

NFPA Automatic Changeover Medical High Pressure by High Pressure Manifold MAT-S (NFPA Version)

Automatic Manifold Changeover system



SPECIFICATION

MAT-S Automatic Changeover Manifold

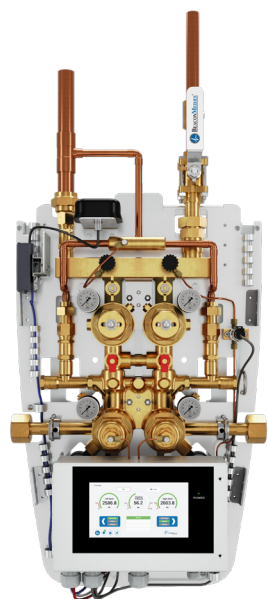
The BeaconMedaes MAT-S Automatic Changeover Manifold accommodates multiple high-pressure cylinders equally divided into two banks for a specific gas service. The cylinder banks are arranged in a staggered configuration and provide an uninterrupted

supply of gas for the specific gas application. The manifold is cleaned, tested, and prepared for the indicated gas service and constructed in accordance with requirements of the latest edition of NFPA 99 and CGA.

BeaconMedaes MAT-S Automatic Manifold Changeover system

The distinctive features of MAT-S

A constant supply of medical gases such as oxygen, nitrous oxide, and medical air is critical to ensure safe, quality patient care. That is why we designed the new MAT-S Automatic Manifold Changeover System to deliver superior reliability. Our medical gas supply system offers a higher utilization rate and uptime for using it more frequently and for longer periods. In addition, its smart features make it easy and efficient to operate the net result: is premium performance and durability and lower operational and maintenance costs.



Features	Customer Benefit
ABS Plastic cover	A new, lightweight, high-strength ABS plastic cover brings a fresh look and feel. More importantly, it eliminates the risk of corrosion to ensure a longer lifetime.
Dome-loaded forged regulators	The dome bias regulator design has proven its reliability and performance for over a decade. It helps reduce connections by 50% and therefore also the risk of leakages of gases. MAT-S automatic manifold changeover system use dome biased bank (1st stage) regulators to ensure maximum flow rates. Dome biased regulators do not open to the atmosphere and thus are not subject to the formation of ice in the regulator. Accumulated ice in the regulator is a very common cause of manifold failure. No air and no ice ensures solid reliability. The new design enables servicing of the regulators without having to replace them. As a result, manifold offers faster and more costefficient maintenance
Automatic changeover pressure setting	The changeover pressure for a 4.0 bar manifold output pressure is improved to 10 bar. This increases the utilization of the cylinder to minimize wastage. This brings huge savings over a year, resulting in lower operational costs. The changeover pressure for the manifold with an output line pressure of 8.0 bar and 11.0 remains unchanged at 20 bar
Individual service valves	MAT-S has individual service valves after each bank (1st stage) and line (2nd stage) regulators. Each regulator can be isolated for service with the best redundancy. This allows you to service any regulator without disrupting the gas supply to the distribution system.
New smart digital controller	A smart operating system powers MAT-S. The controller features a highly responsive 7" LCD color display with 1024px X 768px high resolution. The control is enabled by a simple, clean and easy-to-use, intuitive interface (U.I.)
Built-in Smartbox with MyMedgas Enabled	A Smartbox is included as a standard to allow real-time remote monitoring and reporting of the functioning of the manifold. It offers to push notifications and access to manifold system details wherever you are and when you need
Analog gauges	In addition to the digital control panel, MAT-S comes equipped with analog gauges to give you the peace of mind that you can always monitor gas pressure and operation

Manifold Design

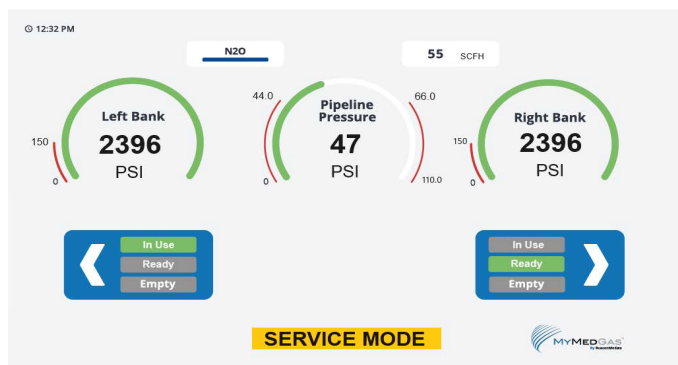
A bank regulator (one for each cylinder bank) is used to initially reduce the cylinder pressure to the two line regulators which control the final line pressure. The manifold automatically changes from the depleted primary supply bank to the secondary supply bank without fluctuation in line pressure utilizing dome bias loading and unloading of the bank regulators. After replacement of the depleted cylinders, the manifold automatically indicates the replaced cylinder bank as the secondary supply. Manual resetting of the control panel is not necessary.

