

# COMPLETE MEDICAL GAS SUPPLY SYSTEMS



**Strom  
Biomedikal**

Biomedikal Müh. ve Medikal Gaz Sistemleri

### 3.2 MEDICAL GAS CENTRAL STATIONS

#### 3.2.1 Supply Systems with Cylinders

The automatic change over decompression unit is designed to supply medical gas (oxygen-nitrous oxide-air-nitrogen-carbon dioxide) of any type of medical gas network, where continuity of supply is essential and where the pipeline is supplied from manifold high pressure gas cylinders.

This product complies with all current safety regulations and laws and is designed and tested to guarantee safety operation.

Automatic central manifold system for medical gases ( $O_2$ ,  $N_2O$ , Air,  $N_2$ ,  $CO_2$ ) with pressure reducers, high pressure shut-off valves, automatic change over unit, analogue sensors, cylinder ramps, flexible connections, pigtails, cylinder holders and emergency inlet point is according to EN ISO 7396-1 and HTM 02-01.

#### Automatic Change over Decompression Unit for Oxygen, Nitrous Oxide, Air, Nitrogen, Carbon Dioxide

The automatic change-over decompression units are composed of:

- A wall mounted box made of 1.5mm painted steel with door key-operated lock and window for reading pressures gauges.
- Two pressure regulators (OT 58) connected in parallel and linked respectively to the right and to the left manifold of cylinders. Each regulator is fitted with brass safety valve set at 13bar, with one pressure gauge diameter  $\varnothing 63\text{mm}$  for high pressure (315bar full range) and with outlet pressure adjustment screw.
- Two inlet filter with pressed brass body and bronze filter mesh.
- Two inlet high pressure valves.
- Two outlet low pressure valves.
- One automatic change over device (inverter) which is connected to the outlet of the regulators.
- One pressure gauge to indicates the network pressure.
- Two pressure transmitters for monitoring the pressure in the cylinders.

Models available with capacity from  $24\text{m}^3/\text{h}$  to  $180\text{m}^3/\text{h}$ .

MGCYLS 2 x m + 1 x n ;

m: R/L lots of cylinders

n: lots of reserve sources/vessels



24m<sup>3</sup>/h

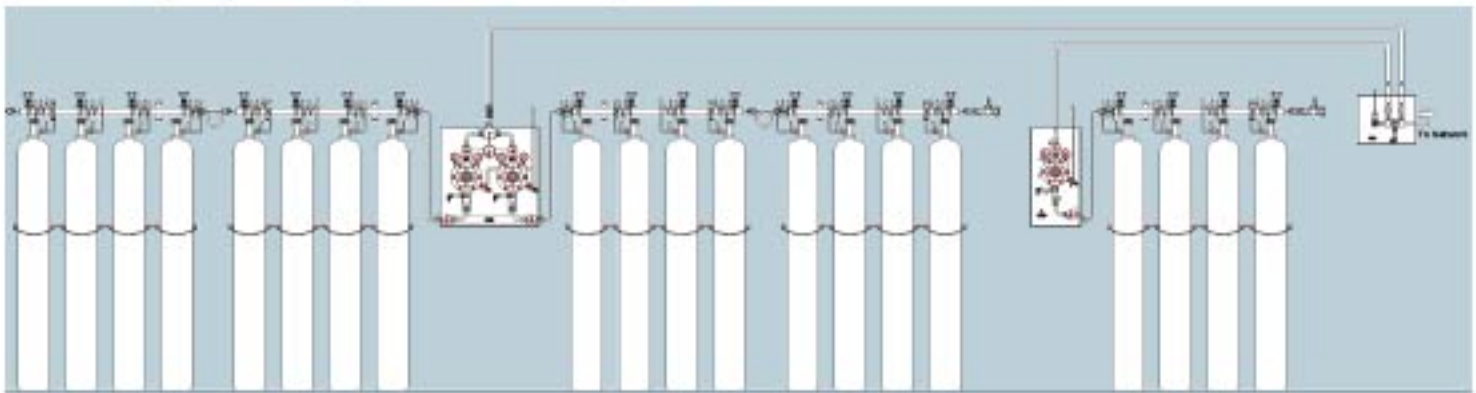


40m<sup>3</sup>/h



180m<sup>3</sup>/h

Typical lay-out Central Cylinder Station:  $180\text{m}^3/\text{h}$  according to ISO 7396-1



**Manifold - Cylinder Ramp**  
From 2 to 6 places



**Cylinder holder U-shape profile**  
1, 3, 5 places

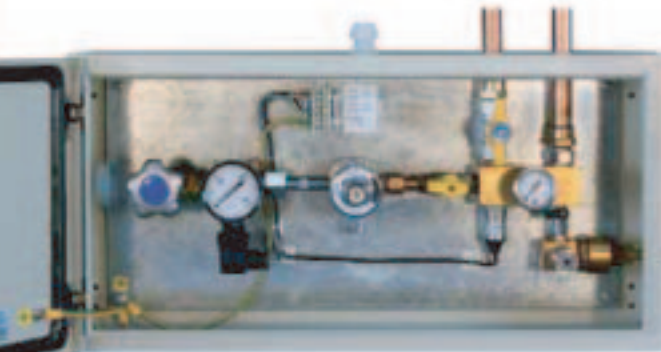


**Ping Tails**  
Flexible high-pressure connector



**3rd Aux Source**

3rd Aux Source Options	
Cylinder Station	24 m <sup>3</sup> /h
	40 m <sup>3</sup> /h
	180 m <sup>3</sup> /h
Vessel	75 m <sup>3</sup> /h
	180 m <sup>3</sup> /h



3rd Source 24 m<sup>3</sup>/h integrated with Emergency Inlet Point



3rd Aux Source  
Cylinder Station 180 m<sup>3</sup>/h

Available connections for ping tails		
NFS	NFE29 650	NFL
BSS	BS-341 nr.3	BSL
CGS	CGA V-1 nr.540	CGL
DNS	DIN 477-1 nr.9	DNL
UNS	UNI 4406	UNL



Vessel Reducer 180 m<sup>3</sup>/h

**Emergency Inlet Point**

The oxygen, nitrous oxide, compressed air emergency metallic panel complies with ISO 9376-1 standard and consists of:

- main shut off valve
- emergency hose of NIST type according to model EN 739
- manometer
- safety valve
- in-line pressure sensor
- other sources inlet points



### 3.2.2 Medical Vacuum Systems (MVCS series)

Vacuum central station consists of one, two or three vacuum pumps.

The vacuum system is design to operate according to ISO 7396-1, BS HTM 2022 standards.



Medical Vacuum central station Vertical



Medical Vacuum central station Horizontal



The duty vacuum pump is rated at 100% of the installation design flow rate and a standby pump capable of automatic operation is fitted (if needed). The vacuum plant design is enable isolation of any one component without interrupting system operation.

#### MVCS 3xV+Vs C/H/V

V: volume of source (m<sup>3</sup>/h)

Vs: total volume of vessels (lit)

C: compact form

H: horizontal form

V: vertical form

The vacuum center usually incorporates the following elements:

- One, two or three blade type rotary vacuum pumps, with inlet filter, air cooling, internal oil circulation, oil mist eliminator for oil-free exhaust air. Suction capacities from 12 m<sup>3</sup>/h to 600 m<sup>3</sup>/h.
- Vacuum tank, capacity according with pumps load.
- Electronic control panel for controlling the operation of the pumps
- Electrical panel for driving the pumps
- Vacuum sensors transducer 4-20mA and digital sensor (optional) for operation
- Vacuum gauges 0-760 mm Hg.
- No-return valves.
- Anti-bacterial filters 99,999% efficient according BS 3928, with differential pressure indicator and sterilisable drain flask.
- Sectioning valves.
- Distance alarm.

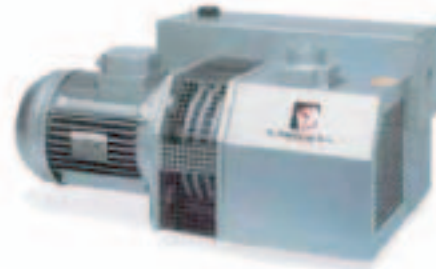


Medical Vacuum central station Compact

## Components

### I. Vacuum pumps

Vacuum pump model	Nominal Capacity m³/h		Motor Power kW		dB(A)
	50Hz	60Hz	50Hz	60Hz	
<i>Oil-lubricated pumps (ph &amp; T-ph)</i>					
P12	12	14,4	0,25	0,25	67
E17	17	20	0,55	0,66	59
P28	28	33	0,75	0,75	61
E25	30	36	0,75	0,90	60
P40	40	48	1,10	1,10	67
E40	47	56	1,10	1,30	62
P60	60	72	1,50	1,50	67
E65	65	78	1,50	1,80	65
E100	96	115	2,20	2,64	67
P100	100	120	3,00	3,00	73
E150	150	180	3,00	3,60	70
E200	190	228	4,00	4,80	71
P220	220	260	5,50	5,50	76
E300	288	345	5,50	6,60	73
P340	340	405	9,20	9,20	76
E350	360	432	7,50	9,00	74
E500	513	616	11,00	13,20	74
E600	632	758	15,00	18,00	75
<i>Oil-free piston pumps (ph, 230V - 50/60Hz)</i>					
12	10	12,3	0,36	0,36	57



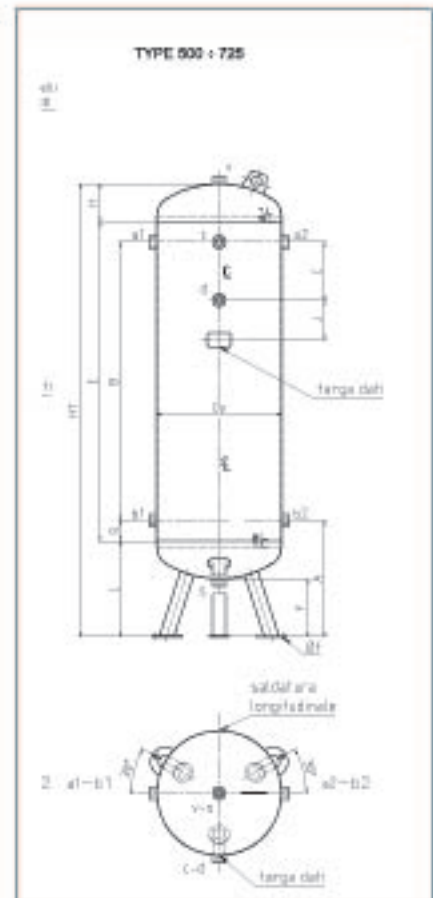
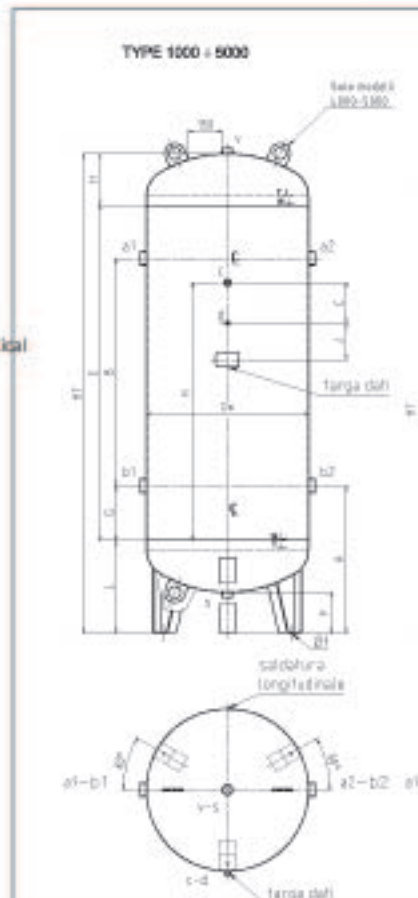
### II. Vessels

Capacity (lit)	Horizontal		Vertical	
	Horizontal	Vertical	Horizontal	Vertical
270	•			
500	•	•	•	•
1000	•	•	•	•
1500	•	•	•	•
2000	•	•	•	•
3000		•	•	•
4000		•	•	•
5000		•	•	•

