

# **USER MANUAL**

### Sullair Touch Screen (STS) Controller Technician



#### ▲ SAFETY WARNING

Users are required to read the entire User Manual before handling or using the product. Keep the User Manual in a safe place for future reference.

#### WARRANTY NOTICE

Failure to follow the instructions and procedures in this manual, or misuse of this equipment, will **void** its warranty.

### PART NUMBER: 02250241-507 R00

The information in this manual is current as of its publication date and applies to all stationary controller models listed on this cover. until the next revision of this manual or release of a replacement manual.

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## 

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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*.



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.
		There are four status indicators that identify the current operational status of the machine:
		<ul> <li>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.</li> </ul>
3	Indicator LEDs	<ul> <li>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 com- pressor 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 immi- nent.</li> <li>Maintenance or Warning Indicator (Amber) - Lights when recommended maintenance or service warning</li> </ul>
		is issued. In most cases, the machine will continue to operate normally.
		<ul> <li>Fault Indicator (Red) - Lights when a compressor fault has occurred. The light remains steady and the com- pressor remains inoperative until the fault condition is corrected.</li> </ul>
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 but- ton 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.

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, MANUALLY 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, UNLOADED, 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

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 His- tory screen. See Section 3.5.3 on page 32
1	<b>Warning</b> – for the list of warnings see Section 3.5.1 on page 30

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 3.5.2.1* on page 31)

**Machine warning** – press the Warning icon to be directed to the Warnings screen (see *Section 3.5.1* on page 30)

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*.

		_	
o. Event	Date	Time	Hours
1 🕛 E-Stop Push Button	03/14/18	10:31	02:05
2 🌒 Low Sump Pressure	03/13/18	15:12	02:04
3 🌒 VSD1 parameter error	03/09/18	12:17	02:04
4 🕕 VSD1 Comm Fault	03/09/18	12:17	02:04
5 🕕 E-Stop Push Button	03/09/18	12:16	02:04
6 🕕 Phase Monitor	03/09/18	10:44	00:43
7 🕂 High Air Filter dp	03/09/18	09:41	00:03
8 🕂 High Air Filter dp	03/09/18	09:40	00:02
9 🕕 High Plant Pressure	03/08/18	15:29	00:00
10 🕕 VSD1 parameter error	03/08/18	14:50	00:00

Figure 2-5: Event History Screen



# Section 3 Controller Functions

#### 3.1 Main Menu



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

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

#### 3.1.1 Menu Hierarchy



Figure 3-1: Menu Hierarchy

#### Menu Hierarchy Legend

- The gray background menus are accessible by all users.
- The green background menus are only accessible by Distributors and Technicians.
- The yellow background menus are only accessible by Technicians.



#### 3.2 Log In

The STS controller has 3 different security levels.

- User
- Distributor
- Technician

Each level accesses different features and information.

In *Figure 3-1* on page 11 (Menu Hierarchy), each level is represented by a different color. In some of the screens, different level users see different objects. For instance, if the user logs in as a technician, in the Support Information screen, the Edit Information button will appear which the regular user cannot see.

<b>—</b>	Main Menu	
System Informatic Log In	Logi Use: Distributor - Password •• Change Password OK Cancel	itenance
	120psi	

Figure 3-2: Spiral Valve Settings

Follow these steps to Log In:

- 1. Push the Log In button on the Main Menu screen. The Login dialog box appears.
- 2. Select the down arrow next to the User field and press Distributor or Technician.
- 3. Press the Password field. A keypad appears like the one shown below.



Figure 3-3: Spiral Valve Settings

Use the keypad to enter the correct password and press OK. A log in level message appears in the bottom right of the screen and the button will then change to read Log Out.

#### 3.3 System Information

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

#### 3.3.1 I/O Status: Input & Relay Status

Follow these steps to access the Input & Output Status 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 I/O Status button.

Input & Output Status				
I	nputs	Outputs		
		🔘 Delta		
Main Motor Overload	Phase Protection	🦲 Main Motor		
Fan Motor Overload	User Fault	<b>WYE</b>		
🔵 Main Aux	🔘 User Warn	O Load		
🔵 Fan Aux	🔘 Remote Unload	Disable Modulation		
🔵 Air Filter	Remote Stop	🔘 Time Moisture Drain		
🔵 Water Pressure	🔘 Remote Load	Common Fault		
		Common Warning		
U E	-Stop Push Button	Remote Master		

Figure 3-4: Input & Output Status

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.

#### 3.3.2 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.

Machine Information				
Machine Hours	137:41	Discharge Temperature	191F	
Compressor Enabled Hours	44:34	Dry Side Temperature	24F	
Motor Running Hours	44:31	Sump Pressure	46psi	
Compressor Loaded Hours	44:30	Line Pressure	92psi	
Compressor Full Loaded Hours	00:00	Oil Filter Pressure	77psi	
Number of Starts		Oil Pressure	83psi	
Number of Load Cycles		Seprator Pressure Delta	Opsi	
		Machine Current	7A	
	92	psi Logged in as	Technician	

Figure 3-5: Machine Information

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 (Aln6), if installed.

#### 3.3.3 Controller & Software Information

Follow these steps to access the Controller & Software 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 Controller & Software button.

	I/O Module	BUI Module	Display
Serial Number	C165000004	C163300029	N/A
Hardware Part Number	02250999-99	02250224-79	02250227-33
Software Part Number	02250999-37	02250998-36	02250232-02
Software Date	07/12/17	07/12/17	06/27/17
Setup Table Version Date	07/11/17		

Figure 3-6: 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.



