Installation, Operation and Maintenance Instructions

Scroll Medical Air Compressor System

Part number 4107 9000 69
Revision 23
January 16, 2024

BeaconMedæs®

Part of the Atlas Copco Group

Lifeline
Medical Systems

Installation, Operation and Maintenance Manual

2-20 Hp "Oil-Less" Scroll Medical Air Systems

This unit is purchased from: _____

Date purchased: _____

Model number: _____

Serial number: _____

Option(s) included: _____

Any information, service or spare parts requests should include the machine serial number and be directed to:

BeaconMedæs
1059 Paragon Way
Rock Hill, SC 29730

Telephone: (888) 463-3427
Fax: (803) 817-5750

BeaconMedæs reserves the right to make changes and improvements to update products sold previously without notice or obligation.

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Appendix D: TotalAlert 360 Control System

Safety Precautions

Pressurized air 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 pressure 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 compressed air levels.
- Air inlet must be placed in an area free of toxic or hazardous contaminants. It must be kept away from ETO exhaust vents, vacuum exhaust vents, areas close to automotive exhausts, etc., in accordance with NFPA 99.
- Prior to using the LifeLine® Scroll Medical Air 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 Air 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 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 without its relief valve in place. Damage to the compressor may occur.
- **Do not add lubricating oil of any kind to the compressor.** Absolutely no oil is required for proper operation.
- The "Manual" mode of operation should only be used for emergencies such as a master printed circuit board 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.

1.0 General Information

1.1 Component Description

NOTE: The features listed in this section are standard for NFPA 99 medical air systems. In the case of special system configurations, these features may or may not be included with the system.

System Design
The **LifeLine®** Scroll Medical Air SPC (Single Point Connection) system consists of a single point connection, base mounted design including the following:

- At least two oil-less scroll compressors and at least two motors
- Duplexed desiccant drying system with purge control
- Duplexed line filters and regulators
- Dew Point and CO transmitters
- Integral, pre-wired, U.L. labeled control panel
- Corrosion resistant air receiver

Each system is fully compliant with the latest edition of NFPA 99. The complete package is pre-wired, pre-piped, and assembled on one common base with single point connections for electrical, intake air, discharge air, and condensation drain. Each system includes valving to allow complete air receiver bypass, as well as air sampling port.

Compressor Module
The compressor is a continuous duty rated scroll type compressor. The design is single stage, air-cooled, consisting of one fixed and one orbiting scroll sealed with PTFE tip seals between the scroll halves and rated for 120 psig discharge pressure. The scrolls are protected from dust or contamination with a two part face seal. Orbiting bearings for scrolls are grease filled which require grease lubrication. See Section 5 for recommended compressor maintenance. The drive bearing is grease filled and lip sealed for its maintenance interval. The scroll case is constructed of diecast aluminum. Maximum heat dissipation is achieved through an integral cooling fan and air ducting.

Compressor Drive and Motor
The compressor is v-belt driven and protected by an OSHA approved totally enclosed beltguard. A sliding motor mounting base that is fully adjustable with two adjusting screws is incorporated to achieve belt tensioning. The motor is a NEMA rated, open dripproof, with 1.15 service factor suitable for 208 or 230/460V electrical service.

Intake Piping
Each compressor has a piped intake manifold with one "hospital type" inlet air filter with threaded opening for remote intake connection. The inlet filter removes dust from the incoming air through cyclonic action and through an element.

Discharge Piping
Each compressor is equipped with an integral air-cooled aftercooler designed for a maximum approach temperature of 15° F complete with automatic solenoid drain valve. Each compressor is equipped with a wired high discharge air temperature shutdown RTD. The compressor discharge line includes a flex connector, safety relief valve, isolation valve and check valve. The discharge piping of each compressor incorporates an integral valve to provide load-less starting and rapid air evacuation between the check valve and scroll discharge at shutdown to minimize reverse rotation of the scroll. The discharge air piping is made of brass and/or stainless steel. The discharge flex connector is braided, 304 stainless steel, brass, or bronze.

Isolation System
The compressor and motor shall be fully isolated from the system base by means of a four-point, heavy duty, isolation system for a minimum of 95% isolation efficiency. Seismic isolation is optional.

1.0 General Information

Dryer

Each desiccant dryer is individually sized for peak calculated demand and capable of producing a 10°F (-12°C) pressure dew point. Dryer purge flow is minimized through a demand-based purge saving control system. In Lifeline dryers, this is achieved using a 441™ transfer valve utilizing two ceramic slide plates. The inlet to each dryer includes a mounted prefilter with automatic drain and element change indicator.

Control System

The mounted and wired control system is U.L. labeled. This control system provides automatic lead/lag sequencing with circuit breaker disconnects for each motor with external operators. The control panel also includes full voltage motor starters with overload protection, redundant 24V DC control circuit power supplies, visual and audible reserve unit alarm with isolated contacts for remote alarm, and touch screen display. Automatic alternation of both compressors based on a first-on/first-off principle with provisions for simultaneous operation if required, automatic activation of reserve unit if required, visual and audible alarm indication for high discharge air temperature shutdown with isolated contacts for remote alarm are included.

Final Line Filters and Regulators

Fully duplexed final line filters rated for 1 micron with element change indicators, along with duplexed final line regulators, are factory mounted and piped.

Dew Point Hygrometer/CO Transmitters

The factory mounted, piped and wired, dew point hygrometer and CO transmitter include remote alarm contacts. The dew point sensor is a ceramic type with system accuracy of ± 2° F. The CO sensor is a chemical type with system accuracy of ± 2 PPM (at 10 PPM) for carbon monoxide. The dew point alarm is factory set at 36° F (2° C) per NFPA 99, and the CO alarm is factory set at 10 PPM. High CO and high dew point conditions are indicated with visual and audible alarms. Transmitters disconnected from control system will activate an alarm. See Appendix A & B for detailed information.

Air Receiver

The vertical air receiver is corrosion resistant, ASME Coded, National Board Certified, and rated for a minimum 200 PSIG design pressure. The tank piping includes a liquid level gauge glass, safety relief valve, manual drain valve, and a zero loss automatic solenoid drain valve.

1.0 General Information

1.2 Electromagnetic Immunity

EN 61000-6-2

Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect Medical Electrical Equipment.

The use of accessories, transducers, and cables other than those specified by the manufacturer, may result in decreased immunity of the TotalAlert 360 control system.

The TotalAlert 360 control system should not be used adjacent to other equipment. If adjacent use is necessary, the TotalAlert 360 control system should be observed to verify normal operation in the configuration in which it will be used.

1.0 General Information

EN 61000-6-2 (Cont.)

Guidance and manufacturer's declaration - electromagnetic immunity			
The TotalAlert 360 control system is intended for use in the electromagnetic environment specified below. The customer or the user of the TotalAlert 360 control system should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic Discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, metal or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short Interruptions and voltage variations on power supply input lines IEC 61000-4-34	<5 % U_T (>95 % dip in U_T) for 0,5 cycle <40 % U_T (>60 % dip in U_T) for 5 cycles <70 % U_T (>30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	<5 % U_T (>95 % dip in U_T) for 0,5 cycle <40 % U_T (>60 % dip in U_T) for 5 cycles <70 % U_T (>30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the TotalAlert 360 control system requires continued operation during power mains interruptions, it is recommended that the system be installed on an emergency power service.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the a.c. mains voltage prior to application of the test level.			

1.0 General Information

EN 61000-6-2 (Cont.)

Guidance and manufacturer's declaration - electromagnetic immunity			
The TotalAlert 360 control system is intended for use in the electromagnetic environment specified below. The customer or the user of the TotalAlert 360 control system should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the TotalAlert 360 control system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2\sqrt{P}$ $d = 1,2\sqrt{P}$ 80 MHz to 800 MHz $d = 2,3\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m	Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the TotalAlert 360 control system is used exceeds the applicable RF compliance level above, the TotalAlert 360 control system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the TotalAlert 360 control system.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

2.0 Installation

2.1 Inspection Upon Receiving

The condition of the **LifeLine®** Scroll Medical Air 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. **LifeLine®** Scroll systems may remain in their shipping containers until ready for installation. If **LifeLine®** Scroll systems 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 unit until they are ready for connecting to the hospital's pipeline distribution system.

2.2 Handling

WARNING:

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

The compressor package can be moved with either a forklift or dollies. Be sure that the orange spacers used to prevent the compressor and motor assemblies from floating are in place, as well as the dryer spacer on 2-7½ hp systems. These spacers will prevent unnecessary movement while moving and mounting the unit. Keep all packing in place during installation to minimize damage. Walk along the route the unit must travel and note dimensions of doorways and low ceilings. **LifeLine®** Scroll 2-7½ hp DX systems are designed to go through 36" doorways. Larger systems must be separated to go through 36" doorways.

If the system must be separated, carefully label all electrical connections that are removed for easier re-assembling at the final destination. Place units to ensure high visibility of indicators and gauges and for performing maintenance on the system.

2.3 Location

The **LifeLine®** Scroll Medical Air system should be installed indoors in a clean, well-ventilated environment. Areas of excessive dust, dirt or other air-borne particulate should be avoided.

Secure the package to a flat, level surface capable of supporting the weight and forces of the unit. Make sure that the main base is not bowed, twisted, or uneven. Because of the internal flexible hose connections and spring isolators, no special foundation is required. However, the unit base must be securely bolted using all mounting holes provided in the base. If a raised concrete pad is used, the base must not overhang the concrete pad. A method to drain away moisture is necessary. If a gravity drain is not available, a connection to a drain is necessary. After securing the unit to the floor, remove the orange spacers from under the compressor/motor structure.

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 105°F (37.8°C). (Note: At temperatures below 32°F the bare compressor will not be adversely affected, but freezing of the condensate can occur which could affect operation.)

Sound levels of 65 to 80 dbA are to be anticipated depending on the size of the package (duplex, triplex, quad). Though the sound levels are not excessive, they should be considered when locating the system.

2.4 Space Requirements

Scroll Medical Air systems should be placed to ensure easy access to perform maintenance and high visibility of indicators and gauges. It is recommended that a minimum space of 24" be allowed on all sides of the compressor system for ventilation and maintenance. A minimum space of 36" in front of the control panel is required by NEC code. A vertical distance of 36" is required above the unit for ventilation and maintenance.

2.0 Installation

2.5 Piping

2.5.1 Intake Piping

WARNING:

The air intake must be placed in an area free of toxic or hazardous contaminates; it must be kept away from ETO gas exhaust vents, vacuum exhaust vents, areas close to automotive exhausts, etc., in accordance with NFPA 99.

The air intake line must be piped to the outside in accordance with NFPA 99. To ensure that no restriction of airflow will occur, size the piping according to the following chart. All piping must be precleaned for medical gas in accordance with NFPA 99. The outside pipe must be turned down and screened to prevent contamination. The source of air is typically from outside the building. In hot and humid areas, using the building's air-conditioned supply (per NFPA 99) may improve operating conditions of the system.

Table 2.5.1.1 System Pipe Length

LifeLine Units	System Pipe Length (ft) - See Notes											
	25	50	75	100	150	200	250	300	350	400	450	500
Duplex 2 Hp	1.25	1.25	1.25	1.25	1.50	1.50	1.50	2.00	2.00	2.00	2.00	2.00
Duplex 3 Hp	1.25	1.25	1.50	1.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.50
Duplex 5 Hp	1.50	2.00	2.00	2.00	2.00	2.50	2.50	2.50	2.50	2.50	2.50	3.00
Duplex 7.5 Hp	2.00	2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.00	3.00	3.00	3.00
Duplex 10 Hp	2.00	2.50	2.50	2.50	2.50	3.00	3.00	3.00	3.00	3.50	3.50	3.50
Duplex 15 Hp	2.50	2.50	2.50	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.00	4.00
Duplex 20 Hp	2.50	2.50	3.00	3.00	3.00	3.50	3.50	3.50	4.00	4.00	4.00	4.00
Triplex 5 Hp	2.00	2.00	2.00	2.50	2.50	2.50	2.50	3.00	3.00	3.00	3.00	3.00
Triplex 7.5 Hp	2.50	2.50	2.50	2.50	3.00	3.00	3.00	3.50	3.50	3.50	3.50	3.50
Triplex 10 Hp	3.00	3.00	3.00	3.00	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.00
Triplex 15 Hp	3.00	3.00	3.00	3.00	3.50	3.50	4.00	4.00	4.00	4.00	5.00	5.00
Triplex 20 Hp	3.00	3.00	3.50	3.50	3.50	3.50	4.00	5.00	5.00	5.00	5.00	5.00
Quad 5 Hp	2.50	2.50	2.50	2.50	3.00	3.00	3.00	3.00	3.50	3.50	3.50	3.50
Quad 7.5 Hp	3.00	3.00	3.00	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.00	4.00
Quad 10 Hp	3.00	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.00	4.00	4.00	5.00
Quad 15 Hp	3.00	3.00	3.50	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00
Quad 20 Hp	3.00	3.50	3.50	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Pentaplex 15 Hp	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00
Pentaplex 20 Hp	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
Hexaplex 15 Hp	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00
Hexaplex 20 Hp	4.00	4.00	4.00	5.00	5.00	5.00	5.00	6.00	6.00	6.00	6.00	6.00

Notes:

1) All pipe sizes are based on the following: copper pipe (Type L), 14.7 psia, 70° F
2) The minimum pipe size must be maintained for the total length of the inlet pipe. Use next larger size pipe in the event the minimum is not available.
3) When determining the total pipe length, add all the straight lengths of pipe together in addition to the number of elbows times the effective pipe length for that pipe size. (See Table 2.5.2.1 and example on page 2-3.)

2.0 Installation

Table 2.5.1.2 Pipe Length for Elbows

Effective Pipe Length Equivalent to each 90 deg Elbow									
Pipe Size (in.)	1.25	1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00
Eff. Pipe Length (ft)	3.4	4.0	4.9	6.4	7.9	9.4	10.0	11.9	13.2

All SPC systems have the necessary flex connectors for the air intake and discharge factory piped, and no further flex connectors are needed.

Example:
Select the pipe size for a Duplex 10 Hp with 20 feet of straight pipe and six elbows:

1. Select the pipe size of 2" diameter for 20 feet of straight pipe.
2. Determine the eff. pipe length for an elbow of 2" diameter (EPL = 4.9 ft/elbow).
3. Calculate the SYSTEM PIPE LENGTH SPL(2.0"D) = 20 + (6 x 4.9) = 49.4 ft
4. Check this SYSTEM PIPLE LENGTH to see if it exceeds the minimum pipe size. In this case, it does, select the next larger pipe size from the table (D = 2.5").
5. To double-check the pipe size, recalculate the SPL with the new diameter.
   SPL (D = 2.5") = 20 + (6 x 6.4) = 58.4 ft, which is okay.

2.5.2 Discharge Piping

Table 2.5.2.1 Minimum Discharge Pipe Size[1]

LifeLine Units	Pipe Size
Duplex 2 Hp	¾
Duplex 3 Hp	¾
Duplex 5 Hp	¾
Duplex 7.5 Hp	¾
Duplex 10 Hp	1
Duplex 15 Hp	1
Duplex 20 Hp	1¼
Triplex 5 Hp	1
Triplex 7.5 Hp	1
Triplex 10 Hp	1
Triplex 15 Hp	1¼
Triplex 20 Hp	1½
Quad 5 Hp	1
Quad 7.5 hp	1¼
Quad 10 Hp	1¼
Quad 15 Hp	1½
Quad 20 Hp	1½
Pentaplex 15 Hp	1½
Pentaplex 20 Hp	1½
Hexaplex 15 Hp	1½
Hexaplex 20 Hp	1½

[1] A larger discharge pipe size may be required depending on the length of distribution piping in the facility. However, the distribution pipe size should not be less than the minimum pipe size shown above.

For discharge pipe sizing, refer to standard pressure drop tables. Total pressure drop in piping should not exceed 5 psi.

2.0 Installation

2.6 Wiring

WARNING:

BE SURE TO DISCONNECT ALL ELECTRICAL POWER FROM THE COMPRESSOR BEFORE PERFORMING ANY ELECTRICAL PROCEDURES.

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

Do not operate compressor on a voltage other than the voltage specified on the compressor nameplate.

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

CAUTION: In the Duplex configuration, all voltages will be disconnected from the compressor modules using the circuit breaker. Turning off the appropriate motor circuit breaker disconnects motor power.

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

Electrical power for the Medical Air system must be supplied from the emergency life support circuit.

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 full load and compressor system amperes on the wiring diagram.

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

Qualified electricians only should make power connections to the control panel and any interconnecting wiring. The control panel has openings for electrical and alarm/data/USB connections. **Do not drill additional holes in the control panel as this may void the system warranty.** See Figure 2.6.1 for opening locations.

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

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

Figure 2.6.1 Electrical/Alarm/Data/USB Openings

3.0 System Operation

3.1 Prestart-up

The contractor should notify **BeaconMedæs** two weeks prior to start-up date to schedule an appointment for an authorized technician to review the installation prior to start-up.

CAUTION: Failure to install the unit properly and have an authorized technician from **BeaconMedæs** start-up the system can void the manufacturer's warranties.

WARNING:

Prior to putting the LifeLine® Scroll Medical Air system into use, 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 Air meets the minimum requirements for Medical Air as specified in NFPA 99.

Prestart-up and start-up procedures should be performed for a new installation or when major maintenance has been performed.

WARNING:

Have more than one person on hand during prestart-up and start-up procedures to ensure safety and to facilitate certain checks.

The main power source to the control panel should be OFF for the duration of the visual inspection.

Ensure that the equipment is installed on a solid level surface. Walk around the system to ensure that there is enough clearance on all sides to perform operational checks/actions and maintenance. The temperature of the area containing the modules should be approximately 70°F (21.1°C) with a minimum ambient temperature of 40°F (4.4°C) and a maximum ambient temperature of 105°F (40°C).

Check the inlet piping for proper size and connection to the compressor modules. Refer to section 2.5 in this manual.

Check all piping system joints that might have come loose during shipment and installation to ensure they are tight.

Check the air receiver, dryers, controls, and compressors for damage.

Check the drain valves on the air receiver and compressor modules.

Check all valves for full open and full close travel. Ensure that the system's valves are positioned for proper operation. (Refer to labeling on valve handles) **Remove all packing material from the unit including the orange shipping blocks under the compressor module(s) and dryer tower (2-7½ Hp Dpx).**

Check the electrical connections to the control cabinet.

Verify electrical service. Before starting the system, check to see that voltage, amperage, and wire size are appropriate.

CAUTION: Electrical service must be as specified or damage to equipment may occur.

WARNING:

To prevent electrical shock, ensure that ALL electrical power to the system is OFF, including the disconnect switches on the control panel. The facility's supply circuit breaker should also be locked out.

Open the electrical cabinet by loosening the fasteners on the front.

CAUTION: Vibration during shipment and installation can loosen electrical terminals, fuse inserts, and mechanical connections. Tighten as necessary.

3.0 System Operation

Check the electrical cabinet for any broken components.

Check that all motor starter connections are tight and that there are no loose objects such as terminal lugs, screws, nuts, etc., in the cabinet.

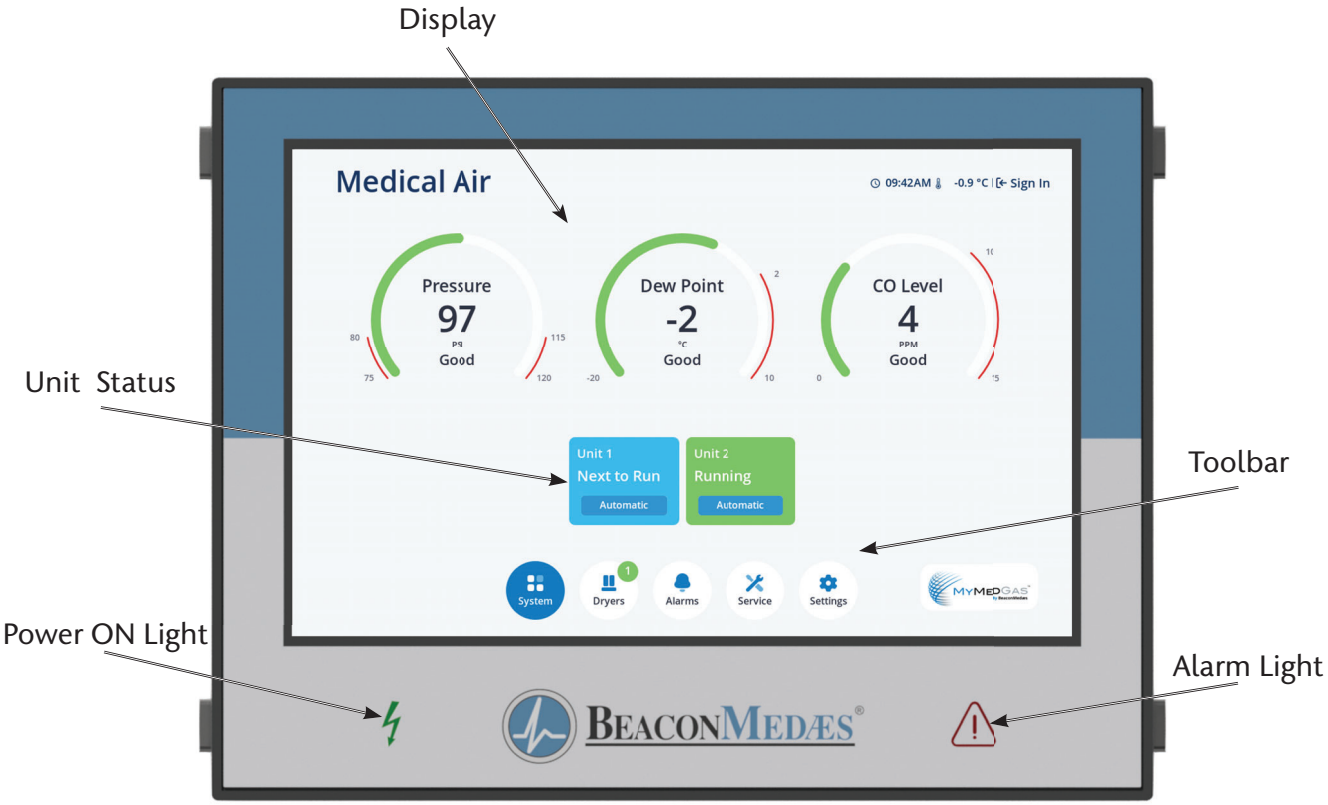


Figure 3.1.1 Touchscreen Controls

3.2 Initial Start-up

CAUTION: Complete the prestart-up procedure before continuing with the initial start-up procedure

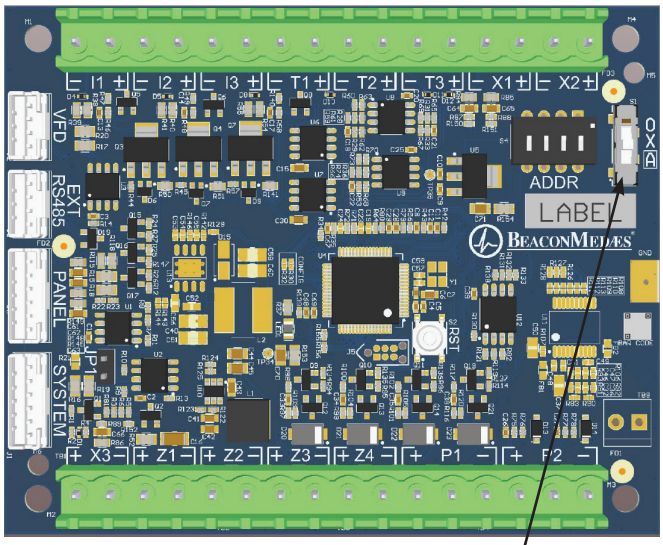
WARNING:

To prevent electrical shock, ensure that ALL electrical power to the system is OFF, including the disconnect switches on the control panel. The facility's supply circuit breaker should also be locked out.

