

# Level Measurement

## Point level measurement – Ultrasonic switch

Pointek ULS200

### Overview



The Pointek ULS200 is an ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries; ideal for sticky materials.

### Benefits

- 2 switch outputs for high-high, high, low, and low-low level alarms or pump up/pump down control
- Integral temperature compensation
- AC or DC power supply
- Electronics provided with fail-safe function
- Threaded and sanitary fitting clamp process connections
- Polycarbonate or aluminum enclosures, Type 6/NEMA 6/IP67
- Easy, two-button programming

### Application

The measuring range for bulk solids is max. 3 m (9.8 ft) and 5 m (16.4 ft) for liquids and slurries. Unlike invasive contacting devices, there is no material buildup on the sensor.

The level switch has a rugged design, combining the transducer and electronics in one durable device. It has no moving parts and is virtually maintenance-free.

The transducer, available in ETFE or PVDF copolymer, is inert to most chemicals. This means the device can be used in the chemical, petrochemical, water, and wastewater industries. A sanitary version of the ULS200, with an industry standard flange option, is easy to remove from the application for cleaning. It thus satisfies the prerequisites for use in the food, beverage, and pharmaceutical industries. The Pointek ULS200 delivers superior performance while reducing maintenance, downtime, and equipment replacement costs.

- Key Applications: liquids, slurries, fluid materials, plugged chute detection, chemical industry

### Design

#### Installation

The Pointek ULS200 should be mounted in an area that is within the temperature range specified and that is suitable to the enclosure rating and materials of construction. The cover should be accessible to allow programming, wiring and display viewing.

It is advisable to keep the Pointek ULS200 away from high voltage or current runs, contactors and SCR control drives.

Locate the Pointek ULS200 so that it has a clear sound path perpendicular to the material surface. The sound path should not intersect the fill path, rough walls, seams, rungs etc.

#### Mounting and Interconnection

The Pointek ULS200 is available in three thread types: 2" NPT, R 2" (BSPT), EN 10226 or PF2 and can be fitted with the optional 75 mm (3 inch) flange adapter for mating to 3" ASME, DN 65, PN 10, and JIS 10K 3B sized flanges.

Separate cables and conduit may be required to conform to standard instrumentation wiring or electrical codes.

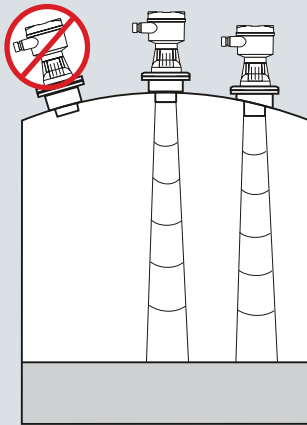
# Level Measurement

## Point level measurement – Ultrasonic switch

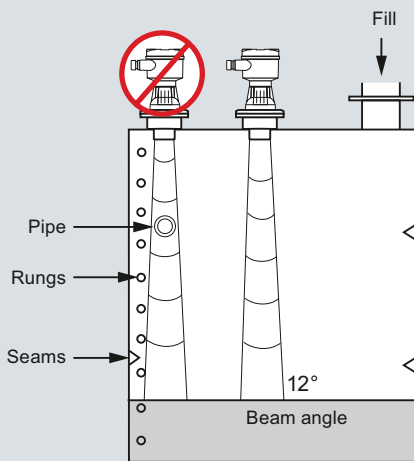
### Pointek ULS200

#### Configuration

##### Parabolic mounting



##### Flat mounting and Beam angle



Pointek ULS200 Mounting

# Level Measurement

## Point level measurement – Ultrasonic switch

Pointek ULS200

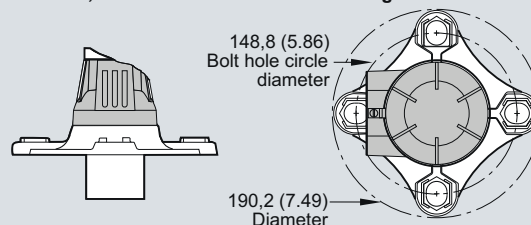
### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic level switch
<b>Measuring range</b>	
Measuring range in liquids	0.25... 5 m (0.8 ... 16.4 ft)
Measuring range in bulk solids	0.25 ... 3 m (0.8 ... 9.8 ft)
<b>Output</b>	
AC Version (relay)	2 SPDT Form C contacts rated 5 A at 250 V AC, resistive load
DC Version (relay)	2 SPDT Form C contacts rated 5 A at 48 V DC
DC Version (transistor)	2 switches, rated max. 100 mA, 48 V DC
<b>Accuracy</b>	
AC/DC version	
• Resolution	3 mm (0.1 inch)
• Repeatability	0.25% of measuring range
<b>Rated operation conditions</b>	
Installation conditions	
• Location	Indoors/outdoors
• Beam angle	12°
Ambient conditions	
• Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)
• If mounted in metal threads	-20 ... +60 °C (-5 t ... +140 °F)
Medium conditions	
• Process pressure	0.5 bar (7.25 psi) max.
<b>Design</b>	
Material	Polycarbonate or epoxy-coated aluminum with gasket
Weight	Approx. 1.5 kg (3.3 lb)
Transducer material	PVDF or ETFE copolymer
Threaded mounting	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
• Optional flange adapter	For 3" ASME, DN 65, PN 10 and JIS 10 K3B
Sanitary mounting	4" sanitary fitting clamp
<b>Power supply</b>	
AC version	100 ... 230 V AC, ± 15%, 50/60 Hz, max. 12 VA, 5 W
DC version	18 ... 30 V DC, 3 W
<b>Displays and controls</b>	
Display	LCD, three digits, 9 mm (0.35 inch) high, for display of distance between sensor face and material, multisegment graphic for operating state
Memory	EEPROM, non-volatile
Programming	2 keys

<b>Electronics/enclosure</b>	Connection: terminal block, max. 2.5 mm <sup>2</sup> (14 AWG) solid/ 1.5 mm <sup>2</sup> (16 AWG) stranded
Degree of protection	IP67/Type 6/NEMA 6
Cable inlet	2 x 1/2" NPT or 2 x PG 13.5
<b>Certificates and approvals</b>	<ul style="list-style-type: none"> <li>• CE (EMC certificate available on request), CSA US/C, FM</li> <li>• CSA/FM Class I, II, III, Div. 1, Gr A, B, C, D, E, F, G T4</li> <li>• ATEX II 2G Ex d mb IIC T5 Gb</li> <li>• C-TICK, ANZEx Ex ds IIC T5, DIP A21 T5, IP65/IP67</li> <li>• INMETRO Br-Ex d mb IIC T5</li> </ul>

### Options

Flange adapter for mating 2" NPT or 2" BSP process connections to 3" ASME, DN 65 PN10 and JIS 10K 3B flanges



Pointek ULS200 Optional Flange Adapter, dimensions in mm (inch)

# Level Measurement

## Point level measurement – Ultrasonic switch

### Pointek ULS200

#### Selection and Ordering data

##### Pointek ULS200

Ultrasonic non-contacting switch with two switch points for level detection of bulk solids, liquids and slurries in a wide variety of industries; ideal for sticky materials

##### Power supply

24 V DC, relay output  
24 V DC, transistor output  
100 ... 230 V AC, relay output

##### Approvals

CE, C-TICK, CSA Class I, II, III, Div. 1<sup>1)</sup>  
CE, C-TICK, FM Class I, II, III, Div. 1<sup>1)</sup>  
CE, C-TICK, CSA Class I, II, Div. 2<sup>2)</sup>  
CE, C-TICK, CSA us/c, FM  
CE, C-TICK, ATEX II 2G Ex d mb IIC T5 Gb<sup>3)</sup>  
INMETRO Br-Ex d mb IIC T5<sup>3)</sup>  
C-TICK, ANZEx Ex ds IIC T5, DIP A21 T5, IP65/IP67<sup>3)</sup>

##### Transducer/Process connection

ETFE, 2" NPT [(Taper), ANSI/ASME B1.20.1]  
EFTE, R 2" [(BSPT), EN 10226]  
EFTE, G 2" [(BSPP), EN ISO 228-1]  
PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1]  
PVDF copolymer, R 2" [(BSPT), EN 10226]  
PVDF copolymer, G [(BSPP), EN ISO 228-1]  
PVDF copolymer, 4" sanitary mounting<sup>4)</sup>

##### Enclosure/cable inlet

###### Polycarbonate

- Cable inlet PG 13.5
- Cable inlet ½" NPT

###### Aluminum

- Cable inlet PG 13.5
- Cable inlet ½" NPT

1) Available with Enclosure/cable inlet option 4 only and process connection options A and E only

2) Available with Enclosure/cable inlet options 2 and 4 only

3) Available with Enclosure/cable inlet option 4 only

4) Available with Approvals option K only

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

#### Order No.

C) 7ML1510-

0

1

2

3

F

G

J

K

L

M

N

A

B

C

E

F

G

J

1

2

3

4

#### Selection and Ordering data

##### Further designs

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

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)];  
Measuring-point number/identification  
(max. 16 characters) specify in plain text

##### Operating Instructions

Quick Start manual, multi-language

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

##### Accessories

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch),  
one text line, suitable for enclosures

Universal Box Bracket Mounting Kit

3" ASME, DN 65, PN 10, JIS 10K 3B ETFE Flange  
adapter for 2" BSPT

3" ASME, DN 65, PN 10, JIS 10K 3B ETFE Flange  
adapter for 2" BSPT

2" BSPT Locknut, plastic

2" NPT Locknut

4" sanitary mounting clamp

##### Spare Parts

Polycarbonate Lid

Aluminum Lid

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

#### Order code

Y15

Order No.

C) 7ML1998-1XB83

7ML1930-1AC

7ML1830-1BK

7ML1830-1BT

7ML1830-1BU

7ML1830-1DQ

7ML1830-1DT

7ML1830-1BR

7ML1830-1LG

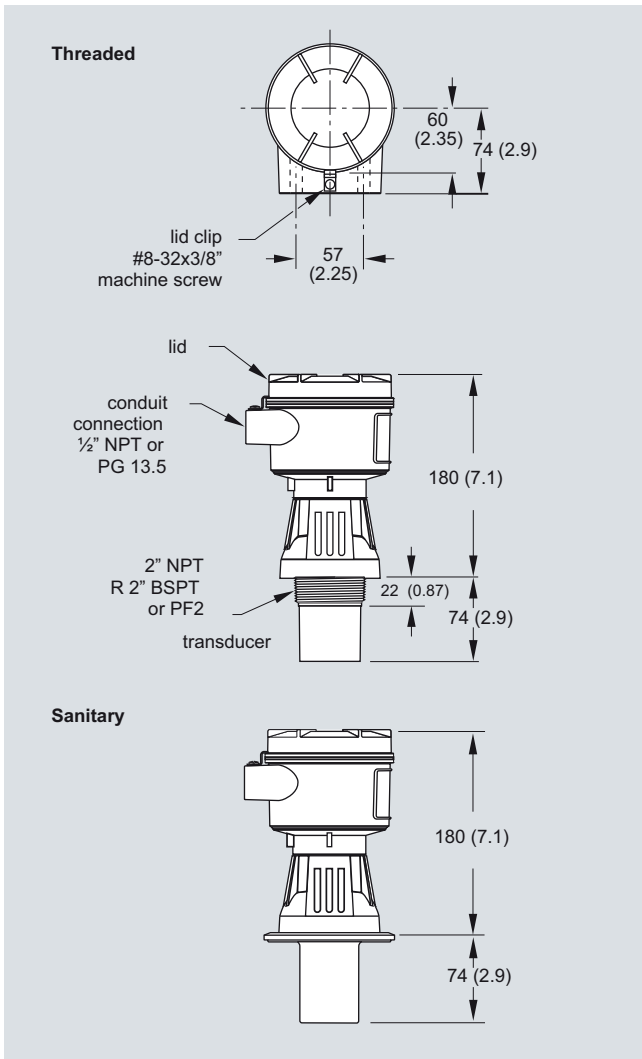
7ML1830-1LH

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Pointek ULS200

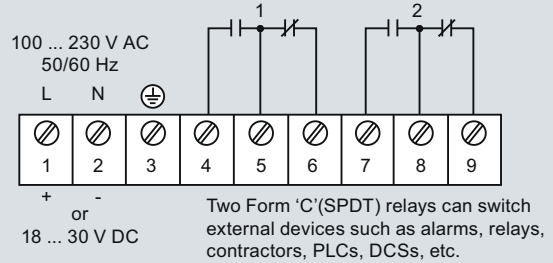
### Dimensional drawings



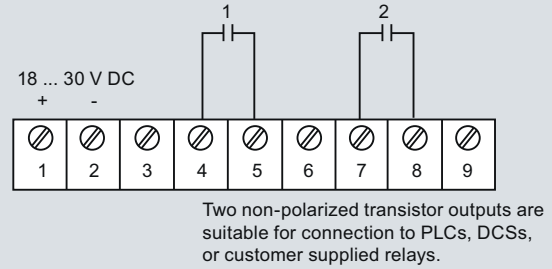
Pointek ULS200, dimensions in mm (inch)

### Schematics

#### Relay Output



#### Transistor Output: DC version only



Pointek ULS200 connections

# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

### The Probe

#### Overview



The Probe is a short-range integrated ultrasonic level transmitter, ideal for liquids and slurries in open or closed vessels.

#### Benefits

- Easy to install, program and maintain
- Accurate and reliable
- Sanitary models available
- Patented Sonic Intelligence echo processing
- Integral temperature compensation

#### Application

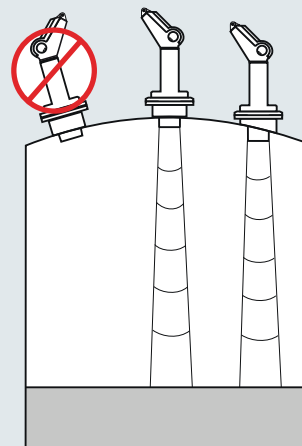
The transducer is available in PVDF copolymer, making the device suitable for use in a wide variety of applications. The Probe is easy to install and maintain, and can be quickly removed for cleaning as required by the food, beverage and pharmaceutical industries.

The reliability of the level data is based on the Sonic Intelligence echo processing algorithms. A filter discriminates between the true echo and false echoes from acoustic or electrical noises and agitator blades in motion. The ultrasonic pulse propagation time to the material and back is temperature-compensated and converted into distance for display, analog output and relay actuation.

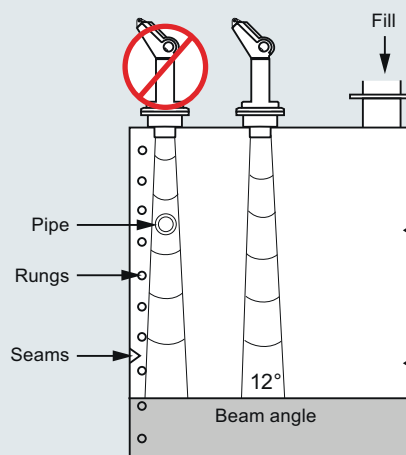
- Key Applications: chemical storage vessels, filter beds, mud pits, liquid storage vessels, food applications

#### Configuration

##### Parabolic Mounting



##### Flat Mounting and Beam Angle



The Probe mounting

# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

### The Probe

Technical specifications		
	Three-wire version	Two-wire version (standard)
<b>Mode of operation</b>		
Measuring principle	Ultrasonic level measurement	Ultrasonic level measurement
<b>Input</b>		
Measuring range	0.25 ... 5 m (0.8 ... 16.4 ft)	0.25 ... 5 m (0.8 ... 16.4 ft)
<b>Output</b>		
mA	4 ... 20 mA	4 ... 20 mA
• Span	Proportional/ inversely proportional	Proportional/ inversely proportional
• Max. load	750 Ω at 24 V DC	600 Ω in the loop at 24 V DC
Relay	For level alarm or fault	No
<b>Power supply</b>		
Supply voltage	18 ... 30 V DC, max. 0.2 A	12 ... 28 V DC, 0.1 A surge
Max. power consumption	5 W (200 mA at 24 V DC)	0.75 W (25 mA at 24 V DC)
<b>Certificates and approvals</b>		
	CE, C-TICK, CSA <sub>US/C</sub> , FM	CE, C-TICK, CSA <sub>US/C</sub>
<b>Accuracy</b>		
Error in measurement	0.25 % of measuring range (in air)	
Resolution	3 mm (0.125")	
Temperature compensation	Built in	
Echo processing	Sonic Intelligence	
<b>Rated operation conditions</b>		
Beam angle	12°	
Ambient temperature		
• Standard	-40 ... +60 °C (-40 ... +140 °F)	
• Metallic mounting	-20 ... +60 °C (-4 ... +140 °F)	
Max. static operating pressure	Normal atmospheric pressure	
Degree of protection	IP65	
<b>Design</b>		
Weight		
• Without flange adapter	1.5 kg (3.3 lbs)	
• With flange adapter	1.7 kg (3.7 lbs)	
Material		
• Electronics enclosure	PVC	
• Transducer	PVDF copolymer	
Degree of protection	IP65	
Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]	
Cable inlet	2 inlets for PG 13.5 or ½" NPT cable glands	

Selection and Ordering data	Order No.
<b>The Probe</b>	C) <b>7ML1201-000</b>
Short-range integrated ultrasonic level transmitter, ideal for liquids and slurries in open or closed vessels	
<b>Measuring range</b>	1
5 m (16.40 ft)	
<b>Transducer/Process connection</b>	E F G J
PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1] PVDF copolymer, R 2" [(BSPT), EN 10226] PVDF copolymer, G 2" [(BSPP), EN ISO 228-1] PVDF copolymer, 4" Sanitary mounting	
<b>Model/Approval</b>	E F
3 Wire, 24 V DC, CE, C-TICK, CSA, FM 2 Wire, 24 V DC, CE, C-TICK, CSA	

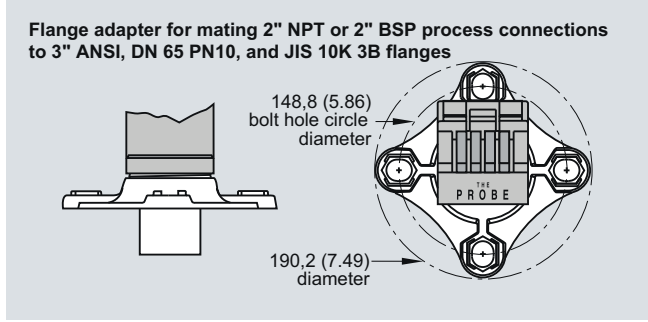
Selection and Ordering data	Order code
<b>Further designs</b>	
Please add "-Z" to Order No. and specify Order code(s).	
Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75")]: Measuring-point number/identification (max. 20 characters) specify in plain text	<b>Y17</b>
<b>Additional Operating Instructions</b>	Order No.
3 Wire, 24 V model, Multi-language manual	C) <b>7ML1998-5GD62</b>
2 Wire model, Multi-language manual	C) <b>7ML1998-5GC63</b>
<b>Accessories</b>	
Universal Box Bracket Mounting kit	<b>7ML1830-1BK</b>
Sanitary 4" mounting clamp	<b>7ML1830-1BR</b>
Power Supply, 24 V DC, 200 mA for 2 probes (105 ... 125 V AC input)	C) <b>7ML1930-1AA</b>
Power Supply, 24 V DC, 100 mA for 1 probe (105 ... 125 V AC input)	C) <b>7ML1930-1AB</b>
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT	<b>7ML1830-1BT</b>
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT	<b>7ML1830-1BU</b>
2" NPT locknut, plastic	<b>7ML1830-1DT</b>
2" BSPT locknut, plastic	<b>7ML1830-1DQ</b>
Plastic M20 cable gland with metal locknut	<b>7ML1930-1DB</b>
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) <b>7ML5750-1AA00-0</b>
C) Subject to export regulations AL: N, ECCN: EAR99.	
K) Subject to export regulations AL: N, ECCN: 5A991X.	

# Level Measurement

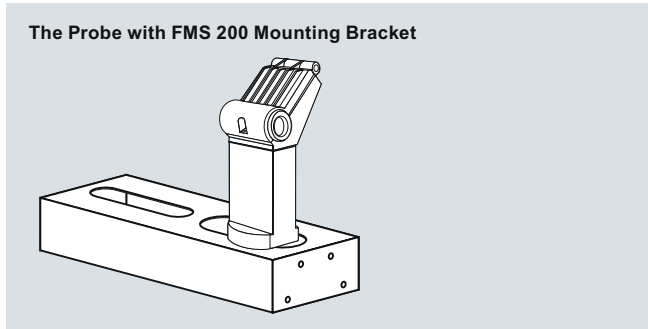
## Continuous level measurement – Ultrasonic transmitters

### The Probe

#### Options

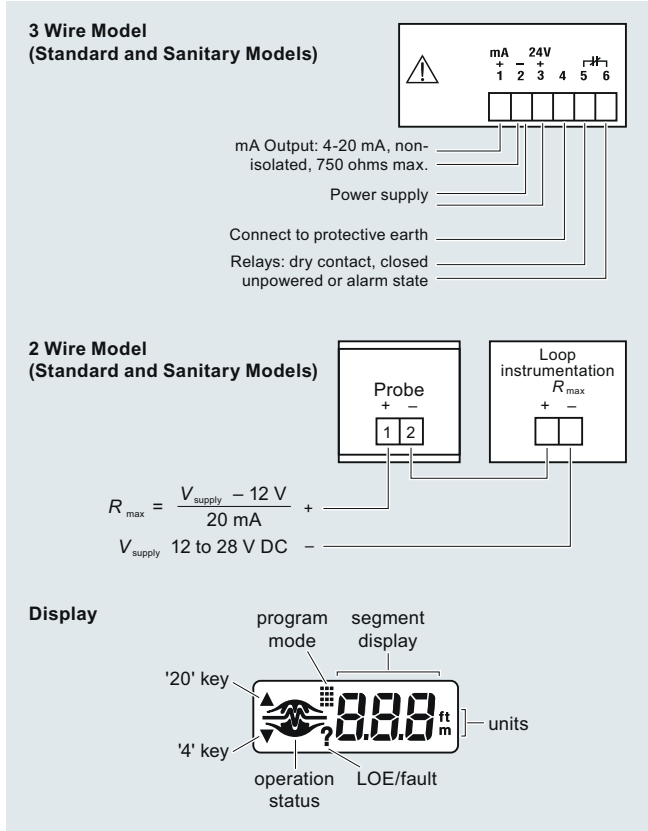


The Probe Optional Flange Adapter, dimensions in mm (inch)



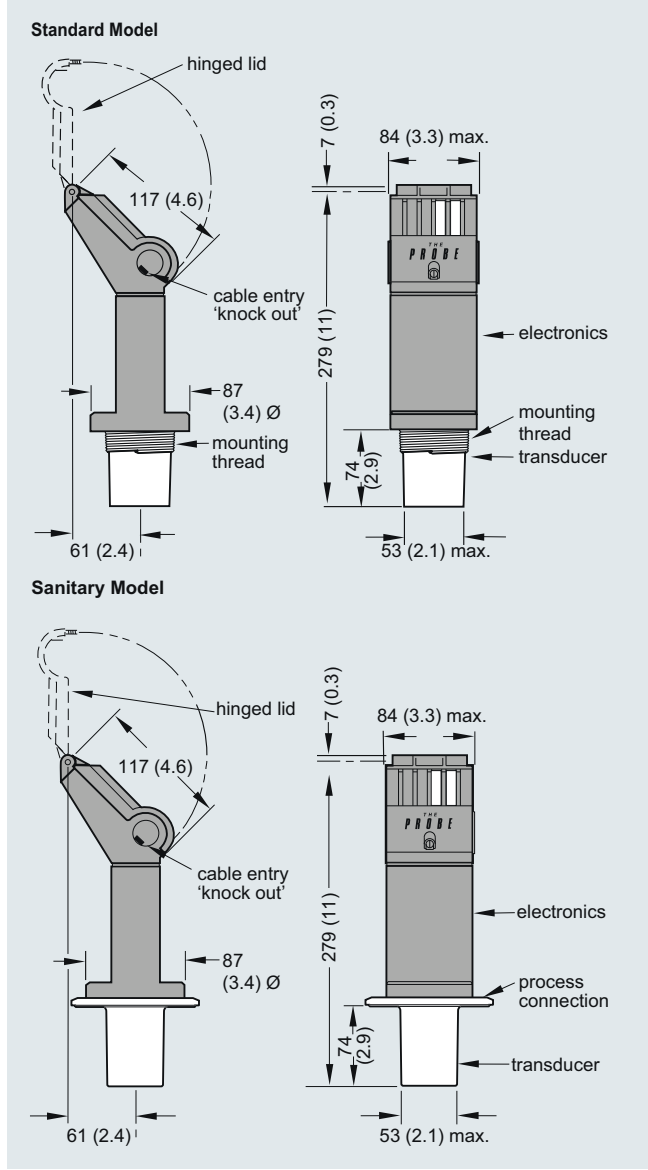
The Probe with Optional Mounting Bracket

#### Schematics



The Probe connections

#### Dimensional drawings



The Probe, dimensions in mm (inch)



# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

SITRANS Probe LU

### Overview



SITRANS Probe LU is a 2-wire loop powered ultrasonic transmitter for level, volume and flow monitoring of liquids in open channels, storage vessels, and simple process vessels.

### Benefits

- Continuous level measurement up to 12 m (40 ft) range
- Easy installation and simple start-up
- Programming using infrared Intrinsically Safe handheld programmer, SIMATIC PDM or HART Communicator
- Communication using HART or PROFIBUS PA
- ETFE or PVDF transducers for chemical compatibility
- Patented Sonic Intelligence signal processing
- Extremely high signal-to-noise ratio
- Auto False-Echo Suppression for fixed obstruction avoidance
- Level to volume or level to flow conversion

### Application

The SITRANS Probe LU is ideal for level monitoring in the water and wastewater industry and chemical storage vessels.

The range of SITRANS Probe LU is 6 or 12 m (20 or 40 ft). Using Auto False-Echo Suppression for fixed obstruction avoidance, as well as an improved signal-to-noise ratio and improved accuracy of 0.15% of range or 6 mm (0.25"), the Probe LU provides unmatched reliability.

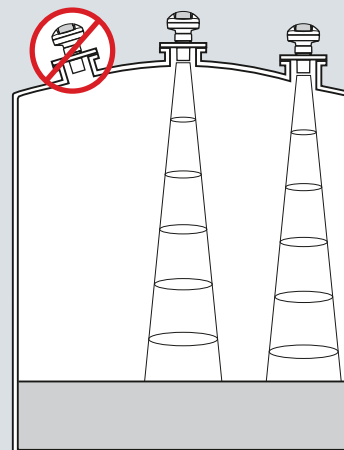
SITRANS Probe LU includes Sonic Intelligence signal processing from the field-proven Probe and incorporates new echo processing features and the latest micro-processor and communications technology. The Probe LU offers two communications options: HART or PROFIBUS PA (Profile version 3.0, Class B).

The transducer on the Probe LU is available as ETFE or PVDF to suit the chemical conditions of your application. As well, for applications with varying material and process temperatures, the Probe LU incorporates an internal temperature sensor to compensate for temperature changes.

