YORK	OPTIVIEW™ CONTROL CENTER CENTRIFUGAL LIQUID CHILLERS	
OPERATION	Supersedes: 160.79-O3 (918)	Form 160.79-O3 (1118)

MODEL YD (MOD D)
WITH OPTIVIEW™ CONTROL CENTER

R-134A

Issue Date:
November 09, 2018

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

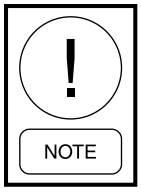
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at http://cgproducts.johnsoncontrols.com.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

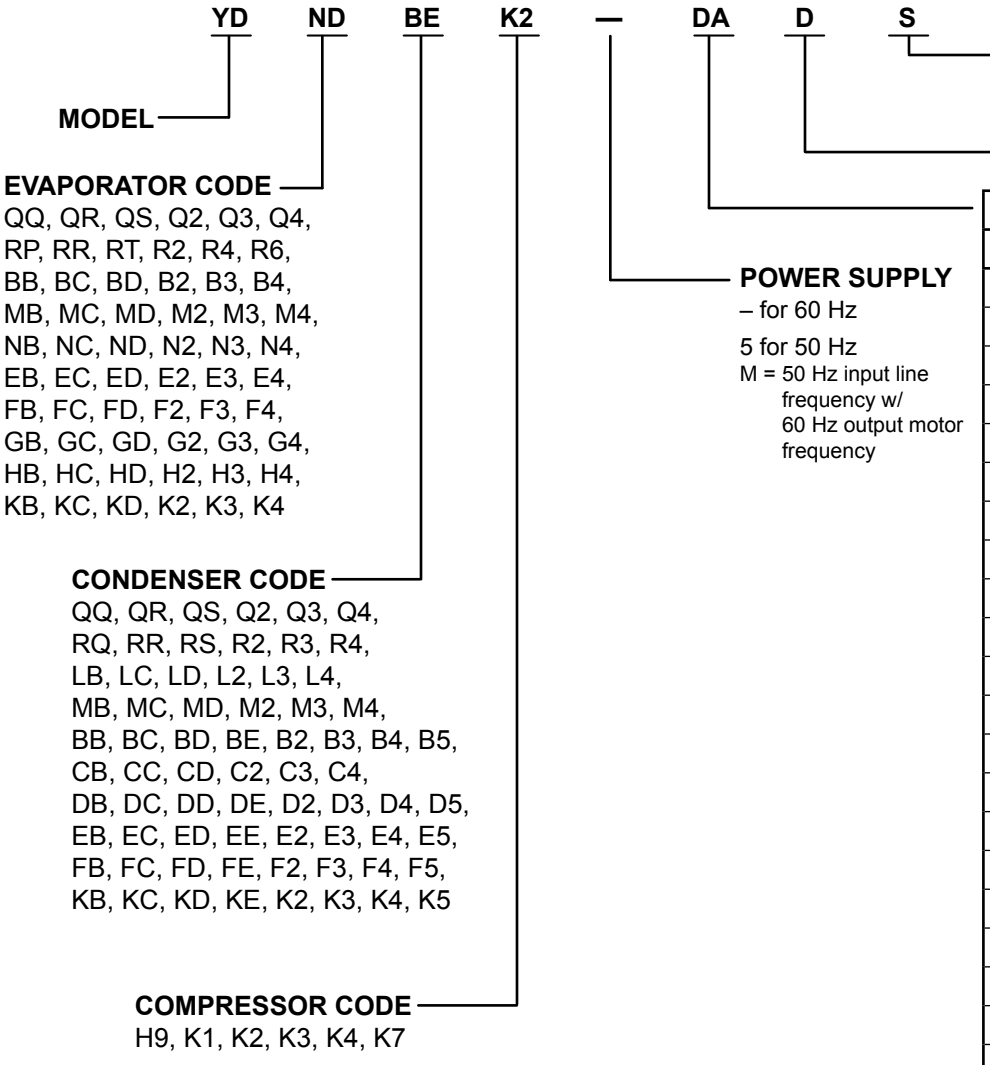
CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Shipping Damage Claims Policy	50.15-NM
Installation Checklist and Request for Startup Engineer	160.79-CL1
Start-Up Checklist YD Chillers	160.79-CL2
Maintenance Requirements	160.69-MR1
Field Reassembly Instructions for Form 2, 3 and 7 Shipment - YD Mod D	160.79-N1
Wiring Diagram - Field Connections YD - Mod D with OptiView Control and Water Pump Starter	160.79-PW1
Wiring Diagram - Field Control Modification for YD - Mod D with OptiView Control	160.79-PW2
Wiring Diagram - Field Connections YD - Mod D with Medium Voltage E-M Starter	160.79-PW3
Wiring Diagram - Field Connections YD - Mod D with Low Voltage E-M Starter	160.79-PW4
Wiring Diagram - YD - Mod D with OptiView Control and Modbus SSS/VSD	160.79-PW5
Wiring Diagram - Field Connections YD - Mod D with Unit Mounted Low Voltage SSS	160.79-PW6
Wiring Diagram - Field Connections YD - Mod D with Unit Mounted Low Voltage VSD	160.79-PW7
Wiring Diagram - Field Connections YD - Mod D with Unit Mounted Medium Voltage SSS	160.79-PW8
Wiring Diagram - Field Connections YD - Mod D with Remote Mounted Medium Voltage SSS	160.79-PW9
Wiring Diagram - Field Connections YD - Mod D with Remote Mounted Medium Voltage VSD	160.79-PW10
Wiring Diagram - YD Mod D Chiller with OptiView Control Center and Motor Monitoring	160.79-PW11
Wiring Diagram - YD Mod D Chillers with OptiView Control Center and Motor Heater	160.79-PW12
OptiView Renewal Parts - YD Mod D	hvacnavigator.com
Unit Renewal Parts - YD Mod D	hvacnavigator.com
K1, K2, K3, K4 and K7 Compressor Part Guide	160.75-RP2

NOMENCLATURE



MOTOR CODE	
60 Hz	**50 Hz**
CT	5CO
CU	5CP
CV	5CQ
CW	5CR
CX	5CS
CY	5CT
CZ	5CU
CA	5CV
CB	5CW
DA	5CX
DB	5DA
DC	5DB
DD	5DC
DE	5DD
DF	5DE
DH	5DF
DJ	5DG
DK	5DH
DL	5DJ
ER	5DK
ES	5DL
ET	5EM
EU	5EN
EV	5EO
EW	5EP
EX	5EQ
EY	5ER
EZ	5ES
EA	5ET
EB	5EU
FA	5EV
FB	5EW
FC	5EX
FD	5FA
	5FB

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SYSTEM OPERATION DESCRIPTION

The following is a high level description of the chiller control. It describes the overall operation. Control Center components, chiller components and programmable setpoints are referenced. See *Figure 2 on page 15* to view the chiller operation flowchart.

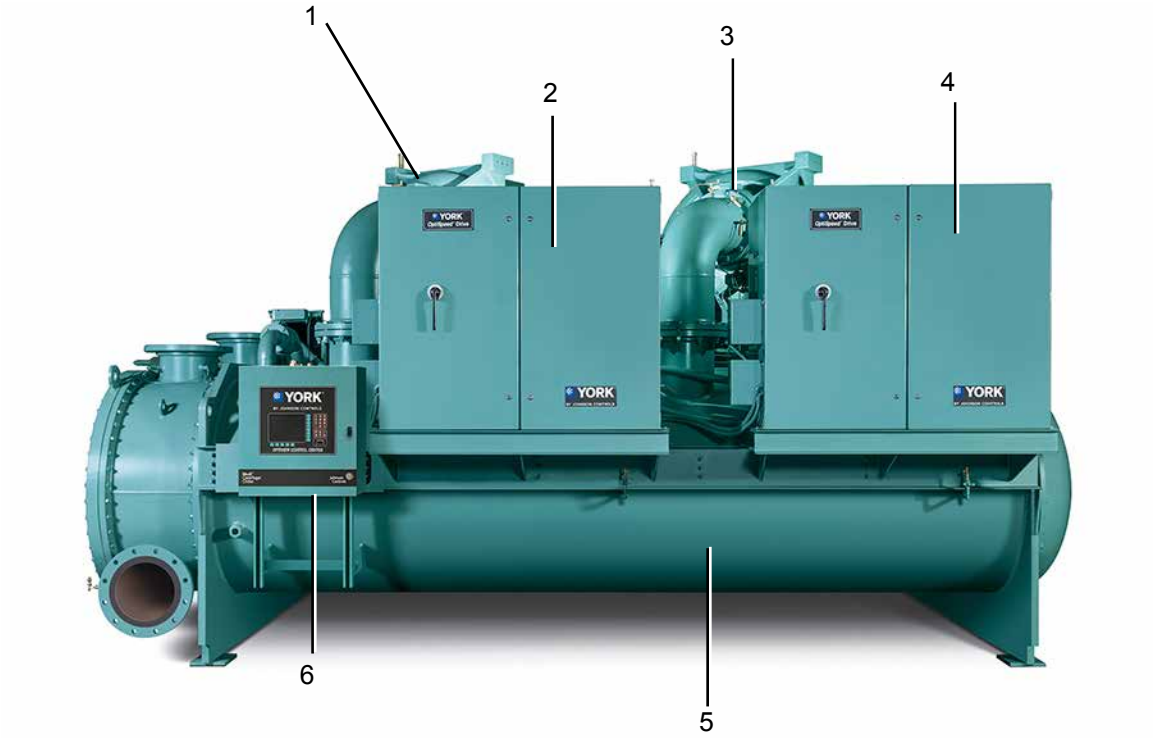
The YD dual compressor chiller consists of one evaporator, one condenser, two oil pumps and two compressors. Other than capacity control, the basic operation is similar to a standard YK Centrifugal Chiller.

