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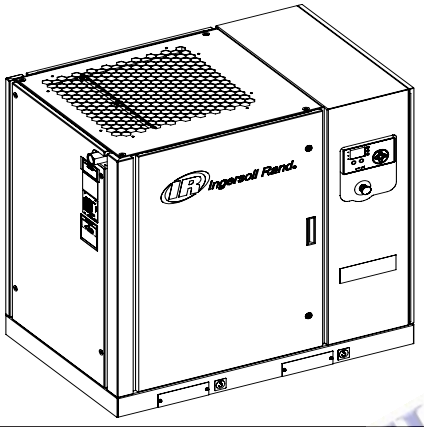
47629513
Revision B
April 2019

Contact-Cooled Rotary Screw Air Compressor

RS15ie, RS18ie, RS22ie, RS11i, RS15i, RS18i, RS22i



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Product Information

Fixed Speed

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

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EN

ABOUT THIS MANUAL

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

For supporting documentation refer to Table 1.

Table 1 : Product Manuals

Publication	Product	Part/ Document Number by Region		
		Americas	EMEIA*	Asia Pacific
Product Safety Information Manual	All	80446313	80446156	80446321
Product Maintenance Manual	RS15-22ie, ne RS11-22i, RS15-22n	47629519	47629518	47629520
Product Information Manual - FS	RS15-22ie, Rs11-22i	47629513	47629512	47629514
Product Information Manual - VSD	Rs15-22ne, Rs15-22n	47629516	47629515	47629517
Product Parts Information Manual	RS15-22ie, ne	47629511		
	RS11-22i, RS15-22n	47636056		

* Europe, Middle East, India and Africa

Product specification sheets and reference drawings are also available.

SAFETY

- Locate, read, understand and follow all Danger, Warning, Caution, and Operating Instructions on the product and in all Manuals. Failure to comply with safety precautions described in the manuals supplied with the product, this manual or any of the labels and tags attached to the product may result in death, serious injury or property damage.
- Check that all labels, tags and data (name) plates are in place and legible.
- It is your responsibility to make this information available to others.
- If you have any questions about safety or procedures not included in this manual, ask your supervisor or contact any **Ingersoll Rand** office or qualified **Ingersoll Rand** distributor.

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TRANSPORTATION/RECEIPT/HANDLING

■ TRANSPORTATION

Ensure machine is secured against movement during transportation.

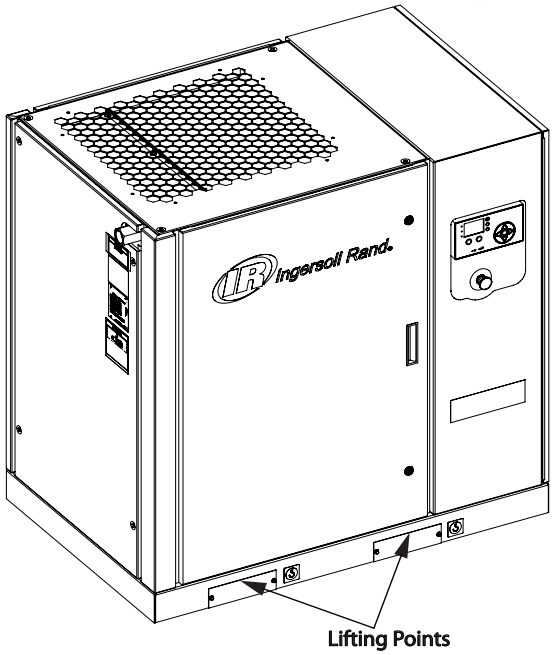

Figure 1: Lifting Points for Base Mounted Unit.

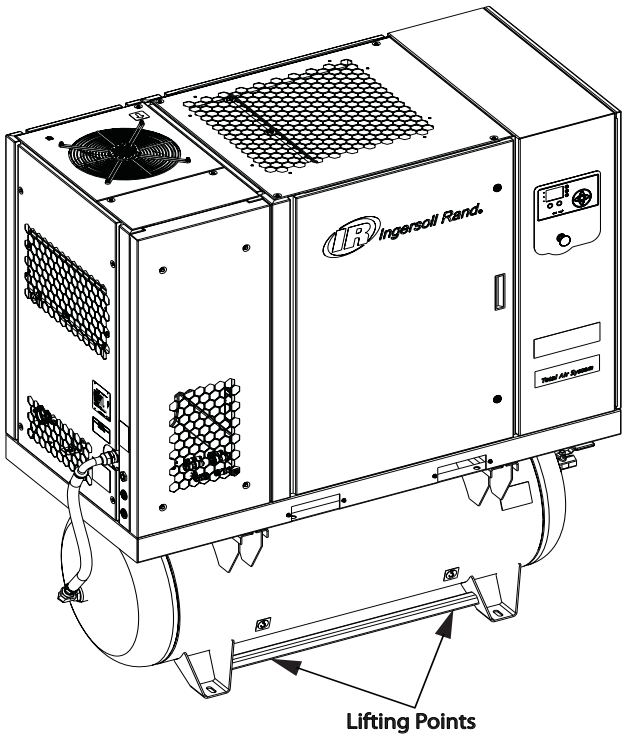

Figure 2 : Lifting Points for Receiver Mounted Unit.

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■ 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.

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

For RS15-22ie:

- (2) two brackets from the motor sub base and (1) one bracket from the separator tank.

For RS11-22i:

- (1) one bracket from the separator tank.

■ LONG TERM STORAGE

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

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GENERAL INFORMATION

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

The standard compressor is designed to operate in the following ambient ranges:

- For RS15-22ie : 2 °C to 46 °C (35 °F to 115 °F)
- For RS11-22i : 2 °C to 40 °C (35 °F to 104 °F)

The standard maximum temperatures of 40 °C (104 °F) and 46 °C (115 °F) are applicable up to an elevation of 1000 m (3280 ft) above sea level. Above this altitude, significant reductions in ambient temperatures are required if a standard motor is to be used.

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

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

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

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

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

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

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

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

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

⚠ CAUTION

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

The compressor should be allowed ample loading time.

■ INTEGRATED DRYER OPERATION

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

For RS15-22ie:

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

For RS11-22i:

Dryer operation is independent with separate power supply and it can be on/off from dryer panel.

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.

■ ENVIRONMENTAL LIMITS

The standard compressor package is designed for the following conditions:

- Indoors only.
- Area not considered to be a high dust area.
- For RS15-22ie, the ambient temperature range is from 2 to 46 °C (35 to 115 °F).
- For RS11-22i, the ambient temperature range is from 2 to 40 °C (35 to 104 °F).

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

- Outdoor modification (RS15-22ie).
- Low ambient option (-23 to 46 °C / -15 to 115 °F) at sea level (RS15-22ie).

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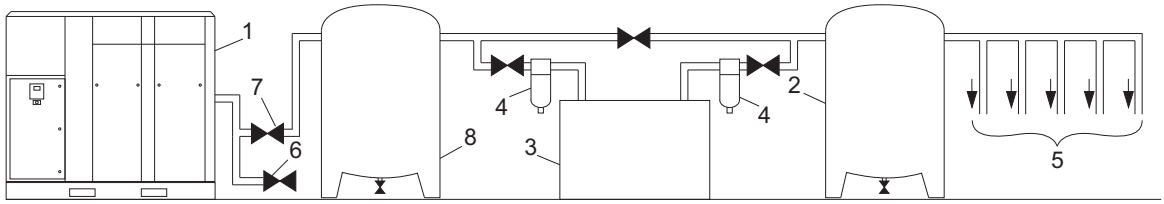
INSTALLATION

■ 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")

- Customer can install flexible element between machine and pressure system to avoid vibration transmission.
- The compressor can be installed on any level floor capable of supporting it. A dry, well ventilated area where the atmosphere is as clean as possible is recommended.
- The area selected for the location of the compressor should be free of dust, chemicals, metal filings, paint fumes and overspray.
- Hard surfaces may reflect noise with an apparent increase in the decibel level. When sound transmission is important, a sheet of rubber or cork can be installed beneath the compressor to reduce noise. Flexible piping may be required.
- See the general arrangement drawing for minimum space requirements for normal operation and maintenance.
- Minimum space in front of the control panel door as required by national or local codes shall be maintained.
- Ambient temperatures higher than 46 °C (115 °F) for RS15-22ie and 40 °C (104 °F) for RS11-22i shall be avoided, as well as areas of high humidity.

