

Level Measurement

Continuous level measurement Radar level transmitters

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.

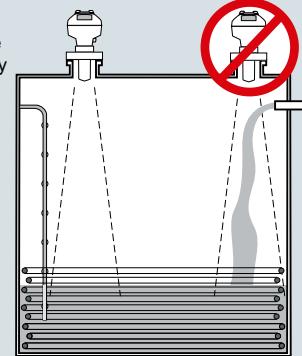
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, corrosive and aggressive materials.

Configuration

Installation of SITRANS LR250 Level Probing Radar

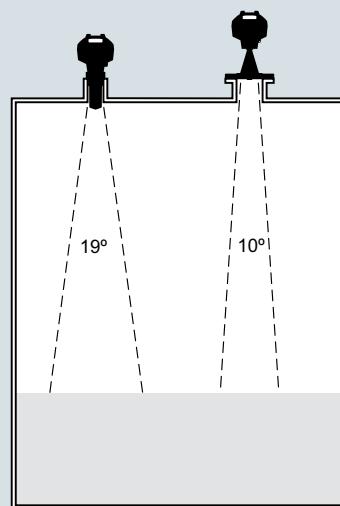
Note:

- 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.

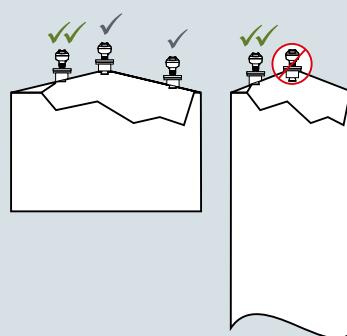


Threaded
PVDF Antenna

Polypropylene
lens antenna



Mounting on vessel



SITRANS LR250 PVDF Antenna and Polypropylene lens antenna, installation

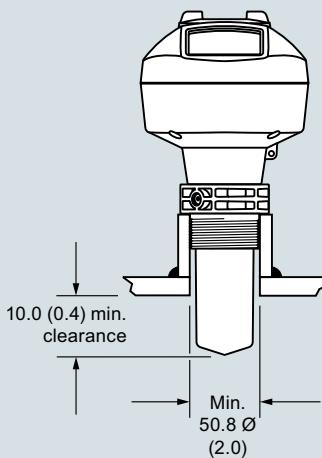
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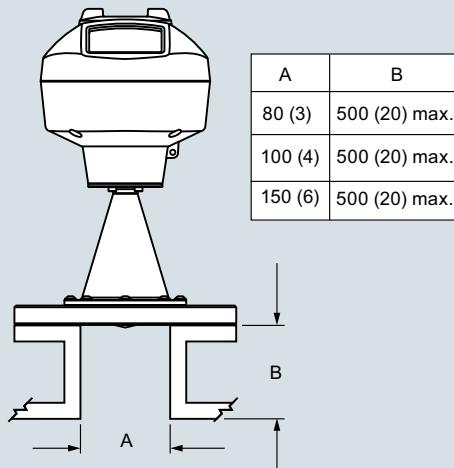
SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

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

- Threaded PVDF antenna
 - 10 m (32.8 ft)
- Polypropylene lens antenna
 - 20 m (66 ft)

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

Indoor/outdoor

Ambient conditions (enclosure)

-40 ... +80 °C (-40 ... +176 °F)

- Ambient temperature
- Installation category
- Pollution degree

I

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Medium conditions

Dielectric constant ϵ_r

- 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 ½" NPT

• Material

• Cable inlet

Type 4X/NEMA 4X, Type 6/

NEMA 6, IP67, IP68

Degree of protection

- 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)

Weight

Display (local)

Graphic local user interface including quick start wizard and echo profile display

Threaded PVDF antenna

PVDF (Polyvinylidene fluoride)

- Material

• Process connections

2" NPT [(Taper), ASME B1.20.1]

2" [(BSPT), EN 10226]

2" [(BSPP), EN ISO 228-1]

