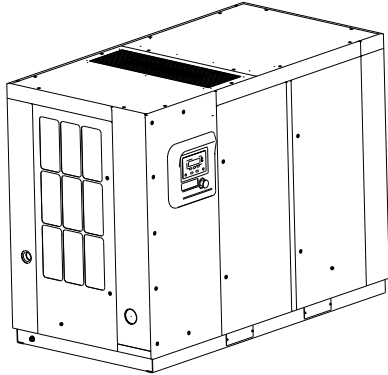## Contact-Cooled Rotary Screw Air Compressor

R37-160

Product Information

EN Product Information
ES Información del producto
FR Informations sur le produit
PT Informações do produto

Save These Instructions

Ingersoll Rand®

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ABOUT THIS MANUAL

The purpose of this manual is to provide site planning, installation and operation guidelines for the compressor.

For supporting documentation refer to Table 1.

Table 1 : Product Manuals

Publication	Product	Part/Document Number by Region		
		Americas	EMEIA *	Asia Pacific
Product Safety Information Manual	All	80446313	80446156	80446321
Product Maintenance Manual	All	80446354	80446248	80446362
Product Parts Information Manual	R37-45 kW	80448095		
	R45IE-75 kW	80446271		
	R132-160 kW Single-Stage	80446057		
	R90-160 kW Two-Stage	80446065		

* Europe, Middle East, India and Africa

Product specification sheets and reference drawings are also available.

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.

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.

For Variable Speed Drive (VSD)

- (3) brackets at the separator tank
- (1) bracket from the air end discharge elbow.
- (1) bracket from the air end support.

For Fixed Speed (FS)

- (3) brackets at the separator tank
- (1) bracket from the air end support.
- (1) bracket from the motor mounting bracket.

■ 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 PLANT

Figure 1 : Typical Air System
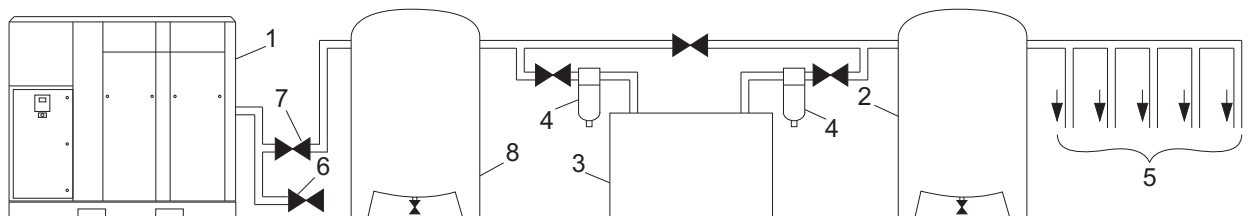
Key

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.

NOTICE

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

Screw type compressors 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 tank using individual air lines.

The compressor is shipped with the shipping restraints in place. Ensure that these are removed to allow free movement of the drive assembly during operation. Each restraint is painted yellow.

■ DISCHARGE AND CONDENSATE PIPING

See Figure 1.

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, when properly selected and installed, they can reduce any liquid carryover to zero.

An air receiver tank (2) is recommended to ensure that the total system volume is sufficient.

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. Discharge piping should not exert any unresolved moments or force on the compressor.

It is good practice to install line filters (4).

Include a vent or drain trap (6) to vent the discharge pipework downstream from the minimum pressure check valve located on the separator tank and upstream of the first system isolation valve (7).

This compressor has an internal discharge check valve. An external check valve is not required. An isolation valve (7) is required within 1 m (36 in) of the compressor discharge.

NOTICE

There should be no plastic or PVC piping attached to this compressor or used for any lines down stream with exception of condensate removal lines.

NOTICE

The discharged air contains a very small percentage of compressor coolant and care should be taken to ensure that downstream equipment is compatible.

When two rotary compressors are operated in parallel, provide an isolation valve (7) and drain trap (6) for each compressor before the common receiver. Ensure the discharge piping is arranged to prevent water from being forced into the non-operating compressor.

A wet tank (8) is recommended in cases where the air dryer is a regenerative desiccant type to prevent short cycling the compressor during the purging cycle when plant air demand is slow.

The built-in after-cooler reduces 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 a built-in after-cooler is furnished with a combination condensate separator/trap.

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.

NOTICE

The drain line shall 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. The drain line must have a minimum inside diameter of 8 mm (5/16 in).

NOTICE

For low volume systems that may not include an air receiver tank (2), compressor response time may need adjusting. Contact your local Ingersoll Rand service provider.

NOTICE

Do not use the compressor to support the discharge pipe.

■ ELECTRICAL

A qualified electrician shall perform all electrical installations and service.

The compressor shall be properly grounded / earthed in compliance with all applicable standards and regulations (local, state, country, federal, etc.).

Installation of this compressor shall be in compliance with all applicable standards and regulations (local, state, country, federal, etc.).

The compressor shall have its own isolator situated adjacent to it. The fuse protecting the circuit and the compressor shall be selected in accordance with recognized code requirements on the basis of the data provided in the specification sheet.

Feeder cables shall be sized 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.

NOTICE
For VSD, cable sizes may vary considerably so the line reactor is equipped with copper bus connections. These connections can accept bolts between 6 mm and 12 mm.

Feeder cable connections to incoming terminals L1-L2-L3 shall be tight and clean.

The applied voltage shall be compatible with the compressor data plate ratings.

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

Remove the blind plate to cut a hole for incoming power connection. If it is necessary to make a hole in the control box in a different location, care should be taken to not allow metal shavings to enter the starter and other electrical components within the box. If another hole is used, the original hole shall be blocked off.

The feeder cable shall be suitably glanded in to the starter box to maintain proper ingress protection. Fixed speed starter boxes are rated for NEMA 4 /IP65, and variable speed drive starter boxes are rated for NEMA 12/IP54. For variable speed drive starter boxes, the feeder cable shall be glanded to ensure that dirty air does not by-pass the filters.

On completion of electrical installation, check that the blower or fan motor rotation is correct.

Variable speed drive compressors are designed for use, where the electricity supply is separated from nearby residential and commercial areas. If the compressor is to be used in a light industrial, residential or commercial environment where the local supply network is shared, further Radio Frequency (RF) screening measures may be required. Consult your local distributor/supplier for details of the optional RF filter.

Variable speed drive compressors have an anti-condensation heater and thermostat in the electrical box. This circuit can be connected to an independent electrical supply of either 110 V or 230 V single phase, dependent on the country of installation. The supply shall be suitably fused and an independent isolator installed adjacent to the compressor. Verify that the thermostat is adjusted to 29 ˚C (85 ˚F). This shall be done in accordance with recognized codes. It is good practice, and sometimes mandatory, to display suitable signs warning that the compressor has two separate electrical supplies which both shall be isolated before any work is attempted.

For Variable speed drive compressors, the heater circuit can also be supplied from the 110 V tapping of the control transformer and connected as shown on the schematic wiring diagram furnished separately from this manual.

NOTICE
Main and fan motor insulation shall be tested by a qualified electrician prior to initial start-up or following an extended shutdown period in cold and damp conditions.

■ WATER-COOLED

■ *COOLING WATER PIPING*

NOTICE
Water piping to and from the compressor package shall be at least 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**.

For sea water applications (sea water option only) a zinc anode is not recommended as it will deteriorate the copper oxide film on the 70/30 copper-nickel alloy tubes in contact with sea water. To minimize galvanic corrosion and provide the greatest corrosion protection to the coolers, it is strongly recommended that a section of iron pipe (>00 mm length) be connected as close as possible to the air compressor package water inlet connection. The iron pipe will act as the sacrificial anode for the copper-nickel tubes and therefore shall be considered a regular maintenance and replacement item. For this reason, the section of iron pipe should be installed so that it can be easily replaced (e.g. with a union joint.).

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 ℃ (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*

Air should be vented from the water side of the system to avoid poor performance and water hammer. Since the air compressor uses different type heat exchangers depending on your selection of "fresh water cooled" or "harsh water cooled" system, the venting procedure is different. Be sure to use the correct procedure below:

Fresh water coolers (brazed plate heat exchangers):

1. Disconnect the water stop valve in the water outlet line of the compressor.

2. Open the inlet water valve(s) to allow the water to flow to the compressor.

3. Allow all the air to escape from the system and observe water at the water outlet port.

4. Connect the water stop valve.

Harsh water coolers (shell and tube heat exchangers):

1. Locate the water system vent cocks on top of the after-cooler and oil cooler.

2. Open the water valve(s) allowing water to flow to the package.

3. Open the vent cocks and allow all air to escape from the system. When water is observed at the vent cocks, close them.

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■ *DRAINING THE WATER SYSTEM*

Should it become necessary to completely drain the water system, use the following procedures specific to the water cooled option you have.

Fresh water coolers (brazed plate heat exchangers):

1. Disconnect the inlet water line from the connection located at the rear of the compressor.

2. Disconnect the water stop valve in the water outlet line of the compressor.

3. Allow the system to completely drain.

Harsh water coolers (shell & tube heat exchangers):

1. Disconnect the inlet and discharge water lines from the connections located at the rear of the compressor.

2. Locate the after-cooler and oil cooler. Remove the drain plugs located at the bottom of the coolers.

3. Open the vent ports in the top of the after-cooler and oil cooler.

4. Allow the system to completely drain.

■ *ADJUSTING THE AFTER-COOLER TRIM VALVE*

See the piping and instrumentation diagram provided separately from this manual. The coolers are piped in a "parallel" water flow arrangement with a manual trim valve controlling the flow through the after-cooler. The after-cooler trim valve is factory set and should not need adjusting but if disturbed use following procedure.

1. Close valve fully clockwise and then open two full turns.

2. With the compressor running loaded observe the package discharge temperature on the controller display. It should be approximately 8 °C (15 °F) above the water inlet temperature.

3. If the temperature is too high, open the valve ¼ turn and wait one minute. If the temperature is too low, close the valve ¼ turn and wait one minute. Repeat the incremental movements until the desired temperature is reached.

4. Put a "Warning – Do Not Adjust" label on the valve or fit a lock.

■ *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 life of the compressor. It should be noted that the quality of water used in any cooling system does not remain constant during the operation of the system. Evaporation, corrosion, chemical and temperature changes, aeration, scale and biological formations affect the water makeup. Most problems in a cooling system first appear as a reduction in the heat transfer rate, then in a reduced flow rate or increased pressure drop, and finally with damage to the system.

Scale: Scale formation inhibits effective heat transfer, yet it does help prevent corrosion. Therefore, a thin uniform coating of calcium carbonate is acceptable on the inner surface. Perhaps the largest contributor to scale formation is the precipitation of calcium carbonate out of the water. This is dependent on temperature and pH level. 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:

Table 2 : Acceptable Limits for Cooling Water Constituents

Substance	Test Interval	ACCEPTABLE MAXIMUM LIMITS	
		Fresh Water (Brazed Plate Heat Exchanger)	Dirty Water / Sea Water (Shell & Tube Heat Exchanger)
Langelier Index (LI)	Monthly	0 to 1	-0.5 to 2.5
Ammonia [NH3], ppm	Monthly	<1	<2
Ammonium [NH4-1], ppm	Monthly	<2	<5
Chlorides [Cl-], ppm	Monthly	<80	<1000
Copper [Cu], ppm	Monthly	<0.01	<0.5
Dissolved Oxygen (DO) [O2], ppm	Weekly	<0.1	<3
Iron + Manganese [Fe + Mn], ppm	Monthly	<0.3	<2
Nitrate [NO3 -], ppm	Monthly	<100	<125
Oil & Grease, ppm	Monthly	<5	<5
Silicon Dioxide (silica) [SiO2], ppm	Monthly	<30	<100
Sulfates [SO4-2], ppm	Monthly	<70	<250

■ **INTEGRATED DRYER**

Do not connect condensate drains common to other pressurized drain lines in a closed circuit. Make sure the outflow from the condensate drains is unimpeded. Connect the condensate piping in such a way to ensure that sound levels are kept to a minimum during drainage.

Ensure that all condensate is disposed of in a responsible manner, in compliance with all applicable standards and regulations (local, state, country, federal, etc.).

The ambient air around the dryer and compressor shall not contain solid or gaseous contaminants. All compressed and condensed gases can generate acids or chemical products which may damage the compressor or components inside the dryer. Take particular care with sulphur, ammonia, chlorine and installations in marine environments.

■ **ENVIRONMENTAL LIMITS**

The standard compressor package is designed for the following conditions:

• Indoors only

• Area not considered to be a high dust area.

• Ambient temperature range 2 to 46 °C (35-115 °F)

Ingersoll Rand offers the following options for fixed speed compressors that extend the environmental limits:

• Outdoor modification

• Low ambient option (-23 to 46 °C / -15 to 115 °F) at sea level

• High ambient option (2 to 55 °C / 35 to 131 °F) at sea level

• High dust air filter

• High dust package filter

GENERAL INFORMATION

The compressor is an electric motor driven, contact cooled screw compressor, complete with all necessary components piped, wired and baseplate mounted. It is a totally self contained air compressor package.

The standard compressor is designed to operate in an ambient range of 2 °C to 46 °C (35 °F to 115 °F). The standard maximum temperature of 46 °C (115 °F) is applicable up to an elevation of 1000 m (3280 ft) above sea level. Above this altitude, significant reductions in ambient temperature are required if a standard motor is to be used.

The compressor is managed by the onboard electronic controller. The controller and drive system operate together to vary the speed of the compressor to deliver compressed air at the target pressure.

For fixed speed (FS) models, the capacity is automatically controlled via 'ON-OFF LINE'. The compressor will operate to maintain a set discharge line pressure and is provided with an auto restart system for use in plants where air demand varies widely.

Panel instrumentation is provided to indicate the compressor operating conditions and general status.

The air/coolant mixture discharges from the compressor into the separation system. This system removes all but a few ppm of the coolant from the discharge air. The coolant is returned to the cooling system and the air passes to the after-cooler and out of the compressor through the moisture separator.

Air is pulled into the compressor by the cooling blower and through the coolant cooler and after-cooler.

By cooling the discharge air, much of the water vapor naturally contained in the air is condensed and is drained from the built-in moisture separator and drain.

The coolant system consists of a sump, cooler, thermostatic valve and a filter. When the compressor is operating, coolant is forced by air pressure from the separator tank to the thermostatic element. The position of the element (a direct result of coolant temperature) will determine whether the coolant circulates through the cooler, bypasses the cooler, or mixes the two paths together to maintain an optimum compressor discharge temperature. This temperature is controlled to preclude the possibility of water vapor condensing. By injecting coolant at a sufficiently high temperature, the discharge air coolant mixture temperature will be kept above the dew point.

For variable speed drive models, the system is enhanced by a control logic that varies the cooling blower speed dependent on the intake and discharge temperatures and hence controls the injection temperature even closer while saving blower motor energy.

The compressor is provided with a temperature sensor which will shut the compressor down in case of excessive temperature. This setting is typically 109 °C (228 °F).

Effective coolant filtration is provided by the use of a screw on, heavy duty coolant filter.

NOTICE

Standard air compressors are factory filled with compressor coolant. It is recommended to perform a coolant analysis every 2000 hours or 3 months to monitor condition and determine when to change the coolant. If an analysis is not performed, the recommended coolant change interval is 8000 hours or two years, whichever comes first.

For compressors supplied with optional food grade coolant, it is recommended to perform a coolant analysis every 500 hours or every month to monitor condition and determine when to change the coolant. If an analysis is not performed, the recommended coolant change intervals is 2000 hours or six months, when utilizing the food grade filter supplied with the compressor. For compressors running food grade coolant without the food grade filter, the change interval should be 1000 hours or three months, whichever comes first.

NOTICE

Fixed speed compressors should not be connected to variable speed drives. Please contact your local Ingersoll Rand representative before inverter duty conversion.

⚠ CAUTION

For fixed speed models, the compressor may not reach its normal operating temperature during periods of low demand. Sustained operation at low demand can result in the buildup of condensate in the coolant. If this situation occurs, the lubricating characteristics of the coolant can be impaired, which may lead to damage of the compressor.

The compressor should be allowed ample loading time.

■ INTEGRATED DRYER OPERATION

In the default mode, the dryer is non-cycling. The stop button must be pressed to shut-off the dryer.

In the energy efficient mode, the dryer may run up to 6 minutes before it shuts off automatically during the Start/Stop mode of the compressor package. Note the dryer could be off for an extended period if the compressor needs to come back on right away.

NOTICE

If ISO Class 4 dew point standards are critical to your application, run the compressor in unload mode (fixed speed) or idle mode (variable speed) for one minute at startup to allow the dryer to reach the required dew point before the compressor begins providing compressed air.

OPERATING INSTRUCTIONS FOR VARIABLE SPEED DRIVE (VSD)

■ 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 coolant level is at least visible in the center of the sight glass and add coolant 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.

The contrast of the SG controller display may be adjusted by turning the small screw which is on the right hand side of the controller when accessed through the starter cabinet door.

■ *INITIAL CHECK SEQUENCE*

The controller will perform an initial check sequence if the compressor receives initial power to the controller or has experienced an 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 and will ramp up the motor speed to its minimum speed. Once the minimum speed has been achieved, the compressor will begin to control pressure by using its speed regulation. When the system pressure reaches the target pressure, the compressor will start to slow. If the system pressure rises to the immediate stop pressure setpoint the compressor will stop. If the system pressure rises to the auto stop setpoint and the compressor is at minimum speed, the compressor will stop.

> ### NOTICE
>
> **During the first startup of the compressor, check for the proper direction of rotation of the dryer condenser fan. If the fan is not rotating in the direction indicated by the rotation arrow decal, reverse two of the wires at the main power supply or at the contactor in the package starter box. Perform the proper stop sequence and lockout/ tagout the main electrical supply before making changes to the wiring.**

■ *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 or until the pressure in the separator tank falls to 2.4 bar (35 psi) before stopping. The compressor will stop if the system pressure reaches the automatic stop or immediate stop pressure setpoints. However, if the compressor stops for this reason, it will automatically restart when the system pressure falls below the target pressure.

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

■ *WARM UP MODE*

A warm up cycle occurs when the compressor's airend discharge temperature doesn't reach the required warm up temperature (82°C/180°F) for two consecutive operational cycles. On a warm up cycle, instead of stopping, the compressor will continue to run with the blowdown valve open. The compressor will run in a fixed speed mode, at minimum speed. The blower will operate at minimum speed. The compressor will run like this for approximately five minutes. During a warm up cycle, the controller will display the message "Warm Up Mode". If the pressure falls during this time period, the compressor will return to normal operation.

■ *BLOWER CONTROL*

The blower speed varies in some conditions to assist in controlling the after-cooler approach temperature and the coolant injection temperature. The blower motor has its own variable speed drive and will ramp up and down as the compressor starts and stops.

