USER MANUAL

Sullair Touch Screen (STS) Controller
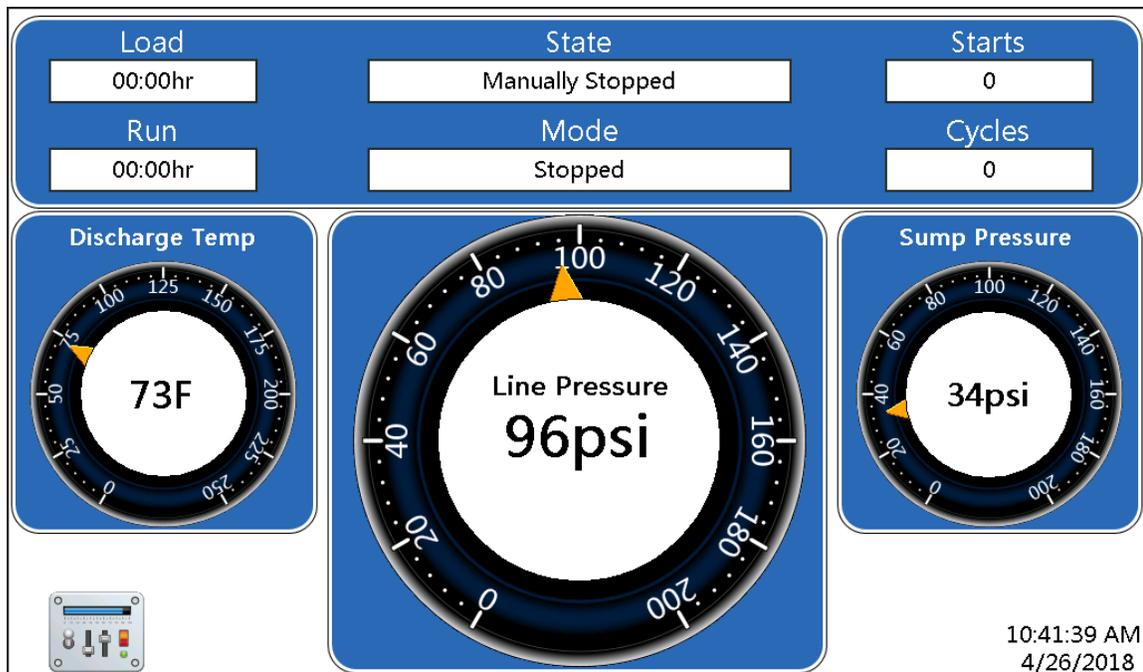
Load	State	Starts
00:00hr	Manually Stopped	0
Run	**Mode**	**Cycles**
00:00hr	Stopped	0

Discharge Temp: 73F

Line Pressure: 96psi

Sump Pressure: 34psi

10:41:39 AM
4/26/2018

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Sullair training courses provide hands-on and classroom instruction for the proper operation, maintenance, and servicing of Sullair products. Individual courses on Stationary compressors, variable speed drives, compressor electrical systems, and dryers are offered at regular intervals throughout the year at Sullair's training facility located in Michigan City, Indiana.

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Section 1
General Overview

1.1 Introduction

This compressor is equipped with the Sullair Touch Screen (STS) Controller for displaying the compressor system operations, setting the machine parameters and performing maintenance operations. The STS Controller is designed for the safe operation and protection of the compressor system. When fault conditions occur, the controller automatically shuts down the machine before the conditions can cause damage to the equipment. The STS Controller also contains features that enable sequencing operation with other machines.

1.2 STS Controller panel layout

The STS Controller panel provides the necessary controls for daily operation of the air compressor package. The controller is shown in *Figure 1-1*.

1.	**Start button**	5.	**Touch screen display**
2.	**Stop button**	6.	**Menu button**
3.	**Indicator LEDs**	7.	**USB Port**
4.	**QR Code**	8.	**E-stop button**
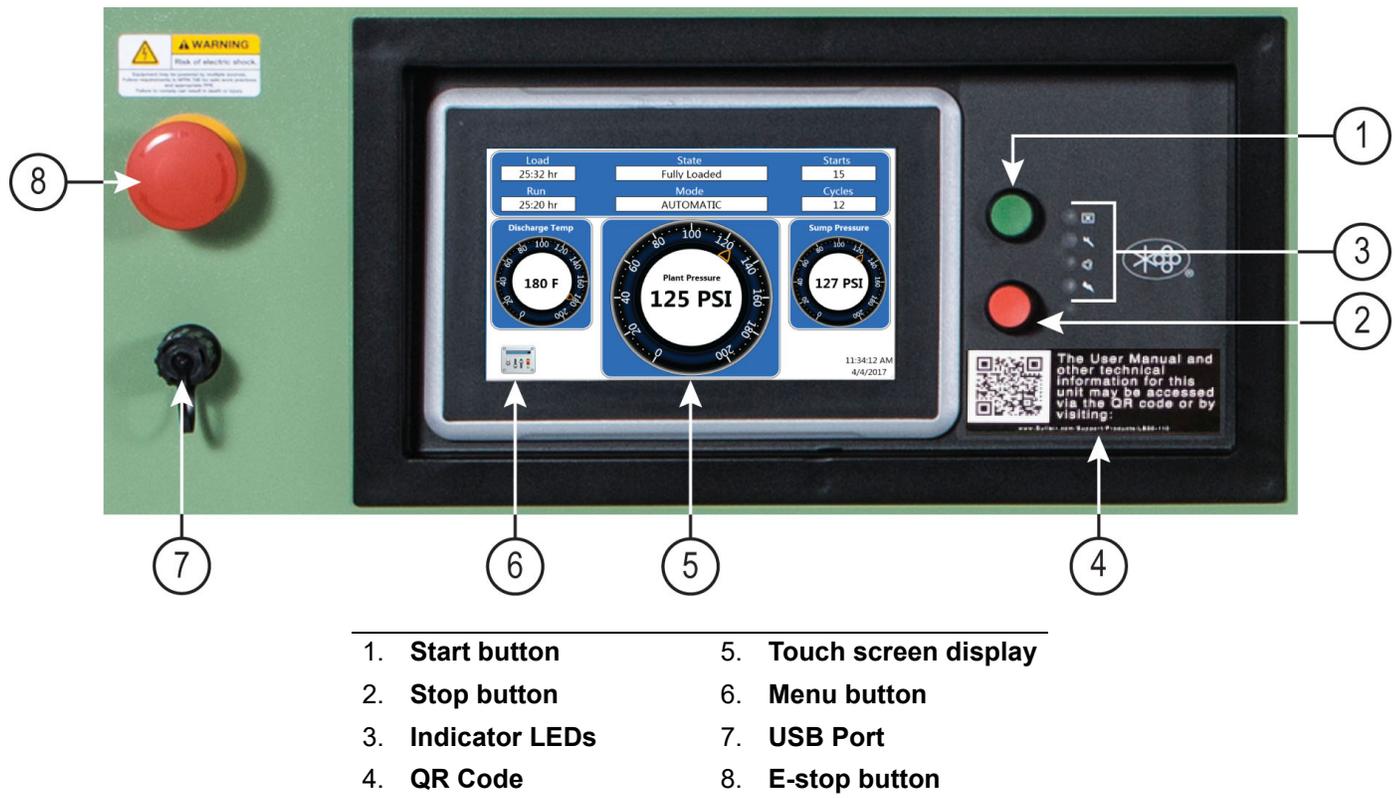
Figure 1-1: STS Controller

Key	Description	Function
1	**Start button**	Push to start the compressor. Can also be used to reset maintenance and warning messages while the compressor is running.
2	**Stop button**	Push to stop the compressor. Can also be used to clear fault messages when the compressor is stopped.
3	**Indicator LEDs**	There are four status indicators that identify the current operational status of the machine: • Power-On Indicator (Blue) – Lights when power is applied to the controller. It will blink slowly to indicate that Automatic Restart After Power Failure is enabled. • Automatic or Manual Run Mode Indicator (Green) – Lights whenever the compressor is set to start and run automatically. The light is constant whenever the motor is running. The light will blink slowly if the compressor motor is stopped while in Automatic Mode as a warning that the machine may restart at any time. The light may blink rapidly if a machine start is imminent. • Maintenance or Warning Indicator (Amber) - Lights when recommended maintenance or service warning is issued. In most cases, the machine will continue to operate normally. • Fault Indicator (Red) - Lights when a compressor fault has occurred. The light remains steady and the compressor remains inoperative until the fault condition is corrected.
4	**QR Code**	Read the QR code with the camera on your smartphone or tablet to access user manuals on your device.
5	**Touch screen display**	Displays operating parameters and compressor information. Provides interface between the user and the compressor controller.
6	**Menu button**	Returns to the main menu screen.
7	**USB Port**	Use this port to upload information to the STS controller using a flash drive.
8	**Emergency Stop (E-stop) button**	Used to stop the compressor immediately. The E-stop button is logged as a fault and should only be used when essential.

Section 2

Home Screen

2.1   Home Screen Introduction

This section describes the data displayed on the three STS Controller home screens for viewing air compressor information.

NOTE

The control parameters described in this manual are those which can be adjusted via the STS controller's menus. Additional parameters that control the operation of the compressor and sequencing of multiple machines can be viewed and edited using the Sequencing & Protocol Manual.

NOTE

Consult your local Sullair service representative for installation guidance.

NOTE

Do not use tools or any other instrument to operate touch screen. Use only finger or stylus to operate display while only using moderate force.

The STS Controller home screens will display the line pressure and current operating mode. The home screen displays various current machine statistics appearing under the heading Status. These values are read-only and cannot be changed.

There are three different schemes for the home screen as seen in figures 1, 2, and 3.

