

Overview



SITRANS LR500 series are 80 GHz radar level transmitters for continuous monitoring of liquids, slurries, and solids in storage and process vessels including high temperature and pressure, to a range of 120 m (393 ft).

Benefits

- Continuous level measurement up to 120 m (393 ft)
- Easy installation and simple startup
- Programming using 4-button HMI, mobile IQ app using Bluetooth, or SIMATIC PDM
- IQ Guard for health monitoring, NE107 diagnostic messaging and quality verification report
- Communication using HART 7
- Graphical HMI with echo profile display and backlight
- Near Range Suppression for automatic detection and suppression of material build up noise
- Process Intelligence signal processing
- 1 mm accuracy in accordance with IEC 62828
- Suitable for API 2350
- Auto False Echo Suppression for fixed obstruction avoidance
- Low power consumption with EPD (environmental product declaration)
- Optional SLOD (second line of defense) for toxic material safety
- 100 000 points of data logging memory for process control analysis and optimization

Application

SITRANS LR500 series radar level transmitters include a graphical local user interface that improves setup and operation by including an intuitive Quick Start Wizard, and echo profile displays for diagnostic support.

The 80 GHz frequency creates a narrow, focused beam allowing for smaller antenna and decreasing sensitivity to obstructions.

SITRANS LR500 series radar level transmitters measure superbly on low dielectric media with high accuracy and repeatability. A very fast measurement response is ideal for process control applications.

- Key Applications: SITRANS LR500 Radar level transmitters are available with four antenna types for level measurement of liquid, slurry, and solid materials:

- Threaded lens antenna
- Flanged encapsulated antenna
- Polymeric horn antenna
- Flanged lens antenna

Selection and ordering data

	Article No.
SITRANS LR500 Series Continuous, non-contact, 120 m (394 ft) range, for liquids, slurries, and solids in storage and process vessels, including high temperature and pressure.	
Antenna versions	
Threaded lens antenna	7ML751-.....
Flanged encapsulated antenna	7ML753-.....
Polymeric horn antenna	7ML755-.....
Flanged lens antenna	7ML758-.....

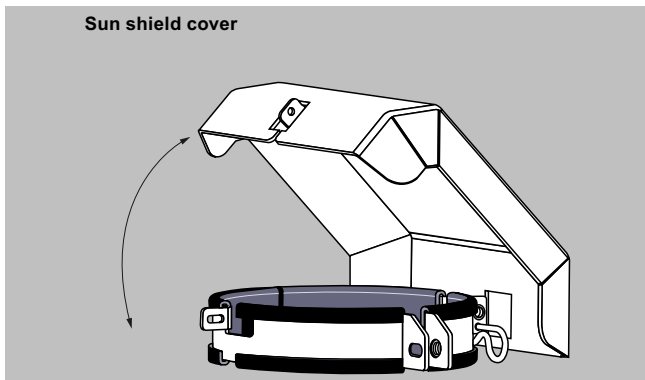
SITRANS LR500 series

Technical specifications

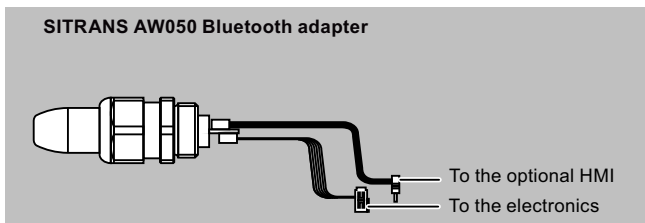
SITRANS LR500 Series	
Mode of operation	
Measuring principle	Radar level measurement
Frequency	W band (80 GHz nominal)
Minimum detectable distance	0 mm from end of the antenna (antenna dependent, reference conditions)
Maximum measuring range	120 m (394 ft), antenna dependent
Output	
HART	Version 7
• Analog output	4 ... 20 mA
• Fail-safe	Programmable as high, low, or hold (loss of echo)
• Update time	Up to 3 measurements per second
Performance (according to reference conditions IEC 62828)	
Maximum measured error	1 mm (0.039 inch)
Influence of ambient temperature	Less than 3 mm/10 K and maximum ± 5 mm over full range from $-40 \dots +80$ °C ($-40 \dots +176$ °F) API 3.1B Inventory
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions (enclosure)	
• Ambient temperature	$-40 \dots +80$ °C ($-40 \dots +176$ °F)
• Storage temperature	$-40 \dots +80$ °C ($-40 \dots +176$ °F)
• Installation category	I
• Pollution degree	4
Medium conditions	
Dielectric constant ϵ_r	> 1.6 , antenna and application dependent
Process temperature	$-196 \dots 250$ °C ($-321 \dots 482$ °F), antenna and seal dependent
Process pressure	Up to 40 bar g (580 psi g), process connection and temperature dependent. Note: Pipe applications are not recommended. For exceptions, contact Siemens technical support.
Design	
Weight	Range from 2 ... 20 kg (4.4 ... 44.1 lb), version dependent
Enclosure	
• Material	Aluminum, polyester powder-coated, C5 corrosion equivalent
• Cable inlet	2 x M20 x 1.5 or 2 x ½" NPT
Degree of protection	Type 4X, Type 6, IP66, IP68
Display (local)	Optional graphical HMI with NE107 diagnostic data, echo profile display and back-light
Trend Logging	100 000 points, up to 8 variables including level, distance, space, volume, signal strength, confidence, temperature
Limit Monitoring	Min/Max of 3 variables with count function
Terminal voltage	Available from HMI or EDD
Asset management	Diagnostic logbook, parameter change logbook
Power supply	
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 800 Ω
Certificates and approvals	
Ordinary locations	FM, cCSA _{US} , CE
Radio	CE, FCC, IC, RCM

