

## Level Measurement

### Continuous level measurement

#### Radar level transmitters / SITRANS LR500 series

##### 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, SIMATIC PDM, SITRANS DTM, or Infrared handheld programmer
- 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
- Siemens EcoTech Profile

##### 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.
<b>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.</b>	
<b>Antenna versions</b>	
Threaded lens antenna	7ML751-.....-.....
Flanged encapsulated antenna	7ML753-.....-.....
Polymeric horn antenna	7ML755-.....-.....
Flanged lens antenna	7ML758-.....-.....

### Technical specifications

SITRANS LR500 Series	
<b>Mode of operation</b>	
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
<b>Output</b>	
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
<b>Performance (according to reference conditions IEC 62828)</b>	
Maximum measured error	1 mm (0.039 inch)
Influence of ambient temperature	Less than 3 mm/10 K and maximum $\pm 5$ mm over full range from -40 ... +80 °C (-40 ... +176 °F) API 3.1B Inventory
<b>Rated operating conditions</b>	
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
<b>Medium conditions</b>	
Dielectric constant $\epsilon_r$	> 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. <b>Note: Pipe applications are not recommended. For exceptions, contact Siemens technical support.</b>
<b>Design</b>	
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 backlight
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
<b>Power supply</b>	
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 800 $\Omega$
<b>Certificates and approvals</b>	
Ordinary locations	FM, cCSA <sub>US</sub> , CE, cFMus, EAC
Radio	CE, FCC, IC, RCM, NCC, WPC, MIC, RRA, ANATEL, MCMC, NBTC, ICASA

### Technical specifications (continued)

SITRANS LR500 Series	
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 EACEx, ATEX, IECEX, CSA, FM, NEPSI, PESO, INMETRO, KCs, Japan, EACEx EX II 1GD EX ia IIC T6 ... T4 Ga Ex ia IIIC T <sub>200</sub> 95 °C Da Ta Ex ta IIIC T <sub>200</sub> 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 cFMus Flameproof/XP Class I, Div. 1, Groups ABCD; T6...T4 Class I, Div. 1, AEx db IIC T6...T4Gb Class I, Zone 0/1, AEx db IIC T6...T4 Ga/Gb ATEX, IECEX, NEPSI Flameproof/XP FMG 25.00115X Ex db IIC T6...T4 Gb Ex db IIC T6...T4 Ga/Gb
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	OF7424.1
• Alberta	OF22399.2
• Saskatchewan	OF7424.13
• Manitoba	OF7424.14
• Ontario	OF7424.15
• Quebec	OF07424.16
• Atlantic Canada and Territories	OF1384.9870YNT
Materials	3.1 of EN 10204, NACE MR 0175 and MR 0103, 2.2 of EN 10204, PMI
<b>Programming</b>	
Remote, via HART	SIMATIC PDM, SITRANS DTM, AMS, TREX communicator
Display (local)	Optional graphical HMI with NE107 diagnostic data, echo profile display and backlight
SITRANS mobile IQ app	Optional AW050 Bluetooth module, for non-hazardous applications only
Infrared Handheld programmer	

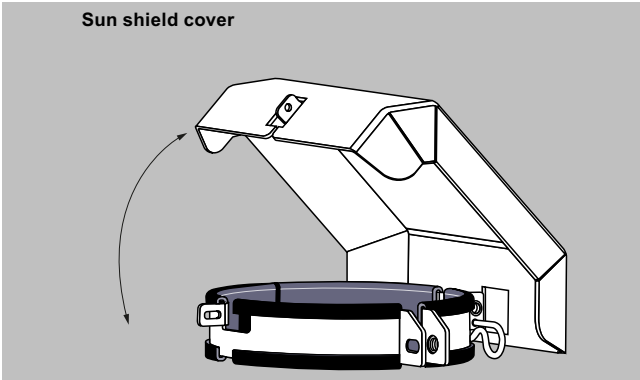
# Level Measurement

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### Radar level transmitters / SITRANS LR500 series

