

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

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 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

- Threaded PVDF or Polypropylene lens antenna 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
- Communication using HART, 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
- 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.

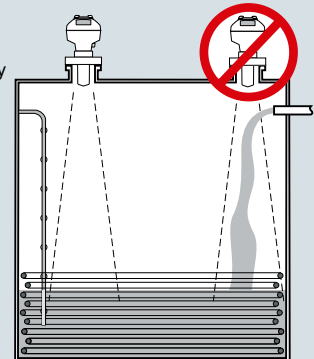
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, corrosive and aggressive materials.

Configuration

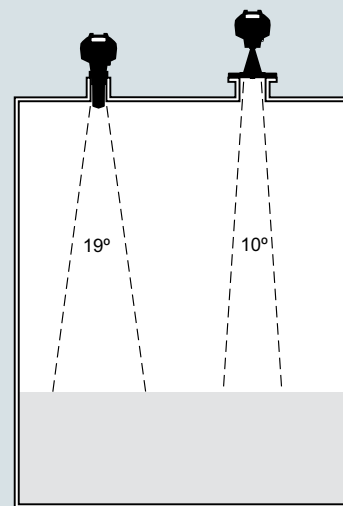
Installation of SITRANS LR250 Level Probing Radar

Note:

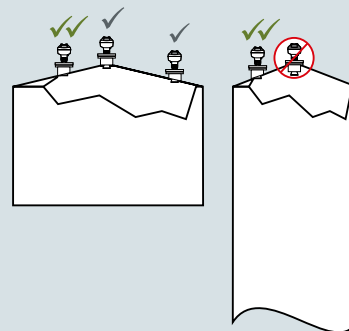
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



Threaded PVDF Antenna Polypropylene lens antenna



Mounting on vessel



SITRANS LR250 PVDF Antenna and Polypropylene lens antenna, installation

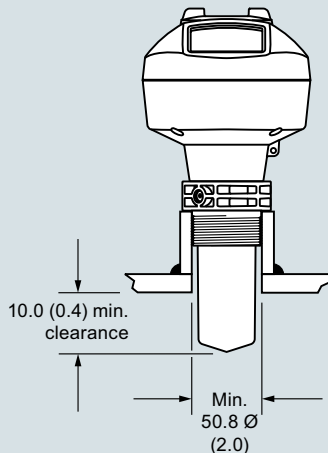
Level Measurement

Continuous level measurement
Radar level transmitters

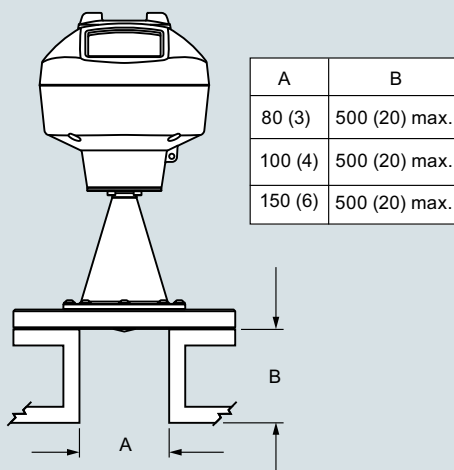
SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Mounting on a nozzle

Threaded PVDF Antenna



Polypropylene lens antenna



SITRANS LR250 PVDF antenna and Polypropylene lens antenna, mounting on a nozzle, 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	<ul style="list-style-type: none"> • Threaded PVDF antenna - 10 m (32.8 ft) • Polypropylene lens antenna - 20 m (66 ft)

Output

HART	Version 5.1
<ul style="list-style-type: none"> • Analog output • Accuracy • Fail-safe 	4 ... 20 mA ± 0.02 mA <ul style="list-style-type: none"> • Programmable as high, low, or hold (loss of echo) • NE 43 programmable
PROFIBUS PA	Profile 3.1
<ul style="list-style-type: none"> • Function blocks 	2 Analog Input (AI)
FOUNDATION Fieldbus	H1
<ul style="list-style-type: none"> • Functionality • Version • Function blocks 	Basic or LAS ITK 5.2.0 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	Indoor/outdoor
<ul style="list-style-type: none"> • Location 	
Ambient conditions (enclosure)	
<ul style="list-style-type: none"> • Ambient temperature • Installation category • Pollution degree 	

