



Medical & Laboratory Air Systems - 7.5 & 10 HP Pumps Operating & Maintenance Manual

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.



Description

The Powerex Scroll Medical Air package is designed to provide medical breathing air for hospital and medical institutes. This system meets NFPA 99 requirements for Level 1 breathing air. Laboratory Air Systems are constructed similarly but the NFPA 99 does not apply.

Introduction

Safety Guidelines

A SEPARATE SAFETY BOOKLET IS PROVIDED ALONG WITH THIS MANUAL. READ AND UNDERSTAND THE SAFETY BOOKLET. This manual contains information that is very important to know and understand. This information is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help recognize this information, observe the following symbols. MAKE SURE EVERYONE OPERATING OR SERVICING THE COMPRESSOR READS AND UNDERSTANDS ALL THE INFORMATION PROVIDED.

Warning Symbols

⚠ DANGER Danger indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING Warning indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.

NOTICE Notice indicates important information, that if not followed, may cause damage to equipment.

NOTE: Note indicates information that requires special attention.

Unpacking

Immediately upon receipt of the compressor system, inspect for any damage which may have occurred during shipment. Repair or replace damaged items before use. The name-plate should be checked to verify the correct model and voltage.

⚠ WARNING Do not operate unit if damaged during shipping, handling or use. Damage may result in unsafe conditions and cause injury or property damage.

Specifications

SPECIFICATIONS	
Product	Powerex Multiplex Air Compressors
Lubrication	Grease-filled Bearing
Operating Voltages	3Ø 208 V, 230 V, 460 V @ 60 Hz (50 Hz by special order)
Compression Cycle	Scroll
Motor Overload Protection	IEC Motor Protector Circuit Breaker
Control Panel	UL508A Listed
Maximum System Pressure	116 psig max
Overpressure Protection	ASME Safety Valve Factory Set and Sealed
California Ordinance 462 (L) (2)	Meets Requirements of this Ordinance
Outlet Air Connections	¾" through 2" NPT
Tank	ASME Rated for 200 psi
Drive	V Belt
Tank Isolation Valves	Standard All Units
Tank Sizes	80 Gallon to 240 Gallon
Performance	See below

HP	Air End	Discharge Pressure (PSIG)	Air Delivery (SCFM)	Motor Voltage
7.5	SLAE075	116 max	23.8 @ 50 PSIG	230/460, 200/400
10	SLAE10	116 max	31.6 @ 50 PSIG	230/460, 200/400
7.5	SLAE075HP	145 max	17.0 @ 145 PSIG	230/460, 200/400
10	SLAE10HP*	145 max	24.5 @ 145 PSIG	230/460, 200/400

*For replacement only

Components

Oilless Scroll Compressor Pumps

Powerex medical and laboratory open scroll systems are designed to supply continuous oil-free air by using the most advanced scroll technology.

The Powerex scroll compressor offers a dynamically balanced air end which insures vibration-free operation. The rotary design permits a continuous 100% duty cycle. No oil separation, oil filtration, or inlet valves are required on the Powerex Scroll unit. Each compressor shall be belt driven oil-less rotary scroll single stage, air-cooled construction with absolutely no oil needed for operation. Direct drive compressors shall not be used. Systems consist of multiple compressor pumps that are automatically controlled and alternated to equalize usage and wear.

The Powerex oil-less rotary scroll air compressor is based on the theory of scroll compression. A scroll is a free-standing, intricate spiral bounded on one side by a solid, flat plane or base. A scroll set, the basic compression element of a scroll compressor, is made up of two identical spirals which form right and left hand parts. One of these scroll components is indexed or phased 180° with respect to the other so the scrolls can mesh.

Crescent-shaped gas pockets are formed and bounded by the spirals and the base plate of both scrolls. As the moving scroll is orbited around the fixed scroll, the pockets formed by the meshed scrolls follow the spiral toward the center and diminish in size. The moving scroll is prevented from rotating during this process so that the 180° phase relationship of the scrolls is maintained. The compressor's inlet is at the outer boundary of the scrolls. The entering gas is trapped in two completely opposite gas pockets and compressed as the pockets move toward the center. The compressed gas is discharged through the outlet at the center of the fixed scroll so no valves are needed.

Each compressor shall have flexible connectors on intake and discharge, an electric drive motor, a discharge check valve, an air-cooled aftercooler and a high discharge temperature shut down switch. Each compressor module shall have an isolation valve and a moisture separator with automatic drain.

The scroll pump is driven by a three phase electric motor and a dual V-belt drive.

The system includes an aftercooler for each pump and condensate separators connected to electric timer drain valves. For NFPA99 systems, duplex, isolatable timer drains are installed. Each pump module or stack of two pumps for 7.5 & 10 HP models is equipped with an isolation valve so that the pump or module may be removed for service and the valve closed leaving the system operable with partial capacity. (If the valve is used to isolate the system while a person is working or risk of injury exists, appropriate energy lock out tag out procedures must be employed.)

Controls

The disconnects and protection devices in the Powerex control system are for the motor branch circuits, accessory supply circuits and for the control circuit only. The controls on the Powerex Open Scroll System do not include a service disconnect and circuit protection for the supply circuit. Selection and installation of these items must be provided in compliance to local and national codes in accordance with each facility's need.

Each plex is provided with a disconnect located on the side of the control panel. With the disconnect in the off position, the specific plex is electrically isolated from the system, with incoming power and control voltage disconnected. The alarms related to the isolated plex are disabled until electricity is restored.

The PLC automatically alternates the lead designation and brings on lag pumps as needed, equalizing run time on the pumps in the system. The touch screen HMI (Human Machine Interface) panel on the front allows operation and monitoring of the system. The touch screen provides the user with displays showing the operating status and allows the user to access features of the control system. The control panel also allows communication using the BACnet® protocol.

The control panel includes Hand-Off-Auto selector switches for each pump so that a pump can be held on (or off). This can be useful if maintenance or diagnostic procedures are being performed.

The transformer is sized for the loads imposed by the Powerex factory controls and should not be utilized for any other purpose. Premium control panels utilize a backup transformer with a reserve transformer in use alarm.

Local alarms are provided for low pressure and general fault conditions. The general fault alarm includes high temperature, reserve transformer in use, motor overload and reserve pump in use (when specified). The wiring connection point for the alarms is on the terminal strip in the control panel box, with good conditions being contacts closed. (If a wire connection is lost, the result is an alarm.)

Receiver Tank

The ASME, National Board registered air receiver is provided in sizes from 200 to 240 gallons. Each receiver is rated at 200 psig working pressure. Receivers are provided with sight gauge, moisture drain (manual and no-loss electric), and internal lining to prevent corrosion.

The system receiver tank with bypass valves and duplex twin tower desiccant dryers are sized to provide adequate air storage and provide a pressure dew point of -40°F for laboratory systems with one dryer operating. Medical systems are not intended to operate with both dryers simultaneously. Doing so will result in back flow into one of the regulators and leakage of air from that device. Laboratory systems have valves to allow both dryers to operate if needed.

The receiver tank is equipped with an electric timer drain that is powered from the main control panel. The drain has a manual test feature. The automatic action of the drain will be confirmed by the lack of water accumulation.

⚠ DANGER Never drill holes in, or perform any welding on receiver tanks (unless qualified by ASME to do so) or use them beyond the rated pressure settings. Never mount other machinery or equipment on receivers.

Air Dryer (Desiccant)

The regenerative desiccant consists of two (dual) towers filled with desiccant. Each tower is switched on and off stream, alternating the air system stream and then being regenerated. Dry purge air pulls moisture from the desiccant and carries the moisture out of the system. The medical system duplex twin tower desiccant dryers have isolation valves and each dryer has a pre-filter to remove water and particulates, and an after filter. Differential pressure indicators show when the elements need to be replaced.

Dew Point Monitor

The Powerex Dew Point Monitor provides indication of dew point temperature. Its microprocessor is controlled with alarm and self-calibration sensor.

Regenerative dryers paired with the Powerex dew point monitor may be operated in Econ Mode where the dew point monitor will signal the dryer to cease purge if system dew point is below the set point. The dryer control forces purge cycles at predefined intervals to assure proper operation.

Frames or Tank Mount Structure

Powerex designed the system to bear the weight and stress of the compressor pumps, controls, and receiver tank and dryers. When lifting the system, use the designated fork lift slots or rig straps to lift the main system skid. Do not attempt to lift the system using individual component lifting hooks and eyes. Piping may need to be supported during lift up or transport to avoid damaging the supplied flex connectors for intake and exhaust.

Systems will require interconnection of modules on site. Make sure individual modules are located per the design drawing and pneumatic and electrical connections are made as shown in the supplied wiring diagram. Some systems will have separately mounted inlet manifolds.

Condensate Traps & Automatic Drains

Powerex 7.5 & 10 HP Scroll Systems are equipped with cyclonic condensate traps after the aftercoolers. Each trap has a "quiet zone" near the bottom of the bowl and the accumulated condensate is piped to a common timer drain through a service isolation valve.

The timer drain assembly is duplexed so the system remains fully functional if our timer drain valve is isolated for service. Under normal conditions the valves to one or both may be opened. Adjust the timer settings to increase duration and frequency of opening if large amounts of condensate accumulates in the receiver tank.

A similar timer drain is installed to drain the tank. Adjust the timer to increase duration and frequency if condensate accumulates in the tank.

Operation at High Altitudes

Compressor pumps are sensitive to reduced atmospheric pressure encountered as altitude increases. Powerex will adjust the operating set points to compensate for altitude if the original order is designated for high altitude and the expected conditions provided to us.

Installation

⚠ WARNING Disconnect, tag and lockout power before attempting to install, service, relocate or perform any maintenance.

⚠ CAUTION Do not lift or move unit without appropriately rated equipment. Be sure the unit is securely attached to lifting device used. Do not lift unit by holding onto tubes or coolers. Do not use pumps to lift other attached equipment.

⚠ WARNING Installation of inlet / outlet air plumbing from the system and electrical connections must be in accordance with National Fire Protection Association (NFPA99) Code Compliance for Medical Gas Breathing Air (Level 1).

Installation Site

1. The compressor system must be located in a clean, well lit and well-ventilated area.
2. The area should be free of excessive dust, toxic or flammable gases and moisture.
3. Never install the system where the surrounding temperature is higher than 104°F or where humidity is high.
4. Clearance must allow for safe, effective inspection and maintenance.
5. If necessary, use metal shims or leveling pads to level the system. Never use wood to shim the unit

NOTE: A minimum of 24" clearance is recommended around the entire unit. Clearance for Control Panel shall be in accordance with OSHA/NEC Requirements.

Ventilation

1. If the oil-less compressor system is located in a totally enclosed room, an exhaust fan with access to outside air make up air must be installed. Room temperature must remain below 104°F. Circulation must be sufficient to prevent local hot spots.

2. Never restrict the cooling fan exhaust air. Maintain a minimum of 24 in. of clearance around the entire unit (36 in. is preferred).
3. Never locate the compressor where hot exhaust air from other heat generating units may be pulled into the system.

Vibration

The Powerex Scroll systems are designed to minimize generated vibrations by using balanced rotary scroll pumps. Each pump is mounted on base plate with a motor and the base mount assembly is isolated from the main support frame by use of cork-rubber pads at the support points.

