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Quick setup guide

LEVEL TRANSMITTER 8139

4 … 20 mA/HART - two-wire

bürkert
FLUID CONTROL SYSTEMS

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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 our homepage.

Operating instructions LEVEL TRANSMITTER 8139 - 4 … 20 mA/HART - Two-wire: Document-ID 58499
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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

LEVEL TRANSMITTER 8139 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 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.

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. 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 and their meaning read in this operating instructions manual.

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The low transmitting power of the radar sensor is far below the internationally approved limits. No health impairments are to be expected with intended use. The band range of the transmission frequency can be found in chapter "*Technical data*".

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 Radio license for Europe

The instrument was tested according to the latest issue of the following harmonized standards:

- EN 302372 - Tank Level Probing Radar
- EN 302729 - Level Probing Radar

It is hence approved for use inside and outside closed vessels in countries of the EU.

Use is also approved in EFTA countries, provided the respective standards have been implemented.

For operation inside of closed vessels, points a to f in annex E of EN 302372 must be fulfilled.

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

- The instrument must be stationary mounted and the antenna directed vertically downward
- The instrument may only be used outside closed vessels in the version with G1½ or 1½ NPT thread with integrated horn antenna.
- The mounting location must be at least 4 km away from radio astronomy stations, unless special permission was granted by the responsible national approval authority

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- When installed within 4 to 40 km of a radio astronomy station, the instrument must not be mounted higher than 15 m above the ground.

You can find a list of the respective radio astronomy stations in chapter "*Supplement*".

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2 Product description

2.1 Configuration

Type label

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

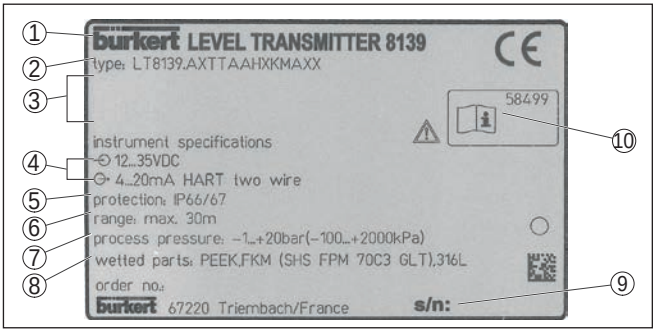

Fig. 1: Layout of the type label (example)

1 Instrument type
2 Product code
3 Type approval mark
4 Power supply and signal output, electronics
5 Protection rating
6 Measuring range
7 Permissible process pressure
8 Material wetted parts
9 Serial number of the instrument
10 Reminder to observe the instrument documentation

Scope of this operating instructions

This operating instructions manual applies to the following instrument versions:

- Hardware version from 1.0.3
- Software version from 1.3.1

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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:

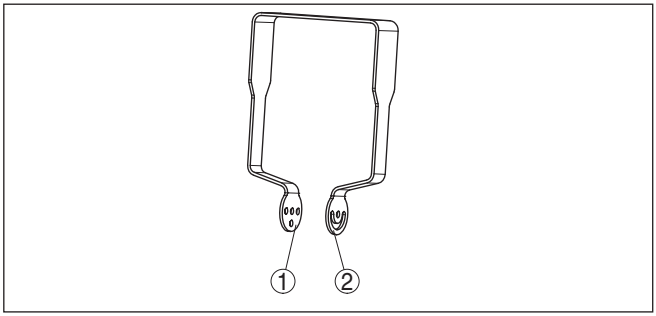

Fig. 2: Mounting strap for screwing to the sensor

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

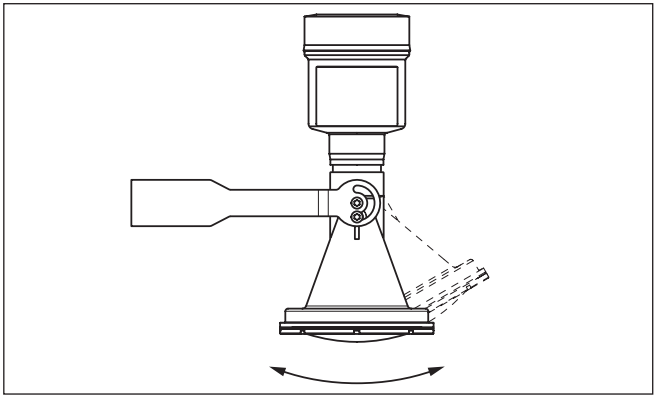

Fig. 3: Adjustment of the angle of inclination

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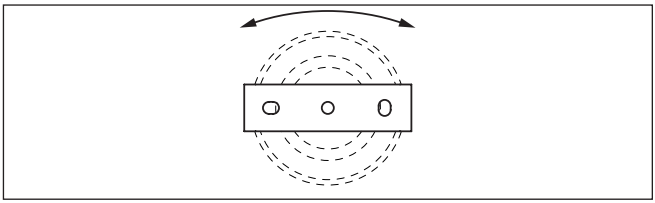

Fig. 4: Turning by fastening in the centre

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:

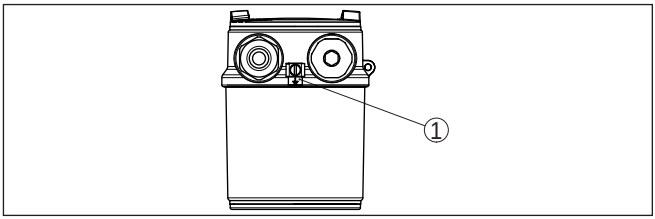

Fig. 5: Position of the polarisation

1 Nose for marking the direction of polarisation

Note:
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 suppression during setup. This applies particularly if buildup on the vessel wall is expected. In such cases, we recommend repeating the false signal suppression at a later date with existing buildup.

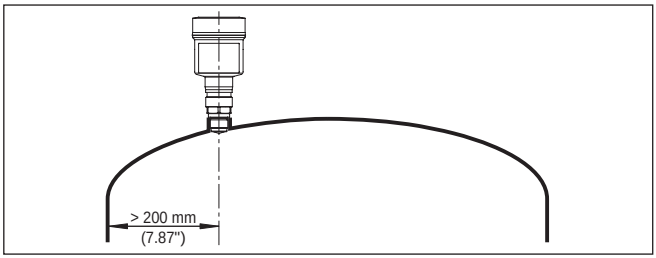

Fig. 6: Mounting of the radar sensor on round vessel tops

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

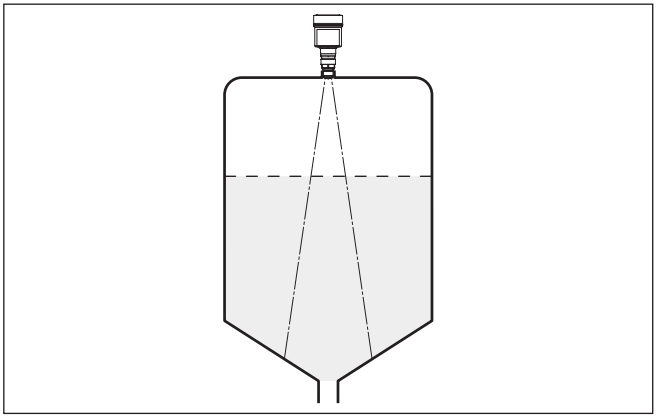

Fig. 7: Mounting of the radar sensor on vessels with conical bottom

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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. 8: Connection steps 5 and 6 - Single 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.

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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 connection compartment

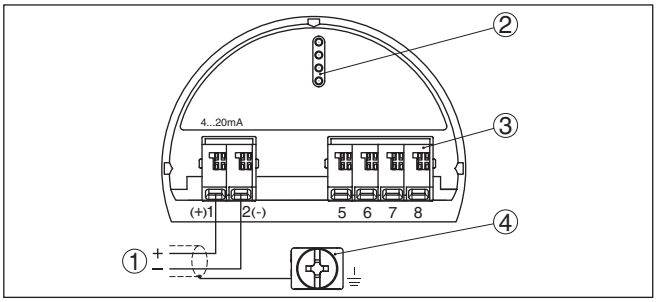

Fig. 9: Electronics and connection compartment - single chamber housing

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

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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.

