

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).

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 2" (50 mm) process connection/antenna allow for easy mounting in nozzles
- Insensitive to mounting location and obstructions, and less sensitive to nozzle interference
- Short blanking distance for improved minimum measuring range to 50 mm (2") from the end of the horn
- 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 PAC Tware or Fieldcare via SITRANS DTM.
- Suitable for use in Safety Related Systems in accordance with IEC 61508/61511 (SIL-2)

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 $dk > 3$.

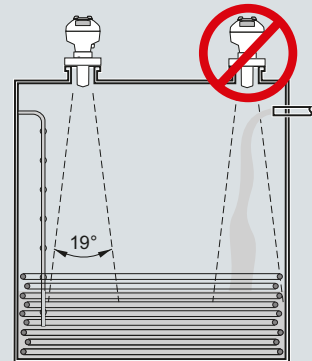
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to +80 °C (+176 °F), corrosive and aggressive materials, media with dielectric (dk) ≥ 3 (application dependent)

Configuration

Installation

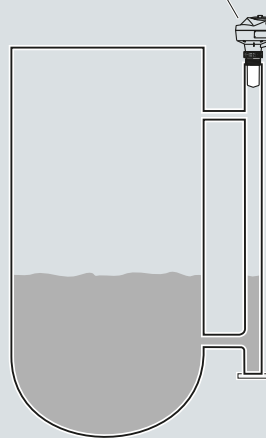
Note:

- 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.



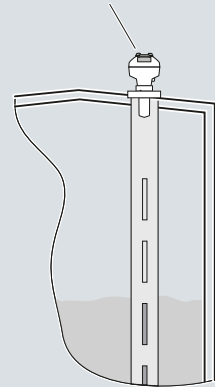
Mounting unit on bypass

Orient front or back of device toward vent.

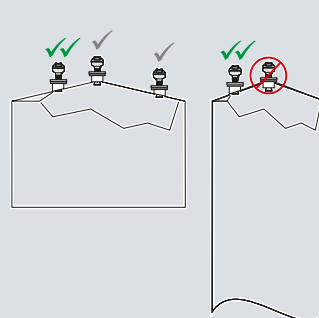


Mounting unit on stilling well

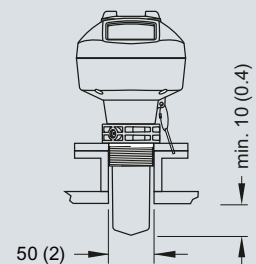
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



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

Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

Technical specifications

Mode of operation

Measuring principle	Radar level measurement
Frequency	K-band (25.0 GHz)
Minimum measuring range	50 mm (2") from end of horn
Maximum measuring range	10 m (32.8 ft)

Output

• HART	Version 5.1
- Analog output	4 to 20 mA
- Accuracy	± 0.02 mA
- Fail-safe	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • > 500 mm from sensor reference point: 5 mm (0.2") • < 500 mm from sensor reference point: 25 mm (1")
• Influence of ambient temperature	<0.003 %/K

Rated operating conditions

<u>Installation conditions</u>	
• Location	Indoor/outdoor
<u>Ambient conditions (enclosure)</u>	
• Ambient temperature	-40 to +80 °C (-40 to +176 °F)
• Installation category	I
• Pollution degree	4

Medium conditions

• Dielectric constant ϵ_r	≥ 3 (1.6 in stillpipe)
• Process temperature	-40 to +80 °C (-40 to +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	
- Material	Aluminium, polyester powder-coated
- Cable inlet	2 x M20x1.5 or 2 x 1/2" NPT
• Degree of protection	Type 4X/NEMA 4X, Type 6/ NEMA 6, IP67, IP68
• Weight	approximately 3.3 kg (7.27 lbs)
• Display (local)	Graphic local user interface including quick start wizard and echo profile display
• Antenna	
- Material	PVDF (Polyvinylidene fluoride)
- Dimensions (nominal sizes)	2" (48 mm)

Process connections

• Process connection	2" NPT [(Taper), ASME B1.20.1] 2" [(BSPT), EN 10226] 2" [(BSPP), EN ISO 228-1]
----------------------	--

Power supply

4 to 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA	15 mA; per IEC 61158-2
FOUNDATION Fieldbus	20.0 mA; per IEC 61158-2