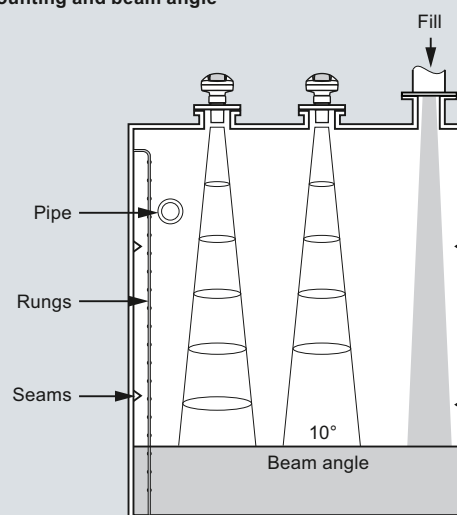
- Key Applications: chemical storage vessels, filter beds, liquid storage vessels

### Configuration

#### Parabolic mounting



#### Flat mounting and beam angle



SITRANS Probe LU mounting

# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

### SITRANS Probe LU

#### Technical specifications

<b>Mode of operation</b>		<b>Process connection</b>	
Measuring principle	Ultrasonic level measurement	• Threaded connection	2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1] 3" (80 mm) universal flange
Typical application	Level measurement in storage vessels and simple process vessels	• Flange connection	FMS 200 mounting bracket (see page 5/198) or customer supplied mount
		• Other connection	
<b>Inputs</b>		<b>Display and Controls</b>	
Measuring range		Interface	Local: LCD display with bar graph Remote: Available via HART or PROFIBUS PA
• 6 m (20 ft) model	0.25 ... 6 m (10" ... 20 ft)	Configuration	Using Siemens SIMATIC PDM (PC) or HART handheld communicator or Siemens infrared handheld programmer
• 12 m (40 ft) model	0.25 ... 12 m (10" ... 40 ft)	Memory	Non-volatile EEPROM
Frequency	54 kHz		
<b>Outputs</b>		<b>Power supply</b>	
mA/HART		4 ... 20 mA/HART	Nominal 24 V DC with 550 Ω maximum; maximum 30 V DC 4 ... 20 mA
• Range	4 ... 20 mA	PROFIBUS PA	12, 13, 15, or 20 mA depending on programming (General Purpose or Intrinsically Safe version) per IEC 61158-2
• Accuracy	± 0.02 mA		
PROFIBUS PA	Profile 3, Class B		
<b>Performance</b>		<b>Certificates and Approvals</b>	
Resolution	≤ 3 mm (0.12")	General	CSA <sub>US/C</sub> , FM, CE, C-TICK • Lloyd's Register of Shipping • ABS Type Approval
Accuracy	± the greater of 0.15 % of range or 6 mm (0.24")	Marine (only applies to HART communication option)	
Repeatability	≤ 3 mm (0.12")	Hazardous	
Blanking distance	0.25 m (10")	• Intrinsically Safe (Europe)	ATEX II 1G EEx ia IIC T4
Update time	≤ 5 s	• Intrinsically Safe (USA/Canada)	CSA/FM (barrier required) T4, Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III
• 4/20 mA/HART version	≤ 5 s at 4 mA	• Intrinsically Safe (Australia/New Zealand)	ANZEx Ex ia IIC T4, Tamb = -40 ... +80 °C (-40 ... +176 °F) IP67, IP68
• PROFIBUS version	≤ 4 s at 15 mA current loop	• Intrinsically Safe (International)	IECEx TSA 04.0020X Ex ia IIC T4
Temperature compensation	Built-in to compensate over temperature range	• Intrinsically Safe (Brazil)	INMETRO Br-Ex ia IIC T4
Beam angle	10°	• Non-incendive (USA)	FM (no barrier required) T5: Class I, Div. 2, Groups A,B,C, D
<b>Rated operating conditions</b>		<b>Handheld Programmer</b>	
Ambient conditions		Intrinsically Safe Siemens handheld programmer	Infrared receiver
• Location	Indoor/outdoor	• Approvals for handheld programmer	IS model with ATEX EEx ia IIC T4 CSA/FM Class I, Div. 1, Groups A, B, C, D
• Ambient temperature	-40 ... +80 °C (-40 ... +176 °F)	Ambient temperature	-20 ... +40 °C (-5 ... +104 °F)
• Relative humidity/ingress protection	Suitable for outdoor	Interface	Proprietary infrared pulse signal
• Installation category	I	Power	3 V lithium battery (non-replaceable)
• Pollution degree	4		
Medium conditions			
• Temperature at flange or threads	-40 ... +85 °C (-40 ... +185 °F)		
• Pressure (vessel)	0.5 bar g (7.25 psi g)		
<b>Design</b>			
Material (enclosure)	PBT (Polybutylene Terephthalate)		
Degree of protection	Type 4X/NEMA 4X, Type 6/NEMA 6/IP67/IP68 enclosure		
Weight	2.1 kg (4.6 lbs)		
Cable inlet	2 x M20x1.5 cable gland or 2 x ½" NPT thread or 1 x M20 x 1.5 and 1 x ½" NPT		
Material (transducer)	ETFE (Ethylene Tetrafluoroethylene) or PVDF (Polyvinylidene Fluoride)		

# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

### SITRANS Probe LU

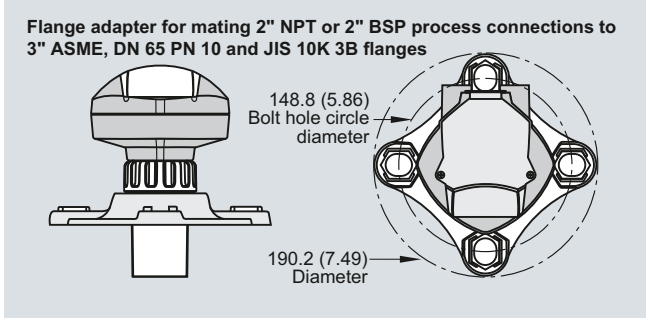
Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>SITRANS Probe LU</b> <b>2-wire, loop powered ultrasonic transmitter for level, volume and flow monitoring of liquids in open channels, storage vessels, and simple process vessels.</b>	C) <b>7ML5221-</b>	<b>Further designs</b> Please add <b>"-Z"</b> to Order No. and specify Order code(s).	
<b>Enclosure/Cable Inlet</b> Plastic (PBT), 1 x M20x1.5 and 1 x 1/2" NPT (no cable glands supplied) Plastic (PBT), 2 x M20x1.5 (includes 1 general purpose cable gland: 7ML1930-1AM) Plastic (PBT), 2 x 1/2" NPT (no cable glands supplied)	0 1 2	Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Range/Transducer material</b> 6 meter (20 ft), ETFE 6 meter (20 ft), PVDF Copolymer 12 meter (40 ft), ETFE 12 meter (40 ft), PVDF Copolymer	A B C D	<b>Operating Instructions for HART/mA device</b> English French German Note: The Operating Instructions should be ordered as a separate item on the order. Additional 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.	Order No. C) <b>7ML1998-5HT02</b> C) <b>7ML1998-5HT12</b> C) <b>7ML1998-5HT32</b> C) <b>7ML1998-5QR81</b>
<b>Process connection</b> 2" NPT [(Taper), ANSI/ASME B1.20.1] R 2" [(BSPT), EN 10226] G 2" [(BSPP), EN ISO 228-1]	A B C	<b>Operating Instructions for PROFIBUS PA device</b> English German Note: The Operating Instructions should be ordered as a separate item on the order. Additional 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) <b>7ML1998-5JB02</b> C) <b>7ML1998-5JB32</b> C) <b>7ML1998-5QV81</b>
<b>Communication/Output</b> 4 ... 20 mA, HART PROFIBUS PA	1 2	<b>Optional equipment</b> Handheld programmer, Intrinsically Safe, EEx ia Handheld programmer, General Purpose approvals Handheld programmer, Infrared, Intrinsically Safe, PROFIBUS PA HART modem/RS-232 (for use with PC and SIMATIC PDM) HART modem/USB (for use with a PC and SIMATIC PDM) 2" NPT locknut, plastic 2" BSPT locknut, plastic 3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT 3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT One General Purpose polymeric cable gland M20x1.5, rated for -20 ... +80 °C (-4 ... +176 °F) One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F) for General Purpose or ATEX EEx e installations (available for HART only) One metallic cable gland M20x1.5, rated -40 ... +80 °C (-40 ... +176 °F) with integrated shield connection (available for PROFIBUS PA) Probe LU, rock guard/sunshield kit, 304 SS 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	D) <b>7MF4997-1DA</b> D) <b>7MF4997-1DB</b> <b>7ML1830-1DT</b> <b>7ML1830-1DQ</b> <b>7ML1830-1BT</b> <b>7ML1830-1BU</b> <b>7ML1930-1AM</b> <b>7ML1930-1AP</b> <b>7ML1930-1AQ</b> C) <b>7ML1930-1GH</b> K) <b>7ML5750-1AA00-0</b>
<b>Approvals</b> General Purpose, FM, CSA, CE, C-TICK FM, Class I, Div. 2 <sup>1)</sup> Intrinsically Safe, CSA/FM Class I, Div. 1, Groups A, B, C, D (barrier required); Class II, Div. 1, Groups E, F, G; Class III <sup>2)</sup> Intrinsically Safe, ATEX II 1G EEx ia IIC T4 <sup>2)</sup> Intrinsically safe, ATEX II 1 G EEx ia IIC T4, ANZEx, IECEX, INMETRO, CE, C-TICK <sup>3)</sup> Intrinsically safe, CSA/FM Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1 Group E, F, G; Class III T4 <sup>3)</sup>	1 4 5 6 7 8	<b>Spare Parts</b> Plastic lid	<b>7ML1830-1KB</b>
1) Available with Enclosure/Cable Inlet option 2 only. 2) Available with communication option 2 only. 3) Available with communication option 1 only.		C) Subject to export regulations AL: N, ECCN: EAR99. D) Subject to export regulations AL: N, ECCN: EAR99H. K) Subject to export regulations AL: N, ECCN: 5A991X.	
C) Subject to export regulations AL: N, ECCN: EAR99.			

# Level Measurement

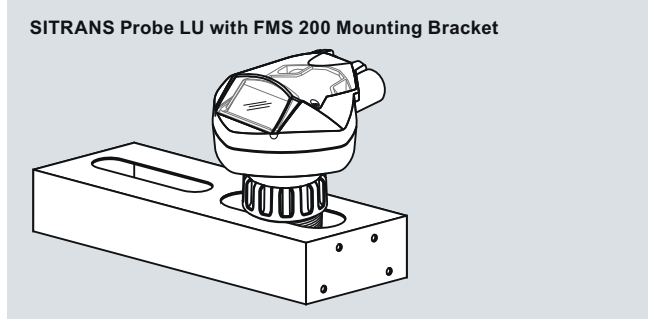
## Continuous level measurement – Ultrasonic transmitters

### SITRANS Probe LU

#### Options

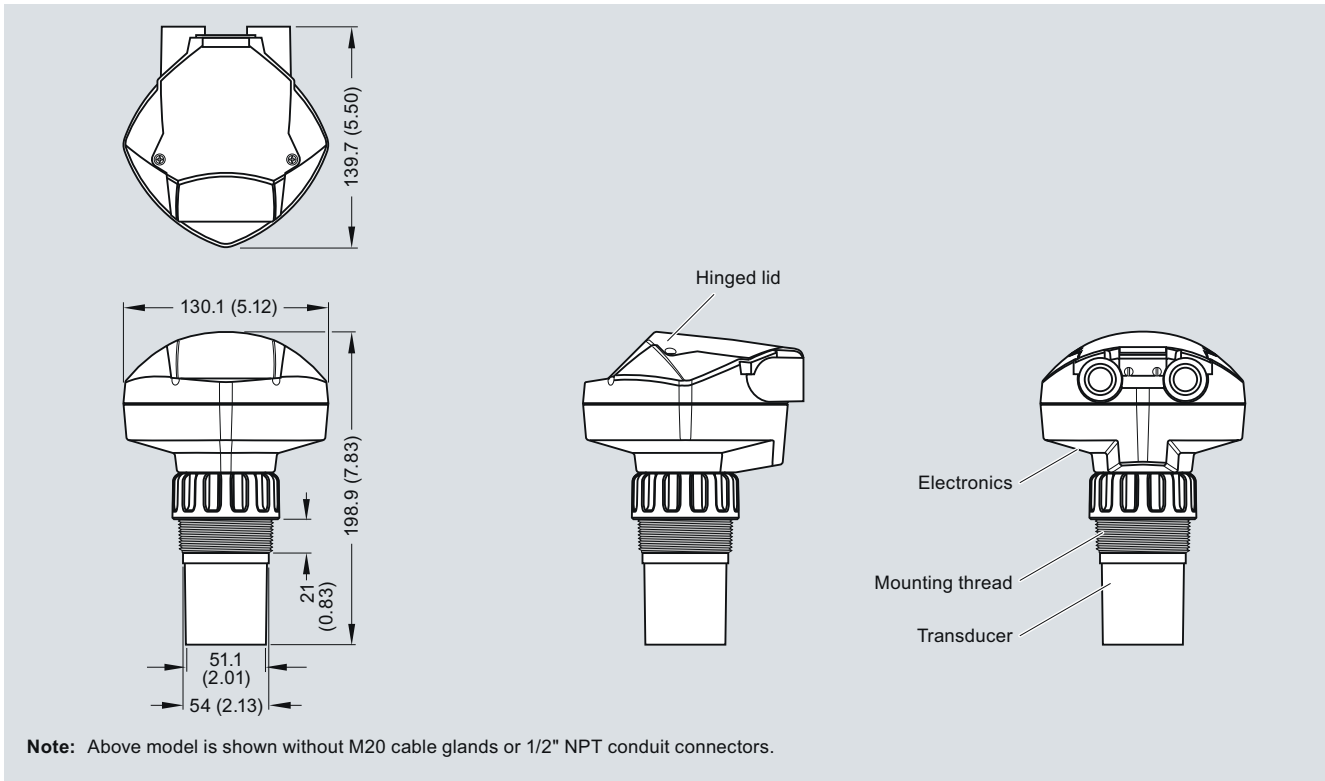


SITRANS Probe LU optional flange adapter, dimensions in mm (inch)



SITRANS Probe LU with optional mounting bracket

#### Dimensional drawings



SITRANS Probe LU, dimensions in mm (inch)

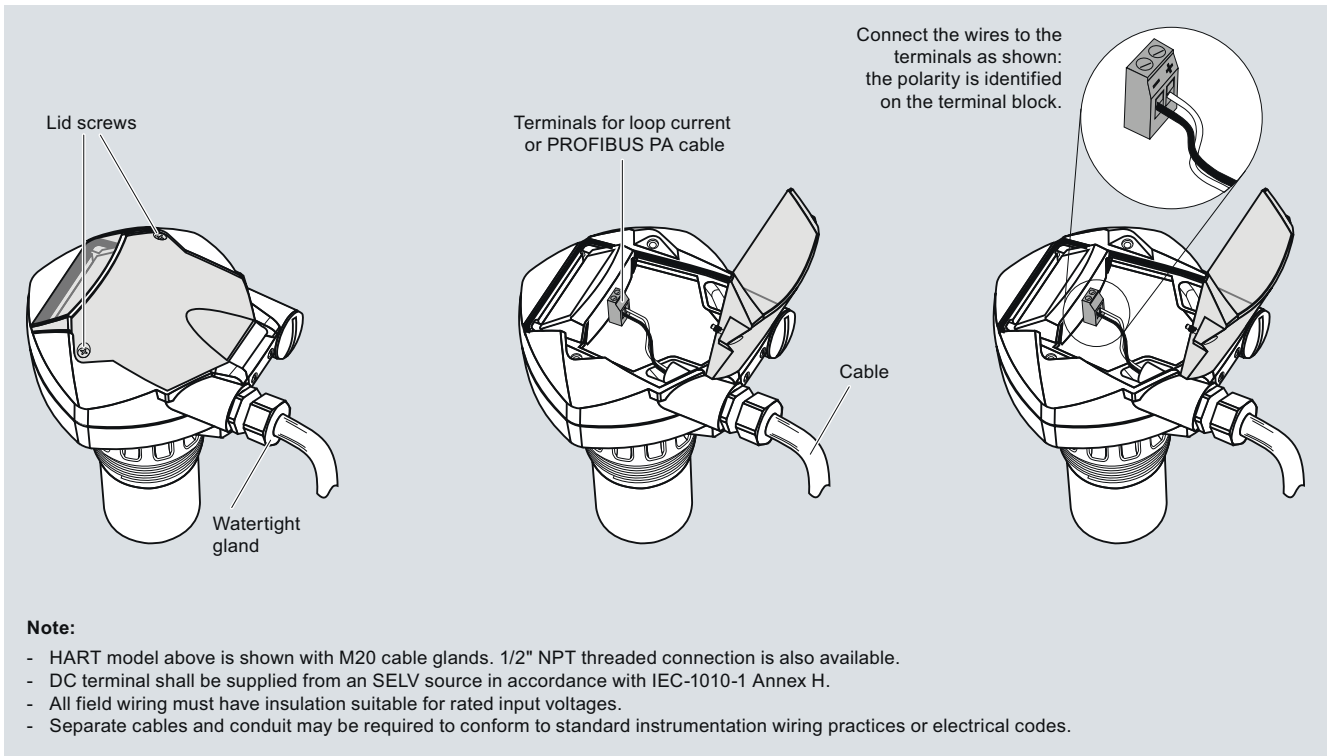
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# Level Measurement

## Continuous level measurement – Ultrasonic transmitters

SITRANS Probe LU

### Schematics



SITRANS Probe LU connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### HydroRanger 200

#### Overview



HydroRanger 200 is an ultrasonic level controller for up to six pumps and provides control, differential control, and open channel flow monitoring.

#### Benefits

- Monitors wet wells, weirs and flumes
- Digital communications with built-in Modbus RTU via RS-485
- Compatible with SmartLinx system and SIMATIC PDM configuration software
- Single or dual point level monitoring
- 6 relay (standard), 1 or 3 relay (optional)
- Auto False-Echo Suppression for fixed obstruction avoidance
- Anti-grease ring/tide mark buildup
- Differential amplifier transceiver for common mode noise rejection and improved signal-to-noise ratio
- Wall and panel mounting options

#### Application

For water authorities, municipal water, and wastewater plants, HydroRanger 200 is an economical, low-maintenance solution delivering control efficiency and productivity needed to meet today's exacting standards. It offers single point monitoring with all models, and optional dual-point monitoring with 6 relay model. As well, it has digital communications with built-in Modbus RTU via RS-485.

The standard 6 relay HydroRanger 200 will monitor open channel flow and features more advanced relay alarming and pump control functions as well as volume conversion. It is compatible with SIMATIC PDM, allowing for PC configuration and setup. Sonic Intelligence advanced echo-processing software provides increased reading reliability. The optional 1 or 3 relay models provide accurate level measurement functions only; these two models do not provide open channel flow, differential level measurement or volume conversion functions.

HydroRanger 200 uses proven continuous ultrasonic echo ranging technology to monitor water and wastewater of any consistency up to 15 m (50 ft) in depth. Achievable resolution is 0.1% with accuracy to 0.25% of range. Unlike contacting devices, HydroRanger 200 is immune to problems caused by suspended solids, harsh corrosives, grease or silt in the effluent, reducing downtime.

- Key Applications: wet wells, flumes/weirs, bar screen control

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

HydroRanger 200

### Technical specifications

<b>Mode of Operation</b>	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft), transducer dependent
Measuring points	1 or 2
<b>Input</b>	
Analog	0 ... 20 mA or 4 ... 20 mA, from alternate device, scaleable (6 relay model)
Discrete	10 ... 50 V DC switching level Logical 0 = < 0.5 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA
<b>Output</b>	
Echomax transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
Relays <sup>1)</sup>	Rating 5 A at 250 V AC, non-inductive
• Model with 1 relay <sup>2)</sup>	1 SPST Form A
• Model with 3 relays <sup>2)</sup>	2 SPST Form A/1 SPDT Form C
• Model with 6 relays	4 SPST Form A/2 SPDT Form C
mA output	0 ... 20 mA or 4 ... 20 mA
• Max. load	750 Ω, isolated
• Resolution	0.1 % of range
<b>Accuracy</b>	
Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater <sup>3)</sup>
Temperature compensation	<ul style="list-style-type: none"> <li>• -50 ... +150 °C (-58 ... +302 °F)</li> <li>• Integral temperature sensor in transducer</li> <li>• External TS-3 temperature sensor (optional)</li> <li>• Programmable fixed temperature values</li> </ul>
<b>Rated operating conditions</b>	
Installation conditions	
• Location	indoor / outdoor
• Installation category	II
• Pollution degree	4
Ambient conditions	
Ambient temperature (enclosure)	-20 ... +50 °C (-4 ... +122 °F)

<b>Design</b>	
Weight	
• Wall mount	1.37 kg (3.02 lbs)
• Panel mount	1.50 kg (3.31 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
Cable	
• Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm <sup>2</sup> (18 AWG), Belden 8760 or equivalent is acceptable
• Max. separation between transducer and transceiver	365 m (1200 ft)
<b>Displays and controls</b>	
	100 x 40 mm (4 x 1.5") multi-block LCD with backlighting
Programming	Programming using handheld programmer or via PC with SIMATIC PDM software
<b>Power supply<sup>4)</sup></b>	
AC version	100 ... 230 V AC ± 15%, 50/60 Hz, 36 VA (17 W)
DC version	12 ... 30 V DC (20 W)
<b>Certificates and approvals</b>	
	<ul style="list-style-type: none"> <li>• CE, C-TICK<sup>5)</sup></li> <li>• Lloyd's Register of Shipping</li> <li>• ABS Type Approval</li> <li>• FM, CSA<sub>US/C</sub>, UL listed</li> <li>• CSA<sub>US/C</sub> Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only)</li> <li>• MCERTS Class 1 approved for Open Channel Flow</li> </ul>
<b>Communication</b>	
	<ul style="list-style-type: none"> <li>• RS-232 with Modbus RTU or ASCII via RJ-11 connector</li> <li>• RS-485 with Modbus RTU or ASCII via terminal blocks</li> <li>• Optional: SmartLinx cards for <ul style="list-style-type: none"> <li>- PROFIBUS DP</li> <li>- DeviceNet</li> <li>- Allen-Bradley Remote I/O</li> </ul> </li> </ul>

<sup>1)</sup> All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays

<sup>2)</sup> This model is level control only; no open channel flow, differential level or volume conversion functions

<sup>3)</sup> Program range is defined as the empty distance to the face of the transducer plus any range extension

<sup>4)</sup> Maximum power consumption is listed

<sup>5)</sup> EMC performance available upon request

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### HydroRanger 200

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Siemens HydroRanger 200</b> Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from number of measurement points options below.	L) <b>7ML5034-</b>	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s).  Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Mounting</b> Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount <sup>1)</sup>	1 2 3	<b>Operating Instructions</b> English French German Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. C) <b>7ML1998-5FC03</b> C) <b>7ML1998-5FC11</b> C) <b>7ML1998-5FC33</b>
<b>Power supply</b> 100 ... 230 V AC 12 ... 30 V DC	A B	<b>Other Operating Instructions</b> SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx DeviceNet, English Note: The appropriate SmartLinx Operating Instructions should be ordered as a separate line on the order.	C) <b>7ML1998-1AP03</b> C) <b>7ML1998-1AQ03</b> C) <b>7ML1998-1AQ33</b> C) <b>7ML1998-1BH02</b>
<b>Number of measurement points</b> Single point model, 6 relays Dual point model, 6 relays Single point model, level only, 1 relay <sup>2)</sup> Single point model, level only, 3 relays <sup>2)</sup>	A B C D	<b>Accessories</b> Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure Sunshield kit, 304 SS 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	<b>7ML1830-2AK</b> <b>7ML1830-1AC</b> <b>7ML1830-1GA</b> K) <b>7ML5750-1AA00-0</b>
<b>Communication (SmartLinx)</b> Without module SmartLinx Allen-Bradley Remote I/O module SmartLinx PROFIBUS DP module  SmartLinx DeviceNet module See SmartLinx product page 5/120 for more information.	0 1 2 3	<b>Spare parts</b> Power Supply Board (100 ... 230 V AC) Power Supply Board (12 ... 30 V DC) Display Board C) Subject to export regulations AL: N, ECCN: EAR99. K) Subject to export regulations AL: N, ECCN: 5A991X.	C) <b>7ML1830-1MD</b> C) <b>7ML1830-1ME</b> C) <b>7ML1830-1MF</b>
<b>Approvals</b> General Purpose CE, FM, CSA <sub>USC</sub> , UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)	1 2		

<sup>1)</sup> Available with approval option 1 only

<sup>2)</sup> This model is level control only; no open channel flow, differential level, or volume conversion functions

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

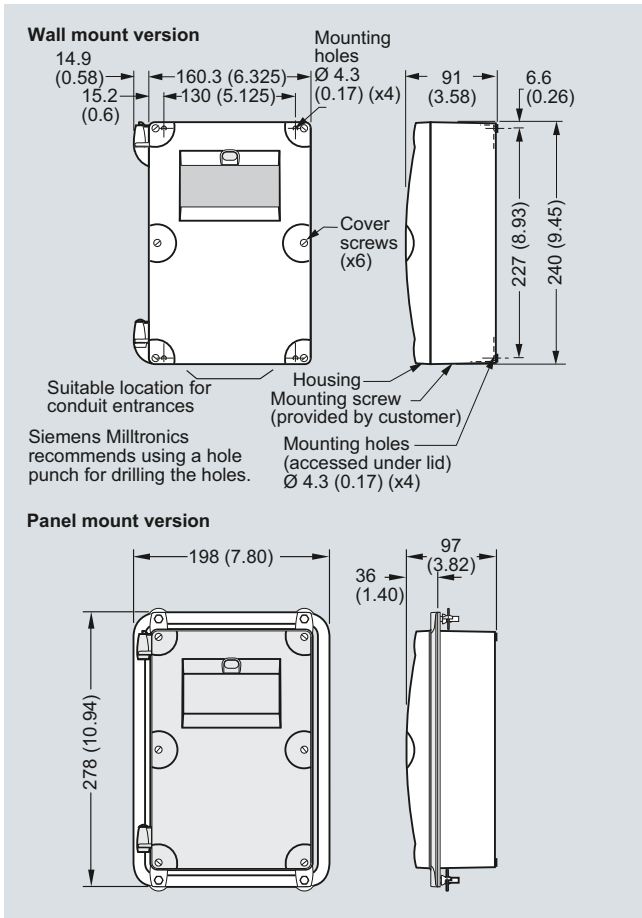


# Level Measurement

## Continuous level measurement – Ultrasonic controllers

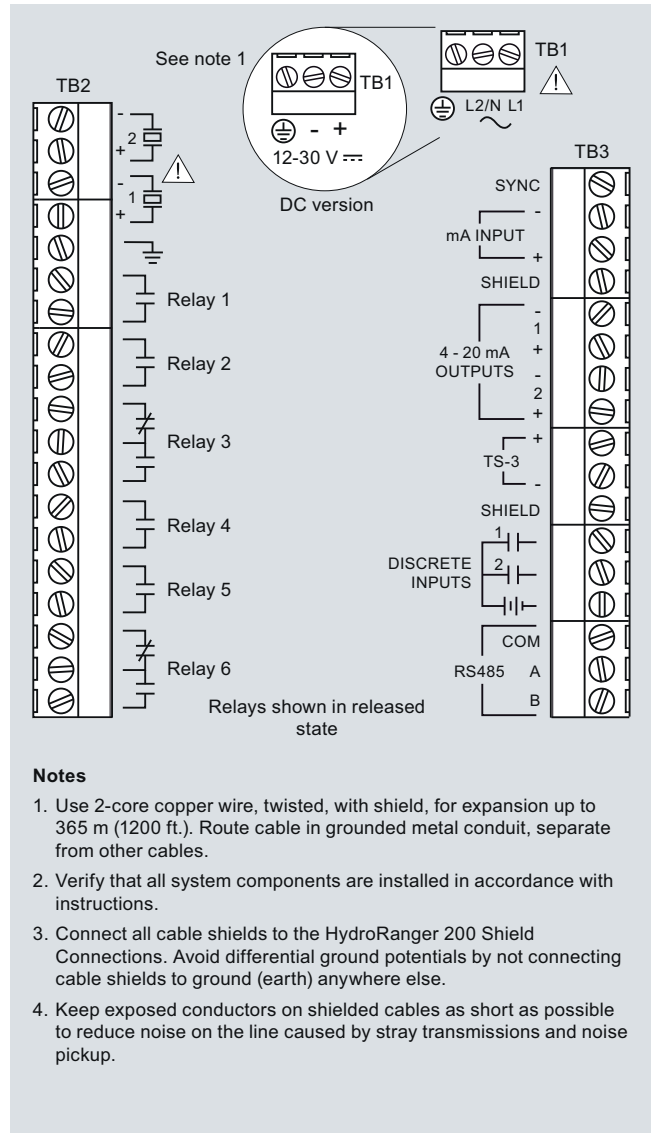
HydroRanger 200

### Dimensional drawings



HydroRanger 200, dimensions in mm (inch)

### Schematics



HydroRanger 200 connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### MultiRanger 100/200

#### Overview



MultiRanger is a versatile short to medium-range ultrasonic single and multi-vessel level monitor/controller for virtually any application in a wide range of industries.

