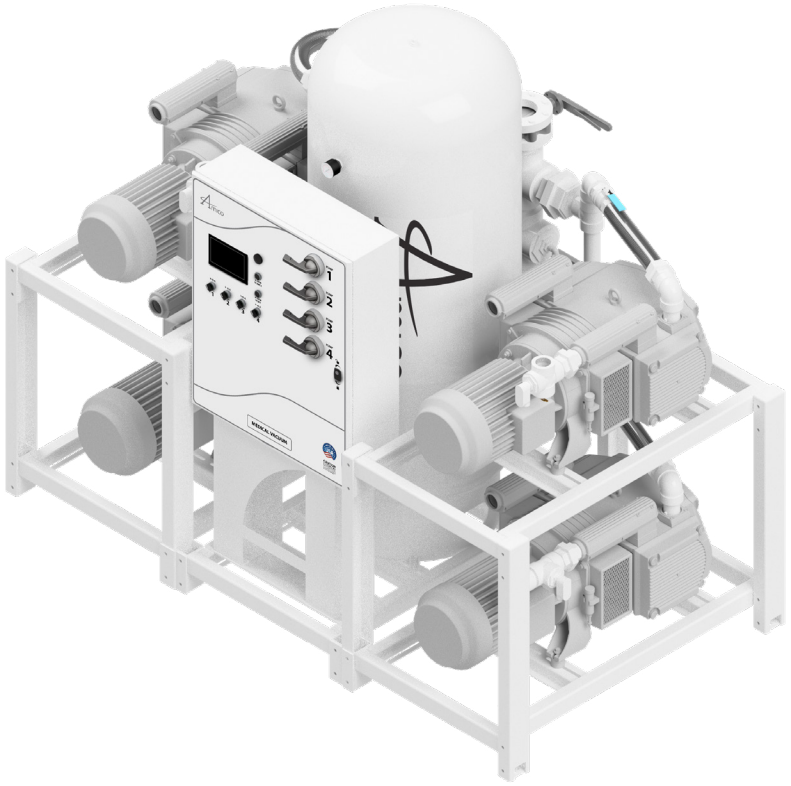
Operation and Maintenance Manual

Dry Rotary Vane Vacuum Systems



Model Number: _____

Job Number: _____

Date Shipped: _____

Date Started Up: _____

Amico

MADE IN NORTH AMERICA

Introduction

For further technical assistance, service or replacement parts, please contact:

Amico Source Corporation

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For Technical Support: as-techsupport@amico.com

For Parts: as-parts@amico.com

Please include the system's job number located on the control panel with all inquires.

Amico Source Corporation reserves the right to make changes and improvements to update products without notice or obligation.

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Safety Precautions

The high vacuum levels produced from the system may cause personnel injury or property damage if the unit is improperly operated or maintained.

Operator should have carefully read and become familiar with the contents of this manual before installing, wiring, starting, operating, adjusting and maintaining the system.

Operator is expected to use common sense safety precautions, good workmanship practices and follow any related local safety precautions.

In Addition:

- Before starting any installation or maintenance procedures, disconnect all power to the package.
- All electrical procedures must be in compliance with all national, state and local codes and requirements.
- A certified electrician should connect all wiring.
- Refer to the electrical wiring diagram provided with the unit before starting any installation or maintenance work.
- Release all vacuum from the package before removing, loosening or servicing any covers, guards, fittings, connections or other devices.
- Notify appropriate hospital personnel if repairs or maintenance will affect available vacuum levels.
- Vacuum discharge must be placed away from any intake to the facility in accordance with NFPA 99.
- Prior to using the Amico Medical Vacuum System, the medical facility must have a Certifier perform all installation tests as specified in NFPA 99. The medical facility is also responsible for ensuring that the medical vacuum meets the minimum requirements as specified in NFPA 99.
- This is a high speed, rotating piece of machinery. Do not attempt to service any part while the machine is in operation.
- To prevent automatic starting, disconnect all electrical power before performing any maintenance.
- Do not operate unit without belt guards, shields or screens in place.
- Make sure that all loose articles, packing material and tools are clear of the package.
- Check all safety devices periodically for proper operation.
- Never operate a compressor with its isolation (shutoff) valve closed or discharge pipe blocked. Damage to the pump may occur.
- The “Hand” mode of operation should only be used for emergencies such as a PLC malfunction and should not be used for normal operation.
- Electrical service must be the same as specified on the control panel nameplate or damage to the equipment may occur.
- Vibration during shipment can loosen electrical terminals, fuse inserts and mechanical connections. Tighten as necessary.

General Information

Product Description

The vacuum system is intended for either:

- Medical use for patients
- Waste anesthetic gas disposal (WAGD)*
- Labs

*For WAGD operation, Amico Source Corporation suggests an oxygen assured pump. Please contact Amico Source Corporation for more information.

The Amico Medical Vacuum System is designed according to the specifications agreed upon during the design phase. Changing the intended use is permissible only after prior consultation with Amico Source Corporation.

Suggested operating temperature: 78°F (26°C).

The vacuum system is intended for use indoors unless otherwise specified.

The vacuum system is designed according to local regulations.

Principles of Operation

The vacuum system takes air from the inlet. The air is passed through an inlet filter (optional) to prevent solid matter from entering the vacuum system. The vacuum pump draws air from the system and from the receiver tank. This allows the system to produce a more stable vacuum level and prevents multiple starting and stopping of the pump(s).

All parts of the system are designed to be isolated including the pump(s) and tank(s). This ensures the continuity of medical vacuum for the patients connected to the system.

Transport

The system is split and crated according to specifications. Amico will make every attempt to split the system into as few pieces as possible to consolidate shipping.

Installation and Commissioning

Inspection Upon Receipt

The condition of the Amico Medical Vacuum System should be carefully inspected upon delivery. Any indication of damage by the carrier should be noted on the delivery receipt, especially if the system will not be immediately uncrated and installed.

Amico Source Corporation modules may remain in their shipping containers until ready to be installed. If any of the modules are to be stored prior to installation, they must be protected from the elements to prevent rust and deterioration.

DO NOT REMOVE the protective covers from the inlet and discharge connection ports of the modules until they are ready for connecting to the facility's pipeline distribution system.

Handling

WARNING: USE APPROPRIATE LOAD RATED LIFTING EQUIPMENT AND OBSERVE SAFE LIFTING PROCEDURES DURING ALL MOVES.

The vacuum system can be moved with either a forklift or a standard pallet jack (for modular systems).

Walk along the route the unit must travel and note dimensions of doorways and low ceilings. Units should be placed to ensure easy access to perform maintenance and high visibility of indicators and gauges. When installing a modular system, there is no preferred arrangement of modules. The modular design of the components allows for the system to be custom fit to the facility to optimize accessibility and operation.

Installation Prerequisites

WARNING: All vacuum systems should be commissioned by an authorized Amico representative. Failure to do so will void all warranties on the system.

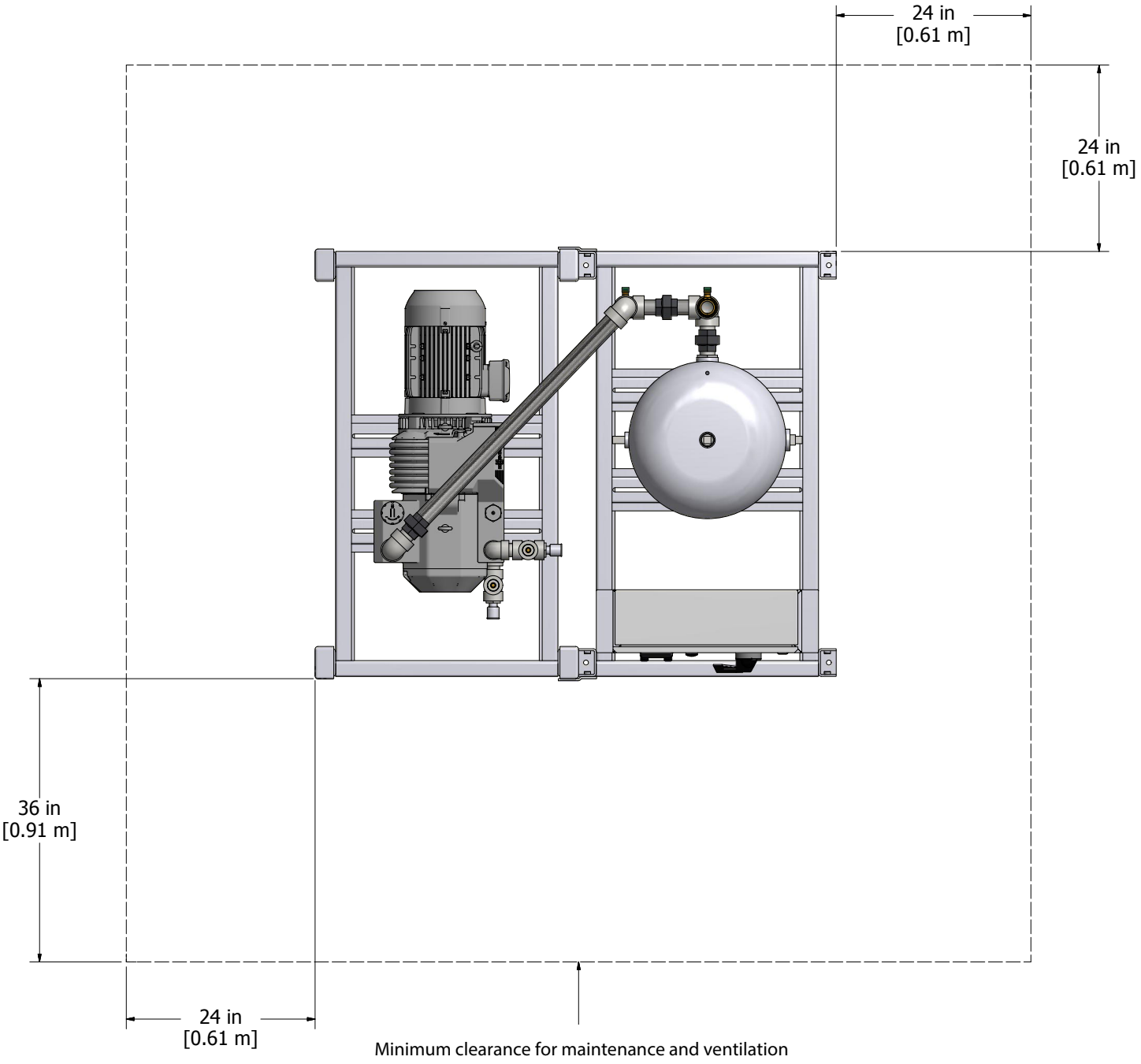
Ensure that the site where the system will be installed has a source of electrical power and that power is of the correct electrical specification as per the design of the system.

