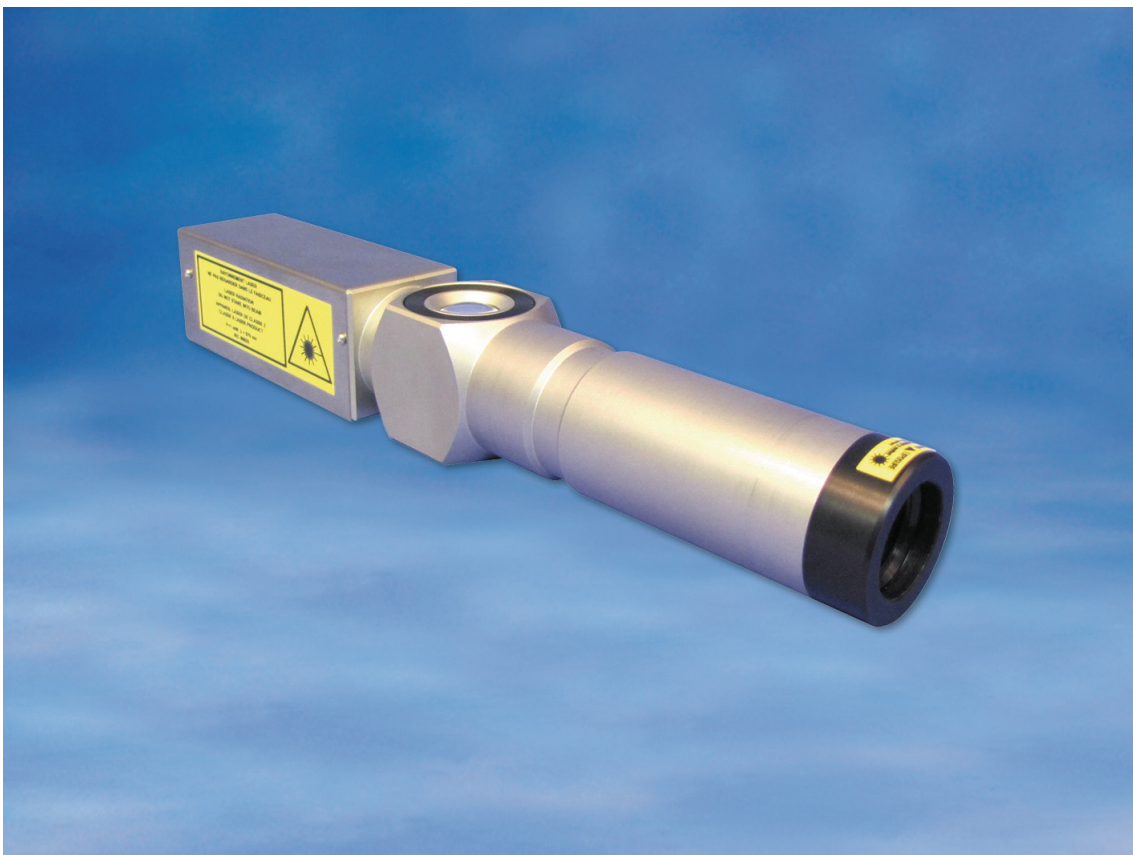


CONEX-LDS

Electronic Autocollimator



Newport®
Experience | Solutions

Controller GUI Manual

V1.0.x

For Motion, Think Newport™

Table of Contents

1.0	Introduction	1
1.1	Purpose	1
1.2	Overview	1
1.3	Controller state diagram.....	1

2.0	Getting Started.....	3
2.1	Discover Instruments	3

3.0	User Interface.....	4
3.1	General.....	4
3.2	Configuration.....	5
3.3	Main.....	8
3.3.1	Target tab.....	8
3.3.2	Cluster view tab.....	8
3.3.3	Positions tab	9
3.4	Calibration	10
3.5	Acquisition.....	12
3.5.1	CONEX-LDS Acquisition tab.....	12
3.5.2	XPS Data Logger tab.....	14
3.6	Setup.....	17
3.6.1	Configuration.....	18
3.6.2	Dark current calibration.....	19
3.6.3	Low pass filter	19
3.6.4	Analog outputs.....	20
3.7	Diagnostics	20
3.8	About.....	22

	Service Form	23
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CONEX-LDS

Electronic Autocollimator

1.0 Introduction

1.1 Purpose

The purpose of this document is to provide instructions on how to use the CONEX-LDS Controller GUI.

1.2 Overview

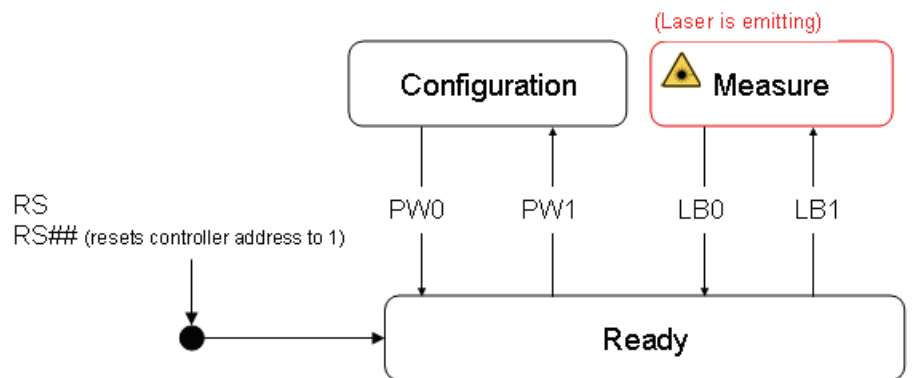
The CONEX-LDS Controller GUI is a software application that has a Graphical User Interface (GUI) which allows the user to interact with the CONEX-LDS device.

1.3 Controller state diagram

For a safe and consistent operation, the CONEX-LDS uses 3 different operational states:

1. Configuration
2. Ready
3. Measure

In each state, only specific commands are accepted by the CONEX-LDS. Therefore, it is important to understand the state diagram below and which commands and actions cause transitions between the different states.



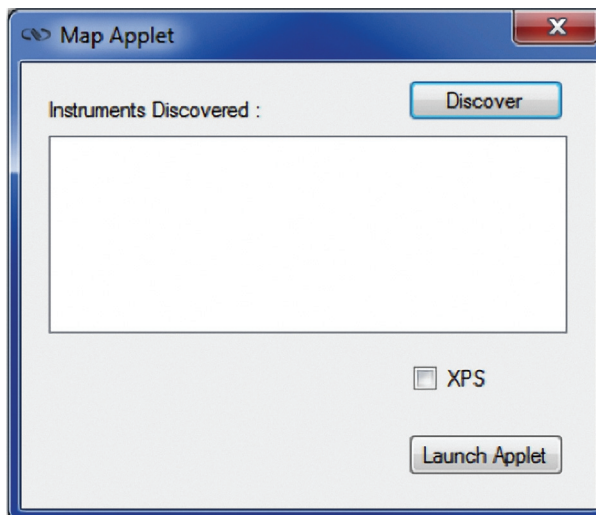
When powering the CONEX-LDS, the controller starts initialization. When initialization is successful, the controller goes to the READY state. The controller can go to the CONFIGURATION state using the PW1 command. In the CONFIGURATION state, the CONEX-LDS allows changes to all configuration parameters, like gains or controller address. The PW0 command saves all changes to the controller's memory and returns the controller back to the READY state.

The device goes to the MEASURE state with the LB1 command. After sending the command, the status LED blinks for 3 seconds, indicating that the laser is going to be powered. At the end of this period the LED stops blinking and the laser starts emitting. This Controller GUI will display the current X and Y positions. Measurements can be recorded either through the command set or the two analog outputs.