Pressure: -1bar

Test pressure: 16,5bar

Temperature (min.- max.): -10°C + +50°C

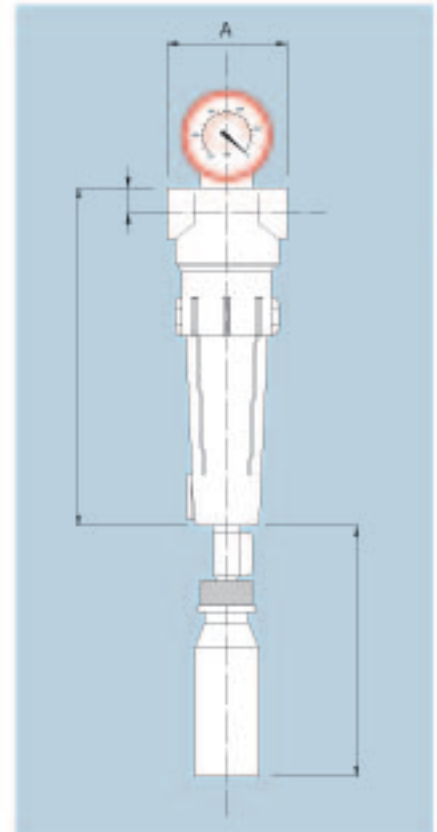


### III. Filters

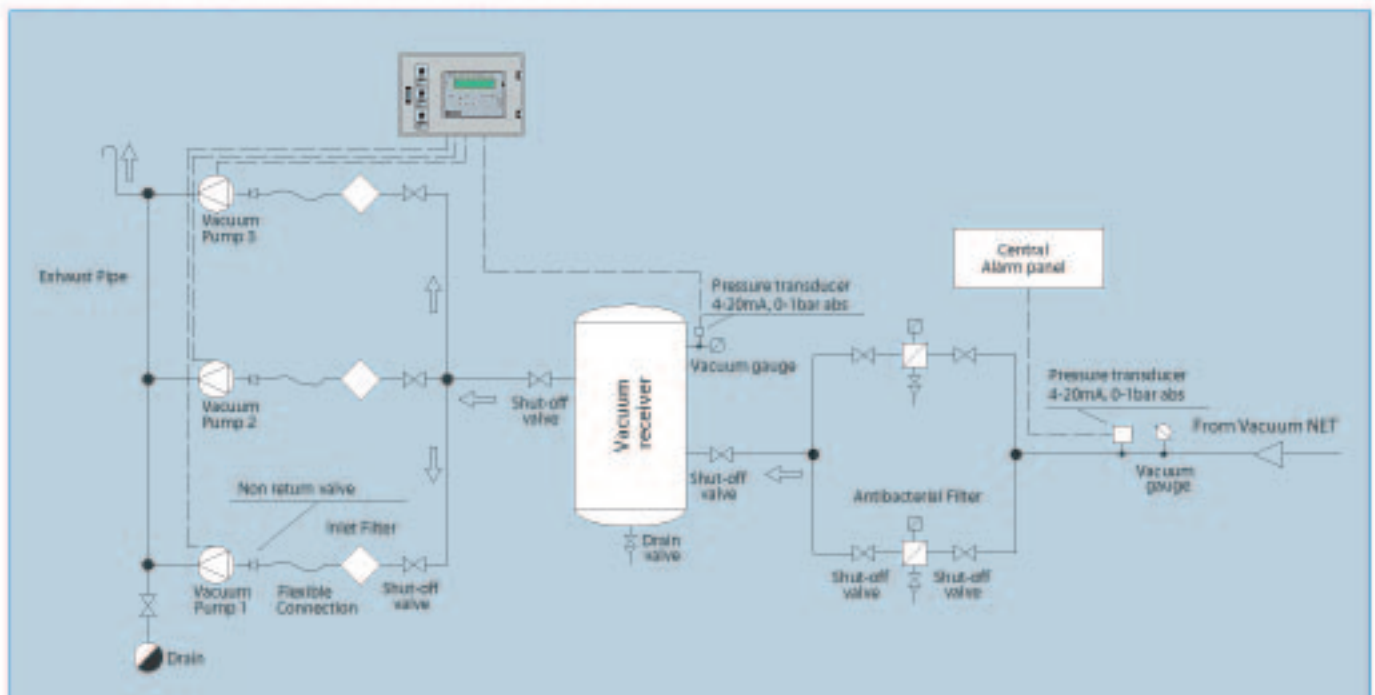
Filter	Connectors	Air Flowrate @ 500mmHg		Dimensions (mm)		
		Nm <sup>3</sup> /h	m <sup>3</sup> /h	A	B	C
100	1/2"	15	45	93	263	20
180	3/4"	25	75	125	285	30
290	1"	40	120	125	385	30
460	1 1/4"	85	255	160	405	38
610	1 1/2"	110	330	160	505	38
930	2"	170	510	190	537	52
1050	2 1/2"	192	576	190	637	52

Vacuum degree (mmHg)	Correction factor
0	1
380	2
570	4
630	6
660	8
685	10

For Vacuum grade different from 500mmHg multiply the flow in Nm<sup>3</sup>/h for correction factor



Typical lay-out Medical Vacuum Central Station according to ISO 7396-1



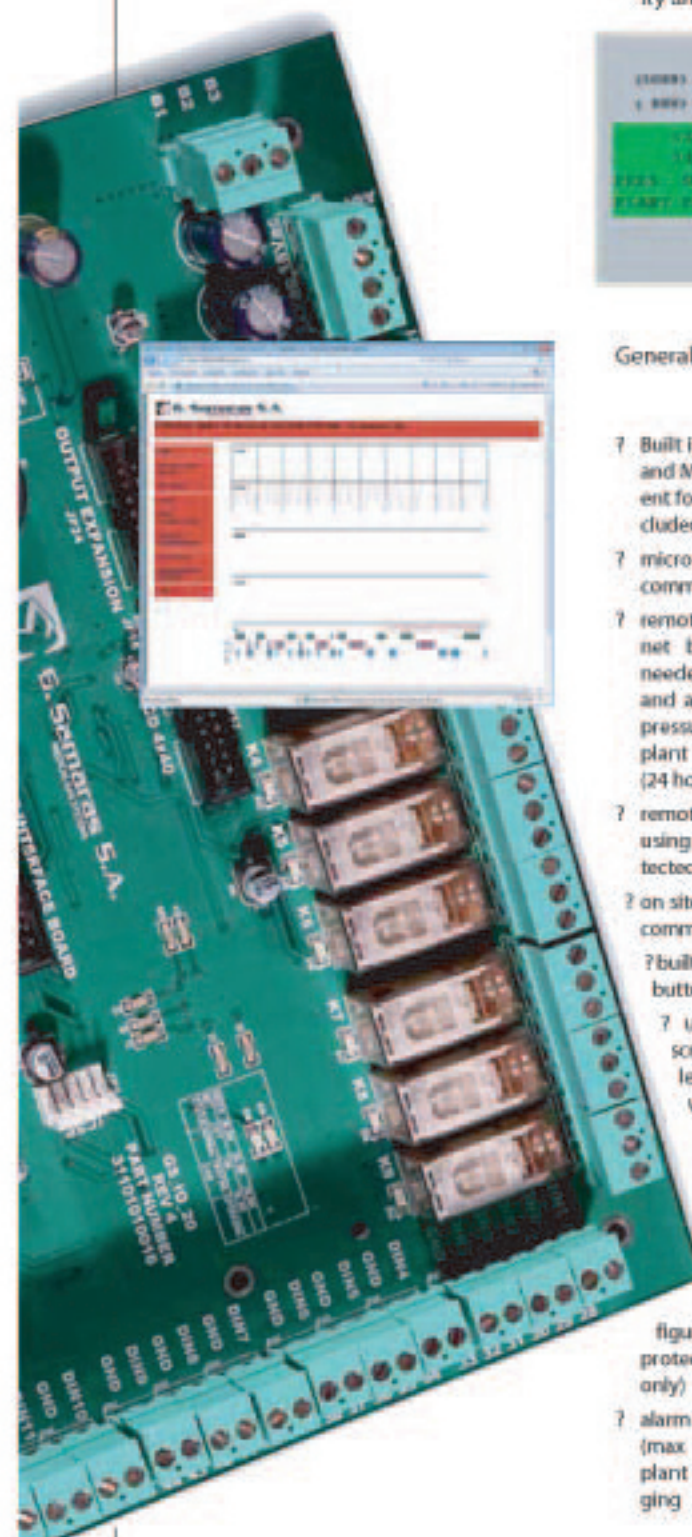
#### IV. Electronic control panel for controlling the operation of the pumps

The MGS Vacuum control panel is a fully electronic automatic, controller and monitoring device of the whole vacuum plant. The MGS Vacuum control panel is built on latest technology microcontroller and provides superior reliability, functionality and flexibility.



#### General features of MGS Vacuum control panel:

- 7 Built in three transfer switches for AUTO and MANUAL mode selection, independent for each source. OFF position also included
- 7 microprocessor based design, Ethernet communication supported,
- 7 remote access via Ethernet by any internet browser, no additional software needed. On line remote system viewing and additional daily graphs for all Net pressures: ( data logging function ) for plant pressure monitoring and analysis (24 hours depth, 1 sample per 15 sec)
- 7 remote parameter settings via Ethernet using any internet browser (code protected area for authorized staff only)
- 7 on site firmware upgrade capability via a common USB memory stick
  - 7 built in buzzer, SILENCE button and TEST button
  - 7 user friendly interface via built in LCD screen, 4x40 characters and additional led indicators for sources and net work pressure, functionality according to ISO 7396-1, HTM 02-01
    - 7 multi language support and text messages for all conditions; emergency alarms and events for real time status viewing
    - 7 user programmable configuration and parameter settings (code protected area for authorized personnel only)
- 7 alarm / events / services report and log file (max 250 records with time stamp) for plant performance analysis and debugging
- 7 cyclic operation of sources based on time balance operation, 3 independent timers for load and run time measurement of each source
- 7 Additional capability of primary Net pressure measurement redundancy for enhancing the system's reliability, using an extra digital pressure sensor connected to digital input (built in auto transfer algorithm for operation via the digital pressure switch if the primary analog pressure transducer failed)
- 7 self test procedures and diagnostics utilities included for system integrity, communication and wiring testing
- 7 real time clock with battery back up
- 7 15 analog inputs, (4...20 mA transducer).
- 7 12 digital inputs NO/NC and enabling/disabling capability
  - + filters performance monitoring,
  - + power supply over/under voltage monitoring
  - + phase sequence monitoring,
  - + thermal protection and operation status monitoring of each source independently
- 7 9 digital outputs (relay output, 12A / 250 Vac)
- 7 dry contacts for remote signaling and interface with other monitoring systems (BMS etc)
- 7 independent dry contact (relay NC / NO) for temperature controller function
- 7 Battery back up system and DC UPS capability with mains power failure signaling function



### 3.2.3 Medical Air Compressor Systems (MACS series)

Air compressor system with three or more compressors, two or more reservoirs, one duplex conditioning system (absorption dryers, pre-filters, activated charcoal filters, particle filters and dew point alarm), emergency inlet point and electronic control panel is according to EN ISO 7396-1 and HTM 02-01.

*A wide range of capacities from 10m<sup>3</sup>/h to 1.000m<sup>3</sup>/h are available to satisfy any request.*

The fully automatic medical compressed air plant provides a reliable and constant air supply, in predefined pressure level, without the transport and management cost associated with heavy gas cylinders. The plant is designed to operate at a maximum of 10bar. A wide range of models are available to satisfy all types of installations.

The automatic control-monitor unit monitors continuously the medical air net pressure via the electronic pressure transducer and regulates the network pressure via controlling the operation (remote start and stop) of the compressors (individually controlled). In every demand, as long as the vessel buffer is exhausted, the first compressor is automatically starts and works until the predetermined pressure level is achieved. In case of larger demand that the one compressor cannot meet, then a second or a third compressor automatically starts working until the predetermined pressure level for each compressor has been achieved. The operation and rotation mode in every operation cycle is defined by the automatic control-monitor unit.

