Quick setup guide

Differential pressure transmitter with metallic measuring cell

VEGADIF 85

4 … 20 mA/HART SIL

With SIL qualification

Document ID: 53574

Contents

Information:
This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available on our homepage.

Operating instructions VEGADIF 85 - 4 … 20 mA/HART with SIL qualification: Document-ID 53568

Safety Manual VEGADIF 85 - Two-wire 4 … 20 mA/HART with SIL qualification: Document-ID 54894

Editing status of the quick setup guide: 2020-09-22

53574-EN-200924

1 For your safety

1.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

1.2 Appropriate use

VEGADIF 85 is an instrument for measurement of flow, level, differential pressure, density and interface.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

1.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

1.5 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm the conformity of the instrument with these directives.

The EU conformity declaration can be found on our homepage.

1.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for fault information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

1.7 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

2 Product description

2.1 Configuration

Type label

The type label contains the most important data for identification and use of the instrument:

Fig. 1: Layout of the type label (example)

1 *Instrument type*
2 *Product code*
3 *Field for approvals*
4 *Technical data*
5 *Serial number of the instrument*
6 *Data matrix code for VEGA Tools app*
7 *Reminder to observe the instrument documentation*

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate (PDF) - optional

Move to " www.vega.com" and enter in the search field the serial number of your instrument.

Alternatively, you can access the data via your smartphone:

- Download the VEGA Tools app from the " *Apple App Store*" or the " *Google Play Store*"
- Scan the DataMatrix code on the type label of the instrument or
- Enter the serial number manually in the app

3 Mounting

3.1 General instructions for use of the instrument

Process conditions

Note:
For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data*" of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Use a suitable connection cable (see chapter " *Connecting to power supply*")
- Tighten the cable gland or plug connector
- Lead the connection cable downward in front of the cable entry or plug connector

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.

Note:
Make sure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, make sure that the housing lid is closed during operation and locked, if necessary.

Ventilation

The ventilation for the electronics housing is realised via a filter element in the vicinity of the cable glands.

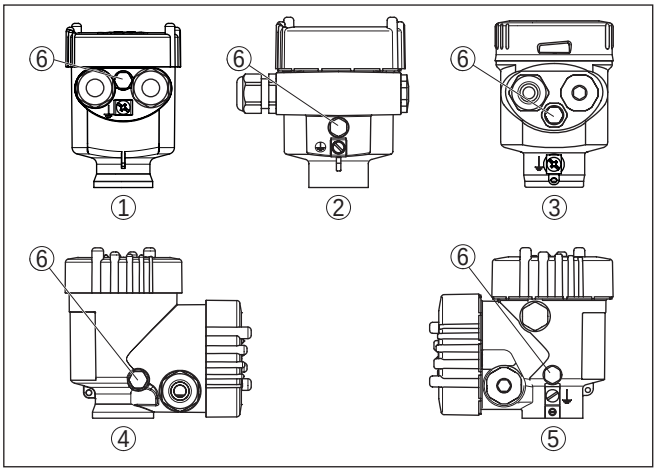


Fig. 2: Position of the filter element - non-Ex, Ex-ia and Ex-d-ia version

1 Plastic, stainless steel single chamber (precision casting)
2 Aluminium - single chamber
3 Stainless steel single chamber (electropolished)
4 Plastic double chamber
5 Aluminium, stainless steel double chamber housing (precision casting)
6 Filter element

Information:
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner may not be used for cleaning.

4 Connecting to power supply

4.1 Connecting

Connection technology

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

Information:
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

Connection procedure

Proceed as follows:

1. Unscrew the housing lid
2. If a display and adjustment module is installed, remove it by turning it slightly to the left
3. Loosen compression nut of the cable gland and remove blind plug
4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
5. Insert the cable into the sensor through the cable entry

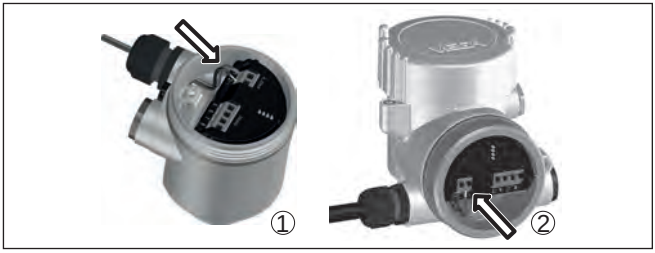


Fig. 3: Connection steps 5 and 6

1 Single chamber housing
2 Double chamber housing

6. Insert the wire ends into the terminals according to the wiring plan

Note:
Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

7. Check the hold of the wires in the terminals by lightly pulling on them
8. Connect the shielding to the internal ground terminal, connect the external ground terminal to potential equalisation

9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
10. Reinsert the display and adjustment module, if one was installed
11. Screw the housing lid back on

The electrical connection is finished.

