



**TDR HUNTER**

Quick Start Manual - 2011 edition



Guided Radar Level Measurement



**ECHO Process Instrumentation, Inc.**

Mail to: PO Box 800 ▪ Ship to: 70 6<sup>th</sup> Ave ▪ Shalimar, FL 32579 USA

Ph: 850-609-1300 ▪ Fx: 850-651-4777 ▪ Em: [info@echopi.com](mailto:info@echopi.com) ▪ [www.echopi.com](http://www.echopi.com)

## General safety notes



You can find the newest and/or additional information by visiting [www.echopi.com](http://www.echopi.com).

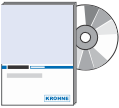
Installation, mounting, commissioning, and maintenance can be performed only by trained personnel.



Responsibility for suitability and intended use of this instrument rests solely with the user.

The supplier accepts no liability for inappropriate use by the customer.

Improper installation and operation may lead to loss of warranty. Moreover, the "general terms and conditions" on the back of the bill apply, which form the basis for the sales contract or can be viewed on our website [www.echopi.com](http://www.echopi.com).



If you have to send the device back to the manufacturer or supplier, call to obtain an RMA number and RMA form. Enclose it with the device upon return. Unless this form is completely filled out, it will unfortunately not be possible for the manufacturer to perform repair or inspection.



Respect general and local electrical safety requirements.

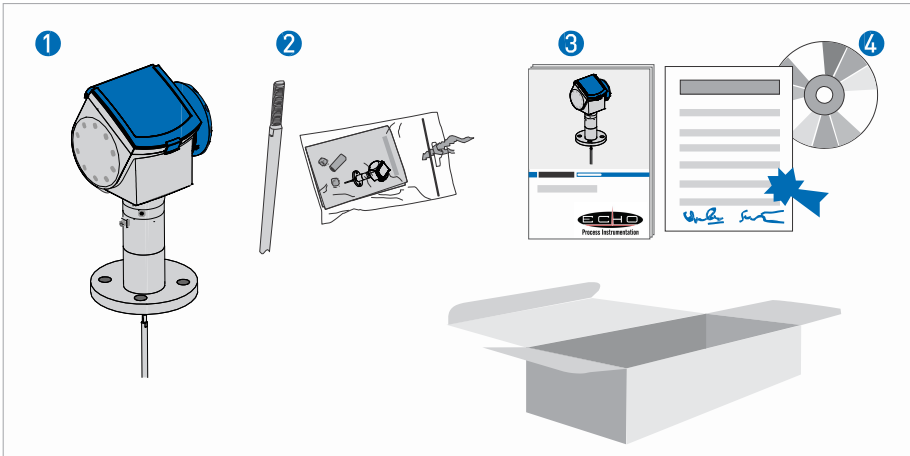


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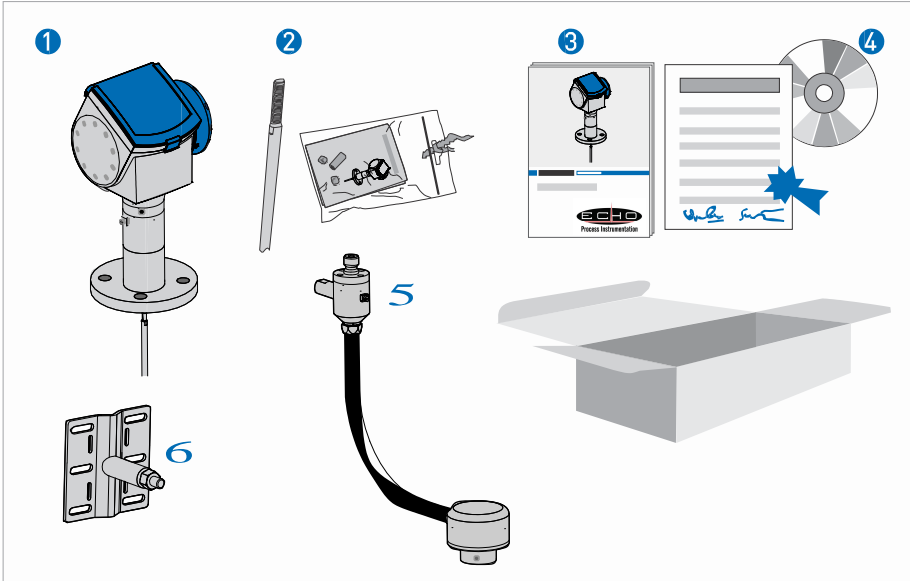
Ph: 850-609-1300 ▪ Fx: 850-651-4777 ▪ Em: [info@echopi.com](mailto:info@echopi.com) ▪ [www.echopi.com](http://www.echopi.com)

## Scope of delivery - compact version



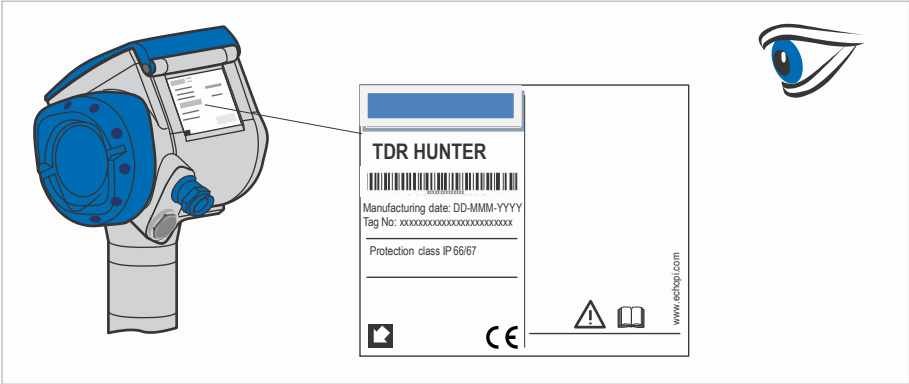
- 1 Signal converter - compact version
- 2 Probe. If a single rod probe is ordered, this is supplied not attached to the instrument. The assembly instructions and small parts are in a bag attached to the housing
- 3 Quick Start
- 4 Technical Datasheet and manual. CD not included anymore.

