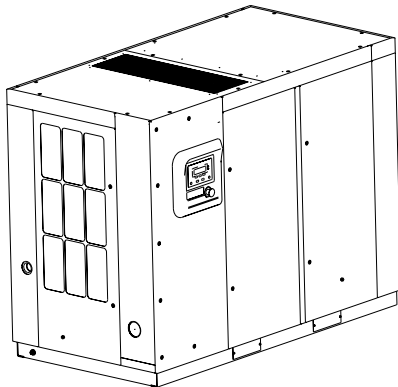




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Revision A
July 2011

Contact Cooled Rotary Screw Air Compressor

R55-160



Product Information

EN Product Information

ZH 产品信息



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ABOUT THIS MANUAL

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

For supporting documentation refer to Table 1.

Table 1: Product Manuals

Publication	Product	Part/Document Number by Region		
		Americas	EMEA *	Asia Pacific
Product Safety Information Manual	All	80446313	80446156	80446321
Product Maintenance Information Manual	All	80446354	80446248	80446362
Product Parts Information Manual	R55-75 kW	80446271		
	R132-160 kW Single-Stage	80446057		
	R90-160 kW Two-Stage	80446065		

* Europe, Middle East and Africa

Product specification sheets and reference drawings are also available.

SAFETY

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

this manual, ask your supervisor or contact any **Ingersoll Rand** office or qualified **Ingersoll Rand** distributor.

RECEIPT / HANDLING

■ Receipt

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

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

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

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

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

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

■ Unpacking and Handling

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

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

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

For Variable Speed Drive (VSD)

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

For Fixed Speed (FS)

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

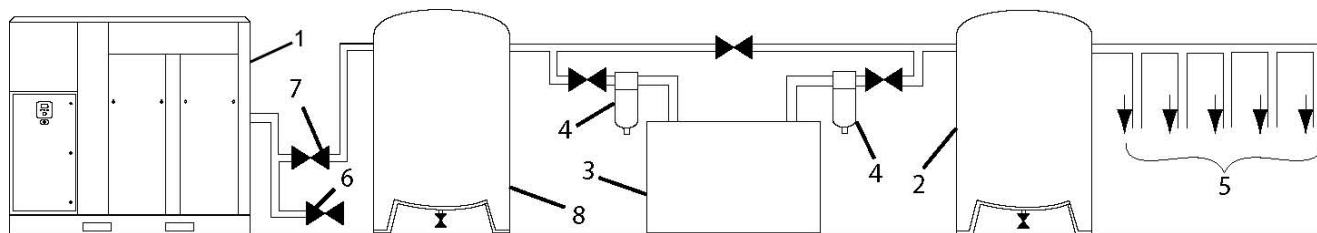
■ Long Term Storage

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

INSTALLATION

■ Location in Plant

Figure 1: Typical Air System



Key

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

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

NOTICE

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

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

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

■ Discharge and Condensate Piping

See Figure 1.

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

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

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

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

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

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

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

NOTICE

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

NOTICE

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

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

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

The built-in aftercooler 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 aftercooler 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.

NOTICE

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

NOTICE

Do not use the compressor to support the discharge pipe.

■ Electrical

A qualified electrician shall perform all electrical installations and service.

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

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

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

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

NOTICE

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

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

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

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

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

The feeder cable shall be suitably glanded in to the starter box to maintain proper ingress protection. Fixed speed starter boxes are rated for NEMA 4 /IP65, and variable speed drive starter boxes are rated for NEMA12/IP54. For variable speed drive starter boxes, the feeder cable shall be glanded to ensure that dirty air does not by-pass the filters.

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

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

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

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

NOTICE

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

■ Watercooled

■ Cooling Water Piping

NOTICE

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

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

For sea water applications (sea water option only) a zinc anode is not recommended as it will deteriorate the copper oxide film on the 70/30 copper-nickel alloy tubes in contact with sea water. To minimize galvanic corrosion and provide the greatest corrosion protection to the coolers, it is strongly recommended that a section of iron pipe (>300 mm length) be connected as close as possible to the air compressor package water inlet connection. The iron pipe will act as the sacrificial anode for the copper-nickel tubes and therefore shall be considered a regular maintenance and replacement item. For this reason, the section of iron pipe should be installed so that it can be easily replaced (e.g. with a union joint).

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

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

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

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

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

■ Venting the water system

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

Fresh water coolers (brazed plate heat exchangers):

1. Disconnect the water stop valve in the water outlet line of the compressor.
2. Open the inlet water valve(s) to allow the water to flow to the compressor.
3. Allow all the air to escape from the system and observe water at the water outlet port.
4. Connect the water stop valve.

Harsh water coolers (shell and tube heat exchangers):

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

■ Draining the water system

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

Fresh water coolers (brazed plate heat exchangers):

1. Disconnect the inlet water line from the connection located at the rear of the compressor.
2. Disconnect the water stop valve in the water outlet line of the compressor.
3. Allow the system to completely drain.

Harsh water coolers (shell & tube heat exchangers):

1. Disconnect the inlet and discharge water lines from the connections located at the rear of the compressor.
2. Locate the aftercooler and oil cooler. Remove the drain plugs located at the bottom of the coolers.
3. Open the vent ports in the top of the aftercooler and oil cooler.
4. Allow the system to completely drain.

■ Adjusting the aftercooler trim valve

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

1. Close valve fully clockwise and then open two full turns.
2. With the compressor running loaded observe the package discharge temperature on the controller display. It should be approximately 8° C (15° F) above the water inlet temperature.

3. If the temperature is too high, open the valve ¼ turn and wait one minute. If the temperature is too low, close the valve ¼ turn and wait one minute. Repeat the incremental movements until the desired temperature is reached.
4. Put a "Warning – Do Not Adjust" label on the valve or fit a lock.

■ Water quality recommendations

Water quality is often overlooked when the cooling system of a watercooled air compressor is examined. Water quality determines how effective the heat transfer rate, as well as the flow rate, will remain during the life of the compressor. It should be noted that the quality of water used in any cooling system does not remain constant during the operation of the system. Evaporation, corrosion, chemical and temperature changes, aeration, scale and biological formations affect the water makeup. Most problems in a cooling system first appear as a reduction in the heat transfer rate, then in a reduced flow rate or increased pressure drop, and finally with damage to the system.

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

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

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

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

Table 2: Acceptable Limits for Cooling Water Constituents

Substance	Test Interval	ACCEPTABLE MAXIMUM LIMITS	
		Fresh Water (Braze Plate Heat Exchanger)	Dirty Water / Sea Water (Shell & Tube Heat Exchanger)
Langelier Index (LI)	Monthly	0 to 1	-0.5 to 2.5
Ammonia [NH ₃], ppm	Monthly	<1	<2
Ammonium [NH ₄ ⁺], ppm	Monthly	<2	<5
Chlorides [Cl ⁻], ppm	Monthly	<80	<1000
Copper [Cu], ppm	Monthly	<0.01	<0.5
Dissolved Oxygen (DO) [O ₂], ppm	Weekly	<0.1	<3
Iron + Manganese [Fe + Mn], ppm	Monthly	<0.3	<2
Nitrate [NO ₃ ⁻], ppm	Monthly	<100	<125
Oil & Grease, ppm	Monthly	<5	<5
Silicon Dioxide (silica) [SiO ₂], ppm	Monthly	<30	<100
Sulfates [SO ₄ ⁻²], ppm	Monthly	<70	<250

■ Integrated Dryer

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

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

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

■ Environmental Limits

The standard compressor package is designed for the following conditions:

- Indoors only
- Area not considered to be a high dust area.
- Ambient temperature range 2 to 46°C (35-115°F)

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

- Outdoor modification
- Low ambient option (-23 to 46°C / -15 to 115°F) at sea level
- High ambient option (2 to 55°C / 35 to 131°F) at sea level)
- High dust air filter
- High dust package filter

GENERAL INFORMATION

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

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

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

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

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

The air/coolant mixture discharges from the compressor into the separation system. This system removes all but a few ppm of the coolant from the discharge air. The coolant is returned to the cooling system and the air passes to the aftercooler 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 aftercooler.

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

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

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

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

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

NOTICE

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

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

NOTICE

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

CAUTION

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

The compressor should be allowed ample loading time.

■ Integrated Dryer Operation

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

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

NOTICE

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

OPERATING INSTRUCTIONS FOR VARIABLE SPEED DRIVE (VSD)

■ Basic Operation

NOTICE

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

■ Prior to starting

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

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

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

■ Initial check sequence

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

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

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

■ Start sequence

The compressor will initially start by the operator pressing the local start button or receiving a remote start command. The compressor will start loaded and will ramp up the motor speed to its minimum speed. Once the minimum speed has been achieved, the compressor will begin to control pressure by using its speed regulation. When the system pressure reaches the target pressure, the compressor will start to slow. If the system pressure rises to the immediate stop pressure setpoint the compressor will stop. If the system pressure rises to the auto stop setpoint and the compressor is at minimum speed, the compressor will stop.

NOTICE

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

■ Stop sequence

The compressor can be stopped by a local or remote stop, a shutdown due to a trip, or an emergency stop. All of the above conditions will cause the compressor to stop immediately, except the local or remote stop. A local or remote stop will open the blowdown valve and the compressor will run for up to 10 seconds or until the pressure in the separator tank falls to 2.4 bar (35 psi) before stopping. The compressor will stop if the system pressure reaches the automatic stop or immediate stop pressure setpoints. However, if the compressor stops for this reason, it will automatically restart when the system pressure falls below the target pressure.

NOTICE

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

■ Warm up mode

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

■ Blower control

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

■ Emergency stopping

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

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

■ Restarting after emergency stopping

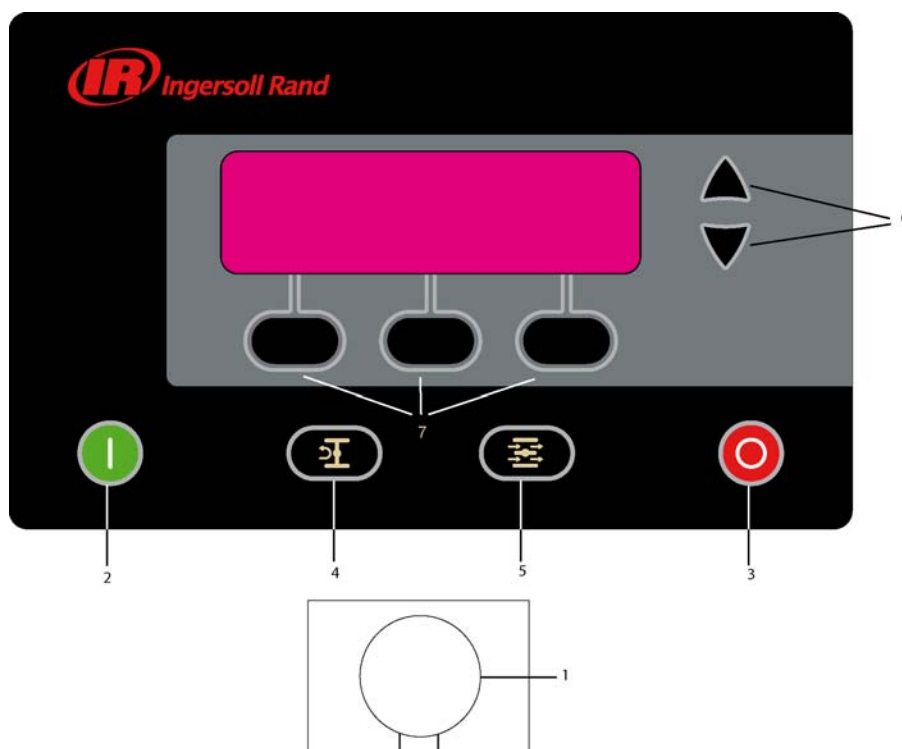
If the compressor has been switched off because of a compressor malfunction, identify and correct the fault before attempting to restart.

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

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

■ SG Controller Controls (VSD)

Figure 2: Controller Interface



1. Emergency Stop

Pressing this switch stops the compressor immediately. The blowdown valve will open to vent pressure in the separator tank to atmosphere. Note the system downstream of the separator tank may still contain pressure. The compressors can not be restarted until the switch is manually reset. Turn the switch knob clockwise and press the reset button twice to reset.

On reset, the controller will display a message indicating that the compressor is ready to start.

2. Start

Pressing this button will activate the start sequence.

3. Stop

Pressing this button will activate the stop sequence.

4. Not used

5. Not used

6. Arrows

The up and down buttons have multiple functions relating to the right half of the display screen. When lists are presented, the buttons are used to move up or down through the items on the list. The small arrow(s) displayed in the upper right hand corner of the display screen indicate when you can move up (designated by an arrow head pointing up) and/or down (designated by an arrow head pointing down) through the list.

When the value of a specific compressor operating parameter is highlighted on the display screen for the purpose of changing that value, the buttons are used to change the value itself.

7. Display Buttons

The functions of the three buttons below the display screen are defined by the words immediately above them in the bottom line of the screen. Each function, such as MAIN MENU, STATUS, etc., is described in appropriate sections in this manual.

■ Display screen

Figure 3: Display screen

100 PSI READY TO START	–CURRENT STATUS– PACKAGE DISCHARGE TEMP 102°F AIREND DISCHARGE TEMP 192°F
MAIN MENU	

The display screen is divided into three functional areas, as seen in the typical CURRENT STATUS screen shown here.

The left side continuously shows the package discharge pressure in large numbers with the line directly below showing the running condition of the compressor.

The right side shows various items or lists such as the compressor's CURRENT STATUS readings, the MAIN MENU, the OPERATOR SETPOINTS list, etc. Any of the lists can be moved up or down by pressing the arrow buttons to the right of the screen. The small arrow(s) displayed in the upper right corner of the screen indicate when you can move up and/or down through a list. The arrow buttons are also used to change an individual item's value. At certain times, items and/or their values are "highlighted". This means that they are displayed as light characters on a dark background.

The bottom of the screen is divided into thirds with the words in each small box showing the function of the button directly beneath it. The words will change in these boxes depending on what actions are permitted at any particular time. The action resulting from pressing each of these buttons is indicated in the operator panel flow diagram later in this section. This can be used as a quick reference of how to step the controller screen through any desired function.

■ Current status screen

The CURRENT STATUS screen is considered to be the “normal” display that the controller shows.

The following items and their present values can be displayed on the right side of the screen by pressing the up and down arrow buttons.

The controller automatically returns the display to this CURRENT STATUS screen from other screens if no buttons are pressed within 30 seconds.

Use the UP and DOWN arrows to move between selections.

CURRENT STATUS items

- % Energy Saving
- % Capacity
- Package kW
- Package Discharge Temperature
- Airend Discharge Temperature
- Injected Coolant Temperature
- Sump Pressure
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- Inlet Filter
- Total Hours
- Motor Speed
- Remote Pressure (optional)
- Time and Date
- Program Name
- Version of Drive Software

When the CURRENT STATUS screen is displayed, pressing the ENERGY STATUS button will toggle the display to the ENERGY STATUS screen. Likewise, when the ENERGY STATUS screen is displayed, pressing the STATUS button will toggle the display to the CURRENT STATUS screen.

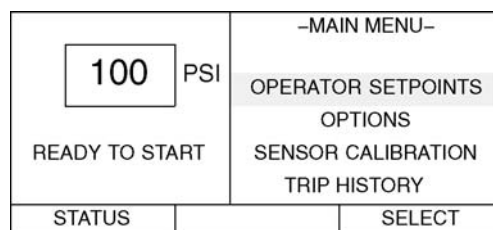
The ENERGY STATUS screen displays the following items.

ENERGY STATUS Items

- Average Package kW-hr
- Average % Capacity
- Average Capacity
- Energy Cost
- Energy Savings
- Lifetime Energy Savings

■ Main menu

Figure 4: Main Menu Screen



The MAIN MENU screen can be accessed from the CURRENT STATUS screen by pressing the MAIN MENU button, identified by the words “MAIN MENU” in the bottom line of the screen directly above the center button.

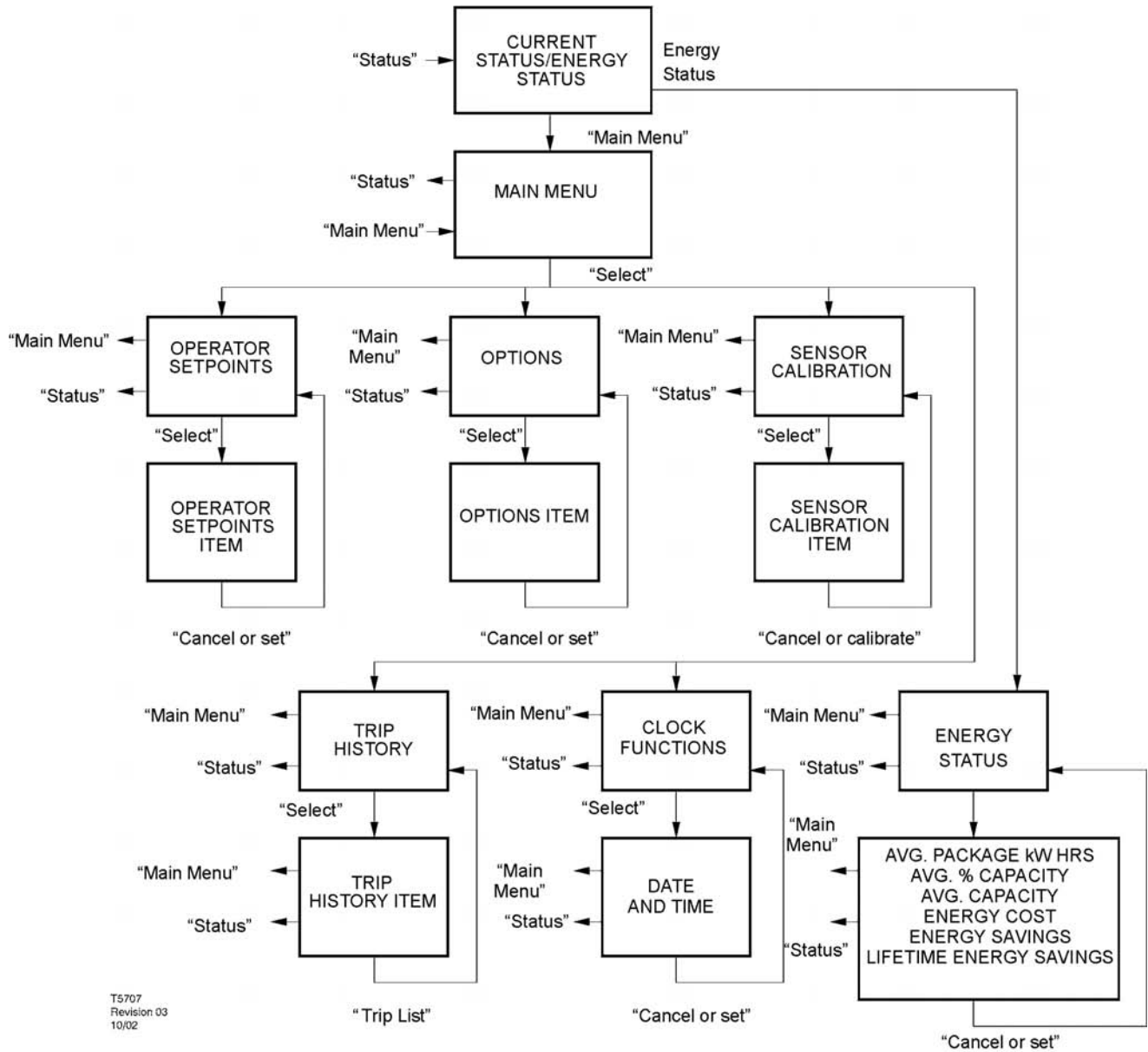
The MAIN MENU screen is the point from which various operator functions can be accessed. Refer to the operator panel flow diagram.

Each of the functions can be chosen by using the up and down arrows to highlight it on the screen.

The controller will go to the highlighted function if the SELECT button is pressed or will return to the CURRENT STATUS screen if the STATUS button is pressed.

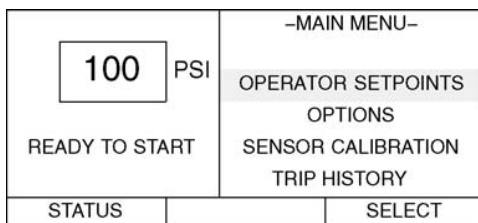
The language and compressors of measure are preset prior to the compressor leaving the factory. If you need to change these settings, contact any Ingersoll Rand office or qualified Ingersoll Rand distributor.

Figure 5: Operator Panel Flow Diagram



■ Operator setpoints

Figure 6: Operator Setpoint Screen



Setpoints are user-adjustable variables in the controller logic that can be set using the OPERATOR SETPOINTS screen shown here.

The name and value of each of the setpoints listed can be seen on the screen by moving the list up and down using the arrow buttons.

Setpoints associated with options are described in the OPTIONS sections.

Table 3: Operator Setpoints

OPERATOR SETPOINTS	DEFAULT	MIN.	MAX.	STEP	UNIT
Target pressure	100	65	145	1	PSI
Automatic stop pressure	110	Target +1	Target +10	1	PSI
Immediate stop pressure	120	Auto	Auto +10	1	PSI
Blowdown mode	Off	Off	On	-	-
% savings compared to	Modulation	-	-	-	-
Energy Rate	0	0	9999.999	-	-
Reset Avg.	--	-	-	Reset Date	-
Service menu	1	1	25535	1	-

A setpoint's value can be changed by first highlighting the item and its value and pressing the SELECT button to highlight just the value. When the value line is highlighted by itself, the value can be adjusted using the up and down arrow buttons. The CANCEL and SET buttons appear at this time. Press the SET button to enter the new value or press the CANCEL button to return the value of the setpoint prior to using the arrows. The displayed value will flash twice to indicate that it has been entered into the setpoint and the pair of setpoint item and value display lines will again be highlighted together.

Operator setpoints can be exited by pressing the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

Target Pressure

The compressor will try to operate at this pressure setting. The target pressure ranges and step sizes for each compressor of measure are listed in the table below.

Table 4: Target Pressure Ranges and Step Sizes

Unit	Min	Max (1S / 2S)	Step
PSI	65	145	1
BAR	4.4	10	0.1
kPa	440	1000	10
KGCM ²	4.5	10.2	0.1

Automatic Stop Pressure

The compressor will stop once the system pressure rises to this pressure and the compressor is operating at the minimum speed. The range for this setpoint will be the target pressure+1 to target pressure+10 psi.

Immediate Stop Pressure

The compressor will stop if the system pressure rises to this pressure. The range for this setpoint will be the automatic stop pressure to automatic stop pressure+10 psi.

Blowdown Mode

Two stage compressors will always blowdown when signalled to stop.

If this mode is selected to ON, the compressor will open the blowdown valve anytime that it stops. This will vent pressure from the airend and the separator tank. If this mode is selected to OFF, the blowdown valve will remain closed when the compressor stops due to an automatic stop. Blowdown mode is set on at all times for two stage models. Blowdown mode will be shown as "Not Installed" at the controller display.

% Savings Compared To

This setpoint is to determine what VSD's percent of savings is compared to. The modes of operation for comparing VSD to are modulation, online/offline, and geometry. The percent savings value is displayed by the status message, "% energy savings".

Energy Rate

The energy cost and the energy savings items on the ENERGY STATUS screen will use this value for their calculations. It is intended to be a monetary value representing the user's power cost per kilowatt hour.

Reset Averaging

When this setpoint is selected and the SET button is pressed, the items on the ENERGY STATUS screen will be reset, and the date the reset occurred will be displayed in this setpoint. This selects the beginning of the time period over which the ENERGY STATUS information will be calculated. Note that the "Lifetime Energy Savings" item will not be reset.

Service Menu

For use by Ingersoll Rand personnel only.

Options

Figure 7: Options Screen

-OPTIONS-		
100 PSI	REMOTE START/STOP ON	
READY TO START	REMOTE START/STOP ON	
STATUS	MAIN MENU	SELECT

Options are turned on or off and their associated values are set using the OPTION screen shown here.

Some options are purchased, require additional compressor hardware and shall first be enabled by service personnel. The name and value of each of the following options can be seen by moving the list up and down using the arrow buttons.

An option item's value can be changed the same way that OPERATOR SETPOINTS values are changed.

Table 5: Option Item Values

OPTIONS Items	SELECTION	MIN.	MAX.	Step	Unit	Installed Option Required
Remote Pressure Sensor	ON/OFF					No
Sequencer	ON/OFF					No
Remote Start/Stop	ON/OFF					No
Power Out Restart	ON/OFF					Yes
Power Out Restart Time		10	600	1	SEC	Yes
Scheduled Start Day		day	day	1	day	Yes
Scheduled Start		00:00	23:59	1	time	Yes
Scheduled Stop Day		day	day	1	day	Yes
Scheduled Stop		00:00	23:59	1	time	Yes
Modbus Protocol	ON/OFF/ICU					No
Modbus Address		1	247	1		No

Remote Pressure Sensor

If this setting is set to ON, the compressor will use a remote mounted pressure sensor for controlling system pressure by comparing it to the Target Pressure setting and the Auto Stop Pressure setting. The pressure measured by this sensor is shown in the CURRENT STATUS display as the Remote Pressure reading. The local sensor at the package discharge is still used for Immediate Stop, for certain Trip conditions and for display on the left side of the screen.

Sequencer

If this setting is set to ON, the compressor will be able to start and stop by commands from a host device. When the controller receives a load command from the host device, the compressor will start. When the controller receives an unload command, the compressor will respond as though executing an immediate stop.

Remote Start/Stop

If this setting is set to ON, the compressor can be started and stopped from a remote device.

Power Out Restart

If this setting is set to ON, the compressor will automatically restart when power is returned to the compressor if it was operating when power was removed.

Power Out Restart Time

If the power out restart setting is set to ON, this is the number of seconds from the time power is restored until the compressor starts. The power out restart horn will sound during this time.

Scheduled Start Day

This option is the selection for the day that a scheduled start will take place. The selections are Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Daily (Su - Sa), Weekdays (M - F), or Weekends. This option setpoint will work with the scheduled start setpoint.

Scheduled Start

This option will cause the compressor to start on the scheduled start day at the time stored in this setpoint. To disable this option, set the value of scheduled start equal to the value of scheduled stop.

Scheduled Stop Day

This option is the selection for the day that a scheduled stop will take place. The selections are Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Daily (Su - Sa), Weekdays (M - F), or Weekends. This option setpoint will work with the scheduled stop setpoint.

Scheduled Stop

This option will cause the compressor to stop on the scheduled stop day at the time stored in this setpoint. To disable this option, set the value of scheduled stop equal to the value of scheduled start.

■ Sensor Calibration

Figure 8: Sensor Calibration Screen

-SENSOR CALIBRATION-		
100 PSI	SENSOR 4APT CALIBRATE	
READY TO START	SENSOR 3APT CALIBRATE	
STATUS	MAIN MENU	SELECT

Pressure sensor calibration is done through the SENSOR CALIBRATION screen. Sensor calibration can only take place when the compressor is stopped. Calibration needs to be done only after a sensor has been replaced or the controller has been replaced.

Each of the sensors listed below can be chosen by using the up and down arrow buttons to highlight it on the screen.

SENSOR CALIBRATION Items

- Sensor 1VAPT (Inlet Vacuum)
- Sensor 4APT (Package Discharge)
- Sensor 3APT (Wet Side Sump)
- Sensor 5CPT (Coolant Filter In)
- Sensor 6CPT (Coolant Filter Out)
- Sensor 2APT (Interstage) (On 2 stage compressors only)
- Sensor 7APT (Aftercooler-dryer compressors only)

Select the highlighted sensor by pressing the SELECT button. Press the CALIBRATE button to start the automatic calibration procedure, or press the CANCEL button to not calibrate it and return to the sensor list.

The calibration screen can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

■ Trip history

Trip History displays each of the Trip messages for the last 15 trips experienced by the compressor. It also gives access to displaying the compressor operating conditions that existed at the time of each trip. The first one shown, "Trip History 1", is the most recent Trip to occur. Note that multiple, consecutive EMERGENCY STOP trips are not recorded as separate trips. Only the first one will be shown.

Figure 9: Trip History Screen

100 PSI		-TRIP HISTORY-	
READY TO START		TRIP HISTORY 1 BLOWER MOTOR OVERLOAD	
		TRIP HISTORY 2 HIGH AIREND DISCH TEMP	
STATUS	MAIN MENU	SELECT	

Each of the last 15 trip messages can be seen by moving the Trip History list up and down using the arrow buttons. Pressing the SELECT button when one of the trips is highlighted will display the list of compressor values that existed at the time that particular trip occurred.

The name and value of each of the items can be seen by moving the list up and down using the arrow buttons. Pressing the TRIP HIST. button will return the display to the TRIP HISTORY screen.

Trip histories can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

■ Clock functions

Figure 10: Clock Functions Screen

100 PSI		-CLOCK FUNCTIONS-	
READY TO START		Time 01:15	
		Date Jan 01, 00	
STATUS	MAIN MENU	SELECT	

The date and time for the real time clock is set through the CLOCK FUNCTIONS screen. Use the up and down arrows to highlight either TIME or DATE. Select the highlighted setting by pressing SELECT.

If TIME is selected, first the hours will be highlighted. Adjust the hours (00-23 hour clock) by using the up and down arrows. Once the correct time is in the display, press SET to highlight the minutes. Adjust the minutes (00-59) and then press SET to complete setting the time.

If DATE is selected, first the month will be highlighted. Adjust the month by using the up and down arrows and then press SET to highlight the date. Once the correct date is displayed, press SET to highlight the year. Once the correct year is displayed, press SET to complete setting the date.

■ Energy status messages

Figure 11: Energy Status Message Screen

100 PSI		-ENERGY STATUS-	
READY TO START		AVERAGE PACKAGE kW HRS	
		AVERAGE % CAPACITY-	
		-AVERAGE CAPACITY	
STATUS	MAIN MENU	SELECT	

The Energy Status display can be selected by pressing the ENERGY STATUS button. The following items and their present values will be displayed on the right side of the screen by pressing the up and down arrows.

AVERAGE PACKAGE kW HOURS - This displays the average package kW per hour for the time period that was started by selecting the reset averaging setpoint. This value includes the blower power usage.

AVERAGE % CAPACITY - Displays the compressor's average percent capacity for the time period that was started by selecting the reset averaging setpoint. The value is determined by taking the average package kW per hour, removing the blower power usage and then dividing that number by the motor kW per hour for that size of compressor at 100% capacity.

AVERAGE CAPACITY - Displays the compressor's average capacity in cfm or m³ for the time period that was started by selecting the reset averaging setpoint.

ENERGY COST - Displays the energy cost of the compressor for the time period that was started by selecting the reset averaging setpoint. This is calculated by multiplying the kW hours of the motor and the blower by the energy rate.

ENERGY SAVINGS - Displays the energy savings of the compressor for the time period that was started by selecting the reset averaging setpoint as compared to a conventional compressor. This value is determined by calculating how much a conventional compressor motor would cost to operate at the same average capacity and then subtracting the motor energy cost of the VSD compressor from it. It is assumed that the blower cost is the same in both packages.

LIFETIME ENERGY SAVINGS - Displays the lifetime energy savings of the compressor at the existing energy rate and at the average percent capacity as compared to a conventional compressor.

■ Warnings

When a WARNING occurs, a large question mark will flash on the display screen.

If multiple WARNINGS exist, the small up/down arrows will appear in the upper right corner of the display screen. The multiple WARNINGS can be seen by pressing the up and down arrow buttons. Pressing the STATUS button will display the CURRENT STATUS screen with the WARNING button indicating that a WARNING still exists.

A WARNING will not cause the compressor to shut down. The compressor will continue to run in its normal operation and the WARNING will remain displayed until reset.

A Warning needs to be reset by the operator by pressing the RESET button twice.

The possible Warning messages are as follows:

HIGH AIREND DISCHARGE TEMP - This will occur if the Airend Discharge exceeds 105° C (221° F) and is not adjustable.

CHANGE COOLANT FILTER - This warning will occur if the high side pressure is 1.4 bar (20 psig) greater than the low side pressure.

CHANGE INLET FILTER - This will occur if the Inlet Vacuum is greater than 0.05 bar (0.7 psig).

CHANGE SEPR ELEMENT - This will occur if the pressure differential across the separator is 1.0 bar (12 psig).

SENSOR FAILURE - This will occur if a sensor is recognized as missing or broken.

HIGH DISCHARGE PRESS - Will occur if the compressor is under the control of an external device, such as an ISC, and the discharge pressure is greater than the immediate stop pressure.

AUXILIARY WARNING 1 or 2 - Will occur if the auxiliary warning input closes.

REMOTE PRESSURE SENSOR FAILURE (option) - This will occur if the remote pressure sensor fails. If this happens, the controller will start using the package discharge pressure sensor to measure system pressure.

CONDENSATE DRAIN ERROR - For compressors fitted with the no loss drain trap, this message occurs if the condensate drain error contacts close while the compressor is running.

HIGH VSD AMBIENT TEMPERATURE - This warning will occur if the VSD ambient temperature gets within 5% of the shutdown value.

HIGH SUMP PRESSURE - Occurs if the compressor is running, the compressor is warm, the package discharge pressure is at least 4.5 bar (65 psi), and the sump pressure is more than 1 bar (15 psi) above the target pressure. The occurrence of this warning will cause the controller to evaluate the need to lower the compressor's speed.

■ Service warnings

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

This will be set prior to the compressor being shipped from the factory. When a service warning occurs, contact your local **Ingersoll Rand** service provider.

■ Initial check trips:

The following trips will only occur when the compressor is not running. These trips are related to high temperature, power loss, and sensor calibration. They will have the same display mode as other trips.

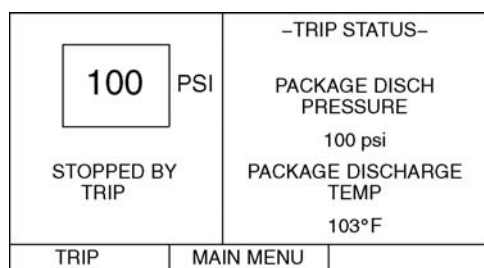
HIGH AIREND DISCH TEMP- Will occur if the airend discharge temperature is greater than 95% of 109° C (228° F).

CHECK SETPOINTS - Will occur if the controller has determined that some of the data stored in memory contains unacceptable values.

INVALID CALIBRATION - Will occur if the sensor zero value is -10% to +1% of its scale. See Sensor Calibration.

■ Trips

Figure 12: Trip Screen



When a trip occurs, a large exclamation mark in a triangle will flash on the display screen. The display message will indicate what caused the trip.

The compressor will stop and cannot be re-started again until the trip condition no longer exists and the trip message reset.

Pressing the STATUS button will display the STATUS screen. The presence of the TRIP button indicates that a trip condition still exists. Trip Status is the list of compressor operating conditions that existed at the time of the trip.

The name and value of each of the items listed can be seen by moving the list up and down using the arrow buttons. Pressing the TRIP button will return the display to the trip screen and the RESET button.

The trip needs to be reset by the operator by pressing the RESET button twice. Any exceptions to this are explained in the trip descriptions.

The possible trip messages are as follows;

EMERGENCY STOP- This will occur if the emergency stop button is engaged. The button shall be disengaged before the trip can be cleared.

BLOWER FAULT- This will occur if a blower fault is sensed.

HIGH AIREND DISCH TEMP- This will occur if the airend discharge temperature is greater than 109° C (228° F).

