CONEX-LDS

Electronic
Autocollimator

Newport®

Controller GUI
Manual

V2.0.x

Table of Contents

Electronic Autocollimator CONEX-LDS

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 GUIis 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.
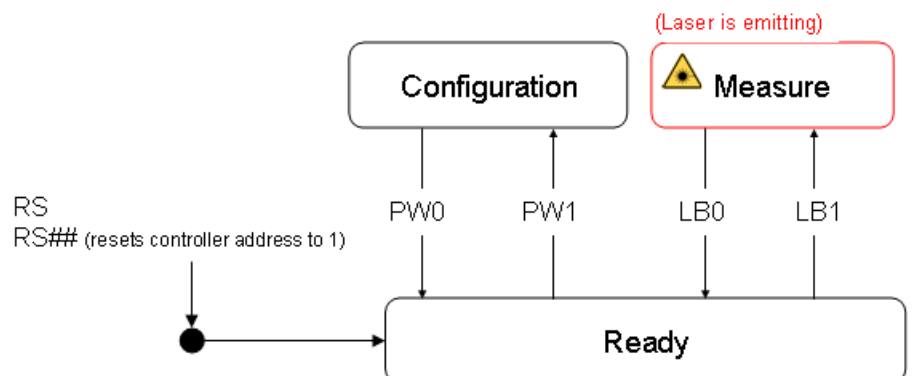
When powering the CONEX-LDS, the controller starts initialization. When initialization is successful, the controller goes to the READY state. The controller can go to the CONFIGURATION state using the PW1 command. In the CONFIGURATION state, the CONEX-LDS allows changes to all configuration parameters, 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   Installation

2.1   Install CONEX-LDS Graphical User Interface

Following are steps to install CONEX-LDS GUI:

- For 32 bit, Select and launch "CONEX-LDS Utility Installer Win32.exe". For 64 bit, Select and launch "CONEX-LDS Utility Installer Win64.exe".
- A window opens up showing Install welcome page.
- Click on "Next".
- A window opens up allowing destination folder selection. By default it is showing C:\.
- Click on "Next".
- Ready to install window opens up. Click "Install".
- Then installation starts, wait for completion. Click on "Finish" to finalize the installation.

32 bit installer will be installed "Newport.CONEXLDS.CommandInterface.dll" in GAC_32 folder and 64 bit installer will be installed the dll in GAC_64 folder.

NOTE

LabVIEW user can add reference of command interface dll from GAC during VI creation.

2.2   Launch GUI

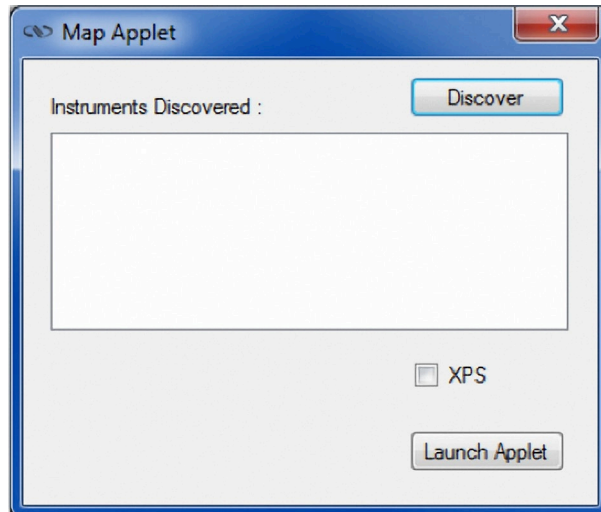From Windows "START" menu, select "All Programs\Newport\Motion Control\CONEX-LDS\CONEX-LDS Utility
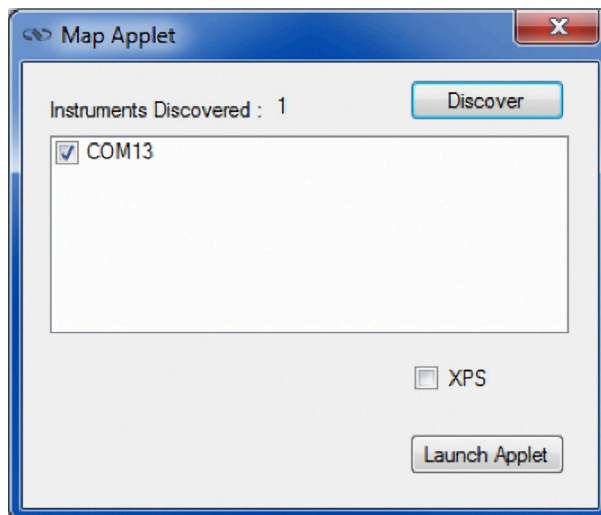
3.0   Getting Started

3.1   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.
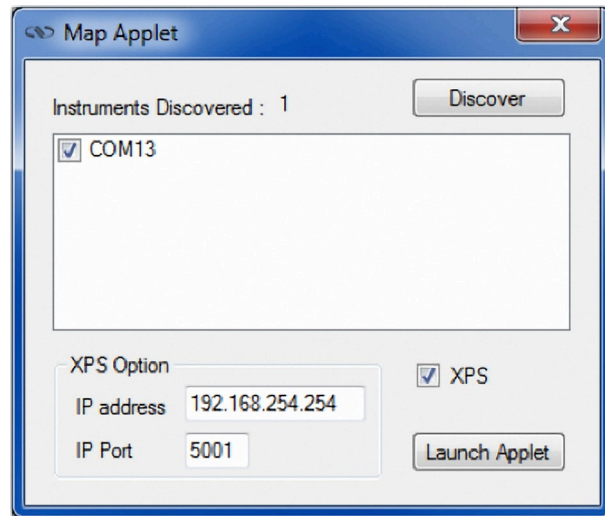
Next, click "**Launch Applet**" (Controller GUI) button.