Scope of delivery - remote version



- 1 Signal converter and probe
- 2 Probe. If a single rod probe is ordered, this is supplied not attached to the instrument. The assembly instructions and small parts are in a bag attached to the housing
- 3 Quick Start
- 4 Technical Datasheet and manual. CD not included anymore.
- 5 Flexible conduit
- 6 Wall bracket (also for installation on pipes)

## Visual check



- Check the delivery for damage
- Compare the data on the nameplate with your order data



### WARNING!

If the display screen glass is broken, do not touch.

## How to turn or remove the converter



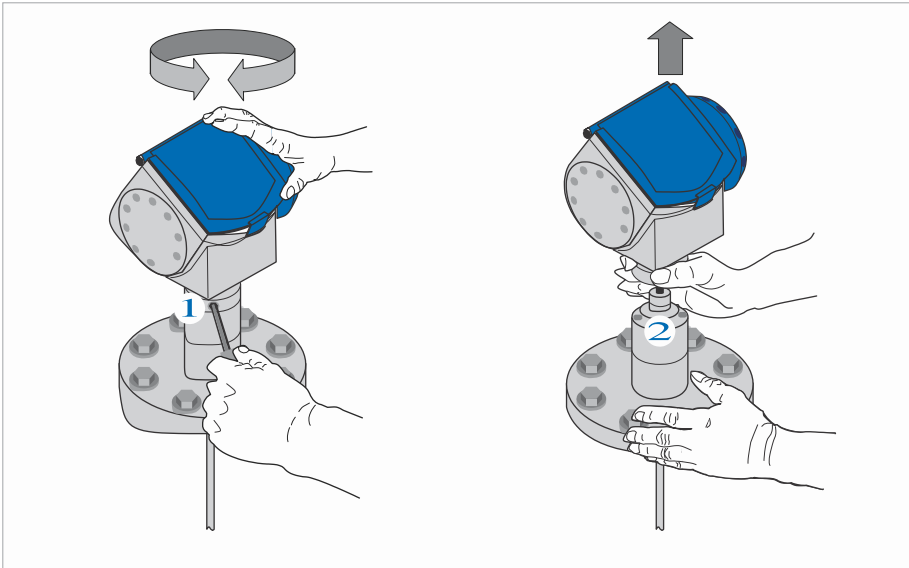
### INFORMATION!

The converter turns 360°. Remove the converter to lift the instrument with a hoist.



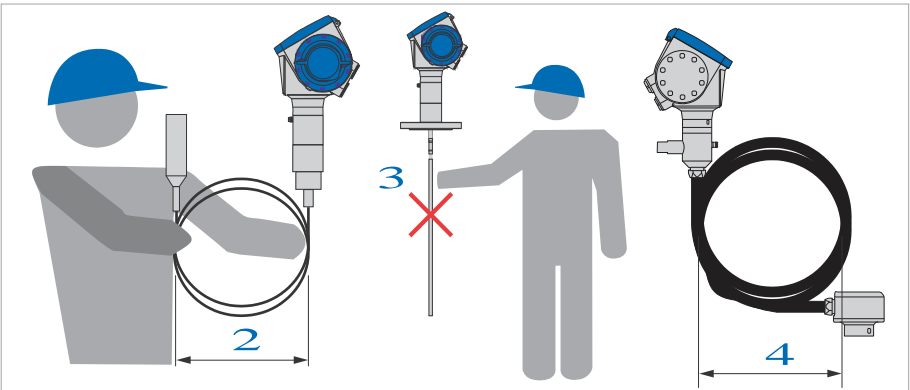
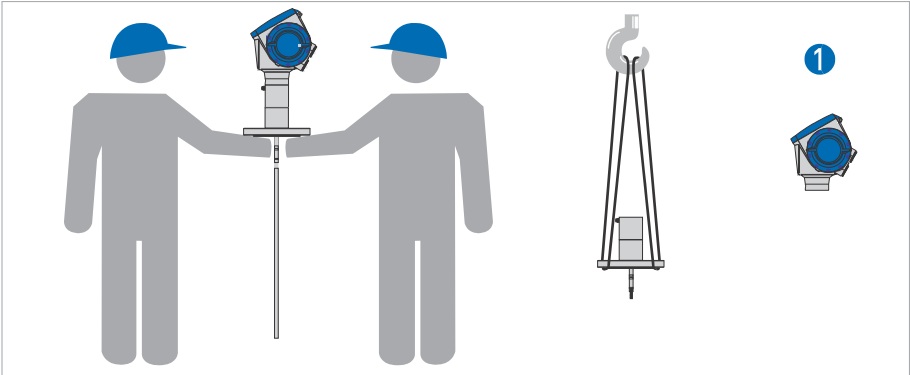
### CAUTION!

If you remove the housing, put a cover on the coaxial hole on top of the flange assembly **2**.



- Loosen the housing locking screw **1** with a 5 mm Allen wrench.
- Turn the housing to the correct position or remove the housing.
- Tighten the housing locking screw **1**.

## Transportation



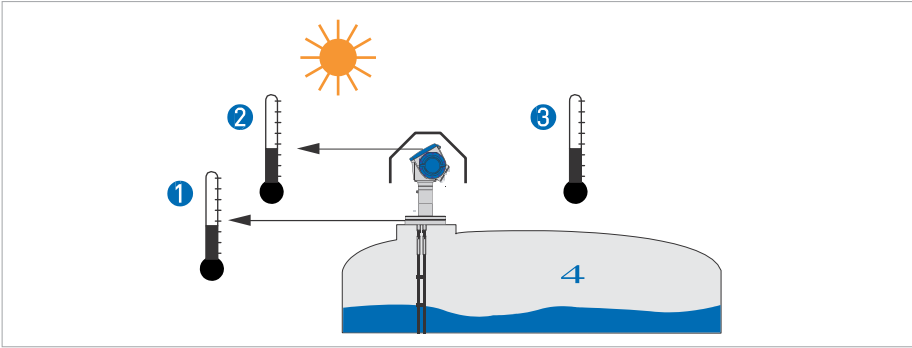
- 1 Remove the converter before you lift the instrument with a hoist.
- 2 Wind cable probes greater than 400 mm / 16" in diameter.
- 3 Do not hold the probe when you lift the instrument.
- 4 Wind the flexible conduit greater than 330 mm / 13" in diameter.