NOTE: DO NOT ADD OIL TO THE COMPRESSOR. The design of the **LifeLine®** Scroll compressor is totally oil-less. It is not necessary to fill the crankcases with oil.

Inside the control panel, make sure that all unit printed circuit boards are set to the manual override "Off" position. This is indicated by the middle position "X" on the three-position sliding switch as shown in Figure 3.2.1. Refer to the wiring diagram for your system to confirm which boards are unit controller boards.

3.0 System Operation



Manual Override Switch

O - On Manual
X - Off
A - Automatic

Figure 3.2.1 Unit PCB Override Switch

Check all voltages supplied to the **LifeLine®** system to ensure they are the required value and phases needed by the control panel.

Open the inlet isolation valve on each compressor.

Open the outlet isolation valve on each compressor.

Open the receiver isolation valves.

Close the receiver bypass valve.

Close the DP/CO sensor isolation valve.

Close the inlet and outlet valves on **both** dryer/filter/regulator assemblies.

Close the outlet isolation valve.

Apply power to the system and turn the disconnect switches to "On".

Inside the control cabinet, switch one of the unit printed circuit boards from the manual override "Off" position to the bottom position, the default "Automatic" mode. Navigate to the Units screen by pressing on either of the unit status boxes on the main screen, see Figure 3.1.1. Make sure the Pump Mode on the display is "Off", see Figure 3.2.2.

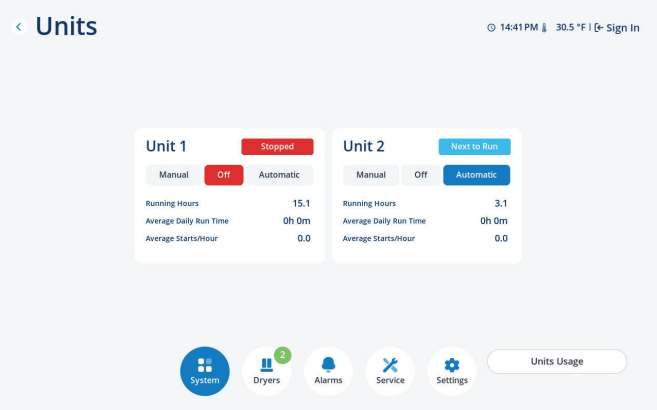


Figure 3.2.2 Unit Screen - Off Position

Check for correct direction of rotation of each compressor by pressing the "Rotate" button on the touchscreen display (found in the Units Rotation section of the Service screen) and observing rotation. See Figure 3.2.3. The Pump Mode for each compressor must be Off for the Rotation to function.

WARNING:

DO NOT RUN THE COMPRESSOR BACKWARDS!

3.0 System Operation

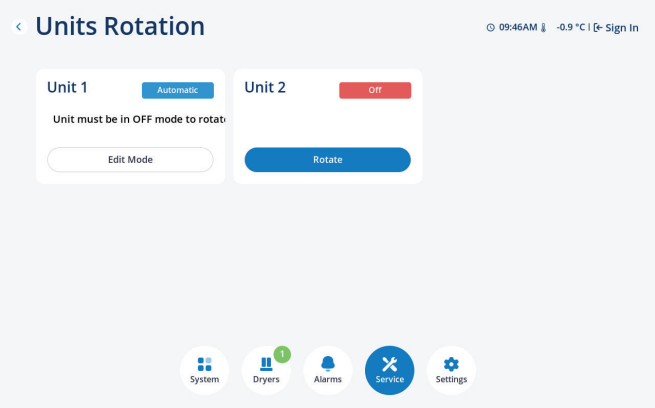


Figure 3.2.3 Unit Screen - Rotation

Rotation direction arrows are located on the belt guard (rotation is counter clockwise, facing the compressor pulley). Correct the rotation, if required, by switching the motor leads at the starter.

REMOVE POWER BEFORE WORKING ON ANY ELECTRICAL CONNECTIONS.

Repeat the process of switching the unit printed circuit boards from the manual override "Off" position to the default "Automatic" position and testing rotation.

Start each compressor by pressing "Automatic" on the touchscreen. See Figure 3.2.4. Allow each compressor module to operate for a short time (15 to 30 seconds) and check for any unusual noises or vibrations. Switch the compressor back to the "Off" position on the touchscreen.

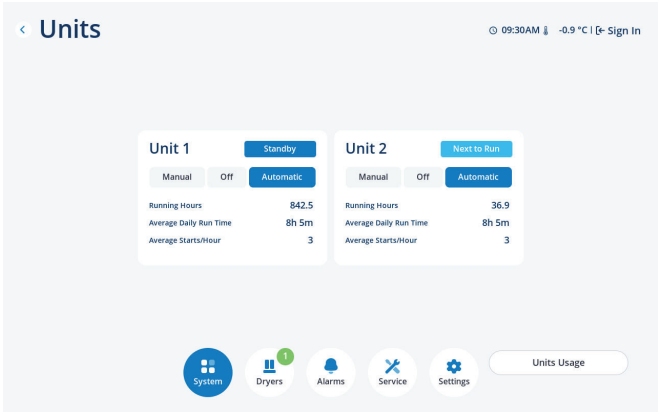


Figure 3.2.4 Unit Screen - Automatic Mode

After testing each compressor, if everything appears normal, put each compressor into the "Automatic" mode and allow each compressor to run until pressure builds in the air receiver. The lead compressor should stop first when the pressure reaches its set point on the controller. Push the "Reset all Alarms" button on the Alarms screen to reset the lag alarm. See Figure 3.2.5. The lag compressor should stop when the pressure reaches 110 psig. Check for any leaks in the piping up to the inlet isolation valves of the dryers. Repair leaks, if needed.

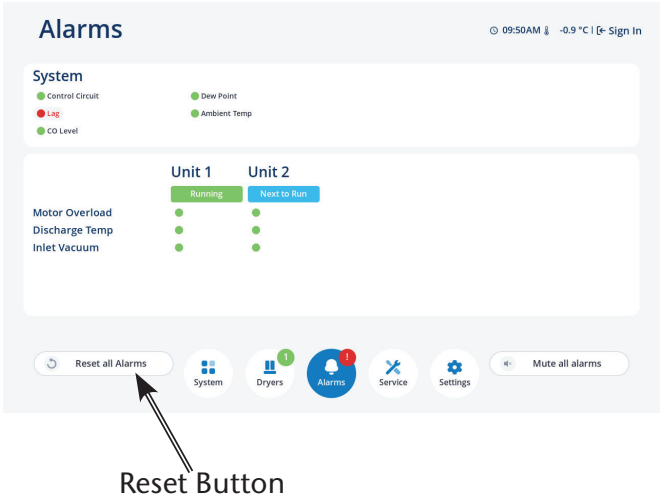


Figure 3.2.5 Main Screen - Reset Button

Open the inlet isolation valve on one of the dryers. Allow the pressure to build until the pressure

3.0 System Operation

reading on both gauges is about the same as the panel. Put the dryer in "Manual" mode. The pressure reading on one of the gauges should stay the same as the panel. The other gauge will normally read 0 psig, and airflow will be coming from the dryer purge exhaust muffler.

It is possible, but unlikely, that the outlet dew point may be low enough to activate the purge saving feature at start-up. If the purge saving feature is activated, then both dryer pressure gauges will be at the same pressure as the control panel and there will be no flow from the dryer purge exhaust muffler.

Check for air leaks.

Adjust the pressure regulator to the desired pressure setting.

Open the outlet isolation valve of the dryer/filter/regulator group. Check for air leaks.

Open the Dew Point/CO sensor isolation valve.

Slowly open the outlet isolation valve to allow air to flow out to the hospital.

Adjust the pressure regulator setting if necessary.

If everything appears normal, open the inlet isolation valve of the other dryer/filter/regulator assembly. If the dryer pressures appear as expected, open the dryer/filter/regulator outlet isolation valve. Close the other dryer/filter/regulator inlet and outlet isolation valves.

CAUTION: Only one dryer/filter/regulator group should be on line at a time.

Adjust the pressure regulator to the desired pressure.

Adjust the pressure regulator setting, if necessary.

The dryer should purge until the dew point monitor reading is below minus 10°C. If dew point is below minus 10°C; both pressure gauges of the on-line dryer will read the same.

Observe the system for normal operation. See Appendix A for more information.

3.3 Normal Start-up

Hospital shutoff valve - CLOSED.

Isolation (shutoff) valves - OPEN.

Receiver bypass valve - CLOSED.

One air dryer off line with valves CLOSED; the other air dryer on-line with the valves OPEN.

Main electrical power - ON.

Disconnect switches - ON.

Pump mode to "Automatic" on touchscreen display.

Pressure increasing to 110 psi.

Check that each compressor shuts down as it reaches its off-limit pressure.

Check that the mainline regulator is set for the desired output pressure and adjust if necessary.

Slowly OPEN the hospital shutoff valve.

NOTE: Opening the hospital valve may cause a pressure demand that brings the lag compressors back on-line. This is a normal sequence.

NOTE: The Medical Air system is now on-line and in the Normal Operating Mode (lead/lag operation).

To verify dryer operation, refer to Appendix A for desiccant dryers.

3.0 System Operation

3.4 Normal Operation

3.4.1 Controls

During normal operation, all pumps should be in "Automatic" mode to effectively control the system. The controls monitor the system pressure condition (see the table 3.4.1.1), starts and stops the compressors depending on changing pressure conditions, and automatically alternates the lead position between compressor units.

The control system sequences the pumps in number order (1, 2, 3, etc.). The control system only considers available units in the sequence. The number of available units is the number of compressors set to "Automatic" on-screen. The system will not count compressors set to "Manual" or "Off". Example: A triplex system has Units 1 and 3 set to "Automatic" and Unit 2 set to "Off". The control system will start/stop the compressors based on having only 2 units, and the sequence will be: 1, 3, 1, etc.

The control system will automatically start/stop the units at pre-defined system pressure values. The start/stop values vary depending on the number of available units and the min/max system pressure settings. The last available (lag) compressor will come on at the min system pressure. The last pump running will turn off at the max system pressure. The factory settings are described in Table 3.4.1.1

This control system operates according to a "first on/first off" principle instead of the more traditional "last on/first off" principle. With the "first on/first off" sequencing technique, starts and stops on the compressor are minimized. The "first on/first off" principle behaves as follows:

The control will signal the lead compressor to start when system pressure falls below the set point. Once the lead compressor has started, the next available pump will read "Next to Run." If the one compressor can carry the load, then the system pressure will rise to 110 psig. At this point, the control will turn off the lead compressor. When the system pressure drops again, the control will automatically sequence the lead role to the "Next to Run" compressor and will start it.

If one compressor cannot carry the load, the system pressure will continue to fall until it triggers the "Next to Run" compressor to start. Once the second compressor has started, the next available unit will read "Next to Run." This will continue until the system pressure stops falling or all available units have turned on. When the compressors can carry the load, the system pressure will rise towards 110 psig. The lead compressor will be the first to stop. When the lead compressor stops, the system will automatically sequence the lead role to the next available unit. If the system pressure continues to rise, the new lead pump will be the next to turn off. If the system pressure drops again, the "Next to Run" compressor will be the next to start.

If the lead compressor runs continuously in lead for more than 17 minutes, the control will automatically turn off the lead unit and sequence the lead role to the next available compressor. In this way, the control system attempts to evenly distribute the run time among all available compressors.

If during operation, the lag compressor is required to come on, the control will turn on the "Lag Alarm" (see Section 3.6).

Table 3.4.1.1 System Pressure Factory Settings

System Pressure Settings	Min	Max
Pressure Transducer	85 psig	110 psig
Backup Switch	80 psig	105 psig

NOTE: Factory settings may vary depending on system size and configuration.

For maintenance or other reasons, compressors can operate in "Manual" position. The compressor(s) in the "Manual" mode will start and stop depending on backup pressure switch conditions.

3.0 System Operation

NOTE: All compressors in the "Manual" mode will start and stop depending on backup pressure switch condition. These compressors will start/stop at the same time rather than the typical staggered start/stop.

3.4.2 Dryers

This fully automatic, heat-less type dryer alternately cycles the compressed process gas flow through two desiccant charged vessels where the gas' vaporous moisture content is adsorbed. One desiccant vessel is always on-line in a **drying cycle** throughout normal dryer operation. The opposite, off-line vessel is in a **regeneration cycle** for removal of the previously adsorbed moisture content, or in a purge saving cycle at line pressure.

When the dryer is in the "**Manual**" mode, the dryer will shift towers every 154 seconds on SAS 20HP PX - HX, and every 30 seconds on all other systems. At normal operating conditions, one tower is approximately 100 psig and the other tower is at 0 psig. Any condition other than this is not normal and will cause a high dew point condition. During tower changeover, the online chamber will exhaust, and the chamber that is regenerating (purging) will come to line pressure. There is a 34 second re-pressurization cycle on SAS 20HP PX - HX and a 5 second repressurization cycle on all other systems. If the dryer is in the "Manual" mode, the dryer will use 15%-23% of the system capacity to purge the dryer.

When the dryer is in the "**Automatic**" mode, the dew point monitor controls the dryer purge, and purging depends on the dew point condition. See Figure 3.4.2.1. When the dew point reading is above the setpoint of -10°C (14˚F), the dryer will function normally (one tower at system pressure, one tower at 0 psig). When the dew point is below the setpoint of -10°C (14˚F), the purge valve will close. In this condition, both towers will be approximately 100 psig (dependent upon tank pressure) and the dryer will not shift towers until the dew point is above -10°C (14˚F).

Dryer 1 is in Automatic mode, Dryer 2 is in Off position

Figure 3.4.2.1 Dryers Screen

3.5 Normal Shutdown

Dryer in Automatic Mode

Disconnect switches-OFF

Main power source-OFF

Hospital shutoff valve-CLOSED

Air receiver manual tank drain-OPEN

Pressure gauge decreasing to 0 psi (0 kPa)

Close air receiver manual tank drain when pressure decreases to 0 psi (0 kPa)

3.0 System Operation

3.6 Emergency Shutdown / Alarms

The following conditions may arise during operation. Alarm conditions will be labelled "Alarm" and shutdown conditions will be labelled "Shutdown".

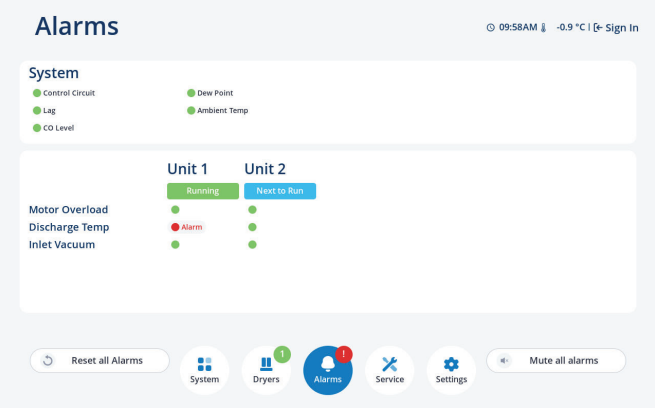
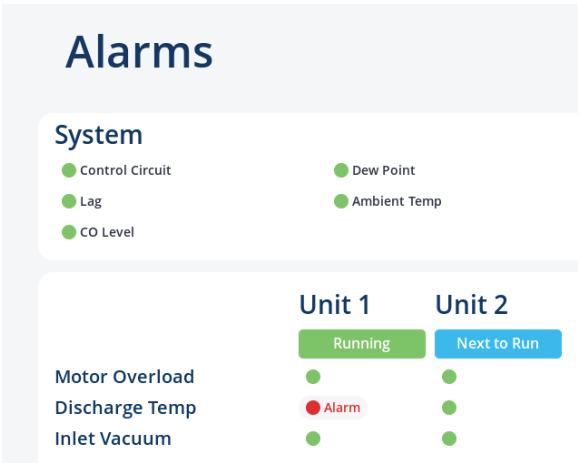


Figure 3.6.1 Alarms Screen

3.6.1 Unit Shutdowns/Alarms



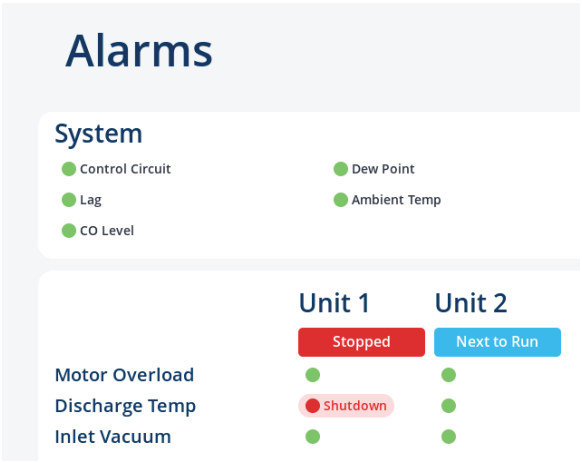


Figure 3.6.1.1&2 Alarms Screen - Unit Alarm and Shutdown

Motor Overload Shutdown - This shutdown will activate if the motor current draw exceeds the set limit. This will shut down the compressor in question and will not re-start until the reset button on the starter inside the main control cabinet is reset and "Reset all Alarms" is pressed on the control panel display. See "Compressor shuts off unexpectedly" in the Troubleshooting Section 4.0.

Discharge Temperature Shutdown - This shutdown will activate if the outlet air temperature exceeds the set limit. This will shut down the compressor in question and will not re-start until "Reset all Alarms" is pressed on the control panel. Before allowing the unit to re-start, the condition should be checked (see "Discharge temperature alarm" in the Troubleshooting Section 4.0). Even after resetting the alarm and putting the compressor in "Automatic" mode, the unit may not re-start, depending on system sequencing and system pressure.

Discharge Temperature Alarm - This alarm will activate if the outlet air temperature exceeds the set point. This will not shut down the compressor in question but instead is a warning that a shutdown is likely to occur. The condition should be checked immediately (see "Discharge temperature alarm" in the Troubleshooting Section 4.0) to avoid a compressor shutdown.

Inlet Vacuum Shutdown - This shutdown will activate if the vacuum level on the inlet piping exceeds the set limit. This will shut down the compressor in question and will not re-start until "Reset all Alarms" is pressed on the control panel. Before allowing the unit to re-start, the condition should be checked (see "Compressor shuts off unexpectedly" or "High inlet vacuum alarm" in the Troubleshooting Section 4.0). Even after resetting the alarm and putting the compressor in "Automatic" mode, the unit may not re-start, depending on system sequencing and system pressure.

3.6.2 System Alarms

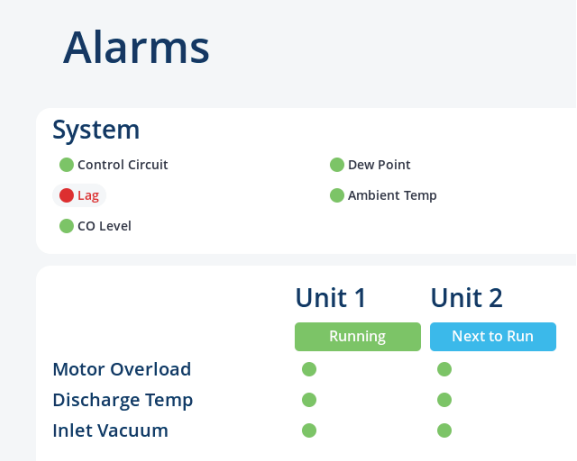


Figure 3.6.2.1 Alarms Screen

Control Circuit Alarm - This alarm will activate if communication between any of the boards in the control circuit is disrupted. This will not shut down the compressor in question but instead is a notification that there is a loss of communication between printed circuit boards within the control panel. See Appendix D on Control System for troubleshooting.

Lag Alarm - This alarm will activate if the last available unit activates bringing the total number of available units remaining to zero. This alarm will activate if the last available compressor unit comes on. (See Section 3.4 for normal operation) To silence the alarm, press the "Mute all alarms" button. In the event the lag alarm is persistent, check to see if any leaks or valves are open downstream or reduce the system load.

CO Level Alarm - This alarm will activate if the detected CO level exceeds the set point. This alarm will activate if the CO level exceeds the 10 ppm set point. To silence the alarm, press the "Mute all alarms" button. See Appendix C, section C.10 Troubleshooting for possible causes and solutions. The alarm remains latched until the alarm condition is reset by the operator.

Dew Point Alarm - This alarm will activate if the dew point temperature rises above the set point. This alarm will activate if the dew point exceeds the alarm setting. To silence the alarm, press the "Mute all alarms" button. If the situation does not correct itself through normal dryer use, see Appendix B, section B.7 Troubleshooting for possible causes and solutions. The alarm remains latched until the alarm condition is reset by the operator.

Ambient Temperature Alarm - This alarm will activate if the ambient temperature outside the control cabinet rises above the set point. This alarm will activate when the temperature in the room exceeds the set point. The audible alarm will not sound but the touchscreen will show an active alarm and record it in the event log. The alarm remains latched until the alarm condition is reset by the operator.

