

Level Measurement

Continuous level measurement – Radar transmitters

SITRANS LR560

Overview



SITRANS LR560 2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft).

5

Benefits

- rugged stainless steel design for industrial applications
- 78 GHz high frequency provides very narrow beam, virtually no mounting nozzle noise, and optimal reflection from sloped solids
- aimer option to direct beam to area of interest, such as draw point of cone
- lens antenna is highly resistant to product build up
- air purge connection is included for self-cleaning of extremely sticky solids
- local display interface (LDI) allows local programming and diagnostics

Application

SITRANS LR560's plug and play performance is ideal for most solids applications, including those with extreme dust and high temperatures to 200 °C (392 °F). Unique design allows safe and simple programming using the Intrinsically Safe handheld programmer without having to open the instrument's lid. SITRANS LR560 includes an optional graphical local display interface (LDI) that improves setup and operation using an intuitive Quick Start Wizard, and echo profile display for diagnostic support. Startup is easy using the Quick Start wizard with a few parameters required for basic operation. SITRANS LR560 measures practically any solids material to a range of 100 m (328 ft).

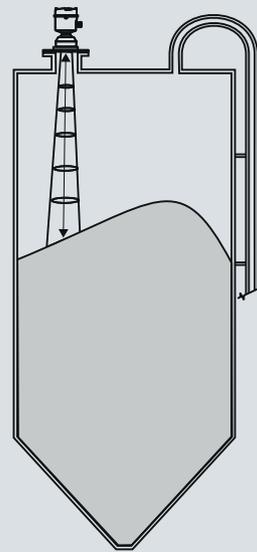
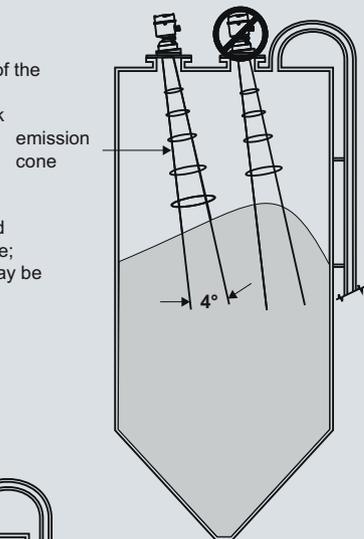
- Key Applications: cement powder, plastic powder/pellets, grain, coal, wood powder, fly ash

Configuration

Installation

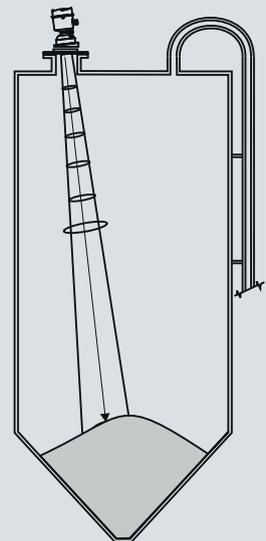
Note:

- 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 signal transmitted outside of the beam angle; therefore false targets may be detected



Aiming is rarely required for signal optimization with 78 GHz frequency.

