

SmartLine® Guided Radar Level Meter Technical Datasheet

34-VF-03-20
October 14th, 2008

Specification

The superior TDR solution

The SmartLine 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
- Easy navigation using a touch screen without opening the housing (installation wizard)
- Configuration software and DTMs included as standard
- Optional second current output - used for displaying interface measurements, for example
- Higher signal dynamics and sharper pulses improve accuracy
- Display in 9 languages: in Chinese, Japanese and Russian

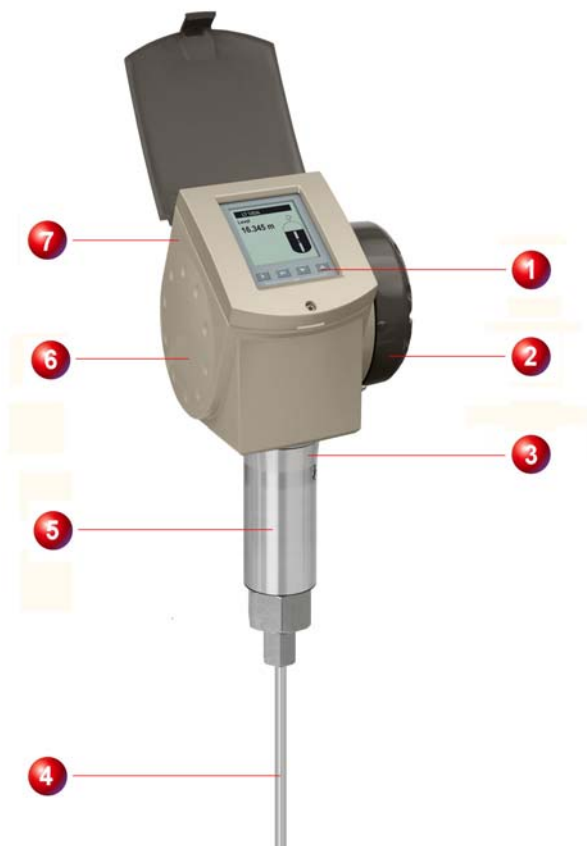
Industries

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

Applications

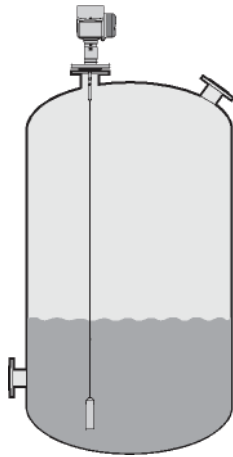
- Blending tanks
- Distillation tanks
- Process tanks
- Separator
- Solid silos (inventory)
- Storage tanks

Figure 1 – SmartLine Guided Radar Level Meter



- 1 Touch screen with 4-button operation
- 2 2-wire level meter
- 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)
- 6 Same housing for Ex and non-Ex
- 7 Large graphical display

Applications



1. Level measurement of liquids

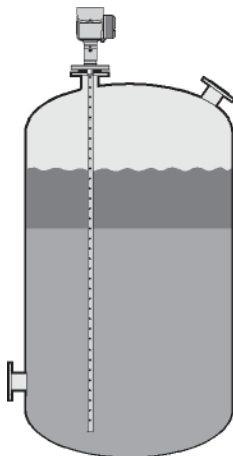
The SmartLine Guided Radar Level Meter can measure the level of a wide range of liquid products on a large variety of installations, including LPG and LNG. It does not require calibration or commissioning when installed. It can measure any liquid within the stated pressure and temperature range.

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. Level 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.

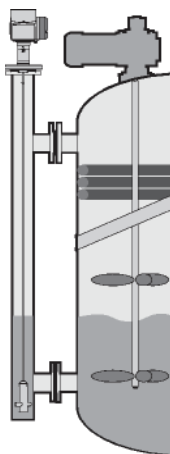
The coaxial probe of the SmartLine Guided Radar Level Meter has a top dead zone of only 10 mm / 0.4": this makes it ideal for tracking full tank or ballast interface.



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

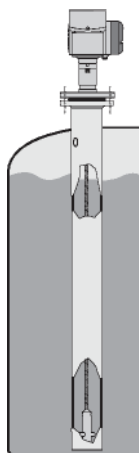
Please refer to the User manual for details of how and where to use these products.

3. 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.

4. Level measurement of liquids in a still well

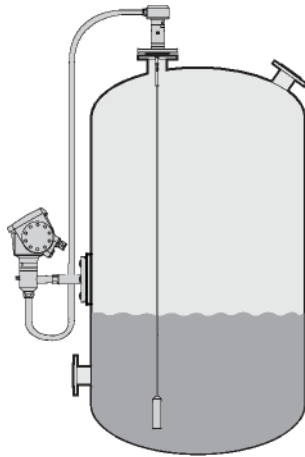


You can also install the SmartLine Guided Radar Level Meter in still well if there are vortices, agitators or other obstructions in the tank. It is also suitable for tanks with floating roofs. The SmartLine Guided Radar Level Meter setup wizard allows you to quickly configure your instrument to suit 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.