REMOTE START FAILURE- This will occur if the remote start button is pressed after the compressor is running or if the remote start button remains closed.

REMOTE STOP FAILURE- This will occur if the remote stop button remains open and either start button is pressed.

SENSOR FAILURE - This will occur if a sensor is recognized as missing or broken.

VSD FAULT - The VSD fault is read from the drive. The controller will read the status menu of the variable speed drive. If a fault condition is returned in the status information, the controller will issue a VSD FAULT trip and display the number of the fault condition.

STOP FAILURE - This will occur if the compressor should be stopped but the motor is still running above minimum speed 4 seconds after the stop signal is given.

HIGH START PRESSURE - If the sump pressure is above 6.9 bar (100 psi) when the compressor starts, the controller will open the blowdown valve during the first few seconds of starting (3 to 7 seconds). If the sump pressure does not fall to 6.9 bar (100 psi) during that time period, this shutdown will occur.

CHECK MOTOR ROTATION - This will occur if the controller reads a negative speed from the VSD when starting.

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

VSD INITIALIZATION FAULT - Will occur if the controller is unable to establish communications with the VSD after a power up.

LOW SUMP PRESSURE - Will occur if the compressor is operating at or above the minimum speed and the sump pressure drops below 1 bar (15 psi) for 15 seconds.

REPLACE COOLANT FILTER - This will occur if the coolant filter is blocked and requires changing.

INCORRECT VSD TYPE - Will occur at power up if the VSD type does not match the size of the compressor.

CHECK INCOMING POWER - This will occur if the compressor should be running and the AC input voltage, as read from the VSD, falls below 100 VAC. There is a delay of 2 seconds on this trip in case the power quickly returns. Phase monitor can also cause this trip.

HIGH INTERSTAGE PRESSURE - If the interstage pressure is over 7 bar (100 psi) while the compressor is running and the compressor is a two stage compressor.

HIGH COOLANT FILTER PRESSURE DROP - Occurs if the compressor has been running for at least 7 seconds, the compressor is warm, already has a change coolant filter warning, the motor is running, and the coolant filter pressure drop is greater than 2.5 bar (35 psi).

HIGH INLET VACUUM - Occurs if the compressor is running loaded, the motor is running, and the inlet vacuum is greater than 0.1 bar (1.8 psi) (vacuum).

HIGH SUMP PRESSURE - Occurs if the compressor is running, the compressor is warm, and any one of the three following conditions exist.

1. The sump pressure is above the maximum offline pressure by 25 psi.
2. The separator pressure drop is measured to be more than 25 psi and the package discharge pressure is at least 65 psi.
3. The sump pressure is above 170 psi.

OPERATING INSTRUCTIONS FOR FIXED SPEED (FS)

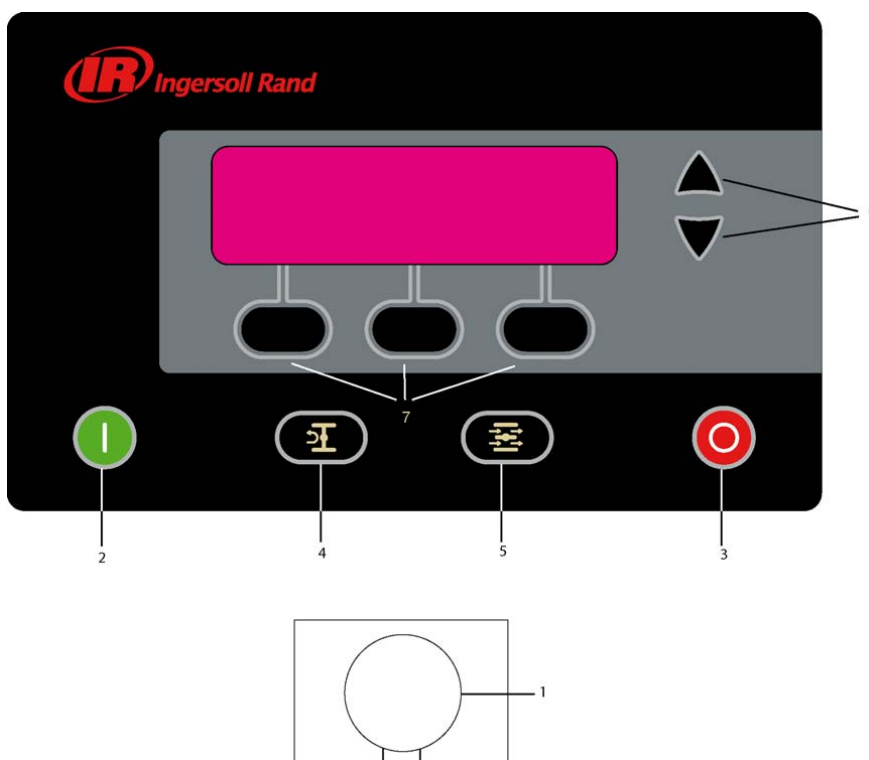


Figure 13: Controller Interface

■ SG Controller Controls (Fixed Speed)

1. EMERGENCY STOP

Pressing this switch stops the compressor immediately. The compressor can not be restarted until the switch is manually reset. Turn the switch knob clockwise to reset.

The controller display will illuminate, indicating that the line and control voltages are available.

2. START

Pressing this button will start the compressor if the display shows READY TO START. The compressor will start and load if there is sufficient demand for air.

3. STOP

Pressing this button will activate the unloaded stop sequence. If the compressor is running loaded, it will unload and continue to run unloaded for an adjustable 10 to 30 seconds and then stop. If the compressor is running unloaded, it will stop immediately.

4. UNLOAD

Pressing this button will cause the compressor to unload and remain unloaded. The display will indicate that the compressor is RUNNING UNLOADED and MODE:UNLOAD.

5. LOAD

Pressing this button will cause the compressor to load if the compressor is running and if the DISCHARGE PRESSURE is less than the ONLINE PRESSURE. This also returns the compressor to the operating mode that is specified by the MODE OF OPERATION set point.

The other five buttons provide access to various operator-selectable functions and compressor operating conditions. The purpose of each of these buttons is defined by the display screen and the particular function being performed at that time.

6. ARROWS

These up and down buttons have multiple functions relating to the right half of the display screen. When lists are presented, the buttons are used to move up or down through the items on the list. The small arrow(s) displayed in the

upper right hand corner of the display screen indicate when you can move up (designated by arrow head pointing up) and/or down (designated by arrow head pointing down) through the list.

When the value of a specific compressor operating parameter is highlighted on the display screen for the purpose of changing that value, the buttons are used to change the value itself.

7. DISPLAY BUTTONS

The functions of the three buttons below the display screen change and are defined by the words immediately above them in the bottom line of the screen. Each function, such as MAIN MENU, STATUS, etc., is described in appropriate sections in this manual.

■ Display screen

Figure 14: Display Screen

7.5 barg		-CURRENT STATUS- PACKAGE DISCHARGE TEMP 39°C AIREND DISCHARGE TEMP 89°C	
RUNNING LOADED MODE: MOD/ACS		MAIN MENU	

The display screen is divided into three functional areas, as seen in the typical CURRENT STATUS screen shown here.

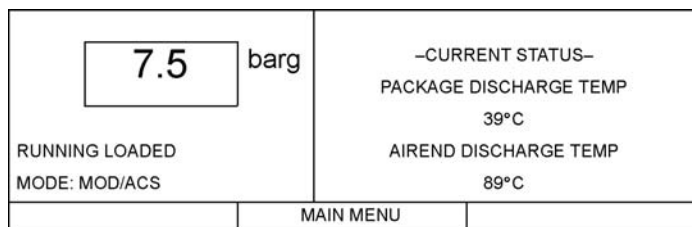
The left side continuously shows the package discharge pressure in large numbers showing the running condition of the compressor and the line below that showing the present mode of operation.

The right side shows various items or lists such as the compressor's CURRENT STATUS readings, the MAIN MENU, the OPERATOR SETPOINTS list, etc. Any of the lists can be moved up or down by pressing the arrow buttons to the right of the screen. The small arrow(s) displayed in the upper right corner of the screen indicate when you can move up and/or down through a list. The arrow buttons are also used to change an individual item's value. At certain times, items and/or their values are "highlighted". This means that they are displayed as light characters on a dark background.

The bottom of the screen is divided into thirds with the words in each small box showing the function of the button directly beneath it. The words will change in these boxes depending on what actions are permitted at any particular time. The action resulting from pressing each of these buttons is indicated in the Operator Panel Flow Diagram later in this section. This can be used as a quick reference of how to step the controller screen through any desired function.

■ Current status

Figure 15: Current Status Screen



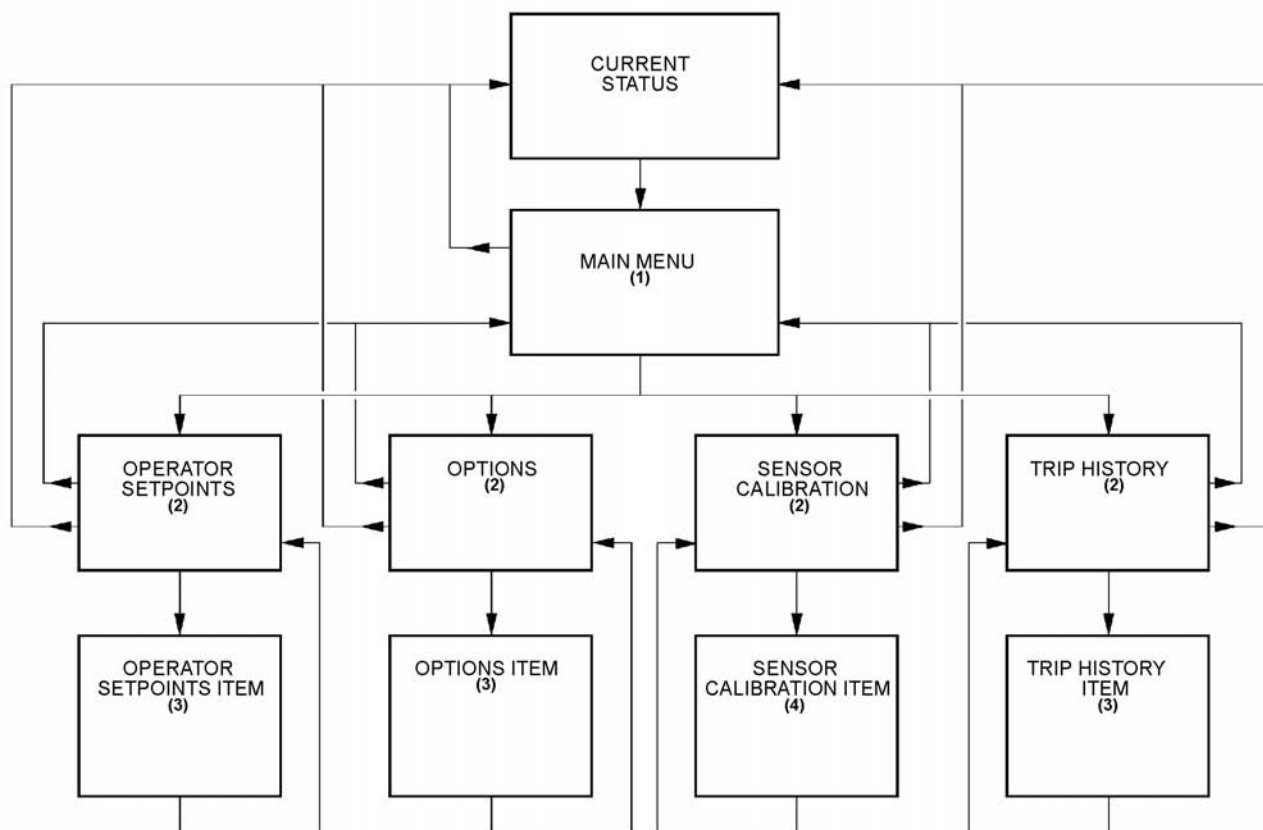
The CURRENT STATUS screen is considered to be the “normal” display that the controller shows.

The following items and their present values can be displayed on the right side of the screen by pressing the up and down arrow buttons.

CURRENT STATUS ITEMS

- Package Discharge Temperature
- Airend Discharge Temperature
- Injected Temperature
- Sump Pressure
- Separator Pressure Drop
- Coolant Filter
- Coolant Filter IN PR
- Coolant Filter OUT PR
- Inlet Vacuum
- Inlet Filter
- Total Hours
- Loaded Hours
- Software Title and Version

Figure 16: Operator Panel Flow Diagram



The controller automatically returns the display to this CURRENT STATUS screen from other screens if no buttons are pressed within 30 seconds.

The MAIN MENU screen can be accessed from the CURRENT STATUS screen by pressing the MAIN MENU button, identified by the words “MAIN MENU” in the bottom line of the screen directly above the centre button.

NOTICE

Use the UP and DOWN arrows to move between selections. Items will be highlighted in inverse display mode.

(1) Selecting the highlighted item will display the corresponding menu.

(2) Selecting the highlighted item will place the value in edit mode. This is indicated by only the value being displayed in inverse display mode.

(3) The UP and DOWN arrows will alter the value.

Depressing “Cancel” will exit the edit mode and leave the value unchanged.

Depressing “Set” will save the new value and flash the value to indicate acceptance.

(4) Depressing “Cancel” will exit the calibration mode.

Depressing “Calibrate” will calibrate the selected sensor.

Ensure that the compressor is stopped and fully depressurised first.

(5) Use the UP and DOWN arrows to scroll through the list of status items.

■ Main menu

Figure 17: Main Menu Screen

7.5 barg READY TO START		–MAIN MENU– OPERATOR SETPOINTS OPTIONS SENSOR CALIBRATION TRIP HISTORY	
STATUS		SELECT	

The MAIN MENU screen is the point from which various operator functions can be accessed. Refer to the Operator Panel Flow Diagram.

Each of the functions can be chosen by using the up and down arrows to highlight it on the screen.

The controller will go to the highlighted function if the SELECT button is pressed or will return to the CURRENT STATUS screen if the STATUS button is pressed.

■ Operator setpoints

Figure 18: Operator Setpoints Screen

7.5 barg READY TO START		–OPERATOR SETPOINTS– OFFLINE PRESSURE 7,6 barg ONLINE PRESSURE 6,9 barg	
STATUS		SELECT	

Setpoints are user-adjustable variables in the controller logic that can be set using the OPERATOR SETPOINTS screen.

The name and value of each of the setpoints listed below can be seen on the screen by moving the list up and down using the arrow buttons.

Table 6: Operator Setpoints Settings

OPERATOR SETPOINTS	RANGE	STEP	UNIT
Offline Pressure	75 to RATED +10	1	PSIG
Online Pressure	65 to OFFLINE – 10	1	PSIG
Mode of Operation	MOD/ACS, ON/OFF LINE, MODULATION ONLY		
Condensate Release	2 to 20	1	SEC
Condensate Inverter	90 to 270	1	SEC
Stop Delay Time	10 to 30	1	SEC
Star-Delta Time*	5 to 30	1	SEC
(Screen) Contrast	0 to 10	1	–

*Does not apply to automatic across the line starters.

Setpoints associated with options are described in the OPTIONS sections.

A setpoint's value can be changed by first highlighting the item and its value and pressing the SELECT button to highlight just the value. When the value line is highlighted by itself, the value can be adjusted using the up and down arrow buttons. The CANCEL and SET buttons appear at this time. Press the SET button to enter the new value or press the CANCEL button to return the value of the setpoint prior to using the arrows. The displayed value will flash twice to indicate that it has been entered into the setpoint and the pair of setpoint item and value display lines will again be highlighted together.

Operator set points can be exited by pressing the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

■ Options

Figure 19: Options Screen

7.5 barg READY TO START		–OPTIONS– AUTO RESTART OFF AUTO RESTART TIME 10 MINUTES	
STATUS		SELECT	

Options are turned on or off and their associated values are set using the OPTION screen.

Some options require additional compressor hardware and the correct "Option Module" to plug into the controller. Descriptions of the options operations can be found later in this section. The name and value of each of the following options can be seen by moving the list up and down using the arrow buttons.

Table 7: Options Settings

OPTIONS Items	RANGE	STEP	UNIT
Power Out Restart	ON/OFF	–	–
Power Out Restart Time	10 to 600	1	SEC
Low Ambient	ON/OFF	–	–

An Option item's value can be changed the same way that OPERATOR SETPOINTS values are changed.

OPTIONAL FEATURES

Modulation hardware extends the control types to modulation (capacity control) and Automatic Control System when the compressor switches between "On-Off line" and modulation as demand varies.

Safety of the operation is provided for as the compressor will shut down if excessive temperatures, electrical overload conditions, or system over pressure should occur.

LOW AMBIENT OPTION (STANDARD & ENHANCED COMPRESSORS)

When the low ambient option is installed and selected and the A/E Discharge temperature is measured to be at or below 2°C (35°F), the compressor will be started when commanded but will not load until the air end discharge temperature is above 2°C (35°F). After the conditions are met the controller will adjust the fan speed to maintain proper operating temperatures. When the low ambient option is not installed, the compressor will not start if the A/E discharge temperature is below 2°C (35°F).

NOTICE

If PORO or Scheduled Start/Stop are installed, additional hardware is required to provide an audible warning of pending re-start. Contact Ingersoll Rand for details.

POWER OUT RESTART OPTION (PORO) (Dependent on installed operations and/or installed controls)

For PORO to execute, the PORO option shall be installed and the PORO set point shall be set to ON. If power is lost to the compressor while the compressor is running or is stopped in auto start/stop, the controller will store the current opening conditions in memory.

When power is restored, the controller will energize the horn and start a countdown on the display. The red LED will flash indicating a warning condition and the horn will blow for the number of seconds set in the PORO time set point. At the end of the countdown, the horn will stop blowing and the compressor will start.

The PORO countdown may be stopped at any time by pressing the Stop / Reset button on the user interface. Pressing any button will cause the horn to stop blowing and the countdown to stop. The control will power up normally in a ready to start mode.

■ Sensor Calibration

Figure 20: Sensor Calibration Screen

7.5 barg READY TO START		–SENSOR CALIBRATION– SENSOR 1AVPT CALIBRATE SENSOR 3APT CALIBRATE
STATUS	MAIN MENU	SELECT

Pressure sensor calibration is done through the SENSOR CALIBRATION screen. Sensor calibration can only take place when the compressor is stopped. Calibration needs to be done only after a sensor has been replaced or the controller has been replaced.

Each of the sensors listed below can be chosen by using the up and down arrow buttons to highlight it on the screen.

SENSOR CALIBRATION Items

- Sensor 1AVPT
- Sensor 3APT
- Sensor 4APT
- Sensor 5CPT
- Sensor 6CPT

Select the highlighted sensor by pressing the SELECT button. Press the CALIBRATE button to start the automatic calibration procedure, or press the CANCEL button to not calibrate it and return to the sensor list.

The calibration screen can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

■ Scheduled Start / Stop

(Dependent on installed options and/or installed controls)

The scheduled start / stop option enables starting and stopping the compressor at specified times. This mode of operation can be turned on and off by selecting the desired mode in the scheduled start stop on / off set point.

When enabled, the horn will blow for 10 seconds to warn anyone in the surrounding area that the compressor is about to start. The display screen will display the warning message "Scheduled Start in X seconds", where "X" is a countdown from 10 to 0 seconds. After 10 seconds, the compressor will automatically start as long as the compressor is not in a fault condition or manually stopped by pressing the stop / reset button.

When a scheduled stop occurs, the compressor can be manually re-started by pressing the control panel start button or closing the remote start signal.

■ Trip history

Figure 21: Trip History Screen

7.5 barg READY TO START		– TRIP HISTORY – TRIP HISTORY 1 MAIN MOTOR OVERLOAD TRIP HISTORY 2 HIGH AIREND DISCH TEMP
STATUS	MAIN MENU	SELECT

Trip History displays each of the Trip messages for the last 15 Trips experienced by the compressor. It also gives access to displaying the compressor operating conditions that existed at the time of each Trip. The first one shown, "Trip History 1", was the most recent Trip to occur. Note that multiple, consecutive EMERGENCY STOP Trips are not recorded as separate Trips, only the first one will be shown.

Each of the last 15 Trip messages can be seen by moving the Trip History list up and down using the arrow buttons. Pressing the SELECT button when one of the Trips is highlighted will display the list of compressor values that existed at the time that particular Trip occurred.

Figure 22: Trip History Screen Detail

7.5 barg READY TO START		– TRIP HISTORY 1 – PACKAGE DISCH PRESSURE 14,2 barg PACKAGE DISCHARGE TEMP 54°C
STATUS	MAIN MENU	TRIP HIST.

The name and value of each of the items listed below can be seen by moving the list up and down using the arrow buttons. Pressing the TRIP HIST. button will return the display to the TRIP HISTORY screen.

TRIP HISTORY ITEMS

- Package Discharge Pressure
- Coolant Filter
- Package Discharge Temperature
- Inlet Vacuum
- Airend Discharge Temperature
- Inlet Filter
- Injected Temperature
- Total Hours
- Sump Pressure
- Loaded Hours
- Separator Press. Drop
- % Load Modulation

Trip histories can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

When a Warning occurs, the word WARNING will flash on the display screen and appear in large letters as shown. The display message will indicate what caused the warning.

Figure 23: Warning Screen

7.5 barg RUNNING UNLOADED MODE: MOD/ACS		WARNING CHANGE INLET FILTER PRESS RESET TWICE
STATUS	MAIN MENU	RESET

If multiple Warnings exist, the small up/down arrows will appear in the upper right corner of the display screen. The multiple Warnings can be seen by pressing the up and down arrow buttons. Pressing the STATUS button will display the CURRENT STATUS screen with the WARNING button indicating that a Warning still exists.

Figure 24: Status Screen with Warning

7.5 barg RUNNING UNLOADED MODE: MOD/ACS		–CURRENT STATUS– PACKAGE DISCHARGE TEMP 39,4°C AIREND DISCHARGE TEMP 89,4°C
WARNING	MAIN MENU	

Pressing the WARNING button will return the display to the WARNING screen and the RESET button.

A Warning needs to be reset by the operator by pressing the RESET button twice.

The possible Warning messages are as follows;

AIREND DISCHARGE TEMP – This will occur if the Airend Discharge (2ATT) exceeds 97% of the alarm limit, 228°F (109°C) and is not adjustable.

CHANGE COOLANT FILTER – This warning will occur if the high side pressure is 20 psig (1,4 bar) greater than the low side pressure of 1 DPS and the Injected Coolant temperature (2CTT) is greater than 120°F (49°C).

CHANGE INLET FILTER – This will occur if the Inlet Vacuum (1AVPT) is greater than 0,7 psig (0,05 bar) and the compressor is fully loaded (inlet valve is completely open).

CHANGE SEPR ELEMENT – This warning will occur if the pressure on the Separator (3APT) is 15 psig (1,0 bar) greater than the pressure at the Package Discharge (4APT) and the compressor is fully loaded.

HIGH DISCHARGE PRESS – This can occur if the compressor's loading function is being controlled by a host device such as a sequencer or an ISC. This warning will occur when the package discharge pressure is above the maximum offline pressure (rated pressure plus 3 psig (0,2 bar)) for more than 3 seconds. This warning will cause the compressor to unload. The host device will not be able to load the compressor until the package discharge pressure falls to the rated pressure of the compressor.

SENSOR FAILURE 4ATT – This will occur if the Package Discharge Temperature Sensor (4ATT) is missing or broken.

TRIPS

When an Trip occurs, the word TRIP will flash on the display screen and appear in large letters as shown. The display message will indicate what caused the Trip.

Figure 25: Trip Screen

7.5 barg		TRIP HIGH AIREND DSCH TEMP 109,4°C PRESS RESET TWICE	
STOPPED BY TRIP MODE: MOD/ACS			
STATUS	MAIN MENU	RESET	

Pressing the STATUS button will display the STATUS screen. The presence of the TRIP button indicates that an Trip condition still exists. Trip Status is the list of compressor operating conditions that existed at the time of the Trip.

Figure 26: Trip Screen Detail

7.5 barg		– TRIP STATUS – PACKAGE DISCH PRESSURE 7,0 barg PACKAGE DISCHARGE TEMP 39,4°C	
STOPPED BY TRIP MODE: MOD/ACS			
ALARM	MAIN MENU		

The name and value of each of the items listed can be seen by moving the list up and down using the arrow buttons. Pressing the TRIP button will return the display to the Trip screen and the RESET button.

The Trip needs to be reset by the operator by pressing the RESET button twice. Any exceptions to this are explained in the Trip descriptions.

The possible Trip messages are as follows;

CHECK MOTOR ROTATION – This will occur if the compressor is started and the compressor has incorrect rotation.

CONTROL POWER LOSS – This will occur if the controller detects a loss of the 110 VAC control power.

EMERGENCY STOP – This will occur if the Emergency Stop button is engaged. The button shall be disengaged before the trip can be cleared.

FAN MOTOR OVERLOAD – This will occur if a fan motor overload is sensed.

HIGH AIREND DISCH TEMP – This will occur if the airend discharge temperature is greater than 228°F (109°C).

HIGH SUMP PRESSURE – This will occur if the sump pressure is above offline pressure by 25 psig and sump pressure drop is more than 25 psig. Can also occur if sump pressure is above 165 psig.

LOW SUMP AIR PRESSURE – This will occur if the compressor is running fully loaded and the sump pressure drops below 20 psig (1,4 bar).

LOW UNLOAD SUMP PRESS – This will occur if the compressor is running unloaded and the sump pressure is less than 15 psig (1,0 bar) for 15 seconds.

MAIN MOTOR OVERLOAD – This will occur if a drive motor overload is sensed.

MEMORY FAULT – This will occur if the controller has determined some of the data stored in memory contains unacceptable values. When this occurs, the sensors should be calibrated and all the set points checked. It is normal for this trip to occur after changing controller software.

REMOTE START FAILURE – This will occur if the Remote Start button is pressed after the compressor is running or if the Remote Start button remains closed.

REMOTE STOP FAILURE – This will occur if the Remote Stop button remains open and either Start button is pressed.

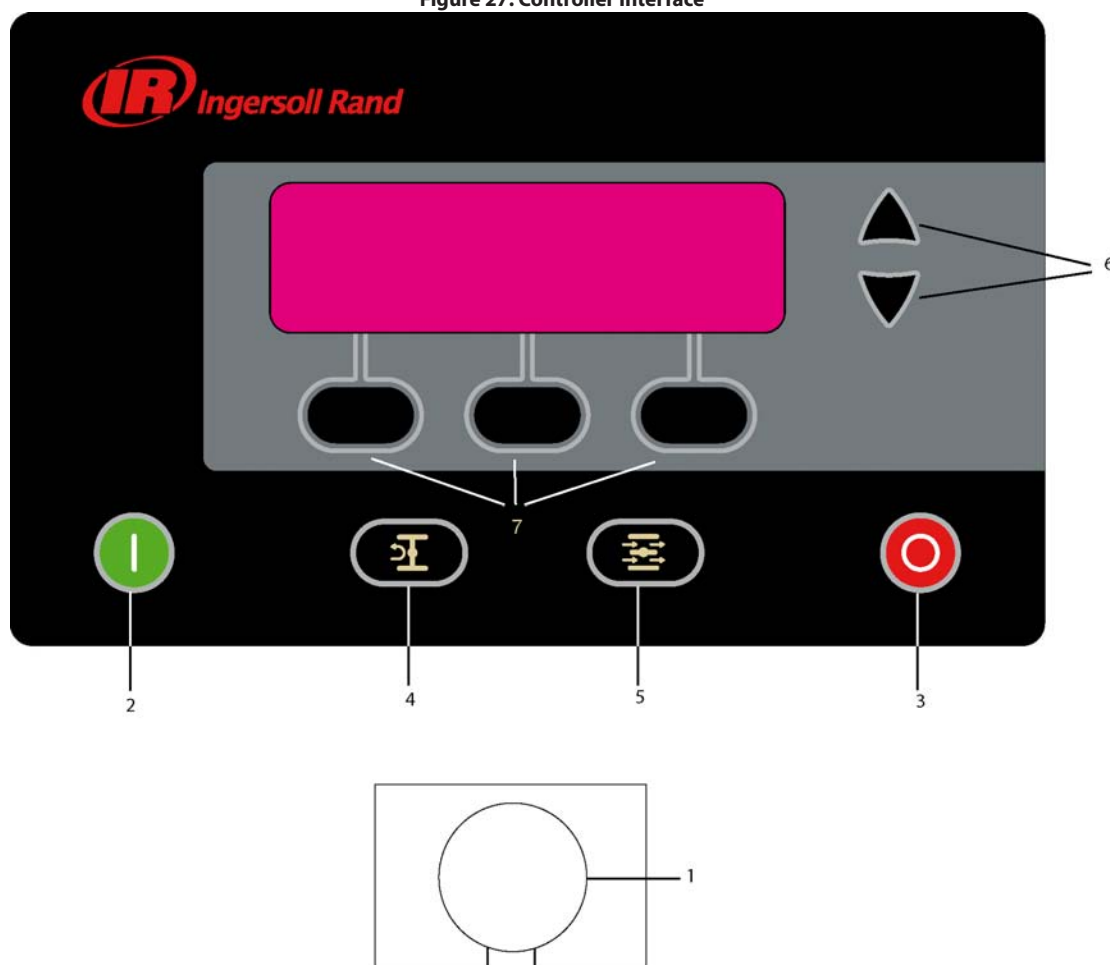
SENSOR FAILURE 1AVPT (or 3APT, 4APT, 2CPT, 5CPT, 6CPT 2ATT) – This will occur if a sensor is recognised as missing or broken. This does not apply to sensor 4ATT.

HIGH INLET VACUUM – This will occur if inlet vacuum is greater than 1.8 psig for compressors with high dust factor, the threshold is 1.8 psig.

■ Prior to starting

1. Check the coolant level in the sight tube/glass. Add coolant if necessary.
2. Ensure that the discharge air isolation valve is open.
3. Switch on the main electrical isolation switch. The power on indicator will illuminate, indicating that the line and control voltages are available.

Figure 27: Controller Interface



■ Starting the compressor

Upon power up, the controller will carry out a series of checks, and the message CHECKING MACHINE will show on the display. If all the check parameters are satisfactory, the display will then show READY TO START.

Depress the start button (2) on the controller compressor. The compressor will start and automatically load.

■ Stopping the compressor

Depress the STOP button (3) which will automatically unload the compressor for 10 seconds before stopping.

Switch off the main electrical isolation switch.

■ Stopping the compressor in an emergency

If the compressor has to be stopped in an emergency DEPRESS THE EMERGENCY STOP BUTTON (1).

This will over-ride the normal unload/stop button and will immediately stop the compressor without the 10 second delay.

■ Re-starting after an emergency

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

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

Refer to the PRIOR TO STARTING and STARTING THE MACHINE instructions earlier in this section before re-starting the compressor.

OPERATING INSTRUCTIONS (XE SERIES CONTROLLER)

■ User Interface

The standard user interface configuration of the controller consists of the membrane and the LCD display. The membrane consists of five command keys (START, STOP, LOAD, UNLOAD, and RESET), four navigation keys (UP, RIGHT, LEFT and DOWN), and an Edit mode selection key (ENTER). These keys, the color graphics display and the LED icons make up the user interface to the compressor.

Figure 28: Controller Interface



■ LED status icons

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

Table 8: LED Status Icons

Icon	Name	Function
	OK	Illuminates when no Warnings or Trips are sensed. Can be in a Ready or Not Ready state.
	Alert	Illuminates when an Warning (flashes) or Trip (constant on) is sensed. Can be in a Ready (Warning) or Not Ready (Trip) state.
	Auto	Illuminates when the compressor stops in auto restart.

■ Command keys

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

Table 9: Command Keys

Icon	Name	Function
	---	None
	Load	Puts the compressor into the selected mode of operation. Unit will load if the pressure conditions are right.
	Unload	Puts the compressor into an unloaded state. Unit will run unloaded.

Icon	Name	Function
	Reset	Clears Warnings and Trips once the condition is corrected.
	Start	Starts the compressor.
	Stop	Stops the compressor. This button should be pressed instead of the E-Stop for normal stopping operation.
	Enter	Toggles the display between the Navigation mode and the Edit mode.

NOTICE

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

■ Navigation keys

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

Figure 29: Navigation Keys



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

■ Display layout

Figure 30: Display Layout

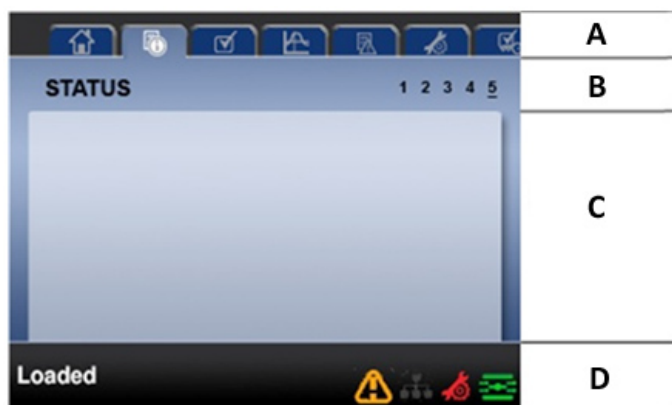


Table 10: Display Layout

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 11: Folder Bar Icons

Folder Name	Icon	Description
Home		System performance and status main information. The first page of this folder is the default page when the controller first powers up.
Operator Settings		System options and configuration settings.
Events		System events log.
Trip History		Details on the most recent trips.
Graphing		On-board graphing of system data. (Optional for some controllers)
Maintenance		Status and notification setup for compressor maintenance items.
General Settings		General settings such as Language, Time, and Units of Measure.
Integral Sequencing		Inter Module communication status and configuration.
Status		Measurements or status from/of all analog and digital I/O.
Factory Settings		Compressor tuning parameters. Also displays hardware and software versions.

■ Page navigation

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

Table 12: 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.

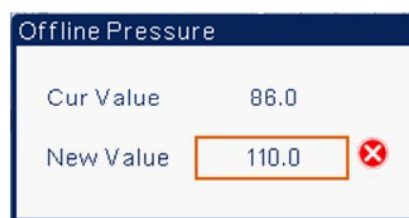
The cursor rolls over, so once the last parameter is selected, pressing the DOWN key will navigate the cursor to the folder bar. If the first parameter is selected, pressing the UP key will move the cursor to the page selection area.

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

Figure 31: Numeric Entry Window



NOTICE

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

■ Dashboard icons

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

Table 13: Dashboard Icons

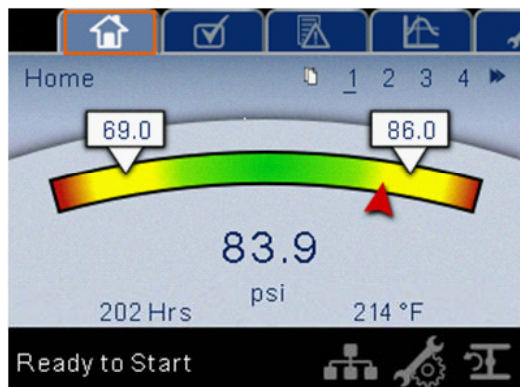
Name	Icon	Description
Network Control		Network control is enabled.
Service Required		A service reminder is nearing or has expired (i.e.: an air or oil filter needs to be changed).
Unloaded or Loaded		Compressor is in the unloaded state. Compressor is in the loaded state.

