PURITY LEVEL 5 99.999%

Fully Automatic Switchover Manifold for Liquid Cylinders (AFAM350B Series - Brass Construction - Laboratory Applications)

SPECIFICATION

Fully Automatic Switchover Manifold

The BeaconMedæs Fully Automatic Switchover Manifold (AFAM350B Series) accommodates multiple cryogenic liquid cylinders (gas withdrawal) equally divided into two banks of either argon, carbon dioxide, oxygen or nitrogen. The cylinder banks provide an uninterrupted supply of gas for the specific application. The manifold is cleaned, tested and prepared for the indicated gas service and constructed following NFPA, ASME B31.3 and CGA guidelines.

Manifold Description

The AFAM350B Series manifold operates as a fully automatic switchover control system. It monitors cylinder bank pressure electronically, controlling switchover and eliminating the need to manually reset levers and valves. The easy to read analog gauges show the delivery and individual bank pressure. A series of lights for each bank indicates whether the bank is “in service”, “ready for use”, or “bank depleted". At a preset pressure, the system automatically changes from the supply bank to the reserve bank without an interruption in gas supply. AFAM350B Series Fully Automatic Switchover manifolds operate on 24 VAC power (power transformer provided by BeaconMedæs), but will continue to function during a power failure (without switchover capabilities).

Operation and Design

The AFAM350B Series consists of a manifold box, an alarm/controller box and two supply bank headers (one in service and one reserve supply). The manifold box is composed of analog cylinder pressure gauges, regulators, pressure relief valves and normally open solenoid valves. The alarm/controller box includes indicator lights (green “In Service”, yellow “Ready for Use”, and red “Bank Depleted”), a buzzer and a silence button. Each supply bank consists of a header bar with flexible hoses, pressure relief valves and cylinder connections.

After initial power-up and with both banks empty, the red light will be illuminated on the alarm/controller box. The bank that is pressurized first will be considered the “In Service” bank and is the bank that supplies the piping system (indicated by the green “In Service“ light), while the cylinder bank on stand-by is referred to as the “Secondary” supply (indicated by the yellow “Ready for Use” light). On the service bank, the gas flows into the manifold box inlet to the bank pressure switch, then into the primary regulator before heading to a solenoid valve, followed by a check valve and the final line regulator. The delivery pressure is controlled by one line regulator and is field adjustable. The gas exits the line regulator and proceeds past the pressure gauge and into the delivery piping.

The gas on the secondary bank flows into the manifold box inlet then to the bank pressure switch. The gas flows through the other primary regulator until it reaches a solenoid valve. Since this is the secondary bank, the valve is closed, preventing the secondary bank from flowing. Switchover from the “Service” to “Secondary” side is accomplished when the service bank pressure drops below a predetermined point (this switchover pressure is determined by the pressure switches). The control module then signals the secondary bank solenoid to open while closing the service bank solenoid valve at the same time, allowing the gas to start flowing without any interruption.

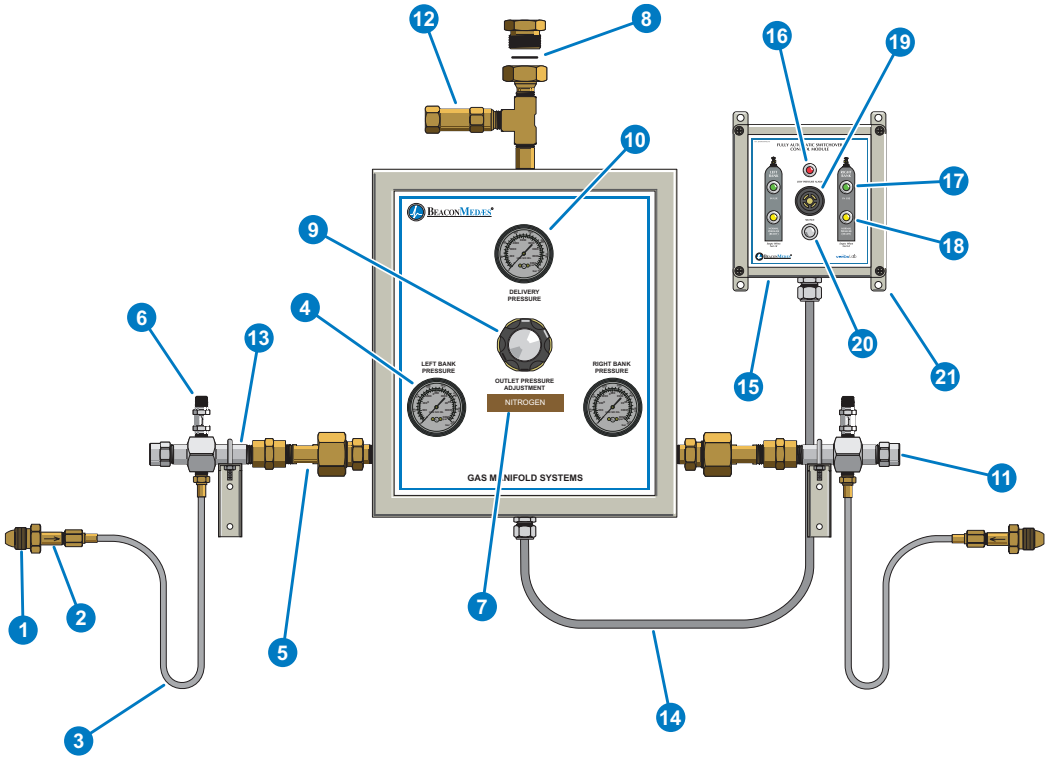
After replacing the empty cylinders, slowly open the cylinder valves. The control module will read this pressure and automatically place the fresh bank of cylinders into reserve (stand by/ready for use) mode, making it the secondary bank. The yellow light will come on indicating that the new bank is ready for use, and the red “Bank Depleted” light will be extinguished. Replacing the empty cylinders is all that is required to reset the switchover manifold.