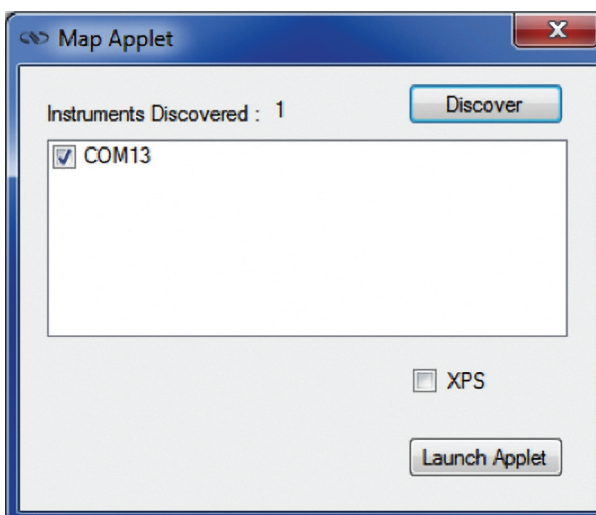
2.0 Getting Started

2.1 Discover Instruments

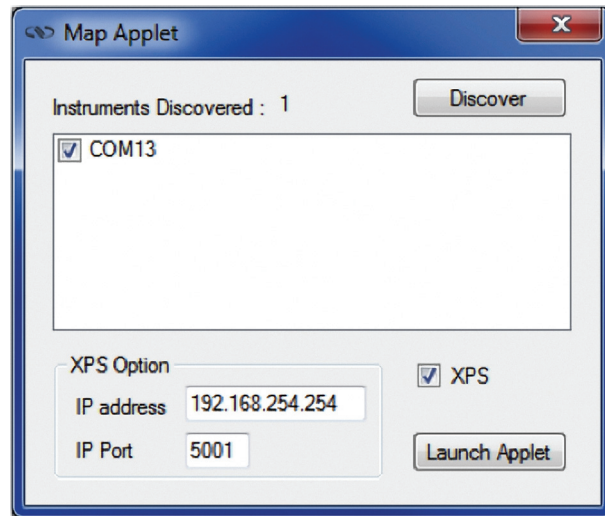
Start the Controller GUI from `Newport\MotionControl\CONEX-LDS`.



Next, click on “**Discover**” button and number of instruments discovered will appear. This window allows the user to select a com port where the desired instrument is connected.



When an XPS controller is connected, this window allows the user to choose XPS Option and enter IP settings.



Next, click “Launch Applet” (Controller GUI) button.

3.0 User Interface

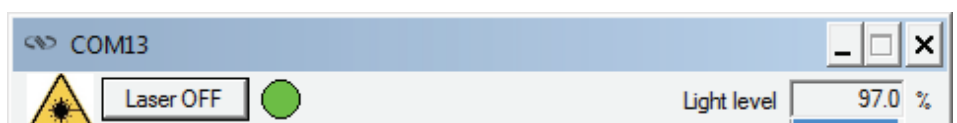
3.1 General

This banner shows the laser status and the light level returned to the sensor as a percentage of the emitted power.



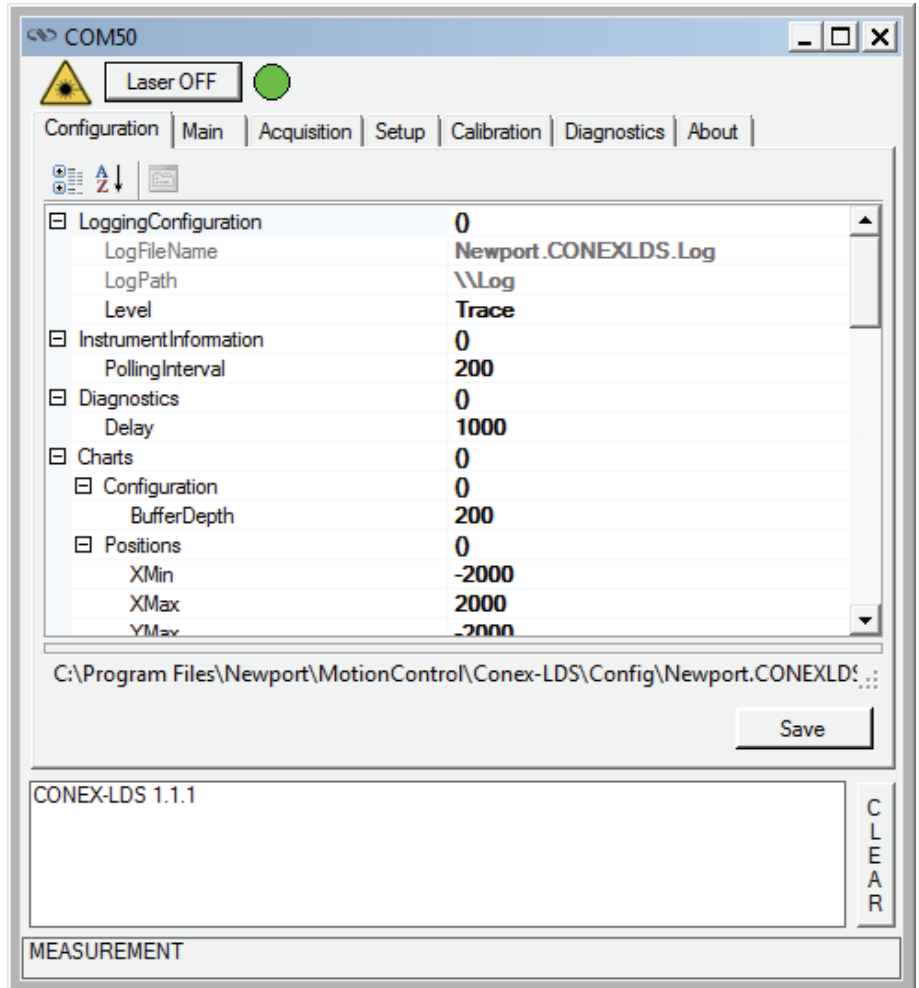
The button “Laser ON” turns the laser on.

When the laser LED is ON (green LED), the button turns to “Laser OFF” to turn it off.



3.2 Configuration

The Configuration tab allows the user to view and / or change information related to the logging configuration and the instrument settings. Read only values are displayed for the log file name and log file path. The Logging Level can be selected from a drop down list that ranges from the Trace level, which logs everything (...) to the least detailed, Critical Error.



The Polling Interval defines the delay, in milliseconds, between each polling event. The user may change the polling interval by entering a new value.

The **Save** button saves the current settings to the configuration file.

Configurable settings

The following table describes all the settings that can be changed by the user.

Parameter	Description	Values	Default
LoggingConfiguration			
Level	Logging level. Trace is the most detailed setting wherein the Controller GUI logs everything. Critical Error is the least detailed setting, which log errors that are defined to be critical.	Trace Detail Equipment Message Info Warning Error Critical Error	Trace
InstrumentInformation			
PollingInterval	The polling interval defines the delay, in milliseconds, between each polling event.	An Integer	200
NbDigits	Number of digits after the decimal point.	An Integer	6
Diagnostics			
Delay	The time, in milliseconds, between commands sent to the instrument.	An Integer	200
Charts			
BufferDepth	BufferDepth defines the maximum number of points displayed in the chart.		200
XMax	XMax defined the maximum X limits of the position charts.		2000
XMin	XMax defined the minimum X limits of the position charts.		-2000
YMax	XMax defined the maximum Y limits of the position charts.		2000
YMin	YMax defined the minimum Y limits of the position charts.		-2000
Models \ InstrumentInfo			
InstrumentType	Type of the main instrument		CONEX-LDS
NoOfInstruments	Number of instruments that could be connected 1) CONEX-LDS (mandatory) 2) XPS (Optional)	1 or 2	2
Instrument1	Type of the main instrument		CONEX-LDS
Instrument2	Type of the optional instrument		XPS
CommunicationChannelLDS	The communication channel	USB	USB
CommunicationChannelXPS	The communication channel	TCP	TCP
LDS			
XAxisName	User name given for the X axis		X
YAxisName	User name given for the Y axis		Y
XDirection	The axis direction for X axis.	Positive Negative	Positive
YDirection	The axis direction for Y axis.	Positive Negative	Positive
XYOrientation	XY Axes orientation Normal = XY Inverse = YX	Normal Inverse	Normal

