Technical specifications

	3-wire version
Mode of operation	
Measuring principle	Ultrasonic level measurement
Input	
Measuring range	0.25 ... 5 m (0.8 ... 16.4 ft)
Frequency	54 kHz
Output	
mA	4 ... 20 mA
• Span	Proportional/ inversely proportional
• Max. load	750 Ω at 24 V DC
Relay	For level alarm or fault
Power supply	
Supply voltage	18 ... 30 V DC, max. 0.2 A
Max. power consumption	5 W (200 mA at 24 V DC)
Certificates and approvals	CE, RCM, CSA$_{US/C}$, FM
Accuracy	
Error in measurement	0.25 % of measuring range (in air)
Resolution	3 mm (0.125 inch)
Temperature compensation	Built in
Echo processing	Sonic Intelligence
Rated operation conditions	
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
Design	
Weight	
• Without flange adapter	1.5 kg (3.3 lb)
• With flange adapter	1.7 kg (3.7 lb)
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] • G 2" [(BSPP), EN ISO 228-1] • 4" sanitary
Flange adapter	3" Universal (fits DN 65, PN 10 and 3" ASME)
Cable inlet	2 inlets for PG 16 or ½" NPT cable glands

Selection and Ordering data — Article No.

The Probe ↗ 7ML1201-▪▪▪ 0 0

Short-range integrated ultrasonic level transmitter, ideal for liquids and slurries in open or closed vessels

↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Measuring range
5 m (16.40 ft) — 1

Transducer/Process connection
PVDF copolymer, 2" NPT [(Taper), ANSI/ASME B1.20.1] — E
PVDF copolymer, R 2" [(BSPT), EN 10226] — F
PVDF copolymer, G 2" [(BSPP), EN ISO 228-1] — G
PVDF copolymer, 4" Sanitary mounting — J

Model/Approval
3-wire, 24 V DC, CE, RCM, CSA, FM — E

Selection and Ordering data — Order code

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

Acrylic coated, stainless steel tag [13 x 45 mm (0.5 x 1.75 inch)]: Measuring-point number/ identification (max. 20 characters) specify in plain text — **Y17**

Operating Instructions
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation

Accessories — Article No.
Universal Box Bracket Mounting kit — **7ML1830-1BK**
Sanitary 4" mounting clamp — **7ML1830-1BR**
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" NPT — **7ML1830-1BT**
3" ASME, DN 65 PN 10, JIS 10K 3B ETFE Flange adapter for 2" BSPT — **7ML1830-1BU**
2" NPT locknut, plastic — **7ML1830-1DT**
2" BSPT locknut, plastic — **7ML1830-1DQ**
Plastic M20 cable gland with metal locknut — **7ML1930-1DB**
SITRANS RD100, loop powered display - see Chapter 7 — **7ML5741-...**
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7 — **7ML5740-...**
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7 — **7ML5744-...**
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7 — **7ML5750-...**
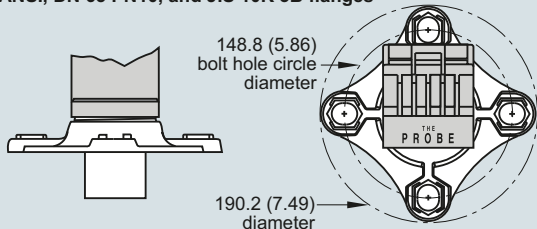For applicable back up point level switch see point level measurement section.

Level Measurement
Continuous level measurement
Ultrasonic transmitters

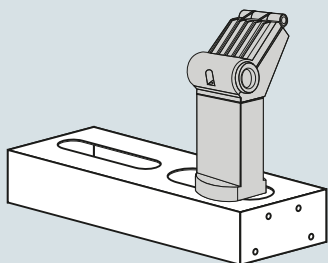**The Probe**

◼ Options

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

148.8 (5.86) bolt hole circle diameter

190.2 (7.49) diameter

The Probe optional flange adapter, dimensions in mm (inch)
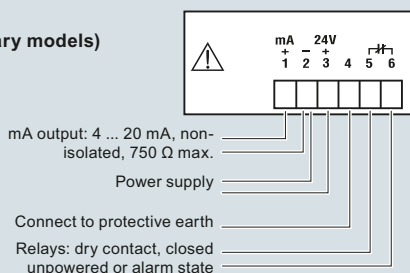
The Probe with FMS 200 mounting bracket