4.0   User Interface

4.1   General

This banner shows the laser status and the light level returned to the sensor as a percentage of the emitted power.
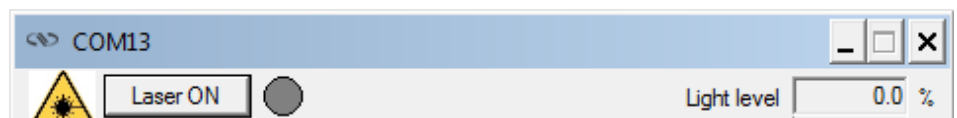
The button "Laser ON" turns the laser on.

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

4.2   Configuration

The Configuration tab allows the user to **View** or **Change**: logging configuration parameters and 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.
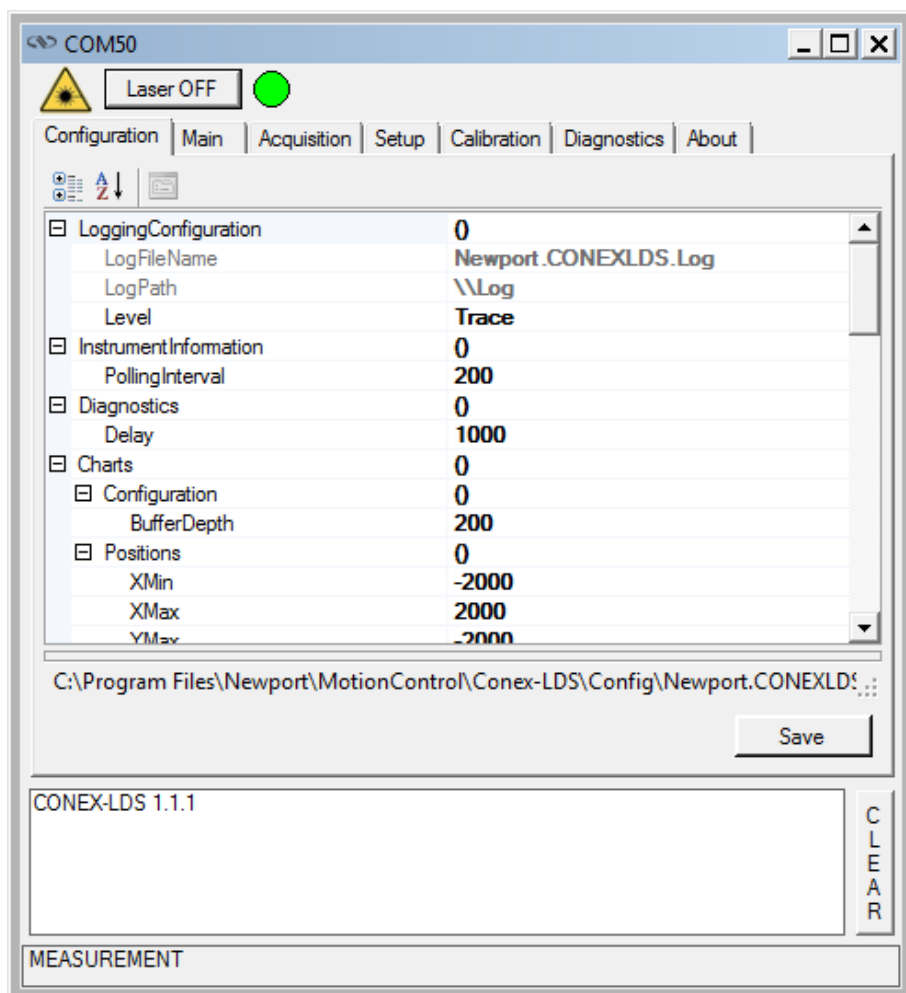
The Polling Interval defines the delay, in milliseconds, between each polling event. The user may change the polling interval by entering a new value.

To Save Changes

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

4.2.1   Configurable settings

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

| Parameter	Description	User Input	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 Errror	**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**

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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.	User should input KitSerialNumber from the Calibration Kit Certificate.	
ReferenceAngleValue	CONEX-LDS-VER optical wedge Reference Angle value.	User should input ReferenceAngleValue from the Calibration Kit Certificate.	
LDSPInformation			
LDSSerialNumber	The "CD" command will return the serial number of the CONEX-LDS		

4.3 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.
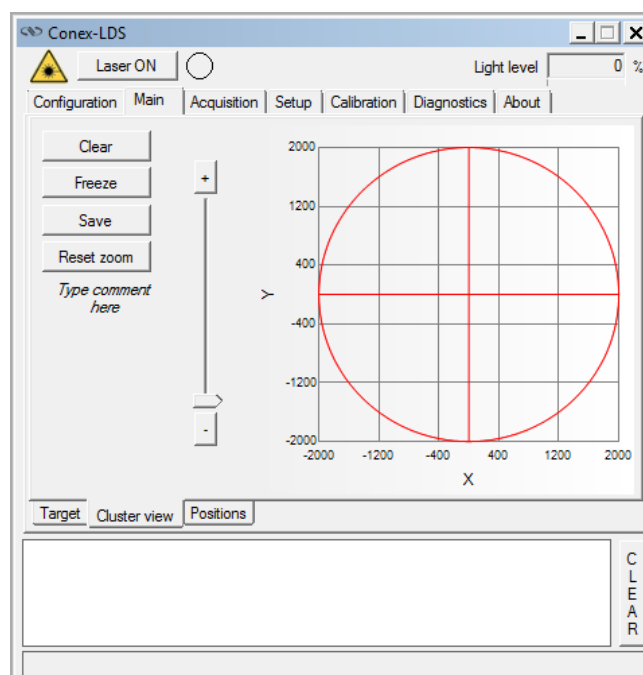
4.3.1 Target tab