4.2 Single chamber housing

The following illustration applies to the non-Ex, Ex-ia and Ex-d version.

Electronics and connection compartment

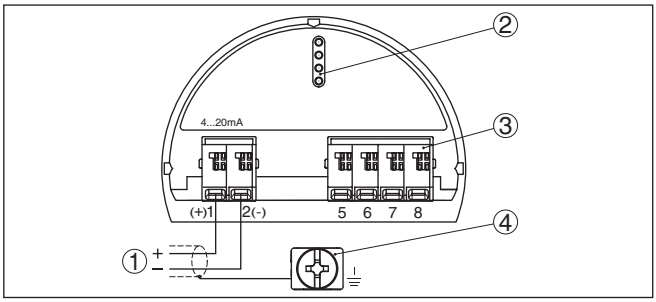


Fig. 4: Electronics and connection compartment - single chamber housing

1 Voltage supply, signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit or Secondary sensor
4 Ground terminal for connection of the cable screening

4.3 Double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.

Connection compartment

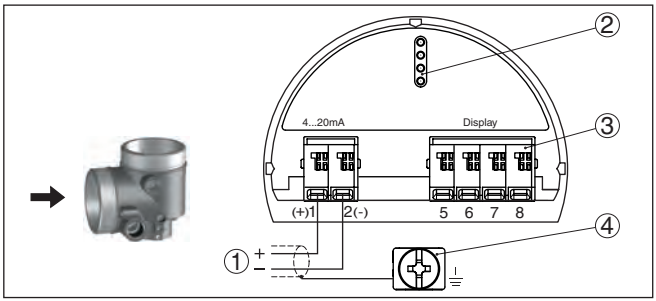


Fig. 5: Connection compartment - double chamber housing

1 Voltage supply, signal output
2 For display and adjustment module or interface adapter
3 For external display and adjustment unit
4 Ground terminal for connection of the cable screening

5 Set up with the display and adjustment module

5.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each displaced by 90°. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing lid
2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.
3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.

Fig. 6: Installing the display and adjustment module in the electronics compartment of the single chamber housing

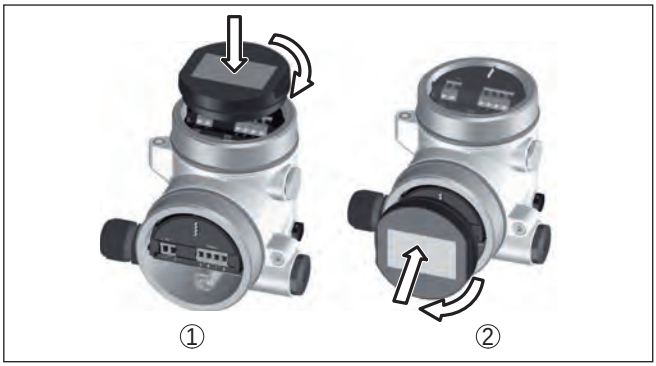


Fig. 7: Installing the display and adjustment module in the double chamber housing

1 In the electronics compartment
2 In the connection compartment

Note:
If you intend to retrofit the instrument with a display and adjustment module for continuous measured value indication, a higher lid with an inspection glass is required.

5.2 Parameter adjustment

Operating sequence

A parameter change with SIL qualified instruments must always be carried out as follows:

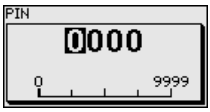
- Unlock adjustment
- Change parameters
- Lock adjustment and verify modified parameters

This ensures that all modified parameters have been deliberately changed.

Unlock adjustment
The instrument is shipped in locked condition.

To prevent unintentional or unauthorized adjustment, the instrument is protected (locked) against all parameter changes while in normal operating condition.

For each parameter change you have to enter the PIN of the instrument. In delivery status, the PIN is "0000".



