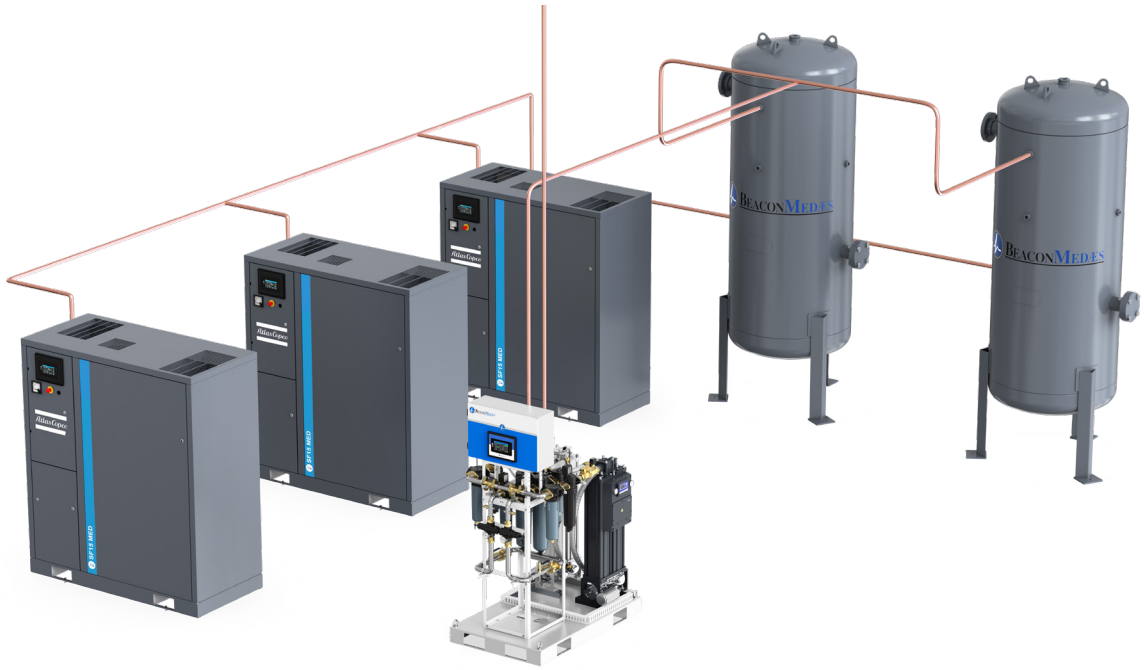
Medical Air Supply System cAIR Combined Air EN ISO 7396-1/HTM 02-01 and HTM2022 EurPh with PMA Medical dryer and Oil-Free Compressors 400 V 50 Hz

Medical Air Supply System



Description

The Medical Air Supply System is a modular system consisting of oil-free compressors with fixed or variable speed drive, a duplex air purification module with central controller, and air receievers. The Air System shall conform to EN ISO 7396-1 and NHS Health Technical Memorandum HTM02-01 or HTM2022. Medical quality air to the European Pharmacopoeia monograph shall be delivered at pressures of 400 kPa (4 bar), 700 kPa (7 bar) gauge for supply of the hospital medical or surgical air systems.

Medical Air Supply System shall be duplexed such that any single functional component failure will not affect the integrity of the medical compressed air supply.

Medical Air Supply System (Surgical air for high pressure application) shall have a duplex air purification module and a simplex compressor. Additional compressors shall be available to duplex the compressors, such that any single compressor failure will not affect the integrity of the air supply.

The duplex air purification modules are CE-marked with approval from a notified body.

The Distinctive Features of Medical Compressors:

Features	Customer benefit
Medical software and HTM commanded features	Fit for medical application with full compliancy to HTM and ISO medical standards
Oil free compressors	Class 0 oil free solutions for pure medical air, eliminate any risk of oil contamination
Modular design	Modular design simplifies manoeuvrability on site

The Distinctive Features of the PMA Medical Dryers:

Features	Customer benefit
Complete Air Purification Package	Everything to clean the air is pre-piped and wired in a fully duplexed package, with a six-step purification process that provides European Pharmacopeia compliant air
Advanced Medical Controls	The advanced master controller monitors and controls both the compressors and the air purification module. Filled with redundancy and medical safety features, the controller operates the system efficiently with a very tight pressure band and equalization of running hours on the compressors and dryers.
MyMedGas Embedded	All parameters of the systems can be seen and stored via MyMedGas
Compact design	With the unique design of the extruded aluminum desiccant dryer towers, the air purification package components are compactly configured to minimize footprint without compromising service access.
Optional Hopcalite catalysator	Less time to assemble and commission, less brazing points, no room for connections
Optional Integrated gas sensor	Combination of gas sensors allows continuous gas quality monitoring with trends stored in MyMedGas

Sources of Supply

HTM02-01/EN ISO 7396-1

The Medical Air Supply System will produce the primary supply with two compressors on standby (unless an Automatic Manifold is used as secondary (HTM02-01) or third (ISO7396-1) supply). For duplex plant, the secondary (HTM02-01) or third (ISO7396-1) supply shall be an Automatic Manifold. For triplex plant, each compressor can supply the total hospital flow. If more than three compressors are installed, the total hospital flow will be split over multiple compressors.

HTM2022

The Medical Air Supply System will produce the primary supply with one compressor on standby. For duplex plant, each compressor can supply the total hospital flow. If more than two compressors are installed, the total hospital flow will be split over multiple compressors. The back-up compressor will form the secondary supply. A third supply shall be from an Automatic Manifold capable of supplying the average hospital demand for 4 hours.

