



Fully Automatic Switchover Manifold for Liquid Cylinders Liquid Withdrawal - Pressure Operated (CFAM-PX Series - Laboratory Applications)

SPECIFICATION

Introduction and Manifold Description

The BeaconMedaes CFAM-PX Series Fully Automatic Switchover Manifold assures a continuous supply of liquid cryogenics or liquid carbon dioxide* for a variety of applications. It is set to transfer automatically from a depleted "IN USE" supply bank to a "READY" supply bank based on the pressure of the liquid cylinders.

The CFAM-PX manifold is composed of a manifold enclosure box, a control module, a left and right valve header and liquid cylinder hoses. The CFAM-PX Series manifolds monitor each bank pressure to determine their status (in use, ready or empty) and will signal the manifold controller to switch automatically to the "READY" supply bank when the "IN USE" bank is empty. The bank is considered empty when its pressure falls below a pre-determined set-point (field adjustable).

Visual Indicators and Audible Signal

The manifold's enclosure box is equipped with a series of lights (6 total, 3 for each bank) to indicate the status of each bank. A green LED illuminates when the bank is "IN USE", while a yellow LED indicates when the cylinder is "READY" and a red LED signals that the cylinder is "EMPTY".

When the bank is depleted, the buzzer sounds while the red "EMPTY" LED turns on. Pushing the silence pushbutton kills the buzzer without extinguishing the corresponding red light. Once the operator changes out the empty cylinder and pushes the RESET pushbutton, the red light extinguishes and the yellow "READY" light illuminates for that bank.

Special Configuration for Oxygen

The CFAM-PX manifolds come standard with pressure actuated ball valves. The source gas (gas from the liquid cylinder headspace) is used to open and close these ball valves with the exception of the oxygen service manifolds. Oxygen service manifolds require an air or nitrogen supply to actuate the valves.

High Pressure and High Flow

The purpose of the CFAM-PX manifolds is to deliver cryogenic liquids to vaporizing equipment such as ambient vaporizers or electric vaporizers. The CFAM-PX shall not be used to feed storage freezers or controlled rate freezers.

Ice & Water Management

There will be some "water management" required with this equipment. Because air is always humid and the wetted components are extremely cold, the ambient air humidity (water vapor) will freeze up on the wetted parts and ice will accumulate. When the equipment will not be in service, the ice will melt and water will drip down. The amount of water will vary upon the relative humidity of the air and the usage of the cryogenic manifold.

Typical Applications

Oxygen to Hyperbaric Chambers

The CFAM-PX Series manifolds have been originally designed to supply oxygen to hyperbaric chambers from liquid cylinders when bulk tank supply was not possible.

Carbon Dioxide to Incubators

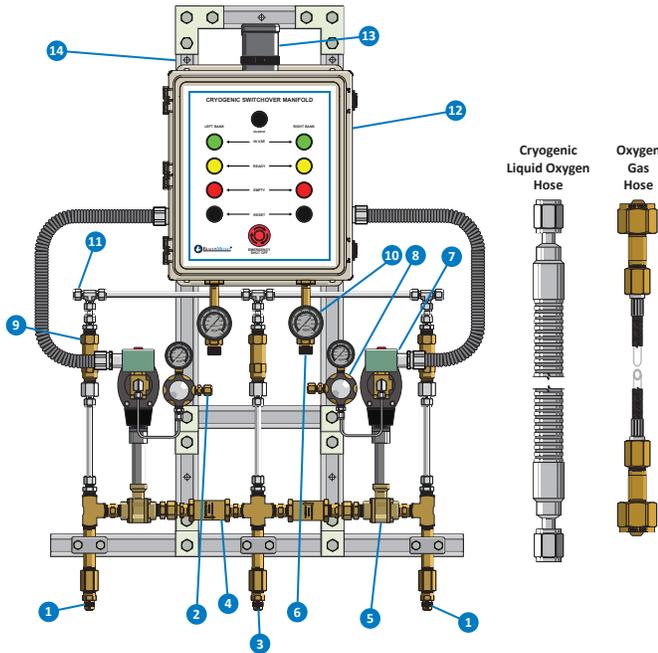
This family of manifolds was expanded to other gases to feed various applications when gas supply was too high for high pressure liquid cylinders and too low for bulk tanks. The most popular application is carbon dioxide feeding a large number of incubators.

Nitrogen

The CFAM-PX Series manifolds can also be used in nitrogen service whenever high flow and/or pressure are required. Among the applications using a large quantity of nitrogen is liquid chromatography - mass spectrometry.

