowed in DISABLED state.

7.2.1.239 PositionerCompensationPreFeedForwardSpatialNotchFilterGet [Extended]

Name

PositionerCompensationPreFeedForwardSpatialNotchFilterGet – Gets the spatial notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks spatial notch number: (-17)
- Checks the positioner name: (-18)

Description

This function returns the parameters defined for the selected spatial notch filter.

Spatial notch filters parameters:

- SpatialNotchStep.
- SpatialNotchBandwidth.
- SpatialNotchGain.

Prototype

```
int PositionerCompensationPreFeedForwardSpatialNotchFilterGet(
    int SocketID,
    char * PositionerName,
    int SpatialNotchNumber,
    double * SpatialNotchStep,
    double * SpatialNotchBandwidth,
    double * SpatialNotchGain)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| SpatialNotchNumber | int | Number of the selected Spatial Notch Frequency filter. |

Output parameters

| | | |
|-----------------------|----------|--|
| SpatialNotchStep | double * | Step for spatial notch filter. |
| SpatialNotchBandwidth | double * | Band width (Hertz) for spatial notch filter. |
| SpatialNotchGain | double * | Gain for spatial notch filter. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.240 PositionerCompensationPreFeedForwardSpatialNotchFilterSet [Extended]

Name

PositionerCompensationPreFeedForwardSpatialNotchFilterSet – Sets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 - If ($\text{SpatialNotchStep} > 1.0\text{e-}12$)
 - $\frac{\text{MaximumVelocity}}{\text{SpatialNotchStep}} \hat{=} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorPeriod}} \grave{u} \grave{u} \quad (\text{CorrectorPeriod: see system.ref})$
 - $\text{SpatialNotchBandwidth} \hat{=} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorPeriod}} \grave{u} \grave{u}$
 - $\text{SpatialNotchGain} \hat{=} [0:100]$
 - Else
 - $\text{SpatialNotchStep} = 0$
 - $\text{SpatialNotchBandwidth} = 0$
 - $\text{SpatialNotchGain} = 1$
- Checks the positioner name: (-18)
- Checks compensation preFeed forward mode is enabled: (-24)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function configures the parameters defined for selected spatial notch filter. If the “SpatialNotchStep” value is 0 then the spatial notch filter is not activated and the gain is setting to 1.

Prototype

```
int PositionerCompensationPreFeedForwardSpatialNotchFilterSet(
    int SocketID,
    char * PositionerName,
    int SpatialNotchNumber,
    double SpatialNotchStep,
    double SpatialNotchBandwidth,
    double SpatialNotchGain
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| PositionerName | char * | Positioner name. |
| SpatialNotchStep | double | Step for spatial notch filter. |
| SpatialNotchBandwidth | double | Band width (Hertz) for spatial notch filter. |
| SpatialNotchGain | double | Gain for spatial notch filter. |
| SpatialNotchNumber | int | Number of the selected Spatial Notch Frequency filter. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.

7.2.1.241 PositionerCompensationSpatialPeriodicNotchsGet [Extended]

Name

PositionerCompensationSpatialPeriodicNotchsGet – Gets pre-feedforward compensation spatial periodic filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)

Description

This functions returns the *CompensationSystemPreFeedForward* spatial periodic filters parameters. These filters reduce the spatial periodic perturbations coming from screw pitch or cogging.

Note that the *CompensationSystemPreFeedForward* feature is available for all corrector types (acceleration, velocity, voltage or position) functioning *in closed loop configuration*.

- SpatialNotchStep1.
- SpatialNotchsBandwidth1.
- SpatialNotchsGain1.
- SpatialNotchStep2.
- SpatialNotchsBandwidth2.
- SpatialNotchsGain2.
- SpatialNotchStep3.
- SpatialNotchsBandwidth3.
- SpatialNotchsGain3.

Prototype

```
int PositionerCompensationSpatialPeriodicNotchsGet(
    int SocketID,
    char * FullPositionerName,
    double * SpatialNotchStep1,
    double * SpatialNotchBandwidth1,
    double * SpatialNotchGain1,
    double * SpatialNotchStep2,
    double * SpatialNotchBandwidth2,
    double * SpatialNotchGain2,
    double * SpatialNotchStep3,
    double * SpatialNotchBandwidth3,
    double * SpatialNotchGain3
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------------|----------|--|
| SpatialNotchStep1 | double * | Spatial periodic step for filter #1 (units). |
| SpatialNotchBandwidth1 | double * | Spatial periodic bandwidth for filter #1 (Hz). |
| SpatialNotchGain1 | double * | Spatial periodic gain for filter #1. |
| SpatialNotchStep2 | double * | Spatial periodic step for filter #2 (units). |
| SpatialNotchBandwidth2 | double * | Spatial periodic bandwidth for filter #2 (Hz). |
| SpatialNotchGain2 | double * | Spatial periodic gain for filter #2. |
| SpatialNotchStep3 | double * | Spatial periodic step for filter #3 (units). |
| SpatialNotchBandwidth3 | double * | Spatial periodic bandwidth for filter #3 (Hz). |
| SpatialNotchGain3 | double * | Spatial periodic gain for filter #3. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.242 PositionerCompensationSpatialPeriodicNotchsSet [Extended]

Name

PositionerCompensationSpatialPeriodicNotchsSet – Sets pre-feedforward compensation spatial periodic filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks corrector type: (-8)
- Checks parameter values: (-17)
 - SpatialNotchStep $\hat{I} [0 : MaximumVelocity * CorrectorISRPeriod]$
 - SpatialNotchBandwidth $\hat{I} \begin{matrix} \hat{e} \\ \hat{e} \\ \hat{e} \end{matrix} 0 : \frac{0.5}{CorrectorISRPeriod} \hat{u}$
- Checks the motion status (Motion status must be disable): (-117)

NOTE

Refer to **system.ref** file to get **CorrectorISRPeriod** and **stages.ini** for **MaximumVelocity** values.

Description

This function sets the *CompensationSystemPreFeedForward* spatial periodic filters parameters. These filters reduce the spatial periodic perturbations coming from screw pitch or cogging.

Note that the *CompensationSystemPreFeedForward* feature is available for all corrector types (acceleration, velocity, voltage or position) functioning *in closed loop configuration*.

- SpatialNotchStep1.
- SpatialNotchsBandwidth1.
- SpatialNotchsGain1.
- SpatialNotchStep2.
- SpatialNotchsBandwidth2.
- SpatialNotchsGain2.
- SpatialNotchStep3.
- SpatialNotchsBandwidth3.
- SpatialNotchsGain3.

Prototype

```
int PositionerCompensationSpatialPeriodicNotchsSet(
    int SocketID,
    char * FullPositionerName,
    double SpatialNotchStep1,
    double SpatialNotchBandwidth1,
    double SpatialNotchGain1,
    double SpatialNotchStep2,
    double SpatialNotchBandwidth2,
    double SpatialNotchGain2,
    double SpatialNotchStep3,
    double SpatialNotchBandwidth3,
    double SpatialNotchGain3
)
```

Input parameters

| | | |
|------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| SpatialNotchStep1 | double | Spatial periodic step for filter #1 (units). |
| SpatialNotchBandwidth1 | double | Spatial periodic bandwidth for filter #1 (Hz). |
| SpatialNotchGain1 | double | Spatial periodic gain for filter #1. |
| SpatialNotchStep2 | double | Spatial periodic step for filter #2 (units). |
| SpatialNotchBandwidth2 | double | Spatial periodic bandwidth for filter #2 (Hz). |
| SpatialNotchGain2 | double | Spatial periodic gain for filter #2. |
| SpatialNotchStep3 | double | Spatial periodic step for filter #3 (units). |
| SpatialNotchBandwidth3 | double | Spatial periodic bandwidth for filter #3 (Hz). |
| SpatialNotchGain3 | double | Spatial periodic gain for filter #3. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.

7.2.1.243 PositionerCorrectorAutoTuning

Name

PositionerCorrectorAutoTuning – Executes auto-tuning process for determining position control loop PID values.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type: (-8)
- Positioner must not be a “Secondary Positioner”: (-8)
- Checks positioner name: (-18)
- Group status must be “READY”: (-22)
- Control loop type must be “PIDFFVelocity”, “PIDDualFFVoltage” or “PIDFFAcceleration”: (-24)

Description

The function executes an auto-tuning process and returns the calculated PID settings (KP, KI and KD values). The selected group must be in “READY” state, else (-22) error is returned.

This function works only if the positioner control loop type is “PIDFFVelocity” (velocity control), “PIDDualFFVoltage” (voltage control) or “PIDFFAcceleration” (acceleration control), else it returns (-24) error.

If the function is called when the positioner is not in READY state, (-22) error will be returned.

The “Mode” input value indicates the control mode of the position loop (**Short Settle** or **High Robustness**).

In the **Short Settle** mode, the PID values are adjusted to have high motion performance (short settling time, less following errors).

The **High Robustness** mode is used for a relatively good performance in motion, but guarantees the robustness (stability) for all stage situations (positions, velocities, accelerations).

If auto-tuning initialization fails (-104) error is returned, or if the motion becomes disabled then (-26) error is returned.

The auto-tuning process is executed in 5 periods. At the end of each period, the auto-tuning process estimates the auto-tuning quality by calculating the noise/signal ratio. If the noise/signal ratio is very close to zero (it means no oscillation), an (-101) error is returned. Else if the noise ratio >MaximumNoiseRatio (normally between 0.1 and 0.2, exact value defined in system.ref) then (-102) error is returned.

If the number of acquired data points (minimum = 9) or the number of acquired signal periods (minimum = 5) is not enough for a good estimate then (-103) error is returned.

At end of this function, the new PID setting is returned and the group status becomes “READY” once again.

Prototype

```
int PositionerCorrectorAutoTuning(
    int SocketID,
    char * PositionerName,
    int Mode,
    double * KP,
    double * KI,
    double * KD
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| Mode | int | Loop control mode (0 = short settle, or 1 = robust). |

Output parameters

| | | |
|----|----------|----------------------|
| KP | double * | Calculated KP value. |
| KI | double * | Calculated KI value. |
| KD | double * | Calculated KD value. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -101: Relay Feedback Test failed: No oscillation.
- -102: Relay Feedback Test failed: Signal too noisy.
- -103: Relay Feedback Test failed: Signal data not enough for analyse.
- -104: Error of tuning process initialization.

7.2.1.244 PositionerCorrectorDamperFilterGet [Extended]**Name**

PositionerCorrectorDamperFilterGet – Gets Dual control loop parameters for a selected positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks damper filter is enabled: (-205)

Description

This function allows returning the Damper Filter parameters for a PID Acceleration control loop.

NOTE

The corrector must be “PIDFFAccelerationCorrector”.

Prototype

```
int PositionerCorrectorDamperFilterGet(
    int SocketID,
    char * PositionerName,
    double * CutOffFrequency,
    double * DamperFactor,
    double * Gain
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|---------------------------------------|
| CutOffFrequency | double * | Damper filter cut-off frequency (Hz). |
| DamperFactor | double * | Damper factor (1 by default). |
| Gain | double * | Filter gain (0 or negative value). |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enabled in your configuration.

7.2.1.245 PositionerCorrectorDamperFilterSet [Extended]

Name

PositionerCorrectorDamperFilterSet – Sets Dual control loop parameters for a selected positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
- $\text{CutOffFrequency} \geq 0$ and $\leq (0.5 / \text{ISRCorrectorPeriod})$
- $\text{DamperFactor} > 0$
- $\text{Gain} \leq 0$
- Checks the motion status (Motion status must be disable): (-117)
- Checks damper filter is enabled: (-205)

Description

This function allows configuring the Damper Filter parameters for a PID Acceleration control loop.

NOTE

The main control loop must be “PIDFAccelerationCorrector”.

This function is enabled only if the group state is DISABLE.

Prototype

```
int PositionerCorrectorDamperFilterSet(
    int SocketID,
    char * PositionerName,
    double CutOffFrequency,
    double DamperFactor,
    double Gain
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| CutOffFrequency | double | Damper filter cut-off frequency (Hz). |
| DamperFactor | double | Damper factor (1 by default). |
| Gain | double | Filter gain (0 or negative value). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -117: Function is only allowed in DISABLED state.
- -205: Not enabled in your configuration.

PositionerCorrectorDualGet [Extended]**Name**

PositionerCorrectorDualGet – Gets Dual control loop parameters for a selected positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the positioner name: (-18)
- Checks dual corrector is enabled: (-205)

Description

This function allows returning the dual control loop parameter values.

NOTE

The “DualCorrectorMode” must be “Enabled” in the stages.ini file to activate the dual control loop. A secondary encoder has to be configured to be able to use the dual control loop. The main control loop must be “PIDFFAccelerationCorrector”.

Prototype

```
int PositionerCorrectorDualGet(
    int SocketID,
    char * PositionerName,
    bool * ClosedLoopStatus,
    double * KP,
    double * KI,
    double * KD,
    double * IntegrationTime,
    double * DerivativeFilterCutOffFrequency,
    double * KFeedForwardAcceleration,
    double * KFeedForwardJerk
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------------------|----------|--|
| ClosedLoopStatus | bool * | Dual control loop status (true = closed and false = opened). |
| KP | double * | PID servo loop proportional gain. |
| KI | double * | PID servo loop integral gain. |
| KD | double * | PID servo loop derivative gain. |
| IntegrationTime | double * | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double * | PID derivative filter cut-off frequency (Hz). |
| KFeedForwardAcceleration | double * | Acceleration feedforward gain (units). |
| KFeedForwardJerk | double * | Jerk feedforward gain (units). |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -205: Not enabled in your configuration.

7.2.1.246 PositionerCorrectorDualSet [Extended]

Name

PositionerCorrectorDualSet – Sets Dual control loop parameters for a selected positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks input parameters value: (-17)
 $KP \geq 0$, $KI \geq 0$, $KD \geq 0$, $KFeedForwardAcceleration \geq 0$, $KFeedForwardJerk \geq 0$
 $IntegrationTime \geq CorrectorPeriod$ (0.0001 s)
- Checks the positioner name: (-18)

Description

This function allows returning the dual control loop parameter values.

NOTE

The “DualCorrectorMode” must be “Enabled” in the stages.ini file to activate the dual control loop. A secondary encoder has to be configured to be able to use the dual control loop. The main control loop must be “PIDFFAccelerationCorrector”.

Prototype

```
int PositionerCorrectorDualSet(
    int SocketID,
    char * PositionerName,
    bool ClosedLoopStatus,
    double KP,
    double KI,
    double KD,
    double IntegrationTime,
    double DerivativeFilterCutOffFrequency,
    double KFeedForwardAcceleration,
    double KFeedForwardJerk
)
```

Input parameters

| | | |
|---------------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| ClosedLoopStatus | bool | Dual control loop status (true = closed and false = opened). |
| KP | double | PID servo loop proportional gain. |
| KI | double | PID servo loop integral gain. |
| KD | double | PID servo loop derivative gain. |
| IntegrationTime | double | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double | PID derivative filter cut-off frequency (Hz). |
| KFeedForwardAcceleration | double | Acceleration feedforward gain (units). |
| KFeedForwardJerk | double | Jerk feedforward gain (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.247 PositionerCorrectorExcitationSignalGainGet

Name

PositionerCorrectorExcitationSignalGainGet – Gets corrector excitation signal gain.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)

Description

This function returns the corrector excitation signal gain for the selected positioner.

Prototype

```
int PositionerCorrectorPIDBaseGet(
    int SocketID,
    char * PositionerName,
    double * ExcitationSignalGain
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|----------------------|----------|-------------------------|
| ExcitationSignalGain | double * | Excitation signal gain. |
|----------------------|----------|-------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.248 PositionerCorrectorExcitationSignalGainSet

Name

PositionerCorrectorExcitationSignalGainSet – Sets corrector excitation signal gain.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the parameter value: value must be between -1 and 1, else return “Parameter out of range or incorrect” (-17)
- Checks the positioner name: (-18)

Description

This function configures the corrector excitation signal gain for the selected positioner. ExcitationSignalGain value must ≥ -1 and ≤ 1 .

NOTE

The final gain of excitation signal for primary positioner = $K_{\text{FeedforwardExcitationToPrimary}} * \text{ExcitationSignalGain}$

The final gain of excitation signal for secondary positioner = $K_{\text{FeedforwardExcitationToSecondary}} * \text{ExcitationSignalGain}$

To have more details about $K_{\text{FeedforwardExcitationToPrimary}}$ and $K_{\text{FeedforwardExcitationToSecondary}}$, refer to the API **PositionerExcitationKFeedforwardSet()**

Prototype

```
Int PositionerCorrectorExcitationSignalGainSet(
    int SocketID,
    char * PositionerName,
    double ExcitationSignalGain
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| ExcitationSignalGain | double | Excitation signal gain. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.249 PositionerCorrectorNotchFiltersGet [Extended]**Name**

PositionerCorrectorNotchFiltersGet – Gets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)

Description

This function returns the parameters defined for two notch filters.

First notch filter parameters:

- UserNotchFrequency1.
- UserNotchBandwidth1.
- UserNotchGain1.

Second notch filter parameters:

- UserNotchFrequency2.
- UserNotchBandwidth2.
- UserNotchGain2.

NOTE

If the corrector type is "NoEncoderPositionCorrector" then (-24) error is returned.

Prototype

```
int PositionerCorrectorNotchFiltersGet(
    int SocketID,
    char * FullPositionerName,
    double * NotchFrequency1,
    double * NotchBandwidth1,
    double * NotchGain1,
    double * NotchFrequency2,
    double * NotchBandwidth2,
    double * NotchGain2
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|---|
| NotchFrequency1 | double * | Frequency (Hertz) for notch filter #1. |
| NotchBandwidth1 | double * | Band width (Hertz) for notch filter #1. |
| NotchGain1 | double * | Gain for notch filter #1. |
| NotchFrequency2 | double * | Frequency (Hertz) for notch filter #2. |
| NotchBandwidth2 | double * | Band width (Hertz) for notch filter #2. |
| NotchGain2 | double * | Gain for notch filter #2. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.250 PositionerCorrectorNotchFiltersSet [Extended]

Name

PositionerCorrectorNotchFiltersSet – Sets the notch filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks parameter values: (-17)

- NotchFrequency $\hat{1} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \hat{u}$
- NotchBandwidth $\hat{1} \begin{matrix} \hat{e} \\ \hat{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \hat{u}$
- NotchGain $\hat{1} [0:100]$

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This function configures the parameters defined for two notch filters. If the “NotchFrequency” value is NULL or the “NotchGain” value is NULL then the notch filter is not activated.

First notch filter parameters:

- NotchFrequency1.
- NotchBandwidth1.
- NotchGain1.

Second notch filter parameters:

- NotchFrequency2.
- NotchBandwidth2.
- NotchGain2.

NOTE

If the corrector type is “NoEncoderPositionCorrector” then (-24) error is returned.

Prototype

```
int PositionerCorrectorNotchFiltersSet(
    int SocketID,
    char * FullPositionerName,
    double NotchFrequency1,
    double NotchBandwidth1,
    double NotchGain1,
    double NotchFrequency2,
    double NotchBandwidth2,
    double NotchGain2
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| NotchFrequency1 | double | Frequency (Hertz) for notch filter #1. |
| NotchBandwidth1 | double | Band width (Hertz) for notch filter #1. |
| NotchGain1 | double | Gain for notch filter #1. |
| NotchFrequency2 | double | Frequency (Hertz) for notch filter #2. |
| NotchBandwidth2 | double | Band width (Hertz) for notch filter #2. |
| NotchGain2 | double | Gain for notch filter #2. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.251 PositionerCorrectorPIDAccelerationFilterGet [Extended]

Name

PositionerCorrectorPIDAccelerationFilterGet – Gets PID acceleration corrector filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)

Description

This function returns PID acceleration corrector filter parameters.

Prototype

```
int PositionerCorrectorPIDAccelerationFilterGet(
    int SocketID,
    char * PositionerName,
    bool * FilterControlStatus,
    double * KD,
    double * DerivativeFilterCutOffFrequency
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------------------|----------|---|
| FilterControlStatus | bool * | Current position of X axis. |
| KD | double * | KD gain. |
| DerivativeFilterCutOffFrequency | double * | Derivative Filter Cut-off Frequency (Hz). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.252 PositionerCorrectorPIDAccelerationFilterSet [Extended]

Name

PositionerCorrectorPIDAccelerationFilterSet – Sets PID acceleration corrector filter parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks the motion status (Motion status must be disable): (-117)
- Checks PID Acceleration Filter is enabled: (-205)

Description

This function updates PID acceleration corrector filter parameters and enables/disables the filter.

Prototype

```
int PositionerCorrectorPIDAccelerationFilterSet(
    int SocketID,
    char * PositionerName,
    bool * FilterControlStatus,
    double * KD,
    double * DerivativeFilterCutOffFrequency
)
```

Input parameters

| | | |
|---------------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| FilterControlStatus | bool | Current position of X axis. |
| KD | double | KD gain. |
| DerivativeFilterCutOffFrequency | double | Derivative Filter Cut-off Frequency (Hz). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -117: Function is only allowed in DISABLED state.
- -205: Not enabled in your configuration.

7.2.1.253 PositionerCorrectorPIDBaseGet [Extended]

Name

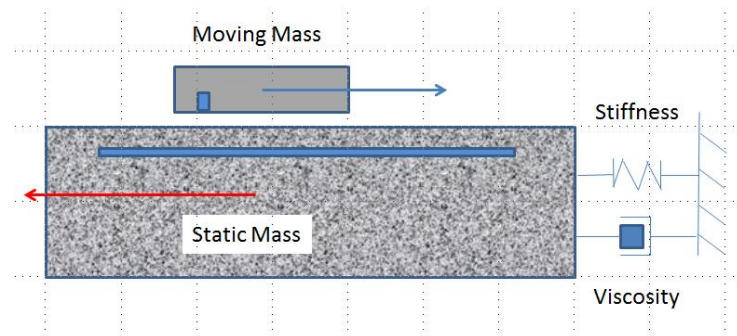
PositionerCorrectorPIDBaseGet – Gets PIDBase parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)

Description

This function returns the PIDBase parameter values.



PIDBase parameters:

- MovingMass.
- StaticMass.
- Viscosity.
- Stiffness.

Prototype

```
int PositionerCorrectorPIDBaseGet(
    int SocketID,
    char * PositionerName,
    double * MovingMass,
    double * StaticMass,
    double * Viscosity,
    double * Stiffness
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------|----------|---|
| MovingMass | double * | Mass of the stage moving part. |
| StaticMass | double * | Mass of the stage static part (the base). |
| Viscosity | double * | Viscosity of the base. |
| Stiffness | double * | Stiffness of the base. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.254 PositionerCorrectorPIDBaseSet [Extended]

Name

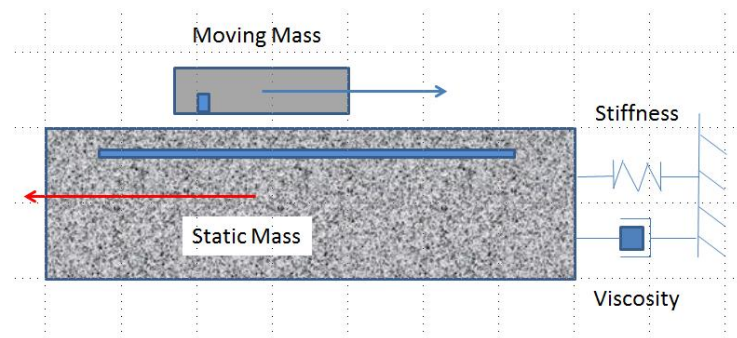
PositionerCorrectorPIDBaseSet – Sets PIDBase parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the parameter values: all values must ≥ 0 , else return “Parameter out of range or incorrect” (-17)
- Checks the positioner name: (-18)

Description

This function configures the PIDBase parameters defined for the selected positioner.



PIDBase parameters to set:

- MovingMass.
- StaticMass.
- Viscosity.
- Stiffness.

Prototype

```
int PositionerCorrectorPIDBaseSet(
    int SocketID,
    char * PositionerName,
    double MovingMass,
    double StaticMass,
    double Viscosity,
    double Stiffness
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| MovingMass | double | Mass of the stage moving part. |
| StaticMass | double | Mass of the stage static part (the base). |
| Viscosity | double | Viscosity of the base. |
| Stiffness | double | Stiffness of the base. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.255 PositionerCorrectorPIDDualFFVoltageGet

Name

PositionerCorrectorPIDDualFFVoltageGet – Gets PIDDualFFVoltage corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)

Description

This function returns the corrector parameter values used by a PID dual feed-forward with a motor voltage output.

NOTE

The “CorrectorType” must be “PIDDualFFVoltage” in the stages.ini file. This servo loop type is used when the position servo loop drives the voltage applied directly to the motor.

Prototype

```
int PositionerCorrectorPIDDualFFVoltageGet(
    int SocketID,
    char * FullPositionerName,
    bool * ClosedLoopStatus,
    double * KP,
    double * KI,
    double * KD,
    double * KS,
    double * IntegrationTime,
    double * DerivativeFilterCutOffFrequency,
    double * GKP,
    double * GKI,
    double * GKD,
    double * KForm,
    double * FeedForwardGainVelocity,
    double * FeedForwardGainAcceleration,
    double * Friction
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------------------|----------|--|
| ClosedLoopStatus | bool * | Position servo loop status (true = closed and false = opened). |
| KP | double * | PID servo loop proportional gain. |
| KI | double * | PID servo loop integral gain. |
| KD | double * | PID servo loop derivative gain. |
| KS | double * | PID integral saturation value (0 to 1). |
| IntegrationTime | double * | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double * | PID derivative filter cut-off frequency (Hz). |
| GKP | double * | Variable PID proportional gain multiplier. |
| GKI | double * | Variable PID integral gain multiplier. |
| GKD | double * | Variable PID derivative gain multiplier. |
| KForm | double * | Variable PID form coefficient. |
| FeedForwardGainVelocity | double * | Velocity feedforward gain (units). |
| FeedForwardGainAcceleration | double * | Acceleration feedforward gain (units). |
| Friction | double * | Friction compensation. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.256 PositionerCorrectorPIDDualFFVoltageSet

Name

PositionerCorrectorPIDDualFFVoltageSet – Sets PIDDualFFVoltage corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)
- Checks parameter value: (-17)
 - $KP \geq 0$.
 - $KI \geq 0$.
 - $KD \geq 0$.
 - $0 \leq KS \leq 1$.
 - $IntegrationTime \geq CorrectorISRPeriod$.
 - $GKP > -1$.
 - $GKI > -1$.
 - $GKD > -1$.
 - $KForm \geq 0$.
 - $KFeedForwardVelocity \geq 0$.
 - $KFeedForwardAcceleration \geq 0$.
 - $Friction \geq 0$.
 - $DerivativeFilterCutOffFrequency \hat{=} \frac{0.5}{CorrectorISRPeriod}$

NOTE

Refer to *system.ref* file to get **CorrectorISRPeriod** value.

Description

This function configures the “PIDDualFFVoltage” corrector parameters. The “CorrectorType” must be “PIDDualFFVoltage” in the stages.ini file, else (-8) error is returned.

NOTE

This servo loop type is used when the position servo loop drives the voltage applied directly to the motor.

Prototype

```

int PositionerCorrectorPIDDualFFVoltageSet(
    int SocketID,
    char * FullPositionerName,
    bool ClosedLoopStatus,
    double KP,
    double KI,
    double KD,
    double KS,
    double IntegrationTime,
    double DerivativeFilterCutOffFrequency,
    double GKP,
    double GKI,
    double GKD,
    double KForm,
    double FeedForwardGainVelocity,
    double FeedForwardGainAcceleration,
    double Friction
)

```

Input parameters

| | | |
|---------------------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” unction. |
| FullPositionerName | char * | Positioner name. |
| ClosedLoopStatus | bool | Position servo loop status (true = closed and false = opened). |
| KP | double | PID servo loop proportional gain. |
| KI | double | PID servo loop integral gain. |
| KD | double | PID servo loop derivative gain. |
| KS | double | PID integral saturation value (0 to 1). |
| IntegrationTime | double | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double | PID derivative filter cut-off frequency (Hz). |
| GKP | double | Variable PID proportional gain multiplier. |
| GKI | double | Variable PID integral gain multiplier. |
| GKD | double | Variable PID derivative gain multiplier. |
| KForm | double | Variable PID form coefficient. |
| FeedForwardGainVelocity | double | Velocity feedforward gain (units). |
| FeedForwardGainAcceleration | double | Acceleration feedforward gain (units). |
| Friction | double | Friction compensation. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.257 PositionerCorrectorPIDFFAccelerationGet

Name

PositionerCorrectorPIDFFAccelerationGet – Gets PIDFFAcceleration corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)

Description

This function returns the corrector parameter values used by a PID feed-forward with an acceleration output.

NOTE

The “CorrectorType” must be “PIDFFAcceleration” in the stages.ini file. This servo loop type is used when a constant value applied to the driver results in a constant acceleration of the stage.

Prototype

```
int PositionerCorrectorPIDFFAccelerationGet(
    int SocketID,
    char * FullPositionerName,
    bool * ClosedLoopStatus,
    double * KP,
    double * KI,
    double * KD,
    double * KS,
    double * IntegrationTime,
    double * DerivativeFilterCutOffFrequency,
    double * GKP,
    double * GKI,
    double * GKD,
    double * KForm,
    double * FeedForwardGainAcceleration,
    double * FeedForwardGainJerk
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------------------|----------|--|
| ClosedLoopStatus | bool * | Position servo loop status (true = closed and false = opened). |
| KP | double * | PID servo loop proportional gain. |
| KI | double * | PID servo loop integral gain. |
| KD | double * | PID servo loop derivative gain. |
| KS | double * | PID integral saturation value (0 to 1). |
| IntegrationTime | double * | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double * | PID derivative filter cut-off frequency (Hz). |
| GKP | double * | Variable PID proportional gain multiplier. |
| GKI | double * | Variable PID integral gain multiplier. |
| GKD | double * | Variable PID derivative gain multiplier. |
| KForm | double * | Variable PID form coefficient. |
| FeedForwardGainAcceleration | double * | Acceleration feedforward gain (units). |
| FeedForwardGainJerk | double * | Jerk feedforward gain (units). |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.258 PositionerCorrectorPIDFFAccelerationSet

Name

PositionerCorrectorPIDFFAccelerationSet – Sets PIDFFAcceleration corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)
- Checks parameter value: (-17)
 - $KP \geq 0$.
 - $KI \geq 0$.
 - $KD \geq 0$.
 - $0 \leq KS \leq 1$.
 - $IntegrationTime \geq CorrectorISRPeriod$.
 - $GKP > -1$.
 - $GKI > -1$.
 - $GKD > -1$.
 - $KForm \geq 0$.
 - $KFeedForwardAcceleration \geq 0$.
 - $KFeedForwardJerk \geq 0$.
 - DerivativeFilterCutOffFrequency $\hat{I} \hat{e} \hat{0} : \frac{0.5}{CorrectorISRPeriod} \hat{u}$

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This function configures the “PIDFFAcceleration” corrector parameters.

NOTE

The “CorrectorType” parameter must be defined as “PIDFFAcceleration” in the “stages.ini” file else (-8) error is returned. This servo loop type is used when a constant value applied to the driver results in a constant acceleration of the stage.

Prototype

```

int PositionerCorrectorPIDFFAccelerationSet(
    int SocketID,
    char * FullPositionerName,
    bool ClosedLoopStatus,
    double KP,
    double KI,
    double KD,
    double KS,
    double IntegrationTime,
    double DerivativeFilterCutOffFrequency,
    double GKP,
    double GKI,
    double GKD,
    double KForm,
    double FeedForwardGainAcceleration,
    double FeedForwardGainJerk
)

```

Input parameters

| | | |
|---------------------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ClosedLoopStatus | bool | Position servo loop status (true = closed and false = opened). |
| KP | double | PID servo loop proportional gain. |
| KI | double | PID servo loop integral gain. |
| KD | double | PID servo loop derivative gain. |
| KS | double | PID integral saturation value (0 to 1). |
| IntegrationTime | double | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double | PID derivative filter cut-off frequency (Hz). |
| GKP | double | Variable PID proportional gain multiplier. |
| GKI | double | Variable PID integral gain multiplier. |
| GKD | double | Variable PID derivative gain multiplier. |
| KForm | double | Variable PID form coefficient. |
| FeedForwardGainAcceleration | double | Acceleration feedforward gain (units). |
| FeedForwardGainJerk | double | Jerk feedforward gain (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.259 PositionerCorrectorPIDFFVelocityGet

Name

PositionerCorrectorPIDFFVelocityGet – Gets PIDFFVelocity corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)

Description

This function returns the corrector parameter values used by a PID with a velocity output:

ClosedLoopStatus, KP, KI, KD, KS, IntegrationTime, DerivativeFilterCutOffFrequency, GKP, GKI, GKD, Kform and FeedForwardGainVelocity.

NOTE

The “CorrectorType” must be “PIDFFVelocity” in the stages.ini file. This servo loop type is used when a constant value applied to the driver results in a constant velocity of the stage.

Prototype

```
int PositionerCorrectorPIDFFVelocityGet(
    int SocketID,
    char * FullPositionerName,
    bool * ClosedLoopStatus,
    double * KP,
    double * KI,
    double * KD,
    double * KS,
    double * IntegrationTime,
    double * DerivativeFilterCutOffFrequency,
    double * GKP,
    double * GKI,
    double * GKD,
    double * KForm,
    double * FeedForwardGainVelocity
)
```

Input parameters

| | | |
|--------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer”function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------------------|----------|--|
| ClosedLoopStatus | bool * | Position servo loop status (true = closed and false = opened). |
| KP | double * | PID servo loop proportional gain. |
| KI | double * | PID servo loop integral gain. |
| KD | double * | PID servo loop derivative gain. |
| KS | double * | PID integral saturation value (0 to 1). |
| IntegrationTime | double * | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double * | PID derivative filter cut-off frequency (Hz). |
| GKP | double * | Variable PID proportional gain multiplier. |
| GKI | double * | Variable PID integral gain multiplier. |
| GKD | double * | Variable PID derivative gain multiplier. |
| KForm | double * | Variable PID form coefficient. |
| FeedForwardGainVelocity | double * | Velocity feedforward gain (units). |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.260 PositionerCorrectorPIDFFVelocitySet

Name

PositionerCorrectorPIDFFVelocitySet – Sets PIDFFVelocity corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)
- Checks parameter value: (-17)
 - $KP \geq 0$.
 - $KI \geq 0$.
 - $KD \geq 0$.
 - $0 \leq KS \leq 1$.
 - $IntegrationTime \geq CorrectorISRPeriod$.
 - $GKP > -1$.
 - $GKI > -1$.
 - $GKD > -1$.
 - $KForm \geq 0$.
 - $KFeedForwardVelocity \geq 0$.

$$\bullet \text{ DerivativeFilterCutOffFrequency} \hat{=} \frac{0.5}{CorrectorISRPeriod}$$

NOTE

Refer to *system.ref* file to get **CorrectorISRPeriod** value.

Description

This function configures the “PIDFFVelocity” corrector parameters.

NOTE

The “CorrectorType” parameter must be defined as “PIDFFVelocity” in the *stages.ini* file else (-8) error is returned. This servo loop type is used when a constant value applied to the driver results in a constant velocity of the stage.

Prototype

```

int PositionerCorrectorPIDFFVelocitySet(
    int SocketID,
    char * FullPositionerName,
    bool ClosedLoopStatus,
    double KP,
    double KI,
    double KD,
    double KS,
    double IntegrationTime,
    double DerivativeFilterCutOffFrequency,
    double GKP,
    double GKI,
    double GKD,
    double KForm,
    double FeedForwardGainVelocity
)

```

Input parameters

| | | |
|---------------------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ClosedLoopStatus | bool | Position servo loop status (true = closed and false = opened). |
| KP | double | PID servo loop proportional gain. |
| KI | double | PID servo loop integral gain. |
| KD | double | PID servo loop derivative gain. |
| KS | double | PID integral saturation value (0 to 1). |
| IntegrationTime | double | PID integration time (seconds). |
| DerivativeFilterCutOffFrequency | double | PID derivative filter cut-off frequency (Hz). |
| GKP | double | Variable PID proportional gain multiplier. |
| GKI | double | Variable PID integral gain multiplier. |
| GKD | double | Variable PID derivative gain multiplier. |
| KForm | double | Variable PID form coefficient. |
| FeedForwardGainVelocity | double | Velocity feedforward gain (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.261 PositionerCorrectorPIPositionGet

Name

PositionerCorrectorPIPositionGet – Gets PIPosition corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)

Description

This function returns the corrector parameter values used by a PI with a position output: ClosedLoopStatus, KP, KI and IntegrationTime.

NOTE

The “CorrectorType” must be “PIPosition” in the stages.ini file. This servo loop type is used when the position servo loop outputs a position value directly.

Prototype

```
int PositionerCorrectorPIPositionGet(
    int SocketID,
    char * FullPositionerName,
    bool * ClosedLoopStatus,
    double * KP,
    double * KI,
    double * IntegrationTime
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------|----------|--|
| ClosedLoopStatus | bool * | Position servo loop status (true = closed and false = opened). |
| KP | double * | PI servo loop proportional gain. |
| KI | double * | PI servo loop integral gain. |
| IntegrationTime | double * | PI integration time (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.262 PositionerCorrectorPIPositionSet

Name

PositionerCorrectorPIPositionSet – Sets PIPosition corrector parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type and the corrector type: (-8)
- Checks parameter value: (-17)
- $KP \geq 0$.
- $KI \geq 0$.
- $IntegrationTime \geq CorrectorISRPeriod$.

NOTE

Refer to *system.ref* file to get *CorrectorISRPeriod* value.

Description

This function configures the “PIPosition” corrector parameters.

NOTE

The “CorrectorType” parameter must be defined as “PIPosition” in the *stages.ini* file else *ERR_WRONG_OBJECT_TYPE* (-8) is returned. This servo loop type is used when the position servo loop outputs a position value directly.

Prototype

```
int PositionerCorrectorPIPositionSet(
    int SocketID,
    char * FullPositionerName,
    bool ClosedLoopStatus,
    double KP,
    double KI,
    double IntegrationTime
)
```

Input parameters

| | | |
|--------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ClosedLoopStatus | bool | Position servo loop status (true = closed and false = opened). |
| KP | double | PI servo loop proportional gain. |
| KI | double | PI servo loop integral gain. |
| IntegrationTime | double | PI integration time (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.263 PositionerCorrectorPlantFeedForwardDelayGet [Extended]

Name

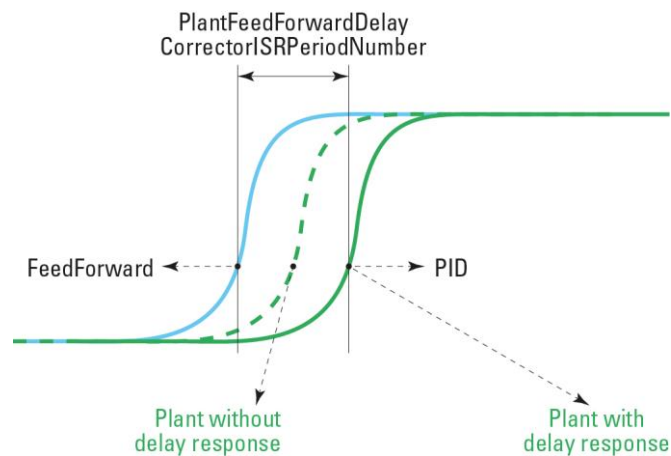
PositionerCorrectorPlantFeedForwardDelayGet – Gets the corrector ISR period number configured to define the plant delay.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)

Description

This function returns the corrector ISR period number configured to define the plant delay. Its value is predefined in the stages.ini file with the parameter named “PlantFeedForwardDelayCorrectorISRPeriodNumber”.



Prototype

```
int PositionerCorrectorPlantFeedForwardDelayGet(
    int SocketID,
    char * PositionerName,
    int * CorrectorISRPeriodNumber
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------------------------|-------|--------------------------------------|
| CorrectorISRPeriodNumber | int * | Number of ISR periods to delay plant |
|--------------------------|-------|--------------------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.264 PositionerCorrectorPlantFeedForwardDelaySet [Extended]

Name

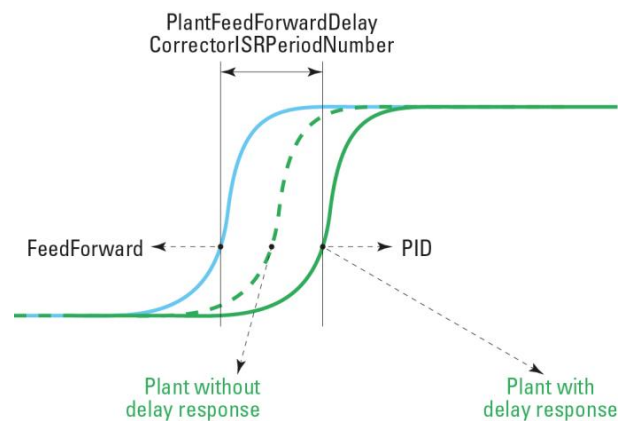
PositionerCorrectorPlantFeedForwardDelaySet – Sets the corrector ISR period number that defines the plant delay.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the filter number: (-17)
- Checks the motion status (Motion status must be disable): (-117)

Description

This function reconfigures the corrector ISR period number to define the plant delay. Its value is predefined in stages.ini with the parameter “PlantFeedForwardDelayCorrectorISRPeriodNumber”.



Prototype

```
int PositionerCorrectorPlantFeedForwardDelaySet(
    int SocketID,
    char * PositionerName,
    int CorrectorISRPeriodNumber )
```

Input parameters

| | | |
|--------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| CorrectorISRPeriodNumber | int | Number of ISR periods to delay plant (max = 100). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

- -117: Function is only allowed in DISABLED state.

7.2.1.265 PositionerCorrectorPostFFGet [Extended]**Name**

PositionerCorrectorPostFFGet – Gets Post Feed Forward parameters of a PIDFFAcceleration corrector.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name: (-18)

Description

This function returns the parameters of the current post feed forward from PIDFFAcceleration corrector.

Prototype

```
int PositionerCorrectorPostFFGet(
    int SocketID,
    char * PositionerName,
    double * PostKFeedForwardAcceleration,
    double * PostKFeedForwardJerk,
    double * PostKFeedForwardSlope
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------------------|----------|--------------------------------|
| PostKFeedForwardAcceleration | double * | Post KFeedForward acceleration |
| PostKFeedForwardJerk | double * | Post KFeedForward jerk |
| PostKFeedForwardSlope | double * | Post KFeedForward slop |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -18: Positioner name doesn't exist or incorrect.

7.2.1.266 PositionerCorrectorPostFFSet [Extended]

Name

PositionerCorrectorPostFFSet – Sets Post Feed Forward parameters of a PIDFFAcceleration corrector.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

This function sets the parameters of the Post Feed Forward from PIDFFAcceleration corrector.

Prototype

```
int PositionerCorrectorPostFFSet(
    int SocketID,
    char * PositionerName,
    double PostKFeedForwardAcceleration,
    double PostKFeedForwardJerk,
    double PostKFeedForwardSlope
)
```

Input parameters

| | | |
|------------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| PostKFeedForwardAcceleration | double | Post KFeedForward acceleration |
| PostKFeedForwardJerk | double | Post KFeedForward jerk |
| PostKFeedForwardSlope | double | Post KFeedForward slop |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: Positioner name doesn't exist or incorrect.
- -121: Function is not allowed due to configuration disabled.

7.2.1.267 PositionerCorrectorTypeGet

Name

PositionerCorrectorTypeGet – Gets the corrector type.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)

Description

This function returns the corrector type used by the selected positioner.

The corrector type can be one of this list:

- PositionerCorrectorPIDFFAcceleration.
- PositionerCorrectorPIDFFVelocity.
- PositionerCorrectorPIDDualFFVoltage.
- PositionerCorrectorPIPosition.
- NoCorrector.

NOTE

The corrector type is defined in the stages.ini file with the “CorrectorType” parameter.

Prototype

```
int PositionerCorrectorTypeGet(
    int SocketID,
    char * FullPositionerName,
    char * CorrectorType
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------|--------|-----------------|
| CorrectorType | char * | Corrector type. |
|---------------|--------|-----------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.268 PositionerCurrentVelocityAccelerationFiltersGet

Name

PositionerCurrentVelocityAccelerationFiltersGet – Gets the velocity and acceleration filter cut-off frequencies.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)

Description

This function returns the current velocity cut-off frequency and the current acceleration cut-off frequency used by gathering for the selected positioner.

Gathering uses these parameters to filter the current velocity and the current acceleration. These parameters are defined in the stages.ini file.

Prototype

```
int PositionerCurrentVelocityAccelerationFiltersGet(
    int SocketID,
    char * FullPositionerName,
    double * VelocityCutOffFrequency,
    double * AccelerationCutOffFrequency
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------------------|----------|---|
| VelocityCutOffFrequency | double * | Velocity filter cut-off frequency (Hz). |
| AccelerationCutOffFrequency | double * | Acceleration filter cut-off frequency (Hz). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.269 PositionerCurrentVelocityAccelerationFiltersSet

Name

PositionerCurrentVelocityAccelerationFiltersSet – Sets the velocity and acceleration filter cut-off frequencies.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks parameter value: (-17)

- VelocityCutOffFrequency $\hat{\Gamma}_{\hat{e}}^{\hat{e}}0: \frac{0.5}{\text{CorrectorISRPeriod}} \hat{\Gamma}_{\hat{e}}^{\hat{e}}$
- AccelerationCutOffFrequency $\hat{\Gamma}_{\hat{e}}^{\hat{e}}0: \frac{0.5}{\text{CorrectorISRPeriod}} \hat{\Gamma}_{\hat{e}}^{\hat{e}}$

NOTE

Refer to *system.ref* file to get CorrectorISRPeriod value.

Description

This function sets a new velocity cut-off frequency and a new acceleration cut-off frequency for the selected positioner.

Gathering uses these parameters to filter the current velocity and the current acceleration. These parameters are defined in the stages.ini file.

Prototype

```
int PositionerCurrentVelocityAccelerationFiltersSet(
    int SocketID,
    char * FullPositionerName,
    double VelocityCutOffFrequency,
    double AccelerationCutOffFrequency
)
```

Input parameters

| | | |
|-----------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| VelocityCutOffFrequency | double | Velocity filter cut-off frequency (Hz). |
| AccelerationCutOffFrequency | double | Acceleration filter cut-off frequency (Hz). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.270 PositionerDriverFiltersGet

Name

PositionerDriverFiltersGet – Gets the piezo driver notch and low-pass filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks driver type (XPS-DRVP1), if not PIEZO: (-24)
- If piezo driver, check if driver is not initialized: (-118)

Description

This function returns current values of the piezo driver filters parameters (KI, notch frequency, notch bandwidth, notch gain, low-pass frequency).

Prototype

```
int PositionerDriverFiltersGet(
    int SocketID,
    char * FullPositionerName,
    double * KI,
    double * NotchFrequency,
    double * NotchBandwidth,
    double * NotchGain,
    double * LowpassFrequency
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------|----------|---------------------------------|
| KI | double * | Driver KI. |
| NotchFrequency | double * | Driver notch frequency (Hz). |
| NotchBandwidth | double * | Driver notch bandwidth (Hz). |
| NotchGain | double * | Driver notch gain. |
| LowpassFrequency | double * | Driver low-pass frequency (Hz). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -24: Not available in this configuration (check hardware or configuration).
- -118: Not allowed action driver not initialized.