Powerex scroll systems are provided with cork-rubber vibration isolation pads for use between the base platforms and the facility floor to give further isolation. Normal practice is to install a pad at each corner. Drill a hole through the pad to accommodate the fastener selected to attach the base platform to the floor, positioning the hole to maximize the contact between the platform lower surface and the pad. When tightening the fastener, apply sufficient torque to take up any slack, but do not crush the pad. Pads are most effective when they are lightly loaded.

In some cases alternate isolation devices may be preferred. Install them according to the recommendations of the device manufacturer. If desired, additional support points may be selected and holes drilled in the base as needed to accommodate the design.

Connecting Piping

1. Locate connection for piping at rear of compressor module to receiver tank module.
2. Remove plastic caps or adhesive covering on ports and connectors.
3. Connect flex line to the ports making sure each flex line is not pinched or kinked.
4. Follow steps 1 to 3 for flex line from dryer package to inlet of receiver tank (if applicable).

NOTE: All piping is provided and sealed for this portion of installation.

5. If applicable, locate and attach intake inline air filter to outside source air or header. A flex line is provided for attaching intake of compressors to air filter assemblies.
6. Connect outlet of tank/dryer module to outlet source piping.

⚠ WARNING Attach all inlet and outlet source piping in accordance with NFPA 99 for Medical Gas. **Piping**

General Guidelines

Refer to the general product manual.

1. Make sure the piping is lined up without being strained or twisted when assembling the piping for the system.
2. Appropriate expansion loops or bends should be installed at the system to avoid stresses caused by changes in hot and cold conditions.
3. Piping supports should be anchored separately from the system to reduce noise and vibration.
4. Never use any piping smaller than the system outlet connection.
5. Use flexible hose to connect the outlet of the system to the piping so that the vibration of the system does not transfer to the piping.

Remote Intake Piping

Powerex Compressor Medical and Laboratory Air Systems with 7.5 & 10 HP pumps are constructed manifolds with a single point connection for remote air intake. Piping for remote intake system must be installed at the final operating site. Under some conditions, the intake piping may facilitate the condensation of humidity in the intake air stream into liquid water.

NOTICE The intake filters supplied by Powerex will not stop ingestion of liquid water by the pumps. Liquid water going into the pumps will damage the pumps and void the warranty.

Always install drip legs with sufficient capacity to capture liquid water in the intake piping before the system connection points. Drip legs must be sized with low enough air velocity to make sure they are effective at capturing liquid water in the intake air and must be maintained (drained) at frequent intervals to make sure they remain effective.

NOTICE

Intake isolation valves must never be closed when the connected compressor is running or in auto. Operation with closed valves will damage the pump. The intake isolation valves have had the handles removed and a handle or handles are provided inside the electrical panel. Powerex strongly recommends the valves opening and closing be controlled to avoid pump damage.

Safety Valves, Pressure Vessels, and Piping

1. Powerex systems are shipped with ASME safety valves sized so that the maximum system flow is less than the capacity of the valve or valves at the rated pressure. The rated pressure of the valve is equal to or less than the maximum allowable working pressure of the vessel or upstream pressure bearing parts. DO NOT MODIFY or install any valves with different specifications unless appropriate evaluations are completed. Do not modify the structure of the pressure vessel or weld on the vessel.
2. Do not install any shut off valves between the safety valve and the vessel or between the compressor pump and the first system safety valve. Doing so can result in a dangerous condition and lead to death or injury.
3. Do not install shut off valves in the system that create trapped compressed air.
4. Manually operate the safety valve every six months or 2,500 operating hours to provide assurance that the mechanism is free to operate. Replace valve if it is leaking when it is closed or if it fails to vent when actuated.
5. Any piping or pressure bearing connection hose or tubing used in the system must be rated equal to or higher than the safety valve pressure rating. Inadequate pressure rating could result in bursting.

Modular Placement

1. Unpack each frame module and discard or recycle all wood shipping materials.
2. Systems consist of multiple frame modules. The steel base platforms are intended to be bolted to the floor as shown in the design drawings and connecting hoses provided (found in the parts pack box). Systems may be placed on isolation pads if desired. Modules may be spaced farther apart without any structural problems, but electrical connections may need to be modified—additional isolation pads and longer hoses may be needed.
3. Place frame modules at location designated on build drawing. Provide sufficient clearance around system for servicing (see minimum clearance section).
4. Install frame assembly fasteners to each frame joining the frames together.
5. Lift corners of each frame assembly and install isolation pads provided.

⚠ WARNING Attach all inlet and outlet source piping in accordance with NFPA 99 for Medical Gas.

Wiring

⚠ DANGER Lock out and tag out the electrical supply before servicing the equipment.

⚠ DANGER Electrical shock hazard. Make sure the system is grounded in accordance with NEC and local requirements.

All electrical hook-ups must be performed by a qualified electrician. Installations must be in accordance with local and national electric codes. Make sure power supply conductors are sized adequately for full system demand.

Use solder-less terminals to connect the electrical power source.

Electrical Wiring of System Shipped In Separate Modules

⚠ CAUTION Provide electrical power in accordance to NEC and local codes. Connection of wiring should be performed by a qualified electrician.

1. A main system service disconnect and overload protection must be installed. Powerex recommends the main system disconnect should be placed as close as possible to the system, preferably visible from the machine.
2. Refer to the system wiring and mechanical diagram, to wire the pumps power wires to appropriate location within the electrical panel. Typically load side of the contactors.
3. Refer to the system wiring diagram, to wire the auxiliary equipment (dryer power cords, electric drain power cord, dew point power cord) and other control wires (High temperature switches and alarm wiring to the master control panel), to appropriate location within the electrical panel. typically on a terminal strip located towards bottom of panel.
4. Wiring connections can become loose during shipping and storage. Check all connections for integrity when installing and starting unit.

For questions concerning assembling and start-up, contact Powerex at 1-888-769-7979 for technical assistance.

Operation

Before Start Up

1. Make sure all safety warnings, labels and instructions have been read and understood before continuing.
2. Remove any shipping materials, brackets, etc.
3. Confirm that the electric power source and ground have been firmly connected. Confirm supply voltage and amps match the system requirements.
4. Be sure all pressure connections are tight.
5. Check to be certain all safety relief valves, etc. are unrestricted.
6. Check that all fuses, circuit breakers, etc. are the proper size.
7. Make sure the inlet filter assembly is properly installed and all intake isolation valves are open.
8. Confirm that the tank manual drain valve is closed.
9. Once power is connected to the unit, visually check the rotation of the compressor pump. If the rotation is incorrect, have a qualified electrician correct the motor wiring.

NOTICE If all pumps are running in the wrong direction, change the incoming power

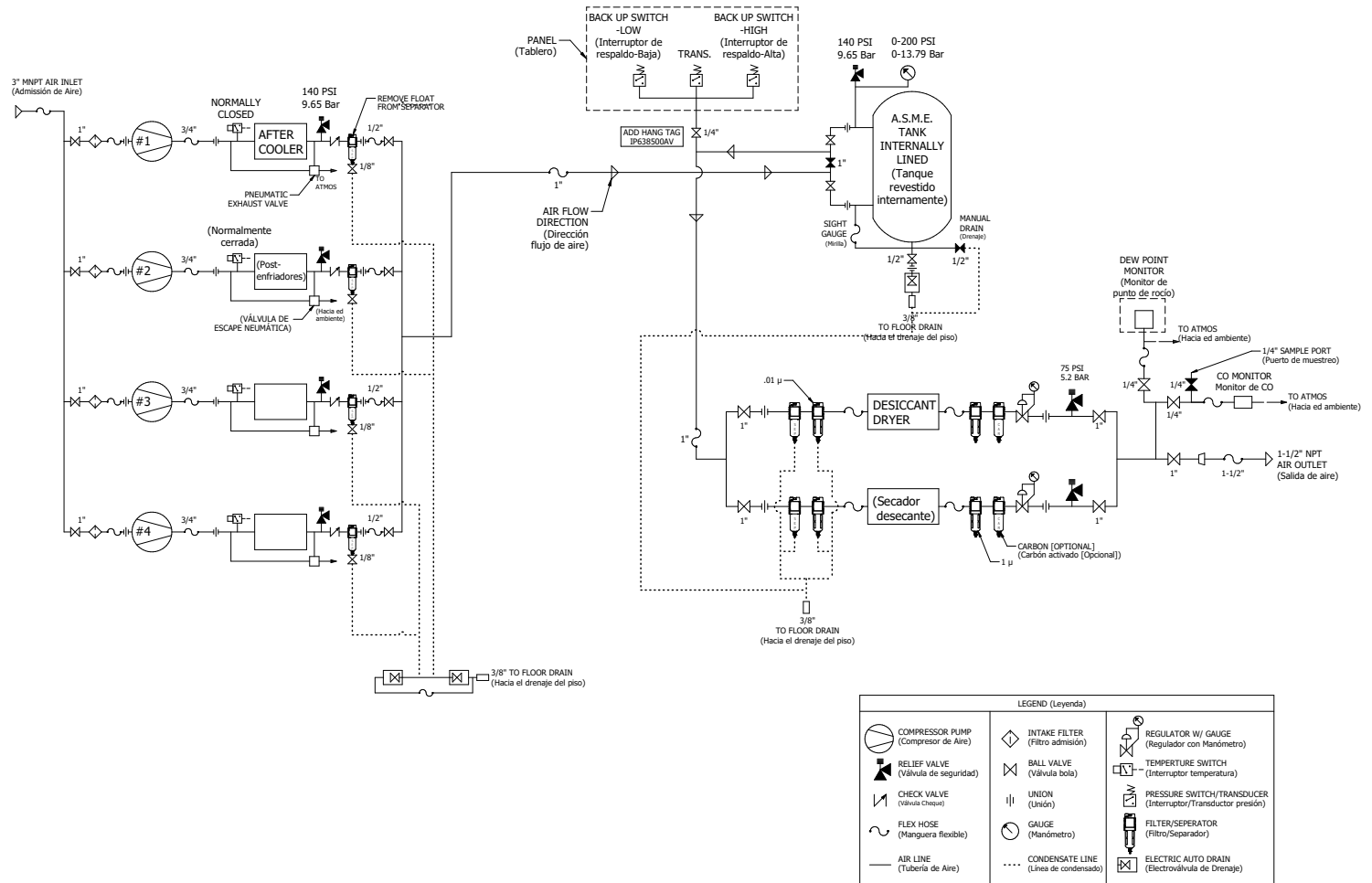
leads to correct rotation.

Start Up & Operation

1. Follow all procedures under “Before Start-Up” before attempting operation of the system.
2. Make sure all Plex Isolation disconnects are in the ON position.
3. Make sure all Plex HOA switches are in the OFF position.
4. Switch on electric source.
5. Open tank connection valve or valves completely.
6. Using the selector switches on the control panel, turn on each pump—motor in the “Auto” mode until all are running.
7. Check for excessive vibration, unusual noises or leaks during operation. If problems are detected, shut down the system and make corrections or repair as needed before operating the system.
8. Pumps may be operated in “hand” mode to override the function of the automatic controls. The pumps and the system will not be damaged during “hand” mode operation is used for a short time. If hand mode is used for many hours, possible overload and overheating may result along with more rapid pump wear. The system safety valves may open if operated in “hand” mode.
9. In normal operation, leave all selector switches in the “Auto” position and allow the controls to cycle the pumps as needed based on compressor demand.

