

## Quick setup guide

**Radar sensor for continuous level  
measurement of liquids**

### VEGAPULS 64

4 ... 20 mA/HART - two-wire



Document ID: 51462



**VEGA**

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## 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 the supplied DVD or in the download area of "[www.vega.com](http://www.vega.com)".

**Operating instructions VEGAPULS 64 - 4 ... 20 mA/HART - two-wire: Document-ID 51141**

Editing status of the quick setup guide: 2015-12-04

## 1 For your safety

### 1.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist 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

VEGAPULS 64 is a sensor for continuous level measurement.

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 the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment. Also the protective characteristics of the instrument can be influenced.

### 1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. 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.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

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.

The safety approval markings and safety tips on the device must also be observed.

Depending on the instrument version, the emitting frequencies are in the C, K or W band range. The low emitting frequencies are far below the internationally approved limit values. When used correctly, the device poses no danger to health.

## 1.5 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of 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 fulfills the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for malfunction 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](http://www.namur.de).

## 1.7 Radio license for Europe

The instrument is approved according to EN 302372-1/2 V1.2.1 (2011-02) for use in closed vessels.

For operation inside of closed vessels, the following conditions must be fulfilled:

- The instrument must be permanently mounted on a closed vessel made of metal, reinforced concrete, or comparable attenuating materials.
- Flanges, process fittings and mounting accessories must ensure the microwave impermeability of the vessel and not let the radar signal escape to the outside
- If necessary, existing viewing windows in the vessel must be coated with a microwave impermeable material (e.g. electrically conductive coating)
- Manholes and flanges on the vessel must be closed and sealed to avoid penetration of the radar signal
- The instrument should be preferably mounted on top of the vessel with antenna orientation downward
- The instrument must only be installed and maintained by appropriately qualified staff

## 1.8 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 fulfill 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:

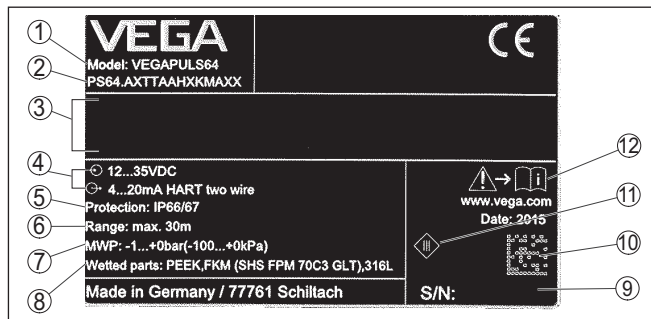


Fig. 1: Layout of the type label (example)

- 1 Instrument type
- 2 Product code
- 3 License label
- 4 Power supply and signal output, electronics
- 5 Protection rating
- 6 Measuring range
- 7 Process and ambient temperature, process pressure
- 8 Material, wetted parts
- 9 Serial number of the instrument
- 10 Data-Matrix-Code for smartphone app
- 11 Symbol of the device protection class
- 12 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

Go to [www.vega.com](http://www.vega.com) "VEGA Tools" and "Instrument search". Enter the serial number.

Alternatively, you can access the data via your smartphone:

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

## 3 Mounting

### 3.1 Mounting preparations, mounting strap

The mounting strap is supplied unassembled (optionally) and must be screwed to the sensor before setup with three hexagon socket screws M5 x 10 and spring washers. Max. torque, see chapter "Technical data". Required tools: Allen wrench size 4.

There are two different variants of screwing the strap to the sensor, see following illustration:

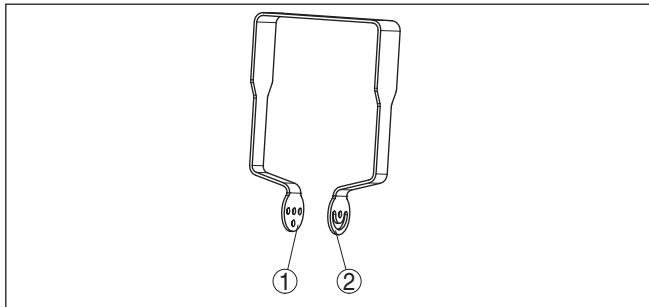


Fig. 2: Mounting strap for screwing to the sensor

- 1 For angle of inclination in steps
- 2 For angle of inclination, infinitely variable

Depending on the selected variant, the sensor can be rotated in the strap:

- Single chamber housing
  - Angle of inclination in three steps 0°, 90° and 180°
  - Angle of inclination 180°, infinitely variable
- Double chamber housing
  - Angle of inclination 90°, infinitely variable
  - Angle of inclination in two steps 0° and 90°

### 3.2 Mounting instructions

#### Polarisation

Radar sensors for level measurement emit electromagnetic waves. The polarization is the direction of the electrical component of these waves.