The use of two compressors requires valves on the discharge line of each compressor. When a compressor is shutdown, its discharge valve is closed to prevent compressor backspin due to a gas flow from the running compressor. An end switch at both the closed and open positions provides indication of full open and full closed positions. The valves can be manually controlled.

Each compressor Pre-rotation Vane assembly is equipped with a potentiometer to provide vane position. A calibration procedure assures displayed position accuracy. The vanes can be manually controlled.

Each compressor also has a Discharge Temperature thermistor and High Pressure safety device.

There are two Liquid Line Solenoid Valves and two Oil Return Solenoid Valves, one for each compressor.



COMPONENT	DESCRIPTION
1	Compressor 1
2	Unit-mounted starter 1
3	Compressor 2
4	Unit-mounted starter 2
5	Evaporator
6	Control panel

FIGURE 1 - MODEL YD CHILLER

A lockout can be performed on a compressor to prevent it from running. Only one compressor at a time can be locked out.

Two CM-2 Current Boards, one for each compressor motor, provides motor Overload and Power Fault protection for units with E-M starters. Units with SSS or VSDs have motor Overload and Power Fault protection built in to the starter.

The Oil System consists of a common Oil Sump for both compressors. There are two oil heaters in the sump. These maintain proper sump temperature when both compressors are shut down. This temperature is monitored by the Oil Temperature Thermistor. There are two Oil pumps, one for each compressor. Each is driven by a Variable Speed Oil Pump Drive. The oil pressure is monitored by a common Sump oil pressure transducer monitoring the low side pressure. Two Pump oil pressure transducers, one for each compressor, monitor the high side oil pressure for each compressor.

The Chiller Current Limit setpoints are used to specify the motor current limit for the chiller as a whole. There are two setpoints: the Chiller Pulldown Demand Limit setpoint (in effect during the Chiller Pulldown Period) and the Chiller Current Limit setpoint (in effect after the Chiller Pulldown Period). These setpoints (programmable over the range of 30% to 100% FLA) are applied to the Chiller Full Load Amp (FLA) rating, which is the combined total of the full load amp ratings of both motors. Each motor provides one-half of the Chiller Full Load Amps. For example, if the Chiller Full Load Amps is 1600 amps, the Full Load Amps of each motor is 800 amps. If the Chiller Current Limit setpoint is 70%, the total chiller motor current is limited to 1120 amps. If both motors are running, each would be limited to 560 amps, providing a chiller total of 1120 amps. If only one motor is running, it is allowed to operate at twice the Chiller Current Limit, up to 100%. In this example, with the total chiller current limited to 1120 amps, one running motor would be allowed to operate at its 100% FLA rating of 800 amps.

COMPRESSOR STARTING

Both compressors are not started at the same time. The "Lead" compressor is started first. If it does not meet the load demand during the Chiller Pulldown Period and later during the Chiller Steady State Period, the Lag compressor is brought on line.

There are three features that can be used to prevent the second compressor from being brought on line. The COMPRESSOR LOCKOUT setpoint can be used to lockout either compressor. The compressor designated for lockout will not be permitted to run. The COMRESSOR MODE Setpoint selects Staged, Dual or Single Compressor mode of operation. In Normal Mode, the Lag compressor is brought on line, if necessary, to meet the load requirement as described below. In Single Mode, the Lag compressor will not be brought on line, regardless of the load requirement. The LEAD COMPRESSOR PULLDOWN DEMAND LIMIT Setpoint, can be used to load the chiller slowly. It prevents the Lag compressor from coming on line for a specified period of time while limiting the motor current of the Lead compressor to a specified value during that time period. These features are detailed separately below.

If equipped with the compressor Variable Geometry Diffuser (VGD), the chiller is started with the VGD in the fully open position.

Upon receipt of a chiller start signal, the "Lead" compressor is selected. The compressor with the least amount of run time that is ready to run is selected as the "Lead" compressor (unless Locked-out) . The Lead compressor enters the Prelube period (Prelube duration determined by Program Switch SW1-3) and the Lead compressor Discharge Valve is opened. All normal Prelube functions are performed. If the Lead compressor Discharge Valve does not fully open (as indicated by the Discharge Valve Limit Switch) within 40 seconds, a Safety shutdown is performed and "Discharge #X – Valve Not Opened" is displayed. Upon entering Pre-lube, the refrigerant level control raise (close) output to the Variable Orifice is energized for the duration of the Valve Preset Time Setpoint (0-100 seconds). After this pre-positioning, the valve is held in this position for the first 3 minutes of compressor operation.

Upon completion of the Prelube period, the Lead compressor motor is started and the **Chiller Pulldown Period** begins. This period is in effect until the Leaving Chilled Liquid Temperature is within 2 ºF of the Leaving Chilled Liquid Temperature Setpoint. During this period, the Pre-rotation Vanes are modulated to achieve the Leaving Chilled Liquid Temperature Setpoint. After the first 3 minutes of compressor operation and for the remainder of the Chiller Pulldown Period, the rate of change of the Leaving Chilled Liquid Temperature is monitored to determine if the Lead compressor is meeting the load demand requirements. The Leaving Chilled Liquid temperature is sampled at one-minute

intervals. If the rate of change of the Liquid Temperature (**Delta T Rate**) is less than the programmed **Minimum Rate Setpoint** (0.5 ºF/minute to 2.0 ºF/minute; default 1.0 ºF/minute) for a period equal to the **Minimum Rate Time Setpoint** (1 to 20 minutes; default 5 minutes) and the Pulldown Demand Limit Setpoint is above 50%, the Lag compressor is brought on line. If a Lead Compressor Pulldown Demand Limit Setpoint has been entered, the Lag compressor will not be brought on line until this time has elapsed.

When the first 3 minutes of compressor operation has elapsed, if the refrigerant level is greater than or equal to the **Level Control Setpoint**, the level is controlled to the Level Setpoint. However, if the level is less than the Level Control setpoint, a linearly increasing ramp called the **Refrigerant Level Target** is applied to the Level Control Setpoint. This ramp allows the level to go from the present level to the Level Control Setpoint over a period programmed as the **Ramp Up Time Setpoint**. After the Ramp Up time has elapsed, the level is controlled to the Level Control Setpoint.

After the Chiller Pulldown Period ends, if the Lag compressor has not been brought on line during the Chiller Pulldown Period, the **Chiller Steady State Period** begins. During this period, the Pre-rotation Vanes are modulated to maintain the Leaving Chilled Liquid Temperature Setpoint. In order to determine if the Lead compressor is meeting the load demand during this period, the Leaving Chilled Liquid Temperature minus the Leaving Chilled Liquid Temperature Setpoint (**Temperature Differential**) is monitored. If the **Temperature Differential** exceeds the **Maximum Delta T Setpoint** (1.0 ºF to 5.0 ºF; default 1.0) for a period equal to the **Maximum Delta T Time Setpoint** (1 to 20 minutes; default 5) and the Chiller Current Limit Setpoint is above 50%, the Lag compressor is brought on line.

With only one compressor running, the compressor Variable Geometry Diffuser is modulated according to the stall and surge activity.

When bringing the Lag chiller on line, it enters the Prelube period. If a high head condition exists, the Lead compressor's Pre-rotation vanes are driven closed as described in "Lag Start with High Head" below. The Refrigerant Level Control Lag Start mode is initiated as described below under "Condenser Refrigerant Level Control Lag Start". During the Lag Prelube, all normal Prelube functions are performed except the Oil Pressure Transducer Offset calibration is not performed. The offset calculation from the Lead compressor start is used. The Prelube time is fixed at 50 seconds. At the completion of the Prelube, the Lag compressor motor is started and after a 50 second delay, the Lag compressor Discharge Valve is opened (If it doesn't fully open within 40 seconds as indicated by the Discharge Valve Limit Switch, a Safety shutdown is performed on both compressors and "Discharge #X – Valve Not Opened" is displayed). After the Discharge Valve has fully opened, the Lag compressor Pre- rotation Vanes are modulated to follow Lead motor current. Meanwhile, the Lead compressor Pre-rotation Vanes have been modulated to maintain the Leaving Chilled Liquid Temperature setpoint (unless "Lag Start with High Head" was performed). When the Lag motor current is within +5% of the Lead motor current, the run time of the compressors are evaluated to determine which should be the Lead compressor (The one with the least amount of run time is identified as the Lead compressor) and if a "Lag Start with High Head" was performed, the Lead Pre-rotation vanes are now allowed to open and control per the Leaving Chilled Liquid Temperature Setpoint. Two minutes after the Lag compressor Discharge Valve has opened, the Condenser Refrigerant Control ramp-up period begins as Described below under "Condenser Refrigerant Level Control – Lag Start". While both compressors are running, the Variable Geometry Diffusers are modulated according to the stall activity and Pre-rotation Vanes position. There is no VGD response to surge activity.

