

## Oxygen Generator Systems

### Description

The Pneumatech MGS modular Oxyplant system shall provide medical quality oxygen into the hospital pipeline system, delivered at a pressure of 400 kPa (4 bar) gauge. The system shall use Atlas Copco compressors, dryer and filters, steel air receiver, PSA oxygen generator and steel oxygen receiver. The generator shall include a graphic LCD controller, oxygen sensor, inlet dewpoint sensor, outlet flow meter, safety purge function and outlet pressure regulator & filter.

### Operation

All components shall be self-controlled in such a way that no central controller is required. The compressor shall operate independently to the generators and shall run to maintain pressure in the air vessel with a typical set pressure of 700 kPa (7 bar) gauge. As soon as the pressure in the air vessel (TK01) reaches the set point, the compressor shall go into unload/stop mode. The generator shall run to maintain pressure in the oxygen buffer vessel at 400 kPa (4 bar) gauge, or up to a maximum pressure of 500 kPa (5 bar) gauge with an oxygen purity of 93%+/-3%. Pressure shall be measured in the oxygen buffer tank (TK02). When the pressure depletes, it reaches the start set-point and the generator will start producing oxygen. When the stop set-point is reached, the generator shall go in stand-by mode. The controller shall continuously monitor the oxygen purity and interact in case purity is too low.

Each generator shall be supplied with a safety purge function, consisting of a supply valve & purge line, to ensure that only the appropriate purity of oxygen is supplied to the hospital distribution pipeline. The delivery valve to the hospital will be closed when the oxygen purity falls below the set purity level (e.g. <90%; adjustable value). In order to flush the oxygen vessel, oxygen shall be blown off through the purge line until the oxygen purity is restored.

In cases using dual independent oxygen production lines (according to ISO 7396-1), the system will work with the following logic:

- One oxygen generation line shall be determined as duty and the other shall in turn be set up as back-up. It is recommended to switch between the lines once a week to balance the load of each line. With this procedure service intervals shall be extended providing equal running hours on all components.
- The system shall be pressure controlled. Each line has a different set pressure. The duty line has a start pressure of 430 kPa (4.3 bar) gauge and the back-up line a pressure of 400 kPa (4 bar) gauge. If the duty line is shut-down or the purge function is activated, the main line pressure will fall. When the back-up set pressure is reached (400 kPa, 4 bar), the back-up line will come online to maintain the main line pressure.

### Oxygen Generator

The oxyplant generator shall incorporate pressure swing absorption (PSA) technology and supplied as a plug & play component for simple installation on site, including oxygen monitoring, service indications and relevant alarms.

Non return valves shall be included to avoid back flow from the outlet of the generator. The vessels shall include chemically produced zeolite to adsorb specific types of molecules, such as water vapour or nitrogen. In order to protect the zeolite, the inlet air dewpoint shall be monitored with a dewpoint sensor and an alarm shall be triggered when the dewpoint is too high.

The oxyplant generator shall include an oxygen sensor for continuous, online measurement of oxygen purity and shall be provided with a calibration report delivered with every unit. The sensor shall be insulated by solenoid valves during standstill to provide longer sensor lifetime. An inlet pressure regulator shall be included to reduce the inlet pressure to a maximum working pressure of 650 kPa (6.5 bar) gauge.

The oxygen purity produced shall be 93%+/-3% with a compressed air inlet quality in accordance with ISO 8573-1 Class 1-4-1 and an oxygen outlet quality in accordance with ISO 8573-1 Class 1-2-1. A silencer shall be included to reduce the noise level during regeneration. This silencer shall have a connection to allow the permeate to be ducted outside the plant room.

### Control System

The oxygen generator Elektronikon Mk5 control system shall provide an intelligent human-machine interface including a real-time clock for recording operational parameters in the event log.

The controller shall give a continuous read-out of the inlet dewpoint, outlet pressure, oxygen purity and flow rate. The control system shall provide analog output signals for inlet dewpoint, oxygen purity & flow rate. The control system shall include BMS connections to indicate normal operation, a general fault condition, low purity alarm and shutdown.

### Specifications

- Supply voltage: 110-240V 50/60Hz (oxygen generator)
- Power consumption: 200W max (oxygen generator)
- Protection degree: IP54 (Nema 3S) (oxygen generator)
- Operation at a maximum ambient temperature of 45°C
- Compressor 750 kPa (7.5 bar) gauge including EFF1 (CEMEP) rated TEFC, IP55 class F electric motors. Incorporating maintenance-free bearings greased for life
- Dryer 3°C PDP at 45°C
- Air receivers PED approved, supplied with safety valve, gauge & relevant test certificates.
- Oxygen vessel of steel construction and approved according to Fluid Group 1
- The oxygen generators shall produce oxygen compliant with the United States Pharmacopeia (USP) and European Pharmacopeia (EurPh) monograph for Oxygen 93.

