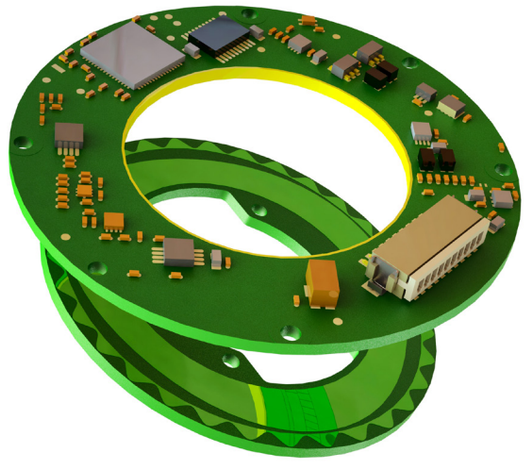
USER MANUAL



All specifications are subject to change without notice

1. Preface

1.1 Version : 2.0 July 2018

1.2 Applicable documents

- VLX-60 Electric Encoder data sheet

2. Safety

2.1 Safety issues

2.2 ESD notes

Although the VLX-60 Electric Encoder is insensitive to ESD and parasitic capacitive coupling from adjacent AC voltages, we highly recommend to enable a discharge path with <20 kΩ between the machine shaft and the electronics ground.

Shielding: the internal ground (return) path of the 5V power supply IS NOT CONNECTED to the cable shielding. We highly recommend grounding the cable shielding through the connector body or by other means.

3. Product Overview

3.1 Overview

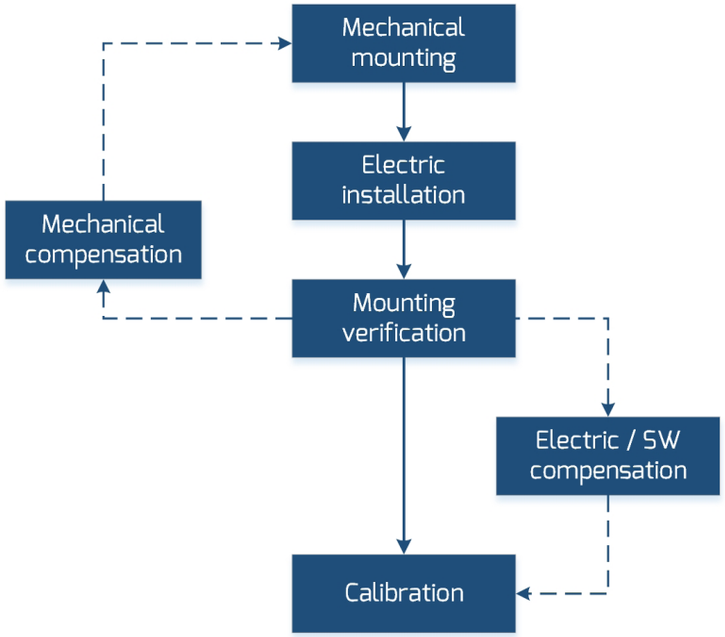
The VLX-60 absolute position Electric Encoder™ is a revolutionary position sensor originally developed for harsh environment critical applications. Currently it performs in a broad range of applications, including defense, homeland security, aerospace, and medical and industrial automation.

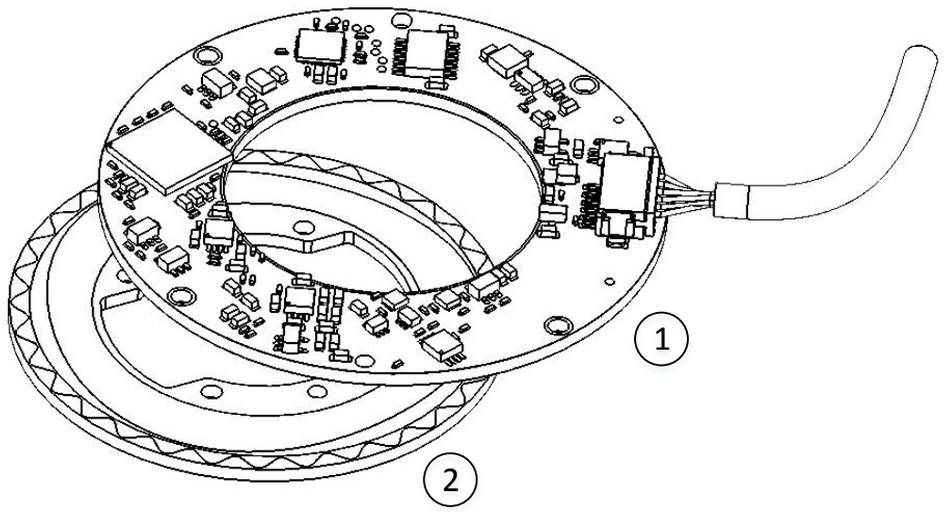
The Electric Encoder™ non-contact technology relies on an interaction between the measured displacement and a space/time modulated electric field.