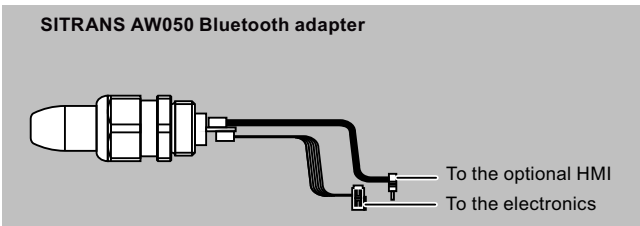
#### Options

Sun shield cover

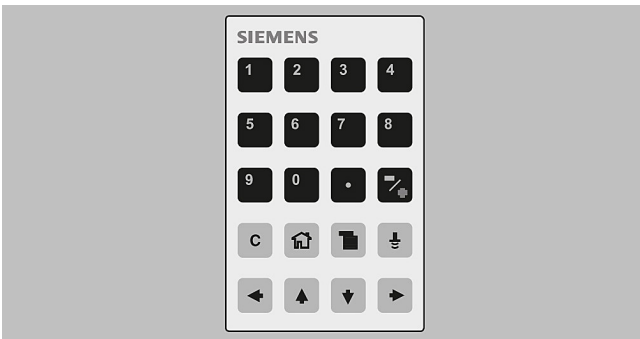


SITRANS LR500 series sunshield

SITRANS AW050 Bluetooth adapter



SITRANS AW050 Bluetooth adapter

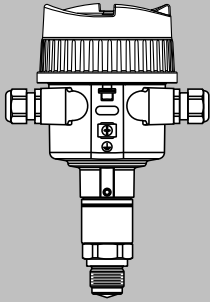


Only 4 bottom arrow keys are used

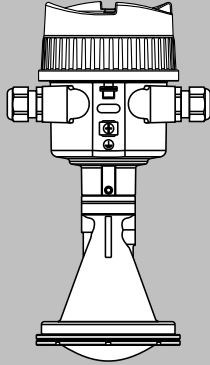
Dimensional drawings

SITRANS LR500 series antenna versions

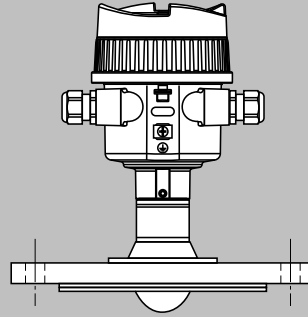
Thread with integrated antenna system



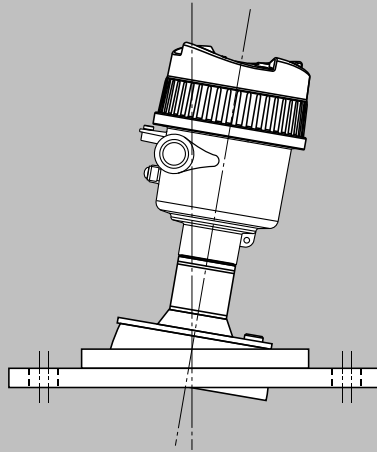
Plastic horn antenna



Flange with encapsulated antenna system



Flange with lens antenna



SITRANS LR500 Series antenna versions

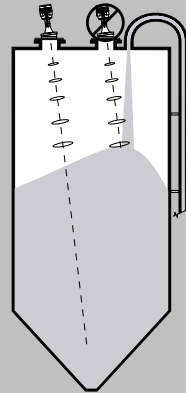
### Overview



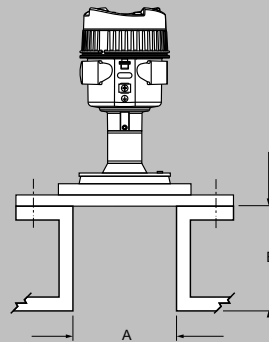
SITRANS LR580 lens antenna provides continuous monitoring of solids or liquids to a range of 120 m (394 ft). The design includes an aimer feature as well as integrated air purge connection for inventory measurement applications in silos. It is also well suited to high temperature applications in the cement and power industries.

