

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.

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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	
• Analog (MultiRanger 200 only)	0 ... 20 mA or 4 ... 20 mA, from alternate device, scaleable
• Discrete	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, XPS 15/15F, and XRS-5
Relays	Rating 5 A at 250 V AC, non-inductive 1 SPST Form A
• Version with 1 relay (MultiRanger 100 only)	
• Version with 3 relays	2 SPST Form A/1 SPDT Form C
• Version 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
Accuracy	
Error in measurement	0.25 % of range or 6 mm (0.24 inch), whichever is greater
Resolution	0.1 % of measuring range ¹⁾ or 2 mm (0.08 inch), whichever is greater
Temperature compensation	<ul style="list-style-type: none"> • -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
Rated operating conditions	
Installation conditions	Indoor/outdoor
• Location	II
• Installation category	4
• Pollution degree	
Ambient conditions	
• Ambient temperature (housing)	-20 ... +50 °C (-4 ... +122 °F)

Design	
Weight	
• Wall mount	1.37 kg (3.02 lb)
• Panel mount	1.50 kg (3.31 lb)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
Electrical connection	
• Transducer and mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm ² (22 ... 18 AWG), Belden 8760 or equivalent is acceptable 365 m (1 200 ft)
• Max. separation between transducer and transceiver	
Displays and controls	
Programming	100 x 40 mm (4 x 1.5 inch) multi-block LCD with backlighting Programming using hand-held programmer, SIMATIC PDM or via PC with Dolphin Plus software
Power supply	
• AC version	100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA (17 W)
• DC version	12 ... 30 V DC (20 W)
Certificates and approvals	
	<ul style="list-style-type: none"> • CE, C-TICK²⁾ • Lloyd's Register of Shipping • ABS Type Approval • FM, CSA_{US/C}, 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	
	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> - PROFIBUS DP - DeviceNet - Allen-BradleyRemote I/O

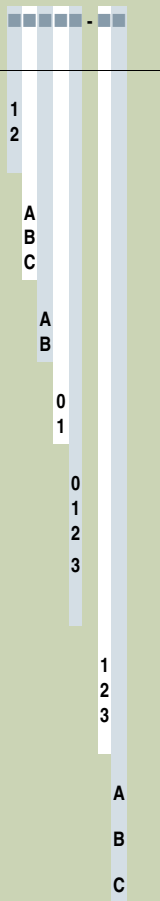
¹⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

