

Level measurement

Continuous level measurement
Radar level transmitters

SITRANS LR250 Flanged Encapsulated Antenna

Overview



SITRANS LR250 with flanged encapsulated 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 20 m (66 ft) (antenna dependent).

Benefits

- Fully encapsulated horn antenna design with FDA approved TFM 1600 PTFE lens 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
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2 inch) from the end of the antenna
- 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
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- Suitable for API 2350

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 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 20 m (66 ft) on materials with $dk > 1.6$.

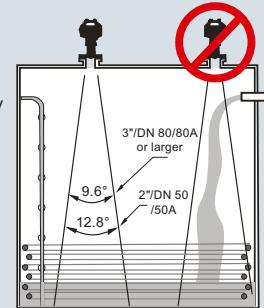
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 170 °C (338 °F), corrosive and aggressive materials and applications where ease of cleaning is required such as food or fine chemicals

Configuration

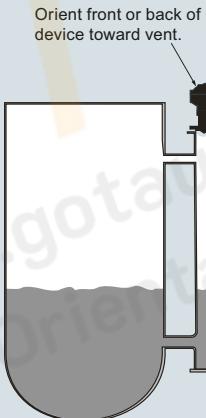
Installation

Note:

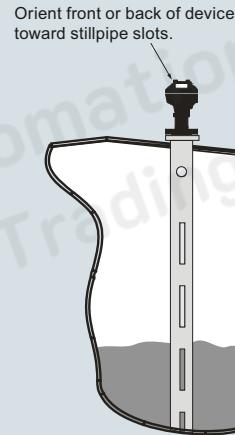
- Beam angle is the width of the cone where the energy density is half of the peak energy density.
- The peak energy density is directly in front of and in line with the antenna.
- There is a signal transmitted outside of the beam angle; therefore false targets may be detected.



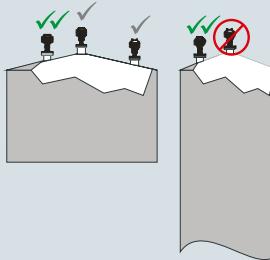
Mounting on bypass



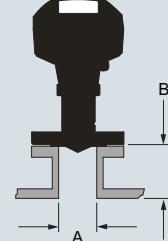
Mounting on stilling well



Mounting on vessel



Mounting on a nozzle



A	B*
ø 50 (2)	500 (20) max.
ø 80 (3)	500 (20) max.
ø 100 (4)	500 (20) max.
ø 150 (6)	500 (20) max.

*Reference conditions

SITRANS LR250 Flanged Encapsulated Antenna installation, dimensions in mm (inch)