NOTICE
A minimum of 1 m (3.3 ft) all around the compressor is recommended. If headroom is restricted, then the exhaust should be ducted or deflected away from the compressor.
Screw type compressors should not be installed in air systems with reciprocating compressors without means of isolation such as a common receiver tank. It is recommended that both types of compressor be piped to a common receiver tank using individual air lines.
The compressor is shipped with the shipping restraints in place. Ensure that these are removed to allow free movement of the drive assembly during operation. Each restraint is painted yellow.

■ DISCHARGE AND CONDENSATE PIPING

See Figure 3.

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

One item which should be considered is liquid carryover. Installation of air dryers (3) is always good practice since, when properly selected and installed, they can reduce any liquid carryover to zero.

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

Discharge piping should be at least as large as the discharge connection of the compressor. All piping and fittings should be suitably rated for the discharge pressure. Discharge piping should not exert any unresolved moments or force on the compressor.

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

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

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

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

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

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

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

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The built-in after-cooler reduces the discharge air temperature below the dew point (for most ambient conditions). Therefore, considerable water vapor is condensed. To remove this condensation, each compressor with a built-in after-cooler is furnished with a combination condensate separator/trap.

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

NOTICE
The drain line shall slope downward from the base to work properly. For ease of inspection of the automatic drain trap operation, the drain piping should include an open funnel. The drain line must have a minimum inside diameter of 6 mm (1/4 in).

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

NOTICE
Do not use the compressor to support the discharge pipe.

■ GENERAL ELECTRICAL

A qualified electrician shall perform all electrical installations and service.

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

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

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

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

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

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

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

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

The feeder cable shall be suitably glanded in to the starter box to maintain proper ingress protection. Fixed speed starter boxes are rated for NEMA12/IP55 (NEMA4/IP65 (optional)).

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

■ INTEGRATED DRYER

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

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

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

■ *INTEGRATED DRYER POWER SUPPLY*

For RS15-22ie:

The dryer is powered from in-built power supply system from compressor. The compressor should be connected to a three phase supply in accordance with local requirement and codes.

For RS11-22i:

The dryer is powered from single-phase that must be supplied separately from the compressor three-phase supply. The dryer should be connected to a single phase supply in accordance with local requirement and codes.

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■ ELECTRICAL SCHEMATIC LEGENDS

Refer to the Electrical Schematic Diagrams (47554348001, 47625478001 and 47540496001) for more information.

Table 2: Electrical Schematic Legends

Label	Description
1AT	DRYER ANTI-FREEZE TEMP SENSOR
1M1	DRYER COMPRESSOR MOTOR
1M2	DRYER FAN MOTOR
1P1	DRYER SAFETY PRESSURE SWITCH
1P2	DRYER FAN PRESSURE SWITCH
1SV	LOAD SOLENOID VALVE
1T1	DRYER TEMPERATURE SWITCH
1Q1	DRYER COMPRESSOR PROTECTOR
1Q2	DRYER FAN MOTOR PROTECTOR
2ATT	AIREND DISCHARGE TEMPERATURE
3APT	SUMP PRESSURE
3SV	BLOWDOWN SOLENOID
3ATS	AMBIENT TEMPERATURE THEMOSTAT
4APT	PACKAGE DISCHARGE PRESSURE
4ATT	PACKAGE DISCHARGE TEMPERATURE
5SV	MODULATION VALVE
6SV	MODULATION VALVE
9SV	CONDENSATE DRAIN VALVE
7APT	PACKAGE AFTER COOLER PRESSURE
10SV	CONDENSATE VALVE
11SV	CONDENSATE VALVE
AT1	AUTO-TRANSFORMER
BP	BACKPANEL
CAB	CABINET
CFM	COOLING FAN MOTOR (STARTER BOX)
CONT	Xe - 50M/70m CONTROLLER
CTO	COMMON TRIP OUTPUT
CTx	CURRENT TRANSFORMER
DFW	DRYER FREEZE SWITCH
DHP	DRYER HIGH PRESSURE SWITCH
DPS	DRYER PRESSURE SWITCH
DR	VSD DRIVE
EB	EARTHING BAR
ES	EMERGENCY STOP BUTTON
ETC	ANTI-FREEZE CONTROLLER

Label	Description
EDV	ELECTRONICS NO LOSS DRAIN VALVE
FA1	RELAY, OVERLOAD THERMAL
FM	FAN MOTOR
FMP	FAN MOTOR PROTECTOR
FU-	FUSES
I/L	MECHANICAL INTERLOCK
K1	CONTROL RELAY
K2	PHASE MONITOR
K3	DRYER PRESSURE SWITCH RELAY
K4	DRYER TEMPERATURE RELAY
K5	DRYER START RELAY
K6	ANTI FREEZE CONTROLLER RELAY
K7	LOW AMBIENT CONTROL RELAY
KM1	MAIN CONTACTOR
KM2	DELTA CONTACTOR
KM3	START CONTACTOR
KM4	BLOWER MOTOR CONTACTOR
KM5	DRYER START CONTACTOR
KM6	DRYER FAN START CONTACTOR
MCBx	CIRCUIT BREAKERS
MM	MAIN MOTOR
PE	PROTECTED EARTH
PORO	POWER OUTAGE RESTART OPTION
RCx	ARC SUPPRESSOR
RLE	REMOTE LOAD ENABLE
RLU	REMOTE LOAD/UNLOAD
RSP	REMOTE STOP
RST	REMOTE START
SEP	SEPARATOR TANK
SPT	SERVICE PORT CONNECT TOOL
T1	CONTROL POWER TRANSFORMER
TH	THERMOSTAT
TOP	TEMPERATURE OVER PROTECTION (FAN MOTOR)
ZNR	ZENER DIODE

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■ PIPING AND INSTRUMENTATION DIAGRAM LEGENDS

Refer to the Piping and Instrumentation Diagrams (47547700001 and 47557334001) for more information.

Table 3: Piping and Instrumentation Diagram Legends

Item No.	Description
1	FILTER, AIR
2	VALVE, AIR INLET
3	VALVE, SOLENOID 1SV (LOAD)
4	AIR END ASSEMBLY
5	MOTOR, MAIN
6	TANK, SEPARATOR - COARSE
7	ELEMENT, SEPARATOR - FINE
8	VALVE, MINIMUM PRESSURE
9	AFTERCOOLER
10	FILTER, COOLANT
11	THERMOSTAT
12	COOLER, OIL
13	SEAL, SCAVENGE
14	VALVE, SAFETY (SEPARATOR TANK)
15	VALVE, DRAIN
16	SEPARATOR, SCAVENGE
17	VALVE, SOLENOID 3SV (BLOWDOWN)
18	ORIFICE
19	INDICATOR, AIR FILTER RESTRICTION
20	TRANSDUCER, PRESSURE (PACKAGE DISCHARGE)
21	TRANSDUCER, PRESSURE (WET SUMP)
22	SENSOR, TEMPERATURE
23	MOTOR , FAN
24	COOLING FAN
25	VALVE, SOLENOID 5SV (MODULATION)
26	VALVE, SOLENOID 5SV (MODULATION)
27	VALVE, SHUTTLE
28	VALVE, MODULATION (REGULATOR)
29	VALVE, SAFETY (AFTERCOOLER)

Item No.	Description
30	MOISTURE SEPARATOR
31	FILTER HIGH EFFICIENCY AIR
32	RECUPERATOR
33	EVAPORATOR
34	MOISTURE SEPARATOR - DRYER
35	DRYER TEMPERATURE SWITCH
36	CAPILLARY TUBE
37	REFRIGERANT COMPRESSOR - DRYER
38	VALVE HOT GAS BYPASS
39	CONDENSER
40	FAN PRESSURE SWITCH
41	HIGH PRESSURE SAFETY SWITCH
42	FILTER DRYER REFRIGERANT
43	SERVICE VALVE
44	DRYER HIGH PRESSURE TEMPERATURE SENSOR (6DTT)
45	ONE WAY VALVES WITH STRAINER
46	ELECTRONIC NO LOSS CONDENSATE DRAIN 10SV
47	CONDENSATE DISCHARGE
48	ELECTRONIC NO LOSS CONDENSATE DRAIN (OPTIONAL)
49	ELECTRONIC NO LOSS CONDENSATE DRAIN (HIGH EFFICIENCY FILTER) OPTIONAL
50	ELECTRONIC NO LOSS CONDENSATE DRAIN (OPTIONAL)
51	RECEIVER, AIR
52	VALVE, SAFETY (AIR RECEIVER)
53	VALVE, ISOLATION (AIR RECEIVER)
54	MANUAL DRAIN VALVE (AIR RECEIVER)
55	CONDENSATE DRAIN VALVE - 9SV (AIR RECEIVER)

