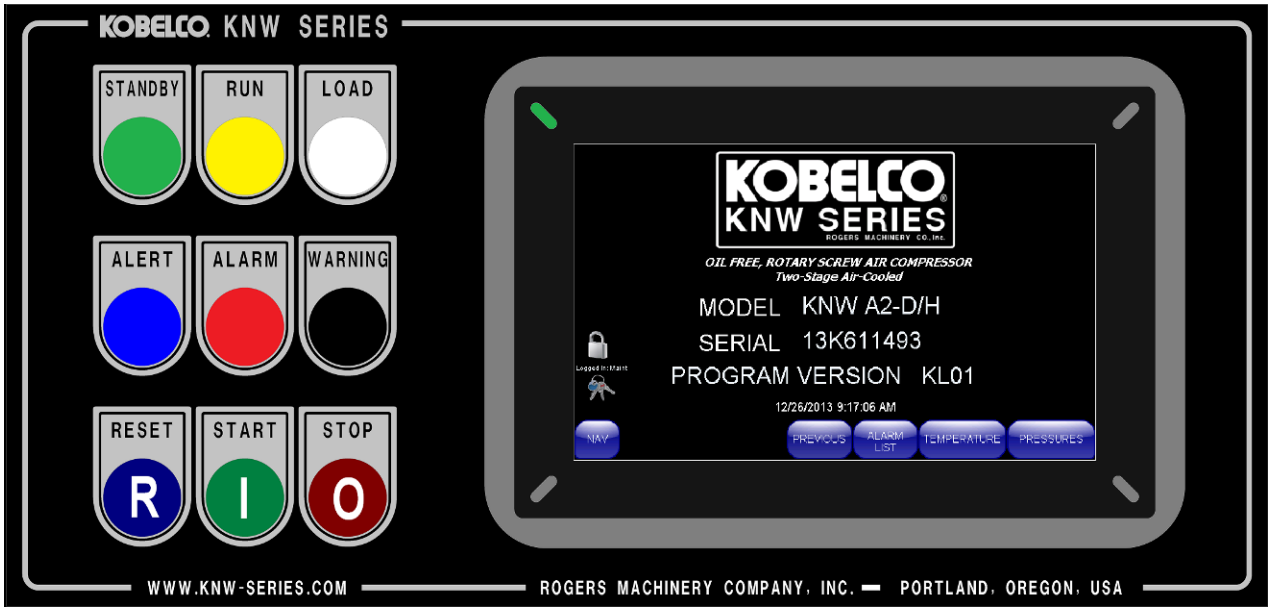
KOBELCO® KNW SERIES

OIL-FREE
TWO-STAGE
ROTARY SCREW
AIR COMPRESSORS

MODEL#:		SERIAL#:	

DESCRIPTION OF OPERATION



For compressors equipped with the
KNW Series Compressor Operator Panel
with Graphic Touchscreen “HMI Terminal”

PROGRAM NUMBER:

KL100B

SAFETY PRECAUTIONS

Safety notices, marked with this symbol, are used in this publication to emphasize that a hazardous condition exists that could cause personal injury and/or damage to the equipment.

1. Read and understand the contents of this manual before installing, operating or maintaining the compressor.

2. Electricity and compressed air are dangerous. When performing maintenance or service work, make absolutely sure the electrical supply is disconnected and locked out. The discharge air lines service valve (customer furnished) must be closed and the compressor relieved of all internal pressure. DO NOT rely on the discharge air line check valve.

3. Compressed air from this unit must not be used for breathing or food processing without adequate filtering and monitoring to meet OSHA 29 CFR 1910 or FDA 21 CFR 178.3570.

4. Do not allow flammable, toxic or corrosive gases to enter the air inlet system or electrical devices.

5. Never attempt to work on compressor or remove guards, panels, covers, shields, etc. while the compressor is in operation.

6. Periodically confirm that all safety and Alarm devices are operating properly.

7. Do not override any safety or Alarm device.

8. Make certain all associated pipe and equipment beyond this compressor is compatible with maximum pressures and temperatures to be encountered during normal and adverse operation. Do not use plastic pipe in the compressed air system.

9. Keep doors closed during normal operation. The noise level inside cabinet exceeds 90 decibels (dbA) and the operating temperature of some components is sufficient to burn the skin.

10. Never assume it is safe to work on the compressor because it is not operating. Many installations have automatic start/stop controls, and the compressor may start at any time.

Description of Operation

PROGRAM NUMBER: KL100B
MODEL NUMBER:
SERIAL NUMBER:

Revisions			
Revision	Author	Date	Description
KL100A	GEW	09-Mar-2015	Updates to 2015 standard; Micrologix 1400 processor.
KL100B	GEW	28-May-2015	Internal program mods for use with PSIG-calibrated transmitters.

1. Overview

The Kobelco KNW Series air compressor is a heavy duty, two-stage, rotary screw design that provides completely oil-free compressed air. Air is drawn in from outside the compressor, passes through a filter, is compressed to a medium pressure by the first compressor stage, passes through the intercooler to reduce temperature, is compressed to full pressure by the second stage, and finally passes through the aftercooler to reduce temperature. Both the first and second stages are driven by a single main motor. Lubricating oil is continually passed over the bearings and gears; an oil cooler prevents the oil from overheating. Air-cooled and water-cooled models are available. All models include a cabinet cooling fan to prevent overheating of the motor and cabinet components.

Resistance temperature detectors and pressure transducers are used to monitor compressor operating conditions, including detection of system air pressure. The compressor can operate in two modes, Loaded and Unloaded. In Unloaded mode, no air is compressed, and energy consumption is greatly reduced. Loading and unloading allows the compressor to maintain system pressure in a narrow band in response to variable demand.

This description of operation focuses on the compressor control system, including the operator interface, standard control options, and special options such as Lead/Lag pressure ranges and remote control. For more information on compressor operation, including maintenance instructions and a troubleshooting guide, please consult the Operations Manual.

2. Compressor Control

The Kobelco KNW Series Oil-Free Rotary Screw Air Compressor Operator Panel uses a Programmable Logic Controller (PLC) to control and monitor compressor operation. PLC operations include controlled sequential starting and stopping, pressure control, and protection from conditions that could damage the compressor. Pilot lights, viewable from a distance, are provided for indication of operating conditions. An audible alarm is provided for alarm annunciation. Pushbuttons are provided for specific control functions, allowing continued compressor operation in the event that the terminal is off-line.

The HMI terminal is an LCD graphic display with touchscreen. The HMI terminal shows operating conditions, pressures, and temperatures. Messages to direct the operator for service, pre-alarms, and Alarms will be shown when necessary. Required settings for pressure control, temperature alarms, and control time delays are viewable and may be modified using the touchscreen. The HMI terminal will automatically ‘dim’ to a sleep condition if inactive, and awakens on any touch contact.

2.1. Pilot Devices

Pilot devices are located adjacent to the HMI terminal for operational control and indication. These include:

STANDBY	Green pilot light. Indicates the compressor is not running, but may automatically start at any time. Start will occur when system pressure drops to a programmed pressure. When flashing, indicates a request for remote mode confirmation (see section 5).
RUN	Yellow pilot light. Indicates the compressor is running.
LOADED	White pilot light. Indicates the compressor is loaded, air is being compressed.
ALERT	Blue pilot light. Indicates the compressor requires service. Also indicates a temperature pre-alarm, showing that compressor temperatures are approaching the "Alarm" settings. The light flashes until the "Alert" is acknowledged, then is on steady until the "Alert" condition is reset
ALARM	Red pilot light. Indicates the compressor has shutdown due to an "Alarm" condition. The light flashes until the "Alarm" is acknowledged, then is on steady until the "Alarm" condition is reset.
	Beeper. An audible alarm which sounds for an Alert or an Alarm.
RESET	Blue pushbutton marked with “R”. Resets "Alert"/"Alarm" indication. If the "Alarm" or "Alert" condition has not been corrected the indication will return after one second. The compressor will not be allowed to start until an "Alarm" condition is reset successfully.
START	Green pushbutton marked with “|”. Initiates the compressor start sequence. NOTE: In Remote mode, pressing ‘Start’ enables remote start control (see section 5).
STOP	Red pushbutton marked with “O”. Initiates the compressor stop sequence.

2.2. Interface Contacts

The standard compressor includes four relays which can be used to remotely monitor the status of the following:

- Running (Energized when running)
- Loaded (Energized when loaded)
- Alarm (De-energized when in alarm condition)
- Alert (Energized when in alert condition)

The relays are Form C contacts, rated 5 amps at 240 volts.

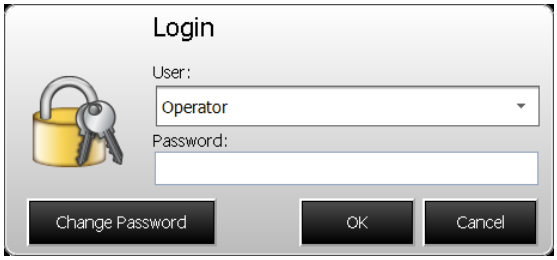
Additional output relays can be added to monitor other conditions; see section 5.4 for information on configurable outputs.

2.3. HMI Terminal Overview

The HMI terminal shows requested information on selectable screens. The terminal may also be used to modify settings affecting compressor operation, and to change the configuration of the compressor.

Blue touchzones with white lettering are used for navigation; pressing a blue touchzone will bring up the screen identified on the touchzone, unless otherwise specified. Black touchzones with white lettering are for special functions. Yellow touchzones are used to modify settings. Some settings will appear on 'popup' screens that display on top the current screen; to exit a popup, press the blue 'Close' button.

Accessing some settings requires a login; the touchzones that allow modification of these settings will be shown with a transparent background, if the correct password has not been entered. Press the keyring icon on the Menu or the Title screen to log in. The Login screen will be brought up:

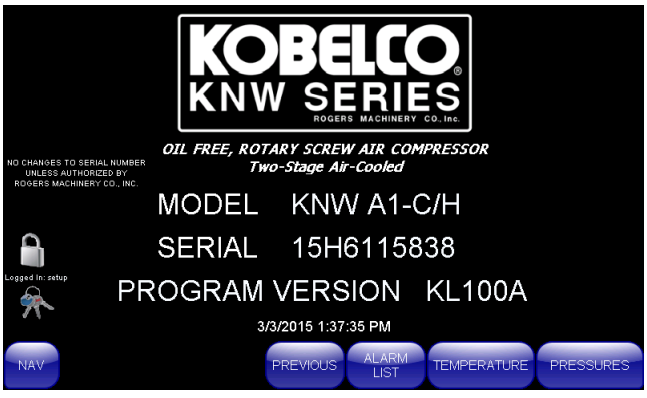


(Note: pressing the 'Login' text will allow the user field to be entered using the keyboard.)

The 'Nav' touchzone at the bottom left of most screens brings up a navigation menu allowing access to most screens. The 'Previous' touchzone, if shown, returns to the previous screen. The 'i' touchzone, if shown, will bring up a Help screen with additional information on settings and operation.

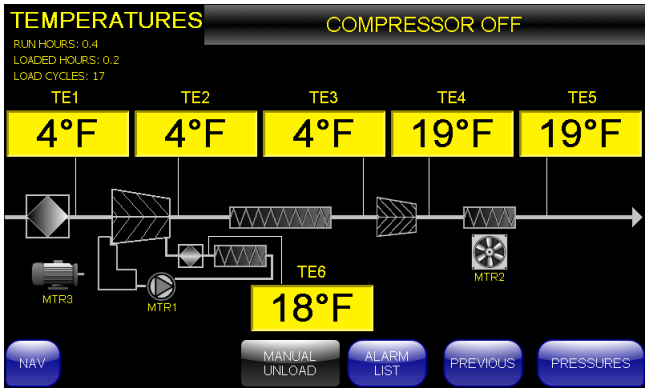
2.4. HMI Terminal Main Screens

The following screens are used to display compressor operational information and navigate to settings screens.



'Title' screen

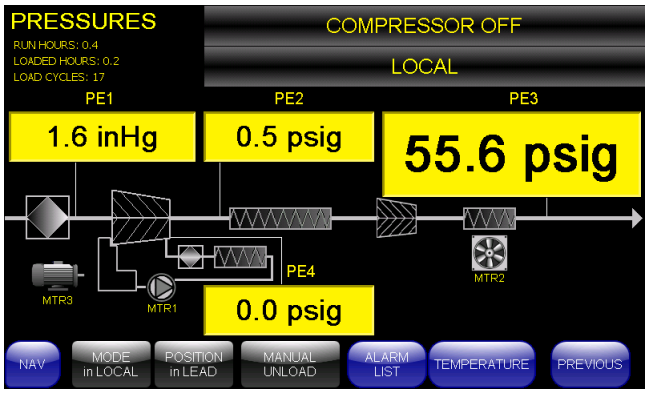
- Displays automatically on power-up
- Displays model number, serial number and program version number.
- Displays 'logged in' status
- Blue buttons used to access other screens



- Accessible from: Title, Presssures, Nav
- Allows manual selection of Lead/Lag and Local/Remote status; see section 5.1 and 5.2.
- Press any displayed temperature to adjust the alarm setpoints for that sensor.
- Press upper left corner to go to Meters screen
- Press motor graphics to bring up motor or VFD info
- 'Man Unload' forces manual compressor unload

'Temperatures' screen

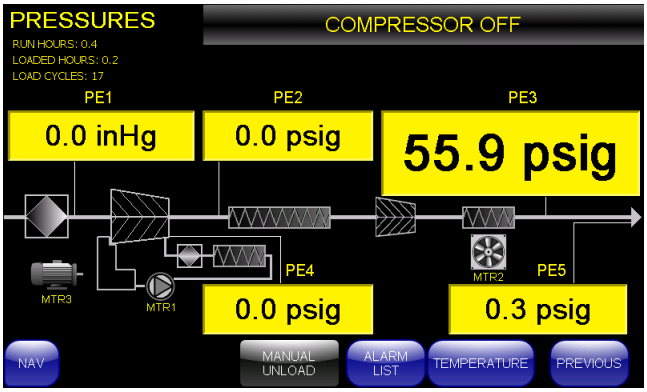
- Displays compressor temperature readings, standby status, lead/lag status, and local/remote status.
- May display “PLC NOT IN RUN”. This message indicates that the PLC is not in RUN mode.
- Top status line shows current operation of compressor.
- Bottom status line shows position, mode, action required, or special status message.
- Green on motor icon indicates motor running.
- Temperature can be displayed in °F or °C; press units to toggle



- Accessible from: Title, Temperatures, Nav.
- Press any displayed pressure to bring up calibration screen for that sensor.
- Other functions as for Temp screen

'Pressures' screen

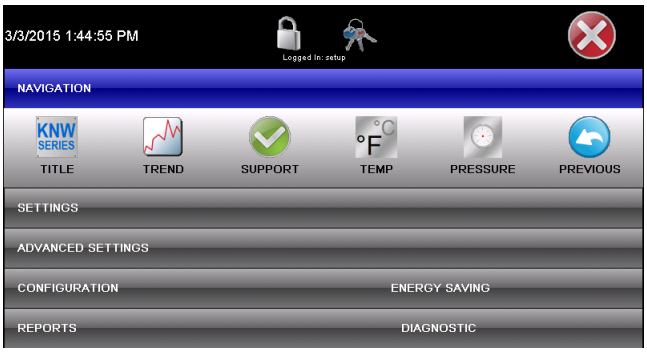
- Displays compressor temperature readings, standby status, lead/lag status, and local/remote status.
- May display special status messages, as described for 'Temperatures' screen.
- Green indicates motor running
- Pressures can be displayed in psig, kg/cm², kPa, bar, or psig; press to toggle



- Accessible from: Title, Temperatures, Nav.
- Press any displayed pressure to bring up calibration screen for that sensor.
- Other functions as for Temp screen

'Pressures' screen, VFD machine

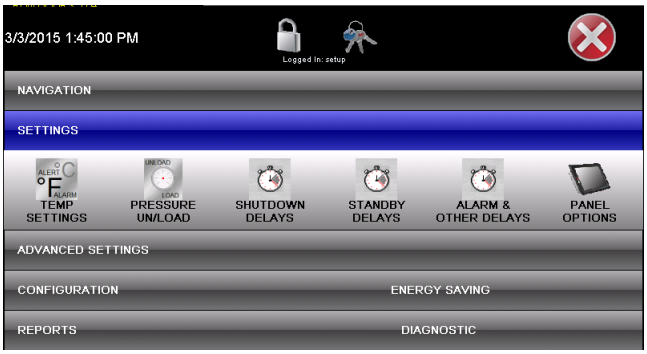
- Screen is as shown when compressor is configured for VFD control. See section 3.3 for more information on VFD setup.