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Polypropylene lens antenna		Programming	
• Materials	<ul style="list-style-type: none"> Polyester powder coated exterior 3 inch cast aluminum Polypropylene lens FKM seal 	Intrinsically Safe Siemens handheld programmer	Infrared receiver
• Process connections	<ul style="list-style-type: none"> - Material - Dimensions 	• Approvals for handheld programmer	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135 °C $T_a = -20 \dots +50$ °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
Power supply		Handheld communicator	HART communicator 375/475
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω	PC	<ul style="list-style-type: none"> SIMATIC PDM Emerson AMS SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)
PROFIBUS PA	<ul style="list-style-type: none"> • 15 mA • per IEC 61158-2 	Display (local)	Graphic local user interface including quick start wizard and echo profile displays.
FOUNDATION Fieldbus	<ul style="list-style-type: none"> • 20.0 mA • per IEC 61158-2 		
Certificates and approvals		Selection and Ordering data	
General	CSA US/C, CE, FM, RCM	Article No.	
Radio	FCC, Industry Canada, RED, RCM	SITRANS LR250 Radar level transmitter	
Hazardous		7ML5431- 0 -	
• Explosion Proof (Brazil)	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da	4	
• Increased Safety (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da	5	
• 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 _A 90 °C		
• Intrinsically Safe (China)	Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C		
• Non-sparking (China)	NEPSI Ex nA IIC T4 Gc		
• Intrinsically Safe (Europe)	ATEX II 1G Ex ia IIC T4 Ga		
• Non-sparking/Energy Limited (Europe)	ATEX II 1D Ex ia ta IIC T100 °C Da		
• Flame Proof (International/Europe)	ATEX II 3G Ex nA IIC T4 Gc		
• Increased Safety (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		
• Intrinsically Safe (International)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da		
• Explosion Proof (Russia/Kazakhstan)	IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIC T100 °C Da		
• Increased Safety (Russia/Kazakhstan)	EAC Ex d		
• Intrinsically Safe (Russia/Kazakhstan)	EAC Ex e		
• Marine	EAC Ex ia		
<ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval Bureau Veritas 			
Process connection and Antenna material		Process connection and Antenna material	
Threaded PVDF antenna ¹		Threaded PVDF antenna ¹	
Painted aluminum 3" horn antenna ²		Painted aluminum 3" horn antenna ²	
Process connection type		Process connection type	
Threaded connections PVDF		Threaded connections PVDF	
2" NPT (ASME B1.20.1) (tapered thread)		2" NPT (ASME B1.20.1) (tapered thread)	
R 2" [(BSPT), EN 10226-1] (tapered thread)		R 2" [(BSPT), EN 10226-1] (tapered thread)	
G 2" [(BSPP), EN ISO 228-1] (parallel thread)		G 2" [(BSPP), EN ISO 228-1] (parallel thread)	
Engineered polymer flange connections		Engineered polymer flange connections	
Without flange, without mounting bracket, no polypropylene lens		Without flange, without mounting bracket, no polypropylene lens	
Without flange, with mounting bracket, no polypropylene lens		Without flange, with mounting bracket, no polypropylene lens	
Universal polymeric flange, flat face, with polypropylene lens, FKM seal		Universal polymeric flange, flat face, with polypropylene lens, FKM seal	
DN80 PN16, ANSI 3", 150 lb, DN80 PN16/10K		DN80 PN16, ANSI 3", 150 lb, DN80 PN16/10K	
DN100 PN16, ANSI 4", 150 lb, DN100 PN16/10K		DN100 PN16, ANSI 4", 150 lb, DN100 PN16/10K	
DN150 PN16, ANSI 6", 150 lb, DN150 PN16/10K		DN150 PN16, ANSI 6", 150 lb, DN150 PN16/10K	
Communication/Output		Communication/Output	
PROFIBUS PA		PROFIBUS PA	
4 ... 20 mA, HART, start-up at < 3.6 mA		4 ... 20 mA, HART, start-up at < 3.6 mA	
FOUNDATION Fieldbus		FOUNDATION Fieldbus	
Enclosure/Cable inlet		Enclosure/Cable inlet	
Aluminum, Epoxy painted		Aluminum, Epoxy painted	
2 x 1/2" NPT		2 x 1/2" NPT	
2 x M20 x 1.5		2 x M20 x 1.5	
Antenna		Antenna	
2 inch (50 mm) threaded PVDF antenna		2 inch (50 mm) threaded PVDF antenna	
3 inch (80 mm) polypropylene lens antenna		3 inch (80 mm) polypropylene lens antenna	