The rotation mode is depending on the operation hours of every compressor, in order to have equable wear for all the compressors. In every operation cycle, the compressor

#### MACS series 3 xV+ Vs

V: Volume of source (m<sup>3</sup>/h)

Vs: Total volume of vessels (lt)

C: Compact form

D: Discrete form

Medical Air central station





holds the minimum operation hour start working. Also there is an option, by activating a parameter on the automatic control unit, according to which if the compressor working cannot reach the predefined pressure level, then a second or a third compressor automatically starts working and so on. The automatic control unit can be connected to hospital's local area network providing remote monitoring and setting through TCP/IP protocol using an internet browser.

The major subsystems/elements of Automatic Compressed Medical Air Station are:

1. Three (3) electrically driven air compressors, connected directly with 3Ph electrical motors, that constitute a solid unit
2. Air receivers according to DIN of 4810 (capacity depends on model). The receivers are galvanized inside-outside
3. The required piping
4. A group of double pre-filters in parallel connection (one in operation and one in stand by mode), each rated at full flow rate of the medical Air central station
5. Two (2) absorption or refrigerator type dryers
6. A group of double oil coalescing filter, activated carbon filter, dust filter and a sterile filter is used in order to provide quality medical air as defined ISO 8573.1. This group includes two (2) filters of every category in parallel connection (one in operation and one in stand by mode), each rated at full flow rate of the medical Air central station, with overall switches in the entry, connections, with differential manometers for the control of cleanliness of filters.
7. Analogue pressure sensor (transducer) that measures the network pressure. It is the sensing element of the Automatic control unit, used for regulating the air pressure level and alarm monitoring.
8. Analogue sensor (transducer) that measures the network's medical air humidity (dew point level)
9. Emergency inlet point
10. Automatic control-monitor unit, an electronic waterproof control panel which is the operating, indicating and alarm system of the Medical Air Central Station.
11. Analogue sensor that measures CO<sub>2</sub> – CO – SO<sub>2</sub> and 77 concentration (optional)

#### Produced medical air quality – surgical tools air

The quality of produced compressed medical air is according to ISO of 8573.1 group 1.2.1 (0,1µ /-40°C / 0,01ppm – dust/water/oil) and according to the European Pharmacopoeia 5.4.1.4/5 with the following maximum contents in oil 0,5 ppm, humidity 60 ppm, carbon monoxide 5 ppm, carbon dioxide 500 ppm, dust of diameter 0,01 micron, mixture NO and NO<sub>2</sub> 2ppm, SO<sub>2</sub> 1 ppm. All sizes referring to regular conditions of pressure and temperature.

The produced medical air have the following characteristics:

Medical air specifications		
1	Oxygen concentration	? 20,4% and ? 21,4%
2	Oil concentration	? 0,1mg/m <sup>3</sup> @ 1 bar abs
3	Carbon monoxide concentration	? 5ml/m <sup>3</sup>
4	Carbon dioxide concentration	? 500ml/m <sup>3</sup>
5	Steam concentration	? 67ml/m <sup>3</sup>
6	Sulfur dioxide concentration	? 1ml/m <sup>3</sup>
7	??+??2 concentration	? 2ml/m <sup>3</sup>

The produced air for surgical tools use have the following characteristics:

Surgical tools air specifications		
1	Oil concentration	? 0,1mg/m <sup>3</sup> @ 1 bar abs
2	Steam concentration	? 67ml/m <sup>3</sup>



# PRODUCT PORTFOLIO

## Medical Gas Central Stations

### 1. Air compressors

Air compressors Type	Nominal Capacity (m <sup>3</sup> /min) (m <sup>3</sup> /h)	Outlet Motor Power Hp KW	Pressure bar	Noise Weight Kgr dB
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#### I. OIL FREE COMPRESSOR 230/50Hz (one phase)

SD1	0.18 10.80	1.50hp 1.10kw	8.0	
SD2	0.23 13.80	2.00hp 1.50kw	8.0	



#### II. COAXIAL LUBRICATED COMPRESSOR ONE PHASE (one phase)

SD4	0.27 16.20	2.50hp 1.80kw	8.0	
SDV	0.36 21.60	3.00hp 2.20kw	9.0	

#### III. FORTIS - ON RECOVER STANDARD PISTON



#### COAXIAL VERSION (Volt/ 50Hz)

240/24F	0.20 12.0	1.5 1.1	8.0	24
240/24	0.22 13.2	2.0 1.5	8.0	24
240/50F	0.20 12.0	1.5 1.1	8.0	50
240/50	0.22 13.2	2.0 1.5	8.0	50

#### BELT DRIVEN VERSION (Volt/ 50Hz)

230/50	0.23 13.8	2.0 1.5	8.0	50
230/100	0.23 13.8	2.0 1.5	10.0	100
260/100	0.26 15.6	2.0 1.5	10.0	100
340/100	0.34 20.4	3.0 2.2	10.0	100
340/200	0.34 20.4	3.0 2.2	10.0	200



#### BELT DRIVEN VERSION (Volt/ 50Hz)

230/50	0.23 13.8	2.0 1.5	8.0	50
230/100	0.23 13.8	2.0 1.5	10.0	100
260/100	0.26 15.6	2.0 1.5	10.0	100
340/100	0.34 20.4	3.0 2.2	10.0	100
340/200	0.34 20.4	3.0 2.2	10.0	200

Air compressors Type	Nominal Capacity (m <sup>3</sup> /min) (m <sup>3</sup> /h)	Outlet Motor Power Hp KW	Pressure bar	Noise Weight Kgr dB
350/200	0.35 21.0	3.0 2.2	10.0	200
450/200	0.45 27.0	4.0 3.0	10.0	200
500/200	0.53 31.8	4.0 3.0	10.0	200
450/270	0.45 27.0	4.0 3.0	10.0	270
500/270	0.53 31.8	4.0 3.0	10.0	270
640/270	0.64 38.4	5.5 4.0	10.0	270
640/270X	0.64 38.4	5.5 4.0	10.0	270
750/270	0.727 43.62	5.5 4.0	10.0	270
750/270X	0.727 43.62	5.5 4.0	10.0	270
850/270	0.872 52.32	7.5 5.5	10.0	270
850/270X	0.872 52.32	7.5 5.5	10.0	270
640/500	0.640 38.4	5.5 4.0	10.0	500
640/500X	0.640 38.4	5.5 4.0	10.0	500
750/500	0.727 43.62	5.5 4.0	10.0	500
850/500	0.872 52.32	7.5 5.5	10.0	500
850/500X	0.872 52.32	7.5 5.5	10.0	500
1200/500	1.1 66.0	10 7.5	10.0	500
1200/500X	1.1 66.0	10 7.5	10.0	500

X=DELTA/STAR starter

#### IV. BASE PLATE COMPRESSOR (400/50Hz)



K28/BF5.5	0.66 39.60	5.5 4.0	10.0	75	3.00
K30/BF7.5	0.87 52.20	7.5 5.5	10.0	92	3.00
K50/BF10	1.07 64.20	10.0 7.5	10.0	140	3.00
K60/BF15	1.75 105.00	15.0 11.0	10.0	160	3.00
K100/BF20	2.15 129.00	20.0 15.0	10.0	256	3.00

#### V. SILENT PISTON



#### SILTEK - SILENT PISTON COMPRESSOR (50Hz) One phase

250/24	0.25 15	2 1.5	10	103	60
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#### SILTEK - SILENT PISTON COMPRESSOR (50Hz) 3 phase

250/24	0.25 15	2.0 1.5	10	103	60
350/24	0.35 21	3.0 2.2	10	110	63
500	0.45 27	4.0 3.0	10	147	65
750	0.75 45	5.5 4.0	10	168	65
850	0.85 51	7.5 5.5	10	182	58
1100	1.10 66	10 7.5	10	220	58

Air compressors	Nominal Capacity		Outlet			Noise	
	Type	(m <sup>3</sup> /min)	(m <sup>3</sup> /h)	Motor Power Hp	Pressure bar	Weight Kgr	dB

### VL SCREW TYPE

#### KA – SINGLE STAGE ROTARY SCREW COMPRESSOR (50-60Hz)



KA2	0.24	14.4	3.0	2.2	10	122	61
KA3	0.36	21.6	4.0	3.0	10	122	61
KA4	0.53	31.8	5.4	4	10	122	62
KA5	0.67	40.2	7.4	5.5	10	122	66
KA7 Plus	0.93	36.0	10.0	7.5	10.0	196	67

#### KSA – SINGLE STAGE ROTARY SCREW COMPRESSOR (50-60Hz)



KSA11	1.65	99	14.8	11	8	234	64
KSA11	1.50	90	14.8	11	10	234	64
KSA11	1.15	69	14.8	11	13	234	64
KSA15	2.21	132.6	20.1	15	8	264	65
KSA15	2.00	120	20.1	15	10	264	65
KSA15	1.60	96	20.1	15	13	264	65
KSA18	2.80	168	24.8	18.5	8	314	67
KSA18	2.50	150	24.8	18.5	10	314	67
KSA18	1.93	115.8	24.8	18.5	13	314	67

#### KS – SINGLE STAGE ROTARY SCREW COMPRESSOR (50-60Hz)



KS36	3.35	201	29.5	22	8	360	75
KS36	2.95	177	29.5	22	10	360	75

Air compressors	Nominal Capacity		Outlet			Noise	
	Type	(m <sup>3</sup> /min)	(m <sup>3</sup> /h)	Motor Power Hp	Pressure bar	Weight Kgr	dB

KS36	2.40	144	29.5	22	13	360	75
KS45	5.00	300	40.2	30	7.5	450	76
KS45	4.50	270	40.2	30	8.5	450	76
KS45	4.10	246	40.2	30	10	450	76
KS45	3.30	198	40.2	30	13	450	76
KS59	5.84	350.4	49.6	37	7.5	650	76
KS59	5.60	336	49.6	37	8.5	650	76
KS59	5.10	306	49.6	37	10	650	76
KS59	4.40	264	49.6	37	13	650	76
KS68	6.95	417	60.3	45	7.5	770	76
KS68	6.80	408	60.3	45	8.5	770	76
KS68	6.20	372	60.3	45	10	770	76
KS68	5.55	333	60.3	45	13	770	76
KS97	9.65	579	73.8	55	7.5	1100	76
KS97	9.50	570	73.8	55	8.5	1100	76
KS97	8.30	498	73.8	55	10	1100	76
KS97	6.75	405	73.8	55	13	1100	76
KS124	12.20	732	100.6	75	7.5	2000	76
KS124	10.50	630	100.6	75	10	2000	76
KS124	8.70	522	100.6	75	13	2000	76
KS158	15.40	924	120.7	90	7.5	2500	76
KS158	12.90	774	120.7	90	10	2500	76
KS158	10.80	648	120.7	90	13	2500	76

### VL SCREW COMPRESSOR BELT DRIVE WITH HORIZONTAL



KDV15	1.63	97.8	15	11.0	7.5	367	66
KDV15	1.44	86.4	15	11.0	10.0	367	66
KDV15	1.11	66.6	15	11.0	13.0	367	66
KDV17	2.64	158.4	17	12.50	7.5	547	68
KDV17	2.24	134.4	17	12.50	10.0	547	68
KDV17	1.73	103.8	17	12.50	13.0	547	68
KDV21	3.14	188.4	21	15.50	7.5	572	70
KDV21	2.83	169.8	21	15.50	10.0	572	70
KDV21	2.16	129.6	21	15.50	13.0	572	70
KDV25	4.02	241.2	25	18.75	7.5	873	64
KDV25	3.39	203.4	25	18.75	10.0	873	64
KDV25	2.78	166.8	25	18.75	13.0	873	64
KDV30	6.04	362.4	38	28.5	7.5	920	70
KDV30	5.25	315.0	38	28.5	10.0	920	70
KDV30	4.58	274.8	38	28.5	13.0	920	70
KDV40	6.87	412.2	43	32.25	7.5	945	70
KDV40	6.34	380.4	43	32.25	10.0	945	70
KDV40	5.28	316.8	43	32.25	13.0	945	70

# PRODUCT PORTFOLIO

## Medical Gas Central Stations

### 2. Vessels

Air vessels Capacity (l)	Painted		Galvanized		In-OUT	Pressure (bars) Max working
	Horizontal	Vertical	Horizontal	Vertical		
500	*	*	*	*		11,0 16,5
1000	*	*	*	*		11,5 16,5
1500	*	*	*	*		11,5 16,5
2000	*	*	*	*		11,5 16,5
3000		*	*	*		11,5 16,5
4000		*	*	*		11,5 16,5
5000		*	*	*		11,5 16,5