**Note: Liquid carbon dioxide is not a cryogenic fluid. It is referred to as a cryogenic liquid in this document to free up the text.*

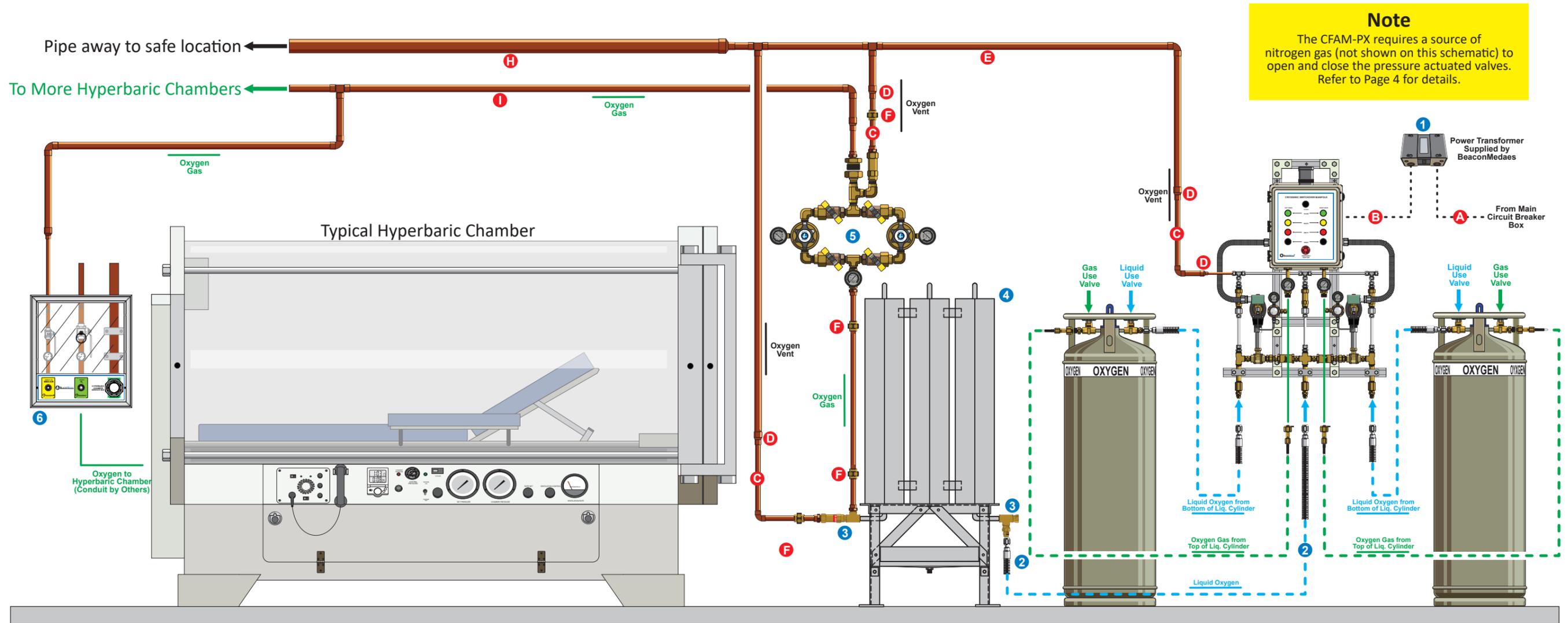


Standard Configuration
Liquid Oxygen Model Shown


- 1 Cryogenic Liquid Inlet, Left & Right
- 2 Air/Nitrogen Inlet for Actuator (Qty = 2)
- 3 Cryogenic Liquid Outlet
- 4 Spring Loaded Cryogenic Check Valve (Qty = 2)
- 5 Cryogenic Ball Valve w/ Actuator (Qty = 2)
- 6 Gas Inlet (Qty = 2)
- 7 Three-Way Solenoid Valve (Qty = 2)
- 8 Gas Regulator for Actuator (Qty = 2)
- 9 Thermal Expansion Pressure Relief Valve (Qty = 3)
- 10 Liquid Cylinder Pressure Gauge (Qty = 2)
- 11 Relief Valve Outlet - 1/2" Compression (Qty = 2)
- 12 Manifold Controller
- 13 Buzzer (Audible Alarm)
- 14 Aluminum Wall Frame