4.0 Troubleshooting

Problem	Possible Causes	Solution
Power failure	Main power disconnected	Turn on main power
		Change power supply phase on incoming power
	Power failure	Restore power
	Main fuse blown	Replace fuse
	Fuse blown in control circuit	Replace fuse
Failure to start	Overload tripped on starter	Reset & check for system overload
	High temperature sensor activated	Allow unit to cool; reset alarm & check for over temperature condition
	Pressure sensor open	Adjust or replace sensor
	Loose or faulty connection	Check & tighten all wire connections
Compressor shuts off unexpectedly	Overload tripped on starter	Reset & check for system overload
	Pressure sensor failure	Replace
	High inlet vacuum switch activated	Check for dirty/clogged inlet filter
		Check for inlet piping restriction
	High temperature sensor activated	Allow unit to cool; reset alarm & check for over temperature condition
	Broken V-belt	Replace
Discharge temperature alarm	High temperature sensor activated	Allow unit to cool; reset alarm & check for over temperature condition
	Discharge temperature sensor disconnected	Check temperature sensor cable
Motor overheating	Low voltage	Check for proper supply voltage
	V-belt too tight	Adjust belt tension
	Defective motor	Contact **BeaconMedæs**
High inlet vacuum alarm	Inlet piping restriction	Check inlet piping
	Clogged inlet filter	Replace inlet filter

4.0 Troubleshooting

Problem	Possible Causes	Solution
Low system pressure	System piping leaks	Repair leaks
	Defective pressure sensor	Replace sensor
	Aftercooler drain solenoid stuck open	Check electrical connections
	Belts slipping	Adjust tension
	Intake filter clogged	Clean or replace
Compressor cycles too often	System undersized	Contact **BeaconMedæs**
	Faulty pressure sensor	Replace sensor
	System piping leaks	Repair leaks
	Check valve or line to receiver is leaking or plugged	Replace if necessary
	Both dryers on line	Valve off one dryer
	Water in air receiver	Drain air receiver
Compressor won't shut off	Pressure sensor faulty	Adjust or replace
Excessive belt wear	Belt tension	Adjust tension
	Belt alignment	Realign compressor & motor sheaves
Abnormal noise	Mounting bolts loose	Tighten bolts
	Belt tension	Adjust tensions

NOTE: For air dryer troubleshooting, see Appendix A.

5.0 Maintenance

5.1 Maintenance Schedule

WARNING:

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

Release all pressure 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.

Item	Frequency	Action
Check condensate in tank	Daily	Open manual drain valve, check auto drain
Check operation of safety valve	Weekly	Manually release pressure
Check inlet air filter(s)	Weekly	Inspect and clean or replace
Check nuts, bolts, fittings, etc.	Monthly	Inspect and tighten
Check belt tension	Monthly	Inspect and tighten or replace
Check flow through orifice of dew point sensor	Monthly	Check for flow blockage
Rotate dryers	Monthly	Adjust valves to rotate dryers
Calibrate CO transmitter	Every 6 months*	Purchase *Service Kit* See Appendix C
Check dew point sensor accuracy	Yearly	Verify dew point sensor accuracy (contact **BeaconMedæs**)
Replace compressor inlet filters, v-belts, and dryer pre-filters & afterfilters	Yearly	Purchase *1-Year System Basic Service Kit* Purchase *1-Year Unit Basic Service Kit (1 per unit)*
Lubricate motor	Yearly	See Section 6.3
Zero-loss Drain Valve	Yearly	**Rebuild** the zero-loss drain valve. (see Section 5.2.11)
Replace DP and CO transmitters	Every 2 years	Purchase *2-Year System Sensor Kits* See Appendix B and C
Replace dryer desiccant	Every 3 years	Purchase *3-Year Dryer Extended Service Kit* See Appendix A
Perform 3-Year Unit Extended Service	Every 3 years	Purchase *3-Year Unit Extended Service Kit*
Grease orbiting bearings** and clean compressor	Varies depending on Hp and ambient temperature conditions	Contact **BeaconMedæs** Technical Support department.
Replace compressor tip seals and grease pin crank bearings**		

* Recalibration of the CO transmitter is required prior to 6 months if any of the following conditions exist:

- Last Calibration date cannot be verified or is unknown
- Sensor Overexposed to target or interfering gases
- Instrument has been subjected to misuse or abuse
- Sensor have been newly replaced or instrument has received any type of servicing
- Whenever sensor response is in question

** An authorized BeaconMedaes Service Technician should perform compressor lubrication and tip seals replacement. Please contact BeaconMedæs Customer Service department at 1-800-463-3427 prior to the maintenance interval.

5.0 Maintenance

5.2 Service Kits

Note: The service kits listed in this section are standard for NFPA 99 medical air systems. In the case of special system configurations, locate service kit part numbers in the Maintenance section of the Main Screen on the panel controls. See Appendix D Controls.

5.2.1 6-Month CO Service Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4004 63	KIT - CO Calibration	1	All Systems	20 PPM CO Gas Bottle 0 PPM CO Gas Bottle 0.5 LPM Regulator #ABL-4021 Nylon Tubing Storage Case

5.2.2 1-Year System Basic Service Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 29	KIT - Scroll Basic Size A	1	2 - 7.5 Hp Duplex	(2) Dryer inlet filters (2) Dryer discharge filters (2) Inlet filter float drains (1) Sight glass tube (1) 3/8" Polyproplyene ball (1) 3/8" In-line check valve (1) 1/2" MNPT inline filter 90 micron, sight glass
4107 4000 30	KIT - Scroll Basic Size B	1	10 - 15 Hp Duplex 5 - 7.5 Hp Triplex 5 Hp Tpx-Exp & Qplex 5 - 7.5 Hp Dpx-Exp	
4107 4000 31	KIT - Scroll Basic Size C	1	20 Hp Duplex 10 Hp Triplex 7.5 Hp Quadruplex 10 Hp Dpx-Exp 7.5 Hp Tpx-Exp	
4107 4000 32	KIT - Scroll Basic Size D	1	15 Hp Triplex 10 Hp Quadruplex 15 Hp Dpx-Exp 10 Hp Tpx-Exp	
4107 4000 33	KIT - Scroll Basic Size E	1	20 Hp Triplex 15 - 20 Hp Quadruplex 15 Hp Pentaplex 15 Hp Hexaplex 15 Hp Tpx-Exp 15 Hp Qpx-Exp 15 Hp Ppx-Exp	
4107 4019 59	KIT - Scroll Basic Size F	1	20 Hp Pentaplex 20 Hp Hexaplex	Same as above plus: (2) Purge mufflers

Note: 1-Year Unit Basic Service Kits required in addition to the above 1-Year System Basic Service Kit.

5.0 Maintenance

5.2.2 1-Year System Basic Service Kits (Next Gen Filters)

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4022 07	KIT - Scroll Basic Size A	1	2 - 7.5 Hp Duplex	(2) Dryer inlet filters (2) Dryer discharge filters (2) Inlet filter float drains (1) Sight glass tube (1) 3/8" Polyproplyene ball (1) 3/8" In-line check valve (1) 1/2" MNPT inline filter 90 micron, sight glass
4107 4022 08	KIT - Scroll Basic Size B	1	10 - 15 Hp Duplex 5 - 7.5 Hp Triplex 5 Hp Tpx-Exp & Qplex 5 - 7.5 Hp Dpx-Exp	
4107 4022 09	KIT - Scroll Basic Size C	1	20 Hp Duplex 10 Hp Triplex 7.5 Hp Quadruplex 10 Hp Dpx-Exp 7.5 Hp Tpx-Exp	
4107 4022 10	KIT - Scroll Basic Size D/E	1	15 Hp Triplex 10 Hp Quadruplex 15 Hp Dpx-Exp 10 Hp Tpx-Exp 20 Hp Triplex 15 - 20 Hp Quadruplex 15 Hp Pentaplex 15 Hp Hexaplex 15 Hp Tpx-Exp 15 Hp Qpx-Exp 15 Hp Ppx-Exp	
4107 4022 11	KIT - Scroll Basic Size F	1	20 Hp Pentaplex 20 Hp Hexaplex	Same as above plus: (2) Purge mufflers

Note: 1-Year Unit Basic Service Kits required in addition to the above 1-Year System Basic Service Kit.

Note:

Next Gen FIlters can be identified by an offset gauge / offset popup indicator on the filter body. These filters should use the kits listed above. If uncertain, please reference the service kit part number listed in the Maintenance section of the control panel of the system.

5.0 Maintenance

5.2.3 1-Year Unit Basic Service Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 40	2 Hp Scroll Basic Compressor Unit Kit	1 per unit	2 Hp 60 Hz	(1) Main air inlet filter (1) Compressor v-belts
4107 4000 46			2 Hp 50 Hz	
4107 4000 41	3 Hp Scroll Basic Compressor Unit Kit	1 per unit	3 Hp 60 Hz	
4107 4000 47			3 Hp 50 Hz	
4107 4000 42	5 Hp Scroll Basic Compressor Unit Kit	1 per unit	5 Hp 60 Hz	(1) Main air inlet filter (2) Compressor v-belts
4107 4000 48			5 Hp 50 Hz	
4107 4000 43	7.5 Hp Scroll Basic Compressor Unit Kit	1 per unit	7.5 Hp 60 Hz	
4107 4000 49			7.5 Hp 50 Hz	
4107 4000 44	10 Hp Scroll Basic Compressor Unit Kit	1 per unit	10 Hp 60 Hz	(2) Main air inlet filters (4) Compressor v-belts
4107 4000 50			10 Hp 50 Hz	
4107 4000 45	15 Hp Scroll Basic Compressor Unit Kit	1 per unit	15 Hp 60 Hz	
4107 4000 51			15 Hp 50 Hz	
4107 4019 78	20 Hp Scroll Basic Compressor Unit Kit	1 per unit	20 Hp 60 Hz	
4107 4019 79			20 Hp 50 Hz	

Note: 1-Year System Basic Service Kit required in addition to the above 1-Year Unit Basic Service Kits. (1) Unit Kit is required for each compressor unit.

5.2.4 2-Year System Sensor Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 59	Dew Point / CO Sensors	1	All Systems	(1) Dew Point sensor (1) CO sensor

5.2.5 3-Year Dryer Extended Service Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 34	KIT - Scroll Extended Size A	1	2 - 7.5 Hp Duplex	(2) 6 lb. bags desiccant (2) ISO2 dryer service kit (2) Dryer purge muffler
4107 4000 35	KIT - Scroll Extended Size B	1	10 - 15 Hp Duplex 5 - 7.5 Hp Triplex 5 Hp Quadruplex 5 - 7.5 Hp Dpx-Exp 5 Hp Tpx-Exp	(3) 6 lb. bags desiccant (2) ISO2 dryer service kit (2) Dryer purge muffler
4107 4000 36	KIT - Scroll Extended Size C	1	20 Hp Duplex 10 Hp Triplex 7.5 Hp Quadruplex 10 Hp Dpx-Exp 7.5 Hp Tpx-Exp	(4) 6 lb. bags desiccant (2) ISO3 dryer service kit (2) Dryer purge muffler

5.0 Maintenance

5.2.5 3-Year Dryer Extended Service Kits (continued)

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 37	KIT - Scroll Extended Size D	1	15 Hp Triplex 10 Hp Quadruplex 15 Hp Dpx-Exp 10 Hp Tpx-Exp	(6) 6 lb. bags desiccant (2) ISO3 dryer service kit (2) Dryer purge muffler
4107 4000 38	KIT - Scroll Extended Size E	1	15 Hp Quadruplex 15 Hp Tpx-Exp	(9) 6 lb. bags desiccant (2) ISO4 dryer service kit (2) Dryer purge muffler
4107 4000 39	KIT - Scroll Extended Size F	1	20 Hp Triplex 20 Hp Quadruplex 15 Hp Pentaplex 15 Hp Hexaplex 15 Hp Qpx-Exp 15 Hp Ppx-Exp	(11) 6 lb. bags desiccant (2) ISO4 dryer service kit (2) Dryer purge muffler

Note: Each dryer service kit contains: (2) o-rings for canister bases, (2) o-rings for tower mounting flanges, (2) check valves for dryer manifold block, and (2) o-rings for check valves.

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4019 80	KIT - System Scroll PD dryer Extended Size E	1	20 Hp Pentaplex 20 Hp Hexaplex	(2) PD0300 dryer desiccant service kit (2) PD0220-PD0300 dryer purge valve service kit (2) PD0220-PD0300 dryer shuttle valve service kit (2) Dryer outlet relief valve

Note: 3-year Dryer Extended Service Kit does not include 1-Year System Basic Service Kit. This must be purchased separately.

5.2.6 3-Year Unit Extended Service Kits

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4021 45	Scroll Extended Compressor Unit Kit	1 per unit	2 - 7.5 Hp Units	(1) 1/8" Pressure relief valve (1) Check valve (aftercooler inlet) (1) Check valve (discharge block) (1) O-ring
4107 4021 46	Scroll Extended Compressor Unit Kit	1 per unit	10 - 15 Hp Units	(2) 1/8" Pressure relief valves (2) Check valves (aftercooler inlet) (1) Check valve (discharge block) (1) O-ring (1) 1/4" Inline filter 40 micron
4107 4019 81	Scroll Extended Compressor Unit Kit	1 per unit	20 Hp Units	

Note: 3-Year Unit Extended Service Kits do not include 1-Year System Basic Service Kit or 1-Year Unit Basic Service Kits. These must be purchased in addition to the 3-Year Dryer Extended Service Kit and the 3-Year Unit Extended Service Kit.

5.0 Maintenance

5.2.7 2 - 3 Hp Service Intervals[2] OR with Tip Seal Kits used to support all systems

IMPORTANT NOTE:

Greasing of the bearings of the compressor element must be done with special grease and grease gun sold by BeaconMedaes below, and according to a specific procedure. Contact BeaconMedaes for service.

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
2903 0139 00	Grease Pump Kit	1	2-15 Hp Systems	Grease gun Adaptors
2892 6100 20	Grease Cartridge	1	2-15 Hp Systems	Grease cartridge
1630 0311 00	Extension Nozzle for grease pump[1]	1	7.5 Hp Units 15 Hp Units	Extension nozzle
4107 4019 42	Hitachi Grease Gun	1	20 Hp Systems	Grease gun

Notes:

1. The Grease Pump Kit does not include the Grease Cartridge or the extension nozzle for 7.5 Hp and 15 Hp units. These items must be ordered separately.
2. 2 - 3 Hp Service Intervals: are 5,000 hours **OR** every two (2) years, whichever comes first, for the orbiting bearings compressor lubrication and 10,000 hours **OR** every four (4) years, whichever comes first, for the pin crank bearings.
3. In high ambient conditions, the bearings must be greased more frequently: for every 9°F increase above 86°F, the maintenance interval should be reduced by 30%.

5.2.8 2 - 3 Hp Only: 10,000 Hours or Every Four (4) Years Compressor Tip Seal Kits[1]

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 4000 54	Kit - Tip seal 2 - 3 Hp	1 per unit	2 - 3 Hp Units	Each kit contains: Element seals Dust seal Round tube backer seal Outlet pipe kit

Notes:

1. Service interval is 10,000 hours or every four (4) years, whichever comes first.
2. An authorized BeaconMedæs Service Technician should perform compressor lubrication and tip seals replacement. Please contact BeaconMedæs Customer Service Department at 1-800-463-3427 prior to the maintenance interval to schedule the maintenance.

5.0 Maintenance

5.2.9 5 - 15 Hp Only Service Intervals*

PART / KIT NUMBER	QTY	ACTION	AT EACH 10,000 RUNNING HOURS OR EVERY 4-YEARS
5 Hp 4107 4018 81	1 per unit	Tip Seal Kit	Replace
		Orbit bearing	Regrease: 3.9 cm^3 (6 strokes**)
10 Hp 4107 4018 82	1 per unit	Pincrank bearing rotor side	Regrease: 2 cm^3 (3 strokes**)
7.5 Hp 4107 4000 56	1 per unit	Cooling duct system	Clean
		Rotor fins	Clean
15 Hp 4107 4000 58	1 per unit	Stator fins	Clean

* **Intervals:** Cleaning of the parts guiding the cooling air and replacement of the tipseals should be performed during every service interval.

** **Strokes:** Number of strokes valid with recommended purchased grease pump from Grease Pump Kit 2903 0139 00 and Grease Cartridge 2892 6100 20

5.2.10 20 Hp Only Service Intervals*

PART / KIT NUMBER	QTY	ACTION	AT EACH 10,000 RUNNING HOURS OR EVERY 4-YEARS
20 Hp 4107 4019 82	1 per unit	Tip Seal Kit	Replace
		Orbit bearing	Regrease**
		Pincrank bearing rotor side	Regrease**
		Cooling duct system	Clean
		Rotor fins	Clean
		Stator fins	Clean

* **Intervals:** Cleaning of the parts guiding the cooling air and replacement of the tipseals should be performed during every service interval.

** Contact **BeaconMedaes** customer service for detailed information about maintenance procedure.

5.0 Maintenance

5.2.11 Zero Loss Drain

UFM-T05

UFM-D05

LD101

There are three different automatic drains in use with the Scroll Medical Air Systems. The UFM-T05 (4107 6526 26) and UFM-D05 (4107 6532 49) are no longer available, but service kits are available for routine maintenance. The LD101 (4107 6563 42) is the replacement model. If the medical air system has the UFM-T05 or UFM-D05 drain assembly on it and the drain needs to be replaced completely, it is necessary to purchase the Replacement Drain Valve Kit with the new model drain

KIT NUMBER	DESCRIPTION	QTY	WHERE USED	CONTENTS
4107 6525 11	Kit - Zero Loss Drain Valve Service Kit - UFM-T05	1	Systems with UFM-T05 Drain	(1) Diaphragm (1) Anchor Plate (2) Springs (3) O-rings
4107 4017 85	Zero Loss Drain Valve Service Kit for UFM-D05 (included in System Basic Service Kit)	1	Systems with UFM-D05 Drain	(1) UFM-D05 Drain Valve Service Module
4107 4019 65	Zero Loss Drain Valve Service Kit - LD101 Compact	1	Systems with LD101 Compact Drain Valve	(1) Filter cap (1) Filter cap O-ring (1) Double mesh metallic filter (1) Valve assembly O-ring (1) Solenoid valve spring (1) Solenoid valve pilot (1) Diaphragm (1) Flow limiter (1) Flow limiter plastic ring
4107 4019 64	Zero Loss Drain Valve Replacement Kit	1		(1) Drain valve, LD101 w/cord (1) Bracket, zero loss drain (1) Elbow, swivel (1) Adapter, tube

Note: For service instructions on the LD101 Compact Zero-loss Drain Valve, see Section 6.5.

6.0 Inspection/Replacement Procedures

6.1 V-Belts

Narrow type V-belts are used for this unit. Refer to Table 6-1a & 6-1b for the correct size.

6.1.1 Tension Check

Table 6.1.1.1 Belt Size and Tension (for new belts) on systems operating at 60 Hz

Hp	Belt Part Number	No. of Belts	Tensioning		
			Defl. (in)	Force New (lbs)	Force Norm (lbs)
2	4107 6548 18	1	1/4"	6	5
3	4107 6562 18	1	1/4"	6	5
5	4107 6562 18	2	7/32"	6	5
7.5	4107 6562 19	2	1/4"	6	5
10	4107 6562 20	4	9/32"	6	5
15	4107 6505 47	4	9/32"	6	5
20	4107 6564 89	4	9/32"	7	6

Table 6.1.1.2 Belt Size and Tension (for new belts) on systems operating at 50 Hz

Hp	Belt Part Number	No. of Belts	Tensioning		
			Defl. (in)	Force New (lbs)	Force Norm (lbs)
2	4107 6524 39	1	1/4"	6	5
3	4107 6524 41	1	1/4"	6	5
5	4107 6524 41	2	1/4"	6	5
7.5	4107 6524 43	2	1/4"	6	5
10	4107 6544 20	4	9/32"	6	5
15	4107 6524 66	4	9/32"	6	5
20	4107 6565 33	4	9/32"	7	6

WARNING:

Before starting any maintenance procedures, disconnect all power to the package.

Never perform any maintenance functions while the unit is in operation.

Release all pressure from the package before removing, loosening, or servicing any covers, guards, fittings, connections, or other devices.

Check the belt tension monthly. Disconnect the main power and remove the beltguard. As shown in the illustration below, Figure 6.1.1.1, deflect each V-belt at the center of the drive span with a spring balance or tension meter at the tension force of Table 6-1. Then check that the average deflections at the proper tension force are approximately the same values as shown in Table 6-1.

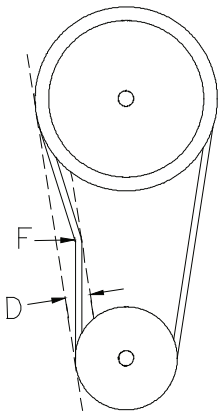


Figure 6.1.1.1 Belt Tension

6.1.2 V-Belt Tension Adjustment

If necessary, adjust the V-belts until the average deflections are within the values shown in Table 6-1.

6.0 Inspection/Replacement Procedures

To tighten the V-belts:

1. Remove the beltguard.
2. Loosen 4 bolts holding motor.
3. Adjust the two belt tensioning adjustment rods on the sliding motor base until the proper tension and alignment is obtained. To check for correct alignment, place a straight edge on the faces of the two sheaves. Proper alignment is obtained when all the gaps between the straight edge and the sheaves are minimized and less than 1/8".
4. Check the belt tension again and make sure the tension is similar to the values listed in Table 6-1.
5. Replace the beltguard **before** operating the machine.

CAUTION: IF THE COMPRESSOR IS OPERATED WITH LOOSE V-BELTS OR IMPROPER SHEAVE ALIGNMENT, THE LIFE OF THE V-BELTS IS SHORTENED. EXCESSIVE TENSION CAN BREAK THE SHAFT OR REDUCE BEARING LIFE. BE SURE TO MAINTAIN PROPER V-BELT TENSION AND ALIGNMENT.

6.1.3 Changing the V-Belts

V-belts should be changed yearly under normal operating conditions. If any damage is found, V-belts should be replaced at once. To change the V-belts call the nearest **Lifeline®** distributor or follow the procedures described below:

To change the belts:

Remove the old belts:

1. Remove the beltguard.
2. Loosen the locking bolts securing the motor base.
3. Adjust the belt tensioning adjustment rods on the motor base to loosen tension on belts.
4. Remove the old belt(s).

Check and clean:

1. Check and clean all of the grooves of both the motor and compressor sheaves.
2. Check the tightness of bolts on the sheave bushings.

Installation of new belts:

1. Confirm the belt type and length.
2. Place the belt(s) into the grooves of both sheaves.
3. Adjust the belt tensioning adjusting rods on the motor base until the proper tension and alignment is obtained. To check for correct alignment, place a straight edge on the faces of the two sheaves. Proper alignment is obtained when all the gaps between the straight edge and the sheaves are minimized and less than 1/8".
4. Check the belt tension again and make sure the tension is similar to the values listed in Table 6-1.
5. Replace the beltguards **before** operating the machine.

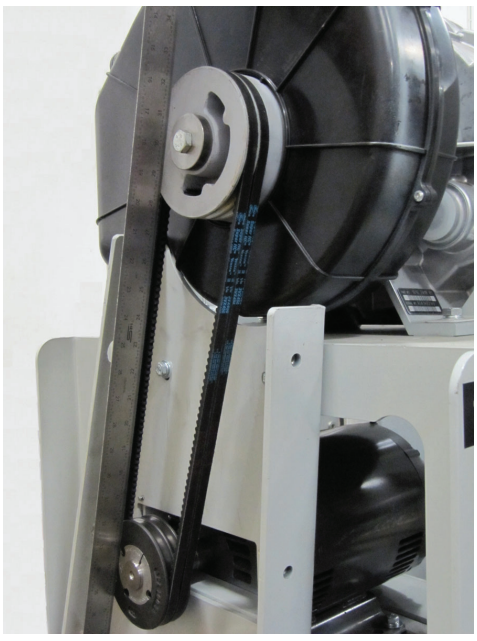


Figure 6.1.3.1 Belt Alignment - Straight Edge

6.0 Inspection/Replacement Procedures

6.2 Air Intake Filter

WARNING:

Before starting any maintenance procedures, disconnect all power to the package.