7.2.1.271 PositionerDriverFiltersSet

Name

PositionerDriverFiltersSet – Sets the piezo driver filters parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks parameter value: (-17)
 - $KI \geq 0$.
 - NotchFrequency $\hat{\Gamma} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \grave{u}$
 - NotchBandwidth $\hat{\Gamma} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \grave{u}$
 - NotchGain $\hat{\Gamma} [0:100]$
 - LowpassFrequency $\hat{\Gamma} \begin{matrix} \acute{e} \\ \grave{e} \\ \grave{e} \end{matrix} 0 : \frac{0.5}{\text{CorrectorISRPeriod}} \grave{u}$
- Checks driver type, if not PIEZO: (-24)
- If the group state is NOTREF or READY: (-117)
- If the driver is not initialized: (-118)

Description

This function sets parameters of the driver (KI integral, notch and low-pass filters) for a piezo driver positioner.

Prototype

```
int PositionerDriverFiltersSet(
    int SocketID,
    char * FullPositionerName,
    double KI,
    double NotchFrequency,
    double NotchBandwidth,
    double NotchGain,
    double LowpassFrequency
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| KI | double | Driver KI. |
| NotchFrequency | double | Driver notch frequency (Hz). |
| NotchBandwidth | double | Driver notch bandwidth (Hz). |
| NotchGain | double | Driver notch gain. |
| LowpassFrequency | double | Driver low-pass frequency (Hz). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -24: Not available in this configuration (check hardware or configuration).
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -117: Function is only allowed in DISABLED state.
- -118: Not allowed action driver not initialized.

7.2.1.272 PositionerDriverPositionOffsetsGet

Name

PositionerDriverPositionOffsetsGet – Gets the current value of piezo driver stage and gage position offsets.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks driver type, if not PIEZO: (-24)
- If the group state is NOTREF or READY: (-117)
- If the driver is not initialized: (-118)

Description

This function returns current value of the piezo driver position offset parameters (stage position offset, gage position offset).

Prototype

```
int PositionerDriverPositionOffsetsGet(
    int SocketID,
    char * FullPositionerName,
    double * StagePositionOffset,
    double * GagePositionOffset
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---------------------------------------|
| StagePositionOffset | double * | Driver stage position offset (units). |
| GagePositionOffset | double * | Driver gage position offset (units). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -117: Function is only allowed in DISABLED state.
- -118: Not allowed action driver not initialized.

7.2.1.273 PositionerDriverStatusGet

Name

PositionerDriverStatusGet – Gets the positioner driver status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must be not a secondary positioner): (-18), (-24)

Description

This function returns the positioner driver status from the driver board.

Use the “PositionerDriverStatusStringGet” function to get the driver status description.

NOTE

See section 8.7: “Positioner Driver Status List”.

Prototype

```
int PositionerDriverStatusGet(
    int SocketID,
    char * FullPositionerName,
    unsigned long * PositionerDriverStatus
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------------|-----------------|---------------------|
| PositionerDriverStatus | unsigned long * | Driver status code. |
|------------------------|-----------------|---------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.274 PositionerDriverStatusStringGet

Name

PositionerDriverStatusStringGet – Gets the positioner driver status description.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns a driver status description from a positioner driver status code.

NOTE

See section 8.7: “Positioner Driver Status List”.

Prototype

```
int PositionerDriverStatusStringGet(
    int SocketID,
    int DriverStatusCode,
    char * DriverStatusString
)
```

Input parameters

| | | |
|------------------|---------------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| DriverStatusCode | unsigned long | Driver status code. |

Output parameters

| | | |
|--------------------|--------|----------------------------|
| DriverStatusString | char * | Driver status description. |
|--------------------|--------|----------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.275 PositionerEncoderAmplitudeValuesGet

Name

PositionerEncoderAmplitudeValuesGet – Gets the encoder amplitude values.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner: (-8)
- Checks the encoder type (must be “AnalogInterpolated”): (-8)

Description

This function returns the maximum and current amplitudes values (in volts) of the analog encoder input.

NOTE

The encoder type must be “AnalogInterpolated” in the stages.ini file (“EncoderType” parameter).

Prototype

```
int PositionerEncoderAmplitudeValuesGet(
    int SocketID,
    char * FullPositionerName,
    double * MaxSinusAmplitude,
    double * CurrentSinusAmplitude,
    double * MaxCosinusAmplitude,
    double * CurrentCosinusAmplitude
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------------------|----------|---|
| MaxSinusAmplitude | double * | Encoder sinus signal maximum amplitude value (Volts). |
| CurrentSinusAmplitude | double * | Encoder sinus signal current amplitude value (Volts). |
| MaxCosinusAmplitude | double * | Encoder cosinus signal maximum amplitude value (Volts). |
| CurrentCosinusAmplitude | double * | Encoder cosinus signal current amplitude value (Volts). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.276 PositionerEncoderCalibrationParametersGet

Name

PositionerEncoderCalibrationParametersGet – Gets the encoder calibration parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must be not a secondary positioner): (-8)
- Checks the encoder type (must be “AnalogInterpolated”): (-8)

Description

After a calibration of the analog encoder input (by the function “GroupInitializeWithEncoderCalibration”), this function returns the optimum parameters for the analog encoder interface. To take these parameters into account (recommended to achieve best performance), these values must be entered manually in the corresponding section of the stages.ini file. The parameters to set in the stages.ini file are:

- EncoderSinusOffset = ; Volts
- EncoderCosinusOffset = ; Volts
- EncoderDifferentialGain =
- EncoderPhaseCompensation = ; Deg

NOTE

The encoder type must be “AnalogInterpolated” in the stages.ini file (“EncoderType” parameter).

Prototype

```
int PositionerEncoderCalibrationParametersGet(
    int SocketID,
    char * FullPositionerName,
    double * SinusOffset,
    double * CosinusOffset,
    double * DifferentialGain,
    double * PhaseCompensation
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------------|----------|--|
| SinusOffset | double * | Encoder sinus signal offset (Volts). |
| CosinusOffset | double * | Encoder cosinus signal offset (Volts). |
| DifferentialGain | double * | Encoder differential gain. |
| PhaseCompensation | double * | Encoder phase compensation (Deg). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.277 PositionersEncoderIndexDifferenceGet

Name

PositionersEncoderIndexDifferenceGet – Gets the distance between the two index encoders (gantry).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxis or an XY): (-8)
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks the positioner name: (-18)
- Checks the positioner type (must be “gantry”): (-24)
- Checks the positioner was at least once homed: (-109)

Description

This function returns the distance between the two encoders indexes of a “primary positioner – secondary positioner” couple. To use this function, the positioner must be configured in “gantry” mode else (-24) error is returned.

For further information about gantry mode, refer to the “SYSTEM – Manual Configuration – Gantry (Secondary Positioners)” section in the XPS User’s Manual.

Prototype

```
int PositionersEncoderIndexDifferenceGet(
    int SocketID,
    char * FullPositionerName
    double * Distance
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|----------|----------|--|
| Distance | double * | Distance between the two index encoders (units). |
|----------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -109: Group need to be homed at least once to use this function (distance mesured during home search).

7.2.1.278 PositionerEncoderLinearCorrectionGet

Name

PositionerEncoderLinearCorrectionGet – Gets encoder linear correction in ppm.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)

Description

This function returns encoder linear correction in ppm.

Prototype

```
int PositionerEncoderLinearCorrectionGet (
    int SocketID,
    char * PositionerName,
    double * EncoderLinearCorrection
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------------------|----------|----------------------------------|
| EncoderLinearCorrection | double * | Encoder linear correction (ppm). |
|-------------------------|----------|----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.279 PositionerEncoderLinearCorrectionSet

Name

PositionerEncoderLinearCorrectionSet – Sets encoder linear correction in ppm.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks group state (must be NOTINIT, DISABLE or READY at HomePreset position): (-205)

Description

This function sets encoder linear correction in ppm.

Prototype

```
int PositionerEncoderLinearCorrectionSet (
    int SocketID,
    char * PositionerName,
    double EncoderLinearCorrection
)
```

Input parameters

| | | |
|-------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| EncoderLinearCorrection | double | Encoder linear correction in ppm |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -205: Not enable in your configuration.

7.2.1.280 PositionerErrorGet

Name

PositionerErrorGet – Gets the positioner error code and clears it.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid positioner name: (-18)
- Validates secondary positioner: (-18)

Description

This function gets the positioner error code and clears it.

The positioner error codes are listed in section 8.5: “Positioner Error List”. The description of the positioner error code can be obtained with the “GroupPositionerErrorStringGet” function.

NOTE

The “PositionerErrorRead” function reads the positioner error without clearing it.

Prototype

```
int PositionerErrorGet(
    int SocketID,
    char * FullPositionerName,
    int * PositionerError
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|-------|------------------------|
| PositionerError | int * | Positioner error code. |
|-----------------|-------|------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.281 PositionerErrorRead

Name

PositionerErrorRead – Gets the positioner error code without clearing it.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid positioner name: (-18)
- Validates secondary positioner: (-18)

Description

This function gets the positioner error code without clearing it.

The positioner error codes are listed in section 8.5: “Positioner Error List”. The description of the positioner error code can be obtained with the “GroupPositionerErrorStringGet” function.

NOTE

The “PositionerErrorGet” function clears the positioner error.

Prototype

```
int PositionerErrorRead(
    int SocketID,
    char * FullPositionerName,
    int * PositionerError
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|-------|------------------------|
| PositionerError | int * | Positioner error code. |
|-----------------|-------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.282 PositionerErrorStringGet

Name

PositionerErrorStringGet – Gets the positioner error description.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns a positioner error description from a positioner error code.

NOTE

See section 8.5: “Positioner Error List”.

Prototype

```
int PositionerErrorStringGet(
    int SocketID,
    char * FullPositionerName,
    int PositionerErrorCode,
    char * PositionerErrorString
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| PositionerErrorCode | int | Positioner error code. |

Output parameters

| | | |
|-----------------------|-------|-------------------------------|
| PositionerErrorString | int * | Positioner error description. |
|-----------------------|-------|-------------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.283 PositionerExcitationSignalGet

Name

PositionerExcitationSignalGet – Gets the currently used parameters of the excitation signal feature.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Invalid positioner name: (-18)

Description

This function gets the last configured excitation signal parameters.

Prototype

```
int PositionerExcitationSignalGet(
    int SocketID,
    char * FullPositionerName,
    int * SignalType,
    double * Frequency,
    double * Amplitude,
    double * Time
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------|----------|---|
| SignalType | int * | Type of signal. |
| Frequency | double * | Frequency (Hz). |
| Amplitude | double * | Amplitude (acceleration, velocity or voltage unit). |
| Time | double * | During time (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.284 PositionerExcitationSignalSet

Name

PositionerExcitationSignalSet – Sets and activate the signal of excitation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Is secondary positioner or has a secondary positioner: (-8)
- Checks frequency (must ≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$): (-17)
- Checks excitation time (*must* $\geq 4 * CorrectorISRPeriod$): (-17)
- Checks signal amplitude [-Acceleration (Velocity or Voltage) limit to Acceleration (Velocity or Voltage) limit]: (-17)
- Checks type of signal (0, 1, 2 or 3): (-17)
- Invalid positioner name: (-18)
- Checks group status (*must be READY*): (-22)
- Validates control loop type: (-24)
- Error if XY secondary positioner and in Option 0 (-222)

Description

The excitation signal functionality generates a typical signal (a sine, a blank noise or an echelon signal) that the controller sends to motors to excite the system. In measuring the output signal of the excited system, we can determine some system characteristics, like the system transfer function.

The excitation signal functionality is only available with the stages controlled in acceleration (acceleration control, ex: brushless / linear motors), velocity (velocity control) or in voltage (voltage control). It does not exist with the stages controlled in position (ex: stepper motors).

The excitation-signal function **PositionerExcitationSignalSet** can be executed only when the positioner is in “READY” state. When the excitation-signal process is in progress, the positioner is in the “ExcitationSignal” state. At the end of the process, the positioner returns to “READY” state (see group state diagram).

The **PositionerExcitationSignalSet** function sends an excitation signal to the motor for a brief time. This function is allowed for “PIDFFAcceleration”, “PIDFFVelocity” or “PIDDualFFVoltage” control loops. The parameters to configure are *signal type* (0:sine, 1:echelon,2:random-amplitude,3:random-pulse-width binary-amplitude, integer), *frequency* (Hz, double), *amplitude* (acceleration, velocity or voltage unit, double) and *during time* (seconds, double).

The function effective parameters for each mode are: (here: Limit means AccelerationLimit, VelocityLimit or VoltageLimit)

- Sine signal mode: Frequency (≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$), Amplitude (>0 and $\leq Limit$), Time ($\geq 4 * CorrectorISRPeriod$)
- Echelon signal mode: Amplitude (>0 and $\leq Limit$, or <0 and $\geq -Limit$), Time ($\geq 4 * CorrectorISRPeriod$)
 - + During *Time*: Signal = *Amplitude*
 - + End of *Time*: Signal = 0
- Random-amplitude signal mode: Amplitude (>0 and $\leq Limit$), Time (>0), Frequency (≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$)

Signal is generated with a random value at with a period defined by the controller base time (*CorrectorISRPeriod* , *default value 0.125 ms*), then is filtered with a second order low-pass filter at the cut-off *Frequency* value.

- Random-pulse-width binary-amplitude signal mode:

Amplitude (>0 and $\leq \text{Limit}$), *Time* ($\geq 4 * \text{CorrectorISRPeriod}$), *Frequency* (≥ 0.1 and $\leq 0.5/\text{CorrectorISRPeriod}$).

Signal is a sequence of pulses (*Signal = Amplitude or = 0*) with pulse randomly varied width (multiple of *Tbase*).

Frequency is the controlled system band-width (*cut-off frequency*), necessary for the PRBS (*Pseudo Random Binary Sequence*) function configuration.

The function non-effective parameters can accept any value, the value 0 is recommended for simplicity.

NOTE

If during the excitation signal generation the stage position exceeds the user minimum or maximum target positions, the motor excitation command is stopped and an error is returned.

Prototype

```
int PositionerExcitationSignalSet(
    int SocketID,
    char * FullPositionerName,
    int SignalType,
    double Frequency,
    double Amplitude,
    double Time
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| FullPositionerName | char * | Positioner name. |
| SignalType | int | Type of signal. |
| Frequency | double | Frequency (Hz). |
| Amplitude | double | Amplitude (acceleration, velocity or voltage unit). |
| Time | double | During time (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -112: Error of excitation signal generation initialization.
- -222: Action not allowed for secondary positioner that is in Option 0

7.2.1.285 PositionerExcitationSignalCorrectorOutSet

Name

PositionerExcitationSignalCorrectorOutSet – Sets and activates the signal of excitation that is inserted at corrector output.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Is secondary positioner or has a secondary positioner: (-8)
- Checks frequency (*must* ≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$): (-17)
- Checks excitation time (*must* $\geq 4 * CorrectorISRPeriod$): (-17)
- Checks signal amplitude [*-Acceleration (Velocity or Voltage) limit to Acceleration (Velocity or Voltage) limit*]: (-17)
- Checks type of signal (0, 1, 2 or 3): (-17)
- Invalid positioner name: (-18)
- Checks group status (*must be READY*): (-22)
- Validates control loop type: (-24)
- Error if XY secondary positioner and in Option 0 (-222)

Description

The excitation signal functionality generates a typical signal (a sine, a blank noise or an echelon signal) that the controller sends to motors to excite the system. In measuring the output signal of the excited system, we can determine some system characteristics, like the system transfer function.

The excitation signal functionality is only available with the stages controlled in acceleration (acceleration control, ex: brushless / linear motors), velocity (velocity control) or in voltage (voltage control). It does not exist with the stages controlled in position (ex: stepper motors).

The excitation-signal function **PositionerExcitationSignalCorrectorOutSet** can be executed only when the positioner is in “READY” state. When the excitation-signal process is in progress, the positioner is in the “ExcitationSignal” state. At the end of the process, the positioner returns to “READY” state (see group state diagram).

The **PositionerExcitationSignalCorrectorOutSet** function sends an excitation signal to the motor for a brief time. This function is allowed for “PIDFFAcceleration”, “PIDFFVelocity” or “PIDDualFFVoltage” control loops. The parameters to configure are *signal type* (0:sine, 1:echelon,2:random-amplitude,3:random-pulse-width binary-amplitude, integer), *frequency* (Hz, double), *amplitude* (acceleration, velocity or voltage unit, double) and *during time* (seconds, double).

The function effective parameters for each mode are: (here: Limit means AccelerationLimit, VelocityLimit or VoltageLimit)

- Sine signal mode: Frequency (≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$), Amplitude (>0 and $\leq Limit$), Time ($\geq 4 * CorrectorISRPeriod$)
- Echelon signal mode: Amplitude (>0 and $\leq Limit$, or <0 and $\geq -Limit$), Time ($\geq 4 * CorrectorISRPeriod$)
 - + During Time: Signal = Amplitude
 - + End of Time: Signal = 0

- Random-amplitude signal mode: Amplitude (>0 and $\leq \text{Limit}$), Time (>0), Frequency (≥ 0.1 and $\leq 0.5/\text{CorrectorISRPeriod}$)

Signal is generated with a random value at with a period defined by the controller base time (*CorrectorISRPeriod*, default value 0.125 ms), then is filtered with a second order low-pass filter at the cut-off *Frequency* value.

- Random-pulse-width binary-amplitude signal mode:

Amplitude (>0 and $\leq \text{Limit}$), *Time* ($\geq 4 * \text{CorrectorISRPeriod}$), *Frequency* (≥ 0.1 and $\leq 0.5/\text{CorrectorISRPeriod}$).

Signal is a sequence of pulses (*Signal* = *Amplitude* or = 0) with pulse randomly varied width (multiple of *Tbase*).

Frequency is the controlled system band-width (*cut-off frequency*), necessary for the PRBS (*Pseudo Random Binary Sequence*) function configuration.

The function non-effective parameters can accept any value, the value 0 is recommended for simplicity.

NOTE

If during the excitation signal generation the stage position exceeds the user minimum or maximum target positions, the motor excitation command is stopped and an error is returned.

NOTE

This function does exactly the same that the function *PositionerExcitationSignalSet()* does, with only one difference between them. The difference is that, with the function *PositionerExcitationSignalCorrectorOutSet()*, the generated excitation signal is inserted at the corrector output, that can be useful in some cases, like the measurement of robustness transfer function.

Prototype

```
int PositionerExcitationSignalCorrectorOutSet(
    int SocketID,
    char * FullPositionerName,
    int SignalType,
    double Frequency,
    double Amplitude,
    double Time
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| FullPositionerName | char * | Positioner name. |
| SignalType | int | Type of signal. |
| Frequency | double | Frequency (Hz). |
| Amplitude | double | Amplitude (acceleration, velocity or voltage unit). |
| Time | double | During time (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -112: Error of excitation signal generation initialization.
- -222: Action not allowed for secondary positioner that is in Option 0

7.2.1.286 PositionerFeedforwardAccDisable [Extended]

Name

PositionerFeedforwardAccDisable – Disables XY External Feed Forward Acceleration signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Disable XY External Feed Forward Acceleration signal.
This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardAccDisable(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.287 PositionerFeedforwardAccEnable [Extended]**Name**

PositionerFeedforwardAccEnable – Enables XY External Feed forward Acceleration signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)
- Checks the group is ready: (-135)

Description

Enable XY External Feed Forward Acceleration signal.

This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardAccEnable(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.
- -135: Function is not allowed because group is not initialized or not referenced.

7.2.1.288 PositionerFeedforwardAccGet [Extended]**Name**

PositionerFeedforwardAccGet – Gets parameters of XY external feed forward acceleration signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Gets parameters of the current XY external feed forward acceleration signal.

Prototype

```
int PositionerFeedforwardAccGet(
    int SocketID,
    char * PositionerName,
    char * OutputName1,
    double * Scale1,
    double * Offset1,
    char * OutputName2,
    double * Scale2,
    double * Offset2
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------|----------|----------------------------|
| OutputName1 | char * | GPIO Analog Output name #1 |
| Scale1 | double * | Signal 1 scale |
| Offset1 | double * | Signal 1 offset |
| OutputName2 | char * | GPIO Analog Output name #2 |
| Scale2 | double * | Signal 2 scale |
| Offset2 | double * | Signal 2 offset |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.289 PositionerFeedforwardAccSet [Extended]**Name**

PositionerFeedforwardAccSet – Sets parameters of XY external feed forward acceleration signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Sets parameters of the current XY external feed forward acceleration signal.

Prototype

```
int PositionerFeedforwardAccSet(
    int SocketID,
    char * PositionerName,
    char * OutputName1,
    double Scale1,
    double Offset1,
    char OutputName2,
    double Scale2,
    double Offset2
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| OutputName1 | char * | GPIO Analog Output name #1 |
| Scale1 | double | Signal 1 scale |
| Offset1 | double | Signal 1 offset |
| OutputName2 | char * | GPIO Analog Output name #2 |
| Scale2 | double | Signal 2 scale |
| Offset2 | double | Signal 2 offset |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.290 PositionerFeedforwardAccStatusGet [Extended]

Name

PositionerFeedforwardAccStatusGet – Gets XY external feed forward acceleration status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Get status of the current XY external feed forward acceleration:

- “Enabled” means XY external feed forward acceleration is in progress.
- “Disabled” means XY external feed forward acceleration is stopped.

Prototype

```
int PositionerFeedforwardAccStatusGet(
    int SocketID,
    char * PositionerName,
    char * Status
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------|--------|--|
| OutputName1 | char * | GPIO Analog Output name #1 |
| Status | char * | Current XY external feed forward status: “Enabled” or “Disabled” |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.291 PositionerFeedforwardPositionDisable [Extended]**Name**

PositionerFeedforwardPositionDisable – Disables XY External Feed forward Position signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Checks the positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Disables XY External Feed forward Position signal.

This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardPositionDisable(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.292 PositionerFeedforwardPositionEnable [Extended]

Name

PositionerFeedforwardPositionEnable – Enables XY External Feed Forward Position signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Checks the positioner name: (-18)
- Not allowed due to configuration disabled: (-121)
- Checks the group status is “READY”: (-135)

Description

Enables XY External Feed Forward Position signal.

This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardPositionEnable(
    int SocketID,
    char * PositionerName
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.
- -135: Function is not allowed because group is not initialized or not referenced.

7.2.1.293 PositionerFeedforwardPositionGet [Extended]**Name**

PositionerFeedforwardPositionGet – Gets parameters of XY External Feed forward Position signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Checks the positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Gets parameters of XY External Feed forward Position signal.

This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardPositionGet(
    int SocketID,
    char * PositionerName,
    char * OutputName,
    double * Scale,
    double * Offset
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------|----------|-------------------------|
| OutputName | char * | GPIO Analog Output name |
| Scale | double * | Signal scale |
| Offset | double * | Signal offset |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.294 PositionerFeedforwardPositionSet [Extended]**Name**

PositionerFeedforwardPositionSet – Sets parameters of XY External Feed forward Position signal.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Checks the positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Sets parameters of XY External Feed forward Position signal.

This function is reserved for an XY group.

Prototype

```
int PositionerFeedforwardPositionSet(
    int SocketID,
    char * PositionerName,
    char * OutputName,
    double Scale,
    double Offset
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| OutputName | char * | GPIO analog output name |
| Scale | double | Signal scale |
| Offset | double | Signal offset |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.295 PositionerFeedforwardPositionStatusGet [Extended]

Name

PositionerFeedforwardPositionStatusGet – Gets XY external feed forward position status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Positioner must not be a “Secondary Positioner” and the group must be a XY group: (-8)
- Invalid positioner name: (-18)
- Not allowed due to configuration disabled: (-121)

Description

Get status of the current XY external feed forward position:

- “Enabled” means XY external feed forward position is in progress.
- “Disabled” means XY external feed forward position is stopped.

Prototype

```
int PositionerFeedforwardPositionStatusGet(
    int SocketID,
    char * PositionerName,
    char * Status
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------|--------|--|
| OutputName1 | char * | GPIO Analog Output name #1 |
| Status | char * | Current XY external feed forward status: “Enabled” or “Disabled” |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -121: Not enable in your configuration.

7.2.1.296 PositionerGantryEndReferencingPositionGet

Name

PositionerGantryEndReferencingPositionGet – Gets the secondary axis position at the end of group home search.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner type (must be a primary positioner): (-8)
- Checks group type: (-8)
 - SingleAxis.
 - SingleAxisTheta.
 - SingleAxisWithClamping.
 - XY.
 - MultipleAxes.
- Checks positioner name: (-18)
- Checks if positioner has a SecondaryPositioner (must be gantry): (-24)
- Checks if homing is done: (-109)

Description

This function gets the saved corrected Setpoint position of the secondary positioner at the end of group home search.

Prototype

```
int PositionerGantryEndReferencingPositionGet(
    int SocketID,
    char PositionerName,
    double * Position
)
```

Input parameters

| | | |
|----------------|-----|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | int | Positioner name. |

Output parameters

| | | |
|----------|----------|---|
| Position | double * | SecondaryPositioner Setpoint Position at the end of home (units). |
|----------|----------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -24: Not available in this configuration (check hardware or configuration).
- -109: Group need to be homed at least once to use this function (distance measured during home search).

7.2.1.297 PositionerHardInterpolatorFactorGet

Name

PositionerHardInterpolatorFactorGet – Gets the interpolation factor for position compare mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must be not a secondary positioner): (-8)
- Checks the encoder type (must be “AnalogInterpolated”): (-8)

Description

This function returns the interpolation factor of the hardware interpolator used in the “Position Compare” mode. The interpolation factor value is defined as:

InterpolationFactor = round (EncoderScalePitch/HardInterpolatorResolution)

NOTE

The encoder type must be “AnalogInterpolated” in the stages.ini file (“EncoderType” parameter).

Prototype

```
int PositionerHardInterpolatorFactorGet(
    int SocketID,
    char * FullPositionerName,
    int * InterpolationFactor
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| Output parameters. | | |
| InterpolationFactor | int * | interpolation factor. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.298 PositionerHardInterpolatorFactorSet

Name

PositionerHardInterpolatorFactorSet – Sets the interpolation factor for position compare mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must be not a secondary positioner): (-8)
- Checks the encoder type (must be “AnalogInterpolated”): (-8)
- Checks input parameter value: (-17)
- Checks the positioner name: (-18)
- Checks the group state (must be NOTINIT): (-22)

Description

This function sets the interpolation factor of the hardware interpolator used in the “PositionCompare” mode. The IP200 is updated and the position compare resolution is set as follows:

$$\text{PositionCompareResolution} = \text{EncoderScalePitch} / \text{InterpolationFactor}$$

The “InterpolationFactor“ value must be define with one of these values:

| | | | | | | | |
|----|----|----|----|----|-----|-----|-----|
| 20 | 25 | 40 | 50 | 80 | 100 | 160 | 200 |
|----|----|----|----|----|-----|-----|-----|

If the input interpolator factor value is different from these values then (-17) error is returned.

NOTE

The group must be NOTINIT to use this function else (-22) error is returned.

The encoder type must be “AnalogInterpolated” in the stages.ini file (“EncoderType” parameter) else the error is returned.

This function applies to XPS-Q hardware. It is kept for XPS-D and XPS-RL backward compatibility but has no effect.

Prototype

```
int PositionerHardInterpolatorFactorSet(
    int SocketID,
    char * FullPositionerName,
    int InterpolationFactor
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| InterpolationFactor | int | interpolation factor. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.299 PositionerHardInterpolatorPositionGet [Extended]**Name**

PositionerHardInterpolatorPositionGet – Gets interpolated position from the encoder hard interpolator.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)
- Checks the encoder type (must be “AnalogInterpolated”): (-8)

Description

This function returns the position interpolated by the encoder hard interpolator.

NOTE

The encoder type must be “*AnalogInterpolated*” or “*AnalogInterpolatedTheta*” in the stages.ini file (“EncoderType” parameter).

Prototype

```
int PositionerHardInterpolatorPositionGet(
    int SocketID,
    char * FullPositionerName,
    double * Position
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|----------|----------|------------------------|
| Position | double * | Interpolated position. |
|----------|----------|------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.300 PositionerHardwareStatusGet

Name

PositionerHardwareStatusGet – Gets the positioner hardware status code.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must be not a secondary positioner): (-8), (-18), (-24)

Description

This function returns the hardware status of the selected positioner. The positioner hardware status is composed of the “corrector” hardware status and the “servitudes” hardware status:

The “Corrector” returns the motor interface and the position encoder hardware status.

The “Servitudes” returns the general inhibit and the end of runs hardware status.

NOTE

See section 8.6: “Positioner Hardware Status List”.

Prototype

```
int PositionerHardwareStatusGet(
    int SocketID,
    char * FullPositionerName,
    int * PositionerHardwareStatus
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------------------------|-------|-----------------------|
| PositionerHardwareStatus | int * | Hardware status code. |
|--------------------------|-------|-----------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.301 PositionerHardwareStatusStringGet

Name

PositionerHardwareStatusStringGet – Gets the positioner error description.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the hardware status description from a positioner hardware status code.

NOTE

See section 8.6: “Positioner Hardware Status List”.

Prototype

```
int PositionerHardwareStatusStringGet(
    int SocketID,
    char * FullPositionerName,
    int PositionerHardwareStatusCode,
    char * PositionerHardwareStatusString
)
```

Input parameters

| | | |
|------------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| PositionerHardwareStatusCode | int | Positioner hardware status code. |

Output parameters

| | | |
|--------------------------------|-------|---|
| PositionerHardwareStatusString | int * | Positioner hardware status description. |
|--------------------------------|-------|---|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.302 PositionerJogMaximumVelocityAndAccelerationGet

Name

PositionerJogMaximumVelocityAndAccelerationGet – Gets the jog maximum velocity and jog maximum acceleration from profiler generator.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name: (-18)

Description

This function returns the jog maximum velocity and jog maximum acceleration of the profile generators. These parameters represent the limits for the profiler and are defined in the stages.ini file:

JogMaximumVelocity = ; unit/second

JogMaximumAcceleration = ; unit/second²

Prototype

```
int PositionerJogMaximumVelocityAndAccelerationGet(
    int SocketID,
    char * FullPositionerName,
    double * JogMaximumVelocity,
    double * JogMaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|------------------------|----------|---|
| JogMaximumVelocity | double * | Jog maximum velocity (units/s). |
| JogMaximumAcceleration | double * | Jog maximum acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.303 PositionerMagneticTrackPositionAtHomeGet

Name

PositionerMagneticTrackPositionAtHomeGet – Gets magnetic track position at home in units.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)

Description

This function returns magnetic track position at home in units.

Prototype

```
int PositionerMagneticTrackPositionAtHomeGet(
    int SocketID,
    char * PositionerName,
    double * MagneticTrackPosition
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------------|----------|--|
| MagneticTrackPosition | double * | Magnetic track position at home (units). |
|-----------------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.304 PositionerMagneticTrackPositionAtHomeSet

Name

PositionerMagneticTrackPositionAtHomeSet – Sets magnetic track position at home in units.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks group state (must be NOTINIT, DISABLE or READY at HomePreset position): (-205)

Description

This function sets magnetic track position at home in units..

Prototype

```
int PositionerMagneticTrackPositionAtHomeSet(
    int SocketID,
    char * PositionerName,
    double MagneticTrackPosition
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| MagneticTrackPosition | double | Magnetic track position at home (units). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -205: Not enable in your configuration.

7.2.1.305 PositionerMaximumVelocityAndAccelerationGet

Name

PositionerMaximumVelocityAndAccelerationGet – Gets the maximum velocity and acceleration from the profiler generators.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)

Description

This function returns the maximum velocity and acceleration of the profile generators. These parameters represent the limits for the profiler and are defined in the stages.ini file:

MaximumVelocity = ; unit/second

MaximumAcceleration = ; unit/second²

Prototype

```
int PositionerMaximumVelocityAndAccelerationGet(
    int SocketID,
    char * FullPositionerName,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| MaximumVelocity | double * | Maximum velocity (units/seconds). |
| MaximumAcceleration | double * | Maximum acceleration (units/seconds ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.306 PositionerMotionDoneGet

Name

PositionerMotionDoneGet – Gets the motion done parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)
- Checks the motion done mode (must be “VelocityAndPositionWindow”): (-8)

Description

This function returns the motion done parameters only for the “VelocityAndPositionWindow” MotionDone mode. If the MotionDone mode is defined as “Theoretical” then (-8) error is returned.

The “MotionDoneMode” parameter from the stages.ini file defines the motion done mode. The motion done can be defined as “Theoretical” (the motion done mode is not used) or “VelocityAndPositionWindow”. For a more thorough description of the motion done mode, please refer to the XPS Motion Tutorial section Motion/Motion Done.

Prototype

```
int PositionerMotionDoneGet(
    int SocketID,
    char * FullPositionerName,
    double * PositionWindow,
    double * VelocityWindow,
    double * MeanPeriod
    double * Timeout
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|----------------|----------|----------------------------------|
| PositionWindow | double * | Position window (units). |
| VelocityWindow | double * | Velocity window (units/seconds). |
| CheckingTime | double * | Checking time (seconds). |
| MeanPeriod | double * | Mean period (seconds). |
| Timeout | double * | Motion done time out (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.307 PositionerMotionDoneSet

Name

PositionerMotionDoneSet – Sets the motion done parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks parameter value: (-17)

Description

This function updates the motion done parameters only for the “VelocityAndPositionWindow” MotionDone mode. The “MotionDoneMode” parameter from the stages.ini file must be defined as “VelocityAndPositionWindow” else (-8) error is returned.

For a more thorough description of the Motion Done mode, please refer to the XPS Motion Tutorial section Motion/Motion Done.

Prototype

```
int PositionerMotionDoneSet(
    int SocketID,
    char * FullPositionerName,
    double PositionWindow,
    double VelocityWindow,
    double MeanPeriod
    double Timeout
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| PositionWindow | double | Position window (units). |
| VelocityWindow | double | Velocity window (units/seconds). |
| CheckingTime | double | Checking time (seconds). |
| MeanPeriod | double | Mean period (seconds). |
| Timeout | double | Motion done time out (seconds). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.308 PositionerMotorDualSinForceBalanceGet

Name

PositionerMotorDualSinForceBalanceGet – Gets force balance parameters of an *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* motor driver interface.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the motor driver interface type is *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* (error -205 otherwise).

Description

This function returns the force balance parameters of an *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* motor driver interface.

Prototype

```
int PositionerMotorDualSinForceBalanceGet(
    int SocketID,
    char * FullPositionerName,
    double * FirstMotorForceBalance,
    double * SecondMotorForceBalance
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Full positioner name (<i>for example XY.X</i>). |

Output parameters

| | | |
|-------------------------|----------|-----------------------------|
| FirstMotorForceBalance | double * | First force balance ratio. |
| SecondMotorForceBalance | double * | Second force balance ratio. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -205: Not enable in your configuration.

7.2.1.309 PositionerMotorDualSinForceBalanceSet

Name

PositionerMotorDualSinForceBalanceSet – Sets force balance parameters of an *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* motor driver interface.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the motor driver interface type is *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* (error -205 otherwise).

Description

This function sets the force balance parameters of an *AnalogDualSinAcceleration* or *AnalogDualSinAccelerationLMI* motor driver interface.

Prototype

```
int PositionerMotorDualSinForceBalanceSet(
    int SocketID,
    char * FullPositionerName,
    double FirstMotorForceBalance,
    double SecondMotorForceBalance
)
```

Input parameters

| | | |
|-------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Full positioner name (<i>for example XY.X</i>). |
| FirstMotorForceBalance | double | First force balance ratio (<i>value between 0 and 1</i>). |
| SecondMotorForceBalance | double | Second force balance ratio (<i>between 0 and 1</i>). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -205: Not enable in your configuration.

7.2.1.310 PositionerPositionCompareAquadBAlwaysEnable

Name

PositionerPositionCompareAquadBAlwaysEnable – Enables the AquadB signal in the always mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks if the CIE board supports this function: (-115)

Description

This function enables the generation of AquadB output signals on the PCO connector (the 2&3 or 4&5 pins) of the XPS controller cards. The “always” mode means that the AquadB signal is generated all the time (not position windowed).

NOTE

This function can be used only with a position encoder. If there is no position encoder then (-24) error is returned.

Prototype

```
int PositionerPositionCompareAquadBAlwaysEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.311 PositionerPositionCompareAquadBPrescalerGet

Name

PositionerPositionCompareAquadBPrescalerGet – Gets PCO AquadB interpolation factor.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks encoder type (must be “AnalogInterpolated” encoder): (-8)
- Checks parameter value: (-17)
- Checks positioner name: (-18)

Description

This function gets the current Position Compare AquadB interpolation factor.

The predefined PCO interpolation values are the following:

- 4.
- 16.
- 256.
- 4096.
- 65536.

Prototype

```
int PositionerPositionCompareAquadBPrescalerGet(
    int SocketID,
    char PositionerName,
    double * PCOInterpolationFactor
)
```

Input parameters

| | | |
|----------------|-----|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | int | Positioner name. |

Output parameters

| | | |
|------------------------|----------|-----------------------------------|
| PCOInterpolationFactor | double * | Current PCO interpolation factor. |
|------------------------|----------|-----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner name doesn't exist or unknown command.

7.2.1.312 PositionerPositionCompareAquadBPrescalerSet

Name

PositionerPositionCompareAquadBPrescalerSet – Sets PCO AquadB interpolation factor.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks encoder type (must be “AnalogInterpolated” encoder): (-8)
- Checks PCO interpolation factor value: (-17)
- Checks positioner name: (-18)

Description

This function configures Position Compare AquadB interpolation factor.

The predefined PCO interpolation values are the following:

- 4
- 16
- 256
- 4096
- 65536

Prototype

```
int PositionerPositionCompareAquadBPrescalerSet(
    int SocketID,
    char PositionerName,
    double PCOInterpolationFactor
)
```

Input parameters

| | | |
|------------------------|--------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| PositionerName | int | Positioner name. |
| PCOInterpolationFactor | double | Predefined PCO interpolation factor value. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.313 PositionerPositionCompareAquadBWindowedGet

Name

PositionerPositionCompareAquadBWindowedGet – Gets the windowed AquadB mode parameters and state..

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks the position compare parameters (must be configured): (-23)
- Checks the configured mode type (must be WindowedAquadB): (-24)
- Checks if the CIE board supports this function: (-115)

Description

This function returns the configured parameters of the position windowed AquadB output signal and gives its state (enabled or disabled).

NOTE

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”). If there is no position encoder then (-24) error is returned.

Prototype

int **PositionerPositionCompareAquadBWindowedGet** (int SocketID, char FullPositionerName[250], double* MinimumPosition, double* MaximumPosition, bool * EnableState)

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| EnableState | bool * | Windowed AquadB state (true=enabled or false=disabled) |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -23: ERR_POSITION_COMPARE_NOT_SET.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.314 PositionerPositionCompareAquadBWindowedSet

Name

PositionerPositionCompareAquadBWindowedSet – Sets the windowed AquadB signal parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks input parameter values: (-17)
 - $\text{MinimumPosition} < \text{MaximumPosition}$.
 - $\text{MinimumPosition} \geq \text{MinimumTargetPosition}$.
 - $\text{MaximumPosition} \leq \text{MaximumTargetPosition}$.
- Checks position compare state (must be disabled): (-22)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks if the CIE board supports this function: (-115)

Description

This function sets the parameters for the position windowed AquadB output signal on the PCO connector (the 2&3 or 4&5 pins) of the XPS controller cards.

These parameters are in effect only when the position compare mode is enabled by the *PositionerPositionCompareEnable()* function.

NOTE

This function can be used only with a position encoder (“AquadB” or “AnalogInterpolated”). If there is no position encoder then (-24) error is returned.

Prototype

```
int PositionerPositionCompareAquadBWindowedSet(
    int SocketID,
    char * FullPositionerName
    double MinimumPosition,
    double MaximumPosition
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| MinimumPosition | double | Minimum position (units). |
| MaximumPosition | double | Maximum position (units). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.315 PositionerPositionCompareDisable

Name

PositionerPositionCompareDisable – Disables the position compare mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)
- Checks the encoder (“AquadB” or “AnalogInterpolated”): (-8)

Description

This function disables the position compare mode.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionCompareDisable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.316 PositionerPositionCompareEnable

Name

PositionerPositionCompareEnable – Enables the position compare mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)
- Checks the encoder (“AquadB” or “AnalogInterpolated”): (-8)
- Checks the positioner name: (-18)
- Checks the group state (must be READY): (-22)
- Checks the position compare parameters (must be configured): (-22)

Description

This function enables the position compare mode. The group must be in READY state to use this function else (-22) error is returned.

If the position compare parameters are not configured (by the “PositionerPositionCompareSet” function) then (-22) error is returned.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionCompareEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.

7.2.1.317 PositionerPositionCompareGet

Name

PositionerPositionCompareGet – Gets the position compare parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)
- Checks the position compare parameters (must be configured): (-23)
- Checks the configured mode type (must be PositionCompare): (-24)

Description

This function returns the real value (without correction) of parameters of the position compare output trigger and returns current state (enabled or disabled).

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionCompareGet(
    int SocketID,
    char * FullPositionerName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * PositionStep,
    bool * EnableState
)
```

Input parameters

| | | |
|--------------------|--------|--|
| SocketID | int | Socket identifier gets b the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| PositionStep | double * | Position step (units). |
| EnableState | bool * | Position compare state (true = enabled or false = disabled). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -23: Position compare not set.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.318 PositionerPositionComparePulseParametersGet

Name

PositionerPositionComparePulseParametersGet – Gets the position compare PCO pulse parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner (must not be a secondary positioner): (-8)

Description

This function returns the configured parameters of the position compare PCO pulse parameters.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionComparePulseParametersGet(
    int SocketID,
    char * FullPositionerName,
    double * PCOPulseWidth,
    double * EncoderSettlingTime
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|--|
| PCOPulseWidth | double * | Width of PCO pulses (μ s). |
| EncoderSettlingTime | double * | Encoder signal settling time (μ s). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.319 PositionerPositionComparePulseParametersSet

Name

PositionerPositionComparePulseParametersSet – Sets the position compare PCO pulse parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks input parameter values: (-17)
 - PCOPulseWidth value must equal to 0.2 (default), 1, 2.5 or 10 (μs)
 - EncoderSettlingTime value must equal to 0.075 (default), 1, 4 or 12 (μs)
- Checks position compare state (must be disabled): (-22)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)
- Checks if the CIE board supports this function: (-115)

Description

This function sets two additional parameters for the position compare output trigger of the PCO connector on the XPS controller cards. The first additional parameter is the pulse width. The second parameter is the encoder settling time value, which is the time the encoder inputs have to stabilize after a change of state is detected.

These parameters are used only when using the position compare mode. For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

NOTE

When changing the PCO Pulse settle time you must limit the maximum velocity of the stage accordingly, otherwise you will lose the PCO position and generate the wrong number of pulses at wrong positions.

For example, if you set the EncoderSettlingTime to 4 μs, the maximum PCO encoder frequency need to be limited to less than $0.25 / 4e^{-6} = 62.5$ kHz.

So, if EncoderScalePitch = 0.004 mm and HardInterpolatorFactor = 200 then the stage maximum velocity must $\leq 62.5e^3 * 0.004 / 200 = 1.25$ mm/s, otherwise the PCO will not work properly.

How to determine PCO encoder frequency:

1. For AquadB encoder:
 $PCO\ encoder\ frequency = Velocity / EncoderResolution$
2. For analog interpolated encoder:
 $PCO\ encoder\ frequency = Velocity * HardInterpolatorFactor / EncoderScalePitch$

Example: XML310 stage (EncoderScalePitch = 0.004 mm, HardInterpolatorFactor = 200). If Velocity = 10mm/s = >PCO encoder frequency = $10 * 200 / 0.004 = 500$ kHz

NOTE

This function can be used only with a position encoder. If no position encoder then (-24) error is returned.

This function is called automatically at controller reboot and at GroupInitialize() execution to set the position compare pulse parameters to default values (PCOPulseWidth to 0.2 μ s, EncoderSettlingTime to 0.075 μ s).

Prototype

```
int PositionerPositionComparePulseParametersSet(
    int SocketID,
    char * FullPositionerName,
    double PCOPulseWidth,
    double EncoderSettlingTime
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| FullPositionerName | char * | Positioner name. |
| PCOPulseWidth | double | Width of PCO pulses (μ s). |
| EncoderSettlingTime | double | Encoder signal settling time (μ s). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.320 PositionerPositionCompareScanAccelerationLimitGet [Extended]

Name

PositionerPositionCompareScanAccelerationLimitGet – Gets the position compare scan acceleration limit.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the corrector type (must be *PIDFFAcceleration* corrector): (-24)

Description

This function returns the position compare scan acceleration limit.

During scan of position compare, the motor output will be limited to this value instead of the *AccelerationLimit*.

The position compare scan acceleration limit takes effect only with *PIDFFAcceleration* corrector type.

This function can be used only with a *PIDFFAcceleration* corrector else (-24) error is returned.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionCompareScanAccelerationLimitGet(
    int SocketID,
    char * FullPositionerName,
    double * ScanAccelerationLimit
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------------|----------|--|
| ScanAccelerationLimit | double * | Limit of position compare scan acceleration (units/s ²). |
|-----------------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.321 PositionerPositionCompareScanAccelerationLimitSet [Extended]

Name

PositionerPositionCompareScanAccelerationLimitSet – Sets the position compare acceleration limit.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter values: (-17)
 - PositionCompareScanAccelerationLimit value must >0 and $\leq \text{MaximumAcceleration}$ (value in stages.ini)
- Checks the corrector type (must be *PIDFFAcceleration* corrector): (-24)

Description

This function sets the position compare scan acceleration limit.

During position compare, the motor output will be limited to this value instead of *AccelerationLimit*.

The position compare scan acceleration limit takes effect only with *PIDFFAcceleration* corrector type.

This function can be used only with a *PIDFFAcceleration* corrector otherwise the (-24) error is returned.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerPositionCompareScanAccelerationLimitSet(
    int SocketID,
    char * FullPositionerName,
    double * ScanAccelerationLimit
)
```

Input parameters

| | | |
|-----------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ScanAccelerationLimit | double | Limit of position compare scan acceleration (units/s ²). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.322 PositionerPositionCompareSet

Name

PositionerPositionCompareSet – Sets the position compare parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type: (-8)
- Checks input parameter values: (-17)
 - $\text{MinimumPosition} < \text{MaximumPosition}$.
 - $\text{MinimumPosition} \geq \text{MinimumTargetPosition}$.
 - $\text{MaximumPosition} \leq \text{MaximumTargetPosition}$.
 - $0 \leq \text{PositionStep} \leq (\text{MaximumPosition} - \text{MinimumPosition})$
- Checks position compare state (must be disabled): (-22)
- Checks the position encoder (“AquadB” or “AnalogInterpolated”): (-24)

Description

This function sets the parameters for the position compare output trigger of the PCO connector on the XPS controller cards.

