

## TECHNICAL REFERENCE MANUAL

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# LP1 - Accu-LaserPro™

Non-Contact Optical Encoder



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# 1. INTRODUCTION

## 1.1 About this manual

This technical manual describes the configuration and installation options for the non- contact optical incremental encoder Accu-LaserPro from Encoder Products Company (EPC). It is a supplement to the other public EPC documents, such as the data sheets, assembly instructions, supplements, catalogs, and flyers.

Read the manual before commissioning. Check beforehand that you have the latest version of the manual.

When reading, pay particular attention to the information, important notes and warnings marked with the corresponding symbols (see 1.1.1).

This manual is intended for a person with technical knowledge of sensors, incremental interfaces, and automation elements. If you have no experience with this topic, first seek the help of an experienced person.

Keep the information supplied with our product in a safe place so that you can obtain further information later if necessary.



- The contents of this manual are arranged in a practical manner.
- All the information in the following chapters is required for optimum use of the device and should be read carefully.

### 1.1.1 Symbols



- The INFO symbol indicates a section that contains particularly important information for advanced use of the device.



- The IMPORTANT symbol is shown next to a section of text that describes a method for solving a particular problem.



- The WARNING symbol indicates that the adjacent instructions must be observed to ensure correct use of the device and to protect the user against hazards.

### 1.1.2 Not covered by this manual:

- Basic information about automation technology
- System planning
- Risks (availability, safety)
- Shielding concepts
- Reflections
- Repeaters
- Network configuration
- Bus cycle times
- FMA management services
- Transmission services
- Telegram types

## 1.2 Product Description

This manual relates to the following encoders produced by Encoder Products Company:

### Non-Contact Optical Encoder:

- Accu-LaserPro™



- EPC's Accu-LaserPro product information can be found on our website: [encoder.com](https://www.encoder.com)

## 1.3 Specifications

An encoder is a sensor for detecting speeds and lengths, for example. The measurement data and the variables derived from it are processed by the encoder and provided as electrical output signals for the downstream peripherals.

The encoders whose article descriptions are listed in section 1.2 have an incremental interface.

## 1.4 Scope of delivery

The scope of delivery depends on the product variants and the details of your order. Before commissioning, check the contents of the package to ensure all parts of there.

The Accu-LaserPro product includes the following items:

- Accu-LaserPro encoder (with 2 pcs M3X12 mounting screws)
- Accu-LaserPro software (downloadable from [encoder.com](https://encoder.com))
- Installation instructions (downloadable from [encoder.com](https://encoder.com))
- Micro USB cable
- Angle Plate
- Flat Plate
- Heavy Duty Mounting Bracket (Optional – not included with encoder)




- The corresponding programming software and data sheet can be downloaded at: [encoder.com](https://encoder.com)



## 2. SAFETY INFORMATION

### 2.1 General safety information

	<ul style="list-style-type: none"><li>• When commissioning the encoder, ensure that you observe the assembly instructions, manual and data sheet.</li><li>• Failure to observe the safety instructions may lead to malfunctions, property damage and personal injury!</li><li>• Observe the operating instructions provided by the machine's manufacturer.</li></ul>
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### 2.2 Intended Use


Encoders are components that are intended for installation in machines. Before commissioning (operation in accordance with the intended use), it must be determined that the machine as a whole corresponds to the EMC and Machine Directive.

An encoder is a sensor that is designed to detect angular positions and revolutions. This sensor is for linear measurement and must only be used for this purpose! Encoder Products Company manufactures and distributes encoders for use in non-safety-relevant industrial applications.

The Accu-LaserPro is used for the non-contact detection of moving objects. It uses a VCSEL Class 1 laser with dot matrix detection.

Any other use or modifications to the product will invalidate any warranty claims against Encoder Products Company.

	<ul style="list-style-type: none"><li>• The output of the incremental signal is a relation to the speed. The units (pulses/mm, m/min &amp; mm) can only be used after the sensor has been calibrated (correction factor).</li><li>• The encoder must not be operated outside the specified limit parameters (see associated data sheet).</li></ul>
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## 2.3 Safe working

The installation and mounting of the encoder must only be carried out by a qualified electrician.

For installation, all relevant local, national, and international regulations must be strictly observed.

Failure to commission the encoder correctly may result in malfunction or failure.