#### Benefits

- Digital input for back-up level override from point level device
- Communication using built-in Modbus RTU via RS-485
- Compatible with SmartLinx system and SIMATIC PDM configuration software
- Single or dual point level monitoring
- Auto False-Echo Suppression for fixed obstruction avoidance
- Differential amplifier transceiver for common mode noise reduction and improved signal-to-noise ratio
- MultiRanger 100: level measurements, simple pump control, and level alarm functions
- MultiRanger 200: level, volume and flow measurements in open channels, differential control, extended pump control, and alarm functions
- Wall and panel mounting options

#### Application

MultiRanger can be used on different materials, including fuel oil, municipal waste, acids, woodchips, or on materials with high angles of repose. MultiRanger offers true dual point monitoring, digital communications with built-in Modbus RTU via RS-485, as well as compatibility with SIMATIC PDM, allowing PC configuration and setup. MultiRanger features Sonic Intelligence advanced echo-processing software for increased reading reliability.

MultiRanger 100 offers cost-effective level alarming, as well as on/off and alternating pump control. MultiRanger 200 will monitor open channel flow and features more advanced relay alarming and pump control functions as well as volume conversion.

It is compatible with chemical-resistant Echomax transducers that can be used in hostile environments at temperatures as high as +145 °C (+293 °F).

- Key Applications: wet wells, flumes/weirs, bar screen control, hoppers, chemical storage, liquid storage, crusher bins, dry solids storage

#### Design

The MultiRanger is available in wall or panel mounting options.

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

MultiRanger 100/200

### Technical specifications

#### Mode of Operation

Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft)
Measuring points	1 or 2

#### Input

<ul style="list-style-type: none"> <li>Analog (MultiRanger 200 only)</li> </ul>	0 ... 20 mA or 4 ... 20 mA, from alternate device, scalable
<ul style="list-style-type: none"> <li>Discrete</li> </ul>	10 ... 50 V DC switching level Logical 0 = < 0.5 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA

#### Output

Echomax transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12, and XRS-5
Relays	Rating 5 A at 250 V AC, non-inductive
<ul style="list-style-type: none"> <li>Version with 1 relay (MultiRanger 100 only)</li> </ul>	1 SPST Form A
<ul style="list-style-type: none"> <li>Version with 3 relays</li> </ul>	2 SPST Form A/1 SPDT Form C
<ul style="list-style-type: none"> <li>Version with 6 relays</li> </ul>	4 SPST Form A/2 SPDT Form C
mA output	0 ... 20 mA or 4 ... 20 mA
<ul style="list-style-type: none"> <li>Max. load</li> </ul>	750 Ω, isolated
<ul style="list-style-type: none"> <li>Resolution</li> </ul>	0.1% of range

#### Accuracy

<ul style="list-style-type: none"> <li>Error in measurement</li> </ul>	0.25% of range or 6 mm (0.24"), whichever is greater
<ul style="list-style-type: none"> <li>Resolution</li> </ul>	0.1% of measuring range <sup>1)</sup> or 2 mm (0.08"), whichever is greater
<ul style="list-style-type: none"> <li>Temperature compensation</li> </ul>	<ul style="list-style-type: none"> <li>-50 ... +150 °C (-58 ... +302 °F)</li> <li>Integral temperature sensor</li> <li>External TS-3 temperature sensor (optional)</li> <li>Programmable fixed temperature values</li> </ul>

#### Rated operating conditions

Installation conditions	
<ul style="list-style-type: none"> <li>Location</li> </ul>	Indoor/outdoor
<ul style="list-style-type: none"> <li>Installation category</li> </ul>	II
<ul style="list-style-type: none"> <li>Pollution degree</li> </ul>	4
Ambient conditions	
<ul style="list-style-type: none"> <li>Ambient temperature (housing)</li> </ul>	-20 ... +50 °C (-4 ... +122 °F)

#### Design

Weight	
<ul style="list-style-type: none"> <li>Wall mount</li> </ul>	1.37 kg (3.02 lbs)
<ul style="list-style-type: none"> <li>Panel mount</li> </ul>	1.50 kg (3.31 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
<ul style="list-style-type: none"> <li>Wall mount</li> </ul>	IP65/Type 4X/NEMA 4X
<ul style="list-style-type: none"> <li>Panel mount</li> </ul>	IP54/Type 3/NEMA 3
Electrical connection	
<ul style="list-style-type: none"> <li>Transducer and mA output signal</li> </ul>	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden 8760 or equivalent is acceptable
<ul style="list-style-type: none"> <li>Max. separation between transducer and transceiver</li> </ul>	365 m (1200 ft)

#### Displays and controls

	100 x 40 mm (4 x 1.5") multi-block LCD with backlighting
<ul style="list-style-type: none"> <li>Programming</li> </ul>	Programming using hand-held programmer, SIMATIC PDM or via PC with Dolphin Plus software

#### Power supply

<ul style="list-style-type: none"> <li>AC version</li> </ul>	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA (17 W)
<ul style="list-style-type: none"> <li>DC version</li> </ul>	12 ... 30 V DC (20 W)

#### Certificates and approvals

- CE, C-TICK<sup>2)</sup>
- Lloyd's Register of Shipping
- ABS Type Approval
- FM, CSA<sub>US/C</sub>, UL listed
- CSA Class I, Div. 2, Groups A, B, C and D, Class II, Div.2, Groups F and G, Class III (wall mount only), ATEX II 3D

#### Communication

- RS-232 with Modbus RTU or ASCII via RJ-11 connector
- RS-485 with Modbus RTU or ASCII via terminal strips
- Optional: SmartLinx cards for
  - PROFIBUS DP
  - DeviceNet
  - Allen-Bradley Remote I/O

<sup>1)</sup> Program range is defined as the empty distance to the face of the transducer plus any range extension

<sup>2)</sup> EMC performance available on request

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### MultiRanger 100/200

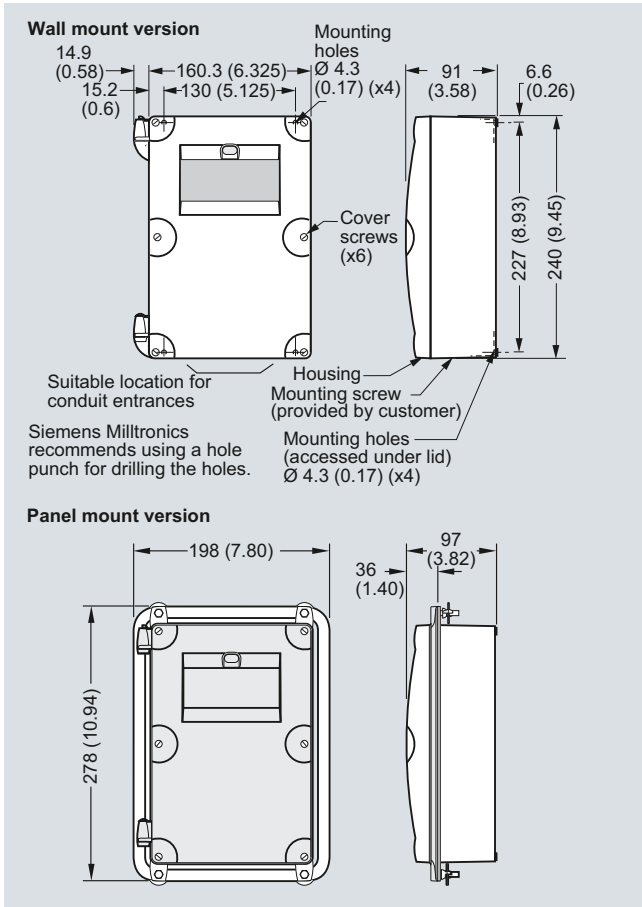
Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>MultiRanger 100/200</b> Versatile short to medium-range ultrasonic single and multi-vessel level monitor/controller for virtually any application in a wide range of industries	L) <b>7ML5033-</b>	<b>Further designs</b>	
<b>Versions</b> MultiRanger 100, level measurement only MultiRanger 200, level, volume, flow and differential measurements	1 2	Please add "-Z" to Order No. and specify Order code(s).	
<b>Mounting, enclosure design</b> Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount (CE, CSA <sub>US/IC</sub> , FM, UL)	A B C	Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Power supply</b> 100 ... 230 V AC 12 ... 30 V DC	A B	<b>Operating Instructions</b>	Order No.
<b>Number of measurement points</b> Single point version Dual point version	0 1	English French Spanish German	C) <b>7ML1998-5FB06</b> C) <b>7ML1998-5FB13</b> C) <b>7ML1998-5FB23</b> C) <b>7ML1998-5FB36</b> C) <b>7ML1998-5QD83</b>
<b>Communication (SmartLinX)</b> Without module SmartLinX Allen-Bradley Remote I/O module SmartLinX PROFIBUS DP module SmartLinX DeviceNet module See SmartLinX product page 5/120 for more information.	0 1 2 3	Quick Start guide, multi-language Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	
<b>Output relays</b> 3 relays (2 Form A, 1 Form C), 250 V AC 6 relays (4 Form A, 2 Form C), 250 V AC 1 relay (1 Form A), 250 V AC (available on MultiRanger 100 model only)	1 2 3	<b>Other Operating Instructions</b>	
<b>Approvals</b> General Purpose CE, FM, CSA <sub>US/IC</sub> , UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III <sup>1)</sup> ATEX II 3D <sup>2)</sup>	A B C	SmartLinX Allen-Bradley Remote I/O, English SmartLinX PROFIBUS DP, English SmartLinX PROFIBUS DP, German SmartLinX DeviceNet, English Note: The appropriate SmartLinX Operating Instructions should be ordered as a separate line on the order.	C) <b>7ML1998-1AP03</b> C) <b>7ML1998-1AQ03</b> C) <b>7ML1998-1AQ33</b> C) <b>7ML1998-1BH02</b>
<sup>1)</sup> For wall mount applications only <sup>2)</sup> For standard enclosure wall mount, option A only		<b>Accessories</b>	
		Handheld programmer	<b>7ML1830-2AK</b>
		Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure	<b>7ML1930-1AC</b>
		M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers)	<b>7ML1930-1FV</b>
		Sunshield kit, 304 SS	<b>7ML1930-1GA</b>
		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) <b>7ML5750-1AA00-0</b>
		<b>Spare parts</b>	
		Power Supply Board (100 ... 230 V AC)	C) <b>7ML1830-1MD</b>
		Power Supply Board (12 ... 30 V DC)	C) <b>7ML1830-1ME</b>
		Display Board	C) <b>7ML1830-1MF</b>
		C) Subject to export regulations AL: N, ECCN: EAR99.	
		K) Subject to export regulations AL: N, ECCN: 5A991X.	

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

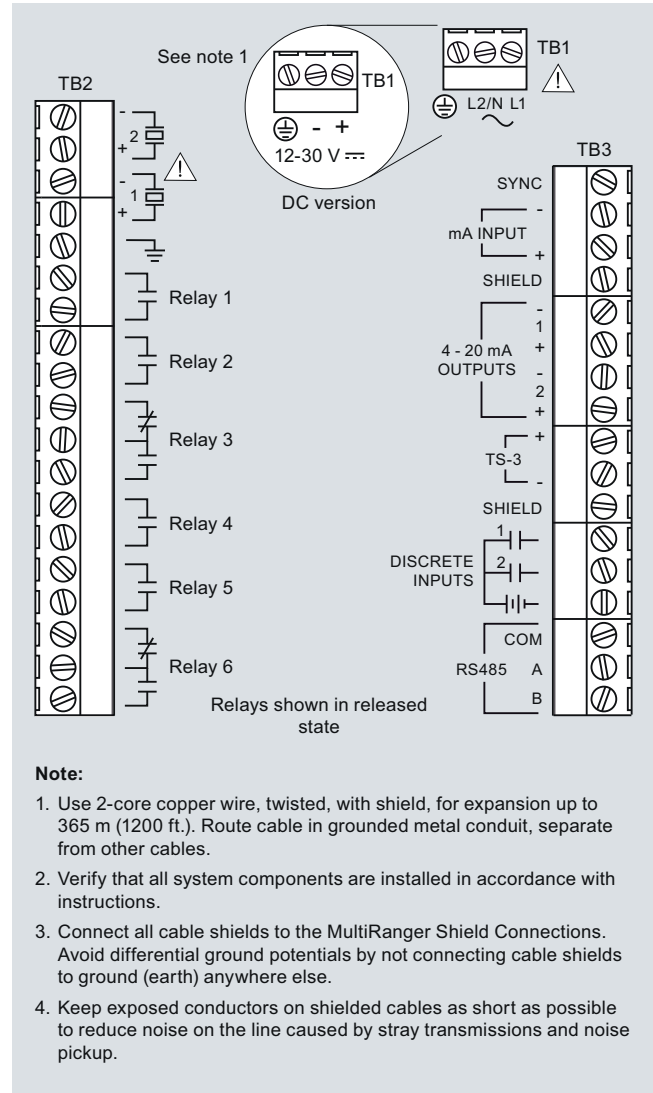
MultiRanger 100/200

### Dimensional drawings



MultiRanger, dimensions in mm (inch)

### Schematics



MultiRanger connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### HydroRanger Plus

#### Overview



HydroRanger Plus is an ultrasonic level controller for control of wet wells and reservoir pump operations, differential control, and open channel flow monitoring, using energy-saving algorithms.

#### Benefits

- Outputs for alarms, chart recorders, controllers and integration of existing systems
- Monitors wet wells, weirs and flumes
- Energy-saving function with built-in real-time clock
- Special control mode to reduce grease rings and other deposits
- Integral temperature compensation
- Pump performance monitoring
- System monitoring and network analysis

#### Application

The system is effective in wet wells, weirs, and flumes where foam and turbulence are typical operating conditions. It can be customized to meet your specific application needs – from measuring flow rate in a narrow flume to volume in a ferric chloride storage bank.

The system consists of the electronics housed in a wall-mounted enclosure and a hermetically sealed, corrosion-resistant Echo-max transducer. These components can be separated by up to 365 m (1200 ft).

Optional submergence shields ensure consistent operation in wet wells where the transducer may be submerged during flooding from rainfall or a power outage. Siemens patented detection software can differentiate between a submerged condition and a high level.

- Key Applications: wet wells, weirs, flumes

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### HydroRanger Plus

#### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft)
Measuring points	1 or 2
<b>Output</b>	
Ultrasonic transducer	44 kHz
Relays	5 alarm/control relays, 1 SPDT Form C per relay, rated 5 A at 250 V AC, resistive load
mA output	0/4 ... 20 mA, optically isolated
• Max. load	1 kΩ
• Resolution	0.1 % of 20 mA
<b>Accuracy</b>	
Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater <sup>1)</sup>
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) <ul style="list-style-type: none"> <li>• Integral temperature sensor</li> <li>• External TS-3 temperature sensor (optional)</li> <li>• Programmable fixed temperature</li> </ul>
<b>Rated operating conditions</b>	
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
<b>Design</b>	
Rack mount	DIN 3 HU/14 pitch, 4 rail plug-in unit suitable for standard 84 pitch (19") rack
Panel mount	Suitable for standard panel cutout DIN 43700, 72 x 144 mm, 100 mm center height
Degree of protection (wall mount)	IP65/NEMA 4X/Type 4X
Weight (rack and panel mount)	0.87 kg (1.9 lbs)
Weight (wall mount)	1.5 kg (3.3 lbs)
Material (enclosure)	Polyester/polycarbonate alloy
<b>Electrical connection</b>	
	Commercially available copper conductor according to local requirements, rated 250 V/5 A
Ultrasonic transducer cable extension	RG 62-A/U coaxial cable with low capacitance
mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden 8760 or equivalent is acceptable

<b>Power supply</b>	100/115/200/230 V AC, ±15%, 50/60 Hz, 15 VA and/or 9 ... 30 V DC, 8 W
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
<b>Displays and controls</b>	
Rack and panel mount	75 x 20 mm (3 x 0.8") LCD (selectable backlighting)
Wall mount	100 x 40 mm (4 x 1.5") multifield LCD, backlit
<b>Programming</b>	Removable programmer or optional Dolphin Plus
<b>Memory</b>	EEPROM (non-volatile), no backup battery required
<b>Certificates and approvals</b>	CE <sup>2)</sup> , FM, CSA <sub>US/C</sub> , C-TICK

- <sup>1)</sup> The measuring range corresponds to the distance from the zero point to the sensor face, plus any range extension.  
<sup>2)</sup> EMC certificate available on request

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### HydroRanger Plus

Selection and Ordering data	Order No.
<b>HydroRanger Plus, rack and panel mount</b> L) <p>Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display Measuring range: 0.3 m to 15 m (1 ... 50 ft)</p>	<b>7ML1025-</b>
<b>Mounting/device version</b>	
Version for 19" rack (requires terminal block; see accessories)	1
Version for panel	2
<b>Approvals</b>	C
CE (EN 61326), CSA <sub>US/C</sub> , FM, C-TICK	
<b>Input voltage</b>	A
100 V AC, 9 ... 30 V DC	B
115 V AC, 9 ... 30 V DC	C
200 V AC, 9 ... 30 V DC	D
230 V AC, 9 ... 30 V DC	

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add <b>"-Z"</b> to Order No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Operating Instructions</b>	Order No.
English	C) <b>7ML1998-1AC02</b>
French	C) <b>7ML1998-1AC12</b>
German	C) <b>7ML1998-1AC32</b>
Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	
<b>Other Operating Instructions</b>	
SmartLinx Allen-Bradley Remote I/O, English	C) <b>7ML1998-1AP03</b>
SmartLinx PROFIBUS DP, English	C) <b>7ML1998-1AQ03</b>
SmartLinx PROFIBUS DP, German	C) <b>7ML1998-1AQ33</b>
SmartLinx DeviceNet, English	C) <b>7ML1998-1BH02</b>
Note: The appropriate SmartLinx Operating Instructions should be ordered as a separate line on the order.	
<b>Accessories</b>	
Handheld programmer	<b>7ML1830-2AC</b>
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure	<b>7ML1930-1AC</b>
Terminal block for rack mount	<b>7ML1830-1JL</b>
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) <b>7ML5750-1AA00-0</b>
<b>Spare parts</b>	
Card, Analog HydroRanger Plus Rack/Panel	C) <b>7ML1830-1LR</b>
Card, daughter	C) <b>7ML1830-1LS</b>
Card, display, backlit	C) <b>7ML1830-1LX</b>

Selection and Ordering data	Order No.
<b>HydroRanger Plus, wall mount</b> L) <p>Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display Measuring range: 0.3 m to 15 m (1 ... 50 ft)</p>	<b>7ML1028-</b>
<b>Input voltage</b>	A
100 V AC, 9 ... 30 V DC	1
115 V AC, 9 ... 30 V DC	2
200 V AC, 9 ... 30 V DC	3
230 V AC, 9 ... 30 V DC	4
<b>Approvals</b>	C
CE; FM General Purpose; CSA Class I, Div. 2, C-TICK	
<b>Mounting/enclosure version</b>	
Standard enclosure (NEMA 4X)	1
Standard enclosure prepared for five M20 cable glands	3
C) Subject to export regulations AL: N, ECCN: EAR99. L) Subject to export regulations AL: N, ECCN: 3A991X. K) Subject to export regulations AL: N, ECCN: 5A991X.	

Selection and Ordering data	Order code
<b>Further designs</b>	
Please add <b>"-Z"</b> to Order No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Operating Instructions</b>	Order No.
English	C) <b>7ML1998-1AC02</b>
French	C) <b>7ML1998-1AC12</b>
German	C) <b>7ML1998-1AC32</b>
Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	
<b>Accessories</b>	
Handheld programmer	<b>7ML1830-2AC</b>
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure	<b>7ML1930-1AC</b>
M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)	<b>7ML1830-1GM</b>
M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers)	<b>7ML1930-1FV</b>
Sunshield kit, 304 SS	<b>7ML1930-1GA</b>
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) <b>7ML5750-1AA00-0</b>
<b>Spare parts</b>	
Card, mother main	C) <b>7ML1830-1LV</b>
Card, daughter	C) <b>7ML1830-1LW</b>
Card, display	C) <b>7ML1830-1LU</b>
C) Subject to export regulations AL: N, ECCN: EAR99. K) Subject to export regulations AL: N, ECCN: 5A991X.	



# Level Measurement

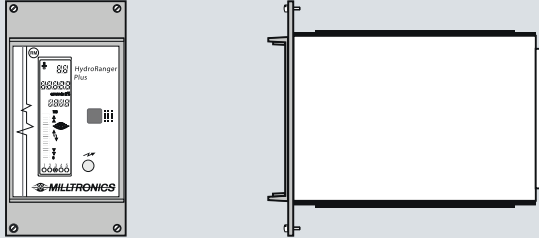
## Continuous level measurement – Ultrasonic controllers

HydroRanger Plus

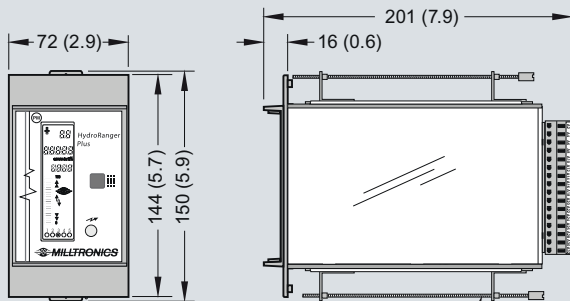
### Dimensional drawings

#### Rack Mount

DIN 3U/14HP, 4 rail plug-in unit suitable for standard 84 HP (19") subrack. (Terminal is customer supplied or available as optional accessory.)

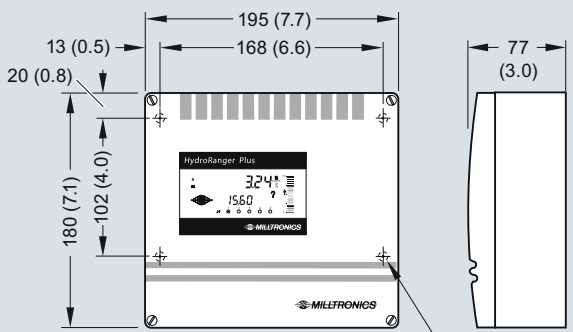


#### Panel Mount



Slip on mounting bracket top and bottom screws to be tightened to no more than 5.9 Nm (1 inch/lb) torque.

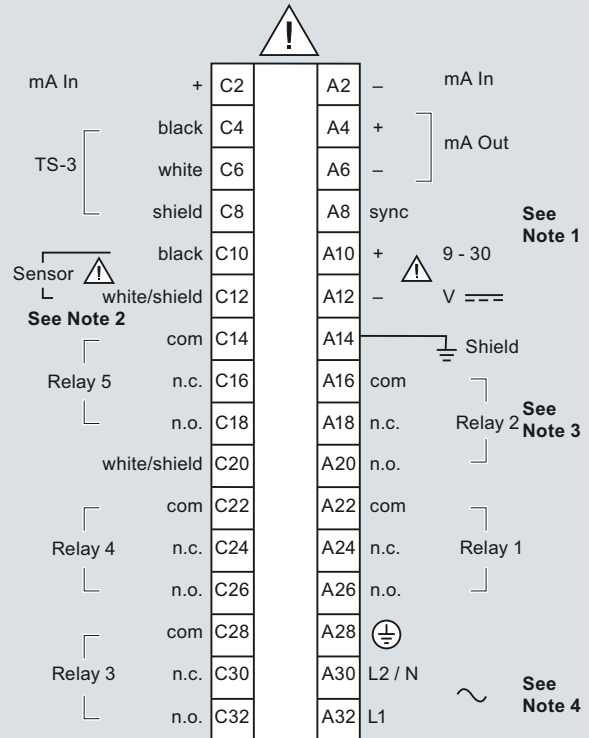
#### Wall Mount



Suitable location for conduit entrances. Use watertight conduit hubs to maintain enclosure rating. mounting holes, Ø4.5 mm (0.18"), 4 places

HydroRanger Plus, dimensions in mm (inch)

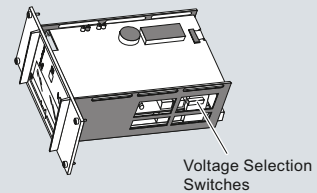
### Schematics



#### Notes

1. Required only if mounted adjacent to other Siemens Milltronics equipment. Interconnect all 'SYNC' terminals with a single 18 AWG (0.5 mm<sup>2</sup>) wire.
2. Use RG-62 A/U coaxial (or equivalent) for extensions up to 365 m (1200 ft). Run in grounded metal conduit, separate from other wiring.
3. Each relay has 1 set of Form 'C' (SPDT) contacts relay rated at 5 A 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed. Relay de-energized when in alarm conditions and energized for pump control.
4. Before applying AC power (mains), ensure the correct voltage is selected. Never operate the HydroRanger Plus with the ground (earth) wire disconnected.

#### Voltage Selection

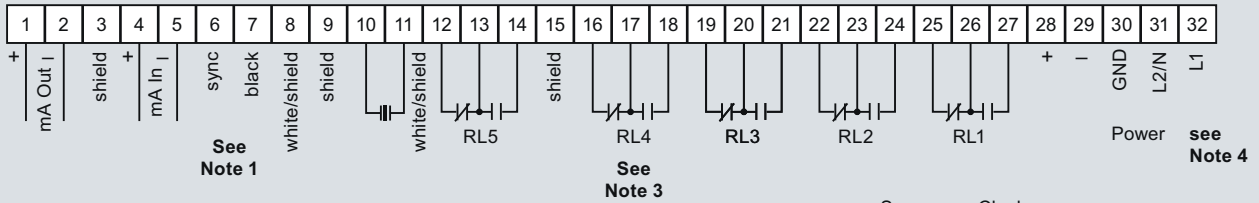


HydroRanger Plus connections, rack and panel mount

# Level Measurement

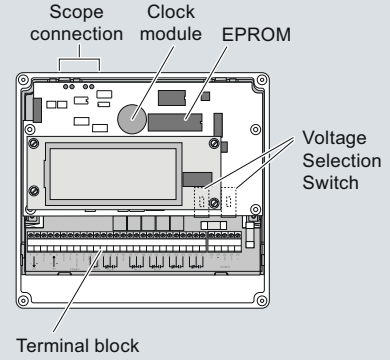
## Continuous level measurement – Ultrasonic controllers

### HydroRanger Plus



**Notes**

- Required only if mounted adjacent to other Siemens Milltronics equipment. Interconnect all 'SYNC' terminals with a single 18 AWG (0.5 mm<sup>2</sup>) wire.
- Use RG-62 A/U coaxial (or equivalent) for extensions up to 365 m (1200 ft). Run in grounded metal conduit, separate from other wiring.
- Each relay has 1 set of Form 'C' (SPDT) contacts relay rated at 5 A 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed. Relay de-energized when in alarm conditions and energized for pump control.
- Before applying AC power (mains), ensure the correct voltage is selected. Never operate the HydroRanger Plus with the ground (earth) wire disconnected.



HydroRanger Plus connections, wall mount

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

SITRANS LUC500

### Overview



SITRANS LUC500 is a complete ultrasonic level controller for monitoring and control of water distribution and wastewater collection systems, with energy-saving algorithms.

### Benefits

- Monitoring and control in one device
- Integral telemetry interface (Modbus RTU/ASCII)
- Patented algorithm for calculation of pumped volume within 5% accuracy
- Logging of pump runtime and number of pump starts
- Expandable with I/Os, RAM for data logging, dual point, SmartLinx communications, and RS-485 interface
- Simple system configuration and diagnostics with Siemens Dolphin Plus Windows-based software
- AC or DC power supply
- SITRANS LUC500 is available for rack mount, panel mount or wall mount

### Application

It combines non-contacting ultrasonic technology, patented echo-processing techniques and proven application software to provide accurate level monitoring in liquids up to 15 m (50 ft).

It also effectively monitors flow in flumes, weirs and open channels. Five relays control any combination of pumps, gate valves and alarms. Further advantages include fault signalling and data logging for trend analysis. It can log the time, date and volume of up to 20 occurrences of combined sewer overflows (CSO).

