

# Level Measurement

## Continuous level measurement – Ultrasonic controllers

SITRANS LUT400 series

### Overview



The Siemens SITRANS LUT400 series controllers are compact, single point, long-range ultrasonic controllers for continuous level or volume measurement of liquids, slurries, and 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 LUI display with local four-button programming, menu-driven parameters, and Wizard support for key applications
- 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

### 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, Volume, 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 ( $\pm 1$  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

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#### Technical specifications

<b>Mode of Operation</b>	Ultrasonic level, volume, pump, and open channel flow
Measuring range	0.3 ... 60 m (1 ... 196 ft), transducer dependent
<b>Input</b>	
Discrete	0 ... 50 V DC switching level Logical 0 = < 10 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA
<b>Output</b>	
Transducer frequency	10 ... 52 kHz
Ultrasonic transducer	Compatible transducers: All EchoMax and ST-H series transducers
Relays	<ul style="list-style-type: none"> <li>• 1 SPDT Form C, NO or NC relay, rated 1A at 250 V AC, non-inductive and 3A at 30 V DC</li> <li>• 2 SPST Form A, NO relays, rated 5A at 250 V AC, non-inductive and 3 A at 30 V DC</li> </ul>
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
<b>Accuracy</b>	
Error in measurement	<ul style="list-style-type: none"> <li>• Standard operation: ± 1 mm (0.04 inch) plus 0.17 % of measured distance</li> <li>• High accuracy OCM: ± 1 mm (0.04 inch), within 3 m (9.84 ft) range</li> </ul>
Resolution	<ul style="list-style-type: none"> <li>• Standard operation: 0.1 % of range or 2 mm (0.08 inch), whichever is greater</li> <li>• High accuracy OCM: 0.6 mm (0.02 inch), within 3 m (9.84 ft) range</li> </ul>
Temperature compensation	<ul style="list-style-type: none"> <li>• -40 ... +150 °C (-40 ... +300 °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	
• Enclosure with display lid:	1.3 kg (2.87 lbs)
• Enclosure with blank lid:	1.2 kg (2.65 lbs)
Material (enclosure)	Polycarbonate
Degree of protection	
• Enclosure with display or blank lid:	IP65/Type 4X/NEMA 4X
• Enclosure with blank lid and knock-out removed:	IP20
• Remote display lid:	IP65/Type 3/NEMA 3

<b>Cable</b>	
Transducer and mA output signal	<ul style="list-style-type: none"> <li>• Transducer, mA output: 2 copper conductors, twisted, with foil shield/drain wire, 300 V 0.5 ... 0.75 mm<sup>2</sup> (22 ... 18 AWG)</li> <li>• Relay/power to be copper conductors per local requirements to meet 250 V 5 A contact rating</li> </ul>
Max. separation between transducer and transceiver	365 m (1 200 ft)
<b>Displays and controls</b>	
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	4 Local push buttons
• Secondary	<ul style="list-style-type: none"> <li>• PC running SIMATIC PDM</li> <li>• PC running Emerson AMS Device Manager</li> <li>• PC running a web browser</li> <li>• PC running a Field Device Tool (FDT)</li> <li>• Field Communicator 375/475 (FC375/FC475)</li> </ul>
Memory	<ul style="list-style-type: none"> <li>• 512 kB flash EPROM</li> <li>• 1.5 MB flash for data logging</li> </ul>
<b>Power supply</b>	
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
<b>Certificates and approvals</b>	
General	CSA <sub>US/C</sub> , CE, FM, UL listed, C-TICK
Hazardous	
• Non-incendive (Canada)	CSA Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2, Groups F, G; Class III
<b>Communication</b>	HART 7.0, USB

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Category	Feature	SITRANS LUT420	SITRANS LUT430	SITRANS LUT440
		Level controller	Level, pump and flow controller	High accuracy OCM controller
<b>Operations</b>	Level, space, and distance measurement	✓	✓	✓
	Open channel flow measurement		✓	✓
	Volume conversion	✓	✓	✓
<b>Specifications</b>	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	✓	✓	✓
<b>Data logging and communications</b>	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			✓
	Daily data logging for maximum, minimum and average flow, daily totalized volume, and minimum and maximum temperature			✓
<b>Flow monitoring</b>	High accuracy open channel flow measurement			✓
	9 digit daily and running flow totalizers		✓	✓
	High and low flowrate alarms		✓	✓
	External totalizer and sampler control		✓	✓
<b>Pump control</b>	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		✓	✓	

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### SITRANS LUT400 series

#### Selection and Ordering data

##### SITRANS LUT420 and LUT430

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.

