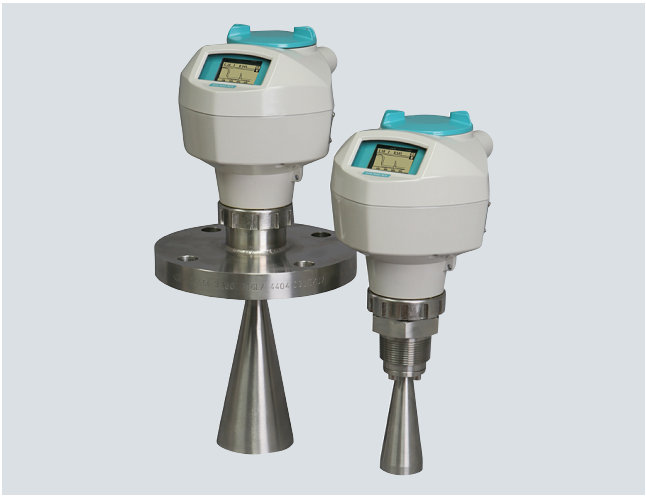
Overview



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") from the end of the antenna
- 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
- Suitable for use in safety related systems in accordance with IEC 61508/61511 (SIL-2)

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 antenna 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.

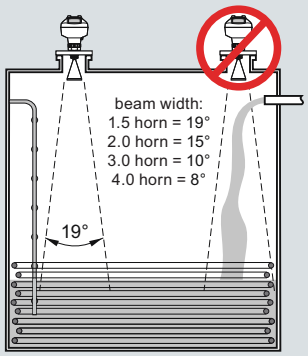
SITRANS LR250 measures superbly on low dielectric media, and in small vessels, as well as tall and narrow vessels.

- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, high temperatures, low dielectric media

Configuration

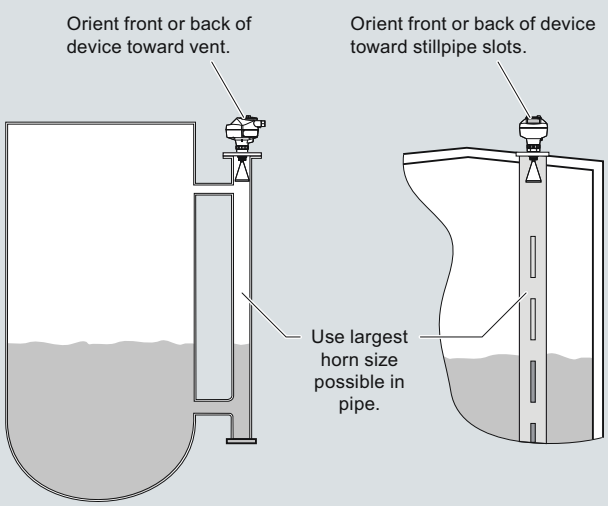
Installation

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.



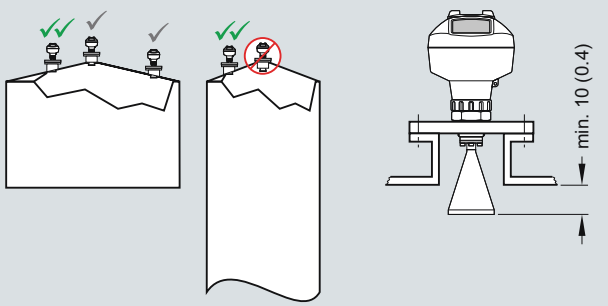
Mounting unit on bypass

Mounting unit on stilling well



Mounting unit on vessel

Mounting on a nozzle



SITRANS LR250 installation, dimensions in mm (inch)

SITRANS LR250

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 antenna
Maximum measuring range	20 m (65 ft), antenna dependent
Output	
HART®:	Version 5.1
• Analog output	4 ... 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 ... +80 °C (-40 ... +176 °F)
• Installation category	I
• Pollution degree	4
Medium conditions	
Dielectric constant ε_r	ε_r > 1.6, antenna and application dependent
Process temperature	-40 ... +200 °C (-40 ... +392 °F) (at process connection with FKM o-ring) -20 ... +200 °C (-4 ... +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 ... 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
• Intrinsically Safe (Brazil)	INMETRO Br-Ex ia IIC T4
• 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
• Increased Safety (Brazil)	INMETRO Br-Ex embia IIC T4
• 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
• Explosion Proof (Brazil)	INMETRO Br-Ex dmbia IIC T4
Marine	• Lloyd's Register of Shipping • ABS Type Approval • Bureau Veritas
Functional Safety	SIL-2 suitable in accordance with IEC 61508/61511

Programming	
Intrinsically Safe Siemens handheld 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 ... +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
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

®HART is a registered trademark of the Hart Communications Foundation.