The Probe with optional mounting bracket

◼ Circuit diagrams

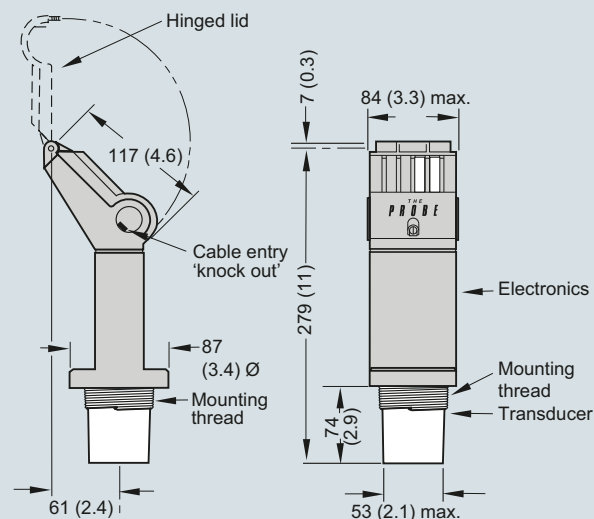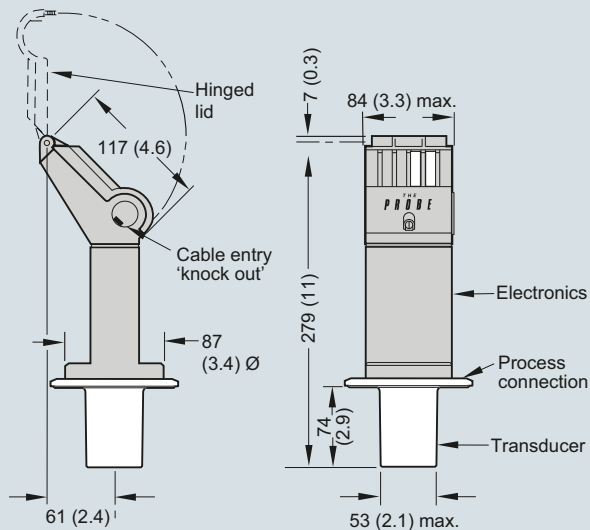**3 wire model (standard and sanitary models)**

mA		24V			
+	−	+			
1	2	3	4	5	6

mA output: 4 ... 20 mA, non-isolated, 750 Ω max.

Power supply

Connect to protective earth

Relays: dry contact, closed unpowered or alarm state

Display

Program mode

Segment display

'20' key

'4' key

Units

Operation status

LOE/fault
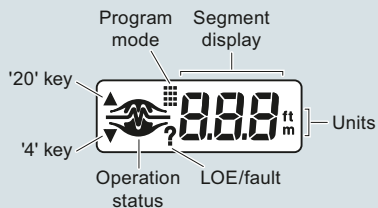
The Probe connections

◼ Dimensional drawings

Standard model

Hinged lid

117 (4.6)

Cable entry 'knock out'

87 (3.4) Ø

Mounting thread

61 (2.4)

7 (0.3)

84 (3.3) max.

279 (11)

Electronics

Mounting thread

Transducer

74 (2.9)

53 (2.1) max.

Sanitary model

Hinged lid

117 (4.6)

Cable entry 'knock out'

87 (3.4) Ø

61 (2.4)

7 (0.3)

84 (3.3) max.

279 (11)

Electronics

Process connection

Transducer

74 (2.9)

53 (2.1) max.

The Probe, dimensions in mm (inch)

Overview

The SITRANS LUT400 series controllers are compact, single point, long-range ultrasonic controllers for continuous level or volume measurement of liquids, slurries, solids, and high accuracy monitoring of open channel flow.

Benefits

- Small 1/2 DIN enclosure [144 h x 144 d x 146 w mm (5.7 x 5.7 x 5.75 inch)] with standard universal mounting bracket for wall, pipe, and DIN rail, plus an optional panel mount
- Easy to use HMI display with local four-button programming, menu-driven parameters, and Wizard support for key applications
- English, German, French, Spanish, Chinese, Italian, Portuguese, and Russian texts on the HMI.
- Level, Volume, OCM Flow monitoring
- Three relays combined with a suite of pump, alarm, and relay control features
- HART Communications
- EDDs for SIMATIC PDM, AMS Device Manager, and Field Communicator 375/475, plus DTMs for FDTs (Field Device Tools)
- Web browser for local programming from an intuitive web-based interface
- Two discrete inputs for backup level override and pump interlock functions
- Echo profile and trend views from the local display
- Patented digital receiver for improved performance in electrically noisy applications (close proximity to VSDs)
- Real time clock with daylight savings time, supporting an integrated datalogger and energy saving algorithms for minimizing pump operation during high cost energy periods
- Removable terminal blocks for ease of wiring
- MCERTS Certified for Open Channel Flow

