

# RIL400 - 405 - 410 - 415 - 420 - 425 Operating Instruction

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## 1 About this document

### 1.1 Function

This operating instructions provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, the exchange of parts and the safety of the user. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.



### 1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.



### 1.3 Symbols used

#### Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on [www.riels.com](http://www.riels.com) you will reach the document download.

### 1.4 Information, tip, note

This symbol indicates helpful additional information.



#### Caution:

If this warning is ignored, faults or malfunctions can result.



#### Warning:

If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



#### Danger:

If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.

## 2 For your safety



### 2.1 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.



### 2.2 Appropriate use

RIL40X 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.



### 2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overflow 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.



### 2.4 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.

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

### 2.5 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.

Electromagnetic compatibility Instruments in four-wire version are designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with class A instruments according to EN 61326-1. If the instrument is used in a different environment, the electromagnetic compatibility to other instruments must be ensured by suitable measures.

### 2.6 Warranty

Products supplied by Riels Instruments srl are guaranteed for a period of 12 (twelve) months from delivery date according to the conditions specified in our sale conditions document. Riels Instruments srl can choose to repair or replace the Product. If the Product is repaired it will maintain the original term of guarantee, whereas if the Product is replaced it will have 12 (twelve) months of guarantee. The warranty will be null if the Client modifies, repair or uses the Products for other purposes than the normal conditions foreseen by instructions or Contract. In no circumstances shall Riels Instruments srl be liable for direct, indirect or consequential or other loss or damage whether caused by negligence on the part of the company or its employees or otherwise howsoever arising out of defective goods.

### 3 Product description

#### 3.1 Configuration

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 Working temperature
- 4 Working pressure
- 5 Output signals
- 6 Power supply
- 7 Measuring range
- 8 Degree protection
- 9 serial number
- 10 Logo riels instruments
- 11 CE logo

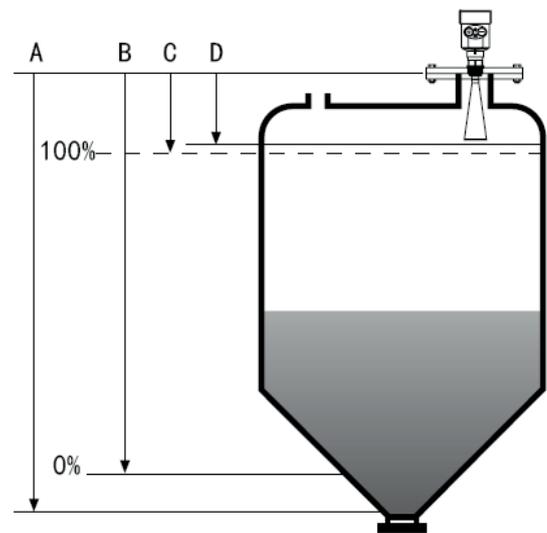
## 4. Product Overview

This series of radar level meter adopted 26G high frequency radar sensor, the maximum measurement range can reach up to 80 meters. Antenna is optimized further processing, the new fast microprocessors have higher speed and efficiency can be done signal analysis, the instrumentation can be used for reactor, solid silo and very complex measurement environment.

### 4.1 Principle

Radar level transmitter antenna microwave pulse is narrow, the downward transmission antenna. Microwave exposure to the medium surface is reflected back again by the antenna system receives, sends the signal to the electronic circuit automatically converted into level signals (because the microwave propagation speed, electromagnetic wave to reach the target and the reflected back to the receiver this time is almost instantaneous).

- A Range set
- B Low adjustment
- C High
- D Blind area



**Datum measurement:** Screw thread bottom or the sealing surface of the flange.

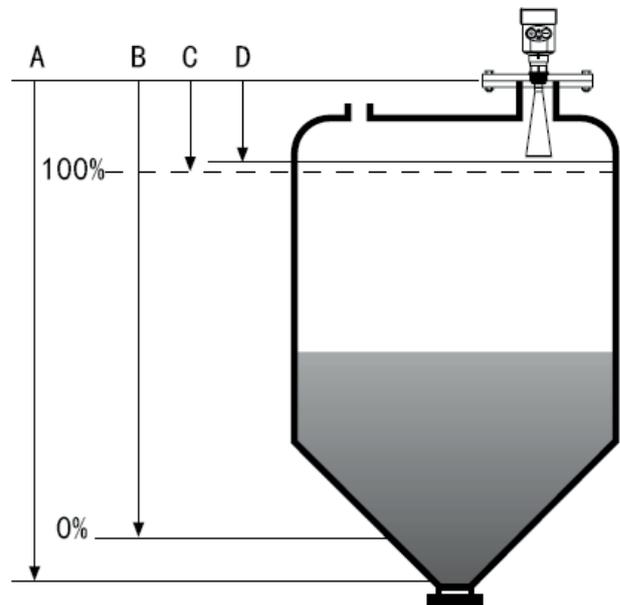
**Note:** Make sure the radar level meter the highest level cannot enter the measuring blind area (Figure D shown below).

### 4.2 The characteristics of 26G radar level meter:

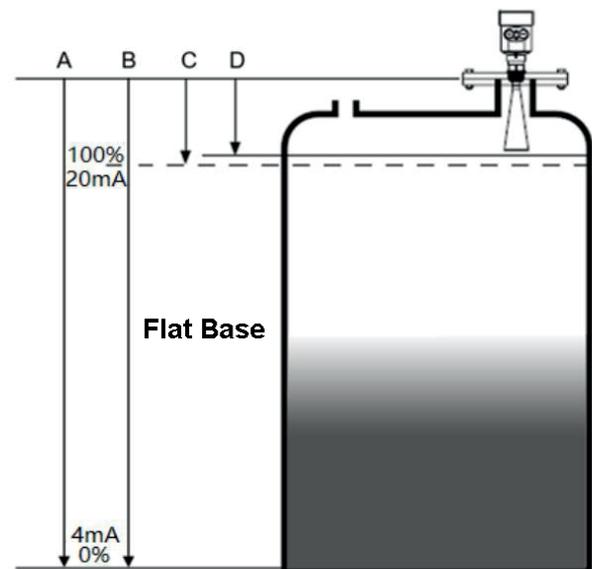
- Small antenna size, easy to install; Non-contact radar, no wear, no pollution.
- Almost no corrosion, bubble effect; almost not affected by water vapor in the atmosphere, the temperature and pressure changes.
- Serious dust environment on the high level meter work has little effect.
- A shorter wavelength, the reflection of solid surface inclination is better.
- Beam angle is small, the energy is concentrated, can enhance the ability of echo and to avoid interference.
- The measuring range is smaller, for a measurement will yield good results.
- High signal-to-noise ratio, the level fluctuation state can obtain better performance.
- High frequency, measurement of solid and low dielectric constant of the best choice.

## 5. The Installation Requirements

- A Range setting
- B Min adjustment
- C Max adjustment
- D Near blanking



- A Range setting
- B Min adjustment
- C Max adjustment
- D Near blanking



**Note:**

The reference surface for measurement: the bottom surface of the thread or the sealing surface of the flange.  
 When using radar level meter, make sure that the highest material level cannot enter the blind area of the measurement (the area shown in D(near blanking)in the figure).  
 When setting the range parameter, be sure to include the height of the conical part of the tank (refer to A in the figure).

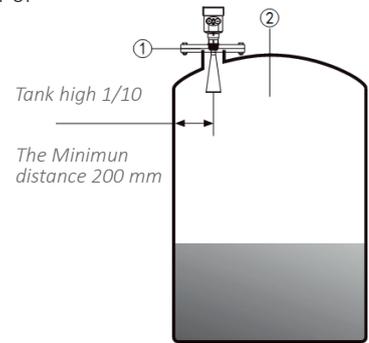
### 5.1 Installation guide:

The radar level transmitter has to be installed in the diameter of the 1/4 or 1/6.

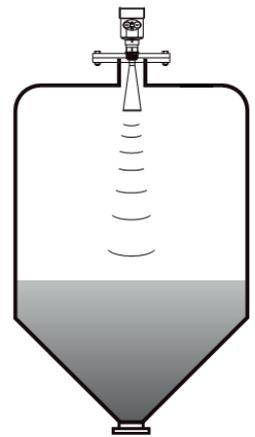
Note: The minimum distance from the tank wall should be 200mm.

Note:

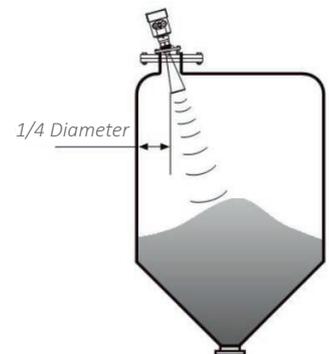
- ① datum plane
- ② The center of the container center or symmetrical



The top plane of the conical tank can be installed in the middle of the tank top, It is guaranteed to measure to the bottom of the cone.



When there is a stockpile, the antenna should be vertically aligned with the material surface. If the material level is Uneven, large pile angle must be adjusted with universal flange. The angle of the horn makes the horn aim at the material surface as much as possible. (Because the inclined solid surface will cause echo attenuation, Even the problem of signal loss)

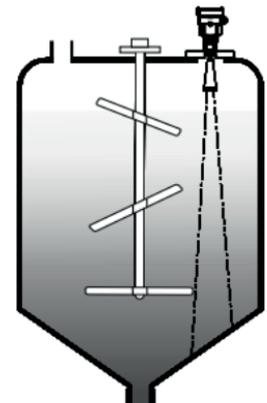


#### Stir

When there is stirring in the tank, keep the meter away from the stirrer if necessary.

After installation, "false echo learning" should be carried out under agitation, In order to eliminate the false echo effect generated by the stirring blade.

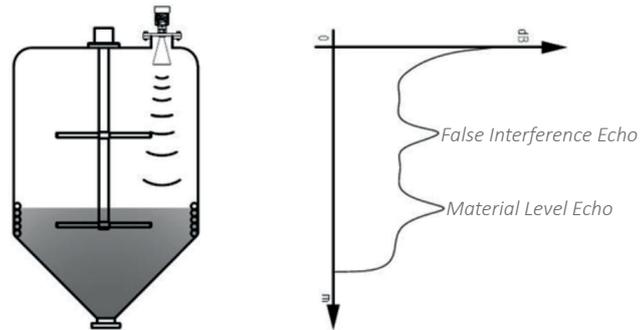
If foam or waves rise due to stirring, The installation should use wave guide pipe.