Technical specifications (continued)

Hazardous areas	ATEX, IECEx, Intrinsically Safe Ex ia IIC T6 Ga ATEX, IECEx, Intrinsically Safe Ex ia IIIC Txx°C Da ATEX, IECEx, Dust Ignition proof Ex ta IIIC Txx°C Da ATEX, IECEx, CSA, FM, NEPSI, PESO, INMETRO EX II 1 GD EX ia IIC T6 ... T4 Ga Ex ia IIIC T ₂₀₀ 95 °C Da Ta Ex ta IIIC T ₂₀₀ 137 °C Da CSA/FM Intrinsically Safe Ex ia Class I, II, III, Div 1, Groups A, B, C, D, E, F, G T6 CSA/FM Non-Incendive Class I, Div. 2, Groups A, B, C, D T6
Materials	3.1 of EN 10204, NACE MR 0175 and MR 0103, 2.2 of EN 10204, PMI
Pressure	CRN, PED
Canadian Registration Number (CRN) Note: CRN is not applicable for process temperatures below -40 °C (-40 °F).	
• British Columbia	0F7424.1
• Alberta	0F22399.2
• Saskatchewan	0F7424.13
• Manitoba	0F7424.14
• Ontario	0F7424.15
• Quebec	0F07424.16
• Atlantic Canada and Territories	0F1384.9870YNT
Materials	3.1 of EN 10204, NACE MR 0175 and MR 0103, 2.2 of EN 10204, PMI
Programming	
PC	SIMATIC PDM
Display (local)	Optional graphical HMI with NE107 diagnostic data, echo profile display and back-light
SITRANS mobile IQ app	Optional AW050 Bluetooth module, for non-hazardous applications only

Options**Sun shield cover**

SITRANS LR500 series sunshield

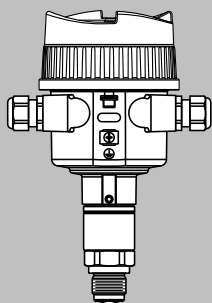
SITRANS AW050 Bluetooth adapter

SITRANS AW050 Bluetooth adapter

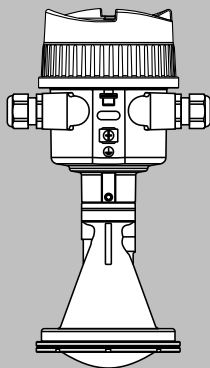
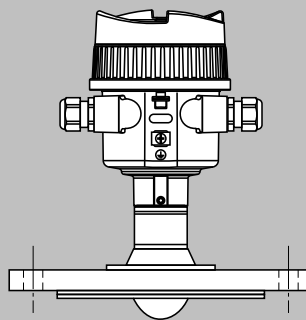
SITRANS LR500 series

