

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 50 mm (2 inch) process connection/antenna allow for easy mounting in nozzles
- 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
- Suitable for use in Safety Related Systems in accordance with IEC 61508/61511 (SIL-2)
- 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 $dk \geq 1.6$.

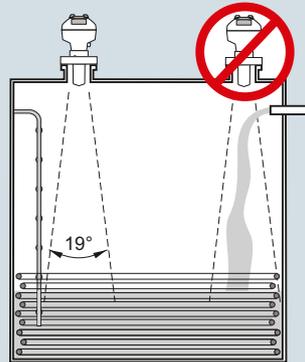
- Key Applications: liquid bulk storage tanks, process vessels with agitators, vaporous liquids, temperatures to 80 °C (176 °F), corrosive and aggressive materials and applications requiring functional safety

Configuration

Installation

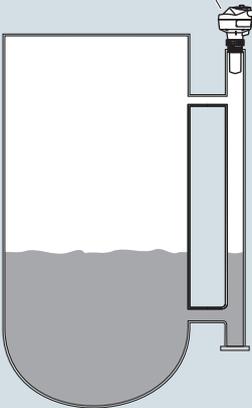
Note:

- 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.



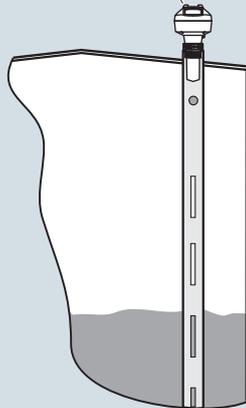
Mounting on bypass

Orient front or back of device toward vent.

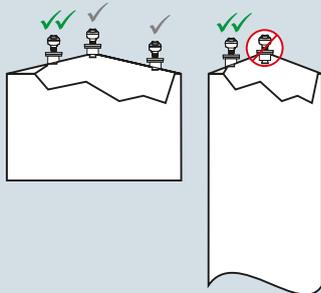


Mounting on stilling well

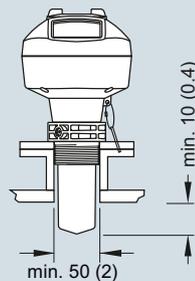
Orient front or back of device toward stillpipe slots.



Mounting 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 $dk \geq 1.6$		
Output		Certificates and approvals	
HART	Version 5.1	General	CSA _{US/C} , CE, FM, NE 21, RCM
<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 	Radio	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) Increased Safety (Brazil) Intrinsically Safe (Brazil) Explosion Proof (Canada/USA) Intrinsically Safe (Canada/USA) Non-incendive (Canada/USA) Flame Proof/Increased Safety (China) Intrinsically Safe (China) Non-sparking (China) Intrinsically Safe (Europe) Non-sparking/Energy Limited (Europe) Flame Proof (International/Europe) Increased Safety (International/Europe) Intrinsically Safe (International) Explosion Proof (Russia/Kazakhstan) Increased Safety (Russia/Kazakhstan) Intrinsically Safe (Russia/Kazakhstan) Marine 	INMETRO Ex d ia mb 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 INMETRO Ex ia IIC T4 Ga, Ex ia ta IIIC T100 °C Da CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4 CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III T4 CSA/FM Class I, Div. 2, Groups A, B, C, D T5 Ex d ia mb IIC T4 Ga/Gb, Ex e ia mb IIC T4 Ga/Gb, Ex ia D 20 T90 IP67 DIP A20 T _A 90 °C Ex ia IIC T4 Ga, Ex ia D 20 T90 IP67 DIP A20 T _A 90 °C NEPSI Ex nA IIC T4 Gc ATEX II 1G Ex ia IIC T4 Ga ATEX II 1D Ex ia ta IIC T100 °C Da ATEX II 3G Ex nA IIC T4 Gc IECEx/ATEX II 1/2 GD, 1D, 2D, Ex d mb ia IIC T4 Ga/Gb, Ex ia ta IIC T100 °C Da IECEx/ATEX II 1/2 GD, 1D, 2D, Ex e mb ia IIC T4 Ga/Gb, Ex ia ta IIIC T100 °C Da IECEx/ATEX II 1 G Ex ia IIC T4 Ga, IECEx/ATEX II 1D Ex ia ta IIC T100 °C Da EAC Ex d EAC Ex e EAC Ex ia <ul style="list-style-type: none"> Lloyd's Register of Shipping ABS Type Approval Bureau Veritas
FOUNDATION Fieldbus	H1	Functional Safety	SIL-2 suitable in accordance with IEC 61508/61511
<ul style="list-style-type: none"> Functionality Version Function blocks 	Basic or LAS ITK 5.2.0 2 Analog Input (AI)		
Performance (according to reference conditions IEC60770-1)		Programming	
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) 	Intrinsically Safe Siemens handheld programmer	Infrared receiver
Influence of ambient temperature	< 0.003 %/K	<ul style="list-style-type: none"> Approvals for handheld programmer 	IS model: ATEX II 1 GD Ex ia IIC T4 Ga Ex ia D 20 T135 °C T _a = -20 ... +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
Rated operating conditions		Handheld communicator	HART communicator 375/475
Installation conditions		PC	<ul style="list-style-type: none"> SIMATIC PDM Emerson AMS SITRANS DTM (for connection into FDT such as PACTware or Fieldcare)
Location	Indoor/outdoor	Display (local)	Graphic local user interface including quick start wizard and echo profile displays
Medium conditions			
Installation conditions (enclosure)			
Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)		
Installation category	I		
Pollution degree	4		
Dielectric constant ϵ_r	≥ 3 (1.6 in stillpipe)		
Process temperature	-40 ... +80 °C (-40 ... +176 °F) at process connection (Is suitable for CIP at 120 °C for 1/2 hr max.)		
Process pressure	Up to 5 bar g (72 psi g) temperature dependent. See Pressure/Temperature curves for more information		
Design			
Enclosure			
<ul style="list-style-type: none"> Material Cable inlet 	Aluminum, polyester powder-coated 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	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			
Process connection	2" NPT [(Taper), ASME B1.20.1] 2" [(BSPT), EN 10226] 2" [(BSPP), EN ISO 228-1]		

