Contact-Cooled Rotary Screw Air Compressor
R4-11 kW

Product Information

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

Save These Instructions
## CONTENTS

**ABOUT THIS MANUAL** ........................................ 3
**SAFETY** ..................................................... 3
**TRANSPORTATION/RECEIPT/HANDLING** ....................... 3
**TRANSPORTATION** ........................................... 3
**RECEIPT** .................................................... 4
**UNPACKING AND HANDLING** .................................. 4
**LONG TERM STORAGE** ....................................... 4
**INSTALLATION** ................................................ 5
**LOCATION IN PLANT** ....................................... 5
**DISCHARGE AND CONDENSATE PIPING** ......................... 5
**GENERAL ELECTRICAL** ...................................... 6
**INTEGRATED DRYER** ......................................... 6
**ENVIRONMENTAL LIMITS** .................................... 6
**GENERAL INFORMATION** ................................... 7
**OPERATING INSTRUCTIONS (GENERAL)** ....................... 8
**BASIC OPERATION** ........................................... 8
**PRIOR TO STARTING** ........................................ 8
**INITIAL CHECK SEQUENCE** ................................ 8
**START SEQUENCE** ........................................... 8
**STOP SEQUENCE** ............................................ 8
**EMERGENCY STOPPING** ..................................... 8
**RESTARTING AFTER EMERGENCY STOPPING** ................. 8
**VARIBALE SPEED DRIVE (VSD)** ............................ 8
**OPERATING INSTRUCTIONS (XE-70M CONTROLLER)** ........ 9
**USER INTERFACE** ........................................... 9
**LED STATUS ICONS** ....................................... 9
**COMMAND KEYS** ............................................ 9
**NAVIGATION KEYS** ......................................... 9
**DISPLAY LAYOUT** ........................................... 9
**FOLDER NAVIGATION AND ICONS** ............................ 10
**PAGE NAVIGATION** ......................................... 10
**ACCESSING PARAMETERS** ................................ 10
**DASHBOARD ICONS** ......................................... 10
**DASHBOARD STATUS MESSAGES** ............................ 10
**FIXED SPEED COMPRESSOR** ................................ 11
**HOME FOLDER** ............................................... 11
**OPERATOR SETTINGS FOLDER** .............................. 12
**EVENTS FOLDER** ........................................... 13
**WARNING EVENTS LIST** .................................. 14
**TRIP EVENTS LIST** .......................................... 14
**START INHIBIT LIST** ....................................... 14
**TRIP HISTORY** ............................................... 15
**MAINTENANCE FOLDER** ..................................... 15
**GENERAL SETTINGS FOLDER** ............................... 15
**INTEGRAL SEQUENCING FOLDER** ........................... 17
**STATUS FOLDER** ............................................. 18
**FACTORY SETTINGS FOLDER** ................................ 19
**VARIABLE SPEED COMPRESSOR** ............................ 19
**HOME FOLDER** ............................................... 19
**OPERATOR SETTINGS FOLDER** .............................. 20
**EVENTS FOLDER** ........................................... 21
**WARNING EVENTS LIST** .................................. 21
**TRIP EVENTS LIST** .......................................... 22
**START INHIBIT LIST** ....................................... 22
**TRIP HISTORY** ............................................... 22
**MAINTENANCE FOLDER** ..................................... 23
**GENERAL SETTINGS FOLDER** ............................... 23
**INTEGRAL SEQUENCING FOLDER** ........................... 24
**STATUS FOLDER** ............................................. 26
**FACTORY SETTINGS FOLDER** ................................ 27
**MODBUS CONNECTION AND CONTROL** ....................... 28
**CONNECTION TO THE MODBUS NETWORK** .................. 28
**RS-485 NETWORK** ........................................... 28
**MODBUS ADDRESS SELECTION** .............................. 28
**MODBUS MASTER SETTINGS** ................................ 28
**R4 to 37 kW FIXED SPEED MODBUS TABLE** ................ 29
**RS.5 to 37 kW VARIABLE SPEED MODBUS TABLE** .......... 31
**X-SERIES SYSTEM CONTROLS CONNECTION** ............... 34
**RS-485 NETWORK** ........................................... 34
**RS-485 ADDRESS SELECTION** ................................ 34
**ENABLING SYSTEM CONTROL CAPABILITIES** ............... 34
**OPERATING INSTRUCTIONS (XE-50M CONTROLLER)** ........ 35
**COMMAND KEYS** ............................................ 35
**DISPLAY LAYOUT** ........................................... 35
**USER DISPLAY** .............................................. 35
**STATUS DISPLAY** ........................................... 35
**FAULT CONDITIONS** ....................................... 36
**SERVICE DUE COUNTDOWN TIMER** ........................ 36
**MENU ROUTINE** ............................................ 36
**OPERATIONAL MENU** ...................................... 36
**FAULT CODES** ............................................... 37
**OPERATING INSTRUCTIONS FOR INTEGRATED DRYER** ...... 38
**INTRODUCTION** .............................................. 38
**SYMBOLS AND LABELS USED IN THE MANUAL AND ON THE DRYER** 38
**GENERAL INFORMATION** .................................. 39
**FUNCTIONAL DESCRIPTION** ................................ 39
**USE OF THE MACHINE IN SAFE CONDITIONS** ............... 39
**START UP** ................................................... 39
**CONTROL PANEL** .......................................... 40
**BEFORE START UP** ......................................... 42
**START UP** .................................................... 42
**NOTICES AND DISCLAIMERS** ............................... 43
**WARRANTY** ................................................... 43
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

<table>
<thead>
<tr>
<th>Publication</th>
<th>Product</th>
<th>Americas</th>
<th>EMEIA *</th>
<th>Asia Pacific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Safety Information Manual</td>
<td>R4-160 kW</td>
<td>80446313</td>
<td>80446156</td>
<td>80446321</td>
</tr>
<tr>
<td>Product Information Manual</td>
<td>R4-11 kW</td>
<td>80448483</td>
<td>80448491</td>
<td>80448509</td>
</tr>
<tr>
<td>Product Maintenance Manual</td>
<td>R4-11 kW</td>
<td>80448517</td>
<td>80448525</td>
<td>80448533</td>
</tr>
<tr>
<td>Product Parts Information Manual</td>
<td>R4-11 kW</td>
<td>80448541</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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.

- 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.

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

TRANSPORTATION/RECEIPT/HANDLING

Ensure machine is secured against movement during transportation.
**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.

**LONG TERM STORAGE**

If the product is not immediately commissioned upon receipt, the motor and airend should be moved 1/2 turn every three months to prevent damage to the bearings. If the product will not be commissioned within six months of receipt, it should be prepared for long term storage. Contact Ingersoll Rand for more details.
INSTALLATION

LOCATION IN PLANT

Figure 3: 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

Standard Base-Mounted Package: Includes item [1] from Figure 3
Dryer Base-Mounted Package: Includes items [1], [3], [4], and [6] from Figure 3. (Item [8] not needed for package with integrated dryer)
Standard Receiver-Mounted Package: Includes items [1], [6], [7], and [8] from Figure 3.
TAS (Total Air System) Package: Includes items [1], [2], [3], [4], [6], [7] from Figure 3. (Item [8] not needed for package with integrated dryer)

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. Heat and water with chemicals present in the air can cause corrosion. 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 40°C (104°F) shall be avoided, as well as areas of high humidity.

DISCHARGE AND CONDENSATE PIPING

It is essential when installing a new compressor (1) to review the total air system. This is to ensure a safe and effective total system.

A flexible element should be installed between compressor and the discharge piping to attenuate vibration transmission.

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 dry 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.

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

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 conditions). Therefore, considerable water vapor is condensed. To remove this condensation, compressor packages that include a dryer have a built-in condensate trap. It is recommended if the customer does not have a dryer unit or receiver-mounted unit, that they install an Ingersoll Rand condensate separator and trap.

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

NOTICE

A minimum of 1 m (3.3 ft) clearance 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.

NOTICE

80448483 Rev.B EN-5
**NOTICE**

Do not use the compressor to support the discharge pipe.

**NOTICE**

The drain line must slope downward 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 6 mm.

**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.

---

**GENERAL ELECTRICAL**

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 40°C (35°F to 104°F). The standard maximum temperature of 40°C (104°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.

For Variable Speed Drive (VSD) models, 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 ‘Load/Unload’. 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.

The Controller screen displays the compressor operating conditions and general status.

---

**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 sulfur, ammonia, chlorine and installations in marine environments. For more details refer the Operating Instructions for Integrated Dryer section in this manual.

---

**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°C to 40°C (35.6°F to 104°F)

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

- Outdoor modification
- Low ambient option (-10°C to 40°C / 14°F to 104°F) at sea level
- High ambient option (2°C to 46°C / 35.6°F to 115°F) at sea level
- High dust inlet air filter
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 fan 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 trap (for dryer machines) 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.

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 premium coolant (Ultra/Ultra EL). 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 for Premium Coolant (Ultra) is 8000 hours or two years, whichever comes first and for Premium Coolant (Ultra EL), the change interval is 16000 hours or three years, whichever comes first.

For compressors supplied with Food-Grade Lubricant (Ultra FG), it is recommended to perform a coolant analysis every 1000 hours to monitor condition and determine when to change the coolant. If an analysis is not performed, the recommended coolant change interval is 6000 hours.

**CAUTION**

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

**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.

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

**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.

Controller logic causes the compressor to continue running for 2 minutes in unloaded state to prevent this condition.
OPERATING INSTRUCTIONS (General)

■ BASIC OPERATION

**NOTICE**

The language and units 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 the coolant level by following the steps outlined in the Maintenance Manual.

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 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 a trip reset. While the initial check sequence occurs, the controller will display a “Checking Machine” message.

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

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

■ START SEQUENCE

For Variable Speed Drive (VSD) machines, 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. When the machine stops, it will go through a blowdown sequence to release pressure.

For Fixed Speed (FS) machines, the compressor will initially start when the operator presses the start button or when the compressor receives a remote start signal. The compressor will be automatically loaded/unloaded when discharge pressure rises above/below the configurable setpoint. When the machine stops, it will go through a blowdown sequence to release pressure.

**NOTICE**

During the first startup of the compressor, check for the proper direction of rotation of the main motor, package fan motor, and 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 10 seconds before stopping. The machine must run unloaded for 10 seconds prior to restarting.

**NOTICE**

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

■ EMERGENCY STOPPING

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

This will override the normal unload/stop button and will immediately stop the compressor.

**NOTICE**

For Variable Speed Drive (VSD) machines, it is a normal situation that drive cooling fan continues to run even when the drive is stopped. And the fan can run even under an E-stop.

■ 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 the section before restarting the compressor.
OPERATING INSTRUCTIONS (XE-70M 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, in conjunction with the graphics display and the LED icons, make up the user interface to the compressor.

![Figure 4: Xe-70M](image)

■ 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>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Illuminates when no Warnings or Trips are sensed. Can be in a Ready or Not Ready state. This icon will flash when the machine is Running Unloaded.</td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td>Illuminates when a Warning (flashes) or Trip (constant ON) is sensed. Can be in a Ready (Warning) or Tripped state.</td>
<td></td>
</tr>
<tr>
<td>Auto</td>
<td>Illuminates when the compressor stops in auto restart.</td>
<td></td>
</tr>
</tbody>
</table>

■ 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>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>Puts the compressor into the selected mode of operation. Unit will load if the pressure conditions are right.</td>
<td></td>
</tr>
<tr>
<td>Unload</td>
<td>Puts the compressor into an unloaded state. Unit will run unloaded indefinitely.</td>
<td></td>
</tr>
<tr>
<td>Reset</td>
<td>Clears Warnings and Trips once the fault condition is corrected.</td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>Starts the compressor.</td>
<td></td>
</tr>
<tr>
<td>Stop</td>
<td>Stops the compressor. This button should be pressed instead of the Emergency Stop for normal stopping operation.</td>
<td></td>
</tr>
</tbody>
</table>

■ 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 5: Navigation Keys](image)

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

■ DISPLAY LAYOUT

![Figure 6: Display Layout](image)

<table>
<thead>
<tr>
<th>Key</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Folder Bar</td>
<td>Uses tabs to graphically identify each folder.</td>
</tr>
<tr>
<td>B</td>
<td>Title Bar</td>
<td>Identifies current folder and page (underlined).</td>
</tr>
<tr>
<td>C</td>
<td>Page Content</td>
<td>Content of the current page.</td>
</tr>
<tr>
<td>D</td>
<td>Dashboard</td>
<td>Displays system status.</td>
</tr>
</tbody>
</table>
**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 5: Folder Bar Icons

<table>
<thead>
<tr>
<th>Folder Name</th>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>🏡</td>
<td>System performance and status main information. The first page of this folder is the default page when the controller first powers up.</td>
</tr>
<tr>
<td>Operator Settings</td>
<td>🛠️</td>
<td>System options and configuration settings.</td>
</tr>
<tr>
<td>Events</td>
<td>🚨</td>
<td>System events log.</td>
</tr>
<tr>
<td>Trip History</td>
<td>🌐</td>
<td>Details on the most recent trips.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>🔧</td>
<td>Status and notification setup for compressor maintenance items.</td>
</tr>
<tr>
<td>General Settings</td>
<td>📜</td>
<td>General settings such as Language, Time, and Units of Measure.</td>
</tr>
<tr>
<td>Integral Sequencing</td>
<td>☰</td>
<td>Integral Sequencing communication status and configuration.</td>
</tr>
<tr>
<td>Status</td>
<td>📊</td>
<td>Measurements or status from/of all analog and digital I/O.</td>
</tr>
<tr>
<td>Factory Settings</td>
<td>💡</td>
<td>Compressor tuning parameters. Also displays hardware and software versions.</td>
</tr>
</tbody>
</table>

**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 6: Title Bar Page Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🌟</td>
<td>Start of the page selection area.</td>
</tr>
<tr>
<td>🔮</td>
<td>Indicates that there are more pages available by navigating right.</td>
</tr>
<tr>
<td>🔮</td>
<td>Indicates that there are more pages available by navigating left.</td>
</tr>
</tbody>
</table>

**ACCESSING PARAMETERS**

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

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

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

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

This icon 🏡 appears on numeric entry windows (see Figure 69). Placing the cursor on it and then pressing the ENTER key will cancel the entry and any changes that were made.