### WARNING!

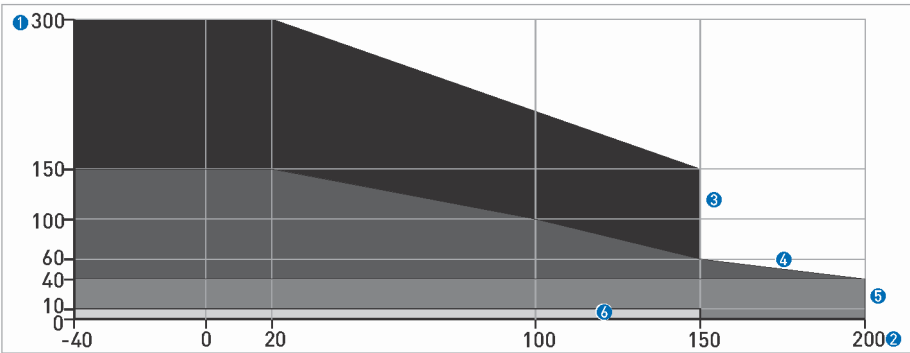
If you do not lift the instrument carefully, you can cause damage to the probe.

## Pressure and temperature ranges

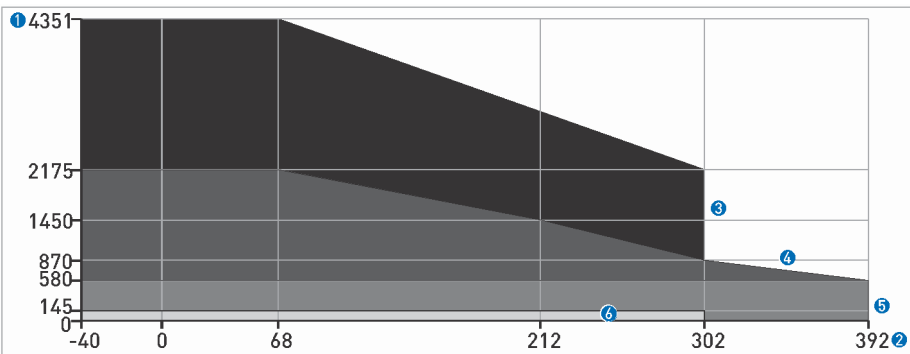


- 1** Flange temperature  
Refer to the graphs that follow.  
Ex instruments: see supplementary operating instructions
- 2** Ambient temperature for operation of the display  
-20...+60°C / -4...+140°F  
If the ambient temperature is not between these limits, the display screen switches off automatically
- 3** Ambient temperature  
Non-Ex devices: -40...80°C / -40...175°F  
Ex instruments: see supplementary operating instructions
- 4** Process pressure  
Refer to the graphs that follow.





- 1 Process pressure, P<sub>s</sub> [bar]
- 2 Flange temperature, T [°C]
- 3 High-pressure (HP) version of the Ø2 mm single cable probe
- 4 Double rod, double cable, Ø4 mm single cable and coaxial probes
- 5 Ø8 mm single cable probe
- 6 Standard version of the Ø2 mm single cable probe