Folder Options (Fixed Speed)

Home folder

Page 1: System Overview

Figure 32: Home Folder



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

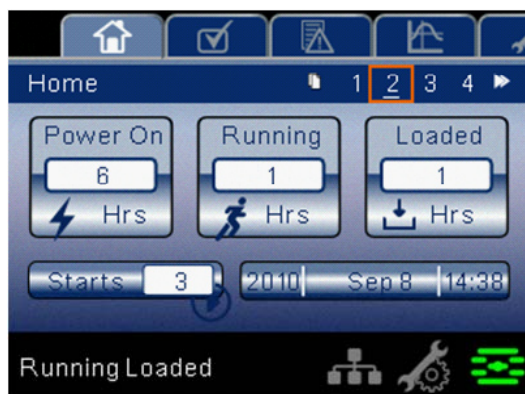
- **Online Pressure Setpoint** is indicated in the white box and by the white arrow, which is always left of center on the gauge.
- **Offline Pressure Setpoint** is indicated in the white box and by the white arrow, which is always right of center on the gauge.
- **Package Discharge Pressure** is indicated by the large numbers centered below the gauge and by the red arrow.
- **Pressure Unit of Measure** is indicated below the Package Discharge Pressure. This is selectable from the General Settings folder.
- **Airend Discharge Temperature** is indicated by the numbers in the lower left of the display.
- **Temperature Unit of Measure** is indicated to the right of the Airend Discharge Temperature. This is selectable from the General Settings folder.
- **Run Hours** indicate the number of hours the compressor has been running.

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

Figure 33: Counters



- **Hour Meters** indicate the hours that: the controller has been powered up, the compressor has been running, and the compressor has running loaded.
- **Starts** indicate the number of times a start is attempted on the compressor.
- **Date & Time** is adjustable and configurable in the General Settings folder.

Pages 3-4: Analog Inputs

Figure 34: Analog Inputs



Icon	Meaning
	Pressure
	Temperature

NOTICE

All information on these pages is read only.

The following inputs are displayed in this section:

- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- Aftercooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- Aftercooler Discharge Pressure (integrated dryer compressors only)
- Remote Pressure (optional)

Operator settings folder

Pages 1-2: Operator Settings

Figure 35: Operator Settings

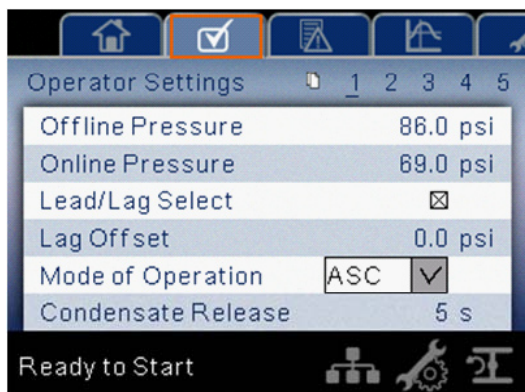


Table 14: Operator Settings

Operator Settings	Selection	Min.	Max.	Default	Step	Unit
Offline Pressure	---	75	Rated+10	Rated+10	1	psi
Online Pressure	---	65	Offline-10	Offline-10	1	psi
Lead/Lag	Lead/Lag	---	---	Lead	---	---
Lag Offset	---	0	45	0	1	psi
Mode of Operation	Mode	---	---	On/off line	---	---
Condensate Release	---	2	20	5	1	sec
Condensate Interval	---	90	270	180	1	sec
Stop Delay Time	---	10	30	10	1	sec
Star-Delta Time / Start Time	---	5	30	10	1	sec

Pages 3-5: Operator Options

Figure 36: Operator Options



Table 15: Operator Options

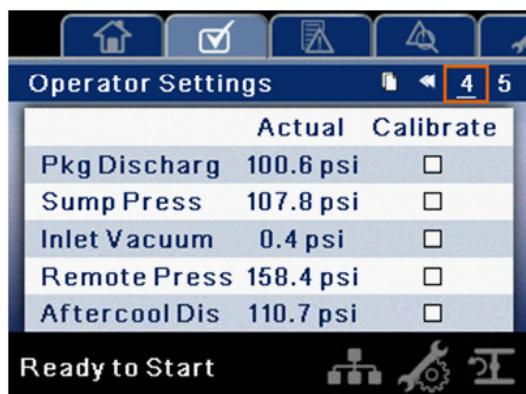
Operator Options	Selection	Min.	Max.	Def.	Step	Unit	Installed option required?
Enable Auto Restart	ON/OFF	---	---	Off	---	---	No
Auto Restart Time	---	2	60	10	1	min	No
Auto Restart Delay	---	0	60	0	1	sec	No
Comm Control	ON/OFF	---	---	Off	---	---	No
Remote Start/Stop	ON/OFF	---	---	Off	---	---	No
Power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

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

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

Pages 6-7: Sensor Calibration

Figure 37: Sensor Calibration



Sensor calibration can only take place when the compressor is stopped. There should be no pressure on a sensor when it is calibrated. Calibration only needs to take place after a sensor is replaced, the controller is replaced, or the operator suspects the sensor reading is in error. Calibrate a sensor by selecting the checkbox beside the sensor name.

Each of the sensors listed below can be calibrated:

- Inlet Vacuum (1AVPT)
- Sump Pressure (3APT)
- Package Discharge Pressure (4APT)
- Coolant Filter Inlet Pressure (5CPT)
- Coolant Filter Outlet Pressure (6CPT)
- Remote Pressure (10APT) – Only on compressors with the remote sensor option
- Interstage Pressure (2APT) – Only on 2-stage compressors
- Aftercooler Discharge Pressure (7APT) – Only on compressors with integrated dryer

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

Events folder

Pages 1-42 (max.)

Figure 38: Events Folder



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

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

The following items will generate an event:

- Power On
- Power Off
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Warning
- Trip
- Start Inhibit

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

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

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

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

Warning Events List

Change Inlet Filter

Will occur if 1AVPT is greater than 0.7 psi vacuum (or 1.3 psi vacuum if the high dust filter option is enabled) and the compressor has been loaded for at least 8 seconds. This condition must exist for 3 seconds before the warning is issued.

Change Coolant Filter

This will occur if the compressor has been running loaded for at least 8 seconds, is warmed up, and the coolant filter pressure drop (5CPT - 6CPT) is greater than 25 psi. This condition must exist for 3 seconds before the warning is issued.

Sensor Failure

This will occur whenever sensors 4ATT, 5DTT, 6DTT, and 7APT are recognized as missing or broken. The sensor failure message shall follow the following format: SENSOR FAILURE 4ATT. The 5DTT, 6DTT, and 7APT sensor failures will be shown only when the integrated dryer is installed (accessed in the factory settings menu). This condition must exist for 3 seconds before the warning is issued.

Change Separator Element

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

High Airend Discharge Temperature

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

High Sump Pressure

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

Auxiliary 1

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

Auxiliary 2

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

Service

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

Service Level 1

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

Service Level 2

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

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

Communication Failure

This will occur if the compressor is the lead compressor in integral sequencing and is unable to communicate with another compressor.

Sensor Failure 10APT – Remote Sensor

This will occur if the remote sensor option is on and the remote sensor is recognized as missing or broken. If this occurs, the compressor will automatically start using 4APT for loading and unloading the compressor. Units equipped with an integrated dryer cannot have a remote pressure sensor. This condition must exist for 3 seconds before the warning is issued.

High Discharge Pressure

Will occur if the compressor is using a remote sensor or is under the control of an external device, such as an 8XI, is loaded, and the discharge pressure (4APT) is greater than the maximum offline pressure. This condition must exist for 3 seconds before the warning is issued. If this condition occurs, the compressor will automatically unload. The compressor will be available to reload once the discharge pressure falls to the rated pressure value.

Condensate Drain Error

This will occur if the compressor is running, the package discharge pressure is over 50 psi, and the condensate drain error contact closes for at least 240 seconds. This warning will be ignored for 4.5 minutes after starting.

Freeze Warning

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

Dryer High Pressure

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

Condenser Temperature High

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

Condenser Temperature Low

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

Change HE Filter

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

Trip Events List

Low Sump Pressure

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

High Airend Discharge Temperature

This will occur if 2ATT is greater than 228 °F and the compressor is running.

Check Motor Rotation

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

Main Motor Overload

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

Fan Motor Overload

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

Remote Stop Failure

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

Remote Start Failure

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

Sensor Failure

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

Emergency Stop

This will occur when the emergency stop button is engaged.

High Sump Pressure

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

High Coolant Filter Pressure Drop

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

High Inlet Vacuum

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

Unit Too Cold To Start

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

High Interstage Pressure

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

Invalid Calibration

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

Start Inhibit List

High Airend Discharge Temperature

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

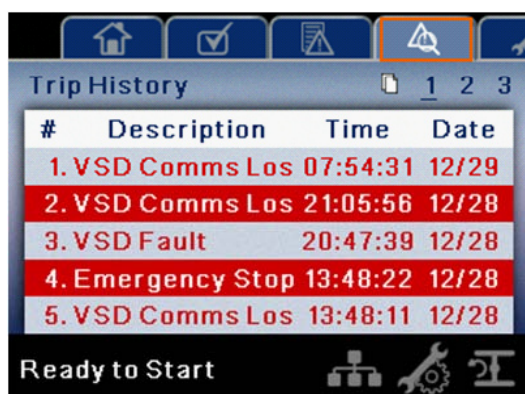
High Sump Pressure

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

■ Trip history

Pages 1-4 (max.)

Figure 39: Trip History



#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	VSD Comms Los	21:05:56	12/28
3.	VSD Fault	20:47:39	12/28
4.	Emergency Stop	13:48:22	12/28
5.	VSD Comms Los	13:48:11	12/28

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

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

The following items will generate an event.

- Power On
- Power Off
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Warning
- Trip
- Start Inhibit

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

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

Figure 40: Trip History Dialog



VSD Comms Lost	
Pkg Discharge Pre	101 psi
Sump Press	108 psi
Airend Disch Temp	207 °F
Inject Coolant Tem	144 °F

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

■ Maintenance folder

Page 1: Filter Status

Figure 41: Filter Status



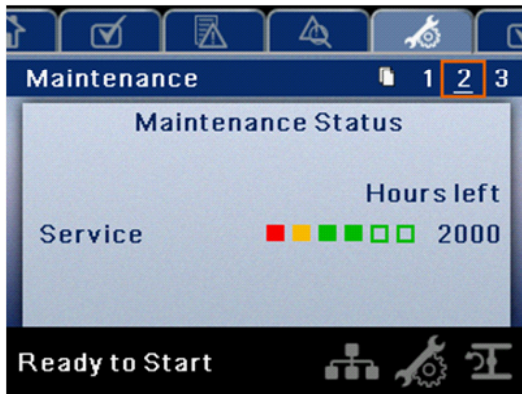
	Status
Coolant Filter Status	OK
Sep Element Status	OK
Inlet Filter Status	OK

This page displays the following:

- Coolant Filter Status
- Separator Element Status
- Inlet Filter Status

Page 2: Maintenance Status

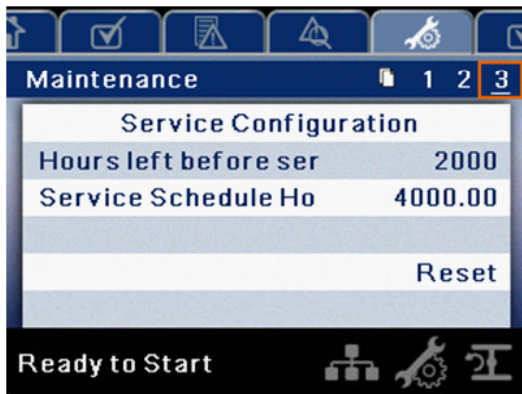
Figure 42: Maintenance Status



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

Page 3: Maintenance Configuration

Figure 43: Maintenance Configuration



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

General settings folder

NOTICE

All parameters in this folder are adjustable.

Page 1: Language Selection

Figure 44: Language Selection



Language is selectable from the following 30 choices:

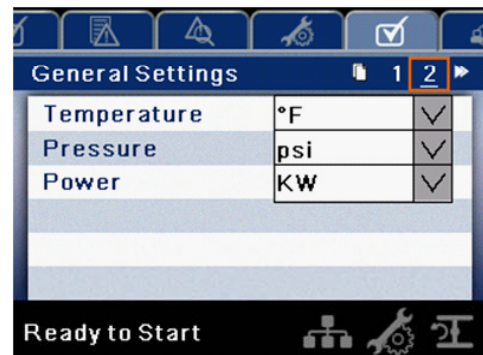
- English (default)
- Bulgarian
- Chinese, simplified
- Croatian
- Czech
- Danish
- Dutch
- Estonian
- Finish
- French
- German
- Greek
- Hungarian
- Italian
- Indonesian
- Korean
- Latvian
- Lithuanian
- Maltese
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Slovak
- Slovenian
- Spanish
-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

Page 1: Units of Measure Settings

Figure 45: Units of Measure Settings



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

Table 16: Units of Measure Settings

Display Text	Description
Temperature	Selectable between °F and °C.
Pressure	Selectable among psi, kpa, bar, kg/cm².
Power	Selectable between kW and HP.

Page 3: Home Page Selection

Figure 46: Home Page Selection



Table 17: Home Page Selection

Display Text	Description
Auto Return to Home	Enables the controller to return the display back to the selected Home Page if there is no user activity for the Delay Time shown. This is only enabled when an "x" appears in the checkbox.
Delay Time	Determines how many seconds of inactivity it will take before the controller will return to the Home Page.
Select Home Folder	Used to select the Home folder.
Select Home Page	Used to select the Home Page within the selected Home folder.

Pages 4-5: Time & Date Settings

Figure 47: Time & Date Settings



All items are adjustable.

The following settings are displayed in this section:

Table 18: Time & Date Settings

Display Text	Description
Hours	Allows the current hour to be set. The hours format is fixed on 24-hour.
Minutes	Allows current minutes to be set.
Seconds	Allows current seconds to be set.
Year	Allows current year to be set.
Month	Allows current month to be set.
Day	Allows current day to be set.
Date Format	Selectable between dd/mm/yyyy (default) and mm/dd/yyyy.
Confirm New Time and Date	Used to verify that changes to selections are desired. An "x" must appear in the checkbox before any changes will take affect.

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

NOTICE

The controller does not support Daylight Savings Time.

Page 6: Backlight Settings

Figure 48: Backlight Settings



The following settings are displayed in this section:

Table 19: Backlight Settings

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

NOTICE

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

The START, STOP, LOAD, UNLOAD, RESET, and ACKNOWLEDGE keys on the controller remain functional while the backlight is switched off. It is recommended to press the ENTER key or one of the navigation keys in order to switch the backlight on.

Pages 7-8: Ethernet Settings

Figure 49: Ethernet Settings

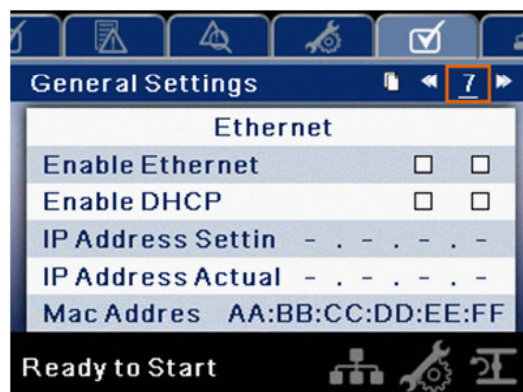


Table 20: Ethernet Settings

Display Text	Description
Enable Ethernet	Allow connection by users to utilize the network enabled functionality of the controller
Enable DHCP	Allow the controller to automatically receive an IP address from the Local Area Network (LAN)
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.
MAC Address	This is the unique hardware MAC address for the controller. This can not be changed.
Subnet Mask Setting	Setpoint for the subnet mask
Subnet Mask Actual	Current reading/setting for the subnet mask
Default Gateway Setting	Setpoint for the default gateway.
Default Gateway Actual	Current reading/setting for the default gateway.
Accept	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.

■ **Status folder**

NOTICE

All information on these pages is read only.

Pages 1-3: Analog Inputs

Figure 50: Analog Inputs

The following inputs are displayed in this section:

- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- Aftercooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- Aftercooler Discharge Pressure (integrated dryer compressors only)
- Remote Pressure (optional)
- Coolant Filter Inlet Pressure
- Coolant Filter Outlet Pressure
- Interstage Pressure (2-stage compressors only)

- Evaporator
- Condenser

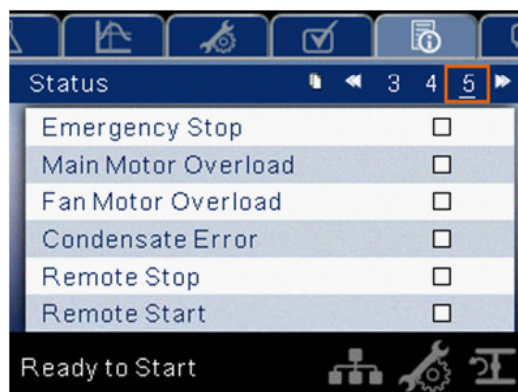
Page 4: Compressor Data

Figure 51: Compressor Data

The following data are displayed in this section:

- Power On Hours
- Running Hours
- Loaded Hours
- Real Time Clock

Pages 5-6: Digital Inputs

Figure 52: Digital Inputs

A marked checkbox beside a digital input indicates that the input is in its TRUE state. For example, Starter Feedback is TRUE when its input is in the high state, where as, E-Stop is TRUE when its input is at 0Vdc.

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

Pages 7-8: Digital Outputs

Figure 53: Digital Outputs



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

- Starter Contact 1
- Starter Contact 2
- Fan Starter Contact
- Blowdown Solenoid
- Modulation Solenoid
- Condensate Drain
- Dryer Run / Fan Run
- PORO Horn
- Trip Relay
- Warning Relay
- Low Voltage Output 1
- Low Voltage Output 2
- Low Voltage Output 3
- Low Voltage Output 4

NOTICE

(RO) indicates read-only values.

Page 9: Analog Outputs

Figure 54: Analog Outputs



The value for the analog outputs will be in mA.

- VSD Blower Output
- Analog Output 2

NOTICE

(RO) indicates read-only values.

Factory settings folder

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

Page 1: Password

Figure 55: Password

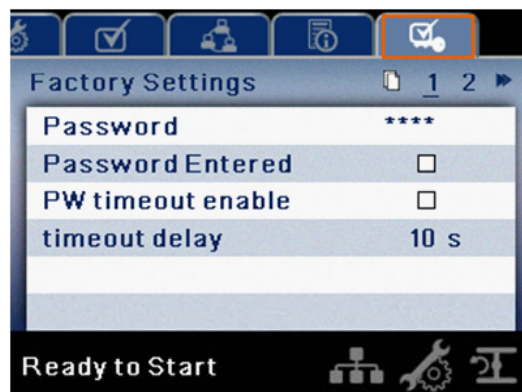


Table 21: Password

Display Text	Description
Password	Provides access to enter a valid password to gain access to password protected parameters. The password is entered by scrolling down to the password value and pressing the RETURN key.
Password entered	This checkbox will indicate a valid password has been entered. If this checkbox is blank, a valid password has not been entered or it has timed out. This is read only.
Password timeout enable	Checking this box will enable the password time feature.
Password timeout	This timeout along with the password timeout enable allows the user to set an adjustable amount of time to require a valid password to be re-entered. Once this timeout is reached re-entry of a valid password is required.

Pages 2-3: Factory Settings

Figure 56: Factory Settings



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

- Rated Pressure (psi – 100, 115, 135, 190)
- Enable Two Stage (On/Off)
- Starter Type (Star-delta, Remote Starter, Soft Starter)
- Service Level (0, 1, or 2)
- Service Time Period (1000 – 8000, in increments of 1000 hours)
- Enable Modulation (On/Off)
- Enable PAC (On/Off)
- Enable Dryer (On/Off)
- Running Hours (adjustable)
- Loaded Hours (adjustable)
- VSD Blower (On/Off)
- Enable Low Ambient (On/Off)

Pages 4-5: Factory Settings

Figure 57: Factory Settings



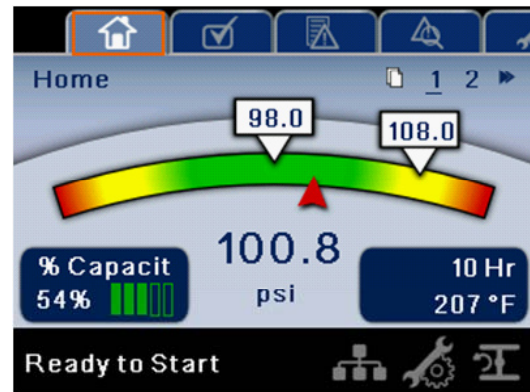
These pages are used for displaying software information for the controller. All items are read only.

Folder Options (Variable Speed)

Home folder

Page 1: System Overview

Figure 58: Systems Overview



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

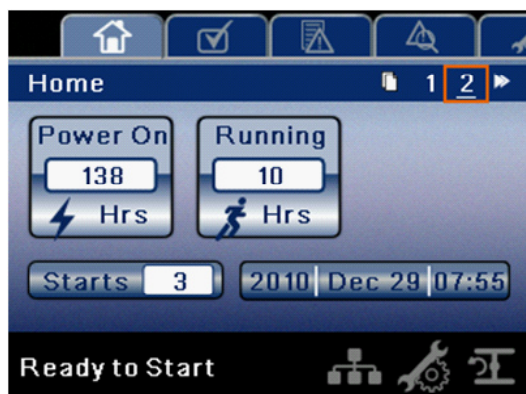
- **Target Pressure Setpoint** is indicated in the white box and by the white arrow, which is always centered on the gauge. This is the pressure that the compressor is trying to maintain.
- **Automatic Stop Setpoint** is indicated in the white box and by the white arrow, which is always right of center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

NOTICE

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

Page 2: Counters

Figure 59: Counters



- **Hour Meters** indicate the hours that: the controller has been powered up, and the compressor has been running.
- **Starts** indicate the number of times a start is attempted on the compressor.
- **Date & Time** is adjustable and configurable in the GENERAL SETTINGS folder.

NOTICE

All information on this page is read only.

Pages 3-5: Analog Inputs & Compressor Information

Figure 60: Analog Inputs & Compressor Information



Icon	Meaning
	Pressure
	Temperature

NOTICE

All information on these pages is read only.

The following analog inputs are displayed in this section:

- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- Aftercooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- Remote Pressure (optional)
- Aftercooler Discharge Pressure (integrated dryer compressors only)

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

- Motor Speed
- Package kW
- Average Package kW/hour
- Average % Capacity
- Average Capacity
- Energy Cost
- Energy Savings
- Lifetime Energy Savings

**Operator settings folder**

Pages 1-2: Operator Settings

Figure 61: Operator Settings



The parameters below are adjustable at any time:

Table 22: Operator Settings

Operator Settings	Default	Min.	Max.	Step	Unit
Target Pressure	100	65	145	1	psi
Automatic Stop Pressure	110	Target+1	Target+10	1	psi
Immediate Stop Pressure	120	Auto	Auto+10	1	psi
% Savings Compared To	Modulation	---	---	---	---
Energy Rate	0.000	0.000	9999.999	---	---
Reset Averaging	--/--/--	-	-	-	date

Pages 3-5: Operator Options

Figure 62: Operator Options



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

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

Table 23: Operator Options

Option Items	Selection	Min.	Max.	Step	Unit	Installed option required?
Remote Sensor	ON/OFF	---	---	---	---	No
Comm Control	ON/OFF	---	---	---	---	No
Remote Start-Stop	ON/OFF	---	---	---	---	No
Enable PORO	ON/OFF	---	---	---	---	Yes
PORO Time	---	10	600	1	sec	Yes
Scheduled Start Day	---	Day	Day	1	day	Yes
Scheduled Start Hour	---	00:00	23:59	1	time	Yes
Scheduled Stop Day	---	Day	Day	1	day	Yes
Scheduled Stop Hour	---	00:00	23:59	1	time	Yes
Modbus Protocol	ON/OFF/ICU	---	---	---	---	No
Modbus Address	---	1	247	1	---	No

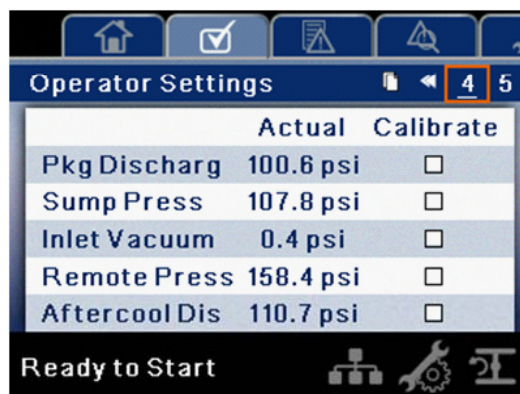
If an option has not been purchased and installed in the compressor, the message "Not Installed" will be shown on the selection display screen. Installation of options will be done using the Ingersoll Rand service tool.

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

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

Pages 6-7: Sensor Calibration

Figure 63: Sensor Calibration



Sensor calibration can only take place when the compressor is stopped. There should be no pressure on a sensor when it is calibrated. Calibration only needs to take place after a sensor is replaced, the controller is replaced, or the operator suspects the sensor reading is in error. Calibrate a sensor by selecting the checkbox beside the sensor name.

Each of the sensors listed below can be calibrated.

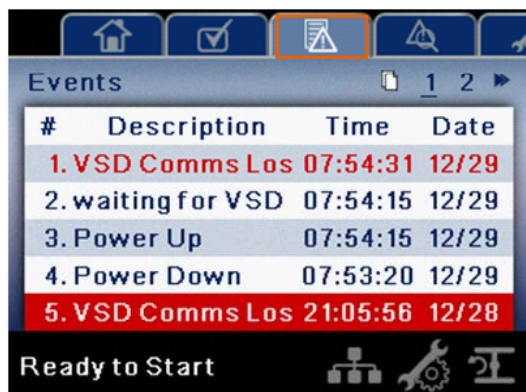
- Inlet Vacuum (1AVPT)
- Sump Pressure (3APT)
- Package Discharge Pressure (4APT)
- Coolant Filter Inlet Pressure (5CPT)
- Coolant Filter Outlet Pressure (6CPT)
- Remote Pressure (10APT) – Only on compressors with the remote sensor option
- Interstage Pressure (2APT) – Only on 2-stage compressors
- Aftercooler Discharge Pressure (7APT) – Only on compressors with integrated dryer

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

Events folder

Pages 1-42 (max.)

Figure 64: Events Folder



#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	waiting for VSD	07:54:15	12/29
3.	Power Up	07:54:15	12/29
4.	Power Down	07:53:20	12/29
5.	VSD Comms Los	21:05:56	12/28

Ready to Start

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

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

The following actions will generate an event:

- Power On
- Power Off
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Warning
- Trip
- Start Inhibit

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

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

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

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

Warning Events List

Change Inlet Filter

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

Change Coolant Filter

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

Sensor Failure (Units without Integrated Dryer)

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

Sensor Failure (Units with Integrated Dryer)

Will occur whenever a sensor is recognized as missing or broken and the compressor has an integrated dryer (3.3.1.6). The sensors affected by this warning are 7APT, 5DTT, and 6DTT. The sensor failure message shall follow the following format: SENSOR FAILURE 7APT.

Change Separator Element

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

High Airend Disch Temp

Will occur if the compressor is running and 2ATT is greater than 221 °F (97% of 228) or the compressor is in idle mode (3.3.7.1) and 2ATT is greater than 184 °F. This warning will normally have a 5 second delay, however, if the hot side thermal valve (3.3.1.5) is set to ON, this warning will have a 90 second delay.

High Discharge Press

Will occur if the compressor is under the control of an external device, such as an X-series, and the discharge pressure is greater than the immediate stop pressure.

Auxiliary Warning 1 (2)

This will occur if the auxiliary warning input closes.

Service

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

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

Service Level 1

If service level 1 (3.3.1.9) has been selected for the compressor, a "SERVICE REQUIRED" warning will be issued the amount of operating hours in the Service Time Period set point (3.3.1.10). This warning can be reset the same as any other warning.

Service Level 2

If service level 2 has been selected for the compressor, the service complete factory set point (3.3.1.11) will be used to clear a level 2 service warning and reset the service time or date. The service complete can be reset before a service warning occurs.

The first "SERVICE REQUIRED" warning will occur at the total hours value of the service time period set point (3.3.1.10). However, 100 hours before this a "100 HOURS TO SERVICE" warning will occur. This warning can be reset the same as any other warning. One hundred hours later, at the total hours value of the service time period, the "SERVICE REQUIRED" warning will occur. This warning can be reset the same as any other warning, however this warning will return in 24 hours if the service complete factory set point has not been set. If the service complete has not been set, 100 hours later (service time period + 100) the "ALARM - SERVICE REQUIRED" warning will be issued. This warning can only be cleared by the service complete factory set point. Once the service complete factory set point is set, indicating the service is completed, the time for the next "SERVICE REQUIRED" warning will be calculated by adding the service time period to the total hours value, with the "100 HOURS TO SERVICE" warning occurring 100 hours before and the "ALARM - SERVICE REQUIRED" warning occurring 100 hours after that time.

Condensate Drain Error

This will occur if the compressor is running, the package discharge pressure is over 50 psi, and the condensate drain error contact closes for at least 240 seconds. This warning will be ignored for 4.5 minutes after starting.

High VSD Ambient Temperature

This warning will occur if the VSD ambient temperature gets within 5% of the shutdown value (133 °F).

Freeze Warning

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

Dryer High Pressure

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

Sensor Failure Remote

This will occur whenever the remote sensor is recognized as missing or broken. The sensor failure message shall follow the following format: SENSOR FAILURE REMOTE. If this warning occurs, the compressor will automatically switch to the package discharge pressure sensor for control.

High Sump Pressure

This will occur if the compressor is running, the package discharge pressure is at least 65 psi, and the sump pressure is more than 15 psi above the target pressure. The occurrence of this warning will cause the controller to evaluate the need to lower the maximum speed (see 4.11).

Condenser Temperature High

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

Condenser Temperature Low

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

Change HE Filter

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

Trip Events List

High Airend Disch Temp

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

Blower Fault

Will occur if the fault contact opens for 3 seconds on the blower VSD.

Remote Stop Failure

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

Remote Start Failure

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

Sensor Failure

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

Emergency Stop

This will occur when the EMERGENCY STOP button is engaged.

VSD Fault

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

Low Sump Pressure

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

Check Motor Rotation

This will occur if the controller reads a negative speed from the VSD when starting.

VSD Communication Failure

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

VSD Initialization Fault

This will occur if the controller is unable to establish communications with the VSD after a power up.

Replace Coolant Filter

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

Incorrect VSD Type

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

Control Power Loss

This will occur if the compressor should be running and the AC input voltage, as read from the VSD, falls below 100 VAC. There is a delay of 2 seconds on this trip in case the power quickly returns. A phase monitor is something that can cause this trip.

Stop Failure

This will occur if the compressor should be stopped, but the motor speed has not dropped below the minimum motor speed set point. The controller will wait 4 seconds for the compressor to stop before issuing this trip.

High Interstage Pressure

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

High Coolant Filter Pressure Drop

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

High Inlet Vacuum

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

High Sump Pressure

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

Start Inhibit List

High Airend Discharge Temperature

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

High Sump Pressure

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

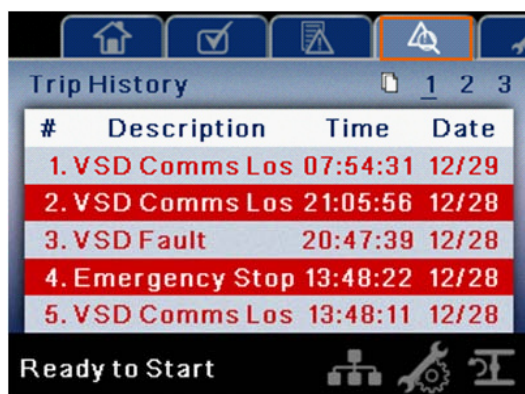
Waiting for VSD Comms

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

■ Trip history

Pages 1-4 (max.)

Figure 65: Trip History



#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	VSD Comms Los	21:05:56	12/28
3.	VSD Fault	20:47:39	12/28
4.	Emergency Stop	13:48:22	12/28
5.	VSD Comms Los	13:48:11	12/28

Ready to Start

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

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

The following actions will generate an event:

- Power On
- Power Off
- Press the Start Key
- Press the Stop Key
- Press the Load Key
- Press the Unload Key
- Warning
- Trip
- Start Inhibit

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

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

Figure 66: Trip History Dialog



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

■ Maintenance folder

Page 1: Filter Status

Figure 67: Filter Status

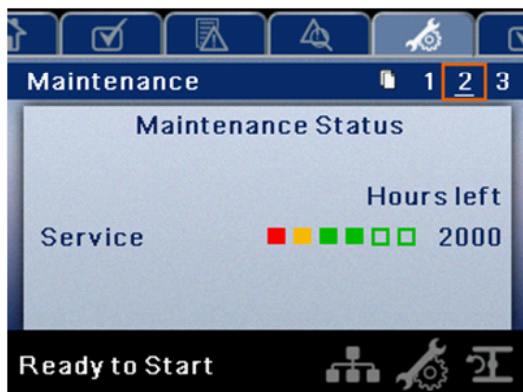


This page displays the following:

- Coolant Filter Status
- Separator Element Status
- Inlet Filter Status

Page 2: Maintenance Status

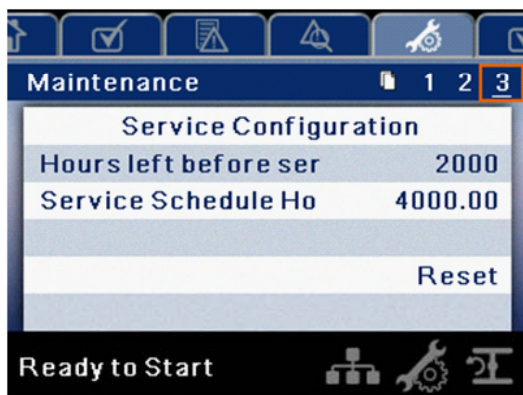
Figure 68: Maintenance Status



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

Page 3: Maintenance Configuration

Figure 69: Maintenance Configuration



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

■ General settings folder

NOTICE

All parameters in this folder are adjustable.

Page 1: Language Selection

Figure 70: Language Selection



Language is selectable from the following 30 choices:

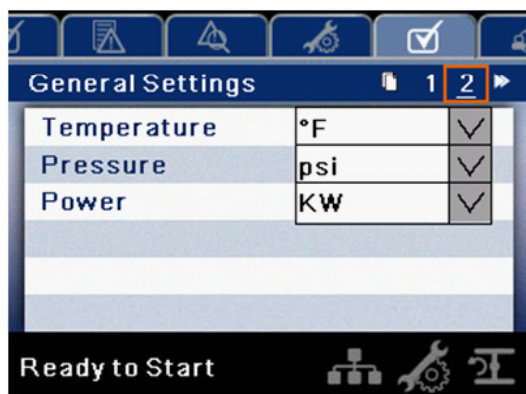
- English (default)
- Bulgarian
- Chinese, simplified
- Croatian
- Czech
- Danish
- Dutch
- Estonian
- Finish
- French
- German
- Greek
- Hungarian
- Italian
- Indonesian
- Korean
- Latvian
- Lithuanian
- Maltese
- Norwegian
- Polish
- Portuguese
- Romanian
- Russian
- Slovak
- Slovenian
- Spanish
-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

Page 1: Units of Measure Settings

Figure 71: Units of Measure Settings



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

Table 24: Units of Measure Settings

Display Text	Description
Temperature	Selectable between °F and °C.
Pressure	Selectable among psi, kpa, bar, kg/cm ² .
Power	Selectable between kW and HP.

