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Nitrogen Generator Conex AP1001250

Manual



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NOTICE

Fans MUST be left on during charging operations. Fumes emitted from batteries during charging can be toxic.

PRECAUTIONS

- Read and save these instructions.
- DO NOT place foreign objects through the guard into blade. Never attempt to stop the fan blades when fan is in operation.
- ALWAYS turn off the fan to clean.
- American Patriot assumes no liability resulting from the improper use of this product.
- It is normal for the motor to feel warm to the touch during operation. The motor is thermally protected and will automatically shutoff should it overheat for any reason. The fan will automatically turn on once the motor has cooled.
- The motor bearings are permanently lubricated at the factory and do not require any lubrication.

CLEANING

- Use a damp rag and mild detergent to clean the blade and guard. Always turn fan off before attempting to clean.



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INTRODUCTION

1.1 AUDIENCE

This manual is intended for Installer/Equipment Operator/Supervisory Staff and should be read in its entirety prior to operation.

1.2 LIMITS OF LIABILITY

Buyer's exclusive remedy for all claims shall be for damages, and seller's total liability for any and all losses and damages arising out of any cause whatsoever including, without limitation, defects in or defective performance of the system, (whether such claim be based in contract, negligence, strictly liability, other tort or otherwise) shall in no event exceed the purchase price of the system in respect of which such cause arises or, at seller's option, the repair or replacement of such; and in no event shall seller be liable for incidental, consequential or punitive damages resulting from any such cause.

Seller shall not be liable for, and Buyer assumes all liability for, the suitability and the results of using nitrogen by itself or in any manufacturing or other industrial process or procedure, all personal injury and property damages connected with the possession, operation, maintenance, other use or resale of the System. Transportation charges for the return of the System shall not be paid unless authorized in advance by Seller.

NOTE: Any MODIFICATIONS made by the customer without the written consent will void the product's design specification

SAFETY GUIDELINES

The following section outlines the basic safety considerations regarding installation and operation of the nitrogen generator. For additional safety information regarding other equipment used in conjunction with the nitrogen generator, such as air compressors, dryers, boosters, etc., please refer to individual manufacturer recommendations and safety guidelines.

1.3 GENERAL SAFETY PRACTICES

Read carefully and act accordingly before installing, operating, or repairing the unit.

- Operator must use safe working practices and rules when operating the nitrogen generator.
- The owner is responsible for keeping the unit in safe operating condition at all times.
- Always use approved parts when performing maintenance and repairs. Make sure that replacement parts meet or exceed the original parts' specification.
- Only authorized, trained, and competent individuals are allowed to perform installation, operation, maintenance, and repair.
- Completely isolate incoming and outgoing pressures to the generator, and make sure to depressurize the service/repair section prior to performing any mechanical work, including changing the filters. The nitrogen generator's exhaust gas and/or any venting gas must be vented to the outside or to a large, well-ventilated room to avoid suffocation due to lack of oxygen.
- Safety glasses should be worn if the cabinet door is open while the machine is operating.

- Use ear protection when the equipment is operating.

WARNING: Pressurized gases are contained within the generator, the receiver, and product tanks. Pressurized gases are dangerous and may cause injury or death if handled or used inappropriately.

- Never allow pressurized gas to exhaust from an unsecured hose. An unsecured hose may exhibit a whipping action, which can cause serious injury. If a hose should burst during use, immediately close all isolation valves if it is safe to do so and power down the unit.
- Never disable or bypass any safety relief valves.
- Always make certain that the nitrogen generator is disconnected from the supply power prior to performing any electrical work.

NOTE: Always following local and site safety regulations in conjunction with this manual.

Correct use of the nitrogen generator is important for your personal safety. Incorrect safety practices can cause damage to yourself and/or to the equipment.

1.4 ROOM VENTILATION RECOMMENDATION

The nitrogen generator will exhaust a slightly higher oxygen (O₂) to nitrogen (N₂) concentration than normally found in air. Typically concentration will be between 20.9 to 40% O₂ balance with N₂. The volume of gas exhausted to the room is approximately equal to bed's pressurized volume at 50% of the incoming air pressure to the generator every minute. For example, let's assume the bed volume at atmosphere is 10 cubic feet, and the incoming air pressure is equal to 100 PSIG, then the calculations are as follows:

100 PSIG x 50% = 50 PSIG, then convert PSIG to PSIA, 50 PSIG + 14.7 PSIG = 64.7 PSIA, then convert to ATM, 64.7 PSIA / 14.7 (PSIA/ATM) = 4.4 ATM, then calculate total volume stored, 4.4 ATM x 10 cubic feet/ATM = 44 cubic feet, then consider this once every minute, 44 cubic feet / 1 minutes = 44 standard cubic feet per minute vented from the unit.

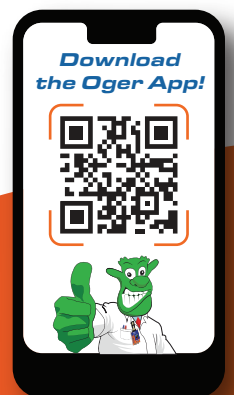
1.5 SAFETY INFORMATION

Nitrogen is not poisonous but it should not be directly inhaled, since in high concentrations, it can cause asphyxiation. Ensure that the unit is installed within a well-ventilated room, one that is not sealed off from normal living space air changes.

All personnel involved with installation, operations, and maintenance of the nitrogen generator must follow safe working practices, OSHA, and local health/safety code regulations during the installation, operation, and maintenance of the unit.

Warnings:

- This manual shall be read in its entirety before installing and operating the nitrogen generator to prevent accidents and damage.
- Use the nitrogen generator in accordance with its designed purpose.
- Qualified personnel are permitted to perform installation, maintenance, and repairs. Work performed by unqualified persons shall result in a voided warranty.
- Do not tamper with, experiment on, or exceed the technical specifications of the equipment.



RECEIVING, UNPACKING, AND STORAGE INSTRUCTIONS

1.6 RECEIVING EQUIPMENT

The Nitrogen Generator – Cylinder Fill and all components are securely packed to minimize possibilities of damages during shipment. The contents of the shipment should be inspected upon delivery to assure that no damage has taken place during transit. Save the packing material, as it may be necessary to return the generator in event of shipping damage. If any components are found to be damaged, the carrier should be notified immediately. The individual pieces should be checked against the packing list. If any discrepancy is found, contact your local distributor. Please include the model number and the serial number with all correspondence.

1.7 UNPACKING, MOVING, AND SECURING EQUIPMENT

The Nitrogen Generator Cylinder Fill is securely bolted down inside of a wooden crate and shipped upright. Removal of this system is easily accomplished by opening the wooden crate from the side that is stamped “open this side” and unbolting the unit from the bottom of the crate. To remove the HPCF out of the box, insert forks from the forklift through the open slots on the bottom skid of the generator. Slowly back the nitrogen generator out of the box and move it to its final location.

Once the equipment is moved to its final destination, follow all local/site codes for anchoring requirements and any other safety procedures in securing the equipment.

1.8 STORAGE INSTRUCTIONS

If the unit is not to be installed until a later date, a safe dry storage location is needed, preferably inside a controlled environment. Place desiccant packets into the electrical cabinet to keep moisture from damaging the electronics. Do not store around moving objects that could fall or damage the unit. If the unit is kept in storage for a long extended time (over 1 month), then the Oxygen Fuel Cell/Analyzer (if included) should be removed, taped off, and stored in a controlled environment.

SITE AND UTILITY REQUIREMENTS

The following requirements must be met to enable the nitrogen generator to perform at its design specifications. Deviation from these requirements may result in poor performance, injury to persons or machinery, and voiding of warranty.

1.9 AIR SUPPLY

Air supplied to the generator must be between 40-100°F (4-38°C) (unless specially designed – refer to unit specific design details), with a water dew point of 40°F (4°C) or better (some models will require -100°F (-73°C)). Air at temperatures higher or lower than this may cause damage not covered by warranty. Moisture content higher than specified may damage the adsorbent material and void the warranty. Other auxiliary equipment such as the air dryer, air and nitrogen pressure vessels must be sized correctly to the generator to meet full design specifications.

The nitrogen generators requires 100 PSIG minimum / 150 PSIG max incoming air pressure, but must be set per the design incoming air pressure to meet the purity and nitrogen production specifications. Operation at higher or lower pressures will result in a nitrogen production/purity above or below design. Operation at higher pressures than 150 PSIG may damage the media inside the pressure beds. Air consumption for each nitrogen generator depends on nitrogen product purity and flow rate. Please consult American Patriot Systems for specific details.

1.10 ADDITIONAL PIPING AND HOSES

The air supply piping components, supplied and installed by others, must be capable of supplying the required amount of max feed air at the required pressure measured at the generator inlet connection. It is safe to assume that the max feed air flowrate can be up to 3 times the specified average feed air flowrate (all incoming feed airflowrate references in any documentation regarding the nitrogen generator is considered average feed air unless otherwise noted). If the length of piping from the air receiver is greater than 50 feet, consult with a piping contractor for appropriate line size to still deliver the required air flow and pressure to the nitrogen generator.

1.11 ELECTRICAL REQUIREMENTS

Power supply must be 110 V or 220 V / 1 ph / 50 - 60 Hz as labeled on the unit. Operating amp draw is less than 2 amps. The nitrogen generator must be hard wired unless otherwise specified in the customer installation drawings. The internal control panel is UL 508A Open Industrial Control Panel approved with a 7 Amp time delay fuse. A hard copy of the electrical schematic is included with the system. Electronic copy available upon request.

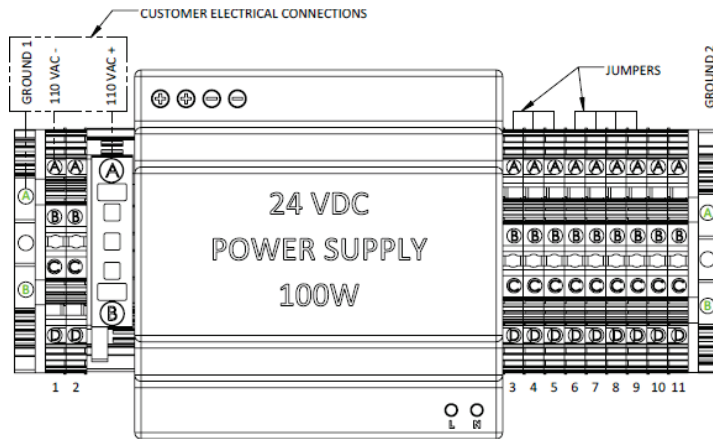


Figure 1: Customer Electrical Connection to Nitrogen Generator

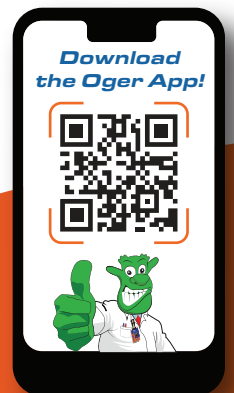
Note: Always obey all local and site code to finalize power connection to the equipment.

1.12 SITE SPECIFICATIONS

Select a non-hazardous area indoors (unless the unit was specifically design for other areas) for installation which remains above 33 °F / 0.5 °C and below 100 °F / 38 °C. Adequate space should be provided around the generator for access and routine maintenance. Ensure that there is enough space for the air receiver and product receiver skid next to the unit.

The exhaust piping from the nitrogen generator may be vented outside, but any additional piping used should be the same size or larger than the exhaust piping supplied with the generator. In the case where exhaust piping distance are greater than 10 feet, consult with a piping contractor for appropriate pipe size to keep the pressure drop less than 0.5 PSIG. Exhaust piping should provide minimal restrictions, and should be as short as possible.

1.13 OUTDOOR PACKAGE UNITS (OPTIONAL)



The outdoor package allows the nitrogen generators to be installed outdoors with limitations (refer to project specifications for details). It is highly recommended that a roof and or walls help shield from driving rains when possible.

The typical outdoor package upgrades includes:

- Nitrogen generator's electronics components are installed in a NEMA Type 4 style cabinet.
- The cabinet has a nitrogen purge from the nitrogen storage tank. This allows the cabinet to maintain a low dew point which keeps the cabinet dry. Always keep the cabinet closed to protect the internal components.
- The cabinet may have a cooler and/or heater depending on the outdoor environment to keep the electronics within their operational range of 40°F (5°C) to 104°F (40°C) with a relative humidity of 10%-90% non- condensing.

SYSTEM INSTALLATION

This section provides a step-by-step Nitrogen Generator HPCF installation procedure with consideration of other peripheral equipment.

1. Follow the instructions for unloading/unpacking the system as described in Section 3.2 Unpacking, Moving, and Securing Equipment.
2. Position the nitrogen generator in an area as described in Section 4.4 Site Specifications. Lift the system carefully to avoid damaging components.
3. Review the supplied customer "General Arrangement Drawing" (included in the documentation package) for detailed designed layout drawings specific to the package. This may include a combination of an air compressor, air dryer, air cooler, air receiver tank, air filtration, nitrogen generator, nitrogen storage tank, and/or nitrogen booster.
4. Carefully lift the equipment and position them in a manner most suitable to the site conditions. Use lifting and strapping devices that are rated to move the equipment. It is recommended to locate the nitrogen storage tank as close to the nitrogen generator as possible.

NOTE: Carefully attach lifting devices and other rigging devices to limit heavy impacts and jolting motions which may damage internal components/material.

5. Install other equipment included in the package (ie: air compressor and refrigerant dryer) in accordance with the original equipment manufacturer's instructions. Complete the connecting plumbing between components as described in the "General Arrangement Drawing" included with the nitrogen generator. Connection plumbing to other components are not supplied as a standard option. Final pipe sizing is to be determined by the local pipe contractor.

WARNING: Only use materials with compatible pressure rating on components on the product pipe lines.

6. Follow local codes when installing tank accessories such as safety relief valves, gauges and

isolation valves. If tank accessories are included with the package, please refer to the "Detail Tank Drawings" included with the nitrogen generator.

7. A qualified electrician should ensure correct available power and complete all electrical connections to the equipment. Connect the nitrogen generator into an approved electrical box with the correct voltage and frequency. Connect any other electrical equipment in the package per the original equipment manufacturer's instructions.
8. Check all fittings and piping/hose connections for pressure leaks.

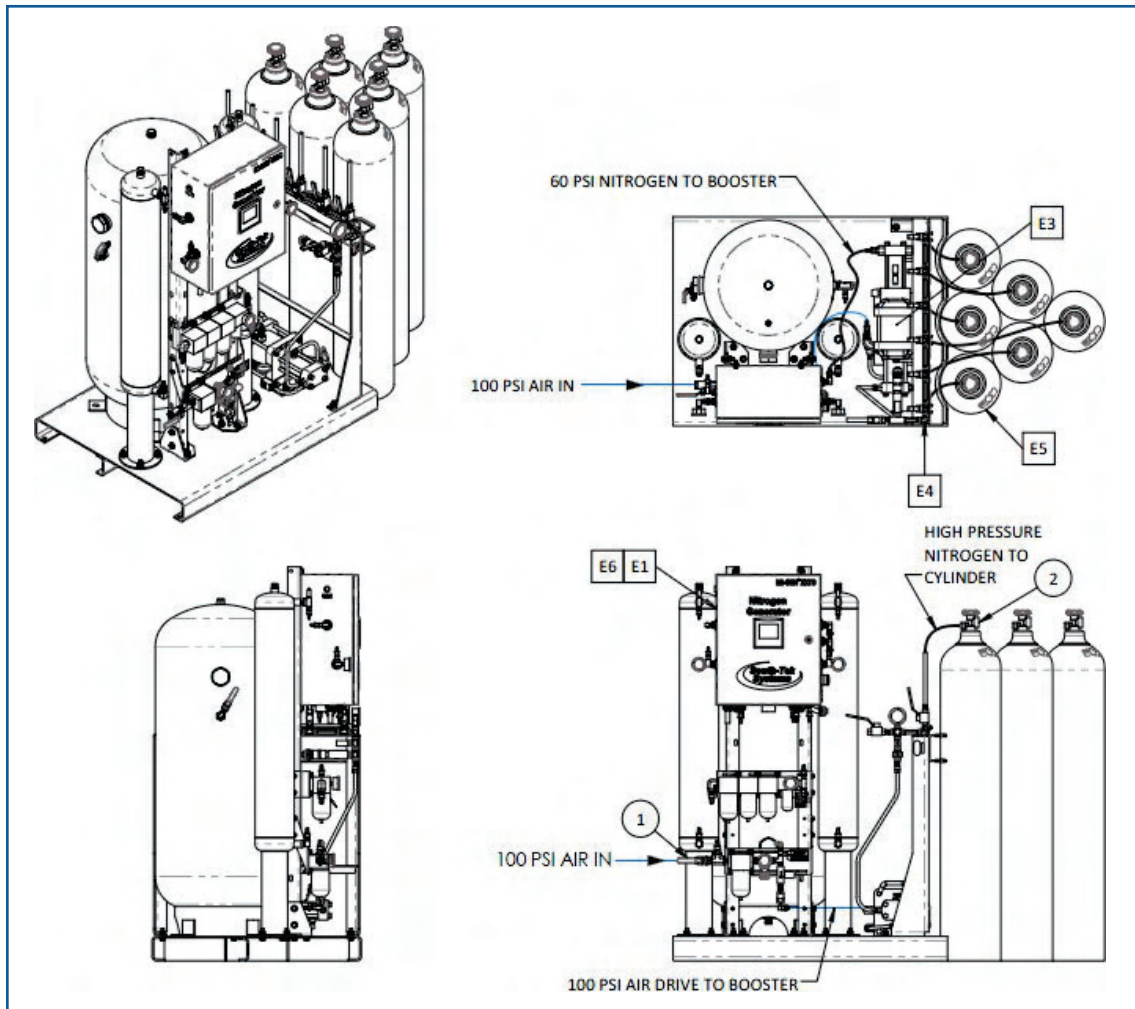
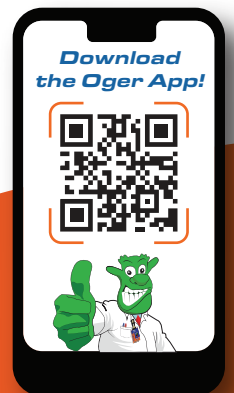


Figure 2: Typical Setup for Nitrogen Generator Cylinder Fill System (Picture is of a 6 Cylinder Filling Station)



SYSTEM DESIGN

SPECIFICATIONS

The table below is a general specification for standard Nitrogen Generator HPCF. Refer to specification project documents for specific details of the unit.

Table 1: Specification Table

General Specifications (see Unit Detail Drawing for Specific Design Data)	
Nitrogen Purity	95-99.999% (purity is set at factory)
Installation	Floor standing, Skid Mount
Display	Display 3.5" Full Touchscreen
# of K cylinder / day	1/2/4/6 bottles per day system available
Cabinet Port Connections	Cabinet Port Connections NPT Female
Electrical	Electrical 110-220V / 50-60Hz / 1Phase; < 2 Op Amps
Ambient Temperature	Ambient Temperature 40° to 104°F (4° to 40°C)
Noise Level (dbA)	Noise Level (dbA) < 90 dbA

STANDARD FEATURES

The Nitrogen Generator HPCF key features include the following:

- Incoming Air Filters and Regulator
- Programmable Logic Controller (PLC) with User Touchscreen
- Pressure Swing Adsorption Beds
- Pressure Transducer
- Safety Relief Valves
- N2 Storage Tank
- N2 Air Amplifier and High Pressure 588 CGA connection

Incoming Air Filters and Regulator:

The nitrogen generator includes (3) filters, a 5 micron particulate, 0.01 micron coalescing, and a 0.003 micron activated carbon absorber filter for the incoming compressed air source. The particulate filter element meets or exceeds ISO Class 3 for maximum particle size and concentration of solid contaminants. The coalescing filter element exceeds ISO Class 1 for maximum particle size and concentration of solid contaminants, and exceed Class 1 on maximum oil content (ppm/wt). The absorber filter element exceeds ISO Class 1 on maximum oil content (ppm/wt).

Table 2: ISO 8573-1 Air Quality Standards

ISO Quality Class	Solid / Dirt Particle size in micron	Vapor Pressure Dewpoint Oil (including Vapor)			
		°C	°F	Mg/m ³	PPM
0	As specified by the equipment supplier and more stringent than Class 1				
1	0.1	-70	-94	0.01	0.008
2	1	-40	-40	0.1	0.08
3	5	-20	-4	1	0.8
4	15	3	38	5	4
5	40	7	45	25	21
6	-	10	50	-	-

All incoming air filter/regulator set will be arranged as follows: particulate, coalescing, absorber, and then pressure regulator (if included).

The nitrogen generators will include a built-in air pressure regulator to regulate incoming air. Depending on the incoming air pressure to the regulator, it may need to be re-adjusted at site. If the unit is not receiving the designed incoming air pressure, check issues with the air compressor and/or restrictions in the pipe line to the nitrogen generator.

****Note – Incoming air pressure should be set so that the bed pressure reaches within 3 psig of the incoming design pressure at the end of each half cycle (which is right when the bed pressure switches).**

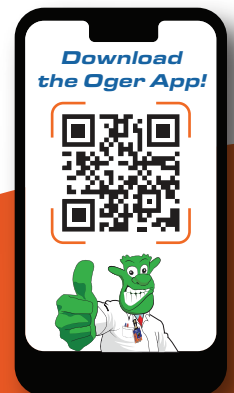
Programmable Logic Controller (PLC) with User Touchscreen:

There is an integrated PLC with a full color touchscreen. It features smart and efficient coding to maximize the performance. It controls the timing and sequencing of the valves to move compressed gas throughout the system. It is programmed to automatically go in and out of "standby" based on the storage tank pressure. A visual touchscreen is included which displays information such as run hours, alarms, sensor readings, and graphs of historical data.

Pressure Swing Adsorption Beds:

Every unit is equipped with a pair of pressurized vessels containing carbon molecular sieve. These vessels are referred to as "Adsorption Beds". They each contain a safety relief valve and pressure gauge. Larger adsorption beds (16" diameter and larger) will also contain manual ball valves to relieve the pressure from the beds. Beds over 10" in diameter will come certified ASME.

Pressure Transducer:



An electronic pressure transducer is installed in the control panel to measure the pressure in the nitrogen storage tank. The PLC utilizes this information to automatically start and stop the nitrogen generator. It tracks the pressure levels and charts it on the graph screen for the past (2) hours. The user can input a low tank pressure level for alarm notification which will display on the screen.

Safety Relief Valves:

Safety relief valves are installed on the system for maximum safety. They are ASME approved. Follow local/site codes for safe venting requirements.

N2 Storage Tank:

A N2 Storage Tank, if supplied from American Patriot Systems, will come with an input and output ball valve, a safety relief valve, a pressure gauge, and a gas sample port. Some of the instruments may require installation on site. Refer to the "General Arrangement Drawing" and "Detailed Tank Drawing" for connection sizes and proper installation of loose instruments.

N2 Air Amplifier and High Pressure 508 CGA connection:

An Air Amplifier is included to boost up the nitrogen pressure up to 2200 PSIG. It includes a safety relief, pressure gauge, line pressure relief ball valve, and a metal braided line with a 508 CGA connection fitting to mate with the K cylinder.

OPTIONAL FEATURES

Oxygen Analyzer

An oxygen analyzer is an optional piece of instrument that can be installed with the nitrogen generator to verify the purity of the nitrogen in the storage tank. Depending on the purity of the nitrogen generator, two different types of analyzer are available.

For all units designed for 99.5% or lower, a galvanic cell type can be installed. The chemistry of the sensor is unique in that it implements a weak acid electrolyte and is unaffected by CO₂, CO, and NO_x. It has a response time of 25 seconds or less and will respond to a 90% step change in oxygen concentration within 15 seconds or better.

For all units designed for 99.9% or higher, a Zirconium Oxide oxygen sensor can be installed. This sensor reads the O₂ content in terms of parts per million (ppm). 99.9% is equivalent to 1000 ppm. This is calculated by taking 1000ppm and dividing it by 1,000,000 ppm which equals 0.001 = 0.1% O₂. Then, if assuming that the product in the storage tank is composed of only nitrogen and oxygen, 100% - 0.1% O₂ equal 99.9% N₂.

Both types of sensors are installed inside the cabinet enclosure and receive a small sample flow from the nitrogen storage tank to continuously monitor the nitrogen purity. Both sensors also have an output exhaust port that relieves excess flow. It is important not to plug or restrict this flow; doing so will cause damage to the sensor.

If the O₂ analyzer is included, the system will come with the sample line already connected to the O₂

sensor since the nitrogen tank is integrated on the skid with the nitrogen generator.

The O₂ sensor provides a digital signal that is sent to the PLC. It is then converted into an engineering valve and sent to the main screen for user visibility. All alarms can be set up via the touchscreen. The Zirconium Oxide oxygen sensor can have alarm set up via on the touchscreen or on the physical equipment.

SYSTEM CONTROLS AND COMMUNICATIONS

The nitrogen generator comes with controls and instrumentations uniquely programmed (proprietary to American Patriot) with a control sequence to effectively and efficiently generate high quality nitrogen on demand. It can be customized and engineered to meet specific needs. Unauthorized changes to the system will void all warranties and may cause damages to the system or cause it to malfunction.

This section describes the function of the major controls and instrumentations associated with the nitrogen generators. Do not attempt to alter any controls or instrumentations; any changes without consent will void the performance specifications unique to the system.

The PLC is used for the control sequence of the valves and controls the nitrogen generator's functionality. All programs are proprietary and password protected from the factory.

Note: Controls for supporting equipment, such as the compressor and dryer, are not included in this section. Please consult the original manufacturer's instructions for further information.

HOME SCREEN

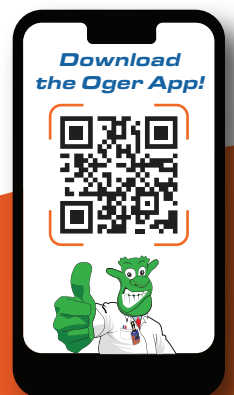
The home screen displays relevant information regarding the nitrogen generator such as system status, purity set-point, nitrogen storage tank pressure/purity (if sensor option is included), and run hours. The user can manually start/stop and navigate to either the "Menu", "Graph" or "Alarms" (if any alarms are active) screens.