All three screens will show the following parameters:

State - The state of the compressor operation in response to the current mode and current conditions. There are 21 states: INITIALIZING, STOPPING, MANU-ALLY STOPPED, REMOTE STOPPING, REMOTE

STOPPED, STANDING BY, FAULTING, FAULTED, WAITING FOR BLOWDOWN, STARTING 1, STARTING 2, STARTING 3, PRECOOLING THE DRYER, LOAD-ING, LOADED & MODULATING, FULLY LOADED, UNLOADING, REMOTE UNLOADING, RUNNING UNLOADED, REMOTE UNLOADED, and RESTARTING.

Mode - Shows the way the machine operation is being controlled. There are five Operating Modes: AUTO-MATIC, MANUAL, OFF, FAULT, and UI COMM.

Starts - Total number of times the compressor has been started automatically or manually.

Cycles - Total number of load cycles the compressor has completed.

Run - Total number of hours the compressor motor has been running.

Load - Total number of hours the compressor has run loaded.

Discharge Temperature - The internal temperature of the compressor.

Sump Pressure - The compressor sump pressure.

Line Pressure - The discharge pressure of the compressor.
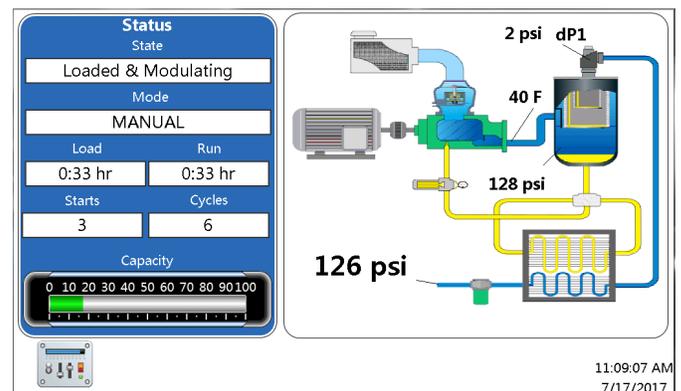

Figure 2-1: Mimic screen

The Mimic screen in *Figure 2-1* shows the dP1.

High Separator dP1—Indicates the fluid separator pressure differential is high. The separator unit needs to

checked or changed. The value is derived from subtracting P2 (Line Pressure) from P1 (Sump Pressure).

Both the Mimic and Multigauge screens (*Figure 2-1* and *Figure 2-2*) have a **Capacity** bar.

The **Capacity** indicates how much air is being delivered by the compressor package as a percent of the compressor's full capacity. The data is updated frequently and shows only the instantaneous delivery rates as compared to the position of the spiral valve or the percentage of maximum frequency of the VSD.
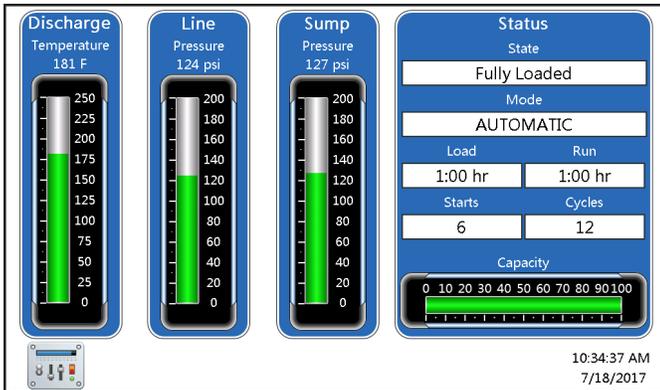

Figure 2-2: Multigauge screen
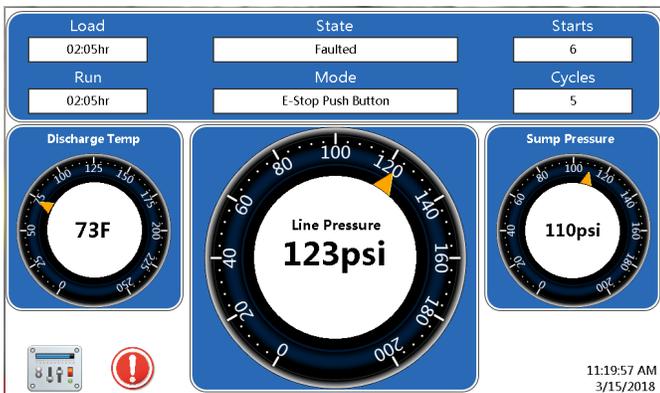
Figure 2-3: Analog/Digital - Fault Icon Button
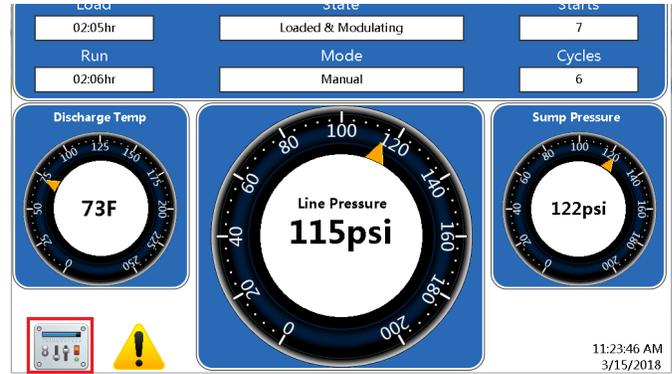
Figure 2-4: Analog/Digital - Warning Icon Button

2.1.1   Recommended Service & Warnings

NOTE
• Do not expose machine to temperatures outside of design specifications. • Do not expose machine or control panel to direct, uninterrupted UV/sunlight. • Do not install machine in areas with high continuous moisture content.

The Fault or Warning icon button will appear any time one of those situations occurs. The icon will show the seriousness of the situation (Fault or Warning). The Mode field will tell you the reason.

	Fault – takes you to the Event History screen. See *Section 3.4.3* on page 21
	Warning – for the list of warnings see *Section 3.4.1* on page 19

There are two situations that cause the Warning icon to appear:

Recommended Service – press the Warning icon to be directed to the Recommended Service screen (see *Section 3.4.2.1* on page 20)

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> **Machine warning** – press the Warning icon to be directed to the Warnings screen (see *Section 3.4.1* on page 19)

For more information like the time of the fault, the user can push the icon button to be directed to the event history. On the Event History screen, an icon appears next to each event as shown in *Figure 2-5*.

Figure 2-5: Event History Screen

Notes:

Section 3
Controller Functions

3.1 Main Menu

When the Menu [icon] button on the home screen is selected, the Main Menu screen with the System Infor-

mation, System Configuration, Maintenance, and Log In buttons will appear. Each menu button is described below.

3.1.1 Menu Hierarchy
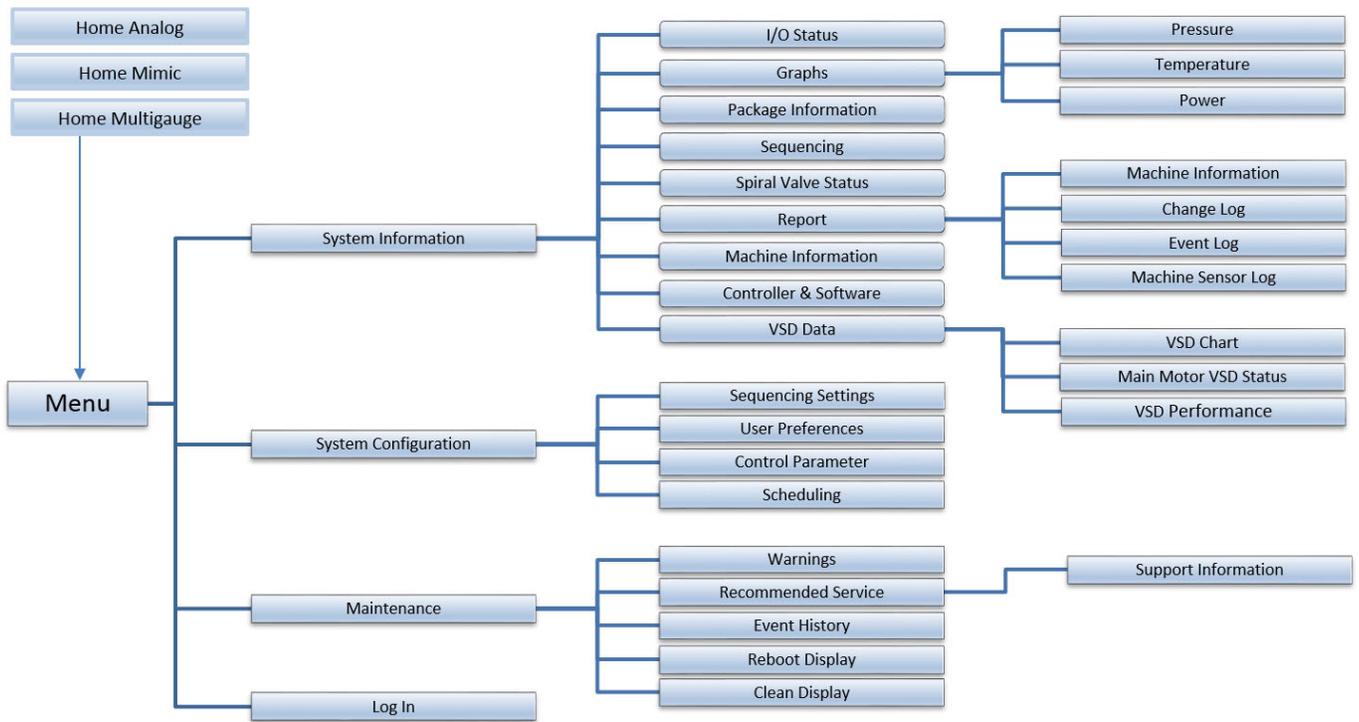
Figure 3-1: Menu Hierarchy

## 3.2 System Information

All system information for the machine can be found in this menu group. These menus are read only.

3.2.1 I/O Status: Input & Relay Status

Follow these steps to access the Input & Output Status screen:

1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Information button.

