

# Level Measurement

## Continuous 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<sup>®</sup> 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

#### 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 <sup>®</sup> 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> • Model with 3 relays <sup>2)</sup> • Model with 6 relays
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	• -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
<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

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**HydroRanger 200**

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>

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

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

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

4) Maximum power consumption is listed

5) EMC performance available upon request

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### HydroRanger 200

Selection and Ordering data	Order No.
<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 model code below.	L) <b>7ML5034-</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>Power supply</b> 100 ... 230 V AC 12 ... 30 V DC	A 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>Communication (SmartLinx)</b> Without module SmartLinx <sup>®</sup> Allen-Bradley <sup>®</sup> Remote I/O module SmartLinx PROFIBUS DP module SmartLinx DeviceNet <sup>™</sup> module See SmartLinx product page 5/310 for more information.	0 1 2 3
<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

<sup>®</sup>Modbus is a registered trademark of Schneider Electric.

<sup>®</sup>Belden is a registered trademark of Belden Wire and Cable Company.

<sup>®</sup>Allen-Bradley is a registered trademark of Rockwell Automation.

<sup>™</sup>DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA)

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 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>7ML1998-5FC32</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>7ML1998-1AQ12</b> C) <b>7ML1998-1BH02</b>
<b>Accessories</b> Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure SITRANS RD100 Remote display - see Chapter 8 SITRANS RD200 Remote display - see Chapter 8 SITRANS RD500 Remote display - see Chapter 8	<b>7ML1830-2AK</b> <b>7ML1930-1AC</b>
<b>Spare parts</b> Power Supply Board (100 ... 230 V AC) Power Supply Board (12 ... 30 V DC) Display Board	C) <b>7ML1830-1MD</b> C) <b>7ML1830-1ME</b> C) <b>7ML1830-1MF</b>
C) Subject to export regulations AL: N, ECCN: EAR99	

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<b>Milltronics 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 model code below.	L) <b>7ML1034-</b>	<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>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>7ML1998-1FC05</b> C) <b>7ML1998-1FC14</b> C) <b>7ML1998-1FC34</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 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>7ML1998-1AQ12</b>  C) <b>7ML1998-1BH02</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 5/310 for more information.	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 SITRANS RD100 Remote display - see Chapter 8 SITRANS RD200 Remote display - see Chapter 8 SITRANS RD500 Remote display - see Chapter 8	<b>7ML1830-2AM</b> <b>7ML1930-1AC</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 (for wall mount applications only)	1 2	<b>Spare parts</b> Power Supply Board (100 ... 230 V AC) Power Supply Board (12 ... 30 V DC) Display Board	C) <b>7ML1830-1MD</b> C) <b>7ML1830-1ME</b> C) <b>7ML1830-1MF</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>	1 2 3 4	C) Subject to export regulations AL: N, ECCN: EAR99	

<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

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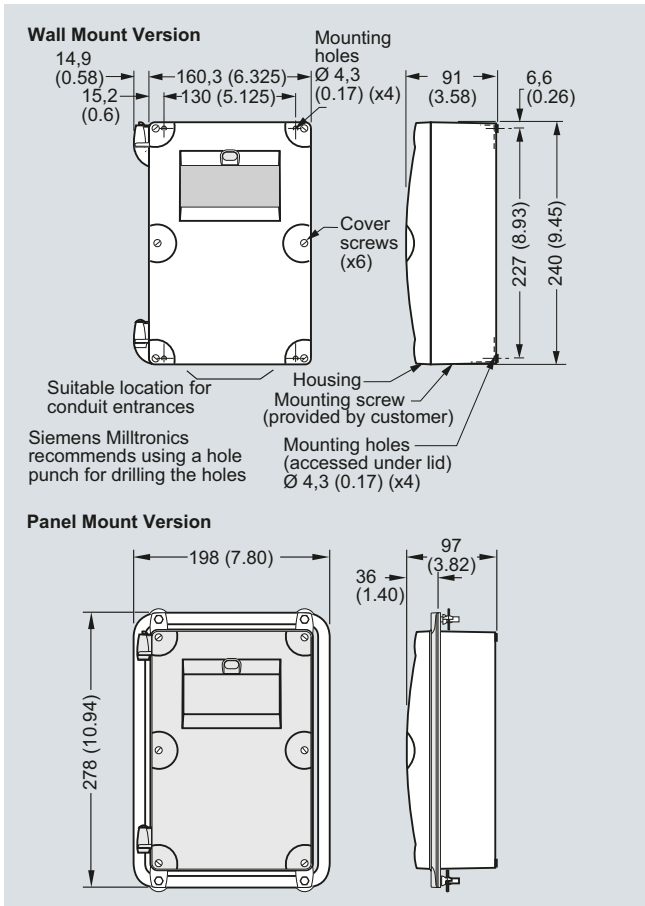
™DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA)

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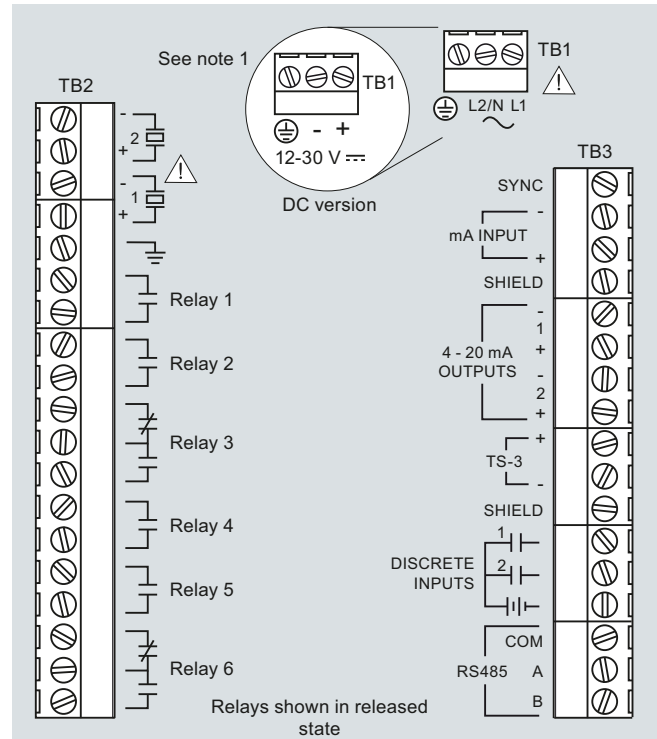
### HydroRanger 200

#### Dimensional drawings



HydroRanger 200, dimensions in mm (inch)

#### Schematics



#### Note:

1. Use 2-core copper wire, twisted, with shield, for expansion up to 365 m (1200 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 HydroRanger 200 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.

HydroRanger 200 connections