

SITRANS LR250 Horn Antenna

Overview



SITRANS LR250 is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft).

Benefits

- Graphical local user interface (LUI) makes operation simple with plug-and-play setup using the intuitive Quick Start Wizard
- LUI displays echo profiles for diagnostic support
- 25 GHz high frequency allows for small antennas for easy mounting in nozzles
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2 inch) from the end of the antenna
- Communication using HART, PROFIBUS PA, or FOUNDATION Fieldbus
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or over a network using SIMATIC PDM, Emerson AMS, or Field Device Tools such as PACTware or Fieldcare via SITRANS DTM
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- 3 mm (0.118 inch) accuracy in accordance with IEC 60770-1
- Suitable for API 2350

Application

SITRANS LR250 includes a graphical local user interface (LUI) that improves setup and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support. Startup is easy using the Quick Start wizard with a few parameters required for basic operation.

The 25 GHz frequency creates a narrow, focused beam allowing for smaller horn antenna options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without saving to open the instrument's lid.

SITRANS LR250 measures superbly on low dielectric media, and in small vessels, as well as tall and narrow vessels.

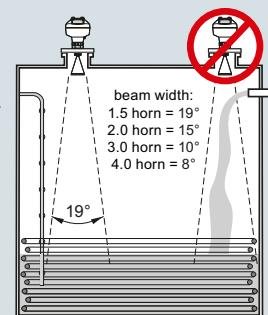
- Key Applications: liquid bulk storage tanks, process vessels, vaporous liquids, high temperatures, low dielectric media and applications with functional safety requirements

Configuration

Installation

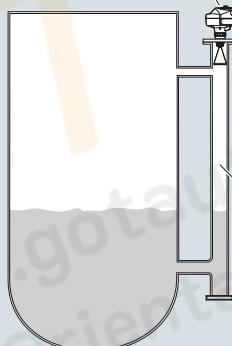
Note:

- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the horn antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.
- Use largest possible antenna.



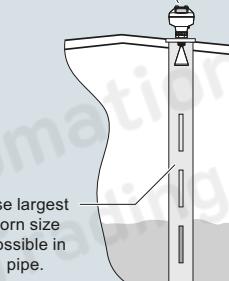
Mounting on bypass

Orient front or back of device toward vent.

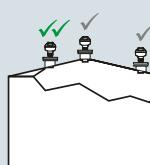


Mounting on stilling well

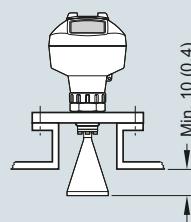
Orient front or back of device toward stillpipe slots.



Mounting on vessel



Mounting on a nozzle



SITRANS LR250 installation, dimensions in mm (inch)