Application

The SITRANS LUT400 comes in three different models, depending on the application, level of performance and functionality required:

- SITRANS LUT420 Level Controller: Level or volume measurement of liquids, slurries, and solids, as well as basic pump control functions, and basic data logging capability
- SITRANS LUT430 Level, Pump and Flow Controller: Includes all features of the LUT420 plus a full suite of advanced pump control and alarm functionality, open channel flow monitoring, and basic flow data logging capability
- SITRANS LUT440 High Accuracy OCM: Our most featured, highest accuracy model. Includes all features of the LUT430, plus the industry's best accuracy (± 1 mm within 3 m), full suite of advanced control functionality, and enhanced flow logging capability
- Key Applications: wet wells, reservoirs, flumes/weirs, chemical storage, liquid storage, hoppers, crusher bins, dry solids storage

4

Level Measurement
Continuous level measurement
Ultrasonic controllers

SITRANS LUT400 series

■ Technical specifications

Mode of Operation	Ultrasonic level, volume, pump, and open channel flow
Measuring range	0.3 … 60 m (1 … 196 ft), transducer dependent
Input	
Discrete	0 ... 50 V DC switching level Logical 0 ≤ 10 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA
Output	
Transducer frequency	10 ... 52 kHz
Ultrasonic transducer	Compatible transducers: All Echo-Max and ST-H series transducers
Relays	• 1 SPDT Form C, NO or NC relay, rated 1A at 250 V AC, non-inductive and 3A at 30 V DC • 2 SPST Form A, NO relays, rated 5A at 250 V AC, non-inductive and 3 A at 30 V DC
mA output	4 … 20 mA, isolated
Max. load	600 Ω max. in ACTIVE mode, 750 Ω max. in PASSIVE mode
Resolution	0.1 % of range
Accuracy	
Error in measurement	• Standard operation: ± 1 mm (0.04 inch) plus 0.17 % of measured distance • High accuracy OCM: ± 1 mm (0.04 inch), within 3 m (9.84 ft) range
Resolution	• Standard operation: 0.1 % of range or 2 mm (0.08 inch), whichever is greater • High accuracy OCM: 0.6 mm (0.02 inch), within 3 m (9.84 ft) range
Temperature compensation	• -40 ... +150 °C (-40 ... +300 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
Rated operating conditions	
Installation conditions • Location • Installation category • Pollution degree	 Indoor/outdoor II 4
Ambient conditions • Ambient temperature (enclosure)	 -20 … +50 °C (-4 … +122 °F)

Design	
Weight • Enclosure with display lid • Enclosure with blank lid	 1.3 kg (2.87 lb) 1.2 kg (2.65 lb)
Material (enclosure)	Polycarbonate
Degree of protection • Enclosure with display or blank lid • Enclosure with blank lid and knock-out removed	 IP65/Type 4X/NEMA 4X IP20
Remote display lid	IP65/Type 3/NEMA 3
Cable	
Transducer and mA output signal	• Transducer, mA output: 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 … 0.75 mm² (22 … 18 AWG) • Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating
Max. separation between transducer and transceiver	365 m (1 200 ft)
Displays and controls	60 x 40 mm (2.36 x 1.57 inch) removable LCD, 240 x 160 pixels resolution, operational up to 5 m from enclosure base
Programming • Primary • Secondary	 4 Local push buttons • PC running SIMATIC PDM • PC running Emerson AMS Device Manager • PC running a web browser • PC running a Field Device Tool (FDT) • Field Communicator 375/475 (FC375/FC475)
Memory	• 512 kB flash EPROM • 1.5 MB flash for data logging
Power supply	
AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA Fuse: 5 x 20 mm, Slow Blow, 0.25 A, 250 V
DC version	10 … 32 V DC, 10 W Fuse: 5 x 20 mm, Slow Blow, 1.6 A, 125 V
Certificates and approvals	
General	CSA$_{US/C}$, CE, FM, UL listed, RCM, EAC, KCC, MCERTS certified for Open Channel Flow
Hazardous • Non-incendive (Canada)	 CSA Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2, Groups F, G; Class III
• Shipping	Lloyd's Register, ABS
Communication	HART 7.0, USB

