Medical Air & Laboratory Air Systems – 7.5 & 10 HP Pumps

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.

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.

⚠ 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.***

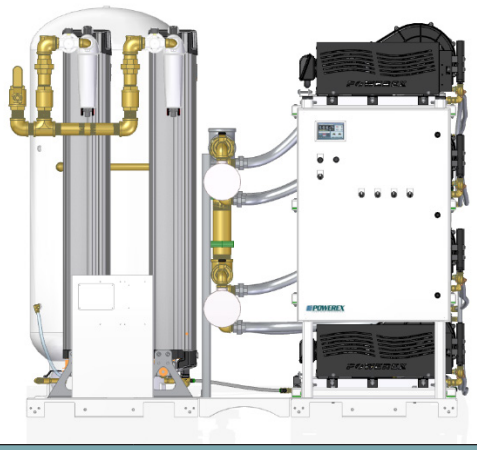
NOTICE ***Notice indicates important information, that if not followed, may cause damage to equipment.***

NOTE: Note indicates information that requires special attention.

Unpacking

Immediately upon receipt of the vacuum 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	
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 1 ½" NPT
Tank	ASME Rated for 200 psi
Drive	V Belt
Tank Isolation Valves	Standard All Units
Tank Sizes	200 and 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	208-230/460
7.5 C	SLAE10	116 max	23.8 @ 50 psig	208-230/460
10	SLAE10	116 max	31.6 @ 50 psig	208-230/460

Components

Oil-less Scroll Compressor Pumps

Powerex 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. The rotary design shall not require any inlet or exhaust valves and shall be rated for 100% continuous duty. 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 after cooler 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 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 Laboratory 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.

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.

Lab system dryers are installed with automatic switching valves and check valves that allow the offline dryer to be utilized when system flow requires the extra drying capacity. The control panel selector switch designates the lead/lag status of the dryers.

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: Minimum of 36 in. of clearance is recommended on all sides. 36 in. is required in front of the electrical panel. 24 in. is required on the remaining sides.

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.

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.

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 and 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).

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.***

Electrical Wiring of System Shipped In

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

1. Systems are provided with overload protection. A main system service disconnect must be installed. Powerex recommends the main system disconnect should be placed as close as possible to the system.
2. Refer to the system wiring diagram. Temperature switches shutdown the compressor when temperature reaches above a pre-set limit. Connect dryer power cords, electric drain power cord, dew point power cord, and alarm wiring to the master control panel.
3. The system has a terminal strip in the control panel with "landing points" for the master alarm panel connections. Locate the supplied landing points and install wire connections as appropriate.
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.

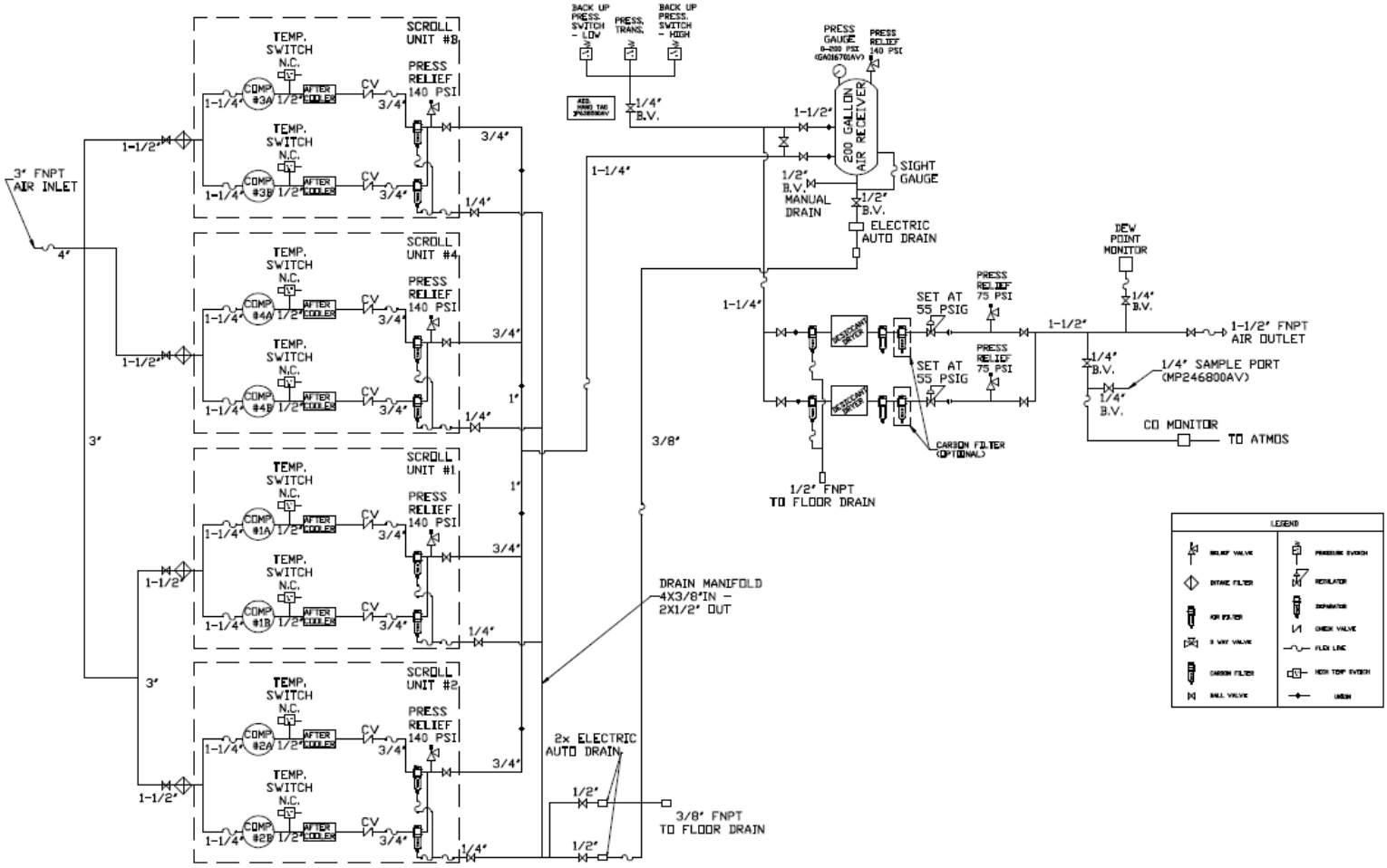
NOTICE ***If all pumps are running in the wrong direction, change the incoming power leads to correct rotation.***

Start Up and Operation

1. Follow all procedures under "Before Start-Up" before attempting operation of the lab air system.
2. Make sure all HOA switches are in the OFF position.
3. Switch on electric source and silence all alarms.
4. Make absolutely certain that the intake isolation valves to all pumps are in the open position. ***OPERATION OF PUMPS WITH THE INLET VALVES CLOSED WILL DAMAGE THE PUMPS.*** Open tank connection valve or valves completely. For medical systems open the valves to and from Dryer A. Valves for Dryer B should be closed.
5. Using the selector switches on the control panel, jog each pump/motor in hand position and verify proper direction of rotation then turn on each pump—motor in the "Auto" mode until all are running. If any pump has incorrect rotation, turn off and lock out power and correct phase conductor wiring to achieve proper rotation before proceeding. If all pumps are incorrect, the incoming power phases can be switched to correct rotation.
6. 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.
7. 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 if 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.
8. 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.

