

# SmartLine Guided Radar Level Meter Specifications

34-VF-03-20 September 2010



## The Superior TDR Solution

The SmartLine<sup>®</sup> Guided Radar Level Meter is a Guided Radar (TDR: Time Delay Reflectometry) Level Meter for measuring distance, level, interface, level and interface, volume and mass. A variant with a remote housing can be mounted up to 14.5 m / 47.6 ft from the probe. The SmartLine Guided Radar Level Meter has higher signal dynamics and a sharper pulse than conventional TDR devices and therefore better reproducibility and accuracy.

## Highlights

- Displays level and interface
- Configuration software and DTMs included as standard
- Optional FOUNDATION<sup>™</sup> Fieldbus and PROFIBUS PA outputs
- Optional second current output - used for displaying interface measurements, for example
- High-pressure and high-temperature versions
- Optimal process safety (with Metaglas<sup>®</sup> dual process sealing system for dangerous products)
- Display in 9 languages: including Chinese, Japanese and Russian
- Available in stainless steel and Hastelloy<sup>®</sup> C-22. Other materials are available on request
- Angled single cable and rod probes are available on request for installation in tanks which contain obstructions

## Industries

- Chemicals
- Petrochemicals
- Oil & Gas
- Minerals & Mining
- Water & Wastewater

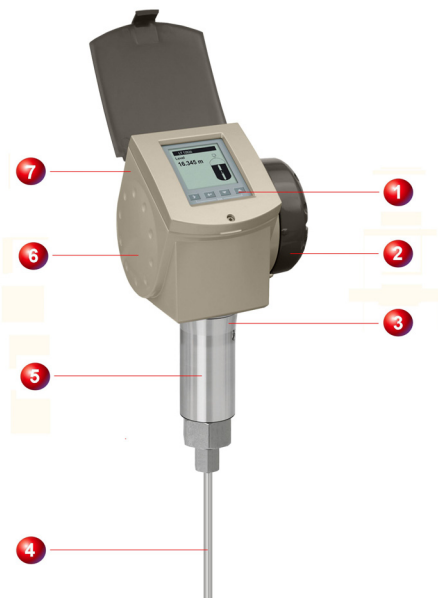


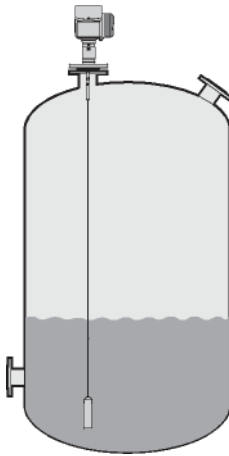
Figure 1 – SmartLine Guided Radar Level Meter

- 1 Touch screen with 4-button operation
- 2 2-wire level meter , 4 wire Foundation Fieldbus
- 3 Housing is rotatable and removable under process conditions
- 4 5 different types of probes suitable for a wide range of media
- 5 Optional ESD protection (30 kV) or Metaglas<sup>®</sup> dual process sealing system for dangerous products
- 6 Same housing for Ex and non-Ex
- 7 Large graphical display

## Applications

- Blending tanks
- Distillation tanks
- Process tanks
- Separator
- Solid silos (inventory)
- Storage tanks

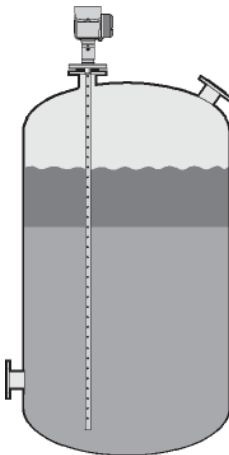
## Applications



### 1. Level measurement of liquids

The SmartLine Guided Radar Level Meter can measure the level of a wide range of liquid products on a large variety of installations within the stated pressure and temperature range, including LPG and LNG. It does not require calibration or commissioning when installed. A Metaglas® option is also available for dangerous products and ensures that no leakage is possible.

A number of probe end attachments are available. For example, the user can fix the end of cable probes to heating coils: this prevents deposits building up on the probe.



### 2. Interface measurement of liquids

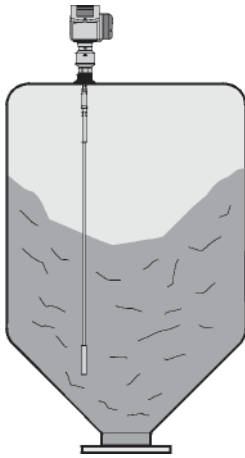
SmartLine Guided Radar Level Meter can measure interface with or without an air gap. It can also measure level and interface simultaneously. It has an optional second analogue output.

The coaxial probe of the SmartLine Guided Radar Level Meter has a top dead zone of only 10 mm / 0.4": this makes it ideal for tracking full tank or ballast interface.

*For installation requirements and application needs please refer to the User manual.*

*Please refer to the User manual for details of how and where to use these products.*

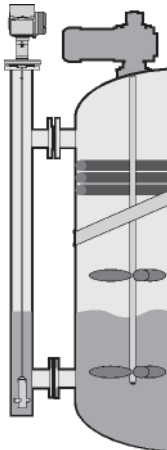
### 3. Level Measurement of solids



The SmartLine Guided Radar Level Meter has a strengthened 8 mm / 0.3" cable probe for measuring powders and granulates in silos up to 35 m / 115 ft high. The 4 mm cable probe is used for small silos. An ESD protection (30 kV) option is also available.

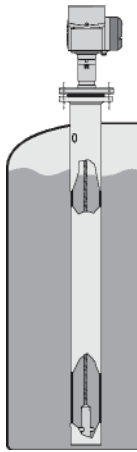
If a product has a very low dielectric constant ( $\epsilon_r < 1.6$ ), SmartLine Guided Radar Level Meter automatically switches to TBF (Tank Bottom Following) mode and keeps operating.

### 4. Measurement of liquids in a bypass chamber



The SmartLine Guided Radar Level Meter can measure accurately in agitated conditions and in the presence of foam. If the tank is full of obstructions such as agitators and reinforcements, Honeywell recommends installing the SmartLine Guided Radar Level Meter in a bypass chamber.

## 5. Level measurement of liquids in a still well

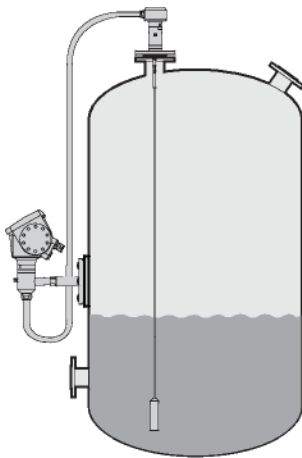


You can also install the SmartLine Guided Radar Level Meter in stilling well if there are vortices, agitators or other obstructions in the tank. It is also suitable for tanks with floating roofs. The SmartLine Guided Radar Level Meter setup wizard allows you to quickly configure your instrument to suit specific types of installations and get the best possible performance from it.

*For installation requirements and application needs please refer to the User manual.*

*Please refer to the User manual for details of how and where to use these products.*

## 6. Remote Display on high or inaccessible tanks



If it is difficult or impossible to read the SmartLine Guided Radar Level Meter integrated display at the top of the tank, Honeywell recommends the remote display variant. It is provided with a cable up to 14.5 m / 47.6 ft. long and a bracket for mounting in an accessible position. If there is vibration in the installation, we also recommend that you attach the remote converter to a wall or another safe object that is not attached to the installation.

*For installation requirements and application needs please refer to the User manual.*

*Please refer to the User manual for details of how and where to use these products.*

## Technical Data

### Input

Measurement principle	Time Domain Reflectometry (TDR )
Parameter	Level, distance, volume and/or interface
<b>Max. measuring range</b>	
Double rod Ø8 mm / 0.3":	4 m / 13 ft
Single rod Ø8 mm / 0.3":	4 m / 13 ft
Single rod Ø8 mm / 0.3" (segmented):	6 m / 20 ft
Coaxial Ø22 mm / 0.9":	6 m / 20 ft
Coaxial Ø22 mm / 0.9" (segmented):	6 m / 20 ft
Double cable Ø4 mm / 0.15":	8 m / 26 ft
Single cable Ø2 mm / 0.08":	35 m / 115 ft (for liquids only)
Single cable Ø4 mm / 0.15":	35 m / 115 ft (For liquids only. An angled probe is available on request for installations with very low ceilings or objects in the tank that prevent installation on top of the tank.)
Single cable Ø8 mm / 0.3":	35 m / 115 ft (For solids only. Tolerance, probe length: -1%/+0%.)