■ *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 (XE SERIES CONTROLLER)

■ USER INTERFACE

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, the color graphics display and the LED icons make up the user interface to the compressor.

Figure 2 : Xe-90M Controller Interface

Figure 3 : Xe-145M Controller Interface

■ *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.

Table 3 : LED Status Icons

Icon	Name	Function
	OK	Illuminates when no Warnings or Trips are sensed. Can be in a Ready or Not Ready state.
	Alert	Illuminates when an Warning (flashes) or Trip (constant ON) is sensed. Can be in a Ready (Warning) or Not Ready (Trip) 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.

Table 4 : Command Keys

Icon	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.
	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.

NOTICE

The LOAD and UNLOAD keys are not used on variable speed compressors.

■ *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.

Figure 4 : Navigation Keys
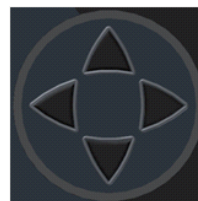
Pressing one of the navigation keys will lead the user down a navigation path. Each time the key is pressed, another step in the path is taken.Once the end of a navigation path is reached, pressing the key one more time will bring the user back to the beginning of the path.Pressing the opposite key, 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.

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■ **DISPLAY LAYOUT**

Figure 5 : Display Layout

Table 5 : Display Layout

Key	Name	Description
A	Folder Bar	Uses tabs to graphically identify each folder.
B	Title Bar	Identifies current folder and page (underlined).
C	Page Content	Content of the current page.
D	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.

Table 6 : Folder Bar Icons

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. (Optional for some controllers)
Maintenance		Status and notification setup for compressor maintenance items.
General Settings		General settings such as Language, Time, and Units of Measure.
Integral Sequencing		Inter Module 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.

■ **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.

Table 7 : Title Bar Page Icons

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.

■ **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 by using the NAVIGATION keys.The LEFT key can be used to move the cursor under the digit to be changed.Use the UP or DOWN keys to change the value. Once all digits have been changed, 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.

This "X" icon appears on numeric entry windows as shown below. Placing the cursor on it and then pressing the ENTER key will cancel the entry and any changes that were made. Press the RIGHT key to place the cursor on the icon.

Figure 6 : Numeric Entry Window
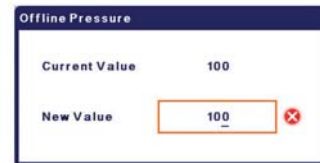
NOTICE
Not all pages have adjustable parameters. Some just have read-only information.

■ **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.

Table 8 : Dashboard Icons

Name	Icon	Description
Network Control		Network 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 Or Loaded		Compressor is in the unloaded state.
		Compressor is in the loaded state.

■ *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.

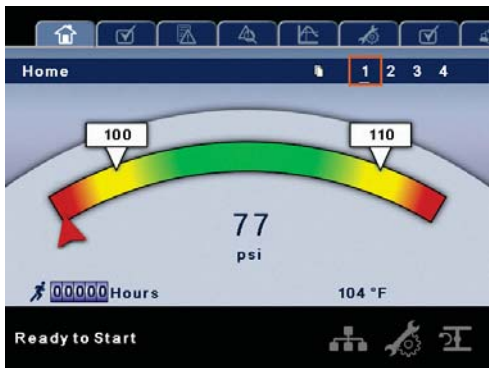- **Processor Init** – The controller is being initialized.

■ **FOLDER OPTIONS (FIXED SPEED)**

■ *HOME FOLDER*

- **PAGE 1 – SYSTEM OVERVIEW**

Figure 7 : Home Folder

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

- **Load Pressure** is 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** is 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** is indicated by the large numbers centered below the gauge and by the red arrow.

- **Pressure Unit of Measure** is indicated below the Package Discharge Pressure. This is selectable from the General Settings folder.

- **Airend Discharge Temperature** is indicated by the numbers in the lower left of the display.

- **Temperature Unit of Measure** is indicated to the right of the Airend Discharge Temperature. This is selectable from the General Settings folder.

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

- **PAGE 2 : COUNTERS**

Figure 8 : Counters

- **Hour Meters** indicate the hours that: the controller has been powered up, the compressor has been running, and the compressor has running loaded.

- **Starts** indicate the number of times a start is attempted on the compressor.

- **Date & Time** is adjustable and configurable in the General Settings folder.

- **PAGES 3-4: ANALOG INPUTS**

Figure 9 : Analog Inputs
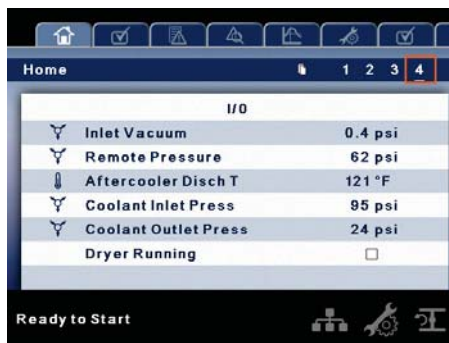
Icon	Meaning
⅄	Pressure
🌡	Temperature

NOTICE

All information on these pages is read only.

The following inputs are displayed in this section:

- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- After-cooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- After-cooler Discharge Pressure (integrated dryer compressors only)
- Remote Pressure (optional)
- Coolant Inlet Pressure
- Coolant Outlet Pressure
- Dryer Running

■ ☑ *OPERATOR SETTINGS FOLDER*

- **PAGES 1-2: OPERATOR SETTINGS**

Figure 10 : Operator Settings

Table 9 : Operator Settings

Operator Settings	Selection	Min.	Max.	Default	Step	Unit
Offline Pressure	---	75	Rated+10	Rated+10	1	psi
Online Pressure	---	65	Offline-10	Offline-10	1	psi
Lead/Lag	Lead/Lag	---	---	Lead	---	---
Lag Offset	---	0	45	0	1	psi
Mode of Operation	Mode	---	---	ON/OFF line	---	---
Condensate Release	---	2	20	5	1	sec
Condensate Interval	---	60	360	180	1	sec
Unloaded Stop Time	---	10	30	10	1	sec
Starter Time	---	7	30	10	1	sec

- **PAGES 3-5: OPERATOR OPTIONS**

Figure 11 : Operator Options

Table 10 : Operator Options

Operator Options	Selection	Min.	Max.	Def.	Step	Unit	Installed option required?
Enable Auto Restart	ON/OFF	---	---	OFF	---	---	No
Auto-Restart Time	---	2	60	10	1	Min	No
Auto-Restart Delay Time	---	0	60	0	1	Sec	No
Communications Control	ON/OFF	---	---	OFF	---	---	No
Remote Start/Stop	ON/OFF	---	---	OFF	---	---	No
Power Out Restart	ON/OFF	---	---	OFF	---	---	Yes
Power Out Restart Time	---	10	600	10	1	Sec	Yes
Low Ambient Temp*	---	30	60	35	1	Deg F	No
Lead/Lag Cycle Time**	---	0	750	0	1	Hours	No
Scheduled Start - Day	---	Day	Day	Sun	1	Day	Yes
Scheduled Start	---	00:00	23:59	00:00	1	Time	Yes
Scheduled Stop - Day	---	Day	Day	Sun	1	Day	Yes
Scheduled Stop	---	00:00	23:59	00:00	1	Time	Yes
Enable High Dust Filter	ON/OFF	---	---	OFF	---	---	Yes
Enable VSD	ON/OFF	---	---	OFF	---	---	Yes
Remote Sensor	ON/OFF	---	---	OFF	---	---	Yes

* The low ambient temperature is only adjustable if the low ambient factory set point is on.

** A value of 0 will disable the lead/lag cycle time feature.

- **PAGES 6-7: SENSOR CALIBRATION**

Figure 12 : Sensor Calibration

Sensor calibration can only take place when the compressor is stopped. There should be no pressure on a sensor when it is calibrated. Calibration only needs to take place after a sensor is replaced, the controller is replaced, 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)
- Sump Pressure (3APT)
- Package Discharge Pressure (4APT)
- Coolant Filter Inlet Pressure (5CPT)
- Coolant Filter Outlet Pressure (6CPT)
- Remote Pressure (10APT) – Only on compressors with the remote sensor option
- Interstage Pressure (2APT) – Only on 2-stage compressors
- After-cooler Discharge Pressure (7APT) – Only on compressors with integrated dryer

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. Please make sure the sensor is being exposed to atmosphere before attempting calibration.

■ **EVENTS FOLDER**

• **PAGES 1-42 (MAX.)**

Figure 13 : Events Folder

The pages in the Events folder document up to the last 250 events that the controller has experienced, and time stamps each. 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 the events, with each page displaying up to seven. Page one displays events one through six, page two displays seven through twelve, 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
  • Warning
  • Trip
  • Start Inhibit

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

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

Active Start Inhibits will be highlighted in blue while cleared Start Inhibits will have blue text. The display will indicate the compressor is not ready to start if a start inhibit is active.

See the following lists for details about messages in each type of event.

■ **WARNING EVENTS LIST**

• **Change Inlet Filter**

Will occur if 1AVPT is greater than 0.7 psi vacuum (or 1.3 psi vacuum if the high dust filter option is enabled) and the compressor has been fully loaded for at least 8 seconds. This condition must exist for 3 seconds before the warning is issued.
NOTE: Change Inlet Filter cannot be checked if the compressor is modulating.

• **Change Coolant Filter**

This will occur if the compressor has been running loaded for at least 8 seconds, is warmed up, and the coolant filter pressure drop (5CPT - 6CPT) is greater than 25 psi. This condition must exist for 150 seconds before the warning is issued.

• **Sensor Failure**

This will occur whenever sensors 4ATT, 5DTT, 6DTT, and 10APT are recognized as missing or broken. The sensor failure message shall follow the following format: SENSOR FAILURE 4ATT. The 5DTT and 6DTT sensor failures will be

shown only when the integrated dryer is installed (accessed in the factory settings menu). The 10APT sensor failure will be shown only when the Enable Remote Pressure is On. This failure will cause the controller to automatically start using 4APT for loading and unloading the compressor. This condition must exist for 3 seconds before the warning is issued.

• **Change Separator Element**

Will occur if the compressor is loaded, the compressor is warmed up (the injected coolant temperature is at least 120 °F), the package discharge pressure is at least 90 psi, and the separator pressure drop is greater than 12 psi. This condition must exist for 3 seconds before the warning is issued.

• **High Airend Discharge Temperature**

Will occur if the compressor is running and 2ATT is greater than 221 °F (97% of 228) and the compressor is running. This condition must exist for 3 seconds before the warning is issued.

• **High Sump Pressure**

If the compressor is running loaded, has been loaded for at least 8 seconds and the sump pressure is more than 25 psi above the rated pressure for the compressor. If this warning occurs, the online and offline pressures will be reduced. For example, a rated pressure of 100 psi would have a maximum offline pressure of 110 psi. This warning would occur if the sump pressure goes above 125 psi in this example. This condition must exist for 3 seconds before the warning is issued.

• **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**

This will occur if auxiliary input 2 closes. The contact must be closed for at least 3 seconds and the Enable Control Power Loss setting must be off before the warning will occur.

• **Service**

Service warnings occur when the compressor 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**

If service level 1 has been selected for the compressor, 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**

If service level 2 has been selected for the compressor, 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 be 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**

Will occur if the compressor is using a remote sensor or is under the control of an external device, such as an 8XI, 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 compressor will be available to reload once the discharge pressure falls to the rated pressure value.

- **Condensate Drain Error**

This will occur if the compressor is running, the package discharge pressure is over 50 psi, and the condensate drain error contact closes for at least 30 minutes. This warning will be ignored for 4.5 minutes after starting.

- **Freeze Warning**

This will occur if the evaporator sensor has a value of 678 (about 0.5 C) or below (low temp) while the dryer is running, on compressors with the integrated dryer. This is a dryer fault. If this happens, the compressor will continue to run, but the dryer will stop. The condition must exist for at least 180 seconds before the warning will occur. NOTE: If this warning is reset while the conditions for running the dryer exist, the dryer can restart. Also the dryer can restart if the evaporator value rises to 709 (about 5 C). However the warning will still be displayed.

- **Dryer High Pressure**

On compressors with the integrated dryer, this will occur if the dryer high pressure switch opens while the dryer is running. This is a dryer fault. If this happens, the compressor will continue to run, but the dryer will stop. The contact must be open for at least 3 seconds before the warning will occur. If this warning is reset while the conditions for running the dryer exist, the dryer can restart. However, this switch is a locking switch. The switch must be reset before the dryer can run. Resetting the warning on the display does not reset the switch.

- **Condenser Temperature High**

This will occur if the condenser sensor has a value above high temperature threshold while the dryer is running, on compressors with the integrated dryer. This is not a dryer fault. If this happens, the compressor and dryer will continue to run. The condition must exist for at least 180 seconds before the warning will occur.

- **Condenser Temperature Low**

This will occur if the condenser sensor has a value below the low temperature threshold while the dryer is running, on compressors with the integrated dryer. This is not a dryer fault. If this happens, the compressor and dryer will continue to run. The condition must exist for at least 180 seconds before the warning will occur.

- **Change HE Filter**

The HE filter is located between the after-cooler discharge and the inlet to the dryer and is only on compressors with an integrated dryer. The drop across the HE filter is measured by subtracting the package discharge pressure from the after-cooler discharge pressure. If the compressor is running, the measured drop across the HE filter is at or above 14 psi (0.9 bar), the compressor is hot (injected coolant temp above 120 °F), and the package discharge pressure (4APT) is above 90 psi, this warning can occur. The condition must exist for at least 3 seconds before the warning will occur. This is not a dryer fault. If this happens, the warning will be displayed, but the dryer will continue to run.

- **Invalid Calibration**

Will occur if the sensor zero value is +/- 10% of its scale. This will only occur when a sensor is calibrated.

■ **TRIP EVENTS LIST**

- **Low Sump Pressure**

Will occur if the compressor is running unloaded or loaded and 3APT is less than 13 psi for 15 seconds.

- **High Airend Discharge Temperature**

This will occur if 2ATT is greater than 228 °F.

- **Check Motor Rotation**

This will occur if 3APT is less than 1 psi on a compressor, 3 seconds after starting (6 seconds if the compressor is equipped with a soft starter or airend discharge temperature is less than 50 °F). This condition can be caused by the motor running in reverse. Once correct motor rotation is established, this trip will not be checked again unless power is removed from the controller.

- **Main Motor Overload**

This will occur if the motor overload relay contact opens. The contact must be open for at least 3 seconds before the trip will occur. This trip will not occur if there is an active Emergency Stop trip.

- **Fan Motor Overload**

Will occur if a fan motor overload relay contact opens and the compressor is not equipped with a variable speed blower. The contact must be open for at least 3 seconds before the trip will occur.

- **Remote Stop Failure**

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

- **Remote Start Failure**

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

- **Sensor Failure**

This will occur when a sensor is recognized as missing or broken. The sensors affected by this trip are 1AVPT, 3APT, 4APT, 5CPT, 6CPT, 2APT (if 2 stage compressor), 7APT (if integrated dryer), 2CTT, and 2ATT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: SENSOR FAILURE 1AVPT. Sensor Failure 1AVPT will only occur if the compressor is running and loaded.

- **Emergency Stop**

This will occur when the emergency stop button is engaged.

- **High Sump Pressure**

This will occur if the compressor is running loaded for at least 8 seconds, and any one of the 3 following conditions exist. (1) The sump pressure is above the rated pressure by 35 psi. (2) The separator pressure drop is measured to be more than 25 psi and the package discharge pressure at least equal to the minimum online set point value. (3) The sump pressure is above 165 psi if the rated pressure is less than 190 psi or the sump pressure is above 220 if the rated pressure is 190 psi.

- **High Coolant Filter Pressure Drop**

This will occur if the compressor has been running loaded for at least 8 seconds, is warmed up, already has a change coolant filter warning, and the coolant filter pressure drop (5CPT - 6CPT) has been greater than 35 psi for 10 seconds.

- **High Inlet Vacuum**

This will occur if the compressor is running loaded and the inlet vacuum is greater than 1.8 psi. If the compressor has a high dust filter, the trip threshold for inlet vacuum is 2.4 psi.

• **Unit Too Cold To Start**

This will occur if the compressor does not have the low ambient option, the airend discharge temperature (2ATT) is less than 35 °F, and the operator attempts to start the compressor. This fault can only occur once a day. Once this fault occurs, the operator can reset it and start the compressor. This fault will be logged in the trip history to indicate that the compressor is being started in low ambient conditions.

• **High Interstage Pressure**

This will occur if the compressor is running and the interstage pressure (2APT) is greater than 75 psi. This trip will only occur in 2 stage compressors.

• **Blower Fault**

This will occur if the variable speed blower setting is enabled, the output to the isolation contact for the blower VSD is on, the compressor is running, and fan motor overload input opens for 3 seconds.

• **Control Power Loss**

This will occur if the control power input (auxiliary 2) opens for at least 0.5 seconds and the setting Enable Control Power Loss is enabled.

■ **START INHIBIT LIST**

• **High Airend Discharge Temperature**

This will occur if 2ATT is greater than 95% of 228 °F.

• **High Sump Pressure**

This will occur if the sump pressure (3APT) is 25 psi or higher than the rated pressure of the compressor.
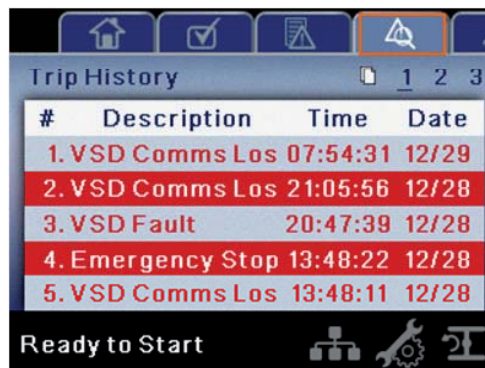
• **Isolation Contact Open**

This will occur if the compressor is equipped with a variable speed blower and the isolation contact is not energized.

■ **TRIP HISTORY**

• **PAGES 1-4 (MAX.)**

Figure 14 : Trip History

The pages in the Trip 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 event.
• Power ON
• Power OFF
• Press the Start Key
• Press the Stop Key
• Press the Load Key
• Press the Unload Key
• Warning
• Trip
• Start Inhibit

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.

Figure 15 : Trip History Dialog

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**

Figure 16 : Individual Graphs

Graphing is only available on the Xe-145 controller.

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.

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**

Figure 17 : 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**

Figure 18 : Filter Status

This page displays the following:

• Separator Element Status

• Coolant Filter Status

• Inlet Filter Status

• PAC Active

• **PAGE 2: MAINTENANCE STATUS**

Figure 19 : Maintenance Status

This page displays the time until the compressor should be serviced.