TMFOUNDATION Fieldbus is a trademark of Fieldbus Foundation.

®Hastelloy and ®C-22 are registered trademarks of Haynes International Inc.

SITRANS LR250

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)]		2
Hastelloy C-22/2.4602, PTFE emitter, FFKM seal[1) 2)]		3
Process Connection Type		
1½" NPT [(Taper), ANSI/ASME B1.20.1][3)]		AA
R 1½" [(BSPT), EN 10226][2)]		AB
G 1½" [(BSPP), EN ISO 228-1] (parallel thread)[3)]		AC
2" NPT [(Taper), ANSI/ASME B1.20.1]		AD
R 2" [(BSPT), EN 10226]		AE
G 2" [(BSPP), EN ISO 228-1] (parallel thread)		AF
2" Class 150 ASME B16.5 flat faced[4)]		BA
3" Class 150 ASME B16.5 flat faced[4)]		BB
4" Class 150 ASME B16.5 flat faced[4)]		BC
2" Class 300 ASME B16.5 flat faced[4)]		CA
3" Class 300 ASME B16.5 flat faced[4)]		CB
4" Class 300 ASME B16.5 flat faced[4)]		CC
DN 50 PN 16 EN 1092-1 Type A flat faced[4)]		DA
DN 80 PN 16 EN 1092-1 Type A flat faced[4)]		DB
DN 100 PN 16 EN 1092-1 Type A flat faced[4)]		DC
DN 50 PN 40 EN 1092-1 Type A flat faced[4)]		EA
DN 80 PN 40 EN 1092-1 Type A flat faced[4)]		EB
DN 100 PN 40 EN 1092-1 Type A flat faced[4)]		EC
50A 10K JIS B 2220 flat faced[4)]		FA
80A 10K JIS B 2220 flat faced[4)]		FB
100A 10K JIS B 2220 flat faced[4)]		FC
DN 50 PN 16 DIN EN1092-1 Type B1 raised face		GA
DN 80 PN 16 DIN EN1092-1 Type B1 raised face		GB
DN 100 PN 16 DIN EN1092-1 Type B1 raised face		GC
DN 150 PN 16 DIN EN1092-1 Type B1 raised face		GD
DN 50 PN 40 DIN EN1092-1 Type B1 raised face		HA
DN 80 PN 40 DIN EN1092-1 Type B1 raised face		HB
DN 100 PN 40 DIN EN1092-1 Type B1 raised face		HC
DN 150 PN 40 DIN EN1092-1 Type B1 raised face		HD
Communication/Output		
PROFIBUS PA		1
4 ... 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[5)]		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[5)]		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 Br-Ex ia IIC T4		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, , INMETRO Br-Ex embia IIC T4[6)]		F
Flame Proof, IECEx/ATEX II 1/2 GD Ex dmbia IIC T4, Ex tD A20 IP67 T90°C, CE, R&TTE, C-TICK, INMETRO BR-Ex dmbia IIC T4[6)]		G
Explosion Proof CSA/FM Class I, II, III, Div. 1, Gr. A, B, C, D, E, F, G, FCC [6)]		H
Pressure rating		
Rating per Pressure/Temperature curves in manual 0.5 bar g (7.25 psi g) maximum		0
		1

1) Not available with process connection options AA to AF
2) Hastelloy flanges are provided as raised face.
3) For 1½" horn antennas only, max. range 10 m (32.8 ft), dk > 3
4) Siemens Milltronics type flange (flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard), see operating instructions for details
5) For 1½" threaded connection only, max. range 10 m (32.8 ft), dk > 3
6) Applicable to Communication option 2 only

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

Selection and Ordering data		Order code
Further designs		
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[2) 3) 4)]		**A55**
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 27 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**
Functional Safety - SIL2 suitable in accordance with IEC 61508/61511[3) 5)]		**C20**
Namur NE43 compliant, device preset to failsafe <3.6 mA[5)]		**N07**
Operating Instructions for HART/mA device		**Order No.**
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.		
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 ... +80 °C (-40 ... +176 °F), HART		**7ML1930-1AP**
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus[6)]		**7ML1930-1AQ**
SITRANS RD100 Remote display - see Chapter 8		
SITRANS RD200 Remote display - see Chapter 8		
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 8		

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) Applicable to Communication option 2 only
6) For use with Communication option 1 and 3 only

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

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

5

SITRANS LR250 Specials

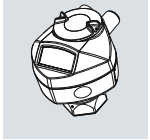
SITRANS LR250 Specials

Order No.