### Current Output

Output signal (Output 1)	4...20 mA HART® or 3.8...20.5 mA acc. to NAMUR NE 43 (11)
Output signal (Output 2)	4...20 mA (no HART® signal) or 3.8...20.5 mA acc. to NAMUR NE 43 (1)
Resolution	±3 µA
Temperature drift	Typically 50 ppm/K
Error signal	High: 22 mA; Low: 3.6 mA acc. to NAMUR NE 43

### PROFIBUS PA

Type	4 wire (+ local HART) level transmitter; Time Domain Reflectometry (TDR)
Function blocks	11 (level, distance, interface level, interface distance, layer, interface conversion, ullage conversion, layer conversion, level conversion, level mass and distance mass)
Protocol / Communication Standard	PROFIBUS PA protocol that agrees with IEC 61158-2, galvanically isolated
Physical layer types	Standard power signaling bus powered
Other features	Bus interface with integrated reverse polarity protection
Device power supply (24 V input)	18...30 VDC
Current consumption on PROFIBUS network	20 mA
Output data	Level, distance, interface level, interface distance, layer, interface conversion, ullage conversion, layer conversion, level conversion, level mass and distance mass
Input data	None
Error current FDE	Typically 0 mA (FDE =Fault Disconnection Electronic)
Address range	0...125. Default address: 126.

**FOUNDATION Fieldbus**

Type	4 wire (+ local HART) level transmitter; Time Domain Reflectometry (TDR)
Function blocks	1 × Resource Block (RB), 4 × Analog Input Blocks (AI), 1 × Transducer Block (TB)
	Analog Input Block: 50 ms
Protocol / Communication standard	Foundation Fieldbus protocol that agrees with IEC 61158-2, galvanically isolated
ITK version	5.1
Physical layer types	Standard power signaling, bus powered, non I.S.
Other features	Bus interface with integrated reverse polarity protection
Device power supply (24 V input)	18...30 VDC
Bus power supply	9...32 VDC (non-Ex); 9...17.5 VDC (intrinsically-safe)
Basic current	20 mA
Maximum error current	20 mA
Start current after 10 ms	20 mA
Polar sensitivity	Yes
Minimum cycle time	100 ms
Output data	Level, distance, level conversion, interface level, interface distance, layer, interface conversion, ullage conversion, layer conversion, level conversion, level mass or distance mass
Input data	None
Error current FDE	Typically 0 mA (FDE =Fault Disconnection Electronic)
Link Master function	Not supported

**Reference Conditions acc. to EN 60770**

Temperature	+20°C ±5°C / +70°F ±10°F
Pressure	1013 mbar abs. ±20 mbar / 14.69 psig ±0.29 psig
Relative air humidity	60% ±15%

**Accuracy**

Resolution	1 mm / 0.04"
Repeatability	±1 mm / ±0.04"
Accuracy (in direct mode)	
Liquids	±3 mm / ±0.12", when distance < 10 m / 33 ft; ±0.03% of measured distance, when distance > 10 m / 33 ft
Powders	±20 mm / ±0.8"
Interface	±10 mm / ±0.4" (εr constant)
Accuracy (in TBF mode)	±20 mm / ±0.8" (εr constant)
Minimum layer (interface)	50 mm / 2"

**User Interface**

Display - LCD	9 lines, 160 x 160 pixels in 8-step grayscale with 4-button keypad
Operating languages	English, German, French, Italian, Spanish, Portuguese, Japanese, Chinese (Mandarin) and Russian

**Process Conditions**

Ambient temperature	-40...+80°C / -40...+175°F (Ex i: see supplementary operating instructions or approval certificates).
Storage temperature	-40...+85°C / -40...+185°F

**Process Connection Temperature**

Standard	-40...+200°C / -40...+390°F (according to the temperature limits of the gasket material. Refer to "Material" in this table.) (Ex: see supplementary operating instructions or approval certificates) (2)
High-Temperature (HT) and High-Temperature / High-Pressure (HT/HP) versions with FKM/FPM and Kalrez® 6375 gaskets	+300°C / +570°F (single cable Ø2 mm / 0.08" probe only) (Ex: see supplementary operating instructions or approval certificates) (2)
HT and HT/HP versions with EPDM gaskets	+250°C / +480°F (single cable Ø2 mm / 0.08" probe only) (Ex: see supplementary operating instructions or approval certificates) (2)
Thermal shock resistance	100°C/min

**Operating Pressure**

Single cable Ø8 mm / 0.3" probe	-1...40 barg / -14.5...580 psig subject to process connection temperature and probe type used (2)
High-Pressure (HP) version	max. 300 barg / 4350 psig (single cable Ø2 mm / 0.08" probe only) subject to process connection temperature and probe type used (2)
All other probe types	-1...100 barg / -14.5...1450 psig subject to process connection temperature and probe type used (2)

**Dielectric constant ( $\epsilon_r$ )**

Level in direct mode	$\geq 1.4$ for coaxial probe; $\geq 1.6$ for single and double probes
Interface in direct mode	$\epsilon_r(\text{interface}) > \epsilon_r(\text{level})^2$ (> more than 2 times the value)
Level in TBF mode	$\geq 1.1$
Vibration resistance	IEC 60068-2-6 and EN 50178 (10...57 Hz: 0.075 mm / 57...150 Hz: 1g)
Protection category	IP 66/67 equivalent to NEMA 6-6X

**Process Connections**

<b>Thread</b>	
Single cable Ø2 mm / 0.08"	G ½; ½ NPT; ½ NPTF (for the HT/HP version)
Single cable Ø8 mm / 0.3"	G 1½; 1½ NPT
All other probes	G ¾...1½; ¾...1½ NPT
<b>Flange versions for single cable Ø8 mm / 0.3", double rod and double cable probes</b>	
EN	DN40...150 in PN16, PN40, PN63 or PN100; others on request
ASME	1½"...8" in 150 lb, 1½"...6" in 300 lb, 1½"...4" in 600 lb or 900 lb; others on request
JIS	40...100A in 10K; others on request
<b>Flange versions for all other probes except single cable Ø2 mm / 0.08"</b>	
EN	DN25...150 in PN16 / PN40; others on request
ASME	1"...8" in 150 lb / 300 lb; others on request
JIS	40...100A in 10K; others on request
<b>Other options for single and double rod probes</b>	
SMS	Available on request
Tri-clamp	Available on request
Others	Others on request

**Electrical Connections**

Instrument terminal 1 - Non-Ex / Ex i	14...30 VDC (6)
Instrument terminal 1 - Ex d	20...36 VDC (6)
Instrument terminal 2 - Non-Ex/ Ex i/ Ex d	10...30 VDC (7)
Cable Entry	M20×1.5; ½ NPT
	G ½ (not for FM- and CSA-approved devices. Not for stainless steel housings.)
	M25×1.5 (for stainless steel housings only)
Cable Gland	Standard: none
	Options: M20×1.5 (for non-Ex and Ex-approved devices with M20×1.5 and M25×1.5
Cable tightening capacity	0.5...1.5 mm <sup>2</sup>