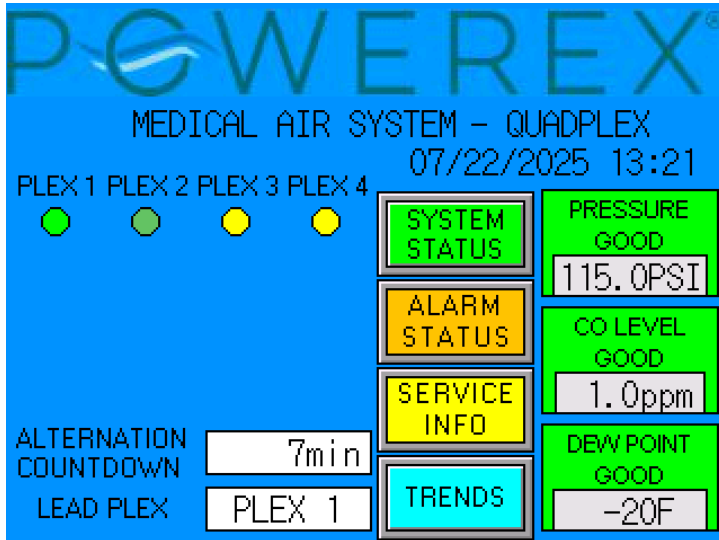
Medical Air Flow Schematic

This is only a representative schematic diagram.



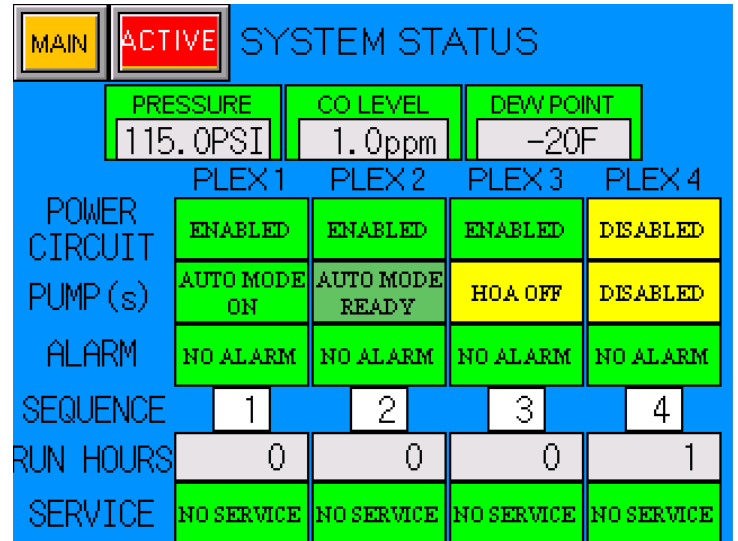
HMI Screens

Main



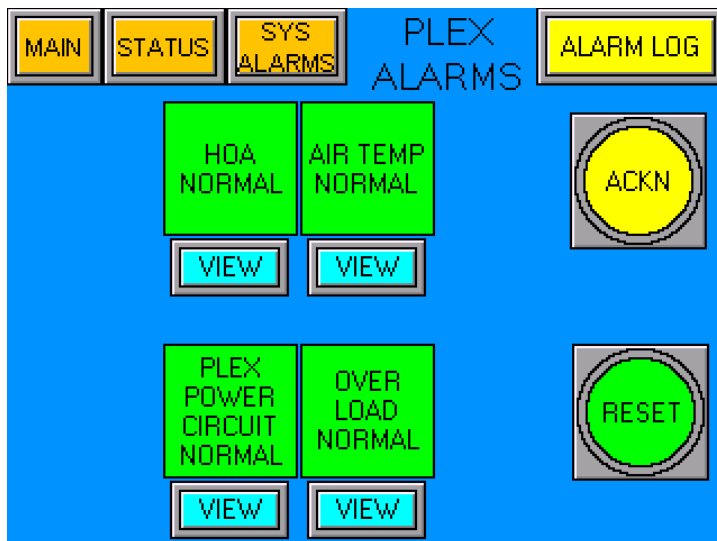
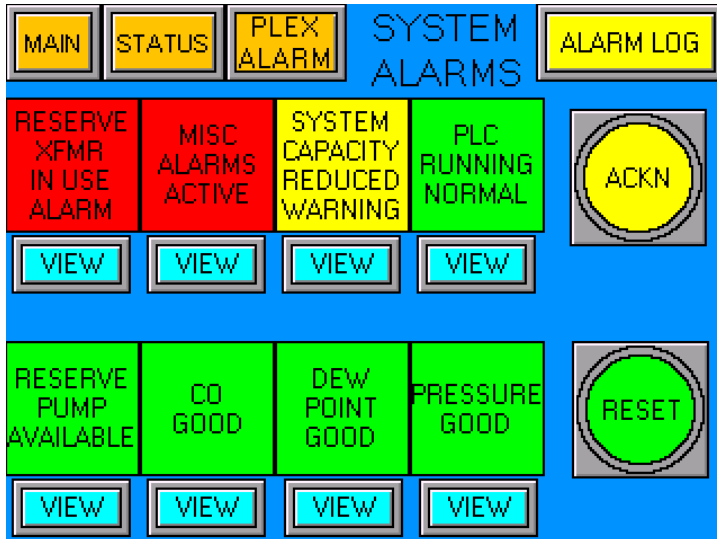
- System Type (Med Air, Lab Air, Med Vac...)
- System Plex
- Screen Buttons
 - System Status Screen
 - Alarm status screen
 - Service info screen
 - Trends screen
- System Process Values (right side)
 - Pressure or Vacuum
 - Carbon Monoxide
 - Dew Point
- System Overview (left side)
 - Basic Plex status
 - Alternation countdown
 - Lead plex
- System Process Values, displays the process value along with visual status indicators (text and background color). Text and color will change as value moves. Red = Alarm, Yellow = Warning, Green = Good.
- Basic Plex Status, displays plex pump status. Green = Running, Dark Green = Ready Yellow = pump off, Red = alarm.
- More detail status available on the system status screen.
- Alternation countdown, displays the countdown time. Air system countdown only begins when a plex is active. Vac system alternation runs regardless of plex activation.
- Lead plex, displays the current lead plex.

System status screen



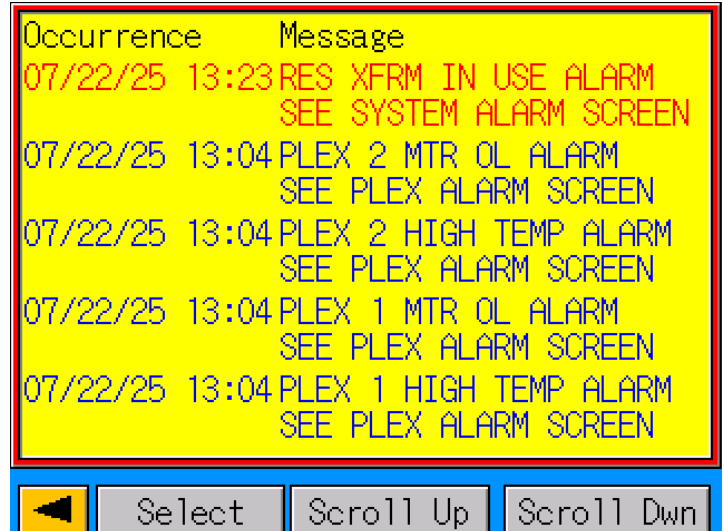
- System Process Values
 - Green....Good
 - Yellow.....Warning
 - Red.....Alarm
- Plex Power Circuit Status
 - Green = enabled
 - Yellow = Disabled
 - Alarm = Alarm
- Plex Pump Status
 - Green = Running
 - Dark Green = Ready
 - Yellow = Pump off
 - Red = Alarm
- Alarm Status
 - Green = No Alarm
 - Red (button) = Alarm
- Plex Sequence
 - 1 = lead, 2 = lag 1.....
- Pump Run Hours
- Service Status
 - Green = no service
 - Yellow (button) = service required

Alarm Screens



- Acknowledge Alarms Button
 - Also silences horn
- Reset Alarm Button
 - If problem has been corrected
- Alarm log button
- Alarm status
 - Green = good (no alarm)
 - Red = Alarm active
- Alarm View buttons
 - Provide more information on alarm

Alarm Log Screens



- Records of all alarms, warnings, and service alerts by date and time
- Message is basic alarm overview, along with where to find additional alarm information

System Alarm View Screens

MAIN **PLC ERROR STATUS** **BACK**

- ☐ POWER FAILURE DETECTION
- ☐ WATCHDOG TIMER ERROR
- ☐ DATA LINK CONNECTION ERROR
- ☐ USER PROGRAM ROM CRC ERROR
- ☐ TIMER/COUNTER PRESET CHANGE ERROR
- ☐ KEEP DATA ERROR
- ☐ USER PROGRAM SYNTAX ERROR
- ☐ USER PROGRAM DOWNLOAD ERROR
- ☐ SYSTEM ERROR
- ☐ CLOCK ERROR
- ☐ EXPANSION BUS INITIALIZATION ERROR
- ☐ SD MEMORY CARD TRANSFER ERROR
- ☐ USER PROGRAM EXECUTION ERROR
- ☐ SD MEMORY CARD ACCESS ERROR

CLEAR PLC ERROR

PLC BATTERY VOLTAGE NORMAL

MAIN **MISC ALARMS STATUS** **SYS ALARMS**

HIGH PRESSURE BACKUP SWITCH NORMAL

HIGH PRESSURE BACKUP SWITCH WITHIN RANGE

LOW PRESSURE BACKUP SWITCH ALARM ACTIVE
***CONFIRM ALL AVAILABLE PLEXES ACTIVE**
CORRECTIVE ACTION: CONFIRM SWITCH SETPOINT

LOW PRESSURE BACKUP SWITCH WITHIN RANGE

AMBIENT TEMPERATURE GOOD

MAIN **SYSTEM ALARMS RPIU AND RTIU** **SYS ALARMS**

RESERVE TRANSFORMER IN USE STATUS

RESERVE TRANSFORMER IN USE ALARM ACTIVE
IMMEDIATE ACTION REQUIRED
SYSTEM OPERATING ON RESERVE
COMMON CAUSE: BLOWN FUSE
CORRECTIVE ACTIONS: REVIEW FUSES, AND WIRING

RESERVE PUMP IN USE STATUS

RESERVE PUMP AVAILABLE

MAIN **SYSTEM CAPACITY REDUCED WARNING** **SYS ALARMS**

COMMON CAUSE FOR WARNING:
PLEX OFF (ISOLATED) FOR MAINTENANCE
PLEX HOA SWITCH OFF
PLEX ALARM ACTIVE

PLEX ALARMS

PLEX 1	PLEX 2	PLEX 3	PLEX 4
NORMAL OPERATION	NORMAL OPERATION	OPERATION RESTRICTED	OPERATION RESTRICTED

MAIN **SYSTEM SENSOR STATUS** **SYS ALARMS**

PRESSURE TRANSDUCER STATUS

115.0PSI PRESSURE LEVEL GOOD
TRANSDUCER INSTALLED

CARBON MONOXIDE (CO) MONITOR STATUS

1.0ppm CARBON MONOXIDE (CO) LEVEL GOOD
MONITOR INSTALLED

DEW POINT TRANSMITTER STATUS

-20F DEW POINT LEVEL GOOD
TRANSMITTER INSTALLED

- Alarm status
 - Green = good (no alarm)
 - Yellow = Warning active
 - Red = Alarm active
- Alarm message provides additional information
 - Common cause
 - Corrective actions
 - General information

