

## Level measurement

Continuous level measurement  
Radar level transmitters

### SITRANS LR250 Polypropylene Lens Antenna

#### Overview



SITRANS LR250 Polypropylene lens antenna is a 25 GHz pulse radar level transmitter for continuous monitoring of liquids and slurries in storage and process vessels including corrosive materials to a range of 20 m (65.6 ft).

#### Benefits

- For use in chemical environments where aggressive and corrosive materials are present.
- 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.

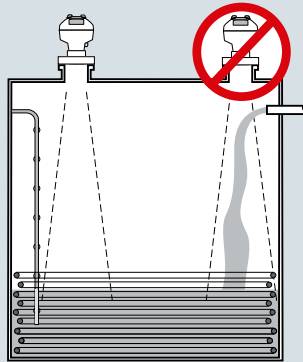
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, corrosive and aggressive materials.

**Configuration**

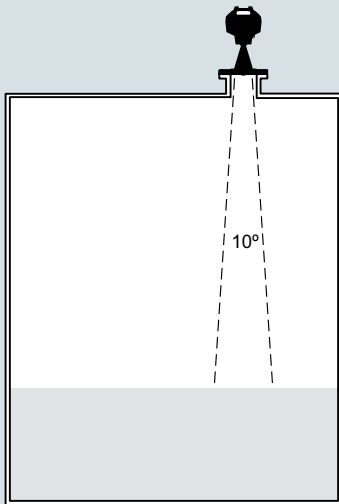
**Installation of SITRANS LR250 Level Probing Radar**

Note:

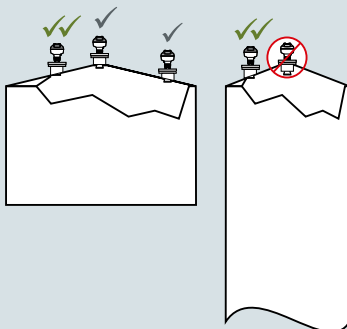
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



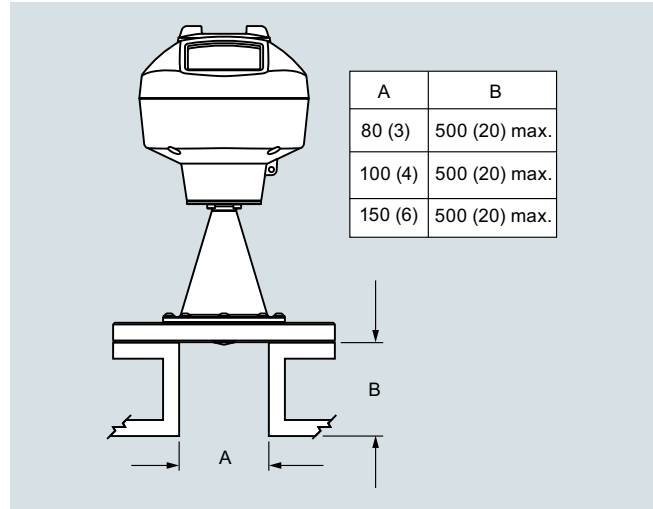
Polypropylene lens antenna



**Mounting on vessel**



SITRANS LR250 Polypropylene lens antenna installation



SITRANS LR250 Polypropylene lens antenna, mounting on a nozzle, 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 antenna
Maximum measuring range	20 m (66 ft)

##### Output

HART	Version 5.1
• Analog output	4 ... 20 mA
• Accuracy	± 0.02 mA
• Fail-safe	<ul style="list-style-type: none"> <li>Programmable as high, low or, hold (loss of echo)</li> <li>NE 43 programmable</li> </ul>
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 IEC 60770-1)

Maximum measured error	<ul style="list-style-type: none"> <li>&gt; 500 mm from sensor reference point: 3 mm (0.118 inch)</li> <li>&lt; 500 mm from sensor reference point: 25 mm (1 inch)</li> </ul>
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)
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
• Installation category	I
• Pollution degree	4

##### Medium conditions

Dielectric constant $\epsilon_r$	> 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.