Level measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna

Technical specifications

Mode of operation	Power supply	
Measuring principle	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
Frequency	PROFIBUS PA	• 15 mA • Per IEC 61158-2
Minimum measuring range	FOUNDATION Fieldbus	• 20.0 mA • Per IEC 61158-2
Maximum measuring range		
Output	Certificates and approvals	
HART	General	CSA _{US/C} , CE, FM, RCM
• Analog output	Radio	FCC, Industry Canada, RED, RCM
• Accuracy	Hazardous	INMETRO Ex dia mb IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
• Fail-safe	• Explosion Proof (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
PROFIBUS PA	• Increased Safety (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ia ta IIC T100 °C Da
• Function blocks	• Intrinsically Safe (Brazil)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
FOUNDATION Fieldbus	• Explosion Proof (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
• Functionality	• Intrinsically Safe (Canada/USA)	NEPSI Ex dia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex iaD tD A20 IP67 T100 °C
• Version	• Non-incendive (Canada/USA)	NEPSI Ex ia IIC T4 Ga, Ex iaD tD A20 IP67 T100 °C
• Function blocks	• Flame Proof/Increased Safety (China)	NEPSI Ex nA IIC T4 Gc
Performance (according to reference conditions IEC60770-1)	• Intrinsically Safe (China)	ATEX II 1G Ex ia IIC T4 Ga
Maximum measured error	• Non-sparking (China)	ATEX II 1D Ex ia IIC T100 °C Da
Influence of ambient temperature	• Intrinsically Safe (Europe)	ATEX II 3G Ex nA IIC T4 Gc
Rated operating conditions	• Non-sparking (Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
Installation conditions	• Flame Proof (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
• Location		IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIC T100 °C Da
Ambient conditions (enclosure)		EAC Ex d
• Ambient temperature	> 1.6, antenna and application dependent	EAC Ex e
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)	EAC Ex ia
• Installation category	-40 ... +80 °C (-40 ... +176 °F)	
• Pollution degree	I	
	4	
Medium conditions		
Dielectric constant ε _r		
Process temperature		
Process pressure		
Design		
Enclosure		
• Material	Aluminum, polyester powder-coated	Lloyd's Register of Shipping
• Cable inlet	2 x M20 x 1.5 or 2 x ½" NPT	ABS Type Approval
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68	Bureau Veritas
Weight	< 3 kg (6.6 lb) 3.75 mm (1½ inch) threaded connection with 1½" horn antenna	SIL-2 suitable in accordance with IEC 61508/61511
Display (local)	Graphic local user interface including quick start wizard and echo profile display	
Antenna		
• Material	316L stainless steel	
• Dimensions (nominal horn sizes)	Standard 1.5 inch (40 mm), 2 inch (48 mm), 3 inch (75 mm), 4 inch (95 mm) horn, and optional 100 mm (4 inch) horn extension	
Process connections		
• Process connection	1½", 2" or 3" NPT [(Taper), ANSI/ASME B1.20.1]	
	R 1½", 2" or 3" [(BSPT), EN 10226]	
	G 1½", 2" or 3" [(BSP), EN ISO 228-1]	
• Flange connection	2", 3", 4" (ANSI 150, 300 lb), 50, 80, 100 mm (PN 16, 40, JIS 10K)	
Programming		
	Infrared receiver	
	Handheld communicator	
	PC	
	Display (local)	

Level measurement

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Radar level transmitters

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Selection and ordering data	Article No.	Article No.
SITRANS LR250 Radar level transmitter Continuous, non-contact, 20 m (66 ft) range, for liquids and slurries.	7ML5431-0 -	7ML5431-
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.		
Process Connection and Antenna Material 316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FKM seal ¹⁾ 316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FFKM seal ¹⁾	0 1	A B C D E F G H I J
Process Connection Type Threaded connection 316L 1½" NPT (ASME B1.20.1) (tapered thread) ³⁾ R 1½" [(BSPT), EN 10226-1] (tapered thread) ³⁾ G 1½" [(BSPP), EN ISO 228-1] (parallel thread) ³⁾ 2" NPT (ASME B1.20.1) (tapered thread) ⁴⁾ R 2" [(BSPT), EN 10226-1] (tapered thread) ⁴⁾ G 2" [(BSPP), EN ISO 228-1] (parallel thread) ⁴⁾ 3" NPT (ASME B1.20.1) (tapered thread) ⁴⁾ R 3" [(BSPT), EN 10226-1] (tapered thread) ⁴⁾ G 3" [(BSPP), EN ISO 228-1] (parallel thread) ⁴⁾ Flanged connection 316L 2" Class 150 ASME B16.5, raised face ⁴⁾ 3" Class 150 ASME B16.5, raised face ⁴⁾ 4" Class 150 ASME B16.5, raised face ⁴⁾ 2" Class 300 ASME B16.5, raised face ⁴⁾ 3" Class 300 ASME B16.5, raised face ⁴⁾ 4" Class 300 ASME B16.5, raised face ⁴⁾ 50A 10K JIS B 2220 flat face ⁴⁾ 80A 10K JIS B 2220 flat face ⁴⁾ 100A 10K JIS B 2220 flat face ⁴⁾ DN 50 PN 16 EN 1092-1 Type B1 raised face ⁴⁾ DN 80 PN 16 EN 1092-1 Type B1 raised face ⁴⁾ DN 100 PN 16 EN 1092-1 Type B1 raised face ⁴⁾ DN 150 PN 16 EN 1092-1 Type B1 raised face ⁴⁾ DN 50 PN 40 EN 1092-1 Type B1 raised face ⁴⁾ DN 80 PN 40 EN 1092-1 Type B1 raised face ⁴⁾ DN 100 PN 40 EN 1092-1 Type B1 raised face ⁴⁾ DN 150 PN 40 EN 1092-1 Type B1 raised face ⁴⁾ Communication/Output PROFIBUS PA ⁵⁾ 4 ... 20 mA, HART, start-up at < 3.6 mA FOUNDATION Fieldbus ⁵⁾ Enclosure/Cable inlet Aluminum, Epoxy painted 2 x ½" NPT 2 x M20 x 1.5	A A A B A C A D A E A F A G A H A I A J B D B E B F C D C E C F F A F B F C G A G B G C G D H A H B H C H D 1 2 3	0 - 0 1 A B C D E F G H I J 0 1
SITRANS LR250 Radar level transmitter Continuous, non-contact, 20 m (66 ft) range, for liquids and slurries.	7ML5431-0 -	A B C D E F G H I J
Approvals General Purpose: CSA, FM, FCC, RED, RCM Intrinsically Safe: CSA/FM Class I, Div. 1, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Class III T4 FCC, Industry Canada Intrinsically Safe: IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia mb IIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia mb IIC T100 °C Da, CE, RED, RCM Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, RED, RCM Increased Safety: IECEx/ATEX II 1/2 GD, 1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia mb IIC T100 °C Da, INMETRO Ex ia mb IIC T4 Ga/Gb, Ex ia mb IIC T100 °C Da, CE, RED, RCM ⁶⁾ Flameproof: IECEx/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia mb IIC T4 Ga/Gb, Ex ia mb IIC T100 °C Da, CE, RED, RCM ⁶⁾ Explosion proof: CSA/FM Class I, II, and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ^{b)} Non Sparking: NEPSI Ex nA IIC T4 Gc Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex ia mb IIC T100 °C Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex ia mb IIC T100 °C ⁶⁾ Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex ia mb IIC T100 °C ⁶⁾	0 - 0 1 A B C D E F G H I J	0 1
Pressure rating Rating per Pressure/Temperature curves in manual 0.5 bar g (7.25 psi g) maximum ⁷⁾		

