

SmartLine® Non-Contact Radar Level Meter Technical Datasheet

34-VF-03-19
September 2009

Specification

The Universal Radar Solution

The SmartLine Non-Contact Radar Level Meter (FMCW) is for level measurement of liquids and can be used to calculate for volume assessment. SmartLine Non-Contact Radar Level Meters provide a more stable measurement than pulse radar and they are well suited for agitated process conditions.

Highlights

- ± 3 mm / ± 0.04 " standard accuracy
- Reliable measurement in difficult process conditions
- Operates up to a flange temperature of 200°C (390°F) and 40 barg (580 psig)
- Measuring range up to 80 m (260 ft)
- Long antenna versions can be extended to suit nozzle length
- Drop antenna for corrosive liquids (with optional PTFE/PP flange plate) or where product build-up is likely
- Sealed drop antenna extension option for pressurized tanks
- Configuration software and HART DTMs included as standard
- Optional second current output
- Direct-accessible graphic touchscreen/wizard (option)
- Converter rotates 360°
- Triple barrier gas-tight protection available for working with dangerous gases (using pre-stressed fused glass)

Industries

- Chemicals
- Food & Beverage
- Iron, Steel & Metals
- Minerals & Mining
- Oil & Gas
- Petrochemicals
- Pulp & Paper
- Water & Wastewater

Applications

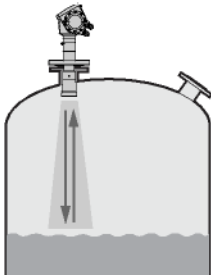
- Tanks with agitators
- Process tanks
- Storage tanks

Figure 1 – SmartLine Non-Contact Radar Level Meter



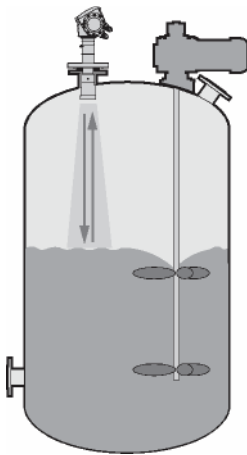
1. Optional touch screen with 4-button operation
2. 2-wire level meter
3. One converter for all applications
4. Antenna extension (for long nozzles)
5. Optional Metaglas barrier
6. Rotatable housing
7. Same housing for Ex d and Non-Ex

Applications



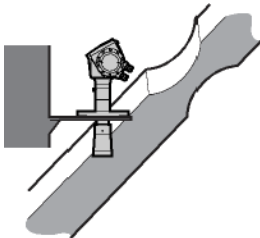
1. Level measurement of liquids in storage tanks

SmartLine Non-Contact Radar can measure the level of a wide range of liquid products on a large variety of installations, including LPG and LNG tanks. It does not require calibration or commissioning when installed. It can measure any liquid within the stated pressure and temperature range, and distances up to 80 m / 260 ft



2. Level measurement of liquids in process tanks

SmartLine Non-Contact Radar can measure level accurately in agitated conditions, such as near to vortices caused by agitators, and also where foam is present.



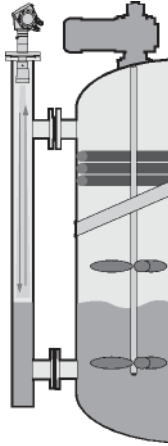
3. Open channel metering or flow

SmartLine Non-Contact Radar can measure level in an open channel and convert this measurement into flow values if the characteristics of the channel are known. This solution is the high end alternative to ultrasonic and hydrostatic pressure transmitters.

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.

4. Measurement of corrosive liquids with a drop antenna



If the tank is full of obstructions such as agitators and reinforcements, Honeywell recommends installing the SmartLine Non-Contact Radar in a bypass chamber or a stilling well.