Mounting Position and Space

For maintenance and ventilation of the system, it is recommended that there is 2' (60.96 cm) of clearance around the system and 3' (91.44 cm) of clearance in front of the control panel. Vibration pads are provided for the system to reduce noise caused by the vibration of the system. The system should be leveled and placed on a concrete pad that is suitable to sustain the weight of the system.

The area should have an average ambient temperature of 70°F (21°C) with a minimum ambient temperature of 40°F (4.4°C) and a maximum ambient temperature of 100°F (37.8°C).

Sound levels of 76 to 85 dbA are to be anticipated. Though the sound levels are not excessive, they should be considered when choosing the installation location for the system.


24 in
[0.61 m]
24 in
[0.61 m]
36 in
[0.91 m]
24 in
[0.61 m]
Minimum clearance for maintenance and ventilation

Piping

Below is a summary of the requirements for the medical vacuum system exhaust locations.

1. Locate the medical vacuum exhaust outdoors in a manner that will minimize the hazards of noise and contamination to the hospital and its environment. The exhaust shall be located remote from any door, window, air intake or other openings in buildings with particular attention given to separate levels of intake and discharge. Care shall also be exercised to avoid discharge locations contraindicated by prevailing winds, adjacent buildings, topography and other influences. Outdoor exhausts shall be protected against entry of insects, vermin, debris or precipitation. Exhaust lines shall be sized to minimize back pressure. Discharge piping shall be free of dips or loops that might trap condensate or oil. If such discharge piping is unavoidable, a trapping drip leg shall be installed to keep the piping free of fluid buildup. The exhaust shall be located at least 30 ft (10 m) from any door or operable window, 50 ft (15 m) from any mechanical air intake and a minimum of 10 ft (3 m) above grade.
2. Medical vacuum exhausts for separate pumps shall be permitted to be joined together to one common exhaust, provided such intake is appropriately sized.
3. Discharge of pumps utilizing a common exhaust pipe shall be fitted with a check valve or a manual value (locked open) or arranged to permit capping of the active pipe when removing or servicing the pump.
4. Install a drip leg at the base of each pump exhaust line riser.
5. Minimum exhaust pipe sizing required based on the medical vacuum system horsepower, configuration and the total pipe length (including elbows and tees) in the medical vacuum exhaust line.
    a. The medical vacuum exhausts are joined together to one common exhaust.
    b. Minimum pipe size must be maintained for the total length of exhaust pipe.
    c. Use the next larger size pipe in the event the minimum size is not available.

To ensure that no restriction of airflow (and thus back pressure) occurs in the exhaust line, size the piping according to the table on the next page.

Exhaust Pipe Sizing

Unit	Flow Basis *SCFM@19" hg*	Allowable Equivalent Run (Feet)							
Minimum Nominal Pipe Size:		*1.5"*	*2.0"*	*2.5"*	*3.0"*	*4.0"*	*5.0"*	*6.0"*	*8.0"*
Duplex 1.5 Hp	12	450							
Duplex 2 Hp	20	170	700						
Duplex 3 Hp	36	65	250	800					
Duplex 5 Hp	74	16	65	200	475				
Duplex 7.5 Hp	138			60	150	600	1,900		
Duplex 10 Hp	178			45	100	425	1,200		
Duplex 15 Hp	240				55	225	675	1,600	
Duplex 20 Hp	272				45	180	525	1,300	
Duplex 25 Hp	336				25	110	325	800	
Triplex 5 Hp	113		30	50	225	900			
Triplex 7.5 Hp	207				75	300	900		
Triplex 10 Hp	267				45	180	550	1,400	
Triplex 15 Hp	375					100	300	700	
Triplex 20 Hp	409					80	250	600	
Triplex 25 Hp	504					60	175	425	
Quad 7.5 Hp	275				45	190	550	1,400	
Quad 10 Hp	355					110	325	800	
Quad 15 Hp	478					65	190	450	
Quad 20 Hp	542						50	150	350
Quad 25 Hp	670						35	170	425

Fittings Equivalent Lengths								
Minimum Nominal Pipe Size	*1.00"*	*1.25"*	*1.50"*	*2.00"*	*2.50"*	*4.00"*	*5.00"*	*6.00"*
Elbows	2.5'	3.0'	4.0'	5.5'	7.0'	12.5'	16.0'	19.0'
Tee (Branch/Run)	4.5'	5.5'/.5'	7'/.5'	9'/.5'	12/.5'	21'/1'	27'/1.5'	34'/2'

Wiring

WARNING: BE SURE TO DISCONNECT ALL ELECTRICAL POWER FROM THE SYSTEM BEFORE PERFORMING ANY ELECTRICAL PROCEDURES.

Refer to the electrical diagram provided with the unit before starting any installation or maintenance work.

Do not operate system on a voltage other than the voltage specified on the system panel.

All customer wiring should be in compliance with the National Electrical Code and any other applicable state or local codes.

CAUTION: All voltages will be disconnected from the pump modules using the circuit breaker. Opening the appropriate fused knife-switch disconnects control power. Turning off the appropriate motor circuit breaker disconnects motor power.

Refer to the wiring diagram(s) that came with the pumps for pertinent wiring connections.

Check the control voltage, phase and amp ratings before starting the electrical installation and make sure the voltage supplied by the hospital is the same. The wire size should be able to handle peak motor amp load of all operating units. Refer to the specifications for full load and compressor system amperes on the wiring diagram.

Check all electrical connections within the vacuum system that may have loosened during shipment.

Only qualified electricians should make power connections to the control panel and any interconnecting wiring.

Ensure that the electrical supply for the emergency generation system is consistent with the vacuum system's requirements.

Three-phase power supplied from emergency generator(s) must match that of the normal supply to allow for correct motor rotation direction at all times.

Control Panel

System Overview

The Premium series controllers are based on vacuum transducers. Every controller will have a color touch screen (HMI) that will allow for process variables adjustment; alarm set points adjustment; visual indication of system faults; current vacuum level as well as each pump status including pump faults, pump duty in sequence and elapsed run time. All pumps will have a circuit breaker through the door disconnect and illuminated H-O-A switches.

Controllers are factory wired for a single power source and a power distribution block is provided for power connection. The system will accept separate power feeds for each pump in case the power distribution block is removed for redundancy purposes. A minimum of two control transformers will be provided. In case the primary transformer fails, a secondary transformer automatically provides control power. Power switching relay(s) are provided to switch primary transformer windings to any available power source if separate power feeds are used.

Control Panel

Sequence of Operation

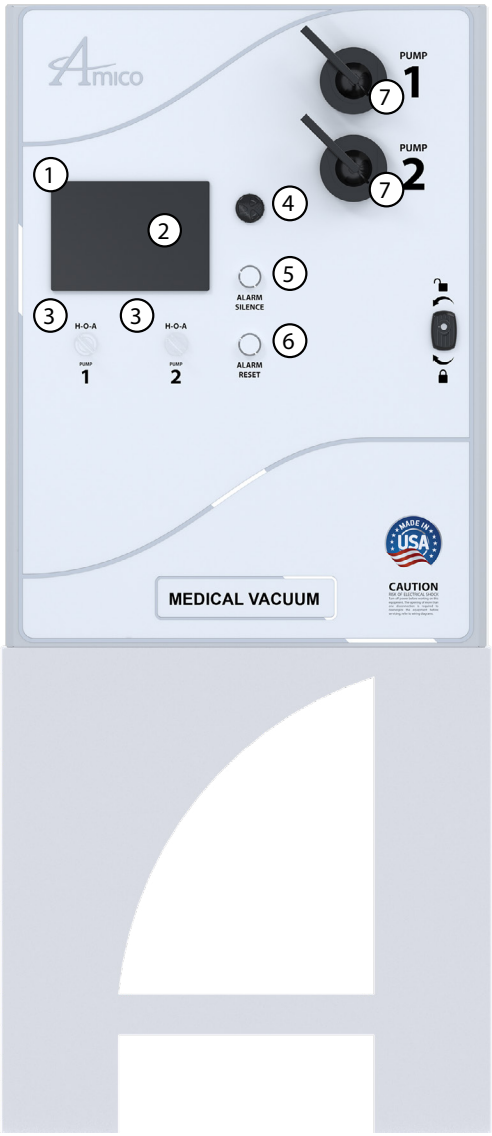
Operation of the controller is based on "ON" and "OFF" setpoints. (See "Setpoints Adjustment" for instructions on how to adjust setpoints).

