



AUSTRALIAN MEDICAL SUCTION SYSTEMS

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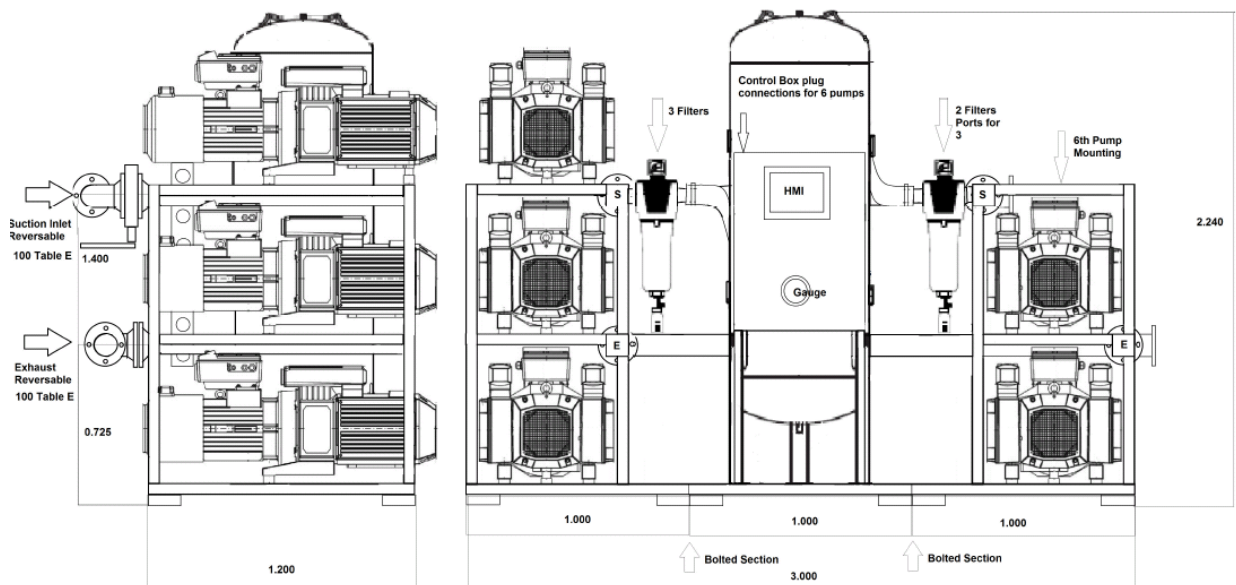
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General

Model MS400-5-60 expandable/modular duplex central vacuum system consisting of two Becker or approved equivalent VTLF2.250 vacuum pumps mounted on a common skid with expandable automatic alternating electrical controls and 530Liter vertical receiver.

Each vacuum pump shall be a Becker Pump Corporation or approved equivalent rotary vane model VTLF2.250 and shall have an open flow of no less than 250m³/hr, and a maximum operating vacuum level of -85kpa. The pumps shall be Oil Free and Variable speed controlled by Pressure Transducer, PLC and inverter.

Requirement

Each vacuum pump shall be direct-driven through a shaft coupling by a 7.5kw, TEFC, NEMA C-face, high efficiency, 1.15 service factor, electric motor wired for operation on a 415 volt, 50 hertz, 3 phase power supply. Actual brake horsepower shall not exceed the rated horsepower at any time or vacuum level. Belt drives shall not be permitted. Each pump shall be air-cooled and have absolutely no water requirements. Auxiliary heat exchangers shall not be permitted.

Capacity

Each Pumps shall be capable of 100m³/hr @ -600mbarG Free Air.

Total systems shall be 400m³/hr @ -600mbarG Free Air N+1

Standard

AS 2896-2011 Clause 2.10

Vacuum Pumps

Each pump shall be equipped with carbon/graphite vanes. A vacuum relief valve shall be incorporated into the design of the pump.

All pumps shall be skid mounted in a vertical arrangement that allows for future expansion to a Triplex (Three pump) system. Pumps shall be connected to a common manifold and piped to an ASME coded 60 Litre vertical receiver. The manifold shall include pre-installed fittings for all present and future pumps. Each vacuum pump shall be equipped with a check valve, and a flex connector. The vacuum pump manufacturer shall be ISO 9001 certified, and all pumps shall be CE compliant, to ensure the highest level of quality control.

System Construction

The vacuum system shall meet all requirements of the current version of the AS2896. The entire system shall be factory assembled to a welded mild steel frame by the vacuum pump manufacturer. Systems assembled by independent packagers shall not be permitted. The entire system shall be tested and pre-commissioned in the factory to ensure that all performance specifications are met.