Medium conditions

Dielectric constant ϵ_r	<ul style="list-style-type: none"> • Threaded PVDF antenna - > 3 • Polypropylene lens antenna - > 1.6
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	Aluminum, polyester powder-coated 2 x M20 x 1.5 or 2 x 1/2" NPT
<ul style="list-style-type: none"> • Material • Cable inlet 	
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68
Weight	<ul style="list-style-type: none"> • Threaded PVDF antenna - approximately 3.5 kg (7.7 lb) • Polypropylene lens antenna with 3 inch (80 mm) polypropylene flange - approximately 3.4 kg (7.5 lb)
Display (local)	Graphic local user interface including quick start wizard and echo profile display
Threaded PVDF antenna	PVDF (Polyvinylidene fluoride)
<ul style="list-style-type: none"> • Material • Process connections 	

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Polypropylene lens antenna • Materials • Process connections - Material - Dimensions	<ul style="list-style-type: none"> • Polyester powder coated exterior • 3 inch cast aluminum • Polypropylene lens • FKM seal Polypropylene Universal flange: 3 inch (80 mm), 4 inch (100 mm), 6 inch (150 mm)
Power supply 4 ... 20 mA/HART PROFIBUS PA FOUNDATION Fieldbus	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω <ul style="list-style-type: none"> • 15 mA • per IEC 61158-2 <ul style="list-style-type: none"> • 20.0 mA • per IEC 61158-2
Certificates and approvals General Radio Hazardous • Explosion Proof (Brazil) • Increased Safety (Brazil) • Intrinsically Safe (Brazil) • Explosion Proof (Canada/USA) • Intrinsically Safe (Canada/USA) • Non-incendive (Canada/USA) • Flame Proof/Increased Safety (China) • Intrinsically Safe (China) • Non-sparking (China) • Intrinsically Safe (Europe) • Non-sparking/Energy Limited (Europe) • Flame Proof (International/Europe) • Increased Safety (International/Europe) • Intrinsically Safe (International) • Explosion Proof (Russia/Kazakhstan) • Increased Safety (Russia/Kazakhstan) • Intrinsically Safe (Russia/Kazakhstan) • Marine	CSA _{US/C} , CE, FM, RCM FCC, Industry Canada, RED, RCM INMETRO Ex d ia mb 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 INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4 CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4 CSA/FM Class I, Div. 2, Groups A, B, C, D T5 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 Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C NEPSI Ex nA IIC T4 Gc 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 IECEx/ATEX II 1/2 GD, 1D, 2D, Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da IECEx/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIC T100 °C Da EAC Ex d EAC Ex e EAC Ex ia <ul style="list-style-type: none"> • Lloyd's Register of Shipping • ABS Type Approval • Bureau Veritas


Programming Intrinsically Safe Siemens handheld programmer • Approvals for handheld programmer	Infrared receiver 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 PC Display (local)	HART communicator 375/475 <ul style="list-style-type: none"> • SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare) Graphic local user interface including quick start wizard and echo profile displays.

Selection and Ordering data	Article No.
SITRANS LR250 Radar level transmitter Continuous, non-contact, 20 m (66 ft) range, for liquids and slurries. ↗ 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 ¹⁾ Painted aluminum 3" horn antenna ²⁾	4 5
Process connection type <u>Threaded connections PVDF</u> 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) <u>Engineered polymer flange connections</u> Without flange, without mounting bracket, no polypropylene lens Without flange, with mounting bracket, no polypropylene lens <u>Universal polymeric flange, flat face, with polypropylene lens, FKM seal</u>	PA PB PC QA QB
DN80 PN16, ANSI 3", 150 lb, DN80 PN16/10K DN100 PN16, ANSI 4", 150 lb, DN100 PN16/10K DN150 PN16, ANSI 6", 150 lb, DN150 PN16/10K	QC QD QE
Communication/Output PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA FOUNDATION Fieldbus	1 2 3
Enclosure/Cable inlet <u>Aluminum, Epoxy painted</u> 2 x 1/2" NPT 2 x M20 x 1.5	0 1
Antenna 2 inch (50 mm) threaded PVDF antenna 3 inch (80 mm) polypropylene lens antenna	R S