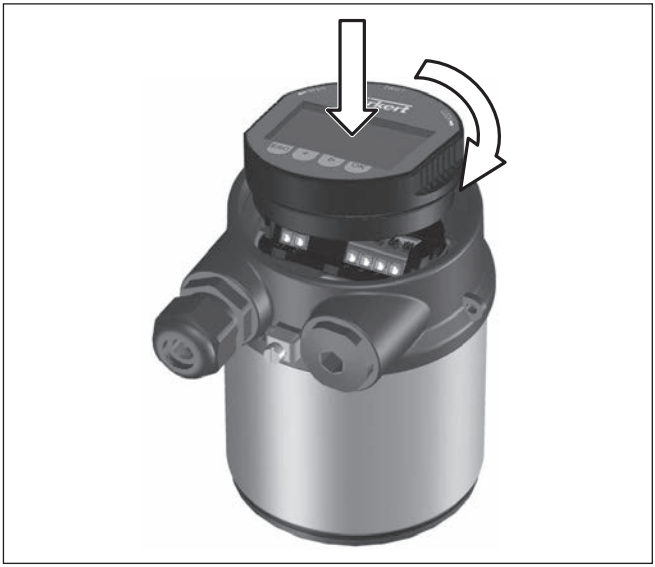

Fig. 10: Insertion of the display and adjustment module with single chamber housing

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.

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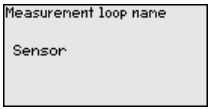
5.2 Parameter adjustment - Quick setup

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.

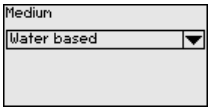
Quick setup process

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

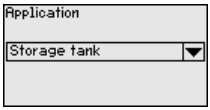
1. Measurement loop name
In the first menu item you assign a suitable measurement loop name. Permitted are names with max. 19 characters.



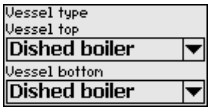
2. Medium
In this menu item you select the medium. The selection comprises liquids with different properties.



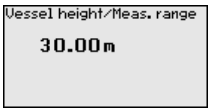
3. Application
In this menu item you determine the application.



4. Vessel form
In this menu item you specify the for 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.



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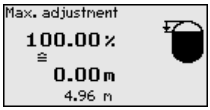
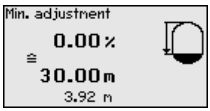
6. Max. adjustment
In this menu item you carry out the max. adjustment.

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 LEVEL TRANSMITTER 8139.

5.3 Menu overview

Setup

Menu item	Parameter	Default setting
Measurement loop name		Sensor
Medium		Liquid Water based
Application		Storage tank
Vessel form	Vessel top	Dished form
	Vessel bottom	Dished form
Vessel height/ Measuring range		35 m
Max. adjustment		0,000 m(d) 100.00 %
Min. adjustment		35 m 0.00 %

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Menu item	Parameter	Default setting
Damping	Integration time	0.0 s
Current output mode	Output characteristics	4 … 20 mA
	Failure mode	≤ 3.6 mA
Current output - Min./Max.	Min. current	3.8 mA
	Max. current	20.5 mA
Lock adjustment		Released

Display

Menu item	Default setting
Language	Order-specific
Displayed value	Filling height in %
Backlight	Switched on

Diagnostics

Menu item	Parameter	Default setting
Sensor status		-
Peak value	Distance	-
Electronics temperature	Temperature	-
Measurement reliability		-
Simulation		Percent
Curve indication	Echo curve	-
	False signal suppression	-
Echo curve memory		-

Additional adjustments

Menu item	Default setting
Instrument units	Distance in m Temperature in °C
False signal suppression	-
Linearization	Linear
PIN	-
Date/Time	Actual date/Actual time
Reset	-
HART mode	Address 0
Copy instrument settings	-

Info

Menu item	Parameter
Device name	LEVEL TRANSMITTER 8139
Instrument version	Hardware and software version
Date of manufacture	Date
Instrument features	Order-specific characteristics

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6 Supplement

6.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

Electromechanical data - version IP 66/IP 67	
Cable gland, blind plug	M20 x 1.5 (cable ø 5 … 9 mm)
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	12 … 35 V DC
Operating voltage U_B with lighting switched on	18 … 35 V DC
Reverse voltage protection	Integrated
Permissible residual ripple	
– for 12 V < U_B < 18 V	≤ 0.7 V_{eff} (16 … 400 Hz)
– for 18 V < U_B < 35 V	≤ 1 V_{eff} (16 … 400 Hz)
Load resistor	
– Calculation	(U_B - U_{min})/0.022 A
– Example - U_B= 24 V DC	(24 V - 12 V)/0.022 A = 545 Ω

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