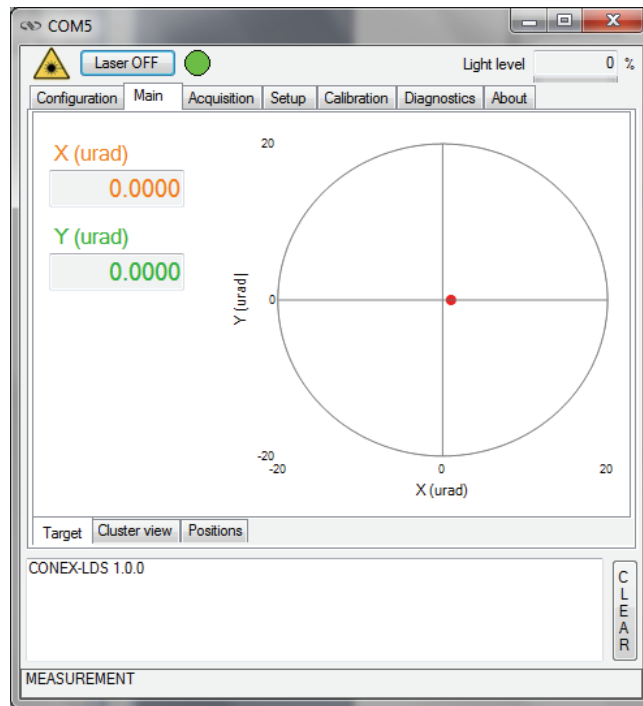
LDSUnitConfiguration			
SelectedConfiguration	Name of the selected configuration		
ConfigurationFactory	Predefined factory configuration of the connected CONEX-LDS.		
ConfigurationArcSec	Predefined configuration		
ConfigurationMDeg	Predefined configuration		
Configuration1	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration2	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration3	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration4	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration5	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration6	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration7	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration8	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration9	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
Configuration10	User configuration.	String format: "name;unit;range;ratioX;ratioY"	
XPS \ XPSDataLogger			
ExternalTrigger	XPS Digital input used as an external trigger to start an XPS gathering (use TTL input 1 only).	GPIO1.DI GPIO2.DI GPIO3.DI GPIO4.DI	GPIO1.DI
XAnalogInput	XPS Analog input used in the XPS gathering to get X-axis positions from the CONEX-LDS.	GPIO2.ADC1 GPIO2.ADC2 GPIO2.ADC3 GPIO2.ADC4	GPIO2.ADC 1
YAnalogInput	XPS Analog input used in the XPS gathering to get Y-axis positions from the CONEX-LDS.	GPIO2.ADC1 GPIO2.ADC2 GPIO2.ADC3 GPIO2.ADC4	GPIO2.ADC 2
LDSPerformanceVerification \ PerformanceVerificationKit			
KitSerialNumber	Serial number of the performance verification kit.		
ReferenceAngleValue	CONEX-LDS-VER optical wedge Reference Angle value.		
LDSPIInformation			
LDSSerialNumber	The "CD" command will return the serial number of the CONEX-LDS		

3.3 Main

The Main tab displays the main controls in the Controller GUI similar to the virtual front panel in Lab view. It is updated at every polling event.

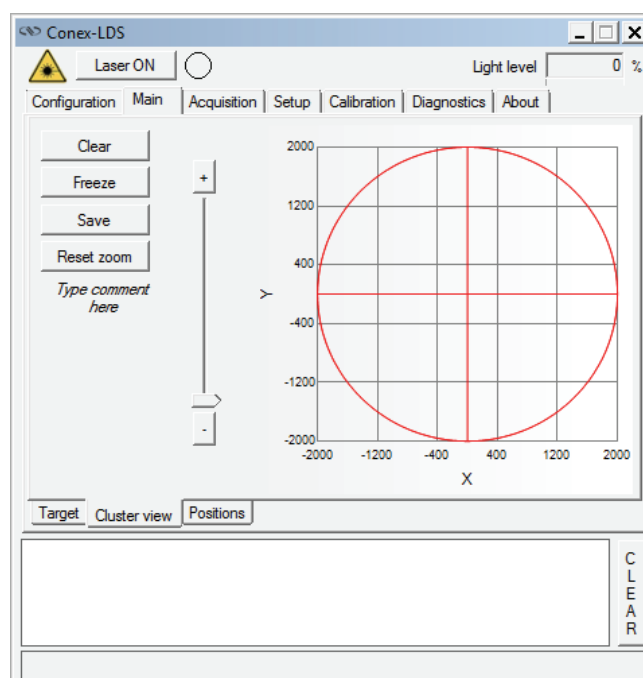
3.3.1 Target tab

This tab shows the current position in (X, Y), refreshed at every PollingInterval cycle. The current position is represented by a point. Four automatic zoom levels are available to change the scale of the display.



3.3.2 Cluster view tab

The cluster view tracks and plots the current position (X, Y) continuously.



Clear Button

Clears the plotted points.

Freeze Button

Freezes the display and stops refreshing. The button label “Freeze” changes to “Resume”, once it is clicked. In order to start refreshing, click “Resume”.

Save Button

Saves the data in a text file.

The format is as follows:

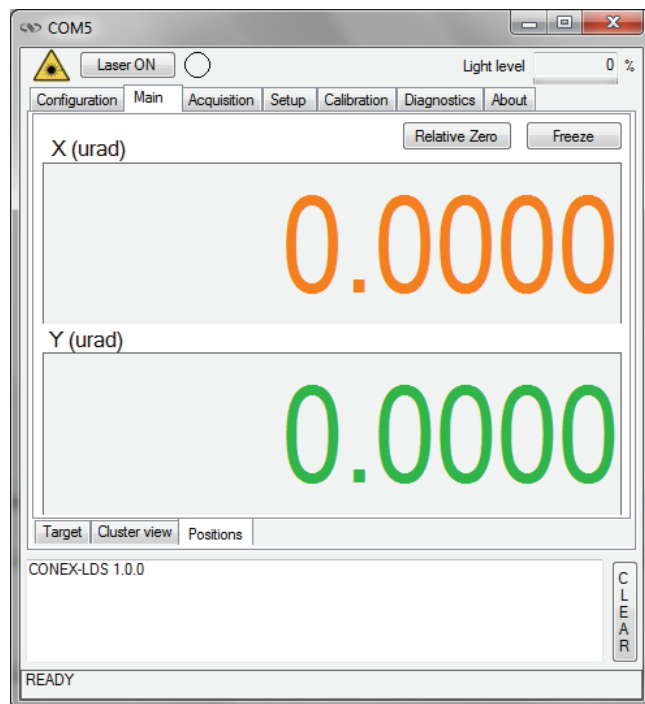
```
1. Comment line
2. Polling delay
3. X User axis name           X User axis name
4. X position                 Y position
```

Reset zoom Button

Resets the zoom scale to the default.

3.3.3 Positions tab

This tab shows the current positions in a large font for better visibility.