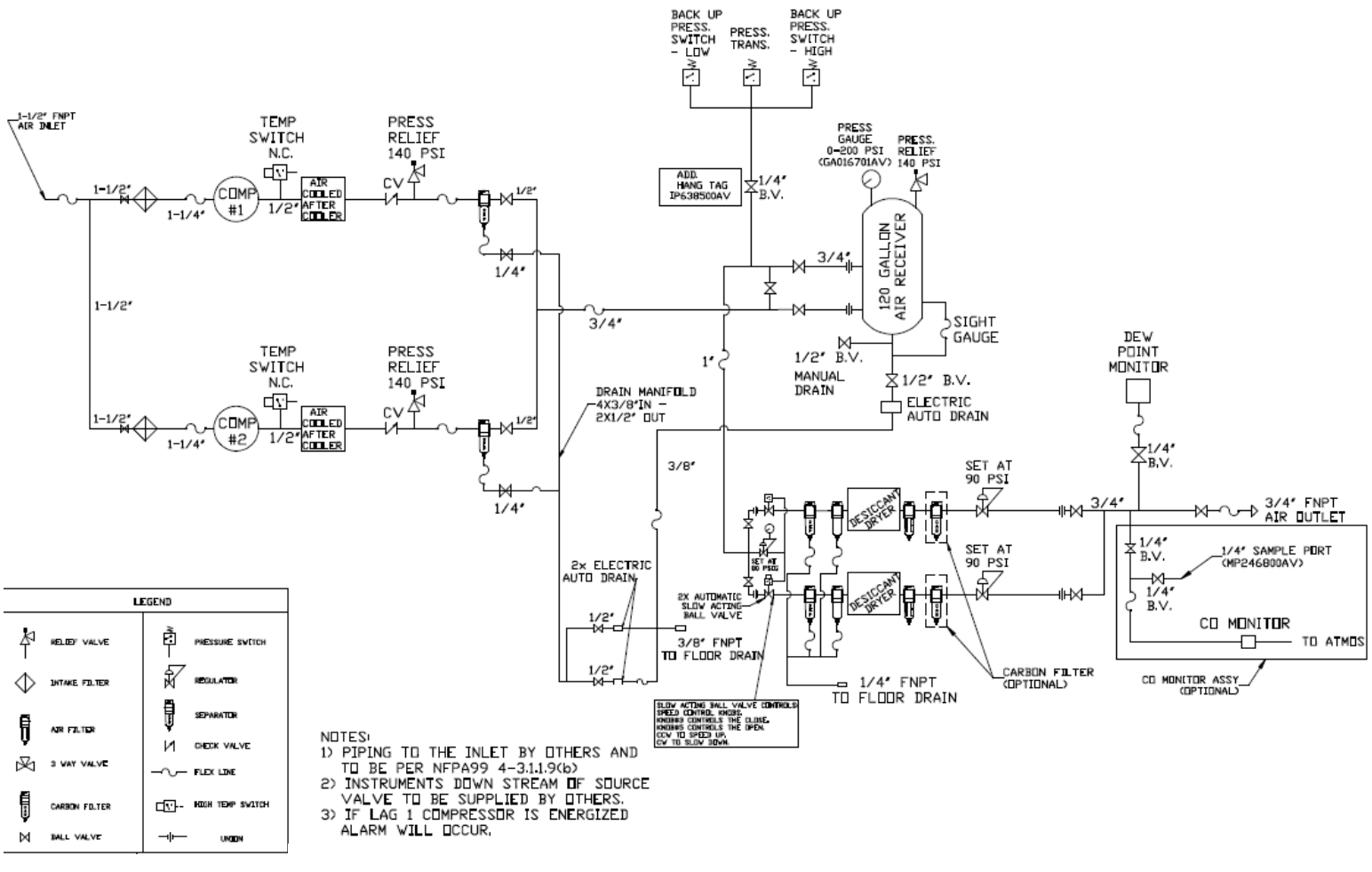
Medical Air Flow Schematic

This is only a representative schematic diagram.



Medical Air Flow Schematic

This is only a representative schematic diagram.



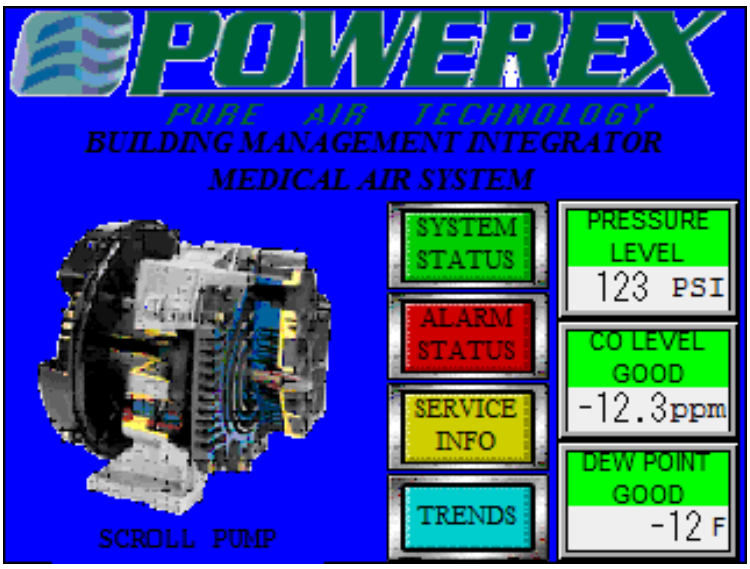
NOTES:
1) PIPING TO THE INLET BY OTHERS AND TO BE PER NFPA99 4-3.1.1.9(b)
2) INSTRUMENTS DOWN STREAM OF SOURCE VALVE TO BE SUPPLIED BY OTHERS.
3) IF LAG 1 COMPRESSOR IS ENERGIZED ALARM WILL OCCUR.

Controls

The Powerex system can have basic electromechanical controls with switches and indicator lights or it can be constructed with our touch screen interface. The basic control system will operate the unit and provide indication of the status. The individual switches, indicator lights and reset buttons are labeled on the panel door.

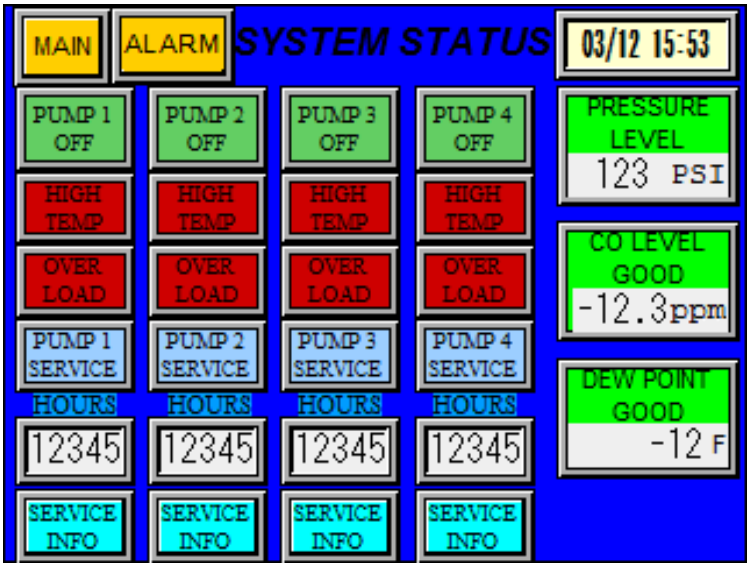
If the system has the touch screen controls, the following section will explain how the screen can be used to control and monitor the unit operation.

Main



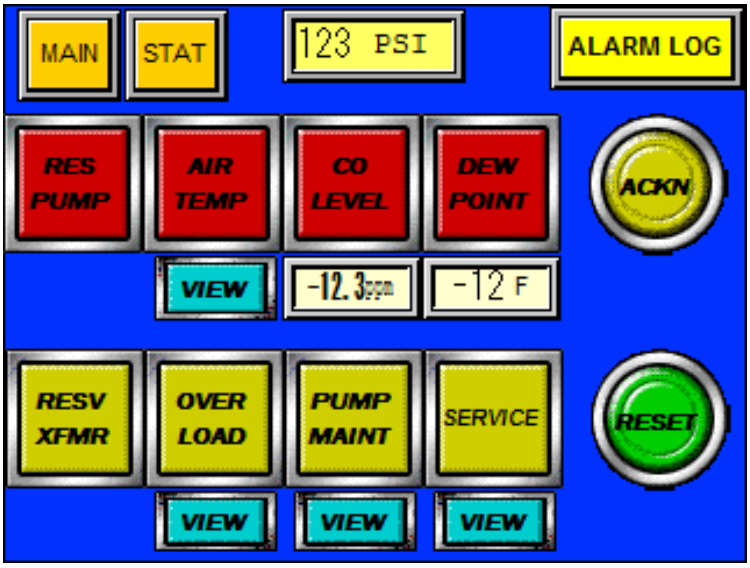
- Displays Pressure level and Dew Point level.
- Pressure level will change from green to orange when high.
- Dew Point level will change from green to orange when approaching alarm level; will change from orange to red when in alarm.
- System Status, Alarm Status, Service Info and Trends buttons will redirect to those specific pages.

System Status



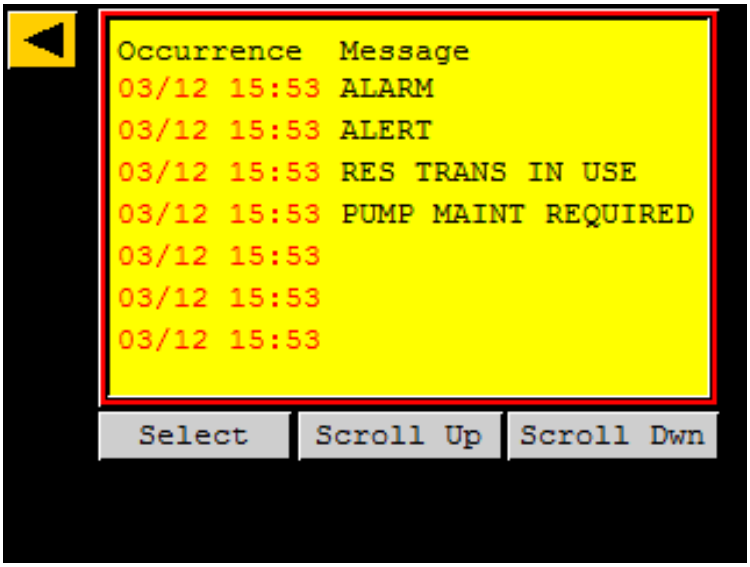
- Displays operating status, run hours, NFPA alarms, and Service alert of each pump on the system.
- Displays Pressure level, and Dew Point level and status like on MAIN page.

