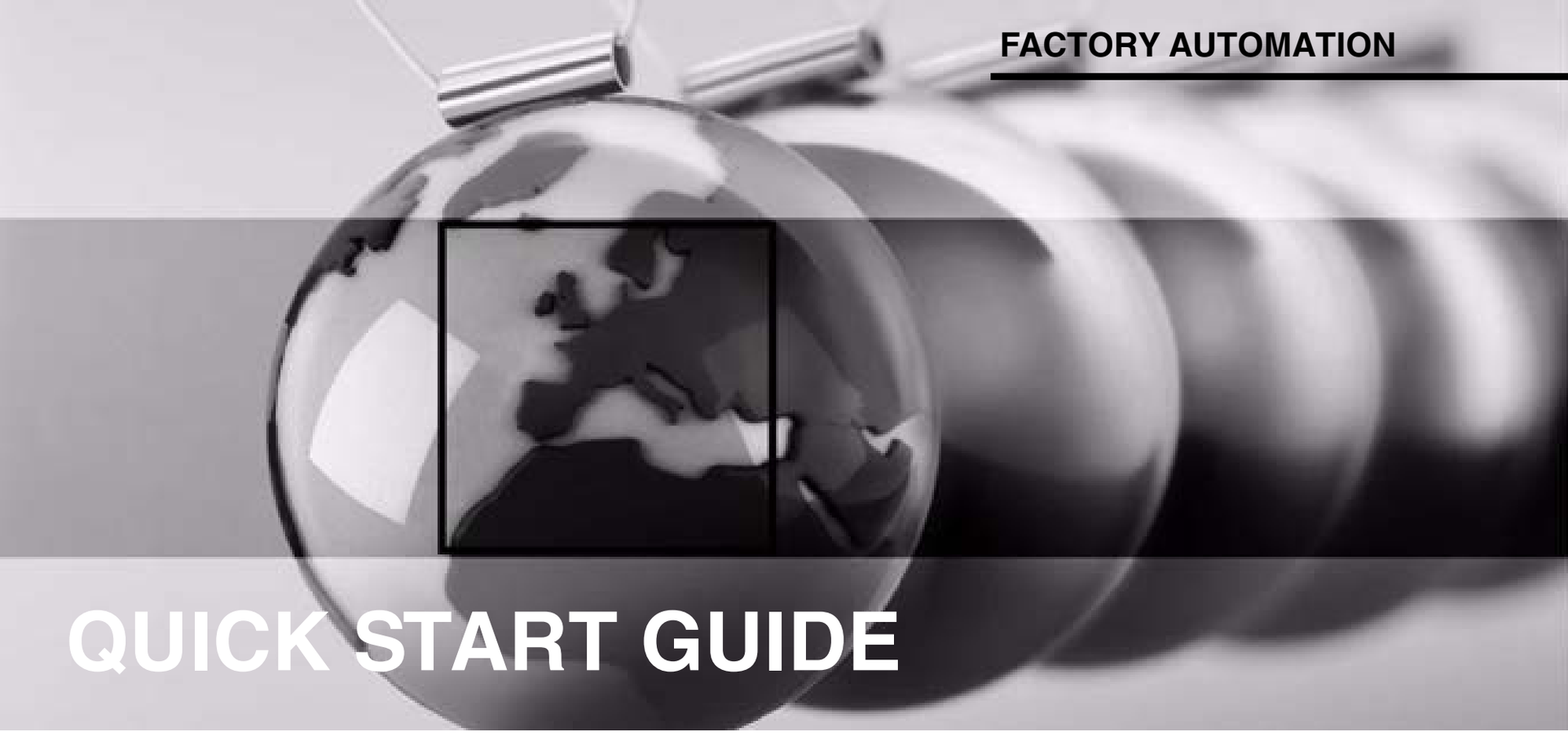
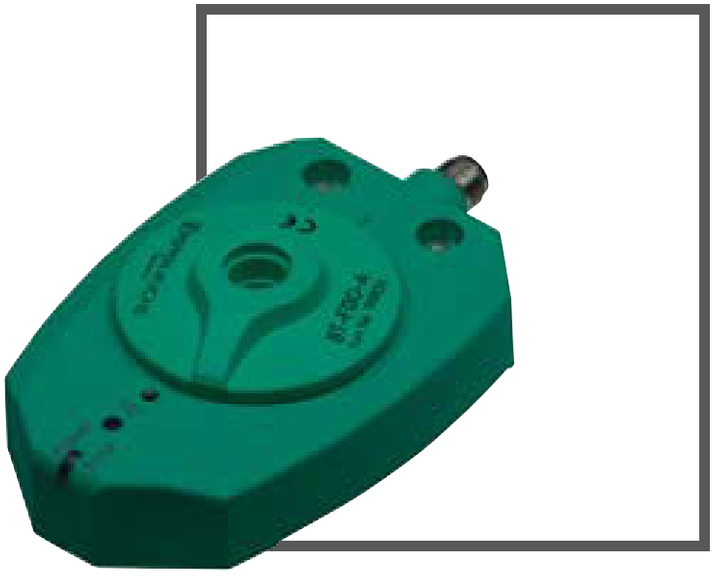


