

HXP-D-JOYSTICK

Joystick Control Software for Newport Hexapod HXP-ELEC-D



The software interface includes several key sections:

- Positions (Work):** A list of axes (X, Y, Z, U, V, W) with numerical input fields. In the screenshot, X is 1.0000, Y is 2.0000, Z is 3.0000, U is 4.0000, V is 5.0000, and W is 6.0000.
- Coordinates:** Radio buttons for 'Work' (selected) and 'Tool'. Full Step Size is set to 10.000 mm and 100.000 Deg.
- Control:** A joystick image with buttons mapped to actions like '+X+Y', '+X+Z', '+Y+Z', '+U+V', '+U+W', '+V+W', and a 'KILL' button.
- Joystick Configuration:** A table for mapping joystick buttons to actions.

Step	Enabled	L/R	Rev	F/B	Rev
1	<input checked="" type="checkbox"/>	X	<input type="checkbox"/>	Y	<input type="checkbox"/>
2	<input checked="" type="checkbox"/>	X	<input type="checkbox"/>	Z	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	Y	<input type="checkbox"/>	Z	<input type="checkbox"/>
4	<input checked="" type="checkbox"/>	U	<input type="checkbox"/>	V	<input type="checkbox"/>
5	<input checked="" type="checkbox"/>	U	<input type="checkbox"/>	W	<input type="checkbox"/>
6	<input checked="" type="checkbox"/>	V	<input type="checkbox"/>	W	<input type="checkbox"/>
- Joystick Buttons Configuration:** A table for mapping joystick buttons to actions.

Action	Button	Enabled	Test Button #
Motion validation	5	<input checked="" type="checkbox"/>	0
Change Configuration (Down)	2	<input checked="" type="checkbox"/>	
Change Configuration (Up)	4	<input checked="" type="checkbox"/>	
Increase Increment (x 10)	3	<input checked="" type="checkbox"/>	
Decrease Increment (/ 10)	1	<input checked="" type="checkbox"/>	
Toggle Work/Tool	6	<input checked="" type="checkbox"/>	
Move to Target	8	<input checked="" type="checkbox"/>	

Preface

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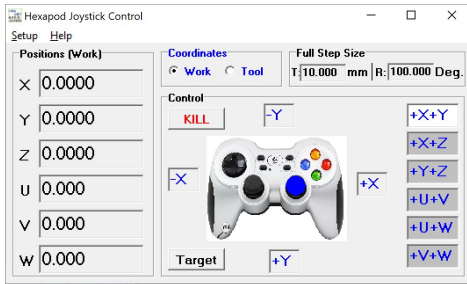
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Joystick Control Software for Newport Hexapod HXP-ELEC-D Controllers

1.0 Introduction

1.1 Introduction

The **HXP-D-JOYSTICK** enables the use of a commercial Joystick on a hexapod system controlled by Newport HXP-ELEC-D Motion Controller.

HXP-D-JOYSTICK reads Joystick commands and converts them into HXP-ELEC-D controller commands. This includes repeated incremental moves to simulate analog control and axis selection.

NOTE

The Joystick must first be correctly installed in the Windows environment.

1.2 Environment

HXP-D-JOYSTICK works in Windows 7,8 and 10 (32 bits) operating environments.

1.3 Requirements

1.3.1 Computer

PC with 2 GB RAM and at least 20 MB free hard disk space, Windows 7, 8 or 10.

1.3.2 Motion Controller

HXP-D-JOYSTICK software supports the Newport HXP-ELEC-D motion controller.

NOTE

HXP-ELEC-D controller must be configured with a group named “HEXAPOD”. Refer to XPS-D Controller User’s Manual.

1.3.3 Control Device

HXP-D-JOYSTICK software supports any device correctly installed and recognized by Windows as a “Human Interface Device” (HID). However, it has been optimized for the use of “Logitech F710” wireless gamepad. Through its USB dongle.

1.3.4 Software Installation

From a CD-ROM:

- Click Start on the Windows taskbar
- Select Run from the Start menu
- Click Browse and locate your CD or DVD-ROM drive to view the files available on the CD-ROM
- Find and copy the “**HXP-D-JOYSTICKVx.ZIP**” file and paste it in the desired location on your hard-disk
- Decompress the file to create and install “**HXP-D-JOYSTICK**” folder
- Launch “**HXP-D-JOYSTICK.EXE**”

NOTE

Make sure you have Administrator rights for the selected location.

1.3.5 Connections

Ethernet link: PC computer to Newport HXP-ELEC-D controller (Host).

HXPx-MECA to HXP-ELEC-D controller: Consult the HXPx-MECA User’s Manual.

