

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR250 threaded PVDF antenna

Overview



SITRANS LR250 with threaded PVDF antenna is a 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosives or aggressive materials, to a range of 10 m (32.8 ft).

Benefits

- Fully insulated PVDF antenna design for use in chemical and sanitary environments where aggressive and corrosive materials are used
- Cost effective replacement for transmitters made of exotic materials
- 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 and 2" (50 mm) process connection/antenna allow 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 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)
- 3mm (0.118 inch) accuracy in accordance with IEC 60770-1

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 in small vessels and in tanks/vessels up to 10 m (32 ft) on materials with $dk > 3$.

- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials, media with dielectric (dk) ≥ 3 (application dependent) and applications requiring functional safety

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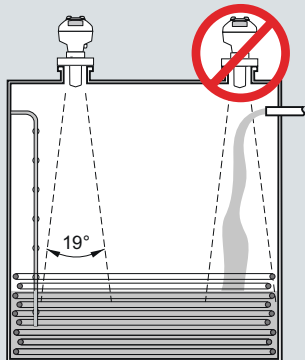
SITRANS LR250 threaded PVDF antenna

Configuration

Installation

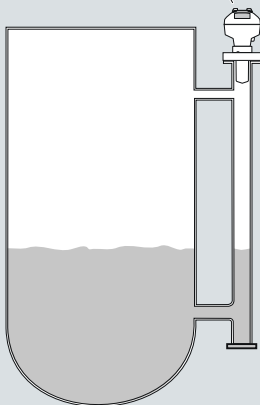
Note:

- 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 antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



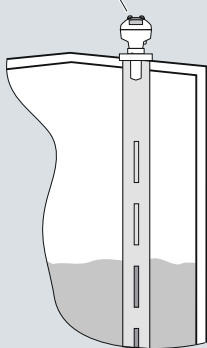
Mounting unit on bypass

Orient front or back of device toward vent.

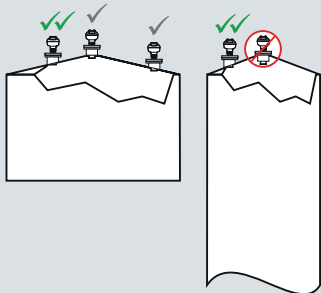


Mounting unit on stilling well

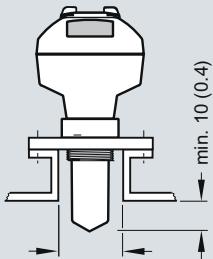
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



SITRANS LR250 PVDF antenna installation, dimensions in mm (inch)

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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 inch) from end of horn
Maximum measuring range	10 m (32.8 ft)

Output

HART	Version 5.1
• Analog output	4 ... 20 mA
• Accuracy	± 0.02 mA
• Fail-safe	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • > 500 mm from sensor reference point: 3 mm (0.118 inch) • < 500 mm from sensor reference point: 25 mm (1 inch)
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	≥ 3 (1.6 in stillpipe)
Process temperature	-40 ... +80 °C (-40 ... +176 °F) at process connection
Process pressure	Up to 5 bar g (72 psi g) 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	approximately 3.3 kg (7.27 lb)
Display (local)	Graphic local user interface including quick start wizard and echo profile display
Antenna	
• Material	PVDF (Polyvinylidene fluoride)
• Dimensions (nominal horn sizes)	2" (48 mm)
Process connections	
Process connection	2" NPT [(Taper), ASME B1.20.1] 2" [(BSPT), EN 10226] 2" [(BSPP), EN ISO 228-1]

Power supply

4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA	<ul style="list-style-type: none"> • 15 mA • per IEC 61158-2
FOUNDATION Fieldbus	<ul style="list-style-type: none"> • 20.0 mA • per IEC 61158-2

