

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) 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
- 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 50 mm (2 inch) process connection/antenna allow for easy mounting in nozzles
- 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)
- 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.

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 $dk > 3$ or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$.

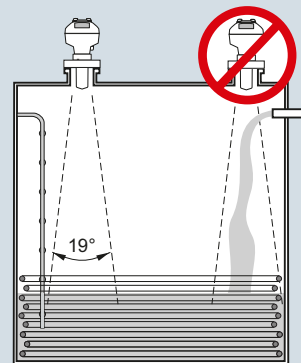
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials and applications requiring functional safety

Configuration

Installation

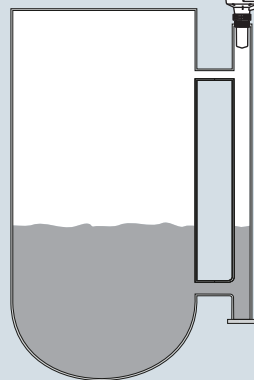
Note:

- 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.



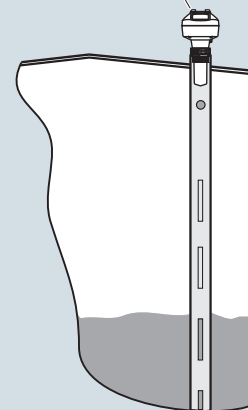
Mounting on bypass

Orient front or back of device toward vent.

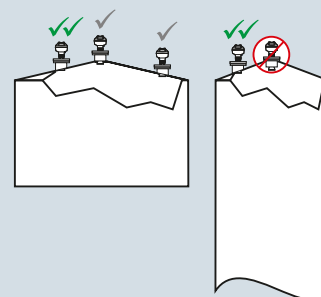


Mounting on stilling well

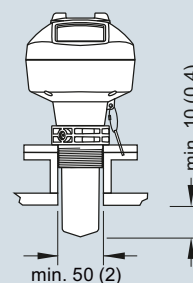
Orient front or back of device toward stillpipe slots.



Mounting on vessel



Mounting on a nozzle



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

Technical specifications

| | | | |
|---|---|--|--|
| Mode of operation | | Certificates and approvals | |
| Measuring principle | Radar level measurement | General | CSA _{US/C} , CE, FM, NE 21, RCM |
| Frequency | K-band (25.0 GHz) | Radio | FCC, Industry Canada, and Europe ETSI EN 302-372, RCM |
| Minimum measuring range | 50 mm (2 inch) from end of antenna | Hazardous | |
| Maximum measuring range | 10 m (32.8 ft) or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$ | • Explosion Proof (Brazil) | INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da |
| Output | | • Increased Safety (Brazil) | INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da |
| HART | Version 5.1 | • Intrinsically Safe (Brazil) | INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da |
| • Analog output | 4 ... 20 mA | • 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 |
| • Accuracy | ± 0.02 mA | • 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 |
| • Fail-safe | • Programmable as high low or hold (loss of echo) • NE 43 programmable | • Non-incendive (Canada/USA) | CSA/FM Class I, Div. 2, Groups A, B, C, D T5 |
| PROFIBUS PA | Profile 3.1 | • 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 _A 90 °C |
| • Function blocks | 2 Analog Input (AI) | • Intrinsically Safe (China) | Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C |
| FOUNDATION Fieldbus | H1 | • Non-sparking (China) | NEPSI Ex nA IIC T4 Gc |
| • Functionality | Basic or LAS | • Intrinsically Safe (Europe) | ATEX II 1G Ex ia IIC T4 Ga ATEX II 1D Ex ia ta IIC T100 °C Da ATEX II 3G Ex nA IIC T4 Gc |
| • Version | ITK 5.2.0 | • Non-sparking/Energy Limited (Europe) | |
| • Function blocks | 2 Analog Input (AI) | • Flame Proof (International/Europe) | IECEX/ATEX II 1/2 GD, 1D, 2D, Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da |
| Performance (according to reference conditions IEC60770-1) | | • 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 |
| 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) | • Intrinsically Safe (International) | IECEX/ATEX II 1 G Ex ia IIC T4 Ga, IECEX/ATEX II 1D Ex ia ta IIC T100 °C Da |
| Influence of ambient temperature | < 0.003 %/K | • Explosion Proof (Russia/Kazakhstan) | EAC Ex d |
| Rated operating conditions | | • Increased Safety (Russia/Kazakhstan) | EAC Ex e |
| Installation conditions | | • Intrinsically Safe (Russia/Kazakhstan) | EAC Ex ia |
| • Location | Indoor/outdoor | • Marine | <ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval Bureau Veritas |
| Ambient conditions (enclosure) | | Functional Safety | SIL-2 suitable in accordance with IEC 61508/61511 |
| • Ambient temperature | -40 ... +80 °C (-40 ... +176 °F) | Programming | |
| • Installation category | I | Intrinsically Safe Siemens handheld programmer | Infrared receiver |
| • Pollution degree | 4 | • 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 |
| Medium conditions | | Handheld communicator | HART communicator 375/475 |
| Dielectric constant ϵ_r | ≥ 3 (1.6 in stillpipe) | PC | <ul style="list-style-type: none"> SIMATIC PDM Emerson AMS SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare) |
| Process temperature | -40 ... +80 °C (-40 ... +176 °F) at process connection (Is suitable for CIP at 120 °C for 1/2 hr max.) | Display (local) | Graphic local user interface including quick start wizard and echo profile displays |
| Process pressure | Up to 5 bar g (72 psi g) temperature dependent. See Pressure/Temperature curves for more information | Power supply | |
| Design | | 4 ... 20 mA/HART | Nominal 24 V DC (max. 30 V DC) with max. 550 Ω |
| Enclosure | | PROFIBUS PA | <ul style="list-style-type: none"> 15 mA per IEC 61158-2 |
| • Material | Aluminum, polyester powder-coated | FOUNDATION Fieldbus | <ul style="list-style-type: none"> 20.0 mA per IEC 61158-2 |
| • 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] | | |