Compressors Modules

Compressors shall be Atlas Copco SF MED single-stage oil free scroll compressors suitable for both continuous and frequent start/stop operation at a nominal outlet pressure of 800 kPa (8 bar) or 1000 kPa (10 bar) gauge. Each compressor shall have at least two individual scroll elements. The air quality shall be 100% oil free, certified ISO8573-1 Class 0 by an independent agency. The compressor shall have a sound insulating enclosure. Compressors shall be supplied with an aftercooler with a dedicated quiet running fan to maximise cooling and efficiency. Totally enclosed air-cooled IP55 Class F electric motors, complying with IE3 and Nema Premium efficiency standards shall be used; motors with lower ratings are not acceptable. The compressor shall be fitted with a high-definition colour display controller and electronic zero-loss water drains.The noise level of the compressor shall be maximum 65dB(A).The compressor shall have the following features as required by HTM02-01/HTM2022:

- Ammeter
- Main switch
- Temperature sensor downstream the aftercooler
- Failed-to-go-on-load feedback pressure switch
- Automatic restart after voltage failure

Variable Speed Compressors

Alternatively, compressors shall be Atlas Copco ZT VSD MED twostage oil free rotary tooth compressors fitted with Variable Speed Drive. By including an AC-DC converter, along with associated control hardware and software it will enable the compressor to continuously match its running speed with the flow demand required by the hospital. By using such technology, start currents will be reduced, machine life will be prolonged and energy savings of up to 35% shall be achievable. The compressor shall operate from 400- 1000kPa (4-10 bar) gauge.

The tooth element shall be stainless steel. The air quality shall be 100% oil free, certified ISO8573-1 Class 0 by an independent agency. The compressor shall have a sound insulating canopy. Compressors shall be supplied with an intercooler and aftercooler with a dedicated radial quiet running fan to maximise cooling and efficiency. Minimum IE3/NEMA Premium electric motors shall be used; motors with lower efficiency ratings are not acceptable. The compressor shall be fitted with a high-definition colour display controller, a dry motor coupling requiring no lubrication and electronic zero-loss water drains.

The noise level of the compressor shall be maximum 72dB(A). The compressor shall have the following features as required by

HTM02-01/HTM2022:

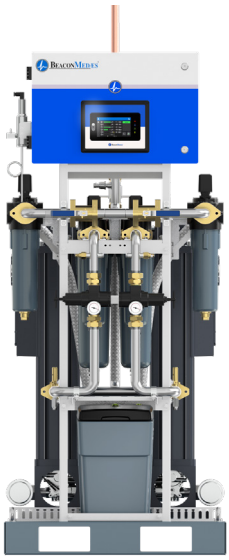
- Ammeter
- Main switch
- Temperature sensor downstream the aftercooler
- Failed-to-go-on-load feedback pressure switch
- Automatic restart after voltage failure

Full VSD air plant shall incorporate VSD controllers on all compressors, cycling the lead compressor to ensure even wear as per HTM02-01 requirements.

The compressors shall be equipped with following HTM mandated features:

HTM code specific features	Function
Aftercooler temperature sensors	To identify the cooling system failure (for example, fan failure) and to prevent hot air going to the dryer, which can cause dryer damage
Separate power lead for central controller	Independent controller electrical supply allows to disconnect any of the compressor lead from the main power supply keeping the plant control operational
Separate power lead for each compressor	Allows to set up the electrical supply redundancy
Ampere meters outside the unit	Allow to monitor the power supply status and the current easily
Failed-to-go-on-load switch	Allows central controller to verify that compressor responded to the controller command and is producing the compressed air
Main power switches on each compressor unit	Allows disconnecting each compressor and safely perform service intervention on one compressor while another compressor is running
Automatic restart after power failure	Resumes medical air supply automatically after power failure or after switching from main to the emergency power supply
Emergency forced local mode	Allows to manually override the automatic unit control and to get the plant running in emergency mode
Separated compressors cubicles	Allows to perform service intervention on one compressor while another unit is running
Back up pressure switch	Automatically overrides control system and activate both primary and secondary supply in case air supply pressure drops below the limit

Air Purification Module



Dryer and filter system

The duplexed air purification module shall incorporate high efficiency water separators, oil coalescing filters, heatless regenerative desiccant dryers, activated carbon filters with optional hopcalite catalyst, bacterial filters and pressure regulators. The performance of the filters shall be according to below specifications:

- Oil coalescing two-in-one high efficiency filter: mass efficiency of 99.99%, tested according to ISO 8573-2 & ISO 12500-1
- Activated carbon filter: max remaining total oil content of 0,003 mg/m³, tested according to ISO 8573-5 & ISO 12500-2
- Bacterial filter: particle count efficiency of 99.97% at MPPS=0.1µm, tested according to ISO 12500-3

Contaminants in the delivered air downstream of the bacterial filters shall be maintained at levels below those shown in the table below :

Contaminant	Threshold
H2O	67 ppm v/v
Dry particulates	Free from visible particulates in a 75 litre sample
Oil (droplet or mist)	0.1 mg/m³
CO	5 ppm v/v
CO2	500 ppm v/v
SO2	1 ppm v/v
NO + NO2	2 ppm v/v
O2	20.4% - 21.4% v/v

Plant Control System

The central control system shall have a touch screen and provide an intelligent human machine interface incorporating on board flash memory and real-time clock for recording operational parameters in the event log. The central control system shall operate at low voltage and include BMS connection for plant fault, plant emergency, reserve fault and pressure fault.

The central control unit shall incorporate a user friendly 5" high-definition color touch screen display with clear pictograms and LED indicators, providing easy access to system operational information. The central controller shall be equipped with the remote monitoring function via the cellular network.

Dryer Purge Control

The dryer control system shall incorporate a Purge Saver Energy Management system that freezes the regeneration of the desiccant once adequate dew point is reached in the inactive tower. Only when the dewpoint level in the active tower deteriorates to an unacceptable level will the intelligent controller switch towers.

Dryer General Data - All types

Parameter	Value
Atmospheric Dew point (°C)	-46
Air quality	Meets European Pharmacopeia
Dryer type	Duplex desiccant dryer with purge saver
Purge	≤ 20%
Controllers[1]	MK5s Touch Central controller, two independent dryer controllers
Test point	BS5682
Pressure regulators	Duplex integrated pressure regulators
Connectivity	MyMedGas embedded
Outlet connection	22 mm (S,M)/28 mm (L,XL) copper stub extension
Inlet connection	22 mm (S,M)/28 mm (L,XL) copper stub extension
Voltage/Frequency	230 V/1 phase/50 Hz or 60 Hz; 115 V/1 phase/50 Hz or 60 Hz; one single phase lead for main cubicle

1. The MK5s Touch Central Controller is considered as main software.

Parameter	Value
Medical device Certification	MDR Class IIa
Piping material	Stainless steel
Condensate drains	Electronic

Dryer Dimensional Data - All types

Platform	S	M	L	XL1	XL2
Length (mm)	1070	1270	1800	1880	2165
Width (mm)	800	800	850	850	900
Height (mm)	1741	1868	1901	1905	1905
Weight (kg)	293	302	593	850	880

Receiver Assembly

The air receiver shall be ML approved, supplied with relevant test certificates. Each air receiver shall be fitted with a zero-loss electronic drain valve. Float type drain valves are not acceptable. The receiver assembly shall be fitted with a pressure safety valve, set at 10% receiver overpressure. The receiver shall further include a pressure gauge. The receivers shall be installed separately and sized according to the design guidelines.