The basic device has 8 digital inputs, 5 digital outputs, 1 analog input, 1 ultrasonic level point, differential/average capability and one RS-232 interface with Modbus RTU/ASCII protocol.

The device can be expanded by additional I/Os, more RAM, two channels, RS-485 or SmartLinx communications models as your needs grow.

It integrates seamlessly with SCADA or DCS systems or a PLC system to provide remote access to all system parameters (pumped volume, pump runtime, pump status). The integral telemetry interface (Modbus RTU/ASCII) allows remote control in real time.

- Key Applications: wet well/lift station control, weirs/flumes, open channels

### Application of accessories

SITRANS LUC500 can be expanded to meet the requirements of a variety of applications.

Auxiliary I/O cards, RAM and data logging, dual-channel function and SmartLinx communications.

- Input/output cards  
A single auxiliary I/O card can be installed in the SITRANS LUC500. The following I/O cards are available:
  - 2 analog inputs/2 analog outputs
  - 4 analog inputs
  - 4 analog outputs
  - 8 digital inputs
  - 8 digital inputs/2 analog inputs/2 analog outputs (wall mount only)
- Expanded memory card  
The available RAM can be increased using this card. The data logging function is then available.
- Two-channel function  
A second measuring point is provided on the SITRANS LUC500 to permit dual-channel measurements. This function is made available by ordering a software access code. Please contact your Siemens representative for details.
- Communications  
The SITRANS LUC500 is offered with Modbus RTU/ASCII as a standard feature. Further industrial communications protocols are available with the addition of an optional SmartLinx card. The following protocols are currently available:
  - PROFIBUS DP
  - Allen Bradley Remote I/O
  - DeviceNet

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LUC500

#### Technical specifications

<b>Mode of operation</b>		<b>Power supply</b>	
Measuring principle	Ultrasonic level measurement		100 ... 230 V AC $\pm$ 15%, 50/60 Hz, 36 VA (17 W) or 12 ... 30 V DC, 20 W
Measuring range	0.3 ... 15 m (1 ... 50 ft)	Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
Measuring points	1 or 2	mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden 8760 or equivalent is acceptable
<b>Output</b>		<b>Displays and controls</b>	
Ultrasonic transducer	44 kHz	Rack and panel mount	75 x 20 mm (3 x 0.8") LCD (selectable backlighting)
Relays	5 relays, rated 5 A at 250 V AC, non-inductive <ul style="list-style-type: none"> <li>• Wall Mount version: 4 SPST Form A relays, 1 SPDT Form C relay</li> <li>• Rack and Panel Mount version: 4 SPST Form A relays, 1 SPST Form B relay</li> </ul>	Wall mount	100 x 40 mm (4 x 1.5") multfield LCD, backlit
<b>Accuracy</b>		<b>Programming</b>	
Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater		Using removable handheld pro- grammer (ordered separately) or Dolphin Plus software (option)
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater <sup>1)</sup>	<b>Memory</b>	
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) <ul style="list-style-type: none"> <li>• Integral temperature sensor</li> <li>• External TS-3 temperature sensor (optional)</li> <li>• Programmable fixed tempera- ture</li> </ul>	<b>Certificates and approvals</b>	
<b>Rated operating conditions</b>		CE, FM, CSA	
Ambient conditions		1) The measuring range corresponds to the distance from the zero point to the sensor face, plus any range extension (P801)	
Ambient temperature for enclosure	-20 ... +50°C (-4 ... +122 °F)		
<b>Design</b>			
Rack mount	DIN 3 HU/21 pitch, 4-rail plug-in unit suitable for standard 3 HU/84 pitch (19") rack		
Panel mount	Suitable for standard panel cutout DIN 43700 72 x 144 mm, 110 mm (4.33") center height		
Weight (rack and panel mount)	1.5 kg (3.3 lbs)		
Weight (wall mount)	2.5 kg (5.5 lbs)		
<b>Communications</b>			
RS-232	Siemens Dolphin protocol, Modbus RTU and ASCII		
Option	SmartLinx compatible, RS-485		

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LUC500

Selection and Ordering data	Order No.
<b>SITRANS LUC500</b> A complete ultrasonic level controller for monitoring and control of water distribution and wastewater collection systems, with energy-saving algorithms.	L) <b>7ML5001-</b> ■■■■■ - ■■ A ■
<b>Mounting</b> Panel mount version Rack mount version for 19" rack Wall mount, standard enclosure Wall, 4 entry, M20 (valid with approval option 3 only)	1 2 3 5
<b>Input voltage</b> 100 ... 230 V AC 12 ... 30 V DC	A B
<b>Number of measurement points</b> Single point version Dual point version	A B
<b>Data communications</b> SmartLinx ready, no module SmartLinx PROFIBUS DP module SmartLinx Allen-Bradley Remote I/O module SmartLinx DeviceNet module	0 1 2 3
<b>Protocol</b> Modbus RTU/ASCII	1
<b>Auxilliary memory</b> None 1 Mbyte static RAM, including data logging module	0 1
<b>Auxilliary I/O</b> None 2 analog inputs and 2 analog outputs 4 analog inputs 4 analog outputs 8 digital inputs 8 digital inputs, 2 analog inputs and 2 analog outputs (only for wall mount)	A B C D E F
<b>Approvals</b> CSA, CE, UL (not available with mounting option 5) CE	2 3
L) Subject to export regulations AL: N, ECCN: 3A991X.	

Selection and Ordering data	Order code
<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s).	
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Operating Instructions</b> English German Note: The Operating Instructions should be ordered as a separate item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	<b>7ML1998-5GL01</b> <b>7ML1998-5GL31</b>
<b>Other Operating Instructions</b> SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx PROFIBUS DP, French SmartLinx DeviceNet, English Note: The appropriate SmartLinx Operating Instructions should be ordered as a separate line on the order.	C) <b>7ML1998-1AP03</b> C) <b>7ML1998-1AQ03</b> C) <b>7ML1998-1AQ33</b> C) <b>7ML1998-1AQ13</b> C) <b>7ML1998-1BH02</b>

Optional Equipment	Order No.
Handheld programmer	<b>7ML1830-2AG</b>
ERS500 Configuration Tool software, CD, cable kit, B) and License	<b>7ML1930-1AE</b>
ERS500 Configuration Tool software, License only B)	<b>7ML1930-1AF</b>
ERS500 Configuration Tool software, demo CD only B)	<b>7ML1930-1AG</b>
M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers) <a href="#">See SmartLinx product page 5/120 for more information.</a>	<b>7ML1930-1FV</b>
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosures	<b>7ML1930-1AC</b>
Sunshield kit, 304 SS (wall mount only)	<b>7ML1930-1GA</b>
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) <b>7ML5750-1AA00-0</b>
<b>Auxiliary Cards. Access code required<sup>1)</sup></b>	
1 MB static RAM extended memory	L) <b>PBD-51034040</b>
2 analog input / 2 analog output for rack and panel mount version	C) <b>PBD-51034039</b>
2 analog input / 2 analog output for wall mount version	C) <b>PBD-51034044</b>
8 digital input for rack and panel mount version	C) <b>PBD-51034042</b>
8 digital input for wall mount version	C) <b>PBD-51034043</b>
4 analog input for rack and panel mount version	C) <b>PBD-51034045</b>
4 analog input for wall mount version	C) <b>PBD-51034046</b>
4 analog output for rack and panel mount version	C) <b>PBD-51034047</b>
4 analog output for wall mount version	C) <b>PBD-51034048</b>
8 digital inputs, 2 analog inputs, 2 analog outputs, wall mount	C) <b>PBD-51034272</b>
Access code, dual point capability	C) <b>7ML1830-1KA</b>
<b>Auxiliary Cards<sup>2)</sup></b>	
1 MB static RAM extended memory	L) <b>7ML1830-1KR</b>
2 analog input / 2 analog output for rack and panel mount version	C) <b>7ML1830-1KS</b>
2 analog input / 2 analog output for wall mount version	C) <b>7ML1830-1KT</b>
8 digital input for rack and panel mount version	C) <b>7ML1830-1KU</b>
8 digital input for wall mount version	C) <b>7ML1830-1LA</b>
4 analog input for rack and panel mount version	C) <b>7ML1830-1LB</b>
4 analog input for wall mount version	C) <b>7ML1830-1LC</b>
4 analog output for rack and panel mount version	C) <b>7ML1830-1LD</b>
4 analog output for wall mount version	C) <b>7ML1830-1LE</b>
8 digital inputs, 2 analog inputs, 2 analog outputs, wall mount	C) <b>7ML1830-1LF</b>
<sup>1)</sup> Values of parameters P345 and P346 must be obtained from the customer in order to generate the order for the access code. <sup>2)</sup> For replacement of auxiliary card or spare auxiliary card. Access code not required. Must be used only as replacement cards. B) Subject to export regulations AL: N, ECCN: EAR99S. 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.	

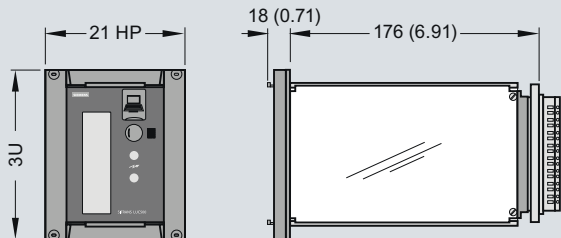
# Level Measurement

## Continuous level measurement – Ultrasonic controllers

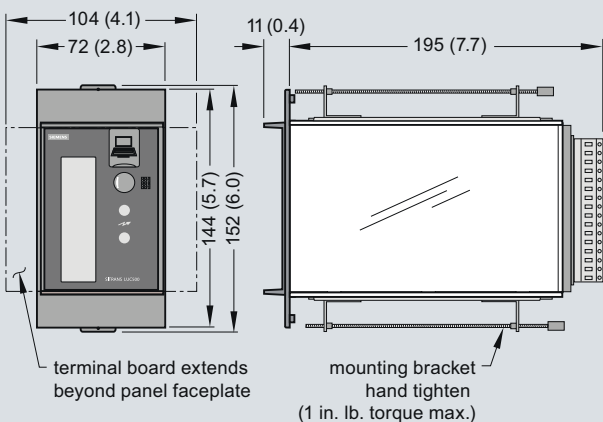
### SITRANS LUC500

#### Dimensional drawings

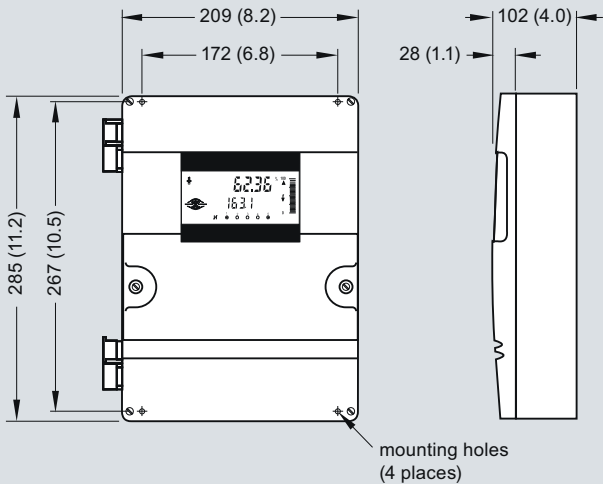
##### Rack Mount Unit



##### Panel Mount Unit



##### Wall Mount Unit



SITRANS LUC500, dimensions in mm (inch)

5

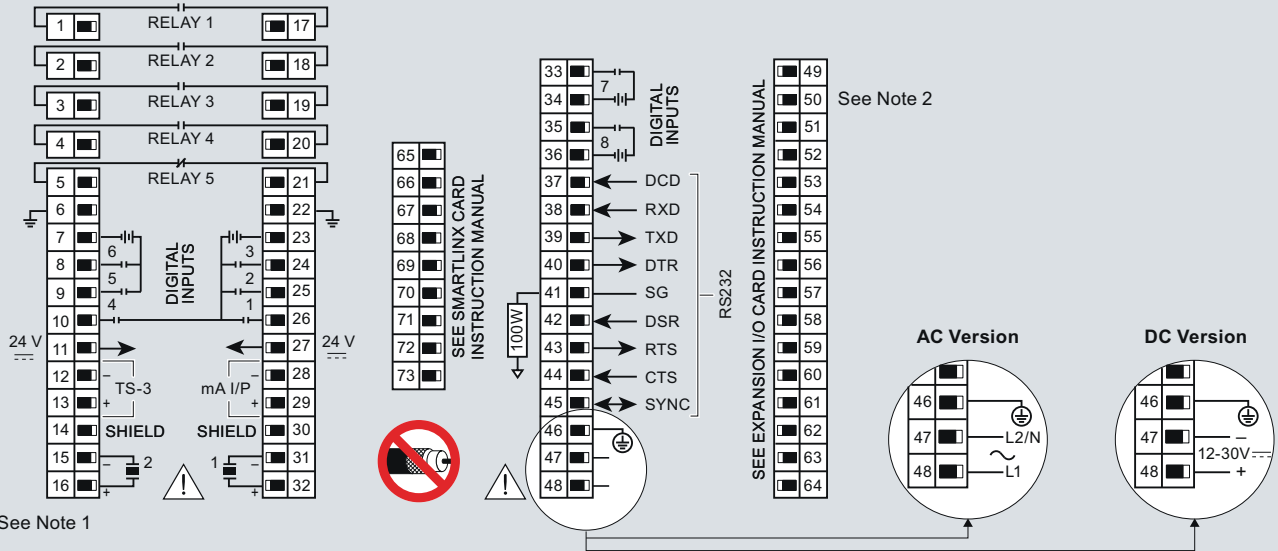
# Level Measurement

## Continuous level measurement – Ultrasonic controllers

SITRANS LUC500

### Schematics

#### Rack and Panel Mount

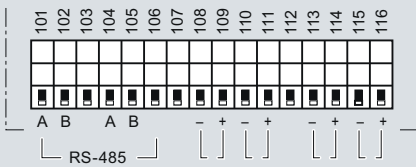


See Note 1

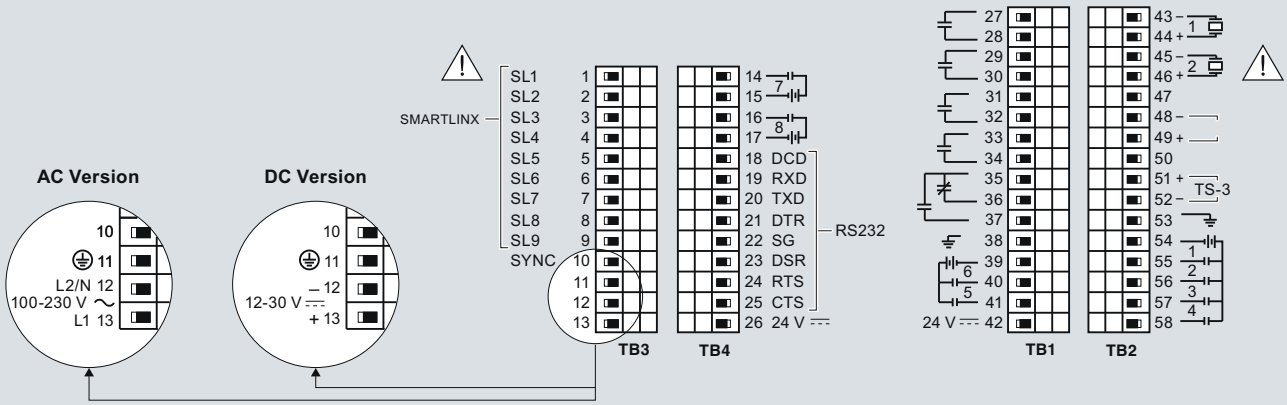
#### Notes

1. Transducer uses 2 wire twisted pair with shield only.
2. Terminals 49-64 are for use with optional expansion I/O cards.

#### Wall Mount



Optional mAInput card shown.  
Other expansion cards I/O available - see SITRANS LUC500 options list.



SITRANS LUC500 connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU01 and LU02

#### Overview



The SITRANS LU01 is an ultrasonic long-range level controller for liquids and solids in a single vessel up to 60 m (200 ft).

Handheld programmer shown is an accessory and must be ordered separately.

#### Benefits

- Single point, long-range level monitoring
- Easy to install; easy to program using removable infrared keypad (optional)
- Compatible with all Echomax transducers
- Backlit LCD display with reading in standard engineering units
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus and SmartLinx compatible
- High/low alarms

#### Application

The system consists of a SITRANS LU01 monitor linked to a non-contacting ultrasonic transducer that can be mounted up to 365 m (1200 ft) away. The SITRANS LU01 will measure distance, level or volume, and it features patented Sonic Intelligence echo processing software for superior reliability.

Readings are displayed in user-selectable linear engineering units on the backlit LCD.

An on-board communications port automatically configures for RS-232, RS-485 or bi-polar current loop. The SITRANS LU01 will connect to a DCS or PLC using Siemens SmartLinx interface modules, giving you remote 2-way communication and full parameter access.

Modules for popular industrial buses can be factory installed or added later to meet changing needs. No external gateway is required, reducing hardware and cabling costs.

- Key Applications: chemical storage, liquid storage, bulk solids storage (gravel, flour bins, grains, cereals), plastic pellets

#### Overview



The SITRANS LU02 is a dual point ultrasonic long-range level controller for liquids and solids in one or two vessels up to 60 m (200 ft).

Handheld programmer shown is an accessory and must be ordered separately.

#### Benefits

- Dual point, long-range level monitoring
- Easy to install; easy to program using removable infrared keypad (optional)
- Compatible with all Echomax transducers
- Backlit LCD display with reading in standard engineering units
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus and SmartLinx compatible
- High/low alarms

#### Application

SITRANS LU02 will measure liquids, solids or a combination of both in one or two vessels of different sizes, shapes and configurations up to 60 m (200 ft).

The system uses ultrasonic technology to measure level, space, distance, volume or average/differential. It features patented Sonic Intelligence echo processing software for superior reliability. Transducers can be mounted up to 365 m (1200 ft) from the monitor.

Readings are displayed in user-selectable linear engineering units on the backlit LCD.

It features an onboard communications port that automatically configures for RS-232, RS-485 or bi-polar current loop. It will connect to a DCS or PLC using Siemens SmartLinx interface modules, giving you remote 2-way communication and full parameter access. Modules for popular industrial buses can be factory installed or added later to meet changing needs. No external gateway is required, reducing hardware and cabling costs.

- Key Applications: chemical storage, liquid storage, bulk solids storage (gravel, flour bins, grains, cereals), plastic pellets, tripper car



# Level Measurement

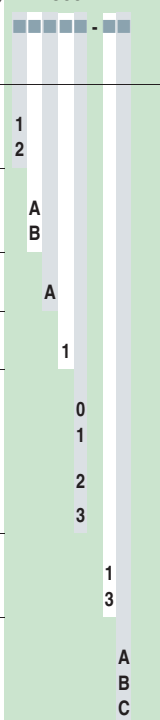
## Continuous level measurement – Ultrasonic controllers

### SITRANS LU01 and LU02

#### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 60 m (1 ... 200 ft)
Measuring points	SITRANS LU01: Max. one point; SITRANS LU02: Max. two points
<b>Output signal</b>	
Ultrasonic transducer	Echomax series, ST-H transducers
Relays	4 SPDT Form C relays, rated at 5 A at 250 V AC, resistive load
mA output	0/4 ... 20 mA, optically isolated
• Max. load	750 Ω, isolated, 30 V
• Resolution	0.1 % of range
• Outputs	SITRANS LU01: Max. one mA output SITRANS LU02: Max. two mA outputs
<b>Accuracy</b>	
Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor • External TS-3 temperature sensor (optional) • Programmable fixed tempera- ture
<b>Rated operating conditions</b>	
Ambient conditions	
Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
<b>Design</b>	
Weight	2.7 kg (6 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (wall mount)	IP65
<b>Electrical connection</b>	
Ultrasonic transducer cable extension	RG62-A/U coaxial cable with low capacitance
mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden 8760 or equivalent is acceptable
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A
Synchronization	Up to 16 LU01/LU02 units can be synchronized together

<b>Power supply</b>	
AC model	100/115/200/230 V AC ± 15%, 50/60 Hz, 31 VA
DC model	18 ... 30 V DC, 25 W
<b>Displays and controls</b>	
Memory	51 x 127 mm (2 x 5") graphics LCD with backlighting
Programming	EEPROM (non-volatile), no backup battery required
<b>Certificates and approvals</b>	
CE, CSA <sub>US/C</sub> , FM, ATEX II 3D Lloyd's register of Shipping (Categories ENV1, ENV2, ENV3 and ENV5)	
<b>Options</b>	
External temperature sensor	TS-3
Communications	<ul style="list-style-type: none"> <li>SmartLinX: protocol-specific modules as interface for popular industrial fieldbus systems</li> <li>Dolphin Plus: Siemens Windows-compatible interface and ComVerter link (infrared)</li> </ul>

Selection and Ordering data	Order No.
<b>SITRANS LU01/LU02</b>	C) <b>7ML5004-</b>
Single or dual point ultrasonic long-range level monitoring system for liquids and solids, and ranges up to 60 m (200 ft).	
<b>Number of measuring points</b>	1 2
LU01 version, 1 point LU02 version, 2 points	
<b>Input voltage</b>	A B
100/115/200/230 V AC, voltage selector switch 18 ... 30 V DC	
<b>Feature software</b>	A
Standard	
<b>Application software</b>	1
Standard	
<b>Data communications</b>	0 1 2 3
No module (SmartLinX ready) SmartLinX Allen-Bradley Remote I/O module SmartLinX PROFIBUS DP module SmartLinX Modbus RTU module	
<b>Enclosure</b>	1 3
Wall mount Wall mount, drilled, 6 x M20	
<b>Approvals</b>	A B C
CE, CSA <sub>US/C</sub> , FM <sup>1)</sup> CE <sup>2)</sup> ATEX II 3D <sup>1)</sup>	

<sup>1)</sup> Available with enclosure option 1 only

<sup>2)</sup> Available with enclosure option 3 only

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

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU01 and LU02

#### Selection and Ordering data

##### Further designs

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

Stainless steel tag [69 x 50 mm (2.71 x 1.97")]:  
Measuring-point number/identification  
(max. 16 characters) specify in plain text

Order code

**Y15**

##### Operating Instructions

###### SITRANS LU01

English

C) **7ML1998-5BE02**

French

C) **7ML1998-5BE12**

German

C) **7ML1998-5BE32**

###### SITRANS LU02

English

C) **7ML1998-5BD02**

French

C) **7ML1998-5BD12**

German

C) **7ML1998-5BD32**

Note: The Operating Instructions should be ordered as a separate line item.  
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

##### Other Operating Instructions

SmartLinx Allen-Bradley Remote I/O, English

C) **7ML1998-1AP03**

SmartLinx PROFIBUS DP, English

C) **7ML1998-1AQ03**

SmartLinx PROFIBUS DP, German

C) **7ML1998-1AQ33**

SmartLinx PROFIBUS DP, French

C) **7ML1998-1AQ12**

SmartLinx Modbus, English

C) **7ML1998-1BF01**

SmartLinx Modbus, German

C) **7ML1998-1BF31**

SmartLinx Modem, English

C) **7ML1998-1BG01**

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

#### Accessories

Handheld programmer

**7ML1830-2AN**Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"),  
one text line, suitable for enclosures**7ML1930-1AC**M20 cable gland kit (6 M20 cable glands,  
6 M20 nuts, 3 stop plugs)**7ML1830-1GM**M20 cable gland kit (4 M20 cable glands,  
4 M20 nuts, 4 washers)**7ML1930-1FV**

TS-3 Temperature Sensor - see TS-3 on page 5/200

**7ML1830-2AN**

Sunshield kit, 304 SS

**7ML1930-1GA**

#### Spare parts

Card, LU01 mother main, AC, comm ready

C) **7ML1830-1KX**

Card, LU02 mother main, AC, comm ready

C) **7ML1830-1MA**

Card, LU02 daughter, comm ready

C) **7ML1830-1LP**

Card, LU01 daughter, comm ready

C) **7ML1830-1LN**

Card, display

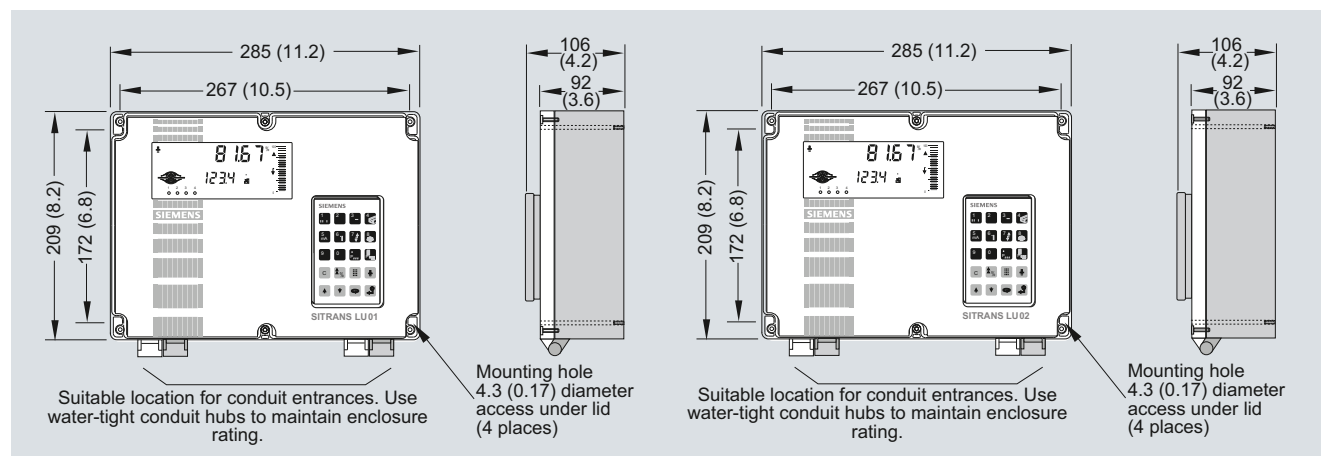
C) **7ML1830-1LQ**

See SmartLinx product page 5/120 for more information.