Level Measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LR250 Radar level transmitter	7ML5431-	Further designs	
Continuous, non-contact, 20 m (66 ft) range, for liquids and slurries.		Please add "-Z" to Article No. and specify Order code(s).	
Approvals		Plug M12, incl. cable socket, IP68 ⁶⁾⁷⁾⁸⁾	A50
General Purpose, CE, CSA, FM, FCC, RED, RCM	A	Plug 7/8", incl. cable socket, IP68 ⁷⁾⁸⁾⁹⁾	A55
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	Long tag (device parameter, max. 27 characters) plate stainless steel 304/1.4301	Y15
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	Factory test certificate - M to DIN 55350, Part 18	C11
Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	D	Inspection certificate 3.1 (EN 10204) - material of pressure-containing and wetted parts	C12
Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, RED, RCM	E	Functional Safety (IEC 61508 and 61511) - SIL2 ³⁾¹⁰⁾	C20
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 ³⁾	F	Namur NE43 compliant: device preset to failsafe < 3.6 mA ³⁾	N07
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 ³⁾	G	Operating Instructions	
Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ³⁾	H	All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Non Sparking: NEPSI Ex nA IIC T4 Gc	K	Selection and Ordering data	Article No.
Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C	L	Accessories	
Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ³⁾	M	Mounting bracket suitable for wall or ceiling mounting, for aluminum painted horn versions only	A5E46342367
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ³⁾	N	Polypropylene lens replacement kit, polypropylene lens antenna and polymeric flange versions	A5E46342366
Pressure rating		One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART ¹¹⁾	7ML1930-1AP
0.5 bar (7.25 psi g) max. ⁴⁾	1	One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus	7ML1930-1AQ
Rating per Pressure/Temperature curves in manual ¹⁾⁵⁾	2	Handheld programmer, Intrinsically safe, EEx ia	7ML1930-1BK
		HART modem/USB (for use with a PC and SIMATIC PDM)	7MF4997-1DB
		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 only with Process connection options PA, PB, and PC and Antenna option R.

²⁾ Available only with Process connection options QA ... QE and Antenna option S. Not available with C20 option.

³⁾ Available only with Communication option 2 and Process connection and Antenna material option 4.

⁴⁾ Not available with Process connection type options PA, PB, and PC.

⁵⁾ Available only with Process connection and Antenna material option 5 and Process connection type option QC.

⁶⁾ Available only with Enclosure option 1.

⁷⁾ Available only with Communication options 1 and 3.

⁸⁾ Available only with Approval options A, B, C, and L.

⁹⁾ Available only with Enclosure option 0.

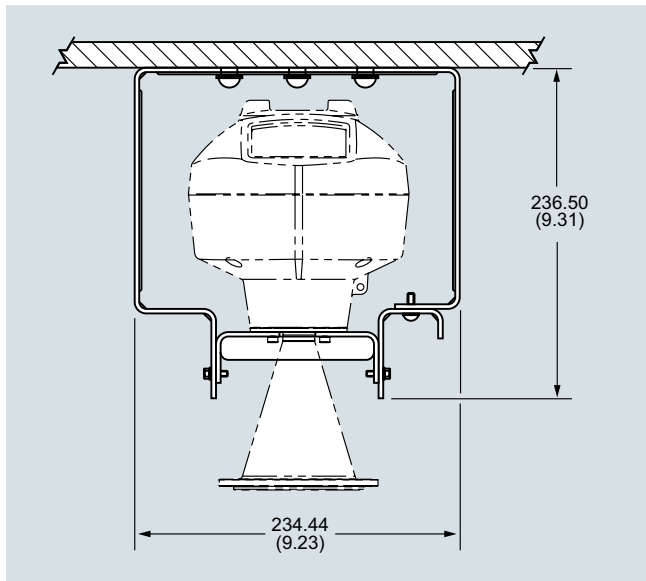
¹⁰⁾ Available only with Approval options A, B, C, D, E, K, and L.