¹⁾ Available with process connection options AA ... HD and Antenna Versions A ... H only.

²⁾ Available with process connection options JA ... MH and Antenna Versions J ... P only.

³⁾ Not available with Antenna options B, C, D, F, G, H.

⁴⁾ Not available with Antenna options A and E.

⁵⁾ Available with Approval options A, B, C, D, K, and L.

⁶⁾ Available only with Communications option 2.

⁷⁾ Available with Process Connection and Antenna Material 0, 1, 2, and 3 only.

Level measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna

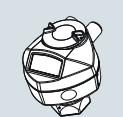
Selection and ordering data	Order code	Article No
Further designs		
Please add "-Z" to Article No. and specify Order code(s).		
Plug M12 with mating Connector ¹⁾²⁾³⁾	A50	7ML1930-1BK
Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	A55	7MF4997-1DB
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	Y15	7ML1930-1AP
Manufacturer's Test Certificate: M to DIN 55350, Part 18 and to ISO 9000	C11	7ML1930-1AQ
Material inspection certificate 3.1 of EN 10204	C12	7ML1830-3AN
Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ⁵⁾	C20	7ML5741-.....-
Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	N07	7ML5742-.....-
Operating Instructions		
All literature is available to download for free, in a range of languages, at		
http://www.siemens.com/processinstrumentation/documentation		
Accessories		
Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)		7ML1930-1BK
One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART (two are required)		7ML1930-1AP
One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus (two are required) ⁶⁾		7ML1930-1AQ
FDA approved FKM O-ring for 2" G (BSPP) process connections -28 ... +80 °C (-28 ... +176 °F)		7ML1830-3AN
SITRANS RD100, loop powered display - see Chapter 7		7ML5741-.....-
SITRANS RD150, remote digital display for 4 ... 20 mA and HART devices - see Chapter 7		7ML5742-.....-
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7		7ML5740-.....-
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7		7ML5744-.....-
For applicable back up point level switch - see point level measurement section		

- 1) Available with enclosure option 1 only.
- 2) To be used with communication options 1 and 3 only. Connector has IP67 rating.
- 3) Available with approval options A and B. Available with approval option C for use on intrinsically safe applications only. Not rated for dust Ex.
- 4) Available with enclosure option 0 only.
- 5) Applicable to communication option 2 only.
- 6) For use with communication options 1 and 3 only.