The VLX-60 Electric Encoder™ is semi-modular, i.e., its rotor and stator are separate, with the stator securely housing the rotor.

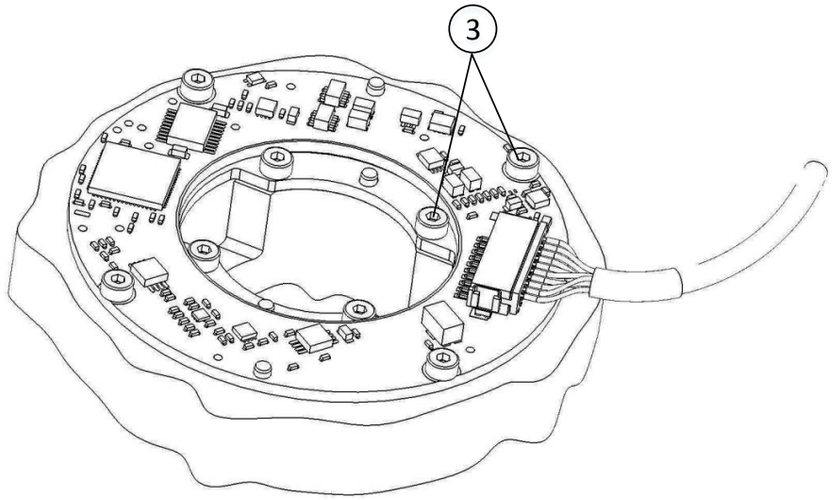
(1) Encoder stator
(2) Encoder rotor

3.2 Installation flow chart



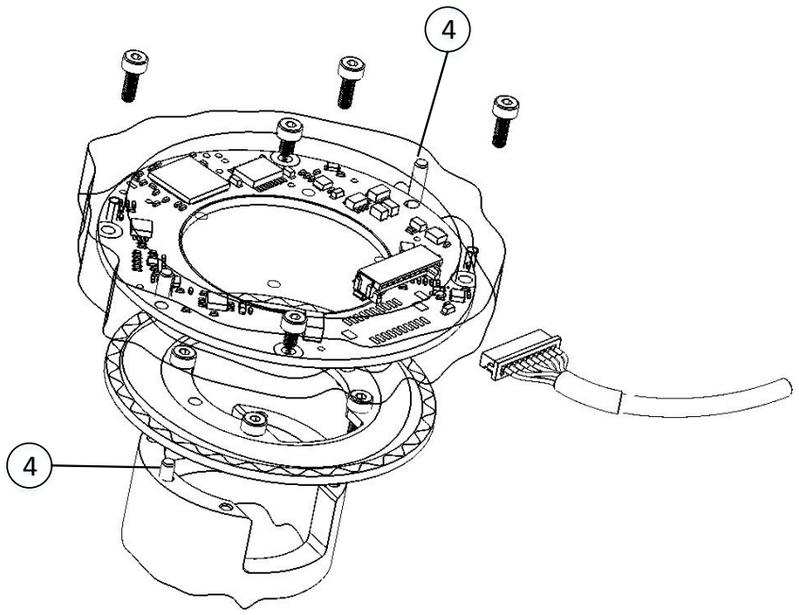


3.3 Encoder Mounting



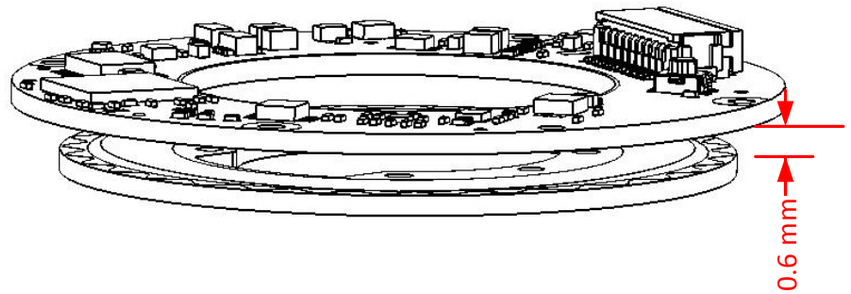
Ty.