- All electrical connections must be tested before commissioning.
- This product is not a safety component according to the EU Machinery Directive. The use of this product is prohibited if it has a direct impact on personal safety.
- Appropriate safety measures must be taken to ensure that no people are harmed and no damage to the system or operating equipment occurs in the event of a failure or malfunction.

## 2.4 Disposal

Devices that are no longer needed or are defective must be disposed of by the user in proper compliance with the local, state, or country-specific laws. It must be taken into consideration that this is a special waste of electronics, and that disposal is not permitted via normal household waste.

There is no obligation by the manufacturer to take the device back. If you have any questions regarding proper disposal, contact a disposal specialist in your area.

## 3. DEVICE DESCRIPTION

### 3.1 Equipment

#### 3.1.1 Overview



Figure 3.1: Overview Accu-LaserPro

#### 3.1.2 Redundancy

Two sensors are installed behind the sensor window. If the difference between the two measured values is too great, this is output as an error. The permissible error tolerance is set in the Accu-LaserPro software (error threshold in the advanced settings).

#### 3.1.3 Possible operating modes

- Only sensor 1 measures
- Only sensor 2 measures



- Changing measurement distances (e.g. due to convex or concave surfaces) and/or materials lead to different measurement results!

### 3.1.4 Scanning direction/measurement alignment

The scanning direction is set in the Extended Tool configuration window in the Accu-LaserPro software. It is determined by the conveying direction of the product or the position of the sensor. The direction may be set for Sensor 1 and Sensor 2 and it will always be the same for both sensors.

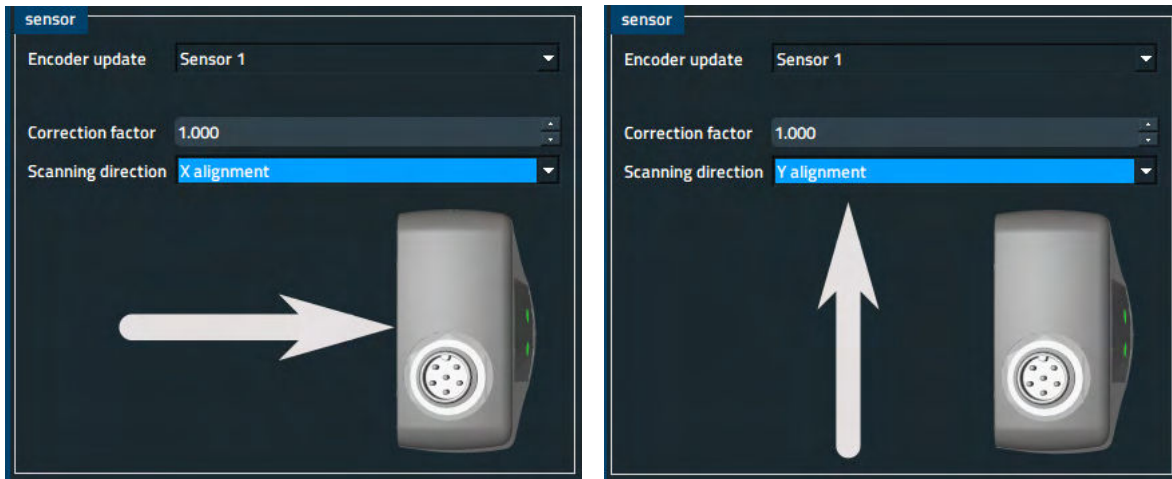


Figure 3.2: Setting the scanning direction

### 3.1.5 Trigger

If the sensor detects that the measurement object starts to move from a standstill, a trigger signal is generated.

- The output delay of this trigger signal is defined in milliseconds.
- The setting is made in Accu-LaserPro software.
- The sensitivity ("standstill threshold") can be adjusted separately (e.g. for ambient noise, vibration with foils, etc.).

Trigger 2 can be used for triggering a second system (e.g. camera, cutter, etc.).