Certificates and approvals

• General	CSA _{US/C} , CE, FM, NE 21, C-TICK, C
• Radio	FCC, Industry Canada and Europe ETSI EN 302-372, C-TICK
• Hazardous	
- Intrinsically Safe (Europe)	ATEX II 1G EEx ia IIC T4 ATEX II 1D EEx tD A20 IP67 T90°C
- Intrinsically Safe (China)	NEPSI Ex ia IIC T4/DIP A20 TA T90°C IP67
- Non-sparking/Energy Limited (Europe)	ATEX II 3G EEx nA/nL IIC T4 Gc
- Non-sparking/Energy Limited (China)	NEPSI Ex nA/nL IIC 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
- Intrinsically Safe (International)	IECEx Ex ia IIC T4, Ex tD A20 IP67 T90°C
- Intrinsically Safe (Brazil)	INMETRO Br-Ex ia IIC T4
- Flame Proof (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex dmbia IIC T4 Ga/Gb, Ex tD A20 IP67 T90°C
- Explosion Proof (Brazil)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex embia IIC T4 Ga/Gb, Ex tD A20 IP67 T90°C
- Increased Safety (International/Europe)	IECEx/ATEX II 1/2 GD, 1D, 2D, Ex embia IIC T4 Ga/Gb, Ex tD A20 IP67 T90°C
- Increased Safety (Brazil)	INMETRO Br-Ex embia IIC T4
- 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
- Increased Safety/Flameproof (China)	Ex dmbia IIC T4/ Ex embia IIC T4/ DIP A20 TA, T90°C IP67
• Marine	<ul style="list-style-type: none"> • Lloyd's Register of Shipping • ABS Type Approval • Bureau Veritas
Functional safety	SIL-2 suitable in accordance with IEC 61508/61511

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

Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

Selection and Ordering data	Order No.
SITRANS LR250 threaded PVDF antenna C)	7ML5431-0
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).	
Process Connection and Antenna Material Threaded PVDF antenna	4
Process Connection Type Threaded connections PVDF	PA PB PC
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)	
Communication/Output PROFIBUS PA	1
4 ... 20 mA, HART®, startup at < 3.6 mA	2
FOUNDATION Fieldbus™	3
Enclosure/Cable inlet Aluminum, Epoxy painted	0
2 x 1/2" NPT	1
2 x M20x1.5	
Antenna 2" (50 mm) threaded PVDF antenna	R
Approvals General Purpose, CE, CSA, FM, FCC, R&TTE, C-TICK, KC	A
Intrinsically Safe, CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G, Industry Canada FCC	B
Intrinsically Safe, IECEx/ATEX II 1 GD Ex ia IIC T4, Ex tD A20 IP67 T90°C, INMETRO Br-Ex ia IIC T4, CE, R&TTE, C-TICK, KC	C
Non-incendive, CSA/FM Class I, Div. 2, Groups A, B, C, D, FCC	D
Non-sparking, Energy Limited, ATEX II 3G Ex nA/nL IIC T4, CE, R&TTE, C-TICK, KC	E
Increased Safety, IECEx/ATEX II 1/2 GD Ex embia IIC T4, Ex tD A20 IP67 T90°C, INMETRO Br-Ex ia IIC T4, CE, R&TTE, C-TICK, KC ¹⁾	F
Flame Proof, IECEx/ATEX II 1/2 GD Ex dmbia IIC T4, Ex tD A20 IP67 T90°C, INMETRO Br-Ex ia IIC T4, CE, R&TTE, C-TICK, KC ¹⁾	G
Explosion Proof CSA/FM Class I, II, III, Div. 1, Gr. A, B, C, D, E, F, G, Industry Canada FCC ¹⁾	H
Pressure rating Rating per Pressure/Temperature curves in manual	2

¹⁾ Applicable to Communication option 2 only

C) Subject to export regulations AL: N, ECCN: EAR99

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Order 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")]: Measuring-point number/identification (max. 27 characters); specify in plain text	Y15
Test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	C11
Inspection Certificate Type 3.1 per EN 10204	C12
Functional Safety - SIL2 suitable in accordance with IEC 61508/61511 ^{5) 6)}	C20
Namur NE43 compliant, device preset to failsafe <3.6 mA ⁵⁾	N07
Operating Instructions for HART/mA device	Order No.
English	C) 7ML1998-5JE04
German	C) 7ML1998-5JE34
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) 7ML1998-5QX83
Operating Instructions for PROFIBUS PA device	
English	C) 7ML1998-5JF04
German	C) 7ML1998-5JF34
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) 7ML1998-5XE83
Operating Instructions for FOUNDATION Fieldbus device	
English	C) 7ML1998-5KL02
German	C) 7ML1998-5KL32
Note: The Operating Instructions should be ordered as a separate line item on the order.	
Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) 7ML1998-5XN82

Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

Accessories

Handheld programmer, Intrinsically safe, EEx ia	C)	7ML1930-1BK
HART modem/RS-232 (for use with a PC and SIMATIC PDM)	D)	7MF4997-1DA
HART modem/USB (for use with a PC and SIMATIC PDM)	D)	7MF4997-1DB
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART		7ML1930-1AP
One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA and FOUNDATION Fieldbus ⁷⁾		7ML1930-1AQ
FDA approved FKM o-ring for 2" G (BSPP) process connections -28 to +80 °C (-28 to +176 °F)		7ML1830-3AN
SITRANS RD100 Remote display - see Chapter 8		
SITRANS RD200 Remote display - see Chapter 8		
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 8		7ML5750-1AA000

- 1) Available with Enclosure option 1 only
- 2) To be used with Communication options 1 and 3 only. Connector has IP67 rating.
- 3) Available with Approvals option A, B, or C only
- 4) Available with Enclosure option 0 only
- 5) Applicable to Communication option 2 only
- 6) Available with Approval options A to E only
- 7) For use with Communication option 1 and 3 only

- C) Subject to export regulations AL: N, ECCN: EAR99
 D) Subject to export regulations AL: N, ECCN: EAR99H

Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

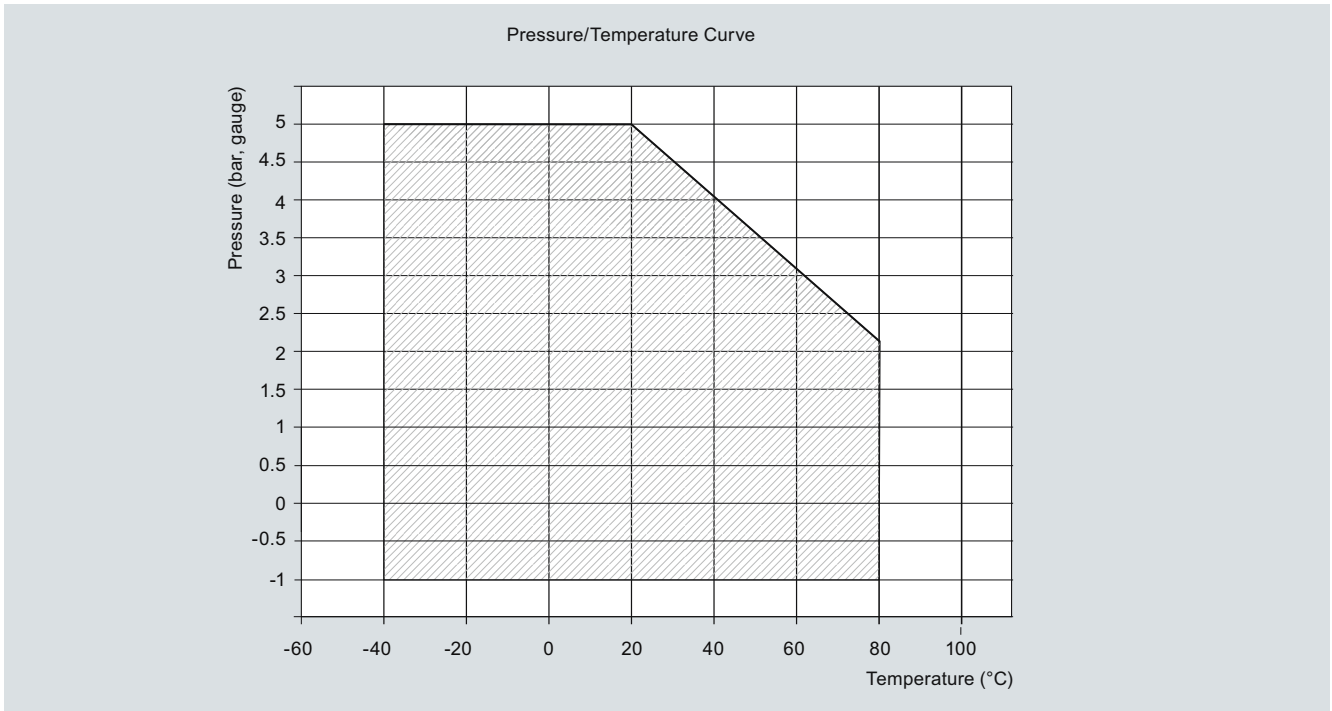
SITRANS LR250 threaded PVDF antenna spare parts