Pressure: 11,5bar. Test pressure: 16,5bar. Temperature (min.- max.): -10°C + +50°C

### 3. Dryers



\* "DA" Absorption dryers with cold regeneration

Dryers	Conn. IN/OUT	Nominal flowrate (35°C-7bar) Nm <sup>3</sup> /h	Weight Kgr
Type	*		
Absorption (30Volt/1/ 50-60Hz/50W)			
DA30	3/8"	18	10,5
DA40	1/2"	40	60
DA80	1/2"	80	86
DA120	1"	120	120
DA160	1"	160	135
DA200	1"	200	190
DA400	1 1/2"	400	325

Pressure (bar)	4	5	6	7	8	9	10
Correction factor	0,60	0,74	0,86	1	1,10	1,20	1,30
Temperature (°C)	25	30	35	40	45	50	
Correction factor	1,10	1,05	1	0,90	0,70	0,60	

Correction factor. Multiply the above flow rates by the corresponding correction factor below.

ii. "EDX" Refrigerator-cycle dryers

Dryers	Conn. IN/OUT	Nominal flowrate (35°C-7bar) Nm <sup>3</sup> /h	Weight Kgr
Type	*		
Refrigeration (30Volt/1/ 50Hz)			



EDX 4	1/2"	24	36
EDX 6	1/2"	36	35
EDX 9	1/2"	54	39
EDX 12	1/2"	72	41
EDX 18	1/2"	108	65
EDX 25	1/2"	150	67

EDX 32	1"	192	80
EDX 38	1"	228	80
EDX 49	1 1/2"	294	103
EDX 62	1 1/2"	372	167

Pressure (bar)	4	5	6	7	8	9	10	11	12
Correction factor (K1)	0,82	0,90	0,96	1	1,04	1,07	1,09	1,11	1,13
Dew point temperature (°C)	5	7	9						
Correction factor (K2)	1	1,12	1,24	1,38					
Ambient temperature (°C)	20	25	30	35	40	45	50		
Correction factor (K3)	1,05	1	0,95	0,89	0,84	0,78	0,72		
Processed air inlet temperature (°C)	30	35	40	45	50	55	60	65	70
Correction factor (K4)	1,23	1	0,81	0,66	0,57	0,52	0,48	0,44	0,4

Correction factor. Multiply the above flow rates by the corresponding correction factor below.

### 4. Filters

Pre-Filter (Before the dryers):

- "RB" grade: 1micron - 0,1ppm (MD)  
Removal of particles down to 1µ, coalesced water and oil (liquid).
- "RA" grade: 0,01micron - 0,01ppm (OD)  
Removal of particles down to 0,01µ, including oil & water aerosols.

Post-Filter (After the dryers):

- "RF" grade: 1micron - 8ppm (MD)  
Collecting dust and debris generated by Absorption dryers.
- "CA" grade: 0,003ppm (OO)  
Removal of oil vapour and hydrocarbons.
- "MAB-P1": Bacteriological stainless steel filters of sterilization.

OO=manual valve  
OO=Automatic inner condensate drain  
OO=OO + differential gauge



Filter	Conn.	Nominal flowrate Nm <sup>3</sup> /h	Pressure Max bar	Replacement elements			
				RB	RA	RF	CA
CDF							
60	3/8"	60	16	*	*	*	*
100	1/2"	100	16	*	*	*	*
180	1/2"	180	16	*	*	*	*
290	1"	290	16	*	*	*	*
460	1 1/2"	460	16	*	*	*	*
610	1 1/2"	610	16	*	*	*	*
930	2"	930	16	*	*	*	*
MAB-P1	1/2"	280	16				
STP	1"	383	16				

Correction factor. Multiply the above flow rates by the corresponding correction factor below.

Pressure (bar)	4	5	6	7	8	9	10	11	12
Correction factor	0,75	0,80	0,90	1	1,10	1,15	1,20	1,25	1,30

## 5. Water / Oil Separator

Water/ Oil separator Type	Nominal flowrate Nm <sup>3</sup> /h (35°C-7bar)	Dimensions mm	Weight Kgr
SK 1	72	316x316x842	6
SK 2	126	550x299x847	8
SK 5	324	490x500x803	12
SK 8	456	500x500x1195	27
SK 15	900	650x500x1195	36
SK 30	1800	700x500x1535	70
SK 60	3588	1000x500x1535	97



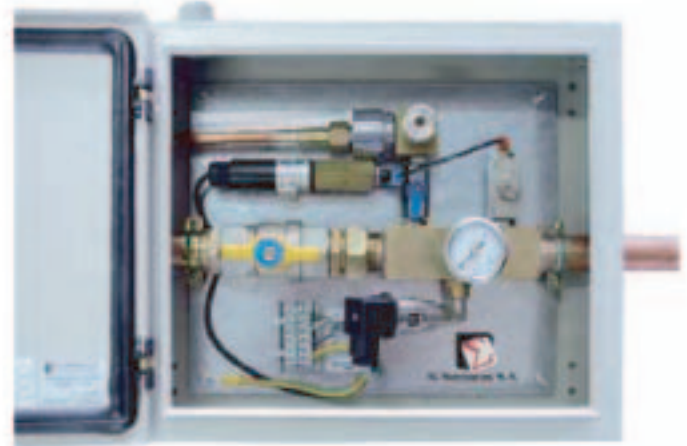
## 6. Automatic Drain

## 7. 2nd Stage Reducer Panel

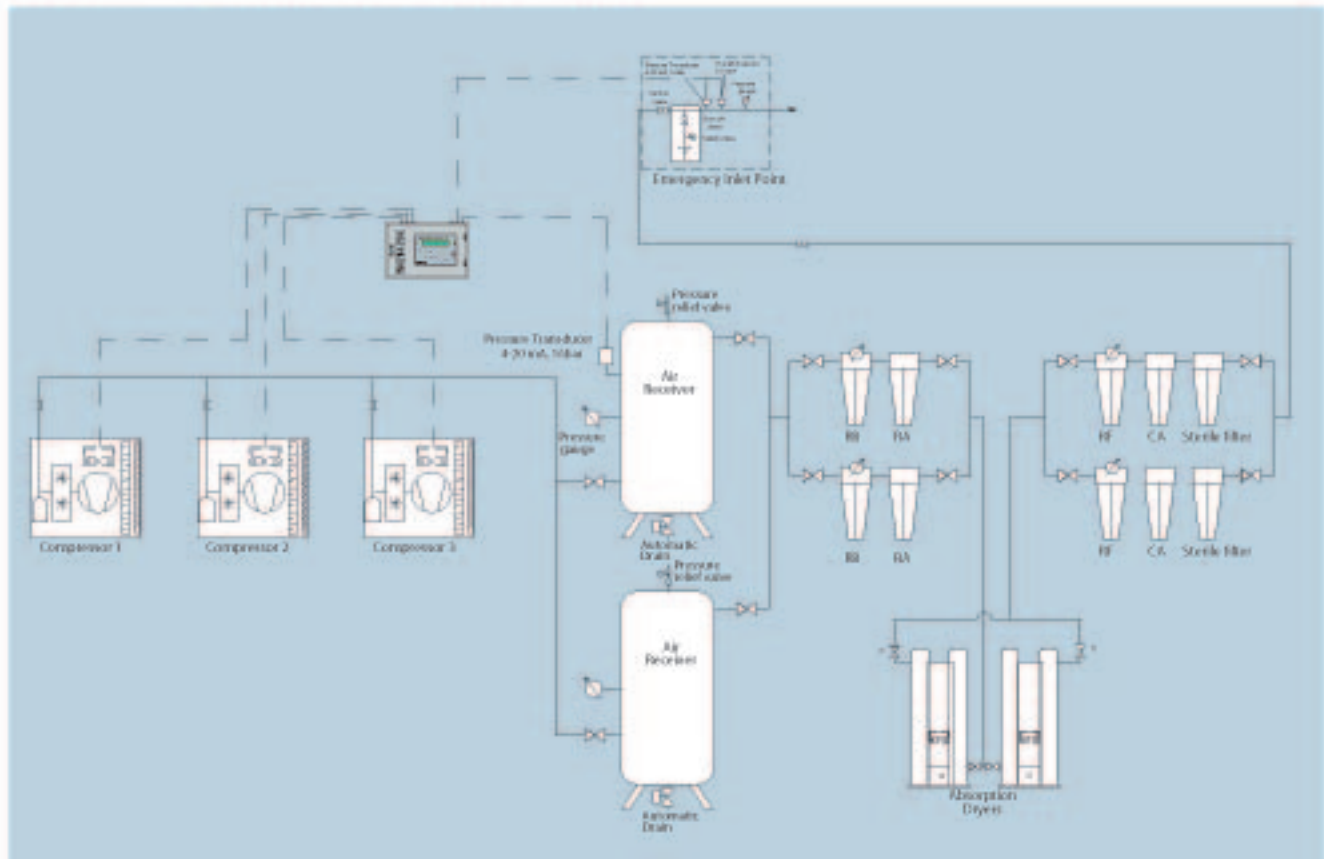
Single	25 r/h	75 r/h	180 r/h
Double	25 r/h	75 r/h	180 r/h

## 8. Emergency Inlet Point

Including network transducer sensor, Dew point sensor, safety valve, manometer, ball valve and nist.



Typical lay-out Medical Compressed Air Central Station according to ISO 7396-1

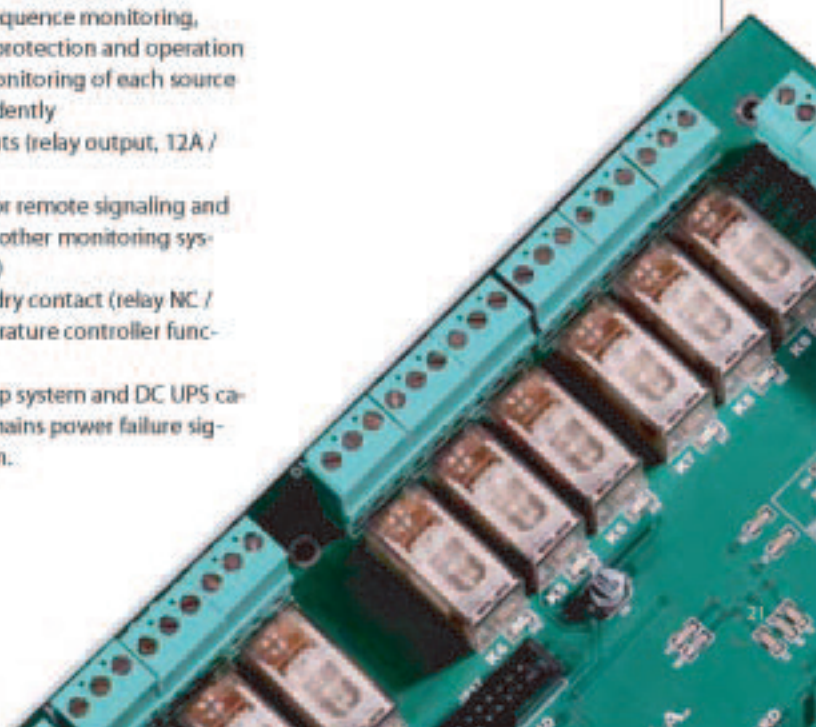


### 9. Electronic control panel for controlling the operation of the Compressors

The MGS C. AIR control panel is a fully electronic automatic, controller and monitoring device of the whole compressed air plant. The MGS C. AIR control panel is built on latest technology microcontroller and provides superior reliability, functionality and flexibility.