Level Measurement

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SITRANS LR250 threaded PVDF antenna

| Selection and Ordering data | Article No. |
|---|------------------------|
| 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) or 20m (66ft) when used in a stilling pipe. ➔ Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | 7ML5431- 0 - |
| Process Connection and Antenna Material Threaded PVDF antenna | 4 |
| Process Connection Type Threaded connections PVDF | |
| 2" NPT (ASME B1.20.1) (tapered thread) | PA |
| R 2" [(BSPT), EN 10226-1] (tapered thread) | PB |
| G 2" [(BSPP), EN ISO 228-1] (parallel thread) | PC |
| 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 1/2" 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, R&TTE, 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, R&TTE, 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, R&TTE, 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, R&TTE, 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, R&TTE, 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 _A 90 °C | L |
| Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ¹⁾ | M |
| Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ¹⁾ | N |
| Pressure rating Rating per Pressure/Temperature curves in manual | 2 |

¹⁾ Applicable to Communication option 2 only

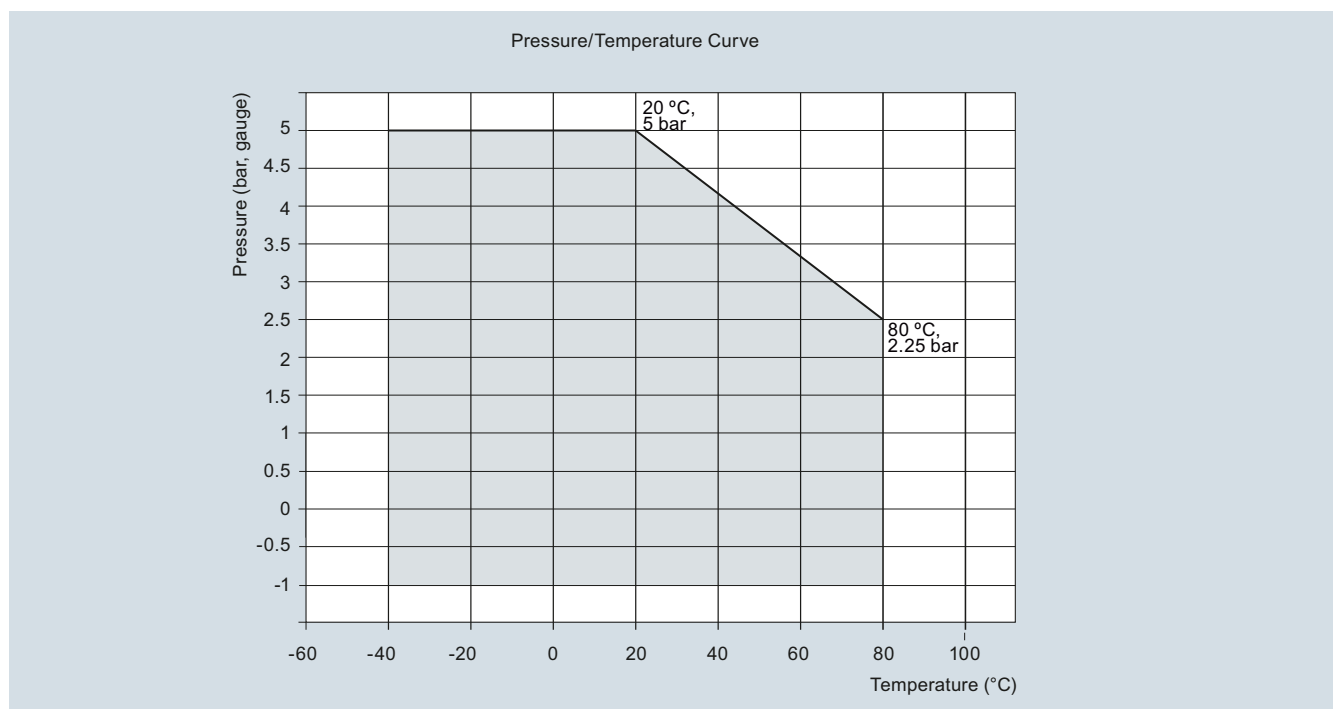
◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 10/11 in the appendix.