QUICK START GUIDE

PMI360DV-F130-IU-V15

Inductive angle positioning system



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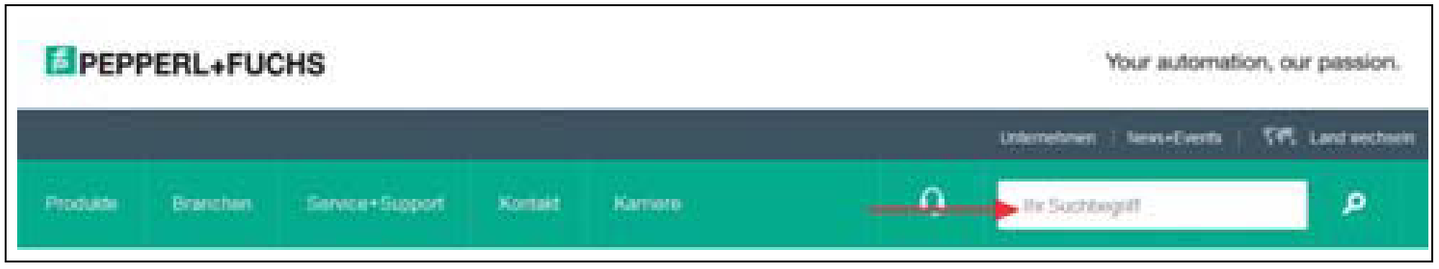
1 Introduction

1.1 Purpose of this quick start guide

This quick start guide contains basic instructions for operating the device. However, the manual takes priority over the quick start guide.

1.2 Product documentation on the internet

You can view all the relevant documentation and additional information on your product at http://www.pepperl-fuchs.com. Simply enter the product name or model number in the **Product/Key word search** box and click **Search**.



Select your product from the list of search results. Click on the information you require in the product information list, e.g., **Technical documents**.

A list of all available documents is displayed.

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2 Product Description

2.1 Use and Applications

The inductive angular positioning system PMI360DV-F130-IU-V15 is a measuring system designed for the non-contact detection of the angular position of valve actuators and valves. The system offers flexible, user-friendly parameterization functions and is suitable for the universal detection and feedback of rotary movements around a fixed rotation point in all areas of machine and plant construction.

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The PMI360DV-F130-IU-V15 has an analog output for the analog indication of angular positions. For high resistance loads (>3.3 kΩ), the angular position is output as a voltage value 0 ... 10 V DC and for low resistance loads (<400 Ω), as a current value 4 ... 20 mA.

The actuator BT-F130-A (see chapter 2.2) is usually attached to the rotary system component to detect the position. This actuator rotates in the central hole on the PMI360DV-F130-IU-V15, contains a metal insert required for position detection and is adapted perfectly to the mechanical requirements of valves or valve actuators.

Note!

In principle, the actuator BT-F130-A is not required. A damping element made from construction steel such as S235JR+AR (previously St37-2) must then be mounted on the rotary system component. This damping element must fulfill all requirements relating to the material, dimensions and distances to the inductive angular positioning system PMI360DV-F130... See chapter 3.2

2.2 Accessories

Various accessories are available.

