

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) or 20 m (66 ft) when used in a stilling pipe.

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 inch (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 inch) from the end of the antenna
- 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 PACTware or Fieldcare via SITRANS DTM.
- Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511
- 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.

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 $dk > 3$ or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$.

- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials and applications requiring functional safety

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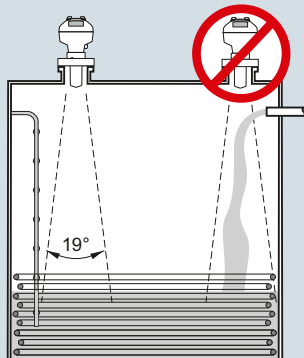
SITRANS LR250 threaded PVDF Antenna

Configuration

Installation

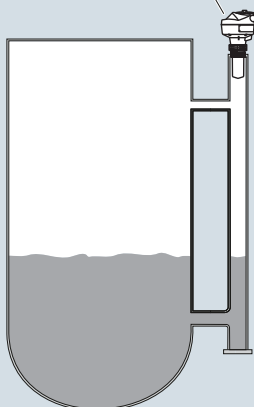
Note:

- 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.



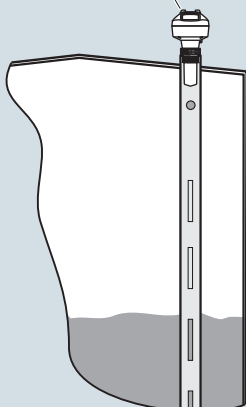
Mounting unit on bypass

Orient front or back of device toward vent.

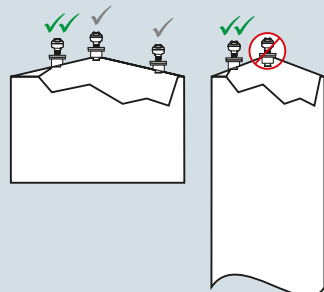


Mounting unit on stilling well

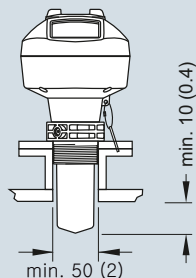
Orient front or back of device toward stillpipe slots.



Mounting unit on vessel



Mounting on a nozzle



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

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Technical specifications

Mode of operation		Power supply	
Measuring principle	Radar level measurement	4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
Frequency	K-band (25.0 GHz)	PROFIBUS PA	<ul style="list-style-type: none"> • 15 mA • per IEC 61158-2
Minimum measuring range	50 mm (2 inch) from end of antenna	FOUNDATION Fieldbus	<ul style="list-style-type: none"> • 20.0 mA • per IEC 61158-2
Maximum measuring range	10 m (32.8 ft) or 20 m (66 ft) when used in a stilling pipe with $dk \geq 1.6$	Certificates and approvals	
Output		General	
HART	Version 5.1	Radio	
<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 	CSA _{US/C} , CE, FM, RCM FCC, Industry Canada and Europe ETSI EN 302-372, RCM	
PROFIBUS PA	Profile 3.1	Hazardous	
<ul style="list-style-type: none"> • Function blocks 	2 Analog Input (AI)	<ul style="list-style-type: none"> • Explosion Proof (Brazil) 	
FOUNDATION Fieldbus	H1	<ul style="list-style-type: none"> • Increased Safety (Brazil) 	
<ul style="list-style-type: none"> • Functionality • Version • Function blocks 	Basic or LAS ITK 5.2.0 2 Analog Input (AI)	<ul style="list-style-type: none"> • Intrinsically Safe (Brazil) 	
Performance (according to reference conditions IEC60770-1)		<ul style="list-style-type: none"> • Explosion Proof (Canada/USA) 	
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) 	<ul style="list-style-type: none"> • Intrinsically Safe (Canada/USA) 	
Influence of ambient temperature	<0.003 %/K	<ul style="list-style-type: none"> • Intrinsically Safe (China) 	
Rated operating conditions		<ul style="list-style-type: none"> • Non-incendive (Canada/USA) 	
Installation conditions		<ul style="list-style-type: none"> • Flame Proof/Increased Safety (China) 	
Location	Indoor/outdoor	<ul style="list-style-type: none"> • Intrinsically Safe (China) 	
Ambient conditions (enclosure)		<ul style="list-style-type: none"> • Non-sparking (China) • Intrinsically Safe (Europe) 	
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)	<ul style="list-style-type: none"> • Non-sparking/Energy Limited (Europe) • Flame Proof (International/Europe) 	
Installation category	I	<ul style="list-style-type: none"> • Increased Safety (International/Europe) 	
Pollution degree	4	<ul style="list-style-type: none"> • Intrinsically Safe (International) 	
Medium conditions		<ul style="list-style-type: none"> • Explosion Proof (Russia) • Increased Safety (Russia) • Intrinsically Safe (Russia) 	
Dielectric constant ϵ_r	≥ 3 (1.6 in stillpipe)	Programming	
Process temperature	-40 ... +80 °C (-40 ... +176 °F) at process connection (Is suitable for CIP at 120 °C for 1/2 hr max.)	Intrinsically Safe Siemens handheld programmer	
Process pressure	Up to 5 bar g (72 psi g) temperature dependent. See Pressure/Temperature curves for more information	<ul style="list-style-type: none"> • Approvals for handheld programmer 	
Design		Infrared receiver	
Enclosure		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	
<ul style="list-style-type: none"> • Material 	Aluminum, polyester powder-coated	HART communicator 375/475	
<ul style="list-style-type: none"> • Cable inlet 	2 x M20x1.5 or 2 x 1/2" NPT	<ul style="list-style-type: none"> • SIMATIC PDM • Emerson AMS • SITRANS DTM (for connection into FDT, such as PACTware or Fieldcare) 	
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP67, IP68	Graphic local user interface including quick start wizard and echo profile displays	
Weight	approximately 3.3 kg (7.27 lb)		
Display (local)	Graphic local user interface including quick start wizard and echo profile display		
Antenna			
<ul style="list-style-type: none"> • Material • Dimensions (nominal sizes) 	PVDF (Polyvinylidene fluoride) 2 inch (48 mm)		
Process connections		Handheld communicator PC	
Process connection	2" NPT [(Taper), ASME B1.20.1] 2" [(BSPT), EN 10226] 2" [(BSPP), EN ISO 228-1]	Display (local)	