#### 3.3.4 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 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.

<b>—</b>		Graphs		
	Temperature	Pressure	Current	
		99psi		

Figure 3-7: Graphs



Figure 3-8: Power



 Temperature

 250
 200

 150
 7/17/2017 11:27:42 AM

 1127:12 AM
 11:27:50 AM

 1127:12 AM
 11:27:21 AM

Figure 3-10: 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.

#### 3.3.5 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.

Package Info	ormation	
Model	LS110	
Hp	150 HP	
Pressure	125	
Hz	60	
Modulation	CONV	
Cooling	AC	
Starter	VFD	
Volts	460	
Dryer	NONE	
Initialization Date	07/17/17	
#	Law	



- 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.

#### 3.3.6 Sequencing

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

#### 3.3.7 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:



- 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 Report button.

-		Reports		
	Machine Information	Change Log	Event Log	
	Machine Sensor Log			
		7 8bar		
		7.00df		

Figure 3-12: Reports

#### 3.3.7.1 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.



- icon from the home 2. Press the Menu 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.

	Machine Sensor Log	
Used Storage		-
Free space		
Capacity		
Time until USB memo	ory full -	
Time and date loggir	g started -	
	0 %	
Data Type	Historica	
Historical File Number	File 1 • Start Log	
	7.8bar	

Figure 3-13: Machine Sensor Log

• Live - the Historical file number will disappear, and the latest data will be used in the report.

<b>(</b>		Machine Sensor Log	
Used Storag	e		-
Free space			-
Capacity			-
Time until U	SB memo	ry full -	
Time and da	ite loggir	g started -	
		0 %	
Data Type		Live -	
		Start Log	
		-	
		7.8bar	

Figure 3-14: Machine Sensor Log

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

#### 3.3.7.2 Viewing a Report

- 1. Insert the USB stick into the computer and look for the folder named Report.
- An example of the file format is C1xST-D\_1074\_SystemReport\_Template mm-dd-yyyy hh.mm.ss PM/AM.xls-

### 3.3.8 Analog Details (Distributor & Technician)



All the raw data coming in from Analog inputs is displayed on this screen. Note: Values displayed need to be divided by 16.

Follow these steps to access the Analog Details 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 Analog Details button.

		Analog	Details		-
AIN1	734	AIN15	0	AIN29	16136
AIN2	1470	AIN16		AIN30	16136
AIN3	1326	AIN17	16136	AIN31	16136
AIN4	1237	AIN18	16136	AIN32	16136
AIN5	716	AIN19	16136		
AIN6		AIN20	16136		
AIN7	3052	AIN21	16136		
AIN8	387	AIN22	16136		
AIN9		AIN23	16136		
AIN10		AIN24	16136		
AIN11		AIN25	16136		
AIN12		AIN26	16136		
AIN13		AIN27	16136		
AIN14		AIN28	16136		
		92	2psi	Logged in as	Technician

Figure 3-15: Analog Details

### 3.3.9 Digital I/O Details (Distributor & Technician)

The Input & Output Status screen displays all the raw data coming in from Digital I/O.

Note: Since this screen lists the raw value of the I/O ports, it may show a different value than the current I/O status.

Follow these steps to access the Digital I/O Details 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 Digital I/O Details button.

Input & Output Status						
	Inp	uts			Outputs	
O DIN1	DIN10	🔘 DIN19	DIN28	🔘 К1	🔘 К10	🔘 к19
OIN2	DIN11	OIN20	OIN29	🔘 К2	🔘 к11	🔘 к20
<b>DIN3</b>	OIN12	OIN21	OIN30	🔘 кз	🔘 к12	🔘 к21
🔘 DIN4	🔘 DIN13	DIN22	🔘 DIN31	🔘 к4	🔘 к13	🔘 к22
🔘 DIN5	🔘 DIN14	DIN23	🔘 DIN32	🔘 к5	🔘 к14	🔘 к23
🔘 DIN6	DIN15	OIN24	🔘 DIN33	🔘 Кб	🔘 к15	🔘 К24
🔘 din7	OIN16	OIN25	🔘 DIN34	🔘 к7	🔘 к16	Ū
DIN8	🔘 DIN17	DIN26	🔘 DIN35	🔘 ка	🔘 к17	
DIN9	🔘 DIN18	OIN27	🔘 DIN36	🔘 к9	🔘 к18	
			99psi	Logge	d in asTechn	ician

Figure 3-16: Input & Output Status

### 3.3.10 Display Information (Distributor & Technician)

The Display Information screen shows all the technical information related to the display.

Follow these steps to access the Display 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 Display Information button.

	Display In	formation	
CPU Load	0 20	40 60 80 100	
Used RAM		%	
Used Storage	•	<b>%</b>	
Screen update time	800ms	Available RAM	1907384ki
Communication errors		Physical RAM	8049028ki
Backlight brightness	100	Used RAM	6141644k
Runtime Version	2.31.67.0	Available Storage	89753ME
Date/Time	10/31/2017 3:01:42 PM	Storage Memory	230032M
Display Serial Number	N/A	Used Storage	140279M
Display Temperature	0C		
	99	osi Logged ir	n asTechnician

Figure 3-17: Display Information

#### 3.3.11 Sensor Log (Technician)

The Sensor Log screen is for logging the sensor events into a file on a USB flash drive. The screen itself shows information about the capacity of the USB flash drive and the time and date of the log.

Note: The USB flash drive is updated when the user pushes the Start button.

Follow these steps to access the Sensor Log 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 Sensor Log button.



Figure 3-18: Sensor Log

#### 3.3.11.1 Create a report on Sensor Log

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

- 1. Insert the USB flash drive into the USB port located on the starter box.
- 2. From the Main Menu, select System Information and Sensor Log.
- 3. Select the sample rate. You can select 1, 10, or 60 seconds.
- 4. Push the Start Log button. The text on the button will change to Stop. You can stop the logging process at any time by selecting this button. You may also leave the screen and return to the home screen during the logging process.

