

## **MiniRanger Plus**

### **Multi-Purpose Level Controller**

#### **Part 1. General**

##### **1.1 Scope**

- A.** This section describes the requirements for an ultrasonic dual purpose level controller transmitter plus transducer with integral temperature compensation sensor.
- B.** Under this item, the contractor shall furnish and install the dual purpose level control equipment 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 the micro-processor based transmitter and transducer.
  - 2. Interconnection and dimensional drawings.
  - 3. List of spare parts

#### **Part 2. Products**

##### **2.1 Ultrasonic Dual-purpose Level Controller**

- A.** The dual purpose level transmitter system shall be a micro-processor based echo-time measuring type providing an electronic output signal proportional to the level of material or space as may be required. It shall consist of a transmitter and a transducer 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 reception is measured. The

elapsed time is proportional to the distance between the transducer face and the material surface.

2. Primary Sensor: The acoustic transducer shall contain a polarized Zirconium crystal with acoustic impedance matching facing and transformer.
  - a. The range of the transducer shall be 1 to 33 feet for liquids and 1 to 16.5 feet for solids.
  - b. The transducer housing shall be Kynar.
  - c. The process connection shall be 1" NPT
  - d. The transducer operating temperature range shall be -40°F to 203 °F for standard transducers and -40 °F to 293 °F for high temperature transducers.

**C. Transmitter:**

1. Enclosure shall be a chemical, UV and impact resistant polyester/polycarbonate alloy rated to NEMA 4X IP65.
2. Power supply shall be 100/115/200/230V +/- 15%, switch selectable; 50/60 Hz.
3. Power consumption shall be 15 VA
4. Operating temperature of transmitter is -40°F to 140 °F. Internally mounted heater and thermostat assemblies shall be mounted in enclosure at temperatures below -5 °F.
5. Outputs:
  - a. Optically isolated 4-20 ma / 0-20 ma proportional or inversely proportional to span.
  - b. 2 alarm / pump control relays, Form C, rated 5 Amps @ 230 VAC non-inductive hard gold plate.
6. Control and Programming

- a. All parameters and commands shall be entered via either:
  - 1. A door mounted keypad from outside the enclosure without opening the enclosure.
  - 2. An optional, removable optical link to RS232 for computer programming and storage of operating parameters.

7. Echo Processing

- a. The transceiver shall use advanced echo processing techniques which store and then analyze the returned echoes and differentiate between true echoes from the material being measured and the echoes generated by acoustical or electrical noises.

8. Communications Protocol

- a. Shall be compatible to accept two-way infrared / RS232 communications for parameter input and data acquisition. Communications software shall be Windows 3.1 (trademark of Microsoft Corp.) based. Data shall be able to be downloaded and saved, Communications module shall be portable.

**D. Transmitter and Transducer Performance**

- 1. EchoMax Transducer Model XRS-5 or XCT-8  
Range shall be 1 to 26 feet for liquids  
  
EchoMax Transducer Model XPS-10 or STH.  
Range shall be 1 to 33 feet for liquids.  
Range shall be 1 to 16.5 feet for solids.
- 2. Accuracy shall be +/- 0.25% or range or 0.24", whichever is greater.
- 3. Resolution shall be .08" (2mm) over full range.

4. Maximum separation between transmitter and transducer shall be 1200 feet.

**E. Indication**

1. Display shall be of 1.5" X 4" multi-field LCD with bar graph.
2. LCD display shall indicate alarm status.

**F. Equipment**

1. The dual purpose level controller shall be a Milltronics MiniRanger Plus with EchoMax™ XRS-5, XPS-10 or STH Transducers.

**Part 3. Operator Functions**

**3.1 Calibration**

- A. Calibration of the dual purpose level controller shall be accomplished by the entry of all parameters and controls through either a door mounted keypad or removable RS232 interface port via an optical infrared link.
- B. Internal self diagnostics shall be available to assist in maintenance of the dual purpose level controller.

**3.2 Transmitter Function Details**

- A. The controller shall provide a 4-20ma or 0-20ma (or reversed) signal proportional to space or material into a maximum of 750 ohms.
- B. The controller shall be capable of controlling up to two pumps 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 manufacturers recommendations.
- D. The transducer shall transmit and receive an acoustic signal to accurately measure material and level.

- E.** The output shall be proportional to level from 0 to 100 % with a resolution of 0.08”.
- F.** Operational range shall be adjustable by entering new data via door mounted keypad or RS232 port.
- G.** There shall be no internal potentiometers or switches used in programming or adjusting the transmitter.
- H.** The power to operate the transducers shall come solely from the transmitter over the signal interconnection cable.
- I.** The 2 relays shall be programmable for level or pump control.
- J.** The pump control function for the relays shall be programmable for up to 2 pumps and shall be able to lead/lag both, if required, and pump back up.
- K.** The controller shall have an EEPROM memory and shall not require a battery to ensure protection of stored data.
- L.** The controller shall come precalibrated with “Quick Start” parameters for easy and quick commissioning.
- M.** The controller shall be calibrated without opening the enclosure during calibration. Open door calibration is unacceptable.
- N.** The liquid crystal display shall indicate level in user selectable units, process air temperature, current mA output, level in percentage of span, and alarm indication. The display shall also have a bar graph for quick and easy viewing of the level.
- O.** Transmitter shall process all echos from stored memory which is continually updated after echo enhancement.
- P.** The echos shall be processed comparing returns for largest area echo and first echo returned. The patented Sonic Intelligence shall compare the various returns and select the echo with the greatest confidence factor.

**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 coaxial.
- 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. Easy Aimer II Aiming Kit
- B. PVC, Aluminum, and Stainless Steel flanges for transducers
- C. Teflon, Vinyl, and Polypropylene facings for transducers
- D. RG62U cable for transducers

**Part 7. Spare Parts**

**7.1 Recommended Spare Parts**

- A. None