



80448574
Revision A
May 2015

Oil-Free Rotary Screw Air Compressor

SL90, SM90, SH90, SL110, SM110, SH110

SL132, SM132, SH132, SL150, SM150, SH150

SL200, SM200, SH200, SL250, SM250, SH250, SH300

L125, H125, HH125, L150, H150, HH150

L200, H200, HH200, L250, H250, HH250

L300, H300, HH300, L350, H350, HH350, HH400

Installation, Operation and Maintenance



Save These Instructions



CONTENTS

FOREWORD	4	START SEQUENCE	14
SAFETY	5	STOP SEQUENCE	14
GENERAL INFORMATION	6	EMERGENCY STOPPING	14
GENERAL OPERATION	6	RESTARTING AFTER EMERGENCY STOPPING	14
DESIGN PRESSURES	6	INTERFACE DATA AND KEYS	15
DESIGN TEMPERATURES	6	Xe-90M/145M	15
COMPRESSED AIR SYSTEM	6	LED STATUS ICONS	15
CONDENSATE REMOVAL SYSTEM	6	COMMAND KEYS	15
LUBRICATION SYSTEM	6	NAVIGATION KEYS	15
COOLING SYSTEM (AIRCOOLED)	7	DISPLAY LAYOUT	16
COOLING SYSTEM (WATERCOOLED)	7	SIERRA COMPRESSOR	18
ELECTRICAL SYSTEM	7	HOME FOLDER	18
CAPACITY CONTROL	7	OPERATOR SETTINGS FOLDER	19
AUTOMATIC START/STOP CONTROL OPTION	7	EVENTS FOLDER	20
REMOTE LOAD/UNLOAD OPTION	8	WARNING EVENTS LIST	21
REMOTE START/STOP OPTION	8	SERVICE	21
POWER OUTAGE RESTART OPTION	8	TRIP EVENTS LIST	22
SEQUENCER CONTROL	8	TRIP HISTORY	23
TIMED LEAD/LAG OPTION	8	GRAPHING FOLDER	23
SCHEDULED START/STOP OPTION	8	MAINTENANCE FOLDER	24
HIGH CONDENSATE LEVEL SWITCH	8	GENERAL SETTINGS FOLDER	24
RECEIPT / HANDLING	9	INTEGRAL SEQUENCING FOLDER	26
RECEIPT	9	STATUS FOLDER	27
UNPACKING AND HANDLING	9	FACTORY SETTINGS FOLDER	28
LONG TERM STORAGE	9	WEB ACCESS	30
INSTALLATION	10	COMMISSIONING PROCEDURES	30
LOCATION IN THE PLANT	10	CONNECTING TO A PC	31
DISCHARGE AND CONDENSATE PIPING	10	ETHERNET CONFIGURATION	35
PRIOR TO STARTING	11	LOGIN PROCESS	36
ELECTRICAL CONNECTION	11	DEFAULT ACCOUNTS	38
COOLING WATER PIPING	11	NAVIGATION	38
VENTING THE WATER SYSTEM	11	TAB NAVIGATION	38
DRAINING THE WATER SYSTEM	12	COMMAND BUTTONS	39
WATER QUALITY RECOMMENDATIONS	12	DASHBOARD ICONS	39
ROTATION CHECK	12	HOME PAGE	40
DRIVE MOTOR	12	EVENT LOG UTILITY	42
FAN MOTOR	13	PERFORMANCE LOG UTILITY	44
ELECTRICAL DATA	13	GRAPHING UTILITY	46
OPERATING INSTRUCTIONS	14	MAINTENANCE UTILITY	48
BASIC OPERATION	14	INSPECTION LOG UTILITY	49
PRIOR TO STARTING	14	COMPRESSOR INFORMATION	51
INITIAL CHECK SEQUENCE	14	COMPRESSOR IDENTIFICATION	51
		EMAIL (SMTP) SETTINGS	52

CONTENTS

COMPRESSOR DETAILS 52	COMPRESSOR MODULE INPUT SHAFT SEAL REPLACEMENT 58
UNIT TYPE 53	MOTOR BEARINGS 59
ACCOUNT MANAGEMENT 53	MOTOR BEARING LUBRICANT SPECIFICATION 59
ADD ACCOUNT 53	CLEANING/INSTALLING PACKAGE PRE-FILTER [90-160Kw(125-200Hp)NEW ENCLOSURE ONLY] 59
MODIFY THE ACCESS LEVEL 55	
MAINTENANCE 57	TROUBLESHOOTING 60
ROUTINE MAINTENANCE 57	
AIR FILTER CHANGE PROCEDURE 58	
OIL CHANGE 58	
OIL FILTER 58	
GEARCASE BREATHER 58	
CONDENSATE DRAIN FUNCTIONALITY 58	
CONDENSATE STRAINERS 58	
AIREND BEARINGS 58	

FOREWORD

The contents of this manual are considered to be proprietary and confidential to **Ingersoll Rand** and should not be reproduced without the prior written permission of **Ingersoll Rand**.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the **Ingersoll Rand** products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions to cover all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorised **Ingersoll Rand** service department.

Any modification to any part is absolutely prohibited and would result in the CE Certification and marking being rendered invalid.

All components, accessories, pipes and connectors added to the compressed air system should be:

- of good quality, procured from a reputable manufacturer and, wherever possible, be of a type approved by **Ingersoll Rand**.
- clearly rated for a pressure at least equal to the machine maximum allowable working pressure.
- compatible with the compressor lubricant/coolant.
- accompanied with instructions for safe installation, operation and maintenance.

*Details of approved equipment are available from **Ingersoll Rand** Service departments.*

The use of non-genuine spare repair parts other than those included within the **Ingersoll Rand** approved parts list may create hazardous conditions over which **Ingersoll Rand** has no control. Therefore **Ingersoll Rand** does not accept any liability for losses caused by equipment in which non-approved repair parts are installed. Standard warranty conditions may be affected.

Ingersoll Rand reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this machine are outlined below and examples of unapproved usage are also given, however **Ingersoll Rand** cannot anticipate every application or work situation that may arise.

IF IN DOUBT CONSULT SUPERVISION.

This machine has been designed and supplied for use only in the following specified conditions and applications:

- Compression of normal ambient air containing no known or detectable additional gases, vapours, or particles.
- Operation within the ambient temperature range specified in the *PRODUCT SPECIFICATION SHEET*.

The use of the machine in any of the situation types listed in table 1:–

- a) **Is not approved by Ingersoll Rand,**
- b) **May impair the safety of users and other persons, and**
- c) **May prejudice any claims made against Ingersoll Rand.**

TABLE 1
Use of the machine to produce compressed air for: a) direct human consumption. b) indirect human consumption, without suitable filtration and purity checks.
Use of the machine outside the ambient temperature range specified in the <i>PRODUCT SPECIFICATION SHEET</i> .
Use of the machine where there is any actual or foreseeable risk of hazardous levels of flammable gases or vapours. THIS MACHINE IS NOT INTENDED AND MUST NOT BE USED IN POTENTIALLY EXPLOSIVE ATMOSPHERES, INCLUDING SITUATIONS WHERE FLAMMABLE GASES OR VAPOURS MAY BE PRESENT.
Use of the machine fitted with <i>non Ingersoll Rand approved components</i> .
Use of the machine with safety or control components missing or disabled.

The company accepts no responsibility for errors in translation of this manual from the original English version.

SAFETY

Locate, read, understand and follow all Danger, Warning, Caution, and Operating Instructions on the product and in all Manuals. Failure to comply with safety precautions described in the manuals supplied with the product, this manual or any of the labels and tags attached to the product may result in death, serious injury or property damage.

Check that all labels, tags and data (name) plates are in place and legible.

It is your responsibility to make this information available to others.

If you have any questions about safety or procedures not included in this manual, ask your supervisor or contact any **Ingersoll Rand** office or qualified **Ingersoll Rand** distributor.

GENERAL INFORMATION

• GENERAL OPERATION

The Sierra compressor is an electric motor driven, two stage, dry screw compressor complete with accessories piped, wired and baseplate mounted. It is a totally self-contained oil free air compressor package. A standard compressor is composed of the following:

- Inlet air filtration
- Compressor and motor assembly
- Pressurised oil system with cooler
- ON/OFF line capacity control system
- Motor starting control system
- Instrumentation
- Safety provisions
- Intercooler
- Aftercooler
- Moisture separation first and second stage
- Automatic condensate removal first and second stage.

The motor and airend are integrally mounted. This assembly is isolated from the base by rubber isolation mounts. Flexible pipe connections are utilised where necessary to isolate the main base and customer connections.

• DESIGN PRESSURES

The normal operating pressures for **Ingersoll Rand** Sierra compressors are 7.0 bar, 8.5 bar and 10.0 bar (100 psi, 125 psi and 150 psi). The maximum allowable pressure is 0.2 bar (3 psi) above the normal operating pressure and is shown on the compressor name plate.

The inter-stage safety valve is set at 3.1 barg (45 psi) 90–150 kW, 125–200 hp or 3.8 barg (55 psi) 200–300 kW, 250–400 hp. The second stage safety valve is set at 11.4 barg (165 psi) max. The design of the pressurised system is well above the safety valve settings.

• DESIGN TEMPERATURES

The standard compressor is designed for operation in an ambient range of 2 °C to 46 °C (35 °F to 115 °F). When conditions other than the design levels described are encountered, we recommend you contact your nearest **Ingersoll Rand** Distributor or Air Centre for additional information.

• COMPRESSED AIR SYSTEM

The compressor air enters the compressor through an opening at the right end of the enclosure. It travels through a passageway lined with sound-absorbing material to the air filter. Via a round flexible hose, the air passes through the inlet/unloading valve into the first stage of the compressor.

The helical rotors compress the air to a pressure of between 1.7 to 2.6 barg (25 to 38 psig). It is discharged into a venturi, which dampens any pressure pulsations that may be present.

The intercooler then reduces the air temperature before it enters the second stage. A safety relief valve is also positioned in this system to guard against an abnormally high inter-stage pressure. A moisture separator is supplied immediately

following the intercooler to remove any condensation that may occur under certain conditions of ambient humidity and temperature.

An expansion joint is utilised between the moisture separator and the second stage.

The second stage further compresses the air to the desired pressure. The pressure pulsations being dampened in a venturi. An expansion joint prevents transmitted vibrations. A poppet type check valve is provided to prevent any backflow of air into the compressor. The aftercooler cools the air to a suitable temperature, while the discharge moisture separator removes significant amounts of condensation.

During unloaded operation, the inlet/unloading valve closes, via mechanical linkage, the blowdown valve opens, expelling any compressed air from the package.

• CONDENSATE REMOVAL SYSTEM

A moisture separator is located immediately after the intercooler and aftercooler to collect and eject any condensation formed from the compressed air.

The condensate is drained through electrically operated solenoid valves. The opening duration is preset at three (3) adjustable between 2 and 20 seconds, the interval between openings may be altered between 60 and 360 seconds, depending on ambient conditions. If the environment consists of high temperature and/or high humidity, then the interval may have to be reduced. The factory set interval is 180 seconds.

The bosses for the manual valves are located on the outside and rear of the sub-base. These valves are supplied loose inside the compressor enclosure and need to be connected to the ports as indicated in the general arrangement drawing. To check operation of solenoid valves, open the manual bypass valves momentarily once per day. For extended shutdown periods, the manual valves should be opened and left open.

Strainers are provided upstream of the condensate valves to prevent any particles from plugging the solenoid valves. Before any maintenance is performed on the strainers or solenoid valves, the strainer service valves should be closed, in order to isolate from possible high pressure.

• LUBRICATION SYSTEM

The oil sump is integral within the gearcase. The oil pump is a positive displacement gear-type pump, and is driven by the compressor driven shaft. Therefore, it rotates at the main motor speed.

See MAINTENANCE section for lubricant specification.

From the pump, the oil travels past a pressure relief valve to the oil cooler. The pressure relief valve's function is to prevent over-pressure of the system. It also regulates oil pressure and may divert some oil flow back to sump.

At the discharge side of the oil cooler is a thermostatic valve. This valve mixes the cold oil with hot oil that bypasses the cooler to provide oil at the optimum temperature to the bearings and gears.

GENERAL INFORMATION

The oil then passes through a filter to a distribution manifold. An orifice from the manifold determines the oil pressure (2.8 to 3.5 barg) (40 to 50 psig), at normal operating temperature (54 °C to 68 °C) (129 °F to 154 °F).

The gearcase is vented to a mounted breather. The breather prevents oil vapour from escaping the sump area. The breather exhaust is piped to the plenum area of the package.

• COOLING SYSTEM (AIRCOOLED)

The intercooler, aftercooler, oil-cooler, fan and motor are an integral assembly. The heat exchanger and fan are mounted directly above the compressor assembly. Cooling air flows through the end of the enclosure, through the heat exchangers and discharges through the top of the package.

• COOLING SYSTEM (WATERCOOLED)

The intercooler, aftercooler and oil-cooler are shell and tube type heat exchangers. The intercooler and aftercooler are "water in the shell" design. The oil-cooler employs "water in the tube".

Cooling water flows through each of the three components in parallel. A water solenoid shut off valve is provided in the water discharge line from the package.

The tube bundles are removable for ease of cleaning.

• ELECTRICAL SYSTEM

The electrical system of the compressor utilises the microprocessor-based Xe controller. The standard electrical/electronic components, contained within a readily accessible enclosure include:

1. Xe controller
2. Star-Delta compressor motor starter, with auxiliary contacts and overload relays
3. Cooling fan manual motor starter and circuit breaker or fuses
4. Power supply board
5. Main motor overload relay
6. Control relay control transformer, and fuses.

• Star-Delta type starter

By use of the Star-Delta type starter, the compressor motor can be started and accelerated using a greatly reduced "inrush" electric current. The starter is completely automatic and controlled by the Xe controller. Refer to the electrical schematic.

• CAPACITY CONTROL

• Automatic unloaded start

The compressor will always start in the unload mode. When unloaded, the inlet valve is nearly closed, the blowdown valve is open and the compressor is operating at minimum power.

• On-Off line control

On-Off line control will deliver air at full capacity (compressor maximum efficiency condition) or will operate at zero capacity (compressor minimum power condition). The compressor is controlled by the Xe controller responding to changes in plant air pressure. The Xe controller energises the load solenoid valve (1SV) to actuate the hydraulic cylinder and load the compressor whenever plant air pressure drops below the online pressure set point. The compressor will then operate to deliver full capacity air to the plant system. If the plant air system pressure rises to the off line set point of the Xe, the load solenoid valve is de-energised, the hydraulic cylinder is de-actuated allowing the machine to unload. The compressor will continue to run with minimum power draw.

• AUTOMATIC START/STOP CONTROL OPTION

Many plant air systems have widely varying air demands or large air storage capacity which allows for automatic standby air capacity control.

The Xe system has been designed to carry out this function utilising a software module. Automatic Start-Stop is standard on all Sierra compressors.

During periods of low air demand, if the line pressure rises to the offline set point, the Xe controller begins to time out. If the line pressure remains above the online set point for as long as the set time, the compressor will stop. At the same time, the Automatic Restart warning message will appear in the display to indicate the compressor has shut down automatically and will restart automatically. An automatic restart will occur when the line pressure drops to the online set point.

The offline and online set points and shutdown delay time are set on the control panel. There is a 10 second delay after shutdown during which the compressor will not restart even if line air pressure drops below the online set point. This is to allow the motor to come to a complete stop and the controller to collect current data of operating condition. If line air pressure is below the online set point at the end of 10 seconds, the unit will start unless the load delay timer is set greater than 10 seconds.

• Delay load time

This is the amount of time the line pressure must remain below the online set point before the compressor will load or start (if the unit was stopped due to an auto start/stop situation). This timer will not delay loading after a start or if the time is set to 0. When the delay load timer becomes active, the display will switch to line pressure (if not displaying line pressure at that time) and then display the delay load countdown. Once the countdown reaches 0, the unit will load or start and the display will return to line pressure. The display select arrows are inactive during the delay load countdown.

GENERAL INFORMATION

- **Automatic start/stop operation**

When in operation, the compressor must meet two specific timing intervals before the Xe controller will stop the unit in an Automatic Start/Stop situation.

A timer prevents the compressor from automatically starting more than 6 times an hour by requiring the unit to run at least 10 minutes after each automatic start.

This 10 minute run period can be loaded, unloaded or a combination of the two and allows dissipation of heat generated within the motor windings at start.

When the compressor has completed the settings of the timer, the controller stops the compressor, turns on the automatic restart light and displays *AUTO-RESTART* in the message display.

Pressure sensor 4APT continues to monitor the package discharge pressure and sends information to the controller which automatically restarts the compressor when the pressure falls to the online setting.

- **REMOTE LOAD/UNLOAD OPTION**

This option allows the operator to remotely load and unload the machine.

With the option enabled, two different switches can be wired (refer to the electrical schematic for wiring locations). The switches are customer supplied.

- **REMOTE START/STOP OPTION**

The remote start/stop option allows the operator to control the compressor from a remote mounted start/stop station. This option may be selected from the customer set-up routine.

With the option enabled, two different switches can be wired to the Xe for remote start/stop. (Refer to the electrical schematic for wiring locations.) The switches are customer supplied and must be of momentary type. The stop switch contacts are normally closed / the start switch contacts are normally open.

The following notice must be permanently fixed to the unit in a prominent position.

(Factory fitted on 60Hz machines).



WARNING

**This machine is remote start and stop equipped.
Disconnect power before servicing.**

**May start or stop at any time.
Lock and tag out.**

**Can cause severe injury or death.
See Operators / Instruction Manual.**

- **POWER OUTAGE RESTART OPTION**

The Power Outage Restart option is for installations that have interruptions in their incoming power supply to the compressor and must maintain an uninterrupted supply of compressed air. When turned on, the option allows the compressor to automatically restart and load 10 seconds after incoming power is restored after a power interruption. Suitable visible and audible warnings are given before restart.

- **SEQUENCER CONTROL**

Sequencer control capability can be added to the electronic control system by utilising a sequencer interface. This option is available as a field installation kit.

- **TIMED LEAD/LAG OPTION**

When two or more machines are set up in a Lead/Lag situation. This option allows the machines to be switched from Lead to Lag at certain time of day.

- **SCHEDULED START/STOP OPTION**

Allows the machine to be started or stopped at certain times of the day.

- **HIGH CONDENSATE LEVEL SWITCH**

This option prevents high condensate levels in the inter-stage moisture separator, providing added protection against condensate carryover into the second stage compression module. If the condensate drain system becomes clogged or inoperative, this switch would signal the controller to shut the unit down and display a HIGH I/C CONDENSATE trip. The option may be factory installed or ordered as a field installation kit.

RECEIPT / HANDLING

• RECEIPT

Before signing the delivery receipt, inspect for damage and missing parts. If damage or missing parts are apparent, make the appropriate notation on the delivery receipt, then sign the receipt. Immediately contact the carrier for an inspection.

All material shall be held in the receiving location for the carrier's inspection.

Delivery receipts that have been signed without a notation of damage or missing parts are considered to be delivered "clear." Subsequent claims are then considered to be concealed damage claims. Settle damage claims directly with the transportation company.

If you discover damage after receiving the compressor (concealed damage), the carrier shall be notified within 15 days of receipt and an inspection shall be requested by telephone with confirmation in writing. On concealed damage claims, the burden of establishing that the compressor was damaged in transit reverts back to the claimant.

Read the compressor nameplate to verify it is the model ordered, and read the motor nameplate to verify it is compatible with your electrical conditions.

Make sure electrical enclosures and components are appropriate for the installation environment.

• UNPACKING AND HANDLING

The compressor will normally be delivered with a polyethylene or other cover. If a knife has to be used to remove this cover, ensure that the exterior paintwork of the compressor is not damaged.

Incorporated within the base of the compressor are slots to enable a fork lift truck to move the compressor. Ensure truck forks are fully engaged on both sides. Alternatively a special lifting frame can be used to enable a crane or hoist to move the compressor. Use only marked lifting points.

Once the packaging and pallet are discarded and the compressor is in its final position, remove the yellow painted transit brackets from the resilient mounts and store for future use or discard.

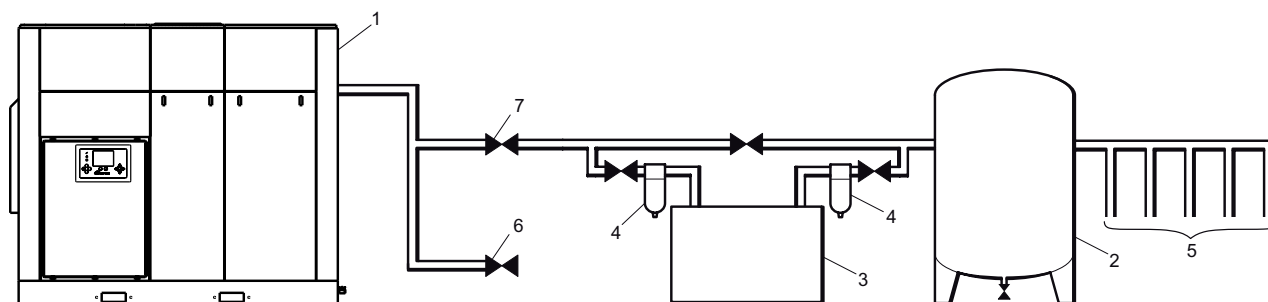
IMPORTANT
Remove any shipping brackets particularly the soft mount transit braces painted in yellow.

• LONG TERM STORAGE

If the product will not be commissioned within six months of receipt, it should be prepared for long term storage. Please contact **Ingersoll Rand** for details.

INSTALLATION

• LOCATION IN THE PLANT



Key

1. Compressor
2. Air Receiver Dry Tank
3. Air Dryer
4. Compressed Air Filters
5. System Demand Points
6. Vent/Drain Trap
7. Isolation Valve
8. Air Receiver ("Wet Tank")

- The compressor can be installed on any level floor capable of supporting it. A dry, well ventilated area where the atmosphere is as clean as possible is recommended.

- The area selected for the location of the compressor should be free of dust, chemicals, metal filings, paint fumes and overspray.
- Hard surfaces may reflect noise with an apparent increase in the decibel level. When sound transmission is important, a sheet of rubber or cork can be installed beneath the compressor to reduce noise. Flexible piping may be required.
- See the general arrangement drawing for minimum space requirements for normal operation and maintenance.
- Minimum space in front of the control panel door as required by national or local codes shall be maintained.
- Ambient temperatures higher than 46 °C (115 °F) shall be avoided, as well as areas of high humidity.

⚠ CAUTION

A minimum of 1 m (3.3ft) all round the compressor is recommended. If headroom is restricted, then the exhaust should be ducted or deflected away from the machine.

Screw type compressors [1] should not be installed in air systems with reciprocating compressors without means of isolation such as a common receiver tank. It is recommended that both types of compressor be piped to a common receiver using individual air lines.

NOTICE

If ducting is fitted, the sump breather needs to be piped outside the enclosure to avoid back pressure into the compression module.