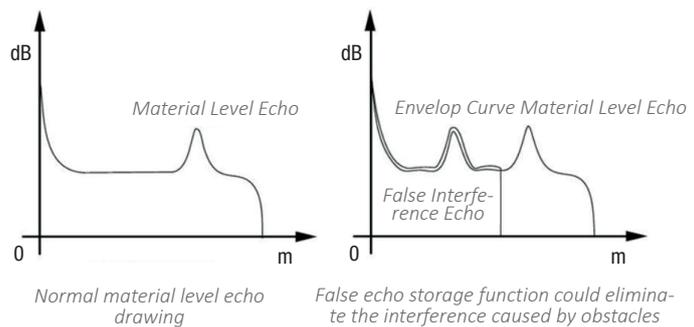
### False echo storage

When there is a stirring blade in the tank that interferes with the radar measurement, if the stirring blade cannot be avoided, a false return is required.

Wave storage eliminates interference signals generated by false waves.



If you want to get the normal level echo, the false echo storage can store the echo signal between the envelope curve in the figure below, the storage is defined as a false signal, and a normal level echo signal is obtained.



### Guide wave pipe installation

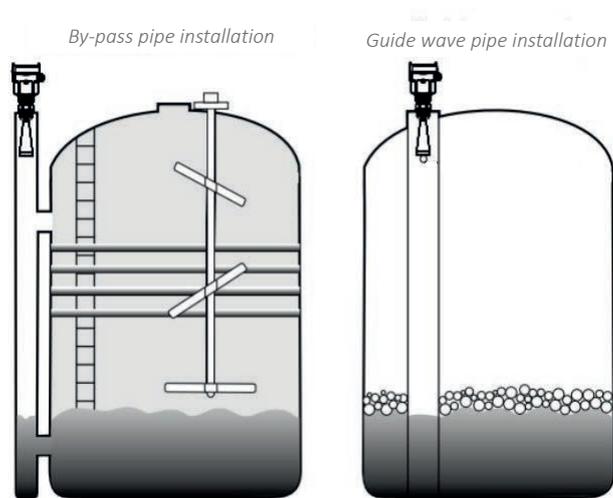
Use guide wave pipe installation (guide wave pipe or by pass pipe), can avoid obstacles and foam influence on the measurement.

Due to feeding, mixing or others process handling in the container, it will generate foam on the surface of some liquids, the signal will be attenuate.

If bubbles cause measurement errors, you should Install the sensor in the guide wave pipe, or use guided wave radar level meter.

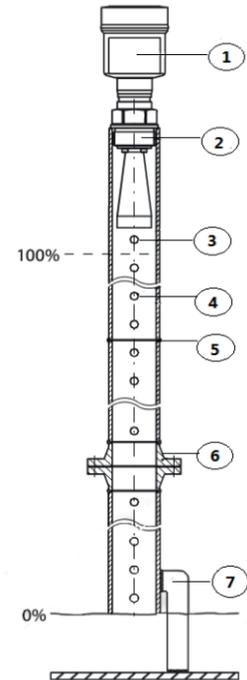
Measure inside the guide wave pipe, the guide wave minimum diameter is 50mm. In the connection guide Wave pipe, should avoid big cracks and Weld. In addition, carry out“virtual False echo learning”.

**Note:** while measure adhesive medium,Should not use guide wave pipe.



### Design requirements for guide wave pipe:

- Metal material, smooth inside the tube;
- Preferably stretched or longitudinal welded stainless steel pipe;
- The weld must be as flat as possible and coaxial with the hole;
- While using pre-welded flanges or extending the sleeves and using a ball valve, the transition pipe must be aligned on the inside and Fix after accurate matching;
- The gap on the transition pipe is  $\leq 0.1\text{mm}$ ;
- Do not weld along the pipe wall. The inner wall of the guide wave pipe must remain flat and smooth. If user accidentally weld the inside, you should remove the uneven places and weld bead. otherwise it will cause serious interference echo,so as to bring convenience to the attachment of the medium;
- Guide wave pipe must reach at least the desired minimum filling height,
- Because the measurement can only be carried out in the tube;
- Aperture  $\leq 5\text{mm}$ , any number, single side or full pass;
- The antenna diameter of the sensor should be as consistent as possible
- with the inner diameter of the pipe;
- The diameter should be consistent throughout the length;



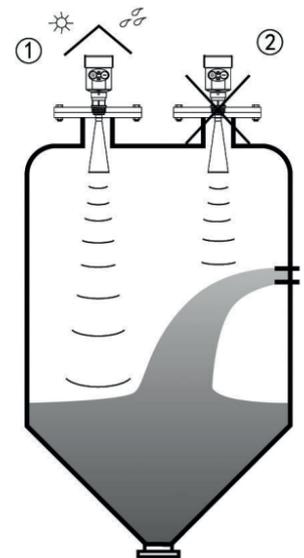
- ① Radar sensor
- ② Thread or flange
- ③ Exhaust hole
- ④ Isobaric hole
- ⑤ Welding seam
- ⑥ Butt welding flange with neck
- ⑦ Fixing of wave tube

### 5.2 Typical installation errors

#### Typical wrong installation:

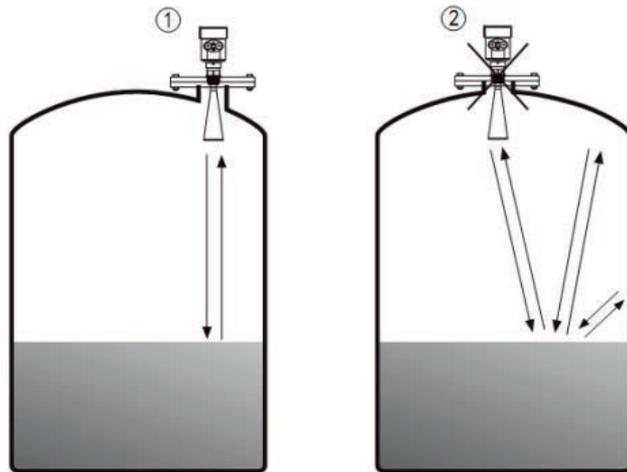
The conical tank cannot be installed above the inlet.  
At the same time: when installing outdoors, user should take sun-shading and rain-proof measures

- ① Correct
- ② Error rainproof measures



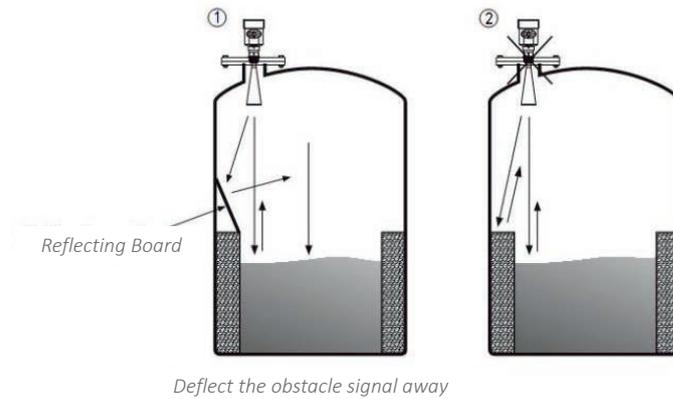
The meter cannot be installed in the middle of an arched or round tank top. In addition to generate indirect echo, but also influenced by the echo, multiple echoes may be larger than the signal threshold of true echoes, because they can be concentrated through the top. Therefore, it cannot be installed in the central location.

- ① Correct
- ② Error



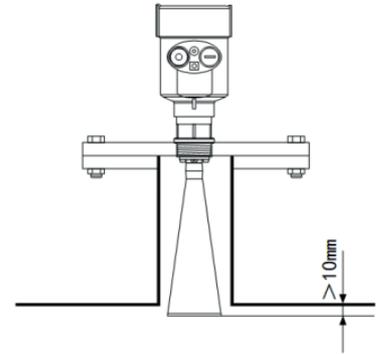
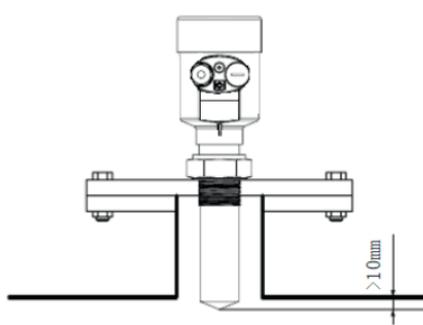
When there are obstacles in the tank that affect the measurement, it is necessary to install a reflecting plate to measure normally.

- ① Correct
- ② Error

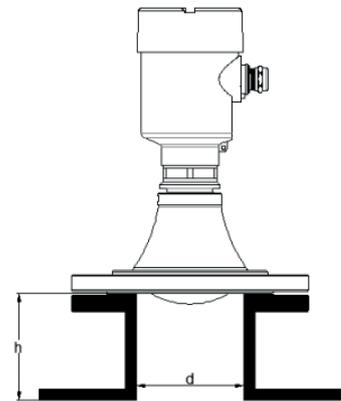


Height of nozzle:

Adapter height requirements: it needs guarantee that the antenna extends into the tank at least 10mm.

