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OPERATION - BASIC

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OPERATION – BASIC
(SESSION LEVEL 0)

FRICK® QUANTUM™ LX
COMPRESSOR
CONTROL PANEL
Version 6.0x



Table of Contents

COMMON TERMINOLOGY	2
Operator Access.....	2
Keys And Key Functions.....	3
MENU STRUCTURE	4
OPERATION OVERVIEW	4
Compressor Start-Up Procedure:.....	4
Compressor Stopping Procedure:.....	4
OPERATING DISPLAY SCREENS	5
Operating Status.....	5
Safeties - Current Safeties.....	7
Safeties - History - Safety History.....	8
Setpoints.....	9
Session.....	10
Help.....	11
Keypad Keys.....	11
Screen Keys.....	12
To Change The Adjustable Setpoints.....	12
About.....	13
WARNINGS/SHUTDOWNS MESSAGES	14
INDEX	20

OVERVIEW OF OPERATOR INTERFACE

The compressor unit is controlled by a computer based machine control system. The controller continuously monitors the conditions and operation of the compressor unit and the various subsystems. It also directs the operation of components.

The panel user interface is designed to allow an operator to efficiently access and control the operation of the compressor unit and subsystems. The control panel screen is used to display graphic screens. By pressing a key on the keypad, the labeled or described function is recognized by the control processor.

The following information is presented to help the operator interact with the graphic screens and the Quantum™ compressor control panel. This manual is intended to describe all presently available features for the compressors listed in *Compressor Model Differences*. Reference this section for the differences of the compressor models that will apply to the displayed data and the setup and setpoint entry. **If applicable** is used throughout this manual to indicate when something might apply. This is because of the compressor model (see *Compressor Model Differences*) or because this feature or option was selected from a setup.

COMMON TERMINOLOGY

Shutdown - A critical safety limit has been reached or exceeded and the compressor has been shutdown.

Warning - A Warning setpoint has been reached or exceeded. The compressor will continue to run if running.

Manual - The device is being controlled from direct commands or keys at the local controller.

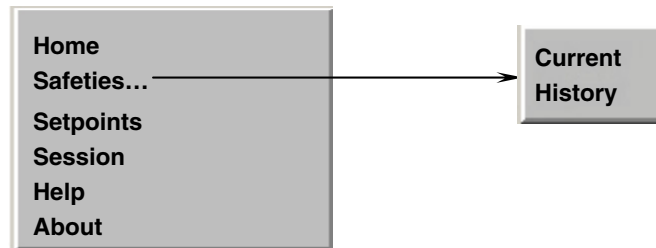
Auto (Automatic) - The device is being controlled from setpoints at the local controller.

Remote - The device is being controlled by a remote controller.

OPERATOR ACCESS

Operator access to this system is through various screens. A screen is the physical representation of data on the display. Icons have been used to help an operator quickly identify functions. An icon is a small, graphic symbol representation. Each screen has a title area. The title is descriptive of the screen. The current day; date and time, is shown in this title area. The day of the week; Sunday through Saturday (Sun. - Sat.) is displayed. The month of the year from January to December (Jan. - Dec.) is displayed. The day of the month from 1 to 31 and the year from 0001 to 9999 are displayed. The time displayed is the actual time in 24 hours (military) format. The hours, minutes, and seconds are displayed. The labeled keys on the panel keypad provide quick access to the operator's needs. By pressing a labeled key on the keypad, the corresponding function is recognized. Most of the screens have screen keys that describe or show a function that is recognized when the coinciding keypad key to the right of the screen is pressed. The screen keys provide access to other screens or commands. For easier viewing, related information is separated into boxes. The setup and setpoint entry is separated into logical control components. Setup selection of features and options have been provided to prevent the operator from unnecessary viewing and entering of unused control settings. The required control settings are clearly presented. To further assist the operator, on-line help is provided. Some selections appear faded to indicate that this feature is unavailable. A feature can be unavailable because of setup selections such as the compressor model. Some selections appear faded to indicate that this feature might be available in a future software release.

MENU STRUCTURE




The above graphic represents the menu structure, or tree, of the Quantum™-LX Basic screens. Use this tree when accessing the various screens. When this document is

viewed electronically, passing the mouse pointer over each of the above names, and then clicking on it, will take you directly to the page with that screen.

OPERATION OVERVIEW


Compressor Start-Up Procedure:

- The **Operating Status** screens provide quick access to the most important information and controls of the compressor unit and the subsystems.
- Starting status is shown for the Compressor on the **Operating Status** screen.
- Press the  button on the keypad (Start).
- All of the safeties are checked by the operating software. If any shutdown condition is present, the corresponding message will be shown, and the compressor is prevented from starting.
- The oil lubrication is automatically checked. If a problem has been detected, an appropriate message is issued and the compressor is prevented from starting. The problem will need to be resolved before continuing.
- The Slide Valve position is checked automatically. If the Slide Valve position is not correct, the compressor is prevented from starting. The problem will need to be resolved before continuing.
- If none of the above conditions has prevented the compressor from starting, a time delay is started that requires the starting conditions to remain satisfied for a period of five seconds for all compressor model types except **[Other Compressor Manuf.]**. The *Other*

compressor model type uses a 20 seconds delay. After the time delay the compressor and the Recycle Delay timer are started.

- If within 30 seconds, the Compressor Start Auxiliary input has not been energized, or Motor Current is not detected, then a message is issued and the compressor is shut down. The problem will need to be resolved before continuing.
- When the compressor begins running, the Oil Pressure values can be in a state of change. For a period of 10 seconds after the compressor status switches to *Running*, the low Oil Pressure warning and shutdown safeties are ignored.
- If all operating parameters are within acceptable limits, the compressor will go into RUN mode. No further operator intervention is normally needed.

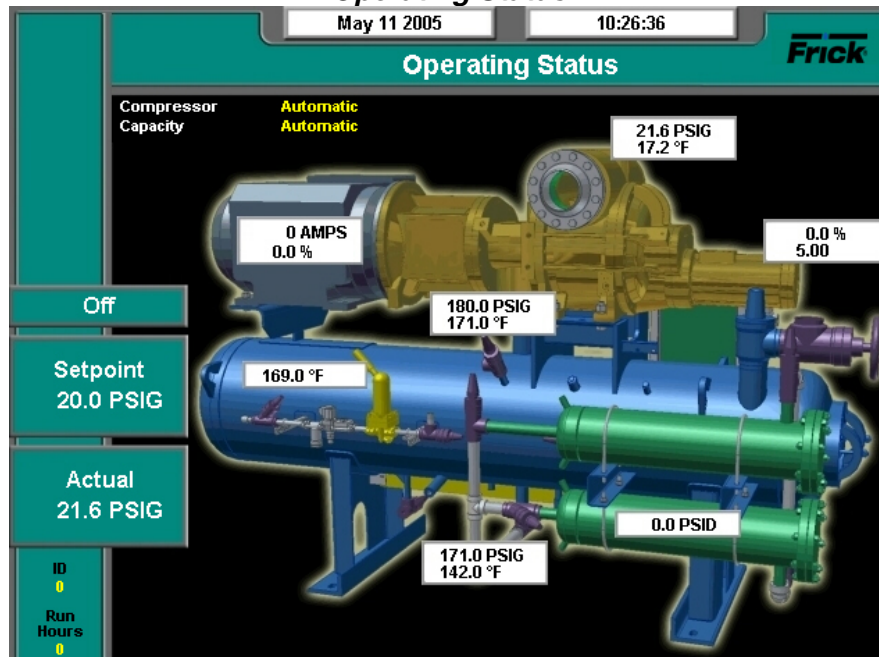
Compressor Stopping Procedure:

Press the  button on the keypad (Stop).

Once the compressor has been stopped, it cannot be restarted again for 20 minutes, this is known as Recycle Delay. Recycle delay time is the time that must elapse prior to allowing the compressor to restart. It is intended to prevent damage to the motor from successive restarts.

OPERATING DISPLAY SCREENS

Operating Status



SCREEN NAME: *Operating Status* or Home.

ACCESSING: → Home

DESCRIPTION: This is the default screen. When power is applied, this screen will appear. Also called the **Home** screen. The most important information about the compressor and the applicable subsystems operation is displayed here. This screen is shown when power is first turned on and when a key is pressed after the screen saver has turned off the backlight. The **Operating Status** screen is continuously updated and provides a variety of information with regard to the current condition and performance of the compressor unit and subsystem.