Release all pressure 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.

The air intake filter element should be changed annually under normal operating conditions. To change the filter:

1. Turn off the compressor being serviced and lock open the appropriate disconnect switches.
2. Close intake isolation valve.
3. Remove the protective cover by loosening the wing nut (if applicable) and latches.
4. Remove the element.
5. Clean inside of housing
6. Insert a new element (note orientation of the element).
7. Replace protective cover and tighten wing nut (if applicable) and latches.
8. Open intake isolation valve.
9. Turn on the compressor.

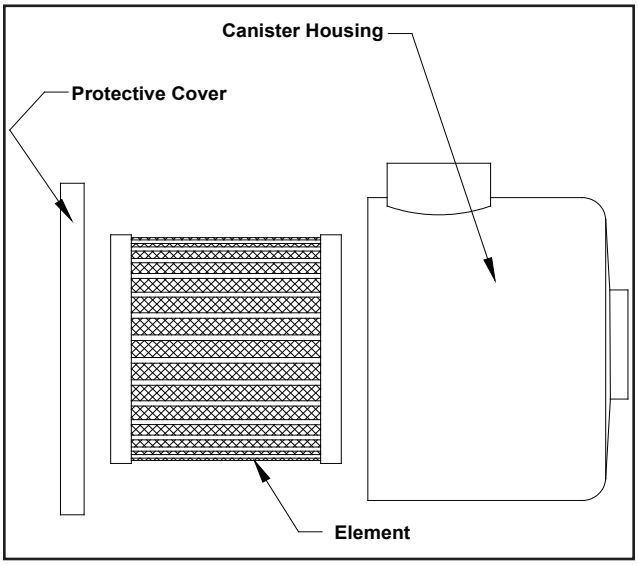


Figure 6.2.1 Air Intake Filter

6.3 Motor Lubrication

6.3.1 Lubrication Information

This a ball or roller bearing motor. The bearings have been lubricated at the factory. Motors are pregreased. New motors that have been stored for a year or more should be relubricated.

Table 6.3.1.1 Motor Lubrication Information

Hp	Weight of Grease per Bearing, Ounce (Grams	Volume of Grease (in^3)	Total Grease Weight	Interval (Hours)
2	.15 (3.9)	0.2	0.3	Yearly
3	.15 (3.9)	0.2	0.3	Yearly
5	.19 (5.0)	0.3	0.38	Yearly
7.5	.19 (5.0)	0.3	0.38	Yearly
10	.3 (8.4)	0.6	0.6	Yearly
15	.3 (8.4)	0.6	0.6	Yearly
20	.47 (12.5)	0.7	0.94	Yearly

Note: See 5.0 Maintenance for ordering grease.

6.3.2 Lubrication Procedure

6.0 Inspection/Replacement Procedures

WARNING:

Before starting any maintenance procedures, disconnect all power to the package.

WARNING:

Surface temperatures of motor enclosures may reach temperatures which can cause discomfort or injury. Protection should be used to protect against accidental contact with hot surfaces. Failure to observe this precaution could result in bodily injury.

Never perform any maintenance functions while the unit is in operation.

Keep grease clean. Mixing dissimilar grease is not recommended.

1. Relubrication with the shaft stationary and a warm motor is recommended (at less than 80°C).

2. Remove all dirt and wipe clean the grease fittings and drains.

3. Apply grease gun to fitting. Too much grease or injecting grease too quickly can cause premature bearing failure. Slowly apply the recommended amount of grease, taking 1 minute or so to apply (See Table 6-3).

6.4 Liquid Level Sight Glass

The sight glass is located lower than the receiver tank and it will show approximately 1/2 full when the receiver is empty. This is a normal condition. See Figure 6.4.1.

Figure 6.4.1 Sight Glass

6.0 Inspection/Replacement Procedures

6.5 Zero Loss Electronic Drain

6.5.1 Isolation of Zero Loss Electronic Drain

Before servicing the Zero Loss Electronic Drain, the drain must be isolated in three locations. The following valves must be closed in the following sequence:

1. Receiver drain valve
2. Top knob on manual drain sight glass
3. Valve after the manual drain sight glass

See Figure 6.5.1.1 for valve locations.

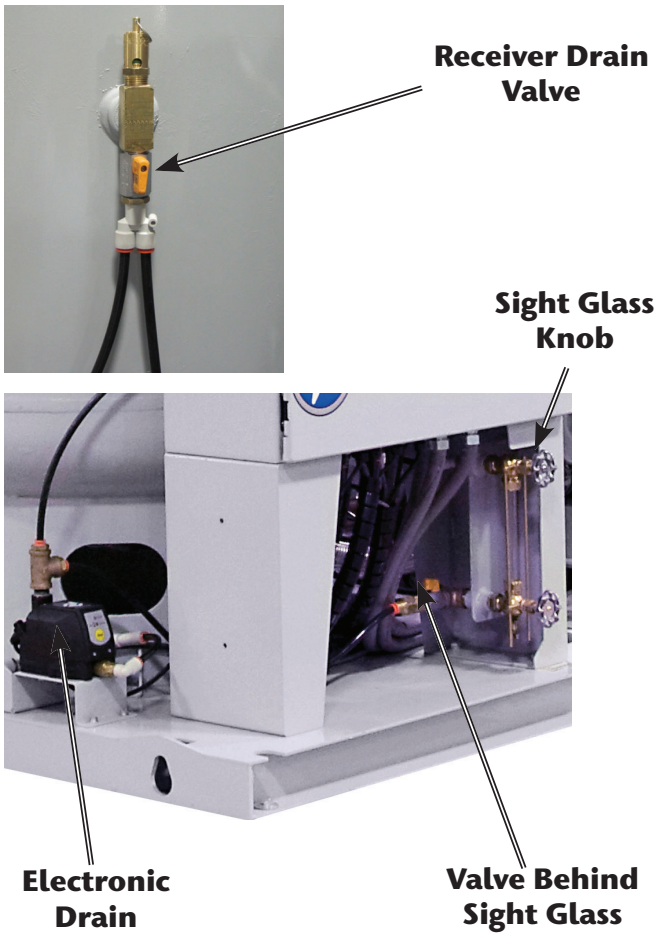


Figure 6.5.1.1 Electronic Drain Isolation Valves

To bring the electronic drain back into operation, open each of the valves in the following sequence:

1. Valve after the manual drain sight glass
2. Top knob on manual drain sight glass
3. Receiver drain valve

Component	Maintenance activity	Every day	Every 12 months. (*)
Condensate Drain	Visual check and function verification.	X	
Integrated filter	Cleaning and/or substitution of the filter.	Periodically. At least once a month.	
Condensate Drain	Replace worn out components, subject to wear and tear, and clean condensate drain.		X
(*) = in the event of applications that are particularly heavy, dirty, and poorly ventilated, it should also be foreseen that this frequency is doubled.			

6.5.2 Recommended Maintenance

Visual check and function verification:

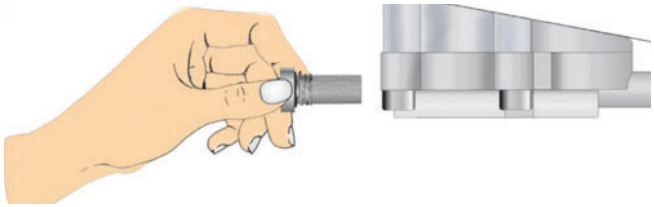
- Inspect the condensate drain for external damages and leaks.
- Check the operating state of the condensate drain by means of the LED displays on the control panel.
- Push the TEST button in order to verify the operating status of the discharge and the

6.0 Inspection/Replacement Procedures

correct operation of the valve.

Cleaning and/or substitution of the filter:

- Unscrew the cap by means of a 17 mm wrench.
- Clean the filter, if necessary, replace it.
- First replace the cleaned filter back in its seat on the cap.



- Screw in the lockable cap with the filter paying attention to not damage the plastic threading of the valve body.

Replace worn out components, subject to wear and tear, and clean the condensate drain:

- Open the condensate drain, unscrewing the 4 M6x25 screws (pos. 12) as well as the M3x10 screws (pos. 13) and remove the valve assembly (pos. 11).
- Unscrew the filter cap (pos. 04) and extract the double mesh metallic filter (pos. 06).
- Remove the O-Ring gasket of the filter cap (pos. 05), O-Ring gasket of the valve assembly (pos. 07), the solenoid valve spring (pos. 08), the solenoid valve pilot (pos. 09) and the diaphragm (pos. 10).
- Clean the internal housing of the valve assembly and the aluminum tank.
- If necessary, clean the level sensor rod and its float, paying however particular attention to not damage it. Do not bend it and do not use it as a lever. It contains electronic material. Mechanical stresses, including moderate ones, can give rise to irreparable malfunctions.
- Insert the new O-Ring of the filter cap, place the new filter on the cap and close on the valve assembly paying attention to correctly screw it.
- Insert the new valve assembly O-Ring.
- Insert the valve components in the following order: spring and pilot in its spool, first insert the spring (insert the side without plastic of the pilot inside the spring) and lastly the diaphragm with its plastic guide. Ensure that diaphragm is correctly positioned.
- Screw the valve assembly onto the condensate drain, tightening the 8 screws present with the following tightening torque values: M6 = 8 Nm +2/-1 Nm, M3 = 0,4 Nm ±15%.
- Replace the flow limiter (pos. 14) and flow limiter plastic ring (pos. 15).
- The container chamber of the electronic board is sealed with a sealing gasket and must not be opened. All of the required connections can be accessed from the outside by electrical connectors.

Maintenance kit:

- Drain maintenance kit (Kit_001) includes:
  - (1) Filter cap
  - (1) Filter cap O-Ring
  - (1) Double mesh metallic filter
  - (1) Valve assembly O-Ring
  - (1) Solenoid valve spring
  - (1) Solenoid valve pilot

NOTE:

See exploded view in this section for components corresponding to pos. #'s.

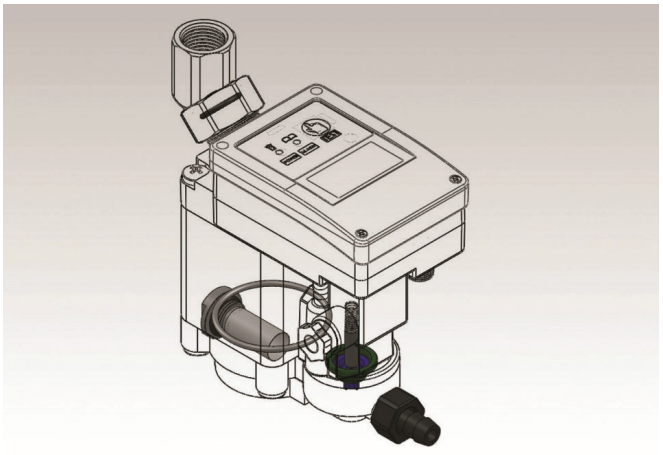
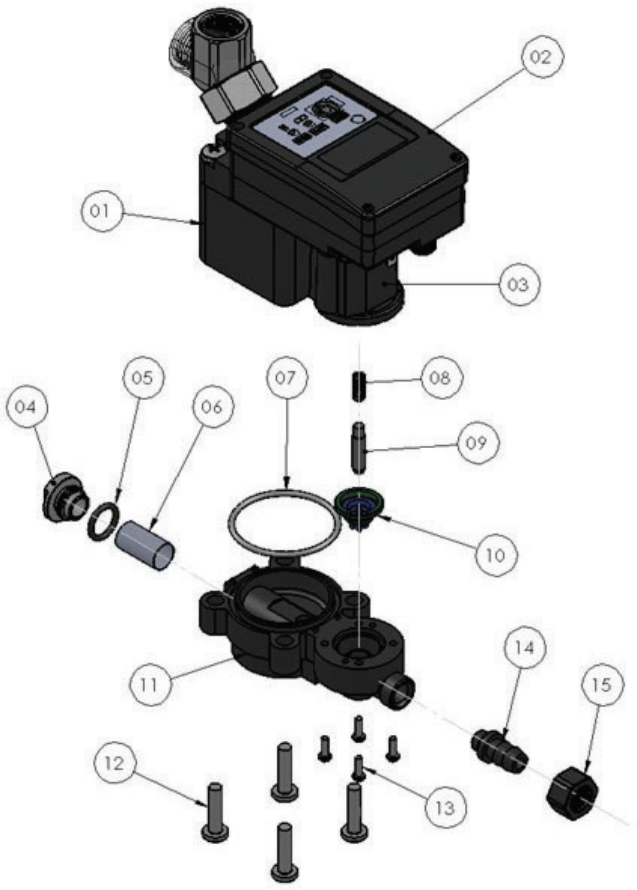


Figure 6.5.2.1 Kit_001

6.0 Inspection/Replacement Procedures

(1) Diaphragm
(1) Flow limiter
(1) Flow limiter plastic ring

Exploded view:



6.5.2 Recommended Maintenance (cont.)

POS	Description	Qty
01	Tank and level sensor	-
02	Electronic board	-
03	Solenoid valve	-
04	Filter cap	1
05	Filter cap O-Ring	1
06	Double mesh metallic filter	1
07	Valve assembly O-Ring	1
08	Solenoid valve spring	1
09	Solenoid valve pilot	1
10	Diaphragm	1
11	Valve assembly	1
12	M6x25 screws	4
13	M3x10 screws	4
14	Flow limiter	1
15	Flow limiter plastic ring	1

Figure 6.6.1 Backup Pressure Switch

6.6 Backup Pressure Switch Set Point Adjustments

The backup switch is set at the factory to the operating point(s) as stated on the wiring diagram supplied with the unit. It is good practice to cycle the switch to determine actual operating points before proceeding with readjustment.

6.0 Inspection/Replacement Procedures

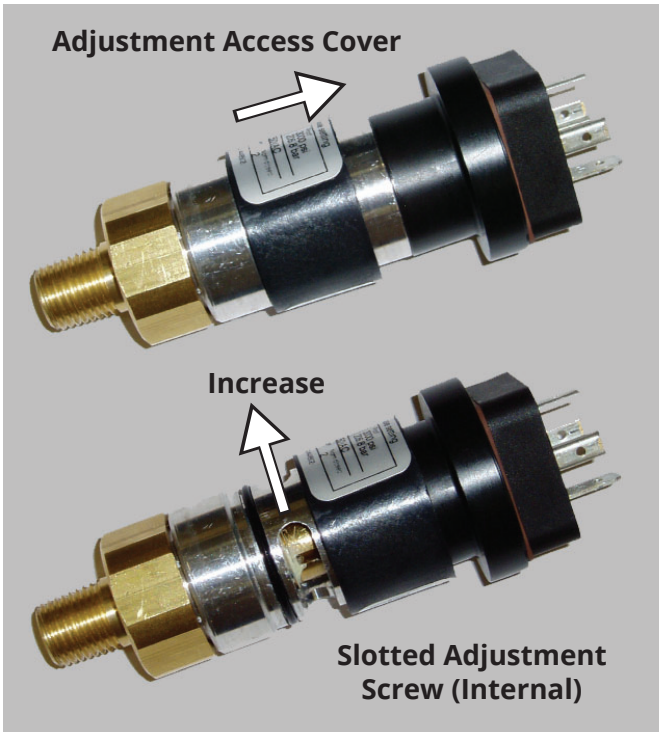


Figure 6.6.1 Backup Pressure Switch

Adjusting Instructions

1. To locate the adjuster, slide the adjustment access cover to reveal a slotted adjustment screw.
2. Turn the screw inward (clockwise) to increase the setpoint and outward (counter-clockwise) to decrease the setpoint. The backup pressure switch should always be set with falling pressure level starting at a pressure level higher than the setpoint.
3. Using the pressure gage, determine the actuation point of the switch.
4. If the actuation point is above the desired value, turn the slotted adjustment screw counter-clockwise to decrease the actuation point, and if it is below, turn the slotted adjustment screw clockwise to increase it.
5. For exact pressure setting, cycle pressure switch and make fine adjustments be repeating steps 2 through 4 (trial and error process) until the desired setting is obtained.
6. Slide the adjustment access cover back into place over the slotted adjustment screw.

⚠ CAUTION:

- ALWAYS change pressure setting gradually.
- ALWAYS check switch setting before making any adjustments.
- DO NOT force slotted adjustment screw when it becomes difficult to turn.
- ALWAYS isolate the pressure transducer before making any adjustments to the backup pressure switch.

6.7 General Inspections

6.7.1 Monthly Inspection

A general inspection should be performed on a regular basis (monthly) for safety items. Items to inspect include all wiring, flex hoses, and other items. If a damaged item is viewed, call your local BeaconMedaes service technician for a thorough inspection and report of findings.

6.7.2 Every Six Months

A thorough inspection of the compressor cooling-air discharge grating and the aftercooler coils should be performed at least every six months or more frequently if conditions require. If a dust/dirt buildup is visible, clean the grating or coils to remove the buildup. Excess dust/dirt buildup in these areas will prevent air from cooling the compressor unit or the aftercooler, affecting performance of the air system.

6.8 Cleaning

Use clean, dry or damp microfiber cloth or soft lint-free cloth to remove any smudges on the display. Do not apply excessive pressure while cleaning. Never use paper towels or tissue paper, which contain wood fibers that may cause scratches.

7.0 Replacement Parts

Any information, service or spare parts requests should include the machine serial number and be directed to:

BeaconMedæs

1059 Paragon Way

Rock Hill, SC 29730

Telephone: (888) 4-MEDGAS

(888) 463-3427

Fax: (803) 817-5750

A Parts List is available as a supplement to this Operation and Maintenance Manual. Please contact BeaconMedaes to have the Parts List sent to you or download an electronic version from the website at www.beaconmedaes.com.

8.0 Specifications

8.1 Duplex Base Mount Scroll SPC NFPA Medical Air System

Model Hp	2	3	5	7.5	10	15	20
Package Hp	4	6	10	15	20	30	40
Max. Pressure (PSI)	120	120	120	120	120	120	123
Delivery (CFM) 50 psi	7.0	10.4	17.2	25.2	34.8	50.4	64
RPM	2200	3200	3150	3000	3150	3000	3555
Tank Size (min)	80 Gal	80 Gal	80 Gal	80 Gal	120 Gal	120 Gal	200 Gal
Intake Pipe Size	1-1/2"	1-1/2"	1-1/2"	1-1/2"	2"	2"	2"
Discharge Pipe Size	3/4"	3/4"	3/4"	3/4"	1"	1"	1-1/4"
Safety Valve Setting (psi) pump	135	135	135	135	145	145	145
Max. Ambient Temperature	105°F	105°F	105°F	105°F	105°F	105°F	105°F
Dimensions (inches)							
Length	47.50	47.50	47.50	47.50	66.00	66.00	72.00
Width	34.50	34.50	34.50	34.50	62.00	62.00	99.50
Height	74.00	74.00	74.00	74.00	81.90	81.90	85.10
Weight (lbs)	1141	1154	1204	1246	2002	2130	2775

8.2 Triplex Base Mount Scroll SPC NFPA Medical Air System

Model Hp	5	7.5	10	15	20
Package Hp	15	22.5	30	45	60
Max. Pressure (PSI)	120	120	120	120	123
Delivery (CFM) 50 psi	34.4	50.4	69.6	100.8	128
RPM	3150	3000	3150	3000	3555
Tank Size (min)	120 Gal	120 Gal	200 Gal	200 Gal	200 Gal
Intake Pipe Size	2"	2"	3"	3"	4"
Discharge Pipe Size	1"	1"	1-1/4"	1-1/4"	1-1/2"
Safety Valve Setting (psi) pump	135	135	145	145	145
Max. Ambient Temperature	105°F	105°F	105°F	105°F	105°F
Dimensions (inches)					
Length	66.00	66.00	72.00	72.00	72.00
Width	62.00	62.00	99.50	99.50	99.50
Height	81.90	81.90	85.10	85.10	85.10
Weight (lbs)	1840	1970	3060	3250	3778

8.0 Specifications

8.3 Quadruplex Base Mount Scroll SPC NFPA Medical Air System

Model Hp	**5**	**7.5**	**10**	**15**	**20**
Package Hp	20	30	40	60	80
Max. Pressure (PSI)	120	120	120	120	123
Delivery (CFM) 50 psi	51.6	75.6	104.4	151.2	192
RPM	3150	3000	3150	3000	3555
Tank Size (min)	120 Gal	200 Gal	200 Gal	200 Gal	240 Gal
Intake Pipe Size	2"	2"	3"	3"	4"
Discharge Pipe Size	1"	1-1/4"	1-1/4"	1-1/4"	1-1/2"
Safety Valve Setting (psi) pump	135	135	145	145	145
Max. Ambient Temperature	105°F	105°F	105°F	105°F	105°F
Dimensions (inches)					
Length	66.00	66.00	72.00	72.00	72.00
Width	62.00	62.00	99.50	99.50	99.50
Height	81.90	85.10	85.10	85.10	97.10
Weight (lbs)	2096	2492	3700	3910	4625

8.4 Pentaplex / Hexaplex Base Mount Scroll SPC NFPA Medical Air System

	Pentaplex	Hexaplex	Pentaplex	Hexaplex
Model Hp	**15**	**15**	**20**	**20**
Package Hp	75	90	100	120
Max. Pressure (PSI)	120	120	123	123
Delivery (CFM) 50 psi	201.6	252	256	320
RPM	3000	3000	3555	3555
Tank Size (min)	200 Gal	240 Gal	240 Gal	240 Gal
Intake Pipe Size	4"	4"	4"	4"
Discharge Pipe Size	1-1/2"	1-1/2"	1-1/2"	1-1/2"
Safety Valve Setting (psi) pump	145	145	145	145
Max. Ambient Temperature	105°F	105°F	105°F	105°F
Dimensions (inches)				
Length	72.00	72.00	72.00	72.00
Width	138.00	138.00	138.00	138.00
Height	85.10	97.10	97.10	97.10
Weight (lbs)	4860	5560	6462	7155

9.0 Maintenance Record

Model Number _____

Serial Number _____

Installation Date _____

Date of Service								
Hours								
Load								
Ambient Temp.								
Inlet Filter								
Belt Tension								
Misc.								
Serviced By								

Notes:

9.0 Maintenance Record

Model Number _____

Serial Number _____

Installation Date _____

Date of Service								
Hours								
Load								
Ambient Temp.								
Inlet Filter								
Belt Tension								
Misc.								
Serviced By								

Notes:

Appendix A: Desiccant Dryer

A.1 General Information

CAUTION: This manual is designed to serve as the operation and maintenance guide for your dryer, if equipped. The contents of this manual should be carefully read BEFORE attempting any phase of operation or maintenance. Failure to follow the operating and maintenance procedures of the instruction manual could result in personal injury or property damage.

All information, specifications and illustrations within this manual are those in effect at the time of printing. The manufacturer reserves the right to change or make improvements without notice and without incurring any obligation to make changes or add improvements to products previously sold.