Plex Alarm View Screens

MAIN

PLEX
ALARMS

HIGH TEMP ALARM

COMMON CAUSE FOR ALARM:
PLEX SPECIFIC TEMPERATURE HIGH
CORRECTIVE ACTION:
REVIEW SYSTEM AIRFLOW AND RELATED WIRING
SEE MANUAL AND DRAWINGS FOR MORE INFO
PLEX ISOLATION RECOMMENDED

PLEX1	PLEX2	PLEX3	PLEX4
NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION

MAIN

PLEX
ALARMS

HOA SWITCH ALARM

COMMON CAUSE FOR ALARM:
PLEX SPECIFIC HOA FEEDBACK AND WIRING ISSUES
CORRECTIVE ACTION:
REVIEW WIRING
SEE MANUAL AND DRAWINGS FOR MORE INFO
PLEX ISOLATION RECOMMENDED

PLEX1	PLEX2	PLEX3	PLEX4
NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION

MAIN

PLEX
ALARMS

MOTOR OVERLOAD ALARM

COMMON CAUSE FOR ALARM:
PLEX SPECIFIC MOTOR PROTECTOR TRIPPED, WIRING
CORRECTIVE ACTION:
RESET MOTOR PROTECTOR, REVIEW WIRING
SEE MANUAL AND DRAWINGS FOR MORE INFO
PLEX ISOLATION RECOMMENDED

PLEX1	PLEX2	PLEX3	PLEX4
NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION

MAIN

PLEX
ALARMS

PLEX ISOLATION ALARM

COMMON CAUSE FOR ALARM:
PLEX DISCONNECT OR CR POWER FEEDBACK ISSUE
CORRECTIVE ACTION:
REVIEW AND CONFIRM WIRING AND PLC INPUTS
SEE MANUAL AND DRAWINGS FOR MORE INFO
PLEX ISOLATION RECOMMENDED

PLEX1	PLEX2	PLEX3	PLEX4
NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION	NORMAL OPERATION

- Plex status
 - Green = good (no alarm)
 - Red = Alarm active
- Alarm screen provides additional information
 - Common cause
 - Corrective actions
 - General information

Service screen

- System info
 - Model and serial number
 - When calling service have this information ready
- Powerex contact info
- Local vendor contact info
 - Enter company name (max 20ch) and phone number (max 14ch)
- Service Status Plex pump and overall system
 - Green = no service
 - Yellow = service needed
 - View Button Provides more information
- Addition service related screen buttons.
 - Plex isolation status, Maintenance mode, test outputs, working setpoints, PLC IO status, Advanced service
- Password protected System setting screen

Service status screens

- Service button to maintenance message screen per plex.
- Shows hours until next service

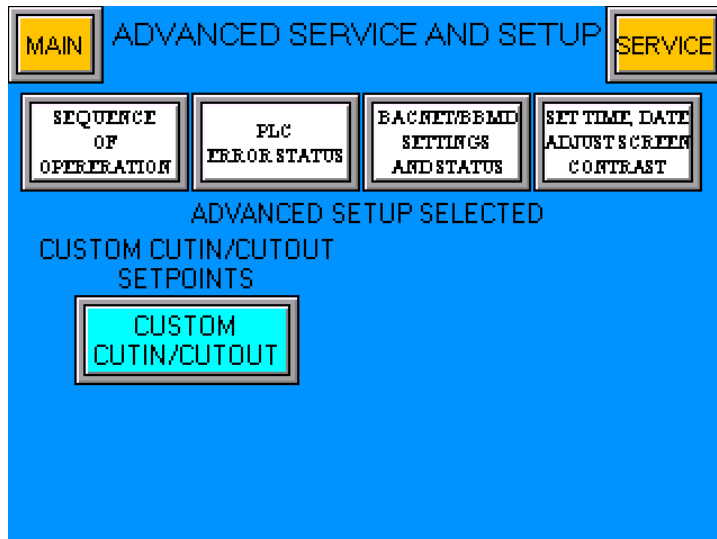
PLEX Service Screen

- Plex power circuit status, based of plex isolation disconnect
 - Red = live not ready for service
 - Green = plex isolated, ready for service
- Maintenance message interval.
- Maintenance message
- Acknowledge button
 - All maintenance messages need to be acknowledged.
- PM Completed, clear notification button.
 - Only displays when Acknowledge of messages is up to date, allowing you to clear message.
- New pump installed, reset hours button.
 - Only used if a pump is being replaced and hours need to be reset.
- Pump Maintenance Hour Counter

System Service Screen

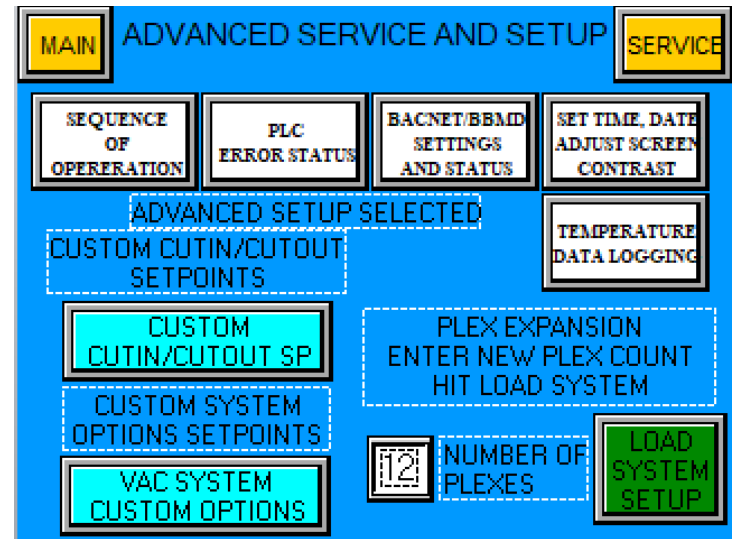
- Service Status message
 - Green = no service
 - Yellow = service required
 - Interval and actions
- Acknowledge and clear for each sensor

Advanced Service screens



- Sequence of operation
 - Provides basic overview of the system operation and hmi screens.
- Plc error status
 - Shows PLC error status
- Bacnet/BBMD Setting and Status
 - See bacnet setup section in the manual for more information
- Set time and date, adjust screen copntrart
 - Exits runtime, read the screen.
- Custom setups
 - If custom setpoints are selected here is were you'll set them up.

System Working setpoints



SERVICE

SYSTEM WORKING
SETPOINTS PAGE 2 OF 2

PAGE 1

CO SETPOINTS (ppm)

DEW POINT SETPOINTS (F)

HIGH ALARM10.0

HIGH ALARM35

HIGH WARNING8.0

HIGH WARNING25

BACKUP SWITCH SETPOINT
REF ONLY (PSI)

DRYER PURGE SETPOINTS (F)

LOW PRES (PS1)65

ECON MODE START-15

HIGH PRES (PS2)120

ECON MODE RESET-10

PRESSURE SETPOINTS (PSI)

HIGH ALARM125.0

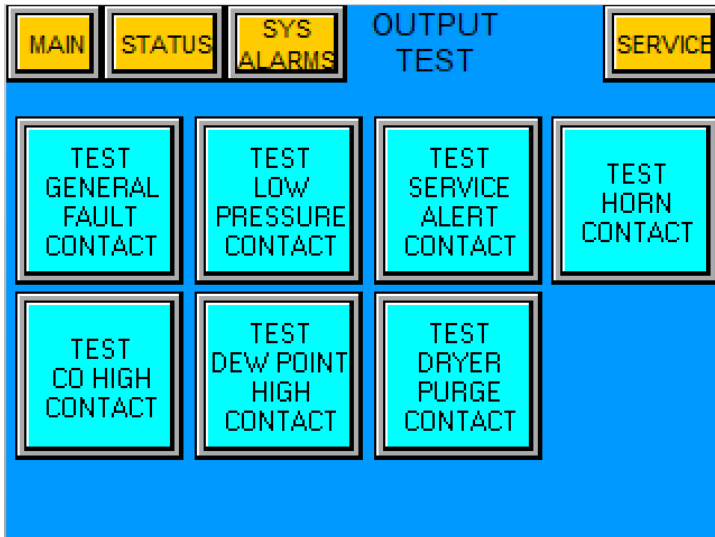
LOW WARNING70.0

HIGH WARNING120.0

LOW ALARM65.0

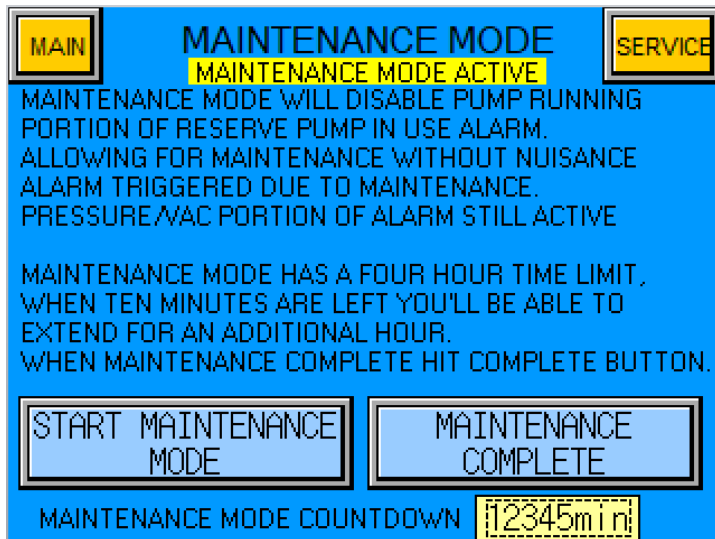
- Screens show working setpoints the system is currently operating with.

Test Outputs



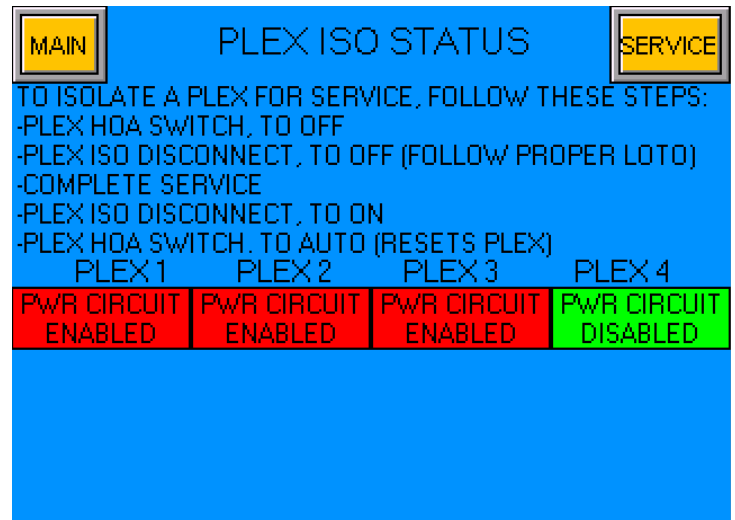
- Pressing button will toggle the related output to allow for testing.
- Enter Maintenance mode

Maintenance Mode



- Maintenance mode notes
- Start and complete buttons
- Maintenance mode countdown
 - At 10min the opportunity to extend is available
- "Maintenance mode active" display will visible when maintenance mode is active.
 - Visible on main and system status screen.

