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 Echomax 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

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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
Output	
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
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[1]
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor • External TS-3 temperature sensor (optional) • Programmable fixed temperature
Rated operating conditions	
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
Design	
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
Electrical connection	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 mm² (22 ... 18 AWG), Belden 8760 or equivalent is acceptable

Power supply	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
Displays and controls	
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
Programming	Removable programmer or optional Dolphin Plus
Memory	EEPROM (non-volatile), no backup battery required
Certificates and approvals	CE[2], FM, CSA$_{US/C}$, C-TICK

[1] The measuring range corresponds to the distance from the zero point to the sensor face, plus any range extension.

[2] EMC certificate available on request

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HydroRanger Plus

Selection and Ordering data		Order No.
HydroRanger Plus, rack and panel mount	L)	**7ML1025-**
Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display		▉▉▉ 0 1
Measuring range: 0.3 m to 15 m (1 ... 50 ft)		
Mounting/device version		
Version for 19" rack (requires terminal block; see accessories)		**1**
Version for panel		**2**
Approvals		
CE (EN 61326), CSA$_{US/C}$, FM, C-TICK		**C**
Input voltage		
100 V AC, 9 ... 30 V DC		**A**
115 V AC, 9 ... 30 V DC		**B**
200 V AC, 9 ... 30 V DC		**C**
230 V AC, 9 ... 30 V DC		**D**

Selection and Ordering data		Order code
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		Order No.
English	C)	**7ML1998-1AC02**
French	C)	**7ML1998-1AC12**
German	C)	**7ML1998-1AC32**
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.		
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 DeviceNet, English	C)	**7ML1998-1BH02**
Note: The appropriate SmartLinx Operating Instructions should be ordered as a separate line on the order.		
Accessories		
Handheld programmer		**7ML1830-2AC**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**7ML1930-1AC**
Terminal block for rack mount		**7ML1830-1JL**
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)	**7ML5750-1AA00-0**
Spare parts		
Card, Analog HydroRanger Plus Rack/Panel	C)	**7ML1830-1LR**
Card, daughter	C)	**7ML1830-1LS**
Card, display, backlit	C)	**7ML1830-1LX**

Selection and Ordering data		Order No.
HydroRanger Plus, wall mount	L)	**7ML1028-**
Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display		▉ A ▉ 7 0
Measuring range: 0.3 m to 15 m (1 ... 50 ft)		
Input voltage		
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**
Approvals		
CE; FM General Purpose; CSA Class I, Div. 2, C-TICK		**C**
Mounting/enclosure version		
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
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		Order No.
English	C)	**7ML1998-1AC02**
French	C)	**7ML1998-1AC12**
German	C)	**7ML1998-1AC32**
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.		
Accessories		
Handheld programmer		**7ML1830-2AC**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**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**
Sunshield kit, 304 SS		**7ML1930-1GA**
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)	**7ML5750-1AA00-0**
Spare parts		
Card, mother main	C)	**7ML1830-1LV**
Card, daughter	C)	**7ML1830-1LW**
Card, display	C)	**7ML1830-1LU**

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

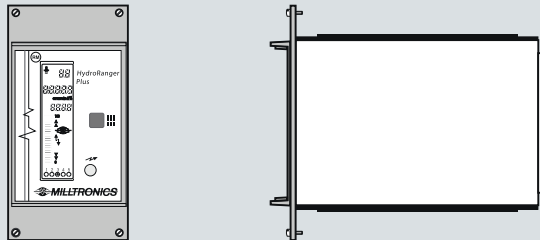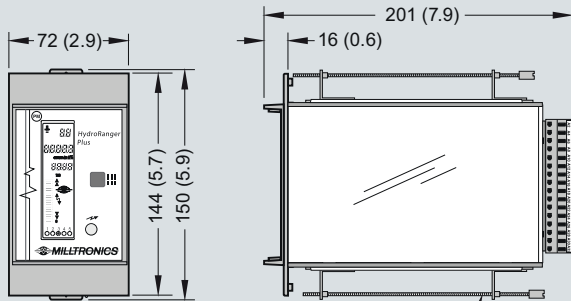K) Subject to export regulations AL: N, ECCN: 5A991X.