Category	Feature	SITRANS LUT420 Level Controller	SITRANS LUT430 Level, pump and flow controller	SITRANS LUT440 High accuracy OCM controller
Operations	Level, space, and distance measurement	✓	✓	✓
	Open channel flow measurement		✓	✓
	Volume conversion	✓	✓	✓
Specifications	Compatible with EchoMax and ST-H transducers	✓	✓	✓
	Standard accuracy: ± 1 mm + 0.17 % of measured distance	✓	✓	✓
	High accuracy: ± 1 mm within 3 meters			✓
	Mounting options: wall or panel, pipe, DIN-rail	✓	✓	✓
Data logging and communications	HART communications	✓	✓	✓
	4 ... 20 mA output (active and passive)	✓	✓	✓
	Integrated datalogger for measurement value and alarms	✓	✓	✓
	Integrated datalogger for fixed rate flow logging		✓	✓
	Integrated datalogger for variable rate flow logging triggered by changes in flow condition			✓
	Daily data logging for maximum, minimum and average flow, daily totalized volume, and minimum and maximum temperature		✓	✓
Flow monitoring	High accuracy open channel flow measurement			✓
	9 digit daily and running flow totalizers		✓	✓
	High and low flowrate alarms		✓	✓
	External totalizer and sampler control		✓	✓
	MCERTS Class 1 Certification			✓
	MCERTS Class 2 Certification		✓	
Pump control	Energy saving algorithms for pump control		✓	✓
	Wall cling reduction	✓	✓	✓
	Pump run-on functionality		✓	✓
	Pump start and power resumption delays		✓	✓
	Alternate duty pump routines	✓	✓	✓
	Fixed duty and service ratio pump routines		✓	✓
	Pumped volume totalizer		✓	✓
	Submergence detection	✓	✓	✓
	Discrete input pump interlocks		✓	✓
	Time to spill calculation		✓	✓

4

Level Measurement
Continuous level measurement
Ultrasonic controllers

SITRANS LUT400 series

Selection and Ordering data	Article No.
SITRANS LUT420 and LUT430 ↗	**7ML5050-**
Compact ultrasonic level controllers for continuous short to long-range level or volume measurement of liquids, slurries, and solids. Both units include basic relay functions for pumps, alarms, and other controls, plus onboard data logging. LUT430 offers additional advanced pump control and alarm functionality, open channel flow monitoring, and basic flow data logging capability. Functionality varies by model.	0 ▢▢▢▢▢ - ▢▢▢ 0
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	

Selection and Ordering data		Article No.
Model		
SITRANS LUT420 - Level controller	A	
SITRANS LUT430 - Level, Pump & Flow controller	B	
Enclosure display options		
With display	A	
With remote panel mount display [Includes panel mount cable extension, 2.5 m (8.2 ft)]	B	
No display (blank lid provided)	C	
Note: Enclosure includes back-plate for wall and pipe mounting, and an integrated clip for DIN-rail mounting. DIN-rail mounting for standard TS35 x 7.5 and TS35 x 15 mm DIN-rail to IEC 60715, EN 60715		
Input voltage		
100 ... 230 V AC ± 15 %	1	
10 ... 32 V DC	2	
Cable inlet		
3 cable inlets, cable glands not supplied	1	
3 cable inlets, 3 M20 plastic cable glands supplied	2	
Number of measurement points		
Single point system (includes one transducer input, one mA output, and one external temperature sensor input)	1	
Communications and I/O		
HART, 2 discrete inputs, 3 relays	D	
Approvals		
General purpose CE, FM, CSA_US/C, UL, RCM, EAC, KCC	A	
Hazardous locations CSA Class I, II, III, Div. 2, Groups A, B, C, D, F, G	C	

Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	**C11**
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	**Y15**
Namur NE43 failsafe setting - device preset to failsafe < 3.6 mA	**N07**
Operating Instructions	Article No.
English	**A5E33329501**
German	**A5E35690863**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