2.0 Software Description

2.1 Main Window Description

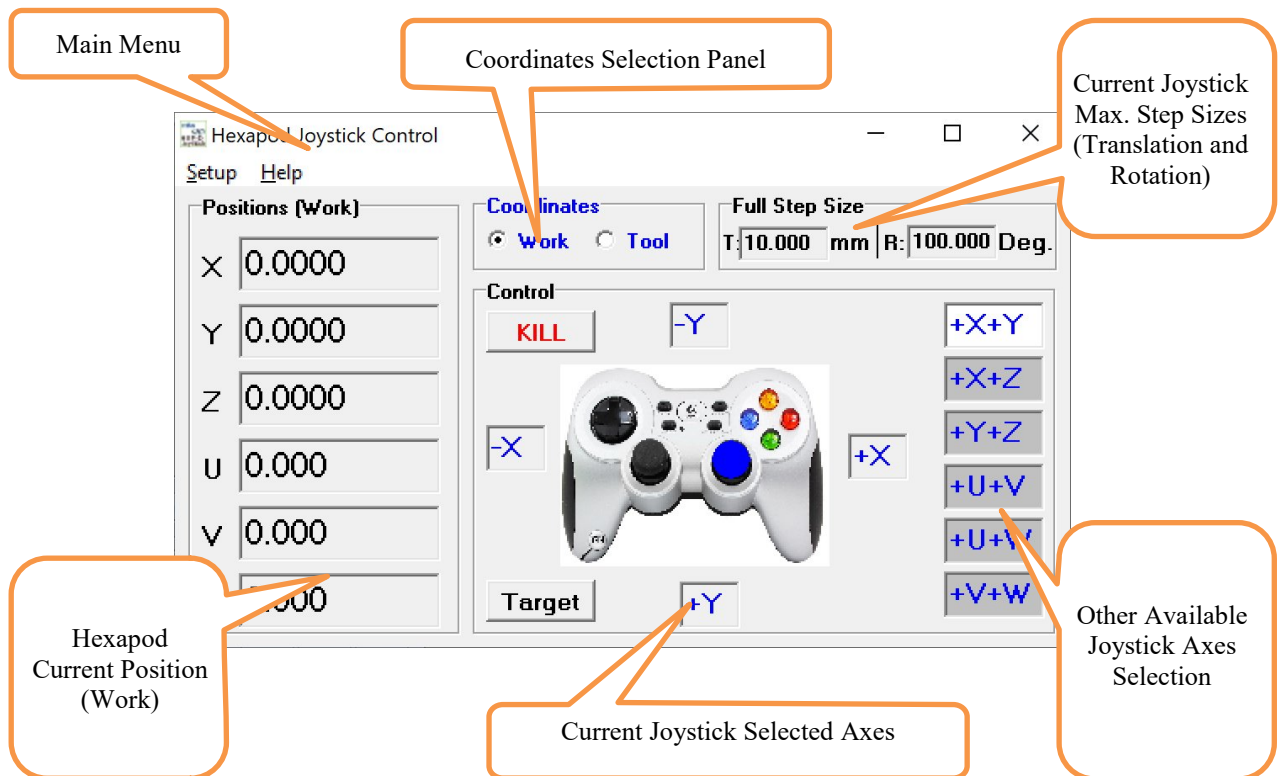


Figure 1: HXP-D-JOYSTICK main window.

- **Main menu** allows setting parameters and displays software information.
- **Positions (Work)** panel displays the hexapod's current position in Work coordinates for all six axes (X, Y, Z, U, V, W).

NOTES

Axes positions background color indicates the Hexapod status:

- **Red:** Not initialized
- **Orange:** Not Referenced or Homing
- **Yellow:** Disabled
- **Light gray:** Idle
- **Dark gray:** Moving

Control panel background color indicates the Motion status

- **Light gray:** Idle
- **Light blue:** Joystick activated

- **Coordinates** panel allows selecting the reference coordinates (Work or Tool) in which Joystick moves will be executed. This selection can also be done by a Joystick button: see [Joystick Buttons Configuration](#) of the [Joystick Parameters Window](#).
- **Control** panel displays the current Joystick axes selected in the [Joystick Axes Configuration](#) of the [Joystick Parameters Window](#).

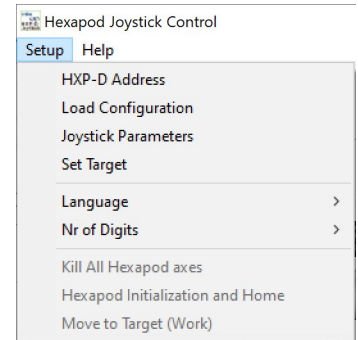
NOTE

Selected Axes background color in Control turns purple whenever the HXP-ELEC-D controller returns an error. For example, when a travel limit is reached.

2.2 Main Menu Description

2.2.1 Setup

- **HXP Address:** to set HXP-ELEC-D TCP/IP address.
- **Load Configuration:** to load a predefined configuration (HXP-ELEC-D, Joystick parameters and Target position).
- **Joystick Parameters:** to select Axes, directions, increments, Buttons actions, etc.).
- **Set Target:** allows setting a particular Hexapod position through the [Set Target](#) window.
- **Language:** to select display language (French/English/Other).
- **Nr of Digits:** use for the number of digits of the **Translation** and **Rotation** axes positions which are displayed in the main window.
- **Kill All Hexapod Axes:** to kill all Hexapod axes. Stops motion and requires initialization. (Enabled only when HXP-ELEC-D controller is connected)
- **Hexapod Initialization & Home:** to initialize and then Home the hexapod. (Enabled only when HXP-ELEC-D controller axes are killed)
- **Move to Target** (in Work coordinates). (Enabled only when HXP-ELEC-D controller axes are ready)



2.2.2 About

- **About** provides Software information.