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2.2.1 Connecting cable

You can use the following cables for the electrical connection:

M12 x 1 connectors, 5-pin

Figure	Material	Length	Order designation
M12 x 1, straight, 5-pin 	PVC	2 m 5 m 10 m	V15-G-2M-PVC V15-G-5M-PVC V15-G-10M-PVC
	PUR	2 m 5 m 10 m	V15-G-2M-PUR V15-G-5M-PUR V15-G-10M-PUR
M12 x 1, angled, 5-pin 	PVC	2 m 5 m 10 m	V15-W-2M-PVC V15-W-5M-PVC V15-W-10M-PVC
	PUR	2 m 5 m 10 m	V15-W-2M-PUR V15-W-5M-PUR V15-W-10M-PUR

Different lengths on request. Also available are shielded cables that may be used in electrically noisy installation environments.

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2.2.2 Actuator

The BT-F130-A actuator is designed for mounting directly on the drive shaft or a servodrive.

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3 Installation

3.1 Note on safety

Warning!

Risk of short circuit

Injuries and damage to the device are possible when working with live parts.

- Before working on the device, always disconnect the supply voltage.
- Connect the device to the supply voltage only after completion of the work.

3.2 Mounting

Mount the sensor as follows:

Mounting

1. Place the sensor on a stable mounting bracket or another suitable base.
2. Align the sensor so that the axis of rotation to be detected is centered on the housing bore hole.
3. Fix the sensor by means of two cylinder head bolts M5 (thread length ≥ 20 mm).

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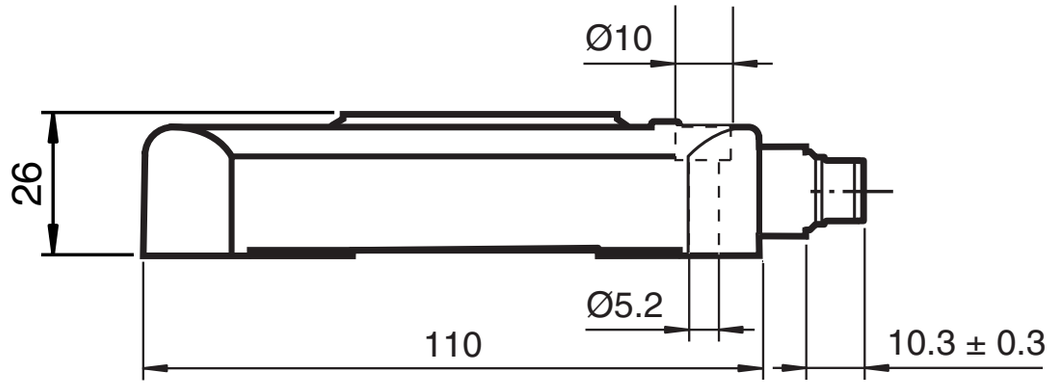
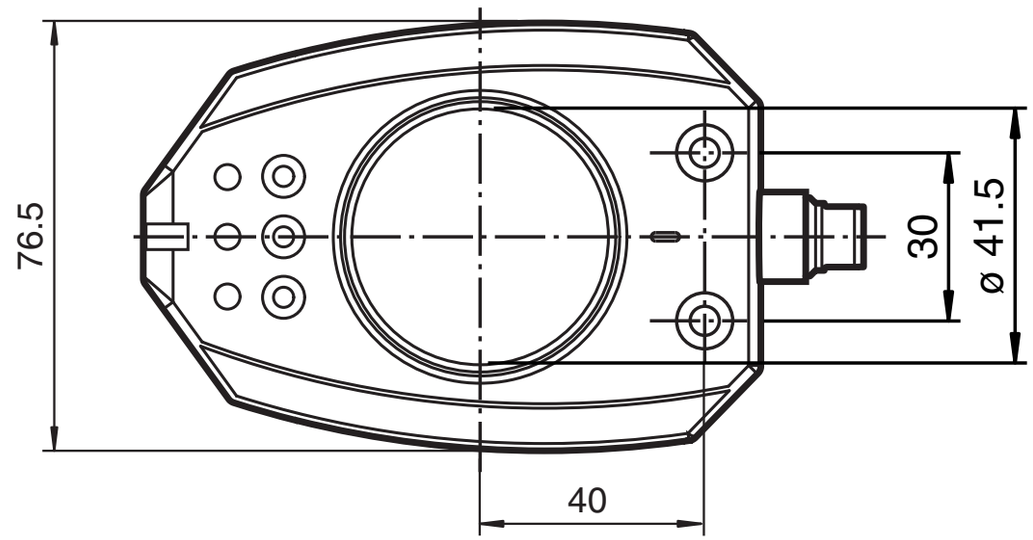
4. Check for rigid and stable seating of the sensor.
5. Mount the actuator or a self-made actuation element on the rotation shaft (if not already mounted) .
6. Check for the required actuator dimensions and gap distance between sensor and actuator. The actuator must not make physical contact or scratch the sensors surface when moving.