Page 3: Home Page Selection

Figure 72: Home Page Selection



The following settings are displayed in this section:

Table 25: Home Page Selection

Display Text	Description
Auto Return to Home	Enables the controller to return the display back to the selected Home Page if there is no user activity for the Delay Time shown. This is only enabled when an "x" appears in the checkbox.
Delay Time	Determines how many seconds of inactivity it will take before the controller will return to the Home Page.
Select Home Folder	Used to select the Home folder.
Select Home Page	Used to select the Home Page within the selected Home folder.

Page 4-5: Time & Date Settings

Figure 73: Time & Date Settings



All items are adjustable.

The following settings are displayed in this section:

Table 26: Time & Date Settings

Display Text	Description
Hours	Allows the current hour to be set. The hours format is fixed on 24-hour.
Minutes	Allows current minutes to be set.
Seconds	Allows current seconds to be set.
Year	Allows current year to be set.
Month	Allows current month to be set.
Day	Allows current day to be set.
Date Format	Selectable between dd/mm/yyyy (default) and mm/dd/yyyy.
Confirm New Time and Date	Used to verify that changes to selections are desired. An "x" must appear in the checkbox before any changes will take effect.

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

NOTICE

The controller does not support Daylight Savings Time.

Page 6 : Backlight Settings

Figure 74: Backlight Settings



The following settings are displayed in this section:

Table 27: Backlight Settings

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

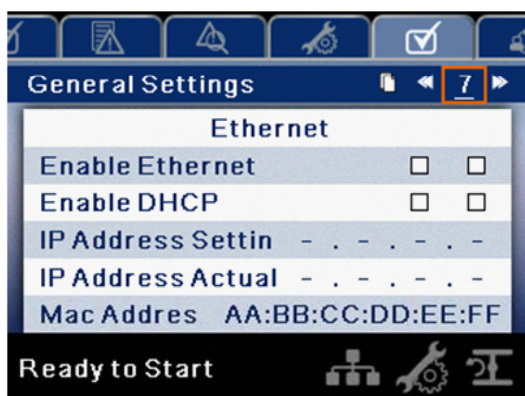
NOTICE

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

The START, STOP, LOAD, UNLOAD, RESET, and ACKNOWLEDGE keys on the controller remain functional while the backlight is switched off. It is recommended to press the ENTER key or one of the navigation keys in order to switch the backlight on.

Pages 7-8: Ethernet Settings

Figure 75: Ethernet Settings



The following settings are displayed in this section:

Table 28: Ethernet Settings

Display Text	Description
Enable Ethernet	Allow connection by users to utilize the network enabled functionality of the controller.
Enable DHCP	Allow the controller to automatically receive an IP address from the Local Area Network (LAN).
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.
MAC Address	This is the unique hardware MAC address for the controller. This can not be changed.
Subnet Mask Setting	Setpoint for the subnet mask.
Subnet Mask Actual	Current reading/setting for the subnet mask.
Default Gateway Setting	Setpoint for the default gateway.
Default Gateway Actual	Current reading/setting for the default gateway.
Accept	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.

Status folder

NOTICE

All information on these pages is read only.

Pages 1 -2: Analog Inputs

Figure 76: Analog Inputs



The following inputs are displayed in this section:

- Package Discharge Pressure
- Sump Pressure
- Airend Discharge Temperature
- Injected Coolant Temperature
- Aftercooler Discharge Temperature
- Separator Pressure Drop
- Coolant Filter Pressure Drop
- Inlet Vacuum
- Aftercooler Discharge Pressure (integrated dryer compressors only)
- Remote Pressure (optional)
- Coolant Filter Inlet Pressure
- Coolant Filter Outlet Pressure
- Interstage Pressure (2-stage compressors only)
- Evaporator
- Condenser

Page 4: Compressor Data

Figure 77: Compressor Data



The following are displayed in this section:

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

Pages 7-8: Digital Inputs

Figure 78: Digital Inputs



A marked checkbox beside a digital input indicates that the input is in its TRUE state. For example, Starter Feedback is TRUE when its input is in the high state, where as, E-Stop is TRUE when its input is at 0Vdc.

The following are displayed in this section:

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

Pages 9-10: Digital Outputs

Figure 79: Digital Outputs



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

- Starter Contact 1
- Starter Contact 2
- Fan Starter Contact
- Blowdown Solenoid
- Modulation Solenoid
- Condensate Drain
- Dryer Run / Fan Run
- PORO Horn
- Trip Relay
- Warning Relay
- Low Voltage Output 1
- Low Voltage Output 2
- Low Voltage Output 3
- Low Voltage Output 4

NOTICE

(RO) indicates read-only values.

Page 11: Analog Outputs

Figure 80: Analog Outputs



The value for the analog outputs will be in mA.

- VSD Blower Output
- Analog Output 2

Factory settings folder

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

Page 1: Password

Figure 81: Password

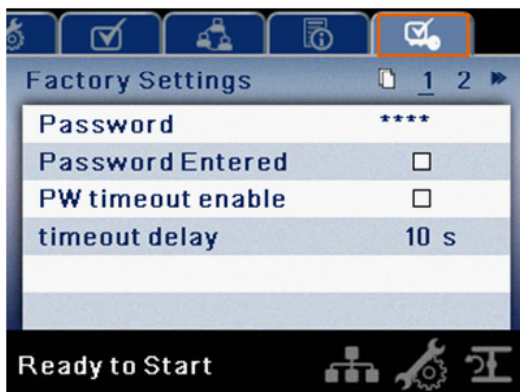


Table 29: Password

Password:	Provides access to enter a valid password to gain access to password protected parameters. The password is entered by scrolling down to the password value and pressing the return key.
Password Entered:	This checkbox will indicate a valid password has been entered. If this checkbox is blank, a valid password has not been entered or it has timed out. This is read only.
Password Timeout Enable:	Checking this box will enable the password time feature.
Timeout Delay:	This timeout along with the password timeout enable allows the user to set an adjustable amount of time to require a valid password to be re-entered. Once this timeout is reached re-entry of a valid password is required.

Pages 2-3: Factory Settings

Figure 82: Factory Settings



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

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

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

Water Cooled (On/Off)

Hot Side Thermal Valve (On/Off)

Enable PAC (On/Off)

Enable Dryer (On/Off)

Constant Running Dryer (On/Off)

Running Hours (adjustable)

Loaded Hours (adjustable)

Pages 4-5: Software Information

Figure 83: Software Information



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

Pages 6-10: Maximum Values

Figure 84: Maximum Values



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

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

Pages 11-12: VSD Diagnostics

Figure 85: VSD Diagnostics



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

NOTICE

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

Pages 13-16: VSD Service Menus

Figure 86: VSD Service Menus



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

NOTICE

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

Notes

NOTICES AND DISCLAIMERS

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

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

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

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

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

WARRANTY

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

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

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

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

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

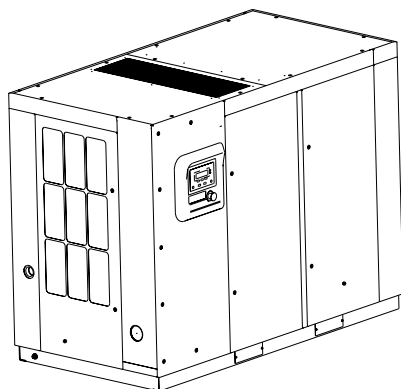
Note that this is **Ingersoll Rand** standard warranty. Any warranty in force at the time of purchase of the compressor or negotiated as part of the purchase order may take precedence over this warranty.



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Revision A
July 2011

螺杆式空气压缩机

R55-160



产品信息

EN Product Information

ZH 产品信息



保存这些说明



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关于本手册

本手册的目的是提供压缩机的场地规划，安装和操作指南。

有关支持文件请参考表 1。

表 1：产品手册

出版	产品	按地区分类的部件/文件号		
		美洲	EMEA *	亚太区
产品安全信息手册	全部	80446313	80446156	80446321
产品维修信息手册	全部	80446354	80446248	80446362
产品部件信息手册	R55-75 kW	80446271		
	R132-160 kW 单级	80446057		
	R90-160 kW 双级	80446065		

* 欧洲、中东和非洲

还可提供产品规格表及参考图。

安全

- 请找到、阅读、了解并遵循产品上和所有手册中的所有危险、警告、小心和操作说明。未能遵守产品随附手册、本手册或产品附带的任何标注与标签中说明的安全预防措施可能会导致死亡、严重伤害或财产损失。
- 请检查是否所有标注、标签和参数标牌（铭牌）都在适当的位置并且

清晰易读。

- 您有责任向他人传达此信息。
- 如果您有任何关于安全或程序的问题未包含在本手册中，请咨询您的主管或联系 **Ingersoll Rand** 的任何办公室或合格的 **Ingersoll Rand** 经销商。

接收/调试

接收

在签署交货回单之前，请检查是否有损坏及是否缺少部件。如果发现明显的损坏或部件缺少，请在交货回单上做出适当标注，然后签署回单。请立即与运输公司联系进行检查。

所有材料均应保留在接收位置供运输公司检查。

交货回单已签署且其中未标注存在损坏或部件缺少，则视为产品已“清洁”交付。随后的申诉则被视为隐蔽的损坏索赔。请与运输公司直接联系处理损坏索赔事宜。

如果在收到产品之后发现损坏（隐蔽的损坏），应在收到产品 15 天内通知运输公司，并应通过电话（且附书面确认）请求进行检查。在进行隐蔽的损坏索赔时，负责证实压缩机是在运输过程中损坏的责任人又转换为索赔者。

请查看产品铭牌以验证是否为所订购的型号，并查看电机铭牌以确定其是否与您的电气状况兼容。

请确保电气外壳和组件适合安装环境。

拆包与搬运

运送压缩机时，通常用聚乙烯薄膜或其他包装材料进行包装。如果必须使用小刀拆除包装，请确保不要损坏压缩机外层的油漆。

压缩机底座上有叉车槽，使用叉车可移动机器。请确保叉车的车叉与两侧的槽完全吻合。此外，可使用专用的起吊架通过起吊机或吊车搬移压缩机。请仅使用标记的起吊点。

丢弃包装和托盘、设备放置妥当后，请将黄漆运输支架从弹性底座上拆下，留作以后使用或丢弃：

对于变速驱动器 (VSD)

- 分离槽处 (3) 个支架
- 来自空气端排放弯管的 (1) 个支架。
- 空气端支架中的 (1) 个支架。

对于恒速 (FS)

- 分离槽处 (3) 个支架
- 空气端支架中的 (1) 个支架。
- 电机安装支架中的 (1) 个支架。

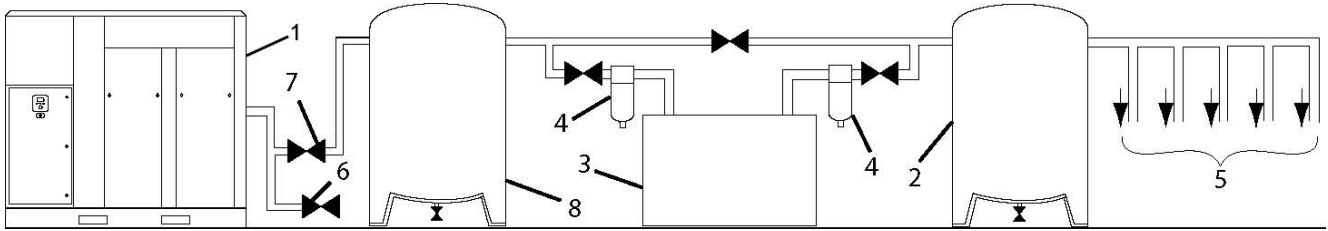
长期存储

如果产品在接收到的 6 个月内未使用，应准备进行长期存储。请与 **Ingersoll Rand** 联系了解详细信息。

安装

■ 在工厂中的使用位置

图 1：典型的空气系统



图例

1. 压缩机
2. 空气储气罐
3. 空气干燥器
4. 压缩空气过滤器
5. 系统用气点
6. 通风/排放弯管
7. 隔离阀
8. 储气罐（“湿罐”）

- 压缩机可以安装在任何可以支撑它的平整地面上。建议安装在干燥、通风、空气尽量洁净的环境中。
- 为产品位置选择的区域应远离尘埃、化学物质、金属屑、油漆汽雾和过量喷涂。
- 硬表面会反射噪音，从而导致分贝级别明显提高。当噪音很大时，请用橡胶或软木板垫在机器下，以降低噪音。可能需要挠性管道。
- 请参阅总布置图，以了解正常操作和维修的最小空间要求。
- 应按照国家或地方法规要求在控制面板门正面前保留最小空间。
- 环境温度应避免高于 46° C (115° F)，且应避开湿度较高的区域。

注意

建议压缩机周围至少保留 1 米（3.3 英尺）。如果顶部空间受限，则应将废气从机器中排出或导出。

螺杆式压缩机不应与往复式压缩机装在同一个空气系统中，除非使用诸如共用储气罐之类的隔离设施。我们建议两种压缩机都用单独的空气管路和共用储气罐连接起来。

设备在装运时使用了固定装置。请确保拆除这些固定装置以便在操作过程中自由地移动驱动电机总线。每个固定装置均漆成黄色。

注意

除了冷凝液清除管道外，该产品不应随附塑料或 PVC 管道，也不应用于下行的任何管道。

注意

由于排放出来的空气中含有少量的压缩机润滑油，因此应小心确保下游设备的兼容性。

当两台螺旋压缩机平行操作时，请在共用储气罐前为每个压缩机提供一个隔离阀 (7) 和排放弯管 (6)。请确保布置了排放管道，以防防水被迫进入未运行的机器。

建议在空气干燥剂为再生干燥剂时使用贮液罐 (8)，以防在工厂空气需求缓慢时进行循环吹净期间使压缩机短期循环。

内置式后冷却器可将排气温度降低至露点以下（针对大多数环境条件）。因此，会凝结一定量的水蒸汽。为去除冷凝液，每台含内置式后冷却器的压缩机均配备联合冷凝液分离器/排放弯管。

压缩机排放管道附近应安装地漏或隔离阀。应将排放管道连接到底座上的冷凝液排放口。

注意

排放管道应该从底座向下倾斜才能正常工作。为便于检查自动排放弯管的情况，排放管道应包含一个开放的漏斗。

注意

对于可能不包含储气罐 (2) 的低容量系统，压缩机响应时间可能需要调整。请联系您当地的 Ingersoll Rand 服务提供商。

注意

切勿用压缩机支撑排放管道。

■ 排放管道和冷凝管道

安装新压缩机 (1) 时考察总体空气系统是非常重要的。其目的是确保有一个安全而有效的总体系统。

必须注意含水率。安装空气干燥器 (3) 总是有利的，因为适当选择并安装的空气干燥器可以将含水率降到零。

建议使用储气罐 (2)，以确保总体系统容量足够。

排放管道至少应与压缩机的排放接口一样大。所有管道及配件都应经过适当评估，以适合排放压力。排放管道不应给设备施加任何未经分析的力矩或力。

最好安装管道过滤器 (4)。

采用相应工具 (6) 排放分离槽上最低压力止回阀中排放管道系统下游的压力和首个系统隔离阀 (7) 上游的压力。

此产品具有内置排放止回阀。无需外部止回阀。在 1 米（36 英寸）的压缩机排放范围之内需要隔离阀 (7)。

■ 电气

压缩机应根据所有适用标准与法规（当地、省/自治区/直辖市、国家/地区、联邦等）正确接地。

此压缩机的安装应符合所有适用标准与法规（当地、省/自治区/直辖市、国家/地区、联邦等）。

压缩机应该有装在它附近的单独绝缘体。应当根据“通用信息”一节中提供的的数据，并按照认可法规的要求，选择用于保护电路和压缩机的熔断器。

馈电电缆的尺寸应由客户/电气承包商决定，以确保电路得到均衡，而且不因其他电气设备而过载。距离适当馈电点的电缆长度是至关重要的，因为压降可能会降低压缩机的性能。

注意

对于 VSD，电缆规格可能相差很大，因此线路感应器配置了铜母线接口。这些连接可以接受介于 6 毫米和 12 毫米之间的螺栓。

输入终端 L1-L2-L3 的馈电电缆接口应该紧固、干净。

应用的电压必须与产品参数标牌上的额定值相符合。

控制电路变压器具有不同的电压分接头。确保在启动之前根据特定的适用电压进行设置。

卸下盲板凿孔，用于输入电源连接。如有必要在控制箱上的其他位置凿孔，请小心操作，切勿使金属屑进入启动器或控制箱内的其他电气部件中。如果使用另一个孔，应当堵住原来的孔。

馈电电缆应当在启动器盒中适当密封，以提供正确的进口保护。恒速启动器盒额定适合 NEMA 4 /IP65，而 VSD 启动器盒额定适合 NEMA 12/IP54。对于 VSD 启动器盒，馈电电缆应当进行密封，以防脏污空气从过滤器旁逸出。

完成电气安装后，请检查风扇或风扇电机旋转是否正常。

VSD 设备设计用于供电系统与附近住宅及商业区分开的场合。如果此设备用于共享本地电网的轻工业、居民或商业环境中，则可能需要采取进一步的射频 (RF) 屏蔽措施。有关 RF 过滤选件的详细信息，请咨询当地经销商/供应商。

VSD 压缩机的电气箱中具有抗冷凝加热器和温控开关。此电路可连接到独立的 110V 或 230V 单相电源，这取决于安装所处的国家/地区。应对电源安装适当的熔断器，并且压缩机附近应安装独立的隔离开关。验证恒温器已调整为 29°C (85° F)。这应根据认可的法规进行操作。最好（并且有时必须）显示相应的标志，警告本设备含两个独立的供电系统，在进行任何操作前应将它们隔离。

对于 VSD 压缩机，加热电路还可由 110V 分接头的控制变压器供电，并按接线图所示进行连接（独立于本手册提供）。

注意

在首次启动之前或长期关闭置于寒冷潮湿环境中时，必须由合格的电工测试主电机和风扇电机的绝缘情况。

■ 水冷却装置

■ 冷却水管道

注意

与压缩机组相连接的水管应当至少等于或大于机组的接口规格。水管规格不能过小。

进口和出口管道上都应安装带有侧排放阀的隔离阀。为维护冷却器的洁净与可靠性，请务必在进入管道上安装筛孔大小为 2 毫米的滤网。可从 Ingersoll Rand 购买过滤器。

如应用于海水（仅限海水选配件），则不推荐使用锌电极，因为接触海水时，它会损坏 70/30 铜镍合金管上的氧化铜膜。为尽可能减小对冷却器的电偶腐蚀并为其提供最强的腐蚀防护，强烈建议在尽可能靠近空压机组进水接口处连接一段铁管（长度 >300 毫米）。铁管将用作铜镍合金管的防腐阳极，因而应视为定期维护与更换的物品。为此，应以适当方式安装该段铁管以便轻松进行更换（例如用管子接头更换）。

空压机设有常关式电磁阀，安装在机组内的出水侧。阀与空压机的控制电路连接，当空压机停止运转时，阀就会关闭。

安装空压机组前，请仔细检查您的水系统装置。请确保管道不存在水锈和沉淀物，因为这可能会限制流向空压机组的水流量。如果水洁净度较差，则建议在进水管道上安装过滤装置。

压缩机正确运行要求提供冷却水流的最大供应温度为 46° C (115° F)。请参阅压缩机工程数据表，了解冷却水流速。

水管中应安装水温和压力计量器，以便用于排除水系统中的故障。理想状况下，水压应在 3 到 5 bar (43.5 到 72.5 psi) 之间，而不应高于 10 bar (145 psi)。

水的洁净度也极其重要。清除冷却器的污垢是客户的责任。因此，强烈建议正确的水质应达到本部分后面“水质建议”中所列的要求。

■ 水系统装置排气

空气应从系统的出水侧排出，以免出现性能不良及水击作用。由于空压机将根据您选择“淡水冷却”或“苛刻水环境冷却”系统而使用不同类型的热交换器，因此排放过程不同。请务必遵循下列正确步骤。

淡水冷却器（镀铜板热交换器）：

1. 切断压缩机出水管路中的止水阀。
2. 打开进水阀，让水流入机组。
3. 让所有空气从系统逸出，从出水口观察水流情况。
4. 连接止水阀。

苛刻水环境冷却器（壳式及管式热交换器）：

1. 找到后冷却器和润滑油冷却器顶部的水系统放气旋塞。
2. 打开进水阀，使水流入机组。
3. 打开放气旋塞，排出系统中的所有空气。当从排放阀可看到水时，关闭排放阀。

■ 水系统装置排水

如果水系统装置必须将水排空，请使用特定于您所拥有的水冷却选件的以下步骤。

淡水冷却器（镀铜板热交换器）：

1. 将进水管路从装置后部的接口上断开。
2. 切断压缩机出水管路中的止水阀。
3. 使系统将水完全排出。

苛刻水环境冷却器（壳式及管式热交换器）：

1. 从水系统装置后面的接口上断开进水和排水管道。
2. 找到后冷却器和油冷却器。取下这些冷却器底部的排水塞。
3. 打开后冷却器和油冷却器顶部的排气口
4. 使系统将水完全排出。

■ 调节后冷却器调节阀

请参阅独立于本手册提供的管道和仪器仪表图。冷却器以“并行”水流排列来布管，并带有一个可手动控制流经后冷却器的水流的调节阀。“后冷却器调节阀”是出厂时设置的，并不需要进行调节，但如果该调节阀功能出现问题，可按下列步骤调节。

1. 沿顺时针方向将阀完全关闭，然后打开两整转。
2. 当机器载荷运行时，请查看微控制器显示屏上的机组排放温度。应比进水口温度约高 8° C (15° F)。
3. 如温度过高，请将阀打开 ¼ 转并等待一分钟。如温度过低，请将阀关闭 ¼ 转并等待一分钟。渐进重复这一步骤，直至达到理想温度。
4. 在阀上放置“警告 – 请勿调整”标签或者安装锁定装置。

■ 水质建议

检查水冷却空压机的冷却系统时经常会忽视水质问题。水质可决定热传输率的效率以及水系统装置使用寿命内所保持的流速。应注意到，任何冷却系统中所使用的水的质量都无法在系统运行期间保持不变。蒸发、腐蚀、化学和温度变化、通风、水锈和生物的形成都会影响水的成分。冷却系统的大部分问题首先表现为热交换器速度降低，随后水流速度降低或压降增加，最终使系统受到损坏。

水垢：形成水垢会阻碍有效传热，但有助于预防腐蚀。因此，内表面需要有一层薄的均匀的碳酸钙涂层。形成水垢的可能的最主要原因是水中的碳酸钙沉淀。这取决于温度及 pH 值。pH 值越高，形成水垢的可能性就越大。可通过水处理方法控制水垢。

腐蚀：相对于水垢而言，另一问题就是腐蚀。氯化物会产生问题是因为氯化物的量和导电性。低 pH 水平可加剧腐蚀，并提高溶解氧的水平。

污垢：生物和有机物质（残渣）也会产生问题，但在温度升高的环境中（如冷却处理），却不再是主要问题。如果污垢导致了堵塞，可进行商业震动处理。

为确保压缩机冷却系统具有良好的运行寿命和性能，建议的可接受的水成分范围如下：

表 2：冷却水成分的可接受限制

物质	检测时间间隔	可接受的最大限制	
		淡水（镀铜板热交换器）	脏水/海水（壳式及管式热交换器）
朗格利尔指数 (LI)	每月	0 到 1	-0.5 到 2.5
氨 [NH ₃], ppm	每月	<1	<2
氨 [NH ₄ -1], ppm	每月	<2	<5
氯化物 [Cl-], ppm	每月	<80	<1000
铜 [Cu], ppm	每月	<0.01	<0.5
溶解氧 (DO) [O ₂], ppm	每周	<0.1	<3
铁 + 锰 [Fe + Mn], ppm	每月	<0.3	<2
硝酸盐 [NO ₃ -], ppm	每月	<100	<125
油和油脂, ppm	每月	<5	<5
二氧化硅 (silica) [SiO ₂], ppm	每月	<30	<100
硫酸盐 [SO ₄ -2], ppm	每月	<70	<250

■ 集成式干燥器

请勿将冷凝排放口与其他增压排水管线置于一个密闭的回路中。确保冷凝排水管道畅通。连接冷凝排水管道时应该确保排水时声级最小。

请确保以负责任的方式处理所有冷凝物，处理方式要符合所有适用标准与法规（当地、省/自治区/直辖市、国家/地区、联邦等）。

干燥器和压缩机周围的环境空气中不能有任何固体或气体污染物。所有压缩和冷凝后的气体可能生成会损坏压缩机或干燥器内部组件的酸性或化学物质。要特别小心硫、氨、氯以及在海水环境的安装。

■ 环境限制

标准压缩机组专用于以下情况：

- 仅室内
- 不被视为高尘区域的区域。
- 环境温度范围：2 至 46° C (35-115° F)

Ingersoll Rand 提供以下适用于可延伸环境限制的恒速装置选配件：

- 室外修改
- 海平面低环境温度选配件（-23 至 46° C/-15 至 115° F）
- 海平面高环境温度选配件（2 至 55° C/35 至 131° F）
- 高尘空气过滤器
- 高尘机组过滤器

简介

压缩机由电机驱动，属触点冷却螺杆型，各种必需部件均已安装，电路已连接好，底架已安装。因此它是一个自成一体的空压机机组。

标准压缩机的设计环境温度范围介于 2° C 和 46° C (35° F 至 115° F) 之间。标准最高温度 46° C (115° F) 适用于海拔 1000 米 (3280 英尺) 以下的高度。当超过此高度时，如果使用标准电机，则需要大幅降低环境温度。

可使用板式电子控制器管理压缩机。控制器与驱动系统协同工作，使压缩机以不同的速度运行，从而以目标压力提供压缩空气。

对于恒速 (FS) 型号，容量通过“开关管路”自动控制。压缩机将开始运行，以保持固定的排放管压力，同时提供在空气需求变化较大的工厂使用的自动重启系统。

所提供的面板仪表可指示压缩机的运行状况和一般状态。

空气/冷却剂混合物从压缩机主机排放到分离系统中。该系统把排出气体中的绝大部分冷却剂清除掉，仅有若干 ppm 的残存。冷却剂返回到冷却系统中，空气通过后冷却器后，再通过水分离器排出压缩机。

空气通过冷却风扇吸入到机器中，并通过冷却剂冷却器和后冷却器。

通过对排放空气进行冷却，空气中自然包含的大部分水蒸汽被冷凝，然后由内置的水分离器和排放阀排放掉。

冷却系统包括冷却剂槽、冷却器、温控阀和过滤器。机组运行时，通过空气压力将冷却剂从分离槽强行注入到温控阀芯中。温控阀芯位置（冷却剂温度的直接结果）将确定冷却剂是在冷却剂中循环、绕过冷却器、还是结合这两种方式来维持最佳的压缩机进气温度。控制此温度以防水蒸气发生冷凝。在足够高的温度下注入冷却剂时，排放空气冷却剂混合温度将保持在露点以上。

对于 VSD 型号，系统由一种控制逻辑增强，该逻辑使冷却风扇速度随进气与排气温度而变化，从而更紧密地控制注入温度，同时节省风扇电机能量。

压缩机附带了一个温度传感器，它可以在温度过高时关闭机组。此设置通常为 109° C (228° F)。

使用旋装式的重尘冷却剂过滤器，可提供有效的冷却剂过滤。

注意

标准空压机在出厂时装有压缩机冷却剂。建议每 2000 小时或每 3 个月进行一次冷却剂分析，以监控状态并确定何时更换冷却剂。如不进行分析，则建议每 8000 小时或每两年更换一次冷却剂，以先发生者为准。

如设备提供有选配的食品级冷却剂，则建议每 500 小时或每月进行冷却剂分析，以监控其状态，从而决定何时更换冷却剂。如不进行分析，则在使用机器随附的食品级过滤器时，建议每 2000 小时或每六个月更换一次冷却剂。对于运行食品级冷却剂但不带食品级过滤器的装置，应每 1000 小时或每三个月更换一次，以先发生者为准。

注意

FS 压缩机不得与 VSD 压缩机连接。在更改变频器功率前，请联系您当地的 Ingersoll Rand 代表。

⚠ 小心

对于 FS 型号，当用气量低时，压缩机可能无法达到正常操作温度。以低要求进行持续操作可能会导致在冷却剂中产生冷凝物。如果发生此类情况，冷却剂的润滑性可能会减弱，这样容易损坏压缩机。

压缩机应有足够的载荷时间。

■ 集成式干燥机的操作

在默认模式下，干燥机不运行。必须按下关闭按钮以关闭干燥机。

在节能模式下，干燥机在空压机组的启动/关闭模式期间，在自动关闭之前可能运行多达 6 分钟。请注意：如果空压机需要马上重新开启，干燥机可长时间关闭。

注意

如果 ISO 4 级露点标准对您的应用至关重要，则应在卸载模式（固定速度）或空闲模式（可变速度）下启动空压机并运行一分钟，以让干燥机在空压机开始提供压缩空气之前达到所要求的露点。

变速驱动器 (VSD) 的操作说明

■ 基本操作

注意

微控制器上所显示的语言和度量单位在出厂前已预设好。如果需要进行更改，请联系您当地的 Ingersoll Rand 服务提供商。

■ 开始之前

请确保冷却剂的液位至少达到窥孔的中间，如有必要，请添加冷却剂。请参阅维护程序，了解如何设置正确的液位。

确保打开排放空气隔离阀。打开主电气隔离开关。控制面板将点亮，表明管道和控制电压是可用的。

打开驱动器柜门，旋转控制器右侧的小旋钮可以调整显示对比度。

■ 初始检查顺序

如果压缩机获得初始的控制器电源或出现警报复位，则控制器将执行初始检查顺序。当执行初始检查顺序时，控制器将显示信息“Checking Machine（检查设备）”。

在初始检查顺序中，控制器将检查控制系统工作是否正常。在此过程中，如发现有任何项目未生效，则将出现警报，设备不会启动。

完成初始检查程序后，控制器将显示“READY TO START（启动准备就绪）”。该过程必须在 10 秒钟内完成。

■ 启动顺序

操作人员按下压缩机的启动按钮或当压缩机接收到远程开机命令时，压缩机将初始启动。压缩机将开始载荷运行并将电机速度逐渐降到其最低速度。达到最低速度后，压缩机将使用其速度调节系统来控制压力。当系统压力达到目标压力时，压缩机将开始降低转速。如果系统压力上升至立即停机压力设定点，则压缩机将停机。如果系统压力上升至自动停机设定点并且压缩机以最低速度运行，而此时放气模式设置为关，则压缩机将停机。但是，如果放气模式设置为开，则压缩机在停机前将打开放气阀长达 10 秒，或直到分离槽中的压力降至 2.4bar (35psi)。系统压力降至目标压力之下后，压缩机将重启。

注意

在空压机首次启动时，应检查干燥器冷凝器风扇的旋转方向是否正确。如果风扇没有按照旋转箭头标牌所指的方向旋转，则应调换主电源线或启动箱接触器上的两条电线。在调换电线之前，应执行正确的停机顺序并锁定/标示主电源。

■ 停机顺序

可以通过本机或远程停止来停止空压机，也可通过故障停机或紧急停止来关闭压缩机。以上所有情况都会导致压缩机立即停机，本机或远程停止除外。本机或远程停止将打开放气阀，压缩机将在停机前将运行长达 10 秒钟或一直运行到分离槽中的压力降至 2.4 bar (35psi)。如果系统压力达到自动停机或立即停机压力设定点，则压缩机将停机。但是，如果压缩机因为该原因而停机，它会在系统压力低于目标压力后自动重启。

注意

如设备必须紧急停止，请按下表板下的紧急停止按钮。

■ 预热模式

当压缩机空气端排放温度未达到两个连续操作循环所要求的预热温度 (82° C/180° F) 时，将会执行预热循环。在进行预热循环时，压缩机不会停机，而是继续运行且放气阀处于打开状态。压缩机将以最低速度在恒速模式下运行。风扇将以最低速度运行。压缩机将像这样运行大约五分钟。在进行预热循环时，控制器将显示信息“Warm Up Mode（预热模式）”。如果压力在这一时段降低，则压缩机将返回正常操作状态。

■ 离心风扇控制

风扇转速在某些条件下会发生变化，以辅助控制后冷却器的进气温度和冷却剂的注入温度。离心风扇电机具有自己的可变速驱动器，可在压缩机启动和停止时逐渐提高或降低转速。

■ 紧急停止

如设备必须紧急停机，请按下表板下的紧急停止按钮。

这将忽略正常的卸荷/停机按钮的作用，并立即停机。

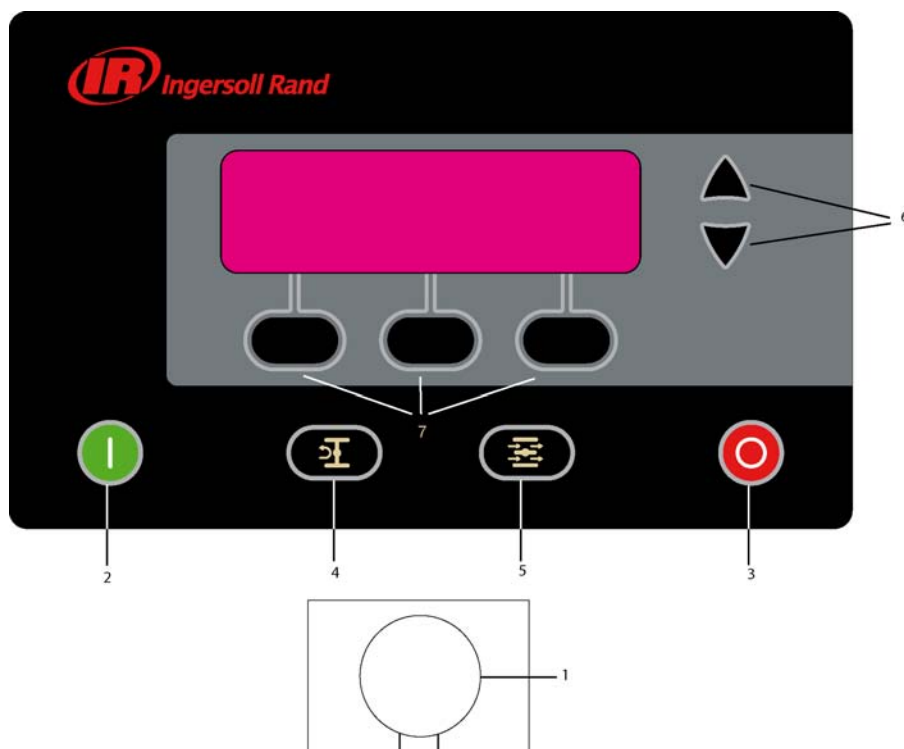
■ 在紧急停止之后重启

如果因机器故障而关闭了机组，请在尝试重启前找到并排除故障。

如果因安全原因而关闭了机组，请在重启前确保机器是可以安全操作的。

重启设备前，请参阅本节前面的启动前和启动顺序说明。

图 2: 控制器接口



1. 紧急停止

按此开关可立即使压缩机停止工作。放气阀将打开，以将分离槽内的压力释放到空气中。请注意，分离槽的系统下游可能仍有压力。除非手动复位此开关，否则不能重启压缩机。顺时针旋转开关旋钮并按两次复位按钮进行复位。