Economizer Circuit

The AFAM350B comes standard with two built-in economizer circuits. The economizer’s purpose is to minimize product loss on the reserve bank. When the liquid cylinder on the reserve bank reaches 200 PSI. The economizer opens and the gas bypasses the primary regulators and feeds directly the line regulator until the pressure drops below 200 PSI. End users sometimes notice that both banks are depleting at the same time thinking the manifold is not operating correctly. That’s because the economizer uses the “reserve” bank as much as the “in use” bank. This is a clear indication that your gas consumption is too low to be fed by liquid cylinders.

NOTE: Both economizers are set to open at 200 PSI. When the economizer throttles around 200 PSI, the economizer may make some noise. This is a normal but temporary situation. The noise will stop as soon as the pressure of the reserve liquid cylinder drops under 200 PSI.

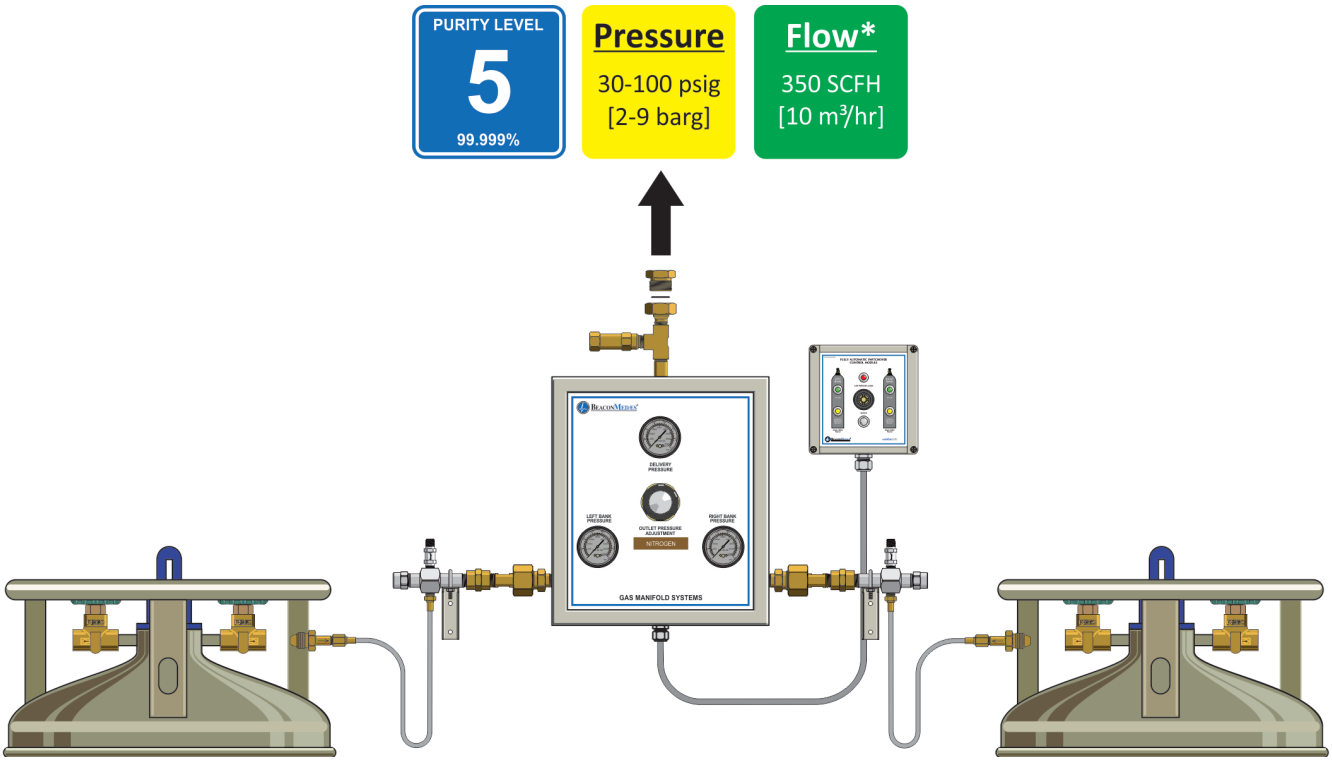
Standard Configuration -Brass Construction