POWERING ON/OFF

Powering On/Off the unit can be done with an external power switch or disconnect, typically supplied by others.

STARTING/STOPPING

The nitrogen generator can be started and stopped on the controller touchscreen. The "Start/Stop"



button is located in the upper left corner. When illuminated green, the unit is has been started and is considered "On". When illuminated red, the unit is "Stopped" and considered "Off". To change from the "On/Off" state, pres s the "Start/Stop" button and the switch will change colors indicating a mode change.

When the system is stopped, all valves will return to the normal position. The air compressor does not need to be valved off from the generator as the internal valving system will automatically stop air flow to the system. It is recommended, though, to valve off the nitrogen storage tank outlet to the process so that the pressure levels in the tank do not fall below the cut-in pressure. Losing the tank pressure may cause the purity to fall out of specification for a brief period when the unit is restarted.

When the nitrogen generator is in the "On" state, it will automatically cycle through the adsorption beds to produce nitrogen to fill the storage tank. Once the storage tank reaches the cut-out pressure, it automatically goes into a "Standby" state, where it pauses the production of nitrogen. Once the storage tank pressure falls to the cut-in pressure, the system will automatically re-start and produce nitrogen to the tank again.

SYSTEM RUN HOURS

On the "Home Screen", the system run hours is displayed in the upper right hand corner below the current time and date. The run hours are calculated when the system is actually cycling and producing nitrogen. The "standby hours" are not included.

TRENDING GRAPHS

The "Graph" button on the "Home" screen will bring up historical trending data of the sensors included with the generator. Every generator will include a nitrogen storage pressure transducer, therefore, every unit will trend the tank pressure. Other optional graphing displays include oxygen purity, air flow, nitrogen flow, and incoming air pressure. Please contact American Patriot if other graphical displays are desired.

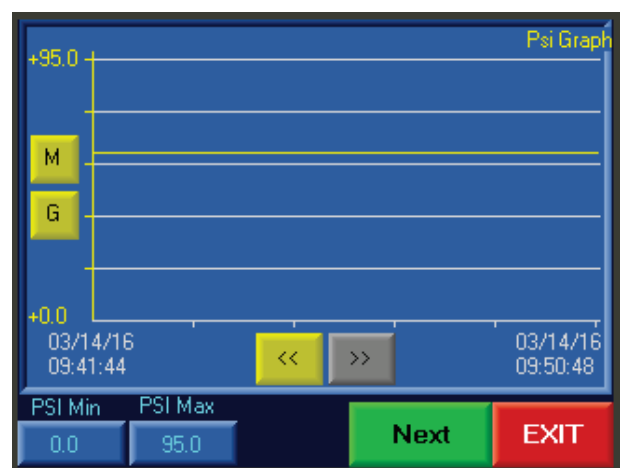
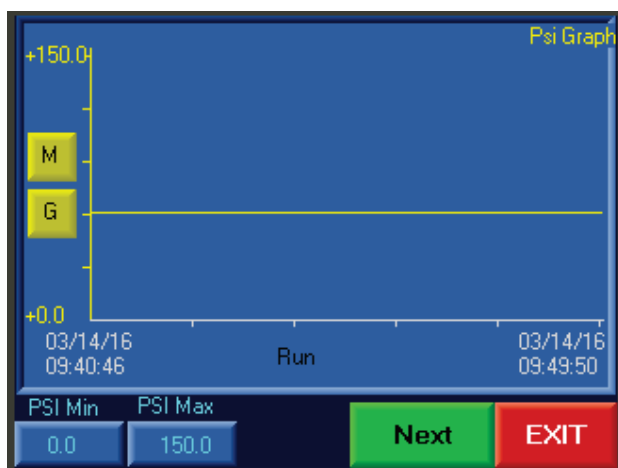


Figure 3: Left - Graph Screen, Right, Graph Screen with History Scroll and Grid Lines

The user can adjust the "Y-Axis" scale (pressure reading range) by adjusting the min and max values

in the lower left corner of the screen. Press the box and a numerical keypad will appear. Enter in the desired values and press enter. The graph will automatically adjust once the min and max values are entered.

The "M" button is for scrolling through the history and the "G" button is to bring up horizontal gridlines. Press the "Next" button to go to the next graph, or press the "Exit" button to return to the home screen.

MENU SCREEN

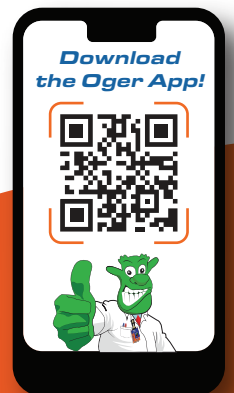
The "Main Menu" screen (accessed from home screen), is password protected. Please consult the second page under "Revision History" of the provided hard-copy manual for the user password.



Figure 4: Main Menu Screen

Once access is granted to the "Main Menu", the user can access all but the "Factory Settings" options shown in the above figure.

SENSOR SETUP/CALIBRATION



The "Sensor Setup/Calibration" screen allows the user to calibrate sensors included with the nitrogen generator. Every unit will have a nitrogen storage pressure sensor and typically, the oxygen (O₂) sensor is recommended as an add-on. Other additional sensors that are available include incoming air temperature, incoming air pressure, incoming air flow meter, incoming air pressure dewpoint meter, nitrogen out pressure dewpoint meter, and/or nitrogen out flowmeter.



Figure 5: Left Screen - Sensor Calibration Selection, Right Screen - 2-Pt Calibration Values

All sensors are setup with a 2-point linear calibration. To setup the calibration, the user will need two known points. It is best to select two points at opposite ends of the sensor's calibration range. The following chart is the recommended 2-Point Calibration range for the "Low" and "High" point.

Table 3: Recommended 2-Point Calibration Ranges

	Calibration Value Ranges	
	Low Point	High Point
Pressure	0-5 PSIG	100-150 PSIG
O ₂ %	0.5-1.5% O ₂	10-21% O ₂
O ₂ PPM	100 PPM	1000 PPM

The "Low Limit Raw" and "High Limit Raw" are determined by the "current raw" reading at the time the known calibration source is applied to the sensors. For example, when the known pressure is 0 PSIG to the pressure sensor, read the "Current Raw" value and enter that in the box next to the "Low Limit Raw" text. Then apply a known pressure of 100 PSIG to the sensor and read the "Current Raw" value (which should be different – if not, the sensor or wiring connection may be bad) and enter that value in the box next to the "High Limit Raw" text.

Other notes for calibrating units with % O₂ sensors:

1. Make sure certified gas is being used for the low point.
2. Clean dry compressed air (20.9) can be used for the high point.

3. Make sure to only flow 1-2 scfh to the sensor. Higher flow may damage the sensor.
4. Never block the outlet purge line – it is a ¼" OD polytubing that extends 12-18" from the output of the sensor.

1.14 ALARMS/FILTER PARAMETERS

The "Alarms/Filter Parameters" menu displays the O2 alarms and low pressure alarm setpoints.



Figure 6: Alarm Setup Screen

The box next to the "O2 High Level" and "Low N2 Tank Press" is the user alarm setpoint. The "O2 Alarm" is triggered when the current O2 purity reading is higher than the setpoint value, and the "Low N2 Tank Press" alarm is triggered when the current nitrogen tank pressure reading is below the setpoint value. These alarms can be disabled by toggling the "On/Off" button on the "Alarm Setup" screen.

The red "Alarm" button (bottom right corner) will bring up a secondary "Alarm Status" screen. Here, the user can get a read out of the current alarm statuses. The user can get more information by going to "Filters Info", "Alarm Details", "Alarm History", or "Clear History".

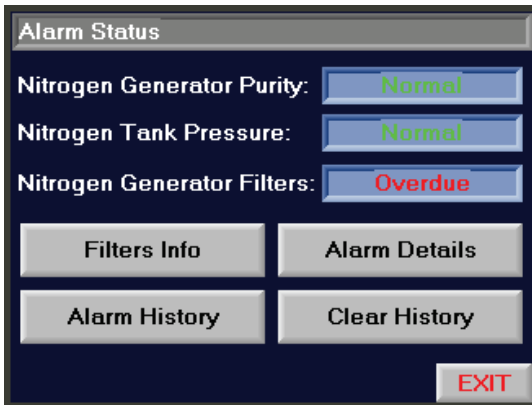
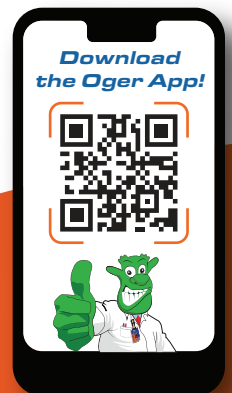


Figure 7: Alarm Status Screen

Alarm Details:

The "Alarm Details" screen will allow the user to see a list of alarms and when the alarm was triggered (time and date).



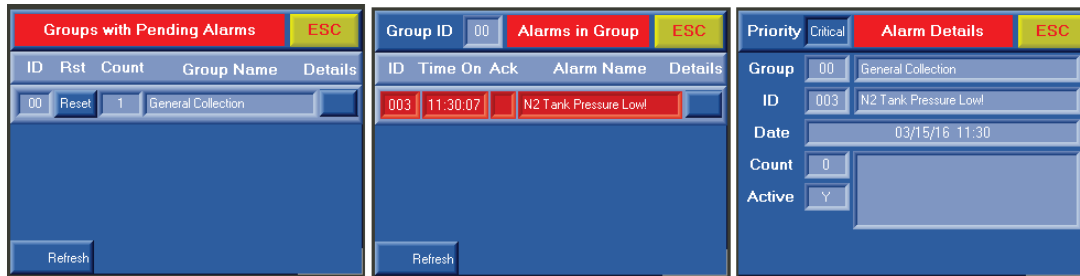


Figure 8: Alarm Detail Screens (Button below "Details" Column Brings up the Next Screen)

Alarm History/Clear Alarm History:

Pressing the "Alarm History" button will take you to the alarm history log. Here, the user can scroll through the history of alarms and see what alarm, when it was triggered, time, duration, and when it was deactivated. Up to 256 alarms can be stored. The user can clear the alarm history log pressing the "Clear History" button. It will bring up another screen requesting an entry of "1111" to confirm clearing the alarm history.

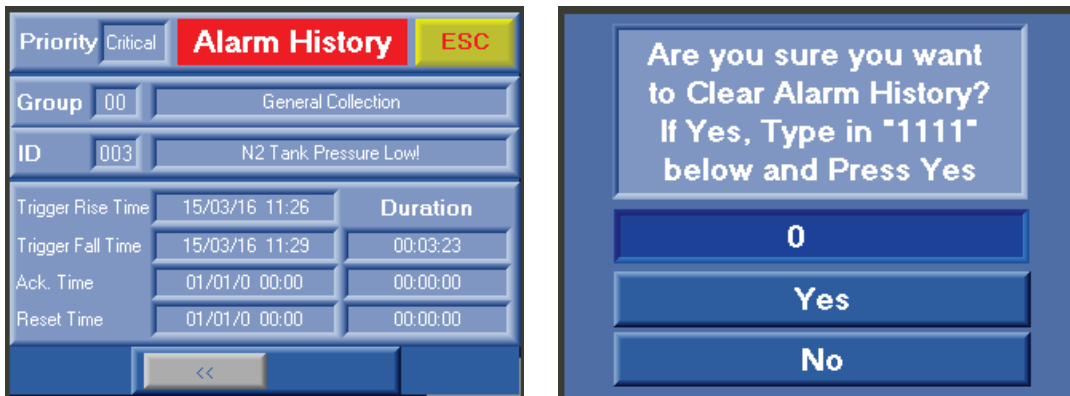


Figure 9: Alarm History Log (Left), Clear Alarm History Confirmation

Screen (Right) Filter Information Screens:

The "Filter Info" screen will display the current filter status of either "Good" or "Overdue". If "Overdue" is highlighted, it is advisable to change out the corresponding filter as soon as possible. Once changed out, the user can press the corresponding green filter element button to reset the filter calendar.

The "FRP Freq" screen will display the factory recommended filter element replacement schedule. It will also display the current status of each individual filter – "Ok" or "Overdue". The user can reset the filters by pressing the reset button.

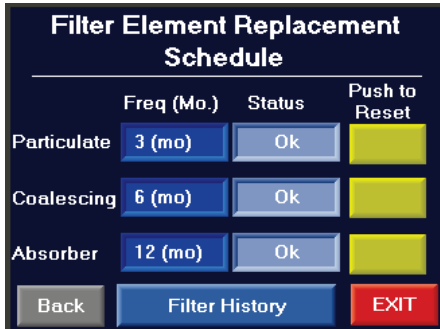


Figure 10: "FRP Freq" - Filter Replacement Parts Frequency

The "Filter History" screen will display the last change dates of each individual filter element. The grey arrow button in the upper right will allow the user to manually enter in the last change dates if for some reason the filter change acknowledgement button was prematurely pressed.

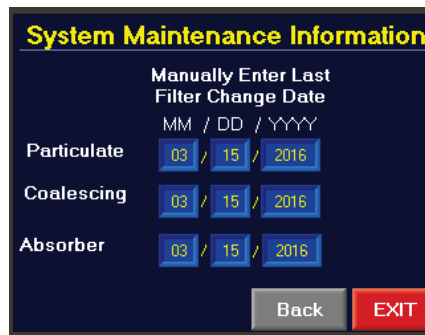
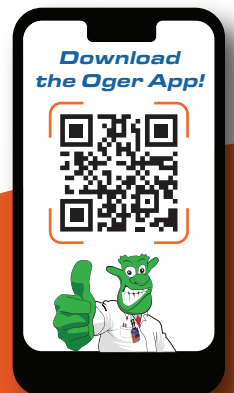


Figure 11: Element Last Change Date (Left), Manual Entry of Last Element Change Date (Right)

1.15 PRESSURE CUT-IN/CUT-OUT SETUP

The nitrogen generator is equipped with a pressure transducer to measure the nitrogen storage tank pressure. It is connected to the controller and the value is used to determine the cut-in and cut-out pressures, allowing the system to be more energy efficient. When the nitrogen storage tank reaches the cut-out pressure, the generator will go into a "standby" mode, where the delivery of air to the nitrogen generator will stop, and therefore, the production of nitrogen to the storage tank will also stop. The system will stay in standby until the nitrogen storage tank pressure falls to the cut-in pressure. The nitrogen generator will resume separating the oxygen from the compressed air and delivering nitrogen to the storage tank.

Note: The cut in / cut out settings are factory set and should not be adjusted. Adjusting the settings may alter the nitrogen purity and flow capabilities.



To see what the factory setpoints are, the user can press the "Menu" button from the main screen, then "Cut-in / Cut-out Parameters".

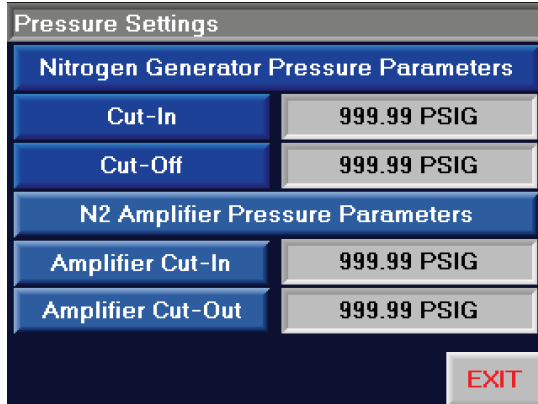
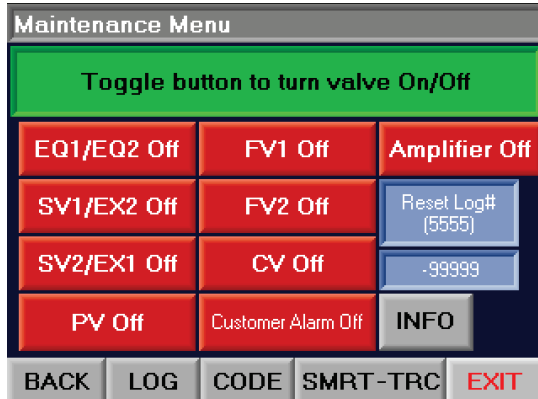


Figure 12: Pressure Setup Screen

MAINTENANCE MENU

The "Maintenance Menu" allows the user to individually toggle each valve to verify that they are working. It is recommended to have the unit in the "Stopped" mode and the nitrogen outlet valve (from the nitrogen generator) valved off prior to toggling the valves individually. Make sure to reset the valves



to "Off" prior to restarting the system.

Figure 13: Maintenance Menu Screen

INFORMATION SCREEN

The "Information" screen will provide specific details such as current run hours, software version, manufacture build

date, serial #, and date of commission. There is a short cut button to show the filter history too.

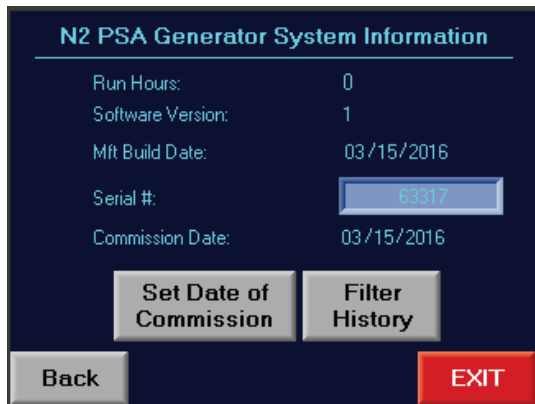


Figure 14: Information Screen

LOGGING FUNCTIONALITY (OPTIONAL)

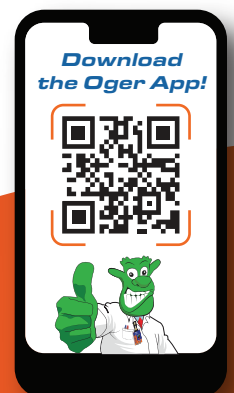
The logging functionality is an optional feature that allows the user to capture and record the system's data. To maximize the full logging capabilities, the system must be designed to equip an air flowmeter, N2 flowmeter, O2 analyzer, nitrogen storage pressure transducer (standard), incoming air pressure transducer, and incoming air thermocouple. The table displays the current, average, max, and min values once the log is started (which can be started by pressing the "Press to Start Data Analysis" button located on the bottom left corner). Pressing the "Press to Stop Data Analysis" will pause the data collection, and then pressing the "Press to Start Data Analysis" will resume data collection. In order to restart the data collection with a fresh set of data, the user must press the "Reset Stats" button and then pressing the "Press to Start Data Analysis" button.



Figure 15: Data Logging

Screen Logging to SD Card:

In order to log the data to a Microsoft .CSV file (MS Excel file), a specially formatted American Patriot



System's micro SD card must be inserted into the controller. If the unit was purchased with the "Logging Functionality" option, the micro SD card will already be inserted to the controller (located on upper left side – looking at the back of the controller).

To start logging to SD card, do the following in the order listed:

1. Make sure the screen reads: "SD Card: OK" in the lower right corner of the screen.
2. Reset the Stats.
3. Press "Press to Log to Excel".
4. Press "Press to Start Data Analysis", and the data will start recording to the SD card.

To stop logging and retrieve data, do the following in the order listed:

1. Press "Press to Stop Excel Logging".
2. Press "Remove SD" card.
3. Wait for the green "Ready" message below the "Remove SD" button. If the message does not appear after 5 seconds, press it again.
4. Once the "Ready" message appears, remove the SD card from the back of the controller and insert it to a computer.
5. Open up the computer drive that the SD card is loaded on and open the folder.
6. To get to the file, navigate through the following folders: Excel > Excel 1. Within the "Excel 1" folder, find the file # to which the file was saved under (the file number is shown on the "Data Logging" screen).
7. Open the "Logging Header Template" also located under the "Excel 1" folder and copy the column headers into the saved data log table.
8. Save the .CSV file with the copied column headers as a Microsoft Excel document to edit the document with personalized graphs.



COMMUNICATION SETTINGS FOR ETHERNET CONNECTION (OPTIONAL)

If the optional Ethernet card is included with the nitrogen generator and the user wants to communicate with the system, a static IP address must be assigned to the controller. Once the static IP address is

assigned, it must be manually entered into the controller. The subnet and gateway is not needed when accessing the controller within the organization's intranet. Once the static IP is entered, the user must press the connect button or cycle the power to the controller to see the device on their intranet network. Communication through Ethernet includes Remote Access, SD Card Access, and MODBUS TCP/IP communication. A connection status message will indicate if a successful connection has been made.

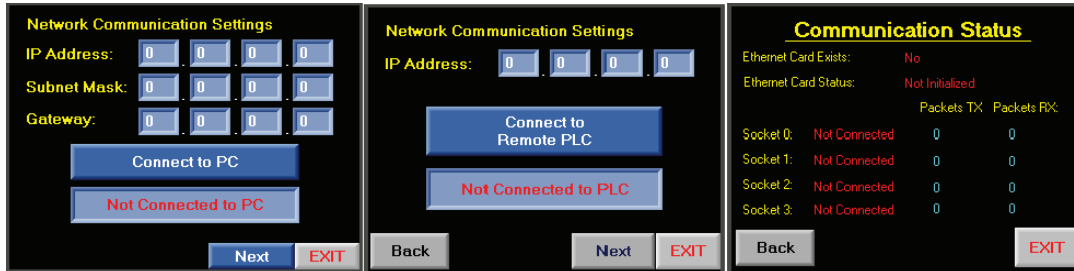
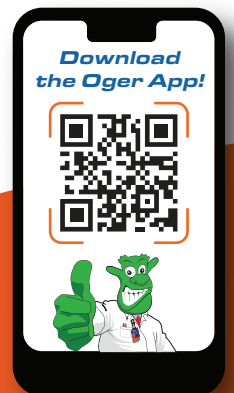


Figure 16: Network Connection

Screens Remote Access

A copy of the setup files for this software will be included on the microSD card installed in the PLC. This software can be installed on any windows based PC with Windows 7 or higher. The user will have full access of the controller touchscreen as if the user was standing in front of the machine and using the mouse to navigate through the screens. To set up communication connection to the controller, the communication settings on the computer must be set up to as the following:

1. Open the Remote Access Software and go to the "Configurations > Communication - PC settings".



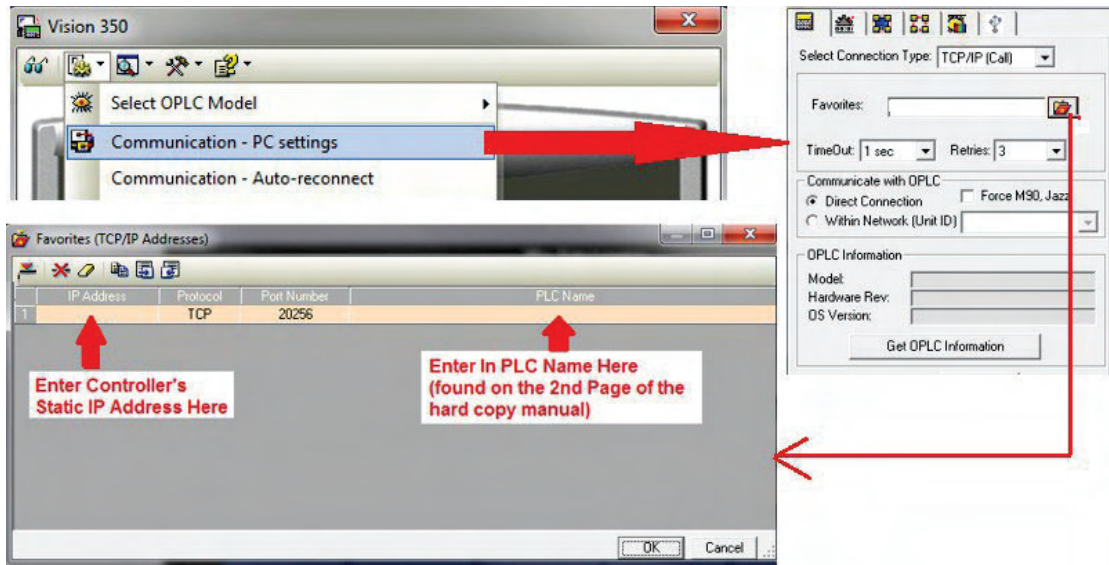


Figure 17: Remote Access Communication Setup

2. Select Connection Type: TCP/IP (Call)
3. Press the red folder to bring up the TCP/IP Addresses setup.
4. Enter in the static IP address assigned to the controller under "IP Address" column.
5. Select "TCP" under "Protocol" column.
6. Enter in the PLC Name (found on the 2nd page of the hard copy manual included with the Nitrogen Generator).
7. Press the "Get OPLC Information" to make sure the connection information is correct. An error message will appear if the information is not correct.
8. Press "Exit" once the connection information has been confirmed.

Loading Image File and Logging on

9. Open the Remote Access Software and go to the "Configurations > Select Fonts and Images file (*.urc)".
10. Browse for the file "PLC Image File.urc" which is loaded onto the SD card.
11. Press the "Glasses" icon in the left corner of the software to establish real time connection with the controller.

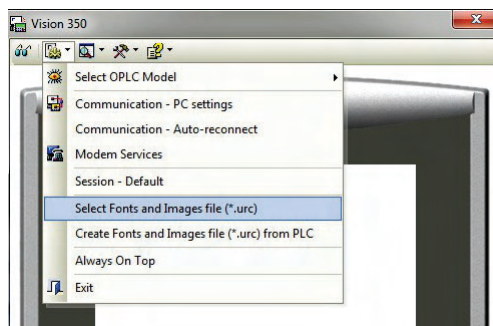


Figure 18: Loading Image File

SD Card Access

The setup SD Card Access file will also be included on the microSD card installed in the PLC. The SD Card Explorer software can be installed on any windows based PC with Windows 7 or higher. This allows the user to have access of the files on the SD card without having to physically remove the SD card. Set up the communication similar to how the Remote Access is set up.