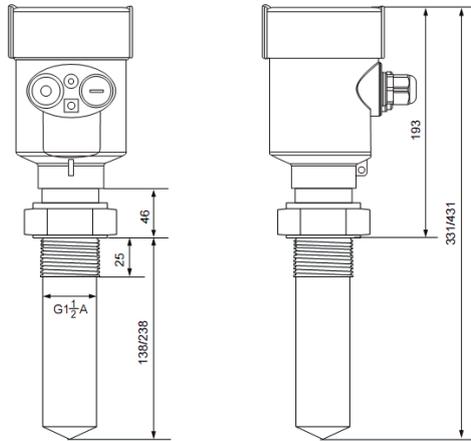


<i>d</i>	<i>h</i>
80 mm (3")	150 mm
100 mm (4")	300 mm
150 mm (6")	500 mm

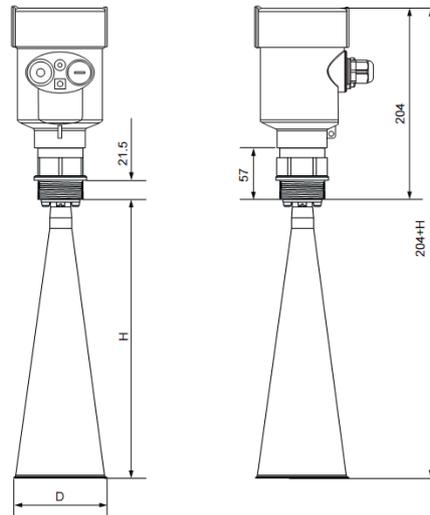


## 6. Structure Drawing

Model RIL400

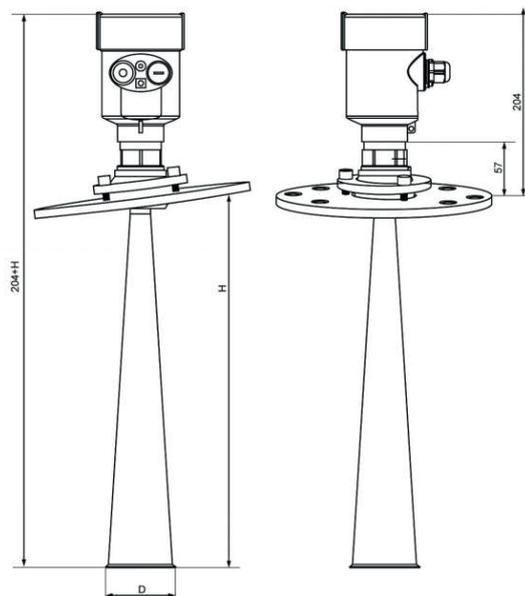


Model RIL405



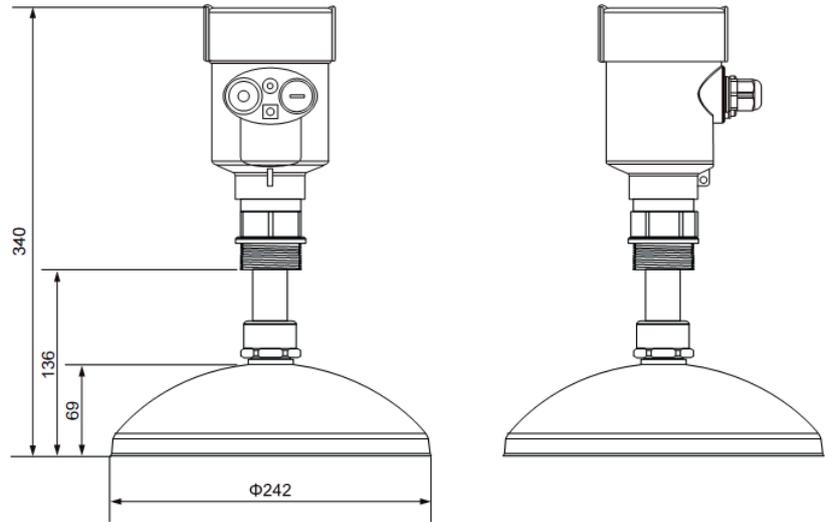
Flange	The bell Diameter D	Bell Height H
DN50	ø 46	140
DN80	ø 76	227
DN100	ø 96	288

Model RIL410

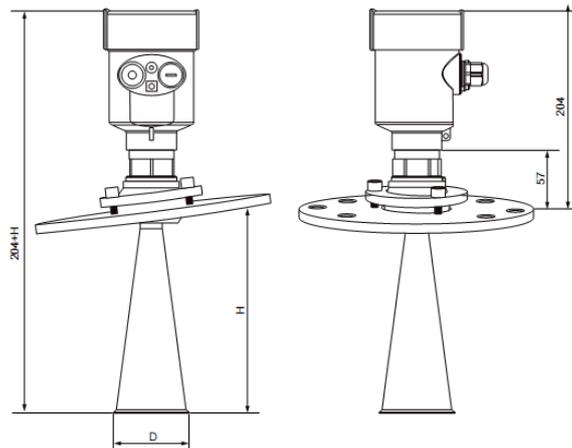


Flange	The bell Diameter D	Bell Height H
DN80	ø 76	227
DN100	ø 96	288
DN125	ø 121	620

Model RIL415

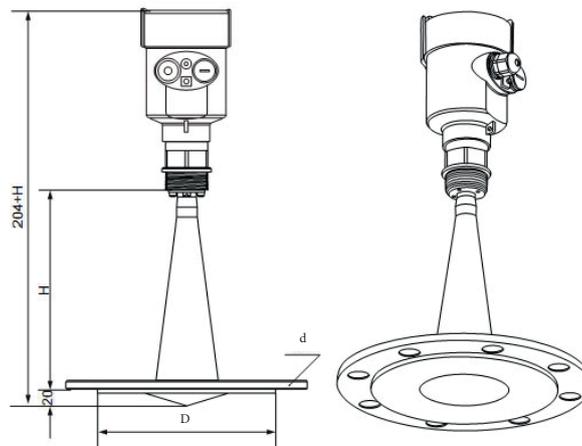


Model RIL420



Flange	The bell Diameter D	Bell Height H
DN50	ø 76	227
DN80	ø 96	288
DN100	ø 121	620

Model RIL425



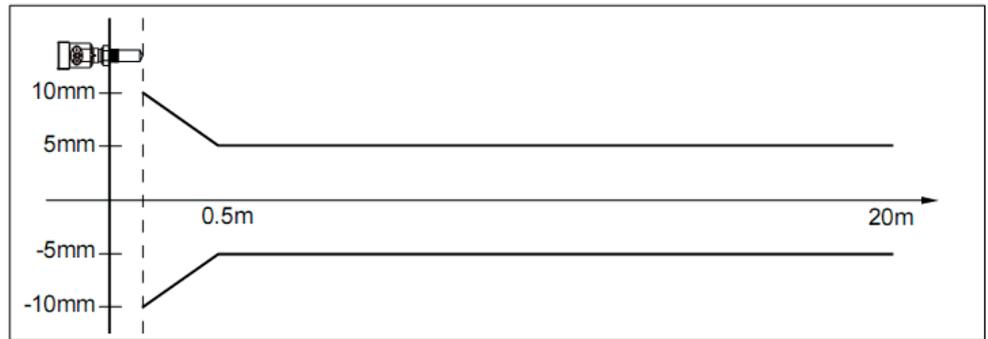
Flange	The bell Diameter D	Bell Height H	PTFE plate d
DN50	ø 46	140	99
DN80	ø 76	227	132
DN100	ø 96	288	156

## 7. Technical Parameters

<b>The outer shell</b>	
The seal between the shell and the shell cover:	Silicone rubber
Casing window:	Polycarbonate
The ground terminal:	Stainless steel
<b>The power supply voltage</b>	
Two wire system	
The standard type:	(16...26) V DC
Intrinsically safe:	(21.6...26.4) V DC
Power dissipation:	max 22.5mA / 1W
Allowable ripple	- <100Hz                      U <sub>ss</sub> <IV - (100÷100K) Hz              U <sub>ss</sub> <10mV
<b>The cable parameters</b>	
Cable entrance / plug	1 M20x1.5 cable entrance 1 blind plug
Terminal	Conductor cross section 2.5mm <sup>2</sup>
<b>Output parameters</b>	
The output signal	(4÷20) mA/RS485
Communication protocol	HART
Resolution	1.6µA
Fault signal	Constant current output; 20.5mA 22mA 3.9mA
The integral time	(0...50) s, adjustable
<b>Blind area</b>	the ends of the antenna
<b>The maximum distance measurement</b>	80 meters
<b>Microwave frequency</b>	26GHz
<b>Communication interface</b>	HART communication protocol
<b>The measurement interval</b>	about 1 second (depending on the parameter settings)
<b>Adjust the time</b>	about 1 second (depending on the parameter settings)
<b>Display resolution</b>	1 mm
<b>Working storage and transportation temperature</b>	-40°C...+100°C
<b>Process temperature (the temperature of the antenna part)</b>	
RIL400	-40°C...+130°C
RIL405/410/415/420	-40°C...+250°C
RIL425	-40°C...+150°C
<b>Pressure</b>	Max.4MPa
<b>Seismic</b>	Mechanical vibration 10 m/s <sup>2</sup> , (10÷150) Hz

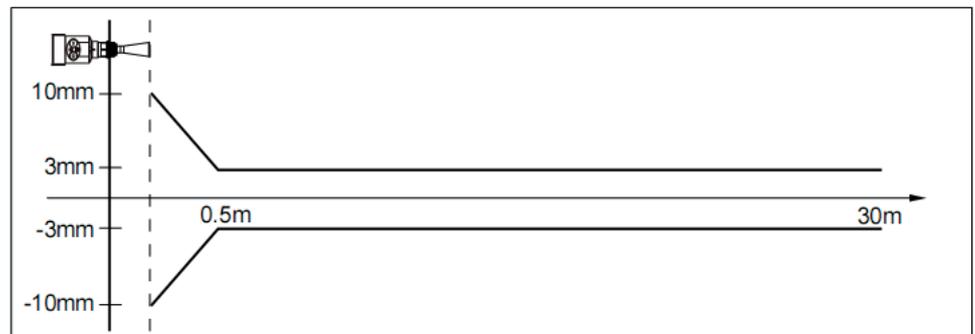
## 8. Meter Linearity

Model RIL400



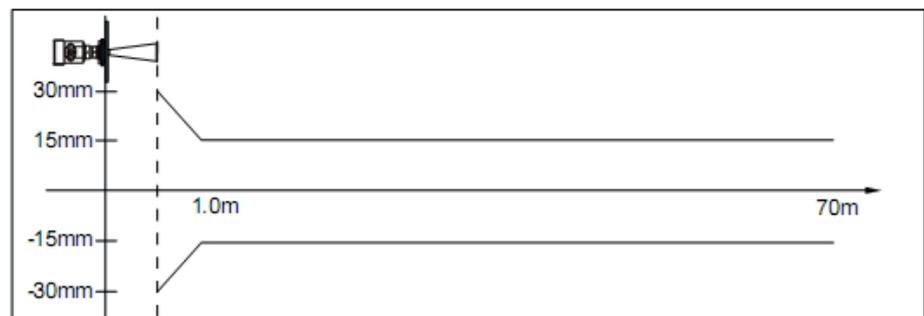
Emission angle	20°
Precision	See chart

Model RIL405



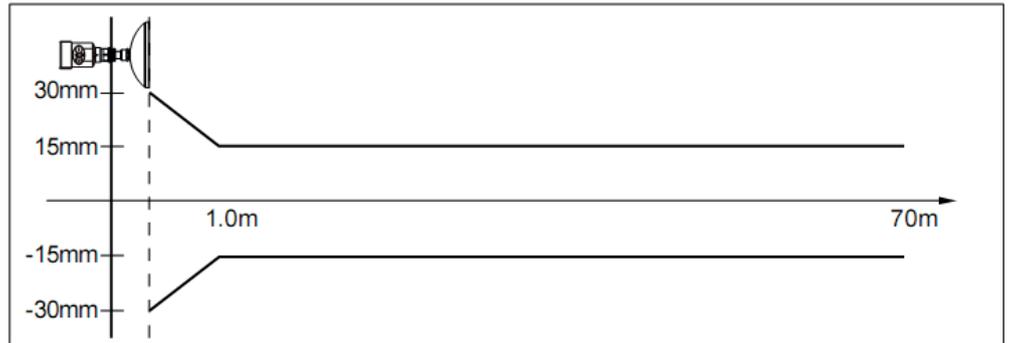
Emission angle	Depending on the size of the antenna
∅ 46 mm	18°
∅ 76 mm	12°
∅ 96 mm	8°
∅ 121 mm	6°
Precision	See chart

