

**Lesman Level Instrumentation  
LSB100/300 Series  
Basic Bubbler System**

**PART 1: GENERAL**

**1.1 SCOPE**

- A. This section describes the specifications of a bubbler system.
- B. The following information shall be described in the submittal for this section:
  - 1. Overview and theory on the operation of a bubbler system
  - 2. Specifications of panel components
  - 3. Installation and Maintenance information

**PART 2: OVERVIEW**

**2.1 BASIC THEORY**

- A. A bubbler system is an accurate means of measuring the fluid level in open or vented containers; especially in harsh environments such as reservoirs, cooling tower sumps, vented fuel tanks, drain sumps, or air washers.
- B. For a bubbler system to be functional, it must have:
  - 1. Customer supplied instrument quality air supply to the panel's air supply bulkhead fitting
  - 2. AC power 120/60, 110/50
  - 3. Customer connected wiring (if desired) for 4-20mA level signal, including loop power supply
  - 4. Piping from the bubbler panel to the diptube (copper, plastic nylon, steel, etc.)
  - 5. Customer fabricated diptube
- C. Bubbler level systems can make level measurements that plague other technologies. The dip/sensing tube portion that extends into the medium from the top and has no moving parts, making a bubbler suitable for measuring not only the level of water, but viscous fluids or liquids with large quantities of suspended solids; like slurries, sewage, drainage water or sludge. The dip tube is in contact with the measured liquid medium, so it must be chemically compatible with the medium.

**PART 3: PRODUCTS**

**3.1 AIR SUPPLY REGULATOR**

- A. Operating Principle: System shall contain a regulator to reduce incoming air pressure from the regulator to the correct pounds per square inch of the application. (consult factory for suggestions)
- B. Style: Must be a relieving regulator.
- C. Construction/specs: Regulator shall have a body construction of Aluminum, inner valve shall be brass, and be controlled with a non-rising adjustment knob. Inlet/outlet shall be 1/4"NPTF; gauge ports shall be 1/8"NPTF and have connections on the front and back.
- D. Maximum Pressure: 200PSIG; 14BAR
- E. Operating Temp: 40-120F; 4-50C
- F. Installation: Regulator must be a modular connection with the Coalescing Filter in section 3.2.

## 3.2 COALESCING FILTER

- A. Operating Principle: System shall contain a 0.3 micron coalescing filter to remove dirt, oil, and water from incoming air supply. It will contain a drain port on the bottom of the bowl to drain accumulated water.
- B. Construction/specs: Regulator shall have a body construction of Aluminum, bowl construction shall be 3.8oz in size made from polycarbonate, shall contain inner and outer support core to prevent element from crushing in either flow direction. Shall have a manual level drain on the bottom of polycarbonate bowl. Inlet/outlet shall be 1/4"NPTF.
- C. Maximum Pressure: 150PSIG; 10BAR
- D. Operating Temp: 40-120F; 4-50C
- E. Installation: Coalescing Filter must be a modular connection with the Regulator in section 3.1.

## 3.3 CONSTANT FLOW REGULATOR/ROTAMETER

- A. Operating Principle: Provides a means for maintaining a practically constant volumetric rate of flow regardless of variations in pressure.
- B. Manufacturer: Shall be a Moore/Siemens 62 series Constant Differential Relay
- C. Construction/specs: Shall have a body construction of aluminum, shall have an attached Rotameter with a magnified sight glass for reading air flow. Input of constant differential relay shall have a 1/4"NPTF connection; output from rotameter shall be 1/4"NPTF. Shall have a min/max purge rate of 0.9/2.1 SCFH; 425/991SCCM.
- D. Supply Pressure: Min- at least 5psig greater than the max downstream pressure  
Max-150PSIG
- E. Operating Temp: -40-180F; -40-82C

## 3.4 PRESSURE TRANSMITTER

- A. Operating Principle: System shall contain a smart gauge pressure transmitter, temperature compensated, to read changing pressure in the bubbler system, which when converted to specified units provides a level reading.
- B. Construction/specs: Pressure transmitter shall have an electrical housing constructed of low-copper die-cast aluminum. Connection shank, oval flange, and seal diaphragm shall be stainless steel. Transmitter shall have a molecular sieve to prevent moisture intrusion into the transmitter body; the molecular sieve provides an IP68 level of protection. Process connection shall be 1/2"NPTF, electrical connection/cable entry to be 1/2"NPTF. Power supply voltage shall be 10.5-45VDC. Measuring cell filling shall be Silicone oil. Transmitter shall have HART communication with a 4-20mA output.
- C. Local reading: Integral digital display with pushbuttons for local configuration.
- D. Power supply: Voltage shall be 10.5-45VDC
- E. Operating Temp: -22-185F; -30-85C
- F. Installation: Pressure transmitter shall be mounted in the vertical position via bulkhead mounting bracket.

## 3.5 PANEL METER

- A. Operating Principle: System shall contain a panel meter to provide DC power to the pressure transmitter, convert the pressure transmitter 4-20mA to level and display level, and retransmit the 4-20mA for customers' use.

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## 3.5 PANEL METER (continued)

- B. Construction/specs: Panel meter enclosure shall have a body construction of 1/8DIN high impact plastic, NEMA 4X, IP65.
- C. Display: Shall have a 6 digit dual display, main display 0.6" secondary display 0.46"
  - 1. Main display will read level number, secondary will read engineering units.
- D. Power Supply: 85-265 VAC 50/60 Hz, 90-265 VDC 20 W max or 12/24 VDC  $\pm 10\%$  (jumper selectable), 15 W max.
- E. Output: 4-20mA, loop powered by customers power supply
- F. Relays: Shall contain 2 SPDT form C relays rated 3 A @ 30 VDC and 125/250 VAC resistive load, 1/14HP @ 125/250 VAC for inductive loads.
- G. Loop power supply: Used to power pressure transmitter. 24VDC; min 10  $\Omega$  max 700  $\Omega$
- H. Operating Temp: -40-150F;-40-65C
- I. Installation: Panel meter shall be mounted in the upper center of panel with a 1/8DIN cutout with two mounting bracket/screw assemblies.