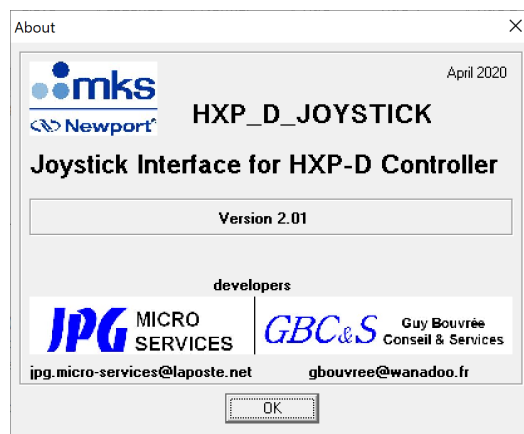


Figure 2: Software version information.

- **Manual:** Opens the HXP-D-Joystick Software User Manual (pdf).

2.3 Set Target

This window allows setting a particular Hexapod position with:

- 6 positions windows to enter desired axes target position values
- **Set to 0** to automatically set all axes target positions to 0
- **Load** to automatically set all axes target positions to the saved target position
- **Use Current Position** to automatically set all axes target positions to the current Hexapod position
- **Set Permanent** to mémorize these values along with Joystick parameters and close the window
- **Set Volatile** to use these values and close the window

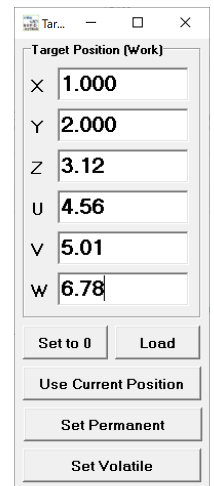


Figure 3: Target setting window.

2.4 Joystick Parameters Window Description

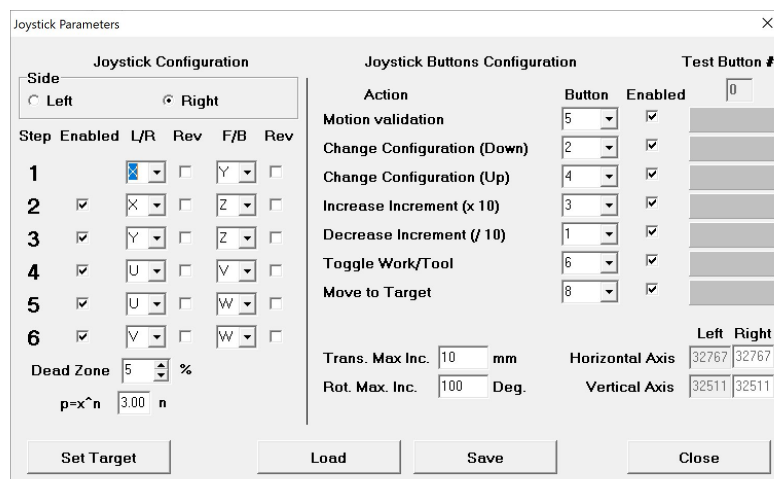


Figure 4: Joystick parameters window.

2.4.1 Joystick Axes Configuration

The left side of this window allows setting the following parameters:

- Joystick Left/Right selection: (only for control device with 2 joysticks).
- Joystick axes assignment: Up to 6 configurations can be set for the 2 axes of the stick control then two buttons allow incrementing/decrementing the configuration step. For each step, the following parameters can be set:
 - Enable/Disable the step
 - Axes for Left/Right and Front/Back control
 - Reverse each axis
- To avoid axis drift due to the joystick's analog output offset, a dead Zone can be set (in % of the full range).
- The increment size / stick value law can be set (Increment size = stick value \wedge nⁿ).

2.4.2 Set Target Button

- This button allows setting a particular Hexapod position through the [Set Target window](#)

2.4.3 Joystick Buttons Configuration

Any of the first 8 joystick action buttons (1 to 8) or the Point of View (PoV) button can be assigned to one of the HXP-D-JOYSTICK six commands and then enabled.

- **Motion Validation:** When enabled, the corresponding joystick button must be kept pressed to allow motion through the joystick or **Move to Target** button.
- **Change configuration Up and Down:** When enabled, pressing the corresponding button increments or decrements the Joystick configuration number in a loop. The control panel of the main window is updated accordingly.
- **Increase/Decrease Increment:** When enabled, pressing the corresponding button increases or decreases the **Translation and Rotation maximal Increments** by a factor of 10. Increment can be reduced 4 times and then increased (No loop mode). Full Step Size panel of the main window is updated accordingly.
- **Toggle Work/Tool:** When enabled, pressing the corresponding button toggles to the reference coordinates for the next joystick move.
- **Move to Target:** When enabled, pressing the corresponding button moves the Hexapod to the memorized target position.
- **Translation and Rotation maximal Increments** allow setting the size of the incremental move sent when the stick is pushed to its maximum position. (**Note:** This setting might not be available depending on the Joystick type)

NOTE

- **Stick intermediate positions generate increment sizes following the increment size / stick position law defined above.**
- **Increment scale factor** (only for single joystick control device) allows setting the size of the incremental move sent when the stick is pushed to its maximal position by using the third analog control of this device.

2.4.4 Test

This section allows testing the device with:



- A first indicator displays the number of the button returned by the device.

NOTE

Only One Button must be pressed at the time.

- Seven **indicators** allow checking the selected joystick inputs (they turn **green** when corresponding button is pressed) and the **value** of the 4 analog controls are displayed (0 to 65535).

NOTE

During this test, no command is sent to the HXP-ELEC-D controller.