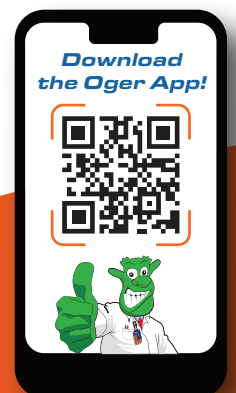
MODBUS Communication

Once the nitrogen generator is provided with a static IP addressed and can be seen on the network, MODBUS communication can be set up to retrieve real time data. The nitrogen generator MODBUS Communication settings are as follows:

- Protocol: TCP
- Local Port: 502
- PLC Controller: Slave

See MODBUS addressing table below:

Table 4: MODBUS Addressing Table



DESCRIPTION	Read / Write	STS Controller Address	Pointer Value (Decimal)	Decimal Base Format	Units
Start/Stop Button	R/W	MB 12	13		
Standby Mode (on/off)	R	MB 7	8		
PSA Cut in	R/W	MI 20	21	XXX.XX	PSIG
PSA Cut out	R/W	MI 21	22	XXX.XX	PSIG
Master Alarm State	R	MB 61	62		
Particulate Filter Alarm	R	MB 14	15		
Coalescing Filter Alarm	R	MB 28	29		
Absorber Filter Alarm	R	MB 29	30		
O2 Alarm	R	MB 0	0		
Low Pressure Alarm	R	MB 106	107		
Alarm OFF	R/W	MB 19	20		
N2 Pressure (PSI)	R	MI 118	119	XXX.XX	PSIG
MaxO2 Sensor (%)	R	MI 5	6	XX.XX	% O2
Sensor 1 Readout (ppm)	R	MI 123	124	XXXX	PPM O2

Coils		MODBUS Command Number	
Pointer Value From	Operand Type	Read	Write
0000	MB	#01 Read Coils	#15 Force Coils

Registers		MODBUS Command Number	
Pointer Value From	Operand Type	Read	Write
0000	MI (16 Bit)	#03 Read Coils	#16 Preset Holding Registers

NITROGEN GENERATOR OPERATIONS

This section describes the procedure for starting, running, and stopping the nitrogen generator. The operator should notify personnel in the area of the equipment start-up. Make sure the start-up will not interfere with other operations.

START-UP

This section describes the necessary steps of both the initial start-up and a normal routine start-up. If this is the first time the unit has been started, follow the Initial Start-up procedure.

Initial Start-Up

1. Verify that power connection is 110 V or 220 V / 1 PH / 50 - 60 Hz as labeled on the unit and that the touchscreen on the generator is in the "Stopped" mode (the "start/stop" button in the upper left corner of the "Home" screen – red button indicates that the system is in stopped mode).
2. Start-up air compressor following the original equipment manufacturer's instructions. Once it has been started up and the air receiver is fully pressurized to the air compressor design pressure, open the air valve to the generator.

NOTE: During the start-up sequence, check for leaks in all pipe-fittings and valves.

WARNING: Shut off air supply valve and depressurize the system before repairing any leaks.

3. Open the nitrogen supply out to the nitrogen storage tank and the gas sample valve from the tank to the generator. Keep the nitrogen out to process valve closed for now.
4. On the nitrogen generator controller, toggle the "Start/Stop" button so that it toggles to green and the nitrogen generator should start cycling through valves and pressurizing the left bed.
5. Observe pressure gauges on the pressure vessels for 10 minutes and make sure that the pressure swings from bed to bed every 50-90 seconds. The bed pressurized bed pressure should reach within 3-5 PSIG of the incoming air supply pressure (incoming air supply pressure verified and readjusted if needed, to the incoming design pressure specifications). While one bed is pressurizing, the other bed should be exhausting down to 0-10 PSIG.
6. Nitrogen will start to flow to the nitrogen storage tank where it should begin building up pressure.
7. When the nitrogen storage pressure reaches the cut-out pressure, the system will go into "standby" mode, indicated on the "Home" screen and the nitrogen production will pause.
8. Now that the system is in "standby", open up the nitrogen to process valve and the nitrogen storage tank will start losing pressure. Once the pressure falls to the "cut-in" pressure, the system will automatically restart and fill nitrogen into the storage tank again.

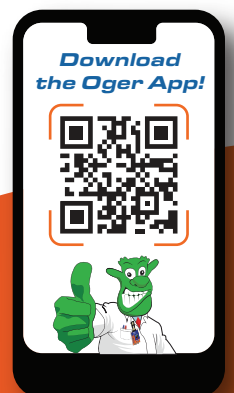
NOTE: When the nitrogen generator is turned on for the first time or after a prolonged shutdown period, some of the lines may have equalized and balanced the nitrogen and oxygen. Therefore, at the restart, the first few cycles of nitrogen being delivered to the storage tank may not be producing the design purity specification. It is recommended that the "EverPure™ Technology" be included for operations requiring tight purity requirements to the process.

Normal Start-up

Follow this procedure to start the generator for normal operation. If this is the first time the unit has been started, follow the Initial Start-up procedure, 7.1.1.

9. Open the air isolation valve.
10. Toggle the "start/stop" button to "start" (button should be illuminated green to indicate that the system has started).
11. Open any shut off valves in the product Nitrogen line to the user's piping system. Allow the system purity to rise before using product.

NOTE: If the generator or any part of the system has been opened to the atmosphere, the system must be purged of any residual air.



SHUTDOWN

In case of an emergency, simply turn off the main power switch to the nitrogen generator. This will stop all generator functions immediately. Nitrogen supply can be shut off manually closing the nitrogen to process valve located on the output of the nitrogen storage tank.

For normal shutdown, valve off the nitrogen to process valve on the output of the nitrogen storage tank. Then, toggle the "Start/Stop" button to off on the "Home" screen.

WARNING: The generator will remain pressurized after shut down. Before performing any maintenance or opening any piping systems, always depressurize the system. Failure to do so may result in injuries.

SYSTEM MAINTENANCE

INCOMING AIR FILTRATION

All units come equipped with a standard filter set that includes a particulate, coalescing, and adsorber filter (Error! Reference source not found.). Clean filter elements are important for good system performance. Factory recommendation on filter change out schedule are as follows:

- Particulate every 3 months (4x per year)
- Coalescing every 6 months (2x per year)
- Adsorber every 12 months (1 per year)

See figures below for illustration of how to remove typical filter bowl for a TS Series and some CS Series and replacing the filter element.

Figure 19: Filter Element Removal
 for all TS Series and some CS Series

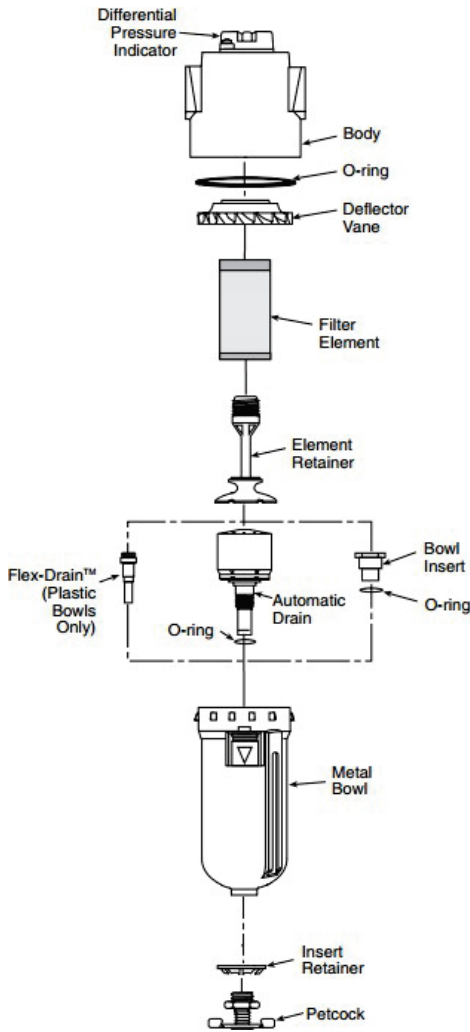
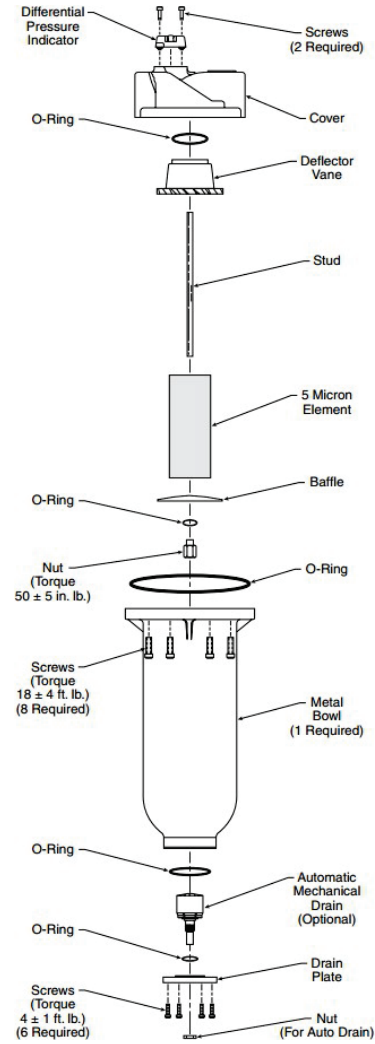
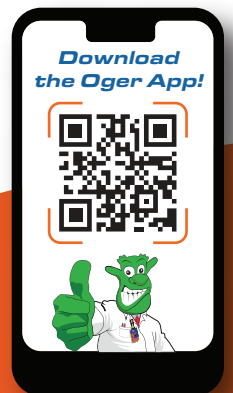


Figure 20: Filter Element Change
 for some CS Series and S Series



WARNING: Do not try to remove filter bowls unless both the air supply gauge clearly read zero psig. Valve off the incoming air supply. Relieve system pressure by opening the wedge valve after the filters.

1. Disconnect the tubes from the bottom of the bowls (if tied into condensate drain system).
2. To remove the bowls from the TS and some CS models, push the bowl latch down and rotate the bowl while pulling down. To remove the bowls from some CS and S Series models, remove the screws holding the bowl to the cover, and pull the bowl off.
3. Inspect the bowls. If the drain system is working properly, the bowls should not be full of water.
4. Remove the filter element by unscrewing it off. Take notice of how the element looks. If the element is excessively dirty, more frequent filter changes is recommended.



NOTE: A plugged drain system will cause water and oil to carry over into the adsorber, which will cause permanent damage to the media inside the nitrogen generator. Such damage is not covered by the manufacturer's warranty. Use of filters other than those specified by American Patriot Systems could result in damages not covered by the warranty.

5. Wash the bowls in soapy water and rinse thoroughly as needed. Use of light air gun to remove debris is also acceptable. Make sure to always clean and dry with a clean and dry cloth.
6. Install new filter element and replace O-rings as needed.
7. Put the filter bowl back on the system opposite of how it was removed making sure the bowl is seated in place correctly.
8. Reconnect the drain tubes.
9. Slowly open the air inlet valve to pressurize the bowls and examine for any leaks.

REBUILD PROCESS VALVE

It is recommended that every 5 years or 15,000 hours, that all the process valves be rebuilt.

BOOSTER

The boosters are designed so that the soft goods (seals) are installed to bear the highest wear. If operated and maintained properly, the seals can be replaced many times usually before any need arises to replace a "hard part", e.g. piston, piston rod, gas barrel, etc. Please refer to the O&M manual and drawings for detail information and instructions.

Before/ After each use:

1. Perform overall visual check of system. Every 20,000 cycles: (or 3-6 months approximate)
1. Inspect and re-lubricate Air Cycling Valve O-rings and Pilot Stems.(see procedure below)
2. Check Booster for gas leaking from vents external leakage, overall performance.
3. Check Air Drive tie rod bolts(25ft lbs) & Gas Barrel tie rod bolts(15ft lbs)

Retorque is needed Every 6 months:

1. Test all pressure gauges.
2. Inspect, clean or replace drive air filter.
3. Inspect, clean or replace booster inline air supply filter, inline nitrogen supply filter.

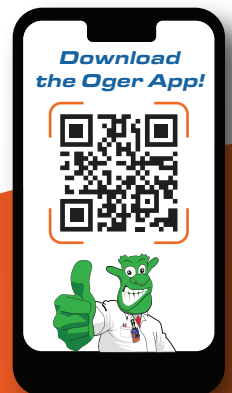
Every 12-18 months. Or 500-2000 hours of continuous use:

1. Inspect piping at full system pressure.
2. Reseal Booster Complete, and all System Components.

FAQS

This section enables the operator to determine the cause of operation problems and suggests remedies for the problems. If there are several likely causes, investigate the simpler solutions first.

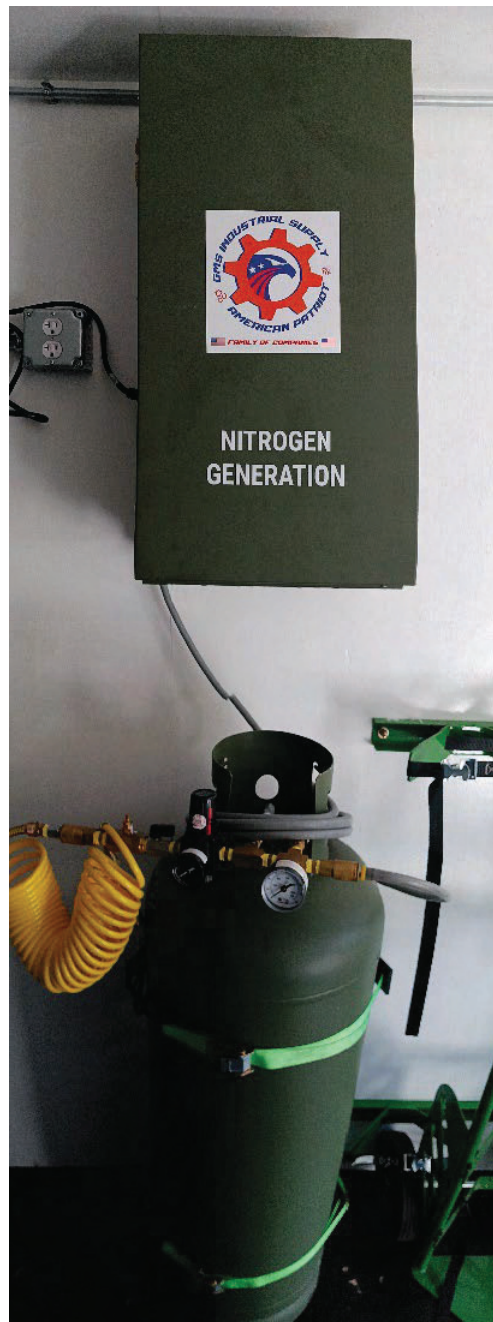
Symptoms	Probable Cause	Corrective Action
Nitrogen Generator Not Cycling	Low Voltage/Amperage	Check Electrical Source
	Circuit breaker tripped	Reset circuit breaker
	Fuse Blown	Replace fuses on electrical panel
	System is OFF (Left button on Home screen is Red)	Touch the Red switch for 2 seconds until it turns green
	Low Operator Air Pressure	Check incoming air source and/or internal air pressure regulator
	Defective Wiring	Check all wiring connections
Nitrogen Generator Running Continuously	Incorrect Cut-Out pressure	Set cutout pressure to factory setting
	Defective wiring with pressure transducer to the Touchscreen	Check the wiring connections
	Excessive N2 Leakage	Correct all N2 leakage
	Cycle Pressure too low	Check incoming air source and/or internal air pressure regulator
Low N2 purity	Product flow too high	Decrease product flow
	O2 analyzer malfunction	Replace O2 analyzer
	O2 flow port valved off	Open the O2 sample port
	Exhaust port plugged	Check exhaust tube is not blocked
Not building any storage pressure	Bad Process valve	Check each individual valve is working properly.
	Defective wiring	Check all wiring
	Disconnected pneumatic line	Check all pneumatic lines for leakage
	No Air Pressure going to the pilot valves	Make sure the pilot valves are getting adequate pressure





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Nitrogen Generator 103347



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SAFETY SUMMARY

Do not puncture any part of the Nitrogen Storage Tank; pressurized gas could burst the vessel and cause personal injury or death.

Do not remove, cut or work on any hose inside or outside the Nitrogen Generator or Tank without cutting off the power or turning off preinstalled valves

Do not expose any pressurized vessel to excessive heat or fire; expanding gas could result in a vessel or hose burst. There are safety valves installed at 150psi bursting pressure to keep pressures below all burst levels.

Pure Nitrogen is being produced by the Nitrogen Generator and can cause asphyxiation if inhaled directly. Always use in a well ventilated area with caution.

If headache or "light-headed" feelings occur, quickly move to a new room or outside. Ventilate the area and check for leaks.

System requires 110VAC up to 8Amps and is not intended for use with or around liquids.

Note all electrical warnings and do not reroute, tap into, or change out any electrical component or wire for non-manufacturer parts.

INTRODUCTION

American Patriot Nitrogen Generator 103347 provides an economical, precise means of generating high purity Nitrogen. Since air is comprised of 79% N₂ we simply and cost effectively separate the N₂ from the air. Nitrogen is an inert gas (non-combustible). The N₂ is "generated" by means of the air compressor pushing air into the simple, safe membrane element which in turn mechanically separates N₂ molecules from other molecules found within air.

**The user should read this manual in its entirety.

IMPORTANT INFORMATION

All personnel (and their supervisors) operating and maintaining the 103347 Generator must read and fully understand this manual prior to operating or performing maintenance on the system.

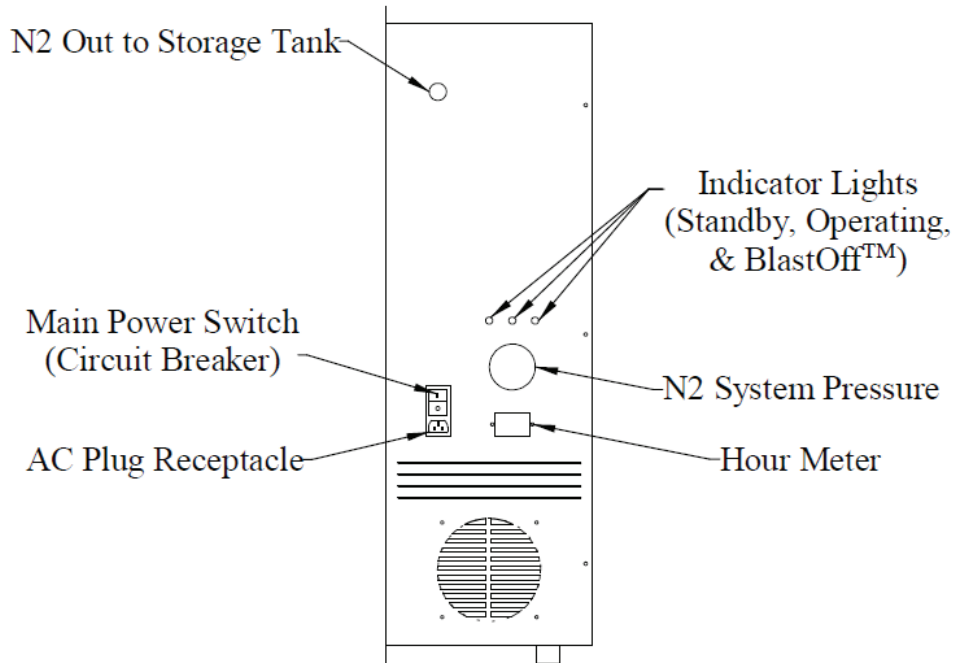
The 103347 Generator produces Nitrogen (N₂) at a low flow rate, which quickly dissipates into the air. N₂ gas is not poisonous but the gas should not be directly inhaled, since in high concentrations, can cause asphyxiation. Ensure that the unit is installed within a well-ventilated room, one that is not sealed off from normal living space air changes.

All personnel involved with operations and maintenance of the 103347 Generator must follow safe working practices, OSHA, and local health/safety code regulations during the operation and maintenance of the unit.

Servicing the N₂-GEN. Before personnel attempt to service the unit, ensure the power switch has been turned to the off position, then disconnect the unit's external power cord from the electrical power supply.

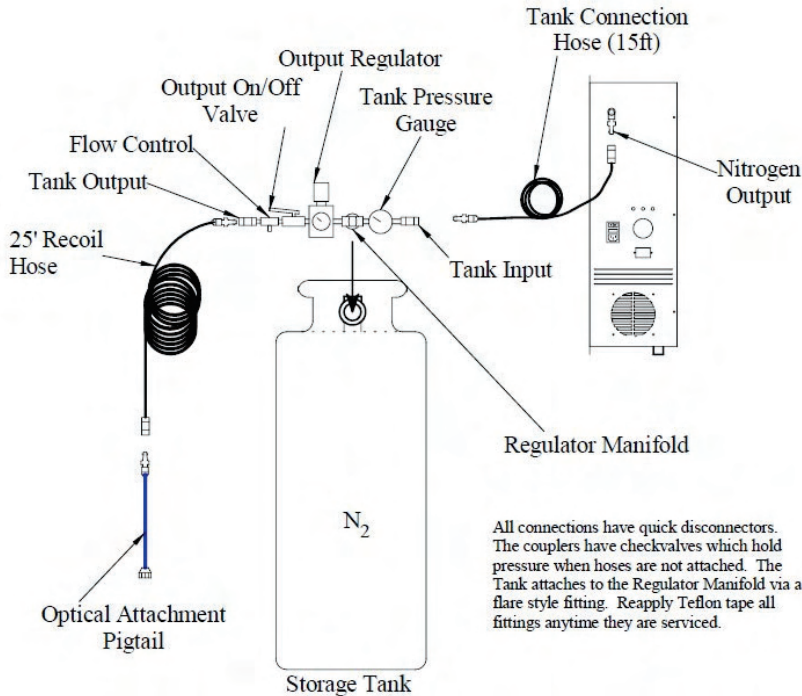
PANEL LAYOUT

All gas connections will be made on the left hand side of the cabinet. Double-check all connection locations before turning on the system or opening any valves. NOTE: The 103347 Generator is factory equipped with 1/4"NPT Female connections.



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POWER UP

Your system is shipped ready for power once you connect your hose. Connect your application tubing or hose to the storage tanks outlet using Teflon tape. All valves should be open and ready for gas to be distributed. Plug your 103347 Generator into an 110VAC power outlet and turn on the rocker switch. Your system's compressor will come on if the N₂ storage tank is not already pressurized. If it is at or above the specified pressure, you will see the "Standby" light illuminated. Once you drop below that pressure, your compressor will activate and generate the N₂ necessary to maintain system gas requirements. The "Operating" light will illuminate until the N₂ storage tank pressure reaches maximum (approximately 100 PSI) and the compressor shuts off.

LEAK CHECK - GENERATOR

1. Turn the storage tank output valve to the off position.
2. Using the 15' Tank Connection Hose, connect the Nitrogen Output of the 103347 Generator to the Output of the storage Tank.
3. Turn the system power on. The system's compressor should start and the system's N₂ pressure will begin to build. The system pressure should build to 100psi. The system should go into stand-by mode and the compressor should stop.
 - a. If the pressure holds in stand-by mode for a minute, then your 103347 Generator is working properly and there appear to be no leaks inside the unit.

- b. If the pressure doesn't hold and the system goes back into operation, then check for leaks at the output connection, and all external fittings. If you can't find a leak, contact the POC.
- c. If the 103347 Generator never goes into stand-by mode, check for external leaks and retry. If no leak is found, then the leak is internal. Open the cabinet and try to locate the internal issue. Contact the POC for guidance if the issue isn't obvious.
 - i. To open cabinet, there are 6 (10x32 -0.5") screws to remove on the front cabinet cover. Remove and set to side.
 - ii. The compressor may be hot, use caution. Do not spray soapy water (leak detector solution) inside the cabinet.
 - iii. Looking for obvious leaks, feel around the hoses and try to find either a leaking fitting or a cut/unconnected hose.
 - iv. If you don't feel or see the obvious issue, contact POC for help.
 - v. If you find the leak and need to replace a defective part, contact POC for factory parts. If it is something you can repair, always use factory replacements (instructions supplied with parts) and Teflon tape (or similar) all brass fittings.
4. Reattach the Tank Connection Hose to the input of the tank and power up the system to begin use or to charge the storage tank.

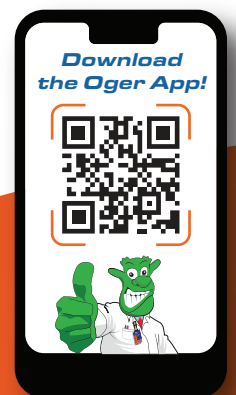
LEAK CHECK – STORAGE TANK

1. Connect the 103347 Generator to the tank input with the provided hose. Turn the 103347 Generator power on to allow the tank to begin filling with nitrogen.
2. Turn the Tank Output Valve to the off position.
3. Once it reaches the storage pressure (100psi) and the system will go into stand-by mode.
 - a. If there is a slow leak in your regulator manifold, the compressor will cut on and start to refill the tank after a few min/sec. Disconnect the outlet hoses and make sure all connections are Teflon taped and tight. Use a leak check solution (soapy water) to see if you find a leak on the manifold. Correct leak.
 - b. If the system never reaches Stand-by Mode
 - i. Use leak check solution to check the regulator manifold
 - ii. Recheck the N2-GENT™ for a leak as described previously (2.6a) if not just verified.
 - iii. Contact POC

WARNING

- If your compressor remains on and your system's N2 pressure never reaches the specified level, double check for leaks, then contact POC.
- If your compressor remains on and the N2 pressure is more than 105psi, power off the system immediately and consult your POC.
- If the compressor is not running and you are more than 10psi under the specified N2 pressure (100psi), make sure you have power, then call POC.