The manifold includes 6 pressure gauges: two delivery pressure gauges, two intermediate pressure gauges and two cylinder bank pressure gauges. The manifold has intermediate and line pressure relief valves that are internally connected to a common vent port, terminating into a 1/2" FNPT "O"-ring sealed "zero clearance" union.

Master Shut-off valves (one for each cylinder bank) are located outside the cabinet and both valves are fabricated with metallic seating surfaces. The manifold is designed for placement of four "H" cylinders directly underneath the manifold cabinet. The cabinet enclosure is easily removable by releasing draw latches for component accessibility, and the latches are equipped with self-locking mechanism.

The manifold should be combined with high-pressure modular header assemblies with gas specific pigtail-to-header high-flow check valves to permit changing of cylinders without gas leakage. Stainless steel flexible pigtails are available for each cylinder gas connection, except for O₂, He, CO₂O₂, HeO₂, and O₂He gases which are provided with rigid copper pigtails.

The manifold is supplied with a 3/4" Female National Pipe Tapered "O"-ring sealed "zero clearance" union outlet. The system also includes a 3/4" full port, three-piece, ball-type source shut-off valve with 1/8" Female National Pipe Tapered port. The source valve has a 3/4" National Pipe Thread attachment to the union outlet and a 3/4" nominal copper (type K) tube for brazing to main supply line.



Control System

The pressure sensor monitors the pressure in each bank of cylinders and bank pressure gauges attached to each bank regulator (1st stage). A pressure sensor measures delivery pressure, and a delivery pressure gauge is attached to each line (2nd stage) regulator for easy service.

The system incorporates a color, graphical interface to indicate pressure in each bank of cylinders and line pressure. All alarms are shown on display with a color indication as per code requirement, and the history of the alarms can be accessed through the logs. A mechanical pressure gauge backs up the digital display in case of power failure.

To increase safety, the control system has an electronic warning signal to inform the user to perform regular maintenance. The warning should be reset once the maintenance is done.

When cylinder capacity, pressure, and quantity are corrected and updated in the control system, it provides an estimated average gas consumption, with a clear indication for cylinders with gas phase inside. A flow sensor is available as an option for hospitals needing a more accurate gas consumption measurement.

All electrical components are in a separate enclosure to limit dust and water penetration and simplify electrical connection with BMS and Alarms. The control system supports RS485 and BACnet communication network.

The control system is linked with plug and socket connectors for easy removal. For added safety, the voltage inside the panel does not exceed 24V D.C.

The control system has a 1024*768 high-resolution 7-inch capacity touch screen. It has a "screen saver" function to extend the lifetime of the display to more than 20,000 hours. The display may run at a reduced 30% brightness to save screen life. The screen comes to full brightness if any alarm conditions are active and revert to 30% brightness 5 minutes after the manifold system returns to normal.

The control system has a restricted Setup Mode to adjust warning levels for line pressure, selecting a pressure measurement system between the bar and psi. Additionally, a Service Mode is provided to allow alarms to be deactivated during commissioning and service and manual operation selection of a duty bank. Service mode is accessible with secured ID and Password.

Features	Available in the MAT-S Automatic Changeover Manifold system controller
7" LCD color display	Yes
Capacitive Touch screen	Yes
Intuitive User Interface	Yes
Clean U.I. Design	Yes
Left & right bank pressure indication	Yes
Line bank pressure indication	Yes
Volume indication of gas flow to hospital	Yes
Left bank gas flow trend	Yes
Right bank gas flow trend	Yes
Banks running status	Yes
Clear alarm warnings (Text+color)	Yes
Alarms status overview	Yes
Custom messaging option for warnings	Yes
Alarms log history	Yes
RS485 & BACnet connections	Yes
Device data information	Yes
Device installation information	Yes
Device initial-set-up information	Yes
Service mode	Yes
QR code for user manual	Yes
QR code for ordering service kit	Yes
User ID & Password	Yes
Device logs history	Yes
Maintenance timer	Yes
MMG integration	Yes
Smartbox connectivity	Yes