General features of MGS C. AIR control panel:

- ? Built in three transfer switches for AUTO and MANUAL
- ? microprocessor based design, Ethernet communication supported,
- ? remote access via Ethernet by any internet browser. On line remote system viewing and additional daily graphs for Net pressure ( data logging function ) for plant pressure monitoring and analysis (24 hours depth, 1 sample per 15 sec) remote parameter settings via Ethernet using any internet browser (code protected area for authorized staff only)
- ? on site firmware upgrade capability via a common USB memory stick
- ? built in buzzer, SILENCE button and TEST button
- ? user friendly interface via built in LCD screen, 4x40 characters and additional led indicators for sources and net work pressure, functionality according to ISO 7396-1, HTM 02-01
- ? multi language support and text messages for all conditions, emergency alarms and events for real time status viewing
- ? user programmable configuration and parameter settings (code protected area)
- ? alarm / events / services report and log file for plant performance analysis and debugging
- ? cyclic operation of sources based on time balance operation, 3 independent timers for load and run time measurement of each source
- ? Additional capability of primary Net pressure measurement redundancy for enhancing the system's reliability, using an extra digital pressure sensor connected to digital input (built in auto transfer algorithm for operation via the digital pressure switch if the primary analog pressure transducer failed)
- ? self test procedures and diagnostics utilities included for system integrity, communication and wiring testing
- ? real time clock with battery back up
- ? 15 analog inputs, (4...20 mA transducer).
- ? Basic Analog measurements are:
  - primary net pressure,
  - secondary net pressure,
  - Air800 net pressure,
  - left/right ramp pressure
  - ambient temperature
- ? Additional, on line analog measurement / monitoring / alarm signaling of:
  - water vapour content, TDEW POINT /RH% measurement
  - CO concentration
  - CO<sub>2</sub> concentration
  - SO<sub>2</sub> concentration
  - O<sub>2</sub> concentration
  - NO+NO<sub>2</sub> concentration
- ? alarm levels according to European Pharmacopoeia 2005
- ? 12 digital inputs NO/NC and enabling/disabling capability
  - filters performance monitoring,
  - power supply over/under voltage monitoring
  - phase sequence monitoring,
  - thermal protection and operation status monitoring of each source independently
- ? 9 digital outputs (relay output, 12A / 250 Vac)
- ? dry contacts for remote signaling and interface with other monitoring systems (BMS etc)
- ? independent dry contact (relay NC / NO) for temperature controller function
- ? Battery back up system and DC UPS capability with mains power failure signaling function.



### 3.2.4 Anaesthetic Gas Scavenging System

The suction and disposal to the environment of the redundant gases from the anaesthetic equipment inside the operating theatres but also from the emitted anaesthetic gases from patients in the stage of recovery, is being applied by using an automatic anaesthetic gas scavenging disposal system (AGSS), through the AGSS outlets which are installed in various departments. The Anaesthetic Gas Scavenging (AGS) system removes anaesthetic gas mixtures from theatres and recovery areas, thereby protecting the medical staff from possible long term health hazards. By virtue of its design, the new active disposal system can produce high levels of capture simply by connecting the terminal unit to the anaesthetic breathing circuit via a receiver unit, thereby removing the majority of "pollution" at source.

Three type of anaesthetic gas scavenging system are available:

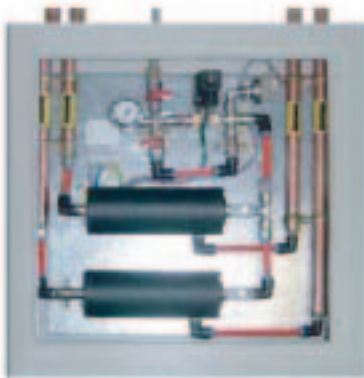
- Venturi type apparatus  
Flow rate 60lpm. Air pressure supply 6-8bar.
- Autonomous scavenging outlet  
Flow rate 50lpm. Air pressure supply 6-8bar.
- Central scavenging system with two blowers  
(range capacity from 30+30m<sup>3</sup>/h to 300+300m<sup>3</sup>/h)

The AGSS central system is manufactured according to the regulations of EN ISO 7396-2 (replacing EN 737-2) and includes:

- two vacuum blowers for continuous operation
- one electric operation panel
- automatic valve for maintaining constant depression in the network (no matter the number of the AGSS outlets that operate)
- pump protection filter
- sensors for distant control of AGSS system operation.
- remote alarm panel for monitoring system's operation signals by distance.

The AGSS central station is activated by remote switch placed on the alarm panel, which is usually placed inside or near the surgery rooms or in each surgery room.

All systems according to EN ISO 7396-2, ISO 9170-2.



AGSS Venturi type



Autonomous Scavenging terminal unit



Scavenging terminal unit



Flow capacity of Blowers
30m <sup>3</sup> /h
75m <sup>3</sup> /h
140m <sup>3</sup> /h
300m <sup>3</sup> /h

AGSS central station



### 3.2.6 Oxygen Vessels (LOX)

When customers require large volumes of oxygen to be delivered as a cryogenic liquid, then a special cryogenic storage tank is required at the customer's site. These tanks are very specialized, come in various sizes and configurations. Tanks and equipment are sized for gas product and usage requirements.

G. Samaras S.A offers turn key solutions including technical consultancy, installation, commissioning and after sales service.

### 3.2.7 Oxygen Generators

Pressure Swing Adsorption (PSA) is a low power consuming solution, efficient and reliable for onsite production of high purity oxygen. It uses the basic principle of passing air over adsorbent material which bound with nitrogen to leave rich stream of oxygen.

G. Samaras S.A can offer different solutions for Oxygen generator in different sizes and different flows.

A typical Oxygen generator system comprise from:

Compressed Air Systems:

- Air Compressor
- Air Treatment unit by refrigerating dryer and filters
- Air Receiver in proper sizing

Oxygen Generator:

- PSA Plant
- PLC
- Oxygen Analyser
- Oxygen Receiver & high efficiency O2 filter

High Pressure Filling System

Booster to fill the cylinders bank (150 bar at 5 bar inlet pressure / 200 bar at 8 bar inlet Pressure).

No.	O <sub>2</sub> Flow m <sup>3</sup> /hr	Oxygen Capacity (liters)	Air Compressor Power (kW)
1	1.2	50	3
2	2.4	100	5
3	5	300	11
4	10	500	15
5	14	750	18
6	18	1.000	30
7	22	1.000	30
8	29	1.500	37
9	36	2.000	45



### 3.3 MEDICAL GAS TERMINAL UNITS / OUTLETS

Two-part Outlets for O<sub>2</sub> - N<sub>2</sub>O - Air- Vacuum - Compressed Air according to ISO 9376-1  
Outlets are installed at the final delivery points in a medical gas pipeline system. They are used by personnel to supply the various different gases using special quick-action connection fittings.

The two-part outlets are composed of the base part and the finishing part.

The base part, made of chrome-plated brass, consists of:

- Automatic shut-off valve for maintenance to permit replacement of the finishing part without having to interrupt gas delivery to other outlets
- Threaded inlet connection, specific for each type of gas, complete with nut, mouth-piece and copper tube suited for braze-welding to the pipeline system
- Threaded outlet connection, specific for each type of gas, for connection to the finishing part.

The finishing part made of chrome-plated steel, equipped with:

- Threaded inlet connection, different for each type of gas, complete with OR seal ring
- Automatic spring-operated valve and filter;
- Outlet connection with different connection fitting for each type of gas.

Medical compressed gases and vacuum outlets are suitable for external or internal wall mounting, for bed head unit and ceiling pendant installation.

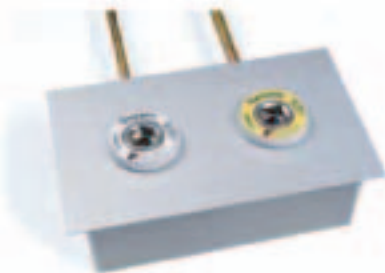
Two-part outlets are composed of the base part and the finishing part according to ISO 7396-1, EN ISO 9170-1 standards.



Outlets are available with the following norms:

1. ENV 737-6 (EUROPEAN STANDARD)
2. AFNOR NF S 90-116 (FRENCH STANDARD)
3. DIN 13260-2 (GERMAN STANDARD)
4. BS 5682 (BRITISH STANDARD)
5. SS 875 24 30 (SVENSK STANDARD)
6. ISO 9376-2

The base part for each specific gas is common for all different norms.



Internal mounted



External mounted



### 3.4 CONTROL AND REDUCER PANEL

#### 3.4.1 Second Stage Pressure Regulator Unit

The 2nd stage pressure regulator unit controls and isolates the medical gases ( $O_2$ ,  $N_2O$ , Air,  $CO_2$ ) that feed the gas outlets.

The 2nd stage panel is suitable for flash or chased distribution networks, contains reducers, shut-off valves (upstream and downstream of reducers), pressure gauges, gas-specific connectors and low-high pressure switches, according to EN ISO 7396-1, HTM 02-01 standards.



2nd stage Reducer Panel of 3 gases  $O_2$ , Air, Vac (double reducers)

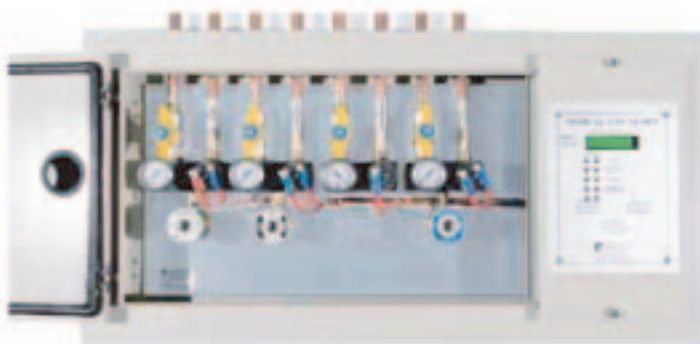


2nd stage Reducer Panel of 3 gases  $O_2$ , Air, Vac (single reducers)

#### 3.4.2 Area service – Zone valves unit

The ASVU are fitted to all medical gas and vacuum services in a prominent and accessible position at the entry to wards, theatres, intensive care, recovery rooms, etc.

The ASVU panel is conforming to EN ISO 7396-1, HTM 02-01 standards and contains in metal box shut-off valves, pressure gauges, gas-specific connectors and low-high pressure switches.



ASVU Box of 4 gases  $O_2$ , Air, Vac,  $N_2O$  with alarm



ASVU Box of 3 gases  $O_2$ , Air, Vac with alarm

# PRODUCT PORTFOLIO

## 3.4 Medical Gas Terminal Units / Outlet

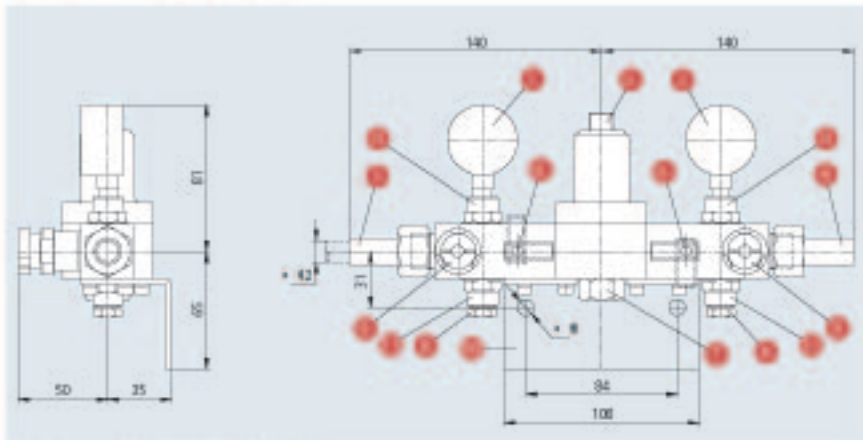
### 3.4.3 Shut-off Valves

The ball valves GS CIM312 are certified in accordance with the European standard EN 331:1998. They are approved in accordance with the European standard for gas appliances (90/396/EEC). Manufactured in accordance with EN 29000 - ISO 9000 are suitable for gas at low pressure. Available in the following sizes: 15mm, 22mm, 28mm, 35mm, 42mm, 54mm and 76mm and 108mm sizes.



### 3.4.4 Reducers

The 2nd stage pressure regulator unit are equipped with line pressure regulators of 24m<sup>3</sup>/h, 75m<sup>3</sup>/h and 180m<sup>3</sup>/h.



Line pressure regulator 24m<sup>3</sup>/h LPR GS

POSITION	DESCRIPTION
1	High pressure manometer
2	Low-pressure manometer
3	Inlet connection (high pressure)
4	Outlet connection (low pressure)
5	Adjustment screw
6	On/off ball valves
7	Access plug to the filter and the pressure regulators valve
8	G1/4" female plugged connections
9	G3/8 front plug
10	Support bracket
11	Fittings with 7 0,4 mm. holes

## 3.5 ALARM SYSTEM FOR MEDICAL GAS PANELS

The medical gases alarm panels are destined to follow up from distance the operation signals of medical gases installations with uninterrupted visual and sound notice to technical service personnel according to EN ISO 7396-1 and HTM 02-01.