**Material**

Housing	Standard: Aluminium
	Option: Stainless steel (1.4404 / 316L)
Single rod (single-piece)	Standard: Stainless steel (1.4404 / 316L)
	Option: Hastelloy® C-22 (2.4602) 3
	On request: Stainless steel (1.4404 / 316L) in a PVC, PVDF or PP protective sheath
	On request: Monel; Tantalum; Titanium; Duplex
Single rod (segmented)	Standard: Stainless steel (1.4404 / 316L)
Double rod	Standard: Stainless steel (1.4404 / 316L)
	Option: Hastelloy® C-22 (2.4602)
	On request: Monel; Tantalum; Titanium; Duplex
Coaxial (single-piece)	Standard: Stainless steel (1.4404 / 316L)
	Option: Hastelloy® C-22 (2.4602)
Single cable	Standard: Stainless steel (1.4401 / 316)
	Option: Hastelloy® C-22 (2.4602)
	- only for the Ø2 mm / 0.15" or Ø4 mm / 0.15" single cable probes
	On request: FEP-coated stainless steel (-20...+150°C / -4...+300°F) - only for the Ø4 mm / 0.15" single cable probe
Double cable	Stainless steel (1.4401 / 316)
Process fitting	Standard: Stainless steel (1.4404 / 316 L)
	Option: Hastelloy® C-22 (2.4602)
	On request: Monel; Tantalum; Titanium; Duplex
Gaskets	FKM/FPM (-40...+200°C / -40...+390°F); Kalrez® 6375 (-20...+200°C / -4...+390°F); EPDM (-50...+150°C / -58...+300°F) - all probes except single cable Ø8 mm / 0.3" (9)
Weather protection (Option)	Stainless steel (1.4301 / 304)
Protective sheath (On request for single rod only)	PP (-40...+90°C / -40...+194°F); PVC (-15...+80°C / +5...+176°F); PVDF (-40...+150°C / -40...+302°F)
Conduit for remote housing (Option)	Zinc-coated steel in a PVC sheath (-40...+105°C / -40...+220°F)

## Approvals

CE	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
ATEX (approval for fieldbus outputs pending)	ATEX II 1 G, 1/2 G, 2 G Ex ia IIC T6...T2;
	ATEX II 1 D, 1/2 D, 2 D Ex iaD 20 or Ex iaD 20/21 IP6X T70°C...T95°C;
	ATEX II 1/2 G, 2 G Ex d[ia] IIC T6...T2 ;
	ATEX II 1/2 D, 2 D Ex tD[iaD] A21/20 IP6X T70°C...T95°C;
	ATEX II 3 G Ex nA IIC T6...T2
IECEx (approval for fieldbus outputs options pending)	Ex ia IIC T6...T3 Ga; Ex iaD 20 IP6X T70°C...T95°C;
	Ex d[ia] IIC T6...T3 Ga/Gb; Ex tD[iaD] A21/20 IP6X T70°C...T95°C
FM - Dual Seal-approved (approval for fieldbus output options pending)	<b>NEC 500</b>
	XP-IS, Cl. I, Div. 1, Gr. ABCD T6...T2;
	DIP, Cl. II/III, Div. 1, Gr. EFG T6...T2;
	IS, Cl. I/II/III, Div. 1, Gr. ABCDEFG T6...T2;
	NI, Cl. I, Div. 2, Gr. ABCD T6...T2
	<b>NEC 505</b>
	Cl. I, Zone 0, AEx d[ia] IIC T6...T2;
	Cl. I, Zone 0, AEx ia IIC T6...T2;
	Cl. I, Zone 2, AEx nA[ia] IIC T6...T2
	Hazardous (Classified) Locations, indoor/outdoor Type 4X and 6P, IP66, Dual Seal
CSA - Dual Seal-approved (approval for Drop antenna, hygienic antenna and fieldbus output options pending)	<b>CEC Section 18 (Zone ratings)</b>
	Cl. I, Zone 1, Ex d, IIC (Probe: Zone 0) T6...T2;
	Cl. I, Zone 0, Ex ia, IIC T6...T2;
	Cl. I, Zone 2, Ex nA, IIC T6...T2
	<b>CEC Section 18 and Annex J (Division ratings)</b>
	XP-IS, Cl. I, Div. 2, Gr. ABCD; Cl. II, Div. 2, Gr. FG; Cl. III, Div. 2 T6...T2;
	IS, Cl. I, Div. 1, Gr. ABCD; Cl. II, Gr. FG; Cl. III T6...T2
NEPSI (approval pending)	Ex dia IIC T2~T6; Ex ia IIC T2~T6
CEPEL / INMETRO (approval pending)	BR-Ex ia IIC T2...T6; BR-Ex d[ia] IIC T2...T6

Other standards and approvals -Continued	
EMC	Electromagnetic Compatibility Directive 2004/108/EC in conjunction with EN 61326-1 (2006) and EN 61326-2-3 (2006). The device agrees with this standard if: - the device has a coaxial probe or - the device has a single / double probe that is installed in a metallic tank.
NAMUR	NAMUR NE 21 Electromagnetic Compatibility (EMC) of Industrial Process and Laboratory Control Equipment
	NAMUR NE 43 Standardization of the Signal Level for the Failure Information of Digital Transmitters
Construction code	On request: NACE MR0175 / ISO 15156

### Options and Accessories

Options	Integrated LCD display with sun cover (-20...+60°C / -4...+140°F); (8)
	2nd current output;
	Remote housing connected to the probe via a flexible conduit Standard lengths: 2 m / 6.6 ft, 4.5 m / 14.8 ft, 9.5 m / 31.2 ft and 14.5 m / 47.6 ft
	ESD protection (30 kV)
	Metaglas® (dual process sealing system for dangerous products (ammonia, chlorine, ...)) (10)
Accessories	Weather protection

1 optional

2 refer to the Pressure/temperature table for probe selection.

3 Hastelloy® is a registered trademark of Haynes International, Inc.

4 Hastelloy® C-22 (2.4602) on request for the Ø2 mm / 0.15" single cable probe.

5 others on request

6 min./max. value for an output of 22 mA at the terminal

7 min/max. value for an output of 22 mA at the terminal (additional power supply needed - output only)

8 if the ambient temperature is not in these limits, the display switches off;

9 Kalrez® is a registered trademark of DuPont Performance Elastomers L.L.C.

10 Metaglas® is a registered trademark of Herberts Industrieglas, GMBH & Co., KG

11 HART® is a registered trademark of the HART Communication Foundation

**Probe Selection**

	Double rod	Single rod	Single rod (segmented)	Coaxial	Coaxial (segmented)	Double cable	Single cable Ø8 mm / 0.3"	Single cable Ø4 mm / 0.15"	Single cable Ø2 mm / 0.08"
<b>Maximum probe length, L</b>									
4 m / 13 ft									
6 m / 20 ft									
8 m / 26 ft									
35 m / 115 ft									
<b>Liquids</b>									
Liquid application									
LPG, LNG								(1)	(1)
Highly viscous liquids									
Highly crystallizing liquids									
Highly corrosive liquids									
Foam									
Agitated liquids		(2)	(2)			(2)		(2)	(2)
High-pressure applications	(3)	(3)	(3)	(3)	(3)	(3)		(3)	(4)
High-temperature applications									(5)
Spray in tank		(1)	(1)					(1)	(1)
Storage tanks									
Installation in bypass chamber									
Small diameter nozzles									
Long nozzles									
Stilling wells									
Interface measurement								(6)	(6)
<b>Solids</b>									
Powders								(7)	
Granules, <5 mm / 0.1"								(7)	