• DISCHARGE AND CONDENSATE PIPING

It is essential when installing a new compressor [1], to review the total air system. This is to ensure a safe and effective total system. One item which should be considered is liquid carryover. Installation of air dryers [3] is always good practice since properly selected and installed they can reduce any liquid carryover to zero.

To assure long trouble free operation of a compressor operating with ON-LINE OFF-LINE control, the system volume must be large enough to keep the load/unload cycles to a minimum (greater than 2 minutes).

A receiver [2], installed before the feeder lines [5], may be necessary to ensure that the total system volume is not less than 2.0 U.S.Gallons per rated delivery C.F.M.

Discharge piping should be at least as large as the discharge connection of the compressor. All piping and fittings should

be suitably rated for the discharge pressure.

It is important to install an isolation valve [7] within 3 feet (1 meter) of the compressor.

It is good practice to install line filters [4].

Include a means [6] to vent the discharge pipework downstream from the machine's check valve and upstream of the first system isolation valve [7].

When two rotary units are operated in parallel, provide an isolation valve and drain trap for each compressor before the common receiver.

The built-in intercooler and aftercooler reduce the discharge air temperature below the dew point (for most ambient conditions), therefore, considerable water vapor is condensed. To remove this condensation, each compressor with built-in aftercooler is furnished with two moisture separator/solenoid valve combinations. **Since these solenoid valves discharge**

INSTALLATION

at different pressures, it is extremely important that they are piped separately into an open drain.

A dripleg assembly and isolation valve should be mounted near the compressor discharge. A drain line should be connected to the condensate drain in the base.

IMPORTANT: The drain line must slope downward from the base to work properly. For ease of inspection of the automatic drain trap operation, the drain piping should include an open funnel.

⚠ CAUTION

The use of plastic bowls on line filters and other plastic air line components without metal guards can be hazardous. Their safety can be affected by either synthetic oils or the additives used in mineral oils. From a safety standpoint, metal bowls should be used on any pressurized system.

NOTICE

Do not use the compressor to support the discharge pipe.

• PRIOR TO STARTING

If the electric motor/control wiring should become exposed or saturated with moisture/water deposits, it must be safely dried off before attempting to make any part or conductor electrically live.

Ensure all persons concerned are suitably competent with electrical installations.

Ensure that there is a safe working procedure which has been issued by supervisory personnel, and that it is understood by all persons concerned with the operation of the compressor.

Ensure that the safety procedure to be applied is based on the appropriate national regulations.

Ensure that the safety procedure is followed at all times.

• ELECTRICAL CONNECTION

Feeder cables should be sized by a competent electrical engineer to meet all power requirements.

IMPORTANT

Ensure that the control circuit is connected to the transformer tapping that matches the supply voltage.

• COOLING WATER PIPING

NOTICE

Water piping to and from the compressor package shall be atleast as large as the package connection size. Do not undersize the water piping.

Isolation valves with side drains should be installed on both the inlet and outlet lines. To maintain cooler cleanliness and reliability, it is important to install a strainer of 2 mm mesh size on the inlet line. Strainers are available from **Ingersoll Rand**.

The air compressor has a normally closed solenoid valve that is fitted to the water outlet side within the package. The valve is wired into the air compressor control circuit and closes when the compressor stops.

Carefully inspect the water system before installing the air compressor package. Ensure that the piping is free of scale and deposits that may restrict water flow to the air compressor package. If water cleanliness is poor, filtration installed on the water inlet pipe line is recommended.

Proper operation of the compressor requires that the cooling water flow be provided at a maximum supply temperature of 46 °C (115 °F). See the compressor engineering data sheets for cooling water flow rates.

Water temperature and pressure gauges should be installed in the water piping for use in any fault finding of the water system. Water pressure should ideally be between 3 and 5 bar (43.5 and 72.5 psi) but shall not be above 10 bar (145 psi).

Water cleanliness is also extremely important. Cleaning of coolers as a result of fouling is a customer responsibility. Therefore, it is highly recommended that proper water quality shall meet the requirements listed in WATER QUALITY RECOMMENDATIONS later in this section.

• VENTING THE WATER SYSTEM

At the initial installation, or for startup after draining the water system, proceed to vent the system as follows:

1. Locate the water system vent cock on top of the intercooler.
2. Open the water valve(s) allowing water to flow to the package.
3. Open the vent cock and allow all air to escape from the system. When water is observed at the vent cock, close it.

The system is now properly vented.

INSTALLATION

• DRAINING THE WATER SYSTEM

Should it become necessary to completely drain the water system, proceed as follows:

1. Disconnect the inlet and discharge water lines from the connections located at the rear of the unit.
2. Locate the oil cooler by removing the left and centre rear panels. Remove the two drain plugs located at the end of the cooler.

Allow the system to completely drain.

• WATER QUALITY RECOMMENDATIONS

Water quality is often overlooked when the cooling system of a water-cooled air compressor is examined. Water quality determines how effective the heat transfer rate, as well as the flow rate will remain during the operation life of the unit. It should be noted that the quality of water used in any cooling system does not remain constant during the operation of the system. The water make-up is effected by evaporation, corrosion, chemical and temperature changes, aeration, scale and biological formations. Most problems in a cooling system show up first in a reduction in the heat transfer rate, then in a reduced flow rate and finally with damage to the system.

There are many constituents in the water system that must be balanced to have a good, stable system. The following major components should be monitored:

SCALE: Scale formation inhibits effective heat transfer, yet it does help prevent corrosion. Therefore, a thin uniform coating of calcium carbonate is desired in the inner surfaces. Perhaps the largest contributor to scale formation is the precipitation of calcium carbonate out of the water. This is dependent on temperature and pH. The higher the pH value, the greater the chance of scale formation. Scale can be controlled with water treatment.

CORROSION: In contrast to scale formation is the problem of corrosion. Chlorides cause problems because of their size and conductivity. Low pH levels promote corrosion, as well as high levels of dissolved oxygen.

FOULING: Biological and organic substances (slime) can also cause problems, but in elevated temperature environments such as cooling processes they are not a major concern. If they create problems with clogging, commercial shock treatments are available.

To ensure good operation life and performance of the compressor cooling system, the recommended acceptable ranges for different water constituents are included below:

Corrosivity (Hardness, pH, Total dissolved solids, Temperature at inlet and Alkalinity should be analysed monthly, or if stable for 3 to 4 months, analysed quarterly.

Acceptable concentration:
Langelier Index 0 to 1

Iron content should be analysed monthly.

Acceptable concentration:
2 mg/l (2 ppm)

Sulphate content should be analysed monthly.

Acceptable concentration:
50 mg/l (50 ppm)

Chloride content should be analysed monthly.

Acceptable concentration:
50 mg/l (50 ppm)

Nitrate content should be analysed monthly.

Acceptable concentration:
2 mg/l (2 ppm)

Silica content should be analysed monthly.

Acceptable concentration:
100 mg/l (100 ppm)

Dissolved Oxygen content should be analysed daily, or if stable, analysed weekly.

Acceptable concentration:
0 mg/l (0 ppm) (as low as possible)

Oil and Grease content should be analysed monthly.

Acceptable concentration:
5 mg/l (5 ppm)

Ammonia content should be analysed monthly. Acceptable concentration:

1 mg/l (1 ppm).

• ROTATION CHECK



CAUTION

If the compressor is operated in the opposite direction of rotation, aircend damage may result and is not warrantable.

Locate the rotation decal on each motor.

• DRIVE MOTOR

The correct motor rotation is clockwise when viewed from the rear or non-drive end of the motor.

For the compressor motor rotation check, the running of the motor must be as short a time as possible.

After depressing the start button, IMMEDIATELY depress the "EMERGENCY STOP" BUTTON. Should the motor rotation be incorrect, put the main isolator in the OFF position.

Open the starter box door.

Interchange any two line connections (L1, L2 or L3) at the starter. Close and fasten the starter box door. Recheck for correct rotation.

INSTALLATION

• FAN MOTOR

Observe the compressor cooling fan. The rotation should be in accordance with the fan rotation decal affixed to the fan motor. Cooling air should exhaust from the top of the compressor enclosure.

Should the motor rotation not be correct, put the main isolator in the OFF position.

Interchange any two fan motor leads at the fan manual motor starter (MMS). Close and fasten the starter box door. Recheck for correct rotation.



CAUTION

Do not operate the machine with the panels removed as this may cause overheating and operators to be exposed to high noise levels.

Do not start or operate the machine in temperatures below or approaching 0 °C (32 °F), because the operation of the regulation system, the unloader valve, the safety valve, will be compromised. Your **Ingersoll Rand** distributor will advise on low ambient modifications.

• ELECTRICAL DATA

An independent electrical isolator should be installed adjacent to the compressor.

Feeder cables should be sized by the customer/electrical contractor to ensure that the circuit is balanced and not overloaded by other electrical equipment. The length of wiring from a suitable electrical feed point is critical as voltage drops may impair the performance of the compressor.

Feeder cable connections to studs L1–L2–L3 on isolator should be tight and clean.

The applied voltage must be compatible with the motor and compressor data plate ratings.

The control circuit transformer has different voltage tapings. Ensure that these are set for the specific applied voltage prior to starting.



CAUTION

Never test the insulation resistance of any part of the machines electrical circuits, including the motor without completely disconnecting the Xe controller.

OPERATING INSTRUCTIONS

BASIC OPERATION

NOTICE

The language and compressors of measure displayed on the controller will be preset before leaving the factory. If these are required to be changed, contact your local Ingersoll Rand service provider.

• PRIOR TO STARTING

Check that the lubricant level is at least visible in the center of the sight glass and add lubricant if necessary. Refer to the maintenance procedures for setting the correct level.

Ensure that the discharge air isolation valve is open. Switch on the main electrical isolation switch. The control panel will illuminate, indicating that the line and control voltages are available.

• INITIAL CHECK SEQUENCE

The controller will perform an initial check sequence if the compressor receives initial power to the controller or has experienced a trip reset. While the initial check sequence occurs, the controller will display a "Checking Machine" message.

During the initial check sequence, the controller will check the control system for proper operation. During this time, if any items are found inoperative, a trip will occur and the compressor will not start.

After completion of the initial check sequence, the controller will then display "READY TO START". This process should be completed within 10 seconds.

• START SEQUENCE

The compressor will initially start by the operator pressing the local start button or receiving a remote start command. The compressor will start loaded at the end of star delta transition period for a star delta starter or wait for a period of time equal to the starter time set point for a remote starter.

• STOP SEQUENCE

The compressor can be stopped by a local or remote stop, a shutdown due to a trip, or an emergency stop. All of the above conditions will cause the compressor to stop immediately, except the local or remote stop. A local or remote stop will open the blowdown valve and the compressor will run for up to 10 seconds. The compressor will stop if the system pressure reaches the offline pressure setpoint. However, if the compressor stops for this reason, it will automatically restart when the system pressure falls below the online pressure set point.

NOTICE

If the compressor has to be stopped in an emergency depress the emergency stop button located underneath the instrument panel.

• EMERGENCY STOPPING

If the compressor has to be stopped in an emergency press the emergency stop button located underneath the instrument panel.

This will over-ride the normal unload/stop button and will immediately stop the compressor.

• RESTARTING AFTER EMERGENCY STOPPING

If the compressor has been switched off because of a compressor malfunction, identify and correct the fault before attempting to restart.

If the compressor has been switched off for reasons of safety, ensure that the compressor can be operated safely before restarting.

Refer to the PRIOR TO STARTING and START SEQUENCE instructions earlier in this section before restarting the compressor.

OPERATING INSTRUCTIONS

INTERFACE DATA AND KEYS

• Xe-90M/145M




The standard user interface configuration of the controller consists of the membrane and the LCD display. The membrane consists of five command keys (Start, Stop, Load, Unload, and Reset), four navigation keys (Up, Right, Left and Down), and an Edit mode selection key (Enter). These keys, in conjunction with the color graphics display and the LED icons, make up the user interface to the compressor.



Xe-90M/145M





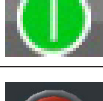
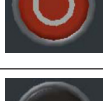

• LED STATUS ICONS

Three LED icons are used to indicate the current status of the control system from a distance and are located on the upper left side of the user interface.

Icon	Name	Function
	OK	Illuminates when no Warnings or Trips are sensed. Can be in a Ready or Not Ready state. This icon will flash when the machine is Running Unloaded.
	Alert	Illuminates when a Warning (flashes) or Trip (constant on) is sensed. Can be in a Ready (Warning) or Tripped state.
	Auto	Illuminates when the compressor stops in auto restart.

• COMMAND KEYS

These keys command the controller to perform actions as specified in the following table. When any of these keys are pressed the action below will be initiated and logged in the event log.

Key	Name	Function
	---	None
	Load	Puts the compressor into the selected mode of operation. Unit will load if the pressure conditions are right.
	Unload	Puts the compressor into an unloaded state. Unit will run unloaded indefinitely.
	Reset	Clears Warnings and Trips once the condition is corrected.
	Start	Starts the compressor.
	Stop	Stops the compressor. This button should be pressed instead of the E-Stop for normal stopping operation.
	Enter	Toggles the display between the Navigation mode and the Edit mode.

Xe-90M/145M Command Keys

• NAVIGATION KEYS

There are four navigation keys (UP, RIGHT, DOWN and LEFT). While the ENTER key is not considered a navigation key, it is used in conjunction with the navigation keys to make or confirm a selection.

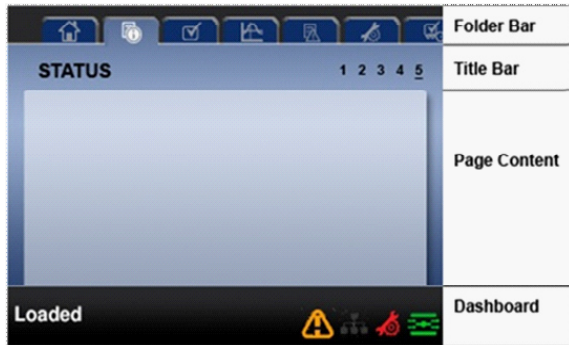


Xe-90M/145M's Navigation Keys

OPERATING INSTRUCTIONS

The navigation keys roll over. Pressing one of the navigation keys will lead the user down a navigation path. Each time the key is pressed, another step in the path is taken. Once the end of a navigation path is reached, pressing the key one more time will bring the user back to the beginning of the path. Pressing the opposite key will move the user through the navigation path in the opposite direction. Once the beginning is reached, pressing the opposite key will take the user to the end of the path.

• DISPLAY LAYOUT



Xe-90M/145M's Display Layout

- Folder Bar:** Uses tabs to graphically identify each folder.
- Title Bar:** Identifies current folder and page (underlined).
- Page Content:** Content of the current page.
- Dashboard:** Displays system status.

• FOLDER NAVIGATION AND ICONS

To move among the tabbed folders shown on the LCD display, press the RIGHT and LEFT keys. The navigation rolls over from the last to the first folder and vice-versa.

Folder Name	Icon	Description
Home		System performance and status main information. The first page of this folder is the default page when the controller first powers up.
Operator Settings		System options and configuration settings.
Events		System events log.
Trip History		Details on the most recent trips.
Graphing		On-board graphing of system data (Xe-145M Only).
Maintenance		Status and notification setup for compressor maintenance items.

Folder Name	Icon	Description
General Settings		General settings such as Language, Time, and Units of Measure.
Integral Sequencing		Integral Sequencing communication status and configuration.
Status		Measurements or status from/of all analog and digital I/O.
Factory Settings		Compressor tuning parameters. Also displays hardware and software versions.

Folder Bar Icons

• PAGE NAVIGATION

Once the desired folder is selected, press the DOWN key to move to the page selection area and then use the RIGHT and LEFT keys to select the desired page. Use the UP key to get back to the folder tabs.

Icon	Description
	Start of the page selection area.
	Indicates that there are more pages available by navigating right.
	Indicates that there are more pages available by navigating left.

Title Bar Page Icons

• ACCESSING PARAMETERS


After the desired page is selected, the page's parameters can be selected by using the DOWN key. The cursor will move to the next parameter each time the DOWN key is pressed. Use the UP key to go back to the previous one.

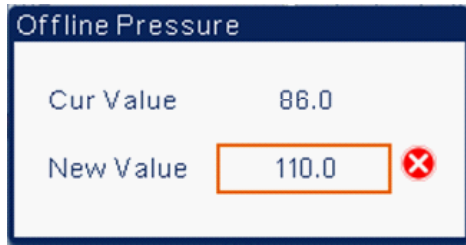
The cursor rolls over, so once the last parameter is selected, pressing the DOWN key will navigate the cursor to the Folder Bar. If the first parameter is selected, pressing the UP key will move the cursor to the page selection area.

Once selected, access parameters by pressing the ENTER key. Make changes using the NAVIGATION keys and then enter the setting by pressing the ENTER key again. After a parameter is accessed, pressing the ENTER key will enter the current setting into the control program and navigate the cursor back to the selected parameter on the page.

When the cursor is on a parameter that has an enabled/disabled box, pressing the ENTER key will cause the setting to toggle.

OPERATING INSTRUCTIONS





The icon  appears on numeric entry windows (see figure below). Placing the cursor on it and then pressing the ENTER key will cancel the entry and any changes that were made.



Not all pages have adjustable parameters. Some just have read-only information.

• DASHBOARD ICONS

The dashboard is intended to be a quick at-a-glance view of system status. The following table lists standard dashboard icons and their definition. Note that the color of these icons changes based on the state set by the application while running.

Name	Icon	Description
Remote Control		Remote control is enabled. This can be Remote Start/Stop, COM Control, Integral Sequencing or Web Control.
Service Required		A service reminder is nearing or has expired (i.e.: an air or oil filter needs to be changed).
Unloaded or Loaded	 	Compressor is in the unloaded state. Compressor is in the loaded state.

Xe-90M/145M's Dashboard Icons

• DASHBOARD STATUS MESSAGES

The dashboard also displays the current operating state of the compressor. The following states can be encountered during machine operation:

- **Ready to Start** – The compressor currently has no trip or start inhibit conditions present. The machine can be started by pressing the start button at any time.

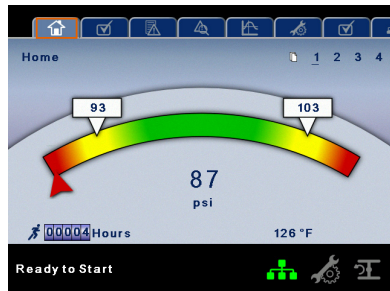
- **Starting** – A start command has been given to the compressor and the start sequence is being performed. The time period for this state can vary depending on the starter type of the machine.
- **Load Delay** – The compressor is waiting for a small period of time after starting before allowing the machine to load. This ensures the machine is at operating conditions before loading
- **Running Loaded** – The compressor is operating and producing air. The inlet valve is open and the blowoff valve is closed.
- **Running Unloaded** – The compressor is operating, but not producing air. The inlet valve is closed and the blowoff valve is open.
- **Auto-Restart** – The compressor has stopped due to pressure rising above the offline or auto-stop setpoints and auto-restart being enabled. The compressor will automatically restart when pressure falls to the online or target pressure setpoint.
- **Stopping** – The compressor has received a stop command and the stop sequence is being performed.
- **Blowdown** – The compressor must wait for a brief period of time after stopping its motor before it is allowed to start again.
- **Not Ready** – The compressor has detected a condition that will not allow the compressor to start. The condition must be cleared before a start is allowed, but does not need to be acknowledged.
- **Tripped** – The compressor has detected an abnormal operational condition that has stopped the machine. A trip must be acknowledged by hitting the reset button before the compressor can start.
- **Processor Init** – The controller is being initialized.

OPERATING INSTRUCTIONS

SIERRA COMPRESSOR

• PAGE 2 – COUNTERS

• HOME FOLDER



• PAGE 1 – SYSTEM OVERVIEW

This is the factory default display after powering up the system.

Load Pressure – indicated in the white box and by the white arrow, which is always left of center on the gauge. The compressor will load when package discharge pressure falls below this value.

Unload Pressure – indicated in the white box and by the white arrow, which is always right of center on the gauge. The compressor will unload when package discharge pressure rises above this value.

Package Discharge Pressure – indicated by the large numbers centred below the gauge and by the red arrow. This is the air pressure that the compressor is supplying to the plant.

Pressure Unit of Measure – indicated below the Package Discharge Pressure. This is selectable from the GENERAL SETTINGS folder.

Package Discharge Temperature – indicated by the numbers in the lower right of the display. This is the temperature of the compressed air/at the discharge of the compression module. The Package Discharge Temperature is only displayed if the Hot Discharge option is disabled.

Second Stage Discharge Temperature – indicated by the numbers in the lower right of the display. This is the temperature of the compressed air at the discharge of the 2nd stage compression module.

Temperature Unit of Measure – indicated to the right of the Aired Discharge Temperature. This is selectable from the GENERAL SETTINGS folder.

Run Hours – indicate the number of hours the compressor has been running.

! All information on this page is read only.



Hour Meters – Indicates the hours that: the controller has been powered up, the compressor has been running, and the compressor has running loaded.

Starts – Indicates the number of times a start is attempted on the compressor.

Date and Time – Indicates the current date and time. This is adjustable and configurable in the GENERAL SETTINGS folder.

! All information on this page is read only.

• PAGES 3 THRU 4 – ANALOG INPUTS



Pressure  is indicated by this icon.

Temperature  is indicated by this icon.

Any sensor that is not installed or is reporting a failure will show an X symbol.

! All information on these pages is read only.

The following analog inputs are displayed in this section:

Package Discharge Pressure – The pressure the compressor is delivering to the plant.

Package Discharge Temperature – The temperature of the air after passing through the After-cooler.

1st Stage Discharge Temperature – The temperature of the air at the discharge of the 1st stage of the compression module.

OPERATING INSTRUCTIONS

2nd Stage Inlet Pressure – The pressure of the air at the intake of the 2nd stage of the compression module.

2nd Stage Inlet Temperature – The temperature of the air at the intake of the 2nd stage of the compression module.

2nd Stage Discharge Pressure – The pressure of the air at the discharge of the 2nd stage of the compression module.

2nd Stage Discharge Temperature – The temperature of the air at the discharge of the 2nd stage of the compression module.

Bearing Oil Temperature – The temperature of the coolant oil at the bearings of the compression module shaft.

Bearing Oil Pressure – The pressure of the coolant oil at the bearings of the compression module shaft.

Inlet Vacuum – Vacuum reading at the inlet valve.

Remote Pressure (optional) – An optional pressure sensor that reads pressure at a point outside of the compressor package. Usually this would be on a common tank.

Oil Filter Pressure Drop – Differential pressure across the filter. Higher values indicate an older or clogged filter.

-  **OPERATOR SETTINGS FOLDER**

- **PAGE 1–2 OPERATOR SETTINGS**



The below values are all setpoints:

Offline Pressure – The compressor will unload when package discharge pressure rises above this value.
Range (in PSI): 75 to Rated Pressure +3.

Online Pressure – The compressor will load when the package discharge pressure falls below this value.
Range (in PSI): 65 to Offline Pressure -10.