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Technical specifications

Mode of operation	Power supply	
Measuring principle	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
Frequency	PROFIBUS PA	• 15 mA • Per IEC 61158-2
Minimum measuring range	FOUNDATION Fieldbus	• 20.0 mA • Per IEC 61158-2
Maximum measuring range		
Output	Certificates and approvals	
HART	General	CSA _{US/C} , CE, FM, RCM
• Analog output	Radio	FCC, Industry Canada, RED, RCM
• Accuracy	Hazardous	INMETRO Ex d ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
• Fail-safe	• Explosion Proof (Brazil)	INMETRO Ex e ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da
PROFIBUS PA	• Increased Safety (Brazil)	INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da
• Function blocks	• Intrinsically Safe (Brazil)	CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4
FOUNDATION Fieldbus	• 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
• Functionality	• Intrinsically Safe (Canada/USA)	CSA/FM Class I, Div. 2, Groups A, B, C, D 15
• Version	• Non-incendive (Canada/USA)	NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex iaD tD A20 IP67 T100 °C
• Function blocks	• Flame Proof/Increased Safety (China)	NEPSI Ex ia IIC T4 Ga, Ex iaD tD A20 IP67 T100 °C
Performance (according to reference conditions IEC60770-1)	• Intrinsic Safety (China)	NEPSI Ex nA IIC T4 Gc
Maximum measured error	• Non-sparking/Energy Limited (China)	ATEX II 1G Ex ia IIC T4 Ga
	• Intrinsically Safe (Europe)	ATEX II 1D Ex ia ta IIIC T100 °C Da
Influence of ambient temperature	• 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 IIC T100 °C Da
	• Intrinsically Safe (International)	IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIIC 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 SIL-2 suitable in accordance with IEC 61508/61511
Rated operating conditions	Programming	
Installation conditions	Intrinsically Safe Siemens handheld programmer	Infrared receiver
• Location	• 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
Ambient conditions (enclosure)	Handheld communicator	HART communicator 375/475
• Ambient temperature	PC	• SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT such as PACTware or Fieldcare)
• Storage temperature	Display (local)	Graphic local user interface including quick start wizard and echo profile displays
• Installation category		
• Pollution degree		
Medium conditions		
Dielectric constant ϵ_r		
Process temperature		
Process pressure		
Design		
Enclosure		
• Material		
• Cable inlet		
Degree of protection	Aluminum, polyester powder-coated 2 x M20 x 1.5 or 2 x ½" NPT	
Weight (dependent on process connection)	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68	
Display (local)	Graphic local user interface including quick start wizard and echo profile display	
Antenna	Stainless Steel 316L (1.4435 or 1.4404) and TFM 1600 PTFE Lens (lens is the only wetted part)	
• Dimensions (nominal sizes)	48 mm (2 inch), 80 mm (3 inch), 100 mm (4 inch), 150 mm (6 inch)	
Process connections		
Flanged connection	Raised Face	
	• 2, 3, 4, 6" Class 150 ASME B16.5	
	• 50A, 80A, 100A, 150A 10K JIS B 2220	
	• DN 50, DN 80, DN 100 & DN 150 PN 10/16 EN 1092-1 type B1	

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Radar level transmitters

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Selection and ordering data	Article No.	Order code
SITRANS LR250 Radar level transmitter with encapsulated horn and PTFE lens Continuous, non-contact, 20 m (66 ft) range, for liquids and slurries in the chemical industry. ↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	7ML4432- 0	
Process Connection Material Stainless steel 1.4404/1.4435	0	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
Process Connection Type Flanged Process Connection Types (stainless steel 1.4404/1.4435) 2" Class 150 ASME B16.5 raised face ¹⁾ 3" Class 150 ASME B16.5 raised face 4" Class 150 ASME B16.5 raised face 6" Class 150 ASME B16.5 raised face 50A 10K JIS B 2220 raised face ¹⁾ 80A 10K JIS B 2220 raised face 100A 10K JIS B 2220 raised face 150A 10K JIS B 2220 raised face DN 50 PN 10/16 EN 1092-1 type B1 raised face ¹⁾ DN 80 PN 10/16 EN 1092-1 type B1 raised face DN 100 PN 10/16 EN 1092-1 type B1 raised face DN 150 PN 10/16 EN 1092-1 type B1 raised face	B F B G B H B J F D F E F F F G G A G B G C G D	
Communication/Output PROFIBUS PA 4 ... 20 mA, HART, start-up at < 3.6 mA FOUNDATION Fieldbus	1 2 3	Operating Instructions All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation
Enclosure/Cable inlet Aluminum, Epoxy painted 2 x ½" NPT 2 x M20 x 1.5	0 1	Accessories Handheld programmer, Intrinsically safe, EEia 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), PROFIBUS PA and FOUNDATION Fieldbus (2 are required) ⁶⁾ 7ML1930-1AP One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus (2 are required) ²⁾ 7ML1930-1AQ SITRANS RD100, loop powered display - see Chapter 7 7ML5741-..... SITRANS RD150, remote digital display for 4 ... 20 mA and HART devices - see Chapter 7 7ML5742-..... 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-..... For applicable back up point level switch - see point level measurement section
Antenna lens material TFM 1600 PTFE Flush Lens	A	
Approvals 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 ia IIIC T100 °C Da, INMETRO Ex ia IIC T4 Ga, Ex ia ia 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 ²⁾ 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 ia mb IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da, CE, RED, RCM ²⁾ Explosion proof: CSA/FM Class I, II and III, Div. 1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ²⁾ Non Sparking: NEPSI Ex nA IIC T4 Gc, Ex iaD ID A20 IP67 T100 °C Intrinsically Safe: NEPSI Ex ia mb IIC T4 Ga/Gb, Ex iaD ID A20 IP67 T100 °C ²⁾ Flameproof: NEPSI Ex d ia mb IIC T4 Ga/Gb, Ex iaD ID A20 IP67 T100 °C ²⁾ Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD ID A20 IP67 T100 °C ²⁾	A B C D E F G H K L M N O	Article No. 7ML1930-1BK 7MF4997-1DB 7ML1930-1AP 7ML1930-1AQ 7ML5741-..... 7ML5742-..... 7ML5740-..... 7ML5744-..... For applicable back up point level switch - see point level measurement section