Options

The dryer is available with the following options.

Description	Part number
PMA OSC Activated carbon	0000066948
PMA OSC Organo clay[1]	0000069349
PMA CO	0000066949
PMA CO+CO2	0000066950
PMA CO+CO2+O2	0000066951
PMA String test	0000069353
Specific voltage for Saudi[2]	0000069350

1. Stronger emulsions: RS Xtend, RS foodgrade, oil mixtures
2. If need 60 Hz voltage, this option need to be ordered together with PMA machine.

Medical Air System Taxonomy

cAIR	-	TGF	-	M1	-	7	-	HTM0201	50 Hz

Nomenclature	Description
cAIR	Plant type: cAIR -combined air, mAir - medical air, sAir – surgical air
TSF	Compressor configuration: DSF-Duplex SF MED fixed speed TSF-Triplex SF MED fixed speed QSF-Quadruplex SF MED fixed speed PSF-Pentaplex SF MED fixed speed DZV-Duplex ZT MED VSD TZV-Triplex ZT MED VSD QZV-Quadruplex ZT MED VSD PZV-Pentaplex ZT MED VSD
M1	Dryer Platform
7	Output pressure (bar)
HTM0201	Standard: HTM0201, HTM2022, ISO

The table below give easy guide of how to configure Medical Air Supply System (combined medical and surgical air). For the configuration of the Medical Air Supply Systems (mAIR) or surgical plants or other variants, please refer to the sizing guide in the end of the datasheet.

Medical Air Supply Systems - Typical Combination

Medical Air Supply System - HTM 2022

Model Name	Model Description	System Design Flow	Compressor Model	Compressor Qty	Dryer Model	Vessel Size	Vessel Qty	Vessel Kit Size	Vessel Kit Qty
SF-MED: Medical Air Supply System 4 bar, Fixed Speed Compressors, HTM 2022 (50 Hz)									
mAIR-DSF	mAIR-DSF-S1-4-HTM 2022	204	SF-MED2-8 FS	2	PMA-S1-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-S2-4-HTM 2022	462	SF-MED6-8 FS	2	PMA-S2-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-S3-4-HTM 2022	667	SF-MED8-8 FS	2	PMA-S3-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-S4-4-HTM 2022	966	SF-MED11-8 FS	2	PMA-S4-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-M1-4-HTM 2022	1368	SF-MED15-8 FS	2	PMA-M1-7/4	1000L 11 Bar	1	1000L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-M2-4-HTM 2022	1570	SF-MED17-8 FS	2	PMA-M2-7/4	1000L 11 Bar	1	1000L 11 Bar KIT	1
mAIR-DSF	mAIR-DSF-M3-4-HTM 2022	1932	SF-MED22-8 FS	2	PMA-M3-7/4	1000L 11 Bar	1	1000L 11 Bar KIT	1
mAIR-TSF	mAIR-TSF-L1-4-HTM 2022	2736	SF-MED15-8 FS	3	PMA-L1-7/4	1500L 11 Bar	1	1500L 11 Bar KIT	1
mAIR-TSF	mAIR-TSF-L2-4-HTM 2022	3140	SF-MED17-8 FS	3	PMA-L2-7/4	2000L 11 Bar	1	2000L 11 Bar KIT	1
mAIR-QSF	mAIR-QSF-L3-4-HTM 2022	3904	SF-MED15-8 FS	4	PMA-L3-7/4	2000L 11 Bar	1	2000L 11 Bar KIT	1
mAIR-QSF	mAIR-QSF-L3-4-HTM 2022	4678	SF-MED17-8 FS	4	PMA-L3-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
mAIR-QSF	mAIR-QSF-XL1-4-HTM 2022	6018	SF-MED22-8 FS	4	PMA-XL1-7/4	2000L 11 Bar	2	3000L 11 Bar KIT	2
mAIR-QSF	mAIR-QSF-XL2-4-HTM 2022	6018	SF-MED22-8 FS	4	PMA-XL2-7/4	2000L 11 Bar	2	3000L 11 Bar KIT	2
SF-MED: Combined Medical Air Supply System 7 bar, Fixed Speed Compressors, HTM2022 (50 Hz)									
cAIR-DSF	cAIR-DSF-S1-7-HTM 2022	288	SF-MED4-10 FS	2	PMA-S1-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-S1-7-HTM 2022	348	SF-MED6-10 FS	2	PMA-S1-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-S2-7-HTM 2022	557	SF-MED8-10 FS	2	PMA-S2-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-S3-7-HTM 2022	710	SF-MED11-10 FS	2	PMA-S3-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-S4-7-HTM 2022	1102	SF-MED15-10 FS	2	PMA-S4-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-S4-7-HTM 2022	1156	SF-MED17-10 FS	2	PMA-S4-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-DSF	cAIR-DSF-M1-7-HTM 2022	1418	SF-MED22-10 FS	2	PMA-M1-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-TSF	cAIR-TSF-M2-7-HTM 2022	2270	SF-MED15-10 FS	3	PMA-M2-10/7	1500L 11 Bar	1	1500L 11 Bar KIT	1
cAIR-TSF	cAIR-TSF-L1-7-HTM 2022	2835	SF-MED22-10 FS	3	PMA-L1-10/7	1500L 11 Bar	1	1500L 11 Bar KIT	1
ZT-MED: Medical Air Supply System 4 bar, Fixed Speed Compressors - HTM 2022 (50 Hz)									
mAIR-DZF	mAIR-DZF-M3-4-HTM 2022	1918	ZT-MED15-7.5 FS	2	PMA-M3-7/4	1000L 11 Bar	1	1000L 11 Bar KIT	1
mAIR-DZF	mAIR-DZF-L1-4-HTM 2022	2388	ZT-MED18-7.5 FS	2	PMA-L1-7/4	1500L 11 Bar	1	1500L 11 Bar KIT	1
mAIR-DZF	mAIR-DZF-L2-4-HTM 2022	2936	ZT-MED22-7.5 FS	2	PMA-L2-7/4	1500L 11 Bar	1	1500L 11 Bar KIT	1
mAIR-DZF	mAIR-DZF-L3-4-HTM 2022	3580	ZT-MED30-7.5 FS	2	PMA-L3-7/4	2000L 11 Bar	1	2000L 11 Bar KIT	1
mAIR-DZF	mAIR-DZF-L3-4-HTM 2022	4720	ZT-MED37-7.5 FS	2	PMA-L3-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
mAIR-QSF	mAIR-QSF-XL1-4-HTM 2022	5460	ZT-MED45-7.5 FS	2	PMA-XL1-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
mAIR-QSF	mAIR-QSF-XL2-4-HTM 2022	5460	ZT-MED45-7.5 FS	2	PMA-XL2-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
ZT-MED: Combined Medical Air Supply System 7 bar, Fixed Speed Compressor - HTM 2022 (50 Hz)									
cAIR-DZF	cAIR-DZF-M1-7-HTM 2022	1460	ZT-MED15-10 FS	2	PMA-M1-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-DZF	cAIR-DZF-M1-7-HTM 2022	1838	ZT-MED18-10 FS	2	PMA-M1-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-DZF	cAIR-DZF-M2-7-HTM 2022	2294	ZT-MED22-10 FS	2	PMA-M2-10/7	1500L 11 Bar	1	1500L 11 Bar KIT	1
cAIR-TZF	cAIR-TZF-L1-7-HTM 2022	3675	ZT-MED18-10 FS	3	PMA-L1-10/7	2000L 11 Bar	1	2000L 11 Bar KIT	1
cAIR-TZF	cAIR-TZF-L2-7-HTM 2022	4589	ZT-MED22-10 FS	3	PMA-L2-10/7	3000L 11 Bar	1	3000L 11 Bar KIT	1
cAIR-QZF	cAIR-QZF-L3-7-HTM 2022	5237	ZT-MED18-10 FS	4	PMA-L3-10/7	3000L 11 Bar	1	3000L 11 Bar KIT	1
cAIR-QZF	cAIR-QZF-L3-7-HTM 2022	6839	ZT-MED22-10 FS	4	PMA-L3-10/7	2000L 11 Bar	2	2000L 11 Bar KIT	2