¹¹⁾ Product shipped with plastic cable gland, rated to -20 °C (-4 °F).

If -40 °C (-40 °F) rating is required, then metallic cable gland is recommended.

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Options

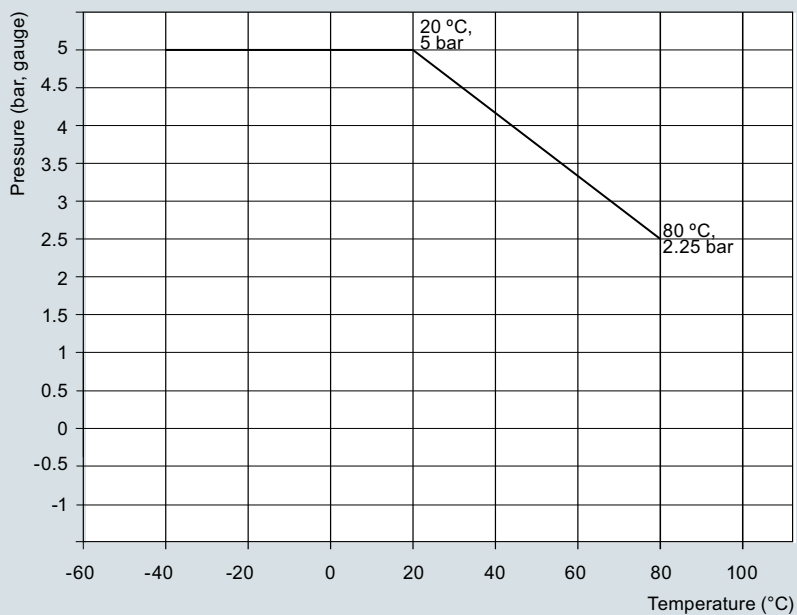


SITRANS LR250 Polypropylene lens antenna, wall/ceiling mount, dimensions in mm (inch)