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OPERATING INSTRUCTIONS (GENERAL)

■ BASIC OPERATION

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

■ *PRIOR TO STARTING*

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

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

■ *INITIAL CHECK SEQUENCE*

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

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

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

■ *START SEQUENCE*

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

■ *RESTARTING AFTER EMERGENCY STOPPING*

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

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

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

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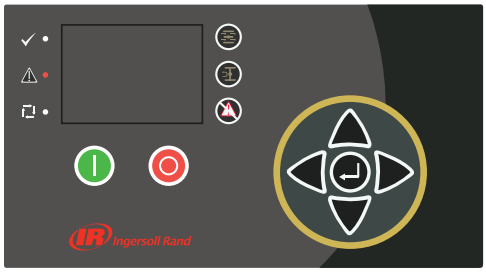
INTERFACE AND DATA KEYS (XE-70M CONTROLLER)

■ XE-70M

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



■ *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 4: Xe-70M LED Status Icons

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

■ *COMMAND KEYS*

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

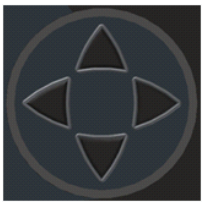
Table 5: Xe-70M Command Keys

Icon	Name	Function
	Load	Puts the compressor into the selected mode of operation. Unit will load if the pressure conditions are right.
	Unload	Puts the compressor into an unloaded state. Unit will run unloaded indefinitely.
	Reset	Clears Warnings and Trips once the fault condition is corrected.
	Start	Starts the compressor.
	Stop	Stops the compressor. This button should be pressed instead of the Emergency Stop for normal stopping operation.
	Enter	Toggles the display between the Navigation mode and the Edit mode.

■ *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



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.

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■ *DISPLAY LAYOUT*

Figure 6 : Display Layout

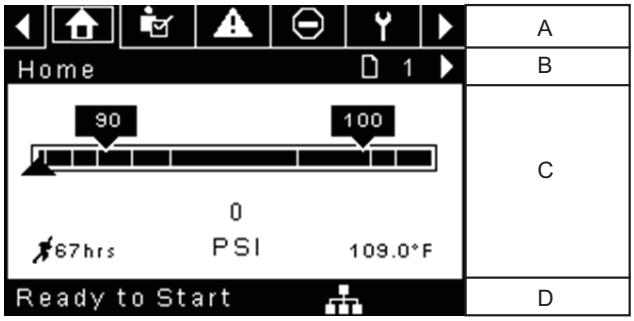


Table 6 : Display Layout

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

■ *FOLDER NAVIGATION AND ICONS*

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

Table 7 : Folder Bar Icons

Folder Name	Icon	Description
Home		System performance and status main information. The first page of this folder is the default page when the controller first powers up.
Operator Settings		System options and configuration settings.
Events		System events log.
Trip History		Details on the most recent trips.
Maintenance		Status and notification setup for compressor maintenance items.
General Settings		General settings such as Language, Time, and Units of Measure.
Integral Sequencing		Integral Sequencing communication status and configuration.
Status		Measurements or status from/of all analog and digital I/O.

■ *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 8 : Title Bar Page Icons

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

■ *ACCESSING PARAMETERS*

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

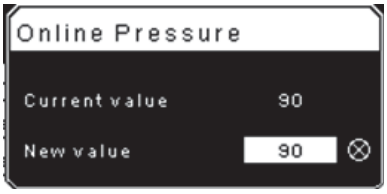
The cursor rolls over, so once the last parameter is selected, pressing the DOWN key will navigate the cursor to the Folder Bar. If the first parameter is selected, pressing the UP key will move the cursor to the page selection area.

Once selected, access parameters by pressing the ENTER key. Make changes 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 7). Placing the cursor on it and then pressing the ENTER key will cancel the entry and any changes that were made.

Figure 7 : Numeric Entry Window



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

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■ *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 9 : Dashboard Icons

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

■ *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.

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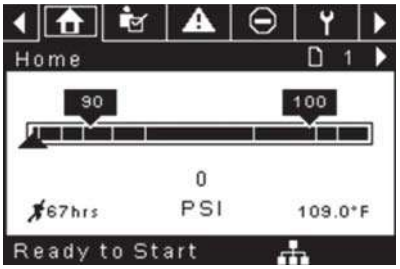
OPERATING INSTRUCTIONS (XE-70M CONTROLLER)

■ 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.

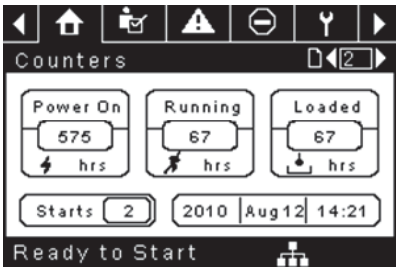
Airend Discharge Temperature - indicated by the numbers in the lower right of the display. This is the temperature measured after air is compressed.

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

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

NOTICE
The online and offline set points can be selected and modified on this page. All other information on this page is read only.

- *PAGE 2 : COUNTERS*



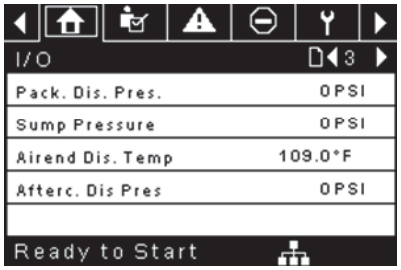
Hour Meters - Indicates the hours that the controller has been powered up, the hours that the compressor has been running, and the hours that the compressor has been running loaded.

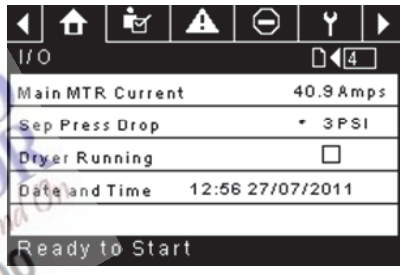
Starts - Indicates the number of times a start is attempted on the compressor.

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

NOTICE
All information on this page is read only.

- *PAGES 3 & 4 – ANALOG INPUTS & COMPRESSOR INFORMATION*





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

NOTICE
All information on this page is read only.

The following analog inputs are displayed in this section.

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

Sump Pressure – The pressure of the air that is present inside the sump tank.

Airend Discharge Temperature – The temperature of the air that flows out of the Airend.

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

Separator Pressure Drop – Pressure drop across sump pressure and package discharge pressure.

Dryer Run Status (Integrated dryer units only) – Checkbox that shows whether the dryer is currently running (checked) or not (blank). **Note**: Only applicable to RS15-22ie.

Time and Date – Indicates the current time and date.

Main Motor Current – Current flowing through the main motor as measured by the installed current transducers.

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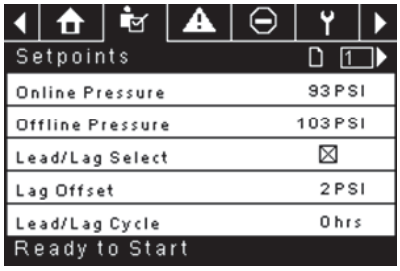
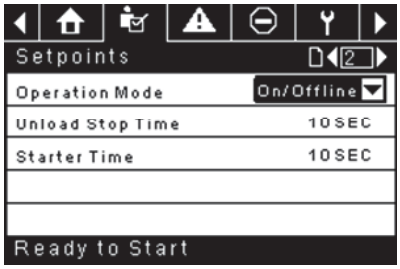
■ *OPERATOR SETTINGS FOLDER*

- *PAGES 1-2: OPERATOR SETTINGS*





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. Please 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 – Selections are Online/Offline, Modulation/ACS, and Modulation 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
- **Modulation –** The compressor will still load and unload as in online/offline, but will energize a different solenoid valve for modulation. When the package discharge pressure is between the online and offline setpoints the compressor will adjust the inlet valve in order to achieve a stable output pressure. The output pressure target needs to be set by a technician at the inlet valve in order to provide effective modulation control. Modulation can only work when the package discharge pressure is above 60 psi. Modulation is an option and must be enabled in the factory settings tab.
- **Mod/ACS –** The compressor will initially start out in online offline mode. If the compressor goes through 3 load/unload cycles within 3 minutes, it will switch over into Modulation mode. It will remain in modulation until the stop button is pressed or 3 minutes pass between an unload and load command. Mod/ACS is an option and must be enabled in the factory settings tab.