Model Name	Model Description	System Design Flow	Compressor Model	Compressor Qty	Dryer Model	Vessel Size	Vessel Qty	Vessel Kit Size	Vessel Kit Qty
ZTVSD-MED: Medical Air Supply System 4 bar, VSD compressors, HTM 2022 (50 Hz)									
mAIR-DZV	mAIR-DZV-L1-4-HTM 2022	1884	ZT-MED18-8.6 VSD	2	PMA-L1-7/4	1000L 11 Bar	1	1000L 11 Bar KIT	1
mAIR-DZV	mAIR-DZV-L1-4-HTM 2022	2574	ZT-MED22-8.6 VSD	2	PMA-L1-7/4	1500L 11 Bar	1	1500L 11 Bar KIT	1
mAIR-DZV	mAIR-DZV-L3-4-HTM 2022	3574	ZT-MED30-8.6 VSD	2	PMA-L3-7/4	2000L 11 Bar	1	2000L 11 Bar KIT	1
mAIR-DZV	mAIR-DZV-L3-4-HTM 2022	4714	ZT-MED37-8.6 VSD	2	PMA-L3-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
mAIR-DZV	mAIR-DZV-L3-4-HTM 2022	5208	ZT-MED45-8.6 VSD	2	PMA-L3-7/4	3000L 11 Bar	1	3000L 11 Bar KIT	1
ZTVSD-MED: Combined Medical Air Supply System 7 bar, VSD compressors, HTM 2022 (50 Hz)									
cAIR-DZV	cAIR-DZV-M1-7-HTM 2022	1913	ZT-MED18-10 VSD	2	PMA-M1-10/7	1000L 11 Bar	1	1000L 11 Bar KIT	1
cAIR-DZV	cAIR-DZV-M2-7-HTM 2022	2318	ZT-MED22-10 VSD	2	PMA-M2-10/7	1500L 11 Bar	1	1500L 11 Bar KIT	1
cAIR-TZV	cAIR-TZV-L1-7-HTM 2022	3825	ZT-MED18-10 VSD	3	PMA-L1-10/7	2000L 11 Bar	1	2000L 11 Bar KIT	1
cAIR-TZV	cAIR-TZV-L2-7-HTM 2022	4637	ZT-MED22-10 VSD	3	PMA-L2-10/7	3000L 11 Bar	1	3000L 11 Bar KIT	1
cAIR-QZV	cAIR-QZV-L3-7-HTM 2022	5507	ZT-MED18-10 VSD	4	PMA-L3-10/7	3000L 11 Bar	1	3000L 11 Bar KIT	1
cAIR-QZV	cAIR-QZV-L3-7-HTM 2022	7163	ZT-MED22-10 VSD	4	PMA-L3-10/7	2000L 11 Bar	2	2000L 11 Bar KIT	2