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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	7ML5431-0 -	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: IECEEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEEx/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: IECEEx/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: IECEEx/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		
Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ³⁾	H	Operating Instructions	
Non Sparking: NEPSI Ex nA IIC T4 Gc	K	All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
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 ³⁾	M	Accessories	Article No.
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ³⁾	N	Mounting bracket suitable for wall or ceiling mounting, for aluminum painted horn versions only	A5E46342367
Pressure rating	1	Polypropylene lens replacement kit, polypropylene lens antenna and polymeric flange versions	A5E46342366
0.5 bar (7.25 psi g) max. ⁴⁾	2	One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART ¹¹⁾	7ML1930-1AP
Rating per Pressure/Temperature curves in manual ¹⁾ ⁵⁾		One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus	7ML1930-1AQ
		Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)	7ML1930-1BK
		FDA approved FKM o-ring for 2" G (BSPP) process connections -28 ... +80 °C (-28 ... +176 °F)	7MF4997-1DB
		SITRANS RD100, loop powered display - see Chapter 7	7ML1830-3AN
		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.

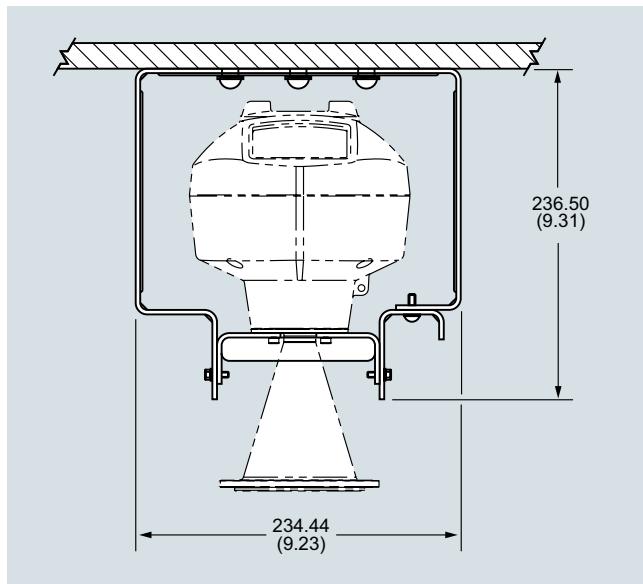
⁹⁾ Available only with Enclosure option 0.