Material	
Enclosure	Polyester, NEMA 4X, c/w Mounting Bracket and Stainless Steel Latches
Pipes	Brass (Silver Brazed at Some Places)
Tubing	Type 304 Stainless Steel
Fittings	Brass and Type 316 Stainless Steel
Cryogenic Liquid Hoses	Stainless Steel (All Wetted Parts)
Gas Hoses	Teflon Core, Stainless Steel Braid, Brass Fittings
Relief Valves	Brass Body, Stainless Steel Spring, Teflon Seat
Pressure Actuated Ball Valves	Bronze Body, Teflon Seat, Stainless Steel Ball
Wall Mount Frame	Aluminum Struts, Galvanized Steel Strut Fittings
External Alarm Signal	C-Style, Dry Contact (NO, NC, COM)

Typical Installation for multiple Hyperbaric Chambers - CFAM-PX with Liquid Cylinders to Vaporizers and Dual Line Regulator Assembly



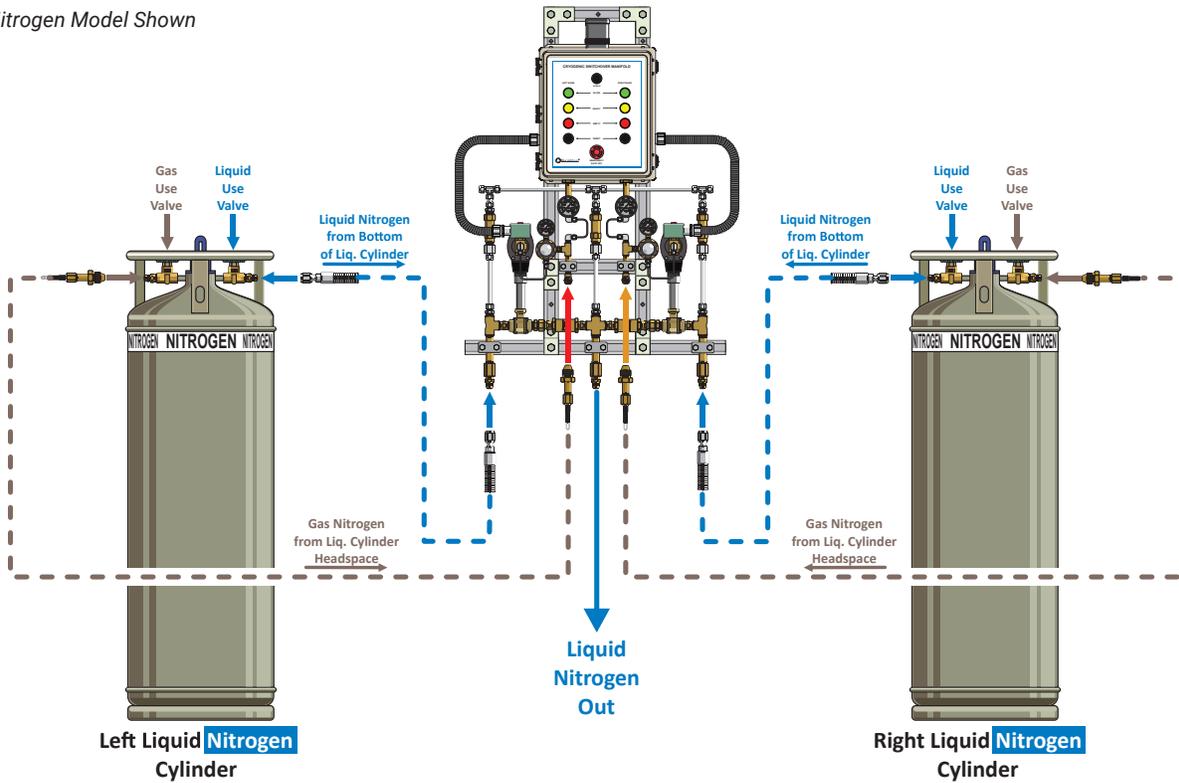
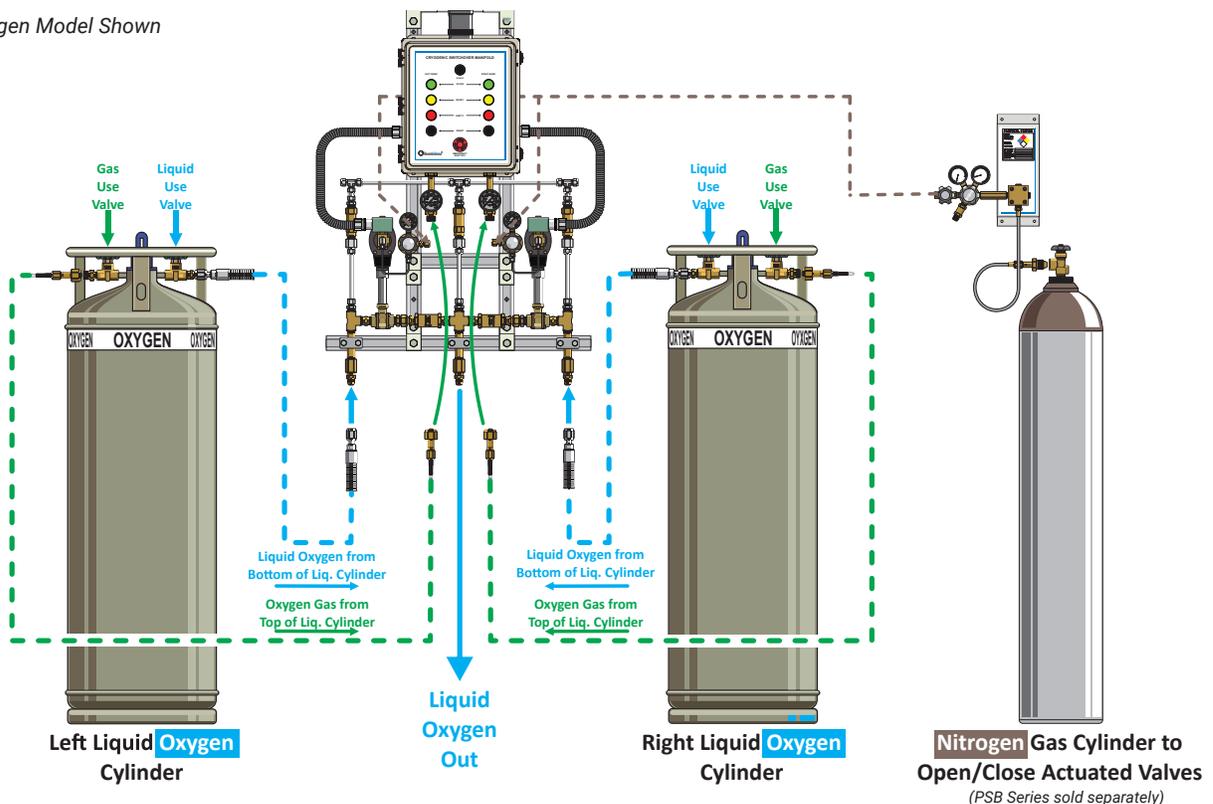
Note
 The CFAM-PX requires a source of nitrogen gas (not shown on this schematic) to open and close the pressure actuated valves. Refer to Page 4 for details.