Plex Isolation Status



- Status of Plex Isolation for each plex
 - Green = disabled, no power ready for service
 - Red = enabled, power present, not ready for service.
- PLEX isolation steps.
- See plex isolation section of the manual for more info.

PLC IO Status

MAINSTATUSSYSALARMSIO STATUSSERVICE

PREV PAGEPLC 0 - COMBO (I/O)NEXT PAGE

☐ I:0.0 - PLC TAG I0000

☒ I:0.1 - PLC TAG I0001

☐ I:0.2 - PLC TAG I0002

☒ I:0.3 - PLC TAG I0003

☐ I:0.4 - PLC TAG I0004

☐ I:0.5 - PLC TAG I0005

☐ I:0.6 - PLC TAG I0006

☐ I:0.7 - PLC TAG I0007

☐ Q:0.0 - PLC TAG Q0000

☐ Q:0.1 - PLC TAG Q0001

☒ Q:0.2 - PLC TAG Q0002

☒ Q:0.3 - PLC TAG Q0003

☒ Q:0.4 - PLC TAG Q0004

☒ Q:0.5 - PLC TAG Q0005

☒ Q:0.6 - PLC TAG Q0006

☐ Q:0.7 - PLC TAG Q0007

MAINSTATUSSYSALARMSIO STATUSSERVICE

PREV PAGEPLC 1 - ANALOGNEXT PAGE

AI:0 - PRESSURE TRANSDUCER (4-20mA)

0

AI:2 - CO MONITOR (4-20mA)

0

AI:4 - DEW POINT MONITOR (0-10V)

0

AI:6 - TEMP TRANSMITTER (4-20mA)

0

MAINSTATUSSYSALARMSIO STATUSSERVICE

PREV PAGEPLC 2 - INPUTSNEXT PAGE

☒ I:2.0 - PLC TAG I0030

☐ I:2.1 - PLC TAG I0031

☒ I:2.2 - PLC TAG I0032

☐ I:2.3 - PLC TAG I0033

☐ I:2.4 - PLC TAG I0034

☐ I:2.5 - PLC TAG I0035

☐ I:2.6 - PLC TAG I0036

☒ I:2.7 - PLC TAG I0037

☐ I:2.10 - PLC TAG I0040

☐ I:2.11 - PLC TAG I0041

☐ I:2.12 - PLC TAG I0042

☐ I:2.13 - PLC TAG I0043

☐ I:2.14 - PLC TAG I0044

☐ I:2.15 - PLC TAG I0045

☐ I:2.16 - PLC TAG I0046

☐ I:2.17 - PLC TAG I0047

MAINSTATUSSYSALARMSIO STATUSSERVICE

PREV PAGEPLC 3 - INPUTSNEXT PAGE

☒ I:3.0 - PLC TAG I0050

☒ I:3.1 - PLC TAG I0051

☒ I:3.2 - PLC TAG I0052

☒ I:3.3 - PLC TAG I0053

☐ I:3.4 - PLC TAG I0054

☐ I:3.5 - PLC TAG I0055

☒ I:3.6 - PLC TAG I0056

☒ I:3.7 - PLC TAG I0057

☒ I:3.10 - PLC TAG I0060

☒ I:3.11 - PLC TAG I0061

☐ I:3.12 - PLC TAG I0062

☐ I:3.13 - PLC TAG I0063

☐ I:3.14 - PLC TAG I0064

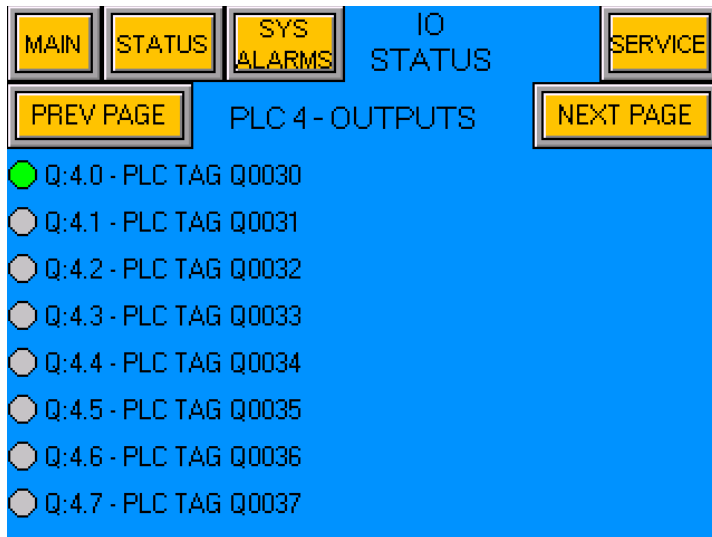
☐ I:3.15 - PLC TAG I0065

☐ I:3.16 - PLC TAG I0066

☐ I:3.17 - PLC TAG I0067

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- IO screen shows status of PLC and related cards.
- Generic IO point name
 - Reference electrical drawings for more detailed IO point names
 - Status of each input and output
 - Green = on
 - Gray = off
- Status of analog inputs and outputs
 - Direct input, with no scaling.

BACnet

This system has been provided with BACnet (Building Automation and Control Networks). BACnet is a communication protocol designed to facilitate the integration of building automation and control systems. Communication network used is BACnet/IP.

Wiring

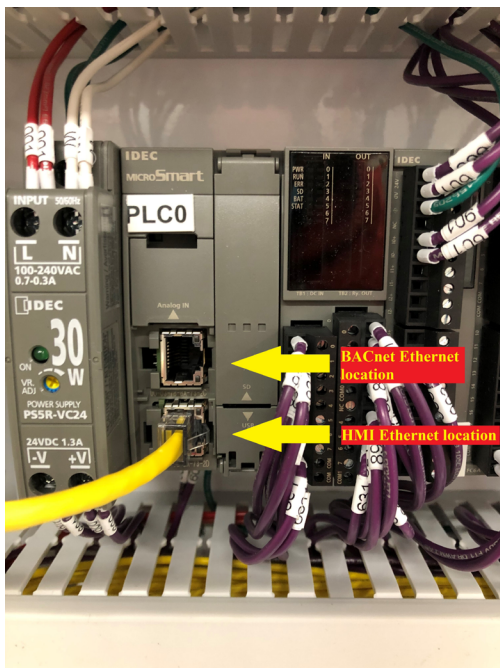
Before the system can begin sending data to the facility, the system needs to be wired into the facility BACnet network.

Land an ethernet cable to PLC Port 1. MAC Address is physically printed underneath the ethernet port.

IP Address and BACnet Setup

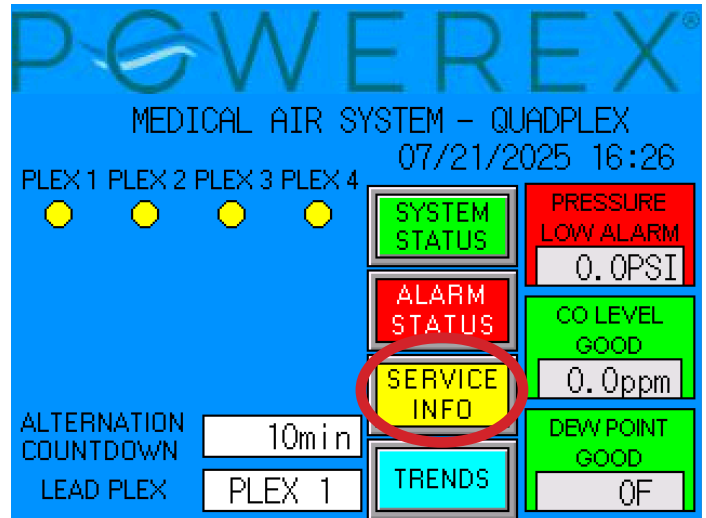
BACnet is active as standard but communication setup is still required. The following will need to be discussed with facility IT or whomever handles BACnet setup. This section will cover the setup of the following items.

- System BACnet Device ID
- System BACnet Port Number
- System Port 1
 - IP Address
 - Subnet Mask
 - Gateway
- BBMD (BACnet Broadcast Management Devices)
 - Required when the facility is using multiple IP subnets to broadcast messages.

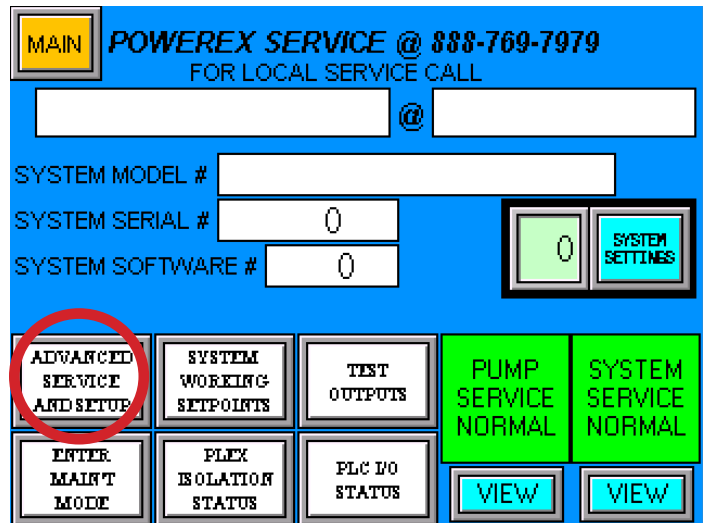


Steps to set up BACnet communications

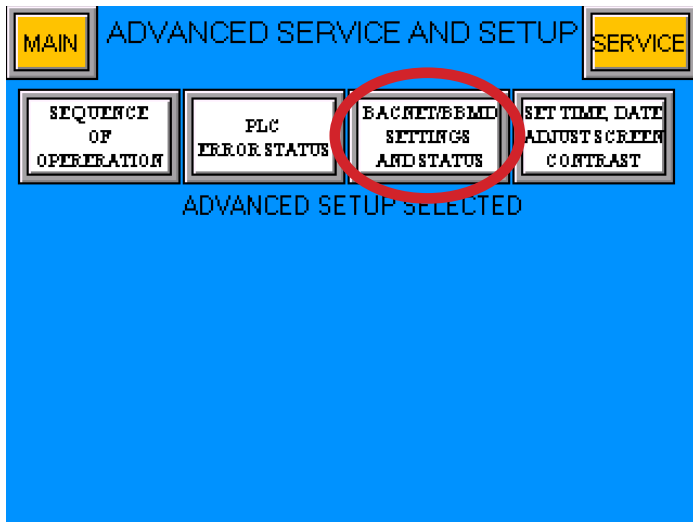
1. Navigate to BACnet BBMD setting and status screen.
 - a. Home screen hit Service info button