**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 7: Dashboard Icons

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

**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 blow-off valve is closed.
- **Running Unloaded** – The compressor is operating, but not producing air. The inlet valve is closed and the blow-off valve is open.
- **Reload Delay** – This is a brief period of time after the compressor has unloaded before it is allowed to load again. This gives the inlet and bypass valves time to reach their proper positions.
- **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. The compressor will restart at the end of the blowdown period if a start command is received during blowdown.
- **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.
### HOME FOLDER

#### Page 1: System Overview

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

- **Online Pressure Setpoint** - indicated in the black box and arrow, which is always left of center on the gauge. The compressor will load when package discharge pressure falls below this value.

- **Offline Pressure Setpoint** - indicated in the black box and arrow, which is always right of center on the gauge. The compressor will unload when package discharge pressure rises above this value.

- **Package Discharge Pressure** - indicated by the large numbers centered below the gauge and by the black arrow below the gauge. This is the air pressure that the compressor is supplying to the plant.

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

- **Airend Discharge Temperature** - indicated by the numbers in the lower right of the display. This is the temperature of the air/oil mixture at the discharge of the compression module.

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

- **Run Hours** – indicated by the numbers in the lower left of the display. The number of hours the compressor motor has been running.

#### Page 2 : Counters

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

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

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

### Pages 3 & 4 – Analog Inputs and Compressor Information

#### Figure 10 : Analog Inputs and Compressor Information

Any sensor that is not installed or is reporting a failure will show a [ - - ] symbol.

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

- **Sump Pressure** – The compressor’s internal pressure at the sump tank.

- **Airend Discharge Temperature** – The temperature of the air/oil mixture at the discharge of the compression module.

- **After-cooler Discharge Temperature** – The temperature of the air after passing through the after-cooler. Note – Only shown when the Low Ambient option is purchased and installed.

- **After-cooler Discharge Pressure** – Pressure the compressor is delivering before the dryer. Note – Only shown when the TAS option is purchased and installed.

- **Separator Pressure Drop** – The pressure drop across the separator element.

- **Dryer Run Status (Integrated dryer units only)** – Checkbox that shows whether the dryer is currently running (checked) or not (blank).

- **Time and Date**

- **Main Motor Current** – Current flowing through the main motor as measured by the installed current transducers.
The below values are all setpoints

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

**Offline Pressure** – The compressor will unload when package discharge pressure rises above this value.
Range (in PSI): 75 to Rated Pressure + 10. Note that the range will be reduced by 7 psi when operating a TAS machine.

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

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

**Mode of Operation** – Selection for R4-11 is Online/Offline only - determines how the compressor will try to maintain a specific pressure.
- **Online/Offline** – The compressor will load the machine by energizing a solenoid that opens the inlet valve and closes the blowdown valve when package discharge pressure falls below the online pressure setpoint. The compressor will unload the machine by de-energizing the solenoid when pressure rises above the offline pressure setpoint.

**Unloaded Stop Time** – Time period that the machine must run unloaded before the motor is allowed to stop after a stop command is received.
Range (in seconds): 10 - 30

**Starter Time** – Time period that the compressor needs in order to come up to operating speed after a start command before being able to produce air.
Range (in seconds): 5 - 30

The parameters on these pages are adjustable any time.

The below values are all setpoints

**Enable Auto-Restart** – Enabling this will allow the compressor to stop if it has been running unloaded for a period of time, and the motor has exceeded its minimum running time (10 minute in most cases).

**Auto-Restart Time** – The time period the compressor must run unloaded before stopping in auto-restart. This time period begins the moment that package discharge pressure rises above the offline setpoint. Both this time period and the minimum motor run timer (10 minutes) must be satisfied before the compressor will stop in auto restart.
Range (in seconds) 2 - 60

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

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

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

**Enable PORO** – Enabling this setpoint will allow the compressor to automatically restart after a power outage has been restored if the compressor was running loaded at the time of the outage. PORO is an option which must be purchased and installed before this feature can be turned ON.
PORO Time – Time after the controller power has been restored and controller has finished booting before the compressor will perform a PORO start. During this time the PORO Horn will sound.
Range (in seconds): 10 - 600

Low Ambient Temp – Airend discharge temperature below which the low ambient option will come into effect. The low ambient option affects the machine's operation by having the controller delay loading the machine until the airend discharge temperature rises above the setpoint value.
Range: -11.1 to 15.6°C (30 to 60°F)

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

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

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

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

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

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

Note that in order to disable Scheduled Start/Stop, the scheduled start and stop days, hours, and minutes must match exactly.

* 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 7 Calibrate Sensors

Figure 13 : Calibrate Sensors

Sensor calibration can only take place when the machine is stopped and there is no pressure on the sensor. Calibration only needs to take place after a sensor is replaced, the controller is replaced, the controller software is upgraded, or the operator suspects the sensor reading is in error. Calibrate a sensor by selecting the checkbox beside the sensor name. Note that the checkbox may appear too quickly to be visible. Calibration can be confirmed by verifying that the sensor value now reads zero.

Each of the sensors listed below can be calibrated.

- Package Discharge Pressure (4APT)

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

Events Folder

- Pages 1 to a Max of 50

Figure 14 : Events folder

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

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

The time and date of the event can be viewed by navigating to an event and pressing the right arrow navigation key. The time and date window can then be exited by pressing the enter key.

Figure 15 : Events folder

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
- Unloading the compressor remotely
- Stopping the compressor remotely
- Loading the compressor remotely
- Warning
- Trip
- Start Inhibit

Active Warnings will show a flashing caution icon while acknowledged. Warnings will a solid icon.

Active Trips will show a flashing trip icon while acknowledged. Trips will have a solid icon.

Active Start Inhibits will be listed in the Event log, but not have an icon present. The display will indicate the compressor is not ready to start if a start inhibit is active.
## WARNING EVENTS LIST

- **High Airend Discharge Temperature**
  Xe-70M On-Screen Text: High A/E Disch T
  Will occur if the unit is running and 2ATT is greater than 105 °C (221 °F) (97% of 109°C [228°F]). This condition must exist for 3 seconds before the warning is issued.

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

- **Service Level 1**
  Xe-70M On-Screen Text: SVC Required
  If service level 1 has been selected for the unit, a "SERVICE REQUIRED" warning will be issued on hour intervals equal to the service time period set point. This warning can be reset the same as any other warning.

- **Service Level 2**
  Xe-70M On-Screen Text: 100 hours to SVC, SVC Required, Service Alarm
  If service level 2 has been selected for the unit, the service complete factory set point will be used to clear a level 2 service warning and reset the service time or date. The service complete can be reset before a service warning occurs.

  The initial "SERVICE REQUIRED" warning will occur at total hour intervals equal to the service time period set point. However, 100 hours before this a "100 HOURS TO SERVICE" warning will occur. This warning can be reset the same as any other warning. One hundred hours later the "SERVICE REQUIRED" warning will occur. This warning can be reset the same as any other warning, however this warning will return in 24 hours if the service complete factory set point has not 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**
  Xe-70M On-Screen Text: High Disch Pres
  Will occur if the unit is using a remote sensor or is under the control of an external device, such as an X8I, is loaded, and the discharge pressure (4APT) is greater than the maximum offline pressure. This condition must exist for 3 seconds before the warning is issued. If this condition occurs, the compressor will automatically unload. The unit will be available to reload once the discharge pressure falls to the rated pressure value.

- **Dryer Temp Warning**
  Xe-70M On-Screen Text: Dryer Temp
  Compressors equipped with a TAS dryer, the dryer temp warning is triggered when the dewpoint temperature exceeds 14.5°C (58.1°F) for 6 minutes or longer. This warning can also be triggered if the temperature probe in the dryer fails.

- **Dryer High Pressure**
  Xe-70M On-Screen Text: Dryer High Pres
  On units 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. However, this switch is a locking switch. The dryer high pressure switch must be reset (contact closed) before this warning can be reset. If this warning is reset while the conditions for running the dryer exist, the dryer can restart.

- **Invalid Calibration**
  Xe-70M On-Screen Text: Invalid Cal
  Will occur if the sensor zero value is ± 10% of its scale. See Sensor Calibration.

## TRIP EVENTS LIST

- **High Airend Discharge Temperature**
  Xe-70M On-Screen Text: High A/E Disch T
  This will occur if 2ATT is greater than 109 °C (228 °F) and the unit is running.

- **Overload**
  Xe-70M On-Screen Text: Overload
  This will occur if the fan or main motor overload relays opens. The contact must be open for at least 3 seconds before the trip will occur.

- **Remote Stop Failure**
  Xe-70M On-Screen Text: Rem Stop Fail
  Will occur if the remote start/stop option is enabled, the remote stop button remains open and either start button is pressed.

- **Remote Start Failure**
  Xe-70M On-Screen Text: Rem Start Fail
  Will occur if the remote start/stop option is enabled, the unit is started by the remote start button, and the button stays closed for 7 seconds after the unit starts.

- **Sensor Failure**
  Xe-70M On-Screen Text: 4APT Failure, 2ATT Failure, Main Motor CT Failure
  This will occur when a sensor is recognized as missing or broken. The sensors affected by this trip are CT1, CT2, CT3, 4APT and 2ATT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: 4APT Failure.

- **Emergency Stop**
  Xe-70M On-Screen Text: Emergency Stop
  This will occur when the EMERGENCY STOP button is engaged.

- **Unit Too Cold To Start**
  Xe-70M On-Screen Text: Unit Too Cold
  This will occur if the unit does not have the low ambient option, the airend discharge temperature (2ATT) is less than 1.6 °C (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 unit is being started in low ambient conditions.

## START INHIBIT LIST

- **High Airend Discharge Temperature**
  Xe-70M On-Screen Text: High A/E Disch T
  This will occur if 2ATT is greater than 95% of 109°C (228°F), which is 103°C (217°F).
TRIP HISTORY

- Pages 1 to a Max of 3

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 entry in the trip history:
- Trips
- Active Trips will show a flashing trip icon while acknowledged Trips will have a solid icon.

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 right navigation button will bring up the trip history dialog box.

MAINTENANCE FOLDER

- Page 1 – Filter Status

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

The following filters are displayed:
- Separator Element

Page 2 - Maintenance Configuration

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

GENERAL SETTINGS FOLDER

All parameters in the general settings folder are adjustable.

- Page 1 – Language and Units Selection

Language is selectable from the following 30 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

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.

Temperature is selectable between °F and °C.

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

80448483 Rev.B

EN-15
Page 2 – Time & Date Settings

Figure 21: Time & Date Settings

Time and Date
Time 13:06
Date 27/07/2011
Date Format DD/MM/YY
Confirm New Time and Date
Ready to Start

All items are adjustable.

**Time** allows the current time to be set in a 24 hour format.

**Date** allows the current month, day, and year to be set.

**Date Format** is selectable between dd/mm/yyyy (default), mm/dd/yyyy, and YYYY/MM/DD.

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

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

**NOTICE**
The controller does not support Daylight Savings Time.

Page 3 – Backlight Settings

Figure 22: Backlight Settings

**Backlight Brightness** adjusts the brightness of the display.

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

**WARNING**
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 4 - Serial Port Address Settings

Figure 23: Serial Port Address Settings

**Active Protocol** – Allows the serial port to be configured to Airbus (used for X-Series system controllers and integral sequencing) or MODBUS protocols.

