

Specification

General

The Powerex Medical Rotary Tooth Compressor Systems are designed to provide medical breathing air for hospital and medical institutions. This system meets NFPA 99 requirements for Risk Category 1 systems. Each system is completely tested before shipment and includes:

- Multiple rotary tooth air compressors and associated equipment mounted inside a rigid steel sound enclosure (number of compressor modules vary depending on size of system).
- Master control panel.
- Corrosion resistant air receiver.
- Redundant medical desiccant air dryers with purge control.
- Dew point and CO monitors.

System installation requirements:

- 120 VAC power connection to master control panel.
- 3 phase main power to each compressor unit, with appropriate branch circuit protection and service disconnect.
- Power wire for air receiver automatic drain to be connected to master control panel. (may require a field supplied junction box depending on location of tank and master control).
- Control signal wiring between master panel and each compressor unit.
- Remote inlet air connection to each module.
- Interconnecting plumbing connections between each compressor, tank, and dryer skid.

Oilless Rotary Tooth Compressor Pump

The compressors shall be shaft driven oil-less dual stage, air-cooled rotary tooth. The rotary design shall be rated for 100% continuous duty. The inlet and outlet for the air ends are located on symmetric faces, preventing axial loading and prolonging the life of the bearings. The rotors are made of stainless steel and highly resistant to corrosion. The air end assembly is rated for 40,000 hours of continuous use operation with regular maintenance. The pump is fully air-cooled requiring no external cooling fluid. An intercooler removes heat between the first and second compression stages, allowing for efficient performance. Compressors are rated for 109 psig (125 psig optional high pressure) maximum pressure at sea level.

Motor

The compressor shall be shaft-driven by a 2 pole, TEFC, IP55 rated, 3 phase induction motor with a squirrel cage rotor and cast iron frame. The motor shall run at 3565 RPM at full load and have a rated current of 57.7 Amps.

Compressor Cabinet Controls

Operation of the compressor and display of essential compressor systems is accomplished with a PLC and a touch screen color display for each compressor. This Programmable Logic Controller

and display can easily be programmed to meet varying operating requirements.

Compressor Control Features

Compressor status indication

- Power on
- Standby mode
- Compressor loaded
- Compressor unloaded
- Real time clock

Hour meter

- Total operating hours
- Total loaded hours

Pressure indicators

- Package discharge air
- First stage discharge
- Inlet air filter
- Unload pressure set point
- Loaded pressure set point

Temperature indicators

- First stage air discharge
- Second stage air inlet
- Second stage air outlet

Service requirement indicators

- Routine maintenance

Pre-alarm indicators

- High 1st stage discharge temperature
- High 2nd stage suction temperature
- High 2nd stage outlet temperature
- Drain valve

Compressor safety shutdown indications

- High 1st stage outlet temperature
- High 2nd stage inlet temperature
- High 2nd stage outlet temperature
- Low oil pressure
- Drive motor overload
- Main starter fault
- Fan motor overload
- Oil pump motor overload
- Intake vacuum switch
- Maintenance interval

Additional devices

- Emergency stop button
- Event alarm log w/ ability to extract via USB
- Real time graphs of temperature and pressure data from each sensor
- Manual load/unload switch
- System auto restart

Remote input commands (optional)

- Start/stop
- Load/Unload

Remote output status

- Unit operating
- Loaded/unloaded
- Standby
- General alarm
- BACnet gateway for building management integration (optional)

Inlet Filter

The system includes a 2 stage inlet air filter with a star-pleated main element and an integrated high-efficiency pre-separator that promotes long element life. A silencer box with internal baffles is located prior to the inlet filter to reduce sound. The filter and the silencer box are located inside the sound reducing cabinet.

Oil Mist Catcher

The compressor pump will include an integrated oil mist catcher. The oil mist catcher eliminates oil mist from the gear casing and recycles the oil back into the sump.

Moisture Separator

The compressor comes equipped with two liquid separators with automatic no-loss electronic drains. The first is installed between the first and second stage air ends and the second separator is installed prior to the final discharge of the air compressor.

Heat Exchangers

Each compressor unit contains 3 different heat exchangers. An aluminum intercooler will be located between pump stages 1 and 2. An aluminum aftercooler will be located prior to the 2nd water separator and discharge. An aluminum oil cooler will be oriented next to the two air heat exchangers. A single cooling fan will remove the heat from the top of the system.

Sound Reducing Enclosure

The system is constructed with an internal frame and steel base system with individual vibration isolation mounted compressor modules. The sound reducing enclosure has access panels to allow service of the major components and electrical controls.

Optional VFD Controller

Compressor to be equipped with an integrated VFD motor control to maximize energy efficiency of the compressor under partial load conditions.