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. Measurement of liquids in a bypass chamber



The drop antenna option combines a relatively small radar beam for more precise measurement and a shape that avoids product build-up. If the tank contains corrosive liquids such as acids and alkaline solutions, we recommend the DN 80 / 3" drop antenna with the PTFE or PP flange plate option

Technical Data

Input

Measurement principle	K-band FMCW radar
Parameter	Level, distance, volume and reflectivity
Min. tank dimension: height	0.2 m (8")
Max. measuring range	80 m (260 ft)
Blocking distance	Antenna extension length + antenna length + 0.1 m / 4"

Outputs

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
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%
Reference target	Metal plate in an anechoic chamber

Accuracy (under reference conditions)

Resolution	1 mm (0.04")
Repeatability	±1 mm (±0.04")
Accuracy	±3 mm (±0.12"), when distance ≤ 10 m (33 ft); ±0.03% of measured distance, when distance > 10 m (33 ft)
Beam angle - DN40 antenna	20°
Beam angle - DN50 antenna	15°
Beam angle - DN80 antenna	10°
Beam angle - DN100 Horn antenna	8°
Beam angle - DN80 Horn antenna	8°

Process conditions

Ambient temperature	-40...+80°C (-40...+175°F) (Ex i: see supplementary operating instructions or approval certificates) Pending.
Storage temperature	-40...+85°C (-40...+185°F)
Flange temperature	
Horn antenna	-50...+200°C / -58...+390°F (Ex i: see supplementary operating instructions or approval certificates)
Drop antenna (PTFE)	-50...+150°C / -58...+300°F (Ex i: see supplementary operating instructions or approval certificates)
Drop antenna (PP)	-50...+100°C / -58...+210°F (Ex i: see supplementary operating instructions or approval certificates)
Thermal shock resistance	<40°C/s / <72°F/s

Operating pressure	
Drop antenna (PP)	-1...16 bar / -14.5...232 psig; subject to process connection used and flange temperature
All other antennas	-1...40 bar / -14.5...580 psig; subject to process connection used and flange temperature
Dielectric constant (ϵ_r)	≥ 1.5
Vibration resistance	IEC 68-2-6 and EN 50178 (10...57 Hz: 0.075 mm (57...150 Hz:1 g)
Protection category	IP 66/67 equivalent to NEMA 6-6X

Material

Housing	Aluminium, Stainless steel (not FM/CSA)
Wetted parts, including antenna	Stainless steel 1.4404 (316L); Hastelloy® C-22 (2.4602) PTFE; PP (a PP or PTFE flange plate is also available)
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) EPDM (-50°C ... +150°C / -58°F ... +300°F)
Feedthrough	PEI/standard -40...+200°C (-40...+390°F); Metaglas® -30...+200°C (-20...+390°F)
Weather protection (Option)	Stainless steel 1.4301 (304)

Process Connections

Thread	G 1½"; NPT 1½"
Flange	DN40...150 (PN40 / PN16); 1½"...8" (150 lb / 300 lb); 10K (40...100A)

Electrical Connections

Instrument terminal 1 - Non-Ex / EEx i versions	14...30 VDC (1)
Instrument terminal 1 - EEx d version	20...36 VDC (1)
Instrument terminal 2 - Non-Ex/ EEx i/ EEx d versions	10...30 VDC (2)
Cable entry (x2)	M20x1.5; ½" NPT G ½" (not for FM- and CSA- approved devices); M25x1.5 (For stainless steel housing only)
Cable tightening capacity	0.5...1.5 mm ² (0.02... 0.06")

Human Machine Interface

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

Approvals

ATEX	ATEX II G 1, 1/2, 2 Ex ia IIC T6...T3; ATEX II D 1, 1/2, 2 Ex iaD 20 or Ex iaD 20/21 or Ex iaD 21 IP6X T65°C...T90°C; ATEX II G 1/2, 2 Ex d [ia] IIC T6...T3; ATEX II D 1, 1/2, 2 Ex tD[iaD] A21/20 or Ex tD[iaD] A21 IP6X T65°C...T90°C; ATEX II G 3 Ex nA IIC T6...T3
IECEx (approval pending)	Zone 0 Ex ia IIC T6...T3; Ex iaD 20 IP6X T65°C...T 90°C
FM or CSA (approvals 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) (approvals pending)

Options and Accessories

Options	Integrated LCD display with sun cover; (-20+60°C/ -4.....+140°F); ⁽⁵⁾ 2nd current output; Antenna purging system ⁽³⁾
Accessories	Weather protection; Antenna extensions

¹ min./max. value for an output of 22 mA at the terminal

² min./max. value for an output of 22 mA at the terminal (additional power supply needed – output relay)