SITRANS LR250 Enclosures (PROFIBUS PA models)

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, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	C)	**A5E01156846**
LR250 enclosure with board stack, M20 cable inlet, approval option D, with PROFIBUS PA communication, no process connection	C)	**A5E01156848**

SITRANS LR250 Enclosures (FOUNDATION Fieldbus models)



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**

SITRANS LR250 Specials

Order No.

SITRANS LR250 Enclosures (<3.6mA start-up HART models)

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**

SITRANS LR250 Enclosures (4 to 20 mA HART models prior to October 2010)

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, NPT cable inlet, approval option D, with HART communication, no process connection	C)	**A5E01156835**
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**

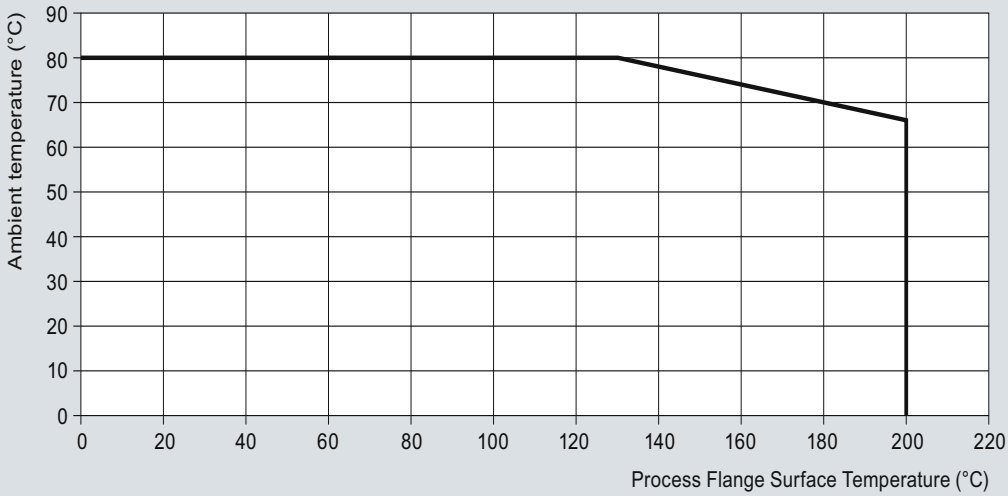
SITRANS LR250 Specials		
		Order No.
SITRANS LR250 horn antenna and extension kits		
38 mm (1.5") horn antenna kit, 1.5" Process Connections only	C)	**A5E01151539**
100 mm (4") horn antenna extension kit, 1.5" Process Connections only		**A5E01151553**
50 mm (2") stainless steel 316L horn antenna kit	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

SITRANS LR250 Specials

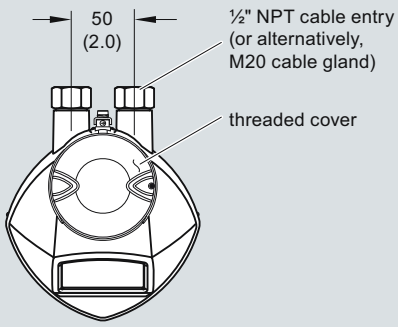
Characteristic curves



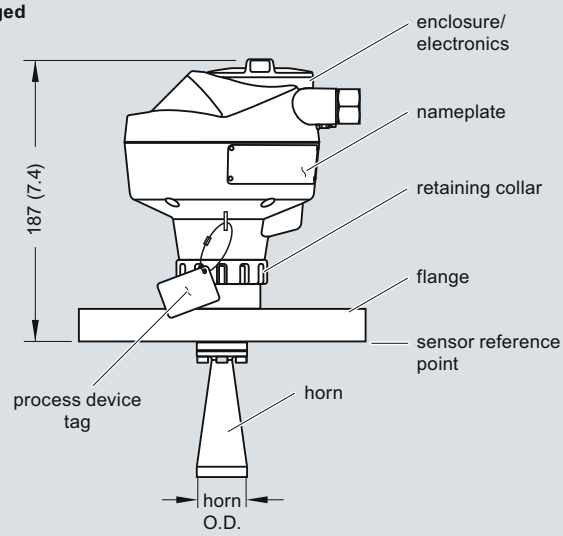
SITRANS LR250 Ambient/Process Flange Surface Temperature Curve