¹⁾ Maximum range 10 m (32.8 ft), dk > 3 [20 m (66 ft)] and dk > 1.6 when mounted in stillpipe].

²⁾ Applicable with communication option 2 only.

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Selection and ordering data	Article No.	Article No.
SITRANS LR250 flanged encapsulated Specials		
SITRANS LR250 flanged encapsulated antenna version enclosures (PROFIBUS PA models)		
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E32462853	A5E32462865
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E32462854	A5E32462866
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E32462855	A5E32462867
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E32462856	A5E32462868
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E32462857	A5E32462869
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option E, with PROFIBUS PA communication, no process connection	A5E32462858	A5E32462870
SITRANS LR250 flanged encapsulated antenna version enclosures (FOUNDATION Fieldbus models)		
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection		
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E32462859	A5E32462871
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E32462860	A5E32462872
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, NPT cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E32462861	A5E32462873
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E32462862	A5E32462874
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E32462863	
SITRANS LR250 flanged encapsulated antenna version (7ML5432) enclosure with board stack, M20 cable inlet, approval option F, with HART communication start-up at < 3.6 mA, no process connection	A5E32462864	

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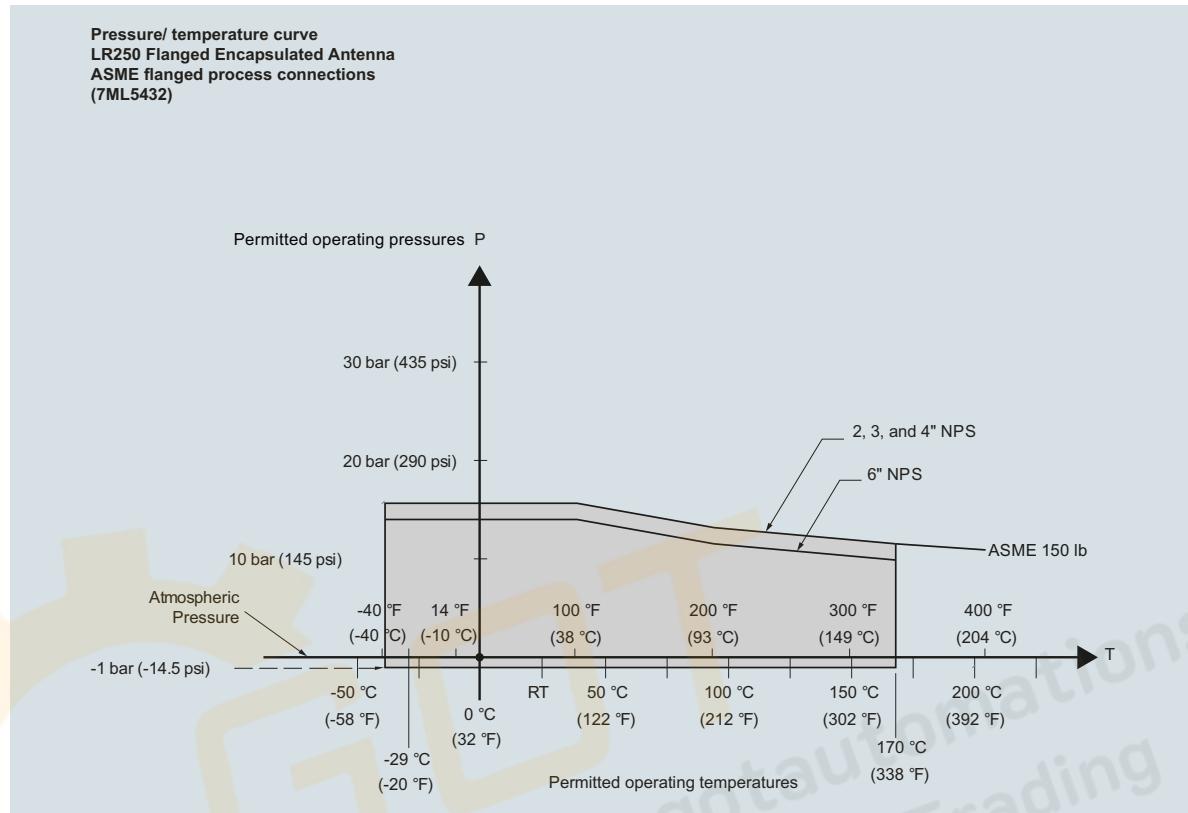
Selection and ordering data	Article No.
SITRANS LR250 flanged encapsulated antenna lens kits	
Replacement TFM 1600 Lens and Spring Washer Kit for 2 inch Class 150 ASME B16.5 raised faced	A5E32462817
Replacement TFM 1600 Lens and Spring Washer Kit for 3 inch Class 150 ASME B16.5 raised faced	A5E32462819
Replacement TFM 1600 Lens and Spring Washer Kit for 4 inch Class 150 ASME B16.5 raised faced	A5E32462820
Replacement TFM 1600 Lens and Spring Washer Kit for 6 inch Class 150 ASME B16.5 raised faced	A5E32462821
Replacement TFM 1600 Lens and Spring Washer Kit for 50A 10K JIS B 2220 raised Face	A5E32462822
Replacement TFM 1600 Lens and Spring Washer Kit for 80A 10K JIS B 2220 raised Face	A5E32462823
Replacement TFM 1600 Lens and Spring Washer Kit for 100A 10K JIS B 2220 raised Face	A5E32462824
Replacement TFM 1600 Lens and Spring Washer Kit for 150A 10K JIS B 2220 raised Face	A5E32462825
Replacement TFM 1600 Lens and Spring Washer Kit for DN50 PN10/16 EN 1092-1 type B1 raised face	A5E32462826
Replacement TFM 1600 Lens and Spring Washer Kit for DN80 PN10/16 EN 1092-1 type B1 raised face	A5E32462827
Replacement TFM 1600 Lens and Spring Washer Kit for DN100 PN10/16 EN 1092-1 type B1 raised face	A5E32462828
Replacement TFM 1600 Lens and Spring Washer Kit for DN150 PN10/16 EN 1092-1 type B1 raised face	A5E32462829
Ex-proof plugs	
Ex-proof plugs kit, 1/2" NPT, qty 5	A5E39979991
Ex-proof plugs kit, M20, qty 5	A5E39979992