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

5

#### Dimensional drawings



Dimensional drawings for SITRANS LU01 (left) and SITRANS LU02 (right), dimensions in mm (inch)

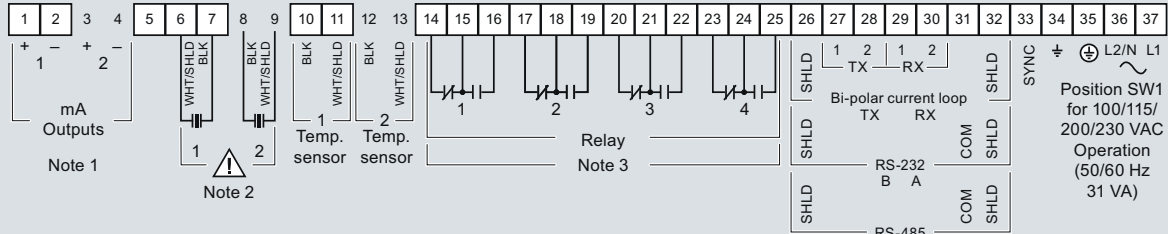
# Level Measurement

## Continuous level measurement – Ultrasonic controllers

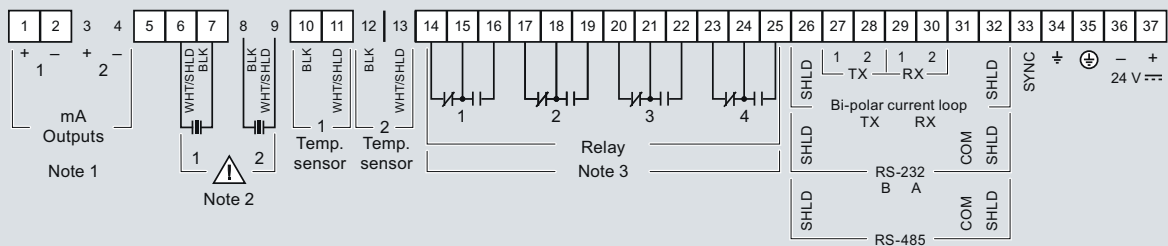
SITRANS LU01 and LU02

### Schematics

#### AC Model



#### DC Model

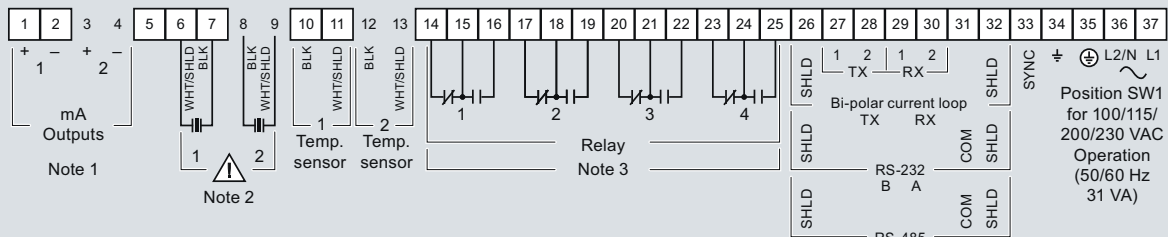


#### Notes:

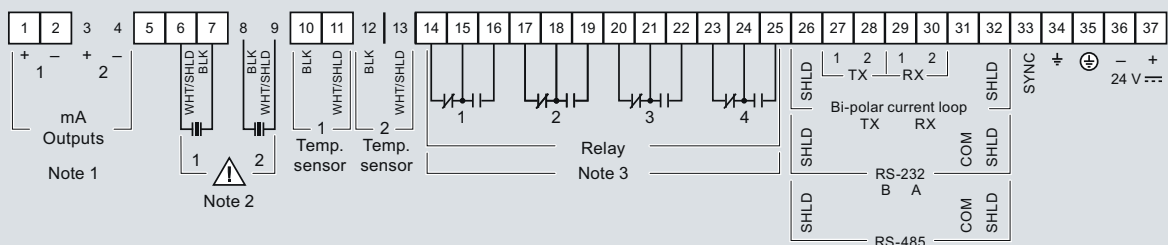
1. Optically isolated, 750 Ω max. load
2. Use RG62-A/U coaxial (or equivalent) for extensions up to 365 m (1200 ft). Run in grounded metal conduit, separate from other wiring.
3. Each relay has 1 set of Form 'C' (SPDT) contacts, relay rated at 5 A 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed.
4. Required if mounted adjacent to other SITRANS LU01 units or other specified Siemens Milltronics devices. Interconnect all 'SYNC' terminals with a single 18 AWG (0.5mm<sup>2</sup>) wire.

#### SITRANS LU01 connections

#### AC Model



#### DC Model



#### Notes:

1. Optically isolated, 750 Ω max. load
2. Use RG62-A/U coaxial (or equivalent) for extensions up to 365 m (1200 ft). Run in grounded metal conduit, separate from other wiring.
3. Each relay has 1 set of Form 'C' (SPDT) contacts, relay rated at 5 A 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed.
4. Required if mounted adjacent to other SITRANS LU01 units or other specified Siemens Milltronics devices. Interconnect all 'SYNC' terminals with a single 18 AWG (0.5mm<sup>2</sup>) wire.

#### SITRANS LU02 connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU10

#### Overview



SITRANS LU10 is an ultrasonic long-range level monitor for liquids and solids, offering 10-point monitoring in a single unit.

Handheld programmer shown is an accessory and must be ordered separately.

#### Benefits

- Ten point, long-range level monitoring
- Automatic level-to-volume conversion for standard or custom tank shapes
- Dolphin Plus and SmartLinX compatible
- Backlit LCD display with reading in standard engineering units
- Easy to install, easy to program using removable infrared keypad (optional)

#### Application

It can be used in a wide range of applications to scan liquids, solids or a combination of both contained in vessels of differing size, shape, and configuration up to 60 m (200 ft).

SITRANS LU10 uses ultrasonic technology to measure level, space, distance, volume, or average/differential. Transducers can be mounted up to 365 m (1200 ft) from the monitor. The SITRANS LU10 features patented Sonic Intelligence echo processing software for superior reliability. Readings are displayed in user-selectable linear engineering units on the LCD.

SITRANS LU10 will connect to a DCS or PLC using Siemens SmartLinX interface modules, giving you remote 2-way communication and full parameter access. Modules for popular industrial buses can be factory installed or added later to meet changing needs. No external gateway is required, reducing hardware and cabling costs.

- Key Applications: chemical storage, liquid storage, bulk solids storage (sugar, flour bins, grains, cereals), plastic pellets, tank farms

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

SITRANS LU10

### Technical specifications

#### Mode of operation

Measuring principle	Ultrasonic level measurement
Measuring range	Max. 0.3 ... 60 m (1 ... 200 ft)
Measuring points	Max. 10

#### Output

Ultrasonic transducer	Echomax series, ST-H transducers
Relays	<ul style="list-style-type: none"> <li>• SITRANS LU SAM module (option): 20 alarm/control relays</li> <li>• SPDT Form C relays, rated 5 A at 250 V AC, resistive load</li> </ul>
mA output	SITRANS LU A0 module (option): 0/4 ... 20 mA, optically isolated
<ul style="list-style-type: none"> <li>• Max. load</li> <li>• Resolution</li> </ul>	750 Ω, isolated 0.1 % of range

#### Accuracy

Error in measurement	0.25 % of range or 6 mm (0.24"), whichever is greater
Resolution	0.1 % of measuring range or 2 mm (0.08"), whichever is greater
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) <ul style="list-style-type: none"> <li>• Integral temperature sensor</li> <li>• External TS-3 temperature sensor (expandable to 10 inputs with optional TIB-9 card)</li> <li>• Programmable fixed temperature</li> </ul>

#### Rated operating conditions

Ambient conditions	
Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)

#### Design

Weight	2.7 kg (6 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (wall mount)	IP65/Type 4X/NEMA 4X

#### Electrical connection

Ultrasonic transducer	RG62-A/U coaxial cable with low capacitance
Signal transmission	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden 8760 or equivalent is acceptable
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A
Synchronization	Up to 16 LU10 units can be synchronized together

#### Power supply

100/115/200/230 V AC ± 15%,  
50/60 Hz, 31 VA

#### Displays and controls

51 x 127 mm (2 x 5") graphics LCD with backlighting

#### Memory

EEPROM (non-volatile), no backup battery required

#### Programming

Using removable programmer (ordered separately) or Dolphin Plus (option)

#### Certificates and approvals

- CE, C-TICK, FM, CSA<sub>US/C</sub>, ATEX II 3D
- Lloyd's register of Shipping (Categories ENV1, ENV2, ENV3 and ENV5)

#### Options

Expansion card	TIB-9, increases the number of TS-3 inputs from 1 to 10  TS-3 <ul style="list-style-type: none"> <li>• SmartLinX: protocol-specific modules as interface for popular industrial fieldbus systems</li> <li>• Dolphin Plus: Siemens Windows-compatible interface and ComVerter link (infrared)</li> <li>• Max. 3 I/O devices per SITRANS LU10</li> <li>• SITRANS LU A0 analog output module (max. 1)</li> <li>• SITRANS LU SAM, satellite alarm module (max. 2)</li> </ul>
<ul style="list-style-type: none"> <li>• External temperature sensor</li> <li>• Communications</li> </ul>	
<ul style="list-style-type: none"> <li>• I/O devices</li> </ul>	

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU10

#### Selection and Ordering data

##### SITRANS LU10

Ten point ultrasonic long-range level monitoring system for liquids and solids applications, and ranges up to 60 m (200 ft).

##### Input voltage

100/115, 200/230 V AC, selectable

##### Feature software

Standard

##### Application software

Standard

##### Data communications

No module (SmartLinx ready)  
SmartLinx Allen-Bradley Remote I/O module  
SmartLinx PROFIBUS DP module  
SmartLinx Modbus RTU module

##### TIB-9 temperature card

None  
With TIB-9 card

##### Enclosure

Wall mount  
Wall mount, drilled, 12 x M20

##### Approvals

CE, CSA<sub>US</sub>(C, FM<sup>1</sup>)  
ATEX II 3D<sup>1</sup>)  
CE, C-TICK<sup>2</sup>)

<sup>1</sup>) Available with Enclosure option 1 only

<sup>2</sup>) Available with Enclosure option 2 only

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

#### Order No.

C) 7ML5007-
1
A
A
0
1
2
3
0
1
1
2
A
B
D

#### Selection and Ordering data

##### Further designs

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

Stainless steel tag [69 x 50 mm (2.71 x 1.97")]:  
Measuring-point number/identification  
(max. 16 characters) specify in plain text

Y15

##### Operating Instructions

English

C) 7ML1998-5AN02

French

C) 7ML1998-5AN12

German

C) 7ML1998-5AN32

##### Other Operating Instructions

SmartLinx Allen-Bradley Remote I/O, English

C) 7ML1998-1AP03

SmartLinx PROFIBUS DP, English

C) 7ML1998-1AQ03

SmartLinx PROFIBUS DP, German

C) 7ML1998-1AQ33

SmartLinx Modbus, English

C) 7ML1998-1BF01

SmartLinx Modbus, German

C) 7ML1998-1BF31

SmartLinx Modem, English

C) 7ML1998-1BG01

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

##### Accessories

Handheld programmer

7ML1830-2AN

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"),  
one text line, suitable for enclosures

7ML1930-1AC

M20 cable gland kit (6 M20 cable glands,  
6 M20 nuts, 3 stop plugs)

7ML1830-1GM

M20 cable gland kit (4 M20 cable glands,  
4 M20 nuts, 4 washers)

7ML1930-1FV

TS-3 Temperature Sensor -  
see TS-3 on page 5/200

7ML1830-2AN

Sunshield kit, 304 SS

7ML1930-1GA

##### Spare parts

Card, mother main, AC, comm ready

C) 7ML1830-1ML

Card, daughter, comm ready

C) 7ML1830-1LY

Card, display  
See SmartLinx product page 5/120 for more information.

7ML1830-1LQ

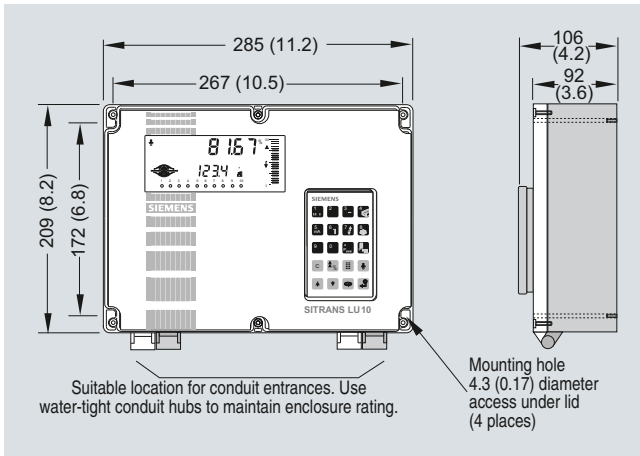
C) Subject to export regulations AL: N, ECCN: EAR99.

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

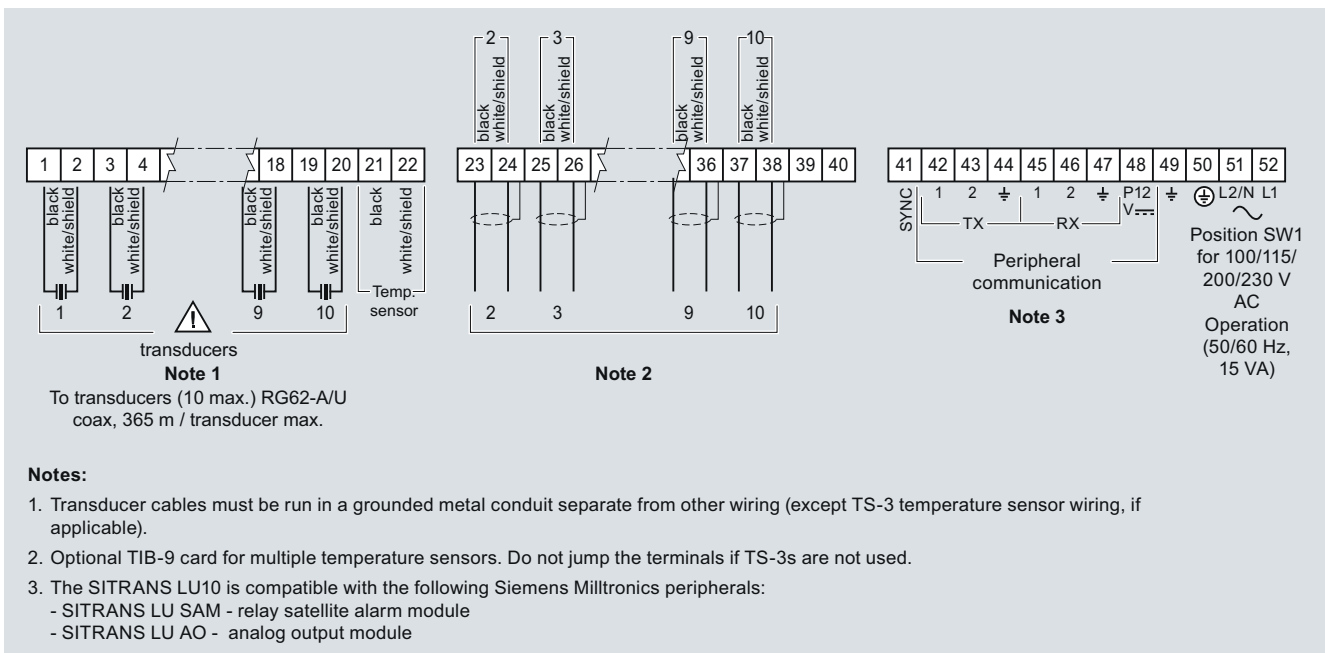
SITRANS LU10

### Dimensional drawings



SITRANS LU10, dimensions in mm (inch)

### Schematics



**Notes:**

1. Transducer cables must be run in a grounded metal conduit separate from other wiring (except TS-3 temperature sensor wiring, if applicable).
2. Optional TIB-9 card for multiple temperature sensors. Do not jump the terminals if TS-3s are not used.
3. The SITRANS LU10 is compatible with the following Siemens Milltronics peripherals:
  - SITRANS LU SAM - relay satellite alarm module
  - SITRANS LU AO - analog output module

SITRANS LU10 connections

5

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU SAM

#### Overview



SITRANS LU SAM Satellite Alarm Module provides up to 20 relay outputs for the measurement points of the SITRANS LU10 level monitor.

#### Benefits

- The SITRANS LU SAM can be located up to 1500 m (5000 ft) from the SITRANS LU10
- Relay outputs can be assigned to any point on the SITRANS LU10

#### Application

The operation of the SITRANS LU SAM is programmed via the SITRANS LU10. The only on-board settings are for bank selection and output testing.

Using a SITRANS LU SAM, you can have two relay outputs for all ten measurement points, all 20 for a single measurement point or any combination between the two.

All relays are Form C to allow NO or NC wiring.

#### Technical specifications

<b>Mode of operation</b>	
<b>Input</b>	
Communications	Data from SITRANS LU10
Transmission rate	4800 bits/s
Voltage	± 20 mA bipolar current loop
<b>Output</b>	
Relays	20 multi-purpose relays, programmable from SITRANS LU10 SPDT Form C relays, rated 5 A at 250 V AC, resistive load
± 20 mA bipolar current loop	Input and transmission
• Max. load	1 receiving unit
<b>Rated operation conditions</b>	
Ambient conditions	
Ambient temperature	-20 ... +50 °C (-5 ... +122 °F)
Location	Indoor/outdoor
Installation category	II
Pollution degree	4
<b>Design</b>	
Weight	3 kg (6.6 lbs)
Material (enclosure)	Polycarbonate
Degree of protection	Type 4X/NEMA 4X/IP65
Cable connection	2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG)
Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A
<b>Power supply</b>	100/115/200/230 V AC ± 15%, 50/60 Hz, 20 VA
<b>Displays and controls</b>	1 LED for display of voltage/communications state, 20 LEDs for display of relay states
<b>Certificates and approvals</b>	CE, FM, CSA <sub>US/C</sub> , C-TICK

Selection and Ordering data	Order No.
<b>SITRANS LU SAM</b>	C) <b>7ML5811-1A</b>
Satellite alarm module provides up to 20 relay outputs for the measurement points of the SITRANS LU10 level monitor.	
Approvals: CSA <sub>US/C</sub> , FM, CE, C-TICK	
<b>Operating Instructions</b>	
English	C) <b>7ML1998-5CF02</b>
German	C) <b>7ML1998-5CF32</b>
Note: Operating Instructions should be ordered as a separate line item on the order.	
This device is shipped with the Siemens Milltronics manual CD containing the complete Quick Start and Operating Instructions library.	
C) Subject to export regulations AL: N, ECCN: EAR99.	

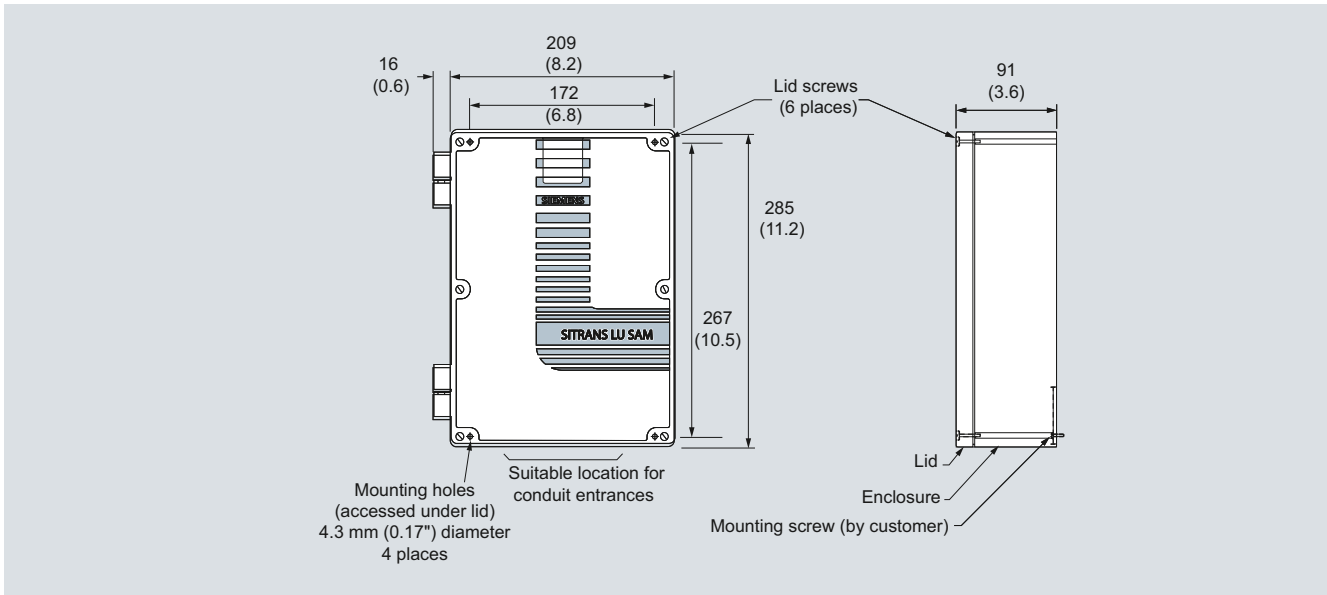


# Level Measurement

## Continuous level measurement – Ultrasonic controllers

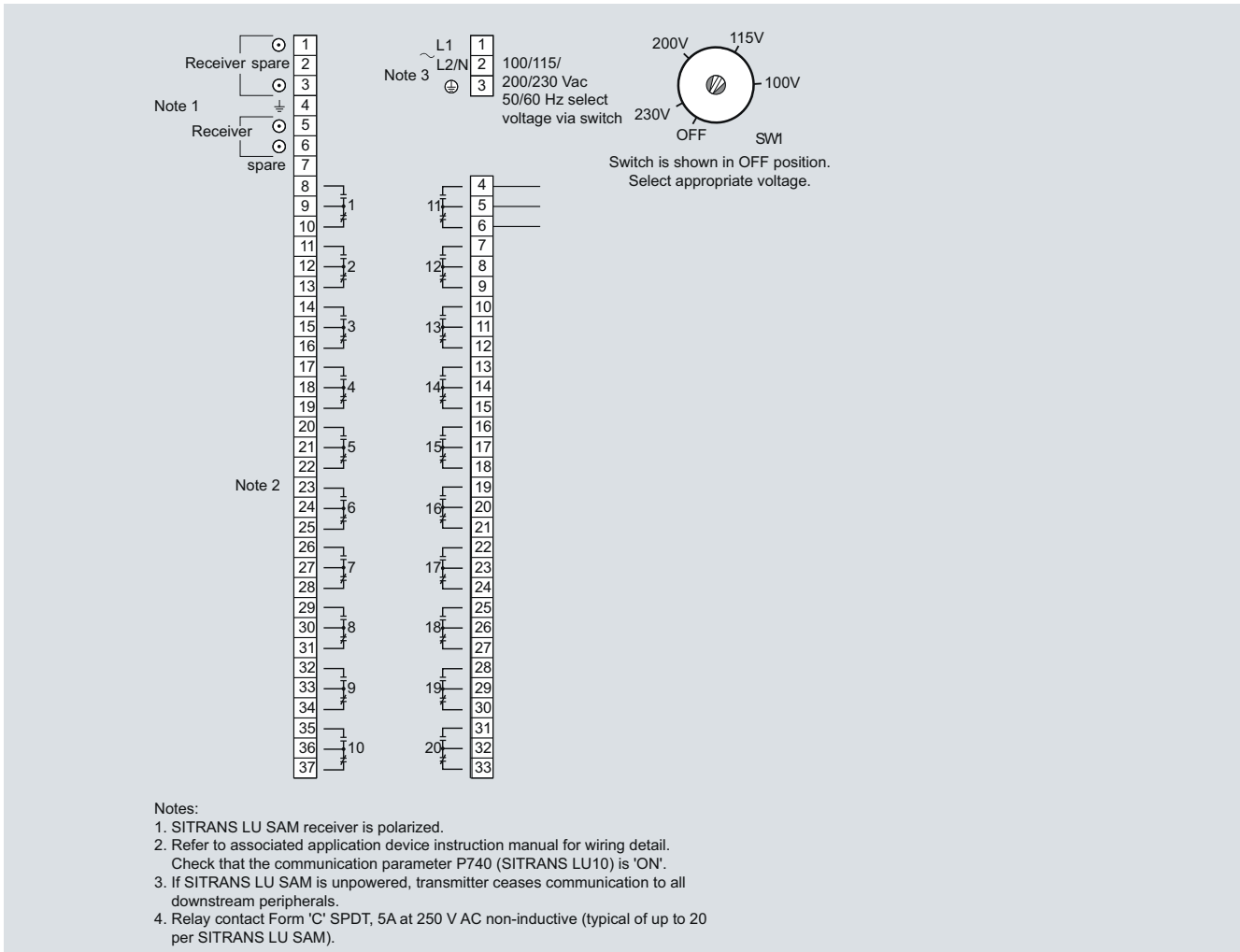
SITRANS LU SAM

### Dimensional drawings



SITRANS LU SAM, dimensions in mm (inch)

### Schematics



SITRANS LU SAM connections

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

### SITRANS LU AO

#### Overview



The SITRANS LU AO Analog Output Module provides remote analog output for the measurement points of the SITRANS LU10 level monitor.

#### Benefits

- Analog outputs can be up to 1500 m (5000 ft) from the SITRANS L 10
- Analog outputs can be per transducer and/or average of 2 or more

#### Application

The operation of the SITRANS LU AO is programmed via the SITRANS LU10. The only on-board settings are for bank selection and output testing.

The SITRANS LU AO can provide up to 10 analog outputs (each sharing a common negative bus which is electrically isolated from ground).

#### Technical specifications

Mode of operation	
<b>Input</b>	
Communications	Data from SITRANS LU10
• Transmission rate	4800 bits/s
• Voltage	± 20 mA bipolar current loop
• Polarization	Non-polarized
• Max. load	1 receiving unit
<b>Output</b>	
Analog outputs	10 analog outputs, programmable from SITRANS LU10
	0 or 4 ... 20 mA, isolated
• ± 20 mA bipolar current loop	Input and transmission
- Max. load	750 Ω
- Resolution	0.1%
Rated operating conditions	
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-5 ... +122 °F)
• Location	Indoor/outdoor
• Installation category	II
• Pollution degree	4
Design	
Weight	2 kg (4.4 lbs)
Material (enclosure)	Polycarbonate
Degree of protection	Type 4X/NEMA 4X/IP65
• Cable connection	2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG)
• Electrical connection and relay connection	Copper conductor according to local requirements, rated 250 V 5 A
Power supply	
	100/115/200/230 V AC ± 15%, 50/60 Hz, 15 VA
Displays and controls	
	1 LED for display of voltage/communications state
Certificates and approvals	
	CE, FM, CSA <sub>US/C</sub> , C-TICK

#### Selection and Ordering data

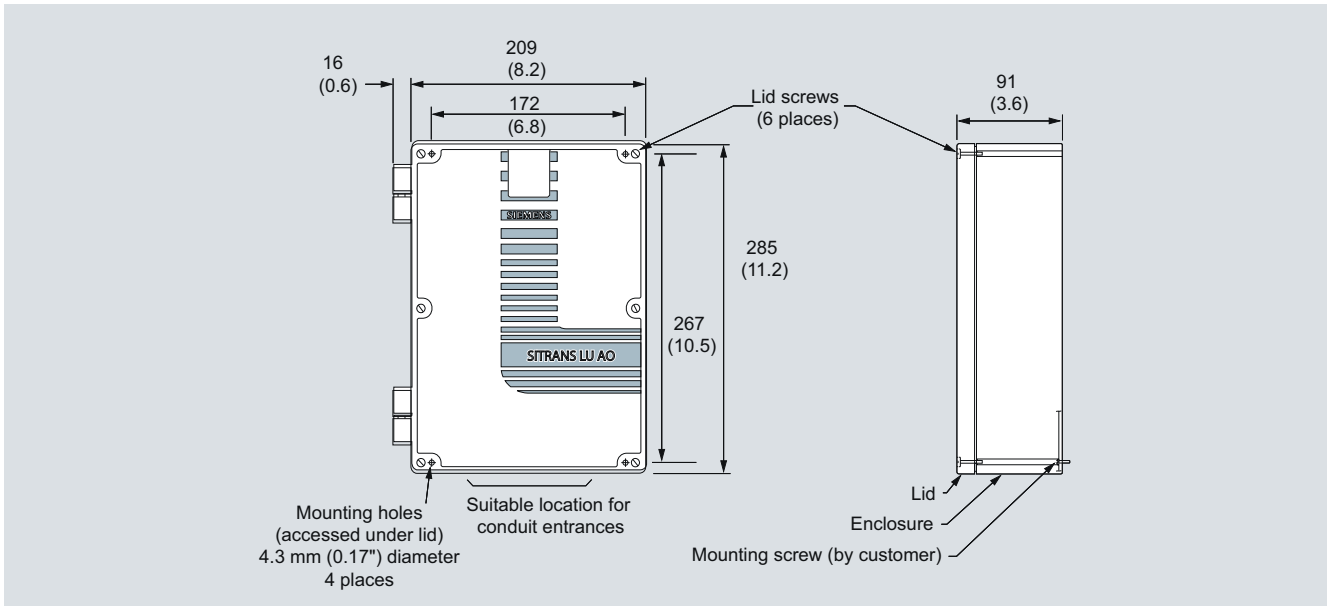
	Order No.
<b>SITRANS LU AO</b>	C) <b>7ML5810-1A</b>
Provides remote analog output for the measurement points of the SITRANS LU10 level monitor. Approvals: CSA <sub>US/C</sub> , FM, CE, C-TICK	
<b>Operating Instructions</b>	
English	C) <b>7ML1998-5CE01</b>
German	C) <b>7ML1998-5CE31</b>
Note: Operating Instructions should be ordered as a separate line item on the order.	
This device is shipped with the Siemens Milltronics manual CD containing the complete Quick Start and Operating Instructions library.	
C) Subject to export regulations AL: N, ECCN: EAR99.	