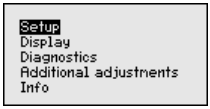
Change parameters
You can find a description below the respective parameter.

Lock adjustment and verify modified parameters

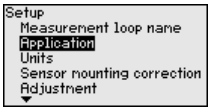
You can find a description below the parameter " *Setup - Lock adjustment*".

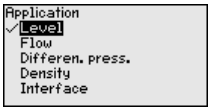
Change setup parameters

1. Go to the menu " *Setup*" via the display and adjustment module.

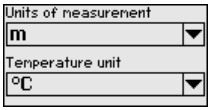


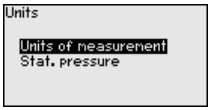
2. In this menu item you activate/deactivate the slave sensor for electronic differential pressure and select the application, e.g. level

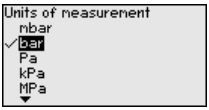




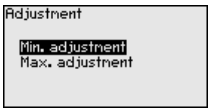
3. Select in the menu item " *Units*" the adjustment unit of the instrument, e.g. " *bar*".

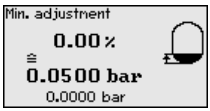


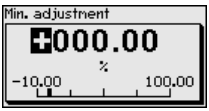




4. Depending on the application, carry out the adjustment e.g. in the menu items " *Min. adjustment*" and " *Max. adjustment*".







Parameterization example

VEGADIF 85 always measures pressure independently of the process variable selected in the menu item "*Application*". To output the selected process variable correctly, an allocation of the output signal to 0 % and 100 % must be carried out (adjustment).

When using the application "*Level*", the hydrostatic pressure, e.g. with full and empty vessel, is entered as adjustment value. A superimposed pressure is detected by the minus side and automatically compensated. See the following example:

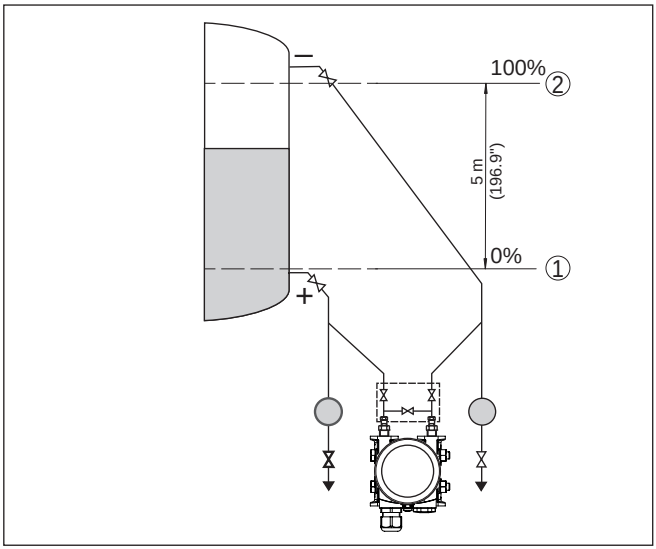


Fig. 8: Parameter adjustment example "Min./max. adjustment, level measurement"

1 Min. level = 0 % corresponds to 0.0 mbar
2 Max. level = 100 % corresponds to 490.5 mbar

If these values are not known, an adjustment with filling levels of e.g. 10 % and 90 % is also possible. By means of these settings, the real filling height is then calculated.

The actual product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

Lock adjustment

With this menu item you safeguard the sensor parameters against unauthorized or unintentional modifications.

SIL To detect parameterization errors reliably, safety-relevant parameters must be verified before saving them into the instrument.

1. Enter PIN
In delivery status, the PIN is "0000".

2. Character string comparison
You then have to carry out the character string comparison. This is used to check the character presentation.

3. Serial number acknowledgement
Afterwards you confirm that the serial number of your instrument was carried over correctly. This is used to check device communication.

4. Verify parameters
Confirm the modified values one after the other.

If the described process of parameter adjustment was run through completely and correctly, the instrument will be locked and hence ready for operation.