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Characteristic curves

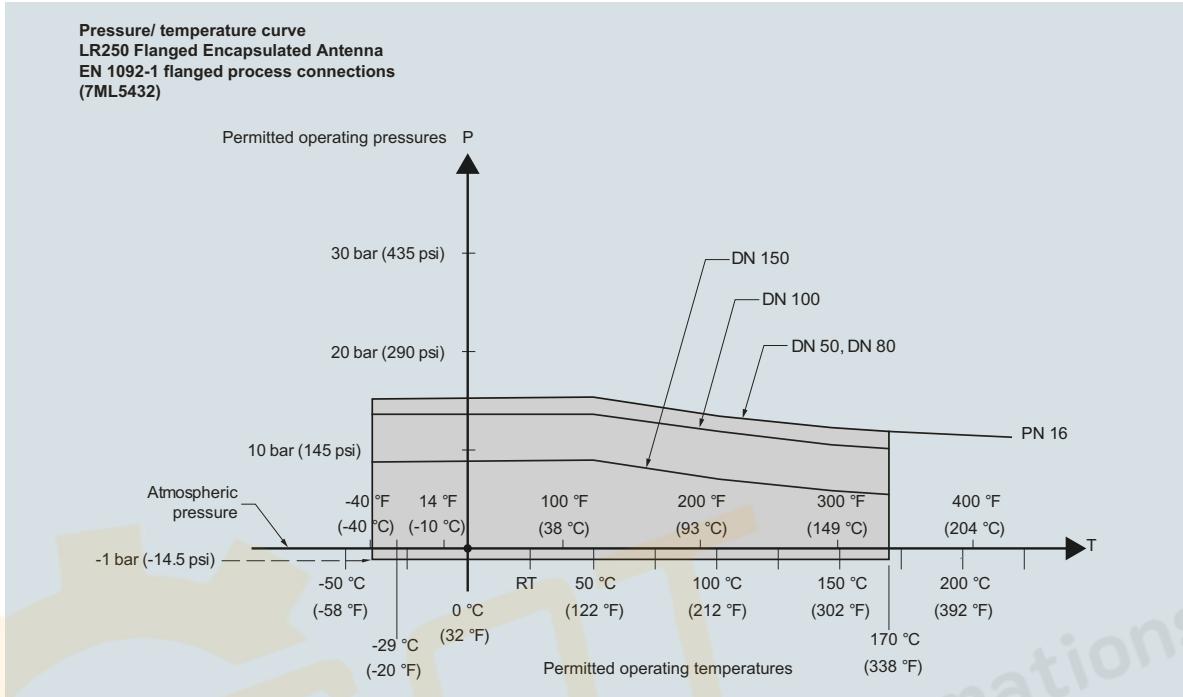


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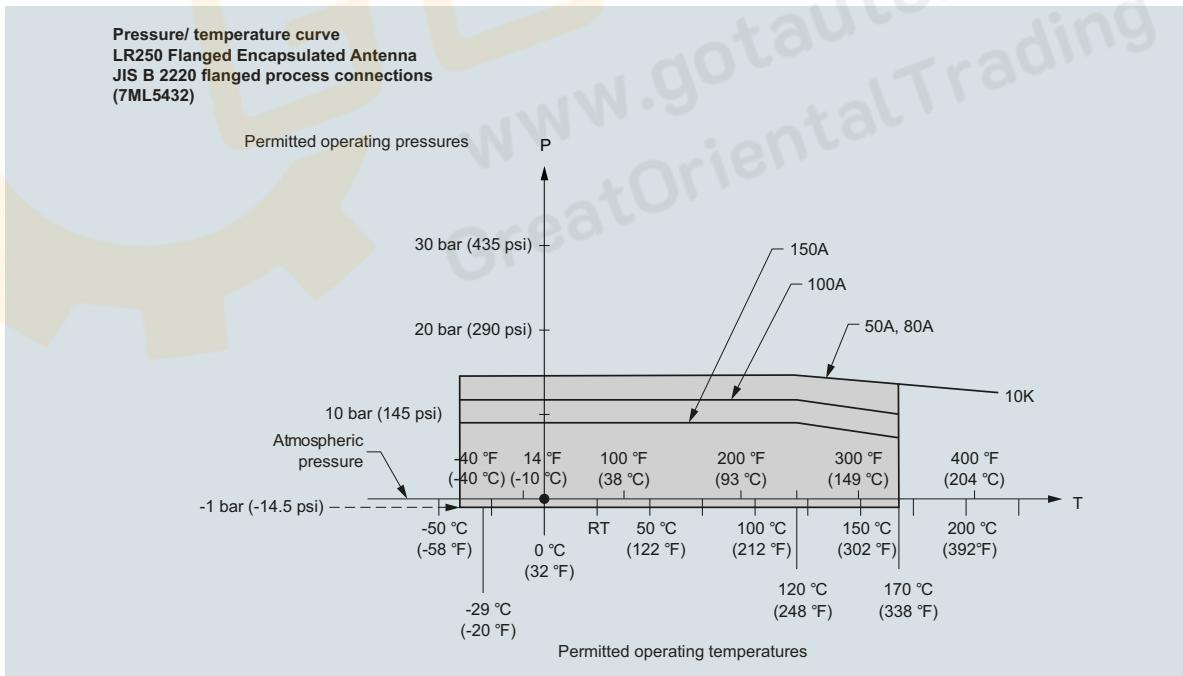
SITRANS LR250 Flanged Encapsulated Antenna pressure/temperature curve