Level measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna

Selection and ordering data	Article No.	Article No.
SITRANS LR250 Spare parts		
SITRANS LR250 horn version enclosures (PROFIBUS PA models)		
SITRANS LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection		
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E01156836	A5E02956317
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156838	A5E02956319
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E01156841	A5E02956320
SITRANS LR250 horn version enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156843	A5E02956322
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E01156844	A5E03441096
SITRANS LR250 horn version enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS communication, no process connection	A5E01156846	A5E03441097
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E01156848	A5E03441099
SITRANS LR250 horn version enclosures (FOUNDATION Fieldbus models)		
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection		
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E03769538	A5E39142556
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E03769539	
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03769543	
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E02654608	
SITRANS LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E02653792	
SITRANS LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E02653793	
SITRANS LR250 horn version enclosure with board stack, NPT cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E02654606	
For special requests please consult a local sales person. For more information, please visit http://www.usa.siemens.com/level.		

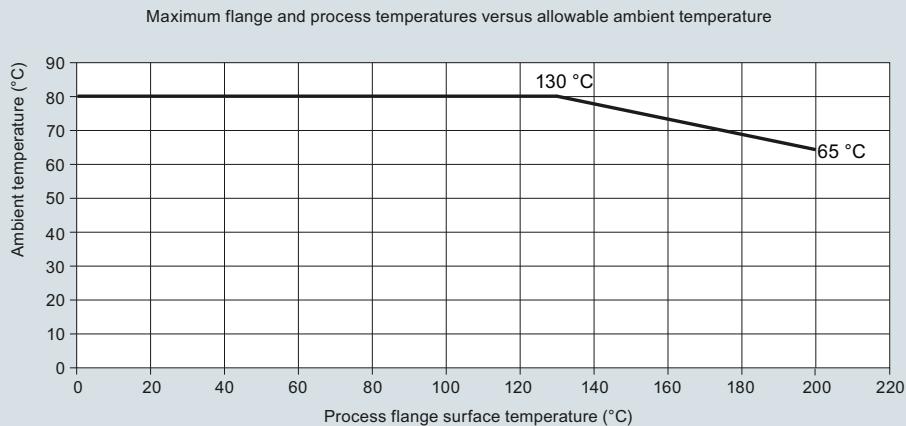
4

Level measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna

Characteristic curves

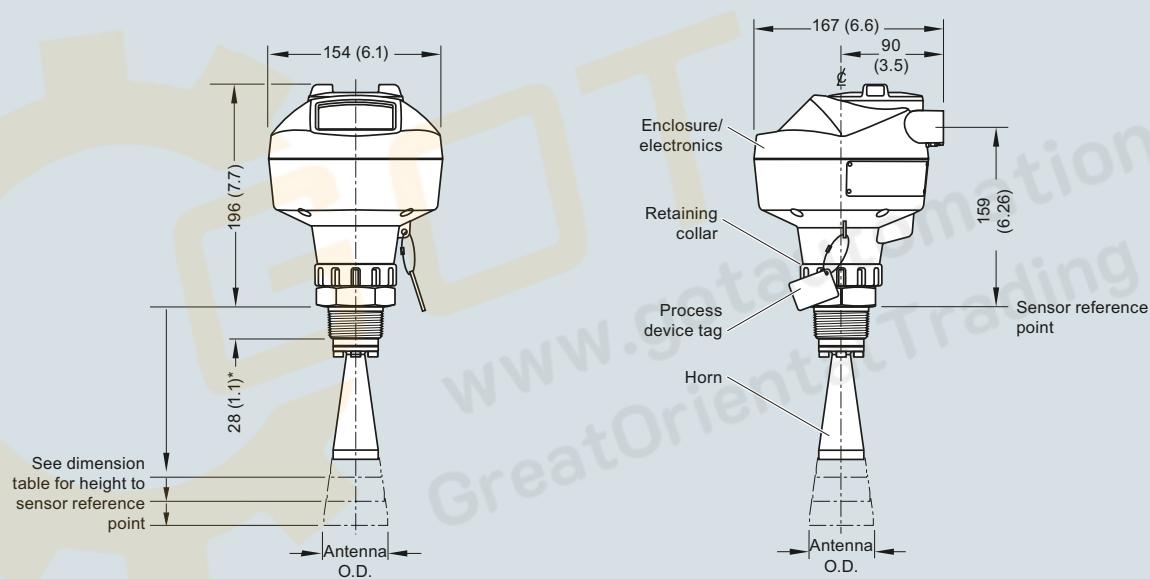
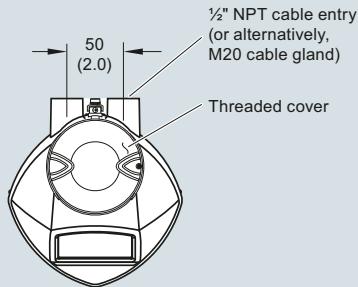