These parameters are used only when the position compare mode is enabled. For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

NOTE

This function can be used only with a position encoder. If no position encoder then (-24) error is returned.

In the PositionCompare mode (activated with PositionerPositionCompareEnable() function), during the move (relative or absolute) and inside the zone set by PositionerPositionCompareSet(), if the current following error exceeds the Warning Following Error value, the PositionCompareWarningFollowingErrorFlag is activated and the move returns an error (-120: Warning following error during move with position compare enabled). To reset the PositionCompareWarningFollowingErrorFlag, send the PositionerPositionCompareDisable() function. The WarningFollowingError is set to FatalFollowingError (defined in stages.ini file) by default, but it can be modified by PositionerWarningErrorSet().

In the PositionCompare mode (activated with PositionerPositionCompareEnable() function), during the move (relative or absolute) and inside the zone set by PositionerPositionCompareSet(), the CorrectorOutput is limited to MaximumAcceleration (defined in stages.ini).

Prototype

```
int PositionerPositionCompareSet(
    int SocketID,
    char * FullPositionerName,
    double MinimumPosition,
    double MaximumPosition,
    double PositionStep,
    bool EnableState
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| FullPositionerName | char * | Positioner name. |
| MinimumPosition | double | Minimum position (units). |
| MaximumPosition | double | Maximum position (units). |
| PositionStep | double | Position step (units). |
| EnableState | bool | Position compare state (true = enabled or false = disabled). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.323 PositionerPreCorrectorExcitationSignalGet [Extended]

Name

PositionerPreCorrectorExcitationSignalGet – Gets the currently used parameters of the pre-corrector excitation signal feature.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Invalid positioner name: (-18)

Description

This function gets the last configured pre-corrector excitation signal parameters.

Prototype

```
int PositionerPreCorrectorExcitationSignalGet(
    int SocketID,
    char * FullPositionerName
    double * Frequency,
    double * Amplitude,
    double * Time
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------|----------|-----------------------------|
| Frequency | double * | Frequency (Hz). |
| Amplitude | double * | Amplitude (position units). |
| Time | double * | During time (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.324 **PositionerPreCorrectorExcitationSignalSet** **[Extended]**

Name

PositionerPreCorrectorExcitationSignalSet – Configures and activate the signal of pre-corrector excitation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Is secondary positioner or has a secondary positioner: (-8)
- Checks frequency (must ≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$): (-17)
- Checks amplitude (*must > 0*): (-17)
- Checks excitation time (*must $\geq 4 * CorrectorISRPeriod$*): (-17)
- Invalid positioner name: (-18)
- Checks group status (*must be READY*): (-22)
- Validates control loop type: (-24)
- Checks position ($CurrSetpointPos \leq UserMaximumTargetPosition$ and $CurrSetpointPos - 2Amplitude \geq UserMinimumTargetPosition$): (-35)
- Checks maximum velocity ($Amplitude * \omega < MaximumVelocity$): (-68)
- Checks maximum acceleration ($Amplitude * \omega^2 < MaximumAcceleration$): (-69)
- Error if XY secondary positioner and in Option 0: (-222)

Description

The pre-corrector excitation signal functionality generates sine-wave signals (*ExcitationPosition*, *ExcitationVelocity*, *ExcitationAcceleration*, *ExcitationJerk*) inserted in the position control loop (*in closed or open loop configuration*) to excite the system. In measuring the output signal (*eg. encoder position, velocity or acceleration*) of the excited system, we can determine some system characteristics, like the system transfer function.

The exact forms of generated pre-corrector excitation signals are as follows:

$$\omega = 2\pi F \text{ (F: excitation frequency)}$$

$$\text{ExcitationPosition} = A * \cos(\omega t) - A \text{ (A: excitation amplitude, t: current time)}$$

$$\text{ExcitationVelocity} = (-A\omega) * \sin(\omega t)$$

$$\text{ExcitationAcceleration} = (-A\omega^2) * \cos(\omega t)$$

$$\text{ExcitationJerk} = (A\omega^3) * \sin(\omega t)$$

The pre-corrector excitation signal functionality is only available with the stages controlled in acceleration (acceleration control, ex: brushless / linear motors), velocity (velocity control) or in voltage (voltage control). It does not exist with stages controlled in position (ex: stepper motors).

The excitation signal function **PositionerPreCorrectorExcitationSignalSet** can be executed only when the positioner is in “READY” state. When the excitation-signal process is in progression, the positioner is in the “ExcitationSignal” state. At the end of the process, the positioner returns to the “READY” state (see group state diagram).

The **PositionerPreCorrectorExcitationSignalSet** function sends a sine form excitation signal to entry of position control loop during a time. This function is allowed for “PIDFFAcceleration”, “PIDFFVelocity” or “PIDDualFFVoltage” control loops. The

parameters to configure include: *frequency* (Hz, double), *amplitude* (position unit, double) and *during time* (seconds, double).

The function effective parameters are: *Frequency* (≥ 0.1 and $\leq 0.5/CorrectorISRPeriod$), *Amplitude* (> 0), *Time* ($\geq 4 * CorrectorISRPeriod$).

NOTE

If during the excitation signal generation the stage position exceeds the user minimum or maximum target positions, the motor excitation command is stopped and an error is returned.

Prototype

```
int PositionerPreCorrectorExcitationSignalSet(
    int SocketID,
    char * FullPositionerName
    double Frequency,
    double Amplitude,
    double Time
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| FullPositionerName | char * | Positioner name. |
| Frequency | double | Frequency (Hz). |
| Amplitude | double | Amplitude (position units). |
| Time | double | During time (seconds). |

Output parameters

None.

Return (In addition to the results of "Input Tests Common to all XPS Functions")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -35: Position is outside of travel limits.
- -68: Velocity on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -112: Error of excitation signal generation initialization.
- -222: Action not allowed for secondary positioner that is in Option 0

7.2.1.325 PositionerRawEncoderPositionGet

Name

PositionerRawEncoderPositionGet – Gets the raw encoder position for a positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Invalid positioner name: (-18)

Description

This function returns the raw encoder position from a corrected position for a positioner.

Prototype

```
int PositionerRawEncoderPositionGet(
    int SocketID,
    char * FullPositionerName
    double UserEncoderPosition,
    double * RawEncoderPosition
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| UserEncoderPosition | double | User corrected encoder position. |

Output parameters

| | | |
|--------------------|----------|-----------------------|
| RawEncoderPosition | double * | Raw encoder position. |
|--------------------|----------|-----------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.326 PositionerSGammaExactVelocityAdjustedDisplacementGet

Name

PositionerSGammaExactVelocityAdjustedDisplacementGet – Gets the adjusted displacement to get exact velocity.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the profiler type (must be “SGamma”): (-8)
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function returns the closest optimum displacement to obtain the most precise velocity during the displacement.

Prototype

```
int PositionerSGammaExactVelocityAdjustedDisplacementGet(
    int SocketID,
    char * FullPositionerName
    double DesiredDisplacement,
    double * AdjustedDisplacement
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| DesiredDisplacement | double | Desired displacement (units). |

Output parameters

| | | |
|----------------------|----------|-------------------------------|
| AdjustedDisplacement | double * | Ajusted displacement (units). |
|----------------------|----------|-------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.327 PositionerSGammaMoveResultGet

Name

PositionerSGammaMoveResultGet – Gets the motion information of the last Sgamma move.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function gets the motion results from the SGamma last move.

Prototype

```
int PositionerSGammaMoveResultGet (
    int SocketID,
    char * FullPositionerName
    double * TimeToAccelerate,
    double * RealAcceleration,
    double * DistanceToAccelerate,
    double * TimeAtConstantSpeed,
    double * RealVelocity,
    double * DistanceAtConstantSpeed,
    double * TotalTimeToMove,
    double * DistanceToDecelerate,
    double * ExecutedDisplacement,
    )
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------------------|----------|--|
| TimeToAccelerate | double * | Time to reach real acceleration (seconds). |
| RealAcceleration | double * | Maximum acceleration during last move (units/seconds ²). |
| DistanceToAccelerate | double * | Distance to reach real acceleration (units). |
| TimeAtConstantSpeed | double * | Time at real velocity (seconds). |
| RealVelocity | double * | Maximum velocity during last move (units/seconds). |
| DistanceAtConstantSpeed | double * | Distance at real velocity (seconds). |
| TotalTimeToMove | double * | Total time to execute last move (seconds). |
| DistanceToDecelerate | double * | Distance to decelerate (units). |
| ExecutedDisplacement | double * | Real displacement during last move (units). |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.328 PositionerSGammaParametersGet

Name

PositionerSGammaParametersGet – Gets the current motion values from the SGamma profiler.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the profiler type (must be “SGamma”): (-8)
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function gets the current SGamma profiler values that are used in displacements.

Prototype

```
int PositionerSGammaParametersGet(
    int SocketID,
    char * FullPositionerName
    double * Velocity,
    double * Acceleration,
    double * MinimumJerkTime,
    double * MaximumJerkTime
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| Velocity | double * | motion velocity (units/seconds). |
| Acceleration | double * | motion acceleration (units/seconds ²). |
| MinimumJerkTime | double * | Minimum jerk time (seconds). |
| MaximumJerkTime | double * | Maximum jerk time (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.329 PositionerSGammaParametersSet

Name

PositionerSGammaParametersSet – Sets new motion values for the SGamma profiler.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the profiler type (must be “SGamma”): (-8)
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks input parameter values: (-17)
 - $0 < \text{NewVelocity} \leq \text{MaximumVelocity}$.
 - $0 < \text{NewAcceleration} \leq \text{MaximumAcceleration}$.
 - $2 * \text{ISRProfileGeneratorPeriod} \leq \text{NewMinimumJerkTime}$ and $\leq \text{NewMaximumJerkTime}$.

Description

This function defines the new SGamma profiler values that will be used in future displacements.

Prototype

```
int PositionerSGammaParametersSet(
    int SocketID,
    char * FullPositionerName
    double Velocity,
    double Acceleration,
    double MinimumJerkTime,
    double MaximumJerkTime
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| Velocity | double | motion velocity (units/seconds). |
| Acceleration | double | motion acceleration (units/seconds ²). |
| MinimumJerkTime | double | Minimum jerk time (seconds). |
| MaximumJerkTime | double | Maximum jerk time (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.

7.2.1.330 PositionerSGammaPreviousMotionTimesGet

Name

PositionerSGammaPreviousMotionTimesGet – Gets the motion and the settling time.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the profiler type (must be “SGamma”): (-8)
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function returns the motion (setting) and settling times from the previous motion. The motion time represents the defined time to complete the previous displacement. The settling time represents the effective settling time for a motion done.

Description

This function gets the current SGamma profiler values that are used in displacements.

Prototype

```
int PositionerSGammaPreviousMotionTimesGet(
    int SocketID,
    char * FullPositionerName
    double * SettingTime,
    double * SettlingTime
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|--------------|----------|--------------------------|
| SettingTime | double * | Setting time (seconds). |
| SettlingTime | double * | Settling time (seconds). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.331 PositionerSGammaVelocityAndAccelerationSet

Name

PositionerSGammaVelocityAndAccelerationSet – Sets the SGamma profiler velocity and acceleration.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter values: (-17)
 - $0 < \text{NewVelocity} \leq \text{MaximumVelocity}$
 - $0 < \text{NewAcceleration} \leq \text{MaximumAcceleration}$

Description

This function sets the SGamma profiler velocity and acceleration that will be used for the future displacements.

Prototype

```
int PositionerSGammaVelocityAndAccelerationSet(
    int SocketID,
    double Velocity,
    double Accelation
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Velocity | double | motion velocity (units / seconds). |
| Acceleration | double | motion accelation (units / seconds ²). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.1.332 PositionerStageParameterGet

Name

PositionerStageParameterGet – Gets a stage parameter value from the stages.ini file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name and the parameter name: (-24)

Description

This function returns stage parameter values from the stages.ini file of a selected positioner.

The positioner name is the stage name. And the parameter name is read in the section under this stage name.

Prototype

```
int PositionerStageParameterGet(
    int SocketID,
    char * FullPositionerName
    char * ParameterName,
    char * ParameterValue
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ParameterName | char * | Parameter name. |

Output parameters

| | | |
|----------------|--------|------------------|
| ParameterValue | char * | Parameter value. |
|----------------|--------|------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -13: Wrong parameter type in the command string: char * expected.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.333 PositionerStageParameterSet

Name

PositionerStageParameterSet – Saves a stage parameter value into the stages.ini file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name and the parameter name: (-24)
- Checks the user rights (must be identified as administrator): (-107)

Description

This function saves a stage parameter value in the “stages.ini” file.

The positioner name sets the stage name and the parameter name is searched in the section of this stage name. Once the parameter is found, the parameter value is modified to the new value.

If file reading fails then (-61) error is returned

If file writing fails then (-60) error is returned

NOTE

To use this function, the user must login with administrator rights (“Login” function).

Prototype

```
int PositionerStageParameterSet(
    int SocketID,
    char * FullPositionerName
    char * ParameterName,
    char * ParameterValue
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| ParameterName | char * | Parameter name. |

Output parameters

| | | |
|----------------|--------|------------------|
| ParameterValue | char * | Parameter value. |
|----------------|--------|------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -24: Not available in this configuration (check hardware or configuration).
- -60: Error during file writing or file doesn't exist.
- -61: Error file corrupt or file doesn't exist.
- -107: This function requires to be logged in with Administrator rights.

7.2.1.334 PositionerTimeFlasherDisable

Name

PositionerTimeFlasherDisable – Disables the time flasher mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)

Description

This function disables the time flasher mode. The time flasher mode is a trigger output per axis that can be either configured to output distance spaced pulses or time spaced pulses. The output pulses are accessible from the PCO connector at the back of the XPS controller.

For a more thorough description of the position compare output, please refer to the XPS User's manual, section named Triggers/Position Compare Output.

Prototype

```
int PositionerTimeFlasherDisable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.335 PositionerTimeFlasherEnable

Name

PositionerTimeFlasherEnable – Enables the time flasher mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks the time flasher parameters (must be configured): (-22)

Description

This function enables the time flasher mode. The time flasher mode is a trigger output per axis that can be either configured to output distance spaced pulses or time spaced pulses. The output pulses are accessible from the PCO connector at the back of the XPS controller.

To use this function, the group must be in READY state else (-22) error is returned.

For a more thorough description of the position compare output, please refer to the XPS User's manual, section named Triggers/Position Compare Output.

Prototype

```
int PositionerTimeFlasherEnable(
    int SocketID,
    char * FullPositionerName
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.1.336 PositionerTimeFlasherGet

Name

PositionerTimeFlasherGet – Gets the time flasher parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks the time flasher parameters (must be configured): (-23)
- Checks the configured mode type (must be TimeFlasher): (-24)

Description

This function returns the parameters of the time flasher trigger. The time flasher mode is defined by:

a position window defined by a minimum position and a maximum position

a time period to set the time spaced pulses.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerTimeFlasherGet(
    int SocketID,
    char * FullPositionerName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * TimePeriod,
    bool * EnableState
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------|----------|--|
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| TimePeriod | double * | Time period (seconds). |
| EnableState | bool * | Enable time flasher state (true = enabled and false = disabled). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -23: Position compare not set.
- -24: Not available in this configuration (check hardware or configuration).

7.2.1.337 PositionerTimeFlasherSet

Name

PositionerTimeFlasherSet – Sets the time flasher parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks input parameter values: (-17)
 - $\text{MinimumPosition} < \text{MaximumPosition}$.
 - $\text{MinimumPosition} \geq \text{MinimumTravelLimit}$.
 - $\text{MaximumPosition} \leq \text{MaximumTravelLimit}$.
 - $0.0000004 \leq \text{TimePeriod} \leq 50.0$ (Max 2.5 MHz and Min 0.02 Hz)
- Checks the time flasher state (must be disabled): (-22)
- Checks the position encoder (must be used): (-24)
- Checks if the CIE board supports this function: (-115)

Description

This function configures the time flasher parameters. The time flasher output trigger uses the PCO connector on the XPS controller cards. The time flasher mode is defined by:

- a position window defined by a minimum position and a maximum position.
- a time period to set the time spaced pulses.

NOTES

This function is not available without a position encoder.

These parameters are used only when the time flasher mode is enabled. To enable the time flasher mode, use the “PositionerPositionCompareEnable” function.

For a more thorough description of the position compare output, please refer to the XPS Motion Tutorial section Triggers/Position Compare Output.

Prototype

```
int PositionerTimeFlasherSet(
    int SocketID,
    char * FullPositionerName,
    double MinimumPosition,
    double MaximumPosition,
    double TimePeriod,
    bool EnableState
)
```

Input parameters

| | | |
|--------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| MinimumPosition | double | Minimum position (units). |
| MaximumPosition | double | Maximum position (units). |
| TimePeriod | double | Time period (seconds). |
| EnableState | bool | Enable time flasher state (true = enabled and false = disabled). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -24: Not available in this configuration (check hardware or configuration).
- -115: Function is not supported by current hardware.

7.2.1.338 PositionerUserTravelLimitsGet

Name

PositionerUserTravelLimitsGet – Gets the user travel limits.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- If piezo driver, check if driver is not initialized: (-118)

Description

This function returns the user-defined travel limits for the selected positioner.

Prototype

```
int PositionerUserTravelLimitsGet(
    int SocketID,
    char * FullPositionerName,
    double * UserMinimumTarget,
    double * UserMaximumTarget
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-------------------|----------|------------------------------------|
| UserMinimumTarget | double * | User minimum travel limit (units). |
| UserMaximumTarget | double * | User maximum travel limit (units). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -118: Not allowed action driver not initialized.

7.2.1.339 PositionerUserTravelLimitsSet

Name

PositionerUserTravelLimitsSet – Sets the user travel limits.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner type (must not be a secondary positioner): (-8)
- Checks input parameter values: (-17)
 - $UserMinimumTargetPosition < UserMaximumTargetPosition$.
 - $MinimumTargetPosition \leq UserMinimumTargetPosition \leq MaximumTargetPosition$.
 - $MinimumTargetPosition \leq UserMaximumTargetPosition \leq MaximumTargetPosition$.
 - $UserMinimumTargetPosition \leq ProfilerPosition$.
 - $UserMaximumTargetPosition \geq ProfilerPosition$.
- If piezo driver, check if driver is not initialized: (-118)

Description

This function sets the new user travel limits of the selected positioner.

Prototype

```
int PositionerUserTravelLimitsSet(
    int SocketID,
    char * FullPositionerName,
    double UserMinimumTarget,
    double UserMaximumTarget
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| UserMinimumTarget | double | User minimum travel limit (units). |
| UserMaximumTarget | double | User maximum travel limit (units). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Wrong parameter type in the command string: double or double * expected.
- -118: Not allowed action driver not initialized.

7.2.1.340 PositionerWarningFollowingErrorGet [Extended]**Name**

PositionerWarningFollowingErrorGet – Gets the warning following error for a positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Invalid positioner name: (-18)

Description

This function gets the current value of the warning following error for a positioner.

Prototype

```
int PositionerWarningFollowingErrorGet(
    int SocketID,
    char * FullPositionerName,
    double * WarningFollowingError
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |

Output parameters

| | | |
|-----------------------|----------|----------------------------------|
| WarningFollowingError | double * | Warning following error (units). |
|-----------------------|----------|----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.

7.2.1.341 PositionerWarningFollowingErrorSet [Extended]**Name**

PositionerWarningFollowingErrorSet – Sets value of the warning following error for a positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Checks input parameter values: (-17)
 - $0 < \text{WarningFollowingError} \leq \text{FatalFollowingError}$.
- Invalid positioner name: (-18)

Description

This function sets a new value of the warning following error for a positioner.

Prototype

```
int PositionerWarningFollowingErrorSet(
    int SocketID,
    char * FullPositionerName,
    double WarningFollowingError
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| FullPositionerName | char * | Positioner name. |
| WarningFollowingError | double | Warning following error (units). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner name doesn't exist or unknown command.

7.2.1.342 Reboot

Name

Reboot – Reboots the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function reboots the controller.

NOTE

This function is not a cold reboot (power off/on), it is a warm (soft) reboot. If an FTP client is connected, this function is not allowed and (-22) error is returned.

Prototype

```
int Reboot(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -22: Not allowed action.

7.2.1.343 RestartApplication

Name

RestartApplication – Restarts the controller's application and avoids hardware reboot.

Input tests

- Refer to section 7.1: "Input Tests Common to all XPS Functions".

Description

This function allows restarting controller applications without hardware reboot.

Prototype

```
int RestartApplication(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of "Input Tests Common to all XPS Functions")

- 0: No error.
- -22: Not allowed action.

7.2.1.344 SingleAxisSlaveModeDisable

Name

SingleAxisSlaveModeDisable – Disables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxis group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "SLAVE": (-22)

Description

This function disables the master-slave mode. If a motion is in progress then it is aborted.

To use this function, the group state must be SLAVE (46). If it's not the case then (-22) is returned.

Prototype

```
int SingleAxisSlaveModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.345 SingleAxisSlaveModeEnable

Name

SingleAxisSlaveModeEnable – Enables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxis group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "READY": (-22)
- Checks the slave parameters (must be configured): (-41)

Description

This function enables the master-slave mode only if the slave group is in "READY" state. In this mode the slave must be defined as a SingleAxis group and the master can be a positioner from any group.

To use this function, the SingleAxis group must be in the READY state. If it's not the case then (-22) error is returned.

To use this function, the master positioner and the slave ratio must be configured using the “SingleAxisSlaveParametersSet” function. If it's not the case then (-41) error is returned.

Prototype

```
int SingleAxisSlaveModeEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -41: Slave-master mode not configured.

7.2.1.346 SingleAxisSlaveParametersGet

Name

SingleAxisSlaveParametersGet – Gets the slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxis group): (-8)
- Checks the positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)

Description

This function returns the slave parameters: the master positioner name and the master-slave ratio.

Prototype

```
int SingleAxisSlaveParametersGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double * Ratio
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |

Output parameters

| | | |
|----------------------|----------|--|
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double * | Gear ratio between the master and the slave. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.347 SingleAxisSlaveParametersSet

Name

SingleAxisSlaveParametersSet – Sets the slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the master group type: (-8)
- Checks the ratio value (Ratio >0): (-17)
- Checks the master positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)
- Checks the base velocity value (must be null): (-48)

Description

This function configures the slave parameters only for a SingleAxis group.

The slave is a copy of the master and a ratio can be applied: Slave = Ratio * Master.

The slave-master mode is activated only after the call of “SingleAxisSlaveModeEnable” function.

The master can be a positioner from any group, except from a spindle group. If the master group is a spindle then (-22) error is returned. The master positioner must be different from the slave positioner else (-8) error is returned.

NOTE

After an emergency stop, the master group and the slave group are in “NOTINIT” status. To restart a master-slave relation, the slave group(s) must be reinitialized before the master group.

Prototype

```
int SingleAxisSlaveParametersSet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double Ratio
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double | Gear ratio between the master and the slave. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -48: BaseVelocity must be null.

7.2.1.348 SingleAxisThetaClampDisable [Extended]

Name

SingleAxisThetaClampDisable – unclamps a SingleAxisTheta group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function unclamps the selected SingleAxisTheta group

The group must be in the CLAMPED state. If unclamping is successful, the group is unclamped and the group state becomes “READY”.

Prototype

```
int SingleAxisThetaClampDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.349 SingleAxisThetaClampEnable [Extended]

Name

SingleAxisThetaClampEnable – clamps a SingleAxisTheta group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function clamps the selected SingleAxisTheta group.

The group must be in the READY state. If clamping is successful, the group is clamped and the group state becomes “CLAMPED”.

Prototype

```
int SingleAxisThetaClampEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxis group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.350 SingleAxisThetaFeedforwardJerkParametersGet [Extended]

Name

SingleAxisThetaFeedforwardJerkParametersGet – Gets currently used “XY to Theta Feedforward Jerk” feature parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

The “XY to Theta Feedforward Jerk” feature allows to compensate the vibration effect on the Theta stage when the XY stage speeds up or speeds down.

This function gets the currently used correction gains of “XY to Theta Feedforward Jerk” feature.

This API is reserved to SingleAxisTheta group only.

Prototype

```
int SingleAxisThetaFeedforwardJerkParametersGet(
    int SocketID,
    char GroupName[250],
    double * KFeedforwardJerkX,
    double * KFeedforwardJerkY
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the <code>_ConnectToServer</code> function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|-------------------|----------|-------------------------------|
| KFeedforwardJerkX | double * | X axis feedforward Jerk gain. |
| KFeedforwardJerkY | double * | Y axis feedforward Jerk gain. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -7: Wrong format in the command string.
- -8: Wrong object type for this command.
- -9: Wrong number of parameters in the command.
- -14: Wrong parameter type in the command string: double or double * expected.
- -19: GroupName doesn't exist or unknown command.

7.2.1.351 SingleAxisThetaFeedforwardJerkParametersSet [Extended]

Name

SingleAxisThetaFeedforwardJerkParametersSet – Sets “XY to Theta Feedforward Jerk” feature parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

The “XY to Theta Feedforward Jerk” feature allows to compensate the vibration effect on the Theta stage when the XY stage speeds up or speeds down.

This function configures the correction gains of “XY to Theta Feedforward Jerk” feature for the SingleAxisTheta group.

This API is reserved to SingleAxisTheta group only.

Prototype

```
int SingleAxisThetaFeedforwardJerkParametersSet(
    int SocketID,
    char GroupName[250],
    double KFeedforwardJerkX,
    double KFeedforwardJerkY
)
```

Input parameters

| | | |
|-------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxisTheta Group name. |
| KFeedforwardJerkX | double | X axis feedforward Jerk gain. |
| KFeedforwardJerkY | double | Y axis feedforward Jerk gain. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -7: Wrong format in the command string.
- -8: Wrong object type for this command.
- -9: Wrong number of parameters in the command.
- -14: Wrong parameter type in the command string: double or double * expected.
- -19: GroupName doesn't exist or unknown command.

7.2.1.352 SingleAxisThetaFeedforwardParametersGet [Extended]

Name

SingleAxisThetaFeedforwardParametersGet – Gets currently used “XY to Theta Feedforward” feature parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

The “XY to Theta Feedforward” feature allows to compensate the vibration effect on the Theta stage when the XY stage speeds up or speeds down.

This function gets the currently used correction gains of “XY to Theta Feedforward” feature.

This API is reserved to SingleAxisTheta group only.

Prototype

```
Int SingleAxisThetaFeedforwardParametersGet(
    int SocketID,
    char PositionerName[250],
    double * KFeedforwardX,
    double * KFeedforwardY
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------|----------|--------------------------|
| KFeedforwardX | double * | X axis feedforward gain. |
| KFeedforwardY | double * | Y axis feedforward gain. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.353 SingleAxisThetaFeedforwardParametersSet [Extended]

Name

SingleAxisThetaFeedforwardParametersSet – Sets “XY to Theta Feedforward” feature parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

The “XY to Theta Feedforward” feature allows to compensate the vibration effect on the Theta stage when the XY stage speeds up or slows down.

This function configures the correction gains of “XY to Theta Feedforward” feature for the SingleAxisTheta group.

This API is reserved to SingleAxisTheta group only.

Prototype

```
Int SingleAxisThetaFeedforwardParametersSet(
    int SocketID,
    char * PositionerName,
    double KFeedforwardX,
    double KFeedforwardY
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| KFeedforwardX | double | X axis feedforward gain. |
| KFeedforwardY | double | Y axis feedforward gain. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.354 SingleAxisThetaSlaveModeDisable [Extended]

Name

SingleAxisThetaSlaveModeDisable – Disables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxisTheta group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "SLAVE": (-22)

Description

This function disables the master-slave mode. If a motion is in progress then it is aborted.

To use this function, the group state must be SLAVE (46). If it is not the case then the (-22) error is returned.

Prototype

```
int SingleAxisThetaSlaveModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxisTheta group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.355 SingleAxisThetaSlaveModeEnable [Extended]

Name

SingleAxisThetaSlaveModeEnable – Enables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxisTheta group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "READY": (-22)
- Checks the slave parameters (must be configured): (-41)

Description

This function enables the master-slave mode only if the slave group is in "READY" state. In this mode the slave must be defined as a SingleAxisTheta group and the master can be a positioner from any group.

To use this function, the SingleAxisTheta group must be in the READY state. If it's not the case then (-22) error is returned.

To use this function, the master positioner and the slave ratio must be configured using the “SingleAxisThetaSlaveParametersSet” function. If it's not the case then (-41) error is returned.

Prototype

```
int SingleAxisThetaSlaveModeEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxisTheta group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -41: Slave-master mode not configured.

7.2.1.356 SingleAxisThetaSlaveParametersGet [Extended]

Name

SingleAxisThetaSlaveParametersGet – Gets the slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a SingleAxisTheta group): (-8)
- Checks the positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)

Description

This function returns the slave parameters: the master positioner name and the master-slave ratio.

Prototype

```
int SingleAxisThetaSlaveParametersGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double * Ratio
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxisTheta group name. |

Output parameters

| | | |
|----------------------|----------|--|
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double * | Gear ratio between the master and the slave. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.357 SingleAxisThetaSlaveParametersSet [Extended]**Name**

SingleAxisThetaSlaveParametersSet – Sets the slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the master group type: (-8)
- Checks the ratio value (Ratio >0): (-17)
- Checks the master positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)
- Checks the base velocity value (must be null): (-48)

Description

This function configures the slave parameters only for a SingleAxisTheta group.

The slave is a copy of the master and a ratio can be applied: Slave = Ratio * Master.

The slave-master mode is activated only after the call of “SingleAxisThetaSlaveModeEnable” function.

The master can be a positioner from any group, except from a spindle group. If the master group is a spindle then (-22) error is returned. The master positioner must be different from the slave positioner else (-8) error is returned.

NOTE

After an emergency stop, the master group and the slave group are in “NOTINIT” status. To restart a master-slave relation, the slave group(s) must be reinitialized before the master group.

Prototype

```
int SingleAxisThetaSlaveParametersSet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double Ratio
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | SingleAxisTheta group name. |
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double | Gear ratio between the master and the slave. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -48: BaseVelocity must be null.

7.2.1.358 SpindleSlaveModeDisable

Name

SpindleSlaveModeDisable – Disables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a Spindle group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "SLAVE": (-22)

Description

This function disables the master-slave mode for a spindle group. If a motion is in progress then it is aborted.

To use this function, the group state must be SLAVE (46). If it's not the case then (-22) error is returned.

Prototype

```
int SpindleSlaveModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.359 SpindleSlaveModeEnable

Name

SpindleSlaveModeEnable – Enables the slave-master mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a Spindle group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "READY": (-22)
- Checks the slave parameters (must be configured): (-41)

Description

This function enables the master-slave mode only if the slave group is in ready mode. In this mode the slave must be defined as a Spindle group and the master can be a positioner from any group.

To use this function, the Spindle group must be in the READY state. If it's not the case then (-22) error is returned.

To use this function, the master positioner and the slave ratio must be configured with the “SpindleSlaveParametersSet” function. If it's not the case then (-41) error is returned.

Prototype

```
int SpindleSlaveModeEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -41: Slave-master mode not configured.

7.2.1.360 SpindleSlaveParametersGet

Name

SpindleSlaveParametersGet – Gets the spindle slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a Spindle group): (-8)
- Checks the positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)

Description

This function returns the slave parameters: the master positioner name and the master-slave ratio.

Prototype

```
int SpindleSlaveParametersGet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double * Ratio
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |

Output parameters

| | | |
|----------------------|----------|--|
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double * | Gear ratio between the master and the slave. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.361 SpindleSlaveParametersSet

Name

SpindleSlaveParametersSet – Sets the spindle slave parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the master group type: (-8)
- Checks the ratio value (Ratio >0): (-17)
- Checks the master positioner name: (-18)
- Checks the slave parameters (must be configured): (-22)
- Checks the base velocity value (must be null): (-48)

Description

This function configures the slave parameters only for a Spindle group.

The slave is a master copy and a ratio can be applied: $Slave = Ratio * Master$.

The slave-master mode is activated only after calling of “SingleAxisSlaveModeEnable” function.

The master can be a positioner from a spindle group only. If the master group is another group type then (-22) error is returned. The master positioner must be different from the slave positioner else (-8) error is returned.

NOTE

After an emergency stop, the master group and the slave group are in “NOTINIT” state. To restart a master-slave relation, the slave group(s) must be reinitialized before the master group.

Prototype

```
int SpindleSlaveParametersSet(
    int SocketID,
    char * GroupName,
    int NbPositioners,
    char * MasterPositionerName ,
    double * Ratio
)
```

Input parameters

| | | |
|----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Spindle group name. |
| MasterPositionerName | char * | Master positioner name from any group. |
| Ratio | double | Gear ratio between the master and the slave. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -48: BaseVelocity must be null.

7.2.1.362 TCLScriptExecute

Name

TCLScriptExecute – Executes a TCL script.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks TCL file name: (-36)
- Checks TCL interpreter (task loading): (-37)
- Checks task name: (-47)

Description

This function executes a TCL script. The TCL script file must be saved in the folder “.\Public\Scripts” of the XPS controller.

- *TaskName* is a user designation for the TCL script being executed. If two TCL scripts are executed at the same time with the same task name, The (-47) error is returned because having the same TaskName is not allowed.
- *InputArguments* represents the input arguments of the TCL script to be executed. The number of these input arguments is not limited but the string length is limited to 250 characters. The argument separator is a comma. To redirect tcl “puts” function to putty instead of screen, you must specified “ttyp<number>” as first argument. Then specify the arguments that are useful for your script.

WARNING : The TCL script name must not contains a space.

Prototype

```
int TCLScriptExecute(
    int SocketID,
    char * TCLFileName,
    char * TaskName,
    char * InputArguments
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TCLFileName | char * | File name contains the TCL script. |
| TaskName | char * | Task name. |
| InputArguments | char * | Input argument string (separator is a comma). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -36: Unknown TCL file.
- -37: TCL interpreter does not run.

- -47: Wrong TCL task name : each TCL task name must be different and doesn't contain any space or tabulation.

7.2.1.363 TCLScriptExecuteAndWait

Name

TCLScriptExecuteAndWait – Executes a TCL script and waits until the end of execution.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks TCL file name: (-36)
- Checks TCL interpreter (task loading): (-37)
- Checks task name: (-47)

Description

This function executes a TCL program. The “TCLScriptExecuteAndWait” function is different than the “TCLScriptExecute” function because it blocks the socket until the script terminates. The TCL script file must be saved in the folder “..\Public\Scripts” of the XPS controller. The file extension is “.tcl”.

- *TaskName* is a user designation for the TCL script in execution. If two TCL scripts are executed at the same time with the same task name, The (-47) error is returned because having the same TaskName is not allowed.
- *InputArguments* represents the input arguments of the TCL script to be executed. The number of these input arguments is not limited but the string length is limited to 250 characters. The argument separator is a comma.
- *OutputArguments* represents the output arguments of the TCL script to be executed. The number of these output arguments is not limited but the string length is limited to 250 characters. The argument separator is a comma.

WARNING : The TCL script name must not contains a space.

Prototype

```
int TCLScriptExecuteAndWait(
    int SocketID,
    char * TCLFileName,
    char * TaskName,
    char * InputArguments,
    char * OutputArguments
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TCLFileName | char * | File name contains the TCL script. |
| TaskName | char * | Task name. |
| InputArguments | char * | Input argument string (separator is a comma). |

Output parameters

| | | |
|-----------------|--------|--|
| OutputArguments | char * | Output argument string (separator is a comma). |
|-----------------|--------|--|

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -36: Unknown TCL file.
- -37: TCL interpreter doesn't run.
- -47: Wrong TCL task name : each TCL task name must be different and doesn't contain any space or tabulation.

7.2.1.364 TCLScriptExecuteWithPriority

Name

TCLScriptExecuteWithPriority – Executes a TCL script with TCL task given priority.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Priority mnemonic incorrect: (-17)
- Checks TCL file name: (-36)
- Checks TCL interpreter (task loading): (-37)
- Checks task name: (-47)

Description

This function executes a TCL script with a TCL task and a user-defined priority level. The TCL script file must be saved in the folder “.\Public\Scripts” of the XPS controller.

- *TaskName* is a user designation for the TCL script in execution. If two TCL scripts are executed at the same time with the same task name, The (-47) error is returned because having the same TaskName is not allowed.
- *InputArguments* represents the input arguments to the TCL script to be executed. The number of these input arguments is not limited but the string length is limited to 250 characters. The argument separator is a comma.
- *PriorityLevel* has three possible values: “HIGH”, “MEDIUM” and “LOW”, with the order being HIGH >MEDIUM >LOW.

WARNING : The TCL script name must not contains a space.

Prototype

```
int TCLScriptExecuteWithPriority(
    int SocketID,
    char * TCLFileName,
    char * TaskName,
    char * Priority,
    char * InputArguments
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TCLFileName | char * | File name contains the TCL script. |
| TaskName | char * | Task name. |
| Priority | char * | TCL task priority (HIGH, MEDIUM or LOW). |
| InputArguments | char * | Input argument string (separator is a comma). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -17: Parameter out of range or incorrect.
- -36: Unknown TCL file.
- -37: TCL interpreter doesn't run.
- -47: Wrong TCL task name : each TCL task name must be different and doesn't contain any space or tabulation.

7.2.1.365 TCLScriptKill

Name

TCLScriptKill – Kills a TCL script.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks semaphore to use the TCL interpreter: (-37)
- Checks TCL interpreter (task loading) and task name: (-38)

Description

This function kills a running TCL script selected using its task name. The task name is a user designation for the TCL script in execution.

NOTE

For the boot script, the task name is “BootScript”.

Prototype

```
int TCLScriptKill(
    int SocketID,
    char * TaskName
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TaskName | char * | Task name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -37: TCL interpreter doesn't run.
- -38: TCL script can not be killed: Wrong task name or task does not run.
- -47: Wrong TCL task name : each TCL task name must be different and doesn't contain any space or tabulation.

7.2.1.366 TCLScriptKillAll

Name

TCLScriptKillAll – Kills all running TCL scripts.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks TCL interpreter (task loading) and task name: (-38)

Description

This function kills all running TCL scripts.

Prototype

```
int TCLScriptKillAll(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|--|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -38: TCL script can not be killed: Wrong task name or task does not run.

7.2.1.367 TCLScriptRunningListGet

Name

TCLScriptRunningListGet– Gets the list of all TCL processes in progress.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the task name’s list of all TCL scripts in progression.

Prototype

```
int TCLScriptRunningListGet(  
    int SocketID,  
    char * TCLScriptsList  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|----------------|--------|-------------------------------------|
| TCLScriptsList | char * | List of TCL scripts in progression. |
|----------------|--------|-------------------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.368 TCP_CloseSocket

Name

TCP_CloseSocket – Closes a socket.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks socket identifier (Max = 100).
- Socket must be used.

Description

Closed the opened TCP/IP communication defined by the given socket identifier. If the socket is undefined or is not used, then nothing happens.

Prototype

```
void TCP_CloseSocket(  
    int SocketID  
)
```

Input parameters

SocketID int Socket identifier used in each function.

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

None.

7.2.1.369 TCP_ConnectToServer

Name

TCP_ConnectToServer – Sets TCP/IP communication and opens a socket.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of used sockets (Max = 100): if no free socket then the SocketID is set to -1.

Description

Configures the TCP/IP communication and opens a socket to connect TCP server.

This function returns a socket identifier to use for each function call. The socket identifier is defined between 0 to 99. If the TCP/IP connection failed then the “SocketID” value is -1.

NOTE

OpenConnection function is used when users are in local mode, it only needs the timeout and socket number to open the connection with the XPS controller. TCP_ConnectToServer function needs more information like the port number and the IP address. This function is called with the DLL.

Prototype

```
int TCP_ConnectToServer(
    char * IP_Address,
    int IP_Port,
    double TimeOut
)
```

Input parameters

| | | |
|------------|--------|--|
| IP_Address | char * | TCP IP address: 195.168.33.xxx or another. |
| IP_Port | int | TCP IP port: 5001 for XPS controller. |
| TimeOut | double | Timeout in seconds used for each. |

function execution.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier used in each function. |
|----------|-----|--|

7.2.1.370 TCP_GetError

Name

TCP_GetError – Gets the last error about socket.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks socket identifier (Max = 100).
- Socket must be used.

Description

Gets the last error from the socket defined by the given socket identifier. If the socket is undefined or is not used, the error description is blank.

Prototype

```
int TCP_GetError(  
    int SocketID,  
    char * ErrorString  
)
```

Input parameters

SocketID int Socket identifier used in each function.

Output parameters

ErrorString char * Last error description.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

None.

7.2.1.371 TCP_SetTimeout

Name

TCP_SetTimeout – Sets the timeout for TCP/IP communication.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks number of used sockets (Maximum number = 100).
- Socket must be used.
- Timeout value must be positive.

Description

Sets a new timeout value in seconds for the opened TCP/IP communication defined by a socket identifier.

If the timeout is less than 0.001, the timeout value defaults to 0.001.

If the socket is undefined or is not used then nothing happens.

Prototype

```
int TCP_SetTimeout(  
    int SocketID,  
    double Timeout  
)
```

Input parameters

| | | |
|----------|--------|--|
| SocketID | int | Socket identifier used in each function. |
| Timeout | double | Timeout in seconds used for each function execution. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

None.

7.2.1.372 TimerGet

Name

TimerGet – Gets the number of frequency ticks for the selected timer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the number of frequency ticks configured for the selected timer.

The “TimerName” can be defined as:

- Timer1
- Timer2
- Timer3
- Timer4
- Timer5

The “FrequencyTicks” defines the frequency of the timer:

One frequency tick represents a corrector period = $>0.125 \text{ ms} = >8 \text{ khz}$

N frequency ticks represents N corrector periods = $>N * 0.125 \text{ ms} = > \frac{8}{N} \text{ kHz}$

NOTE

“FrequencyTicks” = 0 means that the timer is disabled.

Prototype

```
int TimerGet(
    int SocketID,
    char * TimerName,
    int * FrequencyTicks
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TimerName | char * | Name of timer. |

Output parameters

| | | |
|----------------|-------|----------------------------|
| FrequencyTicks | int * | Number of frequency ticks. |
|----------------|-------|----------------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.373 TimerSet

Name

TimerSet – Sets the number of frequency ticks for the selected timer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function sets the number of frequency ticks for the selected timer to activate it.

The “TimerName” can be defined as:

- Timer1
- Timer2
- Timer3
- Timer4
- Timer5

The “FrequencyTicks” allows to defined the frequency of the timer:

One frequency tick represents a corrector period = >0.125 ms = >8 khz

N frequency ticks represents N corrector periods = >N * 0.125 ms = > $\frac{8}{N}$ kHz

NOTE

“FrequencyTicks” = 0 means that the timer is disabled.

Prototype

```
int TimerSet(
    int SocketID,
    char * TimerName,
    int FrequencyTicks
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| TimerName | char * | Name of timer. |
| FrequencyTicks | int | Number of frequency ticks. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.1.374 **TZEncoderCouplingMatrixGet [Extended]**

Name

TZEncoderCouplingMatrixGet – Gets TZ encoder coupling matrix parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function gets the parameters of encoder coupling matrix for the TZ group.

TZ encoder coupling matrix:

```

          [ Param1   Param2   Param3 ]
          [ Param4   Param5   Param6 ]
          [ Param7   Param8   Param9 ]

```

This API is reserved to TZ group only.

Prototype

```

int TZEncoderCouplingMatrixGet(
    int SocketID,
    char GroupName[250],
    double * Param1,
    double * Param2,
    double * Param3,
    double * Param4,
    double * Param5,
    double * Param6,
    double * Param7,
    double * Param8,
    double * Param9
)

```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------|----------|--------------------------------------|
| Param1 | double * | Encoder coupling matrix coefficient. |
| Param2 | double * | Encoder coupling matrix coefficient. |
| Param3 | double * | Encoder coupling matrix coefficient. |
| Param4 | double * | Encoder coupling matrix coefficient. |
| Param5 | double * | Encoder coupling matrix coefficient. |
| Param6 | double * | Encoder coupling matrix coefficient. |
| Param7 | double * | Encoder coupling matrix coefficient. |
| Param8 | double * | Encoder coupling matrix coefficient. |
| Param9 | double * | Encoder coupling matrix coefficient. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -19: GroupName doesn't exist or unknown command.

7.2.1.375 TZEncoderCouplingMatrixSet [Extended]

Name

TZEncoderCouplingMatrixSet – Sets TZ encoder coupling matrix parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function configures the parameters of encoder coupling matrix for the TZ group.

The values are set in the decoupling matrix in the following order:

```

[ Param1   Param2   Param3 ]
[ Param4   Param5   Param6 ]
[ Param7   Param8   Param9 ]

```

This API is reserved to TZ group only.