Motors

The Electric drive shall be 415 volt 3 phase, 50Hz, IP54 degree of protection Class F insulated and capable of continuous operation while meeting the full load requirements of the drive equipment in 40°C ambient temperature.

Vacuum receiver

The Vacuum receiver shall be designed and tested with AS1210. Capacity shall not be less than 60ltr.

Bacterial Filters

Duplicated, combination bacterial filters and drain traps shall be installed in parallel in the suction pipe work prior to the receiver, each shall be provided with inlet and discharge isolation valves.

Each Filter shall be sized to have a maximum clear resistance of 5kPa at the design flow rate. The filter elements shall be readily replaceable.

Each filter shall be provided with a drain isolation valve discharging into a removable, transparent and autoclavable glass vessel. Filters shall be labelled 'bio-hazard' and replacement element details clearly marked.

System Control

Medical suction systems.

As per AS2896-2011. A minimum of two suction pumps, preferably identical, shall be installed with each capable of supplying the design flow rate on its own. Multiple suction pump installations shall be electrically connected so that failure of one suction pump shall not interfere with the correct operation of the remaining pump (or pumps).

If more than two suction pumps are used as the source, the capacity of the pumps shall be such as to supply at least the designed flow rate for the system with any one pump out of operation, i.e. a source of N pumps shall meet or exceed the design capacity with (N-1) pumps operating.

Minimum electrical requirements for a VFD control system.

- 1 x VFD per pump.
- 1 x Circuit breaker per pump.
- 1 x PLC unit provided that VFD has smarts to run at full speed.
- 2 x Volt free contacts for alarm connection.
- Display panel for adjustment.
- Program for PLC to incorporate lead/lag changeover on an actual time basis.
- 2 x Pressure sensing transducers for activating additional pumps and also for alarm in the case of low vacuum.
- Circuit diagram clearly indicating volt free contacts.
- Volt free contacts to be tagged within the panel.
- Power on to panel indication light.
- Cabling for motor connection

Control programs will have but not limited to the following.

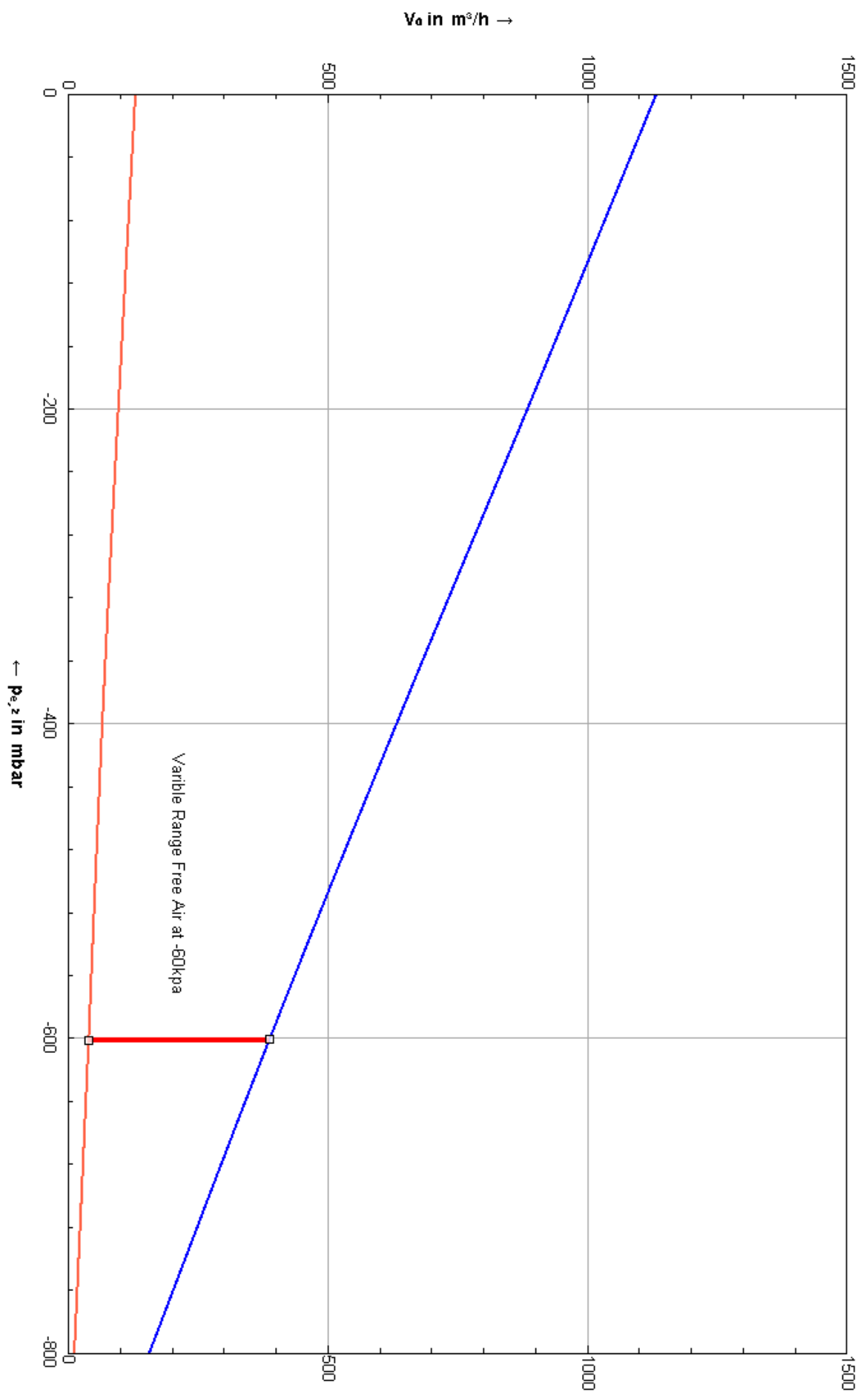
- On/Off/Manual control for all pumps,
- Adjustable set point for frequency speed control,
- Pump fail output,
- Second pump running output,
- Both to operate volt free contacts as well as show on display,
- Individual pump selection,
- A usage meter shall be provided for each pump so that running hours can be balanced and maintenance can be programmed.
- Adjustable set points,
- Initial start-up cycle for in service power failure,
- Lead pump changeover by actual hours not hours
- Indication of which pump running,
- In a two pump system if both are running then this to initiate an alarm referred to as Low vacuum,
- In multiple pumps 3 or more then when pumps less 1 are running the alarm is Initiated,
- As flow requirements increase the vacuum pressure will fall and the pumps speed up when they reach the set point second and subsequent pump will be initiated conversely when the pumps are running at or above the set point then the pumps will slow and the lag pumps will shut down,