Lead/Lag – When this box is checked the compressor is operating as a lead machine. Unchecking the box causes the machine to run as a lag machine.

Lag Offset – If the machine is running as a lag compressor, the lag offset will be subtracted from the online and offline setpoints.
Range (in PSI): 0–45, depending on the online and offline setpoints. The Lag Offset will never allow you to exceed the minimum or maximum values of the online and offline setpoints.

Condensate Release Time – Time period that determines how long the condensate drain valve will remain open every cycle.

Range: 2–20 seconds.

Condensate Interval Time – Time period that determines how long the condensate drain will remain closed every cycle.
Range: 90–270 seconds.

Starter Time – Time period that the compressor needs in order to come up to operating speed after a start command before being able to produce air.

Range (in seconds): 5–30.

Max 1st Stage Temperature – Setting that determines at what temperature the compressor will trip if the 1st Stage Discharge Temperature exceeds it.

Range (in °F): 300–440.

Max 2nd Stage Temperature – Setting that determines at what temperature the compressor will trip if the 2nd Stage Discharge Temperature exceeds it.

Range (in °F): 328–428.

The parameters on these pages are adjustable any time.

- **PAGES 3–5 OPERATOR OPTIONS**



The below values are all setpoints:

Auto-Restart Time – The time period the compressor must run unloaded before stopping in auto-restart. This time period begins the moment that package discharge pressure rises above the offline setpoint. Both this time period and the minimum motor run timer (10 minutes) must be satisfied before the compressor will stop in auto restart.
Range (in seconds): 120–900.

Auto-Restart Delay – The time period after the package discharge pressure has fallen below the online setpoint before the compressor can automatically restart.
Range (in seconds): 0–60.

COM Control – Enabling this setpoint allows the compressor to be controlled by a serial or Ethernet device, such as an X8I. This is equivalent to the “Sequencer” option on older Intellisys controllers.

Remote Start/Stop – Enabling this setpoint allows the compressor to be started and stopped using the digital inputs on the controller.

Enable PORO – Enabling this setpoint will allow the

OPERATING INSTRUCTIONS

compressor to automatically restart after a power outage has been restored if the compressor was running loaded at the time of the outage. PORO is an option and the option module must be purchased and installed before this feature can be turned on.

PORO Time – Time after the controller power has been restored and controller has finished booting before the compressor will perform a PORO start. During this time the PORO Horn will sound.

Range (in seconds): 10–600.

Condensate Level Installed – Setpoint to enable the level switch used to detect a blocked condensate drain.

Lead/Lag Cycle Length – The time period that controls how long the compressor will remain in the lead position before switching to lag. Setting this to 0 will disable this function.

Range: 0–750 hours.

Scheduled Start Day – Day (or days) of the week for which a scheduled start will be performed. The compressor will start when its onboard clock matches the day, hour, and minute of the scheduled start setpoints. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

Scheduled Start Hour – Hour of the day for which a scheduled start will be performed. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

Scheduled Start Minute – Minute of the hour for which a scheduled start will be performed. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

Scheduled Stop Day – Day (or days) of the week for which a scheduled stop will be performed. The compressor will stop when its onboard clock matches the day, hour, and minute of the scheduled stop setpoints. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

Scheduled Stop Hour – Hour of the day for which a scheduled stop will be performed. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

Scheduled Stop Minute – Minute of the hour for which a scheduled stop will be performed. Scheduled Start/Stop is an option and the option module must be purchased and installed before this feature can be turned on.

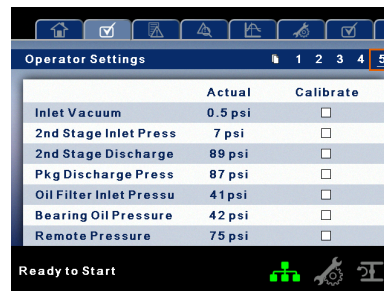
Enable High Dust Filter – Enabling this when a high dust filter is installed will adjust the change inlet filter warning and high inlet vacuum trip thresholds to a higher value.

Enable Remote Pressure Sensor – Enabling this allows the compressor to load and unload based off a sensor reading installed in a remote location.

Please note that in order to disable Scheduled Start/Stop, the Scheduled Start and Stop days, hours, and minutes must

match exactly.

• PAGES 6 CALIBRATE SENSORS



Sensor calibration can only take place when the machine is stopped and there is no pressure on the sensor. Calibration only needs to take place after a sensor is replaced, the controller is replaced, the controller software is upgraded, or the operator suspects the sensor reading is in error. Calibrate a sensor by selecting the checkbox beside the sensor name.

Each of the sensors listed below can be calibrated:

- Inlet Vacuum (1AVPT)
- 2nd Stage Inlet Pressure (2APT)
- 2nd Stage Discharge Pressure (3APT)
- Package Discharge Pressure (4APT)
- Oil Filter Inlet Pressure (5OPT)
- Bearing Oil Pressure (6OPT)
- Remote Pressure (10APT) – Only on units with the remote sensor option.

Please note that if a sensor is currently reading a value that is +/-10% of its range from zero, the sensor will not be able to be calibrated and an warning will be logged in the event log. Please make sure the sensor is being exposed to atmosphere before attempting calibration.

• EVENTS FOLDER

• PAGES 1 TO A MAX OF 50

#	Description	Time	Date
1.	Stop (Local)	13:36:40	07/25
2.	Start (Local)	13:36:03	07/25
3.	Emergency Stop	13:35:44	07/25
4.	Power Up	13:34:40	07/25
5.	Power Down	13:29:44	07/25
6.	Emergency Stop	13:29:36	07/25
7.	Stop (Local)	13:29:14	07/25

The pages in the Events folder document up to the last 250 events that the controller has experienced, with the time and date of the occurrence. The events are recorded in sequence, with number one being the newest and 250 being the oldest. When a new event occurs, it becomes number one and all others are shifted up in number.

The page numbers in the Title Bar are used to scroll through

OPERATING INSTRUCTIONS

the events, with each page displaying up to seven. Page one displays events one through five, page two displays six through ten, and so on.

The following items will generate an event:

- Power On
- Power Off
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Starting the compressor remotely
- Stopping the compressor remotely
- Warning
- Trip
- Start Inhibit.

Active Warnings will be highlighted in amber while acknowledged Warnings will have amber text.

Active Trips will be highlighted in red while acknowledged Trips will have red text.

Active Start Inhibits will be listed in the Event log, but not highlighted. The display will indicate the compressor is not ready to start if a start inhibit is active.

• **WARNING EVENTS LIST**

• ***Change Inlet Filter***

On-Screen Text: Change Inlet Filter

Will occur if 1AVPT is greater than 0.7 psi vacuum for units rated in horsepower, or 1 psi for units rated in kilowatts (1.3 psi vacuum for all units if the high dust filter option is enabled) the unit has been loaded for at least 8 seconds and the inlet valve is on the open limit switch. This condition must exist for 3 seconds before the warning is issued.

• ***Change Oil Filter***

On-Screen Text: Change Oil Filter

This warning will occur if the compressor is running and the Bearing Oil Temperature sensor reads a value greater than 120 °F, and the Oil Filter Pressure Drop is greater than 13 psi for 3 seconds or longer.

• ***Sensor Failure***

On-Screen Text: 5OPT Failure, 7ATT Failure

This will occur whenever sensors 5OPT, 7ATT, or 10APT are recognized as missing or broken. The sensor failure message shall follow the following format: 5OPT FAILURE. This condition must exist for 3 seconds before the warning is issued.

• ***Auxiliary 1***

On-Screen Text: Auxiliary 1

This will occur if auxiliary input 1 closes. The contact must be closed for at least 3 seconds before the warning will occur.

• ***Auxiliary 2***

On-Screen Text: Auxiliary 2

This will occur if auxiliary input 2 closes. The contact must be closed for at least 3 seconds before the warning will occur.

• **SERVICE**

Service warnings occur when the unit has operated a certain number of hours, based on the total hours. Service warnings can have multiple levels, depending on the service level selection. A service level selection of 0 disables service warnings.

• ***Service Level 1***

On-Screen Text: SVC Required

If service level 1 has been selected for the unit, a "SERVICE REQUIRED" warning will be issued on hour intervals equal to the service time period set point. This warning can be reset the same as any other warning.

• ***Service Level 2***

On-Screen Text: 100 hours to Svc, SVC Required, Service Alarm

If service level 2 has been selected for the unit, the service complete factory set point will be used to clear a level 2 service warning and reset the service time or date. The service complete can be reset before a service warning occurs.

The initial "SERVICE REQUIRED" warning will occur at total hour intervals equal to the service time period set point. However, 100 hours before this a "100 HOURS TO SERVICE" warning will occur. This warning can be reset the same as any other warning. One hundred hours later the "SERVICE REQUIRED" warning will occur. This warning can be reset the same as any other warning, however this warning will return in 24 hours if the service complete factory set point has not been set. If the service complete has not been set, 100 hours later, the "ALARM – SERVICE REQUIRED" warning will be issued. This warning can only be cleared by the service complete factory set point. Once the service complete factory set point is set, indicating the service is completed, the time for the next "SERVICE REQUIRED" warning will be calculated by adding the service time period to the total hours value, with the "100 HOURS TO SERVICE" warning occurring 100 hours before and the "ALARM – SERVICE REQUIRED" warning occurring 100 hours after that time.

• ***High Discharge Pressure***

On-Screen Text: High Disch Pres

Will occur if the unit is using a remote sensor or is under the control of an external device, such as an X8I, is loaded, and the discharge pressure (4APT) is greater than the maximum offline pressure. This condition must exist for 3 seconds before the warning is issued. If this condition occurs, the compressor will automatically unload. The unit will be available to reload once the discharge pressure falls to the rated pressure value.

Load or Stop Unit – Will occur if the controller remains in a force unloaded state (by pressing the unload key) for a period of 10 minutes.

OPERATING INSTRUCTIONS

- **Invalid Calibration**

On-Screen Text: Invalid Cal

Will occur if the sensor zero value is +/-10% of its scale. See Sensor Calibration.

- **Check SD Card**

On-Screen Text: Check SD Card

The controller has detected a problem with the SD card during the last boot cycle and is using files from internal memory. The controller will function normally, but web page access may not work properly.

- **TRIP EVENTS LIST**

- **High Intercooler Condensate**

On Screen Text: High I/C Condensate

Will occur if the Condensate Level Switch option is installed and enabled, and the condensate level switch is closed for a time period of 60 seconds or greater. A closed switch indicates that the drains are not working properly.

- **High Intercooler Pressure**

On Screen Text: High I/C Pressure

Will occur if the compressor is running loaded, the 2nd Stage Inlet Pressure sensor reads a value greater than 43 psi, and the 1st Stage Discharge Temperature sensor reads a value greater than 410 °F (430 °F for rated pressures above 125 psi). This will also occur if the compressor is running, started less than 7 seconds ago, and the 2nd Stage Inlet Pressure sensor reads a value greater than 10 psi.

- **High 2nd Stage Pressure**

On Screen Text: High 2nd Stg Press

Will occur if the compressor is running and the 2nd stage discharge pressure sensor reads a value greater than 15 psi above the rated pressure setpoint.

- **High Line Air Pressure**

On Screen Text: High Line Air Press

Will occur if the compressor is running and the package discharge pressure sensor reads a value that is greater than 15 psi above the rated pressure setpoint.

- **Low Bearing Oil Pressure**

On Screen Text: Low Bearing Oil Press

Will occur if the compressor leaves the starting state and the Bearing Oil Pressure sensor reads a value that is less than 15 psi. This will also occur if after leaving the starting state, the Bearing Oil Pressure does not rise above 34 psi within 8 seconds. Lastly, this will occur if the compressor is running unloaded, has been running for at least 7 seconds, and the Bearing Oil Pressure sensor reads a value of less than 34 psi for 3 seconds or longer.

- **2nd Stage Over Ratio**

On Screen Text: 2nd Stage Over Ratio

Will occur if the compressor is running and the equation (2nd Stage Discharge Pressure +14.5 psi) / (2nd Stage Inlet Pressure +14.5 psi) is a value greater than 5 for 2 seconds or longer.

- **High 1st Stage Temperature**

On Screen Text: High 1st Stage Temp

Will occur if the compressor is running and the 1st stage discharge temperature sensor reads a value greater than the High 1st Stage Temperature setpoint.

- **High 2nd Stage Temperature**

On Screen Text: High 2nd Stage Temp

Will occur if the compressor is running and the 2nd stage discharge temperature sensor reads a value greater than the High 2nd Stage Temperature setpoint.

- **High Intercooler Air Temperature**

On Screen Text: High I/C Temp

Will occur if the compressor has been started for at least 15 seconds, is running, and the 2nd stage inlet temperature sensor reads a value greater than 140 °F.

- **High Bearing Oil Temperature**

On Screen Text: High Bearing Oil T

Will occur if the compressor has been started for at least 15 seconds, is running, and the bearing oil temperature sensor reads a value greater than 170 °F.

- **Starter Fault 1SL (2SL)**

On-Screen Text: Starter Fault 1SL, Starter Fault 2SL

Will occur if the unit tries to start and either of the starter auxiliary contacts are already closed.

- **Main Motor Overload**

On-Screen Text: Main Motor OL

This will occur if the motor overload relay opens. The contact must be open for at least 3 seconds before the trip will occur.

- **Fan Motor Overload**

On-Screen Text: Fan Motor OL

Will occur if a fan motor overload relay contact opens. The contact must be open for at least 3 seconds before the trip will occur.

- **Remote Stop Failure**

On-Screen Text: Rem Stop Fail

Will occur if the remote start/stop option is enabled, the remote stop button remains open and either start button is pressed.

OPERATING INSTRUCTIONS

- **Remote Start Failure**

On-Screen Text: Rem Start Fail

Will occur if the remote start/stop option is enabled, the unit is started by the remote start button, and the button stays closed for 7 seconds after the unit starts.

- **Sensor Failure**

On-Screen Text: 1AVPT Failure, 2APT Failure, 3APT Failure, 4APT Failure, 60PT Failure, 2ATT Failure, 3ATT Failure 4ATT Failure, 5OTT Failure.

This will occur when a sensor is recognized as missing or broken. The sensors affected by this trip are 1AVPT, 2APT, 3APT, 4APT, 2ATT, 3ATT, and 5OTT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: 1AVPT Failure.

- **Emergency Stop**

On-Screen Text: Emergency Stop

This will occur when the EMERGENCY STOP button is engaged.

- **Inlet Restriction**

On-Screen Text: Inlet Restriction

This will occur if the unit has running loaded for at least 8 seconds and the inlet vacuum is greater than 3 psi. This warning will also occur if the unit is running unloaded and the inlet vacuum is greater than 13.3 psi.

- **Excessive Unloaded Run**

On Screen Text: Excessive Unload

Will occur if the compressor remains in the forced unload condition (by pressing the unload key) for a time period of 20 minutes.

- **Start Inhibit List**

High 1st Stage Temperature

On Screen Text: High 1st Stage Temp

Will occur if the 1st stage discharge temperature sensor reads a value greater than 95% of the high 1st stage discharge temperature setpoint.

High 2nd Stage Temperature

On Screen Text: High 2nd Stage Temp

Will occur if the 2nd stage discharge temperature sensor reads a value greater than 95% of the high 2nd stage discharge temperature setpoint.

High Bearing Oil Temperature

On Screen Text: High Bearing Oil T

Will occur if the bearing oil temperature sensor reads a value greater than 161 °F.

-  **TRIP HISTORY**

- **PAGES 1 TO A MAX OF 3**



#	Description	Time	Date
1.	Emergency Stop	13:35:44	07/25
2.	Emergency Stop	13:29:36	07/25
3.	2nd Stage Over Ratio	11:30:33	07/25
4.	Emergency Stop	11:29:20	07/25
5.	Emergency Stop	13:50:05	07/24
6.	Emergency Stop	13:47:22	07/24
7.	Emergency Stop	13:46:38	07/24

The pages in the Trips History folder document up to the last 15 trips that the controller has experienced, and time stamps each. The trips are recorded in sequence, with number one being the newest and 15 being the oldest. When a new trip occurs, it becomes number one and all others are shifted up in number.

The page numbers in the Title Bar are used to scroll through the events, with each page displaying up to seven. Page one displays events one through five, page two displays six through ten, and so on.

The following items will generate an entry in the trip history.

- Trips.

Active Trips will be highlighted in red while cleared Trips will have red text.

The trip history also records compressor data at the time of the trip to assist in diagnostics and troubleshooting. Navigating to the trip entry and hitting the enter button will bring up the trip history dialog box.

While the dialog box is active, press the left and right keys in order to scroll through the displayed data. The name of the trip will always be shown in the title bar of the dialog box. Press enter when finished viewing the data to return to the trip history screen.

-  **GRAPHING FOLDER**

- **PAGES 1 THRU 5 – INDIVIDUAL GRAPHS**



Variable (Read Only) Each page graphs one variable, displaying the variable name and unit of measure in the top center of the page. The variables that will be graphed on each of the five pages are selectable from page six. The units of measure are selectable from the GENERAL SETTINGS folder.

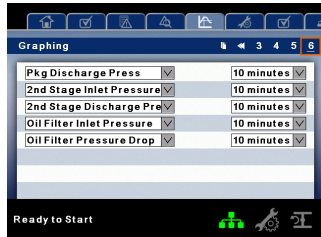
Y-Axis (Read Only) – is auto-scaling.

OPERATING INSTRUCTIONS

X-Axis (Read Only) – The time duration is selectable from page six. The sample rate varies, based on the selected duration.

The graph plots a minimum of 255 readings.

- **PAGE 6 – GRAPHING SELECTIONS**



The selections for page one through five are organized sequentially in rows. The top row has page one selections and the bottom row has page five selections.

Variables – include all analog inputs as well as some calculated variables. The amount of variables will vary depending on the compressor type and the options it has.

Duration – selectable from the following five times:

- 10 minutes
- 30 minutes
- 60 minutes
- 12 hours
- 24 hours

These times are fixed and cannot be changed.

-  **MAINTENANCE FOLDER**

- **PAGE 1 – FILTER STATUS**



This page displays the status of the filters. The filter status will either be "OK" or "Change" depending on the compressor's diagnostic readings. If a filter reaches the "change" status, a warning will be issued and the service indicator will light up yellow to notify the user. Please note that the compressor must be in a "Running Loaded" state to check these maintenance items. If the compressor is not in a running state – the status will display "Load," unless a maintenance indicator has been issued when the machine was running and has not yet been reset.

The following filters are displayed:

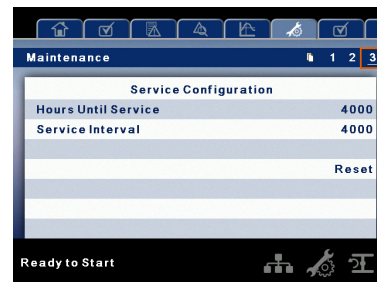
- Oil Filter
- Inlet Filter.

- **PAGE 2 – MAINTENANCE STATUS**



This page displays the time until the unit should be serviced. The service meter will deplete as the hours count down closer to a service appointment. Once the counter reaches the yellow zone, the service indicator will light up yellow. Once the counter reaches the red zone the service indicator will light up red and maintenance must be performed.

- **PAGE 3 – MAINTENANCE CONFIGURATION**



This page allows the user to set the service interval and to reset the counter after the service has been performed. The service interval may be set to any value between 1000 and 8000 hours, but must be set in accordance with the factory maintenance schedule. After maintenance has been performed, the user can reset the counter by navigating to the Reset button and pressing the enter key.

-  **GENERAL SETTINGS FOLDER**

All parameters in the general settings folder are adjustable.

- **PAGE 1 – LANGUAGE SELECTION**



Language (< >) is selectable from the following 30 selections:

English (default)	Finish	Latvian	Slovak
Bulgarian	French	Lithuanian	Slovenian
Chinese, simplified	German	Maltese	Spanish
Croatian	Greek	Norwegian	Swedish

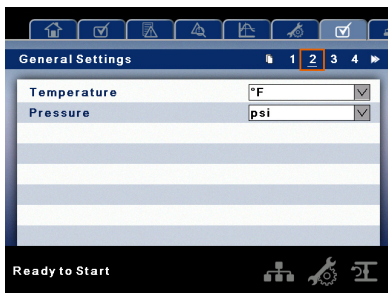
OPERATING INSTRUCTIONS

Czech	Hungarian	Polish	Thai
Danish	Italian	Portuguese	Turkish
Dutch	Indonesian	Romanian	
Estonian	Korean	Russian	

The controller will display all screens in the selected language and only one language can be selected at a time.

Each language appears in its native translation.

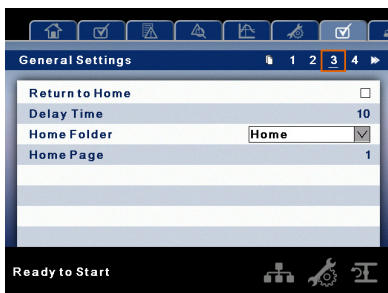
• PAGE 2 – UNITS OF MEASURE SETTINGS



Temperature is selectable between °F and °C.

Pressure is selectable between psi, kpa, bar, kg/cm².

• PAGE 3 – HOME PAGE SELECTION



Auto Return to Home enables the controller to return the display back to the selected Home Page if there is no user activity for the Delay Time shown. This is only enabled when an "x" appears in the checkbox.

Delay Time determines how many seconds of inactivity it will take before the controller will return to the Home Page.

Select Home Folder is used to select the Home Folder.

Select Home Page is used to select the Home Page within the selected Home Folder.

• PAGE 4 – TIME AND DATE SETTINGS



All items are adjustable.

Hours allows the current hour to be set. The hours format is fixed on 24 hour.

Minutes allows current minutes to be set.

Seconds allows current seconds to be set.

Year allows current year to be set.

Month allows current month to be set.

Day allows current day to be set.

Date Format is selectable between dd/mm/yyyy (default) and mm/dd/yyyy.

Confirm New Time and Date is used to verify that changes to selections are desired. An "x" must appear in the checkbox before any changes will take affect.

The controller will continue to display any changes, even when the selections have not been confirmed and the user exits the page, then returns. Cycling of the power returns all selections to their current settings.



The controller does not support Daylight Savings Time.

• PAGE 5 – BACKLIGHT SETTINGS



Backlight Brightness – adjusts the brightness of the display.

Enable Backlight Auto-Off – enables the controller to shut-off the backlight if there is no user activity for the delay time shown.

Backlight Auto-Off Delay Time – determines how many seconds of inactivity it will take before the controller will shut-off the backlight.



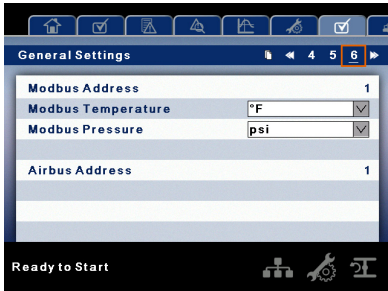
The backlight will be switched on whenever any of the controller's keys are pressed.