### Features

- Factory tested
- Zeolite providing infinite lifetime (if the dryers and filters are properly serviced)
- Valves degreased for oxygen use are provided with an oxygen certificate, delivered with every unit
- Zirconia oxygen sensor included on generator for long life and low maintenance
- Atlas Copco's GA oil flooded rotary screw compressor
- Atlas Copco's FX refrigerant dryer module
- Atlas Copco UD+, QDT and PDP+ high efficiency filters



## Options

- High pressure booster using oil free pistons shall be provided suitable for the on-site filling of oxygen cylinders up to 15,000 kPa (150 bar) gauge or 20,000 kPa (200 bar) gauge (maximum pressure depending on flow size).
- Filling ramp for on site cylinder filling consisting of a high pressure bar with individual isolation valves at each cylinder connection. The cylinders shall be protected from over pressurising by a safety pressure relief valve and shall include a pressure gauge. The filling ramp shall be tested up to 30,000 kPa (300 bar) gauge and shall be supplied complete with test certificate (cylinders are NOT included).

## Oxyplant - 50 Hz

Model	Part No	Capacity*		Compressor	Dryer	UD+ Filter	QDT Filter	PDp+ Filter	Air Receiver	Generator	Oxygen Buffer Tank
		(lpm)	(cfm)								
Oxyplant 4	8102341660	54	2.0	GA5P-7,5 CE	FX6 (A5)	UD25+	QDT20	PDp20+	250 L	OGP4 MED	150L
Oxyplant 6	8102341661	90	3.1	GA7P-7,5 CE	FX7 (A6)	UD45+	QDT45	PDp35+	250 L	OGP6 MED	150L
Oxyplant 8	8102341662	120	4.3	GA11P-7,5 CE	FX9 (E7.5)	UD45+	QDT45	PDp35+	250 L	OGP8 MED	280L
Oxyplant 10	8102341663	144	5.0	GA11+P A 7,5 APB	FX10 (E8)	UD60+	QDT60	PDp50+	500 L	OGP10 MED	500L
Oxyplant 14	8102341664	222	7.8	GA15+P A 7,5 APB	FX11 (E9)	UD100+	QDT95	PDp70+	500 L	OGP14 MED	500L
Oxyplant 18	8102341665	300	10.5	GA18+P A 7,5 APB	FX12 (E10)	UD100+	QDT95	PDp70+	500 L	OGP18 MED	500L
Oxyplant 20	8102341666	318	11.2	GA22+P A 7,5 APB	FX15 (A13)	UD140+	QDT150	PDp130+	1000 L	OGP20 MED	1000L
Oxyplant 29	8102341668	450	16.0	GA30+P A 7,5 APB	FX16 (A14)	UD140+	QDT150	PDp130+	1000 L	OGP29 MED	1000L
Oxyplant 45	8102341670	702	24.7	GA45+P A 7,5 APB	FX18 (E16)	UD180+	QDT185	PDp170+	2000 L	OGP45 MED	1500L
Oxyplant 55	8102341671	852	30.1	GA55P A 7,5 APB	FX18 (E16)	UD220+	QDT245	PDp210+	2000 L	OGP55 MED	2000L
Oxyplant 65	8102341672	1,050	37.2	GA75P A 7,5 APB	FX19,5 (A17,5)	UD310+	QDT310	PDp310+	2000 L	OGP65 MED	2000L
Oxyplant 84	8102341673	1,302	46.0	GA90P A 7,5 APB	FX20 (A18)	UD310+	QDT310	PDp310+	2000 L	OGP84 MED	2000L