##### Design

Enclosure	
• Material	Aluminum, polyester powder-coated
• Cable inlet	2 x M20 x 1.5 or 2 x 1/2" NPT
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68
Weight	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
Polypropylene lens antenna	
• Materials	<ul style="list-style-type: none"> <li>Polyester powder coated exterior</li> <li>3 inch cast aluminum</li> <li>Polypropylene lens</li> <li>FKM seal</li> </ul>
• Process connections	
- Material	Polypropylene
- Dimensions	Universal flange: 3 inch (80 mm), 4 inch (100 mm), 6 inch (150 mm)

##### Power supply

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

##### Certificates and approvals

General	CSA <sub>US/C</sub> , 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 <sub>A</sub> 90 °C
• Intrinsically Safe (China)	Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T <sub>A</sub> 90 °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	<ul style="list-style-type: none"> <li>Lloyd's Register of Shipping</li> <li>ABS Type Approval</li> <li>Bureau Veritas</li> </ul>

##### 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 <sub>a</sub> = -20 ... +50 °C, CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, T6, T <sub>a</sub> = +50 °C, IECEX SIR 09.0073
Handheld communicator	HART communicator 375/475
PC	<ul style="list-style-type: none"> <li>SIMATIC PDM</li> <li>Emerson AMS</li> <li>SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare)</li> </ul>
Display (local)	Graphic local user interface including quick start wizard and echo profile displays.

Selection and ordering data	Article No.	Order code
<b>SITRANS LR250 Radar level transmitter</b> 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 -	
<b>Process Connection and Antenna Material</b> Painted aluminum 3" horn antenna <sup>1)</sup>	5	
<b>Process Connection Type</b> <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> 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	Q A Q B Q C Q D Q E	<b>Further designs</b> Please add "-Z" to Article No. and specify Order code(s). Plug M12, incl. cable socket, IP68 <sup>4)5)6)</sup> Plug 7/8", incl. cable socket, IP68 <sup>5)6)7)</sup> Long tag (device parameter, max. 27 characters) plate stainless steel 304/1.4301 Factory test certificate - M to DIN 55350, Part 18 Inspection certificate 3.1 (EN 10204) - material of pressure-containing and wetted parts Namur NE43 compliant: device preset to failsafe < 3.6 mA <sup>2)</sup>
<b>Communication/Output</b> PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA FOUNDATION Fieldbus	1 2 3	
<b>Enclosure/Cable inlet</b> <u>Aluminum, Epoxy painted</u> 2 x 1/2" NPT 2 x M20 x 1.5	0 1	
<b>Antenna</b> 3 inch (80 mm) polypropylene lens antenna	S	
<b>Approvals</b> General Purpose, CE, CSA, FM, FCC, RED, RCM 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 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 Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, RED, RCM 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 <sup>2)</sup> 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 <sup>2)</sup> Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada <sup>2)</sup> Non Sparking: NEPSI Ex nA IIC T4 Gc Intrinsically Safe: NEPSI Ex ia IIC T4 Ga, Ex iaD 20 T90 IP67 DIP A20 T <sub>A</sub> 90 °C Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T <sub>A</sub> 90 °C <sup>2)</sup> Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T <sub>A</sub> 90 °C <sup>2)</sup>	A B C D E F G H K L M N	<b>Operating Instructions</b> All literature is available to download for free, in a range of languages, at <a href="http://www.siemens.com/processinstrumentation/documentation">http://www.siemens.com/processinstrumentation/documentation</a> <b>Accessories</b> Mounting bracket suitable for wall or ceiling mounting, for aluminum painted horn versions only Polypropylene lens replacement kit, polypropylene lens antenna and polymeric flange versions One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART <sup>9)</sup> One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM) FDA approved FKM o-ring for 2" G (BSPP) process connections -28 ... +80 °C (-28 ... +176 °F) SITRANS RD100, loop powered display - see Chapter 7 SITRANS RD150, remote digital display for 4 ... 20 mA and HART devices - see Chapter 7 SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 For applicable back up point level switch - see point level measurement section
<b>Pressure rating</b> 0.5 bar (7.25 psi g) max. Rating per Pressure/Temperature curves in manual <sup>3)</sup>	1 2	Article No. <b>A50</b> <b>A55</b> <b>Y15</b> <b>C11</b> <b>C12</b> <b>N07</b> <b>A5E46342367</b> <b>A5E46342366</b> <b>7ML1930-1AP</b> <b>7ML1930-1AQ</b> <b>7ML1930-1BK</b> <b>7MF4997-1DB</b> <b>7ML1830-3AN</b> <b>7ML5741-.....-</b> <b>7ML5742-.....-....</b> <b>7ML5740-.....-..</b> <b>7ML5744-.....-..</b>
		1) Available only with Process connection options QA ... QE and Antenna option S. 2) Available only with Communication option 2 and Process connection and antenna material option 4. 3) Available only with Process connection and Antenna material option 5 and Process connection type option QC. 4) Available only with Enclosure option 1. 5) Available only with Communication options 1 and 3. 6) Available only with Approval options A, B, C, and L. 7) Available only with Enclosure option 0. 8) Available only with Approval options A, B, C, D, E, K, and L. 9) Product shipped with plastic cable gland, rated to -20 °C (-4 °F). If -40 °C (-40 °F) rating required, then metallic cable gland is recommended.