When both compressors have been brought online, they will be run for at least 30 minutes (unless the anti-recycle feature has been disabled, a fault is detected or a Local or Remote stop is applied). After the 30 minute waiting period, a Soft Shutdown (as described below) will be performed on the Lag compressor if the Lead compressor motor current goes below the **Low Load Setpoint** (20% to 60%; default 45%) for a period equal to the **Low Load Time Setpoint** (1 to 20 minutes; default 5).

Lag Compressor Start with High Head

When operating at high head conditions, surges can occur while going from one to two compressor operation. A high head condition is detected by measuring the Delta P/P [(Condenser pressure – Evaporator pressure) / Evaporator pressure] and comparing it to the HIGH HEAD DP/P LIMIT Setpoint. By closing the Lead compressor's pre-rotation vanes during a Lag compressor start when a high head condition is present, surge conditions can be minimized.

With the Lead compressor running and it is determined the Lag compressor is required to run, the Delta P/P is measured. If it is > the HIGH HEAD DP/P LIMIT Setpoint, a close signal is applied to the Lead compressor's pre-rotation vanes coincident with the start of the Lag Compressor's Pre-lube. They will be allowed to open when all the following conditions are met: the lag compressor is running, the Lag Discharge Valve is open, the difference between the Lead and Lag motor currents is < 5%.

An LED on the Surge – Dual Compressor Setup Screen and the Capacity Compressor Cycling Screen illuminates whenever a high head Lag compressor start condition exists. Also, "Warning – Head Pressure – High Head Lag Start Limit" is displayed on the System Status line of the Display during this condition.

Condenser Refrigerant Level Control – Lag Start

When operating at low condenser liquid temperatures, a Low Evaporator Pressure trip can occur when going from one to two compressor operation.

During startup of the Lag compressor, as the Lag Discharge Valve opens, the system will see a step change in refrigerant flow. Although the Condenser Refrigerant Level Control keeps the refrigerant level stable during normal operation, the variable orifice does not open quickly enough when the Lag compressor is started. This causes the refrigerant to stack in the in the condenser, starving the evaporator, and causing a low evaporator pressure shutdown.

The condenser Refrigerant Level Control Lag Start mode is initiated when the Lag compressor enters Prelube and is terminated 2 minutes after the Lag Discharge Valve has opened. During this mode, if the refrigerant level is > 20%, the level control lower (valve open) output is turned on for 5 seconds every 10 seconds until the level is less than 20%. If the refrigerant level is < 20%, the level control is held in place.

After the Lag Start mode has ended, a linearly increasing ramp limit, called the Refrigerant Level Target, is applied to the REFRIGERANT LEVEL setpoint. This ramp allows the level to go from the present level (20%) to the programmed Refrigerant Level Setpoint over a period equal to one-half of the VALVE PRESET TIME setpoint. During this ramp-up period, the Refrigerant Level target is used to control the refrigerant level in the condenser. The Refrigerant Level Setpoint is then used to control the level for the remainder of the run period.

On the Refrigerant Level Control Screen, the Refrigerant Level Override Mode displays "Valve Preset" during the pre-positioning of the Refrigerant Level Control Valve while bringing on the Lead compressor. It displays "Lag Start" when performing the Refrigerant Level Control Lag Start mode while starting the Lag compressor. The Override Time Remaining displays the time remaining in the "Valve Preset" mode or the time remaining in the "Lag Start" mode. In the first case, it is the time remaining in the Valve Preset Timer plus the time remaining of the first 3 minutes of Lead compressor run time. In the second case, it is the time remaining in the Lag compressor Pre-lube cycle plus the time remaining in the first 3.5 minutes of Lag compressor run time.

The **Lead Compressor Pulldown Time** Setpoint can be used to limit the chiller to single compressor operation for a specified duration (0-255 minutes) when starting the chiller. While this pulldown time is in effect, "System In Lead Compressor Pulldown" is displayed on the System Details line along with the time remaining in the period. During this time, only the lead compressor is permitted to run. The lag compressor will not be brought on line. After this period has elapsed, the lag compressor can be brought on line per normal operation. While this period is in effect, the lead compressor motor current will be limited to the value programmed for the **Lead Compressor Pulldown Demand Limit** Setpoint (30-100% FLA). This current limit applies to the full load amps of the Lead compressor motor only, not the Chiller Full Load Amps (total of both compressors). For example, if the Chiller Full Load Amps is 2000A, then each compressor's FLA is 1000A. If set to 80%, then the lead compressor motor current would be limited to 800A (80% x 1000) for the duration of this period.

The CHILLER PULLDOWN DEMAND LIMIT Setpoint (that was used during the CHILLER PULLDOWN PERIOD in previous software versions) has been removed in this and later software versions. Although this setpoint has been removed, the logic in the CHILLER PULLDOWN PERIOD that is used to determine if it is necessary to bring on the Lag compressor (to meet load) still exists. This period is still in effect from start until the Leaving Chilled Liquid Temperature is within 2ºF of the Leaving Chilled Liquid Temperature Setpoint. However, the "Chiller Pulldown In Effect" LED (that indicated when the Chiller Pulldown Period is in effect) has been eliminated from the MOTOR Screen to avoid confusion with the Lead Compressor Pulldown Demand Limit feature.

After the Lead Compressor Pulldown Time Setpoint has elapsed, the chiller current limit will be limited to the value programmed for the Chiller Current Limit Setpoint. As in previous software versions, this setpoint is applied to the total chiller current (30% to 100% of the Chiller Full Load Amps). For example, if the Chiller FLA is 1600 Amps, the FLA of each motor is 800 Amps. If this setpoint is set to 70%, the Chiller Current would be limited to 1120 Amps. If both compressors are running, each would be limited to 560 amps. If only one motor is running, the motor would be allowed to operate all the way up to its full load amps of 800 Amps, because the total chiller current is being limited to 1120 Amps.

Compressor Lockout

The COMPRESSOR LOCKOUT Setpoint, available on the Capacity Compressor Cycling Screen, can be used to lockout either compressor. The designated compressor will not be permitted to run. This feature is useful when it is desired to perform service on a compressor.

A single compressor can be locked out while both compressors are running, without shutting down the entire chiller. A soft shutdown will be performed on the running compressor selected for lockout and its status is changed to "Lag" (if it is not the lag compressor already). Upon completion of Coastdown, the compressor will remained locked out until the lockout is released. If there is only one compressor running and it is the one targeted for lockout, the user will have to either shutdown the entire chiller and then lockout the desired compressor or bring the other compressor on line and then lockout the desired one. In previous software versions, a compressor can only be locked out only while it is shutdown.

The following Safety or Cycling Conditions on a Locked-out compressor will not cause the other compressor to shutdown. In previous software versions, these cycling and safety conditions that occur on a Locked Out compressor cause the other compressor to shutdown or prevent it from starting.

"Motor Controller [#1/#2] – Contacts Open"

"Oil Pump [#1/#2] – Drive Contacts Open"

"Proximity Probe – Low Supply Voltage"

"Discharge [#1/#2] – Low Temperature"

"Discharge [#1/#2] – High Temperature"

"Oil Pump [#1/#2] - Differential Pressure Calibration"

"Oil Pump [#1/#2] – Pressure Transducer Out of Range"

"Thrust Bearing [#1/#2] – Proximity Probe Clearance"

"Thrust Bearing [#1/#2] - Proximity Probe Out of Range"

When any of these conditions occur on a locked out compressor, they are displayed as Warnings. This allows the user to know that a condition exists on the locked compressor. The condition must be corrected prior to the lock-out being removed from the compressor. If it is not, the warning condition will revert back to a safety as soon as the lockout is removed and will cause the chiller to trip.

Normal Or Single Compressor Mode

The COMPRESSOR MODE Setpoint, available on the Capacity Compressor Cycling Screen, is used to select either NORMAL Mode or SINGLE COMPRESSOR Mode. In Normal Mode, the second compressor is brought on line to meet the load requirement as described previously. In Single Compressor Mode, operation is restricted to one compressor. The Lag compressor will not be brought on line, regardless of the load requirement.

When starting the chiller in Single Compressor mode, the operator does not designate which compressor will run. Rather, the "Lead" compressor is automatically selected by the software per the present software operation. The software to select the "Lead" compressor has not changed.

If Single Compressor Mode is selected while both compressors are running, a soft shutdown is performed on the "Lag" compressor. All faults for this inhibited compressor are continued to be handled.

If the chiller is shutdown while running in Single Compressor mode, the software selects the "Lead" compressor as it normally does on a subsequent restart.

COMPRESSOR SHUTDOWN

There are two types of shutdowns performed on one or both compressors; Soft Shutdowns and Fault shutdowns.