³ supplied with NPTF ¼ connection

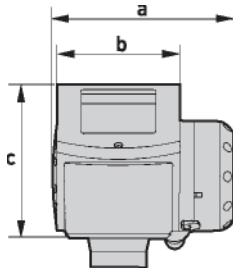
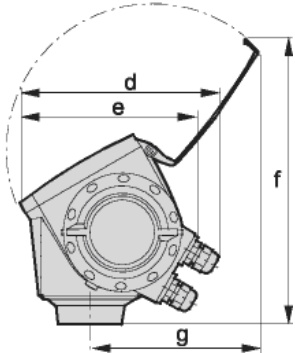
⁵ if the temperature is not in these limits, the display switches off

Dimensions and Weight

Note:

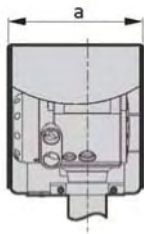
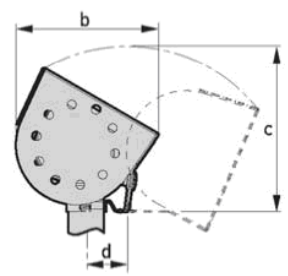
- Cable glands are delivered on demand with non-Ex.
- A weather protection cover is delivered on demand with all devices

Dimensions in mm (inches) and kg (lbs)

								
Housing front view	Housing front view							
Dimensions mm (inches)								
	a	b	c	d	e	f	g	Weight kg (lbs)
Housing	180 (7.1)	122 (4.8)	158.5 (6.2)	182 (1) (7.2)	167 (6.7)	277 (10.9)	155 (6.10)	3.3 (7.3)

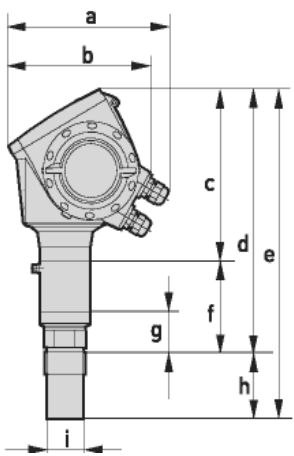
1 if fitted with cable glands

Dimensions and Weight in mm (inches) and kg (lbs)

					
Weather protection back view		Weather protection left side			
	Dimensions mm (inches)				
	a	b	c	d	Weight kg (lbs)
Weather protection	208 (8.2)	231.5 (9.1)	268 (1) (10.6)	66 (2.6)	2.9 (6.4)

1 radius

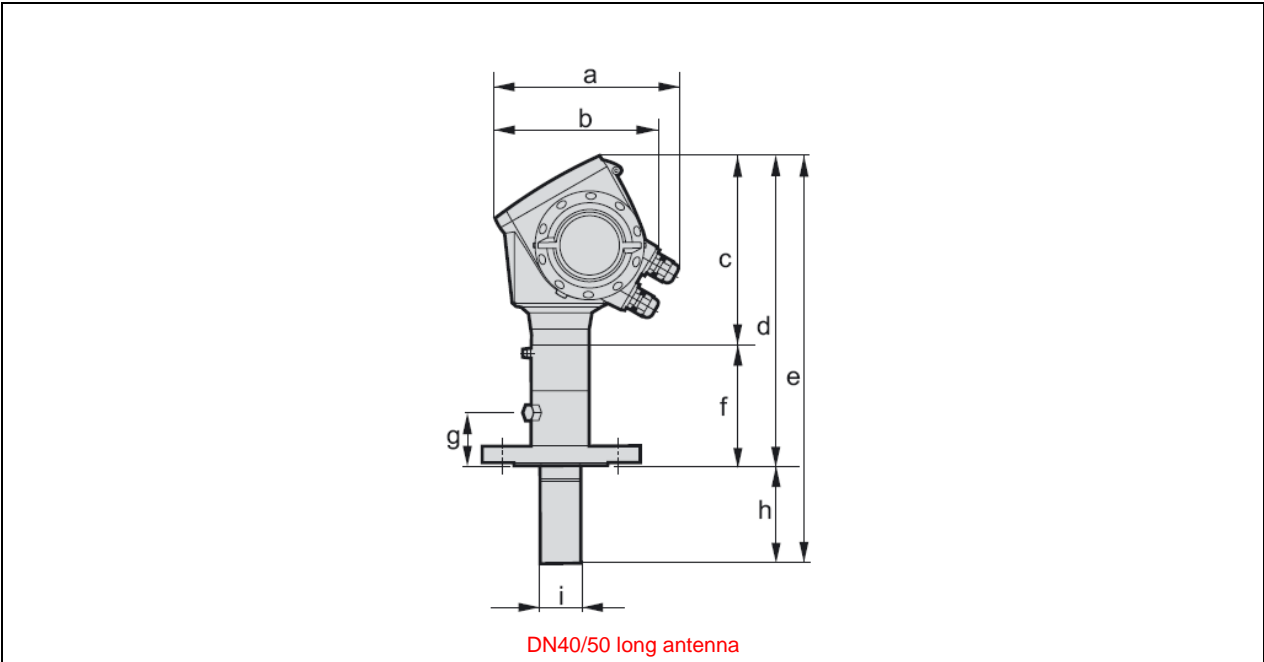
Dimensions and Weight in mm (inches) and kg (lbs)