Model RIL410



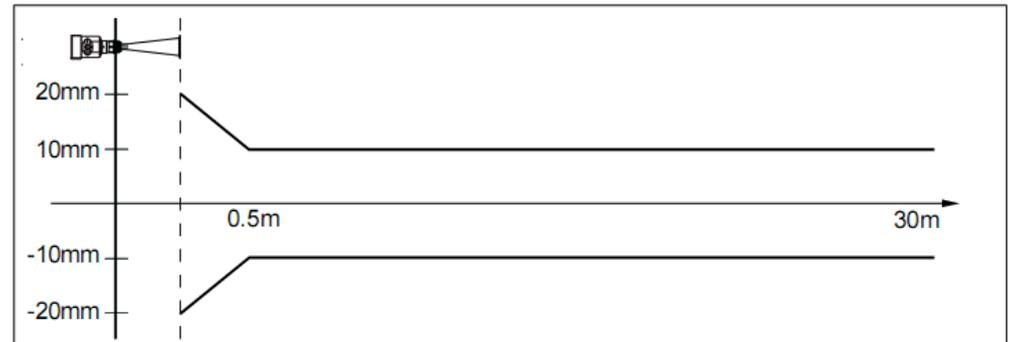
Emission angle	Depending on the size of the antenna
∅ 46 mm	18°
∅ 76 mm	12°
∅ 96 mm	8°
∅ 121 mm	6°
Precision	See chart

Model RIL415



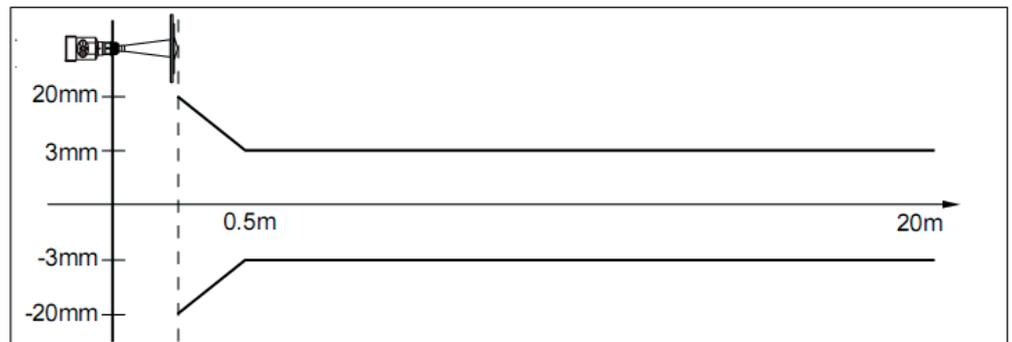
<i>Emission angle</i>	<i>Depending on the size of the antenna</i>
$\varnothing$ 196 mm	4°
$\varnothing$ 242 mm	4°
<i>Precision</i>	<i>See chart</i>

Model RIL420



<i>Emission angle</i>	<i>Depending on the size of the antenna</i>
$\varnothing$ 76 mm	12°
$\varnothing$ 96 mm	18°
$\varnothing$ 121 mm	6°
<i>Precision</i>	<i>See chart</i>

Model RIL425



<i>Emission angle</i>	<i>Depending on the size of the antenna</i>
$\varnothing$ 46	18°
$\varnothing$ 76	12°
$\varnothing$ 96	8°
<i>Precision</i>	<i>See chart</i>

## 9. Electrical Connection

### 9.1 Supply Voltage

#### Cable requirements

The power supply cable can use ordinary two-core cables, and the outer diameter of the cable should be (8...12)mm to ensure the sealing of the cable entrance. If there is electromagnetic interference, it is recommended to use shielded cables.

### 9.2 (4÷20) mA/HART (two wire system)

The power supply and output current signal share a two-core shielded cable. Refer to technical data for specific power supply voltage range, for intrinsic safety type, a safety barrier must be added between the power supply and the instrument.

### 9.3 (4÷20) mA/HART(four wire system)

The power supply and the current signal are separated, refer to technical data for specific power supply voltage range, a two-core shielded cable is used for each.

### 9.4 RS485/Modbus

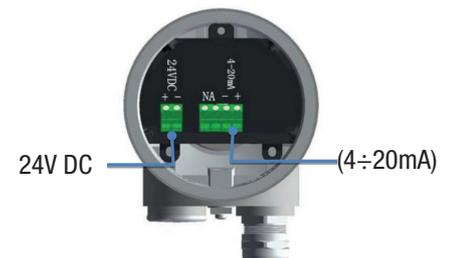
Separate the power supply and the 485 signal line using a two-core shielded cable. For the specific power supply voltage range, refer to the technical data.

### 9.5 Connection type

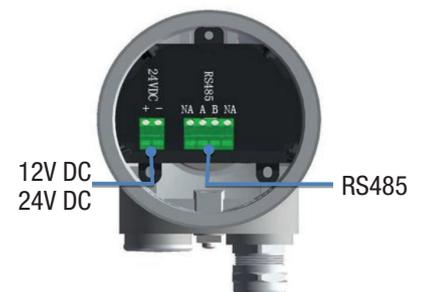
The wiring diagram of 24V two-wire system as below:



The wiring diagram of 24V four-wire system as below:



24V/12V RS485/Modbus Wiring Diagram



## 9.6 Safety Guidance

Please comply with the requirements of local electrical installation regulations!  
Please abide by local regulations and requirements for personnel health and safety. All operations on the electrical components of the instrument must be completed by formal trained professionals.  
Please check the nameplate of the meter to ensure that the product specifications meet your requirements. Please make sure that the power supply voltage is consistent with the requirements in the nameplate.

## 9.7 Protection Class

This instrument fully meets the requirements of protection class IP66/67. Please ensure the waterproofness of the cable sealing head. Such as the following figure:

How to ensure that the installation meets the requirements of IP67:

Make sure that the sealing head is not damaged.

Make sure that the cable is not damaged.

Make sure that the cables used meet the requirements of the electrical connection specifications.

Before entering the electrical interface, bend the cable downward to ensure water will not flow into the shell, see ①

Please tighten the cable sealing head, see ②

Please block the unused electrical interface with blind plug, see ③

## 9.8 Debugging

Three debugging methods:

- ① LCD display /Button
- ② Upper Computer debugging
- ③ HART handheld programmer

## 9.9 LCD display /Button

Debug the meter through the 4 buttons on the display screen. The language of the debugging menu is selectable. After debugging, it is generally only used for display, and the measured value can be read very clearly through the glass window.

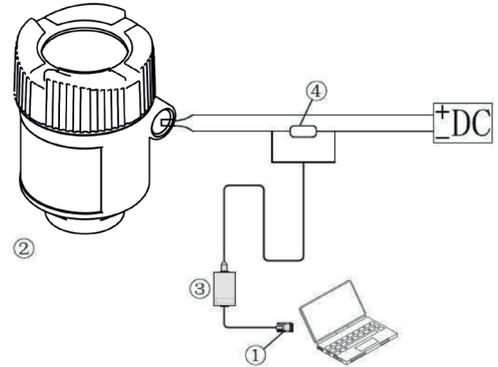


	EXIT THE SETTING AND RETURN TO THE PREVIOUS MENU. SHORTCUT KEY FOR ECHO CURVE
	SELECT THE PARAMETER AND MODIFY THE NUMBER
	MOVE THE CURSOR TO NAVIGATE THROUGH THE MENU
	ENTER THE MENU AND CONFIRM THE SETTINGS

