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) or 20 m (66 ft) when used in a stilling pipe.

Benefits

- Fully insulated PVDF antenna design for use in chemical and sanitary environments where aggressive and corrosive materials are used
- 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 50 mm (2 inch) process connection/antenna allow for easy mounting in nozzles
- 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)
- 3 mm (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.

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 or 20 m (66 ft) when used in a stilling pipe with dk ≥ 1.6.

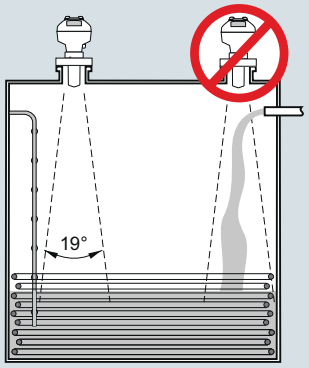
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials and applications requiring functional safety

Configuration

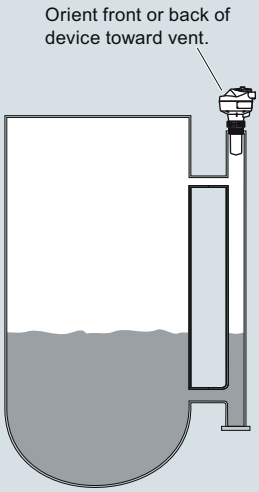
Installation

Note:

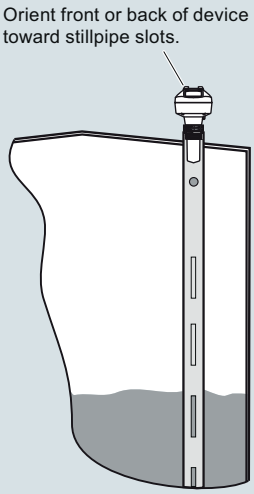
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



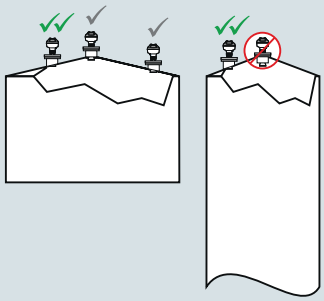
Mounting on bypass



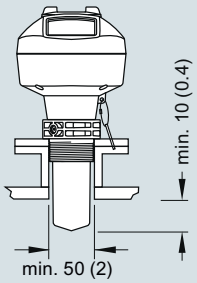
Mounting on stilling well



Mounting on vessel



Mounting on a nozzle



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

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 antenna
Maximum measuring range	10 m (32.8 ft) or 20 m (66 ft) when used in a stilling pipe with dk ≥ 1.6
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	• > 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 (Is suitable for CIP at 120 °C for 1/2 hr max.)
Process pressure	Up to 5 bar g (72 psi g) temperature dependent. See Pressure/Temperature curves for more information
Design	
Enclosure	
• Material	Aluminum, polyester powder-coated
• Cable inlet	2 x M20 x 1.5 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 sizes)	2 inch (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	• 15 mA • per IEC 61158-2
FOUNDATION Fieldbus	• 20.0 mA • per IEC 61158-2

Certificates and approvals	
General	$CSA_{US/C}$, CE, FM, RCM
Radio	FCC, Industry Canada, RED, RCM
Hazardous	
• Explosion Proof (Brazil)	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Increased Safety (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Intrinsically Safe (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da
• 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
• 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
• Flame Proof/Increased Safety (China)	Ex d ia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T_A90 °C
• Intrinsically Safe (China)	Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T_A90 °C
• Non-sparking (China)	NEPSI Ex nA IIC T4 Gc
• Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 Ga ATEX II 1D Ex ia ta IIC T100 °C Da
• Non-sparking/Energy Limited (Europe)	ATEX II 3G Ex nA IIC T4 Gc
• Flame Proof (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da
• Increased Safety (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Intrinsically Safe (International)	IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIC T100 °C Da
• Explosion Proof (Russia/Kazakhstan)	EAC Ex d
• Increased Safety (Russia/Kazakhstan)	EAC Ex e
• Intrinsically Safe (Russia/Kazakhstan)	EAC Ex ia
• 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 T_a = -20 ... +50 °C CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, T6 T_a = +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