- Encoder Stator & Rotor mounting screws (3) Socket Head Cup Screw 8 x M2
- Encoder Stator & Rotor mounting dowel pins (4) , 4 x M2



Encoder Stator / Rotor relative position

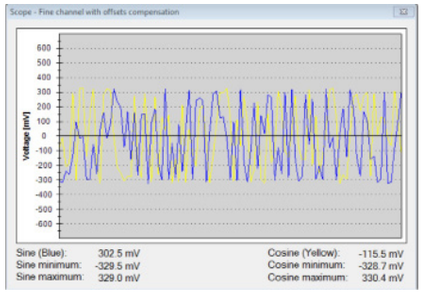
For proper performance the air gap should be 0.6 mm +/- 0.1mm.

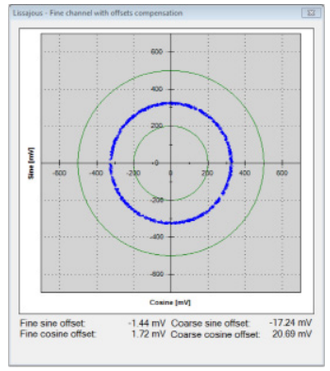


Proper mounting will ensure correct amplitude level of:

Fine channel 200 - 500mV
Coarse channel 200 - 500mV

Proper rotor mounting can be verified by using the Encoder Explorer tools “signal analyzer” or “Mechanical installation verification”





4. Unpacking

4.1 Standard Order

The package of the standard VLX-60 contains the encoder Stator & Rotor.

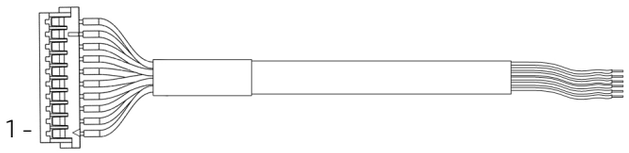
Optional Accessories:

(1) Cables CB-00088-250 & CB-00088-500

(2) CNV-0003, RS-422 to USB converter (with USB internal 5V power supply path)

Interconection - connector HRS DF13-10S-1.25

#	SSi / BiSS	Remarks
8	5V	P.S.
7	GND	GND /RTN
6	Data+	Data / NCP TX
5	Data-	
4	Clock-	Clock / NCP RX
3	Clock+	



Accessories - cables, optional

SSi / BiSS	Remarks
CB-00088-250	AWG30, 250 mm
CB-00088-500	AWG30, 500 mm

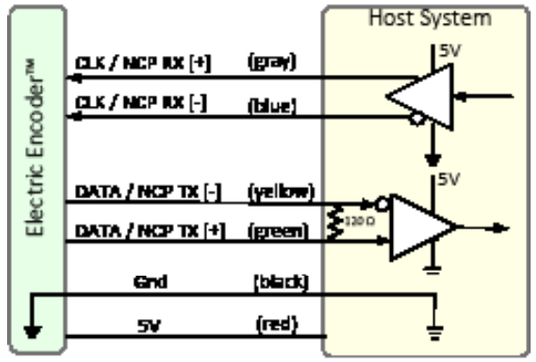
5. Electrical interconnection

This chapter reviews the steps required to electrically connect the VLX-60 with digital interface (SSi or BiSS-C).

Connecting the Encoder

The VLX-60 operates has two operational modes:

(i) i. Absolute Position over SSi or BiSS-C:
This is the power-up default mode.



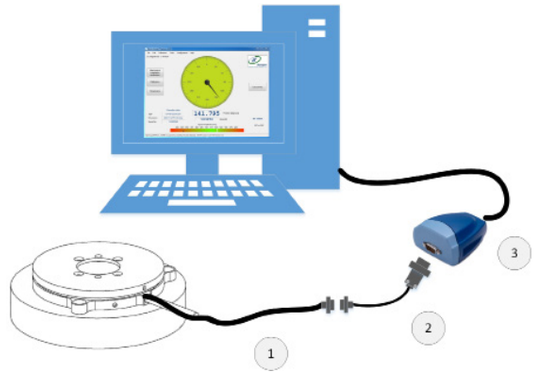
SSi / BiSS interface wires color code

Clock +	Grey	Clock
Clock -	Blue	
Data -	Yellow	Data
Data +	Green	
GND	Black	Ground
+5V	Red	Power supply

(ii) Configuration and setup mode:

This service mode provides access via USB to a PC running Netzer Encoder Explorer application (on MS Windows 7/8). Communication is via Netzer Communication Protocol (NCP) over RS-422 using the same set of wires.

Use the following pin assignment to connect the encoder to a 9-pin D-type connector to the RS-422/USB converter CNV-0003.



