Automatic Changeover Manifold
Lifeline MCS
HTM02-01 / HTM2022 / ISO7396-1

SPECIFICATION

Lifeline MCS Manifold

The BeaconMedæs Lifeline® MCS Medical Manifold conforms to NHS Health Technical Memorandum Nos. 2022 (HTM2022), 02-01 (HTM02-01) and EN ISO7396-1. The manifold control system provides an uninterrupted supply of the designated medical gas from equally sized high pressure cylinder banks via a suitable arrangement of pressure regulators, providing a constant downstream nominal pipeline gauge pressure of 400 kPa, 700 kPa or 1,100 kPa. The entire system is 'duplexed' such that any single functional component failure will not affect the integrity of the medical gas supply. The manifold is supplied fully assembled and tested.

Manifold Design

There are two separate stages of regulation to enable high peak flow rates without a reduction in line pressure. Multistage regulators combined within a single unit are not suitable for this application, as they do not meet the required performance for this product. Regulators comply with BS EN ISO 10524-2. Documented test reports are available confirming successful completion of the oxygen ignition tests stated therein.

All regulators are protected from over pressurisation by relief valves that are vented to atmosphere. The manifold can be vented during commissioning, e.g. by using the included test point.

A test point shall be isolated from the supply with a ball valve. The manifold is supplied with a non-return valve for connection to the distribution system. To minimize installation time, the test point with an antimicrobial GEM Shield medical gas outlet is incorporated into the manifold.

The manifold assembly is housed in a single control panel having a solid construction using epoxy technology in a glass-reinforced polymer moulding for high chemical and corrosion resistance and high impact strength. The case is fully removable to provide unlimited access to all internal components. A powder coated 3mm steel backplate holds all components, providing additional protection and a robust fixture.

To aid maintenance, the connections within the panel uses 'O' rings sealing against flat-face connectors to facilitate easy removal and replacement of components.

To simplify installation there is an installation bracket attached to the wall with four screws, the main panel is then hung on this bracket and is then secured. A P&ID diagram is fixed internally to identify spare parts and wiring connections.

Control System

The Manifold Control System conforms to NHS Health Technical Memorandum 06-01(HTM06-01) Electrical services supply and distribution. Following Chapter 11 requirement, manufacturer will provide an evidence of Electromagnetic compatibility (EMC) for the manifold, e.g. EMC test certificate.

The system incorporates a graphical display to indicate pressure in each bank of cylinders and line pressure. All alarms are duplicated on a display and embedded membrane panel with LEDs. Digital display is backed up by mechanical gauge in case of power failure.

To increase safety, the system has an electronic warning signal to inform the user to perform regular maintenance. The timer is based on a pre-defined service interval.

The system provides an estimated average gas consumption, with a clear indication on the display for non-liquefied gases.

All electrical components are located in a separate enclosure to limit dust, water penetration and simplify electrical connection with BMS and Alarms.

The PCB's are linked with plug and socket connectors for easy removal. For added safety the voltage inside the panel does not exceed 24 V D.C.

The control system has a coloured active matrix liquid crystal display (LCD), a driving circuit and a back light system. The display has a 3.5 (4:3) inch diagonally measured active display area with QVGA (320 horizontal by 240 vertical pixels) resolution.

The system has a "screen saver" function to extend a lifetime of the display to more then 20,000 hours. To save screen life the display may run at a reduced to ½ brightness. The screen comes to full brightness if any alarm conditions are active, and reverts back to ½ brightness 5 minutes after the panel returns to normal.

The system has a restricted Setup Mode to allow adjusting warning levels for line pressure; select pressure measurement system between bar and psi and select the type of alarm output i.e. with Line Contact Monitoring (e.g. connection to Medipoint) or without, e.g. for 3rd party alarm system. Additionally a Service Mode is provided to allow alarms to be deactivated during commissioning and service, as well as allowing manual operation selection of a duty bank.

Power Supply

To increase serviceability, the system has a separate power supply board. Safety approvals: UL60950-1, TUV EN60950-1 approved, compliance to EN55022 (CISPR22) Class B.

The system has a universal input and oerates in a wide power range: AC 90 to 264 V 50/60 Hz. Power supply board has built-in over-voltage protection circuit and overload protection which recovers automatically after the fault condition is removed.