NOTICE

The start, stop, load, unload, reset, and acknowledge keys on the xe-90m/145m remain functional while the backlight is switched off. It is recommended to press the enter key or one of the navigation keys in order to switch the backlight on.

OPERATING INSTRUCTIONS

• PAGE 6 – SERIAL PORT ADDRESS SETTINGS



This page allows the user to set up the network addresses for the RS-485 networks the controller is capable of communicating with.

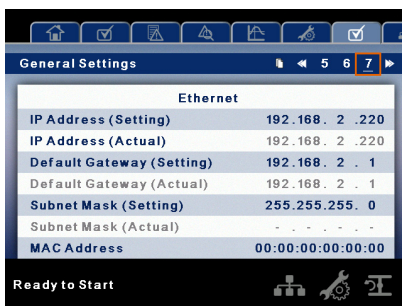
MODBUS Address – Sets the modbus node ID for the controller to communicate with a Modbus capable device, this can be any value between 1 and 247.

MODBUS Pressure – Sets the unit type for pressure data read out via the Modbus connection.

MODBUS Temperature – Sets the unit type for temperature read out via the Modbus connection.

Airbus Address – Sets the airbus address that allows the controller to communicate over Integral Sequencing or an X-Series system controller network.

• PAGES 7 AND 8 – ETHERNET SETTINGS



IP Address Setting – When DHCP is not enabled, this setpoint sets the IP address of the controller.

IP Address Actual – This will match the IP address setting when DHCP is not enabled. If DHCP is enabled this will display the address assigned to the controller by the DHCP server.

Default Gateway Setting – Setpoint for the default gateway.

Default Gateway Actual – Current reading/setting for the default gateway.

Subnet Mask Setting – Setpoint for the subnet mask.

Subnet Mask Actual – Current reading/setting for the subnet mask.

MAC Address – This is the unique hardware MAC address for the controller. This can not be changed.

Enable DHCP – Allow the controller to automatically receive an IP address from the Local Area Network (LAN).

Apply – After editing the desired setpoint navigate to the accept setting and press enter in order for the values in the setting variables to be confirmed by the controller.

Cancel – Discard any changes made to the Ethernet settings.

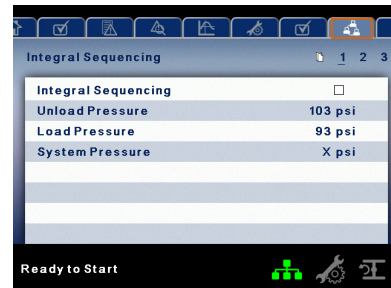
• PAGES 9 AND 10 OPTION MODULE INFORMATION

The option module information screen allows the user to see which software options have been installed in the controller. An option module that is installed will show up with an “X” in the appropriate box. The option part number is displayed with the option name.

If no options are installed, this screen will not appear on the controller.



• INTEGRAL SEQUENCING FOLDER



Integral Sequencing allows the compressor to be networked with up to three other compressors (fixed or variable speed) to maintain a stable system pressure by loading and unloading compressors as needed. Integral sequencing requires no additional hardware other than a serial two wire connection daisy chained between all compressors in the system.

Please note that the compressor's address in the integral sequencing system is defined by the airbus address that is set on the general settings folder. Also note that the pressure signal used to determine when to load or unload another compressor is based on the pressure reading from the compressor at address 1 in the system.

Integral Sequencing – Enabling Integral Sequencing selects this compressor to be the leader of the integral sequencing system. It is important that only one compressor in the sequence be selected as the lead compressor.

Unload Pressure – Determines the pressure at which a compressor will be unloaded by the system.

OPERATING INSTRUCTIONS

Load Pressure – Determines the pressure at which a compressor will be loaded by the system.

System Pressure – Shows the current pressure reading that the system is using for control. This is typically compressor 1's package discharge pressure reading.

Start Delay Interval – Determines the amount of time between loading compressors. This prevents all compressors from loading at once.

Damping – The pressure control "Damping" setting which is used to tune how quickly the system responds to pressure deviations. The default is 10 and should not normally be changed.

Tolerance – The pressure control "Tolerance" setting, which is used to tell the system how to respond to changes in pressure above and below the load/unload pressures. The default is 3.0 psi and should not normally be changed.

Number of Compressors – Defines how many compressors are in the system. There is a maximum of 4.

Sequence – Displays the current load/unload order of the system. Each compressor in the system is assigned a letter, with "A" being the compressor to load first and unload last, and "D" being the compressor to load last and unload first.

Priority – Each compressor can be assigned a priority level. Compressors will only rotate positions with other compressors of the same priority level.

Rotate Now – Selecting this setpoint will cause the sequence to shift according to the priorities, regardless of the rotation interval setpoint.

Rotation Interval – Determines the time period between sequence rotations.

Time Left – Counts down the time until the sequence rotation will occur.

STATUS FOLDER

All information on these pages is read only.



Some values may only be visible when the factory settings password is entered.

PAGES 1 AND 2 – ANALOG INPUTS

Status	
Pkg Discharge Press	91 psi
Pkg Discharge Temp	126 °F
Inlet Vacuum	0.5 psi
Remote Pressure	75 psi
2nd Stage Inlet Pressure	8 psi
2nd Stage Discharge Pressure	92 psi
Oil Filter Inlet Pressure	42 psi
Bearing Oil Pressure	42 psi

Ready to Start

Analog Inputs:

The following analog inputs are displayed in this section:

- Package Discharge Pressure – The pressure the compressor is delivering to the plant.
- Package Discharge Temperature – The temperature of the air after passing through the compressor discharge.
- 1st Stage Discharge Temperature – The temperature of the air at the discharge of the 1st stage of the compression module.
- 2nd Stage Inlet Pressure – The pressure of the air at the intake of the 2nd stage of the compression module.
- 2nd Stage Inlet Temperature – The temperature of the air at the intake of the 2nd stage of the compression module.
- 2nd Stage Discharge Pressure – The pressure of the air at the discharge of the 2nd stage of the compression module.
- 2nd Stage Discharge Temperature – The temperature of the air at the discharge of the 2nd stage of the compression module.
- Oil Filter Inlet Pressure – The pressure of the coolant oil at the inlet of the oil filter.
- Bearing Oil Pressure – The pressure of the coolant oil at the bearings of the compression module shaft.
- Bearing Oil Temperature – The temperature of the coolant oil at the bearings of the compression module shaft.
- Inlet Vacuum – Vacuum reading at the inlet valve.
- Remote Pressure (optional) – An optional pressure sensor that reads pressure at a point outside of the compressor package. Usually this would be on a common tank.
- Condensate Level Switch – Shows the status of the condensate level switch in analog to digital converter counts.

PAGE 3 – COMPRESSOR DATA

Status	
Power On Hours	0 Hr
Running Hours	0 Hr
Loaded Hours	0 Hr
Time	08:38:24

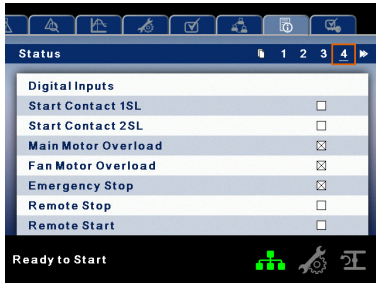
Ready to Start

Compressor Data:

- Power On Hours – The number of hours the controller has been powered up.
- Running Hours – The number of hours the compressor's motor has been running.
- Loaded Hours – The number of hours the compressor has been producing air.
- Real Time Clock – Current time of day.

OPERATING INSTRUCTIONS

PAGES 4 THRU 5 – DIGITAL INPUTS



Digital Inputs:

An “x” in the checkbox beside a digital input indicates that the input is in its TRUE state. For example, Starter Feedback is TRUE when its input is in the high state, where as, Emergency Stop is TRUE when its input is at 0 Vdc.

A password is required to view these pages.

- Starter Contact 1SL
- Starter Contact 2SL
- Main Motor Overload
- Fan Motor Overload
- Emergency Stop
- Remote Stop
- Remote Start
- Remote Lead/Lag
- Remote Load Enable
- Remote Load/Unload
- Auxiliary Input 1
- Auxiliary Input 2.

PAGES 6 AND 7 – DIGITAL OUTPUTS



Digital Outputs:

An “x” in the checkbox beside a digital output indicates that it is energized. A password is required to view these pages.

- Starter Contact 1M
- Starter Contact 1S
- Condensate Solenoid
- Load Solenoids
- Stopped in Auto-Restart
- Warning Output
- PORO Horn
- Trip Indication

- Warning Indication.

FACTORY SETTINGS FOLDER

This folder is for **Ingersoll Rand** factory and service personnel. A password must be entered on page one in order to adjust values in this folder. This folder is used for setting parameters that are specific to that compressor and displaying software information for the controller.

PAGE 1 – PASSWORD



Password:

Provides access to enter a valid password to gain access to password protected parameters. The password is entered by scrolling down to the password value and pressing the return key.

Password entered:

This checkbox will indicate a valid password has been entered. If this checkbox is blank, a valid password has not been entered or it has timed out. This is read only.

Password timeout enable:

Checking this box will enable the password time feature.

Password timeout:

This timeout along with the password timeout enable allows the user to set an adjustable amount of time to require a valid password to be re-entered. Once this timeout is reached re-entry of a valid password is required. The timeout counter is reset after any button press.

PAGES 2 THRU 3 – FACTORY SETTINGS



These pages are used for setting parameters that are specific to the compressor. All of the factory settings that are adjustable are listed below. All settings on these pages are password protected.

Rated Pressure – This is the nominal pressure that the

OPERATING INSTRUCTIONS

compressor can provide. This setpoint is adjustable from 100–150 psi (6.9–10.3 bar) and defaults to 100 psi.

Starter Type (Star-delta, Remote Starter, Soft Starter)

– Choose the starter type installed in the compressor. If this is not set correctly, the compressor may not start.

Service Level (0, 1, or 2) – Set the service level reminders for the compressor.

- **Service Level 0** – Disables all service reminders.
- **Service Level 1** – A service warning will be issued when the service time period has been expired. This warning can be reset by any user.
- **Service Level 2** – A service warning will be issued 100 hours prior to the service time period expiring. This 100 hour warning can be reset by any user. At the expiration of the service time interval the service warning will again occur. This warning can be reset by any user but will recur every 24 hours until the service complete factory setpoint has been set (Password Required).

Hot Discharge – Enable this setpoint to activate the Hot Discharge option, which disables the package discharge temperature sensor.

Power On Hours (Read Only).

Running Hours (adjustable) – Used to adjust the running hours counter on the compressor.

Loaded Hours (adjustable) – Used to adjust the loaded hours on the compressor.

• **PAGES 4 – FACTORY SETTINGS**

Factory Settings	
Serial Number	01061974
Display Boot Version	1.8
Display Firmware Version	1.5.0
Display App Version	1.5.0
I/O Boot Version	1.8
I/O Firmware Version	1.5.0
IO App Version	1.5.0
Software CCN	24474710

Ready to Start

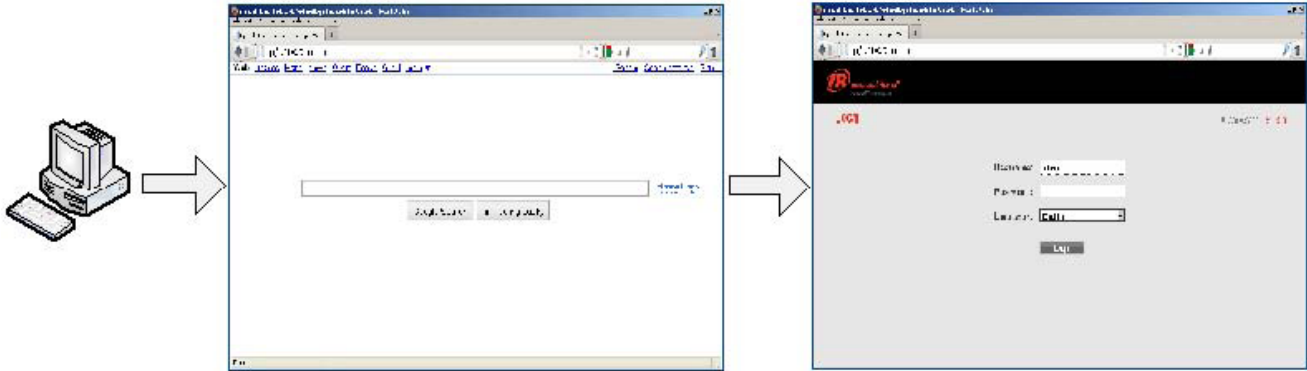
These pages are used for displaying software information for the controller. All items are read only.

OPERATING INSTRUCTIONS

WEB ACCESS

Ingersoll Rand Xe-90M/145M web pages are a visualization application which offers a window using a web browser on your PC. The web pages allows the user to monitor air system at a glance or take a more detailed look into system

operation, equipment status and setup through an intuitive web-page based user interface. To access this application running on the controller, simply connect via a Web Browser from any PC using an Ethernet connection. The PC can be local stand alone or part of a LAN.



The system administrator can assign a user one of three levels of access (view only, user, and administrator) which will determine which functions will be available to that user. For example, only users with administrator access will be able to make new accounts and to view or modify the configuration overview parameters. See section Account Management.

The Xe-90M/145M functions as a web server for the compressor. The web server offers the following through the interface:

- Display of current operating state of the compressor
- Compressor Information – model number, serial number, rated capacity and other details
- Start, Stop, Reset Alarm, Load and Unload buttons
- Adjust operating parameters
- Display of analog signals
- Display of hour meters
- Display of Event log
- Graphing (Xe-145M Only)
- Display of maintenance timers
- Edit and display of maintenance log
- Notification of alarm/trip events via email.

• COMMISSIONING PROCEDURES

There are certain parameters that must be configured in order for the controller to properly communicate to the LAN and to the network. Outlined below is a list of steps that must be completed before the visualization software can be fully utilized. Please be sure that you have ADMIN rights before attempting to configure the controller.

If you will only be connecting to the controller to a single PC, go to step 1. If you will be using a static IP or DHCP assigned IP address on your company's LAN please go to step 2.

1. Connect the controller to a PC – Follow the procedure outlined in section "CONNECTING TO A PC". Please go to step 3.
2. Configure the controller Ethernet settings – Obtain a static IP address from your IT department or have an assigned domain name for DHCP access. Follow the procedures in "ETHERNET CONFIGURATION".
3. Login to the web pages – Follow the procedure in section "LOGIN PROCESS".
4. Configure compressor information – Follow the procedures in section "COMPRESSOR INFORMATION". Make sure you have the compressor nameplate data available.
5. Set up user accounts – Follow the procedures in section "ACCOUNT MANAGEMENT".

OPERATING INSTRUCTIONS

• CONNECTING TO A PC

In order to configure your computer to communicate point-to-point with the Xe-90M/145M controller, you must first set the IP address range of your computer to the default IP address range of the controller. To do this, please follow the instructions listed below to configure the computer IP address. These settings are accessible using Windows XP by selecting:

Using Classic View:

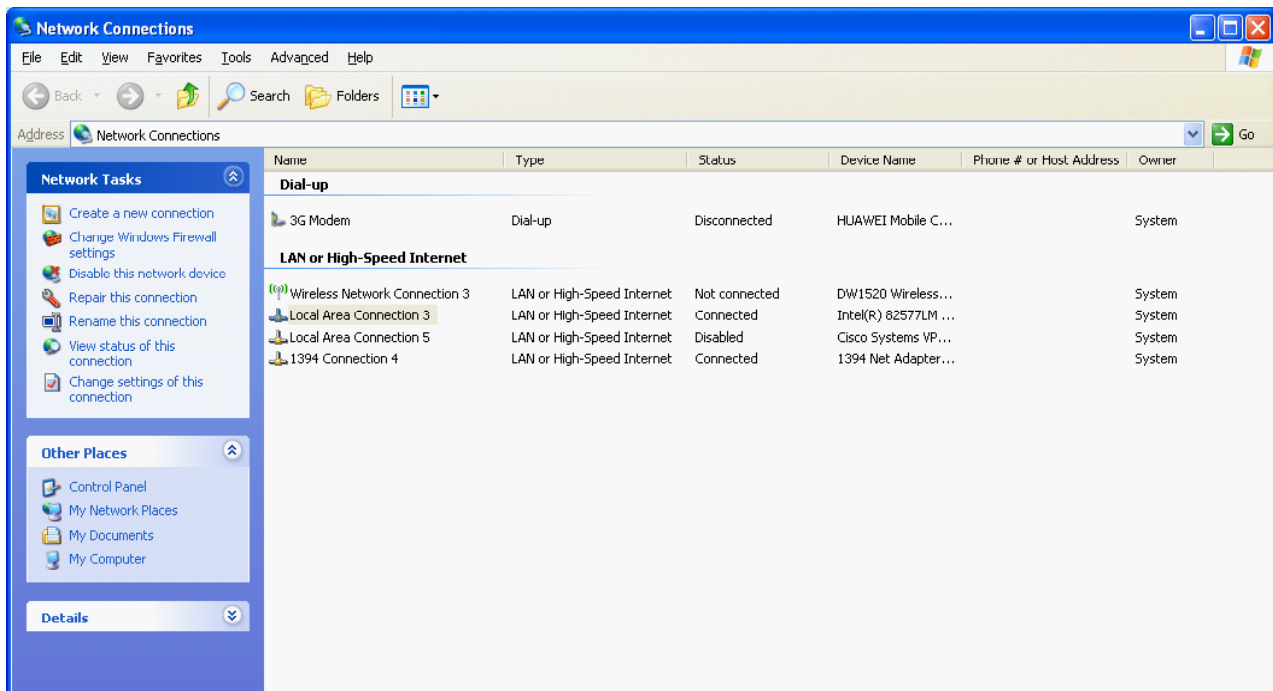
- Select Start
- Select Settings
- Select Network Connections.

Using XP Start View:

- Select Start
- Select Control Panel
- Select Network Connections.

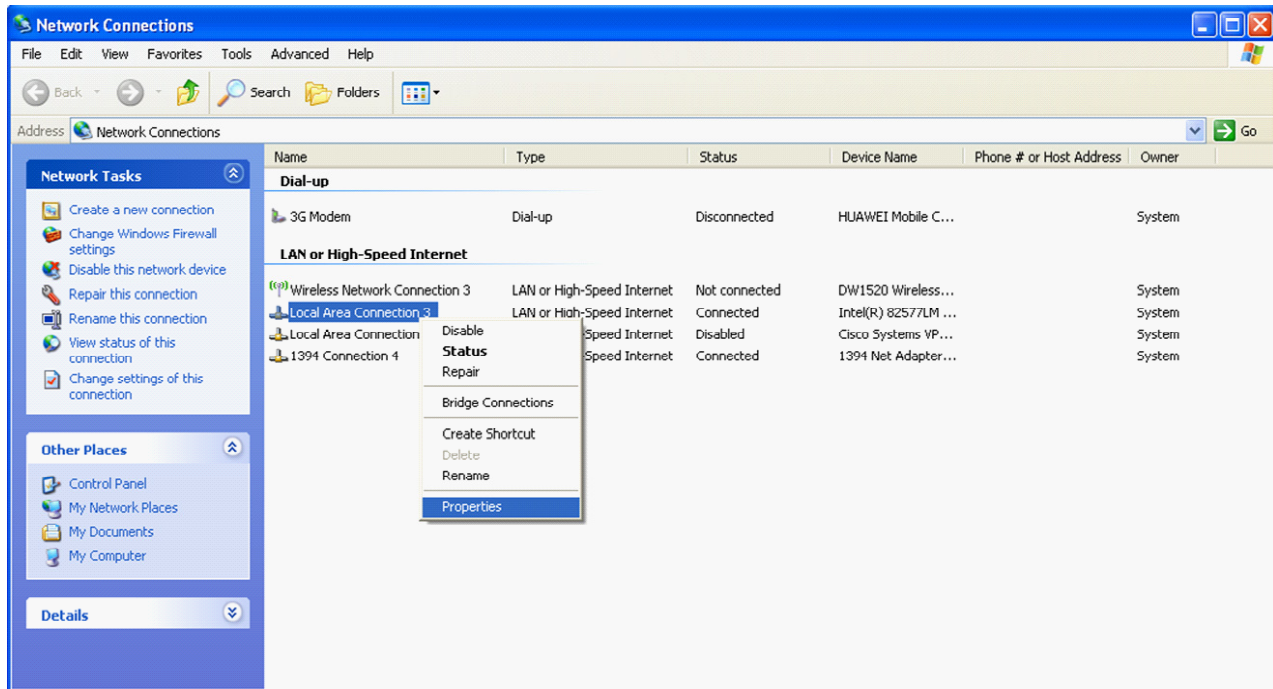
Please note that the controller ships with a default IP address of 192.168.2.220.

1. Select "Local Area Connection" from the list.

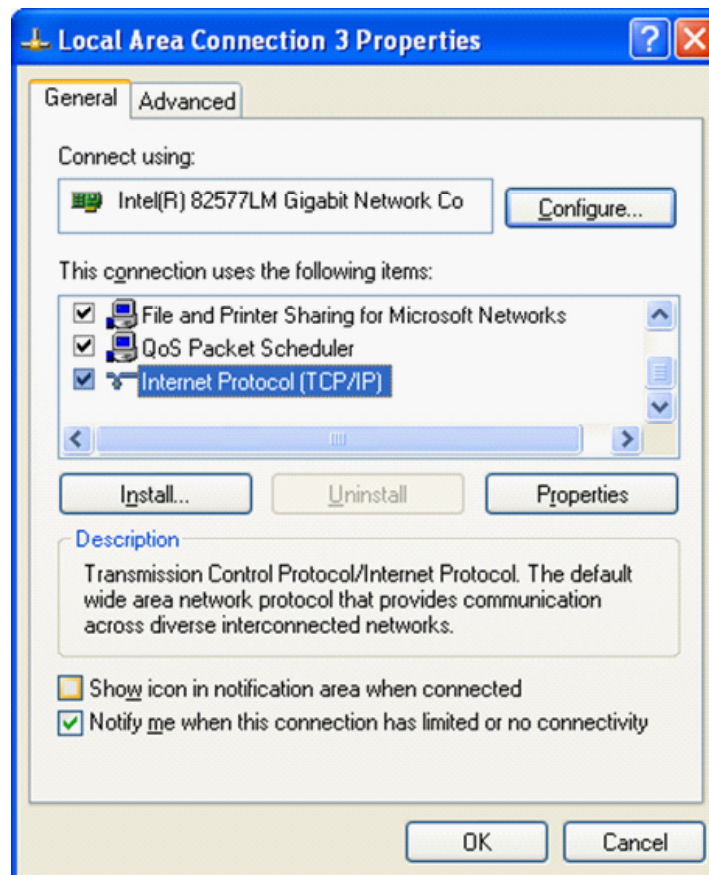


OPERATING INSTRUCTIONS

2. Right click on the "Local Area Connection" and select "Properties".

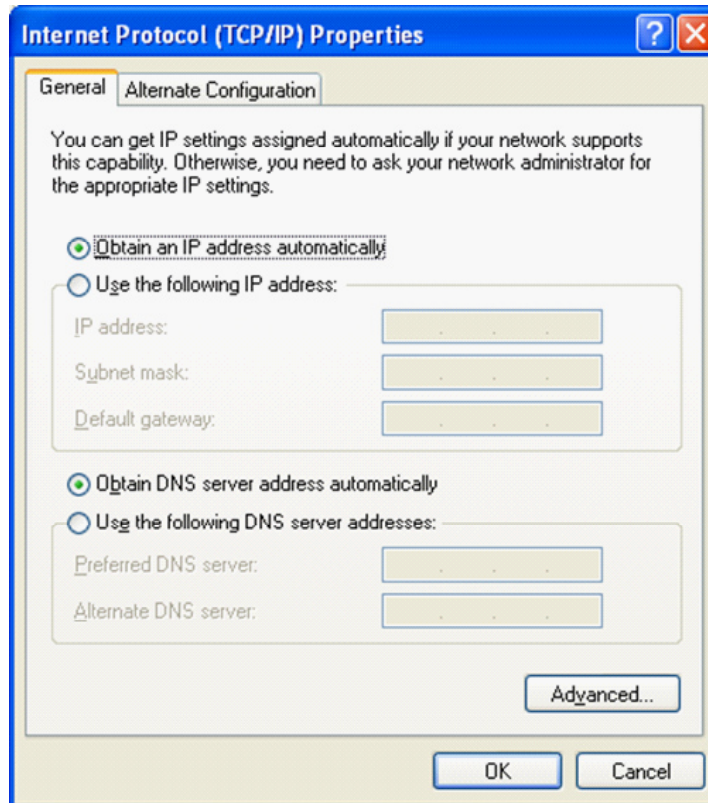


3. Scroll down the connection list to find the "Internet Protocol (TCP/IP)". Select the "Internet Protocol (TCP/IP)" and click on "Properties".