复位时，控制器上将显示一条信息，表明压缩机已就绪，可以启动。

2. 启动

按此按钮将激活启动步骤。

3. 停机

按此按钮将激活停机步骤。

4. 不使用

5. 不使用

6. 箭头

这些向上和向下按钮具有与显示屏右半部分相关的多种功能。当显示列表时，使用这些按钮可在列表中的项目间上下移动。显示在显示屏右上角的小箭头表明这时可在列表中向上（箭头指向上时）和/或向下（箭头指向下时）移动。

在显示屏上选中某一设备运行参数值，可使用这些按钮来更改该值。

7. 显示按钮

显示屏下的三个按钮的功能由屏幕底部这些按钮上方的一些文字来定义。每个功能（例如，“MAIN MENU [主菜单]”、“STATUS [状态]”等）都在本手册相应的章节有讲述。

■ 显示屏

图 3: 显示屏

100 PSI READY TO START	–CURRENT STATUS– PACKAGE DISCHARGE TEMP 102°F AIREND DISCHARGE TEMP 192°F
MAIN MENU	

显示屏分为三个功能区，如此处典型的“CURRENT STATUS（当前状态）”屏幕所示。

屏幕左侧用大的数字连续显示机组排放压力，并且紧接着的下面一行显示机器的运行状况。

右侧显示各种项目或列表，例如机器的“CURRENT STATUS（当前状态）”读数、“MAIN MENU（主菜单）”、“OPERATOR SETPOINTS（操作人员设定点）”列表等。其中任何一个列表均可以通过按压屏幕右侧的箭头按钮上移或下移。显示在屏幕右上角的小箭头表明这时可在列表中上下移动。箭头按钮还可用于更改单个项目的值。某些时候，项目和/或它的值会“高亮显示”。这表示它们是在深色背景上以淡色字体显示。

屏幕底部分为三部分，每个小框中的文字显示了紧挨屏幕下方的按钮的功能。这些框中的文字会根据某个特定时间点所允许的操作而改变。按这些按钮所触发的操作在本节后面的“操作人员面板流程图”中有说明。可将它作为快速参考来了解如何操作控制器屏幕，以进入需要的功能。

■ 当前状态屏幕

“CURRENT STATUS（当前状态）”屏幕被认为是控制器显示的“正常”屏幕。

以下项目和当前值可通过按压上箭头及下箭头按钮，显示在屏幕的右侧。

如果 30 秒内未按下任何按钮，则控制器自动将显示屏从其他屏幕返回到“CURRENT STATUS（当前状态）”屏幕。

使用“UP（上）”和“DOWN（下）”箭头，在各个选项之间移动。

“CURRENT STATUS（当前状态）”项目

- % Energy Saving（节能百分比）
- % CAPACITY（功率百分比）
- PACKAGE KW（机组功率 [千瓦]）
- Package Discharge Temperature（机组排放温度）
- Airend Discharge Temperature（空气端排放温度）
- Injected Coolant Temperature（注入冷却剂温度）
- Sump Pressure（分离前压力）
- Separator Pressure Drop（分离器压降）
- Coolant Filter Pressure Drop（冷却剂过滤器压降）
- Inlet Vacuum（进口真空度）
- Inlet Filter（进口过滤器）
- Total Hours（总时间）
- Motor Speed（电机速度）
- Remote Pressure（远程压力）（可选）
- Time and Date（时间与日期）
- Program Name（程序名称）
- Version of Drive Software（驱动软件版本）

显示“CURRENT STATUS（当前状态）”屏幕时，按下“ENERGY STATUS（能量状态）”按钮会将显示切换到“ENERGY STATUS（能量状态）”屏幕。类似地，当显示“ENERGY STATUS（能量状态）”屏幕时，按下“STATUS（状态）”按钮将使显示屏转换到“CURRENT STATUS（当前状态）”屏幕。

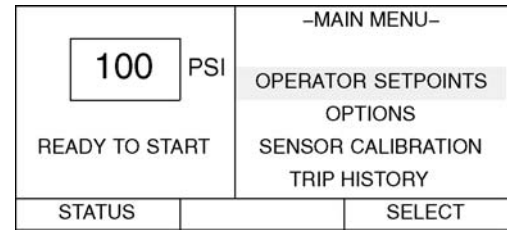
“ENERGY STATUS（能量状态）”屏幕显示下列项目。

“ENERGY STATUS（能量状态）”项目

- Average Package kW-hr（平均机组千瓦小时）
- AVERAGE % CAPACITY（平均气量百分比）
- AVERAGE CAPACITY（平均气量）
- ENERGY COST（能源成本）
- Energy Saving（节能）
- LIFETIME ENERGY SAVINGS（使用期节能）

■ 主菜单

图 4：主菜单屏幕



可通过在“CURRENT STATUS（当前状态）”屏幕中按下“MAIN MENU（主菜单）”按钮进入“MAIN MENU（主菜单）”屏幕，在屏幕最底行紧靠正中按钮上面可以看到“MAIN MENU（主菜单）”字样。

“MAIN MENU（主菜单）”屏幕是访问各种操作人员功能的进口。参阅“操作人员面板流程图”。

每个功能都可使用上、下箭头在屏幕上高亮显示进行选择。

如果按下“SELECT（选择）”按钮，控制器将进入高亮显示的功能，或者如果按下“STATUS（状态）”按钮，将返回到“CURRENT STATUS（当前状态）”屏幕。

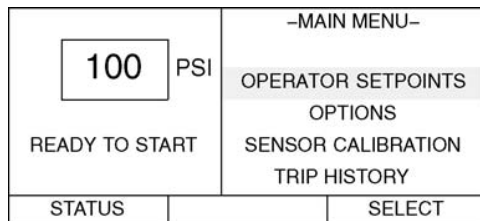
语言和度量单位在压缩机出厂前均已预设。如果需要更改这些设置，请联系 **Ingersoll Rand** 的任何办公室或合格的 **Ingersoll Rand** 经销商。

图 5: 操作人员面板流程图



■ 操作人员设定点

图 6: “Operator Setpoint (操作人员设定点)” 屏幕



设定点是控制器逻辑中可由用户使用“OPERATOR SETPOINTS（操作人员设定点）”屏幕进行调整的变量。

使用箭头键在列表中上下移动，可在屏幕上查看所列的每个设定点的名称和值。

与选项相关的设定点在“OPTIONS（选项）”部分描述。

表 3：操作人员设定点

操作人员设定点	默认	最小	最大	步长	单位
目标压力	100	65	145	1	psi
自动停机压力	110	目标 +1	目标 +10	1	psi
立即停机压力	120	自动	自动 +10	1	psi
放气模式	关闭	关闭	开	-	-
对比的节能百分比	调制	-	-	-	-
能耗比	0	0	9999.999	-	-
复位平均值	--	-	-	复位日期	-
维修菜单	1	1	25535	1	-

可首先选中项目及其值并按“ELECT（选择）”按钮仅高亮显示该值，以更改此设定点的值。如果该数值行本来就自己高亮显示，只需使用上下箭头按钮即可调整此值。此时会出现“CANCEL（取消）”和“SET（设置）”按钮。按下“SET（设置）”按钮可键入新值，或按下“CANCEL（取消）”按钮可返回到使用箭头按钮之前的设定点的值。所显示的值将闪烁两次，表明该值已进入设定点，并且设定点项目和值的显示行将重新一起高亮显示。

按下“STATUS（状态）”或“MAIN MENU（主菜单）”按钮可退出操作人员设定点。如果 30 秒钟内没有按下任何按钮，则显示屏幕将返回到“CURRENT STATUS（当前状态）”屏幕。

目标压力

压缩机将尝试在此压力设置下运行。下表列出了目标压力的范围和每种度量单位的步长。

表 4：目标压力范围与步长

单位	最低	最高 (1S / 2S)	步长
psi	65	145	1
BAR	4.4	10	0.1
kPa	440	1000	10
KGCM2	4.5	10.2	0.1

自动停机压力

一旦系统压力升高到此压力并且压缩机以最低速度运行时，压缩机将停机。该设定点的范围将在目标压力 +1 至目标压力 +10 psi 之间。

立即停机压力

如果系统压力升高到此压力，压缩机将停机。该设定点的范围将在自动停机压力至自动停机压力 +10 psi 之间。

放气模式

两级压缩机会始终在收到停机信号后放气。

如果放气模式设置为“ON（开）”，压缩机将在每次停机时打开放气阀。这将释放空气端和分离槽中的压力。如果放气模式设置为“OFF（关）”，则当压缩机由于自动停机而关机后，放气阀将保持关闭。对于两级型号压缩机，放气模式始终设置为打开。放气模式将在控制器显示屏上显示为“Not Installed（未安装）”。

对比的节能百分比

该设定点用于确定与何种 VSD 节能百分比进行对比。与 VSD 进行对比的操作模式为调制、联机/脱机和几何。节能百分比的值根据状态信息“% energy savings（节能百分比）”显示出来。

能耗比

“ENERGY STATUS（能量状态）”屏幕上的能量消耗和节能项目将利用此值进行计算。它以货币值表示，显示了用户每千瓦小时的电源成本。

复位平均值

当选择此设定点并按下“SET（设置）”按钮后，系统将复位“ENERGY STATUS（能量状态）”屏幕上的项目，并且在此设定点显示发生复位时的日期。这将选择时间段的开始时间，“ENERGY STATUS（能量状态）”信息需根据此开始时间进行计算。注意，“Lifetime Energy Savings（使用期节能）”项目无法复位。

维修菜单

仅限 Ingersoll Rand 人员使用。

选项

-OPTIONS-		
100 PSI	REMOTE START/STOP ON	
READY TO START	REMOTE START/STOP ON	
STATUS	MAIN MENU	SELECT

图 7：选项屏幕

可以打开或关闭选项，选项值使用此处显示的“OPTION（选项）”屏幕进行设置。

某些选项已购买、需要其他机器硬件并应首先由维修人员启用。使用箭头按钮在列表中上下移动可查看以下每个选项所列的名称和值。

选项项目的值可使用与更改“OPERATOR SETPOINTS（操作人员设定点）”值一样的方法进行更改。

表 5: 选项项目值

选项项目	选择	最小	最大	步长	单位	是否需要安装选项
Remote Pressure Sensor (远程压力传感器)	开/关					否
Sequencer (定序器)	开/关					否
Remote Start/Stop (远程启动/停止)	开/关					否
Power Out Restart (电源中断重启)	开/关					是
Power Out Restart Time (电源中断重启时间)		10	600	1	秒	是
Scheduled Start Day (计划的启动日期)		日	日	1	日	是
Scheduled Start (计划启动)		00:00	23:59	1	时间	是
Scheduled Stop Day (计划的停机日期)		日	日	1	日	是
Scheduled Stop (计划停机)		00:00	23:59	1	时间	是
Modbus Protocol (Modbus 协议)	开/关/ICU					否
Modbus Address (Modbus 地址)		1	247	1		否

Remote Pressure Sensor (远程压力传感器)

如果将此设置设定为“ON (开)”，则压缩机会使用远程安装的压力传感器，通过将其与“Target Pressure (目标压力)”设置和“Auto Stop Pressure (自动停机压力)”设置相比较，以控制系统压力。此传感器测得的压力显示在“CURRENT STATUS (当前状态)”屏幕中，显示为“Remote Pressure (远程压力)”读数。机组排放系统的本地传感器仍用于在某些警报状况下的立即停机，并显示在屏幕的左侧。

Sequencer (定序器)

如果将此设置设定为“ON (开)”，则压缩机能够通过来自主机装置的命令进行启动和停机。微控制器从主机装置接收到载荷命令后，压缩机将启动。微控制器接收到卸荷命令后，压缩机将像执行立即停机一样进行响应。

Remote Start/Stop (远程启动/停止)

如该设置设定为“ON (开)”，则压缩机可从远程设备启动和停机。

Power Out Restart (电源中断重启)

当将此设置设定为“ON (开)”时，如果压缩机在运行时断电，则重新通电后压缩机将自动重启。

Power Out Restart Time (电源中断重启时间)

如果将断电重启设置设定为“ON (开)”，则这个时间是从电源恢复时间至压缩机启动时的秒数。这段时间内，断电重启喇叭会发出声音。

Scheduled Start Day (计划的启动日期)

此选项可选择在哪一天发生计划启动。这些选择为星期日、星期一、星期二、星期三、星期四、星期五、星期六、每天（星期一到星期日）、工作日（星期一到星期五）或周末。该选项的设定点将与计划启动设定点同时生效。

Scheduled Start (计划启动)

此选项可使机组在计划的启动日期按照存储在此设定点的时间启动。如需取消该选项，请将计划启动值设置为和计划停机值相等。

Scheduled Stop Day (计划的停机日期)

此选项可选择在哪一天发生计划停机。这些选择为星期日、星期一、星期二、星期三、星期四、星期五、星期六、每天（星期一到星期日）、工作日（星期一到星期五）或周末。该选项的设定点将与计划停机设定点同时生效。

Scheduled Stop (计划停机)

此选项可使机组在计划的停机日期按照存储在此设定点的时间停机。如需取消该选项，请将计划停机值设置为和计划启动值相等。

■ 传感器校准

图 8: 传感器校准屏幕

100 PSI		-SENSOR CALIBRATION-	
READY TO START		SENSOR 4APT CALIBRATE	
		SENSOR 3APT CALIBRATE	
STATUS	MAIN MENU	SELECT	

可通过“SENSOR CALIBRATION (传感器校准)”屏幕进行压力传感器校准。只有停机后才能进行传感器校准。只有在传感器或微控制器已更换后才需要进行校准。

下列每种传感器均可使用上、下箭头在屏幕上高亮显示后进行选择。

传感器校准项

- Sensor 1VAPT (Inlet Vacuum) (传感器 1VAPT [进口真空度])
- Sensor 4APT (Package Discharge) (传感器 4APT [机组排放])
- Sensor 3APT (Wet Side Sump) (传感器 3APT [湿侧油槽])
- Sensor 5CPT (Coolant Filter In) (传感器 5CPT [冷却剂过滤器进口])
- Sensor 6CPT (Coolant Filter Out) (传感器 6CPT [冷却剂过滤器出口])
- Sensor 2APT (Interstage) (传感器 2APT [中间级]) (仅在 2 级压缩机上)
- Sensor 7APT (传感器 7APT) (仅限后冷却器干燥器装置)

按“SELECT (选择)”按钮可选择高亮显示的传感器。按“CALIBRATE (校准)”按钮可启动自动校准过程，按“CANCEL (取消)”按钮不进行校准并返回到传感器列表。

按“STATUS (状态)”或“MAIN MENU (主菜单)”按钮可退出校准屏幕。如果 30 秒钟内没有按下任何按钮，则显示屏将返回到“CURRENT STATUS (当前状态)”屏幕。

■ TRIP HISTORY (警报历史记录)

“TRIP HISTORY (警报历史记录)”显示了设备最近 15 次的警报信息。它还可显示每次警报时设备的运行状况。首先显示的“TRIP HISTORY 1 (警报历史记录 1)”是最近发生的一次警报。注意, 多次、连续的“EMERGENCY STOP TRIPS (紧急停止警报)”不会单独记录为警报, 而只显示第一次警报。

图 9: 警报历史记录屏幕

100 PSI		-TRIP HISTORY-	
READY TO START		TRIP HISTORY 1 BLOWER MOTOR OVERLOAD	
		TRIP HISTORY 2 HIGH AIREND DISCH TEMP	
STATUS	MAIN MENU	SELECT	

使用上、下箭头按钮在“Trip History (警报历史记录)”列表中移动即可查看最近的 15 次警报信息。当某个警报记录被高亮显示时按下“SELECT (选择)”按钮, 将会显示该次警报发生时的设备值列表。

使用箭头按钮在列表中上下移动可查看以下每个选项所列的名称和值。按下“TRIP HIST. (警报历史记录)”按钮将使屏幕返回“TRIP HISTORY (警报历史记录)”屏幕。

按下“STATUS (状态)”或“MAIN MENU (主菜单)”按钮可退出警报历史记录。如果 30 秒钟内没有按下任何按钮, 则显示屏幕将返回到“CURRENT STATUS (当前状态)”屏幕。

■ 时钟功能

图 10: “Clock Functions (时钟功能)”屏幕

100 PSI		-CLOCK FUNCTIONS-	
READY TO START		Time 01:15	
		Date Jan 01, 00	
STATUS	MAIN MENU	SELECT	

可通过“CLOCK FUNCTIONS (时钟功能)”屏幕设置实际时钟的日期和时间。使用上下箭头高亮显示“TIME (时间)”或“DATE (日期)”。按“SELECT (选择)”可选择高亮显示的设置。

如果选择“TIME (时间)”, 则首先会高亮显示小时。使用上下箭头调整小时数 (00-23 时)。显示正确的时间后, 按下“SET (设置)”高亮显示分钟。调整分钟 (00-59), 然后按下“SET (设置)”, 完成时间设置。

如果选择“DATE (日期)”, 则首先会高亮显示月。使用上下箭头调整月份, 然后按下“SET (设置)”高亮显示日。显示正确的日后, 按下“SET (设置)”高亮显示年份。显示正确的年份后, 按下“SET (设置)”, 完成日期设置。

■ 能量状态信息

图 11: “Energy Status Message (能量状态信息)”屏幕

100 PSI		-ENERGY STATUS-	
READY TO START		AVERAGE PACKAGE kW HRS	
		AVERAGE % CAPACITY-	
		-AVERAGE CAPACITY	
STATUS	MAIN MENU	SELECT	

按下“ENERGY STATUS (能量状态)”按钮可选择“Energy Status (能量状态)”屏幕。以下项目和当前值可通过按压上箭头及下箭头按钮, 显示在屏幕的右侧。

“AVERAGE PACKAGE kW HOURS (平均机组千瓦小时)” - 它显示了通过选择复位平均设定点所开始的时期内, 机组的平均每小时千瓦值。该值包含风扇的耗电量。

“AVERAGE % CAPACITY (平均功率百分比)” - 显示了通过选择复位平均设定点所开始的时期内, 压缩机的平均功率百分比。此值的计算方法

是: 平均机组功率 (千瓦) 减去离心风扇用电量, 然后除以该型号的压缩机以 100% 功率运行时电机的功率 (千瓦)。

“AVERAGE CAPACITY (平均功率)” - 显示了通过选择复位平均设定点所开始的时期内, 压缩机每 cfm 或每立方米的平均功率。

“ENERGY COST (能源成本)” - 显示了通过选择复位平均设定点所开始的时期内, 压缩机的能源成本。计算方法是, 将电机与风扇的千瓦小时乘以能源价格。

“ENERGY SAVINGS (节能)” - 显示了通过选择复位平均设定点所开始的时期内, 压缩机与压缩机相比所节约的能源。此值的计算方法是, 首先计算常规压缩机电机以相同的平均功率运行时的消耗, 然后从中减去 VSD 压缩机的电机能量消耗。假设两个机组的风扇成本相同。

“LIFETIME ENERGY SAVINGS (使用期节能)” - 显示了以目前的能源价格及平均功率百分比计算, 压缩机与传统压缩机相比, 在整个使用期内节约的能源。

■ 警告

当出现警告时, 显示屏上将会闪烁大大的问号。

如果存在多个警告, 则在屏幕的右上角将出现小的上/下箭头。按下下箭头按钮可查看多个警告。按下“STATUS (状态)”按钮将显示“CURRENT STATUS (当前状态)”屏幕, “WARNING (警告)”按钮表明“WARNING (警告)”仍然存在。

只有一个警告不会导致机组关闭。设备将继续正常运行, 警告将持续显示直至复位。

警告需要由操作人员按下“RESET (复位)”按钮两次进行复位。

可能的警告信息如下:

“HIGH AIREND DISCHARGE TEMP (高空气端排放温度)” - 当空气端排放温度超过 105° C (221° F) 且无法调整时, 将会出现此信息。

“CHANGE COOLANT FILTER (更换冷却剂过滤器)” - 当高端压力比低端压力高 1.4 bar (20 psig) 时, 将会出现此信息。

“CHANGE INLET FILTER (更换进口过滤器)” - 当进口真空度大于 0.05 bar (0.7 psig) 时, 将会出现此信息。

“CHANGE SEPR ELEMENT (更换分离器元件)” - 当分离器压差为 1.0 bar (12 psig) 时, 将会出现此信息。

“SENSOR FAILURE (传感器故障)” - 当检测到传感器缺乏或损坏时, 将会出现此信息。

“HIGH DISCHARGE PRESS (高排放压力)” - 当设备由 ISC 等外部装置控制且排放压力大于立即停机压力时, 将会出现该警告信息。

“AUXILIARY WARNING (辅助警告)” 1 或 2 - 当辅助警告输入关闭, 将会出现此信息。

“REMOTE PRESSURE SENSOR FAILURE (远程压力传感器故障)” (可选) - 当远程压力传感器发生故障时, 将会出现此信息。如果发生这种情况, 微控制器将使用机组排放压力传感器启动以测量系统压力。

“CONDENSATE DRAIN ERROR (冷凝液排放错误)” - 对于装有无损耗排放弯管的设备, 如冷凝液排放错误接触器在设备运行时关闭, 将会出现此信息。

“HIGH VSD AMBIENT TEMPERATURE (高 VSD 环境温度)” - 当 VSD 环境温度在停机值的 5% 以内时, 将会出现该警告信息。

“HIGH SUMP PRESSURE (高油槽压力)” - 如果压缩机运行、变热、机组排放压力至少为 4.5 bar (65 psi)、油槽压力比目标压力大 1 bar (15 psi), 将会出现此信息。出现该警告将使控制器判断是否需要降低压缩机的速度。

■ 维修警告

“SERVICE (维修)” - 依据总运行时间, 当设备运行了一定时间后, 将会出现维修警告。维修警告可有多个级别, 具体取决于维修级别的选择。

此级别在压缩机出厂前就已设定。发生维修警告时, 请联系您当地的 Ingersoll Rand 服务提供商。

■ 初始检查警报:

仅当设备不运行时才出现以下警报。这些警报与高温、断电和传感器校准有关。它们与其他警报的显示模式相同。

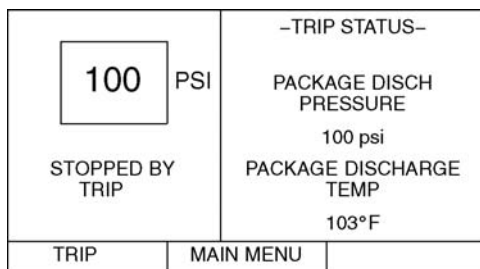
“HIGH AIREND DISCH TEMP (高空气端排放温度)” - 当空气端排放温度高于 109° C (228° F) 的 95% 时, 将会出现此信息。

“CHECK SETPOINTS (检查设定点)” - 当控制器认为内存中存储的某些数据包含不合规定的值时, 将会出现此信息。

“INVALID CALIBRATION (无效校准)” - 当传感器零位值介于 -10% 至 +1% 范围时, 将会出现此信息。请参阅“传感器校准”。

■ TRIPS (警报)

图 12: 警报屏幕



当出现警报时, 显示屏上将会在一个三角形中闪烁大大的感叹号。显示的信息将表明引起警报的原因。

在警报状态消失并且警报信息复位前, 压缩机将停机且无法再重启。

按下“STATUS (状态)”按钮将显示“STATUS (状态)”屏幕。出现“TRIP (警报)”按钮表示仍然存在警报状态。“TRIP STATUS (警报状态)”是发生警报时的设备操作状态列表。

使用箭头按钮在列表中上下移动可查看列出的每个项目的名称和值。按下“TRIP (警报)”按钮将使显示屏返回到“TRIP (警报)”屏幕和“RESET (复位)”按钮。

操作人员需要按两次“RESET (复位)”按钮才能使警报复位。任何例外情况均在警报描述中进行说明。

可能的警报信息如下:

“EMERGENCY STOP (紧急停止)” - 如按下了“Emergency Stop (紧急停止)”按钮, 将会出现该信息。松开该按钮后, 才会清除警报。

“BLOWER FAULT (风扇故障)” - 如检测到风扇发生故障, 将会出现此信息。

“HIGH AIREND DISCH TEMP (高空气端排放温度)” - 当空气端排放温度高于 109° C (228° F) 时, 将会出现此信息。

“REMOTE START FAILURE (远程启动故障)” - 当设备运行后按下“Remote Start (远程启动)”按钮或“Remote Start (远程启动)”按钮处于关闭状态时, 将会出现该信息。

“REMOTE STOP FAILURE (远程停机故障)” - 当“Remote Stop (远程停机)”按钮处于打开状态并按下任一“Start (启动)”按钮时, 将会出现该信息。

“SENSOR FAILURE (传感器故障)” - 当检测到传感器缺乏或损坏时, 将会出现此信息。

“VSD FAULT (VSD 故障)” - VSD 故障从驱动器读取。微控制器将读取变速驱动器的状态菜单。如果故障状况以状态信息的形式返回, 则微控制器将发出“VSD FAULT (VSD 故障)”警报并显示故障状况的编号。

“STOP FAILURE (停机故障)” - 当发出停机信号后, 压缩机应当停机但电机运行速度仍高于最低速度 4 秒时, 将会出现此信息。

“HIGH START PRESSURE (高启动压力)” - 当压缩机启动时, 如油槽压力高于 6.9 bar (100 psi), 微控制器将在刚启动的几秒钟内 (3 至 7 秒) 打开放气阀。如在此期间, 油槽压力未降至 6.9 bar (100 psi), 则将发生此类停机。

“CHECK MOTOR ROTATION (检查电机旋转)” - 如果微控制器在启动时从 VSD 读出负速度, 则会出现此信息。

“VSD COMMUNICATION FAILURE (VSD 通讯故障)” - 如果微控制器在请求信息时从未从 VSD 收到响应, 则会出现此信息。警报需要 8 秒才会出现。

“VSD INITIALIZATION FAULT (VSD 初始化故障)” - 当通电后, 微控制器无法与 VSD 建立通讯时, 将会出现此信息。

“LOW SUMP PRESSURE (低油槽压力)” - 当压缩机以最低速度或高于最低速度运行且油槽压力降至 1 bar (15psi) 达 15 秒时, 将会出现此信息。

“REPLACE COOLANT FILTER (更换冷却剂过滤器)” - 当冷却剂过滤器阻塞并需要更换时, 将会出现此信息。

“INCORRECT VSD TYPE (VSD 类型错误)” - 如果 VSD 类型与压缩机型号不匹配时, 通电后将会出现此信息。

“CONTROL POWER LOSS (控制电源损失)” - 当压缩机应当运行且 VSD 显示的交流输入电压降至 100 VAC 以下时, 将会出现此信息。一旦迅速恢复通电, 此警报将延迟 2 秒。相位监视器也会导致此警报。

“HIGH INTERSTAGE PRESSURE (高级间压力)” - 如果装置运行时中间级压力大于 7 bar (100 psi) 且装置为两级装置时将会出现此信息。

“HIGH COOLANT FILTER PRESSURE DROP (高冷却剂过滤器压降)” - 在装置至少运行了 7 秒、压缩机已热、已出现更改冷却剂过滤器警告、电机运行且冷却剂过滤器压降大于 2.5 bar (35 psi) 时, 将会出现此信息。

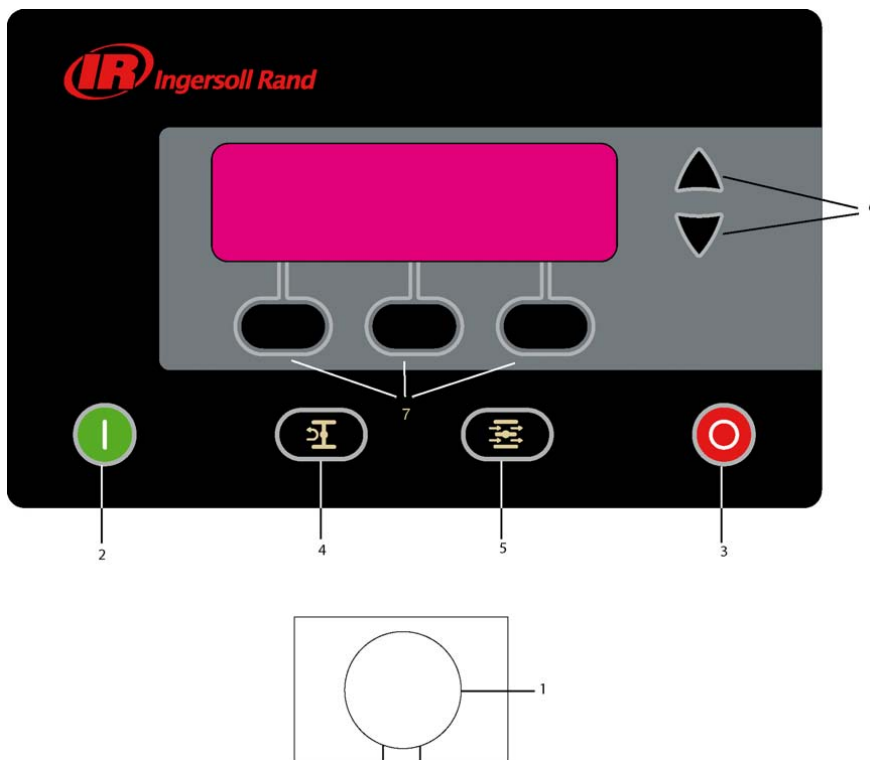
“HIGH INLET VACUUM (高进口真空度)” - 在压缩机载荷运行、监视器运行且进口真空度大于 0.1 bar (1.8 psi) (真空) 时, 将会出现此信息。

“HIGH SUMP PRESSURE (高油槽压力)” - 在压缩机运行、已热且存在以下三个条件之一时, 将会出现此信息。

1. 油槽压力比最大脱机压力高 25 psi。
2. 测量的分离器压降大于 25 psi 且机组排放压力至少为 65 psi。
3. 油槽压力高于 170 psi。

恒速 (FS) 的操作说明

图 13: 控制器接口



■ SG 微控制器控制 (FS)

1. 紧急停止

按此开关可立即使压缩机停止工作。除非手动复位此开关，否则不能重启压缩机。沿顺时针方向旋转开关手柄，进行复位。

控制器显示屏将亮起，表明管道和控制电压是可用的。

2. 启动

如果显示屏显示“READY TO START (准备启动)”，按此按钮将启动压缩机。如果对于空气有足够的需求，压缩机将启动并加载。

3. 停机

按此按钮将激活卸荷停机顺序。如果压缩机载荷运行，则将卸荷并继续空载运行 10 到 30 秒后停止运转。如果压缩机运行于卸荷状态，则会立即停机。

4. 卸荷

按此按钮将使压缩机卸荷并保持卸荷状态。显示屏将显示设备为“RUNNING UNLOADED (空载运行)”状态及“MODE:UNLOAD (模式:卸荷)”。

5. 载荷

如果压缩机正在运行、“DISCHARGE PRESSURE (排放压力)”小于“ONLINE PRESSURE (联机压力)”，则按下此按钮将使压缩机载荷。此外，还将使设备返回到“MODE OF OPERATION (操作模式)”设定点说明的操作模式。

其它五个按钮提供了可由操作人员选择的各种功能和设备工作状态。每个按钮的用途在显示屏及当时执行的具体功能上有说明。

6. 箭头

这些向上和向下按钮具有与显示屏右半部分相关的多种功能。当显示列表时，使用这些按钮可在列表中的项目间上下移动。显示在显示屏右上角的小箭头表明这时可在列表中向上（箭头指向上时）和/或向下（箭头指向下时）移动。

在显示屏上选中某一设备运行参数值，可使用这些按钮来更改该值。

7. 显示按钮

显示屏下的三个按钮的功能会发生变化，这些按钮功能的定义是显示在屏幕最底部这些按钮上方的一些文字。每个功能（例如，“MAIN MENU [主菜单]”、“STATUS [状态]”等）都在本手册相应的章节有讲述。

■ 显示屏

图 14: 显示屏

7.5 barg		-CURRENT STATUS-	
		PACKAGE DISCHARGE TEMP	
		39°C	
RUNNING LOADED		AIREND DISCHARGE TEMP	
MODE: MOD/ACS		89°C	
		MAIN MENU	

显示屏分为三个功能区，如此处典型的“CURRENT STATUS (当前状态)”屏幕所示。

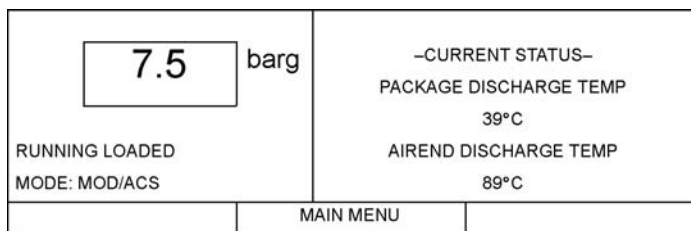
左边始终以大号数字显示机组排放压力，表明设备的运行状态，往下一行显示的是当前操作模式。

右侧显示各种项目或列表，例如机器的“CURRENT STATUS (当前状态)”读数、“MAIN MENU (主菜单)”、“OPERATOR SETPOINTS (操作人员设定)”列表等。其中任何一个列表均可以通过按压屏幕右侧的箭头按钮上移或下移。显示在屏幕右上角的小箭头表明这时可在列表中上下移动。箭头按钮还可用于更改单个项目的值。某些时候，项目和/或它的值会“高亮显示”。这表示它们是在深色背景上以淡色字体显示。

屏幕底部分为三部分，每个小框中的文字显示了紧挨屏幕下方的按钮的功能。这些框中的文字会根据某个特定时间点所允许的操作而改变。按这些按钮所触发的操作在本节后面的“操作人员面板流程图”中有说明。可将它作为快速参考来了解如何操作控制器屏幕，以进入需要的功能。