5. 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.

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
Max. measuring range	
Double rod Ø8 mm / 0.3"	4 m / 13 ft
Single rod Ø8 mm / 0.3"	4 m / 13 ft
Coaxial Ø22 mm / 0.9"	6 m / 20 ft
Double cable Ø4 mm / 0.15"	8 m / 26 ft
Single cable Ø2 mm / 0.08"	35 m / 115 ft
Single cable Ø4 mm / 0.15"	35 m / 115 ft
Single cable Ø8 mm / 0.3"	35 m / 115 ft

Output

Output signal (Output 1)	4...20 mA HART® or 3.8...20.5 mA acc. to NAMUR NE 43
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

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" (εΓ constant)
Accuracy (in TBF mode)	±20 mm / ±0.8" (εΓ constant)
Minimum layer (interface)	50 mm / 2"

Process conditions

Ambient temperature	-40...+80°C / -40...+175°F (EEx i: see supplementary operating instructions or approval certificates)
Storage temperature	-40...+85°C / -40...+185°F
Flange temperature	-40...+200°C / -40...+390°F (EEx i: see supplementary operating instructions or approval certificates) (2)
Thermal shock resistance	100°C/min
Operating pressure	-1...300 barg / -14.5...4350 psig; subject to process connection temperature and probe type used (3)
Dielectric constant ($\hat{\epsilon}_r$)	
Level in direct mode	≥ 1.4 for coaxial probe; ≥ 1.6 for single and double probes
Interface in direct mode	$\epsilon\Gamma(\text{interface}) > > \epsilon\Gamma(\text{level})^2$ (>> more than 2 times the value)
Level in TBF mode	≥ 1.1
Vibration resistance	IEC 68-2-6 and EN 50178 (10...57 Hz: 0.075 mm / 57...150 Hz:1g)
Protection category	IP 66/67 equivalent to NEMA 6-6X

Material

Housing	Aluminum; Stainless steel
Single rod	Stainless steel (1.4404 / 316 L); Hastelloy® C-22 (2.4602)
Double rod	Stainless steel (1.4404 / 316 L); Hastelloy® C-22 (2.4602)
Coaxial	Stainless steel (1.4404 / 316 L); Hastelloy® C-22 (2.4602)
Single cable	Stainless steel (1.4401 / 316); Hastelloy® C-22 (2.4602) (only cable $\varnothing 4$ mm / 0.15") (4)
Double cable	Stainless steel (1.4401 / 316)
Process fitting	Stainless steel (1.4404 / 316L); Hastelloy® C-22 (2.4602)
Gaskets	FKM/FPM (-40...+200°C / -40...+390°F); Kalrez® 6375 (-20...+200°C / -5...+390°F)
Weather protection (Option)	Stainless steel (1.4301 / 304)
Conduit for remote housing (Option)	Zinc-coated steel in a PVC sheath (-40...+105°C/-40...+220°F)

Process Connections

Thread, single cable $\varnothing 2$ mm / 0.08"	G ½; ½ NPT
Thread, single cable $\varnothing 8$ mm / 0.3"	G 1½; 1½ NPT
Thread, all other probes	G ¾...1½; ¾...1½ NPT
Flange, single cable $\varnothing 8$ mm / 0.3"	DN40...150 (PN40 / PN16); 1½"...8" (150 lb / 300 lb); 10K (40...100A) (5)
Flange, all other probes	DN25...150 (PN40 / PN16); 1"...8" (150 lb / 300 lb); 10K (40...100A) (5)

Electrical Connections

Instrument terminal 1 - Non-Ex / EEx i	14...30 VDC (6)
Instrument terminal 1 - EEx d	20...36 VDC (6)
Instrument terminal 2 - Non-Ex/ EEx i/ EEx d	10...30 VDC (7)
Cable entry	M20x1.5; ½ NPT; G ½ (FM & CSA approvals are not pending for the stainless steel option) ; M25x1.5 (for stainless steel housing only)
Cable tightening capacity	0.5...1.5 mm ²