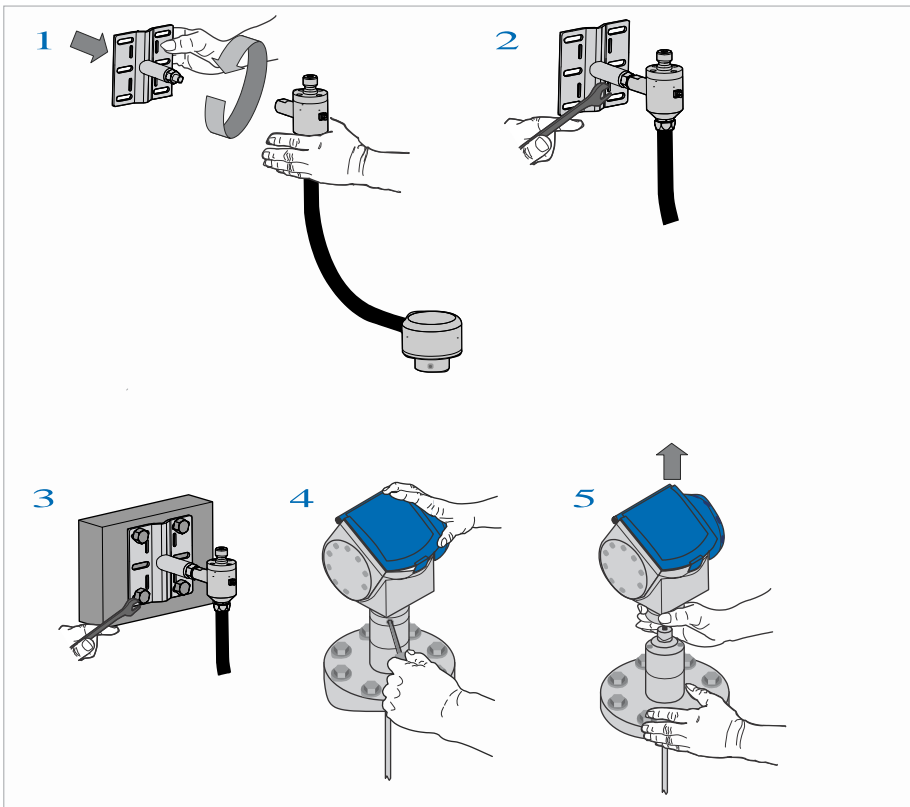


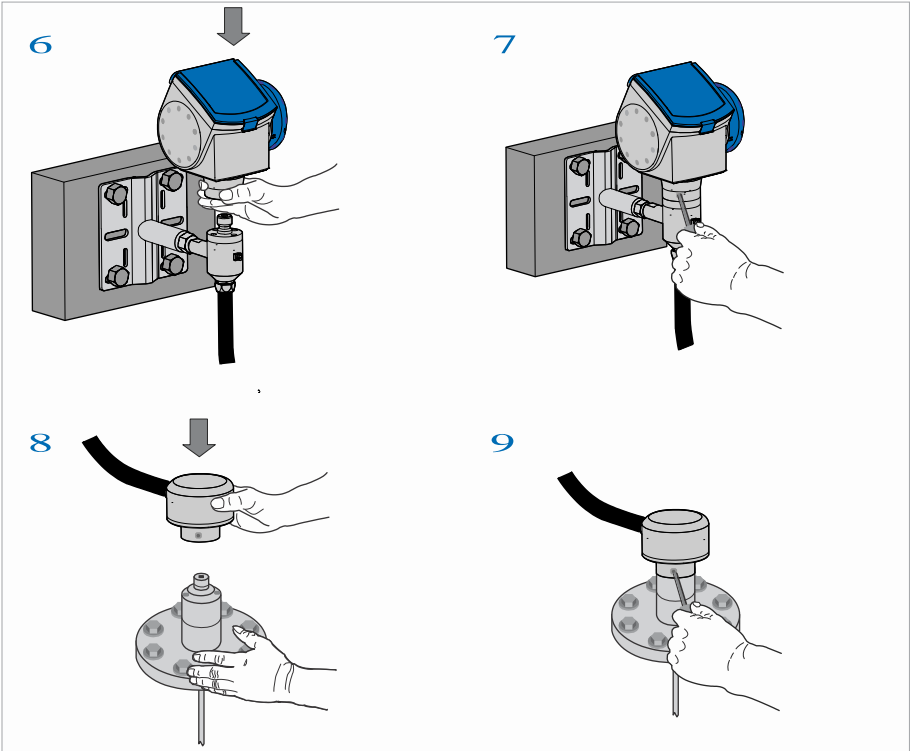
- 1 Process pressure, P<sub>s</sub> [psi]
- 2 Flange temperature, T [°F]
- 3 High-pressure (HP) version of the Ø0.08" single cable probe
- 4 Double rod, double cable, Ø0.15" single cable and coaxial probes
- 5 Ø0.3" single cable probe
- 6 Standard version of the Ø0.08" single cable probe

## How to assemble the remote housing

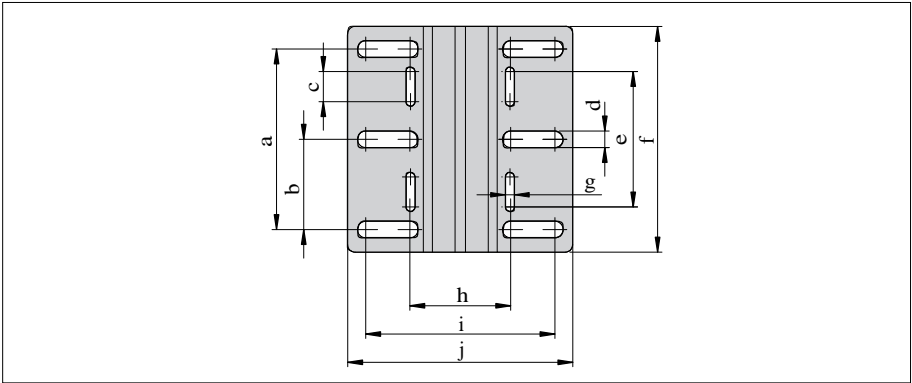
Equipment needed (not supplied):

- 24 mm wrench (for step 2).
- 5 mm Allen wrench (for steps 4, 7 and 9).





You can attach the wall bracket to a wall or pipe (DN50...100 / 2"...4"). These are the dimensions:

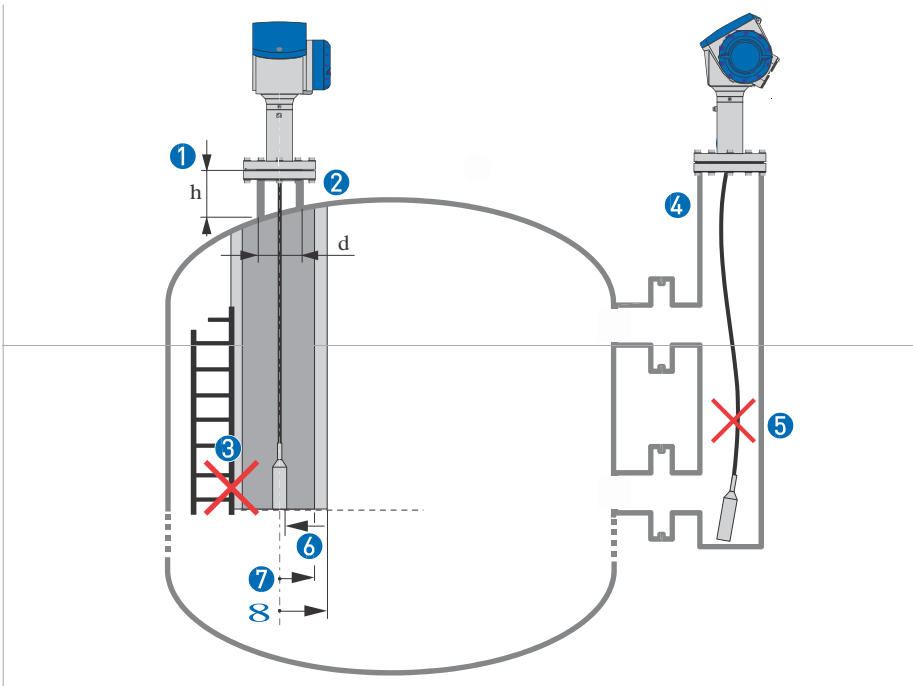


	Dimensions [mm]									
	a	b	c	d	e	f	g	h	i	j
Wall bracket	120	60	20	11	90	150	6	67.4	126.4	150.4

	Dimensions [inches]									
	a	b	c	d	e	f	g	h	i	j
Wall bracket	4.7	2.4	0.8	0.4	3.5	5.9	0.2	2.65	4.98	5.92

## Installation recommendations for liquids

We recommend that you prepare the installation when the tank is empty.