Medical Air Supply Systems - Typical Combination

Medical Air Supply System - HTM 02-01

Model Name	Model Description	System Design Flow	Compressor Model	Compressor Qty	Dryer Model	Vessel Size	Vessel Qty	Vessel Kit Size	Vessel Kit Qty
SF-MED: Medical Air Supply System 4 bar, Fixed Speed Compressors, HTM 02-01 (50 Hz)									
mAIR-TSF	mAIR-TSF-S1-4-HTM 02-01	204	SF-MED2-8 FS	3	PMA-S1-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-TSF	mAIR-TSF-S3-4-HTM 02-01	451	SF-MED6-8 FS	3	PMA-S3-7/4	500L 11 Bar	1	500L 11 Bar KIT	1
mAIR-TSF	mAIR-TSF-S3-4-HTM 02-01	667	SF-MED8-8 FS	3	PMA-S3-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TSF	mAIR-TSF-M1-4-HTM 02-01	1002	SF-MED11-8 FS	3	PMA-M1-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TSF	mAIR-TSF-M1-4-HTM 02-01	1368	SF-MED15-8 FS	3	PMA-M1-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TSF	mAIR-TSF-M2-4-HTM 02-01	1570	SF-MED17-8 FS	3	PMA-M2-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TSF	mAIR-TSF-M3-4-HTM 02-01	1932	SF-MED22-8 FS	3	PMA-M3-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-QSF	mAIR-QSF-L1-4-HTM 02-01	2736	SF-MED15-8 FS	4	PMA-L1-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-QSF	mAIR-QSF-L2-4-HTM 02-01	3140	SF-MED17-8 FS	4	PMA-L2-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-PSF	mAIR-PSF-L3-4-HTM 02-01	3904	SF-MED15-8 FS	5	PMA-L3-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-PSF	mAIR-PSF-L3-4-HTM 02-01	4678	SF-MED17-8 FS	5	PMA-L3-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
SF-MED: Combined Medical Air Supply System 7 bar, Fixed Speed Compressors, HTM 02-01 (50 Hz)									
cAIR-TSF	cAIR-TSF-S1-7-HTM 02-01	288	SF-MED4-10 FS	3	PMA-S1-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-TSF	cAIR-TSF-S1-7-HTM 02-01	348	SF-MED6-10 FS	3	PMA-S1-10/7	500L 11 Bar	1	500L 11 Bar KIT	1
cAIR-TSF	cAIR-TSF-S2-7-HTM 02-01	557	SF-MED8-10 FS	3	PMA-S2-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TSF	cAIR-TSF-S3-7-HTM 02-01	710	SF-MED11-10 FS	3	PMA-S3-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TSF	cAIR-TSF-S3-7-HTM 02-01	996	SF-MED15-10 FS	3	PMA-S3-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TSF	cAIR-TSF-S4-7-HTM 02-01	1156	SF-MED17-10 FS	3	PMA-S4-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-QSF	cAIR-QSF-M1-7-HTM 02-01	1436	SF-MED11-10 FS	4	PMA-M1-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-QSF	cAIR-QSF-M2-7-HTM 02-01	2270	SF-MED15-10 FS	4	PMA-M2-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
cAIR-QSF	cAIR-QSF-L1-7-HTM 02-01	2835	SF-MED22-10 FS	4	PMA-L1-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
ZT-MED: Medical Air Supply System 4 bar, Fixed Speed Compressors - HTM 02-01 (50 Hz)									
mAIR-TZF	mAIR-TZF-M3-4-HTM 02-01	1918	ZT-MED15-7.5 FS	3	PMA-M3-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TZF	mAIR-TZF-L1-4-HTM 02-01	2388	ZT-MED18-7.5 FS	3	PMA-L1-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-TZF	mAIR-TZF-L2-4-HTM 02-01	2936	ZT-MED22-7.5 FS	3	PMA-L2-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-TZF	mAIR-TZF-L3-4-HTM 02-01	3580	ZT-MED30-7.5 FS	3	PMA-L3-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2

Model Name	Model Description	System Design Flow	Compressor Model	Compressor Qty	Dryer Model	Vessel Size	Vessel Qty	Vessel Kit Size	Vessel Kit Qty
mAIR-TZF	mAIR-TZF-L3-4-HTM 02-01	4720	ZT-MED37-7.5 FS	3	PMA-L3-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
mAIR-TZF	mAIR-TZF-XL1-4-HTM 02-01	5460	ZT-MED45-7.5 FS	3	PMA-XL1-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
mAIR-TZF	mAIR-TZF-XL2-4-HTM 02-01	5460	ZT-MED45-7.5 FS	3	PMA-XL2-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
ZT-MED: Combined Medical Air Supply System 7 bar, Fixed Speed Compressors - HTM 02-01 (50 Hz)									
cAIR-TZF	cAIR-TZF-M1-7-HTM 02-01	1460	ZT-MED15-10 FS	3	PMA-M1-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TZF	cAIR-TZF-M1-7-HTM 02-01	1838	ZT-MED18-10 FS	3	PMA-M1-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TZF	cAIR-TZF-M2-7-HTM 02-01	2294	ZT-MED22-10 FS	3	PMA-M2-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
cAIR-QZF	cAIR-QZF-L1-7-HTM 02-01	3675	ZT-MED18-10 FS	4	PMA-L1-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
cAIR-QZF	cAIR-QZF-L2-7-HTM 02-01	4589	ZT-MED22-10 FS	4	PMA-L2-10/7	1500L 11 Bar	2	1500L 11 Bar KIT	2
cAIR-PZF	cAIR-PZF-L3-7-HTM 02-01	5237	ZT-MED18-10 FS	5	PMA-L3-10/7	1500L 11 Bar	2	1500L 11 Bar KIT	2
cAIR-PZF	cAIR-PZF-L3-7-HTM 02-01	6839	ZT-MED22-10 FS	5	PMA-L3-10/7	2000L 11 Bar	2	2000L 11 Bar KIT	2
ZTVSD-MED: Medical Air Supply System 4 bar, VSD compressors, HTM 02-01 (50 Hz)									
mAIR-TZV	mAIR-TZV-L1-4-HTM 02-01	1884	ZT-MED18-8.6 VSD	3	PMA-L1-7/4	500L 11 Bar	2	500L 11 Bar KIT	2
mAIR-TZV	mAIR-TZV-L1-4-HTM 02-01	2574	ZT-MED22-8.6 VSD	3	PMA-L1-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-TZV	mAIR-TZV-L2-4-HTM 02-01	3360	ZT-MED30-8.6 VSD	3	PMA-L2-7/4	1000L 11 Bar	2	1000L 11 Bar KIT	2
mAIR-TZV	mAIR-TZV-L3-4-HTM 02-01	4714	ZT-MED37-8.6 VSD	3	PMA-L3-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
mAIR-TZV	mAIR-TZV-L3-4-HTM 02-01	5208	ZT-MED45-8.6 VSD	3	PMA-L3-7/4	1500L 11 Bar	2	1500L 11 Bar KIT	2
ZTVSD-MED: Combined Medical Air Supply System 7 bar, VSD compressors, HTM 02-01 (50 Hz)									
cAIR-TZV	cAIR-TZV-M1-7-HTM 02-01	1913	ZT-MED18-10 VSD	3	PMA-M1-10/7	500L 11 Bar	2	500L 11 Bar KIT	2
cAIR-TZV	cAIR-TZV-M2-7-HTM 02-01	2318	ZT-MED22-10 VSD	3	PMA-M2-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
cAIR-QZV	cAIR-QZV-L1-7-HTM 02-01	3825	ZT-MED18-10 VSD	4	PMA-L1-10/7	1000L 11 Bar	2	1000L 11 Bar KIT	2
cAIR-QZV	cAIR-QZV-L2-7-HTM 02-01	4637	ZT-MED22-10 VSD	4	PMA-L2-10/7	1500L 11 Bar	2	1500L 11 Bar KIT	2
cAIR-PZV	cAIR-PZV-L3-7-HTM 02-01	5507	ZT-MED18-10 VSD	5	PMA-L3-10/7	1500L 11 Bar	2	1500L 11 Bar KIT	2
cAIR-PZV	cAIR-PZV-L3-7-HTM 02-01	7163	ZT-MED22-10 VSD	5	PMA-L3-10/7	2000L 11 Bar	2	2000L 11 Bar KIT	2