NFPA 99 Multiplex Features

- Automatic lead/lag control
- Reserve in use alarm
- Auto restart after power failure
- Remote Inlet air adapter

The Air Treatment Center control panel provides power to the dryer skid, monitors, and tank auto drain. The touch screen control

panel on each air compressor module has all the alarm contacts and operations for the compressor modules; the Air Treatment Center control panel has connections for the monitor alarms.

Air Receiver

The system shall include an ASME air receiver rated for 200 PSI for 400 gallon, 165 psi for 660 gallon MAWP. 400 gallon and larger tanks are shipped loose and include the accessories mentioned below. (Accessories may require field installation.) The tank shall be equipped with:

- Sight gauge
- Pressure gauge and a safety relief valve
- 3-valve bypass
- Zero air loss type automatic moisture drain (with manual drain valve back up)
- The receiver shall be internally lined for corrosion resistance.

Air Treatment Center

The medical dryer package is a skid mounted design consisting of dual desiccant air dryers, dual filtration system, CO and dew point monitors, a sample port and all bypass piping. All components are mounted and plumbed together with bypass valves in accordance with NFPA 99 for Medical Air Systems. Final safety relief valve also included. Piping to be brass, stainless, or type K copper, and cleaned for medical air use. Piping from the compressor outlet to the tank assembly is to be field furnished and installed. Compressed air from the tank assembly is routed to the Air Treatment Center by field provided and installed piping.

Desiccant Air Dryer

The twin-tower, heatless desiccant air dryer shall yield a pressure dew point of -20 degrees F. Dryer is on a separate skid for systems with 400 gal tanks. The dryer design shall be of the automatic pressure swing, heatless, regenerative type and shall include a purge muffler for quiet operation. The filtration system shall consist of 2 stages of filtration mounted and plumbed to the air dryer. The first stage of filtration shall include a .01 micron coalescing pre-filter with element change indicator and automatic condensate drain and installed up-stream of the air dryer. The second stage shall include a 1 micron particulate filter with element change indicator and installed downstream of the air dryer. Activated carbon final filters are standard per NFPA 99.

Dewpoint Monitor

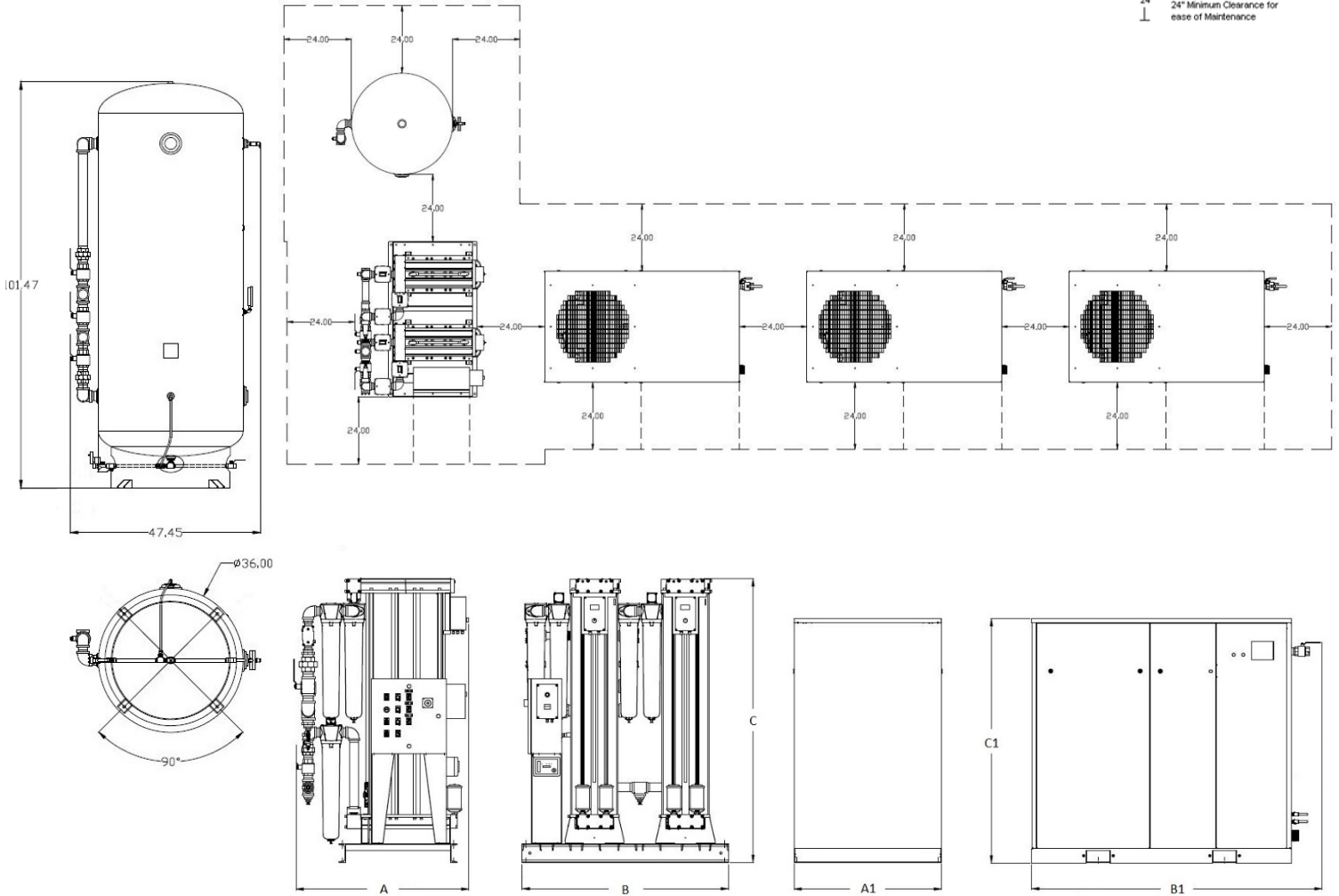
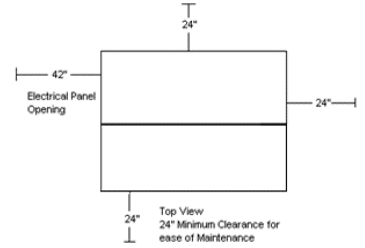
The system-integrated hygrometer shall be equipped with an LCD dew point display and high dew point alarm with dry contacts connected to main controls panel. The sensor shall include an auto calibration feature to ensure the accuracy of the dew point measurement.