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
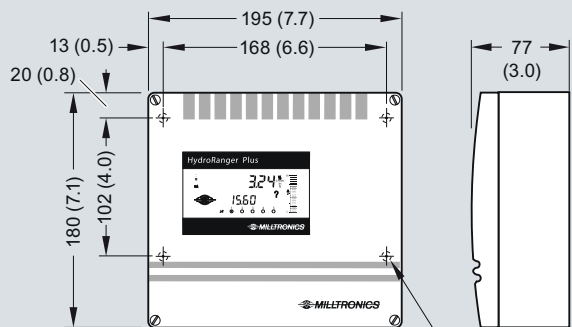accessory.)

Panel Mount

72 (2.9)   201 (7.9)   16 (0.6)

144 (5.7)   150 (5.9)

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

Wall Mount

195 (7.7)
168 (6.6)   77 (3.0)
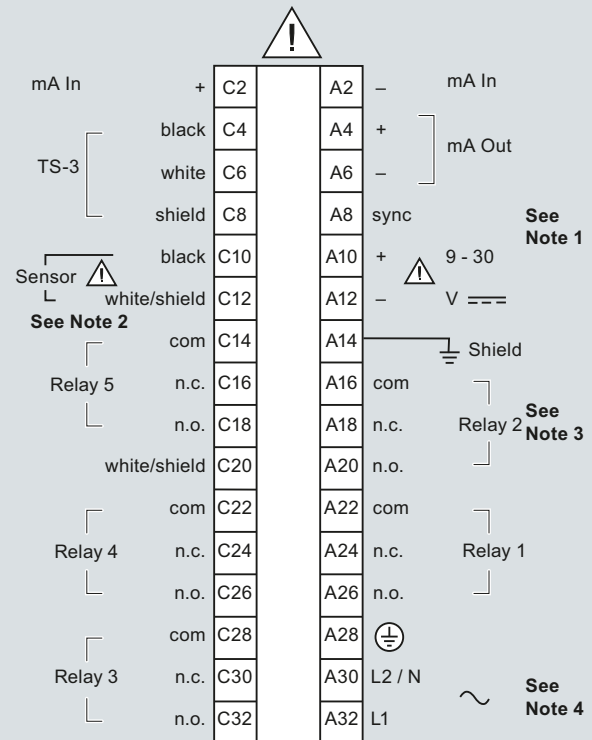13 (0.5)
20 (0.8)
180 (7.1)   102 (4.0)

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

mA In	+	C2	A2	–	mA In
TS-3 {	black	C4	A4	+	} mA Out
	white	C6	A6	–	
	shield	C8	A8	sync	See Note 1
Sensor	black	C10	A10	+	9 - 30
See Note 2	white/shield	C12	A12	–	V ===
	com	C14	A14		⏚ Shield
Relay 5	n.c.	C16	A16	com	
	n.o.	C18	A18	n.c.	Relay 2 See Note 3
	white/shield	C20	A20	n.o.	
Relay 4	com	C22	A22	com	
	n.c.	C24	A24	n.c.	Relay 1
	n.o.	C26	A26	n.o.	
Relay 3	com	C28	A28	⏚	
	n.c.	C30	A30	L2 / N	See Note 4
	n.o.	C32	A32	L1	

Notes

1. Required only if mounted adjacent to other Siemens Milltronics
   equipment. Interconnect all 'SYNC' terminals with a single
   18 AWG (0.5 mm²) 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

Voltage Selection
Switches

HydroRanger Plus connections, rack and panel mount

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HydroRanger Plus

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |

+ mA Out I | shield | + mA In I | sync black | white/shield | shield | white/shield | RL5 | shield | RL4 | RL3 | RL2 | RL1 | + − GND L2/N L1

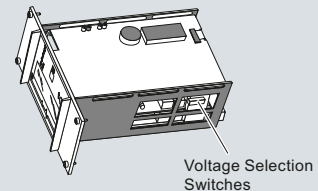See Note 1

TEMP   TRANS   See Note 3   Power   see Note 4

See Note 2

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4. Before applying AC power (mains), ensure the correct voltage is selected. Never operate the HydroRanger Plus with the ground (earth) wire disconnected.

Scope connection   Clock module   EPROM

Voltage Selection Switch

Terminal block

HydroRanger Plus connections, wall mount

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