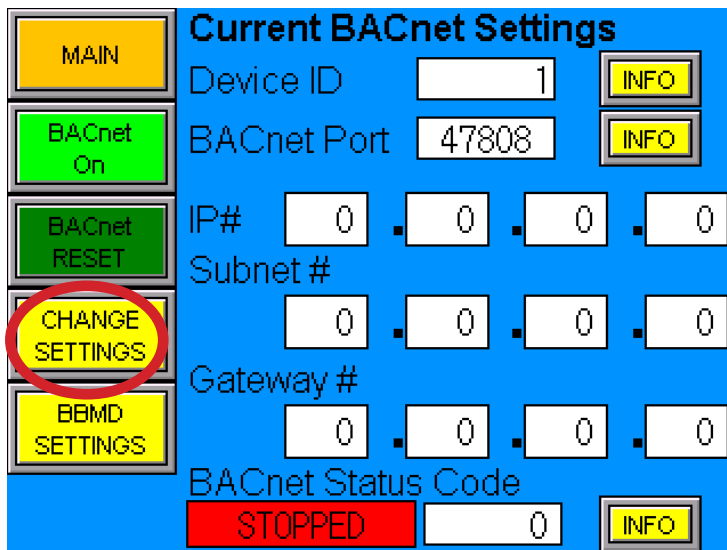
- b. Service Info screen hit advanced service and setup button



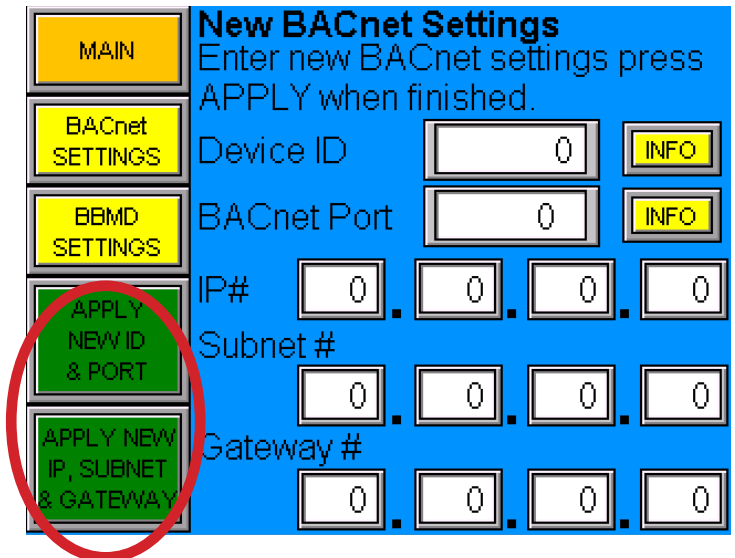
- c. Advanced service screen hit BACnet BBMD setting and status button



2. Current BACnet Settings will be displayed.
 - a. Current BACnet on off status
 - i. On is standard
 - b. Current system Device ID, BACnet Port, IP address, Subnet and Gateway.
 - c. Current BACnet Status code
3. Turn BACnet off
4. Hit Change Settings to go to New BACnet Settings.



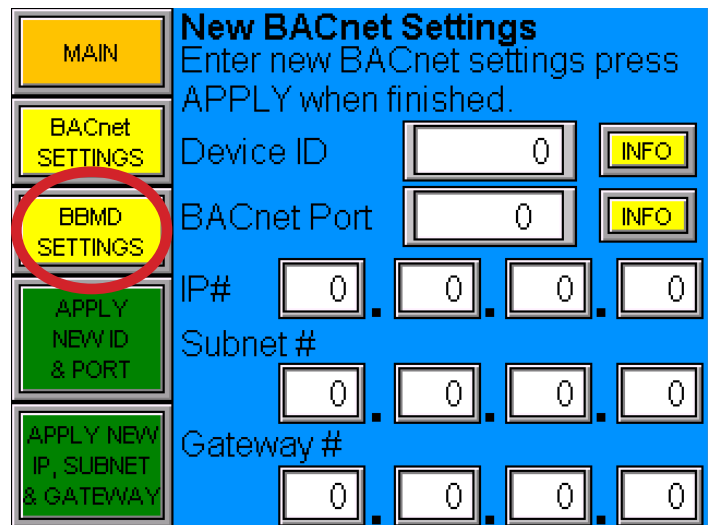
5. While on New BACnet Setting, enter new values
 - a. Device ID
 - b. BACnet Port
 - c. IP, Subnet and Gateway
6. Hit Apply button for both ID/Port and IP/Subnet/ Gateway



7. Return to Current BACnet Setting
8. Turn BACnet to on
9. Confirm BACnet operation
10. If BBMD is required follow BBMD Setup steps.

Setup BBMD (BACnet Broadcast Management Devices)

1. Hit BBMD Setting



2. Current BBMD Settings will be displayed in the top half of the screen.
 - a. Current BBMD on off status
 - i. Off is standard
 - b. Current system BBMD Port and IP address
3. Leave BBMD Off, while setting up.

4. In the New BBMD setting section enter new values
 - a. BBMD Port and IP address
5. Hit Apply New setting

The screenshot shows the HMI interface for BBMD settings. On the left, there are three buttons: 'MAIN' (yellow), 'BACnet SETTINGS' (yellow), and 'BBMD OFF' (red). The main display area is blue and divided into two sections. The top section, 'Current BBMD Settings', shows 'BBMD Port' as 0 and 'BBMD IP Address' as 0.0.0.0, with two 'INFO' buttons. The bottom section, 'New BBMD Settings', prompts the user to 'Press APPLY when finished.' and shows 'BBMD Port' as 0 and 'BBMD IP Address' as 0.0.0.0. A green button labeled 'APPLY NEW SETTINGS' is circled in red.

6. Confirm BBMD setup by viewing Current BBMD setting

BACnet Data Transfer Review

Provided with each system is a list of available BACnet data objects. These data objects fall into two categories, Binary and Analog input objects. These are values from the Powerex system to be used as inputs for the facility.

Binary are on/off bits, some examples would be Plex Isolation status, Plex pump output status and Service alert status.

Analog are continuous electrical signals that represent the measurement variable, some examples would be System values (pressure/vacuum), plex/pump run hours and alternation countdown.

Using the provided BACnet data object list the facility is responsible for setting up what objects are used. Reference the additional notes or comments for assistance on how to best set up and use each object. We recommend the following items be set up at a minimum.

Binary objects: Reserve Pump in Use or Low Pressure (depending if med or lab), General fault and system service alert. CO and Dew point alarms if present

Analog objects: System values (pressure/vacuum, CO, Dew point)

Plex Isolation

Plex Isolation allows each plex to be electrically isolated from incoming power, control voltage, and the other plexes. This is done via a disconnect located on the side of the control panel. Each plex has a separate disconnect. This isolation allows for safer service and maintenance of plex specific items, while leaving unaffected plexes operational to continue to meet the facilities' demands.

When a Plex Isolation disconnect is in the off position, incoming power will be disconnected from the line side of the motor circuit protector. This allows for the replacement of plex motor control components and the corresponding pump. Additionally, control voltage will be disconnected from the plex control wiring, further isolating the plex components. This allows for servicing of control components.

While a plex is isolated, the plex is excluded from operations and alarms are disabled within the PLC. The HMI displays plex isolation status. Entering maintenance mode will disable the all pumps running portion of the Reserve pump in use alarm, so service can be completed without a nuisance alarm.

To properly isolate a plex for service, refer to service screen on the HMI and follow these steps:

1. Turn plex HOA switch to OFF
2. Turn plex isolation disconnect to OFF
 - a. Follow proper LOTO and confirm no voltage is present in the plex components
3. Complete service or maintenance
4. Turn Plex Isolation disconnect to ON
5. Turn Plex HOA Switch to ON
 - a. When the HOA switch is turned ON the plex reset is complete. Requirements include that the HOA be toggled from OFF to ON before a plex can be considered active again.

When the plex isolation disconnect is switched to the "on" position, the plex pumps may become active via the hardwire backup circuit, should the low pressure switch be active. this is true even if the plex shows "hoa reset required", as the hoa reset only controls the plc outputs and not the hardwire backup circuit.

Integrated Digital Dew Point Monitor Specifications

SPECIFICATIONS	
Dew Point Range	-60°F to +54°F
Sensor Output	1V - 5Vdc scaled as: -76F to +54F
Alarm Indication	Audible Alarm, HMI display
Alarm Output	Dry contacts. See drawing for contact ratings.
Alarm Set Point	Medical: HIGH ALARM: +35°F (1.7°C) Lab: HIGH ALARM: -20°F (-28.8°C)
Dryer Control Signals	Contact Open for Purge rate fixed mode: Medical: -10°F to +54°F Lab: -40°F to +54°F Contact Closed for Purge Econ mode: Medical: Below -15°F Lab: Below -45°F
Accuracy	±2°C dew point
Operating Pressure	10 psig—150 psig with a minimal flow rate
Operating Temperatures	32°F to 131°F

Sensor Sample Flow

The dew point sensor must operate in compressed air at the pressure equal to that at which the dew point is desired to be measured. The sensing chamber must be provided with a small flow of air from the system which is being measured. The sensing chamber and flow control orifice are designed to provide the pressure and flow required. Do not close the flow orifice. Doing so will result in a “dead headed” condition for the sensor and the measured dew point will not reflect conditions in the system pipe.

Sensor Calibration and Adjustment

The sensor is fully calibrated as shipped from the factory (see calibration sheet included in the main system manual). With the Daily Auto-Calibration feature (listed below) the sensor may not need replacement for up to 10 years. The manufacturer recommended replacement interval is 2 years from system start-up or if sensor should malfunction.

Installation

⚠ CAUTION Touching the sensor may damage it. Special attention shall be paid to avoid touching the sensor when removing and replacing filters.