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Selection and Ordering data	Article No.	Selection and Ordering data	Order code
SITRANS LR250 threaded PVDF antenna 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 20m (66ft) when used in a stilling pipe.	7ML5431- 0 -	Further designs Please add "-Z" to Article No. and specify Order code(s).	
Process Connection and Antenna Material Threaded PVDF antenna	4	Plug M12 with mating Connector ¹⁾²⁾³⁾	A50
Process Connection Type Threaded connections PVDF		Plug 7/8" with mating Connector ²⁾³⁾⁴⁾	A55
2" NPT (ASME B1.20.1) (tapered thread)	PA	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
R 2" [(BSPT), EN 10226-1] (tapered thread)	PB	Manufacturer's test certificate: M to DIN 55350, Part 18 and to ISO 9000	C11
G 2" [(BSPP), EN ISO 228-1] (parallel thread)	PC	Inspection Certificate Type 3.1 per EN 10204	C12
Communication/Output		Functional Safety (SIL 2). Device suitable for use in accordance with IEC 61508 and IEC 61511 ⁵⁾⁶⁾	C20
PROFIBUS PA	1	Namur NE43 compliant, device preset to failsafe < 3.6 mA ⁵⁾	N07
4 ... 20 mA, HART, startup at < 3.6 mA	2		
FOUNDATION Fieldbus	3		
Enclosure/Cable inlet		Operating Instructions for HART/ mA device	Article No.
Aluminum, Epoxy painted		English	A5E32220602
2 x 1/2" NPT	0	German	A5E32376088
2 x M20x1.5	1	Note: The Operating Instructions should be ordered as a separate line item on the order.	
Antenna		Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E31997170
2 inch(50 mm) threaded PVDF antenna	R	Operating Instructions for PROFIBUS PA device	
Approvals		English	A5E32221386
General Purpose, CE, CSA, FM, FCC, R&TTE, RCM	A	German	A5E32376094
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	Note: The Operating Instructions should be ordered as a separate line item on the order.	
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, R&TTE, RCM	C	Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E31997267
Non-incendive: CSA/FM Class I, Div. 2, Groups A, B, C, D T5, FCC, Industry Canada	D	Operating Instructions for FOUNDATION Fieldbus device	
Non Sparking: ATEX II 3G Ex nA IIC T4 Gc, CE, R&TTE, RCM	E	English	A5E32221411
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, R&TTE, RCM ¹⁾	F	German	A5E32376112
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, R&TTE, RCM ¹⁾	G	Note: The Operating Instructions should be ordered as a separate line item on the order.	
Explosion proof: CSA/FM Class I, II and III, Div.1, Groups A, B, C, D, E, F, G, FCC, Industry Canada ¹⁾	H	Multi-language Quick Start manual This device is shipped with the Siemens Milltronics manual DVD containing the ATEX Quick Start and Operating Instructions library.	A5E31993945
Non Sparking: NEPSI Ex nA IIC T4 Gc	K		
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 ¹⁾	M		
Increased Safety: NEPSI Ex e ia mb IIC T4 Ga/Gb, Ex iaD 20 T90 IP67 DIP A20 T _A 90 °C ¹⁾	N		
Pressure rating Rating per Pressure/Temperature curves in manual	2		