#### 3.3.11.2 Viewing a Sensor Log report

- 1. Insert the USB flash drive into the computer and look for a folder named Report.
- 2. An example of the file format is Sensor Log yyyymm-dd\_hh-mm-ss-PM/AM.cvs

#### 3.3.12 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 from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Information button.
- 3. Press the VSD Information button.
- Press the VSD Chart, Main Motor VSD Status, or VSD Performance button to obtain the corresponding technical information.

-	VSD Information			
	VSD Chart	Main Motor VSD Status	VSD Performance	
		99 <b>ps</b> i		

Figure 3-19: VSD Information

#### 3.3.13 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 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.

Spiral Valve Status	
l Percent of Full Spiral Valve CFM Delivery	0%
Spiral Valve Position (% Opening Rotation)	0%
Spiral Warning Value	01
Motor Driver Alarm & Ready Flags	01
Last Spiral Valve System Warning Value	1FCI
Last Spiral Valve Operation Warning Value	01
93psi	Logged in asTechnician

Figure 3-20: 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.

#### 3.4 System Configuration

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

#### 3.4.1 Control Parameters

Follow these steps to access the Control Parameters screen:



- 1. Press the Menu 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.



Figure 3-21: 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.

#### 3.4.2 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 from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the User Preferences button.





Figure 3-22: 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 9 for a fuller explanation of these three home screens.
- 5. Press the Backlight Settings button to select your preferred setting.
- 6. Press the back arrow to return to the previous window. The new User Preferences are saved.

#### 3.4.3 Sequencing Settings

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

### 3.4.4 Networking (Distributor and Technician)

Only users with Distributor or Technician log in access will see the Networking screen. Pressing the Network button will cause the Networking screen to appear with four buttons. Note: I/O Module IP Address, Serial Modbus, and BUI Module IP Address only appear under the Technician level.

Follow these steps to access the Networking screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Networking button.

<b>—</b>		Networking		
	I/O Module IP Address	Serial Modbus	BUI Module IP Address	
	Display IP Address			
		99psi	Logged in asTechnici	an

Figure 3-23: Networking

#### 3.4.4.1 I/O Module IP Address (Technician)

Some controllers may be configured to allow access and transmission of data via the Ethernet. These settings have no effect on standard controllers.

Follow these steps to change the IP Address:

- 1. Click each field where the number(s) in that IP Address is changing.
- 2. Type the new numbers into each field.
- 3. Press Write Value to save the new addresses.

The TCP/IP parameters are:

**IP Address** - The unique address the STS will use to identify and communicate with another computer via the Internet or other network utilizing the Internet Protocol standard.

**Subnet** - Used to determine what subnet an IP address belongs to.

**Name Server** - A computer server that implements a name service protocol used to correlate its server name with the IP address.

**Gateway** - The Gateway address allows data to pass to and from the network.

<b>(</b>	I/O Module IP Address					1	
	IP	169	254	1	3		
	Subnet	255	255	0	0		
	Name Server	8	8	8	8		
	Gateway	192	168	1	1		
			Write	e Value			
			113ps	i	Logg	ed in as Techniciar	1

Figure 3-24: I/O Module IP Address



Note: The Ethernet port is shown circled in red.

#### 3.4.4.2 BUI Serial Modbus (Technician)

The BUI (Basic User Interface) Modbus settings assigned here must match the Modbus settings assigned in the STS Controller User Profile or other Modbus applications. If the settings do not match, communication with the controller will be lost when the controller is cycled.

**Note**: The BUI is the module behind the front panel (with the four lights).



Figure 3-26: Basic User Interface (BUI) Panel

Communication Parameters control the transmission of data to and from the STS Controller via an RS-485 serial interface. These settings allow the controller to be configured to communicate with a device having RS-485 capabilities.

Follow these steps to change the IP Address:

- 1. Click each field where the number(s) in that IP Address is changing.
- 2. Type the new numbers into each field.
- 3. Press Write Value to save the new addresses.

The RS-485 configurable parameters are listed below.

**Modbus Address** - Select Modbus Address to enter an address for the compressor Modbus communications on the RS485 port. The address may be between 1 and 247.

**Baud Rate** - The rate of data transmission in bits per second. The overall range is 1200 to 115,200 baud.

**Parity** - Data checking method for verifying accuracy of data transmission. Parity options for data checking are odd, even, or none. The default setting is Even.



#### 3.4.4.3 BUI Module IP Address (Technician)

Please see the field definitions under *Section 3.4.4.1* on page 20 to obtain definitions for IP Address, Subnet, Name Server, and Gateway.

Follow these steps to change the IP Address:

- 1. Click each field where the number(s) in that IP Address is changing.
- 2. Type the new numbers into each field.
- 3. Press Write Value to save the new addresses.





### 3.4.4.4 Display IP Address (Distruibutor & Technician)

Follow these steps to view and/or change an IP address:

- 1. Press the Display IP Address button. The IP Settings dialog box appears.
- 2. Select the LAN A or LAN B tab.
- 3. Select the correct field and type in the new IP address.
- 4. Press OK.



Figure 3-29: LAN A and LAN B

#### 3.4.5 Setting the STS Time & Date

Follow these steps to access the Set Date & Time screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Time & Date button.
- 4. Press the Date & Time button. A dialog box opens where you may set the time and date. Press the Time Zone button to set the time zone.



Figure 3-30: Set Date & Time

### 3.4.5.1 Synchronize Date & Time (Distributor and Technician)

The date and time of the STS I/O Controller internal clock can be synchronized with the STS display clock at the Set Date & Time screen.