During a **Soft Shutdown**, first the Pre-rotation Vanes are driven closed. When the Vanes have fully closed (or 210 seconds have elapsed, whichever occurs first),

the Discharge Valve is then driven closed. When the Discharge Valve has fully closed (or 40 seconds have elapsed, whichever occurs first), the run signal to the compressor motor starter is de-energized and the compressor enters “Coastdown”. If any Discharge Valve does not close within 40 seconds, a cycling shutdown is performed and “Discharge #X – Valve Not Closed” is displayed.

If the Lag compressor is taken off line due to a Low Load condition while both compressors are running (as explained above), a Soft Shutdown is performed on the Lag compressor.

If one of the following shutdowns is initiated, a Soft Shutdown is performed simultaneously on all running compressors:

- Operator Initiated Soft Shutdown at Keypad
- "Remote Stop”
- “Leaving Chilled Liquid temperature – Low Temperature”
- "Discharge Valve X – Valve Not Closed”
- “Multiunit – Contacts Open”
- “System Cycling (1 & 2) – Contacts Open”
- “Control panel – Schedule”

If any faults other than those listed above occur during a Soft shutdown, the Soft Shutdown is aborted, the run signal to the compressor motor starter is de-energized and the compressor(s) immediately enters “Coastdown”.

If an Operator initiates a “Local Stop” with the Keypad Rocker Switch or any fault occurs other than those listed immediately above, a **Fault Shutdown** is performed on all running compressors. Simultaneously, the run signal to the compressor motor starter(s) is de-energized, the compressor(s) enters “Coastdown”, and the Pre-rotation Vanes and Discharge Valve(s) are driven closed.

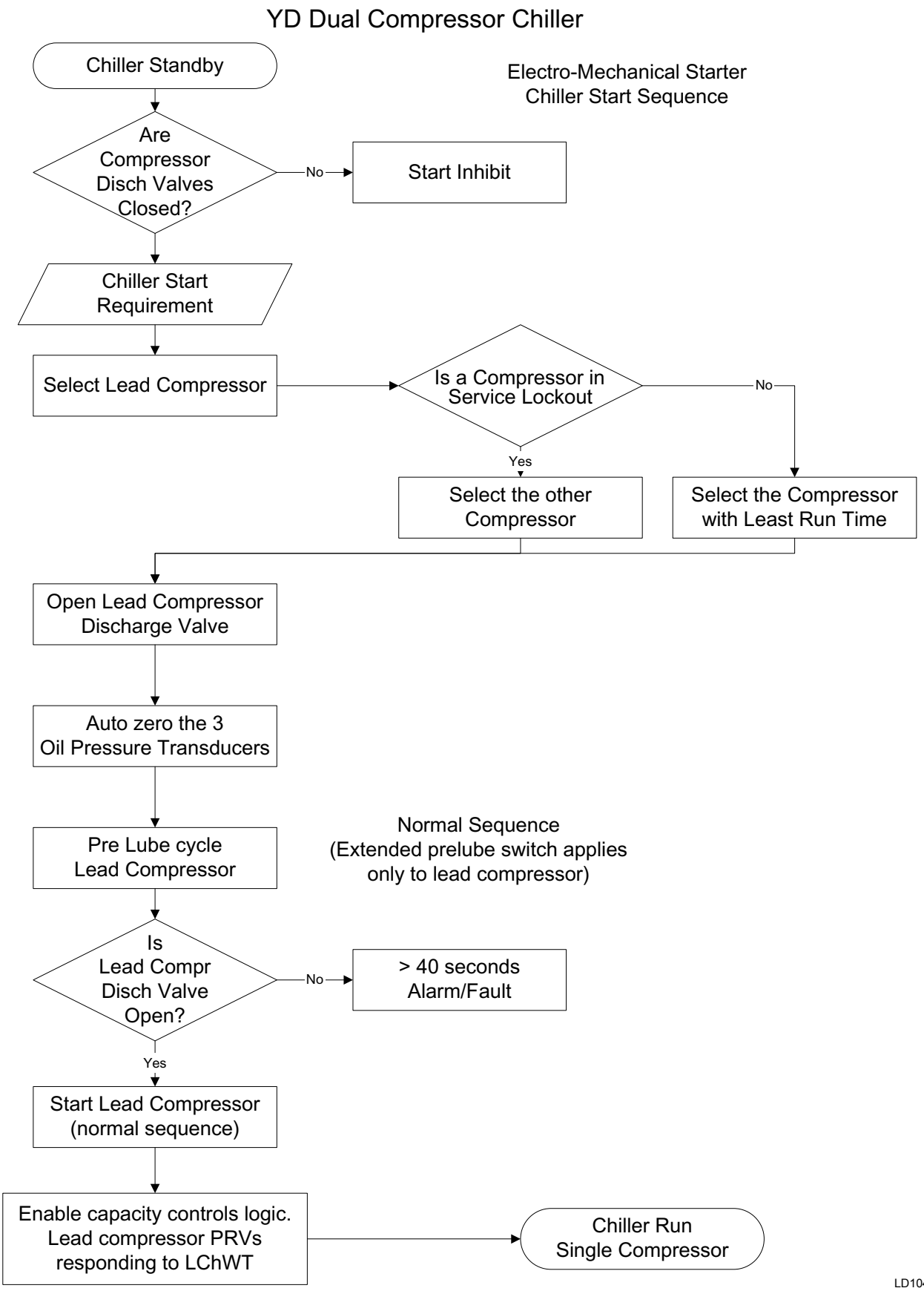


FIGURE 2 - CHILLER OPERATION FLOW CHART

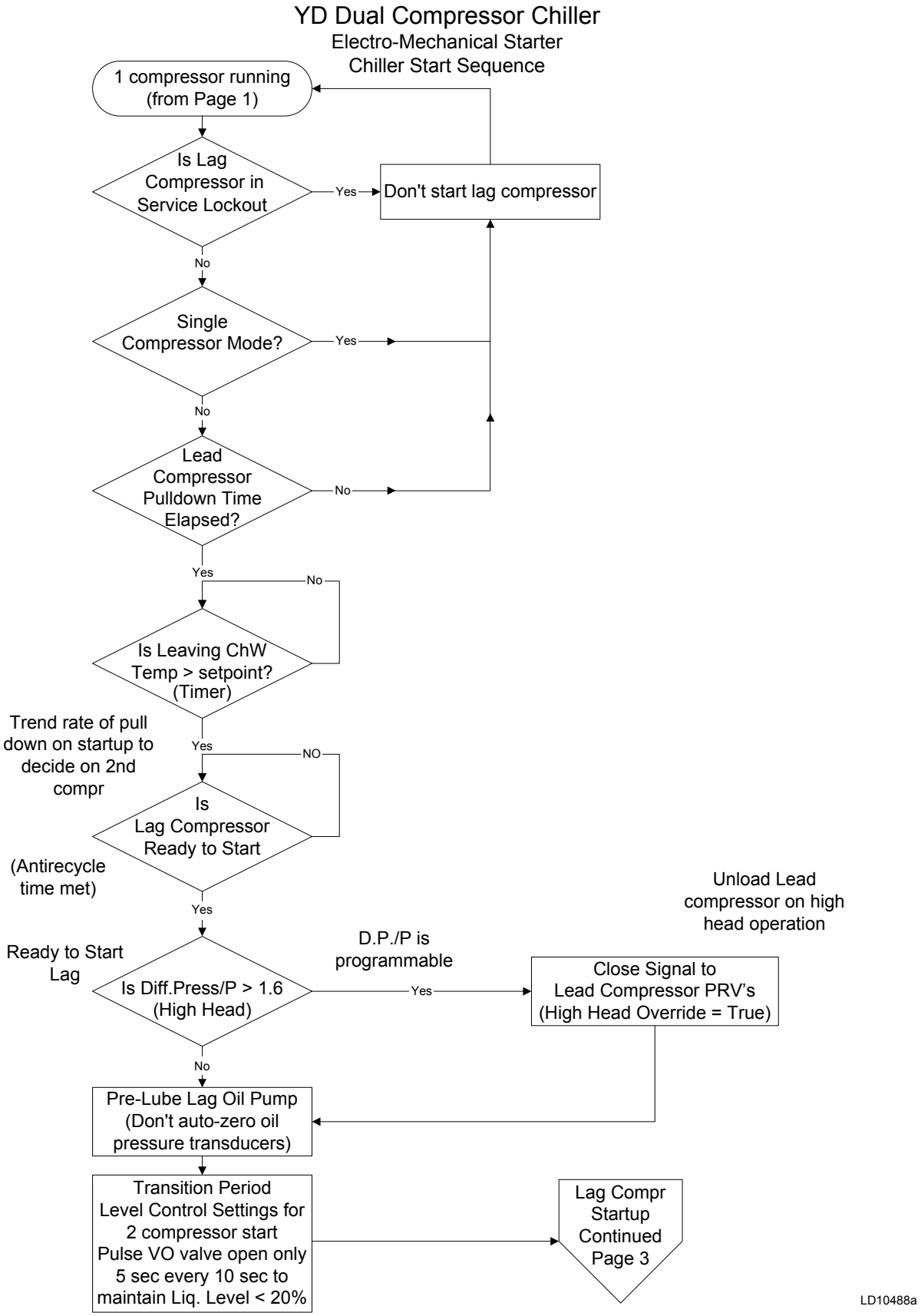


FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

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FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