1 Install the device in a stilling well or a bypass chamber

2 Use this probe with an anchor fitting. For more data, refer to the handbook.

3 Max. pressure is 100 bar / 1450 psig. Refer to the pressure-temperature table for probe selection.

4 Optional. Max. pressure is 300 bar / 4350 psig. Refer to the pressure-temperature table for probe selection.

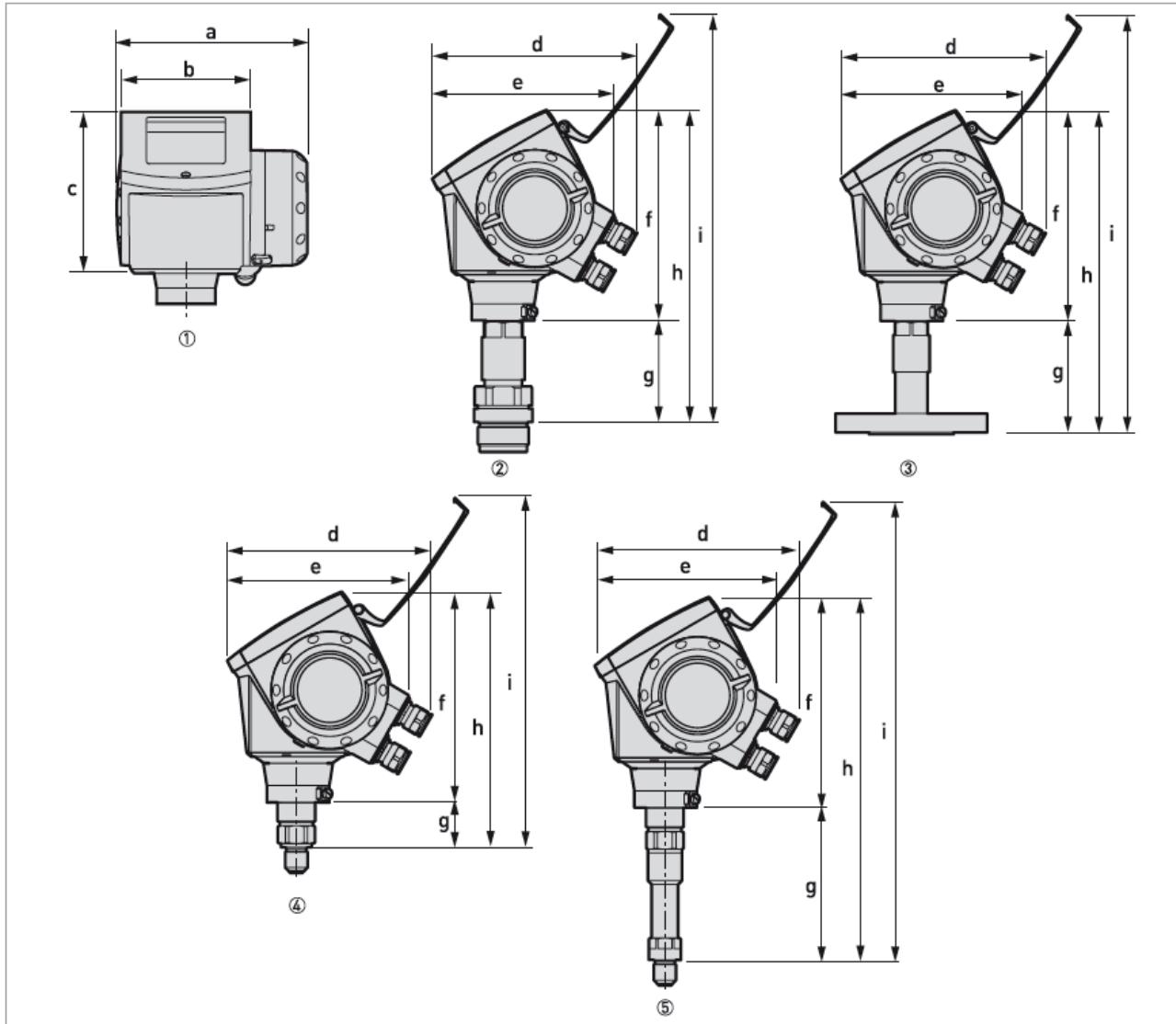
5 Optional. Max. temperature is 300°C / 570°F. Refer to the pressure-temperature table for probe selection.

6 Max. length is 20 m / 65.5 ft, more on request

7 Max. length is 10 m / 33 ft, more on request

## Dimensions and Weight

### Standard Housing



1 Converter (front view)

2 Thread version for all probes except the Ø2 mm / 0.08" single cable probe (right side)

3 Flange version (right side)

4 Thread version for Ø2 mm / 0.08" single cable probe - High-Pressure (HP) version (right side)

5 Thread version for Ø2 mm / 0.08" single cable probe - High-Temperature (HT) and High-Temperature/High-Pressure (HT/HP) versions (right side)

#### Note:

- Cable glands are delivered on demand with non-Ex, Ex i- and Ex d-approved devices.
- Non-Ex and Ex i fittings are plastic and Ex d fittings are metallic. Non-Ex fittings are black and Ex i fittings are blue.
- The diameter of the outer sheath of the cable must be 6...12 mm or 0.2...0.5".
- Cable glands for FM- or CSA-approved devices must be supplied by the customer.

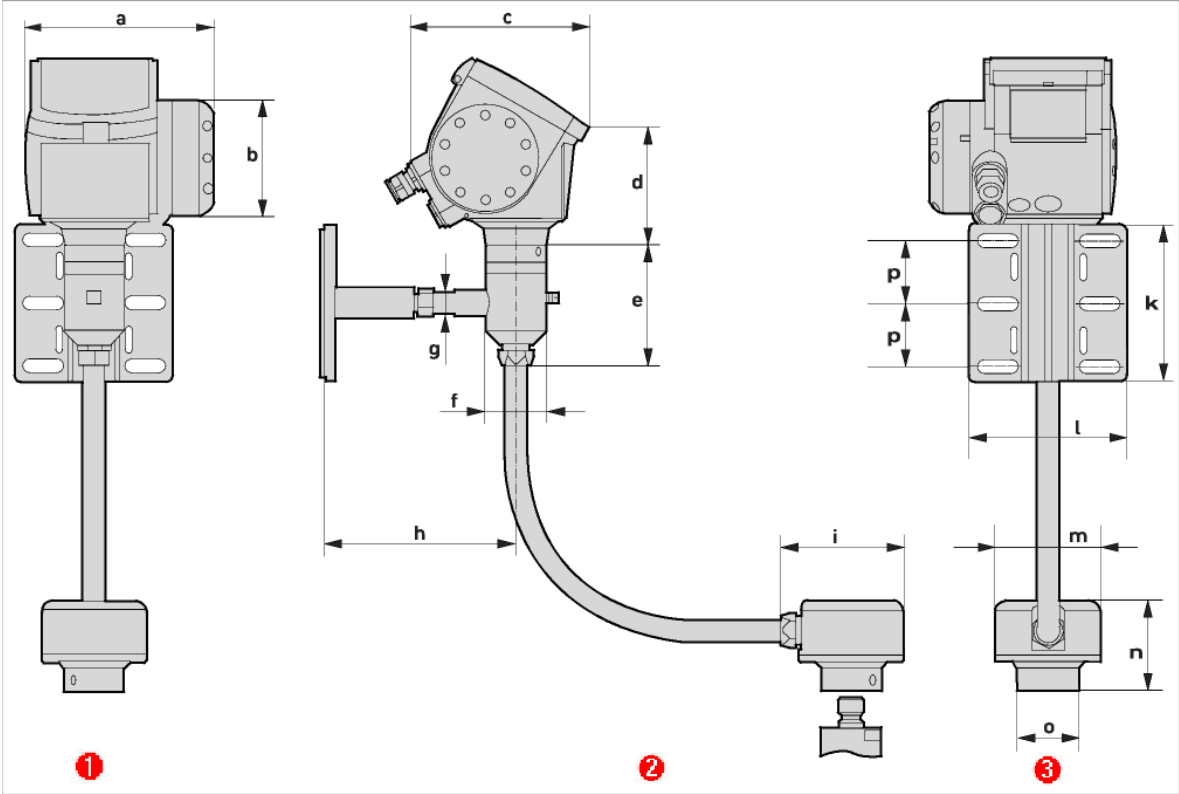
**Dimensions in mm and kg**

	Dimensions – mm (inches)									Weights kg (lb)
	a	b	c	D (1)	e	f	g	H (2)	I (2)	
Housing	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	-	-	-	3.3 (7.3)
Flange DN25...80 (ASME1...3)	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	123 (4.8)	320 (12.6)	357 (14.1)	4...7 (8.8... 15.4)
Flange DN100...150 (ASME4...8)	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	123 (4.8)	320 (12.6)	357 (14.1)	7...12 (15.4... 26.5)
Thread, single cable Ø2 (Ø0.08) – version HT/HTP	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	144 (5.7)	341 (13.4)	378 (14.9)	4.3 (9.5)
Thread, single cable Ø2 (Ø0.08) - version HP	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	43 (1.7)	240 (9.4)	277 (10.9)	4 (8.8)
Thread, all other probes	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (7.2)	170 (6.7)	197 (7.8)	95 (3.7)	292 (11.5)	329 (12.9)	3 (6.6)

1 This dimension is subject to the size of the cable gland used

2 With 30 kV ESD protection option: add 3.9" (99mm) to this dimension. With Metaglas® option: add 1.7" (43mm) to this dimension.