(1) DF-60 encoder with SSi / BiSS interface.
(2/3) RS-422 / USB converter
(CAT No. CNV-00003)

Electric Encoder interface, D Type 9 pin Female

Description	Color	Function	Pin No
SSi Clock / NCP RX	Gray	Clock / RX +	2
	Blue	Clock / RX -	1
SSi Data / NCP TX	Yellow	Data / TX -	4
	Green	Data / TX +	3
Ground	Black	GND	5
Power supply	Red	+5V	8

5.3 Electrical connection and grounding

The VLX-60 does NOT come with specified cable and connector, however, do observe grounding consideration:

(1) The cable shield does not connect to the power supply return line.

(2) Ground the host shaft to avoid interference from the host system, which could result in encoder internal noise.

Note: 4.75 to 5.25 VDC power supply required

6. Software Installation

The Electric Encoder Explorer (EEE) software:

- Verifies Mechanical Mounting Correctness
- Offsets Calibration
- Sets up general and signal analysis

This chapter reviews the steps associated with installing the EEE software application.

6.1 Minimum Requirements

- Operating system: MS windows 7 , 32 / 64 bit
- Memory: 4MB minimum
- Communication ports: USB 2
- Windows .NET Framework , V4 minimum

6.2 Installing the Software

Run the Electric Encoder™ Explorer file found on our website:
Encoder Explorer Sw Tools.

7. Mounting Verification

Perform mounting verification before calibration to ensure optimal performance by selecting [Verification] on the main screen of the Encoder Explorer or by using the signal analyzer under "Tools."

7.1 Starting the Encoder Explorer

Make sure to complete the following tasks successfully:

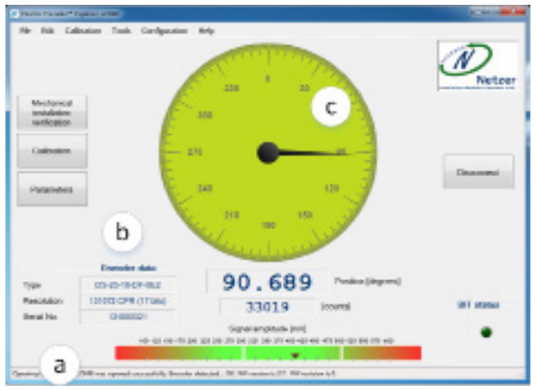
- Mechanical Mounting
- Electrical Connection
- Connecting Encoder for Calibration
- Encoder Explore Software Installation
- Run the Electric Encoder Explorer tool (EEE).

Ensure proper communication with the encoder:

(a) The status bar indicates successful communication.

(b) Encoder data displays in the Encoder data area. (CAT No., serial No.)

(c) The position dial display responds to shaft rotation.



7.2 Mechanical Installation Verification

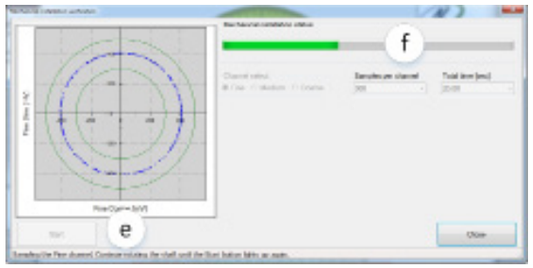
The Mechanical Installation Verification provides procedures to ensure proper mechanical mounting by collecting raw data of the coarse and fine channels during rotation.

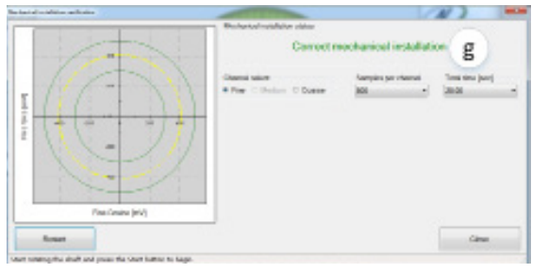
(d) Select [Mechanical Mounting Verification] on the main screen.

(e) Select [Start] to initiate the data collection.

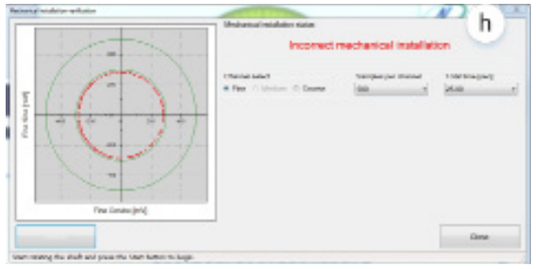
(f) Rotate the shaft for data collecting of the fine/coarse channels.

(g) At the end of successful verification, SW shows "Correct Mechanical Installation.