The following information is shown on this screen:

DATE - The actual date will be displayed in this box. The date must first be set correctly on the **Configuration** screen. Once set, the date will be automatically adjusted for at the end of each month, much like the calendar feature of most modern watches. The primary use of the date feature is to provide a date stamp for Warnings and Shutdowns. (See also [TIME](#))

TIME - The actual time will be displayed in this box. The time must first be set correctly on the **Configuration** screen. The time will also need to be adjusted for those locations which observe Daylight Savings Time. The primary use of the time feature is to provide a time stamp for Warnings and Shutdowns. (See also [Date](#))

SCREEN TITLE - This is the title for the screen that is showing. Each screen will have a title. The Quantum™ LX manuals will extensively refer to screens by these names. When referred to in these manuals, screen names will be shown in bold italic print, such as ***Operating Status***.

COMPRESSOR MODEL - This is actually a rotating marquee. It will alternately display the model name of the compressor (such as RWF) and will then rotate to show Frick®. **NOTE:** The picture of the compressor shown above is for a RWF II. Any other compressor model may not appear the same, however, the values discussed here do not change, regardless of the compressor type.

COMPRESSOR RUN STATUS – This shows the actual status of the compressor.

- Off
- Running
- Starting
- Stopping
- Stopping - High Capacity
- Stopping - Pumpdown

PROCESS SETPOINT VALUE - This is the control setpoint maintained by the internal capacity control.

PROCESS ACTUAL VALUE - The actual reading of the pressure or temperature that was chosen as the compressor control setpoint.

ID - The value shown here is the number that has been assigned to this particular unit on the **Communications Setup** screen.

RUN HOURS – The value shown here is the total number of hours that the compressor has been actually running, since the last start.

WARNING/SHUTDOWNS STATUS AREA - The Warning/Shutdowns Status is displayed near the bottom left side of the screen. This area is blank with no message if there are no warnings or shutdowns present.

When a Warning or Shutdown occurs, a specific message will be shown. The message will be followed by either the word Warning or Shutdown. The description of Warning and Shutdown are:

WARNING - This message flashes when a warning is present. A warning is a condition that requires operator acknowledgement and allows the compressor to continue to run if it is running.

SHUTDOWN - This message flashes when a shutdown is present. A shutdown is a condition that requires an operator to acknowledge it and causes the compressor to shut down. If the compressor cannot be stopped, it is minimally run in a protected state.

A Warning or Shutdown message indicates a Warning or Shutdown point has been reached, or exceeded.

When a Shutdown occurs, the display backlight will flash on and off to alert an operator of the shutdown. This visual alarm will help get the attention of the operator in a noisy engine room environment where audible alarms may not be heard. Pressing any key on the keypad will clear the flashing backlight.

SENSOR READINGS - The following items are shown:

Motor Amps - The actual amps.

Suction Pressure - Is measured at the compressor inlet and the value is displayed along with the unit of measure.

Suction Temperature - Is measured at the compressor inlet and the value is displayed along with the unit of measure.

Discharge Pressure - Is measured at the compressor outlet and the value is displayed along with the unit of measure.

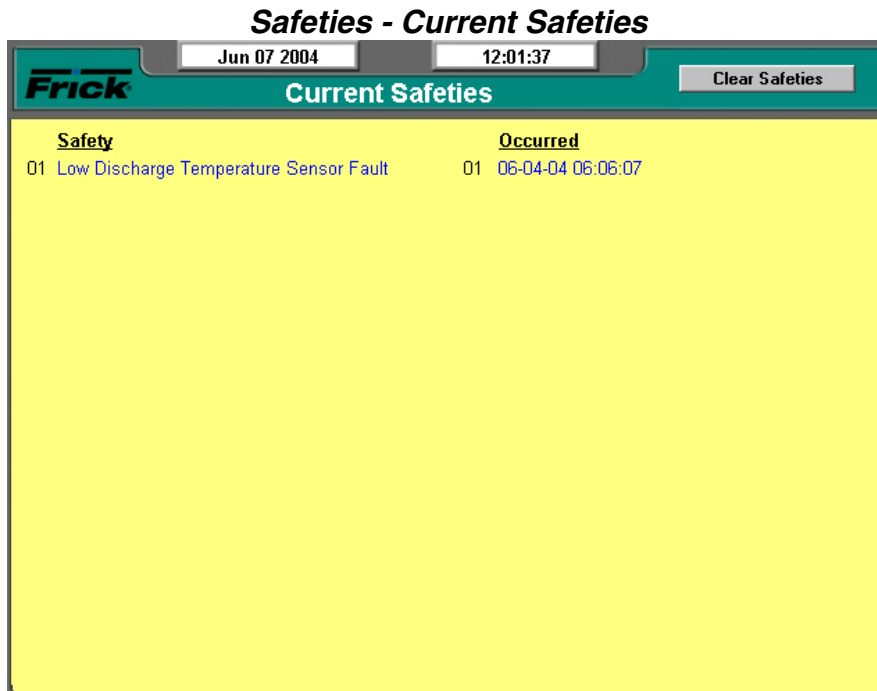
Discharge Temperature - Is measured at the compressor outlet and the value is displayed along with the unit of measure.

Oil Pressure - Is measured prior to entering the compressor and the value is displayed along with the unit of measure.


Oil Temperature - Is measured prior to entering the compressor and the value is displayed along with the unit of measure.

Filter Differential - If applicable, pressure drop across the oil filter. The main oil injection oil filter pressure drop value (differential) is displayed along with the unit of measure.

Separator Temperature - The Oil Separator Temperature value is displayed along with the unit of measure.



SCREEN NAME: *Current Safeties.*

ACCESSING:  → Safeties... → Current

DESCRIPTION: The *Current Safeties* screen shows the Warnings and Shutdowns that have recently occurred (up to 50). When a warning or shutdown is triggered, a blue descriptive message shows on this screen. The date and time of the warning or shutdown occurrence is shown to the right of its description. The most recent message will appear on the top line of the screen with the oldest appearing at the bottom. When a Warning or Shutdown is logged to this screen, it will also be logged to the *Safety History* screen.

The following *Current Safeties* screen key is provided:

[Clear Safeties] - Selecting this key will clear all warnings and/or shutdowns from this screen. It also de-energizes the Warning output module and energizes the Shutdown output module (digital outputs 23 and 24) to silence any warning annunciation device. This will also place a date/time stamp for the corresponding entry on the *Safety History* screen showing that the particular Warning or Shutdown was cleared. Clearing the entry on the *Current Safeties* screen, will not clear it from the *Safety History* screen.

To resume normal operation it will be necessary to go through the following steps:

1. Correct the condition(s) causing the warning.
2. Press the **[ALARM SILENCE]** key. (This action may precede correcting the condition(s) causing the warning). Or, go to step 3.
3. To clear or reset the *Warnings/Shutdowns* screen and turn off any warning annunciation

device, from the screen, press the **[Clear Safeties]** key. This will also clear any warning or shutdown messages from the *Operating Status* screen.

4. If the conditions causing the warning have not been corrected or a new fault has occurred, a new warning or shutdown message will appear. The *Safety History* screen keeps a record of the warnings and shutdowns. This information will help troubleshoot persistent operational problems.

Refer to the *Warnings/Shutdowns Message* section for a list of all the possible conditions.

When a Shutdown occurs, the screen backlight will flash on and off to alert an operator of the shutdown. This visual indication will help get the attention of the operator in a noisy engine room environment where audible alarms may not be heard. Pressing any key on the keypad will clear the flashing backlight.