5.3 Menu overview

Setup

Menu item	Parameter	Default value
Measurement loop name		Sensor
Application (SIL)	Application	Level
Units	Unit of measurement	mbar (with nominal measuring range ≤ 500 mbar) bar (with nominal measuring ranges ≥ 3 bar)
	Temperature unit	°C
Position correction (SIL)		0.00 bar
Adjustment (SIL)	Zero/Min. adjustment	0.00 bar 0.00 %
	Span/Max. adjustment	Nominal measuring range in bar 100.00 %
Damping (SIL)	Integration time	0.0 s
Linearisation		Linear
Current output (SIL)	Current output - Mode	Output characteristics 4 … 20 mA Reaction when malfunctions occur ≤ 3.6 mA
	Current output - Min./Max.	3.8 mA 20.5 mA
Lock adjustment (SIL)		Released

Display

Menu item	Default value
Menu language	Order-specific
Displayed value 1	Current output in %
Displayed value 2	Measuring cell temperature in °C Electronics temperature in °C
Display format 1 and 2	Number of positions after the decimal point, automatically
Backlight	Switched on

Diagnostics

Menu item	Parameter	Default value
Sensor status		-
Peak value indicator	Pressure	Actual measured value
	Temperature	Actual temperature values from measuring cell, electronics
Simulation		Process pressure

Additional adjustments

Menu item	Parameter	Default value
Date/Time		Actual date/Actual time
Copy instrument settings		
Special parameters		No reset
Scaling	Scaling size	Volume in l
	Scaling format	0 % corresponds to 0 l 100 % corresponds to 0 l
Current output 1	Current output - Meas. variable	Lin. percent - Level
	Current output - Adjustment	0 … 100 % correspond to 4 … 20 mA
Current output 2	Current output - Meas. variable	Measuring cell temperature
	Current output - Adjustment	0 … 100 °C correspond to 4 … 20 mA
HART mode		Address 0

Info

Menu item	Parameter
Device name	Device name
Instrument version	Hardware and software version
Factory calibration date	Date
Sensor characteristics	Order-specific characteristics

6 Set up with smartphone/tablet, PC/ notebook via Bluetooth

6.1 Preparations

Activate Bluetooth

Make sure that the Bluetooth function of the display and adjustment module is activated. For this, the switch on the bottom side must be set to "*On*".

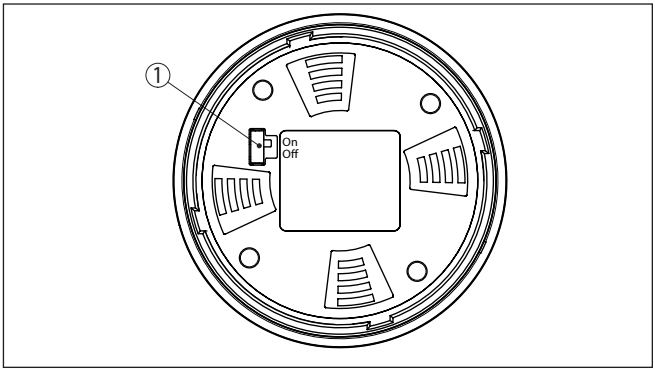


Fig. 9: Activate Bluetooth

1 Switch
On = Bluetooth active
Off = Bluetooth not active

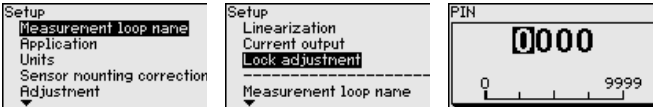
Change sensor PIN

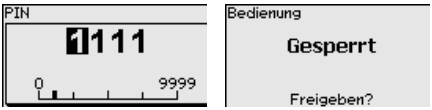
The security concept of Bluetooth operation absolutely requires that the default setting of the sensor PIN be changed. This prevents unauthorized access to the sensor.

The default setting of the sensor PIN is "**0000**". First of all you have to change the sensor PIN in the adjustment menu of the sensor, e.g. to "**1111**":

1. Go to setup via the extended operation

2. Lock operation by changing sensor PIN





3. Enable operation again by entering the sensor PIN once more

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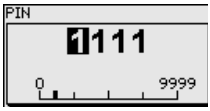

After entering the changed sensor PIN once again, sensor operation is enabled again. For access (authentication) with Bluetooth, the changed PIN is still effective.

Information:
Bluetooth communication functions only if the actual sensor PIN differs from the default setting " **0000**".

6.2 Connecting

Preparations

Smartphone/Tablet
Start the adjustment app and select the function "Setup". The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

PC/Notebook
Start PACTware and the VEGA project assistant. Select the device search via Bluetooth and start the search function. The device automatically searches for Bluetooth-capable devices in the vicinity.