YD Dual Compressor Chiller

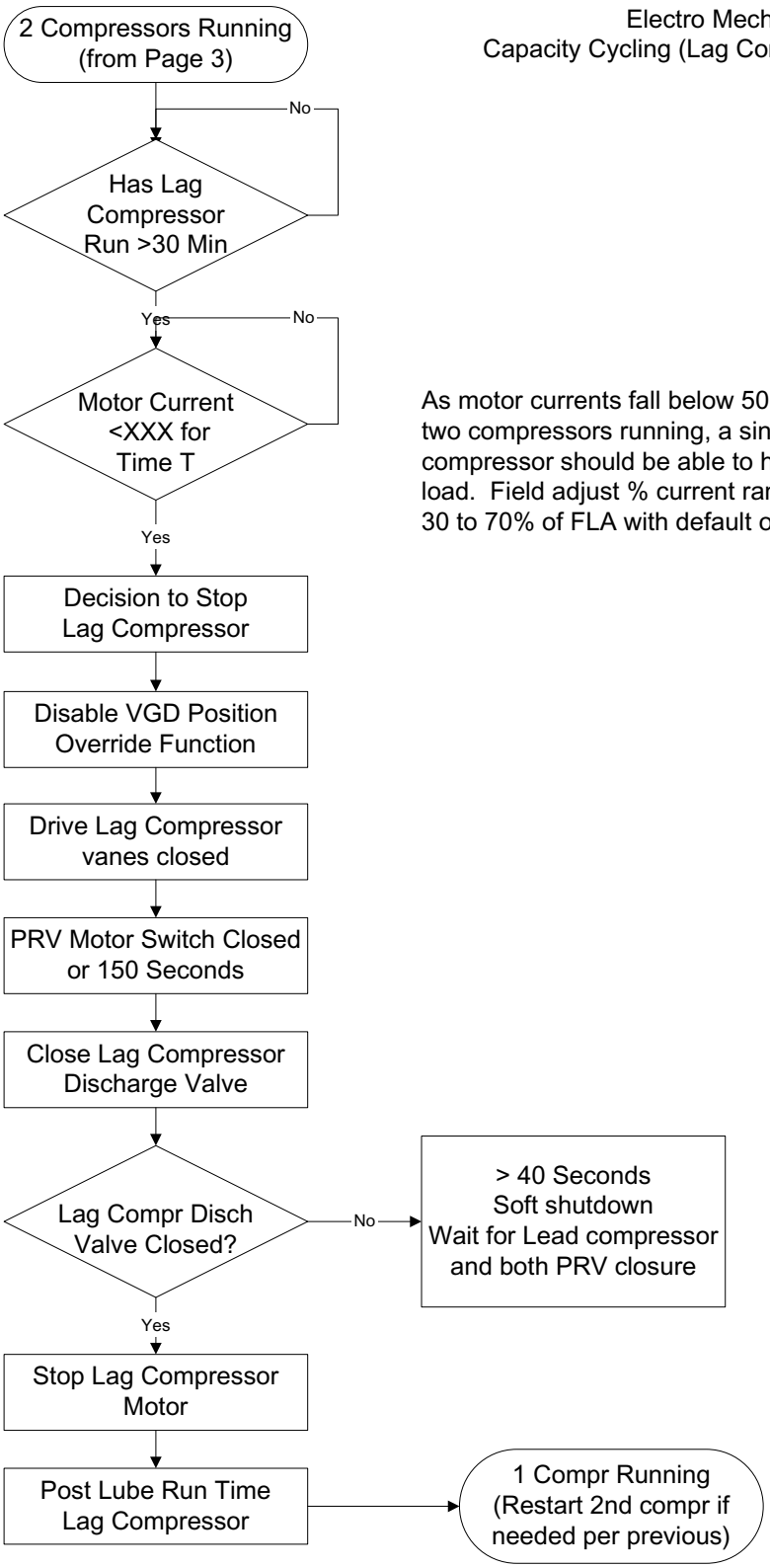

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FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