Aiming will assist in measuring material in the cone



SITRANS LR560 installation

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Technical specifications

Mode of operation	
Measuring principle	Radar level measurement
Frequency	78 GHz FMCW
Minimum detectable distance	400 mm (15.75 inch) from sensor reference point
Maximum measuring range ¹⁾	<ul style="list-style-type: none"> • 40 m (131 ft) version • 100 m (328 ft) version
Output	
<ul style="list-style-type: none"> • Analog output • Communications • Fail-safe 	4 ... 20 mA <ul style="list-style-type: none"> • HART • Optional: PROFIBUS PA • Optional: Foundation Fieldbus • Programmable as high, low or hold (Loss of Echo) • NE43 programmable
Performance (according to reference conditions IEC60770-1)	
<ul style="list-style-type: none"> • Maximum measured error (including hysteresis and non-repeatability) 	<ul style="list-style-type: none"> • Greater of 25 mm (1 inch) or 0.25 % of range from minimum detectable distance to full range
Rated operating conditions (according to reference conditions IEC60770-1)	
Installation conditions	Indoor/outdoor
<ul style="list-style-type: none"> • Location • ambient temperature • installation category • pollution degree 	-40 ... +80 °C (-40 ... +176 °F) I 4
Medium conditions	
<ul style="list-style-type: none"> • Dielectric constant ϵ_r 	> 2.0
Process temperature and pressure	See chart below
Design	
Enclosure	
<ul style="list-style-type: none"> • Construction • Conduit entry • Lens material • Degree of protection • Weight • Optional local display interface 	316L/1.4404 stainless steel M20x1.5, or ½" NPT via adapter <ul style="list-style-type: none"> • 40 m version: PEI • 100 m version: PEEK Type 4X/NEMA 4X, Type 6/NEMA 6, IP68 with lid closed 3.15 kg (6.94 lb) including 3" flange Graphic LCD, with bar graph representing level
Process connections	
Universal flat-faced flanges ²⁾	<ul style="list-style-type: none"> • 3, 4, 6"/80, 100, 150 mm, 304 stainless steel • 3, 4, 6"/80, 100, 150 mm, 316L/1.4404 or 316L/1.4435 stainless steel
Aimer flanges ²⁾	3, 4, 6"/80, 100, 150 mm, polyurethane powder-coated cast aluminum

Power supply	
4 ... 20 mA/HART	Nominal 24 V DC (max. 30 V DC) with max. 550 Ω
PROFIBUS PA/Foundation Fieldbus	13.5 mA 9 ... 32 V DC, per IEC 61158-2
Certificates and approvals	
<ul style="list-style-type: none"> • General • Radio 	CSA _{US/C} , CE, FM Europe (R&TTE), FCC, Industry Canada, C-TICK
Hazardous	
<ul style="list-style-type: none"> • Europe/International • US/Canada • China • Brazil 	IECEx SIR 09.0149X ATEX II 1D, 1/2D, 2D Ex ta IIIC T139°C Da IP68 ATEX II 3G Ex nA II T4 Gc Ex nL IIC T4 Gc FM/CSA Class II, Div. 1, Groups E, F, G Class III T4 FM/CSA Class I, Div. 2, Groups A, B, C, D, T4 NEPSI Ex nA II T4 Ex nL IIC T4 DIP A20 TA, T139°C, IP68 INMETRO BR-Ex nA/nL II T4 IP68
Programming	
Intrinsically Safe Siemens handheld programmer	Infrared receiver
<ul style="list-style-type: none"> • Approvals for handheld programmer 	IS model: ATEX II 1GD Ex ia IIC T4 Ga Ex iaD 20 T = 135 °C Ta = -20 ... +50 °C CSA/FM Class I, II, and III, Div. 1., Gr. A-G, T6 Ta = 50 °C
Handheld communicator	HART communicator 375/475
PC	SIMATIC PDM, AMS, PACTware
Display (local)	Graphic local user interface including quick start wizard and echo profile displays

¹⁾ From sensor reference point

²⁾ Universal flange mates with EN 1092-1 (PN16)/ASME B16.5 (150 lb)/JIS 2220 (10K) bolt hole pattern.

Process temperature and pressure

Version	Stainless steel	Aimer flange: -1 ... 0.5 bar	Aimer flange: -1 ... 3.0 bar
40 m	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)	-40 ... +100 °C (-40 ... +212 °F)
100 m	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +200 °C (-40 ... +392 °F)	-40 ... +120 °C (-40 ... +248 °F)

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Selection and Ordering data

SITRANS LR560

2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids in silos to a range of 100 m (329 ft).

Order handheld programmer separately!

Measurement and process temperature range

40 m (131 ft) max range, -40 ... +100 °C

100 m (329 ft) max range, -40 ... +200 °C

Process connection

Universal flat-faced flange fits ANSI/DIN/JIS flanges

3"/80 mm, 304 stainless steel

4"/100 mm, 304 stainless steel

6"/150 mm, 304 stainless steel

3"/80 mm, 316L stainless steel

4"/100 mm, 316L stainless steel

6"/150 mm, 316L stainless steel

3"/80 mm, painted aluminum, with integral aimer¹⁾

4"/100 mm, painted aluminum, with integral aimer¹⁾

6"/150 mm, painted aluminum, with integral aimer¹⁾

Enclosure (with cable inlet)