Alarm Status



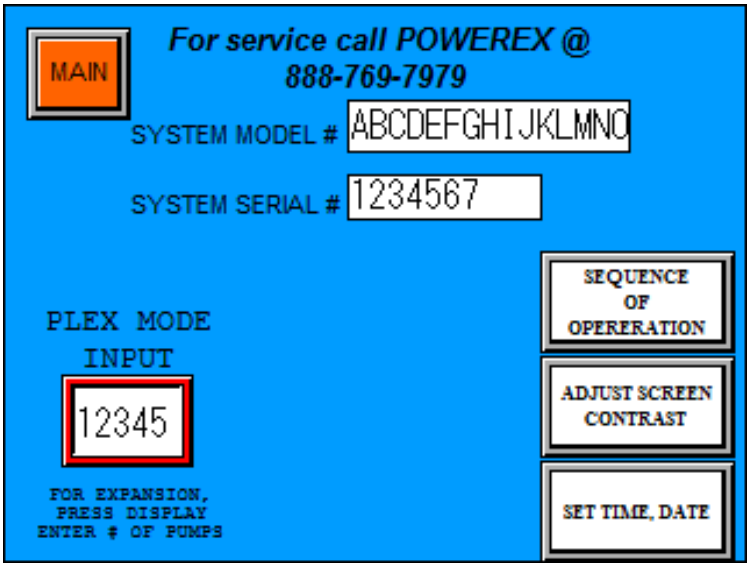
- Acknowledge and reset alarms.
- Displays Pressure level and Dew Point level.

Alarm Log



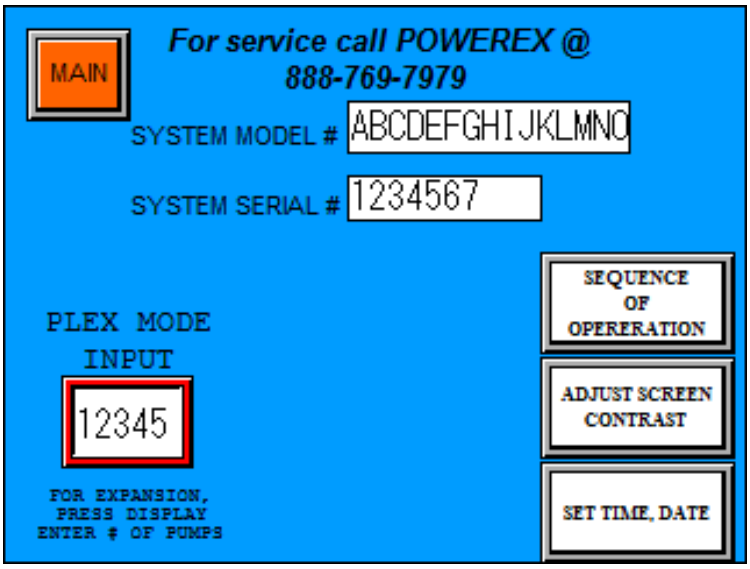
- Record of all alarms, warnings and service alerts with date and time.

To Set Time & Date



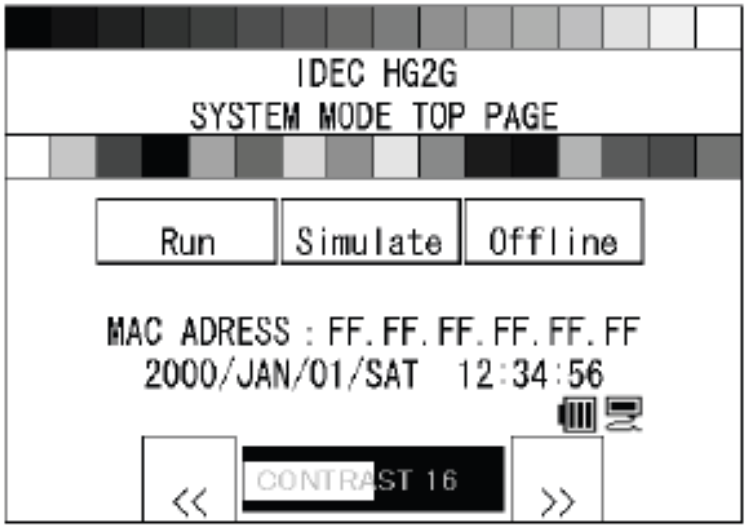
- Press Set Time, Date button

Service



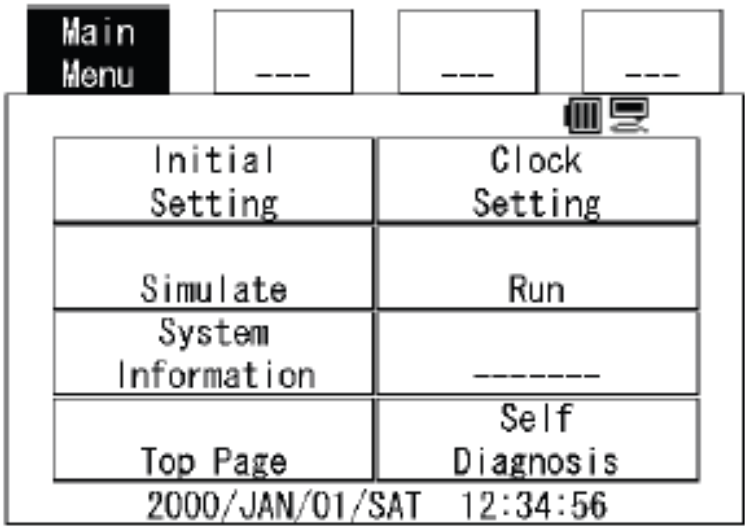
- Displays model number, serial number, service phone number
- If system is expandable, use Plex Mode Input to adjust PLC Program to additional pumps.

This Screen Will Appear



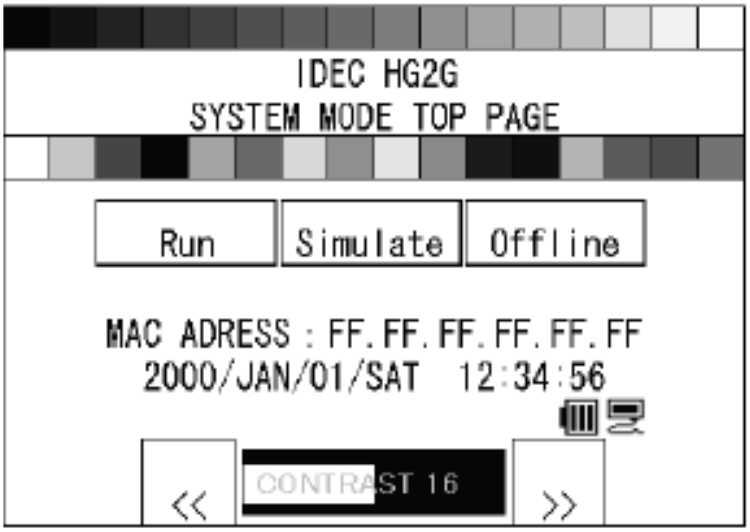
- Press Offline

This Screen Will Appear



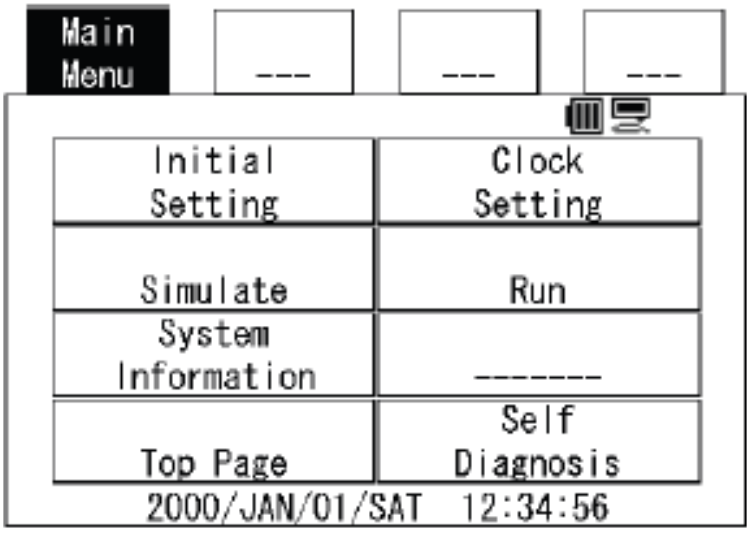
- Press Clock Setting and enter time and date

This Screen Will Appear



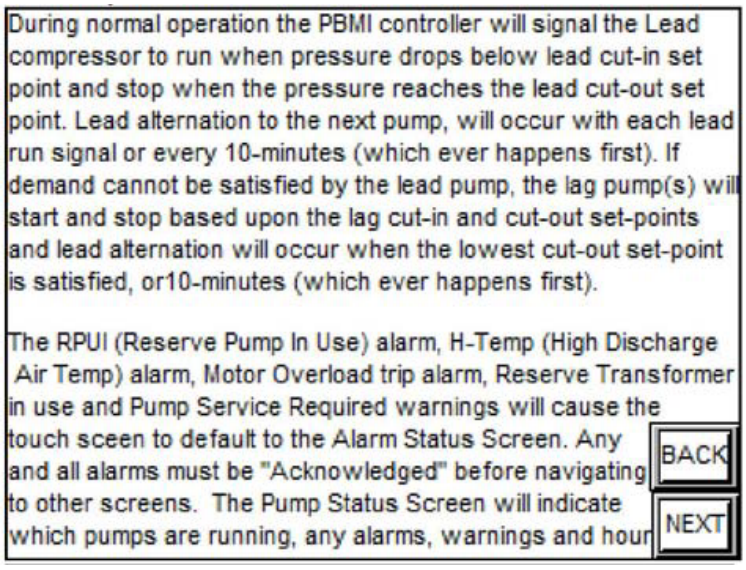
- Press Run and HMI will return to normal operation and Service screen.