When requesting information, service, ordering of spare parts, etc., please reference all information supplied on the serial number plate located on the side of the control panel.

To facilitate maintenance, recommended spare parts for your specific dryer model are available. Failure to maintain recommended spare parts and filter cartridges might result in expensive and unnecessary downtime for which the manufacturer cannot be responsible. To request a quotation of, or place an order for, recommended or emergency spare parts, please contact **BeaconMedæs Service** at 1-888-4MEDGAS.

There are two different styles of dryer used on scroll systems: Lifeline dryers and PD dryers. Instructions apply to both unless noted otherwise.

A.1.1 Drying Cycles

This fully automatic, heatless type dryer alternately cycles the compressed, process gas flow through two desiccant charged towers where the entrained, vaporous moisture content of the gas is adsorbed. One desiccant tower is always on-line in a drying cycle throughout normal dryer operation. The opposite, off-line tower is in a regeneration cycle for removal of the previously adsorbed moisture content or in a purge saving cycle at line pressure.

Manual Mode

When the dryer is in the "**Manual**" mode, the dryer will shift towers every 154 seconds on SAS 20HP PX - HX, and every 30 seconds on all other systems. At normal operating conditions, one tower is approximately 100 psig and the other tower is at 0 psig. Any condition other than this is not normal and will cause a high dew point condition. During tower changeover, the online chamber will exhaust, and the chamber that is regenerating (purging) will come to line pressure. There is a 34 second re-pressurization cycle on SAS 20HP PX - HX and a 5 second repressurization cycle on all other systems. If the dryer is in the "Manual" mode, the dryer will use 15%-23% of the system capacity to purge the dryer.

Automatic Mode

When the dryer is in the "Automatic" mode, the dew point monitor controls the dryer purge, and purging depends on the dew point condition. When the dew point reading is above the setpoint of -10°C (14°F), the dryer will function normally (one tower at system pressure, one tower at 0 p.s.i.). When the dew point is below the setpoint of -10°C (14°F), the purge valve will close. In this condition both towers will be approximately 100 p.s.i. and the dryer will not shift towers until the dew point is above -10°C (14°F).

A.1.2 Pre-filter

As the first line of defense against water contaminants, a coalescing pre-filter with an automatic drain is installed. The coalescing pre-filter removes water aerosols from the gas stream before the gas enters the dryer. Liquids collected by the assembly's filter cartridge(s) fall to the housing sump and are drained by a float drain. Installer should pipe these drain connections to a common drain point.

Appendix A: Desiccant Dryer

A.2 Operation

A.2.1 Initial Start-Up

Figure A.2.1 Main Screen - Dryer Operation

1. Switch on the electrical supply to the dryer.
2. CLOSE the dryer isolation valves.
3. Check that the compressed air supply is on. Let the system come up to pressure.
4. Slowly OPEN the dryer inlet isolation valve. Let the dryer come up to pressure.
5. Press "Manual" on the dryer display screen to begin operation. The dryer will now begin to cycle.
6. Check that purge air is flowing from the purge muffler.
7. Slowly OPEN the dryer outlet isolation valve.
8. Open the dew point and CO sensor (if supplied) isolation valves.
9. Check for airflow at the dew point sensor orifice.
10. Operate the dryer for five to ten minutes with the source isolation valve closed.
11. During the conditioning run, test all joints to locate any leaks using leak detector spray or a suitable alternative. Tighten or repair any leaks and retest.

NOTE: Any small leaks on the dryer outlet side will cause a deterioration of the dew point.

12. Press "Automatic" on the dryer display screen to begin operation in Automatic mode.

NOTE: For SAS 20HP PX - HX systems the dryer solenoid valve requires pressure from the dryer to switch properly. The operating mode should only be switched when the system is in a re-pressurization cycle and both towers are pressurized.

13. On the completion of the conditioning run, **slowly open** the source isolation valve. The dryer will now be fully operational.

A.2.2 Procedure to Switch Off Dryer

1. Put second dryer on line by repeating steps 4 thru 7 above.
2. CLOSE the first dryer outlet isolation valve.
3. Press "OFF" on the first dryer display screen.
4. CLOSE the first dryer inlet isolation valve. Dryer should de-pressurize.

WARNING:

Wait at least 2 minutes for pressure in the dryer to decay before performing any service to the dryer.

A.2.3 Normal Start-up

This procedure is to be followed when the dryer has been shut down for a short period during which time the desiccant has not been exposed to wet gas.

Appendix A: Desiccant Dryer

1. Start up the compressor if shut down.
2. Slowly OPEN the dryer inlet isolation valve.
3. Set the appropriate dryer to Automatic mode.
4. Slowly OPEN the dryer outlet isolation valve.
5. Check operation of the dryer.

A.2.4 Maintenance Shut Down

1. CLOSE the dryer outlet isolation valve.
2. CLOSE the dryer inlet isolation valve.
3. Allow the dryer to continue to cycle until the purge exhaust fully depressurizes both chambers.
4. Switch off electrical power to the dryer by removing the fuse.

WARNING:

Display prominent notices indicating that maintenance is being carried out.

A.3 Troubleshooting

WARNING:

To protect the lives of patients, always notify the appropriate medical facility staff before performing any maintenance or service procedures on the air system. Compressed air levels may be affected during maintenance or service procedures.

WARNING:

Ensure that the dryer and associated pre-filter(s) and afterfilter(s) are valve isolated and fully depressurized before attempting to remove or disassemble any subassemblies or components. Failure to do so may result in serious personal injury and/or equipment damage.

WARNING:

Some of the following troubleshooting checks are conducted while the dryer's electrical power supply is energized. THEREFORE, A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS. A qualified electrical technician should conduct these checks. The dryer's electrical power supply must be de-energized before any electrical maintenance or repair work is conducted.

CAUTION: Each component has been selected to compliment the performance of the other components of the system. Therefore, use of unauthorized parts or improper operation will degrade system performance.

IMPORTANT: Water molecules can diffuse through a pinhole size leak even though pressure inside the piping is several hundred PSIG. It is not at all uncommon to have a minute pinhole leak in a gas line cause an increase in dew point from -40°F to -10°F at a distance of forty or more feet downstream of the leak.

WARNING:

Compressed air can be dangerous unless safety precautions are observed in the use of compressed air and compressed air equipment. Completely vent the internal air pressure to the atmosphere before disassembling any subassemblies or components and before doing any work on compressed air equipment. To vent internal air pressure, follow the maintenance shutdown instructions.

Appendix A: Desiccant Dryer

A.3 Troubleshooting

Problem	Possible Causes	Solution
Dryer not cycling	Main power disconnected	Turn on main power
	Power failure	Restore power
	Main fuse blown	Replace fuse
	Fuse blown in control circuit	Replace fuse
	Dryer circuit board failure	Check and replace if defective
	Dryer operation in Off position	Select Automatic or Manual mode
	Loose or faulty connection	Check & tighten all wire connections
	Switching valve failure	Replace switching valve
Dew point degradation	Incorrect purge air flow	Check purge orifice for blockage. Clean and replace as required
		PD dryers: Check orifice size
	Excessive system flow rate	Reduce inlet flow rate and/or increase operating pressure
	Inlet air temperature is above the dryer's design inlet working temperature	Check the compressor aftercooler and cooling system. Adjust as necessary to bring the dryer inlet temperature to less than the maximum design working temperature of 43°C (110°F)
	Liquids entering the dryer inlet	Isolate and depressurize the pre-filter assembly. Inspect pre-filter cartridges and end seals for loosening and/ or damage. Tighten or replace as necessary.
		Inspect the pre-filter automatic drain valve. Ensure that it is not clogged and is draining properly. Repair or replace as necessary, if a problem is noted.
	Purge muffler restricted	Replace muffler.

Appendix A: Desiccant Dryer

A.3 Troubleshooting

Problem	Possible Causes	Solution
Dew point degradation	Desiccant is contaminated. The "white" desiccant beads may appear discolored and dirty if contamination has occurred.	Shutdown and depressurize the dryer. Inspect the desiccant and replace if fouled. Inspect any existing pre-filter if fouling is noted.
	Union or other piping/ component leaks at dryer outlet manifold or downstream of dryer outlet.	Soap test the dryer outlet manifold and piping downstream of dryer. Repair all leaks noted.
	PD dryers: Cut O-ring on desiccant cartridge	Replace O-ring
Back pressure on a desiccant chamber during the regeneration cycle.	Dirty or fouled purge muffler	Switch off power and remove purge muffler and clean using an air nozzle, or replace.
	Outlet check valve leaking	Repair check valve

NOTE: The presence of backpressure will result in insufficient regeneration followed by dew point degradation. An off-line chamber's pressure **MUST be less than 3 psig** throughout all regeneration cycles.

Appendix A: Desiccant Dryer

A.4 Maintenance

WARNING:

To protect the lives of patients, always notify the appropriate medical facility staff before performing any maintenance or service procedures on the air system. Compressed air levels may be affected during maintenance or service procedures.

WARNING:

Compressed air can be dangerous unless safety precautions are observed in the use of compressed air and compressed air equipment. Completely vent the internal air pressure to the atmosphere before disassembling any subassemblies or components and before doing any work on compressed air equipment. To vent internal air pressure, follow the maintenance shutdown instructions.

A compressed air dryer should give long and trouble free operation if the recommended preventative maintenance program is carried out.

The following is a recommended schedule:

1. **Quarterly procedure** - Clean the auto drain in the coalescing filter. Monitor the backpressure on the purging tower. If the gauge reads more than 0 psig (when purging), check the purge muffler for blockage and replace if necessary.

2. **Annual procedure** - Replace all filter cartridges and purge muffler(s). Check the automatic drain function in the coalescing filter. Refer to chart located in Section A.4.1 for correct system size and part numbers. Contact **BeaconMedæs Service** at 1-888-4MEDGAS for parts.

3. **Three-year procedure** - Change all annual parts. Change desiccant, check valves, shuttle valve(s), and purge valve(s). See chart in Section A.4.1 for correct system size and part numbers. Contact **BeaconMedæs Service** at 1-888-4MEDGAS for parts.

A.4.1 Maintenance Interval

Lifeline Dryers

Service Interval	Description
Every year	Pre-filter
Every year	After-filter
Every year	Purge muffler
Every 3 years	Desiccant
Every 3 years	Check valve
Every 3 years	Tower o-ring
Every 3 years	Canister o-ring
As needed	Switching valve
As needed	Tower pressure gauge
As needed	Purge Poppit Valve

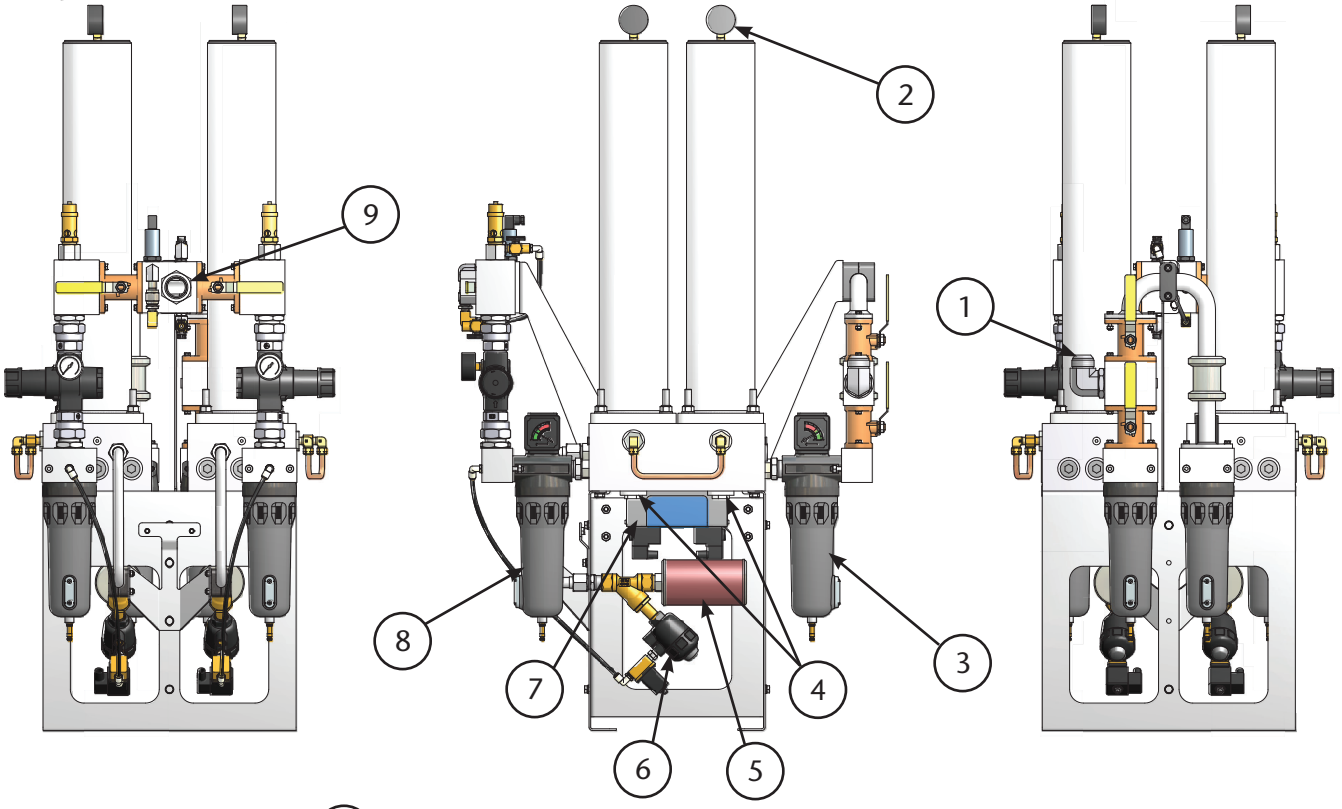
PD Dryers

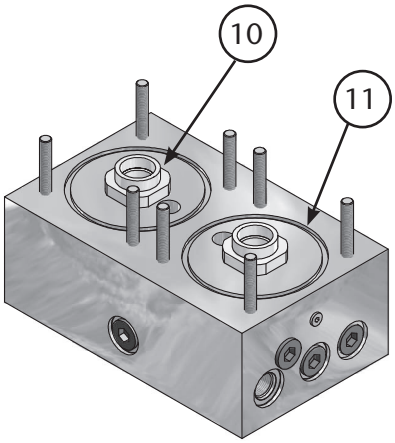
Service Interval	Description
Every year	Pre-filter
Every year	After-filter
Every year	Purge muffler
Every 3 years	Desiccant
Every 3 years	Purge valve
Every 3 years	Main shuttle valve
Every 3 years	Exhaust shuttle valve

Note: All service components are listed as parts within the service repair kits in Section 5.2

Appendix A: Desiccant Dryer

Figure A.4.1.1 Lifeline Desiccant Dryer Components





Item Number	Description
1	Dryer Inlet
2	Tower Pressure Gauge
3	Dryer Pre-Filter
4	Check Valve (2)
5	Purge Muffler
6	Poppit Purge Valve
7	441® Switching Valve
8	Dryer After-Filter
9	Air System Outlet
10	Canister O-Ring
11	Tower O-Ring

Appendix A: Desiccant Dryer

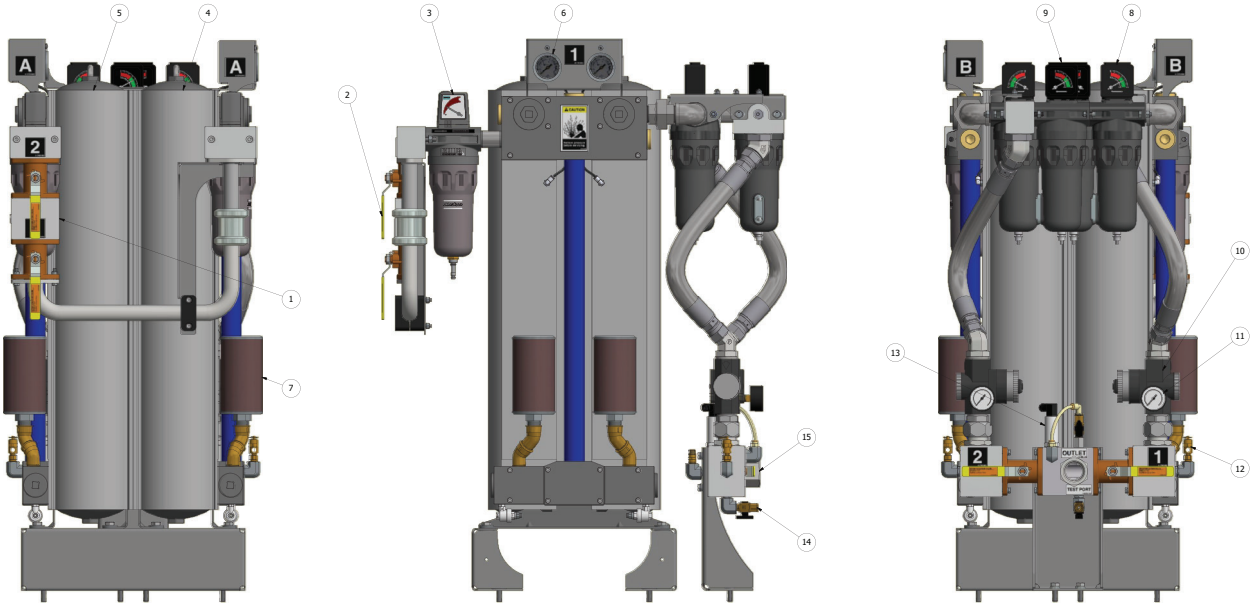


Figure A.4.1.2 PD Desiccant Dryer Components

Item Number	Description
1	Dryer inlet
2	Isolation valve
3	Coalescing pre-filter
4	Dryer 1
5	Dryer 2
6	Dryer tower pressure gauge
7	Purge muffler
8	Coarse particle after-filter
9	Fine particle after-filter
10	Regulator
11	Regulator pressure gauge
12	Relief valve
13	Dew point sensor
14	Test port
15	Air system outlet

Appendix A: Desiccant Dryer

A.5 Replace/Repair

WARNING:

Ensure that the dryer and associated pre-filter(s) and afterfilter(s) are valve isolated and fully depressurized before attempting to remove or disassemble any subassemblies or components. Failure to do so may result in serious personal injury and/or equipment damage.

A.5.1 Lifeline Desiccant Replacement Procedure

WARNING:

Used desiccant material must be handled with special care. Desiccant is an adsorbent material. Used desiccant may contain chemicals and/or gases that are hazardous, toxic and/or flammable. It is recommended that all used desiccants be analyzed to determine content before disposal. Exercise proper care and procedures during handling and storage of used materials. All containers must be properly labeled and disposed of in accordance with local, state and federal regulations.

1. Shut down dryer – close the inlet and outlet isolation valves and turn off electrical power to the dryer.

WARNING:

Desiccant towers contain springs which may release potential energy upon dismantle.

2. Remove hex nuts, washers and towers from manifold assembly.
3. Remove spring and perforated screen from top of canister.
4. Remove canister from manifold assembly, being careful not to spill any desiccant.
5. Dispose of used desiccant into suitable containers.
6. Remove any blockage that may have lodged in the perforated screens.
7. Replace canister O-rings. Set canister onto manifold assembly.
8. Install the perforated screen into the bottom of the canister.
9. Fill canisters with desiccant to one inch (1") from the top of canister. Install perforated screen.

CAUTION: DO NOT OVERFILL

10. Set spring retainer on top of perforated screen. Install tower over the canister. Install plain washers and hex nuts. Tighten nuts in an X-pattern until chambers are snug against the manifold. Torque to 35 ft-lbs.

A.5.2 Lifeline Check Valve Replacement Procedure

1. Remove the caps/plugs from the underside of the dryer block. See Figure A.3.
2. Using a 1⅛ deep well socket, remove the check valves.
3. Replace check valve and cap/plug in dryer block.

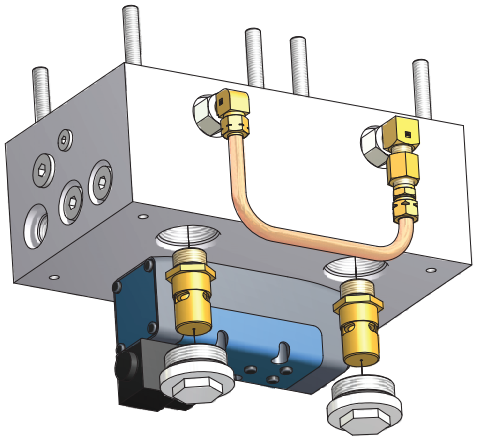
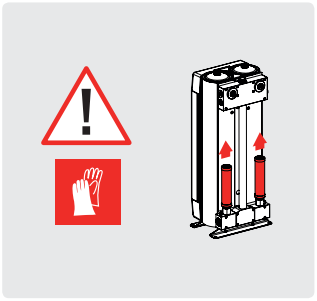
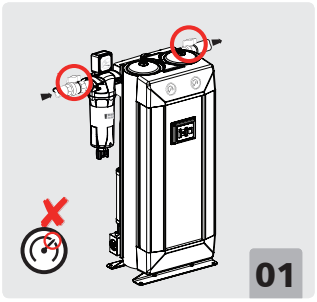


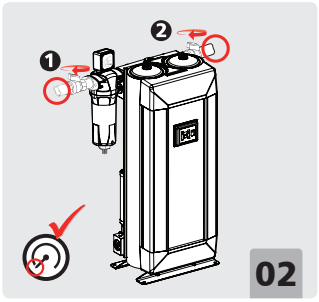
Figure A.5.2.1 Dryer Block Check Valves

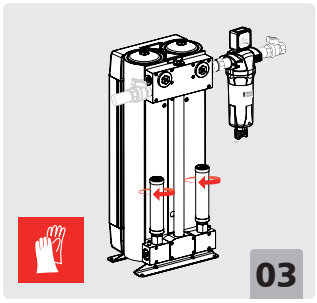
Appendix A: Desiccant Dryer

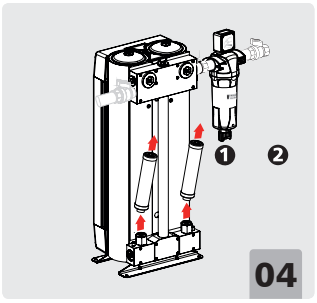
A.5.3 PD Purge Muffler Replacement Procedure

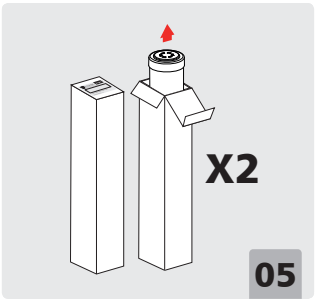


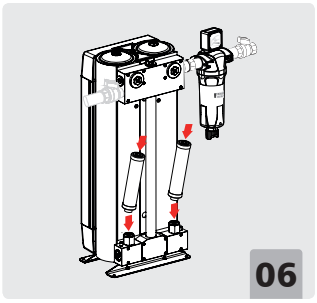


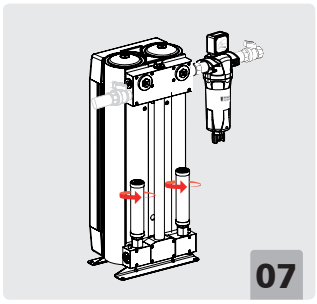


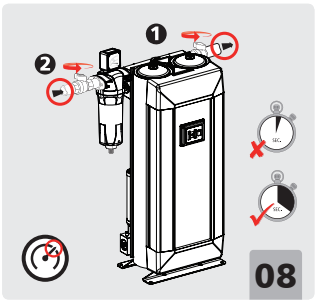


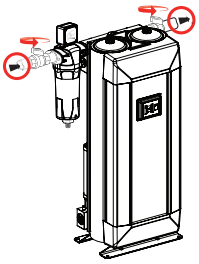












Appendix A: Desiccant Dryer

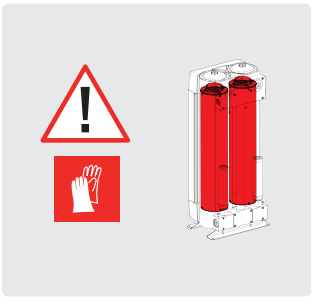
A.5.4 PD Desiccant Replacement Procedure

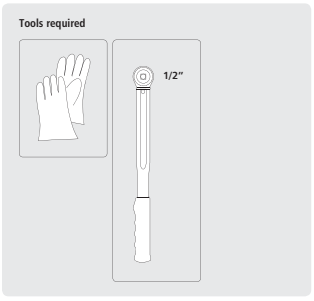
WARNING:

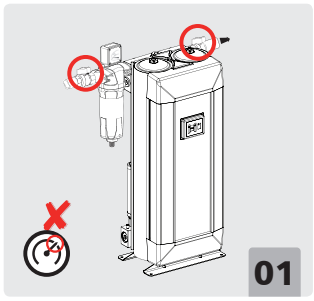
Used desiccant material must be handled with special care. Desiccant is an adsorbent material. Used desiccant may contain chemicals and/or gases that are hazardous, toxic and/or flammable. It is recommended that all used desiccants be analyzed to determine content before disposal. Exercise proper care and procedures during handling and storage of used materials. All containers must be properly labeled and disposed of in accordance with local, state and federal regulations.