3. Press the I/O Status button.
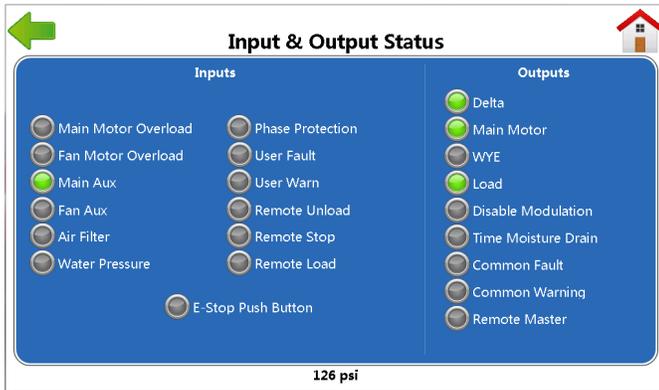
Figure 3-2: Input & Output Status

Figure 3-3: Machine Information

The digital Inputs and relay Outputs indicate that a signal from an input device has been received or a digital output is activated.

Digital Inputs - Each green light indicates that the input has been activated.

E-Stop Push Button - The E-stop input indicator will appear red when the E-stop is pressed.

Relay Outputs - Each green button indicates that the output relay has been activated by the controller. When the E-stop button is pressed the contact is opened and the signal to the input is removed.

3.2.2 Machine Information

Follow these steps to access the Machine Information screen:

1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the System Information button.
3. Press the Machine Information button.

The Machine Information menu presents data for the titles listed below.

Machine Hours - Total number of hours the controller has been monitoring compressor operation.

Compressor Enabled Hours - Total number of hours the compressor has been enabled to run.

Motor Running Hours - Total number of hours the compressor motor has been running.

Compressor Loaded Hours - Total number of hours the compressor has run loaded.

Compressor Full Load Hours - Total number of hours the compressor has run at full load.

Number of Starts - Total number of times the compressor has been started automatically or manually.

Number of Load Cycles - Total number of load cycles the compressor has completed.

Discharge Temperature - Airend discharges air/oil temperature.

Dry Side Temperature - Package outlet temperature (if available).

Sump Pressure - Compressor discharge pressure.

Line Pressure - Package outlet pressure.

Oil Filter Pressure - Oil pressure at the inlet of the oil filter.

Oil Pressure - Injection oil pressure.

Separator Pressure Data - This is the result of pressure P1 (Sump) minus pressure P2 (Line).

Machine Current - Displays the value of Current Transducer (AIn6), if installed.

3.2.3 Controller & Software Information

Follow these steps to access the Controller & Software Information screen:

1. Press the Menu ![menu icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the System Information button.
3. Press the Controller & Software button.
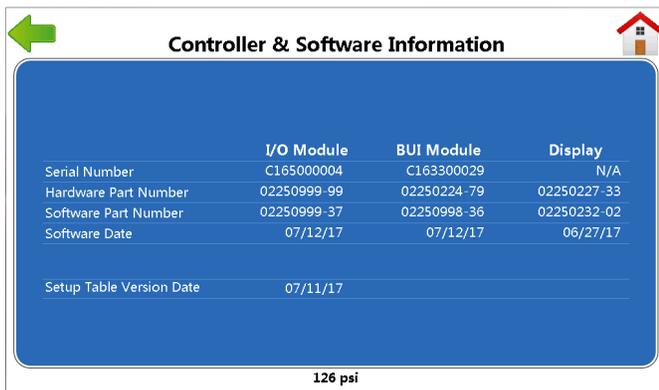
Figure 3-4: Controller & Software Information

The Controller & Software Information display presents part number and date information for the compressor controller. This information is read-only and is displayed in 3 different columns: I/O Module, BUI Module and Display. The categories are described below.

Serial Number - Displays the serial number of the corresponding module.

Hardware Part Number - Displays the corresponding hardware module's part number.

Software Part Number - Displays the version part number of the corresponding module software.

Software Date - Displays the release date of the corresponding module software.

Setup Table Version Date - Displays the date of the parameter table which was used for initializing the machine.

3.2.4 Graphs

This menu contains buttons for displaying time-based graphs of Temperature and Pressure for both machines, plus Current for non-VSD machines and Power for VSD machines.

Follow these steps to access the Graphs screen:

1. Press the Menu ![menu icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the System Information button.
3. Press the Graphs button.
4. Press the Temperature, Pressure, or Current button to access the corresponding graph.
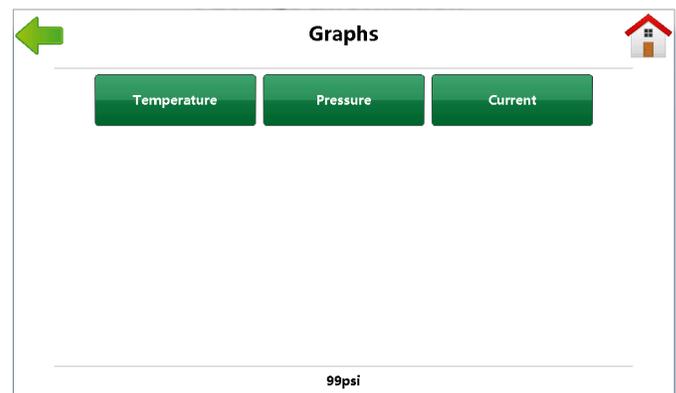

Figure 3-5: Graphs
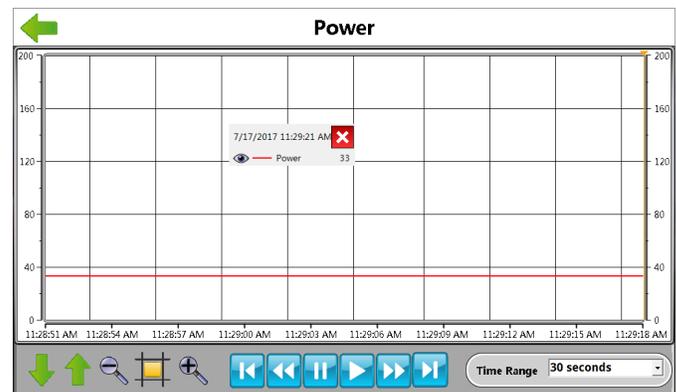
Figure 3-6: Power
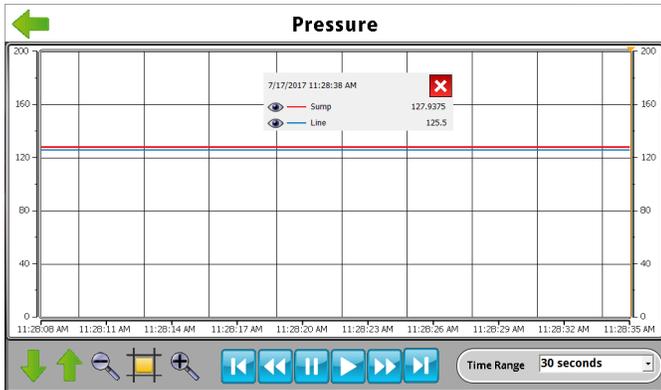
Figure 3-7: Pressure

Figure 3-8: Temperature

You can explore the graph by using the buttons to navigate forward and backward on the graph. You can also zoom in and out to see more details of it.

The time stamp may vary with 30 seconds, or 1, 4, 10 and 30 minutes.

3.2.5 Package Information

The information about the compressor package is recorded during the Controller's initialization.

Follow these steps to access the Package Information screen:

1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the System Information button.
3. Press the Package Information button.

Figure 3-9: Package Information

Model - The model number

HP - Motor Horsepower

Pressure - Nominal pressure rating

Hz - Line frequency

Modulation - The style of controller capacity modulation.
 • CONV: Conventional with Load/Unload & VFD
 • SPRL: Air End with an electronic spiral valve

Cooling - Method of cooling
 • AC: Air-cooled
 • WC: Water-cooled

Starter - The motor control
 • FV/YD: Wye-delta
 • VFD: Variable Frequency Drive

Volts - Nominal Starter line voltage

Dryer - Dryer type

Initialization Date - Date the controller was initialized.

3.2.6 Sequencing

Please refer to the Sequencing & Protocol Manual for more information on this area of the STS Controller screen.

3.2.7 Reports

The Sullair Touch Screen may be used to generate a comprehensive report of the controller's setup and machine history. These reports are small files that may be filed for future reference, e-mailed, or pasted into other documents. They may also be viewed using Microsoft Excel.

Follow these steps to access the Reports screen:

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1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Information button.

3. Press the Report button.
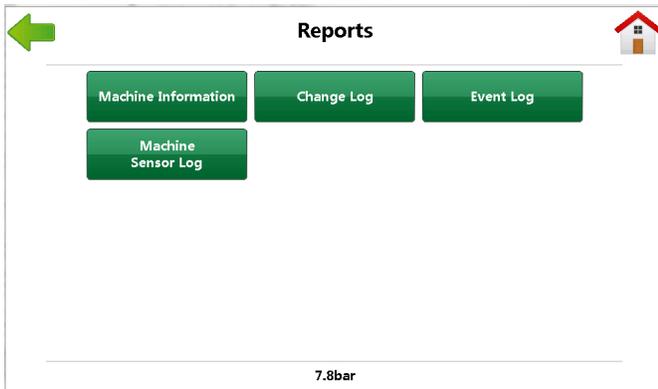
Figure 3-10: Reports

3.2.7.1 Create a Report

Follow these steps to create a new report for the compressor:

1. Insert a USB Flash drive into the USB port located on the starter box.

2. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

3. Press the System Information button.

4. Press the Report button.

5. Select the button to save the desired report.

6. Wait until the message Downloading report Completed appears before removing the USB drive.

Machine Information - This report gives all necessary information about the machine, like Package Information, Machine Information, Control Parameters etc.