Freeze Button

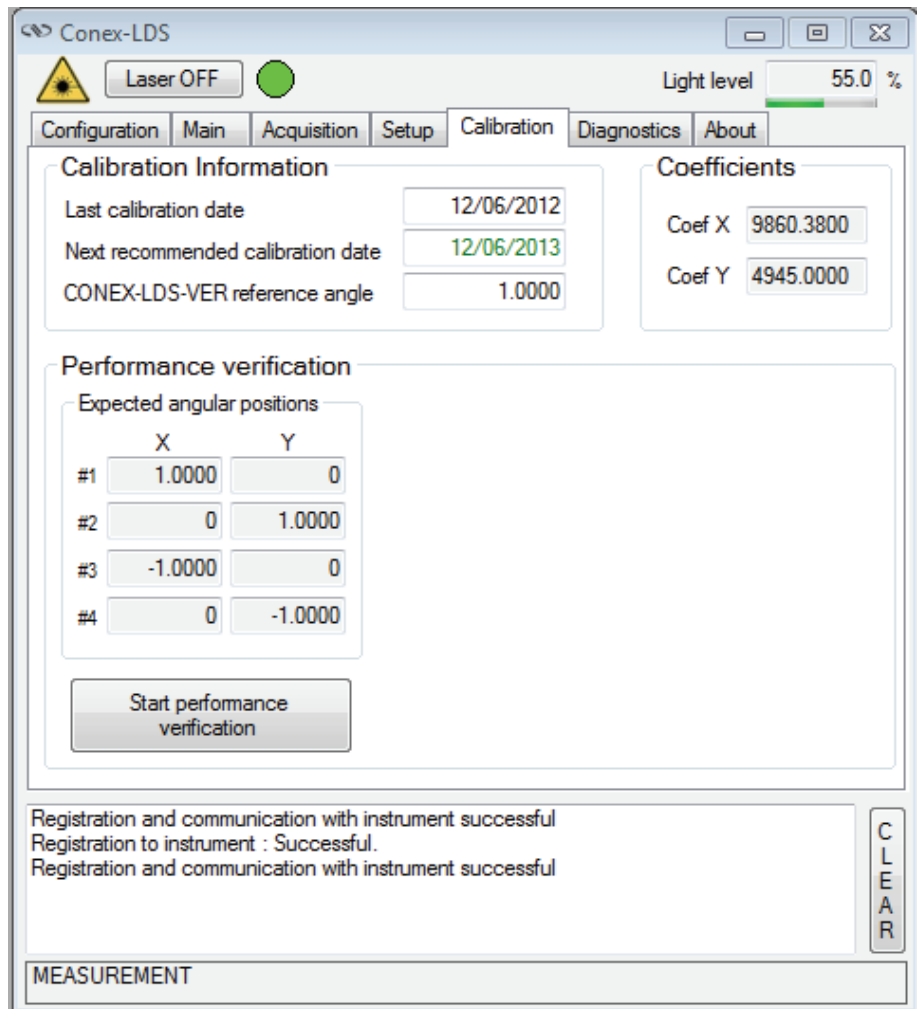
Freezes the display and stops refreshing. The button label “Freeze” changes to “Resume”, once it is clicked. In order to start refreshing, click “Resume”.

Relative Zero Button

Resets the current position to zero.

3.4 Calibration

The Calibration tab is to be used to verify the CONEX-LDS is still within the calibration set at the factory.



Last calibration date

Last calibration date performed at the factory for the CONEX-LDS instrument.

Next recommended calibration date

The Last and Next calibration dates are set in the LDS instrument during factory calibration. The next calibration date display color indicates the following:

- **Green:** there is plenty of time to schedule the next calibration.
- **Orange:** the next calibration date is getting close.
- **Red:** calibration is due.

NOTE

Newport recommends performing factory calibration EACH YEAR.

Start performance verification Button

Opens a user-friendly interface to validate the CONEX-LDS calibration. The label on the button changes to “Stop” to cancel the current recalibration.

- Error $\leq 3\%$ = **GREEN** indicator, OK
- Error $> 3\%$ = **RED** indicator, consider sending the CONEX-LDS to the factory for calibration

REFERENCE INFORMATION

The optical wedge of the CONEX-LDS-VER calibration verification kit induces an angular deviation to the autocollimator's beam. This deviation corresponds to a measurement angle of approximately 1000 μ rad. The exact angle is measured and delivered with each CONEX-LDS-VER Kit. The verification process consists of 4 measurements, spaced 90° apart on the PSD. These measurements are compared to the CONEX-LDS-VER reference angle set in the Configuration tab. Before performing this verification and inserting the optical wedge, the mirror must be centered so the CONEX-LDS reads $X = 0$ and $Y = 0 \pm 10 \mu$ rad.

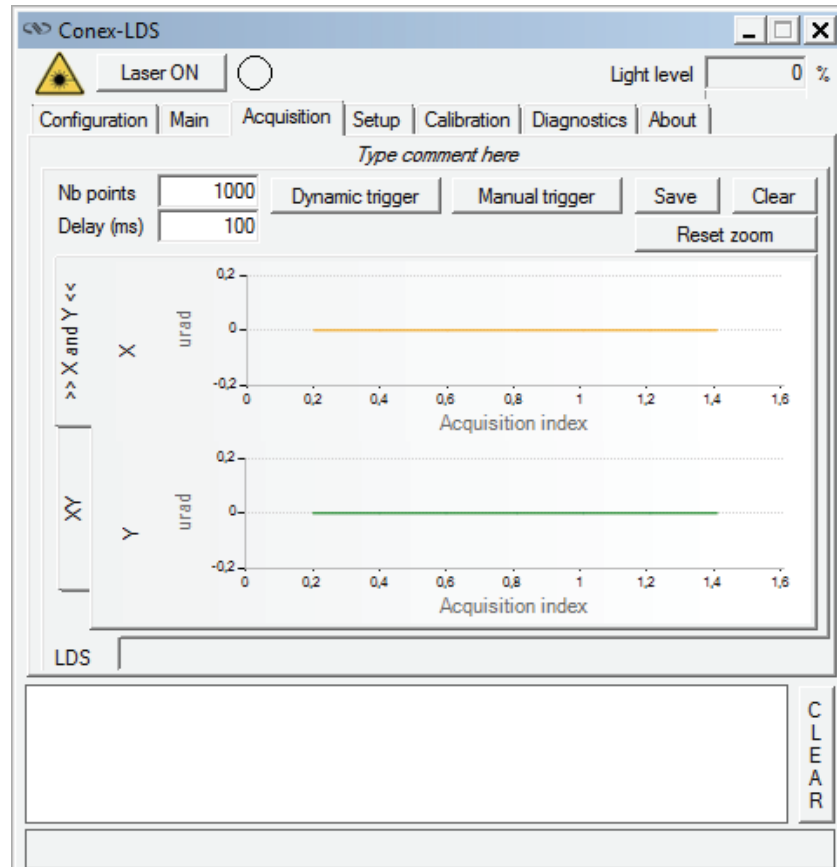
3.5 Acquisition

3.5.1 CONEX-LDS Acquisition tab

In the Acquisition tab, two acquisition methods are available:

1. Manual acquisition: “Manual trigger” button
2. Dynamic acquisition: “Dynamic trigger” button (changes to “Stop” during acquisition)

The dynamic acquisition rate depends on the polling interval defined in the Configuration tab.



Dynamic trigger Button

This button starts running a succession of acquisition defined by:

- A number of points defined by the “Nb points” field
- The default delay value is set to 100 ms. This value is limited by the computer and the communication rate. The save button allows saving the X and Y data as well as the time. This time stamp will help get an idea of system performance by setting the delay to 1 ms (minimum value). The maximum rate is in the range of some tens of Hertz.

Manual trigger Button

This button triggers the acquisition of the current CONEX-LDS position (one shot).

Clear” button

This button clears all acquired positions.

Reset zoom Button

Resets the zoom scale.