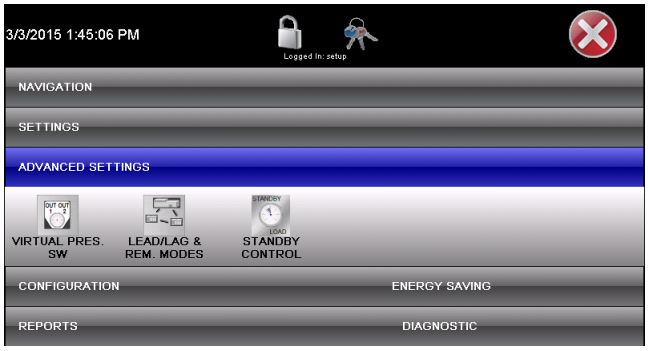
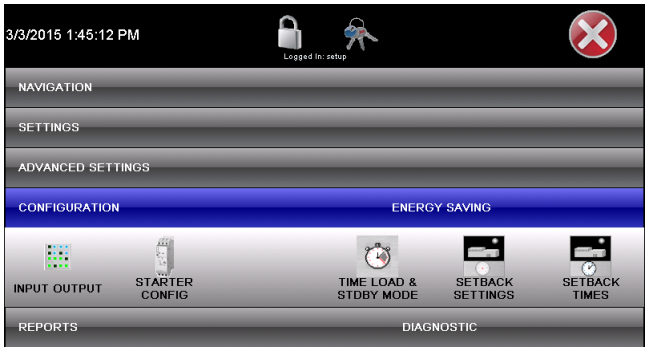
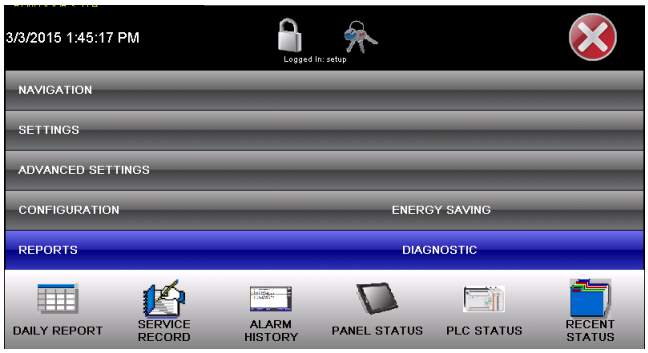
- Accessible from: all screens with a 'Nav' button

'Menu' screen

- Menu is a 'popup' that displays across bottom of current screen. Press headers or arrows to access additional functions.
- "Login" allows password login. "Close" closes menu.
- "Support" brings up Support screen; see section 6.5.
- "Trend" brings up graph of past temperature and pressure readings; see section 6.3.
- "Pressures" brings up Pressures screen; "Temperatures" brings up Temperatures screen.

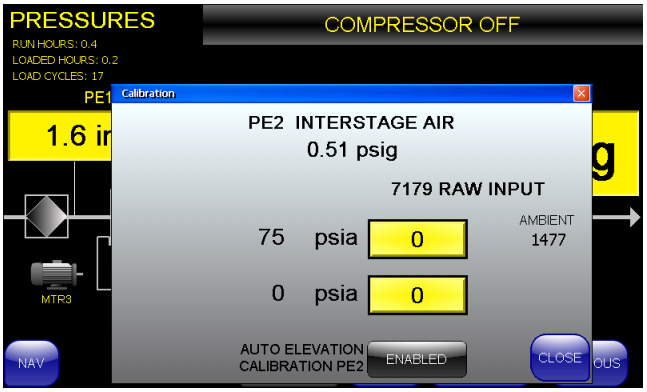


- "Temp Settings": see section 4.
- "Pressure Unload": see section 3.2 or 3.3.
- "Shutdown Delays": see section 3.4.
- "Standby Delays": see section 3.5.
- "Alarm & Other Del": see section 3.7.
- "Panel Options": see section 6.4.

	• "Virtual Pres. Sw": see section 5.6. • "Standby Control": see section 3.5. • "Lead/Lag & Remote Mode": see section 5.1, 5.2.
	• "Input/Output": see section 5.4. • "Starter Configuration": see section 5.5. • "Time Load & Standby Mode": see section 3.5, 3.6. • "Setback Settings", "Setback Times": see section 5.3.
	• "Daily Report" brings up daily report generation screen; see section 6.6. • "Service Record" brings up Service screen; see section 6.5. • "Alarm History" brings up Alarm History screen; see section 4. • "Panel Status", "PLC Status", Recent Status": see section 6.1.

2.5. Transducer Calibration

Under normal circumstances, it should not be necessary to calibrate any transducer. All transducers are factory calibrated before shipment. Before attempting to calibrate a transducer, check it for proper operation, proper type, and range. Calibration is done from the Transducer Calibration screen, accessible from the Pressures display screen; press displayed pressure to calibrate sensor. For the PE3 or PE5 sensor used for load control, press the "Cal" button on the load control screen that appears when displayed pressure is pressed.



- Accessible from: Pressures page. Touch displayed pressure to calibrate associated sensor. Password required.

'Transducer Calibration' screen

- PE2 shown. Similar for other transducers.
- "Raw Input" displays current unscaled reading of selected transducer.
- "Calibrated Pressure" displays current pressure value at selected transducer.
- "Automatic Elevation Calibration" enables or disables auto elevation calibration for selected transducer.

To calibrate a transducer:

1. Shut off the compressor. Connect regulated pressure or vacuum to the transducer.
2. Using a calibrated test gauge, set the pressure to the value shown in the label of the lower block on the calibration screen. When the pressure is at the appropriate value, enter the value shown in "Raw Input" in the lower block.
3. Using a calibrated test gauge, set the pressure to the value shown in the label of the upper block on the calibration screen. When the pressure is at the appropriate value, enter the value shown in "Raw Input" in the upper block.

"Automatic Elevation Calibration", if enabled, automatically calibrates the inlet and interstage transducers when the PLC starts up. This allows the compressor to adjust to differing atmospheric pressures due to altitude of installation. The inlet transducer will read atmospheric pressure when the compressor is stopped; calibration is adjusted based on detected atmospheric pressure.

3. Normal Compressor Operation

3.1. Start Sequence

The PLC monitors for normal conditions of the compressor. If all parameters are acceptable, then starting will be permitted. The PLC controls the timing of the start sequence, as follows:

1. The oil pump starter will energize immediately to start the oil pump. The RUN light will be turned on.
2. When Lube Oil pressure reaches 20 PSI (0-3 frame compressors) or 8 PSI (00 frame compressors), the compressor run relay will energize, closing the compressor main starter, starting the compressor drive motor. Compressor graphic will animate.
3. When Transition Control is enabled, start-to-run transition will occur when the first stage suction stabilizes (varies less than ±3 "H2O for at least 3 seconds) with a minimum transition time of 3 seconds. If the pressure fails to stabilize after 28 seconds, start-to-run transition will be forced.

4. The cooling fan starter will energize to start the fan motor; cooling fan animation will display. When Up-To-Speed (UTS)/Transition Check is enabled the Fan will start 1.5 seconds after the UTS/Transition signal from the starter is active. If UTS/ Transition Check is disabled the Fan will start 1.5 seconds after Lube Oil Pressure is achieved.

3.2. Loading Operation

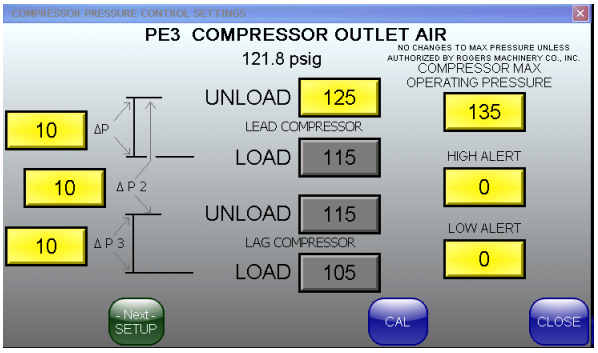
The PLC controls loading of the compressor. “Loaded” is when the compressor inlet capacity control valve is open, and air is being drawn in and compressed. “Unloaded” is when the capacity control valve is closed, and air is not being compressed.

Load control will be enabled 5 seconds after the motor has reached full speed, if "UTS/ Transition Check" input is enabled (see section 5.5), or 20 seconds after the main motor has started. Loading and unloading are determined by the PLC which continuously monitors compressor outlet air pressure and compares the pressure to setpoints stored in the PLC. The PLC controls a 4-way solenoid valve which operates the capacity control valve. If discharge pressure is lower than the "LOAD" set point, the PLC will energize the solenoid valve, loading the compressor. The LOAD light turns on and “LOADED” is indicated on the Temperature page and the Pressure page. If the discharge pressure exceeds the "UNLOAD" set point, the PLC will de-energize the solenoid valve, unloading the compressor. The LOAD light turns off and “UNLOADED” is displayed on the Temperature and Pressure page.

The Temperature and Pressure pages of the HMI Terminal include a Manual Unload button. This allows the compressor to be forced to unload. Pressing the button will bring up a popup which enables or disabled manual unload; the button will blink while manual unload is active. As with automatic unloading, when manually unloaded for more than a preset time, the compressor will go into standby.

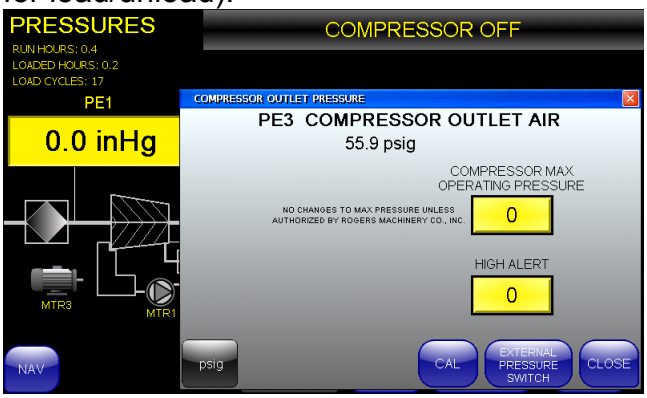
WARNING: The compressor will remain unloaded as long as Manual Unload is selected. The compressor may shut down on Standby timer and automatically restart when Manual Unload is deselected.

An optional LEAD/LAG control is available, allowing two pressure bands to be programmed for installations having two compressors. A LEAD/LAG key is provided on the Temperature page and the Pressure page, to select lead (high) or lag (low) pressure operation. Details of LEAD/LAG control are in Section 5.1.



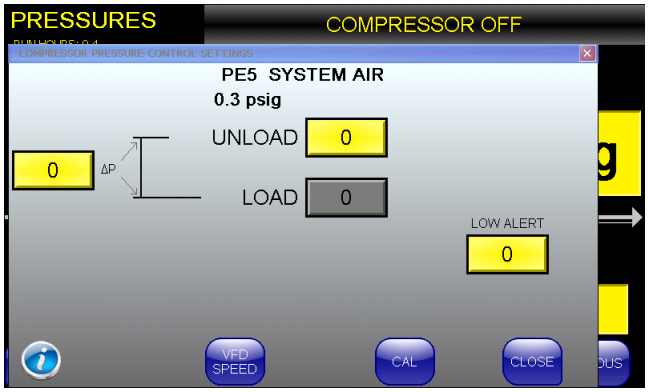
- Accessible from: Pressures screen. Press 'PE3' to bring up.
- Pressure shown at top is current system pressure.
- Pressure units are same as selected on Pressures screen.
- "Pressure Setback Active" may display; see section 5.4.

Version shown on VFD-controlled compressors (see 'System Pressure Setpoints' for load/unload):



'Pressure Setpoints' screen

- "Compressor Unload" and "Load" determine load and unload points in standard operation. Designation changes to "Lead" when Lead/Lag is enabled.
- "Lag Unload" and "Load" determine load and unload points when operating in Lag mode. See section 5.3.
- "ΔP", "ΔP2", "ΔP3" are differences between pressure setpoints; adjusting them will automatically change all lower setpoints as required to adjust for the difference.
- "Compressor Max Operating Pressure" determines maximum allowable pressure at which compressor can operate; "Unload" setting cannot be higher than this pressure. **Pressure is determined by compressor size; do not modify without consulting factory.**
- "Low Alert" and "High Alert" determine pressures at which the outlet pressure alerts occur, if desired. A '0' in these fields disables the alert.
- "Cal" brings up calibration screen for compressor outlet pressure transducer.
- "Virtual Pressure Switch", if displayed, brings up Virtual Pressure Switch controls (see section 5.6).



- Accessible from: Pressures screen. Press 'PE5' to bring up.