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

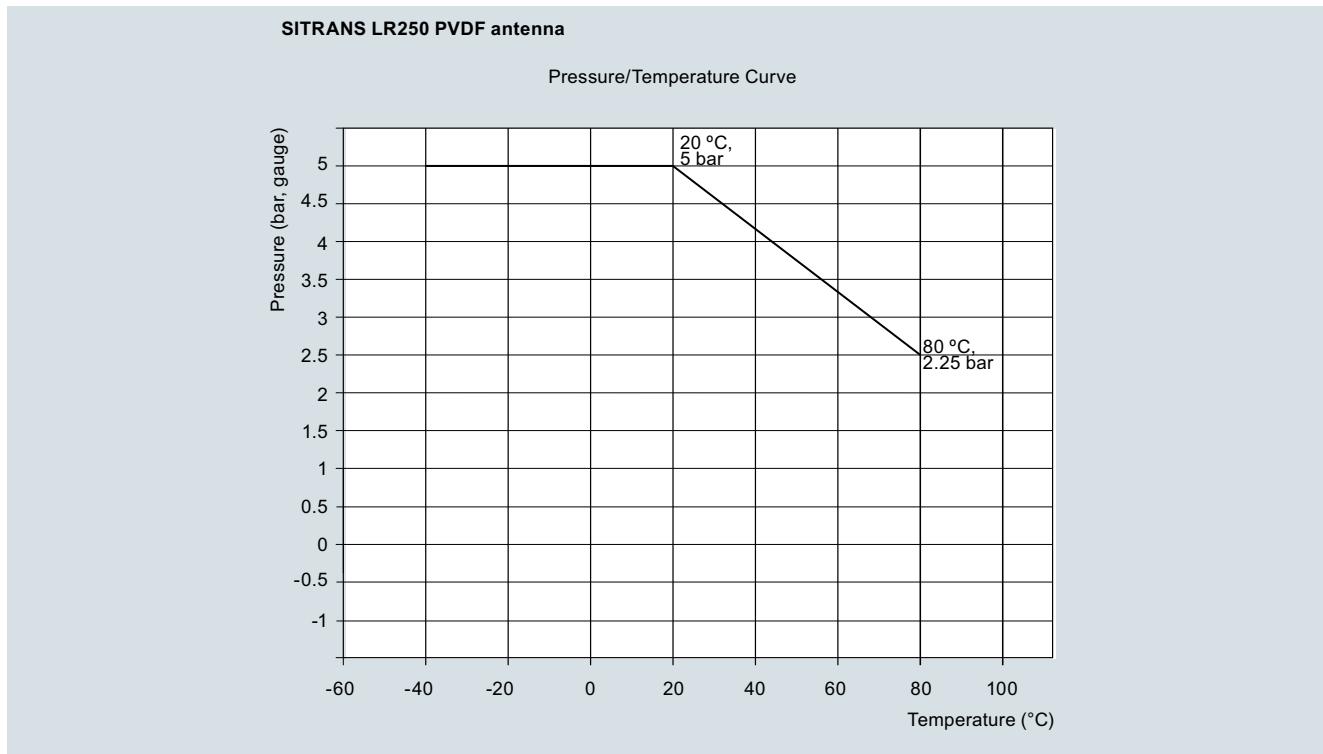
Options



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

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Characteristic curves



SITRANS LR250 PVDF antenna, pressure/temperature curve

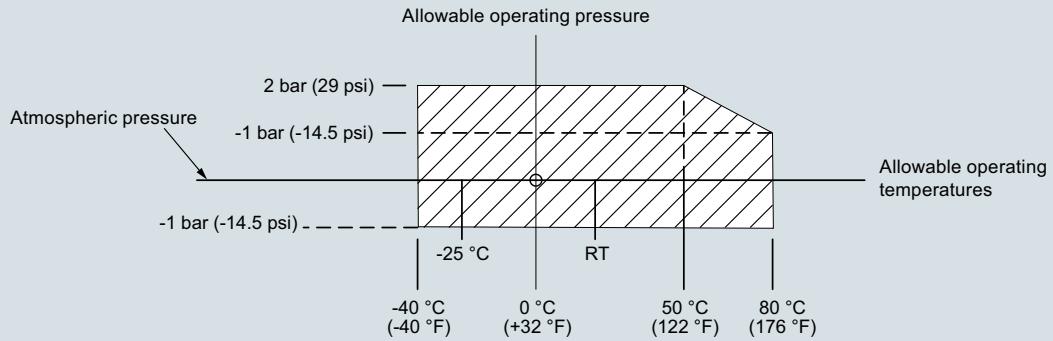
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SITRANS LR250 Polypropylene lens antenna