The lead pump will switch on when pressure drops below the "ON" setpoint and shuts off when pressure reaches the "OFF" setpoint. Every time the lead setpoint is satisfied, the next available pump will become the lead pump.

Lag and all reserve pumps (if applicable) will switch on when the pressure level drops below the respective "ON" setpoints and will switch off when respective "OFF" setpoints are reached.

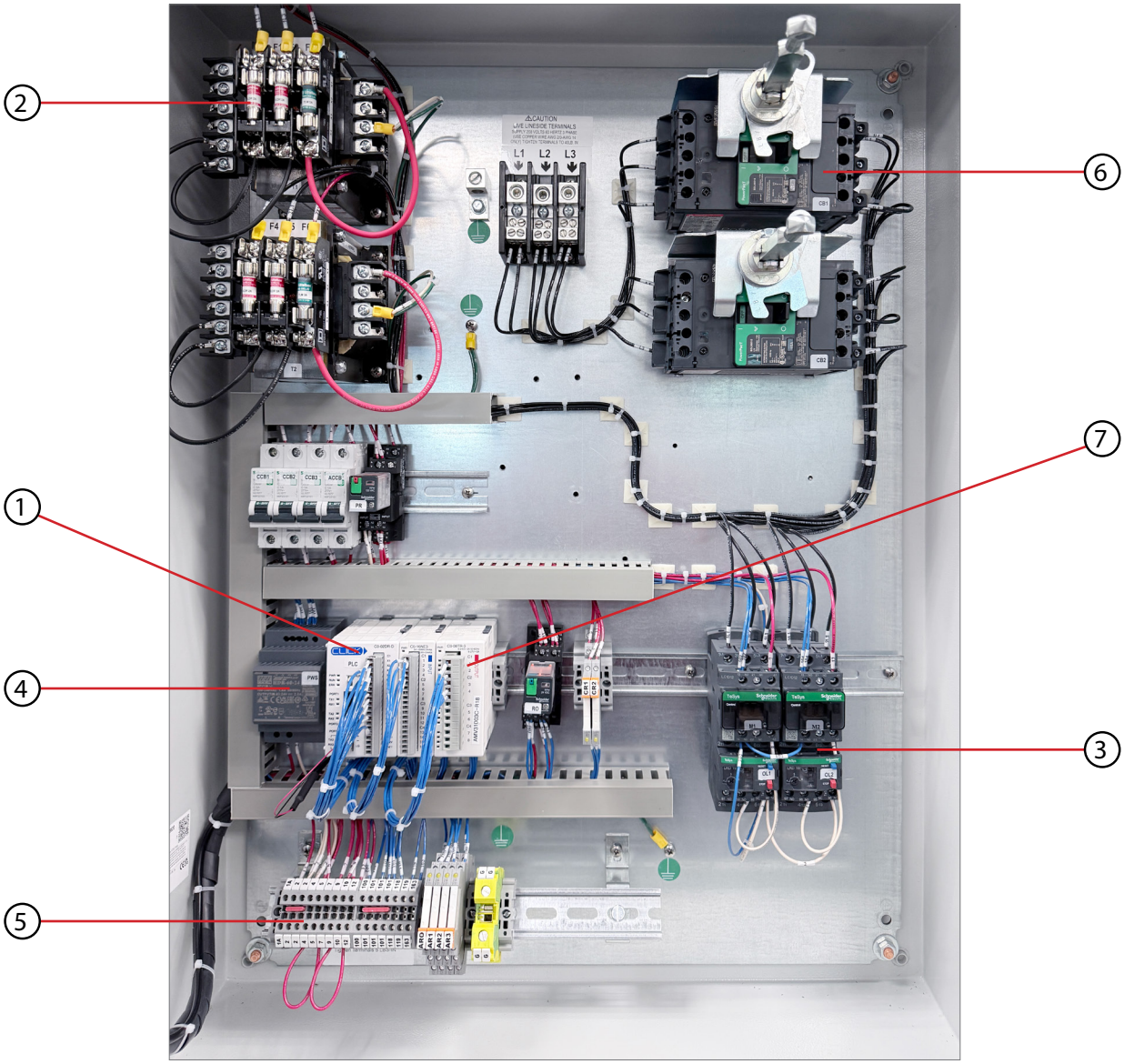
NOTE: See "System timers" for additional information on pump sequencing).

If a pump is switched off by an H-O-A switch or a pump fault is detected, it will be automatically taken out of the sequence and its duty transferred to the next available pump. Once the fault is cleared (See "Troubleshooting" for additional information) and the H-O-A switch is in the "A" position, the pump will be automatically included into the sequence.



1. Display Screen – Displays the systems operating screens, available in Pro IEC or ECO+ displays
2. Touch Monitor – For changing different settings on the display screen
3. H-O-A Selector Switch – Pump control switch: Hand/Off/Auto
4. Alarm Horn – Sounds when an alarm condition occurs
5. Alarm Silence – Silences alarm to allow work to be performed without the annoyance of the alarm
6. Alarm Reset – Resets all alarm states after the condition that set off the alarm is corrected; do not reset the alarm until the type of alarm has been recorded and the alarm cause identified and corrected to the best of your ability
7. Power Breaker – Controls the power to each pump and the control panel

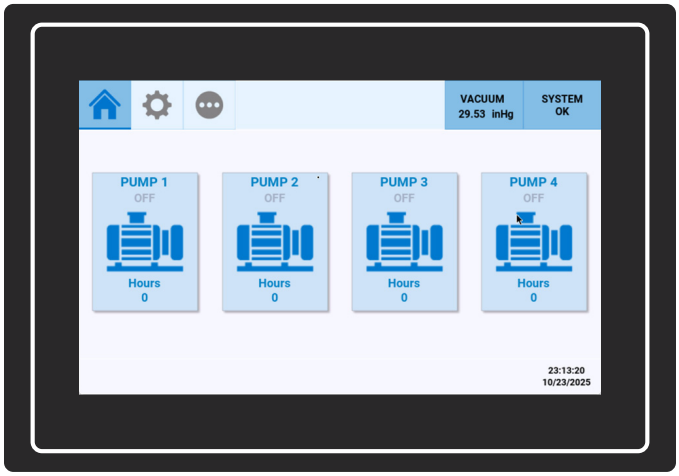
Control Panel



Sub-Plate Layout

1. Programmable Logic Controller
2. Control Circuit Transformer
3. Thermal Overload Relay
4. Power Supply 60W 24V
5. Terminal Blocks Rail Assembly
6. Circuit Breaker
7. I/O Expansion Module

Main Screen



Navigation Header

On the top left of the Main screen is the Navigation Header which includes Home, Settings, Extra and Dryer Tabs for easy navigation.

Pump Duty

Displays the following:

- If H-O-A switch is in the “O” (OFF) position, it will read “OFF”.
- If pump is running, it will read “RUN” regardless of the H-O-A position.
- If pump is off and the H-O-A switch is in “A” (AUTO) position, it will read the duty of the pump: LEAD, LAG, RES1 (RESERVE 1), RES2 (RESERVE 2) as applicable.
- If a pump is in critical fault, it will read “OUT OF SERVICE”.

Pump Status

Displays the following:

- If a pump is in critical fault and the H-O-A switch is in “A” (AUTO) position, it will read “FAULT” Note: even if the reason for the fault is cleared (e.g. an “OVERTEMP” alarm is cleared and reset), the status of the pump will remain in “FAULT.” To reset pump status, the respective H-O-A switch must be turned to “O” (OFF) position. (See “Troubleshooting “for additional information).
- If a pump is in non-critical fault (e.g. maintenance is suggested), it will read “SERVICE SOON!”.
- If a pump is in normal operating condition, it will read “OK”.

Run Time Display

- Run time for each pump is displayed in hours.

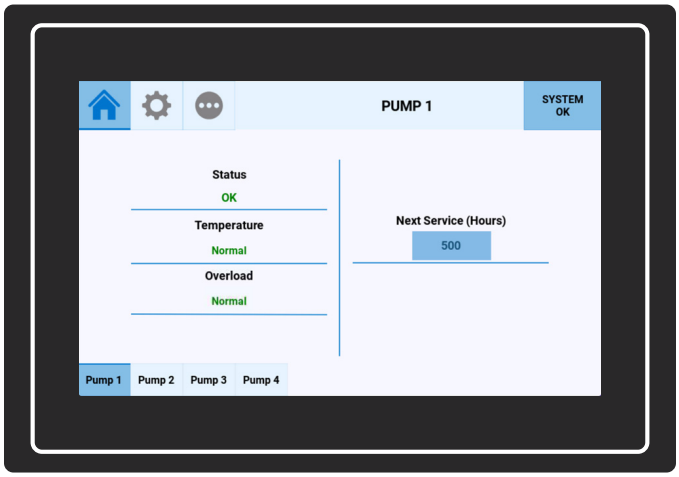
Vacuum Display

- Current Vacuum Level is displayed in inHg or mmHg.
- In case the pressure transducer fails, all pumps will shut off, and "SENSOR FAULTED" will be displayed instead of the pressure readout. After the sensor is repaired, push the reset button to reset sensor fault. (See "Troubleshooting" for additional information).

