SITRANS LR250

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 horn 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") from the end of the horn
- Communication using HART® or 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.

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 options and decreasing sensitivity to obstructions.

SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having 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 with agitators, vaporous liquids, high temperatures, low dielectric media
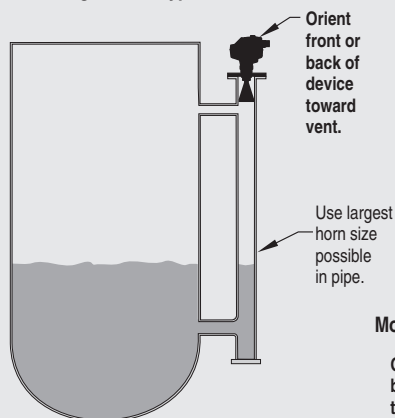
Configuration

Installation

beam width:
1.5 horn = 19°
2 horn = 15°
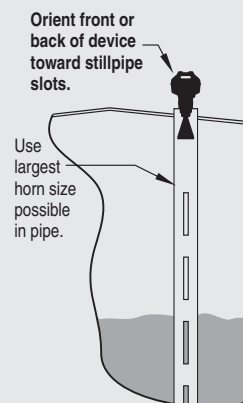3 horn = 10°
4 horn = 8°

19°
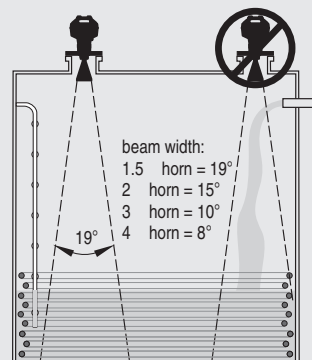
Note:
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the horn antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected

Mounting unit on bypass

Orient front or back of device toward vent.

Use largest horn size possible in pipe.

Mounting unit on stilling well

Orient front or back of device toward stillpipe slots.

Use largest horn size possible in pipe.

Mounting unit on vessel
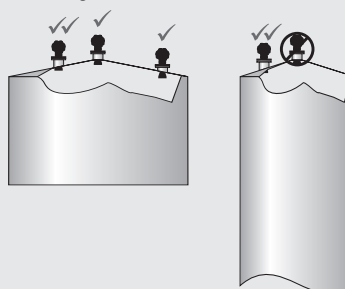
Mounting on a nozzle

minimum 10 mm (0.4)
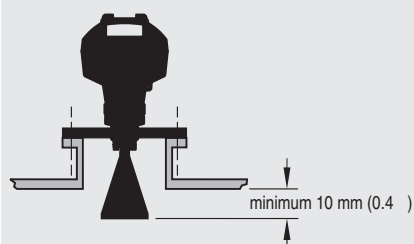
SITRANS LR250 installation

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Technical specifications

Mode of operation	
Measuring principle	Radar level measurement
Frequency	K-band (25.0 GHz)
Minimum measuring range	50 mm (2") from end of horn
Maximum measuring range	20 m (65 ft), horn dependent

Output	
• HART®:	Version 5.1
- Analog output	4 to 20 mA
- Accuracy	± 0.02 mA
- Fail-safe	• Programmable as high low or hold (loss of echo)
	• NE 43 programmable
• PROFIBUS PA:	Profile 3.1
- Function blocks	2 Analog Input (AI)
• FOUNDATION Fieldbus™	H1
- Functionality	Basic or LAS
- Version	ITK 5.2.0
- Function blocks	2 Analog Input (AI)

Performance (according to reference conditions IEC60770-1)	
• Maximum measured error	5 mm (0.2")
• Influence of ambient temperature	<0.003 %/K

Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions (enclosure)	
• Ambient temperature	-40 to +80 °C (-40 to +176 °F)
• Installation category	I
• Pollution degree	4