### Configuration

Installation of SITRANS LR580



SITRANS LR580 nozzle mounting restrictions



Nozzle diameter "A"		Nozzle height "B"	
80 mm	3"	≤400 mm	≤15.8"
100 mm	4"	≤500 mm	≤19.7"
150 mm	6"	≤800 mm	≤31.5"

SITRANS LR580 Nozzle installation

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### Radar level transmitters / SITRANS LR580

#### Selection and ordering data

		Article No.																		
SITRANS LR580 Flanged lens antenna Continuous, non-contact, 120 m (394 ft) range, for solids or liquids.		7	M	L	7	5	8	0	-	0	-	0	-	0	-	0	-	0	-	0
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.																				
<b>Communications</b>																				
4 ... 20 mA, HART		0																		
<b>Sealing material of the antenna/process connection</b>																				
PEEK / FKM / -40 ... +150 °C (-40 ... +302 °F)		0																		
PEEK / FKM / -40 ... +200 °C (-40 ... +392 °F)		1																		
PEEK / FFKM / -15 ... +250 °C (5 ... +482 °F)		2																		
<b>Process connection type and material</b>																				
<b>Flanges</b>																				
DN80 PN16, flat face, 316/316L		P C																		
DN100 PN16, flat face, 316/316L		P D																		
DN150 PN16, flat face, 316/316L		P E																		
3" 150lb, FF, 316/316L		Q C																		
4" 150lb, FF, 316/316L		Q D																		
6" 150lb, FF, 316/316L		Q E																		
DN80 10K, FF, JIS / 316/316L		R C																		
DN100 10K, FF, JIS / 316/316L		R D																		
DN150 10K, FF, JIS / 316/316L		R E																		
<b>Aiming flanges</b>																				
Universal DN100/4", 316/316L		E D																		
Universal DN150/6", 316/316L		E E																		
<b>Second line of defense (SLOD) gas tight seal</b>																				
SLOD not included		0																		
SLOD included		1																		
<b>Enclosure</b>																				
Single compartment enclosure		4																		
<b>Type of protection</b>																				
Non Ex - General purpose		A																		
Intrinsically safe Ex ia / IS (Class I, II, III, Division 1) <sup>1)</sup>		B																		
Flameproof Ex d (Class I, Division 1)		C																		
Non-incendive (Class I, Division 2) <sup>2)</sup>		D																		
Dust Ignition proof, Ex t / DIP (Class II, Division 1) <sup>1)</sup>		M																		
<b>Electrical connection</b>																				
M20		F																		
½" NPT		K																		
<b>Local HMI</b>																				
None, with blind lid		0																		
Included, with blind lid		1																		
Included, with window lid		3																		

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add "-Z" to Article No. and specify Order code(s).	
<b>Test certificates</b>	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000 - performance	C11
Inspection certificate EN 10204-3.1, material	C12
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

Selection and Ordering data	Order code
<b>Tagging</b>	
<u>Stainless steel tag [69 mm x 50 mm (2.71 x 1.97 inch)]</u>	
Tag (device parameters, max. 27 characters), plate, stainless steel 304/1.4301	Y15
<b>Regional Ex Approval <sup>3)</sup></b>	
EAC Ex	E24
INMETRO, IA MASC	E25
KCs (Korea)	E26
NEPSI (China)	E27
PESO (India)	E28

### Selection and ordering data (continued)

Selection and Ordering data	Order code
Japan	E29
ATEX (Europe) and IECEx (International)	E47
CSA (Canada) and FM (USA)	E48
ATEX (Europe), IECEx (International), CSA (Canada), and FM (USA)	E49
<b>Process connection specials</b>	
Non-return valve for purging air connection	J01

Selection and Ordering data	Order code
<b>Operating instructions</b>	
All literature is available to download for free, in a range of languages, at <a href="http://www.siemens.com/processinstrumentation/documentation">http://www.siemens.com/processinstrumentation/documentation</a>	
<b>Accessories</b>	
Hand Programmer, Intrinsically safe	7ML1930-1BK
Sun shield cover	A5E52107153
AW050 Bluetooth module kit, M20 (General purpose only)	A5E51857118
AW050 Bluetooth module kit, ½"NPT (General purpose only)	A5E52095588
Lightning Arrestor M20	7MF7903-7AB
Lightning Arrestor ½" NPT	7MF7903-7AC
Mounting bracket, 300 mm	A5E52885008
EPDM Aiming Gasket DN80	A5E52607563
EPDM Aiming Gasket DN100	A5E52607570
EPDM Aiming Gasket 3"	A5E52607582
EPDM Aiming Gasket 4"	A5E52607584

