

Level instruments

Continuous level measurement - Radar transmitters

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
- Process Intelligence signal processing for improved measurement reliability and Auto False-Echo Suppression of fixed obstructions
- Programming using infrared Intrinsically Safe handheld programmer or SIMATIC PDM

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.

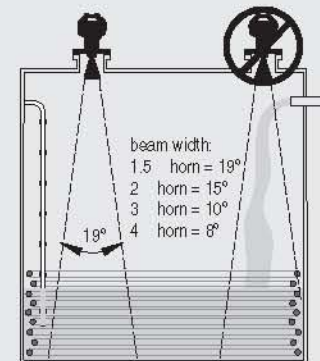
SITRANS LR250's unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid.

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

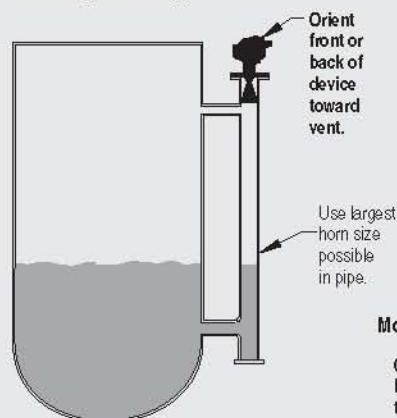
Installation



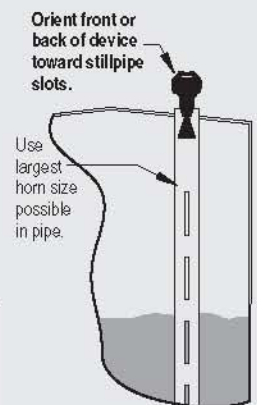
Note:

- 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

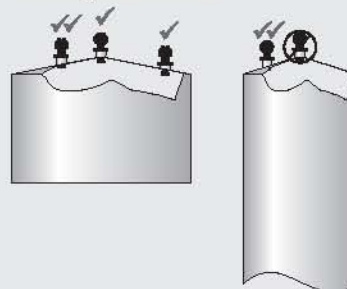
Mounting unit on bypass



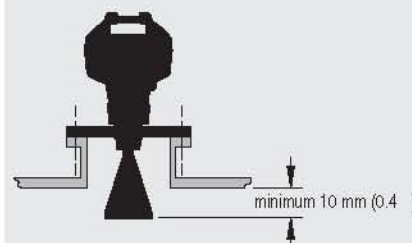
Mounting unit on stilling well



Mounting unit on vessel



Mounting on a nozzle



SITRANS LR250 installation

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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

• Analog output	4 to 20 mA
• Accuracy	± 0.02 mA
• Communications	HART® Optional: PROFIBUS PA (Profile 3.0, Class B)
• Fail-safe	• Programmable as high, low or hold (Loss of Echo) • NE 43 programmable

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
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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	$\epsilon_r > 1.6$, 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 1/2" NPT
• Degree of protection	Type 4X/NEMA 4X, Type 6/ NEMA 6, IP67, IP68
• Weight	< 3 kg (6.6 lbs) 3.75 mm (1 1/2") threaded connection with 1 1/2" 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	1 1/2" or 2" NPT [(Taper), ANSI/ASME B1.20.1] R 1 1/2" or 2" [(BSPT), EN 10226] G 1 1/2" 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	• 10.5 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 EEx ia IIC T4 ATEX II 1D EEx tD A20 IP67 T90 °C
- Intrinsically Safe (USA/Canada)	CSA/FM (barrier required) Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
- Intrinsically Safe (International)	IECEx SIR 05.0031X, Ex ia IIC T4, EX tD A20 IP67 T90 °C
- Non-incendive (USA/Canada)	CSA/FM Class I, Div. 2, Groups A, B, C, D T5
- Flameproof (Europe/ International)	ATEX II 1/2 GD, 1D, 2D, IECEx SIR 08.107X Ex dmbia IIC T4 Ga/Gb Ex tD A20 IP67 T90 °C
- Increased Safety (Europe/Inter- national)	ATEX II 1/2 GD, 1D, 2D, IECEx SIR 08.107X Ex embia IIC T4 Ga/Gb Ex tD A20 IP67 T90 °C
- Explosion proof (USA/Canada)	CSA/FM: (barrier not required) Class I, Div. 1, Groups A, B, C, D Class II, Div. 1, Groups E, F, G Class III T4

Programming

• Intrinsically Safe Siemens hand- held programmer	Infrared receiver
- Approvals for handheld pro- grammer	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, and III, Div. 1., Gr. A-G, T6 Ta=+50 °C IECEx SIR 09.0073
• Handheld communicator	HART communicator 375
• PC	• SIMATIC PDM • AMS
• Display (local)	Graphic local user interface including quick start wizard and echo profile displays