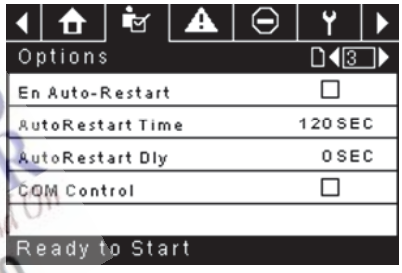
Unloaded Stop Time – The delay time to run in unloaded state before stopping the machine.
Range (in seconds): 10 - 30

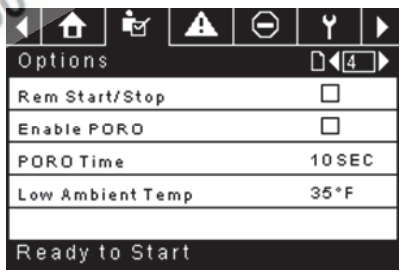
Starter Time – Time period that the compressor needs in order to come up to operating speed after a start command before being able to produce air. Range (in seconds): 5 - 30

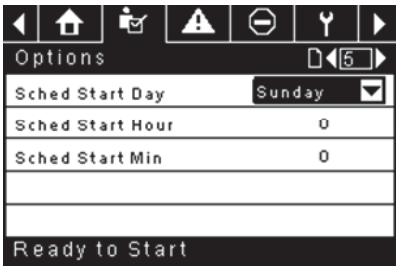
The parameters on these pages are adjustable any time.

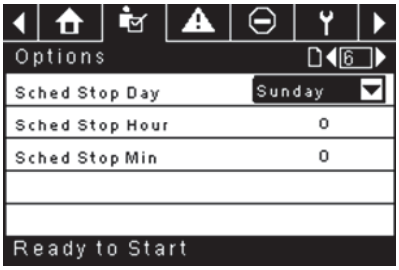
*Note that Mode of Operation can only be adjusted if the modulation option has been purchased for the compressor and the Enable Modulation factory setpoint has been turned ON.

- *PAGES 3-6: OPERATOR OPTIONS*









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The below values are all setpoints

Enable Auto-Restart – Selecting this will enable the Auto-restart option.

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

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

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

Enable PORO – Enabling this setpoint will allow the 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 – Temperature below which the low ambient option will come into effect.
Range (in deg F): 30 - 60

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.

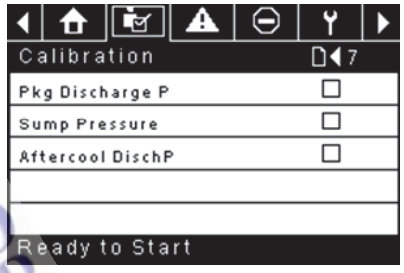
Scheduled Stop Minute – Minute of the hour for which a scheduled stop will be performed. Scheduled Start/Stop is an option which must be purchased and installed before this feature can be turned ON.

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***



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.

- Sump Pressure (3APT) – Only on units with the Enable 3APT factory setpoint ON.
- 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.

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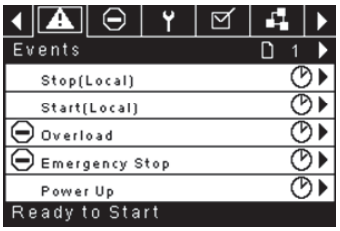
EN

■ EVENTS FOLDER

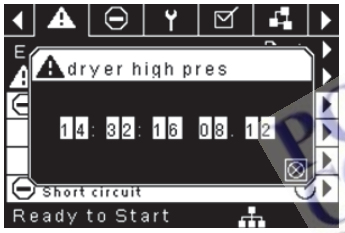
- *PAGES 1 TO A MAX OF 50*



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.



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 have 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

- ***Change Separator Element***

On-Screen Text: Chg Sep Elem

Will occur if the controller has been in a loaded state for 8 seconds, Package Discharge Pressure > 90 psi, injected coolant temperature > 120 degF, and separator pressure drop > 12 psi for 3 seconds.

Note that the Enable 3APT setpoint must be turned ON for this warning to occur.

- ***High Airend Discharge Temperature***

On-Screen Text: High A/E Disch T

Will occur if the controller is running and airend discharge temperature > 221 °F for 3 seconds.

- ***High Sump Pressure***

On-Screen Text: High Sump Pres

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

Note that the Enable 3APT setpoint must be turned ON for this warning to occur.

- ***Service***

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

- ***Service Level 1***

On-Screen Text: SVC Required

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

- ***Service Level 2***

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

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

The initial "SERVICE REQUIRED" warning will occur at total hour intervals equal to the service time period set point. However, 100 hours before this a "100 HOURS TO SERVICE" warning will occur. This warning can be reset the same as any other warning. One hundred hours later the "SERVICE REQUIRED" warning will occur. This warning can be reset the same as any other warning, however this warning will return in 24 hours if the service complete factory set point has not be set. If the service complete has not been set, 100

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hours later, the "ALARM – SERVICE REQUIRED" warning will be issued. This warning can only be cleared by the service complete factory set point. Once the service complete factory set point is set, indicating the service is completed, the time for the next "SERVICE REQUIRED" warning will be calculated by adding the service time period to the total hours value, with the "100 HOURS TO SERVICE" warning occurring 100 hours before and the "ALARM – SERVICE REQUIRED" warning occurring 100 hours after that time.

- ***High Discharge Pressure***

On-Screen Text: High Disch Pres

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

- ***Dryer Temp Warning (Only applicable to RS15-22ie)***

On-Screen Text: Dryer Temp

On units with the integrated dryer, this will occur if the dryer temperature switch 1T1 is open or dryer controller temperature sensor 1AT has fault " Lo" or "Hi" while the dryer is running. This is a dryer fault. The dryer temperature switch 1T1 is auto reset type and sensor 1AT is auto reset by dryer controller. If this happens, the Air compressor will continue to run, However the dryer will run intermittently . However Dryer temp warning is on package main controller display and it must not be reset from package main controller before fault corrective actions from dryer unit.

- ***Dryer High Pressure (Only applicable to RS15-22ie)***

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***

On-Screen Text: Invalid Cal

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

■ *TRIP EVENTS LIST*

- ***Low Sump Pressure***

On-Screen Text: Low Sump Press

Will occur if the unit is running unloaded or loaded and sump pressure is less than 13 psi for 15 seconds.

Note that the Enable 3APT setpoint must be turned ON for this warning to occur.

- ***High Airend Discharge Temperature***

On-Screen Text: High A/E Disch T

Will occur if airend discharge temperature > 228 °F.

- ***Check Motor Rotation***

On-Screen Text: Ck Motor Rot

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

However, if correct motor rotation is not established, this fault will be checked after each start until correct motor rotation is established. Correct motor rotation is established when the controller reads a sump pressure of 1 psi or more within 3 seconds of starting.

Note that the Enable 3APT setpoint must be turned ON for this warning to occur

- ***Overload***

On-Screen Text: Overload

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

- ***Main Motor Overload***

On-Screen Text: Main Motor OL

This will occur if the current transducers indicate that the motor amp draw is excessive. This overload is the equivalent of a class 10A trip level.

- ***Remote Stop Failure***

On-Screen Text: Rem Stop Fail

Will occur if the remote start/stop is enabled and the remote stop digital input is open when the remote start digital input is closed or the local start button is pressed.

- ***Remote Start Failure***

On-Screen Text: Rem Start Fail

Will occur remote start/stop is enabled and the remote start digital input is closed for a period of 7 seconds after the compressor has entered the Run-Starting state.

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- ***Sensor Failure***

On-Screen Text: 3APT Failure, 4APT Failure, 7APT 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, 3APT, 4APT, 7APT, and 2ATT. The sensor should be displayed along with the sensor failure message. The sensor failure message shall follow the following format: 3APT Failure.

- ***Emergency Stop***

On-Screen Text: Emergency Stop

This will occur when the EMERGENCY STOP button is engaged.

- ***High Sump Pressure***

On-Screen Text: High Sump Pres

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

Note that the Enable 3APT setpoint must be turned ON for this warning to occur.

- ***Unit Too Cold To Start***

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 35 deg 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***

On-Screen Text: High A/E Disch T

Will occur if the airend discharge temperature is greater than 216 °F.

