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NOTE TO SPECIFIER; This specification pertains to a digital fully automatic switchover for high purity gases- DFAM Series.

Digital Fully Automatic Switchover Manifolds

1. DESCRIPTION
   a. The gas manifold shall be a PLC-driven automatic switchover manifold providing uninterrupted gas supply from either high pressure gas cylinders, liquid cylinders or a combination of the two. This hybrid feature is available for gases commonly found in liquid cylinder arrangements, such as argon, carbon dioxide, nitrogen or oxygen.
   b. The cabinet–style manifold shall be specifically designed, manufactured and cleaned for a variety of high purity gases including toxic gases, carbon dioxide, inert gases, oxygen, flammable gases and nitrous oxide.
   c. Each manifold shall be composed a controller, a manifold (mechanical) box, and two (2) header bars. Carbon dioxide service manifolds are mounted with an internal double pass gas heater rated for max flowrate 500 SCFH.

2. MATERIALS

   A. Manifold (Mechanical) Box
      1. The delivery pressure from the manifold shall be field adjustable via a knob located inside the manifold mechanical box.
      2. For brass units, all internal wetted components shall be brass without any tubing. For stainless steel units, all internal wetted components shall be stainless steel without any tubing.
      3. All pressure reducing regulators shall be brass or stainless steel bar-stock with stainless steel diaphragms (neoprene diaphragm regulators are not acceptable).
      4. The manifold shall be designed so that when the automatic switchover from the primary bank to the reserve bank occurs there will be no drop in the line pressure.
      5. The switchover process shall be controlled electronically by the manifold controller. Manifolds mounted with shuttle valves are not acceptable.
      6. The resetting of the manifold shall be accomplished automatically (no lever to rotate).
      7. The manifold shall have a minimum flow coefficient of Cv = 1.0 to allow for high flow peak demands.
      8. The manifold box shall be equipped with one (1) pipeline pressure relief valve and two (2) intermediate pressure relief valves (all mounted inside of the manifold box). All three (3) relief valves shall be connected to an exhaust block. The exhaust block outlet port shall be ½" F.NPT for the vent piping (vent piping by installer).
      9. The manifold box shall be designed and made to maintain a minimum gas purity of 99.999%.
      10. Units in carbon dioxide service shall be equipped with built-in heating elements capable of flowing 500 scfh without pressure reducing regulator freeze up. The heating block shall be designed so that the molecules are heated before and after the primary regulators (double-pass heating block).
      11. The inboard solenoid valve shall be normally open type allowing the gas to flow even during power failure.
      12. Pressure gages shall be easily accessible inside the cabinet in the event of HMI display failure.

B. Manifold Controller

1. The manifold controller shall absolutely be separated from the manifold mechanical box. The manifold controller shall be controlled by a programmable logic controller (PLC) and a graphic LCD operator interface (aka HMI touchscreen monitor).
2. The Human Machine Interface (HMI) shall be a touchscreen allowing the operator to select the priority bank and the type of gas cylinders (gas or liquid). There shall be two distinct screens available to the operator.
    - Status Screen - The status screen shall display important information about the status of the manifold such as bank pressures, actual delivery pressure, switchover pressure, switchover priority and bank status ("bank in use", "bank depleted", or bank ready"). The status screen shall also provide alarm status such as high or low delivery pressure, reserve bank depleted and economizer mode.
    - Selection Screen - The selection screen shall allow the operator to select the type of cylinder for each bank and the switchover priority. This shall be done by making the selection directly on the touchscreen. The manifold shall display an error message and activate the audible alarm to signal that the selection made by the operator and the actual cylinder connected to the manifold do not correspond. The manifold shall automatically fall back to the proper settings but keep the warning signal active until the selection corresponds to the actual cylinder pressure.
3. The touchscreen monitor shall indicate the status of each cylinder bank with green (in service), yellow (ready) and red (bank depleted) dots.
4. The manifold controller shall actuate a relay providing a dry contact for remote alarm connection.
5. A buzzer shall sound when a bank is depleted.
6. The buzzer shall be cancelled by a silence push button without canceling the red dot/indicator or the remote alarm signal.
7. The manifold controller shall be programmed with the following features:
    - Opti-Use – The Opti-Use feature shall be enabled for manifolds connected to liquid cylinders. The manifold PLC shall monitor bank pressures to optimize the use of the liquid in the cylinders. The manifold shall not consider a bank fully depleted until the pressure remains below a specific setpoint.
    - Electronic Economizer – The Electronic Economizer feature shall be only available when a liquid cylinder is in "ready/stand-by" mode. The PLC shall monitor the pressure of both "in-service" and "stand-by" cylinder banks. If the stand-by (reserve) bank pressure rises 50 psi above the in-service bank pressure, the PLC shall tap into the reserve bank until the pressure differential drops below 50 psi.
    - Automatic Leak Detection – The Automatic Leak Detection feature shall warn the operator when the stand-by bank (or "Ready" bank) pressure drops by actuating the buzzer and displaying the problem on the screen. This feature shall work for all gas services and cylinder types.

C. Header Bar and Hoses

1. The header bars shall be made from one-piece machined brass or stainless steel barstock (silver brazed header bars are not acceptable). Brass header bars shall be acid cleaned, bright dipped and nickel-plated to the outside (painted header bars are not acceptable). Type 316 stainless steel header bars shall be electropolished to maintain ultra-high purity of the gas.
2. The wetted components of the header bars shall be cleaned for oxygen service to maintain gas purity.

3. Each header bar shall be mounted with a high quality, high flow needle valve acting as a master shutoff valve. Ultra-high purity stainless steel diaphragm valves are available as an option (consult plans for details). The master shutoff valve shall be equipped with a PCTFE soft-tip to prevent gas leaks through the seat (metal-to-metal seat valves are not acceptable). The master valve shall be mounted with an easy to operate round knob (t-bar handle is prohibited).
4. The 36”-long flexible hoses shall be suitable for high purity applications and compatible for the intended gas service. The header bars shall be delivered with the flexible hoses installed at the factory. The whole assembly shall be factory-tested for both leak and pressure prior to shipping. 72”-long flexible hoses are available as an option.
5. Each gas cylinder hose inlet nipple (aka CGA) shall be equipped with integral check valve to minimize introduction of airborne contaminants into the process gas.

3. PRODUCT

A. Acceptable Manufacturer
   1. DFAM Series (brass or stainless steel construction) as manufactured by BeaconMedaes.