

## mVAC Magnis Medical Vacuum Plant

### ISO7396-1

#### SPECIFICATION

##### **Modular System Design**

The mVAC Magnis Medical Vacuum Plant shall conform to EN ISO 7396-1. Each system includes:

- From two to six direct driven, oil-lubricated, single stage, air cooled rotary screw vacuum pump modules, fully enclosed, each with a variable speed drive
- Vertical air receiver(s)
- Master control
- Set of duplex filters

The Medical Vacuum Plant shall ensure the minimum pipeline vacuum level of 450mmHg is maintained at the plant service connection point at the rated volumetric 'free air' flow rate with either two pumps in standby or with one pump on standby. The bacteria filtration system shall be 'duplexed' such that each filter can be isolated for replacement of the filter cartridge.

##### **Vacuum Pumps**

Each pump is a direct driven, oil lubricated, single-stage, variable speed, air cooled rotary screw pump with an ultimate pressure of 0.35mbar(a) and capable of continuous duty operation.

##### **Airend:**

The compression profile is of an asymmetric profile design with four lobes on the male rotor and six lobes on the female rotor.

- The male and female rotors are the same in diameter.
- The element housing is of cast iron construction.

##### **Drive Motor:**

The drive motor is a totally enclosed, fan cooled design and inverter duty rated. The motor meets IE3 / NEMA Premium Efficiency rating and is 100% maintenance free.

##### **Motor/Airend Connection:**

The drive arrangement is direct driven design, fully enclosed to protect against dirt and dust intrusion. The drive arrangement does not include gear box reduction.

##### **Cooling System:**

The vacuum package is fitted with an aluminum, air-cooled, oil cooler. The cooling system includes a temperature controlled axial fan.

##### **Inlet Air Filter:**

The filter is a polyester cartridge type and is factory installed inside the vacuum enclosure.

- The filter has 99%+ removal efficiency standard to 5 micron.
- The service interval of the filter is at least 4,000 hours under normal operating conditions.

##### **Oil System:**

The oil system includes an air/oil separator with oil level indicator.

- The service interval of the separator element is at least 4,000 hours under normal operating conditions.
- The oil filter is a spin-on type with an integrated bypass valve.
- The oil filter element has a 12 micron beta 75 rating and the service interval is at least 4,000 hours under normal operating conditions.
- The oil temperature is regulated by means of a thermostatic bypass valve, and oil circulation is achieved through differential pressure.

- The oil is synthetic and rated for a change interval of 8,000 hours under normal operating conditions.
- The oil separation system has a discharge oil carry over rating of less than 3 PPM across the entire operating range (1013 to .35 mbar).
- Oil separator design is of multiple vertical elements, easily replaceable by one person.
- Separator discharge includes a drip leg internal to the enclosure with drain piped to outside of enclosure.

##### **Enclosure**

The enclosure of each vacuum unit is a steel sound attenuating canopy with removable panels. The sound attenuating material is flame retardant polyurethane foam. The vacuum canopy has a hot cold design, that isolates all heat producing components from all other components.

##### **Bacteria Filters**

The duplex Bacteria Filter system shall incorporate high efficiency filter elements using stainless steel cores, epoxy sealed caps and an anti-corrosive coated filter housing. A differential vacuum indicator shall be installed across the filter to indicate blockage. Additional pressure sensors shall be installed at the inlet and outlet of the filter to measure the pressure drop across the filters. Each filter shall be designed and sized to carry the full plant design flow capacity with a pressure drop not exceeding 33mbar (25mmHg). Bacteria Filter elements shall have penetration levels not exceeding 0.005% when tested by the sodium flame method in accordance with BS 3928:1969 and utilising particles in the 0.02 to 2 micron size range. Performance shall be validated by a third party test agency and shall be available upon request. Drain flasks shall be connected to each filter. Drain flasks shall be manufactured from transparent Pyrex® with a polymer coating on the inner and outer surfaces in order to maintain a seal in the event of inadvertent breakage of the Pyrex® flask. All drain flasks shall be suitable for sterilisation and be connected via a manual isolating valve.

##### **Piping**

Each vacuum pump is shipped with loose inlet and outlet NTP flange adapters and loose inlet valve.

##### **Control System**

The Central Control System shall provide an intelligent human machine interface incorporating on board flash memory and real-time clock for recording operational parameters in the in built event log. The Central Control System shall operate at low voltage and include BMS connection for common fault. Visualisation of plant inputs, outputs and status through a web browser, using a simple Ethernet connection shall be available. The central control unit shall incorporate a user friendly 5.7" high-definition colour display with clear pictograms and LED indicators, providing easy access to system operational information.