PREVENTITIVE MAINTENANCE

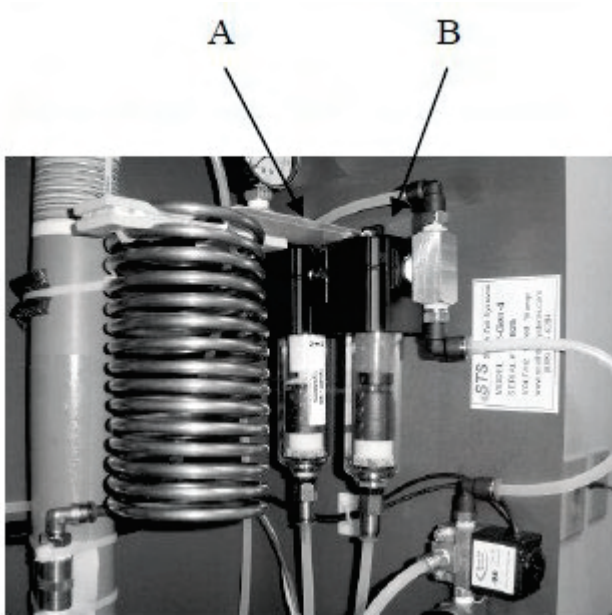


The 103347 Generator contains 3 filters that need to be changed out regularly. All filters should be changed out every 4 months or 250 hours of runtime whichever comes first (there is a hour meter on the side panel).

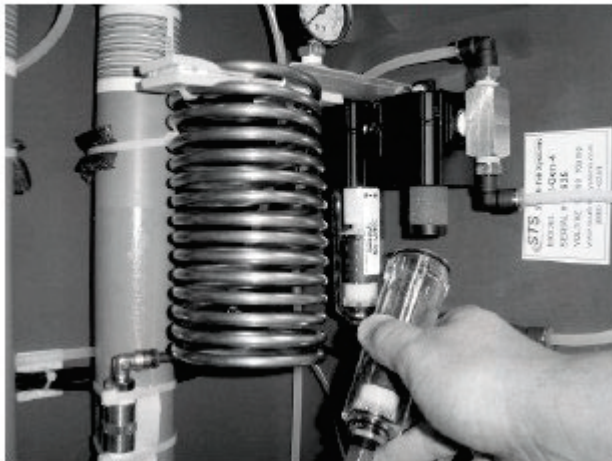
Electronic Filter Service Indicator - The 103347 Generator is equipped with a Filter that has an Electronic Service Indicator built-in. This can be used in the case of prolonged storage or when being used in a harsh environment. The Service Indicator can be used in conjunction with the filter change out schedule above. If the "FilterSvc" indicator illuminates and remains on, then the filter is saturated and all filters need to be changed immediately. Note: the light might come on briefly and turn off while the system is coming up to pressure (<5mins). If it remains on, perform the PMCS. Do not use system with old filtration. The Nitrogen Producing Media can be damaged beyond repair quickly.

Changing the Filters

1. Disconnect the power before servicing the unit.
2. Remove the cover.
3. Locate the 3 filters (shown in photos)
 - a. Pre-compressor filter, located on the top of the compressor.
 - b. General Purpose filter, on the right side, clear bowl, closer to the cabinet back, pinkish filter element.
 - c. Coalescing filter, on the right closest to the front of the unit, green filter element
4. Remove the pre-compressor filter cap by twisting clockwise. Remove the old filter and replace with the new one.
5. Remove the filter bowls on the General Purpose and Coalescing filters by pushing up on the bowls and twisting counter-clockwise 1/8 of a turn, then it will pull straight down.
 - a. Note: there is a rubber O-ring that may or may not come out with the bowl, if it does, make sure to reseal it before putting the bowl back on.
 - b. Remove the filter cartridges by unscrewing them from the housing. Replace with the new cartridges and reinstall the bowl. Make sure the pinkish filter goes in the rear filter and the green filter goes in the front just as they were removed.
6. Reinstall the filter bowls. Make sure the floats that are inside the bowls are in place when you reinstall the bowls. The system won't work without the auto-drain floats. See photos.
7. Reconnect the power and turn the system on. If the storage is full, you can relieve some of the pressure by pulling the Safety relief ring inside the unit in the upper left corner. Once the pressure drops a few pounds, the unit should cut back on. Feel and listen for any leaks on the filters.
8. Once satisfied that they are on tight and sealed; replace the cover and allow the storage to top fill up.



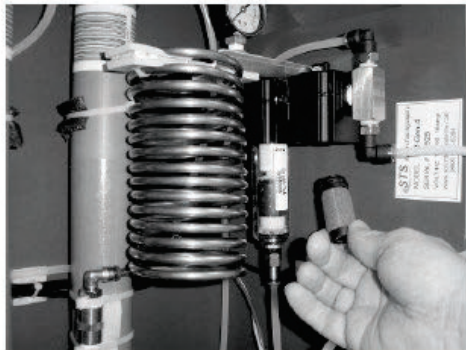
- A- General Purpose Filter
- B- Coalescing Filter



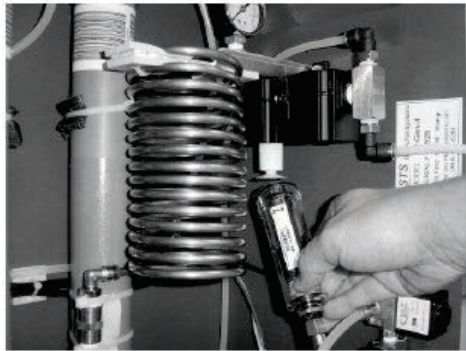
Take off the Coalescing Filter Bowl, push up, turn counter-clockwise, pull down.

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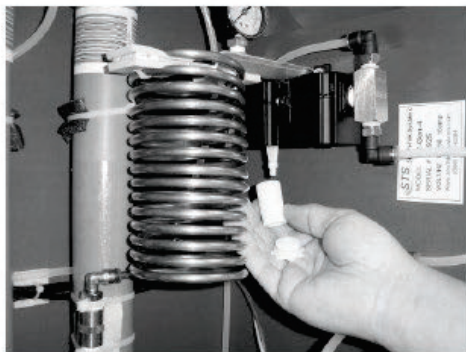




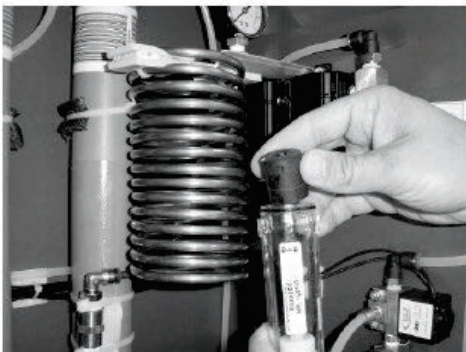
Remove the green coalescing filter by unscrewing.



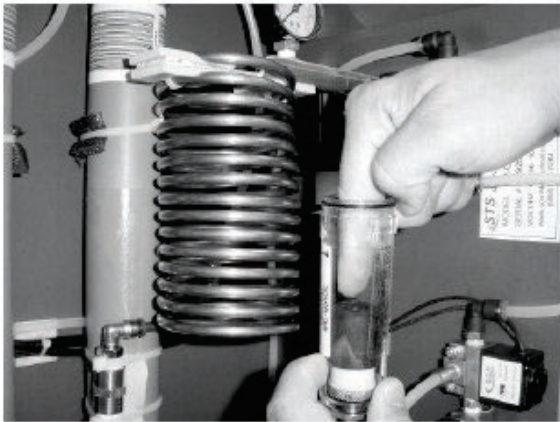
Remove the general purpose Filter bowl.



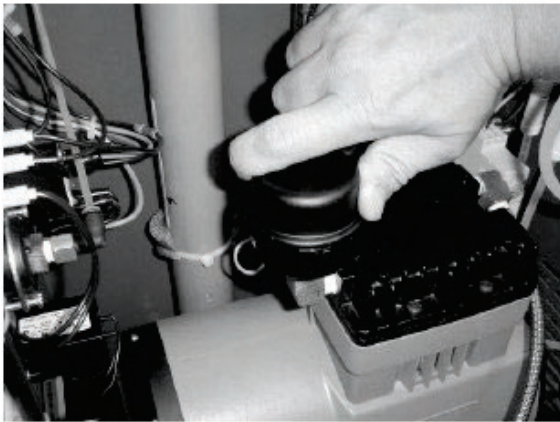
Unscrew the general purpose filter and replace with new filter.



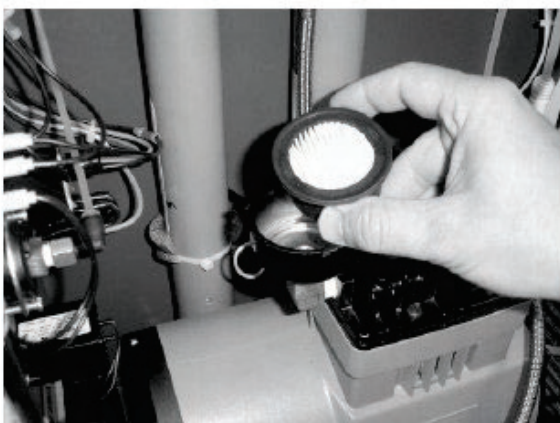
Inside the bowls, there are auto drain floats. Make sure they are put back into the bowl if they come out.



The float should seat all the way to the bottom of the bowl before reinstalling the bowls. Make sure the new filter cartridges are installed before putting the bowls back on.

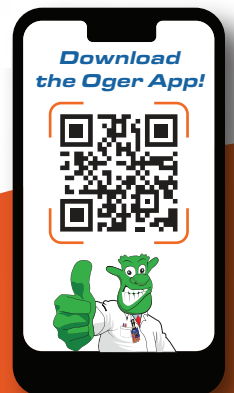


Turn the pre-compressor cover clockwise to remove.



Remove and replace the filter cartridge, reinstall the cover.

LEAK DETECTION SYSTEM



The Leak Detection System is a system when installed into a 103347 Generator will detect line leaks downstream or within the 103347 Generator. Line leaks could be due to a cut hose, a leaking fitting, etc. These leaks are potential safety hazards, they can cause the N2 to deplete quickly, and could cause your 103347 Generator system to run in excess (decreasing the life of the unit).

Once a leak has been detected, the 103347 Generator is factory set to initiate a buzzer, activate a red warning light (inserted into the 103347 Generator cabinet), and shut off the 103347 Generator until the problem has been remedied. To reset the 103347 Generator, simply turn off the 103347 Generator power switch and turn it back on.

Factory settings will give both an audible and visual alarm as well as shut the compressor down. The buzzer and light will continue until the system has been reset. Never reset over and over, if the 103347 Generator goes off, there is a real potential issue. Consult your POC.

SPECIFICATIONS

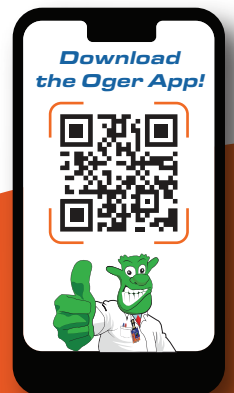
Nitrogen purity	99% +/- .2
Display	Hours/Power on/Operating
N2 Storage Pressure	100 psig
Output	10 lpm
Cabinet Port Connections	¼ " NPT Female
Electrical	110 VAC; 20 Amp breaker
Compressor	Integral / Oil-free
Ambient Temperature	35 to 90 F
Noise level (dbA)	under 80
Size	32"H x 12"W x 11"D
Weight	75 lbs

TROUBLESHOOTING

Always trace all lines and valves to make sure that there are no loose connections or obstructions. Call your POC if you can't determine the cause of the issue. Unplug the 103347 Generator.

Symptom	Cause	Remarks
No Power	Power cord is not plugged into socket or the cabinet's receptacle	Make sure that the cord is not cut or frayed
	The AC outlet is tripped or has an issue	If the outlet trips excessively, consult your POC
The green "Operate" light does not come on	Check the power and fuse Unplug	and make sure all screws on the terminal strip are tight
	The green light is the operating light, if the compressor stays off, the green light will not illuminate	Wait until the compressor is running and check again

The amber light does not come on	If the compressor is not running, the amber light should illuminate	Unplug and make sure all screws on the terminal strip are tight
No pressure is showing on the pressure gauge	There is no pressure in the storage tank	Determine why your tank is empty. Are there leaks?
	System is off and Nitrogen has been used	Power up the system and charge the tank.
	Gauge could be bad	Connect the tank connection hose to the generator and see if there is pressure on the system pressure gauge. They should read the same. Replace the gauge if bad.





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Model Number	Serial Number	Month	Day	Year	
		Date of Purchase			

REV 11/04





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IMPORTANT SAFETY INSTRUCTIONS


















READ THIS MANUAL

Inside you will find many helpful hints on how to use and maintain your air conditioner properly. Just a little preventive care on your part can save you a great deal of time and money over the life of your air conditioner. You'll find many answers to common problems in the chart of troubleshooting tips. If you review our chart of Troubleshooting Tips first, you may not need to call for service at all.

To prevent injury to the user or other people and property damage, the following instructions must be followed. Incorrect operation due to ignoring of instructions may cause harm or damage. The seriousness is classified by the following indications.

 WARNING	This symbol indicates the possibility of death or serious injury.		
 CAUTION	This symbol indicates the possibility of injury or damage to property.		
	Never do this.		Always do this.

WARNING

<p> Plug in power plug properly.</p> <ul style="list-style-type: none"> • Otherwise, it may cause electric shock or fire due to excess heat generation. 	<p> Do not operate or stop the unit by inserting or pulling out the power plug.</p> <ul style="list-style-type: none"> • It may cause electric shock or fire due to heat generation. 	<p> Do not damage or use an unspecified power cord.</p> <ul style="list-style-type: none"> • It may cause electric shock or fire. • If the power cord is damaged, it must be replaced by the manufacturer or an authorised service centre or a similarly qualified person in order to avoid a hazard.
<p> Always install circuit breaker and a dedicated power circuit.</p> <ul style="list-style-type: none"> • Incorrect installation may cause fire and electric shock. 	<p> Do not operate with wet hands or in damp environment.</p> <ul style="list-style-type: none"> • It may cause electric shock. 	<p> Do not direct airflow at room occupants only.</p> <ul style="list-style-type: none"> • This could damage your health.
<p> Always ensure effective grounding.</p> <ul style="list-style-type: none"> • Incorrect grounding may cause electric shock. 	<p> Do not allow water to run into electric parts.</p> <ul style="list-style-type: none"> • It may cause failure of machine or electric shock. 	<p> Do not modify power cord length or share the outlet with other appliances.</p> <ul style="list-style-type: none"> • It may cause electric shock or fire due to heat generation.
<p> Unplug the unit if strange sounds, smell, or smoke comes from it.</p> <ul style="list-style-type: none"> • It may cause fire and electric shock. 	<p> Do not use the socket if it is loose or damaged.</p> <ul style="list-style-type: none"> • It may cause fire and electric shock. 	<p> Do not open the unit during operation.</p> <ul style="list-style-type: none"> • It may cause electric shock.
<p> Keep firearms away.</p> <ul style="list-style-type: none"> • It may cause fire. 	<p> Do not use the power cord close to heating appliances.</p> <ul style="list-style-type: none"> • It may cause fire and electric shock. 	<p> Do not use the power cord near flammable gas or combustibles, such as gasoline, benzene, thinner, etc.</p> <ul style="list-style-type: none"> • It may cause an explosion or fire.
<p> Ventilate room before operating air conditioner if there is a gas leakage from another appliance.</p> <ul style="list-style-type: none"> • It may cause explosion, fire and, burns. 	<p> Do not disassemble or modify unit.</p> <ul style="list-style-type: none"> • It may cause failure and electric shock. 	

IMPORTANT SAFETY INSTRUCTIONS

CAUTION

⊘ When the air filter is to be removed, do not touch the metal parts of the unit.

- It may cause an injury.

⊘ Do not use strong detergent such as wax or thinner but use a soft cloth.

- Appearance may be deteriorated due to change of product color or scratching of its surface.

⊘ Stop operation and close the window in storm or hurricane.

- Operation with windows opened may cause wetting of indoor and soaking of household furniture.

⊘ Always insert the filters securely. Clean filter once every two weeks.

- Operation without filters may cause failure.

⊘ Do not place obstacles around air-inlets or inside of air-outlet.

- It may cause failure of appliance or accident.

⊘ Use caution when unpacking and installing. Sharp edges could cause injury.

⊘ Do not put a pet or house plant where it will be exposed to direct air flow.

- This could injure the pet or plant.

⊘ Do not clean the air conditioner with water.

- Water may enter the unit and degrade the insulation. It may cause an electric shock.

⊘ When the unit is to be cleaned, switch off, and turn off the circuit breaker.

- Do not clean unit when power is on as it may cause fire and electric shock, it may cause an injury.

⊘ Hold the plug by the head of the power plug when taking it out.

- It may cause electric shock and damage.

⊘ Do not place heavy object on the power cord and ensure that the cord is not compressed.

- There is danger of fire or electric shock.

⊘ If water enters the unit, turn the unit off at the power outlet and switch off the circuit breaker. Isolate supply by taking the power-plug out and contact a qualified service technician.

⊘ Ventilate the room well when used together with a stove, etc.

- An oxygen shortage may occur.

⊘ Do not use for special purposes.

- Do not use this air conditioner to preserve precision devices, food, pets, plants, and art objects. It may cause deterioration of quality, etc.

⊘ Ensure that the installation bracket of the outdoor appliance is not damaged due to prolonged exposure.

- If bracket is damaged, there is concern of damage due to falling of unit.

⊘ Turn off the main power switch when not using the unit for a long time.

- It may cause failure of product or fire.

⊘ Do not drink water drained from air conditioner.

- It contains contaminants and could make you sick.

CAUTION

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

- The appliance shall be installed in accordance with national wiring regulations.
- Do not operate your air conditioner in a wet room such as a bathroom or laundry room.
- The appliance with electric heater shall have at least 1 meter space to the combustible materials.
- Contact the authorised service technician for repair or maintenance of this unit.
- Contact the authorised installer for installation of this unit.

IMPORTANT SAFETY INSTRUCTIONS

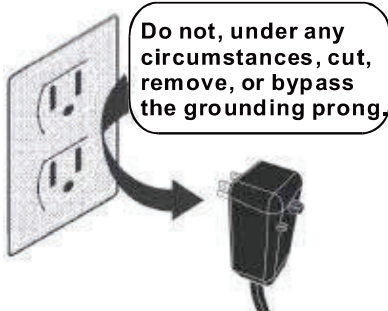
NOTE:

The power supply cord with this air conditioner contains a current detection device designed to reduce the risk of fire. Please refer to the section Operation of Current Device for details. In the event that the power supply cord is damaged, it cannot be repaired—it must be replaced with a cord from the Product Manufacturer.

WARNING

Avoid fire hazard or electric shock. Do not use an extension cord or an adaptor plug. Do not remove any prong from the power cord.

Grounding type wall receptacle



Power supply cord with 3-prong grounding plug and current detection device

WARNING

For Your Safety

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING

Prevent Accidents

To reduce the risk of fire, electrical shock, or injury to persons when using your air conditioner, follow basic precautions, including the following:

- Be sure the electrical service is adequate for the model you have chosen. This information can be found on the serial plate, which is located on the side of the cabinet and behind the grille.
- If the air conditioner is to be installed in a window, you will probably want to clean both sides of the glass first. If the window is a triple-track type with a screen panel included, remove the screen completely before installation.
- Be sure the air conditioner has been securely and correctly installed according to the installation instructions in this manual. Save this manual for possible future use in removing or installing this unit.
- When handling the air conditioner, be careful to avoid cuts from sharp metal fins on front and rear coils.

WARNING

Electrical Information

The complete electrical rating of your new room air conditioner is stated on the serial plate. Refer to the rating when checking the electrical requirements.

- Be sure the air conditioner is properly grounded. To minimize shock and fire hazards, proper grounding is important. The power cord is equipped with a three-prong grounding plug for protection against shock hazards.
- Your air conditioner must be used in a properly grounded wall receptacle. If the wall receptacle you intend to use is not adequately grounded or protected by a time delay fuse or circuit breaker, have a qualified electrician install the proper receptacle. Ensure the receptacle is accessible after the unit installation.
- Do not run air conditioner without side protective cover in place. This could result in mechanical damage within the air conditioner.
- **Do not use an extension cord or an adaptor plug.**

Operation of Current Device

(Applicable to the unit adopts current detection device only)

The power supply cord contains a current device that senses damage to the power cord. To test your power supply cord do the following:

1. Plug in the Air Conditioner.
2. The power supply cord will have TWO buttons on the plug head. Press the TEST button, you will notice a click as the RESET button pops out.
3. Press the RESET button, again you will notice a click as the button engages.
4. The power supply cord is now supplying electricity to the unit. (On some products this it also indicated by a light on the plug head.)

NOTE:

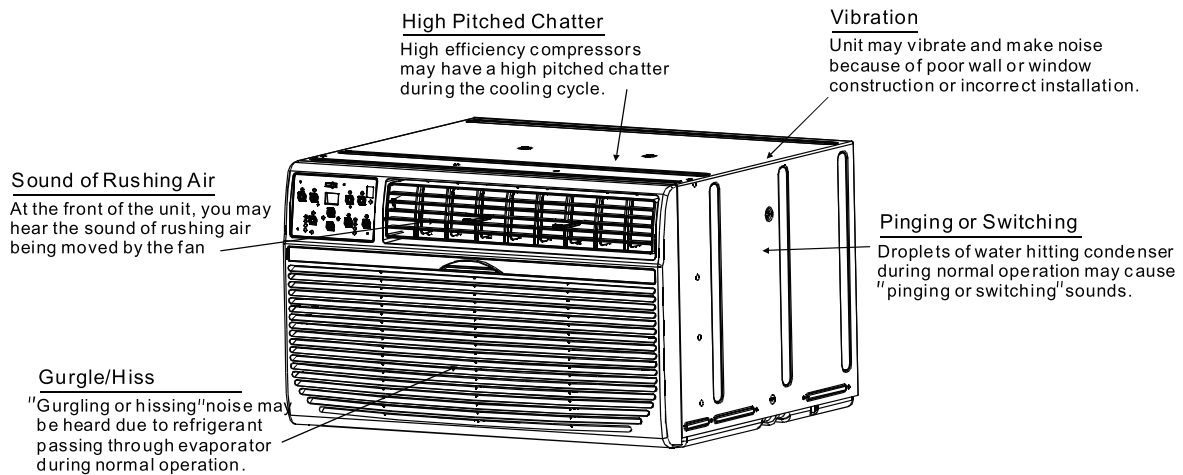
- Do not use this device to turn the unit on or off.
- Always make sure the RESET button is pushed in for correct operation.
- The power supply must be replaced if it fails reset when either the TEST button is pushed, or it cannot be reset. A new one can be obtained from the product manufacturer.
- If power supply cord is damaged, it cannot be repaired. It MUST be replaced by one obtained from the product manufacturer.

NOTE: This air conditioner is designed to be operated under condition as follows:

Cooling operation	Outdoor temp:	64-109°F/18-43°C (64-125°F/18-52°C for special tropical models)
	Indoor temp:	62-90°F/17-32°C
Heating operation	Outdoor temp:	23-76°F/-5-24°C
	Indoor temp:	32-80°F/0-27°C

Note: Performance may be reduced outside of these operating temperatures.

NORMAL SOUNDS



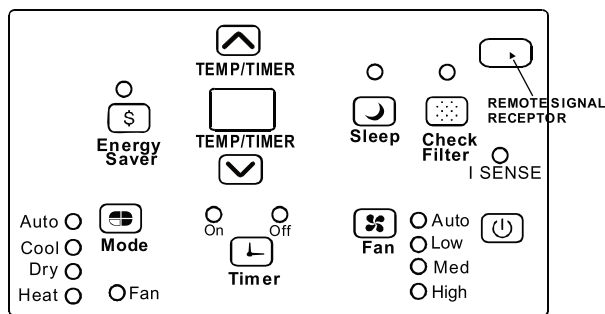
NOTE:

All the illustrations in this manual are for explanation purpose only. Your air conditioner may be slightly different. The actual shape shall prevail.

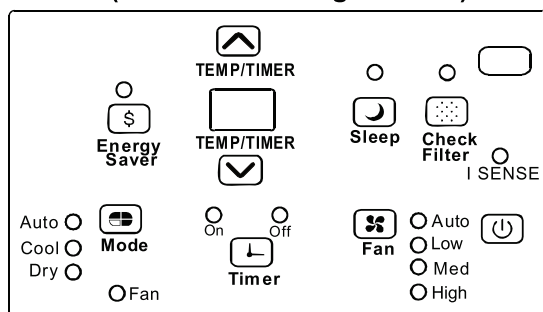
AIR CONDITIONER FEATURES

ELECTRONIC CONTROL OPERATING INSTRUCTIONS

Before you begin, thoroughly familiarize yourself with the control panel as shown below and all its functions, then follow the symbol for the functions you desire. **The unit can be controlled by the unit control alone or with the remote.**



(Electric Heating Models)



(Cooling Only Models)

TO TURN UNIT ON OR OFF:

Press **ON/OFF** button to turn unit on or off.

NOTE: The unit will initiate automatically the Energy Saver function under Cool, Dry, Auto (only Auto-Cooling and Auto-Fan) modes.

TO CHANGE TEMPERATURE SETTING:

Press **UP/DOWN** button to change temperature setting.

NOTE: Press or hold either UP (▲) or DOWN (▼) button until the desired temperature is seen on the display. This temperature will be automatically maintained anywhere between 62°F (17°C) and 86°F (30°C). If you want the display to read the actual room temperature, see "To Operate on Fan Only" section.

AIR CONDITIONER FEATURES

TO ADJUST FAN SPEEDS:

Press **(F)** to select the Fan Speed in four steps-Auto, Low, Med or High. Each time the button is pressed, the fan speed mode is shifted. For some models, the fan speed can not be adjusted under HEAT mode. On Dry mode, the fan speed is controlled at Low automatically.