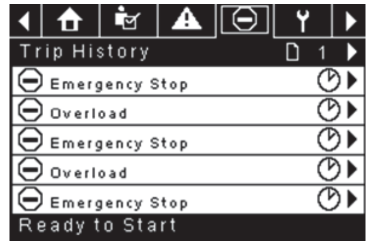
- ***High Sump Pressure***

On-Screen Text: High Sump Pres

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

■ 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 right navigation 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.

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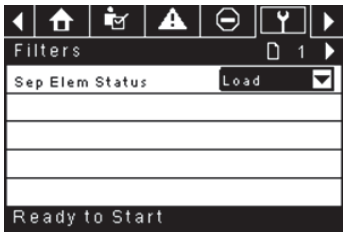
■ MAINTENANCE FOLDER

- *PAGE 1 – FILTER STATUS*

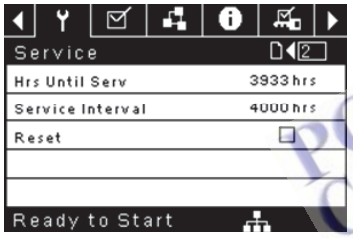


This page displays the status of the filters. The filter status will either be "OK" or "Change" depending on the compressor's diagnostic readings. If a filter reaches the "change' status, a warning will be issued and the service indicator will light up to notify the user. Please note that the compressor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

The following filters are displayed:

- Separator Element

- *PAGE 2 - MAINTENANCE CONFIGURATION*

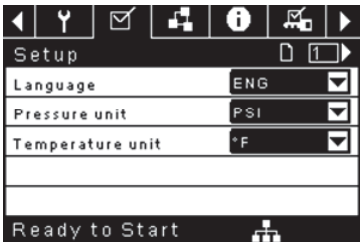


This page allows the user to set the service interval and to reset the counter after the service has been performed. The service interval may be set to any value between 1000 and 8000 hours, but must be set in accordance with the factory maintenance schedule. After maintenance has been performed, the 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)
- Bulgarian
- Chinese, simplified
- Croatian
- Czech
- Danish
- Dutch
- Estonian
- Finish
- French
- German
- Greek
- Hungarian
- Italian
- Indonesian
- Korean
- Latvian
- Lithuanian
- Maltese
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Slovak
- Slovenian
- Spanish
- Swedish
- Thai
- Turkish

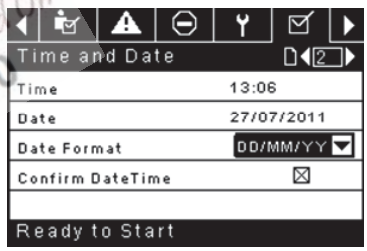
The controller will display all screens in the selected language and only one language can be selected at a time.

Each language appears in its native translation.

Temperature is selectable between °F and °C.

Pressure is selectable between psi, kpa, bar, kg/cm^2.

- *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 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.

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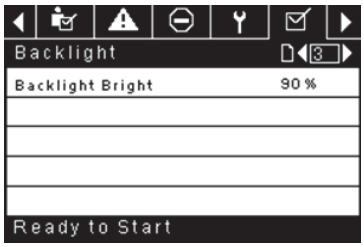
- *PAGE 3 – BACKLIGHT SETTINGS*

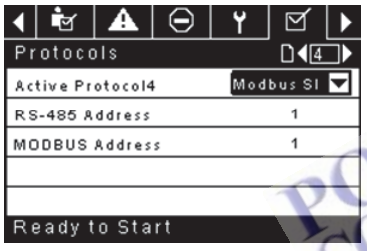


Backlight Brightness adjusts the brightness of the display.

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*



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

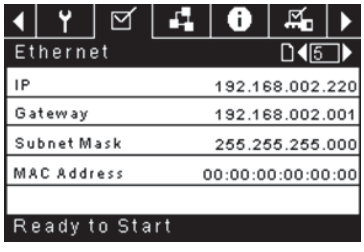
Active Protocol – Allows the serial port to be configured to Airbus (used for X-Series system controllers and integral sequencing) or Modbus protocols.

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)*

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



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.

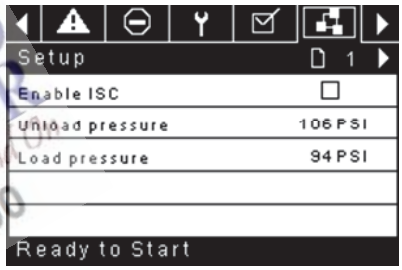
MAC Address – This is the unique hardware MAC address for the controller. This can not be changed.

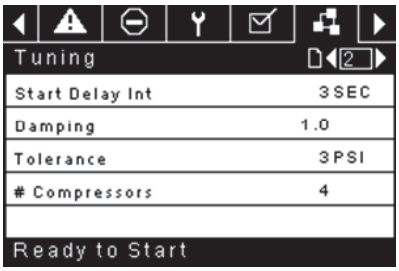
Enable DHCP – Allow the controller to automatically receive an IP address from the Local Area Network (LAN).

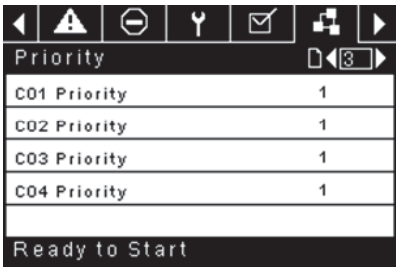
Apply– After editing the desired setpoint navigate to the accept setting and press enter in order for the values in the setting variables to be confirmed by the controller.

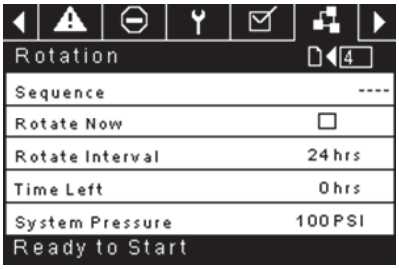
Cancel – Discard any changes made to the Ethernet settings.

■ ***INTEGRAL SEQUENCING FOLDER***









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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.

Please 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 units is from the assigned 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. Please 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.

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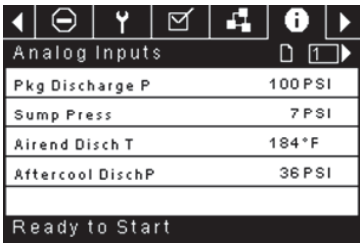
EN

■ STATUS FOLDER

NOTICE
All information on these pages is read only.
Some values may only be visible when the factory settings password is entered.

- *PAGE 1 – ANALOG INPUTS*

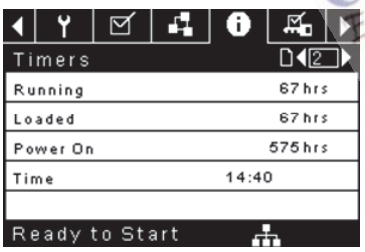


Analog Inputs:

The following analog inputs are displayed in this section.

- **Package Discharge Pressure –** The pressure the compressor is delivering to the plant.
- **Sump Pressure –** The pressure of the air that is present inside the sump tank.
- **Airend Discharge Temperature –** The temperature of the air that flows out of the Airend.
- **After-cooler Discharge Temperature –** The temperature of the air when leaving the cooler. Note that this will only be shown if the Low Ambient option has been purchased and installed.

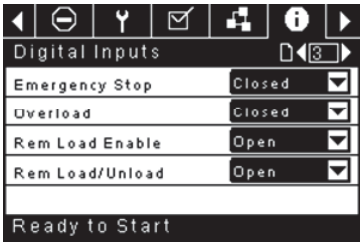
- *PAGE 2 – COMPRESSOR DATA*

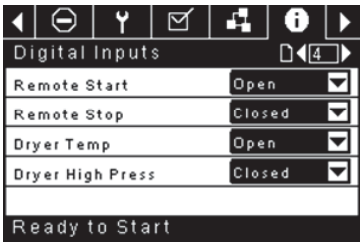


Compressor Data:

- **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 & 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

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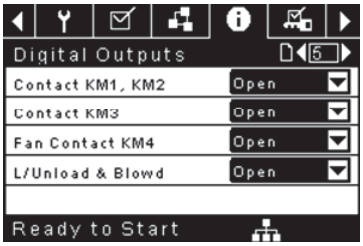
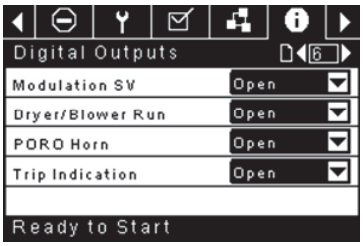
- *PAGES 5 & 6 – DIGITAL OUTPUTS*



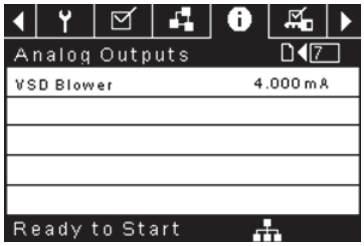


Digital Outputs:

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
- **Modulation Solenoid 3SV –** Normally Open
- **Dryer Run / Fan Run –** Normally Open
- **PORO Horn –** Normally Open
- **Trip Indication –** Normally Open

- *PAGE 7 – ANALOG OUTPUTS*

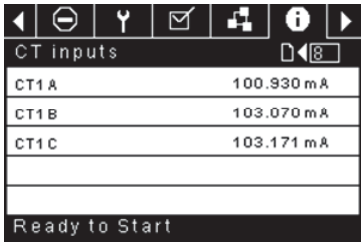


Analog Outputs:

The value for the analog outputs will be in mA.