To Return to Run Mode

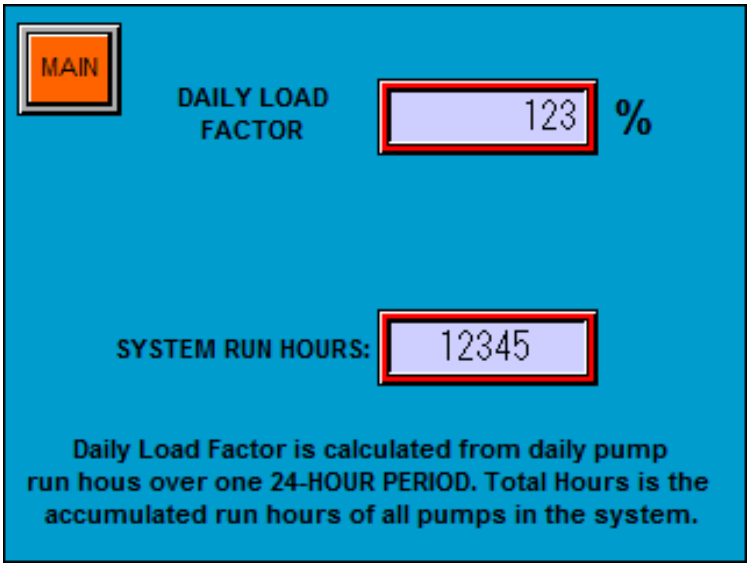


- Press Main Menu tab

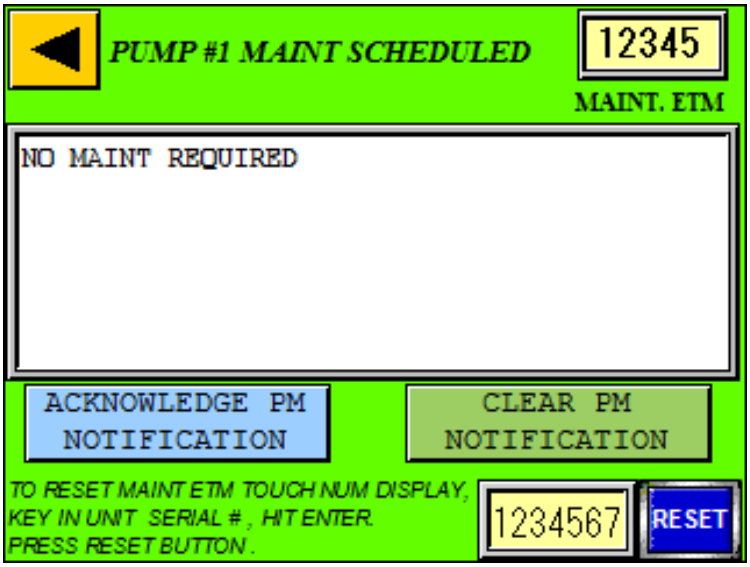
Sequence of Operation



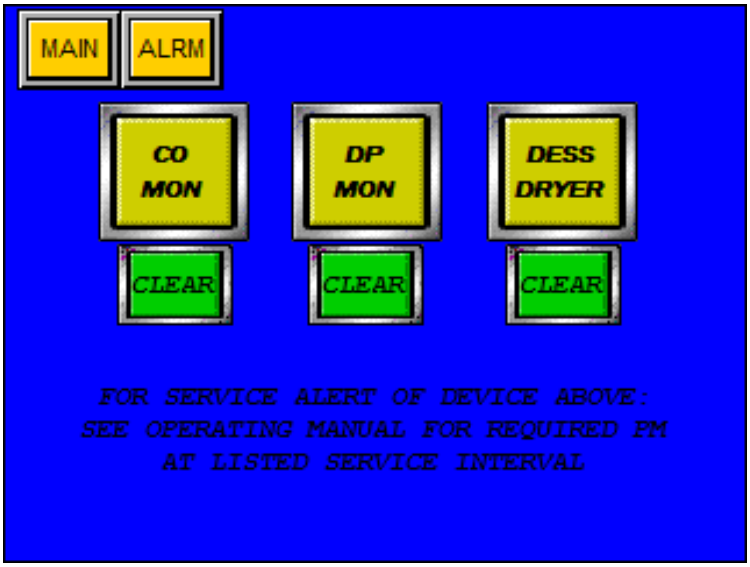
Daily Load Factor



Pump Maintenance



Service Alert



- At specific preset intervals, service alerts for the Dew Point Monitor and Dryer system will notify that maintenance is required.

Gateway Start Up

NOTE: PAGES 12-19 ARE INSTRUCTIONS FOR OPTIONAL PBMI WEBSERVER/BACNET® GATEWAY CARD. THESE INSTRUCTIONS ARE NOT APPLICABLE FOR SYSTEMS WITH HMI ONLY.

Required Tools & Data

You will need the following tools:

- The 260MX-S027 Gateway
- The provided CD-ROM
- A Working PC (Windows based)
- An Ethernet Crossover Cable
- A 12-24 VDC power source (T-strip)

Overview

The 260MX-S027 Gateway device seamlessly connects Modbus RTU Slave devices to a BACnet/IP client. By following this guide, you will be able to configure the 260MX-S027 Gateway for basic operation. You will set the device's network settings and parameters to the proper configuration for initial operation and physically place the device in the network.

Network Connections

The Gateway is shipped out with a Default IP Address of 172.16.3.159 and a Subnet of 255.255.248.0. In order to browse for the gateway's main page and begin configuring the gateway, you must change your PC to be on the same network as the gateway.

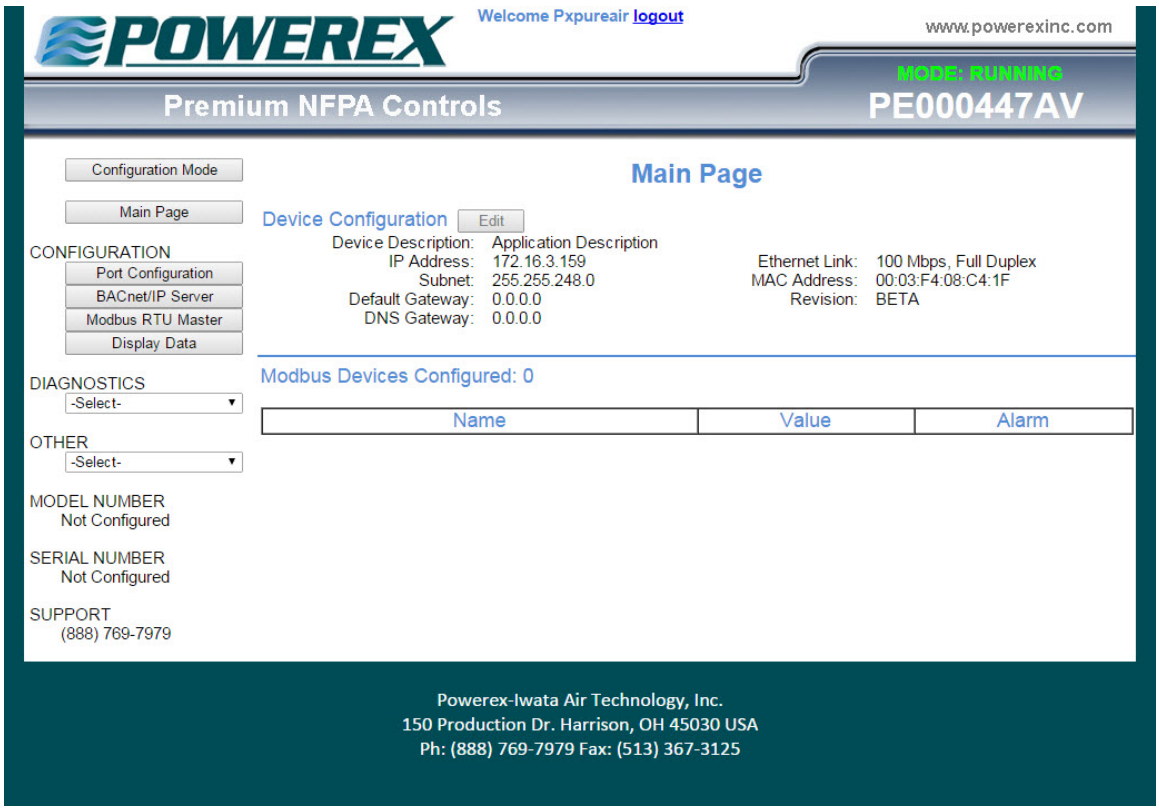
1. Change the IP Address of your PC to be 172.16.3.158
2. Change the Subnet of your PC to be 255.255.248.0
3. Open IPSetup.exe and browse for the gateway under select a unit.
4. Change the IP Address and Subnet to be on your network.
5. Click Set.
6. Change the PC's IP Address and Subnet back to its original settings.
7. Browse for the Unit using IPSetup.exe and launch the webpage.