Prototype

```

int TZEncoderCouplingMatrixSet(
    int SocketID,
    char GroupName[250],
    double Param1,
    double Param2,
    double Param3,
    double Param4,
    double Param5,
    double Param6,
    double Param7,
    double Param8,
    double Param9
)

```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| Param1 | double | Encoder coupling matrix coefficient. |
| Param2 | double | Encoder coupling matrix coefficient. |
| Param3 | double | Encoder coupling matrix coefficient. |
| Param4 | double | Encoder coupling matrix coefficient. |
| Param5 | double | Encoder coupling matrix coefficient. |
| Param6 | double | Encoder coupling matrix coefficient. |
| Param7 | double | Encoder coupling matrix coefficient. |
| Param8 | double | Encoder coupling matrix coefficient. |
| Param9 | double | Encoder coupling matrix coefficient. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.376 TZEncoderCouplingModeGet [Extended]

Name

TZEncoderCouplingModeGet – Gets TZ encoder coupling mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function gets the current state of encoder coupling mode (1=Enabled, 0=Disabled).
This API is reserved to TZ group only.

Prototype

```
int TZEncoderCouplingModeGet(
    int SocketID,
    char GroupName[250],
    int * Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|------|-------|------------------------|
| Mode | int * | Encoder coupling mode. |
|------|-------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.377 TZEncoderCouplingModeSet [Extended]

Name

TZEncoderCouplingModeSet – Sets TZ encoder coupling mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function configures the mode of encoder coupling.

The values for Mode to set are : 1 (Enabled) or 0 (Disabled).

This API is reserved to TZ group only.

Prototype

```
int TZEncoderCouplingModeSet(
    int SocketID,
    char GroupName[250],
    int Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| Mode | int | Encoder coupling mode. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.378 TZFocusModeDisable [Extended]

Name

TZFocusModeDisable – Disables the TZ group from out of the FOCUS state.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "READY": (-22)

Description

This function disables the FOCUS mode of a TZ group. If it executes the group quits FOCUS state and goes into READY state.

To use this function, The group must be in a FOCUS state. If not then (-22) error is returned.

Prototype

```
int TZFocusModeDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.379 TZFocusModeEnable [Extended]

Name

TZFocusModeEnable – Enables the TZ group to go in FOCUS state.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group state must be "READY": (-22)

Description

This function enables the focus mode for the TZ group.

To use this function, The TZ group must be in READY state. If it's not then (-22) error is returned.

Prototype

```
int TZFocusModeEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.380 TZMappingModeGet [Extended]

Name

TZMappingModeGet – Gets TZ mapping mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the group name: (-19)

Description

This function gets the current state of TZ mapping mode (1=Enabled, 0=Disabled).

This API is reserved to TZ group only.

Prototype

```
int TZMappingModeGet(
    int SocketID,
    char * GroupName,
    int * Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |

Output parameters

| | | |
|------|-------|------------------------|
| Mode | int * | TZ mapping mode state. |
|------|-------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.381 TZMappingModeSet [Extended]

Name

TZMappingModeSet – Sets TZ mapping mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the group name: (-19)
- Checks if TZMapping feature is enabled in *system.ini*: (-121)
- Group state must be "NOTINIT": (-140)

Description

This function configures the mode of TZ mapping.

The values for Mode to set : 1 (Enabled) or 0 (Disabled).

This API is reserved to TZ group only.

Prototype

```
int TZMappingModeSet(
    int SocketID,
    char * GroupName,
    int Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |
| Mode | int | TZ mapping mode. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.
- -121: Function is not allowed due to configuration disabled.
- -140: Function is only allowed in NOTINIT state.

7.2.1.382 TZMotorDecouplingMatrixGet [Extended]

Name

TZMotorDecouplingMatrixGet – Gets TZ motor decoupling matrix parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function gets the parameters of motor decoupling matrix for the TZ group.

TZ motor decoupling matrix:

```
[ Param1 Param2   Param3 ]
[ Param4 Param5   Param6 ]
[ Param7 Param8   Param9 ]
```

This API is reserved to TZ group only.

Prototype

```
int TZMotorDecouplingMatrixGet(
    int SocketID,
    char GroupName[250],
    double * Param1,
    double * Param2,
    double * Param3,
    double * Param4,
    double * Param5,
    double * Param6,
    double * Param7,
    double * Param8,
    double * Param9
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------|----------|--------------------------------------|
| Param1 | double * | Motor decoupling matrix coefficient. |
| Param2 | double * | Motor decoupling matrix coefficient. |
| Param3 | double * | Motor decoupling matrix coefficient. |
| Param4 | double * | Motor decoupling matrix coefficient. |
| Param5 | double * | Motor decoupling matrix coefficient. |
| Param6 | double * | Motor decoupling matrix coefficient. |
| Param7 | double * | Motor decoupling matrix coefficient. |
| Param8 | double * | Motor decoupling matrix coefficient. |
| Param9 | double * | Motor decoupling matrix coefficient. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -19: GroupName doesn't exist or unknown command.

7.2.1.383 TZMotorDecouplingMatrixSet [Extended]

Name

TZMotorDecouplingMatrixSet – Sets TZ motor decoupling matrix parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function configures the parameters of motor decoupling matrix for the TZ group.

The values are set in the decoupling matrix in the following order:

[Param1 Param2 Param3]

[Param4 Param5 Param6]

[Param7 Param8 Param9]

This API is reserved to TZ group only.

Prototype

```
int TZMotorDecouplingMatrixSet(
    int SocketID,
    char GroupName[250],
    double Param1,
    double Param2,
    double Param3,
    double Param4,
    double Param5,
    double Param6,
    double Param7,
    double Param8,
    double Param9
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| Param1 | double | Motor decoupling matrix coefficient. |
| Param2 | double | Motor decoupling matrix coefficient. |
| Param3 | double | Motor decoupling matrix coefficient. |
| Param4 | double | Motor decoupling matrix coefficient. |
| Param5 | double | Motor decoupling matrix coefficient. |
| Param6 | double | Motor decoupling matrix coefficient. |
| Param7 | double | Motor decoupling matrix coefficient. |
| Param8 | double | Motor decoupling matrix coefficient. |
| Param9 | double | Motor decoupling matrix coefficient. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.384 TZMotorDecouplingModeGet [Extended]

Name

TZMotorDecouplingModeGet – Gets TZ motor decoupling mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function gets the current state of motor decoupling mode (1=Enabled, 0=Disabled).
This API is reserved to TZ group only.

Prototype

```
int TZMotorDecouplingModeGet(
    int SocketID,
    char GroupName[250],
    int * Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|------|-------|------------------------|
| Mode | int * | Motor decoupling mode. |
|------|-------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.385 TZMotorDecouplingModeSet [Extended]

Name

TZMotorDecouplingModeSet – Sets TZ motor decoupling mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group name: (-19)

Description

This function configures the mode of motor decoupling.

The values for Mode to set are : 1 (Enabled) or 0 (Disabled).

This API is reserved to TZ group only.

Prototype

```
int TZMotorDecouplingModeSet(
    int SocketID,
    char GroupName[250],
    int Mode
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| Mode | int | Motor decoupling mode. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.386 TZPTExecution [Extended]

Name

TZPTExecution – Executes a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a TZ group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)

Description

This function executes a PT (Position Time) trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “TZPTVerification” and “TZPTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTE

In case of an (-33) error, an (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

This function can be used only with the XPS-Q Precision Platform controller.

Prototype

```
int TZPTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```


Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.387 TZPTLoadToMemory [Extended]

Name

TZPTLoadToMemory – Loads some lines of PT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTE

All of the PT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PT trajectory in RAM as it does from a disk.

Example:

```
TZPTLoadToMemory(socketId,myGroup,"dT1,dX11,dX12,dX13#...dTn,dXn1,dXn2,dXn3#")
```

```
TZPTVerification (socketId,myGroup,FromMemory)
```

```
TZPTExecution(socketId,myGroup,FromMemory,1).
```

Prototype

```
int TZPTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.388 TZPTParametersGet [Extended]

Name

TZPTParametersGet – Gets PT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PT): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the PT trajectory parameters (trajectory name and current executing element number) of the current PT trajectory.

Prototype

```
int TZPTParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.389 TZPTPulseOutputGet [Extended]

Name

TZPTPulseOutputGet – Gets the configuration of pulse generation of a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the last configuration of pulse generation of a PT trajectory, that was previously set by *TZPTPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

```
TZPTPulseOutputSet(MyGroup, 3, 5, 0.01)
```

```
TZPTPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is error return, means OK)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int TZPTPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.390 TZPTPulseOutputSet [Extended]

Name

TZPTPulseOutputSet – Sets the configuration of pulse generation of a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function configures and activates the pulse generation of a PT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PT trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PT trajectory. The pulses are generated between the first and the last trajectory element. The minimum possible time interval is CorrectorISRPeriod value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

Example:

TZPTPulseOutputSet(Group1, 3, 5, 0.01)

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int TZPTPulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.391 TZPTResetInMemory [Extended]

Name

TZPTResetInMemory – Deletes the content of the PT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes the PT trajectory buffer in the controller memory, that was previously loaded with the “TZPTLoadToMemory” function.

Prototype

```
int TZPTResetInMemory(
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.392 TZPTVerification [Extended]

Name

TZPTVerification – Checks a PT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (Minimum Velocity \leq Velocity \leq Maximum Velocity): (-68)
- Checks acceleration (Minimum acc. \leq acceleration \leq Maximum acc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of a PT trajectory. The results of the verification can be got with the “TZPTVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a PT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTE

Because of the PT trajectory algorithm for elements end velocity calculation, a correct PT trajectory file must have at least two lines with zero displacements at the trajectory end. Otherwise, the “TZPTVerification” function returns the (-70) error.

The “TZPTVerification” function is independent from the “TZPTExecution” function, but it is highly recommended to execute this function before executing a PT trajectory.

Prototype

int TZPTVerification(

```

int SocketID,
char GroupName[250],
char FileName[250]
)

```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Acceleration on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.393 TZPTVerificationResultGet [Extended]**Name**

TZPTVerificationResultGet – Gets the results of the “TZPTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last TZ PTVerification (must be done): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the results of the previous “TZPTVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int TZPTVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.394 TZPVTExecution [Extended]

Name

TZPVTExecution – Executes a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a TZ group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)

Description

This function executes a PVT (Position Velocity Time) trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “TZPVTVerification” and “TZPVTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTES

In case of (-33) error, (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int TZPVTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.395 TZPVTLoadToMemory [Extended]

Name

TZPVTLoadToMemory – Load some lines of PVT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PVT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PVT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTES

All of the PVT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PVT trajectory in RAM as it does from a disk.

Example:

TZPVTLoadToMemory(socketId,myGroup,”dT1,dX11,Vout11,dX12,Vout12,dX13,Vout13#...dTn,dXn1,Voutn1,dXn2,Voutn2,dXn3,Voutn3#”)

TZPVTVerification (socketId,myGroup,FromMemory)

TZPVTExecution(socketId,myGroup,FromMemory,1).

Prototype

```
int TZPVTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.396 TZPVTParametersGet [Extended]

Name

TZPVTParametersGet – Gets PVT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PVT): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the PVT trajectory parameters (trajectory name and current executing element number) of the current PVT trajectory.

Prototype

```
int TZPVTParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.397 TZPVPulseOutputGet [Extended]

Name

TZPVPulseOutputGet – Gets the configuration of pulse generation of a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the last configuration of pulse generation of a PVT trajectory, that was previously set by *TZPVPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

TZPVPulseOutputSet(MyGroup, 3, 5, 0.01)

TZPVPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is error return, means OK)

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int TZPVPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.398 TZPVPulseOutputSet [Extended]

Name

TZPVPulseOutputSet – Sets the configuration of pulse generation of a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function configures and activates the pulse generation of a PVT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PVT trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PVT trajectory. The pulses are generated between the first and the last trajectory element. The minimum possible time interval is CorrectorISRPeriod value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual, Appendix / General I/O Description.

Example:

```
TZPVPulseOutputSet(Group1, 3, 5, 0.01)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int TZPVPulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.399 TZPVTRResetInMemory [Extended]

Name

TZPVTRResetInMemory – Deletes the content of the PVT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes the PVT trajectory buffer in the controller memory, that was previously loaded with the “TZPVTLoadToMemory” function.

Prototype

```
int TZPVTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.400 TZPVTVerification [Extended]

Name

TZPVTVerification – Checks a PVT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a TZ group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (MinimumVelocity \leq Velocity \leq MaximumVelocity): (-68)
- Checks acceleration (MinimumAcc. \leq acceleration \leq MaximumAcc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of a PVT trajectory. The results of the verification can be got with the “TZPVTVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a PVT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTES

The “TZPVTVerification” function is independent from the “TZPVTExecution” function, but it is highly recommended to execute this function before executing a PVT trajectory.

This function can be used only with the XPS-Q Precision Platform controller.

Prototype

```
int TZPVTVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Acceleration on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.401 TZPVTVerificationResultGet [Extended]

Name

TZPVTVerificationResultGet – Gets the results of the “TZPVTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last TZ PVTVerification (must be done): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the results of the previous “TZPVTVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int TZPVTVerificationResultGet(
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.402 TZTrackingCutOffFrequencyGet [Extended]

Name

TZTrackingCutOffFrequencyGet – Gets tracking cut-off frequency of TZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the group (must not be a positioner): (-19)

Description

This function gets the tracking cut-off frequency of each positioner of TZ group.

Prototype

```
int TZTrackingCutOffFrequencyGet(
    int SocketID,
    char * GroupName,
    double * CutOffFrequency1,
    double * CutOffFrequency2,
    double * CutOffFrequency3
)
```

Input parameters

| | | |
|-----------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | TZ group name |

Output parameters

| | | |
|------------------|----------|-------------------------------------|
| CutOffFrequency1 | double * | Positioner 1 cut-off frequency (Hz) |
| CutOffFrequency2 | double * | Positioner 2 cut-off frequency (Hz) |
| CutOffFrequency3 | double * | Positioner 3 cut-off frequency (Hz) |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.403 TZTrackingCutOffFrequencySet [Extended]

Name

TZTrackingCutOffFrequencySet – Sets tracking cut-off frequency of TZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Value is out of range: (-17)
- Checks the group (must not be a positioner): (-19)

Description

This function sets the tracking cut-off frequency for each positioner of TZ group.

Prototype

```
int TZTrackingCutOffFrequencySet(
    int SocketID,
    char * GroupName,
    double CutOffFrequency1,
    double CutOffFrequency2,
    double CutOffFrequency3
)
```

Input parameters

| | | |
|------------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function |
| GroupName | char * | TZ group name |
| CutOffFrequency1 | double | Positioner 1 cut-off frequency (Hz) |
| CutOffFrequency2 | double | Positioner 2 cut-off frequency (Hz) |
| CutOffFrequency3 | double | Positioner 3 cut-off frequency (Hz) |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.

7.2.1.404 TZTrackingUserMaximumZZZTargetDifferenceGet [Extended]

Name

TZTrackingUserMaximumZZZTargetDifferenceGet – Gets tracking maximum ZZZ target difference of TZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Checks the group (must not be a positioner): (-19)

Description

This function gets the tracking maximum ZZZ target difference of TZ group.

Prototype

```
int TZTrackingUserMaximumZZZTargetDifferenceGet(
    int SocketID,
    char * GroupName,
    double * UserMaximumZZZTargetDifference
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |

Output parameters

| | | |
|--------------------------------|----------|---|
| UserMaximumZZZTargetDifference | double * | User maximum ZZZ target difference (units). |
|--------------------------------|----------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0 : No error.
- -8 : Wrong object type for this command.
- -19 : Group name doesn't exist or unknown command.

7.2.1.405 TZTrackingUserMaximumZZZTargetDifferenceSet [Extended]

Name

TZTrackingUserMaximumZZZTargetDifferenceSet – Sets tracking maximum ZZZ target difference for a TZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the group type (must be a TZ group): (-8)
- Value is out of range: (-17)
- Checks the group (must not be a positioner): (-19)

Description

This function sets the tracking maximum ZZZ target difference for a TZ group.

Prototype

```
int TZTrackingUserMaximumZZZTargetDifferenceSet(
    int SocketID,
    char * GroupName,
    double * UserMaximumZZZTargetDifference
)
```

Input parameters

| | | |
|--------------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | TZ group name. |
| UserMaximumZZZTargetDifference | double | User maximum ZZZ target difference (units). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.

7.2.1.406 XYCrossTalkCompensationMotorDecouplingGet [Extended]

Name

XYCrossTalkCompensationMotorDecouplingGet – Gets motor decoupling parameters of XY cross talk compensation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the cross talk compensation switch is disabled (*firmware.ref*): (-121).

Description

This function returns the motor decoupling parameters of XY cross talk compensation.

Prototype

```
int XYCrossTalkCompensationMotorDecouplingGet(
    int SocketID,
    char *GroupName,
    int *CrossTalkCompensationMode,
    double *YToX1FFAccRatio,
    double *YToX2FFAccRatio,
    double *X1ToYFFAccRatio,
    double *X2ToYFFAccRatio
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|---------------------------|----------|---|
| CrossTalkCompensationMode | int * | XY cross talk compensation mode (Enabled or Disabled) |
| YToX1FFAccRatio | double * | Current Y to X1 feed forward acceleration ratio |
| YToX2FFAccRatio | double * | Current Y to X2 feed forward acceleration ratio |
| X1ToYFFAccRatio | double * | Current X1 to Y feed forward acceleration ratio |
| X2ToYFFAccRatio | double * | Current X2 to Y feed forward acceleration ratio |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -121: Function is not allowed due to configuration disabled

7.2.1.407 XYCrossTalkCompensationMotorDecouplingSet [Extended]

Name

XYCrossTalkCompensationMotorDecouplingSet – Sets motor decoupling parameters of XY cross talk compensation.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the cross talk compensation switch is disabled (*firmware.ref*): (-121).
- Checks if the group is not in NOTINIT nor in DISABLE state: (-215).

Description

This function sets the motor decoupling parameters of XY cross talk compensation.

Prototype

```
int XYCrossTalkCompensationMotorDecouplingSet(
    int SocketID,
    char *GroupName,
    int CrossTalkCompensationMode,
    double YToX1FFAccRatio,
    double YToX2FFAccRatio,
    double X1ToYFFAccRatio,
    double X2ToYFFAccRatio
)
```

Input parameters

| | | |
|---------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| CrossTalkCompensationMode | int | XY cross talk compensation mode (Enabled or Disabled) |
| YToX1FFAccRatio | double | Current Y to X1 feed forward acceleration ratio |
| YToX2FFAccRatio | double | Current Y to X2 feed forward acceleration ratio |
| X1ToYFFAccRatio | double | Current X1 to Y feed forward acceleration ratio |
| X2ToYFFAccRatio | double | Current X2 to Y feed forward acceleration ratio |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -121: Function is not allowed due to configuration disabled
- -215: Not allowed action because group is not in NOTINIT nor in DISABLE state.

7.2.1.408 XYGroupPositionCorrectedProfilerGet

Name

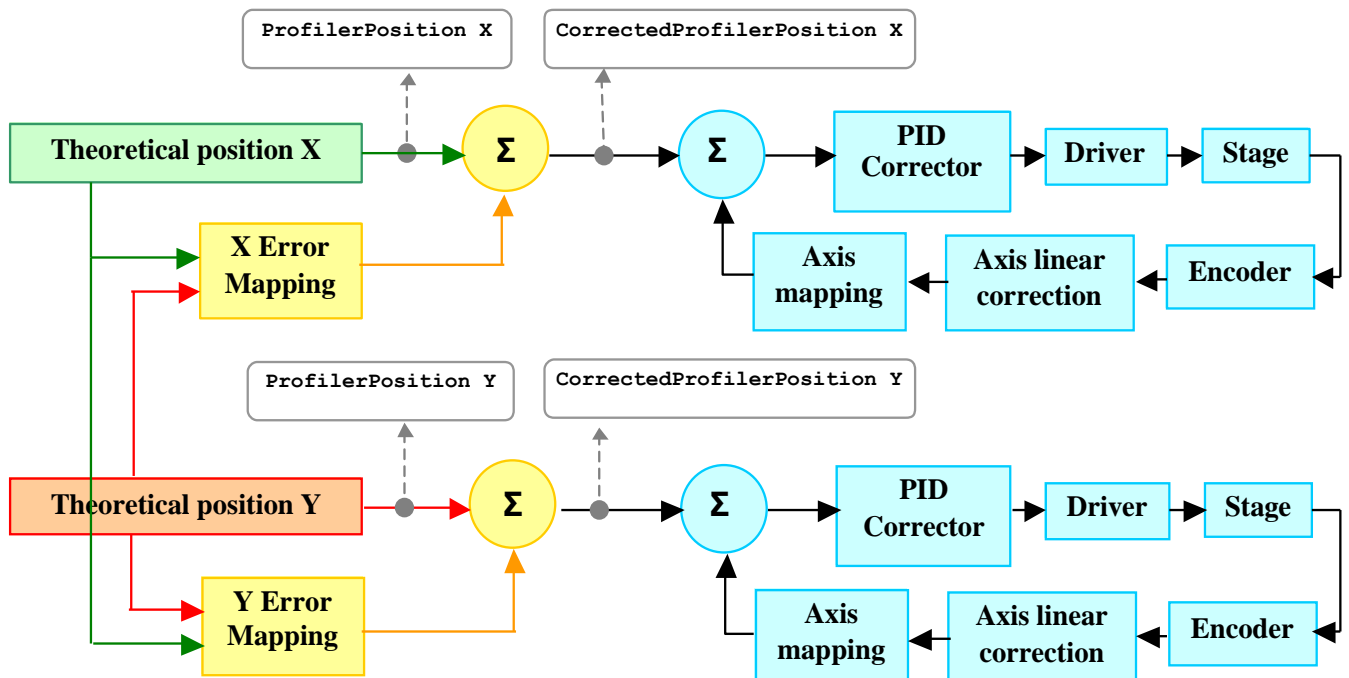
XYGroupPositionCorrectedProfilerGet – Gets the corrected profiler position for all positioners of an XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Validates group type (must be an XY group): (-18)
- Invalid group name: (-19)

Description

This function gets the corrected position which is the theoretical position recalculated with the XY mapping correction.



This function applies the XY mapping on the theoretical user-defined positions and returns the corrected positions.

Prototype

```
int XYGroupPositionCorrectedProfilerGet(
    int SocketID,
    char * GroupName,
    double PositionX,
    double PositionY,
    double * CorrectedPositionX,
    double * CorrectedPositionY
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| PositionX | double | Theoretical position X. |
| PositionY | double | Theoretical position Y. |

Output parameters

| | | |
|--------------------|----------|-----------------------------------|
| CorrectedPositionX | double * | Corrected theoretical position X. |
| CorrectedPositionY | double * | Corrected theoretical position Y. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.409 XYGroupPositionPCORawEncoderGet

Name

XYGroupPositionPCORawEncoderGet – Gets the PCO raw encoder positions for an XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Validates group type (must be an XY group): (-18)
- Invalid group name: (-19)

Description

This function returns the PCO raw encoder positions X and Y from the user specified positions X and Y.

Prototype

```
int XYGroupPositionPCORawEncoderGet(
    int SocketID,
    char * GroupName,
    double PositionX,
    double PositionY,
    double * PCORawPositionX,
    double * PCORawPositionY
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| PositionX | double | User corrected position X. |
| PositionY | double | User corrected position Y. |

Output parameters

| | | |
|-----------------|----------|---------------------|
| PCORawPositionX | double * | PCO Raw position X. |
| PCORawPositionY | double * | PCO Raw position Y. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.410 XYLineArcExecution

Name

XYLineArcExecution – Executes a LineArc trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a XY group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks input value (Velocity and Acceleration >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks the velocity (Velocity must \leq TrajectoryMaximumVelocity): (-68)
- Checks the acceleration (Acceleration must \leq TrajectoryMaximumAcceleration): (-69)
- Checks message queue: (-71)

Description

This function executes a LineArc trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “XYLineArcVerification” and “XYLineArcVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTE

In case of (-33) error, (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int XYLineArcExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    double Velocity,
    double Acceleration,
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| Velocity | double | Trajectory velocity (units/s). |
| Acceleration | double | Trajectory acceleration (units/s ²). |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -68: Velocity on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.411 XYLineArcParametersGet

Name

XYLineArcParametersGet – Gets LineArc trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be LineArc): (-22)

Description

This function returns the LineArc trajectory parameters (trajectory name, trajectory velocity, trajectory acceleration, current executing element number) of the current LineArc trajectory.

Prototype

```
int XYLineArcParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    double * Velocity,
    double * Acceleration,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|----------|--|
| FileName | char * | Currently executing trajectory file name. |
| Velocity | double * | Trajectory velocity (units/s). |
| Acceleration | double * | Trajectory acceleration (units/s ²). |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.412 XYLineArcPulseOutputGet

Name

XYLineArcPulseOutputGet – Gets the configuration of pulse generation of a LineArc.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)

Description

This function returns the last configuration of pulse generation of a LineArc trajectory, that was previously set by *XYLineArcPulseOutputSet()*.

The pulse output configuration is defined by a pulse start trajectory curved length, a pulse end trajectory curved length, and a pulse trajectory curved length interval.

Example:

```
XYLineArcPulseOutputSet(MyGroup, 10, 30, 0.01)
```

```
XYLineArcPulseOutputGet(MyGroup) => 0,10,30,0.01 (0 is error return, means OK)
```

One pulse will be generated every 10 µm on the LineArc trajectory between 10 mm and 30 mm trajectory curved lengths.

- Pulse start trajectory curved length = 10 mm
- Pulse end trajectory curved length = 30 mm
- Pulse trajectory curved length interval = 0.01 mm.

Prototype

```
int XYLineArcPulseOutputGet(
    int SocketID,
    char GroupName[250],
    double * StartLength,
    double * EndLength,
    double * PathLengthInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------------|----------|--------------------------------|
| StartLength | double * | Pulse start length (units). |
| EndLength | double * | Pulse end length (units). |
| PathLengthInterval | double * | Pulse length interval (units). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.413 XYLineArcPulseOutputSet

Name

XYLineArcPulseOutputSet – Sets the configuration of pulse generation of a LineArc trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Controller initialization failed: (-20)
- Checks the pulse generation must not be in progress: (-22)

Description

This function configures and activates the pulse generation of a LineArc trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected LineArc trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows to generate pulses at constant pulse trajectory curved length intervals on a LineArc trajectory. The pulses are generated between a pulse start trajectory curved length and a pulse end trajectory curved length. All lengths are calculated in an orthogonal XY coordination system.

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual, Appendix / General I/O Description.

Example:

XYLineArcPulseOutputSet(Group1, 10, 30, 0.01)

One pulse will be generated every 10 μ m on the LineArc trajectory between 10 mm and 30 mm trajectory curved lengths.

Pulse start trajectory curved length = 10 mm

Pulse end trajectory curved length = 30 mm

Pulse trajectory curved length interval = 0.01 mm

Prototype

```
int XYLineArcPulseOutputSet(
    int SocketID,
    char GroupName[250],
    double StartLength,
    double EndLength,
    double PathLengthInterval
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| StartLength | double | Pulse start length (units). |
| EndLength | double | Pulse end length (units). |
| PathLengthInterval | double | Pulse length interval (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.414 XYLineArcVerification

Name

XYLineArcVerification – Checks a LineArc trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory element ($Radius \geq 1e-14$): (-63)
- Checks trajectory element ($SweepAngle \geq 1e-14$): (-64)
- Checks trajectory element ($|XELEMENTDistance| \geq 1e-14$, $|YELEMENTDistance| \geq 1e-14$, $TangentOut \neq 1.797e308$): (-65)
- Checks trajectory (number of elements must > 0): (-66)
- Checks keys (“*FirstTangent*” and “*DiscontinuityAngle*”) in trajectory file: (-74)

Description

This function verifies the execution of a LineArc trajectory. The results of the verification can be got with the “XYLineArcVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a LineArc trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTE

The “XYLineArcVerification” function is independent from the “XYLineArcExecution” function, but it is highly recommended to execute this function before executing a LineArc trajectory.

Prototype

```
int XYLineArcVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -61: Error file corrupt or file doesn't exist.
- -63: Wrong XY trajectory element arc radius.
- -64: Wrong XY trajectory element sweep angle.
- -65: Trajectory line element discontinuity error or new element is too small.
- -66: Trajectory doesn't contain any element.
- -72: Error trajectory initialization.
- -74: Error file parameter key not found.

7.2.1.415 XYLineArcVerificationResultGet

Name

XYLineArcVerificationResultGet – Gets the results of the “XYLineArcVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last XY LineArcVerification (must be done): (-22)

Description

This function returns the results of the previous “XYLineArcVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int XYLineArcVerificationResultGet(
    SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.416 XYDualCorrectorMappingGet [Extended]

Name

XYDualCorrectorMappingGet – Read data of a line of an XY dual corrector mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Check DualCorrectorSwitch (firmware.ref, must be Enabled): (-121)
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 2 and \leq MappingColumnNumber+2): (-9)
- Checks mapping enable state (must be Enabled): (-121)

Description

Read data of a line of a XY dual corrector mapping matrix in the controller.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYDualCorrectorMappingGet(
    int SocketID,
    char * PositionerName,
    int* LineNumber,
    double* Value1,
    double* Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| LineNumber | int | Mapping line to read. |

Output parameters

| | | |
|--------|----------|--|
| Value1 | double * | Data of column #1 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| Value2 | double * | Data of column #2 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| ... | double * | One data per column of of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.

7.2.1.417 XYDualCorrectorMappingSet [Extended]

Name

XYDualCorrectorMappingSet – Change data of a line of an XY dual corrector mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Check DualCorrectorSwitch (firmware.ref, must be Enabled): (-121)
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 2 and \leq MappingColumnNumber+2): (-9)
- Checks mapping enable state (must be Enabled): (-121)
- Checks group state (must be NOTINIT, DISABLE or READY at HomePreset position): (-205)

Description

Change data of a line of a XY dual corrector mapping matrix.

It's possible to execute this function only when the XY group is in one of following states (*otherwise API returns error -205*) :

- NOTINIT
- DISABLE
- READY and all positioners (X and Y) are at HomePreset position.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYDualCorrectorMappingSet(
    int SocketID,
    char * PositionerName,
    int LineNumber,
    double Value1,
    double Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| LineNumber | int | Mapping line to change. |
| Value1 | double | Data of column #1 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |
| Value2 | double | Data of column #2 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |
| ... | double | One data per column of of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -22: Not allowed action
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.
- -205: Not enable in your configuration.

7.2.1.418 XYGantryDestressingMappingGet [Extended]

Name

XYGantryDestressingMappingGet– Read data of a line of an XY gantry destressing mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Check XYGantryDestressingMappingSwitch (firmware.ref, must be Enabled): (-121)
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 2 and \leq MappingColumnNumber+2): (-9)
- Checks mapping enable state (must be Enabled): (-121)

Description

Read data of a line of a XY gantry destressing mapping matrix in the controller.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYGantryDestressingMappingGet (
    int SocketID,
    char * PositionerName,
    int* LineNumber,
    double* Value1,
    double* Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| LineNumber | int | Mapping line to read. |

Output parameters

| | | |
|--------|----------|--|
| Value1 | double * | Data of column #1 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| Value2 | double * | Data of column #2 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| ... | double * | One data per column of of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.

7.2.1.419 XYGantryDestressingMappingSet [Extended]

Name

XYGantryDestressingMappingSet – Change data of a line of an XY gantry destressing mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Check XYGantryDestressingMappingSwitch (firmware.ref, must be Enabled): (-121)
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 2 and \leq MappingColumnNumber+2): (-9)
- Checks mapping enable state (must be Enabled): (-121)
- Checks group state (must be NOTINIT, DISABLE or READY at HomePreset position): (-205)

Description

Change data of a line of a XY gantry destressing mapping matrix.

It's possible to execute this function only when the XY group is in one of following states (*otherwise API returns error -205*) :

- NOTINIT
- DISABLE
- READY and all positioners (X and Y) are at HomePreset position.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYGantryDestressingMappingSet(
    int SocketID,
    char * PositionerName,
    int LineNumber,
    double Value1,
    double Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| LineNumber | int | Mapping line to change. |
| Value1 | double | Data of column #1 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |
| Value2 | double | Data of column #2 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |
| ... | double | One data per column of of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -22: Not allowed action
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.
- -205: Not enable in your configuration.

7.2.1.420 XYMappingGet

Name

XYMappingGet – Read data of a line of an XY mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks MappingNumber (must be > 0 and ≤ 1 (standard firmware) or 3 (Precision Platform firmware)): (-9)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 3 and \leq MappingColumnNumber+3): (-9)
- Checks mapping enable state (must be Enabled): (-121)

Description

Read data of a line of a XY mapping matrix in the controller.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYMappingGet(
    int SocketID,
    char * PositionerName,
    int* MappingNumber,
    int* LineNumber,
    double* Value1,
    double* Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| MappingNumber | int | XY mapping matrix number. |
| LineNumber | int | Mapping line to read. |

Output parameters

| | | |
|--------|----------|--|
| Value1 | double * | Data of column #1 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| Value2 | double * | Data of column #2 of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |
| ... | double * | One data per column of of line # <i>LinerNumber</i> of the mapping file # <i>MappingNumber</i> . |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.

7.2.1.421 XYMappingSet

Name

XYMappingSet – Change data of a line of an XY mapping matrix in the controller.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name (must be a XY positioner): (-18)
- Checks the secondary positioner (must not be a secondary positioner): (-24)
- Checks MappingNumber (must be > 0 and ≤ 1 (standard firmware) or 3 (Precision Platform firmware)): (-9)
- Checks LineNumber (must be ≥ 1 and \leq MappingLineNumber): (-9)
- Checks the number of parameters (must be > 3 and \leq MappingColumnNumber+3): (-9)
- Checks mapping enable state (must be Enabled): (-121)
- Checks group state (must be NOTINIT, DISABLE or READY at HomePreset position): (-205)

Description

Change data of a line of a XY mapping matrix.

It's possible to execute this function only when the XY group is in one of following states (*otherwise API returns error -205*) :

- NOTINIT
- DISABLE
- READY and all positioners (X and Y) are at HomePreset position.

Example:

| | | | | | | | | |
|-------|----------|----------|----------|---------|---------|---------|---------|----------|
| 0 | -3.00 | -2.00 | -1.00 | 0.00 | 1.00 | 2.00 | 3.00 | |
| -3.00 | -0.00192 | -0.00534 | -0.00254 | 0.00023 | 0.00254 | 0.00534 | 0.00192 | (Line 1) |
| -2.00 | -0.00453 | -0.00322 | -0.00676 | 0.00049 | 0.00676 | 0.00322 | 0.00453 | |
| -1.00 | -0.00331 | -0.00845 | -0.00769 | 0.00102 | 0.00769 | 0.00845 | 0.00331 | |
| 0.00 | -0.00787 | -0.00228 | -0.00787 | 0 | 0.00787 | 0.00228 | 0.00787 | |
| 1.00 | -0.00232 | -0.00210 | -0.00342 | 0.00089 | 0.00342 | 0.00210 | 0.00232 | |
| 2.00 | -0.00134 | -0.00308 | -0.00675 | 0.00101 | 0.00675 | 0.00308 | 0.00134 | |
| 3.00 | -0.00789 | -0.00148 | -0.00234 | 0.00121 | 0.00234 | 0.00148 | 0.00789 | |

Prototype

```
int XYMappingSet(
    int SocketID,
    char * PositionerName,
    int MappingNumber,
    int LineNumber,
    double Value1,
    double Value2,
    ...
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | XY positioner name. |
| MappingNumber | int | XY mapping matrix number. |
| LineNumber | int | Mapping line to change. |
| Value1 | double | Data of column #1 of line # <i>LineNumber</i> of the mapping file # <i>MappingNumber</i> |
| Value2 | double | Data of column #2 of line # <i>LineNumber</i> of the mapping file # <i>MappingNumber</i> |
| ... | double | One data per column of of line # <i>LineNumber</i> of the mapping file # <i>MappingNumber</i> |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -9: Wrong number of parameters in the command.
- -17: Parameter out of range or incorrect.
- -18: PositionerName doesn't exist or unknown command.
- -22: Not allowed action
- -24: Not available in this configuration (secondary positioner is not allowed).
- -121: Function is not allowed due to mapping disabled.
- -205: Not enable in your configuration.

7.2.1.422 XYPTExecution [Extended]

Name

XYPTExecution – Executes a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a XY group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function executes a PT (Position Time) trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “XYPTVerification” and “XYPTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTES

In case of (-33) error, (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

This function can be used only with the XPS-Q Precision Platform controller.

Prototype

```
int XYPTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.423 XYPTLoadToMemory [Extended]

Name

XYPTLoadToMemory – Load some lines of PT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTE

All of the PT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PT trajectory in RAM as it does from a disk.

Example:

XYPTLoadToMemory(socketId,myGroup,”dT1,dX11,dX12#...dTn,dXn1,dXn2#”)

XYPTVerification (socketId,myGroup,FromMemory)

XYPTExecution(socketId,myGroup,FromMemory,1).

Prototype

```
int XYPTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.424 XYPTParametersGet [Extended]

Name

XYPTParametersGet – Gets PT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PT): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the PT trajectory parameters (trajectory name and current executing element number) of the current PT trajectory.

Prototype

```
int XYPTParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.425 XYPTPulseOutputGet [Extended]

Name

XYPTPulseOutputGet – Gets the configuration of pulse generation of a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the last configuration of pulse generation of a PT trajectory, that was previously set by *XYPTPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

```
XYPTPulseOutputSet(MyGroup, 3, 5, 0.01)
```

```
XYPTPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is error return, means OK)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int XYPTPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.426 XYPTPulseOutputSet [Extended]

Name

XYPTPulseOutputSet – Sets the configuration of pulse generation of a PT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function configures and activates the pulse generation of a PT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PT trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PT trajectory. The pulses are generated between the first and the last trajectory element. The minimum possible time interval is CorrectorISRPeriod value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual, Appendix / General I/O Description.

Example:

```
XYPTPulseOutputSet(Group1, 3, 5, 0.01)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int XYPTPulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.427 XYPTResetInMemory [Extended]

Name

XYPTResetInMemory – Deletes the content of the PT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes the PT trajectory buffer in the controller memory, that was previously loaded with the “XYPTLoadToMemory” function.

Prototype

```
int XYPTResetInMemory(
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.428 XYPTVerification [Extended]

Name

XYPTVerification – Checks a PT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (MinimumVelocity \leq Velocity \leq MaximumVelocity): (-68)
- Checks acceleration (MinimumAcc. \leq Acceleration \leq MaximumAcc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of a PT trajectory. The results of the verification can be got with the “XYPTVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

- This function can be executed at any time and is independent of the trajectory execution. It performs the following:
- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a PT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTES

Because of the PT trajectory internal calculation of elements end velocity, a correct PT trajectory file must have at least two lines with zero displacements at the trajectory end. Otherwise, the “XYPTVerification” function returns the (-70) error.

The “XYPTVerification” function is independent from the “XYPTExecution” function, but it is highly recommended to execute this function before executing a PT trajectory.

This function can be used only with the XPS-Q Precision Platform controller.

Prototype

```
int XYPTVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Acceleration on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.429 XYPTVerificationResultGet [Extended]**Name**

XYPTVerificationResultGet – Gets the results of the “XYPTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last XY PTVerification (must be done): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the results of the previous “XYPTVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int XYPTVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.430 XYPVTExecution [Extended]**Name**

XYPVTExecution – Executes a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a XY group): (-8)
- Checks input value (number of executions must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)

Description

This function executes a PVT (Position Velocity Time) trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “XYPVTVerification” and “XYPVTVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTES

In case of an (-33) error, an (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int XYPVTExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    int ExecutionNumber
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| ExecutionNumber | int | Number of trajectory executions. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.431 XYPVTLoadToMemory [Extended]

Name

XYPVTLoadToMemory – Load some lines of PVT trajectory to the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory data (data length must >0 and ≤400): (-3) or (-17)
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function loads some lines of PVT trajectory into XPS controller memory. Each trajectory element must be separated by a comma (“,”). The trajectory lines (data blocks) must be separated between them by a “#” character (*or “\” and “n” two successive characters*). To verify or to execute the PVT trajectory loaded in memory, use the string “**FromMemory**” instead of a file name.

NOTE

All of the PVT functions, when called with the string “FromMemory” instead of a FileName, will perform the same operation as the PVT trajectory in RAM as it does from a disk.

Example:

```
XYPVTLoadToMemory(socketId,myGroup,"dT1,dX11,Vout1,dX12,Vout12#...dTn,dXn1,Voutn1,dXn2,Voutn2#")
```

```
XYPVTVerification (socketId,myGroup,FromMemory)
```

```
XYPVTExecution(socketId,myGroup,FromMemory,1).
```

Prototype

```
int XYPVTLoadToMemory(
    int SocketID,
    char GroupName[250],
    char TrajectoryData[400]
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TrajectoryData | char * | Trajectory data lines. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.432 XYPVTParametersGet [Extended]**Name**

XYPVTParametersGet – Gets PVT trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be PVT): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the PVT trajectory parameters (trajectory name and current executing element number) of the current PVT trajectory.

Prototype

```
int XYPVTParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|--------|---|
| FileName | char * | Currently executing trajectory file name. |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.433 XYPVTPulseOutputGet [Extended]

Name

XYPVTPulseOutputGet – Gets the configuration of pulse generation of a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the last configuration of pulse generation of a PVT trajectory, that was previously set by *XYPVTPulseOutputSet()*.

The pulse output configuration is defined with a start element, an end element, and a time interval in seconds.

Example:

XYPVTPulseOutputSet(MyGroup, 3, 5, 0.01)

XYPVTPulseOutputGet(MyGroup) => 0,3,5,0.01 (0 is error return, means OK)

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Start element= 3

End element = 5

Time interval = 0.01 seconds.

Prototype

```
int XYPVTPulseOutputGet(
    int SocketID,
    char GroupName[250],
    int * StartElement,
    int * EndElement,
    double * TimeInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|--------------|----------|---|
| StartElement | int * | Start pulse element number. |
| EndElement | int * | End pulse element number. |
| TimeInterval | double * | Time interval between pulses (seconds). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.434 XYPVTPulseOutputSet [Extended]

Name

XYPVTPulseOutputSet – Sets the configuration of pulse generation of a PVT trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function configures and activates the pulse generation of a PVT trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected PVT trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows output of pulses at constant time intervals on a PVT trajectory. The pulses are generated between the first and the last trajectory element. The minimum possible time interval is CorrectorISRPeriod value (*system.ref*).

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual, Appendix / General I/O Description.

Example:

```
XYPVTPulseOutputSet(Group1, 3, 5, 0.01)
```

One pulse will be generated every 10 ms between the start of the 3rd element and the end of the 5th element.

Prototype

```
int XYPVTPulseOutputSet(
    int SocketID,
    char GroupName[250],
    int StartElement,
    int EndElement,
    double TimeInterval
)
```


Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| StartElement | int | Start pulse element number. |
| EndElement | int | End pulse element number. |
| TimeInterval | double | Time interval between pulses (seconds). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.435 XYPVTRResetInMemory [Extended]

Name

XYPVTRResetInMemory – Deletes the content of the PVT trajectory buffer in the controller memory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function deletes all data of PVT trajectory buffer in the memory, that was previously loaded with the “XYPVTLoadToMemory” function.

Prototype

```
int XYPVTRResetInMemory (
    int SocketID,
    char GroupName[250],
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name (must be XY group). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.

7.2.1.436 XYPVTVerification [Extended]

Name

XYPVTVerification – Checks a PVT trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)
- Checks BaseVelocity value (must = 0): (-48)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)
- Checks velocity (Minimum Velocity \leq Velocity \leq Maximum Velocity): (-68)
- Checks acceleration (Minimum acc. \leq acceleration \leq Maximum acc.): (-69)
- Checks end output velocity (must = 0): (-70)
- Checks delta time (DeltaTime must > 0): (-75)

Description

This function verifies the execution of a PVT trajectory. The results of the verification can be got with the “XYPVTVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a PVT trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTE

The “XYPVTVerification” function is independent from the “XYPVTExecution” function, but it is highly recommended to execute this function before executing a PVT trajectory.