'System Pressure Setpoints' screen

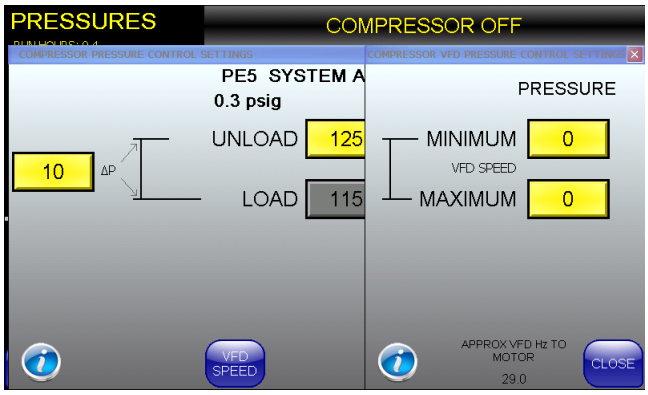
- Shown for VFD-controlled compressors. Loading and unloading is controlled by system pressure transducer, instead of compressor outlet pressure.
- "VFD Speed" brings up VFD Pressure Control screen; see section 3.3.
- "Low Alert" determines pressure at which the outlet pressure low alert occurs, if desired. A '0' in this field disables the alert.

Pressure settings are factory set as specified by customer. Maximum available pressure is dependant on compressor size, gear ratio, horsepower, and elevation.

3.3. VFD Control

If the compressor is configured for VFD control (see section 5.5), compressor speed is controlled by a variable-frequency drive. The drive runs the compressor motor at a speed proportional to air system pressure. If system pressure is high, indicating low demand, the drive will operate more slowly; while system pressure is low, indicating high demand, the drive will increase in speed, allowing more air to be compressed.

VFD speed may also be controlled by a remote analog signal. This mode can be enabled on the Remote Modes screen; see section 5.2.



- Accessible from: Pressure Setpoints.

VFD 'Pressure Control' screen

- "Lead VFD Speed Minimum" and "Maximum" determine pressures at which VFD should be operating at minimum and maximum possible speed. System pressure will normally be between these points; the PLC will automatically adjust VFD speed as required to maintain pressure. If compressor is not in Lead/Lag mode, these pressures always apply.
- "Lag VFD Speed" pressures, if shown, are used to determine speed when compressor is in Lag.

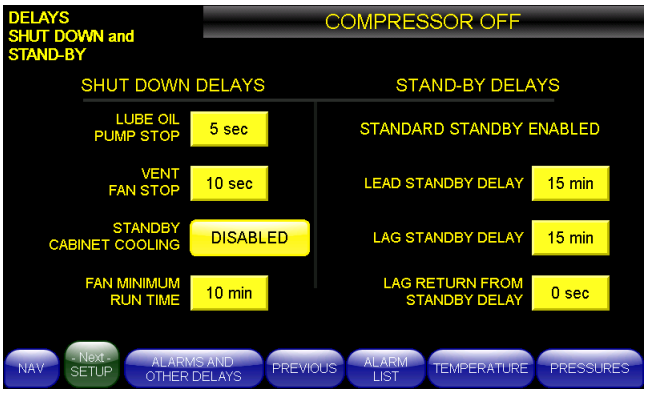
3.4. Shutdown Sequence

The PLC controls the timed Shutdown sequence of the compressor. Once the Shutdown sequence has begun, the compressor will not restart until the sequence is complete.

The Shutdown sequence is as follows:

1. The load solenoid de-energizes, unloading the compressor. After 5 seconds, the main motor run relay de-energizes, stopping the compressor. (If the compressor is already unloaded, the main motor will stop immediately.)
2. After a settable delay following the compressor stop, the oil pump motor stops.
3. After a settable delay, the cabinet cooling fan motor stops.

The cabinet cooling fan can be restarted while the compressor is in standby mode in case of a high temperature alert, if "Standby Cabinet Cooling" is enabled.



- Accessible from: Menu, Alarm Delays.
- See section 3.5 for 'Standby' settings.

'Shutdown and Standby Delays' screen

- "Lube Oil Pump Stop": affects shutdown sequence time; see above.
- "Vent Fan Stop" affects shutdown sequence time; see above.
- "Standby Cabinet Cooling": If enabled, allows the cooling fan to run if a temperature alert occurs while the compressor is in Standby. Cabinet cooling fan will run for the duration of the "Fan Minimum Run Time" once temperature is below Alert setpoint.

Default shutdown sequence settings:

SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
STOP FAN DELAY		20	20	20	20	20	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		300	300	300	300	300	Sec.
STOP PUMP DELAY		3	25	25	25	25	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		30	120	120	120	120	Sec.
COOLING FAN RUN TIME		5	5	5	5	5	Min.
MINIMUM LIMIT		0	0	0	0	0	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.

3.5. Standby

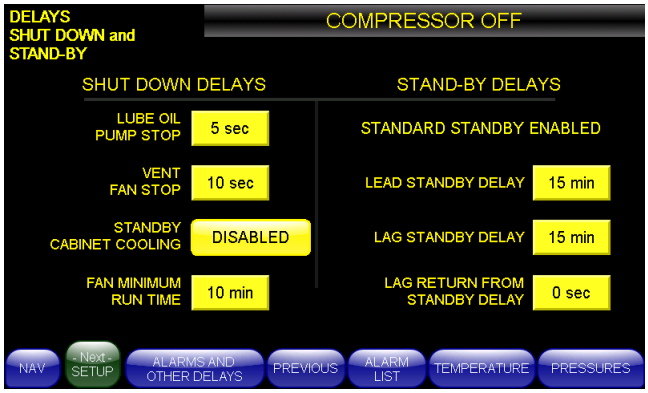
Standby mode allows the compressor to shut down automatically when it has not been loaded for a period of time, in order to conserve energy. While the compressor is in Standby, the green "Standby" light on the control panel will be lit. The compressor will restart automatically from Standby if it detects a drop in pressure below the "Load" setpoint. If applicable, it will also restart upon receiving a "load" signal from a sequencer or external contact.

Two types of Standby are available: "Standard" and "Smart". Mode is selected on the "Timed Load Cycle and Standby" screen; see section 3.6. In "Standard" mode, When the Compressor is running unloaded, a timer is started. If the compressor outlet pressure does not drop below the Load pressure setting, the compressor will shut-down in Stand-By mode.

In "Smart" mode, when the compressor is unloaded, the program uses the difference between successive system pressure measurements, taken every 30 seconds, to calculate expected pressure at the end of the "Standby Delay" time. If the calculated pressure is above the load pressure setting for six consecutive 30-second cycles, the compressor will shut-down in stand-by mode. To prevent unnecessary motor starts, the compressor is not permitted to shut-down in "Smart" Standby mode until it has been running for at least 20 minutes.

To prevent excessive cycling, in either mode, rate of pressure decrease is monitored; if the pressure is decreasing at a rate that would cause the compressor to restart within too short a time after entering Standby, the compressor will not enter Standby.

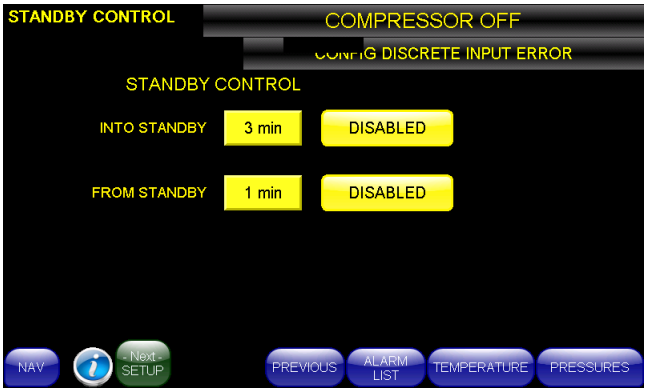
In either mode, once the compressor has entered Standby mode, pressure decrease is monitored; if pressure is decreasing at a rate that will require the compressor to restart in a short time, it will restart immediately, to enable the compressor to finish the startup sequence and load immediately when air is required.



- Accessible from: Menu, Alarm Delays.
- See section 3.4 for Shutdown settings.

'Shutdown and Standby Delays' screen

- "Standard Standby Enabled" or "Smart Standby Enabled" shows standby mode.
- "Lead Standby Delay": time compressor must be unloaded to go to Standby, if in Lead.
- "Lag Standby Delay": time compressor must be unloaded to got to Standby, if in Lag.
- "Lag Return From Standby": Delay after compressor detects pressure drop before restarting, if in Lag.



- Accessible from: Menu.

'Standby Control' screen

- "Into Standby": If pressure is decreasing at a rate that that would cause the compressor to restart within this time, the compressor will not be allowed to enter Standby.
- "From Standby": If pressure is increasing at a rate that would cause the compressor to restart within this time, and compressor is in Standby, it will restart immediately.

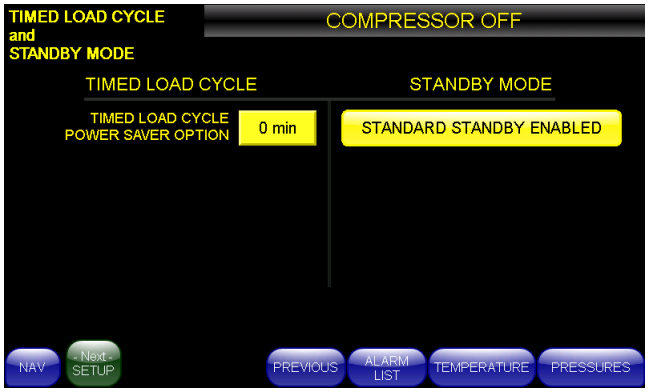
Default standby settings:

SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
LEAD STANDBY DELAY		10	10	15	20	30	Min. Min.
MINIMUM LIMIT		10	10	15	20	30	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.
LAG STANDBY DELAY		10	10	15	20	30	Min.
MINIMUM LIMIT		10	10	15	20	30	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.
LAG RETURN FROM STANDBY DELAY		0	0	0	0	0	Min.
MINIMUM LIMIT		0	0	0	0	0	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.
INTO STANDBY		3	3	3	3	3	Min.
MINIMUM LIMIT		0	0	0	0	0	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.
FROM STANDBY		1	1	1	1	1	Min.
MINIMUM LIMIT		0	0	0	0	0	Min.
MAXIMUM LIMIT		60	60	60	60	60	Min.

3.6. Timed Load Cycle

The "Timed Load Cycle Power Saver" option prevents the compressor from running loaded for excessive periods of time in response to low demand. When enabled, if the

compressor is running loaded, system pressure is above the Load setpoint, and pressure is increasing, a timer is started. After the "Timed Load Cycle" delay has passed, the compressor will unload even if system pressure is below the Unload pressure setpoint.



- Accessible from: Menu.

'Timed Load Cycle and Standby Mode' screen

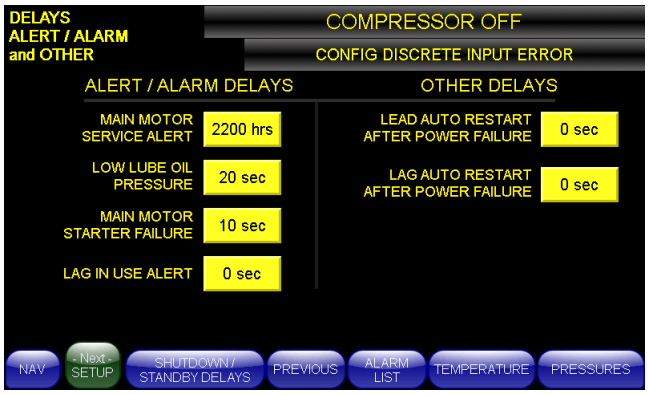
- "Timed Load Cycle Power Saver Option": time for Power Saver option; see above. A 0 in this field disables the option.
- "Standby Mode" determines whether Standard or Standard standby is used; see section 3.5.

Default "Timed Load Cycle" settings:

SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
TIMED LOAD CYCLE		0	0	0	0	0	Min.
MINIMUM LIMIT		0	0	0	0	0	Min..
MAXIMUM LIMIT		300	300	300	300	300	Min.

3.7. Auto Restart

"Auto Restart" allows the compressor to automatically restart after shutting down due to power failure.



- Accessible from: Menu, Shutdown/Standby Delays.
- See section 4 for Alarm settings.

'Alarm and Other Delays' screen

- "Lead Auto Restart After Power Failure": time after power is restored before compressor will restart, if in Lead. A 0 in this field disables the option.
- "Lag Auto Restart After Power Failure": time after power is restored before compressor will restart, if in Lag. A 0 in this field disables the option.

Default "Other Delay" settings:

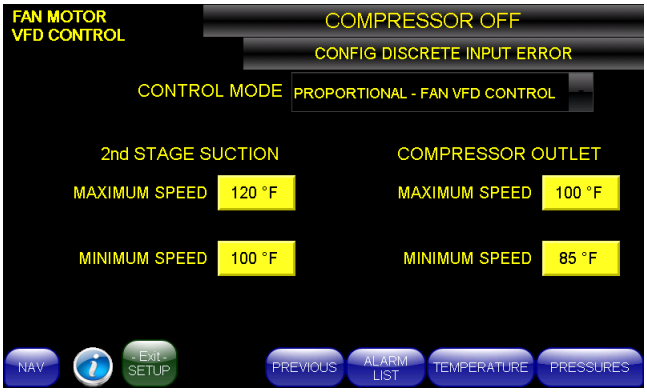
SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
LEAD AUTO RESTART		0	0	0	0	0	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		60	60	60	60	60	Sec.
LAG AUTO RESTART		0	0	0	0	0	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		300	300	300	300	300	Sec.

3.8. Fan VFD Control

If the compressor is configured for Fan VFD Control (see section 5.5), speed of the cooling fan is controlled by a variable-frequency drive. The drive runs the cooling fan at a speed proportional to temperature measured at the compressor second-stage air inlet. This helps prevent condensate buildup and allows the coolers to operate efficiently. If temperature is high, is fan will increase in speed, moving more air across the coolers; if temperature is low, the fan will slow down to save energy and reduce condensation. Fan VFD control is only available on air-cooled machines.

If temperature is high, the fan will increase in speed, moving more air across the coolers; if temperature is low, the fan will slow down to save energy and reduce condensation. Fan speed is based on the temperature at the intercooler exit (2nd Stage Suction) and aftercooler exit (Compressor Outlet). An appropriate fan speed based on each temperature is determined; the fan is then run at whichever fan speed is higher.