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

- *PAGE 8 – CT INPUTS*



CT Inputs

Displays the mA value of the current transformers installed on each leg of the motor incoming power

- **CT1**
- **CT2**
- **CT3**

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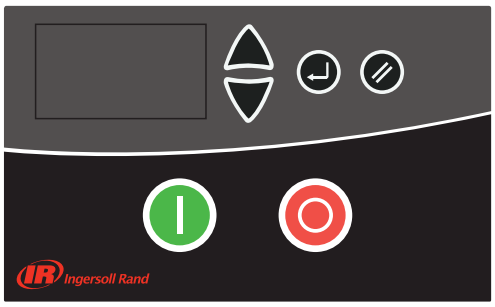
OPERATING INSTRUCTIONS (XE-50M CONTROLLER)

■ XE-50M

Figure 8 : Xe-50M



■ *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 10: Xe-50M Command Keys

Icon	Name	Function
	Start	Starts the compressor.
	Stop	Stops the compressor, this button should be pressed instead of the E-stop for normal stopping operation
	Navigation Keys	Leads the user down or up a navigation path
	Reset	Clears Warnings and Trips once the condition is corrected
	Enter	Confirms operation

■ *DISPLAY LAYOUT*

Figure 9 : Display Layout

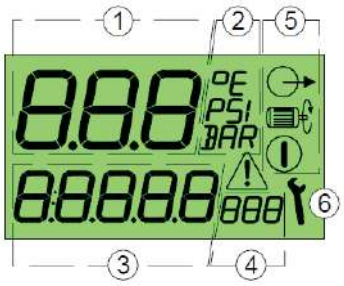


Table 11 : Dislpay Icons

Key	Description
1	Main Display Value
2	Main Display Value Units
3	User Menu Item Display Value
4	User Menu Item Display Units
5	Status Symbols Started, Running, Loaded
6	Service/Fault Symbols Service, Fault: Alarm/ Warning/Trip
	Started
	Running
	Loaded
	Service
	Fault: Warning Trip

■ *USER DISPLAY*

Table 12: User Display Icons

7.0 BAR 102 PSI 85.6 °C 186 °F	Main Display Value : Pressure (bar/psi menu selectable)
	Default User Menu item : Temperature (˚C/˚F menu selectable)
	To view alternative user menu items Press Up or Down
23456 Hr	Total Run Hours
16420 LHr	Total Run Onload
420 Hr	Hours Until Service Due (countdown timer based on total run hours)
1 Add	RS485 Communication Network Address (*only show if RS485 option installed)

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.

Pressure Switch Mode

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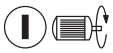
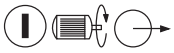
■ *STATUS DISPLAY*

The operating status is continuously displayed using status symbols.

Table 13 : Status Display Icons

	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.
	Running : The compressor is running offload (run-on-time active)
	Loaded : The compressor is running onload

■ *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 - Accessible just for **Ingersoll Rand** authorised service personnel.

	To access a menu, Stop the compressor first, then press the Up and Down buttons simultaneously. After several seconds the display will show four "0" characters; the first character will flash. Press Up and Down to adjust the first character to match the first character to match the first character of the required access code. Press Enter to increment to the second code character.
	When all four character has been set, and the last code character is flashing, press Enter. If the access code is correct for the access to one of the two menus the first menu item of the appropriate menu will be displayed. If the access code is incorrect the display will return to the normal operational display. To select a menu item for adjustment press Up or Down until the menu item is displayed. To adjust an item setting press 'Enter', the value or option will flash. Press Up or Down to adjust as required then press Enter to store in memory.
	To exit a menu and return to the normal operational display, at any time, Press Reset. Any adjustment that has not to be entered to memory will be abandoned and previous setting maintained.

■ *OPERATIONAL MENU*

Table 14 : Operational Menu

Item		Description
1	1.Pu	Upper Pressure Set Point
2	1.PL	Lower Pressure Set Point
3	1.Sd	Motor Star/Delta Time
4	1.P-	Pressure Display Unit
5	1.t-	Temperature Display Unit
6	1.LS	Load Source
7	1.SS	Start Source

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.

NOTE:

- **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.**

- ***Load Source***

Shall be set to 0 for local operation and to 2 for remote control (remote load/unload) using controller digital inputs C3 and C6 and external dry contacts.

- ***Start Source***

Shall be set to 0 for local operation and to 2 for remote control (remote start/stop command) using controller digital inputs C3 and C6 and external dry contacts.

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- ***Remote Start/Stop Input:***

Machine can be started/stopped remotely via digital input C3 and C6. Start Source 1.SS set to 2 (2:dIn)

In order to put the machine in local operation, 1.d3 to be set for 0 (0:Ano) and 1.SS to be set for 0.

- ***Remote Load/Unload Input:***

Machine can be loaded/unloaded remotely via digital input C3 and C6. P Load Source 1.LS set to 2 (2:dIn)

In order to put the machine in local operation, 1.d6 to be set for 0 (0:Ano) and 1.LS to be set for 0.

■ *FAULT CODES*

Fault codes are separated in two categories:

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

Table 15 : Warning Codes

A:2040	Freeze warning (Dryer Package Only)	(DI-C4)
A:2050	Dryer High Pressure (Dryer Package Only)	(DI-C5)
A:2118	High Pressure : alarm limit exceeded	
A:2128	High Temperature : alarm limit exceeded	
A:2816	Power failure detected	
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)	
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)	
A:4804	Service Due - Service interval hours counter has reduced to zero	
A:3129	Airend Discharge Temperature is above 103 ˚C	

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

Table 16 : Trip Codes

E:0010	Emergency Stop - 24 Vac is not being detected on terminal R1C	
E:0020	Main or Fan Motor Overload	(DI-C2)
E:0115	Pressure Sensor Fault: 4-20mA signal out-of-range (<3.8mA or >20.8mA)	
E:0119	Excess Pressure : shutdown limit exceeded	
E:0125	Temperature Sensor Fault : signal out-of-range (<50 ˚C or > 250 ˚C)	
E:0129	Excess Temperature : shutdown limit exceeded	
E:0866	Power Supply 24V DC low	
E:0821	Power Supply Analog Inputs Low	
E:0030	Remote start failure	
E:0060	Remote stop failure	

■ *X-SERIES SYSTEM CONTROLS CONNECTION*

Xe-50M now supports system controller communication using Digital Input C3 and C6 and digital output R1 and R2 through IR-PCB interface module.

Note that XE-50m does not support communication through RS485.

Remote Start/Stop:

When 1.SS is set to 2, DI C3 shall act as remote start, DI C6 shall act as remote stop. When 1.SS is set to 2, 1.LS will be automatically set to 0 (local only) and it will be a mutually exclusive setting.

Remote Load/Unload:

When 1.LS is set to 2, DI C6 should act as load/unload input, DI C3 acts as remote load enable. When 1.LS is set to 2, 1.SS will be set to 0 (local only, no remote start allowed for remote load/unload to work).

■ *ENABLING SYSTEM CONTROL CAPABILITIES*

To enable remote operation, X03 DI C3 should be connected to 202: Load enable port of IR-PCB interface module and X03 DI C6 should be connected to 220: Load/Unload port of IR-PCB interface module. Also X04 DO R1 should be connected to 120: READY and X04 DO R2 should be connected to 113: RUN port of IR-PCB interface module.