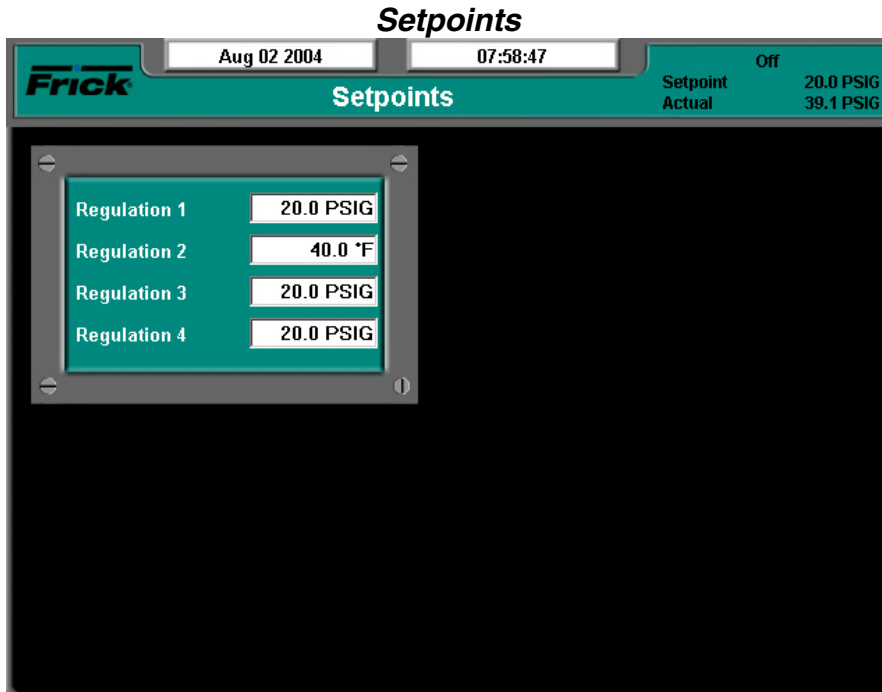
Safeties - History - Safety History

Jan 12 2005		09:02:16	
Frick Safety History			
Safety	Occurred	Cleared	
01 Compressor Capacity Unload Warning	01 01-11-05 12:17:34		
02 Stopping Failure - Motor Amps	02 06-03-04 14:55:36	06-03-04 15:07:16	
03 Oil Pump 1 Auxiliary Warning	03 06-03-04 13:35:59	06-03-04 14:31:37	
04 Low Oil Pressure Shutdown	04 06-03-04 13:23:28	06-03-04 14:31:37	
05 Low Oil Pressure Warning	05 06-03-04 13:18:28	06-03-04 14:31:37	
06 Oil Level Shutdown	06 06-03-04 13:13:28	06-03-04 14:31:37	
07 Stopping Failure - Motor Amps	07 06-03-04 13:08:34	06-03-04 14:31:37	
08 False Running Failure -- Motor Amps	08 06-03-04 13:08:27	06-03-04 14:31:37	
09 False Running Failure -- Motor Amps	09 06-03-04 13:06:04	06-03-04 14:31:37	
10 Stopping Failure - Motor Amps	10 06-03-04 13:00:36	06-03-04 14:31:37	
11 False Running Failure -- Motor Amps	11 06-03-04 13:00:32	06-03-04 14:31:37	
12 Low Oil Pressure Shutdown	12 06-03-04 12:23:41	06-03-04 14:31:37	
13 Low Oil Pressure Warning	13 06-03-04 12:18:41	06-03-04 14:31:37	
14 Oil Level Shutdown	14 06-03-04 12:13:41	06-03-04 14:31:37	
15 Stopping Failure - Motor Amps	15 06-03-04 12:08:46	06-03-04 14:31:37	
16 False Running Failure -- Motor Amps	16 06-03-04 12:08:40	06-03-04 14:31:37	
17 Low Oil Pressure Shutdown	17 06-03-04 11:48:48	06-03-04 14:31:37	
18 Low Oil Pressure Warning	18 06-03-04 11:43:48	06-03-04 14:31:37	
19 Stopping Failure - Motor Amps	19 06-03-04 11:38:55	06-03-04 14:31:37	
20 Oil Level Shutdown	20 06-03-04 11:38:48	06-03-04 14:31:37	
21 Stopping Failure - Motor Amps	21 06-03-04 11:32:49	06-03-04 11:33:35	
22 Stopping Failure - Motor Amps	22 06-03-04 11:32:08	06-03-04 11:32:43	
23 Low Oil Pressure Shutdown	23 06-03-04 10:58:29	06-03-04 11:32:02	
24 Low Oil Pressure Warning	24 06-03-04 10:53:29	06-03-04 11:32:02	


SCREEN NAME: **Safety History.**



DESCRIPTION: The **Safety History** screen shows the warnings and shutdowns that have recently occurred (up to 50 maximum). When a warning or shutdown is triggered, a blue descriptive message shows on this screen. The date and time of the warning or shutdown occurrence is shown to the right of its description, followed by the date and time that the safety was cleared (if applicable, from the **Current Safeties** screen). The most recent message will appear on the top line of the screen with the oldest appearing at the bottom.



SCREEN NAME: *Capacity Control.*

ACCESSING:  → **Setpoints**

DESCRIPTION: All setpoints having to do with Compressor Control are found here.

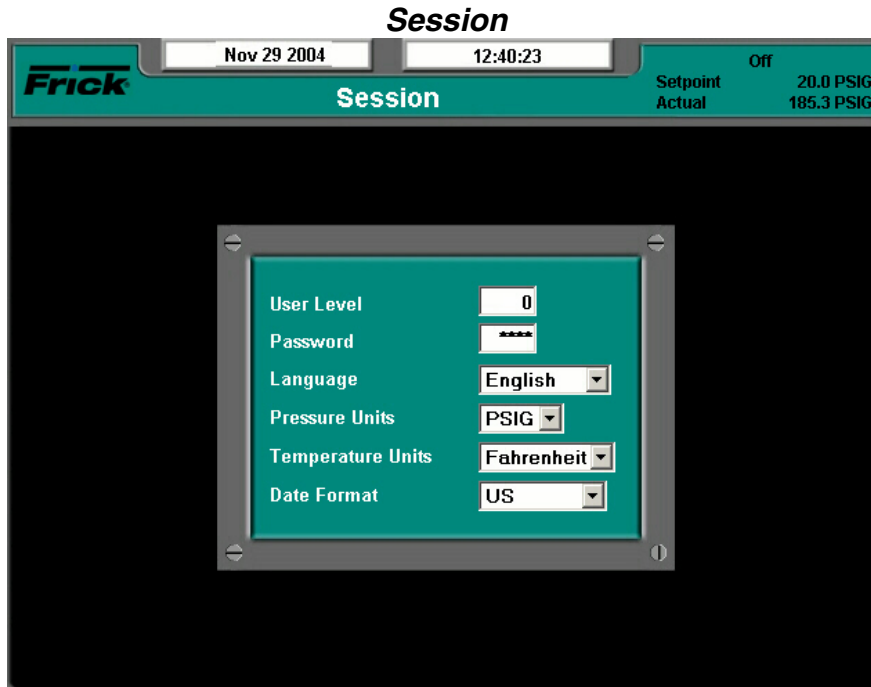
This screen will list all Regulation modes which have been setup by the supervisor. A setpoint box is provided next to each available Regulation mode, along with the proper units (pressure, temperature, etc.). The user may need to set each box to the setpoint value that they wish to have the compressor maintain for that particular mode.

Although the mode itself cannot be changed manually at the Basic level, it can be changed automatically if the unit has been set by the supervisor to run in Scheduling mode. This feature is automatic in nature, and requires no intervention by the operator. Scheduling will cause the

compressor to run in any four of the possible Regulation modes, based upon a pre-programmed time schedule.

The following Regulation Modes could be shown (depending on the setup):

- Regulation 1
- Regulation 2
- Regulation 3
- Regulation 4



SCREEN NAME: *Session.*

ACCESSING:

DESCRIPTION: This screen allows the user/supervisor to access the various available user levels. This is also where the user can select the language, pressure units, temperature units and date format.

The following Setpoints may be changed:

User Level - Level 0 is referred to as the BASIC level, and is used to access the very basics of compressor operation. Level 0 requires no password.

Password - To access any level above level 0, a password must be entered that matches the password that has previously been assigned to each user level by the supervisor.