User Interface

Display	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

Approvals

ATEX (approval pending)	ATEX II 1, 1/2, 2 G/D EEx ia IIC T6...T3; ATEX II 1/2, 2 G/D EEx d [ia] IIC T6...T3; ATEX II 3 G EEx nA IIC T6...T3
IECEX (approval pending)	Ex iaD 21 T65...T90 IP 6X; Ex ia IIC T6...T4 IP 66
FM or CSA (approval pending)	
NEC 500/ CEC	Cl. I, Div . 1, Gr. ABCD (IS);
	Cl. I, Div . 1, Gr. ABCD (FM only) (XP); (FM approval pending)
	Cl. I, Div . 2, Gr. ABCD (XP/NI);
	Cl. II, Div . 1, Gr. EFG; Cl. III (FM only) (XP); (FM approval pending)
	Cl. II Div . 1, Gr. EFG; Cl. III (IS);
	Cl. II/III, Div . 2, Gr. FG (XP/NI)
NEC 505/ CEC	Cl. I, Zone 0 AEx ia Gr. IIC (CSA: Ex ia) (IS); (CSA approval pending)
	Cl. I, Zone 1 AEx d [ia] Gr. IIC (XP);
	Cl. I, Zone 2, AEx nA [ia], Gr. IIC (CSA: Ex nA [ia]) (IS) (CSA approval pending)
NEPSI (approval pending)	Ex dia IIC T3...T6; Ex ia IIC T3...T6
Other approvals	Gosstandard; PESO (India) – all pending approval

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)
Accessories	Weather protection

- 1 optional
- 2 refer to the Pressure/temperature table for probe selection. 315°C / 599°F pending for the high-temperature (HT) version of the Ø2 mm / 0.15" single cable probe.
- 3 refer to the Pressure/temperature table for probe selection
- 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;

Probe Selection

	Double Rod	Single Rod	Coaxial	Double Cable	Single Cable Ø8mm / 0.3"	Single Cable Ø4mm / 0.15"	Single Cable Ø2mm / 0.08"
Maximum Probe Length, L							
4m / 13ft	■	■					
6m / 20ft			■				
8m / 26ft				■			
35m / 115ft					■	■	■
Liquids							
Liquid application	■	■	■	■		■	■
LPG, LNG	■		■	■			
Highly viscous liquids		■				■	■
Highly crystallizing liquids		■				■	■
Highly corrosive liquids	■	■	■			■	■
Foam		■	■			■	■
Agitated liquids	■		■	(1)		(1)	(1)
High pressure applications	(2)	(2)	(2)	(2)		(2)	(3)
Spray in tank			■				
Storage tanks	■		■	■		■	■
Installation in bypass chamber	■		■	■		■	■
Small diameter nozzles	■		■	■			
Long nozzles	■		■	■			
Stilling wells	■	■	■	■		■	■
Interface measurement	■		■	■		(4)	(4)
Solids							
Powders					■	(5)	
Granules, <5mm / 0.1"					■	(5)	

1 with anchor fitting

2 max. pressure is 150 bar / 2175 psig. Refer to the pressure-temperature table for probe selection.

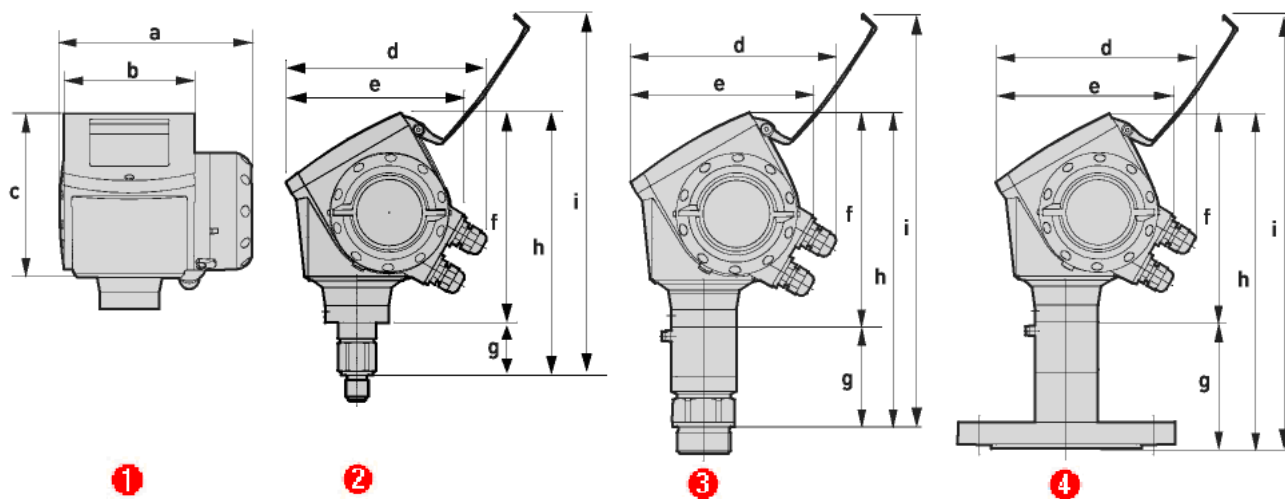
3 optional. Max. pressure is 300 bar / 4350 psig. Refer to the pressure-temperature table for probe selection.