- 1  $h \leq d$ , where  $h$  is the height of the tank nozzle and  $d$  is the diameter of the tank nozzle.
- 2 Make sure that the probe does not touch the nozzle. Attach the probe if the liquid is turbulent.
- 3 The EM field generated by the instrument. It has a radius of  $R_{\min}$ . Make sure that the EM field is clear of objects and product flow. Refer to the table that follows.
- 4 If there are too many objects in the tank, install a bypass chamber or still well.
- 5 Keep the probe straight.

Probe type	Empty space (radius, $R_{min}$ ), around the probe	
	[mm]	[inches]
Coaxial <b>6</b>	0	0
Double rod <b>7</b> Double cable Ø4 mm/0.15" <b>7</b>	100	4
Single rod <b>8</b> Single cable Ø4 mm/0.15" <b>8</b> Single cable Ø2 mm/0.08" <b>8</b>	300	12



**NOTE!**

If your instrument has a coaxial probe, you can ignore these installation recommendations.



**NOTE!**

If your instrument is for installation in a still well, you can ignore these installation recommendations. You can find more data in Bypass chambers and still wells.



**CAUTION!**

Install coaxial probes in clean liquids that are not too viscous.

## Installation recommendations for non-metallic tanks and pits

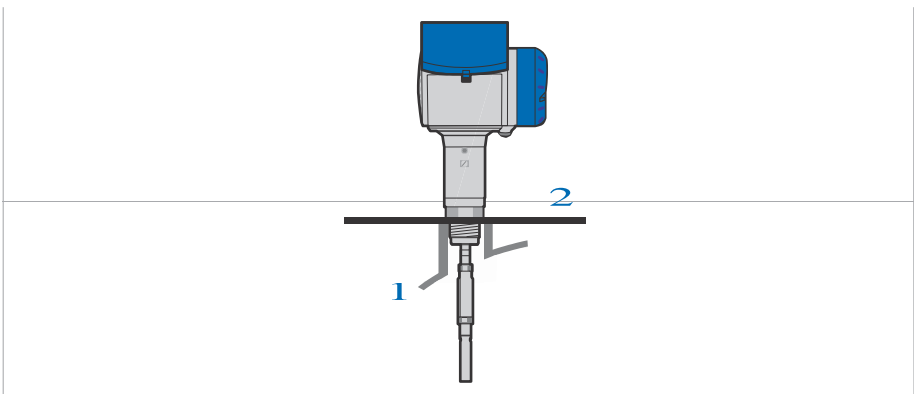
If you have an instrument with a rod or a cable probe and a thread connection, obey these instructions:



- Put a metal sheet between the instrument and the process connection.  
 ⓘ It must have a diameter greater than 200 mm / 8".
- Make sure that the metal sheet is in contact with the thread stop on the instrument.

We recommend that you use  $DN \geq 200 / \geq 8"$  for flange connections.

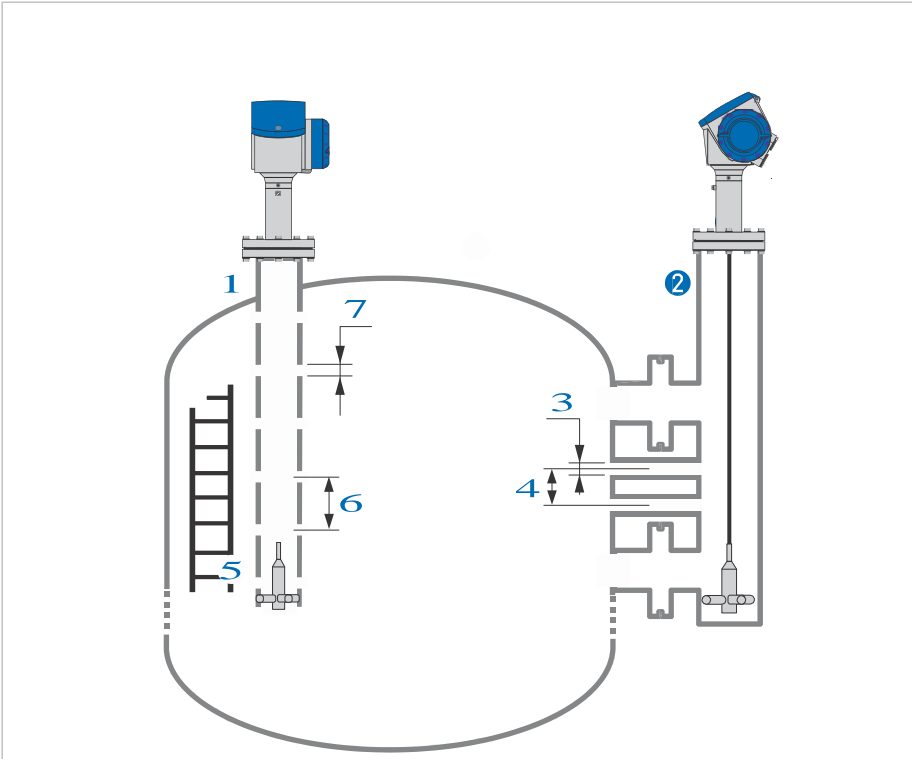
If you have an instrument with a coaxial probe, you can ignore these instructions.



- 1 Non-metallic (plastic...) tank or pit
- 2 Metal sheet,  $\varnothing \geq 200$  mm / 8"

## Bypass chambers and still wells

Prepare the installation when the tank is empty.