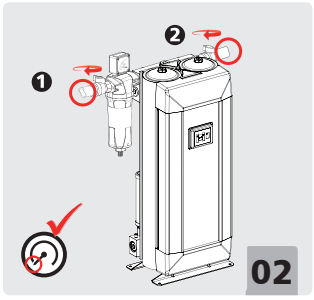
WARNING:

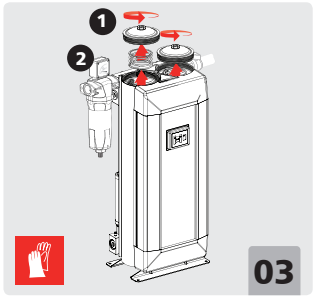
Desiccant towers contain springs which may release potential energy upon dismantle.

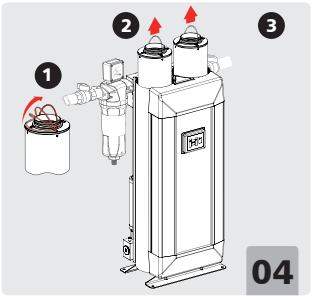


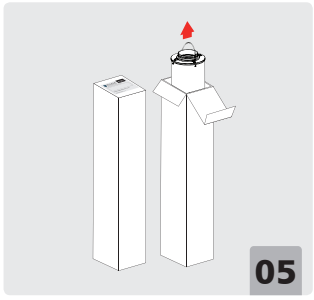


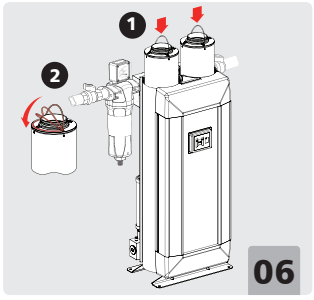


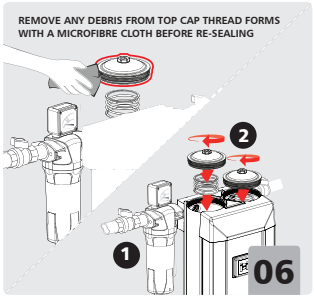


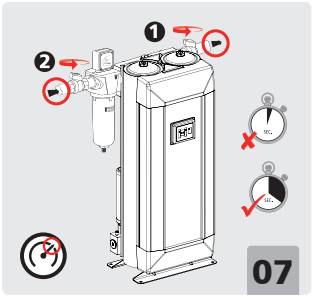






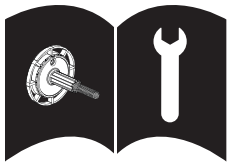


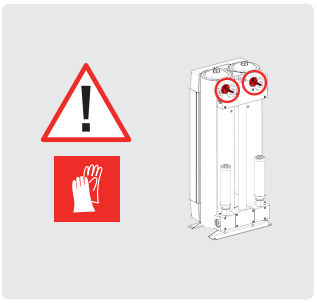


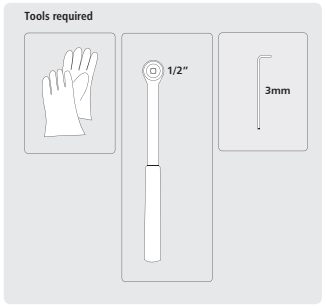


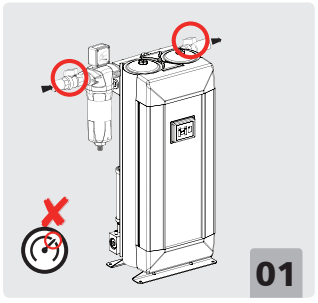
Appendix A: Desiccant Dryer

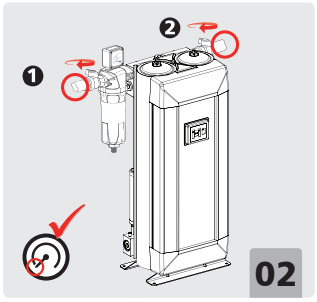
A.5.5 PD Purge Valve Replacement Procedure

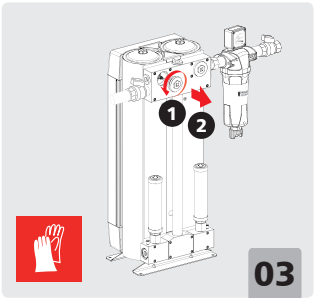


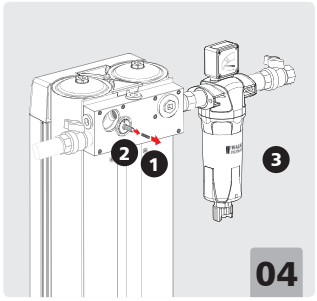


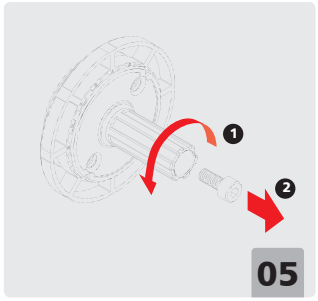


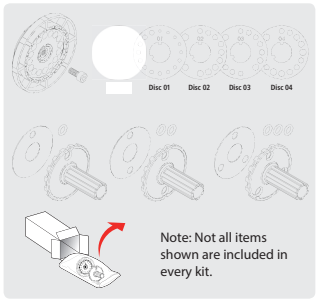


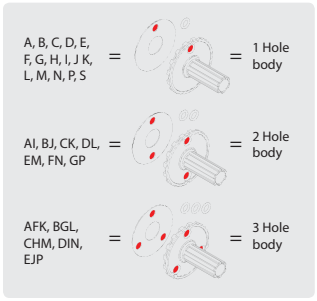


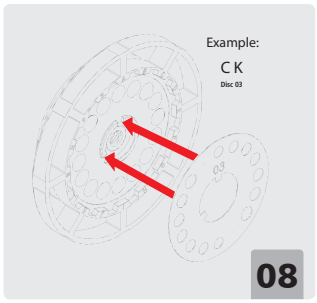


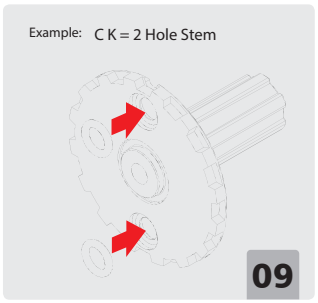


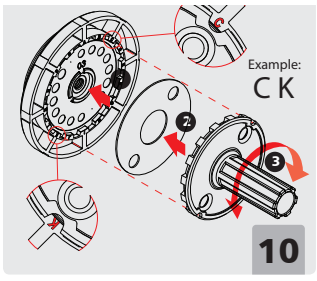


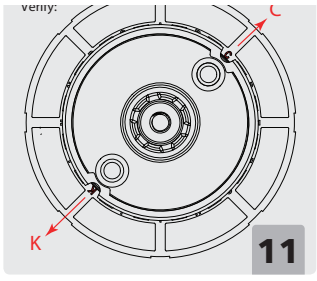


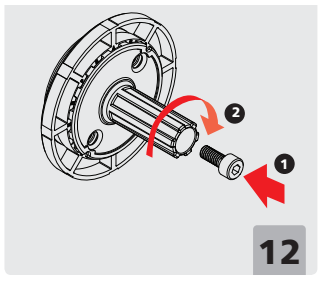


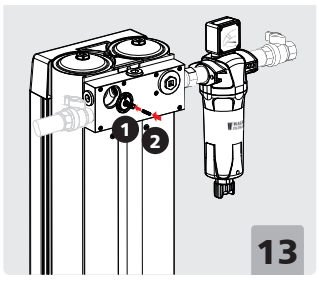


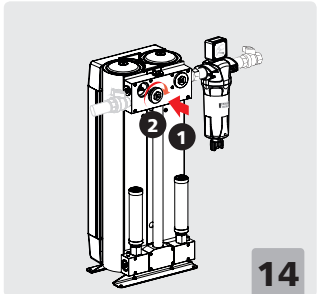


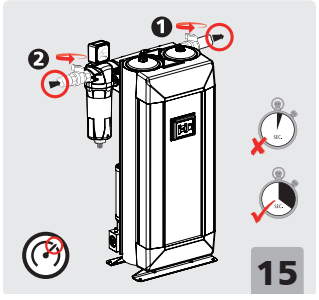






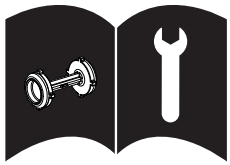


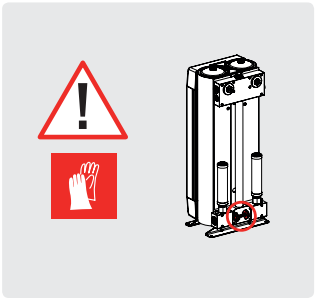


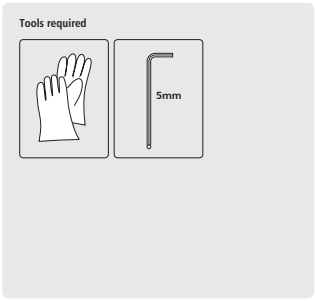


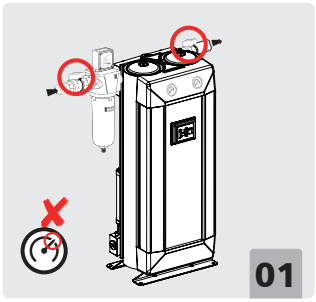
Appendix A: Desiccant Dryer

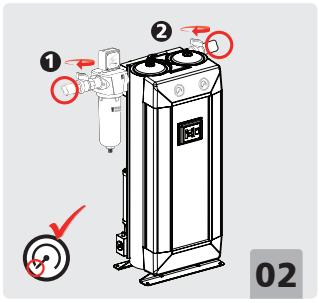
A.5.6 PD Main Shuttle Valve Replacement Procedure

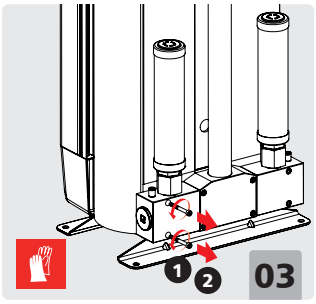


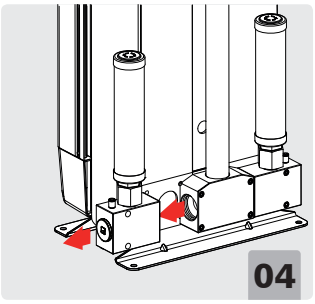


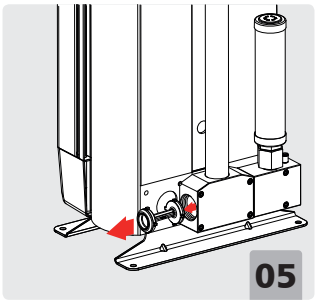


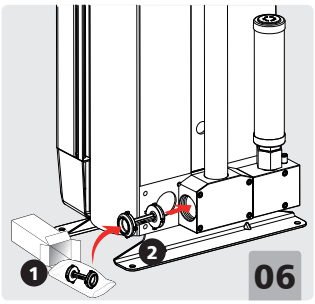


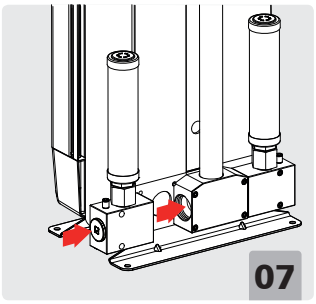


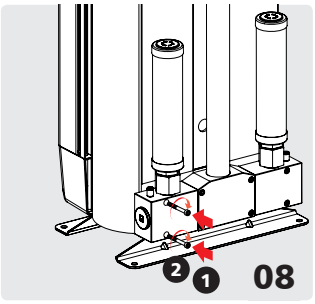


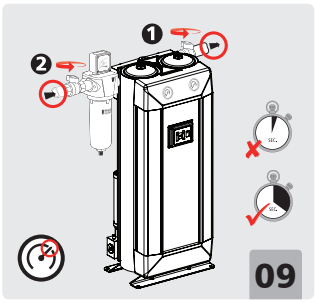






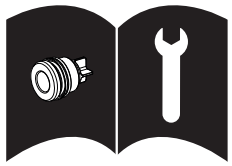


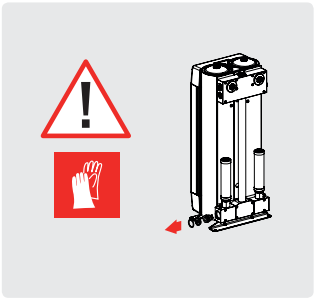


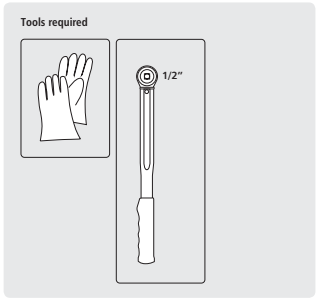


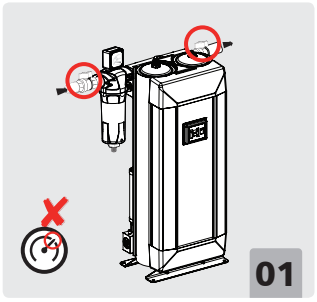
Appendix A: Desiccant Dryer

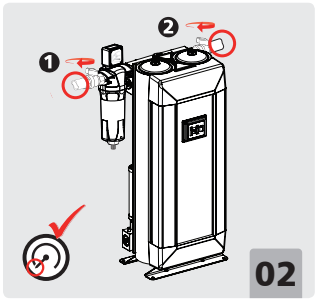
A.5.7 PD Exhaust Valve Replacement Procedure

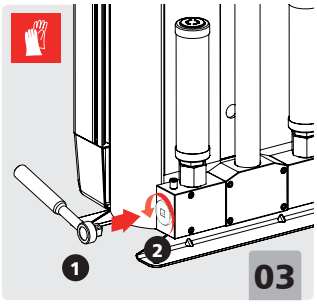


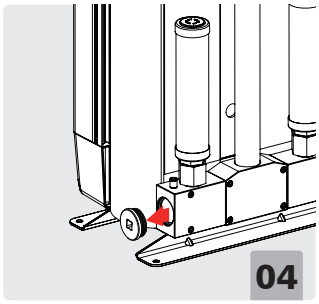


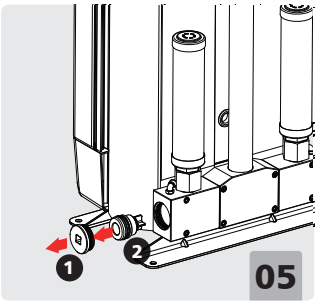


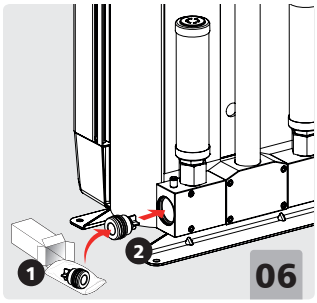


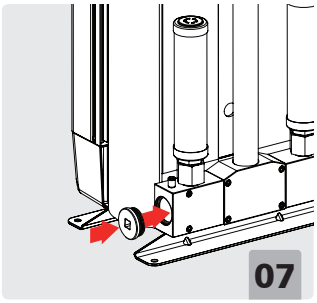


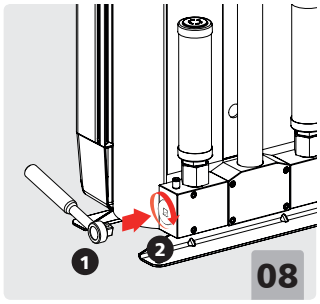


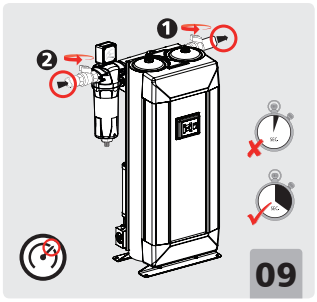












Appendix A: Desiccant Dryer

A.6 Dryer Specifications

Model:	Lifeline dryer	PD dryer
Type:	Desiccant Heatless	Desiccant Heatless
Design Pressure:	105 psig	110 psig
Operating Pressure:	60 psig minimum, 125 psig maximum	58 psig minimum, 188.5 psig maximum
Maximum Inlet Air Temperature:	43°C (110°F)	46°C (115°F)
Ambient Temperature:	4.4°C (40°F) minimum, 40.5°C (105°F) maximum	4.4°C (40°F) minimum, 40.5°C (105°F) maximum
Pressure Dew Point Capability @ 100 psig:	-12°C (10°F)	-40°C (-40°F)
Normal DP Operating Range:	-8°C (17.6°F) to -12°C (10°F)	-8°C (17.6°F) to -12°C (10°F)
Differential Pressure @ 100 psig and 37.8°C (100°F):	2 to 8 psig	10 psig
Desiccant:	Activated Alumina	Activated Alumina
Control:	Fully automatic solid-state electric	Fully automatic solid-state electric
Power:	24VDC Power	24VDC Power

Appendix B: Dew Point Transmitter

B.1 General Information

CAUTION: This manual is designed to serve as the operation and maintenance guide for your Dew Point Transmitter, if equipped. The contents of this manual should be carefully read BEFORE attempting any phase of operation or maintenance. Failure to follow the operating and maintenance procedures of the instruction manual could result in personal injury or property damage.

WARNING:

Before starting any installation, maintenance or service procedure, disconnect ALL power to the system to prevent electrical shock.

Before making or breaking any medical gas line connections, make sure the system is depressurized in order to avoid personal injury.

Before removing the dew point transmitter, verify that the source of line pressure has been closed and the line pressure reduced to atmospheric pressure.

An alarm condition on dew point indicates a dew point level exceeding the maximum set point, or a faulty dew point transmitter. Immediate action should be taken to reduce the possibility of high dew point in the Medical Air line.

If the dew point transmitter flowmeter becomes clogged, dew point readings may be inaccurate, allowing moisture to accumulate undetected.

B.2 Introduction

The dew point transmitter is a continuous, on-line instrument that measures the absolute moisture content in the final air line. The transmitter measures dew point with excellent long term stability. The Advanced Ceramic Moisture sensor is durable and has been designed for ruggedness and simplicity. The transmitter is fully calibrated at the factory prior to shipment.

B.3 Specifications

1. Dew point Temperature: -100° to 20°C (-148° to 68°F)
2. Operating Temperature: 0° to 60°C (32° to 140°F)
3. Dew point accuracy: ±2°C (±3.6°F)
4. Air Consumption: 0.75 LPM (1.6 SCFH)

B.3.1 Output

Analog output: 4 - 20 mA

B.3.2 General

1. Operation Voltage: 12 - 28 VDC
2. Probe material: Stainless Steel (316)
3. Sensor protection: Ceramic

B.4 Operation

Although the correct operation of the transmitter is not sample flow dependent, it is important that flow velocity through the sample source to the sample block is high enough to avoid long lead time lags in response to changes in moisture at the sample source.

Appendix B: Dew Point Transmitter

B.5 Alarms

Dew points that exceed set points shall cause an alarm condition at the control panel. When the dew point exceeds the alarm set point, the alarm contacts are de-energized. The alarm remains de-energized until the alarm condition is cleared by the operator. A high dewpoint alarm will activate if the transmitter loses power or is disconnected from the control system.

WARNING:

Respond to alarm conditions immediately. An alarm condition on the dew point indicates a dew point level exceeding the maximum set point. Immediate action to correct the problem should be taken. Prolonged exposure to condensing moisture can damage the Medical Air equipment.

B.6 Maintenance

B.6.1 Repair Policy

Do not use a unit that is not functioning properly until all necessary repairs have been made and the unit has been tested to determine that it is functioning in accordance with the manufacturer's published specifications. Contact **BeaconMedæs Technical Services** department at 1-888-4MEDGAS (888-463-3427) for assistance.

NOTE: To ensure full reliability, have all maintenance and testing done by a qualified technician. If this cannot be done, maintenance and testing of those parts discussed in this manual may be undertaken by a competent, trained individual having experience in the repair of devices of this nature.

WARNING:

Electrical shock hazard

No repair should ever be attempted by anyone not having experience in the repair of devices of this nature. Failure to follow proper repair procedures can result in serious injury.

CAUTION: No maintenance and testing should ever be undertaken or attempted by anyone not having general experience in the repair of devices of this nature. Also, to avoid damaging the unit or any of its components, no maintenance and testing should be undertaken by qualified individuals who are not familiar with the procedures in this manual.

Replace damaged parts with components from **BeaconMedæs**. Test the unit after installation of replacement parts to make certain that it complies with the published specifications.