Note - This list just shows the typical combinations of medical air supply system. The combinations are not released as a package. The compressor, PMA dryer and vessel still need to be ordered via separate part numbers.

Dryer Selection Table

Dryer Taxonomy

PMA	-	M1	-	10	/	7

Nomenclature	Description
PMA	Model name
M1	Platform size
10	Inlet pressure (bar)
7	Output pressure (bar)

Model Description	Maximum Inlet Pressure (Bar)	Minimum Outlet Pressure (Bar)	Maximum Inlet Flow (l/min)	Maximum Outlet Flow (l/min)	Part Number Without Hopcalite	Part Number With Hopcalite
PMA-S1-7/4	7	4	300	252	4109004760	4109006000
PMA-S2-7/4	7	4	550	462	4109004761	4109006001
PMA-S3-7/4	7	4	859	722	4109004762	4109006002
PMA-S4-7/4	7	4	1150	966	4109004763	4109005785
PMA-M1-7/4	7	4	1650	1386	4109004764	4109006003
PMA-M2-7/4	7	4	2000	1680	4109004765	4109006004
PMA-M3-7/4	7	4	2300	1932	4109004766	4109006005
PMA-L1-7/4	7	4	3300	2772	4109004767	4109006006
PMA-L2-7/4	7	4	4000	3360	4109004768	4109006007
PMA-L3-7/4	7	4	6200	5208	4109004769	4109006008
PMA-XL1-7/4	7	4	8520	7158	4109005095	–
PMA-XL2-7/4	7	4	8520	7158	-	4109005096
PMA-S1-10/7	10	7	414	348	4109004770	4109006009
PMA-S2-10/7	10	7	759	638	4109004771	4109006010
PMA-S3-10/7	10	7	1186	996	4109004772	4109006011
PMA-S4-10/7	10	7	1587	1333	4109004773	4109006012
PMA-M1-10/7	10	7	2277	1913	4109004774	4109006013
PMA-M2-10/7	10	7	2760	2318	4109004775	4109006014
PMA-M3-10/7	10	7	3174	2666	4109004776	4109006015
PMA-L1-10/7	10	7	4554	3825	4109004777	4109006016
PMA-L2-10/7	10	7	5520	4637	4109004778	4109006017
PMA-L3-10/7	10	7	8556	7187	4109004779	4109006018
PMA-XL1-10/7	10	7	11040	9276	4109005107	–
PMA-XL2-10/7	10	7	11040	9276	-	4109005108
PMA-S1-13/10	13	10	525	441	4109004780	4109006019
PMA-S2-13/10	13	10	963	809	4109004781	4109006020
PMA-S3-13/10	13	10	1503	1263	4109004782	4109006021
PMA-S4-13/10	13	10	2013	1691	4109004783	4109006022
PMA-M1-13/10	13	10	2888	2426	4109004784	4109006023
PMA-M2-13/10	13	10	3500	2940	4109004785	4109006024
PMA-M3-13/10	13	10	4025	3381	4109004786	4109006025

Model Description	Maximum Inlet Pressure (Bar)	Minimum Outlet Pressure (Bar)	Maximum Inlet Flow (l/min)	Maximum Outlet Flow (l/min)	Part Number Without Hopcalite	Part Number With Hopcalite
PMA-L1-13/10	13	10	5775	4851	4109004787	4109006026
PMA-L2-13/10	13	10	7000	5880	4109004788	4109006027
PMA-L3-13/10	13	10	10850	9114	4109004789	4109006028
PMA-XL1-13/10	13	10	13980	11742	4109005119	-
PMA-XL2-13/10	13	10	13980	11742	-	4109005120

1. PMA-XL1 is equipped with QD+ filter, which does not have hopcalite catalysator. PMA-XL2 is equipped with QDT+ filter, which has hopcalite catalysator.
2. The standard inlet temperature condition of PMA is 35°C. If the actual inlet temperature is higher than 35°C, correction factor should be considered.
3. The maximum outlet flow is calculated based on 16% purge loss.