	Order No.
SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA models)	
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588171
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with PROFIBUS PA communication, no process connection	A5E03588253
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with PROFIBUS PA communication, no process connection	A5E03588512
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with PROFIBUS PA communication, no process connection	A5E03589260
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option D, with PROFIBUS PA communication, no process connection	A5E03589262
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 threaded PVDF antenna version enclosures (FOUNDATION Fieldbus models)	
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589266
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589275
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E03589277
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03589280
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E03589281
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E03589283

Order No.

SITRANS LR250 threaded PVDF antenna version enclosures (< 3.6 mA start-up HART models)	
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option A, with HART® communication start-up at < 3.6mA, no process connection	A5E03569747
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option A, with HART® communication start-up at < 3.6mA, no process connection	A5E03586807
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option B, with HART® communication start-up at < 3.6mA, no process connection	A5E03586854
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option C, with HART® communication start-up at < 3.6mA, no process connection	A5E03586887
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option D, with HART® communication start-up at < 3.6mA, no process connection	A5E03586961
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option E, with HART® communication start-up at < 3.6mA, no process connection	A5E03587012
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option F, with HART® communication start-up at < 3.6mA, no process connection	A5E03587132
LR250 threaded PVDF antenna version enclosure with board stack, M20 cable inlet, approval option G, with HART® communication start-up at < 3.6mA, no process connection	A5E03587223
LR250 threaded PVDF antenna version enclosure with board stack, NPT cable inlet, approval option H, with HART® communication start-up at < 3.6mA, 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	A5E03528948

Characteristic curves



SITRANS LR250 PVDF antenna pressure/temperature curve

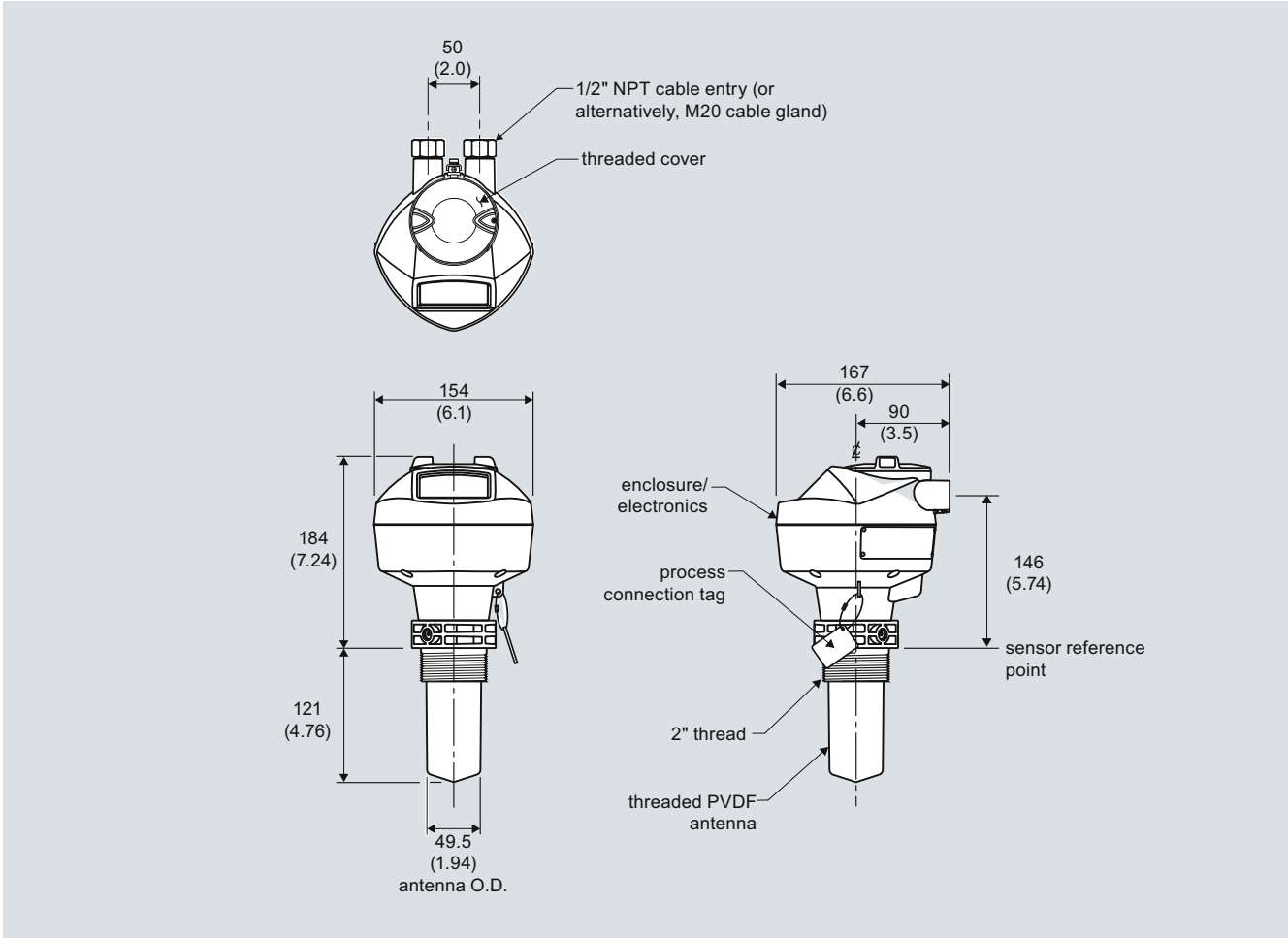
Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