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

SITRANS LU AO

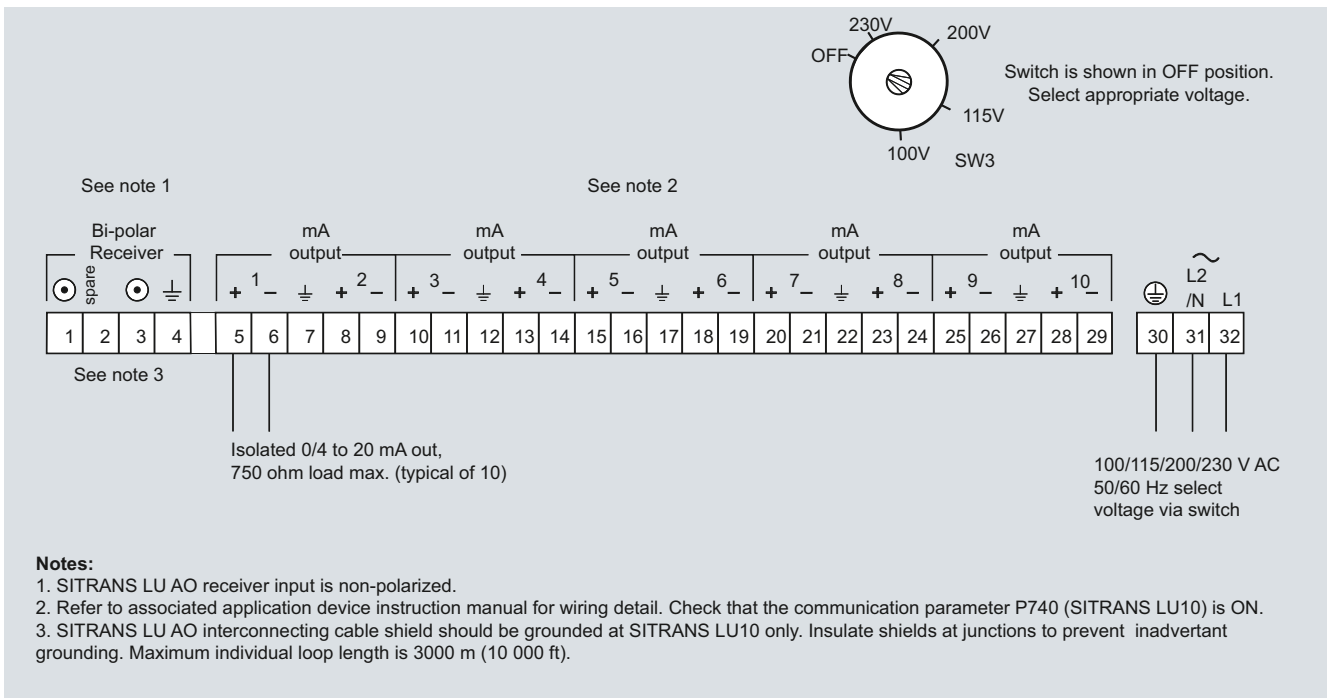
### Dimensional drawings



SITRANS LU AO, dimensions in mm (inch)

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### Schematics



SITRANS LU AO connections

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Ultrasonic transducers

#### Overview

##### Ultrasonic Transducers

Ultrasonic measuring systems are the cost-effective choice for monitoring and control in short- to long-range applications for liquids, slurries, and solids in a wide range of industries. Transducers are impervious to dust, moisture, corrosion, vibration, flooding, and extreme temperature. They are easy to install and virtually maintenance-free. Choose from a wide selection of models designed for short or long range applications on liquids or solids.

#### Technical specifications

Echomax Transducers											
	Liquids		Liquids and Solids				High Temperature		Solids		
	XRS-5	ST-H	Standard		High Temperature		XCT-8	XCT-12	High Temperature		
			XPS-10	XPS-15	XPS-30	XPS-40			XLT-30	XLT-60	
<b>Max. range</b> <sup>1)</sup>	8 m (26 ft)	10 m (33 ft)	10 m (33 ft)	15 m (50 ft)	30 m (100 ft)	40 m (130 ft)	8 m (26 ft)	12 m (40 ft)	30 m (100 ft)	60 m (200 ft)	
<b>Min. range</b>	0.3 m (1 ft)	0.3 m (1 ft)	0.3 m (1 ft)	0.3 m (1 ft)	0.6 m (2 ft)	0.9 m (3 ft)	0.6 m (2 ft)	0.6 m (2 ft)	0.9 m (3 ft)	1.8 m (6 ft)	
<b>Max. temperature</b>	+65 °C (+149 °F)	+73 °C (+164 °F)	+95 °C (+203 °F)	+95 °C (+203 °F)	+95 °C (+203 °F)	+95 °C (+203 °F)	+145 °C (+293 °F)	+145 °C (+293 °F)	+150 °C (+300 °F)	+150 °C (+300 °F)	
<b>Min. temperature</b>	-20 °C (-4 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	-40 °C (-40 °F)	
<b>Typical Applications</b>	Wet wells and open channels	Chemical storage and liquid tanks	Dusty solids and slurries	Deep wet wells and solids	Powders, pellets and solids	Powders, pellets and solids	Hot acids and slurries, food	Hot acids and slurries	Clinker and coal bunkers	Clinker and coal bunkers	
<b>Frequency</b>	44 kHz	44 kHz	44 kHz	44 kHz	30 kHz	22 kHz	44 kHz	44 kHz	22 kHz	13 kHz	
<b>Beam angle (-3dB)</b>	10°	12°	12°	6°	6°	6°	12°	6°	5°	5°	
<b>Thread size</b>	R 1" [(BSPT), EN 10226] 1" NPT	1" and 2" NPT R 2" [(BSPT), EN 10226], 2" [(BSPP), EN ISO 228-1]	R 1" [(BSPT), EN 10226] 1" NPT	R 1" [(BSPT), EN 10226] 1" NPT	R 1.5" [(BSPT), EN 10226] Universal thread 1.5" NPT	R 1.5" [(BSPT), EN 10226] Universal thread 1.5" NPT	R 1" [(BSPT), EN 10226] 1" NPT	R 1" [(BSPT), EN 10226] 1" NPT	1" NPT	1" NPT	
<b>Enclosure</b>	<ul style="list-style-type: none"> <li>PVDF Copolymer</li> <li>CSM</li> <li>Option: Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>ETFE</li> <li>Option: PVDF</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Foam facing</li> <li>Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Foam facing</li> <li>Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Foam facing</li> <li>Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Foam facing</li> <li>Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Foam facing</li> <li>Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Flange with PTFE facing</li> <li>Sanitary version</li> </ul>	<ul style="list-style-type: none"> <li>PVDF</li> <li>Option: Flange with PTFE facing</li> </ul>	<ul style="list-style-type: none"> <li>Aluminum</li> <li>304 Stainless steel</li> <li>Polyester</li> <li>Silicone</li> </ul>	<ul style="list-style-type: none"> <li>Aluminum</li> <li>304 Stainless steel</li> <li>Polyester</li> <li>Silicone</li> </ul>
<b>Compatible with:</b>											
<b>SITRANS LU</b>	•	•	•	•	•	•	•	•	•	•	
<b>SITRANS LUC500</b>	•	•	•	•	•	•	•	•	•	•	
<b>Hydro Ranger 200</b>	•	•	•	•	•	•	•	•	•	•	
<b>Multi-Ranger 100/200</b>	•	•	•	•	•	•	•	•	•	•	
<b>OCM III</b>	•										

<sup>1)</sup> Application conditions such as extreme dust or angle of repose may reduce the usable maximum range. Consult your local Siemens representative for further information.

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

ST-H

### Overview



ST-H transducers use ultrasonic technology to measure level in chemical storage and liquid tanks.

### Benefits

- Can be mounted on a 2" (50.8 mm) standpipe
- Immune to corrosive and harsh environments
- Integral temperature sensor

### Application

The narrow design of the ST-H allows the transducer to be mounted on a 2" (50.8 mm) standpipe. When mounted correctly, it is completely protected from the process and can even be used in harsh, corrosive environments.

During operation, the ultrasonic transducer emits acoustic pulses in a narrow beam perpendicular to the transducer face. The level transceiver measures the propagation time between pulse emission and reception of the echo to calculate the distance from the transducer to the material. Variations in sound velocity due to changes in temperature within the permissible range are automatically compensated by the integral temperature sensor.

- Key Applications: chemical storage, liquid tanks

### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic transducer
<b>Input</b>	
Measuring range	0.3 ... 10 m (1 ... 33 ft)
<b>Output</b>	
Frequency	44 kHz
Beam angle	12°
<b>Accuracy</b>	
Temperature compensation	Compensated by integral temperature sensor
<b>Rated operating conditions</b>	
Pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +60 °C (-5 ... +140 °F) (ATEX approved model) -40 ... +73 °C (-40 ... +163 °F) (CSA/FM approved model)
<b>Design</b>	
Weight <sup>1)</sup>	1.4 kg (3 lbs)
Material (enclosure)	Base and lid made of ETFE or PVDF (epoxy fitted joint) <sup>2)</sup>
Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1], R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
Degree of protection	IP68
Cable connection	2-core shielded/twisted, 0.519 mm <sup>2</sup> (20 AWG), PVC sheath
Cable (max. length)	365 m (1200 ft) with RG 62 A/U coaxial cable
<b>Options</b>	
Flange adapter	3" Universal (fits DN 65, PN 10 and 3" ASME)
<b>Certificates and approvals</b>	
CE <sup>3)</sup> , CSA Class I, II, III, Div. 1, Gr. A, B, C, D, E, F, G T3 (ETFE only), FM Class I, II, Div. 1, Gr. C, D, E, F, G T4A, ATEX II 2G EEx m IIC T5, C-TICK, INMETRO: Br-Ex m II T5	

<sup>1)</sup> Approximate shipping weight of transducer with standard cable length

<sup>2)</sup> When measuring chemicals, check compatibility of ETFE or PVDF and epoxy, or mount joint external to process.

<sup>3)</sup> EMC certificate available on request

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### ST-H

#### Selection and Ordering data

**Echomax ST-H ultrasonic transducer** C) **7ML1100-**

Level measurement in chemical storage and liquid tanks. The narrow design of the ST-H allows the transducer to be mounted on a 2" standpipe. Measuring range: min. 0.3 m (1 ft), max. 10 m (33 ft).

#### Process connection

ETFE, 2" NPT [(Taper), ANSI/ASME B1.20.1]  
 ETFE, R 2" [(BSPT), EN 10226]  
 ETFE, G 2" [(BSPP), EN ISO 228-1]  
 PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1]  
 PVDF copolymer, R 2" [(BSPT), EN 10226]  
 PVDF copolymer, G 2" [(BSPP), EN ISO 228-1]

#### Cable length

5 m (16.40 ft)  
 10 m (32.81 ft)  
 30 m (98.43 ft)  
 50 m (164.04 ft)  
 100 m (328.08 ft)

#### Approvals

FM Class I, II, Div. 1, C-TICK  
 ATEX II 2G, CSA, C-TICK, INMETRO <sup>1)</sup>  
 ATEX II 2G, C-TICK, INMETRO <sup>2)</sup>

#### Operating Instructions

Quick Start Manual, multi-language

Applications Guidelines, multi-language

Note: The Applications Guidelines should be ordered as a separate line item on the order.

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

<sup>1)</sup> Available with Process connection options 0 to 2 only

<sup>2)</sup> Available with Process connection options 3 to 5 only

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

Order No.

**7ML1100-**

**A 0**

**0**

**1**

**2**

**3**

**4**

**5**

**A**

**B**

**C**

**D**

**E**

**2**

**3**

**4**

**7ML1998-5QK82**

**7ML1998-5HV61**

#### Selection and Ordering data

##### Further designs

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

Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75")]: Measuring-point number/identification (max. 16 characters) specify in plain text

**Y17**

##### Accessories

Universal box bracket, mounting kit

3" ASME, DN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" NPT

3" ASME, DN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" BSPT

Easy Aimer 2, NPT with ¾" x 1" PVC coupling

Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings

Easy Aimer 304, with stainless steel coupling

Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings

Order No.

**7ML1830-1BK**

**7ML1830-1BT**

**7ML1830-1BU**

**7ML1830-1AQ**

**7ML1830-1AX**

**7ML1830-1AU**

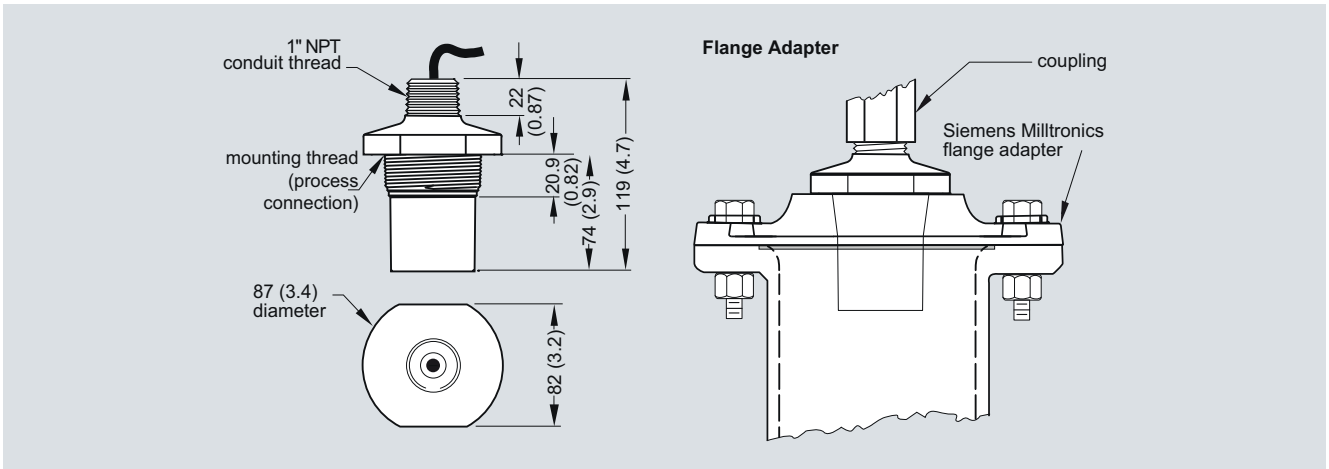
**7ML1830-1GN**

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

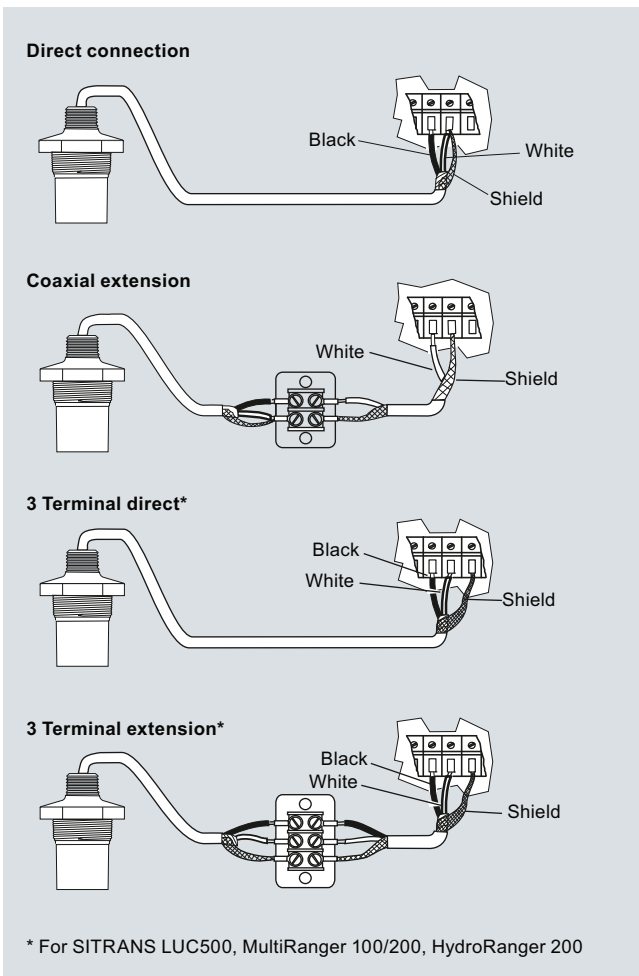
ST-H

### Dimensional drawings



ST-H ultrasonic transducer, dimensions in mm (inch)

### Schematics



ST-H ultrasonic transducer connections

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# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XRS-5

#### Overview



Echomax XRS-5 ultrasonic transducer provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds using a beam angle of just 10° and a CSM rubber face.

#### Benefits

- Narrow beam angle of only 10°
- Chemically resistant PVDF copolymer enclosure and CSM rubber face
- Measuring range: 8 m (26 ft) for measurement of liquids and slurries
- Fully submersible: IP68 degree of protection
- Easy installation with 1" NPT or R 1" BSPT connection

#### Application

The XRS-5 is non-contacting with a measuring range from 0.3 to 8 m (1 to 26 ft). Advanced echo processing ensures reliable data even in conditions with obstructions, turbulence and foam.

The hermetically sealed CSM rubber face and the PVDF copolymer enclosure are designed for maximum resistance to methane, salt water, caustics and harsh chemicals common to wastewater installations. With an IP68 degree of protection, this rugged sensor is fully submersible in the event of flood conditions. Use a submergence shield if full submergence is possible in the application. A submergence shield will maintain a high level reading output during submerged conditions.

The low-cost XRS-5 transducer is compatible with a full range of Siemens controllers, from a basic system for high/low alarm or simple pump control, up to advanced control systems with communications, telemetry and SCADA integration capabilities.

- Key Applications: wet wells, flumes, weirs, filter beds

#### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic transducer
<b>Input</b>	
Measuring range	0.3 ... 8 m (1 ... 26 ft), dependent on application
<b>Output</b>	
Frequency	44 kHz
Beam angle	10°
<b>Accuracy</b>	
Temperature error	Compensated by integral temperature sensor
<b>Rated operating conditions</b>	
Vessel pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +65 °C (-4 ... +149° F)
<b>Design</b>	
Weight (approximate shipping weight of sensor with standard cable length)	1.2 kg (2.6 lbs)
Material (enclosure)	PVDF copolymer enclosure and CSM face
Process connection	1" NPT [(Taper), ANSI/ASME B1.20.1] or R 1" [(BSPT), EN 10226]
Degree of protection	IP65/IP68
Cable connection	2-core shielded/twisted, 0.5 mm <sup>2</sup> (20 AWG), PVC sheath
Cable (max. length)	<ul style="list-style-type: none"> <li>• 365 m (1200 ft) with RG 62 A/U coaxial cable</li> <li>• 365 m (1200 ft) with 2-core twisted pair, foil shield, 0.5 mm<sup>2</sup> (20 AWG), PVC sheath, only for SITRANS LUC500, MultiRanger 100/200</li> </ul>
<b>Options</b>	
Flange version	Factory flange with PTFE face for ASME, EN or JIS configuration
Submergence shield	For applications with flooding possible
<b>Certificates and approvals</b>	
CE (EMC certificate available on request), CSA Class I Div. 2, FM Class I, ATEX II 2G, SAA Ex s Class I	



# Level Measurement

## Continuous level measurement – Ultrasonic transducers

Echomax XRS-5

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Echomax XRS-5 transducer</b> With a beam angle of 10°, the XRS-5 provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds. Measuring range: min. 0.3 m (1 ft), max. 8 m (26 ft)	C) <b>7ML1106-0-0</b>	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y17</b>
<b>Process connection</b> 1" NPT [(Taper), ANSI/ASME B1.20.1] R 1" [(BSPT), EN 10226]	1 2	<b>Accessories</b> Submergence shield kit	Order No. <b>7ML1830-1BH</b>
<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft)	A B C	Easy Aimer 2, NPT with ¾" x 1" PVC coupling	<b>7ML1830-1AQ</b>
<b>Facing</b> Standard (CSM rubber) PTFE (flange versions)	A B	Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	<b>7ML1830-1AX</b>
<b>Approvals</b> CE, FM Class I, ATEX II 2G, CSA Class I Div. 2, SAA Class I	2	Easy Aimer 304, with stainless steel coupling	<b>7ML1830-1AU</b>
<b>Mounting flange (flush mount)</b> None 3" ASME, 150 lbs, flat faced 4" ASME, 150 lbs, flat faced 6" ASME, 150 lbs, flat faced DN 80, PN 10/16, Type A, flat faced DN 100, PN 10/16, Type A, flat faced DN 150, PN 10/16, Type A, flat faced JIS10K 3B style JIS10K 4B style JIS10K 6B style Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.	A B C D J K L Q R S	Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	<b>7ML1830-1GN</b>
<b>Operating Instructions</b> Quick Start Manual, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) <b>7ML1998-5QT81</b> C) <b>7ML1998-5HV61</b>	FMS-200 universal box bracket, mounting kit FMS-210 channel bracket, wall mount FMS-220 extended channel bracket, wall mount FMS-310 channel bracket, floor mount FMS-320 extended channel bracket, floor mount FMS-350 bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information) 1" NPT locknut, plastic 1" BSPT locknut, plastic	<b>7ML1830-1BK</b> <b>7ML1830-1BL</b> <b>7ML1830-1BM</b> <b>7ML1830-1BN</b> <b>7ML1830-1BP</b> <b>7ML1830-1BQ</b> <b>7ML1830-1DS</b> <b>7ML1830-1DR</b>

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

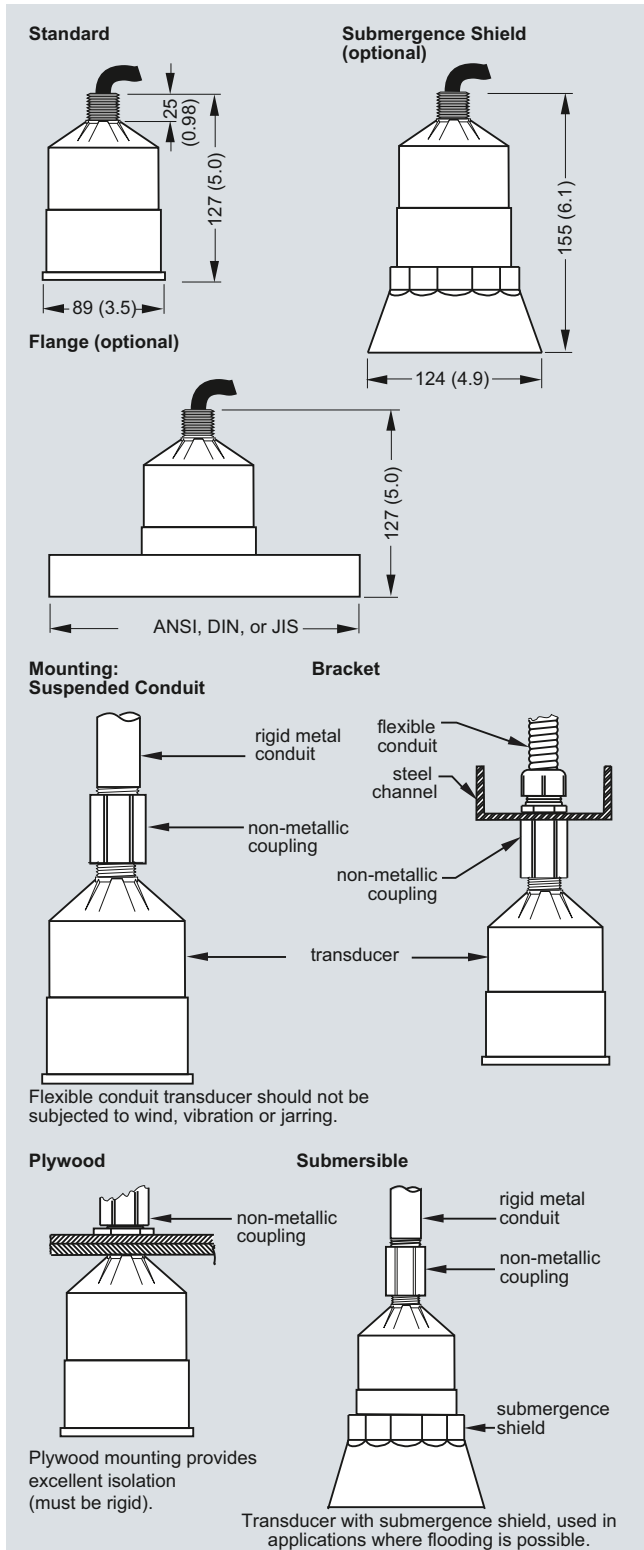
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# Level Measurement

## Continuous level measurement – Ultrasonic transducers

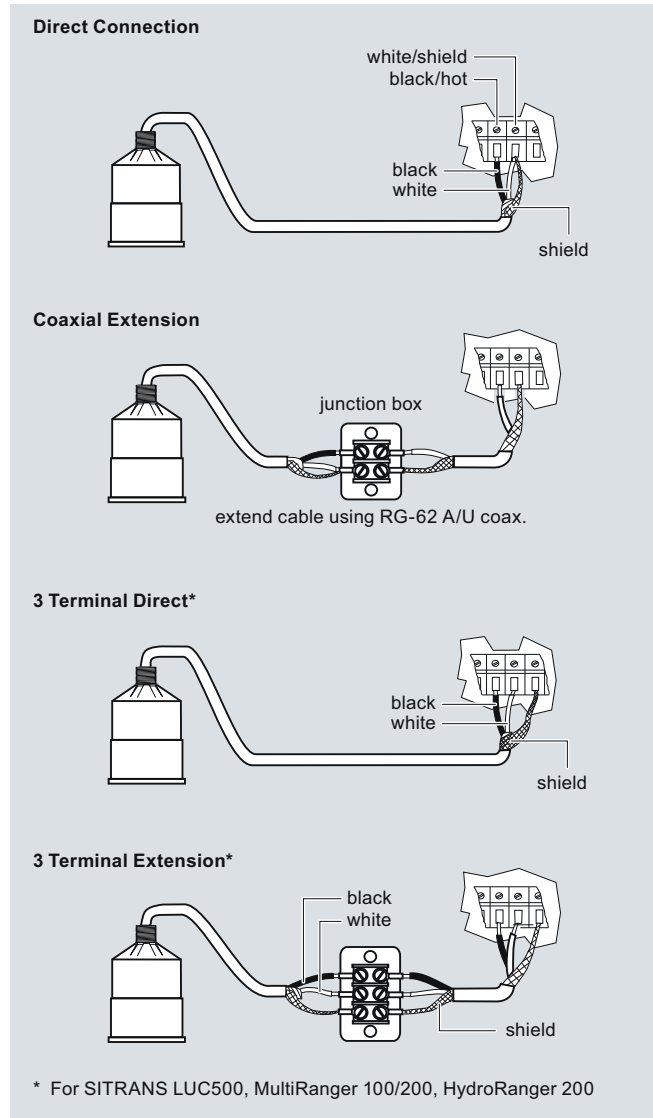
### Echomax XRS-5

#### Dimensional drawings



XRS-5 ultrasonic transducer, dimensions, in mm (inch)

#### Schematics



XRS-5 ultrasonic transducer connections

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# Level Measurement

## Continuous level measurement – Ultrasonic transducers

Echomax XPS and XCT

### Overview



Echomax XPS/XCT transducers use ultrasonic technology to measure level in a wide range of liquids and solids.

### Benefits

- Integral temperature compensation
- Low ringing effect reduces blanking distance
- Optional foam facing for dusty applications
- Self-cleaning and low-maintenance
- Chemically resistant
- Hermetically sealed

### Application

The transducers can be fully immersed, are resistant to steam and corrosive chemicals, and can be installed without flanges.

The XPS series offers versions for various measuring ranges up to 40 m (130 ft) and up to a max. temperature of 95 °C (203 °F).

The XCT series can be used in applications at higher temperatures to measure level up to a distance of 12 m (40 ft) and at a max. temperature of 95 °C (203 °F).

During operation, the Echomax transducers emit acoustic pulses in a narrow beam. The level monitor measures the propagation time between pulse emission and its reflection (echo) to calculate the distance.