## Oxyplant - 60 Hz

Model	Part No	Capacity*		Compressor	Dryer	UD+ Filter	QDT Filter	PDp+ Filter	Air Receiver	Generator	Oxygen Buffer Tank
		(lpm)	(cfm)								
Oxyplant 4	8102341680	54	2.0	GA5P-100 APL	FX6 (A5)	UD25+	QDT20	PDp20+	250 L	OGP4 MED	150L
Oxyplant 6	8102341681	90	3.1	GA7P-100 APL	FX7 (A6)	UD45+	QDT45	PDp35+	250 L	OGP6 MED	150L
Oxyplant 8	8102341682	120	4.3	GA11P-100 APL	FX9 (E7,5)	UD45+	QDT45	PDp35+	250 L	OGP8 MED	280L
Oxyplant 10	8102341683	144	5.0	GA11+P A 100 APB	FX10 (E8)	UD60+	QDT60	PDp50+	500 L	OGP10 MED	500L
Oxyplant 14	8102341684	222	7.8	GA15+P A 100 APB	FX11 (E9)	UD100+	QDT95	PDp70+	500 L	OGP14 MED	500L
Oxyplant 18	8102341685	300	10.5	GA18+P A 100 APB	FX12 (E10)	UD100+	QDT95	PDp70+	500 L	OGP18 MED	500L
Oxyplant 20	8102341686	318	11.2	GA22+P A 100 APB	FX15 (A13)	UD140+	QDT150	PDp130+	1000 L	OGP20 MED	1000L
Oxyplant 29	8102341688	450	16.0	GA30+P A 100 APB	FX16 (A14)	UD140+	QDT150	PDp130+	1000 L	OGP29 MED	1000L
Oxyplant 45	8102341690	702	24.7	GA45+P A 100 APB	FX18 (E16)	UD180+	QDT185	PDp170+	2000 L	OGP45 MED	1500L
Oxyplant 55	8102341691	852	30.1	GA55P A 100 APB	FX18 (E16)	UD220+	QDT245	PDp210+	2000 L	OGP55 MED	2000L
Oxyplant 65	8102341692	1,050	37.2	GA75P A 100 APB	FX19,5 (A17,5)	UD310+	QDT310	PDp310+	2000 L	OGP65 MED	2000L
Oxyplant 84	8102341693	1,302	46.0	GA90P A 100 APB	FX20 (A18)	UD310+	QDT310	PDp310+	2000 L	OGP84 MED	2000L

\* Output at 93% concentration, 20°C ambient, 20°C inlet air, 6.5 bar (94.3 psig) inlet pressure. Oxygen concentration varies with demand. Correction factors apply for temperatures above 20°C. See Flow Factoring Tables for more details.



## Compressor Selection Table (Oil-injected screw technology - Fixed Speed)

Model	Voltage / Frequency	Part No	Nominal Pressure	Nominal Motor Rating (kW)	Nosie level (dB[A])	Max Ambient Temp (°C)	Footprint L x W x H (mm)	Weight (kg)
GA5P	400 50 380 60	8153 0001 64 8153 0034 08	7.5 bar 100 psi	5.8 5.8	60	46	1250 x 820 x 1420	280
GA7P	400 50 380 60	8153 0002 06 8153 0034 40	7.5 bar 100 psi	8.5 8	61	46	1250 x 820 x 1420	270
GA11P	400 50 380 60	8153 0002 48 8153 0034 81	7.5 bar 100 psi	12.6 12	62	46	1250 x 820 x 1420	300
GA11+P	400 50 380 60	8152 7005 66 8152 7053 67	7.5 bar 100 psi	12.5 12.8	63	46	1255 x 692 x 1475	410
GA15+P	400 50 380 60	8152 7006 08 8152 7054 09	7.5 bar 100 psi	16.2 16.6	64	46	1255 x 692 x 1475	420
GA18+P	400 50 380 60	8152 7006 40 8152 7054 41	7.5 bar 100 psi	20.2 20.6	65	46	1255 x 692 x 1475	440
GA22+P	400 50 380 60	8152 7006 81 8152 7054 82	7.5 bar 100 psi	23.8 24.4	66	46	1255 x 692 x 1475	455
GA30+P	400 50 380 60	8153 5654 06 8153 5730 04	7.5 bar 100 psi	36.5 36.7	65	46	1766 x 970 x 1800	817
GA45+P	400 50 380 60	8153 5655 62 8153 5731 60	7.5 bar 100 psi	55.7 55.8	66	46	1766 x 970 x 1800	970
GA55P	400 50 380 60	8153 5853 88 8153 5926 08	7.5 bar 100 psi	58.4 65.7	69	46	2248 x 1080 x 1955	1229
GA75P	400 50 380 60	8153 5854 20 8153 5926 40	7.5 bar 100 psi	82.6 86.9	73	46	2248 x 1080 x 1955	1259
GA90P	400 50 380 60	8153 5855 37 8153 5927 56	7.5 bar 100 psi	96.7 106.5	73	46	2248 x 1080 x 1955	1425

\* All figures are stated at 50Hz then 60Hz

\*\* Figures stated at reference conditions

\*\*\* MOM standard compressors are available on request including 3rd party certification of the internal pressurised vessel

