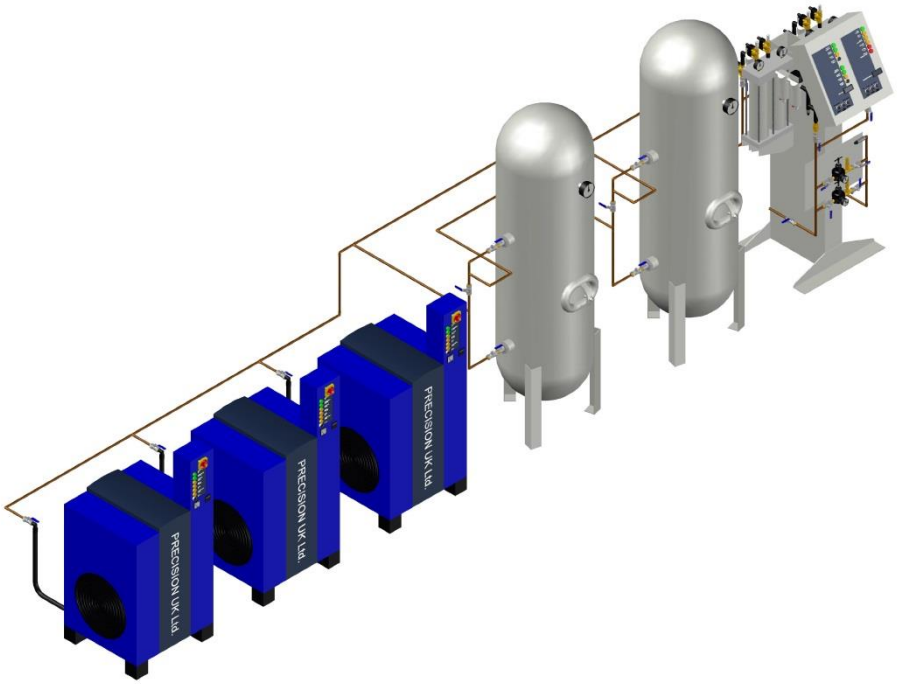
Technical Specification

Medical Air Plant



Product Description

The CPX medical air plant shall fully comply with the United Kingdom Department of Health (DoH) HTM02-01, HTM2022 and NHS Model Engineering Specification C11. This plant is manufactured under ISO13485:2003 quality management system, a copy of the certificate shall be provided for review. CPX medical air plant shall ensure that medical quality air to European Pharmacopoeia monograph shall be delivered at pressures of 400kPa (4 bar), 700kPa (7 bar) or 1000kPa (10 bar) gauge for the supply of the hospital medical or surgical air systems. The entire system shall be as a minimum "duplexed" such that any single functional component failure will not affect the integrity of the medical gas compressed air system supply. The plant consists of a vertical air receiver or receivers (with automatic and manual drain valve), oil filled rotary screw type compressors, duplex filter dryer module, compressor starter panels, plant and dryer control units. Supplied factory tested and fully assembled unit ready to install as a plug and play item. Certificate of conformity shall accompany the Medical Air Plant.

Compressors

The compressors shall be oil lubricated, rotary screw type suitable for both continuous and frequent stop/start operation at a nominal outlet pressure of 1000kPa (10 bar). The compressors are air cooled, air end directly driven by a 380-420V, 3 phase, 50/60Hz TEFC electric motor coupled to an air blast after-cooler with auto drains. Multistage oil separators

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capable of limiting oil carry over to a maximum of 2 ppm are fitted to minimise contamination and maintenance. The compressors are provided with intake valves to enable compressors to be run unloaded. A temperature switch is fitted to give indication if the temperature after the after-cooler exceeds 115°C. A pressure is included to provide indication that the compressor is delivering air after it has been called for.

Vertical Air Receiver

The vertical air receiver shall be vertically mounted and constructed to BS EN 286-1 and is manufactured from heavy gauge fusion weld steel. The vertical air receiver shall be internally galvanised, double coat primer and epoxy coated white RAL 9010, fitted with automatic and manual drain valves and be protected by a pressure relief valve, fusible plug and include a pressure gauge. The vertical air receiver shall include inspection holes to provide full internal inspection. The air receivers shall be at least 50% of the plant capacity in 1minute in terms of free air delivered at normal working pressure. The receiver(s) shall be connected to the dryer unit in parallel incorporating lockable valves for safe inspection such that operation can continue during receiver isolation for periodic internal inspection.