4 max. length is 20 m / 65.5 ft

5 max. length is 10 m / 33 ft

Dimensions and Weight

Standard Housing



- 1 Converter (front view)
- 2 Thread version for Ø2 mm/0.08" single cable probe (right side)
- 3 Thread version for all other probes (right side)
- 4 Flange version (right side)

Note

- Cable glands are delivered on demand with non-Ex.
- Non-Ex fittings are plastic. Non-Ex fittings are black.
- The diameter of the outer sheath of the cable must be 6...12 mm or 0.2...0.5".

Dimensions in mm and kg

	Dimensions [mm]									Weight [kg]
	a	b	c	d	e	f	g	h	i	
Housing	180	122	158.5	182 (1)	170	190				3.3
Flange DN25... 80	180	122	158.5	182 (1)	170	190	126.5	316.5 (2)	353.5 (3)	4... 7
Flange CN100...150	180	122	158.5	182 (1)	170	190	126.5	316.5 (2)	353.5 (3)	7... 12
Thread, single cable Ø2	180	122	158.5	182 (1)	170	190	48	238 (4)	275 (5)	4
Thread, all other probes	180	122	158.5	182 (1)	170	190	99	289 (6)	326 (7)	3

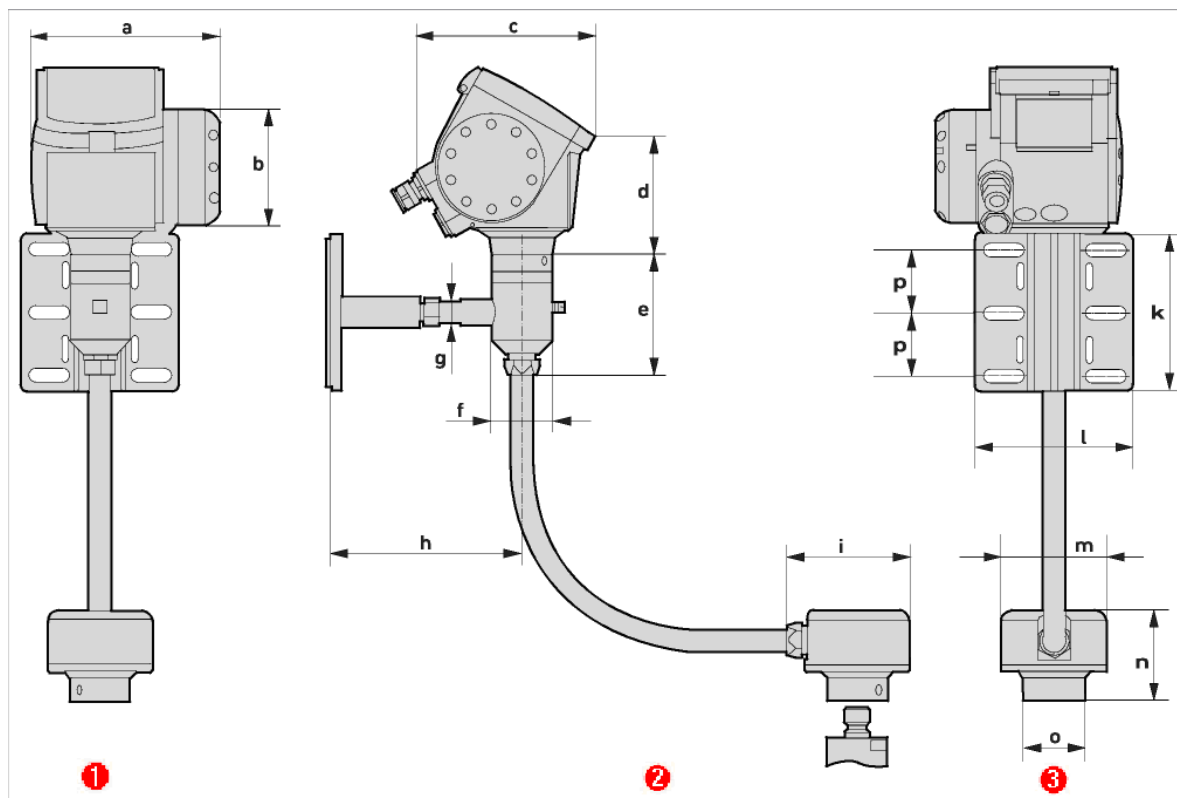
- 1 if fitted with standard cable glands
- 2 with option for 30 kV ESD protection: 415.5 mm.
- 3 with option for 30 kV ESD protection: 452.5 mm.
- 4 with option for 30 kV ESD protection: 337 mm.
- 5 with option for 30 kV ESD protection: 374 mm.
- 6 with option for 30 kV ESD protection: 388 mm.
- 7 with option for 30 kV ESD protection: 425 mm.