Medium conditions	
• Dielectric constant ε_r	ε_r > 1.6, horn and application dependent
• Process temperature	-40 to +200 °C (-40 to +392 °F) (at process connection with FKM o-ring)
	-20 to +200 °C (-4 to +392 °F) (at process connection with FFKM o-ring)
• Process pressure	Up to 40 bar g (580 psi g), process connection and temperature dependent.
	See Pressure/Temperature curves for more information

Design	
• Enclosure	
- Material	Aluminium, polyester powder-coated
- Cable inlet	2 x M20x1.5 or 2 x ½" NPT
• Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68
• Weight	< 3 kg (6.6 lbs) 3.75 mm (1½") threaded connection with 1½" horn antenna
• Display (local)	Graphic local user interface including quick start wizard and echo profile display

• Antenna	
- Material	316L stainless steel [optional alloy N06022/2.4602 (Hastelloy® C-22® or equivalent)]
- Dimensions (nominal horn sizes)	Standard 1.5" (40 mm), 2" (48 mm), 3" (75 mm), 4" (95 mm) horn and optional 100 mm (4") horn extension

Process connections	
• Process connection	1½" or 2" NPT [(Taper), ANSI/ASME B1.20.1]
	R 1½" or 2" [(BSPT), EN 10226] G 1½" or 2" [(BSPP), EN ISO 228-1]
• Flange connection	2", 3", 4" (ANSI 150, 300 lbs), 50, 80, 100 mm (PN 16, 40, JIS 10K)

Power supply	
4 to 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA	• 15 mA
	• per IEC 61158-2
FOUNDATION Fieldbus	• 20.0 mA
	• per IEC 61158-2

Certificates and approvals	
• General	CSA_{US/C}, CE, FM, NE 21, C-TICK
• Radio	FCC, Industry Canada and Europe ETSI EN 302-372, C-TICK
• Hazardous	
- Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 ATEX II 1D Ex tD A20 IP67 T90°C
- Non-sparking/Energy Limited (Europe)	ATEX II 3G Ex nA/nL IIC T4 Gc
- Intrinsically Safe (Canada/USA)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
- Non-incendive (Canada/USA)	CSA/FM Class I, Div. 2, Groups A, B, C, D T5
- Intrinsically Safe (International)	IECEx Ex ia IIC T4, Ex tD A20 IP67 T90°C
- Flame Proof (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex dmbia IIC T4 Ga/Gb, Ex tD A20 IP67 T90°C
- Increased Safety (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex embia IIC T4 Ga/Gb, Ex tD A20 IP67 T90°C
- 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
• Marine	• Lloyd's Register of Shipping
	• ABS Type Approval
	• Bureau Veritas

Programming	
• Intrinsically Safe Siemens hand-held programmer	Infrared receiver
- Approvals for handheld programmer	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135°C Ta = -20 to +50 °C CSA/FM Class I, II, III, Div. 1., Groups A, B, C, D, E, F, G, T6 Ta = +50 °C IECEx SIR 09.0073

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SITRANS LR250

• Handheld communicator	HART communicator 375/475
• PC	• SIMATIC PDM
	• Emerson AMS
	• SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)
• Display (local)	Graphic local user interface including quick start wizard and echo profile displays

[R]HART is a registered trademark of the Hart Communications Foundation.

[TM]FOUNDATION Fieldbus is a trademark of Fieldbus Foundation.

[R]Hastelloy and [R]C-22 are registered trademarks of Haynes International Inc.

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Selection and Ordering data	Order No.
SITRANS LR250	C) **7ML5431 -**
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). Ideal for small vessels and low dielectric media.	■■■■ 0 - ■■■■

Process Connection and Antenna Material	
316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FKM seal	0
316L (1.4435 or 1.4404) stainless steel, PTFE emitter, FFKM seal	1
Hastelloy C-22/2.4602, PTFE emitter, FKM seal[1]	2
Hastelloy C-22/2.4602, PTFE emitter, FFKM seal[1]	3