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Using a different actuating element

You may use a different actuator instead of the BT-F130-A actuator provided. When using a different actuating element, the element must fulfill all requirements relating to the material, dimensions and distance to the sensitive surface on the sensors (see table). Failing to fulfill all of these requirements may reduce the accuracy/resolution of the sensor or even cause the sensor to stop functioning.

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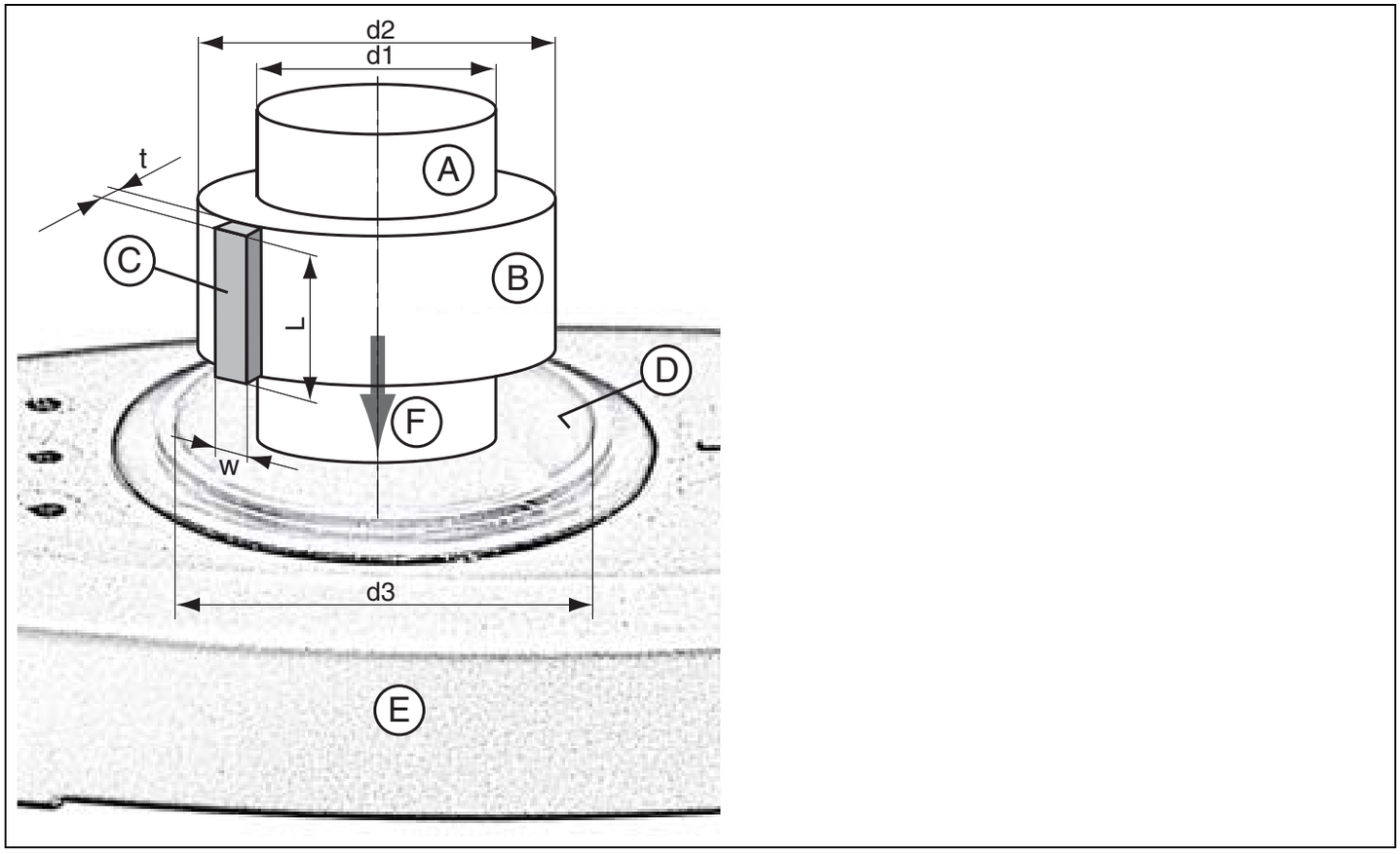
Dimensions when using a different actuating element