4

SITRANS LR250 ambient/process flange surface temperature curve

Dimensional drawings

Threaded Horn Antenna



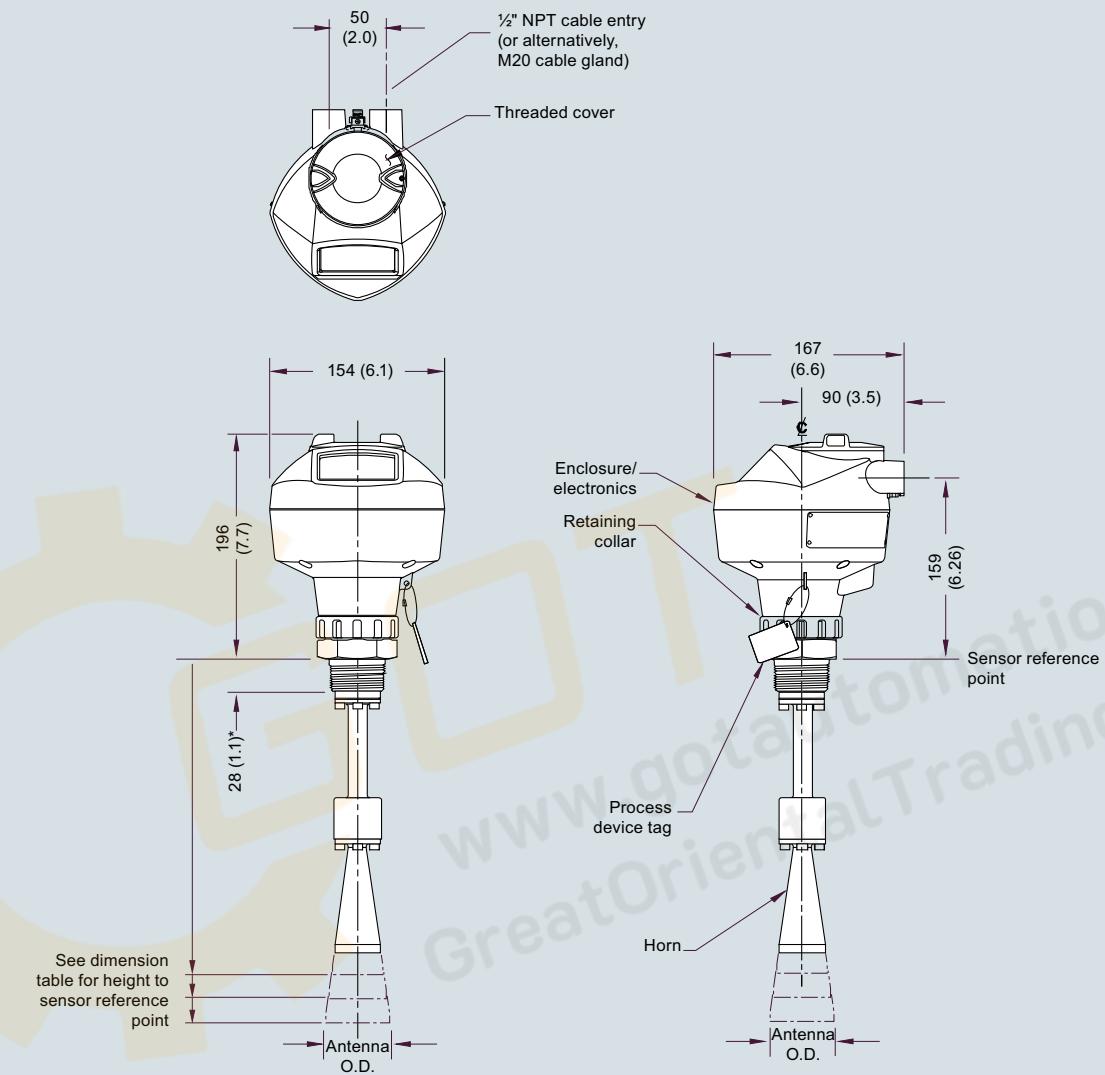
*28 mm (1.1) for 1.5 inch and 2 inch, 42 mm (1.65) for 3 inch