Selection and Ordering data	Order code
SIMATIC RTU3010C compact, remote data manager with alarming	6NH3112-0BA00-0XX0
SIMATIC RTU3030C compact, remote data manager with alarming	6NH3112-3BA00-0XX0
Sealing plug, 316L/1.4404, Ex d, 1/2 NPT	7MF79067BJ
Sealing plug, 316L/1.4404, Ex d, M20 x 1.5	7MF79067AJ
HART modem with USB interface	7MF4997-1DC
SITRANS RD100, loop powered display	7ML5741-.....
SITRANS RD150, remote digital display for 4 to 20 mA and HART devices	7ML5742-.....
SITRANS RD200, universal input display with Modbus conversion	7ML5740-.....
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion	7ML5744-.....
SITRANS LT500, a versatile, single and multi-vessel level monitor/controller for virtually any application in a wide range of industries.	7ML60-.....
For applicable back up point level switch - see point level measurement catalog	
<b>Spare parts</b>	
Electronic module, LR530, LR550, LR580, >DN50 / 2 inch, mA/HART	A5E53276249
LR500 lid with window, Non-Exd/XP	A5E53276250
LR500 lid with window, Exd/XP	A5E53308680
LR500 lid without window, all versions	A5E53276252
HMI graphical display, with interconnection cable	A5E53276247

- 1) Available only with one -Z Regional hazardous Approval options.
- 2) Available only with -Z Regional hazardous Approval option E48.
- 3) Not available with Type of Protection option A.

# Level Measurement

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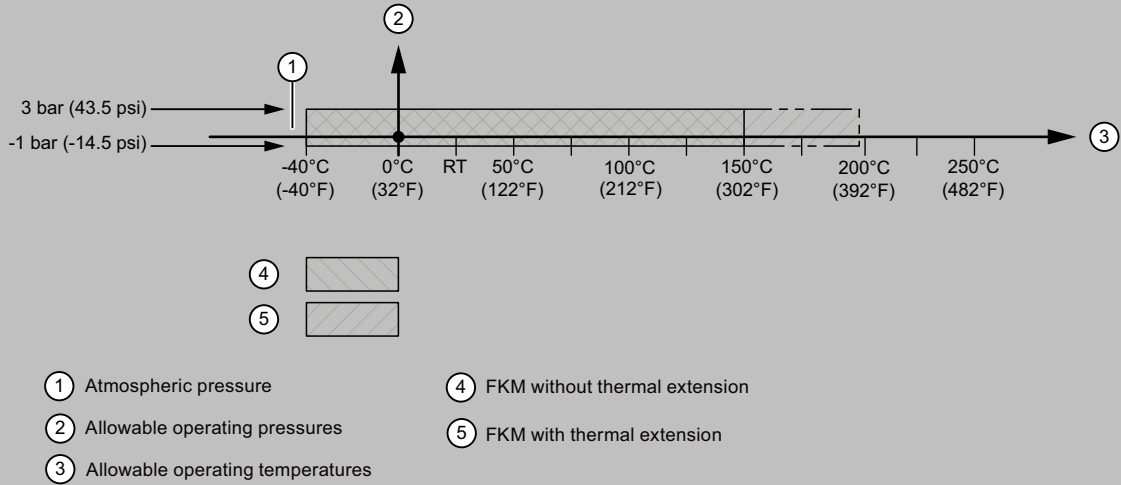
### Radar level transmitters / SITRANS LR580

#### Technical specifications

SITRANS LR580	
<b>Mode of operation</b>	
Recommended measuring range	Beam angle 3°: 120 m (394 ft)
<b>Medium conditions</b>	
Process temperature	<ul style="list-style-type: none"> <li>• PEEK/FKM: -40 ... +150 °C (-40 ... +302 °F)</li> <li>• PEEK/FKM, thermal extension: -40 ... +200 °C (-40 ... +392 °F)</li> <li>• PEEK/FFKM, thermal extension: -15 ... +250 °C (5 ... +392 °F)</li> </ul>
Process pressure	-1 ... 3 bar max.
<b>Design</b>	
Flange material	316/316L
Wetted materials	
• Antenna lens	PEEK
• Antenna seal	FKM/FFKM (Perlast G75B)
Process connections	<ul style="list-style-type: none"> <li>• DN80 PN16, flat face</li> <li>• DN100 PN16, flat face</li> <li>• DN150 PN16, flat face</li> <li>• 3" 150 lb, flat face</li> <li>• 4" 150 lb, flat face</li> <li>• 6" 150 lb, flat face</li> <li>• DN80 10K, flat face, JIS</li> <li>• DN100 10K, flat face, JIS</li> <li>• DN150 10K, flat face, JIS</li> <li>• Aiming flange universal DN100/4"</li> <li>• Aiming flange universal DN150/6"</li> </ul>
<b>EPDM aiming gasket</b>	
Maximum adjustment	8°