Remote Housing



- 1 Front view
- 2 Left side
- 3 Rear view

Note:

- Refer to "ESD protection and Metaglas® (dual process sealing system for dangerous products) options" for the height to add to dimension "n".

Dimensions and Weights in mm and kg

	Dimensions [mm]															Weight [kg]
	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	
Remote version	180	109	165	193	98.5	58	21	183	117	150	150.4	100	86	58	60	6.6... 12.85 (1)

1 wall bracket (1.4 kg) + housing support (1.5 kg) + remote probe housing (2.7 kg) + flexible conduit (2 m: 1 kg; 4.5 m: 2.25 kg; 9.5 m: 4.75 kg; 14.5 m: 7.25 kg)

Dimensions and Weights in inches and lbs

	Dimensions [inches]															Weight [lbs]
	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	
Remote version	7.09	4.29	6.50	7.60	3.88	2.28	0.83	7.20	4.60	5.91	5.92	3.94	3.39	2.28	2.36	14.6... 28.3 (1)

1 wall bracket (3.1 lbs) + housing support (3.3 lbs) + remote probe housing (6.0 lbs) + flexible conduit (6.6 ft: 2.2 lbs; 14.8 ft: 5.0 lbs; 31.2 ft: 10.5 lbs; 47.6 ft: 16.0 lbs)

### Remote Version Limits

For interface and solid (powder, granulate) applications the maximum extension length is 4.5 m / 14.8 ft.

- For liquid level applications, the maximum measuring range is reduced according to the length of the coaxial cable between the flange and the converter (extension length).

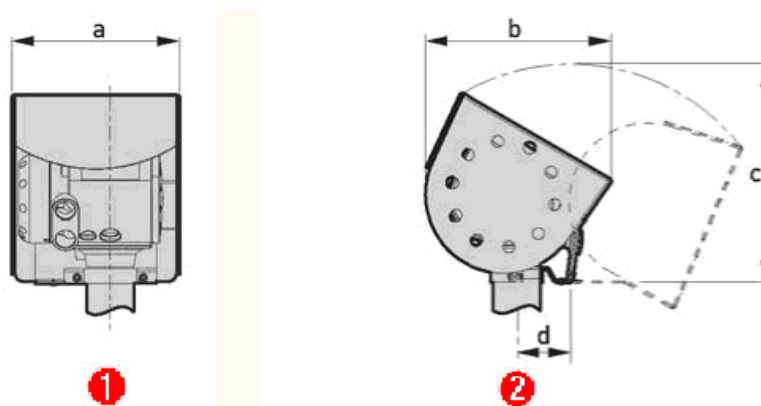
Extension length		Max. measuring range (or sensor length, L)	
[m]	[ft]	[m]	[ft]
2	6.6	30	98
4.5	14.8	25	82
9.5	31.2	15	29
14.5	47.6	5	16.4

### Applications

Tank with a lot of vibration

- Limited space on the top of the tank or limited access (due to the size of the compact converter)
- Remote display at the bottom of the tank

### Weather Protection Option



### Dimensions and Weight in mm and kg

	Dimensions [mm]				Weight [kg]
	a	b	c	d	
Weather protection	208	231.5	268 (1)	66	2.9

1 radius

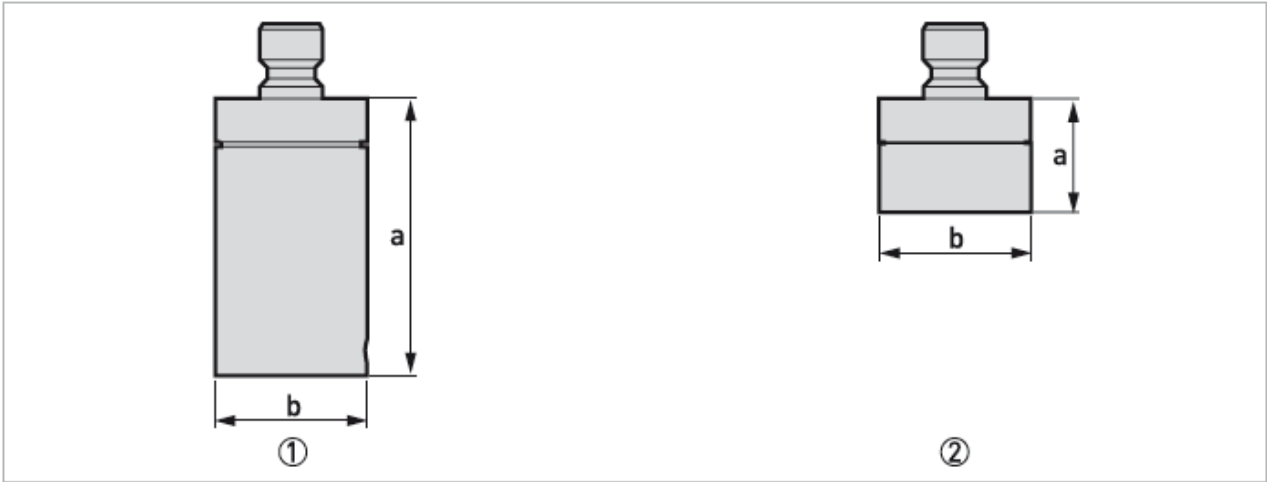
### Dimensions and Weight in inches and lbs

	Dimensions [inches]				Weight [lbs]
	a	b	c	d	
Weather protection	8.2	9.1	10.6 (1)	2.6	6.4

1 radius



ESD Protection and Metaglas® Options



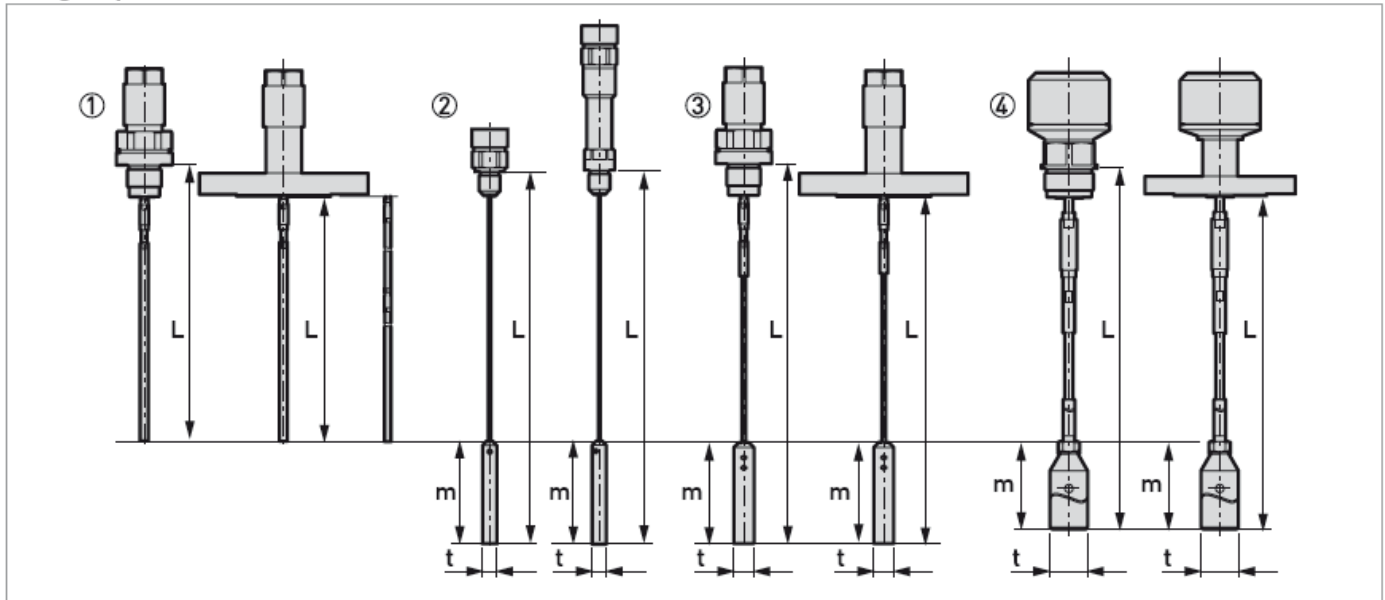
- 1 Optional ESD protection (30 kV) for solid applications
- 2 Optional Metaglas® (dual process sealing system for dangerous products)

The ESD Protection and the Metaglas Options cannot be fitted to the same Device.