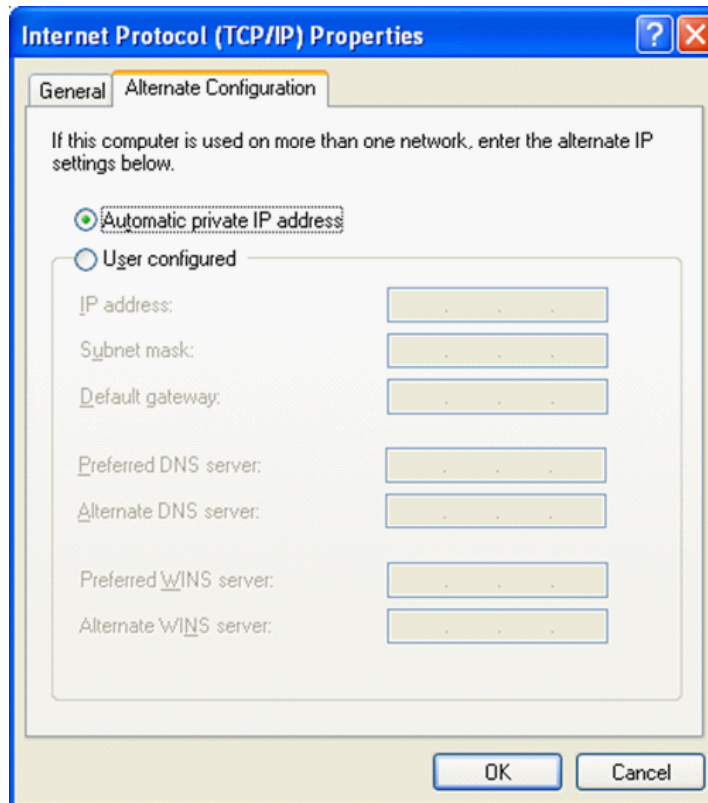


OPERATING INSTRUCTIONS

4. Click on the "Alternative Configuration" tab.

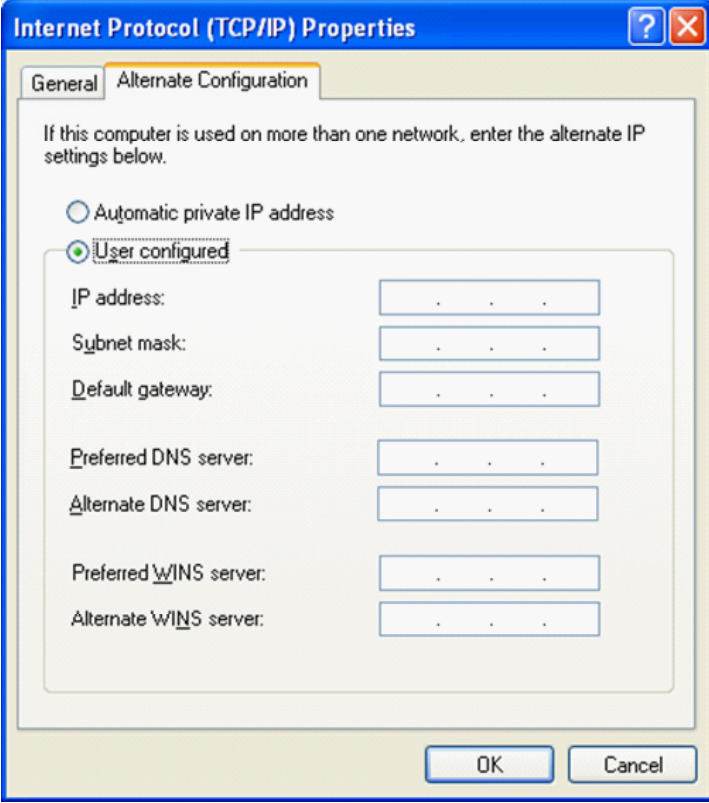


5. Click on "User Configured" Button.



OPERATING INSTRUCTIONS

6. Enter IP address for the computer (192.168.2.221), Enter the Subnet mask for the computer (255.255.255.0) and leave all other field boxes blank.



Internet Protocol (TCP/IP) Properties

General | **Alternate Configuration**

If this computer is used on more than one network, enter the alternate IP settings below.

Automatic private IP address

User configured

IP address: [. . .]

Subnet mask: [. . .]

Default gateway: [. . .]

Preferred DNS server: [. . .]

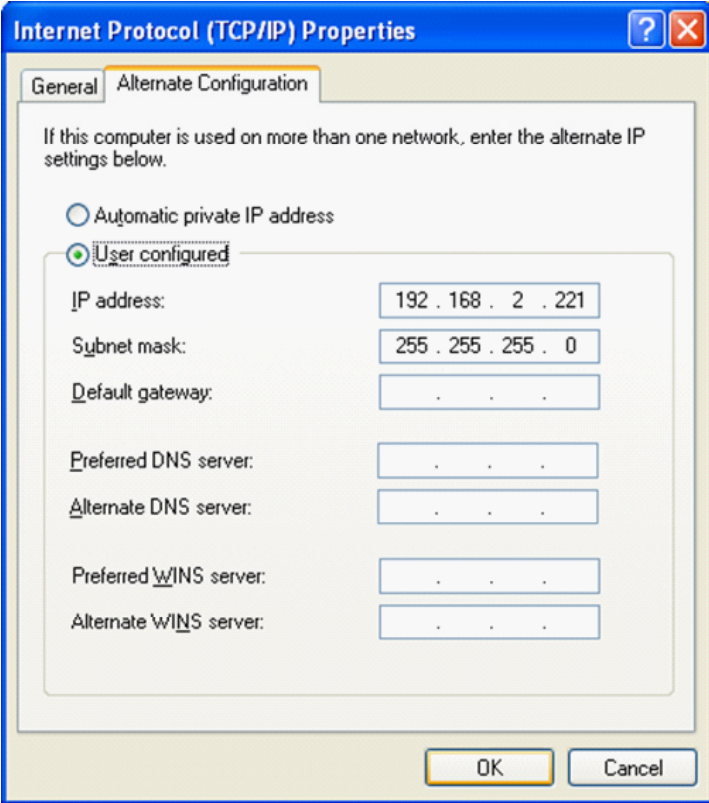
Alternate DNS server: [. . .]

Preferred WINS server: [. . .]

Alternate WINS server: [. . .]

OK Cancel

7. Click on "OK" button when it is complete.



Internet Protocol (TCP/IP) Properties

General | **Alternate Configuration**

If this computer is used on more than one network, enter the alternate IP settings below.

Automatic private IP address

User configured

IP address: [192 . 168 . 2 . 221]

Subnet mask: [255 . 255 . 255 . 0]

Default gateway: [. . .]

Preferred DNS server: [. . .]

Alternate DNS server: [. . .]

Preferred WINS server: [. . .]

Alternate WINS server: [. . .]

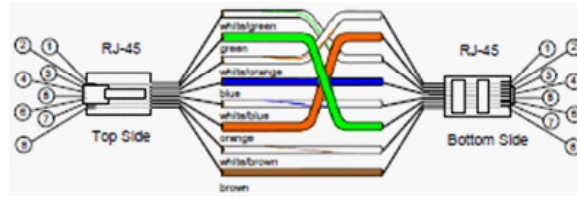
OK Cancel

OPERATING INSTRUCTIONS

8. Connect an Ethernet cable to your computer and to the controller. Within a minute, the computer will make a connection to the controller. Once connected, you will be able to log into and configure the controller.

ETHERNET WIRES

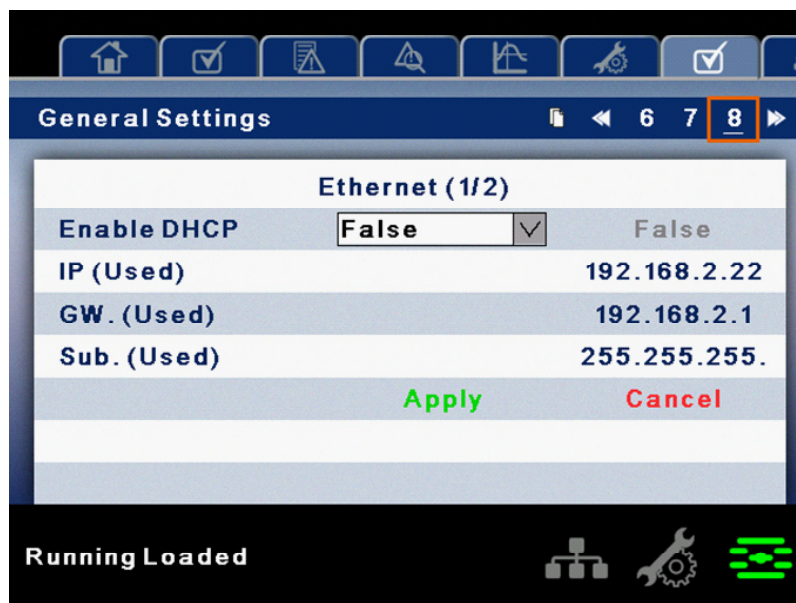
Wiring the network is accomplished by connecting the user computer to the controller using Category 5 (or better) cables. The connection point on the user computer is a RJ-45 port located on the Network Interface card.



The Ethernet cables are terminated with CAT 5 RJ-45 (RJ means "Registered Jack") modular plugs. RJ-45 plugs are similar to those seen on the end of a telephone cable except they have eight versus four or six contacts on the end of the plug and they are about twice as big.

• ETHERNET CONFIGURATION

The Ethernet configuration allows the user to select how the controller will be connected to the LAN.



The controller ships with a default IP address of 192.168.2.220. If "Enable DHCP" option is true in the "General Settings" [screen# 8] of the controller, then it will obtain an IP address via DHCP. Refer R55-160 kW Instruction manual for more information.

Once the user changes the "DHCP Enable" option to true, the "Assigned IP" address (e.g. 10.40.193.73) will appear below this selection in few seconds. The users connected with the local area network can use this new assigned IP to login to the web pages. Please note that depending on the LAN architecture, not all users will be able to view the web pages from their PC.

⚠ CAUTION

Changing the Ethernet configuration of the controller may cause the web pages to become unresponsive and require IT or other support to return the web pages to an operational condition. Be certain all Ethernet settings are correct before saving changes.

OPERATING INSTRUCTIONS

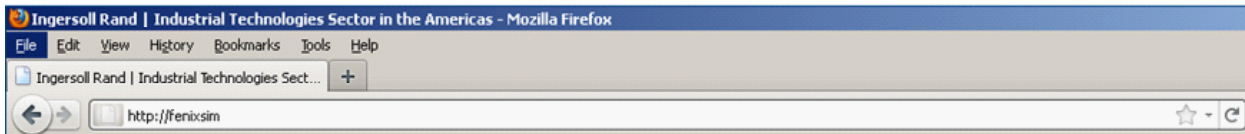
• LOGIN PROCESS

The server is accessed either by host name or by IP. Accessing by name requires that a router be in the network. During the installation and commissioning process a network address was assigned to the CONTROLLER by your IT department.

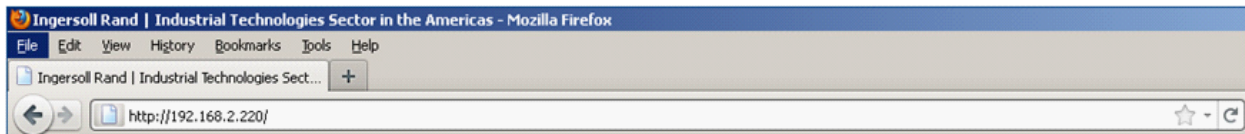
This address may be a static IP (e.g. <http://192.168.2.220>, recommended) or a DHCP assigned domain name address (e.g. <http://fenixsim.com>). A domain name address is a web page address chosen by the user to represent the controller. The domain name must be approved by your IT department but can generally be any text label you wish. You must have this address before you can log in to the web pages. See section – Ethernet Configuration.

Please note that Web Pages requires Internet Explorer 8 (or newer) or Mozilla Firefox 5 (or newer). Certain functions may not behave correctly when using older browser software.

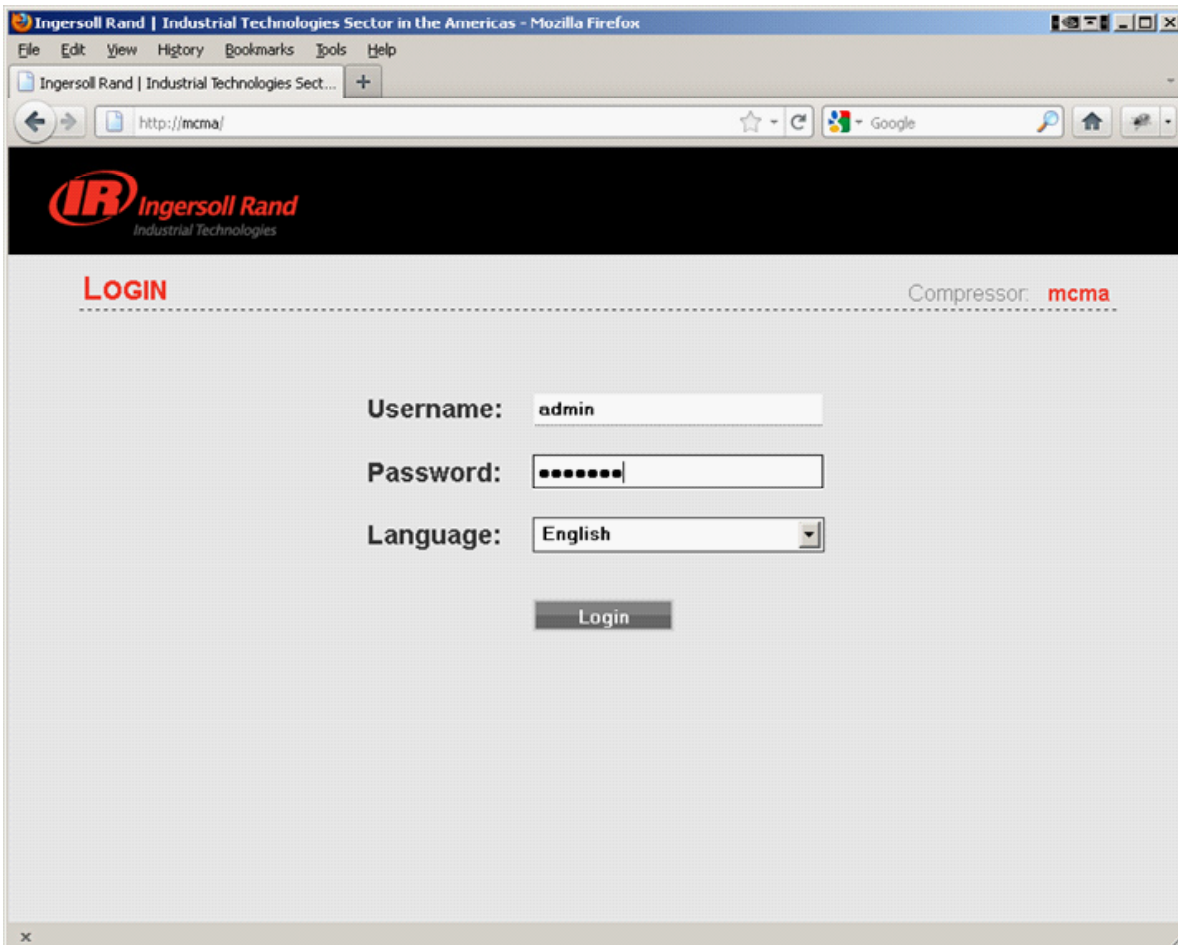
To log in to the web pages you must first type the address into your browser and then press the enter button. For example, with a DHCP enabled controller you might type this:



While with a static IP address you might type this:



If the controller is configured correctly you will then see the web pages in your browser. This may take a few seconds depending on your network connection speed.



OPERATING INSTRUCTIONS

The login screen requires the user to enter their username, password and select the language for the web pages. This login screen will authenticate the user against the type of account. After log in the user can view/modify the data as per the available access to the user account.

Enter the username and password for log into system and access the web pages.

Username:

Type in your user name (case sensitive).

Password:

Type in your password (case sensitive).

If the user name or password are incorrect the login page will show a message "Unknown combination of username and password".

Click on the dropdown control and select the "Language" from language dropdown control. The full list of languages for the Xe-145M controller is supported by the web interface. The user may select one language from this list. This selection will be the language for the web interface after the login is successful.

Language:

English
English
Nederlands

Login

Select your language from the dropdown list.

Click on "Login" button to continue. Upon successfully logging in you will see the system HOME screen.

The screenshot shows the Ingersoll Rand Industrial Technologies web interface. The browser address bar displays "10.40.194.116/home.htm". The page header includes the Ingersoll Rand logo and a navigation menu with icons for Home, Reports, Settings, and other functions. The main content area is titled "HOME" and displays a list of system parameters:

Online Pressure	93	PSI
Offline Pressure	103	PSI
Discharge pressure	91.1	PSI
Package Discharge Temperature	88	°F
Inlet Vacuum	0.6	PSI
1st Stage Discharge Temperature	98	°F
2nd Stage Inlet Pressure	8.6	PSI
2nd Stage Discharge Pressure	98.8	PSI
2nd Stage Inlet Temperature	161	°F
2nd Stage Discharge Temperature	45	°F
Oil Filter Inlet Pressure	39.4	PSI
Bearing Oil Pressure	34.8	PSI
Remote pressure	84.4	PSI
Bearing Oil Temperature	142	°F
Powered hours	1	hrs
Running Hours	0	hrs
Loaded Hours	0	hrs
Number of Starts	0	
Auto-Restart Time	600	s
Auto-Restart Delay Time	0	s
Communications Control	OFF	
Remote Start-Stop	OFF	

The status bar at the bottom of the page indicates "Ready to Start" and includes icons for a warning, a network diagram, a gear, and a wrench.



Only 5 users can concurrently login to the controller at a time. If another user attempts to login, an error message will be displayed. "The limit on the number of concurrent users has been reached. Please wait for a user to logoff before trying again."

Please see below section for default account information, and section "ACCOUNT MANAGEMENT" for more detailed information about the account management process.

OPERATING INSTRUCTIONS

• DEFAULT ACCOUNTS

The web page software comes with default administrator account. The system administrator can assign users one of three levels of access (view only, user and administrator) which will determine which functions will be available. For example, only users with administrator access will be able to create a new user account and view or modify the configuration overview parameters.

It is highly advised that the administrator change these accounts as soon as feasible to prevent unauthorized access to the Visualization software. The three level of access rights are as follows:

- 1. VIEW :** The user is able to view information on all the screens. The user is unable to change any set points or access to the configuration overview screens.
- 2. USER :** The user has all rights available to the VIEW access level as well as being able to change setpoints on the HOME screen and working duration of the maintenance counter. The user is able to manually start, stop, load and unload the compressors, as well as reset the alarm.
- 3. ADMIN :** The user has all rights of the VIEW and USER access levels as well as full access to the configuration overview screens and the account management utility.

Please note that there can be as many as five (5) maximum users logged into the system at one time, and only one administrator logged in at one time. Only a user with ADMIN rights will be able to modify these default accounts.

The default account is:

Login : admin
 Password: password
 Rights : ADMIN








• NAVIGATION

Each of the main segments is represented by a tab on the top of web pages. Clicking on the tab will bring you to the screen for that particular segment.

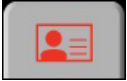
• TAB NAVIGATION



The components of the tab navigation are as follows:

	Home	Clicking this tab will bring the user to the HOME page. See section HOME PAGE.
	Event Log	Clicking this tab will bring the user to the EVENT LOG. See section EVENT LOG UTILITY.
	Performance Log (Xe-145M Only)	Clicking this tab will bring the user to the PERFORMANCE LOG. See section PERFORMANCE LOG UTILITY.
	Graphing (Xe-145M Only)	Clicking this tab will bring the user to the GRAPHING page. See section GRAPHING UTILITY.
	Maintenance	Clicking this tab will bring the user to the MAINTENANCE page. See section MAINTENANCE UTILITY.
	Inspection Log (Xe-145M Only)	Clicking this tab will bring the user to the INSPECTION LOG. See section INSPECTION LOG UTILITY.
	Compressor Information	Clicking this tab will bring the user to the COMPRESSOR INFORMATION page. See section COMPRESSOR INFORMATION.

OPERATING INSTRUCTIONS

	Account	Clicking this tab will bring the user to the ACCOUNT page. See section ACCOUNT MANAGEMENT.
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• COMMAND BUTTONS

All pages show five command buttons (Start, Stop, Reset Alarm, Load and Unload), five dash board icons and current status of the compressor.



If the current user's account type does not have the necessary access rights to control the compressor via the web interface, remote control from the web interface will be disabled at the controller.

"Command Keys" on the web pages command the compressor to perform actions as specified in the following table:

Key	Name	Function
	Start	Start the Compressor.
	Stop	Stops the compressor. This button should be pressed instead of the E-Stop for normal stopping operation.
	Reset Alarm	Clears Warnings and Trips once the condition is corrected.
	Load	Loads the compressor.
	Unload	Unloads the compressor.








Remote starting and stopping can be accomplished through the Ethernet Port. Panel power must be on, all utilities must be running and permissive functions satisfied in order for the start-up from the web page.