Selection and Ordering data	Article No.
Accessories	
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure	**7ML1930-1AC**
TS-3 Temperature Sensor - see TS-3 on page 4/195	**7ML1813-...**
Panel mount cable extension, 2.5 m (8.2 ft)	**7ML1930-1GF**
Qty 3 cable glands and retaining nuts	**7ML1930-1GB**
USB cable, 2 m (6.56 ft) - Standard USB-A to USB-mini B	**7ML1930-1GD**
Hart modem/USB (for use with a PC and SIMATIC PDM)	**7MF4997-1DB**
Sunshield, 304 stainless steel	**7ML1930-1GE**
SITRANS RD100, loop powered display - see Chapter 7	**7ML5741-...**
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	**7ML5740-...**
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	**7ML5744-...**
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	**7ML5750-...**
Spare parts	
Panel mount retrofit kit (convert standard unit with display to panel mount version)	**7ML1830-1PA**
Terminal block replacement kit (5 piece kit with one of each removable terminal)	**7ML1830-1PB**
Wall/Pipe mount plate	**7ML1830-1PC**
Enclosure (include blank label)	**7ML1830-1PD**
SITRANS LUT400 Lid (with Display)	**7ML1830-1PE**
SITRANS LUT400 Lid (blank)	**7ML1830-1PF**
Fuse - AC (0.25 A, 250 V, Slow Blow)	**7ML1830-1PG**
Fuse - DC (1.6 A, 125 V, Slow Blow)	**7ML1830-1PH**
Panel mount gasket and fastener kit	**7ML1830-1PK**
DIN-rail clip	**7ML1830-1PL**
LUT420, assembly, DC, board stack with cradle, hazardous	**A5E42824561**
LUT420, assembly, AC, board stack with cradle, hazardous	**A5E42824563**
LUT430, assembly, DC, board stack with cradle, hazardous	**A5E42824565**
LUT430, assembly, AC, board stack with cradle, hazardous	**A5E42824570**

4

Selection and Ordering data	Article No.
SITRANS LUT440 ↗	**7ML5050-**
The SITRANS LUT440 is the most accurate and featured model in the LUT400 series. It includes high accuracy open channel monitoring, relay functions for external samplers, totalizers, alarms, and enhanced data logging, as well as all pump and control functions available with other models in the LUT400 series.	**0 ▪▪▪▪ - ▪▪▪ 0**
↗ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.	

Model	
SITRANS LUT440 - High accuracy Open Channel Monitor [1]	**C**
Enclosure display options	
With display	**A**
With remote panel mount display [includes panel mount cable extension, 2.5 m (8.2 ft)]	**B**
No display (blank lid provided)	**C**
Note: Enclosure includes back-plate for wall and pipe mounting, and an integrated clip for DIN-rail mounting. DIN-rail mounting for standard TS35 x 7.5 and TS35 x 15 mm DIN-rail to IEC 60715, EN 60715	
Input voltage	
100 ... 230 V AC ± 15 %	**1**
10 ... 32 V DC	**2**
Cable inlet	
3 cable inlets, cable glands not supplied	**1**
3 cable inlets, 3 M20 plastic cable glands supplied	**2**
Number of measurement points	
Single point system (includes one transducer input, one mA output, and one external temperature sensor input)	**1**
Communications and I/O	
HART, 2 discrete inputs, 3 relays	**D**
Approvals	
General purpose CE, FM, CSA_{US/C}, UL, RCM, EAC, KCC	**A**
Hazardous locations CSA Class I, II, III, Div. 2, Groups A, B, C, D, F, G	**C**

[1] Compatible with all EchoMax Transducers. High accuracy OCM performance with the use of an XRS-5 transducer and TS-3 temperature sensor (each sold separately).

