

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 60770-1
- 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

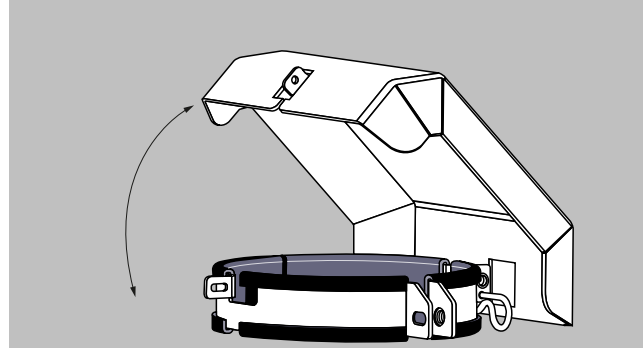
SITRANS LR500 Series	
Mode of operation	
Measuring principle	Radar level measurement
Frequency	W band (80 GHz nominal)
Minimum detectable distance	0 mm from end of the antenna (antenna dependent, reference conditions)
Maximum measuring range	120 m (394 ft), antenna dependent
Output	
HART	Version 7
• 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 IEC60770-1)	
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 ... +80 °C (-40 ... +176 °F) API 3.1B Inventory
Rated operating conditions	
Installation conditions	
• Location	Indoor/outdoor
Ambient conditions (enclosure)	
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)
• Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
• Installation category	I
• Pollution degree	4
Medium conditions	
Dielectric constant ϵ_r	> 1.6, antenna and application dependent
Process temperature	-196 ... 250 °C (-321 ... 482 °F), antenna and seal dependent
Process pressure	Up to 40 bar g (580 psi g), process connection and temperature dependent.
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 1/2" 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 log-book
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, UKCA Intrinsically Safe Ex ia IIC T6 Ga ATEX, IECEx, UKCA Intrinsically Safe Ex ia III C Txx°C Da ATEX, IECEx, UKCA Dust Ignition proof Ex ta IIC Txx°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
Pressure	CRN, PED
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