## 3.2 Connection assignment Accu-LaserPro

### 3.2.1 M8 – 6-pin

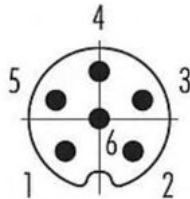
Pin-assignment	
	
VDC+	1
TR1	2
GND	3
TR2/ERR/DIR	4
A	5
B	6

Table 3.1: Pin-assignment



- A faulty connection can lead to the destruction of the sensor or to functional problems with connected machines.
- **Never connect wire 1 (brown/VDC+) to one of the other wires!**

### 3.2.1.1 VDC+

Power supply +5 to 30 VDC, (40 mA at 12V)

### 3.2.1.2 TR1

Trigger signal 1 (e.g. printer)

### 3.2.1.3 GND

Ground

### 3.2.1.4 TR2/ERR/DIR

Function can be selected in the Accu-LaserPro software.

3.2.1.4.1 TR2: Trigger signal 2 (e.g. camera, cutting device)

3.2.1.4.2 ERR: Error - difference between the two sensors exceeds the permissible limit

3.2.1.4.3 DIR: Direction (see Table 3.2) - The current status is maintained at standstill

X	Y	DIR level
+	+	High
-	-	Low

*Table 3.2: DIR level*

### 3.2.1.5 A

Encoder track A

### 3.2.1.6 B

Encoder track B

### 3.2.2 Dimensions

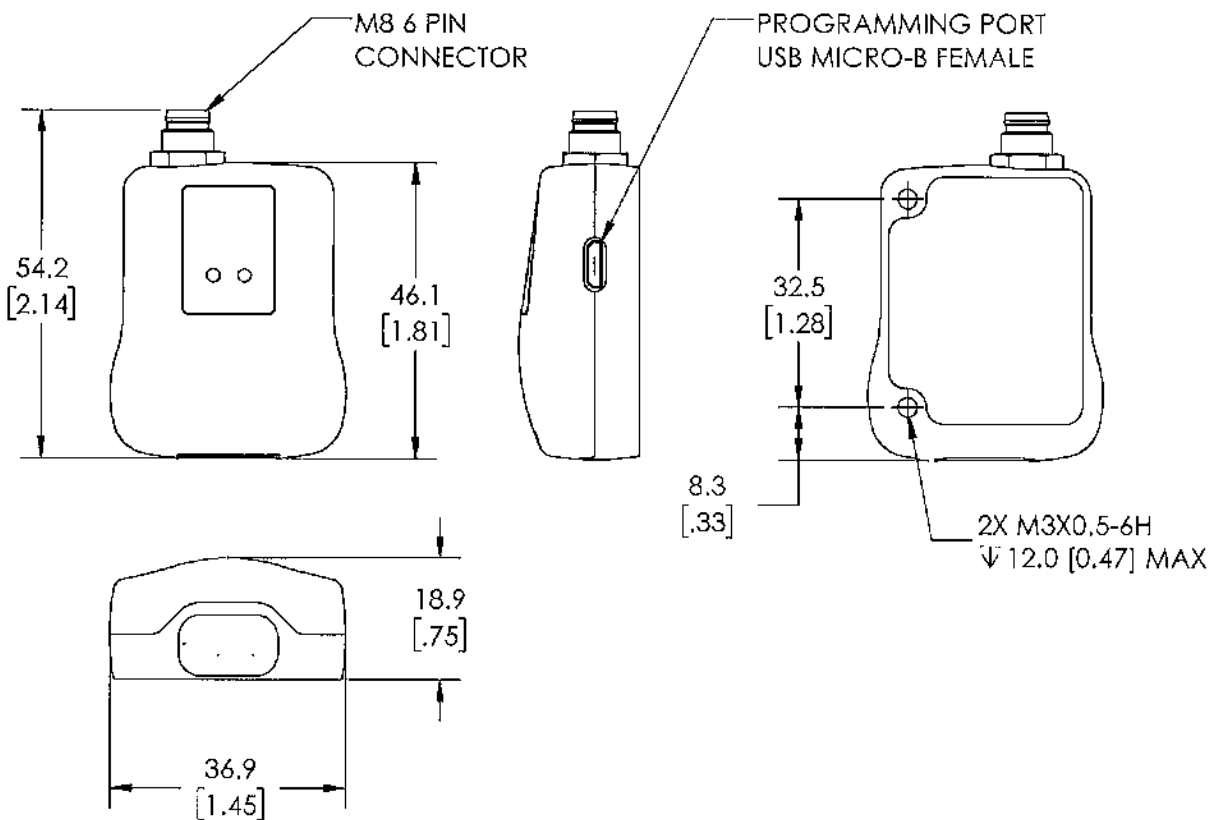




Figure 3.3: Dimensions\*

\* Primary dimensions are in mm, secondary dimensions SI units [inches] in brackets for reference only.  
All dimensions have a tolerance of  $\pm 0.25$ mm unless otherwise specified.