SLEEP FEATURE:

Press **(S)** Sleep button to initiate the sleep mode. In this mode the selected temperature will increase (cooling) or decrease (heating) by 2°F/1(or 2)°C 30 minutes after the mode is selected. The temperature will then increase (cooling) or decrease (heating) by another 2°F/1(or 2)°C after an additional 30 minutes. This new temperature will be maintained for 6 hours before it returns to the originally selected temperature. This ends the Sleep mode and the unit will continue to operate as originally programmed. The Sleep mode program can be cancelled at any time during operation by pressing the Sleep button again.

CHECK FILTER FEATURE:

Press **(F)** Check filter button to initiate this feature. This feature is a reminder to clean the Air Filter for more efficient operation. The LED(light) will illuminate after 250 hours of operation. To reset after cleaning the filter, press the Check Filter button and the light will go off.

ENERGY SAVER FEATURE:

Press **(S)** Energy saver button to initiate this function. This function is available on COOL, DRY, AUTO (only AUTO-COOLING and AUTO-FAN) modes. The fan will continue to run for 3 minutes after the compressor shuts off. The fan then cycles on for 2 minutes at 10 minute intervals until the room temperature is above the set temperature, at which time the compressor turns back on and Cooling Starts.

I SENSE FEATURE: (on some models)



This feature can be activated from the remote control ONLY. The remote control serves as a remote thermostat allowing for the precise temperature control at its location.

To activate the I SENSE feature, point the remote control towards the unit and press the I SENSE button. The remote display is actual temperature at its location. The remote control will send this signal to the air conditioner every 3 minutes interval until press the I SENSE button again. If the unit does not receive the I SENSE signal during any 7 minutes interval, the unit will beep to indicate the I SENSE mode has ended.

TO SELECT THE OPERATING MODE:

To choose operating mode, press **(M)** Mode button. Each time you press the button, a mode is selected in a sequence that goes from Auto, Cool, Dry, heat (cooling only models without) and Fan. The indicator light beside will be illuminated and remained on once the mode is selected.

The unit will initiate automatically the Energy Saver function under Cool, Dry, Auto (only Auto-Cooling and Auto-Fan) modes.

To operate on Auto feature:

- When you set the air conditioner in AUTO mode, it will automatically select cooling, heating (cooling only models without), or fan only operation depending on what temperature you have selected and the room temperature.
- The air conditioner will control room temperature automatically round the temperature point set by you.
- In this mode, the fan speed cannot be adjusted, it starts automatically at a speed according to the room temperature.

To operate on Fan Only:

- Use this function only when cooling is not desired, such as for room air circulation or to exhaust stale air (on some models). (Remember to open the vent during this function, but keep it closed during cooling for maximum cooling efficiency.) You can choose any fan speed you prefer.
- During this function, the display will show the actual room temperature, not the set temperature as in the cooling mode.
- In Fan only mode, the temperature is not adjusted.

To operate on Dry mode:

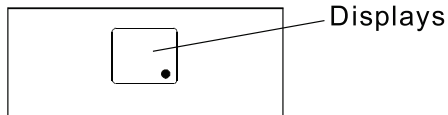
- In this mode, the air conditioner will generally operate in the form of a dehumidifier. Since the conditioned space is a closed or sealed area, some degree of cooling will continue.

TIMER: AUTO START/STOP FEATURE:

- When the unit is on or off, first press **(T)** Timer button, the TIMER ON indicator light illuminates. It indicates the Auto Start program is initiated.
- When the time of TIMER ON is displayed, press the Timer button again, the TIMER OFF indicator light illuminates. It indicates the Auto Stop program is initiated.
- Press or hold the UP or DOWN button to change the Auto time by 0.5 hour increments, up to 10 hours, then at 1 hour increments up to 24 hours. The control will count down the time remaining until start.
- The selected time will register in 5 seconds, and the system will automatically revert back to display the previous temperature setting or room temperature when the unit is on. (when the unit is off, there is no display.)
- Turning the unit ON or OFF at any time or adjusting the timer setting to 0.0 will cancel the Auto Start/Stop timed program.

AIR CONDITIONER FEATURES

DISPLAYS:



DISPLAYS:

Shows the set temperature in " °C" or " °F" and the Auto-timer settings. While on Fan only mode, it shows the room temperature.

Error codes:

AS-Room temperature sensor error-Unplug the unit and plug it back in.If error repeats, call for service.
NOTE: In Fan only mode, it will display "LO" or "HI".

- -Evaporator temperature sensor error-Unplug the unit and plug it back in.If error repeats, call for service.

NOTE: "•" is displayed as shown in the left picture.

HS -Electric heating sensor error-Unplug the unit and plug it back in.If error repeats, call for service.

NOTE:

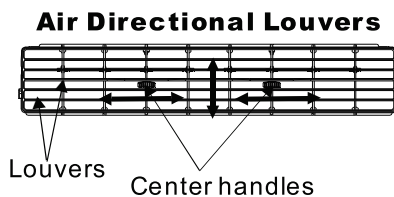
If the unit breaks off unexpectedly due to the power cut, it will restart with the previous function setting automatically when the power resumes.

ADDITIONAL THINGS YOU SHOULD KNOW

Now that you have mastered the operating procedure, here are more features in your control that you should become familiar with.

- The Cool circuit has an automatic 3 minute time delayed start if the unit is turned off and on quickly. This prevents overheating of the compressor and possible circuit breaker tripping. The fan will continue to run during this time.
- The control is capable of displaying temperature in degrees Fahrenheit or degrees Celsius. To convert from one to the other, press and hold the Left and Right Temp/Timer buttons at the same time, for 3 seconds.

Air Directional Louvers

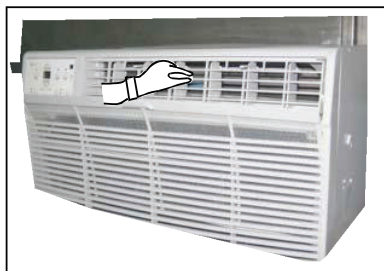


Air Direction(4-way)

Air directional louvers control air flow direction. Your air conditioner has the 4-way directional system described below. The louvers will allow you to direct the air flow Up or Horizontal, and Left or Right throughout the room as needed. Use the center handles to adjust the air directional louvers side-to-side until the desired Left or Right direction is obtained. Pivot horizontal louvers with your fingertips until the desired Up or Horizontal direction is obtained. There are a total of 4 possible air directional orientations available with this system.

CARE AND CLEANING

Air Filter Cleaning



The air filter should be checked at least once a month to see if cleaning is necessary. Trapped particles in the filter can build up and cause an accumulation of frost on the cooling coils.

CAUTION

Clean your air conditioner occasionally to keep it looking new. **Be sure to unplug the unit before cleaning to prevent shock or fire hazards.**

CARE AND CLEANING

Air Filter Cleaning

- Take the filter by the center and pull up and out.
- Wash the filter using liquid dishwashing detergent and warm water. Rinse filter thoroughly. Gently shake excess water from the filter. Be sure the filter is thoroughly dry before replacing. Or, instead of washing you may vacuum the filter clean.

Note: Never use hot water over 40°C(104°F) to clean the air filter. Never attempt to operate the unit without the air filter.

Winter Storage

If you plan to store the air conditioner during the winter, remove it carefully from the window according to the installation instructions. Cover it with plastic or return it to the original carton.

Energy Saving Note

In order to reach the maximum energy saving and comfort, it is recommended to use a cover to insulate the unit when the unit is not in use. The recommended size for the unit is 24.4"x14.8"x2.2"(WxHxD).

Cabinet Cleaning

- Be sure to unplug the air conditioner to prevent shock or fire hazard. The cabinet and front may be dusted with an oil-free cloth or washed with a cloth dampened in a solution of warm water and mild liquid dishwashing detergent. Rinse thoroughly and wipe dry.
- Never use harsh cleaners, wax or polish on the cabinet front.
- Be sure to wring excess water from the cloth before wiping around the controls. Excess water in or around the controls may cause damage to the air conditioner.
- Plug in air conditioner.

TROUBLESHOOTING TIPS

Before calling for service, review this list. It may save your time and expense. This list includes common occurrences that are not the result of defective workman-ship or materials in this appliance.

Problem	Solution
Air conditioner does not start	<i>Wall plug disconnected. Push plug firmly into wall outlet.</i>
	<i>House fuse blown or circuit breaker tripped. Replace fuse with time delay type or reset circuit breaker.</i>
	<i>Plug Current Device Tripped. Press the RESET button.</i>
	<i>Power is OFF. Turn power ON.</i>
Air from unit does not feel cold enough	<i>Room temperature below 62°F(17°C). Cooling may not occur until room temperature rises above 62°F(17°C).</i>
	<i>Temperature sensing behind air filter element touching cold coil. Keep it from the cold coil.</i>
	<i>Set to a Lower temperature.</i>
	<i>Compressor stopped when changing modes. Wait for 3 minutes after set to the COOL mode.</i>
Air conditioner cooling, but room is too warm- ice forming on cooling coil behind decorative front.	<i>Outdoor temperature below 64°F(18°C). To defrost the coil, set FAN ONLY mode.</i>
	<i>Air filter may be dirty. Clean filter. Refer to Care and Cleaning section. To defrost, set to FAN ONLY mode.</i>
	<i>Thermostat set too cold for night-time cooling. To defrost the coil, set to FAN ONLY mode. Then, set temperature to a Higher setting.</i>

TROUBLESHOOTING TIPS

Problem	Solution
Air conditioner cooling, but room is too warm- NO ice forming on cooling coil behind decorative front.	<i>Dirty air filter- air restricted. Clean air filter. Refer to Care and Cleaning section.</i>
	<i>Temperature is set too High, set temperature to a Lower setting.</i>
	<i>Air directional louvers positioned improperly. Position louvers for better air distribution.</i>
	<i>Front of units is blocked by drapes, blinds, furniture, etc. - restricts air distribution. Clear blockage in front of unit.</i>
	<i>Doors, windows, registers, etc. Open- cold air escapes. Close doors, windows, registers.</i>
	<i>Unit recently turned on in hot room. Allow additional time to remove " Stored heat" from walls, ceiling, floor and furniture.</i>
Air conditioner turns on and off rapidly	<i>Dirty air filter- air restricted. Clean air filter.</i>
	<i>Outside temperature extremely hot. Set FAN speed to a Higher setting to bring air past cooling coils more frequently.</i>
Noise when unit is cooling	<i>Air movement sound. This is normal . If too loud, set to a slower FAN setting.</i>
	<i>Window vibration - poor installation. Refer to installation instructions or check with installer.</i>
Water dripping INSIDE when unit is cooling.	<i>Improper installation. Tilt air conditioner slightly to the outside to allow water drainage. Refer to installation instructions - check with installer.</i>
Water dripping OUTSIDE when unit is cooling.	<i>Unit removing large quantity of moisture from humid room. This is normal during excessively humid days.</i>
Remote Sensing Deactivating Prematurely (some models)	<i>Remote control not located within range. Place remote control within 20 feet & 180°, radius of the front of the unit.</i>
	<i>Remote control signal obstructed. Remove obstruction.</i>
Room too cold	<i>Set temperature too low. Increase set temperature.</i>

The design and specifications are subject to change without prior notice for product improvement. Consult with the sales agency or manufacturer for details.



GMS INDUSTRIAL SUPPLY
AMERICAN PATRIOT
FAMILY OF COMPANIES

Air Compressor Package 103346



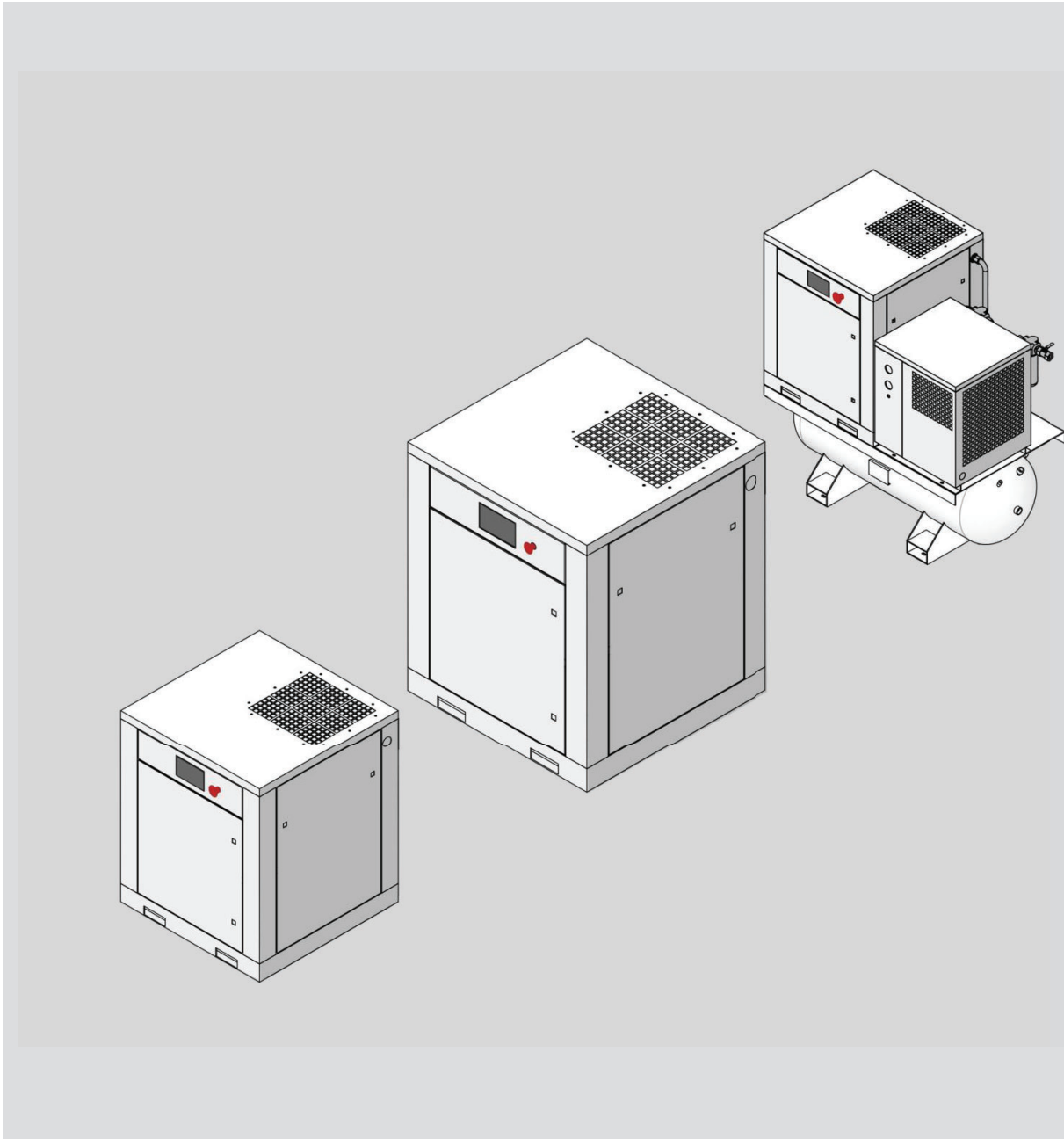
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Operating instructions

American Patriot Screw Compressor FAS03 – 37



Read the instructions before operating the compressor!

Preface

Thank you for deciding on a product from our range of screw compressors. Our products undergo thorough checks and tests before leaving the factory. In order to be able to guarantee safe, reliable and long-term use of the system, please read the operating instructions carefully before using the system. Compliance with the information about operation contained in the instructions is a prerequisite for a good working condition of the system in the long term.

Thank you!

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2 General information

2.1 Limitation of liability

All information and instructions in this manual have been compiled taking account of the applicable standards and regulations, state-of-the-art technology and our years of knowledge and experience.

The manufacturer assumes no liability for damages caused by:

- Failure to adhere to these instructions
- Improper use
- Assignment of unqualified staff
- Unauthorised conversions
- Technical modifications
- Use of non-approved spare parts

The actual scope of supply may differ from the descriptions and illustrations in these instructions in the case of custom designs, the inclusion of additional order options or as a result of the latest technical modifications.

The obligations agreed in the contract of supply, the manufacturer's general terms and conditions of business and delivery and the legal regulations valid at the time of signing the contract apply.

2.2 Copyright

These instructions are protected by copyright and for internal purposes only.

These instructions must not be made available to third parties, reproduced in any way – even excerpts – and the content must not be utilised and/or communicated, except for internal purposes, without the written permission of the manufacturer.

Any infringement shall be subject to compensation for damages. We reserve the right to assert further claims.

2.3 Guarantee conditions

The guarantee conditions are included in the General Terms and Conditions issued by the manufacturer.

2.4 Customer service

Our Customer Service department is available to provide technical information. See page 2 for contact data.

3.0 Safety instructions

3.1 Explanation of symbols

Safety instructions

The safety instructions and safety information in these instructions are denoted by symbols. The safety instructions are prefaced by signal words which express the extent of the risk.

To prevent accidents, personal injury and property damage, comply with the safety instructions at all times and proceed with caution.



DANGER!

This combination of symbol and signal word indicates an immediate, hazardous situation which will lead to serious or even fatal injuries if not avoided.



WARNING!

This combination of symbol and signal word indicates a potentially hazardous situation which may lead serious or even fatal injuries if not avoided.



CAUTION!

This combination of symbol and signal word indicates a potentially hazardous situation which may cause minor or light injuries if not avoided.



NOTE!

This combination of symbol and signal word indicates a potentially hazardous situation which may cause property damage and environmental damage if not avoided.

3.2 Fundamental dangers

The following section describes residual risks that can arise from the machine and were determined by a risk assessment.

To minimise health hazards and avoid dangerous situations, follow the safety instructions specified here as well as in the following chapters of these instructions.

3.2.1 General dangers at the workplace

Noise



WARNING!
Danger of injury from noise!

The noise level in the work area can cause severe hearing loss.

- Always wear ear protection when working.
- Only stay in the danger zone as long as necessary.

Accumulation of fluids



CAUTION!
Danger of injury due to slipping in accumulated fluids!

Slipping in fluids that have accumulated on the floor may result in a fall. A fall may result in injuries.

- Absorb any accumulations of fluids using suitable means.
 - Wear non-slip safety shoes.
 - Affix warnings and mandatory signs on or near any area in which fluids can accumulate on the floor.
-

3.2.2 Dangers due to electric energy

Electric power



DANGER!

Danger to life due to electric current!

Imminent risk of fatal injury from electric shock in the event of in contact with live parts. Damage to insulation or individual components can present a danger to life.

- Any work on the electrical system must be performed by qualified electricians.
- In the event of damage to insulation, shut down power supply immediately and have repairs performed.
- Before working on active parts of electrical systems and equipment, always disconnect these from the mains supply and ensure they remain disconnected for the duration of the work. In doing so, observe the 5 safety rules:
 - Isolate from electrical supply.
 - Secure against restart.
 - Check for absence of voltage.
 - Ground and short-circuit.
 - Cover or shield any adjacent live parts.
- Never bypass fuses or disable fuses. When replacing fuses, observe the correct amperage.
- Protect energised parts from moisture. This could cause a short circuit.

Stored charges



DANGER!

Danger to life due to stored charges!

Electric charges may be stored in electrical components; these charges may be retained even after the system has been switched off and disconnected from the power supply. Contact with these components may result in serious or fatal injury.

- Before working on the components named, ensure that they have been completely disconnected from the power supply. Allow 10 minutes to elapse to ensure that the internal capacitors have been fully discharged.

3.2.3 Dangers due to mechanical elements

Moving parts



WARNING!

Danger of injury due to moving components!

Rotating parts or parts making linear motions can cause serious injuries.

- Never reach into moving parts or handle moving parts during operation.
- Do not open covers during operation.
- Be aware of the stop delay: Make sure that all parts have stopped moving before opening any covers.
- Wear close-fitting work clothing with low resistance to tearing in the danger area.

Sharp edges and pointed corners



CAUTION!

Danger of injury due to sharp edges and pointed corners!

Sharp edges and pointed corners may cause grazing and cuts to the skin.

- Proceed with caution when working near sharp edges and pointed corners.
- If in doubt, wear protective gloves.

3.2.4 Dangers due to hydraulic energy

Jets of liquid



WARNING!

Danger to life due to jets of liquid escaping under high pressure!

In the event of defective lines or components, a jet of liquid can escape under high pressure. The jet of liquid can cause extremely severe injuries or even death.

- Never hold body parts or objects in the jet of liquid. Keep people out of the danger zone. In the event of accidental contact with the jet of liquid, initiate first aid measures and consult a doctor immediately.
- Initiate an immediate emergency stop. If necessary, take additional measures in order to reduce the pressure and stop the jet of liquid.
- Collect and dispose of escaping liquids properly.

General information / safety instructions

- Have faulty components repaired immediately.

Air receiver



WARNING!

Danger to life in the event of improperly performed work on the air receiver!

Improper handling of air receivers can cause a sudden release of pressure and thereby cause serious or even fatal injuries and considerable material damage.

- Never carry out welding or soldering work on the air receiver tank.
- Do not carry out any mechanical work on the air receiver tank.
- Fully vent the air receiver tank via the fitted vent screw after connecting the pneumatic line.
- Do not start work on compressors with a air receiver before the pressure has been completely relieved and checking that there is no pressure.
- Do not start any work on the air receiver until the gas pre-load pressure has been completely relieved.

Compressed air



WARNING!

Danger of injury due to compressed air!

Compressed air can escape from compressed air hoses or components under pressure in the event of improper handling or in the event of a fault. This can result in eye injuries, dust being raised, or hoses making uncontrolled movements.

Pressurised components can move in uncontrolled manner and can cause injuries if handled incorrectly.

- Before removing pressurised hoses or components, depressurise them.
- Have any faulty pressurised components replaced immediately by specialist personnel.
- Before all work, ensure that the compressor is depressurised; wait at least 5 minutes.

Oil mist



CAUTION!
Danger of injury due to Oil mist!

In the event of high temperatures or mechanical spray dispersion, Oil mist can form. Oil mist can irritate eyes and the respiratory system.

- When working on the Oil system and an Oil mist forms, wear breathing protection and protective goggles and ensure that there is a fresh air supply.

3.2.5 Dangers due to high temperatures

Hot surfaces



WARNING!
Danger of injury due to hot surfaces!

The surfaces of components, and operating materials (e.g. Oil or cooling water) may heat up considerably during operation. Contact between the skin and hot surfaces and liquids cause serious burns to the skin.

- When performing any work near hot surfaces, heat-resistant occupational safety clothing and protective gloves must be worn.
- When performing any work with operating materials, heat-resistant occupational safety clothing and protective gloves must be worn.
- Before any work, make sure that all surfaces have cooled to ambient temperature; wait at least 30 minutes.

Hot operating materials



WARNING!
Danger of injury due to hot operating materials!

Operating materials can reach high temperatures during operation. Skin contact with hot operating materials causes severe skin scalding.

- When performing any work with operating materials, heat-resistant occupational safety clothing and protective gloves must be worn.

- Before performing any work with operating materials, check whether they are hot. If necessary, allow them to cool down.

3.3. Proper use

The machine is designed and constructed for proper use as described here only.

The screw compressor is only used to generate compressed air in a non-explosive environment. The screw compressor may be only supplied with cool, dry and dust-free cooling air.

Proper use also includes compliance with all the information and specifications in these instructions.

Any use going beyond the proper use or other type of use is regarded as misuse.



WARNING!
Danger due to misuse!

Misuse of the compressor can cause dangerous situations.

- The compressed air may not be used for respiration without prior treatment.
- The compressed air may not be used directly for pharmaceutical or sanitary purposes, or for direct treatment of food, without appropriate after-treatment.
- The screw compressor may not be operated outdoors.
- The screw compressor or individual components may not be converted, modified or re-equipped.
- The screw compressor may not be used in an explosive atmosphere.
- The intake of media other than cool, dry and dust-free cooling air is prohibited.

No claims of any kind can be asserted for damage resulting from misuse.

3.4 Responsibility of the owner

Owner

The owner is the person who operates the machine for commercial or business purposes themselves, or hands it over to a third party for use/application, and who assumes the legal product responsibility for the protection of the user, the personnel or third parties during operation.

Owner obligations

The machine is used for commercial purposes. Therefore, the owner of the machine is subject to legal occupational safety regulations.

In addition to the safety instructions in these instructions, the safety instructions, the regulations for the prevention of accidents and environmental protection regulations applicable at the site of the machine, must also be adhered to.

The following applies in particular:

- The owner must keep informed of the applicable occupational health and safety regulations and identify any additional hazards, resulting from the specific local operating conditions, by performing a risk assessment. These must be implemented in the form of operating instructions for the operation of the machine.
- During the full period of machine use, the owner must check whether the operating instructions created correspond to the current status of rules and regulations and adapt the operating instructions if necessary.
- The owner must clearly regulate and specify responsibilities for installation, operation, repair of malfunctions, maintenance, and cleaning.
- The owner must ensure that all employees who work with the machine have read and understood these instructions. In addition, the owner must train staff at regular intervals and inform the staff of the dangers.
- The owner must provide staff with the required safety clothing and equipment and instruct them that wearing the required protective equipment is mandatory.

Furthermore, the owner is responsible for ensuring that the machine is always in a technically perfect working condition. The following requirements therefore apply:

- The owner must ensure that the maintenance intervals described in these operating instructions are adhered to.
 - The owner must have all safety equipment checked regularly to make sure it is fully functional and complete.
-

- The owner must ensure that the appropriate media connections are provided.
- The owner must ensure that the supply of the required quantity of cooling medium (air/water) is guaranteed.
- The owner must make sure that the required heat extraction is guaranteed.

3.5 Description of the installed safety devices

Main switch with emergency stop function

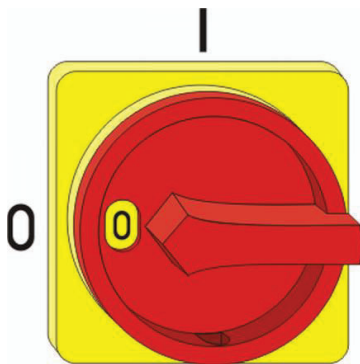


Fig. 1: Main switch

The main switch is also designed as an emergency stop switch. By turning the main switch to the “0” position, the machine is stopped by switching off the power immediately, thereby triggering an emergency stop.