■ 当前状态

图 15：当前状态屏幕



“CURRENT STATUS（当前状态）”屏幕被认为是控制器显示的“正常”屏幕。

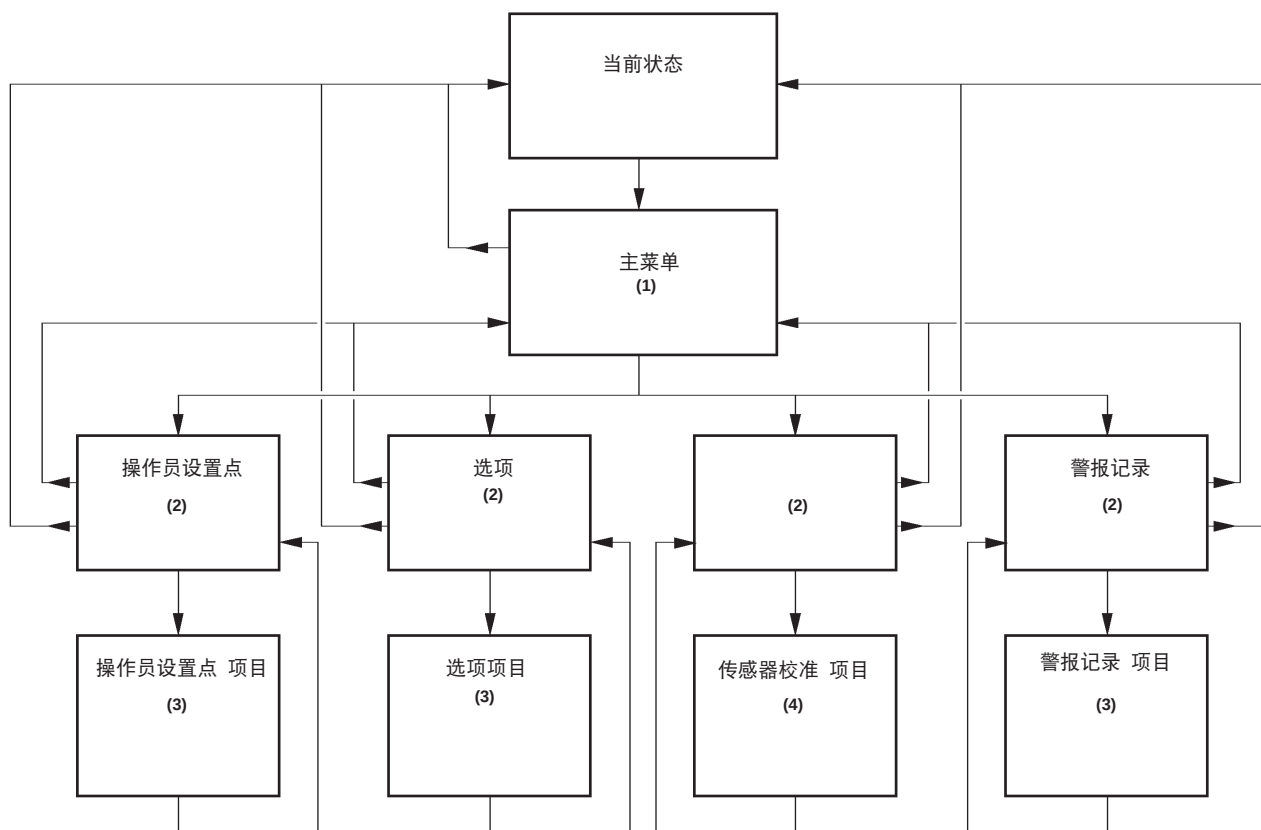
以下项目和当前值可通过按压上箭头及下箭头按钮，显示在屏幕的右侧。

“CURRENT STATUS（当前状态）”项目

- Package Discharge Temperature（机组排放温度）
- Airend Discharge Temperature（空气端排放温度）

- Injected Temperature（注入温度）
- Sump Pressure（分离前压力）
- Separator Pressure Drop（分离器压降）
- Coolant Filter（冷却剂过滤器）
- Coolant Filter IN PR（冷却剂过滤器进口 PR）
- Coolant Filter OUT PR（冷却剂过滤器出口 PR）
- Inlet Vacuum（进口真空度）
- Inlet Filter（进口过滤器）
- Total Hours（总时间）
- Loaded Hours（载荷时数）
- Software Title and Version（软件名称与版本）

图 16：操作人员面板流程图



如果 30 秒内未按下任何按钮，则控制器自动将显示屏从其他屏幕返回到“CURRENT STATUS（当前状态）”屏幕。

可通过在“CURRENT STATUS（当前状态）”屏幕中按下“MAIN MENU（主菜单）”按钮进入“MAIN MENU（主菜单）”屏幕，在屏幕最底行紧靠正中按钮上面可以看到“MAIN MENU（主菜单）”字样。

注意

使用“UP（上）”和“DOWN（下）”箭头，在各个选项之间移动。项目将以反向显示模式高亮显示。

(1) 选择高亮显示的项目将显示相应的菜单。

(2) 选择高亮显示的项目将使值进入编辑模式。这可以从只有值被反向显示上看出。

(3) 通过上下箭头可改变值。

按下“Cancel（取消）”会退出编辑模式并保持值不变。

按下“Set（设置）”会保存新值并使值闪烁以表明接受。

(4) 按下“Cancel（取消）”会退出校准模式。

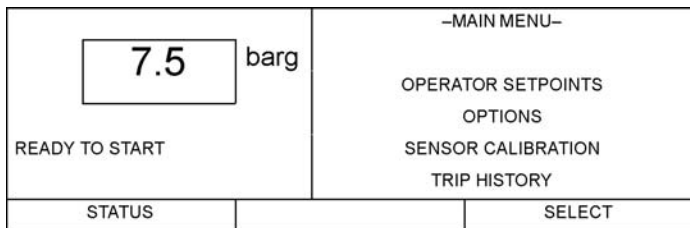
按下“Calibrate（校准）”会校准选定的传感器。

确保首先使设备停止运行并完全卸压。

(5) 使用“UP（上）”和“DOWN（下）”箭头，滚动查看状态项目列表。

■ 主菜单

图 17: 主菜单屏幕



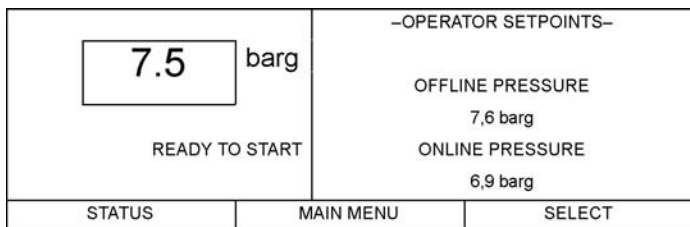
“MAIN MENU（主菜单）”屏幕是访问各种操作人员功能的进口。参阅“操作人员面板流程图”。

每个功能都可使用上、下箭头在屏幕上高亮显示进行选择。

如果按下“SELECT（选择）”按钮，控制器将进入高亮显示的功能，或者如果按下“STATUS（状态）”按钮，将返回到“CURRENT STATUS（当前状态）”屏幕。

■ 操作人员设定点

图 18: “Operator Setpoint（操作人员设定点）”屏幕



设定点是控制器逻辑中可由用户使用“PERATOR SETPOINTS（操作人员设定点）”屏幕进行调整的变量。

使用箭头键在列表中上下移动，可在屏幕上查看下列的每个设定点的名称和值。

表 6: 操作人员设定点设置

操作人员设定点	范围	步长	单位
脱机压力	75 至额定 +10	1	PSIG
联机压力	65 至脱机 -10	1	PSIG
操作模式	MOD/ACS, 联机/脱机, 仅调制		
冷凝液排放	2 至 20	1	秒
冷凝液变换器	90 至 270	1	秒
停机延迟时间	10 至 30	1	秒
Star-Delta 时间*	5 至 30	1	秒
（屏幕）对比度	0 至 10	1	-

*不适用于管路启动器的自动启动。

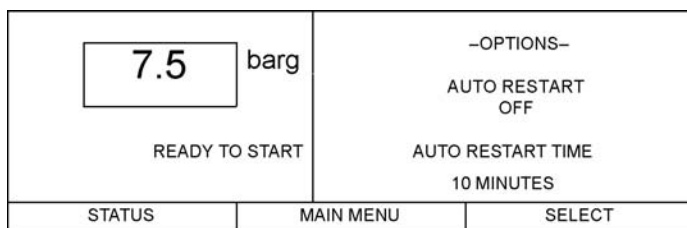
与选项相关的设定点在“OPTIONS（选项）”部分描述。

可首先选中项目及其值并按“ELECT（选择）”按钮仅高亮显示该值，以更改此设定点的值。如果该数值行本来就自己高亮显示，只需使用上下箭头按钮即可调整此值。此时会出现“CANCEL（取消）”和“SET（设置）”按钮。按下“SET（设置）”按钮可键入新值，或按下“CANCEL（取消）”按钮可返回到使用箭头按钮之前的设定点的值。所显示的值将闪烁两次，表明该值已进入设定点，并且设定点项目和值的显示行将重新一起高亮显示。

按下“STATUS（状态）”或“MAIN MENU（主菜单）”按钮可退出操作人员设定点。如果 30 秒钟内没有按下任何按钮，则显示屏将返回到“CURRENT STATUS（当前状态）”屏幕。

■ 选项

图 19: 选项屏幕



可以打开或关闭选项，选项值使用“OPTION（选项）”屏幕进行设置。

某些选项需要其他机器硬件与正确的“可选模块”来插入微控制器。关于选项操作的说明请参阅后文。使用箭头按钮在列表中上下移动可查看以下每个选项所列的名称和值。

表 7: 选项设置

选项项目	范围	步长	单位
Power Out Restart（电源中断重启）	开/关	-	-
Power Out Restart Time（电源中断重启时间）	10 至 600	1	秒
Low Ambient（低环境温度）	开/关	-	-

选项项目的值可使用与更改“OPERATOR SETPOINTS（操作人员设定点）”值一样的方法进行更改。

可选功能

压缩机按需求变化在“联机-脱机”与调制之间切换时，调制硬件会将控制类型扩展为调制（容量控制）与自动控制系统。

如果遇到温度过高、电荷过载或系统压力过大的情况，压缩机将会停止运行，这时会提供操作的安全模式。

低环境要求选项（标准和增强型压缩机）

当安装并选择了低环境温度选项且空气端排放温度经测量在 2°C (35°F) 或以下时，压缩机将在接到指令时启动，但直至空气端排放温度高于 2°C (35°F) 时才会载荷。一旦达到条件，控制器将调节风扇转速，以维持适当的操作温度。在没有安装低环境选项时，如果空气端排放温度低于 2°C (35°F)，机器不会启动。

注意

如安装了 PORO 或“Scheduled Start/Stop（计划启动/停机）”，则必须安装另外的硬件，以提供醒目的警告，防止出现重启。联系 Ingersoll Rand，了解详情。

电源中断重启选项 (PORO)

（取决于安装操作和/或安装控制）

要执行 PORO，应安装电源中断重启选项，并且电源中断重启设定应设为开。如果压缩机运行时断电或在自动启动/停机模式下停机，则控制器将在内存中存储当前开启状态。

当电源恢复时，控制器将给报警器加电，并启动显示屏上的倒计时秒。红色 LED 闪烁表示警告，同时报警器在 PORO 时间设定点时响起数秒。在倒计时秒结束时，报警器响声停止，压缩机将启动。

通过按下用户界面上的停止/重启按钮，可随时停止 PORO 倒计时秒。按下任意按钮都会使报警器停止响声，并停止倒计时秒。在准备开始模式中不会正常启动控制。

■ 传感器校准

图 20: 传感器校准屏幕

7.5 barg READY TO START			-SENSOR CALIBRATION- SENSOR 1AVPT CALIBRATE SENSOR 3APT CALIBRATE		
STATUS	MAIN MENU	SELECT			

可通过“SENSOR CALIBRATION（传感器校准）”屏幕进行压力传感器校准。只有停机后才能进行传感器校准。只有在传感器或微控制器已更换后才需要进行校准。

下列每种传感器均可使用上、下箭头在屏幕上高亮显示后进行选择。

传感器校准项

- 传感器 1AVPT
- 传感器 3APT
- 传感器 4APT
- 传感器 5CPT
- 传感器 6CPT

按“SELECT（选择）”按钮可选择高亮显示的传感器。按“CALIBRATE（校准）”按钮可启动自动校准过程，按“CANCEL（取消）”按钮不进行校准并返回到传感器列表。

按“STATUS（状态）”或“MAIN MENU（主菜单）”按钮可退出校准屏幕。如果 30 秒钟内没有按下任何按钮，则显示屏幕将返回到“CURRENT STATUS（当前状态）”屏幕。

■ SCHEDULED START / STOP（计划启动/停机）

（取决于安装选项和/或安装控制）

计划的启动/停止选项可在指定的时间启动和停止压缩机。通过在计划启动/停止时间/关设定点内选择需要的模式，可打开和关闭该操作模式。

在启用时，警报器将会响起 10 秒以警示周边所有人压缩机即将启动。显示屏上会显示警告信息“Scheduled Start in X seconds（在 X 秒内会按计划启动）”，此处“X”是从 10 到 0 的倒数计时。在 10 秒钟后，只要压缩机未出现故障或未按下停止/重启按钮手动停止，压缩机就会自动启动。

在发生计划停止时，可通过按下控制面板启动按钮或关闭远程启动信号来手动重启压缩机。

■ TRIP HISTORY（警报历史记录）

图 21: 警报历史记录屏幕

7.5 barg READY TO START			- TRIP HISTORY - TRIP HISTORY 1 MAIN MOTOR OVERLOAD TRIP HISTORY 2 HIGH AIREND DISCH TEMP		
STATUS	MAIN MENU	SELECT			

“TRIP HISTORY（警报历史记录）”显示了设备最近 15 次的警报信息。它还可显示每次警报时设备的运行状况。首先显示的“TRIP HISTORY 1（警报历史记录 1）”是最近发生的一次警报。注意，多次、连续的“EMERGENCY STOP TRIPS（紧急停止警报）”不会单独记录为警报，而是只显示第一次警报。

使用上、下箭头按钮在“Trip History（警报历史记录）”列表中移动即可查看最近的 15 次警报信息。当某个警报记录被高亮显示时按下“SELECT（选择）”按钮，将会显示该次警报发生时的设备值列表。

图 22: 警报历史记录屏幕详细信息

7.5 barg READY TO START		- TRIP HISTORY 1 - PACKAGE DISCH PRESSURE 14,2 barg PACKAGE DISCHARGE TEMP 54°C	
STATUS	MAIN MENU	TRIP HIST.	

使用箭头按钮在列表中上下移动可查看下列每个项目的名称和值。按压“TRIP HIST.（警报历史记录）”按钮将使屏幕返回“TRIP HISTORY（警报历史记录）”屏幕。

“TRIP HISTORY（警报历史记录）”项目

- Package Discharge Pressure（机组排放压力）
- Coolant Filter（冷却剂过滤器）
- Package Discharge Temperature（机组排放温度）
- Inlet Vacuum（进口真空度）
- Airend Discharge Temperature（空气端排放温度）
- Inlet Filter（进口过滤器）
- Injected Temperature（注入温度）
- Total Hours（总时间）
- Sump Pressure（分离前压力）
- Loaded Hours（载荷时数）
- Separator Press. Drop（分离器压降）
- % Load Modulation（载荷调制百分比）

按下“STATUS（状态）”或“MAIN MENU（主菜单）”按钮可退出警报历史记录。如果 30 秒钟内没有按下任何按钮，则显示屏幕将返回到“CURRENT STATUS（当前状态）”屏幕。

当出现警告时，显示屏上将会闪烁“WARNING（警告）”字样，并显示上述的大号文字。显示的信息将表明引起警告的原因。

图 23: 警告屏幕

7.5 barg RUNNING UNLOADED MODE: MOD/ACS			WARNING CHANGE INLET FILTER PRESS RESET TWICE		
STATUS	MAIN MENU	RESET			

如果存在多个警告，则在屏幕的右上角将出现小的上/下箭头。按上下箭头按钮可查看多个警告。按下“STATUS（状态）”按钮将显示“CURRENT STATUS（当前状态）”屏幕，“WARNING（警告）”按钮表明“WARNING（警告）”仍然存在。

图 24: 带警告的状态屏幕

7.5 barg RUNNING UNLOADED MODE: MOD/ACS			-CURRENT STATUS- PACKAGE DISCHARGE TEMP 39,4°C AIREND DISCHARGE TEMP 89,4°C		
WARNING	MAIN MENU				

按下“TRIP（警报）”按钮将使显示屏返回到“TRIP（警报）”屏幕和“RESET（复位）”按钮。

警告需要由操作人员按下“RESET（复位）”按钮两次进行复位。

可能的警告消息如下：

“AIREND DISCHARGE TEMP（空气端排放温度）” - 如果空气端排放（2ATT）超过警告限值（228° F（109° C））的 97%、无法进行调节，将会出现该警告信息。

“CHANGE COOLANT FILTER（更换冷却剂过滤器）” - 如果高端压力比低端压力 1 DPS 高 20 psig（1,4 bar）、注入冷却剂温度（2CTT）大于 120° F（49° C），将会出现该警告。

“CHANGE INLET FILTER（更换进口过滤器）” - 如果进口真空度（1AVPT）大于 0,7 psig（0,05 bar）、设备完全载荷（进气阀完全打开），将会出现该警告信息。

“CHANGE SEPR ELEMENT（更换分离器元件）” - 如果分离器（3APT）压力比机组排放（4APT）压力高 15 psig（1,0 bar）、设备完全载荷时，将会出现该警告

“HIGH DISCHARGE PRESS（高排放压力）” - 如果设备载荷功能由定序器或 ISC 等主机装置控制，将会出现该信息。当机组排放压力大于最大脱机压力（额定压力加 3 psig [0,2 bar]）超过 3 秒时，将会出现该警告。该警告将导致压缩机卸荷。主机装置将在机组排放压力降至设备额定压力值后才能使压缩机载荷。

“SENSOR FAILURE 4ATT（传感器故障 4ATT）” - 如果机组排放温度传感器（4ATT）缺少或损坏，将会显示该信息。

TRIPS（警报）

当出现警报时，显示屏上将会闪烁“TRIP（警报）”字样，并显示上述的大号文字。显示的信息将表明引起警报的原因。

图 25：警报屏幕

7.5 barg STOPPED BY TRIP MODE: MOD/ACS			TRIP HIGH AIREND DSCH TEMP 109,4°C PRESS RESET TWICE		
STATUS		MAIN MENU		RESET	

按下“STATUS（状态）”按钮将显示“STATUS（状态）”屏幕。出现“TRIP（警报）”按钮表示仍然存在警报状态。“TRIP STATUS（警报状态）”是发生警报时的设备操作状态列表。

图 26：警报屏幕详细信息

7.5 barg STOPPED BY TRIP MODE: MOD/ACS			- TRIP STATUS - PACKAGE DISCH PRESSURE 7,0 barg PACKAGE DISCHARGE TEMP 39,4°C		
ALARM		MAIN MENU			

使用箭头按钮在列表中上下移动可查看列出的每个项目的名称和值。按下“TRIP（警报）”按钮将使显示屏返回到“TRIP（警报）”屏幕和“RESET（复位）”按钮。

操作人员需要按两次“RESET（复位）”按钮才能使警报复位。任何例外情况均在警报描述中进行说明。

可能的警报信息如下：

“CHECK MOTOR ROTATION（检查电机旋转）” - 如果设备启动、压缩机旋转不正确，将会出现该信息。

“CONTROL POWER LOSS（控制电源损失）” - 如果控制器检测到损失了 110 V 交流控制电源，将会出现该信息。

“EMERGENCY STOP（紧急停止）” - 如果按下了“Emergency Stop（紧急停止）”按钮，将会出现该信息。松开该按钮后，才会清除警报。

“FAN MOTOR OVERLOAD（风扇电机过载）” - 如果检测到风扇电机过载，将会出现该信息。

“HIGH AIREND DISCH TEMP（高空气端排放温度）” - 当空气端排放温度高于 228° F（109° C）时，将会出现此信息。

“HIGH SUMP PRESSURE（高油槽压力）” - 如果油槽压力比脱机压力高 25 psig、油槽压降大于 25 psig，将会出现此信息。如果油槽压力大于 165 psig，也会出现该信息。

“LOW SUMP AIR PRESSURE（低油槽空气压力）” - 如果设备完全载荷运行、油槽压降低于 20 psig（1,4 bar），将会出现此信息。

“LOW UNLOAD SUMP PRESS（低空载油槽压力）” - 如果设备空载运行、油槽压力小于 15 psig（1,0 bar）15 秒，将会出现此信息。

“MAIN MOTOR OVERLOAD（主电机过载）” - 当检测到驱动电机过载时，将会出现此信息。

“MEMORY FAULT（内存故障）” - 当控制器认为内存中存储的某些数据包含不合规定的值时，将会出现此信息。当出现这种情况时，应校准传感器并检查所有的设定值。更换控制器软件后通常会出现这种警报。

“REMOTE START FAILURE（远程启动故障）” - 当设备运行后按下“Remote Start（远程启动）”按钮或“Remote Start（远程启动）”按钮处于关闭状态时，将会出现该信息。

“REMOTE STOP FAILURE（远程停机故障）” - 当“Remote Stop（远程停机）”按钮处于打开状态并按下任一个“Start（启动）”按钮时，将会出现该信息。

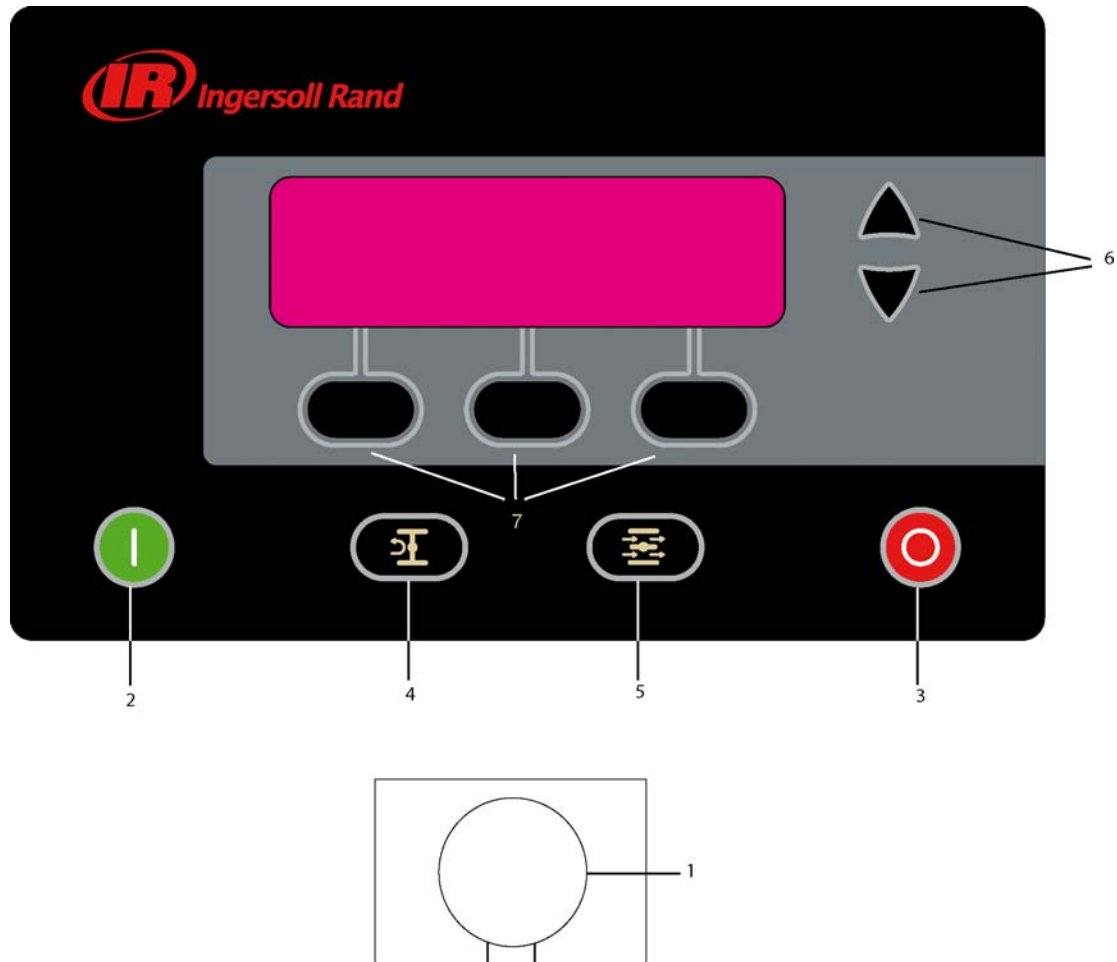
“SENSOR FAILURE（传感器故障）” - 当检测到传感器缺乏或损坏时，将会出现此信息。不适用于传感器 4ATT。

“HIGH INLET VACUUM（高进口真空度）” - 如果防尘系数较高的装置进口真空度大于 1.8 psig、阈值为 1.8 psig，将会出现此信息。

■ 开始之前

1. 查看观察孔/窥镜中冷却剂的液位。根据需要添加冷却剂。
2. 确保打开排放空气隔离阀。
3. 打开主电气隔离开关。指示器的电源将亮起，表明管路和控制电压可以使用。

图 27: 控制器接口



■ 启动设备

接通电源后，微控制器将执行一系列检查，显示屏上将显示“CHECKING MACHINE（检查设备）”信息。如果所有检查参数均合格，则显示屏将显示“READY TO START（准备启动）”。

按下微控制器装置上的启动按钮 (2)。设备将启动并自动载荷。

■ 停止设备运转

按下“STOP（停机）”按钮 (3)，将使压缩机自动卸荷 10 秒后才停机。

关闭主电气隔离开关。

■ 紧急停机

如果设备必须紧急停机，请按下紧急停止按钮 (1)。

这将覆盖正常的卸荷/停机按钮，并将立即使设备停止运转，而不会延迟 10 秒。

■ 紧急停止后重启

如果因机器故障而关闭了机组，请在尝试重启前找到并排除故障。

如果因安全原因而关闭了机组，请在重启前确保机器可以安全操作。

在重启设备前，请参阅本节前面的“启动前”及“启动设备”说明。

操作说明（XE 系列控制器）

■ 用户界面

控制器的标准用户界面配置包含膜和 LCD 显示屏。膜包含五个命令键（Start [启动]、Stop [停止]、Load [载荷]、Unload [卸荷] 和 Reset [重置]）、四个导航键（Up [上]、Right [右]、Left [左] 和 Down [下]）以及编辑模式选择键（Enter [确认]）。这些键与彩色图形显示屏和 LED 图标共同组成了压缩机的用户界面。

图 28：控制器接口



■ LED 状态图标

三个 LED 图标用于从远处表示控制系统的当前状态，并且位于用户界面的左上方。

表 8：LED 状态图标

图标	名称	功能
	确定	在未感应到警告或警报时亮起。可以处于“Ready（就绪）”或“Not Ready（未就绪）”状态。
	警报	在感应到警告（闪烁）或警报（常亮）时亮起。可以处于“Ready（就绪）”（警告）或“Not Ready（未就绪）”（警报）状态。
	自动	当压缩机在自动重启模式下停机时亮起。

■ 命令键

这些键可命令控制器执行操作，如下表中所指定。按下任何这些键时，将启动以下操作并记录在事件日志中

表 9：命令键

图标	名称	功能
	---	无
	载荷	将压缩机置于选定操作模式。如果压力状况正确，装置将载荷。
	卸荷	将压缩机置于卸荷状态。装置将以卸荷状态运行。
	复位	更正警告和警报条件后，会清除警告和警报。

图标	名称	功能
	启动	启动压缩机。
	停止	停止压缩机。应按下此按钮来正常停止工作而非急停。
	回车	使屏幕在导航模式和编辑模式间切换。

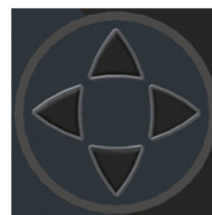
注意

变速压缩机上不使用“LOAD”（载荷）或“UNLOAD”（卸荷）键。

■ 导航键

有四个导航键“（UP [上]”、“RIGHT [右]”、“DOWN [下]”和“LEFT [左]”）。未考虑“ENTER（确认）”键作为导航键时，其将用于结合导航键进行选择或确认选择。

图 29：导航键



按下其中一个导航键将让用户沿导航路径移动。每次按下该键时，将执行路径中的其他步骤。一旦到达导航路径的终点，按下该键多次会将用户返回路径开头。按下相反的键，将让用户以相反的方向沿导航路径移动。到达开头后，按下相反的键会让用户移至路径终点。

■ 显示布局

图 30: 显示布局



表 10: 显示布局

图例	名称	说明
A	文件夹栏	使用选项卡以图形方式标示每个文件夹。
B	标题栏	标示当前文件夹和页面（带下划线）。
C	页面内容	当前页面的内容。
D	仪表盘	显示系统状态。

■ 文件夹导航和图标

要在 LCD 显示屏上显示的选项卡文件夹之间移动，请按“RIGHT（向右）”和“LEFT（向左）”键。导航从最后一个文件夹滚动至第一个文件夹，反之亦可。

表 11: 文件夹栏图标

文件夹名称	图标	说明
Home（主页）		系统性能和状态主要信息。控制器第一次通电时，此文件夹的第一个页面是默认页面。
Operator Settings（操作人员设置）		系统选项和配置设置。
Events（事件）		系统事件日志。
Trip History（警报历史记录）		有关最新警报的详细信息。
Graphing（图解）		板上图解系统数据。（某些控制器选装）
Maintenance（维护）		用于压缩机保养项目的状态和通知设置。
General Settings（常规设置）		常规设置，例如语言、时间和计量单位。
Integral Sequencing（积分定序）		模块间通信状态和配置。
Status（状态）		所有模拟和数字 I/O 的测量或状态
出厂设置		压缩机调节参数。还显示硬件和软件版本。

■ 页面导航

选择所需文件夹之后，按下“DOWN（向下）”键后会移至页面选择区域，然后使用“RIGHT（向右）”和“LEFT（向左）”键，来选择所需页面。使用“UP（向上）”键，返回文件夹选项卡。

表 12: 标题栏页面图标

图标	说明
	启动页面选择区域。
	表示向右导航可显示更多页面。
	表示向左导航可显示更多页面。

■ 访问参数

选择所需页面后，可以使用“DOWN（向下）”键选择页面的参数。每次按下“DOWN（向下）”键，光标将移至下一参数。使用“UP（向上）”键，返回上一参数。

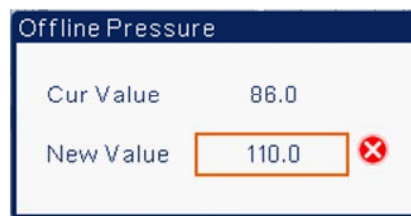
光标移动，因此在选择最后一个参数后，按下“DOWN（向下）”键会将光标导航至文件夹栏。如果选择第一个参数，则按下“UP（向上）”键会将光标移至页面选择区域。

选择后，可通过按下“ENTER（确认）”键，访问参数。使用导航键进行更改，然后通过再次按“ENTER（确认）”键确认设置。访问参数后，按下“ENTER（确认）”键可将当前设置输入控制体系，并将光标导航回在页面上选择的参数。

当光标处于具有启用/禁用框的参数上时，按下“ENTER（确认）”键将转换设置。

“x”图标显示在数字条目窗口上，如下所示。将光标放在图标上，然后按下“ENTER（确认）”键将取消条目以及所做的所有更改。

图 31: 数字条目窗口



注意

并非所有页面上都有可调整的参数。某些页面只有只读信息。

■ 仪表盘图标

仪表盘旨在快速查看系统状态。下表列出了标准仪表盘图标和这些图标的定义。请注意，这些图标的颜色根据运行时应用设置的状态更改。

表 13: 仪表盘图标

名称	图标	说明
网络控制		启用网络控制。
需要进行的维修		维修提醒将近或已过期（即：需要更换空气过滤器或滤油器）。
卸荷或载荷		压缩机处于卸荷状态。 压缩机处于载荷状态。

■ 文件夹选项（恒速）

■ 主文件夹

页码 1：系统概览

图 32：主文件夹



这是系统通电后的出厂默认显示。

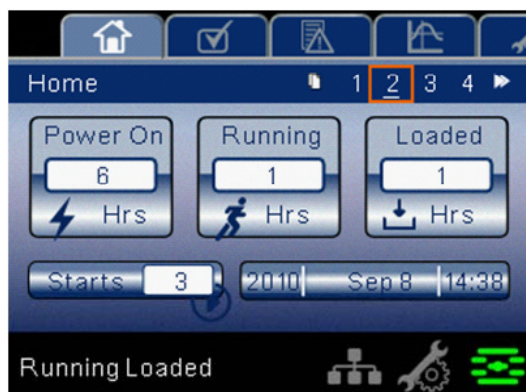
- **Online Pressure Setpoint（联机压力设定点）** 在白色框中以白色箭头表示，始终在测量计中心点左侧。
- **Offline Pressure Setpoint（脱机压力设定点）** 在白色框中以白色箭头表示，始终在测量计中心点右侧。
- **“Package Discharge Pressure（机组排放压力）”** 以测量计中心下的大数字并以红色箭头表示。
- **“Pressure Unit of Measure（压力计量单位）”** 在机组排放压力下指示。可从“General Settings（常规设置）”文件夹选择。
- **“Air End Discharge Temperature（空气端排放温度）”** 由显示屏左下部中的数字表示。
- **“Temperature Unit of Measure（温度计量单位）”** 在空气端排放温度右侧指示。可从“General Settings（常规设置）”文件夹选择。
- **“Run Hours（运行时间）”** 指示压缩机已运行的小时数。

注意

可在此页面中选择联机与脱机设定点并进行修改。此页面上的所有其他信息均为只读。

页码 2：计数器

图 33：计数器



- **“Hour Meters（小时表）”** 指示：控制器已通电、压缩机已运行、压缩机以载荷状态运行的小时数。
- **“Starts（启动数）”** 指示压缩机上尝试启动的次数。
- **Date & Time（日期和时间）** 在“GENERAL SETTINGS（常规设置）”文件夹中可调整且可配置。

第 3-4 页：模拟输入

图 34：模拟输入



图标	含义
	压力
	温度

注意

这些页面上的所有信息均为只读。

以下输入显示在该部分：

- Package Discharge Pressure（机组排放压力）
- Sump Pressure（分离前压力）
- Air End Discharge Temperature（空气端排放温度）
- Injected Coolant Temperature（注入冷却剂温度）
- Aftercooler Discharge Temperature（后冷却器排放温度）
- Separator Pressure Drop（分离器压降）
- Coolant Filter Pressure Drop（冷却剂过滤器压降）
- Inlet Vacuum（进口真空度）
- Aftercooler Discharge Pressure（后冷却器排放压力）（仅限集成干燥器装置）
- Remote Pressure（远程压力）（可选）

■ “Operator settings（操作人员设置）”文件夹

第 1-2 页：Operator Settings（操作人员设置）

图 35：Operator Settings（操作人员设置）

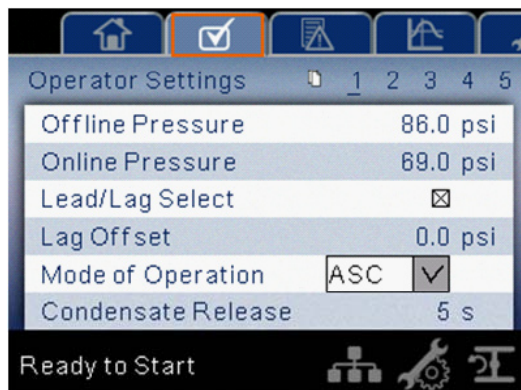


表 14: Operator Settings (操作人员设置)

第 3-5 页: 操作人员选项

Operator Settings (操作人员设置)	选择	最低	最大	默认	步长	单位
脱机压力	---	75	额定+10	额定+10	1	psi
联机压力	---	65	脱机-10	脱机-10	1	psi
超前/滞后	超前/滞后	---	---	超前	---	---
滞后偏移	---	0	45	0	1	psi
操作模式	模式	---	---	联机/脱机	---	---
冷凝液排放	---	2	20	5	1	秒
冷凝液间隔	---	90	270	180	1	秒
停机延迟时间	---	10	30	10	1	秒
Star-Delta 时间/启动时间	---	5	30	10	1	秒