Certificates and approvals

General	CSA _{US/CA} , CE, FM, NE 21, C-TICK, KC
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 Ex iaD 20 tD A20 IP67 T90°C
• Intrinsically Safe (China)	NEPSI Ex ia IIC T4/DIP A20 TA T90°C IP67
• Non-sparking/Energy Limited (Europe)	ATEX II 3G EEx nA/nL IIC T4 Gc
• Non-sparking/Energy Limited (China)	NEPSI Ex nA/nL IIC T4
• 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 iaD 20 tD A20 IP67 T90°C
• Intrinsically Safe (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ta IIIC T90°C Da IP67
• Flame Proof (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex dmbia IIC T4 Ga/Gb, Ex iaD 20 tD A20 IP67 T90°C
• Explosion Proof (Brazil)	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex tb IIIC T90°C Db IP67
• Increased Safety (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex embia IIC T4 Ga/Gb, Ex iaD 20 tD A20 IP67 T90°C
• Increased Safety (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex tb IIIC T90°C Db IP67
• 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
• Increased Safety/Flameproof (China)	NEPSI Ex dmbia IIC T4/ Ex embia IIC T4/ DIP A20 TA, T90°C IP67
Marine	<ul style="list-style-type: none"> • 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 T = 135 °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	<ul style="list-style-type: none"> • 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

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Selection and Ordering data	Order No.	Selection and Ordering data	Order code
SITRANS LR250 threaded PVDF antenna 2-wire, 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosives or aggressive materials, to a range of 10 m (32.8 ft).	C) 7ML5431- 0 -	Further designs Please add "-Z" to Order No. and specify Order code(s).	
Process Connection and Antenna Material Threaded PVDF antenna	4	Plug M12 with mating Connector ¹⁾²⁾³⁾	A50
Process Connection Type Threaded connections PVDF 2" NPT (ASME B1.20.1) (tapered thread) R 2" [(BSPT), EN 10226-1] (tapered thread) G 2" [(BSPP), EN ISO 228-1] (parallel thread)	PA PB PC	Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	A55
Communication/Output PROFIBUS PA 4 ... 20 mA, HART, startup at < 3.6 mA FOUNDATION Fieldbus	1 2 3	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
Enclosure/Cable inlet Aluminum, Epoxy painted 2 x 1/2" NPT 2 x M20x1.5	0 1	Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
Antenna 2" (50 mm) threaded PVDF antenna	R	Inspection Certificate Type 3.1 per EN 10204	C12
Approvals General Purpose, CE, CSA, FM, FCC, R&TTE, C-TICK, KC Intrinsically Safe, CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada FCC Intrinsically Safe, IECEx/ATEX II 1 GD Ex ia IIC T4, Ex iaD 20 tD A20 IP67 T90°C, INMETRO Ex ia IIC T4 Ga, Ex ta IIIC T90°C Da IP67, CE, R&TTE, C-TICK, KC Non-incendive, CSA/FM Class I, Div. 2, Groups A, B, C, D, FCC Non-sparking, Energy Limited, ATEX II 3G Ex nA/nL IIC T4, CE, R&TTE, C-TICK, KC Increased Safety, IECEx/ATEX II 1/2 GD Ex embia IIC T4, Ex iaD 20 tD A20 IP67 T90°C, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex tb IIIC T90°C Db IP67, CE, R&TTE, C-TICK, KC ¹⁾ Flame Proof, IECEx/ATEX II 1/2 GD Ex dmbia IIC T4, Ex iaD 20 tD A20 IP67 T90°C, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex tb IIIC T90°C Db IP67, CE, R&TTE, C-TICK, KC ¹⁾ Explosion Proof CSA/FM Class I, II, III, Div. 1, Gr. A, B, C, D, E, F, G, Industry Canada FCC ¹⁾	A B C D E F G H	Functional Safety - SIL ₂ suitable in accordance with IEC 61508/61511 ^{5) 6)}	C20
Pressure rating Rating per Pressure/Temperature curves in manual	2	Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	N07
		Operating Instructions for HART/mA device	Order No.
		English	C) 7ML1998-5JE05
		German	C) 7ML1998-5JE34
		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) 7ML1998-5QX83
		Operating Instructions for PROFIBUS PA device	
		English	C) 7ML1998-5JF05
		German	C) 7ML1998-5JF34
		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) 7ML1998-5XE83
		Operating Instructions for FOUNDATION Fieldbus device	
		English	C) 7ML1998-5KL03
		German	C) 7ML1998-5KL32
		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) 7ML1998-5XN82