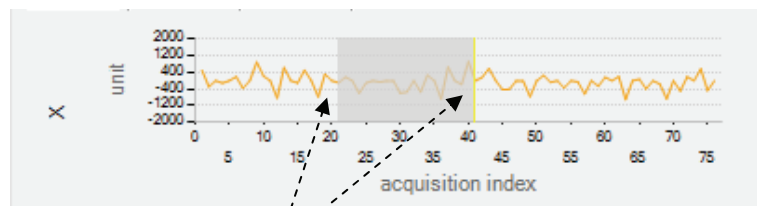
Save Button

This button saves the acquired positions in a text file. The format is as follows:

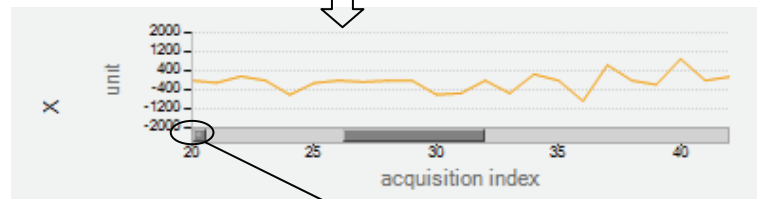
```

1. Acquisition type (manual or dynamic)
2. Date and time
3. Comment:                               Comment line
4. Nb points:                              Number of points
5. Period (ms):                            Polling delay in milliseconds
6. Low pass filter (ms):                   low pass filter frequency in ms
7. X user axis name                        Y user axis name
8. X position #1                           Y position #1
9. ...                                     ...
10. X position #N                          Y position #N
    
```

Zoom in “X and Y” view

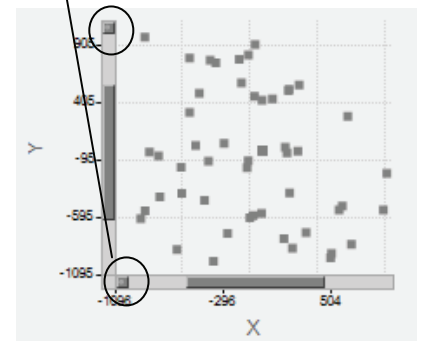
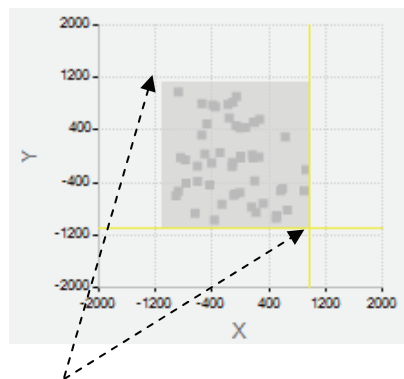


Sets a new window of axis position based on start and end points as defined with the mouse cursor click.



Button to reset the last scale view zoom

Zoom in “XY” view



Sets a new window of axis positions based on start and end points (XY) defined with the mouse cursor click.

NOTE

The “Reset zoom” button automatically resets all zooms.

3.5.2 XPS Data Logger tab

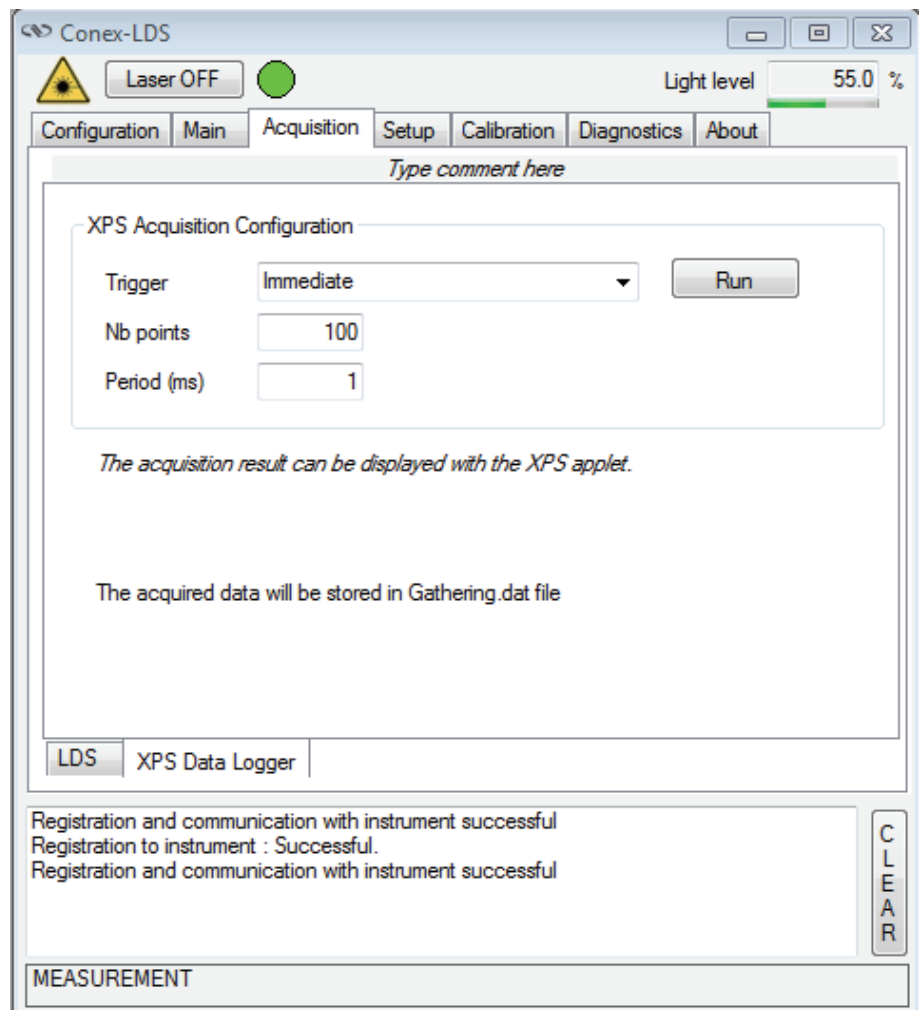
This function is available only if an XPS Universal Motion Controller is physically connected and configured in the Configuration tab.

The “Run” button starts the acquisition with the XPS. Once clicked, the “Run” button changes to “Stop”. The “Stop” button aborts the current XPS acquisition.

The results are saved in an XPS data file.

NOTE

For additional information on the XPS and to download the manual, visit newport.com.



Three available triggers:

1. Immediate
2. Start on TRIG
3. Synchronized on TRIG

In all 3 cases below, the analog outputs of the CONEX-LDS must be connected to GPIO2 of the XPS at AI1 and AI2. The default pins can be changed in the configuration tab to AI1 thru AI4 (pins 14 to 17).

Start on trig mode always refers to the TTL input 1 of GPIO1 to GPIO4 connectors. GPIO1 is the default, which can be changed in the configuration tab.

- GPIO1 TTL input1 = pin4
- GPIO2 TTL input1 = pin3
- GPIO3 TTL input1 = pin9
- GPIO4 TTL input1 = pin1

1) Immediate TRIGGER (Standard XPS gathering)