## 3.6 PANEL HEATER

- A. Semiconductor Heater: Shall be black anodized, extruded aluminum. Controlled by thermostat over a range of 32-140F.
- B. Specifications: Shall be PTC (positive temp coefficient) heating element, rated IEC IP54/CE.
- C. Power Consumption: 60watts                      Start nominal Current: 2.5amps
- D. Mounting: Shall have mounting clip for 35mm DIN rails.
- E. Power supply: AC 120/60, 110/50

## 3.7 PANEL ENCLOSURE

- A. Dimensions: Enclosure shall be 20"H x 16"W x 8"D.
- B. Construction: Enclosure shall have a body construction of carbon steel, body shall be 18 gauge steel and door shall be 16 gauge steel. Latch style shall be quarter turn. Seams continuously welded and ground smooth. Mounting holes shall be in back for wall mounting kit. Standard finish shall be ANSI 61 gray.
- C. Rating: NEMA/EEMAC type 4,12,13  
CSA, File No. 42186: Type 4, 12  
VFE IP66  
IEC 60529, IP66

## 3.8 MISCELLANEOUS ASSEMBLY PARTS

- A. Fittings:
  - 1. Fittings shall be push-to-connect style for 3/8"OD tubing.
  - 2. Metal body shall be nickel-plated brass, composite body shall be glass-reinforced nylon, nitrile O-ring, polyacetal release button, stainless steel grab ring, and white acrylic sealant.
  - 3. Metal body: 0-200F @ 300psi max.
  - 4. Composite Body: 5-155F @ 260psi max
- B. Tubing:
  - 1. Material: made from flexible, high-grade, abrasion & chemical resistant, heat & light stabilized Nylon. Shall be Natural in color.
  - 2. Tubing shall be .375"OD x .190"ID with a wall thickness of .093".
  - 3. Tubing shall have a working pressure rating of 500psi with a 2000psi burst pressure.

## 3.9 SOLENOID/CHECK VALVE (for purge option)

- A. Solenoid Valve
  - 1. Body construction: Body shall be brass, core tube shall be 305SS, springs shall be 302SS, core and plugnut shall be 430SS, shading coil shall be copper. 3/8"NPTF inlet/outlet, normally-closed, 2-way.
  - 2. Electrical: Powered 120/60, 110/50VAC
  - 3. Ratings: Watertight, Types 1, 2, 3, 3S, 4, and 4X; 32-125F; 0-52C
    - i. LSB100: 150psi max pressure
    - ii. LSB300: 200psi max pressure (5psi min differential)
- B. Check Valve
  - 1. Body Construction: Body shall be brass, seal material shall be Buna-N. 1/4"NPT female inlet/outlet connection.
  - 2. Pressure ratings:
    - i. Max pressure: 500psi
    - ii. Cracking pressure: <1"H<sub>2</sub>O
    - iii. Flow Coefficient (Cv): 0.80

## PART 4: INSTALLATION/MAINTENANCE

### 4.1 FIELD INSTALLATION

- A. Panel must be mounted with allowance for access to instrument quality supply air, bubbler air, drain port, and electrical connections on the bottom of the panel.
- B. Air supply and Bubbler outlet air shall be 1/2"NPT female connections. Drain shall be 1/8"NPT female.
- C. Electrical conduit access shall be created by customer and is suggested to be on bottom of panel to ensure weather integrity of panel. See section 3.7 PANEL ENCLOSURE for panel ratings/approvals.
- D. Panel piping/plumbing/tubing connections made by customer must be tight and leak free to prevent low level indication from a leak.

### 4.2 FIELD WIRING

- A. Panel is prewired and tested before shipment.
- B. Field wiring consists of:
  - 1. Power supply to bubbler panel: shall be 120/60, 110/50VAC and be supplied to the appropriate terminals per wiring diagram. (supplied at receipt of PO)
  - 2. Connecting loop power supply and the associated 4-20mA receiver device at the appropriate terminal per wiring diagram. (supplied at receipt of PO)
  - 3. Pressure transmitter test terminals: The transmitter has conventional test terminals which are wired to terminal block to be used to check transmitters loop current with a milliammeter without breaking loop circuit. This can be tested from test terminals indicated in the wiring diagram. (supplied at receipt of PO)

### 4.3 MAINTENANCE REQUIREMENTS

- A. Drain: Coalescing filter contains a manual drain, as needed, panel door shall be opened and manual level is to be pushed down which will cause blowdown of air/water outside of panel on the bottom bulkhead.

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## **4.3 MAINTENANCE REQUIREMENTS (continued)**

- B. Drift in smart pressure transmitter is negligible, but a calibration check can be performed as needed.
- C. Confirm thermostat set point is above 35F, adjust as needed.
- D. Tube Blowdown: depending on the application and suspended solids in the well, consult factory for suggestions.

## **4.4 HART COMMUNICATION**

- A. HART communicator probes can be attached across the 250ohm resistor located on the back of the precision digital panel meter.

## **PART 5: MANUFACTURER'S ASSISTANCE**

### **4.1 WARRANTY**

- A. The manufacturer shall offer a one year warranty for replacement of parts if needed.