Process Connection Type	
1½" NPT [(Taper), ANSI/ASME B1.20.1][2]	A A
R 1½" [(BSPT), EN 10226][2]	A B
G 1½" [(BSPP), EN ISO 228-1] (parallel thread)[2]	A C
2" NPT [(Taper), ANSI/ASME B1.20.1]	A D
R 2" [(BSPT), EN 10226]	A E
G 2" [(BSPP), EN ISO 228-1] (parallel thread)	A F
2" ASME, 150 lb, FF, ASME B16.5[3]	B A
3" ASME, 150 lb, FF, ASME B16.5[3]	B B
4" ASME, 150 lb, FF, ASME B16.5[3]	B C
2" ASME, 300 lb, FF, ASME B16.5[3]	C A
3" ASME, 300 lb, FF, ASME B16.5[3]	C B
4" ASME, 300 lb, FF, ASME B16.5[3]	C C
DN 50 PN 16, Type A, EN 1092-1[3]	D A
DN 80 PN 16, Type A, EN 1092-1[3]	D B
DN 100 PN 16, Type A, EN 1092-1[3]	D C
DN 50 PN 40, Type A, EN 1092-1[3]	E A
DN 80 PN 40, Type A, EN 1092-1[3]	E B
DN 100 PN 40, Type A, EN 1092-1[3]	E C
JIS 50A 10K, FF, JIS B2220[3]	F A
JIS 80A 10K, FF, JIS B2220[3]	F B
JIS 100A 10K, FF, JIS B2220[3]	F C
DN 50 PN 10/16 DIN EN1092-1 form B1	G A
DN 80 PN 10/16 DIN EN1092-1 form B1	G B
DN 100 PN 10/16 DIN EN1092-1 form B1	G C
DN 150 PN 10/16 DIN EN1092-1 form B1	G D
DN 50 PN 25/40 DIN EN1092-1 form B1	H A
DN 80 PN 25/40 DIN EN1092-1 form B1	H B
DN 100 PN 25/40 DIN EN1092-1 form B1	H C
DN 150 PN 25/40 DIN EN1092-1 form B1	H D

Communication/Output	
PROFIBUS PA	1
4 to 20 mA, HART®, startup at <3.6 mA	2
FOUNDATION Fieldbus™	3

Enclosure/Cable inlet	
Aluminum, Epoxy painted	
2 x ½" NPT	0
2 x M20x1.5	1

Antenna	
1½" horn[4]	A
2" horn (fits 2" ASME or DN 50 nozzles)	B
3" horn (fits 3" ASME or DN 80 nozzles)	C
4" horn (fits 4" ASME or DN 100 nozzles)	D
1½" horn with 100 mm extension[4]	E
2" horn with 100 mm extension	F
3" horn with 100 mm extension	G
4" horn with 100 mm extension	H
(Note: Please use largest horn size possible.)	

Selection and Ordering data	Order No.
SITRANS LR250	C) **7ML5431 -**
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). Ideal for small vessels and low dielectric media.	■■■■ 0 - ■■■■

Approvals	
General Purpose, CE, CSA, FM, FCC, R&TTE, C-TICK	A
Intrinsically Safe, CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, FCC	B
Intrinsically Safe, IECEx/ATEX II 1 GD Ex ia IIC T4, Ex tD A20 IP67 T90°C, R&TTE, C-TICK, INMETRO	C
Non-incendive, CSA/FM Class I, Div. 2, Groups A, B, C, D, FCC	D
Non-sparking, Energy Limited, ATEX II 3G Ex nA/nL IIC T4, CE, R&TTE, C-TICK	E
Increased Safety, IECEx/ATEX II 1/2 GD Ex embia IIC T4, Ex tD A20 IP67 T90°C, CE, R&TTE, C-TICK [5]	F
Flame Proof, IECEx/ATEX II 1/2 GD Ex dmbia IIC T4, Ex tD A20 IP67 T90°C, CE, R&TTE, C-TICK [5]	G
Explosion Proof CSA/FM Class I, II, III, Div. 1, Gr. A, B, C, D, E, F, G, FCC [5]	H

Pressure rating	
Rating per Pressure/Temperature curves in manual	0
0.5 bar g (7.25 psi g) maximum	1