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.
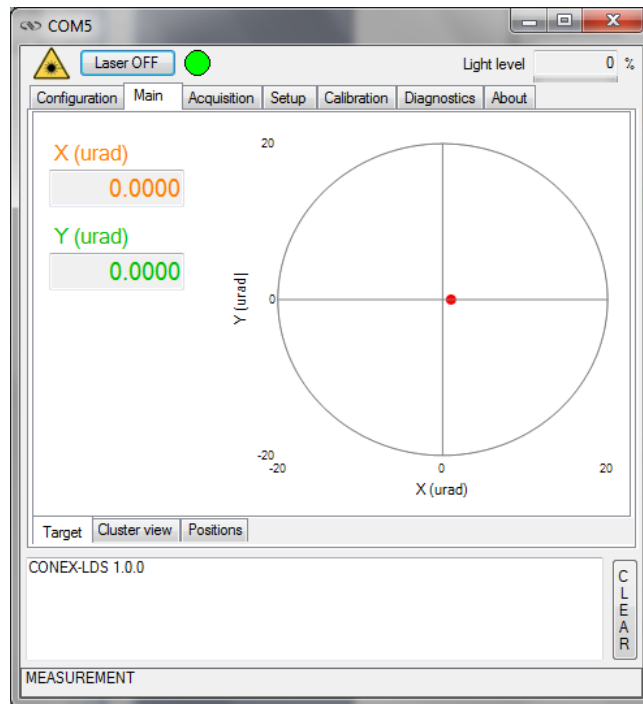
4.3.2 Cluster view tab

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.

4.3.3   Positions tab

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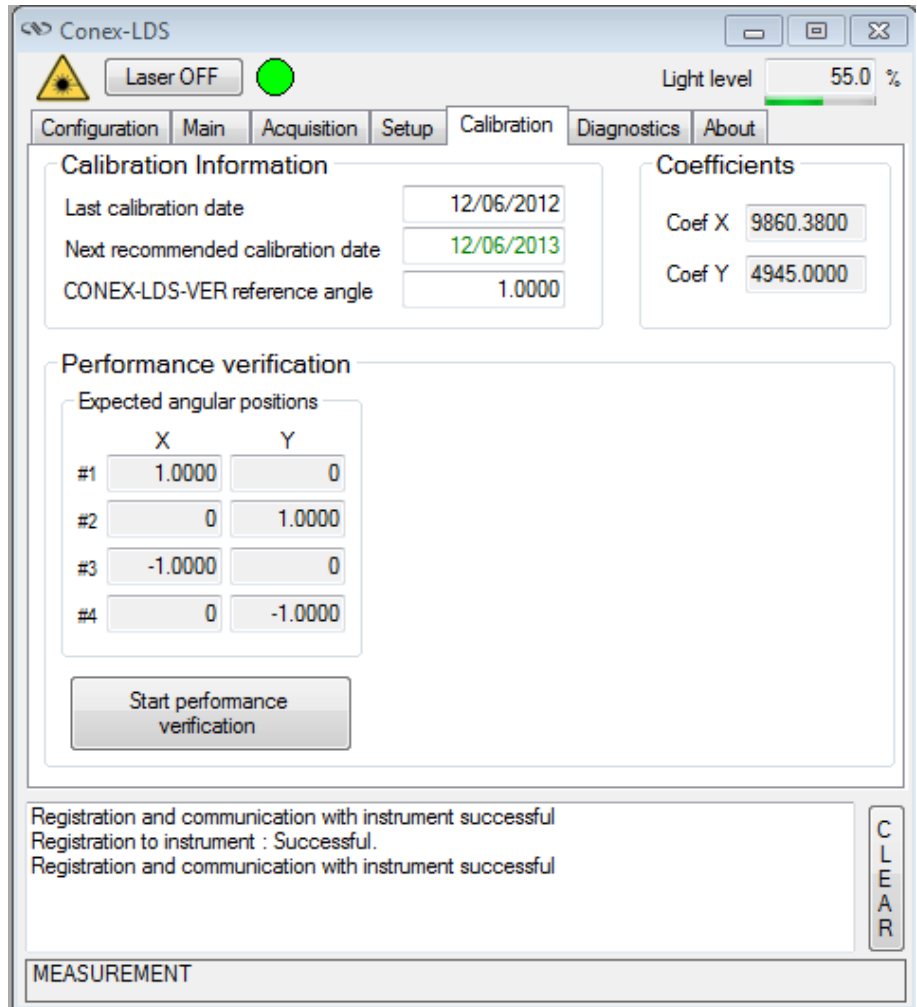

Freeze Button

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.

4.4   Calibration

The Calibration tab is to be used to verify that 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 calibration verification process.