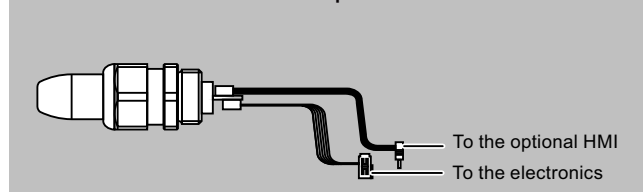
Options

Sun shield cover



SITRANS LR500 series sunshield

SITRANS AW050 Bluetooth adapter

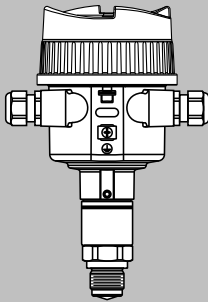


SITRANS AW050 Bluetooth adapter

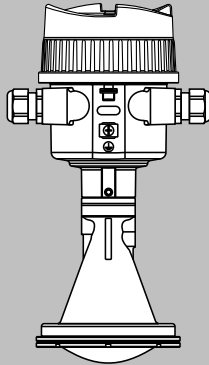
Dimensional drawings

SITRANS LR500 series antenna versions

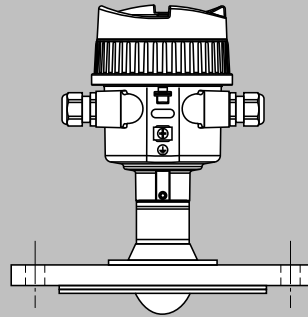
Thread with integrated antenna system



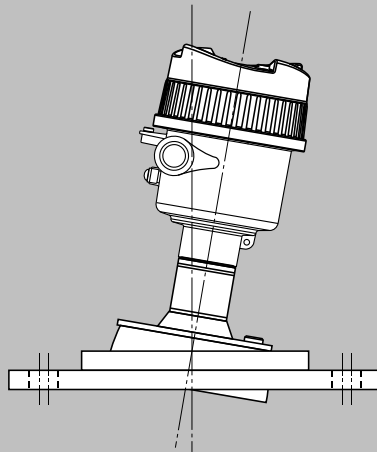
Plastic horn antenna



Flange with encapsulated antenna system



Flange with lens antenna



SITRANS LR500 Series antenna versions

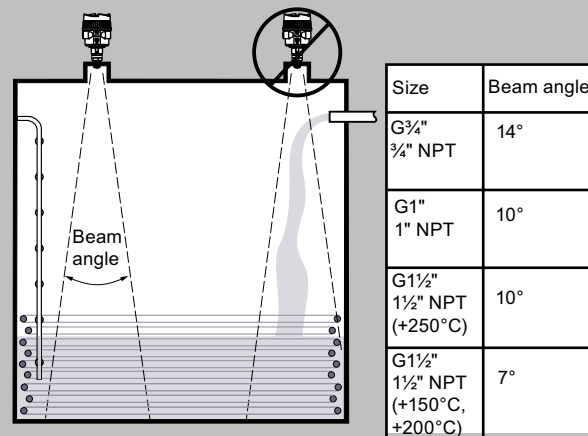
Overview



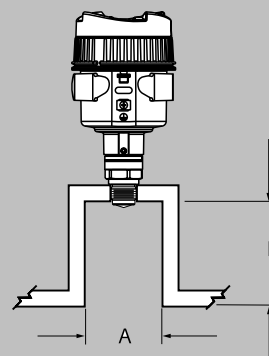
SITRANS LR510 threaded lens antenna provides continuous monitoring of liquids, including corrosive liquids, and slurries to a range of 30 m (98 ft). The small process connection makes it ideal for applications with challenging mounting conditions.

Configuration

Installation of SITRANS LR510



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

		Article No.									
SITRANS LR510 threaded connection Continuous, non-contact, 30 m (98 ft) range, for liquids and slurries.		7	M	L	5	1	0	-	0	0	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-G $\frac{3}{4}$ ", 316/316L				A		A					
Thread, DIN 3852-2-A-G $\frac{3}{4}$ ", Alloy C22 (2.4602)				A		B					
Thread, ASME B1.20.1, $\frac{3}{4}$ " NPT, 316/316L				A		C					
Thread, ASME B1.20.1, $\frac{3}{4}$ " 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- $\frac{1}{2}$ ", 316/316L				C		A					
Thread, DIN 3852-2-A-G1- $\frac{1}{2}$ ", Alloy C22 (2.4602)				C		B					
Thread, ASME B1.20.1, 1- $\frac{1}{2}$ " NPT, 316/316L				C		C					
Thread, ASME B1.20.1, 1- $\frac{1}{2}$ " 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											
Intrinsically safe Ex ia / IS (Division 1) ¹⁾		A									
Non-incendive (Division 2) ²⁾		D									
Dust Ignition proof, Ex t / DIP (Class II, Division 1) ¹⁾⁴⁾		M									
Electrical connection											
M20		F									
$\frac{1}{2}$ " 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), and UKEX (Great Britain)	E47

Selection and ordering data (continued)

Selection and Ordering data	Order code
CSA (Canada) and FM (USA)	E48
ATEX (Europe), IECEx (International), UKEX (Great Britain), 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), ½" NPT	A5E52095588
Lightning Arrestor, M20	7MF7903-7AB
Lightning Arrestor, ½" NPT	7MF7903-7AC

Selection and ordering data	Article No.
Spare parts	
¾" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276254
1" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276255
1-½" process seal for G thread types FKM, KLINGERSIL C-4400	A5E53276256
Electronic module, mA/HART	A5E53276249
LR500 lid with window, Non-Exd/XP	A5E53276250
LR500 no window, Non-Exd/XP	A5E53276252
HMI graphical display, with interconnection cable	A5E53276247