Dimensions in inches and lbs

	Dimensions [inches]									Weight [lbs]
	a	b	c	d	e	f	g	h	i	
Housing	7.1	4.8	6.2	7.2 (1)	6.7	7.5				3.3
Flange DN25... 80	7.1	4.8	6.2	7.2 (1)	6.7	7.5	5.0	12.5 (2)	13.9 (3)	8.8... 15.4
Flange CN100...150	7.1	4.8	6.2	7.2 (1)	6.7	7.5	5.0	12.5 (2)	13.9 (3)	15.4... 26.5
Thread, single cable Ø8	7.1	4.8	6.2	7.2 (1)	6.7	7.5	1.9	9.4 (4)	10.8 (5)	8.8
Thread, all other probes	7.1	4.8	6.2	7.2 (1)	6.7	7.5	3.9	11.4 (6)	12.8 (7)	6.6

- 1 if fitted with standard cable glands
- 2 with option for 30 kV ESD protection: 16.4".
- 3 with option for 30 kV ESD protection: 17.8".
- 4 with option for 30 kV ESD protection: 13.3".
- 5 with option for 30 kV ESD protection: 14.7".
- 6 with option for 30 kV ESD protection: 15.2".
- 7 with option for 30 kV ESD protection: 16.7".

Remote Housing



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

Note:

- Refer to "ESD protection" 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

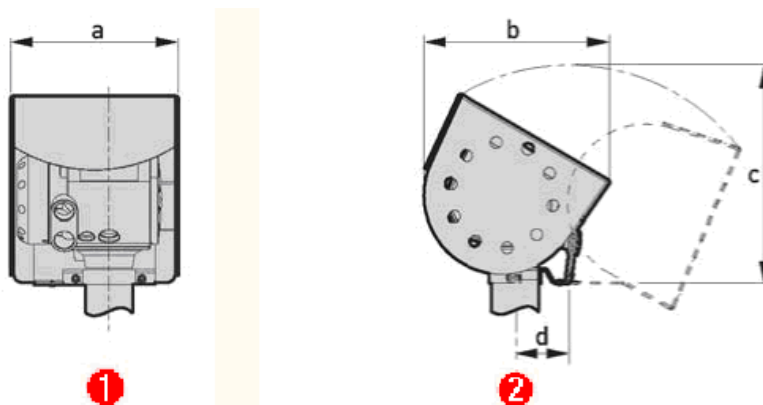
- For interface and solid (powder, granulate) applications the maximum extension length is 4.5 m / 14.8 ft.
- For liquid level applications, the maximum measuring range is reduced according to the length of the coaxial cable between the flange and the converter (extension length).

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

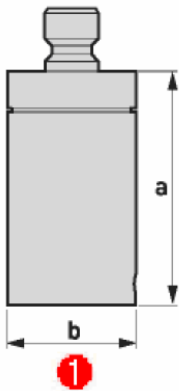
1 radius

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 option



1 Optional ESD protection (30 kv) for solids applications

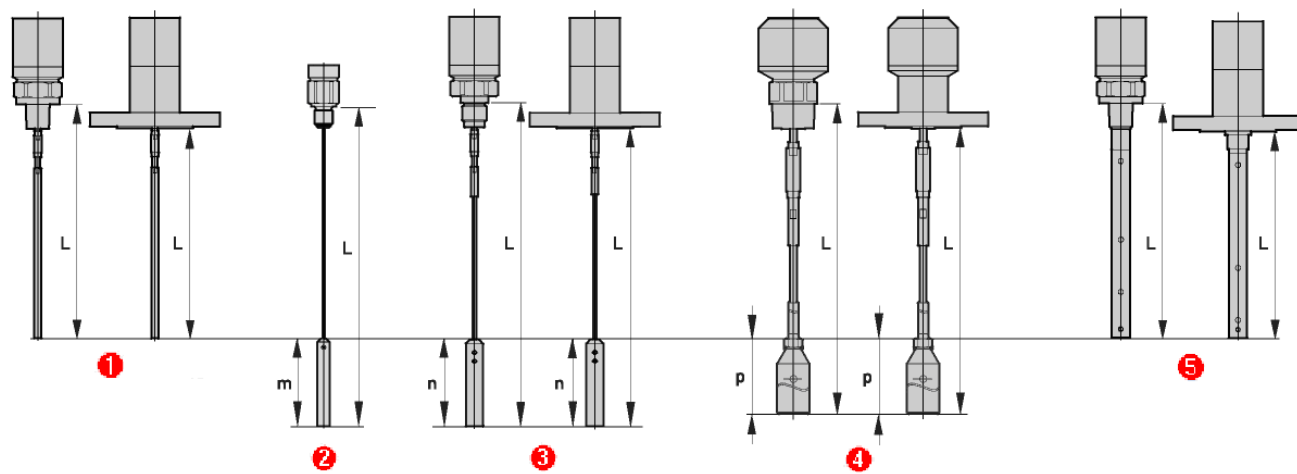
Special options: Dimensions and weight in mm and kg