B.6.2 Maintenance Schedule

Maintenance	Frequency	Action
Check flow through orifice	Weekly	Check for proper flow
Check transmitter accuracy	Yearly	Verify dew point sensor accuracy (contact **BeaconMedæs**)
Replace Sensor	Every 2 years	See Section B.9

Appendix B: Dew Point Transmitter

B.7 Troubleshooting

WARNING:

Before removing the dew point transmitter, verify that line pressure has been valved off or reduced to atmospheric pressure.

Before servicing the dew point transmitter, do the following:

1. Close dew point transmitter isolation valve
2. Allow transmitter piping to depressurize through the flowmeter until it reduces to atmospheric pressure.
3. Disconnect sensor cable and remove transmitter from piping.

NOTE: Remote alarms will be activated

Problem	Possible Cause	Solution
Slow system response	Insufficient flow through dew point sensor	Check flow
No power	No incoming power	Verify line power is being supplied
Erratic display	Unit defect	Contact **BeaconMedæs**
High dew point	Air is not being dried	Verify that the online dryer (valve open) is in the "Automatic" position on the control panel and that the off-line dryer (valve closed) is in the "Off" position on the control panel.
		Check flow
	Faulty sensor	Replace sensor

Appendix B: Dew Point Transmitter

B.8 Dew Point Sensor Calibration

The dew point sensor is shipped to you pre-calibrated, no user calibration is required. Contact **BeaconMedæs** to check accuracy if required.

B.9 Dew Point Sensor Replacement

Check the response time of the sensor by removing it from the sensor chamber and covering the probe with your hand. The dew point reading should rise rapidly. If the dew point does not rise or is slow to respond, it is time to replace the sensor. To replace, disconnect the power to the instrument, unplug and remove the sensor from the dew point sensor chamber, replace sensor and reassemble.

NOTE: The Dew Point Sensor is included in the 2-Year System Sensor Kits as shown in section 5.2.4.

Appendix C: CO Transmitter

C.1 General Information

CAUTION: This manual is designed to serve as the operation and maintenance guide for your CO Transmitter, if equipped. The contents of this manual should be carefully read BEFORE attempting any phase of operation or maintenance. Failure to follow the operating and maintenance procedures of the instruction manual could result in personal injury or property damage.

WARNING:

Before starting any installation, maintenance or service procedure, disconnect ALL power to the system to prevent electrical shock.

Before making or breaking any medical gas line connections, make sure the system is depressurized in order to avoid personal injury.

An alarm condition on CO indicates a CO level exceeding the maximum set point, or a faulty CO sensor. Immediate action should be taken to reduce the possibility of CO in the Medical Air line.

C.2 Introduction

The CO transmitter is a continuous, on-line instrument that measures the carbon monoxide level in the final product line. The instrument's electronics are enclosed in a NEMA-4 corrosion resistant case. The unit operates on 24 VDC power supplied from the control panel and sends a 4-20mA signal to the control panel. The transmitter uses a state-of-the-art electrochemical cell for detecting carbon monoxide. The sensor has a life expectancy of approximately two years. It is easily replaced and should be periodically calibrated as its output diminishes during its life especially during the final months. Contact **BeaconMedæs Technical Services** department at 1-888-4MEDGAS (1-888-463-3427) for technical support or to order spare parts.

C.3 Specifications

1. Analog output: 4-20mA
2. Operation Voltage: 24 VDC
3. Sensor body material: Aluminum
4. Air Consumption: Minimum 0.5 to 0.9 CFH (14 to 25 lph)

C.4 Power Connection

This is a two wire transmitter. Connect to 24VDC power supply only (See Fig C.1).

C.5 Alarms

CO levels that exceed 10 ppm set point shall cause an alarm condition at the control panel. When the CO level exceeds the set point, the alarm contacts are de-energized. The alarm remains de-energized until the alarm condition is cleared by the operator. A high CO alarm will activate if the transmitter loses power or is disconnected from the control system.

Appendix C: CO Transmitter

C.6 Operation

CAUTION: At initial startup, if the unit is reading a gas level, do not make any adjustments for a few hours until the unit has a chance to settle in and stabilize.

If gas readings remain high or below zero (-0), re-calibration may be needed. We also recommend checking the compressor's air intake for contamination first.

C.7 Maintenance

WARNING:

Electrical Shock Hazard. No repair should ever be attempted by anyone not having experience in the repair of devices of this nature. Failure to follow proper repair procedures can result in serious injury.

Replace damaged parts with components from **BeaconMedæs**. Test the unit after installation of replacement parts to make certain that it complies with the published specifications. Contact **BeaconMedæs Technical Services** department at 1-888-4MEDGAS (1-888-463-3427) for technical support or to order spare parts.

C.7.1 Maintenance Schedule

Maintenance	Frequency	Action
Recalibration	Every 6 months	See Section C.9
Replace Sensor	Every 2 years	See Section C.8

C.8 Sensor Checkout & Replacement

To check a sensor's response, test gas has to be placed on the sensor. When it fails to show a gas response during calibration, a new sensor is required.

To replace the sensor (see Fig C.1), disconnect the power to the unit, disconnect the inlet air connection and unscrew the cover to access the inside of the transmitter. Next, unplug the CO sensor from the bottom of the internal PC board. Then remove the cap on the bottom of the transmitter and remove the CO sensor and wiring. Unplug the wiring from the sensor and replace it with a new one. Reinstall the sensor in the reverse order. Once the sensor is installed go through steps C.9.1 and C.9.2 to calibrate and verify the proper operation of the CO sensor.

C.9 Calibration

C.9.1 Zeroing Transmitter

The following procedure should be used for zeroing the transmitter. (See C.11 Accessories and Replacement Parts for zero gas part numbers)

- Turn on the power and allow the transmitter to warm up for several hours to stabilize.
- Disconnect the inlet air line to the transmitter and connect the air line from the zero gas cylinder.
- Allow the calibration gas from the cylinder to flow through the sensor for approximately 3 minutes to stabilize the sensor.
- Remove the cover from the transmitter housing.
- For this step a multimeter on mV setting will need to be used. Insert positive lead of multimeter (Red) into + test point socket. Insert negative lead of multimeter (Black) into - test point socket. Locate the blue pot (marked "Zero") and adjust the pot until the mV display reads 40.0 +/-0.3 mV. Turning the adjusting screw ClockWise will increase and CounterClockWise will decrease the output. Refer back to main screen to confirm CO setting is on "0" or "1".
- Proceed to C.9.2 for calibrating the transmitter.

Appendix C: CO Transmitter

C.9.2 Transmitter Calibration

The following procedure should be used to calibrate the transmitter. (See C.11 Accessories and Replacement Parts for calibration kit part numbers)

- Zero the transmitter prior to calibration, see C.9.1 for zeroing procedure.
- Disconnect the zero gas cylinder from the transmitter and connect the air line from the 20 ppm CO gas cylinder.
- Allow the calibration gas from the cylinder to flow through the sensor for approximately 3 minutes to stabilize the sensor.
- Locate the dark blue potentiometer (marked "Span") and adjust the pot until the mV display reads 50.7 +/-0.3 mV. Turning the adjusting screw ClockWise will increase and CounterClockWise will decrease the output. Refer back to main screen to confirm CO setting is on "19-21".
- As this adjustment may affect the previously completed Zero Adjustment, it is necessary to repeat both the zeroing procedure and calibration procedure once more to ensure the transmitter is set properly.
- After verifying that both Zero and Calibration adjustments are done correctly, reinstall the cover on the transmitter.
- Reconnect the inlet air line from the dryer.

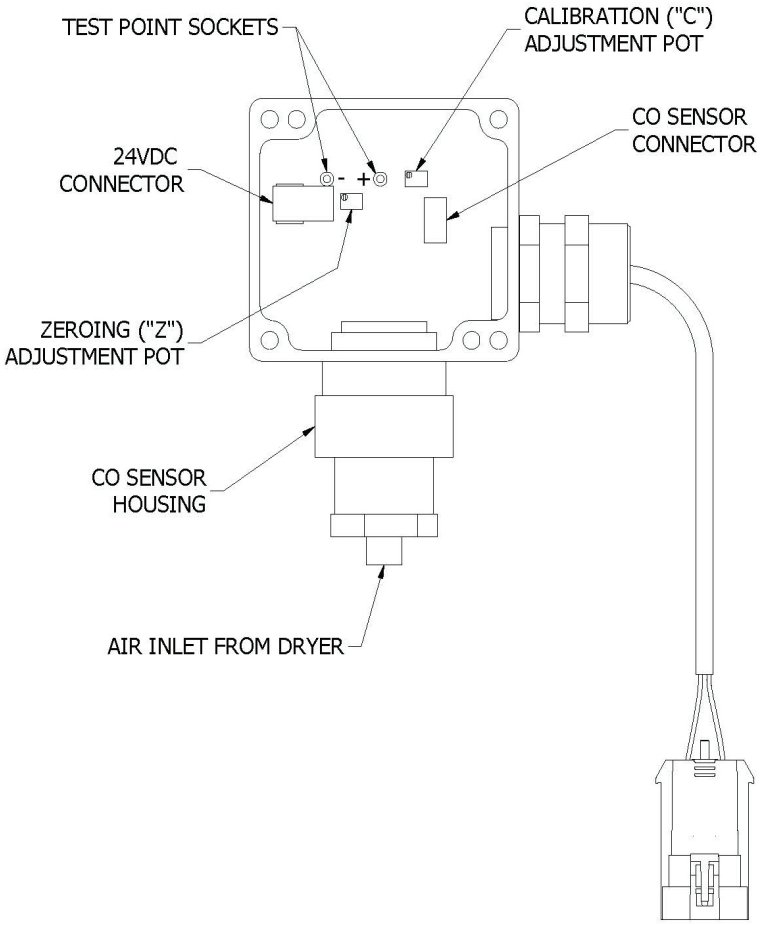


Figure C.9.2.1 CO Transmitter Assembly

Appendix C: CO Transmitter

C.10 Troubleshooting

WARNING:

Before removing the CO sensor, verify that line pressure has been valved off or reduced to atmospheric pressure.

Before servicing the CO sensor, do the following:

1. Unplug sensor(s) or turn off monitor.
2. Depressurize the CO sensor.

NOTE: Remote alarms will be activated.

Problem	Possible Causes	Solution
CO Alarm - 10 ppm or above	Inlet air to the medical air system is contaminated	Move air inlet location or remove source of CO contamination
Monitor will not calibrate	Sensor depleted	Replace sensor
CO Alarm - CO reading erratic	Incoming power feed to control panel adjacent to CO signal wires	Separate incoming power feed from CO signal wires

C.11 Accessories & Replacement Parts

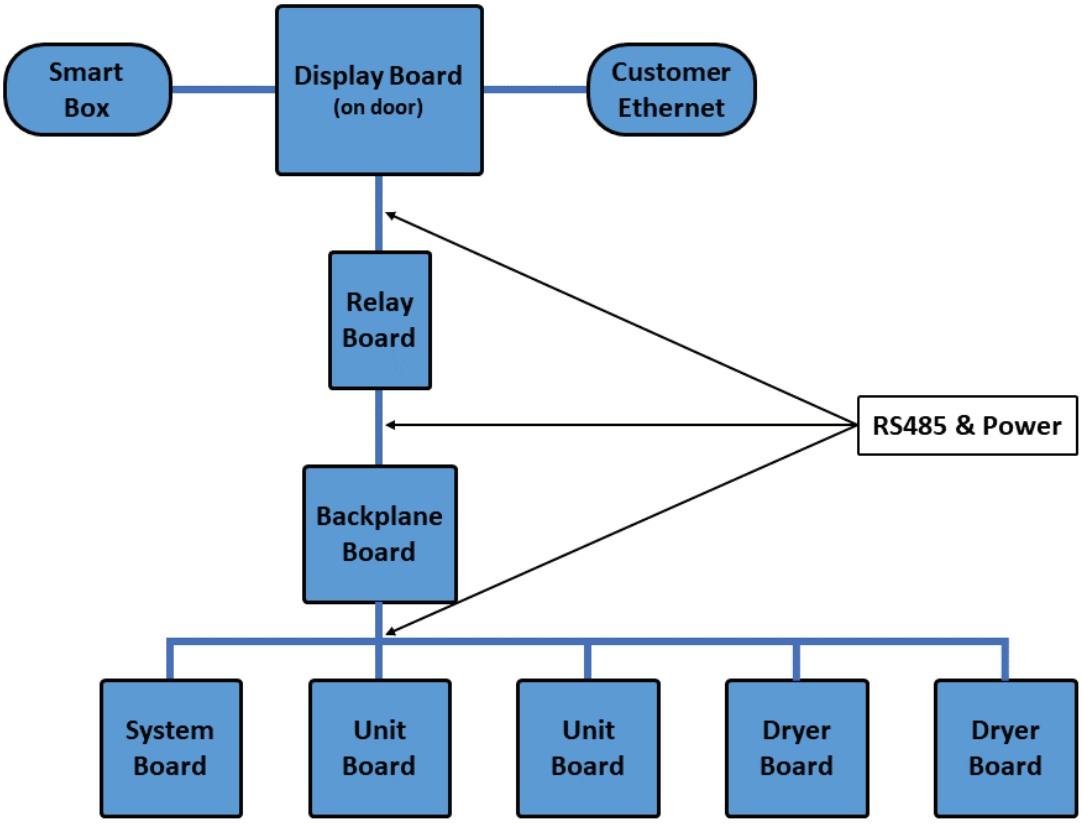
Description	Part No.	Qty Required
Calibration Kit*	4107 6532 36	1
CO Sensor Element	4107 6530 69	1
20 ppm Carbon Monoxide	4107 6525 14	1
Impurity Free Air (Zero Gas)	4107 6525 13	1

* Kit includes calibration connector, 20 ppm test gas and 0 ppm test gas in carrying case.

NOTE: CO Sensor is a component of the 2-Year System Sensor Kit as listed in Section 5.2.4. If purchasing the 2-Year System Sensor Kit, there is no need to purchase the CO Sensor listed above in addition.

Appendix D: TotalAlert 360 Control System

Figure D.1 Touchscreen Controls



All Boards Other than Display Board Mounted on Back Panel

Figure D.2 Duplex Medical Air Configuration - Printed Circuit Boards

Appendix D: TotalAlert 360 Control System

D.1 Board Configurations

The source control system is comprised of six (6) different printed circuit boards (PCBs) with interconnecting wiring (RS485) for internal communications between the boards. See Figure D.2. NOTE: The system, unit controller, and dryer controller boards are the same printed circuit board with different settings distinguishing them.

1. Display Board for 10.1" Touch Screen Display
2. Relay Board
3. Backplane Board
4. Control Board for System, Unit, or Dryer

In a standard medical air duplex system, the PCB configuration consists of the following quantities and types of boards:

- (1) Display Board
- (1) Relay Board
- (1) Backplane Board
- (1) System Control Board
- (2) Unit Control Boards
- (2) Dryer Control Boards

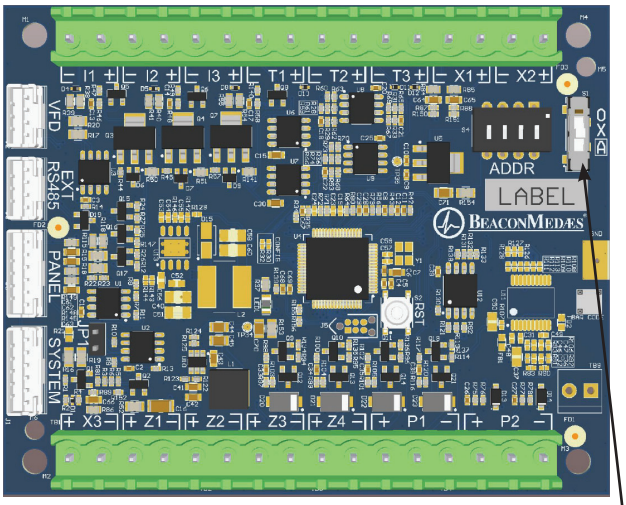
In a standard medical air quadruplex system, the PCB configuration consists of the following quantities and types of boards:

- (1) Display Board
- (1) Relay Board
- (2) Backplane Boards
- (1) System Control Board
- (4) Unit Control Boards
- (2) Dryer Control Boards

D.2 Manual Override

During the system startup, the manual override switch, located on the unit board, is utilized to ensure the unit is in the off position. The manual override switch on the unit board is a safety measure as well, for emergency situations to ensure the unit produces medical air.

In an emergency where the control system is not operating effectively, the manual override switch can be moved from the Automatic position to the Manual position. See Figure D.2.1. Moving to this position forces the pump to run based on pressure data from the backup pressure switch.



Manual Override Switch

O - On Manual
X - Off
A - Automatic

Unit Board with Manual Override Switch

Figure D.2.1 Manual Override

If the switch is in Manual or Off position on the unit board, the touchscreen controls no longer control the compressor. Moving the switch back to the Automatic position puts the unit under the control of the TotalAlert 360 control system.

Appendix D: TotalAlert 360 Control System

CAUTION: The "Manual Override" mode of operation should only be used for emergencies such as a loss of the display touchscreen and should not be used for normal operation.

D.3 10.1" Display Controller

D.3.1 Basic Software Architecture

The primary purpose of the display board is to drive the 10.1" LCD display. Its other functions include the following:

1. Communicate through the relay board and backplane board via RS485 bus to relay commands from the touch screen to the system, unit, and dryer boards.
2. Display messages from the system, unit, and dryer boards.
3. Interface to the 10.1" Display touch screen to interpret the user interaction.
4. Evaluate alarm signals.
5. Accept new firmware via the USB connection when connected to a system programmer configured with genuine **BeaconMedæs** software for reprogramming.

D.3.2 User Interface for Source Systems

Figure D.3.2.1 Main Screen

The user interface is displayed on a 10.1" 1280 x 800 pixel display as shown in Figure D.3.2.1. The interface is designed such that any information can be accessed with a minimal amount of touches by the user.

The 10.1" screen is divided into two main areas – the top portion above the toolbar which changes depending on the icon selected on the toolbar and bottom portion which contains the toolbar (Figure D.3.2.2) and is available on most screens.

Figure D.3.2.2 Screen Toolbar

D.3.3 System (Main) Screen

The system (main) screen (Figure D.3.2.1) shows the pertinent system measurements as well as unit sequence information.

The pertinent system measurements include: Pressure, Dew Point, and CO Level. Pressing a pertinent system data gauge shows Trend information for that value. See Figure D.3.4.1.

The Unit Button (Figure D.3.3.1) shows unit, status, and mode.

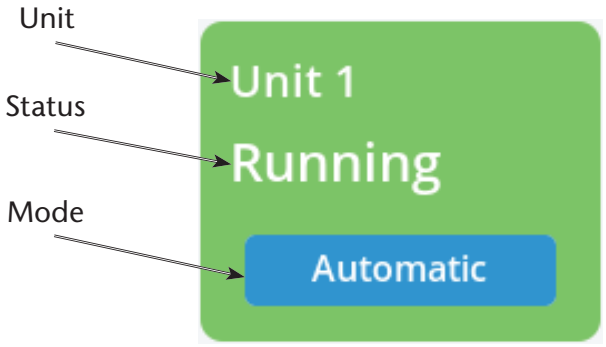


Figure D.3.3.1 Unit Button

Appendix D: TotalAlert 360 Control System

Mode Label	Mode Color	Status Label	Button Color
Automatic	Blue	Running	Green
		Next to Run	Lt. Blue
		Standby	Blue
Manual	Orange	Running	Orange
		Standby	Yellow
Off	Red	Stopped	Red
Override ON	Red	Running	Orange
		Standby	Yellow
Override OFF	Red	Stopped	Red
Emergency COM	Red	No Comms	Red
Expandable	Gray	Unavailable	White

Table D.3.3.1 Unit Mode & Status Configurations

Table D.3.3.1 shows the possible combinations of mode and status for a given unit. Depending on the combination of mode and status, a unit will be considered either available or unavailable. A unit is only considered available when the mode is Automatic and the status is either Next to Run or Standby. All other combinations result in the unit being considered unavailable. When the number of remaining available units reaches zero, the lag alarm will come on.

- In Automatic, the unit will start/stop depending on the system pressure and unit sequencing.
- In Manual, the unit will start/stop based on pressure readings from the backup pressure switch.
- In Off, the unit is stopped and will not run.
- In Override ON, the unit will start/stop based on pressure readings from the backup pressure switch.
- In Override OFF, the unit is stopped and will not run.
- In Emergency COM, communication between the controls and the unit has been disrupted. If a connection to the backup pressure switch is intact, the unit will start/stop based on pressure readings from the backup pressure switch. Otherwise, the unit will not run.
- In Expandable, the unit does not exist but can be added to the system.

D.3.4 Trend Screen

Figure D.3.4.1 Trend Screen

The trend screen (Figure D.3.4.1) shows the measured value over a specific time period:

- The default time period when opening the window is the last 60 minutes. For a given period, the maximum amount of data stored will only be for the most recent time period and the older data will be removed from view and memory.
- Another time period is selected by pressing the buttons above the trend chart. These periods are 60 minutes (600 data points – 0.1 min resolution), 6 hours (600 data points – 0.6 min resolution), 24 hours (600 data points – 2.4 min resolution) and 6 days (600 data points – 14.4 min resolution).
- There is an export button available underneath the gauge. When the export button is pressed, the data will be stored on the display board

Appendix D: TotalAlert 360 Control System

until it is transferred to a computer (If the system turns off, the export file will be lost). This transfer will require a USB-A to USB-A cable. Only one file can be stored on the display board at a time. If exporting multiple files, transfer each file before exporting the next file.

D.3.5 Unit Screen

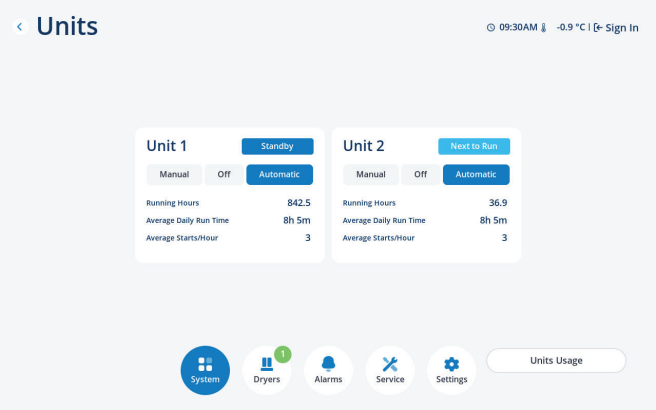


Figure D.3.5.1 Unit Screen

The unit screen (Figure D.3.5.1) shows the operation mode and status of each unit along with running hours, average daily run time, and average starts per hour.

The unit modes Automatic, Manual, and Off can be selected from the display. The override modes are set using the switch on the unit controller boards (Figure D.2.1), but will be shown on the display. If in an override mode, no other selection can be made using the display. See Section D.3.3 for further information on unit modes.