Change Log - This report provides last 200 changes in the machine.

Event Log - This report provides last 200 events accrued in the machine.

Machine Sensor Log – The Machine Sensor Log report requires some data to be entered before pulling the

report. Select the Data Type field and click either Live or Historical.

• **Historical** – the Historical File Number field appears, and you may select from among 8 different files. File1 is the newest while File8 is the oldest.
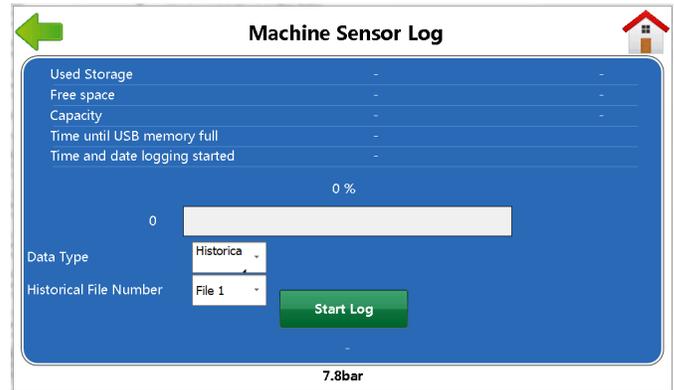
Figure 3-11: Machine Sensor Log

• **Live** - the Historical file number will disappear, and the latest data will be used in the report.
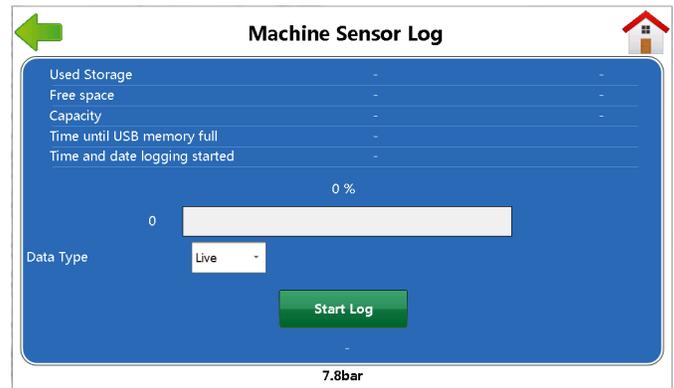
Figure 3-12: Machine Sensor Log

Press Start Log and the report will start to compile. The controller will take 100 samples at one second intervals.

3.2.7.2 Viewing a Report

1. Insert the USB stick into the computer and look for the folder named Report.

2. An example of the file format is C1xST-D_1074_SystemReport_Template mm-dd-yyyy hh.mm.ss PM/AM.xls

3.2.8   VSD Data

The VSD Information menu screen is used to select the VSD Chart, Main Motor Status, and VSD Performance information screens.

Follow these steps to access the VSD Information screen:

1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Information button.

3. Press the VSD Information button.

4. Press the VSD Chart, Main Motor VSD Status, or VSD Performance button to obtain the corresponding technical information.
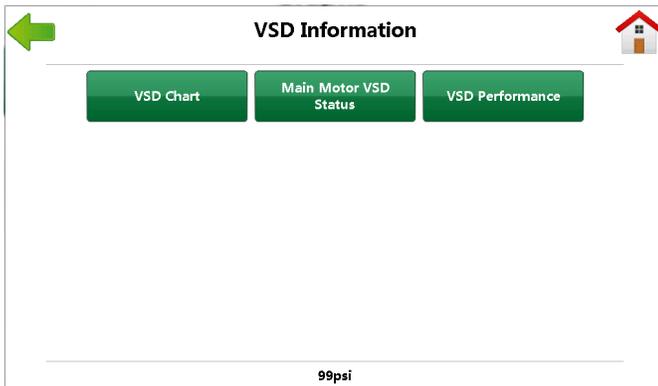
Figure 3-13: VSD Information

3.2.9   Spiral Valve Status

The Spiral Value Status screen displays a selection of the spiral valve operational data.

Follow these steps to access the Spiral Valve Status screen:

1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Information button.

3. Press the Spiral Valve Status button.
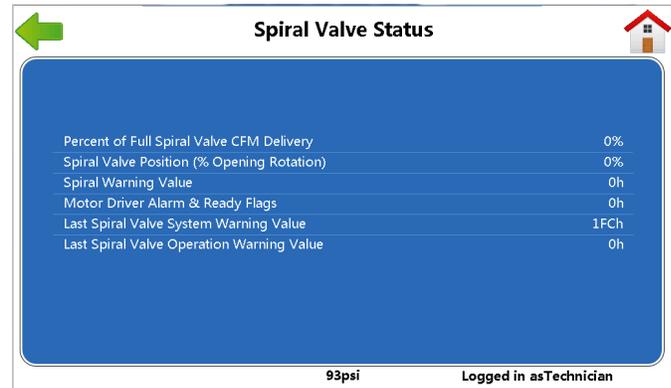
Figure 3-14: Spiral Valve Status

Percent of Full Spiral Valve CFM Delivery - This number represents the position of the spiral valve in terms of a percent of its turn down range.

Spiral Valve Position - This number represents the position of the spiral valve in terms of a percent of its available travel range.

Spiral Warning Value - This is the value of the last spiral motor driver alarm that disabled valve movement. The value *h* refers to hexadecimal.

Motor Driver Alarm & Ready Flags - This will report selected internal flags. The value *h* refers to hexadecimal.

Last Spiral Valve System Warning Value - This will report the numeric value of the any current System warnings. These warnings indicate system issues that do not allow the valve to operate and require a physical repair after power is removed. The value *h* refers to hexadecimal.

Last Spiral Valve Operation Warning Value - This reports the numeric value of any warnings that may be associated with issues that have blocked valve operation, and may require changing certain operating conditions before they will reset. Examples could be start-ups at low ambient air temperatures, or a malfunctioning compressor cooling system. The value *h* refers to hexadecimal.

3.3   System Configuration

All system configuration data for the machine can be found in this menu group.

3.3.1   Control Parameters

Follow these steps to access the Control Parameters screen:

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1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Configuration button.

3. Press the Control Parameters button.

Control Parameters

Unload Pressure	135.0 psi	Unload Time (s)	240
Load Pressure	130.0 psi	Drain Interval (s)	300
Modulation	Modulate	Drain Time (s)	5
Mode	Manual	Restart Time (s)	0
VSD Setpoint	125.0 psi	Wye-Delta Time (s)	6
		Cost per KWH	70

124 psi
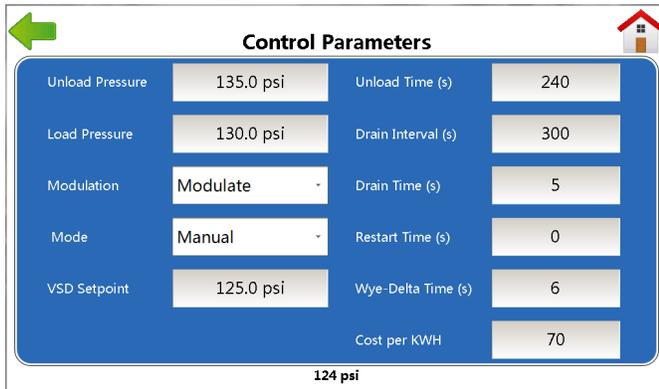
Figure 3-15: Control Parameters

The following three settings affect the compressor's response to line pressure. The compressor starts to deliver air to the system whenever pressure falls below the Load pressure and stops delivering air whenever pressure rises above the Unload pressure.

Unload Pressure - Line pressure setpoint (psi, bar, or kpa) at which the compressor will unload and stop delivering air.

Load Pressure - Pressure (psi, bar, or kpa) at which the compressor motor will start, and the compressor will begin to deliver air.

Modulation - Assigns the way the machine will be delivering air (Load/Unload or Modulate).

VSD Setpoint Pressure - Available only with VSD equipped machines. It is the targeted pressure for the variable speed controls. The speed will be adjusted to maintain this pressure. Most packages will allow adjustment of this over a wide range to allow tailoring of the pressure to the needs of the application.

Spiral Target Pressure - Available only with electronic spiral valve equipped machines. The target pressure is set the same as described for the VSD Setpoint Pressure.

Unload Time (seconds) - Set this to the time that the machine is to run unloaded in Automatic mode before shutting off.

Drain Interval (seconds) - Set this time as the desired interval between activation of the drain cycle for machines equipped with an electric solenoid drain.

Drain Time (seconds) - Set this time as the number of seconds that the drain is to remain energized.

Restart Time (seconds) - Set this time to the desired number of seconds before auto restart is to occur on power up. Set it to zero (0) to disable auto restart.

Wye-Delta Time (seconds) - Set this as the time for the wye to delta starter transition.

Cost per KWH - Available only with VSD equipped machines. Sets the KWH cost value used in operating cost calculations. Enter value divided by 1000. For example, the default is 70, which is $0.070/KWH.

3.3.2 User Preferences / Changing Controller Units and Language Preferences

You may change the display preferences of the STS Controller. The units of measure for pressure and temperature, and language preferences can be changed at the User Preference screen. These changes are then reflected in the STS Controller display.