Option	Dimensions [mm]		Weight (kg)
	a	b	
ESD protection 30 kV	100	∅58	0.83

Special options: Dimensions and weight in inches and lbs

Options	Dimensions [inches]		Weight (lbs)
	a	b	
ESD protection 30 kV	3.9	∅2.3	1.87

Single probes



- 1 Single rod $\varnothing 8$ mm / $\varnothing 0.3$ " (thread and flange versions)
- 2 Single cable $\varnothing 2$ mm / $\varnothing 0.08$ " (thread version)
- 3 Single cable $\varnothing 4$ mm / $\varnothing 0.15$ " (thread and flange versions)
- 4 Single cable $\varnothing 8$ mm / $\varnothing 0.3$ " (thread and flange versions)
- 5 Coaxial $\varnothing 22$ mm / $\varnothing 0.9$ " (thread and flange versions)

Single probes: Dimensions in mm

Probes	Dimensions [mm]			
	L max.	m	n	p
Single rod $\varnothing 8$ mm	4000	-	-	-
Single cable $\varnothing 2$ mm	35000	100	-	-
Single cable $\varnothing 4$ mm	35000	-	100	-
Single cable $\varnothing 8$ mm	35000	-	-	0 (1)
Coaxial $\varnothing 22$ mm	6000	-	-	-

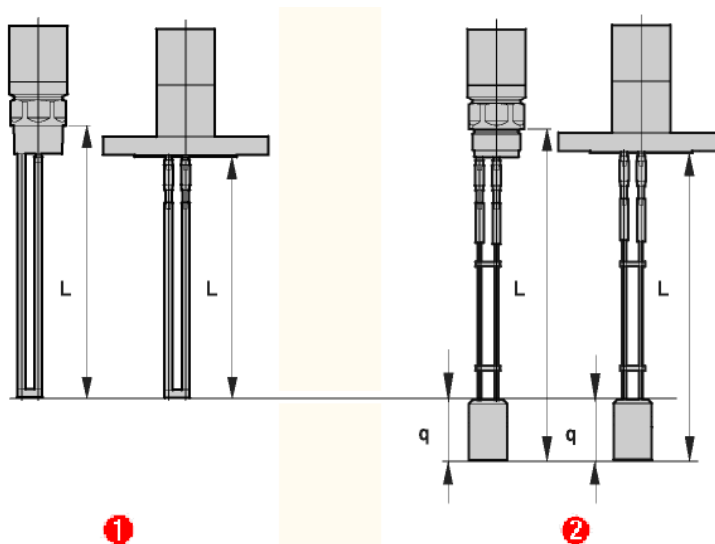
1 for $\varnothing 12$ mm counterweight. If $\varnothing 38$ mm counterweight ordered: 245 mm

Single probes: Dimensions in inches

Probes	Dimensions [inches]			
	L max.	m	n	p
Single rod $\varnothing 0.3$ "	158	-	-	-
Single cable $\varnothing 0.08$ "	1378	3.9	-	-
Single cable $\varnothing 0.15$ "	1378	-	4.0	-
Single cable $\varnothing 0.3$ "	1378	-	-	0 (1)
Coaxial $\varnothing 0.9$ "	236	-	-	-

1 for $\varnothing 0.5$ " counterweight. If $\varnothing 1.5$ " counterweight ordered: 9.6"

Double probes



- 1 Double rod $\text{\O}8$ mm / $\text{\O}0.3$ " (thread and flange versions)
- 2 Double cable $\text{\O}4$ mm / $\text{\O}0.15$ " (thread and flange versions)

Note:

A wide range of counterweights and anchoring solutions are available. Contact Honeywell for further information.

Double probes: Dimensions in mm

Probes	Dimensions [mm]	
	L max.	q
Double rod $\text{\O}8$ mm	4000	-
Double cable $\text{\O}4$ mm	8000	60