### 3.3 LEDs and signaling

Two status LEDs signal various sensor states and support diagnostics and troubleshooting in the field (see Table 3.3).

LED 1	Meaning
	Error threshold was exceeded (difference between sensor 1 & 2)
	Trigger is active (the LED goes off and on again once for each trigger)






Status LED	Cause
	Standstill
	Movement (frequency corresponding to the speed)
	Image quality good
	Poor image quality Change distance if necessary.
	Poor image quality Change distance if necessary.

Table 3.3: LED signaling

Explanation of the symbols and asterisks:

LED off // /// LED on // / LED blinking



## **4. ACCU-LASERPRO SOFTWARE**

### **4.1 Functions**

- Visualization of the data generated by the sensor.
- Configuration of the sensors
- Saving the configuration
- Mirroring the configuration

### **4.2 Requirements**

Compatible with Windows 10 / 11

Available languages: English, French, German, Polish, Spanish

Requires a Micro USB to USB-A adapter cable to connect to the computer.

### **4.3 Download**

You can find the software at [www.encoder.com](http://www.encoder.com) on the Accu-LaserPro™ product page.

### **4.4 Installation**

Execute the downloaded file: "LP1\_acculaserpro\_software.zip" & "Accu-LaserPro\_Software\_Setup\_X\_X\_X.exe" (X's indicate version number)

## 4.5 Configuration

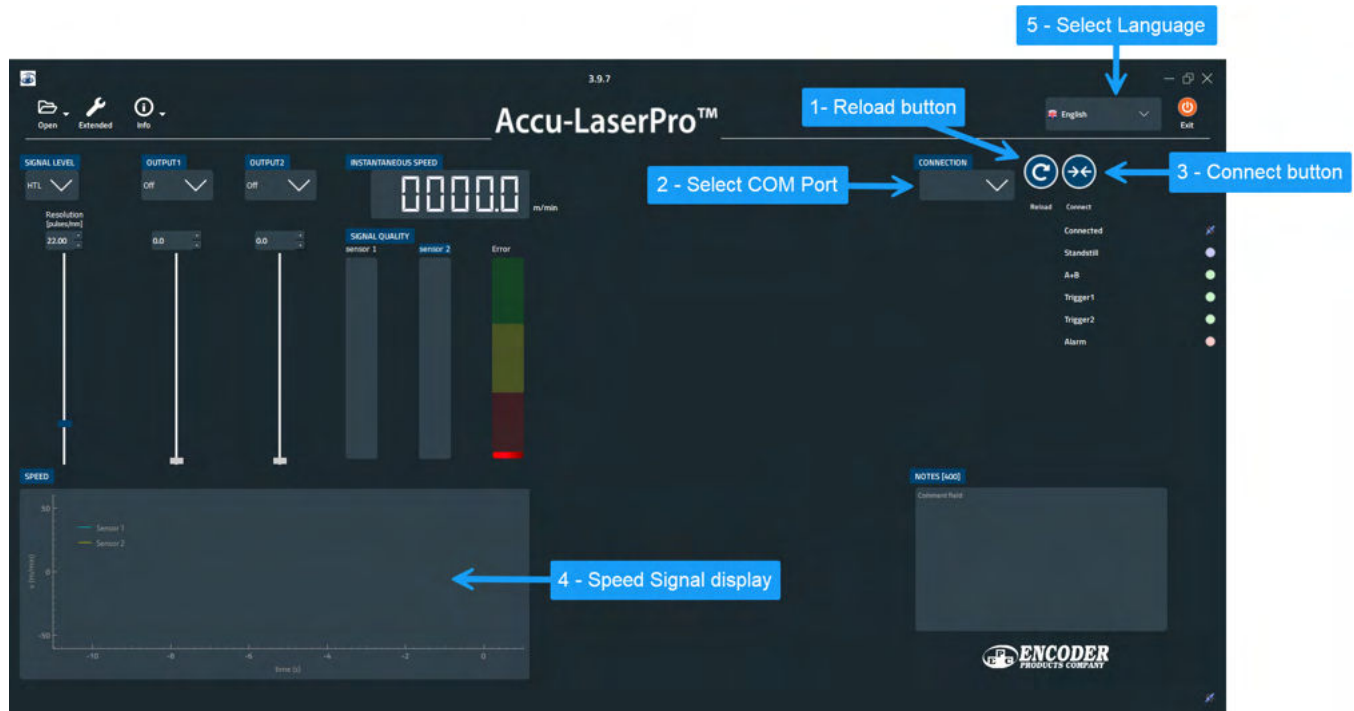
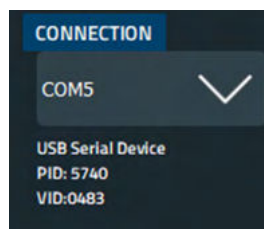