### 9.10 Computer Debugging

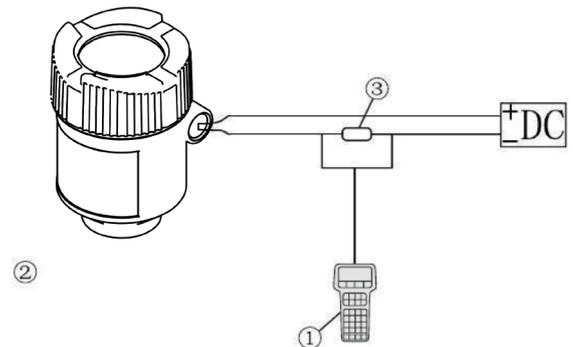
Connect with computer via HART

- ① USB
- ② Radar level meter
- ③ HART adapter
- ④ 250Ω Resistor

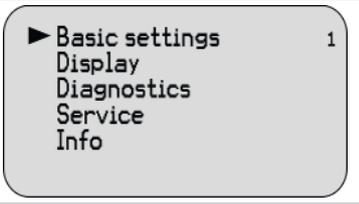
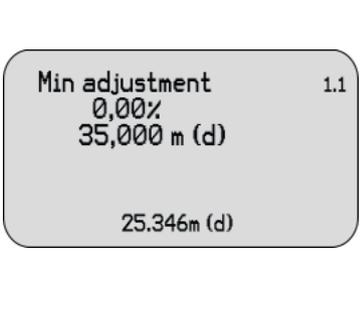
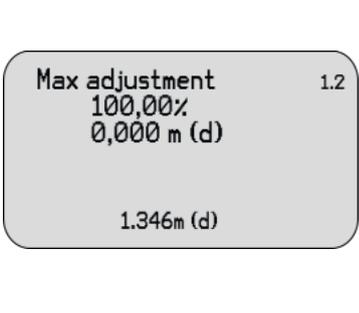
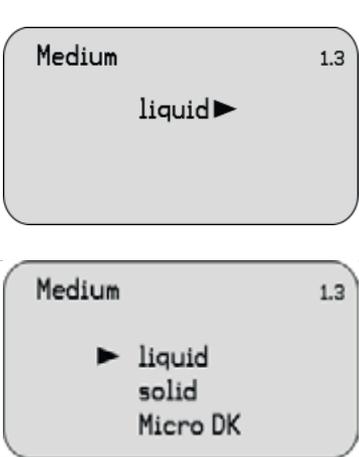
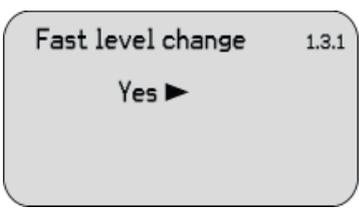
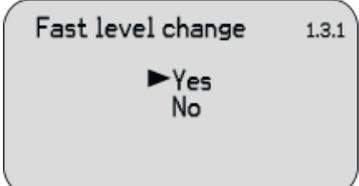


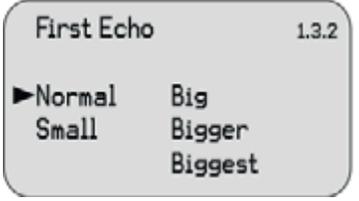
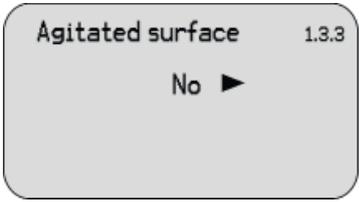
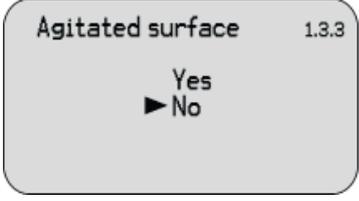
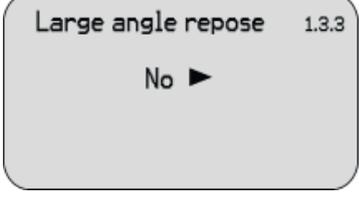
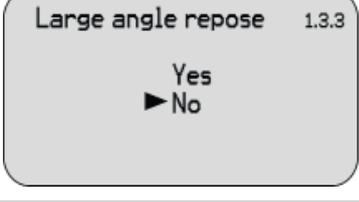
### 9.11 HART Hand-held Programmer Programming

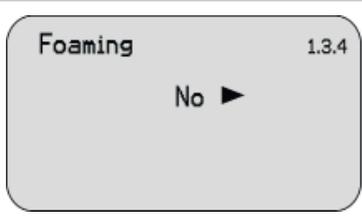
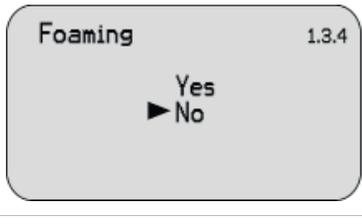
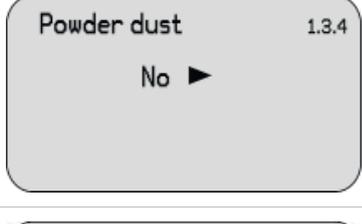
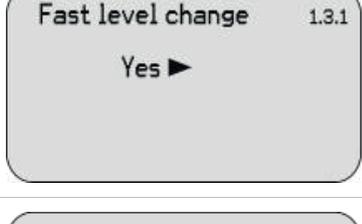
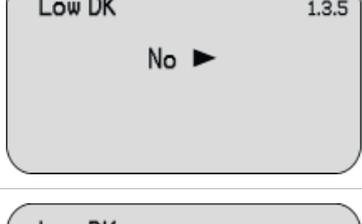
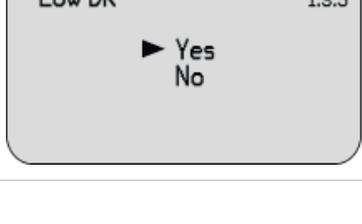
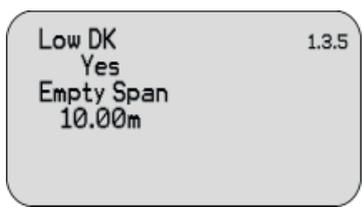
- ① HART handheld programmer
- ② Radar level meter
- ③ 250Ω Resistor



## 10. Operation Instructions

<p><b>10. Basic Settings (1)</b></p> <p>From "RUN" mode press <b>OK</b> to enter the configuration menu. Press <b>OK</b> to select and to confirm. The menu item number is always displayed on the top right corner. By selecting and confirming "Basic settings" in menu 1, the display will show in sequence:</p>	 <p>Basic settings 1          Display          Diagnostics          Service          Info</p>	<p><b>OK</b> Select menu</p> <p><b>OK</b> Confirm</p> <p>Note-The menu item number is displayed on the top right corner.</p>
<p><b>10.1 Min. adjustment (1.1)</b></p> <p>Press <b>OK</b> to modify the percentage value (see par. 2.4). Press <b>OK</b> again to confirm and to edit the corresponding distance value. After the setup press <b>OK</b> to confirm. Press <b>OK</b> to enter menu 1.2.</p> <p>Note: The lower value (d) shows the measured instantaneous distance.</p>	 <p>Min adjustment 1.1          0,00%          35,000 m (d)          25.346m (d)</p>	<p><b>OK</b> Enter editing menu</p> <p><b>OK</b> Select the value</p> <p><b>↑</b> Modify the value</p> <p><b>OK</b> Confirm</p> <p><b>OK</b> Go to menu 1.2</p>
<p><b>10.2 Max adjustment (1.2)</b></p> <p>Press <b>OK</b> to modify the percentage value (see par. 2.4). Press <b>OK</b> again to confirm and to edit the corresponding distance value. After the setup press <b>OK</b> to confirm. Press <b>OK</b> to enter menu 1.3</p> <p>Note- The lower value (d) shows the measured instantaneous distance.</p>	 <p>Max adjustment 1.2          100,00%          0,000 m (d)          1.346m (d)</p>	<p><b>OK</b> Enter editing menu</p> <p><b>OK</b> Select the value</p> <p><b>↑</b> Modify the value</p> <p><b>OK</b> Confirm</p> <p><b>OK</b> Go to menu 1.3</p>
<p><b>10.3 Medium (1.3)</b></p> <p>Each medium has different reflective properties. In this menu is possible to choose between liquid or solid medium.</p> <p>Press <b>OK</b> to enter medium selection menu.</p> <p>Press <b>OK</b> to select the medium and <b>OK</b> to confirm and to enter submenu 1.3.1</p>	 <p>Medium 1.3          liquid ▶</p>	<p><b>OK</b> Enter editing menu</p> <p><b>OK</b> Go to menu 1.4</p> <p><b>OK</b> Select parameter</p> <p><b>OK</b> Confirm and enter submenu 1.3.1</p>
<p><b>10.3.1 Fast level change (1.4)</b></p> <p>Transient or foreign elements could temporary cause unexpected rushes in measured values. In these events set the parameter on "No" in order to filter the rushes. Default setting is "Yes".</p> <p>Press <b>OK</b> to enter parameter modification, press <b>OK</b> to enter the next menu 1.5</p> <p>With <b>OK</b> you can select the parameter setting, with <b>OK</b> you can confirm your selection and go back to previous submenu.</p>	 <p>Fast level change 1.3.1          Yes ▶</p>  <p>Fast level change 1.3.1          ▶ Yes          No</p>	<p><b>OK</b> Enter editing menu</p> <p><b>OK</b> Go to submenu 1.5</p> <p><b>OK</b> Select parameter</p> <p><b>OK</b> Confirm and go back to previous submenu</p>

<p><b>10.3.2 First echo (1.3.2)</b></p> <p>This parameter sets the first valid echo signal acceptance . Press  to enter parameter modification, press  to enter the next submenu 1.3.3 (par.3.3.c).</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.3.3.</p>
<p>With  you select the parameter setting, with  you confirm your selection and go back to previous submenu:</p> <ul style="list-style-type: none"> <li>- Normal; automatic</li> <li>- Small; decrease first echo by 10dB</li> <li>- Big; increase first echo by 10dB</li> <li>- Bigger; decrease first echo by 40dB</li> <li>- Biggest; increase first echo by 40dB</li> </ul>		<p> Select parameter</p> <p> Confirm and go to back to previous submenu</p>
<p><b>10.3.3 Agitated surface (1.3.3)</b> Large angle repose (1.3.3)</p> <p>This submenu is related to the previous selection in menu 1.3: by selecting "Liquid" in menu 1.3, the display will now show "Agitated surface"; In both cases the default setting is "No".</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.3.4.</p> <p><i>Note - This window is displayed only in case of selected option "Liquid" in menu 1.3</i></p>
<p>Press  to enter parameter modification, press to  enter the next submenu.</p>		<p> Select parameter</p> <p> Confirm and go to back to previous submenu</p>
<p>By selecting "Solid" in menu 1.3, the display will now show "Large angle repose". Press  to enter parameter modification, press  to enter the next submenu.</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.3.4.</p> <p><i>Note - This window is displayed only in case of selected option "Solid" in menu 1.3</i></p>
		<p> Select parameter</p> <p> Confirm and go to back to previous submenu</p>