Dimensional drawings

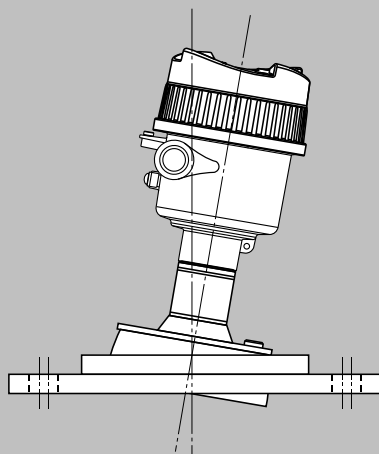
SITRANS LR500 series antenna versions

Thread with integrated
antenna system

Plastic horn antenna

Flange with encapsulated
antenna system

Flange with lens antenna



SITRANS LR500 Series antenna versions

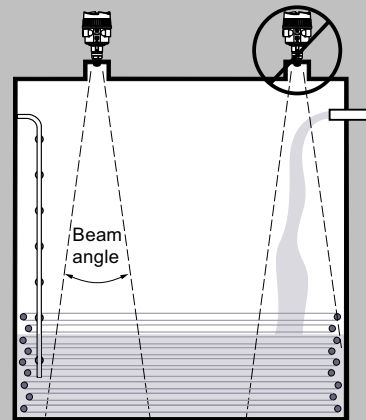
Overview



SITRANS LR510 threaded lens antenna provides continuous monitoring of liquids, including corrosive liquids, and slurries to a range of 30 m (98 ft). The small process connection makes it ideal for applications with challenging mounting conditions.

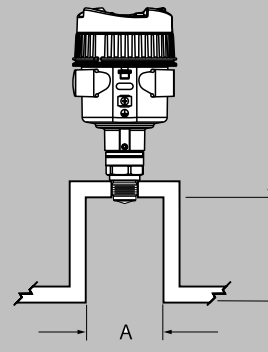
Configuration

Installation of SITRANS LR510



Size	Beam angle
G $\frac{3}{4}$ " $\frac{3}{4}$ " NPT	14°
G1" 1" NPT	10°
G1 $\frac{1}{2}$ " 1 $\frac{1}{2}$ " NPT (+250°C)	10°
G1 $\frac{1}{2}$ " 1 $\frac{1}{2}$ " NPT (+150°C, +200°C)	7°

SITRANS LR510 threaded connection



Nozzle diameter "A"		Nozzle length "B"	
40 mm	1 1/2"	≤ 150 mm	≤ 5.9"
50 mm	2"	≤ 200 mm	≤ 7.9"
80 mm	3"	≤ 300 mm	≤ 11.8"
100 mm	4"	≤ 400 mm	≤ 15.8"
150 mm	6"	≤ 600 mm	≤ 23.6"

SITRANS LR510 Nozzle installation

SITRANS LR510

Selection and ordering data

SITRANS LR510 threaded connection Continuous, non-contact, 30 m (98 ft) range, for liquids and slurries.		Article No. 7ML751 • - • • • • 0 - • • • •											
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.													
Communications													
4 ... 20 mA HART			0										
Sealing material of the antenna/process connection													
PEEK / FKM -40 ... +150 °C (-40 ... +302 °F)					0								
PEEK / FKM -40 ... +200 °C (-40 ... +392 °F)					1								
PEEK / FFKM -20 ... +150 °C (-4 ... +302 °F)					2								
PEEK / FFKM -20 ... +250 °C (-4 ... +482 °F)					3								
Process connection type and material													
Thread, DIN 3852-2-A-G¾", 316/316L						A	A						
Thread, DIN 3852-2-A-G¾", Alloy C22 (2.4602)						A	B						
Thread, ASME B1.20.1, ¾" NPT, 316/316L						A	C						
Thread, ASME B1.20.1, ¾" NPT, Alloy C22 (2.4602)						A	D						
Thread, DIN 3852-2-A-G1", 316/316L						B	A						
Thread, DIN 3852-2-A-G1", Alloy C22 (2.4602)						B	B						
Thread, ASME B1.20.1, 1" NPT, 316/316L						B	C						
Thread, ASME B1.20.1, 1" NPT, Alloy C22 (2.4602)						B	D						
Thread, DIN 3852-2-A-G1-½", 316/316L						C	A						
Thread, DIN 3852-2-A-G1-½", Alloy C22 (2.4602)						C	B						
Thread, ASME B1.20.1, 1-½" NPT, 316/316L						C	C						
Thread, ASME B1.20.1, 1-½" NPT, Alloy C22 (2.4602)						C	D						
Second line of defence (SLOD) gas-tight seal													
SLOD not included							0						
SLOD included							1						
Enclosure													
Single compartment enclosure									4				
Type of protection													
Non Ex - General purpose										A			
Intrinsically safe Ex ia / IS (Class I, II, III, Division 1) ¹⁾										B			
Non-incendive (Class I, Division 2) ²⁾										D			
Dust Ignition proof, Ex t / DIP (Class II, Division 1) ¹⁾⁴⁾										M			
Electrical connection													
M20											F		
½" NPT											K		
Local HMI													
None, with blind lid												0	
Included, with blind lid												1	
Included, with window lid												3	