The following pull-down menus have been provided:

Language - You may choose from the following list:

- English
- French
- Chinese
- Portuguese

Pressure Units - You may choose from the following list:

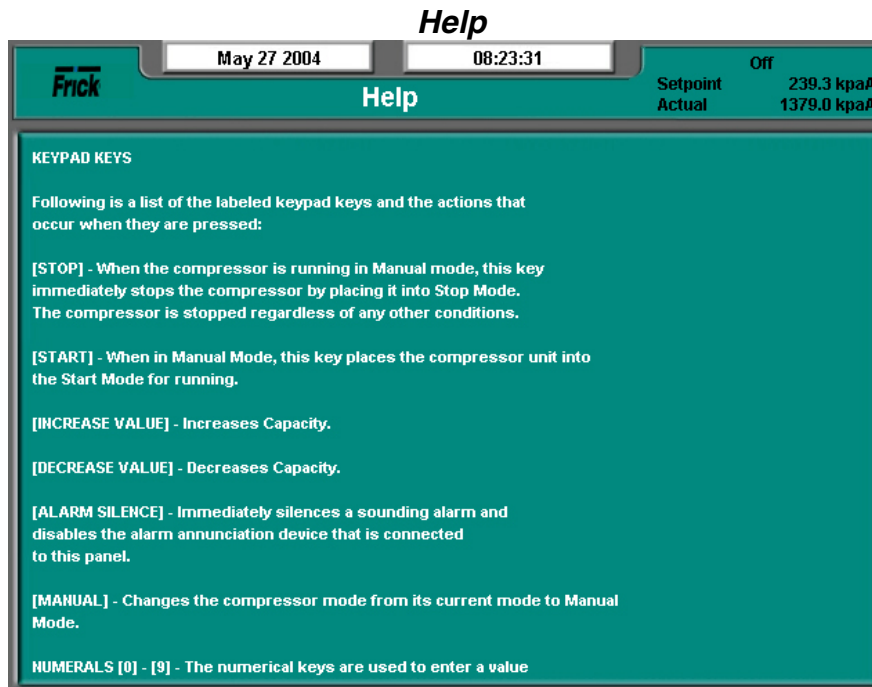
- Kpa
- Bar
- BarA
- PSIA
- PSIG/hg

Temperature Units - You may choose from the following list:


- Celcius
- Fahrenheit

Date Format - You may choose from the following list:

- US
- Europe



SCREEN NAME: *Help.*

ACCESSING: 

DESCRIPTION: This screen provides the user with specific information as to the function of all keypad keys, as well as all screen keys, and changing Setpoints.

KEYPAD KEYS

Following is a list of the labeled keypad keys and the actions that occur when they are pressed:

[STOP] - When the compressor is running in Manual mode, this key immediately stops the compressor by placing it into Stop Mode. The compressor is stopped regardless of any other conditions.

[START] - When in Manual Mode, this key places the compressor unit into the Start Mode for running.

[INCREASE VALUE] - Increases Capacity.

[DECREASE VALUE] - Decreases Capacity.

[ALARM SILENCE] - Immediately silences a sounding alarm and disables the alarm annunciation device that may be connected to this panel.

[MANUAL] - Changes the compressor mode from its current mode to its previous mode.

NUMERALS [0] - [9] - The numerical keys are used to enter a value in a data field.

DECIMAL [.] - The decimal point is used when entering a decimal value in a data field.

[+/-] - When changing a value in a data field, this key will toggle the value between negative and positive.

[BACKSPACE] - Pressing this key will cause the current location of the cursor to backup one position per key depression. When changing a value in a data field, this key will delete the selected character.

[UP ARROW] - Provides upward navigation within the Main MENU window.

[TAB] - When in the mode of changing setpoints, pressing this key will cause the cursor to jump to the next data entry field.

[LEFT ARROW] - When in the mode of changing setpoints, this arrow is used to go to the previous character within a data entry field. When the *MAIN MENU* is shown, pressing this key will cancel the window.

[DOWN ARROW] - Provides downward navigation within the *MAIN MENU* window.

[RIGHT ARROW] - When in the mode of changing a data entry field, this arrow is used to go to the next character.

[ENTER] - When changing data in a data entry field, this key will accept the change. This key is also used to select items on Menu Windows.

[SUBMIT] - After changing a setpoint value, Use this key to enter (submit) the change.

[MENU] - Shows the *MAIN MENU* window. This window shows the main selections for accessing information, setup of options, and setpoint entry.

SCREEN KEYS

TO CHANGE THE ADJUSTABLE SETPOINTS

The adjustable setpoints define the operation and limits of the compressor unit and subsystems operation. Adjustable Setpoints are stored in EEPROM (non-volatile memory) and are easily changed in the field.

NOTE: Adjustable Setpoints are not lost after power is interrupted. However, we suggest that a list of Adjustable Setpoints be recorded and stored safely to facilitate reentry, in case there is a need to return to the original settings.

The **[TAB]** key is used to maneuver around the screen.

Use the arrow keys to move the cursor to the data entry field to be modified.

Having selected the setpoint to be changed, the numerical keys and the decimal key may be used to enter the new setpoint. Typing a new value will completely erase the old value.

To remove a typing mistake, the left and right arrow key can be used to position the cursor on the mistake and then use the **[BACKSPACE]** key to erase it.

Press the **[ENTER]** key to input the new data in the data entry field.

If the value is out of bounds, an error message box shows and displays the proper value range. Press the **[OK]** key to acknowledge that you saw the error message. Re-enter the correct value.

Pressing the **[Enter]** key inputs the new setpoint and selects the next data entry field.

When finished making any changes to the data on an adjustable setpoint, press the **[SUBMIT]** key to accept all changes or select another screen to cancel all of the data changes.

Note: When the display units are selected to display in PSIG, an entry of a pressure value above 29.7 is assumed to be PSIG, an entry less than or equal to 29.7 will cause a message box to appear after pressing the **[ENTER]** key. This message prompts the operator to select the unit of measure. The operator must select either the **[HG]** or the **[PSIG]** key.

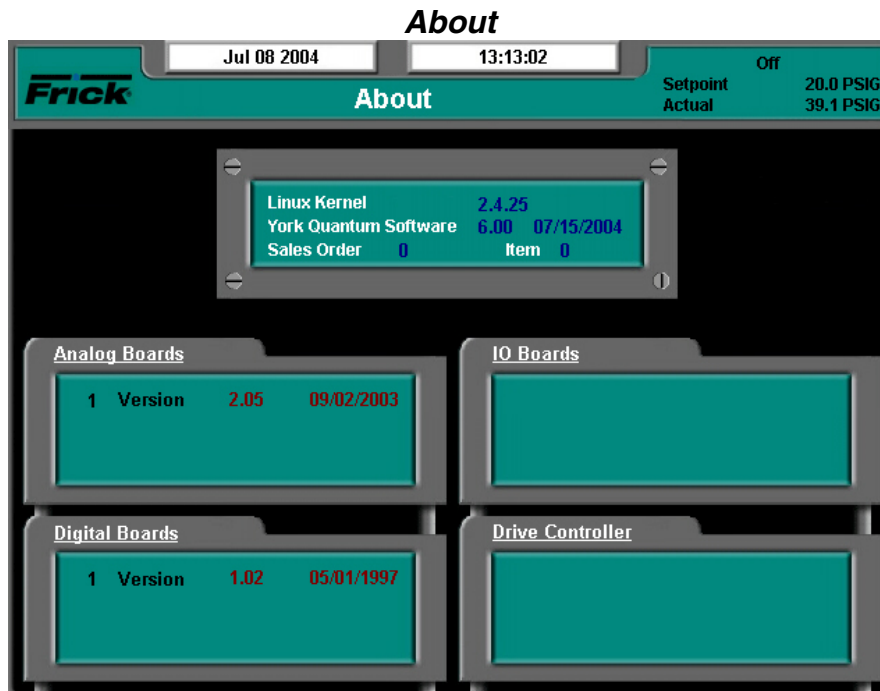
To resume normal operation it will be necessary to go through the following steps:

Correct the conditions causing the alarm.



Press the **[ALARM SILENCE]** key. (This action may precede correcting the conditions causing the alarm).

To clear or reset the 'Warnings/Shutdowns' screen, from the 'Current Safeties' screen press the **[Clear Safeties]** key. This will also clear the 'WARNING' or 'SHUTDOWN' message from the **Operating Status** screen.

If the conditions causing the fault have not been corrected or a new fault has occurred, a new 'WARNING' or 'SHUTDOWN' message will appear. The Warning/Shutdowns history screen keeps a record of the warnings and shutdowns. This information will help troubleshoot persistent operational problems.



SCREEN NAME: *About*.

ACCESSING:  → 

DESCRIPTION: The *About* screen shows all microprocessor-based circuit boards that have been detected by the Quantum™ LX, as well other related software information.

The following information is shown here:

Linux Kernel - The Quantum™ LX controller runs on a Linux programming architecture (rather than Microsoft Windows). This is the software version number for the main Linux Kernel (or program).