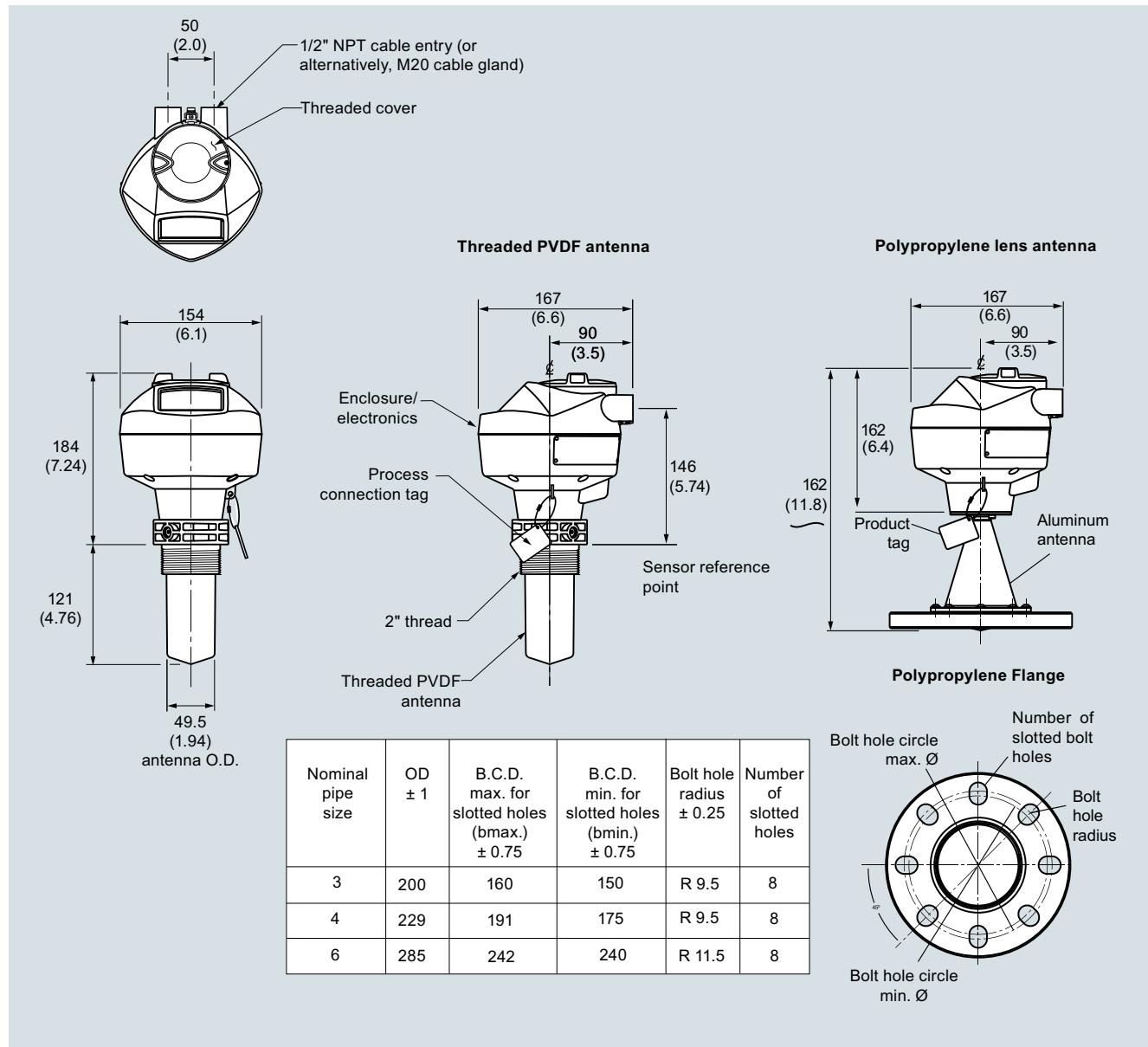
Pressure/temperature curve, 3 inch (80 mm) flange only