Figure 4.1: Accu-LaserPro software – Settings 1

1. The **Reload** button updates/refreshes the list of connected devices.
2. Select the **COM** port to which the Accu-LaserPro is connected. The correct connection will always have a Product ID (PID) of **5740** and a Vendor ID (VID) of **0483**



3. The **Connect** button connects the software to the Accu-LaserPro sensor.
4. The speed signals of the two sensors are displayed graphically.
5. **Select** the interface language.



Figure 4.2: Accu-LaserPro software – Settings 2

1. Speed graph of both sensors' values.
2. Current speed in m/min
3. Status bar
4. Parameters saved notification area – A message will appear in this area confirming the changes to the configuration.
5. Resolution in pulses / mm
6. Start distance trigger 1 in mm (if active)
7. Start distance trigger 2 in mm (if active)
8. Signal quality - Image quality of sensor 1 and sensor 2.
9. Error threshold value



Figure 4.3: Accu-LaserPro software – Settings 3

1. Customer notes which are saved on the device
2. Switching level, configuration of the encoder signal (HTL /TTL)
3. Output 1, switching trigger 1 on/off
4. Output 2, switching on/off of trigger 2 or alarm or direction signal.
5. Version Info, this area displays the hardware/software version when connected.

H/W rev.: 1.1 S/W rev.:1.14 S/N:241200331 Trigger function ✓

## 4.6 Advanced configuration

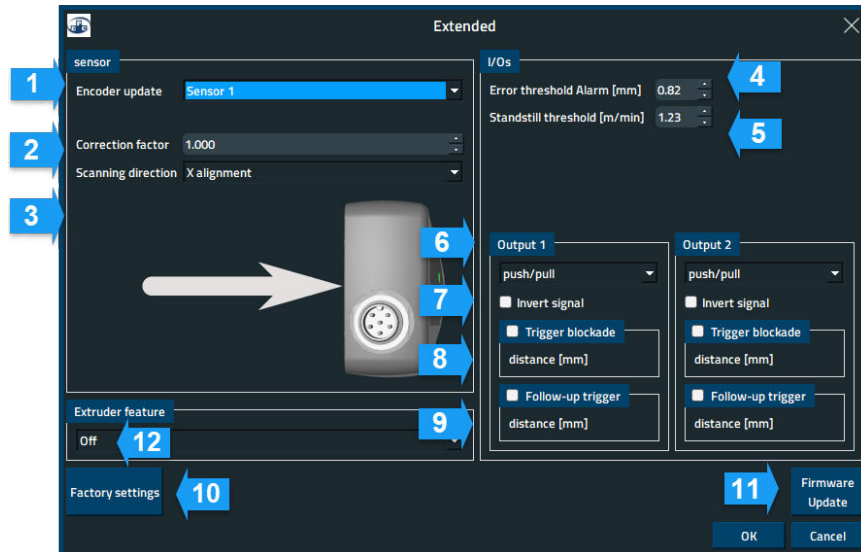


Figure 4.4: Accu-LaserPro software - Advanced configuration

1. Evaluation of the respective sensor. (For higher speeds or accelerations, operation with only one sensor is recommended).
2. Calibration of the sensor to the exact speed.
3. Change between measuring directions X/Y.
4. Limit value for triggering the error output if the difference between sensor 1 and 2 exceeds the set error threshold value.
5. Sensor sensitivity at standstill.
6. Signal trigger type (NPN / PNP / push-pull).
7. Change of trigger signal (high / low).
8. Suppresses all pulses within the specified distance that would be caused by a standstill.
9. Outputs trigger pulses consecutively, even without a standstill.
10. After resetting to factory settings, the sensor must be restarted by acknowledging the message.
11. After the update, the sensor must be restarted by acknowledging the message.
12. Blocks a backward movement of a product and continues counting the pulses from this point when the forward movement resumes.