[1] Not available with process connection options AA to AF

[2] For 1½" horn antennas only, max. range 10 m (32.8 ft), dk > 3

[3] Siemens Milltronics type flange, see instruction manual for details

[4] For 1½" threaded connection only, max. range 10 m (32.8 ft), dk > 3

[5] Applicable to Communication option 0 or 2 only

C) Subject to export regulations AL: N, ECCN: EAR99

Further designs	Order code
Please add "-Z" to Order No. and specify Order code(s).	
Plug M12 with mating Connector [1) 2) 3)]	A50
Plug 7/8" with mating Connector [7) 8) 4)]	A55
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters); specify in plain text	Y15
Test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Namur NE43 compliant, device preset to failsafe <3.6 mA[5]	N07

Operating Instructions for HART/mA device	
English	C) **7ML1998-5JE03**
German	C) **7ML1998-5JE33**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) **7ML1998-5QX82**

Operating Instructions for PROFIBUS PA device	
English	C) **7ML1998-5JF03**
German	C) **7ML1998-5JF33**
Note: The Operating Instructions should be ordered as a separate line item on the order.	

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SITRANS LR250

Further designs		Order code
Please add "-Z" to Order No. and specify Order code(s).		
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C)	**7ML1998-5XE82**
Operating Instructions for FOUNDATION Fieldbus device		
English	C)	**7ML1998-5KL01**
German	C)	**7ML1998-5KL31**
Note: The Operating Instructions should be ordered as a separate line item on the order.		
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C)	**7ML1998-5XN81**
Accessories		
Handheld programmer, Intrinsically safe, EEx ia	C)	**7ML1930-1BK**
HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D)	**7MF4997-1DA**
HART modem/USB (for use with a PC and SIMATIC PDM)	D)	**7MF4997-1DB**
One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F), HART[5]		**7ML1930-1AP**
One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F), PROFIBUS PA[6]		**7ML1930-1AQ**
SITRANS RD100 Remote display - see RD100 on page 5/324		
SITRANS RD200 Remote display - see RD200 on page 5/327		
SITRANS RD500 Remote display - see RD500 on page 5/331		

[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 Approvals option A, B, or C only

[4] Available with Enclosure option 0 only

[5] Product shipped with plastic cable gland, rated to -20 °C. If -40 °C rating required, then metallic cable gland is recommended.

C) Subject to export regulations AL: N, ECCN: EAR99

D) Subject to export regulations AL: N, ECCN: EAR99H

Selection and ordering Data

SITRANS LR250 Spare parts

	Order No.
SITRANS LR250 Enclosures	

		Order No.
LR250 enclosure with board stack, NPT cable inlet, approval option A, with HART® communication, no process connection	C)	**A5E01156819**
LR250 enclosure with board stack, M20 cable inlet, approval option A, with HART® communication, no process connection	C)	**A5E01156820**
LR250 enclosure with board stack, NPT cable inlet, approval option B, with HART® communication, no process connection	C)	**A5E01156823**
LR250 enclosure with board stack, M20 cable inlet, approval option B, with HART® communication, no process connection	C)	**A5E01156824**
LR250 enclosure with board stack, NPT cable inlet, approval option C, with HART® communication, no process connection	C)	**A5E01156827**
LR250 enclosure with board stack, M20 cable inlet, approval option C, with HART® communication, no process connection	C)	**A5E01156832**
LR250 enclosure with board stack, NPT cable inlet, approval option D, with HART® communication, no process connection	C)	**A5E01156834**
LR250 enclosure with board stack, M20 cable inlet, approval option D, with HART® communication, no process connection	C)	**A5E01156835**
LR250 enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	C)	**A5E01156836**
LR250 enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	C)	**A5E01156838**
LR250 enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	C)	**A5E01156839**
LR250 enclosure with board stack, M20 cable inlet, approval option B, with PROFIBUS PA communication, no process connection	C)	**A5E01156841**
LR250 enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	C)	**A5E01156843**
LR250 enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	C)	**A5E01156844**
LR250 enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	C)	**A5E01156846**