LIST OF EQUIPMENT

- 1** CFAM-PX Series Fully Automatic Switchover Cryogenic Manifold
- 2** LCH Series Liquid Cylinder Hose
- 3** VHK Series Vaporizer Hose Kit
- 4** AV Series Ambient Vaporizer (multiple vaporizing capacities available)
- 5** DLRA500 Series Dual Line Regulator Assembly (DLRA400 required for 3 chambers or more)
- 6** HCSB Series Hyperbaric Chamber Service Box (one per chamber)

FIELD SUPPLIES AND INSTALLATION

- A** 120 VAC Power Line
- B** 24 VAC Power Line
- C** Copper Pipe, Type L or K, 1/2" NPS [diameter shall be greater to feed more chambers]
- D** Reducer, 1/2" NPS x 3/4" NPS, Copper
- E** Copper Pipe, Type L or K, 3/4" NPS
- F** Pipe Union, 1/2" NPS, Brass
- G** 3/8" O.D. tube (1/4"), Copper
- H** Copper Pipe, Type L or K, 2" NPS
- I** Copper Pipe, Type L or K, Minimum 3/4" NPS for two chambers

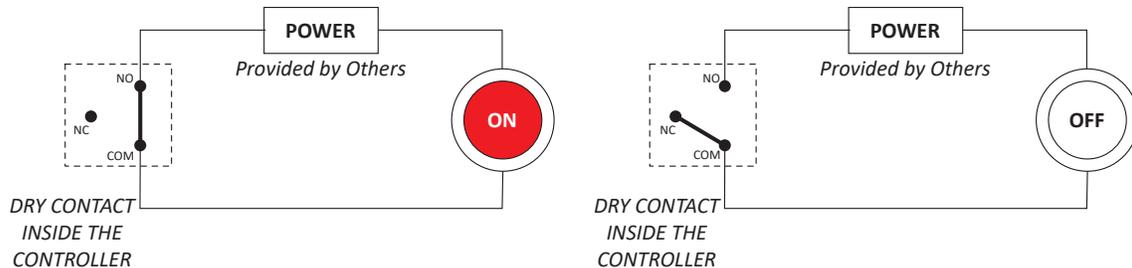
Standard Configuration
Liquid Nitrogen Model Shown