SITRANS LR250 Threaded PVDF Antenna

Selection and Ordering data	Article No.
SITRANS LR250 Threaded PVDF Antenna ↗	**7ML5431-**
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) or 20 m (66 ft) when used in a stilling pipe.	■■■■ **0** - ■■■■
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	
Process Connection and Antenna Material	
Threaded PVDF antenna	**4**
Process Connection Type	
Threaded connections PVDF	
2" NPT (ASME B1.20.1) (tapered thread)	**P A**
R 2" [(BSPT), EN 10226-1] (tapered thread)	**P B**
G 2" [(BSPP), EN ISO 228-1] (parallel thread)	**P C**
Communication/Output	
PROFIBUS PA	**1**
4 ... 20 mA, HART, start-up at < 3.6 mA	**2**
FOUNDATION Fieldbus	**3**
Enclosure/Cable inlet	
Aluminum, Epoxy painted	
2 x ½" NPT	**0**
2 x M20 x 1.5	**1**
Antenna	
2 inch (50 mm) threaded PVDF antenna	**R**
Approvals	
General Purpose, CE, CSA, FM, FCC, RED, RCM	**A**
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	**B**
Intrinsically Safe: IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da, CE, RED, RCM	**C**
Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	**D**
Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, RED, RCM	**E**
Increased Safety: IECEx/ATEX II 1/2 GD,1D, 2D Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, RED, RCM[1)]	**F**
Flameproof: IECEx/ATEX II 1/2 GD 1D, 2D Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, RED, RCM[1)]	**G**
Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada[1)]	**H**
Non Sparking: NEPSI Ex nA IIC T4 Gc	**K**
Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T_A90 °C	**L**
Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T_A90 °C[1)]	**M**
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T_A90 °C[1)]	**N**
Pressure rating	
Rating per Pressure/Temperature curves in manual	**2**

[1)] Applicable to Communication option 2 only

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article 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 inch)]: Measuring-point number/identification (max. 27 characters); specify in plain text	**Y15**
Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	**C11**
Material inspection Certificate Type 3.1 per EN 10204	**C12**
Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511[5)6)]	**C20**
Namur NE43 compliant, device preset to failsafe < 3.6 mA[5)]	**N07**
Compact Operating Instructions for HART/ mA device	Article No.
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	**A5E33469191**
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	**A5E33469171**
English, Portuguese (Brazil), Chinese	**A5E34046583**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Compact Operating Instructions for PROFIBUS PA device	
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	**A5E33469239**
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	**A5E33472685**
English, Portuguese (Brazil), Chinese	**A5E34046624**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

Selection and Ordering data	Article No.
Compact Operating Instructions for FOUNDATION Fieldbus device	
English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish	**A5E33472700**
English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian	**A5E33472738**
English, Portuguese (Brazil), Chinese	**A5E34046626**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Other Operating Instructions	
SITRANS LR250 Functional Safety manual, English	**A5E32286471**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

Selection and Ordering data	Article No.
Accessories	
Handheld programmer, Intrinsically safe, EEx ia	**7ML1930-1BK**
HART modem/USB (for use with a PC and SIMATIC PDM)	**7MF4997-1DB**
One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART	**7ML1930-1AP**
One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus[2)]	**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 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-...**
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	**7ML5750-...**
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.

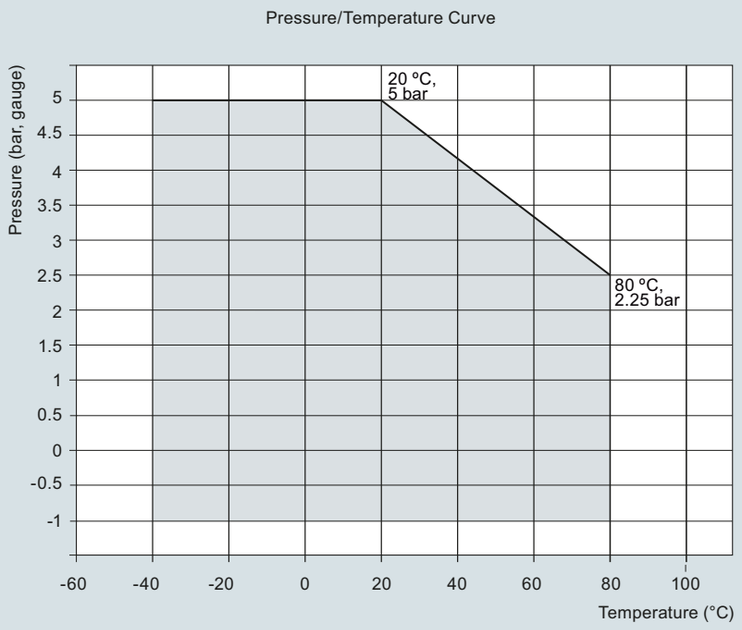
3) Available with Approval options A and B. Available with approval option C for use on intrinsically safe applications only. Not rated for dust Ex.