- Alarm panels:
  - 5 gases floor local alarm panel  
*Inputs:* 5 analogue, 10 digital, two buttons (Silence-Test). *Outputs:* LCD 2x20, 13 LED, Serial, Ethernet
  - One station alarm panel  
*Inputs:* 5 analogue, 10 digital, two buttons (Silence-Test). *Outputs:* LCD 2x20, 13 LED, Serial, Ethernet
  - Centralized station for all alarm panels  
*Inputs:* 100 stations, interface touch panel PC or standard PC
  - Central alarm system for all gas stations (TCP/IP connection and WEB interface)  
*Inputs:* 15 analogue, 12 digital, KEYBOARD. *Outputs:* LCD 4x40, 21 LED, Serial, USB, Ethernet, 8 Relays
- Sensors
  - Digital sensors (Hi-Low)
  - Analog sensors (transducers 4-20mA)

The medical gas alarm panels are based on microprocessor technology to provide an alarm system capable of monitoring the complete medical gas services installed in a hospital and transfer all the information through internet (TCP/IP) connection to the control room.



Digital sensor



Analog sensor



5gases alarm panel

### 3.5.1 Local Alarm Panel - One Station Alarm Panel

IP based

#### FEATURES:

Inputs: 5 analog inputs (transducers), 10 digital (switches).

Out-put:

- 10 output digital signals used for: a) repeating to second panel b) central alarm system c) BMS of installation.
- built in 10 LED, 2 red LED for each gas, one for high and for low pressure indication
- built in buzzer for alarm signaling
- LCD display (2x 16 characters) for real time pressure monitoring and text messages corresponding to alarm conditions
- adjustable limits and alarm messages. (by user programming through TCP/IP)
- adjustable analog sensors range and type
- alarm programming through Ethernet connection with an IP address
- LIVE monitoring the pressure of the gases
- button test and silence.
- 230V Voltage 50Hz-60Hz (Double transformer).



Centralized station for all hospitals (software)

### 3.5.2 Central Alarm Panel for Medical Gases

The central alarm system, is the monitoring and alarm system of all sources and networks of Medical gases. It's functionality is according to ISO 7396-1 (EN 737-3), HTM 02.01 including all the necessary audible and visual signals for any alarm condition. The system is making on line measurements of pressure, using analog transducers and displays them in the built in LCD 4x40 display. The pressure measurements of medical gases are:

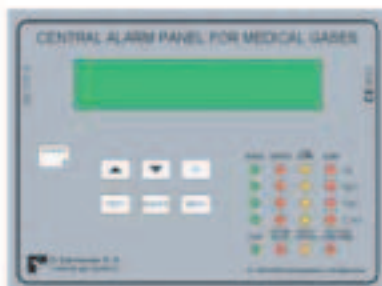
- O<sub>2</sub> R/L/A cylinder, Vessel, 1st / 2nd stage network
- N<sub>2</sub>O R/L/A cylinder, 1st / 2nd stage network
- C. Air network and Humidity
- Vacuum network

The visual and audible alarm signals are specified in ISO 7396-1 and are grouped in the following categories:

- Emergency alarms (ALARM)
- Operating alarms (PRE ALARM) - (SERVICE)
- Information signals

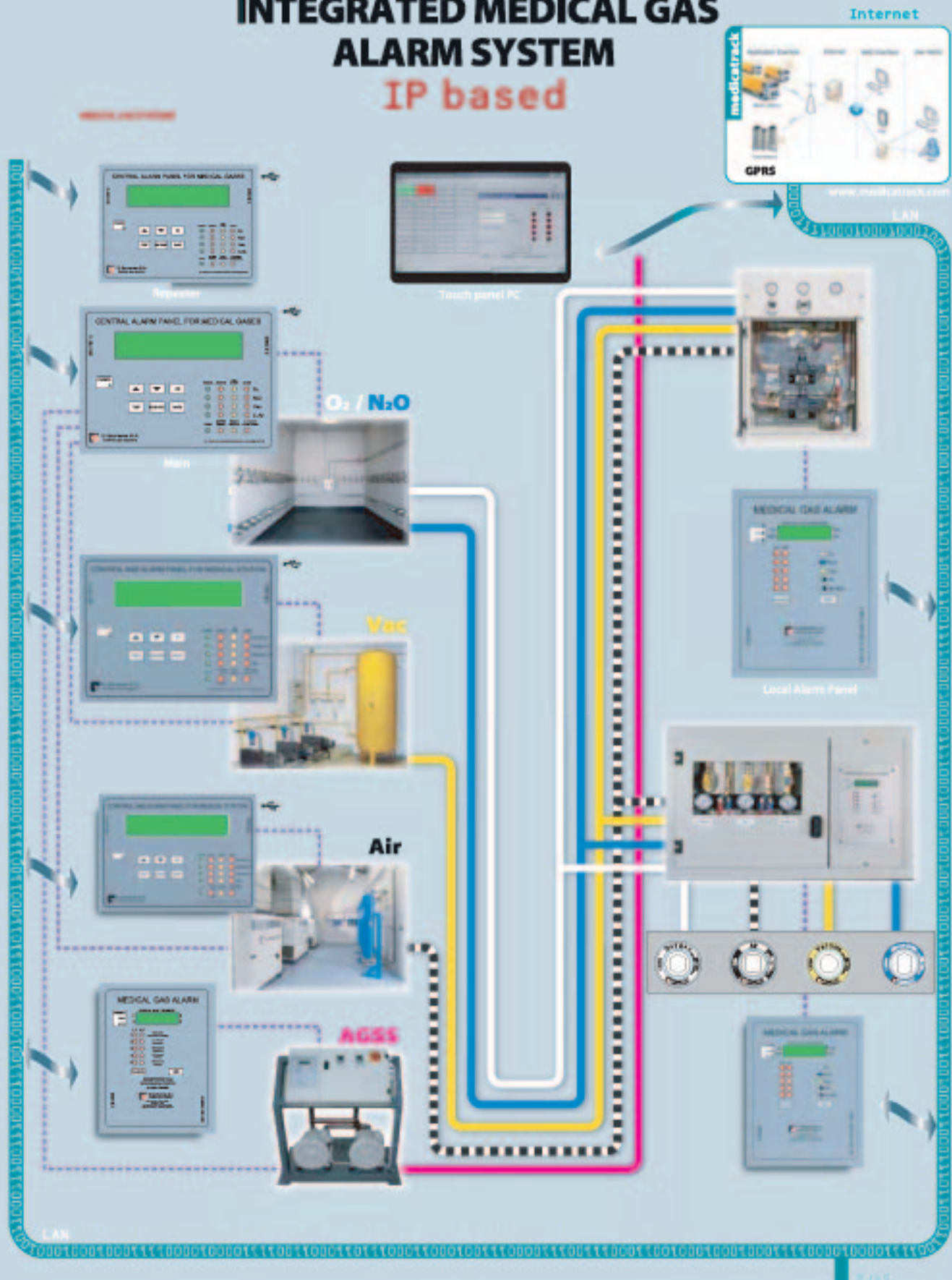
Additional major features:

- IP based system, remote access via Ethernet by any internet browser,
- self test procedures and diagnostics utilities included for system integrity, communication and wiring testing
- real time clock with battery back up and built in non volatile memory
- default values for all parameters ensures reliable operation
- user programmable configuration and parameter settings (code protected area)
- alarm / events / services report and log file (max 250 records with time stamp)
- Medical gases plants monitoring using graphs, that are stored in MGS controller memory and they can be retrieved for further evaluation by using a USB memory stick.
- optional Battery back up system
- on site firmware upgrade capability via a common USB memory stick
- on line remote system viewing and additional daily graphs for all Net pressures
- water proof Metal enclosure, IP 54



Central alarm panel

# INTEGRATED MEDICAL GAS ALARM SYSTEM IP based





### 3.6 BED HEAD UNITS

Bed head units have been created for grouping all the necessary electrical, lighting, data, communications equipment and medical gases services and are designed to serve:

Normal hospital care, intensive care areas, special care areas (reanimation, geriatric, coronary, etc.), old people home.

All models of B.H.U. are constituted of extruded aluminum profiles, stove enameled, having different compartments for power mains, low and extra low voltages and for medical gases.



Vertical Panorama



Kassandra



Horizontal Theodoro



Infante I.C.U.



# PRODUCT PORTFOLIO

## Bed Head Units



Wood-style

The units are supplied in a white standard color RAL9016. In option any other color of the RAL scale can be supplied too. For all units offered tailor made solutions with the necessary installations.

The units can be equipped with any desirable type of electrical and medical gas outlets.

The available B.H.U. models are: ELISA, KASSANDRA, THEODORO, PANORAMA.

The units are suitable for wall or suspended in any length as one unit serving more than one bed and are ready to install.

The bed head units are manufactured and tested in accordance with standards EN ISO 7396-1, EN ISO 14971, EN ISO 11197, EN 60101-1, EN 60598-1 and EN 12464-1.

All units are labeled CE0653 to guarantee a high level of safety for patients and personnel.



Suspended "PANORAMA" with trolleys

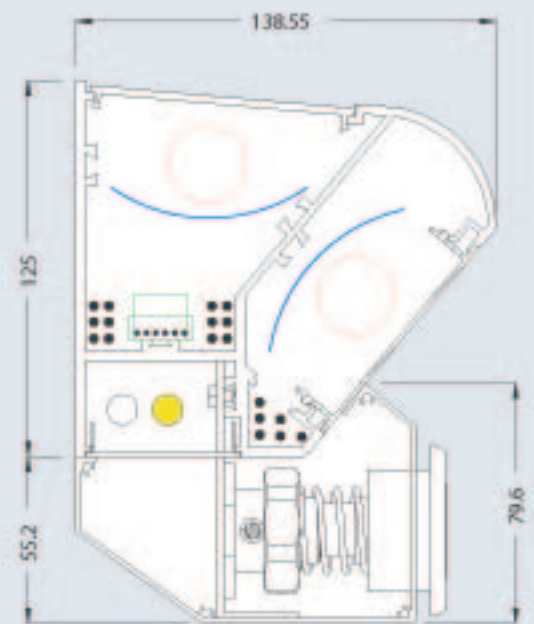
I.C.U.