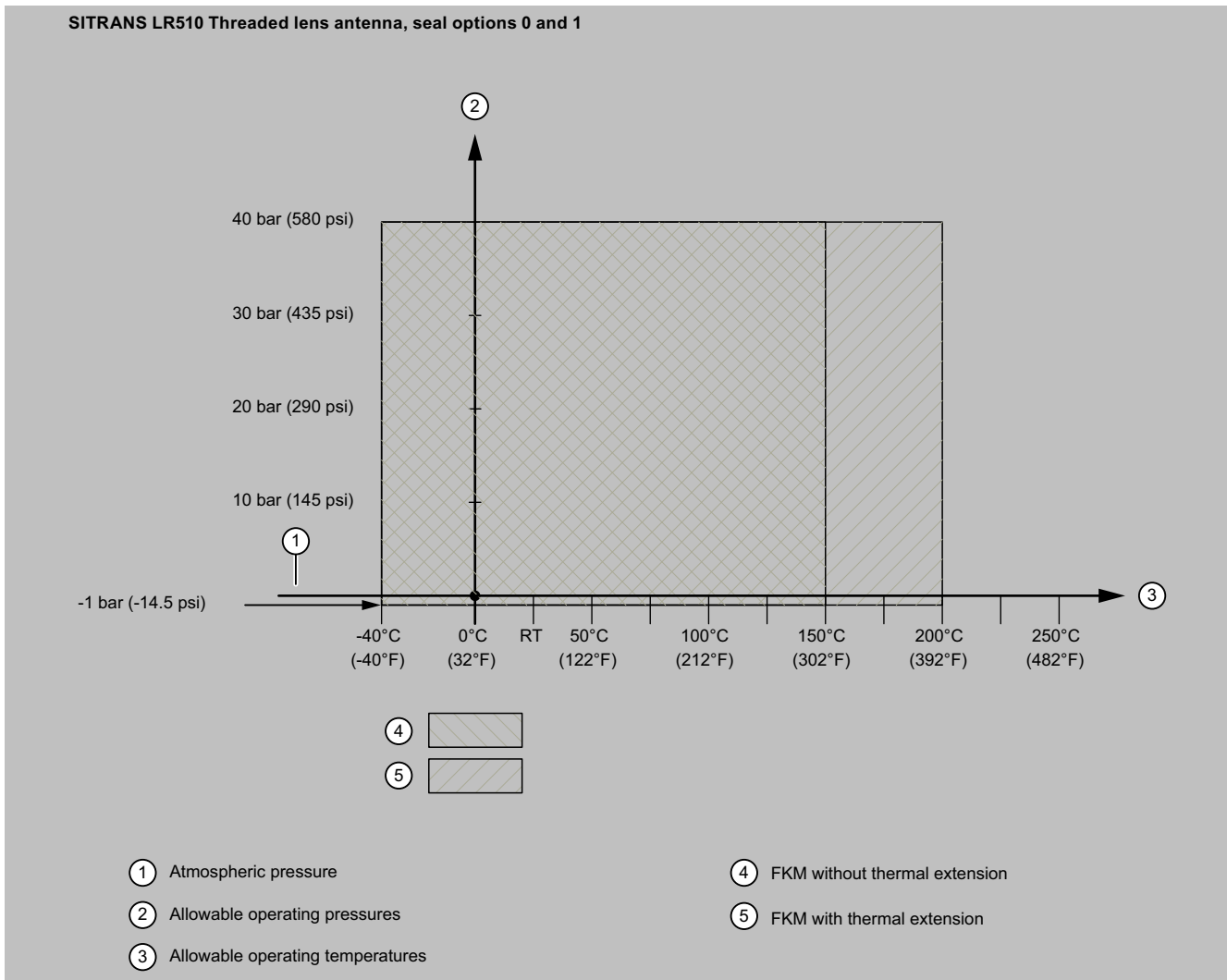
- 1) Available only with one of -Z Regional hazardous Approval options.
- 2) Available only with -Z Regional hazardous Approval option E48.
- 3) Not available with Type of Protection option A.
- 4) Available only with Second line of defence gas tight seal option 1.
- 5) Only one regional hazardous approval option can be selected.
- 6) 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.

Technical specifications

SITRANS LR510	
Mode of operation	
Recommended measuring range	<ul style="list-style-type: none"> • G¾", ¾" NPT: 10 m (32.81 ft) • G1", 1" NPT: 20 m (65.62 ft) • G1½", 1½" NPT (+150 °C, +200 °C): 30 m (98 ft)
Medium conditions	
Process temperature	<ul style="list-style-type: none"> • 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
Process connection	<ul style="list-style-type: none"> • ¾" thread, DIN3852-2-A, PN40 • ¾" NPT, ASME B1.20.1 • 1" thread, DIN3852-2-A, PN40 • 1" NPT, ASME B1.20.1 • 1-½" thread, DIN3852-2-A, PN40 • 1-½" NPT, ASME B1.20.1
Second line of defence option (SLOD)	Internal fused glass seal