¹⁾ Applicable to Communication option 2 only

● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.

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Accessories

Handheld programmer, Intrinsically safe, EEx ia

7ML1930-1BK

HART modem/RS 232
(for use with a PC and SIMATIC PDM)

7MF4997-1DA

HART modem/USB
(for use with a PC and SIMATIC PDM)

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 Fieldbus²⁾

7ML1930-1AQ

FDA approved FKM o-ring for 2" G (BSPP) process
connections -28 ... +80 °C (-28 ... +176 °F)

7ML1830-3AN

SITRANS RD100 Remote display - see Chapter 7

SITRANS RD200 Remote display - see Chapter 7

SITRANS RD500 web, datalogging, alarming,
ethernet, and modem support for instrumentation -
see Chapter 7

**7ML5750-
1AA00-0**

For applicable back up point level switch -
see point level section on page 4/9

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 Approval options A and B. Available with approval option C
for use on intrinsically safe applications only. Not rated for dust Ex.

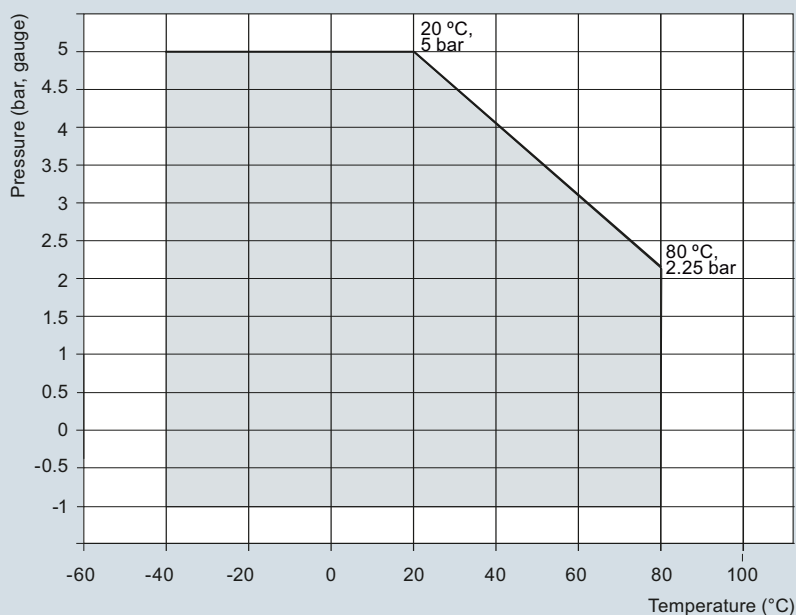
⁴⁾ Available with Enclosure option 0 only