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

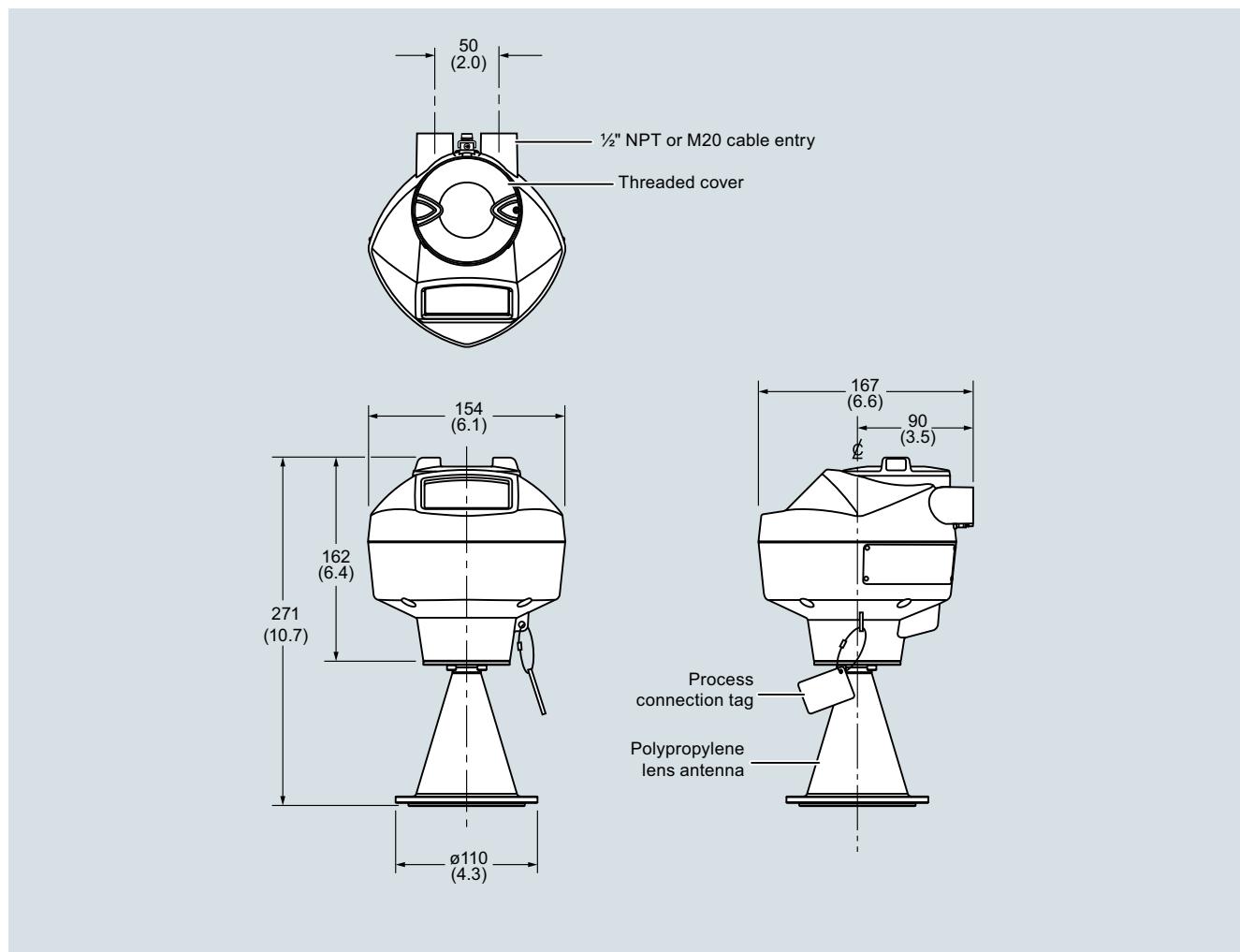


SITRANS LR250 PVDF antenna and Polypropylene lens antenna, dimensions in mm (inch)

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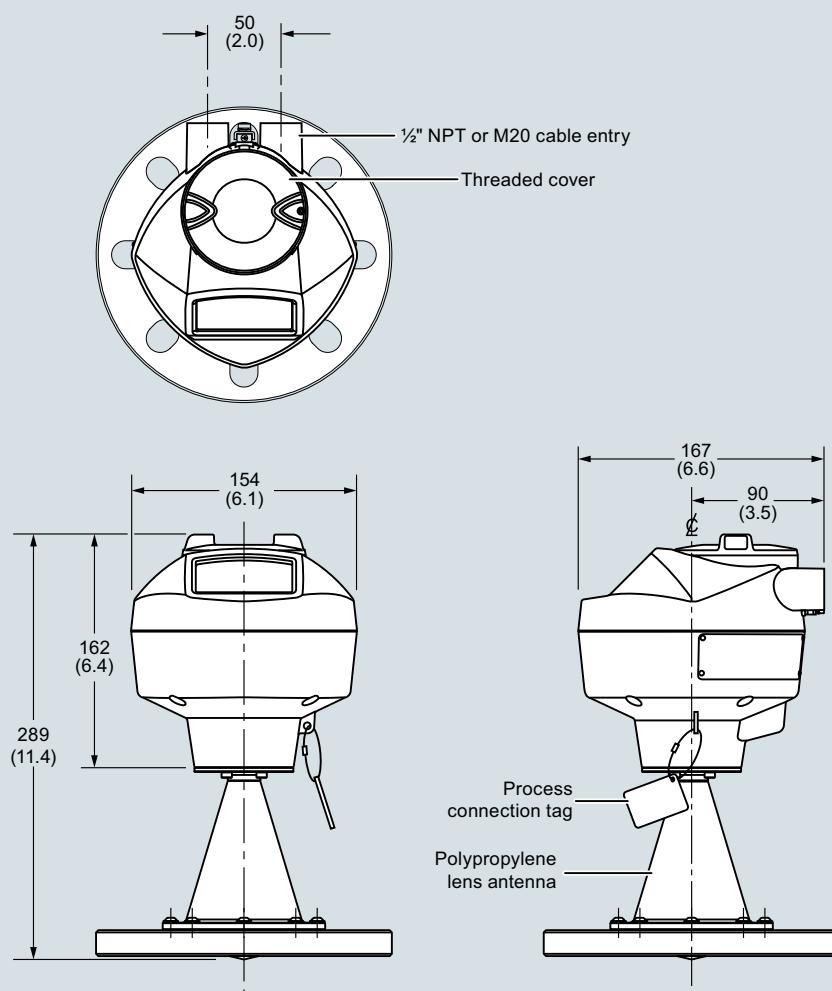
SITRANS LR250 with PVDF antenna or Polypropylene lens antenna