Duplex Filter Dryer Module

The duplexed filter and dryer shall incorporate pre filters for particle removal to 1 micron. Coalescing filters for particle removal to 0.1 micron. The dryers consist of twin column heatless air regenerated desiccant dryer producing -63C dewpoint and dust filters for particle removal down to 1 micron, with active carbon element to remove vapours hydrocarbon odours. A duplex filter/pressure regulating unit is fitted to the assembly. This shall comprise of sterile filters and non-relieving pressure regulators, which regulate the output pressure of the plant to 4 bar (7 bar optional). Contaminants in delivered air downstream of bacterial filters shall be maintained at levels below those shown in the following table:

Contaminant	Threshold
H2O	67 ppm v/v (-46°C atm. pressure)
Dry Particulates	0.01 mg/m³
Oil (droplets or mist)	0.1 mg/m³
CO	5 ppm v/v
CO2	500 ppm v/v
SO2	1 ppm v/v
NO	2 ppm v/v
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Control system
The control system shall incorporate compressor starter units, dryer control unit and plant control unit.

Compressor Starter Units
The compressor starter units are provided with Star-Delta motor starters and each motor is protected by thermal overload relays. The incoming supply terminates at the door interlock isolator. An ammeter is fitted to each starter indicating the current drawn by the motor. Each starter panel incorporates a 24V transformer to provide power to the Plant Control Unit such that complete control of the plant is maintained in the event of a single power supply failure. The compressor starter panel provides LED indicators for the following operating and fault conditions. Mains on (Green), Compressor Running (Green), Control Failed (Amber), Motor Tripped (Amber), Over-Temperature (Amber), Compressor Failed (Amber). A reset pushbutton is incorporated on each starter panel.

The Dryer Control Unit
The dryer control unit shall incorporate duplex PLC's for cycle timing, hand/auto switches, a dew point sensing circuit to detect moisture after the dryers. Line pressure sensors for high and low pressure in the medical pipeline. The dryer control panel shall consist of a timing mechanism, economy circuit for regeneration, a digital dew point display, dryer selector switch and auto changeover circuit for each dryer. The dryer control unit provides LED's for Dryer Selected (Green), Dryer Normal (Green) and Dryer Fault (Amber). The panel also incorporates a reset pushbutton for each dryer. This assembly requires a separate 230V, single phase (ac), 50/60Hz power supply.

Plant Control Unit
The plant control unit controls the operation of the whole system and ensures it matches demand. The plant control panel shall ensure that each compressor is ran equally to maximise compressor life. The panel also incorporates a central control which can operate up to four compressors.
The units LED's display Plant Normal (Green), Plant Fault (Amber), Plant Emergency (Amber), Reserve Low (Amber), System Fault (Red) and 4 Bar Pipeline Fault (Red). The receiver pressure is displayed via a digital meter. The panel also incorporates a duty selector and compressor auto/manual switches. The panel incorporates the plant alarm interface provides volt free contacts to a centralised alarm system as well as BMS contacts for the following:- Plant Fault, Plant Emergency, Reserve Cylinder Low and Pressure Fault.

Installation
Medical air plant shall be floor mounted in an adequately ventilated area at least 250mm away from any wall to ease any further maintenance. Avoid obstructing the flow of cooling

air to the fan end of the motor. The equipment should not be operated in ambient temperatures exceeding 40̊C.
Each medical air compressor requires a separate 3 phase supply. This should be supplied via a local distribution board and be suitable for the rating of the pump. A separate single phase supply is required for the dryer control panel.

Mechanical
Secure the base plate to the floor using suitable fixings. The mounting plate holes provided in the base are Ø10mm. Where possible mount the medical air plant on a plinth.
Connect the inlet pipework and exhaust pipework to the connections provided.
Exhausts should be run as directly as possible to atmosphere and terminate in an elbow pointing downwards to protect against the ingress of water. Avoid air intakes for air conditioning, ventilation systems and windows.
Check the condensate drain flasks are fitted.