Daily Auto-Calibration

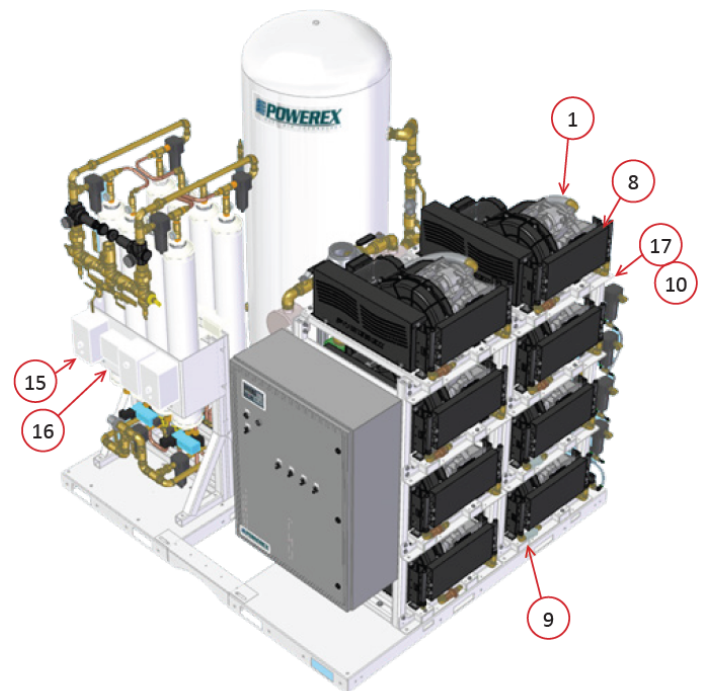
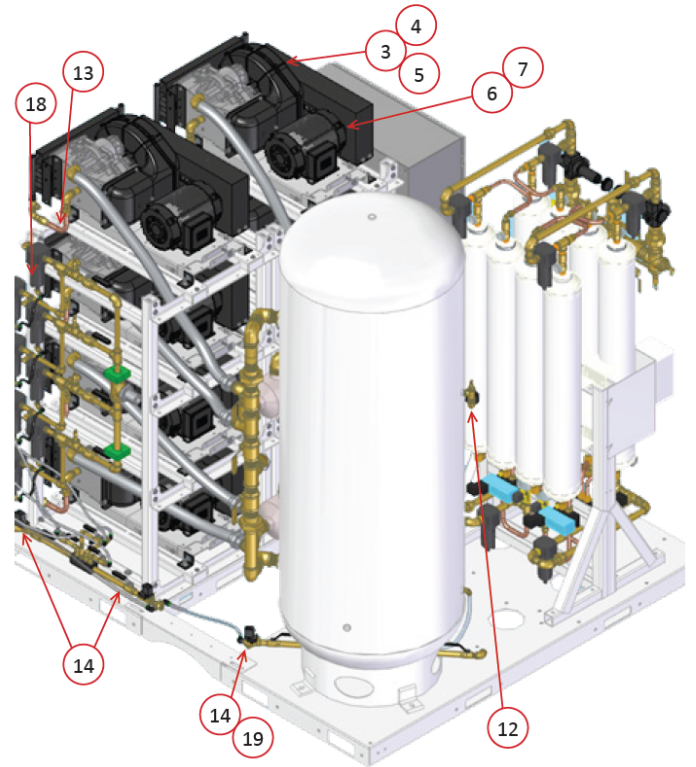
The Daily Auto-Calibration feature of the sensor is an automatic procedure which greatly reduces the possible drift in the dry end of the dew point measurement. It is performed at one hour intervals, and when the power is switched on. During auto-calibration the sensor is warmed for a short period (< 1 min) and the sensor capacitance values are evaluated at the elevated temperature. The possible dry end drift is then corrected to correspond to the calibrated values. During the auto-calibration the transmitter outputs the Td value prior to the procedure. Auto-calibration is carried out only if several criteria for the measurement environment are fulfilled. This ensures the reliability of the adjustments, and maintains the excellent long term stability that the patented technology offers. These criteria include e.g. a sufficiently stable enough moisture level in the measured atmosphere. If the conditions are not fulfilled, the auto-calibration function is postponed until the satisfied conditions are reached.

Sensor Warming in High Humidity

Additionally the sensor has a warming feature which prevents the sensor and filter from becoming wet in high humidity. High humidity can be present when the dew point temperature rises close to the gas temperature. Sensor warming is switched on automatically when the humidity level in the measured gas increases to a level where dew can start to form. The advantage of sensor warming is rapid response of dew point measurement. A wet sensor and filter would otherwise result in a dew point equal to ambient temperature (i.e. RH=100%). If the sensor becomes soaked in any way, it will fully recover and return back to normal operation after it dries out.

Replacement Parts

Ref #	Description	Part #	QTY
1	7.5 HP scroll pump	SLAE075 SLAE075HP	1
	10 HP "C" Scroll Pump	SLAE10 SLAE10HP	1
2	7.5 HP motor 208-230/460 60 Hz 2 pole ODP	MC304232AV	1
	10 HP motor 208-230/460 60 Hz 2 pole ODP	MC304234AV	1
3	3VX series drive belt 7.5 HP	BT024000AV	2 per pump
	3VX series drive belt 10 HP & 7.5 HP "C"	BT023900AV	2 per pump
4	Belt guard outer	BG308400AV	1 per pump
5	Belt guard inner	BG308500AV	1
6	Motor pulley with bushing 7.5 HP	PU202649AV	1
	Motor pulley with bushing 7.5 HP "C"	PU202623AV	1
7	Motor pulley with bushing 10 HP	PU202648AV	1
8	Aftercooler	SL060000AV	1 per pump
9	Check valve 7.5 HP	IP087700AV	1 per pump
	Check valve 10 HP	IS025003AV	1 per pump
10	Pump overpressure safety valve 116 PSI 145 PSI	V-215100AV V-215106AV	1 1
12	Tank safety valve	V-215400AV	1
13	Pump outlet flex hose	SM008108AV	1 per pump
14	Tank electric timer drain/after-cooler drain	SL300701AV	1
15	CO monitor	ACO600105AJ	1
16	Dew Point monitor – for basic units with separate dew point monitor	PDM series – see unit for exact model #	1
17	Temperature switch	AM003032AV	1 per pump/set
18	Water separator assembly	ST178515AV	1
	Water separator connection tubing	PS010300AV	Specify length
	Water separator bottom fitting (remove float assembly)	ST178519AV	1
N/A	Inlet air filter element	VP000509AV	1 per pump
N/A	Tip seal kit 7.5 HP	SK600101AJ	1 per pump
N/A	Tip Seal kit 10 HP & 7.5 HP	SK600101AJ	1 per pump



Parts Identification

Description	Part #	QTY
Pressure transducer	PE000454AV	1
Dew point sensor (medical & standard laboratory)	ACO500110	1
Pressure transducer cable	PE000451AV	1
HOA switch operator non-illum contact block ZNO	PE000542AV PE000543AV	As needed As needed
Hourmeter (for basic control systems)	PE001014AV	1 per motor
Motor protector circuit breaker 7.5 HP 208 V	PE000308AV	1 per motor
Motor protector circuit breaker 7.5 HP 230 V	PE000308AV	1 per motor
Motor protector circuit breaker 7.5 HP 460 V	PE000306AV	1 per motor
Motor protector circuit breaker 10 HP 208 V	PE000310AV	1 per motor
Motor protector circuit breaker 10 HP 230 V	PE000310AV	1 per motor
Motor protector circuit breaker 10 HP 460 V	PE000307AV	1 per motor
Contactor 7.5 HP 208 V	PE000103AV	1 per motor
Contactor 7.5 HP 230 V	PE000103AV	1 per motor
Contactor 7.5 HP 460 V	PE000102AV	1 per motor
Contactor 10 HP 208 V	PE000104AV	1 per motor
Contactor 10 HP 230 V	PE000104AV	1 per motor
Contactor 10 HP 460 V	PE000102AV	1 per motor
Auxiliary contact for motor protector circuit breaker	PE000518AV	1 per motor
Connector motor protector circuit breaker to contactor	PE000619AV	1 per motor

Maintenance Schedule

Compressor

Item	Action Needed	Operating Hours						Remarks
		500	2,000	4,000	8,000	12,000	16,000	
Inlet Air Filter	Inspect Replace	●	●	▲	▲	▲	▲	Replace at 4,000 hours
Blower Fan	Clean				●	●	●	
Fan Duct	Clean				●	●	●	
Compressor Fins	Clean			●	●	●	●	Every 4,000 hours or less
Bearings	Grease			▲	▲	▲	▲	Every 4,000 hours (145 psig scroll units) Every 8,000 hours (100 psig scroll units)
Tip Seal	Replace			▲	▲	▲	▲	Every 4,000 hours (145 psig scroll units) Every 8,000 hours (100 psig scroll units)
Dust Seal	Replace			▲	▲	▲	▲	
V-Belt	Replace				▲		▲	See Note 3
Pressure Switch/ Transducer	Confirm operation				●		●	
Magnetic Starter	Inspect				●		●	Replace if contact point is deteriorated
Check Valve	Replace		●		▲		▲	Check every 2,000 hours, replace every 8,000 hours

Piping System

Item	Action Needed	Operating Hours						Remarks
		2,000	4,000	8,000	12,000	16,000	20,000	
Safety valve	Confirm operation	●			●			Every 2,000 hours or less
Pressure gauge	Inspect	●			●			Every 2,000 hours or less
Tank	Drain moisture							Verify proper drain operation
Air leaks	Inspect		●		●		●	
Electro auto drains	Replace							Replace every 4 years

Air Dryers

Item	Action Needed	Operating Hours						Remarks
		500	2,500	8,000	10,000	15,000	20,000	
Desiccant Dryer	Switch dryer online/offline							Each month (see dryer manual for maintenance instructions)

- – Inspect
- ▲ – Replace

NOTES:

- Inspect and perform maintenance periodically according to maintenance schedule.
- The maintenance schedule relates to the normal operating conditions. If the circumstances and load condition are adverse, shorten the interval time and perform maintenance accordingly.
- Belts require no attention unless slippage is detected (Chirping sound on start up or while running). Retension as indicated when tip seals are replaced for the first time. Proper belt tension should be 0.25 inch deflection when 6 pounds of force is applied on the center of the belt span.

Servicing the Scroll Pump & Motor

The Powerex Medical and Laboratory Air 7.5 and 10 HP systems are equipped with a slide system for the baseplate assemblies to facilitate pump and motor access for maintenance and if necessary, repair. To utilize the slide, identify the base mount assembly needing attention and lock out and tag out the power sources, both electrical and pneumatic. Electrically isolate the required plex by following the Plex Isolation steps outlined previously. Mechanically utilize the lockable isolation ball valves. Verify that the compression side flex hose from any nearby sets do not interfere with the slide assembly, make any adjustments necessary and prepare to slide out the baseplate.

Loosen the nuts on the bolts that secure the L-bracket to the slide rails. It is not necessary to remove the bolts, and the elastic stop nuts are provided to facilitate keeping the bolts secure in the L-bracket holes.

To Pull Out the Pump Side

Remove pressure from the discharge side of the pump by actuating the safety valve upstream of the isolation valve in the outlet line. Then remove the braided stainless flex hose from the set. Loosen the bolts holding the L-brackets to the baseplate on the side you are pulling so they can lift up over the head of the rail to frame securing bolt. Now carefully slide the set outward. The back L-bracket will be restrained at the midpoint by the end of the long slot. The pump will now be accessible for service actions. When complete, reverse the disassembly steps.

On multi-stack systems the motor side may be pulled outward toward the tank dryer skid by a similar process. On single stack system the air filter group may obstruct motor access on some tiers. In those cases, pull the slide out the pump side, unbolt the pump and transfer the L-brackets to the closer long slot, now pull out the motor until access is achieved.