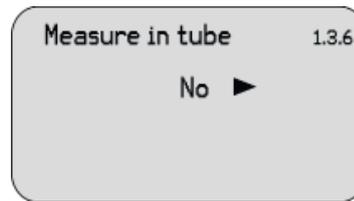
<p><b>10.3.4 Foaming (1.3.4)</b> <b>Powder dust (1.3.4)</b></p> <p>This submenu is related to the previous selection in menu 1.3: by selecting “Liquid” in menu 1.3, the display will now show “Foaming” In both cases the default setting is “No”.</p> <p>Press  to enter editing menu and press  to select the option. Then press  again to confirm and to go</p> <p>by selecting “Solid” in menu 1.3, the display will now show “Powder dust”.</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.3.5.</p> <p><i>Note - This window is displayed only in case of selected option “Liquid” in menu 1.3</i></p>
<p>Press  to enter editing menu and press  to select the option. Then press  again to confirm and to go</p>		<p> Select parameter</p> <p> Confirm and go to back to previous submenu</p>
<p>Press  to enter editing menu and press  to select the option. Then press  again to confirm and to go</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.3.5.</p> <p><i>Note - This window is displayed only in case of selected option “Solid” in menu 1.3</i></p>
<p><b>10.3.5 Low DK (1.3.5)</b></p> <p>The Dielectric Constant is very important in order to obtain a correct measurement. In case of products with low dielectric constant (abestos or non-conductive liquids), set the parameter on “Yes”. The default setting is “No”.</p> <p>Press  to enter parameter modification and press  to select the parameter. Press  again to confirm and to go back to previous submenu.</p> <p>Selecting “Yes” must enter the height of empty vessel. Press  again and enter the Empty Span. Press  to confirm and  to go back to previous submenu.</p>		<p> Enter editing menu</p> <p> Go to next submenu</p>
<p>Press  to enter parameter modification and press  to select the parameter. Press  again to confirm and to go back to previous submenu.</p>		<p> Enter editing menu</p> <p> Go to next submenu</p> <p><i>Note - This window is displayed only in case of selected option “Liquid” in menu 1.3</i></p>
<p>Press  to enter parameter modification and press  to select the parameter. Press  again to confirm and to go back to previous submenu.</p>		<p> Select parameter</p> <p> Confirm</p>
<p>Press  to enter parameter modification and press  to select the parameter. Press  again to confirm and to go back to previous submenu.</p>		<p> Enter editing menu</p> <p> Select the value</p> <p> Modify the value</p> <p> Confirm</p> <p> Go to the next menu</p>

### 10.3.6 Measure in tube (1.3.6)

This window is displayed only by selecting “Liquid” in menu 1.3.  
If the transmitter is installed into a calm or by pass pipe it is necessary to set “Yes”. The default setting is “No”.

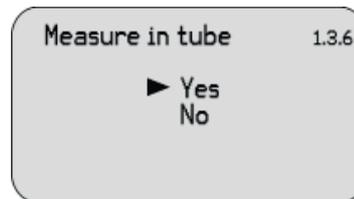
Press **OK** to enter parameter modification and press **↺** to make the selection. Confirm with **OK** and go next submenu “Measure diameter”.

Press again **OK** and enter the diameter value, as specified in par. 2.4.  
Press **OK** to confirm and **↺** to go back to previous submenu.

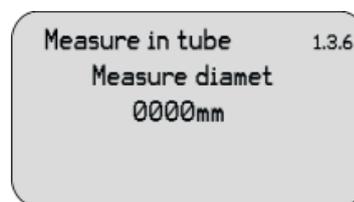


- OK** Enter editing menu
- ↺** Go to next submenu 1.3.1.

*Note - This window is displayed only in case of selected option “Liquid” in menu 1.3*



- ↺** Select parameter
- OK** Confirm and go to the next submenu



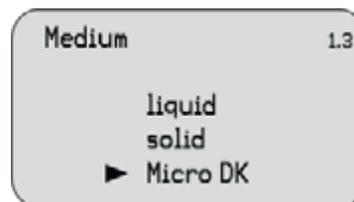
- OK** Enter editing menu
- ↺** Select the value
- ↑** Modify the value
- OK** Confirm

### 10.3.7 Micro DK (1.3.1)

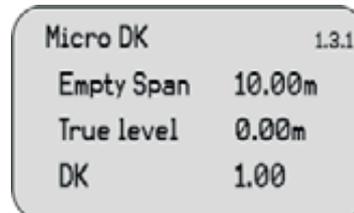
Normally when electronic constant is smaller than 1.4, the direct echo from the medium is low and hard to detect.  
However by measuring the echo reflected from the base of the vessel, the height of the medium can be measured.

Two parameters are needed to be entered here.

1. Height of empty vessel.
  2. True medium height or medium electronic constant, these two parameters are related, entering either one is accepted.
- The precision of parameters will affect the precision of the measurement.



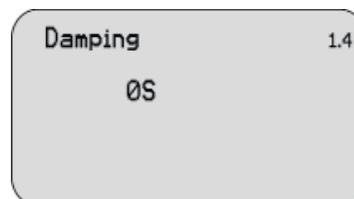
- OK** Enter editing menu
- ↺** Go to next submenu



- OK** Enter editing menu
- ↺** Select the value
- ↑**

### 10.4 Damping (1.4)

Press **OK** to enter parameter modification and set the value (in seconds) and confirm with **OK**. Press **↺** to go to next menu 1.5.



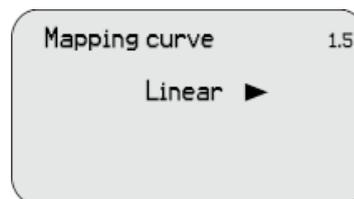
- OK** Enter editing menu
- ↺** Select the value
- ↑** Modify the value
- OK** Confirm
- ↺** Go to the next menu 1.5.

### 10.5 Mapping curve (1.5)

The relationship between the measured value and the output signal 4÷20mA can be linear or non linear.

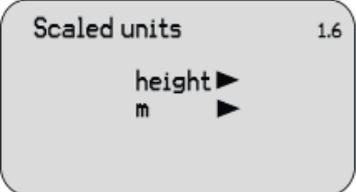
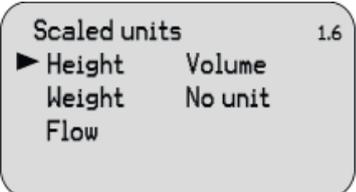
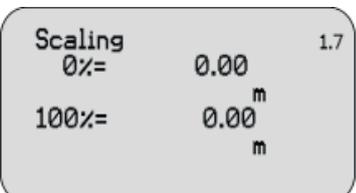
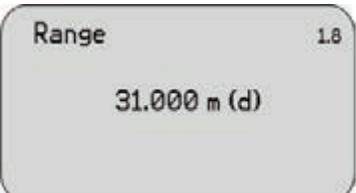
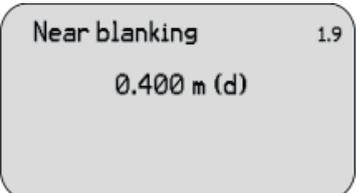
In this menu you can set the output signal 4÷20mA: “linear” or “non-linear”.

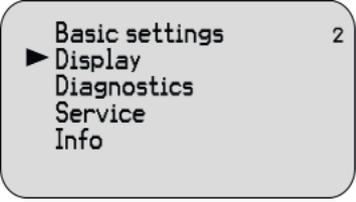
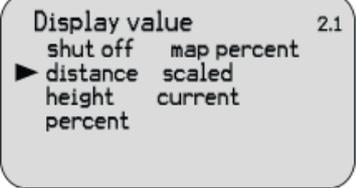
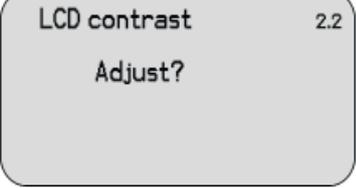
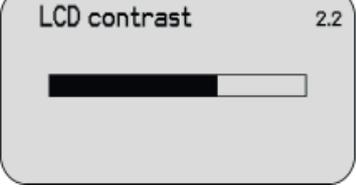
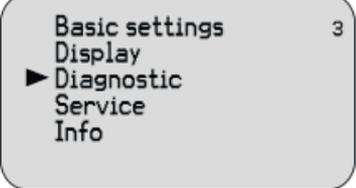
The setting of “non-linear” mode must be done with software through PC.  
Press **OK** to select the 4÷20mA output mode, press **↺** to enter the next menu.

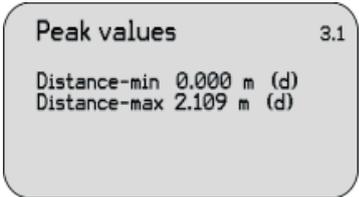
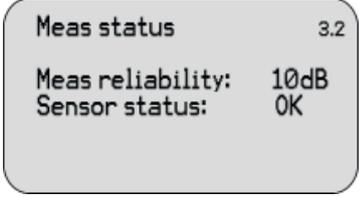
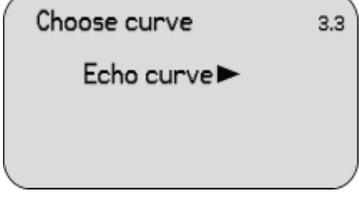
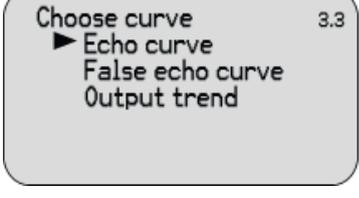
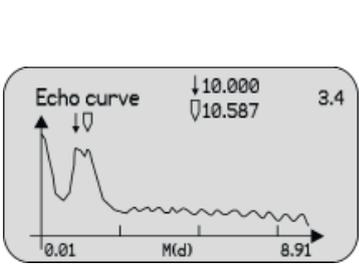


- OK** Enter editing menu
- ↺** Go to next submenu 1.6.