#### Model

SITRANS LUT420 - Level controller  
SITRANS LUT430 - Level, Pump & Flow controller

#### Enclosure display options

With display  
With remote panel mount display  
No display (blank lid provided)

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 %  
10 ... 32 V DC

#### Cable inlet

3 cable inlets, cable glands not supplied  
3 cable inlets, 3 M20 plastic cable glands supplied

#### Number of measurement points

Single point system (includes one transducer input, one mA output, and one external temperature sensor input)

#### Communications and I/O

HART, 2 discrete inputs, 3 relays

#### Approvals

General purpose CE, FM, CSA<sub>US/C</sub>, UL, C-TICK  
Hazardous locations CSA Class I, II, III, Div. 2  
(Groups A,B,C,D,F,G)

Order No.

Order No.	Options
7ML5050-	C)
0	0
A	A
B	B
A	A
B	B
C	C
1	1
2	2
1	1
2	2
1	1
D	D
A	A
C	C

#### Selection and Ordering data

##### Further designs

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

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

Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]:  
Measuring-point number/identification (max. 27 characters) specify in plain text

Namur NE43 failsafe setting - device preset to fail-safe < 3.6 mA

##### Operating Instructions

English

French

Spanish

German

Italian

Note: The operating instructions should be ordered as a separate line item on the order.

##### Communications Manual

English

French

Spanish

German

Italian

Note: The communications manual should be ordered as a separate line item on the order.

##### Accessories

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

TS-3 Temperature Sensor - see TS-3 in catalog

Panel mount cable extension, 2.5 m (8.2 ft)

Qty 3 cable glands and retaining nuts

USB cable, 2 m (6.56 ft) - Standard USB-A to USB-mini B

HART modem/RS-232 (for use with a PC and SIMATIC PDM)

Hart modem/USB (for use with a PC and SIMATIC PDM)

Sunshield, 304 stainless steel

##### Spare parts

Panel mount retrofit kit (convert standard unit with display to panel mount version)

Terminal block replacement kit (5 piece kit with one of each removable terminal)

Wall/Pipe mount plate

Enclosure (include blank label)

Lid (with Display)

No display (blank lid provided)

Fuse - AC (0.25 A, 250 V, Slow Blow)

Fuse - DC (1.6 A, 125 V, Slow Blow)

Battery BR2032

Panel mount gasket and fastener kit

DIN-rail clip

Order No.