1 Gas Specific Cylinder Nut	8 Outlet Union	15 Alarm/Controller Enclosure
2 Gas Specific Cylinder Nipple with Check Valve	9 Delivery Regulator Adjustment Knob	16 Red LED (Empty)
3 Cylinder Lead	10 Outlet Pressure Gauge (0-200 psi)	17 Green LED (In Use)
4 Inlet Pressure Gauge (0-400 psi)	11 Capped for Future Expansion	18 Yellow LED (Ready to Use)
5 Header Bar Union	12 Outlet Pressure Relief Valve (1/2" F.NPT-150 psi)	19 Audible Alarm (Buzzer)
6 Header Bar Relief Valve (1/4" M.NPT-350 psi)	13 Header Bar	20 Silence Push-button
7 Gas I.D. Label	14 Controller Cable	21 Mounting Legs

Materials		
	Enclosure	Steel, Powder Coated, Light Grey
	Header Bars	Brass Bar Stock, Nickel Plated
	Tubing	Copper, ASTM B75
	Fittings	Brass
	Flexible Hoses	All Stainless Steel
	Relief Valves	Brass Body, Teflon Seat, Stainless Steel Spring
	Pressure Reducing Regulators	Brass Body, Stainless Steel Diaphragm, Teflon Seat
	Pressure Switches	Brass Body, Viton Seals
	Solenoid Valves	Brass Body, Viton Seals and Seat
	Optional Vent Valves	Brass Bar Stock, Stainless Steel Diaphragm, PCTFE Seat

Use & Performance



Liquid Cylinder
[Gas Withdrawal]
Max. 350 psig [24 barg]
Max. Flow: 350 SCFH [10 m³/hr]*

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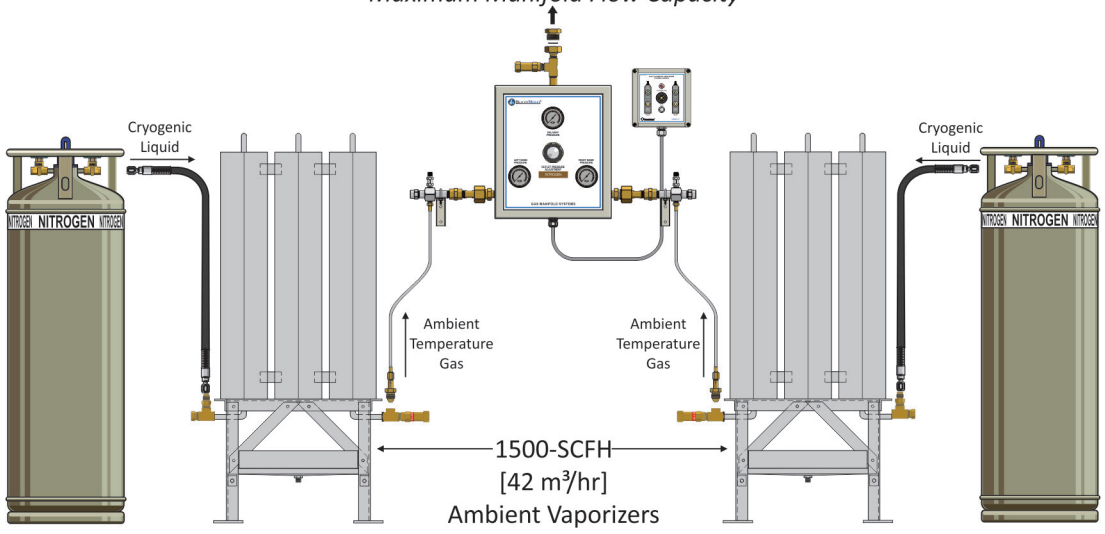
***Flow Rate & Liquid Cylinders**