System Status Display

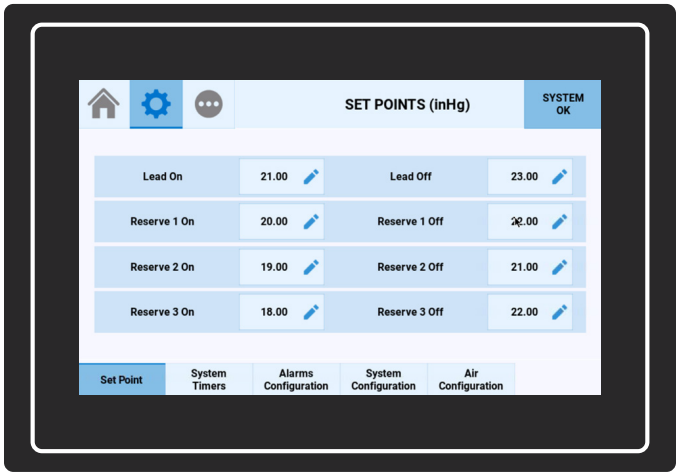
- If no system faults are present, it will read "OK." If any unit alarms are present, it will read "SYSTEM FAULTED." By clicking on the message, an alarms screen will be displayed where specific alarms can be viewed. (See "Troubleshooting" for additional information).

Pump Detail Screen



The Pump Detail screen can be accessed from the main screen by pressing the respective "P #" button. It will display the current pump status, hours left until service is required, the temperature readout for each head if RTD sensors are used, pump faults and alarms (See "Troubleshooting" for additional information).

Setpoints Screen

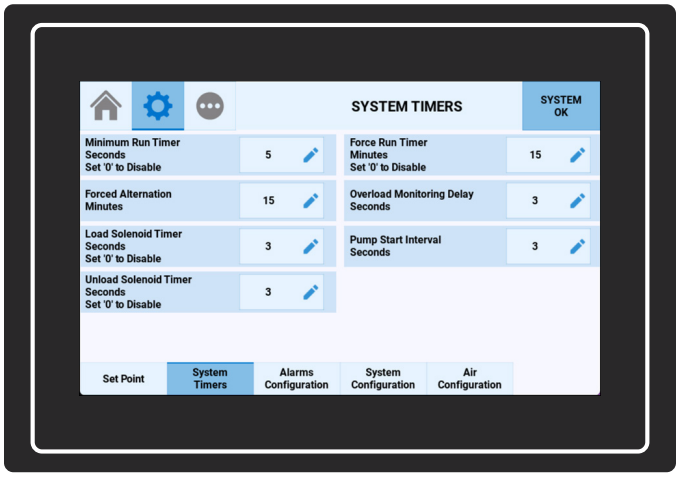


The pressure Setpoints screen can be accessed from the main screen by pressing the "SET UP" button. "ON" and "OFF" setpoints can be adjusted by pressing the respective values. A numeric keypad will appear, allowing direct value entry.

NOTE: The system has the following restrictions:

- It will not accept "OFF" entry values lower than "ON" values.
- Lag and all subsequent Res. (if applicable) "ON" and "OFF" values cannot be higher than previous "ON" and "OFF" values.

System Timers Screen



The System Timers screen can be accessed from the main screen by pressing the "Set Up" button and then pressing "System Timers." It will display the minimum run timer, forced run timer and forced alternation timer.

Minimum Run Timer

The value of this timer is in seconds. This is the time that the pump will run after it has been switched on in automatic mode regardless of pressure level. For example, if it is set to 600 seconds (10 minutes) and a respective pressure setpoint is satisfied in 5 minutes, the pump will run for 5 more minutes and then shut down. If a respective pressure setpoint is satisfied in 13 minutes, the pump will shut down immediately upon switch satisfaction. The value "0" will turn this timer off.

WARNING: ALL AIR SYSTEMS SHOULD HAVE THIS SET TO "0" SECONDS. FAILURE TO DO SO WILL VOID THE WARRANTY.

Forced Run Timer

The value of this timer is in minutes. This is the time that will take to switch the next available pump on if the lead setpoint (SP1) is not satisfied within this period. For example, if it is set to 15 minutes and the lead pressure setpoint is not satisfied within this time with the lead pump running, then the lag pump will be switched on. If the lead setpoint is still not satisfied within the next 15 minutes, the reserve pump (if applicable) will be switched on. All pumps will run until the lead setpoint is satisfied. If a minimum run timer is used (see "Minimum Run Timer" section above), pumps that ran less than the minimum run timer setting will continue to run until their minimum run time elapses. The value "0" will turn this feature off.

NOTE: If lag and reserve (if applicable) pumps are switched on by their respective pressure setpoint, they will continue to run until the lead setpoint is satisfied.

Forced Alternation Timer

The value of this timer is in minutes. This is the time that will take to alternate the pumps in case the lead setpoint was not satisfied within the specified time. For example, if this timer is set to 480 minutes (8 hours) and the lead setpoint is not satisfied within this period, all pumps will be shut off briefly, and the next lead pump will be switched on. The value "0" will turn this feature off.

NOTE: Even with this timer active, normal alternation on each cycle will occur.

Load Solenoid Timer

The value of this timer is in Seconds. This is the time that will delay the closing load solenoid of the pumps once the pump is commanded to run.

Unload Solenoid Timer

The value of this timer is in Seconds. This is the time that will delay the opening the load solenoid of the pumps once the pump is commanded to stop.

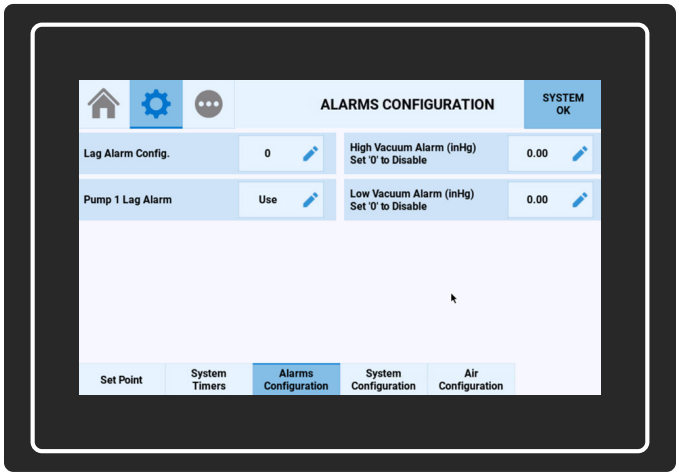
Overload Monitoring Delay

The value of this timer is in Seconds. This is the time that pump will take to close the relay contactor in the panel, if overload is tripped the contactor will not close, and if the time entered in seconds is elapsed, Overload feedback fault alarm will be triggered for corresponding pump.

Pump Start Interval

The value of this timer is in seconds. This is the time each pump will be commanded to run in sequence (I.E Lead, Reserve 1, Reserve 2…) only when the designated seconds have been elapsed.

Alarms Configuration Screen



This screen can be accessed from the main screen by pressing the "SET UP" button and then pressing "Units Alarms". It allows entering settings for the following alarms:

Lag Alarm Configuration

This setting allows the user to change the functionality of lag alarm, regardless of the total number of pumps in the system, if a user wants to trigger the lag alarm upon running the specific reserve pump (1= Reserve 1, 2 = Reserve 2, 3 = Reserve 3…) this can be achieved by putting the reserve pump number in this field.

Pump 1 Lag Alarm

This setting is only for a system if a user wants to disable the lag alarm when the LEAD pump is the only functioning pump in the system.

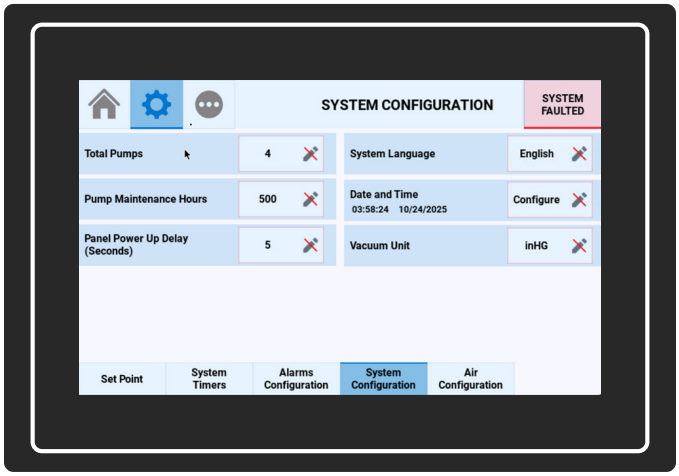
High Vacuum Alarm

This setting determines if the High Vacuum Level alarm is disabled or enabled. Any other value than 0 will indicate the current vacuum level being greater than the limit will cause the high vacuum alarm to occur and the system should command all the pumps to stop running regardless of the minimum run timer if the vacuum level is more than 29 inHG which is factory default limit

Low Vacuum Alarm

This setting determines if the Low Vacuum Level alarm is disabled or enabled. Any other value than 0 will indicate the current vacuum level being less than the limit will cause the low vacuum alarm to occur.