Cascading of vacuum pumps shall be achieved by measuring the vacuum level at the plant inlet with a pressure transducer. A mechanical back-up facility shall ensure continued operation in the event of a control system malfunction. The control system shall normally employ automatic rotation of the lead pump to maximise pump life and ensure even wear.

### Vacuum Receiver(s)

Vacuum Receiver(s) shall be supplied with relevant test certificates and sized to work with Variable Speed Drive (VSD) based vacuum pumps. Vessels shall be Atlas Copco grey (RAL 7011) powder coated steel receivers to BS EN 286-1:1998.

### Voltage

Magnis Medical Vacuum Plant and individual MGS vacuum pumps accepts 3-phase, 400V 50Hz or 380V/460V 60Hz. See electrical diagram for correct connection. In case of other voltages, appropriate options have to be ordered.

### CE Marking

The standard range of BeaconMedaes Medical Vacuum Plant are 'CE' marked under the Medical Devices Directive 93/42/EEC with approval from notified body no. 0088 (Lloyd's Register Quality Assurance). Under this directive, the specified products are classified as Class IIa Medical Devices.

### Naming

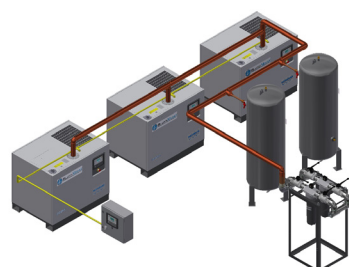
Name: mVAC-AAABC-MSV

#### where:

mVAC - System family name  
 AAA - Power rating of pump  
 B - Total quantity of pumps  
 C - Quantity of stand-by pumps  
 MSV Pumps family: Magnis Screw Vacuum pumps

#### Example:

mVAC-007DS-MSV: Magnis Medical Vacuum Plant, based on two MSV 007 pumps. Where only one pump is foreseen to provide 100% flow, second pump is for the backup



## Data Tables

### mVAC Magnis Medical Vacuum System

ISO7396-1. Two backup pump

Part Number for complete system	Model Number	Plant Output at 300mbar(a)		Total quantity of pumps	Quantity of standby pumps	Pump type	Each Pump flow, lpm	Filter type	Central controller type	Number of receivers	Total receiver volume (litres)	Receiver connection(s) (mm)
		l/m	m <sup>3</sup> /h									
8102370127	mVAC-007TD-MSV	1,400	84	3	2	MSV 007	1,520	Duplex Vacuum Filter Set, MV based, frame mounted	ES- VAC Medical	2	4,000	76
8102370128	mVAC-010TD-MSV	1,810	109	3	2	MSV 010	2,010			2	4,000	76
8102370129	mVAC-015TD-MSV	2,430	146	3	2	MSV 015	2,700			2	4,000	76
8102370130	mVAC-020TD-MSV	2,950	177	3	2	MSV 020	3,280			2	4,000	76
8102370131	mVAC-030TD-MSV	5,000	300	3	2	MSV 030	5,550			2	4,000	76
8102370132	mVAC-040TD-MSV	5,920	355	3	2	MSV 040	6,580			2	4,000	76
8102370133	mVAC-050TD-MSV	6,710	403	3	2	MSV 050	7,450			2	4,000	76
8102370134	mVAC-030QD-MSV	9,990	599	4	2	MSV 030	5,550			2	4,000	76
8102370135	mVAC-050QD-MSV	13,410	805	4	2	MSV 050	7,450			2	4,000	76

- Plant Output in terms of free air aspired at a vacuum of 300 mbar(a) (225mmHg) at the inlet connection with two pumps on standby and with a tolerance of  $\pm 10\%$ .
- Electrical details are provided for guidance only and are referenced at 40 °C ambient temperature. Site conditions may impose a larger cable size. For exact cable sizing, and fuse / MCB ratings, consult a qualified electrical engineer.
- Plant shipped as a set of loose components due to size limitations and shipment efficiency. Consult Operation Manual and Installation proposal for details.