Accessing the Main Page

Before you can configure the gateway itself, you must configure the network settings to connect the gateway. The following steps will connect the gateway properly.

1. Connect the 12-24 VDC power source to the device.
2. Using the crossover cable, connect the device to the PC.
3. Insert the provided CD-ROM.
4. Run the IPSetup program from the CD-ROM.
5. Configure the IP Settings based on your subnet.
6. Click Set.
7. Click Launch Webpage. The Main page should appear.

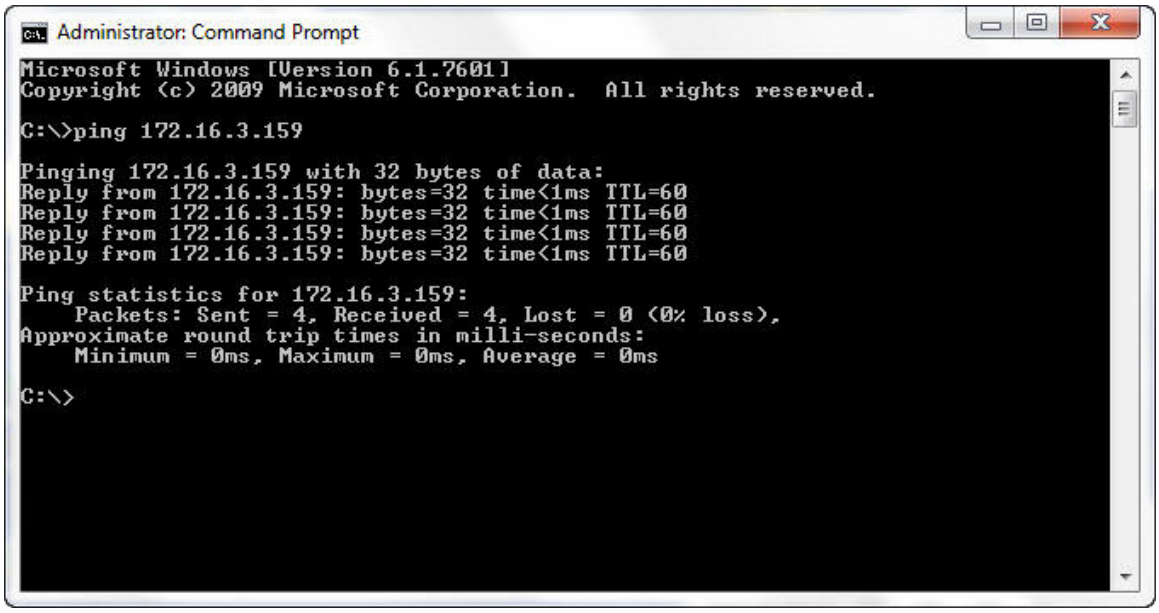
NOTE: Browser configuration is compatible with Chrome, Internet Explorer, and Firefox. Default IP address is 172.16.3.159

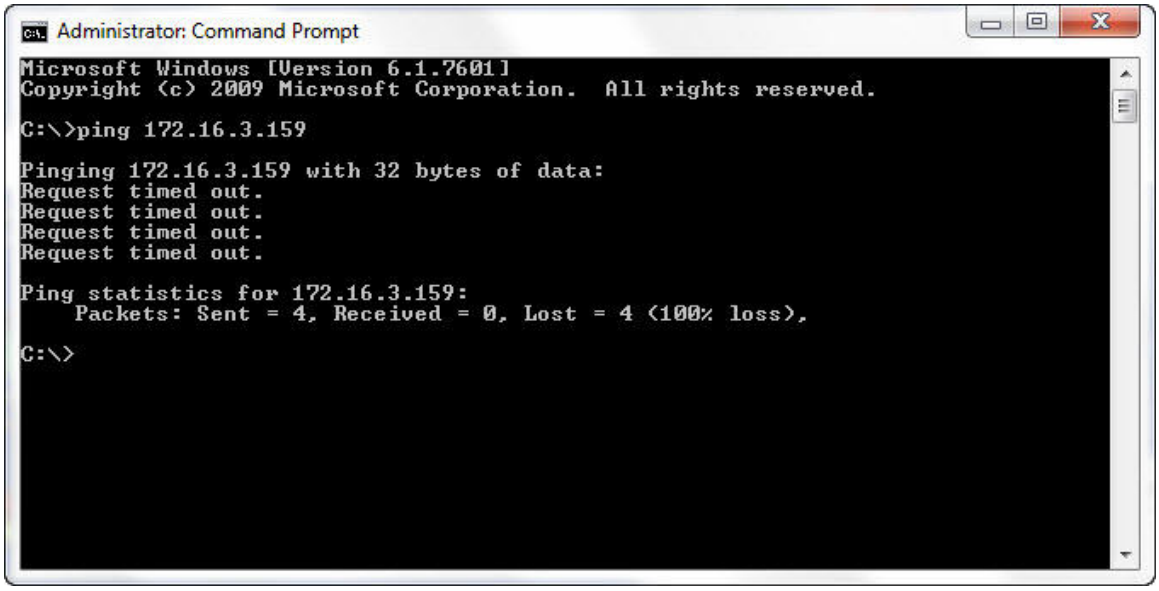


Error: Main Pain Does Not Launch

If the Main Page does not launch the IP Address is most likely incorrect. Correct the IP Address and try again. If you do not know the IP Address use the following procedure:

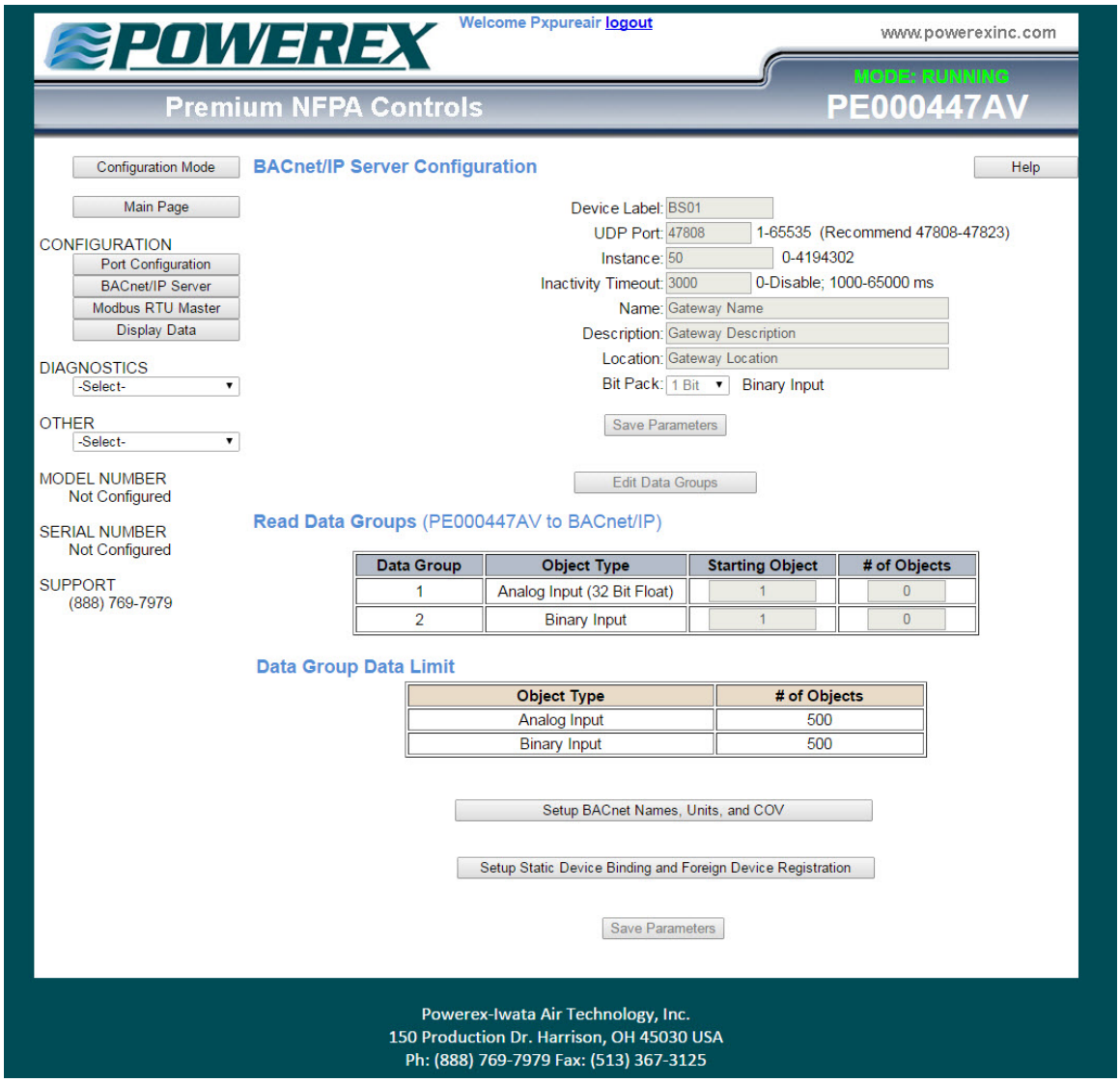
1. Open an MS-DOS Command Prompt.
2. Type ipconfig and press enter.
3. Note the IP address. (The previous example was 172.16.3.158)
4. To test the communication between the PC and the unit type ping (###.###.###.###) in the prompt and press Enter. The (###.###.###.###) is the IP address of the unit you used in step 5 of network configuration, which is 172.16.3.159 by default. If the device is connected to the network the ping will show a response. If you get no response check the crossover cable.