System Configuration Screen



This screen is used to configure the system by selecting the appropriate options.

Total Pumps

This represents the number of active pumps in the service regardless of the electrical panel size.

Pump Maintenance Hours

This setting is used to define the amount of run hours to be elapsed for each pump before the service warning is triggered.

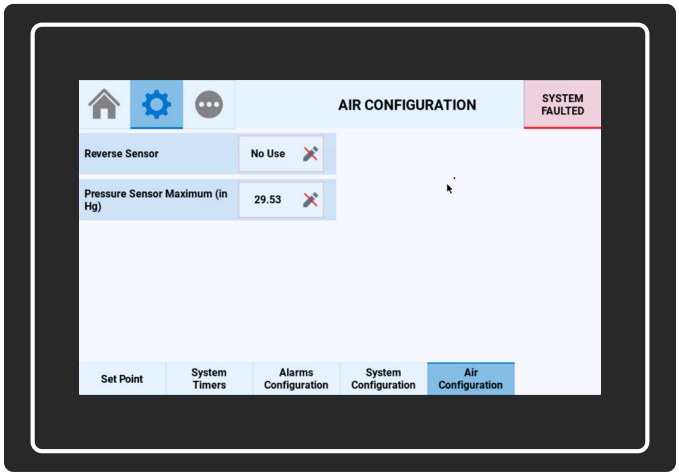
Panel Power Up Delay

This time is in seconds and is used to delay the control operation by controller once the system is powered up to ensure all the electrical components are energized prior to regaining the automatic system control by panel controller.

System Language / Time / Units.

System Language, Date and time of the system, Vacuum units are allowed to be changed from this screen if appropriate user is logged in.

Air Configuration Screen



On this screen user will be able to select the sensors used in the system and set the parameters for each sensor.

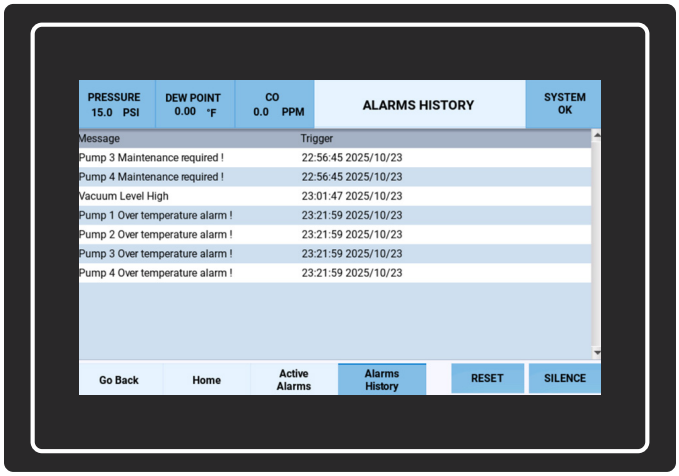
Pressure Sensor Minimum and Maximum

This setting is in inHg only; user can set the minimum and maximum rating on the screen by referring to the physical installed sensor limits.

Reverse Sensor Use

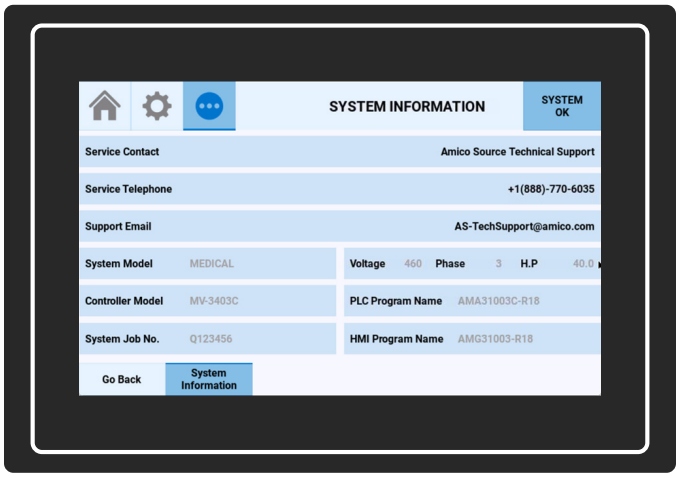
This setting can be changed to "Use" if the physical sensor is installed on the system is not ranging from 0-29.53 inHg, and "No User" if the physical sensor is installed on the system is not ranging from 29.53-0 inHg.

System Log Screen



The System Log keeps track of all the alarms on the system. The information provided in the log can be used for troubleshooting purposes.

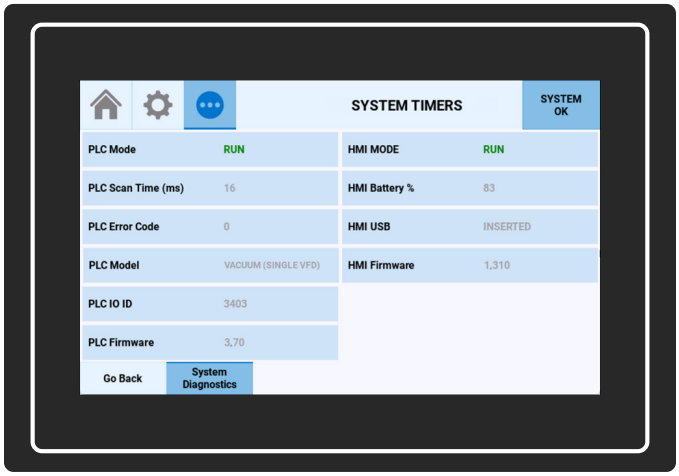
System Information Screen



This screen can be accessed from the Extra screen by pressing the three dots at the top and selecting “System Information” button. It will display general system information.

This will also display the service provider’s information, maintenance interval and other service information.

Service Diagnostics Screen



The Service Diagnostics screen can be accessed from the Extra screen by pressing the three dots at the top and selecting “System Diagnostics” button.

This provides information related to PLC controller and Screen for troubleshooting.

Extra Screen



Extra screen can be accessed from the top left navigation bar by clicking “three dot” icon.

Here user can access following screens:

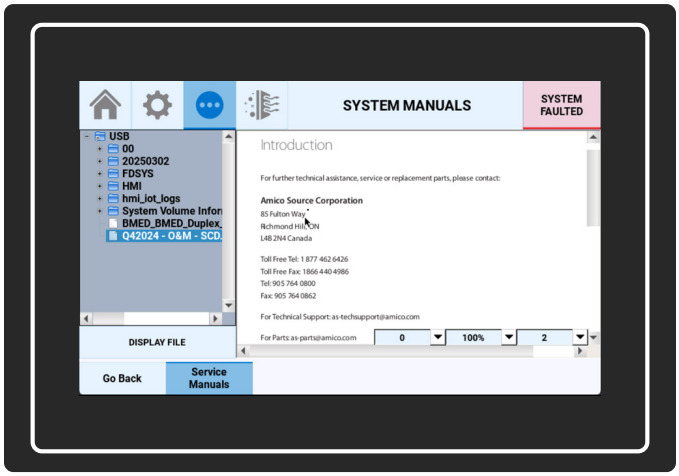
Login Screen

User can log in and log out by selecting the appropriate password.

Service Manuals Screen

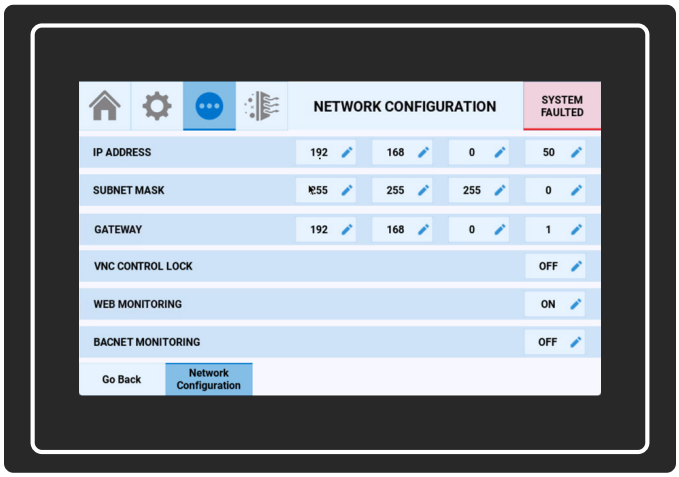
User can view the Operating manuals and Preventive, Maintenance check lists, System piping diagram and electrical panel diagram from here as shown in picture below.

NOTE: The USB needs to be inserted with correct files to access the files listed above.



Network Configuration Screen.

User can set up the networking as shown in picture below on this screen.