York Quantum Software - This is the version of the software program that does the actual control of the compressor. It runs in the Linux environment.

Sales Order - A six digit numerical value that has been assigned to a specific compressor package by Frick Company. It is very important to have this number available when calling the factory for assistance or parts ordering.

Item - This is actually an extension of the Sales Order number. It would potentially be used for a multiple compressor site, where the same Sales Order number was assigned for all compressors. The Item Number would be different for each compressor.

Analog Boards - Shows all analog boards that were detected through communications at the last power up. If a board is detected, the software version of the program running on that board (with date of the software) will be shown.

Digital Boards - Shows all digital boards that were detected through communications at the last power up. If a board is detected, the software version of the program running on that board (with date of the software) will be shown.

IO Boards - Shows all other I/O boards that were detected through communications at the last power up. If a board is detected, the software version of the program running on that board (with date of the software) will be shown.

Drive Controller - Shows motor or engine drive controllers that were detected through communications at the last power up. If a board is detected, the software version of the program running on that board (with date of the software) will be shown.

Warnings/Shutdowns Messages

When a Shutdown occurs, the display backlight will flash on and off to alert an operator of the shutdown. This visual warning will help get the attention of the operator in a noisy engine room environment where audible alarms may not be heard. Pressing any key on the keypad will clear the flashing backlight.

Following is the alphabetical listing of all the possible conditions:

Analog Board 1 Communications Shutdown - It has been detected that the program is no longer able to communicate to Analog Board 1.

Analog Board 2 Communications Shutdown - It has been detected that the program is no longer able to communicate to Analog Board 2.

Auxiliary Input 1 Shutdown - The Auxiliary #1 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 1 Warning - The Auxiliary #1 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 2 Shutdown - The Auxiliary #2 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 2 Warning - The Auxiliary #2 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 3 Shutdown - The Auxiliary #3 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 3 Warning - The Auxiliary #3 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 4 Shutdown - The Auxiliary #4 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 4 Warning - The Auxiliary #4 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 5 Shutdown - The Auxiliary #5 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 5 Warning - The Auxiliary #5 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 6 Shutdown - The Auxiliary #6 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 6 Warning - The Auxiliary #6 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 7 Shutdown - The Auxiliary #7 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 7 Warning - The Auxiliary #7 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 8 Shutdown - The Auxiliary #8 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 8 Warning - The Auxiliary #8 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Auxiliary Input 9 Shutdown - The Auxiliary #9 input module has been setup to indicate a shutdown when it is de-energized and it became de-energized.

Auxiliary Input 9 Warning - The Auxiliary #9 input module has been setup to indicate a warning when it is de-energized and it became de-energized.

Balance Piston 1 Shutdown - Balance piston control has been enabled. This shutdown will occur if the difference between Discharge Pressure and Suction Pressure is less than 60 lb. and the Balance Piston output module (digital output module 12) is de-energized, then the Balance Piston pressure must be 1.1 times Suction Pressure plus or minus 15 lb.

Balance Piston 2 Shutdown - Balance piston control has been enabled. This shutdown will occur if the difference Discharge Pressure and Suction Pressure is greater than or equal to 60 lb. and the Balance Piston output module (digital output module 12) is de-energized, then the Balance Piston pressure must be 50 lb. below Discharge Pressure plus or minus 15 lb.

Balance Piston 3 Shutdown - Balance piston control has been enabled. This shutdown will occur if the Balance Piston output module (digital output module 12) is energized, then Balance Piston pressure must be within 20lb. of Oil Pressure.

Compressor Auxiliary Shutdown - This shutdown message is issued if while the compressor is running, the Compressor Auxiliary input module, which receives feedback from the motor starter, becomes de-energized.

Compressor Capacity Unload Warning - While stopping the compressor or if the compressor is off, this indicates that the Slide Valve position has not unloaded below the *Highest Slide Valve Position to allow starting the compressor* setpoint.

DBS - Communication Failure Shutdown - It has been detected that the program is no longer able to communicate to a RAM DBS Motor Starter.

DBS - Current Unbalance

DBS - Heatsink Over-temperature

DBS - Jam

DBS - Phase Loss

DBS - Phase Reversal

DBS - RTD Overtemperature

DBS - RTD Temperature

DBS - Short Circuit

DBS - Shorted SCR

DBS - Thermal Overload

Digital Board 1 Communications Shutdown - It has been detected that the program is no longer able to communicate to Digital Board 1.

Digital Board 1 Reset - If a reset of Digital Board 1 occurs, a shutdown will result to prevent the motor from restarting.

Digital Board 2 Communications Shutdown - It has been detected that the program is no longer able to communicate to Digital Board 2.

Digital Board 2 Reset - If a reset of Digital Board 2 occurs, a shutdown will result to prevent the motor from restarting.

Discharge Temperature Saturation Shutdown - This Shutdown applies if Superheat has been enabled. When running, a shutdown will occur if TDsat plus setpoint temperature is greater than the Discharge Temperature for the setpoint time.

Discharge Temperature Saturation Warning - This warning applies if Superheat has been enabled. When running, a warning will occur if TDsat plus setpoint temperature is greater than the Discharge Temperature for the setpoint time.

False Running Failure -- Compressor Confirmed Running Input - This shutdown message is issued if while the compressor is off the compressor auxiliary is energized. While this condition is present, the Oil Pump (if available) is on, and Liquid Injection (if available) is allowed on and the Slide Valve is unloaded to 0% to safeguard the compressor.

False Running Failure -- Motor Amps - This shutdown message is issued if while the compressor is off, the Motor Current reading is above the *Low Motor Amps Shutdown* setpoint. While this condition is present, the Oil Pump (if available) is on, and Liquid Injection (if available) is allowed on and the Slide Valve is unloaded to 0% to safeguard the compressor.

High Auxiliary Analog 1 Shutdown - The Auxiliary Analog #1 value was greater than or equal to the high Auxiliary Analog #1 shutdown setpoint for its time delay.

High Auxiliary Analog 1 Warning - The Auxiliary Analog #1 value was greater than or equal to the high Auxiliary Analog #1 warning setpoint for its time delay.

High Auxiliary Analog 2 Shutdown - The Auxiliary Analog #2 value was greater than or equal to the high Auxiliary Analog #2 shutdown setpoint for its time delay.

High Auxiliary Analog 2 Warning - The Auxiliary Analog #2 value was greater than or equal to the high Auxiliary Analog #2 warning setpoint for its time delay.

High Auxiliary Analog 3 Shutdown - The Auxiliary Analog #3 value was greater than or equal to the high Auxiliary Analog #3 shutdown setpoint for its time delay.

High Auxiliary Analog 3 Warning - The Auxiliary Analog #3 value was greater than or equal to the high Auxiliary Analog #3 warning setpoint for its time delay.

High Auxiliary Analog 4 Shutdown - The Auxiliary Analog #4 value was greater than or equal to the high Auxiliary Analog #4 shutdown setpoint for its time delay.

High Auxiliary Analog 4 Warning - The Auxiliary Analog #4 value was greater than or equal to the high Auxiliary Analog #4 warning setpoint for its time delay.

High Auxiliary Analog 5 Shutdown - The Auxiliary Analog #5 value was greater than or equal to the high Auxiliary Analog #5 shutdown setpoint for its time delay.

High Auxiliary Analog 5 Warning - The Auxiliary Analog #5 value was greater than or equal to the high Auxiliary Analog #5 warning setpoint for its time delay.

High Auxiliary Analog 6 Shutdown - The Auxiliary Analog #6 value was greater than or equal to the high Auxiliary Analog #6 shutdown setpoint for its time delay.

High Auxiliary Analog 6 Warning - The Auxiliary Analog #6 value was greater than or equal to the high Auxiliary Analog #6 warning setpoint for its time delay.

High Auxiliary Analog 7 Shutdown - The Auxiliary Analog #7 value was greater than or equal to the high Auxiliary Analog #7 shutdown setpoint for its time delay.

High Auxiliary Analog 7 Warning - The Auxiliary Analog #7 value was greater than or equal to the high Auxiliary Analog #7 warning setpoint for its time delay.

High Auxiliary Analog 8 Shutdown - The Auxiliary Analog #8 value was greater than or equal to the high Auxiliary Analog #8 shutdown setpoint for its time delay.