D.3.6 Units Usage

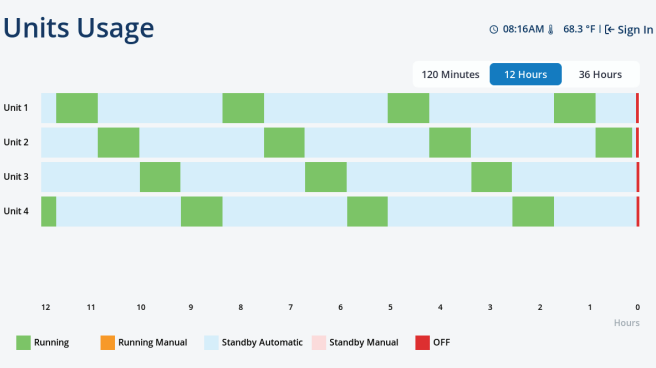


Figure D.3.6.1 Units Usage

The Units Usage screen (Figure D.3.6.1) can be accessed by selecting the button to the right of the toolbar on the Units screen. Once on the Units Usage screen, the user can view three different time intervals (120 minutes, 12 hours, and 36 hours) by using the buttons at the top right of the chart. The chart shows the running status of each unit during the selected time interval.

D.3.7 Dryer Screen (If Equipped)

Figure D.3.7.1 Dryer Screen

The dryer screen (Figure D.3.7.1) shows the operation mode of the dryer(s) and which tower is online:

Appendix D: TotalAlert 360 Control System

- The default view when the dryer screen is selected shows both dryer operation modes. If there are no dryers on the system, this screen is not available.
- The operation modes for the dryer: Automatic (Blue and dew point purge controlled), Off (Red and not running), Manual (Orange and timer controlled).
- The view on the dryers screen shows an image depicting the status of the dryer(s). The arrows indicate which tower is online (arrow pointing down) and which tower is offline (Checkmark or arrow pointing up). The arrow pointing up on the tower indicates that tower is purging. Once the purge cycle is complete and the dryer is ready to switch (based on dewpoint in automatic mode), the arrow on the tower is replaced with a check mark.

D.3.8 Alarms Screen

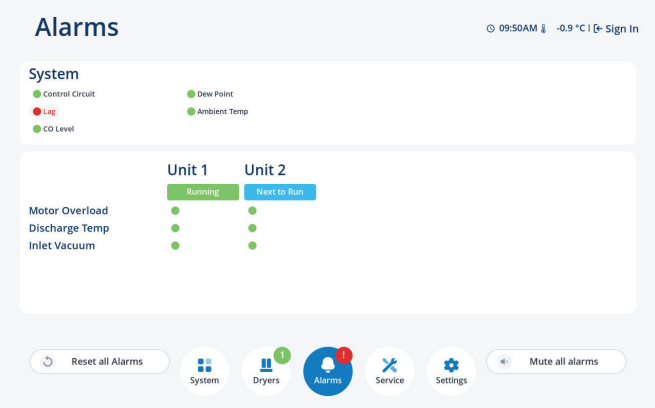


Figure D.3.8.1 Alarms Screen

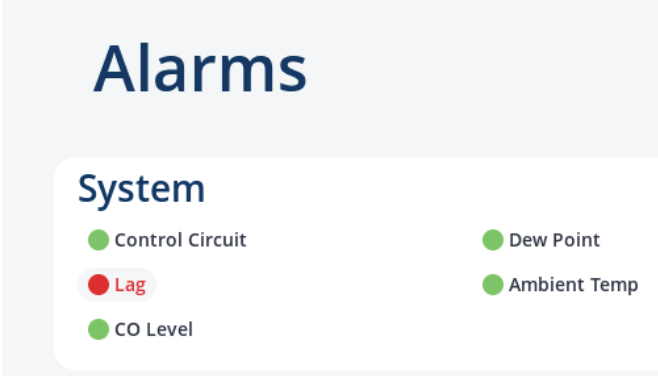


Figure D.3.8.2 System Alarm

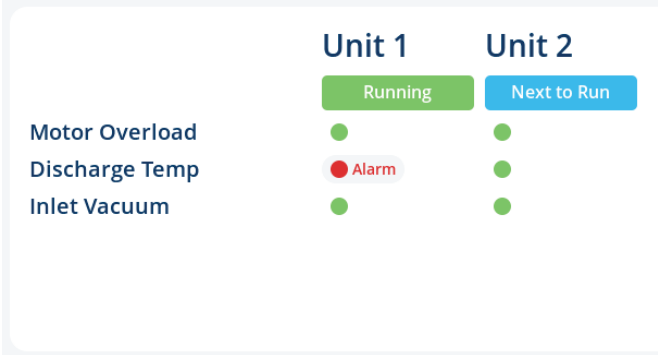


Figure D.3.8.3 Unit Alarm

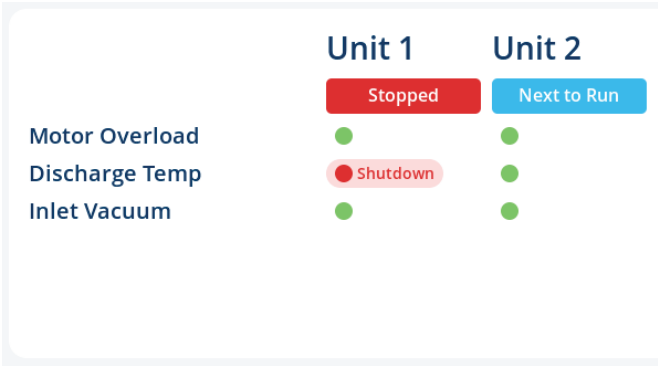


Figure D.3.8.4 Unit Shutdown

The alarms screen (Figure D.3.8.1) shows all of the system alarm and shutdown information. An alarm is classified as an event of significance that does not shut the system down. These alarms are latched and are not cleared until a user presses the reset button on the alarms screen and enters

Appendix D: TotalAlert 360 Control System

their initials. This reset button will reset all alarms for that given system. A shutdown is classified as an event of significance that shuts the unit down. Shutdown events are latched and are not cleared until the condition is corrected and a user presses the reset button on the alarms screen and enters their initials.

- Green condition indicates a normal status for that condition.
- Red condition indicates an abnormal status for that condition. The icon will be labelled "Alarm" or "Shutdown" as applicable.
- The horn silence button is at the bottom right of the screen.
- if the user is signed into the system, the initials associated with that account will automatically be entered in the event log when resetting an alarm. TC for technician, AD for admin, and any custom initials set up for established users. If not signed into the system, users will be prompted to enter their initials.

D.3.9 Service Screen

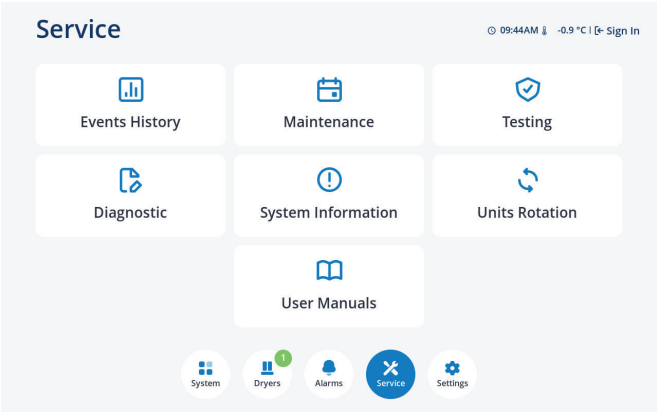


Figure D.3.9.1 Service Screen

Figure D.3.9.2 Diagnostic Screen

The service screen (Figure D.3.9.1) allows the selection of various sub screens:

- Events History – Displays a log of all recorded events. Data can be exported.
- Maintenance – Additional screens depicting suggested and required maintenance items with resettable timers. When maintenance is due, both the maintenance button and the service icon on the tool bar will have a red (!) symbol. See Section D.3.11 for more information.
- Testing – Allows the user to test all alarm events. See Section D.3.12 for more information.
- Diagnostic – Two tabs depicting the I/O status of the connecting unit controller board. The first tab (Figure D.3.9.2) lists the digital inputs (X1-X3 as 0 or 1), the analog readings (T1-T3, I1-I3, and P1-P2 with A/D values), the 24VDC powered digital outputs (Z1-Z4 as 0 or 1), as well as the statuses of "Fan Enable (Off/On)", "Backup Switch (Open/Closed)", and "Override Switch (On/Off/No)". The values on the first tab can be displayed in their raw state as described above or as converted values changed into their corresponding units of measurement (Note: Values from disconnected I/Os may also convert, but these converted values are incorrect and should be

Appendix D: TotalAlert 360 Control System

ignored). The second tab lists alarm contacts as "Open" or "Closed". "Open" contacts are in alarm state.

- System information – Displays the system serial and model numbers, wiring diagram number, system warranty level, ship date, startup date and person, as well as service contact number. Also contains software version.

- Units Rotation – Allows the user to run the unit for a short period to check rotation. Arrows located on the belt guard show the correct rotation direction (counter clockwise when facing the compressor pulley). Unit mode must be Off to test rotation.

- User Manuals – Contains a QR code that directs to the user manual for the system.

D.3.10 Events History Screen

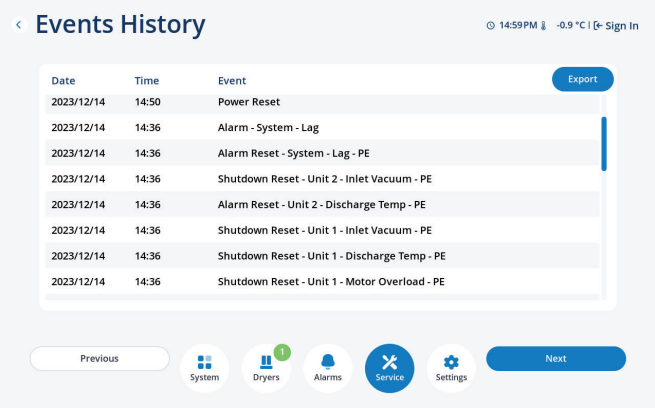


Figure D.3.10.1 Events History Screen

The Events History screen (Figure D.3.10.1) shows all of the system and unit event history excluding service maintenance history.

- Events are shown in descending date/time order. Located at the bottom of the screen to either side of the toolbar are buttons for navigating between pages. The maximum number of events is 200.

- There is an export button available at the top right of the table. When the export button is pressed, the data will be stored on the display board until it is transferred to a computer. This transfer will require a USB-A to USB-A cable. Only one file can be stored on the display board at a time. If exporting multiple files, transfer each file before exporting the next file.

D.3.11 Maintenance Screen

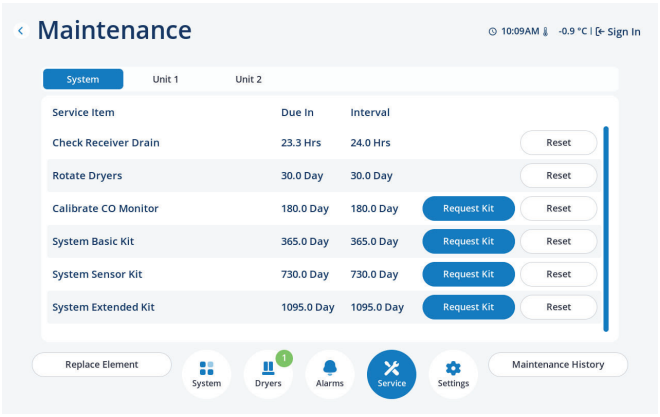


Figure D.3.11.1 System Maintenance Screen

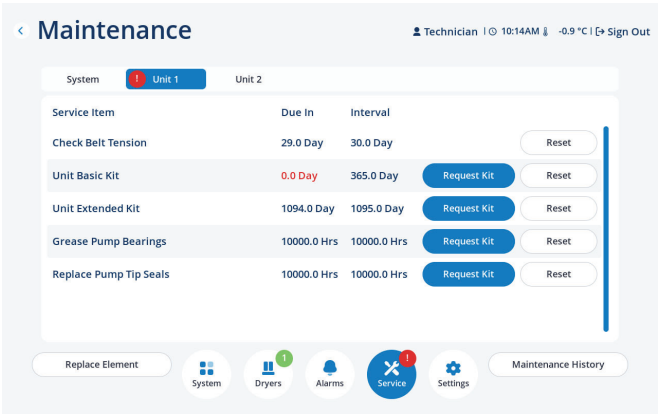


Figure D.3.11.2 Unit Maintenance Screen

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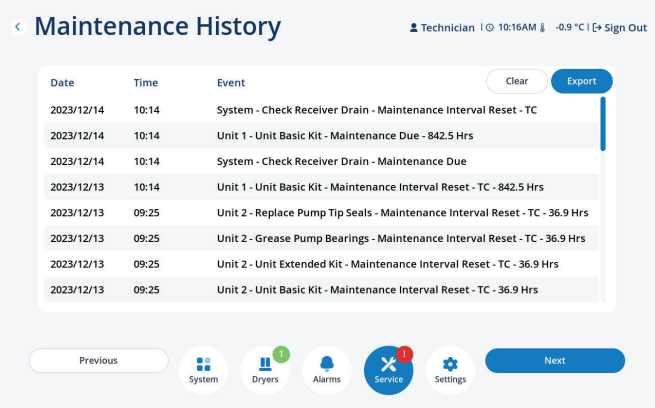

Figure D.3.11.3 Maintenance History Screen

The maintenance screens (Figures D.3.11.1-3) are accessed via the service screen:

- Multiple screens depicting maintenance items with resettable timers. If an item is past due the "Due In" column value will turn red and the service icon and appropriate tab will have a red (!) symbol.
- The first (default) tab shows the system maintenance. The other tabs across the top of the screen allow the user to access unit maintenance pages. When the user resets a timer, the action is logged in the service history.
- By selecting the Request Kit button, the user will be taken to a page with a QR code to access the kit information.
- After a service activity is performed, press the Reset button next to the appropriate service item and enter the users initials. If signed in, the users initials will be entered automatically.
- The Replace Element button to the left of the toolbar will reset all of the maintenance timers for the active page. The user must be signed in to use this function.
- Maintenance history is accessed by pressing the button to the right of the toolbar on the Maintenance screen. Once on the Maintenance History screen, the user will have the ability to navigate between pages using buttons on either side of the toolbar. Additionally, the user can either clear the history (with technician level access) or export the data using buttons at the top right of the table. When the export button is pressed, the data will be stored on the display board until it is transferred to a computer (If the system turns off, the export file will be lost). This transfer will require a USB-A to USB-A cable. Only one file can be stored on the display board at a time. If exporting multiple files, transfer each file before exporting the next file.

D.3.12 Testing Alarms

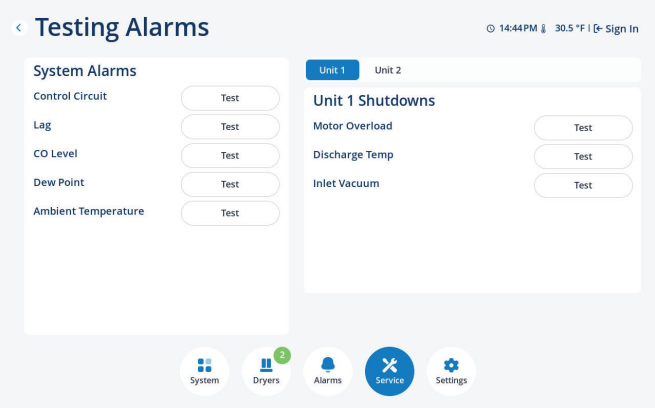

Figure D.3.12.1 Testing Alarms Screen

In the Service section of the Main screen and Unit screens, the operator can test each alarm and shutdown event. When an alarm/shutdown event is selected to test, the actual alarm/shutdown is latched. At this point, the system responds as if an actual alarm/shutdown has occurred.

CAUTION: If testing a shutdown event, the pump being tested will shut down. Notify the appropriate hospital personnel **BEFORE** testing any alarms.

For an alarm/shutdown event, the following will occur:

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- Unit shuts down (shutdown event only).
- The horn will initiate.
- Alarms screen will show the alarm/shutdown condition.
- An alarm/shutdown signal will be sent to the Master alarms.
- The operator must respond and reset the alarm/shutdown signal by pressing the "Reset all Alarms" button on the Alarms screen.
- A history item will be created that shows the "Test" alarm/shutdown event and a subsequent event for the correction of the "Test" item.

CAUTION: When testing a Shutdown condition, the pump shuts down and must be restarted after the test. Press Automatic on the Unit main screen.

D.3.13 Settings Screen

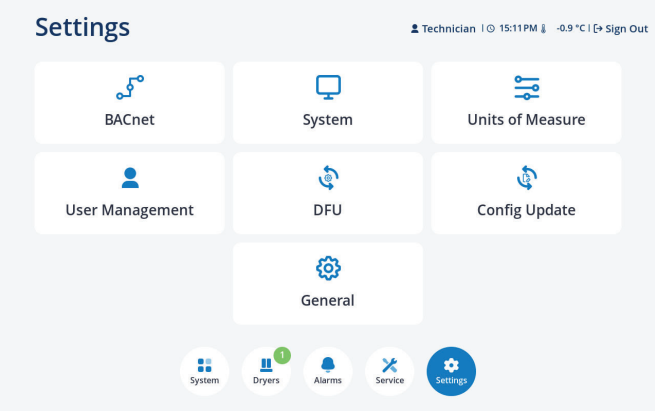

Figure D.3.13.1 Settings Screen

The settings screen (Figure D.3.13.1) allows the selection of various sub screens that pertain to system configuration data. All value/adjustment changes are password protected.

- BACnet – Displays BACnet connection information and settings. See Section D.5 for more information.
- System – Allows the adjustment of system vacuum operating range.
- Units of Measure – Allows changing units of measurement displayed by the system.
- General – Allows adjustment of horn reinitialization timer, system language, and date and time as well as activation of the backlight timer.

The below option is only available when signed in as a technician or admin.

- User Management – Allows user to create and manage user profiles.

The below options are only available when signed in as a technician.

- DFU – Reboots system in DFU mode.
- Config Update – Allows user to update system configuration.

D.4 User Access

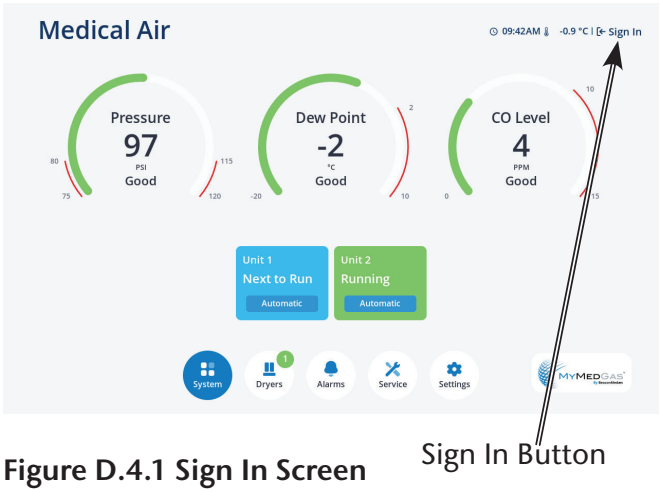

Figure D.4.1 Sign In Screen

The TotalAlert 360 control system can store up to five user profiles. There are three permission levels to which a profile can be assigned: technician, admin, and user. There will be one technician and one admin profile per system and up to three user

Appendix D: TotalAlert 360 Control System

profiles. The technician profile has the highest level of access followed by the admin and lastly the user. To sign in, select the "Sign In" button at the top right of the main screen. See Figure D.4.1. On this page, use the drop down to select the desired profile. It may be necessary to scroll down to find the intended profile. Then enter the correct password to sign into the selected profile.

D.4.1 Password Items

Some system settings require the user to be signed in to change. Certain settings are only available when the user is signed in as either an admin or technician. An Admin level profile will have the ability to change the Admin level settings as well as all User level settings. A Technician level profile will have the ability to change the Technician level settings as well as all Admin and User level settings.

User Level Settings:

- Adjust system pressure operating levels - Adjust the system operating pressure high and low levels within the min and max ranges.
- Set horn reinitialization timer - Turn the horn reinitialization timer on/off and set the timer. The horn will reinitiate at the set amount of time after being silenced.
- Test horn - Test the local alarm horn.
- Change display language - Change the language on the display.
- Change units of measure - Change the system units of measurement.
- Set date/time - Set the year, month, day and time on the display.
- Set BACnet settings - Configure settings for connecting to the BACnet system. See Section D.5 for more information.
- Turn backlight timer on/off - Turn on/off the backlight timer. Screen will dim after 15 minutes of no user input. Just touch the screen to return brightness to normal setting.
- Reset maintenance events - Reset the "Due In" timer on maintenance items.

Admin Level Settings

- All User level settings
- Create or delete user profiles - Create or delete User level profiles for adding additional users.

Technician Level Settings

- All User and Admin level settings
- Set maximum unit run time - Set how long a unit will run before the system will cycle to the next available unit.
- Set pressure reading offset - This offset will change the on-screen pressure reading by the selected value. This feature is used to align the pressure reading on the display with the gauge on the receiver. Possible values are +/-1, 2, or 3 psig.
- Change number of units installed - Used to add units on an expandable system.
- Change maintenance item intervals
- Adjust pressure min and max levels - Change set points for when units start and stop while running in Automatic mode.
- Reset events history log - Clear the events history log.
- Reset maintenance history log - Clear the maintenance history log.
- Reset user password - Reset the password for User or Admin profiles.

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D.5 BACnet

Figure D.5.1 BACnet Settings

This system is BACnet compatible. The user can connect to the system through the ethernet port on the top of the control cabinet. When signed in, the user can modify the following settings:

- Device Name
- Device ID
- IPv4
- Subnet Mask
- Gateway
- Port
- Foreign LifeTime
- Foreign IPv4
- Foreign Port

D.6 MyMedGas

D.6.1 Logging Daily Rounds

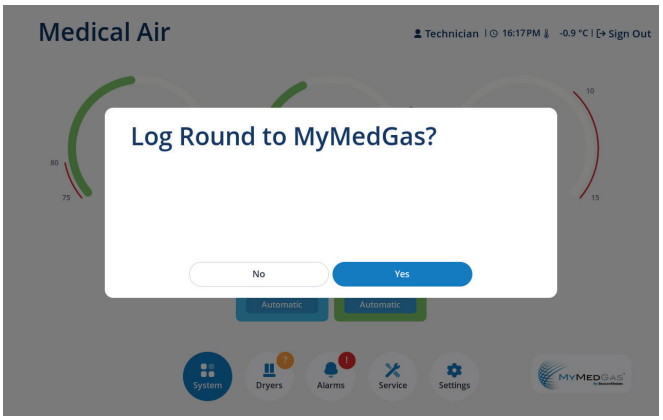

Figure D.6.1.1 Log Daily Round

The MyMedGas button at the bottom right of the main screen can be used to log a daily round to the MyMedGas system. This cellular communication is done via the SmartBox unit in the control cabinet.

D.6.2 MyMedGas Further Information

For further information, refer to the manual for MyMedGas.

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