WARNING!

Danger to life due to restarting in an uncontrolled manner!

Restarting the machine in an uncontrolled manner can cause serious or fatal injuries.

- Before restarting, ensure that the reason for the emergency stop has been rectified and that all safety devices are installed and in working order.
- Only turn the main switch to the “I” position when there is no more danger.

Emergency stop button

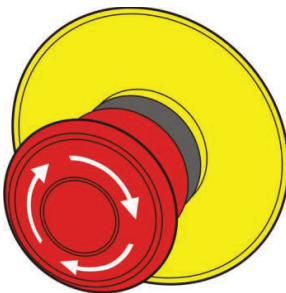


Fig. 2: Emergency stop button

Pressing the emergency stop button stops the machine by switching off the power supply with immediate effect. After an emergency stop button has been pressed, it must be unlocked by turning it to allow a restart.



WARNING!

Danger to life due to restarting in an uncontrolled manner!

Restarting the machine in an uncontrolled manner can cause serious or fatal injuries.

- Before restarting, ensure that the reason for the emergency stop has been rectified and that all safety devices are installed and in working order.

- Do not unlock the emergency stop button until there is no more danger.

Safety valves

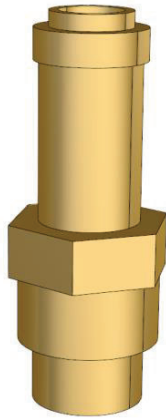


Fig. 3: Safety valve

Safety valves are safety components and are pressure-relief equipment for the areas under pressure such as the boiler, pressure tank, pipes and transport container. In the event of an impermissible pressure increase, safety valves discharge gases, vapours or liquids into the atmosphere.

3.6 Securing against restart



WARNING!

Risk of fatal injury if the machine is restarted without authorisation or in an uncontrolled manner!

An uncontrolled or unauthorised restart of the machine can cause severe or fatal injuries.

- Before restarting, ensure that all safety devices have been fitted and are fully functional, and that there are no hazards for personnel.
- Always adhere to the procedure described below to secure against restart.

4 Design and function

4.1 Design

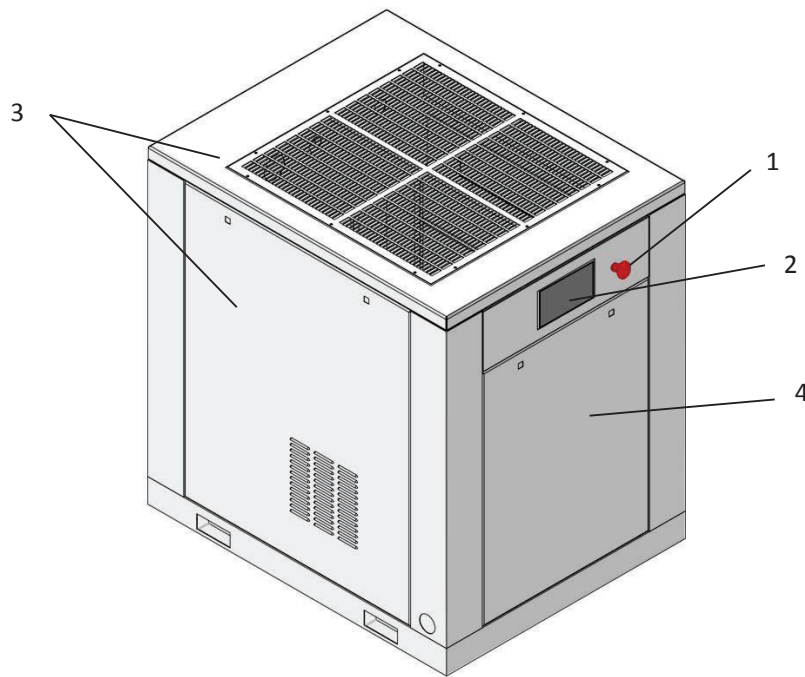


Fig. 1: 37 kW screw compressor

- | | |
|--------------------------|----------------------------|
| 1. Emergency stop button | 3. Noise insulation covers |
| 2. Control panel | 4. Switch cabinet |

Note:

The dimensions and configuration of different models may vary, however share the same basic structure.

4.2 Introduction to the compact, oil-lubricated screw compressor

The compact, oil-lubricated screw compressor is characterised by its reliability, low wear, low vibration properties, smooth running operation and high efficiency.

4.2.1 Brief description of the function

The fresh air supplied by the installed cooling air ventilator is filtered through the intake filter. The air flows over the intake regulator into the compressor stage, where it is compressed together with the injected Oil to the final pressure. The compressed air is largely separated from the Oil in the Oil pressure tank. The subsequent oil separator removes the remaining Oil from the compressed air. The compressed air then flows over the minimum pressure valve and return valve into the compressed air aftercooler and is cooled down before it leaves the screw compressor through the compressed air connection.

The Oil is separated from the compressed air in the Oil pressure tank and the oil separator and flows to the Oil cooler. The Oil temperature regulator adds the cooled Oil to the hot Oil via the Oil cooler bypass in accordance with the temperature set point. Finally, the Oil filter cleans the Oil before it is injected into the compressor stage once again.

4.3 Environmental protection



NOTE!

Danger to the environment due to incorrect handling of environmentally hazardous substances!

If environmentally hazardous substances are handled incorrectly, in particular if they are disposed of incorrectly, there is a risk of considerable harm to the environment.

- Always adhere to the instructions below when handling and disposing of environmentally hazardous substances.
- If environmentally hazardous substances are accidentally released into the environment, take suitable measures immediately. If there are any doubts, inform the responsible community authorities about the damage and enquire about suitable measures to take.

The following environmentally hazardous substances are used:

Oil

Oils can contain toxic substances and substances that are harmful to the environment. They must not be released into the environment. Disposal must be carried out by a specialist disposal company.

Lubricants

Lubricants such as grease, oil and condensate contain toxic substances. They must not be released into the environment. Disposal must be carried out by a specialist disposal company.

4.4 Signage

The following symbols and information signs are posted in the work area. They refer to the immediate surroundings in which they are posted.



WARNING!

Danger of injury due to illegible symbols!

Stickers and signs may become dirty or unidentifiable over time, preventing dangers from being recognised and the necessary operating instructions from being followed. This results in a danger of injury.

- All safety, warning and operating information must be kept in a legible condition at all times.
- Damaged signs or stickers must be replaced immediately.

4.4.1 Warning signs

Electric voltage



Only qualified electricians may work in a room marked with this sign. Unauthorised persons may not enter workplaces marked with this sign, nor open a cabinet marked with this sign.

Automatic start-up



Maintain sufficient distance from all parts that can move; they present a danger of crush injuries or being pulled in.

Hot surface



Hot surfaces, such as machine parts, containers or materials, but also hot liquids, are not always apparent. Do not touch these without protective gloves.

4.4.2 Instructions on the machine

Direction of rotation



There is a direction of rotation sticker on the drive unit and on the cooling air fan. This sticker shows the respective direction of rotation.

Relubrication

Nachschmierung nach XXXX h
Relubrication after XXXX h

The sticker for relubrication is affixed to the drive unit.

Oil filling

Ölfüllung
Oil charged
Remplissage d'huile
XXX XXX No. XXX.XXXXX

The sticker for Oil filling is affixed to the Oil tank and next to the installed controller.

Brief commissioning instructions

The sticker is affixed to the switch cabinet and contains brief commissioning instructions.

Brief commissioning instructions
(The detailed operating instructions must be observed)

Only trained personnel authorised by the operator may set up, operate and maintain the compressor. Operate the compressor in a cool, dry and dust-free environment with good ventilation. Room temperature between +5 °C and +40 °C. A connection to the compressed air network must be made using a flexible hose or vibration compensator. Do not break the aluminium compressed air connection sleeve of the compressor open with a threaded pipe.

Before connecting the electricity, check the required current type, voltage and frequency. Check whether the oil level is at a maximum. The maximum oil level is the lower edge of the oil filler nozzle. The oil must be checked regularly for condensate. Any condensate must be removed using the oil drain and must be reported to Customer Service.

ATTENTION! Check the correct direction of rotation. The correct direction of rotation is indicated by the rotation direction arrow on the compressor stage. To do so, check that the direction of rotation is to the right by using a rotating field measurement device. Start the compressor using start button I; the green lamp lights up. If the network pressure is already higher than the switch-on pressure, the flashing green lamp indicates the compressor is ready for operation.

CAUTION! When the green lamp is flashing, the compressor can switch on by itself at any time! Only switch off the compressor using stop button 0. Red flashing lamp = warning. Red lamp remains lit = fault (compressor standstill). In the event of a warning or fault, observe the display and call customer service if necessary.

If you have any questions, please specify the data on the type plate. The type plate is on the compressed air outlet side of the switch cabinet, or on the lower frame on the maintenance side.

ATTENTION!
Only open the sound damping hood when the compressor is switched off and at a standstill.
Attention:
Danger of injury!
Remove main fuses.

CE

5 Technical data

5.1 Type plate

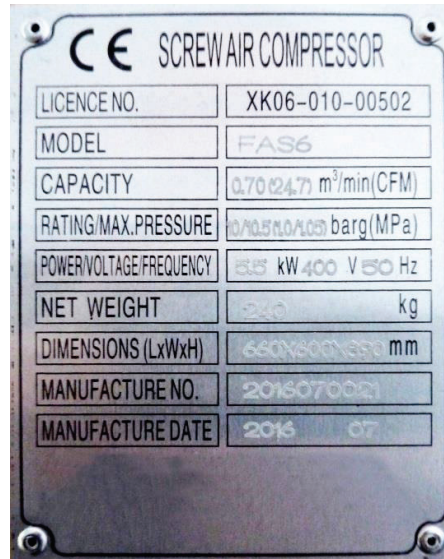


Fig. 4: Type plate

The type plate is affixed to the rear of the system and contains the following information:

- Licence number
 - Model
 - Capacity
 - Maximum pressure
 - Motor power
 - Net weight
 - Dimensions
 - Manufacturer no.
 - Manufacture date
-

5.2 General specifications

5.2.1 Operating conditions

■ Environment

Physical variable	Numerical value	Unit
Temperature range	5 – 45	°C
Maximum relative humidity	60	%
Maximum installation altitude above sea level	1 000	m

5.2.2 Operating materials

■ FAS03 –06

Type	Lubricant	Oil quantity	Unit
FAS03	Oil	1.6	Gal
FAS04	Oil	1.6	Gal
FAS06	Oil	1.6	Gal

■ FAS07 – 11

Type	Lubricant	Oil quantity	Unit
FAS07	Oil	2.1	Gal
FAS11	Oil	2.1	Gal

■ FAS15

Type	Lubricant	Oil quantity	Unit
FAS15	Oil	2.1	Gal

■ FAS18 – 22

Type	Lubricant	Oil quantity	Unit
FAS18	Oil	3.2	Gal
FAS22	Oil	3.2	Gal

■ FAS30 – 37

Type	Lubricant	Oil quantity	Unit
FAS30	Oil	4.75	Gal
FAS37	Oil	4.75	Gal

5.2.3 Air supply and cooling

■ FAS03-6

Type	Compressed air outlet	Cooling air volume
	G/DN	m ³ /h
FAS03	G 1/2	850
FAS04	G 1/2	850
FAS06	G 1/2	850

■ FAS07 – 11

Type	Compressed air outlet	Cooling air volume
	G/DN	m ³ /h
FAS07	G 3/4	1200
FAS11	G 3/4	1200

Design and function

- FAS15

Type	Compressed air outlet	Cooling air volume
	G/DN	m ³ /h
FAS15	G 3/4	1200

- FAS18 – 22

Type	Compressed air outlet	Cooling air volume
	G/DN	m ³ /h
FAS18	G 1 1/4	5300
FAS22	G 1 1/4	5300

- FAS30 – 37

Type	Compressed air outlet	Cooling air volume
	G/DN	m ³ /h
FAS30	G 1 1/2	10 500
FAS37	G 1 1/2	10 500

5.3 FAS03 – 37

5.3.1 Power and dimensions

■ FAS03-6

Type	Rated motor output	Screw compressor (standard)		Screw compressor (incl. compressed air tank)		Screw compressor (incl. compressed air tank and dryer)	
	kW	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]
FAS03	3	660 × 600 × 890	220	1500 × 600 × 1440	335	1450 × 600 × 1440	425
FAS04	4	660 × 600 × 890	230	1500 × 600 × 1440	345	1450 × 600 × 1440	435
FAS06	5.5	600 × 600 × 890	240	1500 × 600 × 1440	355	1450 × 600 × 1440	445

Design and function

■ FAS07 – 11

Type	Rated motor output	Screw compressor (standard)		Screw compressor (incl. compressed air tank)		Screw compressor (incl. compressed air tank and dryer)	
	kW	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]
FAS07	7.5	800 × 800 × 995	280	1650 × 800 × 1510	460	1600 × 800 × 1600	560
FAS11	11	880 × 830 × 1075	300	1650 × 830 × 1665	480	1600 × 830 × 1665	580

■ FAS15

Type	Rated motor output	Screw compressor (standard)		Screw compressor (incl. air tank)		Screw compressor (incl. air tank and dryer)	
	kW	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]	L x W x H [mm]	Weight [kg]
FAS15	15	880 × 830 × 1075	400	1500 × 830 × 1590	580	1500 × 830 × 1680	680

■ FAS18 – 22

Type	Rated motor output	Screw compressor (standard)	
	kW	L x W x H [mm]	Weight [kg]
FAS18	18.5	1050 × 880 × 1260	500
FAS22	22	1050 × 880 × 1260	570

■ FAS30 – 37

Type	Rated motor output	Screw compressor	
	kW	L x W x H [mm]	Weight [kg]
FAS30	30	1000 × 1250 × 1310	850
FAS37	37	1000 × 1250 × 1310	880

5.3.2 Connection values

■ FAS03-6

Type	230 V / 460V - 60 Hz current value
	SFA
FAS031	20
FAS033	12.8 / 6.4
FAS041	27.5
FAS043	17.7 / 8.8
FAS061	34.6
FAS063	22.9 / 11.5

■ FAS07 – 11

Type	230 V / 460V - 60 Hz current value
	SFA
FAS073	28.2 / 14.2
FAS113	40.9 / 20.5

Design and function

■ FAS15

Type	230 V / 460V - 60 Hz current value
	SFA
FAS153	61 / 30.4

■ FAS18 – 22

Type	230V / 460 V - 60 Hz current value
	SFA
FAS183	74.4 / 37.1
FAS223	83.8 / 41.9

■ FAS30 – 37

Type	230V / 460 V - 60 Hz current value
	SFA
FAS303	115 / 57.5
FAS373	138.8 / 69.4

6. Screw compressor installation

6.1 Safety instructions for installation and commissioning

Electrical system

**DANGER!****Danger to life due to electric current!**

Danger to life in the event of contact with live components. Active electrical components may make uncontrolled movements and result in severe injuries or even death.

- Switch off the electric power and secure it against a restart before starting work.

Improper commissioning

**WARNING!****Danger of injury due to improper commissioning!**

Improper commissioning may result in serious injuries and considerable property damage.

- Ensure that all installation work has been performed and completed according to the information and instructions in these instructions before commissioning.
- Before commissioning, ensure that there is nobody in the danger area.

Installation

Securing against a restart



WARNING!
Danger of fatal injury due to unauthorised restart!

Switching the power supply back on without authorisation during installation presents a danger of severe injuries, or even death, for persons working in the danger zone.

- Switch off all power supplies and secure them against a restart before starting work.

Improper installation and commissioning



WARNING!
Danger of injury due to improper installation and initial commissioning!

Improper installation and initial commissioning can cause serious injuries and considerable property damage.

- Before starting work, ensure sufficient installation space.
- Use caution when handling exposed sharp-edged components.
- Make sure that installation area is organised and clean! Loosely stacked components, or components and tools left lying around, are a source of accidents.
- Install components correctly. Comply with all specified screw tightening torques.
- Ensure components cannot be dropped or cannot fall over.
- Prior to initial commissioning, observe the following:
 - Ensure that all installation work has been performed and completed according to the information and instructions included in these instructions.
 - Ensure that there is nobody in the danger area.

6.2 Requirements for the installation location

Set up the screw compressor so that the following conditions are complied with:

- The installation location is level.
- The stability of the machine is guaranteed.
- The machine is easily accessible and can be accessed from all sides.
- There is sufficient lighting.
- There is sufficient ventilation.
- A power supply is available.
- Escape routes and rescue equipment are freely accessible.
- The machine is not exposed to an explosive atmosphere.
- The machine is not exposed to a corrosive atmosphere.
- The machine is not exposed to direct sunlight.
- There is no external heat from surrounding sources of heat.
- No dust can accumulate.
- Fire protection measures have been taken.
- The machine is not exposed to vibrations.
- The surface is resistant to solvents, impermeable to liquids, is anti-static and easy to clean.
- There are no machines in the vicinity which cause electrical or electromagnetic interference.

6.3 Installation

If the screw compressor is installed in a location which does not comply with the requirements and without specific planning, and operation starts as soon as the lines have been connected, this will, in most cases, be the cause of problems with maintenance as well as a poor quality of the compressed air generated by the screw compressor.



NOTE!

Choosing a suitable installation site is a requirement for proper use of the screw compressor system.

6.4 Information about lines and the foundation

6.4.1 Dangers due to mechanical elements

Moving parts



WARNING!

Danger of injury due to moving components!

Rotating parts or parts making linear motions can cause serious injuries.

- Never reach into moving parts or handle moving parts during operation.
- Do not open covers during operation.
- Be aware of the stop delay: Make sure that all parts have stopped moving before opening any covers.
- Wear close-fitting work clothing with low resistance to tearing in the danger area.

Sharp edges and pointed corners



CAUTION!

Danger of injury due to sharp edges and pointed corners!

Sharp edges and pointed corners may cause grazing and cuts to the skin.

- Proceed with caution when working near sharp edges and pointed corners.
- If in doubt, wear protective gloves.

6.5 General information and safety instructions in relation to electric operating materials

6.5.1 Dangers due to electric energy

Electric power



DANGER!

Danger to life due to electric current!

Imminent risk of fatal injury from electric shock in the event of in contact with live parts. Damage to insulation or individual components can present a danger to life.

- Any work on the electrical system must be performed by qualified electricians.
- In the event of damage to insulation, shut down power supply immediately and have repairs performed.
- Before working on active parts of electrical systems and equipment, always disconnect these from the mains supply and ensure they remain disconnected for the duration of the work. In doing so, observe the 5 safety rules:
 - Isolate from electrical supply.
 - Secure against restart.
 - Check for absence of voltage.
 - Ground and short-circuit.
 - Cover or shield any adjacent live parts.
- Never bypass fuses or disable fuses. When replacing fuses, observe the correct amperage.
- Protect energised parts from moisture. This could cause a short circuit.

Stored charges



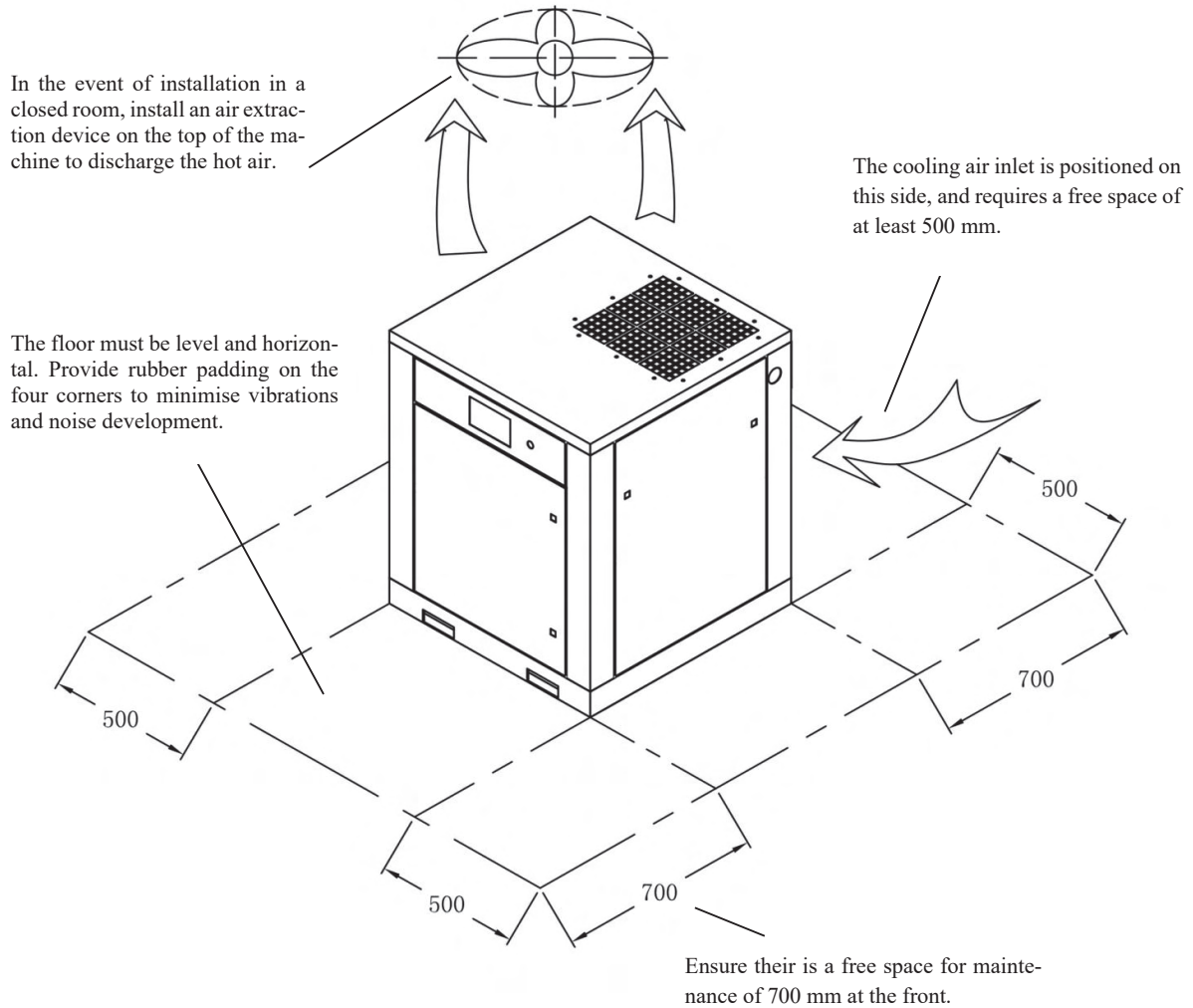
DANGER!

Danger to life due to stored charges!

Electric charges may be stored in electrical components; these charges may be retained even after the system has been switched off and disconnected from the power supply. Contact with these components may result in serious or fatal injury.

- Before working on the components named, ensure that they have been completely disconnected from the power supply. Allow 10 minutes to elapse in order to ensure that the internal capacitors have been fully discharged.

Installation



Schematic diagram of the installation requirements for the screw compressor

7 Interfaces and function of the individual components

7.1 Interfaces

7.1.1 Compressed air route

Dust is filtered from the intake air in the intake filter, and is then conducted through the intake regulator to the compressor stage, where it is compressed and mixed with the Oil. It flows from there to the Oil pressure tank. The compressed air enters the consumer network through the oil separator, the minimum pressure valve and the compressed air aftercooler.

7.1.2 Functional description of the individual components in the compressed air circuit

1. Intake filter

The intake filter is a dry filter made of paper. The maintenance interval is stored in the controller, and can be changed if ambient conditions vary.

2. Intake regulator

When the system pressure falls, the intake regulator ensures a new supply of air to the compressor.

3. Compressor stage

The intake air is compressed by the compressor stage and is conducted to the Oil pressure tank together with the injected Oil.

4. Drive

The compressor stage is driven by an electric motor. This motor is installed on the base frame and drives the main rotor of the compressor stage by means of 2 belt discs with the corresponding transmission ratios. The motor is also controlled using a frequency converter to correspond to consumption on the FAS SC 7 – 37 models.

5. Oil pressure tank

The Oil pressure tank is comprised of several components. The safety valve protects the Oil pressure tank from overpressure. The inspection glass is used to check the Oil level. The Oil is topped up through the filler nozzle and removed through the Oil drain. When at a standstill, the Oil level must be between the upper and lower limit value in the inspection glass. Due to the large cross-section of the Oil pressure tank, the flow rate of the Oil–air mixture is reduced, and this is where the majority of the Oil is separated from the compressed air.

6. Oil separator

The oil separator removes additional Oil from the compressed air. The oil separator needs to be removed in specific time intervals. The maintenance interval is stored in the controller, and can be changed if ambient conditions vary.

7. Minimum pressure and non-return valve

The minimum pressure valve is installed above the Oil–air tank and only opens when the system pressure increases to 4.5 bar.

After switching off the screw compressor, the minimum pressure and non-return valve prevents the compressed air from flowing back out of the network.

8. Compressed air aftercooler

The cooling air fan blows cold air through the cooling fins of the air cooler, thereby cooling the compressed air flowing through it. The cooling effect is highly dependent on the ambient temperature when cooling the air. Observe the ventilation conditions when choosing an installation location. If ambient conditions are not good, deposits of dust can quickly form on the air cooler fins, impairing the cooling effect. This can result in high compressed air final temperatures and, ultimately, to the system heating up. Make sure that the surface of the cooler remains clean.

7.2 Oil interfaces

7.2.1 Oil route

The Oil is injected into the compressor stage together with the intake air. After compression, the compressed air, mixed with Oil, enters the Oil pressure tank. Most of the Oil is separated here. The remaining air, which contains Oil mist, passes the oil separator. More cooling liquid is separated here, and conveyed back to the Oil pressure tank. Due to the pressure in the Oil pressure tank, Oil is pressed into the Oil cooler, and cools down. Contaminants and particles are then removed in the Oil filter. The Oil flow is then split into two parts: one part is injected into the compression chamber through the bottom end of the system housing in order to cool the compressed air; the other part is used to lubricate the bearings on both ends of the system; both flows are then combined at the base of the compression chamber and discharged with the compressed air into the Oil pressure tank.