										
Antenna with thread connection										
	Dimensions mm (inches)									Weight kg (lbs)
	a	b	c	d	e	f	g	h	i	
DN50 Standard	182 (1) (7.2)	167 (6.5)	190 (7.5)	278 (11.0)	355 (14.0)	88 (3.5)	44.5 (1.8)	77 (3.0)	43 (2) (1.7)	6 (13.2)

1 if fitted with standard cable glands

2 1½" NPT or G process connections available

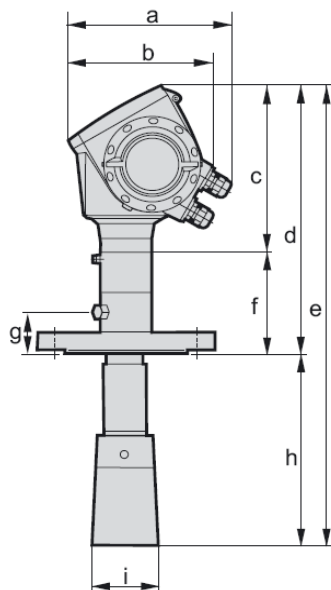
Dimensions and Weight in mm (inches) and kg (lbs)



	Dimensions mm (inches)									Weight kg (lbs)
	A	b	c	d	e	f	g	h	i	
DN40 long	182 (1) (7.2)	167 (6.5)	190 (7.5)	305 (12.0)	590 (23.2)	115 (4.5)	50 (2) (2.0)	95 (3) (3.7)	39 (1.5)	9 (19.8)
DN50 long	182 (1) (7.2)	167 (6.5)	190 (7.5)	305 (12.0)	411 (16.2)	115 (4.5)	50 (2) (2.0)	106 (3) (4.2)	43 (1.7)	9 (17.8)

- 1 if fitted with standard cable glands
- 2 antenna flushing system delivered on demand (NPTF ¼ connection)
- 3 additional antenna extensions of 105 mm (4.1") length are available

Dimensions and Weight in mm (inches) and kg (lbs)



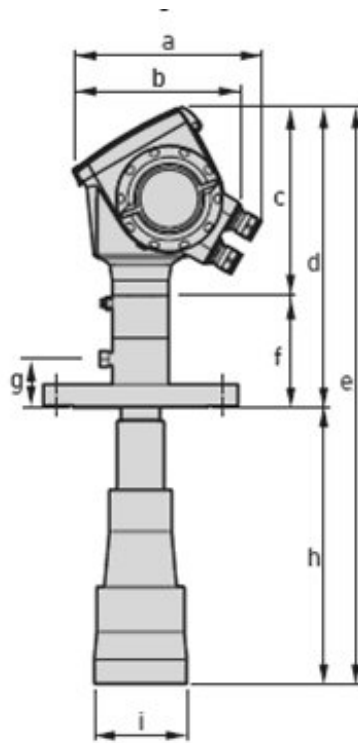
DN80 long antenna

	Dimensions mm (inches)									Weight kg (lbs)
	a	b	c	d	e	f	g	h	i	
DN80	182 (1)	167	190	305	523	115	50 (2)	216 (3)	75	12
long	(7.2)	(6.5)	(7.5)	(12.0)	(20.5)	(4.5)	(2.0)	(8.5)	(3.0)	(26.5)

1 if fitted with standard cable glands

2 antenna flushing system delivered on demand (NPTF ¼ connection)