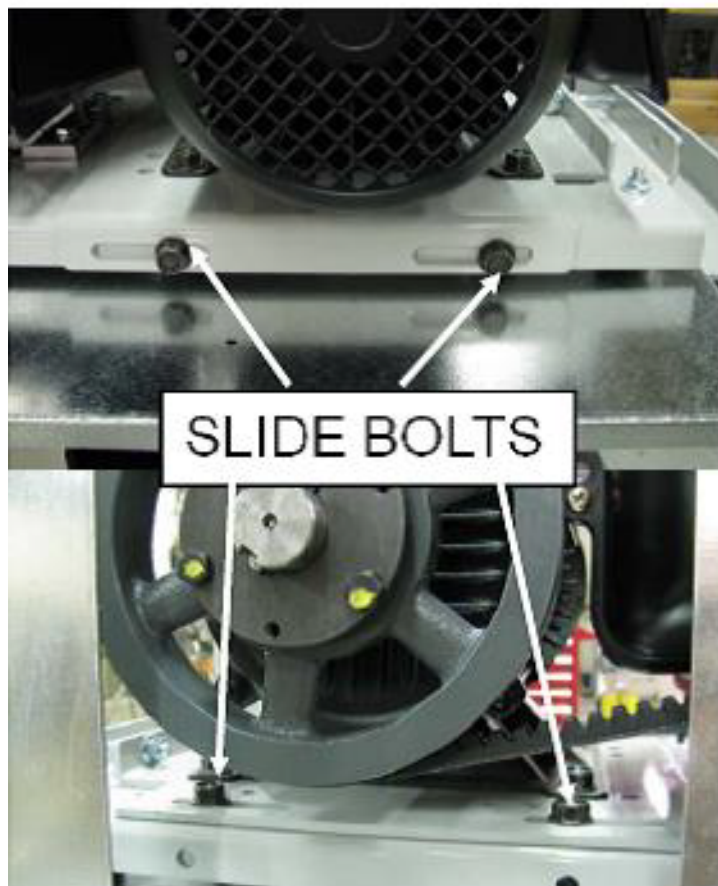
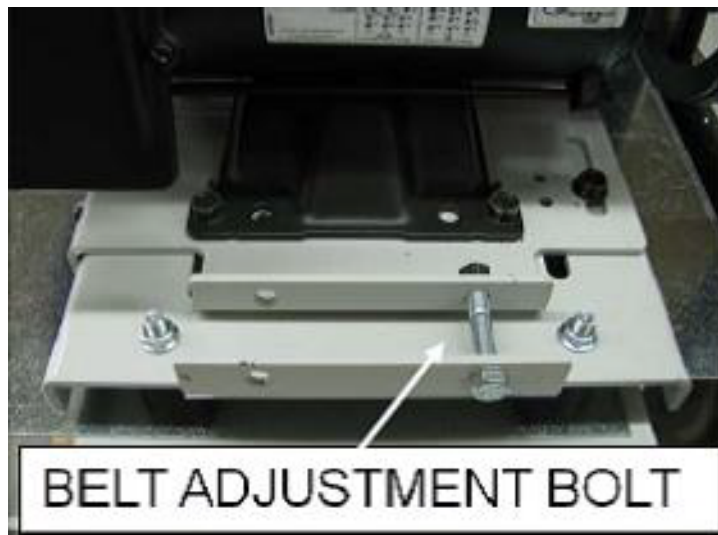
NOTE: If pulling out for motor access the motor leads and conduit may need to be detached to achieve sufficient travel.

Using the Motor Slide Base to Tension the Belts

Belt tension is set at the factory. If slippage is detected, reset the tensions as follows:

After the first 200 to 500 running hours or at any time chirping is heard on startup, check the belt tension. If tension is below 25 pounds on any belt, increase the center distance using the motor slide base so that

belt tension is 45 to 50 pounds. The motor slide base details are shown below. If installing new belts see the procedure below.



New Belt Installation Procedure

1. Loosen the two slide bolts near the motor pulley and the two slide bolts on the front edge of the base. Keep enough torque on them to take up any slack between the slider and the main base, but enough slack to allow the slider to move.
2. Tighten the belt adjustment bolt using a torque wrench to 45 inch pounds. This will bring the belts to the proper tension.
3. Tighten the slider bolts, the two on the front edge of the base, then the two slider bolts closest to the motor pulley so the belt tension is 45 to 50 pounds.



Powerex Limited Warranty – Applicable to Non-OEM Customers

Warranty and Remedies. (a) General. Powerex warrants each Compressor System, Vacuum System, Vacuum Pump, Compressor Air-End, or Powerex branded Accessory (collectively “Products”, individually each a “Product”) to be free from defects in material and workmanship (“Defects”) at the date of shipment. This warranty shall apply only to Products that are purchased and used Worldwide. **EXCEPT AS SET FORTH BELOW, NO OTHER WARRANTY, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL EXIST IN CONNECTION WITH THE SALE OR USE OF SUCH PRODUCTS. TO THE EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED.** All warranty claims must be made in writing and delivered to Powerex in accordance with the procedures set forth on its website (www.powerexinc.com), or such claim shall be barred. Upon timely receipt of a warranty claim, Powerex shall inspect the Product claimed to have a Defect, and Powerex shall repair, or, at its option, replace, free of charge, any Product which it determines to have had a Defect ; provided, however, that if circumstances are such as to preclude the remedying of Defect by repair or replacement, Powerex shall, upon return of the Product, refund to buyer any part of the purchase price of such Products paid to Powerex. Freight for returning Products to Powerex for inspection shall be paid by buyer. The warranties and remedies herein are the sole and exclusive remedy for any breach of warranty or for any other claim based on any Defect, or non-performance of the Products, whether based upon contract, warranty or negligence.

(b) (i) Standard Period of Warranty – Parts and Labor. The purchase of any system includes our standard warranty. Powerex warrants and represents all Products shall be free from Defects for the first eighteen (18) months from the date of shipment by Powerex, or twelve (12) months from the documented date of startup, or five thousand (5,000) hours of use, whichever occurs first. During such warranty period, Powerex shall be fully liable for all Defects in the Products (the “Product Defects”), i.e., all costs of repair or replacement, which may include “in and out” charges, so long as the Products are reasonably located and accessible by service personnel for removal. “In and out” charges include the costs of removing a Product from buyer’s equipment for repair or replacement.

(ii) Premium Period of Warranty – Parts and Labor. In order to be eligible for premium warranty coverage, a premium warranty for each system must be purchased when order is placed. Powerex warrants and represents all Products shall be free from Defects for the first thirty (30) months from the date of shipment by Powerex, or twenty-four (24) months from the documented date of startup, or seven thousand five hundred (7,500) hours of use, whichever occurs first. During such warranty period, Powerex shall be fully liable for all Defects in the Products (the “Product Defects”), i.e., all costs of repair or replacement, which may include “in and out” charges, so long as the Products are reasonably located and accessible by service personnel for removal. “In and out” charges include the costs of removing a Product from buyer’s equipment for repair or replacement.

(c) Additional Period of Warranty – Parts Only (No Labor). In addition to the above, Powerex warrants each Powerex branded Compressor Air- End and Vacuum Pump shall be free of Defects for a period of forty-two (42) months from the date of shipment by Powerex, or thirty-six (36) months from the documented date of startup, or ten thousand (10,000) hours of use, whichever occurs first. Supplier’s repair or replacement of any Product shall not extend the period of any warranty of any Product. This warranty applies to the exchange of part(s) found to be defective by an Authorized Powerex Service Representative only.

(d) Replacement Pumps – Parts Only (No Labor). For any replacement Air-End or Vacuum Pumps installed on a Powerex manufactured system or unit after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex warrants that the Air-End or Vacuum Pumps shall be free of Defects for a period of thirty-six (36) months from the date of shipment by Powerex or ten thousand (10,000) hours of use, whichever comes first. For any replacement Air-End or Vacuum Pumps installed on a system that was not manufactured by Powerex after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex warrants that the Air-End or Vacuum Pumps shall be free of Defects for the first twelve (12) months from the date of shipment by Powerex. Supplier’s repair or replacement of any Product shall not extend the period of any warranty of any Product. This warranty applies to the exchange of part(s) found to be defective by an Authorized Powerex Service Representative only.

(e) Replacement Motors – Parts Only (No Labor). For any replacement motor installed on a Powerex manufactured system or unit after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex warrants that the replacement motor shall be free of Defects for the first twelve (12) months from the date of shipment by Powerex. For any replacement motor installed on a system or unit that was not manufactured by Powerex after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex warrants that the replacement motor shall be free of Defects for the first ninety (90) days from the date of shipment by Powerex. Supplier’s repair or replacement of any

Product shall not extend the period of any warranty of any Product. This warranty applies to the exchange of part(s) found to be defective by an Authorized Powerex Service Representative only.

(f) Replacement Parts – Parts Only (No Labor). For other replacement parts besides motors, Air-End or Vacuum Pumps installed on a Powerex manufactured system or unit after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex warrants that such replacement parts will be free from Defects for the first twelve (12) months from the date of shipment by Powerex. For other replacement parts besides motors, Air-End or Vacuum Pumps installed on a system or unit that was not manufactured by Powerex after any initial warranty period has expired or where another warranty does not apply for any reason, Powerex makes no warranties. Supplier's repair or replacement of any Product shall not extend the period of any warranty of any Product. This warranty applies to the exchange of part(s) found to be defective by an Authorized Powerex Service Representative only.

(g) Coverage. The warranty provided herein applies to Powerex manufactured units or systems only.

(h) Exceptions. Notwithstanding anything to the contrary herein, Powerex shall have no warranty obligations with respect to Products:

- (i) that have not been installed in accordance with Powerex's written specifications and instructions;
- (ii) that have not been maintained in accordance with Powerex's written instructions;
- (iii) that have been materially modified without the prior written approval of Powerex; or
- (iv) that experience failures resulting from operation, either intentional or otherwise, in excess of rated capacities or in an otherwise improper manner.

(i) The warranty provided herein shall not apply to: (i) any defects arising from corrosion, abrasion, use of insoluble lubricants, or negligent attendance to or faulty operation of the Products; (ii) ordinary wear and tear of the Products; or (iii) defects arising from abnormal conditions of temperature, dirt or corrosive matter; (iv) any OEM component which is shipped by Powerex with the original manufacturer's warranty, which shall be the sole applicable warranty for such component.

Limitation of Liability. NOT WITHSTANDING ANYTHING TO THE CONTRARY HEREIN, TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, UNDER NO CIRCUMSTANCES SHALL POWEREX BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, PUNITIVE, SPECULATIVE OR INDIRECT LOSSES OR DAMAGES WHATSOEVER ARISING OUT OF OR IN ANY WAY RELATED TO ANY OF THE PRODUCTS OR GOODS SOLD OR AGREED TO BE SOLD BY POWEREX TO BUYER. TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, POWEREX'S LIABILITY IN ALL EVENTS IS LIMITED TO, AND SHALL NOT EXCEED, THE PURCHASE PRICE PAID.

Warranty Disclaimer. Powerex has made a diligent effort to illustrate and describe the Products in its literature, including its Price Book, accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the Products are merchantable, or fit for a particular purpose, or that the Products will necessarily conform to the illustrations or descriptions.

Product Suitability. Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of Products for certain purposes, which may vary from those in neighboring areas. While Powerex attempts to assure that its Products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a Product, please review the Product applications, and national and local codes and regulations, and be sure that the Product, installation, and use will comply with them.

Claims. Any non-warranty claims pertaining to the Products must be filed with Powerex within 6 months of the invoice date, or they will not be honored. Prices, discounts, and terms are subject to change without notice or as stipulated in specific Product quotations. Powerex shall not be liable for any delay or failure arising out of acts of the public enemy, fire, flood, or any disaster, labor trouble, riot or disorder, delay in the supply of materials or any other cause, whether similar or dissimilar, beyond the control of Company. All shipments are carefully inspected and counted before leaving the factory. Please inspect carefully any receipt of Products noting any discrepancy or damage on the carrier's freight bill at the time of delivery. Discrepancies or damage which obviously occurred in transit are the carrier's responsibility and related claims should be made promptly directly to the carrier. Returned Products will not be accepted without prior written authorization by Powerex and deductions from invoices for shortage or damage claims will not be allowed. UNLESS OTHERWISE AGREED TO IN WRITING, THE TERMS AND CONDITIONS CONTAINED IN THIS LIMITED WARRANTY WILL CONTROL IN ANY TRANSACTION WITH POWEREX. Any different or conflicting terms as may appear on any order form now or later submitted by the buyer will not control. All orders are subject to acceptance by Powerex.