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Pressure test certificates	
Pressure test certificate inspection certificate EN 10204-3.1 (AD2000-A4 / EN12266-1) ⁸⁾	C01
Pressure test certificate inspection certificate EN 10204-3.1 (ASME B31.1 / B31.3) ⁹⁾	C02
Certificates	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000 - performance	C11
Inspection certificate EN 10204-3.1, material	C12

Selection and Ordering data	Order code
Inspection certificate EN 10204-3.1, material with NACE MR0175 and MR0103	C13
Test report EN 10204-2.2, material	C14
Test report EN 10204-3.1, PMI test - XRF (X-Ray fluorescence)	C15
Tagging	
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97 inch)]	
Tag (device parameters, max. 27 characters), plate, stainless steel 304/1.4301	Y15
Regional Ex Approval ³⁾⁵⁾	
NEPSI (China)	E27
ATEX (Europe), IECEx (International)	E47

Selection and ordering data (continued)

Selection and Ordering data	Order code
CSA (Canada) and FM (USA)	E48
ATEX (Europe), IECEx (International), CSA (Canada), and FM (USA)	E49

Selection and ordering data	Article No.
Operating instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	
Sun shield cover	A5E52107153
AW050 Bluetooth module kit (General purpose only), M20	A5E51857118
AW050 Bluetooth module kit (General purpose only), 1/2" NPT	A5E52095588
Lightning Arrestor, M20	7MF7903-7AB
Lightning Arrestor, 1/2" NPT	7MF7903-7AC
Polypropylene adapter flange, 2"/DN50, universal, 1.5" NPT	A5E50868980
Polypropylene adapter flange, 2"/DN50, universal, 1.5" BSPT	A5E50868982
Polypropylene adapter flange, 3"/DN80, universal, 1.5" NPT	A5E50868988
Polypropylene adapter flange, 3"/DN80, universal, 1.5" BSPT	A5E50868998
Polypropylene adapter flange, 4"/DN100, universal, 1.5" NPT	A5E50869003
Polypropylene adapter flange, 4"/DN100, universal, 1.5" BSPT	A5E50869005
<i>Note: other polypropylene adapter flange sizes available via PVR request.</i>	
SIMATIC RTU3010C compact, remote data manager with alarming	6NH3112-0BA00-0-XX0
SIMATIC RTU3030C compact, remote data manager with alarming	6NH3112-3BA00-0-XX0

Selection and ordering data	Article No.
HART modem with USB interface	7MF4997-1DC
Intrinsically Safe barrier	7NG4124-1AA00
SITRANS RD100, loop powered display - see Chapter 7	7ML5741-.....
SITRANS RD150, remote digital display for 4 to 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-.....
SITRANS LT500, a versatile, single and multi-vessel level monitor/controller for virtually any application in a wide range of industries.	7ML60-.....
Spare parts	
3/4" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276254
1" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276255
1-1/2" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276256
Electronic module, LR510, LR530, <DN80 / 3 inch, mA/HART	A5E53276263
LR500 lid with window, Non-Exd/XP	A5E53276250
LR500 no window, Non-Exd/XP	A5E53276252
HMI graphical display, with interconnection cable	A5E53276247

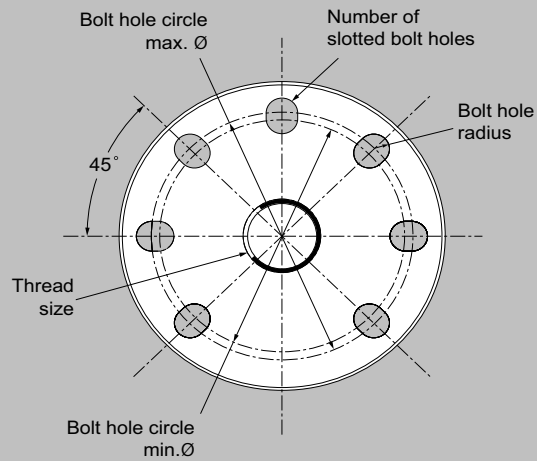
- ¹⁾ Available only with one of -Z Regional hazardous Approval options.
- ²⁾ Available only with -Z Regional hazardous Approval option E48.
- ³⁾ Not available with Type of Protection option A.
- ⁴⁾ Available only with Second line of defence gas tight seal option 1.
- ⁵⁾ Only one regional hazardous approval option can be selected.
- ⁸⁾ Available only with Process connection type and material options AA, AB, BA, BB, CA, and CB.
- ⁹⁾ Available only with Process connection type and material options AC, AD, BC, BD, CC, and CD.