Stainless Steel, 1 X ½" NPT

Stainless Steel, 1 X M20 x 1.5
(plastic gland included)

Pressure rating

0.5 bar g (7.5 psi g) maximum

3 bar g (40 psi g) maximum

Output/communication

4 to 20 mA, HART

PROFIBUS PA

Foundation Fieldbus

Approvals

General Purpose, CSA_{US/C}, Industry Canada, FCC, CE, R&TTE, C-TICK

CSA/FM Class I, Div. 2, Gr. A,B,C,D, Class II, Div. 1, Gr. E,F,G, Class III

ATEX II 1 D, ½ D, 2 D, 3G Ex nA/nL, CE, R&TTE, C-TICK

Local display interface

Without LDI (local display interface)

With LDI (local display interface)

1) Rated to 120 °C max. when used with Pressure rating option 1

C) Subject to export regulations AL: N, ECCN: EAR99.

D) Subject to export regulations AL: N, ECCN: EAR99H.

Order No.

L) **7ML5440-**

0 0 -

0 1

A

B

C

D

E

F

G

H

J

A

B

0

1

A

B

C

A

B

C

1

2

Selection and Ordering data

Further designs

Please add "-Z" to Order No. and specify Order code(s).

Plug M12 with mating connector¹⁾²⁾³⁾

Plug 7/8" with mating connector²⁾⁴⁾⁴⁾

A50

A55

Y15

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:

Measuring-point number/identification

(max. 16 characters); specify in plain text

Test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000

C11

Inspection Certificate Type 3.1 per EN 10204⁵⁾

C12

NAMUR NE43 compliant, device preset to failsafe < 3.6 mA⁶⁾

N07

Operating Instructions for HART device

Order No.

English

C) **7ML1998-5KB01**

German

C) **7ML1998-5KB31**

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

C) **7ML1998-5XF81**

Operating Instructions for PROFIBUS PA device

English

C) **7ML1998-5LT01**

German

C) **7ML1998-5LT31**

Multi-language Quick Start manual

This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

C) **7ML1998-5XQ81**

Operating Instructions for Foundation Fieldbus device

English

C) **7ML1998-5LY01**

German

C) **7ML1998-5LY31**

Multi-language Quick Start manual
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

C) **7ML1998-5XR81**

Accessories

Hand Programmer, Intrinsically safe

C) **7ML1930-1BK**

Local display interface

C) **7ML1930-1FJ**

Sun Shield Cover

7ML1930-1FK

Housing lid with window

C) **7ML1930-1FL**

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), HART⁷⁾

7ML1930-1AP

One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F), PROFIBUS PA⁷⁾

7ML1930-1AQ

SITRANS RD100 Remote display - see Chapter 8

SITRANS RD200 Remote display - see Chapter 8

SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 8

K) **7ML5750-1AA00-0**

1) Available with Approval option A only

2) Available with Enclosure option B only

3) Available with Output/communication options B and C only

4) Available with Enclosure option A only

5) Available with Pressure rating option 1 only

6) Available with Output/communication option A only

7) Product shipped with plastic cable gland, rated to -20 °C.

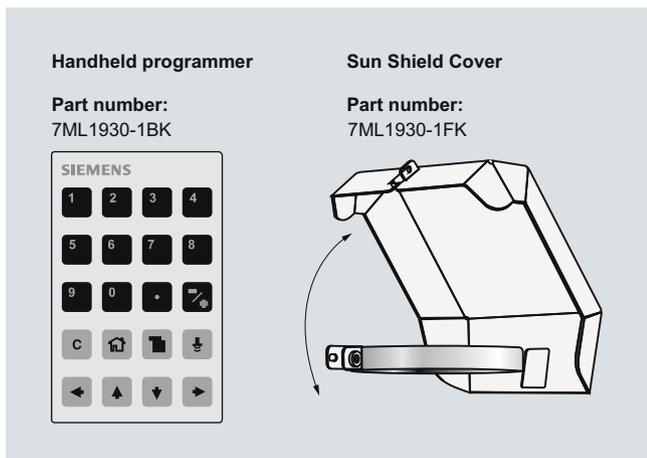
If -40 °C rating required, then metallic cable gland is recommended.