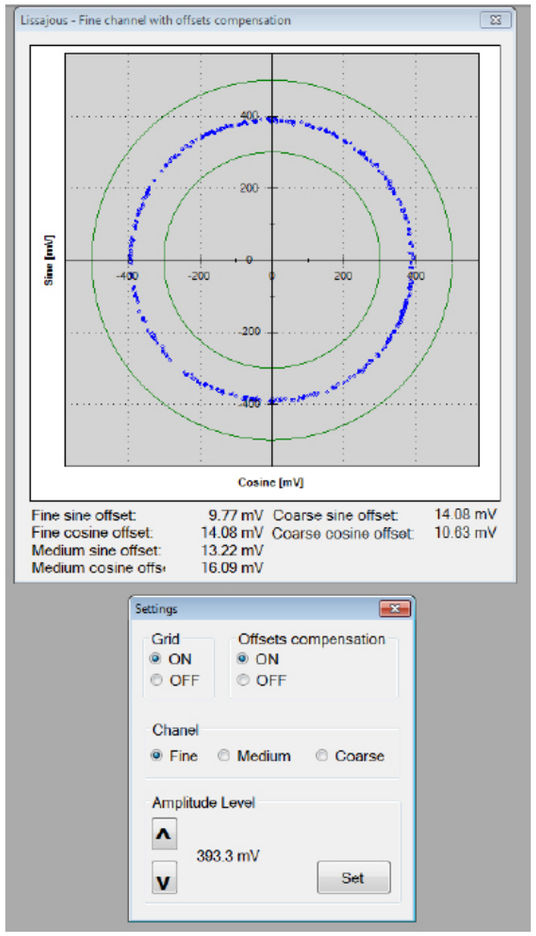




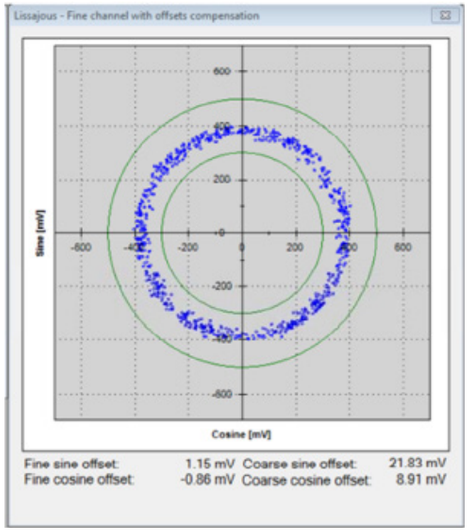
(h) If SW indicates "Incorrect Mechanical Installation," place the mechanical shims below the rotor, as presented in paragraph 3.3 - "Rotor Relative Position."

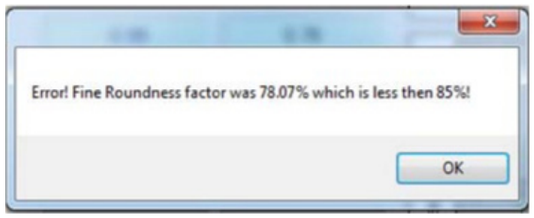


(i) Tools --> Signal analyzer , amplitude fine tuning option with the UP / DOWN keys to the nominal amplitude level , save the level by the "set" option. This process available for the fine / coarse and medium channels.



In case the reading data (blue dots) are not evenly distributed on a thin circle, you may experience "noise" in your installation (check shaft/stator grounding).





8. Calibration

8.1 Offset Calibration

For optimal performance of the VLX-60 Electric Encoder, the inevitable DC offset of the sine and cosine signals must be compensated over the operational sector.

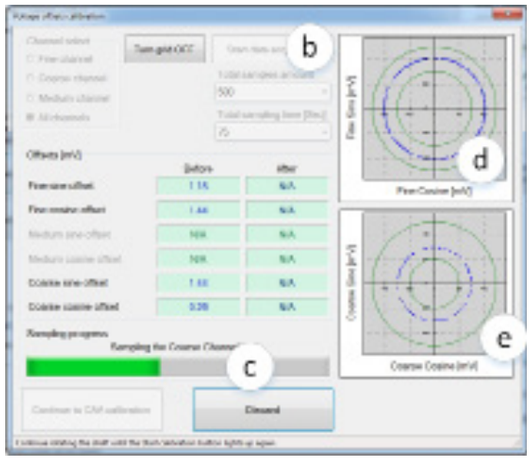
After successfully completing the Mounting Verification procedure:

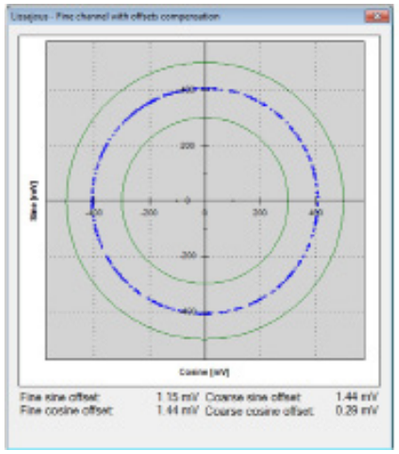
(a) Select [Calibration] on the main screen.