		Order No.
LR250 enclosure with board stack, M20 cable inlet, approval option D, with PROFIBUS PA communication, no process connection	C)	**A5E01156848**
LR250 enclosure with board stack, M20 cable inlet, approval option F, with HART® communication, no process connection	C)	**A5E02448270**
LR250 enclosure with board stack, M20 cable inlet, approval option G, with HART® communication, no process connection	C)	**A5E02448274**
LR250 enclosure with board stack, NPT cable inlet, approval option H, with HART® communication, no process connection	C)	**A5E02448278**
LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	C)	**A5E02653792**
LR250 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	C)	**A5E02653793**
LR250 enclosure with board stack, NPT cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	C)	**A5E02654606**
LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	C)	**A5E02654608**
LR250 enclosure with board stack, M20 cable inlet, approval option A, with HART® communication start-up at <3.6mA, no process connection	C)	**A5E02956317**
LR250 enclosure with board stack, M20 cable inlet, approval option C, with HART® communication start-up at <3.6mA, no process connection	C)	**A5E02956319**
LR250 enclosure with board stack, M20 cable inlet, approval option E, with HART® communication start-up at <3.6mA, no process connection	C)	**A5E02956320**
LR250 enclosure with board stack, M20 cable inlet, approval option F, with HART® communication start-up at <3.6mA, no process connection	C)	**A5E02956322**
LR250 enclosure with board stack, M20 cable inlet, approval option G, with HART® communication start-up at <3.6mA, no process connection	C)	**A5E02956323**
LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus™ communication , no process connection	C)	**A5E02653792**
LR250 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus™ communication , no process connection	C)	**A5E02653793**
LR250 enclosure with board stack, NPT cable inlet, approval option C, with FOUNDATION Fieldbus™ communication , no process connection	C)	**A5E02654606**
LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus™ communication , no process connection	C)	**A5E02654608**

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SITRANS LR250

SITRANS LR250 horn antenna and extension kits


38 mm (1.5") horn antenna kit, 1.5" Process Connections only	C)	**A5E01151539**
100 mm (4") horn antenna extension kit, 1.5" Process Connections only		**A5E01151553**
50 mm (2") stainless steel 316L horn antenna kit	C)	**A5E01151569**
75 mm (3") stainless steel 316L horn antenna kit	C)	**A5E01151571**
100 mm (4") stainless steel 316L horn antenna kit	C)	**A5E01151573**
100 mm (4") horn antenna extension kit, 50 mm (2"), 75 mm (3") and 100 mm (4") process connection	C)	**A5E01151577**
50 mm (2") horn antenna kit, Hastelloy C-22	J)	**A5E01151584**
75 mm (3") horn antenna kit, Hastelloy C-22	J)	**A5E01151585**
100 mm (4") horn antenna kit, Hastelloy C-22	J)	**A5E01151587**
5 Dupont 1Gr Polyback, PTFE grease kit	C)	**A5E01151626**
LR250 lid with O-ring		**A5E02465410**

C) Subject to export regulations AL: N, ECCN: EAR99

J) Subject to export regulations AL: 9I999, ECCN: EAR99

Please contact nacc.smpi@siemens.com for special requests.