C) Subject to export regulations AL: N, ECCN: EAR99.

K) Subject to export regulations AL: N, ECCN: 5A991X.

L) Subject to export regulations AL: N, ECCN: 3A991X.

Options



SITRANS LR560 handheld programmer and sun shield cover

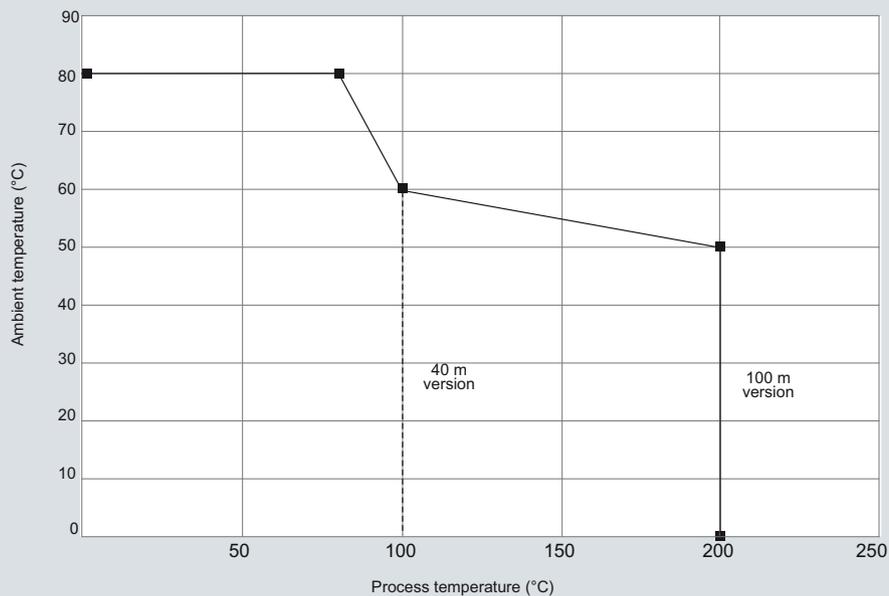
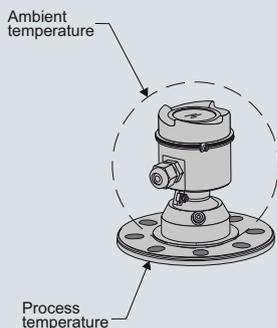
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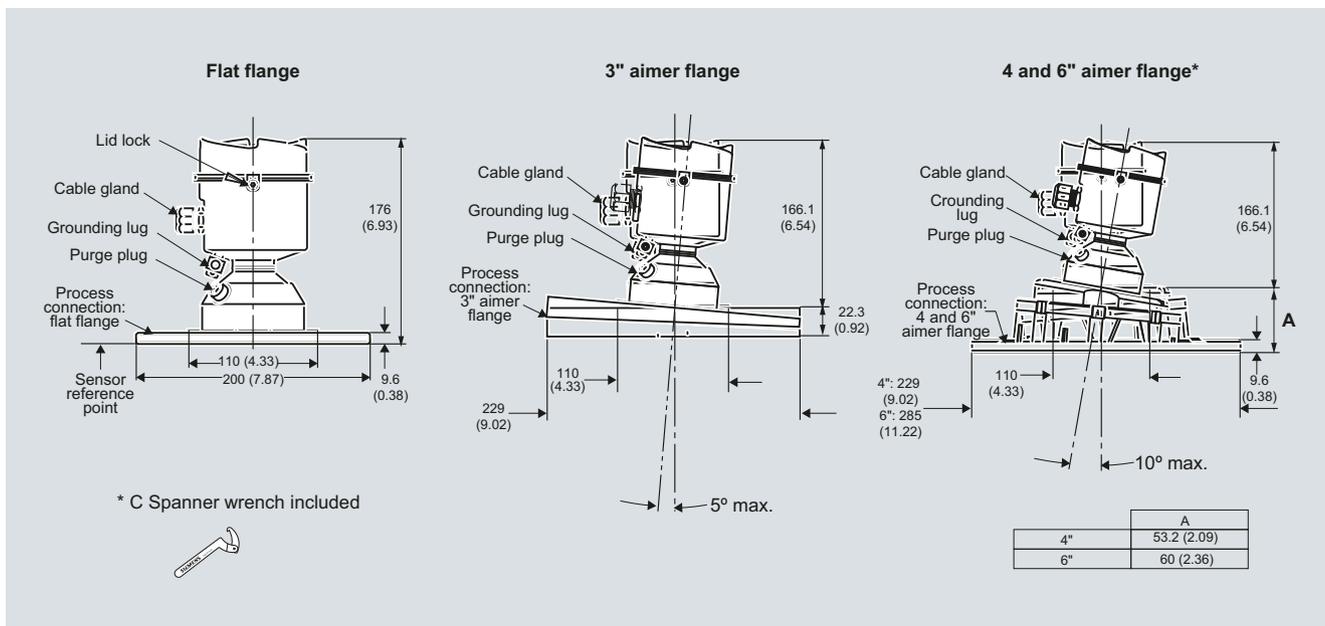
Characteristic curves