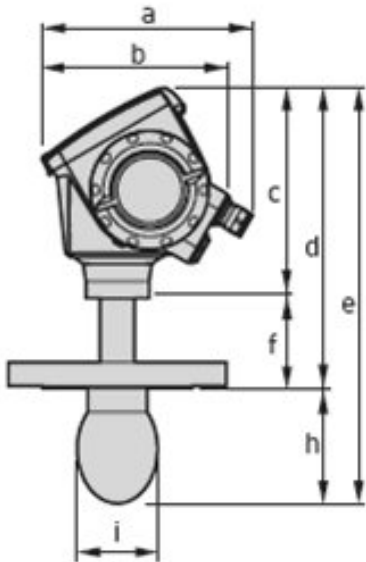
3 additional antenna extensions of 105 mm (4.1") length are available



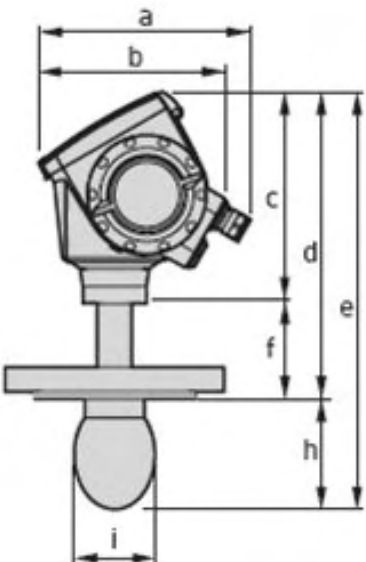
DN100/4" long horn antenna

	Dimensions mm (inches)									Weight kg (lbs)
	a	b	c	d	e	f	g	h	i	
DN100	182 (1)	167	190	305	523	115	71.5 (2)	284 (3)	95	19
long	(7.2)	(6.5)	(7.5)	(12.0)	(20.5)	(4.5)	(2.8)	(11.2)	(3.7)	(42)

1 if fitted with standard cable glands
2 antenna purging system delivered on demand (NPTF ¼ connection)
3 additional antenna extensions of 105 mm (4.1") length are available