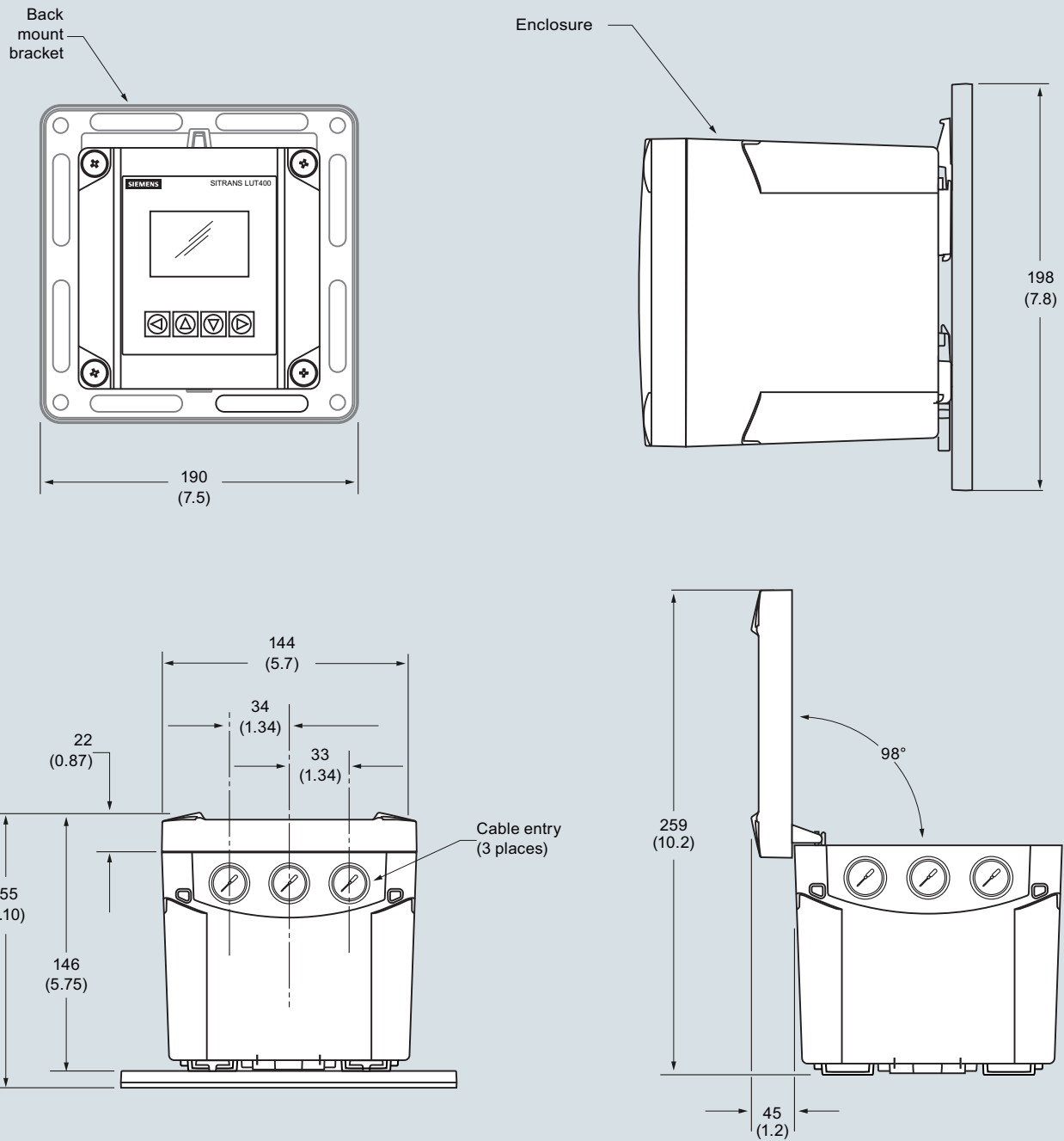| Selection and Ordering data	Order code
Further designs	
Please add "**-Z**" to Article No. and specify Order code(s).	
Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000	**C11**
Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text	**Y15**
Namur NE43 failsafe setting - device preset to failsafe < 3.6 mA	**N07**
Operating Instructions	Article No.
English	**A5E33329501**
German	**A5E35690863**
Note: The Operating Instructions should be ordered as a separate line item on the order.	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

Selection and Ordering data	Article No.
Accessories	
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure	**7ML1930-1AC**
TS-3 Temperature Sensor - see TS-3 on page 4/195	**7ML1813-...**
Panel mount cable extension 2.5 m (8.2 ft)	**7ML1930-1GF**
Qty 3 cable glands and retaining nuts	**7ML1930-1GB**
USB cable 2 m (6.56 ft) - Standard USB-A to USB-mini B	**7ML1930-1GD**
HART modem/USB (for use with PC and SIMATIC PDM)	**7MF4997-1DB**
Sunshield, 304 stainless steel	**7ML1930-1GE**
SITRANS RD100, loop powered display - see Chapter 7	**7ML5741-...**
SITRANS RD200, universal input display with Modbus conversion - see Chapter 7	**7ML5740-...**
SITRANS RD300, dual line display with totalizer and linearization curve and Modbus conversion - see Chapter 7	**7ML5744-...**
SITRANS RD500 web, universal remote monitoring solution for instrumentation - see Chapter 7	**7ML5750-...**
Spare parts	
Panel mount retrofit kit (convert standard unit with display to panel mount version)	**7ML1830-1PA**
Terminal block replacement kit (5 piece kit with one of each removable terminal)	**7ML1830-1PB**
Wall/Pipe mount plate	**7ML1830-1PC**
Enclosure (include blank label)	**7ML1830-1PD**
SITRANS LUT400 Lid (with Display)	**7ML1830-1PE**
SITRANS LUT400 Lid (blank)	**7ML1830-1PF**
Fuse - AC (0.25 A, 250 V, Slow Blow)	**7ML1830-1PG**
Fuse - DC (1.6 A, 125 V, Slow Blow)	**7ML1830-1PH**
Panel mount gasket and fastener kit	**7ML1830-1PK**
DIN-rail clip	**7ML1830-1PL**
LUT440, assembly, DC, board stack with cradle, hazardous	**A5E42847454**
LUT440, assembly, AC, board stack with cradle, hazardous	**A5E42847456**