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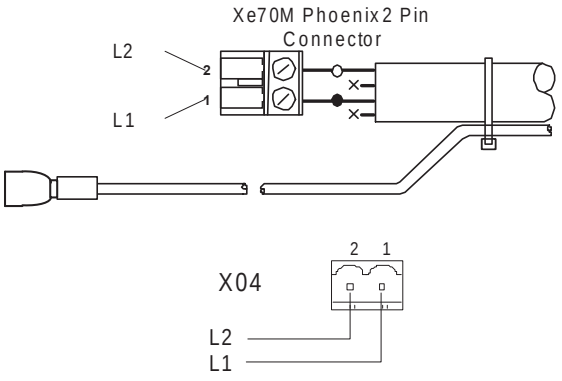
MODBUS CONNECTION AND CONTROL

■ 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 10



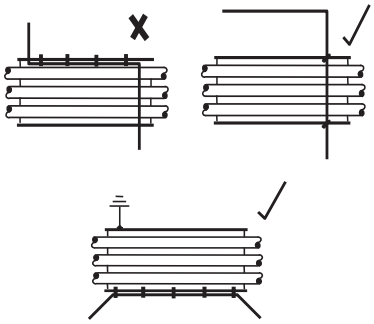
■ RS-485 NETWORK

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).

Figure 11



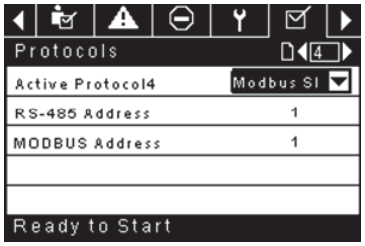
■ MODBUS ADDRESS SELECTION

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 12



■ 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

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■ MODBUS TABLE

Table 17: Modbus Table

Register (40XXX)	Variable	Read/ Write	Range	Notes
1	Status/ Control	R/W		See Table 18
3	Package Discharge Pressure	R		
4	Sump Pressure	R		
7	Airend Discharge Temperature	R		
8	After-cooler Discharge Temperature	R		Low Ambient units only
10	Separator Pressure Drop	R		
16	After-cooler Discharge Pressure	R		Dryer units only
65	Running Hours MSB	R		
66	Running Hours LSB	R		
67	Loaded Hours MSB	R		
68	Loaded Hours LSB	R		
98	Rated Pressure	R		
100	Starter Type	R	1-3	See Table 19
101	Modulation Enabled	R		0=Disabled
102	Service Level	R	0 - 2	0=Level 0, 1=Level 1, 2=Level 2
103	Service Time Period	R	1000 - 8000	Increments of 1000
104	Dryer Installed	R		0=OFF
112	Offline Pressure	R/W	75 - (rated+10)	rated = rated pressure
113	Online Pressure	R/W	65-(offline-10)	offline = offline pressure
114	Mode of Operation	R/W	0 – 2	See Table 19
115	Starter Time (seconds)	R/W	5 – 30	
116	Auto Restart Time (seconds)	R/W	120 – 3600	
117	Auto Restart ON/ OFF	R		0=OFF
118	Communication Control ON/ OFF	R		0=OFF
119	Remote Start/ Stop Enable	R		0=OFF
121	Power Out Restart Option (PORO) Enable	R		0=OFF
122	PORO Time (seconds)	R/W	10 - 600	
123	Auto Start/ Stop Delay Time (seconds)	R/W	0 - 60	
124	Low Ambient Temperature	R/W	30 - 60	Degree F
125	Unloaded Stop Time	R/W	10 - 30	
128	Lead/ Lag	R/W		0=Lag
129	Lag Offset	R/W	0 - 45	psi
131	Lead/ Lag Cycle Length (Hours)	R/W	0 – 750	
132	Scheduled Start (Day)	R/W	0 - 9	See Table 19
133	Scheduled Start (Hour)	R/W	0 – 23	
134	Scheduled Start (Minute)	R/W	0 – 59	
135	Scheduled Stop (Day)	R/W	0 - 9	See Table 19
136	Scheduled Stop (Hour)	R/W	0 – 23	
137	Scheduled Stop (Minute)	R/W	0 – 59	
255	Warning Code	R		See Table 20
256	Trip Code	R		See Table 20
400	Reset Web Logins	R/W	0-1	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

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Table 18 : Controller Register 01-Status/ Control

Bit 0: Host/ Local (R/ W)
- 0 = Local
- 1 = Host

Bit 1: Run/ Stop (R/ W)
- 0 = Stop
- 1 = Run

Bit 2: Load/ Unload (R/ W)
- 0 = Unload
- 1 = Load

Bit 3: Modulating (R)
- 0 = Not Modulating
- 1 = Modulating

Bit 4: Unused

Bit 5: Stopped in Auto Restart (R)
- 0 = Not Stopped in Auto Restart
- 1 = Stopped in Auto Restart

Bit 6: Alarm (R)
- 0 = No Alarms
- 1 = Alarms

Bit 7: Warning (R)
- 0 = No Warnings
- 1 = Warnings

Bit 8: ON/ OFF Line Mode (R)
- 0 = Not in ON/ OFF Line Mode
- 1 = ON/ OFF Line Mode

Bit 9: Mod/ ACS or Mod Only (R)
- 0 = Not in Mod/ ASC Mode
- 1 = Mod/ASC Mode

Bits 10-12: Unused

Bits 13-15: Unit Type (R): Unused

Table 19 : Controller Register Codes

Register 100: Starter Type
- 1 = Star-Delta
- 2 = Remote Starter
- 3 = Soft Starter

Register 114: Mode of Operation
- 0 = ON/ OFF Line
- 1 = MOD/ ACS
- 2 = Modulation Only

Registers 132, 135: Day
- 0 = Sunday
- 1 = Monday
- 2 = Tuesday
- 3 = Wednesday
- 4 = Thursday
- 5 = Friday
- 6 = Saturday
- 7 = Daily
- 8 = Weekdays
- 9 = Weekends

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Table 20 : Controller Trip & Warning Codes

Code	Description
2	Sensor Failure 3APT
3	Sensor Failure 4APT
8	Sensor Failure 7APT
10	Sensor Failure 2ATT
11	Sensor Failure 4ATT
18	Motor Overload (Main) – due to CTs
19	Overload – due to Thermal OL
22	Check Motor Rotation
25	Remote Stop Failure
26	Remote Start Failure
28	Low Sump Pressure
29	High Air Pressure
31	High Airend Discharge Temperature

Code	Description
32	Emergency Stop
34	Change Separator Element
36	Sensor Error (Calibration)
38	100 Hours To Service
39	Service Required
40	Alarm – Service Required
48	Unit Too Cold To Start
49	High Sump Pressure
51	Dryer High Pressure
52	Dryer Temperature Warning
55	Change HE Filter (Dryer)
56	Sensor Failure – Main Motor CT Inputs

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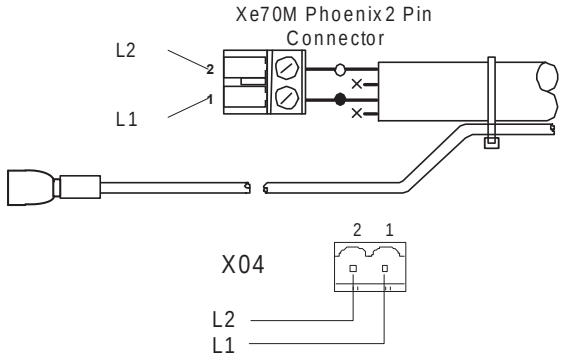
X-SERIES SYSTEM CONTROLS CONNECTION

■ CONNECTION TO X-SERIES SYSTEM CONTROLS

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.:

Figure 13



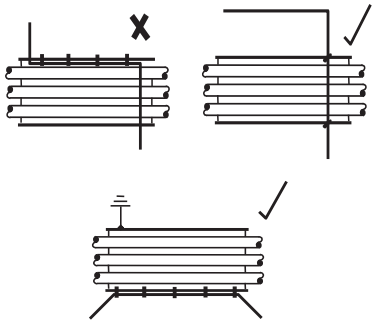
■ RS-485 NETWORK

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).

Figure 14



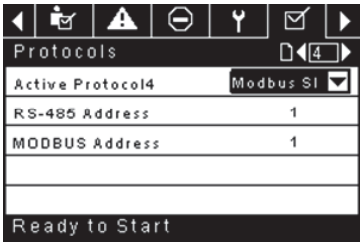
■ RS-485 ADDRESS SELECTION

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.