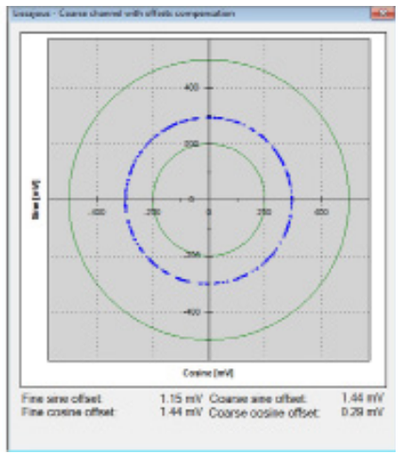
(b) Start the data acquisition while rotating the shaft.

The progress bar (c) indicates the collection progress.

Rotate the axis consistently during data collection—covering the working sector of the application end to end—by default the procedure collects 500 points over 75 seconds. Rotation speed is not a parameter during data collection. Data collection indication shows for the fine/coarse channels, a clear “thin” circle appears in the center (d) (e) with some offset.







8.2 CAA Calibration

The following calibration aligns the coarse/fine channel by collecting data from each point of both channels.

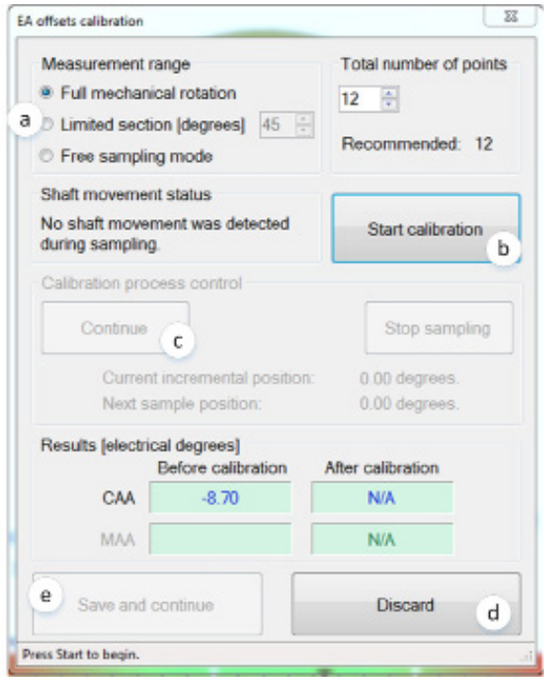
Select [Continue to CAA Calibration]

In the CAA angle calibration window, select the relevant option button from the measurement range options (a):

- Full mechanical rotation – shaft movement is over 10deg - recommended.
- Limited section – define operation of the shaft in a limited angle defined by degrees in case of <10deg
- Free sampling modes - define the number of calibration points in the total number of points in the text box. The system displays the recommended number of points by default. Collect a minimum of nine points over the working sector.

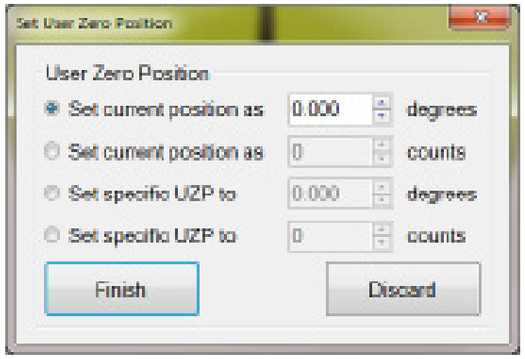
- Click the [Start Calibration] button (b)
- The status (c) indicates the next required operation; the shaft movement status; the current position, and the next target position to which the encoder should be rotated.
- Rotate the shaft/encoder to the next position and click the [Continue] button (c) - the shaft should be in STAND STILL during the data collection. Follow the indication/interactions during the cyclic process for positioning the shaft --> stand still --> reading calculation.
- Repeat the above step for all defined points. Finish (d)
- Click the [Save and Continue] button (e).

The last step saves the offsets CAA parameters, completing the calibration process.