**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 254.

**RS-485 Address** – Sets the airbus address that allows the controller to communicate over Integral Sequencing or an X-Series system controller network.

Pages 5 & 6 – Ethernet Settings (ECO Module Only)

Figure 24: Ethernet Settings (ECO Module Only)

**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.
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, connected to port X04 on the controller.

For a compressor to be a member of the integral sequencing system, the COM control setpoint in the operator settings tab must be enabled and the compressor must be started via the local start button. Additionally, it is recommended that the Auto-Restart function be enabled as the integral sequencing system will never start and stop machines, only load and unload them. Integral sequencing relies on Auto-Restart to turn OFF the compressor motor when not needed.

Note that the compressor's address in the integral sequencing system is defined by the RS-485 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 assigned as the integral sequencing master. Lastly, note that the Active Protocol on the general settings tab must be set to Airbus485 for integral sequencing to operate properly.

Certain functions may interfere with compressors loading and unloading:
- Verify that the Remote Load Enable switch is in the open position. Having this closed will allow the remote load/unload switch to define the load command.
- The master controller MUST be started and running in the sequence. Otherwise, compressors will revert to their local setpoints.
- If the master controller is telling a slave controller to load and the slave's local pressure is above its maximum offline setpoint, or its immediate stop setpoint, the slave will unload locally, and remain unloaded until pressure falls below online or target setpoints.

Integral Sequencing – Enabling Integral Sequencing chooses this compressor to be the sequence Master. The master's package discharge pressure sensor will be the pressure signal used for the system. The default is disabled. Make sure all compressors are set up for integral sequencing before enabling this function. It is important that only one compressor in the system have this setpoint enabled, otherwise system behaviour could be impacted. This setpoint should also only be modified while the compressor is stopped. Note that the Integral Sequencing master does not have to be the compressor assigned RS-485 address 1.

Unload Pressure – Determines the pressure at which a compressor will be unloaded by the system. The system unload pressure should always be set lower than the local offline setpoint of compressors in the system. Note that when under system control, the compressor will ignore the local pressure setpoints except for protective functions.

Load Pressure – Determines the pressure at which a compressor will be loaded by the system. The system unload pressure should always be set lower than the local offline setpoint of compressors in the system. The system unload pressure should always be set lower than the local offline setpoint of compressors in the system. Note that when under system control, the compressor will ignore the local pressure setpoints except for protective functions.

Start Delay Interval – Determines the amount of time between loading compressors. This prevents all compressors from loading at once. This setpoint should be set to the longest starting time of any compressor in the system. In general, this will be equivalent to the star/delta transition time for a fixed speed machine, or ramp time for a VSD machine.

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

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

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

Priority – Each compressor can be assigned a priority level. Setting a priority for a compressor affects how the rotation will occur. Compressors with priority 1 will always be in the lead position(s), followed by priority 2 compressors, and so on. Compressors will only rotate positions with other compressors of the same priority level.

Sequence – Displays the current load/unload order of the system. Each compressor in the system is assigned a letter. The letter indicates whether the machine with the assigned Airbus address is a lead machine (loads first, unloads last) or one of the trim machines. Letter A is assigned to the lead machine, B to the next machine to load, C to the third machine to load, and D to the final machine to load. Machines will unload in the reverse order, such that A will be the last machine running.

The first position in the - - - - sequence on Integral Sequencing tab, page 3 always refers to the compressor that is assigned Airbus Address 1. The second position to Airbus Address 2, and so on. Note that the letter sequence may change due to rotation.

Note that the sequence will only be displayed on the master controller.

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 automatic sequence rotations.

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

System Pressure – Shows the current pressure reading that the system is using for control. This will only be shown on the sequence Master controller.
• Page 1 – Analog Inputs

Analog Inputs:
The following analog inputs are displayed in this section.

- Package Discharge Pressure – The pressure the compressor is delivering to the plant
- Sump Pressure – The compressor’s internal pressure at the sump tank.
- Airend Discharge Temperature – The temperature of the air/oil mixture at the discharge of the compression module.
- After-cooler Discharge Temperature – The temperature of the air after passing through the After-cooler. Note that this will only be shown if the Low Ambient option has been purchased and installed.
- After-cooler Discharge Pressure (integrated dryer units only) – Pressure the compressor is delivering before the dryer.

• Page 2 – Compressor Data

Compressor Data:
- Power ON Hours – The number of hours the controller has been powered up
- Running Hours – The number of hours the compressor’s motor has been running
- Loaded Hours – The number of hours the compressor has been producing air
- Real Time Clock - Current time of day

• Pages 3 and 4 – Digital Inputs

Digital Inputs:
Each digital input will have an indication showing whether the input is in an “OPEN” or “CLOSED” state. This is the physical state of the input and may not necessarily line up with the logical condition. The normal state is shown below.

- Emergency Stop – Normally Closed
- Main/Fan Motor Overload – Normally Closed
- Remote Load Enable – Normally Open
- Remote Load/Unload – Normally Open
- Remote Start – Normally Open
- Remote Stop – Normally Closed
- Dryer Temperature Fault – Normally Open
- Dryer High Pressure – Normally Closed

• Pages 5 & 6 – Digital Outputs

Digital Outputs:
Each digital output will have an indication showing whether the output is in an “OPEN” or “CLOSED” state. This is the physical state of the input and may not necessarily line up with the logical condition. The normal state is shown below.

- Starter Contact KM1, KM2 – Normally Open
- Starter Contact KM3 – Normally Open
- Fan Starter Contact KM4 – Normally Open
• Load Solenoid 1SV – Normally Open
• Dryer Run / Fan Run – Normally Open
• PORO Horn – Normally Open
• Trip Indication – Normally Open

Page 7 – Analog Outputs

Analog Outputs:
The value for the analog outputs will be in mA.

- VSD Blower Output – Current speed of the VSD blower (if installed).

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.

VARIABLE SPEED COMPRESSOR

HOME FOLDER

Page 1 – System Overview

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

Target Pressure Setpoint is indicated in the black box, which is always centered on the gauge. This is the pressure that the compressor is trying to maintain by adjusting the motor speed.

Automatic Stop Setpoint is indicated in the black box which is always right of center on the gauge. When the compressor reaches this setpoint the compressor will unload and stop once the motor reaches minimum speed and the compressor motor has been running for at least 2 minutes.

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 in numeric and bar graph form. 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. This is the temperature of the air/oil mixture at the discharge of the compression module.

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

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.

Pages 3 & 4 – Analog Inputs and Compressor Information

Any sensor that is not installed or is reporting a failure will show a [ - - ] symbol.

The following analog inputs are displayed in this section.

- Package Discharge Pressure – The pressure the compressor is delivering to the plant
- Airend Discharge Temperature – The temperature of the air/oil mixture at the discharge of the compression module.
- After-cooler Discharge Pressure (Integrated dryer units only) – Pressure the compressor is delivering before upstream of the dryer
- Dryer Run Status (Integrated dryer units only) – Checkbox that shows whether the dryer is currently running (checked) or not (blank)
Additionally, the following compressor status readings are included in this section:

- **Motor Speed** – The current speed of the motor in rpm
- **Package kW** – The current power being consumed by the package, including the main and blower VSDs

### OPERATOR SETTINGS FOLDER

- **Pages 1 and 2 Operator Settings**

  ![Figure 34: Operator Settings](image)

  **Setpoints**
  - **Target** 100 PSI
  - **Automatic stop** 110 PSI
  - **Immediate stop** 119 PSI

  **Target Pressure** – The compressor will vary its speed in order to maintain a package discharge pressure as close to this value as possible. Range (in psi): Target +1 to Target +10

  **Automatic Stop Pressure** – The compressor will stop if the package discharge pressure reaches this value and the compressor is running at minimum speed. Range (in psi): Target +1 to Target +10

  **Immediate Stop Pressure** – The compressor will stop if the package discharge pressure reaches this value, regardless of its speed. Range (in psi): Auto Stop Pressure to Auto Stop Pressure +10

- **Pages 2 Thru 4 Operator Options**

  ![Figure 35: Operator Settings](image)

  **Options**
  - **COM Control**
  - **Rem Start/Stop**
  - **Enable PORO**
  - **PORO Time** 10 SEC

  **Ready to Start**

  **Options**
  - **Sched Start Day**
  - **Sched Start Hour** 0
  - **Sched Start Min** 0

  **Ready to Start**

  **Options**
  - **Sched Stop Day**
  - **Sched Stop Hour**
  - **Sched Stop Min**

  **Ready to Start**

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

  **Compressor Control** – Enabling this setpoint allows the compressor to be controlled by a serial or Ethernet device, such as an X8I. This is equivalent to the "Sequencer" option on older Intellisyss controllers.

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

  **Enable PORO** – Enabling this setpoint will allow the compressor to automatically restart after a power outage has been restored if the compressor was running loaded at the time of the outage. PORO is an option which must be purchased and installed before this feature can be turned ON.

  **PORO Time** – Time after the controller power has been restored and controller has finished booting before the compressor will perform a PORO start.

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

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

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

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

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

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

  Note that in order to disable Scheduled Start/Stop, the Scheduled Start and Stop days, hours, and minutes must match exactly.

- **Page 5 Calibrate Sensors**

  ![Figure 36: Calibrate Sensors](image)

  **Options**
  - **Pkg Discharge P**
  - **Jump Pressure**
  - **Aftercool DischP**

  **Ready to Start**

  Sensor calibration can only take place when the machine is stopped and there is no pressure on the sensor. Calibration only needs to take place after a sensor is replaced, the controller is replaced, the controller software is upgraded, or the operator suspects the sensor reading is in error. Calibrate a sensor by selecting the checkbox beside the sensor name. Note that the checkbox may appear too quickly to be visible. Calibration can be confirmed by verifying that the sensor value now reads zero.

  Each of the sensors listed below can be calibrated.

  - **Package Discharge Pressure (4APT)**

  Note that if a sensor is currently reading a value that is ±10% of its range from zero, the sensor will not be able to be calibrated and an warning will be logged in the event log. Make sure the sensor is being exposed to atmosphere before attempting calibration.
EVENTS FOLDER

- Pages 1 to a Max of 50

The pages in the Events folder document up to the last 200 events that the controller has experienced, with the time and date of the occurrence. The events are recorded in sequence, with number one being the newest and 200 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 five, page two displays six through ten, and so on.

The time and date of the event can be viewed by navigating to an event and pressing the right arrow navigation key. The time and date window can then be exited by pressing the enter key.

The following items will generate an event.
- Power ON
- Power OFF
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Starting the compressor remotely
- Stopping the compressor remotely
- Loading the compressor remotely
- Unloading the compressor remotely
- Warning
- Trip
- Start Inhibit

Active Warnings will show a flashing caution icon while acknowledged Warnings will a solid icon.

Active Trips will show a flashing trip icon while acknowledged Trips will have a solid icon.

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

WARNING EVENTS LIST

- High Airend Disch Temp
  Xe-70M On-Screen Text: High A/E Disch T
  Will occur if the unit is running and 2ATT is greater than 105°C (221°F) (97% of 109°C (228°F)) or the unit is in idle mode (3.3.7.1) and 2ATT is greater than 84.4°C (184°F). This warning will have a 90 second delay.

- High Discharge Press
  Xe-70M On-Screen Text: High Disch Press
  Will occur if the unit is under the control of an external device, such as an X-series system controller, and the discharge pressure is greater than the immediate stop pressure for a time period of 3 seconds. At this point, the controller will unload the compressor until package discharge pressure falls back below the target pressure setpoint.

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

- Service Level 1
  Xe-70M On-Screen Text: SVC Required
  If service level 1 has been selected for the unit, 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
  Xe-70M On-Screen Text: 100 Hrs to SVC, SVC Required, Service Alarm
  If service level 2 has been selected for the unit, the service complete factory set point will be used to clear a level 2 service warning and reset the service time or date. The service complete can be reset before a service warning occurs.

  The 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 been 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.

- High VSD Ambient Temperature
  Xe-70M On-Screen Text: High VSD Amb T
  This warning will occur if the VSD ambient temperature gets within 5% of the shutdown value of 56.1°C (133°F). This condition must exist for 3 seconds before the warning is issued.

- Dryer Temp Warning
  Xe-70M On-Screen Text: Dryer Temp
  Note that the dryer temp warning is triggered when the dewpoint temperature exceeds 14.5°C (58.1 °F) for 6 minutes or longer. This warning can also be triggered if the temperature probe in the dryer fails.