图 36: 操作人员选项



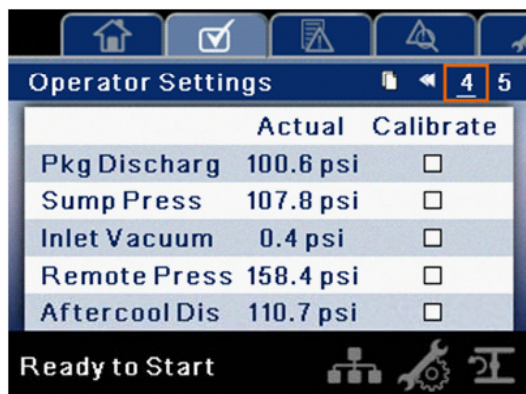
表 15: 操作人员选项

操作人员选项	选择	最低	最大	偏移	步长	单位	是否需要安装选项?
Enable Auto Restart (启动自动重启)	开/关	---	---	关闭	---	---	否
Auto Restart Time (自动重启时间)	---	2	60	10	1	最低	否
Auto Restart Delay (自动重启延迟)	---	0	60	0	1	秒	否
Comm Control (命令控制)	开/关	---	---	关闭	---	---	否
Remote Start/Stop (远程启动/停止)	开/关	---	---	关闭	---	---	否
Power Out Restart (电源中断重启)	开/关	---	---	关闭	---	---	是
Power Out Restart Time (电源中断重启时间)	---	10	600	10	1	秒	是
Low Ambient Temp (低环境温度) *	---	30	60	35	1	华氏度数	否
Lead/Lag Cycle Time (超前/滞后循环时间) **	---	0	750	0	1	小时	否
Scheduled Start - Day (计划启动 - 日期)	---	日	日	周日	1	日	是
Scheduled Start (计划启动)	---	00:00	23:59	00:00	1	时间	是
Scheduled Stop - Day (计划停机 - 日期)	---	日	日	周日	1	日	是
Scheduled Stop (计划停机)	---	00:00	23:59	00:00	1	时间	是
High Dust Filter (高尘过滤器)	开/关	---	---	关闭	---	---	否
Remote Sensor (远程传感器)	开/关	---	---	关闭	---	---	否

* 如果低环境出厂设定打开, 则低环境温度只可调整。

** 值为 0 将禁用超前/延迟循环时间功能。

图 37：传感器校准



只有停机后才能进行传感器校准。进行校准时，传感器上应没有压力。校准仅需要在更换传感器、控制器后或操作人员怀疑传感器读数有错误时进行。通过选择传感器名称旁边的复选框可对其进行校准。

以下列出的每个传感器均可以进行校准：

- Inlet Vacuum（进口真空度）(1AVPT)
- Sump Pressure（分离前压力）(3APT)
- Package Discharge Pressure（机组排放压力）(4APT)
- Coolant Filter Inlet Pressure（冷却剂过滤器进口压力）(5CPT)
- Coolant Filter Outlet Pressure（冷却剂过滤器出口压力）(6CPT)
- Remote Pressure（远程压力）(10APT) - 仅在具有远程传感器选件的装置上
- Interstage Pressure（中间级压力）(2APT) - 仅在 2 级装置上
- Aftercooler Discharge Pressure（后冷却器排放压力）(7APT) - 仅在具有集成干燥器的装置上

请注意，如果传感器当前读取的值与零相差其范围的 +/- 10%，则传感器将无法进行校准。请确保传感器在尝试校准之前暴露于空气中。

■ “EVENTS（事件）”文件夹

第 1-42 页（最大）

图 38：“Events（事件）”文件夹



事件文件夹中的页面最多记录控制器经历的最后 250 个事件，以及每个事件的时间戳记。这些事件按顺序记录，编号 1 为最新，编号 250 为最老。新事件发生时，则会成为编号 1，所有其他事件的编号均加 1。

标题栏中的页码用于翻阅事件，每页最多显示 7 个事件。第一页显示事件一至六，第二页显示事件七至十二，依此类推。

以下项目将生成事件：

- 开机
- 关机
- 按下“Start（启动）”键
- 按下“Stop（停止）”键
- 按下“Load（载荷）”键
- 按下“Unload（卸荷）”键
- 警告
- TRIP（警报）
- 启动禁止

活动警告将以琥珀色高亮显示，而清除的警告文本为琥珀色。

活动警报将以红色高亮显示，而清除的警报文本为红色。

活动的启动禁止将列在事件日志中，但不高亮显示。如果启动禁止处于活动状态，则显示屏将指示压缩机未准备好启动。

请参阅下表，了解有关每种事件中信息的详细信息。

警告事件列表

Change Inlet Filter（更换进口过滤器）

如果 1AVPT 大于 0.7 psi 真空度（或在高尘过滤器选项启用时大于 1.3 psi 真空度）、装置已至少载荷 8 秒，将会出现此信息。这一状况必须持续 3 秒，才会发布警告。

Change Coolant Filter（更换冷却剂过滤器）

如果装置已至少载荷运行 8 秒、已预热、冷却剂过滤器压降 (5CPT - 6CPT) 大于 25 psi，将会出现此信息。这一状况必须持续 3 秒，才会发布警告。

Sensor Failure（传感器故障）

只要传感器 4ATT、5DTT、6DTT 和 7APT 被视为缺少或损坏，就将出现此信息。传感器故障信息应遵循以下格式：SENSOR FAILURE 4ATT（传感器故障 4ATT）。仅在安装了集成干燥器（在出厂设置菜单中进行访问）时才会显示 5DTT、6DTT 和 7APT 传感器故障。这一状况必须持续 3 秒，才会发布警告。

Change Separator Element（更换分离器元件）

如果装置已载荷、预热（注入的冷却剂温度至少为 120 °F）、机组排放压力至少为 90 psi、分离器压降大于 12 psi，将会出现此信息。这一状况必须持续 3 秒，才会发布警告。

High Airend Discharge Temperature（高空气端排放温度）

如果装置正在运行、2ATT 大于 221 °F (228 的 97%)，将会出现此信息。这一状况必须持续 3 秒，才会发布警告。

High Sump Pressure（高油槽压力）

如果装置载荷运行、已至少载荷 8 秒、油槽压力比压缩机的额定压力高 25 psi 以上，将会出现此信息。如果出现此警告，联机与脱机压力将减少。例如，100 psi 的额定压力的最大脱机压力为 110 psi。如果在本例中油槽压超过 125 psi，将会出现此警告。这一状况必须持续 3 秒，才会发布警告。

Auxiliary 1（辅助 1）

如果辅助输入 1 关闭，将会出现此信息。触点必须至少闭合 3 秒，然后才会出现警告信息。

Auxiliary 2（辅助 2）

如果辅助输入 2 关闭，将会出现此信息。触点必须至少闭合 3 秒，然后才会出现警告信息。

Service (维修)

依据总运行时间，当设备运行了一定时间后，将会出现维修警告。维修警告可多个级别，具体取决于维修级别的选择。选择维修级别 0 将禁用维修警告。

Service Level 1 (维修级别 1)

如果为装置选择了维修级别 1，“SERVICE REQUIRED (需要维修)”警告将以等于维修时段设定点的时间间隔进行发布。与任何其他警告一样，此警告可以重置。

Service Level 2 (维修级别 2)

如果为装置选择了维修级别 2，则维修完成出厂设定点将用于清除级别 2 维修警告及重设维修时间或日期。在维修警告出现之前，可以先重设维修完成。

首次“SERVICE REQUIRED (需要维修)”警告将在总时间间隔等于维修时段设定点时出现。然而，在此之前的 100 个小时，将出现“100 HOURS TO SERVICE (100 小时后需要维修)”警告。与任何其他警告一样，此警告可以重置。一百小时之后将出现“SERVICE REQUIRED (需要维修)”警告。此警告可以像任何其他警告一样重置，然而，如果未设置维修完成出厂设定点，此警告将在 24 小时后返回。如果未设置维修完成，100 小时后，将发布“ALARM - SERVICE REQUIRED (警报 - 需要维修)”警告。此警告只能由维修完成出厂设定点清除。设置维修完成出厂设定点即表明维修已完成之后，下次“SERVICE REQUIRED (需要维修)”警告的时间将通过将维修时段添加到总小时数值来计算，并且“100 HOURS TO SERVICE (100 小时后需要维修)”警告在 100 个小时前出现且“ALARM - SERVICE REQUIRED (警报 - 需要维修)”警告在此之后 100 个小时出现。

Communication Failure (通讯故障)

如果装置为处于积分定序的超前压缩机、无法与其他装置通讯，将会出现此信息。

Sensor Failure 10APT - Remote Sensor (传感器故障 10APT - 远程传感器)

如果远程传感器选项处于打开状态、远程传感器被视为缺少或损坏，将会出现此信息。如果出现此信息，装置将使用 4APT 自动启动以载荷与卸荷压缩机。装有集成干燥器的装置无法具有远程压力传感器。这一状况必须持续 3 秒，才会发布警告。

High Discharge Pressure (高排放压力)

如果装置使用远程传感器或者由外部设备（例如 8XI）控制、已载荷、排放压力 (4APT) 大于最大脱机压力，将会出现此信息。这一状况必须持续 3 秒，才会发布警告。如果出现此状况，压缩机将自动卸荷。排放压力降至额定压力值后，此装置将可以重载。

Condensate Drain Error (冷凝液排放错误)

如果压缩机正在运行、机组排放压力超过 50 psi、冷凝液排放错误触点闭合至少 240 秒，将会出现此信息。此警告将在启动后被忽略 4.5 分钟。

Freeze Warning (冷冻警告)

如果在带集成干燥器的装置上干燥器运行时蒸发器传感器的值为 687 (大约 0.5 °C) 或以下 (低温)，将会出现此信息。这是干燥器故障。如果出现这种情况，压缩机将继续运行，但干燥器将停止。条件必须至少存在 180 秒，然后才会出现警告信息。注意：如果运行干燥器的条件存在时重置此警告，干燥器可以重启。如果蒸发器值升高到 709 (大约 5 °C)，干燥器也会重启。而警告仍会显示。

Dryer High Pressure (干燥器高压)

在带集成干燥器的装置上，这将在干燥器高压开关打开而干燥器正在运行时出现。这是干燥器故障。如果出现这种情况，压缩机将继续运行，但干燥器将停止。触点必须至少打开 3 秒，然后才会出现警告信息。如果运行干燥器的条件存在时重置此警告，干燥器可以重启。然而，此开关是锁定式开关。必须先重置开关，然后干燥器才能运行。重置显示屏上的警告不会重置开关。

Condenser Temperature High (冷凝器温度高)

如果在带集成干燥器的装置上干燥器运行时冷凝器传感器的值高于高温阈值，将会出现此信息。这不是干燥器故障。如果发生这种状况，压缩机与干燥器将继续运行。条件必须至少存在 180 秒，然后才会出现警告信息。

Condenser Temperature Low (冷凝器温度低)

如果在带集成干燥器的装置上干燥器运行时冷凝器传感器的值低于低温阈值，将会出现此信息。这不是干燥器故障。如果发生这种状况，压缩机与干燥器将继续运行。条件必须至少存在 180 秒，然后才会出现警告信息。

Change HE Filter (更换 HE 过滤器)

HE 过滤器位于后冷却器排放管与干燥器进口之间并且仅存在于带集成干燥器的装置上。HE 过滤器上的压差通过后冷却器排放压力中减去机组排放压力来进行计量。如果压缩机正在运行、HE 过滤器上测量的压差大于或等于 10 psi (0.7 bar)、装置已热 (注入冷却剂温度高于 120 °F)、机组排放压力 (4APT) 高于 90 psi，将会出现此警告。条件必须至少存在 3 秒，然后才会出现警告。这不是干燥器故障。如果出现这种情况，将显示警告，但干燥器将继续运行。

警报事件列表

LOW SUMP PRESSURE (低分离前压力)

如果装置卸荷或载荷运行、3APT 小于 13 psi 的状况持续了 15 秒，将会出现此信息。

High Aired Discharge Temperature (高空气端排放温度)

如果 2ATT 大于 228 °F、装置正在运行，将会出现此信息。

检查电机旋转

如果在启动 3 秒后某装置上 3APT 小于 1 psi (在装置装有软启动器或空气端排放温度低于 50 °F 时 6 秒)，将会出现此信息。此状况可能由电机反向运行导致。形成正确的电机旋转后，此警报将不再被检查，除非拔下控制器电源。

Main Motor Overload (主电机过载)

如果电机过载继电器触点打开，将会出现此信息。触点必须至少打开 3 秒，然后才会出现警报。

Fan Motor Overload (风扇电机过载)

如果风扇电机过载继电器触点打开，将会出现此信息。触点必须至少打开 3 秒，然后才会出现警报。

REMOTE STOP FAILURE (远程停止失败)

如果远程启动/停止选项启用、远程停止按钮保持打开状态、任一启动按钮按下，将会出现此消息。

REMOTE START FAILURE (远程启动失败)

如果远程启动/停止选项启用、装置由远程启动按钮启动、装置启动后按钮保持闭合 7 秒，将会出现此信息。

Sensor Failure (传感器故障)

当传感器被认为缺少或损坏时，将会显示此信息。受此警报影响的传感器有 1AVPT、3APT、4APT、5CPT、6CPT、2APT (如果为 2 级装置)、2CTT 和 2ATT。显示的传感器应带有传感器故障消息。传感器故障信息应遵循以下格式：SENSOR FAILURE 1AVPT (传感器故障 1AVPT)。

EMERGENCY STOP (紧急停止)

当按下紧急停止按钮时，将会出现此信息。

High Sump Pressure (高油槽压力)

如果压缩机至少载荷运行 8 秒、存在以下 3 个条件中的任何一个，将会出现此信息。(1) 油槽压力比额定压力高 35 psi。(2) 测量的分离器压降高于 25 psi，且机组排放压力至少等于最低联机设定值。(3) 额定压力低于 190 psi 时油槽压力高于 165 psi，或者额定压力为 190 psi 时油槽压力高于 220。

High Coolant Filter Pressure Drop (高冷却剂过滤器压降)

如果装置已至少载荷运行 8 秒、已预热、已出现更改冷却剂过滤器警告、冷却剂过滤器压降 (5CPT - 6CPT) 大于 35 psi，将会出现此信息。

High Inlet Vacuum (高进口真空度)

如果装置载荷运行、进、口真空度大于 1.8 psi，将会出现此信息。如果装置具有高尘过滤器，进口真空度的警报阈值为 2.4 psi。

Unit Too Cold To Start (装置太冷无法启动)

如果装置没有低环境选项、空气端排放温度 (2ATT) 小于 35° F、操作人员尝试启动压缩机，将会出现此信息。此故障每天只能发生一次。此故障发生后，操作人员可以进行重设并启动压缩机。此故障将记录到警报历史记录，表明装置要在低环境条件下启动。

High Interstage Pressure (高级间压力)

如果装置运行、中间级压力 (2APT) 高于 75 psi，将会出现此信息。此故障仅在 2 级装置中出现。

Invalid Calibration (校准无效)

如果传感器零值是其刻度范围的 +/- 10%，将会出现此信息。此信息仅会在校准传感器时出现。

启动禁止列表

High Airend Discharge Temperature (高空气端排放温度)

如果 2ATT 高于 228 ° F 的 95%，将会出现此信息。

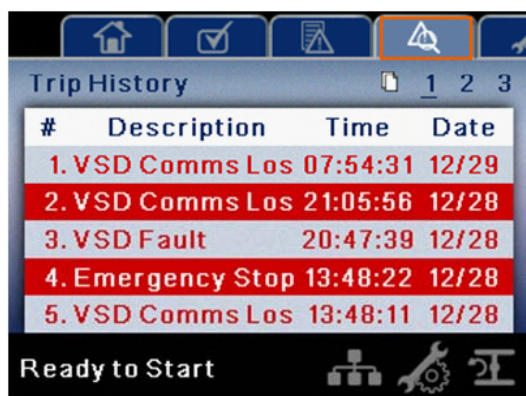
High Sump Pressure (高油槽压力)

如果油槽压力 (3APT) 为 25 psi 或高于压缩机额定压力，将会出现此信息。

TRIP HISTORY (警报历史记录)

第 1-4 页 (最大)

图 39: TRIP HISTORY (警报历史记录)



#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	VSD Comms Los	21:05:56	12/28
3.	VSD Fault	20:47:39	12/28
4.	Emergency Stop	13:48:22	12/28
5.	VSD Comms Los	13:48:11	12/28

“Trip History (警报历史记录)” 文件夹中的页面最多记录控制器经历的最后 15 个警报，以及每个警报的时间戳记。这些警报按顺序记录，编号 1 为最新，编号 15 为最老。新警报发生时，则会成为编号 1，所有其他警报的编号均加 1。

标题栏中的页码用于翻阅事件，每页最多显示 7 个事件。第一页显示事件一至五，第二页显示事件六至十，依此类推。

以下项目将生成事件。

- 开机
- 关机
- 按下 “Start (启动)” 键
- 按下 “Stop (停止)” 键
- 按下 “Load (载荷)” 键

- 按下 “Unload (卸荷)” 键
- 警告
- TRIP (警报)
- 启动禁止

活动警报将以红色高亮显示，而清除的警报文本为红色。

警报历史记录还记录警报发生时的压缩机数据以协助诊断与故障排除。导航到警报条目并点击输入按钮将弹出警报历史记录对话框。

图 40: 警报历史记录对话框



#	Description	Value
1.	Pkg Discharge Pre	101 psi
2.	Sump Press	108 psi
3.	Airend Disch Temp	207 °F
4.	Inject Coolant Tem	144 °F
5.	VSD Comms Los	13:48:11 12/28

对话框处于活动状态时，请按左右键以滚动查看显示的数据。警报的名称将始终显示在对话框的标题栏中。数据查看完毕时按输入可返回警报历史记录屏幕。

“MAINTENANCE (维护)” 文件夹

页码 1: 过滤器状态

图 41: 过滤器状态



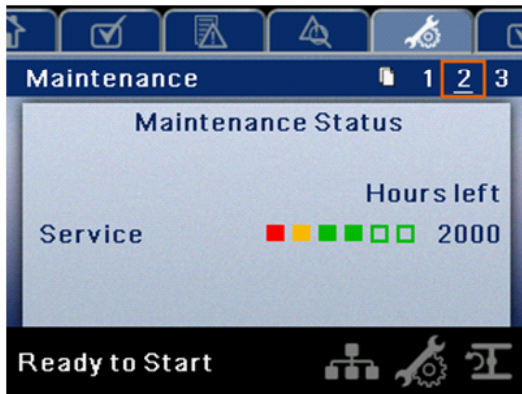
Status
Coolant Filter Status
Sep Element Status
Inlet Filter Status

此页面将显示以下各项：

- Coolant Filter Status (冷却剂过滤器状态)
- Separator Element Status (分离器元件状态)
- Inlet Filter Status (进口过滤器状态)

页码 2: 维护状态

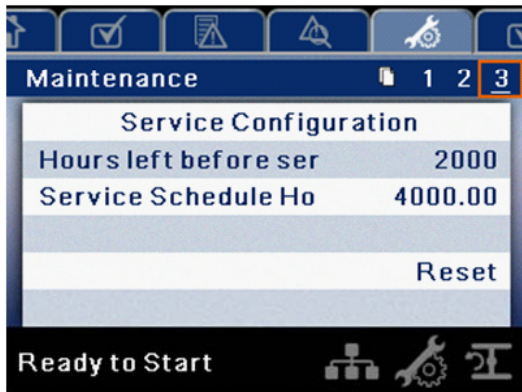
图 42: 维护状态



此页面将显示距离应进行维修的时间。

页码 3: 维护配置

图 43: 维护配置



通过此页面，用户可以设置维修间隔及在执行维修之后重置计数器。

■ “GENERAL SETTINGS (常规设置)” 文件夹

注意

此文件夹中的所有参数均可以调整。

页码 1: 语言选择

图 44: 语言选择



语言可以从以下 30 个选项中进行选择：

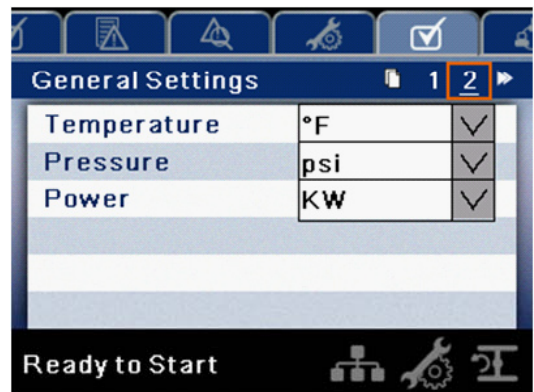
- 英语（默认）
- 保加利亚语
- 简体中文
- 克罗地亚语

- 捷克语
- 丹麦语
- 荷兰语
- 爱沙尼亚语
- 芬兰语
- 法语
- 德语
- 希腊语
- 匈牙利语
- 意大利语
- 印度尼西亚语
- 韩语
- 拉脱维亚语
- 立陶宛语
- 马耳他语
- 挪威语
- 波兰语
- 葡萄牙语
- 罗马尼亚语
- 俄语
- 斯洛伐克语
- 斯洛文尼亚语
- 西班牙语
- 瑞典语
- 泰国语
- 土耳其语

控制器将以选择的语言显示所有屏幕，并且一次只能选择一个语言。每个语言均以本地翻译显示。

页码 1: 衡量单位设置

图 45: 衡量单位设置



以下衡量单位设置显示在此部分中。

表 16: 衡量单位设置

显示文本	说明
温度	可在 °F 和 °C 之间选择。
压力	可在 psi、kpa、bar、kg/cm ² 之间选择。
功率	可在 kW 和 HP 之间选择。

页码 3：主页选项

图 46：主页选项



表 17：主页选项

显示文本	说明
Auto Return to Home (自动返回主页)	在对于显示的延迟时间没有用户活动时，使控制器返回选定主页。这只能在复选框中显示“x”时启用。
Delay Time (延迟时间)	确定在控制器返回主页之前处于不活动状态的秒数。
Select Home Folder (选择主文件夹)	用于选择主文件夹。
Select Home Page (选择主页)	用于选择选定主文件夹中的主页。

第 4-5 页：时间与日期设置

图 47：时间与日期设置



所有项目均可调整。

以下设置显示在该部分中：

表 18：时间与日期设置

显示文本	说明
Hours (小时)	可以设置当前小时。小时格式固定为 24 小时。
Minutes (分钟)	可以设置当前分钟。
Seconds (秒)	可以设置当前秒钟。
Year (年)	可以设置当前年份。
Month (月)	可以设置当前月份。
日	可以设置当前日期。
Date Format (日期格式)	可在 dd/mm/yyyy (默认) 与 mm/dd/yyyy 之间选择。
Confirm New Time and Date (确认新时间与日期)	用于验证是否需要更改选择。复选框中必须显示“x”，然后更改才会生效。

控制器将继续显示所有更改，即使尚未确认选择，而且用户退出页面，然后返回也是如此。电源循环会将所有选项返回至其当前设置。

注意

控制器不支持夏令时。

页码 6：背景灯设置

图 48：背景灯设置



以下设置显示在该部分中：

表 19：背景灯设置

显示文本	说明
Backlight Brightness (背景灯亮度)	调整显示屏的亮度。
Enable Backlight Auto-Off (启用背景灯自动关闭)	使控制器在对于显示的延迟时间没有用户活动时关闭背景灯。
Backlight Auto-Off Delay Time (背景灯自动关闭延迟时间)	确定在控制器关闭背景灯之前处于不活动状态的秒数。

注意

按下控制器的任何键都会打开背景灯。

背景灯关闭后，控制器上的“Start (启动)”、“Stop (停止)”、“Load (载荷)”、“Unload (卸荷)”、“Reset (重置)”和“Acknowledge (确认)”键仍有效。建议按确认键或导航键之一，以打开背景灯。

第 7-8 页：以太网设置

图 49：以太网设置

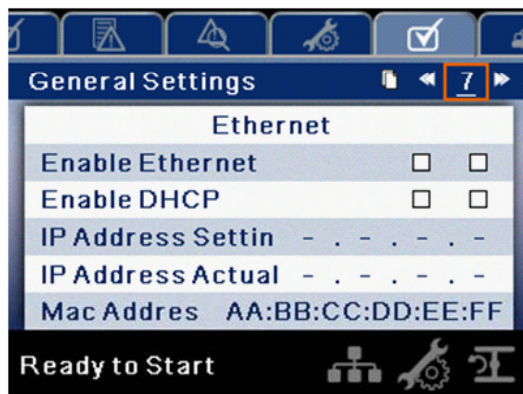


表 20: 以太网设置

显示文本	说明
Enable Ethernet (启用以太网)	使用户连接可以利用控制器的网络启用功能。
Enable DHCP (启用 DHCP)	使控制器可以自动接收来自局域网 (LAN) 的 IP 地址
IP Address Setting (IP 地址设置)	如果 DHCP 未启用, 则此设定会设置控制器的 IP 地址。
IP Address Actual (实际 IP 地址)	在未启用 DHCP 时, 这将与 IP 地址设置相匹配。如果启用了 DHCP, 则这将显示由 DHCP 服务器分配给控制器的地址。
MAC 地址	这是控制器唯一的硬件 MAC 地址。这无法更改。
Subnet Mask Setting (子网掩码设置)	子网掩码的设定点
Subnet Mask Actual (实际子网掩码)	子网掩码的当前读数/设置
Default Gateway Setting (默认网关设置)	默认网关的设定点。
Default Gateway Actual (实际默认网关)	默认网关的当前读数/设置。
Accept (接受)	在编辑所需设定点后, 导航到接受设置并按输入, 以使设置变量中的值得到控制器的确认。
Cancel (取消)	丢弃对以太网设置所做的任何更改。

- Interstage Pressure (中间级压力) (仅限 2 级装置)
- Evaporator (蒸发器)
- Condenser (冷凝器)

页码 4: 压缩机数据

图 51: 压缩机数据

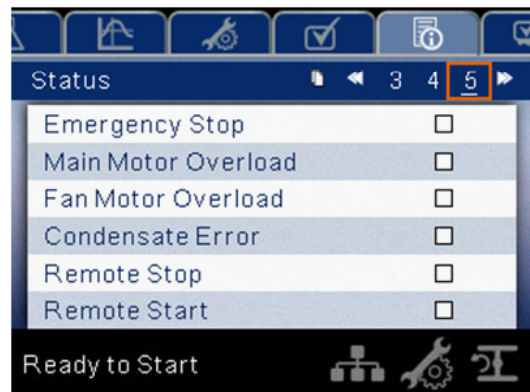


以下数据将显示在该部分中:

- Power On Hours (开机时数)
- Running Hours (运行时数)
- Loaded Hours (载荷时数)
- Real Time Clock (实时时钟)

第 5-6 页: 数字输入

图 52: 数字输入



数字输入旁边的已标记复选框表明输入处于“TRUE (真)”状态。例如, 启动器反馈在输入处于较高状态时为“TRUE (真)”, 而紧急停止在输入为 0V 直流电压时为“TRUE (真)”。

- EMERGENCY STOP (紧急停止)
- Main Motor Overload (主电机过载)
- Fan Motor Overload (风扇电机过载)
- Condensate Drain Error (冷凝液排放错误)
- Remote Stop (远程停止)
- Remote Start (远程启动)
- Remote Lead/Lag (远程超前/滞后)
- Remote Load Enable (远程载荷启用)
- Remote Load/Unload (远程载荷/卸荷)
- Auxiliary Input 1 (辅助输入 1)
- Auxiliary Input 2 (辅助输入 2)
- Dryer High Pressure (干燥器高压)

“STATUS (状态)” 文件夹

注意

这些页面上的所有信息均为只读。

第 1-3 页: 模拟输入

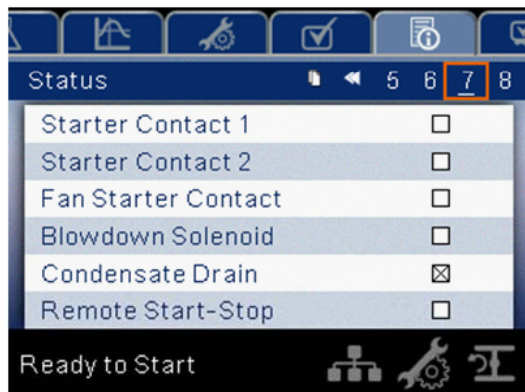
图 50: 模拟输入



以下输入显示在该部分:

- Package Discharge Pressure (机组排放压力)
- Sump Pressure (分离前压力)
- Airend Discharge Temperature (空气端排放温度)
- Injected Coolant Temperature (注入冷却剂温度)
- Aftercooler Discharge Temperature (后冷却器排放温度)
- Separator Pressure Drop (分离器压降)
- Coolant Filter Pressure Drop (冷却剂过滤器压降)
- Inlet Vacuum (进口真空度)
- Aftercooler Discharge Pressure (后冷却器排放压力) (仅限集成干燥器装置)
- Remote Pressure (远程压力) (可选)
- Coolant Filter Inlet Pressure (冷却剂过滤器进口压力)
- Coolant Filter Outlet Pressure (冷却剂过滤器出口压力)

图 53：数字输出



数字输出旁边的已标记复选框表明其已通电。

- Starter Contact 1 (启动器触点 1)
- Starter Contact 2 (启动器触点 2)
- Fan Starter Contact (风扇启动器触点)
- Blowdown Solenoid (放气电磁阀)
- Modulation Solenoid (调制电磁阀)
- Condensate Drain (冷凝液排放管)
- Dryer Run / Fan Run (干燥器运行/风扇运行)
- PORO Horn (PORO 警报器)
- Trip Relay (警报继电器)
- Warning Relay (警告继电器)
- Low Voltage Output 1 (低电压输出 1)
- Low Voltage Output 2 (低电压输出 2)
- Low Voltage Output 3 (低电压输出 3)
- Low Voltage Output 4 (低电压输出 4)

注意

(RO) 表示只读值。

图 54：模拟输出



模拟输出的值将以 mA 为单位。

- VSD 风扇输出
- 模拟输出 2

注意

(RO) 表示只读值。

“FACTORY SETTINGS (出厂设置)” 文件夹

此文件夹供工厂与维修人员使用。必须在第一页输入密码以便调整此文件夹中的值。此文件夹用于设置特定于该压缩机的参数及显示控制器的软件信息。

页码 1：密码

图 55：密码

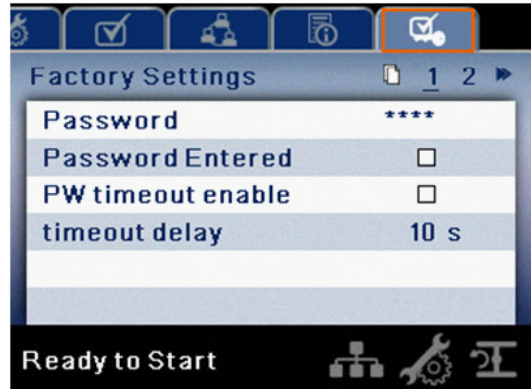
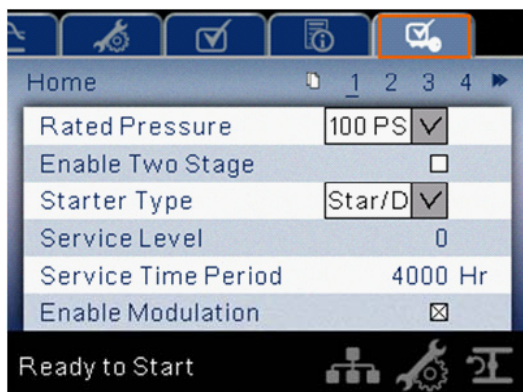


表 21：密码

显示文本	说明
Password (密码)	提供访问权，以输入有效密码，从而获取对受密码保护参数的访问。可通过向下滚动至密码值并按回车键来输入密码。
Password entered (输入的密码)	此复选框表示有效密码已输入。如果此复选框为空，则可能尚未输入有效密码或密码已超时。这为只读。
Password timeout enable (密码超时启用)	勾选此复选框将启用密码时间功能。
Password timeout (密码超时)	此超时可与密码超时启用一起让用户设置重新输入有效密码所需的可调整时间段。达到此超时后，需要重新输入有效密码。

第 2-3 页：出厂设置

图 56：出厂设置



这些页面用于设置特定于压缩机的参数。下面列出了可调整的所有出厂设置。这些页面中的所有设置均受密码保护。

- Rated Pressure (额定压力) (psi - 100、115、135、190)
- Enable Two Stage (启用两级) (开/关)
- Starter Type (启动器类型) (Star-delta、远程启动器、软启动器)
- Service Level (维修级别) (0、1 或 2)
- Service Time Period (维修时段) (1000 - 8000，增量为 1000 小时)
- Enable Modulation (启用调制) (开/关)
- Enable PAC (启用 PAC) (开/关)
- Enable Dryer (启用干燥器) (开/关)
- Running Hours (运行时数) (可调整)
- Loaded Hours (载荷时数) (可调整)
- VSD Blower (VSD 风扇) (开/关)
- Enable Low Ambient (启用低环境) (开/关)

第 4-5 页：出厂设置

图 57：出厂设置



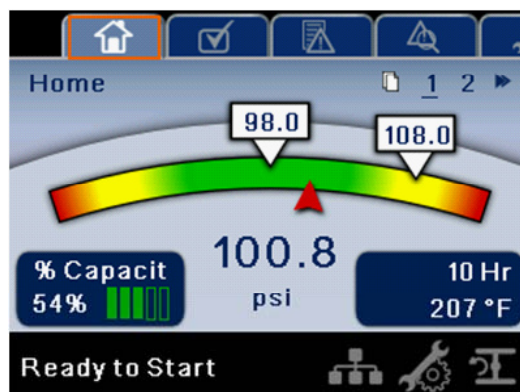
这些页面用于显示控制器的软件信息。所有项目均为只读。

■ 文件夹选项 (变速)

■ 主文件夹

页码 1：系统概览

图 58：系统概览



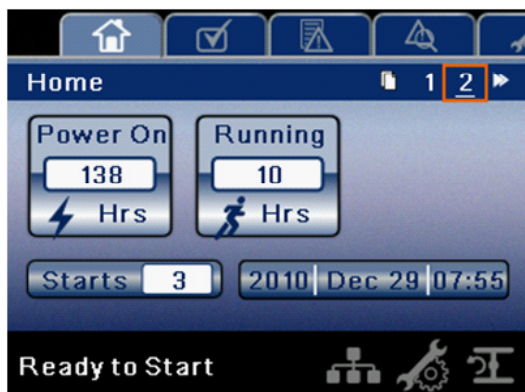
这是系统通电后的出厂默认显示。

- “Target Pressure Setpoint (目标压力设定点)” 在白色框中以白色箭头表示，始终在测量计中心。这是压缩机尝试维护的压力。
- “Automatic Stop Setpoint (自动停止设定点)” 在白色框中以白色箭头表示，始终在测量计中心点右侧。当压缩机到达此设定点时，压缩机将卸荷并停机。
- “Package Discharge Pressure (机组排放压力)” 以测量计中心下的大数字并以红色箭头表示。这是压缩机的输出压力。
- “Pressure Unit of Measure (压力计量单位)” 在机组排放压力下指示。可从“GENERAL SETTINGS (常规设置)”文件夹选择。
- “Percent Capacity (容量百分比)” 在屏幕左下部以数字和条形图形式显示。这是压缩机产生的空气量（其最大容量的百分比）。
- “Airend Discharge Temperature (空气端排放温度)” 由显示屏右下部的数字表示。
- “Temperature Unit of Measure (温度计量单位)” 在空气端排放温度右侧指示。可从“GENERAL SETTINGS (常规设置)”文件夹选择。
- “Run Hours (运行时间)” 指示压缩机已运行的小时数。

注意

可在此页面中选择和修改目标压力与自动停止设定点。此页面上的所有其他信息均为只读。

图 59: 计数器



- “Hour Meters (小时表)”指示：控制器已通电且压缩机已运行的小时数。
- “Starts (启动数)”指示压缩机上尝试启动的次数。
- Date & Time (日期和时间) 在“GENERAL SETTINGS (常规设置)”文件夹中可调整且可配置。