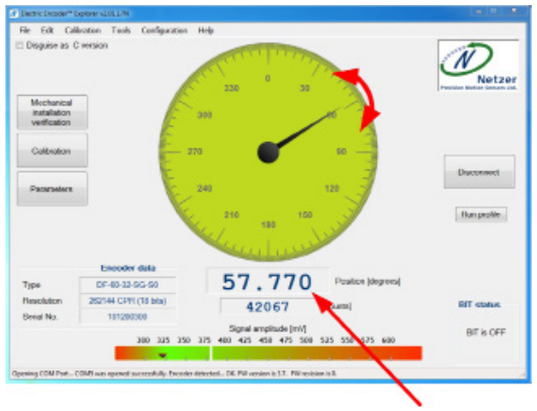
8.3 Setting the Encoder Zero Point

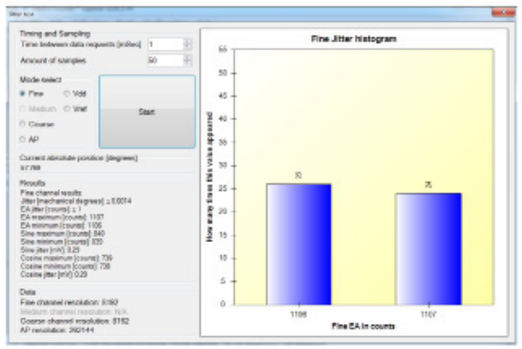
- The zero position can be defined anywhere in the working sector.
- Rotate the shaft to the desired zero mechanical position.
- Select “Set Current Position” as zero by using the relevant option, and click [Finish].



8.4 Jitter test

Perform a jitter test to evaluate the quality of the installation; the jitter test presents the reading statistics of absolute position readings (counts) over time. Common jitter should be up +/- three counts; higher jitter may indicate system noise.