7.2.2 Functional description of the individual components in the Oil circuit

1. Oil cooler

The Oil cooler and the compressed air aftercooler function in the same cooling mode. The cooling air fan blows cold air through the cooling fins of the air cooler, thereby cooling the compressed air flowing through it. The cooling effect is highly dependent on the ambient temperature when cooling the air. Observe the ventilation conditions when choosing an installation location. If ambient conditions are not good, deposits

of dust can quickly form on the air cooler fins, impairing the cooling effect. This can result in high compressed air final temperatures and, ultimately, to the system overheating. This is why the cooler fins need to be cleaned regularly. Make sure that the surface of the cooler remains clean.

2. Oil filter

The Oil filter is a paper filter that can filter contaminants out of the Oil, such as metal particles. A mesh size of 10 µm ensures bearings and rotors are protected reliably. If the Oil filter is not replaced as specified in the maintenance table, there is a danger of an insufficient flow rate of Oil, high compressed air final temperatures and a shutdown of the system. The service life of the bearings may also be impaired by an insufficient Oil volume.

3. Oil separator

The filter element of the oil separator is comprised of multiple layers of fine fibreglass, allowing the proportion of Oil mist in the compressed air to be reduced significantly after passing the oil separator. The quality of the Oil and the degree of contamination of the ambient air have a large impact on its service life. Only the Oil for screw compressors that we recommend may be used as a Oil.

The Oil filtered by the oil separator is collected in the small, round cavity in the middle, and is conveyed back to the compressor stage through a Oil return line.

4. Oil temperature regulator

There is a thermoregulation valve in front of the Oil cooler. The Oil temperature is low shortly after starting up the system. The thermoregulation valve then automatically opens the return circuit, allowing Oil to flow into the system without passing the Oil cooler. If the Oil temperature increases to more than 67 °C, this valve opens slowly until it is fully open at 72 °C. The entire Oil then passes the Oil cooler first before flowing into the system.

8 Protective and warning devices

8.1 Motor overload protection

There are two electric motors in the screw compressor – a main drive motor and a motor for the cooling air fan. When the operating current exceeds the set upper limit for the protective device under normal operating conditions, the overload protection device automatically shuts down the power supply. After shutdown, the screw compressor starts up again automatically if it has not otherwise been reset by pressing the reset switch manually. The current protection device is set at the factory, and this is very important for protection when the compressor is operating normally. These settings must not be changed without authorisation.

If a motor overload occurs during operation, please contact your service partner immediately. Otherwise there is a danger of further damage.

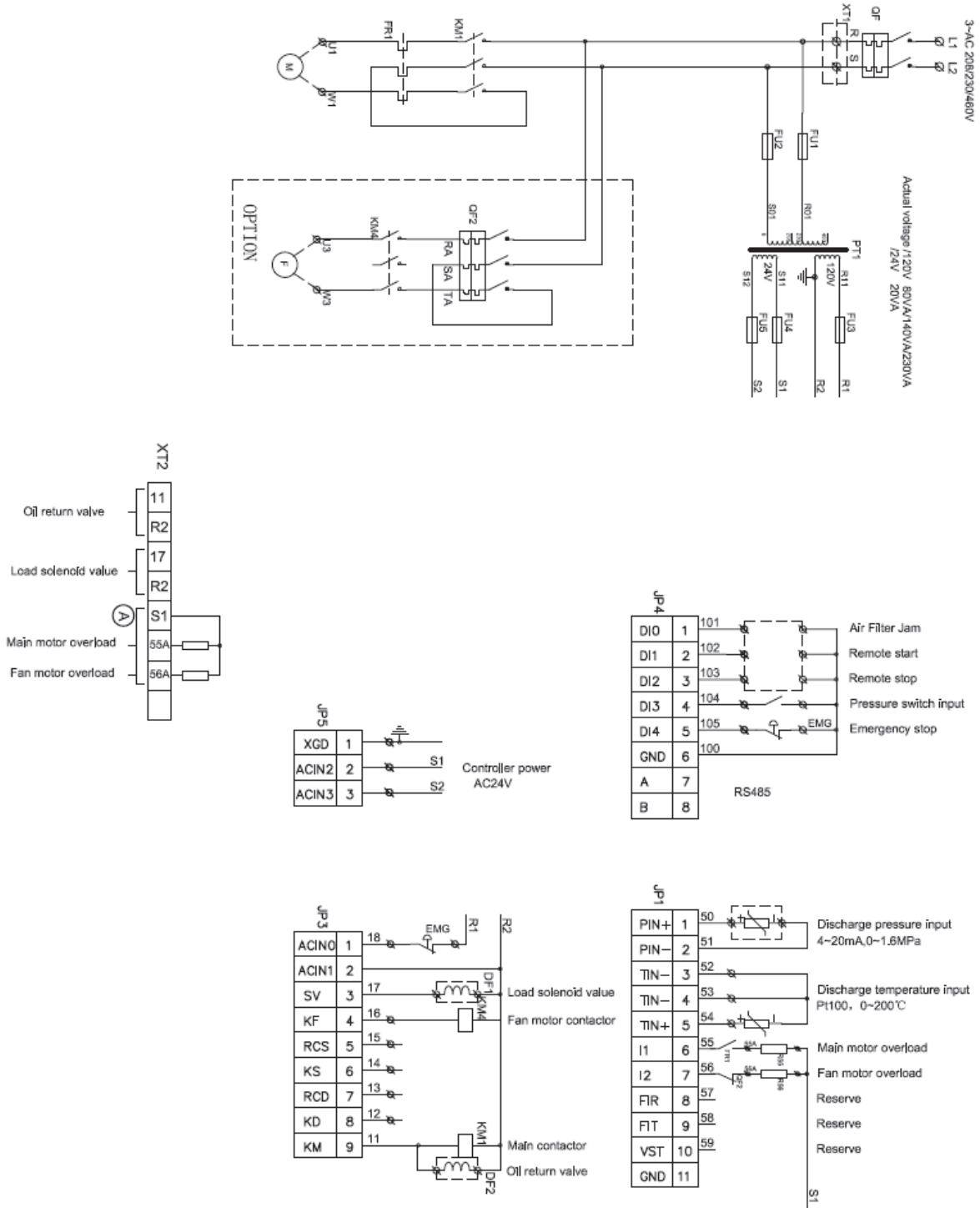
8.2 Compressed air final temperature – excess temperature protection

The maximum compressed air final temperature of the system totals 95 °C. At temperatures above this value, the display will flash and an alarm is triggered. If the temperature exceeds 100 °C, the system automatically shuts down the power supply. There are many possible reasons for an excessively high temperature at the compressed air outlet, with the most frequent being a high level of contaminants in the Oil cooler. When the fins of the Oil cooler are dusty, the cold air can no longer pass the cooler freely, and the temperature gradually increases and causes the system to shut down after reaching the corresponding value. This is why the fins need to be cleaned in short intervals.

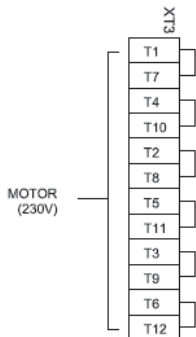
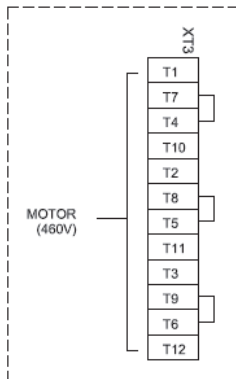
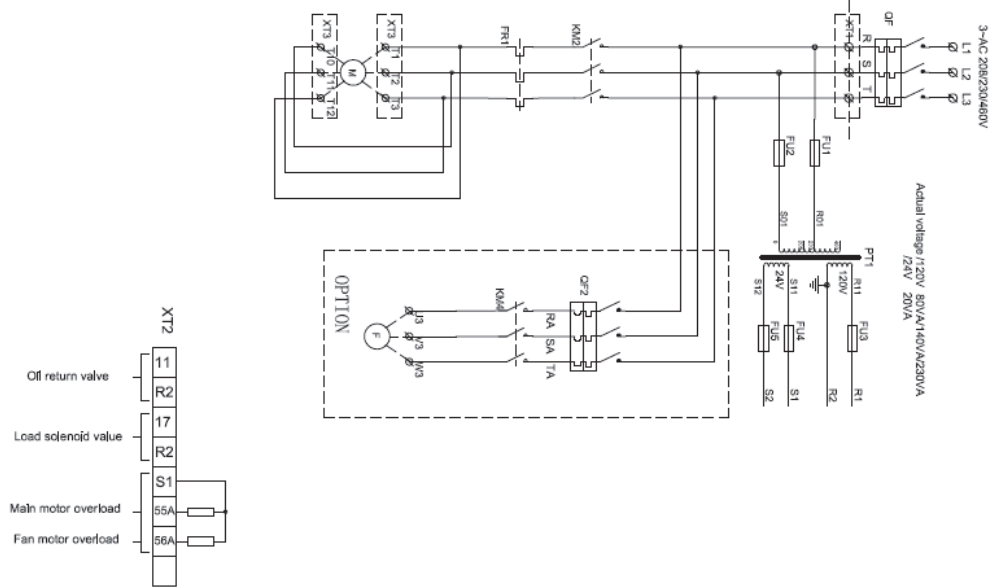
The maximum ambient temperature of the screw compressor totals 45 °C. Consequently, an installation location with a low ambient temperature and good ventilation must be chosen whenever possible. If the excess temperature protection is tripped, the start circuit of the system is stopped; pressing the reset button allows the system to be restarted.

9. Electrical circuit diagram

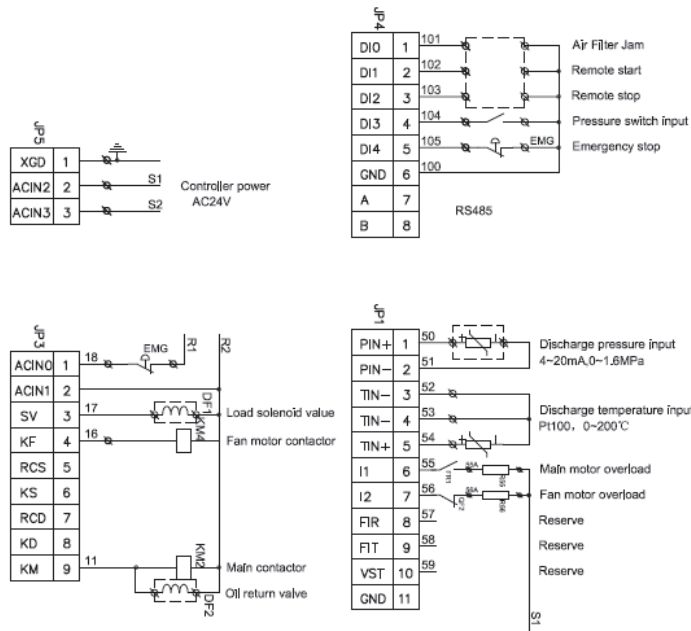
FAS03 – 06 SINGLE PHASE



FAS03 – 06 3 PHASE (DOL)

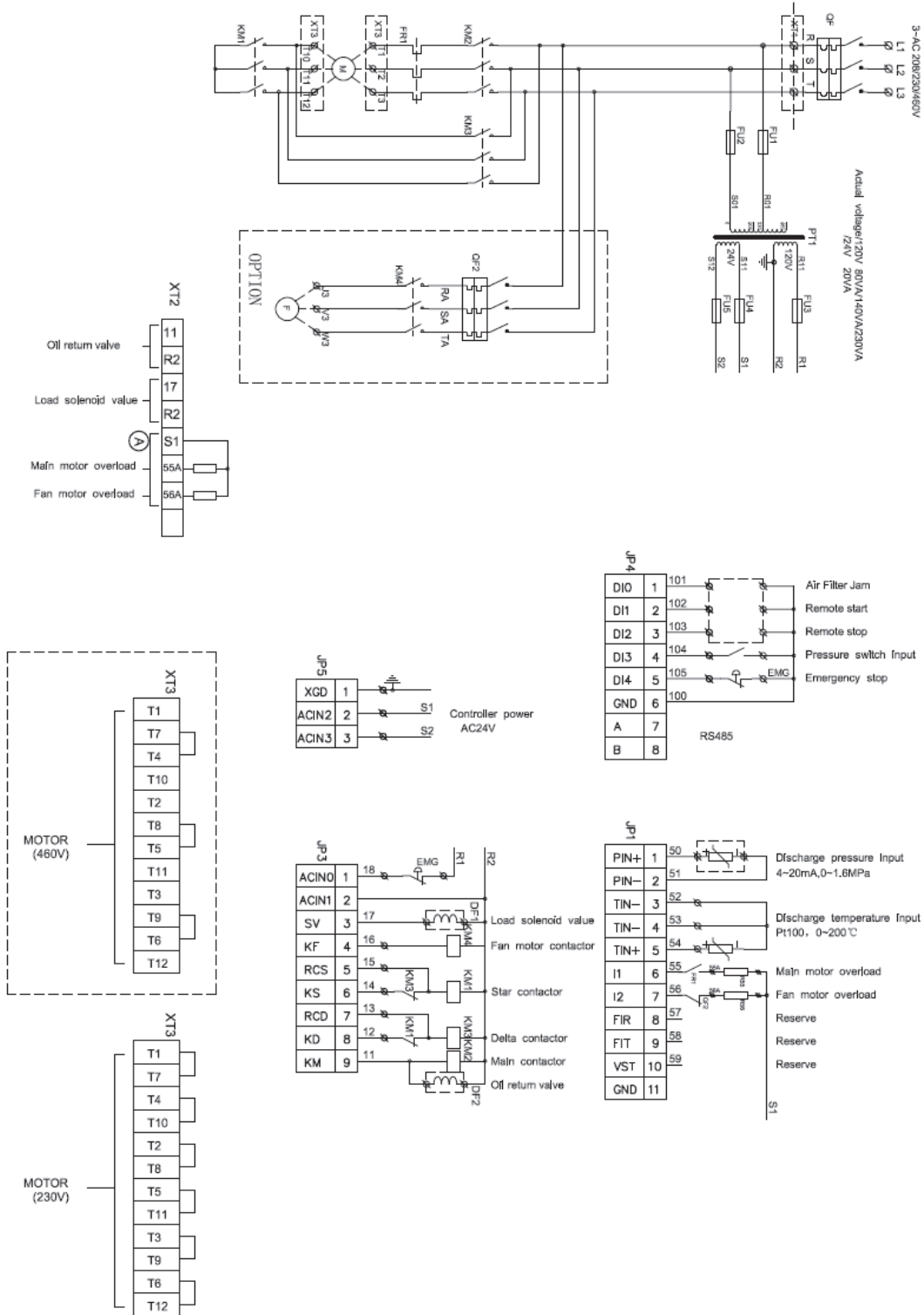


Note: The factory wiring 230V



Electrical circuit diagram

FAS07 – 37 3 PHASE (Y-D)



10 Transportation, packaging and storage

10.1 Safety instructions for transportation

Improper transportation



NOTE!

Property damage due to improper transportation!

Improper transportation can cause packages to fall or topple over. This can cause considerable property damage.

- Proceed with caution when unloading packages upon delivery and when transporting them on the premises, and observe the symbols and instructions on the packaging.
- Only use the fastening points provided.
- Do not remove packaging until shortly before installation.

10.2 Transportation inspection

Upon receipt of the delivery, check for completeness and transportation damage immediately.

In the event of visible transportation damage on the outside, proceed as follows:

- Do not accept the delivery, or only conditionally.
- Make a note of the extent of the damage on the transportation documents or the delivery note issued by the transportation company.
- File a complaint.



File a complaint about each defect as soon as it has been identified. Claims for damages can only be lodged within the applicable claim periods.

10.3 Packaging

About the packaging

The individual screw compressors are packaged in cartons or, at times, on wooden frames and in accordance with the expected transport conditions. Only environmentally-friendly materials are used for the packaging.

The packaging is designed to protect the individual components from transport damage, corrosion and other damage until they are installed. You must therefore not destroy the packaging and not remove it until shortly before installation.

Handling packaging materials

Packaging material must be disposed of in accordance with the legal provisions and local regulations applicable respectively.



NOTE!

Danger for the environment due to incorrect disposal!

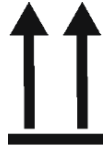
Packaging material is a valuable resource and can, in many cases, be re-used or be reconditioned and recycled. Incorrect disposal of packaging materials can cause environmental hazards.

- Dispose of the lubricant in an environmentally friendly manner.
- Observe the disposal regulations applicable locally. Commission a specialist company with disposal, if necessary.

10.3.1 Symbols on the packaging

The following symbols are affixed to the packaging. Always observe these symbols during transportation.

Top



The tips of the arrows point to the top of the package. They must always point upwards, as otherwise the content may be damaged.

Fragile



Identified packages with fragile or sensitive content. Handle the package with care, do not drop it and do not subject it to impacts.

Protect from moisture



Protect the package from moisture and keep it dry.

10.4 Transportation

Transportation with a fork lift

Packages can be transported with a fork lift under the following conditions:

- The fork lift must be engineered for the weight of the packages.
- Existing guide rails on the frame must be used.
- The length of the forks must be at least 1400 mm.

Transporting

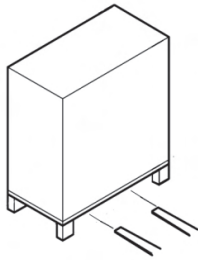


Fig. 5: Transportation with a fork lift

1. Use the fork lift with the forks inserted as shown in fig. 5.
2. Insert the forks so that they protrude on the other side.
3. Ensure that the package cannot tip if the centre of gravity is off-centre.
4. Lift the package and begin transportation.

10.5 Storage

Storage of the packages

Store the packages under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free environment.
- Do not expose to any aggressive media.
- Protect from exposure to sunlight.
- Avoid mechanical jolts.
- Storage temperature: 15 to 35 °C.
- Relative humidity: max. 60%.
- In the event of storage for more than 3 months, check the general condition of all parts and the packaging regularly. If necessary, refresh or replace the rust-proofing.



Under some circumstances, there may be notes about storage on the packages which extend beyond the requirements specified here. Adhere to these accordingly.

11 Operation

11.1 Operating

11.1.1 Safety instructions for operation

Improper operation

**WARNING!****Danger of injury due to improper operation!**

Improper operation may result in serious injuries and considerable property damage.

- Carry out all operating steps in accordance with the specifications and information in these instructions.
- Before starting work, observe the following:
 - Ensure that all covers and safety equipment are installed and function properly.
 - Ensure that there are no persons in the danger area.
- Never disable or bypass safety equipment during operation.

11.1.2 Shutting down in an emergency

In dangerous situations, components movements must be stopped and the power supply has to be shut off as quickly as possible.

Shutting down in an emergency

In an emergency, proceed as follows:

1. Immediately trigger the emergency stop by means of the emergency stop device.
 2. If there is no danger to your own health, remove personnel from the danger zone.
 3. Administer first aid measures as necessary.
 4. Alert the fire services and/or rescue services.
 5. Inform the responsible parties at the location.
 6. Switch the machine off and secure to prevent a restart.
 7. Clear access routes for emergency vehicles.
 8. Brief rescue vehicles.
-

Following rescue measures

9. Inform the responsible authorities if the severity of the emergency requires this.
10. Assign specialist personnel to rectify the fault.



WARNING!

Risk of fatal injury if the machine is restarted without authorisation or in an uncontrolled manner!

An uncontrolled or unauthorised restart of the power supply can result in severe or fatal injuries.

- Before restarting, ensure that all safety devices have been fitted and are fully functional, and that there are no hazards for personnel.

11. Before restarting the machine, ensure that all safety equipment is installed and functional.

11.3 Commissioning, starting and shutting down

11.3.1 Removing the transport protection

Remove the transport protection screw on the vibration damper plate on the base of the unit.



NOTE!

Damage to the compressor stage due to insufficient lubrication!

If the unit is started up after a long transport route, 0.5 l of Oil must be filled in the compressor stage straight away, and the screw compressor must be rotated several times by hand to ensure it does not start up without lubrication.

11.3.2 Connecting to the power supply

Personnel: ■ Qualified electrician

Protective equipment: ■ Protective work clothing
■ Safety shoes

**NOTE!**

Danger of material damage to the compressor stage as a result of incorrect connection of the power supply!

In the event of incorrect connection of the power supply, the compressor stage may be destroyed due to an incorrectly rotating drive.

- Connect the power in accordance with the circuit diagram and check the rotating field before starting the screw compressor.



Prerequisites for correct installation are correctly dimensioned fuses in the mains supply (person-system protection) and a suitable main switch (for switching the supply on and off).

1. Using the data in the circuit diagram (in the switch cabinet), check whether the existing mains supply is suitable. Voltage deviations of more than 10% are not permitted.
 2. Connect the power in accordance with the circuit diagram included in the delivery and in accordance with the technical data.
 3. Check that the direction of rotation is to the right by using a rotating field measurement device.
 4. Ensure that the power cable does not present a stumbling hazard.
-

11.3.3 Connecting to the compressed air network

- | | |
|-----------------------|--|
| Personnel: | ■ Qualified personnel |
| Protective equipment: | ■ Protective work clothing
■ Safety shoes |
| Materials: | ■ Flexible compressed air hose, max. 1.5 m |



WARNING!

Danger of injury due to unpredictable movement of the compressed air hose!

Load switches in the compressed air network cause the compressed air hose to move suddenly, and with high force.

- Anchor and fasten the compressed air hose sufficiently.



A properly planned, installed and serviced compressed air network and an additional stop valve installed at the input to the compressed air network are prerequisites for correct installation.

1. Connect the compressed air in accordance with the technical data.
2. Ensure that the compressed air hose does not present a stumbling hazard.
3. Anchor and fasten the flexible compressed air hose sufficiently.

11.3.4 Switching on – switching off

Check

- whether all screw connections are tight
- that the Oil level in the Oil pressure tank is between the highest level (H) and the lowest level (L).

Press **“ON”**. The compressor starts operation. The current compressor data appear on the controller display.

Pressing the **“OFF”** switch makes the controller switch off the motor once the run-on time has elapsed. (The switch-off delay prevents the compressor from stopping immediately under heavy loads and Oil from escaping from the intake side

This does not apply for **“EMERGENCY STOP”**; in this case, the compressor shuts down immediately!)

11.3.5 Precautionary measures during operation

1. In the event of strong vibrations or unusual noises, the compressor must be shut down immediately using the **“Emergency stop”** button.
2. Lines, tanks and valves are pressurised during operation. Removal of panels or opening screws and nuts during operation is prohibited.
3. If the Oil level falls below the minimum level and the temperature gradually increases during extended periods of operation, stop the system immediately. Check the liquid level after 10 minutes of downtime. If it is still insufficient, wait until the system is no longer pressurised. Then refill Oil.



A sufficiently high compression temperature ensures that the moisture in the intake air does not form condensate. Switching the screw compressor on and off frequently may result in the compressor not reaching the required operating temperature.



NOTE!

Danger of material damage due to condensate in the Oil circuit!

Condensate in the Oil circuit can result in the destruction of the compressor stage.

- In the event of condensate in the Oil pressure tank, contact our service immediately; see page 2 for the contact data.



Condensate is heavier than the Oil

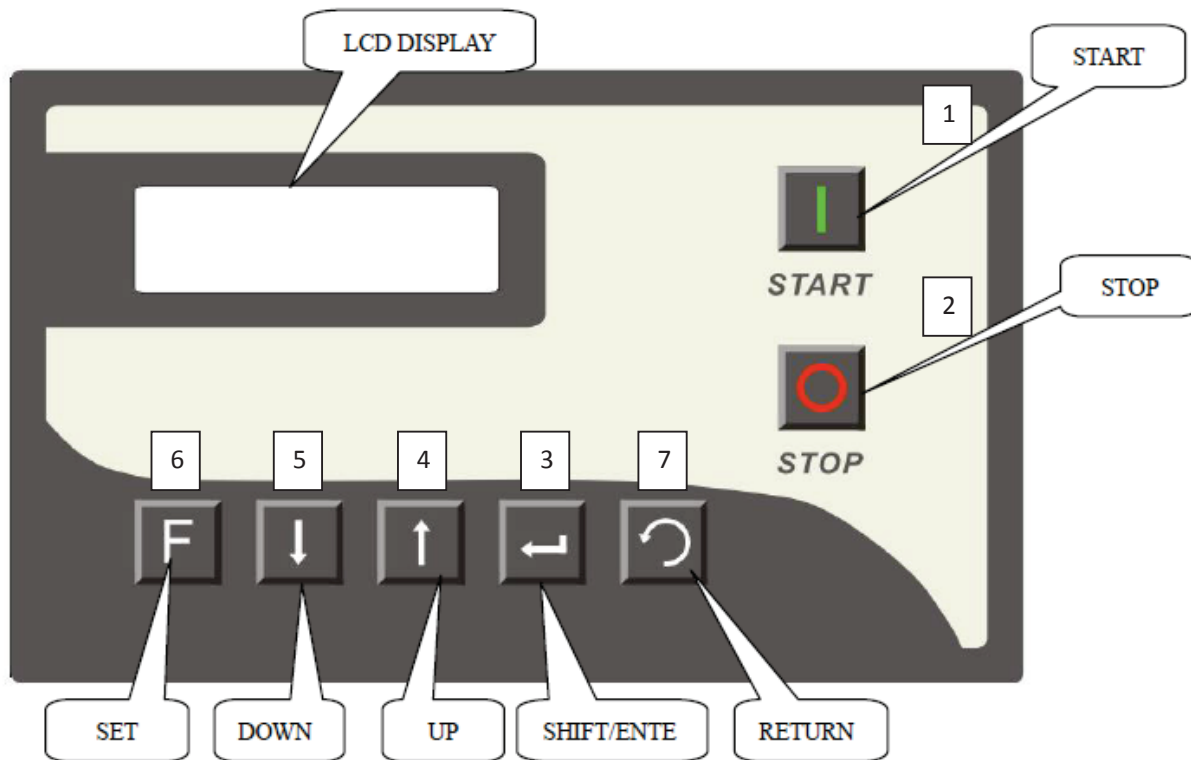
Because the condensate is heavier than the Oil, it collects on the bottom of the Oil pressure tank after extended downtime.