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

#### Technical specifications

Input	XPS-10 (standard and F models)	XPS-15 (standard and F models)	XPS-30	XPS-40	XCT-8 (standard and sanitary models)	XCT-12
Measuring range	0.3 ... 10 m (1 ... 33 ft)	Standard: 0.3 ... 15 m (1 ... 50 ft)  Flanged: 0.45 ... 15 m (1.5 ... 50 ft)	0.6 ... 30 m (2 ... 100 ft)	0.9 ... 40 m (3 ... 130 ft)	0.6 ... 8 m (2 ... 26 ft)	0.6 ... 12 m (2 ... 40 ft)
<b>Output</b>						
Frequency	44 kHz	44 kHz	30 kHz	22 kHz	44 kHz	44 kHz
Beam angle	12°	6°	6°	6°	12°	6°
<b>Environmental</b>						
Location	Indoors/outdoors					
Ambient temperature	Standard: -40 ... +95 °C (-40 ... +203 °F) F: -20 ... +95 °C (-4 ... +203 °F)				Standard: -40 ... +145 °C (-40 ... +293 °F)  Sanitary: -40 ... +125 °C (-40 ... +260 °F)	-40 ... +145 °C (-40 ... +293 °F)
Pollution degree	4					
Pressure	8 bar g (120 psi g)  Flanged: 0.5 bar g (7.25 psi g)	8 bar g (120 psi g)  Flanged: 0.5 bar g (7.25 psi g)	0.5 bar g (7.25 psi g)  Flanged: 0.5 bar g (7.25 psi g)	0.5 bar g (7.25 psi g)	Standard: 4 bar g (60 psi g): -40 ... +138 °C (-40 ... +280 °F)  Standard: 8 bar g (120 psi g): -40 ... +95 °C (-40 ... +203 °F)  Flanged: 0.5 bar g (7.25 psi g)  Sanitary: XCT-8: 0.5 bar g (7.25 psi g)	
<b>Design</b>						
Weight	0.8 kg (1.8 lbs)	1.3 kg (2.8 lbs)  Flanged: 2 kg (4.4 lbs)	4.3 kg (9.5 lbs)	8 kg (18 lbs)	0.8 kg (1.7 lbs)	1.3 kg (2.8 lbs)
Power supply	Operation of transducer only with approved Siemens Milltronics controllers					
Material	Standard: PVDF  Flanged: PVDF with CPVC flange  Option: PTFE face with CPVC flange	Standard: PVDF  Flanged: PVDF with CPVC flange  Option: PTFE face with CPVC flange	Standard: PVDF  Flanged: PVDF with CPVC flange  Option: PTFE face with CPVC flange	PVDF	Standard: PVDF  Options: DERAKANE flange; PTFE face with universal PVDF flange	
Color	Standard: blue  F: gray	Standard: blue  F: gray	blue	blue	white	
Process connection	Standard: 1" NPT or 1" BSPT  F: 1" NPT	Standard: 1" NPT or 1" BSPT  F: 1" NPT	1.5" universal thread (NPT or BSPT)		1" NPT or R 1" (BSPT), EN 10226	
Degree of protection	IP66/68	IP66/68	IP66/68	IP66/68	IP66/68	IP66/68
Cable	2 wire twisted pair/braided and foil shielded 0.5 mm <sup>2</sup> (20 AWG) PVC jacket				2 wire twisted pair/braided and foil shielded 0.5 mm <sup>2</sup> (20 AWG) silicone jacket	
Separation	Max. 365 m (1200 ft)					
<b>Certificates and approvals</b>	Standard: CE <sup>1)</sup> , CSA, FM, ATEX II 2GD  F: FM Class I, Div 1, Groups A, B, C and D, Class II Div 1, Groups E, F and G, Class III	Standard: CE <sup>1)</sup> , CSA, FM, ATEX II 2GD  F: FM Class I, Div 1, Groups A, B, C and D, Class II Div 1, Groups E, F and G, Class III	CE <sup>1)</sup> , CSA, FM, ATEX II 2G 1D	CE <sup>1)</sup> , CSA, FM, ATEX II 2G 1D	Standard: CE <sup>1)</sup> , CSA, FM, ATEX II 2GD  Sanitary: CE, CTICK, CSA <sub>US/C</sub>	CE <sup>1)</sup> , CSA, FM, ATEX II 2GD

<sup>1)</sup> EMC certificate available on request.

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Echomax XPS-10 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 10 m	C) <b>7ML1170-</b> 0	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s).  Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Mounting thread and facing</b> 1" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1] with foam facing <sup>1)</sup> 1" NPT [(Taper), ANSI/ASME B1.20.1] with PTFE facing <sup>2)</sup>  R 1" [(BSPT), EN 10226] R 1" [(BSPT), EN 10226] with foam facing <sup>1)</sup> R 1" [(BSPT), EN 10226] with PTFE facing <sup>2)</sup>	0 1 2 3 4 5	<b>Operating Instructions</b> Quick Start guide, multi-language C) <b>7ML1998-5QM82</b>  Applications Guidelines, multi-language C) <b>7ML1998-5HV61</b>  Note: The Applications Guidelines should be ordered as a separate line item on the order.  This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No.
<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft)  50 m (164.04 ft) 100 m (328.08 ft)	B C E F K	<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors  Submergence shield kit  Easy Aimer 2, with 3/4" x 1" NPT PVC coupling  Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings  Easy Aimer 304, with stainless steel coupling  Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 SS couplings  Universal box bracket, mounting kit  Channel bracket, wall mount  Extended channel bracket, wall mount  Channel bracket, floor mount  Extended channel bracket, floor mount  Bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information)	<b>7ML1930-1BJ</b>  <b>7ML1830-1BH</b> <b>7ML1830-1AQ</b> <b>7ML1830-1AX</b>  <b>7ML1830-1AU</b> <b>7ML1830-1GN</b>  <b>7ML1830-1BK</b> <b>7ML1830-1BL</b> <b>7ML1830-1BM</b> <b>7ML1830-1BN</b> <b>7ML1830-1BP</b> <b>7ML1830-1BQ</b>
<b>Mounting flange</b> None  3" ASME, 150 lb, flat faced 4" ASME, 150 lb, flat faced  6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced  DN 80, PN 10/16, Type A, flat faced DN 100, PN 10/16, Type A, flat faced DN 150, PN 10/16, Type A, flat faced  JIS10K3B Style JIS10K4B Style JIS10K6B Style (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)	A C D E F G J L M P R	1" NPT locknut, plastic  1" BSPT locknut, plastic  C) Subject to export regulations AL: N, ECCN: EAR99.	<b>7ML1830-1DS</b> <b>7ML1830-1DR</b>
<b>Approvals</b> ATEX II 2 GD, FM Class I Div. 2, SAA Class I CSA Class I Div. 1 <sup>3)</sup>	3 4		

1) Not available with flanged versions

2) Available with flanged versions only

3) Valid with mounting thread and facing options 0 to 2 only

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

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

#### Selection and Ordering data

**Echomax XPS-10F ultrasonic transducer**  
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor.  
Measuring range: min. 0.3 m, max. 10 m

**Mounting thread and facing**  
1" NPT [(Taper), ANSI/ASME B1.20.1]

**Cable length**  
5 m (16.40 ft)  
10 m (32.81 ft)  
30 m (98.43 ft)  
50 m (164.04 ft)  
100 m (328.08 ft)

**Mounting flange, flush mount**  
None  
3" ASME, 150 lb, flat faced  
4" ASME, 150 lb, flat faced  
6" ASME, 150 lb, flat faced  
8" ASME, 150 lb, flat faced  
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)

**Approvals**  
FM Class I Div. 1

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

Order No.

7ML1170-  
0

1

B  
C  
D  
E  
F

A  
B  
C  
D  
E

1

#### Selection and Ordering data

Order code

##### Further designs

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

Acrylic coated, stainless steel tag [13 x 45 mm  
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]:  
Measuring-point number/identification  
(max. 16 characters) specify in plain text

Y15

##### Operating Instructions

Quick Start guide, multi-language

C) 7ML1998-1DU01

Applications Guidelines, multi-language  
Note: The Applications Guidelines should be ordered as a separate line item on the order.

C) 7ML1998-5HV61

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

##### Accessories

Tag, stainless steel with hole, 12 x 45 mm  
(0.47 x 1.77"), one text line for fastening on sensors

7ML1930-1BJ

Submergence shield kit

7ML1830-1BH

Easy Aimer 2, with 3/4" x 1" NPT PVC coupling

7ML1830-1AQ

Easy Aimer 304, with stainless steel coupling

7ML1830-1AU

Universal box bracket, mounting kit

7ML1830-1BK

Channel bracket, wall mount

7ML1830-1BL

Extended channel bracket, wall mount

7ML1830-1BM

Channel bracket, floor mount

7ML1830-1BN

Extended channel bracket, floor mount

7ML1830-1BP

Bridge channel bracket, floor mount  
(see Mounting Brackets on page 5/198 for more information)

7ML1830-1BQ

1" NPT locknut, plastic

7ML1830-1DS

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

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Echomax XPS-15 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 15 m	C) <b>7ML1118-0</b>	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Mounting thread and facing</b> 1" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1] with foam facing <sup>1)</sup> 1" NPT [(Taper), ANSI/ASME B1.20.1] with PTFE facing <sup>2)</sup> R 1" [(BSPT), EN 10226] R 1" [(BSPT), EN 10226] with foam facing <sup>1)</sup> R 1" [(BSPT), EN 10226] with PTFE facing <sup>2)</sup>	0 1 2 3 4 5	<b>Operating Instructions</b> Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. C) <b>7ML1998-5QM82</b> C) <b>7ML1998-5HV61</b>
<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C E F K	<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors Submergence shield kit Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information) 1" NPT locknut, plastic 1" BSPT locknut, plastic Easy Aimer 2, with ¾" x 1" NPT PVC coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304 with stainless steel coupling Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	<b>7ML1930-1BJ</b> <b>7ML1830-1BJ</b> <b>7ML1830-1BK</b> <b>7ML1830-1BL</b> <b>7ML1830-1BM</b> <b>7ML1830-1BN</b> <b>7ML1830-1BP</b> <b>7ML1830-1BQ</b> <b>7ML1830-1DS</b> <b>7ML1830-1DR</b> <b>7ML1830-1AQ</b> <b>7ML1830-1AX</b> <b>7ML1830-1AU</b> <b>7ML1830-1GN</b>
<b>Mounting flange</b> None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced DN 150, PN 10/16, Type A, flat faced DN 200, PN 10/16, Type A, flat faced JIS10K 6B JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)	A D E J K N P		
<b>Approvals</b> ATEX II 2GD, FM Class I Div. 2, SAA Class I CSA Class I Div. 1 <sup>3)</sup>	3 4		
<sup>1)</sup> Not available with flanged versions <sup>2)</sup> Available with flanged versions only <sup>3)</sup> Available with mounting options 0 to 2 only C) Subject to export regulations AL: N, ECCN: EAR99.			
		C) Subject to export regulations AL: N, ECCN: EAR99.	

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order No.
<b>Echomax XPS-15F ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 15 m	C) <b>7ML1171-0</b>
<b>Mounting thread and facing</b> 1" NPT [(Taper), ANSI/ASME B1.20.1]	1
<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C D E F
<b>Mounting flange, flush mount</b> None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2220 standard.)	A B C
<b>Approvals</b> FM Class I Div. 1	1

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

Selection and Ordering data	Order code
<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y15
<b>Operating Instructions</b> Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. C) <b>7ML1998-1DU01</b> C) <b>7ML1998-5HV61</b>
<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors Submergence shield kit Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information) 1" NPT locknut, plastic Easy Aimer 2, with ¾" x 1" NPT PVC coupling Easy Aimer 304 with stainless steel coupling	<b>7ML1930-1BJ</b> <b>7ML1830-1BJ</b> <b>7ML1830-1BK</b> <b>7ML1830-1BL</b> <b>7ML1830-1BM</b> <b>7ML1830-1BN</b> <b>7ML1830-1BP</b> <b>7ML1830-1BQ</b> <b>7ML1830-1DS</b> <b>7ML1830-1AQ</b> <b>7ML1830-1AU</b>

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

Selection and Ordering data	Order No.
<b>Echomax XPS-30 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. 1½" universal thread compatible with 1½" NPT and R 1½" [(BSPT), EN 10226] Measuring range: min. 0.6 m (1.97 ft), max. 30 m (98.43 ft)	C) <b>7ML1123-0</b>
<b>Mounting thread and facing</b> 1½" universal thread 1½" universal thread, foam facing <sup>1)</sup> 1½" universal thread, PTFE facing <sup>2)</sup>	0 1 2
<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	B C E F K
<b>Mounting flange</b> None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced DN 150, PN 10/16, Type A, flat faced DN 200, PN 10/16, Type A, flat faced JIS10K 6B JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2220 standard.)	A D E J K N P
<b>Approvals</b> ATEX II 2G 1D, FM Class I Div 2, SAA	5

1) Not available with flanged versions

2) Available with flanged versions only

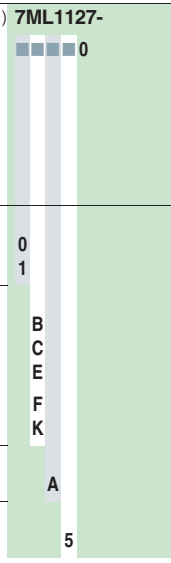
C) Subject to export regulations AL: N, ECCN: EAR99.



# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order code	Selection and Ordering data	Order No.
<b>Further designs</b> Please add <b>"-Z"</b> to Order No. and specify Order code(s).		<b>Echomax XPS-40 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. 1½" universal thread compatible with 1½" NPT and R 1½" [(BSPT), EN 10226] Measuring range: min. 0.9 m (2.95 ft), max. 40 m (131.23 ft)	C) <b>7ML1127-0</b> 
Acrylic coated, stainless steel tag [13 x 45 mm] Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>	<b>Mounting thread and facing</b> 1½" universal thread 1½" universal thread, foam facing	
<b>Operating Instructions</b> Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. C) <b>7ML1998-5QM82</b> C) <b>7ML1998-5HV61</b>	<b>Cable length</b> 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	
<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors 1½" BSPT locknut, plastic Easy Aimer 2, 1½" NPT galvanized coupling Easy Aimer 2, 1½" NPT with stainless steel coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings C) Subject to export regulations AL: N, ECCN: EAR99.	<b>7ML1930-1BJ</b> <b>7ML1830-1DP</b> <b>7ML1830-1AN</b> <b>7ML1830-1AT</b> <b>7ML1830-1AX</b> <b>7ML1830-1GN</b>	<b>Mounting flange</b> None <b>Approvals</b> ATEX II 2G 1D, FM Class I Div 2, SAA C) Subject to export regulations AL: N, ECCN: EAR99	
		<b>Selection and Ordering data</b> <b>Further designs</b> Please add <b>"-Z"</b> to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm] Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text <b>Operating Instructions</b> Quick Start guide, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library. <b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors 1½" BSPT locknut, plastic Easy Aimer 2, 1½" NPT galvanized coupling Easy Aimer 2, 1½" NPT with stainless steel coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings C) Subject to export regulations AL: N, ECCN: EAR99. J) Subject to export regulations AL: 91999, ECCN: EAR99.	Order code <b>Y15</b> Order No. C) <b>7ML1998-5QM82</b> C) <b>7ML1998-5HV61</b> <b>7ML1930-1BJ</b> <b>7ML1830-1DP</b> <b>7ML1830-1AN</b> <b>7ML1830-1AT</b> <b>7ML1830-1AX</b> <b>7ML1830-1GN</b>

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Echomax XCT-8 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Ambient temperatures up to 145 °C (293 °F) Measuring range: min. 0.6 m (2 ft), max. 8 m (26 ft)	C) <b>7ML1132-0</b>	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
<b>Mounting thread and facing</b> 1" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1], PTFE facing <sup>1)</sup> R 1" [(BSPT), EN 10226] R 1" [(BSPT), EN 10226], PTFE facing <sup>1)</sup>	0 1 2 3	<b>Operating Instructions</b> Quick start manual, multi-language XCT-8 with Sanitary Flange, multi-language Note: This manual should be ordered as a separate line item with Mounting Option V.	Order No. C) <b>7ML1998-5QM82</b> C) <b>7ML1998-5HX62</b>
<b>Cable length</b> 1 m (3.28 ft) 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	A B C E F K	Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	C) <b>7ML1998-5HV61</b>
<b>Mounting flange</b> None 3" ASME, 150 lb, flat faced 4" ASME, 150 lb, flat faced 6" ASME, 150 lb, flat faced DN 80, PN 10/16, Type A, flat faced DN 100, PN 10/16, Type A, flat faced DN 150, PN 10/16, Type A, flat faced JIS10K 3B JIS10K 4B JIS10K 6B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 or JIS B 2220 standard.) 3" universal <sup>2)</sup> 4" universal <sup>3)</sup> 6" universal <sup>4)</sup> 4" sanitary flange <sup>5)</sup>	A C D E G J L M P R S T U V	<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors Submersible hood Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information) 1" NPT locknut, plastic 1" BSPT locknut, plastic Easy Aimer 304 with stainless steel coupling Easy Aimer, aluminum, with M20 adapter and ¾ ... 1" and 1½" BSPT couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings Sanitary, 4" mounting clamp Sanitary, isolating gasket	<b>7ML1930-1BJ</b> <b>7ML1830-1BH</b> <b>7ML1830-1BK</b> <b>7ML1830-1BL</b> <b>7ML1830-1BM</b> <b>7ML1830-1BN</b> <b>7ML1830-1BP</b> <b>7ML1830-1BQ</b> <b>7ML1830-1DS</b> <b>7ML1830-1DR</b> <b>7ML1830-1AU</b> <b>7ML1830-1AX</b> <b>7ML1830-1GN</b> <b>7ML1830-1BR</b> J) <b>7ML1830-1KC</b>
<b>Approvals</b> ATEX II 2GD, FM Class I, Div. 2, SAA CSA Class I Div. 1, available with mounting thread and facing option 0 CE, C-TICK, CSA <sub>US/C</sub>	4 5 7		

- 1) Available with flange versions S to V only  
 2) Universal fits 3" ASME, DN 80, JIS 10K3B style  
 3) Universal fits 4" ASME, DN 100, JIS 10K4B style  
 4) Universal fits 6" ASME, DN 150, JIS 10K6B style  
 5) Available with Mounting thread and facing options 1 and 3, and approval option 7 only  
 C) Subject to export regulations AL: N, ECCN: EAR99.

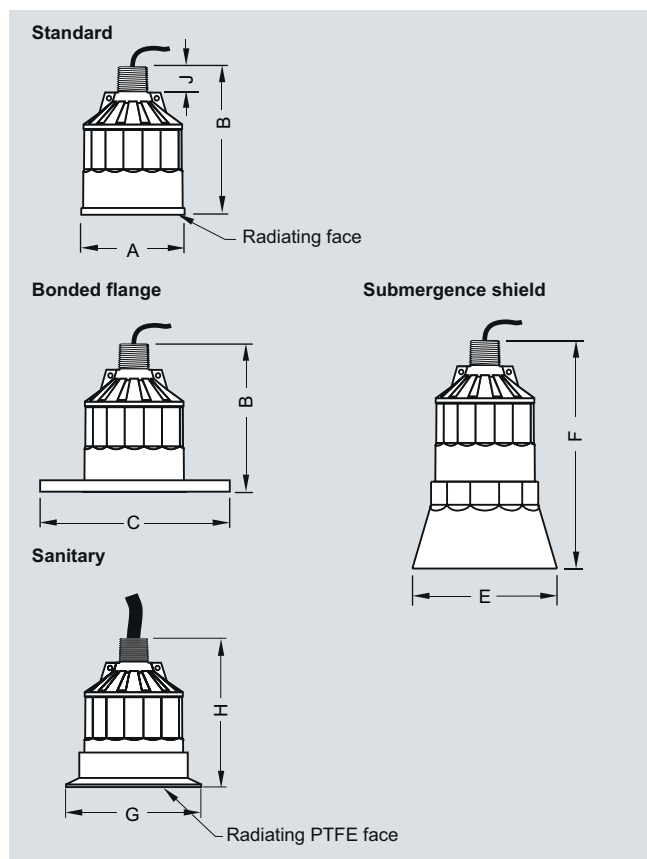
- C) Subject to export regulations AL: N, ECCN: EAR99.  
 J) Subject to export regulations AL: 91999, ECCN: EAR99.

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

Echomax XPS and XCT

### Dimensional drawings

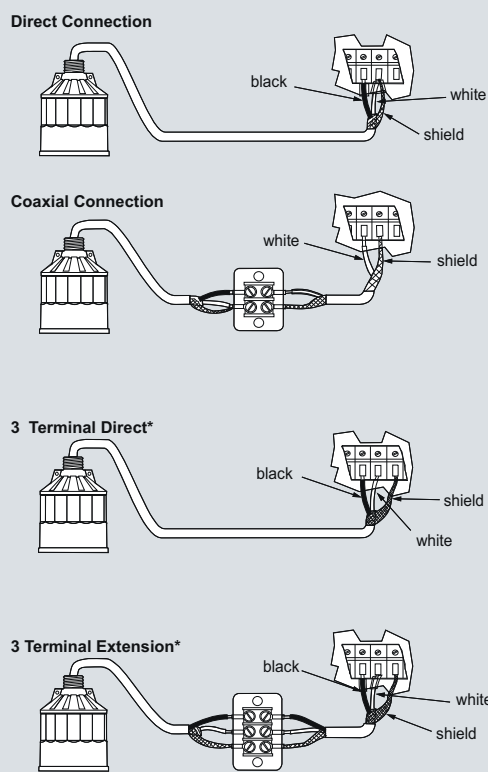


XPS and XCT ultrasonic transducer, dimensions, in mm (inch)

Version				
Dimension	XPS-10	XPS-15	XPS-30	XPS-40
A	88 mm (3.464")	121 mm (4.764")	175 mm (6.890")	206 mm (8.110")
B	122 mm (4.803")	132 mm (5.197")	198 mm (7.795")	229 mm (9.016")
C	According to ASME, DIN and JIS			n/a
E	124 mm (4.882")	158 mm (6.220")	n/a	n/a
F	152 mm (5.984")	198 mm (7.795")	n/a	n/a
J	28 mm (1.1")	28 mm (1.1")	28 mm (1.1")	28 mm (1.1")

Version		
Dimension	XCT-8	XCT-12
A	88 mm (3.464")	121 mm (4.764")
B	122 mm (4.803")	132 mm (5.197")
C	According to ASME, DIN and JIS	
E	n/a	n/a
F	n/a	n/a
G	Sanitary version: 119 mm (4.68")	n/a
H	Sanitary version: 122 mm (4.8")	n/a
J	28 mm (1.1")	28 mm (1.1")

### Schematics



\* For SITRANS LUC500, MultiRanger 100/200, HydroRanger 200

#### Mounting

Make particularly sure that the radiating face of the transducer is protected from damage. Mount the transducer so that it is above the maximum material level by at least the blanking value. On liquid applications, the transducer must be mounted so that the axis of transmission is perpendicular to the liquid surface. On solids applications, a Milltronics Easy Aimer should be used to facilitate aiming the transducer. Consider the optional temperature sensor when mounting the transducer.

#### Interconnection

Do not route cable openly or near high voltage or current runs, contactors and SCR control drives. For optimum isolation against electrical noise, run cable separately in a grounded metal conduit. Seal all thread connections to prevent ingress of moisture.

XPS and XCT ultrasonic transducer connections

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XPS and XCT

Selection and Ordering data	Order No.	Selection and Ordering data	Order code
<b>Echomax XCT-12 ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Ambient temperatures up to 145 °C (293 °F) Measuring range: min. 0.6 m (2 ft), max. 12 m (40 ft)	C) 7ML1136-0	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y15
<b>Mounting thread and facing</b> 1" NPT [(Taper), ANSI/ASME B1.20.1] 1" NPT [(Taper), ANSI/ASME B1.20.1], PTFE facing, available for flange options U only <sup>1)</sup> R 1" [(BSPT), EN 10226] R 1" [(BSPT), EN 10226], PTFE facing, available for flange options U only <sup>1)</sup>	0 1 2 3	<b>Operating Instructions</b> Quick start manual, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	Order No. C) 7ML1998-5QM82 C) 7ML1998-5HV61
<b>Cable length</b> 1 m (3.28 ft) 5 m (16.40 ft) 10 m (32.81 ft) 30 m (98.43 ft) 50 m (164.04 ft) 100 m (328.08 ft)	A B C E F K	This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	
<b>Mounting flange</b> None 6" ASME, 150 lb, flat faced 8" ASME, 150 lb, flat faced DN 150, PN 10/16, Type A, flat faced DN 200, PN 10/16, Type A, flat faced JIS10K 6B JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 or JIS B 2220 standard.) 6" universal for 6" ASME, DN 150 or JIS 10K6B style	A D E J K N P U	<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors Submergence shield kit Universal box bracket, mounting kit Channel bracket, wall mount Extended channel bracket, wall mount Channel bracket, floor mount Extended channel bracket, floor mount Bridge channel bracket, floor mount (see Mounting Brackets on page 5/198 for more information) 1" NPT locknut, plastic 1" BSPT locknut, plastic Easy Aimer 304 with stainless steel coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	7ML1930-1BJ 7ML1830-1BJ 7ML1830-1BK 7ML1830-1BL 7ML1830-1BM 7ML1830-1BN 7ML1830-1BP 7ML1830-1BQ 7ML1830-1DS 7ML1830-1DR 7ML1830-1AU 7ML1830-1AX 7ML1830-1GN
<b>Approvals</b> ATEX II 2GD, FM Class I, Div. 2, SAA CSA Class I, Div. 1, available with mounting thread and facing option 0 only	3 4		
<sup>1)</sup> Available with universal flanges only C) Subject to export regulations AL: N, ECCN: EAR99.			

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

Echomax XLT

### Overview



Echomax XLT transducers use ultrasonic technology to measure level in a wide range of bulk solids.

### Benefits

- Sealed aluminum face
- Integral temperature sensor
- Self-cleaning and low maintenance
- Connect using only two wires
- Easy to install

### Application

XLT transducers operate with Siemens SITRANS LU transceivers in measuring ranges from 0.9 to 60 m (1.8 ... 200 ft) and temperatures up to 150 °C (300 °F). A beam angle of just 5° provides accurate readings in deep, narrow tanks.

With increased signal sensitivity, the XLT transducers from Siemens can operate in difficult applications such as limestone, cement clinker and hot stone. All models have a sealed aluminum face to withstand very harsh environments.

During operation, Echomax transducers emit acoustic pulses in a narrow beam. The level transceiver measures the propagation time between pulse emission and reception of the echo to calculate the distance from the transducer to the material. Temperature variations are automatically compensated by the integral temperature sensor.

- Key Applications: bulk solids including limestone, cement clinker, hot stone and coal bunkers

### Technical specifications

Mode of operation	
Measuring principle	Ultrasonic transducer
Input	
Measuring range	
• XLT-30	0.9 ... 30 m (3.0 ... 100 ft)
• XLT-60	1.8 ... 60 m (6.0 ... 200 ft)
Output	
Frequency	
• XLT-30	22 kHz
• XLT-60	13 kHz
• Beam angle <sup>1)</sup>	5°
Accuracy	
Temperature error	Compensated by transducers internal temperature sensor
Rated operating conditions	
Ambient conditions	
• Ambient temperature - XLT-30 and XLT-60	-40 ... +150 °C (-40 ... +300 °F)
Design	
Weight	
• XLT-30	4.3 kg (9.5 lbs)
• XLT-60	6.6 kg (14.5 lbs)
Material (enclosure)	Aluminium, 304 stainless steel, polyester and silicone
Degree of protection	IP68
Color	
• XLT-30 and XLT-60	Red
Mounting	
Cable connection	1" NPT [(Taper), ANSI/ASME B1.20.1]
Cable (max. length)	2-core shielded/twisted, 0.5 mm <sup>2</sup> (20 AWG), silicone sheath
Certificates and approvals	365 m (1200 ft) with RG 62 AU coaxial cable
	CE (EMC certificate available on request), CSA <sub>US/C</sub> , FM, ATEX II 2G 1D T5

<sup>1)</sup> Definition of beam width: twice the angle at which the off-axis transmission is 3 dB less than the acoustic pressure level of the transmission axis (as measured equidistant from the sensor face).