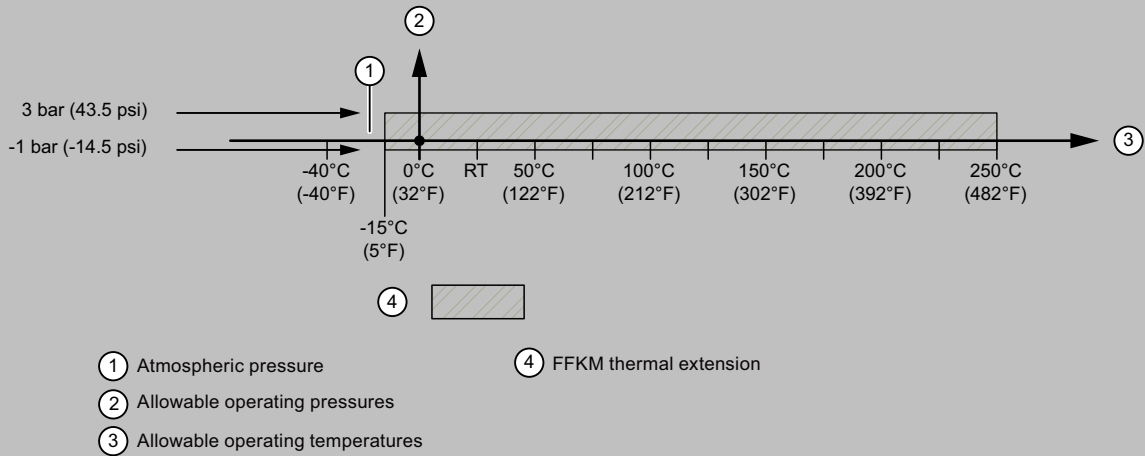
Characteristic curves

SITRANS LR580 Flanged lens antenna, seal options 0 and 1



SITRANS LR580 Flanged lens antenna, process pressure/temperature derating curve, seal options 0 and 1

SITRANS LR580 Flanged lens antenna, seal option 2



SITRANS LR580 Flanged lens antenna, process pressure/temperature derating curve, seal option 2