Inlet Temperature (°C)	25	30	35	40	45	50
Correction Factor	1	1	1	0.97	0.88	0.73

Compressor Selection Table

Fixed Speed -SF-MED - 50 Hz

Model Name	SF2 MED	SF4 MED	SF6 MED	SF8+ MED	SF11+ MED	SF15+ MED	SF17+ MED	SF22+ MED
Output flow (litres/minute) 8 bar variant *	252	402	588	804	1266	1632	1890	2466
Output flow (litres/minute) 10 bar variant *	204	354	456	678	900	1356	1410	1782
Footprint L x W x H (mm)	750 X 640 X 835	750 X 640 X 835	750 X 640 X 835	1628 X 750 X 1230	1628 X 750 X 1230	1628 X 750 X 1844	1628 X 750 X 1844	1628 X 750 X 1844
Compressor weight (kg)	110	124	144	372	418	580	573	687
Service connection (mm)	15	15	15	28	28	28	28	28
Noise level/pump (dB[A])	55	57	59	63	63	63	64	65
Max ambient temperature (°C)	46	46	46	46	46	46	46	46
Supply voltage (v)	400	400	400	400	400	400	400	400
Supply frequency (Hz)	50	50	50	50	50	50	50	50
Nominal motor rating (kW)	2.2	3.7	5.5	7.4	11	14.8	16.5	22
Full load current per compressor (A)	3.6	7.2	10.8	17.7	22.5	35	38	50
Part Number - 8 bar ML (ISO)	4109004096	4109004098	4109004100	4109004862	4109004864	4109004866	4109004868	4109004870
Part Number - 10 bar ML (ISO)	4109004097	4109004099	4109004101	4109004863	4109004865	4109004867	4109004869	4109004871
Part Number - 8 bar ML (HTM)	4109004892**	4109004894**	4109004896	4109004898**	4109004900**	4109004902**	4109004904**	4109004906**
Part Number - 10 bar ML (HTM)	4109004893**	4109004895	4109004897**	4109004899**	4109004901**	4109004903	4109004905**	4109004907
Part Number - 8 bar MOM (ISO)	4109004108	4109004110	4109004112	4109004882	4109004884	4109004886	4109004888	4109004890
Part Number - 10 bar MOM (ISO)	4109004109	4109004111	4109004113	4109004883	4109004885	4109004887	4109004889	4109004891

* Output flow stated at reference conditions.

** These part numbers have not been released yet. If there is demand, please contact with Wuxi product company.

Variable Speed Drive - ZT VSD-MED - 50 Hz

Model Name	ZT18 VSD MED	ZT22 VSD MED	ZT30 VSD MED	ZT37 VSD MED	ZT45 VSD MED	ZT55 VSD MED
Output flow (litres/minute) 8 bar variants *	n/a	n/a	2472-4746	2472-5706	2466-6762	2484-8328
Output flow (litres/minute) 10 bar variants *	1182-2292	1182-2844	n/a	n/a	n/a	1940-7321
Footprint L x W x H (mm)	2195 X 1026 X 1621	2195 X 1026 X 1621	2440 X 1026 X 1880	2440 X 1026 X 1880	2440 X 1026 X 1880	2440 X 1026 X 1880
Compressor weight (kg)	1127	1120	1400	1430	1481	1485
Service connection (mm)	42	42	42	42	42	42
Noise level/pump (dB[A])	72	72	74	74	75	75
Max ambient temperature (°C)	46	46	46	46	46	46
Supply voltage - ML version (v)	380	380	380	380	380	380
Supply voltage - ASME version (v)	400	400	400	400	400	400
Supply frequency (Hz)	50	50	50	50	50	50
Nominal motor rating (kW)	18	22	30	37	45	55
Full load current per compressor (A)	32.5	39.7	54.1	66.8	81.2	99.2
Part Number - 8.6 bar ML (ISO)	n/a	n/a	4109004153	4109004154	4109004155	4109004156
Part Number - 10 bar ML (ISO)	4109005294	4109005295	n/a	4109005973	n/a	4109005974
Part Number - 8.6 bar ML (HTM)	n/a	n/a	4109004960**	4109004961**	4109004962**	4109004963**
Part Number - 10 bar ML (HTM)	4109004958**	4109004959**	n/a	n/a	n/a	n/a
Part Number - 10 bar ASME (HTM)	4109006189**	4109006190**	n/a	n/a	n/a	4109006188**

* Output flow stated at reference conditions.

** These part numbers have not been released yet. If there is demand, please contact with Wuxi product company.

Fixed Speed - ZT-MED - 50 Hz

Model Name	ZT15 MED	ZT18 MED	ZT22 MED	ZT30 MED	ZT37 MED	ZT45 MED
Output flow (litres/minute) 7.5 bar variant *	2286	2916	3576	4572	5712	6840
Output flow (litres/minute) 8.6 bar variant *	2130	2784	3240	4230	5460	6534
Output flow (litres/minute) 10 bar variant *	1824	2202	2736	n/a	n/a	n/a
Footprint L x W x H (mm)	1760 X 1026 X 1621	1760 X 1026 X 1621	1760 X 1026 X 1621	2005 X 1026 X 1880	2005 X 1026 X 1880	2005 X 1026 X 1880
Compressor weight (kg)	1025	1050	1065	1280	1355	1385
Service connection (mm)	42	42	42	42	42	42
Noise level/pump (dB[A])	68	70	72	69	71	73
Max ambient temperature (°C)	46	46	46	46	46	46
Supply voltage (v)	380	380	380	380	380	380
Supply frequency (Hz)	50	50	50	50	50	50
Nominal motor rating (kW)	15	18	22	30	37	45
Full load current per compressor (A)	27.1	32.5	39.7	54.1	66.8	81.2
Part Number - 7.5 bar ML (ISO)	4109005276	4109005279	4109005282	4109005960	4109005963	4109005966
Part Number - 8.6 bar ML (ISO)	4109005277	4109005280	4109005283	4109005961	4109005964	4109005967
Part Number - 10 bar ML (ISO)	4109005278	4109005281	4109005284	4109005962	4109005965	4109005968
Part Number - 7.5 bar ML (HTM)	4109004970**	4109004973**	4109004976**	4109004979**	4109004981**	4109004983**
Part Number - 8.6 bar ML (HTM)	4109004971**	4109004974**	4109004977**	4109004980**	4109004982**	4109004984**
Part Number - 10 bar ML (HTM)	4109004972**	4109004975**	4109004978**	n/a	n/a	n/a

* Output flow stated at reference conditions.