Dimensional drawings

5



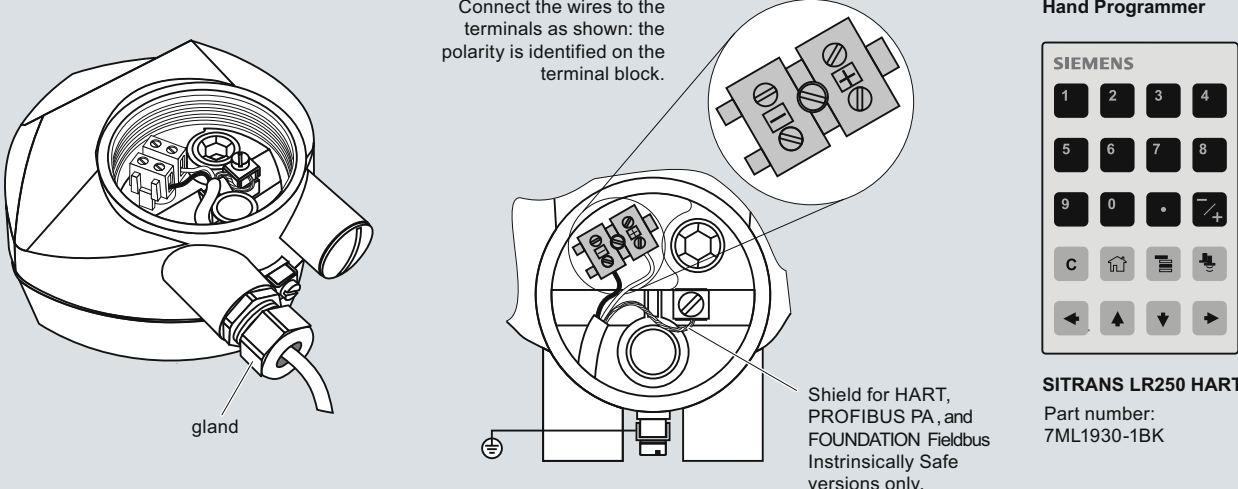
SITRANS LR250 PVDF antenna, dimensions in mm (inch)

Level Measurement

Continuous level measurement - Radar transmitters

SITRANS LR250 threaded PVDF antenna

Schematics



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

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	⏪	⏩	⏴
←	↑	↓	→

SITRANS LR250 HART
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 to 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