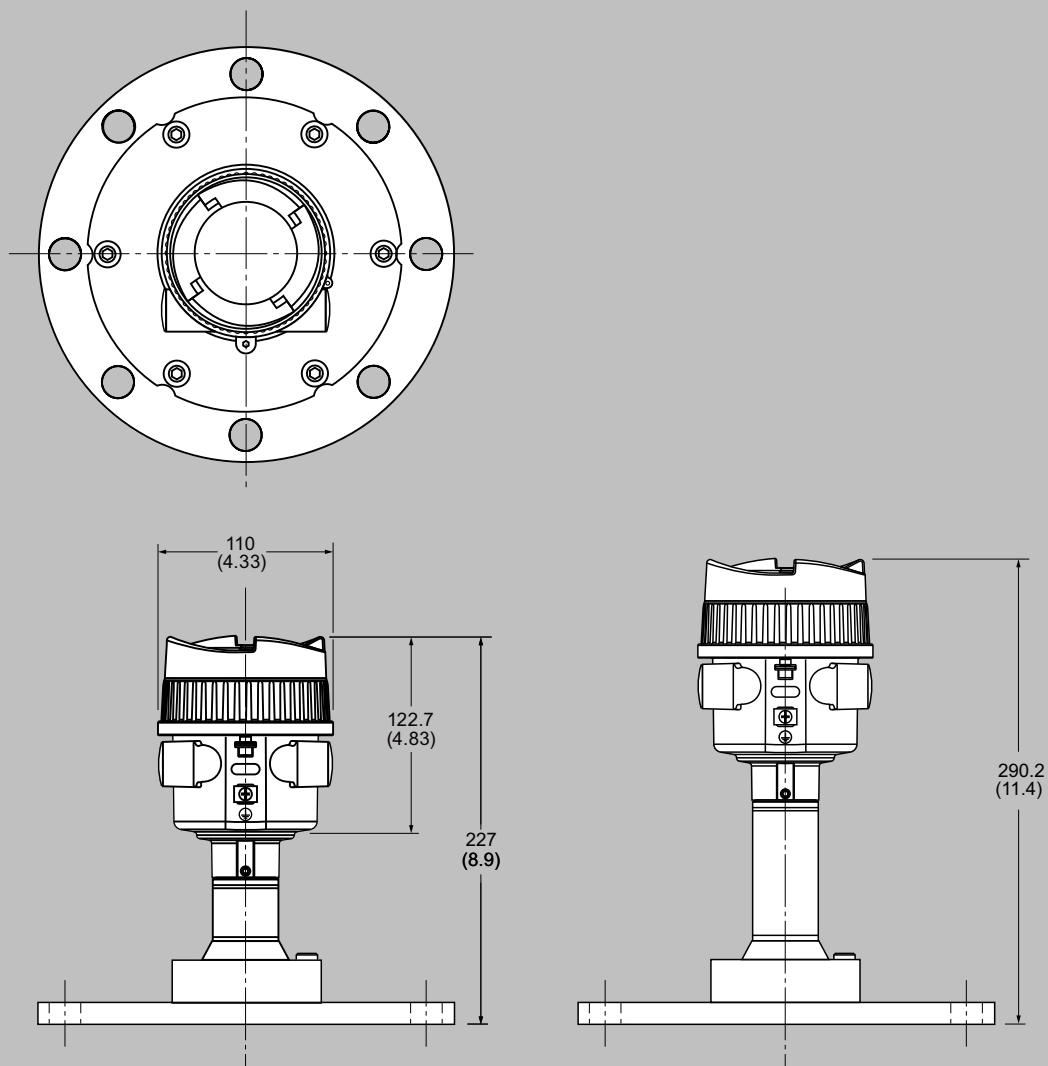
# Level Measurement

## Continuous level measurement

### Radar level transmitters / SITRANS LR580

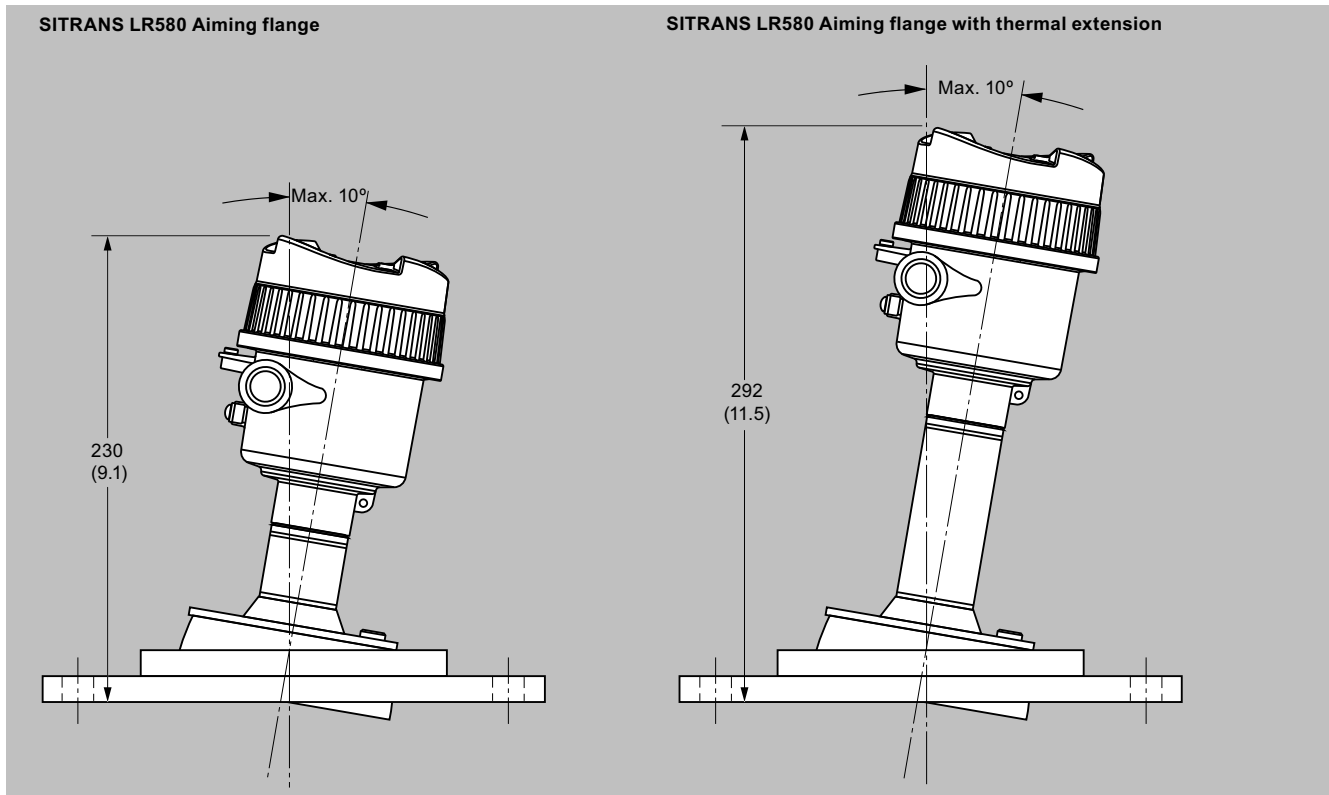
#### Dimensional drawings

SITRANS LR580 Flat face flanges



SITRANS LR580 Flat face flanges, dimensions in mm (inch)

## Dimensional drawings (continued)



SITRANS LR580 Aiming flanges, dimensions in mm (inch)

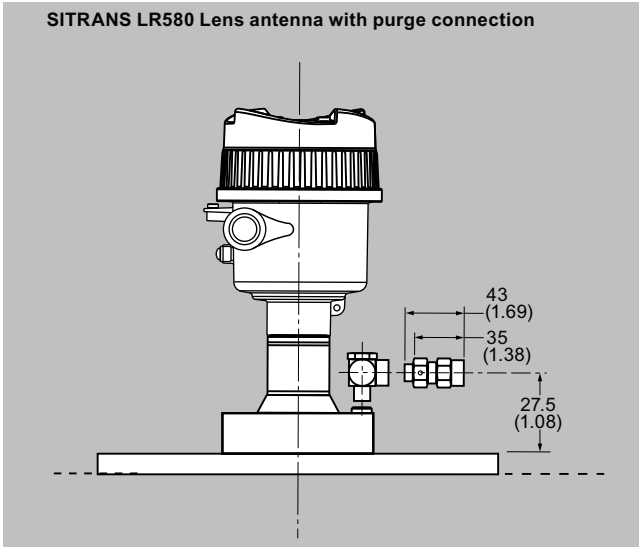
Flange	Flange O.D. [mm (inch)]	Bolt hole circle Ø [mm (inch)]	Bolt hole Ø [mm (inch)]	No. of bolt holes	Flange thickness [mm (inch)]
DN80 PN16, flat face	200 (7.87)	160 (6.93)	18 (0.06)	8	11.5 (0.04)
DN100 PN16, flat face	220 (8.66)	180 (7.09)	18 (0.06)	8	
DN150 PN16, flat face	285 (11.22)	240 (9.45)	22 (0.07)	8	
3" 150lb flat face	190.5 (7.5)	152.4 (6)	19.1 (0.06)	4	
4" 150lb flat face	228.6 (9)	190.5 (7.5)	19.1 (0.06)	8	
6" 150lb flat face	279.4 (11)	241.3 (9.5)	22.4 (0.07)	8	
DN80 10K, flat face, JIS	185 (7.28)	150 (5.9)	19 (0.06)	8	
DN100 10K, flat face, JIS	210 (8.27)	175 (6.89)	19 (0.06)	8	
DN150 10K, flat face, JIS	280 (11.02)	240 (9.45)	23 (0.07)	8	
Aiming flange universal DN100/4"	228.6 (9)	175 ... 191	19.1 (0.06)	8	
Aiming flange universal DN150/6"	285 (11.22)	241 (9.49)	24 (0.08)	8	

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#### Radar level transmitters / SITRANS LR580

#### Dimensional drawings (continued)



SITRANS LR580 Lens Antenna with purge connection, dimensions in mm (inch)