2.4.5 Load & Save Configuration Buttons

Current Joystick parameters, HXP-ELEC-D TCP-IP address and Target positions can be saved by pressing the **Save** button.

Previously saved configurations can be re-loaded by pressing the **Load** button.

NOTE

In case of different HXP-ELEC-D IP address, HXP-D-JOYSTICK software must be closed and restarted.

3.0 Launching HXP-D-JOYSTICK



HXP_D_Joy
stick.exe -
Shortcut

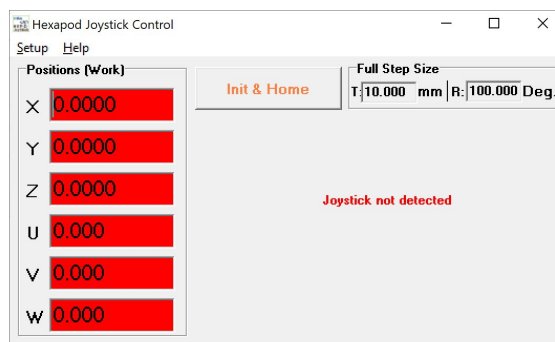
Launch HXP-D-JOYSTICK and wait for communications to be established.

HXP-D-JOYSTICK performs two tasks before starting:

- Control device to be connected and correctly installed in Windows environment.
- HXP-ELEC-D controller to be connected powered on and boot process completed.

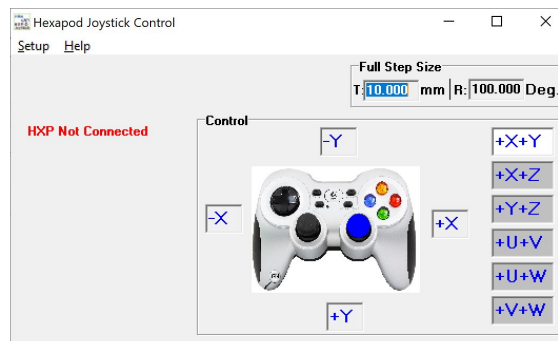
In the case of an incorrect setup, HXP-D-JOYSTICK will not be able to communicate with the control device and the “Control” panel will be replaced by the Label “Joystick Not Detected”. Check chapter 4 [Hardware Installation Verification](#).

Then close and restart HXP-D-JOYSTICK.

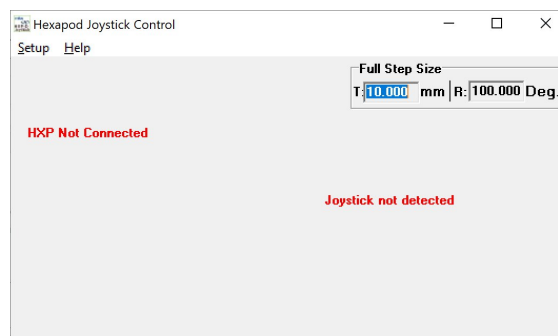


In the case of a communication problem with the controller, HXP-D-JOYSTICK will not be able to communicate with the controller and the “positions” panel will be replaced by the Label “HXP Not Connected”. See [Verifying/Setting HXP-ELEC-D Parameters](#) chapter.

Then close and restart HXP-D-JOYSTICK.



In case of controller and control device communication problem, both panels will be disabled



3.1 Verifying/Setting HXP-ELEC-D Parameters

Default communication IP address are set as follow:

- **HXP-D-JOYSTICK** Software: 192.168.254.254
- HXP-ELEC-D Controller, REMOTE port: 192.168.254.254
- HXP-ELEC-D Controller, HOST port: 192.168.0.254

Using HXP-D-JOYSTICK software on a Newport HXP-ELEC-D controller for the first time requires verifying and or setting several parameters.

NOTE

These parameters must be set only once as they are memorized by HXP-D-JOYSTICK software.

3.1.1 Computer TCP/IP Address

To establish communication with the HXP-ELEC-D controller, the computer Ethernet TCP/IP address must be set correctly according to hardware communication configuration.

- Computer linked directly to HXP-ELEC-D “Remote” port.
In this case, a cross-over Ethernet cable must be used.
Computer TCP/IP address must be set at “192.168.254.X” (with X smaller than 254). Subnet mask must be set at “255.255.255.0”.
- Computer linked directly to HXP-ELEC-D “Host” port.
In this case, a cross-over Ethernet cable must be used.
Computer TCP/IP address must be set at an address corresponding to HXP-ELEC-D “Host” TCP address. (The first 3 sets of numbers must be the same, but the last one different. I.e.: “150.10.23.45” for HXP-ELEC-D and “150.10.23.44” for computer).
Subnet mask must be set to “255.255.255.255”.

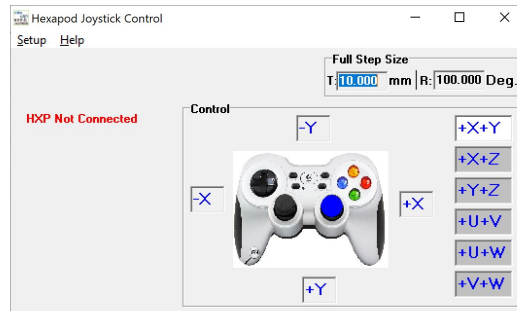
NOTE

Consult HXP-D user’s manual for HXP-ELEC-D “Host” port address setting.