¹⁾ Applicable to Communication option 2 only

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

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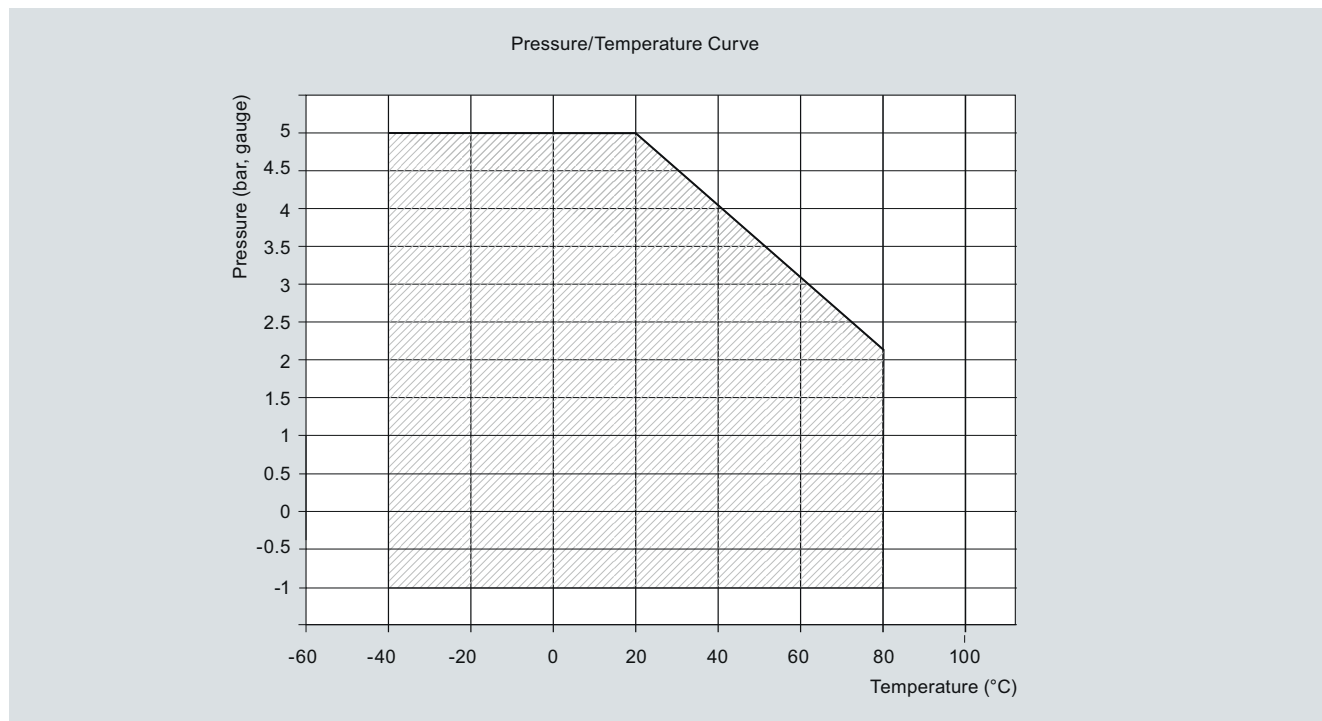
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Selection and Ordering data	Order code
Accessories	
Handheld programmer, Intrinsically safe, EEx ia	C) 7ML1930-1BK
HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DA
HART modem/USB (for use with a PC and SIMATIC PDM)	D) 7MF4997-1DB
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 ⁷⁾	7ML1930-1AQ
FDA approved FKM o-ring for 2" G (BSPP) process connections -28 ... +80 °C (-28 ... +176 °F)	7ML1830-3AN
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	K) 7ML5750- 1AA00-0

- 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) Available with Approval options A to E only
 - 7) 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: EAR99R.
K) Subject to export regulations AL: N, ECCN: 5A991X.