Follow these steps to access the Set Date & Time screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Time & Date button.

Press the Synch Time button to synchronize the clocks. See *Figure 3-30* on page 22. The program will automatically adjust the controller clock and calendar to the same time as the STS clock.

**Note**: Make sure the STS Display Date and Time are setup correctly before syncing it with the I/O board.

### 3.4.6 Maximum User Unload Settings (Technician)

The Maximum User Unload settings allow the maximum limit to be set for the compressor unload pressure. This limits the setting for the User-level adjustment of unload pressure.

Follow these steps to access the Maximum User Unload Settings screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Max Unload Settings button.

**Load/Unload Mode** - Sets the maximum Unload pressure limit for the compressor when the machine is operated in Load/Unload mode.

**Modulating Mode** - Sets the maximum Unload pressure limit for the compressor when the machine is operated in Modulating mode.

**Manual Unload Button** - The technician can unload the machine manually by selecting the Manual Unload button. This button appears when the machine is **turned on**. The button's title will change to Resume Normal Operation when selected. The text *Time to Normal: 29:59* then appears at the bottom of the screen.

This count-down timer represents how much time remains for the resumption to normal operation. The machine will also return to normal operation when the technician logs off.



Figure 3-31: Maximum User Unload Settings

<b>—</b>	Maximum User	r Unload Sett	tings
	Load/Unload Mode	100.0 psi	
	Modulating Mode	110.0 psi	
	Resume Norm	al Operation	
Fime to Normal 23:0	8	6 psi	Logged in as Technician

Figure 3-32: Maximum User Unload Settings

#### 3.4.7 Analog Zero Trims (Technician)

Follow these steps to access the Analog Zero Trims screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Analog Zero Trims button.

<b>—</b>		Analog Zero Trim	s	
AIN1	0.0	73.8psi AIN7	0.0	209.3F
AIN2	0.0	194.0psi AIN8	0.0	124.6F
AIN3	0.0	12.8psi AIN9	0.0	310.0F
AIN4	0.0	12.4psi AIN10	0.0	0.0F
AIN5	0.0	96.9psi AIN11	0.0	0.0F
AIN6	0	212 Seprator DP	0.0	
		13.4bar	Logged in as	Technician

Figure 3-33: Analog Zero Trims

The Analog Zero Trims screen allows for calibration of various analog inputs. Analog inputs are assigned to sensors used to measure specific characteristics of the compressor system.

Table 3-1: Analog Zero Trims (Column 1) - Example Only

P2 (Package

Discharge

Pressure

AIN3

P3 (Injection

Pressure)

AIN2

The Analog Signal Zero Trims function is used to adjust the displayed value of the measurements to equal the measured value of the analog device.

The Sensor Calibration section provides steps on calibrating analog input measurements. The inputs used vary with compressor models and design.

Refer to the wiring diagram for a specific model to determine the usage of analog inputs.

controller should be calibrated to reflect the same pressure measurement as that measured at the Line transducer location. The calibration should be performed when the system is at a stable pressure with minimal load on the output lines. Use the following steps to calibrate the STS Controller Line pressure:

AIN5

P5 (TBD)

AIN6

Current

Transducer

- 1. Measure the parameter (Line pressure) at the sensor (transducer) location using an independent certified gauge.
- 2. At the STS Controller screen observe the Line pressure reading. Compare this reading with the measurement at the transducer location.
- If the measurement on the external gauge at the transducer does not match the discharge pressure reading, select the corresponding edit box.
- 4. Enter the value necessary to increase or decrease the Discharge reading in order to equal

AIN7	AIN8	AIN9

Table 3-2: Analog Zero Trims (Column 2) - Example Only

AIN7	AIN8	AIN9	AINTU	AINTT
T1 (Airend Dis- charge Pressure)	T2 (Sump Tank Dryside Tempera- ture)	T3 (Injection Tem- perature)	T4 (Interstage Pressure)	T5 (TBD)

AIN4

P4 (Oil Sup-

ply Pressure)

#### 3.4.7.1 Sensor Calibration

AIN1

P1 (Sump

Pressure)

The compressor is equipped with sensors that monitor and measure various characteristics of the compressor performance. These values are received at the STS Controller as analog input signals from the sensor. Most sensor inputs can be adjusted to calibrate the reading at the controller with the actual measured value at the sensor location. This section will describe the steps necessary to calibrate the Line Pressure transducer. Calibrate other sensors in the system in a similar manner.

#### 3.4.7.2 P2 Pressure Transducer Calibration

The Line Pressure transducer input measurement is assigned to analog input at the controller. This pressure transducer measures the output line pressure at the compressor main header. Over time, the pressure transducer may vary slightly producing an inaccurate reading at the controller. Periodically, and prior to operating multiple controllers in a sequence, the



the measurement at the transducer. The calibration variance limits are -7.5 to +7.6.

5. Press Enter on the keypad that appears in the time select edit. The variance value will be added to or subtracted from each measurement received by the controller. The value change can be immediately observed.

#### 3.4.8 Initialization (Technician)

Initialization is the process of initializing the STS Controller for operation as a specific compressor model and type. During the initialization process, all previous stored data (parameter values, logs, history information, etc.) is erased from the controller memory. The new default parameter values are then loaded to the controller to configure it for a specific compressor model.

Follow these steps to access the Initialization screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Initialization button.

**Note**: Controller initialization is normally a one-time event when a new controller is installed. The compressor must be stopped before beginning the initialization process.

Follow these steps to initialize a controller for a compressor model:

- 1. Press the E-Stop stop button and leave it depressed throughout the Initialization procedure.
- 2. Insert the USB flash drive which contains the Initialization table with all of the machine parameters. For more information, see *Section 3.4.8.1* on page 26.