• **PAGE 3: MAINTENANCE CONFIGURATION**

Figure 20 : Maintenance Configuration
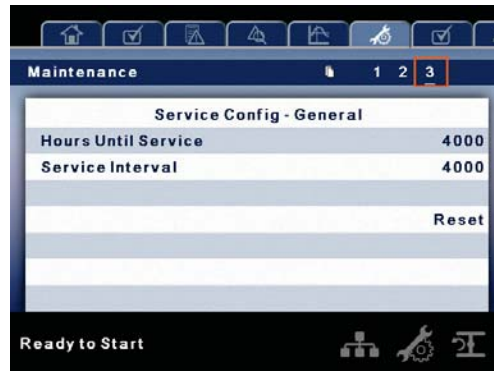
This page allows the user to set the service interval and to reset the counter after the service has been performed.

■ **GENERAL SETTINGS FOLDER**

NOTICE

All parameters in this folder are adjustable.

• **PAGE 1: LANGUAGE SELECTION**

Figure 21 : Language Selection

Language is selectable from the following 31 choices:

- English (default)
- Bulgarian
- Chinese, simplified
- Croatian
- Czech
- Danish
- Dutch
- Estonian
- Finish
- French
- German
- Greek
- Hungarian
- Italian
- Indonesian
- Korean
- Latvian
- Lithuanian
- Maltese
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Slovak
- Slovenian
- Spanish
- Swedish
- Thai
- Turkish
- Japanese

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.

The following compressors of measure settings are displayed in this section.

Table 11 : Units of Measure Settings

Display Text	Description
Temperature	Selectable between °F and °C.
Pressure	Selectable among psi, kpa, bar, kg/cm².
Date Format	Selectable between dd/mm/yyyy (default) and mm/dd/yyyy.

• **PAGE 2: TIME & DATE SETTINGS**

Figure 22 : Time & Date Settings

All items are adjustable.

The following settings are displayed in this section:

Table 12 : Time & Date Settings

Display Text	Description
Time	Allows the current hours, minutes, and seconds to be set. The time format is 00:00:00.
Year	Allows current year to be set.
Month	Allows current month to be set.
Day	Allows current day to be set.
Confirm Time and Date	Used to verify that changes to selections are desired. Select Apply 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.

NOTICE

The controller does not support Daylight Savings Time.

• **PAGE 3: HOME PAGE SELECTION**

Figure 23 : Home Page Selection

Table 13 : Home Page Selection

Display Text	Description
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.
Home Folder	Used to select the Home folder.
Home Page	Used to select the Home Page within the selected Home folder.

- **PAGE 4: BACKLIGHT SETTINGS**

Figure 24 : Backlight Settings

The following settings are displayed in this section:

Table 14 : Backlight Settings

Display Text	Description
Backlight Brightness	Adjusts the brightness of the display.
Backlight Auto-Off	Enables the controller to shut-off the backlight if there is no user activity for the delay time shown.
Backlight Off Delay	Determines how many seconds of inactivity it will take before the controller will shut-off the backlight.

NOTICE

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

The START, STOP, LOAD, UNLOAD, RESET, and ACKNOWLEDGE keys on the controller 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.

- **PAGE 5 - PROTOCOLS**

Figure 25 : Protocols
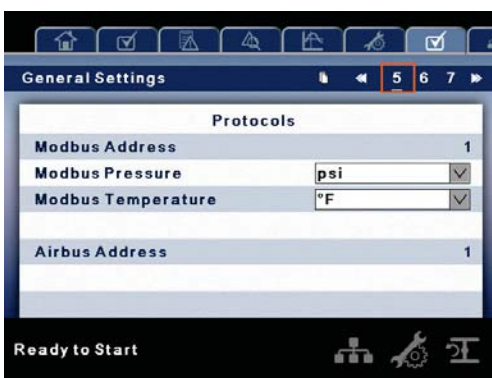
This page allows the user to set up the network addresses for the RS-485 networks the controller is capable of communicating with.

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.

- **PAGE 6 - COM2 CONFIGURATION**

Figure 26 : COM2 Configuration

This page allows the user to adjust the baud rate, stop bits, and parity for Com 2.

Baud Rate - The baud rate is adjustable from 9600 to 115200.

Stop Bits - The stop bits can be set as 1 or 2.

Parity - The parity can be set as none, even, or odd.

Apply – After editing the desired settings 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 Com2 configuration settings.

- **PAGES 7-8: ETHERNET SETTINGS**

Figure 27 : 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.

- **PAGE 9 : OPTION MODULE INFORMATION**

Figure 28 : Installed Options

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**

- **PAGES 1 THRU 3 : ETHERNET SETTING**

Figure 29 : Ethernet Settings

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**.**

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 1.0 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 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

NOTICE
All information on these pages is read only.

PAGES 1-3: ANALOG INPUTS

Figure 30 : Analog Inputs

The following inputs are displayed in this section:
- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- After-cooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- After-cooler Discharge Pressure (integrated dryer compressors only)
- Remote Pressure (optional)
- Coolant Filter Inlet Pressure
- Coolant Filter Outlet Pressure
- Interstage Pressure (2-stage compressors only)
- Evaporator
- Condenser

PAGES 4-5: COMPRESSOR DATA

Figure 31 : Compressor Data
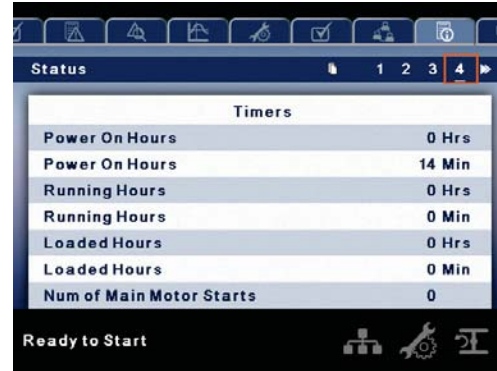
The following data are displayed in this section:
- Power On Hours and Minutes
- Running Hours and Minutes
- Loaded Hours and Minutes
- Number of Main Motor Starts
- Real Time Clock

EN

- **PAGES 6-7: DIGITAL INPUTS**

Figure 32 : Digital Inputs

A marked 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, E-Stop is TRUE when its input is at 0Vdc.

- Emergency Stop
- Main Motor Overload
- Fan Motor Overload
- Condensate Drain Error
- Remote Stop
- Remote Start
- Remote Lead/Lag
- Remote Load Enable
- Remote Load/Unload
- Auxiliary Input 1
- Auxiliary Input 2
- Dryer High Pressure

- **PAGES 8-9: DIGITAL OUTPUTS**

Figure 33 : Digital Outputs

A marked checkbox beside a digital output indicates that it is energized.

- Starter Contact 1
- Starter Contact 2
- Fan Starter Contact
- 1SV
- 5SV
- Condensate Drain
- Dryer Run / Fan Run
- PORO Horn
- Trip Relay
- Warning Relay
- True Running

NOTICE
(RO) indicates read-only values.

- **PAGE 10: ANALOG OUTPUTS**

Figure 34 : Analog Outputs

The value for the analog outputs will be in mA.

- VSD Blower Output

NOTICE
(RO) indicates read-only values.

■ *FACTORY SETTINGS FOLDER*

This folder is for 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**

Figure 35 : Password

Table 15 : Password

Display Text	Description
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.
Enable PW Timeout	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.

- **PAGES 2-5: FACTORY SETTINGS**

Figure 36 : 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 (psi – 100, 115, 135, 190)

- Enable Two Stage (On/Off)

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

- Service Level (0, 1, or 2)

- Enable Modulation (On/Off)

- Enable PAC (On/Off)

- Enable Dryer (On/Off)
- Constant Run Dryer (On/Off)
- Enable VSD Blower (On/Off)
- Limit Blower VSD (On/Off)
- Enable Low Ambient (On/Off)
- Blower Speed (adjustable)
- Max Inlet Vacuum (adjustable)
- Gateway (On/Off)
- Enable Control Power Loss (On/Off)
- Running Hours (adjustable)
- Loaded Hours (adjustable)
- Power On Hours (adjustable)
- Number of Main Motor Starts (adjustable)

- **PAGES 6-7: SOFTWARE VERSION**

Figure 37 : Softare Version

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

■ **FOLDER OPTIONS (VARIABLE SPEED)**

■ *HOME FOLDER*

- **PAGE 1: SYSTEM OVERVIEW**

Figure 38 : Systems Overview
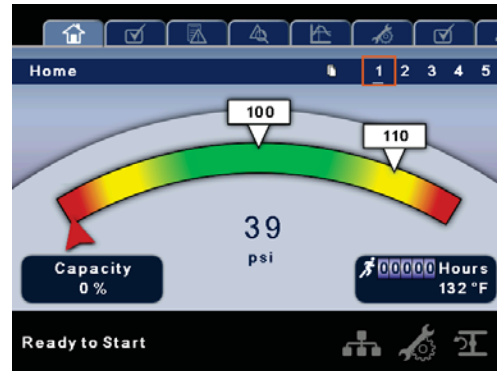
This is the factory default display after powering up the system.

- **Target Pressure Setpoint** is indicated in the white box and by the white arrow, which is always centered on the gauge. This is the pressure that the compressor is trying to maintain.
- **Automatic Stop Setpoint** is indicated in the white box and by the white arrow, which is always right of center on the gauge. When the compressor reaches this setpoint the compressor will unload and stop.
- **Package Discharge Pressure** is indicated by the large numbers centered below the gauge and by the red arrow. This is the output pressure of the compressor.
- **Pressure Unit of Measure** is indicated below the Package Discharge Pressure. This is selectable from the GENERAL SETTINGS folder.
- **Percent Capacity** is indicated on the lower left side of the screen. This is how much air the compressor is producing as a percentage of its maximum capacity.
- **Airend Discharge Temperature** is indicated by the numbers in the lower right of the display.
- **Temperature Unit of Measure** is indicated to the right of the Airend Discharge Temperature. This is selectable from the GENERAL SETTINGS folder.
- **Run Hours** indicate the number of hours the compressor has been running.

NOTICE
The target pressure and automatic stop set points can be selected and modified on this page. All other information on this page is read only.

• **PAGE 2: COUNTERS**

Figure 39 : Counters
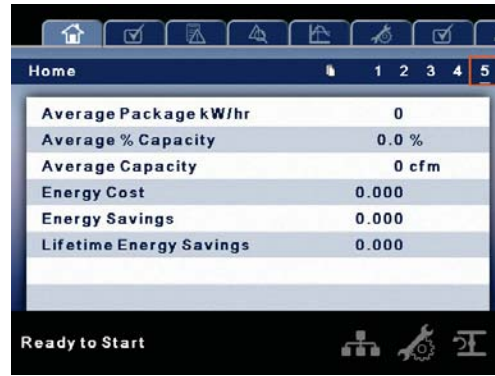
• **Hour Meters** indicate the hours that: the controller has been powered up, and the compressor has been running.

• **Starts** indicate the number of times a start is attempted on the compressor.

• **Date & Time** is adjustable and configurable in the GENERAL SETTINGS folder.

NOTICE

All information on this page is read only.

• **PAGES 3-5: ANALOG INPUTS & COMPRESSOR INFORMATION**

Figure 40 : Analog Inputs & Compressor Information

Icon	Meaning
	Pressure
	Temperature

NOTICE

All information on these pages is read only.
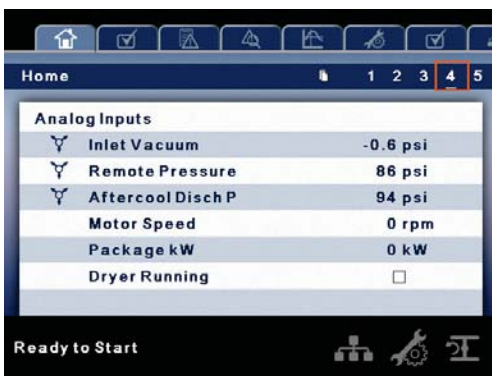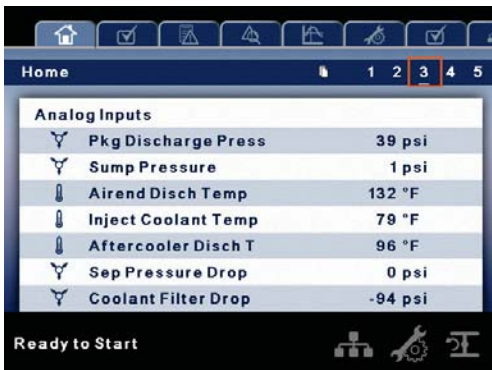
The following analog inputs are displayed in this section:

• Package Discharge Pressure

• Sump Pressure

• Airend Discharge Temperature

• Injected Coolant Temperature

• After-cooler Discharge Temperature

• Separator Pressure Drop

• Coolant Filter Pressure Drop

• Inlet Vacuum

• Remote Pressure (optional)

• After-cooler Discharge Pressure (integrated dryer compressors only)

Additionally, the following compressor status readings are included in this section:

• Motor Speed

• Package kW

• Dryer Running

• Average Package kW/hour

• Average % Capacity

• Average Capacity

• Energy Cost

• Energy Savings

• Lifetime Energy Savings

■ **OPERATOR SETTINGS FOLDER**

• **PAGES 1: OPERATOR SETTINGS**

Figure 41 : Operator Settings

The parameters below are adjustable at any time:

Table 16 : Operator Settings

Operator Settings	Default	Min.	Max.	Step	Unit
Target Pressure	100	65	145	1	psi
Automatic Stop Pressure	110	Target+1	Target+10	1	psi
Immediate Stop Pressure	120	Auto	Auto+10	1	psi
% Savings Compared To	Modulation	---	---	---	---
Energy Rate	0.000	0.000	9999.999	---	---
Reset Averaging	--/--/--	-	-	-	Date
Condensate Release	5	2	20	1	Sec
Condensate Interval	180	90	270	1	Sec

• **PAGES 2-3: OPERATOR OPTIONS**

Figure 42 : Operator Options

The parameters immediately below are only adjustable when the compressor is stopped.

The options set points are similar to the operator set points except these set points cannot be changed while the compressor is running.

Table 17 : Operator Options

Option Items	Selection	Min.	Max.	Step	Unit	Installed option required?
Remote Sensor	ON/OFF	---	---	---	---	No
Comm Control	ON/OFF	---	---	---	---	No
Remote Start-Stop	ON/OFF	---	---	---	---	No
Enable PORO	ON/OFF	---	---	---	---	Yes
PORO Time	---	10	600	1	Sec	Yes
Scheduled Start Day	---	Day	Day	1	Day	Yes
Scheduled Start Hour	---	00:00	23:59	1	Time	Yes
Scheduled Stop Day	---	Day	Day	1	Day	Yes
Scheduled Stop Hour	---	00:00	23:59	1	Time	Yes

If an option has not been purchased and installed in the compressor, the message "Not Installed" will be shown on the selection display screen. Installation of options will be done using the **Ingersoll Rand** service tool.

* The low ambient temperature is only adjustable if the low ambient factory set point is ON.

** A value of 0 will disable the lead/lag cycle time feature.

- **PAGE 4-5: SENSOR CALIBRATION**

Figure 43 : Sensor Calibration

Sensor calibration can only take place when the compressor is stopped. There should be no pressure on a sensor when it is calibrated. Calibration only needs to take place after a sensor is replaced, the controller is replaced, 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)
- Sump Pressure (3APT)
- Package Discharge Pressure (4APT)
- Coolant Filter Inlet Pressure (5CPT)
- Coolant Filter Outlet Pressure (6CPT)
- Remote Pressure (10APT) – Only on compressors with the remote sensor option
- Interstage Pressure (2APT) – Only on 2-stage compressors
- After-cooler Discharge Pressure (7APT) – Only on compressors with integrated dryer

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. Please make sure the sensor is being exposed to atmosphere before attempting calibration.

- **EVENTS FOLDER**

- **PAGES 1-42 (MAX.)**

Figure 44 : Events Folder

The pages in the Events folder document up to the last 250 events that the controller has experienced, and time stamps each. 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 the events, with each page displaying up to seven. Page one displays events one through six, page two displays seven through twelve, and so on.

The following actions will generate an event:

- Power ON
- Power OFF
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Warning
- Trip
- Start Inhibit

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

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

Active Start Inhibits will be highlighted in blue while cleared Start Inhibits will have blue text. The display will indicate the compressor is not ready to start if a start inhibit is active.

See the following lists for details about messages in each type of event.

- **WARNING EVENTS LIST**

- **Change Inlet Filter**

This will occur if the compressor has been running for at least 7 seconds, the motor speed is equal to or greater than the minimum speed, and the inlet vacuum is greater than 0.7 psi. This condition must exist for 3 seconds.

- **Change Coolant Filter**

This will occur if the compressor has been running for at least 7 seconds, the injected coolant temperature is at least 140 °F, the motor speed is at least equal to the minimum speed, and the coolant filter pressure drop (5CPT - 6CPT) is greater than 25 psi. This condition must exist for 150 seconds before the warning will occur.

- **Sensor Failure (Units without Integrated Dryer)**

Will occur whenever a sensor is recognized as missing or broken. The sensors affected by this warning are 1ATT, 2ATT, 4ATT, and 3CTT. The sensor failure message shall follow the following format: SENSOR FAILURE 4ATT. The conditions for a sensor failure warning must exist for 3 seconds before the warning will be issued.

- **Sensor Failure (Units with Integrated Dryer)**

Will occur whenever a sensor is recognized as missing or broken and the compressor has an integrated dryer. The sensors affected by this warning are 5DTT and 6DTT. The sensor failure message shall follow the following format: SENSOR FAILURE 5DTT. The conditions for a sensor failure warning must exist for 3 seconds before the warning will be issued.

- **Change Separator Element**

This will occur if the compressor has been running for at least 7 seconds, the injected coolant temperature is at least 120 °F, the package discharge pressure is at least 65 psi, and the separator pressure drop is at least 12 psi. If the target pressure is less than 90 psi, the warning value will increase 1 psi per 5 psi in reduced target pressure. For example, if the target pressure is between 89 and 85 psi, the warning value will be 13 psi. This condition must exist for 3 seconds before the warning is issued.

- **High Airend Disch Temp**

Will occur if the compressor is running and 2ATT is greater than 221 °F (97% of 228) or the compressor is in idle mode and 2ATT is greater than 184 °F. This warning will normally have a 5 second delay, however, if the hot side thermal valve is set to ON, this warning will have a 90 second delay.

- **High Discharge Press**

Will occur if the compressor is under the control of an external device, such as an X-series, and the discharge pressure is greater than the immediate stop pressure. This condition must exist for 3 seconds before the warning is issued.