Prototype

```
int XYPVTVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -24: Not available in this configuration.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't content any element.
- -68: Velocity on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -70: Final velocity on trajectory is not zero.
- -72: Error trajectory initialization.
- -75: Trajectory element has a negative or null delta T.

7.2.1.437 XYPVTVerificationResultGet [Extended]

Name

XYPVTVerificationResultGet – Gets the results of the “XYPVTVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last XY PVTVerification (must be done): (-22)
- Not available in this configuration (PrecisionPlatform firmware only): (-24)

Description

This function returns the results of the previous “XYPVTVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int XYPVTVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.
- -24: Not available in this configuration.

7.2.1.438 XYZGroupPositionCorrectedProfilerGet

Name

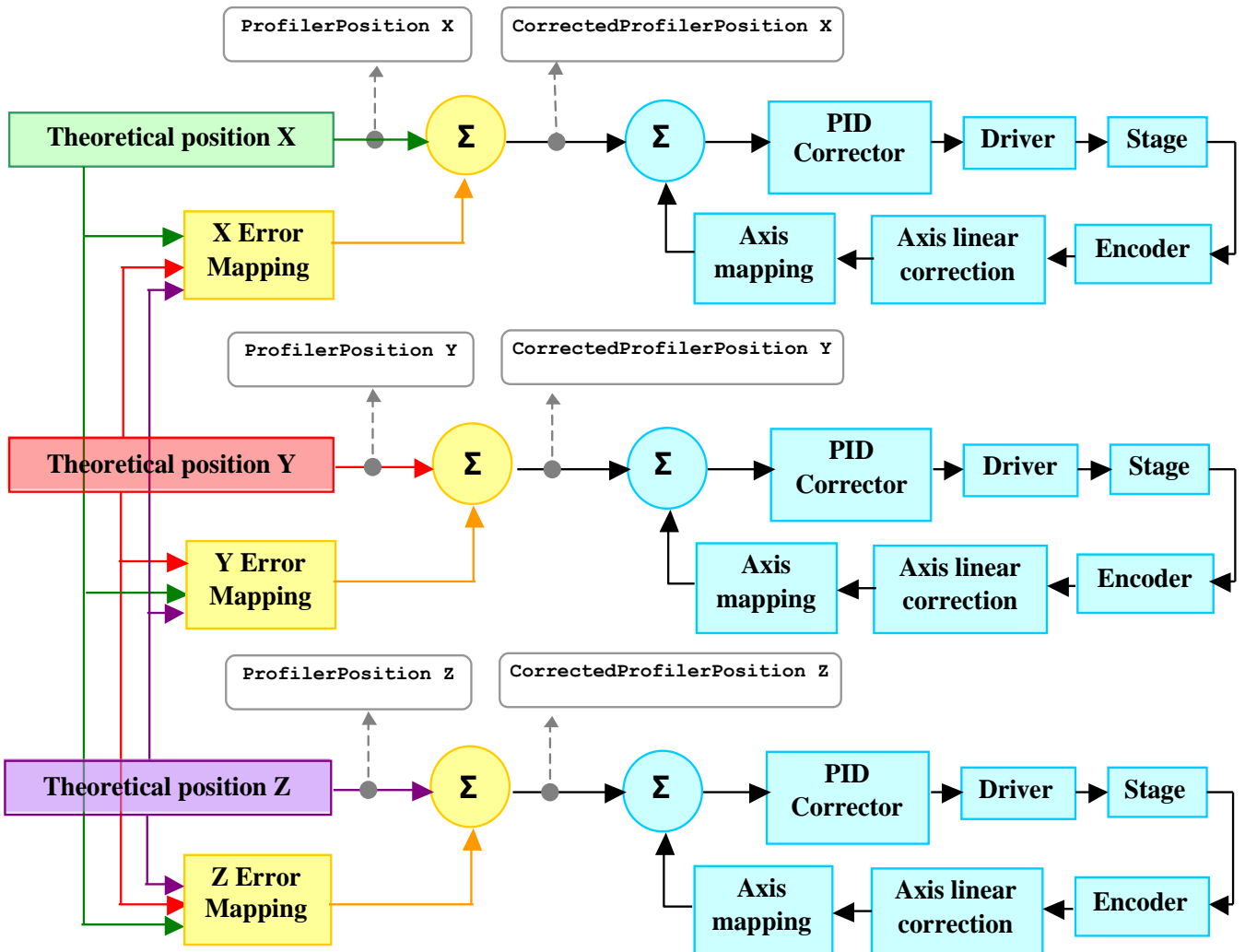
XYZGroupPositionCorrectedProfilerGet – Gets the corrected profiler position for all positioners of an XYZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Validates group type (must be an XYZ group): (-18)
- Invalid group name: (-19)

Description

This function corrects a theoretical position which is recalculated with the XYZ mapping correction.



This function applies the XYZ mapping on the theoretical user positions and returns the corrected positions. These corrected profiler positions (X, Y and Z) take the XYZ mapping correction into account.

NOTE

This function is only allowed with an XYZ group.

Prototype

```
int XYZGroupPositionCorrectedProfilerGet(
    int SocketID,
    char * GroupName,
    char * FileName,
    double PositionX,
    double PositionY,
    double PositionZ,
    double * CorrectedPositionX,
    double * CorrectedPositionY,
    double * CorrectedPositionZ
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XYZ group name. |
| PositionX | double | Theoretical position X. |
| PositionY | double | Theoretical position Y. |
| PositionZ | double | Theoretical position Z. |

Output parameters

| | | |
|--------------------|----------|-----------------------------------|
| CorrectedPositionX | double * | Corrected theoretical position. |
| CorrectedPositionY | double * | Corrected theoretical position Y. |
| CorrectedPositionZ | double * | Corrected theoretical position Z. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.439 XYZGroupPositionPCORawEncoderGet

Name

XYZGroupPositionPCORawEncoderGet – Gets the PCO raw encoder positions of an XYZ group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Validates object type: (-8)
- Validates group type (must be a XYZ group): (-18)
- Invalid group name: (-19)

Description

This function returns the X, Y and Z PCO raw encoder positions from the X, Y and Z user positions.

NOTE

This function is only allowed with a XYZ group.

Prototype

```
int XYZGroupPositionPCORawEncoderGet(
    int SocketID,
    char * GroupName,
    double PositionX,
    double PositionY,
    double PositionZ,
    double * PCORawPositionX,
    double * PCORawPositionY,
    double * PCORawPositionZ
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XYZ group name. |
| PositionX | double | User position X. |
| PositionY | double | User position Y. |
| PositionZ | double | User position Z. |

Output parameters

| | | |
|-----------------|----------|---------------------|
| PCORawPositionX | double * | PCO Raw position X. |
| PCORawPositionY | double * | PCO Raw position Y. |
| PCORawPositionZ | double * | PCO Raw position Z. |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.440 XYZSplineExecution

Name

XYZSplineExecution – Executes a Spline trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length: (-3)
- Checks group type (must be a XYZ group): (-8)
- Checks input value (Velocity and Acceleration must >0): (-17)
- Checks group name: (-19)
- Group state must be "READY": (-22)
- Checks backlash (must not be enabled): (-46)
- Checks BaseVelocity (stages.ini, must = 0): (-48)
- Checks trajectory file existence or file reading: (-61)
- Checks message queue: (-71)
- Checks the velocity ($\text{Velocity} \leq \text{TrajectoryMaximumVelocity}$): (-68)
- Checks the acceleration ($\text{Acceleration} \leq \text{TrajectoryMaximumAcceleration}$): (-69)

Description

This function executes a Spline trajectory. The trajectory file must be stored in the folder “\Admin\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (message queue or task error) then (-72) is returned.

Before a trajectory execution, it is recommended to check whether the trajectory is within the positioner motion capabilities by using “XYZSplineVerification” and “XYZSplineVerificationResultGet” functions.

During the trajectory execution, if a positioner reaches one of travel limits, the trajectory execution will stop and the (-25) error is generated in the positioner errors.

NOTE

In case of an (-33) error, an (-25) error or (-44) error, the group state becomes DISABLE. To help determine the error source, check the positioner errors, the hardware status and the driver status.

Prototype

```
int XYZSplineExecution(
    int SocketID,
    char GroupName[250],
    char FileName[250],
    double Velocity,
    double Acceleration
)
```

Input parameters

| | | |
|--------------|--------|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |
| Velocity | double | Trajectory velocity (units/s). |
| Acceleration | double | Trajectory acceleration (units/s ²). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -46: Not allowed action due to backlash.
- -48: BaseVelocity must be null.
- -61: Error file corrupt or file doesn't exist.
- -68: Velocity on trajectory is too big.
- -69: Acceleration on trajectory is too big.
- -71: Error read from or write in message queue.
- -72: Error trajectory initialization.

7.2.1.441 XYZSplineParametersGet

Name

XYZSplineParametersGet – Gets Spline trajectory parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XYZ group): (-8)
- Checks group name: (-19)
- Checks current executing trajectory type (must be Spline): (-22)

Description

This function returns the Spline trajectory parameters (trajectory name, trajectory velocity, trajectory acceleration, current executing element number) of the current Spline trajectory.

Prototype

```
int XYZSplineParametersGet(
    int SocketID,
    char GroupName[250],
    char * FileName,
    double * Velocity,
    double * Acceleration,
    int * CurrentElementNumber
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|----------|--|
| FileName | char * | Currently executing trajectory file name. |
| Velocity | double * | Trajectory velocity (units/s). |
| Acceleration | double * | Trajectory acceleration (units/s ²). |
| CurrentElementNumber | int * | Currently executing element number. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.442 XYZSplinePulseOutputGet

Name

XYZSplinePulseOutputGet – Gets the configuration of pulse generation of a Spline trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XYZ group): (-8)
- Checks group name: (-19)

Description

This function returns the last configuration of pulse generation of a Spline trajectory, that was previously set by *XYZSplinePulseOutputSet()*.

The pulse output configuration is defined by a pulse start trajectory curved length, a pulse end trajectory curved length, and a pulse trajectory curved length interval.

Example:

```
XYZSplinePulseOutputSet(MyGroup, 10, 30, 0.01)
```

```
XYZSplinePulseOutputGet(MyGroup) => 0,10,30,0.01 (0 is error return, means OK)
```

One pulse will be generated every 10 μm on the Spline trajectory between 10 mm and 30 mm trajectory curved lengths.

Pulse start trajectory curved length = 10 mm

Pulse end trajectory curved length = 30 mm

Pulse trajectory curved length interval = 0.01 mm.

Prototype

```
int XYZSplinePulseOutputGet(
    int SocketID,
    char GroupName[250],
    double * StartLength,
    double * EndLength,
    double * PathLengthInterval
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters.

| | | |
|--------------------|----------|--------------------------------|
| StartLength | double * | Pulse start length (units). |
| EndLength | double * | Pulse end length (units). |
| PathLengthInterval | double * | Pulse length interval (units). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.443 XYZSplinePulseOutputSet

Name

XYZSplinePulseOutputSet – Sets the configuration of pulse generation of a Spline trajectory.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XYZ group): (-8)
- Checks group name: (-19)
- Checks the pulse generation must not be in progress: (-22)

Description

This function configures and activates the pulse generation of a Spline trajectory. The pulse generation is defined by a start element, an end element, and a time interval in seconds. If a pulse generation is already activated on the selected Spline trajectory then this function returns -22 (“Not allowed action”) error.

Please note that the pulse output settings are automatically removed when the trajectory is over. Hence, with the execution of every new trajectory, it is required to define the pulse output settings again.

This capability allows to generate pulses at constant pulse trajectory curved length intervals on a Spline trajectory. The pulses are generated between a pulse start trajectory curved length and a pulse end trajectory curved length. All lengths are calculated in an orthogonal XYZ coordination system.

The trajectory pulses are generated on the following GPIO outputs:

| GPIO signals | ISA XPS controller | PCI XPS controller (for example XPS-RL) with basic GPIO board | PCI XPS controller (for example XPS-RL) with extended GPIO board |
|--------------|--------------------|---|--|
| Window | GPIO2, pin 11 | GPIO1.DO6 | GPIO5.DO14 |
| Pulses | GPIO2, pin 12 | GPIO1.DO7 | GPIO5.DO15 |

To find the GPIO connector pin number from GPIOx.DOy, refer to XPS User's Manual, Appendix / General I/O Description.

Example:

XYZSplinePulseOutputSet(Group1, 10, 30, 0.01)

One pulse will be generated every 10 μ m on the Spline trajectory between 10 mm and 30 mm trajectory curved lengths.

Pulse start trajectory curved length = 10 mm

Pulse end trajectory curved length = 30 mm

Pulse trajectory curved length interval = 0.01 mm

Prototype

```
int XYZSplinePulseOutputSet(
    int SocketID,
    char GroupName[250],
    double StartLength,
    double EndLength,
    double PathLengthInterval
)
```

Input parameters

| | | |
|--------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| StartLength | double | Pulse start length (units). |
| EndLength | double | Pulse end length (units). |
| PathLengthInterval | double | Pulse length interval (units). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.444 XYZSplineVerification

Name

XYZSplineVerification – Checks a Spline trajectory data file.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks trajectory file name length (must ≤ 250): (-3)
- Checks group type (must be a XYZ group): (-8)
- Checks group name: (-19)
- Checks trajectory file existence and the file format: (-61)
- Checks trajectory (number of elements must > 0): (-66)

Description

This function verifies the execution of a Spline trajectory. The results of the verification can be got with the “XYZSplineVerificationResultGet” function. The trajectory file must be stored in the folder “\ADMIN\Public\Trajectory” of the XPS controller. If the trajectory cannot be initialized (task error) then the (-72) error is returned.

This function can be executed at any time and is independent of the trajectory execution. It performs the following:

- Checks the trajectory file for data coherence.
- Calculates the trajectory limits, which are: the required travel per positioner, the maximum possible trajectory velocity and the maximum possible trajectory acceleration. This function helps define the parameters for the trajectory execution.
- The required travel values (MinimumPosition and MaximumPosition) are calculated relative to the position zero, not to the current position. So before executing a Spline trajectory, the user must pay attention to the current position of the positioners to make sure that the trajectory will not exceed the positioner travel limits.
- If all is OK, it returns “SUCCESS” (0). Otherwise, it returns a corresponding error.

NOTE

The “XYZSplineVerification” function is independent from the “XYZSplineExecution” function, but it is highly recommended to execute this function before executing a Spline trajectory.

Prototype

```
int XYZSplineVerification(
    int SocketID,
    char GroupName[250],
    char FileName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| FileName | char * | Trajectory file name. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -3: String too long.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -61: Error file corrupt or file doesn't exist.
- -66: Trajectory doesn't contain any element.
- -72: Error trajectory initialization.

7.2.1.445 XYZSplineVerificationResultGet

Name

XYZSplineVerificationResultGet – Gets the results of the “XYZSplineVerification” function.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks positioner name length (must ≤ 250): (-3)
- Checks positioner name: (-18)
- Checks the last XYZ SplineVerification (must be done): (-22)

Description

This function returns the results of the previous “XYZSplineVerification” function, positioner by positioner. The results are the travel requirements (min and max values), the possible maximum velocity and the possible maximum acceleration.

If no verification was previously done then the (-22) error is returned.

Prototype

```
int XYZSplineVerificationResultGet(
    int SocketID,
    char PositionerName[250],
    char * TrajectoryFileName,
    double * MinimumPosition,
    double * MaximumPosition,
    double * MaximumVelocity,
    double * MaximumAcceleration
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |

Output parameters

| | | |
|---------------------|----------|---|
| TrajectoryFileName | char * | Examined trajectory file name. |
| MinimumPosition | double * | Minimum position (units). |
| MaximumPosition | double * | Maximum position (units). |
| MaximumVelocity | double * | Maximum velocity (units/s). |
| MaximumAcceleration | double * | Maximum acceleration (units/s ²). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -3: String too long.
- -18: Positioner name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.446 XYScanShutterDisable [Extended]

Name

XYScanShutterDisable – disables shutter stage during scan.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Check shutter group existence (-22)

Description

This function disables the use of shutter stage during scan for the selected XY group.

Prototype

```
int XYScanShutterDisable (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.447 XYScanShutterEnable [Extended]

Name

XYScanShutterEnable – enables shutter stage during scan.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Check shutter group existence (-22)

Description

This function enables the use of shutter stage during scan for the selected XY group.

Prototype

```
int XYScanShutterEnable (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.448 XYShutterInterlockMonitoringDisable [Extended]**Name**

XYShutterInterlockMonitoringDisable – disables shutter interlock monitoring.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)

Description

This function disables the shutter interlock monitoring for the selected XY group.

Prototype

```
int XYShutterInterlockMonitoringDisable (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.449 XYShutterInterlockMonitoringEnable [Extended]**Name**

XYShutterInterlockMonitoringEnable – enables shutter interlock monitoring.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)

Description

This function enables the shutter interlock monitoring for the selected XY group.

Prototype

```
int XYShutterInterlockMonitoringEnable (
    int SocketID,
    char GroupName[250]
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.450 XYShutterInterlockRectParametersGet [Extended]**Name**

XYShutterInterlockRectParametersGet – gets rectangle shutter interlock parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)

Description

This function gets parameters of rectangle shutter interlock.

Prototype

```
int XYShutterInterlockRectParametersGet (
    int SocketID,
    char GroupName[250],
    double *ImageRefX,
    double *ImageRefY,
    double *w11, double *w12, double *w13, double *w14,
    double *wr1, double *wr2, double *wr3, double *wr4,
    double *sL1, double *sL2, double *sL3, double *sL4,
    double *sR1, double *sR2, double *sR3, double *sR4,
    double *wMeanPeriod, double *wMeanVelocityMin,
    double *wMeanVelocityInitial,
    double *sMeanPeriod, double *sMeanVelocityMin,
    double *sMeanVelocityInitial,
    double *oMeanPeriod, double *oMeanVelocityMin,
    double *oMeanVelocityInitial,
    double *mL1, double *mL2, double *mR
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|----------------------|----------|-------------------------------------|
| ImageRefX | double * | Image reference in X coordination. |
| ImageRefY | double * | Image reference in Y coordination. |
| w11,w12,w13,w14 | double * | Wafer zone longer l1,l2, l3 and l4 |
| wr1,wr2,wr3,wr4 | double * | Wafer zone radius r1, r2, r3 and r4 |
| sL1,sL2,sL3,sL4 | double * | Skirt zone longer L1,L2, L3 and L4 |
| sR1,sR2,sR3,sR4 | double * | Skirt zone radius R1, R2, R3 and R4 |
| wMeanPeriod | double * | Wafer zone mean period |
| wMeanVelocityMin | double * | Wafer zone mean velocity minimum |
| wMeanVelocityInitial | double * | Wafer zone mean velocity initial |
| sMeanPeriod | double * | Skirt zone mean period |

| | | |
|----------------------|----------|-------------------------------------|
| sMeanVelocityMin | double * | Skirt zone mean velocity minimum |
| sMeanVelocityInitial | double * | Skirt zone mean velocity initial |
| oMeanPeriod | double * | Other zone mean period |
| oMeanVelocityMin | double * | Other zone mean velocity minimum |
| oMeanVelocityInitial | double * | Other zone mean velocity initial |
| mL1, mL2, mR | double * | Mirror zone longer (X,Y) and radius |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.451 XYShutterInterlockRectParametersSet [Extended]**Name**

XYShutterInterlockRectParametersSet – sets rectangle shutter interlock parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks if *ShutterInterlockMonitoringFlag* = *false* (-22 otherwise)
- Checks *wl1,wl2,wl3,wl4, wr1,wr2,wr3,wr4* ≥ 0 : (-17 otherwise)
- Checks *sL1,sL2,sL3,sL4, sR1,sR2,sR3,sR4* ≥ 0 : (-17 otherwise)
- Checks $-wl1 + wr1 \leq wl2 - wr2$: (-17 otherwise)
- Checks $-wl1 + wr3 \leq wl2 - wr4$: (-17 otherwise)
- Checks $-wl4 + wr3 \leq wl3 - wr1$: (-17 otherwise)
- Checks $-wl4 + wr4 \leq wl3 - wr2$: (-17 otherwise)
- Checks $-sL1 + sR1 \leq sL2 - sR2$: (-17 otherwise)
- Checks $-sL1 + sR3 \leq sL2 - sR4$: (-17 otherwise)
- Checks $-sL4 + sR3 \leq sL3 - sR1$: (-17 otherwise)
- Checks $-sL4 + sR4 \leq sL3 - sR2$: (-17 otherwise)
- Checks $wMeanPeriod \geq 10 * CorrectorISRPeriod * ProfileGeneratorISRRatio$: (-17 otherwise)
- Checks $wMeanVelocityMin \geq 0$: (-17 otherwise)
- Checks $sMeanPeriod \geq 10 * CorrectorISRPeriod * ProfileGeneratorISRRatio$: (-17 otherwise)
- Checks $sMeanVelocityMin \geq 0$: (-17 otherwise)
- Checks $oMeanPeriod \geq 10 * CorrectorISRPeriod * ProfileGeneratorISRRatio$: (-17 otherwise)
- Checks $oMeanVelocityMin \geq 0$: (-17 otherwise)

Description

This function sets parameters of rectangle shutter interlock.

Prototype

```
int XYShutterInterlockRectParametersSet (
    int SocketID,
    char GroupName[250],
    double ImageRefX,
    double ImageRefY,
    double wl1, double wl2, double wl3, double wl4,
    double wr1, double wr2, double wr3, double wr4,
    double sL1, double sL2, double sL3, double sL4,
    double sR1, double sR2, double sR3, double sR4,
    double wMeanPeriod, double wMeanVelocityMin,
    double wMeanVelocityInitial,
    double sMeanPeriod, double sMeanVelocityMin,
    double sMeanVelocityInitial,
    double oMeanPeriod, double oMeanVelocityMin,
    double oMeanVelocityInitial,
    double mL1, double mL2, double mR
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

| | | |
|----------------------|--------|-------------------------------------|
| ImageRefX | double | Image reference in X coordination. |
| ImageRefY | double | Image reference in Y coordination. |
| w11,w12,w13,w14 | double | Wafer zone longer l1.l2, l3 and l4 |
| wr1,wr2,wr3,wr4 | double | Wafer zone radius r1. r2, r3 and r4 |
| sL1,sL2,sL3,sL4 | double | Skirt zone longer L1.L2, L3 and L4 |
| sR1,sR2,sR3,sR4 | double | Skirt zone radius R1. R2, R3 and R4 |
| wMeanPeriod | double | Wafer zone mean period |
| wMeanVelocityMin | double | Wafer zone mean velocity minimum |
| wMeanVelocityInitial | double | Wafer zone mean velocity initial |
| sMeanPeriod | double | Skirt zone mean period |
| sMeanVelocityMin | double | Skirt zone mean velocity minimum |
| sMeanVelocityInitial | double | Skirt zone mean velocity initial |
| oMeanPeriod | double | Other zone mean period |
| oMeanVelocityMin | double | Other zone mean velocity minimum |
| oMeanVelocityInitial | double | Other zone mean velocity initial |
| mL1, mL2, mR | double | Mirror zone longer (X,Y) and radius |

Output parameters

None

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.452 XYScanNextGet [Extended]

Name

XYScanNextGet – gets XY Scan parameters.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)

Description

This function gets parameters of the Scan feature.

Prototype

```
int XYScanNextGet (
    int SocketID,
    char GroupName[250],
    double *MinStartVelocity,
    double *MaxStartVelocity,
    double *StartCheckingTime,
    double *MinPositionForLaserEnable,
    double *MaxPositionForLaserEnable,
    double *MinPositionForNotchStart,
    double *MaxPositionForNotchEnd
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |

Output parameters

| | | |
|---------------------------|----------|--------------------------------|
| MinStartVelocity | double * | Minimum start velocity. |
| MaxStartVelocity | double * | Maximum start velocity. |
| StartCheckingTime | double * | Start checking time. |
| MinPositionForLaserEnable | double * | Laser enable minimum position. |
| MaxPositionForLaserEnable | double * | Laser enable maximum position. |
| MinPositionForNotchStart | double * | Notch start minimum position. |
| MaxPositionForNotchEnd | double * | Notch end maximum position. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -19: Group name doesn't exist or unknown command.

7.2.1.453 XYScanNextSet [Extended]

Name

XYScanNextSet – sets parameters used for next scan.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks that the system is not scanning (-22 otherwise)
- Checks $\text{MaximumStartVelocity} \geq \text{MinimumStartVelocity} \geq 0$ (-17 otherwise)
- Checks $\text{StartCheckingTime} \geq 0$ (-17 otherwise)
- Checks $\text{MaximumPositionForLaserEnable} \geq \text{MinimumPositionForLaserEnable}$ (-17 otherwise)
- Checks $\text{MaximumPositionForNotchEnd} \geq \text{MinimumPositionForNotchStart}$ (-17 otherwise)

Description

This function sets the scan parameters used for next scan.

Prototype

```
int XYScanNextSet (
    int SocketID,
    char GroupName[250],
    double MinStartVelocity,
    double MaxStartVelocity,
    double StartCheckingTime,
    double MinPositionForLaserEnable,
    double MaxPositionForLaserEnable,
    double MinPositionForNotchStart,
    double MaxPositionForNotchEnd
)
```

Input parameters

| | | |
|---------------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| MinStartVelocity | double | Minimum start velocity. |
| MaxStartVelocity | double | Maximum start velocity. |
| StartCheckingTime | double | Start checking time. |
| MinPositionForLaserEnable | double | Laser enable minimum position. |
| MaxPositionForLaserEnable | double | Laser enable maximum position. |
| MinPositionForNotchStart | double | Notch start minimum position. |
| MaxPositionForNotchEnd | double | Notch end maximum position. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.454 XYScanMoveAbsolute [Extended]

Name

XYScanMoveAbsolute – makes a group absolute move for scan purpose.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks target position in relation with the travel limits :
 - $TargetPositionX \geq MinimumTargetPosition$ (-17 otherwise)
 - $TargetPositionX \leq MaximumTargetPosition$ (-17 otherwise)
 - $TargetPositionY \geq MinimumTargetPosition$ (-17 otherwise)
 - $TargetPositionY \leq MaximumTargetPosition$ (-17 otherwise)
- Checks start position in relation with the current position and the target position (-17 otherwise)
- Checks that XYScanNextSet API was executed previously (-22 otherwise)
- Checks group status must be "READY": (-22 otherwise)

Description

This function makes a group absolute move to X and Y target positions for scan purpose.

The absolute move refers to the acceleration, velocity, minimum jerk time and maximum jerk time predefined in the “stages.ini” or redefined with the “PositionerSGammaParametersSet” API.

Prototype

```
int XYScanMoveAbsolute (
    int SocketID,
    char GroupName[250],
    double TargetPositionX,
    double TargetPositionY,
    double StartPosition,
    int *ScanErrorCode,
    double *MinimumRecordedVelocity,
    double *MaximumRecordedVelocity,
    double *AverageScanVelocity
)
```

Input parameters

| | | |
|-----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TargetPositionX | double | X target position. |
| TargetPositionY | double | Y target position. |
| StartPosition | double | Start position. |

Output parameters

| | | |
|-------------------------|----------|----------------------------|
| ScanErrorCode | int * | Scan error code. |
| MinimumRecordedVelocity | double * | Minimum recorded velocity. |
| MaximumRecordedVelocity | double * | Maximum recorded velocity. |

7.2.1.455 XYScanMoveRelative [Extended]

Name

XYScanMoveRelative – makes a group relative move for scan purpose.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Checks target position in relation with the travel limits :
 - $TargetPositionX \geq MinimumTargetPosition$ (-17 otherwise)
 - $TargetPositionX \leq MaximumTargetPosition$ (-17 otherwise)
 - $TargetPositionY \geq MinimumTargetPosition$ (-17 otherwise)
 - $TargetPositionY \leq MaximumTargetPosition$ (-17 otherwise)
- Checks start position in relation with the current position and the target position (-17 otherwise)
- Checks that XYScanNextSet API was executed previously (-22 otherwise)
- Checks group status must be "READY": (-22 otherwise)

Description

This function makes a group relative move with X and Y target displacement for scan purpose.

The relative move refers to the acceleration, velocity, minimum jerk time and maximum jerk time predefined in the “stages.ini” or redefined with the “PositionerSGammaParametersSet” API.

Prototype

```
int XYScanMoveRelative (
    int SocketID,
    char GroupName[250],
    double TargetDisplacementX,
    double TargetDisplacementY,
    double StartDisplacement,
    int *ScanErrorCode,
    double *MinimumRecordedVelocity,
    double *MaximumRecordedVelocity,
    double *AverageScanVelocity
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| TargetDisplacementX | double | X target displacement. |
| TargetDisplacementY | double | Y target displacement. |
| StartDisplacement | double | Start displacement. |

Output parameters

| | | |
|-------------------------|----------|----------------------------|
| ScanErrorCode | int * | Scan error code. |
| MinimumRecordedVelocity | double * | Minimum recorded velocity. |
| MaximumRecordedVelocity | double * | Maximum recorded velocity. |

AverageScanVelocity double * Average scan velocity.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.

7.2.1.456 XYScanExecutePVT [Extended]**Name**

XYScanExecutePVT – Executes a PVT trajectory for X and Y with scan activated.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks group type (must be a XY group): (-8)
- Checks group name: (-19)
- Check trajectory file name: (-61)
- Check execution number > 0: (-17 otherwise)
- Checks that XYScanNextSet API was executed previously: (-22 otherwise)
- Checks group status must be "READY": (-22 otherwise)

Description

This function executes a PVT trajectory for X and Y with scan activated.

Prototype

```
int XYScanExecutePVT (
    int SocketID,
    char GroupName[250],
    char PVTTrajectoryFileName[250],
    int ExecutionNumber,
    int *ScanErrorCode,
    double *MinimumRecordedVelocity,
    double *MaximumRecordedVelocity,
    double *AverageScanVelocity
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Group name. |
| PVTTrajectoryFileName | char * | PVT trajectory file name. |
| ExecutionNumber | int | Number of executions. |

Output parameters

| | | |
|-------------------------|----------|----------------------------|
| ScanErrorCode | int * | Scan error code. |
| MinimumRecordedVelocity | double * | Minimum recorded velocity. |
| MaximumRecordedVelocity | double * | Maximum recorded velocity. |
| AverageScanVelocity | double * | Average scan velocity. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -19: Group name doesn't exist or unknown command.

- -22: Not allowed action.
- -61: Error file corrupt or file doesn't exist.
- -72: Error trajectory initialization.

7.2.1.457 XYClampDisable [Extended]**Name**

XYClampDisable – unclamps XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function unclamps the selected XY group

The group must be in the CLAMPED state. If unclamping is successful, the group is unclamped and the group state becomes “READY”.

Prototype

```
int XYClampDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY group name. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.458 XYClampEnable [Extended]

Name

XYClampEnable – clamps a XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function clamps the selected XY group.

The group must be in the READY state. If clamping is successful, the group is clamped and the group state becomes “CLAMPED”.

Prototype

```
int XYClampEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.1.459 MaskClampDisable [Extended]**Name**

MaskClampDisable – Disables Mask clamping.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function unclamps the Mask group

The group must be in the CLAMPED state.

Prototype

```
int MaskClampDisable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Mask group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.460 MaskClampEnable [Extended]

Name

MaskClampEnable – Enables Mask clamping.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function enables Mask clamping.

Prototype

```
int MaskClampEnable(
    int SocketID,
    char * GroupName
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Mask group name. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.1.461 MaskClampStateGet [Extended]**Name**

MaskClampStateGet – Gets Mask clamping state.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group): (-8)
- Invalid positioner name: (-18)
- Invalid group name: (-19)

Description

This function gets Mask clamping state.

TRUE = Mask clamp is enabled.

False = Mask clamp is disabled.

Prototype

```
int MaskClampStateGet (
    int SocketID,
    char * GroupName
    bool * MaskState
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | Mask group name. |

Output parameters

| | | |
|-----------|--------|----------------------|
| MaskState | bool * | Mask clamping state. |
|-----------|--------|----------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.

7.2.2 Special Functions

The functions described in this section are for a specific controller configuration, please contact Newport for further information.

7.2.2.1 AbortMove

Name

AbortMove – abort the motion or the jog in progress for the XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function allows aborting a motion or a jog in progress. The group status must be “MOVING” or “JOGGING” else the (-22) error is returned.

If the group status is “MOVING”, this function stops all motion in progress.

If the group status is “JOGGING”, this function stops all “jog” motion in progress and disables the jog mode. After this “group move abort” action, the group status becomes “READY”.

Prototype

```
int AbortMove(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -27: Move Aborted.

7.2.2.2 EndJog

Name

EndJog – Disables the jog mode in the XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the group name: (-19)
- Group status must be “READY”: (-22)

Description

This This function disables the Jog mode for the first declared XY group. To use this function, the group must be in the “JOGGING” state and all positioners must be idle (means velocity must be 0).

This function allows to exit the “JOGGING” state and to come back to the “READY” state. If the group state is not “JOGGING” or if the profiler velocity is not null then the (-22) error is returned.

NOTE

Use the “StartJog” function to enable the jog mode.

Prototype

```
int GetJogAcceleration(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.3 GetAccParams

Name

GetAccParams – Gets acceleration parameters for X and Y axes.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This API gets the current acceleration parameters for X and Y axes.

The smooth factor represents the jerk time and all parameters unit in milliseconds.

Prototype

```
int GetAccParams(
    int SocketID,
    int * XaccTime_ms,
    int * XsmoothFactor_ms,
    int * YaccTime_ms,
    int * YsmoothFactor_ms
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|------------------|-------|--------------------------------------|
| XaccTime_ms | int * | X acceleration time in msec. |
| XsmoothFactor_ms | int * | X Smooth factor in msec (jerk time). |
| YaccTime_ms | int * | Y acceleration time in msec. |
| YsmoothFactor_ms | int * | Y Smooth factor in msec (jerk time). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.2.4 GetBrakeState

Name

GetBrakeState– Gets the brake status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function reads the current brake command signal state from Inhibit or GPIO connector.

Brake command signal:

- 0 = Brake OFF
- 1 = Brake ON

Prototype

```
int GetBrakeState(  
    int SocketID,  
    int * BrakeStatus  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-------------|-------|-------------------|
| BrakeStatus | int * | The brake status. |
|-------------|-------|-------------------|

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.

7.2.2.5 GetCurrentPosition

Name

GetCurrentPosition – Gets all current positions of X, X2 and Y.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name is valid: (-18)
- Not allowed due to configuration disabled: (-121)
- Not allowed because group is not initialized or not referenced: (-135)

Description

Read all current positions of Y, X, X2, Y laser and X laser.

Units:

Y and X positions: μm

X1 and X2 positions: counts

Y and X laser positions: counts

Prototype

```
int GetCurrentPosition (int SocketID, double * y_position_um, double *
x_position_um, int * x1_position_cnts, int * x2_position_cnts, int *
y_laser_position_cnts, int * x_laser_position_cnts)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------------------|----------|-------------------------------|
| y_position_um | double * | Y position in μm . |
| x_position_um | double * | X position in μm . |
| x1_position_cnts | int * | X1 position in counts. |
| x2_position_cnts | int * | X2 position in counts. |
| y_laser_position_cnts | int * | Y laser position in counts. |
| x_laser_position_cnts | int * | X laser position in counts. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: PositionerName doesn't exist or unknown command.
- -121: Not allowed due to configuration disabled.
- -135: Not allowed because group is not initialized or not referenced.

7.2.2.6 GetGantryMode

Name

GetGantryMode – Gets Gantry mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the set option: (-17)
- Checks the group name is valid: (-19)
- Verifies gantry mode getting is allowed: (-22)

Description

Get the current gantry option. Three “gantry” options are available:

- Option0 =>Gantry standard.
- Option1 =>Gantry force balance.
- Option2 =>Gantry force balance with interferometer.

Prototype

```
int GetGantryMode(
    int SocketID,
    char * Option
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|--------|--------|--|
| Option | char * | Option selection(Option0, Option1 or Option2). |
|--------|--------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.7 GetJogAcceleration

Name

GetJogAcceleration – Gets the acceleration set by “SetJogAcceleration”.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)

Description

This function returns the acceleration setting by the user to use the jog mode for one positioner or for all positioners of the XY group.

Prototype

```
int GetJogAcceleration(
    int SocketID,
    int * XaccelerationTime_ms,
    int * XsmoothFactor_ms,
    int * YaccelerationTime_ms,
    int * YsmoothFactor_ms
)
```

Input parameters

| | | |
|----------------------|-------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| XaccelerationTime_ms | int * | User jog Acceleration time for X in ms. |
| XsmoothFactor_ms | int * | User jog Smooth factor for X in ms. |
| YaccelerationTime_ms | int * | User jog Acceleration time for Y in ms. |
| YsmoothFactor_ms | int * | User jog Smooth factor for Y in ms. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.

7.2.2.8 GetJogVelocity

Name

GetJogVelocity – Changes “on the fly” the velocity in the jog mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)

Description

This function returns jog velocities and the jog velocity acknowledge timeout in milliseconds used by the jog mode in the XY group.

Prototype

```
int GetJogVelocity(
    int SocketID,
    double * Xvelocity,
    double * Yvelocity,
    int * joystickAckTimeout_ms
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------------------|----------|--|
| Xvelocity | double * | user jog velocity for X in $\mu\text{m/s}$. |
| Yvelocity | double * | user jog velocity for Y in $\mu\text{m/s}$. |
| joystickAckTimeout_ms | int * | user jog velocity acknowledge timeout in ms. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.

7.2.2.9 GetPistonState

Name

GetPistonState – Gets current status of Piston and Lift Pin.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Read the current status of Piston and Lift Pin :

- Piston command status.
- Piston limit UP (Engaged).
- Piston limit DOWN (Released).
- Lift Pin UP.

Piston signal meaning :

| | | |
|------------------------------|----------|----------------|
| Piston Command Status | 0 | Release piston |
| | 1 | Engage piston |

| | | |
|------------------------------|----------|-------------|
| Piston Engaged Status | 0 | Not Engaged |
| | 1 | Engaged |

| | | |
|-------------------------------|----------|--------------|
| Piston Released Status | 0 | Not Released |
| | 1 | Released |

| | | |
|---------------------------|----------|------|
| Lift Pin UP Status | 0 | DOWN |
| | 1 | UP |

Prototype

```
int GetPistonState(
    int SocketID,
    int * CommandState,
    int * isEngaged,
    int * isReleased,
    int * LiftPinUPInterlock
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the "TCP_ConnectToServer" function. |
|----------|-----|---|

Output parameters

| | | |
|--------------------|-------|---|
| CommandState | int * | Status of the Piston command (0 or 1). |
| isEngaged | int * | Status of the Piston Engaged (0 or 1). |
| isReleased | int * | Status of the Piston Released (0 or 1). |
| LiftPinUPInterlock | int * | Status of the Lift Pin UP (0 or 1). |

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -7: Wrong format in the command string.
- -9: Wrong number of parameters in the command.
- -15: Wrong parameter type in the command string: int, short, int * or short * expected.

7.2.2.10 GetVarX

Name

GetVarX – Sets new value for a specified parameter name from stages.ini for Y positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Get parameter value from stages.ini file for the X positioner.

Prototype

```
int GetVarX(
    int SocketID,
    char * ParameterName,
    double * ParameterValue
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |

Output parameters

| | | |
|----------------|----------|--|
| ParameterValue | double * | The value to be set for the “ParameterName”. |
|----------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.11 GetVarXSecondary

Name

GetVarXSecondary – Gets the configured value of the parameter name from stages.ini for X secondary positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Get the configured value of the parameter name from stages.ini for X secondary positioner.

Prototype

```
int GetVarXSecondary(
    int SocketID,
    char * ParameterName,
    double * ParameterValue
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |

Output parameters

| | | |
|----------------|----------|--|
| ParameterValue | double * | The value to be set for the “ParameterName”. |
|----------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.12 GetVarY

Name

GetVarY – Gets the configured value of the parameter name from stages.ini for Y positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Get the configured value of the parameter name from stages.ini for Y positioner.

Prototype

```
int GetVarY(
    int SocketID,
    char * ParameterName,
    double * ParameterValue
)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |

Output parameters

| | | |
|----------------|----------|--|
| ParameterValue | double * | The value to be set for the “ParameterName”. |
|----------------|----------|--|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.13 GetVelParams

Name

GetVelParams – Gets current velocity for X and Y axes.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API updates the current acceleration parameters for X and Y axes.

The smooth factor represents the jerk time and all parameters unit in milliseconds.

Prototype

```
int GetVelParams(
    int SocketID,
    double * Xvelocity,
    double * Yvelocity
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------|----------|---------------------------------|
| Xvelocity | double * | X velocity in $\mu\text{m/s}$. |
| Yvelocity | double * | Y velocity in $\mu\text{m/s}$. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.14 GetVerCommand

Name

GetVerCommand – Return firmware version.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the controller name and the firmware version number.

Example of returned version string: “XPS-Q8 Firmware V2.1.0”

- Controller name is XPS-Q8.
- Firmware version is V2.1.0.

Prototype

```
int GetVerCommand(  
    int SocketID,  
    char * Version  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------|--------|-----------------------|
| Version | char * | The firmware version. |
|---------|--------|-----------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.2.15 GetXVelParams

Name

GetXVelParams – This API returns the current velocity parameter in $\mu\text{m/s}$ for X axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API returns the current velocity parameter in $\mu\text{m/s}$ for X axis.

Prototype

```
int GetXVelParams(  
    int SocketID,  
    double * Xvelocity  
)
```

Input parameters

SocketID int Socket identifier gets by the
“TCP_ConnectToServer” function.

Output parameters

Xvelocity double * X velocity in $\mu\text{m/s}$.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.16 GetYVelParams

Name

GetYVelParams – This API returns the current velocity parameter in $\mu\text{m/s}$ for Y axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API returns the current velocity parameter in $\mu\text{m/s}$ for Y axis.

Prototype

```
int GetYVelParams(  
    int SocketID,  
    double * Yvelocity  
)
```

Input parameters

SocketID int Socket identifier gets by the
“TCP_ConnectToServer” function.

Output parameters

Yvelocity double * Y velocity in $\mu\text{m/s}$.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.17 GetZone

Name

GetZone – Gets current parameters of the defined circle zone.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name is valid: (-18)
- Not allowed due to configuration disabled: (-121)
- Not allowed because group is not initialized or not referenced: (-135)

Description

Get current parameters of the defined circle zone. A digital output is defined in the stage.ini file. It's always available after the home search. All parameters are defined in μm . The Radius and Hysteresis are defined to signal when going out the circle.

Prototype

```
int GetZone (int SocketID, double * x_center_um, double * y_center_um, double *
radius_um, double * hysteresis_um)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------------|----------|-------------------------------|
| x_center_um | double * | X center in μm . |
| y_center_um | double * | Y center in μm . |
| radius_um | double * | Radius in μs . |
| hysteresis_um | double * | Hysteresis in μm . |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: PositionerName doesn't exist or unknown command.
- -121: Not allowed due to configuration disabled.
- -135: Not allowed because group is not initialized or not referenced.

7.2.2.18 InitializeAndHomeX

Name

InitializeAndHomeX – Do home search on X axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the set option: (-17)
- Verifies this command is allowed: (-22)
- Checks state of physical ends of run: (-113)
- Checks the opened socket is valid: (-200)
- Checks this command is enabled for the current controller configuration: (-205)

Description

Initializes the motor, calibrates the encoder and activates the servo loop of each positioner of the XY group.

Next, performs a home search on the X positioner and configures the gantry mode used after homing.

Once the home search is finished with success, the group must be in “READY” state only if the Y positioner is already referenced. If it’s not the case, a home search on the Y positioner must be done.

To be “READY”, all axes must be referenced.

NOTE

The home search routine for each positioner is defined in the “stages.ini” file by the “HomeSearchSequenceType” key.

The home search time out is defined in the “stages.ini” file by the “HomeSearchTimeOut” key.

Prototype

```
int InitializeAndHomeX(
    int SocketID,
    char * Option
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Option | char * | Option selection(Option0, Option1 or Option2). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -25: Following Error.
- -28: Home search timeout.
- -33: Motion done timeout.
- -35: Position is outside of travel limits.
- -49: Inconsistent mechanical zero during home search.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.
- -200: Invalid socket.
- -202: Not allowed action due to an external motion interlock.
- -205: Not enable in your configuration.
- -208: Not allowed action because piston is engaged.
- -1004: Zygo signal is not present.

7.2.2.19 InitializeAndHomeXY

Name

InitializeAndHomeXY – Do home search on X then Y axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the set option: (-17)
- Verifies this command is allowed: (-22)
- Checks state of physical ends of run: (-113)
- Checks the opened socket is valid: (-200)
- Checks this command is enabled for the current controller configuration: (-205)

Description

This function initializes the motor, calibrates the encoder and activates the servo loop of each positioner of the XY group. Then, it performs a home search on X positioner and after on Y positioner. It configures the gantry mode used after homing.

Once the home search is finished with success, the group must be in “READY” state.

NOTE

The selected gantry option during the initialization phase is **Option0**.

The home search routine for each positioner is defined in the “stages.ini” file by the “HomeSearchSequenceType” key.

The home search time out is defined in the “stages.ini” file by the “HomeSearchTimeOut” key.

The home search sequence is defined in the “stages.ini” file by the “InitializationAndHomeSearchSequence”. The value must be “XthenY”.

Prototype

```
int InitializeAndHomeXY(
    int SocketID,
    char * Option
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Option | char * | Option selection(Option0, Option1 or Option2). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -28: Home search timeout.
- -33: Motion done timeout.
- -35: Position is outside of travel limits.
- -44: Slave error disabling master.
- -49: Inconsistent mechanical zero during home search.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.
- -120: Warning following error during move with position compare enabled.
- -200: Invalid socket.
- -205: Not enable in your configuration.

7.2.2.20 InitializeAndHomeY

Name

InitializeAndHomeY – Do home search on Y axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies this command is allowed: (-22)
- Checks state of physical ends of run: (-113)
- Checks the opened socket is valid: (-200)
- Checks this command is enabled for the current controller configuration: (-205)

Description

This function initializes the motor, calibrates the encoder and activates the servo loop of each positioner of the XY group. Then, it performs a home search on the Y positioner.

Once the home search is finished with success, the group must be in “READY” state only if the X positioner is already referenced. If it’s not the case, a home search on the X positioner must be done.

To be in “READY” state, all axes must be referenced.

NOTE

The home search routine for each positioner is defined in the “stages.ini” file by the “HomeSearchSequenceType” key.

The home search time out is defined in the “stages.ini” file by the “HomeSearchTimeOut” key.

Prototype

```
int InitializeAndHomeY(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -22: Not allowed action.
- -25: Following Error.
- -28: Home search timeout.
- -33: Motion done timeout.
- 35: Position is outside of travel limits.
- -49: Inconsistent mechanical zero during home search.
- -50: Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch.
- -113: Both ends of run activated.
- -200: Invalid socket.
- -202: Not allowed action due to an external motion interlock.
- -205: Not enable in your configuration.
- -208: Not allowed action because piston is engaged.
- -1004: Zygo signal is not present.

7.2.2.21 MoveAbsolute

Name

MoveAbsolute – Moves the stage to the end position. The positions are defined in um.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Invalid object type (group or positioner): (-8)
- Verifies target position in relation with the travel limits: (-17)
 - $TargetPosition \geq MinimumTargetPosition$.
 - $TargetPosition \leq MaximumTargetPosition$.
- Invalid positioner name: (-18)
- Invalid group name: (-19)
- Group status must be "READY" or "MOVING": (-22)

Description

This function executes an absolute motion to go to a target XY position. The group state must be “READY” or “MOVING” else the (-22) error is returned. If the group is “READY” then the group status becomes “MOVING”.

Each “positioner” move refers to the acceleration, velocity, minimumTjerkTime and maximumTjerkTime as defined in the “Stages.ini” file or as redefined by the “PositionerSGammaParametersSet” function.

If a slave error or a following error is detected during the moving then (-25) or ERR_SLAVE (-44) error is returned. In this case, the motion in progress is stopped and the group status becomes “DISABLE”.

If a “MotionDoneMode” is defined as “VelocityAndPositionWindowMotionDone” then an (-33) error can be returned if the time out (defined by “MotionDoneTimeout” in the stages.ini file) is reached before the motion done.

If “AbortMove” or “GroupMoveAbort” is done, an (-27) error is returned. In this case, the motion in progress is stopped and the group status becomes “READY”.

If a “GroupKill” command, an emergency brake or an emergency stop is occurred, an (-26) error is returned. In this case, the motion in progress is stopped and the group status becomes “NOT INITIALIZED”.

NOTE

The asynchronous moves for positioners of the same group are possible through the use of different sockets to send the function.

Prototype

```
int MoveAbsolute(
    int SocketID,
    double PositonAbsoluteX_um,
    double PositionAbsoluteY_um
)
```

Input parameters

| | | |
|---------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositonAbsoluteX_um | double | Target position in μm for X axis. |
| PositonAbsoluteY_um | double | Target position in μm for Y axis. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -8: Wrong object type for this command.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -25: Following Error.
- -26: Kill command or Emergency signal: check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features.
- -27: Move Aborted.
- -33: Motion done timeout.
- -44: Slave error disabling master.
- -120: Warning following error during move with position compare enabled.

7.2.2.22 MoveSlice

Name

MoveSlice – Executes a slice move on an XY group.