- Number of points
- Frequency

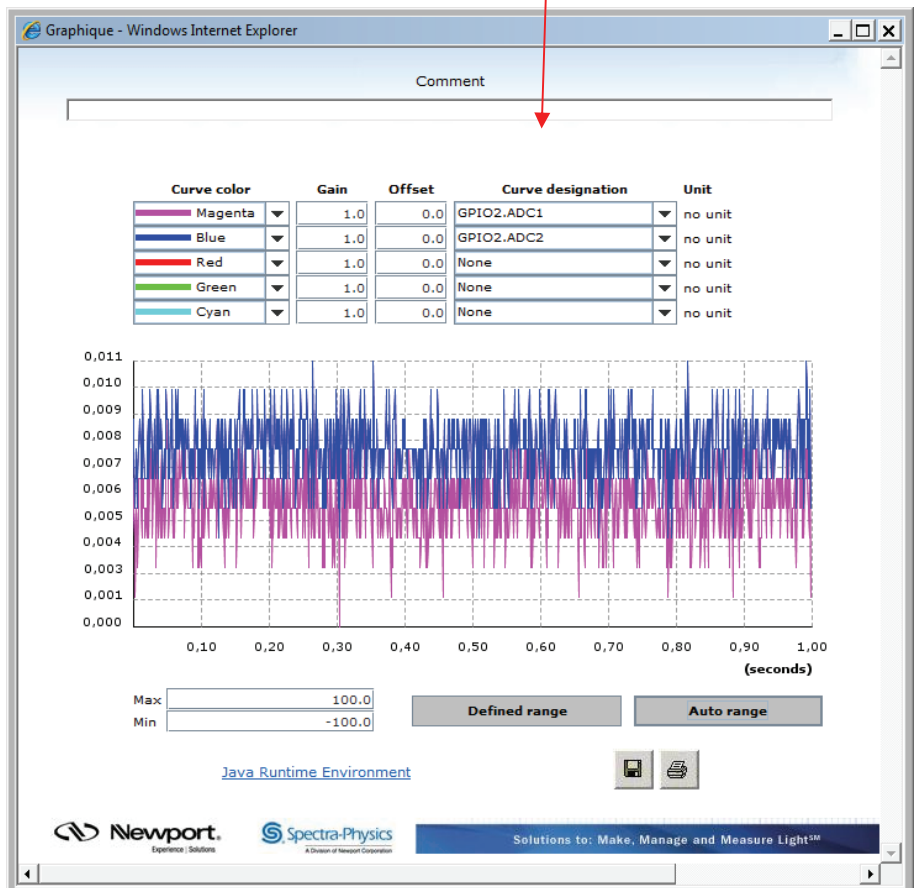
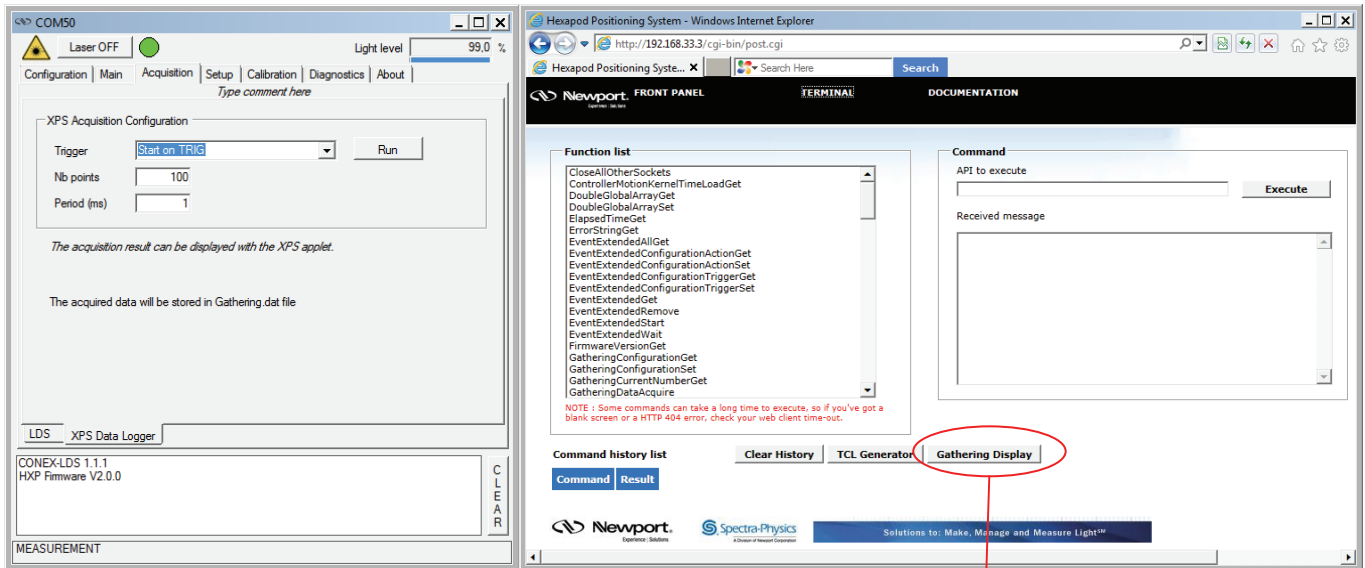
2) Start on external TRIGGER (Standard XPS gathering)

- Number of points
- Frequency

3) Synchronized on external TRIGGER (TRIG IN : External gathering)

- Number of points
- The Synchronized on Trig mode refers to the "Syncro input" pin6 of TRIG IN connector in the XPS.

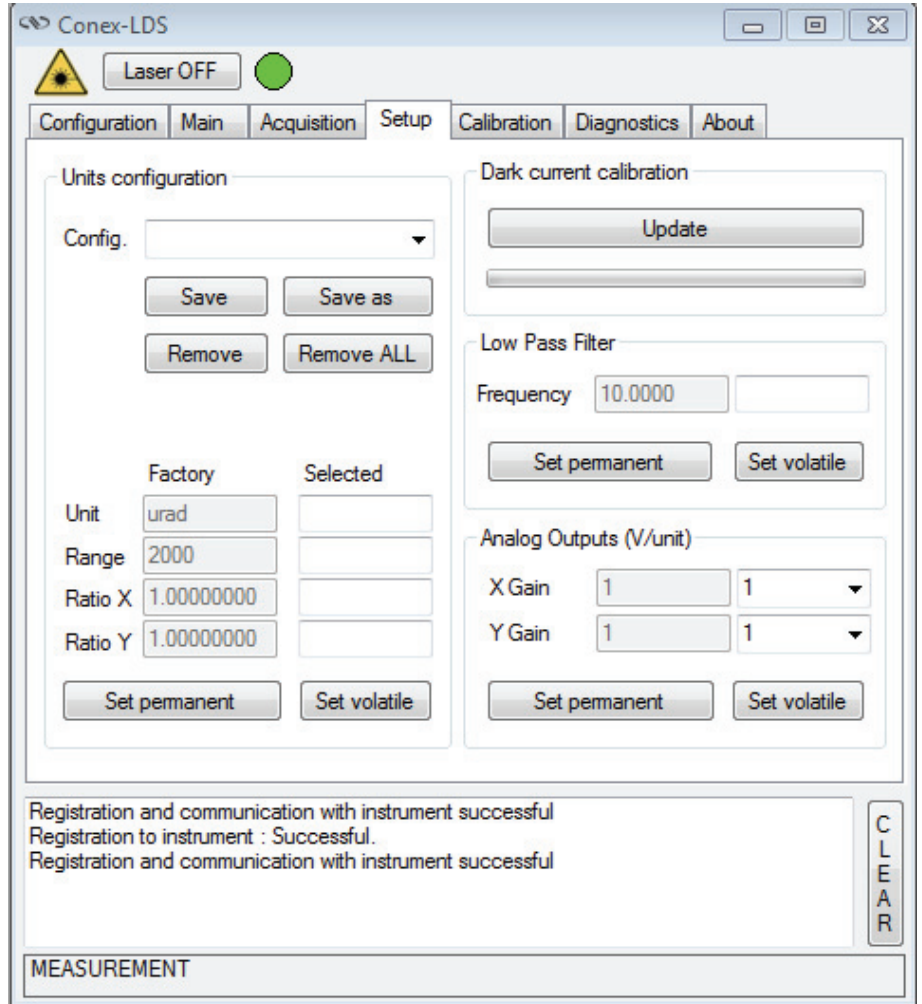
The result of the acquisition using an immediate trigger or starting on an external trigger can be displayed in the XPS gathering display feature. See below. For acquisitions using synchronized on external trigger, the data will be stored in the GatheringExternal.dat file found in the ftp site of the XPS.



To properly display the results in the XPS interface, gains must be properly set. Refer to the CONEX-LDS Users Manual for the correct gains to use with the analog outputs.

3.6 Setup

The Setup tab configures the CONEX-LDS parameters used in the graphical user interface.



Unit information

A CONEX-LDS **configuration** is based on the following parameters:

- Unit:** It's a string that represents the units defined by the user for the application.
- Range:** It's the display range applied in the application.
- Ratio X:** It's the ratio X applied to the factory's coefficient X and the factory's offset X to define the current coefficient X and offset X.
- Ratio Y:** It's the ratio Y applied to the factory's coefficient Y and the factory's offset Y to define the current coefficient Y and offset Y.

3.6.1 Configuration

Factory Configuration

The “Factory” configuration contains the factory values saved in the memory of the CONEX-LDS. This configuration is mandatory to use with Calibration verification.

Current Configuration

The “Current” configuration contains the current values defined in the selected configuration.

Config Combo-box

The “Config” combo-box selects and applies a predefined CONEX-LDS configuration.

Remove Button

The “Remove” button deletes the selected configuration from the list.