Double probes: Dimensions in inches

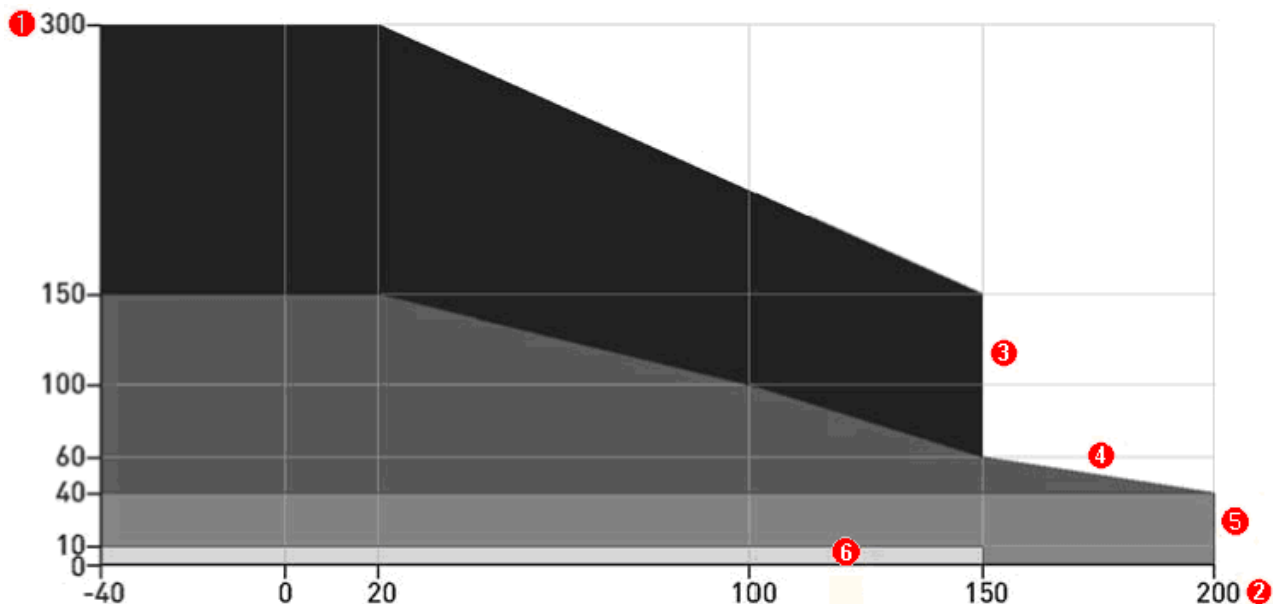
Probes	Dimensions [inches]	
	L max.	q
Double rod $\text{\O}0.3$ "	158	-
Double cable $\text{\O}0.15$ "	315	2.4

Probe weight

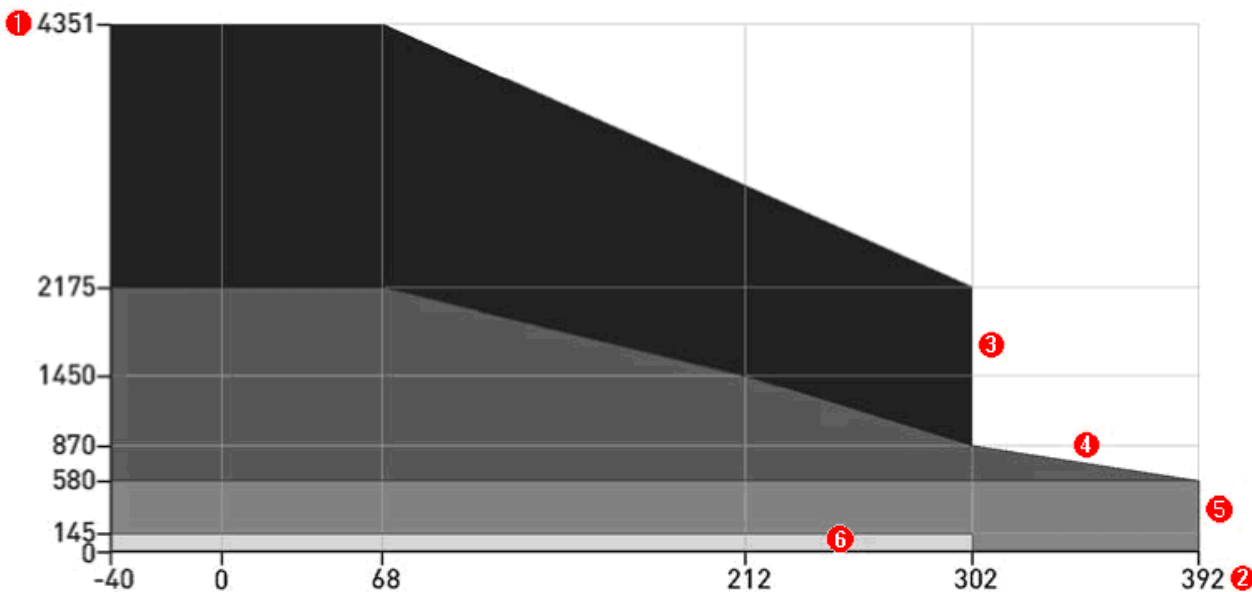
Probes	Min. process connection size		Weight	
	Thread	Flange	[kg/m]	[lbs/ft]
Single cable $\text{\O}2$ mm / 0.08"	G $\frac{1}{2}$ A; NPT $\frac{1}{2}$	-	0.016	0.035
Single cable $\text{\O}4$ mm / 0.15"	G $\frac{3}{4}$ A; NPT $\frac{3}{4}$	DN25 PN40; 1" 150 lb; 1 $\frac{1}{2}$ " 300 lb	0.12	0.08
Single cable $\text{\O}8$ mm / 0.3"	G $1\frac{1}{2}$ A; NPT $1\frac{1}{2}$	DN40 PN40; 1 $\frac{1}{2}$ " 150 lb; 1 $\frac{1}{2}$ " 300 lb	0.41	0.28
Double cable $\text{\O}4$ mm / 0.15"	G $1\frac{1}{2}$ A; NPT $1\frac{1}{2}$	DN50 PN40; 2" 150 lb; 2" 300 lb	0.24	0.16
Single rod $\text{\O}8$ mm / 0.3"	G $\frac{3}{4}$ A; NPT $\frac{3}{4}$	DN25 PN40; 1" 150 lb; 1 $\frac{1}{2}$ " 300 lb	0.41	0.28
Double rod $\text{\O}8$ mm / 0.3"	G $1\frac{1}{2}$ A; NPT $1\frac{1}{2}$	DN50 PN40; 2" 150 lb; 2" 300 lb	0.82	0.56
Coaxial $\text{\O}22$ mm / 0.9"	G $\frac{3}{4}$ A; NPT $\frac{3}{4}$	DN25 PN40; 1" 150 lb; 1 $\frac{1}{2}$ " 300 lb	0.79	0.53