The liquid cylinder's built-in ambient vaporizer is capable of providing 350 scfh of gas (only 100 scfh with Carbon Dioxide gas). If greater flow is needed from the liquid cylinders, connect each liquid cylinder to an external ambient vaporizer (sold separately). The flow will greatly increase.

1250-SCFH [35 m³/hr]
Maximum Manifold Flow Capacity



Ordering Information

AFAM350B - ___ - ___ - _____ - 10S-WM-___
A B C D E F G

BeaconMedæs AFAM350B Manifold Model Number Chart			
Variable	**Definition**	**Allowable Value**	**Description**
A	**Inlet Pressure**	350	350 PSIG [24 BARG]
B	**Material**	B	Brass
C	**Gas**	320 580A 580N 540	Carbon Dioxide Argon Nitrogen Oxygen
D	**No. of Cylinders**	2 4 6	1x1 2x2* 3x3*
E	**Hose**	SSH SSHAG	Stainless Steel Hose Stainless Steel Hose with Armour Guard
F	**Configuration**	10S WM	Standard Wall Mount
G	**Option**	VV 3R** RI IVF	Vent Valve Outside Installation Reserve Inlet Stainless Steel Tubing for IVF Applications
(G)	**Cylinder Connection**	CGA (leave blank) BS DIN NEN	CGA-United States BS341-Great Britain DIN 477-Germany NEN 3268-The Netherlands

Example: MANIFOLD AFAM, 350 PSIG INLET, BRASS, ARGON, 2X2 CYLINDERS, STAINLESS STEEL HOSES, USA
Example Model Number: AFAM350B-580A-4-SSH-10S-WM

***For configurations of 2x2 and 3x3**, it is recommended to use a **VENT KIT** (sold separately) for the most effective operation of the liquid cylinders. The Vent Kit equalizes the vapor head space of each liquid cylinder and allows each cylinder to withdraw gas equally and operates at maximum flow capacity.

****3R Option--Outside Installation**
AFAM Series Manifolds are designed for indoor installations. If outdoor installation is required, by selecting the "3R" option, all electrical devices (within the manifold and alarm/controller) will be mounted with NEMA 4X enclosures. Please be aware that even with the 3R option selected, the AFAM enclosure, which is not NEMA 4X, will rust over time due to outdoor exposure as it is made out of steel.

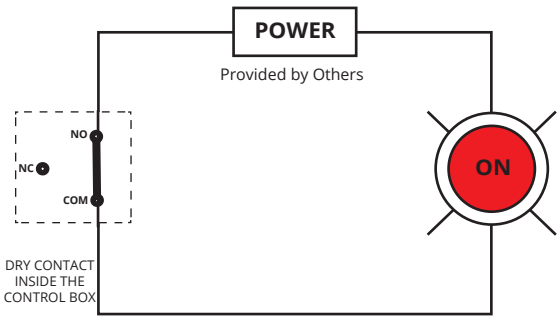
Technical Specifications	
Gas Service	Refer to Part Number Matrix
Maximum Inlet Pressure	350 psig [24 barg]
Delivery Pressure Range	30-100 psig [2-7 barg]
Maximum Flow*	1250 scfh* [38 m^3/hr], 1/2" F.NPT
Flow Coefficient	Cv = 0.4
Operating Temperature	-40°F to 100°F [-40°C to 38°C]
Inlet Relief Valves	350 psig [24 barg], 1/4" M.NPT
Pipeline (Outlet) Relief Valve	150 psig [10 barg], 1/2" F. NPT
Inlet Connections	Refer to Part Number Matrix
Manifold Outlet Connection	1/2" F.NPT
Power	24 VAC (Power Transformer provided by BeaconMedæs)
Power Transformer	Primary: 120 VAC, Secondary: 24 VAC , 6.25 Amp.
Maximum Power Consumption	6 Amp
Electrical Components	All Electrical Components are UL and CSA listed
Configuration	Normally Open (Supplies Gas When Not Energized)
Dry Signal Contact	Normally Open (3 Amp. @ 28 VDC/277 VAC when contact is in Close Position)
Economizer Set Point	200 psig [14 barg]
Cleaning	Cleaned for Oxygen Service as per CGA 4.1