A **Drive shaft**

B **Insulation ring made from non-conductive material**

C **Separate actuator (L ≥23 µµ)**

D **Sensitive surface on the sensors (black, cylindrical inner surface)**

E **Sensor**

F **Insert the shaft until actuator C and the sensitive surface on sensor D overlap as far as possible.**

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Actuator (C) can be placed on the insulating ring made from non-conductive material (B) or inserted in this ring.

Dimension	Value
t	2 mm
w	7.5 mm
d1	Depending on the drive shaft material S235JR+AR (previously St37-2): max. 19 mm Stainless steel 1.4435 / AISI 316L (V4A): max. 21 mm Stainless steel 1.4305 / AISI 303 (V2A): max. 23 mm
d2	Select so that the distance between the edges of the actuator and the sensitive surface on the sensor is 1 ... 2 mm.
d3	41.5 mm
Actuator material	Construction steel such as S235JR+AR (previously St37-2)

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3.3 Electrical connection

Wire the electrical connections on the sensor as follows:

Electrical connection

1. For the electrical connection to the sensor, use one of the cord-sets with a 5-pin connector M12 x 1 listed in the Accessories chapter.
2. When routing the electric cables, make sure they are protected against physical damage.
3. Make sure that cables are routed at a sufficient distance from other current-carrying system components. This is the only way to guarantee adequate protection from short circuits and/or interfering signals. If required shielded cables can be used to help prevent electrical interference.
4. Check that the wires are connected correctly before connecting the cordset to the sensor. On Pepperl+Fuchs cordsets, the wire colors are assigned to the connecting pins in the connector according to DIN EN 60947-5-2.
5. Attach the socket on the cordset to the connector on the sensor and tighten the union nut by hand.
6. Switch on the operating voltage.

   ↳ The "Power/Error" LED on the sensor lights up green if the actuator is already fitted and red if the actuator is not yet fitted.

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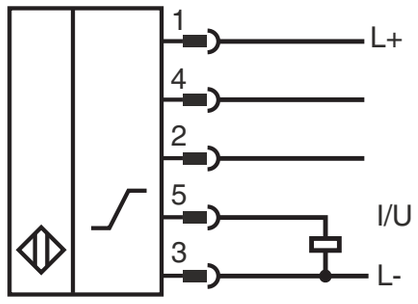
Note!

The I/U LED may light up depending on the position of the actuator, as well.



Connector pin	Function
1	$+U_B$
2	not connected
3	$-U_B$
4	not connected
5	Analog output I/U

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Wire colors are assigned to the connecting pins in the connector according to DIN EN60947-5-2.

Connecting pin	Wire color
1	brown
2	white
3	blue
4	black
5	gray

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4 Commissioning

4.1 Programming the analog output

The start point of the analog output is preset to the angular position 0° and the end point is preset to the angular position 360°in the factory. If the actuator is located in the 0° position, a current value of 4 mA or a voltage value of 0 V is available at the analog output depending on the connected load. If the actuator is rotating clockwise, the output value increases proportionately according to the angle until the analog output adopts the maximum value of 20 mA or 10 V after reaching the angular position 360°. The start and end points of the analog output can be programmed at any desired position. The permitted limited values of the angle range for the analog output are 45° and 360°.

Note!

A loss of the actuator during the programming process interrupts the programming process and a fault message is issued. The last valid parameters are retained.

Program the analog output as follows:

Programming the analog output

1. Make sure that the sensor is mounted correctly and securely, and check that an actuator with the specified dimensions is positioned

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at the correct distance from the surface of the sensor. See chapter 3.2

2. Press the "I/U" button for ≥ 2 s.

   ↳ The flashing yellow LED indicates that the device is ready for you to teach in the start point of the analog ramp.