C11

Y15

N07

7ML1998-5MV01

7ML1998-5MV11

7ML1998-5MV21

7ML1998-5MV31

7ML1998-5MV51

7ML1998-5NE01

7ML1998-5NE11

7ML1998-5NE21

7ML1998-5NE31

7ML1998-5NE51

7ML1930-1AC

7ML1813

7ML1930-1GF

7ML1930-1GB

7ML1930-1GD

7MF4997-1DA

7MF4997-1DB

7ML1930-1GE

7ML1830-1PA

7ML1830-1PB

7ML1830-1PC

7ML1830-1PD

7ML1830-1PE

7ML1830-1PF

7ML1830-1PG

7ML1830-1PH

7ML1830-1PJ

7ML1830-1PK

7ML1830-1PL

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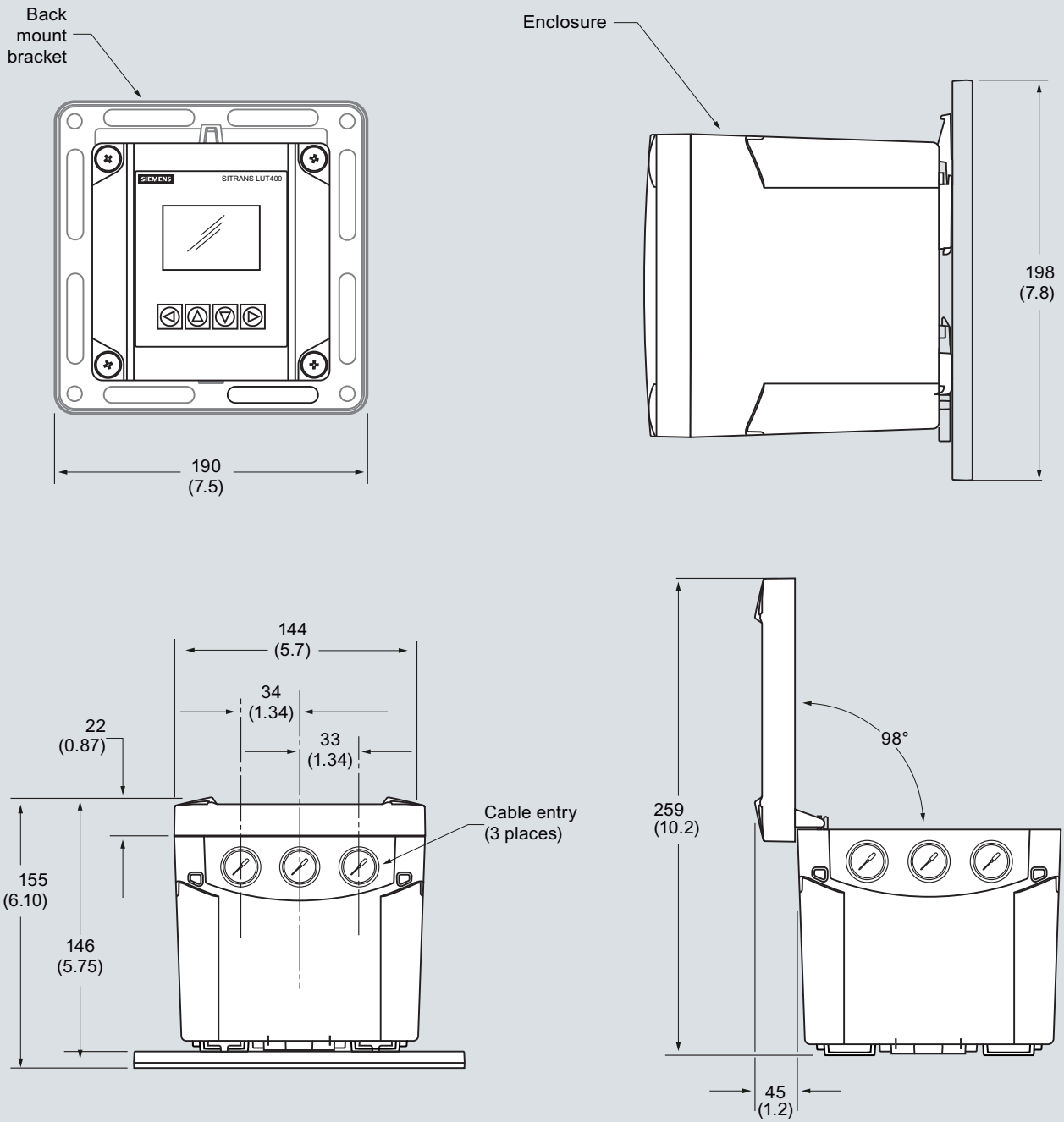
Selection and Ordering data	Order No.	Selection and Ordering data	Order No.
<b>SITRANS LUT440</b> The SITRANS LUT440 is the most accurate and featured model in the LUT400 series. It includes high accuracy open channel monitoring, relay functions for external samplers, totalizers, alarms, and enhanced data logging, as well as all pump and control functions available with other models in the LUT400 series.	C) <b>7ML5050-</b> 0 ■■■■ - ■■■■ 0	<b>Further designs</b> Please add "-Z" to Order No. and specify Order code(s). Manufacturer's test certificate M to DIN 55350, Part 18 and to ISO 9000 Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: Measuring-point number/identification (max. 27 characters) specify in plain text Namur NE43 failsafe setting - device preset to fail-safe < 3.6 mA	<b>C11</b> <b>Y15</b> <b>N07</b>
<b>Model</b> SITRANS LUT440 - High accuracy Open Channel Monitor <sup>1</sup>	<b>C</b>	<b>Operating Instructions</b> English French Spanish German Italian Note: The operating instructions should be ordered as a separate line item on the order.	<b>7ML1998-5MV01</b> <b>7ML1998-5MV11</b> <b>7ML1998-5MV21</b> <b>7ML1998-5MV31</b> <b>7ML1998-5MV51</b>
<b>Enclosure display options</b> With display With remote panel mount display No display (blank lid provided) 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	<b>A</b> <b>B</b> <b>C</b>	<b>Communications Manual</b> English French Spanish German Italian Note: The communications manual should be ordered as a separate line item on the order.	<b>7ML1998-5NE01</b> <b>7ML1998-5NE11</b> <b>7ML1998-5NE21</b> <b>7ML1998-5NE31</b> <b>7ML1998-5NE51</b>