Follow these steps to access the User Preferences screen:

1. Press the Menu [icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Configuration button.

3. Press the User Preferences button.

User Preferences

Pressure Units	psi
Temperature Units	F
Language	English
Home Screen	Analog/Digital Panel

92psi
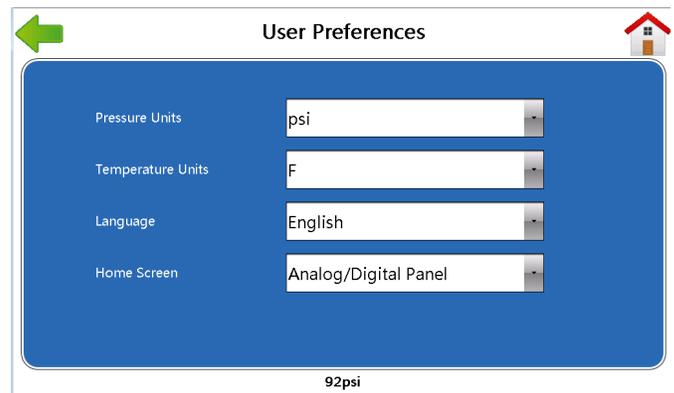
Figure 3-16: User Preferences
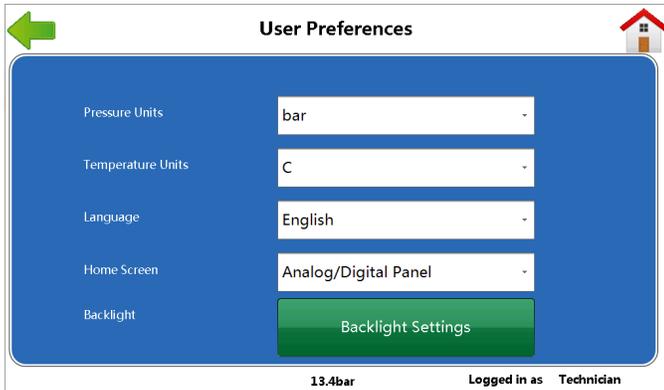
Figure 3-17: User Preferences

Follow these steps to change the STS display user preferences:

1. Press the **Pressure Units** field and press the correct unit – psi, bar, and kPa.

2. Press the **Temperature Units** field and press either F (Fahrenheit) or C (Celsius).

3. Press the **Language** field and press the desired language: English, Chinese, French, German, Japanese, Portuguese, Russian, or Spanish.

4. Press the **Home Screen** field and press the correct home screen style: Mimic, Multigauge, and Analog/Digital Panel. Please see *Section 2.1* on page 7 for a fuller explanation of these three home screens.

5. Press the back arrow to return to the previous window. The new User Preferences are saved.
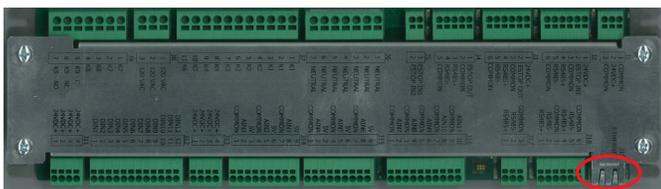
Figure 3-18: I/O Control Module Cover

Note: The Ethernet port is shown circled in red.

3.3.3 Scheduling

The Scheduling screen is designed to show when the machine will be running certain actions at scheduled times during the week. The user can schedule the machine to run a 24/7 schedule.

Follow these steps to access the Scheduling screen:

1. Press the Menu ![icon] icon from the home screen of the STS Controller. The Main Menu appears.

2. Press the System Configuration button.

3. Press the Scheduling button.

In *Figure 3-19*, the first column indicates the time set for the specific action. The time can be set from 00:00 to 23:59.

Follow these steps to add a time:

1. Touch the box where the time is to be entered. A keypad appears.

2. Enter the time without a colon. For example, 1245 should be entered instead of 12:45.

The second to eighth columns indicate the day that action happens. In *Figure 3-19*, the first event is set to happen Tuesday through Friday.

The last column is the action that takes place during the scheduled date and time. The action can be any of the following:

- **Unload** - Compressor is put in the Unloaded state. In Automatic mode, the compressor will stop after the unload time setting has been reached. This is recommended over Halt to allow cool down.

- **Halt** - This action halts the compressor.

- **Normal** - This action returns the compressor to normal operations.

- **Offset -** This action will have the compressor's output pressure decrease to the Offset level at the specified day and time.

Note: An offset value of between 0.0 to 25.0 psi may be entered in the Offset field at the bottom of the screen.

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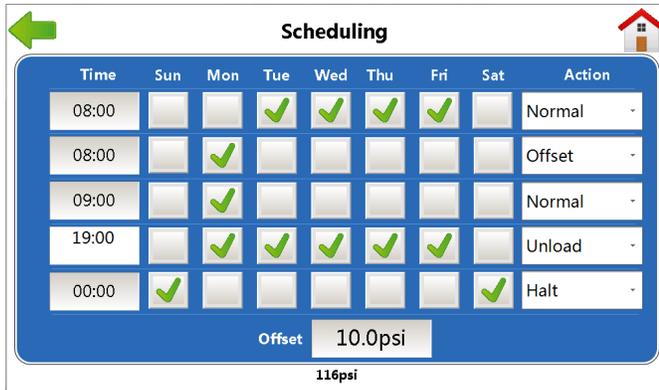
Figure 3-19: Scheduling
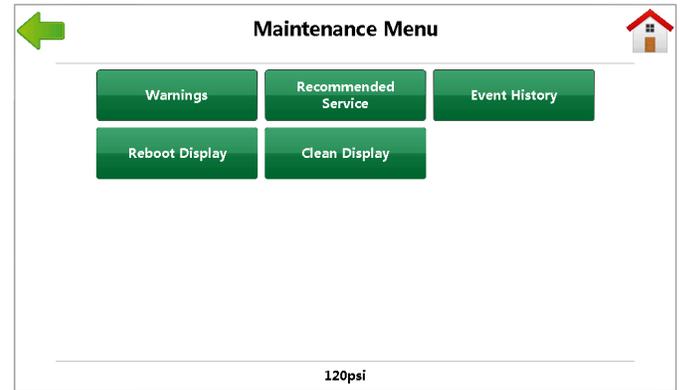
Figure 3-20: Maintenance

Based on the scheduling example found in *Figure 3-19*, this compressor will operate in the following manner:

- If the compressor sequence mode is set to **Remote**, **Hours** or **Com Number**, there is time in the **Unload Time** parameter and the machine is set to **Automatic**.
- Monday morning (8:00 AM to 9:00 AM), the compressor will run at 10 PSI less than the programmed Unload and Load (Offset).
- Monday (at 9:00 AM) the compressor will come out of Offset and resume Normal operation.
- Tuesday through Friday (at 8:00 AM), when demand is present, the compressor will come out of Standby and run, using programmed Load and Unload settings (Normal).
- Monday through Friday (at 7:00 PM), the compressor will unload, run unloaded for the duration of Unload Time and go into Standby (Unload).
- Friday night (at 12:00 AM), the compressor will go from Standby to Halt. The compressor will remain in Halt state until 8:00 AM Monday morning (Halt).

3.4   Maintenance

The Maintenance menu contains recent Warnings, Recommended Service, Event History, Reboot Display and Clean Display buttons.

3.4.1   Warnings

When a warning message is displayed, the compressor will still operate. However, the condition which caused the warning must be resolved within a short period of time to prevent a fault condition or damage to the machine. Refer to the Troubleshooting section of this manual.

Follow these steps to access the Warnings screen:

1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the Maintenance button.
3. Press the Warnings button.

For actions to be taken when a Warning condition occurs, see the figure below.

Warning messages that may appear on the Maintenance Display are listed below.

High Oil (Fluid) Filter dP - Indicates the fluid filter pressure differential is high. The fluid filter needs to be checked or changed.

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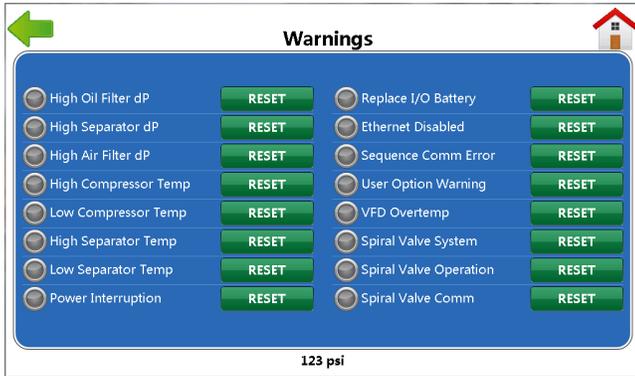
Figure 3-21: Warnings

High Separator dP - Indicates the fluid separator pressure differential is high. The separator unit needs to be checked or changed.

High Air Filter dP - Air filter pressure differential is high indicating that the air filter element needs to be checked or changed.

High Temperature Compressor, Separator - Compressor Temperature at the specified temperature probe location is approaching the set high limit.

Low Temperature Compressor, Separator - Compressor Temperature at the specified temp probe location is approaching the set low limit.

Power Interruption - An interruption in power to the compressor has occurred.

Replace I/O Battery - Indicates that the controller internal battery is low and needs to be replaced.

Ethernet Disabled - Indicates that a problem has occurred with the Ethernet connection.

Sequence Comm Error - Communication problem exists between the compressor controllers set up for sequential operation.

User Option Warning - A user furnished switch has been activated.

VFD Overtemp - Indicates that the variable frequency drive is operating near its designed temperature limit.

Spiral Valve System - Electronic Spiral Valve Operation has been blocked by a system set-up issue. Check the cable connection between the spiral motor driver and the motor.

**Spiral Valve Operation** - Electronic Spiral Valve Operation has been blocked by an abnormal operational issue such as component temperatures. These will tend to clear themselves as compressor operating conditions normalize. Check for high ambient conditions and low temperature start-up.

Spiral Valve Comm - Electronic Spiral Valve Operation has been blocked by a loss of communication between the STS Controller and the Spiral motor driver module. Check the connection between the power cable and the driver module. Check the communication cable between the STS I/O module and the spiral motor driver. If this is a replacement driver module double check that the driver switches are set as directed.

3.4.2   Recommended Service

Follow these steps to access the Recommended Service screen:

1. Press the Menu ![icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the Maintenance button.
3. Press the Recommended Service button.

The Recommended Service menu shows the hours remaining to the next recommended service activity.