Characteristic curves

SITRANS LR250 PVDF antenna

Pressure/Temperature Curve



SITRANS LR250 PVDF antenna, pressure/temperature curve

Level Measurement

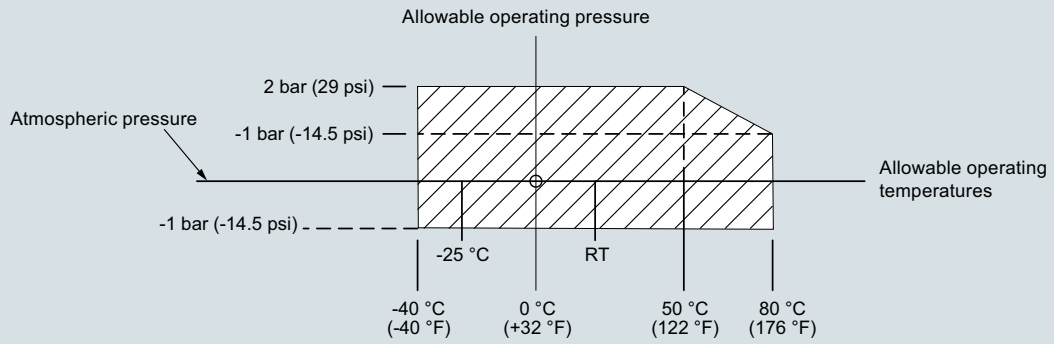
Continuous level measurement

Radar level transmitters

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

SITRANS LR250 Polypropylene lens antenna

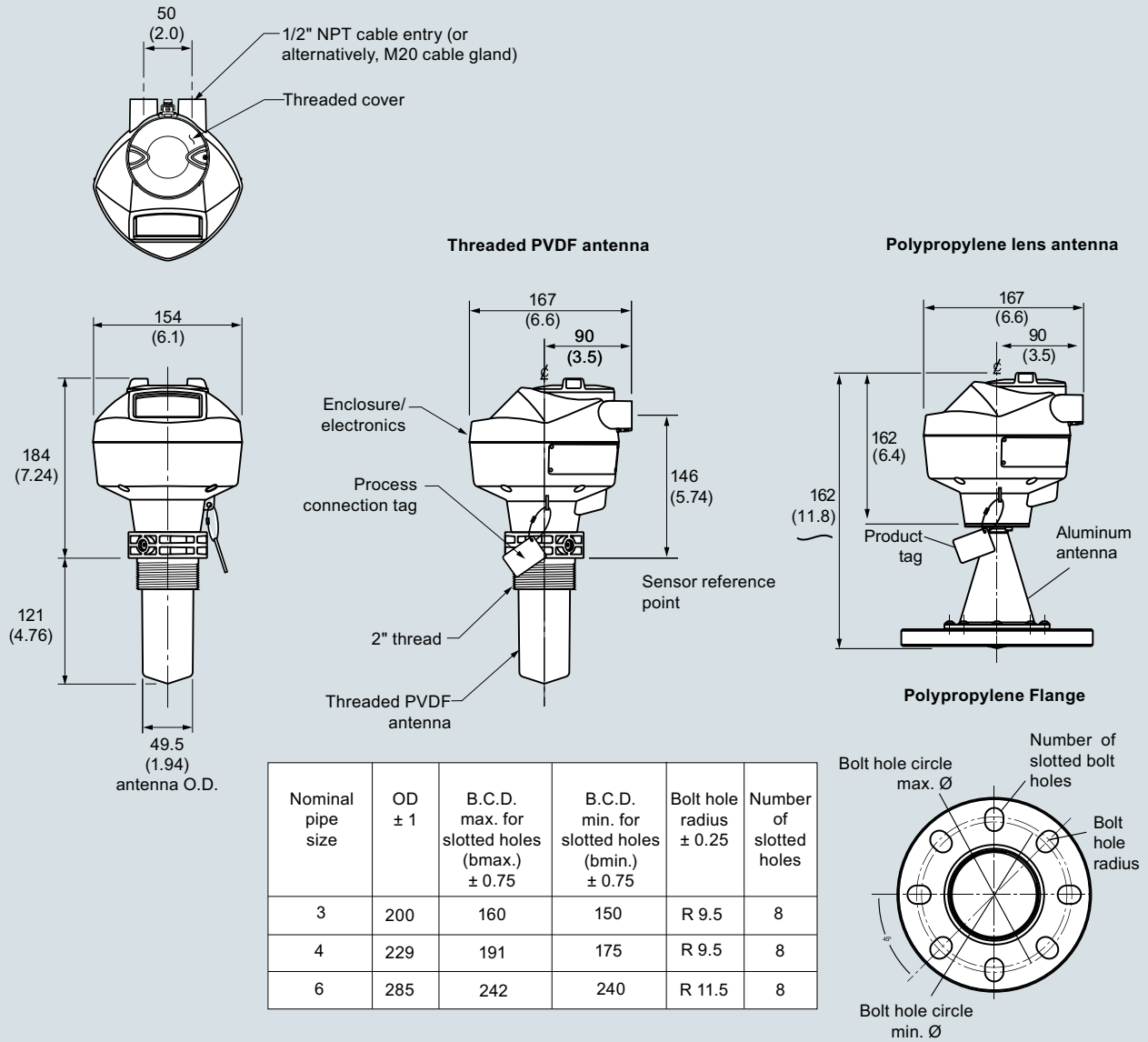
Pressure/temperature curve, 3 inch (80 mm) flange only