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

### Echomax XLT

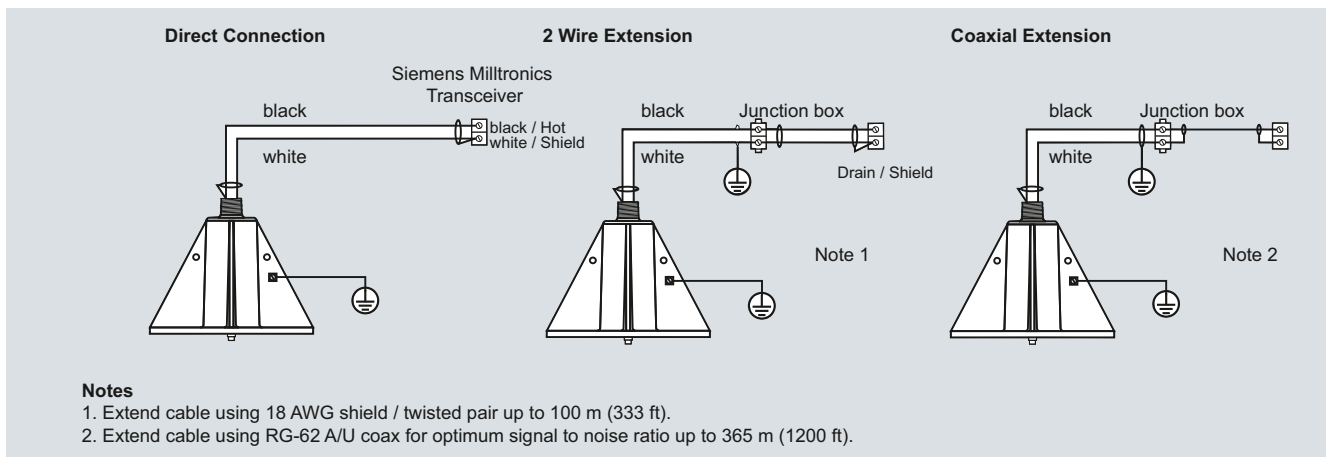
Selection and Ordering data	Order No.
<b>Echomax XLT-30, XLT-60, ultrasonic transducer</b> High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.9 m, max. 30 m Process connection: 1" NPT [(Taper), ANSI/ASME B1.20.1]	
<b>XLT-30</b>	C) <b>7ML1141-</b>
<b>XLT-60</b>	C) <b>7ML1145-</b>
	<b>E 0</b>
<b>Facing</b>	
XLT-30	0
XLT-60	1
XLT-30, nylon	2
XLT-60, nylon	3
<b>Cable length</b>	
1 m (3.28 ft)	A
5 m (16.40 ft)	B
10 m (32.81 ft)	C
20 m (65.62 ft)	D
30 m (98.43 ft)	E
50 m (164.04 ft)	F
70 m (229.66 ft)	G
80 m (262.47 ft)	H
90 m (295.28 ft)	J
100 m (328.08 ft)	K
<b>Approvals</b>	
ATEX II 2G 1D, CSA Class I Div. 1, FM Class I Div. 2, CE	3

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

Selection and Ordering data	Order code
<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Acrylic coated, stainless steel tag [13 x 45 mm Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 27 characters) specify in plain text	<b>Y15</b>
<b>Operating Instructions</b> Quick start manual, multi-language Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.	Order No. C) <b>7ML1998-5QS81</b> C) <b>7ML1998-5HV61</b>
<b>Accessories</b> Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77"), one text line for fastening on sensors Easy Aimer 2, 1" NPT galvanized Easy Aimer 304 with stainless steel coupling Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	<b>7ML1930-1BJ</b> <b>7ML1830-1AP</b> <b>7ML1830-1AU</b> <b>7ML1830-1AX</b> <b>7ML1830-1GN</b>

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

### Schematics



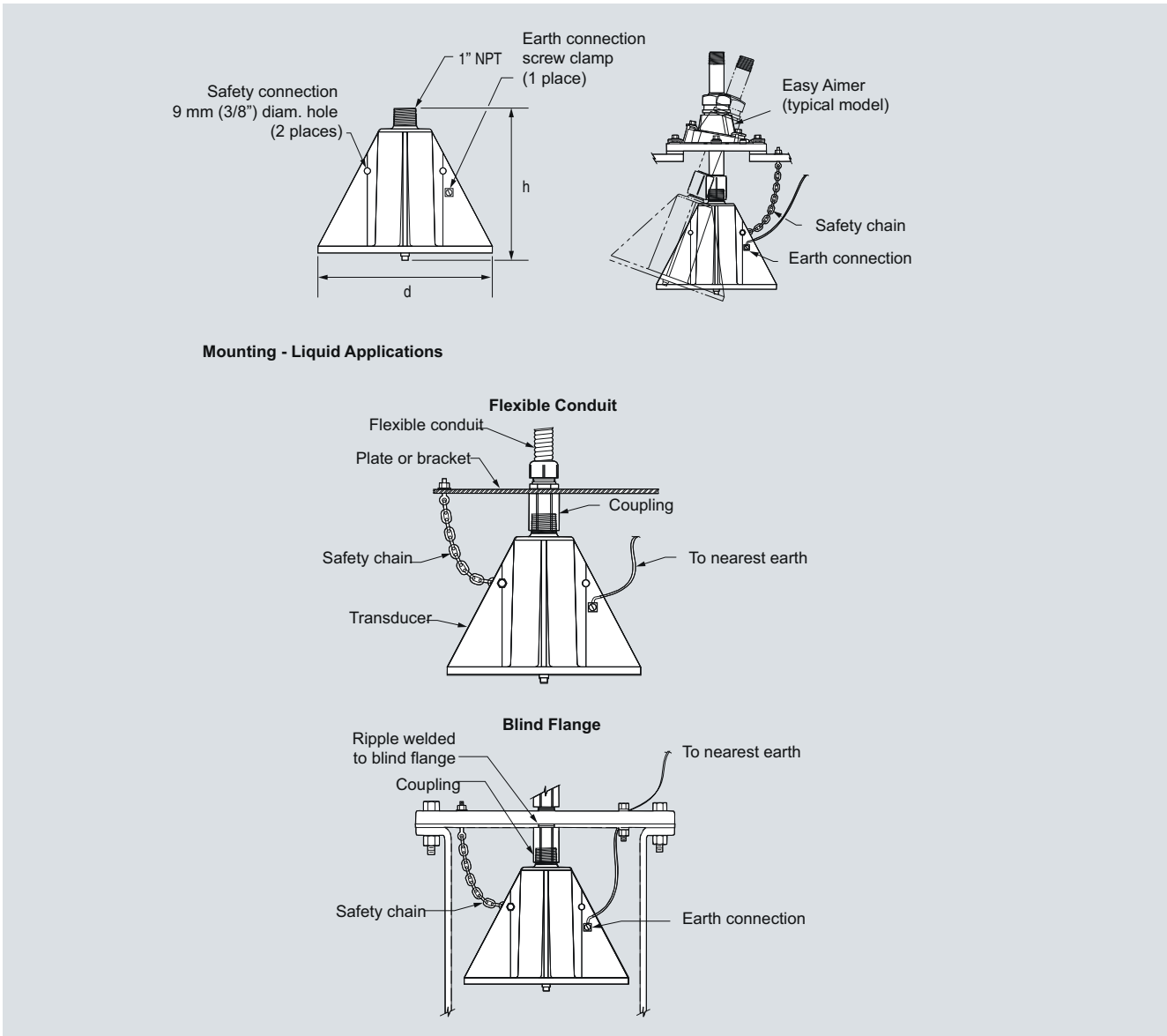
XLT ultrasonic transducer connections

# Level Measurement

## Continuous level measurement – Ultrasonic transducers

Echomax XLT

### Dimensional drawings



XLT ultrasonic transducer, dimensions, in mm (inch)

	XLT-30	XLT-60
d	264 mm (10.4")	335 mm (13.2")
h	249 mm (9.8")	324 mm (12.75")

5

# Level Measurement

## Continuous level measurement – Accessories for ultrasonic

### EA aiming devices

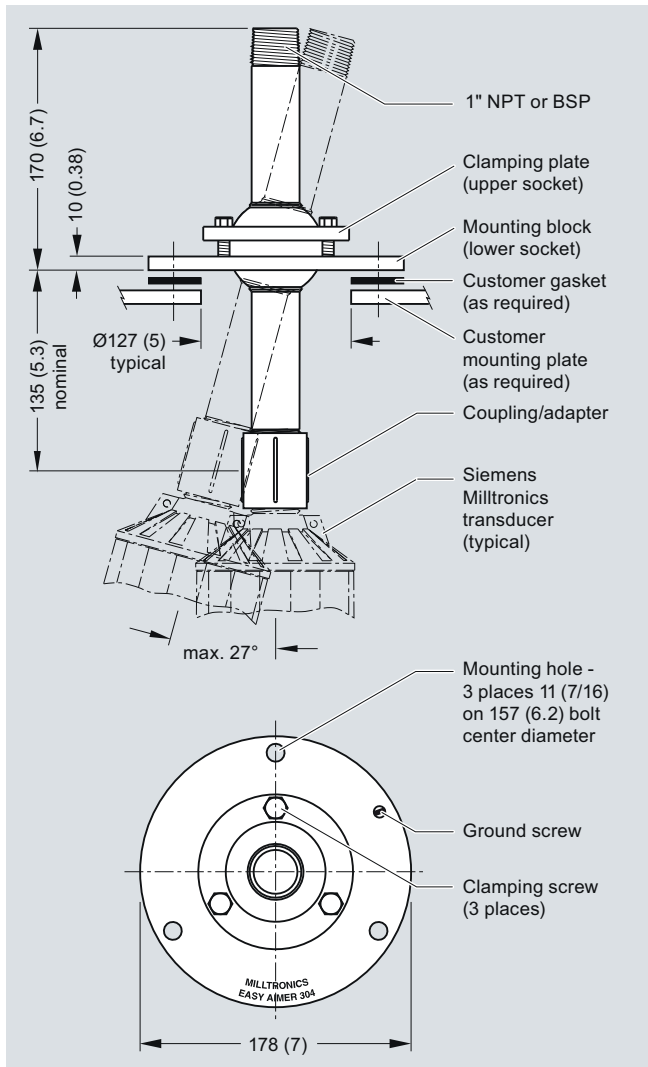
#### Application

##### EA 304 aiming device

The Easy Aimer 304 flange is a stainless steel aiming device for alignment of Siemens ultrasonic transducers used for level measurement of bulk solids.

The sensor must be mounted aimed towards the low level draw point in the silo. The sensor can be rotated through 360° and angled at 0 to 27° off vertical. It must be mounted using an access plate with welded studs or a flange in order to isolate the mounting holes from the pressurized environment. When installed properly, the EA 304 aiming device is capable of withstanding pressures up to 0.5 bar (Europe) or 15 psi (North America). It can even be used in corrosive and aggressive environments.

#### Dimensional drawings



EA 304 aiming device, dimensions in mm (inch)

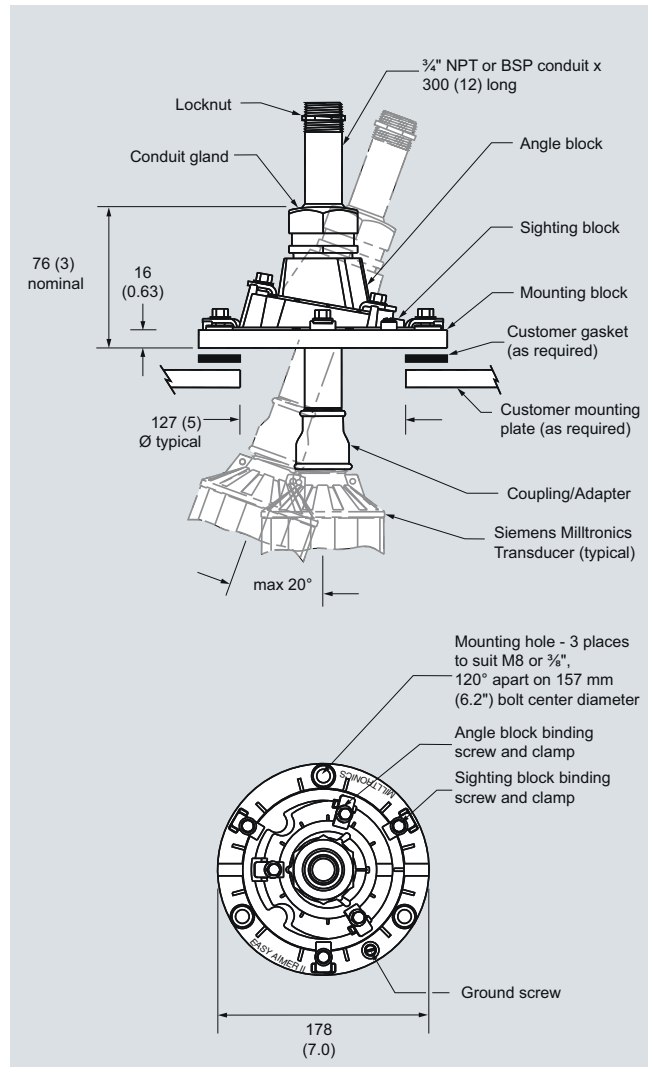
#### Application

##### EA 2 aiming device

The Easy Aimer 2 flange is a cast aluminum aiming device for alignment of Siemens ultrasonic transducers.

The flange has graduated adjustments and an adjustable insertion length. When used for applications with bulk solids, the sensor is mounted so that it is aimed towards the lower level draw point in the silo. The sensor can be rotated through 360° and angled at 0 to 20° off vertical. It must be mounted using an access plate with welded studs or a flange in order to isolate the mounting holes from the pressurized environment. When installed properly, the EA 2 aiming device is capable of withstanding pressures up to 0.5 bar (Europe) or 15 psi (North America). It can even be used in corrosive and aggressive environments.

#### Dimensional drawings



EA 2 aiming device, dimensions in mm (inch)

5



# Level Measurement

## Continuous level measurement – Accessories for ultrasonic

EA aiming devices

Selection and Ordering data	Order No.
<b>Easy aimer</b> Used on solids applications to aim transducers for optimal performance. Available in a 304 stainless steel model, or a cast aluminum model.	
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	<b>7ML1830-1AX</b>
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	<b>7ML1830-1GN</b>
Easy Aimer 2, aluminum, BSPT conduit	<b>7ML1830-1AL</b>
Easy Aimer 2, aluminum, NPT with 1½" galvanized coupling <sup>1)</sup>	<b>7ML1830-1AN</b>
Easy Aimer 2, aluminum, NPT with 1" galvanized coupling	<b>7ML1830-1AP</b>
Easy Aimer 2, aluminum, NPT with ¾" x 1" PVC coupling	<b>7ML1830-1AQ</b>
Easy Aimer 304, BSPT conduit	<b>7ML1830-1AS</b>
Easy Aimer 304, NPT with 1½" coupling <sup>1)</sup>	<b>7ML1830-1AT</b>
Easy Aimer 304, NPT with 1" coupling	<b>7ML1830-1AU</b>
<b>Operating Instructions</b> Easy Aimer 2 and 304 Operating Instructions, Multi-language Note: The Operating Instructions should be ordered as a separate line item on the order.  This device is shipped with the Siemens Milltronics manual CD containing the complete Quick Start and Operating Instructions library.	<b>7ML1998-5HG62</b>

<sup>1)</sup> For use with XPS-30 or XPS-40 transducers only

# Level Measurement

## Continuous level measurement – Accessories for ultrasonic

### FMS mounting brackets

#### Application

Siemens mounting brackets permit simple, fast installation of ultrasonic transducers. These rugged, high quality mounting brackets are constructed of 304 (1.4301) stainless steel and are suitable for use indoors and outdoors. They adjust to fit almost any application, saving you the time and expense of building custom brackets. Each kit includes all mounting parts.

#### **FMS-200** **universal box bracket system**

Mounting of units with 1" or 2" threaded connection.

Distance from sensor to wall or beam: 20 to 31 cm (8 to 12").

The unique box design also acts as a sun shield for transducers with 1" threaded connections.

#### **FMS-210** **wall mounting set**

Mounting of transducers with 1" threaded connection.

Distance from transducer to wall or beam: 12 to 48 cm (5 to 19").

#### **FMS-220** **extended wall mounting set**

Mounting of transducers with 1" threaded connection.

Distance from transducer to wall or beam: 32 to 98 cm (13 to 39").

#### **FMS-310** **floor mounting set**

Mounting of transducers with 1" threaded connection.

Distance from transducer to floor: 20 to 48 cm (8 to 19").

Distance from mounting support: 5 to 57 cm (2 to 22").

#### **FMS-320** **extended floor mounting set**

Mounting of transducers with 1" threaded connection.

Distance from transducer to floor: 20 to 48 cm (8 to 19").

Distance from mounting support: 41 to 108 cm (16 to 43").

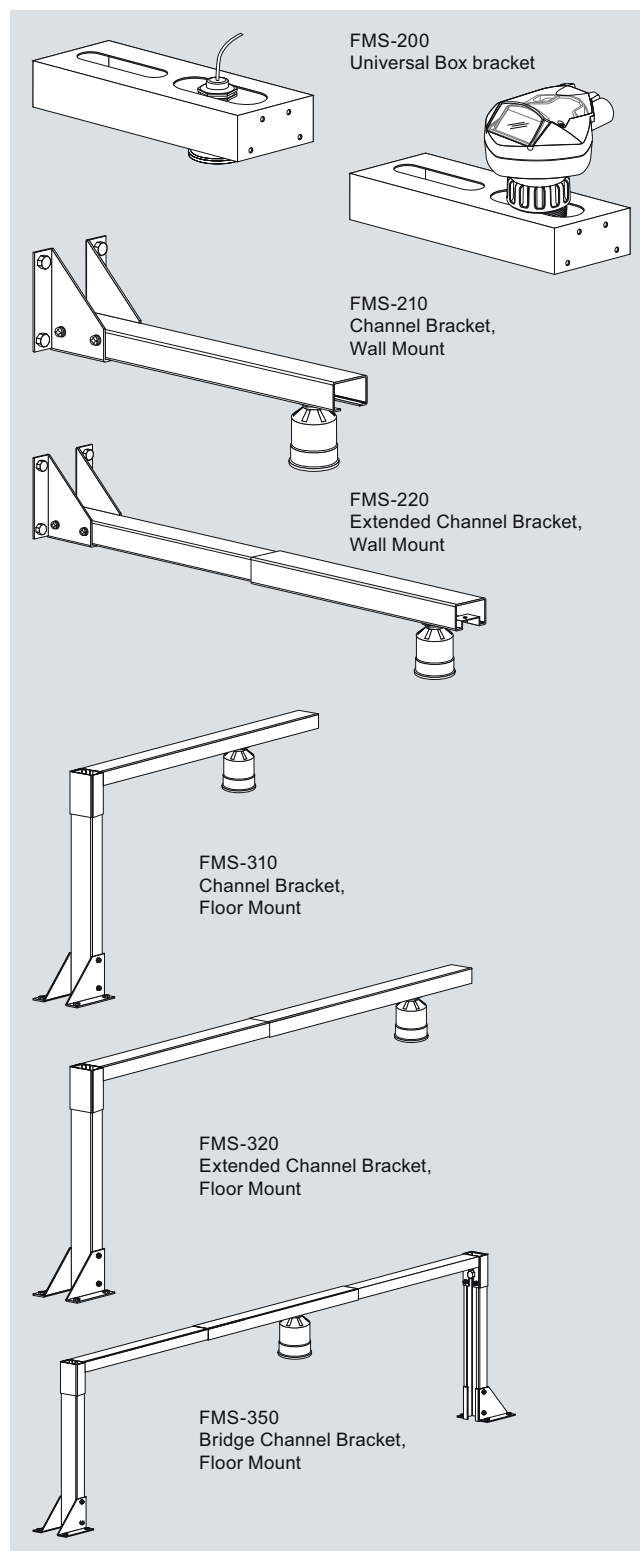
#### **FMS-350** **floor mounting set, bridge**

Mounting of transducers with 1" threaded connection.

Distance from transducer to floor: 20 to 48 cm (8 to 19"), anywhere along the complete width of the bridge [166 cm (65")].

This kit is particularly suitable for measurements on open channels (OCM) by providing a very stable mount for the transducer above a flume or weir.

#### Integration



FMS mounting brackets

# Level Measurement

## Continuous level measurement – Accessories for ultrasonic

### FMS mounting brackets

Selection and Ordering data	Order No.
<b>Mounting brackets for XPS-10/XCT-8 sensors</b>	
FMS-200 universal box bracket set	<b>7ML1830-1BK</b>
FMS-210 wall mounting set	<b>7ML1830-1BL</b>
FMS-220 extended wall mounting set	<b>7ML1830-1BM</b>
FMS-310 floor mounting set	<b>7ML1830-1BN</b>
FMS-320 extended floor mounting set	<b>7ML1830-1BP</b>
FMS-350 floor mounting set, bridge	<b>7ML1830-1BQ</b>
<b><i>Additional Operating Instructions</i></b>	
FMS-200	C) <b>7ML1998-5BK61</b>
FMS-210	C) <b>7ML1998-5BL61</b>
FMS-220	C) <b>7ML1998-5BM61</b>
FMS-310	C) <b>7ML1998-5BN61</b>
FMS-320	C) <b>7ML1998-5BP61</b>
FMS-350	C) <b>7ML1998-5BQ61</b>
Note: The Operating Instructions should be ordered as a separate line item on the order.	
C) Subject to export regulations AL: N, ECCN: EAR99.	

# Level Measurement

## Continuous level measurement – Accessories for ultrasonic

### TS-3 temperature sensor

#### Overview



The TS-3 temperature sensor provides an input signal for temperature compensation of specific Siemens ultrasonic level controllers.

#### Benefits

- Chemically resistant ETFE enclosure
- Fast response time
- Approved for use in potentially explosive atmospheres

#### Application

Temperature compensation is essential in applications where temperature variations of the sound medium are expected.

By installing the temperature sensor close to the sound path of the associated ultrasonic transducer, a signal representative of the sound medium's ambient temperature is obtained. The temperature sensor should not be mounted in direct sunlight.

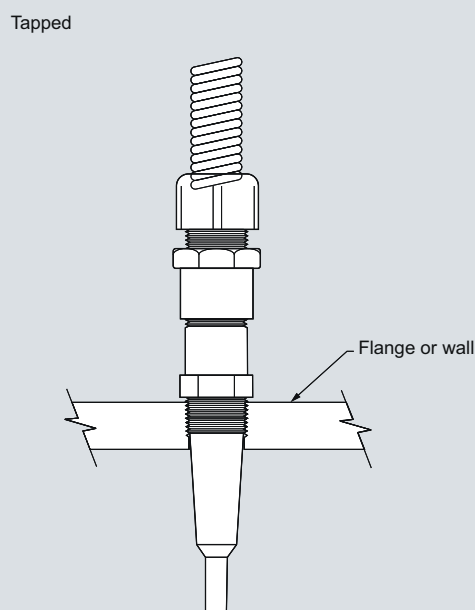
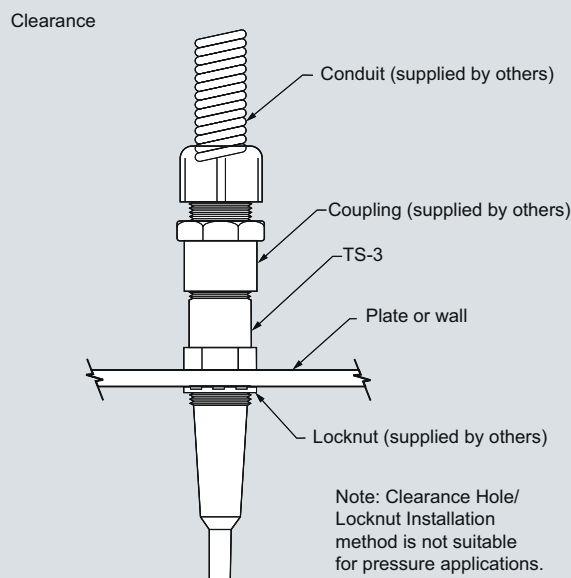
The TS-3 is used in conjunction with ultrasonic transducers that do not have an integral temperature sensor. It is also recommended in cases where the integral temperature sensor of the transducer cannot be used.

The following conditions are typical for use of the TS-3 sensor: where a fast reaction to temperature variations is required, where a flanged ultrasonic transducer is used, or where high temperatures are encountered.

The TS-3 is not compatible with devices using the TS-2 or LTS-1 temperature sensors. Refer to the associated controller manual for more details.

- Key Applications: For use in applications where temperature sensor measurement from transducer does not accurately represent vessel temperature. Used for applications requiring quick temperature response (open channel monitoring).

#### Design



TS-3 temperature sensor

# Level Measurement

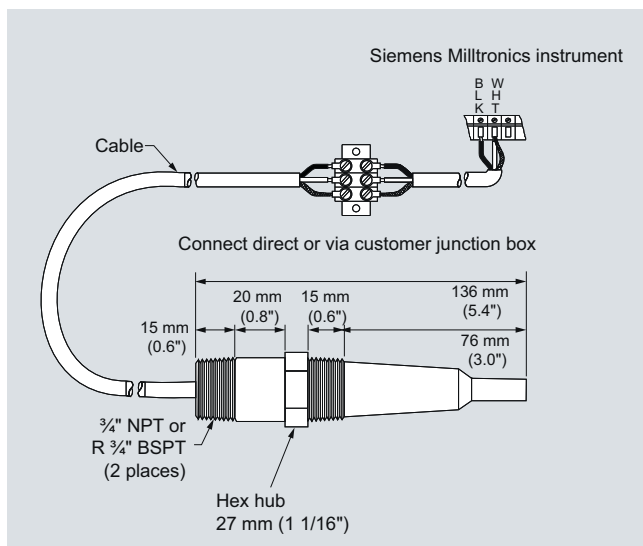
## Continuous level measurement – Accessories for ultrasonic

### TS-3 temperature sensor

Technical specifications		Selection and Ordering data	Order No.
<b>Mode of operation</b>		<b>TS-3 temperature sensor</b>	C) <b>7ML1813-</b>
Measuring principle	Temperature sensor	TS-3 provides an input signal for temperature compensation of specific Siemens ultrasonic level controllers.	
<b>Input</b>		Compensation is essential in applications where variation in temperature of the sound medium is expected.	
Measuring range	-40 ... +150 °C (-40 ... + 302 °F)	<b>Cable length</b>	
<b>Output</b>		1 m (3.28 ft)	1
Response time		5 m (16.40 ft)	2
• Forced circulation (temperature variation: 63 %)	55 s	10 m (32.81 ft)	3
• Flange, forced circulation	90 s	30 m (98.43 ft)	4
• Natural convection	150 s	50 m (164.04 ft)	5
<b>Rated operating conditions</b>		70 m (229.66 ft)	6
• Installation instructions	Mounted indoors/outdoors, but not exposed to direct sunlight	90 m (295.28 ft)	7
• Pressure	Max. 4 bar (60 psi/400 kPa)	<b>Process connection</b>	
<b>Design</b>		¾" NPT [(Taper), ANSI/ASME B1.20.1] R ¾" [(BSPT), EN 10226]	A B
Material (enclosure)	ETFE <sup>1)</sup>	<b>Approvals</b>	
Cable connection	2-core, 0.5 mm <sup>2</sup> (20 AWG), shielded, silicone sheath	CSA, FM ATEX, SAA	3 4
Process connection	¾" NPT [(Taper), ANSI/ASME B1.20.1] R ¾" [(BSPT), EN 10226], totally encapsulated	<b>Operating Instructions</b>	
<b>Certificates and approvals</b>	SAA, FM, CSA, ATEX	English	C) <b>7ML1998-5EM01</b>
		German	C) <b>7ML1998-1EM31</b>
		Note: The Operating Instructions should be ordered as a separate line item on the order.	
		This device is shipped with the Siemens Milltronics manual CD containing ATEX Quick Starts and Operating Instructions.	
		<b>Optional equipment</b>	
		¾" NPT locknut, aluminum	C) <b>7ML1930-1BE</b>
		Tag, stainless steel with hole, 12 x 45 mm (0.47 x 1.77") for fastening on sensors	<b>7ML1930-1BJ</b>
		C) Subject to export regulations AL: N, ECCN: EAR99.	

<sup>1)</sup> ETFE is a fluoropolymer inert to most chemicals. For exposure to specific environments, check the chemical compatibility charts before installing the TS-3 in your application.

### Dimensional drawings



TS-3 temperature sensor, dimensions in mm (inch)