SITRANS LR250 Flanged Encapsulated Antenna

Characteristic curves (continued)



SITRANS LR250 Flanged Encapsulated Antenna pressure/temperature curve



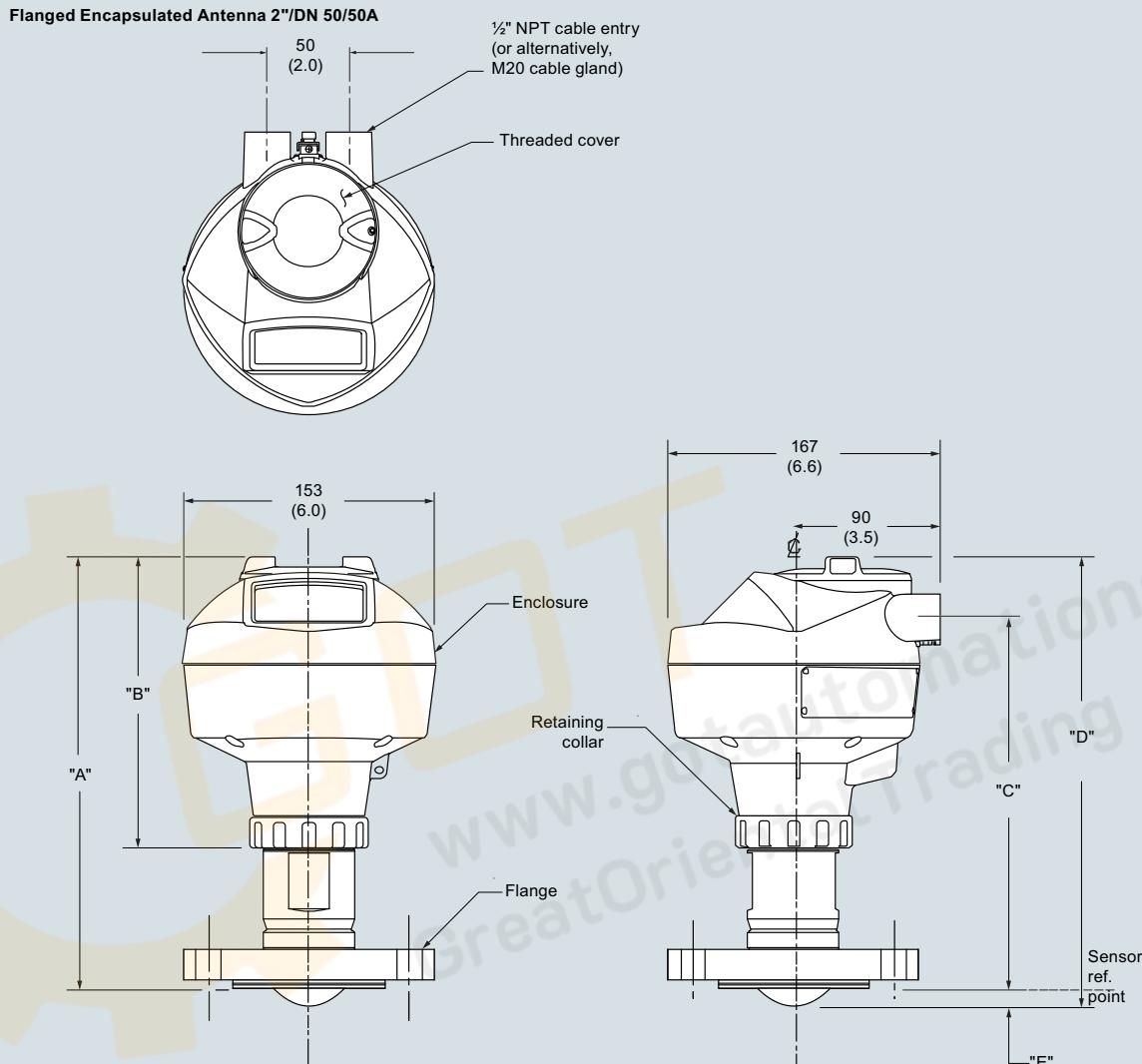
SITRANS LR250 Flanged Encapsulated Antenna pressure/temperature curve