- Dryer High Pressure
  Xe-70M On-Screen Text: Dryer High Pres
  On units 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 dryer high pressure switch must be reset (contact closed) before this warning can be reset. If this warning is reset while the conditions for running the dryer exist, the dryer can restart.

- **Invalid Calibration**
  Xe-70M On-Screen Text: Invalid Cal
  This will occur if the sensor zero value is ±10% of its scale.

## TRIP EVENTS LIST

- **High Airend Disch Temp**
  Xe-70M On-Screen Text: High A/E Disch T
  This will occur if 2ATT is greater than 109 °C (228 °F) during normal operation. This trip will occur at 93 °C (200 °F) if the unit is in idle mode.

- **Overload**
  Xe-70M On-Screen Text: Overload
  This will occur if the fan overload relay opens. The contact must be open for at least 3 seconds before the trip will occur.

- **Remote Stop Failure**
  Xe-70M On-Screen Text: Rem Stop Fail
  Will occur if the REMOTE START/STOP option is enabled, the remote stop button remains open and either start button is pressed.

- **Remote Start Failure**
  Xe-70M On-Screen Text: Rem Start Fail
  Will occur if the unit is started by the remote start button and the button stays closed for 7 seconds after the unit starts.

- **Sensor Failure**
  Xe-70M On-Screen Text: 4APT Failure, 2ATT Failure, Main Motor CT Failure
  This will occur when a sensor is recognized as missing or broken. The sensors affected by this trip are CT1, CT2, CT3, 4APT, and 2ATT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: 4APT Failure.

- **Emergency Stop**
  Xe-70M On-Screen Text: Emergency Stop
  This will occur when the EMERGENCY STOP button is engaged.

- **VSD Fault X**
  Xe-70M On-Screen Text: VSD Fault X
  The compressors variable speed drive is reporting a fault. Refer to the troubleshooting guide for further information.

- **Check Motor Rotation**
  Xe-70M On-Screen Text: Ck Motor Rot
  This will occur if the controller reads a negative speed from the VSD when starting.

- **VSD Communication Failure**
  Xe-70M On-Screen Text: VSD Comm Fail
  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**
  Xe-70M On-Screen Text: Wrong 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.

- **Stop Failure**
  Xe-70M On-Screen Text: 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 4 seconds for the compressor to stop before issuing this trip. This is normally an indication the run relay (K1) did not open when de-energized. Because of this, the isolation contact should open when this fault occurs. The isolation contact can close when this fault is cleared, if the unit is not water cooled.

- **VSD Initialization Fault**
  Xe-70M On-Screen Text: Drive Init Error
  This will occur if the controller is unable to properly set-up the drive after boot or after a reset. The controller will attempt to write a parameter 10 times to the drive, after these 10 attempts have failed this trip will be registered.

- **Remote Stop Failure**
  Xe-70M On-Screen Text: Rem Stop Fail
  Will occur if the REMOTE START/STOP option is enabled, the remote stop button remains open and either start button is pressed.

## START INHIBIT LIST

- **High Airend Discharge Temperature**
  Xe-70M On-Screen Text: High A/E Disch T
  This will occur if 2ATT is greater than 95% of 109 °C (228 °F).

- **VSD Initialization**
  Xe-70M On-Screen Text: VSD Initializing
  This will occur if the compressor has not responded to the initial communications from the controller.

## TRIP HISTORY

- **Pages 1 to A Max of 3**

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

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

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

- **Trips**

  Active Trips will show a flashing trip icon while acknowledged Trips will have a solid icon.

The trip history also records compressor data at the time of the trip to assist in diagnostics and troubleshooting. Navigating to the trip entry and hitting the enter button will bring up the trip history dialog box.
While the dialog box is active, press the left and right keys in order to scroll through the displayed data. The name of the trip will always be shown in the title bar of the dialog box. Press enter when finished viewing the data to return to the trip history screen.

**MAINTENANCE FOLDER**

- **Page 1 – Filter Status**

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

The following filters are displayed:

- Separator Element

- **Page 2 - Maintenance Configuration**

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

**GENERAL SETTINGS FOLDER**

All parameters in the general settings folder are adjustable.

- **Page 1 – Language & Units Selection**

Language is selectable from the following 30 selections:

- English (default)
- Chinese, simplified
- Finnish
- French
- German
- Greek
- Hungarian
- Italian
- Japanese
- Korean
- Lithuanian
- Latvian
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Slovak
- Slovenian
- Spanish
- Swedish
- Thai
- Turkish

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.

*Temperature* is selectable between °F and °C.

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

- **Page 2 – Time & Date Settings**

All items are adjustable.

*Time* allows the current time to be set in a 24 hour format

*Date* allows the current month, day, and year to be set

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

*Confirm New Time and Date* is used to verify that changes to selections are desired. An “x” must appear in the checkbox before any changes will take effect.
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 – Backlight Settings**

**Figure 45 : Backlight Settings**

Backlight Brightness adjusts the brightness of the display.

**NOTICE**

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

**WARNING**

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 4 - Serial Port Address Settings**

**Figure 46 : Serial Port Address Settings**

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

- **Active Protocol** – Allows the serial port to be configured to Airbus (used for X-Series system controllers and integral sequencing) or MODBUS protocols
- **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 254.
- **RS-485 Address** – Sets the airbus address that allows the controller to communicate over Integral Sequencing or an X-Series system controller network.

**Pages 5 & 6 – Ethernet Settings (ECO Module Only)**

The ECO Module is the Ethernet Connectivity Option. This option allows the customer to connect to a LAN and view web pages served by the controller. The ECO module also has the ability to store up to the past seven days of operational data for troubleshooting purposes.

Note that these pages will have no effect unless the ECO module option has been purchased.

**Figure 47 : Ethernet Settings (ECO Module Only)**

- **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.

**INTEGRAL SEQUENCING FOLDER**

**Figure 48 : Integral Sequencing**

- **Enable ISC**
- **Unload Pressure**
- **Load Pressure**
- **Ready to Start**
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, connected to port X04 on the controller.

For a compressor to be a member of the integral sequencing system, the COM control setpoint in the operator settings tab must be enabled and the compressor must be started via the local start button. Additionally, it is recommended that the Auto-Restart function be enabled as the integral sequencing system will never start and stop machines, only load and unload them. Integral sequencing relies on Auto-Restart to turn OFF the compressor motor when not needed.

Note that the compressor’s address in the integral sequencing system is defined by the RS-485 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 assigned as the integral sequencing master. Lastly, note that the Active Protocol on the general settings tab must be set to Airbus 485 for integral sequencing to operate properly.

Certain functions may interfere with compressors loading and unloading:
- Verify that the Remote Load Enable switch is in the open position. Having this closed will allow the remote load/unload switch to define the load command.
- The master controller MUST be started and running in the sequence. Otherwise, compressors will revert to their local setpoints.
- If the master controller is telling a slave controller to load and the slave’s local pressure is above its maximum offline setpoint, or its immediate stop setpoint, the slave will unload locally, and remain unloaded until pressure falls below online or target setpoints.

**Integral Sequencing** – Enabling Integral Sequencing chooses this compressor to be the sequence Master. The master’s package discharge pressure sensor will be the pressure signal used for the system. The default is disabled. Make sure all compressors are set up for integral sequencing before enabling this function. It is important that only one compressor in the system have this setpoint enabled, otherwise system behaviour could be impacted. This setpoint should also only be modified while the compressor is stopped. Note that the Integral Sequencing master does not have to be the compressor assigned RS-485 address 1.

**Unload Pressure** – Determines the pressure at which a compressor will be unloaded by the system. The system unload pressure should always be set lower than the local offline setpoint of compressors in the system. Note that when under system control, the compressor will ignore the local pressure setpoints except for protective functions.

**Start Delay Interval** – Determines the amount of time between loading compressors. This prevents all compressors from loading at once. This setpoint should be set to the longest starting time of any compressor in the system. In general, this will be equivalent to the star/delta transition time for a fixed speed machine, or ramp time for a VSD machine.

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

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

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

**Priority** – Each compressor can be assigned a priority level. Setting a priority for a compressor affects how the rotation will occur. Compressors with priority 1 will always be in the lead position(s), followed by priority 2 compressors, and so on. Compressors will only rotate positions with other compressors of the same priority level.

**Sequence** – Displays the current load/unload order of the system. Each compressor in the system is assigned a letter. The letter indicates whether the machine with the assigned Airbus address is a lead machine (loads first, unloads last) or one of the trim machines. Letter A is assigned to the lead machine, B to the next machine to load, C to the third machine to load, and D to the final machine to load. Machines will unload in the reverse order, such that A will be the last machine running.

The first position in the - - - - sequence on Integral Sequencing tab, page 3 always refers to the compressor that is assigned Airbus Address 1. The second position to Airbus Address 2, and so on.

Note that the letter sequence may change due to rotation.

Note that the sequence will only be displayed on the master controller.

**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.

**System Pressure** – Shows the current pressure reading that the system is using for control. This will only be shown on the sequence Master controller.
**Page 1 – Analog Inputs**

**Figure 49 : Analog Inputs**

- **Package Discharge Pressure** – The pressure the compressor is delivering to the plant
- **Airend Discharge Temperature** – The temperature of the air/oil mixture at the discharge of the compression module.

**Analog Inputs:**

The following analog inputs are displayed in this section.

- **Package Discharge Pressure**
- **Airend Discharge Temperature**

**Pages 2 Thru 4 – Compressor Data**

**Figure 50 : Compressor Data**

- **Motor Current** – Electrical current currently being drawn by the motor.
- **Motor Voltage** – Electrical voltage at the motor.
- **DC Link Voltage** – DC Bus Voltage on the VSD
- **Package kW** – Instantaneous power consumption of the compressor
- **Heatsink Temperature** – Temperature of the VSD at the heatsink
- **Control Card Temperature** – Temperature of the VSD at the control card

- **Motor Current**
- **Motor Voltage**
- **DC Link Voltage**
- **Package kW**
- **Heatsink Temperature**
- **Control Card Temperature**

**Pages 5 & 6 – Digital Inputs**

**Figure 51 : Digital Inputs**

- **Emergency Stop** – Normally Closed
- **Main/Fan Motor Overload** – Normally Closed
- **Remote Start** – Normally Open
- **Remote Stop** – Normally Closed
- **Dryer Temperature Fault** – Normally Open
- **Dryer High Pressure** – Normally Closed

**Digital Inputs: (Password Required)**

Each digital input will have an indication showing whether the input is in an “OPEN” or “CLOSED” state. This is the physical state of the input and may not necessarily line up with the logical condition. The normal state is shown below.

- **Emergency Stop** – Normally Closed
- **Main/Fan Motor Overload** – Normally Closed
- **Remote Start** – Normally Open
- **Remote Stop** – Normally Closed
- **Dryer Temperature Fault** – Normally Open
- **Dryer High Pressure** – Normally Closed

**Compressor Data:**

- **Power ON Hours** – Number of hours that the controller has been powered up
- **Running Hours** – Number of hours the compressor’s motor has been running
- **Motor Speed** – Current speed of the motor in RPM
- **Time** – Current time of day.
**Pages 7 & 8 – Digital Outputs**

**Figure 52 : Digital Outputs**

Digital Outputs (Password Required):

Each digital output will have an indication showing whether the output is in an “OPEN” or “CLOSED” state. This is the physical state of the input and may not necessarily line up with the logical condition. The normal state is shown below.

- **VSD Run K1 Contact** – Normally Open
- **Fan Starter Contact KM4** – Normally Open
- **Blowdown Solenoid 1SV** – Normally Open
- **Dryer Run / Fan Run** – Normally Open
- **PORO Horn** – Normally Open
- **Trip Indication** – Normally Open

**Page 53 – Analog Outputs**

**Figure 53 : Analog Outputs**

Analog Outputs:

The value for the analog outputs will be in mA.

- **VSD Output**

**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.
MODBUS CONNECTION AND CONTROL

**CONNECTION TO THE MODBUS NETWORK**

The Xe-70M controller is designed to interface to any MODBUS RTU master capable device using Belden 9841 or equivalent RS-485 cable. In order to connect to the network, the cable must be connected to port X04 on the controller as shown in the figure below:

![Figure 54 Xe70M Phoenix2 Pin Connector](image)

**RS-485 NETWORK**

RS-485 data communications and other low voltage signals can be subject to electrical interference.

This potential can result in intermittent malfunction or anomaly that is difficult to diagnose. To avoid this possibility always use earth shielded cables, securely bonded to a known good earth at one end. In addition, give careful consideration to cable routing during installation.

1. Never route an RS-485 data communications or low voltage signal cable alongside a high voltage 3-phase power supply cable. If it is necessary to cross the path of a power supply cable(s), always cross at a right angle.