Figure 15



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■ ENABLING SYSTEM CONTROL CAPABILITIES

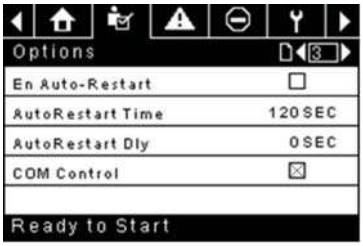
In order to communicate properly with the X-Series system controller, the Xe-70M must have the following setpoints correctly set.

On the Operator Settings tab, page 3 (Fixed Speed) or page 2 (Variable Speed).

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.

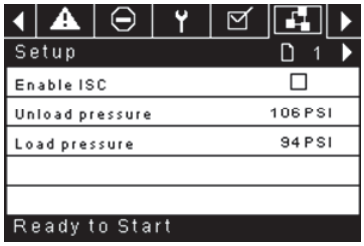
Additionally, for fixed speed machines, make sure that the Enable Auto-Restart setpoint is enabled (checkbox is filled in) or the compressor will continue to run when unloaded by the system controller.

Figure 16



After the address and COM control have been set, be sure that Integral Sequencing (ISC) 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:

Figure 17



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.

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OPERATING INSTRUCTIONS FOR INTEGRATED DRYER (APPLICABLE TO RS11-22i)

INTRODUCTION

This manual is an integral part of the dryer you have purchased and must remain with the machine even if resold.

It is highly recommended that the qualified personnel for installation, maintenance and/or control fully comply with the contents of this manual and the prevention and safety rules enforced in the country where the system will be used.

Should you experience any issues or problems with your dryer, contact your local authorized **Ingersoll Rand** distributor.

Note that when necessary, the use of original **Ingersoll Rand** spare parts will help to ensure greater efficiency and continuous operation of your dryer.

Due to the continuous technological evolution of its products, **Ingersoll Rand** reserves the right to modify the specifications contained within this manual without providing previous notice.

GENERAL INFORMATION

FUNCTIONAL DESCRIPTION

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

Compressed air enters the patented aluminium heat exchanger where it is cooled down to the dew point temperature in two different stages: In the first air/air stage, compressed inlet air is cooled by the colder compressed air coming out of the counter flow from the condensate separator. In the second refrigerant/air stage, compressed air temperature is further lowered to the dew point temperature. During these two stages, almost all of the oil and water vapor contained in the compressed air are condensed to liquid form and separated from the compressed air in the condensate separator and expelled by the automatic drain. At this point, the obtained cooled air re-enters the counter flow at the initial air/air exchanger and is reheated by the hotter inlet air, reducing the relative humidity contained within the outflowing air as well as creating the potential for energy recovery.

The dryer comes provided with all 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 (resulting in a higher dew point), but it will not affect its safety.

The electric diagram (47554348001 - ES DWG XE50, 47625478001 - ES DWG XE70) shows the minimum protection degree IP 42.

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⚠ WARNING

IMPROPER GROUNDING

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

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 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.

DRYER OPERATION

The dryer supplied has already been tested and preset for normal operation, and it doesn't require any calibration. Nevertheless, it is necessary to check all performance parameters during the first working hours of operation.

The dryer must be supplied with a separate power supply. A separate power cable is provided to connect the dryer with the main panel for single phase power.

START-UP SEQUENCE

Perform the following steps to start the dryer:

1. Connect the dryer to the main power supply. Make sure to check the rated power supply as per manual and dryer data label.
2. Set the main power supply switch to "ON".
3. Switch ON the power ON/OFF button at the dryer panel as suggested in the dryer's Operating Instruction section of this manual. The control panel will show the message OFF, indicating that the line and control voltages are available. The dryer will initially start by pressing and holding the local ON/OFF button. Before starting the machine, make sure that all operating parameters correspond to the nominal data. The start sequence will progress only if there are no active alarms. The compressor motor will start AFTER 120 SECONDS. The fan motor will start simultaneously with the compressor after a few seconds.
4. Wait for 6 minutes after switching the dryer's power to ON, allowing the system to achieve the desired dew point temperature.
5. After approximately 6 minutes, the air compressor can be switched to ON, and moisture separation from the compressed air can begin. Once the dryer loaded with compressed air, check the drain discharge of condensate water.

NOTICE

There may be chance of abnormal trip on high pressure /temperature if start sequence of dryer is not maintained with air compressor. There may also chance that water carry over to application point in this scenario.

VARIABLE SPEED FAN CONTROL

A patented microprocessor allows for the adjustment of the 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%.

STOP SEQUENCE

The stop sequence of the dryer is simply the reverse of the start-up sequence. Once the air compressor is switched to OFF, switch OFF the dryer at the control panel and then disconnect it from the power supply.

Stop the dryer using any of the following methods below:

1. Normal Stop - Stop the Dryer locally from the controller on the electrical panel. After you press 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.
2. Emergency Stop/Alarm Trip - In addition to the requirements for normal stop, the Emergency Stop/ Alarm Trip shall fulfill the requirements as a Category 0 stop according to EN60204 and NFPA 79. The alarm or energy saving condition (ESA or ES2) can also stop the dryer. The alarm or energy saving condition (ESA or ES2) can also stop the dryer. 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.
3. Remote Stop – Does the same action as normal stop, but it is initiated from the remote location.

In case of power loss, restart the Dryer. The dryer has a built-in 3 minute delay restart function to protect the system and balance system pressure when power is supplied. If dryer is switched off from main power supply, then wait for 3 minutes to restart the dryer from main control panel to avoid any nuisance tripping.

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EN

■ CONTROL PANEL

The dryer is 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 LEDs indicated by icons (Figure 18).

Figure 18 : Display Visualization and Signalling LEDs

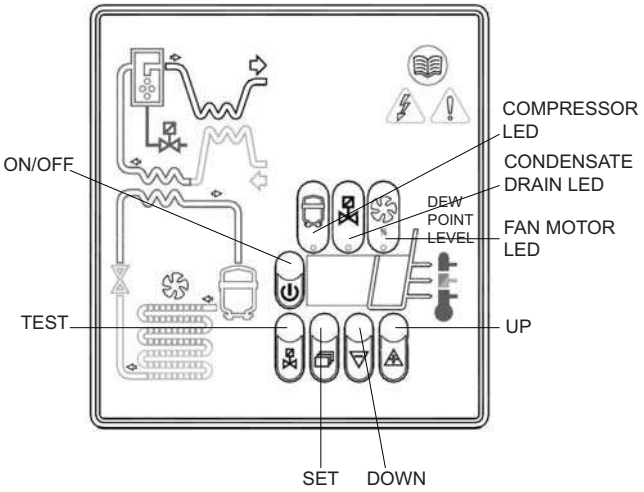

Table 21 : Display Icons

Display	Description
On	the unit is ON with low load
On.	the unit is ON with normal load
On:	the unit is ON with normal-high load
On:	the unit is ON with high load

Table 22 : LED Display Icons

LED	Status	Description
	ON	Compressor energized
	Blinking	Programming mode activated
	ON	Condensate drain energized*
	Blinking	
	ON	Speed of the fan = 100%
	Blinking	Speed of the fan < 100%
	OFF	Fan not running

■ *KEYS FUNCTION*

Table 23 : Keys and its Functions

Keys	Functions
TEST	When pushed for 3 secs. during normal operation, it activates the condensate drain. (Not used on No loss condensate drain)
SET	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.
DOWN	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.
UP	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.
ON/OFF	Pressed, it activates or deactivates the dryer. When the dryer is deactivated, the display shows OFF.

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.

⚠ WARNING

It is forbidden to attempt to modify the other configuration parameters of the electronic controller without authorization.

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Table 24

Parameter	Description	Range	Default Set Value
C8	Delay between condensate discharges	1 ÷ 999 (min)	**1**
C9	Time required for condensate discharge	1 ÷ 999 (sec)	**3**

NOTICE

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.

■ *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 25: Display Indications

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

NOTE: PF1 has priority on all other messages.

Before disconnecting the dryer from electrical power supply, use ON/OFF button on controller to stop the dryer. Otherwise wait 3 minutes before switching the dryer on again, in order to allow freon pressure to rebalance.

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Appliance You Can Depend On
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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 CE Mark and conform to various directives. In such cases, the design specification of this compressor has been certified as complying with EC directives. Any modification to any part is absolutely prohibited and would result in the CE certification and marking being rendered invalid.

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

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

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

⚠ WARNING

Cancer and reproductive harm - www.p65warnings.ca.gov

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.

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

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

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