

Entech Design, Inc.

BinMinder 9300 Interface Level Analyzer Specification

Part 1. General

1.1 Scope

- A. This section describes the requirements for a multi-purpose material interface level analyzer inclusive of transducer(s) and remote transmitter.
- B. Under this item, the contractor shall furnish and install the multi-purpose material interface level analyzer 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 product literature for microprocessor based transmitter and transducer.
 - 2. Connections and dimensional drawings.
 - 3. List of spare parts.

Part 2. Products

2.1 Material Interface Level Analyzer

- A. The multi-purpose interface level analyzer shall be a microprocessor based liquid media echo-time measuring type. It shall consist of a transmitter and from one to four transducers connected by up to 1500 feet of cable. Each analyzer shall be configured with four fully functional transducer channels and shall require no hardware or firmware modification to permit subsequent addition of transducers to the maximum four (4) in total.
- B. **Transducer:**
 - 1. Operating principle: Acoustic impulses emitted from a transducer located in the process liquid are reflected back from material in the process liquid or from a liquid or gas in the process with differing physical properties, and are received by the transducer. The transmit time of the pulse from generation to echo is measured. The elapsed time is proportional to the distance between the transducer and material surface(s). The relative

strength of return echo is plotted on a proportional graphic display and is representative of the pattern of material distributed beneath the transducer. Relatively strong and persistent echo patterns are identified as interface points between clear liquid and liquid containing greater solids concentrations.

2. Primary Sensor: The acoustic transducer shall contain a piezoelectric crystal designed to emit an acoustic pulse at a frequency between 500-750 KHz.
 - a. The range of the transducer shall be 1 to 328 feet.
 - b. Transducer housing shall consist of a PVC housing with epoxy poured to encapsulate the piezoelectric crystal and cable leads.
 - c. Process connection shall be 3/4" NPT
 - d. Operating temperature shall be -40 to +50° C
 - e. A self-cleaning transducer shall be employed in clarifier and thickener applications in which there is no surface skimmer. The self-cleaning mechanism shall automatically remove bubbles, slime, and other accumulations from the sensing surface of the transducer. No additional equipment, piping, wiring or control devices shall be required. If additional equipment, piping, wiring or control devices are required to implement the self-cleaning function, the cost of such items, including the cost of installation, shall be borne by the manufacturer.

C. Transmitter

1. Transmitter shall utilize a 32 bit microprocessor
2. Enclosure shall be NEMA 4X molded fiberglass polyester
3. Power supply shall be 110/220 VAC +/- 10% @ 50/60Hz.
4. Operating temperature shall be -40 to +60 degrees Centigrade
5. Outputs:
 - a. One (1) 4-20ma output associated with each transducer channel.
 - b. Four SPDT multi-purpose relays rated at 10A @ 250V AC; 10A @ 30V DC
 - c. RS232 output for single unit operation and RS485 output for multiple unit operation.

6. Control and Programming

All parameters and commands shall be entered via an integral membrane keypad from outside the transmitter enclosure without opening the enclosure. If additional equipment or instruments are required to program the unit, the manufacturer shall supply a minimum of one such instrument for each transmitter that is supplied.

7. Transmitter shall process all echoes from stored memory which is continually updated after echo enhancement. A user determined parameter shall allow varying amounts of echo data, ranging from two (2) seconds to three (3) minutes, to be averaged prior to refreshing the measurement estimate and system display.

D. Transmitter and Transducer Performance

1. Range shall be 1 to 328 feet
2. Accuracy shall be +/- 0.5% of range or 0.1 ft, whichever is greater.
3. Maximum separation between transmitter and transducer shall be 1500 feet.

E. Indication

Display shall be a multi-function back-lit LCD with digital indication of Level or Range measurement and graphical representation of the return echo profile. It shall have an alpha/numeric set-up menu and system parameters.

F. Equipment

The multi-purpose interface level analyzer shall be an Entech Design, Inc. BinMinder 9300 with one (1) to four (4) standard transducers. Auto Clean Wiper Transducer 9306-54 shall be employed in clarifier and thickener applications in which there is no surface skimmer to provide periodic rotation of the transducer out of the process.

Part 3. Operator Functions

3.1 Calibration

- A. Calibration of the multi-purpose interface level analyzer shall be accomplished by the entry of all operating data through the integral membrane keypad. No additional equipment shall be required. If additional equipment or instruments are required for this function, the manufacturer shall supply a minimum of one such instrument for each transmitter that is supplied.
- B. User evaluation and interpretation of the acoustic echo profile shall be

accomplished through an LCD graphical display integral to the transmitter. No additional equipment shall be required. If additional equipment or instruments are required for this function, the manufacturer shall supply a minimum of one such instrument for each transmitter that is supplied.

- C. The analyzer shall have an automatic self-calibration feature to adapt to speed of sound variances resulting from changes in temperature and pressure. No additional equipment shall be required.

3.2 Transmitter Function Details

- A. The transmitter shall provide a 4-20mA signal proportional to Level or Range for each of the four transducer channels.
- B. The transmitter shall be capable of reading the Level or Range as outlined in the instrumentation schedule.
- C. The transducer shall be permanently mounted at the measurement site and shall be installed in accordance with the manufacturer's recommendations.
- D. Operational range shall be adjustable by entering new data via the integral membrane keypad.
- E. Power to operate the transducer(s) shall be provided solely by the transmitter over the signal interconnection cable. The cost of installation of any additional components or equipment that may be required for this purpose shall be borne by the manufacturer.
- F. The four contact relays shall be programmable for level and dead band, or timed cycle and duration, or loss of echo alarm functions.
- G. The transmitter shall have an EPROM memory and shall not require a battery to ensure protection of stored data.
- H. The transmitter shall have capability for storing current and secondary system parameters. Current parameters shall be recalled from memory on power loss or system reboot and secondary parameters shall be recallable by operator command.
- I. The analyzer shall be capable of detecting up to four (4) interfaces in a vessel with a single transmitter and transducer and shall be capable of displaying and out-putting values for each interface independently. This function shall be accomplished by connecting one transducer to multiple input channels on the transmitter. No additional transducers or measurements are allowed in this configuration.
- J. The transmitter shall have automatic gain compensation to automatically adapt echo enhancement to dynamic process changes.

Part 4. Execution

4.1 Installation

- A. Locate the transducer in the process liquor so that it is fully submerged.
- B. Mount the transducer to ensure that there are no fixed obstructions between the transducer and the intended interface to be measured. Utilize a swing bracket and transducer shield to permit free movement from contact with a surface skimmer or other moving equipment.
- C. Additional cable for the transducer shall be Belden 9463 Twin Ax shielded cable or equal.
- 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 specified equipment shall guarantee for twelve (12) months from delivery 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

- A. Belden 9463 Twin Ax shielded cable for transducers
- B. Swing bracket assembly and mounting hardware for handrail mount
- C. Transmitter mounting plate and mounting hardware for handrail or wall mount
- D. Self-cleaning transducer (Part No. 9306-54). Required for clarifier and thickener applications in which no surface skimmer is present.

Part 7. Spare Parts

7.1 Recommended Spare Parts

- A. None