

## **HydroRanger Multi Purpose Level Controller**

### **Part 1. General**

#### **1.1 Scope**

- A.** This section describes the requirements for an ultrasonic multi-purpose level controller transmitter plus transducer with integral temperature compensation sensor.
- B.** Under this item, the contractor shall furnish and install the multi-purpose ultrasonic control equipment and accessories as indicated on the plans and as herein specified.

#### **1.2 Submittals**

- A.** The following information shall be included in the submittal for this section:
  - 1. Data sheets and catalog literature for micro-processor based transmitter and transducer.
  - 2. Interconnection and dimensional drawings.
  - 3. List of spare parts

### **Part 2. Products**

#### **2.1 Ultrasonic Multi-Purpose Level Controller**

- A.** The multi-purpose level transmitter system shall be a microprocessor based echo-time measuring type providing an electronic output signal proportional to the level of material, space, volume, flow or differential as may be required. It shall consist of a transmitter and one or two transducers connected by up to 1200 feet of cable.
- B. Transducer:**
  - 1. Operating principle: Acoustic impulses emitted from an ultrasonic transducer are reflected back from the material surface and are received by the transducer.

The transit time of pulse travel from generation to echo is measured. The elapsed time is proportional to the distance between the transducer face and material surface.

2. Primary Sensor: The acoustic transducer shall contain a polarized Zirconium crystal with acoustic impedance matching face and transformer.
  - a. The range of the transducer shall be 1 to 25 feet.
  - b. Transducer housing shall be Kynar-Flex
  - c. Process connection shall be 1" NPT
  - d. Operating temperature shall be -40° to 203°F

### **C. Transmitter**

1. Enclosure shall be NEMA 4X polycarbonate
2. Power supply shall be 100/115/200/230 VAC +/- 15% @ 50/60 Hz
3. Power consumption shall be 15 VA
4. Operating temperature shall be -5° to 122° F. Internally mounted heater and thermostat assemblies shall be enclosed at temperatures below -5° F.
5. Outputs:
  - a. 4-20ma/20-4ma/0-20ma/20-0ma into 600 ohms.
  - b. 5 form C, SPDT multi-purpose relays rated at 5A /220 VAC non-inductive

6. Control and Programming
  - a. All parameter and commands shall be entered via a removable infrared keypad from outside the enclosure without opening the enclosure.
7. Transmitter shall process all echoes from stored memory that is continually updated after echo enhancement.
8. The echoes shall be processed comparing returns for largest echo and first echo returned. The patented Sonic Intelligence shall compare the various returns and select the echo with the greatest confidence factor.

**D. Transducer Performance**

1. Range shall be 1 to 26 feet  
(EchoMax Transducer Model XRS-5)  
  
Range shall be 1 to 33 feet  
(EchoMax Transducer Model XPS-10)  
  
Range shall be 1 to 50 feet  
(EchoMax Transducer Model XPS-15)
2. Accuracy shall be +/- 0.25% of range or 2 mm, whichever is greater.
3. Resolution shall be 0.1% of range
4. Maximum separation between transmitter and transducer shall be 1200 feet
5. CSA approved for Class I Groups A,B,C & D  
Class II Groups E, F, & G
6. Shall accept submersible shield

**E. Indication**

1. Display shall be a 4 digit LCD with .7" high characters

2. Individual alarm status light

**F. Equipment**

The multi-purpose level controller shall be a Milltronics HydroRanger, with an Echomax™ XRS-5, XPS-10 or XPS-15 transducer.

**Part 3. Operator Functions**

**3.1 Calibration**

- A. Calibration of the multi-purpose level controller shall be accomplished by the entry of all operating data through the removable keypad via infrared link. No additional equipment shall be required.
- B. Internal self-diagnostics shall be available to assist in maintenance of the multi-purpose level controller.

**3.2 Transmitter Function Details**

The following functions shall be provided:

- A. The controller shall provide an isolated 4-20ma or 0-20ma (or reversed) signal proportional to space, material, volume, flow or differential into a maximum of 750 ohms.
- B. The controller shall be capable of reading the differential, head or level as outlined in the instrumentation schedule.
- C. The transducer shall be permanently mounted at the measuring site and shall be installed in accordance with the manufacturer's recommendations.
- D. The transducer shall transmit and receive an acoustic signal to accurately measure material flow and level.
- E. The output shall be proportional to level, flowrate or volume from 0 to 100 % with a resolution of 0.1%.
- F. Operational range shall be adjustable by entering new data via infrared keypad.

- G.** The controller shall be capable of zero to full scale simulation to assure proper operation with regards to flow charts or pump control parameters.
- H.** There shall be no internal potentiometers or switches used in programming or adjusting the transmitter.
- I.** The power to operate the transducers shall come solely from the transmitter over the signal interconnection cable.
- J.** The 5 alarm relays shall be programmable for level, rate of change of level, differential level, time sampling, volume sampling, pump control, loss of echo or temperature.
- K.** The pump control function for the relays shall be programmable for up to 5 pumps and shall be able to lead/lag all five if required, and shall have option of periodic run-on. The controller shall be capable of logging individual run time for up to five pumps and the total flow of all five pumps.
- L.** The controller shall have an EEPROM memory and shall not require a battery to ensure protection of stored data.

## **Part 4. Execution**

### **4.1 Installation**

- A.** Follow manufacturers recommendation for the minimum separation between the transducer face and the maximum expected material level.
- B.** Mount the transducer to ensure a clear path to the material surface.
- C.** Additional cable for the transducer shall be RG62U coax.
- D.** Wiring between the transmitter and the transducer shall be routed through grounded metal conduit.