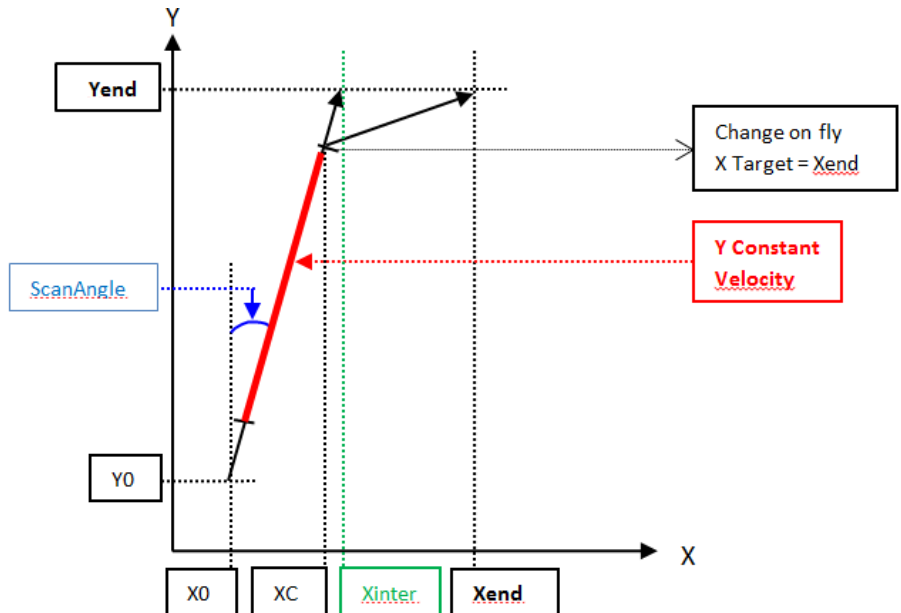
Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Verifies target position in relation with the travel limits: (-17)
- Checks the group status, it must be “READY” state: (-22)

Description

This API moves the stage to perform a “U-turn”.

The slice move begins a linear interpolation to move to (Xinter, Yend) but when the stage has finished the constant velocity phase, the slice move changes the target position to go to (Xend, Yend).



Prototype

```
int MoveSlice(
    int SocketID,
    double Yend_um,
    double Xend_um,
    double ScanAngle_urad
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Yend_um | double | y target position in μm. |
| Xend_um | double | x target position in μm. |
| ScanAngle_urad | double | Scan angle in μrad. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -5: Not allowed due to a positioner error or hardware status.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -202: Not allowed action due to an external motion interlock.
- -208: Not allowed action because piston is engaged.
- -1004: Zygo signal is not present.

7.2.2.23 RequestType1

Name

RequestType1– Gets data collection Type 1.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the data collection of type1.

Prototype

```
int RequestType1(
    int SocketID,
    char * Header,
    charhex32 * TimeStamp,
    charhex32 * IDFe,
    charhex32 * IDPos,
    charhex32 * XFe,
    charhex32 * XPos,
    charhex32 * YawFe,
    charhex32 * YawPos,
    charhex32 * YFe,
    charhex32 * YPos,
    charhex32 * XMotor,
    charhex32 * YMotor,
    charhex32 * XSinCos,
    charhex32 * YSinCos
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------|-------------|---|
| Header | char * | Type1, Type2 or Type3. |
| TimeStamp | charhex32 * | Internal counter in milliseconds. |
| 1DFe | charhex32 * | 1D+ following error in μm . |
| 1DPos | charhex32 * | 1D+ current position in μm . |
| XFe | charhex32 * | X following error in μm . |
| XPos | charhex32 * | Yaw following error in μm . |
| YawFe | charhex32 * | Yaw current position in μm . |
| YFe | charhex32 * | Y following error in μm . |
| YPos | charhex32 * | Y current position in μm . |
| XMotor | charhex32 * | X motor current in 1/10000 full scale. |
| YMotor | charhex32 * | Y motor current in 1/10000 full scale. |
| XSinCos | charhex32 * | X Sin Cos in Volts. |
| YSinCos | charhex32 * | Y Sin Cos in Volts. |

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -100: Internal error (memory allocation error, ...).
- -136: Wrong parameter type in the command string: charhex32 * expected.

7.2.2.24 RequestType2

Name

RequestType2– Gets data collection Type 2.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the data collection of type2.

Prototype

```
int RequestType2(
    int SocketID,
    char * Header,
    charhex32 * TimeStamp,
    charhex32 * ZygoLaserPower
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|----------------|-------------|-------------------------------------|
| Header | char * | Type1, Type2 or Type3. |
| TimeStamp | charhex32 * | Internal counter in milliseconds. |
| ZygoLaserPower | charhex32 * | Zygo Laser Power (ON = 1, OFF = 0). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -136: Wrong parameter type in the command string: charhex32 * expected.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.25 RequestType3

Name

RequestType3– Gets data collection Type 3.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function returns the data collection of type3.

Prototype

```
int RequestType3(
    int SocketID,
    char * Header,
    charhex32 * TimeStamp,
    charhex32 * ZygoSignalStrength1,
    charhex32 * ZygoSignalStrength2
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------------------|-------------|-----------------------------------|
| Header | char * | Type1, Type2 or Type3. |
| TimeStamp | charhex32 * | Internal counter in milliseconds. |
| ZygoSignalStrength1 | charhex32 * | Zygo Signal Strength 1. |
| ZygoSignalStrength2 | charhex32 * | Zygo Signal Strength 2. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -17: Parameter out of range or incorrect.
- -136: Wrong parameter type in the command string: charhex32 * expected.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.26 SetAccParams

Name

SetAccParams – Sets acceleration parameters for X and Y axes.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This API updates the current acceleration parameters for X and Y axes.

The smooth factor represents the jerk time and all parameters unit in milliseconds.

Prototype

```
int SetAccParams(
    int SocketID,
    int XaccTime_ms,
    int XsmoothFactor_ms,
    int YaccTime_ms,
    int YsmoothFactor_ms
)
```

Input parameters

| | | |
|------------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| XaccTime_ms | int | X acceleration time in msec. |
| XsmoothFactor_ms | int | X Smooth factor in msec (jerk time). |
| YaccTime_ms | int | Y acceleration time in msec. |
| YsmoothFactor_ms | int | Y Smooth factor in msec (jerk time). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.2.27 SetBrake

Name

SetBrake– Sets Brake command.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the break feature is enabled: (-205)

Description

This function sets brake command signal from Inhibit or GPIO connector.

Brake commands:

- 0 = Brake OFF
- 1 = Brake ON

Prototype

```
int SetBrake(
    int SocketID,
    int Command
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Command | int | Brake command (0 or 1). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.

7.2.2.28 SetGantryMode

Name

SetGantryMode – Sets Gantry mode (Option0, Option1 or Option2).

Input tests

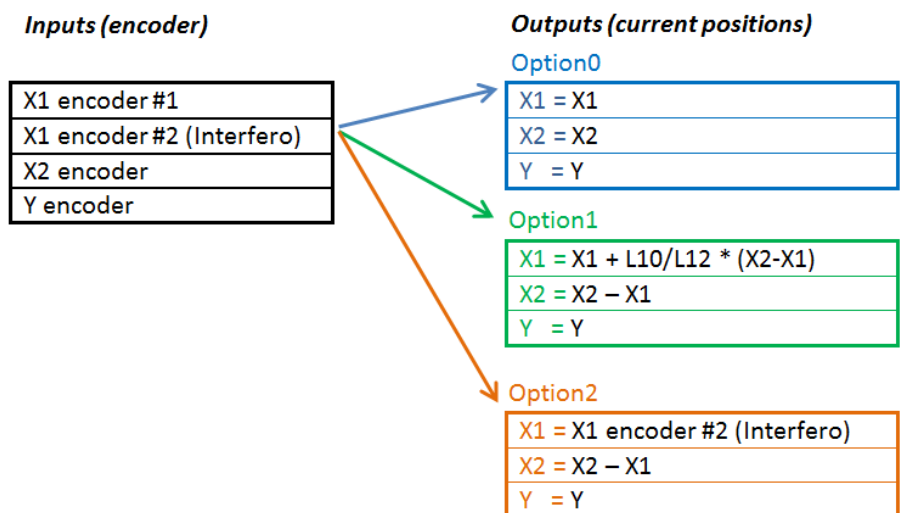
- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the set option: (-17)
- Checks the group name is valid: (-19)
- Checks if XY gantry mode is enabled: (-205)

Description

Set the gantry option to use. It’s possible to configure the gantry mode only when the XY group is in “READY” or “DISABLE” state.

Three “gantry” options are available:

- Option0 =>Gantry standard.
- Option1 =>Gantry force balance.
- Option2 =>Gantry force balance with interferometer.



Prototype

```
int SetGantryMode(
    int SocketID,
    char * Option
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Option | char * | Option selection(Option0, Option1 or Option2). |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -17: Parameter out of range or incorrect.
- -19: GroupName doesn't exist or unknown command.
- -205: Not enable in your configuration.

7.2.2.29 SetJogAcceleration

Name

SetJogAcceleration – Changes the acceleration parameters in the jog mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group status must be “JOGGING”: (-22)

Description

This function allows changing the acceleration used by the jog mode. If an error occurs, each positioner stops and the velocity value is set to zero.

To use this function, the jog mode must be enabled (the call of ”StartJog” function is required). If the group status is not “JOGGING” then the (-22) error is returned.

If a slave error or a following error is detected during the jog setting then (-25) error or (-44) error is returned. In this case, the motion is stopped, the jog mode is disabled and the group status becomes “DISABLE”.

Prototype

```
int SetJogAcceleration(
    int SocketID,
    int XaccelerationTime_ms,
    int XsmoothFactor_ms,
    int YaccelerationTime_ms,
    int YsmoothFactor_ms
)
```

Input parameters

| | | |
|----------------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| XaccelerationTime_ms | int | User jog Acceleration time for X in ms. |
| XsmoothFactor_ms | int | User jog Smooth factor for X in ms. |
| YaccelerationTime_ms | int | User jog Acceleration time for Y in ms. |
| YsmoothFactor_ms | int | User jog Smooth factor for Y in ms. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.30 SetJogVelocity

Name

SetJogVelocity – Changes “on the fly” the velocity in the jog mode.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group status must be “JOGGING”: (-22)

Description

This function allows changing “on the fly” the velocity used by the jog mode in the XY group. If an error occurs, each positioner stops and the velocity value is set to zero.

To use this function, the jog mode must be enabled (the call of the “StartJog” function is required). If the group status is not “JOGGING” then the (-22) error is returned.

If a slave error or a following error is detected during the jog setting then the (-25) error or (-44) error is returned. In this case, the motion is stopped, the jog mode is disabled and the group status becomes “DISABLE”.

NOTE

This function is available only for an XY group.

Prototype

```
int SetJogVelocity(
    int SocketID,
    double Xvelocity,
    double Yvelocity,
    int joystickAckTimeout_ms
)
```

Input parameters

| | | |
|-----------------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Xvelocity | double | user jog velocity for X in $\mu\text{m/s}$. |
| Yvelocity | double | user jog velocity for Y in $\mu\text{m/s}$. |
| joystickAckTimeout_ms | int | user jog velocity acknowledge timeout in ms. |

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.31 SetPiston

Name

SetPiston – Sets command to engage or release piston.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if the brake feature is enabled: (-205)
- Check if try to release piston when Lift Pin is UP: (-202)

Description

Send command to engage or release piston.

Piston commands:

- 0 = Release Piston
- 1 = Engage Piston

Prototype

```
int SetPiston(
    int SocketID,
    int Command
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Command | int | Piston command (0 or 1). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
 - -202: Not allowed action due to an external motion interlock.
- -205: Not enable in your configuration.

7.2.2.32 SetVarX

Name

SetVarX – Sets new value for a specified parameter name from stages.ini for X positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Set new value for the specified parameter name from stages.ini file for the X positioner.

Prototype

```
int SetVarX(
    int SocketID,
    char * ParameterName,
    double ParameterValue
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |
| ParameterValue | double | The value to be set for the “ParameterName”. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.33 SetVarXSecondary

Name

SetVarXSecondary – Sets new value for a specified parameter name from stages.ini for X secondary positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Set new value for the specified parameter name from stages.ini file for the X secondary positioner.

Prototype

```
int SetVarXSecondary(
    int SocketID,
    char * ParameterName,
    double ParameterValue
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |
| ParameterValue | double | The value to be set for the “ParameterName”. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.34 SetVarY

Name

SetVarY – Sets new value for a specified parameter name from stages.ini for Y positioner.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter value: (-17)
- Checks positioner name: (-18)
- Verifies the positioner is from a XY group: (-22)

Description

Set new value for the specified parameter name from stages.ini file for the X secondary positioner.

Prototype

```
int SetVarY(
    int SocketID,
    char * ParameterName,
    double ParameterValue
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| ParameterName | char * | Stages.ini parameter name. |
| ParameterValue | double | The value to be set for the “ParameterName”. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -18: Positioner Name doesn't exist or unknown command.
- -22: Not allowed action.

7.2.2.35 SetVelParams

Name

SetVelParams – Sets acceleration parameters for X and Y axes.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API updates the current velocity parameters in $\mu\text{m/s}$ for X and Y axes.

Prototype

```
int SetAccParams(
    int SocketID,
    double Xvelocity,
    double Yvelocity
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Xvelocity | double | X velocity in $\mu\text{m/s}$. |
| Yvelocity | double | Y velocity in $\mu\text{m/s}$. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.36 SetXVelParams

Name

SetXVelParams – Sets velocity for X axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API updates the velocity parameter in $\mu\text{m/s}$ for X axis.

Prototype

```
int SetXVelParams(  
    int SocketID,  
    double Xvelocity  
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Xvelocity | double | X velocity in $\mu\text{m/s}$. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.37 SetYVelParams

Name

SetYVelParams – Sets velocity for Y axis.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks motion profile: (-8)

Description

This API updates the velocity parameter in $\mu\text{m/s}$ for Y axis.

Prototype

```
int SetYVelParams(  
    int SocketID,  
    double Yvelocity  
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Yvelocity | double | Y velocity in $\mu\text{m/s}$. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.38 SetZone

Name

SetZone – Sets parameters to define the circle zone.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the positioner name is valid: (-18)
- Not allowed due to configuration disabled: (-121)
- Not allowed because group is not initialized or not referenced: (-135)

Description

Set parameters to define a circle zone.

An output signal will be generated when the position is inside the circle.

The digital output is defined in the stage.ini file.

It's always available after the home search.

All parameters are defined in μm .

The Radius and Hysteresis are defined to signal when going out the circle.

Prototype

```
int SetZone (int SocketID, double x_center_um, double y_center_um, double
radius_um, double hysteresis_um)
```

Input parameters

| | | |
|---------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| x_center_um | double | X center in μm . |
| y_center_um | double | Y center in μm . |
| radius_um | double | Radius in μm . |
| hysteresis_um | double | Hysteresis in μm . |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -18: PositionerName doesn't exist or unknown command.
- -121: Not allowed due to configuration disabled.
- -135: Not allowed because group is not initialized or not referenced.

7.2.2.39 StartJog

Name

StartJog – Enables the jog mode in XY group.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks the positioner name: (-18)
- Checks the group name: (-19)
- Group status must be “READY”: (-22)
- Backlash must be not activated: (-46)

Description

This function enables the Jog mode for the first declared XY group. To use this function, the group must be in the “READY” state and all positioners must be idle (means velocity must be 0).

This function allows going to the “JOGGING” state. If the group state is not “READY”, the (-22) error is returned.

NOTE

Use the “EndJog” function to disable the jog mode.

Prototype

```
int GetJogAcceleration(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -18: Not allowed due to a positioner error or hardware status.
- -19: GroupName doesn't exist or unknown command.
- -22: Not allowed action.
- -46: Not allowed action due to backlash.

7.2.2.40 WaitMotionEnd

Name

WaitMotionEnd – Wait the end of move (XY group only).

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Group must be “XY”: (-8)
- Checks expected position after motion: (-211)

Description

This function allows waiting the real end of move (after a GroupMoveAbsolute, GroupMoveRelative or GroupMoveSlice).

NOTE

This function is available only for an XY group.

Prototype

```
int WaitMotionEnd(
    int SocketID,
    char * GroupName,
    double TimeOutMs,
    double YPosition,
    double XPosition
)
```

Input parameters

| | | |
|-----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| GroupName | char * | XY Group name. |
| TimeOutMs | double | Time out in milliseconds. |
| YPosition | double | Y position to check in microns. |
| XPosition | double | X position to check in microns. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -22: Not allowed action.
- -211: Not expected position after motion.

7.2.2.41 ZygoADCDiagnosticStatusGet

Name

ZygoADCDiagnosticStatusGet – Gets the diagnostic ADC status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Axis number and Zygo axis number: (-17)

Description

Returns the diagnostic ADC status in relation to the ADC Mux number.

Prototype

```
int ZygoADCDiagnosticStatusGet(
    int SocketID,
    int Axis,
    int ADCMuxNumber,
    char * ADCDiagStatus
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | Zygo axis number (1 or 2). |
| ADCMuxNumber | int | ADC Mux (refer to table 4-12 from ZMI2402 manual). |

Output parameters

| | | |
|---------------|--------|-----------------------------------|
| ADCDiagStatus | char * | Raw value from Diag ADC Register. |
|---------------|--------|-----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -17: Parameter out of range or incorrect.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.42 ZygoAmplitudeGet

Name

ZygoAmplitudeGet – Gets the reference channel status and measuring channel amplitude.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Returns the reference channel status and the measuring channel amplitudes.

Prototype

```
int ZygoAmplitudeGet(
    int SocketID,
    int * ZygoReferenceSignalStatus,
    int * Meas1Signal,
    int * Meas2Signal
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------------------------|-------|---|
| EthernetCommunicationStatus | int * | 1 = Connected, 0 = Not connected. |
| Meas1Signal | int * | Measure 1 Signal Strength (refer to ZMI 2402 Diagnostic ADC). |
| Meas2Signal | int * | Measure 2 Signal Strength (refer to ZMI 2402 Diagnostic ADC). |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -1001: API. The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer

7.2.2.43 ZygoConnectToServer

Name

ZygoConnectToServer – Connect ZYGO to server.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)
- Checks Zygo is enabled: (-205)

Description

This function opens a TCP/IP communication with a ZMI Measuring board.

Prototype

```
int ZygoConnectToServer(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.
- -205: Not enable in your configuration.
- -1002: Connection to Zygo TCP server failed.
- -1003: The XPS controller is already connected to Zygo TCP server.

7.2.2.44 ZygoDisconnectFromServer

Name

ZygoDisconnectFromServer – Disconnect ZYGO from server.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Close the TCP/IP communication opened with the ZYGO ZMI box.

Prototype

```
int ZygoDisconnectFromServer(  
    int SocketID  
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.2.45 ZygoErrorStatusGet

Name

ZygoErrorStatusGet – Gets the ZYGO error status code via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo axis value: (-17)
- Checks Zygo is enabled: (-205)

Description

This function returns the ZYGO axis error code.

The axis error codes are listed in the “Zygo error status list”.

The description of the axis error code can be getting with the “ZygoErrorStatusStringGet” function.

Prototype

```
int ZygoErrorStatusGet(
    int SocketID,
    int Axis,
    char * ErrorStatus
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | ZMI Axis number (1 = Y axis and 2 = X axis). |

Output parameters

| | | |
|-------------|--------|------------------------|
| ErrorStatus | char * | ZMI Axis Error Status. |
|-------------|--------|------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.46 ZygoErrorStatusStringGet

Name

ZygoErrorStatusStringGet – Gets the ZYGO axis error status description via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo axis value: (-17)

Description

This function returns the ZYGO axis error status description.

Prototype

```
int ZygoErrorStatusStringGet(
    int SocketID,
    int Axis,
    char * ErrorStatusDescription
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | ZMI Axis number (1 = Y axis and 2 = X axis). |

Output parameters

| | | |
|------------------------|--------|------------------------------------|
| ErrorStatusDescription | char * | ZMI Axis Error Status description. |
|------------------------|--------|------------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.2.47 ZygoEthernetCommunicationStatusGet

Name

ZygoEthernetCommunicationStatusGet – Gets ZYGO Ethernet Connection Status.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Get the Ethernet Communication Status: Connected or Not connected.

Prototype

```
int ZygoEthernetCommunicationStatusGet(
    int SocketID,
    int * EthernetCommunicationStatus
)
```

Input parameters

| | | |
|----------|-----|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|--|

Output parameters

EthernetCommunicationStatus int * 1 = Connected, 0 = Not connected.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.

7.2.2.48 ZygoGetPEGLastCommunicationTime

Name

ZygoGetPEGLastCommunicationTime – Gets the last communication time to configure Zygo PEG.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the XPS controller configuration: (-4)

Description

This function gets the last communication time to configure Zygo PEG in seconds.

Prototype

```
int ZygoGetPEGLastCommunicationTime(  
    int SocketID,  
    double * LastCommunicationTime,  
    )
```

Input parameters

| | | |
|-----------|----------|--|
| SocketID | int | Socket identifier gets by the TCP_ConnectToServer” function. |
| ParamName | double * | Last communication time to configure PEG (s). |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -4: Unknown command.

7.2.2.49 ZygoGetVerInterfero

Name

ZygoGetVerInterfero – Gets firmware version of ZMI system (ZYGO interferometer) via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo is enabled: (-205)

Description

This function returns the ZMI system name and its firmware version number.

Prototype

```
int ZygoGetVerInterfero(
    int SocketID,
    char * Version
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|---------|--------|---------------------|
| Version | char * | ZMI system version. |
|---------|--------|---------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.51 ZygoPositionGet

Name

ZygoPositionGet – Gets positions of Y and X axes from ZMI system via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo is enabled: (-205)

Description

This function returns positions (36-bits) of Y and X axes.

Prototype

```
int ZygoPositionGet(
    int SocketID,
    long long int * PositionY,
    long long int * PositionX
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

| | | |
|-----------|-----------------|-----------------------------|
| PositionY | long long int * | Current position of Y axis. |
| PositionX | long long int * | Current position of X axis. |

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.52 ZygoReadLong

Name

ZygoReadLong – Read a long register from a ZMI Measuring board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function reads a LONG register (max 32-bits) from a ZMI Measuring board.

Example

Read Control Register 1 on Axis 1:

ZygoReadLong (AXIS1, A)

ZMI Measuring board Response:

#H70

Prototype

```
int ZygoReadLong(
    int SocketID,
    char * AxisNum,
    char * Register,
    char * Response
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| AxisNum | char * | “AXIS1” or “AXIS2”. |
| Register | char * | Register value in hexadecimal. |

Output parameters

| | | |
|----------|--------|---|
| Response | char * | Response returned by the ZMI Measuring board. |
|----------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.53 ZygoReadWord

Name

ZygoReadWord – Read a long register from a ZMI Measuring board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function reads a WORD register data (max 16-bits) from a ZMI Measuring board.

Example

Read Control Register 1 on Axis 2:

ZygoReadWord (AXIS2, A)

ZMI Measuring board Response:

#H1

Prototype

```
int ZygoReadWord(
    int SocketID,
    char * AxisNum,
    char * Register,
    char * Response
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| AxisNum | char * | “AXIS1” or “AXIS2”. |
| Register | char * | Register value in hexadecimal. |

Output parameters

| | | |
|----------|--------|---|
| Response | char * | Response returned by the ZMI Measuring board. |
|----------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.54 ZygoRegisterGet

Name

ZygoRegisterGet – Gets register value from P2 ZYGO board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)

Description

This function reads the register value from P2 ZYGO board.

Refer to the list of P2 interface registers.

Prototype

```
int ZygoRegisterGet(
    int SocketID,
    char * PositionerName,
    int Register,
    int * Value
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| Register | int | Register value in hexadecimal. |

Output parameters

| | | |
|-------|-------|---|
| Value | int * | Response returned by the ZMI Measuring board. |
|-------|-------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.55 ZygoRegisterSet

Name

ZygoRegisterSet – Sets register value from P2 ZYGO board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks the object type of this command is valid: (-8)

Description

This function sets the register value from P2 ZYGO board.

Refer to the list of P2 interface registers.

Prototype

```
int ZygoRegisterSet(
    int SocketID,
    char * PositionerName,
    int Register,
    int Value
)
```

Input parameters

| | | |
|----------------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| PositionerName | char * | Positioner name. |
| Register | int | Register value in hexadecimal. |
| Value | int | Response returned by the ZMI Measuring board. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -8: Wrong object type for this command.

7.2.2.56 ZygoReset

Name

ZygoReset – Reset all Zygo axes.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks if Zygo mode is enabled: (-205)
- Checks Zygo TCP Server Connexion: (-1001)

Description

This function sends commands to Zygo ZMI 2402 to reset all Zygo axes (#1 and #2).

Prototype

```
int ZygoReset(  
    int SocketID  
)
```

Input parameters

SocketID int Socket identifier gets by the
“TCP_ConnectToServer” function.

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -205: Not enable in your configuration.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.57 ZygoResetX

Name

ZygoResetX – Reset X axis via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo is enabled: (-205)

Description

This function resets X axis (defined as Zygo axis #2).

The **Axis Reset** resets only the measurement function and error conditions, and does not affect axis configuration. An axis reset is identical to the combined effects of the **Position Reset**, **Time Reset**, and **Error Reset**.

The **Position Reset** reinitializes the position measurement function and sets the position register to zero.

The **Time Reset** immediately sets the time register to zero.

The **Error Reset** resets all errors.

NOTE

Due to minor timing differences, simultaneous multi-axis reset commands may result in some axes actually being reset one reference clock period (50 ns) later than other axes.

The allowable operating conditions and the time required for an axis reset depends on the settings in *Aux Control 0* as shown below.

The **reset time** is from the *Reset Axis* command until *Position Reset Complete* status.

This time includes the *Reset Delay* (RD) specified in *Control Register 2*. Table 3-8 specifies the *Reset Delay* choices.

Prototype

```
int ZygoResetX(
    int SocketID
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
|----------|-----|---|

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run `ZygoStartInterferometer` API.

7.2.2.58 ZygoResetY

Name

ZygoResetY – Reset Y axis via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo is enabled: (-205)

Description

This function resets Y axis (defined as Zygo axis #1).

The **Axis Reset** resets only the measurement function and error conditions, and does not affect axis configuration. An axis reset is identical to the combined effects of the **Position Reset**, **Time Reset**, and **Error Reset**.

The **Position Reset** reinitializes the position measurement function and sets the position register to zero.

The **Time Reset** immediately sets the time register to zero.

The **Error Reset** resets all errors.

NOTE

Due to minor timing differences, simultaneous multi-axis reset commands may result in some axes actually being reset one reference clock period (50 ns) later than other axes.

The allowable operating conditions and the time required for an axis reset depends on the settings in *Aux Control 0* as shown below.

Table 3-7 Axis Reset Conditions and Required Time

| <i>Enable Reset Finds Velocity</i> <i>Aux Control 0</i> | <i>RFV Mode</i> <i>Aux Control 0</i> | Reset Time | Max Velocity during reset | Max Acceleration during reset |
|--|---|------------------|---------------------------|-------------------------------|
| 0 | - | 22 μ s + RD | \pm 0.1 m/s | 10 g |
| 1 | 0 (Diagnostic) | 2.0 ms + RD | \pm 2.1 m/s | 0.1 g |
| 1 | 1 (Default) | 210 μ s + RD | \pm 2.1 m/s | 10 g |

The **reset time** is from the *Reset Axis* command until *Position Reset Complete* status.

This time includes the *Reset Delay* (RD) specified in *Control Register 2*. Table 3-8 specifies the *Reset Delay* choices.

Table 3-8 Reset Delay

| RD2 | RD1 | RD0 | Reset Delay (RD) |
|-----|-----|-----|------------------|
| 0 | 0 | 0 | 2 μ s |
| 0 | 0 | 1 | 6 μ s |
| 0 | 1 | 0 | 26 μ s |
| 0 | 1 | 1 | 102 μ s |
| 1 | 0 | 0 | 410 μ s |
| 1 | 0 | 1 | 1.6 ms |
| 1 | 1 | 0 | 6.5 ms |
| 1 | 1 | 1 | 26.2 ms |

Prototype

```
int ZygoResetY(  
    int SocketID  
)
```

Input parameters

SocketID int Socket identifier gets by the
"TCP_ConnectToServer" function.

Output parameters

None.

Return (In addition to the results of "**Input Tests Common to all XPS Functions**")

- 0: No error.
- -2: TCP timeout.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.59 ZygoSendAndReceive

Name

ZygoSendAndReceive – Send a command and read a response from ZYGO box.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Send a command to ZYGO box and wait a response from ZYGO box.

The command string must be defined in the ZYGO format.

Prototype

```
int ZygoSendAndReceive(
    int SocketID,
    char * Command,
    char * Response
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Command | char * | “AXIS1” or “AXIS2”. |
| Register | char * | Command to send to ZYGO box. |

Output parameters

| | | |
|----------|--------|------------------------------|
| Response | char * | Response read from ZYGO box. |
|----------|--------|------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.60 ZygoSetOffsetX

Name

ZygoSetOffsetX – Sets offset value for X axis via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter type: (-127)
- Checks Zygo is enabled: (-205)

Description

This function sets the offset value for X (defined as Zygo axis #2).

The offset value is subtracted from the position value.

Prototype

```
int ZygoSetOffsetX(
    int SocketID,
    long Xoffset
)
```

Input parameters

| | | |
|----------|------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Xoffset | long | Offset value for X. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -127: Wrong parameter type in the command string: long or long * expected.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.61 ZygoSetOffsetY

Name

ZygoSetOffsetY – Sets offset value for Y axis via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter type: (-127)
- Checks Zygo is enabled: (-205)

Description

This function sets the offset value for Y (defined as Zygo axis #1).

The offset value is subtracted from the position value.

Prototype

```
int ZygoSetOffsetY(
    int SocketID,
    long Yoffset
)
```

Input parameters

| | | |
|----------|------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Yoffset | long | Offset value for Y. |

Output parameters

None.

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -127: Wrong parameter type in the command string: long or long * expected.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.62 ZygoSetPEGParams

Name

ZygoSetPEGParams – Sets PEG parameters (ZYGO System) via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameter type: (-127)
- Checks Zygo is enabled: (-205)

Description

This function sets PEG (Position Event Generator) parameters.

The PEG function generates an electronic signal when the internal position measurement meets criteria established by values programmed into the board by the host system.

The first pulse is output when the position value enters the active region between the P1 and P2 values.

Additional pulses are output each time the position changes by the prescribed *Delta 1*, or in *Delta 2* mode

For K1 number of PEG events, the increment value is *Delta 1*

For K2 number of PEG events, the increment value is *Delta 2*

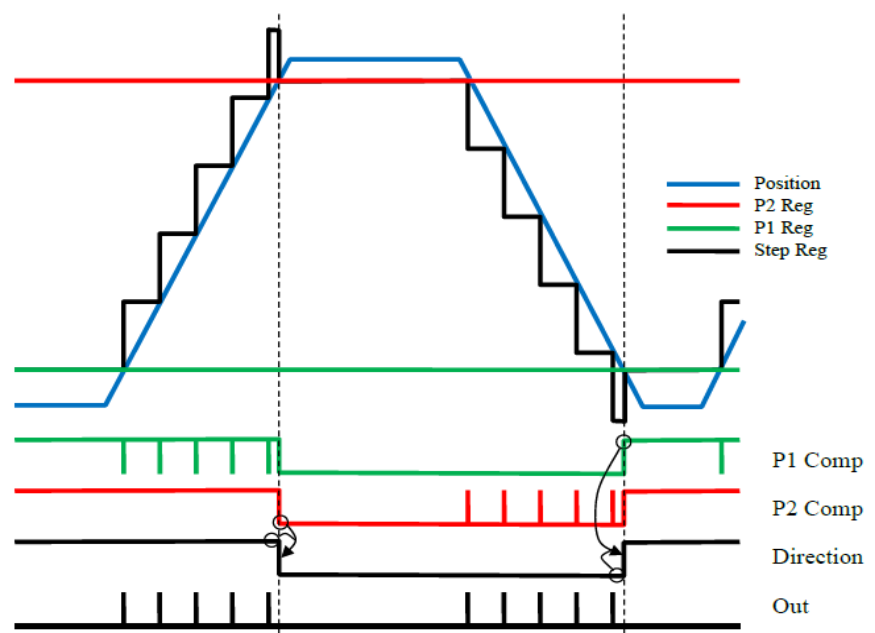
This repeats K1, K2, K1, K2, etc...

Pulses stop when the position leaves the active region between the P1 and P2 values.

This may be repeated for travel in either direction between P1 and P2.

A number of other features, such as signal polarity, axis select (for 2402), and pulse duration shall be programmable. Direction of motion is inferred by the position crossing the start and stop values. Starting operation at a point in between the start and stop values is undefined.

When entering at P1, the PEG starts with Delta 1. When entering at P2, the Delta is selectable by the *PEG P2 Delta* bit in the PEG Control register (refer to PEG Control register).



NOTE

**This API is enabled only with a ZMI system equipped of PEG function.
Refer to *ZYGO ZMI 2400 with PEG Function (revision J)*.**

Prototype

```
int ZygoSetPEGParams(
    int SocketID,
    long P1,
    long P2,
    unsigned int Delta1,
    long K1,
    unsigned int Delta2,
    long K2,
    int ControlWord
)
```

Input parameters

| | | |
|-------------|--------------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| P1 | long | Start PEG region (+/- 660 mm). |
| P2 | long | End PEG region (+/- 660 mm and P2 >P1). |
| Delta1 | unsigned int | Increment value (max 20 μm). |
| K1 | long | Number of PEG events. |
| Delta2 | unsigned int | Increment value (max 20 μm). |
| K2 | long | Number of PEG events. |
| ControlWord | int | PEG control (refer to PEG Control register). |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -2: TCP timeout.
- -127: Wrong parameter type in the command string: long or long * expected.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.63 ZygoStartBoardP2

Name

ZygoStartBoardP2– Starts ZYGO P2 board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks input parameters value: (-17)

Description

This function allows initializing and starting the ZYGO P2 board.

Required settings to get the board up and running after power up:

Switch Settings

SW6-3:4 Set to ON ON for INT0 to deliver Axis 1 interrupts
 SW6-5:6 Set to OFF ON for INT1 to deliver Axis 2 interrupts
 SW6-7:8 Set to OFF OFF for sampling on SCLK1 falling edge
 SW8-1:8 Set all to ON for a 00000000 base P2 address (recommendation)

This will correspond to required A11:4 on the P2 pins.

-Switch settings can be found on **2-9** in the manual.

Register Settings

Control Register 1 Set the desired P2_RESET * line behavior (bits 6:3)

Bit 8 (P2 latch Mode) = 0, External sample input

Bit 9 (P2 D16 Select) = 0, for 32-bit data path

- The above must be done for both axes.

Bit 10 (P2 Sclk0 Disable) = 1

Bit 11 (P2 Sclk0 Output Enable) = 1

- The above must be done for axis 1 only.

Control Register 2 Set the desired *Kp* digital filter (bits 6:4)

the desired *Kv* digital filter values, (bits 2:0)

- See section of ZMI manual for more information

Set the *Change Position Direction Sense* bit. This bit defines the interferometer direction.

Setting this bit reverses the direction sense of the position accumulator. An axis reset must be performed after changing the direction sense.

- All of the above must be done for both axes.

Data Age Adjust Program the appropriate data age adjust values

See detailed procedure below for more information

- This must be done for both axes.

P2 Interrupt Enable Select which errors will generate a signal on the P2_INT *

- This must be done for both axes.

Procedural Steps

Read the status register until *Reference Present* bit is present in the *Status Register*. This indicates that the laser is locked. Check the *Measure Present* bit on each axis; when this bit is active, perform an axis reset for that axis. Ensure Error Status Register is cleared. Position information should now be continuously updated, as long as there are no Fatal Errors.

Prototype

```
int ZygoStartBoardP2(
    int SocketID,
    int Kv,
    int Kp,
    bool ReverseDirectionSense,
    int DataAgeAdjust
)
```

Input parameters

| | | |
|-----------------------|------|--|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Kv | int | digital filter Kv gain = -7, -9, -11, -13, -15, -17, -19 or -32. |
| Kp | int | digital filter Kp gain = -2, -3, -4, -5, -6, -7, -8 or -9. |
| ReverseDirectionSense | bool | true = reversed direction, false = normal direction. |
| DataAgeAdjust | int | Data Age Adjust Register. |

Output parameters

None.

Return (In addition to the results of “**Input Tests Common to all XPS Functions**”)

- 0: No error.
- -17: Parameter out of range or incorrect.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.

7.2.2.64 ZygoStartInterferometer

Name

ZygoStartInterferometer – Start ZYGO interferometer.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

Start ZYGO interferometer: Open Ethernet connection, Check signals, Start P2 Board
This API can take several minutes.

Prototype

```
int ZygoADCDiagnosticStatusGet(
    int SocketID,
    int Axis,
    int ADCMuxNumber,
    char * ADCDiagStatus
)
```

Input parameters

| | | |
|--------------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | Zygo axis number (1 or 2). |
| ADCMuxNumber | int | ADC Mux (refer to table 4-12 from ZMI2402 manual). |

Output parameters

| | | |
|---------------|--------|-----------------------------------|
| ADCDiagStatus | char * | Raw value from Diag ADC Register. |
|---------------|--------|-----------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run. ZygoStartInterferometer API.
- -1002: Connection to Zygo TCP server failed.
- -1003: The XPS controller is already connected to Zygo TCP server.
- -1004: Zygo signal is not present.

7.2.2.65 ZygoStatusGet

Name

ZygoStatusGet – Gets the ZYGO axis status code via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo axis value: (-17)
- Checks Zygo is enabled: (-205)

Description

This function returns the ZYGO axis status code.

The axis status codes are listed in the “Zygo axis status list”.

The description of the axis status code can be getting with the “ZygoStatusStringGet” function.

Prototype

```
int ZygoErrorStatusGet(
    int SocketID,
    int Axis, char * Status
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | ZMI Axis number (1 = Y axis and 2 = X axis). |

Output parameters

| | | |
|--------|--------|------------------|
| Status | char * | ZMI Axis Status. |
|--------|--------|------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -17: Parameter out of range or incorrect.
- -205: Not enable in your configuration.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.66 ZygoStatusStringGet

Name

ZygoStatusStringGet – Gets the ZYGO axis status description via Ethernet.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.
- Checks Zygo axis value: (-17)

Description

This function returns the ZYGO axis status description.

Prototype

```
int ZygoStatusStringGet(
    int SocketID,
    int Axis,
    char * StatusDescription
)
```

Input parameters

| | | |
|----------|-----|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| Axis | int | ZMI Axis number (1 = Y axis and 2 = X axis). |

Output parameters

| | | |
|-------------------|--------|------------------------------|
| StatusDescription | char * | ZMI Axis Status description. |
|-------------------|--------|------------------------------|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -17: Parameter out of range or incorrect.

7.2.2.67 ZygoWriteLong

Name

ZygoWriteLong – Write data to a long register of ZMI Measuring board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function write data to a long register (max 32-bits) of ZMI Measuring board.

Example

Write 0x5000 to Control Register 1 on Axis 1:

ZygoWriteLong(Axis1, A, 5000)

ZMI Measuring board Response:

OK

Prototype

```
int ZygoWriteLong(
    int SocketID,
    char * AxisNum,
    char * Register,
    char * Data,
    char * Response
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| AxisNum | char * | “AXIS1” or “AXIS2”. |
| Register | char * | Register value in hexadecimal. |
| Data | char * | Data value in hexadecimal in max-32bits. |

Output parameters

| | | |
|----------|--------|---|
| Response | char * | Response returned by the ZMI Measuring board. |
|----------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

7.2.2.68 ZygoWriteWord

Name

ZygoWriteWord – Write data to a word register of ZMI Measuring board.

Input tests

- Refer to section 7.1: “Input Tests Common to all XPS Functions”.

Description

This function changes a word register data (max 16-bits) to a ZMI Measuring board.

Example

Write 0x0020 to Control Register 1 on Axis 1:

ZygoWriteWord(**AXIS1, A, 20**)

ZMI Measuring board Response:

OK

Prototype