4

Dimensional drawings

SITRANS LUT400, dimensions in mm (inch)

110.00 ± 1.00
(4.33 ± 0.04)

1.80 ± 1.00
(0.07 ± 0.04)

13.50 ± 1.00
(0.53 ± 0.04)

5.50 (0.22) dia.
(4 places)

6.25 (0.25) rad.
(4 places)

Note: Cut-out template
(printed to scale) shipped
with remote panel mount
model.

125.00
(4.92)

97.00 ± 1.00
(3.81 ± 0.04)

Cut-out

125.00
(4.92)
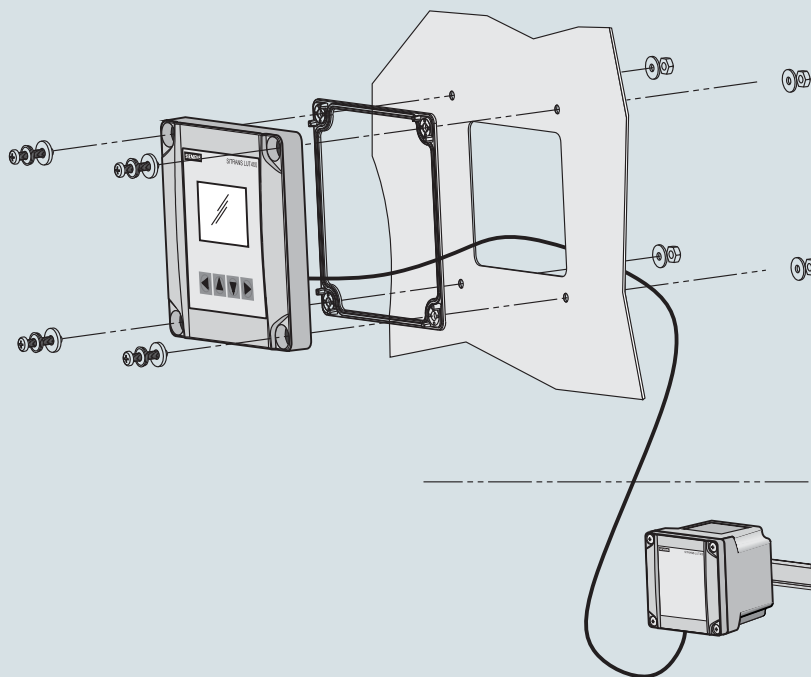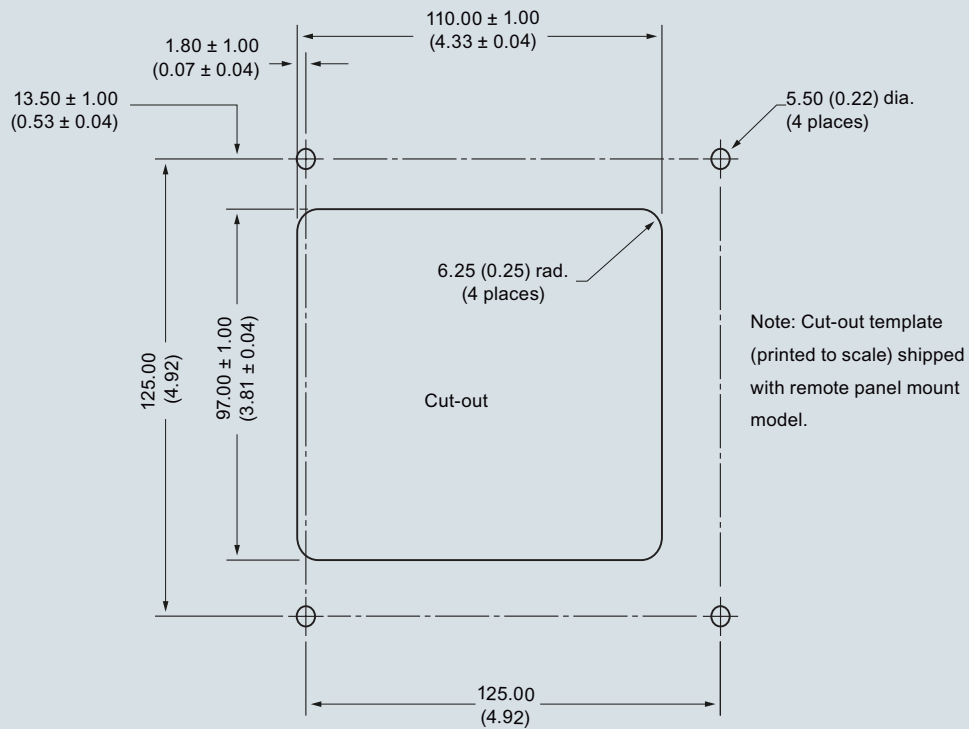
SITRANS LUT400, dimensions in mm (inch)
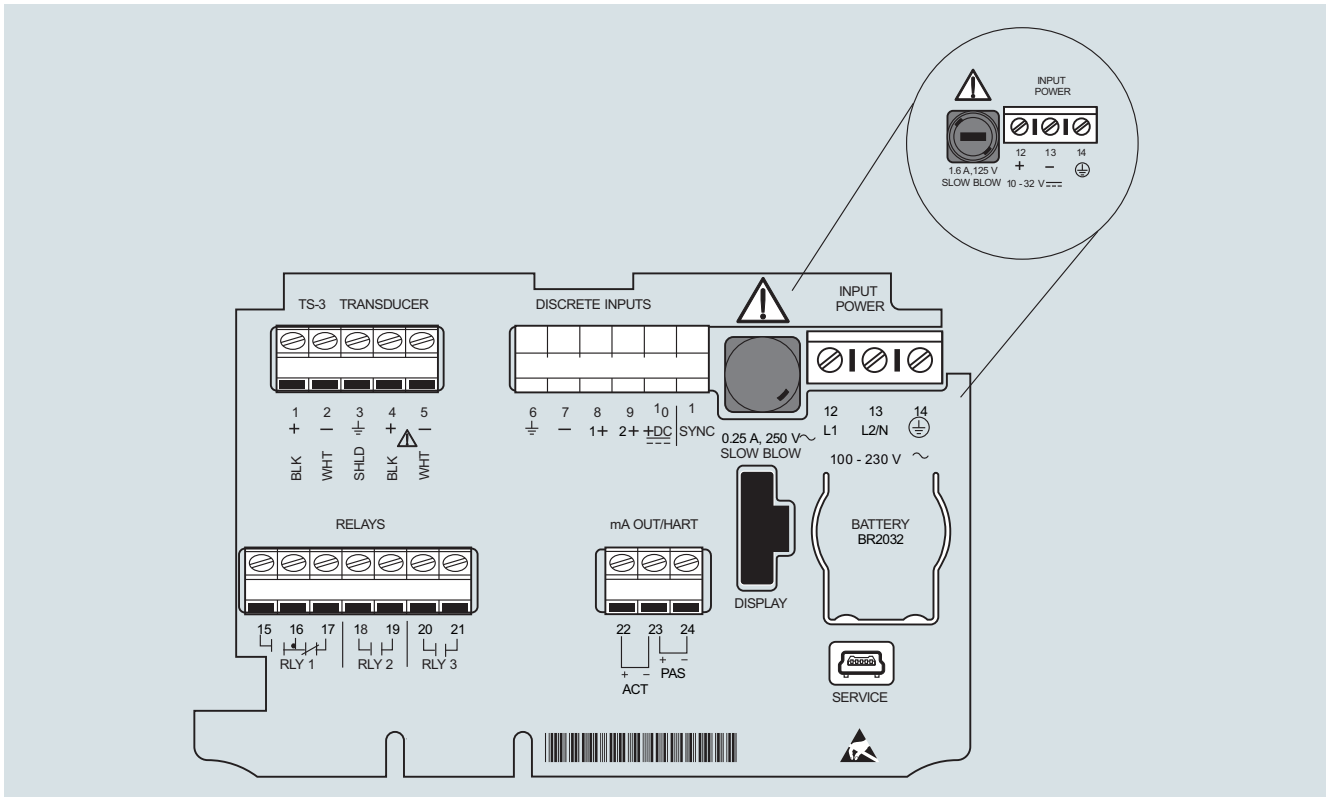
Level Measurement
Continuous level measurement
Ultrasonic controllers

SITRANS LUT400 series

■ **Circuit diagrams**

SITRANS LUT400 connections