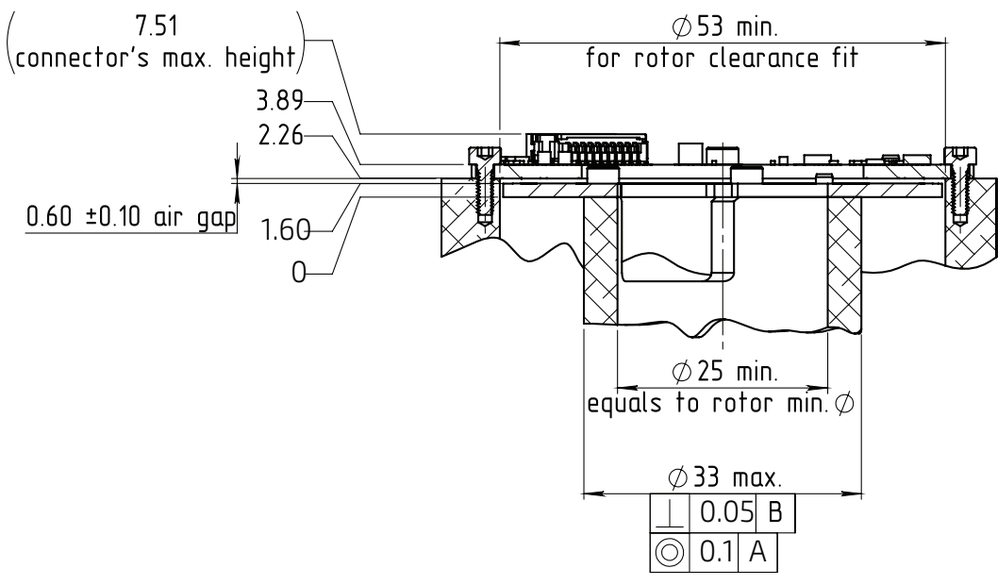


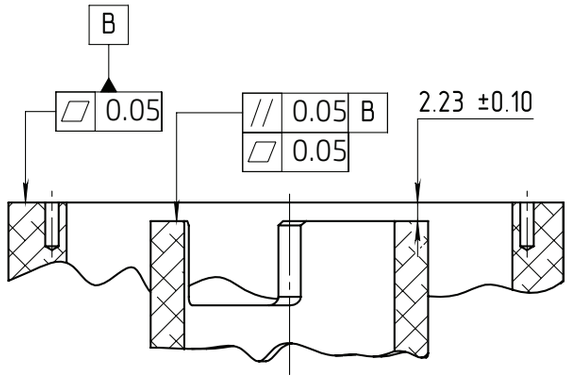


8.5 Automatic calibration

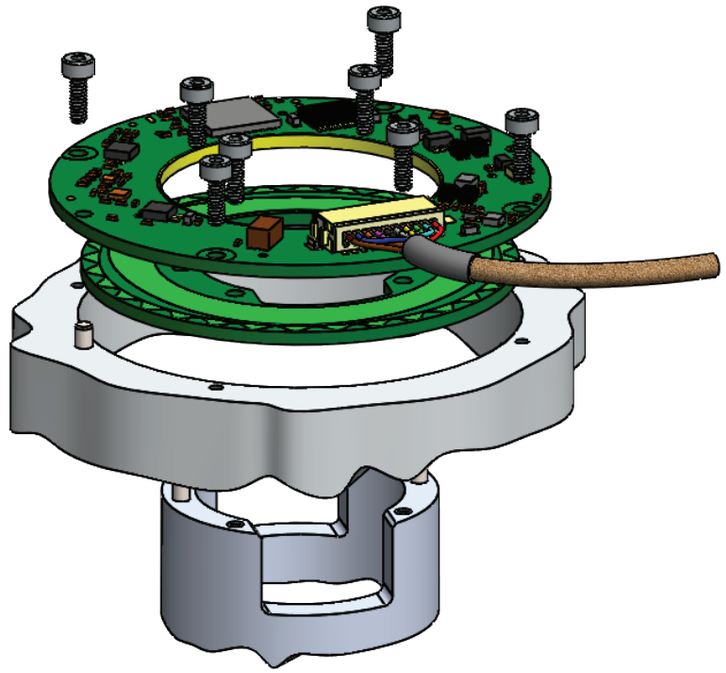
The VLX-60 includes “on board” automatic calibration option, eliminate the need for external SW tools. CALL for support.

SECTION A-A

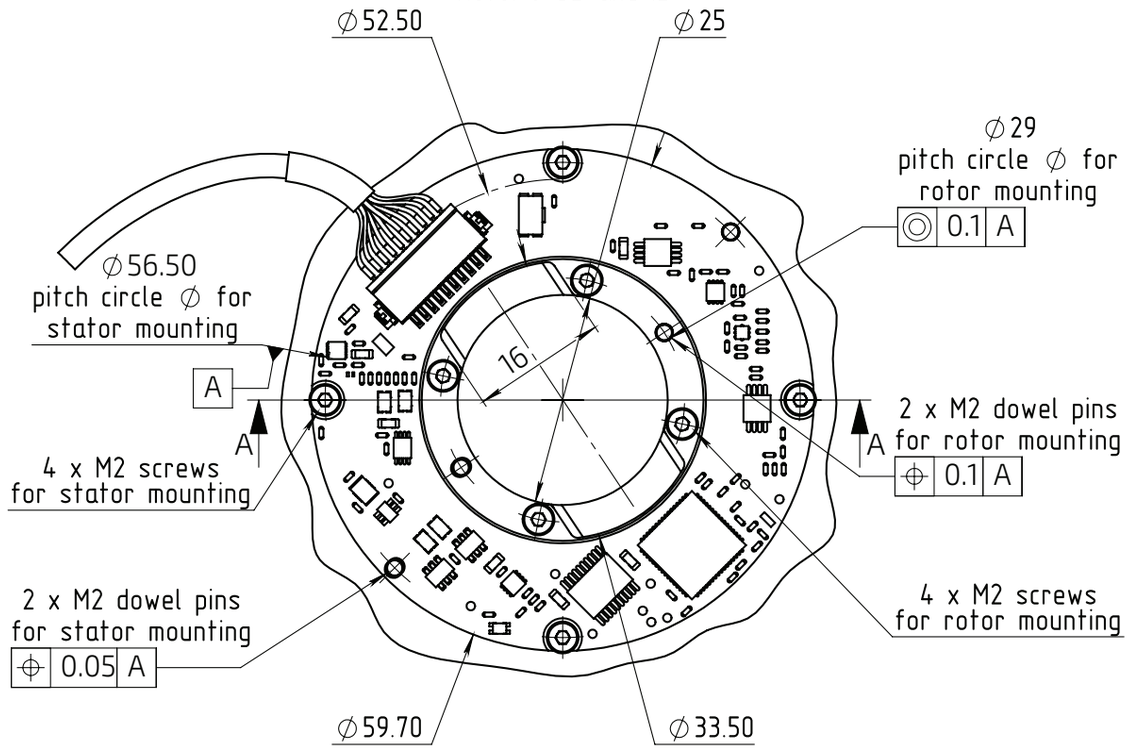




SECTION B-B



Rotor's OD and ID



Stator's OD and ID

UNLESS OTHERWISE SPECIFIED

Dimentions are in: mm
Surface Finish: N6
Linear Tolerances: ±0.5 deg
All Chamfer: 0.1 mm x 45°