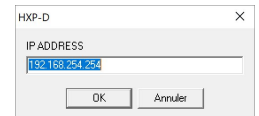
- Computer linked to HXP-ELEC-D “Host” port though a network.
In this case, a straight through Ethernet cable must be used.
Computer and HXP-ELEC-D TCP/IP addresses must be set at different addresses compatible with the current network settings (consult your network administrator).
Recommended Subnet mask setting is: “255.255.255.0”.
If HXP-ELEC-D TCP/IP address has already been set, **HXP-D-JOYSTICK** software is ready to use and the main window is displayed. Joystick parameters can now be set through [Setting joystick parameters](#).
For the first use or in case of new IP address **HXP-D-JOYSTICK** software will go through parameter settings described in [chapter 3.1.2](#).

3.1.2 HXP-ELEC-D Address in HXP-D-JOYSTICK software

In the case of an incorrect TCP/IP address setting, HXP-D-JOYSTICK will not be able to communicate with the controller and the “position” panel will be replaced by the Label “HXP Not Connected”.



Select “HXP-D Address” command of the “Setup” menu and then enter the current HXP-ELEC-D IP address.

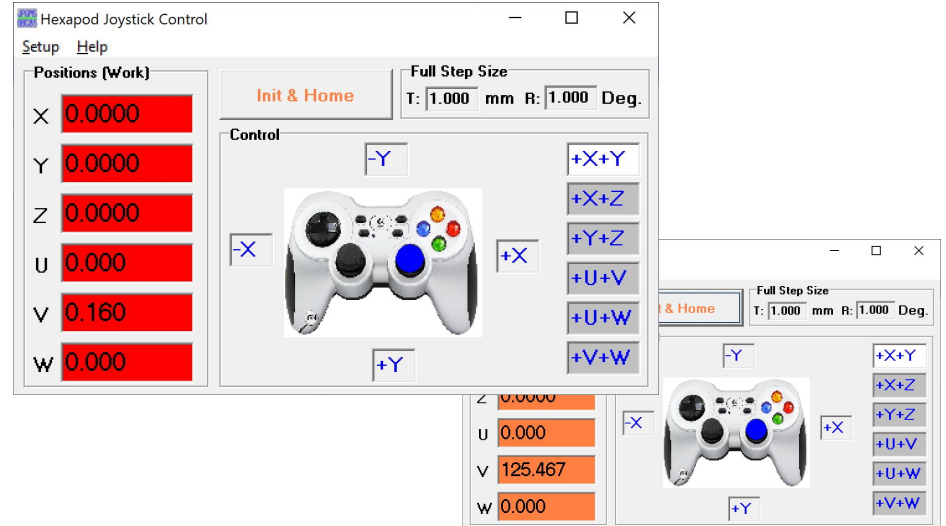


Then exit and re-launch HXP-D-JOYSTICK software (to memorized parameters).

3.1.3 HXP-ELEC-D Controller Group Name

- Verify that all axes in the HXP controller are set in a group named “HEXAPOD”.

Once the HXP-ELEC-D address has been set correctly and if Hexapod has not been initialized, the HXP-D-JOYSTICK main window displays the Hexapod position (in Work coordinates) as follows:



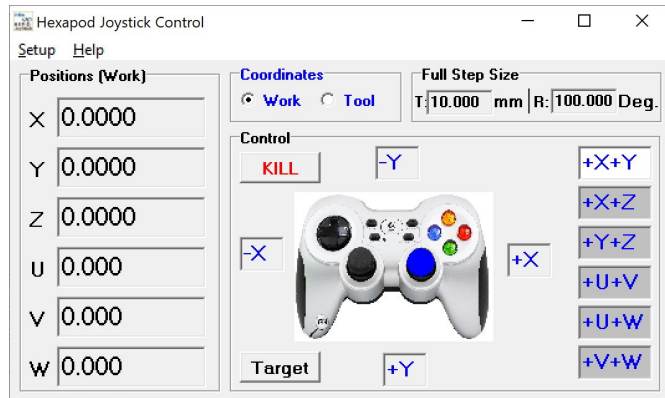
To be under joystick control, all 6 hexapod axes need to be initialized. If HXP-ELEC-D axes are not initialized, HXP-D-JOYSTICK Positions background color turns red indicating the need for initialization which can be done by clicking on “Initialization & Home” in the main menu. During Homing process, background color turns orange

WARNING

Ensure that the hexapod can move freely, remove the shipping bracket, for example, before launching Initialization & Home.

3.1.4 Move to Target Position

Once all HXPx-MECA actuators have been initialized and homed, it is recommended to move the Hexapod to its default **Target** position (in Work coordinates) by simply pressing “**Target**” button or by clicking on the “**Move to Target**” of the ‘**Setup**’ menu.



NOTES

Default Target position is set to 0 for all axes, but can be changed.

Hexapod axes can be killed through “**KILL**” button or the “**Kill All Hexapod Axes**” of the ‘**Setup**’ menu.

3.2 Verifying Control Device Installation

- Logitech F710 gamepad

Follow Logitech instructions to install the necessary drivers for this device. See chapter 3.4 for details.