SITRANS LR510

Technical specifications

SITRANS LR510	
Mode of operation	
Recommended measuring range	• G$\frac{3}{4}$", $\frac{3}{4}$" NPT: 10 m (32.81 ft) • G1", 1" NPT: 20 m (65.62 ft) • G1$\frac{1}{2}$", 1$\frac{1}{2}$" NPT (+150 °C, +200 °C): 30 m (98 ft)
Medium conditions	
Process temperature	• PEEK lens, FKM seal: -40 ... +150 °C (-40 ... +302 °F) • PEEK lens, FKM seal, thermal extension: -40 ... +200 °C (-40 ... +392 °F) • PEEK lens, FFKM seal: -20 ... +150 °C (-4 ... +302 °F) • PEEK lens, FFKM seal, thermal extension: -20 ... +250 °C (-4 ... 482 °F)
Process pressure	Up to 40 bar g (580 psi g), process connection and temperature dependent. See Pressure/Temperature curves for more information.
Design	
Materials	
• Threaded process connection	316L stainless steel or optional Alloy C22 (2.4602)
• Antenna lens	PEEK
• Antenna seal	FKM or FFKM (Kalrez 6375)
Process connection	• 3/4" thread, DIN3852-2-A, PN40 • 3/4" NPT, ASME B1.20.1 • 1" thread, DIN3852-2-A, PN40 • 1" NPT, ASME B1.20.1 • 1-$\frac{1}{2}$" thread, DIN3852-2-A, PN40 • 1-$\frac{1}{2}$" NPT, ASME B1.20.1
Second line of defence option (SLOD)	Internal fused glass seal