BACnet®/IP Server Settings

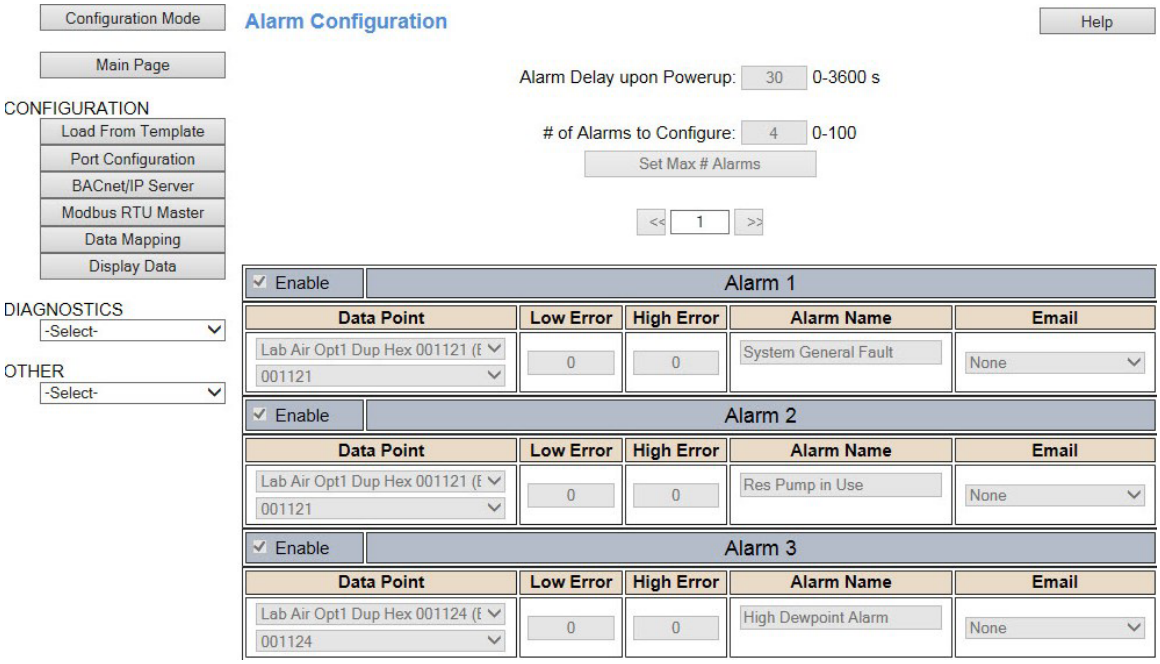
1. Click on the BACnet®/IP Server button. This will put the gateway into configuration mode so you can edit the BACnet® settings.
2. Enter the Device Instance that the 260MX-S027 will have on the BACnet®/IP Network. Note that this must be unique amongst all BACnet® devices on the network.
3. In the Name field enter a unique name for the device.
4. The Description and Location fields are optional. Filling in this information is recommended to identify the device on a network.
5. Beneath the Read Data Groups, verify the number of Analog Input (AI), Analog Output (AO), Binary Input (BI), and Binary Output (BO) objects that you will be exposing to the BACnet®/IP Client.
6. Click Save Parameters.



7. To save changes and force the gateway back to running mode, click on the Reboot Now button and after 5 seconds hit the Refresh button. You should see the gateway appear in Mode: Running.

Alarm Configuration

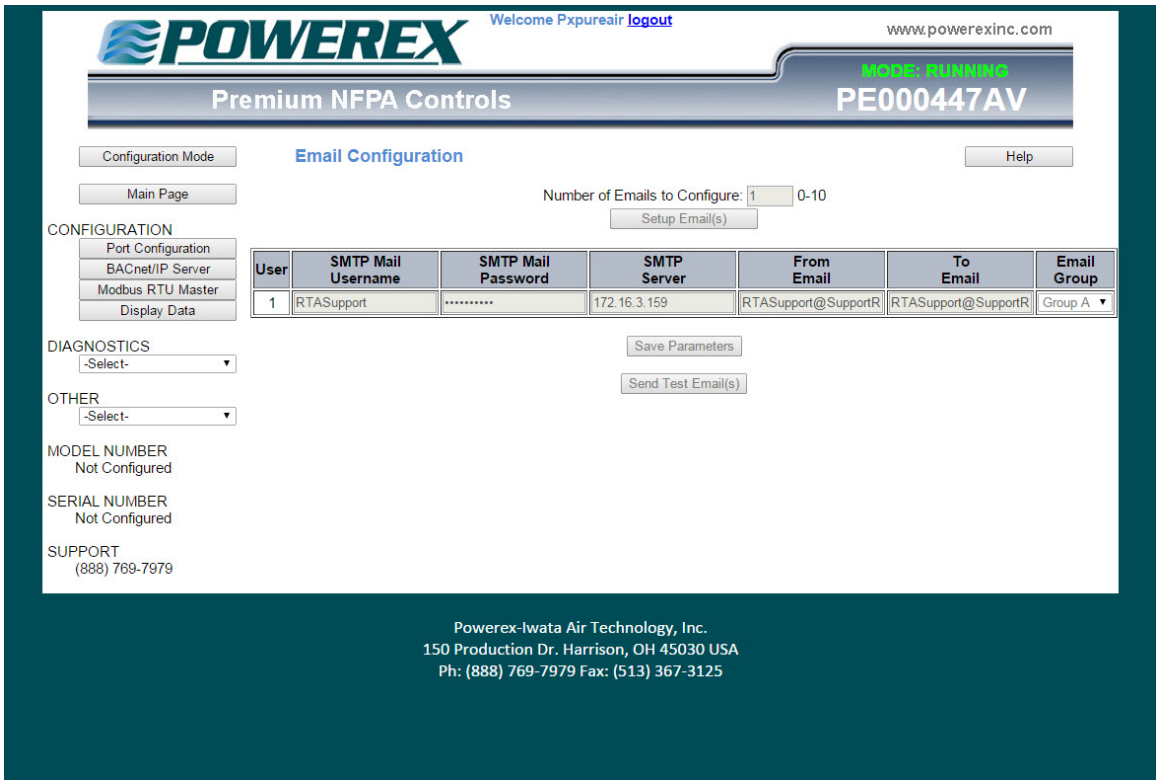
1. Click on the Other dropdown menu and select Alarm Configuration. Click on the Configuration Mode button to edit the alarm settings.
2. To enable an alarm, check the enable box.
3. If an alarm is enabled, then the Low Alarm and High Alarm must be set.
4. If the value of the point falls below the Low Alarm, the alarm is set and an email is generated if email is configured.
5. If the value of the point reaches the High Alarm, the alarm is set and an email is generated if email is configured.
6. Scroll to the bottom and Save Parameters.



7. To save changes and force the gateway back to running mode, click on the Reboot Now button and after 5 seconds hit the Refresh button. You should see the gateway appear in Mode: Running.