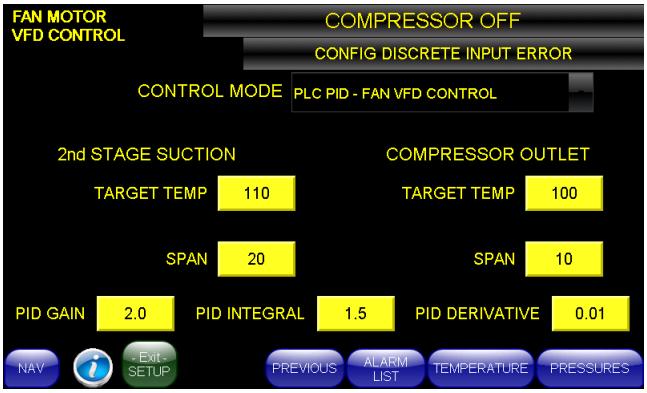
Three modes of fan speed control are available: Proprotional-Integral-Derivative (PID) and Proportional. "Proportional" control derives fan speed directly from temperature. "PLC PID" control uses a PID loop to anticipate changes in temperature, controlling the fan speed to maintain a constant temperature. "Fan PID" control provides a target output to a fan VFD's internal PID control.



- Control mode is selectable; this screen is shown when "Proportional" (no PID) control is selected.

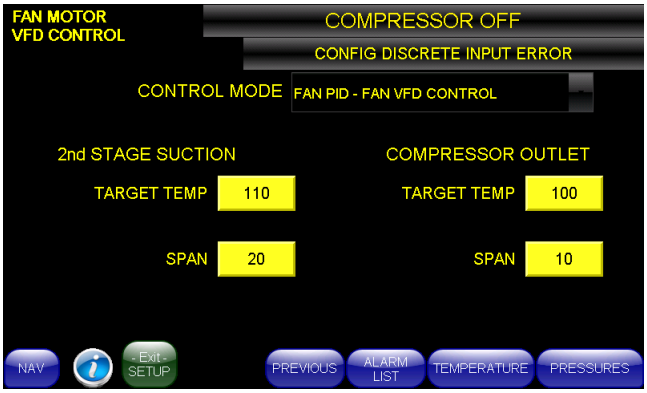
'Fan VFD Control' screen

- Accessible from: Temperatures, Pressures. Press 'Fan' graphic to bring up Fan VFD Control settings, if enabled.
- All temperatures are in °F.
- Fan speed is determined according to both "2nd Stage Suction" and "Compressor Outlet" temperatures; whichever speed is higher is used.
- "Max Speed" and "Min Speed" determine temperatures at which fan will run at maximum and minimum speed.



- This screen is shown when "PLC PID" (PID loop in PLC) control is selected.

- "Target Temp" is the temperature the fan will attempt to maintain. If temperature is above this value, fan speed will increase; if below, decrease. "Span" determines maximum allowable variation from target temp.
- "PID Gain", "PID Integral" and "PID Derivative" affect operation of PID fan control. Do not modify these settings without consulting factory.



- This screen is shown when "Fan PID" (PID loop in VFD controller) control is selected.

- "Target Temp" is the temperature the fan will attempt to maintain. If temperature is above this value, fan speed will increase; if below, decrease. "Span" determines maximum allowable variation from target temp.
- Target speed is output to fan; VFD uses internal PID control to determine actual fan speed.

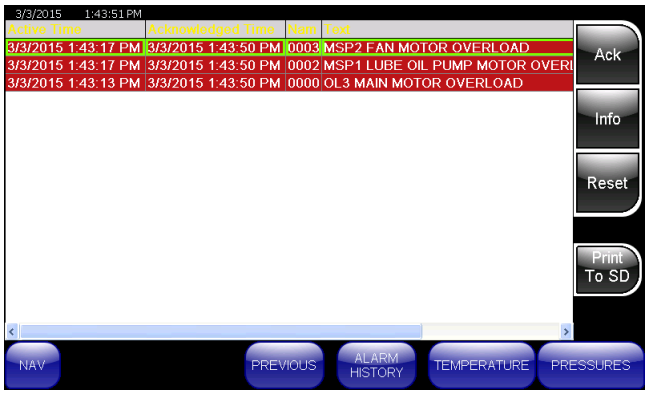
4. Alerts And Alarms

An Alert is any condition that requires operator intervention that does not shut down the compressor; an Alarm is a condition that shuts the compressor down immediately. After an Alarm has occurred, the compressor will not operate until the condition that caused the alarm has ceased.

When an Alert or Alarm has occurred, the HMI will display the Alarms screen. the Alert or Alarm light as appropriate will turn on, and the beeper will sound. The beeper may be silenced by pressing the “ACK” key. This will not reset the alarm. While an alarm is active, most screens will display a red 'Alarm Active' message.

Pressing the “Reset” button on the control panel, or the "Reset" touchzone on the Alarm list, will clear an alarm condition, but only if the cause of the alert or alarm has been corrected.

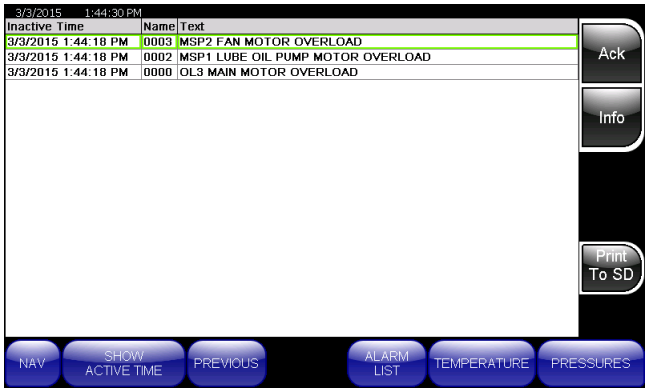
For a complete list of alert and alarm conditions, see Appendix A.



- Accessible from: most screens via 'Alarm List' button.

'Alarms' screen

- Shows currently active alarms.
- "Ack" acknowledges alarm and silences audible alarm.
- "Info" displays more information about selected alarm/alert.
- "Reset" attempts to reset selected alarm.
- "Print To SD" saves alarm list to inserted SD card; see section 6.2.

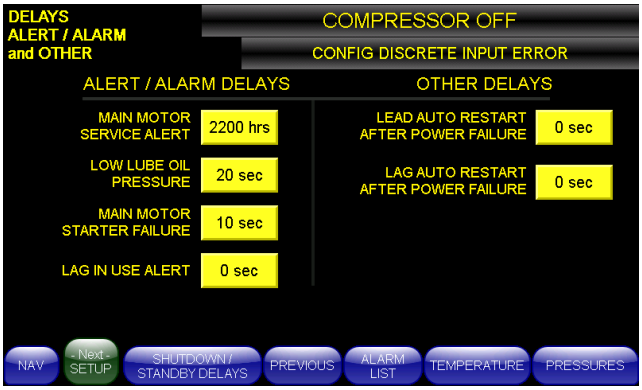


- Accessible from: Menu, Alarms.

'Alarm History' screen

- Shows all alarms and alerts, including alarms previously cleared or reset before acknowledgement (for example, power failure alarms).
- "Show Active Time" / "Show Acknowledged" / "Shows Inactive Time" toggles displayed timestamp: time alarm occurred, time it was acknowledged, or time of reset.
- "Print To SD" saves alarm list to inserted SD card; see section 6.2.

Some alarms are not triggered until the relevant condition has existed for a specified number of seconds, to prevent nuisance alarms. These delays are adjusted from the "Alarm Delays" screen.



- Accessible from: Menu, Shutdown and Standby Delays
- See section 3.5 for Other Delays settings

'Alarm and Other Delays' screen

- "Main Motor Service Alert" sets hours motor runs before Motor Service Alert occurs; see section 6.5. A '0' in this field disables the alert.
- "Low Lube Oil Pressure": time for which the Low Lube Oil Pressure alarm is temporarily disabled on start-up, to allow the oil pump to start.
- "Main Motor Starter Failure": settable debounce time for starter failure alarm.
- "Loss of Communications": settable debounce for communications loss alarm. Only applicable to compressors with "Remote Net" mode control.
- "Lag in Use": settable debounce for Lag in Use alert. A 0 in this field disables the alert. The alert is required to be enabled on NFPA99 compressors.

Default alarm delay settings:

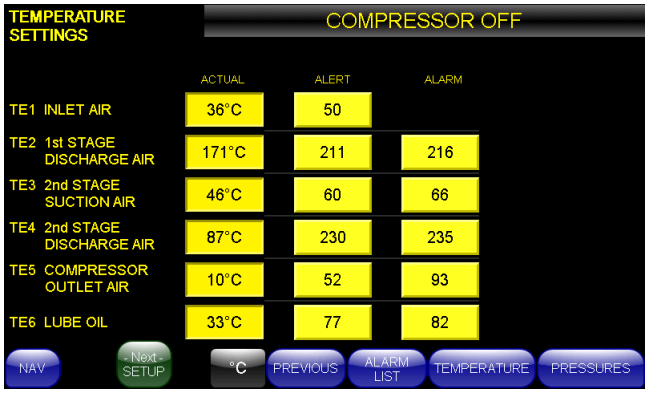
SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
MOTOR SERVICE ALERT		2200	2200	2200	2200	2200	Hours
MINIMUM LIMIT		0	0	0	0	0	Hours
MAXIMUM LIMIT		8800	8800	8800	8800	8800	Hours
LOW LUBE OIL PRESSURE DELAY		20	20	20	20	30	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		60	60	60	60	60	Sec.
STARTER FAILURE		10	10	10	10	10	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		60	60	60	60	60	Sec.
LOSS OF COMMUNICATIONS DELAY		20	20	20	20	20	Sec.
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		60	60	60	60	60	Sec.
LAG IN USE ALERT DELAY		0	0	0	0	0	Sec.

SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
MINIMUM LIMIT		0	0	0	0	0	Sec.
MAXIMUM LIMIT		999	999	999	999	999	Sec.

Temperature Alarms/Alerts

Temperature alerts and alarms occur when the compressor senses dangerously high temperature. Alerts occur at a lower temperature than alarms, and are disabled when the compressor is off. If a temperature alarm occurs while the compressor is not running, the cabinet cooling fan may be set to turn on temporarily in an attempt to reduce compressor cabinet temperature. This prevents nuisance alarms due to external heat sources. This function can be configured from the "Shutdown Delays" screen; see section 3.3.

To adjust the alert and alarm setpoints for any temperature, press the displayed temperature on the 'Temperatures' status screen. Login is required. Alternately, all temperature settings can be adjusted from the Temperature Settings screen.



- Accessible from: Menu.

'Temperature Settings' screen

- Temperatures are settings at which temperature alerts or alarms will occur.
- "°F" or "°C" determines whether temperatures are displayed in Fahrenheit or Celsius. Press to toggle units.
- Current temperatures are displayed in label boxes.

Default temperature alert/alarm settings:

SETPOINT	USER SETTING	FACTORY SETTING - 00/ A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
INLET ALERT		122 (50)	122 (50)	122 (50)	122 (50)	122 (50)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		180 (82)	180 (82)	180 (82)	180 (82)	180 (82)	°F (°C)
1st STAGE DISCHARGE ALERT		580 (304)	455 (235)	412 (211)	412 (211)	400 (204)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)

SETPOINT	USER SETTING	FACTORY SETTING - 00/A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
MAXIMUM LIMIT		590 (310)	464 (240)	421 (216)	421 (216)	410 (210)	°F (°C)
1st STAGE DISCHARGE ALARM		590 (310)	464 (240)	421 (216)	421 (216)	410 (210)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		590 (310)	464 (240)	421 (216)	421 (216)	410 (210)	°F (°C)
2nd STAGE SUCTION ALERT		165 (73)	140 (59)	140 (59)	140 (59)	140 (59)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		175 (79)	150 (65)	150 (65)	150 (65)	150 (65)	°F (°C)
2nd STAGE SUCTION ALARM		175 (79)	150 (65)	150 (65)	150 (65)	150 (65)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		175 (79)	150 (65)	150 (65)	150 (65)	150 (65)	°F (°C)
2nd STAGE DISCHARGE ALERT		580 (304)	455 (235)	446 (230)	446 (230)	445 (229)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		590 (310)	464 (240)	455 (235)	455 (235)	446 (230)	°F (°C)
2nd STAGE DISCHARGE ALARM		590 (310)	464 (24)	455 (235)	455 (235)	455 (235)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		590 (310)	464 (240)	455 (235)	455 (235)	455 (235)	°F (°C)
COMPRESSOR OUTLET ALERT		125 (51)	125 (51)	125 (51)	125 (51)	125 (51)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		200 (93)	200 (93)	200 (93)	200 (93)	200 (93)	°F (°C)
COMPRESSOR OUTLET ALARM		200 (93)	200 (93)	200 (93)	200 (93)	200 (93)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		200 (93)	200 (93)	200 (93)	200 (93)	200 (93)	°F (°C)
LUBRICANT ALERT		170 (77)	170 (77)	170 (77)	170 (77)	170 (77)	°F (°C)
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		180 (82)	180 (82)	180 (82)	180 (82)	180 (82)	°F (°C)
LUBRICANT ALARM		180 (82)	180 (82)	180 (82)	180 (82)	180 (82)	°F (°C)

SETPOINT	USER SETTING	FACTORY SETTING - 00/A00	FACTORY SETTING - 0/A0	FACTORY SETTING - 1/A1	FACOTRY SETTING - 2/A2	FACTORY SETTING - 3	UNITS
MINIMUM LIMIT		32 (0)	32 (0)	32 (0)	32 (0)	32 (0)	°F (°C)
MAXIMUM LIMIT		180 (82)	180 (82)	180 (82)	180 (82)	180 (82)	°F (°C)

5. Special-Purpose Compressor Control Options

5.1. Lead/Lag Control

When a compressor is set up for Lead/Lag control, it will operate at either of two pressure ranges, determined by whether the compressor is in Lead or Lag. Lead/Lag status can be selected using the HMI Terminal. Compressors can be rotated between Lead and Lag status, to equalize wear, or to meet changing demands better by using different-capacity compressors at different times.

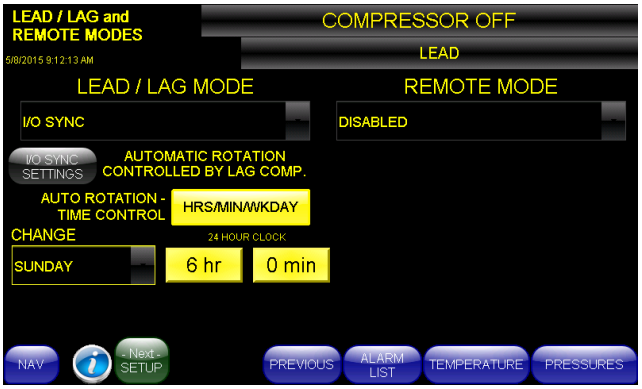
The purpose of Lead/Lag control is to allow two compressors to operate at once, with one operating as LEAD and maintaining system pressure, and the other operating as LAG and loading only as necessary when system pressure drops. For example, consider a system with two compressors, A and B. Compressor A is set up as Lead, and B as Lag. Compressor A, as Lead, will load when system pressure drops to 90 PSI, and unload when pressure reaches 100 PSI. Compressor B, as Lag, will load only when system pressure drops to 85 PSI, and will unload when system pressure reaches 95 PSI. Therefore, when system pressure is above 95 PSI, only Compressor A will run; when system pressure is below 90 PSI, both compressors will run, and when system pressure is between 90 and 95 PSI, Compressor B will run if pressure most recently was below 90 and stop if pressure was most recently above 95.