Options



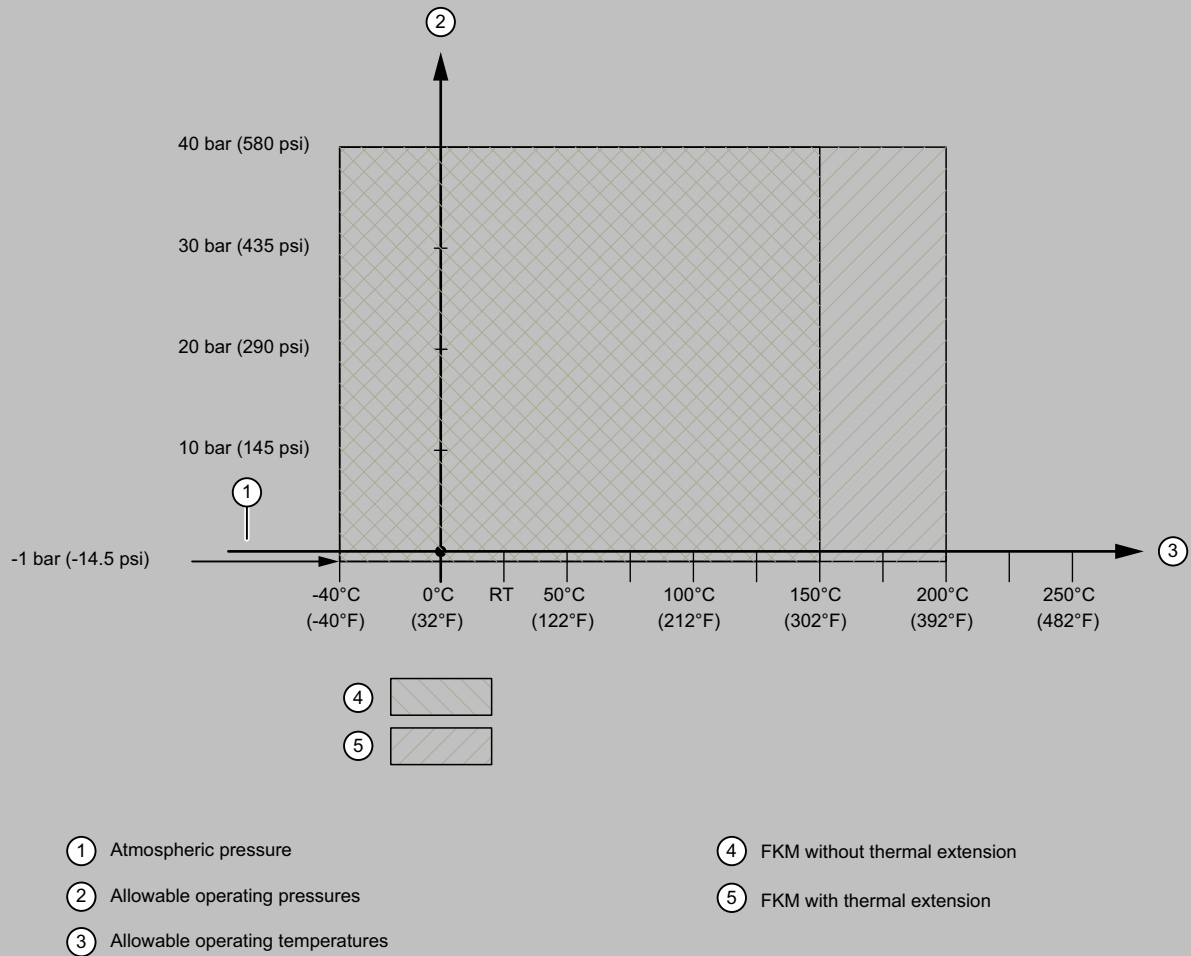
Part number	Adapter flange size	OD ± 1	B.C.D. max. for slotted holes (bmax.) ± 0.75	B.C.D. min. for slotted holes (bmin.) ± 0.75	Bolt hole radius ± 0.25	Number of slotted holes	Thread size
A5E50868980 A5E50868982 A5E50868983	2"/DN50	200	160	150	R 9.5	8	1.5" NPT, PP 1.5" BSPT, PP 1.5" BSPP, PP
A5E50868988 A5E50868998 A5E50869002	3"/DN80	200	160	150	R 9.5	8	1.5" NPT, PP 1.5" BSPT, PP 1.5" BSPP, PP
A5E50868953 A5E50868975 A5E50869003 A5E50869005 A5E50869010	4"/DN100	229	191	175	R 9.5	8	1" NPT, PP 1" BSPT, PP 1.5" NPT, PP 1.5" BSPT, PP 1.5" BSPP, PP
A5E50868976 A5E50868977 A5E50869012 A5E50869014 A5E50869015	6"/DN150	285	242	240	R 11.5	8	1" NPT, PP 1" BSPT, PP 1.5" NPT, PP 1.5" BSPT, PP 1.5" BSPP, PP

SITRANS LR510, Polypropylene adapter flange

SITRANS LR510

Characteristic curves

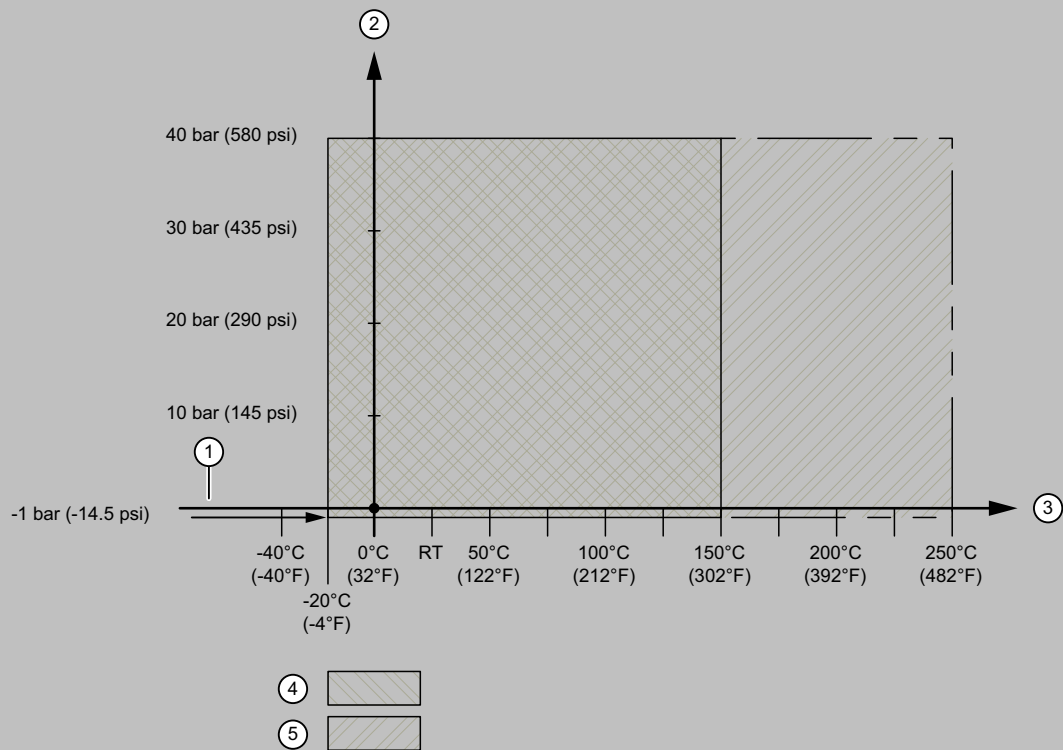
SITRANS LR510 Threaded lens antenna, seal options 0 and 1