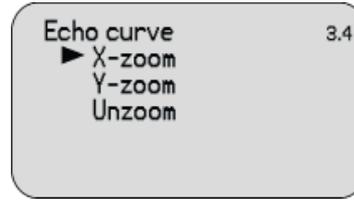
*Note -The setting of a “non-linear” mapping curve must be done with software through PC*

<p><b>10.6 Scaled units (1.6)</b></p> <p>Press  to enter parameter modification. Press  to go to next menu 1.7.</p>		<p> Enter editing menu</p> <p> Go to next submenu 1.7.</p>
<p>The selectable options are:</p> <ul style="list-style-type: none"> <li>- Height; m, ft, in, cm, mm</li> <li>- Mass; Kg, t, lb</li> <li>- Flow; m3/s, m3/h, ft3/s, ft3/m, gal/s, gal/min, gal/h, l/s, l/min, l/h</li> <li>- Volume; m3, l, hl, ft3, in3</li> </ul> <p>Press  to make the selection and  press to confirm</p>		<p> Select parameter</p> <p> Confirm and enter to relevant submenu</p>
<p><b>10.7 Scaling (1.7)</b></p> <p>Press  to modify the 0% value, press  to enter the next menu. Set the value and confirm with .</p> <p>Press  again to modify the 100% value. Set the value and confirm. Press  to enter the next menu.</p>		<p> Enter editing menu</p> <p> Select the value</p> <p> Modify the value</p> <p> Confirm</p> <p> Go to the next menu 1.8.</p>
<p><b>10.8 Range (1.8)</b></p> <p>Press  to modify the value expressed in meters, press  to enter the next menu 1.9. Set the value and confirm with .</p> <p>Press  to enter the next menu 1.9.</p>		<p> Enter editing menu</p> <p> Select the value</p> <p> Modify the value</p> <p> Confirm</p> <p> Go to the next menu 1.9.</p>
<p><b>10.9 Near blanking (1.9)</b></p> <p>Press  to modify the value expressed in meters, press  to enter the next menu 1.10 Set the value and confirm with .</p> <p>Press  to enter the next menu 1.9.,</p>		<p> Enter editing menu</p> <p> Select the value</p> <p> Modify the value</p> <p> Confirm</p> <p> Go to the next menu 1.9.</p>
<p><b>10.10 Sensor tag (1.10)</b></p> <p>Press  to modify the parameter, press  to enter the starting menu 1.1. Set the value, as specified in par 2.4, and confirm with .</p> <p>Press  to enter the starting menu 1.1.</p>		<p> Enter editing menu</p> <p> Select the value</p> <p> Modify the value</p> <p> Confirm</p> <p> Go to the next menu 1.1.</p>

<p><b>11. DISPLAY (2)</b></p> <p>From "RUN" mode press <b>OK</b> to enter the configuration menu: the following menu will be displayed (1). Press <b>OK</b> to select the item and press <b>↻</b> to confirm. The menu item number is always displayed on the top right corner. By selecting and confirming "Display" in menu 2, the display will show in sequence:</p>		<p><b>↻</b> Select menu</p> <p><b>OK</b> Confirm</p> <p><i>Note-The menu item number is displayed on the top right corner</i></p>
<p><b>11.1 Display value (2.1)</b></p> <p>Press <b>OK</b> to to enter parameter modification and press <b>↻</b> to enter next menu 2.2.</p>		<p><b>OK</b> Enter editing menu</p> <p><b>↻</b> Go to the next menu 2.2.</p>
<p>Select with <b>↻</b> the measured value you want to be displayed and press <b>OK</b> to confirm and to go back to previous menu.</p>		<p><b>↻</b> Select the parameter</p> <p><b>OK</b> Confirm and go back to menu 2.1.</p>
<p><b>11.2 LCD contrast (2.2)</b></p> <p>Press <b>OK</b> to enter parameter modification and press <b>↻</b> to enter next menu 2.1.</p>		<p><b>OK</b> Enter editing menu</p> <p><b>↻</b> Go to the next menu 2.1.</p>
<p>Press <b>▲</b> to increase the contrast and press <b>↻</b> to decrease. Press <b>OK</b> to confirm and to go back to previous menu.</p>		<p><b>↻</b> Decrease the contrast</p> <p><b>▲</b> Increase the contrast</p> <p><b>OK</b> Confirm and go back to menu 2.2.</p>
<p><b>12. Diagnostic (3)</b></p> <p>From "RUN" mode press <b>OK</b> to enter the configuration menu: the following menu will be displayed (1). Press <b>↻</b> to select the item and press <b>OK</b> to confirm. The menu item number is always displayed on the top right corner. By selecting and confirming "Diagnostic" in menu 3, the display will show in sequence:</p>		<p><b>↻</b> Select programming menu</p> <p><b>OK</b> Confirm selection.</p> <p><i>Note-The menu item number is displayed on the top right corner</i></p>

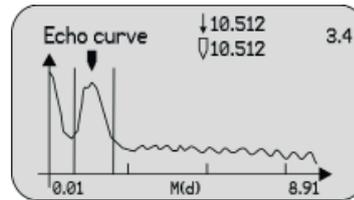
<p><b>12.1 Peak values (3.1)</b></p> <p>In this menu are recorded the min. and max. distance values. They can be cleared to zero in menu 4.3. Press  to enter the next menu 3.2.</p>		 Go to the next menu 3.2.
<p><b>12.2 Measurement status (3.2)</b></p> <p>The display shows the level of the receiving signal and the general status of the sensor. Press  to enter menu 3.3.</p>		 Go to the next menu 3.3.
<p><b>12.3 Choose curve (3.3)</b></p> <p>Press  to enter curve selection and press  to enter menu 3.4.</p>		 Enter editing menu  Go to the next menu 3.4.
<p>Press  to select the curve and press  to confirm and to enter menu 3.4.</p>		 Select curve  Confirm and go to next menu 3.4.
<p><b>12.4 Echo curve (3.4)</b></p> <p>Press  to enter zoom submenu of the selected curve. Press  to enter the next menu 3.5. The 2 echo curve indicators show: ↓- actual measure ⇓- estimated measure In normal operating conditions the indicators coincide in position and measure.</p>		 Enter Zoom sub-menu  Go to the next menu 3.5.

Press to select the zoom mode and press to confirm. The display will then show the curve.

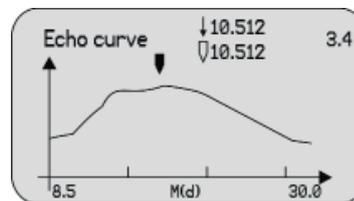


- Select zoom mode
- Confirm and see the curve

In case of “X-zoom” selection, you must proceed in the following way:  
 - press to move right the first line (opening line) of the zoom window  
 - press to confirm the position and to edit the second opening line  
 - press to move right the second line (closing line) of the zoom window  
 - press to confirm the position and to visualize the zoom window of the curve



- Move the first zoom line
- Confirm first line position
- Move the second zoom line
- Confirm second line position and see the zoom window

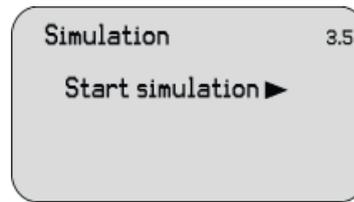


- Go to submenu Zoom
- Go back to menu 3.4
- Go to next menu 3.5

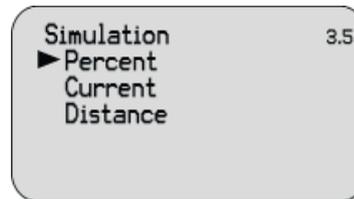
### 12.5 Simulation (3.5)

The “Simulation” menu is used to simulate the 4-20mA current output. There are three options:  
 - **Percent:** the output current is defined as a percent value (0% correspond to 4mA and 100% to 20mA)  
 - **Current:** the output current is defined as a current value  
 - **Distance:** the output current is defined by a distance value, in relation to Min adjustment (1.1), Max adjustment (1.2) and Mapping (1.6).

Press to select simulation mode, press to go back to menu 3.1.



- Enter the editing menu
- Go to the next menu 3.1.

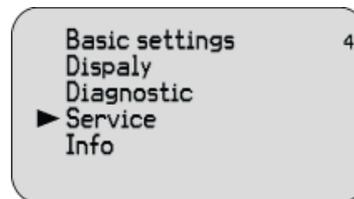


- Select simulation mode
- Confirm

### 13. Service (4)

From “RUN” mode press to enter the configuration menu. The following menu will be displayed (1).  
 Press to select the item and press to confirm the selection.

The menu item number is always displayed on the top right corner. By selecting and confirming “Service” in menu 4, the display will show in sequence:



- Select programming menu
- Confirm selection.

*Note-The menu item number is displayed on the top right corner*

### 13.1 False echo (4.1)

This function gets rid of interfering signals caused by obstacles placed between the sensor and the product surface (i.e. brackets, agitators or pipes).

Press  to enter the False echo storing/modifying mode, press  to enter the next menu 4.2.

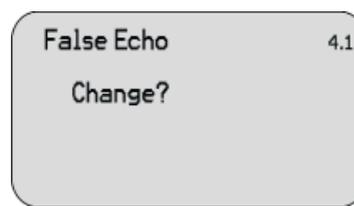
Press  to select the function, then press  to confirm and to enter the next sub-menu in case of "Update/Create new".

The 0% level condition is the best way to record the False echo curve. In this way the system will monitor the whole path of the radar wave, intercepting all the obstacles that a product level > 0% would hide. Input the real actual distance that the system would measure.

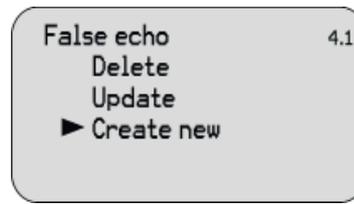
Note:

Check the correct distance from the product surface. In case of higher wrong input, the existing level would be recorded as false signal. As a consequence, the filling level will not be detected.

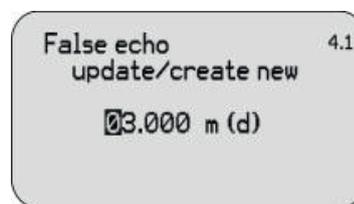
Press  to set the parameter and to confirm. After the confirmation the system goes back to menu 4.1.



-  Enter the editing menu
-  Go to the next menu 4.2.



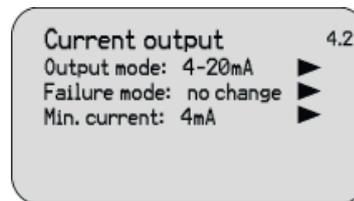
-  Select function
-  Confirm selection and go to next sub-menu in case of update/create new



-  Select the digit
-  Modify the value
-  Confirm modification and start the recording false echo procedure

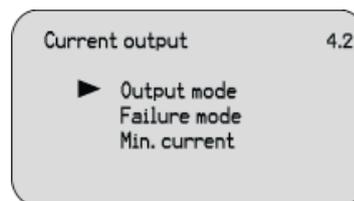
### 13.2 Current output (4.2)

Press  to enter current output sub-menu, press  to enter the next menu 4.3



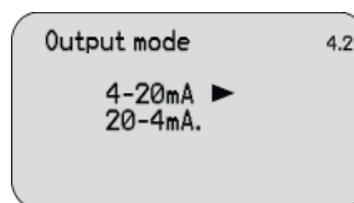
-  Enter the editing menu
-  Go to the next menu 4.3.