In Manual or Automatic modes, this form of Lead/Lag control requires no connection between the two compressors. In External mode, control requires an external dry contact to connect to the compressor. In Ethernet Sync Client or Server modes, the RJ45 port on the PLC communication modules must be connected, using a CAT5 crossover cable.

There are five modes of Lead/Lag control. Mode may be selected on the "Lead/Lag and Remote Modes" screen.

- **MANUAL ONLY:** Compressor operates as Lead or Lag based on user selection on Temperature or Pressure screen, and does not change position unless selection is changed. No connection between compressors is required.
- **AUTOMATIC:** Compressor alternates between Lead and Lag automatically, at intervals selected by time and date or by run time, as selected on the Configuration screen. No connection between compressors is required.

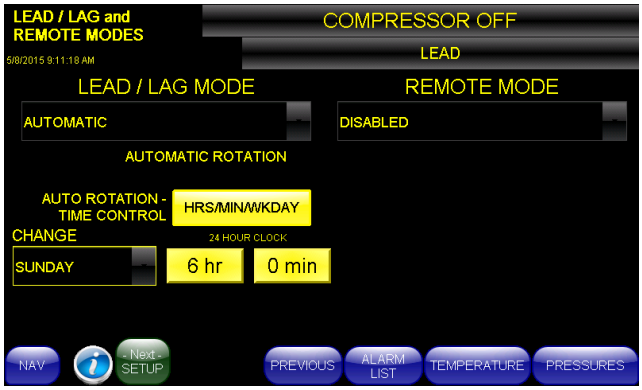
- **EXTERNAL:** Lead/Lag status is determined by an external signal; requires configured input (see below). A dry contact signal from the customer control system is required for each compressor.
- **ETHERNET SYNC CLIENT, SERVER:** Compressor is connected to other compressor by Ethernet, as shown on electrical schematic. Compressor alternates between Lead and Lag automatically, at intervals selected on Configuration screen. When either compressor changes from Lead to Lag or vice versa, the other will change to the opposite setting.
- **I/O SYNC:** Compressor is connected to other compressor by a hardwired dry contact, as shown on electrical schematic. Compressor alternates between Lead and Lag automatically, at intervals selected on Configuration screen. When either compressor changes from Lead to Lag or vice versa, the other will change to the opposite setting.



- Accessible from: Menu.
- Screen appears as shown when "Automatic" or "Client" lead/lag mode and "Hrs/Min/Wkday" auto rotate mode are selected.
- "I/O Sync Settings" brings up I/O Sync screen.

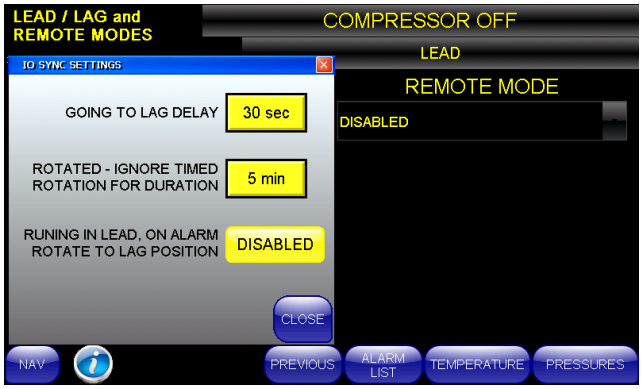
'Lead/Lag And Remote Modes screen, Lead/Lag settings

- "Lead/Lag Mode": selects mode of Lead/Lag control, as described above.
- "Remote Mode": selects remote control mode; see section 5.2.
- "Auto Rotate Time Control" selects time of automatic rotation in Automatic or Client mode.
- In "Hrs/Min/Wkday" mode, compressor will switch from Lead to Lag or vice versa at the specified time of day and day of week, or daily at the specified time.
- "Rotate to Lead When Other Comp In Alarm" applies to Client/Server configured compressors only. If the other compressor shuts down due to ar alarm and this compressor is in Lag, it will immediately switch modes.



- Screen appears as shown when "Automatic" or "Client" lead/lag mode and "Hours" auto rotate mode are selected.

- In "Hours" mode, compressor will switch from Lead to Lag or vice versa after operating for the specified number of hours.



- Accessible from: Lead/Lag screen.

'I/O Sync Settings' screen

- "Going To Lag Delay": Time after compressors change positions that the former Lead compressor will continue to use Lead pressure settings. This gives the new Lead compressor time to start and load.
- "Rotated - Ignore Timed Rotation": Time after a compressor has changed to lag position for any reason, including alarm or manual rotation, that it will ignore automatic rotation commands to return to lead. This prevents compressor short-cycling.
- "On Alarm Rotate": Enables/disables automatic rotation on alarm. If enabled, an alarm on the Lead compressor will force it to rotate to Lag and the other compressor to Lead, to maintain typical system pressure.

5.2. Local/Remote Operation

When a compressor is set up for Local/Remote control, it can be operated based on either local system pressure as determined by the compressor's own sensors, or on signals from an external device. Local/Remote status can be selected using the HMI Terminal. In modes that require a remote signal to start the compressor, the local Start button will not start the compressor, but the local Stop button acts as an override for the remote signal, and if pressed, will stop the compressor immediately. It will also return the compressor to Local mode; Remote mode must be re-enabled before the compressor can be operated remotely.

In Local mode, the compressors can be started and stopped using the Start and Stop pushbuttons located on the panel; loading and unloading are controlled by the local PLC.

In Remote modes that include remote starting, the local Start button is used to "arm" the compressor to remote control; when the compressor is placed in Remote mode, the Standby light will flash to indicate confirmation of remote control. When the Start button is pressed, the Standby LED will remain solid to indicate that the compressor may start at any time when the Remote Run contact closes. If an alarm shutdown occurs, the compressor will automatically return the compressor to Local mode.

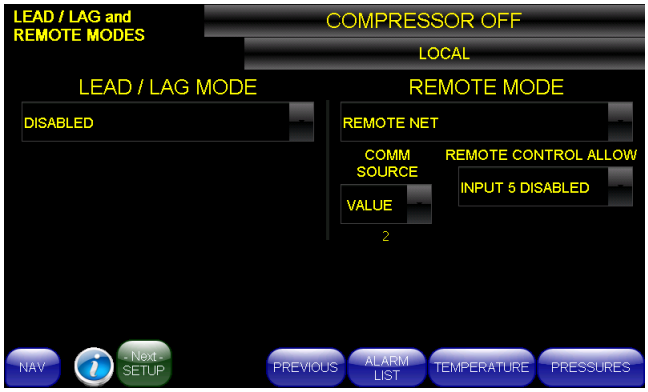
There are seven modes of Remote operation. Mode may be selected on the "Lead/Lag Remote" screen. For modes requiring remote contacts, see compressor electrical schematic for contact location.

- **REMOTE RUN**: Starting and stopping is controlled by a remote maintained contact; if the contact is closed, the compressor will run, and if it is open, the compressor will stop.
- **REMOTE LOAD**: Starting and stopping is controlled by the local Start and Stop buttons, but compressor loading is determined by a remote maintained contact. The compressor will load when the contact is energized, and unload when it is de-energized. As in Local mode, if the compressor has been unloaded for a set time it will automatically enter Standby mode and shut down; it will start up when it receives a signal to load.
- **REMOTE RUN AND LOAD**: Both starting and loading are controlled by remote maintained contacts; the run contact must be closed for the compressor to run, and the load contact must be closed for the compressor to load.
- **REMOTE UNLOAD**: Starting and stopping are determined by the local Start and Stop buttons. Compressor loading is controlled by local pressure settings and a remote contact; in order for the compressor to load, pressure must be below the local Load setpoint and the contact must not be energized. When the contact is energized, the compressor will be forced to unload. As in Local mode, if the compressor has been unloaded for a set time it will automatically enter Standby mode and shut down; it will start up when the pressure drops to the Load point and the Remote Unload contact is de-energized.
- **REMOTE NET**: As in Remote Run And Load mode, start/stop and load/unload functions are controlled remotely; in Remote Net, these functions are controlled via the PLC’s communications port rather than via relays connected to the input and output modules. This mode is reserved for use with a Rogers Machinery Company external sequencer, and should not be used without consulting the factory.
- **START-STOP INPUTS**: Compressor starting and stopping are controlled by two remote contacts; the local Start button will not start the compressor. While both contacts are open, the compressor will remain in Standby. When the remote start contact closes and the remote stop contact is closed, the compressor will start. When the remote stop contact is open the compressor will stop. The remote stop contact will take priority over the remote start input. This remote mode will operate normally whether the signals are continuous or momentary, but they must be the same type. It is recommended to always reset the remote start interface signal when stopping the compressor.

- **START-STOP AND LOAD**: In this mode starting and stopping are controlled by two remote contacts, as in Start-Stop Inputs mode; loading and unloading is controlled by a third maintained contact.

Additionally, on VFD-controlled compressors, the VFD can be set to change speed according to a remote signal, rather than according to the system pressure sensor. This mode is enabled on the Remote Modes screen.

All modes of Remote control include an option for a Remote Control Enable input. This is a hardwired contact to PLC input 5 (see electrical schematic), which must remain closed for the compressor to operate in Remote mode. If the contact opens, the compressor will not run. This input can be used to verify a 'ready' signal from a remote controller.



- Accessible from: Menu.

'Lead/Lag And Remote Modes screen, Remote settings

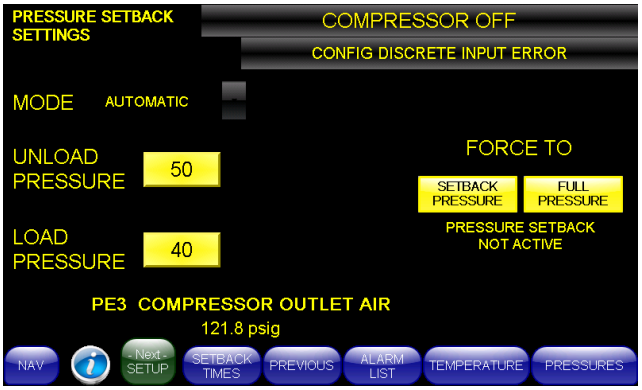
- Screen appears as shown when "Remote Net" remote mode is selected.
- "Remote Mode" selects mode.
- "Comm Source", in Remote Net mode, determines whether to use a heartbeat bit or word comparion to detect comm loss. Consult factory for more information.
- "Remote Control Allow" enables or disables Remote Control Enable input; see above.

5.3. Setback Mode

"Setback Mode" allows the compressor to operate at a lower pressure than normal at specified times. If standard system pressure is not required except during standard on-shift times, but a lower pressure must be maintained constantly, "Setback Mode" will save energy by operating the compressor less while off-shift.

There are three modes of Setback operation. Mode may be selected on the "Pressure Setback Settings" screen.

- **MANUAL:** Compressor enters Setback (operating at lower pressure settings) when a remote enable contact is energized. Inputs must be appropriately configured for remote signal; see section 5.4.
- **AUTOMATIC:** Compressor enters Setback at specified times, as defined on "Pressure Setback Times" screen; see below.
- **MANUAL AND AUTOMATIC:** As in Automatic mode, compressor enters Setback at specified times. Additionally, compressor will enter Setback when the remote enable contact is energized; this overrides the normal pressure operation due to time settings. Inputs must be appropriately configured for remote signal; see section 5.4.

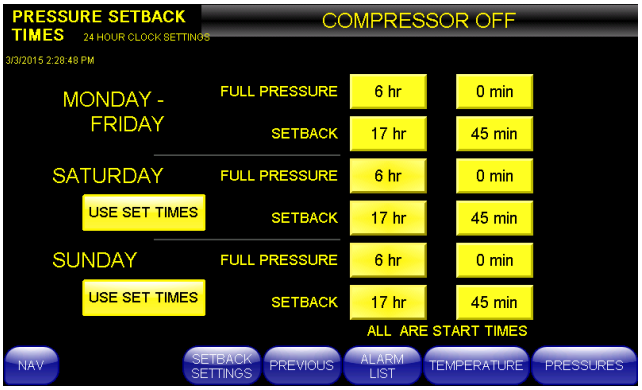


- Accessible from: Menu, Pressure Setback Times

'Pressure Setback Settings' screen

- "Setback Mode" enables Setback mode and selects type of Setback operation; see above.
- "Unload Pressure" determines pressure at which the compressor will unload when operating in Setback. Pressure units are selectable.
- "Load Pressure" determines pressure at which the compressor will load when operating in Setback mode.
- "Force To" buttons, when in an Automatic setback mode, will force the compressor to either Setback or Normal pressure settings. The settings will return to normal operation at the next automatic change.
- "Setback Times" brings up "Pressure Setback Times" screen.

Setback mode can be configured to operate the compressor at normal pressure during independently specified times on weekdays, Saturday (if desired), and Sunday (if desired). These times apply in "Automatic" or "Manual And Automatic" Setback mode .



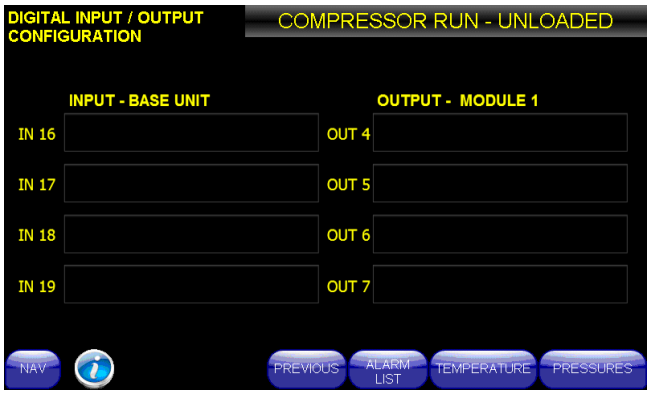
- Accessible from: Menu, Pressure Setback Settings

'Pressure Setback Times' screen

- "Monday - Friday": Settings apply to all weekdays.
    - "Full Pressure" determines time of day at which compressor will begin to operate at standard pressure setting.
    - "Setback" determines time of day at which compressor will fall back to Setback.
- "Saturday": "All Day" will operate compressor at Setback pressure for all of Saturday. "Set Times" will operate compressor at normal pressure between specified times.
- "Sunday": "All Day" will operate compressor at Setback pressure for all of Sunday. "Set Times" will operate compressor at normal pressure between specified times.