Electrical
380-450V three phase 50/60Hz supply should be provided to each compressor starter unit, connect the electrical power supply from the wall mounted isolator to the door interlock isolator on the compressor starter panel.
Connect multicores to BMS or central area alarms as required. Connect the separate 230V single phase (ac.), 50/60Hz, 5 amp supply to the dryer control panel. The panels are EMC (electromagnetic) tested to comply with EN60601-1-2

Pipeline Jointing
The medical air plant copper stub pipe is manufactured to BS13348 for connection to the pipeline system and joints shall be made on site using copper, phosphorus and silver brazing alloy CuP282 to BS EN 17672:2010. Brazing should be carried out using oxygen free nitrogen as an inert gas shield to prevent the formation of oxides on the inside of the pipe. Copper pipes shall be cut square with the pipe axis using a sharp wheel cutter wherever possible, and be cleaned to get rid of any cuttings or burrs.

Quality
Medical air plant is manufactured in the UK under BS EN 13485 Medical Devices: Quality Management Systems. All plant is manufactured under strict quality control procedures to ISO 9001:2008.

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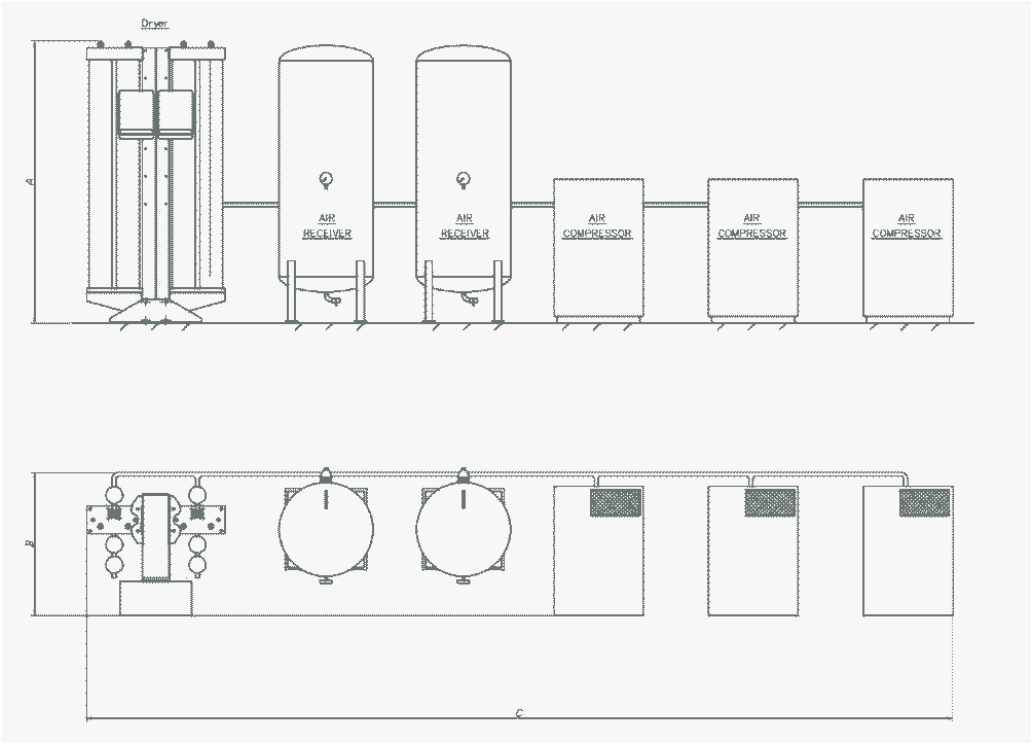
Specialists in HTM02-01 Medical Gas Pipeline Equipment