```
int ZygoWriteWord(
    int SocketID,
    char * AxisNum,
    char * Register,
    char * Data,
    char * Response
)
```

Input parameters

| | | |
|----------|--------|---|
| SocketID | int | Socket identifier gets by the “TCP_ConnectToServer” function. |
| AxisNum | char * | “AXIS1” or “AXIS2”. |
| Register | char * | Register value in hexadecimal. |
| Data | char * | Data value in hexadecimal in max-16bits. |

Output parameters

| | | |
|----------|--------|---|
| Response | char * | Response returned by the ZMI Measuring board. |
|----------|--------|---|

Return (In addition to the results of “Input Tests Common to all XPS Functions”)

- 0: No error.
- -2: TCP timeout.
- -1000: Zygo command execution failed.
- -1001: The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API.
- Zygo errors: Refer to section 8.9: “Error List”.

8.0 Lists and Tables for XPS Functions

8.1 Event Triggers List

| [Actor.] | | [Category.] | | | | | | | | | Event Name | Parameters | | | |
|----------|------------|-------------|--------|--------|-----|-----------|--------|-----|----|--|----------------------------------|------------------------|-------|---|---|
| Group | Positioner | GPIO | TimerX | SGamma | Jog | XYLineArc | Spline | PVT | PT | | 1 | 2 | 3 | 4 | |
| | | | | | | | | | | | Immediate | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | Always | 0 | 0 | 0 | 0 |
| | | | ■ | | | | | | | | Timer | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | ■ | | | | | | MotionStart | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | ■ | | | | | | MotionEnd | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | ■ | | | | | | MotionState | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | MotionDone | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | MotionDoneTimeout | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | ■ | | | | | | ConstantVelocityStart | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantVelocityEnd | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | ■ | | | | | | ConstantVelocityState | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantAccelerationStart | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantAccelerationEnd | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantAccelerationState | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantDecelerationStart | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantDecelerationEnd | 0 | 0 | 0 | 0 |
| | ■ | | | ■ | | | | | | | ConstantDecelerationState | 0 | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | TrajectoryStart | 0 | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | TrajectoryEnd | 0 | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | TrajectoryState | 0 | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | ElementNumberStart | Element index | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | ElementNumberState | Element index | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | TrajectoryPulse | 0 | 0 | 0 | 0 |
| ■ | | | | | | ■ | ■ | ■ | ■ | | TrajectoryPulseState | 0 | 0 | 0 | 0 |
| | | ■ | | | | | | | | | DIHighState | Bit index | 0 | 0 | 0 |
| | | ■ | | | | | | | | | DIHighState | Bit index | 0 | 0 | 0 |
| | | ■ | | | | | | | | | DIHighLow | Bit index | 0 | 0 | 0 |
| | | ■ | | | | | | | | | DIHighLow | Bit index | 0 | 0 | 0 |
| | | ■ | | | | | | | | | DIHighLow | Bit index | 0 | 0 | 0 |
| | | ■ | | | | | | | | | ADCHighLimit | Value | 0 | 0 | 0 |
| | | ■ | | | | | | | | | ADCLowLimit | Value | 0 | 0 | 0 |
| | | ■ | | | | | | | | | ADCInWindow | min | max | 0 | 0 |
| | | ■ | | | | | | | | | ADCOutWindow | min | max | 0 | 0 |
| | ■ | | | | | | | | | | PositionerError | Mask | 0 | 0 | 0 |
| | ■ | | | | | | | | | | PositionerHardwareStatus | Mask | 0 | 0 | 0 |
| | ■ | | | | | | | | | | ExcitationSignalStart | 0 | 0 | 0 | 0 |
| | ■ | | | | | | | | | | ExcitationSignalEnd | 0 | 0 | 0 | 0 |
| | ■ | | | | | | | | | | WarningFollowingError | 0 | 0 | 0 | 0 |
| | ■ | | | | | | | | | | WaitForPositionLeftToRight | Target position | 0 | 0 | 0 |
| | ■ | | | | | | | | | | WaitForPositionRightToLeft | Target position | 0 | 0 | 0 |
| | ■ | | | | | | | | | | WaitForPositionToggled | Target position | 0 | 0 | 0 |
| | | | | | | | | | | | DoubleGlobalArrayEqual | Global variable number | value | 0 | 0 |
| | | | | | | | | | | | DoubleGlobalArrayDifferent | Global variable number | value | 0 | 0 |
| | | | | | | | | | | | DoubleGlobalArrayInferiorOrEqual | Global variable number | value | 0 | 0 |
| | | | | | | | | | | | DoubleGlobalArraySuperiorOrEqual | Global variable number | value | 0 | 0 |
| | | | | | | | | | | | DoubleGlobalArrayInferior | Global variable number | value | 0 | 0 |

| | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|----------------------------|------------------------|-------|-----|---|
| | | | | | | | | | | DoubleGlobalArraySuperior | Global variable number | value | 0 | 0 |
| | | | | | | | | | | DoubleGlobalArrayInWindow | Global variable number | min | max | 0 |
| | | | | | | | | | | DoubleGlobalArrayOutWindow | Global variable number | min | max | 0 |

8.2 Actions List

| [Actor.] | | | | Action Name | Parameters | | | |
|----------|------------|------|--------|-----------------------------|---------------------------------------|---|-----------|---|
| Group | Positioner | GPIO | TimerX | | 1 | 2 | 3 | 4 |
| | | ■ | | DACSet.CurrentPosition | Positioner name | Gain | Offset | 0 |
| | | ■ | | DACSet.CurrentVelocity | Positioner name | Gain | Offset | 0 |
| | | ■ | | DACSet.SetpointPosition | Positioner name | Gain | Offset | 0 |
| | | ■ | | DACSet.SetpointVelocity | Positioner name | Gain | Offset | 0 |
| | | ■ | | DACSet.SetpointAcceleration | Positioner name | Gain | Offset | 0 |
| | | ■ | | DACSet.Value | Value | 0 | 0 | 0 |
| | | ■ | | DOPulse | Mask | 0 | 0 | 0 |
| | | ■ | | DOToggle | Mask | 0 | 0 | 0 |
| | | ■ | | DOSet | Mask | Value | 0 | 0 |
| | | | | EventRemove | Trigger identifier (-1 for itself) | 0 | 0 | 0 |
| | | | | ExecuteCommand | Function name | Parameters (Between {} and separator is the semi-column) | Task name | |
| | | | | ExecuteTCLScript | TCL file name | Task name | Arguments | |
| | | | | ExternalGatheringRun | Nb of points | Divisor | 0 | 0 |
| | | | | GatheringOneData | 0 | 0 | 0 | 0 |
| | | | | GatheringRun | Nb of points | Divisor | 0 | 0 |
| | | | | GatheringRunAppend | 0 | 0 | 0 | 0 |
| | | | | GatheringStop | 0 | 0 | 0 | 0 |
| | | | | GlobalArrayDoubleSet | Global variable number | Double value | 0 | 0 |
| | | | | GlobalArrayStringSet | Global variable number | String value | 0 | 0 |
| | | | | KillTCLScript | Task name | 0 | 0 | 0 |
| ■ | | | | MoveAbort | 0 | 0 | 0 | 0 |
| ■ | | | | MoveAbortFast | Deceleration multiplier | 0 | 0 | 0 |
| | | | | SynchronizeProfiler | 0 | 0 | 0 | 0 |

8.3 Gathering Data Types

PositionerName.CurrentAcceleration

PositionerName.CurrentPosition

PositionerName.CurrentVelocity

PositionerName.SetpointAcceleration

PositionerName.SetpointPosition

PositionerName.SetpointVelocity

PositionerName.FollowingError

PositionerName.FollowingErrorCompensation (for precision platform only)

PositionerName.InnerFollowingError (for precision platform only)

PositionerName.ExcitationSignalInput

PositionerName.CorrectedEncoderPosition

PositionerName.CorrectedSetpointPosition

PositionerName.CorrectorOutput

PositionerName.EstimatedVelocity

PositionerName.CorrectorOutput BeforeCompensation (for precision platform only)

PositionerName.CorrectorOutput BeforeCompensationFiltered (precision platform)

PositionerName.CorrectorOutput BeforeDamperFilter (for precision platform only)

PositionerName.CorrectorOutput DamperFilter (for precision platform only)

PositionerName.CorrectorOutputDualPID (for precision platform only)

PositionerName.CorrectorOutputPID (for precision platform only)

PositionerName.RawCorrectorOutput (for precision platform only)

PositionerName.RawCurrentPosition (for precision platform only)

PositionerName.FilteredPIDOutputBeforeFeedForward (for precision platform only)

PositionerName.GantryOption (for precision platform only)

[HXP-D] *(for Hexapod group only)*

PositionerName can be :

GROUPNAME.X

GROUPNAME.Y

GROUPNAME.Z

GROUPNAME.U

GROUPNAME.V

GROUPNAME.W

XPS-Q Hardware:

- GPIO1.DI
- GPIO1.DO
- GPIO2.DI
- GPIO3.DI
- GPIO3.DO
- GPIO4.DI
- GPIO4.DO
- GPIO2.ADC1
- GPIO2.ADC2
- GPIO2.ADC3

- GPIO2.ADC4
- GPIO2.DAC1
- GPIO2.DAC2
- GPIO2.DAC3
- GPIO2.DAC4

XPS-RL or XPS-D Hardware:

Basic GPIO board:

- GPIO1.DI
- GPIO1.DO
- GPIO2.ADC1
- GPIO2.ADC2
- GPIO2.DAC1
- GPIO2.DAC2

Extended GPIO board:

- GPIO3.DI
- GPIO3.DO
- GPIO5.DI
- GPIO5.DO
- GPIO6.DI
- GPIO6.DO
- GPIO4.ADC1
- GPIO4.ADC2
- GPIO4.ADC3
- GPIO4.ADC4
- GPIO4.ADC5
- GPIO4.ADC6
- GPIO4.ADC7
- GPIO4.ADC8
- GPIO4.DAC1
- GPIO4.DAC2
- GPIO4.DAC3
- GPIO4.DAC4
- GPIO4.DAC5
- GPIO4.DAC6
- GPIO4.DAC7
- GPIO4.DAC8

ISRCorrectorTimePeriod

ISRCorrectorTimeUsage

ISRProfilerTimeUsage

ISRServitudesTimeUsage

CPUTotalLoadRatio

TimeFromBoot

8.4 External Gathering Data Types

PositionerName.ExternalLatchPosition

XPS-Q Hardware:

- GPIO2.ADC1
- GPIO2.ADC2
- GPIO2.ADC3
- GPIO2.ADC4
- GPIO2.DAC1
- GPIO2.DAC2
- GPIO2.DAC3
- GPIO2.DAC4

XPS-RL or XPS-D Hardware:

Basic GPIO board:

- GPIO2.ADC1
- GPIO2.ADC2
- GPIO2.DAC1
- GPIO2.DAC2

Extended GPIO board:

- GPIO4.ADC1
- GPIO4.ADC2
- GPIO4.ADC3
- GPIO4.ADC4
- GPIO4.ADC5
- GPIO4.ADC6
- GPIO4.ADC7
- GPIO4.ADC8
- GPIO4.DAC1
- GPIO4.DAC2
- GPIO4.DAC3
- GPIO4.DAC4
- GPIO4.DAC5
- GPIO4.DAC6
- GPIO4.DAC7
- GPIO4.DAC8

8.5 Positioner Error List

| Bit # | Mask | Error description |
|-------|-----------|---|
| 0 | 1 | General inhibition detected |
| 1 | 2 | Fatal following error detected |
| 2 | 4 | Home search time out |
| 3 | 8 | Motion done time out |
| 4 | 16 | Requested position exceed travel limits in trajectory or slave mode |
| 5 | 32 | Requested velocity exceed maximum value in trajectory or slave mode |
| 6 | 64 | Requested acceleration exceed maximum value in trajectory or slave mode |
| 7 | 168 | Clamping incoherence |
| 8 | 256 | Minus end of run activated |
| 9 | 512 | Plus end of run activated |
| 10 | 1024 | Minus end of run glitch |
| 11 | 2048 | Plus end of run glitch |
| 12 | 4096 | Encoder quadrature error |
| 13 | 8192 | Encoder frequency and coherancy error |
| 14 | 16384 | Sine and Cosine radius error |
| 15 | 32768 | X or Y correction is out of encoder correction limits |
| 16 | 65536 | Hard interpolator encoder error |
| 17 | 131072 | Hard interpolator encoder quadrature error |
| 20 | 1048576 | First driver in fault |
| 21 | 2097152 | Second driver in fault |
| 22 | 4194304 | AqB and Sine/Cosine out of phase |
| 24 | 16777216 | Home search mechanical zero inconsistency |
| 25 | 33554432 | Interferometer no signal error on axis or reference |
| 26 | 67108864 | Interferometer glitch error on axis or reference |
| 27 | 134217728 | Fatal internal error |
| 28 | 268435456 | GPIO transfer error |
| 29 | 536870912 | I2C transfer error |

NOTE

The most significant bit is always set to 1. So, all positioner errors are negative.

8.6 Positioner Hardware Status List

| Bit # | Mask | Error description |
|-------|------------|---|
| 0 | 1 | General inhibition detected |
| 2 | 4 | ZM high level |
| 8 | 256 | Minus end of run activated |
| 9 | 512 | Plus end of run activated |
| 10 | 1024 | Minus end of run glitch |
| 11 | 2048 | Plus end of run glitch |
| 12 | 4096 | Encoder quadrature error |
| 13 | 8192 | Encoder frequency or coherancy error |
| 14 | 16384 | Sine and Cosine radius error |
| 15 | 32768 | X or Y correction is out of encoder correction limits |
| 16 | 65536 | Hard interpolator encoder error |
| 17 | 131072 | Hard interpolator encoder quadrature error |
| 20 | 1048576 | First driver in fault |
| 21 | 2097152 | Second driver in fault |
| 22 | 4194304 | First driver powered on |
| 23 | 8388608 | Second driver powered on |
| 24 | 16777216 | Interferometer no signal error on axis or reference |
| 25 | 33554432 | Interferometer glitch error on axis or reference |
| 26 | 67108864 | PCO error (underrun) |
| 27 | 134217728 | PCO pulses ended |
| 28 | 268435456 | GPIO External gathering error |
| 29 | 536870912 | I2C transfer error |
| 30 | 1073741824 | External gathering error |

NOTE

Positioner errors are used to trigger consequences on the system, for instance disable, emergency break, etc. Positioner hardware status information is mainly provided for information purposes.

Positioner hardware status description:

General inhibition detected: This refers to the General Inhibition connector at the rear panel or the Stop All button at the front panel of the XPS controller. The General Inhibition connector is a safety feature and can be used for a custom STOP ALL emergency switch. Inhibition (pin#2), must always be connected to GND during normal operation of the controller. In this case, inhibition is not detected. An open circuit is equivalent to pressing STOP ALL on the front panel, in which case, inhibition is detected.

ZM high level: This refers to the mechanical zero signal used with some stages. The ZM signal is high during one part of the travel and low during the other part of the travel. The detection of the ZM high/low transition in combination with an encoder index pulse signal allows a fast and repeatable origin search (MechanicalZeroAndIndexHomeSearch).

Minus end of run activated: Refers to the hardware minus end of run limit switch. During normal operation, this end of run switch should never be activated and any motion will be stopped by the detection of the minus software limit.

Plus end of run activated: Refers to the hardware positive end of run limit switch. During normal operation, this end of run switch should never be activated and any motion will be stopped by the detection of the positive software limit.

Minus end of run glitch: Undesirable, momentary instability of the hardware minus end of run signal, for instance can be generated by ripple or noise.

Plus end of run glitch: Undesirable, momentary instability of the hardware positive end of run signal, for instance can be generated by ripple or noise.

Encoder quadrature error: Error generated when the signals of both encoder channels simultaneously change. In normal operation, only one quadrature signal changes state at a time. This error can occur due to an undesirable level change or a glitch as illustrated below.

Encoder freq. and coherency error: Error generated when the frequency of the signals is too high. The maximum frequency of the encoder input is 25MHz.

Hard interpolator encoder error: Error generated when the difference of the sine/cosine encoder signals from a unity circle is too large (for instance when signals are phase shifted or amplitude modified).

Hard interpolator quad. encoder error: Error generated when the signals of both encoder channels of the hardware interpolated encoder output simultaneously change. Same error as *Encoder quadrature error* except that the quadrature signals are those converted from the sine/cosine signals of the hard interpolator. The hardware interpolator is used only with AnalogInterpolated encoders to trigger the position compare output and to gather positions during external data gathering.

First driver in fault: problem with the first driver.

Second driver in fault: problem with the second driver in case two drivers are connected to one axis.

First driver powered on: First driver with motor ON after initialization.

Second driver powered on: Second driver with motor ON after initialization, in case two drivers are connected to one axis.

8.7 Positioner Driver Status List

| Bit | code | DRV00x | DRV01 | DRV02x | D6U | DRV03 | DRVP1 |
|-----|------|------------------|------------------|----------------------|----------------------|----------------------|----------------------|
| 0 | a | | | Short-circuit | Short-circuit | Short-circuit | |
| 1 | b | | | Broken fuse | Broken fuse | Broken fuse | Voltage out of range |
| 2 | c | | | Thermistor fault | Thermistor fault | | Over temperature |
| 3 | d | | | Initialization error | Initialization error | Initialization error | Initialization error |
| 4 | e | | | I ² T | I ² T | I ² T | Dynamic error |
| 5 | f | | | Current limit | Current limit | | |
| 6 | g | | | | | TG is opened | No stage connected |
| 7 | h | Inhibition input | Inhibition input | Inhibition input | Inhibition input | Inhibition input | Inhibition input |
| 8 | i | Driver in fault | Driver in fault | Driver in fault | Driver in fault | Driver in fault | Driver in fault |

8.8 Group Status List

| Code | Description |
|------|--|
| 0 | NOTINIT state |
| 1 | NOTINIT state due to an emergency brake: see positioner status |
| 2 | NOTINIT state due to an emergency stop: see positioner status |
| 3 | NOTINIT state due to a following error during homing |
| 4 | NOTINIT state due to a following error |
| 5 | NOTINIT state due to an homing timeout |
| 6 | NOTINIT state due to a motion done timeout during homing |
| 7 | NOTINIT state due to a KillAll command |
| 8 | NOTINIT state due to an end of run after homing |
| 9 | NOTINIT state due to an encoder calibration error |
| 10 | Ready state due to an AbortMove command |
| 11 | Ready state from homing |
| 12 | Ready state from motion |
| 13 | Ready State due to a MotionEnable command |
| 14 | Ready state from slave |
| 15 | Ready state from jogging |
| 16 | Ready state from analog tracking |
| 17 | Ready state from trajectory |
| 18 | Ready state from spinning |
| 19 | Ready state due to a group interlock error during motion |
| 20 | Disable state |
| 21 | Disabled state due to a following error on ready state |
| 22 | Disabled state due to a following error during motion |
| 23 | Disabled state due to a motion done timeout during moving |
| 24 | Disabled state due to a following error on slave state |
| 25 | Disabled state due to a following error on jogging state |
| 26 | Disabled state due to a following error during trajectory |
| 27 | Disabled state due to a motion done timeout during trajectory |
| 28 | Disabled state due to a following error during analog tracking |
| 29 | Disabled state due to a slave error during motion |
| 30 | Disabled state due to a slave error on slave state |
| 31 | Disabled state due to a slave error on jogging state |
| 32 | Disabled state due to a slave error during trajectory |
| 33 | Disabled state due to a slave error during analog tracking |
| 34 | Disabled state due to a slave error on ready state |
| 35 | Disabled state due to a following error on spinning state |
| 36 | Disabled state due to a slave error on spinning state |
| 37 | Disabled state due to a following error on auto-tuning |
| 38 | Disabled state due to a slave error on auto-tuning |
| 39 | Disable state due to an emergency stop on auto-tuning state |
| 40 | Emergency braking |
| 41 | Motor initialization state |
| 42 | Not referenced state |
| 43 | Homing state |
| 44 | Moving state |

| | |
|----|--|
| 45 | Trajectory state |
| 46 | Slave state due to a SlaveEnable command |
| 47 | Jogging state due to a JogEnable command |