SITRANS LR510 Threaded lens antenna, process pressure/temperature derating curve, seal options 0 and 1

Characteristic curves (continued)

SITRANS LR510 Threaded lens antenna, seal options 2 and 3



① Atmospheric pressure

② Allowable operating pressures

③ Allowable operating temperatures

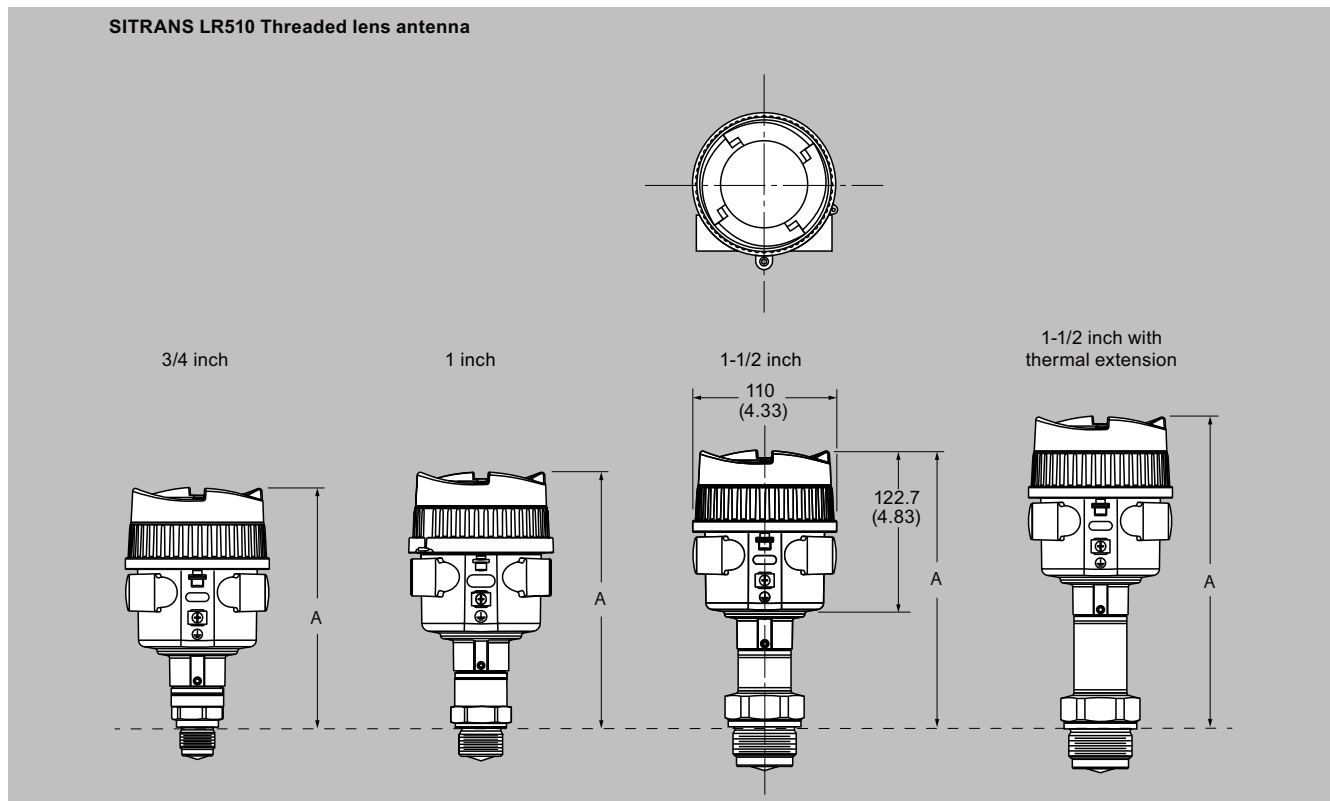
④ FFKM without thermal extension

⑤ FFKM with thermal extension

SITRANS LR510 Threaded lens antenna, process pressure/temperature derating curve, seal options 2 and 3