**Note**: Depending on the selected model, the Initialization process may alter the functions of inputs and outputs. Ensure that the E-Stop button is pressed to prevent output relays from operating inappropriately during the process.

3. Under the system configuration model press the Initialization button. The Initialization screen appears.

			Tait	iolizotion			
			IUU	lalization			
Model	Power	Hertz P	ressure C	ooling Modul	ation Star	ter Volts	Dryer
LS110 •	150 HP 🔸	60 - 12	.5 - AC	CONV	<ul> <li>VFD</li> </ul>	- 460	• NONE •
						•	E-Stop Button
		I/O	BOARD	FIL	TER		
							7
				124 nsi		Logged i	n as Technician
						Loggedi	as realifican

Figure 3-34: Initialization

4. Press the down arrows to find the machine model for which the controller is to be initialized.

**Note**: Use care selecting the proper machine model. All machine attributes must match the model selected during initializing to ensure proper and safe operation.

- 5. After the Model has been chosen, select the attributes that apply to the specific machine being initialized. Only those options that have multiple choices may be selected.
  - 5.1. Press **HP** to select the horsepower of the compressor motors.
  - 5.2. Press **Hz** to select the compressor motor frequency.
  - 5.3. Press **Pressure** to select the compressor pressure rating.
  - 5.4. Press **Cooling** to select the compressor cooling method.
  - 5.5. Press **Modulation** to select the compressor modulating.
  - 5.6. Press **Motor** to select the compressor motor phase type.
  - 5.7. Press **Volts** to select the compressor operating voltage.
  - 5.8. Press **Dryer** to select the compressor dryer type.



Figure 3-35: Initialization

6. When all appropriate attributes have been selected, press **Upload To I/O Board**. The program will start.

**Note:** Ensure the STS Controller time and date are correct and synchronized with I/O before proceeding to initialization. If the time and date aren't valid, the initialization will fail.



Figure 3-36: Initialization

- 7. As the settings are loaded to the controller, a bar will be presented to monitor the progress of the initializing process. When the default settings have finished loading to the controller, a final confirmation box will appear indicating that initializing is complete.
- 8. Turn the controller power off and on again.
- 9. To verify, restore power and reconnect to the controller. Pull the E-Stop button, and clear the controller fault. Verify the machine information.

#### 3.4.8.1 Updating and Using Initialization Data

The Initialization parameters will be updated from time to time as new models or features are added to the line of

compressors. When this happens, an initialization data text file will be distributed. This will allow the update without affecting other STS Controller preferences and saved information. The procedure is simple and fast, and should be done by following this single step for any distribution from Sullair.

• Copy the new file to your USB flash drive's root folder. Replace the previous file if it exists. Do not rename the file.

#### 3.4.9 Machine Profiles (Technician)

The Machine Profiles menu may be used to restore or save all adjustments to the settings following the most recent Initialization with the factory default profile or the user profile. This may be used to correct inadvertent errors. All machine history will be retained.

Follow these steps to access the Machine Profiles screen:



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

Follow these steps to restore the factory default settings:

- 1. Stop the machine and press the E-Stop button and then select Recall Sullair Profile. A confirmation message appears.
- 2. Select Yes to restore the factory default profiles.

Technicians can save their own settings in an installation profile. Technicians can then load them back by using the Recall Installation Profile.

Recall Sullair Save Installation Recall Installation Profile Profile Profile		Machine Profiles	5
	Recall Sullair Profile	Save Installation Profile	Recall Installation Profile

Figure 3-37: Machine Profiles

**Recall Sullair Profile** - Return to the settings immediately after initialization.



**Save Installation Profile** - Save the user settings after the user changes some parameters after initialization.

**Recall Installation Profile** - Return to the parameters that the user changed and then saved.

#### 3.4.10 Modbus (Technician)

Instructions for setting up Modbus communications are provided by Sullair. Please contact the Sullair stationary service department for assistance.

#### 3.4.11 VSD Package Settings (Technician)

The VSD Package Settings are shown below. Note: The values shown in the following fields need to be divided by ten: Minimum Speed (dHz), Maximum Speed (dHz), and Motor Protect Amps.



Figure 3-38: VSD Package Settings

**Flow calibration** - The flow indicator sets the nominal (100%) flow value for the machine operating under typical conditions. This value may be adjusted as needed for specific applications and operating conditions.

**Power calibration** - The power indicator sets the nominal (100%) power value for the machine operating under typical conditions. This value may be adjusted as needed for specific applications and operating conditions.

**Gain control I and Gain Control P** - A value of 10 is recommended for each of these controls for almost all end-use applications. Additional stability functions are built into the controls that make these values non-critical and virtually eliminate the need for tuning. However, extremely large or small volume systems may benefit from some adjustment. Consult the factory if stability problems are encountered. **Autoset %** - Allows speed adjustments to be made automatically when changes in the Setpoint pressure are made causing the compressor to operate at its full rated power capability. This should normally be set to 100. If the compressor needs to run at less than full capacity, set this to a lower value. For example, set the Autoset % to 80 to operate a 50HP compressor at 40HP maximum. The STS Controller will calculate the necessary speed adjustments whenever the setpoint is changed.

**Minimum Speed (dHz)** - Normally left at the factory setting, but may be increased. Enter the desired frequency multiplied by 10 (e.g., 250 for 25.0 Hz).

**Maximum Speed (dHz)** - If Autoset is enabled, the maximum speed will be set automatically for the machine and setpoint pressure.