Operation

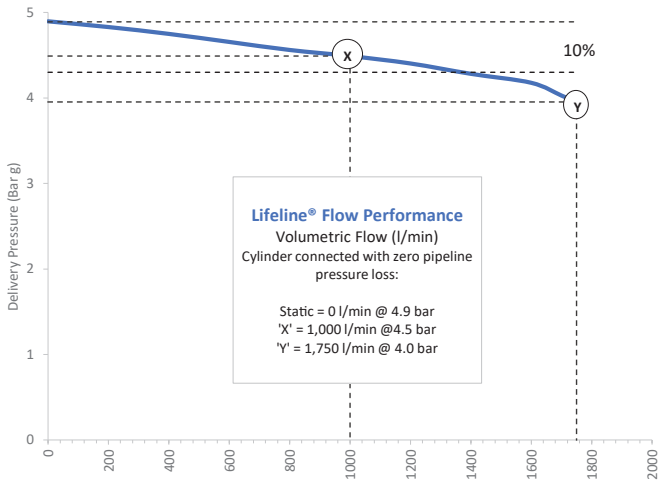
Either the left or right hand manifold bank may be designated "Duty". The Lifeline® Manifold automatically changes to supply the distribution system from the "Standby" bank when pressure in the "Duty" bank falls to a pre-determined level. Each side of the Lifeline® Manifold is capable of being fully 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 fail safe system in the event of power failure. Solenoid valves open and there is full continuity of supply pressure and flow. 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 are manual changeover buttons so that servicing either side of the system can be simply achieved. For safety reasons, manual changeover to an already exhausted side is blocked.

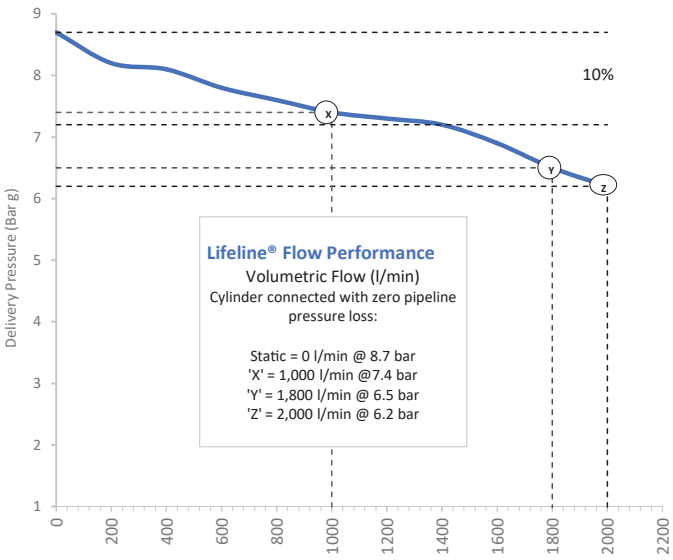
Output Flow

The manifold control panel can flow in excess of 1750 lpm for all nominal line pressure options. ISO 7396 -1 requires static to dynamic pressure change within 10% from zero to full flow (see ISO 10524 -2). See following flow curves for 10% ISO performance requirements.

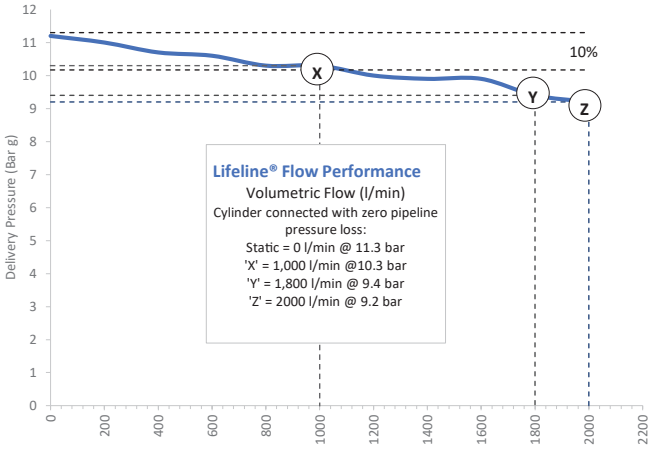
Typical 4 bar Manifold flow curve



Typical 7 bar Manifold flow curve



Typical 11 bar Manifold flow curve



Materials

All polymers and elastomers in the gas flow that can be subjected to working pressure greater than 3,000 kPa are halogen-free. The use of PTFE, PCTFE, Viton and other halogenated polymers in these applications is strictly prohibited. Non-return valves fitted to header manifolds has a metallic seat with ceramic ball. Soft seat non-return valves utilising polymers or elastomers are not acceptable.