High Auxiliary Analog 8 Warning - The Auxiliary Analog #8 value was greater than or equal to the high Auxiliary Analog #8 warning setpoint for its time delay.

High Auxiliary Analog 9 Shutdown - The Auxiliary Analog #9 value was greater than or equal to the high Auxiliary Analog #9 shutdown setpoint for its time delay.

High Auxiliary Analog 9 Warning - The Auxiliary Analog #9 value was greater than or equal to the high Auxiliary Analog #9 warning setpoint for its time delay.

High Compressor Vibration Shutdown - Suction - If the Suction End Compressor Vibration sensor registers a reading that is higher than the value that has been set for the *Suction End High Shutdown*, for the period of time as set for the *Suction End High Shutdown Delay*, a Shutdown will be generated.

High Compressor Vibration Warning - Suction - If the Suction End Compressor Vibration sensor registers a reading that is higher than the value that has been set for the *Suction End High Warning*, for the period of time as set for the *Suction End High Warning Delay*, a Warning will be generated.

High Compressor Vibration Shutdown - Discharge - If the Discharge End Compressor Vibration sensor registers a reading that is higher than the value that has been set for the *Discharge End High Shutdown*, for the period of time as set for the *Discharge End High Shutdown Delay*, a Shutdown will be generated.

High Compressor Vibration Warning - Discharge - If the Discharge End Compressor Vibration sensor registers a reading that is higher than the value that has been set for the *Discharge End High Warning*, for the period of time as set for the *Discharge End High Warning Delay*, a warning will be generated.

High Discharge Pressure Shutdown -- Dual Discharge Mode 1 - The Discharge Pressure was greater than or equal to the active *High Discharge Pressure Shutdown* setpoint for its time delay.

High Discharge Pressure Warning -- Dual Discharge Mode 1 - The Discharge Pressure was greater than or equal to the active *High Discharge Pressure Warning* setpoint for its time delay.

High Discharge Pressure Shutdown -- Dual Discharge Mode 2 - The Discharge Pressure was greater than or equal to the active *High Discharge Pressure Shutdown* setpoint for its time delay.

High Discharge Pressure Warning -- Dual Discharge Mode 2 - The Discharge Pressure was greater than or equal to the active *High Discharge Pressure Warning* setpoint for its time delay.

High Discharge Pressure Sensor Fault - This shutdown message is issued if the Discharge Pressure reading was to the upper or maximum range (out of range) for its sensor.

High Discharge Temperature Shutdown - The Discharge Temperature was greater than or equal to the *High Discharge Temperature Shutdown* setpoint for its time delay.

High Discharge Temperature Warning - The Discharge Temperature was greater than or equal to the *High Discharge Temperature Warning* setpoint for its time delay.

High Economizer Shutdown - The Auxiliary Analog #10 value was greater than or equal to the high Auxiliary Analog #10 shutdown setpoint for its time delay.

High Economizer Warning - The Auxiliary Analog #10 value was greater than or equal to the high Auxiliary Analog #10 warning setpoint for its time delay.

High Entering Process Temperature Shutdown - The Entering Process Temperature was greater than or equal to the *High Entering Process Temperature Shutdown* setpoint for its time delay.

High Entering Process Temperature Warning - The Entering Process Temperature was greater than or equal to the *High Entering Process Temperature Warning* setpoint for its time delay.

High Limit Discharge Pressure Shutdown - The Discharge Pressure was greater than or equal to the active *High Discharge Pressure Shutdown* setpoint for its time delay.

High Limit Discharge Temperature Shutdown - The Discharge Temperature was greater than or equal to the active *High Discharge Temperature Shutdown* setpoint for its time delay.

High Liquid Level Shutdown - The corresponding input module was de-energized.

High Manifold Pressure Shutdown - This shutdown applies if Engine Drive was enabled. When the Manifold Pressure exceeds this setpoint, an alarm will occur.

High Manifold Pressure Warning - This warning applies if Engine Drive was enabled. When the Manifold Pressure exceeds this setpoint, a warning will occur.

High Motor Current Shutdown - The motor amps was greater than or equal to the *High Motor Amps Shutdown* setpoint for its time delay.

High Motor Current Warning - The Motor Amps was greater than or equal to the *High Motor Amps Warning* setpoint for its time delay.

High Motor Vibration Shutdown - Opposite Shaft Side - If the Opposite Shaft Side Drive Vibration sensor registers a reading that is higher than the value that has been set for the *Opposite Shaft High Shutdown*, for the period of time as set for the *Opposite Shaft High Shutdown Delay*, a Shutdown will be generated.

High Motor Vibration Warning - Opposite Shaft Side - If the Opposite Shaft Side Drive Vibration sensor registers a reading that is higher than the value that has been set for the *Opposite Shaft High Warning*, for the period of time as set for the *Opposite Shaft High Warning Delay*, a warning will be generated.

High Motor Vibration Shutdown - Shaft Side - If the Shaft Side Drive Vibration sensor registers a reading that is higher than the value that has been set for the *Shaft Side High Shutdown*, for the period of time as set for the *Shaft Side High Shutdown Delay*, a Shutdown will be generated.

High Motor Vibration Warning - Shaft Side - If the Shaft Side Drive Vibration sensor registers a reading that is higher than the value that has been set for the *Shaft Side*

High Warning, for the period of time as set for the *Shaft Side High Warning Delay*, a warning will be generated.

High Oil Filter Pressure Warning - The Oil Filter Pressure was greater than or equal to the *High Filter Pressure Warning* setpoint for its time delay.

High Oil Filter Pressure Shutdown - The Oil Filter Pressure was greater than or equal to the *High Filter Pressure Shutdown* setpoint for its time delay.

High Oil Pressure Sensor Fault - This shutdown message is issued if the Oil Pressure reading was to the upper or maximum range (out of range) for its sensor.

High Oil Temperature Shutdown - The Oil Temperature was greater than or equal to the *High Oil Temperature Shutdown* setpoint for its time delay.

High Oil Temperature Warning - The Oil Temperature was greater than or equal to the *High Oil Temperature Warning* setpoint for its time delay.

High RPM Shutdown - This shutdown applies if Engine or Turbine Drive was enabled. If the RPM's of the motor exceeds this setpoint, a shutdown will occur.

High RPM Warning - This warning applies if Engine or Turbine Drive was enabled. If the RPM's of the motor exceeds this setpoint, a warning will occur.

High Suction Pressure Shutdown - The Suction Pressure was greater than or equal to the active *High Suction Pressure Shutdown* setpoint for its time delay.

High Suction Pressure Warning - The Suction Pressure was greater than or equal to the active *High Suction Pressure Warning* setpoint for its time delay.

Insufficient Main Oil Pressure Shutdown - The Slide Valve is greater than 50% and the Oil Pressure (PSIA) is less than or equal to the Suction Pressure (PSIA) multiplied by 1.5 and then added to 15.0.

Liquid Slugging Shutdown - This shutdown is triggered off of a sudden decrease in Discharge Temperature that is greater than the Liquid Slug Shutdown setpoint for a five (5) second period. That is, if the Discharge Temperature is 130 degrees F, and the Liquid Slug Shutdown setpoint is 20 degrees F, then a sudden drop in Discharge Temperature from 130 to 110 degrees F within a five second period will generate a shutdown condition.

Liquid Slugging Warning - This warning is triggered off of a sudden decrease in Discharge Temperature that is greater than the Liquid Slug Warning setpoint for a five (5) second period. That is, if the Discharge Temperature is 130 degrees F, and the Liquid Slug Warning setpoint is 10 degrees F, then a sudden drop in Discharge Temperature from 130 to 120 degrees F within a five second period will generate a warning condition.

Low Auxiliary Analog 1 Shutdown - The Auxiliary Analog #1 value was less than or equal to the low Auxiliary Analog #1 shutdown setpoint for its time delay.

Low Auxiliary Analog 1 Warning - The Auxiliary Analog #1 value was less than or equal to the low Auxiliary Analog #1 warning setpoint for its time delay.

Low Auxiliary Analog 2 Shutdown - The Auxiliary Analog #2 value was less than or equal to the low Auxiliary Analog #2 shutdown setpoint for its time delay.

Low Auxiliary Analog 2 Warning - The Auxiliary Analog #2 value was less than or equal to the low Auxiliary Analog #2 warning setpoint for its time delay.