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

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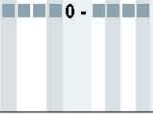
Selection and Ordering data	Order No.
SITRANS LR250	C) 7ML5431-
2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including high temperature and pressure, to a range of 20 m (66 ft). Ideal for small vessels and low dielectric 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⁾	AA
R 1½" [(BSPT), EN 10226] ²⁾	AB
G 1½" [(BSPP), EN ISO 228-1] (parallel thread) ²⁾	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" ASME, 150 lb	BA
3" ASME, 150 lb	BB
4" ASME, 150 lb	BC
2" ASME, 300 lb	CA
3" ASME, 300 lb	CB
4" ASME, 300 lb	CC
DN 50 PN 16	DA
DN 80 PN 16	DB
DN 100 PN 16	DC
DN 50 PN 40	EA
DN 80 PN 40	EB
DN 100 PN 40	EC
JIS 50A 10K	FA
JIS 80A 10K	FB
JIS 100A 10K	FC
DN 50 PN 10/16 DIN EN1092-1 form B1	GA
DN 80 PN 10/16 DIN EN1092-1 form B1	GB
DN 100 PN 10/16 DIN EN1092-1 form B1	GC
DN 150 PN 10/16 DIN EN1092-1 form B1	GD
DN 50 PN 25/40 DIN EN1092-1 form B1	HA
DN 80 PN 25/40 DIN EN1092-1 form B1	HB
DN 100 PN 25/40 DIN EN1092-1 form B1	HC
DN 150 PN 25/40 DIN EN1092-1 form B1	HD
Communication/Output	
4 to 20 mA, HART [®]	0
PROFIBUS PA	1
Enclosure/Cable inlet	
Aluminum, Epoxy painted	0
2 x ½" NPT	1
2 x M20x1.5	1
Antenna	
1½" horn ³⁾	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 ²⁾	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.)	

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Approvals	
General Purpose, CE, CSA, FM, FCC, R&TTE, C-TICK	A
CSA/FM Class I and II, Div. I, Groups A, B, C, D, E, F, G Intrinsically Safe, barrier required, FCC, C-TICK	B
ATEX II 1 GD EEx ia IIC T4, Intrinsically Safe, barrier required, R&TTE, C-TICK, INMETRO ⁴⁾	C
CSA/FM Class I, Div. 2, Non-Incendive, no barrier required, FCC, C-TICK ⁵⁾	D
ATEX II 3G Ex nA II T4, Non-Sparking, no barrier required, CE, R&TTE, C-TICK ⁴⁾⁵⁾⁶⁾	E
ATEX II 1/2 GD Ex embia IIC T4, Ex tD A20 IP67 T90C, CE, R&TTE, C-TICK ⁴⁾⁵⁾⁶⁾	F
ATEX II 1/2 GD Ex dmbia IIC T4, Ex tD A20 IP67 T90C, CE, R&TTE, C-TICK ⁴⁾⁵⁾⁶⁾	G
CSA/FM Class I, II and III, Div. 1, Gr. A-G, FCC, C-TICK ⁴⁾⁵⁾	H
Pressure rating	
Rating per Pressure/Temperature curves in Manual 0.5 bar g (7.25 psi g) maximum	0 1
Further designs	Order code
Please add "-Z" to Order No. and specify Order code(s).	
Acceptance 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 <3.6mA ⁶⁾	N07
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 27 characters) specify in plain text	Y15
Instruction manual for HART/mA device	Order No.
English	C) 7ML1998-5JE01
German	C) 7ML1998-5JE31
Note: The instruction manual should be ordered as a separate line item on the order.	
Multi-language Quick Start manual	C) 7ML1998-5QX81
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	

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SITRANS LR250 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.	C) 7ML5431- 
Instruction manual for PROFIBUS PA device English German Note: The instruction manual 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 instruction manual library.	C) 7ML1998-5JF02 C) 7ML1998-5JF32 C) 7ML1998-5XE81
Accessories Handheld programmer, Intrinsically Safe, EEx ia (LUI enabled) HART modem/RS-232 (for use with a PC and SIMATIC PDM) One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F) One metallic cable gland M20x1.5, rated -40 to +80 °C (-40 to +176 °F), PROFIBUS PA SITRANS RD100 Remote display - see RD100 on page 5/304 SITRANS RD200 Remote display - see RD200 on page 5/306	C) 7ML1930-1BK D) 7MF4997-1DA 7ML1930-1AP 7ML1930-1AQ

- 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) For 1½" threaded connection only, max. range 10 m (32.8 ft), dk > 3
- 4) Includes equivalent IECEx approval
- 5) No barrier required
- 6) Applicable to HART version only