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### SITRANS LR250 Polypropylene Lens Antenna

#### Selection and ordering data

#### Article No.

#### Article No.

#### SITRANS LR250 Polypropylene Lens Antenna Specials

##### 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 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

**A5E035869747**

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 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 B, with PROFIBUS PA communication, no process connection

**A5E03588512**

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, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection

**A5E03589260**

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, 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 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 H, with HART communication start-up at < 3.6 mA, no process connection

**A5E03588125**

SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection

**A5E03589280**

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

**A5E039979991**

Ex-proof plugs kit, M20, qty 5

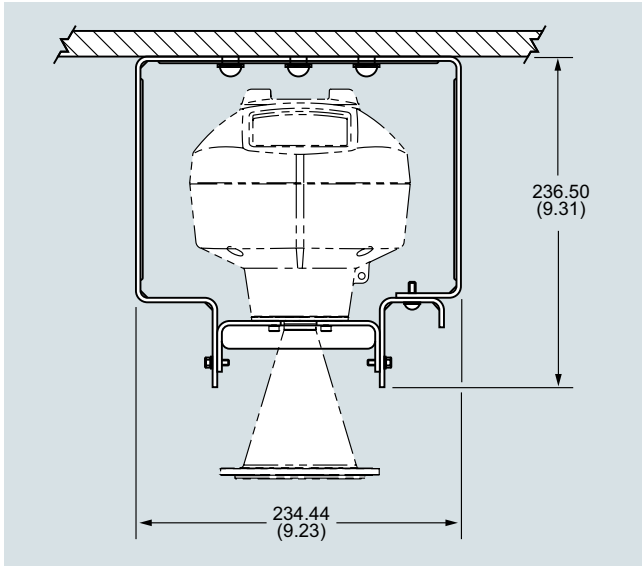
**A5E039979992**

SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection

**A5E03589283**

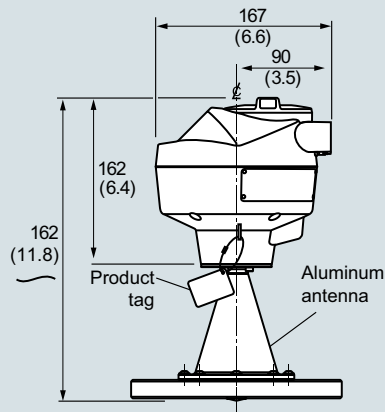
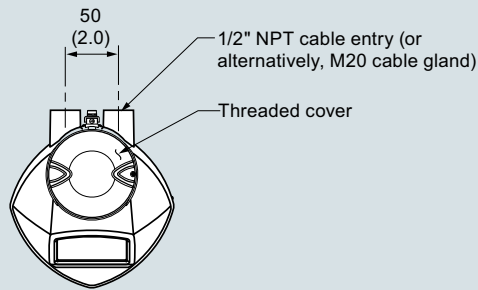
**SITRANS LR250 Polypropylene Lens Antenna**

**Options**



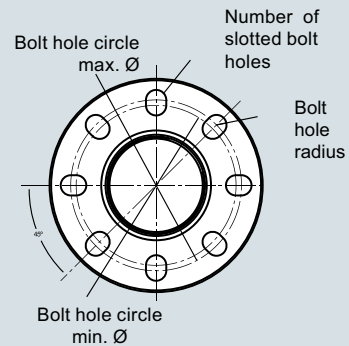
SITRANS LR250 Polypropylene lens antenna, wall/ceiling mount

**Dimensional drawings**



**Polypropylene Flange**

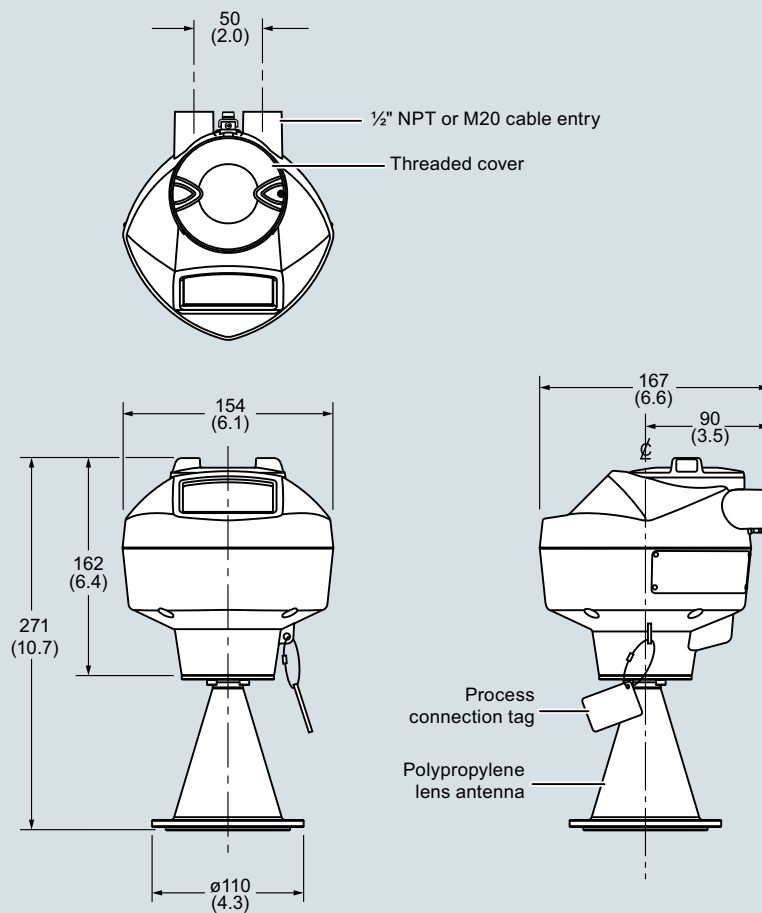
Nominal pipe size	OD ± 1	B.C.D. max. for slotted holes (bmax.) ± 0.75	B.C.D. min. for slotted holes (bmin.) ± 0.75	Bolt hole radius ± 0.25	Number of slotted holes
3	200	160	150	R 9.5	8
4	229	191	175	R 9.5	8
6	285	242	240	R 11.5	8