The polarization direction is marked by a nose on the housing, see following drawing:

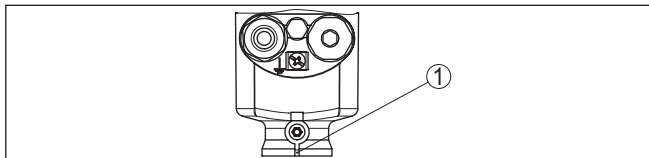


Fig. 3: Position of the polarisation

- 1 Nose for marking the direction of polarisation

**Information:**

When the housing is rotated, the direction of polarization changes and hence the influence of the false echo on the measured value. Please keep this in mind when mounting or making changes later.

**Installation position**

When mounting the sensor, keep a distance of at least 200 mm (7.874 in) from the vessel wall. If the sensor is installed in the center of dished or round vessel tops, multiple echoes can arise. However, these can be suppressed by an appropriate adjustment (see chapter "Setup").

If you cannot maintain this distance, you should carry out a false signal storage during setup. This applies particularly if buildup on the vessel wall is expected. In such cases, we recommend repeating the false signal storage at a later date with existing buildup.

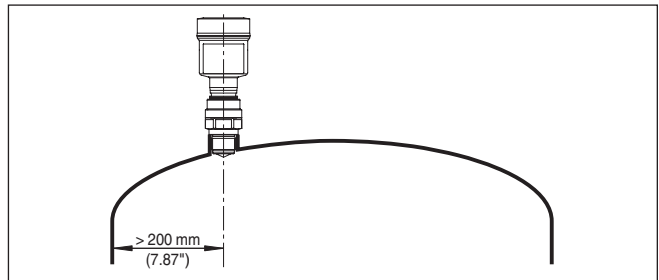


Fig. 4: Mounting of the radar sensor on round vessel tops

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the vessel bottom.

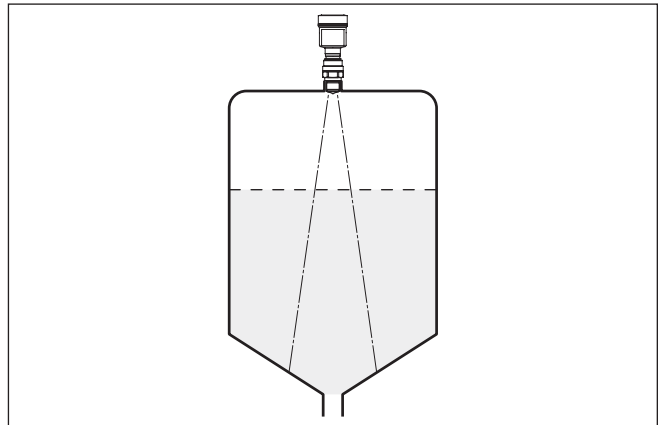


Fig. 5: Mounting of the radar sensor on vessels with conical bottom



## 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. 6: Connection steps 5 and 6 - Single chamber housing



Fig. 7: Connection steps 5 and 6 - Double chamber housing

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



#### Information:

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.

You can find further information on the max. wire cross-section under "*Technical data - Electromechanical data*"

7. Check the hold of the wires in the terminals by lightly pulling on them
8. Connect the screen 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 Wiring plan, single chamber housing



The following illustration applies to the non-Ex as well as to the Ex-ia version.