• DASHBOARD ICONS





"Dashboard Icons" are intended to be a quick at-a-glance view of system status. These icons are always visible regardless of the folder/page selected.

The following table lists standard dashboard icons and their definition. Note that the color of these icons changes based on the state set by the application while running.

Icons	Name	Description
	Alert	Illuminates when a Warning (flashes) or Trip (constant on) is sensed.
	Remote Control	Remote control is enabled.
	Service Required	A Service reminder is nearing or has expired (i.e. an air or oil filter needs to be changed).
	Unloaded	Compressor is in the unloaded state.
	Loaded	Compressor is in the loaded state.

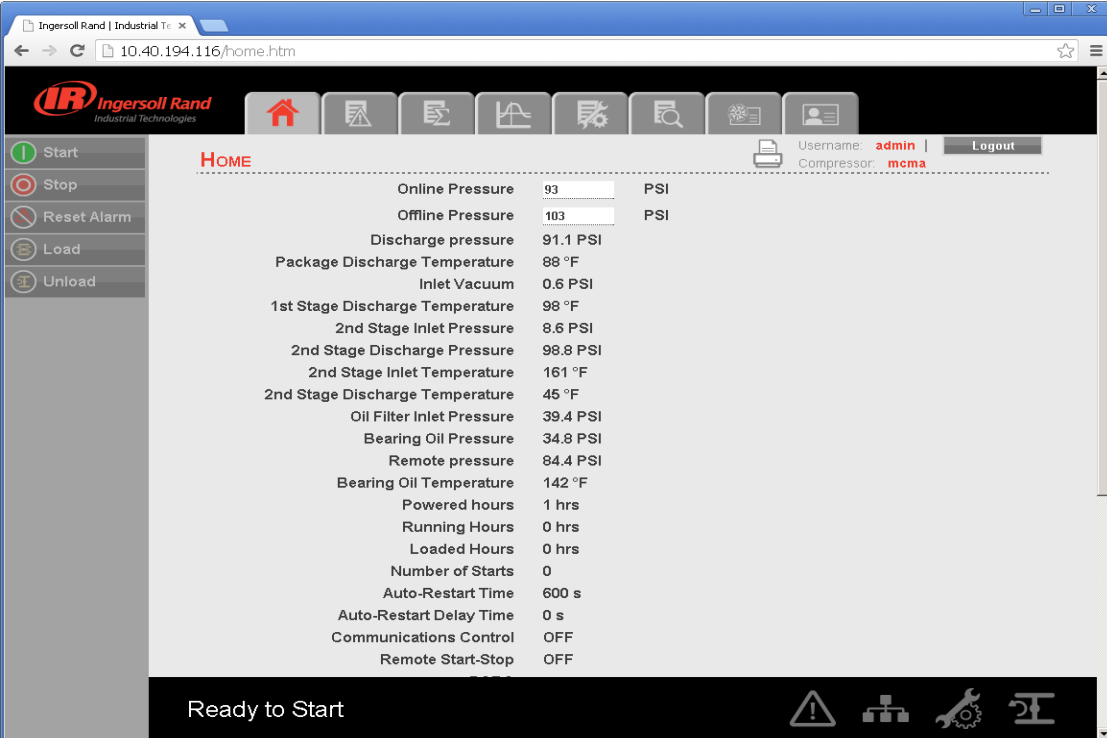
OPERATING INSTRUCTIONS

Compressor Name, User Name, Print Button and Log Out button are always visible on the right side top of the page, regardless of the tab selected.

Compressor Name		The user can set the "Compressor Name" from the "Compressor Information" tab. The user can use this host name as a browser address for the web pages. A "Compressor Name" is a domain address to log in the CONTROLLER web pages.
Logged in User		Currently logged in user is shown on the right side top in each web page.
Print Button		Click on "Print" button, to print the content on existing web page.
Log Out Button		Click on "Logout" button to terminate the current session. Clicking this button will log out the current user and return to the web page login screen.

• HOME PAGE

The "HOME" tab shows information about the compressor operating parameters, total power consumption, running hours, loaded hours, number of starts, etc.



The screenshot shows the Ingersoll Rand Industrial Technologies web interface. The browser address bar displays "10.40.194.116/home.htm". The page header includes the Ingersoll Rand logo and navigation icons. The main content area is titled "HOME" and displays the following parameters:

Online Pressure	93	PSI
Offline Pressure	103	PSI
Discharge pressure	91.1	PSI
Package Discharge Temperature	88	°F
Inlet Vacuum	0.6	PSI
1st Stage Discharge Temperature	98	°F
2nd Stage Inlet Pressure	8.6	PSI
2nd Stage Discharge Pressure	98.8	PSI
2nd Stage Inlet Temperature	161	°F
2nd Stage Discharge Temperature	45	°F
Oil Filter Inlet Pressure	39.4	PSI
Bearing Oil Pressure	34.8	PSI
Remote pressure	84.4	PSI
Bearing Oil Temperature	142	°F
Powered hours	1	hrs
Running Hours	0	hrs
Loaded Hours	0	hrs
Number of Starts	0	
Auto-Restart Time	600	s
Auto-Restart Delay Time	0	s
Communications Control	OFF	
Remote Start-Stop	OFF	

The status at the bottom of the page is "Ready to Start".

OPERATING INSTRUCTIONS

Click on the pressure set point value in the white box, to change the "Pressure Set Point" value. Enter the new pressure set point value and click on "Confirm" button. "Pressure Set Point" is only editable parameter for the "Admin" and "User" type accounts. The user with "View" type account can't change these system parameters.

The screenshot shows the Ingersoll Rand Industrial Technologies web interface. The browser address bar displays "10.40.194.116/home.htm". The interface includes a navigation menu on the left with options: Start, Stop, Reset Alarm, Load, and Unload. The main content area is titled "HOME" and displays "Online Pressure 93 PSI". A dialog box is open, allowing the user to edit the "Online Pressure" value. The current value is 93, and the user has entered 39. The dialog box also shows "Min: 50 | Max: 93" and "Confirm" and "Cancel" buttons. Below the dialog box, a list of system parameters is displayed:

2nd Stage Inlet Pressure	8.6 PSI
2nd Stage Discharge Pressure	98.6 PSI
2nd Stage Inlet Temperature	161 °F
2nd Stage Discharge Temperature	45 °F
Oil Filter Inlet Pressure	39.4 PSI
Bearing Oil Pressure	34.6 PSI
Remote pressure	84.2 PSI
Bearing Oil Temperature	141 °F
Powered hours	1 hrs
Running Hours	0 hrs
Loaded Hours	0 hrs
Number of Starts	0
Auto-Restart Time	600 s
Auto-Restart Delay Time	0 s
Communications Control	OFF
Remote Start-Stop	OFF

At the bottom of the interface, the status "Ready to Start" is displayed along with several icons.

OPERATING INSTRUCTIONS

• EVENT LOG UTILITY

The “EVENT LOG” tab shows the event log from the controller. This tab contains the event log details for the system events, warnings and trips that have occurred and provides first-out indication. It also provides controls for filtering the list of events as shown. Any time an event occurs, the system will send the display to the first event log page

Each event is added into “EVENT LOG” with a date (mm/dd), time (hh:mm:ss) and the event value. This is the value that triggered the event. The event labeled as “1” is the newest event.

The screenshot shows the Ingersoll Rand Industrial Technologies web interface. The main content area is titled "EVENT LOG" and contains a table of events. The table has the following data:

#	Date	Time	Description
1	10/22	11:19:20	Emergency Stop
2	10/22	11:18:21	Power Up
3	10/22	11:18:12	Power Down
4	10/22	11:16:06	Emergency Stop
5	10/22	10:59:17	Sensor 4ATT Failure
6	10/22	10:58:28	High 2nd Stage Temperature
7	10/22	10:58:09	Sensor 2ATT Failure
8	10/22	10:56:06	High 2nd Stage Temperature
9	10/22	10:56:05	High 1st Stage Temperature
10	10/22	10:54:36	Fan Motor Overload
11	10/22	10:54:36	Main Motor Overload
12	10/22	10:54:34	Sensor 5OTT Failure
13	10/22	10:54:34	Sensor 3ATT Failure
14	10/22	10:54:33	High 2nd Stage Temperature
15	10/22	10:54:33	High 1st Stage Temperature
16	10/22	10:54:33	Emergency Stop

The interface also includes a navigation menu on the left with options: Start, Stop, Reset Alarm, Load, and Unload. The top right shows the user is logged in as "admin" with the compressor name "mcma". The bottom status bar indicates "Ready to Start".

Click on the dropdown control and select the number of events per page. If the events per page are 20, then previous events will be available in the next page. Click on the “Next” button will display the previous twenty events.

OPERATING INSTRUCTIONS

The "Event Type" dropdown allows the user to filter the list of events by event type. The user can select the type of event from the list by clicking the dropdown control. The events recorded and placed into one of three categories: Warnings, Trips/Shutdowns, and System Events. "EVENT LOG" page highlights all the trips in red text, warnings in yellow text and system events in the blue text.

The screenshot shows the "EVENT LOG" page in a web browser. The interface includes a navigation menu on the left with buttons for Start, Stop, Reset Alarm, Load, and Unload. The main content area displays a table of events with columns for #, Date, Time, and Description. The "Type" dropdown is set to "Warnings & Trips".

#	Date	Time	Description
1	10/22	11:19:20	Emergency Stop
2	10/22	11:18:21	Emergency Stop
3	10/22	11:18:12	Power Down
4	10/22	11:16:06	Emergency Stop
5	10/22	10:59:17	Sensor 4ATT Failure
6	10/22	10:58:28	High 2nd Stage Temperature
7	10/22	10:58:09	Sensor 2ATT Failure
8	10/22	10:56:05	High 2nd Stage Temperature
9	10/22	10:56:05	High 1st Stage Temperature
10	10/22	10:54:36	Fan Motor Overload
11	10/22	10:54:36	Main Motor Overload
12	10/22	10:54:34	Sensor 5OTT Failure
13	10/22	10:54:34	Sensor 3ATT Failure
14	10/22	10:54:33	High 2nd Stage Temperature
15	10/22	10:54:33	High 1st Stage Temperature
16	10/22	10:54:33	Emergency Stop

The "History" dropdown allows the user to select the option to see the event log history for a selected time period. Click on the dropdown command and select option "Last 7 Days" to see the event log of last 7 days.

The screenshot shows the "EVENT LOG" page with the "History" dropdown menu open. The "Last 7 Days" option is selected. The event log table is the same as in the previous screenshot.

#	Date	Time	Description
1	10/22	11:19:20	Emergency Stop
4	10/22	11:16:06	Emergency Stop
5	10/22	10:59:17	Sensor 4ATT Failure
7	10/22	10:58:09	Sensor 2ATT Failure
10	10/22	10:54:36	Fan Motor Overload
11	10/22	10:54:36	Main Motor Overload
12	10/22	10:54:34	Sensor 5OTT Failure
13	10/22	10:54:34	Sensor 3ATT Failure
16	10/22	10:54:33	Emergency Stop

The EVENT LOG will record the last 500 events. Once this 500 event limit has been reached the oldest events will be cleared and the newest events will appear at the top of the event log.

OPERATING INSTRUCTIONS

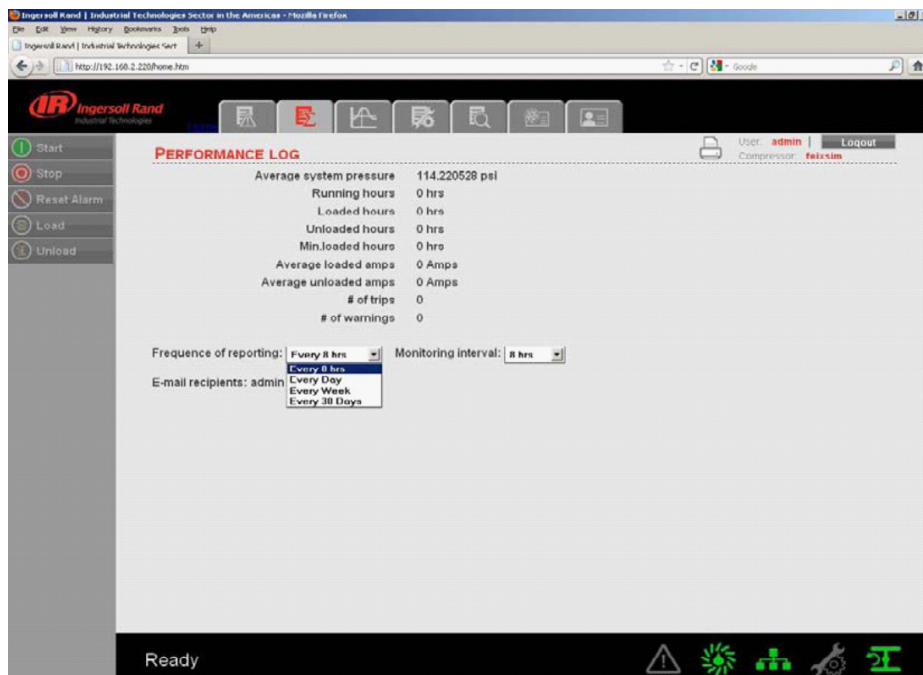
• PERFORMANCE LOG UTILITY

The “PERFORMANCE LOG” tab shows the performance details and system data for the compressor including Average system pressure, hour meters, number of trips and warnings. The Performance log report provides a summary of the compressed air system’s performance for the selected time period.



The “PERFORMANCE LOG” page is divided into two major sections. The top section displays the parameter values. The bottom section contains the controls for the Performance log.

The “Running Hours” are the amount of time that the compressor has been operating between all start and stop sequence. The “Loaded Hours” is the amount of time that the compressor has been running and not running unloaded. The “Unloaded Hours” is the amount of time that the compressor has been running unloaded.

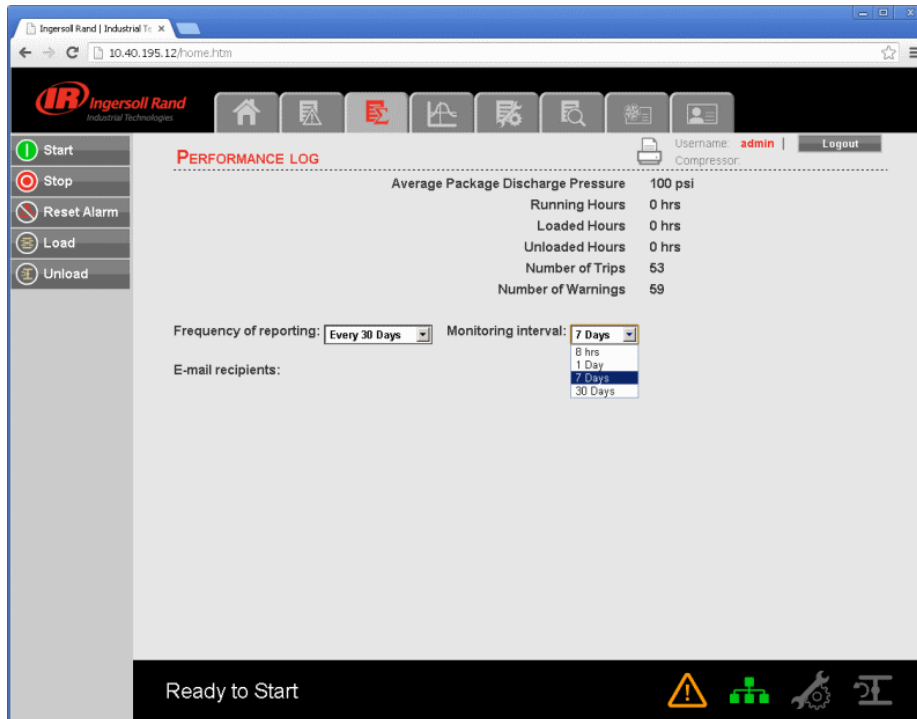


OPERATING INSTRUCTIONS

The "PERFORMANCE LOG" provides two dropdown controls that allow the user to select sampling of reporting and reporting settings. The user can change the frequency of reporting and monitoring interval by clicking on the dropdown controls.

The time period of the performance report is selected based on the "Frequency of Reporting". Click on the dropdown control and select the "Frequency of Reporting" at which performance log will be emailed to the users that request it via the email notification section of the "ACCOUNT" page. The default frequency of reporting is "Every 8 hours". In this case after every 8 hours, the web page application will send the performance log to the user at a specified email account.

The sampling rate of the data capture can be set by the user selection of the "Monitoring Interval". The "Monitoring Interval" dropdown control determines the time interval after which parameters will be updated in to the "PERFORMANCE LOG". All parameters are stored in a rolling FIFO manner.



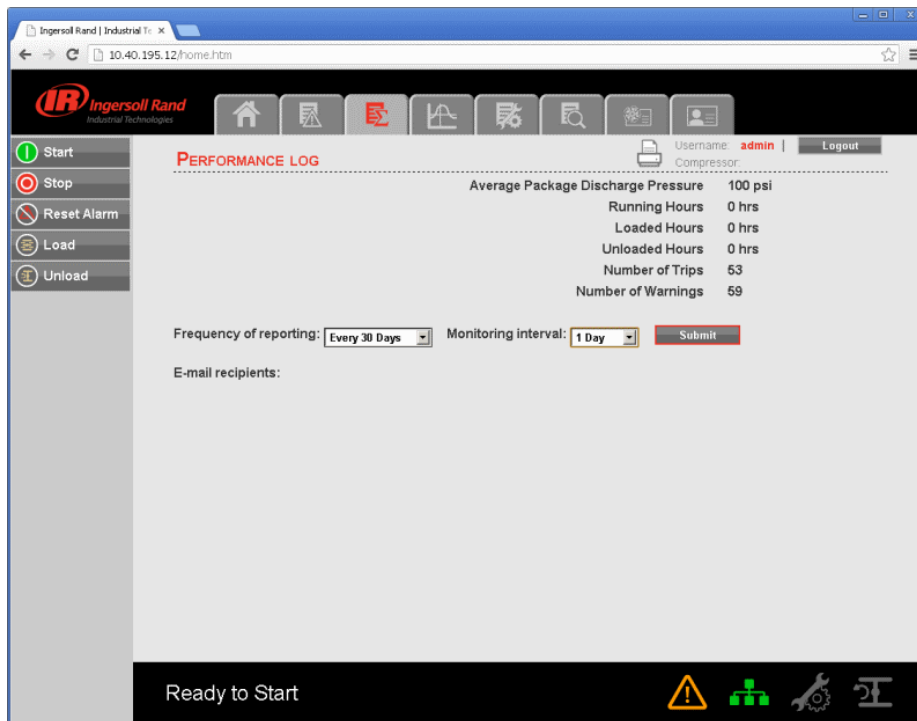
User names will be displayed as "E-mail recipients" in the "PERFORMANCE LOG", if the check box for the same is checked in the Email notification section of the "ACCOUNT" page.



Refer E-mail notification section of the "ACCOUNT MANAGEMENT" page to change the E-mail address.

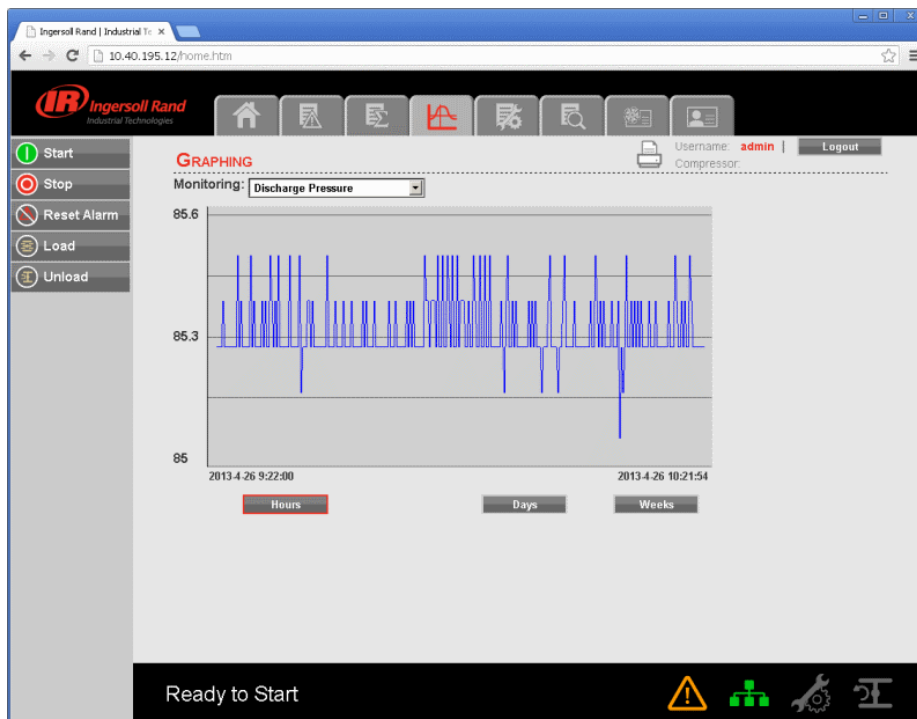
OPERATING INSTRUCTIONS

Whenever the user changes the "Frequency of reporting" and/or "Monitoring Interval", a "Submit" button will appear on the screen. Click on "Submit" button to save the changes.



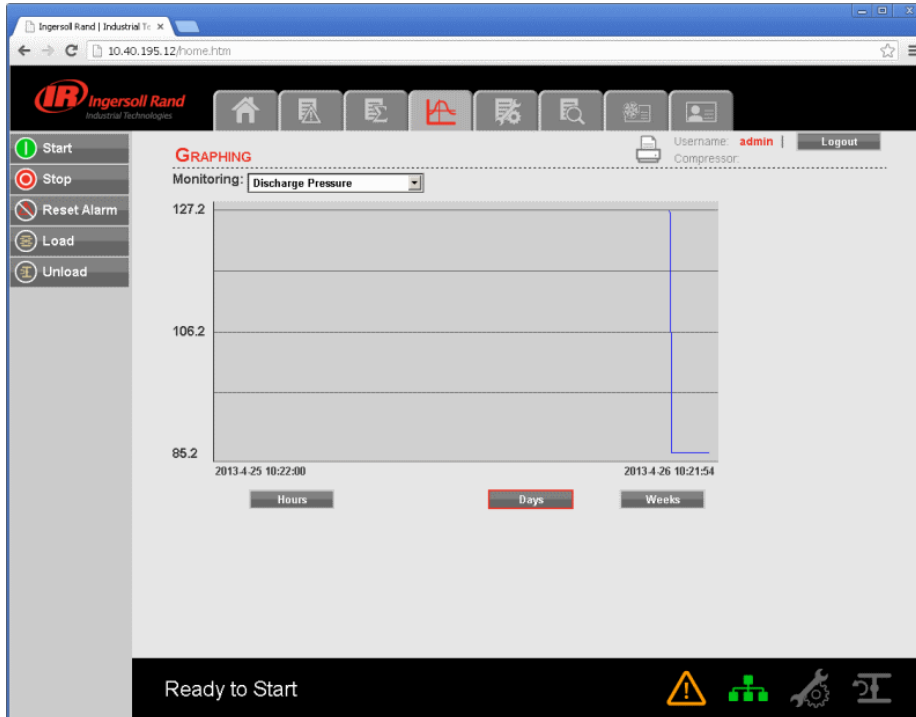
• GRAPHING UTILITY

Click on "GRAPHING" tab to view the data in a graphical format for the selected analog input variable and time duration. The GRAPHING UTILITY allows the user to plot a graph on hour, day or week basis. The default option is Hours. Activation of a button will deselect any other button previously selected. When "Hours" has been selected, the X axis will be scaled such that the span on graph represents duration of 1 hour.