Remove ALL Button

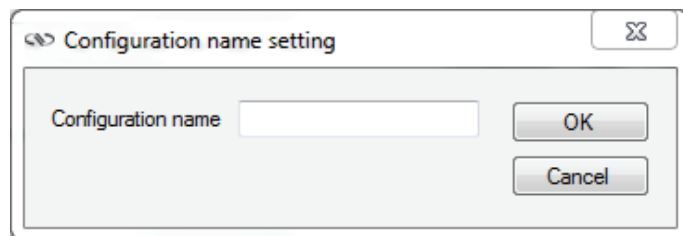
The “Remove ALL” button deletes all configurations saved in the list of configurations.

Save Button

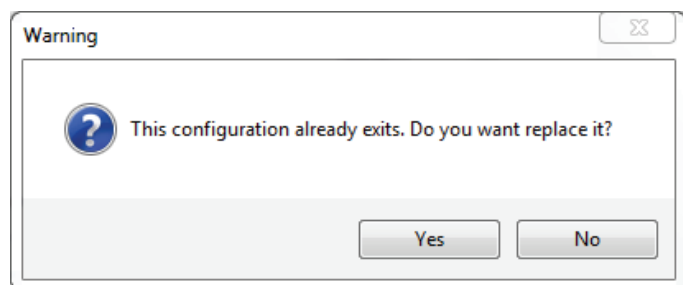
The “Save” button saves and applies the selected configuration.

Save as Button

The “Save as” button saves and applies a user-defined CONEX-LDS configuration in the XML configuration file. A new configuration name can be entered in the dialog box that appears:



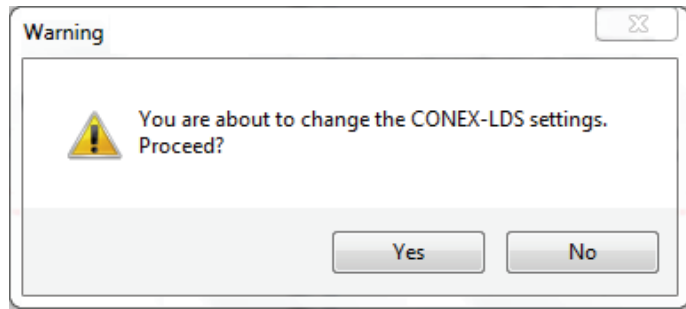
If the configuration name already exists, the following message pops up.



Choosing “Yes” will overwrite the current configuration and “ No “ will create and save a new one.

Set permanent Button

Saves the new values for the range, the calibration coefficients and the offsets in the memory of the CONEX-LDS. The controller will need to be in the Configuration state in order for changes to take place. The following message will pop up to verify if the user wants to change the settings or not:



Choosing “Yes” will save the parameters in memory and “No” will cancel the operation.

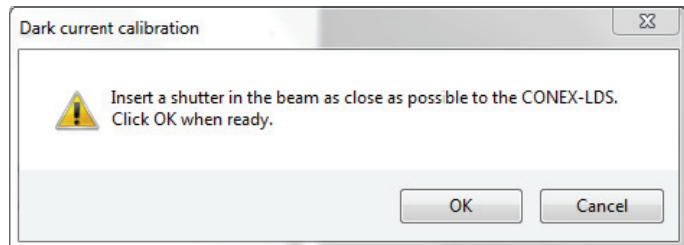
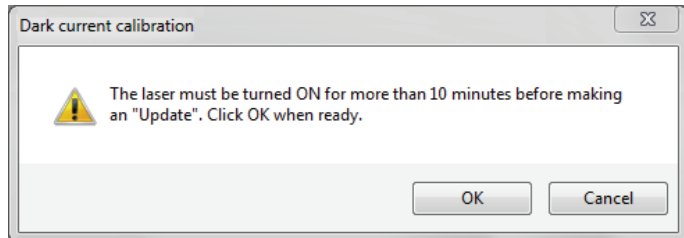
Set Volatile

Writes to volatile memory and is lost upon reboot.

3.6.2 Dark current calibration

Update Button

Updates the offsets. Follow the pop up messages to complete the process.



NOTE

This function minimizes the effects of internal reflections that reach the sensor and impact the measurement signal. The laser should be ON for a least 10 minutes before performing this calibration. A non-reflective shutter should be inserted as close as possible to the autocollimator beam output.

This calibration is performed on each CONEX-LDS at the factory and can be performed on site. Be familiar with the process before attempting to proceed, since it could be source of measurement errors, if not properly done.

3.6.3 Low pass filter

Set volatile Button

Applies the new value of the low pass filter frequency.

Set permanent Button

Saves the new value of the low pass filter frequency in the memory of the CONEX-LDS. The controller will need to be in Configuration state, in order for the changes to take place.

3.6.4 Analog outputs

Set volatile Button

The “Set volatile” button applies a new values of gains.