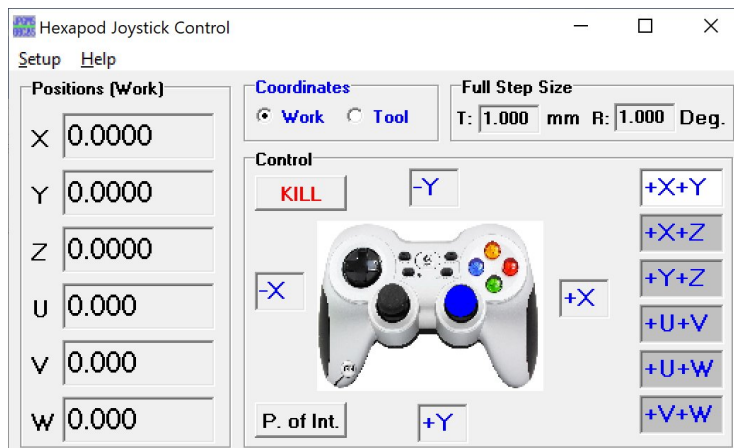


3.3 Setting Joystick Parameters

NOTE

Prior to launching HXP-D-JOYSTICK software, the gamepad controller must have been installed correctly and recognized by Windows. See chapter 3.4 for details.

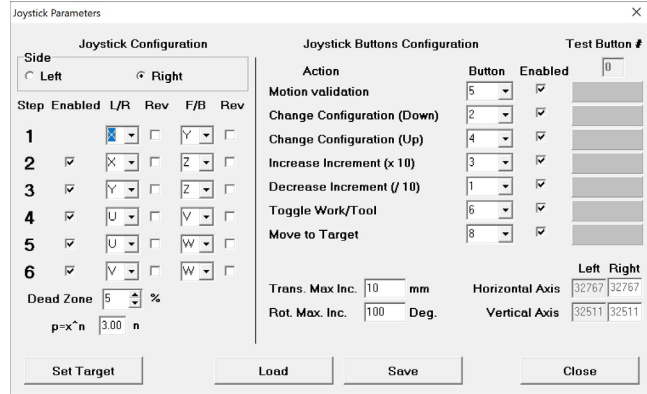
Once all parameters have been set correctly, the HXP-D-JOYSTICK main window displays the Hexapod position (in Work coordinates) as follows:



If the last saved configuration corresponds to the present needs, **HXP-D-JOYSTICK** is ready to use.

If another previously saved configuration is preferred, just select it through the menu: **Setup/ Load configuration**.

If a new configuration is required, set it through the **Joystick Parameters** window.

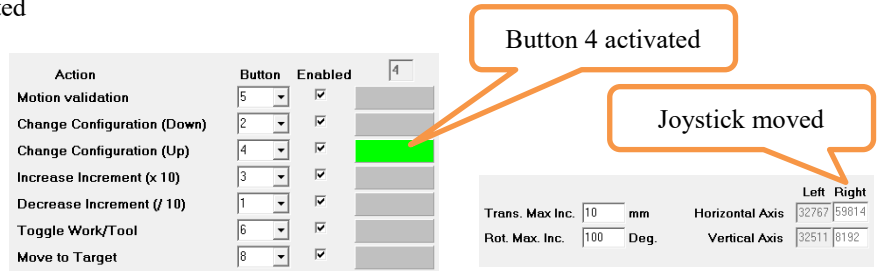


NOTE

Do not forget to **Save** the new configuration before closing the configuration window.

3.4 Testing the Joystick

Whenever the **Joystick Parameters** window is opened, action buttons and sticks can be tested



NOTES

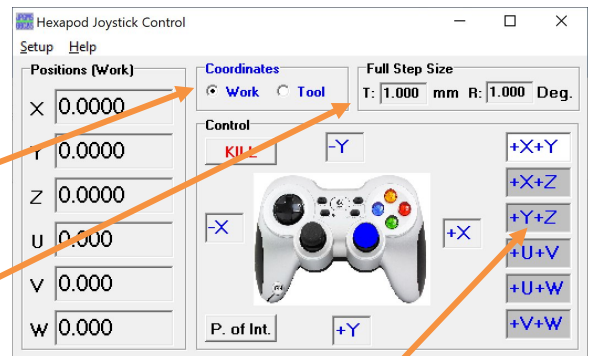
Only one button must be pressed at the time.

During this test, no command is sent to the HXP-ELEC-D controller.

3.5 Using the Joystick

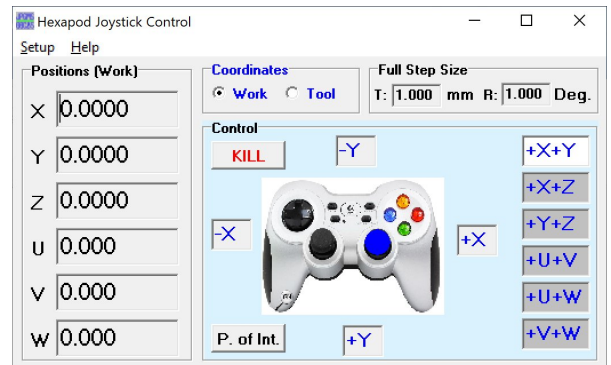
To use the Joystick, proceed as follow:

- Select the coordinate system
- Select the Step value
- Select the 2 axes to be controlled by moving Up/down the list of available choices