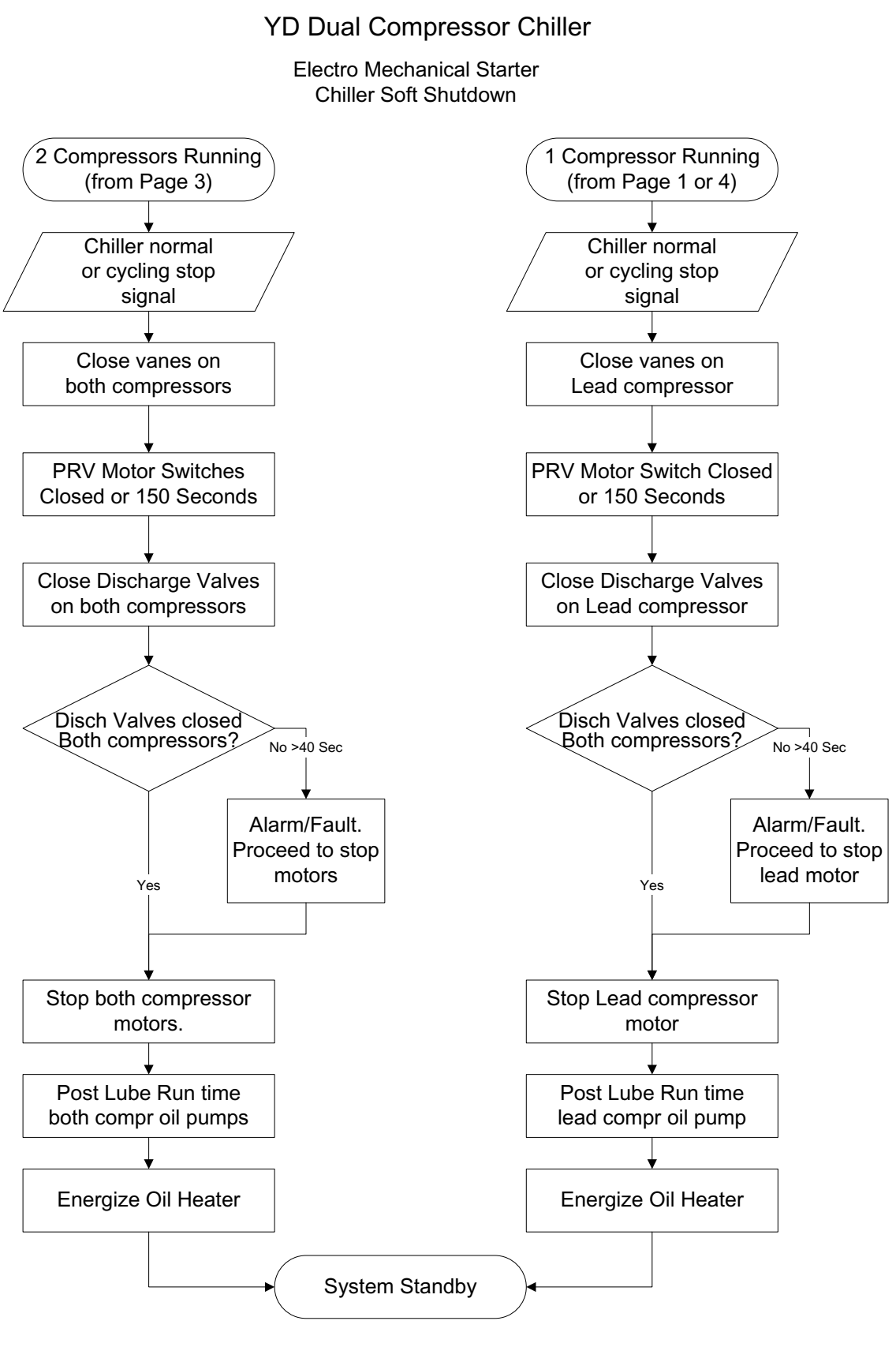

FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

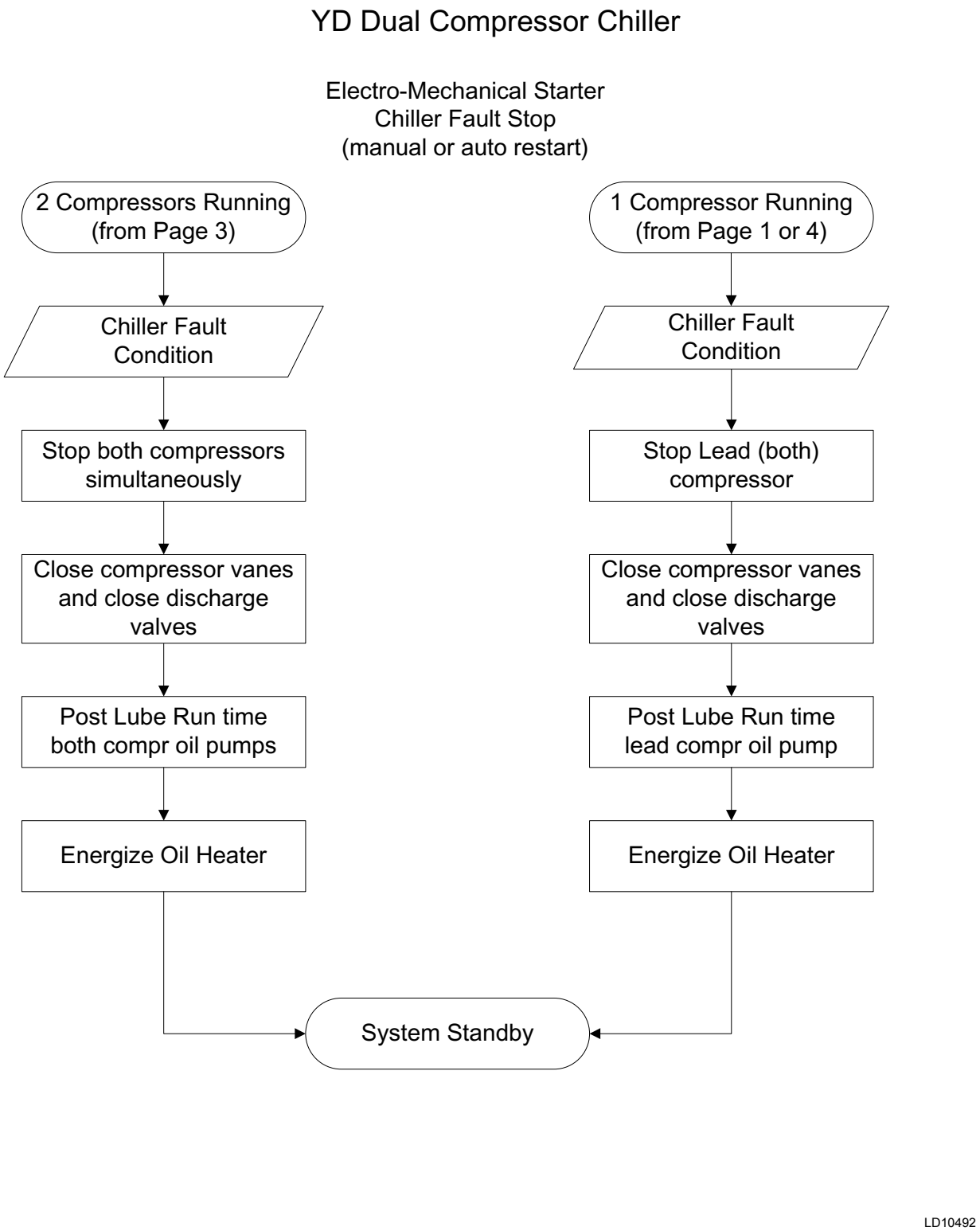

FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

YD Dual Compressor Chiller

Anti-Surge Control Algorithm

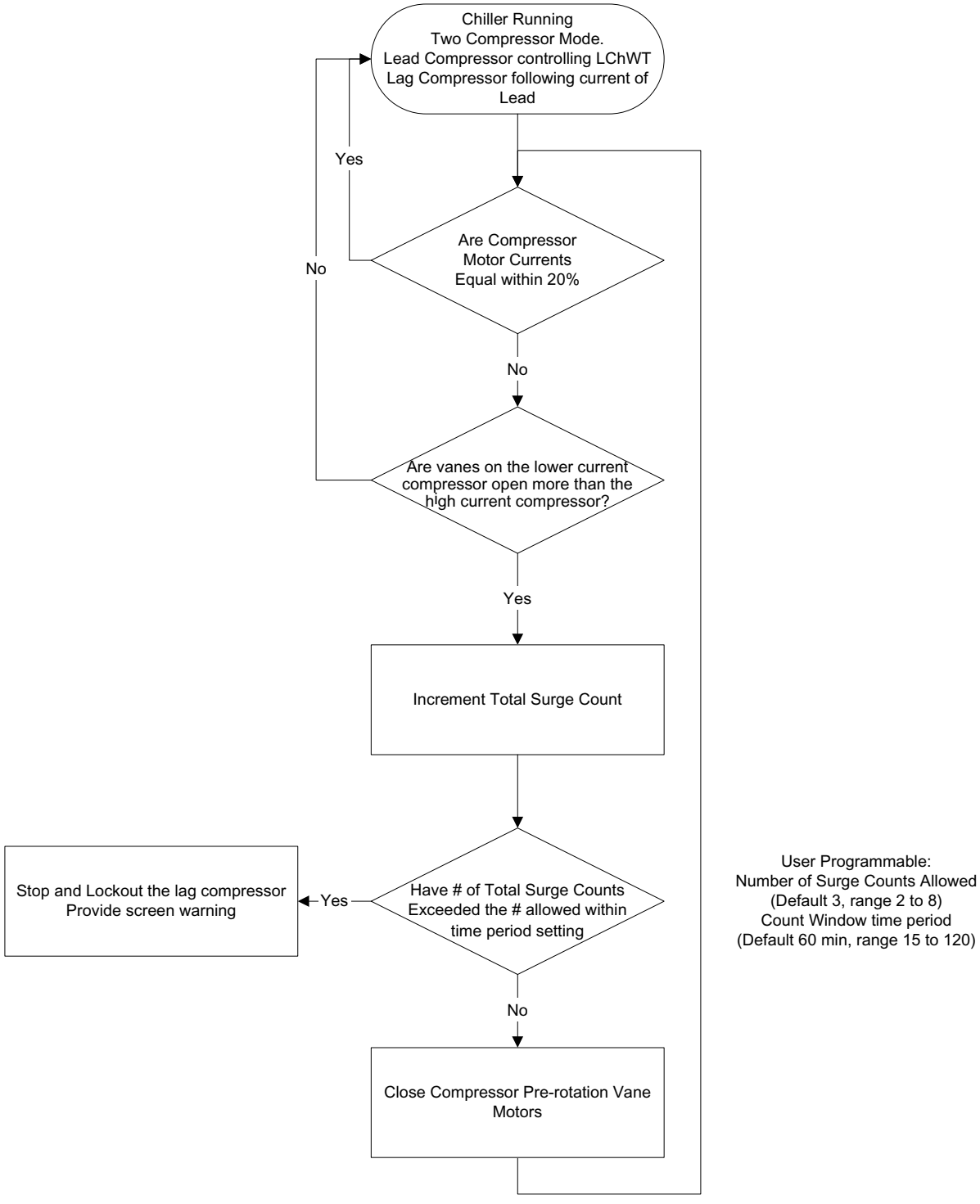

FIGURE 2 – CHILLER OPERATION FLOW CHART - (CONT'D)

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SECTION 2 – OPTIVIEW CONTROL CENTER

INTRODUCTION

The YORK OptiView™ Control Center is a microprocessor based control system for R134a centrifugal chillers. It controls the leaving chilled liquid temperature via pre-rotation vane controls and has the ability to limit motor current via control of the pre-rotation vanes.

The panel comes configured with a full screen LCD Graphic Display mounted in the middle of a keypad interface. The graphic display allows the presentation of several operating parameters at once. In addition, the operator may view a graphical representation of the historical operation of the chiller as well as the present operation. For the novice user, the locations of various chiller parameters are clearly and intuitively marked. Instructions for specific operations are provided on many of the screens.

The graphic display also allows information to be represented in both English (temperatures in °F and pressures in PSIG) and Metric (temperatures in °C and pressures in kPa) mode. The advantages are most apparent, however, in the ability to display many languages.

The Control Center continually monitors the system operation and records the cause of any shutdowns (Safety, Cycling or Normal). This information is recorded in memory and is preserved even through a power failure condition. The user may recall it for viewing at any time. During operation, the user is continually advised of the operating conditions by various status and warning messages. In addition, it may be configured to notify the user of certain conditions via alarms. A complete listing of shutdown, status, and warning messages is attached in the Display Messages section of this book.

There are certain screens, displayed values, programmable Setpoints and manual control shown in this book that are for Service Technician use only. They are only displayed when logged in at SERVICE access level or higher. The Setpoints and parameters displayed on these screens are explained in detail in *Service Manual (Form 160.69-M1-C)*. These parameters affect chiller operation and should never be modified by anyone other than a qualified Service Technician. They are shown in this book for reference only.

Advanced Diagnostics and troubleshooting information for Service Technicians are included in the Service manual, along with detailed descriptions of chiller features, such as the Refrigerant Level Control, Variable Speed Drive Oil Pump, Hot Gas Bypass, High Speed Thrust Bearing Proximity Probe, Remote Setpoints, Smart Freeze Protection, and Standby Lubrication.

The control center expands the capabilities of remote control and communications. By providing a common networking protocol through the BAS, YORK Chillers not only work well individually, but also as a team. This new protocol allows increased remote control of the chiller, as well as 24-hour performance monitoring via a remote site. In addition, compatibility is maintained with the present network of ISN communications. The chiller also maintains the standard digital remote capabilities as well. Both of these remote control capabilities allow for the standard Energy Management System (EMS) interface:

1. Remote Start
2. Remote Stop
3. Remote Leaving Chilled Liquid Temperature Setpoint adjustment (0-10VDC, 2-10VDC, 0-20mA or 4-20mA) or Pulse Width Modulation
4. Remote Current Limit Setpoint adjustment (0-10VDC, 2-10VDC, 0-20mA or 4-20mA) or Pulse Width Modulation
5. Remote “Ready to Start” Contacts
6. Safety Shutdown Contacts
7. Cycling Shutdown Contacts

The chiller operating program resides in the OptiView Control Center microboard.