Antenna Type	Antenna O.D.	Height to sensor reference point			Beam angle	Measurement range
		1-1/2" threaded connection	2" threaded connection	3" threaded connection		
1.5" horn	39.8 (1.57)	135 (5.3)	N/A	N/A	19 degrees	10 m (32.8 ft)
2" horn	47.8 (1.88)	N/A	166 (6.55)	180 (7.09)	15 degrees	20 m (65.6 ft)
3" horn	74.8 (2.94)	N/A	199 (7.85)	213 (8.39)	10 degrees	20 m (65.6 ft)
4" horn	94.8 (3.73)	N/A	254 (10)	268 (10.55)	8 degrees	20 m (65.6 ft)

SITRANS LR250 Threaded Horn Antenna, dimensions in mm (inch)

Level measurement

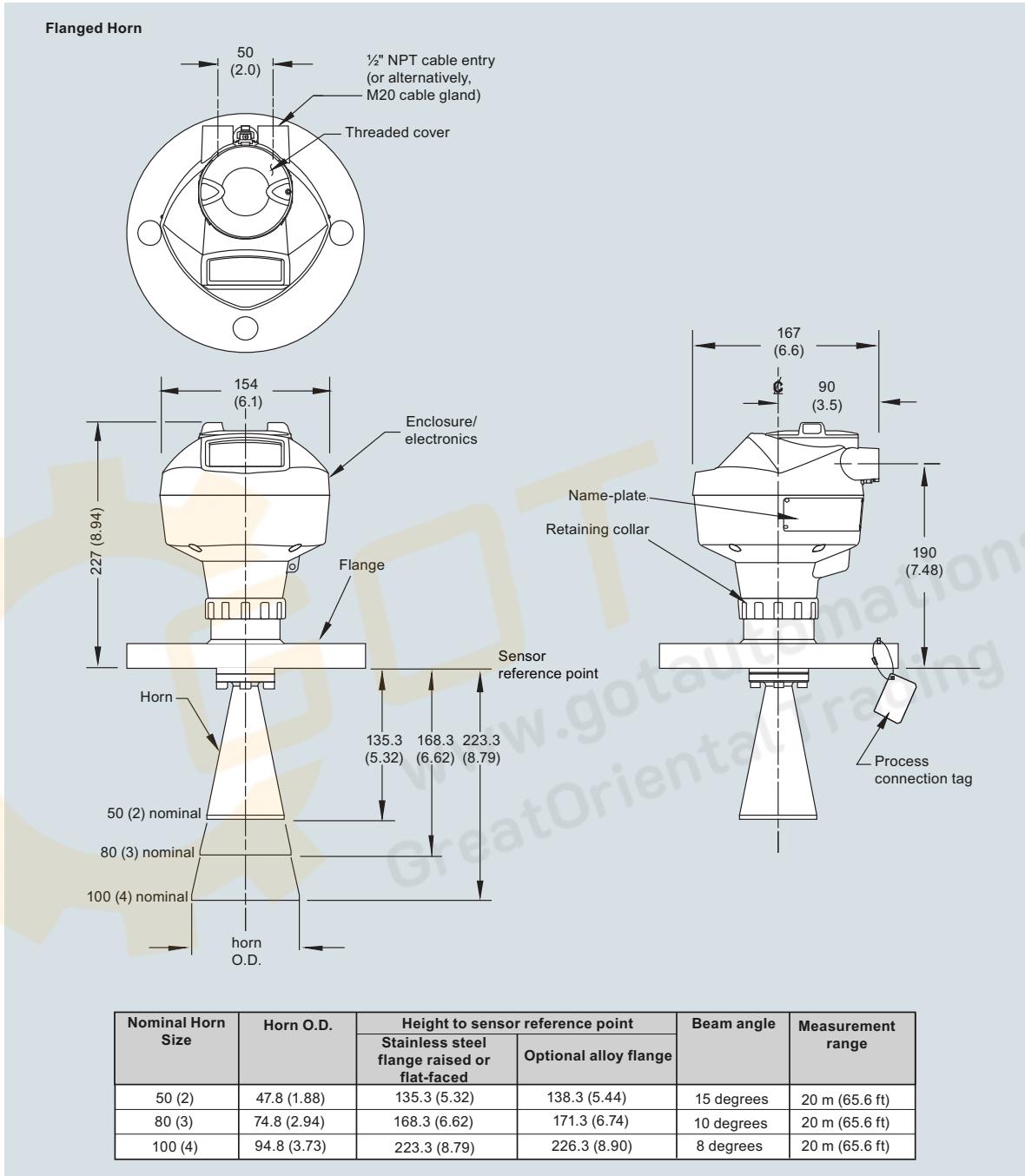
Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna**Dimensional drawings (continued)****Threaded Horn Antenna with Extension**