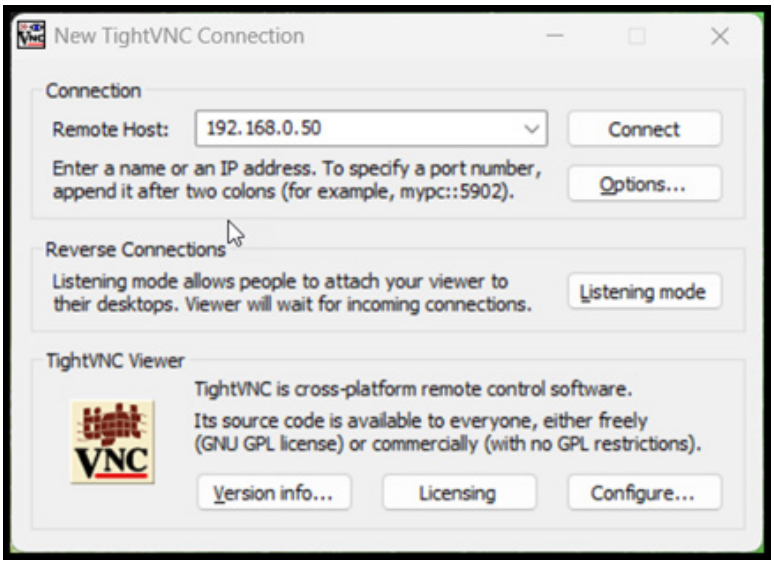
IP Address, Subnet mask and Gateway can be provided by the facility to access the internet and can be entered here.

VNC monitoring / Web monitoring can be accessed by the facility if the valid IP address is configured and the user is able to access the HMI over network.

VNC Remote Control / Monitoring

This feature enables user to control the system status over any internet browser if connected to facility's network over Wi-Fi or LAN.

- To remotely control the system user must enter IP Address on their VNC software's address bar, e.g. *Real VNC / TightVNC Software for Windows/iOS/Android.*
- Once entered it will prompt for password which will be same as system password **2023AD**.

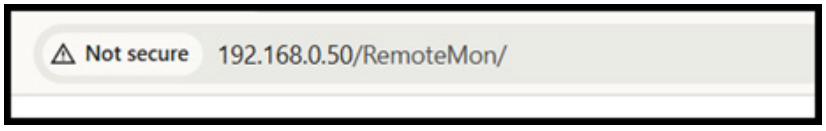


User can choose to disable the control of HMI over network by selecting the VNC Control Lock option to ON.

Web Monitoring can be enabled or disabled by selecting the appropriate option on this screen.

Web Monitoring

Web monitoring can be accessed by opening web browser on the user's computer and typing IP address of the system as configured above followed by /RemoteMon/ as below.

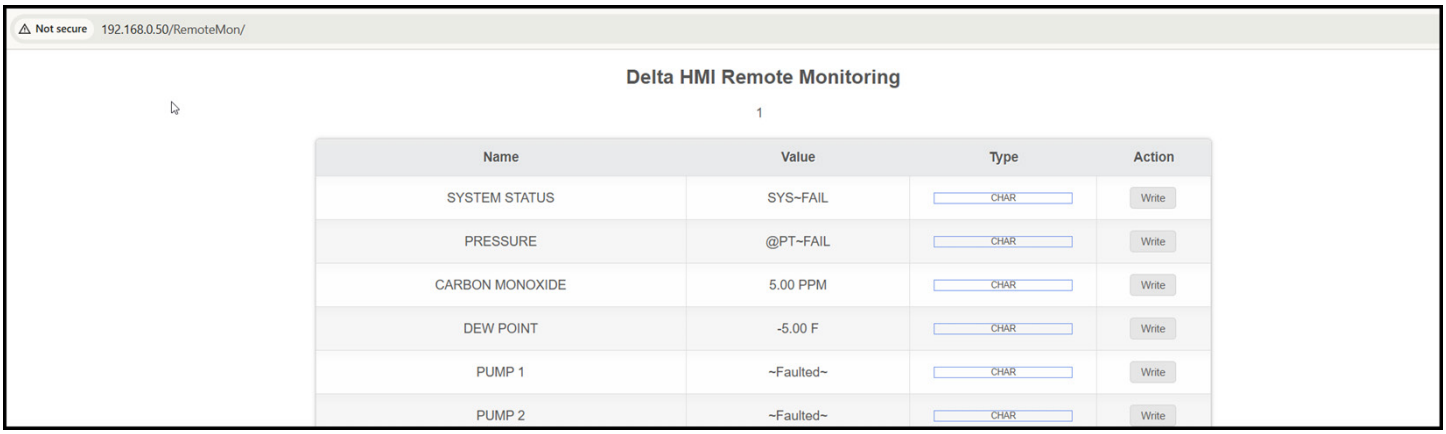


This feature enables user to monitor the system status over any internet browser if connected to facility's network over Wi-Fi or LAN.

- To remotely monitor the system user must enter following on their internet browser's address bar, IP Address of the system configured as mentioned on under section 3.9 followed by **/RemoteMon/** as below.
- Once entered it will prompt for password which will be same as system password **2023AD**.

Following information can be monitored with remote monitoring feature which is live data from the system.

Control Panel

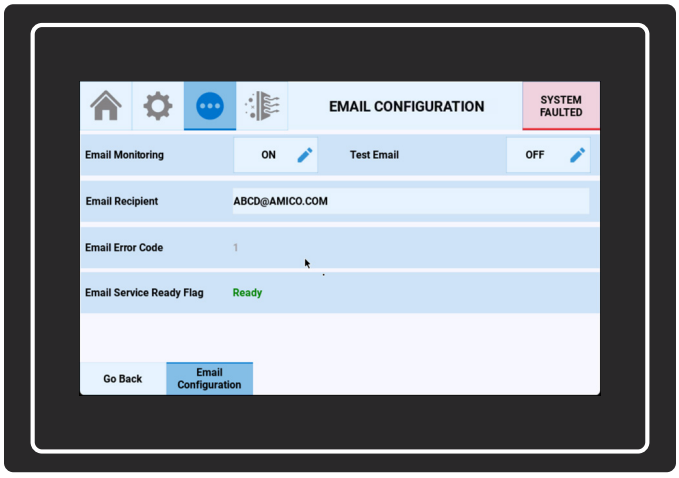


- System Status – OK / Sys-Fault or Failed
- System Pressure / Dew Point / Carbon Monoxide Levels
- Pump Status – n/a / OFF / Running / Reserve1/2/X depending on physical pumps available.

NOTE: If system is configured to have two physical pumps only two pumps will be updated with live data mentioned above and rest pumps will be updated with n/a status since those pumps are physically present.

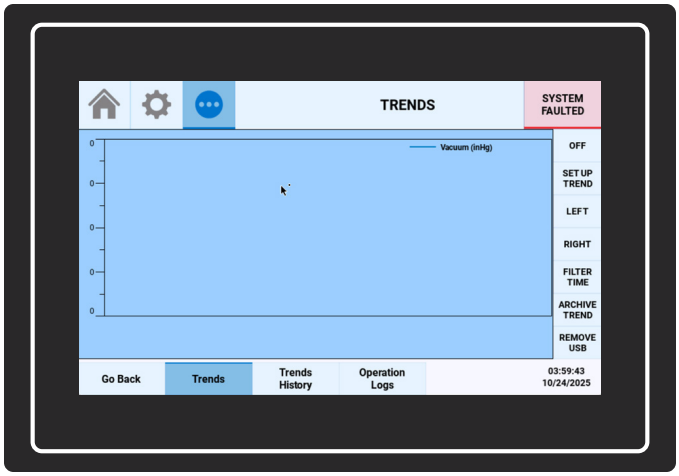
Email Configuration Screen

User can set up the email monitoring as shown in picture below and can test the email functionality provided that the HMI is connected to the internet by assigning the correct IP address under network settings.



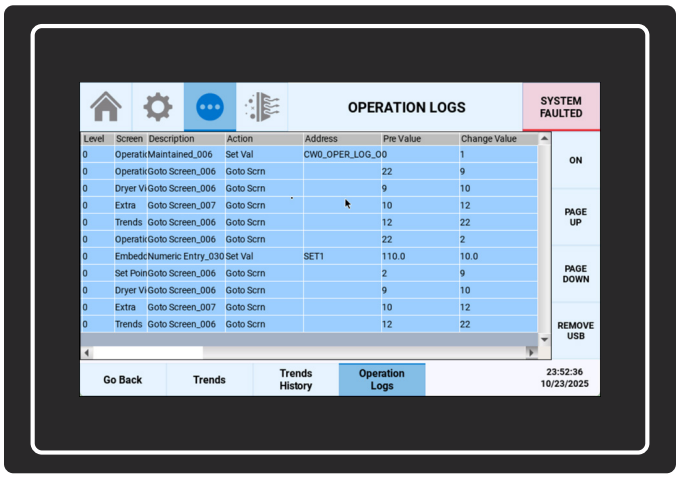
Trends Screen

On this screen, User can view the live parameters and trend it on the graph as below. user has ability to view the previous archived trends from USB by clicking Trend history button at the bottom of the screen.



- User can monitor the Pressure / Vacuum / Dew Point / Carbon Monoxide by navigating to Trends Screen.
- This trend can be turned on by ON button at top right of the side bar. Interval, X and Y Axis can be configured by selecting SET UP TREND button on the side bar at the right of the screen.
- User can navigate left and right of the trend by pressing the appropriate button on the right-side bar.
- User also has the option to filter the trend by date / time along with ability to archiving the trend to the connected USB drive.

Also, HMI Operation logs can be stored and used for diagnostics and record keeping by selecting operation logs button at the bottom of the screen.