### Electronics and terminal compartment

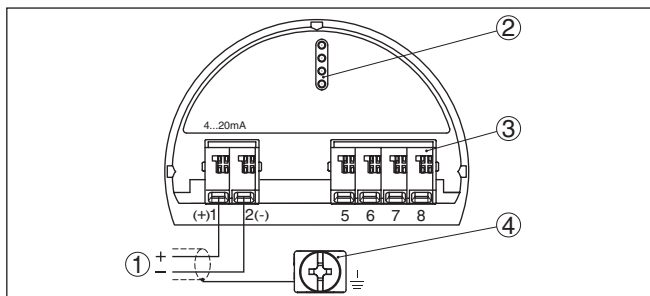


Fig. 8: Electronics and terminal compartment, single chamber housing

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

## 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. 9: Installing the display and adjustment module in the electronics compartment of the single chamber housing

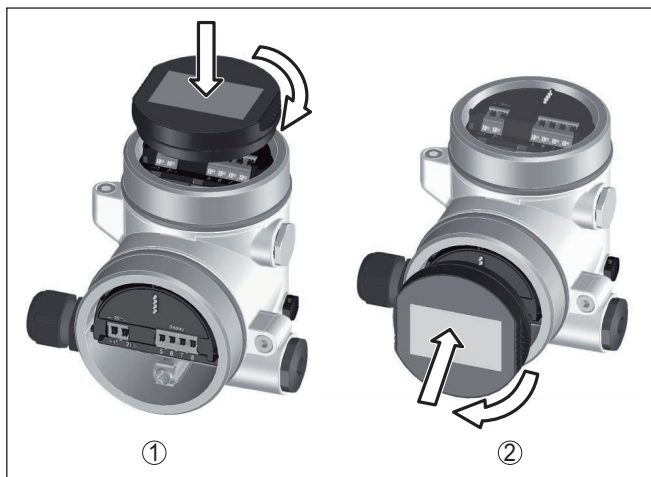


Fig. 10: Installing the display and adjustment module in the double chamber housing

- 1 In the electronics compartment
- 2 In the terminal 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 - Quick setup

To quickly and easily adapt the sensor to the application, select the menu item "Quick setup" in the start graphic on the display and adjustment module.

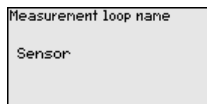


### Quick setup process

Select the individual menu items with the [→] key. Carry out the steps in the below sequence.

#### 1. Measurement loop name

In the first menu item you assign a suitable measurement loop name. Permitted are names with max. 19 characters.



#### 2. Medium

In this menu item you select the medium. The selection comprises liquids with different properties.

Medium
Water based ▼

**3. Application**

In this menu item you determine the application.

Application
Storage tank ▼

**4. Vessel form**

In this menu item you specify the for of the vessel bottom and top.

Vessel type
Vessel top
Dished boiler ▼
Vessel bottom
Dished boiler ▼

**5. Vessel height/Measuring range**

In this menu item you enter the height of the vessel and hence the active measuring range.


Vessel height/Meas. range
30.00 m

**6. Max. adjustment**

In this menu item you carry out the max. adjustment.

Enter the measuring distance for 100 % filling.


Max. adjustment
100.00 %
≅
0.00 m
4.96 m


**7. Min. adjustment**

In this menu item you carry out the min. adjustment.

Enter the measuring distance for 0 % filling.

Min. adjustment
0.00 %
≅
30.00 m
3.92 m


**8. Termination**

"Quick setup terminated successfully" is displayed briefly.

**Information:**

The echo curve of setup was stored automatically during the quick setup.

The quick setup is finished.

The return to the measured value indication is carried out through the **[→]** or **[ESC]** keys or automatically after 3 s

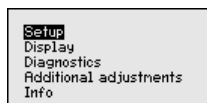
## Extended adjustment

The menu "*Extended adjustment*" is available for further settings. Important functions are described in the following chapter. You can find a complete description of all functions of the "*Extended adjustment*" in the operating instructions manual of VEGAPULS 64.

## Main menu

### 5.3 Parameter adjustment - Extended adjustment

The main menu is divided into five sections with the following functions:



**Setup:** Settings, e.g., for measurement loop name, units, application, adjustment, signal output

**Display:** Settings, e.g., for language, measured value display, lighting

**Diagnosis:** Information, for example, on device status, peak value, simulation, echo curve

**Additional adjustments:** Date/Time, reset, copy function, scaling, current output, false signal suppression, linearization, HART mode, special parameters

**Info:** Instrument name, hardware and software version, calibration date, instrument features

In the main menu item "*Setup*", the individual submenu items should be selected one after the other and provided with the correct parameters to ensure optimum adjustment of the measurement. The procedure is described in the following.