Figure 3-22: Recommended Service

3.4.2.1   Service Reminders

Service Reminders may inform the user that a component of the compressor is recommended for service. Resetting service intervals is available to the user after maintenance is completed. Filters and fluids should be changed as directed by the specific model's Operator's manual. The compressor location and environment may dictate more frequent changes.

The following service reminders can appear under the Recommended Service menu.

Oil (Fluid) Filter Change - The compressor fluid filter life interval has expired. Change the fluid filter within the time frame noted in the machine operation specifications.

Separator Change - The compressor fluid separator life interval has expired. Change the separator within the time frame noted in the machine operation specifications.

Air Filter Change - The compressor air filter life interval has expired. Change the air filter within the time frame noted in the machine operation specifications.

Oil (Fluid) Analysis - Fluid analysis interval has expired. Schedule the compressor fluid analysis per machine operation specifications.

Oil (Fluid) Change - The compressor fluid life interval has expired. Change the compressor fluid within the time frame noted in the machine operation specifications.

3.4.3   Event History

Follow these steps to access the Event History screen:

1. Press the Menu ![icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the Maintenance button.
3. Press the Event History button.

A history of the 16 most recent Warning, Fault and alarm messages may be viewed in the Event History window.

Figure 3-23: Event History

1. Select the Event History button on the Maintenance menu.
2. The Event History window will appear displaying the following elements:
   2.1. First column shows the number of the event.
   2.2. Second column shows the corresponding icon - the red circle means fault and the yellow triangle means warning. See *Section 2.1.1* on page 8.

2.3. Third column shows abbreviated headings corresponding to the event.

There are column headings for the machine: Date, Time, and Hours.

Note: Use the up and down buttons on the top and the bottom of the scroll bar to view more than ten events.

Warning history is also included in the comprehensive text report. See *Section 3.2.7* on page 14.

3.4.4   Reboot Display

Follow these steps to access the Reboot Display screen:

1. Press the Menu ![icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the Maintenance button.
3. Press the Reboot Display button. The following pop up screen appears.
4. If the user selects Reboot, only the display will be rebooted.
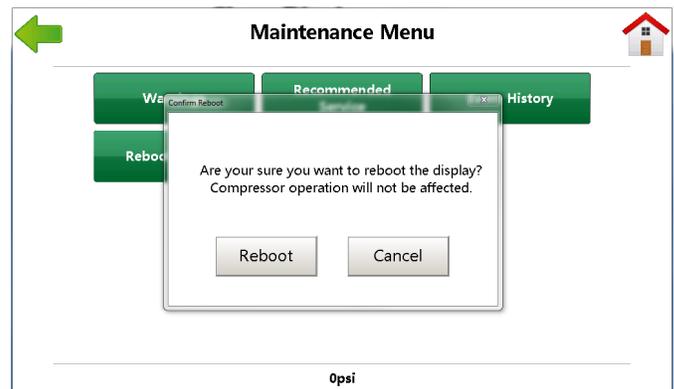
Figure 3-24: Reboot Display

3.4.5   Clean Display

Only use a soft cloth and mild detergent to clean the display. Use of other materials may void the warranty. Follow these steps to access the Clean Display screen:

1. Press the Menu ![icon] icon from the home screen of the STS Controller. The Main Menu appears.
2. Press the Maintenance button.
3. Press the Clean Display button.

The Clean Display disables the touch screen and gives the user 10 seconds for cleaning. Repeat steps 1-3 if more cleaning time is needed.

Clean Display

Touch feature temporarily disabled for cleaning

Seconds until previous screen is shown

5
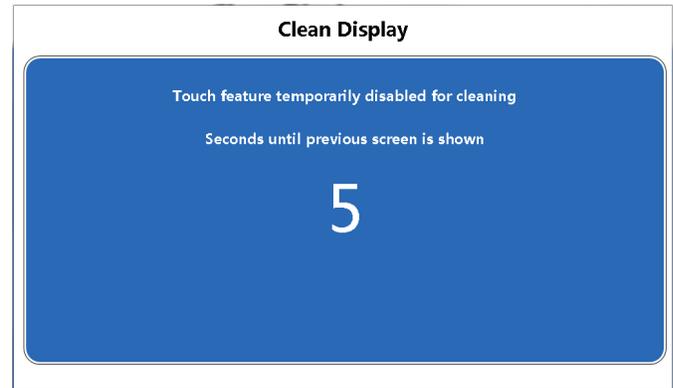
Figure 3-25: Clean Display

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Section 4
Variable Speed Drive

4.1   Overview

The Sullair VSD drive application is custom designed for operation of air compressors. All necessary control functions are performed through the Sullair Touch Screen Controller and software. The drive functions as a module on the Sullair Touch Screen Controller communications bus. It provides detailed information about relevant drive status data and compressor performance. Drive controls are coordinated with internal compressor controls, and with other Supervisor or controlled compressors in sequenced systems. The Sullair Touch Screen Controller monitors drive performance to provide motor thermal and other protections in an easy-to-use, robust design.

4.1.1   VSD Installation and Operation

Refer to the VSD Installation and Service manual that came with the compressor for installation information.

Generally, the STS functions operate in the same manner for VSD machines as with non-VSD machines. When a VSD compressor is initialized, the program provides additional functionality for monitoring and controlling VSD operations. The VSD Data button appears as in *Figure 4-1* below.
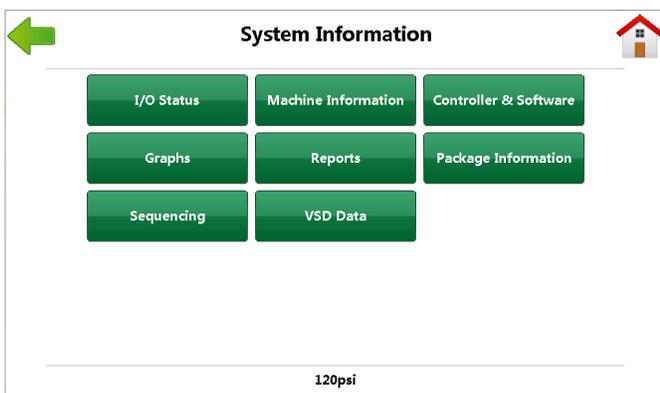
Figure 4-1: System Information

This section defines those additional STS functions that are available for VSD compressors. When the VSD Data button is pressed, three buttons appear on the next screen.
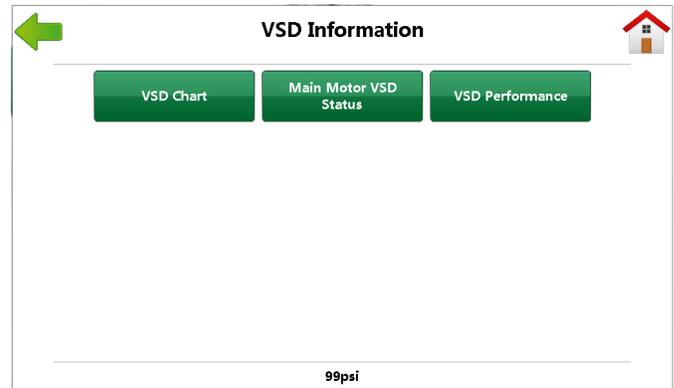
Figure 4-2: VSD Information

4.2   VSD Chart

Select the VSD Chart button to open that screen. This window displays a detailed breakdown of the compressor operation over a Recent period or over the Lifetime of the machine.
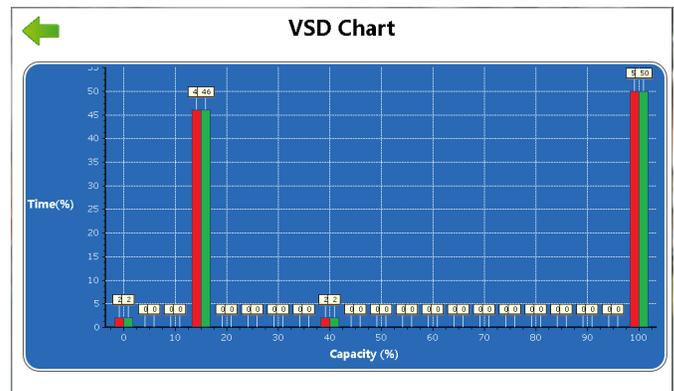
Figure 4-3: Input & Output Status

The VSD Chart shows the percentage of the amount of time the compressor has operated at various rates of delivery. For example, the values shown in the figure correspond to a compressor that has been delivering

approximately 46% of its rated capacity for 24 minutes; it ran 10 minutes at 25% capacity, etc.

Red bars represent the Lifetime delivery and the green bars shows the current one. These values may be used for further estimates of compressor options during plant surveys and evaluations. The Recent values shown in the Delivery Profile window are reset to zero when the Clear Recent Data button is pressed in the VSD performance screen.

4.3   Main Motor Status
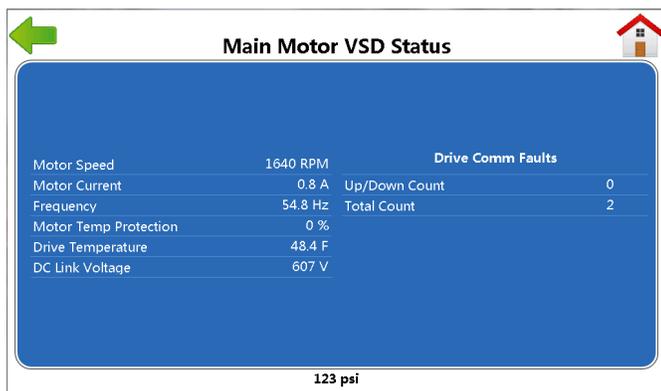
Figure 4-4: Main Motor VSD Status

Service data related to VSD Compressors is displayed in the Main Motor VSD Status window. See *Figure 4-4*. The Main Menu VSD Status window contains the following information:

Motor speed displays a calculated motor speed based on the programmed motor speed and the VSD's output frequency.