Characteristic curves



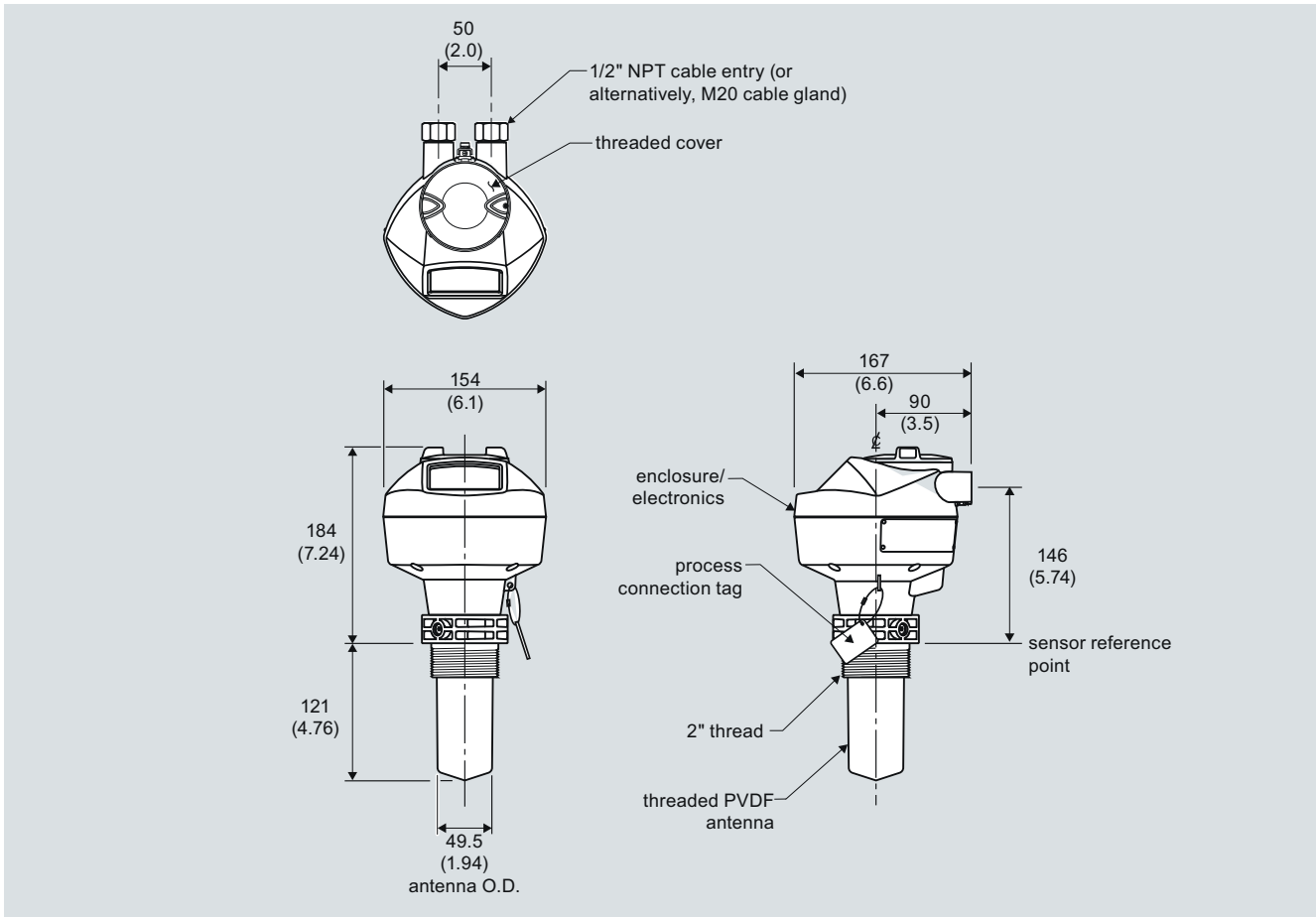
SITRANS LR250 PVDF antenna pressure/temperature curve