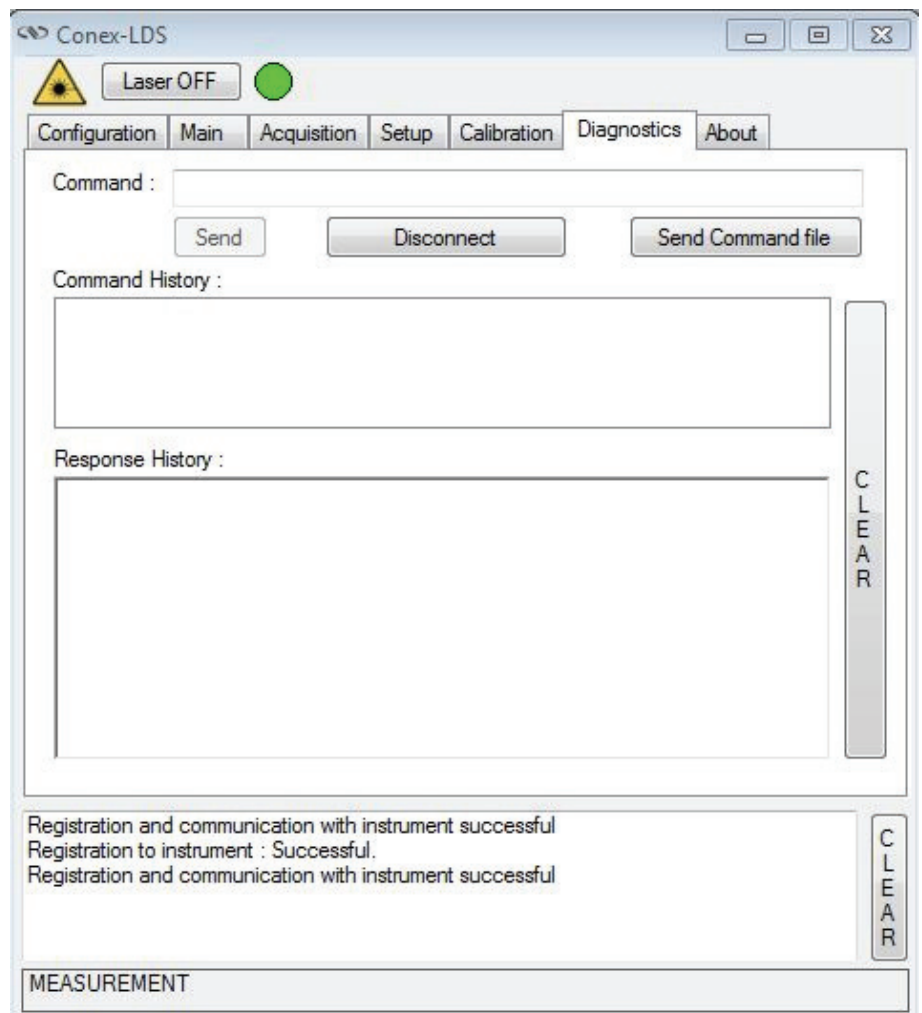
Set permanent Button

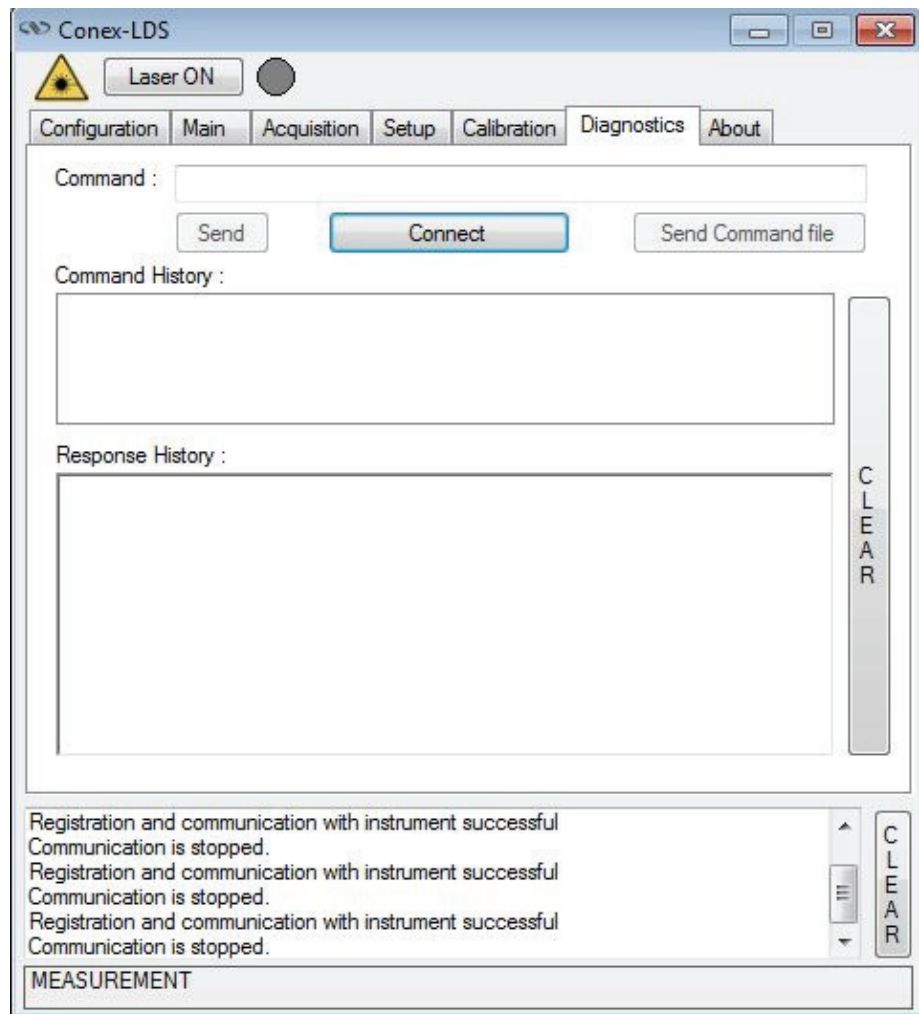
The “Set permanent” button saves the new values of gains in the memory of the CONEX-LDS. The controller must be in the Configuration state, in order for the changes to take place.

3.7 Diagnostics

The Diagnostics tab allows the user to enter instrument commands, to view the history of sent commands and received responses. The list of commands and their syntax are described in the user’s manual.

“Send Command file” button sends a file to the controller (all the commands in the file are sent one by one).



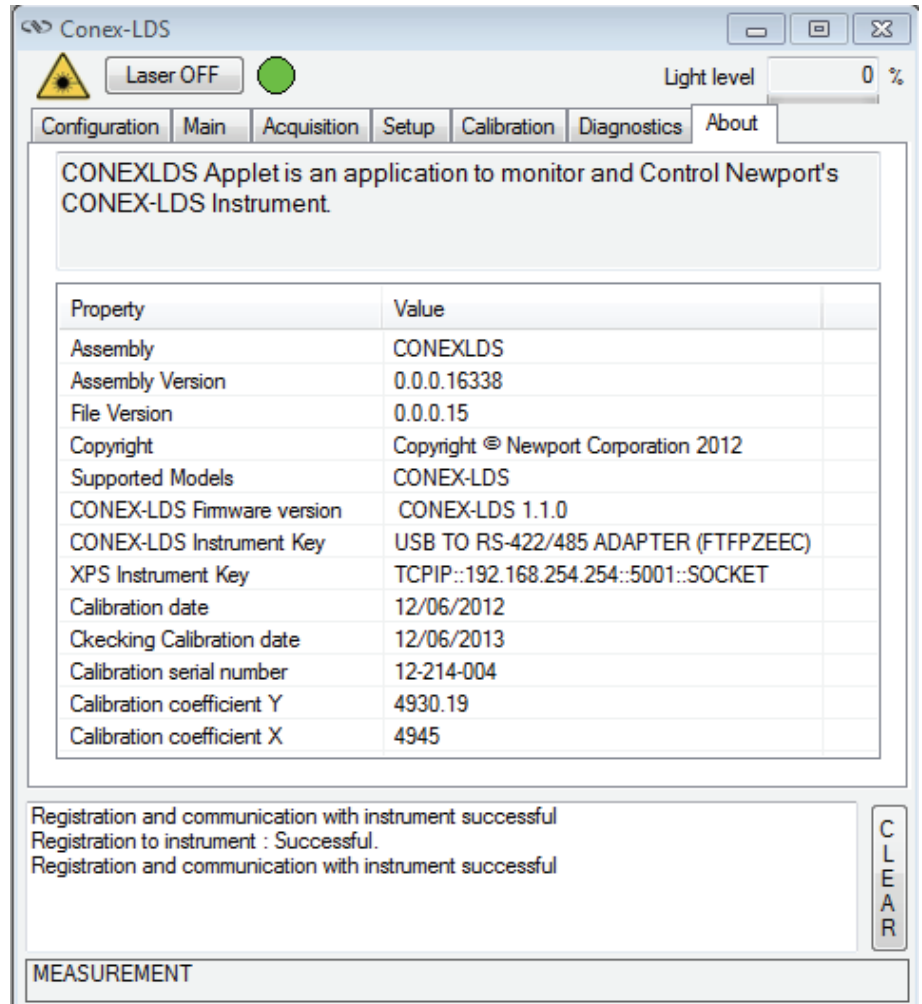


NOTE

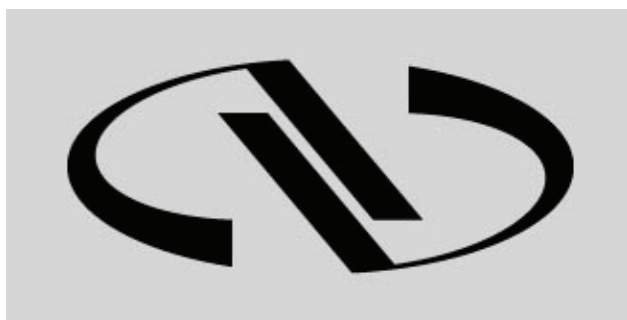
Refer to the CONEX-LDS Users manual for the description of the commands.

3.8 About

The About tab displays information about the Controller GUI and connected instrument. It displays the Controller GUI name, version, and copyright information. It also displays the instrument model, instrument key (serial number) and firmware versions of the CONEX-LDS and the XPS controller.



For an external data logger, refer to the analog out pinouts and the gains table to convert from voltage to position. Refer to the CONEX-LDS Users manual for more information.



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www.newport.com

North America & Asia

Newport Corporation
1791 Deere Ave.
Irvine, CA 92606, USA

Sales

Tel.: (800) 222-6440
e-mail: sales@newport.com

Technical Support

Tel.: (800) 222-6440
e-mail: tech@newport.com

Service, RMAs & Returns

Tel.: (800) 222-6440
e-mail: service@newport.com

Europe

MICRO-CONTROLE Spectra-Physics S.A.S
9, rue du Bois Sauvage
91055 Évry CEDEX
France

Sales

Tel.: +33 (0)1.60.91.68.68
e-mail: france@newport.com

Technical Support

e-mail: tech_europe@newport.com

Service & Returns

Tel.: +33 (0)2.38.40.51.55