| 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 | |
| ◆ We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ◆. For details see page 10/11 in the appendix. | |

4

| Selection and Ordering data | Article No. | Selection and Ordering data | Article No. |
|--|---|---|---|
| <p>Compact Operating Instructions for FOUNDATION Fieldbus device</p> <p>English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish</p> <p>English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian</p> <p>English, Portuguese (Brazil), Chinese</p> <p>Note: The Operating Instructions should be ordered as a separate line item on the order.</p> <p>All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation</p> | <p>A5E33472700</p> <p>A5E33472738</p> <p>A5E34046626</p> | <p>Accessories</p> <p>Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)</p> <p>One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART</p> <p>One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus²⁾</p> <p>FDA approved FKM o-ring for 2" G (BSP) process connections -28 ... +80 °C (-28 ... +176 °F)</p> <p>SITRANS RD100, loop powered display - see Chapter 7</p> <p>SITRANS RD200, universal input display with Modbus conversion - see Chapter 7</p> <p>SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7</p> <p>SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7</p> <p>For applicable back up point level switch - see point level measurement section</p> | <p>7ML1930-1BK</p> <p>7MF4997-1DB</p> <p>7ML1930-1AP</p> <p>7ML1930-1AQ</p> <p>7ML1830-3AN</p> <p>7ML5741-...</p> <p>7ML5740-...</p> <p>7ML5744-...</p> <p>7ML5750-...</p> |
| <p>Other Operating Instructions</p> <p>SITRANS LR250 Functional Safety manual, English</p> <p>Note: The Operating Instructions should be ordered as a separate line item on the order.</p> <p>All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation</p> | <p>A5E32286471</p> | <p>¹⁾ Available with Enclosure option 1 only</p> <p>²⁾ To be used with Communication options 1 and 3 only. Connector has IP67 rating.</p> <p>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.</p> <p>⁴⁾ Available with Enclosure option 0 only</p> <p>⁵⁾ Available with communication option 2 only</p> <p>⁶⁾ Available with approval options A, B, C, D, E, K, and L only</p> | |