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

**Level measurement**

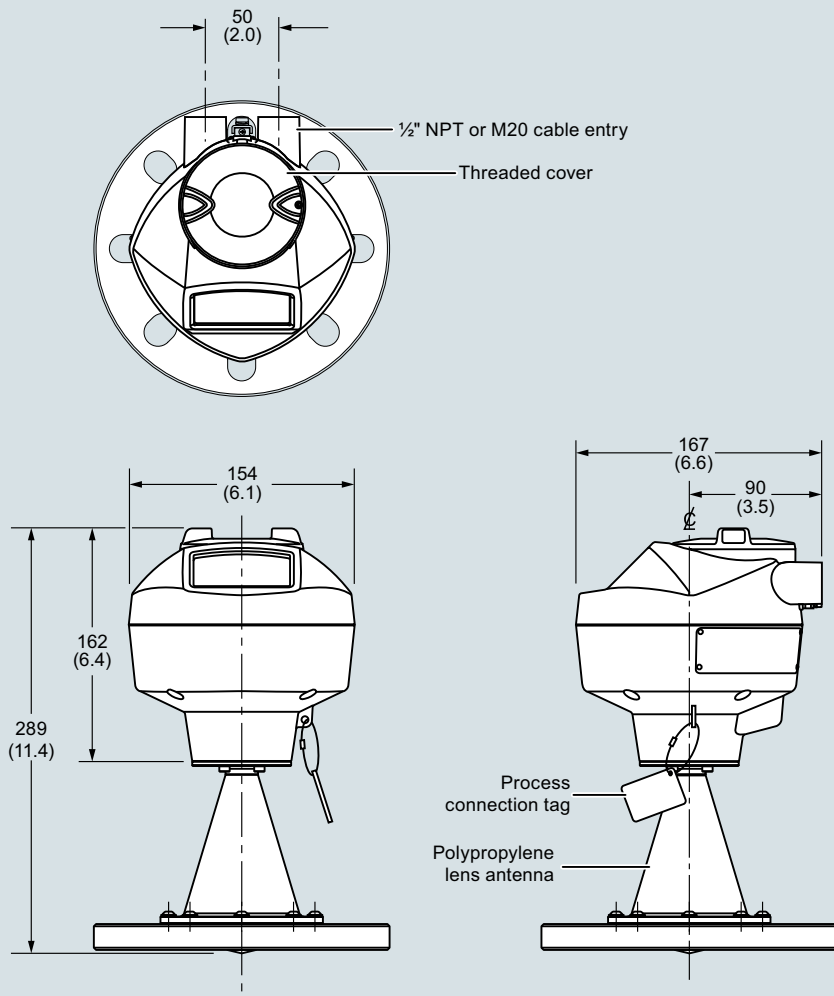
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**SITRANS LR250 Polypropylene Lens Antenna****Dimensional drawings** (continued)

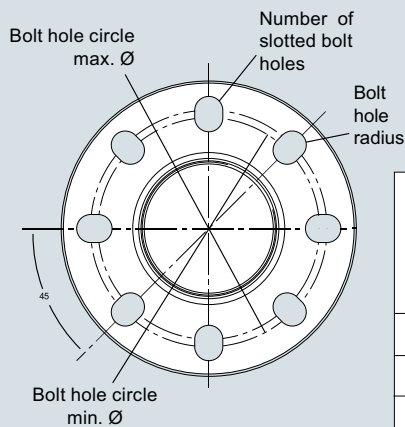
SITRANS LR250 Polypropylene lens antenna, dimensions in mm (inch)

**SITRANS LR250 Polypropylene Lens Antenna**

**Dimensional drawings** (continued)



**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 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 Intrinsically Safe versions only.

**Hand Programmer**

SIEMENS

1	2	3	4
5	6	7	8
9	0	.	+/-
C	Home	List	Download
←	↑	↓	→

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 connections