Lesman Level Instrumentation

LSB100-020 or LSB300-020 Bubbler Systems with Purge

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 (ISA-7.0.01-1996, Quality Standard for Instrument Air Standard)
2. AC power 120/60, 110/50
3. Customer supplied piping and fittings from the bubbler panel to the diptube (copper, plastic nylon, steel, etc.)
4. Customer fabricated diptube and supports
5. Customer connected wiring (if desired) for 4-20mA level signal. The 4-20mA output shall be either active (powered by the panel) or passive, loop powered from an external DC power supply.
6. Customer connected (if desired) alarm or control actuation from either of two internal alarm/control relays

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. Bubbler measurement is a hydrostatic head pressure measurement and is fluid density or fluid Specific Gravity dependent.

PART 3: PRODUCTS

3.1 INTERNAL AIR SUPPLY REGULATOR

A. Customer shall regulate the supply air/gas to less than 130 PSIG with customer supplied regulator.

B. Operating Principle: The Bubbler System shall contain an internal pressure regulator to reduce incoming air pressure from the regulator to the correct supply pressure for the application. (consult factory for suggestions)

C. Style: Must be a relieving regulator**.**

D. 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.

E. Maximum Pressure: 200PSIG; 14BAR

F. Operating Temp: 40 to 120°F; 4 to 50°C

G. Installation: Regulator must be a modular connection with the Coalescing Filter in section 3.2.

H. The pressure regulator will have a pressure gauge indicating the outlet supply pressure.

3.2 COALESCING FILTER

A. Operating Principle: System shall contain a replaceable 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 which shall be piped with tubing to a drain connection on the bottom of the panel.

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: 150 PSIG; 10 BAR

D. Operating Temp: 40 to 120 °F; 4 to 50 °C

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 through the Dip tube and Dip tube piping regardless of variations in supply or outlet back 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 to 180F; -40 to 82°C

3.4 PRESSURE TRANSMITTER

A. Operating Principle: System shall contain a smart gauge pressure transmitter, temperature compensated, to read changing pressure in the bubbler Dip tube, which when converted (for the fluid's Specific Gravity) to specified engineering 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 fill fluid shall be Silicone oil. Transmitter shall have HART communication with a 4-20mA output.

C. Local display: Transmitter shall have an integral digital display for pressure reading and pushbuttons for local configuration.

D. Power supply: Voltage shall be 10.5-45VDC

E. Operating Temp: -22 to 185 °F; -30 to 85 °C

F. Installation: Pressure transmitter shall be mounted in the vertical position on a 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, display the level value and its engineering units, and retransmit the 4-20mA as either an active panel powered 4-20mA signal or as a passive loop powered 4-20mA signal for customers' use.

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 show the level value; the secondary display will show engineering units.

D. Power Supply: 85 to 265 VAC 50/60 Hz, 90 to 265 VDC 20 W max ±10% (jumper selectable), 15 W max.

E. Output: active or passive 4-20mA (customer supplies DC power for passive loop powered output)

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 Ω max 700 Ω

H. Operating Temp: -40 to 150F; -40 to 65C

I. Installation: Panel meter shall be mounted in the upper center of panel with a 1/8 DIN horizontal cutout with two mounting bracket/screw assemblies. The bezel gasket shall provide NEMA 4 weather protection

3.6 PANEL HEATER

A. Housing: Heater housing shall be black anodized, extruded aluminum.
B. Control: Heater shall be controlled by thermostat located in the panel, over a range of 32 to 140°F.
C. Specifications: Shall be PTC (positive temp coefficient) heating element, rated IEC IP54/CE.
D. Power Consumption: 60watts Start nominal Current: 2.5amps
E. Mounting: The heater and the thermostat shall have mounting clip for 35mm DIN rails.
F. Power supply: AC 120/60, 110/50
G. Fusing: The panel heater shall be fused independent of the instrumentation.

3.7 PANEL ENCLOSURE

A. Dimensions: Enclosure shall be 24”H x 20”W x9”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. Wall mount flanges on each of four corners shall be installed on the panel.
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. Pipe fittings shall be brass
2. Tube fittings shall be push-to-connect style for 3/8”OD for pressure sensing or push-to-connect ½” OD flexible tubing for the pneumatic purge circuit.
3. Tube fitting 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.
4. Metal body: 0 to 200°F @ 300psi max.
5. Composite Body: 5 to 155°F @ 260psi max

B. Tubing:
1. Material: made from flexible, high-grade, abrasion & chemical resistant, heat & light stabilized Nylon. Shall be Natural in color.
2. Purge tubing shall be 0.50” OD with 0.062” wall thickness
3. Level pressure tubing shall be 0.375”OD with 0.050” wall thickness.
4. Tubing shall have a working pressure rating of 250psi with a 1000psi burst pressure.