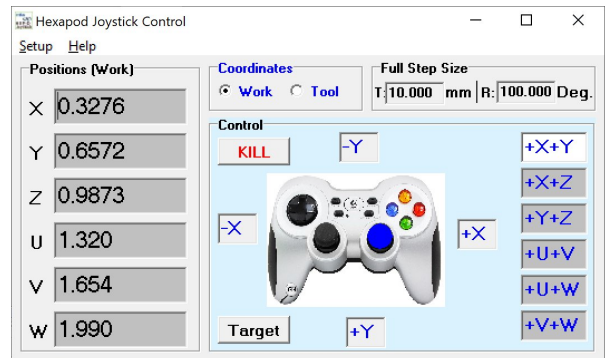


- While **maintaining** the button assign to **Motion Validation**, move the selected joystick to start Hexapod motion

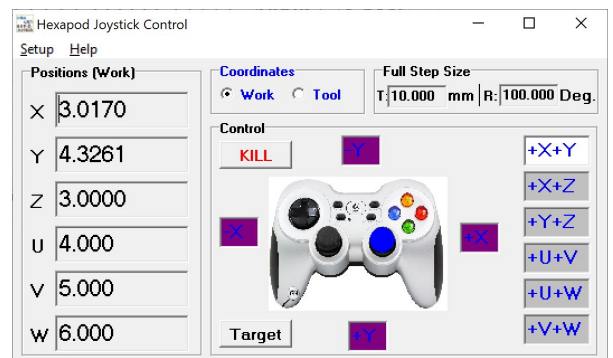
As soon as the motion validation button is pressed, Control panel background color turns light blue.



During large motion, Positions panel background color turns dark gray

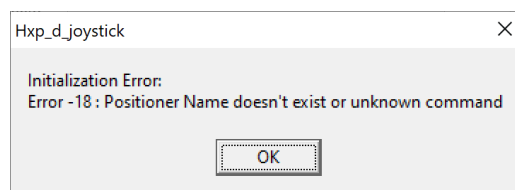


In case of “Not Allowed Motion” (controller not ready: limits, disable, etc...) Joystick arrows background color turns purple



NOTE

Any error returned by the controller will be displayed in a dedicated window. Press Ok to continue,



4.0 Hardware Installation Verification

4.1 Windows Installation - Logitech Gamepad

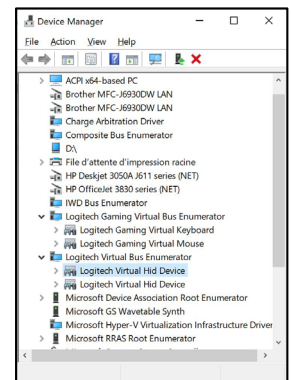
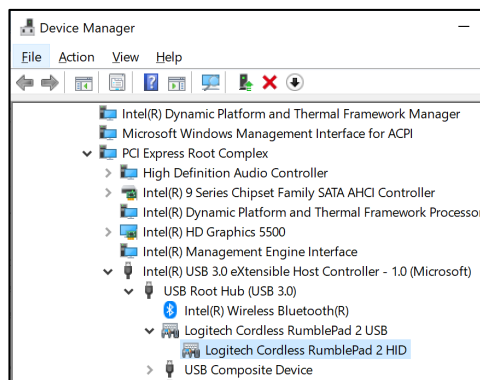
4.1.1 Logitech Wireless Gamepad F710

It is highly recommended to install the device manufacturer driver. Windows generic drivers might not be fully compatible and may cause malfunctions.

After installing the gamepad driver and connecting it to one of the PC USB ports, open Windows Device Manager, select “View/Devices by connection” and verify that the gamepad is correctly installed.

Depending on PC Windows version, Device Manager appearance may change.

View/Devices by connection



View/Devices by type

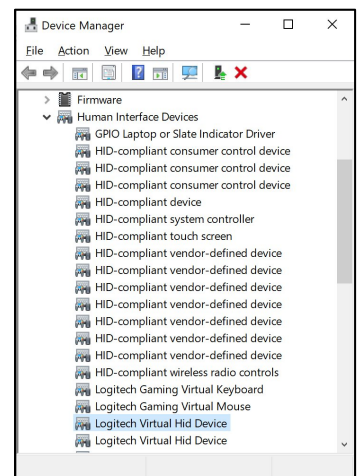
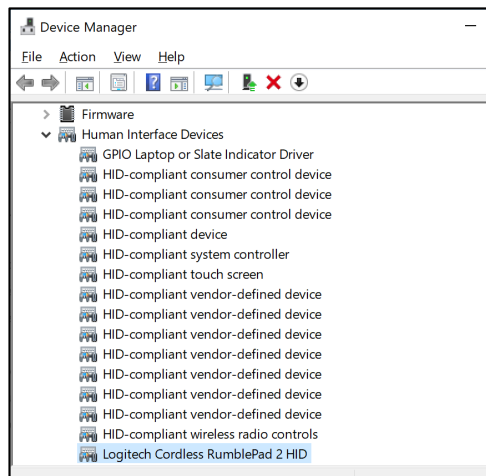


Figure 5: Examples of Device manager:

4.2 Control Hardware Windows Installation Verification

4.2.1 Logitech Gamepad F170 Features

The gamepad includes 12 individual Action buttons, 1 “Point of View” 8-direction button, 2 joysticks (2 analog controls), a mode control button and a vibration button.