Special Options: Dimensions and Weight

Options	Dimensions – mm (inches)		Weights kg (lb)
	a	b	
ESD protection 30 kV	99 (3.9)	Ø58 (Ø2.3)	0.85 (1.87)
Metaglas®	43 (1.7)	Ø58 (Ø2.3)	0.83 (1.82)

## Single probes



- 1 Single rod Ø8 mm / Ø0.3" (thread and flange versions). A segmented probe option shown on the right side. An optional protective sheath is available on request for the flange version.
- 2 Single cable Ø2 mm / Ø0.08" (the only thread version for the High-Pressure (HP) option and the only thread version for the High-Temperature (HT) and High-Temperature/High-Pressure (HT/HP) options)
- 3 Single cable Ø4 mm / Ø0.15" (thread and flange versions - an optional FEP coating is available on request)
- 4 Single cable Ø8 mm / Ø0.3" (thread and flange versions)

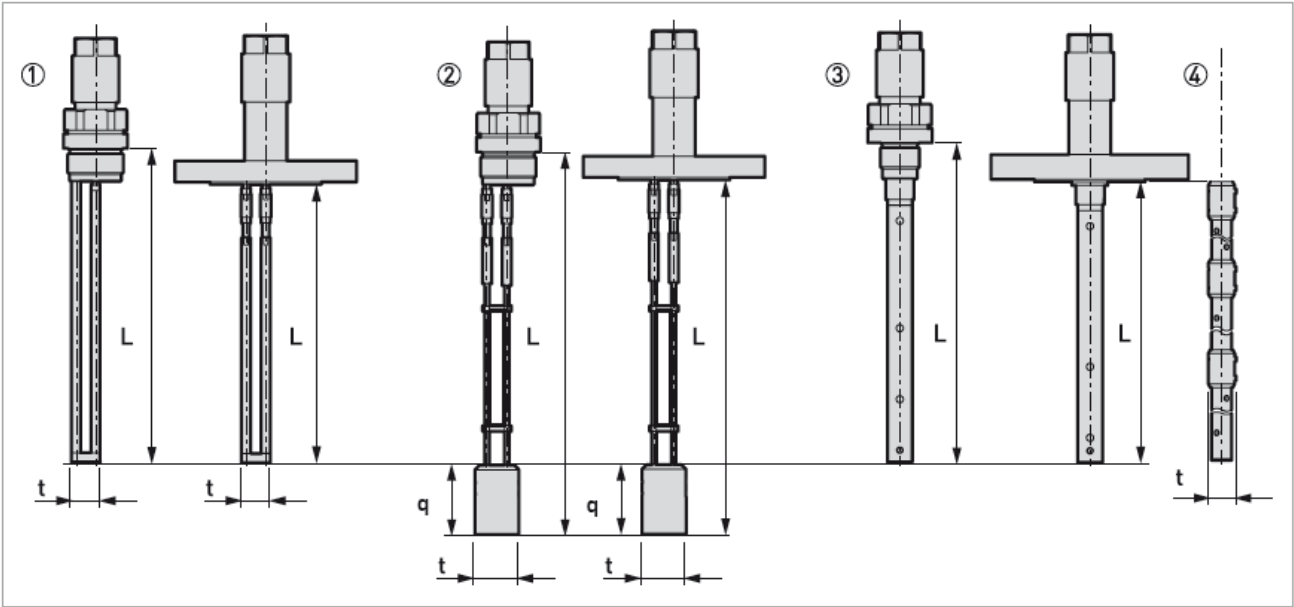
A wide range of counterweights and anchoring solutions are available. For dimensional data, refer to the pages that follow.  
For installation data, refer to the handbook.

## Single Probes: Dimensions

Probes	Dimensions – mm (inches)			
	L min (2)	L max	m	t
Single rod Ø8 mm (Ø0.3") (1)	600 (24)	4000 (158)	-	-
Single rod Ø8 mm (Ø0.3") (segmented) (1)	600 (24)	6000 (236)	-	-
Single cable Ø2 mm (Ø0.08") (3)	600 (24)	35000 (1378)	100 (3.9)	Ø14 (Ø0.6)
Single cable Ø4 mm (Ø0.15") (4)	600 (24)	35000 (1378)	100 (3.9)	Ø20 (Ø0.8)
Single cable Ø8 mm (Ø0.3") (4)	600 (24)	35000 (1378)	0 (5)	Ø38 (Ø1.5)

- 1 A device with this probe option must be assembled on site. For the assembly procedure, refer to the handbook or the printed procedure supplied with the components.
- 2 A shorter probe length is available on request
- 3 1 counterweight option (Ø0.6×3.9"). No anchoring solution is available.
- 4 Refer to the end of this section for data about all the probe end options
- 5 This value is for the Ø0.5" counterweight. If you ordered the Ø1.5" counterweight: 9.6"

Double Probes



- 1 Double rod Ø8 mm / Ø0.3" (thread and flange versions)
- 2 Double cable Ø4 mm / Ø0.15" (thread and flange versions)
- 3 Coaxial Ø22 mm / Ø0.9" (thread and flange versions)
- 4 Segmented coaxial Ø22 mm / Ø0.9" (thread and flange versions)

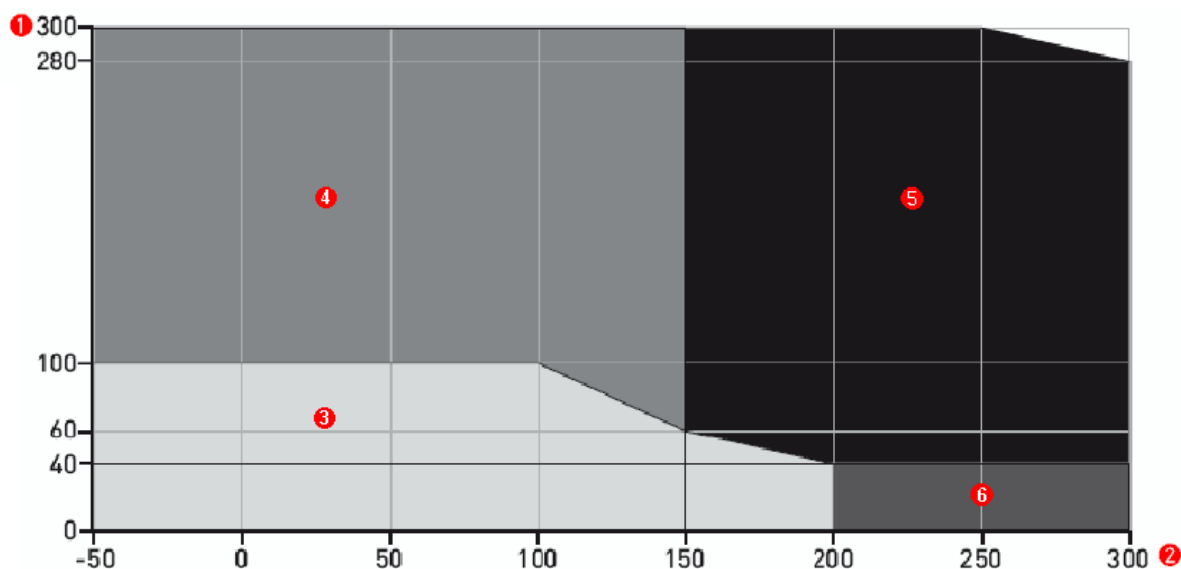
A wide range of counterweights and anchoring solutions are available. For dimensional data, refer to the pages that follow.  
 For installation data, refer to the handbook.