3.9 PURGE/BLOWDOWN CIRCUIT

A. Operating Principles

1. The bubbler system shall lock or hold the indicated level at the initiation of and during the entire purge cycle to prevent a false process variable upset to any connected level control or false alarms from the turbulence expected from purge action.

2. The bubbler system shall lock or hold the indicated level for a period of time after the purge is completed to allow the pressures to stabilize and equilibrate after the turbulence created by the purge cycle. 3. The pressure transmitter and constant flow regulator shall be blocked during the purge.

B. Construction

1. Pushbutton. A momentary pushbutton, labeled Purge, shall be mounted in the panel door. Pressing and holding the pushbutton switch shall directly connect the supply line pressure air to the DIP tube outlet to provide purge/blowdown air.

2. Timers. The time intervals shall be field adjustable (to adjust for local conditions) by a digital timer module with pushbuttons and display.

4.0 SOLENOID BLOCK VALVE for Purge/Blowdown Circuit

A. Solenoid Valve

1. Body construction: Body shall be brass, core tube shall be 305SS, springs shall be 302SS, core and plugnut shall be 430F SS, shading coil shall be copper. 1/8" NPTF inlet/outlet, normally-open, 2-way.
2. Electrical: Powered120/60,110/50VAC
3. Ratings: Watertight, Types 1, 2, 3, 3S, 4, and 4X; 32 to125°F; 0-52°C
    i. LSB100: 150psi max pressure
    ii. LSB300: 200psi max pressure (5psi min differential)

4.1 SOLENOID PURGE/BLOWDOWN VALVE

A. Purge Solenoid Valve shall be pilot operated for high flow rate to achieve purging action

B. Purge Solenoid Valve shall have a minimum Cv of 3.0

C. Purge Solenoid Valve specifications.

1. Body construction: Body shall be brass, core tube shall be 305SS, springs shall be 302SS, shading coil shall be copper. 3/8" NPTF inlet/outlet, normally-closed, 2-way.
2. Electrical: Powered120/60,110/50VAC
3. Ratings: Watertight, Types 1, 2, 3, 3S, 4, and 4X; 32 to 125°F; 0-52°C
    i. LSB100: 130psi max pressure
    ii. LSB300: 200psi max pressure (5psi min differential)

4.2 DOCUMENTATION

A. Component manufacturer's documentation shall be shipped with the panel in an envelope labeled "Do not Discard. Bubbler panel Component Documentation"

B. A printed bubbler panel Instruction Manual shall include Installation, Theory of Operation, Operation, Troubleshooting, and Wiring Diagrams

PART 4: INSTALLATION/MAINENANCE

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 1/4" 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.

D. Panel piping/plumbing/tubing connections made by customer must be tight and leak free to prevent false low level indication from a leak.

4.2 FIELD WIRING

A. Panel is prewired. The panel meter is configured for customer specified level and alarm/control relay setpoints. The retransmit 4-20mA level output is configured and tested to match the indicator range (unless specified otherwise). The bubbler air and purge circuits are 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 wiring for a 4-20mA receiver device at the appropriate terminal per wiring diagram. (supplied at receipt of PO)
3. Connecting wiring for alarm or on-off control to the alarm relay terminal connections per wiring diagram (supplied at receipt of PO)

4.3 MAINTENANCE REQUIREMENTS

A. Drain: As needed, the panel door shall be opened and the coalescing filter manual lever depressed which will blowdown through the bulkhead fitting on the bottom of the panel..

B. Coalescing filter replacement shall be done as required on a periodic basis, depending on the dirt and moisture conditions of the supply air.

C. Confirm thermostat set point is 60°F, to maintain a minimum 40°F panel temperature.

D. Drift in smart pressure transmitter is negligible, but a calibration check can be performed as needed.

E. Dip Tube Purge/Blowdown: as frequently as needed, depending on the application and suspended solids in the well, consult factory for suggestions.

4.4 HART COMMUNICATION

A. HART modem or communicator probes can be attached across the 250ohm resistor located on the terminal blocks.

PART 5: MANUFACTURER'S ASSISTANCE

5.1 WARRANTY

A. The manufacturer shall offer a one year warranty on the materials, workmanship and components.