<b>Input voltage</b> 100 ... 230 V AC ± 15 % 10 ... 32 V DC	1 2	<b>Accessories</b> Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 in catalog Panel mount cable extension 2.5 m (8.2 ft) Qty 3 cable glands and retaining nuts USB cable 2 m (6.56 ft) - Standard USB-A to USB-mini B HART modem/RS-232 (for use with a PC and SIMATIC PDM) HART modem/USB (for use with PC and SIMATIC PDM) Sunshield, 304 stainless steel	<b>7ML1930-1AC</b> <b>7ML1813</b> <b>7ML1930-1GF</b> <b>7ML1930-1GB</b> <b>7ML1930-1GD</b> <b>7MF4997-1DA</b> <b>7MF4997-1DB</b> <b>7ML1930-1GE</b>
<b>Cable inlet</b> 3 cable inlets, cable glands not supplied 3 cable inlets, 3 M20 plastic cable glands supplied	1 2	<b>Spare parts</b> Panel mount retrofit kit (convert standard unit with display to panel mount version) Terminal block replacement kit (5 piece kit with one of each removable terminal) Wall/ Pipe mount plate Enclosure (include blank label) Lid (with Display) No display (blank lid provided) Fuse - AC (0.25 A, 250 V, Slow Blow) Fuse - DC (1.6 A, 125 V, Slow Blow) Battery BR2032 Panel mount gasket and fastener kit DIN-rail clip	<b>7ML1830-1PA</b> <b>7ML1830-1PB</b> <b>7ML1830-1PC</b> <b>7ML1830-1PD</b> <b>7ML1830-1PE</b> <b>7ML1830-1PF</b> <b>7ML1830-1PG</b> <b>7ML1830-1PH</b> <b>7ML1830-1PJ</b> <b>7ML1830-1PK</b> <b>7ML1830-1PL</b>
<b>Number of measurement points</b> Single point system (includes one transducer input, one mA output, and one external temperature sensor input)	1		
<b>Communications and I/O</b> HART, 2 discrete inputs, 3 relays	<b>D</b>		
<b>Approvals</b> General purpose CE, FM, CSA <sub>US/C</sub> , UL, C-TICK Hazardous locations CSA Class I, II, III, Div. 2, (Groups A,B,C,D,F,G) 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).	<b>A</b> <b>C</b>		