Press  to select the current output function, press  to confirm and enter the selected item, in sequence:



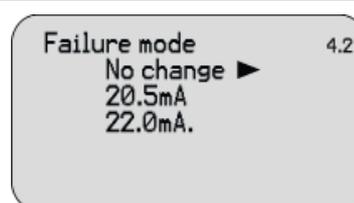
-  Select mode
-  Confirm and go to sub-menu

- **Output mode;** direct (4÷20mA) or indirect (20÷4mA) output.  
Press  to select the current output and then press  to confirm and to go back to sub-menu 4.2

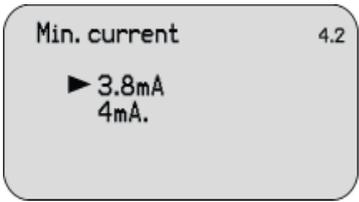
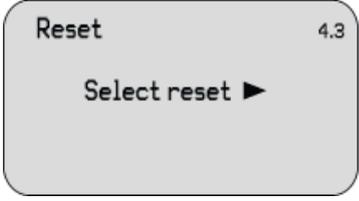
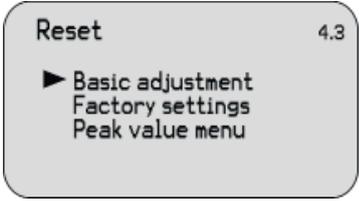
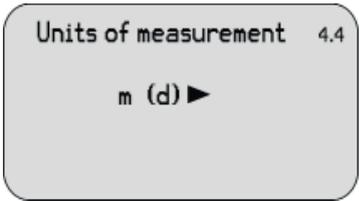
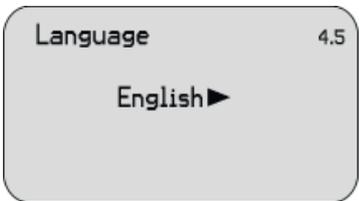
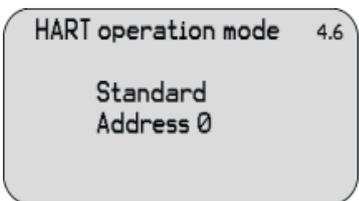
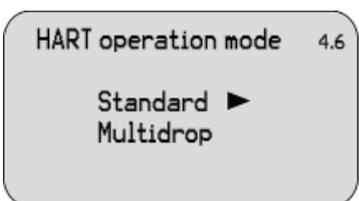


-  Select parameter
-  Confirm and go to sub-menu 4.2.

- **Failure mode;** output signal forcing in case of system failure (no change/, 20.5mA or 22.0mA)  
Press  to select the parameter and press  to confirm and to go back to sub-menu 4.2

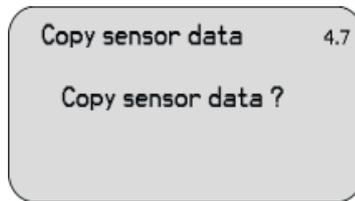


-  Select parameter
-  Confirm and go to sub-menu 4.2.

<p>- <b>Min. current</b>; min.value of the signal (3.8mA or 4mA). Press  to select the value and press  to confirm and to go back to sub-menu 4.2</p>		<p> Select parameter  Confirm and go to sub-menu 4.2.</p>
<p><b>13.3 Reset (4.3)</b> Press  to enter reset sub-menu, press  to enter the next menu 4.4</p>		<p> Enter the editing menu  Go to the next menu 4.4.</p>
<p>Press  to select the resetting parameters and press  to confirm. The system is now reconfigured with default values.</p>		<p> Select parameter  Confirm and reset</p>
<p><b>13.4 Units of measurement (4.4)</b> Press  to enter the units of measurement menu: metric system (m) or British system (ft). Press to enter the next menu 4.5.</p>		<p> Enter the editing menu  Go to the next menu 4.5.</p>
<p><b>13.5 Language (4.5)</b> Press  to enter the language selection menu: Italian or English. Press  to enter the next menu 4.6.</p>		<p> Enter the editing menu  Go to the next menu 4.6.</p>
<p><b>13.6 HART operation mode (4.6)</b> Press  to enter the HART operation mode: standard or multidrop. Press  to enter the next menu 4.7.</p>		<p> Enter the editing menu  Go to the next menu 4.7.</p>
<p>Press  to select HART communication mode: "Standard" (address0) or "Multidrop" (you must input the address. On the same line there cannot be 2 or more units with the same address). Press  to confirm: the system is now reconfigured with default values.</p>		<p> Select parameter  Confirm and reset</p>

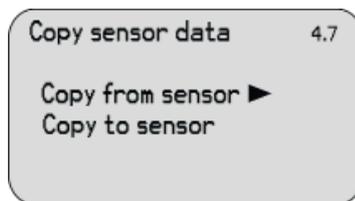
### 13.7 Copy sensor data (4.7)

Press  to enter the copy sensor data menu: copy from sensor or copy to sensor. Press  to enter the next menu 4.8



-  Enter the editing menu
-  Go to the next menu 4.8.

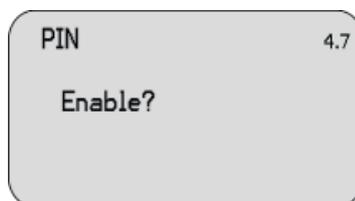
Press  to select the operation: with “Copy from sensor”, it is possible to save the sensor settings; with “Copy to sensor”, all the previously saved sensor settings are restored. Press  to confirm: the system is now reconfigured with default values.



-  Select the option
-  Confirm

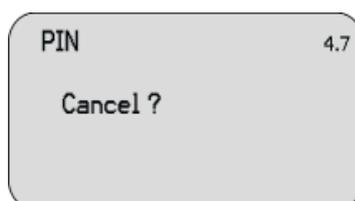
### 13.8 PIN (4.8)

Press  to enter PIN sub-menu: if the PIN is inactive the option will be “Enable?”.



-  Enter editing menu
-  Go back menu 4.1.

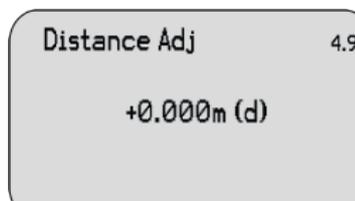
Press  to enter a 4 digit PIN code. If the PIN is active the option will be “Cancel?”.  
Press  to go back to menu 4.1



-  Enter editing menu
-  Go back menu 4.1.

### 13.9 Distance Adj (4.9)

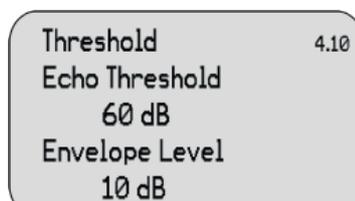
Pressing  to access the distance adjustment.  
Press  to go back to next menu.



-  Enter editing menu
-  Select the value
-  Modify the value
-  Confirm
-  Go to the next menu

### 13.10 Threshold (4.10)

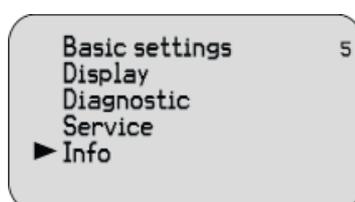
With a low echo signal may be necessary to reduce the echo acquisition threshold (Echo Threshold). With a strong background noise may have to move higher up the echo curve zero line (Envelope Level). Press  to modify the Echo Threshold value. Press  again to confirm and to edit the Envelope Level value. After the setup press  to confirm. Press  to enter next menu.



-  Enter editing menu
-  Select the value
-  Modify the value
-  Confirm
-  Go to the next menu

### 14. Info (5)

From “RUN” mode press  to enter the configuration menu.  
The following menu will be displayed (1).  
Press  to select the item and  to confirm.  
The menu item number is always displayed on the top right corner.  
By selecting and confirming “Info” in menu 5, the display will show in sequence:



-  Select menu
  -  Confirm
- Note-The menu item number is displayed on the top right corner*

<p><b>14.1 Sensor type / Serial number (5.1)</b></p> <p>Press  to go to next menu 5.2.</p>	<div style="border: 1px solid black; border-radius: 10px; padding: 10px; background-color: #f0f0f0;"> <p>Sensor type <span style="float: right;">5.1</span></p> <p>Serial number 123456</p> </div>	<p> <i>Go to the next menu 5.2.</i></p>
<p><b>14.2 Date of manuf./ Software version (5.2)</b></p> <p>Press  to go back to menu 5.1</p>	<div style="border: 1px solid black; border-radius: 10px; padding: 10px; background-color: #f0f0f0;"> <p>Date of manufacture <span style="float: right;">5.2</span></p> <p>Software version</p> </div>	<p> <i>Go back to menu 5.1.</i></p>

## 11. Troubleshooting



Error Code	Error	Solution
Err11	Power supply faulty	Use a multimeter to check whether the power supply of the product is outside the normal use range, please make sure that the power supply of the product is within the normal use range
Err12	HART faulty	Check whether the load resistance (250 ohm) wiring is correct or not, and then check whether the communication between the product and the host computer is normal or not.
Err13	RS485 MODBUS faulty	First check RS485 communication wire positive and negative terminal is corrected connected according to indication, and confirm RS485 shift to RS232 communication shift module is work normal or not, the hardware connection make sure no problem, then make sure RS485 MODBUS instruction is send by instruction table info or not.
Err14	Without receive effective echo wave signal	Check echo curve menu and make sure echo wave is exist or not, make sure the product enter blind zone or not, check range setting could satisfy actual application, then check the installation position could meet the requirements or not.
Err15	Internal memory data read/write error	Send back to factory for repair.
Err16	Device temperature exceeds the permitted range	It indicates electronic databank actual working temperature beyond -40...85°C, pls make sure product operation within normal operation range.
Err17	Device EEPROM data read /write error	Send back to factory for repair.
Err18	System component parameters not match	Send back to factory for repair.



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