Start-up cycle. On connection of system to power initially or after power failure the system is to run at full speed until the high set point is achieved at which time the pumps will slow, this will then enable the full program to run. During start up one or all pumps may run however when set point is reached then the lag pumps will shut down.

Electrical requirements

The suction source shall be installed in accordance with the electrical requirements of AS/NZS 3000 and shall be equipped with a lockable isolator ready for connection to the essential services supply of the hospital.

Volume Flow



SUCTION PUMP SYSTEM SPECIFICATIONS	
MODULE	
Arrangement	Self Contained free standing rack style, receiver in rack,
Qty of Pumps	Five (5) (4 Pumps for Flow requirements)
Qty of Receivers	1
Design Capacity	400 m3/hr @ -60Kpa Intake Pressure Free Air
VACUUM PUMP DATA	
Make	Becker
Model	VTLF 2.250.0-400
Type	Single Stage Oil Free Rotary Vane
Speed	Variable to 1700rpm
Capacity	100m3/h @ -60Kpa Intake Pressure each Pump
Installed Power	7.5 kW per pump
VACUUM RESERVIOR	
Code	Australian Standard AS 1210 1989/1997
Diameter	300 mm
Length	968 mm
Capacity	60 Litres
Paint	Blue
MOUNTING – RACK CONSTRUCTION	
Tubing	40x40x3 SHS
Finish	Fully welded and painted BECKER Grey
Nominal Size	L = 3000mm W = 1300mm H = 2240mm to suit
BACTERIAL FILTERS	
Make	Walker Filtration / Becker
Type	Medical Vacuum
Model	FM160
Rated Flow	555m3/hr Free air
Drain Flask	Yes
CONTROL SYSTEM	
Type	Variable Frequency drive fitted on each pump
Circuit Breakers	Direct on Line
Function Control	PLC with touch screen HIM
Motor Overloads	Inbuilt in VFD
Lead/Lag Control	Auto Lead Pump Rotation PLC controlled pump rotation on lowest hours run. First on, First off
On/Off Switch	On/ Off / Auto Panel Mounted
Alarms	Green Light = Normal
	Red Light = Alarm
BMS Monitoring	Low Vacuum – Pump Stopped Volt Free Contacts
Monitoring	Transducer
Vacuum Level	Set at time of commissioning
Hours Run	Each Frequency drive displays hours run
Pressure Indication	100mm diameter gauge in vacuum line
Phase Failure	Automatic