Temperature derating curve



SITRANS LR560 temperature derating curve

Dimensional drawings



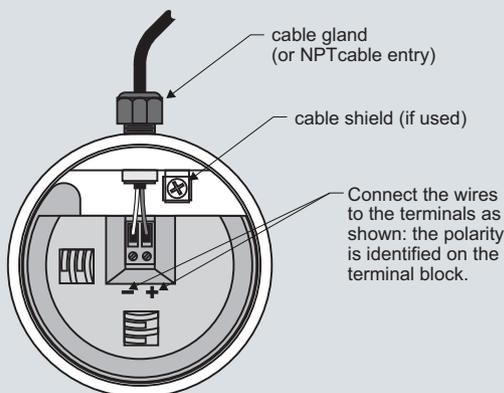
SITRANS LR560, dimensions in mm (inch)

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SITRANS LR560 Specials

Schematics



Notes:

1. Depending on the approval rating, glands and plugs may be supplied with your instrument.
2. 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.
3. All field wiring must have insulation suitable for rated input voltages.
4. Use shielded twisted pair cable (14 to 22AWG) for HART version.
5. Separate cables and conduit may be required to conform to standard instrumentation wiring practices or electrical codes.

SITRANS LR560 connections

SITRANS LR560 Specials

	Order No.
LR560 Electronics Modules	
LR560 Electronics Module, HART, 100m range, compatible with 7ML54401XX00XAXX, no enclosure or process connection included.	C) 7ML1830-3AC
LR560 Electronics Module, PROFIBUS PA, 100m range, compatible with 7ML54401XX00XBXX, no enclosure or process connection included.	L) 7ML1830-3AH
LR560 Electronics Module, Foundation Fieldbus, 100m range, compatible with 7ML54401XX00XCXX, no enclosure or process connection included.	L) 7ML1830-3AJ
LR560 Electronics Module, HART, 40m range, compatible with 7ML54400XX00XAXX, no enclosure or process connection included.	L) 7ML1830-3AK
LR560 Electronics Module, PROFIBUS PA, 40m range, compatible with 7ML54400XX00XBXX, no enclosure or process connection included.	L) 7ML1830-3AL
LR560 Electronics Module, Foundation Fieldbus, 40m range, compatible with 7ML54400XX00XCXX, no enclosure or process connection included.	L) 7ML1830-3AM
LR560 Miscellaneous Spare Kits	
Kit, Lid Gasket, EPDM, LR560	J) 7ML1830-3AA
Kit, Wrench for 4" and 6" Aimers, LR560	C) 7ML1830-3AB
Kit, O-rings for 3" Aimer, LR560	C) 7ML1830-3AD
Kit, O-rings for 4" Aimer, LR560	C) 7ML1830-3AE
Kit, O-rings for 6" Aimer, LR560	C) 7ML1830-3AF
Kit, Lid Screw and Purge Plug set with Hex Keys, LR560	C) 7ML1830-3AG
Kit, Lid, No Window, LR560	C) 7ML1830-3AP

C) Subject to export regulations AL: N, ECCN: EAR99.

J) Subject to export regulations AL: 91999, ECCN: EAR99.

L) Subject to export regulations AL: N, ECCN: 3A991X.

Please contact ceg.smpi@siemens.com for special requests.