5.4. Input/Output Configuration

The compressor PLC includes a number of input and output signals which can be configured to meet the needs of the application, such as external alarm contacts and specialized status contacts. In some cases selecting a Lead/Lag or Local/Remote setting will automatically set input or output configuration options.



'I/O Configuration' screen

- Accessible from: Menu.
- Displays current I/O configuration settings.
- Allows selection of configurable inputs and outputs (login required).

Inputs

Available input options are:

- None
- Remote Stop: In Remote Start/Stop mode, this input will accept a momentary or continuous signal to stop the compressor.
- Cooling Water Flow Switch: Water-cooled compressors only. Input for a flow switch used to confirm that cooling water is reaching the compressor.
- Phase Monitor: Special alarm input, for a phase monitor alarm signal. If the input receives a signal, the Phase Loss alarm is triggered.
- Lube Oil Sump Level Alarm: Special alarm input, for a level switch at the oil sump. Triggers Low Oil Level alarm.
- External Lead/Lag: If "External" Lead/Lag mode is selected, this input must receive a signal for the compressor to operate in Lag mode.
- Pressure Setback: Input for a remote signal. In Manual Pressure Setback mode, this input must be enabled for compressor to use Setback pressure settings.
- Receiver Level Switch: This option is intended for water-cooled healthcare package compressors. Input for a level switch to detect water in the downstream receiver, triggering an alarm.
- CO Monitor: Special alarm input, for a carbon monoxide monitor. If the input receives a signal, the High CO alarm is triggered.
- Dryer Fault: This option applies to compressors with a third-party air dryer downstream. Input that generates an alarm when the dryer reports a fault; the alarm will shot down the compressor.
- Dryer Alarm: This option applies to compressors with a third-party air dryer downstream. Input that generates an alert when the dryer reports a fault; the alert is for information only and will not shut down compressor.
- External Interlock: (alert or alarm): Used for run inhibit conditions not otherwise specified as an option.

- Z-Purge Pressure Switch: Input for a pressure switch from a Z-Purge pressurization device, used in hazardous conditions to reduce the risk of sparking.
- Vibration: Input for a vibration switch; triggers an alarm when excess vibration at the air end is detected.
- Interstage Drain Alarm: Special alarm input for a powered drain. If the input recieves a signal, the Interstage Drain Alarm is triggered.
- Aftercooler Drain Alert: Special alarm input for a powered drain. If the input recieves a signal, the Aftercooler Drain Alert is triggered.
- Motor Thermostat: Special alarm input for a motor high temperature switch.
- Lube Oil Sump Level Alert: Special alarm input, for a level switch at the oil sump. Triggers Low Oil Level Alert, if continued operation despite low oil level is required.
- Monitor For Auto Restart: On compressor equipped with a phase or voltage monitor on incoming power and set up for automatic restart on power loss, monitors for brownouts and momentary power interruptions.

Outputs

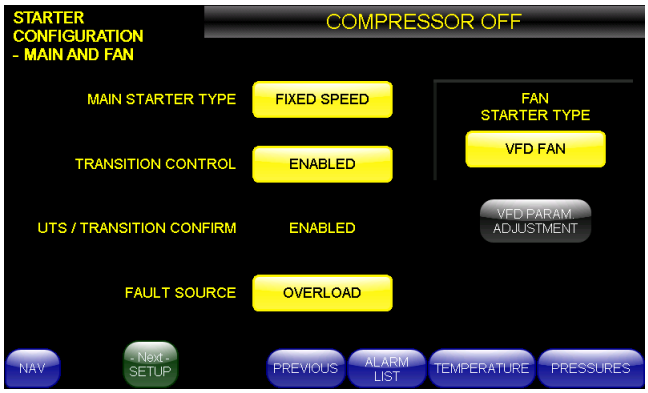
Outputs 0-3 on PLC-X1 output module are used for four status relays (Running, Loaded, Alert, and Alarm), as described in section 2.2. Additional relays may be connected to the remaining outputs to monitor the status conditions described below.

Available output options are:

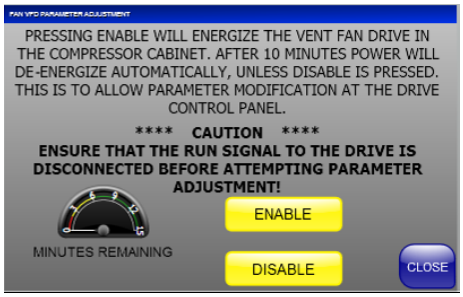
- None
- In Local: Energizes when compressor enters local control mode.
- In Remote: Energizes when compressor enters remote mode.
- Lag In Use: Energizes when compressor is operating in "Lag" mode and pressure drops below Lag Load setpoint, causing compressor to load.
- In Lead: Energizes when compressor is in Lead mode.
- In Lag: Energizes when compressor is in Lag mode.
- Running: Energizes when lube oil pump is energized.
- Loaded: Energizes when compressor load relay output is energized. Low Lubricant Pressure: Output energizes when a Low Lubricant Pressure alarm occurs.
- Check Inlet Air Filter: Energizes when an Inlet Air Filter High Differential Pressure alert occurs.
- Virtual Pressure Switch: Energizes when pressure is in a specified range; see section 5.6. This enables control of a secondary compressor or other device.
- 1st Stage Discharge Temp Alarm: Energizes when a 1st Stage Discharge High Temp alarm occurs.
- 2nd Stage Discharge Temp Alarm: Energizes when a 2nd Stage Discharge High Temp alarm occurs.

5.5. Starter Configuration

Compressors can be configured to operate using various types of main motor starter. Normally, 00, 0, and 1 frame compressors use a two-step Wye-Delta starter; 2 and 3 frame compressors use a solid-state soft starter. Consult factory for further information about available starter options. **Do not modify these settings without consulting factory.**



- Accessible from: Menu.
- "VFD Param. Adjustment" allows power to fan VFD to be briefly turned on without running fan:



'Starter Configuration' screen

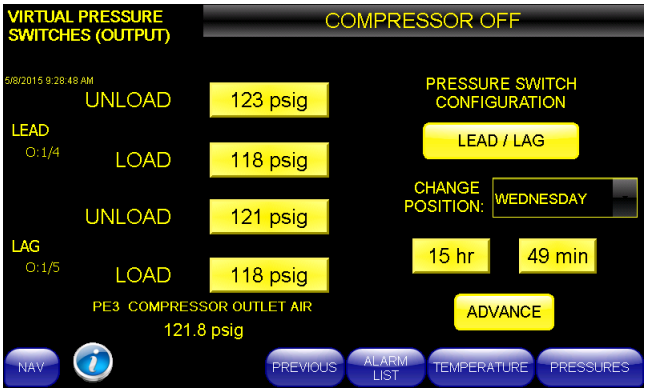
- "Main Starter Type" determines whether the compressor uses a VFD or fixed-speed starter.
- "Transition Control" determines whether the PLC controls the transition to full speed. This should be enabled when using a two-step starter.
- "UTS/Transition Confirm" determines whether PLC uses a signal from the starter to confirm that the compressor has reached full speed. This is enabled except when using some models of soft starter; contact factory.
- "Fault Source" determines whether starter faults are indicated by a motor overload or a starter control board signal.
- "Fan Starter Type" determines whether the compressor uses a fixed-speed or VFD-controlled cabinet cooling fan.

5.6. Virtual Pressure Switch

The Virtual Pressure Switch option allows the compressor to energize one or two status relays when detected system pressure is within specified ranges. This allows the compressor to control other compressors or auxiliary equipment, or to provide status information to a plant control system. To use Virtual Pressure Switch control, outputs O:1/4 and O:1/5, or O:1/6 and O:1/7, must be configured accordingly; see section 5.4.

If only one output is configured for Virtual Pressure Switch operation, that output will energize according to the range specified as "#1". If both available outputs are configured for Virtual Pressure Switch operation, they will be designated as "Lead" and "Lag".

Two modes of operation are available for use with two outputs: Lead/Lag and Static. In Lead/Lag mode, the "Lead" and "Lag" settings switch outputs at specified times, allowing control of two other compressors using a Lead/Lag-like mode. In Static mode, the two pressure ranges each control a single output and do not switch.



- Accessible from: Menu, Pressure Setpoints.
- "Compressor Outlet Pressure" displays current system pressure.

'Virtual Pressure Switch' screen

- "Unload" and "Load" determine system pressure readings at which associated output will de-energize and energize.
- "Pressure Switch Configuration" determines mode; see above.
- "Change Position", if Lead/Lag configuration is selected, will rotate the outputs, changing the output now designated as "Lead" to "Lag", and vice versa, at the specified times. Current output selection is shown below '"Lead", "Lag" labels.
- "Advance" forces Lead and Lag outputs to change position.

6. Informational Settings

6.1. Diagnostic Screens

Diagnostic screens display the current value of all PLC inputs and outputs. These screens are primarily intended to help technicians locate and correct problems in the field. Diagnostic screens are available from the Menu.

6.2. Data Logging

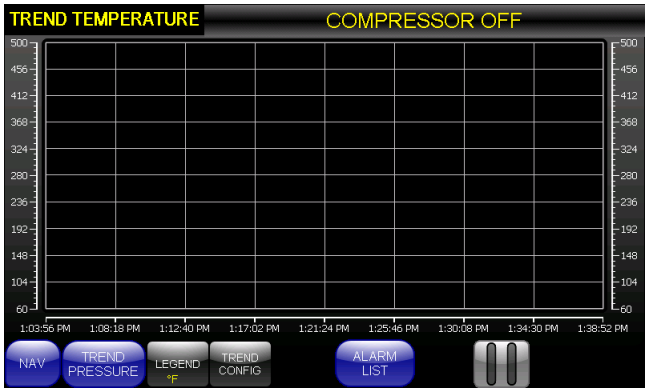
Data logging records compressor operating information and list of alarms, and may be retrieved by saving data to a USB flash drive or connecting to the terminal FTP via Ethernet. Data is logged every 5 seconds. To save data, insert a USB flashdrive or SD card in the appropriate slot on the back of the display. Go to the 'Panel Options' screen and ensure you are logged in. Various 'Save Data' buttons will be shown; choose the appropriate one for the data you wish to save.

6.3. Temperature and Pressure Trends

"Trending" pages are available to display recent temperature and pressure readings for the compressor. These can help to identify situations with the compressor and possible settings modifications for greater efficiency.

Two trend charts can be shown: Temperatures and Pressures. Data is recorded every 5 seconds. Displayed section of the trend charts can be adjusted on the "Trend Config" screen. This affects only what data is *displayed*; if data is not displayed, it is not lost.

The Temperature trend chart can be used to measure temperature differentials across the intercooler and aftercooler. Reductions in temperature differentials here may indicate loss of cooler efficiency; the coolers may need to be cleaned.

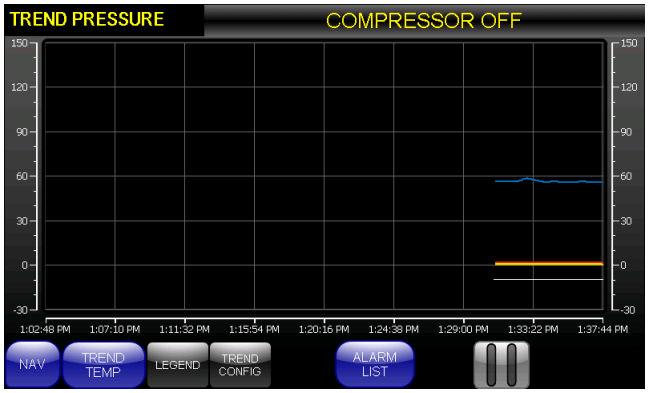


- Accessible from: Menu, Trend Pressure.

'Temperature Trend' screen

- "Legend" brings up list of chart colors.
- "Trend Config" brings up configuration popup.
- Displays temperature readings for:
    - Compressor Inlet
    - 1st Stage Discharge
    - 2nd Stage Suction
    - 2nd Stage Discharge
    - Compressor Outlet
    - Lube Oil

The Pressure trend chart can be used to determine variations in system pressure due to usage patterns, which can be used to find the most efficient settings for your compressor. It can also be used to monitor pressure rise across each air end, which can help identify problems with the air end.

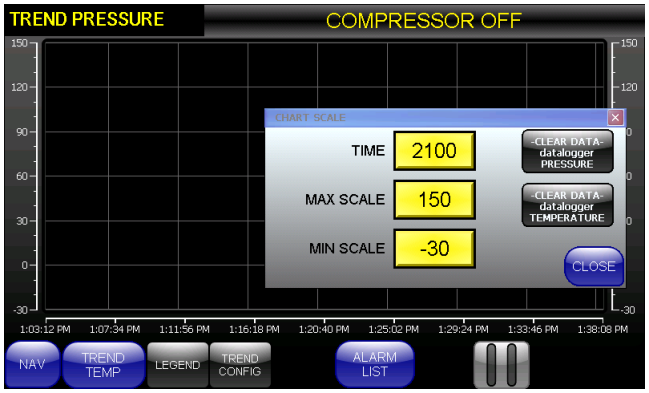


- Accessible from: Menu, Trend Temp.

'Pressure Trend' screen

- "Legend" brings up list of chart colors.
- "Trend Config" brings up configuration popup.
- Displays pressure readings for:
    - 1st Stage Suction
    - Interstage
    - Compressor Outlet
    - Lube Oil
    - System Transducer (when used, on VFD compressors)

Displayed section of chart can be adjusted using the Treng Config popup.



- Accessible from each trend screen.
- Temperatures units are as selected on "Temp" screen. Pressures are shown in PSI, except 1st stage suction pressure, which is in

Trend Config

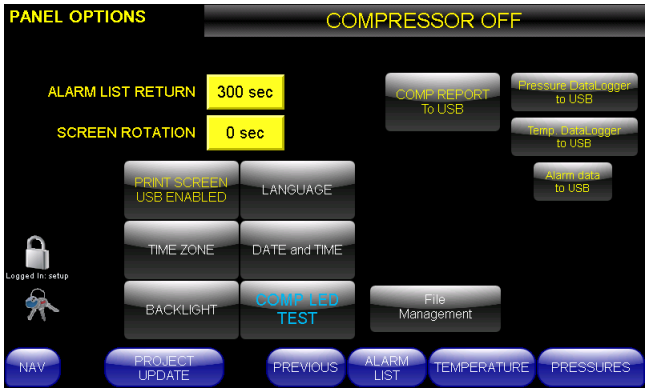
- "Time" determines range of time over which values are shown.
- "Max Scale" and "Min Scale" determine largest and smallest values shown on chart.
- "Clear Data" erases all recorded data for the specified chart.