- **Auxiliary Warning 1 (2)**

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

- **Service**

Service warnings could change significantly once the predictive maintenance warnings have been determined.

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

- **Service Level 1**

If service level 1 has been selected for the compressor, a "SERVICE REQUIRED" warning will be issued the amount of operating hours in the Service Time Period set point. This warning can be reset the same as any other warning.

- **Service Level 2**

If service level 2 has been selected for the compressor, 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 first "SERVICE REQUIRED" warning will occur at the total hours value of 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, at the total hours value of the service time period, 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 be set. If the service complete has not been set, 100 hours later (service time period + 100) 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.

- **Condensate Drain Error**

This will occur if the compressor is running, the package discharge pressure is over 50 psi, and the condensate drain error contact closes for at least 30 minutes. This warning will be ignored for 4.5 minutes after starting.

- **High VSD Ambient Temperature**

This warning will occur if the VSD ambient temperature gets within 5% of the shutdown value (133 °F). This condition must exist for 3 seconds before the warning will be issued.

- **Freeze Warning**

This will occur if the evaporator sensor has a value of 687 (about 0.5 °C) or below (low temp) while the dryer is running, on compressors with the integrated dryer. This is a dryer fault. If this happens, the compressor will continue to run, but the dryer will stop. The condition must exist for at least 180 seconds before the warning will occur. NOTE: If this warning is reset while the conditions for running the dryer exist, the dryer can restart. Also the dryer can restart if the evaporator value rises to 709 (about 5 °C). However the warning will still be displayed.

- **Dryer High Pressure**

On compressors with an integrated dryer, this will occur if the dryer high pressure switch opens while the dryer is running. This is a dryer fault. If this happens, the compressor will continue to run, but the dryer will stop. The contact must be open for at least three seconds before the warning will occur. If this warning is reset while the conditions for running the dryer exist, the dryer can restart. However, this switch is a locking switch. The switch must be reset before the dryer can run. Resetting the warning on the display does not reset the switch.

- **Sensor Failure 10APT**

This will occur whenever the remote sensor is recognized as missing or broken. The sensor failure message shall follow the following format: SENSOR FAILURE 10APT. If this warning occurs, the compressor will automatically switch to the package discharge pressure sensor for control. This condition must exist for 3 seconds before the warning will be issued.

- **High Sump Pressure**

This will occur if the compressor is running, the package discharge pressure is at least 65 psi, and the sump pressure is more than 15 psi (22 psi for units with an integrated dryer) above the target pressure. The occurrence of this warning will cause the controller to evaluate the need to lower the maximum speed. This condition must exist for 3 seconds before the warning will be issued.

- **Condenser Temperature High**

This will occur if the condenser sensor has a value of 1019 (about 65 °C) or above (high temp) while the dryer is running, on compressors with the integrated dryer. This is not a dryer fault. If this happens, the compressor and dryer will continue to run. The condition must exist for at least 180 seconds before the warning will occur.

- **Condenser Temperature Low**

This will occur if the condenser sensor has a value of 887 (about 40 °C) or below (low temp) while the dryer is running, on compressors with the integrated dryer. This is not a dryer fault. If this happens, the compressor and dryer will continue to run. The condition must exist for at least 180 seconds before the warning will occur.

- **Change HE Filter**

The HE filter is located between the after-cooler discharge and the inlet to the dryer and is only on compressors with an integrated dryer. The drop across the HE filter is measured by subtracting the package discharge pressure from the after-cooler discharge pressure. If the compressor is running at a minimum of 75% capacity, the measured drop across the HE filter is at or above 10 psi (0.7 bar), the compressor is hot (injected coolant temp above 120 °F), and the package discharge pressure (4APT) is above 90 psi, this warning can occur. The condition must exist for at least 3 seconds before the warning will occur. This is not a dryer fault. If this happens, the warning will be displayed, but the dryer will continue to run.

- **Replace Coolant Filter**

This will occur if the idle mode is set to on. This trip is used as a reminder to **Ingersoll Rand** service to only use idle mode if a new coolant filter is installed.

- **Invalid Calibration**

Will occur if the sensor zero value is +/- 10% of its scale. This will only occur when a sensor is calibrated.

■ **TRIP EVENTS LIST**

- **High Airend Disch Temp**

This will occur if 2ATT is greater than 228 °F during normal operation. This trip will occur at 200 °F if the compressor is in idle mode.

- **Blower Fault**

Will occur if the fault contact opens for 3 seconds on the blower VSD and the compressor is running or stopped in auto restart. This trip will not occur on water cooled units..

- **Remote Stop Failure**

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

- **Remote Start Failure**

Will occur if the compressor is started by the remote start button and the button stays closed for 7 seconds after the compressor starts.

- **Sensor Failure**

This will occur when a sensor is recognized as missing or broken. The sensors affected by this trip are 4APT, 3APT, 2APT, 1AVPT, 5CPT, 6CPT, 7APT and 2ATT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: SENSOR FAILURE 4APT. Sensor 4APT has the following additional logic. A sensor failure 4APT will be issued if the sump pressure is over 100 psi and the package discharge pressure (4APT) is 50 psi less than the sump pressure. 2APT is only a sensor failure on 2-stage units. 7APT is only a sensor failure on units with an integrated dryer.

- **Emergency Stop**

This will occur when the EMERGENCY STOP button is engaged.

- **VSD Fault**

For R30-37 kW, the VSD fault is read from drive, controller only shows VSD FAULT. Once fault is eliminated from drive, VSD fault can be cleared by pressing the reset button and machine can be restarted.

For R37e-160 kW, the VSD fault is read from the drive. The controller will read the status menu of the variable speed drive. If a fault condition is returned in the status information, the controller will issue a VSD FAULT trip and display the number of the fault condition. VSD faults 39 – 42 and 44 cannot be cleared by pressing the reset button. All other VSD faults can be cleared by pressing the reset button. The only way to clear a VSD fault 39 – 42 or 44 is by cycling the power on the compressor. Cycling the power causes the VSD to execute a power module test. The power module test must be passed before the compressor can be restarted after a VSD fault 39 – 42 or 44. VSD faults 39, 40, and 41 (IGBT failures) have additional logic associated with them. Due to false trips the logic was modified to allow an automatic restart. If the VSD fault 39, 40, or 41 occurs, the controller will trip and display the fault message. After two minutes, the controller will issue a command to the VSD to run the power module test. While the VSD is running the power module test, the controller will force itself into a reset. Upon completing the reset, the controller will monitor the VSD for completion of the power module test. If the power module test is completed and all conditions have passed, the controller will automatically restart the compressor. If the power module test is failed, the controller will show the power module test failure message and the failure code. The controller will not allow more than five automatic restarts of VSD Fault 39 – 41 within a 24 hour period. The controller will also not allow two automatic restarts of VSD Fault 39 – 41 within a 10 minute period. If a VSD Fault 39 – 41 occurs and violates the time periods, the controller will not issue a power module test and restart. It will display the fault and not allow a reset from the controller. The operator must cycle power. Another exception on all drives are VSD faults 10, 12 – 14, and 16. If the compressor trips due to one of these faults, instead of shutting down on the VSD fault, the controller will reset and then restart the compressor. If the compressor is equipped with a power outage restart option (PORO), the controller will execute a PORO restart. If the compressor does not have PORO, the controller will restart the compressor 10 seconds after the controller has reset. A compressor will be allowed to do this up to five times in a one hour period. If the compressor exceeds five occurrences within a one hour period, the sixth occurrence will be treated like a regular VSD fault.

- **Low Sump Pressure**

This will occur if the compressor is operating and the sump pressure drops below 13 psi for 15 seconds.

- **Check Motor Rotation**

This will occur if the controller reads a negative speed from the VSD when starting. This fault is checked after every power cycle. Once correct rotation is established, this fault will not be checked again until power is cycled on the controller.

- **VSD Communication Failure**

This will occur if the controller does not receive a response from the VSD when requesting information. This trip will take about 8 seconds to occur.

- **Incorrect VSD Type**

This will occur at power up if the VSD type does not match the size of compressor. The controller will determine this by comparing the compressor type with the drive ID board.

- **Control Power Loss**

This will occur if the compressor should be running and the AC input voltage, as read from the VSD, falls below 300 VAC (480 VAC if the unit is rated for 575 volts). There is a delay of 5 seconds on this trip in case the power quickly returns.

- **Stop Failure**

This will occur if the compressor should be stopped, but the motor speed has not dropped below the minimum motor speed set point. The controller will wait 8 seconds for the compressor to stop before issuing this trip.

- **High Interstage Pressure**

This will occur if the compressor is running, is a two stage compressor, and the interstage pressure is above 75 psi.

- **High Coolant Filter Pressure Drop**

This will occur if the compressor has been running for at least seven seconds, the injected coolant temperature is at least 140 °F, already has a change coolant filter warning, the motor speed is at least equal to the minimum speed, and the coolant filter pressure drop (5CPT - 6CPT) is greater than 35 psi. This trip has a 10 second delay.

- **High Inlet Vacuum**

This will occur if the compressor is running loaded, the motor speed is at least minimum speed, and the inlet vacuum is greater than 1.8 psi (vacuum).

- **High Sump Pressure**

This will occur if the compressor is running and any one of the three following conditions exist: (1) The sump pressure is above the target pressure by 25 psi. (2) The separator pressure drop is measured to be more than 25 psi (32 psi if unit is equipped with an integrated dryer) and the package discharge pressure is at least 65 psi. (3) The sump pressure is above 168 psi.

- **Power Module Timeout**

The VSD will automatically do a power module test at power up. The controller will monitor the power module test result parameter. A value of 0 will indicate the power module test is running. If it does not complete within 20 seconds after power up, the controller will issue the trip.

- **Fan Motor Overload**

Will occur if the fault contact opens for 3 seconds and the unit is water cooled.

■ **START INHIBIT LIST**

• **High Airend Discharge Temperature**

This will occur if 2ATT is greater than 95% of 228 °F.

• **High Sump Pressure**

This will occur if the sump pressure (3APT) is 25 psi (32 psi if the unit is equipped with an integrated dryer) or higher than the rated pressure of the compressor.

• **Waiting for VSD Comms**

This will occur if the compressor VSD has not responded to the initial communications from the controller.

• **Power Module Test**

This will occur if the VSD is running a power module test.

• **High VSD Ambient**

This will occur if the VSD ambient temperature rises to 133 °F while the compressor is stopped.
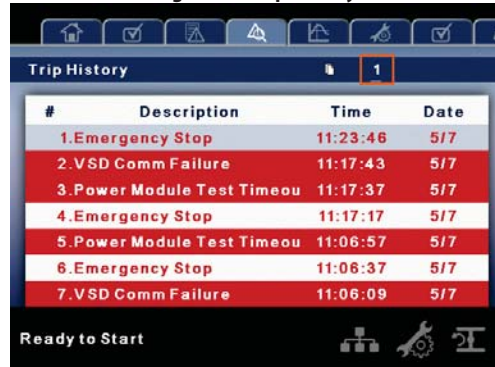
• **Isolation Contact Open**

This will occur if the isolation contact has been cycled too many times.

■ *TRIP HISTORY*

• **PAGES 1-2 (MAX.)**

Figure 45 : Trip History

The pages in the Trip 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 actions will generate an event:

• Power ON
• Power OFF
• Press the Start Key
• Press the Stop Key
• Press the Load Key
• Press the Unload Key
• Warning
• Trip
• Start Inhibit

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 pressing the enter button will activate the trip history dialog box.

Figure 46 : Trip History Dialog

While the dialog box is active, press the left and right keys 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**

Figure 47 : Individual Graphs

Graphing is only available on the Xe-145 controller.

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.

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**

Figure 48 : 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**

Figure 49 : Filter Status

This page displays the following:

• Coolant Filter Status

• Separator Element Status

• Inlet Filter Status

• PAC Active

• **PAGE 2: MAINTENANCE STATUS**

Figure 50 : Maintenance Status

This page displays the time until the compressor should be serviced.

• **PAGE 3: MAINTENANCE CONFIGURATION**

Figure 51 : Maintenance Configuration

This page allows the user to set the service interval and to reset the counter after the service has been performed.

■ **GENERAL SETTINGS FOLDER**

<div style="background:black;color:white">

NOTICE

</div>

All parameters in this folder are adjustable.

- **PAGE 1: LANGUAGE SELECTION**

Figure 52 : Language Selection

Language is selectable from the following 31 choices:

• English (default)	• Korean
• Bulgarian	• Latvian
• Chinese, simplified	• Lithuanian
• Croatian	• Maltese
• Czech	• Norwegian
• Danish	• Polish
• Dutch	• Portuguese
• Estonian	• Romanian
• Finish	• Russian
• French	• Slovak
• German	• Slovenian
• Greek	• Spanish
• Hungarian	• Swedish
• Italian	• Thai
• Indonesian	• Turkish
	• Japanese

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.

The following compressors of measure settings are displayed in this section:

Table 18 : Units of Measure Settings

Display Text	Description
Pressure	Selectable among psi, kpa, bar, kg/cm².
Temperature	Selectable between ºF and ºC.
Flow	Selectable between CFM and m³/m.

- **PAGE 2: TIME & DATE SETTINGS**

Figure 53 : Time & Date Settings
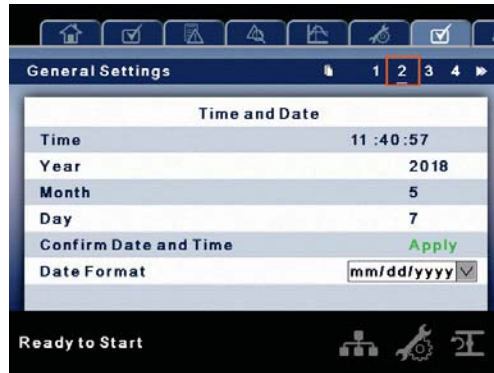
All items are adjustable.

The following settings are displayed in this section:

Table 19 : Time & Date Settings

Display Text	Description
Time	Allows the current hours, minutes, and seconds to be set. The time format is 00:00:00.
Year	Allows current year to be set.
Month	Allows current month to be set.
Day	Allows current day to be set.
Confirm Date and Time	Used to verify that changes to selections are desired. Select Apply before any changes will take effect.
Date Format	Selectable between dd/mm/yyyy (default) and mm/dd/yyyy.

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.

<div style="background:black;color:white">

NOTICE

</div>

The controller does not support Daylight Savings Time.

- **PAGE 3: HOME PAGE SELECTION**

Figure 54 : Home Page Selection

The following settings are displayed in this section:

Table 20 : Home Page Selection

Display Text	Description
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.
Home Folder	Used to select the Home folder.
Home Page	Used to select the Home Page within the selected Home folder.

- **PAGE 4 : BACKLIGHT SETTINGS**

Figure 55 : Backlight Settings

The following settings are displayed in this section:

Table 21 : Backlight Settings

Display Text	Description
Backlight Brightness	Adjusts the brightness of the display.
Backlight Auto Shutoff	Enables the controller to shut-off the backlight if there is no user activity for the delay time shown.
Backlight Off Delay	Determines how many seconds of inactivity it will take before the controller will shut-off the backlight.

NOTICE

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

The START, STOP, LOAD, UNLOAD, RESET, and ACKNOWLEDGE keys on the controller 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.

- **PAGE 5 - PROTOCOLS**

Figure 56 : Protocols
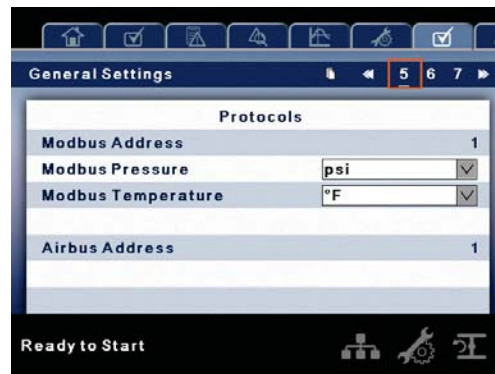
This page allows the user to set up the network addresses for the RS-485 networks the controller is capable of communicating with.

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.

- **PAGE 6 - COM2 CONFIGURATION**

Figure 57 : COM2 Configuration

This page allows the user to adjust the baud rate, stop bits, and parity for Com 2.

Baud Rate - The baud rate is adjustable from 9600 to 115200.

Stop Bits - The stop bits can be set as 1 or 2.

Parity - The parity can be set as none, even, or odd.

Apply – After editing the desired settings 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 Com2 configuration settings.

- **PAGES 7-8: ETHERNET SETTINGS**

Figure 58 : Ethernet Settings
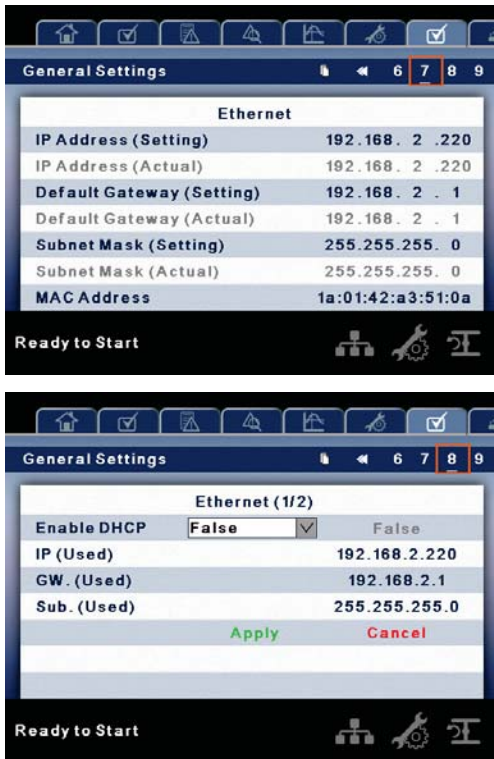
The following settings are displayed in this section:

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.

- **PAGE 9 : OPTION MODULE INFORMATION**

Figure 59 : Installed Options

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**

- **PAGES 1 THRU 3 : SETUP, TUNING, AND SEQUENCE**

Figure 60 : Integral Sequencing Settings

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**.**

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 1.0 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 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

! When using integral sequencing with variable speed compressors, only 1 compressor will change speeds and that compressor must be in the 1st position in the sequence.

■ **STATUS FOLDER**

NOTICE
All information on these pages is read only.