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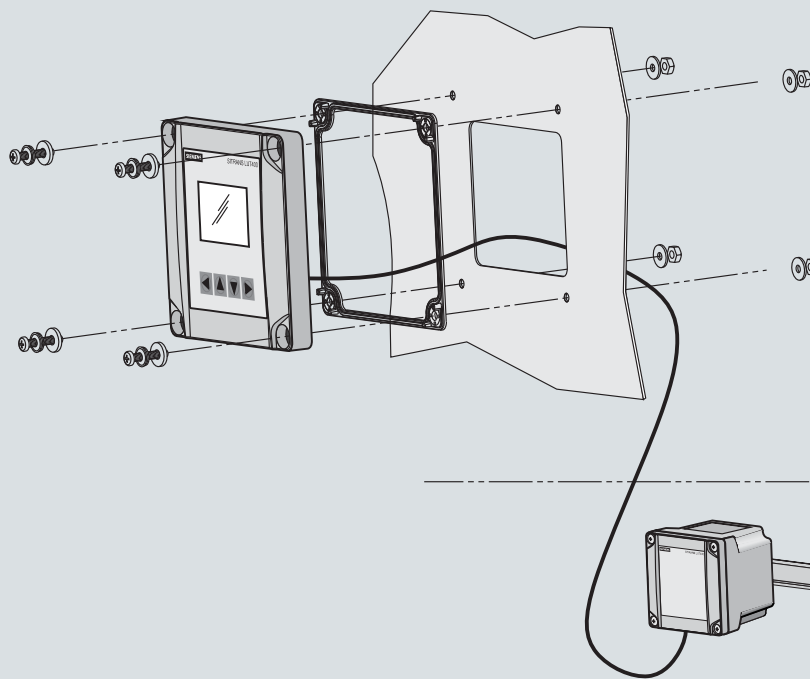
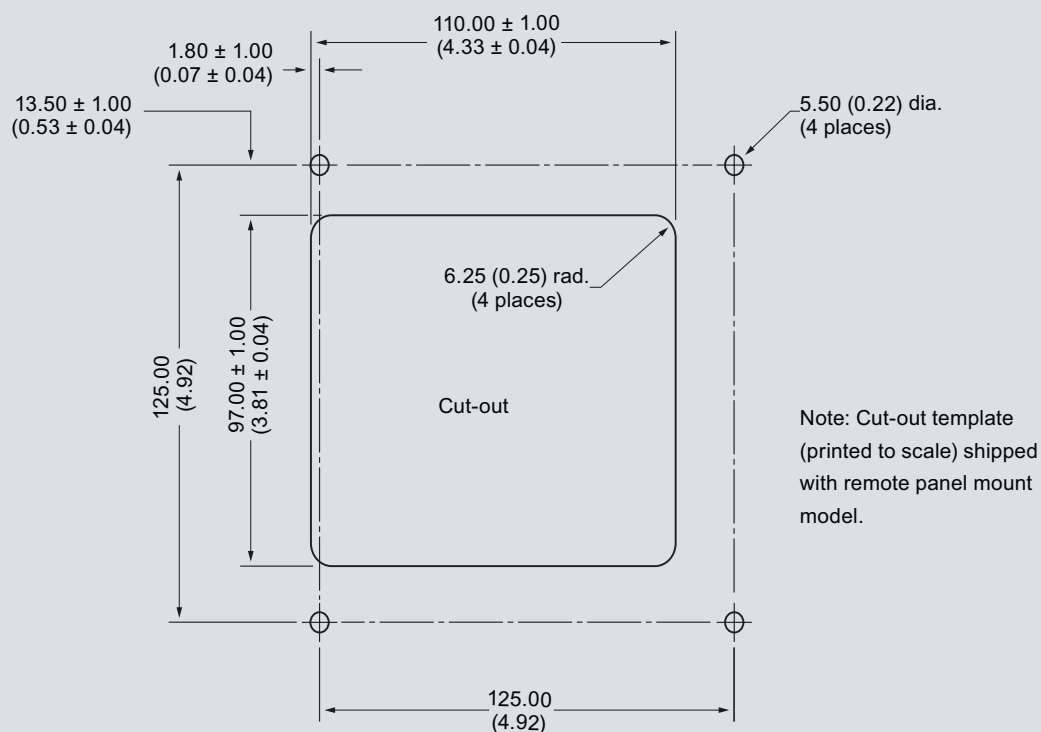
#### Dimensional drawings