**Motor Protect Amps (deciAmps)** - Maximum amp setting for VSD operation. This should be set for the lower of either:

- Maximum motor amps. This is FLA times service factor, unless a specific SFA is shown. For 460V/ 60Hz motors connected 400V/60Hz, multiply the 460V nameplate ratings by 1.15.
- 2. Rated drive current. This is shown on the drive nameplate. This will usually be the limit for most 460V compressors.

**Slow Acc/Dec** - Setting for controlling VSD acceleration and deceleration. The factory settings are based on standard motors, and this setting is 0. If a special motor is applied, this setting may be increased to eliminate drive over voltage during deceleration. Slower settings will reduce system stability, and may require additional air storage.

**Disable VFD Phase Protection Check Box** - Disables VFD phase protection.

#### 3.4.12 Spiral Valve Settings (Technician)

Follow these steps to access the electric Spiral Valve Settings screen. Note: This section does not apply to pneumatic spiral valves.



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Spiral Valve Settings button.





Figure 3-39: Spiral Valve Settings

A Spiral Tuning value between 32 and 64 will normally work well. There should be no need to manually adjust it.

- A value of 64 should work well if your system volume is designed to CAGI minimum standards.
- If your system volume is greater than CAGI minimum standards, you may try reducing the Spiral Tuning number by halves until pressure regulation seems over responsive. Then double the final value.
- If your system volume is less than CAGI minimum standards, you may try to increase the Spiral Tuning number by factors of 2x until pressure regulation seems slow or unresponsive. Then reduce the final value by half.

In systems where there is more than one compressor, it is recommended that only the machine being tuned be allowed to modulate. All other compressors should either be turned off or have their modulation function disabled during the tuning process.

**Spiral Target** - Only available with Electronic spiral valve equipped machines. The target pressure is set the same as described for the VSD Setpoint Pressure.

Follow these steps to change the Spiral Tuning value using the STS Controller:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Spiral Valve Settings button.

- 4. Click the Spiral Tuning field and type the correct value.
- 5. Press the back-green arrow. The value is saved.

#### 3.4.13 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 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 3-40*, 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 3-40*, 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.



•				Sc	hedul	ing			,	1
	Time	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Action	
	08:00			$\checkmark$	✓	✓	$\checkmark$		Normal	-
	08:00		<b>√</b>						Offset	-
	09:00		<b>√</b>						Normal	-
	19:00		$\checkmark$	✓	✓	$\checkmark$	✓		Unload	-
	00:00	✓						<b>√</b>	Halt	-
				Offset	10	).0psi				
					116psi					

Figure 3-40: Scheduling

Based on the scheduling example found in *Figure 3-40*, 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).

#### 3.4.14 Signal Address Function

Follow these steps to access the Signal Address Function screen:



- 1. Press the Menu icon from the home screen of the STS Controller. The Main Menu appears.
- 2. Press the System Configuration button.
- 3. Press the Signal Address Function button.

<b>(</b>	Signal A	ddress	Functions	1
General Fault	DIN8 On		Dryer Fault	Disabled •
General Warning	DIN9 On		Phase Motor Fault	DIN7 Off
General Runtime Fault	Disabled			
General Runtime Warning	Disabled	•		
Remote Stop	DIN11 On			
Remote Master	DIN12 On	•	Digital Output 7	Fault 🗾
Remote Unload	DIN10 On	-	Digital Output 8	Warning
Dryer Warning	Disabled		Digital Output 9	Master(Enable d)
		96psi	Logae	d in as Technician

96psi Logged in as Tech Figure 3-41: Signal Address Function

The screen contains a list of controller functions, and allows selection of signals to operate the function. This allows special field setups for special applications. It is recommended that these settings be saved with the Save Installation Profile button. See *Section 3.4.9* on page 26 for more information.

**General Fault** - Generates an Option Input Fault when on.

**General Warning** - Generates User Option Warning when on.

**General Runtime Fault** - Generates an Option Input Run Fault when on. This fault is enabled a few seconds after the compressor starts.

**General Runtime Warning** - Generates a User Option Warning when on. This warning is enabled a few seconds after the compressor starts.

Remote Stop - Forces the compressor to stop when on.

Remote Master - Uses remote inputs when on.

**Remote Unload** - Forces the compressor to unload when on independent of local control. Refer to the Sequencing manual for details on using remote inputs.

**Dryer Warning** - Generates Dryer warning when on. Defaults to Disabled if no dryer is present when machine is initialized.

**Dryer Fault** - Generates Dryer fault when on. Defaults to Disabled if no dryer is present when machine is initialized.

**Phase Monitor Fault** - Generates Phase Monitor fault when on.



**Digital Output 7 to 9** - Operates the factory defined relay when on. Actual relay assignments are shown, and depend on compressor model.

#### 3.4.14.1 Digital Input Options

The following options may be selected as digital inputs for the fields listed above.

 $\mathbf{On}$  - Activates the function continuously. The input signal is ON.

Off - Deactivates the function. The input signal is OFF.

**Running** - Activates the function when the compressor is running.

**DIN On** - Activates the function when the input signal at the respective input (7, 8, 9, 10, 11, or 12) is ON. The list of available inputs varies with models.

**DIN Off** - Activates the function when the input signal at the respective input (7, 8, 9, 10, 11, or 12) is OFF. The list of available inputs varies with models.

**MB Remote On** - Activates the function when the Modbus Remote signal is ON.

**MB Timer 1 On** - Activates the function when the respective Modbus Timer signal (1, 2, 3) is ON.

**MB Remote Off** - Activates the function when the Modbus Remote signal is OFF.

**MB Timer 1 Off** - Activates the function when the respective Modbus Timer signal (1, 2, 3) is ON.

#### 3.4.14.2 Digital Output Options

The following options may be selected for a Digital Output Relay (7-9).

On - Turns the relay ON.

Off - Turns the relay OFF.