• **PAGES 1-3: ANALOG INPUTS**

Figure 61 : Analog Inputs
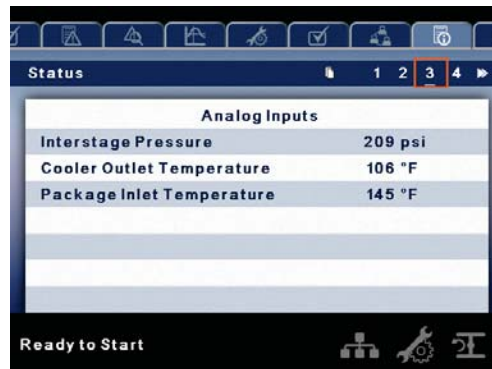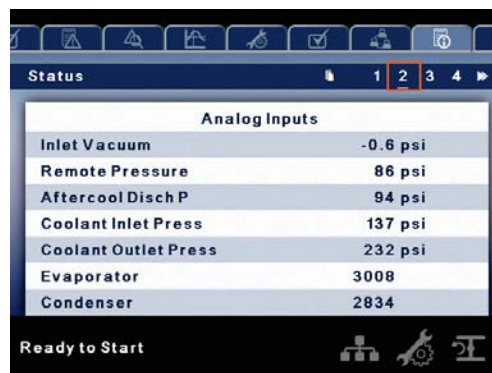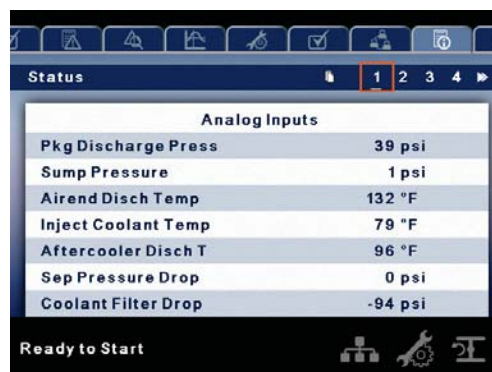
The following inputs are displayed in this section:

• Package Discharge Pressure

• Sump Pressure

• Airend Discharge Temperature

• Injected Coolant Temperature

• After-cooler Discharge Temperature

• Separator Pressure Drop

• Coolant Filter Pressure Drop

• Inlet Vacuum

• After-cooler Discharge Pressure (integrated dryer compressors only)

• Remote Pressure (optional)

• Coolant Filter Inlet Pressure

EN

- Coolant Filter Outlet Pressure
- Interstage Pressure (2-stage compressors only)
- Evaporator
- Condenser
- Cooler Out Temperature
- Package Inlet Temperature

- **PAGES 4-5: DIGITAL INPUTS**

Figure 62 : Digital Inputs

A marked 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, E-Stop is TRUE when its input is at 0Vdc.

The following are displayed in this section:

- Emergency Stop
- Blower Fault
- Condensate Drain Error
- Remote Stop
- Remote Start
- Auxiliary Input 1
- Auxiliary Input 2
- Dryer High Pressure

- **PAGES 6-7: DIGITAL OUTPUTS**

Figure 63 : Digital Outputs
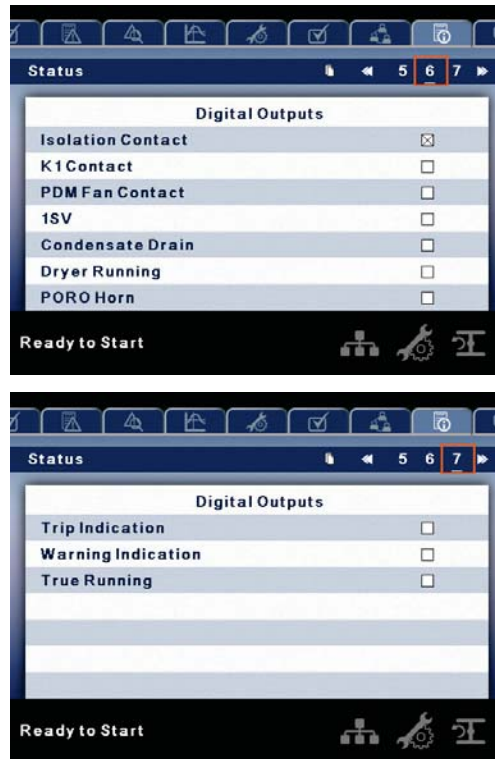
A marked checkbox beside a digital output indicates that it is energized.

- Isolation Contact
- K1 Contact
- PDM Fan Contact
- 1SV
- Condensate Drain
- Dryer Running
- PORO Horn
- Trip Relay
- Warning Relay
- True Running

NOTICE
(RO) indicates read-only values.

- **PAGE 8: ANALOG OUTPUTS**

Figure 64 : Analog Outputs

The value for the analog outputs will be in %.

- VSD Blower Output.

- **PAGES 9-11: COMPRESSOR DATA**

Figure 65 : Compressor Data
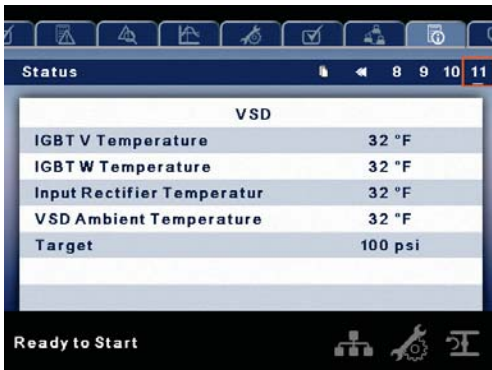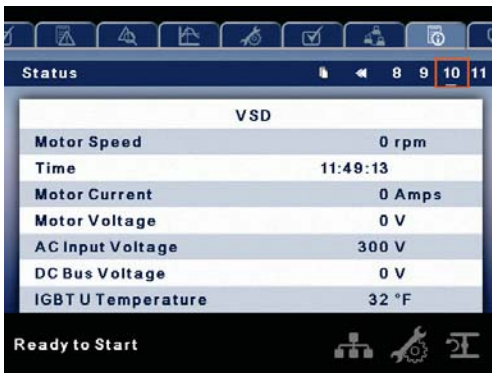
The following are displayed in this section:

- % Energy Savings
- % Capacity
- Package Power
- Power On Hours and Minutes
- Running Hours and Minutes
- Motor Speed
- Time
- Motor Current
- Motor Voltage
- AC Input Voltage
- DC Bus Voltage
- IGBT U Temperature
- IGBT V Temperature
- IGBT W Temperature
- Input Rectifier Temperature
- VSD Ambient Temperature
- Target Pressure

■ **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**

Figure 66 : Password

Table 22 : 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.
Timeout Delay:	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.

- **PAGES 2-4 : FACTORY SETTINGS**

Figure 67 : 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.

Compressor Type will be selected here. The choices are listed below:

- 37 kW/50 hp 1-S (46, 47) (38, 39)
- 45 kW/60 hp 1-S (47) (39)
- 55 kW/75 hp 1-S (48, 49) (40, 41)
- 75 kW/100 hp 1-S (49) (41)
- 90 kW 1-S (50, 51) (42, 43)
- 125 hp 1-S (50, 51) (42, 43)
- 110 kW 1-S (51) (43)
- 150 hp 1-S (51) (43)
- 132 kW 1-S (52, 53) (44, 45)
- 200 hp 1-S (53) (45)
- 160 kW 1-S (53) (45)
- 90 kW 2-S (50, 51) (42, 43)
- 125 hp 2-S (50, 51) (42, 43)
- 110 kW 2-S (51) (43)
- 150 hp 2-S (51) (43)
- 132 kW 2-S (52, 53) (44, 45)
- 200 hp 2-S (53) (45)
- 160 kW 2-S (53) (45)

Enable Water Cooled (ON/OFF)

Enable Two Stage (ON/OFF)

Enable PAC (ON/OFF)

Enable Dryer (ON/OFF)

Constant Running Dryer (ON/OFF)

Service Level (0, 1, or 2)

Variable Speed Delay (adjustable)

Remote Sensor Offset (adjustable)

Running Hours (adjustable)

Power On Hours (adjustable)

Number of Main Motor Starts (adjustable)

- **PAGES 5-8 : MAXIMUM VALUES**

Figure 68 : Maximum Values

The maximum values pages are used to record the highest value the controller has seen since the last time the maximum values have been reset. Each maximum value entry displays the highest value recorded as well as the time and date stamp of when these maximum values have occurred.

The final maximum value page has a reset setting at the bottom of the page, highlighting this button and hitting enter will cause the controller to clear all history of maximum values and begin recording them again. The password must be entered in order to use this reset functionality.

• **PAGE 9 : VSD DIAGNOSTICS**

Figure 69 : VSD Diagnostics
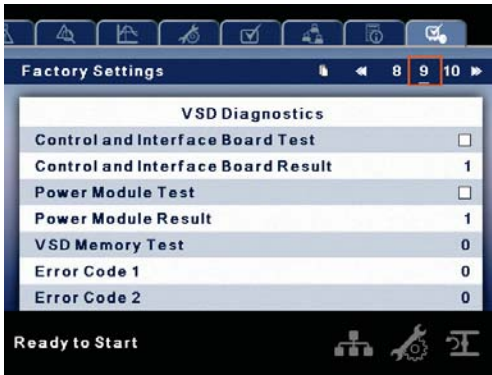
The VSD Diagnostics screens are used to troubleshoot any drive problems.

> **NOTICE**
>
> **These screens must only be used by authorized service technicians. The password must be entered in order to activate these diagnostic tests.**

• **PAGES 10 -12 : VSD SERVICE MENUS**

Figure 70 : VSD Service Menus

The VSD service menus contain parameters used to set up the compressor for optimal operation.

> **NOTICE**
>
> **These screens must only be used by authorized service technicians. The password must be entered in order to modify these parameters.**

• **PAGES 13-14 : SOFTWARE VERSION**

Figure 71 : Software Version

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

EN

WEB ACCESS

Ingersoll Rand Xe-90M/ Xe-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.
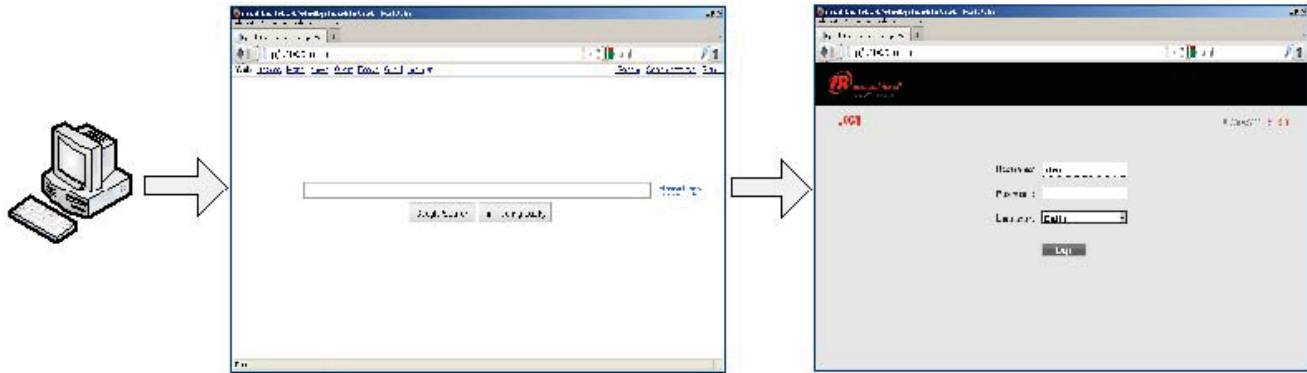
The system administrator can assign a user one of three levels of access (view only, user, and administrator) which will determine which functions will be available to that user. For example, only users with administrator access will be able to make new accounts and to view or modify the configuration overview parameters. See section Account Management.

The Xe-90M/ Xe-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 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".

WEB ACCESS

CONNECTING TO A PC

In order to configure your computer to communicate point-to-point with the Xe-90M/ Xe-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
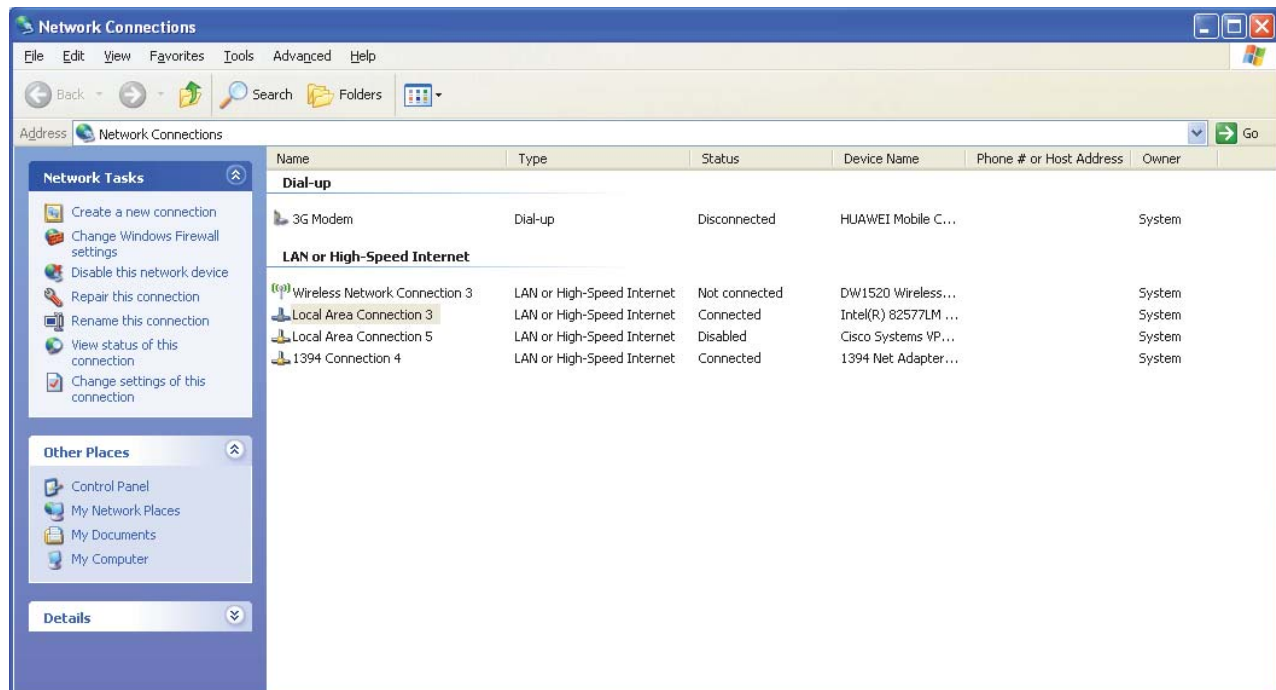
WEB ACCESS

2. Right click on the "Local Area Connection" and select "Properties".
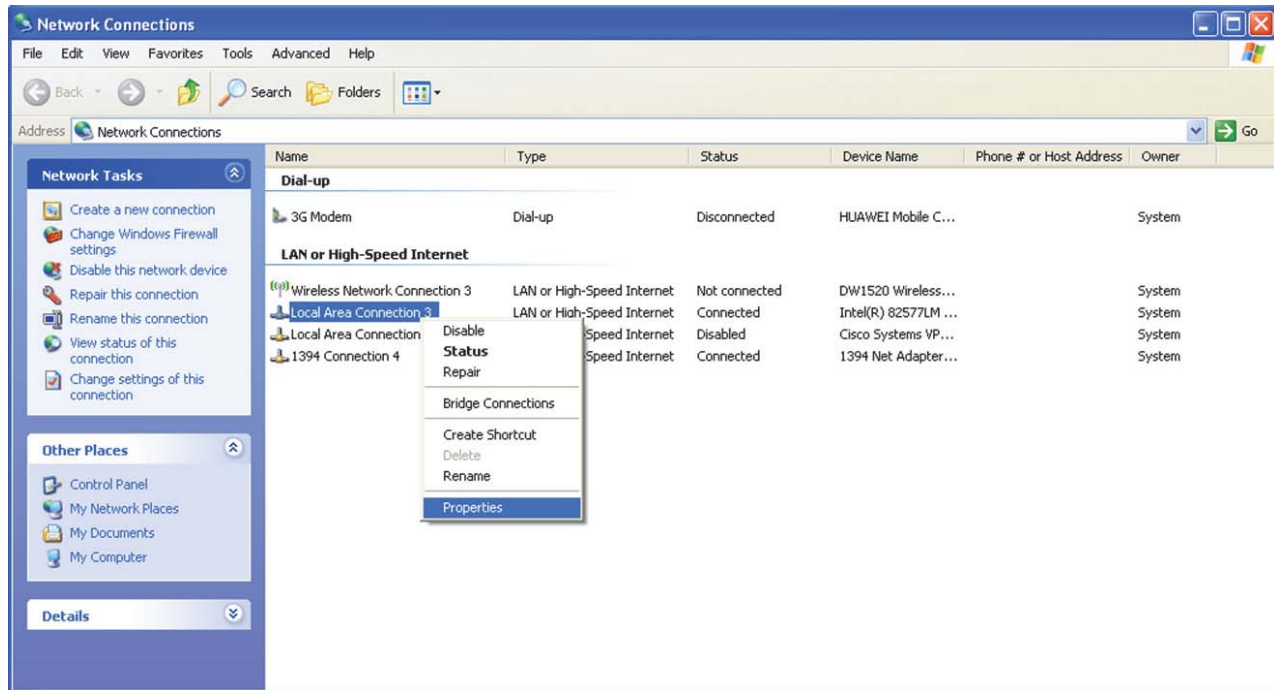
3. Scroll down the connection list to find the "Internet Protocol (TCP/IP)". Select the "Internet Protocol (TCP/IP)" and click on "Properties".
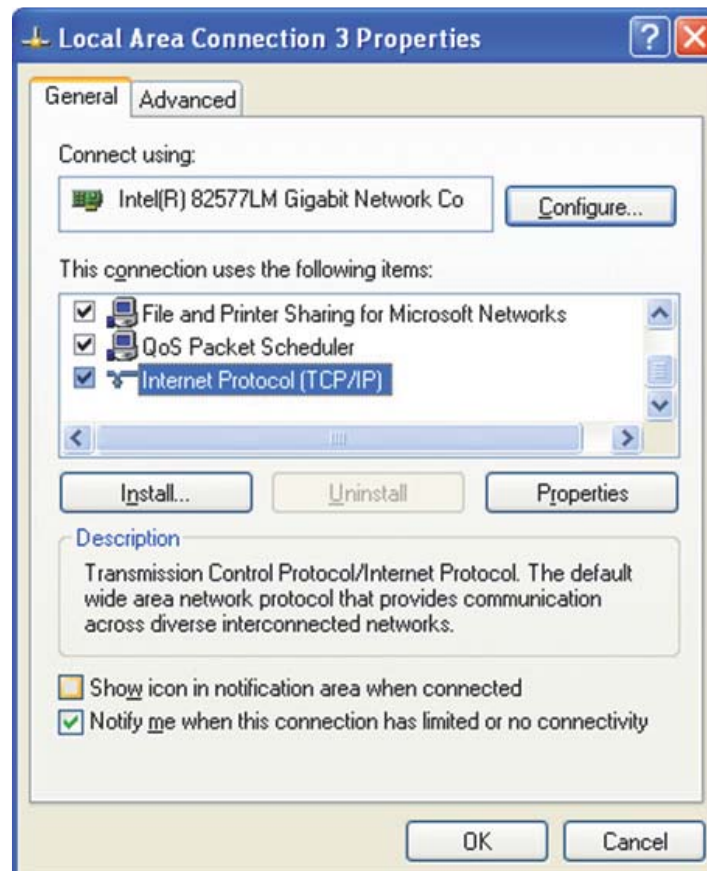
WEB ACCESS

4. Click on the "Alternative Configuration" tab.
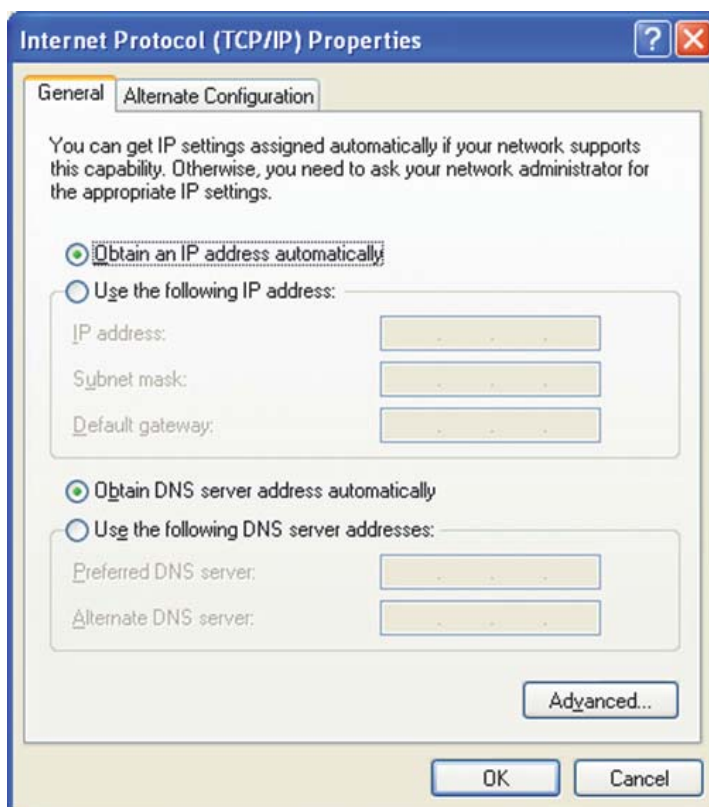
5. Click on "User Configured" Button.