Modular Header Manifolds

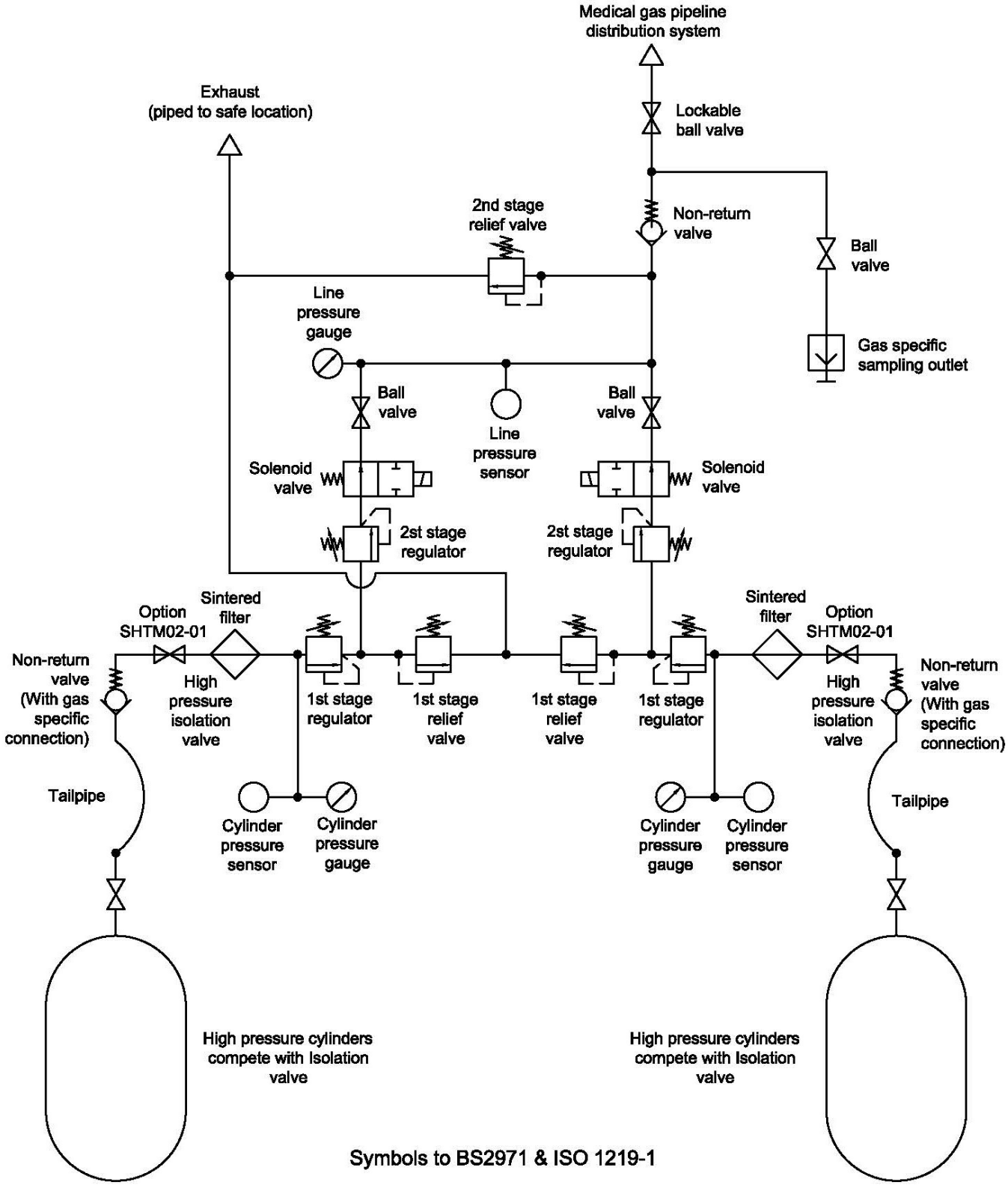
Modular Header Manifolds shall provide connection points for flexible cupronickel tailpipes. Pin indexed tailpipes shall comply to EN ISO 407:2004 as required. Non-return valves shall be fitted to each tailpipe connection point to protect the system in the event of a tailpipe fracture.