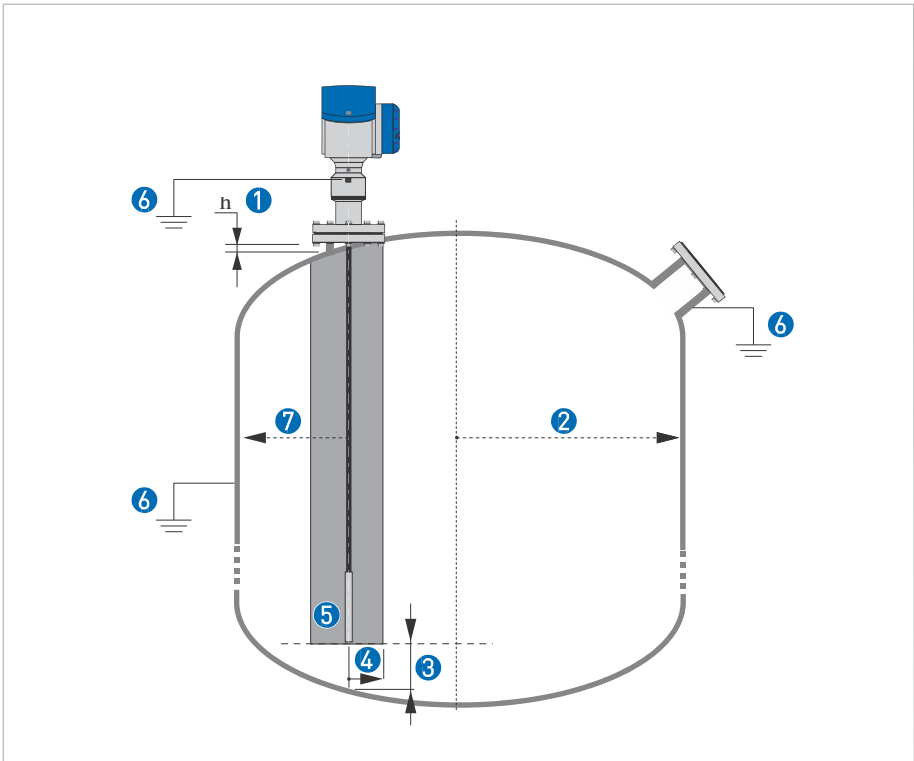


- 1 Still well. If it is made of metal, diameter  $\geq 50$  mm / 2". If it is not made of metal, contact ECHO.
- 2 Bypass chamber.
- 3 Recommended diameter of the circulation pipe:  $\varnothing 25$  mm / 1" (tanks with 2 or more liquids only).
- 4  $\geq 100$  mm/4" distance between circulation pipes (tanks with 2 or more liquids only). If there
- 5 are too many objects in the tank, install a bypass chamber or still well. Recommended
- 6 diameter of the circulation hole:  $\varnothing 10$  mm / 0.4" (tanks with 2 or more liquids only).
- $\geq 100$  mm/4" distance between circulation holes (tanks with 2 or more liquids only).
- 7



## Installation recommendations for solids

We recommend that you prepare the installation when the silo is empty.



- 1 We recommend installation without a nozzle. If not,  $h \leq 50 \text{ mm} / 2"$ .
- 2 Radius of the tank,  $r$
- 3 The end of the probe must be more than  $300 \text{ mm} / 12"$  above the tank bottom.
- 4 Empty space (radius,  $R_{\min}$ ) around the probe.
- 5 The electromagnetic (EM) field generated by the instrument. It is also the measurement zone of the probe. Make sure that the EM field is clear of objects and product flow.
- 6 Ground the tank, the product and the probe (if attached).
- 7 Position of the the process fitting from the tank wall,  $r/2$ .

Probe type	Empty space (radius, $R_{\min}$ ) around the probe	
	[mm]	[inches]
Single cable Ø4 mm/0.15" <b>4</b>	300	12
Single cable Ø8 mm/0.3" <b>4</b>	300	12

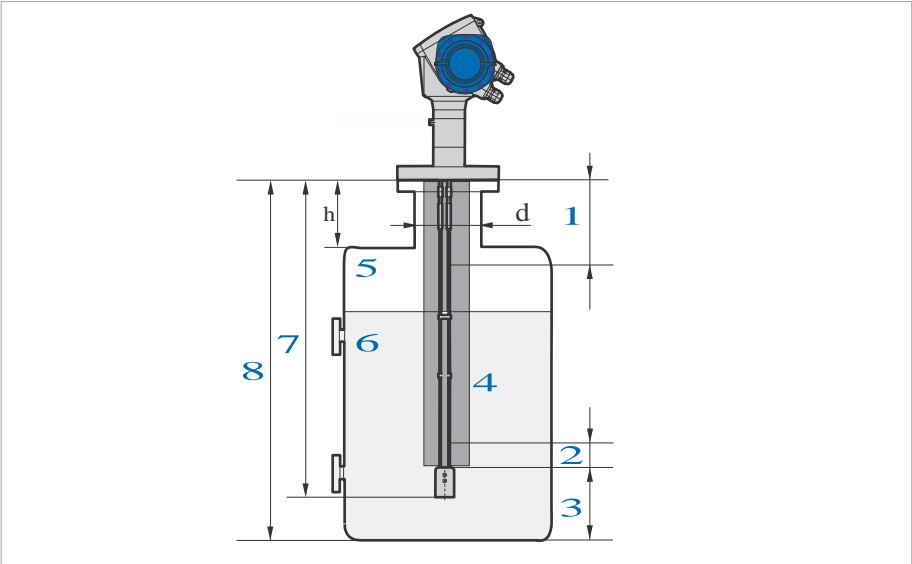


**DANGER!**  
Risk of electrostatic discharge



**NOTE!**  
If the probe is longer than 10 m/33 ft, we recommend that you do not attach the end of the probe

## Measurement limits



- 1** A1, Top dead zone: Distance from the flange to the top limit of measuring range. Refer to the notes and table that follow.
- 2** A2, Bottom dead zone: Length at the end of the probe, where measurement is not linear.
- 3** D, non measurement zone: Zone where measurement cannot be taken.
- 4** Electromagnetic (EM) field: The EM field generated by the instrument. Keep the EM field clear of objects and product flow. Refer to Installation recommendations for liquids in this document for the empty space ( $R_{min}$ ) around the probe.
- 5** Gas (Air)
- 6** Product 1
- 7** L, Probe length: Length specified by customer in the order. This is also the maximum measuring length for some probe types in direct mode and all instruments that operate in TBF mode. You can find more data about probe types in the full manual.
- 8** Tank Height



### INFORMATION!

$h$  is the height of the nozzle.  $d$  is the diameter of the tank nozzle.



### NOTE!

If  $h < d$ , then the top dead zone ( $A_1$ ) is equal to the top dead zone for the probe only. Refer to the tables that follow.