Returning to the Home Screen

From any sub screen, you can press the “Home” button at the top left of the screen.

Principles of Operation

The Amico Source Corporation Dry Rotary Vane pumps are direct driven, air cooled, oil-sealed, rotary vane pumps that operate as positive displacement pumps. These pumps work according to the rotary vane principle without the use of foreign mediums for lubrication. An eccentrically installed rotor rotates in the cylinder. The centrifugal force of rotation pushes the vanes, which are gliding in slots in the rotor, towards the wall of the cylinder. The vanes separate the sickle-shaped space between rotor and cylinder wall in chambers.

When the chambers are connected with the inlet channel, gas is sucked in, compressed by the next rotation and then discharged. The compression is made without the use of foreign medias for lubrication.

The following are recommendations provided by the vacuum pump manufacturer. For a more detailed manual, please contact Amico Source Corporation for a copy of the pump manual directly from the manufacturer.

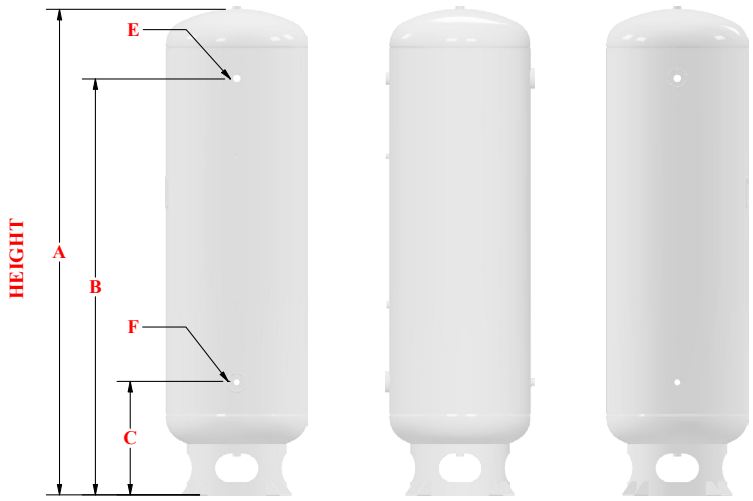
Vacuum Level Settings

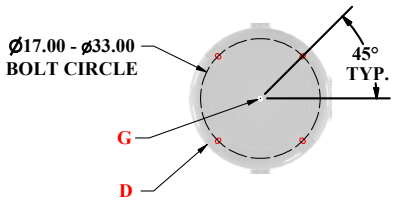
System Vacuum Factory Settings	Start (Close)	Stop (Open)
Lead	18 inHg	23 inHg
Res 1	16 inHg	21 inHg
Res 2	14 inHg	19 inHg
Res 3	12 inHg	17 inHg

For maintenance or other reasons, the pumps can operate in the "Hand" position. In this condition, the pump in the "Hand" position will start when the switch remains in hand and will continue to run until the switch is in "Off" or "Auto" position. These vacuum level conditions must be programmed into the control panel. These vacuum level values must be set to ensure safe operation of the pumps.

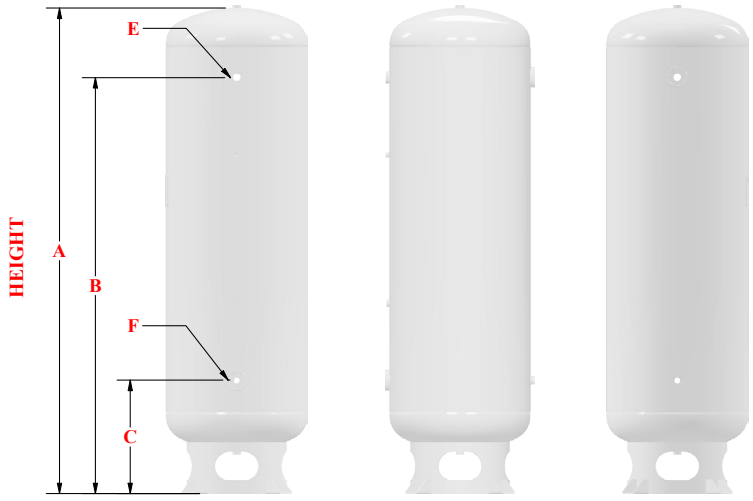
For high altitude installations, pumps may not be able to meet these vacuum levels. If the pump runs and is unable to meet these settings, please contact Amico Source Corporation's Technical Support for assistance.

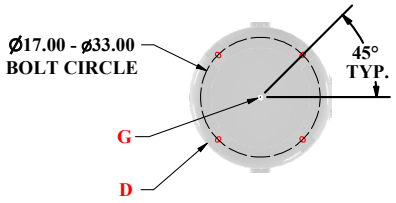
Air & Vacuum Receivers Vertical





Model	Capacity (U.S. Gal.)	Dimension (Inches)							Weight Approx.
		A	B	C	D	E	F	G	
TV-200-080G-PT-MG	80	69.002	59.125	16.125	20.000	2" NPT	2" NPT	½" NPT	175 lbs
TV-200-120G-PT-MG	120	75.032	61.000	20.000	24.000	2" NPT	2" NPT	2" NPT	294 lbs
TV-200-200G-PT-MG	200	79.855	66.485	21.225	30.000	2" NPT	2" NPT	2" NPT	460 lbs
TV-200-240G-PT-MG	240	91.971	79.000	20.000	30.000	2" NPT	2" NPT	2" NPT	578 lbs
TV-200-400G-PT-MG	400	101.321	N/A	N/A	36.000	3" NPT	2" NPT	2" NPT	860 lbs





Model	Capacity (U.S. Gal.)	Dimension (Inches)							Weight Approx.
		A	B	C	D	E	F	G	
TV-200-080G-PT-MG	80	69.002	59.125	16.125	20.000	¾" NPT	2" NPT	½" NPT	175 lbs
TV-200-120G-PT-MG	120	75.032	61.000	20.000	24.000	2" NPT	2" NPT	2" NPT	294 lbs
TV-200-200G-PT-MG	200	79.855	66.485	21.225	30.000	2" NPT	2" NPT	2" NPT	460 lbs
TV-200-240G-PT-MG	240	91.971	79.000	20.000	30.000	2" NPT	2" NPT	2" NPT	578 lbs
TV-200-400G-PT-MG	400	101.321	N/A	N/A	36.000	3" NPT	2" NPT	2" NPT	860 lbs

Maintenance

Vacuum Pump

WARNING: BEFORE STARTING ANY MAINTENANCE PROCEDURES, DISCONNECT ALL POWER TO THE PACKAGE.

Release all vacuum from the package before removing, loosening, or servicing any covers, guards, fittings, connections, or other devices. Never perform any maintenance functions while the unit is in operation.

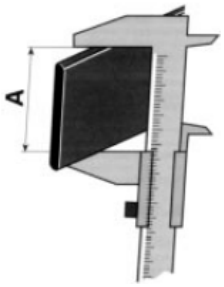
Component	Inspection Instructions	Maintenance and Inspection Time Interval		Remarks
		Every 500 Hours or 3 Months	*Every 1,000 Hours or 1 Year*	
Inlet Filter (optional)	Clean	Inspect	Replace	Clean regularly
Pressure Side Filter	Replace		Replace	Change if necessary
Vanes	Width should be minimum as per below		Inspect	Change if vane width is below minimum requirements
Cooling Ducts	Clear of Dust		Inspect	Blow out with compressed air
Fan Cover	Clear of Dust		Inspect	Dirty fan covers, cooling spirals, and/ or fan hoods will lead to overheating of the pump if not cleaned
Electrical Connection	Clear of Dust		Inspect	

Vanes

To check the vanes, measure using a Caliper for the following widths:

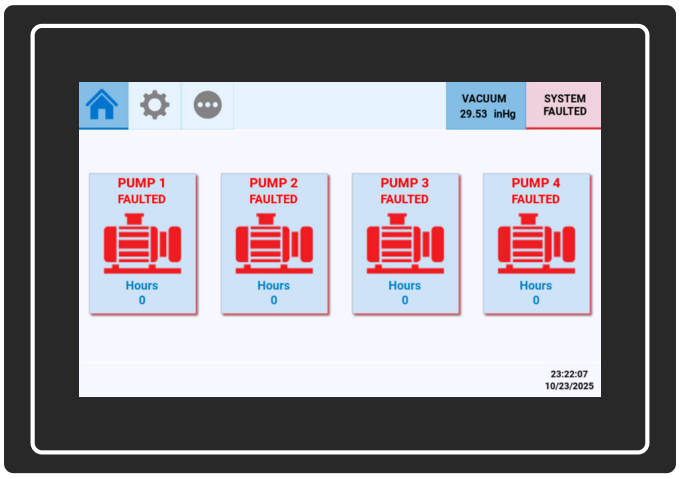
Horsepower	Vane Width (A)
0.5 hp	27 mm (2.7cm)
0.75 hp	27 mm (2.7cm)
1.2 hp	33 mm (3.3 cm)
1.7 hp	33 mm (3.3 cm)

Horsepower	Vane Width (A)
3 hp	44 mm (4.4 cm)
4 hp	44 mm (4.4 cm)
5.4 hp	26 mm (2.6 cm)
7.4 hp	30 mm (3.0 cm)

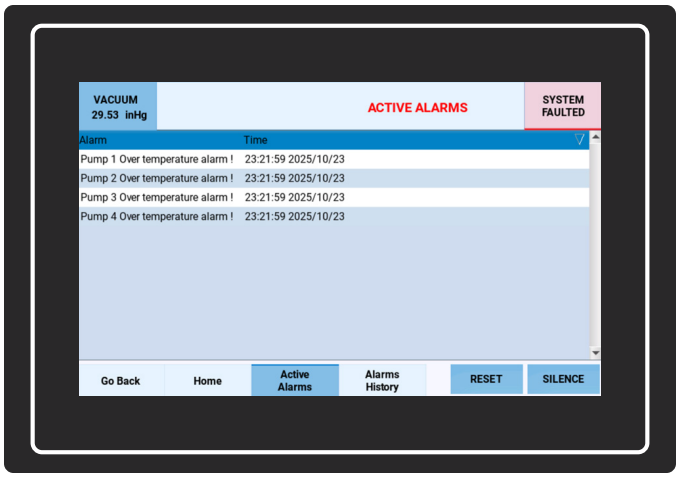


Control Panel Troubleshooting

To Begin troubleshooting the system, press the System Status button which reads “SYSTEM FAULTED!”.