Operation

Either the left- or right-hand manifold bank may be designated "IN USE". The MAT-S Manifold automatically changes to supply the distribution system from the "standby" bank when pressure in the "IN USE" bank falls to a predetermined level. Each side of the MAT-S Manifold is capable of being fully isolated via a full flow ball valve, facilitating changing any regulator without interruption of supply. The inlet of the 1st stage regulator is protected from the particulate matter by a 25µm sintered bronze filter. There is a failsafe system in the event of power failure. The left bank supply serves as a primary source and there is full continuity of supply pressure and flow. The right bank supply will take over when the left bank is empty. Once the primary left bank is refilled, it will changeover to the left bank once the right bank depleted. Upon power restoration the unit reverts to the original bank of cylinders. Once changeover has occurred and the cylinders have been replaced, system automatically resets alarm conditions.

There is manual changeover arrow so that servicing either side of the system can be simply achieved. For safety reasons, manual changeover to an already exhausted side is blocked.

Environmental Considerations

Manifolds are to be installed in accordance with requirements stated by NFPA 99, CGA and all applicable local codes. Manifold components are designed to work best over a temperature range of 0°F through 130°F. Wider temperature variation may cause manifold malfunctions to occur.

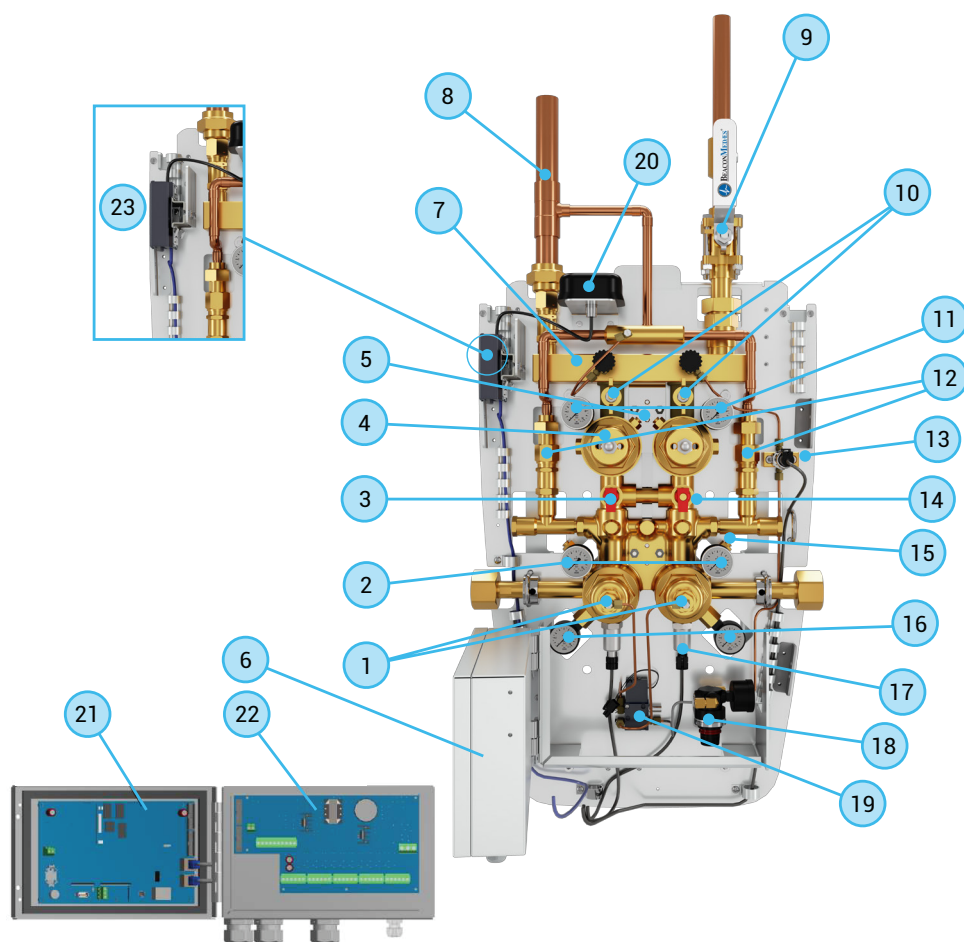
Flow Characteristics at Minimum Cylinder (Changeover) Pressure		
Delivery Line Pressure (PSIG)	Minimum Delivery Line Flow (SCFH)	Change Over Pressure (PSIG)
55	2800	145
55	3100	218
100	3400	290
180	4000	290

Note: The flow capacity of a nitrous oxide and carbon dioxide manifold depends upon environmental conditions at the installation site and the number of cylinders in service. Installing a nitrous oxide or a carbon dioxide manifold in a location that exposes it to an ambient temperature below 32°F (0°C) is not recommended.