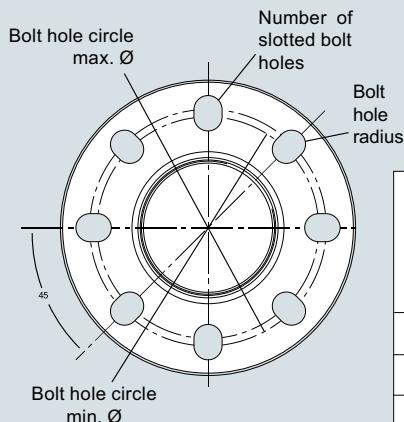
SITRANS LR250 Polypropylene lens antenna, dimensions in mm (inch)

SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

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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

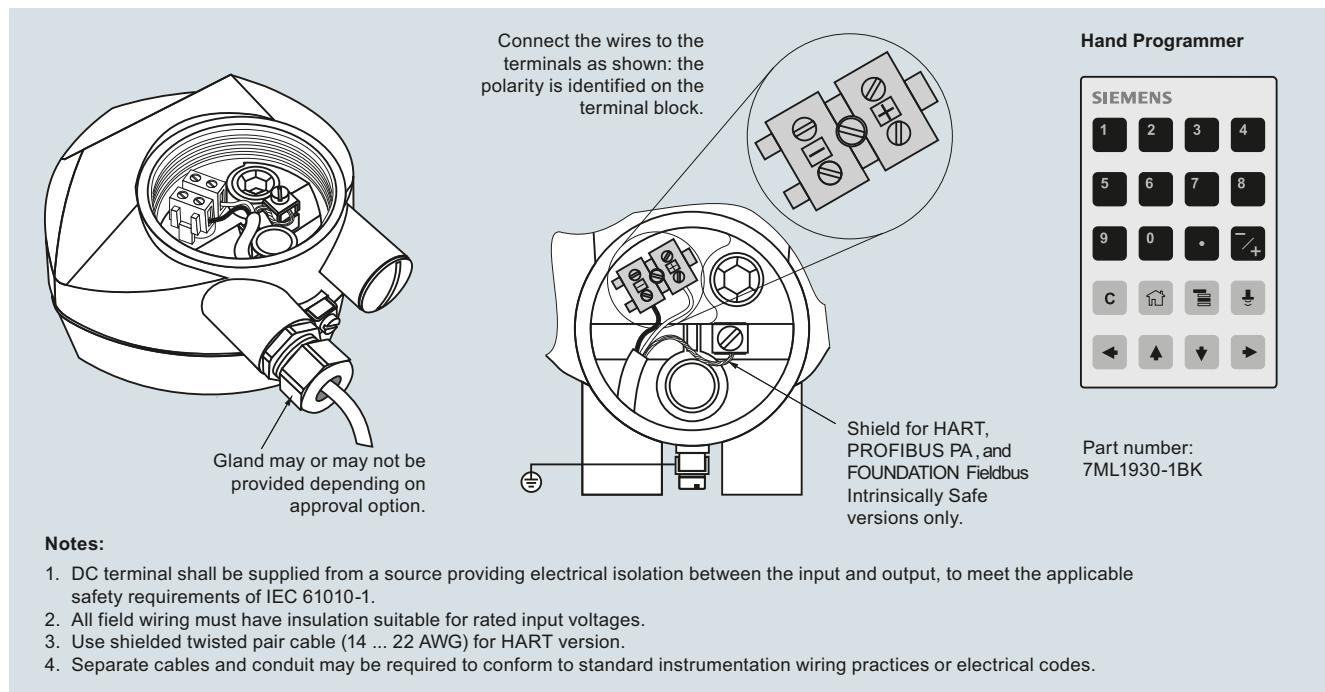
SITRANS LR250 Polypropylene lens antenna with universal polymeric flange, dimensions in mm (inch)

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SITRANS LR250 with PVDF antenna or Polypropylene lens antenna

Circuit diagrams



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	
< 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