SITRANS LR510

Dimensional drawings



SITRANS LR510 Threaded lens antenna, dimensions in mm (inch)

Antenna type	A mm (inch)	Recommended max. range m (ft)	Beam angle	Process seal material	Temperature
Thread G3/4" PN40, DIN3852-A	182.3 (7.18)	10 (32.8)	14°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread 3/4" NPT, ASME B1.20.1	182.3 (7.18)	10 (32.8)	14°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread G1" PN40, DIN3852-2-A	193.8 (7.63)	20 (65.6)	10°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread 1" NPT, ASME B1.20.1	194 (7.64)	20 (65.6)	10°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread G1-1/2" PN40, DIN3852-2-A	213.8 (8.42)	30 (98.4)	7°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread 1-1/2" NPT, ASME B1.20.1	214 (8.43)	30 (98.4)	7°	FKM	-40 ... +150 °C (-40 ... +302 °F)
Thread G3/4" PN40, DIN3852-2-A	182.3 (7.18)	10 (32.8)	14°	FFKM	-20 ... +150 °C (-4 ... +302 °F)
Thread 3/4" NPT, ASME B1.20.1	182.3 (7.18)	10 (32.8)	14°	FFKM	-20 ... +150 °C (-4 ... +302 °F)
Thread G1" PN40, DIN3852-2-A	193.8 (7.63)	20 (65.6)	10°	FFKM	-20 ... +150 °C (-4 ... +302 °F)
Thread 1" NPT, ASME B1.20.1	194 (7.64)	20 (65.6)	10°	FFKM	-20 ... +150 °C (-4 ... +302 °F)
Thread G1-1/2" PN40, DIN3852-2-A	213.8 (8.42)	30 (98.4)	7°	FFKM	-20 ... +150 °C (-4 ... +302 °F)
Thread 1-1/2" NPT, ASME B1.20.1	214 (8.43)	30 (98.4)	7°	FFKM	-20 ... +150 °C (-4 ... +302 °F)

Dimensional drawings (continued)

Antenna type Thermal extension	A mm (inch)	Recommended max. range m (ft)	Beam angle	Process seal material	Temperature
Thread G3/4" PN40, DIN3852-2-A	234.2 (9.22)	10 (32.8)	14°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread 3/4" NPT, ASME B1.20.1	234.2 (9.22)	10 (32.8)	14°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread G1" PN40, DIN3852-2-A	245.8 (9.68)	20 (65.6)	10°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread 1" NPT, ASME B1.20.1	245.8 (9.68)	20 (65.6)	10°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread G1-1/2" PN40, DIN3852-2-A	265.8 (10.46)	30 (98.4)	7°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread 1-1/2" NPT, ASME B1.20.1	266 (10.47)	30 (98.4)	7°	FKM	-40 ... +200 °C (-40 ... +392 °F)
Thread G3/4" PN40, DIN3852-2-A	234.3 (9.22)	10 (32.8)	14°	FFKM	-20 ... +250 °C (-4 ... +392 °F)
Thread 3/4" NPT, ASME B1.20.1	234.5 (9.32)	10 (32.8)	14°	FFKM	-20 ... +250 °C (-4 ... +392 °F)
Thread G1" PN40, DIN3852-2-A	245.8 (9.68)	20 (65.6)	10°	FFKM	-20 ... +250 °C (-4 ... +392 °F)
Thread 1" NPT, ASME B1.20.1	246 (9.68)	20 (65.6)	10°	FFKM	-20 ... +250 °C (-4 ... +392 °F)
Thread G1-1/2" PN40, DIN3852-2-A	237.8 (9.36)	30 (98.4)	10°	FFKM	-20 ... +250 °C (-4 ... +392 °F)
Thread 1-1/2" NPT, ASME B1.20.1	238 (9.37)	30 (98.4)	10°	FFKM	-20 ... +250 °C (-4 ... +392 °F)