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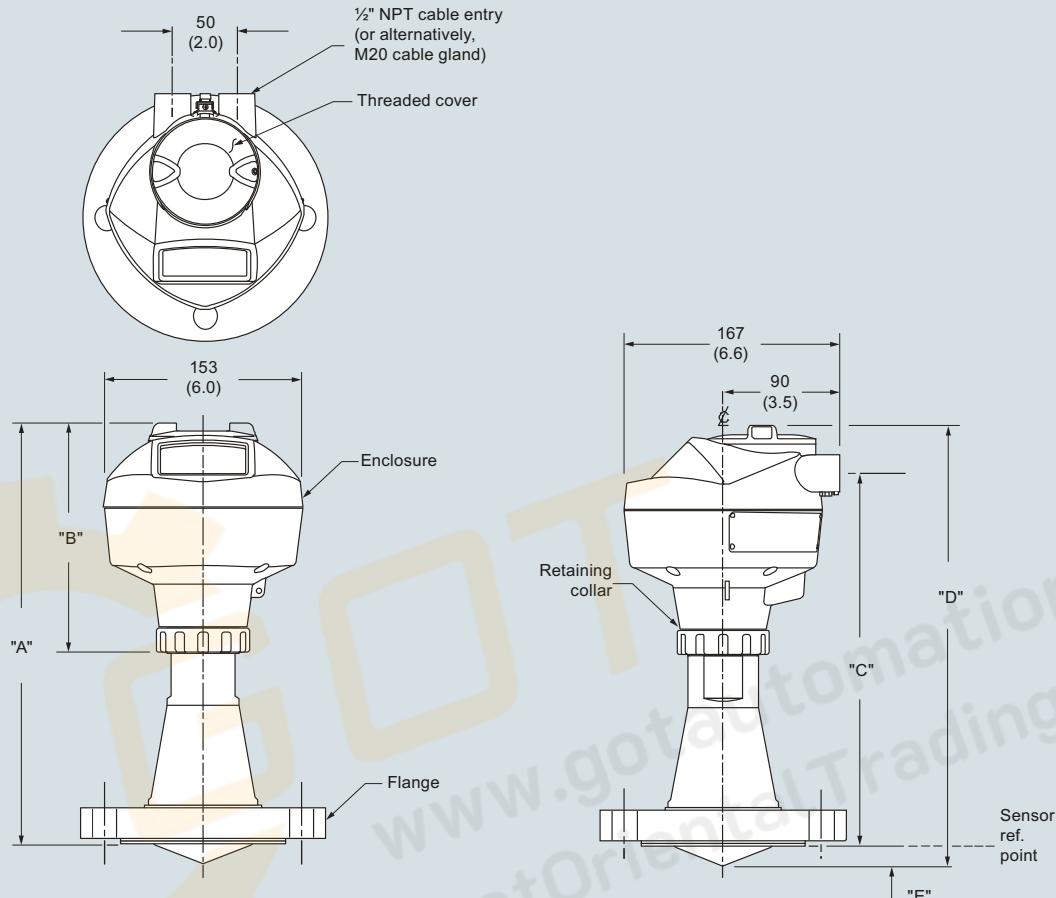
Dimensional drawings



Flange Size	Flange Class	Flange O.D.	Antenna aperture size	Height to Sensor reference point dimension E ¹⁾	Beam angle	Measurement Range	Dimension A	Dimension B	Dimension C	Dimension D
2"	150 lb	152 (5.98)	50 (1.97)	11 (0.43)	12.8°	10 m (32.8 ft)	263 (10.35)	178 (7)	223 (8.78)	274 (10.79)
DN 50	PN 10/16	165 (6.50)								
50A	10K	155 (6.10)								

¹⁾ Height from tip of lens to sensor reference point as shown.