## Setup - Adjustment

Since the radar sensor is a distance measuring instrument, the distance from the sensor to the product surface is measured. To indicate the actual level, an allocation of the measured distance to the percentage height must be carried out.

To perform the adjustment, enter the distance with full and empty vessel, see the following example:

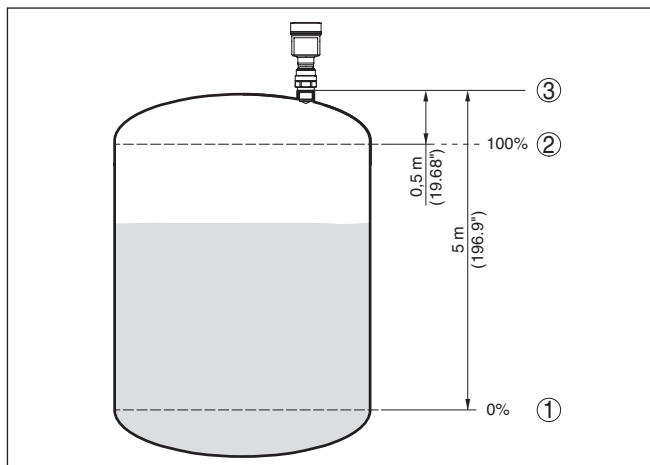


Fig. 11: Parameter adjustment example min./max. adjustment

- 1 Min. level = max. measuring distance
- 2 Max. level = min. measuring distance
- 3 Reference plane

If these values are not known, an adjustment with the distances of e.g. 10 % and 90 % is possible. Starting point for these distance specifications is always the sealing surface of the thread or flange. You can find specifications on the reference plane in chapter "Technical data". The actual level is calculated on the basis of these settings.

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.

## Diagnostics - Echo curve memory

The function "Setup" allows the echo curve to be saved at the time of setup.



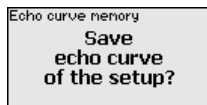
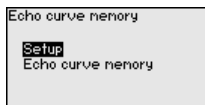
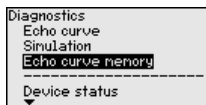
### Information:

This is generally recommended, however, for use of the Asset Management functions it is absolutely necessary. Saving should be carried out with a very low level.

The function "Echo curve memory" allows up to ten individual echo curves to be stored, for example to detect the measurement behaviour of the sensor in different operating conditions.

With the adjustment software PACTware and the PC, the stored echo curves can be displayed with high resolution and used to recognize signal changes over time. In addition, the echo curve saved during setup can also be displayed in the echo curve window and compared with the current echo curve.





### Menu and parameter overview

#### Menu - Setup

Menu item	Parameter	Default setting
Measurement loop name		Sensor
Units		Distance in m Temperature in °C
Application	Medium	Water based
	Application	Storage tank
	Vessel top/Vessel bottom	Dished form/Dished form
	Vessel height/ Measuring range	30 m
Adjustment	Max. adjustment	0,000 m(d) 100.00 %
	Min. adjustment	30 m 0.00 %
Damping	Integration time	0.0 s
Current output	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		Released

#### Menu - Display

Menu item	Default setting
Menu language	Order-specific
Displayed value 1	Filling height in %
Displayed value 2	Electronics temperature in °C
Backlight	Switched on

#### Menu - Diagnosis

Menu item	Parameter	Default setting
Sensor status		-
Peak value	Distance	-
	Meas. certainty	-

Menu item	Parameter	Default setting
<b>Peak values, additional</b>	Temperature	-
<b>Curve indication</b>	Echo curve	-
	False signal suppression	-
<b>Simulation</b>		Percent
<b>Echo curve memory</b>		Percent