Corner connectors shall be available to enable installation of manifold headers around corners of the manifold room. A custom length corner connector is available to enable header manifolds to be installed in a 'U' configuration across 3 adjacent walls of a manifold room.

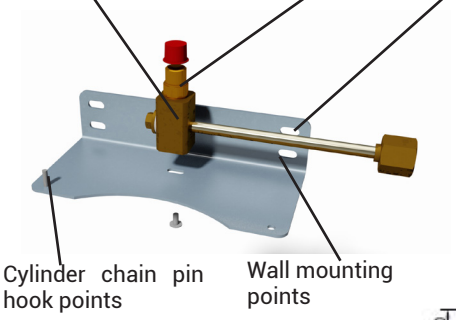
CE Marking

The standard range of BeaconMedæs Lifeline® Manifold control systems are 'CE' marked under the Medical Devices Directive 93/42/EEC with approval from a notified body (more detailed information available on request). Under this directive, the specified products are classified as Class IIa Medical Devices.

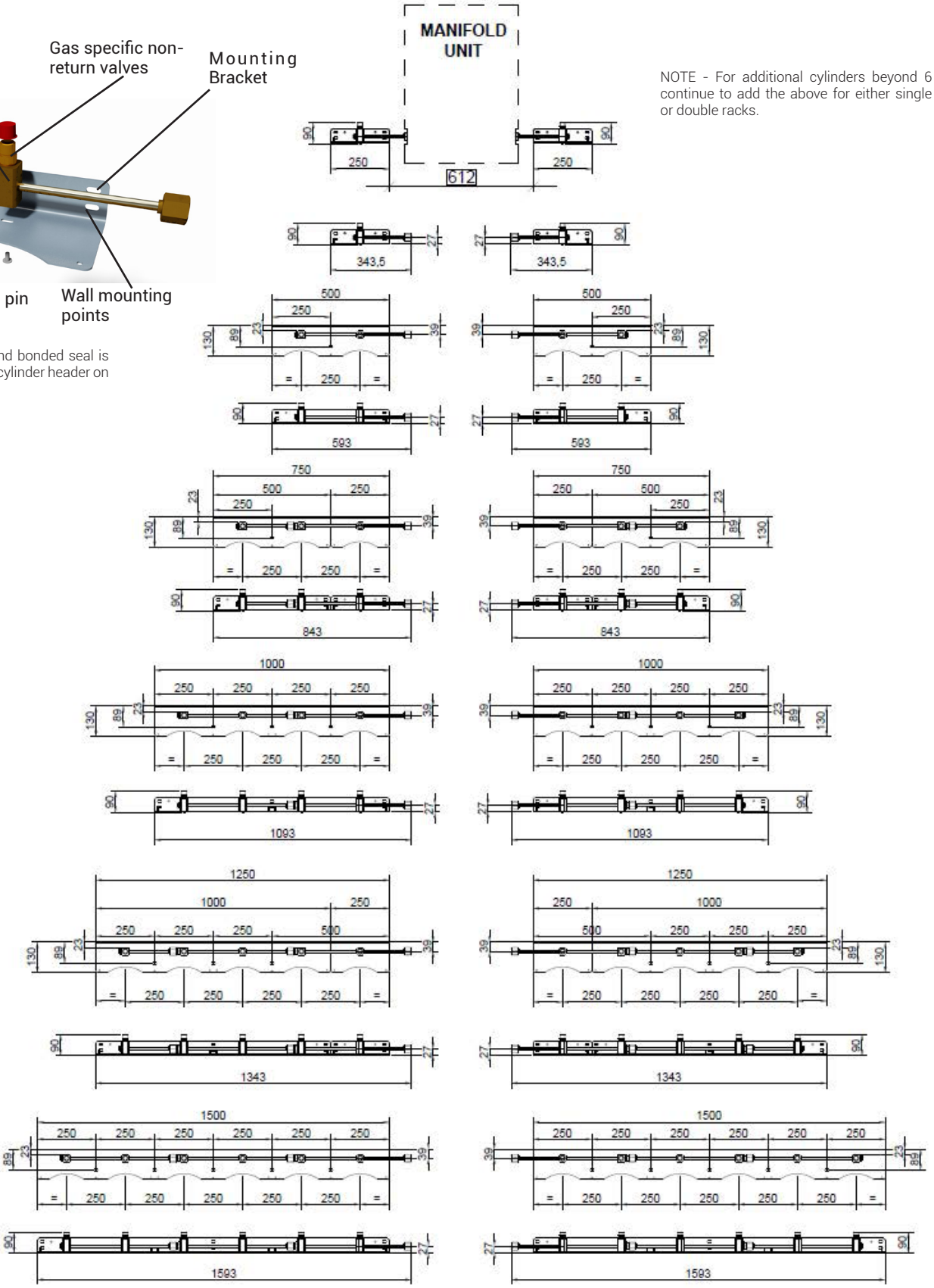
Typical Automatic Changeover Manifold Schematic