Standard Configuration

Standard Model Shown



Item No	Description
1	1st stage regulator
2	Intermediate pressure gauge
3	Intermediate isolation valves
4	Line regulator
5	Bleed valve
6	Manifold smart controller
7	Line vent valve
8	Line relief vent & intermediary (both right and left) combined vent outlet
9	Line source valve
10	Line isolation valves
11	Line pressure gauge
12	Intermediary safety valves

Item No	Description
13	Line pressure sensor
14	Intermediary isolation valve (three way)
15	Bank bleed valve (also in the left bank regulator)
16	Left and right bank pressure gauge
17	Change over pressure transducer
18	Dome regulator (100-180 psi delivery pressure)
19	Solenoid valve
20	Smartbox antenna
21	Manifold controller LCD Screen
22	Manifold controller PCB Board
23	Smart box

Order Information

e.g., MAT-S-HH-O2-A

A-B-C-D-E

Variable	Definition	Allowable Value	Allowable Value Description
A	Model name	MAT	Automatic Changeover Manifold
B	Smart	S	Smartbox & MyMedGas enabled
C	Input type	HH	High pressure gas cylinder
		LH	Low pressure liquid cylinder
D	Gas type	O2	Oxygen (O2)
		N2O	Nitrous Oxide (N2O)
		AIR	Medical Air (MA)
		N2	Nitrogen (N2)
		IAIR	Instrument Air (IAIR)
		CO2	Carbon Dioxide (CO2)
		CO2O2	Carbon Dioxide/ Oxygen CO2 over 7%
		O2CO2	Oxygen/ Carbon Dioxide CO2 not over 7%
		HEO2	Helium/Oxygen Helium over 80%
		O2HE	Oxygen/Helium not over 80%
		HE	Helium
E	Delivery pressure	A	55 psi
		B	100 psi
		C	180 psi