C) Subject to export regulations AL: N, ECCN: EAR99
 D) Subject to export regulations AL: N, ECCN: EAR99H

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Selection and ordering Data

SITRANS LR250 Spare parts

	Order No.		Order No.
SITRANS LR250 Enclosures			
			
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option A, with HART communication, no process connection	C) A5E01156819	SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option F, with PROFIBUS PA communication, no process connection	C) A5E01156848
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option A, with HART communication, no process connection	C) A5E01156820	SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option F, with Hart communication, no process connection	C) A5E02448270
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with HART communication, no process connection	C) A5E01156823	SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option G, with Hart communication, no process connection	C) A5E02448274
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option B, with HART communication, no process connection	C) A5E01156824	SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option H, with Hart communication, no process connection	C) A5E02448278
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option C, with HART communication, no process connection	C) A5E01156827		
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with HART communication, no process connection	C) A5E01156832	SITRANS LR250 horn antenna and extension kits	
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with HART communication, no process connection	C) A5E01156834	38 mm (1.5") horn antenna kit, 1.5" Process Connections only	C) A5E01151539
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option D, with HART communication, no process connection	C) A5E01156835	100 mm (4") horn antenna extension kit, 1.5" Process Connections only	A5E01151553
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	C) A5E01156836	50 mm (2") stainless steel horn antenna kit	C) A5E01151569
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	C) A5E01156838	75 mm (3") stainless steel horn antenna kit	C) A5E01151571
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	C) A5E01156839	100 mm (4") stainless steel horn antenna kit	C) A5E01151573
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option B, with PROFIBUS PA communication, no process connection	C) A5E01156841	100 mm (4") horn antenna extension kit, 50 mm (2"), 75 mm (3") and 100 mm (4") process connection	C) A5E01151577
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	C) A5E01156843	50 mm (2") horn antenna kit, Hastelloy C-22	J) A5E01151584
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	C) A5E01156844	75 mm (3") horn antenna kit, Hastelloy C-22	J) A5E01151585
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	C) A5E01156846	100 mm (4") horn antenna kit, Hastelloy C-22	J) A5E01151587
		5 Dupont 1Gr Polyback, PTFE grease kit	C) A5E01151626

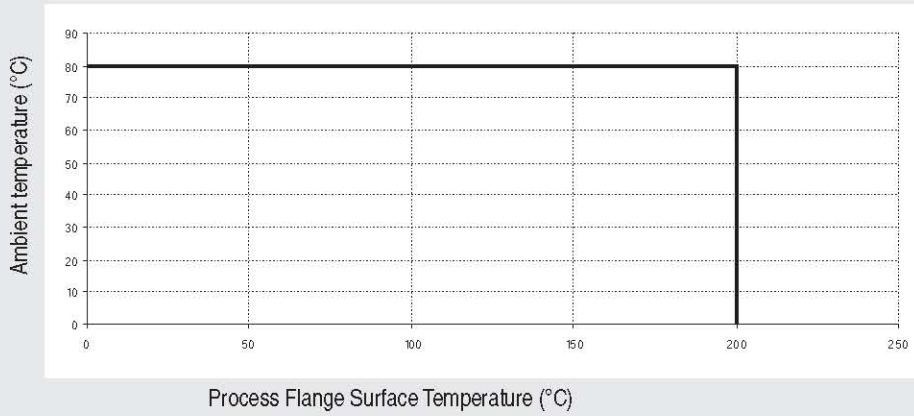
C) Subject to export regulations AL: N, ECCN: EAR99

J) Subject to export regulations AL: 91999, ECCN: EAR99

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

Characteristic curves

Maximum Flange and Process Temperatures versus Allowable Ambient



SITRANS LR250 Ambient/Process Flange Surface Temperature Curve

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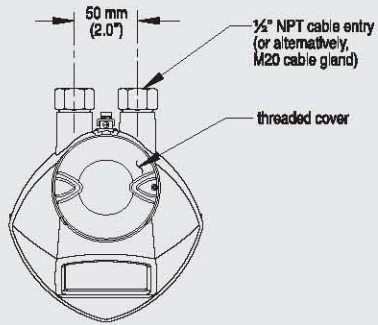
Continuous level measurement - Radar transmitters