**Drain** - Activates the relay for the duration of drain time when drain interval is achieved.

**Running** - Activates the relay when the compressor is running.

**Enabled** - Activates the relay when the compressor is enabled.

Fault - Activates the relay when a Fault condition occurs.

**Warning** - Activates the relay when a Warning condition occurs.

**Fault or Warn** - Activates the relay when either a Fault or Warning occurs.

**Master Enabled** - Activates the relay when the controller is enabled as the Master device in a sequence.

**Dryer Running** - Activates the relay to operate an integrated refrigerated dryer when one is being used.

#### 3.5 Maintenance

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



Figure 3-42: Maintenance

#### 3.5.1 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.



Warnings					
High Oil Filter dP	RESET	Replace I/O Battery	RESET		
High Separator dP	RESET	Ethernet Disabled	RESET		
🔵 High Air Filter dP	RESET	Sequence Comm Error	RESET		
High Compressor Temp	RESET	User Option Warning	RESET		
Low Compressor Temp	RESET	VFD Overtemp	RESET		
High Separator Temp	RESET	Spiral Valve System	RESET		
Low Separator Temp	RESET	Spiral Valve Operation	RESET		
Power Interruption	RESET	Spiral Valve Comm	RESET		

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.

**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.

#### 3.5.2 Recommended Service

Follow these steps to access the Recommended Service 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 Recommended Service button.

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

			SUPPORT INFORMATION
Service	Hours to Next	Interval	
Fluid Filter Change		2000	RESET
Separator Change		8000	RESET
🔵 Air Filter Change		2000	RESET
Fluid Analysis		2000	RESET
Fluid Change		10000	RESET

Figure 3-43: Recommended Service

#### 3.5.2.1 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.

### 3.5.2.2 Support Information (Distributor & Technician)

The Support Information menu can be accessed by pressing the Support Information button on the Recommended Service screen. A window will appear presenting previously entered information.

If a technician is logged in, Edit Support Information will appear at the right bottom of the screen.

Follow these steps to edit the support information:

- 1. Insert the USB flash drive into the computer.
- Create the file on the root drive using this name: Support\_Info.txt
- 3. Open the file you just created.
- 4. Put your arbitrary text in the following format.

<info1>

Your text.....

.....

</info1>

<info2>

Your text.....

.....

</info2>

The number of lines for each entry cannot exceed more than 8 and the line length cannot exceed more than 90 characters.



Figure 3-44: Support Information

#### 3.5.3 Event History

Follow these steps to access the Event History 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 Event History button.

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

	Event History					
No.	Event	Date	Time	Hours		
1 🚺 Lo	w AIN6 Sensor	08/13/17	11:25	1:32		
2 🔥 M	aintenance General Warning	08/14/17	13:46	1:45		

Figure 3-45: 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 10.

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 3.3.7* on page 15.

#### 3.5.4 Reboot Display

Follow these steps to access the Reboot Display 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 Reboot Display button. The following pop up screen appears.
- 4. If the user selects Reboot, only the display will be rebooted.

-	Maintenance Menu	
	We Control Recommended History	
	Reboc Are your sure you want to reboot the display? Compressor operation will not be affected.	
	Reboot Cancel	
	Opsi	

Figure 3-46: Reboot Display

#### 3.5.5 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 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 3-47: Clean Display

#### Notes:



# 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. VSD Information

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

		100 Status	
Motor Speed	1640 RPM	Drive Comm I	aults
Motor Current	0.8 A	Up/Down Count	
Frequency	54.8 Hz	Total Count	
Motor Temp Protection	0 %		
Drive Temperature	48.4 F		
DC Link Voltage	607 V		

Figure 4-4: Main Motor VSD Status

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

VSD Performance						
	Currrent	Recent	Lifetime			
Capacitity	702	413	413			
Capacitity %	100.0%	58.0%	58.0%			
Power	137	89	89			
Power %	100.0%	64.0%	64.0%			
Hours		0:52hr	0:52hr			
Total Delivery						
Total Energy		77	77			
Total Cost						
Savings vs Load/Unloa	d					
Savings vs Inlet Modul	ation					
Savings vs Variable Dis	placement					
		RESET				
	123	psi				

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



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 Package Settings (Technician)

Refer to the VSD Package screen found in *Section 3.4.11* on page 27 in this manual.

#### 4.4.3 VSD Adjustment

As discussed earlier in this manual in *Section 3.4.1* on page 19, 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.



# 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.





# 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 42 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.

Message	Probable cause	Remedy	
Analyze Fluid	Service interval has expired. Mainte- nance due.	Perform recommended maintenance and reset the reminder using the Rec- ommended Service screen.	
		Reset auxiliary overload after element cools. Verify correct motor amps.	
	Auviliary Motor Tripped on Cooling	Check for loose connections.	
Aux Motor Overload	Fan, Fluid Pump or Other Motor.	Check motor starter contact for proper operation.	
		Check line voltage, if low consult power company.	
CE Voltage too high	Excessive voltage from power sup- ply or transformer.	Check connections and adjustments.	
CE Voltage too low	Inadequate voltage from power sup- ply or transformer.	Check connections and adjustments.	
CL voltage too low	Excessive load or short in 24v con- trol devices.	Check wiring, coils, and solenoid valves.	
Change Air Filter			
Change Fluid	Service interval has expired. Mainte-	Perform recommended maintenance and reset the reminder using the Rec- ommended Service screen.	
Change Fluid Filter	nance due.		
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	Consult the dryer manual and/or Sullair	
Dryer High DP Fault	high dew point temperature setting.	Factory Service.	
Low Dryer Dew point	The dryer is cooling below the low	Consult the dryer manual and/or Sullair	
Dryer Low DP Fault	dew point temperature setting.	Factory Service.	
Dryer Overload	Indicates a dryer overload has	Consult the dryer manual and/or Sullair	
Dryer Overload Fault	occurred.	Factory Service.	
Dryer Relay Fault	Indicates a general dryer malfunction has occurred	Consult the dryer manual and/or Sullair Factory Service.	
Dryer Service	Dryer malfunction is imminent.	Consult the dryer manual and/or Sullair Factory Service.	
E-Ston 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	