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■ **Characteristic curves**

Maximum Flange and Process Temperatures versus Allowable Ambient
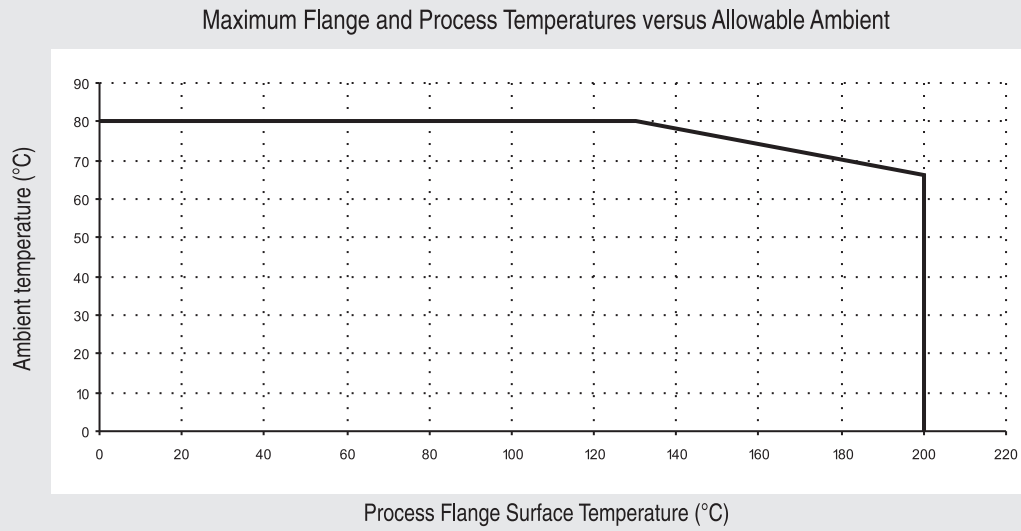
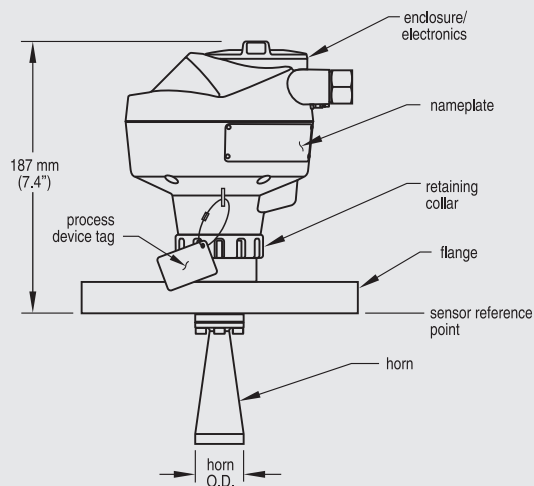SITRANS LR250 Ambient/Process Flange Surface Temperature Curve