2. If it is necessary to follow the route of power supply cables for a short distance (for example: from a compressor unit to a wall along a suspended cable tray) attach the RS-485 or signal cable on the outside of an earthed cable tray such that the cable tray forms an earthed electrical interference shield.

3. Where possible, never route an RS-485 or signal cable near to equipment or devices that may be a source of electrical interference (for example: 3-phase power supply transformer, high voltage switchgear unit, frequency inverter drive module, radio communications antenna).

**MODBUS ADDRESS SELECTION**

Each compressor connected to the MODBUS network will have a unique assigned address, starting at compressor 1 increasing sequentially to the number of compressors connected to the MODBUS network.

The MODBUS address for each compressor is set on the General Settings Tab, Page 4. The controller’s default MODBUS Address setting is 1. Additionally, the active protocol must be set to MODBUS Slave.

![Figure 56: Protocols](image)

**MODBUS MASTER SETTINGS**

In order to communicate properly with the Xe-70M controller, the MODBUS master must be set to communicate with the following configuration:

- **Baud Rate** – 9600
- **Data Bits** – 8
- **Stop Bits** – 1
- **Parity** – None

The following polling parameters are recommended for optimal system operation:

- **Polling Rate**: Not less than 500 ms
- **Timeout**: 500 ms
- **Retries**: 2

![Figure 55](image)
## R4 to 37 kW FIXED SPEED MODBUS TABLE

### Table 8: R4 To 37 kW Fixed Speed MODBUS Table

<table>
<thead>
<tr>
<th>Register (40XXX)</th>
<th>Variable</th>
<th>Read/Write</th>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Status/Control</td>
<td>R/W</td>
<td></td>
<td>See table 9</td>
</tr>
<tr>
<td>3</td>
<td>Package Discharge Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Sump Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Airend Discharge Temperature</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>After-cooler Discharge Temperature</td>
<td>R</td>
<td></td>
<td>Low Ambient units only</td>
</tr>
<tr>
<td>10</td>
<td>Separator Pressure Drop</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>After-cooler Discharge Pressure</td>
<td>R</td>
<td></td>
<td>Dryer units only</td>
</tr>
<tr>
<td>65</td>
<td>Running Hours MSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Running Hours LSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Loaded Hours MSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Loaded Hours LSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Rated Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Starter Type</td>
<td>R</td>
<td>1-3</td>
<td>See table 10</td>
</tr>
<tr>
<td>101</td>
<td>Modulation Enabled</td>
<td>R</td>
<td>0=Disabled</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Service Level</td>
<td>R</td>
<td>0 - 2</td>
<td>0=Level 0, 1=Level 1, 2=Level 2</td>
</tr>
<tr>
<td>103</td>
<td>Service Time Period</td>
<td>R</td>
<td>1000 - 8000</td>
<td>Increments of 1000</td>
</tr>
<tr>
<td>104</td>
<td>Dryer Installed</td>
<td>R</td>
<td>0=OFF</td>
<td></td>
</tr>
<tr>
<td>112</td>
<td>Offline Pressure</td>
<td>R/W</td>
<td>75 - (rated+10)</td>
<td>rated = rated pressure</td>
</tr>
<tr>
<td>113</td>
<td>Online Pressure</td>
<td>R/W</td>
<td>65-(offline-10)</td>
<td>offline = offline pressure</td>
</tr>
<tr>
<td>114</td>
<td>Mode of Operation</td>
<td>R/W</td>
<td>0 – 2</td>
<td>See table 9</td>
</tr>
<tr>
<td>115</td>
<td>Starter Time (seconds)</td>
<td>R/W</td>
<td>5 – 30</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>Auto Restart Time (seconds)</td>
<td>R/W</td>
<td>120 – 3600</td>
<td></td>
</tr>
<tr>
<td>117</td>
<td>Auto Restart ON/OFF</td>
<td>R</td>
<td>0=OFF</td>
<td></td>
</tr>
<tr>
<td>118</td>
<td>Communication Control ON/OFF</td>
<td>R</td>
<td>0=OFF</td>
<td></td>
</tr>
<tr>
<td>119</td>
<td>Remote Start/Stop Enable</td>
<td>R</td>
<td>0=OFF</td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>Power Out Restart Option (PORO)</td>
<td>R</td>
<td>0=OFF</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>PORO Time (seconds)</td>
<td>R/W</td>
<td>10 - 600</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td>Auto Start/Stop Delay Time (seconds)</td>
<td>R/W</td>
<td>0 – 60</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>Low Ambient Temperature</td>
<td>R/W</td>
<td>30 - 60</td>
<td>Degree F</td>
</tr>
<tr>
<td>125</td>
<td>Unloaded Stop Time</td>
<td>R/W</td>
<td>10 - 30</td>
<td></td>
</tr>
<tr>
<td>128</td>
<td>Lead/Lag</td>
<td>R/W</td>
<td>0=Lag</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Lag Offset</td>
<td>R/W</td>
<td>0 – 45</td>
<td>psi</td>
</tr>
<tr>
<td>131</td>
<td>Lead/Lag Cycle Length (Hours)</td>
<td>R/W</td>
<td>0 – 750</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>Scheduled Start (Day)</td>
<td>R/W</td>
<td>0 - 9</td>
<td>See table 10</td>
</tr>
<tr>
<td>133</td>
<td>Scheduled Start (Hour)</td>
<td>R/W</td>
<td>0 – 23</td>
<td></td>
</tr>
<tr>
<td>134</td>
<td>Scheduled Start (Minute)</td>
<td>R/W</td>
<td>0 – 59</td>
<td></td>
</tr>
<tr>
<td>135</td>
<td>Scheduled Stop (Day)</td>
<td>R/W</td>
<td>0 - 9</td>
<td>See table 10</td>
</tr>
<tr>
<td>136</td>
<td>Scheduled Stop (Hour)</td>
<td>R/W</td>
<td>0 – 23</td>
<td></td>
</tr>
<tr>
<td>137</td>
<td>Scheduled Stop (Minute)</td>
<td>R/W</td>
<td>0 – 59</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>Warning Code</td>
<td>R</td>
<td></td>
<td>See table 11</td>
</tr>
<tr>
<td>256</td>
<td>Trip Code</td>
<td>R</td>
<td></td>
<td>See table 11</td>
</tr>
<tr>
<td>400</td>
<td>Reset Web Logins</td>
<td>R/W</td>
<td>0-1</td>
<td>Writing a 1 value will reset the web logins to factory defaults. After the reset is performed this value shall be set back to 0</td>
</tr>
</tbody>
</table>
Table 9: Xe 70M Fixed Speed Controller Register 01-Status/Control

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Host/Local (R/W)</td>
<td>0 = Local, 1 = Host</td>
</tr>
<tr>
<td>1</td>
<td>Run/Stop (R/W)</td>
<td>0 = Stop, 1 = Run</td>
</tr>
<tr>
<td>2</td>
<td>Load/Unload (R/W)</td>
<td>0 = Unload, 1 = Load</td>
</tr>
<tr>
<td>3</td>
<td>Modulating (R) **</td>
<td>0 = Not Modulating, 1 = Modulating</td>
</tr>
<tr>
<td>4</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stopped in Auto Restart (R)</td>
<td>0 = Not Stopped in Auto Restart, 1 = Stopped in Auto Restart</td>
</tr>
<tr>
<td>6</td>
<td>Alarm (R)</td>
<td>0 = No Alarms, 1 = Alarms</td>
</tr>
<tr>
<td>7</td>
<td>Warning (R)</td>
<td>0 = No Warnings, 1 = Warnings</td>
</tr>
<tr>
<td>8</td>
<td>On/Off Line Mode (R)</td>
<td>0 = Not in On/Off Line Mode, 1 = On/Off Line Mode</td>
</tr>
<tr>
<td>9</td>
<td>Mod/ACS or Mod Only (R) **</td>
<td>0 = Not in Mod/ASC Mode, 1 = Mod/ASC Mode</td>
</tr>
<tr>
<td>10-12</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>13-15</td>
<td>Unit Type (R): Unused</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Xe 70M Fixed Speed Controller Register Codes

<table>
<thead>
<tr>
<th>Register 100: Starter Type</th>
<th>Register 114: Mode of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Star-Delta</td>
<td>0 = On/Off Line</td>
</tr>
<tr>
<td>2 = Remote Starter</td>
<td>1 = MOD/ACS **</td>
</tr>
<tr>
<td>3 = Soft Starter</td>
<td>2 = Modulation Only **</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Registers 132, 135: Day</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Sunday</td>
<td>32</td>
</tr>
<tr>
<td>1 = Monday</td>
<td>34**</td>
</tr>
<tr>
<td>2 = Tuesday</td>
<td>36</td>
</tr>
<tr>
<td>3 = Wednesday</td>
<td>38</td>
</tr>
<tr>
<td>4 = Thursday</td>
<td>39</td>
</tr>
<tr>
<td>5 = Friday</td>
<td>40</td>
</tr>
<tr>
<td>6 = Saturday</td>
<td>48</td>
</tr>
<tr>
<td>7 = Daily</td>
<td>49**</td>
</tr>
<tr>
<td>8 = Weekdays</td>
<td>51**</td>
</tr>
<tr>
<td>9 = Weekends</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 11: Xe 70M Fixed Speed Controller Trip & Warning Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02**</td>
<td>Sensor Failure 3APT</td>
<td>32</td>
<td>Emergency Stop</td>
</tr>
<tr>
<td>03</td>
<td>Sensor Failure 4APT</td>
<td>34**</td>
<td>Change Separator Element</td>
</tr>
<tr>
<td>08**</td>
<td>Sensor Failure 7APT</td>
<td>36</td>
<td>Sensor Error (Calibration)</td>
</tr>
<tr>
<td>10</td>
<td>Sensor Failure 2ATT</td>
<td>38</td>
<td>100 Hours To Service</td>
</tr>
<tr>
<td>11**</td>
<td>Sensor Failure 7ATT</td>
<td>39</td>
<td>Service Required</td>
</tr>
<tr>
<td>18</td>
<td>Motor Overload (Main) –due to CTs</td>
<td>40</td>
<td>Alarm – Service Required</td>
</tr>
<tr>
<td>19</td>
<td>Overload – due to Thermal OL</td>
<td>48</td>
<td>Unit Too Cold To Start</td>
</tr>
<tr>
<td>22**</td>
<td>Check Motor Rotation</td>
<td>49**</td>
<td>High Sump Pressure</td>
</tr>
<tr>
<td>25</td>
<td>Remote Stop Failure</td>
<td>51**</td>
<td>Dryer High Pressure</td>
</tr>
<tr>
<td>26</td>
<td>Remote Start Failure</td>
<td>52</td>
<td>Dryer Temperature Warning</td>
</tr>
<tr>
<td>28**</td>
<td>Low Sump Pressure</td>
<td>55</td>
<td>Change HE Filter (Dryer)</td>
</tr>
<tr>
<td>29</td>
<td>High Air Pressure</td>
<td>56</td>
<td>Sensor Failure – Main Motor CT Inputs</td>
</tr>
<tr>
<td>31</td>
<td>High Arend Discharge Temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that (***) Marked bits and codes are not applicable for R4-11 packages
### R5.5 to 37 kW VARIABLE SPEED MODBUS TABLE