EN
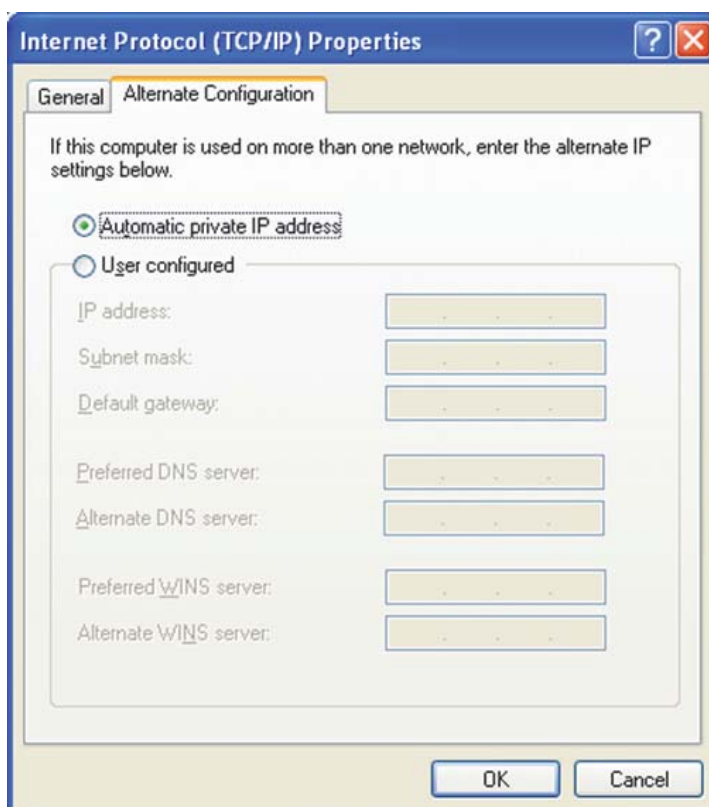
WEB ACCESS

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.

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

WEB ACCESS

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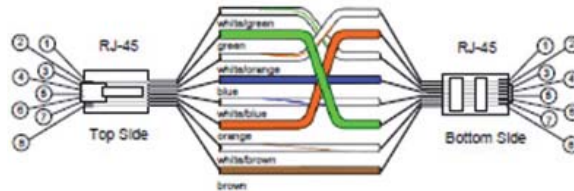
	The Ethernet cables are terminated with CAT 5 RJ-45 (RJ means "Registered Jack") modular plugs. RJ-45 plugs are similar to those seen on the end of a telephone cable except they have eight versus four or six contacts on the end of the plug and they are about twice as big

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.

EN

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.
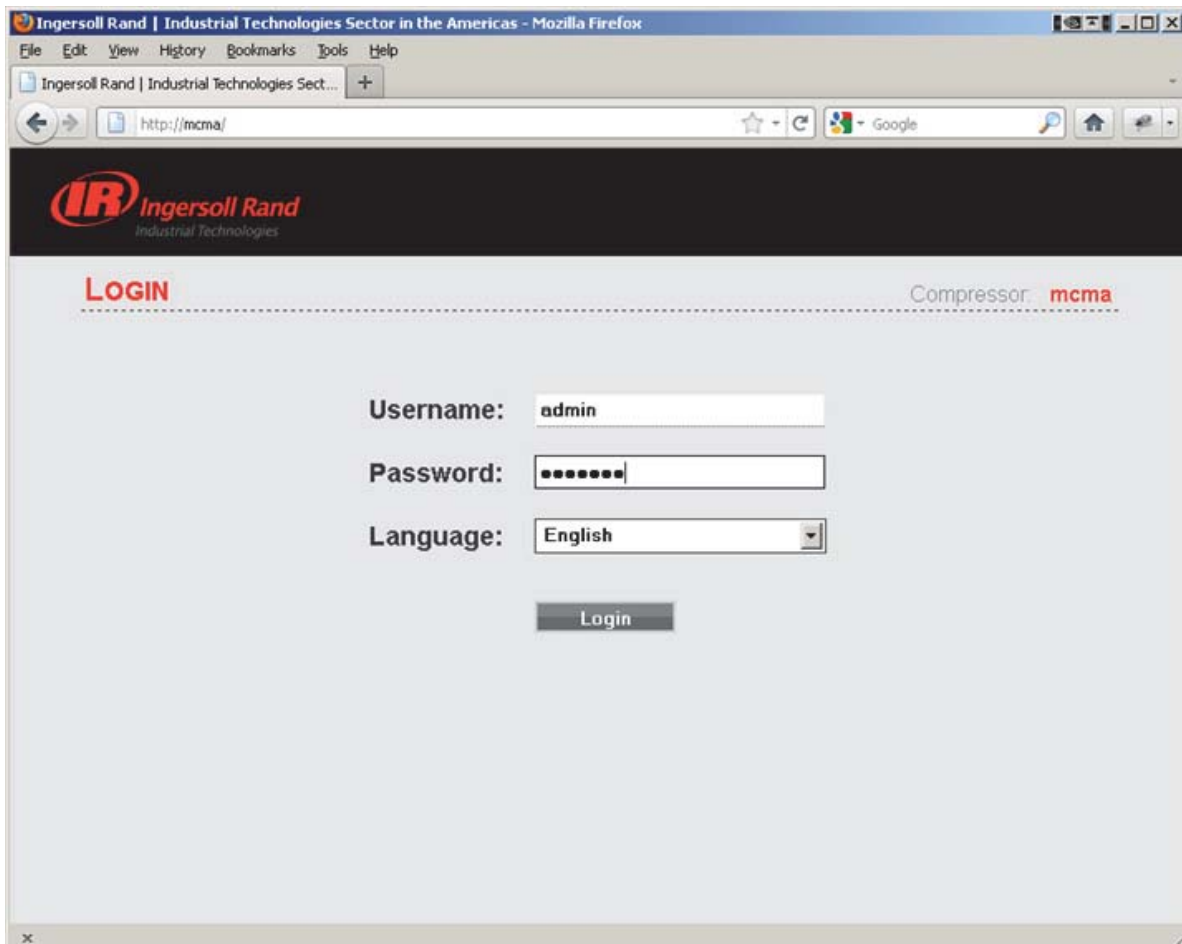
WEB ACCESS

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 & 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 X^e-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.

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.

EN

WEB ACCESS

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

WEB ACCESS

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-145 Only)	Clicking this tab will bring the user to the PERFORMANCE LOG. See section PERFORMANCE LOG UTILITY
	Graphing (Xe-145 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-145 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
	Account	Clicking this tab will bring the user to the ACCOUNT page. See section ACCOUNT MANAGEMENT

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. Not used with variable speed application.
	Unload	Unloads the compressor. Not used with variable speed application.

> ⓘ 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.

> ⓘ There will be a 2nd Level of confirmation for each "Command Key"

EN

WEB ACCESS
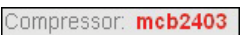
DASHBOARD ICONS

"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

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	Compressor: **mcb2403**	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	User: **admin**	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	Logout	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.

WEB ACCESS

HOME PAGE

The "HOME" tab shows information about the compressor operating parameters, total power consumption, running hours, loaded hours, number of starts, etc
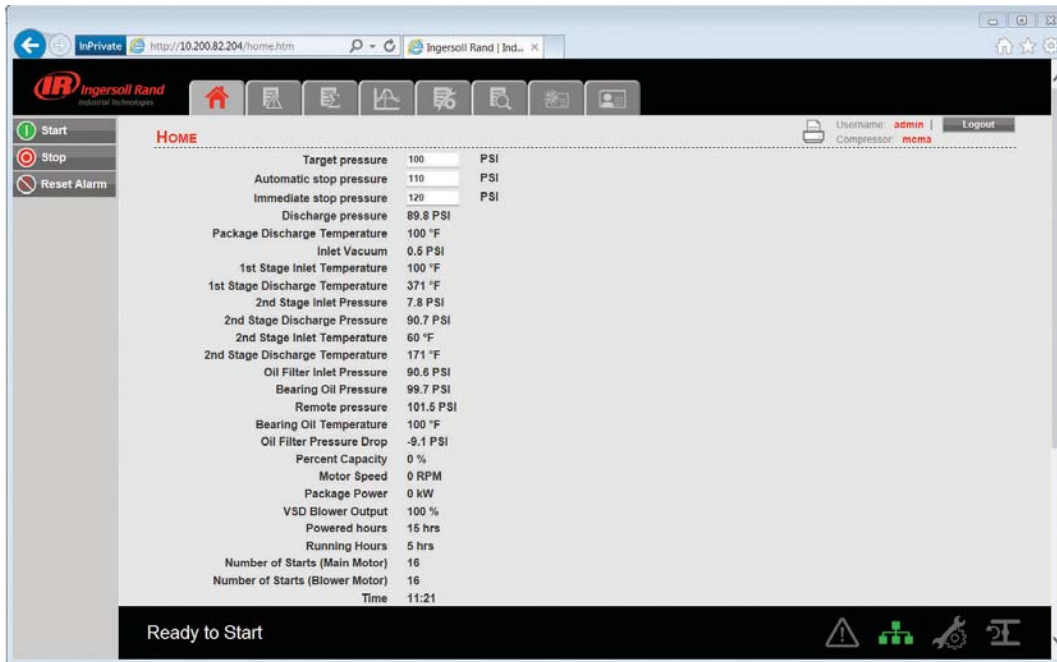
Click on the pressure set point value in the white box, to change the "Pressure Set Point" value. Enter the new pressure set point value and click on "Confirm" button. "Pressure Set Point" is only editable parameter for the "Admin" and "User" type accounts. The user with "View" type account can't change these system parameters.

EN
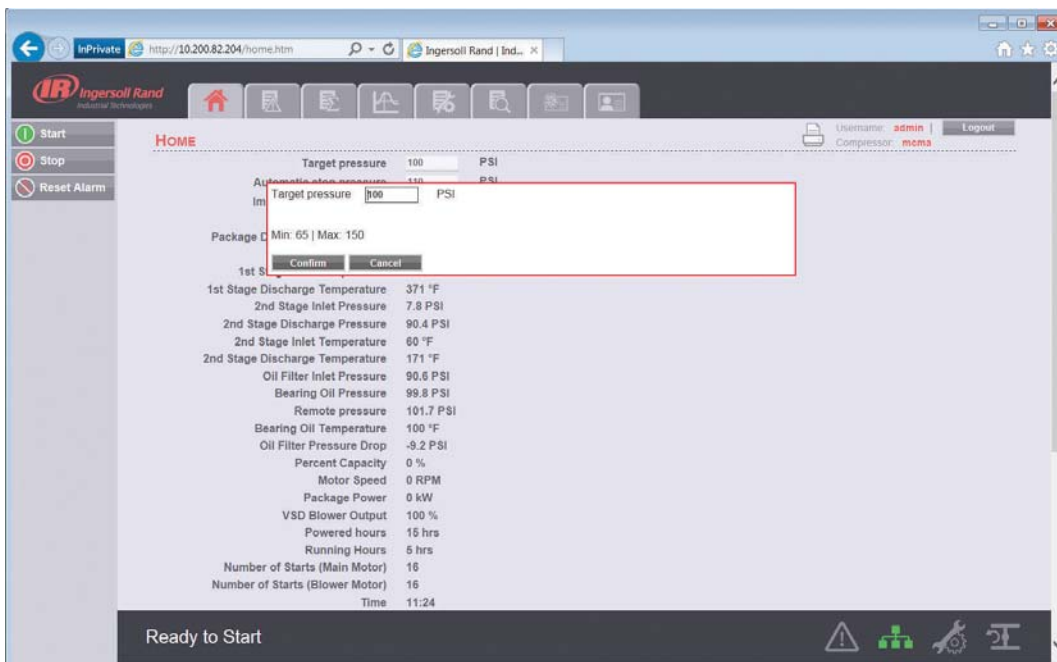
WEB ACCESS

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.

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.

WEB ACCESS

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.
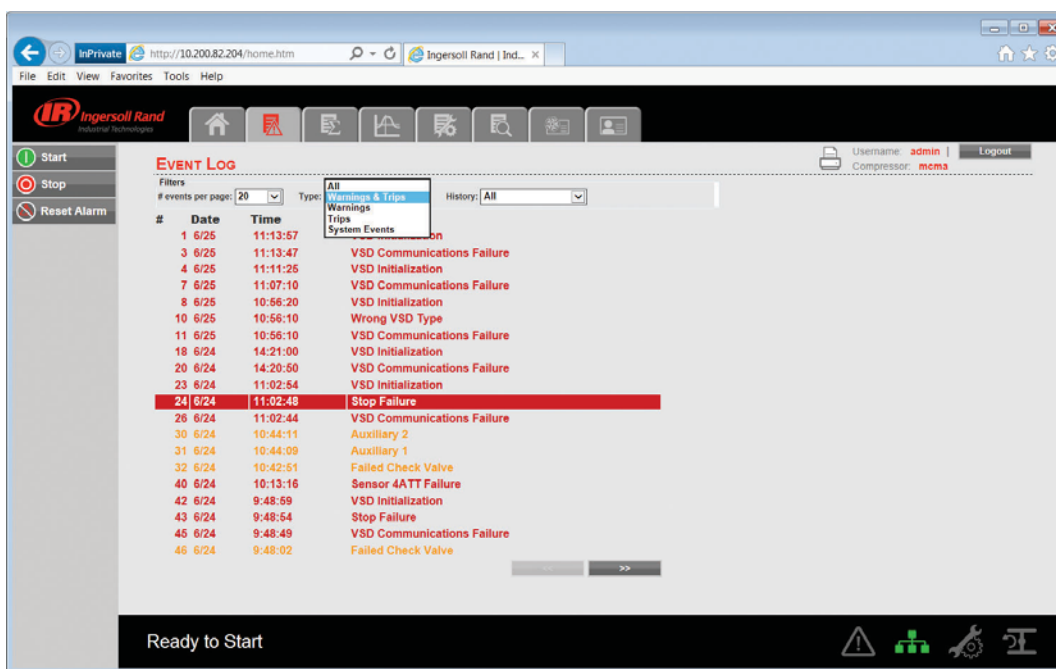
The "History" dropdown allows the user to select the option to see the event log history for a selected time period. Click on the dropdown command and select option "Last 7 Days" to see the event log of last 7 days.
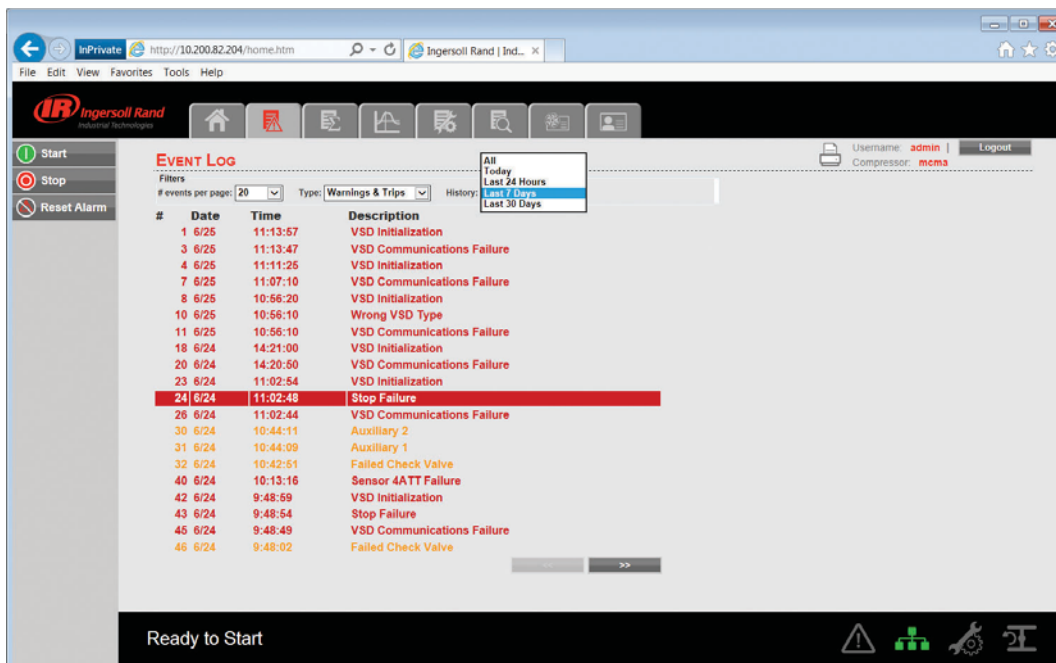
The EVENT LOG will record the last 500 events. Once this 500 event limit has been reached the oldest events will be cleared and the newest events will appear at the top of the event log.