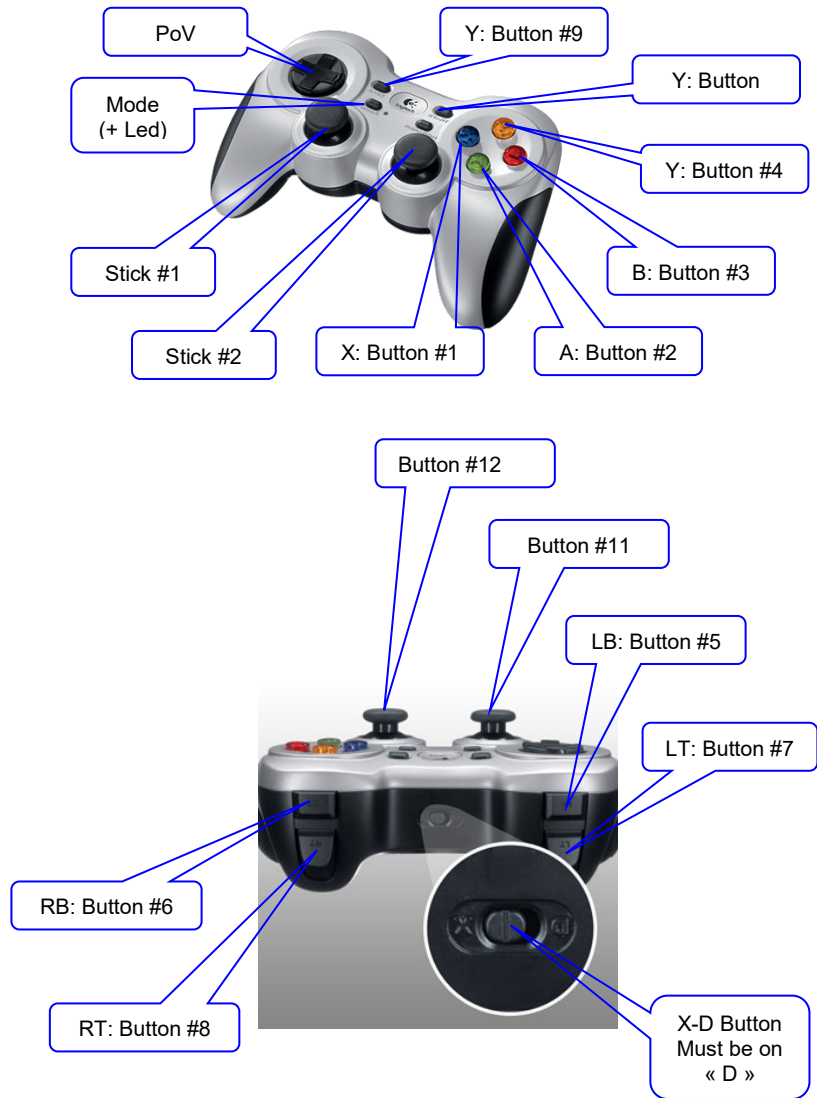


Figure 6: Logitech Gamepad F170 Features.

NOTES

- **Back X-D button must be on “D”**
- **Vibration button not used**
- **Mode Button:**
 - LED Off: Stick 1 (analog 1 & 2) provides HXP analog control (recommended)
 - LED On: PoV provide HXP-ELEC-D (max) step by step motion
- **After some time, the Gamepad turns itself off. Push “X” to reactivate**

Recommended HXP-D-JOYSTICK configuration for this Gamepad:

(For a right-handed user)

- Right joystick
- Motion Validation: Button 5 (LB)
- Change configuration (Down): Button 2 (A)
- Change configuration (Up): Button 4 (Y)
- Increase Step size: Button 3 (B)
- Decrease Step size: Button 1 (X)
- Toggle Work/Tool: Button 6 (RB)
- Move to Target: Button 5 (LB) + Button 8 (RT)

Joystick Parameters
✕

Joystick Configuration

Side
 Left Right

Step	Enabled	L/R	Rev	F/B	Rev
1	<input type="checkbox"/>	X	<input type="checkbox"/>	Y	<input type="checkbox"/>
2	<input checked="" type="checkbox"/>	X	<input type="checkbox"/>	Z	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	Y	<input type="checkbox"/>	Z	<input type="checkbox"/>
4	<input checked="" type="checkbox"/>	U	<input type="checkbox"/>	V	<input type="checkbox"/>
5	<input checked="" type="checkbox"/>	U	<input type="checkbox"/>	W	<input type="checkbox"/>
6	<input checked="" type="checkbox"/>	V	<input type="checkbox"/>	W	<input type="checkbox"/>

Dead Zone: %
 $p=x^n$ n

Joystick Buttons Configuration

Action	Button	Enabled	Test Button #
Motion validation	5	<input checked="" type="checkbox"/>	<input type="text" value="0"/>
Change Configuration (Down)	2	<input checked="" type="checkbox"/>	<input type="text"/>
Change Configuration (Up)	4	<input checked="" type="checkbox"/>	<input type="text"/>
Increase Increment (x 10)	3	<input checked="" type="checkbox"/>	<input type="text"/>
Decrease Increment (/ 10)	1	<input checked="" type="checkbox"/>	<input type="text"/>
Toggle Work/Tool	6	<input checked="" type="checkbox"/>	<input type="text"/>
Move to Target	8	<input checked="" type="checkbox"/>	<input type="text"/>

Trans. Max Inc. mm

Rot. Max. Inc. Deg.

Horizontal Axis

Vertical Axis

Set Target

Load

Save

Close



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