Message	Probable cause	Remedy	
High Air Filter dP	Differential Pressure Across Inlet Fil-	Replace filter.	
	ter High.	Check inlet filter pressure switch.	
	Sensor (Pressure Transducer, Temp Probe, etc.) or Wiring Failure.	Check sensor wiring.	
HIGH AN_ JENJOK		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.	
	Moisture drain malfunction	Check wiring and operation of moisture drain, replace if necessary.	
High Moisture	Improper moisture drain interval	Increase drain rate and/or open time.	
rigii Moisture	Plugged moisture drain strainer	Clean strainer	
	Insufficient oil flow to absorber mod- ule. Plugged orifice and/or strainer.	Clean strainers and orifices.	
	High pressure across fluid filter while running.	Replace fluid filter.	
	Fluid filter clogged.		
High Oil Filter dP	Low ambient temperature.	Sump heater may be required in ambi- ents 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.	
High Sump Pressure	Sump Pressure High (Poppet, Sulli- con, Spiral, Blowdown or Pneumatic Valve Failed)	Check valves. Check Sullicon adjust- ment (see Control Adjustment section in the compressor operator's manual).	
	Faulty solenoid valves.	Check solenoid valve operation and wiring.	
		Check pressure regulator adjustment and operation.	
	Faulty pressure regulator.	Check minimum pressure check valve (not applicable to Fluid Free compres- sors).	

Table 6-1: Controller troubleshooting guide

Message	Probable cause	Remedy	
	High Temp Fault.	Ambient temperature high, improve local ventilation.	
	Fluid level low.	Replenish fluid to proper level.	
	Thermal valve fault.	Check thermal valve operation.	
High Temperature 1	Cooler fins dirty.	Clean Cooler fins and fan blades.	
High Temperature 2	Low water flow.	Check for valve closed, pump off or broken pipe.	
High Temperature 3	High water temperature.	Increase water flow or lower water tem- perature.	
	Cooler plugged.	Clean cooler tubes and shell. If plug- ging persists, use cleaner water.	
	Temp probe or sensor failure.	Check sensor and wiring.	
		Close the disconnect switch	
High Voltage Failed	No power to the high voltage starter	Check main motor fuses or circuit breaker	
Illegal State	Controller fault.	Contact Sullair Factory Service.	
Ethernet Comm Error	Module Network Error; Communica- tion has failed between the Display Module, I/O Module and other mod- ules.		
LOW AN SENSOR	Sensor (Pressure Transducer, Temp	Check sensor wiring.	
LUW AN_ SENSUR	Probe, etc.) or Wiring Failure.	Check sensor.	
Low Dryer Dewpoint	The dryer is cooling below the low dewpoint temperature setting.	Consult the dryer manual and/or Sullair Factory Service.	
	Demand exceeds canacity	Reduce demands.	
Low Line Pressure	Demand exceeds capacity.	Increase capacity.	
	Leaks in supply lines.	Check for leaks or open lines in air sup- ply. Repair as necessary.	
	Fluid filter clogged.	Replace fluid filter.	
	Sump fluid level low.	Replenish fluid to proper level.	
Low Fluid Pressure	Low ambient temperature.	Sump heater may be required in ambi- ents 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 tub- ing.	
	Machine may have failed to start.	Check machine operation.	
Low Temperature 1			
Low Temperature 2	Low ambient air temperature	Sump heater may be required in ambi- ents below $40^{\circ}$ E ( $4^{\circ}$ C)	
Low Temperature 3			



Message	Probable cause	Remedy	
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.	
		Reset overload after heater element cools down.	
Main Motor Overland	Main Motor Overload Relay Tripped.	Check that compressor is properly con- figured.	
		Ensure load pressure is set below limit of compressor.	
		Check line voltage, if low consult power company.	
Maintenance A	Service interval has expired. Mainte- nance due.	Perform recommended maintenance and reset the reminder using Recom- mended 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 doc- umentation 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.	
	Auxiliary Motor Tripped on Fluid Pump Motor	Reset auxiliary overload after element cools. Verify correct motor amps.	
		Check for loose connections.	
Pump Motor Overload		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.	
Link Severator -D	Pressure Differential Across Separa- tor High. Replace separator.		
High Separator dP	Plugged separator elements.		
	Pressure sensor failure.	Check sensor wiring.	



Message	Probable cause	Remedy	
Sequence Comm Error	Cable or connection fault between compressors.	Check wiring.	
	Improper sequence adjustments.	Check sequence settings of all com- pressors in the sequence.	
Spiral Valve Comm	Electronic Spiral Valve Operation has been blocked by a loss of com- munication between the STS Con- troller 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 replace- ment 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 compo- nent temperatures.	These will tend to clear themselves as compressor operating conditions nor- malize. Check for high ambient condi- tions 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.	
	Main starter failed to operate.	Check starter and control wiring.	
Starter	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.	
	Communications lost with the VSD	Check connections to the VSD.	
VSD1 Comm Fault		Check VSD control power and check for board faults.	
	Warpa that the variable frequency	Ensure adequate ventilation	
VFD Overtemp	drive is too hot	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

tion, 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 faulted prior to the power interrup-



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:



Subject to EAR, ECCN EAR99 and related export control restrictions.



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