## 4.7 Save configuration

For the purpose of quick product changes and their adaptation, various configurations can be saved as separate files and called up again. (Symbol "Open" < > "Save as")

## 4.8 Correction factor

By default, the correction factor is set to 1.000 in the advanced settings.

To achieve an accurate result, this value can be adjusted using a hand tachometer or another reference source. Pay attention to your safety when doing this!

Place the hand tachometer on the moving object (e.g. shaft, conveyor belt) and compare the speed displayed there with the digital speed display in the Accu-LaserPro software. Adjust the correction factor until both speeds are approximately the same.

When detecting rotating parts (shafts, axes), the following values are recommended as a guide:

Diameter of the axis/shaft	Correction factor
65 mm	0.7
100 mm	0.75
160 mm	0.8

Table 4.1: Correction factor

### 4.8.1 Concrete calculation of the correction factor

Measure a known length or measure a known speed and check the output of the Accu-LaserPro. If the result deviates from the expected value, you must calculate the correction factor and enter it into the Accu-LaserPro software.

The calculation is as follows. Divide the current correction factor by the number of pulses actually determined and multiply the result by the value of pulses/mm set in the Accu-LaserPro. The result is the new correction factor, enter this into the advanced settings.

#### 4.8.1.1 Length:

$$\frac{\text{Current correction factor}}{\text{Pulses measured}} \times \text{Impulses expected} = \text{New correction factor}$$

#### 4.8.1.2 Example calculation length:

You measure a distance of 1000 mm and have set 22 pulses/mm with a correction factor of 1.000. Your meter only outputs 21,750 pulses instead of the expected 22,000 pulses. Carry out the calculation and you will receive a correction factor of 1.011. Set this in the advanced settings.

Calculation:

$$\frac{1,000}{21750 \text{ Pulses}} \times 22000 \text{ Pulses} = 1,011$$

#### 4.8.1.3 Speed:

$$\frac{\text{Current correction factor}}{\text{Speed measured}} \times \text{Speed expected} = \text{New correction factor}$$

#### 4.8.1.4 Example calculation speed:

You measure the speed on a conveyor belt with a hand-held tachometer of 10 m/s. The Accu-LaserPro displays a value of 8.8 m/s in the software. Carry out the calculation and you will receive the new correction factor of 1.136. Set this in the software under Advanced.

Calculation:

$$\frac{1,000}{8,8 \text{ m/s}} \times 10,0 \text{ m/s} = 1,136$$

## 4.9 Application tips

- The Accu-LaserPro works with 5 VDC via the programming interface and/or via the machine's supply voltage in the range of 5 to 30 VDC.
- The optimum distance between the Accu-LaserPro and the material/object surface is 15 - 60 mm.
- The distance to the product should first be adjusted or varied until LED2 lights up green. Test both when the product is moving and when it is stationary.
- Any surface in front of the sensor window is detected. Transparent materials are also detected (but not glass panes!). However, it is not possible to measure through a material (e.g. a transparent film or glass pane).
- If the sensor detects that the object being measured starts to move from a standstill, a trigger signal is generated. The output delay of this trigger signal is defined in millimeters. The setting is made in Accu-LaserPro software. The sensitivity ("standstill threshold") can be adjusted separately (e.g. for ambient noise, vibration of foils, etc.).
- For marking systems, we recommend setting the resolution to around 22 pulses/mm.
- Trigger 2 can be used for triggering a second system (e.g. camera, cutter, etc.).
- Changes in product direction can be detected by comparing the A and B tracks or via output 2 (direction). It should be noted that the previous status is retained when the system is at a standstill.



## 5. MISCELLANEOUS

### 5.1 Maintenance and cleaning

The Accu-LaserPro is maintenance-free however it is recommended to check the sensor window for damage or contamination at regular intervals. If necessary, remove dust with a brush. Then clean carefully by dabbing with a lint-free microfiber cloth moistened with alcohol. Avoid scratches or streaks. Anti-static plastic cleaner and special optical cloths are recommended for cleaning.