### Menu - Additional adjustments

Menu item	Parameter	Default setting
<b>Date/Time</b>		Actual date/Actual time
<b>Reset</b>		-
<b>Copy instrument settings</b>		-
<b>Scaling</b>	Scaling size	Volume in l
	Scaling format	0 % corresponds to 0 l 100 % corresponds to 0 l
<b>Current output 1</b>	Current output - Meas. variable	Lin. percent - Level
	Current output - Adjustment	0 ... 100 % correspond to 4 ... 20 mA
<b>Current output 2</b>	Current output - Meas. variable	Lin. percent - Level
	Current output - Adjustment	0 ... 100 % correspond to 4 ... 20 mA
<b>False signal suppression</b>		-
<b>Linearization</b>		Linear
<b>HART mode</b>		Address 0
<b>Special parameters</b>		-

### Menu - Info

Menu item	Parameter
<b>Device name</b>	VEGAPULS 6.
<b>Instrument version</b>	Hardware and software version
<b>Factory calibration date</b>	Date
<b>Sensor characteristics</b>	Order-specific characteristics

### Additional adjustments - False signal suppression

The following circumstances cause interfering reflections and can influence the measurement:

- High sockets
- Vessel installations such as struts
- Agitators
- Buildup or welded joints on vessel walls



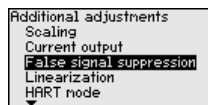
#### Note:

A false signal suppression detects, marks and saves these false signals so that they are no longer taken into account in the level measurement.

This should be done with a low level so that all potential interfering reflections can be detected.

Proceed as follows:

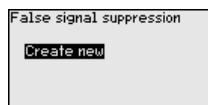
1. Select with **[→]** the menu item "False signal suppression" and confirm with **[OK]**.



2. Confirm again with **[OK]**.



3. Confirm again with **[OK]**.



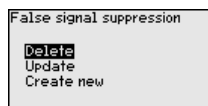
4. Confirm again with **[OK]** and enter the actual distance from the sensor to the product surface.
5. All interfering signals in this section are detected by the sensor and stored after confirming with **[OK]**.



#### Note:

Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as a false signal. The level would then no longer be detectable in this area.

If a false signal suppression has already been saved in the sensor, the following menu window appears when selecting "False signal suppression":



**Delete:** An already created false signal suppression will be completely deleted. This is useful if the saved false signal suppression no longer matches the metrological conditions in the vessel.

**Extend:** is used to extend an already created false signal suppression. This is useful if a false signal suppression was carried out with too high a level and not all false signals could be detected. When selecting "*Extend*", the distance to the product surface of the created false signal suppression is displayed. This value can now be changed and the false signal suppression can be extended to this range.

## 6 Supplement

### 6.1 Technical data

#### Electromechanical data - version IP 66/IP 67 and IP 66/IP 68; 0.2 bar

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	Material seal insert	Cable diameter				
		4.5 ... 8.5 mm	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 mm<sup>2</sup> (AWG 24 ... 14)
- Stranded wire with end sleeve 0.2 ... 1.5 mm<sup>2</sup> (AWG 24 ... 16)

#### Voltage supply

Operating voltage  $U_B$

- Non-Ex instrument 12 ... 35 V DC
- Ex-d instrument 12 ... 35 V DC
- Ex ia instrument 12 ... 30 V DC
- Ex-d-ia instrument 17 ... 35 V DC

Operating voltage  $U_B$  - illuminated display and adjustment module

- Non-Ex instrument 18 ... 35 V DC
- Ex-d instrument 18 ... 35 V DC
- Ex ia instrument 18 ... 30 V DC
- Ex-d-ia instrument Due to the barrier, no lighting possible

Reverse voltage protection Integrated

Permissible residual ripple - Non-Ex, Ex-ia instrument

- for  $12 \text{ V} < U_B < 18 \text{ V}$   $\leq 0.7 V_{\text{eff}}$  (16 ... 400 Hz)
- for  $18 \text{ V} < U_B < 35 \text{ V}$   $\leq 1.0 V_{\text{eff}}$  (16 ... 400 Hz)

Permissible residual ripple - Ex-d-ia instrument

- for  $18 \text{ V} < U_B < 35 \text{ V}$   $\leq 1 V_{\text{eff}}$  (16 ... 400 Hz)

Load resistor

- Calculation  $(U_B - U_{\text{min}})/0.022 \text{ A}$
- Example - Non-Ex instrument with  $U_B = 24 \text{ V DC}$   $(24 \text{ V} - 12 \text{ V})/0.022 \text{ A} = 545 \Omega$





# VEGA

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

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51462-EN-160111



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