Trend chart settings

T4 - TREND CHARTS	User Setting	Factory Setting	Minimum Limit	Maximum Limit	Units
PRESSURES, TIME SCALE		240	60	9999	Sec.
PRESSURES, MINIMUM VALUE		-30	-30	600	Chart
PRESSURES, MAXIMUM VALUE		60	0	600	Chart
TEMPERATURES, TIME SCALE		240	60	9999	Sec.
TEMPERATURES, MINIMUM VALUE		60	0	600	Chart
TEMPERATURES, MAXIMUM VALUE		500	0	600	Chart

6.4. Panel Options

These options affect the HMI. Exercise care when modifying "Current Date/Time", as time affects automatic lead/lag and pressure setback operation.



- Accessible from: Menu.

'Panel Options' screen

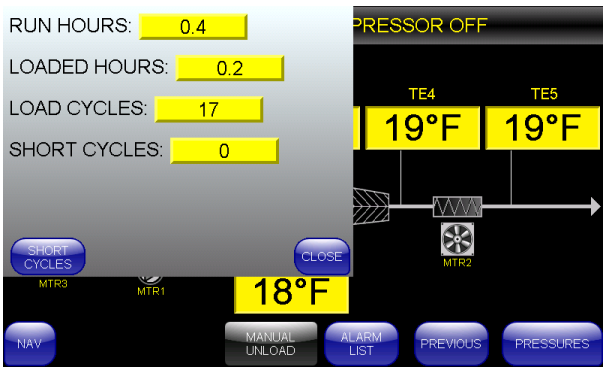
- "Alarm List Return": If an alarm is active and 'Esc' has been used to return to previous screen, length of time before 'Alarm' screen is automatically brought up again.
- "Screen Rotation": Seconds between automatic scrolling between Pressure and Temperature screens. A 0 in this field disables automatic scrolling.
- "Date And Time": Determines current system time. Factory set.
- "Time Zone": Determines system time zone.
- "Backlight:" adjusts display backlight.
- "Comp LED Test": Briefly illuminates all status lamps, to check for proper operation.
- "Print Screen Select" allows selection of location for 'Print Screen' function.

Screenshots of the HMI can be saved using the 'Print Screen' function. To use, insert a USB flash drive or SD card in the appropriate slot on the back of the display. Press 'Print Screen Select' on the Panel Options screen; select a location to save. Go to the screen you wish to save and press the top center of the screen; this will create an image and save it in the specified location.

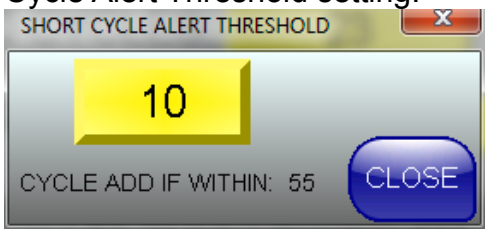
6.5. Service Information

The compressor requires service at regular intervals. Service intervals are dependant on compressor usage; see Operations Manual for details regarding required maintenance. The compressor tracks load/unload cycles and total running hours, allowing maintenance to be performed at appropriate intervals. A 'Service Alert' occurs when the load counter indicates that the compressor is due for maintenance; these timers are normally reset during service by the service technician.

Additionally, the compressor tracks 'short cycles'. A 'short cycle' occurs when the compressor loads and unloads again, or unloads and then loads again, within a minute. Short cycles are indicative of incorrect compressor settings or a problem in the plant air system. Frequent cycling can shorten the life of the compressor and should be avoided. A 'Short Cycle Alert' occurs after a specified number of short cycles; this indicates that compressor settings should be reviewed.



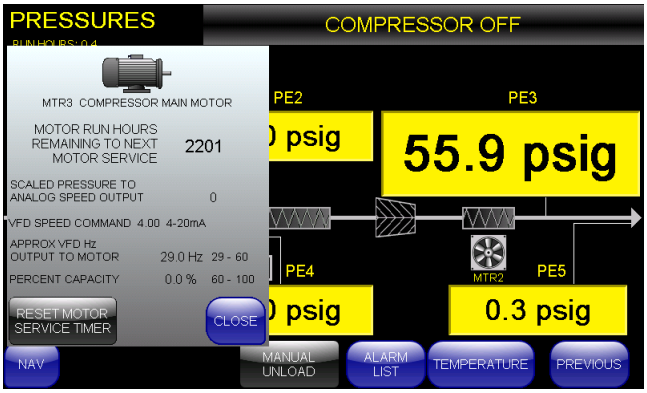
- Accessible from: Temperatures, Pressures.
- Press 'Short Cycles' to bring up Short Cycle Alert Threshold setting:



'Meters' screen

- Run Hours" displays total time the compressor has been run.
- "Loaded Hours" displays total time the compressor has been loaded.
- "Load Cycles" displays total number of load/unload cycles since last service.
- "Short Cycles" displays total number of short cycles since counter was last reset.
- "Short Cycle Alert Threshold": number of short cycles that must be detected before alert occurs. A 0 in this field disables the alert.

A "Motor Service Alert" occurs when the motor run timer indicates that the motor has run for long enough to require service. To view motor service information, motor graphic on the "Pressures" or "Temperatures" page. VFD information (if applicable) is also displayed on this page.

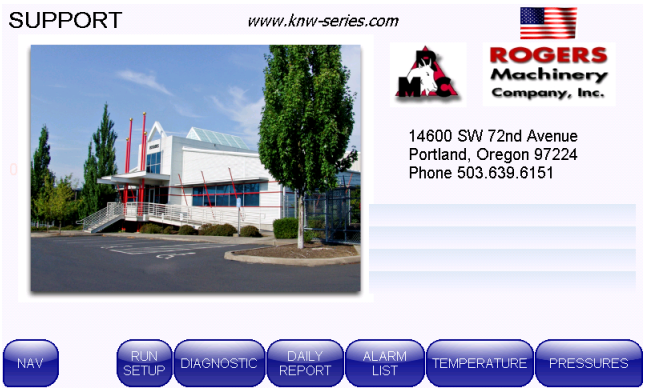


- Accessible from: Temperatures, Pressures.

'Main Motor Info' screen

- "Motor Run Hours Remaining To Next Motor Service" shows hours until Motor Service alert will occur.
- "VFD Speed Command", on VFD-controlled machines, indicates current speed control output to VFD.
- "Approx VFD Hz Output to Motor" indicates current VFD running speed.
- "Reset Motor Service Timer" resets time to motor service; use when motor service is completed.

Contact information for Rogers Machinery and for the local compressor service facility is shown on the "Support" screen.



- Accessible from: Menu.

"Support" screen

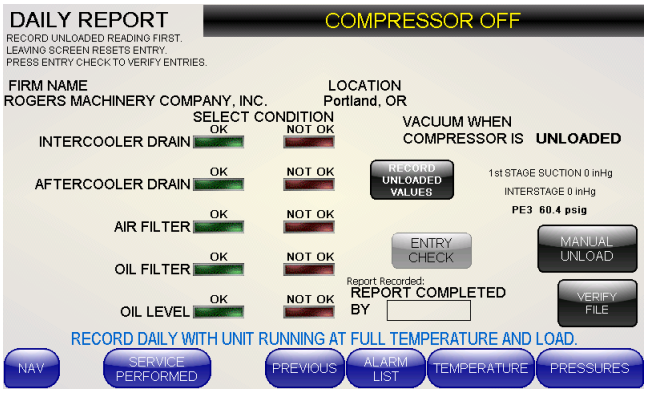
- Shows contact information for loca service facility.
- "Diagnostic" brings up diagnostic screens; see section 6.1.
- "Daily Report" brings up Daily Repor screen; see section 6.6.

6.6. Daily Report

In order to detect possible problems in advance, operating conditions of the machine should be recorded daily and sent to Rogers Machinery regularly for review. This service is provided for the life of the machine. Operating conditions can be recorded onto a USB drive or SD card automatically by using the "Daily Report" screen.

To take a report:

- Make all daily operating checks as described in the Operations Manual.
- Insert a USB flashdrive or SD card into the appropriate slot on the display.
- Ensure that the compressor is running loaded, at full temperature and pressure.
- Go to the Daily Report screen. Enter firm name and location. Enter your name in the "Report Completed By" field.
- Select the condition, "OK" or "Not OK", for each daily checkpoint.
- Press "Man. Unload" to unload the compressor. Press "Record Unloaded Values" to record unloaded intake and interstage pressures. Turn off "Man. Unload".
- When the compressor is running loaded, at full temperature, press "Entry Check". When all entries are valid, the "Report To USB" and "Report To SD" buttons should appear. **NOTE:** Leaving this screen will reset previously entered values.
- Press "Report To USB" or "Report To SD", as appropriate, to save daily report values. IMPORTANT: Make sure that there is adequate time for report generation before compessor unloads before pressing "Report To" button.

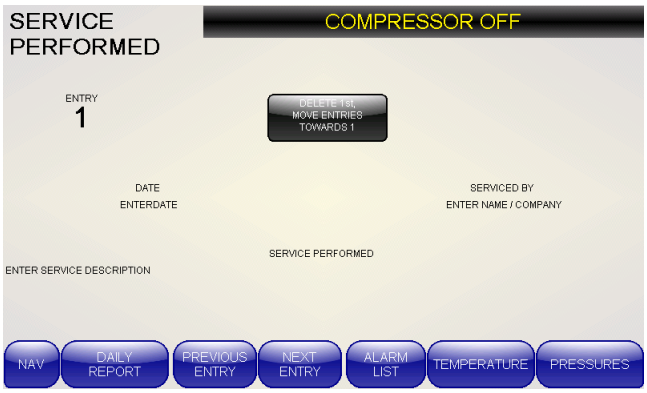


- Accessible from: Menu.

'Daily Report' screen

- "Service Performed": brings up screen to note compressor services.
- "Man. Unload": forces unload, to allow recording of unloaded values.

When compressor services are performed, the services should be recorded on the 'Service Performed' screen. These records are part of the Daily Report, and will be added to the report when it is generated.



- Accessible from: Menu, Daily Report.

'Service Performed' screen

- Allows recording of compresso services.
- "Previous Entry" and "Next Entry' scroll through list of services. List car go to 10 services.
- Enter date, name, and description o service performed.
- 'Delete 1st, Move Entries Towards 1 removes the service listed as 'Entry 1 and moves all other services up the list, to allow a new entry as 'Entry 10' Login required.

APPENDIX 1: Index of Alerts and Alarms

The following messages may be displayed when an Alert or Alarm occurs. An Alert will not shut the compressor down, but requires operator intervention to correct as soon as possible. An Alarm will shut the compressor down; the compressor will not run until the condition has been corrected. See section 4 for more information.