SITRANS LR250

■ **Dimensional drawings**
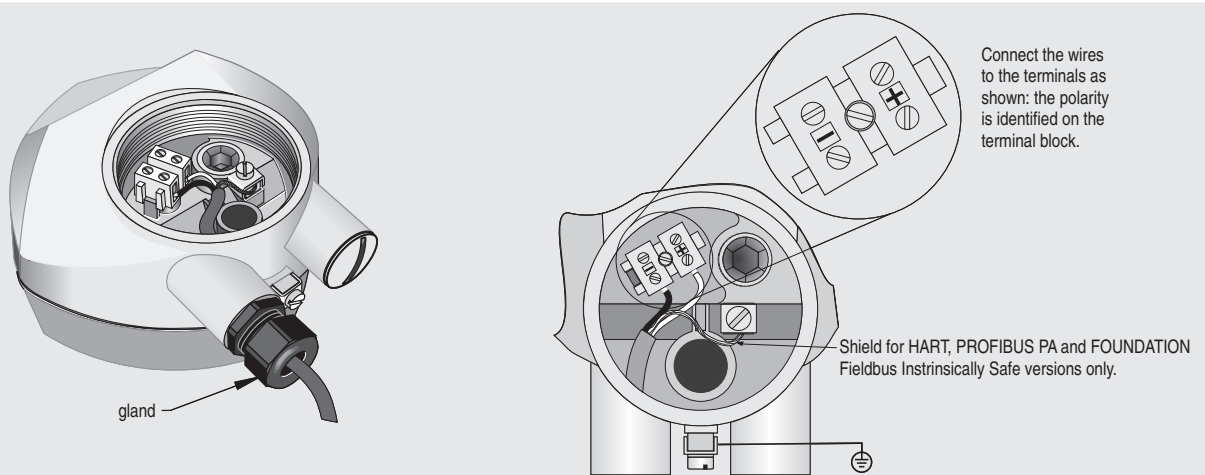

SITRANS LR250
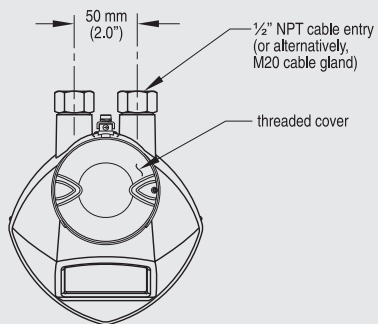
Flanged

Threaded
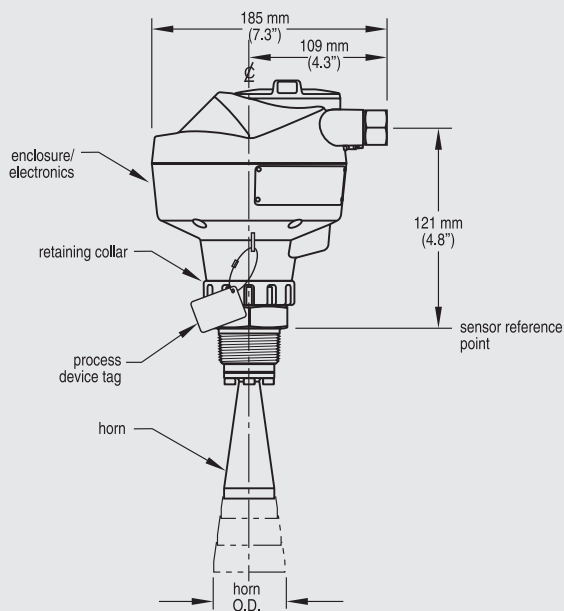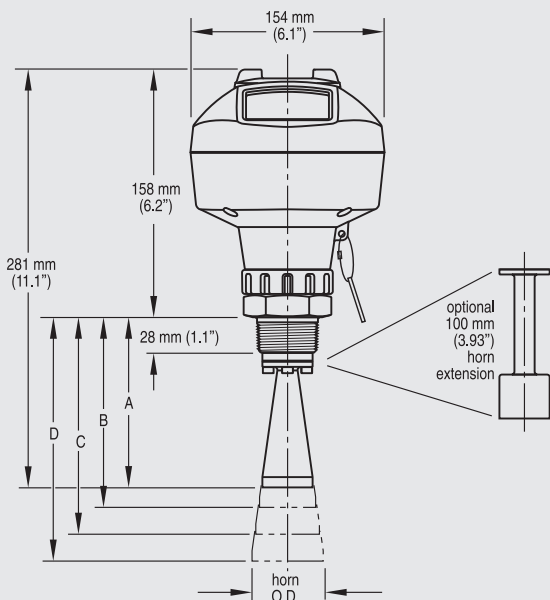
Nominal Horn Size	Horn O.D.	Horn Height		Beam Angle	Measurement Range
40 mm (1.5")	39.8 mm (1.57")	A	135 mm (5.3")	19 degrees	10 m (32.8 ft)
50 mm (2")	47.8 mm (1.88")	B	166 mm (6.55")	15 degrees	20 m (65.6 ft)
80 mm (3")	74.8 mm (2.94")	C	199 mm (7.85")	10 degrees	20 m (65.6 ft)
100 mm (4")	94.8 mm (3.73")	D	254 mm (10")	8 degrees	20 m (65.6 ft)

SITRANS LR250 dimensions

▪ Schematics

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Shield for HART, PROFIBUS PA and FOUNDATION Fieldbus Instrinsically Safe versions only.

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Notes:
1. DC terminal shall be supplied from a source providing electrical isolation between the input and output, to meet the applicable safety requirements of IEC 61010-1.
2. All field wiring must have insulation suitable for rated input voltages.
3. Use shielded twisted pair cable (14 to 22 AWG) for HART version.
4. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

Hand Programmer	**SITRANS LR250**
	Part number: 7ML1930-1BK

SITRANS LR250 connections