** Note: Maximum flow can only be achieved with the use of external vaporizers (sold separately); otherwise flow is limited by the internal vaporizers on the liquid cylinders.*

Remote Alarm Signal Circuitry

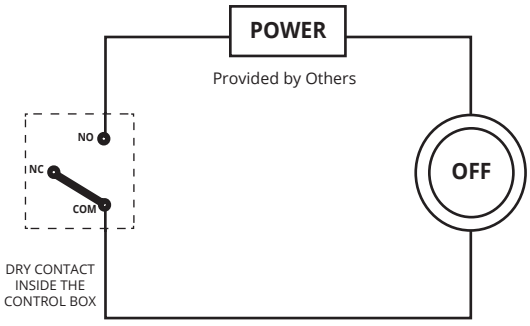
The Alarm/Control Box of the AFAM350B Series Manifold has a dry contact available for remote alarm actuation. It is triggered each time any of the two cylinder banks are empty.

Alarm Condition



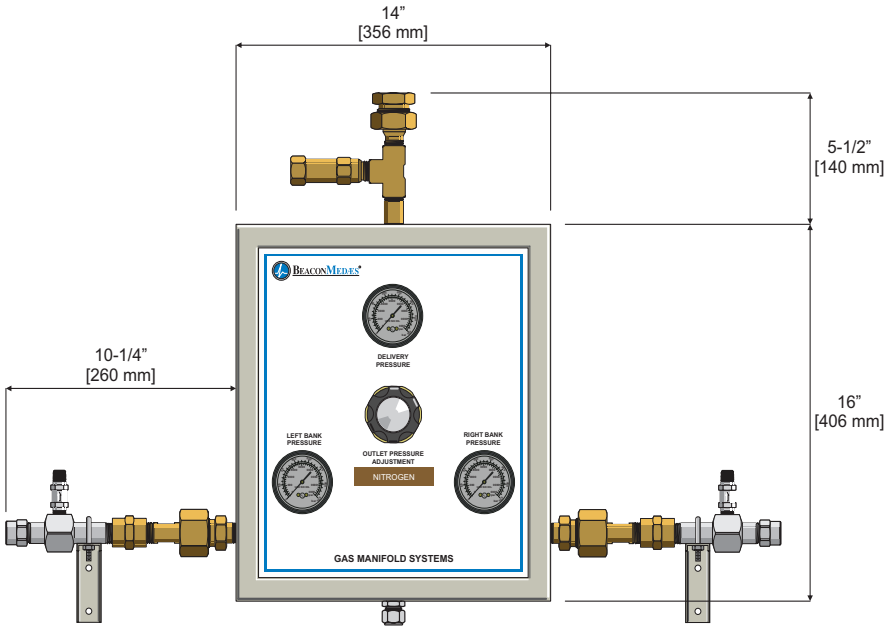
When the content inside one of the gas cylinder banks is depleted (low pressure), the dry contact switches from the Normally Closed (NC) position to Normally Open (NO) position. The electrical circuit is closed and the alarm device is actuated.

No Alarm Condition

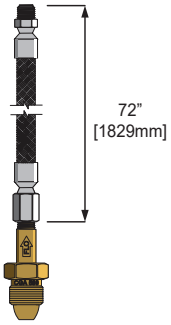


In this situation, both gas cylinder bank pressures are satisfactory (i.e. not empty). The dry contact inside the remote alarm box is in the Normally Closed position. The electrical circuit is open and the alarm device is NOT actuated.

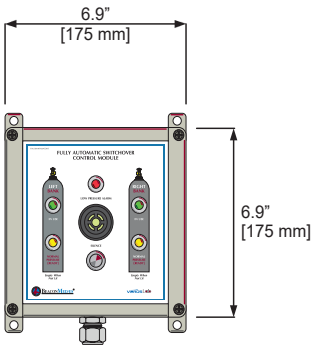
Standard Dimensions (1x1) in inches
Numbers between [ ] are in millimeters

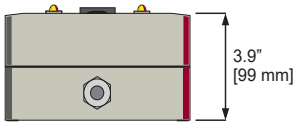


Typical
Flexible Hose



Alarm/Controller
Box





BeaconMedæs AFAM350 Header Bar Length			
Cylinder Configuration	**1x1**	**2x2**	**3x3**
Inches	34.50"	54.50"	76.25"
Milimeters	876.3 mm	1384.3 mm	1936.75 mm

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