4) Available with Enclosure option 0 only

5) Available with communication option 2 only

6) Available with approval options A, B, C, D, E, K, and L only

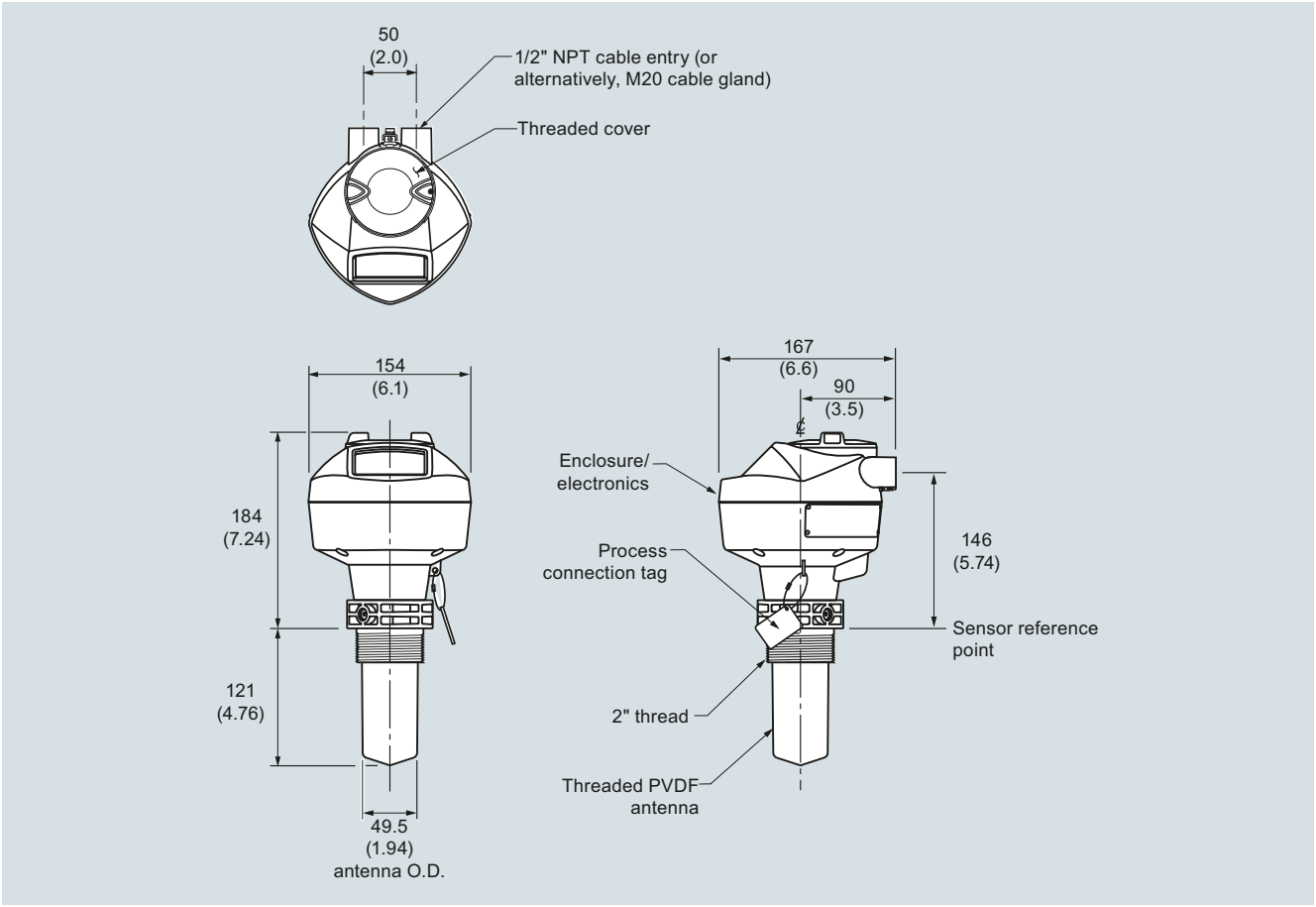
Characteristic curves



SITRANS LR250 PVDF Antenna pressure/temperature curve

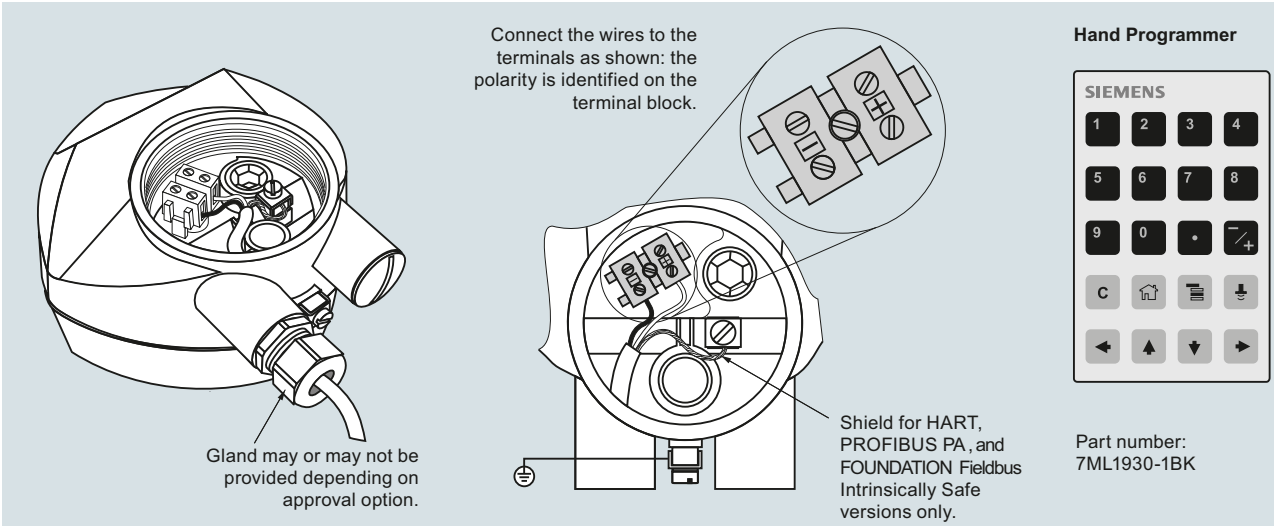
SITRANS LR250 Threaded PVDF Antenna

Dimensional drawings



SITRANS LR250 PVDF Antenna, dimensions in mm (inch)

Circuit diagrams



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 ... 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

Selection and Ordering data

SITRANS LR250 threaded PVDF Specials	Article No.
NOTE: **LR260 head can be supplied with any LR250 process connection or antenna as special order. For LR250, this means a stronger signal and longer measurement range is possible.**	
SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA models)	
SITRANS LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	**A5E03588171**
SITRANS LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	**A5E03588253**
SITRANS LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	**A5E03588512**
SITRANS LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	**A5E03589260**
SITRANS LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	**A5E03589262**
SITRANS 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)	
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	**A5E03589266**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	**A5E03589275**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	**A5E03589277**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	**A5E03589280**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	**A5E03589281**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	**A5E03589283**

SITRANS LR250 threaded PVDF Specials	Article No.
SITRANS LR250 threaded PVDF antenna version enclosures (< 3.6 mA start-up HART models)	
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	**A5E03569747**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option A, with HART communication start-up at < 3.6 mA, no process connection	**A5E03586807**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with HART communication start-up at < 3.6 mA, no process connection	**A5E03586854**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection	**A5E03586887**
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with HART communication start-up at < 3.6 mA, no process connection	**A5E03586961**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with HART communication start-up at < 3.6 mA, no process connection	**A5E03587012**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	**A5E03587132**
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection	**A5E03587223**
SITRANS LR250 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: consists of O-rings, screws, wavewasher, and loctite	**A5E03528948**
Ex-proof plugs	
Ex-proof plugs kit, 1/2" NPT, qty 5	**A5E39979991**
Ex-proof plugs kit, M20, qty 5	**A5E39979992**