Low Auxiliary Analog 3 Shutdown - The Auxiliary Analog #3 value was less than or equal to the low Auxiliary Analog #3 shutdown setpoint for its time delay.

Low Auxiliary Analog 3 Warning - The Auxiliary Analog #3 value was less than or equal to the low Auxiliary Analog #3 warning setpoint for its time delay.

Low Auxiliary Analog 4 Shutdown - The Auxiliary Analog #4 value was less than or equal to the low Auxiliary Analog #4 shutdown setpoint for its time delay.

Low Auxiliary Analog 4 Warning - The Auxiliary Analog #4 value was less than or equal to the low Auxiliary Analog #4 warning setpoint for its time delay.

Low Auxiliary Analog 5 Shutdown - The Auxiliary Analog #5 value was less than or equal to the low Auxiliary Analog #5 shutdown setpoint for its time delay.

Low Auxiliary Analog 5 Warning - The Auxiliary Analog #5 value was less than or equal to the low Auxiliary Analog #5 warning setpoint for its time delay.

Low Auxiliary Analog 6 Shutdown - The Auxiliary Analog #6 value was less than or equal to the low Auxiliary Analog #6 shutdown setpoint for its time delay.

Low Auxiliary Analog 6 Warning - The Auxiliary Analog #6 value was less than or equal to the low Auxiliary Analog #6 warning setpoint for its time delay.

Low Auxiliary Analog 7 Shutdown - The Auxiliary Analog #7 value was less than or equal to the low Auxiliary Analog #7 shutdown setpoint for its time delay.

Low Auxiliary Analog 7 Warning - The Auxiliary Analog #7 value was less than or equal to the low Auxiliary Analog #7 warning setpoint for its time delay.

Low Auxiliary Analog 8 Shutdown - The Auxiliary Analog #8 value was less than or equal to the low Auxiliary Analog #8 shutdown setpoint for its time delay.

Low Auxiliary Analog 8 Warning - The Auxiliary Analog #8 value was less than or equal to the low Auxiliary Analog #8 warning setpoint for its time delay.

Low Auxiliary Analog 9 Shutdown - The Auxiliary Analog #9 value was less than or equal to the low Auxiliary Analog #9 shutdown setpoint for its time delay.

Low Auxiliary Analog 9 Warning - The Auxiliary Analog #9 value was less than or equal to the low Auxiliary Analog #9 warning setpoint for its time delay.

Low Discharge Pressure Sensor Fault - This shutdown message is issued if the Discharge Pressure reading was to the lower or minimum range (out of range) for its sensor.

Low Discharge Temperature Sensor Fault - This shutdown message is issued if the Discharge Temperature reading was to the lower or minimum range (out of range) out of range for its sensor.

Low Economizer Shutdown - The Auxiliary Analog #10 value was less than or equal to the low Auxiliary Analog #10 shutdown setpoint for its time delay.

Low Economizer Warning - The Auxiliary Analog #10 value was less than or equal to the low Auxiliary Analog #10 warning setpoint for its time delay.

Low Entering Process Temperature Shutdown - The Entering Process Temperature was less than or equal to the *Low Entering Process Temperature Shutdown* setpoint for its time delay.

Low Entering Process Temperature Warning - The Entering Process Temperature was less than or equal to the *Low Entering Process Temperature Warning* setpoint for its time delay.

Low Main Oil Injection Pressure Shutdown - This shutdown can occur if Oil Injection was enabled. The Oil Injection Pressure (channel 15, Analog Board 2) must greater than or equal the Suction Pressure times 1.5, plus the setpoint to be in the safe condition, otherwise this shutdown will occur.

Low Motor Current Shutdown - This shutdown message is issued if, while the compressor was running, the Motor Amps reading was less than or equal to the *Low Motor Amps Shutdown* setpoint.

Low Oil Pressure Sensor Fault - This shutdown message is issued if the Oil Pressure reading was to the lower minimum range (out of range) for its sensor.

Low Oil Pressure Shutdown - The compressor was running. Either the Oil Pressure of a running pump was less than or equal to the *Low Oil Pressure Shutdown* setpoint, or the Oil Pressure of a not running pump was less than or equal to the *Low Oil Pressure Shutdown* setpoint for its time delay.

Low Oil Pressure Warning - The compressor was running. Either the Oil Pressure of a running pump was less than or equal to the *Low Oil Pressure Warning* setpoint, or the Oil Pressure of a not running pump was less than or equal to the *Low Oil Pressure Warning* setpoint for its time delay.

Low Oil Temperature Sensor Fault - This shutdown message is issued if the Oil Temperature reading was to the lower or minimum range (out of range) for its sensor.

Low Oil Temperature Shutdown - The Oil Temperature was less than or equal to the *Low Oil Temperature Shutdown* setpoint for its time delay.

Low Oil Temperature Warning - The Oil Temperature was less than or equal to the *Low Oil Temperature Warning* setpoint for its time delay.

Low RPM Shutdown - This shutdown applies if Engine or Turbine Drive was enabled. If the RPM's of the motor drops below this setpoint, a shutdown will occur.

Low RPM Warning - This warning applies if Engine or Turbine Drive was enabled. If the RPM's of the motor drops below this setpoint, a warning will occur.

Low Separator Temperature Sensor Fault - This shutdown message is issued if the Separator Temperature reading was to the lower or minimum range (out of range) for its sensor.

Low Separator Temperature Shutdown - The Oil Separator Temperature was less than or equal to the *Low Oil Separator Temperature Shutdown* setpoint for its time delay.

Low Separator Temperature Warning - The Oil Separator Temperature was less than or equal to the *Low Oil Separator Temperature Warning* setpoint for its time delay.

Low Suction Pressure Sensor Fault - This shutdown message is issued if the Suction Pressure reading was to the lower or minimum range (out of range) for its sensor.

Low Suction Shutdown -- Regulation Mode 1 - When running in Regulation Mode 1, if the Suction Pressure was less than or equal to the active Regulation Mode 1 *Low Suction Shutdown* setpoint for its time delay.

Low Suction Warning -- Regulation Mode 1 - When running in Regulation Mode 1, if the Suction Pressure was less than or equal to the active Regulation Mode 1 *Low Suction Warning* setpoint for its time delay.

Low Suction Shutdown -- Regulation Mode 2 - When running in Regulation Mode 2, if the Suction Pressure was less than or equal to the active Regulation Mode 2 *Low Suction Shutdown* setpoint for its time delay.

Low Suction Warning -- Regulation Mode 2 - When running in Regulation Mode 2, if the Suction Pressure was less than or equal to the active Regulation Mode 2 *Low Suction Warning* setpoint for its time delay.

Low Suction Shutdown -- Regulation Mode 3 - When running in Regulation Mode 3, if the Suction Pressure was less than or equal to the active Regulation Mode 3 *Low Suction Shutdown* setpoint for its time delay.

Low Suction Warning -- Regulation Mode 3 - When running in Regulation Mode 3, if the Suction Pressure was less than or equal to the active Regulation Mode 3 *Low Suction Warning* setpoint for its time delay.

Low Suction Shutdown -- Regulation Mode 4 - When running in Regulation Mode 4, if the Suction Pressure was less than or equal to the active Regulation Mode 4 *Low Suction Shutdown* setpoint for its time delay.

Low Suction Warning – Regulation Mode 4 - When running in Regulation Mode 4, if the Suction Pressure was less than or equal to the active Regulation Mode 4 *Low Suction Warning* setpoint for its time delay.

Missing Oil Pressure Shutdown A - The Oil Pressure (PSIA) is less than the Suction Pressure (PSIA) multiplied by 1.1 and then added to 15.0, then delayed by 2 min.

Missing Oil Pressure Shutdown B - The Oil Pressure (PSIA) is less than the Suction Pressure (PSIA) added to 15.0, then delayed by 25 sec.

Missing Oil Pressure Warning - The Oil Pressure (PSIA) is less than the Suction Pressure (PSIA) multiplied by 1.1 and then added to 15.0, then delayed by 25 sec.

Oil Level Shutdown - The corresponding input module for low Oil Level was de-energized for five (5) minutes.

Oil Log Shutdown - Oil log was enabled and the Compressor has not started and the Oil Pump has already run for the fail delay time.