⁵⁾ Available with communication option 2 only

⁶⁾ Available with approval options A ... E only

Characteristic curves

Pressure/Temperature Curve



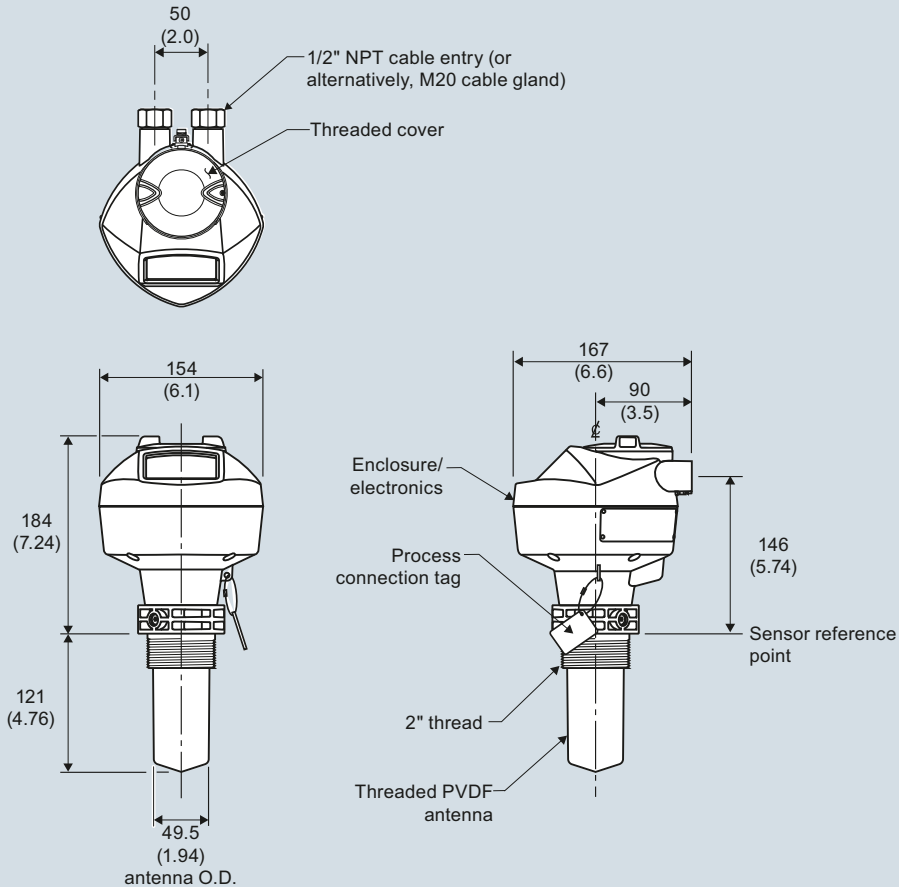
SITRANS LR250 PVDF antenna pressure/temperature curve

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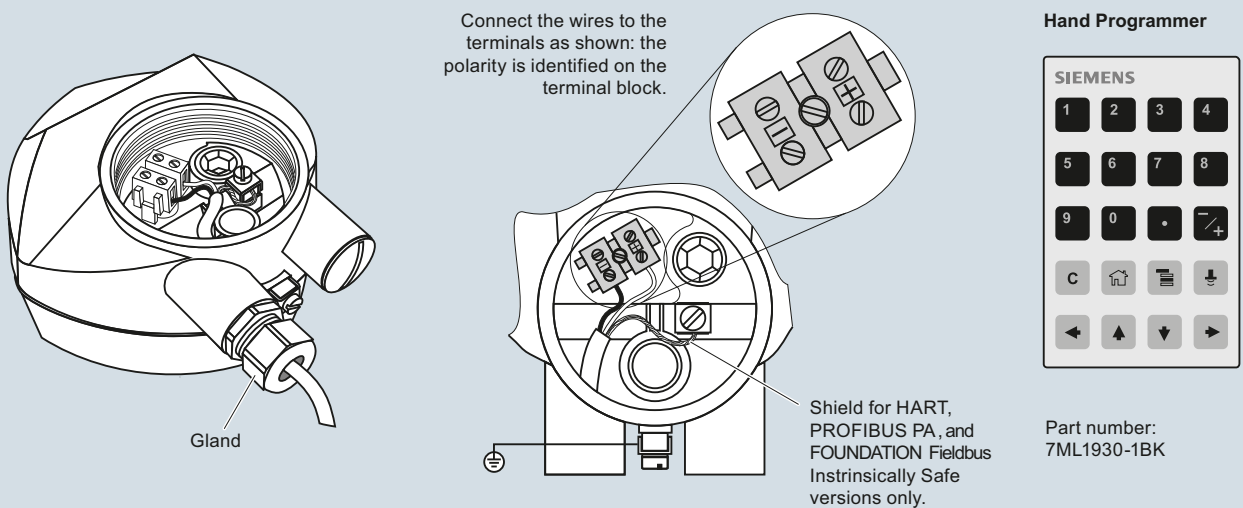
SITRANS LR250 threaded PVDF Antenna

Dimensional drawings



SITRANS LR250 PVDF antenna, dimensions in mm (inch)

Schematics



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.

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SITRANS LR250 threaded PVDF Specials

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	Article 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 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589266
LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589275
LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E03589277
LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03589280
LR250 enclosure with board stack, NPT cable inlet, approval option D, with FOUNDATION Fieldbus communication, no process connection	A5E03589281
LR250 enclosure with board stack, M20 cable inlet, approval option E, with FOUNDATION Fieldbus communication, no process connection	A5E03589283

SITRANS LR250 threaded PVDF Specials

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