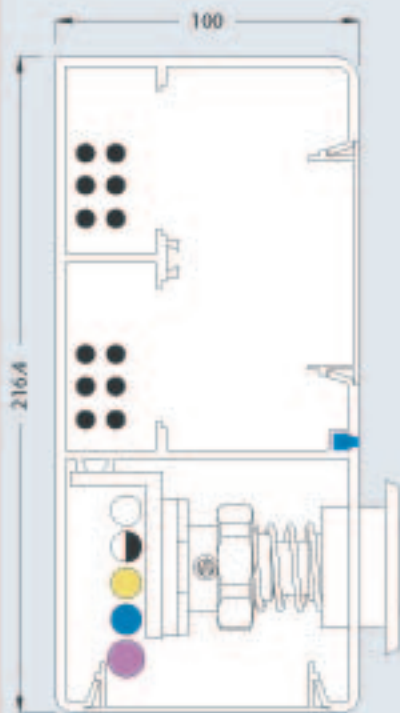
## B.H.U. Aluminum profiles



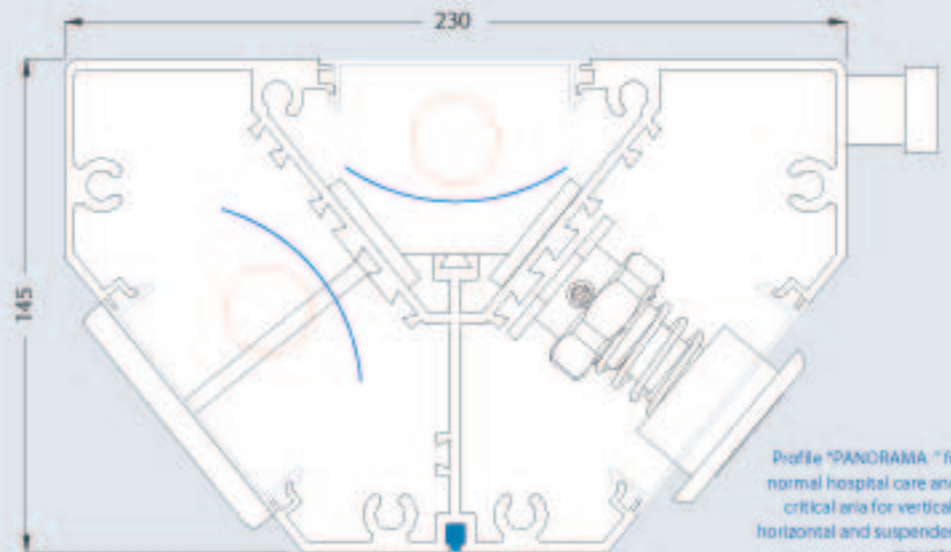
Profile "ELISA" for normal hospital care and critical area for horizontal and suspended mounted



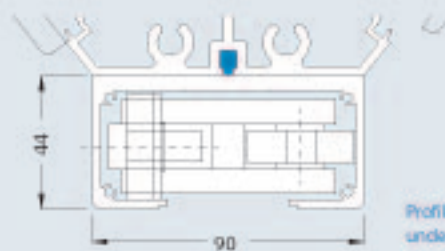
Profile "KASSANDRA" for normal hospital care and ward areas for horizontal and suspended mounted



Profile "THEODORO" for intensive care, recovery and special care for vertical, horizontal and suspended mounted



Profile "PANORAMA" for normal hospital care and critical area for vertical, horizontal and suspended mounted

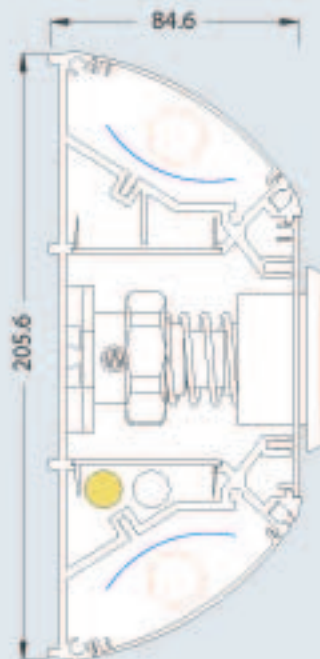


Profile "TR" for trolley attach under "PANORAMA" profile

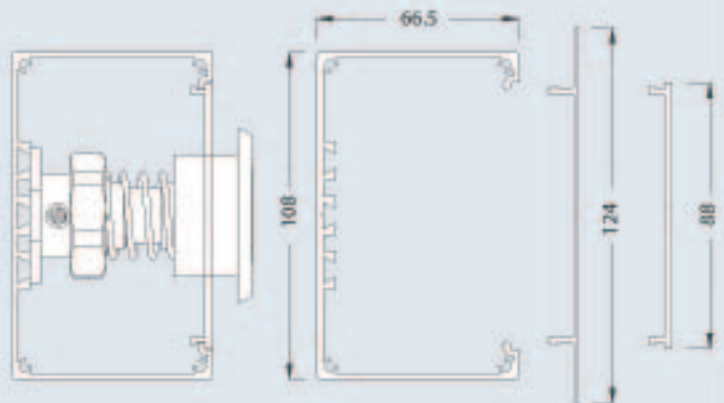


# PRODUCT PORTFOLIO

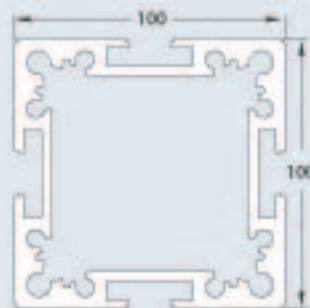
## Bed Head Units



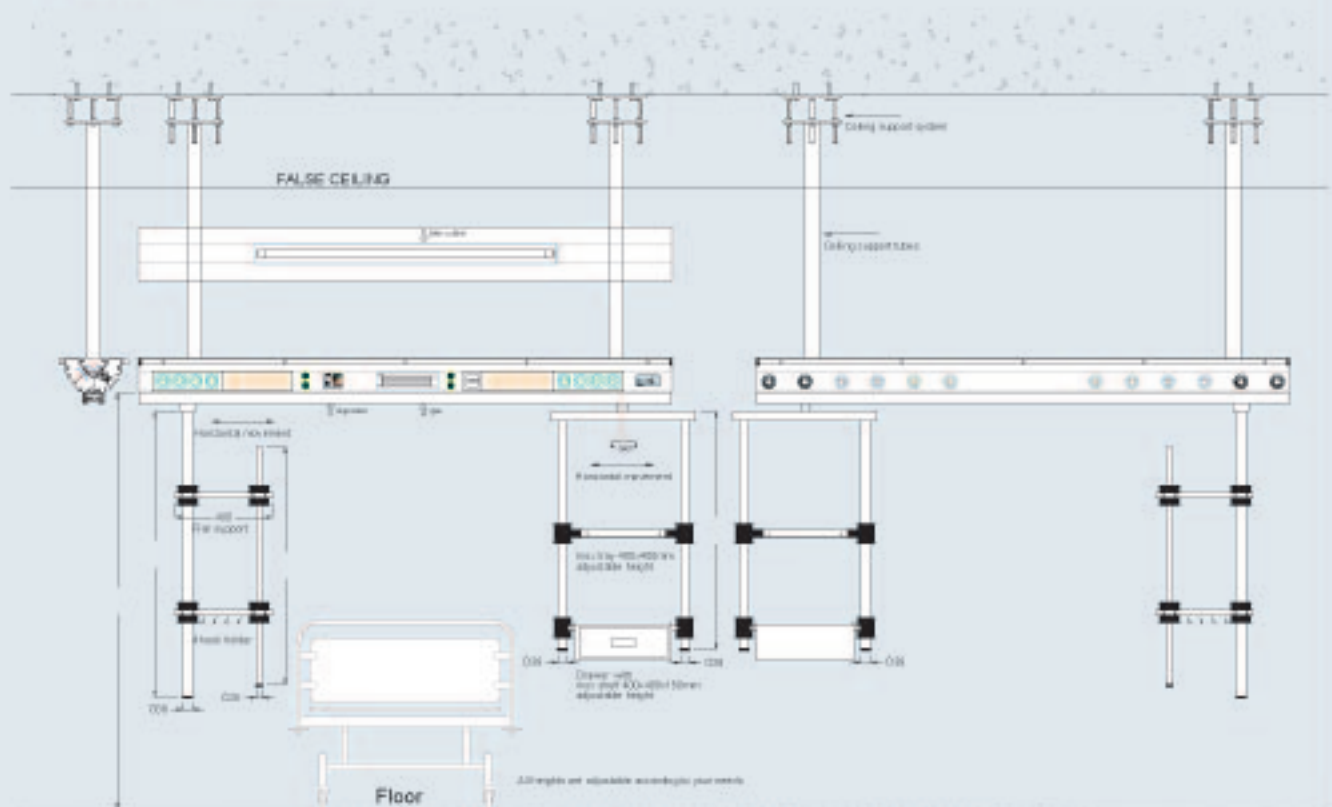
Profile "Pandora" for normal care for vertical, horizontal and suspended mounted



Profile "PG" for gasoutlet or electrical equipment for vertical, horizontal, embedded (PG-EM) or external mounted (PG-EX)



Profile "BR" for suspended BHU



Suspended BHU "PANORAMA" with trolley "TR"

The bed head unit is placed on the wall above the patient bed. It includes all the elements that are required for patient treatment and nursing personnel needs and provides lighting (general and local), electrical energy (sockets), data (telephone, nurse call etc.), medical gases and vacuum.

The bed head unit is manufactured from a special profile of aluminum and coated with electrostatic paint.

The characteristics of various types of the bed head units are presented analytically in Table that follows.



BHU "Elsa" profile with LED lights

### Proposed BHU configurations

I/P	Room description	Bed (pc.)	Length (m)	BHU description	Rail on BHU	Rail on the wall	Extra equipment	Equipment on bed			Lighting				Network		Nursing equipment		Direct N		
								Medical gas outlets	Electrical sockets	IQ	Data cat6	Data RJ45	Direct	Night direct	In-	Operation	Direct				
							72	90	90	Onaero	Normal supply	EQ	Data	Voice or LED*	18 W LED	5W or 58 W	30W or 58 W	18W of 58 W	16W Nurse call	18 W LED	5W or 58 W
1	Nursery single bed	1	1,80	Elsa-Pandora (one profile)			1	1		1	1		1	1	1	1	1	Yes	From nurse call hand set	Yes	Switch on the BHU
2	Nursery two bed	1	3,60	Elsa-Pandora (one profile)			1	1		1	1		1	1	1		1	Yes	From nurse call hand set	Yes	Switch on the BHU
3	Day clinic	2	1,80	Elsa-Pandora (one profile)			1	1		1	1		1	1	1	1	1	Yes	From nurse call hand set	Yes	Switch on the BHU
4	(AIDS, SARI)	1	1,80	Elsa-Pandora (one profile)			1	1		1	1		1	1	1	1	1	Yes	Yes		Switch on the BHU
5	Artificial kidney	1	1,80	Teodoro-Pandora (two profiles)			1	1		3	3		1	1	1	1	1	Yes		Yes	on the BHU
6	Delivery		1,80	Elsa (one profile)	Yes		1	1	1		2	2	2		1	1	1		on the BHU	Switch on the BHU	
7	ICU, CCU, High Dependency unit, Isolation	1	2,00	Teodoro-Pandora (two profiles)	Yes	Yes	Digital clock - Horizontal rail for 220V tubes for instruments	4	4	4		8	8	4	2		1	1	1	on the BHU	Switch on the BHU
8	Neonatal unit	1	2,00	Teodoro (one profile)	Yes			2	2	2		4	4	2	2						
9	Resuscitation	1	2,00	Teodoro (one profile)	Yes	Yes		2	2	2	2	2	4	4	2	2					
10	Recovery	1	2,00	Teodoro (one profile)	Yes			2	2	2		4	4	2	1						
11	Preparation	1	1,00	Teodoro (one profile)	Yes			1	1	1	1	2	2	2	1						
12	Triage	1	1,80	Teodoro (one profile)	Yes			1	1	1		4	2	2	1						
13	Accident and emergency	1	1,80	Teodoro (one profile)	Yes			1	1		2	2	1	1							
14	Suspended for special rooms	1	2,00	Panorama (double)	Yes	Yes	Horizontal rail for 220V tubes for instruments	4	4	4		8	8	4	2		1	1			Yes

\*The number and the type of the medical gas outlets per bed are according to ISO 7396-1 & 2, HTM 02-01



\*\*The Bed Head Unit can be equipped with LED light

- There are three ways of installation: a) wall mounted, b) suspended from the ceiling (using metallic columns) and c) (using metallic columns from ceiling to floor)
- Installation height (from finishing floor)
  - Elsa, Pandora profile : 1,50-1,80m lower part of BHU
  - Teodoro profile: 1,20-1,40m lower part of BHU
  - Kassandra profile: 1,70-1,80m lower part of BHU (when used as lighting profile with Teodoro profile)
- The suggested profile types are the most common and there is other solutions according to the project

### 3.7 CEILING PENDANT ARMS

The ceiling pendants for special treatment rooms, is placed at the ceiling of these rooms, as intensive care units and surgeries, above the patient bed or above the surgical table. The ceiling pendant has been created for grouping all the necessary electrical, data and medical gases services, required for use in operating theaters in anesthetic, surgical rooms and intensive care areas.

G. Samaras S.A. ceiling pendants are manufactured and installed to the customer's specifications to suit a particular location and purpose. The installed position ensures that the outlets can be placed immediately above the medical equipment or the anesthetic machine, thereby removing the hazard of trailing hoses and cables.



Pella



The ceiling mounted pendant system is manufactured totally of special extruded anodized aluminum profiles or stainless steel and is electrostatic painted to any desired color. The ceiling mounted pendant systems are produced according to ISO 11197, EN ISO 5359, ISO 7396-1, ISO 7396-2, ISO 9170-1, ISO 9170-2, EN 60601-1 standards and they are labeled CE0653 to guarantee a high level of safety for patients and personnel.