Typical Triplex Air Plant Configuration



Product Code	Plant size	Dim A	Dim B	Dim C	Vessels	kW	Start type	Start (A)	Run (A)	Fuse (A)	Noise	Weight
Duplex Air Plant												
MA-420-D	420 l/min	1850 mm	800 mm	3250 mm	1 x 210 l	2 x 4.0	S.D.	21.25	8.5	10	62 dB(A)	515 kg
MA-580-D	580 l/min	2000 mm	900 mm	3400 mm	1 x 300 l	2 x 5.5	S.D.	28.25	11.3	16	66 dB(A)	640 kg
MA-800-D	800 l/min	2000 mm	1100 mm	3500 mm	1 x 400 l	2 x 7.5	S.D.	38	15.2	16	70 dB(A)	750 kg
MA-1100-D	1100 l/min	2300 mm	1100 mm	3500 mm	1 x 580 l	2 x 11.0	S.D.	48.75	19.5	20	70 dB(A)	830 kg
MA-1800-D	1800 l/min	2200 mm	1300 mm	3800 mm	1 x 900 l	2 x 15.0	S.D.	73.25	29.3	32	70 dB(A)	1160 kg
MA-2250-D	2250 l/min	2250 mm	1300 mm	4150 mm	1 x 1200 l	2 x 18.5	S.D.	90	36	40	71 dB(A)	1450 kg
MA-2650-D	2650 l/min	2450mm	1300 mm	4150mm	1 x 1400 l	2 x 22.0	S.D.	102.5	41	50	71 dB(A)	1520 kg
Triplex Air Plant												
MA-840-T	840 l/min	2000 mm	800 mm	4400 mm	1 x 420 l	3 x 4.0	S.D.	29.75	8.5	10	62 dB(A)	950 kg
MA-1160-T	1160 l/min	2200 mm	900 mm	4500 mm	1 x 580 l	3 x 5.5	S.D.	39.55	11.3	16	66 dB(A)	1050 kg
MA-1600-T	1600 l/min	2200 mm	1100 mm	4700 mm	1 x 800 l	3 x 7.5	S.D.	53.2	15.2	16	70 dB(A)	1450 kg
MA-2200-T	2200 l/min	2300 mm	1100 mm	4700 mm	1 x 1100 l	3 x 11.0	S.D.	68.25	19.5	20	70 dB(A)	1550 kg
MA-3600-T	3600 l/min	2650 mm	1300 mm	5900 mm	2 x 900 l	3 x 15.0	S.D.	102.55	29.3	32	70 dB(A)	2130 kg
MA-4500-T	4500 l/min	2650 mm	1300 mm	6200 mm	2 x 1150 l	3 x 18.5	S.D.	126	36	40	71 dB(A)	2370 kg
MA-5300-T	5300 l/min	2650mm	1300 mm	6200 mm	2 x 1350 l	3 x 22.0	S.D.	143.5	41	50	71 dB(A)	2400 kg
Quadplex Air Plant												
MA-1250-Q	1250 l/min	2200 mm	800 mm	5500 mm	1 x 625 l	3 x 4.0	S.D.	38.25	8.5	10	62 dB(A)	1100 kg
MA-1700-Q	1700 l/min	2200 mm	900 mm	5600 mm	1 x 850 l	3 x 5.5	S.D.	50.85	11.3	16	66 dB(A)	1250 kg
MA-2400-Q	2400 l/min	2400 mm	1100 mm	5800 mm	1 x 1200 l	3 x 7.5	S.D.	68.4	15.2	16	70 dB(A)	1700 kg
MA-3300-Q	3300 l/min	2650 mm	1100 mm	6800 mm	2 x 825 l	3 x 11.0	S.D.	87.75	19.5	20	70 dB(A)	2000 kg
MA-5400-Q	5400 l/min	2650 mm	1300 mm	7000 mm	2 x 1350 l	3 x 15.0	S.D.	131.85	29.3	32	70 dB(A)	2550 kg
MA-6700-Q	6700 l/min	2650 mm	1300 mm	8200 mm	3 x 1150 l	3 x 18.5	S.D.	162	36	40	71 dB(A)	3000 kg
MA-8000-Q	8000 l/min	2650mm	1300 mm	8200 mm	3 x 1350 l	3 x 22.0	S.D.	184.5	41	50	71 dB(A)	3300 kg

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Purge losses for Dryers			
Product code	Plant output (l/min)	Plant input (l/min)	Purge losses (l/min)
MA-420-D	420	483	63
MA-580-D	580	667	87
MA-800-D	800	920	120
MA-1100-D	1100	1264	164
MA-1800-D	1800	2069	269
MA-2250-D	2250	2586	336
MA-2650-D	2650	3046	396
MA-840-T	840	966	126
MA-1160-T	1160	1333	173
MA-1600-T	1600	1839	239
MA-2200-T	2200	2529	329
MA-3600-T	3600	4138	538
MA-4500-T	4500	5172	672
MA-5300-T	5300	6092	792
MA-1250-Q	1250	1437	187
MA-1700-Q	1700	1954	254
MA-2400-Q	2400	2759	359
MA-3300-Q	3300	3793	493
MA-5400-Q	5400	6207	807
MA-6700-Q	6700	7701	1001
MA-8000-Q	8000	9195	1195