If  $h \geq d$ , then the top dead zone ( $A_1$ ) is equal to the tank nozzle height plus the top dead zone for the probe.



### NOTE!

The dimensions of the tank nozzle have no effect on the top dead zone of the coaxial probe.

## Measurement limits in mm

Probes	Top dead zone, A1 $\epsilon_r = 80$	Bottom dead zone, A2 $\epsilon_r = 80$	Top dead zone, A1 $\epsilon_r = 2.3$	Bottom dead zone, A2 $\epsilon_r = 2.3$
	[mm]			
Double rod	125	10	165	50
Single rod	200	10	250	50
Coaxial	10	10	10	50
Double cable	125	10	165	50
Single cable Ø8 mm	200	10	250	50
Single cable Ø4 mm	200	10	250	50
Single cable Ø2 mm	200	10	250	50

80 is  $\epsilon_r$  of water; 2.3 is  $\epsilon_r$  of oil

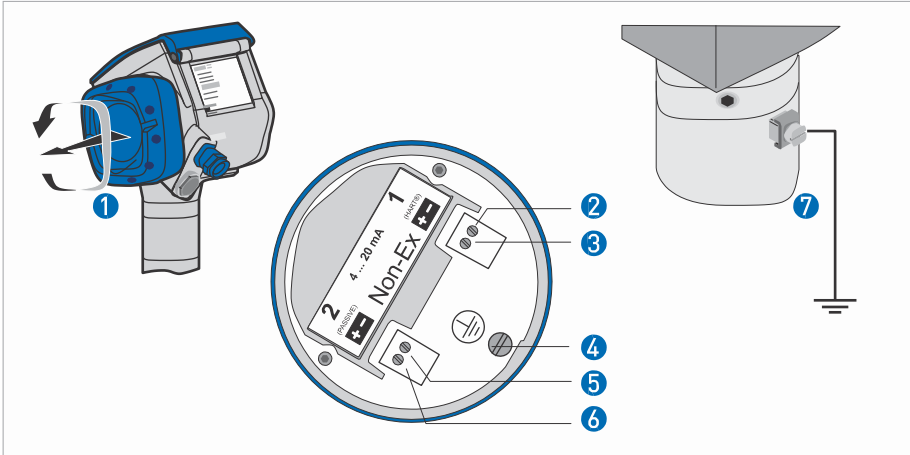
## Measurement limits in inches

Probes	Top dead zone, A1 $\epsilon_r = 80$	Bottom dead zone, A2 $\epsilon_r = 80$	Top dead zone, A1 $\epsilon_r = 2.3$	Bottom dead zone, A2 $\epsilon_r = 2.3$
	[inches]			
Double rod	4.90	0.40	6.50	1.95
Single rod	7.90	0.40	9.90	1.95
Coaxial	0.40	0.40	0.40	1.95
Double cable	4.90	0.40	6.50	1.95
Single cable Ø0.3"	7.90	0.40	9.90	1.95
Single cable Ø0.15"	7.90	0.40	9.90	1.95
Single cable Ø0.08"	7.90	0.40	9.90	1.95

80 is  $\epsilon_r$  of water; 2.3 is  $\epsilon_r$  of oil

## Electrical installation: outputs 1 and 2

### Terminal compartment



- 1 Terminal compartment cover
- 2 Terminal 1 current output -
- 3 Terminal 1 current output +
- 4 Grounding terminal in the housing
- 5 Terminal 2 current output -
- 6 Terminal 2 current output +
- 7 Grounding terminal on the connection piece between sensor and converter.

## Wiring procedure



### NOTE!

If the instrument has the second current output option, use a separate power supply to energize terminal 2.

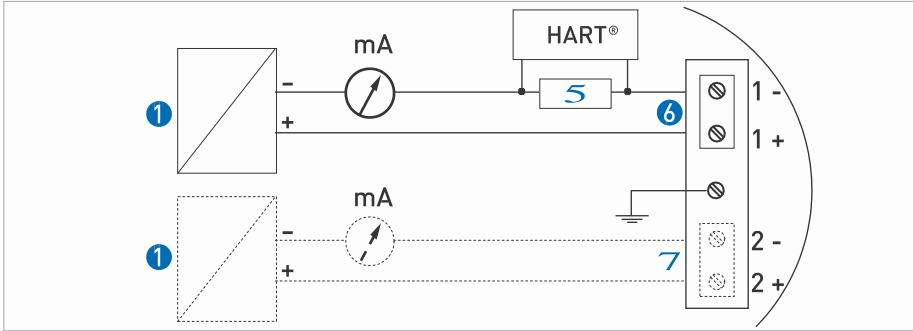


### Obey the instructions that follow:

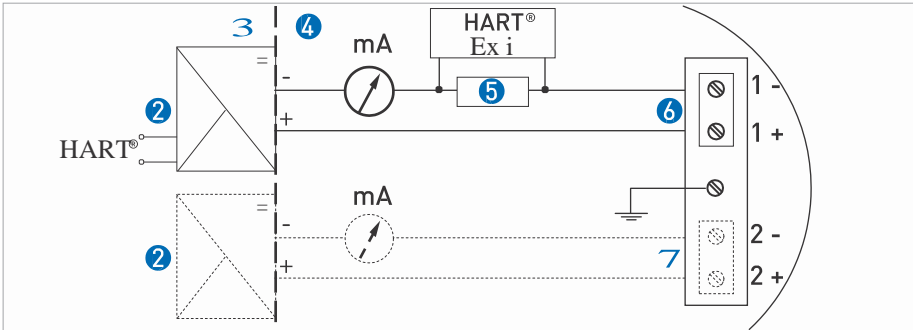
- Unscrew the housing lid **1** of the electric terminal compartment.
- Wire the device using standard rules.
- Observe the correct polarity.
- Attach the ground to **4** or **7**. Both terminals are technically equivalent.