All ceiling pendant units are consisting of the following main parts:

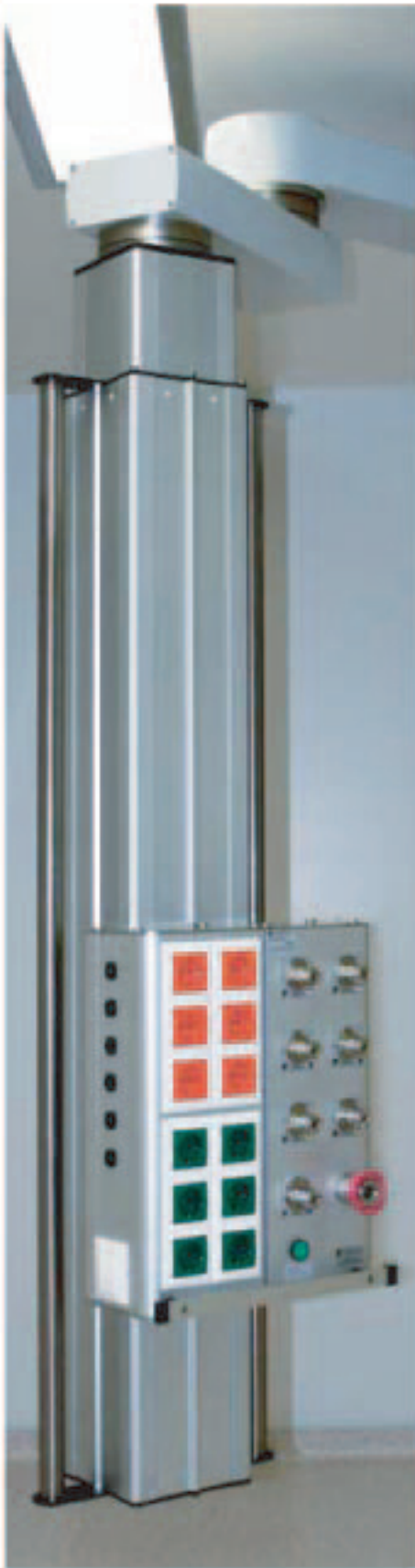
- Ceiling support system (tailor made depending of the concrete ceiling height)
- One or two horizontal arms (made form reinforced aluminum profiles in deferent lengths)
- Vertical retractable or stable body (movement through electrical motor in angle or telescopically)
- Technical box (that includes instruments shelves, drawer, rail)
- Special 738 tubes supports for instrument, monitors and selves support

The available ceiling pendants models are separated in two categories: not electrically driven (circling movement) and electrically driven (circling movement and movement in the vertical axis).



Operation theater with Vargina 1b and Olympia 04

Olympia 06



Thessaloniki



Vergina

### Pendant arms

The horizontal motion is made manually with pendant rotation ability of 330°. The two circling movement will be achieved with the help of cylindrical bearing cases. The arms revolve on high quality bearings **SKF** so that the technical box can be moved very smoothly and securely to any position. We can have horizontal rotation in two or three axis.

The rotation cylinder of the arm is provided with pneumatic brake for the stabilization of pendant during the rotation in the desirable place, while head cylinder uses adjustable mechanical brake. Pneumatic brakes are optional and after request.

The vertical movement is electrical by special actuator (Swiss made **SKF** Magnetic) with lifting capacity from 5.000N to 8.000N/360W.

The carrying capacity depends on the configuration (from 80Kgr to 350Kgr).



# PRODUCT PORTFOLIO

## Ceiling Pendant Arms



### Technical box – head of the pendant arm

In the head of the pendant and in separate apartments, are found installed the terminal units of medical gases with the corresponding manometers, the electric sockets and EQ, while around the table exists a special stainless rail of dimensions 25x10 mm, for the suspension of various medical appliances and tools. For all units are offered tailor made solutions with the necessary facilities. The pendant can include different elements (in number and type) from mentioned before depending on the demand.

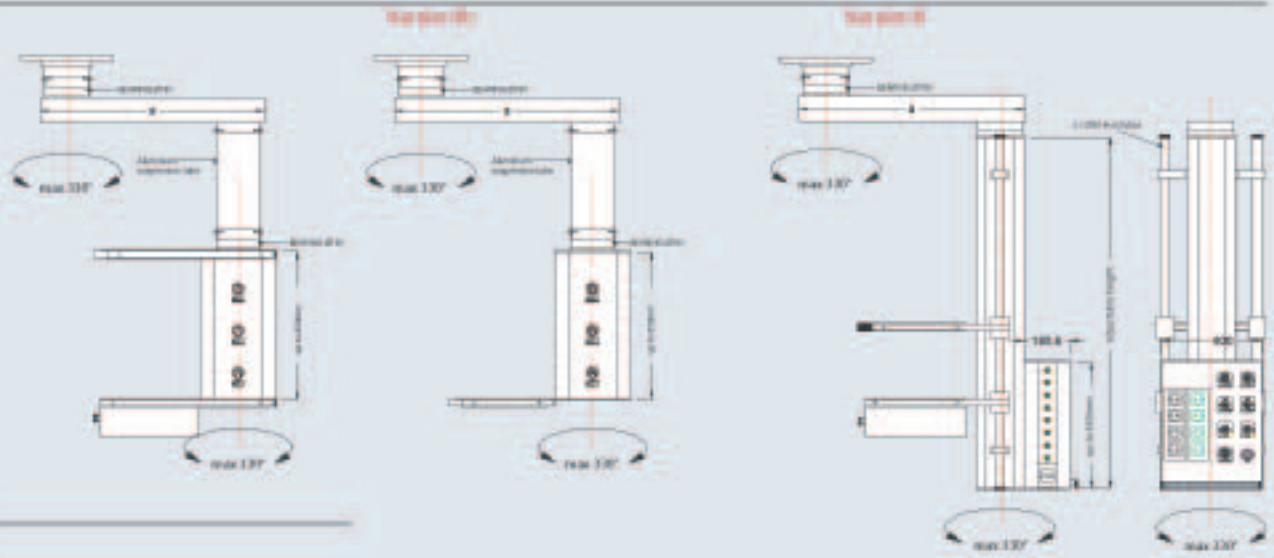
Olympia 04



Macedonia ICU

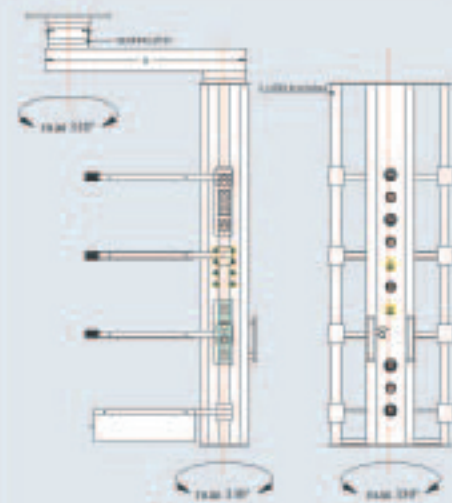
## VERGINA

Standard 4x



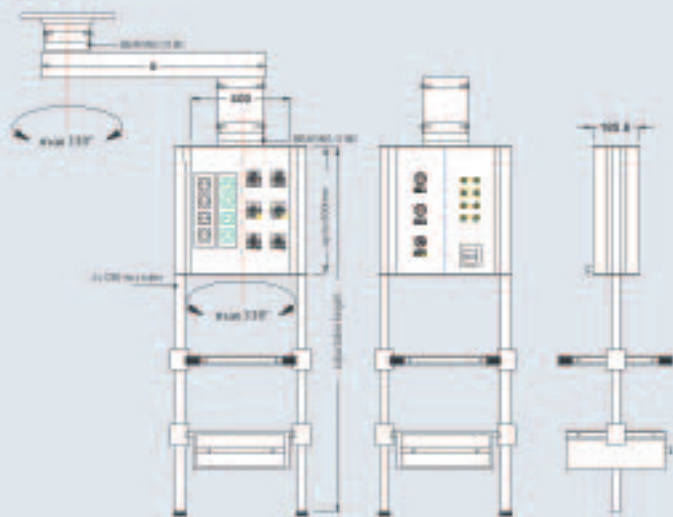
## VERGINA

Standard 3x



## VERGINA

Standard 2x

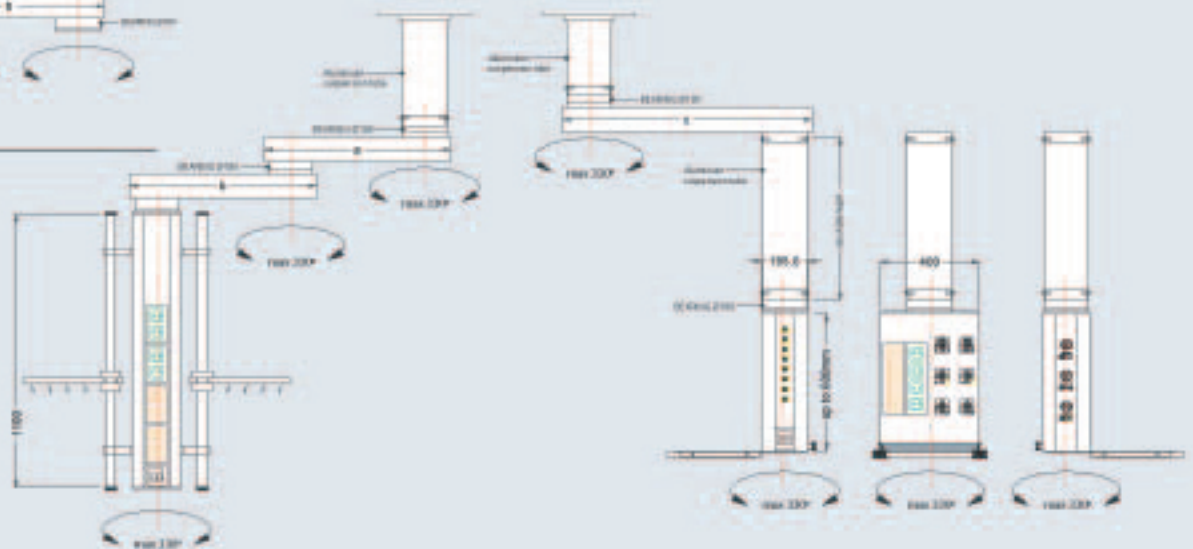


## THERMI

Standard 2x



## MACEDONIA



## Medical Gas Network



### Standard Copper Pipe

(other sizes can be delivered on request)

1	∅ 10x1mm
2	∅ 12x1mm
3	∅ 15x1mm
4	∅ 18x1mm
5	∅ 22x1mm
6	∅ 28x1mm
7	∅ 35x1,5mm
8	∅ 42x1,5mm
9	∅ 54x2,0mm
10	∅ 64x2,0mm
11	∅ 76x2,0mm
12	∅ 89x2,0mm
13	∅ 108x2,5mm

### 3.1 MEDICAL GAS NETWORK

#### 3.1.1 Copper Pipes and Parts (medical grade)

G. Samaras S.A. can offer all necessary medical gas network parts.

Copper pipes are in accordance with the EN13348 standard and with DIN 1786 and DIN 17671, type R290 (SF Cu / F37), arsenic free, oil free, protected to their ends, characterized according to the regulations for use in medical gases installations using silver welding of 40% content in silver, in neutral gas (N<sub>2</sub>) environment.

The pipe flexions are permitted up to diameter of 18mm according to the standard EN13348 and regulations DIN 1786 by using a special tool.

The copper fittings are oil free, suitable for medical gases installations and according to DIN 2856 and ISO 2016.

*The characterization of networks becomes with special self-adhesive stripes of various colors and signs that are indicated by ISO 7396-1 (replacing EN 737-3) standard.*



#### 3.1.2 Antistatic Tubes

The antistatic tubes are used, according to ISO 7396-1, in specific departments (MRI), where there is a demand for non magnetized materials), as flexible connection between pendants (surgeon, anesthesiologist, ICU) and suspended BHU and the medical gases network.

The antistatic tubes are manufactured according to EN ISO 5359 (replacing 77 739:1998) by PVC materials free of cadmium.