Motor current displays the motor current measured in Amps.

Frequency displays the frequency command from the controller.

Motor temp protection is calculated using several VSD parameters and output values. No actual motor data is used.

Drive temperature displays the current drive temperature measured in degrees Fahrenheit or Celsius.

DC link voltage displays the drive's DC link voltage.

Drive Com Faults provides a count of the drive communication faults between the VSD and I/O.

Up/down count is the number of recent faults.

Total count is the total number of drive communication faults that have occurred.

4.4   VSD Performance
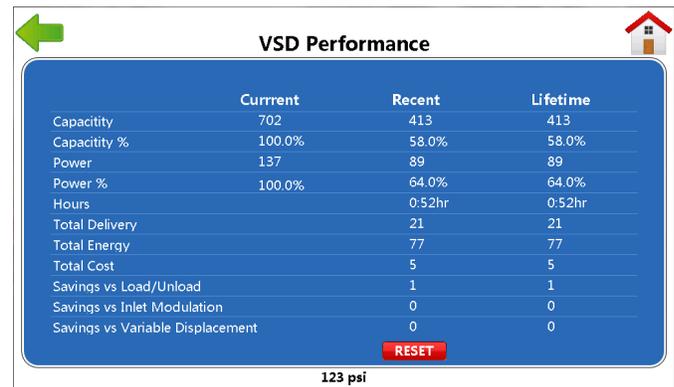
Figure 4-5: VSD Performance

When the STS Controller is initialized as a compressor model with a VSD, additional VSD related parameters will be displayed on the VSD Performance screen. See *Figure 4-5*. The data shown indicate current, recent and lifetime performance of the VSD compressor package. Lifetime data are averages or totals since the time the compressor was initialized. Recent data are averages and totals since the last reset. Current data show a real time flow rate and power estimates of the compressor package.

Figure 4-5 shows a sample display of VSD performance data for a compressor operating under normal conditions. A description of the VSD data is presented below:

Capacity - approximately how much air is being delivered by the compressor package in CFM. The Current data is updated frequently and shows the real time delivery rates. Recent shows the recent average since the last reset and Lifetime shows the average since the machine was initialized.

Capacity % - approximately how much air is being delivered by the compressor package as a percentage of the VSD's rated capacity. The Current data is updated frequently and shows the real time delivery rates. Recent shows the recent average, and Lifetime shows the average since initializing.

Power - the amount of power being used to operate the VSD. The power is presented in kilowatts (KW) approximating the compressor's total power usage. The Current power data is updated frequently and shows the instantaneous power usage rates. Recent shows the recent power usage average, and Lifetime shows the average power usage since the machine was initialized.

Power % - the amount of power being used to operate the VSD expressed as a percentage of the compressor's estimated usage when operating at full capacity. The Current power data is updated frequently and shows the

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real time power usage rates. Recent shows the recent power usage average, and Lifetime shows the average power usage since the machine was initialized.

Hours - the amount of time (in hours and minutes) that the machine has been operated since the Clear Recent Data button was clicked for Recent and since the machine was initialized for Lifetime.

Total Delivery - the estimated total amount of air delivered since the last reset for Recent data and since the machine was initialized for Lifetime data; measured in thousands of cubic feet (KCF).

Total Energy - the estimated total electrical energy consumption since the last reset for Recent data and since the machine was initialized for Lifetime data; measured in Kilowatt-Hours (KWH).

Total Cost - the cost for the electrical energy since the last reset for Recent data and since the machine was initialized for Lifetime data; calculated as dollars (or other units of currency).

Savings vs Load/Unload - the estimated additional cost to deliver the same quantity of air using load/unload compressor control since the last reset for Recent data and since the machine was initialized for Lifetime data; calculated as Dollars. This value is calculated using the Compressed Air Challenge curve for Load/Unload.

Savings vs Inlet Mod. - the estimated additional cost to deliver the same quantity of air using inlet modulation compressor control since the last reset for Recent data and since the machine was initialized for Lifetime data;

calculated as Dollars. This value is calculated using the Compressed Air Challenge curve for Inlet Modulation.

Savings vs Variable Displacement - the estimated additional cost to deliver the same quantity of air using variable displacement compressor control since the last reset for Recent data and since the machine was initialized for Lifetime data; calculated as Dollars. This value is calculated using the Compressed Air Challenge curve for Variable Displacement.

4.4.1   Clear Recent Data

The Recent data column displays average and total values since the date of the last reset. Recent data history may be reset to zero (like a trip odometer in a car) by selecting the Reset button at the bottom of the VSD Performance screen. A few seconds after the button is pressed, all values in the Recent columns of the VSD Performance group and the Delivery History window will be set to zero. New machine statistics will immediately begin to be calculated and the Recent columns will soon be populated with the new Recent data values.

4.4.2   VSD Adjustment

As discussed earlier in this manual in *Section 3.3.1* on page 16, the Control Parameter screen allows the user to modify certain control parameters of the compressor operation. In addition to the general control parameters previously described, two VSD adjustments become available when the STS is initialized to a VSD model. These VSD control parameters are setpoint pressure and cost per kilowatt-hour.

Notes:

4: Variable Speed Drive

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Section 5
Remote Monitoring

5.1   Introduction

The STS Controller provides both serial and Ethernet connections to remotely monitor a compressor. Your local Sullair distributor will be able to assist you with this functionality.

Notes:

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Section 6
Troubleshooting

6.1   Introduction

This Troubleshooting section is provided as a guide to aid in diagnosing and resolving certain compressor conditions when they occur. The information contained in *Table 6-1* on page 30 has been compiled from factory experience and contains symptoms and usual causes for the described problems. Each Service Reminder, Warning, or Fault Message is listed with conditions of when the problem may occur, a probable cause, and a suggested solution to the problem.

Note: DO NOT assume that these are the only problems that may occur.

This document cannot address every possible adverse condition that may happen, nor does it provide every solution for the potential troubles listed. All available data concerning the trouble should be systematically analyzed before undertaking any repairs or component replacement procedures.

Always perform a detailed visual inspection when a machine problem occurs prior to attempting any repairs. Doing so may avoid unnecessary repair and/or additional damage to the compressor.

Always remember to:

   • Check for loose wiring.
   • Check for damaged piping.
   • Check for parts damaged by heat or an electrical short circuit, usually apparent by discoloration or a burnt odor.

Should your problem persist after making the recommended check, consult your nearest Sullair Distributor or the Sullair factory Service Department.

NOTE
The Troubleshooting Guide and STS Controller Faults and Warnings portray common systematic problems that can occur during controller operation. For a more thoroughly in-depth coverage of machine operation troubles, consult the Troubleshooting Section in the machine operators manual

6.2   Troubleshooting Guide

The Controller troubleshooting guide contains symptoms and common causes for the problems that may occur throughout the compressor system. Each warning or fault message that may appear is listed along with conditions for the problem, a probable cause, and a suggested solution to the problem.

Note: DO NOT assume that these are the only possible problems that may occur, and each message listed in the guide does not necessarily apply to all compressor units.

Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
Sluggish/ slow/ unresponsive display	Machine may have had long-term UV/sunlight exposure	Remove from UV/sunlight exposure
	Temperature may be outside design specifications	Maintain machine within design specifications
Touchscreen goes to calibration mode	Screen may be damaged due to excessive force	Do not use tools or any other instrument to operate touch screen
		Use only finger or stylus to operate display while only using moderate force
		Replace screen
Analyze Fluid	Service interval has expired. Maintenance due.	Perform recommended maintenance and reset the reminder using the Recommended Service screen.
Aux Motor Overload	Auxiliary Motor Tripped on Cooling Fan, Fluid Pump or Other Motor.	Reset auxiliary overload after element cools. Verify correct motor amps.
		Check for loose connections.
		Check motor starter contact for proper operation.
		Check line voltage, if low consult power company.
CE Voltage too high	Excessive voltage from power supply or transformer.	Check connections and adjustments.
CE Voltage too low	Inadequate voltage from power supply or transformer.	Check connections and adjustments.
	Excessive load or short in 24v control devices.	Check wiring, coils, and solenoid valves.
Change Air Filter	Service interval has expired. Maintenance due.	Perform recommended maintenance and reset the reminder using the Recommended Service screen.
Change Fluid		
Change Fluid Filter		
Change Separator		
Controller Watchdog	Controller fault.	Contact Sullair Factory Service.
Dryer Fault	Indicates a general dryer malfunction has occurred.	Consult the dryer manual and/or Sullair Factory Service.
High Dryer Dew point	The dryer is unable to cool below the high dew point temperature setting.	Consult the dryer manual and/or Sullair Factory Service.
Dryer High DP Fault		
Low Dryer Dew point	The dryer is cooling below the low dew point temperature setting.	Consult the dryer manual and/or Sullair Factory Service.
Dryer Low DP Fault		
Dryer Overload	Indicates a dryer overload has occurred.	Consult the dryer manual and/or Sullair Factory Service.
Dryer Overload Fault		
Dryer Relay Fault	Indicates a general dryer malfunction has occurred	Consult the dryer manual and/or Sullair Factory Service.