Antenna Type	Antenna O.D.	Height to sensor reference point			Beam angle	Measurement range
		1-1/2" threaded connection	2" threaded connection	3" threaded connection		
1.5" horn	39.8 (1.57)	235 (9.3)	N/A	N/A	19 degrees	10 m (32.8 ft)
2" horn	47.8 (1.88)	N/A	266 (10.47)	280 (11.02)	15 degrees	20 m (65.6 ft)
3" horn	74.8 (2.94)	N/A	299 (11.77)	313 (12.32)	10 degrees	20 m (65.6 ft)
4" horn	94.8 (3.73)	N/A	354 (13.94)	368 (14.49)	8 degrees	20 m (65.6 ft)

SITRANS LR250 Threaded Horn Antenna with extension, dimensions in mm (inch)

Dimensional drawings (continued)



SITRANS LR250 Flanged Horn Antenna, dimensions in mm (inch)

Level measurement

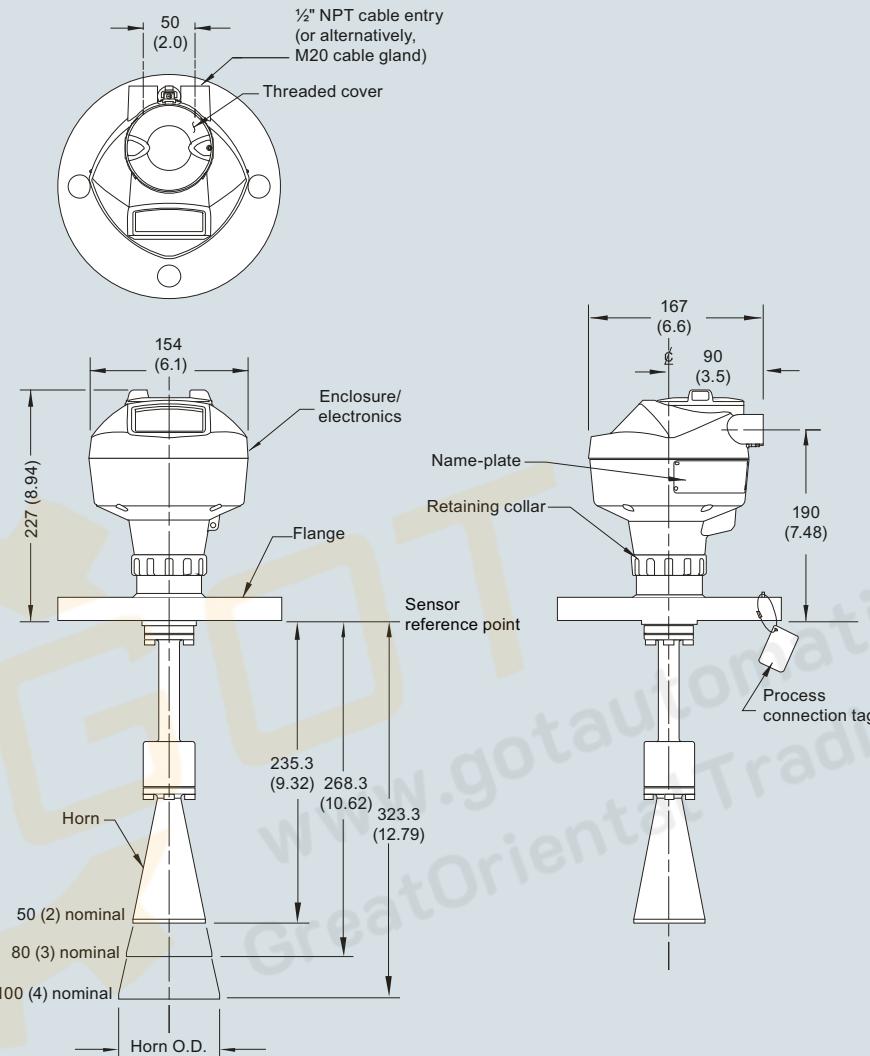
Continuous level measurement
Radar level transmitters