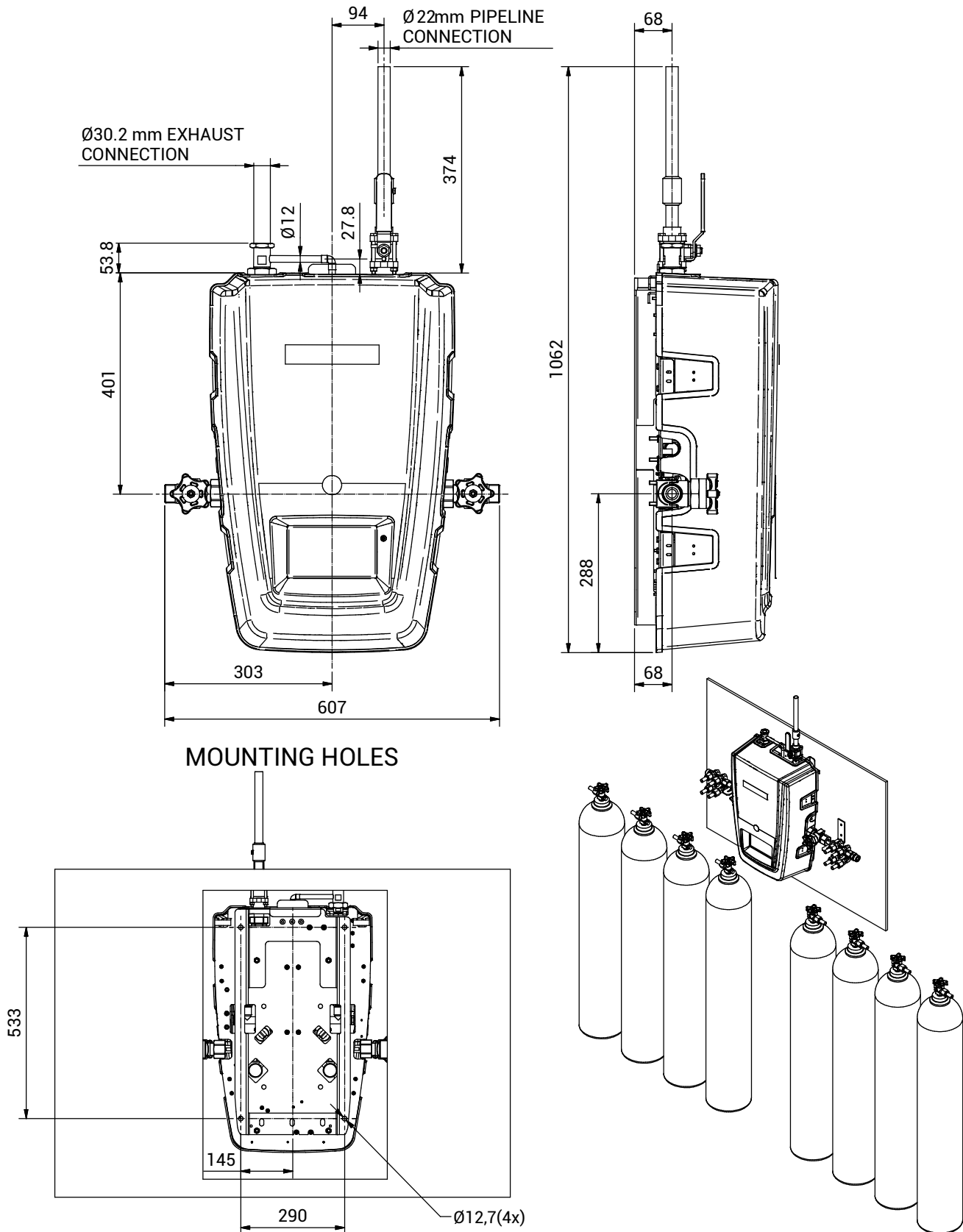


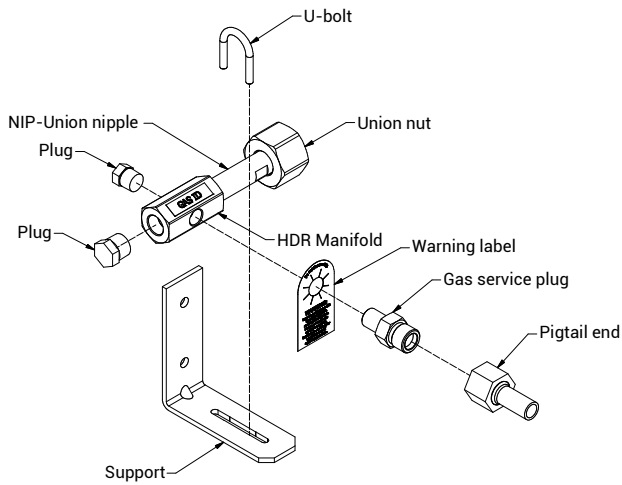
Description	Low Changeover Pressure Part No	High Changeover Pressure Part No	Standard Part No
MAT-S-HH-O2-A	4109004617	4109005140	n/a
MAT-S-HH-N2O-A	4109004618	4109005205	n/a
MAT-S-HH-AIR-B	n/a	n/a	4109004620
MAT-S-HH-N2-C	n/a	n/a	4109004674
MAT-S-HH-CO2-B	n/a	n/a	4109004622
MAT-S-HH-CO2-A	4109003965	4109005145	n/a
MAT-S-HH-AR-A	4109004673	4109005146	n/a
MAT-S-HH-AIR-A	4109004843	4109005147	n/a
MAT-S-HH-HE-A	4109004844	4109005148	n/a
MAT-S-HH-CO2O2-A	4109004845	4109005149	n/a
MAT-S-HH-O2CO2-A	4109004846	4109005150	n/a
MAT-S-HH-HEO2-A	4109004847	4109005151	n/a
MAT-S-HH-O2HE-A	4109004848	4109005152	n/a
MAT-S-HH-O2-B	n/a	n/a	4109004849
MAT-S-HH-IAIR-C	n/a	n/a	4109004850

Description	Part No
Retrofit kit Lifeline MCS to MAT-S NFPA	4109630100

Headers and pigtail	
2X1	0000066916
2X2	0000066917
2X3	0000066918
2X4	0000066919
2X5	0000066920
2X6	0000066921
2X7	0000066922
2X8	0000066923
2X9	0000066924
2X10	0000066925
2X11	0000066926
2X12	0000066927
2X13	0000066928
2X14	0000066929

Standard Configuration





Note : Header assembly shall be leak free at minimum of 4000 PSI.

DETAIL OF SUPPORT