**Part 5. Warranty**

**5.1 Terms**

- A.** The manufacturer of the above specified equipment shall guarantee for twenty four (24) months from equipment startup or thirty (30) months from date of shipment, whichever occurs first, that the equipment shall be free from defects in design, workmanship or materials.
- B.** In the event a component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.

**Part 6. Options**

**6.1 Related Equipment**

- A.** TS-3 Temperature Sensor
- B.** RG62U cable for transducers

**Part 7. Spare Parts**

**7.1 Recommended Spare Parts**

- A.** Programmer

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### **Part 2. Products**

#### **2.1 Ultrasonic Multi-Purpose Level Controller**

- A.** The multi-purpose level transmitter system shall be a microprocessor based echo-time measuring type providing an electronic output signal proportional to the level of material, space, volume, flow or differential as may be required. It shall consist of a transmitter and one or two transducers connected by up to 1200 feet of cable.
- B. Transducer:**
  - 1. Operating principle: Acoustic impulses emitted from an ultrasonic transducer are reflected back from the material surface and are received by the transducer.

The transit time of pulse travel from generation to echo is measured. The elapsed time is proportional to the distance between the transducer face and material surface.

2. Primary Sensor: The acoustic transducer shall contain a polarized Zirconium crystal with acoustic impedance matching face and transformer.
  - a. The range of the transducer shall be 1 to 50 feet.
  - b. Transducer housing shall be Kynar-Flex
  - c. Process connection shall be 1" NPT
  - d. Operating temperature shall be -40° to 203°F

### **C. Transmitter**

1. Enclosure shall be NEMA 4X polycarbonate
2. Power supply shall be 100/115/200/230 VAC +/- 15% @ 50/60 Hz
3. Power consumption shall be 15 VA
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6. Control and Programming
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7. Transmitter shall process all echoes from stored memory that is continually updated after echo enhancement.
8. The echoes shall be processed comparing returns for largest echo and first echo returned. The patented Sonic Intelligence shall compare the various returns and select the echo with the greatest confidence factor.

**D. Transducer Performance**

1. Range shall be 1 to 50 feet
2. Accuracy shall be +/- 0.25% of range or 2 mm, whichever is greater.
3. Resolution shall be 0.1% of range
4. Maximum separation between transmitter and transducer shall be 1200 feet
5. CSA approved for Class I Groups A,B,C & D  
Class II Groups E, F, & G
6. Shall accept submersible shield

**E. Indication**

1. Display shall be a 4 digit LCD with .7" high characters
2. Individual alarm status light

**F. Equipment**

The multi-purpose level controller shall be a Milltronics HydroRanger with an Echomax<sup>TM</sup> XPS-15 transducer.

## **Part 3. Operator Functions**

### **3.1 Calibration**

- A.** Calibration of the multi-purpose level controller shall be accomplished by the entry of all operating data through the removable keypad via infrared link. No additional equipment shall be required.
- B.** Internal self-diagnostics shall be available to assist in maintenance of the multi-purpose level controller.

### **3.2 Transmitter Function Details**

The following functions shall be provided:

- A.** The controller shall provide an isolated 4-20ma or 0-20ma (or reversed) signal proportional to space, material, volume, flow or differential into a maximum of 600 ohms.
- B.** The controller shall be capable of reading the differential, head or level as outlined in the instrumentation schedule.
- C.** The transducer shall be permanently mounted at the measuring site and shall be installed in accordance with the manufacturer's recommendations.
- D.** The transducer shall transmit and receive an acoustic signal to accurately measure material flow and level.
- E.** The output shall be proportional to level, flowrate or volume from 0 to 100 % with a resolution of 0.1%.
- F.** Operational range shall be adjustable by entering new data via infrared keypad.
- G.** The controller shall be capable of zero to full scale simulation to assure proper operation with regards to flow charts or pump control parameters.
- H.** There shall be no internal potentiometers or switches used in programming or adjusting the transmitter.
- I.** The power to operate the transducers shall come solely from the transmitter over the signal interconnection cable.

- J.** The 5 alarm relays shall be programmable for level, rate of change of level, differential level, time sampling, volume sampling, pump control, loss of echo or temperature.
- K.** The pump control function for the relays shall be programmable for up to 5 pumps and shall be able to lead/lag all five if required, and shall have option of periodic run-on. The controller shall be capable of logging individual run time for up to five pumps and the total flow of all five pumps.
- L.** The controller shall have an EEPROM memory and shall not require a battery to ensure protection of stored data.

#### **Part 4. Execution**

##### **4.1 Installation**

- A.** Follow manufacturers recommendation for the minimum separation between the transducer face and the maximum expected material level.
- B.** Mount the transducer to ensure a clear path to the material surface.
- C.** Additional cable for the transducer shall be RG62U coax.
- D.** Wiring between the transmitter and the transducer shall be routed through grounded metal conduit.

#### **Part 5. Warranty**

##### **5.1 Terms**

- A.** The manufacturer of the above specified equipment shall guarantee for twenty four (24) months from equipment startup or thirty (30) months from date of shipment, whichever occurs first, that the equipment shall be free from defects in design, workmanship or materials.
- B.** In the event a component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.

**Part 6. Options**

**6.1 Related Equipment**

- A. TS-3 Temperature Sensor
- B. RG62U cable for transducers

**Part 7. Spare Parts**

**7.1 Recommended Spare Parts**

- A. Programmer

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