SITRANS LR250

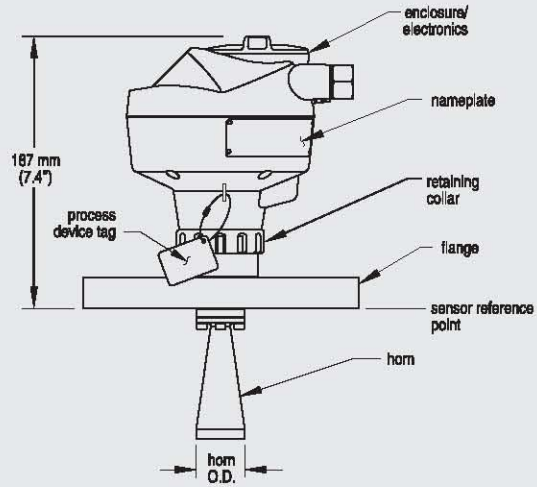
Dimensional drawings

5

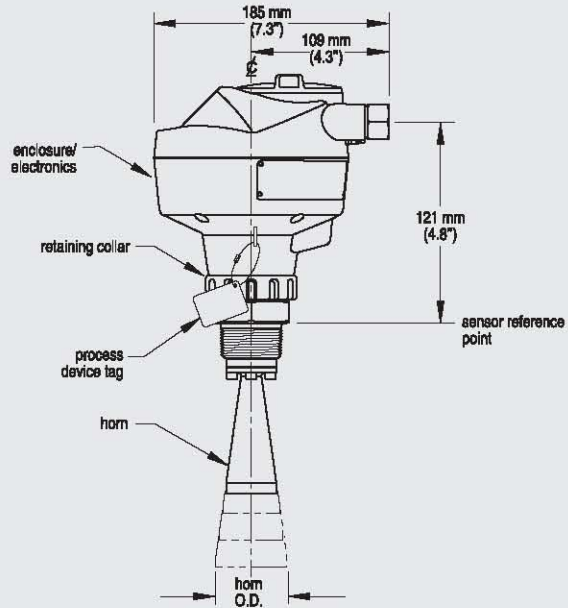
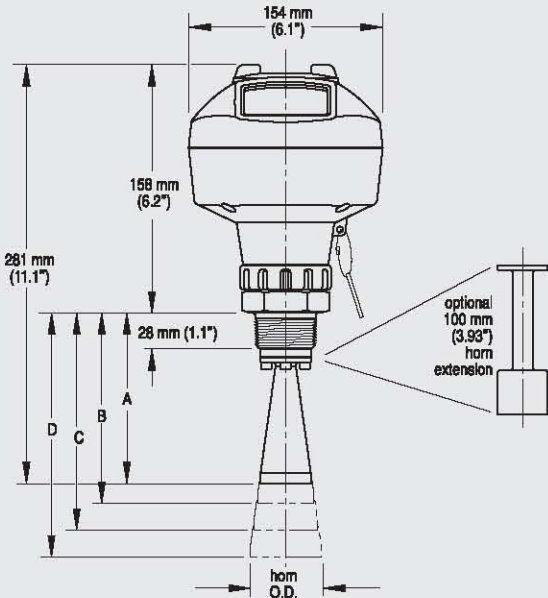
SITRANS LR250



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)

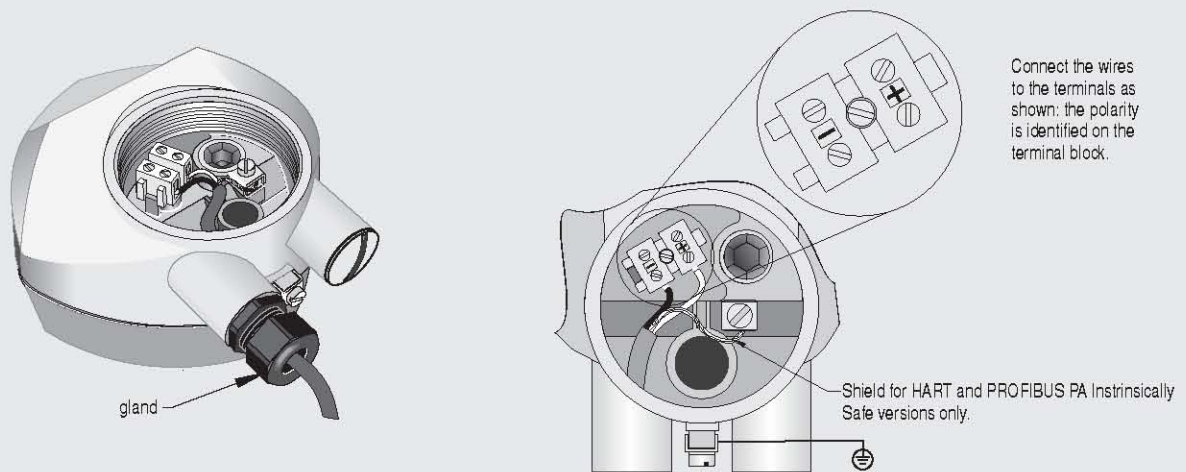
SITRANS LR250 dimensions

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Schematics



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
HART**

Part number:
7ML1930-1BK



SITRANS LR250 connections