SITRANS LR250 Polypropylene lens antenna with 3 inch (80 mm) flange, pressure/temperature curve

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Dimensional drawings



SITRANS LR250 PVDF antenna and Polypropylene lens antenna, dimensions in mm (inch)

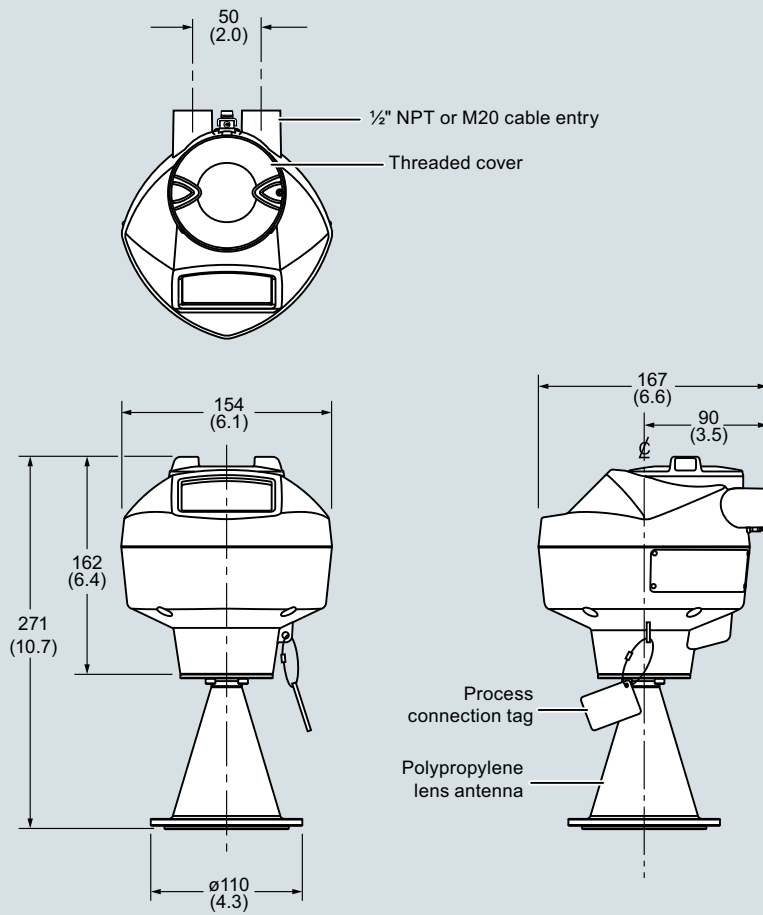
Level Measurement

Continuous level measurement

Radar level transmitters

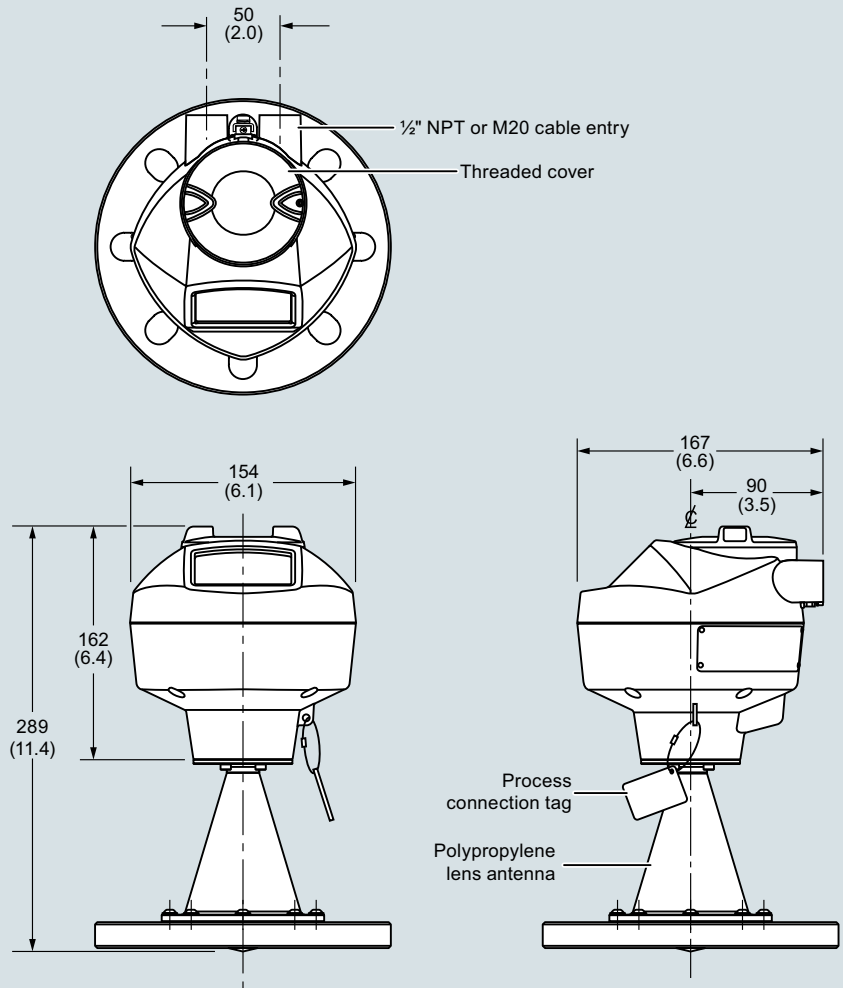
SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

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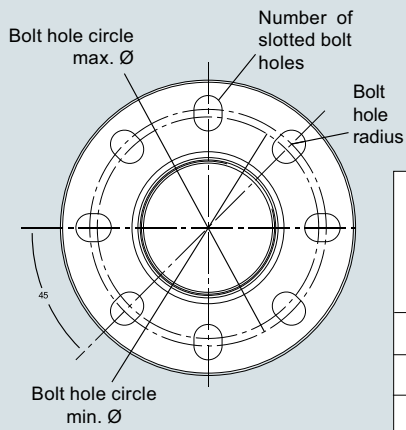


SITRANS LR250 Polypropylene lens antenna, dimensions in mm (inch)

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna



Universal polymeric flange



Nominal pipe size	OD ± 1	B.C.D. max. for slotted holes (bmax.) ± 0.75	B.C.D. min. for slotted holes (bmin.) ± 0.75	Bolt hole radius ± 0.25	# of slotted holes
3 (80)	7.87 (200)	6.30 (160)	5.91 (150)	0.37 (9.5)	8
4 (100)	9.00 (229)	17.52 (191)	6.89 (175)	0.37 (9.5)	8
6 (150)	11.22 (285)	9.53 (242)	9.45 (140)	0.45 (11.5)	8

SITRANS LR250 Polypropylene lens antenna with universal polymeric flange, dimensions in mm (inch)

Level Measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Circuit diagrams

4

Connect the wires to the terminals as shown: the polarity is identified on the terminal block.

Gland may or may not be provided depending on approval option.

Shield for HART, PROFIBUS PA, and FOUNDATION Fieldbus Intrinsic Safe versions only.

Hand Programmer

SIEMENS			
1	2	3	4
5	6	7	8
9	0	.	+
C	⏪	⏩	⏴
←	↑	↓	→

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 ... 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 connection

SITRANS LR250 with aluminum or PVDF antenna specials

Selection and Ordering data

SITRANS LR250 with aluminum or PVDF antenna 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.	
PROFIBUS PA models	
SITRANS LR250 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 PROFIBUS PA communication, no process connection	A5E03588253
SITRANS LR250 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 PROFIBUS PA communication, no process connection	A5E03589260
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E03589262
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection	A5E03589264
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 with aluminum or PVDF antenna specials

	Article No.
< 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