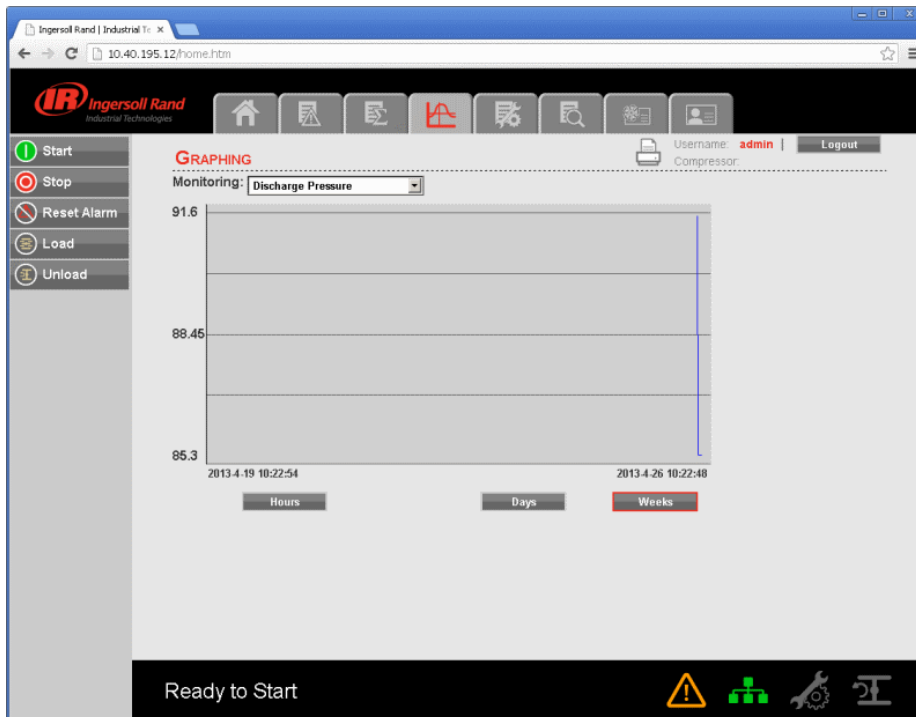


OPERATING INSTRUCTIONS

When "Days" has been selected, the X axis will be scaled such that the span on graph represents duration of 1 day.

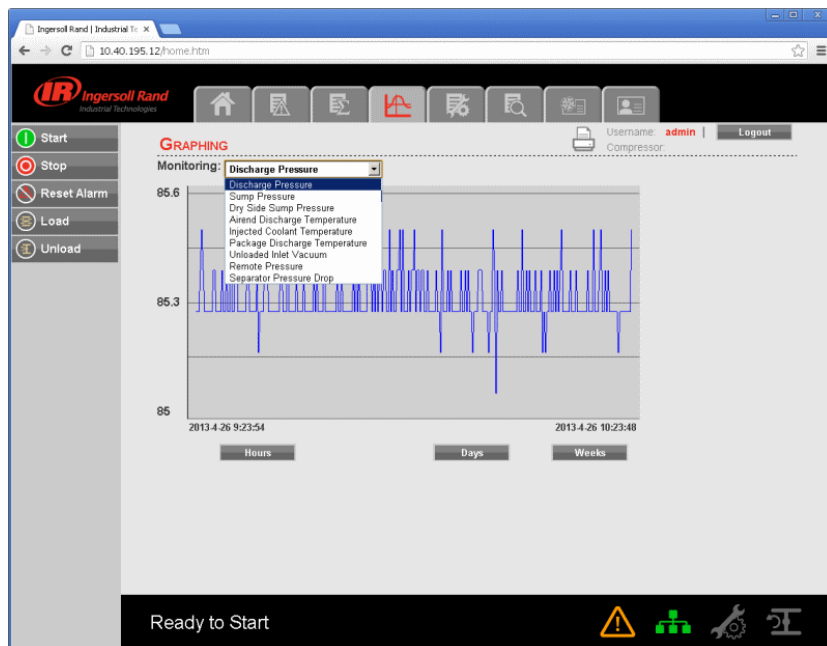


When "Weeks" has been selected, the X axis will be scaled such that the span on graph represents duration of 1 week.



OPERATING INSTRUCTIONS

The drop down menu allows the user to choose a variable to view data on the graph. Click on the dropdown menu and select the variable to monitor on the graph. Variables include all analog inputs as well as some calculated variables. The amount of variables will vary depending on the compressor type and the available options.



By moving the mouse over graph will display the determined value at the position of cursor with the date and time. Due to performance requirements the data on the real time chart cannot be interacted with directly so this allows the user to determine the approximate value of any data point.

• MAINTENANCE UTILITY

“MAINTENANCE” tab contains the service schedule hours same as shown on the “MAINTENANCE” folder of controller.

This tab provides a service scheduler so that periodic maintenance reminders may be scheduled for consumable parts.

The user can also change the contact address and contact number to call for parts or service. This is the number of the local **Ingersoll Rand** representative. Click on “Confirm” button to save the changes.



“Admin” and “User” type accounts can only have an access to change the working duration of the maintenance counter and Contact details. The “View” type account can’t have an access to change these parameters.

OPERATING INSTRUCTIONS

• INSPECTION LOG UTILITY

The "INSPECTION LOG" tab is intended to record machine data over a fixed period of time and a fixed rate. Inspection log contains the controller logged data for the variables at the time of download. The controls section of the "INSPECTION LOG" shows the user name currently set to receive inspection logs via email, as per the specified time interval and time of the day for instantaneous data.

The screenshot shows the Ingersoll Rand Industrial Technologies web application. The "INSPECTION LOG" section is active. The "Interval" dropdown is set to "Daily" and the "Time of day" is set to "12:00". The "E-mail recipients" field is empty. The "Inspection log" table displays data for various variables over time.

Variable Name	10/22 - 11:19:24	10/22 - 12:00:02	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00
Discharge pressure	0	91	0	0	0	0
2nd Stage Inlet Pressure	0	9	0	0	0	0
2nd Stage Discharge Pressure	0	99	0	0	0	0
Inlet Vacuum	0.0	0.6	0.0	0.0	0.0	0.0
Oil Filter Inlet Pressure	0	40	0	0	0	0
Bearing Oil Pressure	0	35	0	0	0	0
Remote pressure	0	84	0	0	0	0
1st Stage Discharge Temperature	0	98	0	0	0	0
2nd Stage Inlet Temperature	0	161	0	0	0	0
2nd Stage Discharge Temperature	0	45	0	0	0	0
Bearing Oil Temperature	0	141	0	0	0	0

Click on the dropdown control and select the "Interval". The default time interval is "Daily". If the time interval is "Weekly", then the web page application will send the inspection log to the user at a specified email address on weekly basis.

The screenshot shows the Ingersoll Rand Industrial Technologies web application. The "INSPECTION LOG" section is active. The "Interval" dropdown is now set to "Weekly" and the "Time of day" is still "12:00". The "E-mail recipients" field is now populated with "Weekly". The "Inspection log" table displays data for various variables over time.

Variable Name	10/22 - 11:19:24	10/22 - 12:00:02	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00
Discharge pressure	0	91	0	0	0	0
2nd Stage Inlet Pressure	0	9	0	0	0	0
2nd Stage Discharge Pressure	0	99	0	0	0	0
Inlet Vacuum	0.0	0.6	0.0	0.0	0.0	0.0
Oil Filter Inlet Pressure	0	40	0	0	0	0
Bearing Oil Pressure	0	35	0	0	0	0
Remote pressure	0	84	0	0	0	0
1st Stage Discharge Temperature	0	98	0	0	0	0
2nd Stage Inlet Temperature	0	161	0	0	0	0
2nd Stage Discharge Temperature	0	45	0	0	0	0
Bearing Oil Temperature	0	141	0	0	0	0

OPERATING INSTRUCTIONS

Click on the dropdown control and select the "Time of day". It is shown in a 24 hours clock format.

The screenshot shows the 'INSPECTION LOG' configuration page. The 'Time of day' dropdown is open, showing a 24-hour clock format. The 'Submit' button is highlighted. The page displays the Ingersoll Rand logo and contact information. The 'Variable Name' table is partially visible, showing columns for 10/22, 12/31, and 23:00:00.

Variable Name	10/22 - 12:00:02	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00
Discharge pressure	91	0	0	0	0
2nd Stage Inlet Pressure	9	0	0	0	0
2nd Stage Discharge Pressure	99	0	0	0	0
Inlet Vacuum	0.0	0.6	0.0	0.0	0.0
Oil Filter Inlet Pressure	0	40	0	0	0
Bearing Oil Pressure	0	35	0	0	0
Remote pressure	0	84	0	0	0
1st Stage Discharge Temperature	0	98	0	0	0
2nd Stage Inlet Temperature	0	161	0	0	0
2nd Stage Discharge Temperature	0	45	0	0	0
Bearing Oil Temperature	0	141	0	0	0

Click on the "Submit" button to save the changes into the report settings. The user will receive the INSPECTION LOG as per the selected time interval and time of the day. If the interval is "Daily" and time of day is "09:00" then the web page application will send inspection logs via email, everyday at 9:00 AM.

The screenshot shows the 'INSPECTION LOG' configuration page. The 'Submit' button is highlighted. The 'E-mail recipients' field is visible. The page displays the Ingersoll Rand logo and contact information. The 'Variable Name' table is partially visible, showing columns for 10/22, 12/31, and 23:00:00.

Variable Name	10/22 - 11:19:24	10/22 - 12:00:02	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00	12/31 - 23:00:00
Discharge pressure	91	0	0	0	0	0
2nd Stage Inlet Pressure	0	9	0	0	0	0
2nd Stage Discharge Pressure	0	99	0	0	0	0
Inlet Vacuum	0.0	0.6	0.0	0.0	0.0	0.0
Oil Filter Inlet Pressure	0	40	0	0	0	0
Bearing Oil Pressure	0	35	0	0	0	0
Remote pressure	0	84	0	0	0	0
1st Stage Discharge Temperature	0	98	0	0	0	0
2nd Stage Inlet Temperature	0	161	0	0	0	0
2nd Stage Discharge Temperature	0	45	0	0	0	0
Bearing Oil Temperature	0	141	0	0	0	0

The user name will be displayed as "E-mail recipients" in the "INSPECTION LOG", if the check box for the same is checked in the Email notification section of the "ACCOUNT" page.



Refer E-mail notification section of the "ACCOUNT" page to change the E-mail address.

OPERATING INSTRUCTIONS

• COMPRESSOR INFORMATION

The "COMPRESSOR INFORMATION" tab contains the compressor name, compressor model number, compressor serial number, rated capacity, rated pressure, rated voltage, running current, starting current, power requirement, motor service factor, measuring units and Email (SMTP) settings.

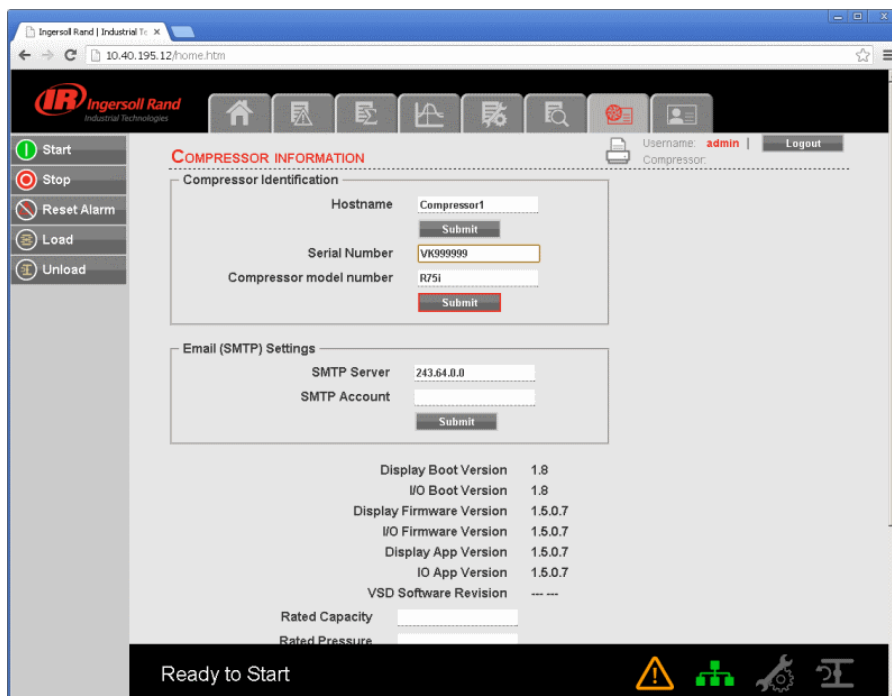
• COMPRESSOR IDENTIFICATION

The "Host Name" is shown as a "Compressor Name" on the right side top of each web page. The user can use this domain name as a web page browser address to access the web pages. To change the existing host name, enter the new hostname in the white box and click on "Submit" button.



Once the user will submit the new host name, the compressor name will be changed automatically on the next login.

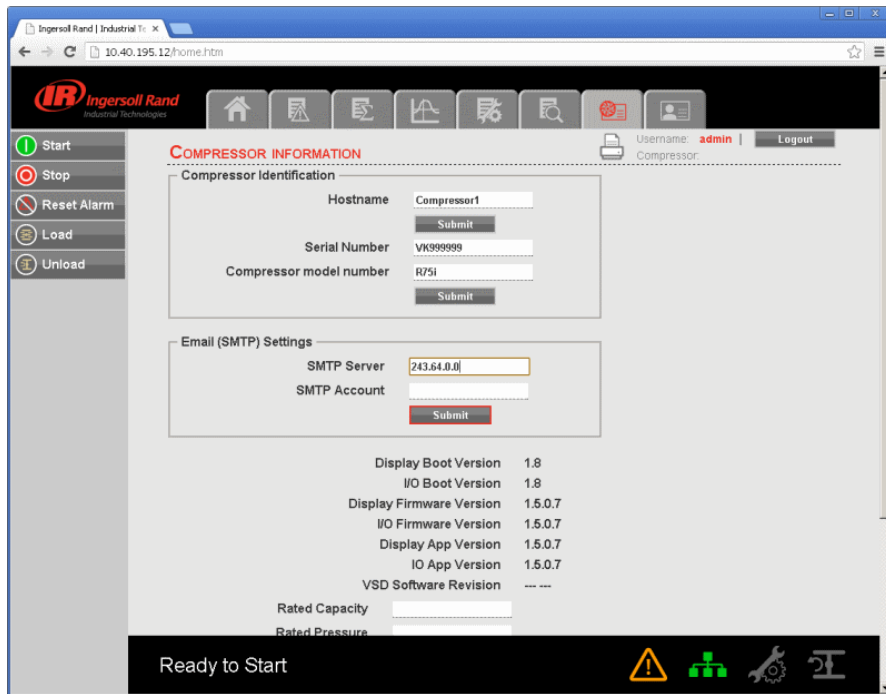
Enter the "Serial Number" and "Model Number" as per the compressor nameplate, and click on "Submit" button to save these compressor details.



OPERATING INSTRUCTIONS

• EMAIL (SMTP) SETTINGS

If email notifications are to be used, the SMTP server settings must be obtained from IT and entered in this location. Enter the "SMTP Server" and "SMTP Account" and then click on "Submit" button to save the SMTP settings.

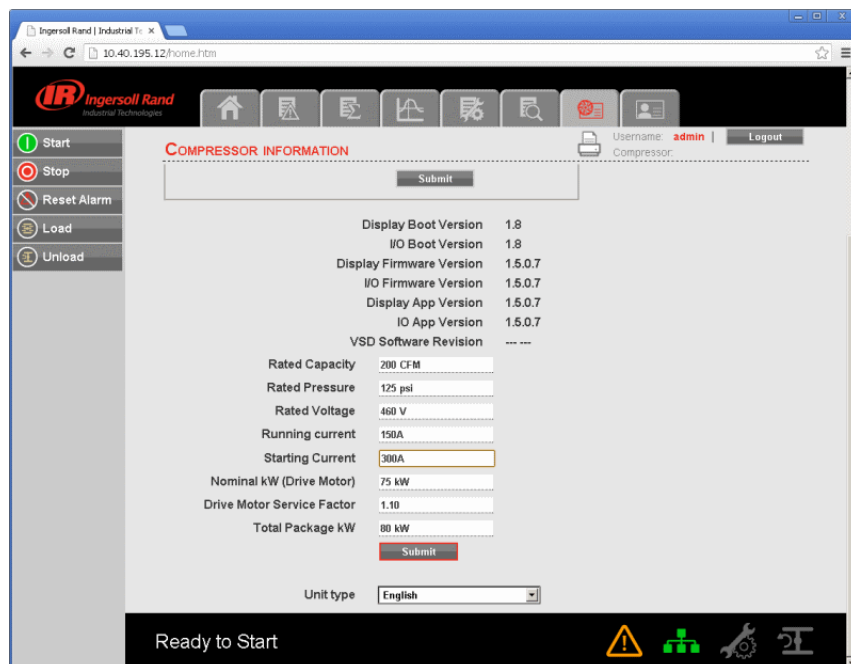


User account with access level "Admin" can only have an access to change the parameters in "Compressor Identification" and "Email (SMTP) Settings" blocks. User account with access level "User" and "VIEW" cannot have an access to change these parameters.

• COMPRESSOR DETAILS

Enter the rated capacity, rated pressure, rated voltage, running current, starting current, nominal power in kW and main motor service factor as per the data available in the compressor datasheet.

Click on the "Submit" button to save the compressor details.



OPERATING INSTRUCTIONS

• UNIT TYPE

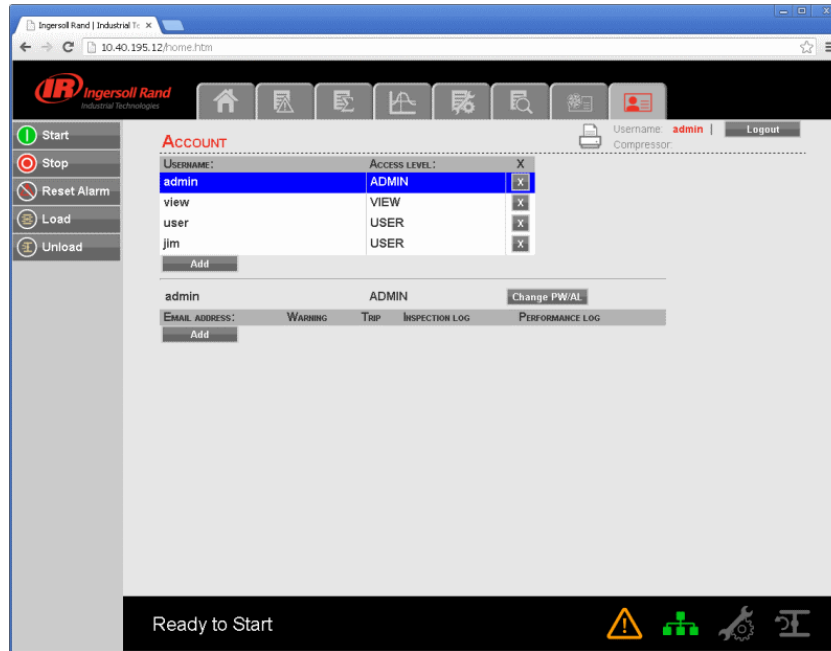
Click on the dropdown control and select the measurement unit type for the compressor parameters. Default unit type is "English".



User account with access level "Admin" and "User" can only have an access to change these compressor parameters. User account with access level "VIEW" can only monitor the data and the user can not have an access to change these parameters.

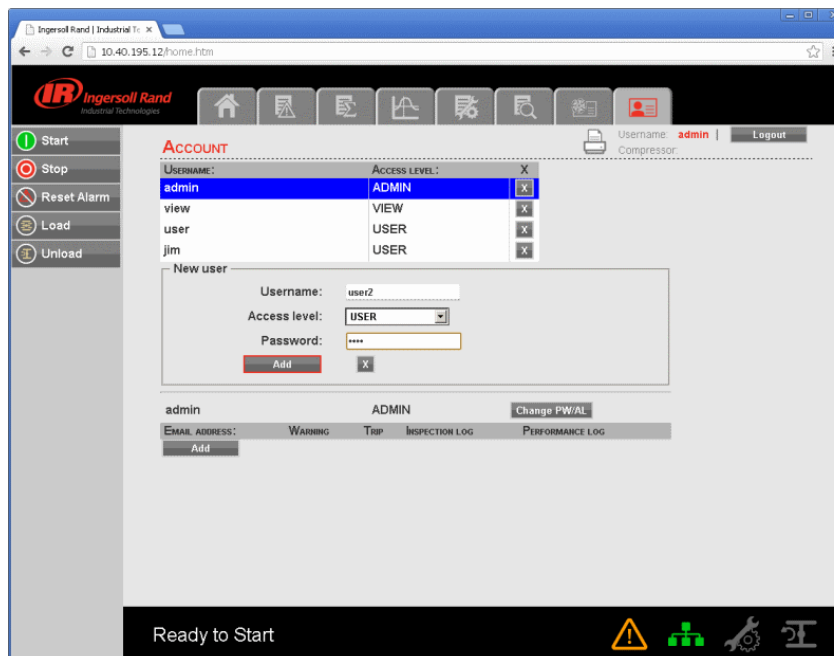
• ACCOUNT MANAGEMENT

The administrator can create any number of users desired and assign each user one of three levels of access, as well as assigning email notifications to various events that may occur.



• ADD ACCOUNT

The "ACCOUNT" tab shows the list of accounts that currently exist which are listed by user name and access rights. Clicking on an account will highlight that account in blue color. Click on "ADD" button to add an account with a specified access level for the web page application. Enter the ADMIN password to proceed.



OPERATING INSTRUCTIONS

To generate a new user account; enter the unique username, password and select the user access rights. Click on "Add Account" button will add the new user account into the list of user accounts. Only a user with "ADMIN" rights will be able to make a new account or remove the existing accounts.