Probes	Dimensions – mm (inches)			
	L min (1)	L max	q	t
Double rod Ø8 mm (Ø0.3")	1000 (40)	4000 (158)	-	25 (1.0)
Double cable Ø4 mm (Ø0.15") (2)	1000 (40)	8000 (315)	60 (2.4)	Ø38 (Ø1.5)
Coaxial Ø22 mm (Ø0.9")	500 (20)	6000 (236)	-	-
Coaxial Ø22 mm (Ø0.9") (segmented) (3)	500 (20)	6000 (236)	-	Ø28 (Ø1.1)

- 1 A shorter probe length is available on request
- 2 Refer to the end of this section for data about all the probe end options
- 3 A device with this probe option must be assembled on site. For the assembly procedure, refer to the handbook or the printed procedure supplied with the components.

### Pressure/Temperature Table for Probe Selection

Ensure that the transmitters are used within their operating limits. Observe the following requirements.



1 Process pressure, Ps [bar]

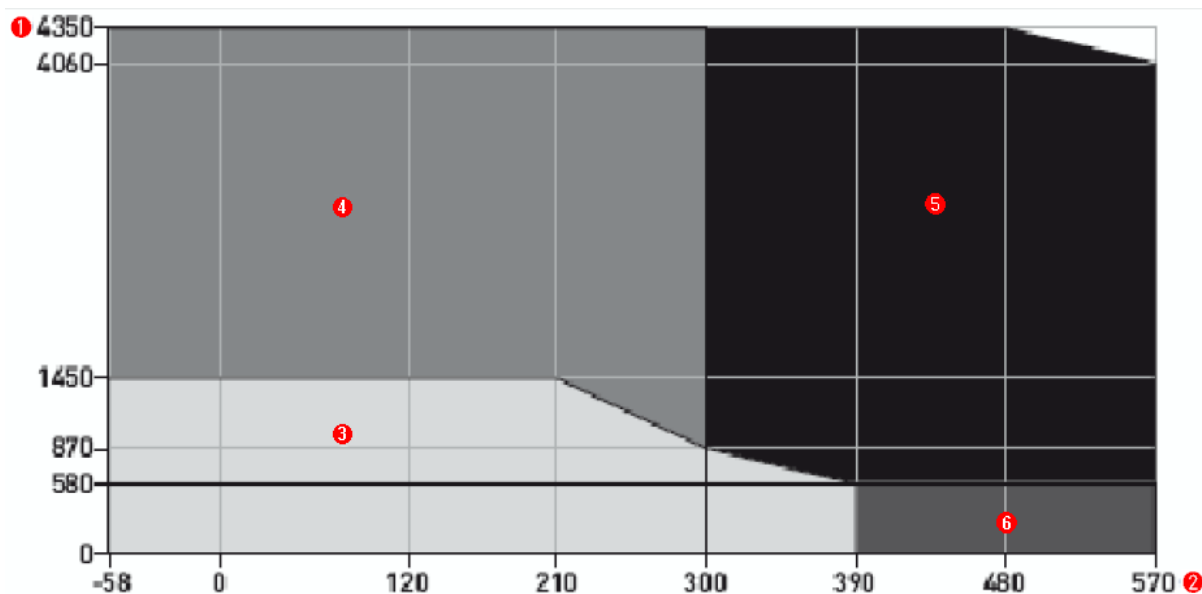
2 Process connection temperature, T [°C]

3 All probes

4 High-Pressure (HP) version of the Ø2 mm single cable probe

5 High-Temperature/High-Pressure (HT/HP) version of the Ø2 mm single cable probe

6 High-Temperature (HT) version of the Ø2 mm single cable probe



1 Process pressure, Ps [psi]

2 Process connection temperature, T [°F]

3 All probes

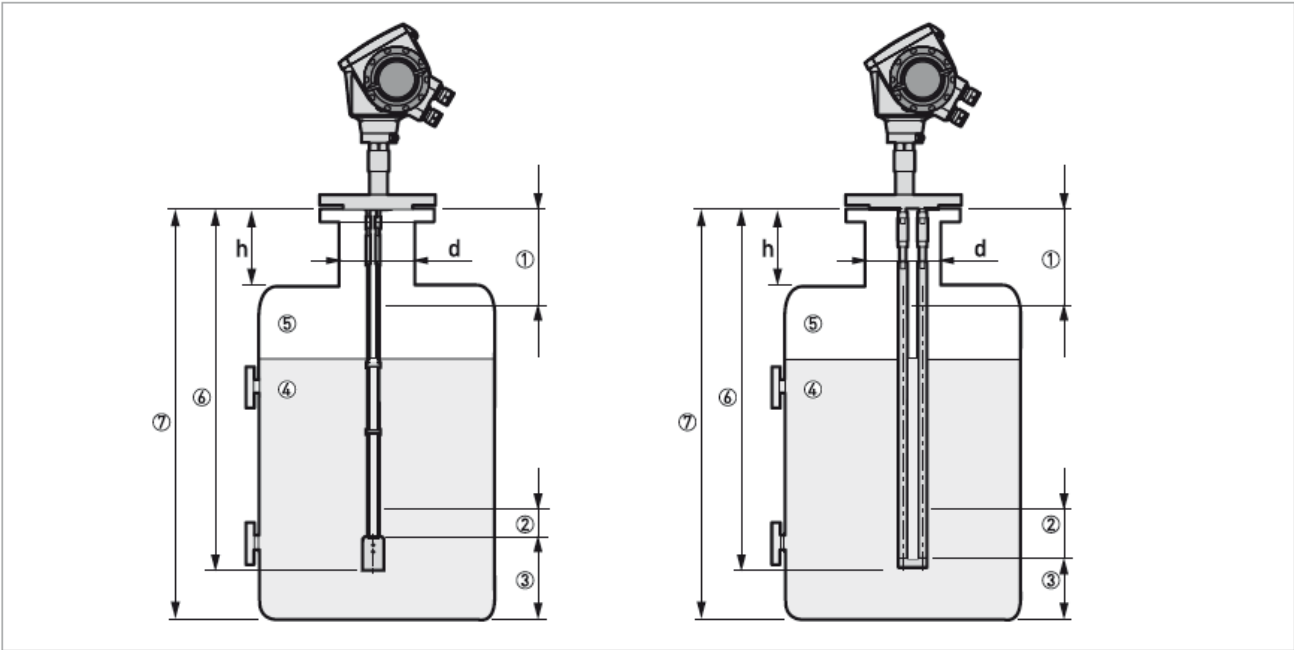
4 High-Pressure (HP) version of the Ø0.08" single cable probe

5 High-Temperature/High-Pressure (HT/HP) version of the Ø0.08" single cable probe

6 High-Temperature (HT) version of the Ø0.08" single cable probe

Measurement Limits

Double Cable and Double Rod Probes



- 1 A1, Top dead zone: Distance from the flange to the top limit of the 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 Gas (Air)
- 5 Product
- 6 L, Probe length: Length specified by the customer in the order. This is also the maximum measuring length for some probe types in direct mode and all devices that operate in TBF mode.
- 7 Tank Height