- Error ≤ **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 µrad. The <u>exact</u> angle is measured and reported in the Calibration Certificate shipped with each CONEX-LDS-VER Kit. The user should input KitSerialNumber and ReferenceAngleValue from the Calibration Certificate in the Configuration tab. 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 by the user 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 ±10 µrad.
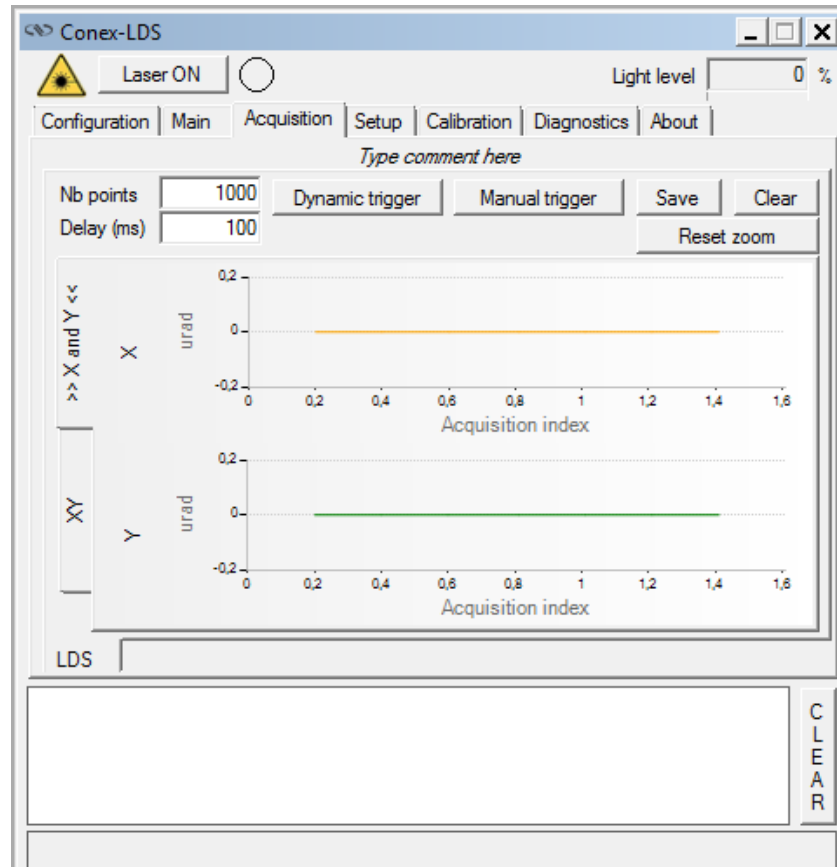
4.5   Acquisition

4.5.1   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.
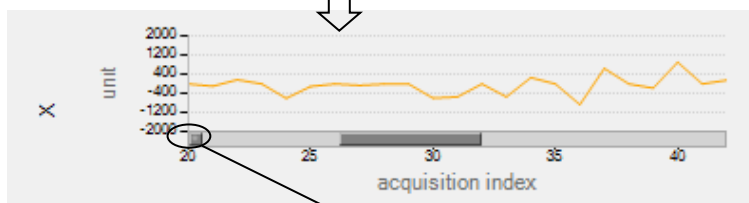
Reset zoom Button

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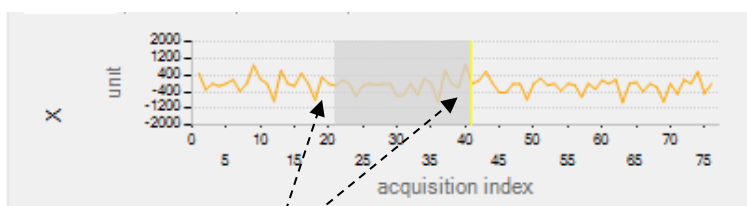
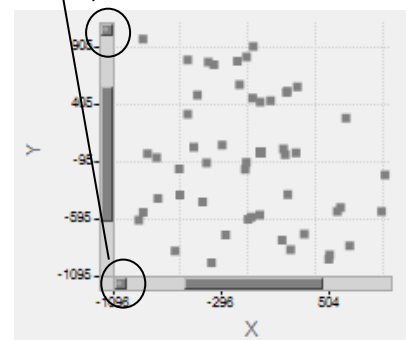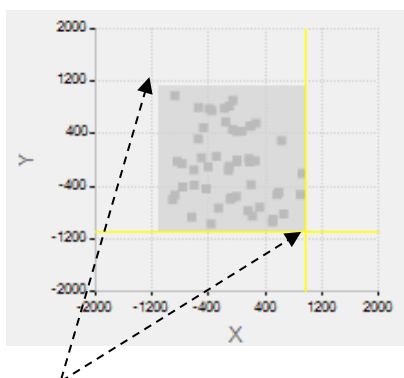
Sets a new window of axis position based on start and end points as defined with the mouse cursor click.

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.


4.5.2   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.
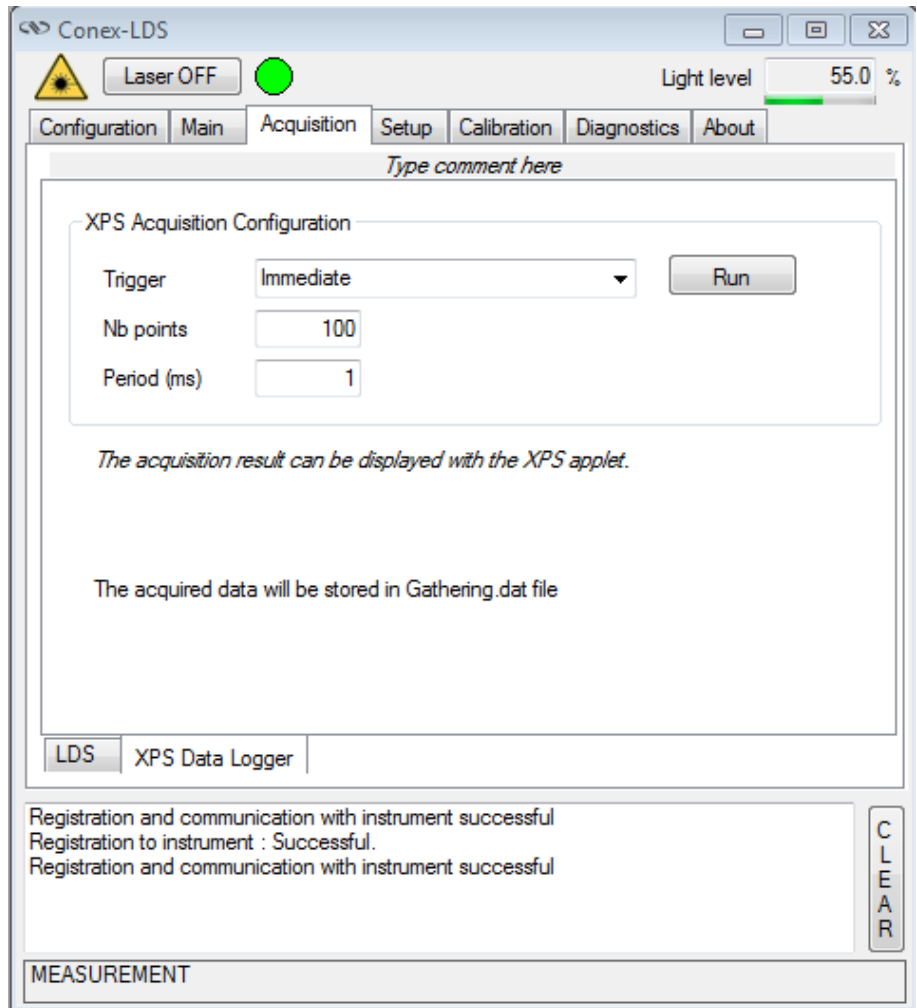
Three available triggers:

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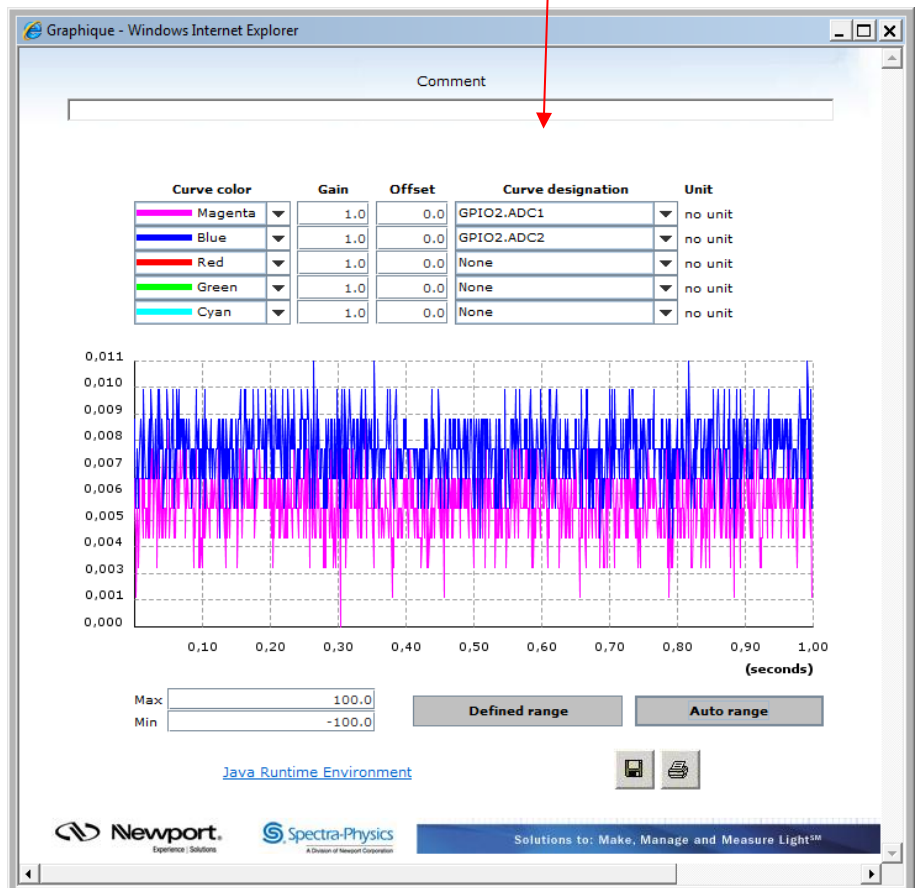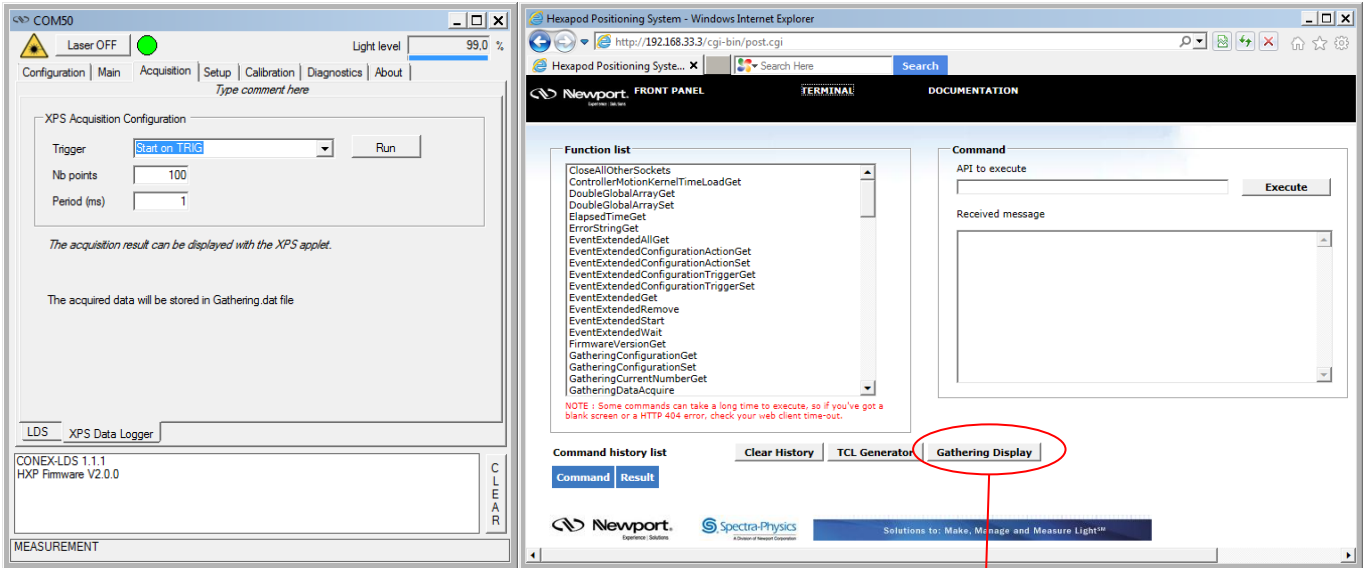
To properly display the results in the XPS interface, gains must be properly set. Refer to the CONEX-LDS Users Manual for the correct gains to use with the analog outputs.