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Selection and Ordering data

Article No.

Compact Operating Instructions for FOUNDATION Fieldbus device

English, French, German, Spanish, Italian, Dutch, Danish, Finnish, Greek, Portuguese (Portugal), Swedish

A5E33472700

English, Bulgarian, Czech, Estonian, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovakian, Slovenian

A5E33472738

English, Portuguese (Brazil), Chinese

A5E34046626

Note: The Operating Instructions should be ordered as a separate line item on the order.

All literature is available to download for free, in a range of languages, at <http://www.siemens.com/processinstrumentation/documentation>

This device is shipped with the Siemens Level and Weighing manual DVD containing the ATEX Compact Operating Instructions and Operating Instructions library.

Selection and Ordering data

Article No.

Accessories

Handheld programmer, Intrinsically safe, EEx ia HART modem/USB (for use with a PC and SIMATIC PDM)

7ML1930-1BK

7MF4997-1DB

One metallic cable gland M20 x 1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART

7ML1930-1AP

One metallic cable gland M20 x 1.5, 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, loop powered display - see Chapter 7

7ML5741-...

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

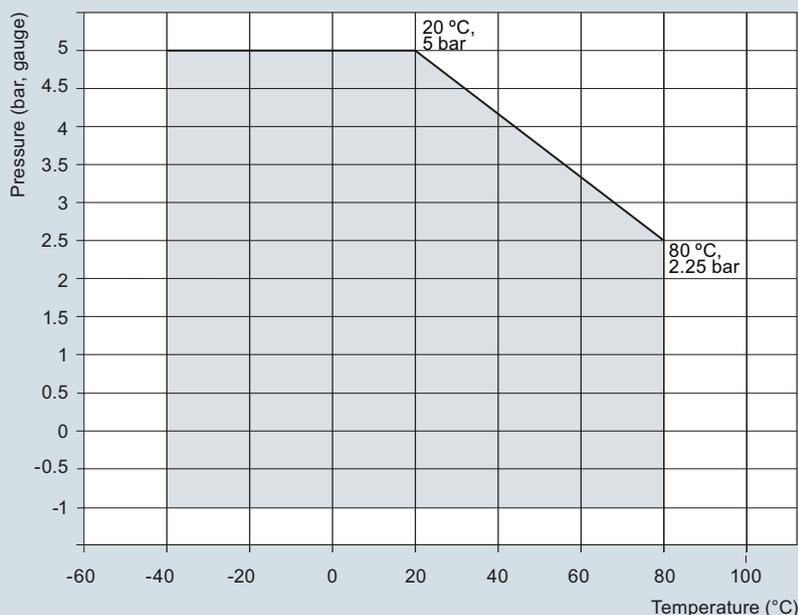
7ML5750-...