Pressure/temperature table for probe selection

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

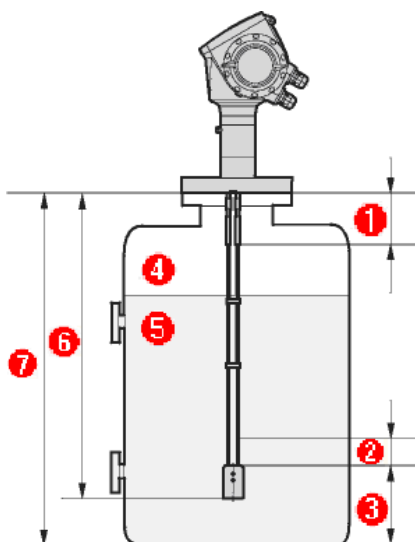


- 1 Process pressure, P_s [bar]
- 2 Flange temperature, T [°C]
- 3 High-pressure (HP) version of the $\varnothing 2$ mm single cable probe
- 4 Double rod, double cable, single rod, $\varnothing 4$ mm single cable and coaxial probes
- 5 $\varnothing 8$ mm single cable probe
- 6 Standard version of the $\varnothing 2$ mm single cable probe



- 1 Process pressure, P_s [psi]
- 2 Flange temperature, T [°F]
- 3 High-pressure (HP) version of the $\varnothing 0.08$ " single cable probe
- 4 Double rod, double cable, single rod, $\varnothing 0.15$ " single cable and coaxial probes
- 5 $\varnothing 0.3$ " single cable probe
- 6 Standard version of the $\varnothing 0.08$ " single cable probe

Measurement Limits



- 1 **A1, Top dead zone:** Min. distance from flange to top limit of measuring range.
- 2 **A2, Bottom dead zone:** Length at end of 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 customer in the order.
- 7 **Tank Height**

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 $\varnothing 8$ mm	200	10	250	50
Single cable $\varnothing 4$ mm	200	10	250	50
Single cable $\varnothing 2$ mm	200	10	250	50

80 is ϵ_r of water; 2.3 is ϵ_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 $\varnothing 0.3$ "	7.90	0.40	9.90	1.95
Single cable $\varnothing 0.15$ "	7.90	0.40	9.90	1.95
Single cable 0.08"	7.90	0.40	9.90	1.95

80 is ϵ_r of water; 2.3 is ϵ_r of oil

Ordering Information

Contact your nearest Honeywell sales office, or

In the U.S.:

Honeywell Process Solutions
Honeywell International Inc
2500 West Union Hills Drive
Phoenix, AZ 85027 1-800-343-0228

In Canada:

The Honeywell Centre
155 Gordon Baker Rd.
North York, Ontario M2H 3N7
1-800-461-0013

In Latin America:

Honeywell Inc.
480 Sawgrass Corporate Parkway,
Suite 200 Sunrise, FL 33325
(954) 845-2600

In Europe and Africa:

Honeywell S. A.
Avenue du Bourget 1
1140 Brussels, Belgium

In Eastern Europe:

Honeywell Praha,
s.r.o. Budejovicka 1
140 21 Prague 4,
Czech Republic

In the Middle East:

Honeywell Middle East Ltd.
Khalifa Street,
Sheikh Faisal Building
Abu Dhabi, U. A. E.

In Asia:

Honeywell Asia Pacific Inc.
Honeywell Building,
17 Changi Business Park Central 1
Singapore 486073
Republic of Singapore

In the Pacific:

Honeywell Pty Ltd.
5 Thomas Holt Drive
North Ryde NSW Australia 2113
(61 2) 9353 7000

In Japan:

Honeywell K.K.
14-6 Shibaura 1-chrome
Minato-ku, Tokyo, Japan 105-0023

Or, visit Honeywell on the World Wide Web at: <http://www.honeywell.com/ps>
Specifications are subject to change without notice.