SITRANS LUT400, dimensions in mm (inch)

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### Dimensional drawings



SITRANS LUT400, dimensions in mm (inch)

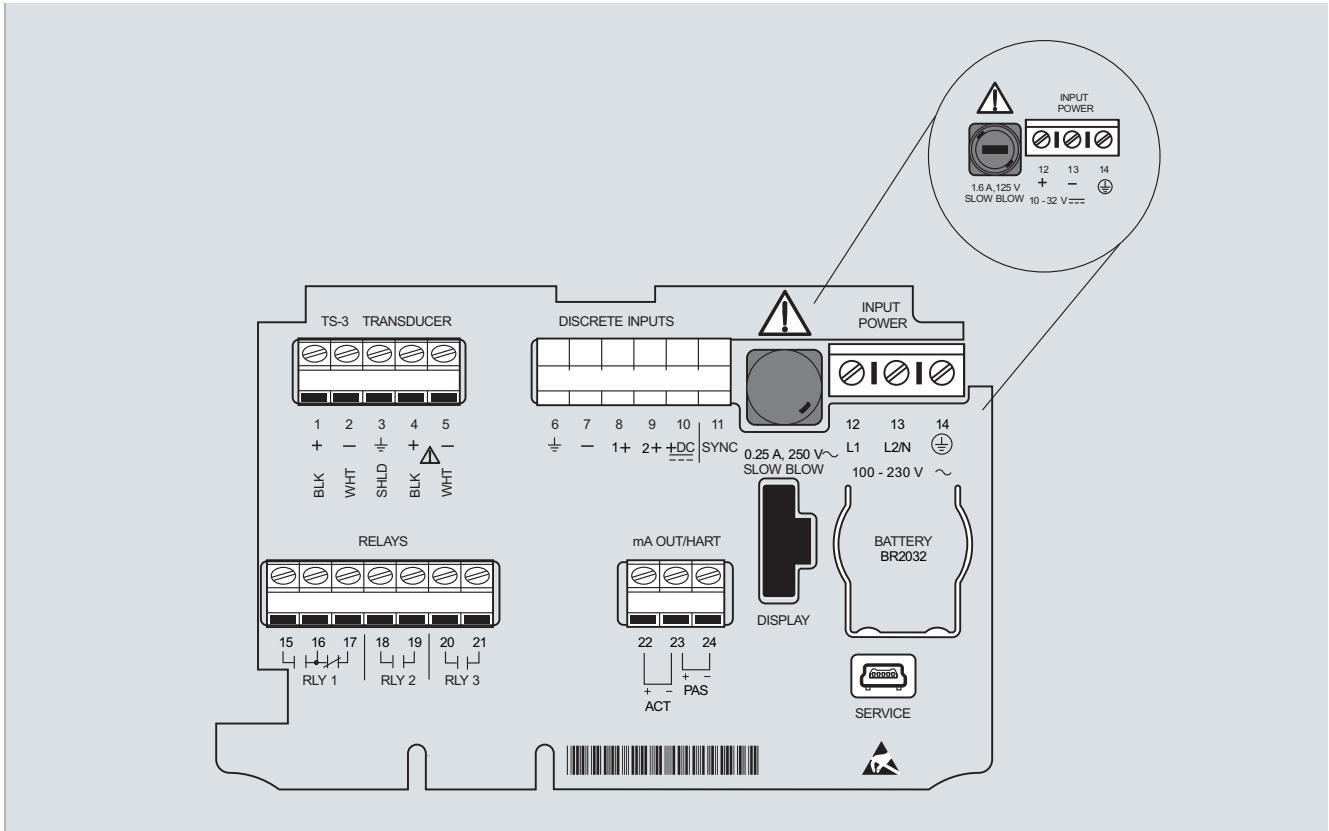
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### SITRANS LUT400 series

#### Schematics

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SITRANS LUT400, connections