4.6   Setup

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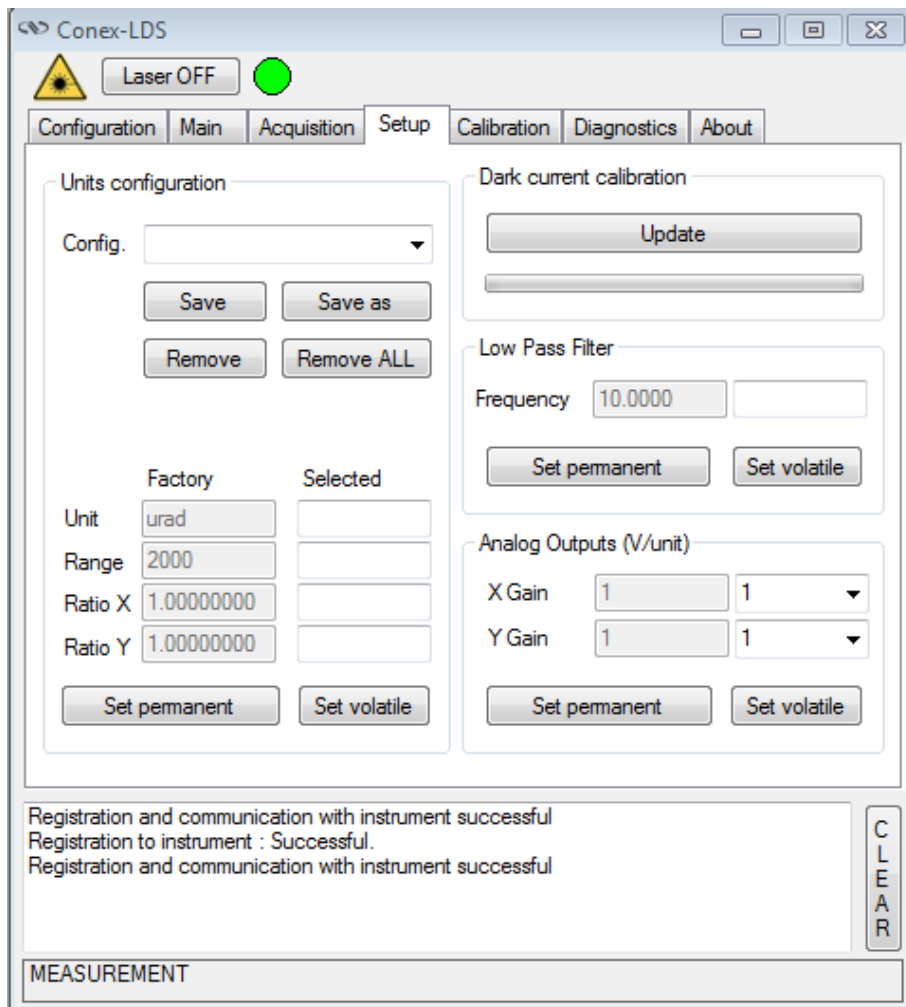
Unit information

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.

4.6.1   Configuration

<u>Factory Configuration</u>

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

<u>Current Configuration</u>

The "Current" configuration contains the current values defined in the selected configuration.

<u>Config Combo-box</u>

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

<u>Remove Button</u>

The "Remove" button deletes the selected configuration from the list.

<u>Remove ALL Button</u>

The "Remove ALL" button deletes all configurations saved in the list of configurations.
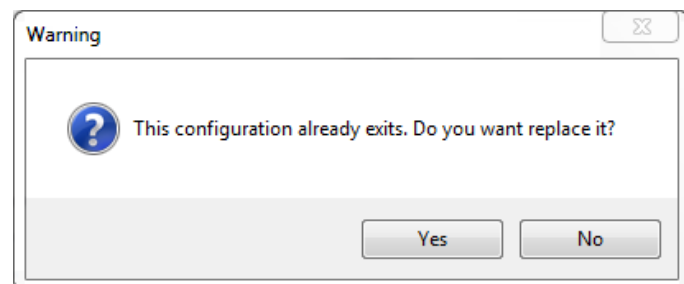
<u>Save Button</u>

The "Save" button saves and applies the selected configuration.

<u>Save as Button</u>

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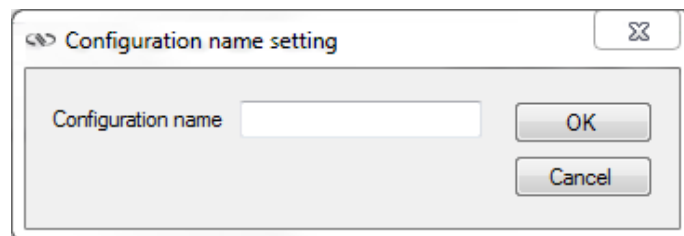
If the configuration name already exists, the following message pops up.