EN

WEB ACCESS

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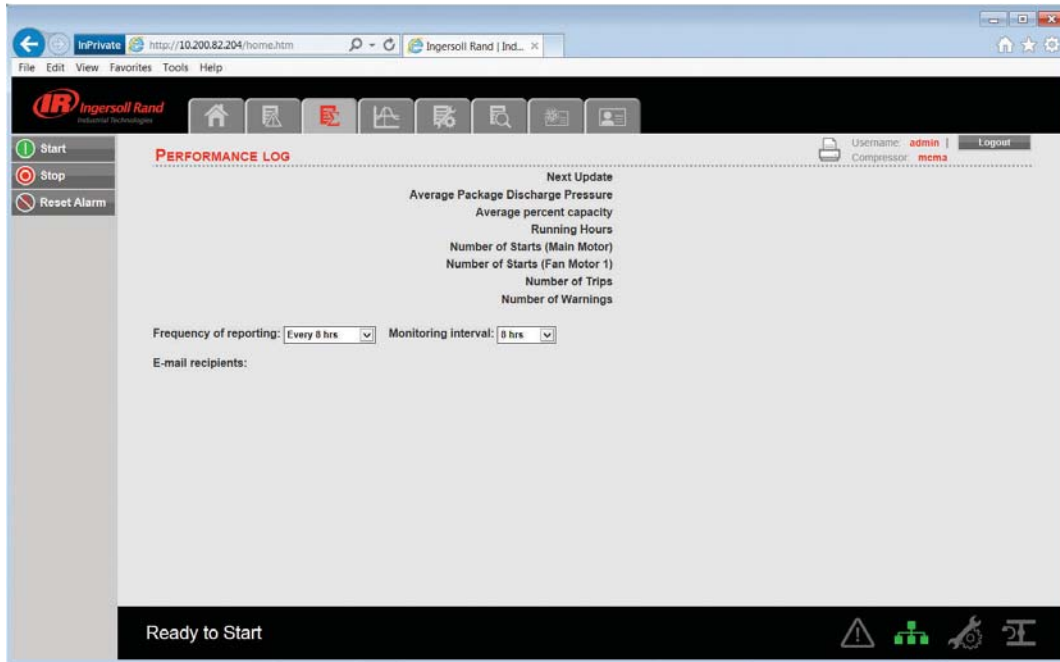
The "PERFORMANCE LOG" page is divided into two major sections. The top section displays the parameter values. The bottom section contains the controls for the Performance log.

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.
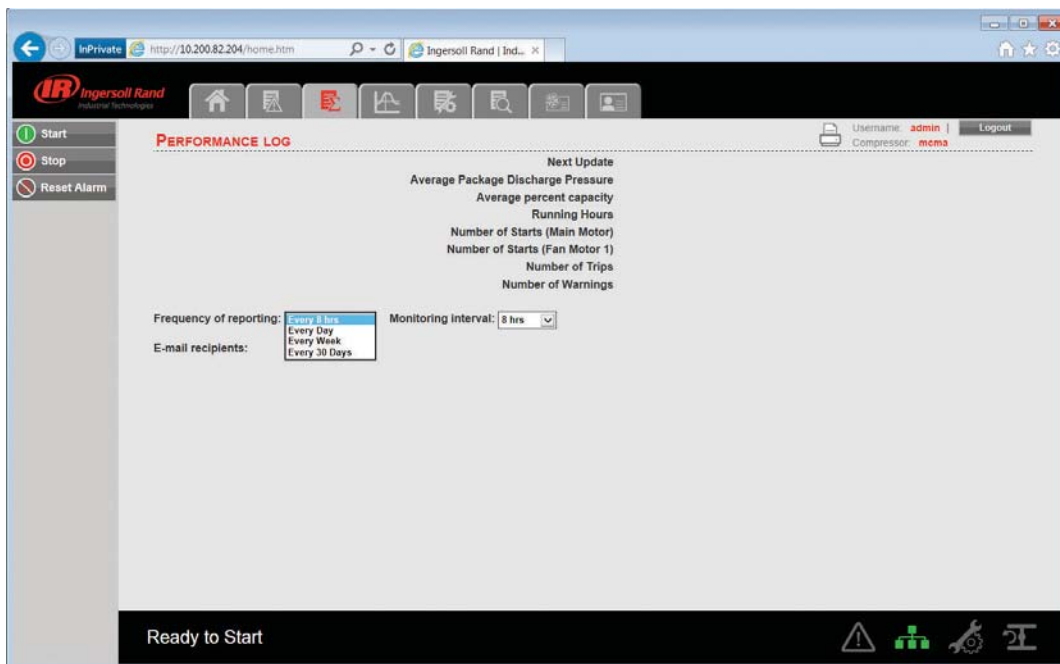
WEB ACCESS

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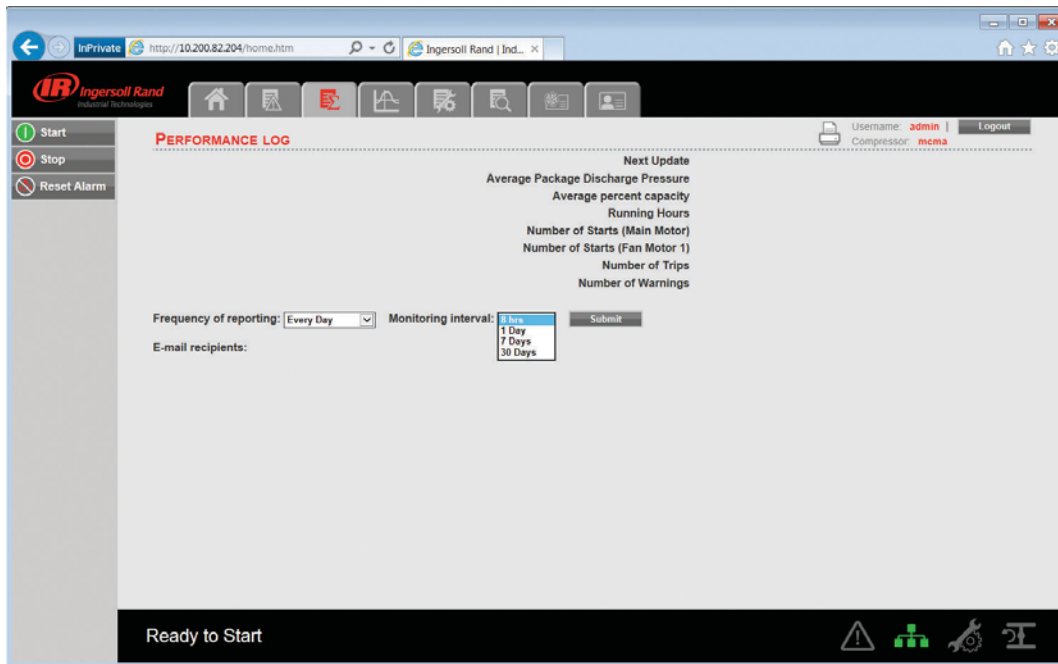
User names will be displayed as "E-mail recipients" in the "PERFORMANCE LOG", if the check box for the same is checked in the Email notification section of the "ACCOUNT" page.

(!)   Refer E-mail notification section of the "ACCOUNT MANAGEMENT" page to change the E-mail address

WEB ACCESS

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.
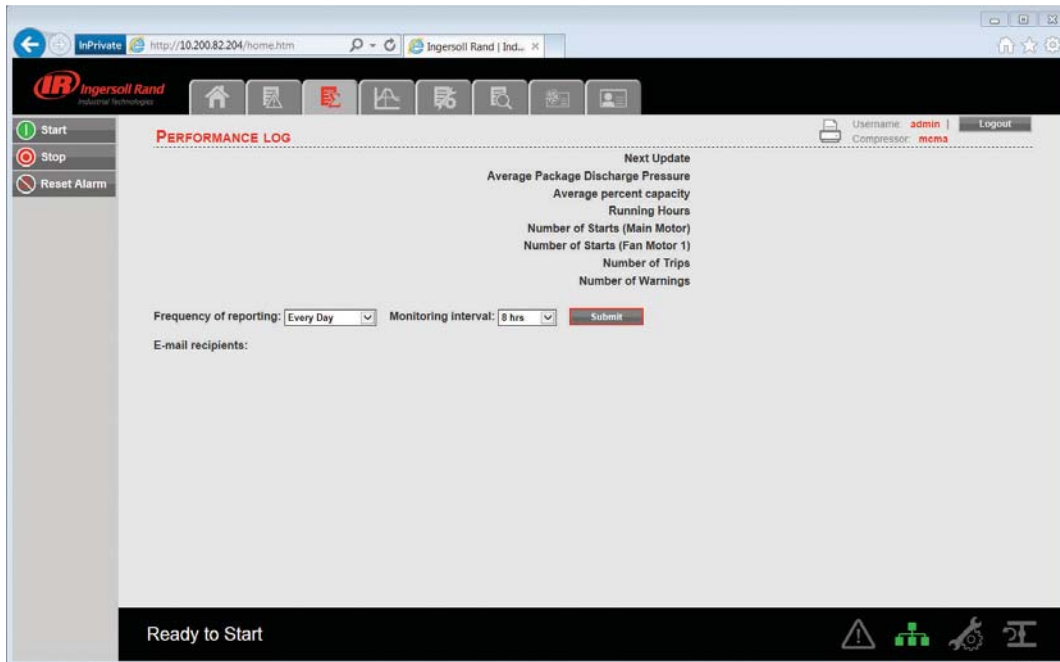
GRAPHING UTILITY

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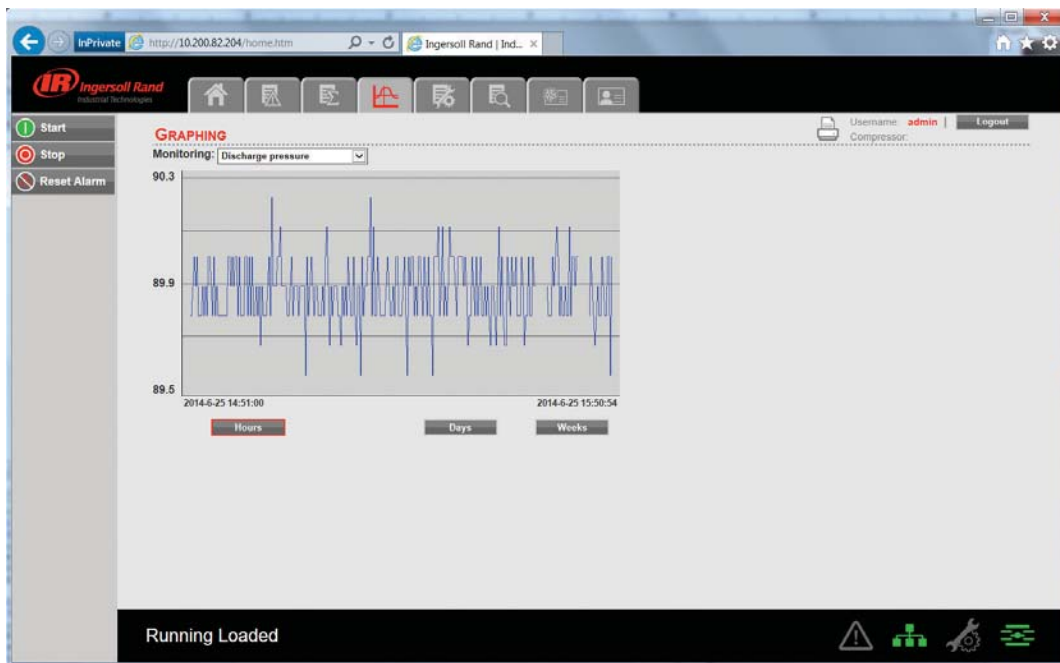
When "Days" has been selected, the X axis will be scaled such that the span on graph represents duration of 1 day.

WEB ACCESS
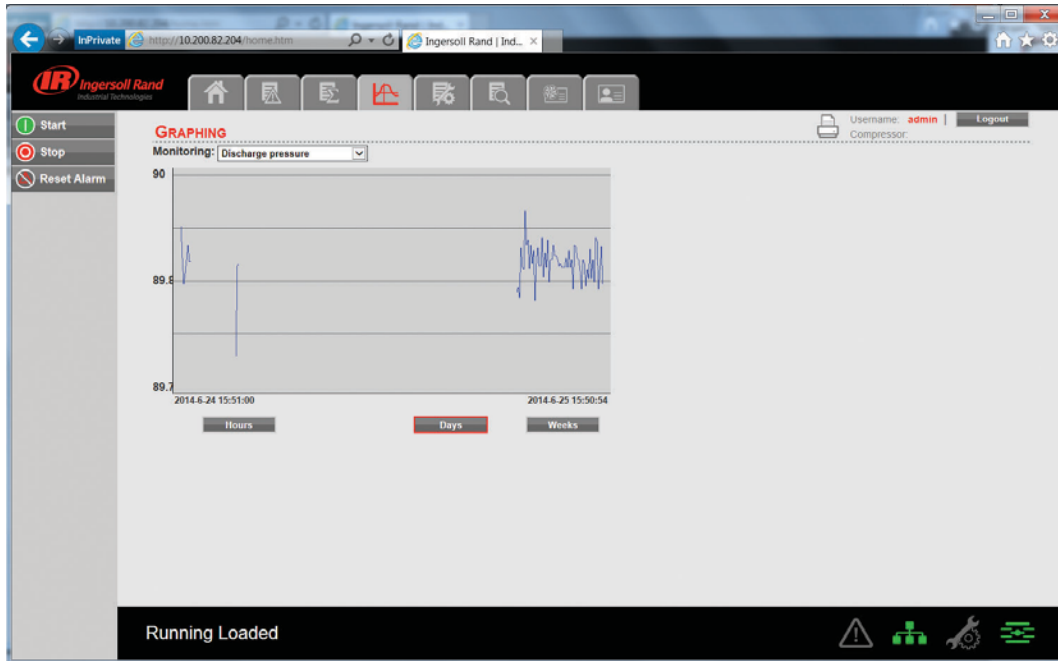
When "Weeks" has been selected, the X axis will be scaled such that the span on graph represents duration of 1 week.
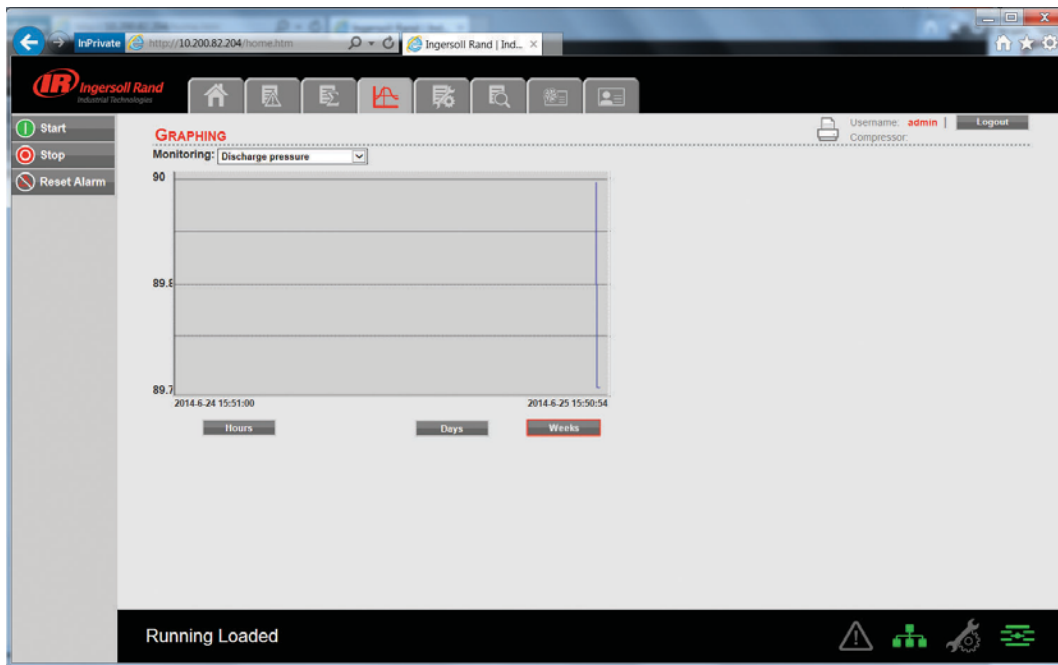
The drop down menu allows the user to choose a variable to view data on the graph. Click on the dropdown menu and select the variable to monitor on the graph. Variables include all analog inputs as well as some calculated variables. The amount of variables will vary depending on the compressor type and the available options.

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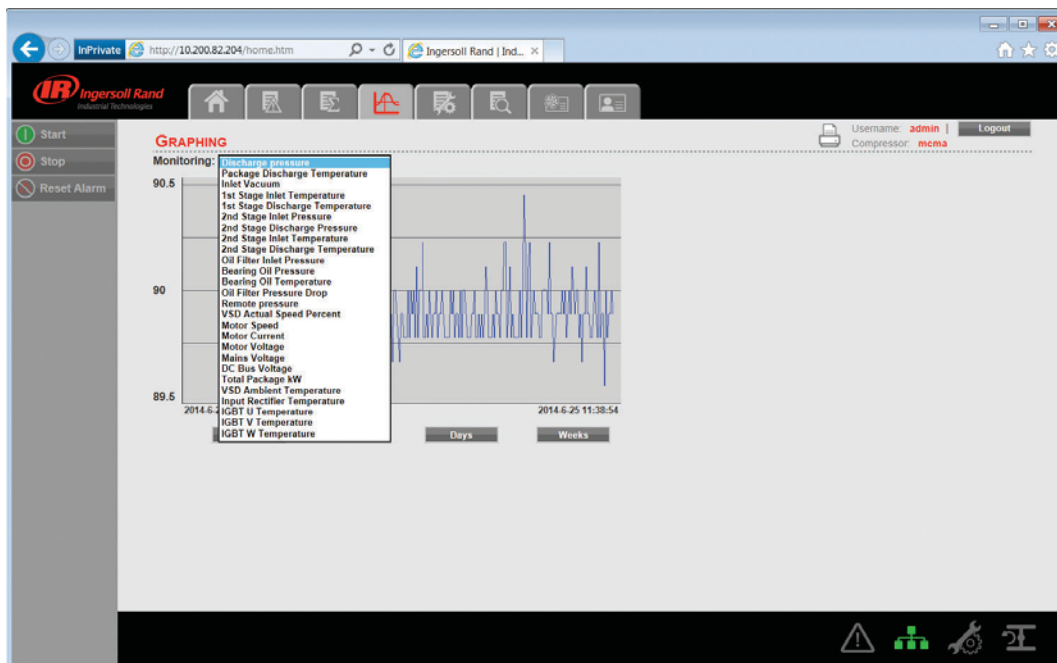
By moving the mouse over graph will display the determined value at the position of cursor with the date and time. Due to performance requirements the data on the real time chart cannot be interacted with directly so this allows the user to determine the approximate value of any data point.