You will get a screen like the one shown below:



Control Panel Troubleshooting

Problem	Possible Causes	Solution
Pressure sensor failed	• Loose Wire	• Check the wiring between the sensor and terminal in the panel
"ERROR" in place of pressure readout	• Pressure sensor is faulty	• Replace pressure sensor
Lag in use	• Last available pump is called • One of the pumps may be out of service	• Confirm all pumps are working on automatic • Once at least one of the pumps is turned off automatically in the system, press alarm reset • Investigate the demand from the facility
Primary transformer failed	• Transformer failure • Burned out fuse	• Contact certified technician
Receiver high water (Québec systems only)	• CSA vacuum systems in Québec only • High water level in receiver tank	• Check receiver tank for water • Drain tank as necessary • Replace sensor as necessary

Pump Troubleshooting

Problem	Possible Causes	Solution
Failure to start	Main power disconnected	Turn on main power
	Phase reversal monitor open	Change power supply phase on incoming power
		Check voltage dial setting on phase reversal switch
	Power failure	Restore power
	Main fuse blown	Replace fuse
	Fuse blown in control circuit	Replace fuse
	Overload tripped on starter	Reset and check for system overload
	High temperature switch activated	Allow unit to cool, reset switch and check for over temperature condition
	Vacuum switch open	Adjust or replace switch
	Loose or faulty connection	Check and tighten all wire connections

Pump Troubleshooting

Problem	Possible Causes	Solution
Power failure	Main fuse blown	Replace fuse
	Fuse blown in control circuit	Replace fuse
Pump shuts off unexpectedly	Overload tripped on starter	Reset and check for system overload
	Vacuum switch has incorrect adjustment	Adjust or replace
	High inlet vacuum switch activated	Check for dirty/clogged inlet filter or inlet piping restriction
	High temperature switch activated	Allow unit to cool, reset switch and check for over temperature condition
High temperature alarm	High temperature switch activated	Allow unit to cool, reset switch and check for over temperature condition
Low tank vacuum	System piping leaks	Repair leaks
	Defective pressure gauge	Replace gauge
	Pressure switch open	Adjust or replace
	No power to solenoid or solenoid stuck open	Check electrical connections
	Intake filter clogged	Clean or replace
Pump cycles too often	System undersized	Contact Amico Source Corporation
	Incorrect vacuum setting	Adjust vacuum switch
	Faulty vacuum switch	Replace switch
	System piping leaks	Repair leaks
	Check valve or the line to receiver is leaking or plugged	Replace if necessary
	Minimum timer not set	Set minimum timer to 6 minutes
	Water in air receiver	Drain air receiver
Pump won't shut off	Vacuum switch has incorrect adjustment or it is faulty	Adjust or replace
Abnormal noise	Mounting bolts loose	Tighten bolts
Motor overheating	Low voltage	Check for proper supply voltage
	Defective motor	Contact Amico Source Corporation

Pump Troubleshooting

Problem	Possible Causes	Solution
Pump runs hot	Incorrect vacuum level setting	Adjust pressure switch
	Faulty check valve	Contact Amico Source Corporation
	Check if valve or the line to receiver is leaking or plugged	Replace if necessary
	Intake filter clogged	Clean or replace
Vacuum pump does not reach the usual vacuum level. The drive motor draws a too high current. Evacuation of the system takes too long.	The vacuum system or suction line is not leak-tight	Check the hose or pipe connection for possible leak
	The vacuum relief valve is misadjusted or defective	Contact Amico Source Corporation
	The inlet screen in the suction connection is partially clogged	Clean screen If frequent, install an inlet filter
	Partial clogging in the discharge	Remove the clogging
	Incorrect sized discharge piping	Use larger diameter
	Internal parts worn or damage	Contact Amico Source Corporation
The drive motor is running, but the vacuum pump stands still	Coupling between the drive motor and the pump is defective	Inspect and replace the coupling element
The vacuum pump starts, but labours or runs noisily or rattles	Loose connection(s) in the drive motor terminal box Not all drive motor coils are properly connected The drive motor operates on two phases only	Check the proper connection of the wires against the connection diagram. Tighten or replace loose connections
	Defective bearings	Contact Amico Source Corporation
	Worn coupling element	Replace the coupling element
	Low oil level in the synchronising gear, leaking oil	Contact Amico Source Corporation

Warranty Policy - Medical Air and Vacuum Systems

Amico Source Corporation warrants the equipment it manufactures to be free of defects in materials or workmanship when installed and operated in accordance with instructions. The Warranty Periods commence upon shipment or at start up, whichever period terminates earlier.

Standard Warranty Periods

	From Shipment	From Start-up
Medical Air Systems	30 months	24 months
Desiccant Air Dryer Systems	30 months	24 months
Lubricated Vane Vacuum Systems	30 months	24 months
Oil-less Vane Vacuum Systems	30 months	24 months
Liquid Ring Vacuum Systems	30 months	24 months
Claw (Standard and 02 Assured) Vacuum Systems	30 months	24 months

Conditions of Standard Warranty Periods – Complete Systems

30 months from the date of shipment or 24 months from start up, whichever comes first, on replacement of defective parts. Labor and travel are covered for 18 months from the date of shipment or 12 months from start up, whichever comes first. Shipping costs (ground only) are covered for 12 months from date of shipment.

Conditions of Standard Warranty Periods – Parts Orders

12 months from the date of shipment on replacement of defective parts only.

This warranty covers all necessary parts and services as defined in the Conditions of Standard Warranty Periods, required for correction of the defect whether by any or all of repair, replacement, or credit, which election shall be made by Amico Source Corporation at its sole discretion, and which are purchaser's only remedies for breach of warranty.

This warranty requires the owner to ensure that the equipment is:

- Installed in accordance with the installation and maintenance manuals provided with the product
- Started up or placed in service by an authorized representative of Amico Source Corporation, which includes the completion and forwarding to Amico Source Corporation of a Start-up and Warranty Registration Form; downloadable from the following location: http://www.amico.com/warranties
- Certified in accordance with all applicable local standards, by a properly qualified certification agency
- Maintained in strict accordance with the Operation and Maintenance Instructions provided with the product

Warranty Policy - Medical Air and Vacuum Systems

Warranty claims will be honoured only after defective parts are evaluated by Amico Source Corporation and only when the examination discloses to Amico Source Corporation's reasonable satisfaction that the equipment has not been damaged in shipment or improperly installed, operated outside of any published parameters (including but not limited to temperature, pressure, or ventilation), improperly or inadequately maintained, field modified in any way, improperly repaired, or in any other way improperly applied or used.

All claims against this warranty require prompt notification, within the warranty period, of any seeming defect. Failure to promptly notify Amico Source Corporation of the seeming defect will invalidate all warranties.

Amico Source Corporation is not liable for delay, damage or defect caused by shipping, acts of God, fire, war, labor difficulties, action of government, or other cause beyond the reasonable control of Amico Source Corporation. If there is a material delay in delivery for any reason, purchaser's only remedy is to cancel the purchase order.

This warranty is given in lieu of all other warranties, expressed or implied, including implied warranties of fitness for a particular purpose and merchantability. In no event is Amico Source Corporation liable for damages in excess of the value of the defective product, nor is Amico Source Corporation liable for any indirect, special or consequential damages, loss of profit of any kind, or for loss of use of the products, even if Amico Source Corporation is aware or should be aware of the possibility of the same.

Replacement Parts

Amico Source Corporation

85 Fulton Way
Richmond Hill, Ontario
L4B 2N4

Phone: (877) 462-6426
Fax: (866) 440-4986
For parts: as-parts@amico.com

Maintenance Record

Model Number: _____
Serial Number: _____
Installation Date: _____

Date of Service								
Hours								
Load								
Ambient Temperature								
Inlet Filter								
Pressure Side Filter								
Vanes								
Cooling Ducts								
Fan Cover								
Electrical Connection								
Misc.								
Serviced By								

www.amico.com

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Toll Free Tel: 1.877.462.6426 | Toll Free Fax: 1.866.440.4986 | Tel: 905.764.0800 | Fax: 905.764.0862
Email: info@amico.com | www.amico.com