Connecting

The message " *Instrument search running*" is displayed. All devices found are listed in the operating window. The search is automatically continued continuously.

Select in the device list the requested device. The message " *Connecting*" is displayed.

Authenticate

For the first connection, the operating device and the sensor must authenticate each other. After successful authentication, the next connection functions without authentication.

For authentication, enter in the next menu window the 4-digit sensor PIN.

6.3 Sensor parameter adjustment

The sensor parameterization is carried out via the adjustment app on the smartphone/tablet or the DTM on the PC/notebook.

App view

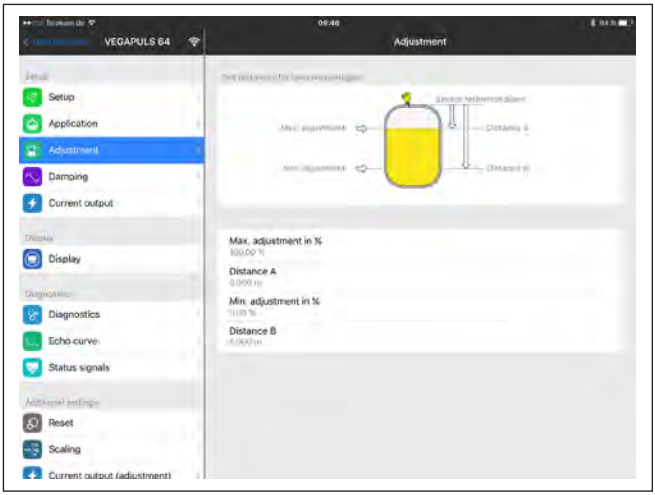

Fig. 10: Example of an app view - Setup sensor adjustment

7 Supplement

7.1 Technical data

Output variable	
Output signal	4 … 20 mA/HART
Range of the output signal	3.8 … 20.5 mA/HART (default setting)
Fulfilled HART specification	7.3
Signal resolution	0.3 µA
Fault signal, current output (adjustable)	≤ 3.6 mA, ≥ 21 mA, last measured value[1]
Max. output current	21.5 mA
Load	See load resistance under Power supply
Starting current	≤ 10 mA for 5 ms after switching on, ≤ 3.6 mA
Damping (63 % of the input variable), adjustable	0 … 999 s
HART output values according to HART 7 (default setting)[2]	
– First HART value (PV)	Linear percentage value
– Second HART value (SV)	Static pressure
– Third HART value (TV)	Differential pressure
– Fourth HART value (QV)	Electronics temperature

Electromechanical data - version IP66/IP67 and IP66/IP68 (0.2 bar)[3]	
Options of the cable entry	
– Cable entry	M20 x 1.5; ½ NPT
– Cable gland	M20 x 1.5, ½ NPT (cable ø see below table)
– Blind plug	M20 x 1.5; ½ NPT
– Closing cap	½ NPT

Material cable gland/Seal insert	Cable diameter			
	5 … 9 mm	6 … 12 mm	7 … 12 mm	10 … 14 mm
PA/NBR	●	●	–	●
Brass, nickel-plated/NBR	●	●	–	–
Stainless steel/NBR	–	–	●	–

Wire cross-section (spring-loaded terminals)	
– Massive wire, stranded wire	0.2 … 2.5 mm² (AWG 24 … 14)
– Stranded wire with end sleeve	0.2 … 1.5 mm² (AWG 24 … 16)

Voltage supply	
Operating voltage U_B	11 … 35 V DC

[1] Last measured value not possible with SIL.
[2] The output values can be assigned individually.
[3] IP66/IP68 (0.2 bar), only with absolute pressure.

Operating voltage U_B with lighting switched on	16 … 35 V DC
Reverse voltage protection	Integrated
Permissible residual ripple	
– for U_N 12 V DC (11 V < U_B < 14 V)	≤ 0.7 V_{eff} (16 … 400 Hz)
– for U_N 24 V DC (18 V < U_B < 35 V)	≤ 1.0 V_{eff} (16 … 400 Hz)
Load resistor	
– Calculation	(U_B - U_{min})/0.022 A
– Example - U_B= 24 V DC	(24 V - 11 V)/0.022 A = 591 Ω

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Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

53574-EN-200924

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