Carbon Monoxide Monitor

Carbon monoxide (CO) monitor is in an enclosure with LCD display of CO concentrations. The monitor shall continuously display the CO content of the discharge air and shall provide audible and visual high CO alarms. Dry contacts are provided for remote monitoring of the high CO alarm on the Air Treatment Center control panel.

Dimensions

Model	Dim. A	Dim. B	Dim. C	Dim. A1	Dim. B1	Dim. C1	Inlet	Outlet
MTRC0507K	32"	100"	77"	40"	78"	66"	2 1/2"	3"
MTRC0507F	32"	100"	77"	40"	78"	66"	2 1/2"	3"



Rotary Tooth Medical Air System – Triplex

Model	HP	Control	Maximum Pressure (PSIG)	System Capacity (SCFM)*	Tank Size (gal)	BTU/Hr*	dB(A) Level	System F.L.A.			System Weight (lbs)
								208V	230V	460V	
MTRC0507K	50 (3)	Load/Unload	109	408	400	254,500	70	147	128	64	8,820
MTRC0507F	50 (3)	VFD	109	67-428	400	254,500	70	152	132	66	8,820

*System capacity with one compressor in reserve per NFPA 99. SCFM measured at 100 psig working pressure.

Model Data for Compressed Air – Variable Frequency Drive		
Manufacturer: Powerex, Inc.		
Model Number:	Date:	5/27/15
<input checked="" type="checkbox"/> Air-cooled <input type="checkbox"/> Water-cooled	Type:	Other
<input type="checkbox"/> Oil-injected <input checked="" type="checkbox"/> Oil-free	# of Stages:	2
Rated Operating Pressure:	109	psig ²
Drive Motor Nominal Rating:	50	hp
Drive Motor Nominal Efficiency:	94	percent
Fan Motor Nominal Rating (if applicable):	1.0	hp
Fan Motor Nominal Efficiency:	75	percent
Input Power (kW)	Capacity (acfm) ^{1,4}	Specific Power (kW/100 acfm) ⁴
49.9	196.8	25.34
47.7	194.3	24.57
38.4	145.8	26.31
30.1	112.8	26.65
20.6	66.6	30.90
Total Package Input Power at Zero Flow: ^{3,4}	13.0	kW

Notes:

- 1 – Measured at the discharge terminal point of the compressor package in accordance with ISO 1217, Annex C; ACFM is actual cubic feet per minute at inlet conditions.
- 2 – The operating pressure at which the Capacity and Electrical Consumption were measured for this data sheet.
- 3 – Maximum pressure attainable at full flow, usually the unload pressure setting for load/no load control or the maximum pressure attainable before capacity control begins. May require additional power.
- 4 – Tolerance is specified in ISO 1217, Annex C, as shown in table below:

Volume Flow Rate at Specified Conditions		Volume Flow Rate (%)	Specific Energy Consumption (%)	No Load/Zero Flow Power (%)
(m3/min)	(ft3/min)			
Below 0.5	Below 15	+/- 7	+/- 8	+/- 10
0.5 to 1.5	15 to 50	+/- 6	+/- 7	
1.5 to 15	50 to 500	+/- 5	+/- 6	
Above 15	Above 500	+/- 4	+/- 5	