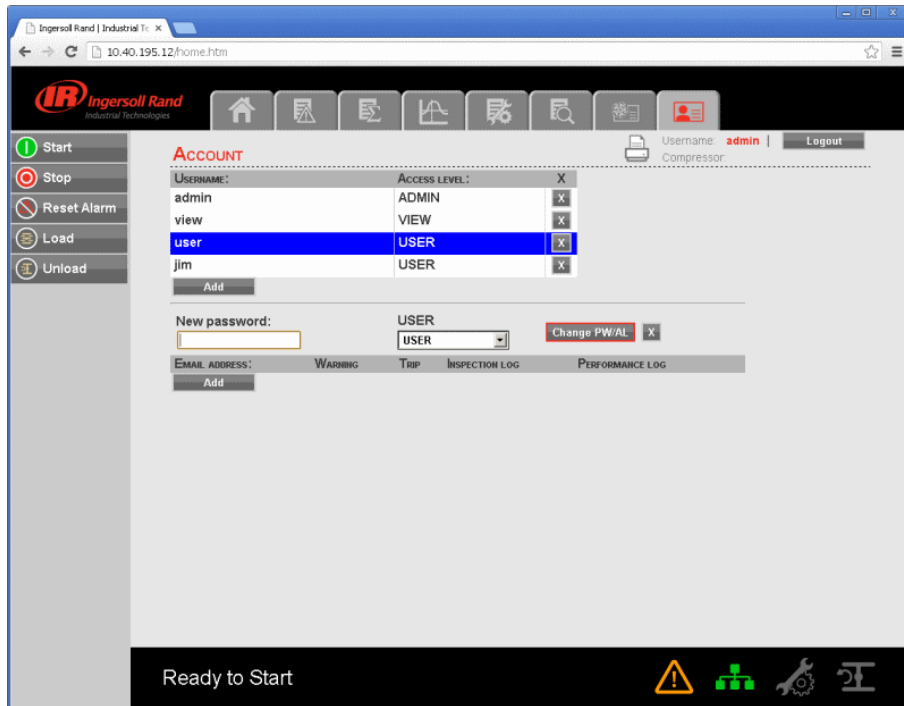
Select the user account from the list and click on "X" button to delete the selected user account.



OPERATING INSTRUCTIONS

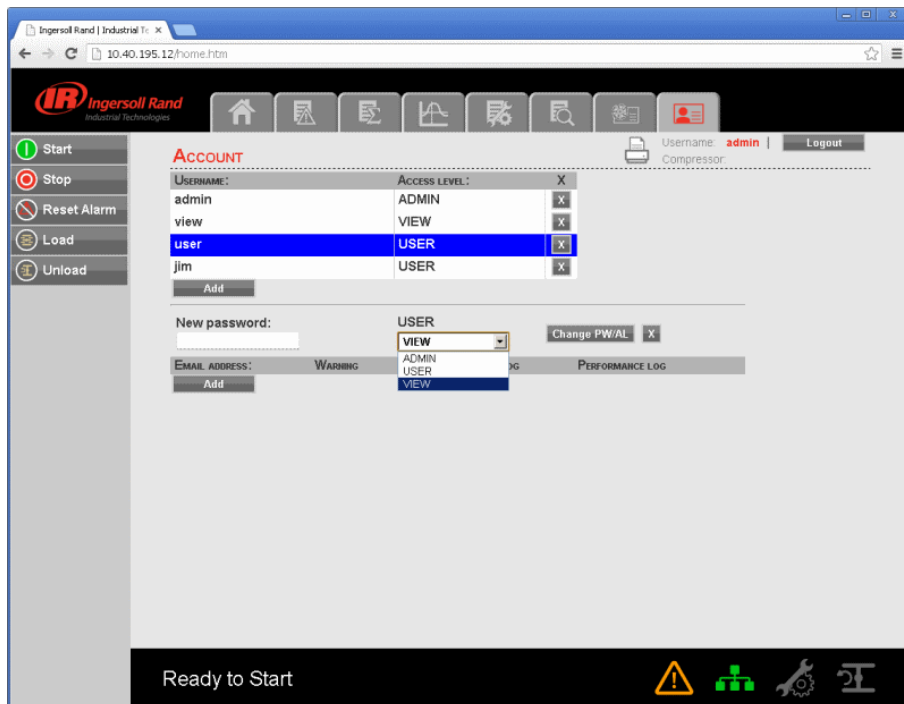
• MODIFY THE ACCESS LEVEL

User account with access level "ADMIN" can also change the access level of existing user accounts. To change the access level or password of an existing user account, select the user account from the list and click the Change PW/AL button.

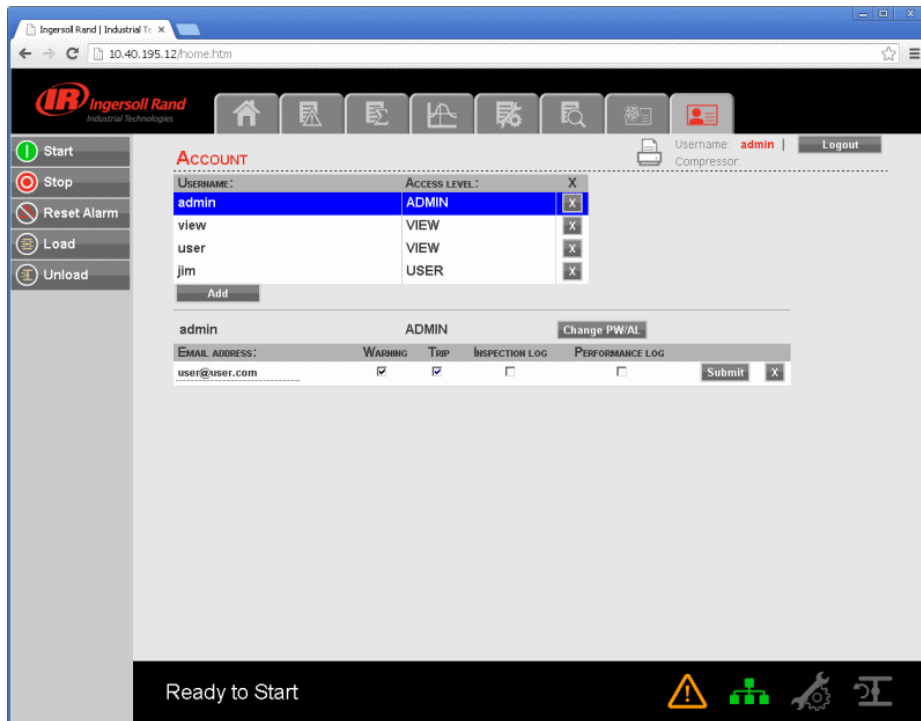


Click on the dropdown control and choose the new access level for selected user account. Again, click on "Change PW/AL" button to save the changes in access level or password for selected user account.

Set the email address settings for the user by clicking on the "Add" button in the email list. Then type in the email address and check the boxes for the type of alerts the user should receive. When finished, press the "Submit" button.



OPERATING INSTRUCTIONS



User account with access level "Admin" can only have an access to make a new account or modify the access level of these accounts. User account with access level "User" and "VIEW" can't have an access to make a new account or modify the user accounts.

MAINTENANCE

PERIOD	MAINTENANCE
Daily	Check the lubricating oil level and replenish as necessary.
	Check the oil filter pressure differential.
	Check the air filter pressure differential.
	Check the condensate drain functionality.
First 150 hours	Change the oil filter element.
	Clean the condensate strainers.
1 month	AC Check the cooler(s) for build-up of foreign matter. Clean if necessary by blowing out with air.
Every 1000 hours	Analyse Food-grade Lubricant (Ultra FG).
Each 3 months	Operate the safety valves manually to verify that the valve mechanism is functioning correctly and that a small amount of air is released.
	Check all hoses for signs of deterioration, cracks, hardening etc.
2000 hours	Lubricate the main motor <i>drive end</i> bearing. Lubricate the main motor <i>non-drive end</i> bearing. Analyse Premium Coolant (Ultra/Ultra EL).
4000 hours	Rebuild condensate solenoid valves using field kits.
4000 hours / 6 months	Inspect the blowdown silencers and replace if necessary. Clean the gearcase breather.
6 months	Check the calibration of the pressure transducers. Change the air filter element (replace more frequently if local conditions require).
Every 6000 hours	Replace Food-grade Lubricant (Ultra FG). NOTE: Change the oil filter element if replacing Food-grade Lubricant.
8000 hours	Inspect the starter contactors, replace if required.
	Replace check valve seat and spring using field kit.
	Rebuild blowdown valve using field kit.
8000 hours / 1 year	Clean the condensate strainers. Change the oil filter element. Replace Premium Coolant (Ultra) [8000 hours or every 2 years].
	Fully inspect condensate separators, all external surfaces, and fittings. Report any excessive corrosion, mechanical or impact damage, leakage or other deterioration.
1 year	Remove the safety valves from compressor, inspect and re-calibrate.

PERIOD	MAINTENANCE
16000 hours	Rebuild hydraulic cylinder using field kit. Replace Extended-life Premium Coolant (Ultra EL) [16000 hours or every 3 years].
4 years	Replace all hoses.
40000 hours	Replace discharge check valve.

• ROUTINE MAINTENANCE

This section refers to the various components which require periodic maintenance and replacement.

The *SERVICE/MAINTENANCE CHART* indicates the various components' descriptions and the intervals when maintenance has to take place. Oil capacities, etc., can be found in the *PRODUCT SPECIFICATION SHEET*.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Prior to attempting any maintenance work, ensure that:–

- all air pressure is fully discharged and isolated from the system. If the automatic blowdown valve is used for this purpose, then allow enough time for it to complete the operation.
- the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.
- all residual electrical power sources (mains and battery) are isolated.

Prior to opening or removing panels or covers to work inside a machine, ensure that:–

- anyone entering the machine is aware of the reduced level of protection and the additional hazards, including hot surfaces and intermittently moving parts.
- the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.

Prior to attempting any maintenance work on a running machine, ensure that:–

- the work carried out is limited to only those tasks which require the machine to run.
- the work carried out with safety protection devices disabled or removed is limited to only those tasks which require the machine to be running with safety protection devices disabled or removed.
- all hazards present are known (e.g. pressurised components, electrically live components, removed panels, covers and guards, extreme temperatures, inflow and outflow of air, intermittently moving parts, safety valve discharge etc.).
- appropriate personal protective equipment is worn.
- loose clothing, jewellery, long hair etc. is made safe.

MAINTENANCE

- warning signs indicating that *Maintenance Work is in Progress* are posted in a position that can be clearly seen.

Upon completion of maintenance tasks and prior to returning the machine into service, ensure that:–

- the machine is suitably tested.
- all guards and safety protection devices are refitted.
- all panels are replaced, canopy and doors closed.
- hazardous materials are effectively contained and disposed of.

WARNING

Do not under any circumstances open any drain valve or remove components from the compressor without first ensuring that the compressor is FULLY SHUT-DOWN, power isolated and all air pressure relieved from the system.

• AIR FILTER CHANGE PROCEDURE

A warning message will appear if the air filter pressure drop exceeds 0,048 bar (0,7 psi). To check the condition of the inlet filter, run the compressor in load mode and select "INLET VACUUM" from the current status screen using the up and down arrows. Change if equal to or above 0,048 bar (0,7 psi). To change the inlet filter, remove the appropriate enclosure panel on the front of the machine.

- Check the retaining cap for dirt and debris and wipe clean.
- Unclip the retaining cap and withdraw the old element.
- Fit the new element and refit the retaining cap.

• OIL CHANGE

To change the oil, the oil should be warm for more effective drainage. Remove the right end enclosure panel. Remove the pipe plug from the oil drain connection in the rear of the baseplate. Place a suitable drain pan under the drain connection and open the valve.

Dispose of waste lubricant according to local regulations.

When the gearcase is empty, close the valve and replace the pipe plug. Change the oil filter and allow the oil to drain from the oil cooler as well.

Unscrew the oil filler cap and add oil until the level reaches the top of the gearcase sight glass.

Start the compressor and run in unload mode. Check the oil filter and oil drain valve for leaks. Select "BEARING OIL PRESS" from the current status screen to insure that adequate oil pressure has been attained. Inspect the gearcase sight glass, the correct oil level for the sump during operation is 3/4 to 4/4 full. Some amount of foaming in the sight glass is normal. The oil level is interpreted as the level in the sight glass below the top foam, where a line of separation can be seen. If additional oil is required, stop the compressor and add oil as needed.

• OIL FILTER

Change oil filter after every 8,000 hours or less as required (see checking procedure below). To check the condition of the oil filter, the compressor must be running and the oil temperature must be greater than 49 °C (120 °F). With these conditions met select "OIL FILTER PRESS DROP" from current status screen. If "OIL FILTER PRESS DROP is less than 0,9 bar (13 psi) then the oil filter does not need service. If the warning light is on and "CHANGE OIL FILTER" warning is displayed, then the oil filter should be replaced.

Position the empty drain pan under the oil filter, loosen the filter housing. Remove the element from the housing. Wipe the sealing surface of the filter adaptor with a clean, lint-free cloth. Remove the replacement filter from its protective package. Apply a small amount of clean oil on the rubber seal and install the element. Screw the element on until the seal makes contact with the seat on the adaptor head. Tighten the filter a further 1/2 to 3/4 of a turn.

Start the compressor, check for leaks and check the oil level.

• GEARCASE BREATHER

To service the gearcase breather, remove the right end panel. Remove the breather cover by unscrewing the four retaining screws. Remove all of the breather media and clean with a suitable solvent. Allow the media to dry. Re-install the media, the cover, and the enclosure panel.

• CONDENSATE DRAIN FUNCTIONALITY

To verify the functionality of the condensate drains, simply observe the timed operation of each. Each drain should open at least every 2 minutes while the compressor is loaded. (The intercooler drain exhausts at a much lower pressure than the aftercooler).

Oil free condensate can be disposed of via a sewer drain.

• CONDENSATE STRAINERS

In order to service the condensate strainers (both inter-stage and discharge), the strainer service valves preceding the strainers should be closed. Remove the screens from the strainers, while noting the direction. Clean any debris from the screens and reinstall. Open the strainer service valves.

• AIREND BEARINGS

Airend bearings are lubricated by the compressor lubricating oil and require no maintenance.

• COMPRESSOR MODULE INPUT SHAFT SEAL REPLACEMENT

- Remove the main motor, observing all safety precautions in Section A of this manual, utilising appropriate lifting gear as recommended and following established safe working practices.
- Pull the compressor coupling half off the shaft.

MAINTENANCE

3. Remove the 4 bolts retaining the seal housing and screw 2 of them to remove the housing complete with seal.
4. Remove the old seal from the housing.
5. Remove the old wear sleeve from the input shaft.
6. Clean the seal housing, input shaft, wear sleeve inside diameter and seal outside diameter (Absolutely grease free).
7. Apply Loctite 620 to the sleeve and shaft journal. Install the sleeve ensuring that the face of the sleeve is 4 mm from the shoulder on the shaft. Wipe excess Loctite.
8. Apply Loctite 524 to the seal outer diameter and install into the seal housing with lip facing towards the compressor.
9. Allow to cure for 2 hours.
10. Clean the gasket face of the seal housing and gearcase housing (absolutely grease free).
11. Apply Loctite 510 to the gasket face on the seal and gearcase housings.
12. Lubricate the outside diameter of the installation tool with clean oil. Tool CPN 39307848.
13. Using the seal installation tool, slide the seal housing into place on the bearing housing, being careful not to tilt the housing and seal. Apply axial pressure to the end of the installation tool while the seal leaves the tool and enters the wear sleeve. The seal will slip between the tool and the sleeve if pressure is not applied.
14. Apply Loctite 242 to the 4 seal housing bolt threads and tighten.
15. Heat the coupling half to 177 °C (350 °F) for 1,5 hours and re-fit the coupling and spacer to the shaft.
16. Allow 24 hours for all Loctite applications to cure before restarting the machine.

• MOTOR BEARINGS

Clean the area around the inlet and outlet plugs before

removing the plugs. Add the specified quantity of recommended grease using a hand lever gun. Replace the inlet plug, run the machine for 10 minutes and then replace the outlet plug.

• MOTOR BEARING LUBRICANT SPECIFICATION

50Hz Use *High Temperature Grease Esso* Unirex N3 (CPN:92844729).

60Hz As per nameplate. Chevron Black Pearl#2. Chevron SRI2.

 CAUTION

Do not over pack the motor bearings with grease as this may lead to motor failure.

 CAUTION

Ensure dirt and/or other contaminants are not introduced into the bearing during the greasing process.

• CLEANING/INSTALLING PACKAGE PRE-FILTER [90-160Kw(125-200Hp)NEW ENCLOSURE ONLY]

1. Unlatch the two 1/4 turn latches and open the intake panle (panel is hinged).
2. Remove the six wing nuts and flat washers.
3. Remove the filter grill.
4. Pull out the filter element.
5. Center the new element over the package intake opening. Also note that the filter is washable with mild detergent.
6. Push the filter over the grill studs so that the studs poke through the filter media.
7. Install the filter grill.
8. Install the six wing nuts and flat washers.
9. Close the intake panel and latch.

TROUBLESHOOTING

PROBLEM	REMEDY
Compressor fails to start.	110/120V CONTROL VOLTAGE NOT AVAILABLE. Check the fuse. Check the transformers and wiring connections.
	EMERGENCY STOP. Rotate emergency stop button to disengage, and press reset button twice.
	STARTER FAULT (1SL OR 2SL). Inspect starter auxiliary contacts, connections and wiring. Inspect contactors. Replace if defective.
	MAIN (OR FAN) MOTOR OVERLOAD. Manually reset main (or fan) motor overload relay, and press reset button twice. Run unit and compare actual amps with name plate for possible action.
	SENSOR FAILURE. Check for defective sensor, bad sensor connection or broken sensor wires.
	Xe CONTROLLER 24VAC CONTROL VOLTAGE NOT AVAILABLE. Check fuses.
	DISPLAY PANEL AND POWER ON LIGHT DOES NOT ILLUMINATE. Check wiring. Verify 24VAC is within voltage tolerance ($\pm 15\%$).
Compressor shuts down.	HIGH 2ND STAGE TEMPERATURE Ensure that installation area has adequate ventilation. Fan side of intercooler may be dirty or plugged, clean as required.
	INLET RESTRICTION. Check for obstructions in air intake system. Verify that 2nd stage discharge temperature in the unload reduces slowly from the temperature in the load mode. If the unload temperature is greater, adjust the inlet/unloading valve. (Note: The inlet vacuum under the inlet/unloading valve should be approximately 0.87 bar (13 psi) in the unload mode).
	LOW BEARING OIL PRESSURE. Check oil level in gearcase sight glass. The level should be between $\frac{3}{4}$ to $\frac{1}{4}$ full. Check complete machine for oil leaks. Oil filter may be dirty or plugged. Replace filter. Remove tube on discharge side of oil relief valve to determine if valve is leaking. Replace valve if leaking. Remove flex line from vent side of hydraulic cylinder. If a large amount of oil exits the cylinder, overhaul hydraulic cylinder valve assembly. Remove oil pump to inspect tang drive. Replace pump and/or drive assembly if found defective.
	HIGH I/C PRESSURE. Check for air leaks between 2nd stage discharge flange and discharge check valve. Check discharge safety relief valve for leakage. Replace valve if leaking. Check discharge manual condensate valve to ensure that it is closed.
	HIGH 1ST STAGE TEMPERATURE. Ensure that installation area has adequate ventilation. Ensure that cooling fan is operating. Ensure that inlet control hydraulic cylinders is fully stroking when compressor is loaded. Replace inlet/unloading assembly if it is found defective.
	HIGH BEARING OIL TEMPERATURE. Ensure that installation area has adequate ventilation. Fan side of oil cooler may be dirty. Clean as required. Thermostat element in oil temp control valve may be defective.

TROUBLESHOOTING

PROBLEM	REMEDY
Compressor shuts down.	HIGH I/C AIR TEMPERATURE. Ensure that installation area has adequate ventilation. Fan side of intercooler may be dirty or plugged. Clean as required.
	HIGH 2ND STAGE PRESSURE HIGH LINE AIR PRESSURE. Check for blockage or obstruction in air side of aftercooler, discharge moisture separator or discharge check valve. Ensure that air network has adequate receiver volume. Ensure that isolation valve is fully open. Ensure that discharge pipe is adequately sized.
	STARTER FAULT (1SL OR 2SL). Check for loose wires or faults on the control circuit. Inspect starter connectors.
	MAIN MOTOR OVERLOAD. Check for loose wires. Check supply voltage. Check heater size.
	FAN MOTOR OVERLOAD. Check for loose wires. Check supply voltage. Check heater size. Check for obstructions at machine inlet and outlet openings.
	HIGH 1/C CONDENSATE. Check intercooler condensate drain system including strainer. Check valve and 6SV. Repair as required.
	REMOTE STOP FAILURE. Check remote stop switch and wiring.
	REMOTE START FAILURE. Check remote start switch and wiring.
	EMERGENCY STOP Disengage emergency stop button. Press reset button twice.
	SENSOR FAILURE. Check for defective sensor, bad sensor connection or broken sensor wires.
	Low system air pressure.
AIR LEAK. Check air piping system. Ensure that manual condensate valves are closed. Also make sure solenoid-operated condensate valves are not stuck open.	
UNLOADING VALVE NOT FULLY OPEN. If inlet control hydraulic cylinder is not fully extended, replace inlet/unloading valve assembly.	
SYSTEM DEMAND EXCEEDS COMPRESSOR DELIVERY. Install larger or an additional compressor.	
DIRTY AIR FILTER ELEMENT. Check filter condition. Replace as required.	
Compressor fails to load.	LEAKING SEALS IN HYDRAULIC CYLINDER. If cylinder does not fully stroke when "LOAD" button is pressed, overhaul hydraulic cylinder.
	DEFECTIVE LOAD SOLENOID VALVE. Remove tube that runs from load solenoid valve to the hydraulic cylinder. Start compressor and press "LOAD" button. If oil does not come out of solenoid valve. replace valve.

TROUBLESHOOTING

PROBLEM	REMEDY
Water in system.	DEFECTIVE MOISTURE SEPARATOR/DRAIN TRAP. Inspect and clean if required. Replace separator/trap if defective.
	TRAP DRAIN OR DRAIN PIPING PLUGGED. Inspect and clean.
	AFTERCOOLER CORE DIRTY. Inspect and clean.
	ENCLOSURE PANELS NOT IN PLACE. Install enclosure panels.
	NO AFTERCOOLER ON UNIT. Install aftercooler.
	DRAIN LINE/DRIP LEG INCORRECTLY INSTALLED. Slope drain line away from trap. Install drip leg.
Excessive noise level.	COMPRESSOR DEFECTIVE. (BEARING OR GEAR FAILURE OR ROTOR CONTACT.) Contact authorized distributor immediately. Do not operate unit.
	ENCLOSURE PANELS NOT IN PLACE. Install enclosure panels.
	LOOSE COMPONENT MOUNTING. Inspect and tighten.
Excessive vibration.	LOOSE COMPONENTS. Inspect and tighten.
	MOTOR OR COMPRESSOR BEARING FAILURE. Contact authorized distributor immediately. Do not operate unit.
	EXTERNAL SOURCES. Inspect area for other equipment.
Pressure relief valve opens.	COMPRESSOR OPERATING OVER PRESSURE. Adjust controller set points.
	DEFECTIVE VALVE. Replace valve.



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