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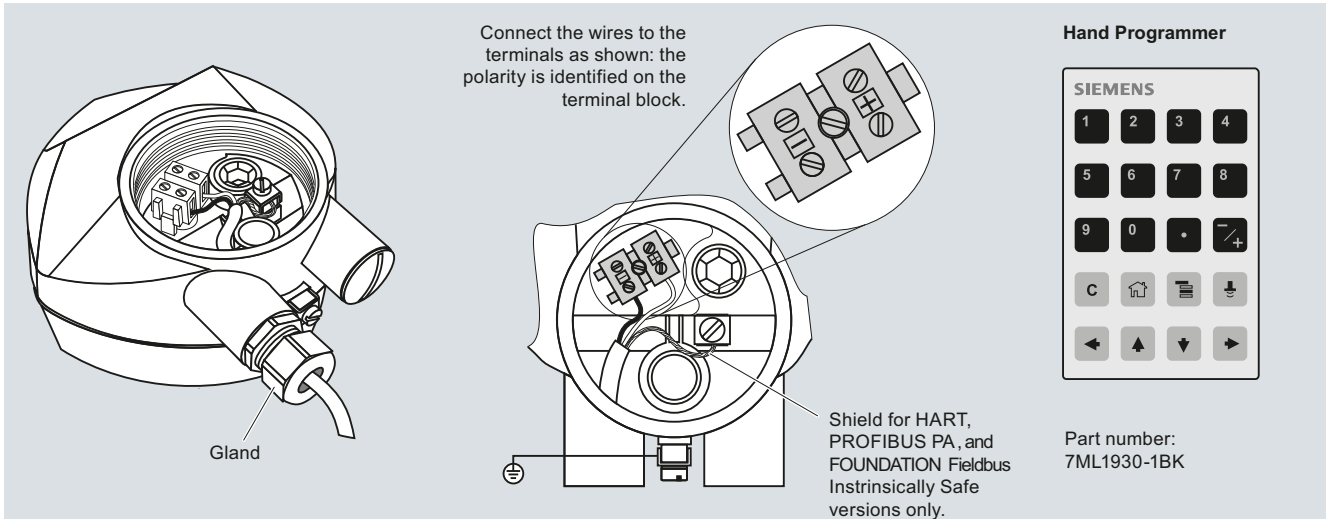
SITRANS LR250 threaded PVDF antenna

Dimensional drawings



SITRANS LR250 PVDF antenna, dimensions in mm (inch)

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.

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SITRANS LR250 threaded PVDF Specials

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	Order No.
SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA models)	
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588171
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588253
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E03588512
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E03589260
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E03589262
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection	A5E03589264
SITRANS LR250 threaded PVDF antenna version enclosures (FOUNDATION Fieldbus models)	
LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589266
LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589275
LR250 horn version enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E03589277
LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03589280
LR250 horn version enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E03589281
LR250 horn version enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E03589283

SITRANS LR250 threaded PVDF Specials

	Order No.
SITRANS LR250 threaded PVDF antenna version enclosures (< 3.6 mA start-up HART models)	
LR250 horn version enclosure with board stack, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E03569747
LR250 horn version enclosure with board stack, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	A5E03586807
LR250 horn version enclosure with board stack, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection	A5E03586854
LR250 horn version enclosure with board stack, M20 cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection	A5E03586887
LR250 horn version enclosure with board stack, NPT cable inlet, approval option D, with HART communication start-up at < 3.6 mA, no process connection	A5E03586961
LR250 horn version enclosure with board stack, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection	A5E03587012
LR250 horn version enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	A5E03587132
LR250 horn version enclosure with board stack, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection	A5E03587223
LR250 horn version enclosure with board stack, NPT cable inlet, approval option H, with HART communication start-up at < 3.6 mA, no process connection	A5E03588125
SITRANS LR250 threaded PVDF antenna kits	
Antenna kit 2" NPT threaded PVDF	A5E03528941
Antenna kit 2" R (BSPT) threaded PVDF	A5E03528943
Antenna kit 2" G (BSPP) threaded PVDF	A5E03528947
Kit of hardware parts for LR250 threaded PVDF antenna	A5E03528948