SITRANS LR250 Flanged Encapsulated Antenna, dimensions in mm (inch)

SITRANS LR250 Flanged Encapsulated Antenna**Dimensional drawings (continued)****Flanged Encapsulated Antenna 3"/DN 50/80A or greater**

Flange Size	Flange Class	Flange O.D.	Antenna aperture size	Height to Sensor reference point dimension E ¹⁾	Beam angle	Measurement Range	Dimension A	Dimension B	Dimension C	Dimension D
3"	150 lb	190 (7.48)								
DN 80	PN 10/16	200 (7.87)	75 (2.95)	15 (0.59)	9.6°	20 m (65.6 ft)	328 (12.91)	178 (7)	288 (11.34)	343 (13.54)
80A	10K	185 (7.28)								
4"	150 lb	230 (9.06)								
DN 100	PN 10/16	220 (8.66)	75 (2.95)	13 (0.51)	9.6°	20 m (65.6 ft)	328 (12.91)	178 (7)	288 (11.34)	343 (13.50)
100A	10K	210 (8.27)								
6"	150 lb	280 (11.02)								
DN 150	PN 10/16	285 (11.25)	75 (2.95)	15 (0.59)	9.6°	20 m (65.6 ft)	333 (13.11)	178 (7)	293 (11.54)	348 (13.70)
150A	10K	280 (11.02)								

¹⁾ Height from tip of lens to sensor reference point as shown.

SITRANS LR250 Flanged Encapsulated Antenna, dimensions in mm (inch)

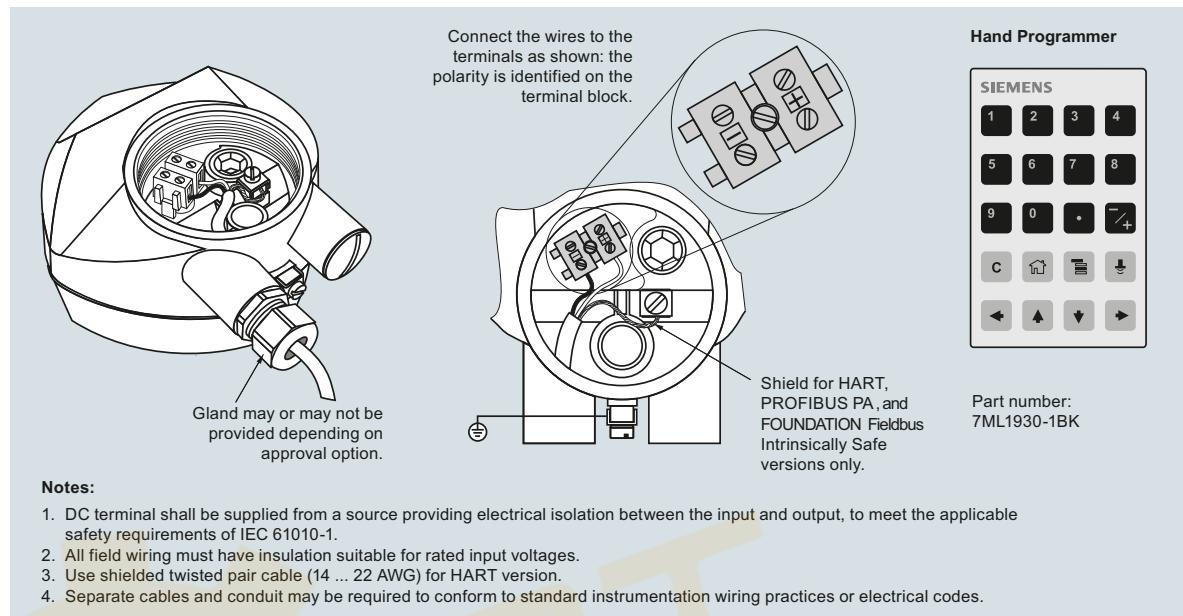
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Radar level transmitters

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Circuit diagrams

4



SITRANS LR250 connections

บริษัท เกรตโอเรียนเต็ล เทคโนโลยี จำกัด
เลขที่ 1049 ถนนร่วมธรรม
ตำบลคลองหลวง อ.เมืองกาญจน
จังหวัดสุโขทัย 90110
074-300212-4

095-078-7525



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