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

<u>Set permanent Button</u>

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 Configuartion 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:
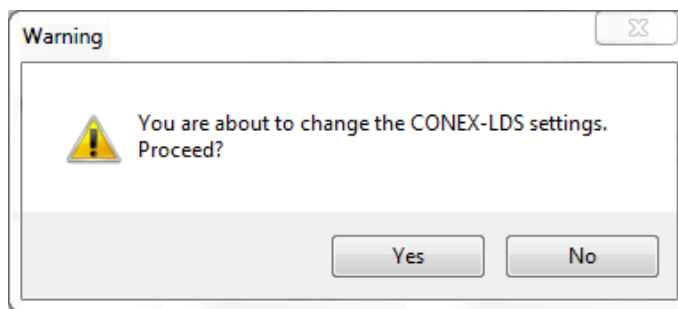
Choosing "Yes" will save the parameters in memory and "No" will cancel the operation.
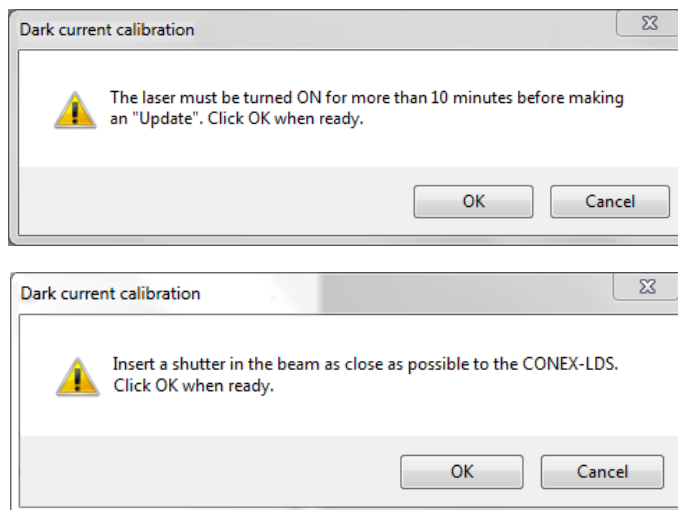
Set Volatile

Writes to volatile memory and is lost upon reboot.

4.6.2   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.

4.6.3   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 b in Configuration state, in order for the changes to take place.

4.6.4   Analog outputs

<u>**Set volatile Button**</u>

The "Set volatile" button applies a new values of gains.

<u>**Set permanent Button**</u>

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.

4.7   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).
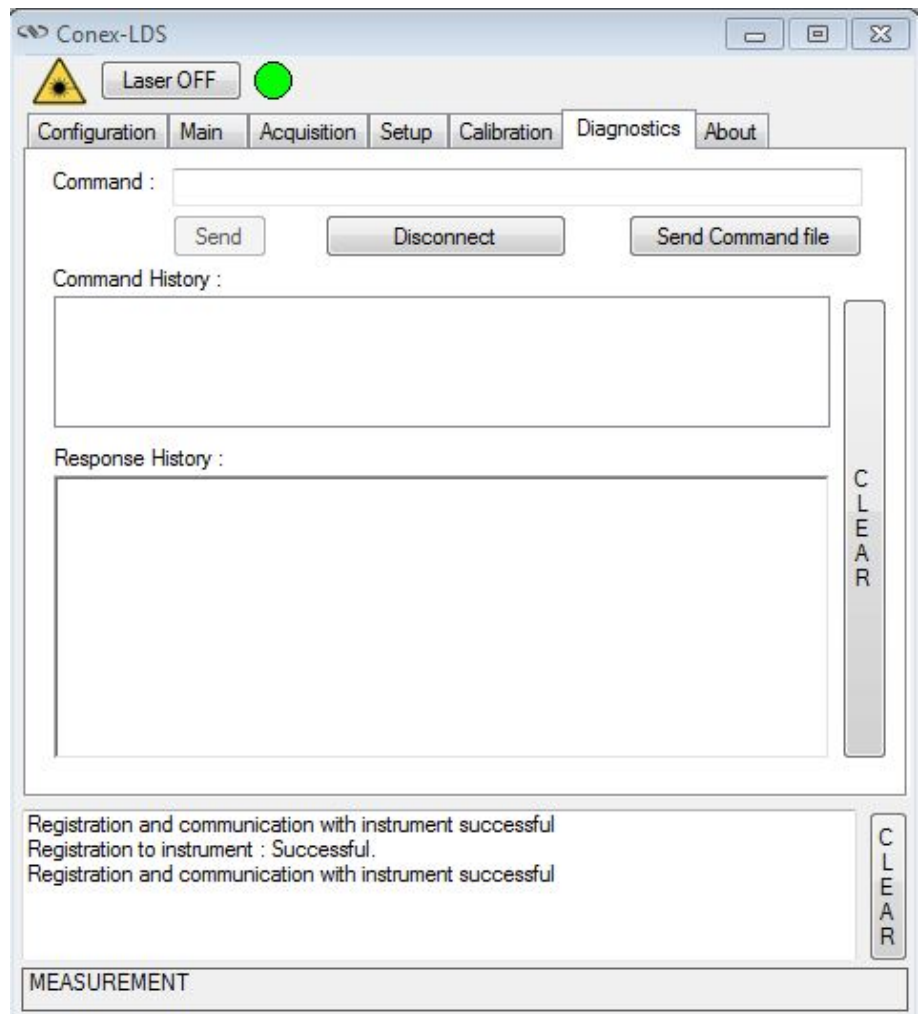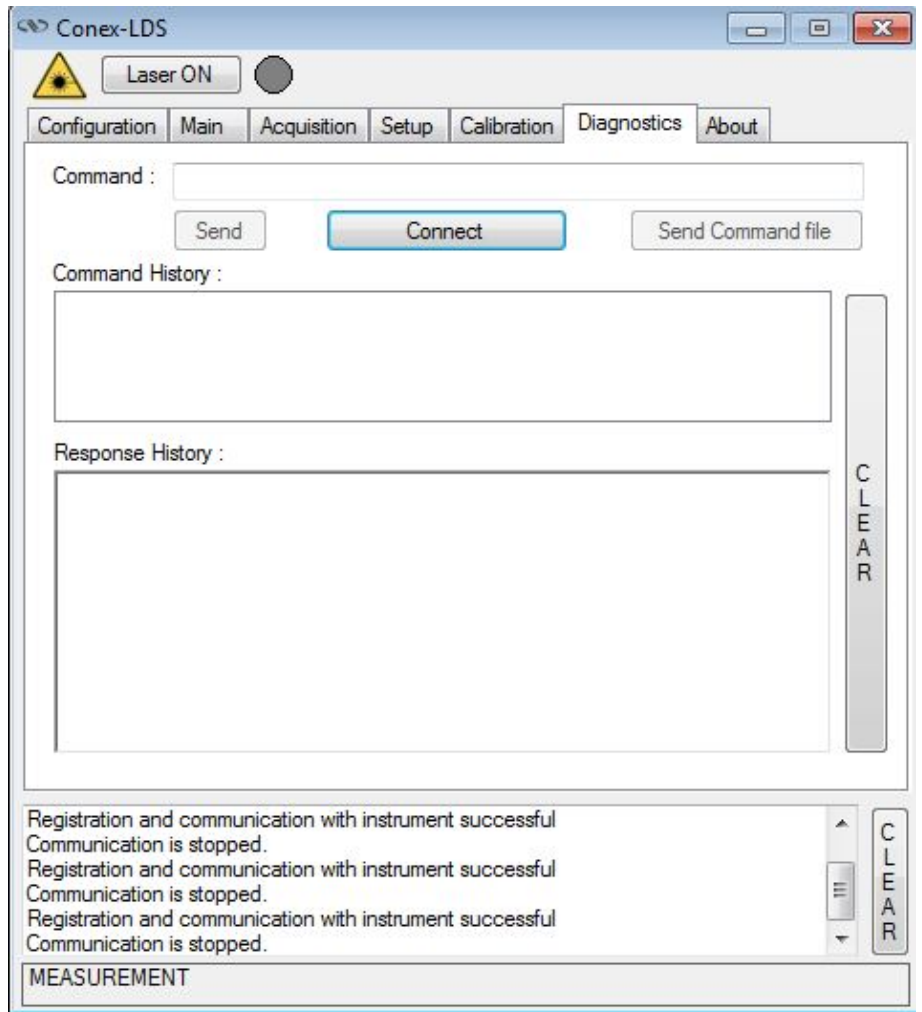
NOTE