## Oxygen Generator Selection Table

Model	Part Number	Oxygen Capacity*		Feed Air Required		Width (mm)	Length (mm)	Height (mm)
		(lpm)	(cfm)	(lpm)	(cfm)			
OGP4 MED	8102 9823 28	54	2.0	588	20.8	600	600	1650
OGP6 MED	8102 9823 30	90	3.1	1,098	38.8	900	800	1750
OGP8 MED	8102 9823 31	120	4.3	1,650	58.3	900	800	1750
OGP10 MED	8102 9823 32	144	5.0	1,692	59.8	1200	900	2100
OGP14 MED	8102 9823 33	222	7.8	2,400	84.8	1200	900	2100
OGP18 MED	8102 9823 34	300	10.5	3,102	109.5	1300	900	2400
OGP20 MED	8102 9823 35	318	11.2	3,498	123.5	1300	1000	2400
OGP29 MED	8102 9823 37	450	16.0	5,238	185.0	2000	1000	2500
OGP45 MED	8102 9823 39	702	24.7	8,400	296.6	2000	1000	3400
OGP55 MED	8102 9823 40	852	30.1	9,900	349.6	2000	1000	3400
OGP65 MED	8102 9823 41	1,050	37.2	12,800	452.0	2000	1000	3400
OGP84 MED	8102 9823 42	1,302	46.0	15,800	557.9	2200	2400	3200

\* Output at 93% concentration, 20°C ambient, 20°C inlet air, 6.5 bar (94.3 psig) inlet pressure. Concentration varies with demand. Correction factors apply for temperatures above 20°C. See Flow Factoring Tables for more details.



## Dryer Selection Table

Model	Voltage / Frequency	Part No	Footprint L x W x H (mm)	Weight (kg)
FX6	230 50 115 60	8102 2184 12 8102 2187 76	500 x 370 x 804	51
FX7	230 50 115 60	8102 2184 20 8102 2187 84	500 x 370 x 804	51
FX9	230 50 115 60	8102 2260 84 8102 2262 74	621 x 460 x 829	68
FX10	230 50 115 60	8102 2260 68 8102 2262 82	621 x 460 x 829	73
FX11	230 50 115 60	8102 2260 92 8102 2261 91	651 x 580 x 939	90
FX12	230 50 115 60	8102 2261 00 8102 2262 09	651 x 580 x 939	90
FX15	400 50 380 60	8102 2244 44 8102 2244 85	898 x 735 x 1002	158
FX16	400 50 380 60	8102 2244 51 8102 2244 93	898 x 735 x 1002	185
FX17	400 50 380 60	8102 2201 52 8102 2218 38	1082 x 1020 x 1535	365
FX18	400 50 380 60	8102 2263 40 8102 2263 81	1082 x 1020 x 1535	375
FX19,5	400 50 380 60	8102 2220 18 8102 2220 42	1123 x 1020 x 1551	380
FX20	400 50 380 60	8102 2201 86 8102 2218 61	2099 x 1020 x 1560	550

\* All figures are stated at 50Hz then 60Hz  
\*\* Figures stated at reference conditions

## Filter Selection Table

UD+ Filter			QDT Filter		
Model	Part No	Weight (kg)	Model	Part No	Weight (kg)
UD25+	8102 2976 71	1.3	QDT20	8102 2968 48	10
UD45+	8102 2976 89	1.6	QDT45	8102 2968 48	15
UD60+	8102 2977 05	2.1	QDT60	8102 2968 48	18
UD100+	8102 2977 13	3.7	QDT95	8102 2968 48	29
UD140+	8102 2977 21	4.2	QDT150	8102 2968 48	42
UD180+	8102 2977 39	4.5	QDT185	8102 2968 48	50
UD220+	8102 2977 47	4.6	QDT245	8102 2968 48	67
UD310+	8102 2977 54	6.9	QDT310	8102 2968 48	84

## PDp+ Filter Selection Table

Model	Part No	Weight (kg)
PDp20+	8102 2639 70	1.1
PDp35+	8102 2640 10	1.3
PDp50+	8102 2640 36	1.6
PDp70+	8102 2640 51	2.1
PDp130+	8102 2649 77	4.2
PDp170+	8102 2640 93	4.5
PDp210+	8102 2641 19	4.6
PDp310+	8102 2642 18	6.9



## Air Receiver Selection Table

Model*	Part No	Volume (liters)	Footprint D x H (mm)	Weight (kg)
250 L 11bar CE	8102 3405 70	250	457/2020	125
500 L 11bar CE	8102 3405 74	500	610/2105	195
1000 L 11bar CE	8102 3405 76	1000	762/2630	380
2000 L 11bar CE	8102 3405 80	20000	1067/2775	800

\* MOM air receivers are available on request including 3rd party certification

## Oxygen Buffer Tank Selection Table

Volume	Part No
150L	8102 9824 40
280L	8102 9824 41
500L	8102 9824 42
1000L	8102 9824 43
1500L	8102 9824 44
2000L	8102 9824 45