3. Move the actuator to the position that you wish to define as the start point of the analog ramp and then press the "I/U" button.

   ↳ The yellow "I/U" LED lights up for 2 seconds and then starts to flash again. This indicates that the device is ready for you to teach in the end point of the analog ramp.

4. Move the actuator to the position that you wish to define as the end point of the analog ramp.
   When the actuator rotates, the first 30° define the direction of rotation of the measurement range in which the values of the analog output increase (clockwise/counterclockwise). If the actuator rotates less than 30°, the previously set direction of rotation is retained.

5. Briefly press the "I/U" button.

   ↳ The setting is then stored in the non-volatile memory of the sensor. The yellow "I/U" LED then lights up permanently to indicate that programming was successful.

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When the actuator moves in a clockwise or counterclockwise direction, the analog output value increases starting from the programmed start position, depending on the direction in which the actuator moves during the programming process. The overall signal range 4 … 20 mA or 0 ... 10 V of the analog output is scaled to the programmed angle segment.

Note!

Programming an angle segment of exactly 45°

If you intend to program an angle segment of exactly 45° for the analog output, you can make use of the restriction that prevents the angle segment from being below 45°
In the second step of the angle segment programming process, move the actuator to a position that represents less than 45° in relation to the start position. If the actuator covers an angle < 30°, the preset direction of rotation is retained. If the actuator covers an angle > 30° but < 45°, this direction of rotation is adopted.
After the relevant button is pressed to confirm this position, the sensor calculates and stores the exact position value for 45°.

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Note!

Programming an angle segment of exactly 360°

If you intend to program an angle segment of exactly 360° for the analog output, you can make use of the restriction that prevents the angle segment from exceeding 360°.
In the second step of the angle segment programming process, move the actuator to a position that represents more than a full rotation in relation to the start position (>360°, but <390°). The direction of the rotation movement determines the direction in which the output values of the analog output increase.
If the actuator does not move between the time the measurement range start point and end point are parameterized, a measurement range of 360° is programmed. The measurement range start point is then located in the position defined in the first step. The previous preset direction of rotation for increasing the output values is retained in this case.
After the relevant button is pressed to confirm this position, the sensor independently calculates and stores the exact position value for 360°.

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5 Troubleshooting

5.1 Faults when programming the output

If unexpected situations occur when the output of the inductive angular positioning system is programmed, refer to the table below for possible causes and instructions for rectifying the problem.

State	Possible cause	Action
Sensor cannot be moved in programming mode (relevant yellow LED does not flash when a button is pressed).	Button not pressed long enough.	Press the button for programming the output ≥ 2 s.
Sensor cannot be moved in programming mode ("Power/Error" LED lights up red).	No actuator available or own actuator mounted too far away from the surface of the sensor.	Mount actuator according to specifications (see chapter 3.2).
"Power/Error" LED lights up red during programming.	Actuator lost during the parameterization process or distance between actuator and surface of sensor too great (own actuator).	Make sure that the concentricity and adjustment of own actuator does not result in a loss of the actuator (see chapter 3.2).

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State	Possible cause	Action
LED stops flashing during the programming process.	Timeout while programming the output (1 minute after the last input).	Move sensor again in programming mode (or)
After programming, the function of the output/outputs remains unchanged.	Programming process not completed within the time frame (1 minute) or incorrect button pressed during programming.	Complete the programming process by pressing the corresponding button for the output a third time within the time frame (or)
A yellow LED flashes and the "Power/Error" LED flashes red at the same time.	The button assigned to the flashing yellow LED is stuck.	Remove any dirt or foreign objects that are causing the key to stick.

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Worldwide Headquarters
Pepperl+Fuchs GmbH
68307 Mannheim · Germany
Tel. +49 621 776-0
E-Mail: info@de.pepperl-fuchs.com

USA Headquarters
Pepperl+Fuchs INC
Twinsburg, Ohio 44087 · USA
Tel. +1 330 4253555
E-Mail: sales@us.pepperl-fuchs.com

Asia Pacific Headquarters
Pepperl+Fuchs Pte Ltd.
Company Registration No. 199003130E
Singapur 139942
Tel. +65 67799091
E-Mail: sales@sg.pepperl-fuchs.com

www.pepperl-fuchs.com

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