Liquid Oxygen Model Shown


Specification Table

Technical Specification		
Fluid	Liquid Argon, Liquid Carbon Dioxide, Liquid Nitrogen, Liquid Oxygen	
Maximum Working Pressure	350 psig (Relief Valve Set Pressure) [24 barg]	
Operating Temperature	-325°F to 120°F [-198°C to 49°C]	
Inlet Connections	Liquid Argon Liquid Carbon Dioxide Liquid Nitrogen Liquid Oxygen	CGA 295 CGA 622 CGA 295 CGA 440
	Argon Gas Carbon Dioxide Gas Nitrogen Gas Oxygen Gas	CGA 580 CGA 320 CGA 580 CGA 540
Relief Valve Outlet Connection	1/2" Compression Stainless Steel	
Header	1/2" NPS, Brass	
Pressure Actuated Ball Valve	Normally Closed Position or Normally Open Position (Customer's Choice)	
Power Requirements	120 VAC, Single Phase, 6 Amp	
Audible Alarm	Standard, 85 dBA	

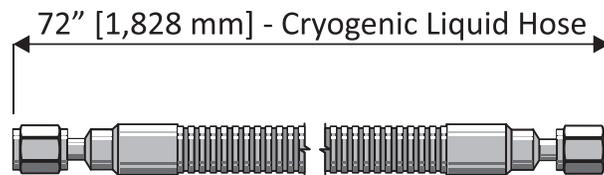
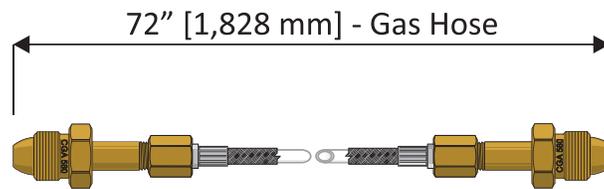
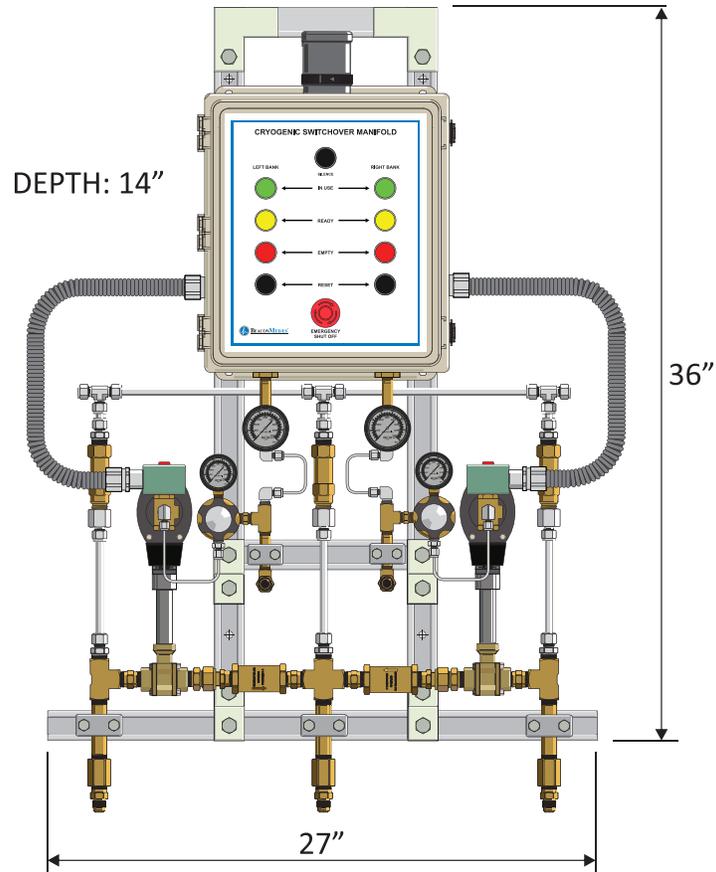
Remote Alarm Signal Circuitry

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



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

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

Dimensions
Liquid Nitrogen Model Shown

Life is in the details.®