** These part numbers have not been released yet. If there is demand, please contact with Wuxi product company.

Receiver Selection Table

Receiver Capacity (litres)	300	500	1000	1500	2000	3000
Maximum working pressure (bar)	11	11	11	11	11	11
Individual Receiver Dimensions (diameter, height, mm)	500/1750	590/1982	800/2480	900/2872	1000/3075	1200/3548
Receiver Weight (kg)	155	178	380	600	800	1000
Receiver pipe size (mm)	28	28	42	42	42	42
Receiver Part Number	4109500506	4109500507	4109500508	4109500531	4109500509	4109500528
Receiver Kit *	4109400407	4109400408	4109400409	4109400436	4109400410	4109400434

Receiver Capacity (litres)	300	500	1000	1500	2000	3000
Maximum working pressure (bar)	14	14	14	14	14	14
Individual Receiver Dimensions (diameter, height, mm)	500/1750	590/1982	800/2480	900/2872	1000/3075	1200/3548
Receiver Weight (kg)	155	178	380	600	800	1000
Receiver pipe size (mm)	28	28	42	42	42	42
Receiver Part Number	4109500526	4109500527	4109500524	4109500532	4109500525	4109500529
Receiver Kit *	4109400430	4109400431	4109400432	4109400437	4109400433	4109400435

* Receiver kit for medical air receiver complete with data plate, pressure safety valve, zero-loss electronic drain valve (with isolation and bypass valve), pressure gauge (with isolation valve), copper inlet and outlet connection pipes (each with isolation valve).

Combined Air Plant Sizing Guide

In HTM02-01, the relative size of receiver capacity and compressor capacity on surgical air or combined medical/surgical air systems changes according to the design flow rate. In order to correctly calculate the receiver capacity and compressor capacity, both the medical and surgical design flow-rates (DF's) are required. It should be noted that for all combined air systems, an additional duplex regulating station (ordered separately) is needed to supply the medical air pipeline.

Surgical Air Compressors	
Design Flow (l/min)	Value 'A' FAD (l)
<500	0.33 x DF
500-3500	0.66 x DF
>3500	0.5 x DF

Table 1: Surgical Air Plant Flow Rate Multiplier Value 'A'

Steps on ordering Air Plant:

1. Determine total flow (l/min) required from dryer outlet and at what pressure (bar)
2. Select dryer model at what outlet pressure (bar)
3. Select compressor model at what outlet pressure (bar)
4. Select vessel(s) size with proper pressure relief valve

Example 1 - Small Day Treatment Centre (Upgrade)

Flow Rate and Dryer Sizing

Medical Air DF = 555 l/min (FAD) (4 Bar)
Surgical Air DF = 1138 l/min (FAD) (7 Bar)
Combined/total DF = 1693 l/min (FAD)
(7 Bar high pressure system)

A dryer greater than 1693 l/min outlet flow should be selected (outlet flow is the inlet flow minus purge losses)

= PMA-M1-10/7 inlet flow 2277 l/min, outlet flow 1913 l/min

Flow Rate and Compressor Sizing

From **Table 1,** surgical air DF is between 500-3500 l/min, so the multiplying factor 'A' = 0.66

Compressor flow rate = Med. DF + (Surg. DF x A)
= 555 + (1138 x 0.66)
= 555 + 751
= 1306 l/min

We also need to add the purge losses to the compressor output. For additional purge consumption use

PMA inlet - PMA outlet = purge losses l/min
= 2277 - 1913 = 364 l/min

Compressors should be selected with a flow rate greater than
1306 l/min + 364 l/min = 1670 l/min

Example: G15-MED at 2166 l/min (10 bar output), or
GA15 VSD+ MED at 2130 l/min (10 bar output)

Receiver Sizing

Surgical Air Compressors	
Design Flow (l/min)	Value 'B' Receiver water capacity (l)
<500	1 x 200% x DF
500-2000	2 x 66.6% x DF
2001-3500	2 x 50% x DF
>3500	3 x 33.3% x DF

Table 2: Surgical Air Receiver Multiplier Value 'B'

From **Table 2,** surgical air DF is between 500-2000 l/min, so the multiplying factor 'B' = 2 x 66.6%

Capacity = (Med. DF x 0.5) + (Surg. DF x B)
= (555 x 0.5) + (1138 x 2 x 0.66)
= 278 + 1502
= 1780 litres

A combination of receivers with a minimum number of 2 should be selected.

Selected receiver capacity = 2000 litres (2 x 1000 litre)

Plant System Selection

Selected plant capacity should be above calculated sizing value.

If no standard model is available for selection from the standard range a bespoke configuration of dryer, compressors and receivers are available and can be quoted by our sales and sales support teams.

Plant Ordering Example #1

HTM02-01 Combined Air Plant capable for 1693 l/min, to serve 4 bar for patient and 7 bar for surgical tools, with fixed speed oil-lubricated screw compressors.

Note: Duplex reducing sets are required when dual pipeline systems are supplied by one medical air plant system.

Plant selection:

cAIR-TGF-M1-7-HTM 02-01 50 Hz

(1802 l/min at 7 bar dryer output)

Item	Description	Part No.	Qty
Compressor	G15 MED 10 bar	4109000107	3
Purifier	PMA-M1-10/7	4109004774	1
Receiver	1000L 11 Bar	4109500508	2
Receiver kit	1000L 11 bar kit	4109400409	2

Example 2 - Large District Hospital

Flow Rate and Dryer Sizing

Medical Air DF = 3920 l/min (FAD) (4 Bar)

Surgical Air DF = 1138 l/min (FAD) (10 Bar)

Combined/total DF = 5058 l/min (FAD)*

(10 Bar high pressure system)

*Similar calculations applied as in Example 1

Plant Ordering Example #2

HTM2022 Combined Air Plant capable for 5058 l/min, to serve 4 bar for patient and 10 bar for surgical tools, with variable speed (VSD) oil-lubricated screw compressors.

Note: Duplex reducing sets are required when dual pipeline systems are supplied by one medical air plant system

Plant selection:

cAIR-DGV-L2-10-HTM 2022 50 Hz

(5780 l/min at 10 bar dryer output)

Item	Description	Part No.	Qty
Compressor	GA45 VSD+ -MED 13 bar	4109004860	2
Purifier	PMA-L2-13/10	4109004788	1
Receiver	3000L 14 bar	4109500529	1
Receiver kit	3000L 14 bar kit	4109400435	1

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