Software versions are alpha-numeric codes that represent the application and revision level per below. Each time the software is revised, the level increments.

Y.OPT.11.xx.yzz:

- Y – Commercial chiller
- OPT - Used on Microboard 031-03630-007
- 11 – YD chiller
- xx - controls revision level (00, 01, etc)
- y – language package (0=English only, 1=NEMA, 2=CE, 3=NEMA/CE)
- zz – language package revision level (00, 01, etc)

OPTIVIEW CONTROL CENTER IN DETAIL

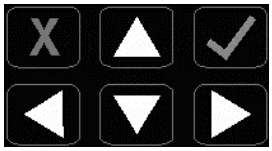
The OptiView™ Control Center display is highlighted by a full screen graphics display. This display is nested within a standard keypad, and is surrounded by "soft" keys which are redefined based on the currently displayed screen. Eight buttons are available on the right side of the panel, and are primarily used for navigation between the system screens. At the base of the display are 5 additional buttons. The area to the right of the keypad is used for data entry with a standard numeric keypad provided for entry of system setpoints and limits.

The *Decimal* key provides accurate entry of setpoint values.

A +/- key has also been provided to allow entry of negative values and AM/PM selection during time entry.

In order to accept changes made to the chiller setpoints, the Check key is provided as a universal 'Enter' key or 'Accept'' symbol.

In order to reject entry of a setpoint or dismiss an entry form, the *'X'* key is provided as a universal 'Cancel' symbol.



Cursor *Arrow* keys are provided to allow movement on screens which contain a large amount of entry data. In addition, these keys can be used to scroll through history and event logs.

The Start/Stop control is operated via a three-position rocker switch. When toggled all the way to the right, it is considered in the **STOP/RESET** position. When in the middle position, this is considered the RUN state. When toggled to the left-most position, it is considered in the START state. Each state is described in detail below:

- **STOP / RESET (O)**
  When in this position, the chiller will not run under any condition. The switch must be placed in this state following a Safety shutdown before the chiller is allowed to restart. This guarantees that manual intervention has taken place and the shutdown has been acknowledged.

- **START (◀)**
  The switch can only remain in this position when being acted upon by a manual force. Once the user has released the switch, it automatically reverts to the RUN position. Generally, this state only occurs momentarily as the operator attempts to locally start the unit. Once this position has been sensed, if all fault conditions are cleared, the unit will enter the system prelube (start sequence).

- **RUN (■)**
  When in this position, the chiller is able to operate. The switch spring-returns to this state after it has been toggled to the **START** position. When in this state, the chiller is allowed to function normally, and will also allow the chiller to automatically restart following a Cycling shutdown. The switch must be in this state to receive a valid remote start signal when operating under a remote control source.

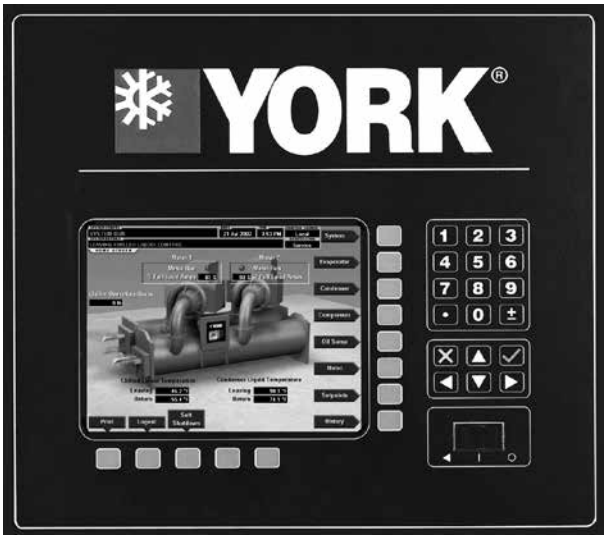


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FIGURE 3 - OPTIVIEW™ CONTROL CENTER

OVERVIEW OF INTERFACE

The new graphical display on each control panel allows a wide variety of information to be presented to the user. Each screen description in this document will begin with a section entitled **Overview** which will describe the graphical elements on the screen and give a short summary of the functions available. Each element on the screen will then be categorized into three distinct groups: Display Only, Programmable, and Navigation. Below is a short description of what types of information are included in these groups.

The Programmable values and Navigation commands are also subject to access level restrictions as described below. For each of these elements, an indication is given to show the minimum access level required to program the value or navigate to the subscreen.

Display Only

Values in this group are read-only parameters of information about the chiller operation. This type of information may be represented by a numerical value, a text string, or an LED image. For numerical values, if the monitored parameter is above the normal operating range, the high limit value will be displayed along with the '>' symbol; if it is below the normal operating range, the low limit value will be displayed along with the '<' symbol. In some cases, the value may be rendered invalid by other conditions and the display will use X's to indicate this.

Programmable

Values in this group are available for change by the user. In order to program any setpoints on the system, the user must first be logged in with the appropriate access level. Each of the programmable values requires a specific Access Level which will be indicated beside the specified value. All of the programmable controls in the system fall into one of the categories described below:

Access Level

In order to program any setpoints on the system, the user must first login with an appropriate access level. When power is applied to the chiller, the system begins with an Access Level of **VIEW**. This will allow the user to navigate to most screens and observe the values displayed there. However, the user will not be allowed to change any values. To change any values, the user must return to the **Home Screen** (shown by default when power is applied to the system), and use the **LOGIN** button or utilize the **CHANGE SETPOINTS** key described below. At this point, the user will be prompted to enter a User ID and the corresponding Password. By default, the User ID is zero (0). In order to gain standard **OPERATOR** level access, the Password would be entered as **9 6 7 5**, using the numeric keypad. **OPERATOR** access reverts to the **VIEW** level after 10 continuous minutes without a keypress. If a custom User ID and Password have been defined (see *User Screen*), the user may enter that User ID and the corresponding Password value.

If the correct password is received, the user is authorized with the appropriate Access Level. If an incorrect password is entered, the user is notified of the failure and prompted again. At this point the user may retry the password entry, or cancel the login attempt.

Change Setpoints

On screens containing setpoints programmable at the **OPERATOR** access level, a key with this label will be visible if the present access level is **VIEW**. This key brings up the Access Level prompt described above. It allows the user to login at a higher Access Level without returning to the Home Screen. After login, the user may then modify setpoints on that screen.

Setpoints

The control center uses the setpoint values to control the chiller and other devices connected to the chiller system. Setpoints can fall into several categories. They could be numeric values (such as 45.0°F for the Leaving Chilled Liquid Temperature), or they could Enable or Disable a feature or function.

Regardless of which setpoint is being programmed, the following procedure applies:

1. Press the desired setpoint key. A dialog box appears displaying the present value, the upper and lower limits of the programmable range, and the default value.
2. If the dialog box begins with the word "ENTER", use the numeric keys to enter the desired value. Leading zeroes are not necessary. If a decimal point is necessary, press the '•' key (i.e. 45.0)

Pressing the ▲ key, sets the entry value to the default for that setpoint. Pressing the ▼ key, clears the present entry. The ◀ key is a backspace key and causes the entry point to move back one space.

If the dialog box begins with "SELECT", use the ◀ and ▶ keys to select the desired value.

If the previously defined setpoint is desired, press the 'X' (Cancel) key to dismiss the dialog box.

3. Press the ' ✔ ' (Enter) key.

   If the value is within range, it is accepted and the dialog box disappears. The chiller will begin to operate based on the new programmed value. If out of range, the value will not be accepted and the user is prompted to try again.

Manual Controls

Some keys are used to perform manual control functions. These may involve manual control of items such as the pre-rotation vanes, variable orifice or oil pump speed. Other keys in this category are used to initiate/terminate processes such as calibrations or reports.

Free Cursor

On screens containing many setpoints, a specific "soft" key may not be assigned to each setpoint value. A soft key will be assigned to enable the cursor arrow keys below the numeric keypad which are used to "highlight" the desired setpoint field. At this point, the '3' key is pressed to bring up a dialog prompting the user to enter a new setpoint value. The 'X' key cancels cursor mode.

Navigation

In order to maximize the amount of values which the panel can display to the user, and in order to place those values in context, multiple screens have been designed to describe the chiller operation. In order to move from one screen to the next, navigation keys have been defined. These keys allow the user to either move "forward" to a subscreen of the present screen, or move "backward" to the previous screen. Except for the Home Screen display, the upper-right "soft" key will always return the user to the Home Screen. Navigating with "soft" keys is as simple as pressing the key next to the label containing the name of the desired screen. The system will immediately refresh the display with the graphics for that screen. Following is a layout of all the screens and how they are connected.