**Data Tables. mVAC Magnis Medical Vacuum System**  
**ISO7396-1. One backup pump (third source is provided locally)**

Part Number	Model Number	Plant Output at 300mbar(a)		Total quantity of pumps	Quantity of standby pumps	Pump type	Each Pump flow, lpm	Filter type	Central controller type	Number of receivers	Total receiver volume (litres)	Receiver connection(s) (mm)
		l/m	m3/h									
8102370119	mVAC-007DS-MSV	1,400	84	2	1	MSV 007	1,520	Duplex Vacuum Filter Set, MV based, frame mounted	ES- VAC Medical	2	4,000	76
8102370120	mVAC-010DS-MSV	1,810	109	2	1	MSV 010	2,010			2	4,000	76
8102370121	mVAC-015DS-MSV	2,430	146	2	1	MSV 015	2,700			2	4,000	76
8102370122	mVAC-020DS-MSV	2,950	177	2	1	MSV 020	3,280			2	4,000	76
8102370123	mVAC-030DS-MSV	5,000	300	2	1	MSV 030	5,550			2	4,000	76
8102370124	mVAC-040DS-MSV	5,920	355	2	1	MSV 040	6,580			2	4,000	76
8102370125	mVAC-050DS-MSV	6,710	403	2	1	MSV 050	7,450			2	4,000	76
8102370126	mVAC-030TS-MSV	9,990	599	3	1	MSV 030	5,550			2	4,000	76
8102370151	mVAC-050TS-MSV	13,410	805	3	1	MSV 050	7,450			2	4,000	76

**ISO7396-1 - No Vessels, No Filters (provided locally)**  
**One backup pump (third source is provided locally)**

Part Number	Model Number	Plant Output at 300mbar(a)		Total number of pumps	Pump type	Each Pump flow, lpm	Central Controller type
		l/m	m3/h				
8102370136	mVAC-007DS-MSV-NVNF	1,400	84	2	MSV 007	1,520	ES- VAC Medical
8102370137	mVAC-010DS-MSV-NVNF	1,810	109	2	MSV 010	2,010	
8102370138	mVAC-015DS-MSV-NVNF	2,430	146	2	MSV 015	2,700	
8102370139	mVAC-020DS-MSV-NVNF	2,950	177	2	MSV 020	3,280	
8102370140	mVAC-030DS-MSV-NVNF	5,000	300	2	MSV 030	5,550	
8102370141	mVAC-040DS-MSV-NVNF	5,920	355	2	MSV 040	6,580	
8102370142	mVAC-050DS-MSV-NVNF	6,710	403	2	MSV 050	7,450	
8102370143	mVAC-020TS-MSV-NVNF	5,900	354	3	MSV 020	3,280	
8102370144	mVAC-030TS-MSV-NVNF	9,990	599	3	MSV 030	5,550	
8102370145	mVAC-040TS-MSV-NVNF	11,840	710	3	MSV 040	6,580	
8102370146	mVAC-050TS-MSV-NVNF	13,410	805	3	MSV 050	7,450	
8102370147	mVAC-020QS-MSV-NVNF	8,860	532	4	MSV 020	3,280	
8102370148	mVAC-030QS-MSV-NVNF	14,990	899	4	MSV 030	5,550	
8102370149	mVAC-040QS-MSV-NVNF	17,770	1,066	4	MSV 040	6,580	
8102370150	mVAC-050QS-MSV-NVNF	20,120	1,207	4	MSV 050	7,450	

- Plant Output in terms of free air aspirated at a vacuum of 300 mbar(a) (225mmHg) at the inlet connection with two pumps on standby and with a tolerance of  $\pm 10\%$ .
- System Flow at atmospheric pressure at the inlet connection with two pumps on standby and with a tolerance of  $\pm 10\%$ .
- Electrical details are provided for guidance only and are referenced at 40 °C ambient temperature. Site conditions may impose a larger cable size. For exact cable sizing, and fuse / MCB ratings, consult a qualified electrical engineer.
- Plant shipped as a set of loose components due to size limitations and shipment efficiency. Consult Operation Manual and Installation proposal for details.