SITRANS LR510

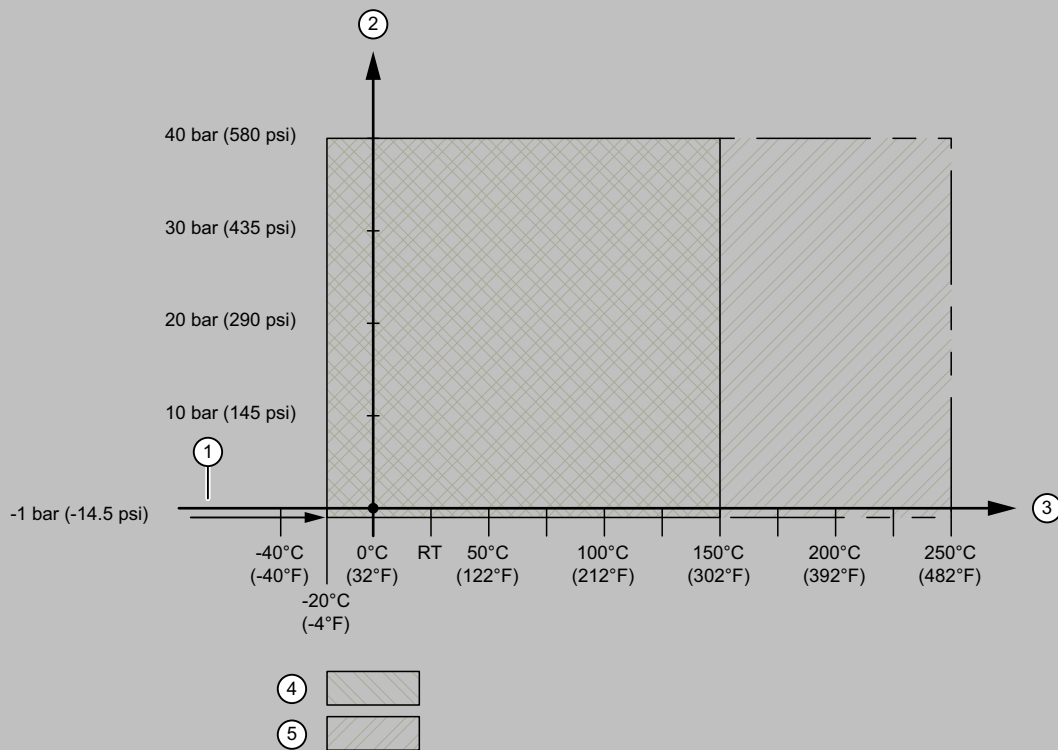
Characteristic curves



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

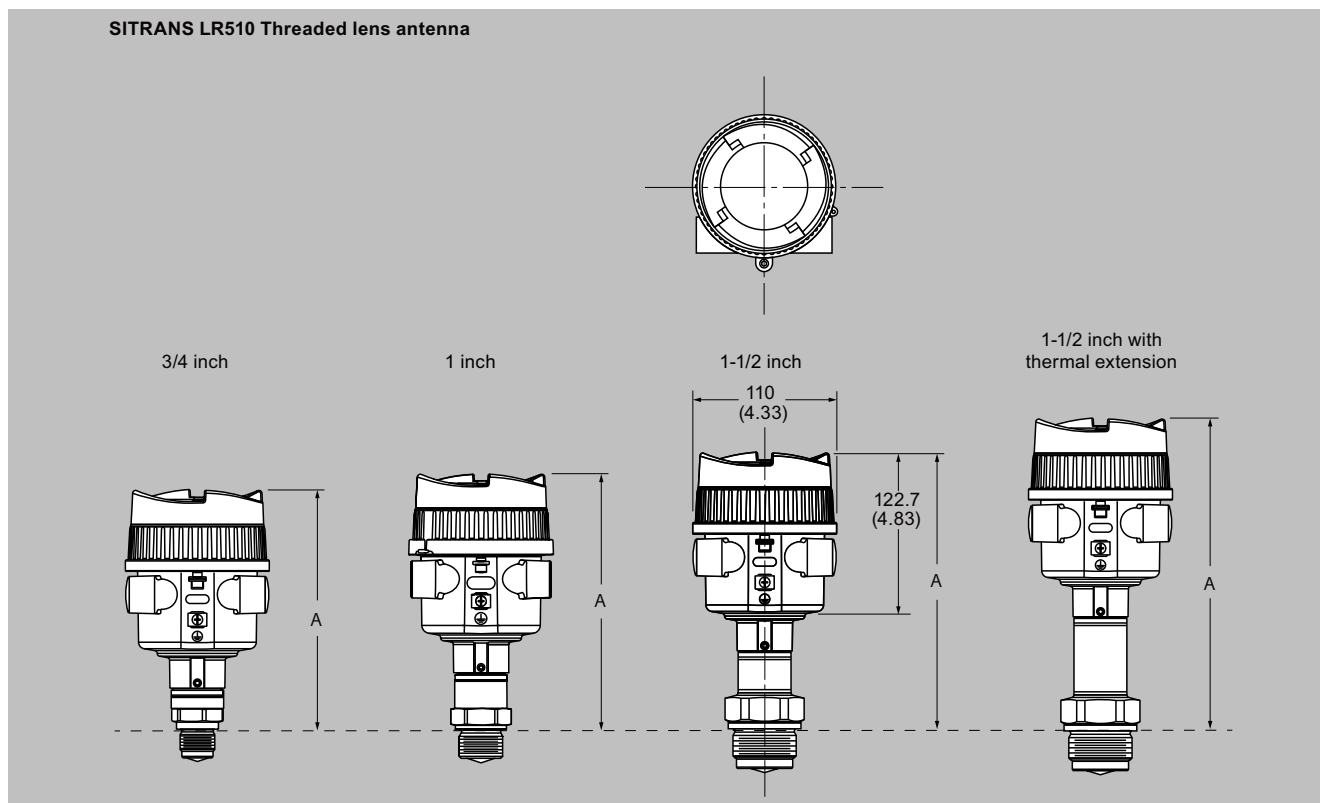
④ FFKM without thermal extension

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)