Quick setup guide

Radar sensor for continuous level measurement of liquids

VEGAPULS 64
4 ... 20 mA/HART - two-wire

Document ID: 51462
Contents

1 For your safety
   1.1 Authorised personnel ................................................................. 3
   1.2 Appropriate use ........................................................................ 3
   1.3 Warning about incorrect use .......................................................... 3
   1.4 General safety instructions ............................................................. 3
   1.5 CE conformity ........................................................................... 4
   1.6 NAMUR recommendations ............................................................. 4
   1.7 Radio license for Europe .............................................................. 4
   1.8 Environmental instructions .......................................................... 4

2 Product description
   2.1 Configuration ............................................................................ 6

3 Mounting
   3.1 Mounting preparations, mounting strap ........................................... 7
   3.2 Mounting instructions ................................................................ 7

4 Connecting to power supply
   4.1 Connecting ............................................................................. 9
   4.2 Wiring plan, single chamber housing ............................................. 10

5 Set up with the display and adjustment module
   5.1 Insert display and adjustment module ............................................ 12
   5.2 Parameter adjustment - Quick setup ............................................. 13
   5.3 Parameter adjustment - Extended adjustment ............................. 15

6 Supplement
   6.1 Technical data ........................................................................ 21

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".

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.

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

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

![Type label diagram](image)

*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:

![Mounting strap for screwing to the sensor](image)

*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
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:

![Position of the polarization](image)

*Fig. 3: Position of the polarization*

1 Nose for marking the direction of polarization
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](image1)

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](image2)
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
4 Connecting to power supply

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
5 Set up with the display and adjustment module

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.
5 Set up with the display and adjustment module

3. Application
In this menu item you determine the application.

4. Vessel form
In this menu item you specify the form of the vessel bottom and top.

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

6. Max. adjustment
In this menu item you carry out the max. adjustment.
Enter the measuring distance for 100% filling.

7. Min. adjustment
In this menu item you carry out the min. adjustment.
Enter the measuring distance for 0% filling.

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.

### 5.3 Parameter adjustment - Extended adjustment

**Main menu**

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

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Parameter</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement</td>
<td>loop name</td>
<td>Sensor</td>
</tr>
<tr>
<td>Units</td>
<td></td>
<td>Distance in m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temperature in °C</td>
</tr>
<tr>
<td>Application</td>
<td>Medium</td>
<td>Water based</td>
</tr>
<tr>
<td></td>
<td>Application</td>
<td>Storage tank</td>
</tr>
<tr>
<td></td>
<td>Vessel top/Vessel</td>
<td>Dished form/Dished form</td>
</tr>
<tr>
<td></td>
<td>bottom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vessel height/</td>
<td>30 m</td>
</tr>
<tr>
<td></td>
<td>Measuring range</td>
<td></td>
</tr>
<tr>
<td>Adjustment</td>
<td>Max. adjustment</td>
<td>0,000 m(d)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.00 %</td>
</tr>
<tr>
<td></td>
<td>Min. adjustment</td>
<td>30 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.00 %</td>
</tr>
<tr>
<td>Damping</td>
<td>Integration time</td>
<td>0.0 s</td>
</tr>
<tr>
<td>Current output</td>
<td>Current output -</td>
<td>Output characterisitcs</td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td>4 ... 20 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reaction when malfunctions occur</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≤ 3.6 mA</td>
</tr>
<tr>
<td></td>
<td>Current output -</td>
<td>3.8 mA</td>
</tr>
<tr>
<td></td>
<td>Min./Max.</td>
<td>20.5 mA</td>
</tr>
<tr>
<td>Lock adjustment</td>
<td>Released</td>
<td></td>
</tr>
</tbody>
</table>

### Menu - Display

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu language</td>
<td>Order-specific</td>
</tr>
<tr>
<td>Displayed value 1</td>
<td>Filling height in %</td>
</tr>
<tr>
<td>Displayed value 2</td>
<td>Electronics temperature in °C</td>
</tr>
<tr>
<td>Backlight</td>
<td>Switched on</td>
</tr>
</tbody>
</table>

### Menu - Diagnosis

<table>
<thead>
<tr>
<th>Menu item</th>
<th>Parameter</th>
<th>Default setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor status</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Peak value</td>
<td>Distance</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Meas. certainty</td>
<td>-</td>
</tr>
</tbody>
</table>
### Menu item | Parameter | Default setting
--- | --- | ---
Peak values, additional | Temperature | -
Curve indication | Echo curve | -
 | False signal suppression | -
Simulation | Percent | Percent
Echo curve memory | Percent | Percent

### Menu - Additional adjustments

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

### Menu - Info

| Menu item | Parameter |
--- | --- |
Device name | VEGAPULS 6. |
Instrument version | Hardware and software version |
Factory calibration date | Date |
Sensor characteristics | 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
Update
Create new
**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

<table>
<thead>
<tr>
<th>Material cable gland</th>
<th>Material seal insert</th>
<th>Cable diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4.5 ... 8.5 mm</td>
</tr>
<tr>
<td>PA</td>
<td>NBR</td>
<td>–</td>
</tr>
<tr>
<td>Brass, nickel-plated</td>
<td>NBR</td>
<td>●</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>NBR</td>
<td>–</td>
</tr>
</tbody>
</table>

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

Permissible residual ripple - Ex-d-ia instrument
- for 18 V< $U_B$ < 35 V $\leq 1 V_{eff}$ (16 ... 400 Hz)

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

© VEGA Grieshaber KG, Schiltach/Germany 2016