SITRANS LR250 Horn Antenna

Dimensional drawings (continued)

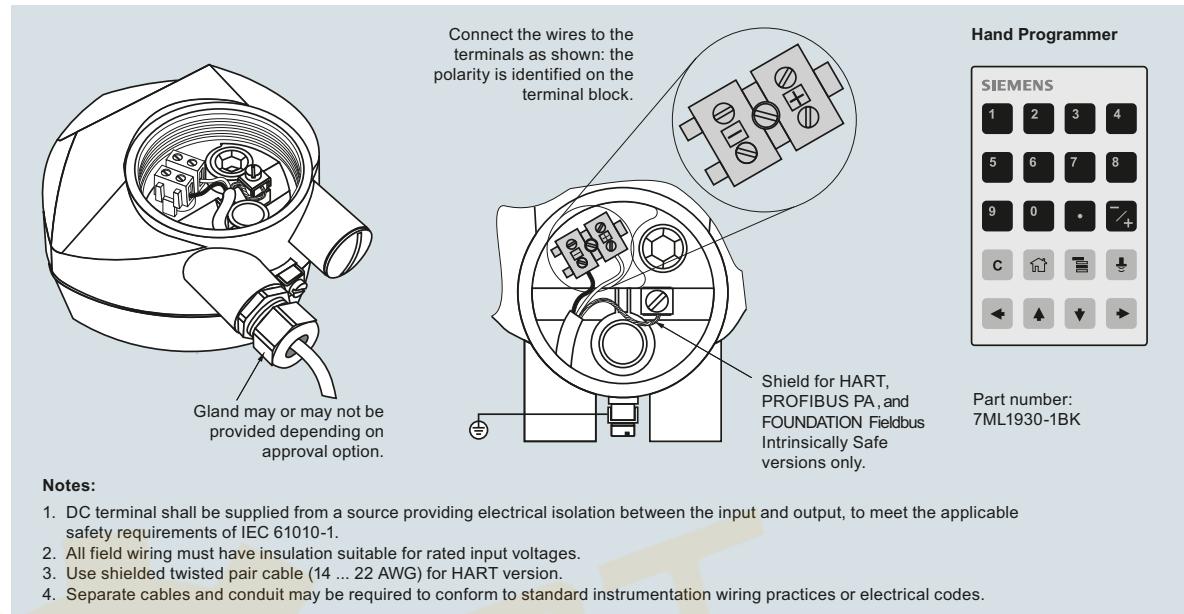
4

Flanged Horn with Extension



Nominal Horn Size	Horn O.D.	Height to sensor reference point		Beam angle	Measurement range
		Stainless steel flange raised or flat-faced	Optional alloy flange		
50 (2)	47.8 (1.88)	235.3 (9.26)	238.3 (9.38)	15 degrees	20 m (65.6 ft)
80 (3)	74.8 (2.94)	268.3 (10.56)	271.3 (10.68)	10 degrees	20 m (65.6 ft)
100 (4)	94.8 (3.73)	323.3 (12.73)	326.3 (12.85)	8 degrees	20 m (65.6 ft)

SITRANS LR250 Flanged Horn Antenna with extension, dimensions in mm (inch)

Circuit diagrams

SITRANS LR250 connections

บริษัท เกรตโอเรียนเต็ล เทคโนโลยี จำกัด
เลขที่ 1049 ถนนร่วมธรรม
ตำบลคลองสี่ อำเภอหาดใหญ่
จังหวัดสงขลา 90110
074-300212-4



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