Dimensional drawings

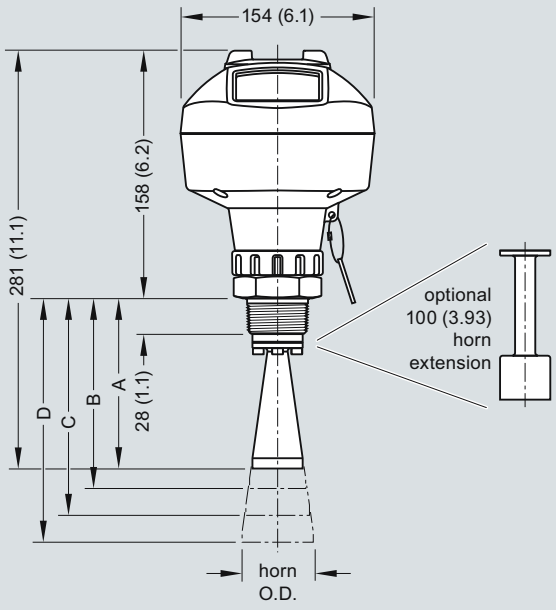
SITRANS LR250

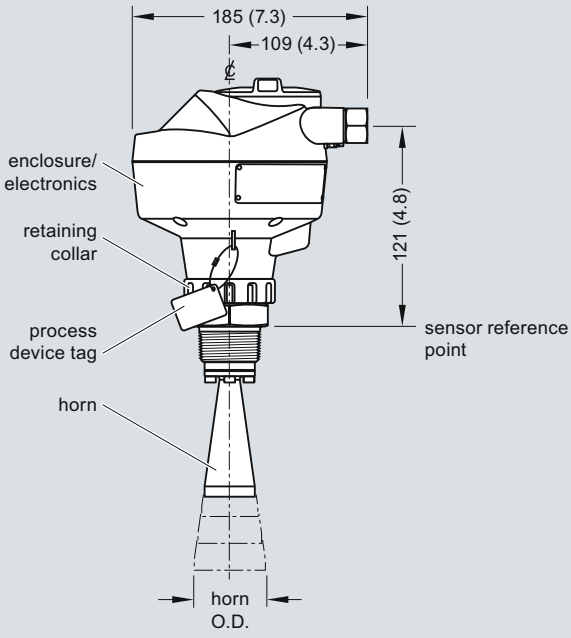


Flanged



Threaded



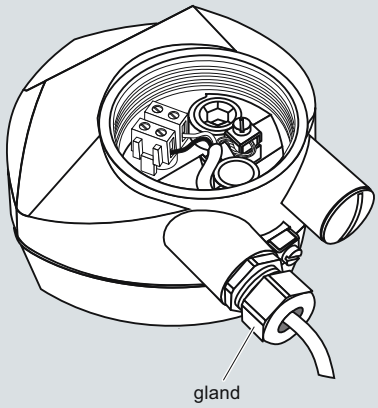


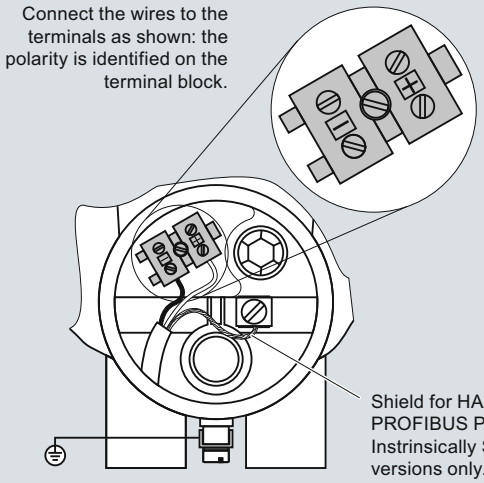
Nominal Horn Size	Horn O.D.	Horn Height		Beam Angle	Measurement Range
40 (1.5)	39.8 (1.57)	A	135 (5.3)	19 degrees	10 m (32.8 ft)
50 (2)	47.8 (1.88)	B	166 (6.55)	15 degrees	20 m (65.6 ft)
80 (3)	74.8 (2.94)	C	199 (7.85)	10 degrees	20 m (65.6 ft)
100 (4)	94.8 (3.73)	D	254 (10)	8 degrees	20 m (65.6 ft)

SITRANS LR250, dimensions in mm (inch)

SITRANS LR250 Specials

Schematics





Hand Programmer

SITRANS LR250 HART
Part number:
7ML1930-1BK

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.

SITRANS LR250 connections

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