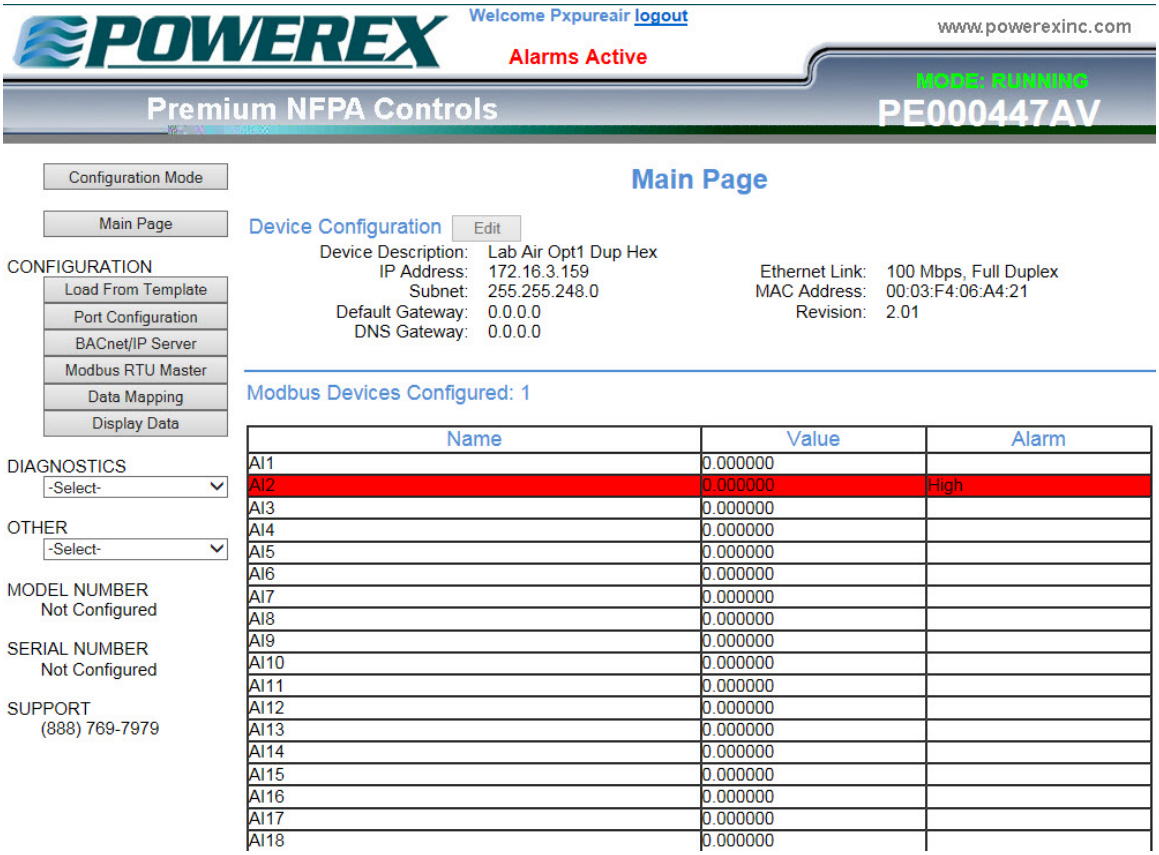
Email Configuration

1. Click on the Other dropdown menu and select Email Configuration. Click on the Configuration Mode button to edit email settings.
2. Enter in the number of emails to configure and press Setup Email(s).
3. Enter in the SMTP Username. This email must have SMTP capability set up.
4. If the SMTP device requires authentication, enter in the Password for the SMTP Mail Username.
5. Enter in the SMTP Server that is being used.
6. Enter in the Email Address of the sender. This is going to be the same field as Step 3.
7. Enter in the Email Address of the recipient.
8. Select an Email Group for the user to be a part of. Multiple users may be part of a group and can receive the same alarm message.
9. Repeat steps 3-7 for multiple recipients.
10. Click Save Parameters.
11. Click Send Test Email to verify all of the email settings are correct.
12. To save changes and force the gateway back to running mode, click on the Reboot Now button and after 5 seconds hit the Refresh button. You should see the gateway appear in Mode: Running.



System Status

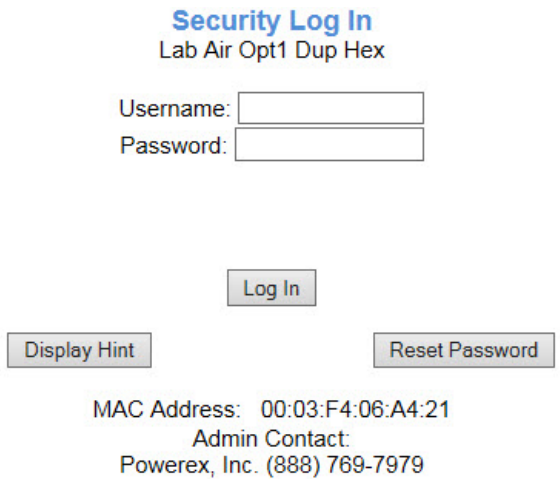
1. The main page shows the BACnet® Point, its current value, and whether an alarm is set.
2. The Value column will show the current value of the point upon a Refresh of this page.
3. If an alarm is enabled and is triggered, the point in an alarm state will be displayed in Red.



Name	Value	Alarm
AI1	0.000000	
AI2	0.000000	High
AI3	0.000000	
AI4	0.000000	
AI5	0.000000	
AI6	0.000000	
AI7	0.000000	
AI8	0.000000	
AI9	0.000000	
AI10	0.000000	
AI11	0.000000	
AI12	0.000000	
AI13	0.000000	
AI14	0.000000	
AI15	0.000000	
AI16	0.000000	
AI17	0.000000	
AI18	0.000000	

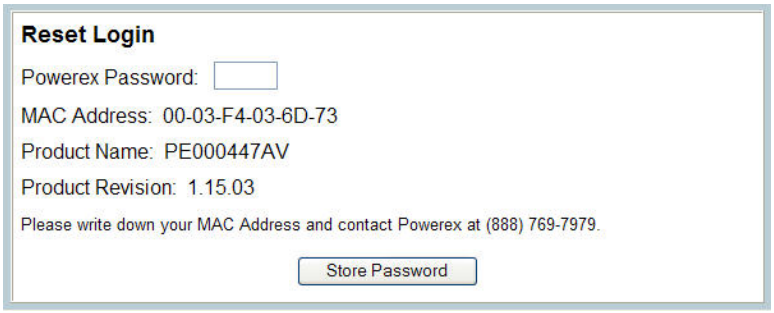
Locking the System

1. To lock the system within the network, click on the Log Out button on the top of any page.
2. If the Username and/or Password is ever forgotten, click the Reset Password.
3. Click Confirm Reset.
4. Physically cycle power on the gateway within 15 minutes to gain access to the web pages. Set up the Security Settings again.



Reset the Username/Password

Please call Powerex at (888) 769-7979 with the MAC Address of the gateway. Once the correct Powerex Password is entered, you will be redirected to the Login Password and be prompted to enter in a new Username and Password.



Integrated Digital Dew Point Monitor

Specifications

SPECIFICATIONS	
Dew Point Range	-60°F to +54°F
Sensor Output	0 V – 5 V scaled as: below -60°F to over +54°F
Alarm Indication	Audible Alarm, HMI display
Alarm Output	Dry contacts. See drawing for contact ratings.
Alarm Set Point	HIGH ALARM: -20°F (-28.8°C)
Dryer Control Signals	10 AMP @ 115 VAC Rated Contact (Normally Open) Contact Open for Purge rate fixed mode: -40°F to +54°F Contact Closed for Purge Saver mode: 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.

Replacing the Filter

The sensor is protected with a stainless steel sintered filter. The filtering grade is 34 um.

The filter is recommended to be changed whenever it looks dirty or as a part of the periodical maintenance procedure. The recommended replacement interval depends heavily on the application and can vary from less than a year to several years. Dirty or corroded filter may cause increased response times. In case the sensor is used in a drying system with silica gel (or other drying agent) the dust from the dryer may collect on the sensor slowing the response but also generating a micro climate around the sensor altering the dew point at the sensor. This is easily corrected by changing or cleaning the filter. Since the air from the Powerex system is filtered at the dryer exit, filter problems are unlikely.

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 Purge

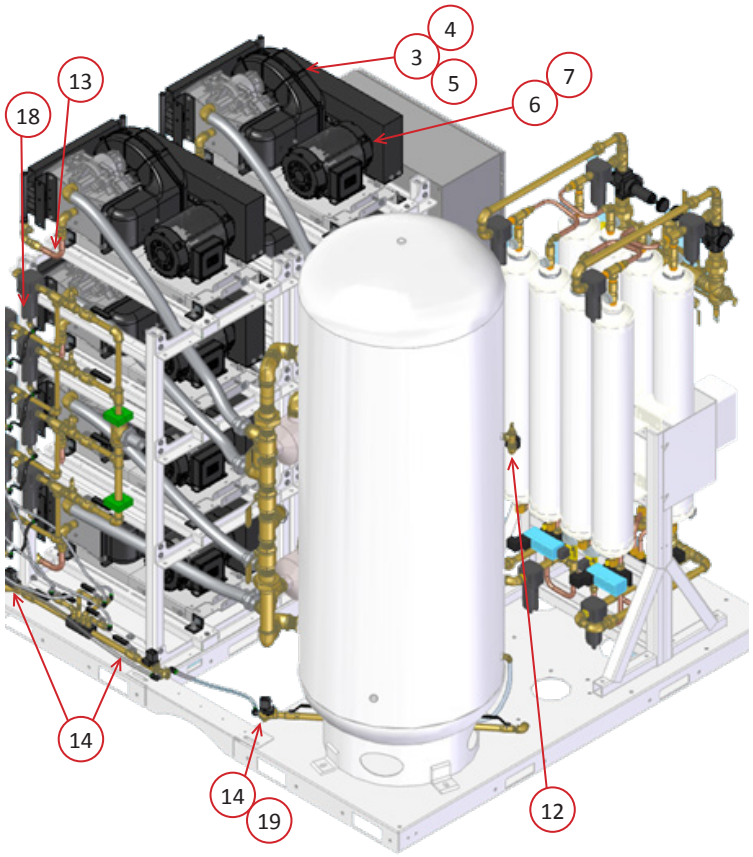
Sensor purge is also an automatic procedure that minimizes the drift at the wet end readings of the dew point measurement. Sensor purge is performed once a day or when the power is switched on. The sensor is heated for several minutes which will then evaporate all excess molecules out of the sensor polymer. This, together with the auto-calibration results in a very small drift of the sensor due to the very linear behavior of the polymer technology.