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Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
Dryer Service	Dryer malfunction is imminent.	Consult the dryer manual and/or Sullair Factory Service.
E-Stop Push Button	E-Stop Button Active.	Release button.
	Faulty E-Stop Button.	Check wiring.
Ethernet disabled	Excessive Ethernet traffic	Install a router to reduce the traffic on the compressor's LAN.
Failed to Unload	Compressor failed to unload	Check operation of the inlet valve and controls
High Air Filter dP	Differential Pressure Across Inlet Filter High.	Replace filter.
		Check inlet filter pressure switch.
HIGH AN_ SENSOR	Sensor (Pressure Transducer, Temp Probe, etc.) or Wiring Failure.	Check sensor wiring.
		Check sensor.
High Dryer Dew point	The dryer is unable to cool below the high dew point temperature setting.	Consult the dryer manual and/or Sullair Factory Service.
High Moisture	Moisture drain malfunction	Check wiring and operation of moisture drain, replace if necessary.
	Improper moisture drain interval	Increase drain rate and/or open time.
	Plugged moisture drain strainer	Clean strainer
	Insufficient oil flow to absorber module. Plugged orifice and/or strainer.	Clean strainers and orifices.
High Oil Filter dP	High pressure across fluid filter while running.	Replace fluid filter.
	Fluid filter clogged.	
	Low ambient temperature.	Sump heater may be required in ambients below 40°F (4°C).
	Sensor failure.	Check sensor, wiring and tubing.
High Interstage Pres	Compressor Interstage Blockage or second stage failure	Inspect for: interstage flow restriction, or damaged air end and repair
High Package Press	High pressure.	Check operation of valves and controls.
High Pressure A High Pressure B	Faulty pressure sensor.}	Check and replace pressure sensor if defective.
High Separator dP	High Separator pressure drop	Inspect separator and replace
High Spiral Valve Pr	Mis-adjustment	Check setting of the pressure regulator for the spiral valve actuator.

Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
High Sump Pressure	Sump Pressure High (Poppet, Sullicon, Spiral, Blowdown or Pneumatic Valve Failed)	Check valves. Check Sullicon adjustment (see Control Adjustment section in the compressor operator's manual).
	Faulty solenoid valves.	Check solenoid valve operation and wiring.
	Faulty pressure regulator.	Check pressure regulator adjustment and operation.
		Check minimum pressure check valve (not applicable to Fluid Free compressors).
High Temperature 1 High Temperature 2 High Temperature 3	High Temp Fault.	Ambient temperature high, improve local ventilation.
	Fluid level low.	Replenish fluid to proper level.
	Thermal valve fault.	Check thermal valve operation.
	Cooler fins dirty.	Clean Cooler fins and fan blades.
	Low water flow.	Check for valve closed, pump off or broken pipe.
	High water temperature.	Increase water flow or lower water temperature.
	Cooler plugged.	Clean cooler tubes and shell. If plugging persists, use cleaner water.
	Temp probe or sensor failure.	Check sensor and wiring.
High Voltage Failed	No power to the high voltage starter	Close the disconnect switch
		Check main motor fuses or circuit breaker
Illegal State	Controller fault.	Contact Sullair Factory Service.
Ethernet Comm Error	Module Network Error; Communication has failed between the Display Module, I/O Module and other modules.	Check wiring.
LOW AN_ SENSOR	Sensor (Pressure Transducer, Temp Probe, etc.) or Wiring Failure.	Check sensor wiring.
		Check sensor.
Low Dryer Dewpoint	The dryer is cooling below the low dewpoint temperature setting.	Consult the dryer manual and/or Sullair Factory Service.
Low Line Pressure	Demand exceeds capacity.	Reduce demands.
		Increase capacity.
	Leaks in supply lines.	Check for leaks or open lines in air supply. Repair as necessary.

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Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
Low Fluid Pressure	Fluid filter clogged.	Replace fluid filter.
	Sump fluid level low.	Replenish fluid to proper level.
	Low ambient temperature.	Sump heater may be required in ambients below 40°F (4°C).
	Fluid pump failure.	Fluid pump may be required for remote coolers. Consult Sullair Factory Service.
Low Sump Pressure	Bad sensor or connections.	Check pressure sensor, wiring and tubing.
	Machine may have failed to start.	Check machine operation.
Low Temperature 1 Low Temperature 2 Low Temperature 3	Low ambient air temperature	Sump heater may be required in ambients below 40°F (4°C).
Low Water Pressure	Cooling Water Pressure below 10 psi (0.7 bar).	Check for closed valves or broken pipes.
	Switch is shorted or open.	Replace switch. Check wiring for shorts, arcing or loose connections.
Main Motor Overload	Main Motor Overload Relay Tripped.	Reset overload after heater element cools down.
		Check that compressor is properly configured.
		Ensure load pressure is set below limit of compressor.
		Check line voltage, if low consult power company.
Maintenance A	Service interval has expired. Maintenance due.	Perform recommended maintenance and reset the reminder using Recommended Service section.
Memory Error	The controller I/O board has failed.	Board replacement required. Contact Sullair Factory Service.
Not Commissioned	Controller replacement	Follow commissioning procedures to set up for the specific compressor package.
Option Input Option Input Run	User furnished switch has operated.	Check operation of optional device.
User Option Warning	User furnished external phase relay protection relay has tripped.	Check operation of optional device. Refer to user supplied phase relay documentation and troubleshooting steps.
Port C Comm Error Port E Comm Error	Wiring fault between the controller and User Interface panel	Check the cable and connections
Power Interruption	Intermittent Control Power.	Check line voltage and connections.

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Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
Pump Motor Overload	Auxiliary Motor Tripped on Fluid Pump Motor	Reset auxiliary overload after element cools. Verify correct motor amps.
		Check for loose connections.
		Check motor starter contact for proper operation.
		Check line voltage, if low consult power company.
Pump Starter Contact	Pump starter failed to operate.	Check starter and control wiring.
	Faulty auxiliary contact.	Check contact and contact wiring.
Replace Battery	Controller I/O backup battery is low.	Replace battery.
High Separator dP	Pressure Differential Across Separator High.	Replace separator.
	Plugged separator elements.	
	Pressure sensor failure.	Check sensor wiring.
Sequence Comm Error	Cable or connection fault between compressors.	Check wiring.
	Improper sequence adjustments.	Check sequence settings of all compressors in the sequence.
Spiral Valve Comm	Electronic Spiral Valve Operation has been blocked by a loss of communication between the STS Controller and the Spiral motor driver module.	Check the connection between the power cable and the driver module. Check the communication cable between the STS I/O module and the spiral motor driver. If this is a replacement driver module, double check that the driver switches are set as directed.
Spiral Valve Operation	Electronic Spiral Valve Operation has been blocked by an abnormal operational issue such as component temperatures.	These will tend to clear themselves as compressor operating conditions normalize. Check for high ambient conditions and low temperature start-up.
Spiral Valve System	Electronic Spiral Valve Operation has been blocked by a system set-up issue.	Check the cable connection between the spiral motor driver and the motor.
Starter	Main starter failed to operate.	Check starter and control wiring.
	Faulty auxiliary contact.	Check contact and contact wiring.
	Momentary Line Power loss or brownout	Check Line Power quality
UI Voltage too high	Controller fault.	Contact Sullair Factory Service.
UI Voltage too low	Controller fault.	Contact Sullair Factory Service.
User Option Warning	User furnished switch has operated.	Check function of optional device.
HIGH VOLT SENSOR	Controller fault.	Contact Sullair Factory Service.
LOW VOLT SENSOR	Controller fault.	Contact Sullair Factory Service.

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Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy
VSD1 Comm Fault	Communications lost with the VSD	Check connections to the VSD.
		Check VSD control power and check for board faults.
VFD Overtemp	Warns that the variable frequency drive is too hot	Ensure adequate ventilation
		Schedule cleaning before a High Temp fault occurs
VSD1 parameter error	Controller initialized incorrectly.	Initialize the controller per the machine nameplate
	Incorrect VSD	Replace with proper drive rating
VSD1 Response	The VSD drive is not responding to STS control.	Remove power for 1 minute. Restore power for 1 minute. Restart the machine.

6.3 Machine behavior after a power interruption

If the compressor was faulted prior to the power interruption, the controller will resume the Faulted condition and display the reason for the fault. Repair the cause of the fault and press the Stop button to reset the controller.

If the compressor was manually stopped prior to the power interruption, the controller will return to the manually stopped mode. Press the Start button to manually restart operation.

If the restart timer is greater than zero AND the controller was in Automatic or Manual mode prior to the interruption, the controller will resume that mode after the restart timer expires. No key press is necessary to restart the compressor.

6.4 Internal Battery

The Controller employs an internal battery that maintains the real-time clock and maintains the integrity of the controller memory records when power is disconnected from the controller. For best performance, ensure that the battery is functioning. If the controller is operated with a drained or dead battery, the time-of-day records will not work properly, and loss of recent records could occur. If recent records are lost due to an inoperative battery (or other reason), the controller will revert to the last saved versions of settings and records.

The internal battery is located inside the controller I/O module and will operate for several years without requiring maintenance. When the battery voltage gets low, the controller will issue a Replace Battery warning. Perform the following steps to replace the battery.

1. Press the Stop button to stop the compressor.
2. Disconnect and lockout power according to lockout/tag out procedure.
3. Open the starter enclosure and locate the I/O Control Module.
4. Remove four screws from the I/O Control Module cover and remove it.
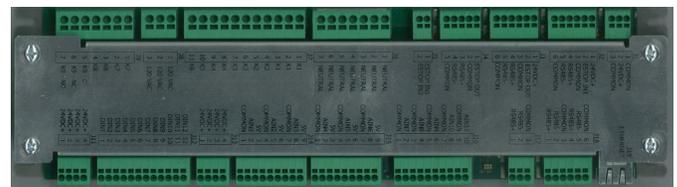
Figure 6-1: I/O Control Module Cover

5. Locate the internal battery. The battery is located near one end of the I/O circuit board (usually oriented towards the top).
6. Remove the battery and replace with a battery type BR2032.
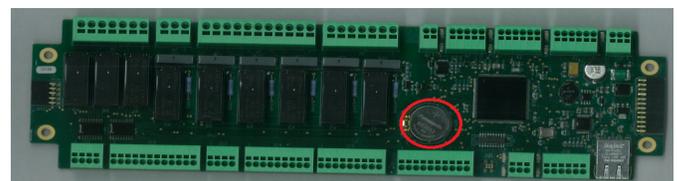
Figure 6-2: I/O Control Module Cover

7. Replace the I/O cover, close starter door, and follow normal startup procedures.

Notes:

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