Oil Pump Auxiliary Failure - While starting the Oil Pump, the Oil Pump Auxiliary input module did not energize within five (5) seconds, or, while the Oil Pump was running, the Oil Pump Auxiliary input module de-energized.

Oil Pump 1 Auxiliary Warning - While starting Oil Pump #1, the Oil Pump #1 Auxiliary input module did not energize within five (5) seconds, or, while this Oil Pump was running, the Oil Pump #1 Auxiliary input module de-energized. This indicates Dual Pump Control and *Pump #1* is the lead pump.

Oil Pump 1 Auxiliary Shutdown - While starting Oil Pump #1, the Oil Pump #1 Auxiliary input module did not energize within five (5) seconds, or, while this Oil Pump was running, the Oil Pump #1 Auxiliary input module de-energized. This indicates Dual Pump Control and *Pump #1* is the last pump to start.

Oil Pump 2 Auxiliary Warning - While starting Oil Pump #2, the Oil Pump #2 Auxiliary input module did not energize within five (5) seconds, or, while this Oil Pump was running the Oil Pump #2 Auxiliary input module de-energized. This indicates Dual Pump Control and *Pump #2* is the lead pump.

Oil Pump 2 Auxiliary Shutdown - While starting Oil Pump #2, the Oil Pump auxiliary input module did not energize within five (5) seconds, or, while the Oil Pump

was running, the Oil Pump auxiliary input module de-energized. This indicates Dual Pump Control and *Pump #2* is the last pump to start.

Start Failure Shutdown For Engine And Turbine - This message may be issued if Engine or Turbine was enabled, and the start delay period to get to a running condition has expired.

Starting Failure - Low Motor Amps - This shutdown message is displayed if after 30 seconds from sending the compressor start signal, the Motor Amps reading is not greater than the *Low Motor Amps Shutdown* setpoint.

Starting Failure - No Compressor Auxiliary - This shutdown message is displayed if after 450 seconds from sending the compressor start command, the compressor auxiliary input module is still not energized.

Starting Superheat Shutdown - This message may be issued if Superheat was enabled. A shutdown will occur if TDsat plus temperature setpoint is greater than the Separator temperature.

Stopping Failure - Compressor Auxiliary - This shutdown message is issued if while stopping the compressor, after 8 seconds from the compressor stop command, the compressor auxiliary is energized. While this condition is present, the Oil Pump (if available) is on and Liquid Injection (if available) is allowed on and the Slide Valve is unloaded to 0% to safeguard the compressor.

Stopping Failure - Motor Amps - This shutdown message is issued if while stopping the compressor, after 12 seconds from the compressor stop command, the Motor Current reading is above the *Low Motor Amps Shutdown* setpoint. While this condition is present, the Oil Pump (if available) is on, and Liquid Injection (if available) is allowed on and the Slide Valve is unloaded to 0% to safeguard the compressor.

VariSpeed Communications Warning - If VariSpeed option is enabled and the Comms communication has failed, this warning is shown. **Note:** Only used with the YORK VariSpeed drive.

Index

A

Alarm Silence	3, 7, 11, 12
Analog Board 1 Comm. Fail - Shutdown	14
Analog Board 2 Comm. Fail - Shutdown	14
Analog Boards	13
Auto	2
Automatic	2, 4, 9
Auxiliary Input Shutdown	14, 15
Auxiliary Input Warning	14, 15

B

Backspace	3, 11, 12
-----------------	-----------

C

Capacity Control	9
Clear Safeties	7, 12
Common Terminology	2
Compressor Warning/Shutdown Status Area	6
Compressor Start	4
Compressor Starting Failure - Aux.	21
Compressor Starting Failure - Low Motor Amps	21
Compressor Start-Up Procedure	4
Compressor Stopping Failure - Aux.	21
Compressor Stopping Failure - Motor Amps	21
Compressor Stopping Procedure	4
Compressor Unable to Unload - Warning	15
Configuration	5
Controller	2, 13

D

Date	2, 5, 7, 8, 10
Date Format	10
DBS Alarm	15
DBS Trip	17
Decimal	3, 11
Decrease Value	3, 11
Digital Boards	13
Discharge Pressure	6, 15, 17, 18, 20
Discharge Pressure Sensor Fault	17
Discharge Temperature	15, 16, 17, 18, 20
Discharge Temperature Sensor Fault	20
Down Arrow	3, 11
Drive Controller	13

E

Economizer	17, 20
EEPROM	12
Enter	3, 11, 12

F

False Start Failure - Aux.	16
False Start Failure - Motor Amps	16
Filter Differential	6
Freeze	8, 12

H

High Auxiliary Analog Warning	16, 17
High Auxiliary Analog Shutdown	16, 17
High Discharge Pressure Warning	21
High Discharge Pressure Shutdown	17

High Economizer Warning	17
High Economizer Shutdown	17
High Entering Process Temperature Warning	17
High Entering Process Temperature Shutdown	17
High Liquid Level Shutdown	18
High Manifold Pressure Warning	18
High Manifold Pressure Shutdown	18
High Motor Amps	18
High Motor Current Warning	20
High Motor Current Shutdown	20
High Oil Filter Pressure Warning	18
High Oil Filter Pressure Shutdown	18
High Oil Temperature Warning	18
High Oil Temperature Shutdown	18
High RPM Warning	18
High RPM Shutdown	18
High Suction Pressure Shutdown	20

I

Increase Value	11
Insufficient Main Oil Pressure Shutdown	18
IO Boards	13

K

Keypad	2, 3, 6, 7, 11, 14
Keypad Keys	11
Keys And Key Functions	3

L

Language	10
Left Arrow	3, 11
Linux Kernal	13
Low Auxiliary Analog Warning	18, 19
Low Auxiliary Analog Shutdown	18, 19
Low Economizer Warning	20
Low Economizer Shutdown	20
Low Entering Process Temperature Warning	20
Low Entering Process Temperature Shutdown	20
Low Main Oil Injection Pressure Shutdown	20
Low Motor Current Shutdown	20
Low Oil Pressure Warning	21
Low Oil Pressure Shutdown	21
Low Oil Separator Temperature Warning	20
Low Oil Separator Temperature Shutdown	20
Low Oil Temperature Warning	20
Low Oil Temperature Shutdown	20
Low RPM Warning	20
Low RPM Shutdown	20

M

Main Menu	3, 11
Main Oil Injection	20
Manual	2, 3, 4, 11
Menu	3, 4, 5, 11
Missing Oil Pressure Warning	21
Missing Oil Pressure Shutdown	21
Motor	6
Motor Control - Low Motor Amps Shutdown	16, 20, 21

N

Numerals	3, 11
----------------	-------

O

Oil Level Shutdown	21
Oil Log Shutdown	21
Oil Pressure	4, 6, 15, 18, 20, 21
Oil Pressure Sensor Fault	18, 20
Oil Pump	4, 16, 21
Oil Pump Aux. Warning	21
Oil Pump Aux. Failure Shutdown	21
Oil Pump Aux Failure	21
Oil Temperature	6, 18, 20
Operating Status	4, 5, 7, 8
Other Compressor Manuf	4

P

Password	10
Pressure	6, 15, 17, 18, 20, 21
Pressure Units	10
Process Actual Value	5

Q

Quantum™ LX	4, 5, 13
-------------------	----------

R

Recycle Delay	4
Remote	2
Right Arrow	3, 11

S

Sales Order	13
Screen	2, 4, 5, 7, 8, 10, 11, 12, 13
Screen Keys	12
Screen Title	5

Separator Temp.	6
Shutdown	2, 6, 7, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21
Shutdown - Digital Board Reset	15
Shutdown Delay	17, 18
Slide Stop	4
Slide Valve	4, 9, 15, 16, 18, 21
Slide Valve Position	9
Start	3
Starting Failure	21
Starting Superheat Shutdown	21
Status	5, 6, 8, 12
Stop	3, 11
Submit	3, 11, 12
Suction Pressure	6, 15, 18, 20, 21
Suction Temperature	6
Superheat	15, 16, 21

T

TAB	3, 11, 12
Temperature	6, 15, 16, 17, 18, 20
Temperature Units	10
Time	2, 4, 5, 7, 8, 15, 16, 17, 18, 19, 20, 21

U

Up Arrow	3, 11
User Level	10

W

Warning	2, 6, 7, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21
Warning Delay	17, 18

Y

YORK Quantum Software	13
-----------------------------	----