Alarms and alerts include a 4-digit identification code. This code is to assist in troubleshooting when contacting the factory. Alarms are assigned codes 0000 - 0599; alerts are assigned codes 0600 and up.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0000 (Alarm)	OL3 MAIN MOTOR OVERLOAD	Alarm is indicated when the overload relay on compressor drive starter is tripped.	Overload relay must be manually reset before alarm can be cleared. If a solid state starter is used, this alarm indicates a trip of the starter alarm relay; refer to manufacturer's instruction manual for diagnostic information.
0001 (Alarm)	M3 MAIN MOTOR STARTER FAULTED	Applies to compressors with solid state starter only. Solid state starter indicates fault.	Consult manufacturer's instructions for troubleshooting and directions to reset fault at starter.
0002 (Alarm)	MSP1 LUBE OIL PUMP MOTOR OVERLOAD	Oil pump motor starter overload relay tripped.	Overload relay must be manually reset to clear alarm. Check amperage and inspect motor wiring.
0003 (Alarm)	MSP2 FAN MOTOR OVERLOAD	Fan motor starter overload relay tripped.	Overload relay must be manually reset to clear alarm. Check amperage and inspect motor wiring.
0004 (Alarm)	MTR3 MAIN MOTOR FAILED TO START	Compressor motor starter auxiliary input is not present when expected.	Inspect compressor motor starter and auxiliary contacts. Check to ensure PLC is correctly configured for your starter type.
0005 (Alarm)	M4/M5 MAIN MOTOR TRANSITION FAILED	Applies to two-step starters only. Transition confirmation input fails to report completed transition.	Inspect compressor motor starter and auxiliary contacts. Check to ensure PLC is correctly configured for your starter type.
0006 (Alarm)	M3 CHECK MAIN MOTOR STARTER AUX CONTACT	When the compressor is off the PLC input for the starter auxiliary contact should be off. When the compressor is running the PLC input should be on. Alarm is indicated when input state is wrong for current operating mode.	Inspect compressor motor starter and auxiliary contacts.
0007 (Alarm)	M4/M3 CHECK TRANSITION AUX CONTACTS	Applies to compressors with wye-delta starter only. When the compressor is not up to speed, contact should be off. Alarm is indicated when input state is wrong for current operating mode.	Inspect compressor motor starter and auxiliary contacts.
0008 (Alarm)	M3 MAIN MOTOR STARTER STUCK	Compressor motor starter auxiliary input is present when not expected. Also trips 'Lube Failsafe' alarm.	Inspect compressor motor starter and auxiliary contacts. Check to ensure PLC is correctly configured for your starter type.
0009 (Alarm)	PE1 RUNNING IN REVERSE	1st stage suction air transducer reports pressure rise instead of expected drop.	Check transducer, wiring, and input modules; check pressure tubing. Observe motor for correct rotation; if rotation is incorrect, lock off power to compressor and exchange two leads.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0010 (Alarm)	PE1 UNDIRECTED RUN DETECTED	Pressure sensors detect compressor is operating when it should be stopped.	Inspect compressor motor starter. Check to ensure PLC is correctly configured for your starter type.
0011 (Alarm)	MAIN MOTOR VFD FAULTED	Main motor VFD reports fault.	Correct fault at VFD, following manufacturer's instructions.
0012 (Alarm)	FAN VFD FAULTED	Fan VFD reports fault.	Correct fault at VFD, following manufacturer's instructions.
0100 (Alarm)	TE2 1st STAGE DISCHARGE RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect first stage discharge RTD, wiring, input modules.
0101 (Alarm)	TE2 1st STAGE DISCHARGE RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect first stage discharge RTD, wiring, input modules.
0102 (Alarm)	TE3 2nd STAGE SUCTION RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect second stage suction RTD, wiring, input modules.
0103 (Alarm)	TE3 2nd STAGE SUCTION RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect second stage suction RTD, wiring, input modules.
0104 (Alarm)	TE4 2nd STAGE DISCHARGE RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect second stage discharge RTD, wiring, input modules.
0105 (Alarm)	TE4 2nd STAGE DISCHARGE RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect second stage discharge RTD, wiring, input modules.
0106 (Alarm)	TE5 COMPRESSOR OUTLET RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect compressor outlet RTD, wiring, input modules.
0107 (Alarm)	TE5 COMPRESSOR OUTLET RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect compressor outlet RTD, wiring, input modules.
0108 (Alarm)	TE6 LUBE OIL RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect RTD, wiring, input modules.
0109 (Alarm)	TE6 LUBE OIL RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect RTD, wiring, input modules.
0110 (Alarm)	PE3 OUT OF RANGE - TRANSDUCER OVER or CHANNEL <2mA	Faulty transducer; poor connections.	Inspect compressor outlet transducer, wiring, input modules.
0111 (Alarm)	PE3 OUT OF RANGE - TRANSDUCER UNDER RANGE	Faulty transducer; poor connections.	Inspect compressor outlet transducer, wiring, input modules.
0112 (Alarm)	PE4 OUT OF RANGE - TRANSDUCER OVER or CHANNEL <2mA	Faulty transducer; poor connections.	Replace transducer, inspect electrical connections.
0113 (Alarm)	PE4 OUT OF RANGE - TRANSDUCER UNDER RANGE	Faulty transducer; poor connections.	Replace transducer, inspect electrical connections.
0200 (Alarm)	TS1 HIGH CABINET TEMPERATURE	Cabinet temperature switch has tripped, indicating dangerously high temperature inside cabinet.	Check temperature switch and wiring for proper operation; check actual temperature with infrared gun. If actual temperature is above switch setting, refer to manual for temperature troubleshooting.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0201 (Alarm)	TE2 HIGH 1st STAGE DISCHARGE TEMP	Air temperature at first stage discharge is over Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0202 (Alarm)	TE3 HIGH 2nd STAGE SUCTION TEMP	Air temperature at second stage suction is over Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0203 (Alarm)	TE4 HIGH 2nd STAGE DISCHARGE TEMP	Air temperature at second stage discharge is over Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0204 (Alarm)	TE5 HIGH COMPRESSOR OUTLET TEMP	Air temperature at compressor discharge is over Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0205 (Alarm)	TE6 HIGH LUBE OIL TEMP	Oil temperature is over Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0210 (Alarm)	PSH HIGH COMPRESSOR OUTLET PRESSURE	Pressure switch reports air pressure at compressor discharge is dangerously high.	Check pressure switch for proper operation; if switch is operating properly, refer to manual for pressure troubleshooting.
0211 (Alarm)	PE2 HIGH INTERSTAGE PRESSURE	Interstage air pressure is over 50 PSIG.	Check transducer, wiring, and input modules. Check condition of 2nd stage airend.
0212 (Alarm)	PE4 LOW LUBE OIL PRESSURE	Oil pressure lower than oil pressure setpoint.	Check oil pressure setpoint of PLC. If pressure setpoint is correct, check for low oil level (using sight gauge on oil sump), and proper adjustment of relief valve. This alarm can also be due to a defective oil pump, or to oil too cold for proper operation; if compressor is outside, crankcase heaters may be necessary to ensure proper heating.
0301 (Alarm)	RECEIVER HIGH LIQUID LEVEL	Applicable only to water-cooled healthcare package compressors. Level switch in downstream air receiver indicates high liquid level.	Verify that inputs are correctly configured. Inspect switch and wiring. If switch is operating properly, check coolers for leaks. Check auto drain traps for proper operation.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0302 (Alarm)	INCOMING POWER OUT-OF-PHASE	Phase monitor input reports problem with incoming power phase. Alarm only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Inspect phase monitor, check power connections.
0303 (Alarm)	HIGH CARBON MONOXIDE	Carbon monoxide monitor input has tripped, indicating high CO levels in air.	Verify that inputs are correctly configured. Check wiring and inspect monitor.
0304 (Alarm)	LOW LUBE OIL SUMP LEVEL	Oil level switch reports low oil level. Alarm only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Inspect switch and wiring. If switch is operating properly, check oil sump for leaks and add oil of the same type as originally used. *Do not mix lubricants.*
0305 (Alarm)	INTERSTAGE DRAIN	Electronic drain from intercooler reports fault. Alarm only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Check wiring to drain. Check drain line for obstructions. Consult drain manufacturer's instruction manual for troubleshooting.
0306 (Alarm)	MTR3 MAIN MOTOR OVER TEMPERATURE SWITCH	Main motor temperature switch reports high temperature. Alarm only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Check wiring to temperature switch. Refer to manual for temperature troubleshooting.
0400 (Alarm)	DRYER ALARM	External dryer contact indicates fault. Alarm only active if input is configured accordingly; see section 5,	Verify that inputs are correctly configured. Correct problem at dryer; consult dryer manufacturer's manual for troubleshooting assistance.
0600 (Alert)	TE1 HIGH INLET TEMPERATURE	Air temperature at compressor intake is abnormally high.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0601 (Alert)	TE2 HIGH 1st STAGE DISCHARGE TEMP	Air temperature at first stage discharge is nearing Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0602 (Alert)	TE3 HIGH 2nd STAGE SUCTION TEMP	Air temperature at second stage suction is nearing Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0603 (Alert)	TE4 HIGH 2nd STAGE DISCHARGE TEMP	Air temperature at second stage discharge is nearing Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
064 (Alert)	TE5 HIGH COMPRESSOR OUTLET TEMP	Air temperature at compressor discharge is nearing Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0605 (Alert)	TE6 HIGH LUBE OIL TEM	Oil temperature is nearing Alarm point.	Check RTD, wiring, and input modules; check actual temperature with infrared gun or temperature gauge in RTD port. Check programmed setpoint (see Settings pages) against recorded user settings. If actual temperature is above correct setpoint, refer to manual for temperature troubleshooting.
0700 (Alert)	PE1 OUT OF RANGE - TRANSDUCER OVER or CHANNEL <2mA	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0701 (Alert)	PE1 OUT OF RANGE - TRANSDUCER UNDER RANGE	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0702 (Alert)	PE2 OUT OF RANGE - TRANSDUCER OVER or CHANNEL <2mA	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0703 (Alert)	PE2 OUT OF RANGE - TRANSDUCER UNDER RANGE	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0704 (Alert)	PE1 CHECK 1st STAGE TRANSDUCER CONNECTIONS	1st stage suction transducer fails to report expected pressure drop while running unloaded.	Check transducer, wiring, and input modules; check pressure tubing.
0705 (Alert)	PE4 LUBE OIL PRESSURE OUT OF OPERATING RANGE	Transducer signal is out of range but not shorted or open. Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0706 (Alert)	PE3 COMPRESSOR OUTLET PRESSURE OUT OF OPERATING RANGE	Transducer signal is out of range but not shorted or open. Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0707 (Alert)	PE3 COMPRESSOR OVER PRESSURE	Compressor outlet pressure transmitter detects high pressure is 3PSI above Compressor Max Operating Pressure.	Check pressure transmitter for proper operation; check downstream conditions.
0708 (Alert)	PE3 HIGH COMPRESSOR OUTLET PRESSURE	Pressure above the High Compressor Outlet Pressure Alert setpoint is detected, indicating unusual plant conditions.	Verify that setpoint (on Pressure Setpoints screen; see section 3.2) is at correct value. If so, check downstream conditions.
0709 (Alert)	PE3 LOW COMPRESSOR OUTLET PRESSURE	Pressure below the Low Compressor Outlet Pressure Alert setpoint is detected, indicating unusual plant conditions.	Verify that setpoint (on Pressure Setpoints screen; see section 3.2) is at correct value. If so, check downstream conditions; unusual demand or a leak may be present.
0710 (Alert)	TE1 INLET RTD SHORTED	Signal from RTD is out of range for the PLC.	Inspect intake air RTD, wiring, input modules.
0711 (Alert)	TE1 INLET RTD OPEN	Signal from RTD is out of range for the PLC.	Inspect intake air RTD, wiring, input modules.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0712 (Alert)	PE5 OUT OF RANGE - TRANSDUCER OVER or CHANNEL <2mA	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0713 (Alert)	PE5 OUT OF RANGE - TRANSDUCER UNDER RANGE {0}	Faulty transducer; poor connections.	Inspect transducer, wiring, input modules.
0714 (Alert)	PE5 LOW SYSTEM AIR PRESSURE {0} {1}	Applies only to machines with PE5 system pressure sensor. Pressure below the Low Alert setpoint is detected, indicating unusual plant conditions.	Verify that setpoint (on Pressure Setpoints screen; see section 3.2) is at correct value. If so, check downstream conditions; unusual demand or a leak may be present.
0800 (Alert)	LAG IN USE	Lag compressor is operating when only one compressor should be needed.	Applicable only to Client/Server Lead/Lag compressors; alert can be disabled from screen L1.
0801 (Alert)	PLC BATTERY LOW	PLC battery is low and in need of replacement.	Replace PLC auxiliary battery. DO NOT attempt to replace integral battery; this could permanently damage the PLC. Refer to manufacturer's instructions for battery replacement.
0803 (Alert)	PE1 CHECK INLET AIR FILTER	Pressure transducers indicate high pressure differential across air filter. Must be tripped for 60 seconds to cause alert.	Inspect air filter and clean or replace if necessary.
0804 (Alert)	PDS1 CHECK LUBE OIL FILTER	Oil filter differential pressure switch indicates high pressure differential across oil filter. Must be tripped for 60 seconds to cause alert.	Inspect oil filter and replace if necessary. Oil temperature must be above 80°F (40°F if using synthetic lube) for alert to function; crankcase heaters may be necessary if compressor is installed outdoors.
0805 (Alert)	FAILED TO LOAD	Less than 10 PSIG at intercooler while compressor is loaded. 10 second delay before alert.	Inspect transducer, capacity control valve, unloading valve and associated tubing, shuttle valve, and unloading valve relay. Capacity control valve diaphragm may be ruptured.
0806 (Alert)	FAILED TO UNLOAD	More than 10 PSIG at intercooler while compressor is loaded. 20 second delay before alert.	Inspect transducer, capacity control valve, unloading valve, and unloading valve relay. Capacity control valve may be in need of rebuild.
0807 (Alert)	DRYER FAULTED	External dryer contact indicates fault. Alert only active if input is configured accordingly; see section 5,.	Verify that inputs are correctly configured. Correct problem at dryer; consult dryer manufacturer's manual for troubleshooting assistance.
0808 (Alert)	LOW Z-PURGE PRESSURE	Z-purge pressure switch reports pressure fault. Alert only active if input is configured accordingly; see section 5.	Verify that inputs are configured correctly. Check switch operation and wiring. If switch is operating properly, check air plumbing to Z-purge panel for leaks and blockages.
0809 (Alert)	HIGH VIBRATION LEVEL	Vibration switch indicates dangerous vibration in compressor stages. Alert only active if input is configured accordingly; see section 5.	Verify that inputs are configured correctly. Check switch operation and wiring. If switch is operating properly, air end failure is possible; shut down compressor and consult factory.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
0810 (Alert)	LOW COOLING WATER FLOW	Cooling water flow switch tripped, indicating low flow. Alert only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Check switch operation and wiring. If switch is operating correctly, check upstream cooling water piping for incorrectly closed valves or obstructions in the pipe.
0811 (Alert)	SHORT LOAD/UNLOAD CYCLE	Compressor has loaded and unloaded within a 1-minute period more times than specified on Service Counters screen.	Check that Short Cycle alert trigger is set correctly (see section 6.5). Check pressure settings. Ensure that air flow is unimpeded between compressor and air receiver.
0812 (Alert)	AFTERCOOLER DRAIN	Electronic drain from aftercooler reports fault. Alert only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Check wiring to drain. Check drain line for obstructions. Consult drain manufacturer's instruction manual for troubleshooting.
0814 (Alert)	LOW LUBE OIL SUMP LEVEL	Oil level switch reports low oil level. Alert only active if input is configured accordingly; see section 5.	Verify that inputs are correctly configured. Inspect switch and wiring. If switch is operating properly, check oil sump for leaks and add oil of the same type as originally used. *Do not mix lubricants.*
1000 (Alert)	COMPRESSOR SERVICE ALERT	Compressor has completed 500,000 load/unload cycles, and is due for annual service.	Complete service and reset cycle counter.
1001 (Alert)	EXTERNAL INTERLOCK OPEN	Normally closed interlock contact has opened, indicating problem elsewhere in system. Alarm only active if input is configured accordingly; see section 5.	Verify that inputs are configured correctly. Corrective action for this alarm varies depending on purpose of external interlock; consult local documentation for assistance.
1002 (Alert)	REVISION LETTER INCORRECT	Model and serial number on service info screen do not match.	Consult factory.
1003 (Alert)	LOSS OF NETWORK COMMS	Applicable to compressors with sequencer only. Network communications have failed.	Check communication cables between PLC, communication module, and other compressors.
1004 (Alert)	LUBE OIL FAILSAFE	Compressor motor AUX closed when compressor should be off, or vacuum reading from 1st stage suction transducer when compressor should be off. Lubricant pump will start to prevent rotor damage.	Inspect starter for proper operation, look at PLC inputs for each device.
1005 (Alert)	POWER LOSS	Power lost while running or in standby.	If necessary, the compressor can be programmed to restart automatically after power failure. Consult factory for more information.
1006 (Alert)	LOSS OF CLIENT/ SERVER COMMS	Applicable to client/server lead/lag compressors only. Network communications have failed.	Check communication cables between compressors.
1007 (Alert)	MTR3 MOTOR SERVICE REMINDER	Main motor run time indicates motor is due for maintenance.	Complete service and reset timer. See page 36.
1008 (Alert)	PE1/PE2 AMBIENT PRESSURE CALIBRATION ERROR	"Set Ambient" attempted from transducer calibration page has given a pressure value outside expected range.	Do not attempt to set ambient pressure while compressor is running. Check transducer; verify that incoming air system is not blocked and no unusual atmospheric conditions exist.

ID	MESSAGE DISPLAYED	CAUSE/NOTES	CORRECTIVE ACTION
1009 (Alert)	VFD REMOTE SPEED SIGNAL LOSS	Applicable to VFD compressors with remote speed signal enabled. Remote speed signal has failed.	Check wiring, signal source, and PLC input module.
1010 (Alert)	PE1 ELEVATION CALIBRATION IN ERROR	Calibration data from transmitter is out of expected range. Bad transmitter; faulty wiring.	Inspect transducer, wiring, input modules.
1011 (Alert)	PE2 ELEVATION CALIBRATION IN ERROR	Calibration data from transmitter is out of expected range. Bad transmitter; faulty wiring.	Inspect transducer, wiring, input modules.

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