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 & 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.

WEB ACCESS

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.

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.

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

WEB ACCESS

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 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

WEB ACCESS

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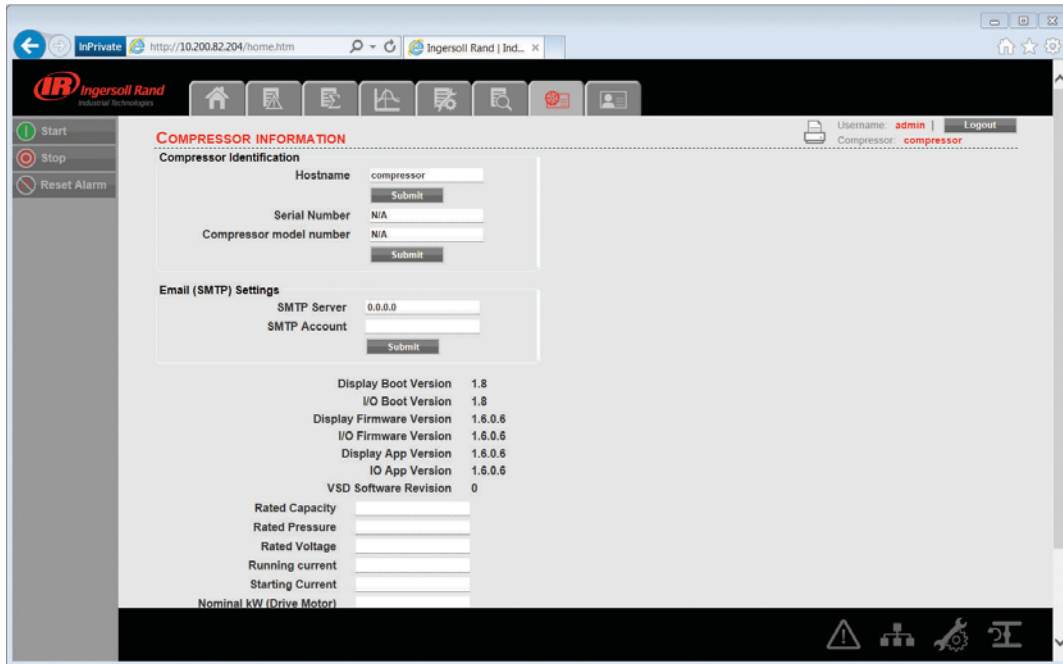
Once the user will submit the new host name, the compressor name will be changed automatically on the next login.

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

EN

WEB ACCESS

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" & "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.

WEB ACCESS

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.

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.
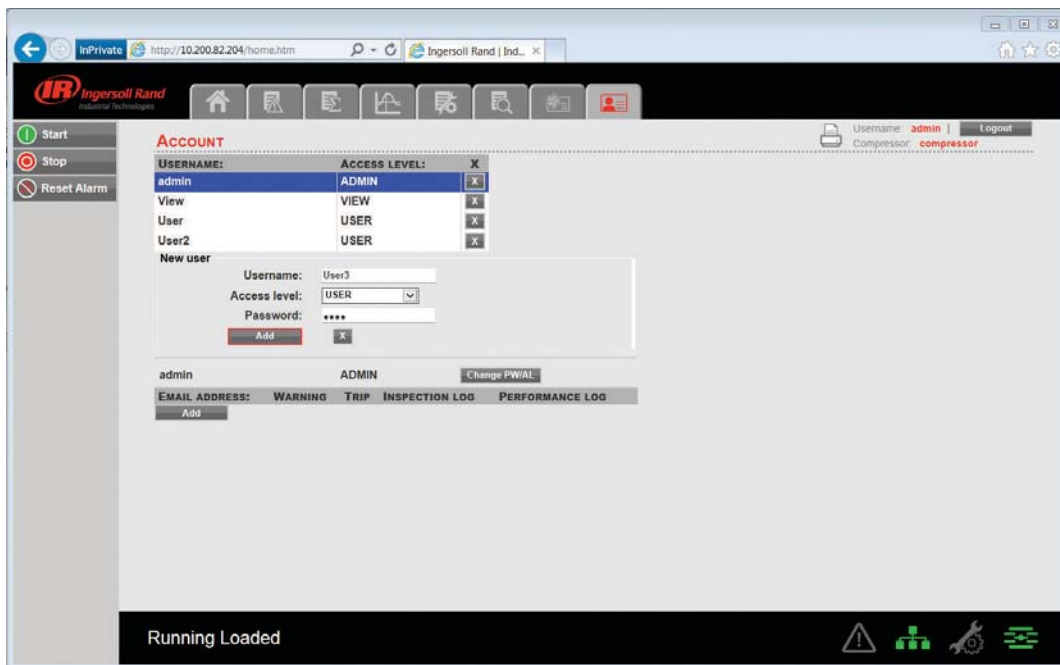
WEB ACCESS

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.
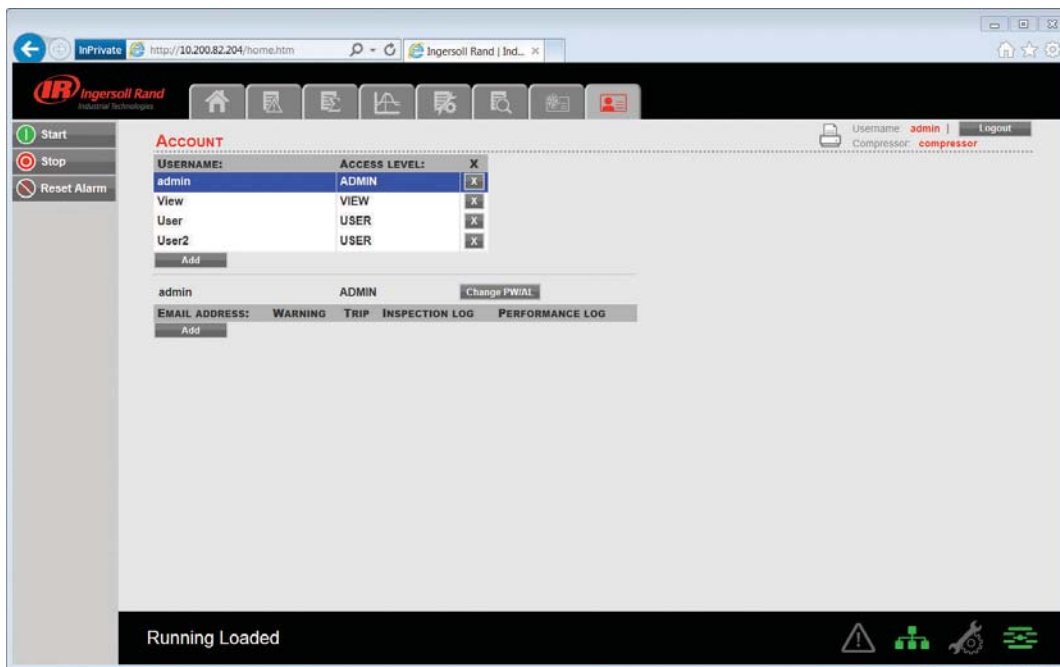
ADD ACCOUNT

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.
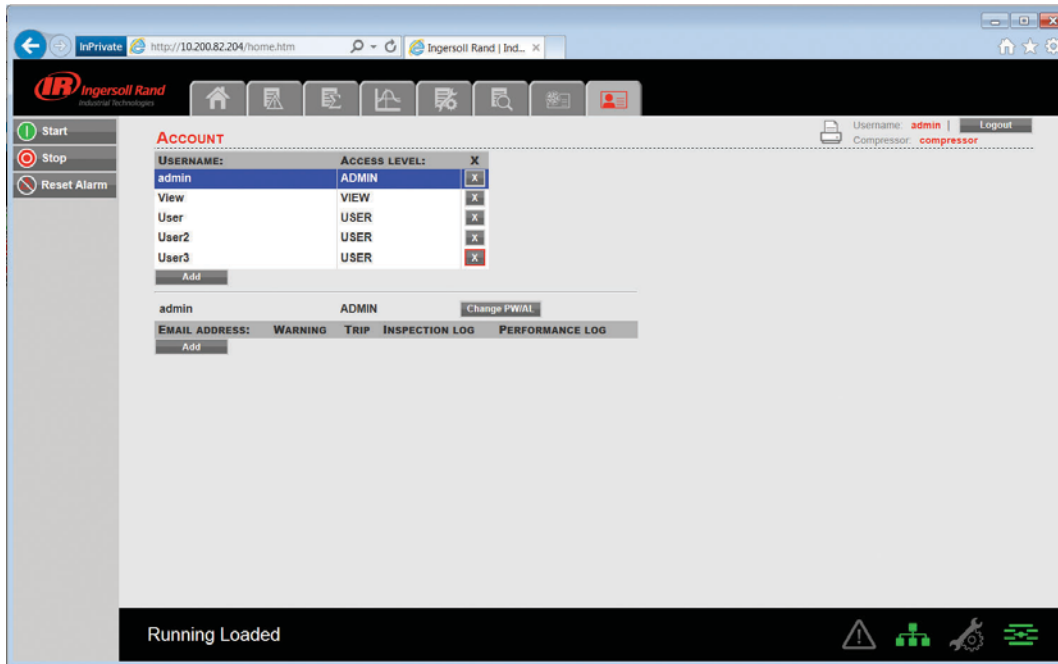
WEB ACCESS

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.

WEB ACCESS

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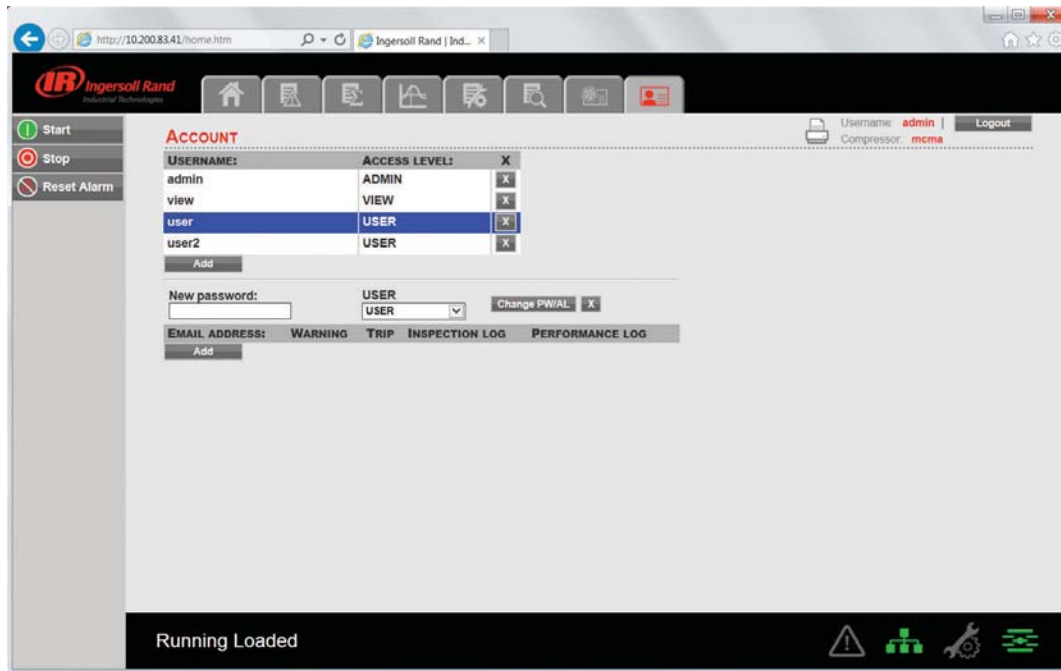
Click on the dropdown control and choose the new access level for selected user account. Again, click on "Change PW/AL" button to save the changes in access level or password for selected user account.

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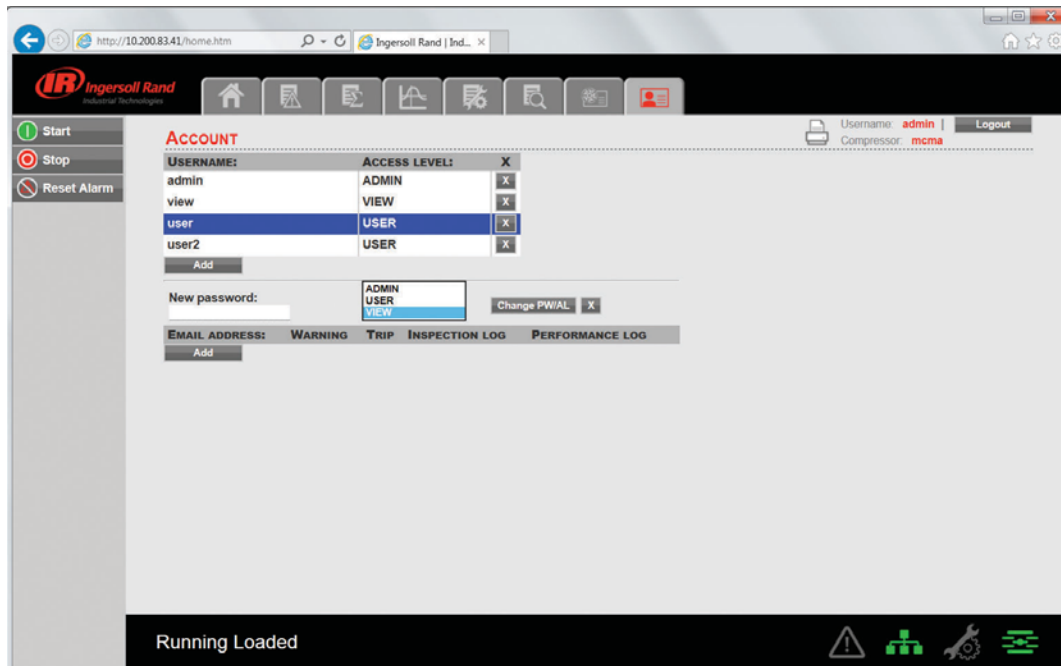
WEB ACCESS
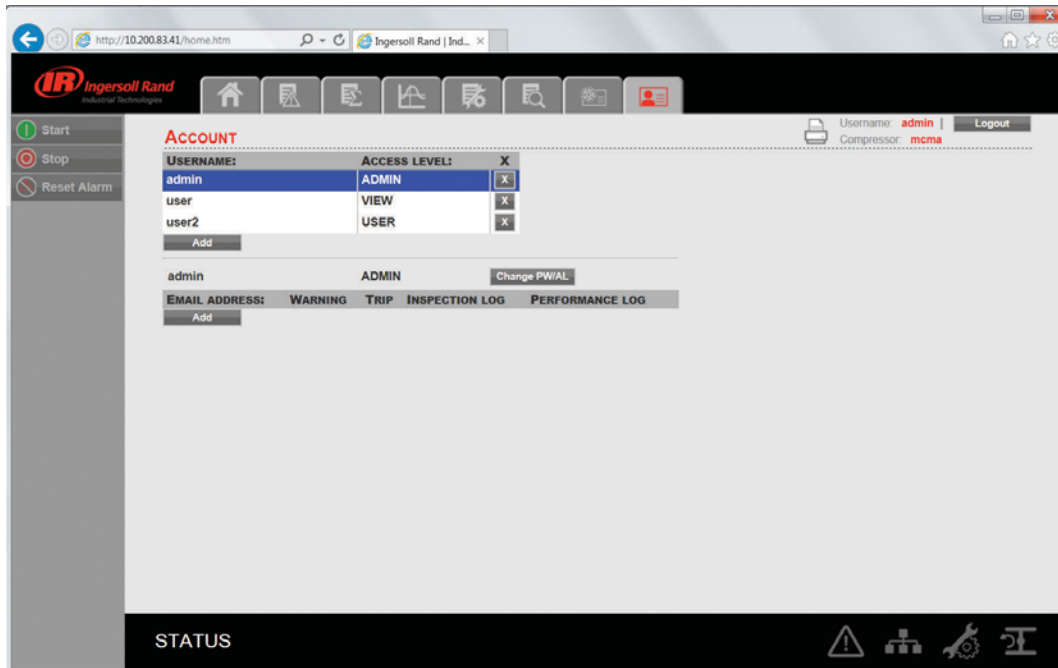
User account with access level "Admin" can only have an access to make a new account or modify the access level of these accounts. User account with access level "User" and "VIEW" can't have an access to make a new account or modify the user accounts.

NOTICES AND DISCLAIMERS

Machine models represented in this manual may be used in various locations worldwide. Machines sold and shipped into European community countries shall display the EC Mark and conform to various directives. In such cases, the design specification of this compressor has been certified as complying with EC directives. Any modification to any part is absolutely prohibited and would result in the CE certification and marking being rendered invalid.

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

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

The design of this Compressor package and certain features within it are covered by patents held by Ingersoll Rand and patents pending.

WARRANTY

The Company warrants that the equipment manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment from the factory, whichever shall first occur. The Purchaser shall be obligated to promptly report any failure to conform to this warranty, in writing to the Company in said period, whereupon the Company shall, at its option, correct such nonconformity, by suitable repair to such equipment or, furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labor performed by the Purchaser or others without Company's prior written approval.

The effects of corrosion, erosion and normal wear and tear are specifically excluded. Performance warranties are limited to those specifically stated within the Company's proposal. Unless responsibility for meeting such performance warranties are limited to specified tests, the Company's obligation shall be to correct in the manner and for the period of time provided above.

THE COMPANY MAKES NO OTHER WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED.

Correction by the Company of nonconformities whether patent or latent, in the manner and for the period of time provided above, shall constitute fulfilment of all liabilities of the Company for such non conformities whether based on contract, warranty negligence, indemnity, strict liability or otherwise with respect to or arising out of such Equipment.

The purchaser shall not operate Equipment which is considered to be defective, without first notifying the Company in writing of its intention to do so. Any such use of Equipment will be at Purchaser's sole risk and liability.

Note that this is **Ingersoll Rand** standard warranty. Any warranty in force at the time of purchase of the compressor or negotiated as part of the purchase order may take precedence over this warranty.

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