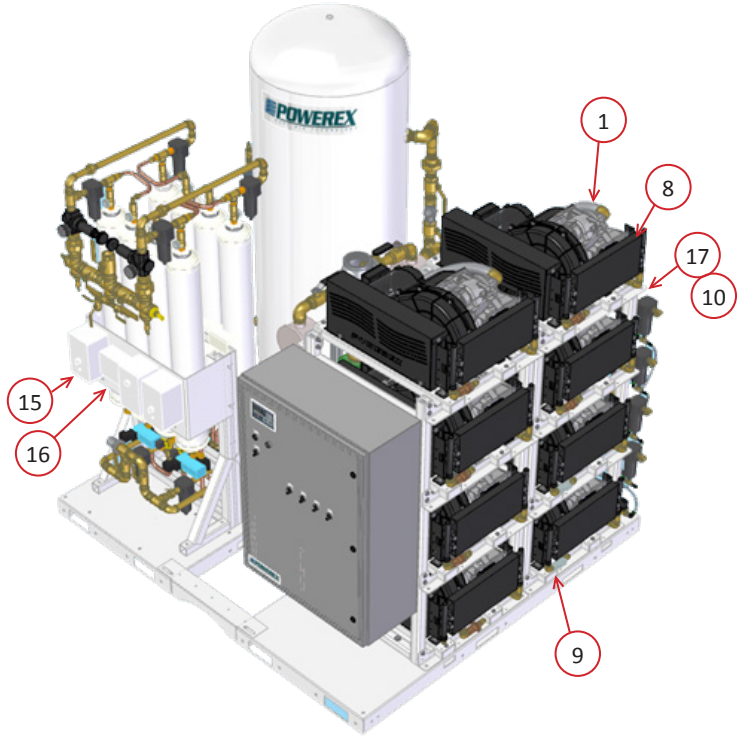
Sensor Warming in High Humidity

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	SL020500AJ	1
	10 HP & 7.5 HP "C" Scroll Pump	SL021000AJ	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	V-215100AV	1
12	Tank safety valve	V-215400AV	1
13	Pump outlet flex hose	SM008108AV	1 per pump
14	Tank electric timer drain/ aftercooler 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	AM003202AV	1 per pump/set
18	Water separator assembly	ST178515AV	1
	Water separator connection tubing	PS010300AV	Specify length
	Water separator bottom fitting (remove float assembly)	ST178517AV	1
N/A	Inlet air filter element	VP000509AV	1 per pump
N/A	Tip seal kit 7.5 HP	92780180	1 per pump
N/A	Tip Seal kit 10 HP & 7.5 HP "C"	92728290	1 per pump





Parts Identification

Description	Part #	QTY
Pressure transducer	PE000454AV	1
Dew point sensor (medical &standard laboratory)	ACO500108	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)	PE001004AV	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	8,000	16,000	24,000	32,000	
Inlet air filter	Inspect Replace	●	▲					Replace both at 2,000 hours
Blower fan	Clean			●	●	●	●	
Fan duct	Clean			●	●	●	●	
Compressor fins	Clean			●	●	●	●	Every 8,000 hours or less
Bearings	Grease			▲	▲	▲	▲	Every 8,000 hours
Tip seal	Replace			▲	▲	▲	▲	Every 8,000 hours
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 2000 hours, replace every 8000 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		●		●		●	
Electric 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:

1. Inspect and perform maintenance periodically according to the maintenance schedule.
2. The maintenance schedule relates to the normal operating conditions. If the circumstances and load condition are adverse, shorten the cycle time and perform maintenance accordingly.
3. Belts require no attention unless slippage is detected (Chirping sound on start up or while running). Re-tension 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.
4. Grease bearings after 3 years even if hours have not reached 8,000.

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. (Utilize the lockable motor protector circuit breaker and the 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.

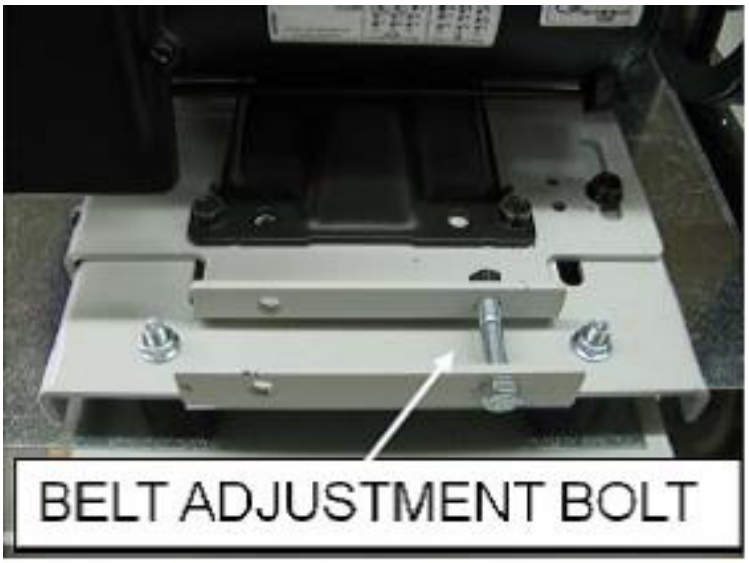
On multi-stack systems the motor side may be pulled outward toward the tank dryer skid by a similar process. On single stack system the air filter group may obstruct motor access on some tiers. In those cases, pull the slide out the pump side, unbolt the pump and transfer the L-brackets to the closer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

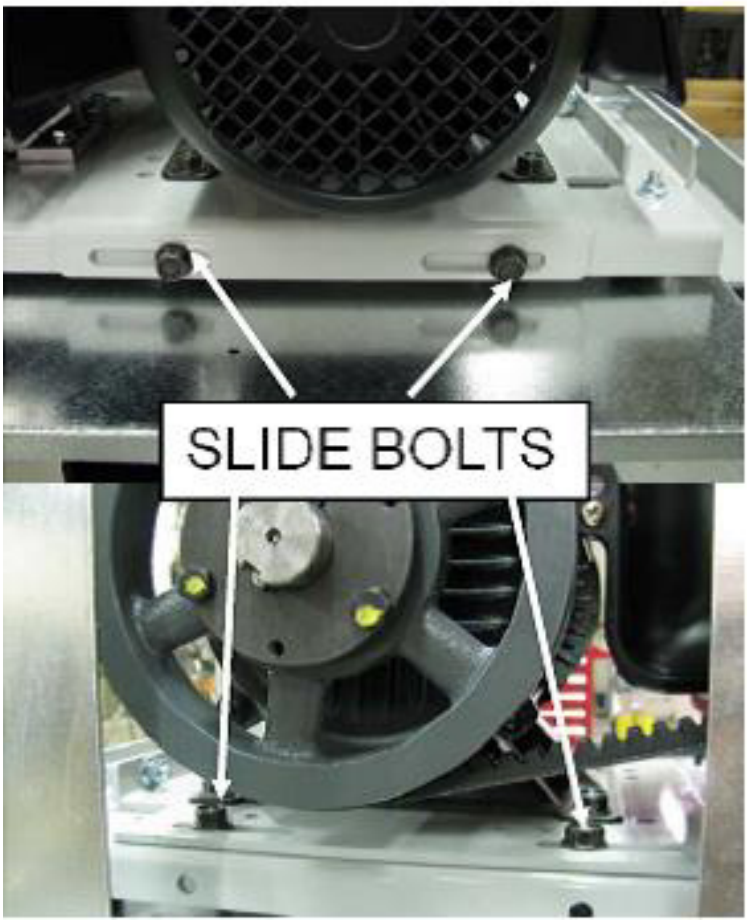
NOTE: If pulling out for motor access the motor leads and conduit may need to be detached to achieve sufficient travel.

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.

Notes

Powerex Limited Warranty – Applicable to Non-OEM Customers in the U.S. & Canada Only

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 in the United States of America and in Canada. 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 located in the United States or Canada, and 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 located in the United States or Canada, and 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 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.

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. NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, UNDER NO CIRCUMSTANCES SHALL POWEREX BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTAL, 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.