### 5.2 Notes

The greater the distance in relation to the respective surface, the smaller the measurement deviations caused by this will be.

**Note: Vibrations must be avoided to prevent incorrect measurement**

The sensor must be mounted perpendicular (90°) to the surface to be measured, and the measuring axis (X or Y) must be aligned parallel to the direction of movement – otherwise there will be a systematic deviation (see illustration below)

The sensor must be mounted at a distance of between 15 and 60 mm. Depending on the surface condition, the optimum value is visualized by a “green” display on LED 2.

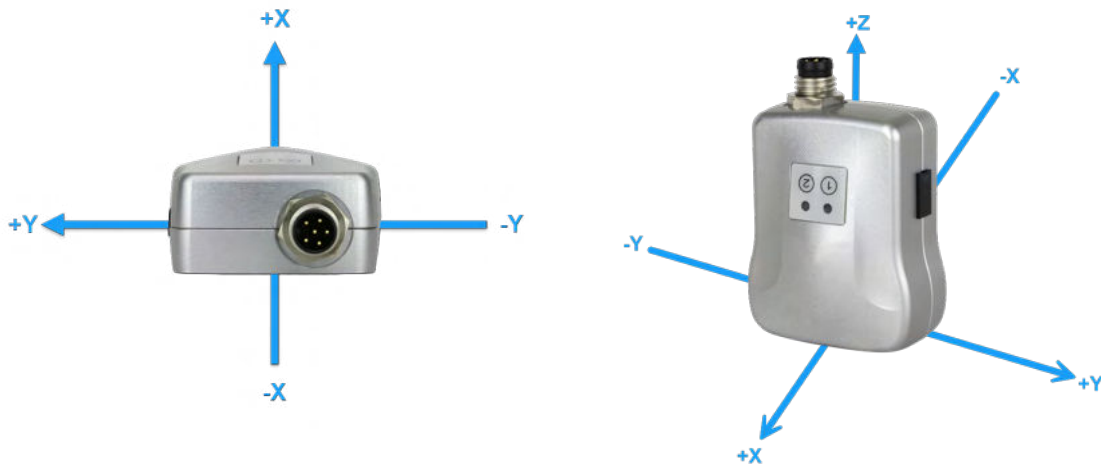


Figure 5.1: Directions of movement (top view and front view)

### 5.3 Fault diagnosis

The sensor functions when the status LEDs on the device light up (if installed and configured correctly).

## **5.4 Troubleshooting**

1. There are no LED lights – Check the power supply is providing power and ensure that the cable is securely connected.
2. Inaccurate Output – Check that the Sensor Window is clean and scratch free and ensure that the LP1 has been configured properly using the Accu-LaserPro software.
3. I get an error message when trying to start the Accu-LaserPro software – Run the Accu-LaserPro software installer. When prompted select uninstall and select uninstall user settings. When the uninstall is complete run the installer again to reset the configuration settings.

For further troubleshooting information, please contact the application consultant or EPC technical support.

## 6. TECHNICAL DATA

### 6.1 Optical Specifications

Measuring distance	15 to 60 mm
Wavelength	850 nm
Sampling rate	1 ms
Response time	4 ms
Accuracy	+/- 0.3%*
Speed	0.5 to 135 m/min**

Table 6.1: Optical data

### 6.2 Electrical Specifications

Supply voltage	+5 to 30 VDC
Power consumption	40 mA (at 12 VDC)
Output circuit	HTL/TTL 10nF/150kHz
Output circuit trigger	PNP/NPN/push-pull
Output circuit error	PNP
Reverse polarity protected	Yes
Protection class	III

Table 6.2: Electrical data

### 6.3 Mechanical Specifications

Housing material	Aluminum
Encapsulation	No
Temperature range	-10°C to +60°C
Protection class	IP54, (with mounted plug)
Connections	Connector: M8 6-pin for data Micro USB for computer

Table 6.3: Mechanical data

## 6.4 Accessories

Software	Accu-LaserPro software (download from <a href="https://encoder.com">encoder.com</a> )
Accessories (Part No.)	Flat Plate #140150 Angle Plate #140151
Optional accessories (Part No.)	Mount #LP1HD-01

Table 6.4: Other

\* Error limit for the systematic measurement deviation according to DIN 1319-1:1995, valid between 1 m/min - 120 m/min. Smaller devia-