**Vacuum Pumps Selection Table**

PartNo	Description	System Flow, l/m (1)	Volumetric flow, m <sup>3</sup> /h (2)	Min/Max Sound, dB(A) (4)	Footprint H x L x W (mm)	Weight, (kg)	Cooling air, m <sup>3</sup> /s (3)	Oil type	Inlet service connection	Outlet connection	Total power input (kW) (5)	Motor cable size (mm <sup>2</sup> /Amps)	Supply voltage (V)
8102369972	MSV 007 MED IEC-UL/CUL	1,565	483	51/65	1,083 x 1,266 x 934	500	0.5	Synthetic	PN6 DN80 flange	Non std DN60 flange	7.9	4	400V, 50Hz or 380V/460V 60Hz
8102369973	MSV 010 MED IEC-UL/CUL	2,010	607	51/68		500	0.5				10.9	4	
8102369974	MSV 015 MED IEC-UL/CUL	2,700	784	51/73		515	0.6				15.5	6	
8102369975	MSV 020 MED IEC-UL/CUL	3,280	877	51/76		525	0.6				20.6	10	
8102369976	MSV 030 MED IEC-UL/CUL	5,550	1,341	65/75	1,470 x 1,420 x 1,590	1,058	1.3		PN10 DN150 flange	PN10 DN100 flange	27.6	16	
8102369977	MSV 040 MED IEC-UL/CUL	6,580	1,615	65/78		1,063	1.3				35.6	25	
8102369978	MSV 050 MED IEC-UL/CUL	7,450	1,811	65/79		1,073	1.3				42.7	25	

**Note:**

1. System flow in terms of free air aspired at a vacuum of 300 mbar(a) (225mmHg) at the inlet connection with a tolerance of ±10%.
2. Informative: maximum displacement, volumetric flowrate at the canopy (Am<sup>3</sup>/h), measured acc. ISO 21360-2:2012(E)
3. Cooling air flow referred to air inlet grating vacuum pump (m<sup>3</sup>/s)
4. Measured according to ISO 2151:2004 using ISO 9614/2 (sound intensity method)
5. Total electrical power input (kW) at -700mbar(e) or 300 mbar(a)


**Duplex Bacterial Filters Selection Table**

PartNo	Description	Flow acc. HTM02-01, l/m (1)	Flow acc. ISO7396-1, l/m (1)	Height (mm)	Length (mm)	Width (mm)	Weight (kg)	Inlet service connection (mm)	Outlet service connection (mm)
8102341370	MV80 Filter Module 2 filters	1,400	1,400	1,450	880	650	55	60	60
8102341371	MV120 Filter Module 2 filters	2,000	2,000	1,450	1,190	800	72	76	76
8102341372	MV160 Filter Module 2 filters	2,700	2,700	1,450	1,190	800	75	76	76
8102341373	MV120 Filter Module 4 filters	3,900	5,900	1,450	1,190	1,575	150	76	76
8102341374	MV160 Filter Module 4 filters	5,400	8,000	1,450	1,300	1,675	160	108	108
8102341375	MV160 Filter Module 6 filters	8,000	13,400	1,450	1,200	2,350	250	108	108

**Note:**

1. Flow is different due to different standards requirements. According to HTM02-01 bacteria filters should be arranged in two identical subassemblies, where according to ISO7396-1, total filtration capacity sized in a way that the system design flow is sustained at normal operating conditions when at least one bacteria filter is isolated during maintenance, e.g. filter cartridge replacement.

**Receiver Selection Table**


Part Number CE type	Part Number MOM type (Lloyds)	Description	Type	Height (mm)	Diameter (mm)	Weight (kg)	Inlet service connection (mm)	Outlet service connection (mm)
8102341000	8102341005	500L VERTICAL VACUUM VESSEL	Painted Steel	2,105	610	195	2"BSPT	2"BSPT
8102341001	8102341006	1000L VERTICAL VACUUM VESSEL	Painted Steel	2,630	762	380	2" BSPT	2" BSPT
8102341002	8102341007	1500L VERTICAL VACCUM VESSEL	Painted Steel	2,670	900	520	65 NB	65 NB
8102341003	8102341008	2000L VERTICAL VACUUM VESSEL	Painted Steel	2,775	1,067	800	100 NB	100 NB
8102341004	8102341009	3000L VERTICAL VACUUM VESSEL	Painted Steel	3,050	1,220	1,000	100 NB	100 NB

Part Number	Description
8102341010	500L VERTICAL VACUUM VESSEL KIT
8102341011	1000L VERTICAL VACUUM VESSEL KIT
8102341012	1500L VERTICAL VACCUM VESSEL KIT
8102341013	2000L VERTICAL VACUUM VESSEL KIT
8102341014	3000L VERTICAL VACUUM VESSEL KIT

**Central Controller**

PartNo	Description	Footprint H x L x W (mm)	Weight, (kg)	Power input (kW)
8102341614	ES-VAC Medical Central Controller	500 x 500	7	0.3