DN80/3" drop antenna, without plate



DN80/3" drop antenna, with plate

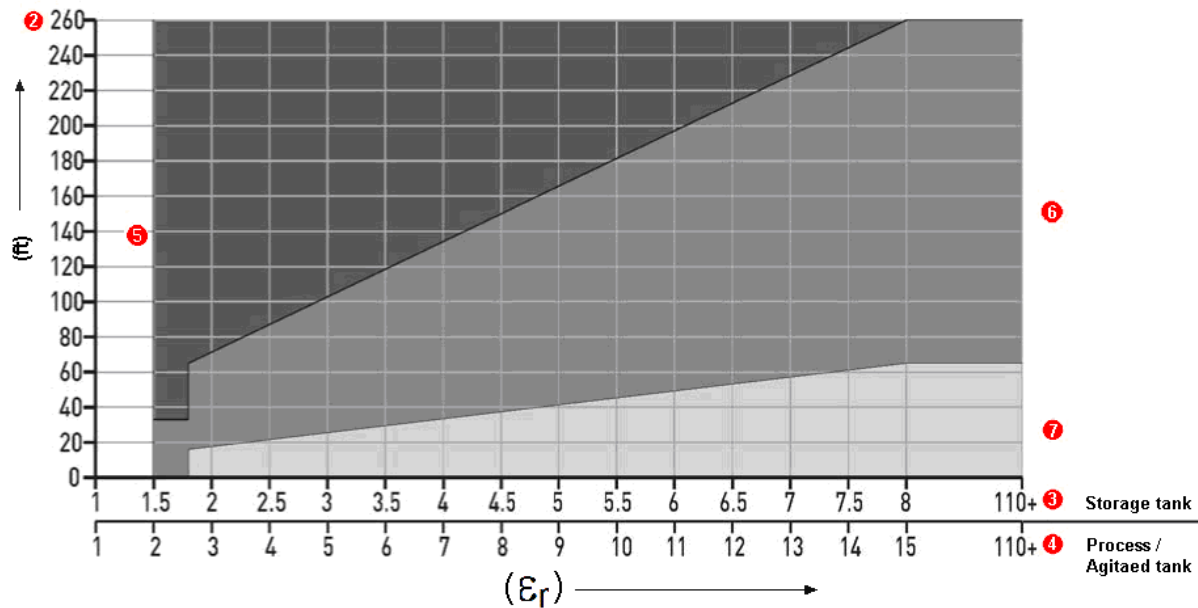
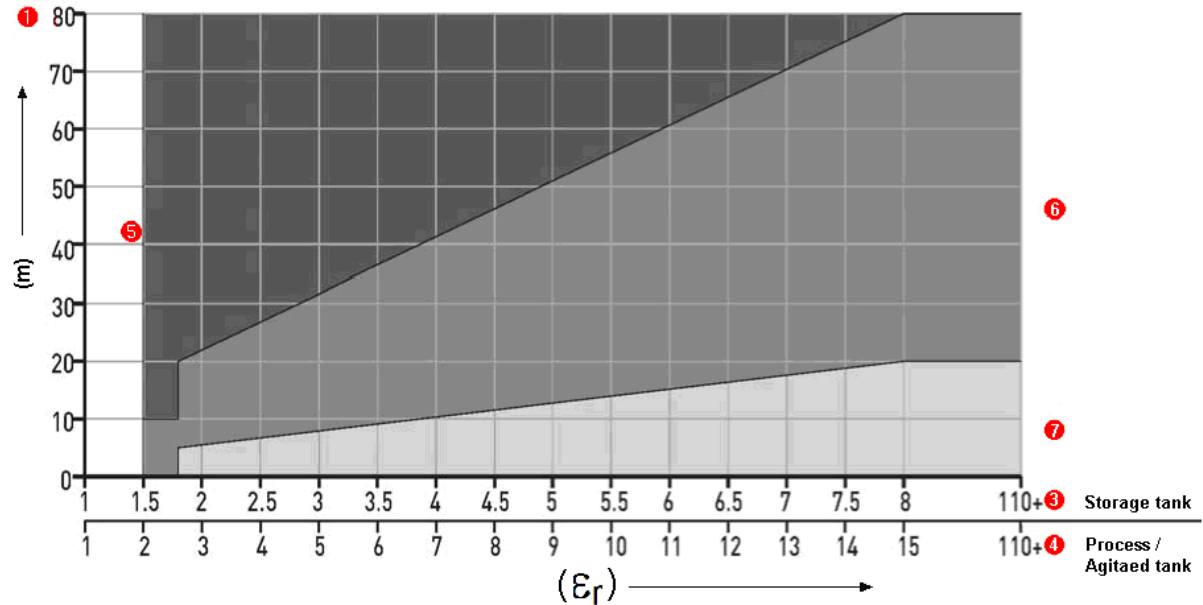
	Dimensions mm (inches)									Weight kg (lbs)
	a	b	c	d	e	f	g	h	i	
DN80 3"	182 (1) (7.2)	167 (6.5)	193 (7.6)	276 (2) (10.9)	382 (15.0)	83 (3) (3.3)	71.5 (2.8)	106 (4) (4.2)	74 (2.9)	11 (24.3)

1 if fitted with standard cable glands
2 11.1",with the PP/PTFE flange plate option
3 3.5", with the PP/PTFE flange plate option
4 4" with the PP/PTFE flange plate option. Additional antenna extensions of 4.1" length are available for drop antenna without the flange plate option.

Antenna selection: liquid applications

The graphs below show which antenna to select for the application based on:

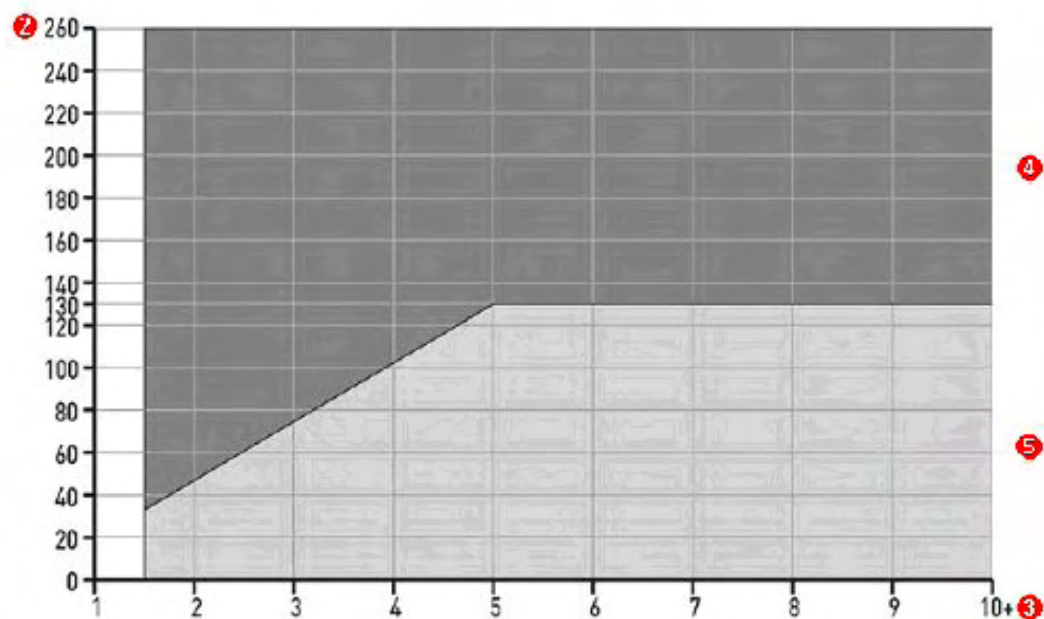
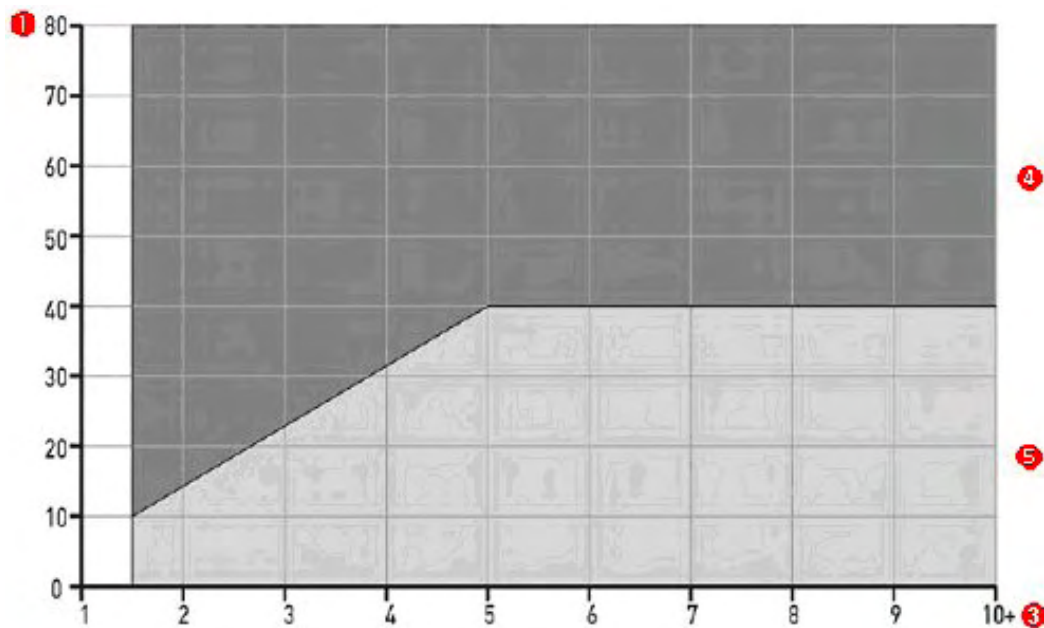
- D, the measuring range,
- ϵ_r is the dielectric constant of the product being measured and
- the application.



- 1 Distance, D [m]
- 2 Distance, D [ft]
- 3 Dielectric constant (ϵ_r) range for storage/agitator applications
- 4 Dielectric constant (ϵ_r) range for process/agitator applications
- 5 DN 80 antenna in a still well
- 6 DN 80 antenna with or without a still well
- 7 DN40, DN 50, DN 80 antenna with or without a still well

Antenna selection: solid applications

- D, the measuring range,
- ϵ_r , is the dielectric constant of the product being measured and
- the application.



- 1 Distance, D [m]
- 2 Distance, D [ft]
- 3 Dielectric constant (ϵ_r)
- 4 On request
- 5 DN 80/3" or DN 100/4" antenna

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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 Europe and Africa:

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

In Asia:

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

In Canada:

The Honeywell Centre
155 Gordon Baker Rd.
North York, Ontario M2H 3N7
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In Eastern Europe:

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140 21 Prague 4,
Czech Republic

In the Pacific:

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North Ryde NSW Australia 2113
(61 2) 9353 7000

In Latin America:

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

In the Middle East:

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

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.