## Electrical connection for current output

Non-Ex



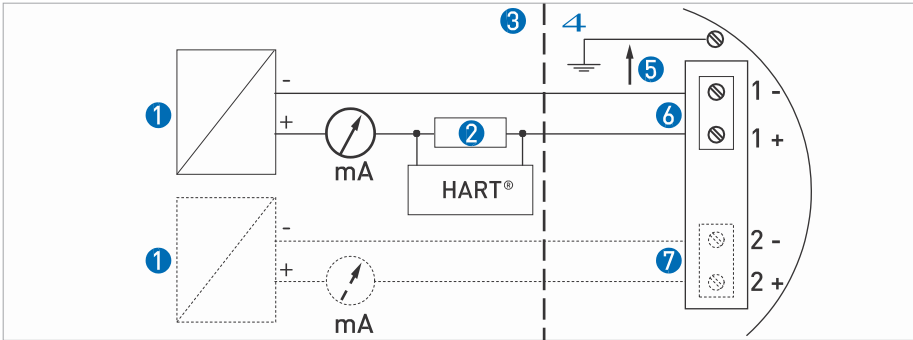
Ex i



- 1 Power supply
- 2 Intrinsically-safe power supply
- 3 Zone non-Ex
- 4 Zone Ex
- 5 Resistor for HART® communication
- 6 14...30 VDC for an output of 22mA at the terminal (refer to caution)
- 7 10...30 VDC for an output of 22mA at the terminal



Ex d



- 1 Power supply
- 2 Resistor for HART® communication
- 3 Non-Ex zone
- 4 Ex zone
- 5  $U \leq 5\text{ V}$
- 6 20...36 VDC for an output of 22mA at the terminal (refer to caution)
- 7 10...30 VDC for an output of 22mA at the terminal

**CAUTION!**

Make sure that you supply the correct voltage to the instrument terminal.

**CAUTION!**

If you remove the housing, put a cover on the coaxial hole on top of the flange assembly.

## Protection category



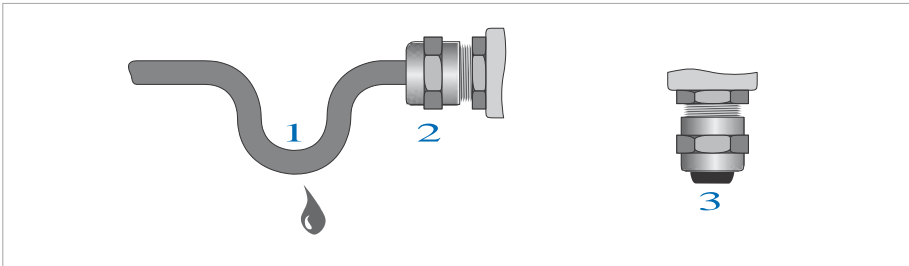
### NOTE!

The instrument fulfills all requirements per protection class IP 66/67.



### DANGER!

Make sure the cable gland is watertight.



- Make sure that the gaskets are not damaged.
- Make sure that the electrical cables are not damaged.
- Make sure that the electrical cables agree with the national electrical code.
- The cables are in a loop in front of the instrument **1** so water cannot enter the housing.
- Tighten the cable glands **2**.
- Close unused cable glands with dummy plugs **3**.

## Start-up



### DANGER!

Make sure that it is safe to supply electrical power. Do a start-up check.



### CAUTION!

If you removed and installed the housing after delivery, make sure that the instrument probe length agrees with your order data.



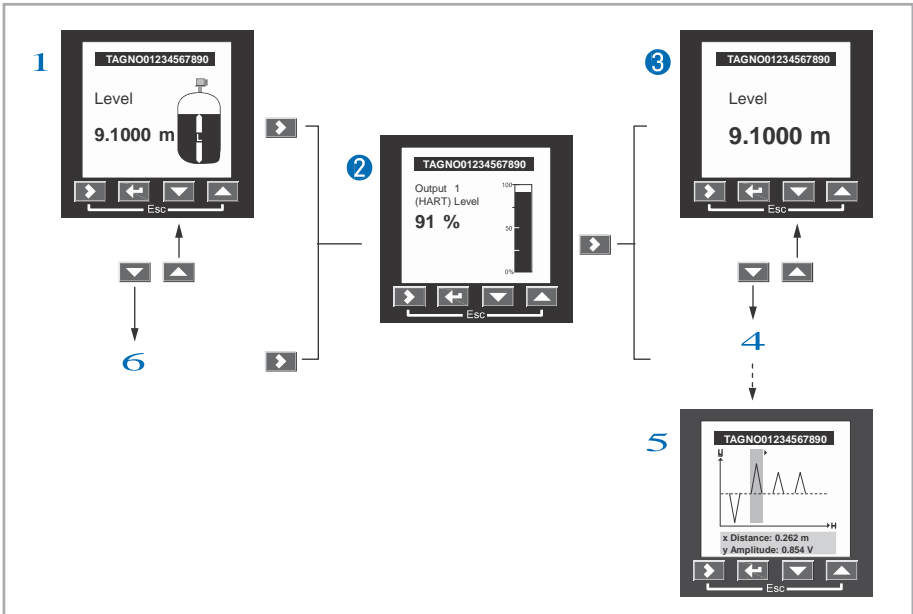
- Does the information given on the nameplate agree with the application?
- Did you install the instrument correctly?
- Solid applications: Did you ground the installation correctly?
- Did you install the correct cable entries?
- Is the terminal compartment correctly sealed?
- Make sure that you supply the correct voltage to the instrument terminal.  
Refer to Electrical connection for current output in this document.
- Ex applications: refer to the supplementary instructions for ATEX applications.

## User interface



### CAUTION!



Do not change the instrument settings. These are preset at the factory.




- 1 Level measurement screen (with a stationary tank image)
- 2 Percentage current output screen with an active bar graph (information depends on the output function)
- 3 Level measurement screen (text only, large characters)
- 4 Other information with text only (distance, volume...)
- 5 Signal screen - press > to move the cursor to another signal
- 6 Other information with a stationary tank image (distance, volume...)

## Hot keys in measurement mode

Press a button for more than one second to get access to the hot key functions.

Hot key button	Hot key description
	Enter program mode
	Active screen is saved as the default screen

Press this button for more than three seconds to get access to the hot key function.

Hot key button	Hot key description
	Display language will change to English. Press again to go back to the initial language set in the user interface.

Notes:



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