²⁾ EMC performance available on request

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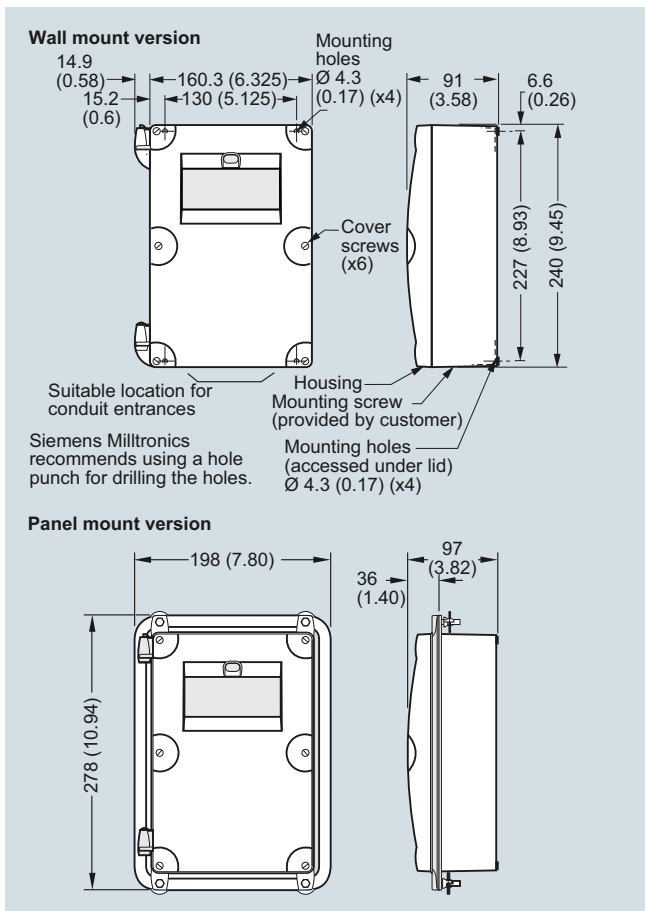
Selection and Ordering data	Article No.	Selection and Ordering data	Order code
MultiRanger 100/200 Versatile short to medium-range ultrasonic single and multi-vessel level monitor/controller for virtually any application in a wide range of industries	7ML5033- 	Further designs Please add "-Z" to Article No. and specify Order code(s). Stainless steel tag [69 x 50 mm (2.71 x 1.97 inch)]: ● Y15 Measuring-point number/identification (max. 27 characters) specify in plain text	
Versions MultiRanger 100, level measurement only ● 1 MultiRanger 200, level, volume, flow and differential measurements ● 2		Operating Instructions English French Spanish German 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 DVD containing the ATEX Quick Start and Operating Instructions library.	Article No. 7ML1998-5FB06 7ML1998-5FB13 7ML1998-5FB23 7ML1998-5FB36 7ML1998-5QD83
Mounting, enclosure design Wall mount, standard enclosure ● A Wall mount, 4 entries, 4 M20 cable glands included ● B Panel mount (CE, CSA _{US/IC} , FM, UL) ● C		Other Operating Instructions 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.	7ML1998-1AP03 7ML1998-1AQ03 7ML1998-1AQ33 7ML1998-1AQ13 7ML1998-1BH02
Power supply 100 ... 230 V AC ● A 12 ... 30 V DC ● B		Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77 inch), one text line, suitable for enclosure M20 cable gland kit (4 M20 cable glands, 4 M20 nuts, 4 washers) Sunshield kit, 304 stainless steel SITRANS RD100 Remote display - see Chapter 7 SITRANS RD200 Remote display - see Chapter 7 SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see Chapter 7	7ML1830-2AK 7ML1930-1AC 7ML1930-1FV 7ML1930-1GA 7ML5750-1AA00-0
Number of measurement points Single point version ● 0 Dual point version ● 1		Spare parts Power Supply Board (100 ... 230 V AC) Power Supply Board (12 ... 30 V DC) Display Board	7ML1830-1MD 7ML1830-1ME 7ML1830-1MF
Communication (SmartLinX) Without module ● 0 SmartLinX Allen-Bradley Remote I/O module ● 1 SmartLinX PROFIBUS DP module ● 2 SmartLinX DeviceNet module ● 3 See SmartLinX product page 4/339 for more information.			
Output relays 3 relays (2 Form A, 1 Form C), 250 V AC ● 1 6 relays (4 Form A, 2 Form C), 250 V AC ● 2 1 relay (1 Form A), 250 V AC (available on MultiRanger 100 model only) ● 3			
Approvals General Purpose CE, FM, CSA _{US/IC} , UL listed, C-TICK ● A CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III ¹⁾ ● B ATEX II 3D ²⁾ ● C			
¹⁾ For wall mount applications only ²⁾ For standard enclosure wall mount, option A only ● We can offer shorter delivery times for configurations designated with the Quick Ship Symbol ●. For details see page 9/5 in the appendix.			

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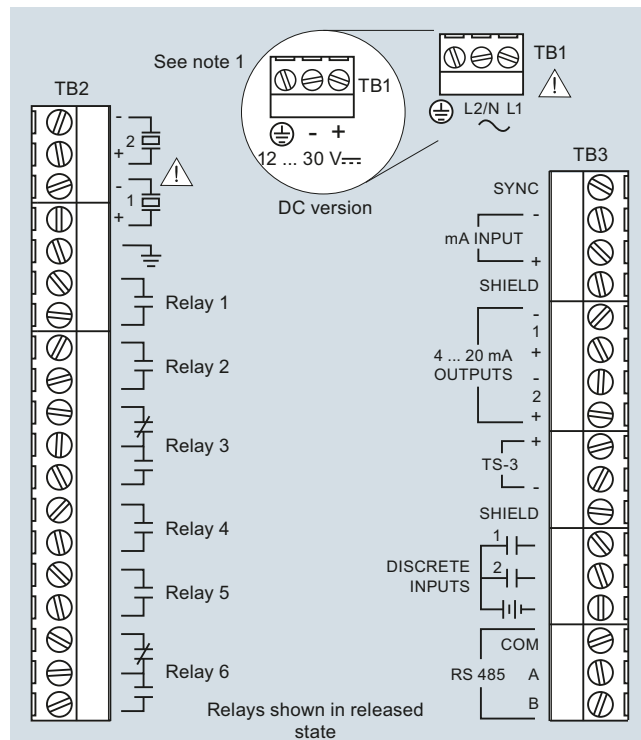
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Dimensional drawings



MultiRanger, dimensions in mm (inch)

Schematics



Note:

1. Use 2-core copper wire, twisted, with shield, for expansion up to 365 m (1 200 ft). Route cable in grounded metal conduit, separate from other cables.
2. Verify that all system components are installed in accordance with instructions.
3. Connect all cable shields to the MultiRanger shield connections. Avoid differential ground potentials by not connecting cable shields to ground (earth) anywhere else.
4. Keep exposed conductors on shielded cables as short as possible to reduce noise on the line caused by stray transmissions and noise pickup.

MultiRanger connections