| 48 | Analog tracking state due to a TrackingEnable command |
| 49 | Analog interpolated encoder calibrating state |
| 50 | NOTINIT state due to a mechanical zero inconsistency during homing |
| 51 | Spinning state due to a SpinParametersSet command |
| 52 | NOTINIT state due to a clamping timeout |
| 55 | Clamped |
| 56 | Ready state from clamped |
| 58 | Disabled state due to a following error during clamped |
| 59 | Disabled state due to a motion done timeout during clamped |
| 60 | NOTINIT state due to a group interlock error on not reference state |
| 61 | NOTINIT state due to a group interlock error during homing |
| 63 | NOTINIT state due to a motor initialization error |
| 64 | Referencing state |
| 65 | Clamping initialization |
| 66 | NOTINIT state due to a perpendicularity error homing |
| 67 | NOTINIT state due to a master/slave error during homing |
| 68 | Auto-tuning state |
| 69 | Scaling calibration state |
| 70 | Ready state from auto-tuning |
| 71 | NOTINIT state from scaling calibration |
| 72 | NOTINIT state due to a scaling calibration error |
| 73 | Excitation signal generation state |
| 74 | Disable state due to a following error on excitation signal generation state |
| 75 | Disable state due to a master/slave error on excitation signal generation state |
| 76 | Disable state due to an emergency stop on excitation signal generation state |
| 77 | Ready state from excitation signal generation |
| 78 | Focus state |
| 79 | Ready state from focus |
| 80 | Disable state due to a following error on focus state |
| 81 | Disable state due to a master/slave error on focus state |
| 82 | Disable state due to an emergency stop on focus state |
| 83 | NOTINIT state due to a group interlock error |
| 84 | Disable state due to a group interlock error during moving |
| 85 | Disable state due to a group interlock error during jogging |
| 86 | Disable state due to a group interlock error on slave state |
| 87 | Disable state due to a group interlock error during trajectory |
| 88 | Disable state due to a group interlock error during analog tracking |
| 89 | Disable state due to a group interlock error during spinning |
| 90 | Disable state due to a group interlock error on ready state |
| 91 | Disable state due to a group interlock error on auto-tuning state |
| 92 | Disable state due to a group interlock error on excitation signal generation state |
| 93 | Disable state due to a group interlock error on focus state |
| 94 | Disabled state due to a motion done timeout during jogging |
| 95 | Disabled state due to a motion done timeout during spinning |

| | |
|-----|--|
| 96 | Disabled state due to a motion done timeout during slave mode |
| 97 | Disabled state due to a ZYGO error during motion |
| 98 | Disabled state due to a master/slave error during trajectory |
| 99 | Disable state due to a ZYGO error on jogging state |
| 100 | Disabled state due to a ZYGO error during analog tracking |
| 101 | Disable state due to a ZYGO error on auto-tuning state |
| 102 | Disable state due to a ZYGO error on excitation signal generation state |
| 103 | Disabled state due to a ZYGO error on ready state |
| 104 | Driver initialization |
| 105 | Jitter initialization |
| 106 | Not initialized state due to an error with GroupKill or KillAll command |
| 107 | Not initialized state due to a clamp disable error |
| 108 | Not initialized state due to a clamp enable error |
| 109 | Scanning state |
| 110 | Ready state from scan done |
| 111 | Ready state from scan error |
| 112 | Ready state from group interlock error during scan |
| 113 | Ready state from scan abort |
| 114 | Disabled state due to an error during scan |
| 115 | Disabled state due to a following error during scan |
| 116 | Disabled state due to a motion done timeout during scan |
| 117 | Disabled state due to a group interlock error during scan |
| 118 | Disabled state due to a ZYGO error during scan |
| 119 | Disabled state due to a master/slave error during scan |
| 120 | PVT scanning state |
| 121 | Ready state from PVT scan done |
| 122 | Ready state from group interlock error during PVT scan |
| 123 | Ready state from PVT scan abort |
| 124 | Disabled state due to a following error during PVT scan |
| 125 | Disabled state due to a motion done timeout during PVT scan |
| 126 | Disabled state due to a group interlock error during PVT scan |
| 127 | Disabled state due to a ZYGO error during PVT scan |
| 128 | Disabled state due to a master/slave error during PVT scan |
| 129 | Shutter enable ready state |
| 130 | Shutter enable moving state |
| 131 | Ready state from shutter done |
| 132 | Ready state from shutter error |
| 133 | Ready state from shutter disable |
| 134 | Ready state due to a group interlock error during shutter enable |
| 135 | Disabled state due to a following error during shutter enable |
| 136 | Disabled state due to a motion done timeout during shutter moving |
| 137 | Not initialized state due to all retry failed with index error during homing |

8.9 Error List test

| code | Error description |
|------|--|
| 2 | Error to ignore |
| 1 | TCL interpreter error: wrong syntax |
| 0 | Successful command |
| -1 | Busy socket: previous command not yet finished |
| -2 | TCP timeout |
| -3 | String too long |
| -4 | Unknown command |
| -5 | Not allowed due to a positioner error or hardware status |
| -7 | Wrong format in the command string |
| -8 | Wrong object type for this command |
| -9 | Wrong number of parameters in the command |
| -10 | Wrong parameter type in the command string |
| -11 | Wrong parameters type in the command string: word or word * expected |
| -12 | Wrong parameter type in the command string: bool or bool * expected |
| -13 | Wrong parameter type in the command string: char * expected |
| -14 | Wrong parameter type in the command string: double or double * expected |
| -15 | Wrong parameter type in the command string: int, short or int *, short * expected |
| -16 | Wrong parameter (value < 0) or wrong type in the command string : unsigned int, unsigned short, unsigned int * or unsigned short * expected |
| -17 | Parameter out of range or incorrect |
| -18 | Positioner Name doesn't exist or unknown command |
| -19 | GroupName doesn't exist or unknown command |
| -20 | Fatal Error during initialization, read the error.log file for more details |
| -21 | Controller in initialization |
| -22 | Not allowed action |
| -23 | Position compare not set |
| -24 | Incorrect file name, bad section name, or not available in this configuration (check hardware or configuration) |
| -25 | Following Error |
| -26 | Kill command or Emergency signal : check each positioners and each slave positioners, check that motion does not exceed software limits when combined with mapping and other features. |
| -27 | Move Aborted |
| -28 | Home search timeout |
| -29 | Mnemonic gathering type doesn't exist |
| -30 | Gathering not started |
| -31 | Home position is out of user travel limits |
| -32 | Gathering not configured |
| -33 | Motion done timeout |
| -34 | Out of travel difference limits |
| -35 | Position is outside of travel limits |
| -36 | Unknown TCL file |
| -37 | TCL interpreter doesn't run |

| | |
|-----|---|
| -38 | TCL script can not be killed: Wrong task name or task does not run |
| -39 | Mnemonic action doesn't exist |
| -40 | Mnemonic event doesn't exist |
| -41 | Slave-Master mode not configured |
| -42 | Jog value out of range or jog velocity not NULL when disabling Jog mode |
| -43 | Gathering running |
| -44 | Slave error disabling master |
| -45 | End of run activated |
| -46 | Not allowed action due to backlash |
| -47 | Wrong TCL task name : each TCL task name must be different and doesn't contain any space or tabulation |
| -48 | BaseVelocity must be null |
| -49 | Inconsistent mechanical zero during home search |
| -50 | Motor initialization error. Check InitializationAccelerationLevel, ScalingAcceleration, MaximumJerkTime, EncoderResolution or EncoderScalePitch |
| -51 | Spin value out of range |
| -52 | Group interlock |
| -53 | Not allowed action due to a group interlock |
| -60 | Error during file writing or file doesn't exist |
| -61 | Error file corrupt or file doesn't exist |
| -62 | Wrong trajectory element type |
| -63 | Wrong XY trajectory element arc radius |
| -64 | Wrong XY trajectory element sweep angle |
| -65 | Trajectory line element discontinuity error or new element is too small |
| -66 | Trajectory doesn't content any element |
| -68 | Velocity on trajectory is too big |
| -69 | Acceleration on trajectory is too big |
| -70 | Final velocity on trajectory is not zero |
| -71 | Error read from or write in message queue |
| -72 | Error trajectory initialization |
| -73 | End of file |
| -74 | Error file parameter key not found |
| -75 | Trajectory element has a negative or null delta T |
| -76 | Wrong file name: bad extension, existing target file or no source file |
| -77 | Bad trajectory line format |
| -80 | Event not configured |
| -81 | Action not configured |
| -82 | Event buffer is full |
| -83 | Event ID not defined |
| -85 | Secondary positioner index is too far from first positioner |
| -86 | Home search index error |
| -90 | Focus socket not reserved or closed |
| -91 | Focus event scheduler is busy |
| -94 | Module file doesn't exist or module name incorrect (must be OptionalModule... .out) |
| -95 | Error of executing an optional module |
| -96 | Error of stopping an optional module |

| | |
|------|---|
| -97 | Error of loading an optional module |
| -98 | Error of unloading an optional module |
| -99 | Fatal external module load: see error.log |
| -100 | Internal error (memory allocation error, ...) |
| -101 | Relay Feedback Test failed: No oscillation |
| -102 | Relay Feedback Test failed: Signal too noisy |
| -103 | Relay Feedback Test failed: Signal data not enough for analyse |
| -104 | Error of tuning process initialization |
| -105 | Error of scaling calibration initialization |
| -106 | Wrong user name or password |
| -107 | This function requires to be logged in with Administrator rights |
| -108 | The TCP/IP connection was closed by an administrator |
| -109 | Group need to be homed at least once to use this function (distance mesured during home search) |
| -110 | Execution not allowed for Gantry configuration |
| -111 | Gathering buffer is full |
| -112 | Error of excitation signal generation initialization |
| -113 | Both ends of run activated |
| -114 | Clamping timeout |
| -115 | Function is not supported by current hardware |
| -116 | Error during driver initialization, read error.log file for more details |
| -117 | Function is only allowed in DISABLED state |
| -118 | Not allowed action driver not initialized |
| -119 | Position is outside of travel limits on secondary positioner |
| -120 | Warning following error during move with position compare enabled |
| -121 | Function is not allowed due to configuration disabled |
| -122 | Data incorrect (wrong value, wrong format, wrong order or inexistent) |
| -123 | Action not allowed, an Administrator is already logged in |
| -124 | Error during move of secondary positioner: check positioners errors for details |
| -125 | Check tcl task name is not empty |
| -126 | Wrong parameter type in the command string: short or short * expected |
| -127 | Wrong parameter type in the command string: long or long * expected |
| -128 | Wrong parameter (value < 0) or wrong type in the command string : unsigned short or unsigned short * expected |
| -129 | Wrong parameter (value < 0) or wrong type in the command string : unsigned long or unsigned long * expected |
| -130 | Wrong parameter type in the command string : float or float * expected |
| -131 | Wrong parameter type in the command string: long long int or long long int * expected |
| -132 | Wrong parameter (value < 0) or wrong type in the command string : unsigned long long or unsigned long long * expected |
| -133 | Error when creating actions tasks |
| -134 | Changing the loop status is allowed in DISABLE state only |
| -135 | Function is not allowed because group is not initialized or not referenced |
| -136 | Wrong parameter type in the command string: charhex32 * expected |
| -137 | Event&Action: action threads number exceeds limit (must be ≤20) |

| | |
|-------|---|
| -138 | Event&Action: action thread is running |
| -139 | Event&Action: Always event is not compatible with associated action |
| -140 | Function is only allowed in NOTINIT state |
| -150 | Unknown or not allowed PSO mode. |
| -151 | The number of positioner of this group is lower than the configured number of PSO positioner. |
| -200 | Invalid socket |
| -201 | The group is already in this mode |
| -202 | Not allowed action due to an external motion interlock |
| -204 | Function is not allowed because the feed forward is enabled |
| -205 | Not enable in your configuration |
| -206 | Dual encoder position error |
| -207 | Gantry mode error: check Encoder Matrix and Decoupling Motor Matrix |
| -208 | Not allowed action because piston is engaged |
| -209 | INT board command failed: invalid card number or initialization not done |
| -210 | Not allowed action due to $(XStart \leq Xangle \leq XEnd)$ is not true |
| -211 | Not expected position after motion |
| -212 | MagneticTrackPositionAtHome value is out of tolerance and can not be applied. |
| -213 | Clamp disable error |
| -214 | Clamp enable error |
| -215 | Not allowed action because group is not in NOTINIT nor in DISABLE state |
| -218 | Motion execution not possible, check your displacement |
| -219 | Error generated by external module |
| -220 | Number of TCL script files exceeds limit |
| -221 | Number of trajectory files exceeds limit |
| -222 | Action not allowed for secondary positioner that is in Option 0 |
| -300 | Wrong HTTP format in the command string |
| -301 | Error due to an empty string |
| -1000 | Zygo command execution failed |
| -1001 | The controller is not connected to Zygo TCP server. Run ZygoStartInterferometer API. |
| -1002 | Connection to Zygo TCP server failed |
| -1003 | The XPS controller is already connected to Zygo TCP server |
| -1004 | Zygo signal is not present |
| -1005 | Zygo PEG configuration failed |
| -1006 | Zygo error detected |
| -1055 | Incorrect Number of Axes |
| -1056 | Signal below Threshold |
| -1057 | Range must be higher than step |
| -1058 | Max Reduction factor must be higher than reduction factor |
| -1059 | Lenght must be higher than step |
| -1065 | Trajectory exceed capacity |
| -1066 | Trajectory buffer is full |
| -1116 | Wrong coordinate system |
| -1117 | Wrong trajectory type |

8.10 Controller Status List

| Controller status code | code | Controller status description |
|---|------------|--|
| CONTROLLER_STATUS_OK | 0x00000000 | Controller status OK |
| CONTROLLER_STATUS_INITIALIZATION_FAILED | 0x00000001 | Controller initialization failed |
| CONTROLLER_STATUS_NB_OPENED_SOCKETS_REACHED_MAXIMUM_ALLOWED | 0x00000002 | Number of currently opened sockets reached maximum allowed number |
| CONTROLLER_STATUS_CPU_OVERLOAD | 0x00000004 | Controller CPU is overloaded |
| CONTROLLER_STATUS_CORRECTOR_OVER_CALCULATED | 0x00000008 | Current measured corrector calculation time exceeds the corrector period |
| CONTROLLER_STATUS_PROFILER_OVER_CALCULATED | 0x00000010 | Profile generator calculating time exceeds ProfileGeneratorISRRatio * IRSCorrectorPeriod |
| CONTROLLER_STATUS_CORRECTOR_INTERRUPT_LOST | 0x00000020 | Controller has lost a corrector interrupt |
| CONTROLLER_STATUS_INTERFERO_SIGNAL_NOT_PRESENT | 0x00000040 | Zygo interferometer signal is not present |
| CONTROLLER_STATUS_INTERFERO_INITIALIZATION_FAILED | 0x00000080 | Zygo interferometer Ethernet initialisation failed |
| CONTROLLER_STATUS_INTERFERO_ERROR_STATUS | 0x00000100 | Zygo interferometer error detected. Please check ZYGO Error Status |
| CONTROLLER_STATUS_MOTION_VELOCITY_LIMITED | 0x00000200 | Motion velocity is limited |
| CONTROLLER_STATUS_LIFT_PIN_UP | 0x00000400 | Lift pin is UP |

NOTE

Within about 5 minutes after the controller startup, due to the hardware thermal stabilization, the **CONTROLLER_STATUS_CORRECTOR_OVER_CALCULATED**, **CONTROLLER_STATUS_CORRECTOR_INTERRUPT_LOST**, **CONTROLLER_STATUS_PROFILER_OVER_CALCULATED**, **CONTROLLER_STATUS_CPU_OVERLOAD** or **CONTROLLER_STATUS_NB_OPENED_SOCKETS_REACHED_MAXIMUM_ALLOWED** status flags may be raised.

These flags are automatically reset after a controller status reading using the *ControllerStatusGet()* command.

Another way to avoid these flags during the 5 first minutes after boot is to set the following parameter in system.ref to 300 (seconds):

DelayBeforeStartup = 300 ; Controller boots completely after 300 seconds

8.11 “ExternalInterlockA” error list

| Error Bit # | Mask | Error description |
|-------------|-------|-------------------------|
| 0 | 1 | Lift pin not down |
| 1 | 2 | Invalid Lift pin state |
| 2 | 4 | Hold signal |
| 3 | 8 | Door is opened |
| 4 | 16 | Shutter is opened |
| 5 | 32 | Invalid Shutter state |
| 6 | 64 | WRT not retracted |
| 7 | 128 | Not in loading position |
| 8 | 256 | Not in safety position |
| 9 | 512 | Not used |
| ... | ... | Not used |
| 15 | 32768 | Not used |

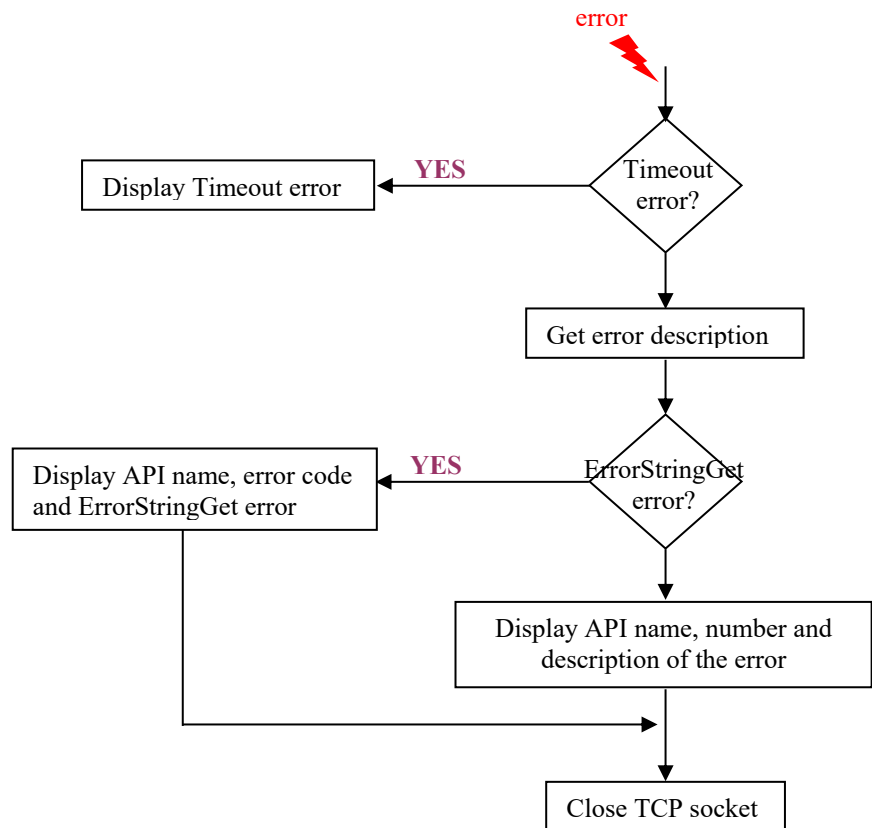
9.0 Process Examples

This section provides examples of programming sequences. The next diagrams show the order of use of the different Functions. To see programming code examples, please refer to the TCL Manual for TCL scripts.

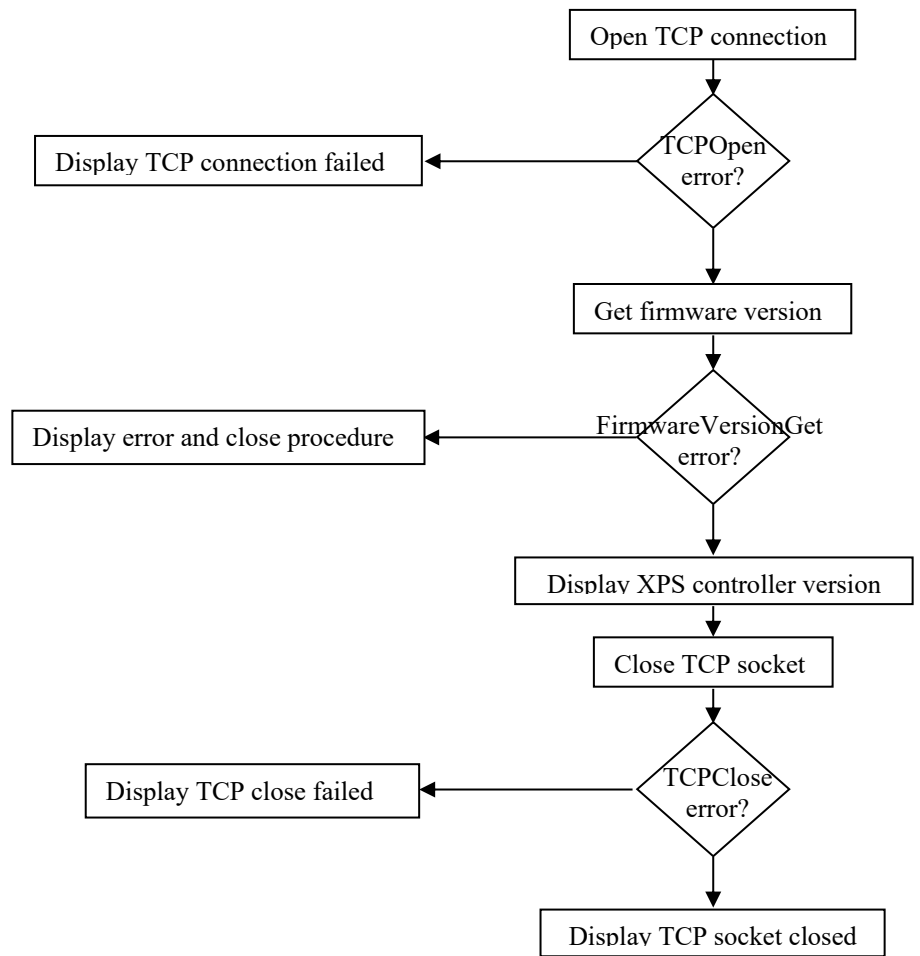
9.1 Management of Errors Example

When an error occurs, it is desirable to analyze and fix the error. The following error display and socket closing procedure is useful to detect and display the errors during the execution of a program. This sequence could be added to each program and called each time users need to test certain parts of a program.

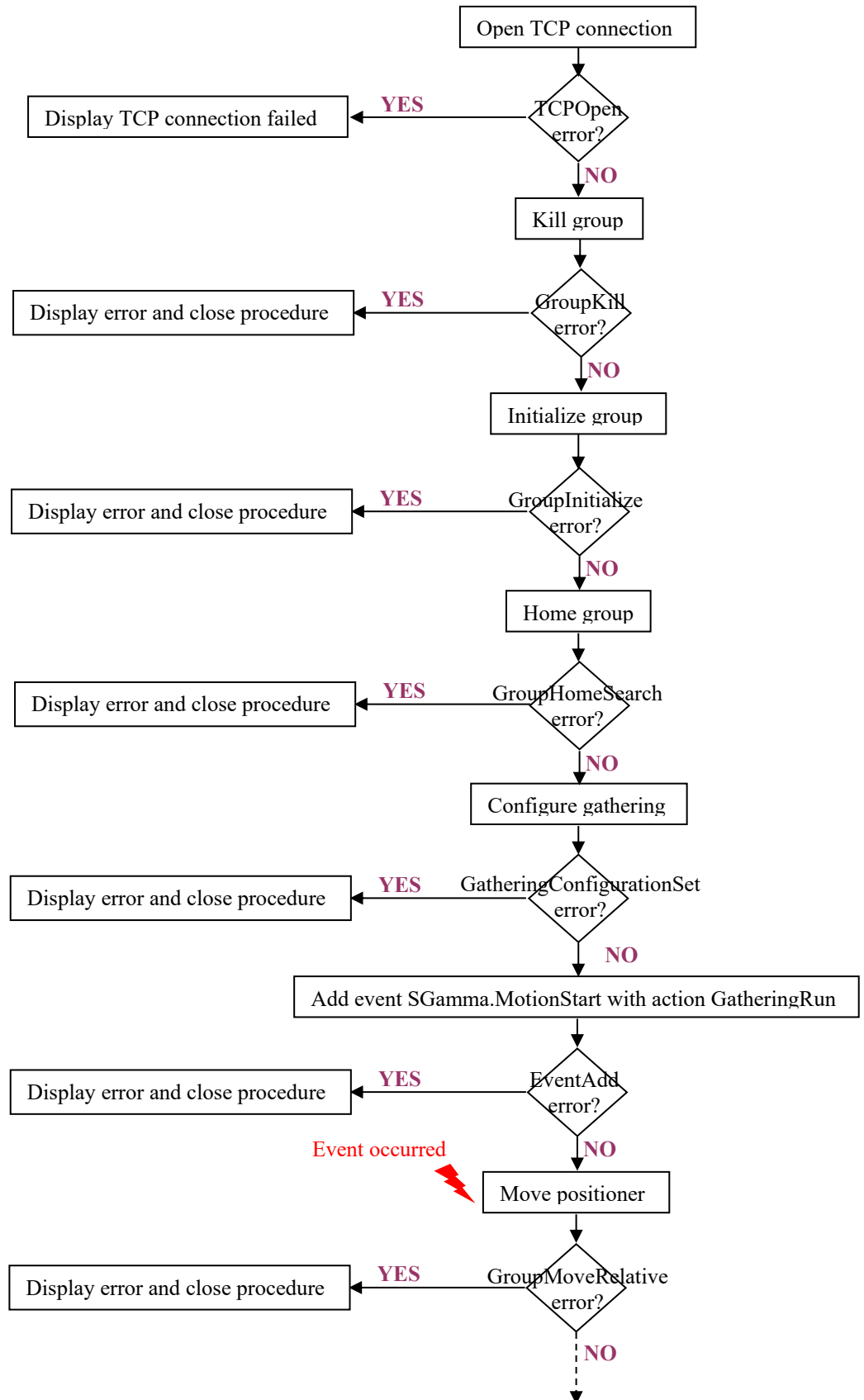
Display error and close procedure:

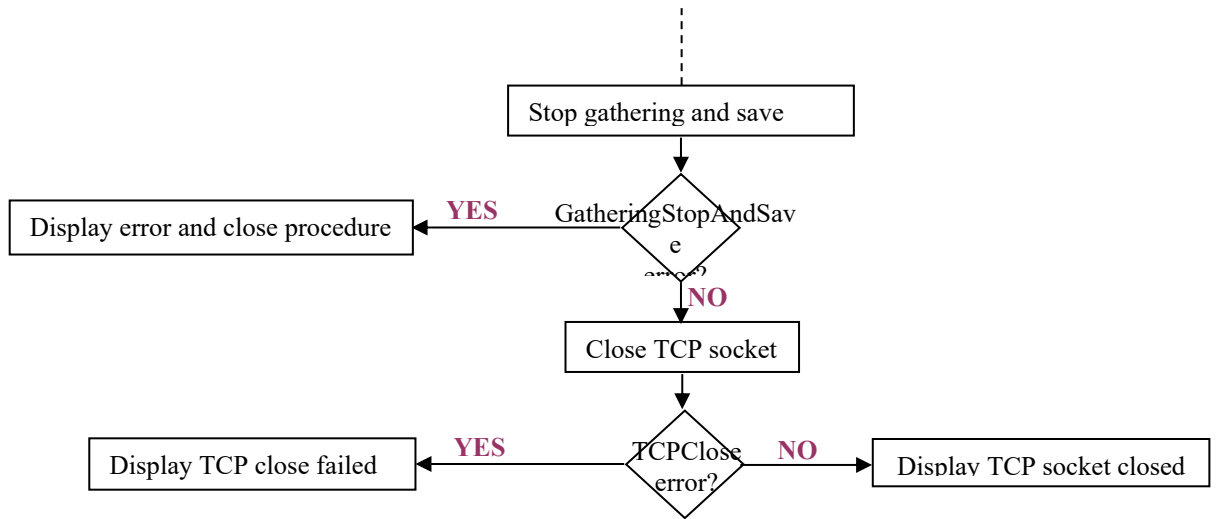


9.2 Firmware Version Example

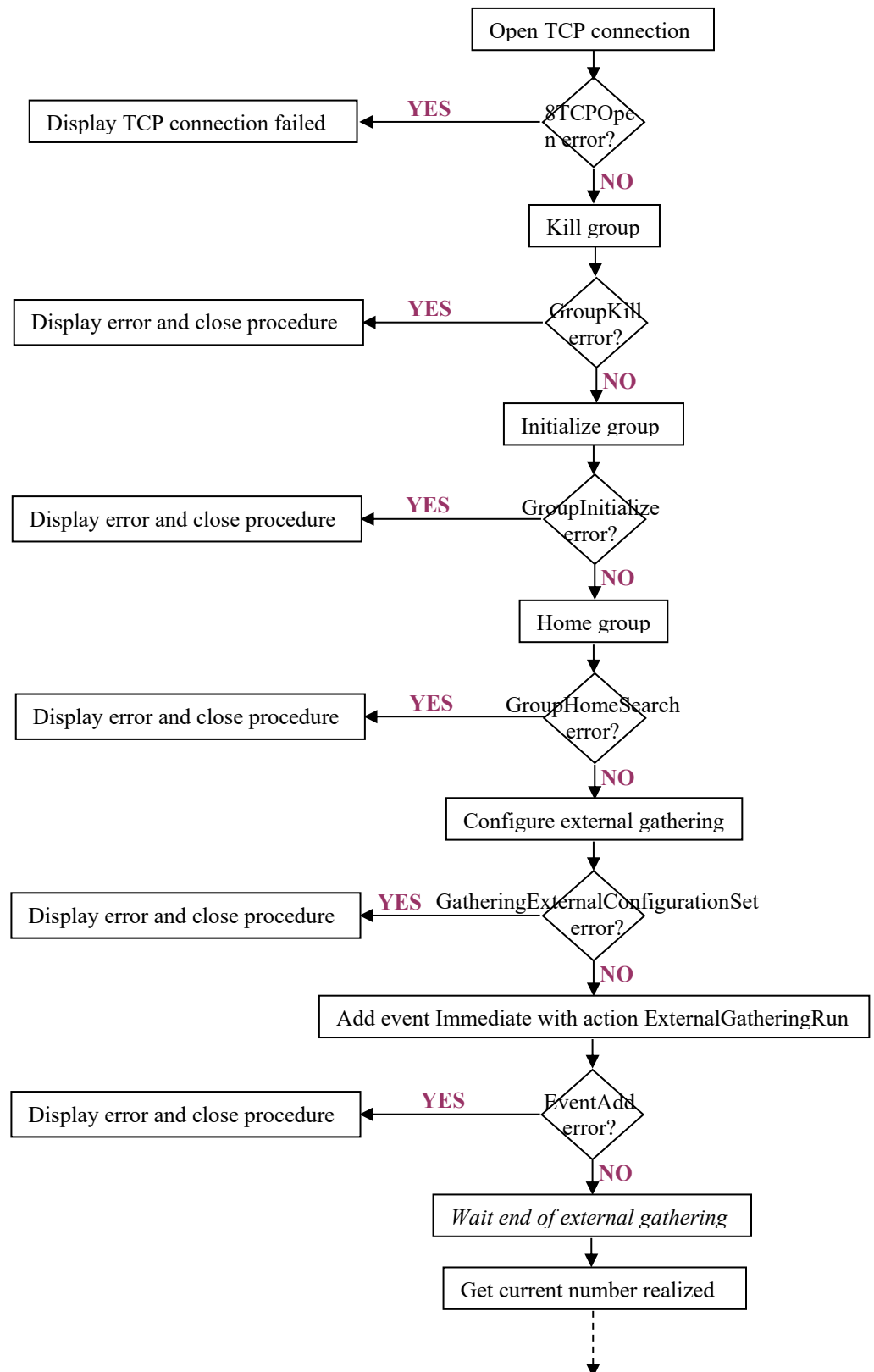


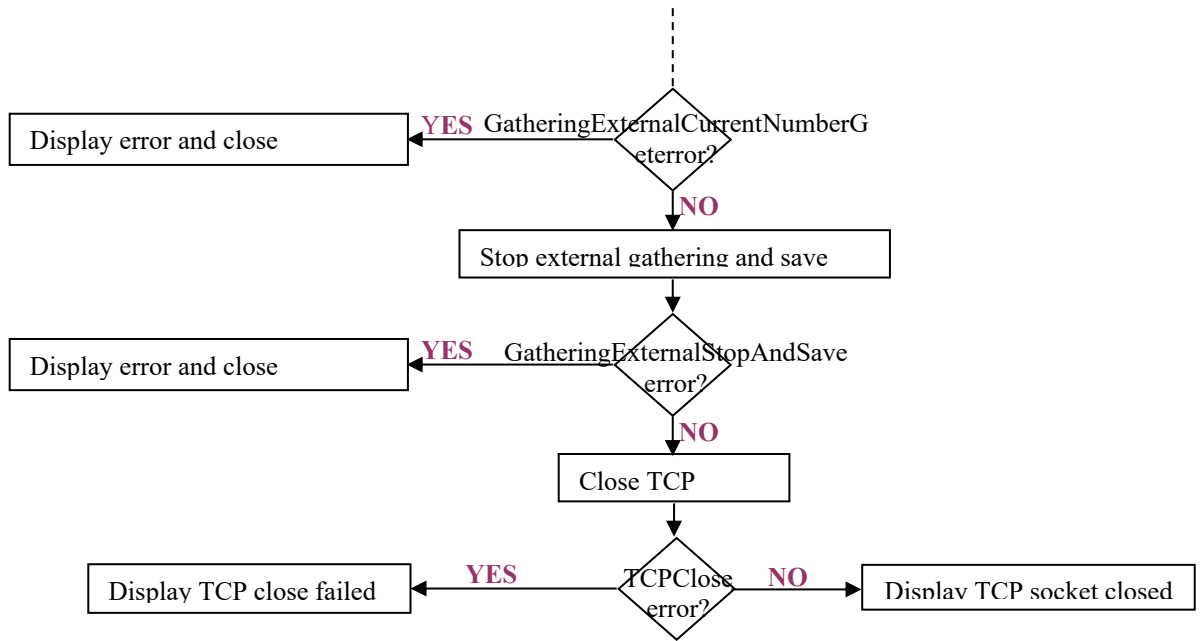
9.3 Gathering with Motion Example



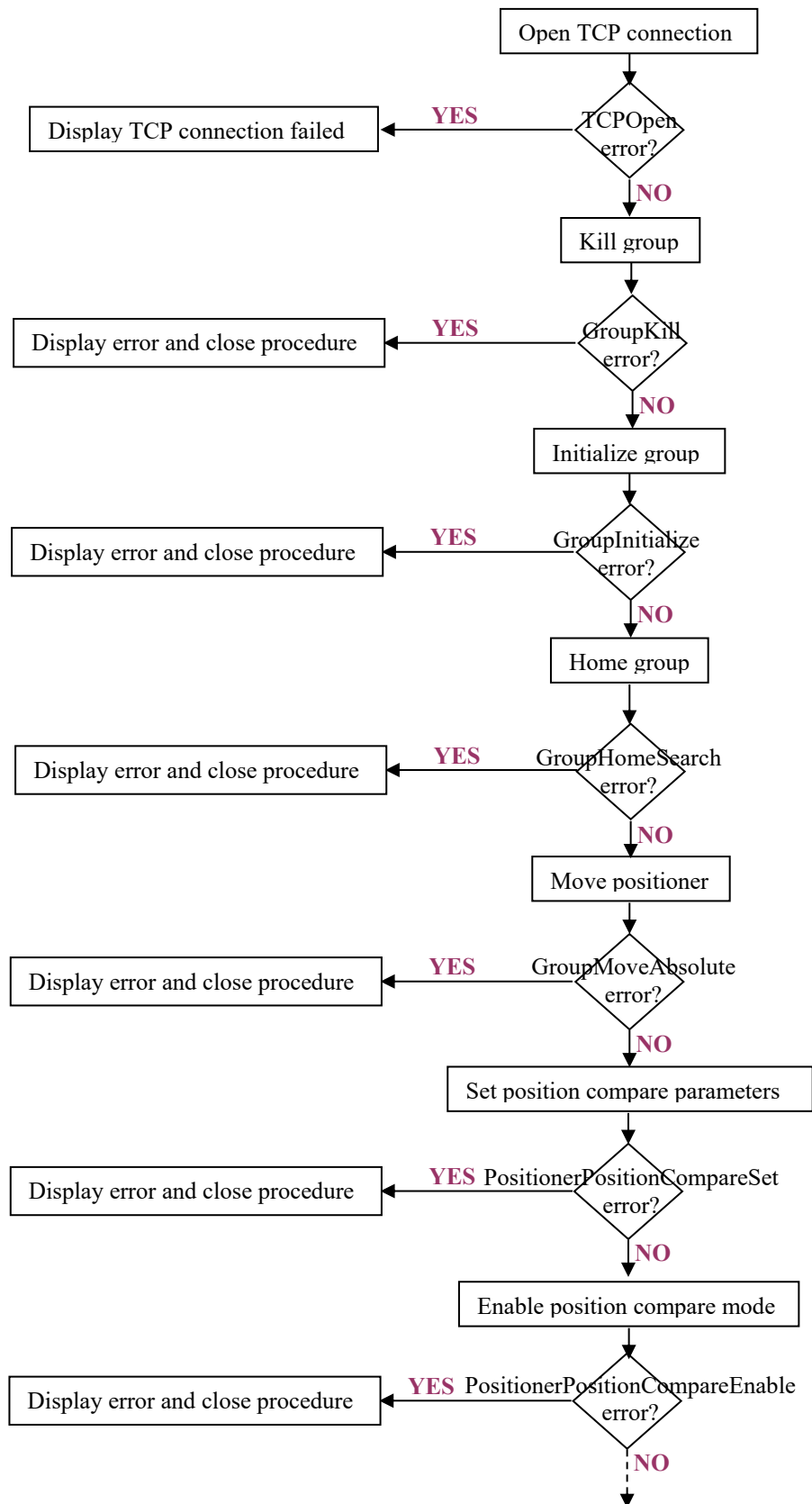


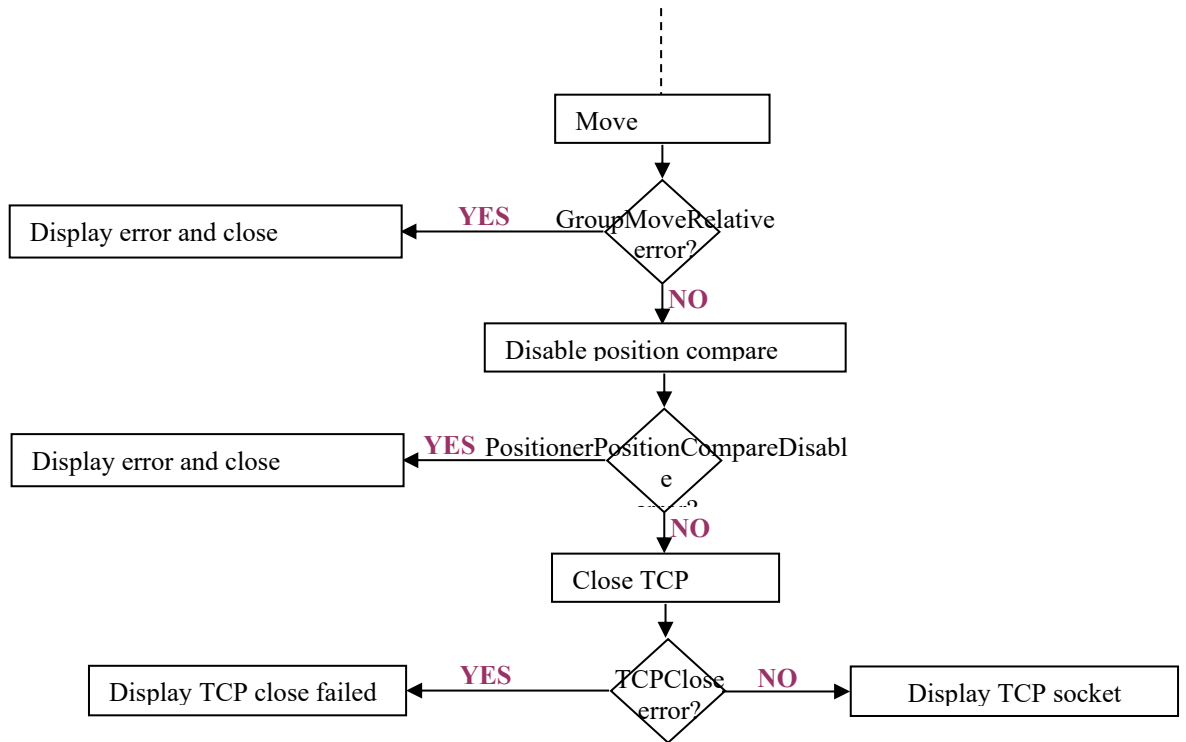
9.4 External Gathering Example



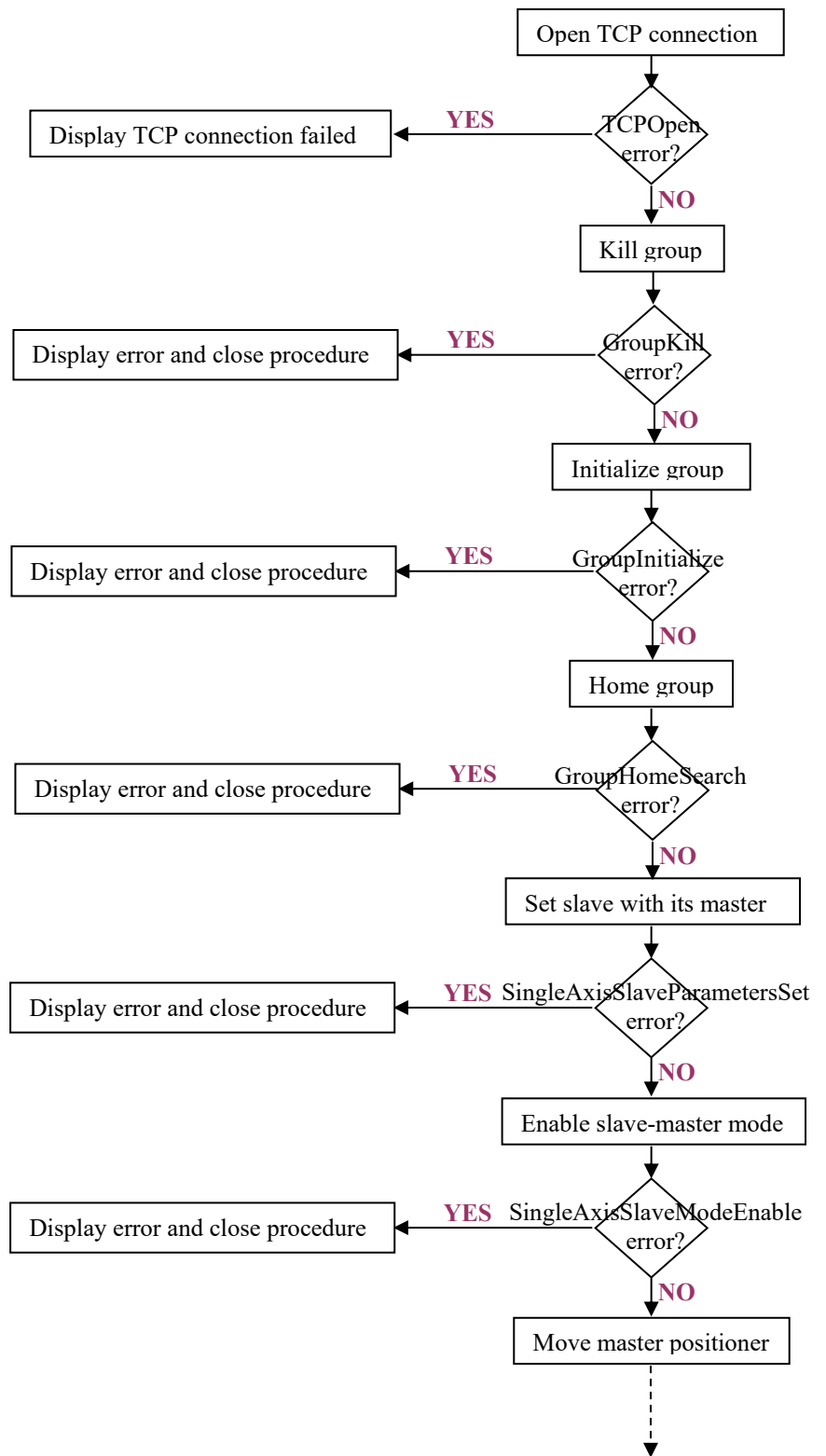


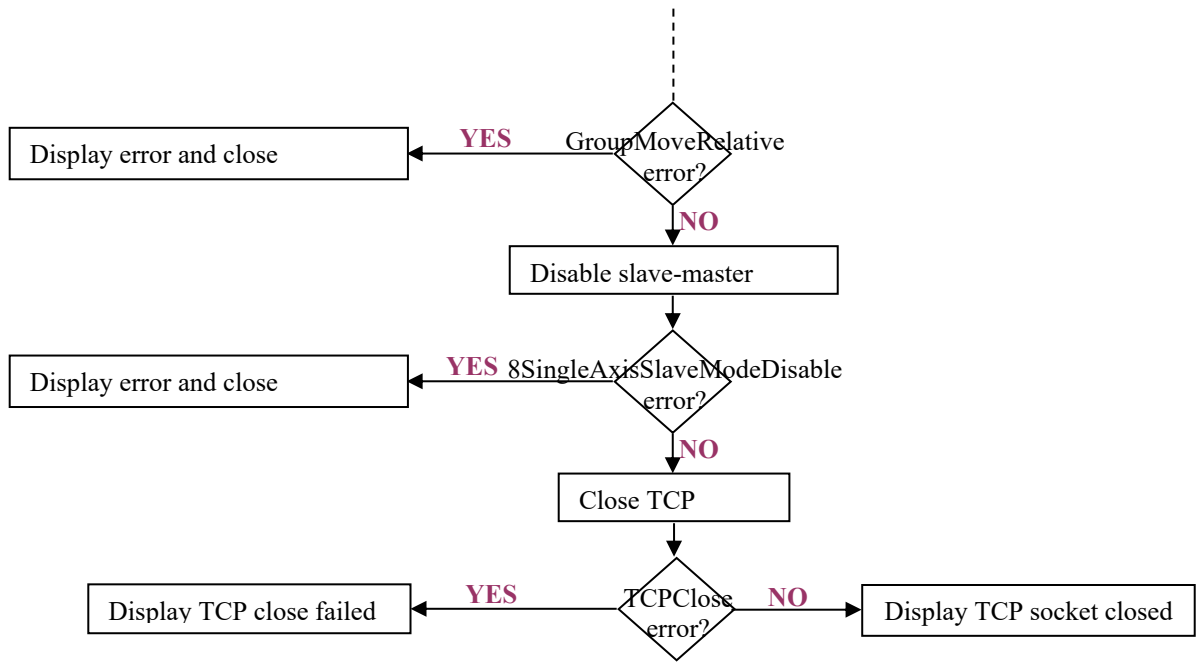
9.5 Position Output Compare Example



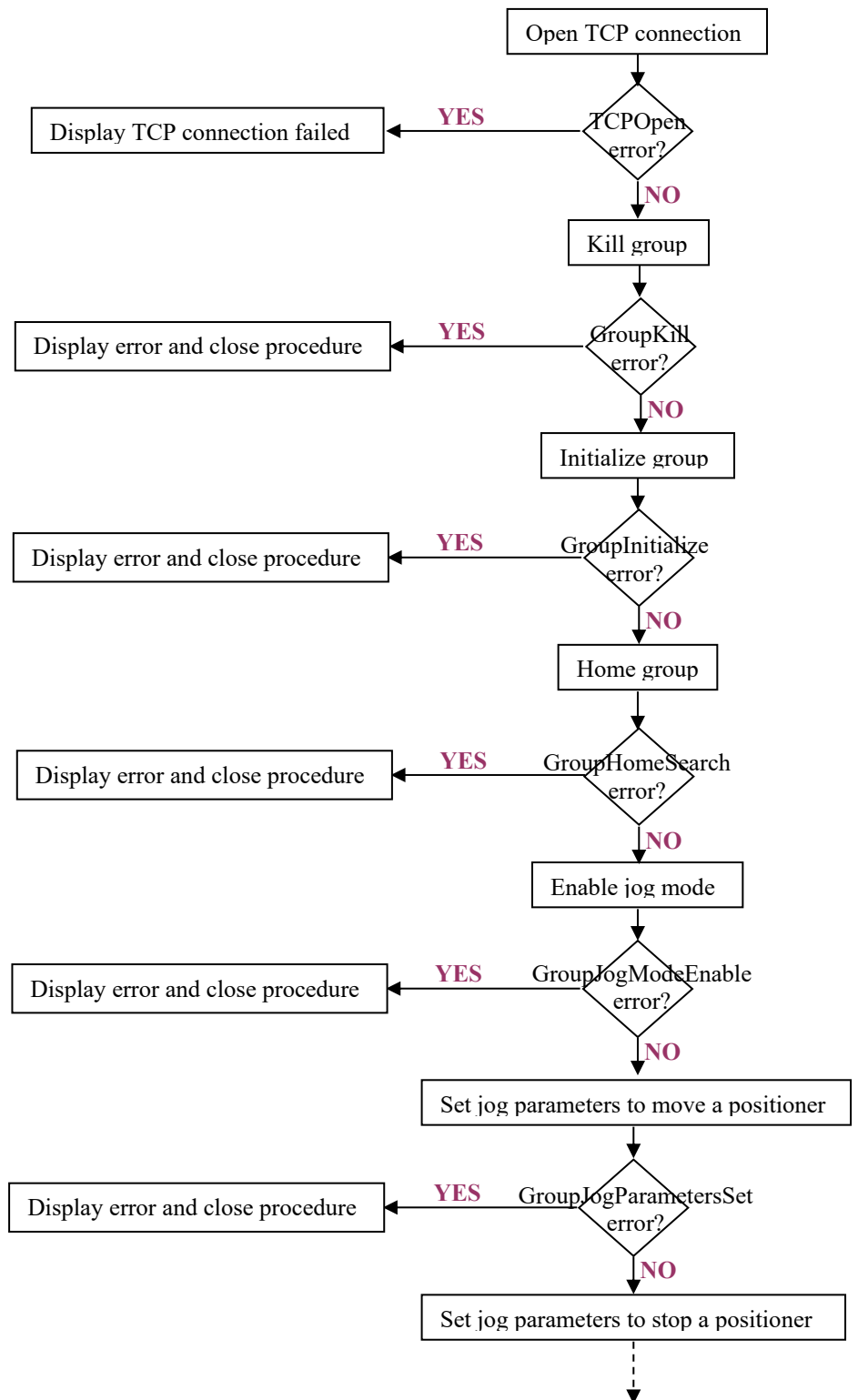


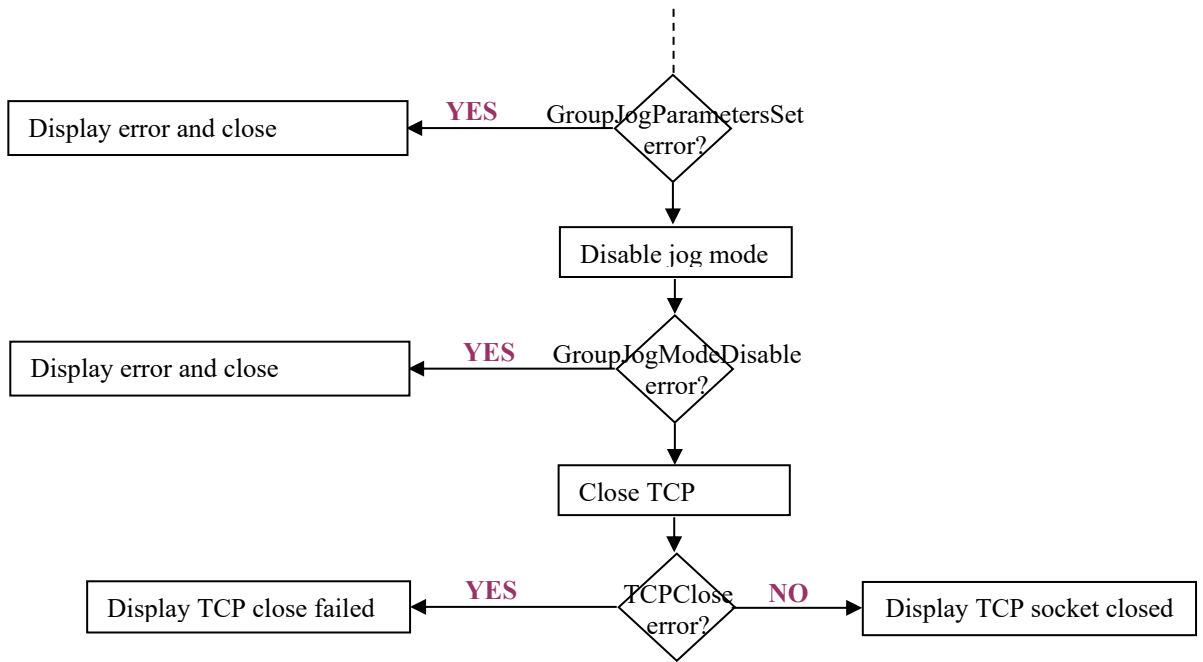
9.6 Slave-Master Mode Example



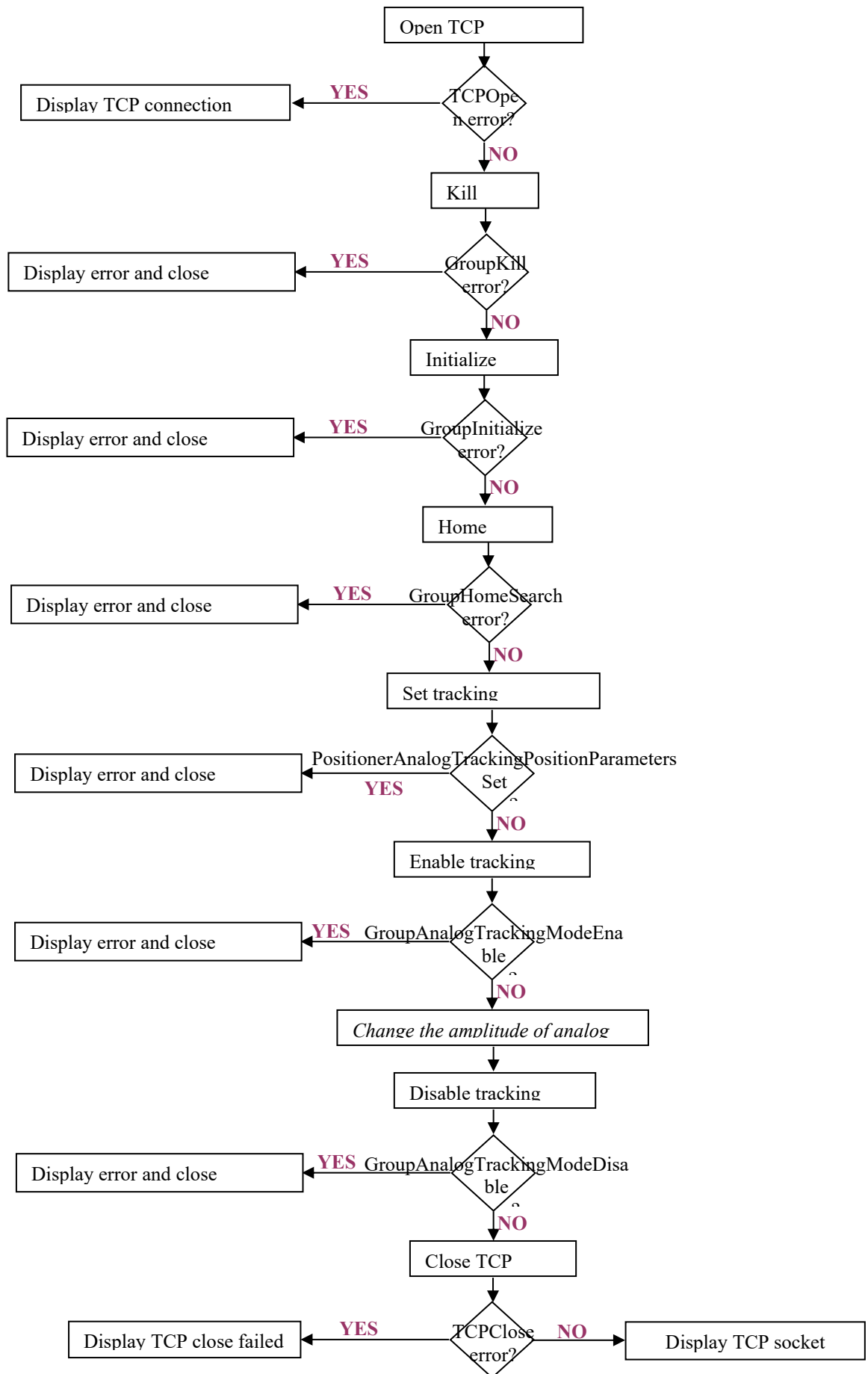


9.7 Jogging Example

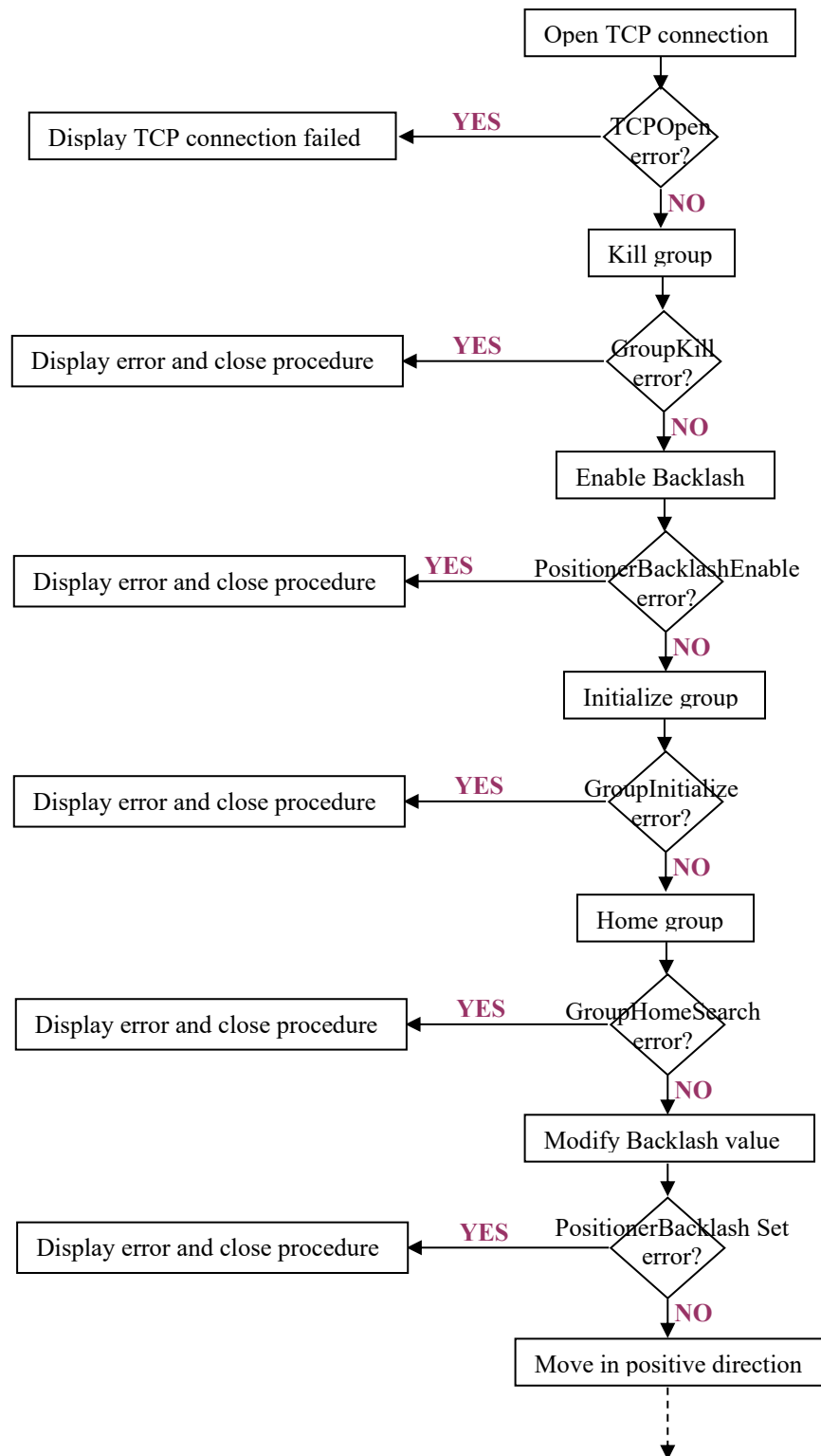


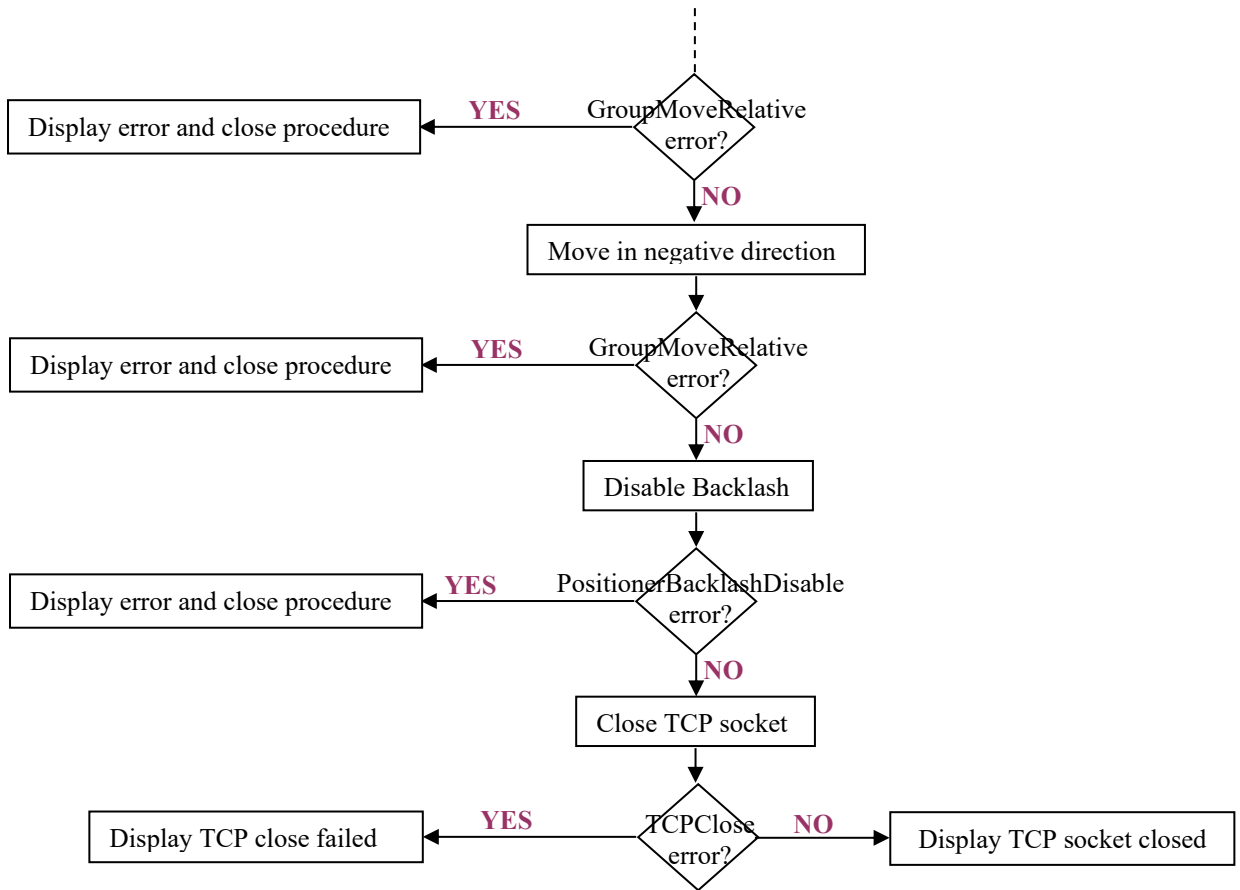


9.8 Tracking Example

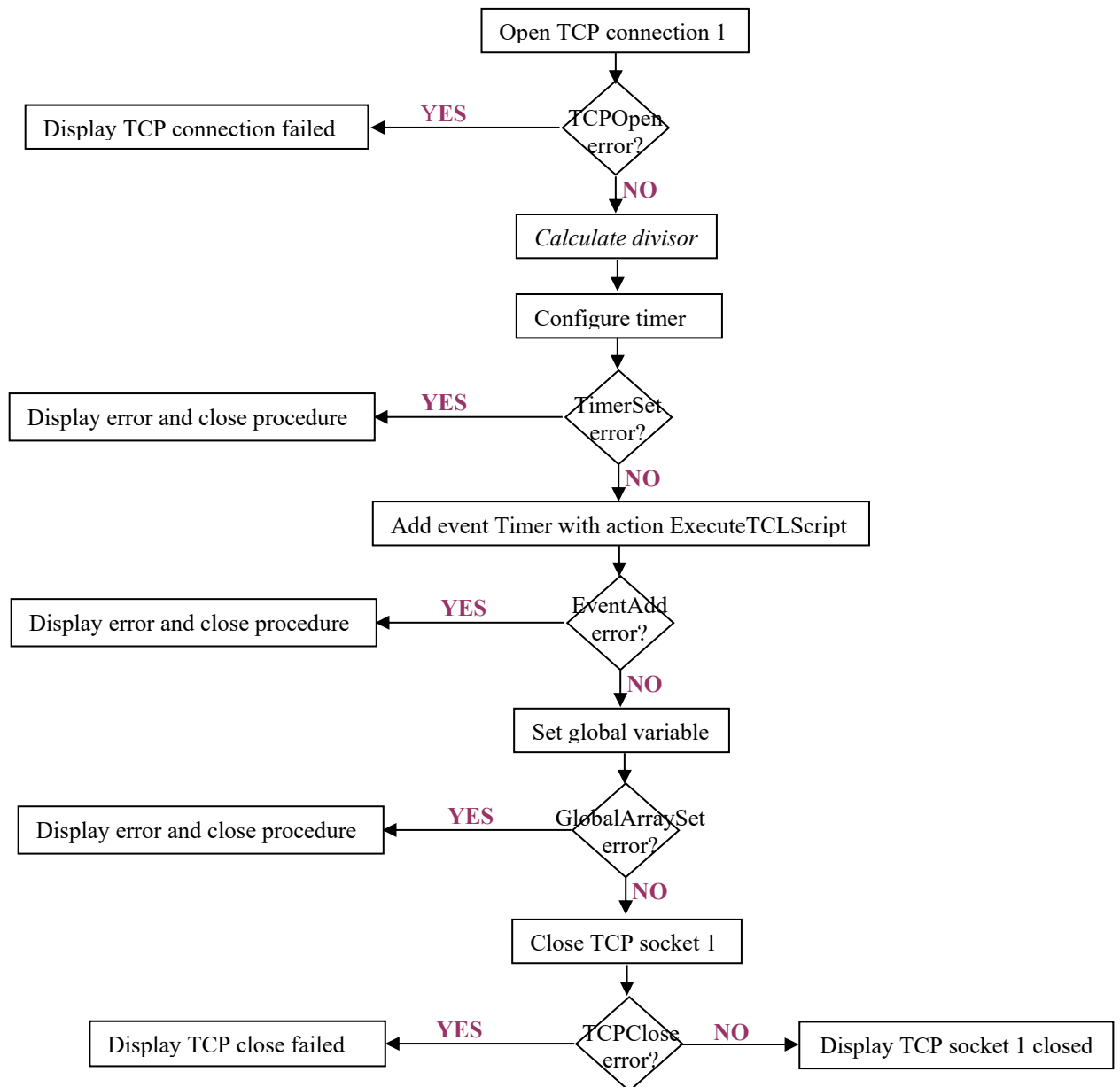


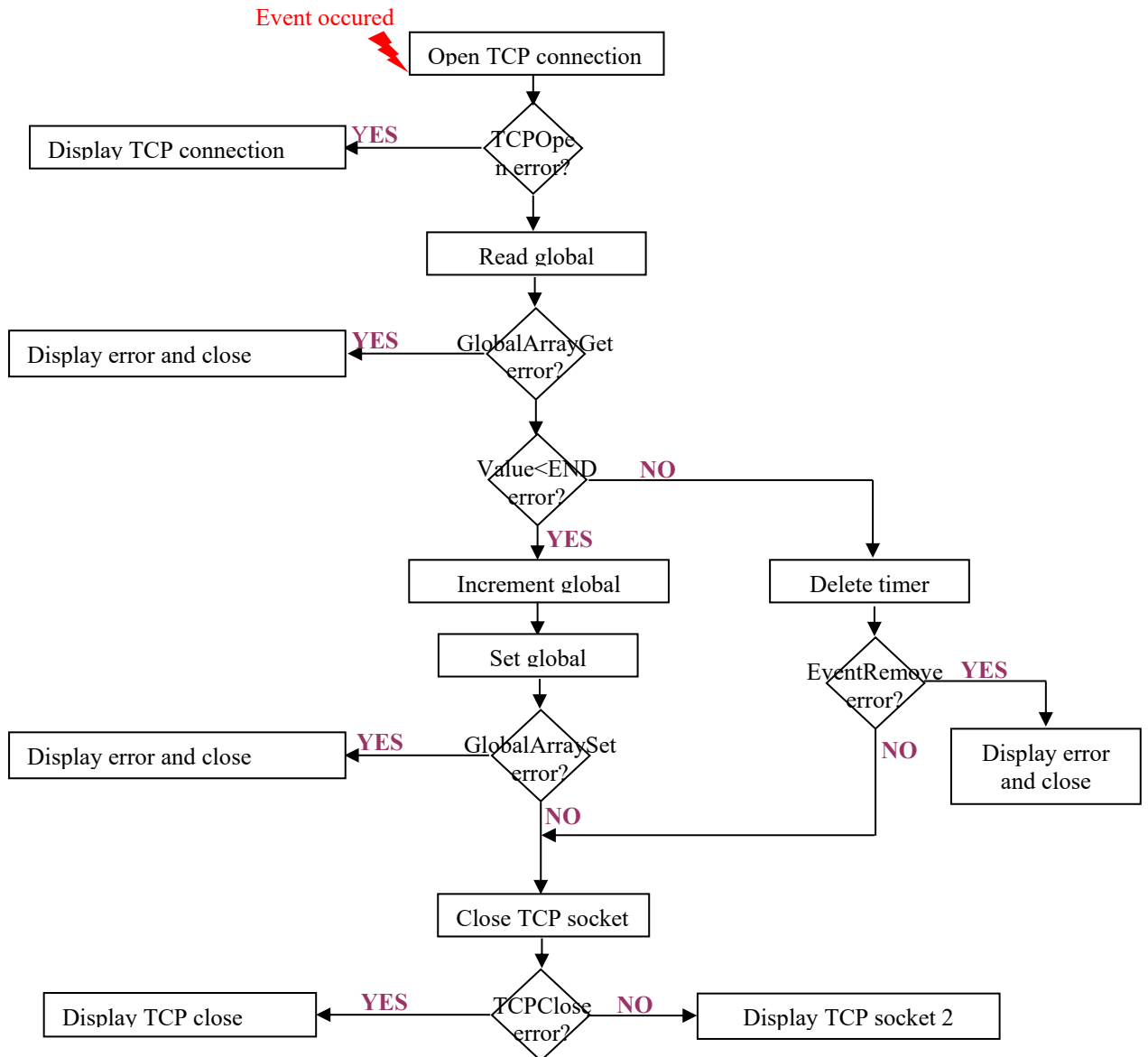
9.9 Backlash





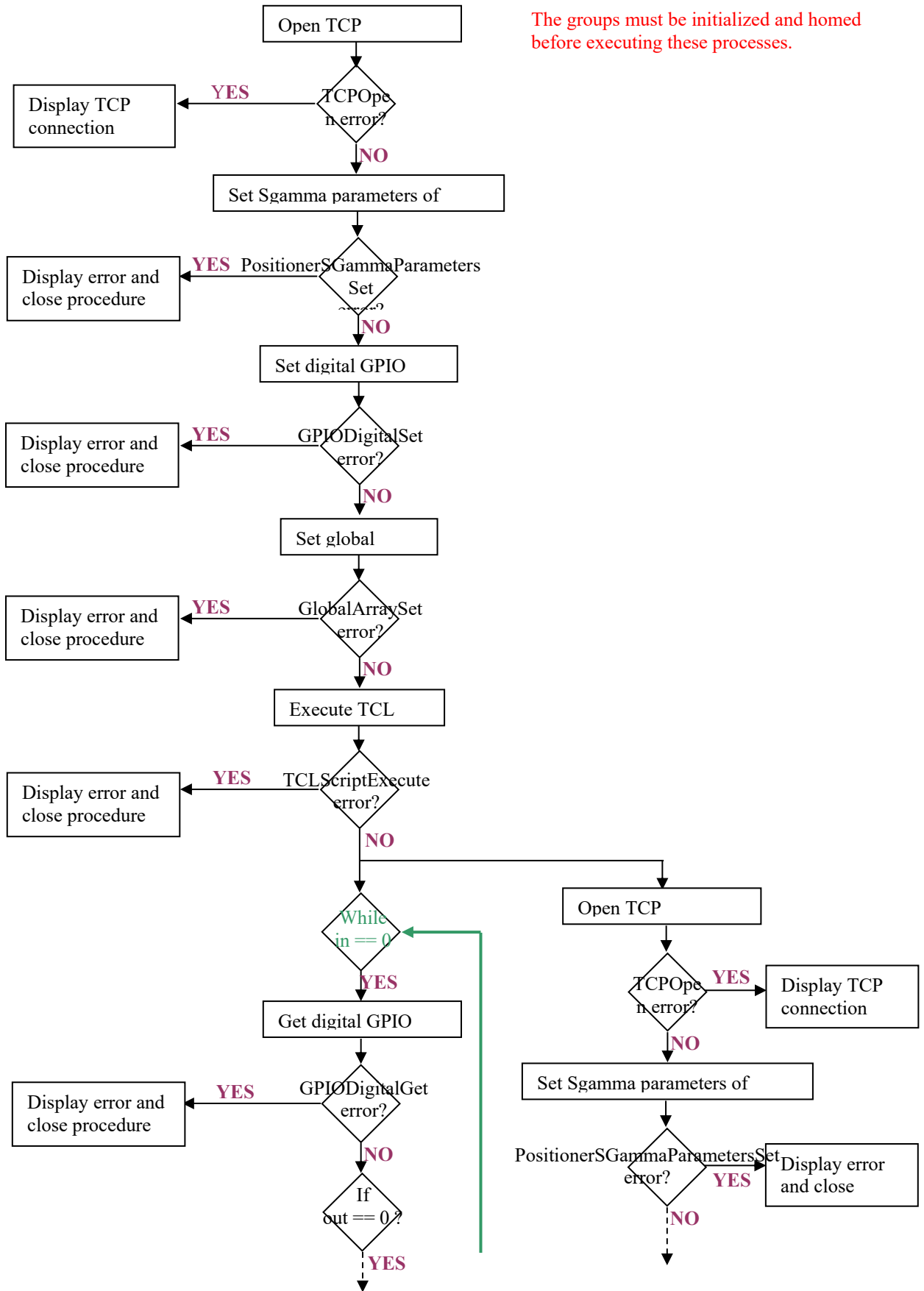
9.10 Timer Event and Global Variables

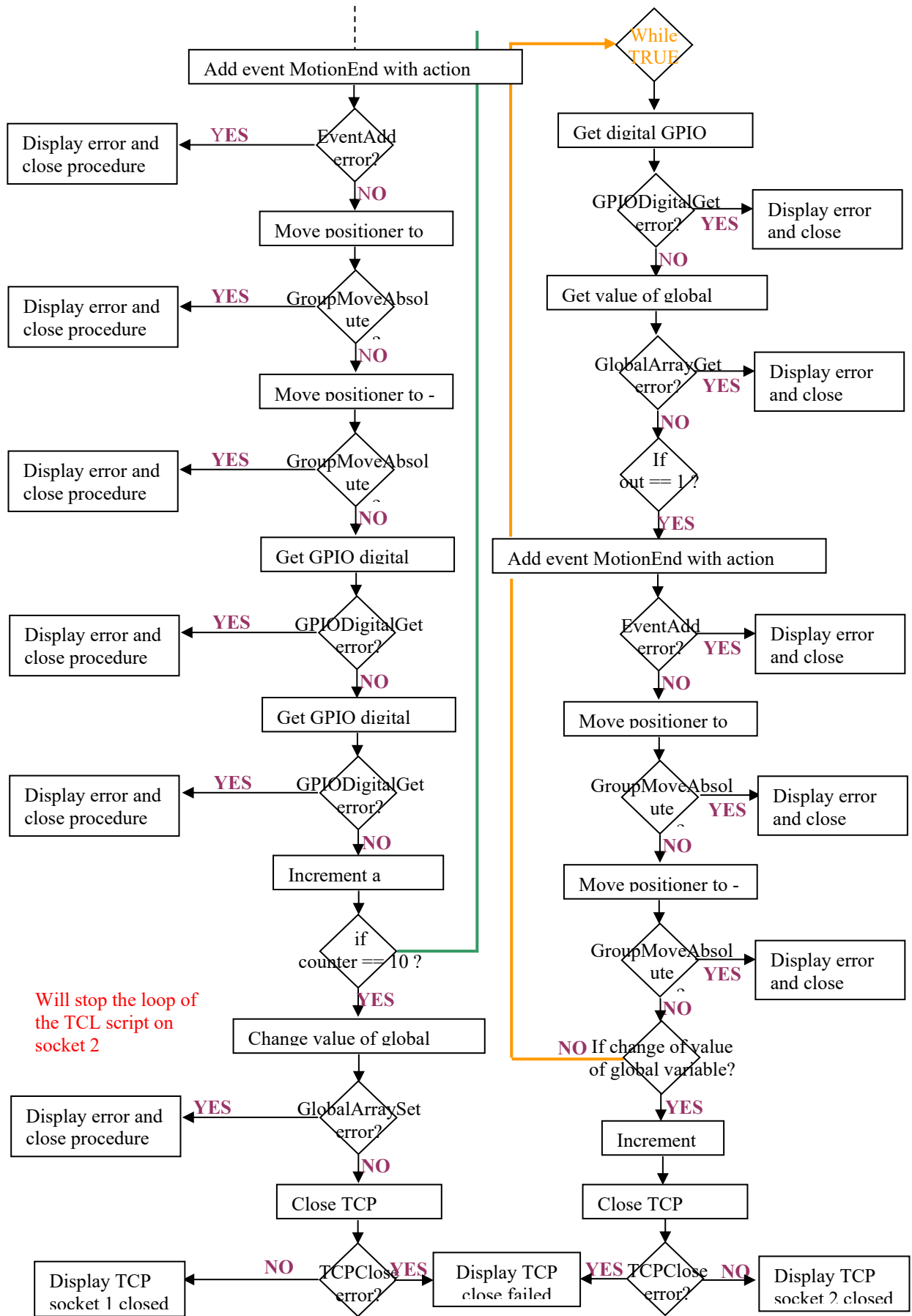




9.11 Running Several Motion Processes Simultaneously

The groups must be initialized and homed before executing these processes.







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