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

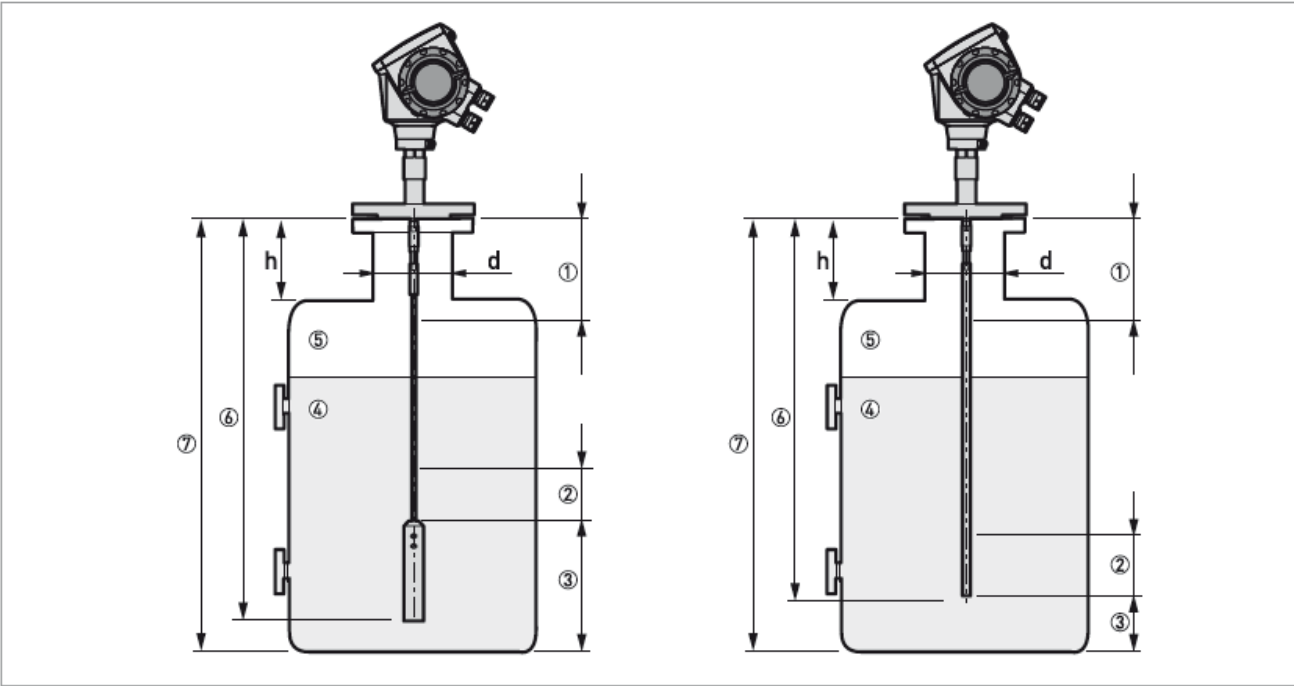
- If **h < d**, then the top dead zone (A1) is equal to the top dead zone for the probe only. Refer to the table that follows.
- If **h > d**, then the top dead zone (A1) is equal to the tank nozzle height plus the top dead zone for the probe.

Measurement Limits in mm and inches

Probes	Top dead zone, A1 $\Sigma r = 80$		Bottom dead zone, A2 $\Sigma r = 80$		Top dead zone, A1 $\Sigma r = 2.3$		Bottom dead zone, A2 $\Sigma r = 2.3$	
	mm	inches	mm	inches	mm	inches	mm	inches
Double rod Double cable	125	4.9	10	0.4	165	6.5	50	1.95

80 is  $\Sigma r$  of water; 2.3 is  $\Sigma r$  of oil

Single Cable and Single Rod Probes



- 1 A1, Top dead zone: Distance from the flange to the top limit of the 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 Gas (Air)
- 5 Product 1
- 6 L, Probe length: Length specified by the customer in the order. This is also the maximum measuring length for some probe types in direct mode and all devices that operate in TBF mode.
- 7 Tank Height

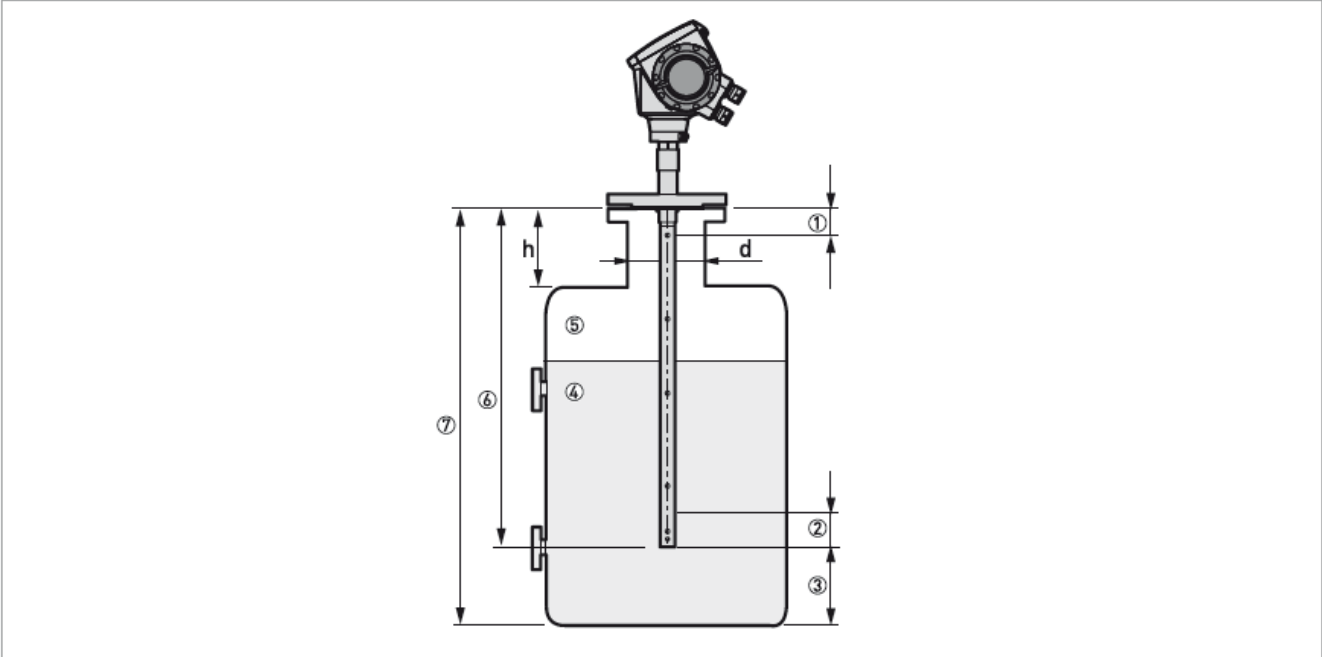
**h** is the height of the nozzle. **d** is the diameter of the tank nozzle.

- If **h < d**, then the top dead zone (A1) is equal to the top dead zone for the probe only. Refer to the table that follows.
- If **h > d**, then the top dead zone (A1) is equal to the tank nozzle height plus the top dead zone for the probe.

Measurement Limits in mm and inches

Probes	Top dead zone, A1 $\Sigma r = 80$		Bottom dead zone, A2 $\Sigma r = 80$		Top dead zone, A1 $\Sigma r = 2.3$		Bottom dead zone, A2 $\Sigma r = 2.3$	
	mm	inches	mm	inches	mm	inches	mm	inches
Single rod Single cable	200	7.9	10	0.4	250	9.9	50	1.95

Coaxial Probe



- 1** A1, Top dead zone: Distance from the flange to the top limit of the 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** Gas (Air)
- 5** Product 1
- 6** L, Probe length: Length specified by the customer in the order. This is also the maximum measuring length for some probe types in direct mode and all devices that operate in TBF mode.
- 7** Tank Height

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

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

Measurement Limits in mm and inches

Probes	Top dead zone, A1 $\Sigma r = 80$		Bottom dead zone, A2 $\Sigma r = 80$		Top dead zone, A1 $\Sigma r = 2.3$		Bottom dead zone, A2 $\Sigma r = 2.3$	
	mm	inches	mm	inches	mm	inches	mm	inches
Coaxial	10	0.4	10	0.4	10	0.4	50	1.95

*Specifications are subject to change without notice.*

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