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

4.8   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.
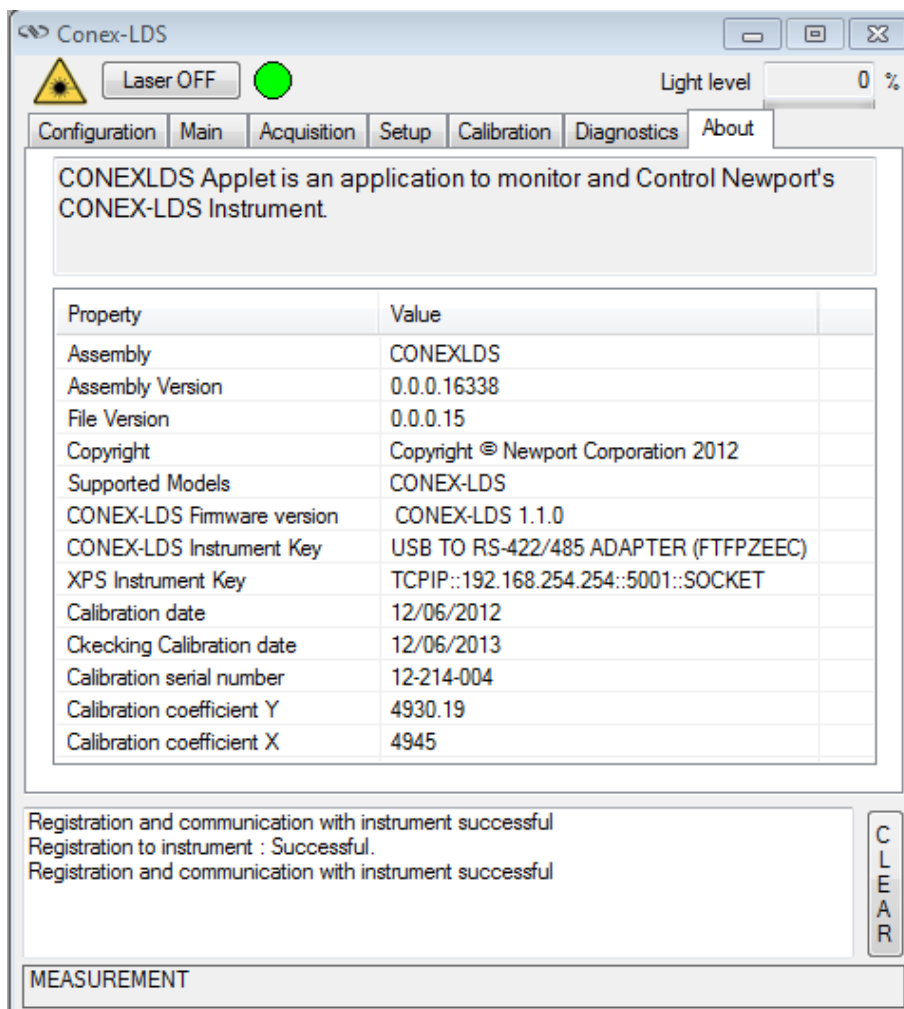
For an external data logger, refere to the analog out pinouts and the gains table to convert from voltage to position. Refer to the CONEX-LDS Users manual for more information.

Service Form

Your Local Representative

Tel.: _____

Fax:_____

Name: _____

Company:_____

Address: _____

Country:_____

P.O. Number:_____

Item(s) Being Returned:_____

Model#: _____

Return authorization #: _____
(Please obtain prior to return of item)

Date: _____

Phone Number: _____

Fax Number: _____

Serial #: _____

Description: _____

Reasons of return of goods (please list any specific problems): _____

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