**Table 12: R5.5 TO 37 kW Variable Speed MODBUS Table**

<table>
<thead>
<tr>
<th>Register (40XXX)</th>
<th>Variable</th>
<th>Read/Write</th>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Status/Control</td>
<td>R/W</td>
<td></td>
<td>See table 13</td>
</tr>
<tr>
<td>3</td>
<td>Package Discharge Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>After-cooler Discharge Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Airend Temperature</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Separator Pressure Drop</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Percent Capacity</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Motor Speed</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Motor Current</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>DC Link Voltage</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Motor Voltage</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Package kW</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>kW Hours</td>
<td>R</td>
<td>0 – 999</td>
<td>Add to (mW hours * 1000)</td>
</tr>
<tr>
<td>65</td>
<td>Total Hours MSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Total Hours LSB</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Compressor Type</td>
<td>R</td>
<td></td>
<td>See table 14</td>
</tr>
<tr>
<td>99</td>
<td>Service Level</td>
<td>R</td>
<td>0 - 2</td>
<td>0=Level 0, 1=Level 1, 2=Level 2</td>
</tr>
<tr>
<td>100</td>
<td>Service Time Period</td>
<td>R</td>
<td>1000 - 8000</td>
<td>Increments of 1000</td>
</tr>
<tr>
<td>103</td>
<td>Dryer Installed</td>
<td>R</td>
<td></td>
<td>0 = no dryer</td>
</tr>
<tr>
<td>112</td>
<td>Target Pressure</td>
<td>R/W</td>
<td>65 - 145</td>
<td></td>
</tr>
<tr>
<td>113</td>
<td>Auto Stop Pressure</td>
<td>R/W</td>
<td>(T+1)-(T+10)</td>
<td>T = target pressure</td>
</tr>
<tr>
<td>114</td>
<td>Immediate Stop Pressure</td>
<td>R/W</td>
<td>ASP–(ASP+10)</td>
<td>ASP = auto stop pressure</td>
</tr>
<tr>
<td>117</td>
<td>Compare Savings To</td>
<td>R/W</td>
<td>0 - 2</td>
<td>0=Geo, 1=Mod, 2=ON/OFF</td>
</tr>
<tr>
<td>121</td>
<td>Communication Control ON/OFF</td>
<td>R</td>
<td></td>
<td>0=OFF</td>
</tr>
<tr>
<td>122</td>
<td>Remote Start/Stop ON/OFF</td>
<td>R</td>
<td></td>
<td>0=OFF</td>
</tr>
<tr>
<td>123</td>
<td>Power Out Restart Option (PORO) ON/OFF</td>
<td>R</td>
<td></td>
<td>0=OFF</td>
</tr>
<tr>
<td>124</td>
<td>PORO Time (seconds)</td>
<td>R/W</td>
<td>10 - 600</td>
<td>See table 14</td>
</tr>
<tr>
<td>127</td>
<td>Scheduled Start - Day</td>
<td>R/W</td>
<td>0 - 9</td>
<td>See table 14</td>
</tr>
<tr>
<td>128</td>
<td>Scheduled Stop - Day</td>
<td>R/W</td>
<td>0 - 9</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>Scheduled Start (Hour)</td>
<td>R/W</td>
<td>0 – 23</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Scheduled Start (Minute)</td>
<td>R/W</td>
<td>0 – 59</td>
<td></td>
</tr>
<tr>
<td>131</td>
<td>Scheduled Stop (Hour)</td>
<td>R/W</td>
<td>0 – 23</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>Scheduled Stop (Minute)</td>
<td>R/W</td>
<td>0 – 59</td>
<td></td>
</tr>
<tr>
<td>133</td>
<td>Rated Pressure</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>251</td>
<td>VSD Software Version Number</td>
<td>R</td>
<td></td>
<td>Divide by 100</td>
</tr>
<tr>
<td>255</td>
<td>Warning Code</td>
<td>R</td>
<td></td>
<td>See table 15</td>
</tr>
<tr>
<td>256</td>
<td>Alarm Code History</td>
<td>R</td>
<td></td>
<td>See table 15</td>
</tr>
<tr>
<td>400</td>
<td>Reset Web Logins</td>
<td>R/W</td>
<td>0-1</td>
<td>Writing a 1 value will reset the web logins to factory defaults. After the reset is performed this value shall be set back to 0</td>
</tr>
</tbody>
</table>
Table 13: Xe 70M Variable Speed Controller Register 01-Status/Control

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Host/Local (R/W)</td>
<td>0 = Local, 1 = Host</td>
</tr>
<tr>
<td>1</td>
<td>Run/Stop (R/W)</td>
<td>0 = Stop, 1 = Run</td>
</tr>
<tr>
<td>2</td>
<td>Load/Unload (R/W)</td>
<td>0 = No Loaded Operation, 1 = Loaded Operation</td>
</tr>
<tr>
<td>3</td>
<td>Operating at Minimum Speed (R)</td>
<td>0 = Operating above Minimum Speed, 1 = Operating at Minimum Speed</td>
</tr>
<tr>
<td>4</td>
<td>Operating at Maximum Speed (R)</td>
<td>0 = Operating below Maximum Speed, 1 = Operating at Maximum Speed</td>
</tr>
<tr>
<td>5</td>
<td>Stopped in Auto Restart (R)</td>
<td>0 = Not Stopped in Auto Restart, 1 = Stopped in Auto Restart</td>
</tr>
<tr>
<td>6</td>
<td>Alarm (R)</td>
<td>0 = No Alarms, 1 = Alarms</td>
</tr>
<tr>
<td>7</td>
<td>Warning (R)</td>
<td>0 = No Warnings, 1 = Warnings</td>
</tr>
<tr>
<td>8-9</td>
<td>Normal/Unload Operate (R)</td>
<td>00 = Unloaded Operation, 11 = Normal Operation</td>
</tr>
<tr>
<td>10-11</td>
<td>Unused</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fixed/Variable Speed Compressor (R)</td>
<td>0 = Fixed Speed, 1 = Variable Speed</td>
</tr>
<tr>
<td>13-15</td>
<td>Unit Type (R): Unused</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Xe 70M Variable Speed Controller Register Codes

<table>
<thead>
<tr>
<th>Register 98: Compressor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 = 5.5 kW</td>
</tr>
<tr>
<td>75 = 7.5 kW</td>
</tr>
<tr>
<td>80 = 7.5 hp</td>
</tr>
<tr>
<td>100 = 10 hp</td>
</tr>
<tr>
<td>110 = 11 kW</td>
</tr>
<tr>
<td>150 = 15 kW</td>
</tr>
<tr>
<td>200 = 20 hp</td>
</tr>
<tr>
<td>220 = 22 kW</td>
</tr>
<tr>
<td>290 = 30 hp</td>
</tr>
<tr>
<td>300 = 30 kW</td>
</tr>
<tr>
<td>400 = 40 hp</td>
</tr>
<tr>
<td>370 = 37 kW</td>
</tr>
<tr>
<td>500 = 50 hp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Register 127 &amp; 128:Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Sunday</td>
</tr>
<tr>
<td>1 = Monday</td>
</tr>
<tr>
<td>2 = Tuesday</td>
</tr>
<tr>
<td>3 = Wednesday</td>
</tr>
<tr>
<td>4 = Thursday</td>
</tr>
<tr>
<td>5 = Friday</td>
</tr>
<tr>
<td>6 = Saturday</td>
</tr>
<tr>
<td>7 = Daily</td>
</tr>
<tr>
<td>8 = Weekdays</td>
</tr>
<tr>
<td>9 = Weekends</td>
</tr>
</tbody>
</table>
### Table 15: Xe-70M Variable Speed Controller Trip & Warning Codes for MODBUS Communication

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Sensor Failure 4APT</td>
</tr>
<tr>
<td>10</td>
<td>Sensor Failure 2ATT</td>
</tr>
<tr>
<td>18</td>
<td>High VSD Temperature</td>
</tr>
<tr>
<td>19</td>
<td>Blower Fault</td>
</tr>
<tr>
<td>20</td>
<td>VSD Communication Failure</td>
</tr>
<tr>
<td>23</td>
<td>Stop Failure</td>
</tr>
<tr>
<td>25</td>
<td>Remote Stop Failure</td>
</tr>
<tr>
<td>26</td>
<td>Remote Start Failure</td>
</tr>
<tr>
<td>27</td>
<td>Incorrect VSD Type</td>
</tr>
<tr>
<td>29</td>
<td>High Air Pressure</td>
</tr>
<tr>
<td>31</td>
<td>High Airend Discharge Temperature</td>
</tr>
<tr>
<td>32</td>
<td>Emergency Stop</td>
</tr>
<tr>
<td>36</td>
<td>Invalid Calibration</td>
</tr>
<tr>
<td>37</td>
<td>Check Set Points (Parameter Reset to Defaults)</td>
</tr>
<tr>
<td>38</td>
<td>100 Hours To Service</td>
</tr>
<tr>
<td>39</td>
<td>Service Required</td>
</tr>
<tr>
<td>40</td>
<td>Alarm – Service Required</td>
</tr>
<tr>
<td>51</td>
<td>Dryer High Pressure</td>
</tr>
<tr>
<td>52</td>
<td>Dryer Temperatures Warning</td>
</tr>
<tr>
<td>55</td>
<td>Change HE Filter</td>
</tr>
<tr>
<td>100</td>
<td>VSD Fault (generic)</td>
</tr>
<tr>
<td>101</td>
<td>VSD Fault 1</td>
</tr>
<tr>
<td>102</td>
<td>VSD Fault 2</td>
</tr>
<tr>
<td>103</td>
<td>VSD Fault 3</td>
</tr>
<tr>
<td>104</td>
<td>VSD Fault 4</td>
</tr>
<tr>
<td>105</td>
<td>VSD Fault 5</td>
</tr>
<tr>
<td>106</td>
<td>VSD Fault 6</td>
</tr>
<tr>
<td>107</td>
<td>VSD Fault 7</td>
</tr>
<tr>
<td>108</td>
<td>VSD Fault 8</td>
</tr>
<tr>
<td>109</td>
<td>VSD Fault 9</td>
</tr>
<tr>
<td>110</td>
<td>VSD Fault 10</td>
</tr>
<tr>
<td>111</td>
<td>VSD Fault 11</td>
</tr>
<tr>
<td>112</td>
<td>VSD Fault 12</td>
</tr>
<tr>
<td>113</td>
<td>VSD Fault 13</td>
</tr>
<tr>
<td>114</td>
<td>VSD Fault 14</td>
</tr>
<tr>
<td>115</td>
<td>VSD Fault 15</td>
</tr>
<tr>
<td>116</td>
<td>VSD Fault 16</td>
</tr>
<tr>
<td>117</td>
<td>VSD Fault 17</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>123</td>
<td>VSD Fault 23</td>
</tr>
<tr>
<td>124</td>
<td>VSD Fault 24</td>
</tr>
<tr>
<td>125</td>
<td>VSD Fault 25</td>
</tr>
<tr>
<td>126</td>
<td>VSD Fault 26</td>
</tr>
<tr>
<td>127</td>
<td>VSD Fault 27</td>
</tr>
<tr>
<td>128</td>
<td>VSD Fault 28</td>
</tr>
<tr>
<td>129</td>
<td>VSD Fault 29</td>
</tr>
<tr>
<td>130</td>
<td>VSD Fault 30</td>
</tr>
<tr>
<td>131</td>
<td>VSD Fault 31</td>
</tr>
<tr>
<td>132</td>
<td>VSD Fault 32</td>
</tr>
<tr>
<td>133</td>
<td>VSD Fault 33</td>
</tr>
<tr>
<td>134</td>
<td>VSD Fault 34</td>
</tr>
<tr>
<td>135</td>
<td>Unused</td>
</tr>
<tr>
<td>136</td>
<td>VSD Fault 36</td>
</tr>
<tr>
<td>137</td>
<td>Unused</td>
</tr>
<tr>
<td>138</td>
<td>VSD Fault 38</td>
</tr>
<tr>
<td>139</td>
<td>Unused</td>
</tr>
<tr>
<td>140</td>
<td>VSD Fault 40</td>
</tr>
<tr>
<td>141</td>
<td>VSD Fault 41</td>
</tr>
<tr>
<td>142</td>
<td>VSD Fault 42</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>147</td>
<td>VSD Fault 47</td>
</tr>
<tr>
<td>148</td>
<td>VSD Fault 48</td>
</tr>
<tr>
<td>149</td>
<td>VSD Fault 49</td>
</tr>
<tr>
<td>150</td>
<td>AMA Not OK</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>159</td>
<td>VSD Fault 59</td>
</tr>
<tr>
<td>160</td>
<td>Unused</td>
</tr>
<tr>
<td>161</td>
<td>VSD Fault 61</td>
</tr>
<tr>
<td>162</td>
<td>VSD Fault 62</td>
</tr>
<tr>
<td>163</td>
<td>VSD Fault 63</td>
</tr>
<tr>
<td>164</td>
<td>VSD Fault 64</td>
</tr>
<tr>
<td>165</td>
<td>VSD Fault 65</td>
</tr>
<tr>
<td>166</td>
<td>VSD Fault 66</td>
</tr>
<tr>
<td>167</td>
<td>VSD Fault 67</td>
</tr>
<tr>
<td>168</td>
<td>VSD Fault 68</td>
</tr>
<tr>
<td>169</td>
<td>Unused</td>
</tr>
<tr>
<td>170</td>
<td>VSD Fault 70</td>
</tr>
<tr>
<td>171</td>
<td>VSD Fault 71</td>
</tr>
<tr>
<td>172</td>
<td>VSD Fault 72</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>180</td>
<td>VSD Fault 80</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>190</td>
<td>VSD Fault 90</td>
</tr>
<tr>
<td>191</td>
<td>VSD Fault 91</td>
</tr>
<tr>
<td></td>
<td>Unused</td>
</tr>
<tr>
<td>210</td>
<td>KTY Error (VSD Fault)</td>
</tr>
<tr>
<td>211</td>
<td>Fans Error (VSD Fault)</td>
</tr>
<tr>
<td>212</td>
<td>ECB Error (VSD Fault)</td>
</tr>
<tr>
<td>213</td>
<td>Broken Belt (VSD Fault)</td>
</tr>
<tr>
<td>214</td>
<td>Clock Failure (VSD Fault)</td>
</tr>
<tr>
<td>215</td>
<td>End of Curve (VSD Fault)</td>
</tr>
</tbody>
</table>
The Xe-70M controller is designed to interface to an Ingersoll Rand X-Series System Controller using Belden 9841 or equivalent RS-485 cable. In order to connect to the network, the cable must be connected to port X04 on the controller as shown in the diagrams below. Note that up to 8 (X8I) or 12 (X12I) devices can be daisy chained together in an X-Series network.