Typical cylinder header & extension layout details



NOTE - 3/8" plug and bonded seal is required on the last cylinder header on each bank.



NOTE - For additional cylinders beyond 6 continue to add the above for either single or double racks.

Description	Part No
O_2 Lifeline Manifold Control System	8102341310
N_2O Lifeline Manifold Control System	8102341311
O_2/N_2O Lifeline Manifold Control System	8102341312
MA-4 Lifeline Manifold Control System	8102341313
SA-7 Lifeline Manifold Control System	8102341314
SA-11 Lifeline Manifold Control System	8102341315
N_2-7 Lifeline Manifold Control System	8102341316
N_2-11 Lifeline Manifold Control System	8102341317
CO_2 Lifeline Manifold Control System	8102341318
Heater Kit (N_2O, CO_2 and N_2O/O_2 50%/50% mixture) up to 137 bar	4233402247
Heater Kit (N_2O/O_2 50%/50% mixture) over 137 bar	8102370895
Retrofit kit MCS2 to Lifeline MCS	8102369648

Note: Manifold weight is 24 kg.

Description	Part No
1 Cylinder Spare Rack	8102371105
2 Cylinder Spare Rack	8102371106
4 Cylinder Spare Rack	8102371107
6 Cylinder Spare Rack	8102371108

Description	Part No
Manifold Header Corner Connector - one side	2212020815

Tailpipe	O_2	N_2O	N_2O / O_2	Air	CO_2	N_2
Pin-Indexed (ISO 407) [2]	8102340110	8102340123	8102340130	8102340140	8102340151	
Pin-Indexed (ISO 407) Extended	8102340116		8102340131	8102340146		
Bull nose (ISO5145) [2,3], Side entry	8102369663		8102369664			
Bull nose (BS341) [1] Top entry	8102340111			8102340141		8102340161
Bull nose (BS341) [1] Side entry	8102340112	8102340120		8102340142	8102340150	
Bull nose (BS341) [1] Extended	8102340117	8102340125		8102340147	8102340154	
US Std (CGA)	8102340114	8102340122		8102340144		
Chinese Bullnose	8102340115	8102340124		8102340145	8102340152	8102340162

Notes: 1. Bullnose tailpipes (except Chinese type) are to the following BS standards: Oxygen, Air, Nitrogen: BS: 341-1 No. 3; Carbon dioxide: BS: 341-1 No. 8; Nitrous oxide: BS: 341-1 No. 13.

2. Mixture N_2O - O_2, (registered trade name Entonox BOC) low pressure cylinder "G" type has Pin-indexed connector according to standard BS EN ISO 407 and 230 bar cylinder "EW" type has Bull nose connector according to ISO 5145 No. 13.

3. Oxygen cylinder "J" type has Pin-Indexed connector according to ISO 407, where "W" type (230 bar) has Bull nose according to ISO 5145 No.5

Generation Modular Headers Rack Table

Gas Type	2x1	2x2	2x3	2x4	2x5	2x6
Oxygen	8102371280	8102371281	8102371282	8102371283	8102371284	8102371285
Nitrous Oxide	8102371286	8102371287	8102371288	8102371289	8102371290	8102371291
Entonox - O_2/N_2O	8102371292	8102371293	8102371294	8102371295	8102371296	8102371297
Medical Air	8102371298	8102371299	8102371300	8102371301	8102371302	8102371303
Nitrogen	8102371304	8102371305	8102371306	8102371307	8102371308	8102371309
Carbon Dioxide	8102371310	8102371311	8102371312	8102371313	8102371314	8102371315

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