For applicable back up point level switch - see point level measurement section

- 1) Available 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, B, C, D, E, K, and L only

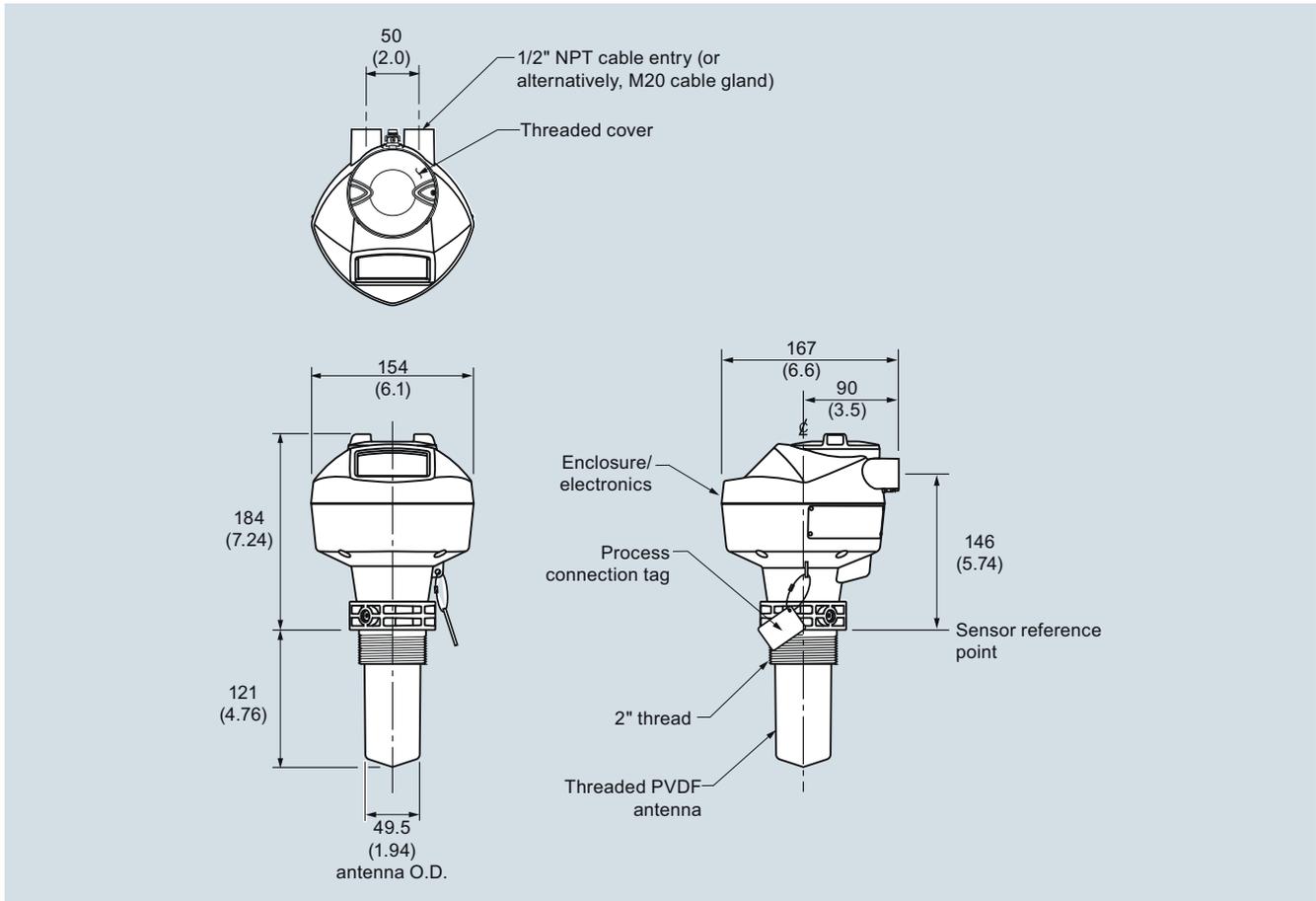
Characteristic curves

Pressure/Temperature Curve



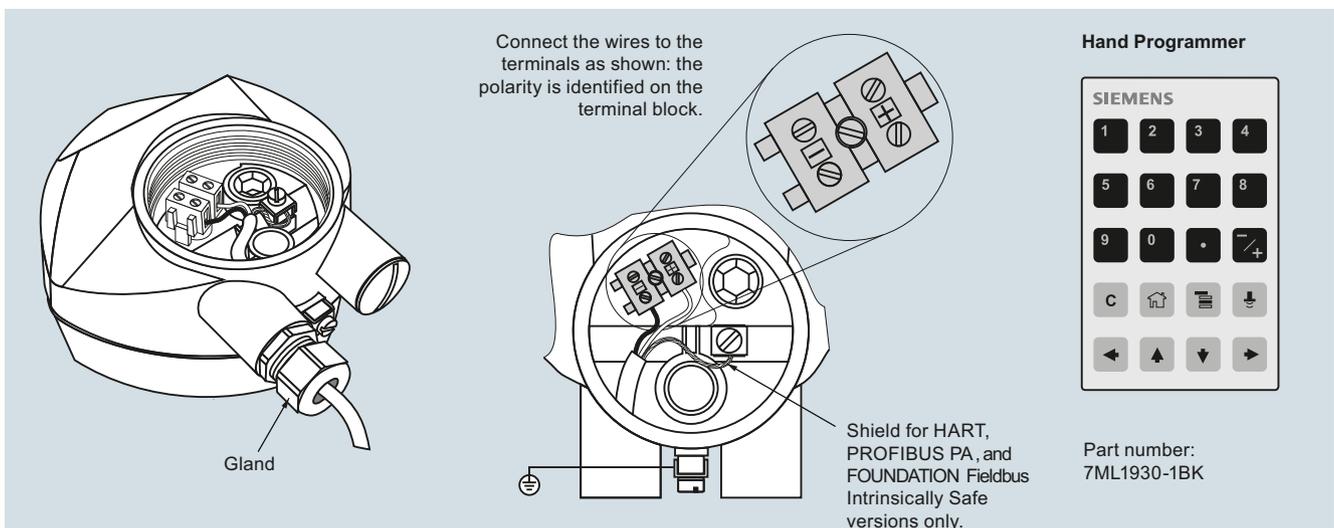
SITRANS LR250 PVDF Antenna pressure/temperature curve

Dimensional drawings



SITRANS LR250 PVDF Antenna, dimensions in mm (inch)

Schematics



Notes:

- 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.
- All field wiring must have insulation suitable for rated input voltages.
- Use shielded twisted pair cable (14 ... 22 AWG) for HART version.
- 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

Selection and ordering data

SITRANS LR250 threaded PVDF Specials		SITRANS LR250 threaded PVDF Specials	
	Article No.		Article No.
SITRANS LR250 threaded PVDF antenna version enclosures (PROFIBUS PA models)		SITRANS LR250 threaded PVDF antenna version enclosures (< 3.6 mA start-up HART 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 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 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, 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, NPT 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 threaded PVDF antenna kits	
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589266	Antenna kit 2" NPT threaded PVDF	A5E03528941
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option A, with FOUNDATION Fieldbus communication, no process connection	A5E03589275	Antenna kit 2" R (BSPT) threaded PVDF	A5E03528943
SITRANS LR250 enclosure with board stack, NPT cable inlet, approval option B, with FOUNDATION Fieldbus communication, no process connection	A5E03589277	Antenna kit 2" G (BSPP) threaded PVDF	A5E03528947
SITRANS LR250 enclosure with board stack, M20 cable inlet, approval option C, with FOUNDATION Fieldbus communication, no process connection	A5E03589280	Kit of hardware parts for LR250 threaded PVDF antenna: consists of O-rings, screws, wavewasher, and loctite	A5E03528948
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		