RS-485 ADDRESS SELECTION

Each compressor connected to the network will have a unique assigned address, starting at compressor 1 increasing sequentially to the number of compressors connected to the network.

The RS-485 address for each compressor is set on the General Settings Tab, Page 7. The controller’s default RS-485 Address setting is 1. Additionally, the active protocol must be set to Airbus485.

ENABLING SYSTEM CONTROL CAPABILITIES

In order to communicate properly with the X-Series system controller, the Xe-70M must have the following setpoints correctly set.

1. On the Operator Settings tab, page 3 (Fixed Speed) or page 2 (Variable Speed).
2. Verify that the COM control setpoint is enabled (Checkbox is filled in) as shown below. If this setpoint is not selected, the system controller will be unable to load or unload the machine.
3. Additionally, for fixed speed machines, make sure that the Enable Auto-Restart setpoint is enabled (checkbox is filled in) or the compressor will continue to run when unloaded by the system controller.

After the address and COM control have been set, be sure that Integral Sequencing is disabled by navigating to Integral Sequencing, page 1 and verifying that the integral sequencing setpoint is disabled (checkbox not filled in) as shown below:

Once these setpoints are correctly set and the machine is started locally, the system controller should see status information from the compressor and be able to take control.
OPERATING INSTRUCTIONS (XE-50M CONTROLLER)

## 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>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Start Icon]</td>
<td>Start</td>
<td>Starts the compressor.</td>
</tr>
<tr>
<td>![Stop Icon]</td>
<td>Stop</td>
<td>Stops the compressor, this button should be pressed instead of the E-stop for normal stopping operation</td>
</tr>
<tr>
<td>![Navigation Keys Icon]</td>
<td>Navigation Keys</td>
<td>Leads the user down or up a navigation path</td>
</tr>
<tr>
<td>![Reset Icon]</td>
<td>Reset</td>
<td>Clears Warnings and Trips once the condition is corrected</td>
</tr>
<tr>
<td>![Enter Icon]</td>
<td>Enter</td>
<td>Confirms operation</td>
</tr>
</tbody>
</table>

## DISPLAY LAYOUT

![Display Layout](image)

### Table 16: Xe-50M Command Keys

<table>
<thead>
<tr>
<th>Icon</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Start Icon]</td>
<td>Start</td>
<td>Starts the compressor.</td>
</tr>
<tr>
<td>![Stop Icon]</td>
<td>Stop</td>
<td>Stops the compressor, this button should be pressed instead of the E-stop for normal stopping operation</td>
</tr>
<tr>
<td>![Navigation Keys Icon]</td>
<td>Navigation Keys</td>
<td>Leads the user down or up a navigation path</td>
</tr>
<tr>
<td>![Reset Icon]</td>
<td>Reset</td>
<td>Clears Warnings and Trips once the condition is corrected</td>
</tr>
<tr>
<td>![Enter Icon]</td>
<td>Enter</td>
<td>Confirms operation</td>
</tr>
</tbody>
</table>

## USER DISPLAY

### Table 17: User Display Icons

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Main Display Value</td>
</tr>
<tr>
<td>2</td>
<td>Main Display Value Units</td>
</tr>
<tr>
<td>3</td>
<td>User Menu Item Display Value</td>
</tr>
<tr>
<td>4</td>
<td>User Menu Item Display Units</td>
</tr>
<tr>
<td>5</td>
<td>Status Symbols Started, Running, Loaded</td>
</tr>
<tr>
<td>6</td>
<td>Service/Fault Symbols Service, Fault: Alarm/Warning/Trip</td>
</tr>
</tbody>
</table>

## USER DISPLAY

### Table 18: User Display Icons

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Main Display Value Icon]</td>
<td>Main Display Value : Pressure (bar/psi menu selectable)</td>
</tr>
<tr>
<td>![Main Display Value Units Icon]</td>
<td>Main Display Value Units</td>
</tr>
<tr>
<td>![User Menu Item Display Value Icon]</td>
<td>Default User Menu Item : Temperature (˚C/˚F menu selectable)</td>
</tr>
<tr>
<td>![User Menu Item Display Units Icon]</td>
<td>To view alternative user menu items Press Up or Down</td>
</tr>
<tr>
<td>![Status Symbols Icon]</td>
<td>Total Run Hours</td>
</tr>
<tr>
<td>![Service/Fault Symbols Icon]</td>
<td>Total Run Onload</td>
</tr>
<tr>
<td>![Service/Fault Symbols Icon]</td>
<td>Hours Until Service Due (countdown timer based on total run hours)</td>
</tr>
<tr>
<td>![Service/Fault Symbols Icon]</td>
<td>RS485 Communication Network Address (*only show if RS485 option installed)</td>
</tr>
</tbody>
</table>

- If a timer event occurs (run-on, stop, blowdown or auto restart time) the User item display will show the time countdown in seconds. While a countdown is being displayed normal User items can still be viewed; press Down.

- The display will default back to the User Temperature item after a short period of no key activity or after a timer events has completed.

- If operating in ‘Pressure Switch Mode’ the main display will show the detected temperature and the default User Menu item will be total run hours. Pressure is not displayed in pressure switch mode.

## STATUS DISPLAY

The operating status is continuously displayed using status symbols.

### Table 19: Status Display Icons

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Standby Icon]</td>
<td>Standby : The compressor is in a started state but not running. The compressor will automatically re-start and load when pressure falls to the lower pressure set point; or a remote load signal.</td>
</tr>
<tr>
<td>![Running Icon]</td>
<td>Running : The compressor is running offload (run-on-time active)</td>
</tr>
<tr>
<td>![Loaded Icon]</td>
<td>Loaded : The compressor is running onload</td>
</tr>
</tbody>
</table>
**FAULT CONDITIONS**

If a Fault condition occurs the Fault triangle symbol will switch ON steady (Warning) or flash (Trip). The user menu display item will show a ‘Fault Code’ dependant on the fault.

Fault Codes.

**SERVICE DUE COUNTDOWN TIMER**

If the service due countdown timer reaches 0 (Zero) hours the Service and Alarm symbols will flash and the service Alarm (Warning) code will be displayed. The Alarm code can be reset but the service symbol will remain on the display until the service due timer is reset; the service hours will continue to decrement in negative hours. The service countdown timer can be reset, using the menu routine, when the required service has been carried out. Set to any value greater than 0 (Zero) hours before reset.

**MENU ROUTINE**

Parameters, Values and Options can be adjusted and set using the Menu Routines. These are two menu lists:

1. Operational Menu - Access Code “0009”
2. Configuration Menu - Accessable just for **Ingersoll Rand** authorised service personnel.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pu Upper Pressure Set Point</td>
</tr>
<tr>
<td>2</td>
<td>PL Lower Pressure Set Point</td>
</tr>
<tr>
<td>3</td>
<td>bt Blowdown time</td>
</tr>
<tr>
<td>4</td>
<td>St Stop time</td>
</tr>
<tr>
<td>5</td>
<td>P- Pressure Display Unit</td>
</tr>
<tr>
<td>6</td>
<td>t- Temperature Display Units</td>
</tr>
</tbody>
</table>

The compressor will maintain pressure between the set Pu (Unload Pressure Set Point) and (PL) (Load Pressure Set Point). When Pressure reaches the set ‘Pu’ level the compressor will unload. When pressure falls to the ‘PL’ level the compressor will load.

**OPERATIONAL MENU**

Table 20 : Operational Menu

*Do not change factory setting of the upper and lower pressure set points*

*For TAS version machines maximum operating pressure cannot exceed rated discharge pressure*

*Do not change factory setting of Auto Restart Time*

**Blowdown Timer:**

When the main motor stops the compressor will allow a period of blowdown (the Blowdown Time) before a motor start can be re-initiated. A motor re-start is inhibited during this time period. This time is intended to allow internal pressure (or sump pressure) to be vented before a motor start sequence is permitted. Set to 0 (zero) seconds if not required.

**Stop Time:**

When the Stop button is pressed the compressor will unload and the main motor will continue to run for the set Stop Time. This time is intended to allow internal pressure (or sump pressure) to reduce before the compression element is stopped; preventing potential oil blow-back through the compression element and air filter. The stop time is initiated from the moment the compressor is unloaded. If the compressor has been offload for a period of time prior to a stop command the time is automatically reduced accordingly. If the compressor is stopped after the compressor has been running offload for the stop time, or longer, the compressor is stopped immediately; no stop time is applied. Set to 0 (zero) seconds if not required.
### FAULT CODES

Fault codes are separated in two categories:

**A** : Warning - symbol illuminated on steady, the compressor will continue to operate

**E** : Trip - symbol will flash, the compressor will stop

<table>
<thead>
<tr>
<th>Table 21: Warning Codes</th>
<th>Table 22: Trip Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:2040 Freeze warning (Dryer Package Only) (DI-C4)</td>
<td>E:0010 Emergency Stop - 24 Vac is not being detected on terminal R1C</td>
</tr>
<tr>
<td>A:2050 Dryer High Pressure (Dryer Package Only) (DI-C5)</td>
<td>E:0020 Main or Blower Motor Overload (DI-C2)</td>
</tr>
<tr>
<td>A:2118 High Pressure : alarm limit exceeded</td>
<td>E:0115 Pressure Sensor Fault: 4-20mA signal out-of-range (&lt;3.8mA or &gt;20.8mA)</td>
</tr>
<tr>
<td>A:2128 High Temperature : alarm limit exceeded</td>
<td>E:0119 Excess Pressure : shutdown limit exceeded</td>
</tr>
<tr>
<td>A:2816 Power failure detected</td>
<td>E:0125 Temperature Sensor Fault: signal out-of-range (&lt;50 ºC or &gt; 250 ºC)</td>
</tr>
<tr>
<td>A:3123 Run Inhibited - temperature is below set low temperature run inhibit limit (will self reset when temperature increases above the set temperature limit; cannot be manually reset)</td>
<td>E:0129 Excess Temperature : shutdown limit exceeded</td>
</tr>
<tr>
<td>A:3423 Load Inhibited - temperature is below set low temperature run inhibit limit (will self reset when temperature increases above the set temperature limit; cannot be manually reset)</td>
<td>E:0866 Power Supply 24V DC low</td>
</tr>
<tr>
<td>A:4804 Service Due - Service interval hours counter has reduced to zero</td>
<td>E:0821 Power Supply Analog Inputs Low</td>
</tr>
<tr>
<td>A:3129 Airend Discharge Temperature is above 103 ºC</td>
<td></td>
</tr>
</tbody>
</table>
OPERATING INSTRUCTIONS FOR INTEGRATED DRYER

INTRODUCTION
This manual is an integral part of the dryer you bought, and must remain with the machine even if this will be resold.

It is highly recommended that the qualified* personnel for installation maintenance and/or control will fully comply with the contents of this manual and the prevention and safety rules in force in the country where the system will be used. In this way, not only the usage of the machine will be rational, but also the service will result cost effective.

In case your dryer will present any kind of problem, please contact your local authorized Ingersoll Rand distributor.

Note that, when necessary, the use of original spare parts will ensure efficiency and long duration to your dryer.

Due to the continuous technological evolution, Ingersoll Rand reserves the right to modify the specifications contained in this manual without giving previous notice.