Characteristic curves



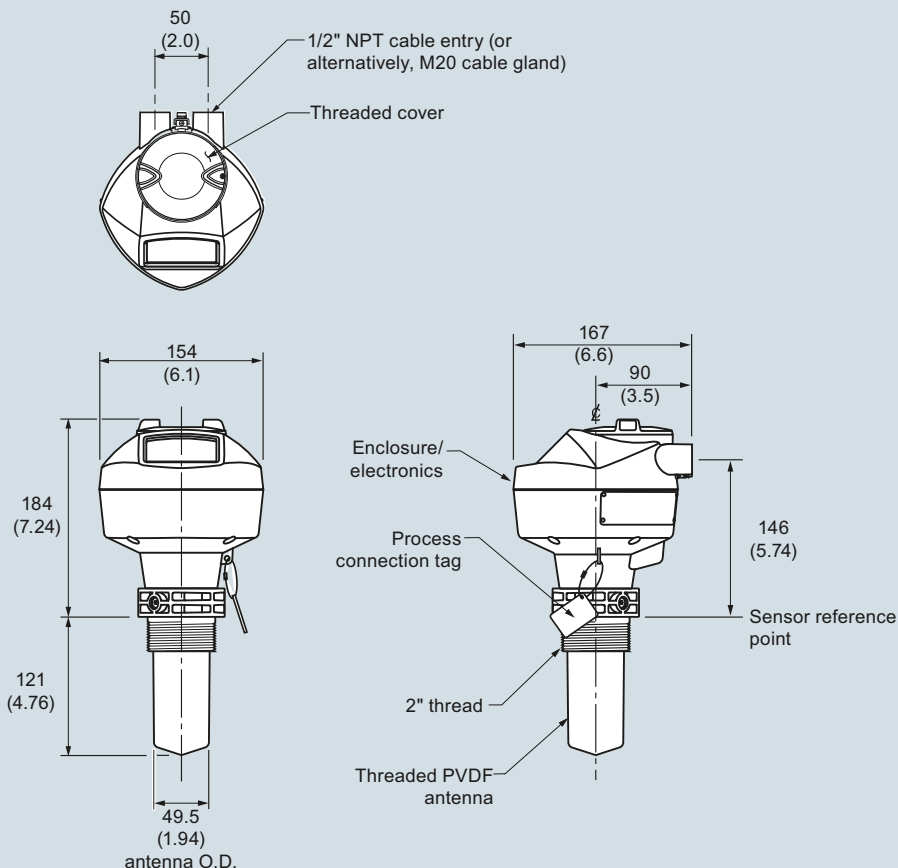
SITRANS LR250 PVDF Antenna pressure/temperature curve

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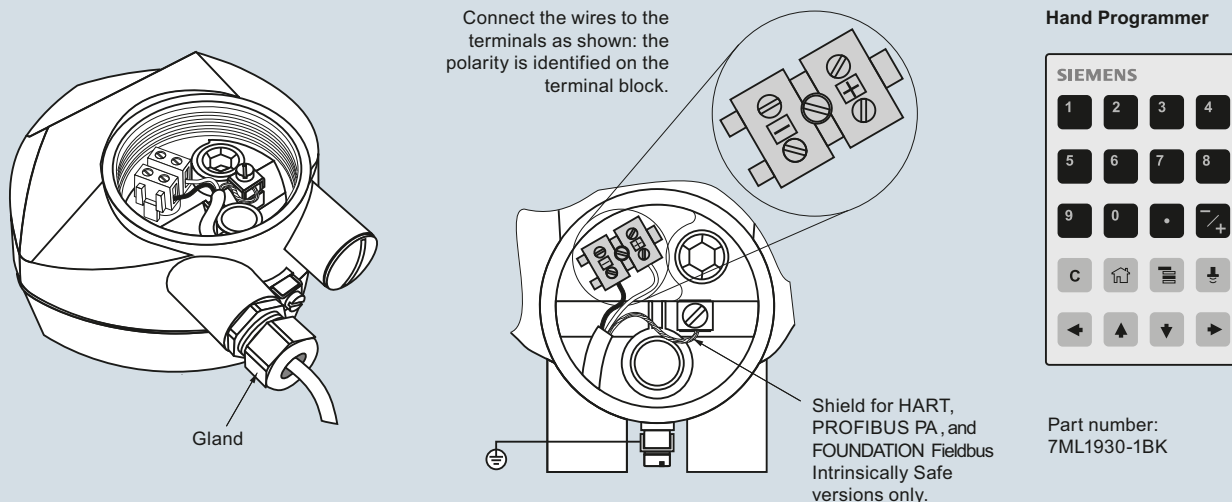
SITRANS LR250 threaded PVDF antenna

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 ... 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. | 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 (< 3.6 mA start-up HART models) | |
| SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA 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 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection | A5E03588171 | 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 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection | A5E03588253 | 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 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection | A5E03588512 | 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 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection | A5E03589260 | SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option C, with HART communication start-up at < 3.6 mA, no process connection | A5E03586961 |
| 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 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 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection | A5E03589264 | 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 threaded PVDF antenna version enclosures (FOUNDATION Fieldbus models) | | 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 A, with FOUNDATION Fieldbus communication, no process connection | A5E03589266 | 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, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection | A5E03589275 | 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 B, with FOUNDATION Fieldbus communication, no process connection | A5E03589277 | SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option G, with HART communication start-up at < 3.6 mA, no process connection | A5E03588125 |
| SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection | A5E03589280 | SITRANS LR250 threaded PVDF antenna kits | |
| SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection | A5E03589281 | Antenna kit 2" NPT threaded PVDF | A5E03528941 |
| SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection | A5E03589283 | Antenna kit 2" R (BSPT) threaded PVDF | A5E03528943 |
| SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection | | 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 |