11.3.6 Break in period

The compressor comes from the factory filled with break-in fluid. This fluid needs to be replaced after 500 hours of operation. **After 500 hours, replace the oil and oil filter.**

12 Instructions for operation

12.1 Control panel



12.2 Description of the individual buttons

1 START – Starts and operates the screw compressor, as long as it is free of faults, and switches from “Shutdown” to “Operation” mode.

2 STOP: Stops compressor operation.

3 SET – Press this button after changing parameters to confirm the input data.

4 ARROW UP – Press this button when changing data to increase the value. This button is also used as a selection button when making menu selections.

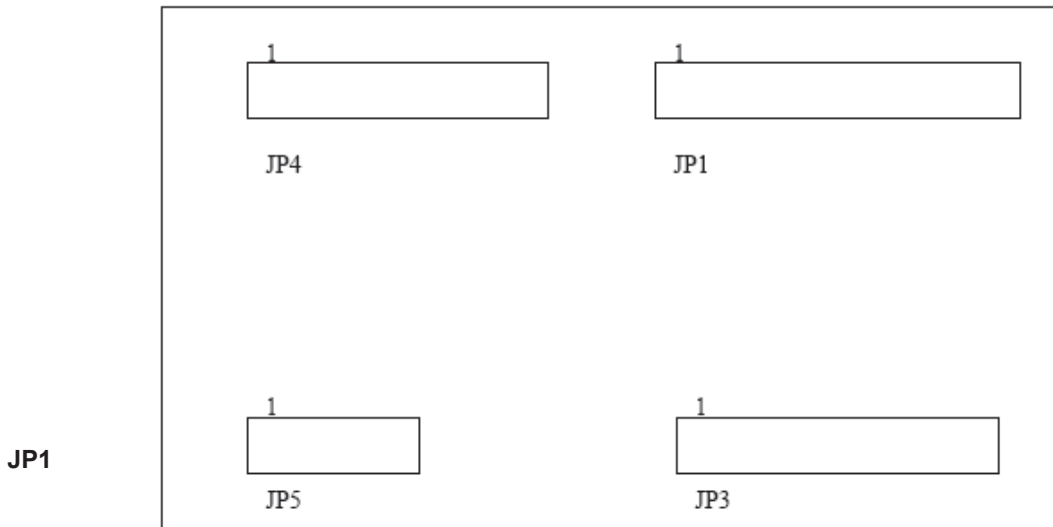
5 ARROW DOWN – Press this button when changing data to decrease the value. This button is also used as a selection button when making menu selections.

6 SHIFT/ENTER – This button is used as a shift button for data changes, and as an enter button when making menu selections.

7 ESC – This button is used to return to a higher-level menu when using the menu.

12.3 Characteristics of the digital inputs and outputs

Description of the control interface



No.	Designation	Description
1	PIN+	Pressure sensor input +
2	PIN-	Pressure sensor input
3	TIN-	Temperature sensor input
4	TIN-	Temperature sensor input
5	TIN+	Temperature sensor input
6	I1	Input for current host sensor (R)
7	I2	Input for current host sensor (T)
8	FIR	Input for current cooling air fan sensor (R)
9	FIT	Input for current cooling air fan sensor (T)
10	VST	Input for three-phase voltage sensor
11	GND	Ground

Operating instructions

JP4

No.	Designation	Description
1	DI0	Air filter signal input (usually open)
2	DI1	Oil filter signal input (usually open)
3	DI2	Precipitator element signal input (usually open)
4	DI3	Pressure switchover input (usually open)
5	DI4	Emergency stop signal input (usually closed)
6	GND	Ground
7	A	RS485
8	B	RS485

JP3

No.	Designation	Description
1	ACIN0	Contact input via power1 (public access point for relay output)
2	ACIN1	Contact input via power2 (public access point for internal RC element)
3	VD	Load solenoid valve output
4	KF	Cooling air fan contactor output
5	RCS	RC element output, star-delta starter
6	KS	Star-delta starter contactor output
7	RCD	RC element output, delta starter contactor
8	KD	Delta starter contactor output
9	KM	Main contactor output

JP5

No.	Designation	Description
1	XGD	Contact with ground
2	ACIN0	25 V AC voltage (the same to R)
3	ACIN1	25 V AC voltage (the same to S)

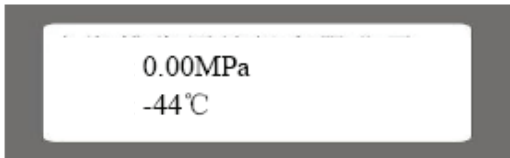
12.4 Operating the screw compressor

12.4.1 Start and start side

After switching on the controller, the operating display on the control panel lights up. A start page appears on the screen.



The standard screen appears automatically after 5 seconds.



Pa

The pressure generated, the compressor temperature and the speed in percent are shown in the screen shown above.

12.4.2 Main menu of the screw compressor

Press **"ARROW DOWN" (5)** on the control panel to open the main menu for the compressor.



There are four options in the following screen:

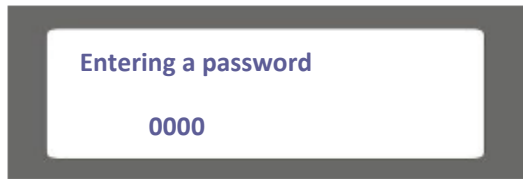
Queries – System – Maintenance – Fault

The current menu is marked at the right by "◆".

12.4.3 Set parameters (F)

To change the set parameters, a four-digit password must first be entered. The digit currently active flashes. Press **"ARROW UP" (4)** to increase the current value by "1" and **"ARROW DOWN" (5)** to decrease the current value by the same amount. Move the flashing digit by pressing the **"F" (6)** button. Press the **"F" (6)** button after completing the input.

Operating instructions



If the password entered is correct, press “**F**” (6) to open the menu. “Controller”, “Time” and “Maintenance” then appear on the screen. Press “**ESC**” (7) to return to page 1 for the compressor.



The current menu is marked at the right by “◆”. If the symbol “◆” displays the selected function, press “**F**” (6) to open the operating screen. To change between parameters, press “**ARROW UP**” (4) or “**ARROW DOWN**” (5). Press “**ESC**” (7) to return to the page to set the parameters.

12.5 Messages about operating, alarm and fault statuses

12.5.1 Operating status

No.	Status displayed	Description of the status
1	Compressor stopped	Normal stop, compressor can be started
2	Emergency stop of the compressor	The emergency stop button was pressed
3	Compressor running	The compressor is running
4	Compressor pressurised	The compressor is pressurised normally
5	Compressor not pressurised	The compressor is not pressurised
6	Compressor – idle stop	Idling period elapsed, compressor was stopped (normal stop)
7	Compressor Stop delay	Compressor must depressurise before it can be started
8	Delay – main motor overload	The main motor is overloaded, the compressor can only be started after a given delay
9	Contact manufacturer	Servicing or maintenance is required on the compressor

12.5.2 Alarm due to minor faults

A minor fault is signalled in the status bar of the control panel. **The compressor does not stop**; you will, however, be informed that a minor intervention is required.

No.	Alarm displayed	Description of the alarm
1	Replace air filter	The air filter service life has expired – replace air filter, reset compressor
2	Air filter blocked	Air filter blocked or defective – needs replacement
3	Replace Oil filter	The Oil filter service life has expired – replace Oil filter, reset compressor
4	Oil filter blocked	Oil filter blocked or defective – needs replacement
5	Replace Oil precipitator	The Oil precipitator service life has expired – replace Oil precipitator, reset compressor
6	Oil precipitator blocked	Oil precipitator blocked or defective; needs replacement
7	Replace lubricant	The lubricant service life has expired – replace lubricant, reset compressor
8	Alarm – high compressed air final temperature	The compressed air final temperature is too high, check the cooling system
9	Alarm – ambient temperature too low	The ambient temperature is too low – increase the ambient temperature
10	Alarm – ambient temperature too high	The ambient temperature is too high – decrease the ambient temperature
11	Motor bearing temperature too high	The temperature of the bearings in the main motor is too high – check motor bearing
12	Main motor – current too high	The current at the main motor is too high – check the lubrication system
13	Temperature precipitator tank too high	The temperature in the precipitator tank is too high – check the cooling and lubrication system

12.5.3 Alarm due to major faults

If a major fault occurs and the system cannot be restarted, **the compressor stops**. Rectify the problem and restart the compressor. A major fault is displayed in the status line of the controller.

No.	Alarm displayed	Description of the alarm
1	Alarm – High compressed air final temperature	The compressed air final temperature is too high – check the lubrication system
2	Alarm – high final pressure	The final pressure is too high – check the safety valve
3	Temperature sensor – no signal	No temperature sensor signal – check sensor and cable
4	Pressure transducer – no signal	No pressure transducer signal, check sensor and cable
5	Stop – main motor overload	The main motor is overloaded, check the lubrication system for the drive
6	Stop – cooling air fan motor overload	The motor for the cooling air fan is overloaded – check the cooling air fan; if a thermal overload relay is installed, reset the relay
7	Stop – water loss (for water-cooled systems)	Cooling water could not be refilled – check the cooling water system
8	Phase sequence fault	Direction of drive rotation incorrect – change phase sequence of input current
9	Temperature too low	The lubricant temperature is too low – heat up the lubricant
10	Voltage too high	The supply voltage is too high – check the voltage supply
11	Voltage too low	The supply voltage is too low – check the voltage supply
12	Precipitator tank temperature too high	The temperature in the precipitator tank is too high – check the cooling system
13	Precipitator tank pressure too high	The pressure in the precipitator tank is too high – check the relief valve
14	Current incorrect	The power supply fluctuates, pressure relief current too high – check the power supply and relief valve

15	Inverter fault	An inverter feedback fault has occurred.
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13 Maintenance

13.1 Safety instructions for maintenance

Electrical system



DANGER!
Danger to life due to electric current!

Danger to life in the event of contact with live components. Active electrical components may make uncontrolled movements and result in severe injuries.

- Switch off the electric power and secure it against a restart before starting work.

Moving parts



WARNING!
Danger of injury due to moving components!

Rotating parts or parts making linear motions can cause serious injuries.

- Before carrying out any maintenance work on moving components, switch off the machine and secure it against restart. Wait until all components have come to a complete standstill.
- Wear close-fitting work clothing with low resistance to tearing in the danger area.

Securing against a restart



WARNING!
Danger of fatal injury due to unauthorised restart!

Restarting the power supply without authorisation during maintenance puts any personnel in the danger zone at risk from severe injuries, or even death.

- Switch off all power supplies and secure them against a restart before starting work.

Hot surfaces



WARNING!
Danger of injury due to hot surfaces!

The surfaces of components, and operating materials (e.g. Oil or cooling water) may heat up considerably during operation. Contact between the skin and hot surfaces and liquids cause serious burns to the skin.

- When performing any work near hot surfaces, heat-resistant occupational safety clothing and protective gloves must be worn.
- When performing any work with operating materials, heat-resistant occupational safety clothing and protective gloves must be worn.
- Before any work, make sure that all surfaces have cooled to ambient temperature; wait at least 30 minutes.

Improperly performed maintenance work



WARNING!
Danger of injury due to improperly performed maintenance work!

Improper maintenance can cause serious injuries and considerable property damage.

- Before starting work, ensure sufficient installation space.
- Make sure that installation area is organised and clean! Loosely stacked components, or components and tools left lying around, are a source of accidents.
- If components were removed, ensure correct installation, reinstall all fastening elements and observe screw torques.
- Prior to re-commissioning, observe the following:
 - Ensure that all maintenance work has been performed and completed according to the information and instructions included in these instructions.
 - Ensure that there is nobody in the danger area.
 - Ensure that all covers and safety equipment are installed and function properly.

Compressed air



WARNING!
Danger of injury due to compressed air!

Compressed air can escape from compressed air hoses or components under pressure in the event of improper handling or in the event of a fault. This can result in eye injuries, dust being raised, or hoses making uncontrolled movements.

Pressurised components can move in uncontrolled manner and can cause injuries if handled incorrectly.

- Before removing pressurised hoses or components, depressurise them.
- Have any faulty pressurised components replaced immediately by specialist personnel.
- Before all work, ensure that the compressor is depressurised; wait at least 5 minutes.

Oil mist



CAUTION!
Danger of injury due to Oil mist!

In the event of high temperatures or mechanical spray dispersion, Oil mist can form. Oil mist can irritate eyes and the respiratory system.

- When working on the Oil system and a Oil mist forms, wear breathing protection and protective goggles and ensure that there is a fresh air supply.

Accumulation of fluids



CAUTION!
Danger of injury due to slipping in accumulated fluids!

Slipping in fluids that have accumulated on the floor may result in a fall. A fall may result in injuries.

- Absorb any accumulations of fluids using suitable means.
- Wear non-slip safety shoes.
- Affix warnings and mandatory signs on or near any area in which fluids can accumulate on the floor.

Environmental protection

Adhere to the following instructions on environmental protection when performing maintenance work:

- Remove any escaped, used or excess grease from all lubrication points which are supplied with lubricant by hand and dispose of it in accordance with the applicable local regulations.
- Collect replaced Oils in suitable containers and dispose of them in accordance with the applicable local regulations.

The following sections describe maintenance work that is required for optimal and fault-free operation of the machine.

If increased wear is identified during regular checks, the required maintenance intervals must be shortened to correspond to the actual signs of wear. For questions about maintenance work or intervals, contact the manufacturer; see the contact data on page 2.

13.2 Oil and filter replacement

No.	Designation	Maintenance cycle
1	Air filter	Every 2 000h
2	Oil filter	Every 2 000h
3	Oil separator	Every 4 000h (FAS03, 4, 6 every 2000h)
4	Oil	Replace break in fluid after 500h, every 4 000h thereafter

13.3 Maintenance

No.	Content	Maintenance cycle					
		Check daily	2 000 h or 1x year	4 000 h or 1x year	8 000 h or every 2 years	16 000 h or every 3 years	24 000 h or every 4 years
1	Compressed air – check temperature and Oil parameters	x	x	x	x	x	x
2	Check for compressed air and Oil leaks	x	x	x	x	x	x
3	Check for leakage	x	x	x	x	x	x
4	Check the voltage, amperage and temperature increase in the motor of the screw compressor		x	x	x	x	x
5	Check for vibrations and noises	x	x	x	x	x	x
6	Clean the system technically		x	x	x	x	x
7	Replace Oil and Oil filter		x	x	x	x	x
8	Replace air filter insert		x	x	x	x	x
9	Check the belt and replace when necessary (on models with belt drive)		x	x	x	x	x
10	Check fasteners		x	x	x	x	x
11	Check the Oil cooler and compressed air aftercooler, clean when necessary		x	x	x	x	x
12	Check the temperature of the cooler		x	x	x	x	x
13	Clean the cover of the cooling air fan and fins of the main motor		x	x	x	x	x
14	Refill lubricant for main motor		x	x	x	x	x
15	Clean or replace prefilter screen		x	x	x	x	x
16	Check all valves			x	x	x	x

Maintenance

No.	Content	Maintenance cycle					
		Check daily	2 000 h or 1x year	4 000 h or 1x year	8 000 h or every 2 years	16 000 h or every 3 years	24 000 h or every 4 years
17	Check or calibrate pressure sensor and temperature sensor			X	X	X	X
18	Check the power supply to the switch cabinet and the solenoid valve			X	X	X	X
19	Replace the oil separator		X*	X	X	X	X
20	Check the vibration dampers			X	X	X	X
21	Clean the motor fins and the fan hood			X	X	X	X
22	Replace Oil		X*	X	X	X	X
23	Replace the intake regulator				X	X	X
24	Replace the minimum pressure valve				X	X	X
25	Replace the temperature control valve				X	X	X
26	Replace motor bearings					X	X
27	Overhaul/replace compressor stage						X

(* FAS03, 4, 6 only)

The maintenance intervals depend on the operating conditions and get along with cool and clean ambient conditions, a high operating grade and low load runs.

At differing requirements the manufacturer have to be informed!

13.4 Measures on completion of maintenance

After completion of the maintenance work and before switching the machine on, carry out the following steps:

1. Check all screw connections which were unfastened beforehand to make sure they are tightened.
2. Check whether all protective devices and covers removed beforehand have been reinstalled properly.
3. Ensure that all tools, materials and other items of equipment that were used have been removed from the work area.
4. Carefully open the compressed air network-side shut-off valve.
5. Clean the work area and remove any substances such as fluids, processing material or similar that may have escaped.
6. Ensure that all safety equipment on the machine functions perfectly.

14 Troubleshooting the screw compressor

Fault description	Cause	Remedy	Personnel
Compression temperature too high	Intake or ambient temperature too high	Ventilate compressor room	Trained person
	Cooling air intake or outlet blocked	Unblock cooling air intake or outlet sufficiently	Trained person
	Oil contains contaminants	Replace the Oil	Qualified personnel
	Oil low	Refill Oil	Qualified personnel
	Oil cooler contains contaminants	Clean the Oil cooler	Qualified personnel
Network pressure drops	Compressed air consumption higher than delivery quantity of the screw compressor	Screw compressor with higher delivery quantity necessary	Manufacturer
	Intake filter clogged	Replace intake filter	Qualified personnel
	Relief valve discharges during compression	Check relief valve and replace gaskets if necessary	Manufacturer
	Intake regulator does not open	Check solenoid valve and plunger and replace if necessary	Manufacturer
Network pressure drops	Leaks in the compressed air network	Seal the compressed air network	Qualified personnel

Troubleshooting

Fault description	Cause	Remedy	Personnel
Screw compressor discharges via safety valve	Minimum pressure valve blocked	Clean or replace minimum pressure valve	Manufacturer
	Safety valve faulty	Check safety valve and replace if necessary	Manufacturer
	Oil separator clogged	Replace the oil separator	Qualified personnel
<i>“High pressure” in display</i>	Oil separator clogged	Replace the oil separator	Qualified personnel
	Higher outside pressure present in compressed air network	Equalise outside pressure or disconnect from the network	Qualified personnel
Screw compressor does not start automatically or does not convey after being switched off beforehand by reaching the final pressure or from idle	Network pressure set too high	Reset network pressure	Trained person
	Interruption in the power circuit	Check power circuit for interruption	Qualified electrician
	Ambient temperature below +1 °C, message	Install auxiliary heating or regulate temperature of compressor room, and also contact the manufacturer	Qualified personnel
	Switching times are activated in the circuit	Check switching and pressure times in the circuit	Trained person

Troubleshooting

Fault description	Cause	Remedy	Personnel
System does not start up when the start switch is pressed	Network pressure higher than switch-on pressure	Observe network pressure and change settings	Trained person
	“Lokl” or “Remo” symbol flashes	Remote control activated	Trained person
	No voltage at the screw compressor	Check whether there is voltage	Qualified electrician
	Electrical fault in the controller	Check controller	Qualified electrician
Compressed air contains a lot of Oil (Oil consumption too high)	Return line for the Oil is blocked	Clean or replace return line for the Oil	Qualified personnel
	Faulty oil separator	Replace oil separator	Qualified personnel
System stops before reaching the final pressure	Excess temperature or overpressure	Rectify fault	Qualified personnel
	Interruption in the control power circuit	Check power circuit	Qualified electrician
Pressure drop	Pressure difference of the filters too high	Replace filter	Qualified personnel

14.1 Commissioning after rectifying a fault

After rectifying the fault, carry out the following steps for recommissioning:

1. Check all screw connections which were unfastened beforehand to make sure they are tightened.
2. Ensure that all tools, materials and other items of equipment that were used have been removed from the work area.
3. Check whether all protective devices and covers removed beforehand have been reinstalled properly.
4. Reset emergency stop equipment.
5. Acknowledge fault
6. Carefully open the compressed air network-side shut-off valve.

7. Make sure that there is nobody in the danger area.
8. Start the screw compressor

15 Dismantling and disposal

Once the service life has ended, the machine must be dismantled and disposed of in an environmentally responsible manner.

15.1 Safety instructions for dismantling and disposal

Electrical system

**DANGER!****Danger to life due to electric current!**

Danger to life in the event of contact with live components. Active electrical components may make uncontrolled movements and result in severe injuries.

- Switch off the electric power supply and secure it against a restart before starting to dismantle the machine.

Improper dismantling

**WARNING!****Danger of injury due to improper dismantling!**

Any residual energy stored, sharp-edged components, points and corners on or in the machine or the tools required can result in injuries.

- Before starting work, ensure there is sufficient space.
- Use caution when handling exposed sharp-edged components.
- Ensure the workplace is organised and clean! Loosely stacked components, or components and tools left lying around, are a source of accidents.
- Dismantle components properly. Observe what can be high inherent component weights. If necessary, using lifting equipment.
- Ensure components cannot be dropped or cannot fall over.
- Consult the manufacturer in the event of uncertainty.

15.2 Dismantling

Before starting dismantling:

- Switch the machine off and secure to prevent a restart.
- Physically disconnect the entire power supply from the machine, allow stored residual energy to discharge.
- Remove operating materials and auxiliary materials, as well as residual processing materials and dispose of them in an environmentally responsible manner.

Then clean modules and components properly and disassemble them in compliance with the occupational safety and environmental regulations applicable locally.

15.3 Disposal

If no agreement has been made for return or disposal, recycle the disassembled components:

- Scrap metals.
- Recycle plastic elements.
- Sort other components by material properties and dispose of them separately.



NOTE!
Danger for the environment due to incorrect disposal!

Incorrect disposal can cause environmental hazards.

- Have electrical scrap, electronic components, lubricants and other consumables disposed of by certified specialist companies.
- If there are any doubts about environmentally responsible disposal, contact the local community authorities or specialist disposal company for information.

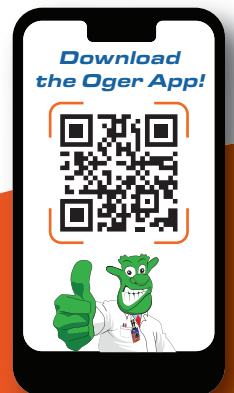


Generator Connection Guide

Certified or Designated Electrician Required

1. Read data plate or label on container for power requirements.
2. Acquire generator that meets supply demands. Recommended power is listed on next page. Make sure to use data to your containers model.
3. Acquire 3' female generator cord provided with container: (female connector and bare end) **DO NOT CONNECT**, set aside.
1. After acquiring the correct generator use the following steps.
 - Set generator to 120/208 3PH.
 - Turn generator on.
 - Use a voltmeter to locate short leg. Short leg is 120V neutral to line.
 - Use ground or neutral for lead #1.
 - With the second lead, place on L1, L2, L3 to determine the two short legs (120V) and high leg (208V).
 - Short leg will read 110-120V (ground or neutral - L?)
 - High leg will read 208-220V (ground or neutral -L?)
 - You will use the 2 short legs **ONLY**; high leg will be eliminated from use. When using 3 phase generators.
 - Test the two legs with one lead on each leg, combined voltage should be 230- 240V.
 - If the voltage is not 230-240V, adjust voltage on generator.
5. Once the voltage is set to listed requirements, turn off the generator.
6. Wire female generator cord to generator using previously identified legs.
 - Green to ground, White to neutral, Black to short leg 1, Red to short leg 2
7. Make sure wires are secured, then turn on generator.
8. Test voltage again.
 - Ground/ Neutral to L? = 120
 - L? to L? (short legs) = 230-240V
9. Make sure ALL circuit breakers are off in container.
10. Locate 27' cord provided with container.
11. Connect container to generator using cord.
12. Turn on 100amp circuit breaker.
13. Turn on the remaining circuit breakers one by one.
14. You are ready to operate.

*Our equipment highest voltage is 240V, **NEVER EXCEED** 240V on combined legs *



Certified or Designated Electrician Required

Battery/ Office Container Generator Recommended

AP#	1 Phase	3 Phase	Max Voltage
AP104016	15KW	20KW	120/240
AP1000096A	15KW	20KW	120/240

Nitrogen Container Generator Recommended

AP#	1 Phase	3 Phase	Max Voltage
AP1001250	20KW	30KW	120/240

Motor Pool Container Generator Recommended

AP#	1 Phase	3 Phase	Max Voltage
AP1000097A	15KW	20KW	120/240

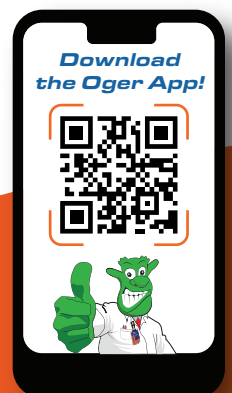
Max Voltage on each leg should NOT EXCEED 120V.

- *When using a 3-phase generator, high leg (208V) will NOT be used, ONLY both short legs*
- *{120V max}*

**Short leg is 120V read on voltage meter when you put one lead on neutral and one lead on a line.*

- *You can use a higher KW generator BUT note you will wet stack.*

**Wet Stack- Unused diesel fuel, accumulated moisture and carbon particles gather in the exhaust of your generator.*



American Patriot proudly offers a minimum 1-year parts and service warranty on every product that we sell. We also offer multiple items in our catalog that exceed the standard 1-year warranty. This ranges anywhere from 2-5 year durations. American Patriot upholds customer satisfaction to the highest priority and backs every item sold. Even in the event that the items are out of their warranty period or not covered, American Patriot will assess the customer needs on a case-by-case basis in order to attain the most effective option for the customer. We have worked with customers in the past that have had various limitations such as inaccessible funds for repair or replacement, inability to ship items, or even just troubleshooting assistance.

At American Patriot we pride ourselves in having customers that buy from us during their entire military career. We do this by going above and beyond just meeting the needs of our customers - including our trouble-free warranty.



Rachel Gorken, Owner/President