SYMBOLS AND LABELS USED IN THE MANUAL AND ON THE DRYER

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>Pay particular attention to the indications preceded by these symbols.</td>
</tr>
<tr>
<td>▼</td>
<td>Air inlet / outlet</td>
</tr>
<tr>
<td>▼</td>
<td>Air inlet / outlet</td>
</tr>
<tr>
<td>▼</td>
<td>Air inlet / outlet</td>
</tr>
<tr>
<td>▼</td>
<td>Air outlet</td>
</tr>
<tr>
<td>▼</td>
<td>Air inlet.</td>
</tr>
<tr>
<td>!</td>
<td>Read the Operators manual before attempt to start up the machine and to perform any service operation on the dryer.</td>
</tr>
<tr>
<td>!</td>
<td>Installation, maintenance, and/or control operations preceded by these symbols must be performed exclusively by qualified personnel*.</td>
</tr>
<tr>
<td>!</td>
<td>Pay particular attention to the risk of moving parts</td>
</tr>
<tr>
<td>△</td>
<td>Pay particular attention to components or systems under pressure.</td>
</tr>
<tr>
<td>△</td>
<td>Pay particular attention to hot surfaces.</td>
</tr>
<tr>
<td>△</td>
<td>Condensate drain point.</td>
</tr>
<tr>
<td>△</td>
<td>Condensate drain point.</td>
</tr>
<tr>
<td>!</td>
<td>Pay particular attention to the risk of electric shock.</td>
</tr>
<tr>
<td>★</td>
<td>Rotation direction of the fan.</td>
</tr>
<tr>
<td>!</td>
<td>Attention: Before performing any maintenance operation on this machine, do not forget to disconnect the electric supply, to completely discharge air pressure, and to refer to the Operators manual.</td>
</tr>
</tbody>
</table>

* Qualified personnel must be trained and certified in accordance with local laws and regulations.
**GENERAL INFORMATION**

**FUNCTIONAL DESCRIPTION**

Ingersoll Rand refrigerated air dryers remove moisture from compressed air. Moisture is detrimental to pneumatically operated appliances, controls, instruments, machinery and tools.

Compressed air enters the patented aluminum heat exchanger where it is cooled down to the dew point temperature in two different stages: In the first air/air sector compressed inlet air is cooled thanks to the colder compressed air coming out counterflow from the condensate separator. In the second refrigerant / air sector, compressed air temperature is further lowered to the dew point temperature. During this two stages almost all the oil and water vapours contained in compressed air are condensed to liquid and successively be separated from the compressed air in the condensate separator and drained out by the automatic drain. At this point the obtained cold air re-enters counterflow the initial air/exchanger and it is reheated by the inlet hot air with the consequence of energy recovering and also reduction of the relative humidity contained in the outflowing air.

This dryer can be easily installed into various pneumatic systems in which dry air is required or desired. Refer to Principles of Operation for complete operating details.

The dryer comes provided with all the control, safety and adjustment devices, therefore no auxiliary devices are needed.

A system overload not exceeding the maximum operative limits can worsen the operational performance of the dryer (high dew point), but it will not affect its safety.

The electric diagram (attachment B) shows the minimum protection degree IP 42.

Improper grounding can result in electrical shock and can cause severe injury or death.

This product must be connected to a grounded, metallic, permanent wiring system or an equipment-grounding terminal or lead on the product. All grounding must be performed by a qualified electrician and comply with national and local electrical codes.

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current.

Ground must be established with a bare grounding wire sized according to the voltage and minimum branch circuit requirements.

Ensure good bare metal contact at all grounding connection points, and ensure all connections are clean and tight.

Check grounding connections after initial installation and periodically thereafter to ensure good contact and continuity has been maintained.

Check with a qualified electrician or service technician if the grounding instructions are not completely understood, or if in doubt as to whether the product is properly grounded.

**USE OF THE MACHINE IN SAFE CONDITIONS**

This system has been designed and manufactured in compliance with the European safety directive in force, therefore any Installation, use and maintenance operations must be performed respecting the instructions contained in this manual.

Because an air dryer is pressurized and contains rotating parts, the same precautions should be observed as with any piece of machinery of this type where carelessness in operation or maintenance could be hazardous to personnel. In addition to obvious safety rules that should be followed with this type of machinery, safety precautions as listed below must be observed.

1. Only qualified personnel shall be permitted to adjust, perform maintenance or repair this air dryer.
2. Read all instructions completely before operating unit.
3. Pull main electrical disconnect switch and disconnect any separate control lines, if used, before attempting to work or perform maintenance on the unit.
4. Do not attempt to service any part while machine is in an operational mode.
5. Do not attempt to remove any parts without first relieving the entire air system of pressure.
6. Do not attempt to remove any part of the refrigeration system without removing and containing refrigerant in accordance with the EPA and local regulations.
7. Do not operate the dryer at pressures in excess of its rating.
8. Do not operate the dryer without guards, shields and screen in place.
9. Inspect unit daily to observe and correct any unsafe operating conditions.

**START UP**

Switch on the main electrical isolation switch (if present). The control panel will show the message OFF, indicating that the line and control voltages are available.

**Start sequence**

The dryer will start closing the contact remote ON / OFF. The fan motor will start 30 seconds after the compressor.

**Stop sequence**

The dryer can be stopped locally from the control panel or opening the remote ON/OFF contact. After having pressed the ON/OFF switch for 1 second, the compressor and the fan motor keep on running for further 10 seconds in order to re-balance the internal pressures. The dryer can be also stopped due to an alarm or energy saving condition (ESA or ES2). Any alarm will de-energize the compressor, fan motor can still running, it depends on the type of alarm (see Display indications chapter). If the shutdown is due to an alarm, a message will blink on display indicating the reason for the shutdown. Energy saving condition (ESA or ES2) occurs when the dew point stands below the set value for a long time in order to save energy and avoid heat exchanger freezing. This situation can happen when ambient temperature is low and there is no compressed air load.

**Variable speed fan control**

A patented microprocessor allows to adjust dryer's cooling capacity by changing the fan motor speed. If the dew point is greater than the set value, the fan speed is increased, if the dew point is smaller than the set value, the fan velocity is decreased. The range can be from 0 to 100% and the higher is the fan speed, the faster the fan LED blinks, you can read the exact value by pressing the UP button.

If the velocity is 100% you will read FL (Full Load). Under load standard condition the fan speed is usually at 100%, if there is no load the fan velocity can oscillate between 0 and 20%.
CONTROL PANEL

The dryers are provided with an electronic control system. All adjustments and resets can be performed by means of the digital panel located on the front of the dryer. The control panel is composed of 5 keys (ON/OFF, TEST, SET, DOWN and UP) and a 3 digit display, with three signalling LED’s indicated by icons (Figure 64).

Figure 64 : Display Visualization and Signalling LEDS

<table>
<thead>
<tr>
<th>Keys Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEST</strong>: When pushed for 3 sec. during normal operation, it activates the condensate drain. (Not used on No loss condensate drain)</td>
</tr>
<tr>
<td><strong>SET</strong>: When pushed and released during normal operation, it displays the parameter C1. When pushed for 10 seconds, it allows to enter the C8 and C9 condensate drain parameters programming menu (see relevant table). When pushed after having set new configuration values, it stores the applied modifications.</td>
</tr>
<tr>
<td><strong>DOWN</strong>: When pushed while setting the drain set point, it decreases the displayed value of one unit per second, during the first 10 seconds, than of one unit every 0,1 sec. When pushed for 10 seconds during normal operation, it starts an automatic test cycle of the controller.</td>
</tr>
<tr>
<td><strong>UP</strong>: When pushed while setting the drain set point, it increases the displayed value of one unit per second, during the first 10 seconds, than of one unit every 0,1 sec.</td>
</tr>
<tr>
<td><strong>ON / OFF</strong>: Pressed, it activates or deactivates the dryer. When the dryer is deactivated, the display shows OFF.</td>
</tr>
</tbody>
</table>

**NOTE:**

When the controller is in the OFF position, some parts of the dryer may still be energized. Therefore, for safety purposes, disconnect the electrical power before performing any operation on the machine.

**Condensate Discharge Parameters Programming**

Push the SET key for 10 seconds to enter the parameters configuration menu; the display will show in sequence the set point value, the code of the first modifiable parameter (C8) and its value. Only if strictly necessary, use the UP and/or DOWN keys to change the displayed parameter value. Press the SET key to store the previously changed parameter value or to browse the parameters without changing them. 15 seconds after the last performed operation, the controller will return automatically to the normal operation mode.

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>the unit is ON with low load</td>
</tr>
<tr>
<td>On</td>
<td>the unit is ON with normal load</td>
</tr>
<tr>
<td>On</td>
<td>the unit is ON with normal-high load</td>
</tr>
<tr>
<td>On</td>
<td>the unit is ON with high load</td>
</tr>
</tbody>
</table>

Table 24 : Display Icons

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ON</td>
<td>Compressor energized</td>
</tr>
<tr>
<td>Blinking</td>
<td>Programming mode activated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Condensate drain energized*</td>
</tr>
<tr>
<td>Blinking</td>
<td>Speed of the fan = 100%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Speed of the fan &lt; 100%</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
<td>Fan not running</td>
</tr>
</tbody>
</table>

Table 25 : LED Display Icons
Table 25

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Range</th>
<th>Default Set Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8</td>
<td>Delay between condensate discharges</td>
<td>1 ÷ 999 (min)</td>
<td>1</td>
</tr>
<tr>
<td>C9</td>
<td>Time required for condensate discharge</td>
<td>1 ÷ 999 (sec)</td>
<td>10</td>
</tr>
</tbody>
</table>

**NOTE**

Changes entered for timing values will be effective only after exiting the programming, while changes to other variables will be immediately effective.

Remember that eventual changes to the configuration parameters of the machine could negatively affect its efficiency. Thus, changes have to be performed by a person familiar with the operation of the dryer.

**WARNING**

It’s forbidden to attempt to modify the other configuration parameters of the electronic controller without authorization from Ingersoll Rand’s authorized distributor.

- **Display Indications**
  
The controller is capable of recognizing certain types of anomalies in the drying circuit. In such cases, a message will blink on the display, alternated to the current dew point value.

Table 26: Display Indications

<table>
<thead>
<tr>
<th>MESSAGE (BLINKING)</th>
<th>CAUSE</th>
<th>OUTPUTS</th>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HtA</td>
<td>High dew point value (delayed alarm)</td>
<td>Alarm output ON</td>
<td>Resettable by switching off the dryer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrig. Compressor output OFF</td>
<td>If problem persists call your local Ingersoll Rand distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan output ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drain cycle standard</td>
<td></td>
</tr>
<tr>
<td>Ht2</td>
<td>Very high dew point value (immediate alarm)</td>
<td>Alarm output ON</td>
<td>Resettable by switching off the dryer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrig. Compressor output OFF</td>
<td>May require replacing the faulty probe.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan output OFF</td>
<td>If problem persists call your local Ingersoll Rand distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drain cycle standard</td>
<td></td>
</tr>
<tr>
<td>PF1</td>
<td>Interruption or short circuit on the PTC probe input line</td>
<td>Alarm output ON</td>
<td>Call your local Ingersoll Rand distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrig. Compressor output OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan output OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drain cycle standard</td>
<td></td>
</tr>
<tr>
<td>ESA</td>
<td>The automatic Energy saving mode activated due to low load</td>
<td>Alarm output OFF</td>
<td>No action necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrig. Compressor output OFF</td>
<td>Automatic Reset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan output OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drain cycle standard</td>
<td></td>
</tr>
<tr>
<td>ES2</td>
<td>Activated after repeated alarms</td>
<td>Alarm output ON</td>
<td>Call your local Ingersoll Rand distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrig. Compressor output OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan output ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drain cycle standard</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: PF1 has priority on all other messages.

- **Remote Signaling System**
  
The dryer control board is equipped with a dry contact for a remote alarm signal. This is normally open contact: when an alarm is detected, this contact is closed.

Proceed as follows to activate a remote alarm output:

1. The User must review the diagram below.
2. Disconnect the dryer from electrical power supply, remove cover and left side panel.
3. Connect the alarm circuit to the terminal blocks (See Figure 65).
4. Replace cover, left side panel and reconnect power.
Alarm Output electric features:
12V DC - 40mA on alarm, 0V on normal conditions.

The activation of the above function is at the User's discretion. The User will purchase all necessary installation material. Any operation which needs access to the dryer must be carried out by qualified personnel.

■ BEFORE START UP

⚠️ Before starting the machine, make sure that all operating parameters correspond to the nominal data.
The dryer is supplied already tested and preset for normal operation, and it doesn't require any calibration.

Nevertheless, it's necessary to check the operating performances during the first working hours.

■ START UP

The operations specified below must be performed after the first start up and at each start up after a prolonged inactive period of time due to maintenance operations, or any other reason.

1. Make sure that all instructions contained in chapters INSTALLATION SITE and INSTALLATION have been observed.
2. Ensure dryer by-pass is open and air inlet/outlet valves closed. (if existing).
3. Activate power supply and close the remote ON/OFF contact.
4. Wait 5 to 10 minutes until machine has achieved its standard operating parameters.
5. Slowly open the air outlet valve and successively open the air inlet valve.
6. If existent, close the air by-pass valve.
7. Check if the condensate drain is working properly.
8. Check if all connecting pipes are properly tightened and fixed.

Before disconnecting the dryer from electrical power supply, use ON/OFF button on controller to stop the dryer. Otherwise wait 10 minutes before switching the dryer on again, in order to allow freon pressure to rebalance.
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.

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

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

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

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.