## High Pressure Booster Compressor Selection Table

Model	Part No	Power Rate (kW)	Flow		Cylinders per day B50 (water capacity 50L)*			Weight (kg)
			scfh	m <sup>3</sup> /h	2000 psi 137 bar	2200 psi 150 bar	2500 psi 172 bar	
Booster 0.5-1.0 scfm - 230V/1ph/50Hz	8102 3704 10	1,1	60	1,6	5,6	5,2	-	91
Booster 0.5-1.0 scfm - 115V/1ph/60Hz	8102 3704 11	1,1	60	1,6	5,6	5,2	-	91
Booster 1.0-2.0 scfm - 230V/1ph/50Hz	8102 3704 12	1,1	120	3,2	11	10	-	91
Booster 1.0-2.0 scfm - 115V/1ph/60Hz	8102 3704 13	1,1	120	3,2	11	10	-	91
Booster 1.0-2.0 scfm - 230V/1ph/60Hz	8102 3704 14	1,1	120	3,2	11	10	-	91
Booster 8-10 scfm - 380-415V/3ph/50Hz	8102 3704 15	7,5	600	16	56	52	45	408
Booster 8-10 scfm - 380-415V/3ph/60Hz	8102 3704 16	7,5	600	16	56	52	45	408
Booster 8-10 scfm - 208-230V/3ph/60Hz	8102 3704 17	7,5	600	16	56	52	45	408
Booster 17-20 scfm - 380-415V/3ph/50Hz	8102 3704 18	11	1200	32	113	103	90	839
Booster 17-20 scfm - 460V/3ph/60Hz	8102 3704 19	11	1200	32	113	103	90	839
Booster 17-20 scfm - 208-230V/3ph/60Hz	8102 3704 20	11	1200	32	113	103	90	839

\* Calculation based on commonly used cylinders B50 (water capacity 50 liters)

## Filling Ramp Selection Table

Model*	Part No	Footprint L x W x H (mm)	Weight (kg)
4 Cylinder filling ramp	8102 3704 21	1103 x 300 x 1865	23
6 Cylinder filling ramp	8102 3704 22	1620 x 300 x 1865	31
10 Cylinder filling ramp	8102 3704 23	2657 x 300 x 1865	48

\* Does not include cylinders



## Flow Factoring At Different Oxygen Purity Levels

Model	90% Purity				93% Purity				95% Purity			
	Oxygen Capacity		Feed Air Required		Oxygen Capacity		Feed Air Required		Oxygen Capacity		Feed Air Required	
	(lpm)	(cfm)	(cfm)	(Nm <sup>3</sup> /h)	(lpm)	(cfm)	(cfm)	(Nm <sup>3</sup> /h)	(lpm)	(cfm)	(cfm)	(Nm <sup>3</sup> /h)
Oxyplant 4	66	2.4	22.9	36.00	54	2.0	21.4	35.4	54	2.0	21.2	34.8
Oxyplant 6	120	4.1	45.8	72.00	90	3.1	37.5	66	90	3.1	36.9	64.8
Oxyplant 8	138	5	64.9	102.00	120	4.3	59.8	99	114	4.1	58.1	96
Oxyplant 10	174	6	64.9	102.00	144	5.0	58.3	101.4	138	4.8	57.9	100.8
Oxyplant 14	252	8.9	98.5	154.80	222	7.8	84.8	144	198	7.0	81.2	138
Oxyplant 18	330	11.6	120.2	189.00	300	10.5	109.0	186	252	8.9	98.5	168
Oxyplant 20	360	12.7	137.4	216.00	318	11.2	123.4	210	300	10.6	120.0	204
Oxyplant 29	516	18.3	206.1	324.00	450	16.0	185.8	314.4	432	15.3	182.0	307.8
Oxyplant 45	804	28.3	324.5	510.00	702	24.7	295.7	504	642	22.6	288.7	492
Oxyplant 55	990	35	397.0	624.00	852	30.1	350.0	594	798	28.2	339.4	576
Oxyplant 65	1170	41.4	500.1	786.00	1050	37.2	452.9	768	936	33.1	442.3	750
Oxyplant 84	1512	53.4	614.6	966.00	1302	46.0	557.9	948	1218	43.0	529.7	900

## Flow Factoring At Different Temperatures

Temperature (°C)	Temperature (°F)	Correction factor
10	50	1.00
15	59	1.00
20	68	1.00
25	77	0.98
30	86	0.91
35	95	0.82
40	104	0.74
45	113	0.60