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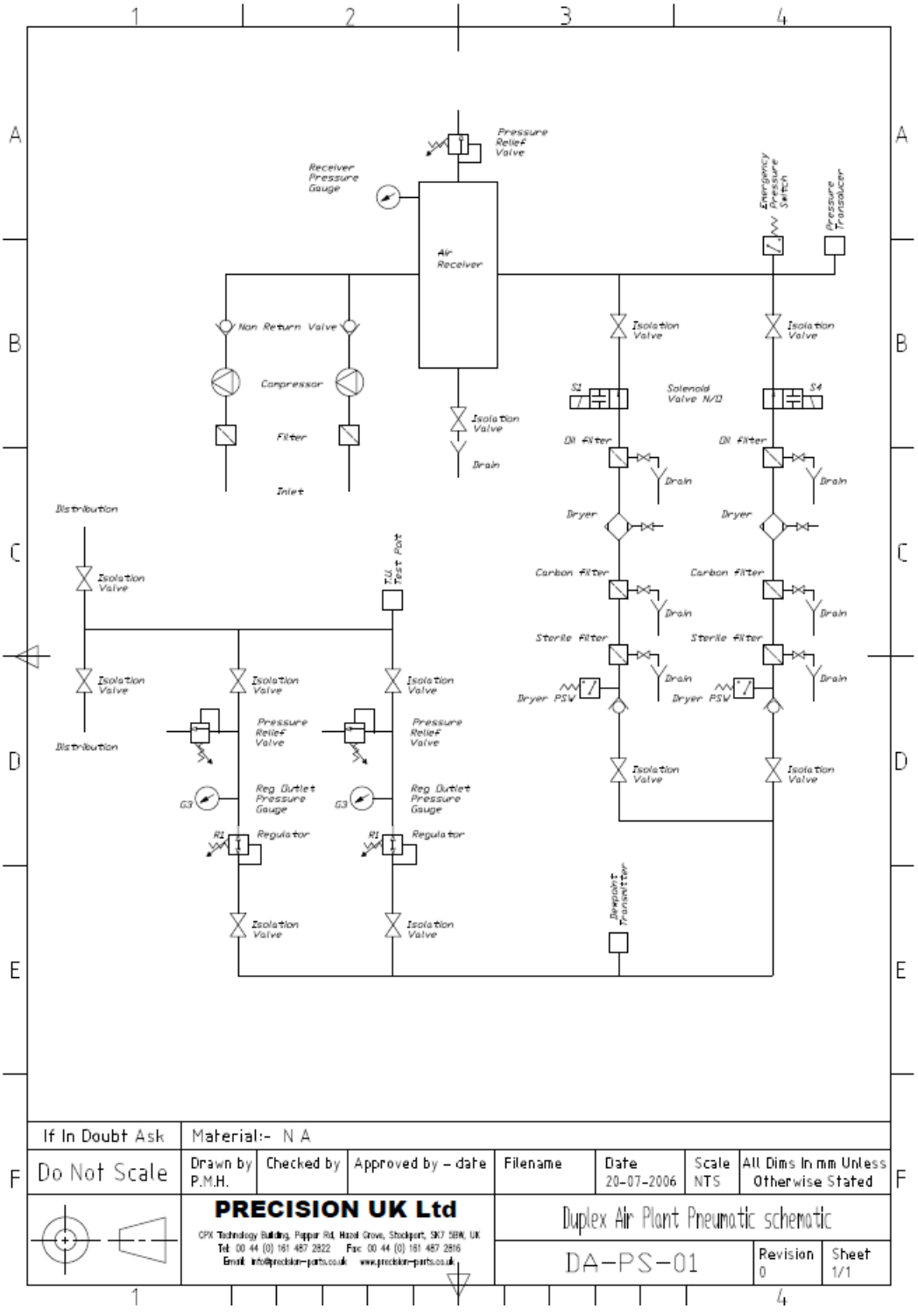
Duplex Medical Air Plant Schematic diagram



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