注意

此页面上的所有信息均为只读。

图 60: 模拟输入与压缩机信息



图标



含义

压力



温度

注意

这些页面上的所有信息均为只读。

以下模拟输入将显示在该部分中：

- Package Discharge Pressure (机组排放压力)
- Sump Pressure (分离器压力)
- Airend Discharge Temperature (空气端排放温度)
- Injected Coolant Temperature (注入冷却剂温度)
- Aftercooler Discharge Temperature (后冷却器排放温度)
- Separator Pressure Drop (分离器压降)
- Coolant Filter Pressure Drop (冷却剂过滤器压降)
- Inlet Vacuum (进口真空度)
- Remote Pressure (远程压力) (可选)
- Aftercooler Discharge Pressure (后冷却器排放压力) (仅限集成干燥器装置)

此外，以下压缩机状态读数将包括在此部分中：

- Motor Speed (电机速度)
- PACKAGE KW (机组功率 [千瓦])
- Average Package kW-hr (平均机组千瓦小时)
- AVERAGE % CAPACITY (平均气量百分比)
- AVERAGE CAPACITY (平均气量)
- ENERGY COST (能源成本)
- Energy Saving (节能)
- LIFETIME ENERGY SAVINGS (使用期节能)

■ “OPERATOR SETTINGS (操作人员设置)” 文件夹

第 1-2 页: Operator Settings (操作人员设置)

图 61: Operator Settings (操作人员设置)



下面的参数随时可以调整：

表 22: Operator Settings (操作人员设置)

Operator Settings (操作人员设置)	默认	最低	最大	步长	单位
目标压力	100	65	145	1	psi
自动停机压力	110	目标+1	目标+10	1	psi
立即停机压力	120	自动	自动+10	1	psi
对比的节能百分比	调制	---	---	---	---
能耗比	0.000	0.000	9999.999	---	---
复位平均值	--/--/--	-	-	-	日期

第 3-5 页：操作人员选项

图 62：操作人员选项



正下方的参数仅在压缩机停止时才可调整。

选项设定点类似于操作人员设定点，除了这些设定点无法在装置运行时更改这一点不同。

表 23：操作人员选项

选项项目	选择	最低	最大	步长	单位	是否需要安装选项?
Remote Sensor (远程传感器)	开/关	---	---	---	---	否
Comm Control (命令控制)	开/关	---	---	---	---	否
Remote Start-Stop (远程启动/停止)	开/关	---	---	---	---	否
Enable PORO (启用 PORO)	开/关	---	---	---	---	是
PORO 时间	---	10	600	1	秒	是
Scheduled Start Day (计划的启动日期)	---	日	日	1	日	是
Scheduled Start Hour (计划的启动小时)	---	00:00	23:59	1	时间	是
Scheduled Stop Day (计划的停机日期)	---	日	日	1	日	是
Scheduled Stop Hour (计划的停止小时)	---	00:00	23:59	1	时间	是
Modbus Protocol (Modbus 协议)	开/关/ICU	---	---	---	---	否
Modbus Address (Modbus 地址)	---	1	247	1	---	否

如果未购买、未在装置中安装某选项，则选择显示屏上将显示消息 “Not Installed (未安装)”。将使用 Ingersoll Rand 维修工具安装选项。

* 如果低环境出厂设定点打开，则低环境温度只可调整。

** 值为 0 将禁用超前/延迟循环时间功能。

第 6-7 页：传感器校准

图 63：传感器校准



只有停机后才能进行传感器校准。进行校准时，传感器上应没有压力。校准仅需要在更换传感器、控制器后或操作人员怀疑传感器读数有错误时进行。通过选择传感器名称旁边的复选框可对其进行校准。

以下列出的每个传感器均可以进行校准。

- Inlet Vacuum (进口真空度) (1AVPT)
- Sump Pressure (分离前压力) (3APT)
- Package Discharge Pressure (机组排放压力) (4APT)
- Coolant Filter Inlet Pressure (冷却剂过滤器进口压力) (5CPT)
- Coolant Filter Outlet Pressure (冷却剂过滤器出口压力) (6CPT)
- Remote Pressure (远程压力) (10APT) - 仅在具有远程传感器选项的装置上
- Interstage Pressure (中间级压力) (2APT) - 仅在 2 级装置上
- Aftercooler Discharge Pressure (后冷却器排放压力) (7APT) - 仅在具有集成干燥器的装置上

请注意，如果传感器当前读取的值与零相差其范围的 +/- 10%，则传感器将无法进行校准。请确保传感器在尝试校准之前暴露于空气中。

“EVENTS (事件)” 文件夹

第 1-42 页 (最大)

图 64: “Events (事件)” 文件夹

#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	waiting for VSD	07:54:15	12/29
3.	Power Up	07:54:15	12/29
4.	Power Down	07:53:20	12/29
5.	VSD Comms Los	21:05:56	12/28

事件文件夹中的页面最多记录控制器经历的最后 250 个事件，以及每个事件的时间戳记。这些事件按顺序记录，编号 1 为最新，编号 250 为最老。新事件发生时，则会成为编号 1，所有其他事件的编号均加 1。

标题栏中的页码用于翻阅事件，每页最多显示 7 个事件。第一页显示事件一至六，第二页显示事件七至十二，依此类推。

以下操作将生成事件：

- 开机
- 关机
- 按下“Start (启动)”键
- 按下“Stop (停止)”键
- 按下“Load (载荷)”键
- 按下“Unload (卸荷)”键
- 警告
- TRIP (警报)
- 启动禁止

活动警告将以琥珀色高亮显示，而清除的警告文本为琥珀色。

活动警报将以红色高亮显示，而清除的警报文本为红色。

活动的启动禁止将列在事件日志中，但不高亮显示。如果启动禁止处于活动状态，则显示屏将指示压缩机未准备好启动。

请参阅下表，了解有关每种事件中信息的详细信息。

警告事件列表

Change Inlet Filter (更改进口过滤器)

如果装置已至少运行 7 秒、电机速度等于或大于最低速度、进口真空度大于 0.7 psi，将会出现此信息。

Change Coolant Filter (更换冷却剂过滤器)

如果装置已至少运行 7 秒、注入冷却剂温度至少为 140 华氏度、电机速度至少等于最低速度、冷却剂过滤器压降 (5CPT - 6CPT) 大于 25 psi，将会出现此信息。

Sensor Failure (传感器故障) (不带集成干燥器的装置)

只要传感器被视为缺少或损坏，就会出现此信息。受此警告影响的传感器为 1ATT、2ATT、4ATT 和 3CTT。传感器故障信息应遵循以下格式：SENSOR FAILURE 4ATT (传感器故障 4ATT)。

Sensor Failure (传感器故障) (带集成干燥器的装置)

只要传感器被视为缺少或损坏、装置具有集成干燥器 (3.3.1.6)，将会出现此信息。受此警告影响的传感器为 7APT、5DTT 和 6DTT。传感器故障信息应遵循以下格式：SENSOR FAILURE 7APT (传感器故障 7APT)。

Change Separator Element (更换分离器元件)

如果装置已至少运行 7 秒、注入冷却剂温度至少为 120 ° F、机组排放压力至少为 65 psi、分离器压降至少为 12 psi，将会出现此信息。如果目标压力小于 90 psi，则目标压力每降低 5 psi 警告值将增加 1 psi。例如，如果目标压力介于 89 与 85 psi 之间，则警告值将为 13 psi。

High Airend Disch Temp (高空气端排放温度)

如果装置正在运行、2ATT 大于 221 ° F (228 的 97%) 或装置处于闲置模式 (3.3.7.1)、2ATT 大于 184 ° F，将会出现此信息。此警告通常会有 5 秒的延迟，然而，如果热端热阀 (3.3.1.5) 设置为打开，则此警告会有 90 秒的延迟。

High Discharge Press (高排放压力)

当设备由 X 系列型号等外部装置控制且排放压力大于立即停机压力时，将会出现该警告信息。

Auxiliary Warning 1 (辅助警告 1) (2)

如果辅助警告输入关闭，将会出现此信息。

Service (维修)

确定预测性维护警告后，维修警告会发生显著变化。

依据总运行时间，当设备运行了一定时间后，将会出现维修警告。维修警告可有多级，具体取决于维修级别的选择。选择维修级别 0 将禁用维修警告。

Service Level 1 (维修级别 1)

如果为装置选择了维修级别 1 (3.3.1.9)，“SERVICE REQUIRED (需要维修)”警告将以维修时段设定点 (3.3.1.10) 中的操作时间为间隔进行发布。与任何其他警告一样，此警告可以重置。

Service Level 2 (维修级别 2)

如果为装置选择了维修级别 2，则维修完成出厂设定点 (3.3.1.11) 将用于清除级别 2 维修警告及重设维修时间或日期。在维修警告出现之前，可以先重设维修完成。

首次“SERVICE REQUIRED (需要维修)”警告将在总小时数值为维修时段设定点 (3.3.1.10) 时出现。然而，在此之前的 100 个小时，将出现“100 HOURS TO SERVICE (100 小时后需要维修)”警告。与任何其他警告一样，此警告可以重置。一百小时之后，在总小时数值为维修时段时，“SERVICE REQUIRED (需要维修)”警告将出现。此警告可以像任何其他警告一样重置，然而，如果未设置维修完成出厂设定点，此警告将在 24 小时后返回。如果未设置维修完成，100 小时后 (维修时间段 + 100)，将发布“ALARM - SERVICE REQUIRED (警报 - 需要维修)”警告。此警告只能由维修完成出厂设定点清除。设置维修完成出厂设定点即表明维修已完成之后，下次“SERVICE REQUIRED (需要维修)”警告的时间将通过将维修时间段添加到总小时数值来计算，并且“100 HOURS TO SERVICE (100 小时后需要维修)”警告在 100 个小时前出现且“ALARM - SERVICE REQUIRED (警报 - 需要维修)”警告在此之后 100 个小时出现。

Condensate Drain Error (冷凝液排放错误)

如果压缩机正在运行、机组排放压力超过 50 psi、冷凝液排放错误触点闭合至少 240 秒，将会出现此信息。此警告将在启动后被忽略 4.5 分钟。

High VSD Ambient Temperature (高 VSD 环境温度)

当 VSD 环境温度在停机值 (133 ° F) 的 5% 以内时，将会出现该警告。

Freeze Warning (冷冻警告)

如果在带集成干燥器的装置上干燥器运行时蒸发器传感器的值为 687 (大约 0.5 °C) 或以下 (低温)，将会出现此信息。这是干燥器故障。如果出现这种情况，压缩机将继续运行，但干燥器将停止。条件必须至少存在 180 秒，然后才会出现警告信息。注意：如果运行干燥器的条件存在时重置此警告，干燥器可以重启。如果蒸发器值升高到 709 (大约 5 °C)，干燥器也会重启。而警告仍会显示。

Dryer High Pressure (干燥器高压)

在带集成干燥器的装置上，这将在干燥器高压开关打开而干燥器正在运行时出现。这是干燥器故障。如果出现这种情况，压缩机将继续运行，但干燥器将停止。触点必须至少打开三秒，然后才会出现警告信息。如果运行干燥器的条件存在时重置此警告，干燥器可以重启。然而，此开关是锁定式开关。必须先重置开关，然后干燥器才能运行。重置显示屏上的警告不会重置开关。

Sensor Failure Remote (传感器故障远程)

只要传感器被认为缺少或损坏，就将显示此信息。传感器故障信息应遵循以下格式：SENSOR FAILURE REMOTE (传感器故障远程)。如果出现此警告，则装置将自动切换到机组排放压力传感器以进行控制。

High Sump Pressure (高油槽压力)

如果压缩机正在运行、机组排放压力至少为 65 psi、油槽压力比目标压力大 15 psi 时，将会出现此信息。出现该警告将使控制器判断是否需要降低最大速度 (请参阅 4.11)。

Condenser Temperature High (冷凝器温度高)

如果在带集成干燥器的装置上干燥器运行时冷凝器传感器的值为 1019 (大约 65 °C) 或以上 (高温)，将会出现此信息。这不是干燥器故障。如果发生这种状况，压缩机与干燥器将继续运行。条件必须至少存在 180 秒，然后才会出现警告信息。

Condenser Temperature Low (冷凝器温度低)

如果在带集成干燥器的装置上干燥器运行时冷凝器传感器的值为 887 (大约 40 °C) 或以下 (低温)，将会出现此信息。这不是干燥器故障。如果发生这种状况，压缩机与干燥器将继续运行。条件必须至少存在 180 秒，然后才会出现警告信息。

Change HE Filter (更换 HE 过滤器)

HE 过滤器位于后冷却器排放管与干燥器进口之间并且仅存在于带集成干燥器的装置上。HE 过滤器上的压差通过后冷却器排放压力中减去机组排放压力来进行计量。如果压缩机正在以最大速度为能力的 75% 的速度运行、HE 过滤器上测量的压差大于或等于 10 psi (0.7 bar)、装置已热 (注入冷却剂温度高于 120 °F)、机组排放压力 (4APT) 高于 90 psi，会出现此警告。条件必须至少存在 3 秒，然后才会出现警告。这不是干燥器故障。如果出现这种情况，将显示警告，但干燥器将继续运行。

警报事件列表

High Airend Disch Temp (高空气端排放温度)

如果在正常运行期间 2ATT 大于 228 °F，将会出现此信息。如果装置处于闲置模式，此警告将在 200 °F 时出现。

Blower Fault (风扇故障)

如果风扇 VSD 上故障触点打开 3 秒，将会出现此信息。

REMOTE STOP FAILURE (远程停止失败)

如果远程启动/停止选项启用、远程停止按钮保持打开状态、任一启动按钮按下，将会出现此消息。

REMOTE START FAILURE (远程启动失败)

如果装置由远程启动按钮启动、装置启动后按钮保持闭合 7 秒，将会出现此信息。

Sensor Failure (传感器故障)

当传感器被认为缺少或损坏时，将会显示此信息。受此故障停机影响的传感器有 4APT、3APT、2APT、1AVPT、5CPT、6CPT 和 2ATT。显示的传感器应带有传感器故障消息。传感器故障信息应遵循以下格式：SENSOR FAILURE 4APT (传感器故障 4APT)。传感器 4APT 具有以下更多逻辑。如果油槽压力高于 100 psi、机组排放压力 (4APT) 比油槽压力小 50 psi，将发布传感器故障 4APT。

EMERGENCY STOP (紧急停止)

当按下紧急停止按钮时，将会出现此信息。

VSD Fault (VSD 故障)

VSD 故障从驱动器读取。控制器将读取变速驱动器的状态菜单。如果故障状况以状态信息的形式返回，则微控制器将发出“VSD FAULT (VSD 故障)”警报并显示故障状况的编号。VSD 故障 39 - 42 和 44 无法通过按压重置按钮清除。所有其他 VSD 故障均可通过按压重置按钮清除。清除 VSD 故障 39 - 42 或 44 的唯一方法是循环压缩机上的电源。循环电源会使 VSD 执行电源模块测试。必须先通过电源模块测试，然后压缩机才能在 VSD 故障 39 - 42 或 44 之后重启。VSD 故障 39、40 和 41 (IGBT 故障) 有其他逻辑与其关联。由于错误的警报，逻辑已修改为允许自动重启。如果发生 VSD 故障 39、40 或 41，控制器将发出警报并显示故障信息。两分钟后，控制器将向 VSD 发布命令以运行电源模块测试。在 VSD 运行电源模块测试时，控制器将强制自身重置。完成重置后，控制器将监控 VSD 以完成电源模块测试。如果电源模块测试已完成、所有条件均已通过，控制器将自动重启压缩机。如果电源模块测试失败，控制器将显示电源模块测试失败信息与故障代码。控制器不允许在 24 小时内有超过五次的 VSD 故障 39 - 41 自动重启。同时控制器不允许在 10 分钟内有超过两次的 VSD 故障 39 - 41 自动重启。如果发生 VSD 故障 39 - 41、违反时间期限，控制器将不发布电源模块测试与重启。它将显示故障但不允许控制器重置。操作人员必须循环电源。所有驱动器的另一例外是 VSD 故障 10、12 - 14 和 16。如果由于其中一种故障压缩机发出警报，而在 VSD 故障时关闭，控制器将重置，然后重启压缩机。如果压缩机配备了断电重启选项 (PORO)，控制器将执行 PORO 重启。如果装置没有 PORO，控制器将在重置后 10 秒启动压缩机。在一个小时之内，一个装置最多可以执行此操作五次。如果一个小时之内装置执行此操作的次数超过五次，第六次操作将视为常规 VSD 故障。

LOW SUMP PRESSURE (低分离前压力)

如果压缩机正在运行、油槽压降低于 13 psi 15 秒，将会出现此信息。

检查电机旋转

如果控制器在 VSD 启动后读出负速度，则会出现这种情况。

VSD 通讯故障

如果控制器在请求信息时未从 VSD 收到响应，将会出现此信息。警报需要 8 秒才会出现。

VSD Initialization Fault (VSD 初始化故障)

如果通电后，控制器无法与 VSD 建立通讯，将会出现此信息。

Replace Coolant Filter (更换冷却剂过滤器)

如果闲置模式设置为开，将会出现此信息。如果已安装新的冷却剂过滤器，此警报用于提醒 IR 服务只使用闲置模式。

Incorrect VSD Type (不正确的 VSD 类型)

如果 VSD 类型与压缩机型号不匹配，通电后将会出现此信息。控制器将通过比较压缩机类型与驱动器 ID 板确定这一点。

CONTROL POWER LOSS (控制电源断电)

如果压缩机应当运行、VSD 显示的交流输入电压降至 100 V 交流电压以下时，将会出现此信息。一旦迅速恢复通电，此警报将延迟 2 秒。相位监视器也会导致此警报。

Stop Failure (停机故障)

如果压缩应停机但电机速度未降至最低电机速度设定值以下，将会出现此信息。控制器将在发布警报之前等待 4 秒以使压缩机停机。

High Interstage Pressure (高级间压力)

如果压缩机正在运行、为两级装置、中间级压力高于 75 psi，将会出现此信息。

High Coolant Filter Pressure Drop (高冷却剂过滤器压降)

如果装置已至少运行七秒、注入冷却剂温度至少为 140 ° F、已出现更换冷却剂过滤器警告、电机速度至少等于最低速度、冷却剂过滤器压降 (5CPT - 6CPT) 大于 35 psi，将会出现此信息。

High Inlet Vacuum (高进口真空度)

如果压缩机载荷运行、电机速度至少为最低速度、进口真空度大于 1.8 psi (真空)，将会出现此信息。

High Sump Pressure (高油槽压力)

如果压缩机正在运行、存在以下三个条件中的任何一个，将会出现此信息：(1) 油槽压力比目标压力高 25 psi。(2) 测量的分离器压降大于 25 psi 且机组排放压力至少为 65 psi。(3) 油槽压力高于 168 psi。

启动禁止列表

High Airend Discharge Temperature (高空气端排放温度)

如果 2ATT 高于 228 ° F 的 95%，将会出现此信息。

High Sump Pressure (高油槽压力)

如果油槽压力 (3APT) 为 25 psi 或高于压缩机额定压力，将会出现此信息。

Waiting for VSD Comms (等待 VSD 命令)

如果压缩机 VSD 未响应控制器的初始通讯，将会出现此信息。

TRIP HISTORY (警报历史记录)

第 1-4 页 (最大)

图 65: Trip History (警报历史记录)

#	Description	Time	Date
1.	VSD Comms Los	07:54:31	12/29
2.	VSD Comms Los	21:05:56	12/28
3.	VSD Fault	20:47:39	12/28
4.	Emergency Stop	13:48:22	12/28
5.	VSD Comms Los	13:48:11	12/28

Ready to Start

“Trip History (警报历史记录)” 文件夹中的页面最多记录控制器经历的最后 15 个警报，以及每个警报的时间戳记。这些警报按顺序记录，编号 1 为最新，编号 15 为最老。新警报发生时，则会成为编号 1，所有其他警报的编号均加 1。

标题栏中的页码用于翻阅事件，每页最多显示 7 个事件。第一页显示事件一至五，第二页显示事件六至十，依此类推。

以下操作将生成事件：

- 开机
- 关机
- 按下 “Start (启动)” 键
- 按下 “Stop (停止)” 键
- 按下 “Load (载荷)” 键
- 按下 “Unload (卸荷)” 键
- 警告
- 警报
- 启动禁止

活动警报将以红色高亮显示，而清除的警报文本为红色。

警报历史记录还记录警报发生时的压缩机数据以协助诊断与故障排除。导航到警报条目并按输入按钮将激活警报历史记录对话框。

图 66: 警报历史记录对话框

VSD Comms Lost	
Pkg Discharge Pre	101 psi
Sump Press	108 psi
Airend Disch Temp	207 °F
Inject Coolant Tem	144 °F

1/6

Ready to Start

对话框处于活动状态时，请按左右键以滚动查看显示的数据。警报的名称将始终显示在对话框的标题栏中。数据查看完毕时按输入可返回警报历史记录屏幕。

■ “MAINTENANCE（维护）”文件夹

页码 1：过滤器状态

图 67：过滤器状态

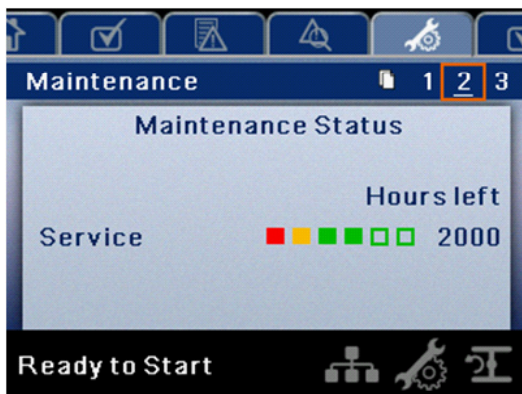


此页面将显示以下各项：

- Coolant Filter Status（冷却剂过滤器状态）
- Separator Element Status（分离器元件状态）
- Inlet Filter Status（进口过滤器状态）

页码 2：维护状态

图 68：维护状态



此页面将显示距离应进行维修的时间。

页码 3：维护配置

图 69：维护配置



通过此页面，用户可以设置维修间隔及在执行维修之后重置计数器。

■ “GENERAL SETTINGS（常规设置）”文件夹

注意

此文件夹中的所有参数均可以调整。

页码 1：语言选择

图 70：语言选择



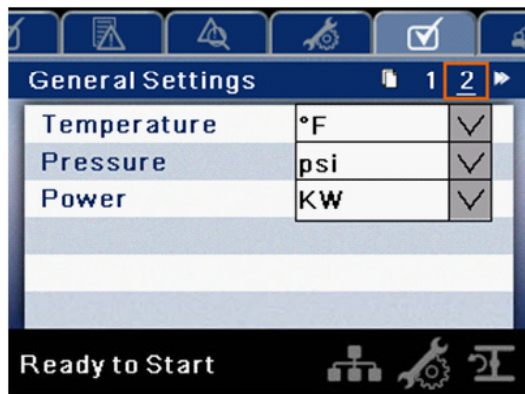
语言可以从以下 30 个选项中进行选择：

- 英语（默认）
- 保加利亚语
- 简体中文
- 克罗地亚语
- 捷克语
- 丹麦语
- 荷兰语
- 爱沙尼亚语
- 芬兰语
- 法语
- 德语
- 希腊语
- 匈牙利语
- 意大利语
- 印度尼西亚语
- 韩语
- 拉脱维亚语
- 立陶宛语
- 马耳他语
- 挪威语
- 波兰语
- 葡萄牙语
- 罗马尼亚语
- 俄语
- 斯洛伐克语
- 斯洛文尼亚语
- 西班牙语
- 瑞典语
- 泰国语
- 土耳其语

控制器将以选择的语言显示所有屏幕，并且一次只能选择一个语言。
每个语言均以本地翻译显示。

页码 1: 衡量单位设置

图 71: 衡量单位设置



以下衡量单位设置显示在此部分中:

表 24: 衡量单位设置

显示文本	说明
温度	可在 °F 和 °C 之间选择。
压力	可在 psi、kpa、bar、kg/cm² 之间选择。
功率	可在 kW 和 HP 之间选择。

页码 3: 主页选项

图 72: 主页选项



以下设置显示在该部分中:

表 25: 主页选项

显示文本	说明
Auto Return to Home (自动返回主页)	在对于显示的延迟时间没有用户活动时, 使控制器返回选定主页。这只能在复选框中显示“x”时启用。
Delay Time (延迟时间)	确定在控制器返回主页之前处于不活动状态的秒数。
Select Home Folder (选择主文件夹)	用于选择主文件夹。
Select Home Page (选择主页)	用于选择选定主文件夹中的主页。

页码 4-5: 时间与日期设置

图 73: 时间与日期设置



所有项目均可调整。

以下设置显示在该部分中:

表 26: 时间与日期设置

显示文本	说明
Hours (小时)	可以设置当前小时。小时格式固定为 24 小时。
Minutes (分钟)	可以设置当前分钟。
Seconds (秒)	可以设置当前秒钟。
Year (年)	可以设置当前年份。
Month (月)	可以设置当前月份。
日	可以设置当前日期。
Date Format (日期格式)	可在 dd/mm/yyyy (默认) 与 mm/dd/yyyy 之间选择。
Confirm New Time and Date (确认新时间与日期)	用于验证是否需要更改选择。复选框中必须显示“x”，然后任何更改才会生效。

控制器将继续显示所有更改, 即使尚未确认选择, 而且用户退出页面, 然后返回也是如此。电源循环会将所有选项返回至其当前设置。

注意

控制器不支持夏令时。

页码 6: 背景灯设置

图 74: 背景灯设置



以下设置显示在该部分中：

表 27: 背景灯设置

显示文本	说明
Backlight Brightness (背景灯亮度)	调整显示屏的亮度。
Enable Backlight Auto-Off (启用背景灯自动关闭)	使控制器在对于显示的延迟时间没有用户活动时关闭背景灯。
Backlight Auto-Off Delay Time (背景灯自动关闭延迟时间)	确定在控制器关闭背景灯之前处于不活动状态的秒数。

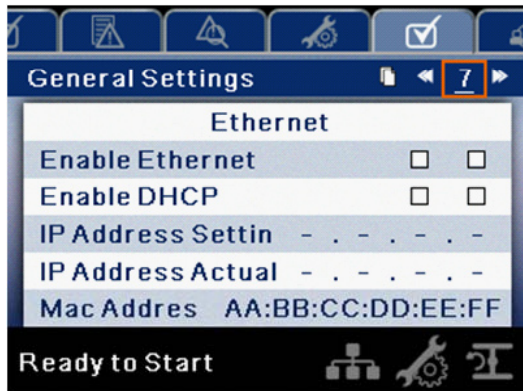
注意

按下控制器的任何键都会打开背景灯。

背景灯关闭后，控制器上的“Start (启动)”、“Stop (停止)”、“Load (载荷)”、“Unload (卸荷)”、“Reset (重置)”和“Acknowledge (确认)”键仍有效。建议按确认键或导航键之一，以打开背景灯。

第 7-8 页：以太网设置

图 75: 以太网设置



以下设置显示在该部分中：

表 28: 以太网设置

显示文本	说明
Enable Ethernet (启用以太网)	使用户连接可以利用启用了网络的控制器的功能。
Enable DHCP (启用 DHCP)	使控制器可以自动接收来自局域网 (LAN) 的 IP 地址。
IP Address Setting (IP 地址设置)	如果 DHCP 未启用，则此设定会设置控制器的 IP 地址。
IP Address Actual (实际 IP 地址)	在未启用 DHCP 时，这将与 IP 地址设置相匹配。如果启用了 DHCP，则这将显示由 DHCP 服务器分配给控制器的地址。
MAC 地址	这是控制器唯一的硬件 MAC 地址。这无法更改。
Subnet Mask Setting (子网掩码设置)	子网掩码的设定点。
Subnet Mask Actual (实际子网掩码)	子网掩码的当前读数/设置。
Default Gateway Setting (默认网关设置)	默认网关的设定点。
Default Gateway Actual (实际默认网关)	默认网关的当前读数/设置。
Accept (接受)	在编辑所需设定点后，导航到接受设置并按输入，以使设置变量中的值得到控制器的确认。
Cancel (取消)	丢弃对以太网设置所做的任何更改。

“STATUS (状态)” 文件夹

注意

这些页面上的所有信息均为只读。

第 1-2 页：模拟输入

图 76: 模拟输入



以下输入显示在该部分：

- Package Discharge Pressure (机组排放压力)
- Sump Pressure (分离前压力)
- Airend Discharge Temperature (空气端排放温度)
- Injected Coolant Temperature (注入冷却剂温度)
- Aftercooler Discharge Temperature (后冷却器排放温度)
- Separator Pressure Drop (分离器压降)
- Coolant Filter Pressure Drop (冷却剂过滤器压降)
- Inlet Vacuum (进口真空度)
- Aftercooler Discharge Pressure (后冷却器排放压力) (仅限集成干燥器装置)
- Remote Pressure (远程压力) (可选)
- Coolant Filter Inlet Pressure (冷却剂过滤器进口压力)
- Coolant Filter Outlet Pressure (冷却剂过滤器出口压力)
- Interstage Pressure (中间级压力) (仅限 2 级装置)
- Evaporator (蒸发器)
- Condenser (冷凝器)

页码 4：压缩机数据

图 77：压缩机数据

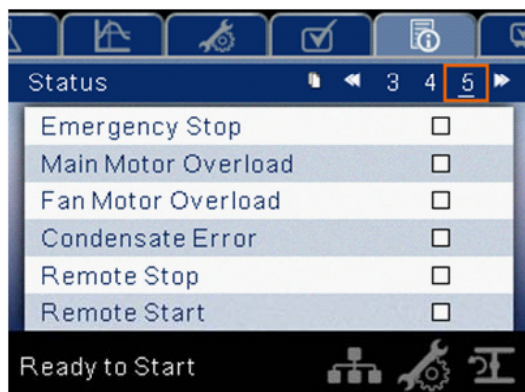


以下各项显示在该部分中：

- % Energy Saving (节能百分比)
- % CAPACITY (功率百分比)
- Package Power (机组功率)
- Power On Hours (开机时数)
- Running Hours (运行时数)
- Motor Speed (电机速度)
- Time (时间)
- Motor Current (电机电流)
- Motor Voltage (电机电压)
- AC Input Voltage (交流输入电压)
- DC Bus Voltage (直流总线电压)
- IGBT U Temperature (IGBT U 温度)
- IGBT V Temperature (IGBT V 温度)
- IGBT W Temperature (IGBT W 温度)
- Input Rectifier Temperature (输入整流器温度)
- VSD Ambient Temperature (VSD 环境温度)
- Remote Maximum Speed (远程最大速度)
- Remote Maximum Pressure (远程最大压力)
- 目标压力

第 7-8 页：数字输入

图 78：数字输入



数字输入旁边的已标记复选框表明输入处于“TRUE (真)”状态。例如，启动器反馈在输入处于较高状态时为“TRUE (真)”，而紧急停止在输入为 0V 直流电压时为“TRUE (真)”。

以下各项显示在该部分中：

- EMERGENCY STOP (紧急停止)
- Main Motor Overload (主电机过载)
- Fan Motor Overload (风扇电机过载)
- Condensate Drain Error (冷凝液排放错误)
- Remote Stop (远程停止)
- Remote Start (远程启动)
- Remote Lead/Lag (远程超前/滞后)
- Remote Load Enable (远程载荷启用)
- Remote Load/Unload (远程载荷/卸荷)
- Auxiliary Input 1 (辅助输入 1)
- Auxiliary Input 2 (辅助输入 2)
- Dryer High Pressure (干燥器高压)

第 9-10 页：数字输出

图 79：数字输出



数字输出旁边的已标记复选框表明其已通电。

- Starter Contact 1 (启动器触点 1)
- Starter Contact 2 (启动器触点 2)
- Fan Starter Contact (风扇启动器触点)
- Blowdown Solenoid (放气电磁阀)
- Modulation Solenoid (调制电磁阀)
- Condensate Drain (冷凝液排放管)
- Dryer Run / Fan Run (干燥器运行/风扇运行)
- PORO Horn (PORO 警报器)
- Trip Relay (警报继电器)
- Warning Relay (警告继电器)
- Low Voltage Output 1 (低电压输出 1)
- Low Voltage Output 2 (低电压输出 2)
- Low Voltage Output 3 (低电压输出 3)
- Low Voltage Output 4 (低电压输出 4)

注意

(RO) 表示只读值。

图 80: 模拟输出



模拟输出的值将以 mA 为单位。

- VSD 风扇输出
- 模拟输出 2

■ “FACTORY SETTINGS (出厂设置)” 文件夹

此文件夹供 IR 工厂与维修人员使用。必须在第一页输入密码以便调整此文件夹中的值。此文件夹用于设置特定于该压缩机的参数及显示控制器的软件信息。

页码 1: 密码

图 81: 密码

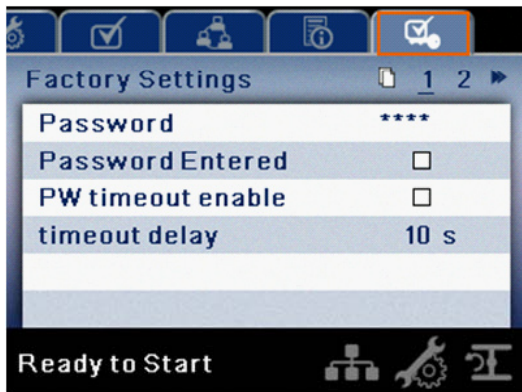


表 29: 密码

Password (密码):	提供访问权, 以输入有效密码, 从而获取对受密码保护参数的访问。可通过向下滚动至密码值并按回车键来输入密码。
Password entered (输入的密码):	此复选框表示有效密码已输入。如果此复选框为空, 则可能尚未输入有效密码或密码已超时。此为只读。
Password timeout enable (密码超时启用):	勾选此复选框将启用密码时间功能。
Timeout Delay (超时延迟):	此超时可与密码超时启用一起让用户设置重新输入有效密码所需的可调整时间段。达到此超时后, 需要重新输入有效密码。

图 82: 出厂设置



这些页面用于设置特定于压缩机的参数。下面列出了可调整的所有出厂设置。这些页面中的所有设置均受密码保护。

“Compressor Type (压缩机类型)” 将在此处选择。选项列出如下:

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

Water Cooled (水冷) (开/关)

Hot Side Thermal Valve (热端热阀) (开/关)

Enable PAC (启用 PAC) (开/关)

Enable Dryer (启用干燥器) (开/关)

Constant Running Dryer (持续运行干燥器) (开/关)

Running Hours (运行时数) (可调整)

Loaded Hours (载荷时数) (可调整)

图 83: 软件信息



这些页面用于显示控制器的软件信息。所有项目均为只读。

图 84: 最大值



最大值页面用于记录自上次最大值重置以来控制器看到的最高值。每个最大值条目显示所记录的最高值以及这些最大值出现时的时间与日期戳。

最终最大值页面在页面底部有重置设置，高亮显示此按钮并点击输入将使控制器清除最大值的所有历史记录并开始再次进行记录。必须输入密码才能使用此重置功能。

图 85: VSD 诊断



VSD 诊断屏幕用于对任何驱动器问题进行故障排除。

注意

这些屏幕必须仅由授权的维修技术人员使用。必须输入密码才能激活这些诊断测试。

图 86: VSD 维修菜单



VSD 维修菜单包含用于设置压缩机以获得最佳操作的参数。

注意

这些屏幕必须仅由授权的维修技术人员使用。必须输入密码才能修改这些参数。

备注

备注

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