- Home Screen
  - System Screen
  - Evaporator
  - Condenser
    - Level Control
  - Compressors
    - Compressor #1
      - Proximity Probe Calibrate
      - Pre-Rotation Vanes Calibration
    - Compressor #2
      - Proximity Probe Calibrate
      - Pre-Rotation Vanes Calibration
    - Hot Gas Bypass
    - Surge Protection
    - Capacity Compressor Cycling
  - Oil Sump
    - Oil Pump 1
    - Oil Pump 2
  - Motor
    - EM Starter Version
  - Setpoints
    - Setup
      - Schedule
      - User
      - Comms
      - Printer
      - Sales Order
      - Operations
      - Diagnostics *(Refer to Service Manual 160.69-M1-C)*
  - History
    - History Details
    - Security Log Screen
      - Security Log Details Screen
    - Custom View
      - Custom Setup
    - Trend
      - Trend Setup
      - Advanced Trend Setup
        - Common Slots

Languages

The Screens can be displayed in various languages. Language selection is done on the USER Screen. The desired language is selected from those available. Not all languages are available. English is the default language. If a language other than English is being displayed, an English-only speaking person should navigate to the USER Screen using the preceding Navigation chart and select English per the USER Screen instructions in this book.

ANALOG INPUT RANGES

The following table indicates the valid display range for each of the analog input values. In the event that the input sensor is reading a value outside of these ranges, the < or > symbols will be displayed beside the minimum or maximum value, respectively.

ANALOG INPUT	ENGLISH RANGE			METRIC RANGE		
	LOW	HIGH	UNITS	LOW	HIGH	UNITS
Leaving Chilled Liquid Temperature	0.0	82.0	°F	-17.7	27.7	°C
Return Chilled Liquid Temperature	0.0	94.1	°F	-17.7	34.5	°C
Leaving Condenser Liquid Temperature	8.0	133.5	°F	-13.3	56.3	°C
Return Condenser Liquid Temperature	8.0	133.5	°F	-13.3	56.3	°C
Evaporator Refrigerant Temperature (Optional)	0.0	126.1	°F	-17.7	52.3	°C
Discharge Temperature	31.8	226.3	°F	-0.1	107.9	°C
Oil Temperature	31.8	226.3	°F	-0.1	107.9	°C
Condenser Pressure	0.0	315.0	**PSIG**	0.0	2172.4	**KPAG**
Condenser Temperature*	-98.7	160.1	°F	-72.6	71.7	°C
Evaporator Pressure	5.5	77.4	**PSIG**	37.9	533.7	**KPAG**
Evaporator Temperature*	-44.9	64.7	°F	-42.7	18.1	°C
Oil Sump Pressure	0.0	315.0	**PSIG**	0.0	2172.4	**KPAG**
High Speed Thrust Bearing Proximity Position	8.0	99.0	**MILS**	8.0	99.0	**MILS**
Refrigerant Level	0.0	100.0	**%**	0.0	100.0	**%**
Drop Leg Refrigerant	0.0	121.7	°F	-17.7	49.8	°C

*Saturation temperatures are calculated values. They will display XXX if the pressure used for the calculation is out of range.

HOME SCREEN

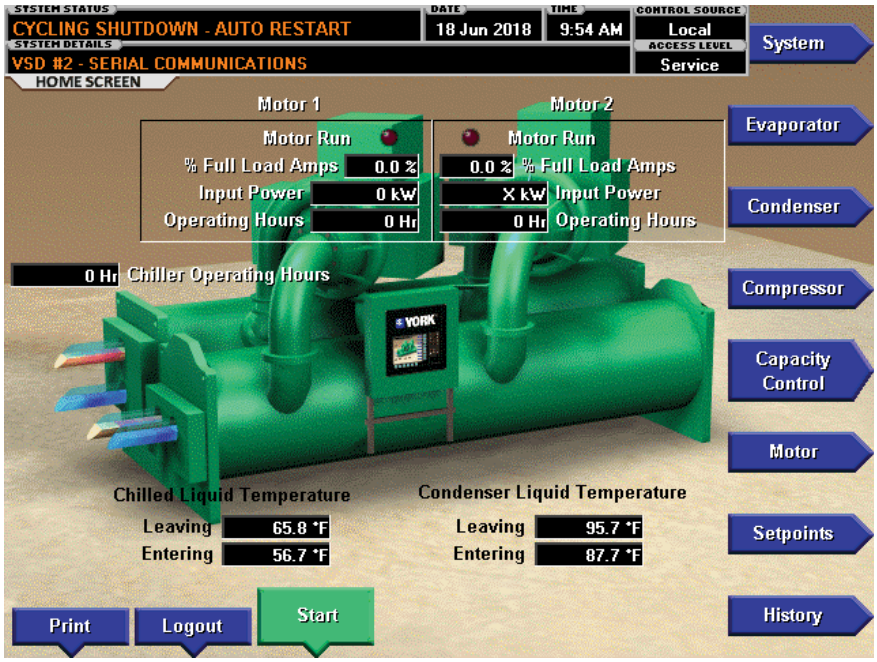

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FIGURE 4 - HOME SCREEN

When the chiller system is powered on, the above default display appears. The primary values which must be monitored and controlled are shown on this screen. The Home Screen display depicts a visual representation of the chiller itself. Animation indicates chilled liquid flow.

DISPLAY ONLY

Chilled Liquid Temperature - Leaving

Displays the temperature of the liquid as it leaves the evaporator.

Chilled Liquid Temperature - Entering

Displays the temperature of the liquid as it enters the evaporator.

Condenser Liquid Temperature - Leaving

Displays the temperature of the liquid as it leaves the condenser.

Condenser Liquid Temperature - Entering

Displays the temperature of the liquid as it enters the condenser.

Motor 1

Motor Run (LED)

On when the digital output controlling compressor #1 motor starter is on.

% Full Load Amps

Displays the percentage of compressor motor full load amps being utilized by compressor #1 motor.

Input Power

Displays kW being utilized by compressor #1 motor. The input power display is not available on units equipped with EM starters.

Operating Hours

Displays the total operating hours of compressor #1.

Motor 2

Motor Run (LED)

On when the digital output controlling compressor #2 motor starter is on.

% Full Load Amps

Displays the percentage of compressor motor full load amps being utilized by compressor #2 motor.

Input Power

Displays kW being utilized by compressor #2 motor. The input power display is not available on units equipped with EM starters.

Operating Hours

Displays the total operating hours of compressor #2.

PROGRAMMABLE

Login

Access Level Required: VIEW

The OptiView™ Panel restricts certain operations based on password entry by the operator. Three different access levels are provided as follows: **VIEW:** The panel defaults to the lowest access level which is termed **VIEW**. In this mode, the chiller operating values and setpoints can be observed, but no changes can be made. **OPERATOR:** The second access level is termed **OPERATOR** and will allow the customer to change all of the setpoints required to operate the chiller system. The **OPERATOR** access level reverts to the V**IEW** level after 10 continuous minutes without a keypress. **SERVICE**: In the event that advanced diagnostics are necessary, a **SERVICE** access level has been provided. Only qualified service personnel utilize this access level. This level provides advanced control over many of the chiller functions and allows calibration of many of the chiller controls. The access levels are listed above in hierarchical order beginning with the lowest level and proceeding to the highest level. Users logged in under higher access levels may perform any actions permitted by lower access levels.

The **OPERATOR** access level is accompanied by a 10-minute timeout. After ten (10) successive minutes without a keypress, the panel will revert to the VIEW access level. This prevents unauthorized changes to the chiller if a user was logged in at a higher access level and failed to logout. Proper procedure requires that after making necessary setpoint adjustments the user return to the Home Screen and logout.

Logout

Access Level Required: OPERATOR

This key is displayed when a user is logged in at any level other than **VIEW**. Pressing it will return the access level to **VIEW**.

Print

Access Level Required: VIEW

Use this key to generate a hard-copy report of the present system status. This provides a snapshot of the primary operating conditions at the time the key is pressed. The History page provides enhanced reporting capability. (See *History on page 32*.)

Message Clear

Access Level Required: SERVICE

When certain safety or cycling conditions have been detected and the chiller has been shutdown, the main status display of the chiller will continue to display a message indicating the cause of the shutdown. Using this key, the message can be cleared once the condition has been removed.

Warning Reset

Access Level Required: OPERATOR

Use of this key acknowledges a warning condition and resets the message display associated with it.

Soft Shutdown

Access Level Required: Operator

This key, displays as **Start** when the chiller is shut down. It changes to **Soft Shutdown** when the chiller is running. If both compressors are running, the soft shutdown is performed on both compressors simultaneously. Otherwise it is performed on whichever compressor is running. A Soft Shutdown fully closes the Pre-rotation Vanes prior to shutting down the compressor. This reduces bearing wear by eliminating compressor backspin at shutdown. Pressing this key causes the Vanes to be driven to the fully closed position. While the vanes are closing, “System Unloading Before Shutdown” is displayed on the System Status line. When the Vane Motor Switch (VMS) closes, indicating the vanes have fully closed (or 3.5 minutes have elapsed, whichever occurs first), the Run signal is removed from the compressor motor starter and a “System Coastdown” is performed. While the vanes are closing, if a Local Stop is initiated with the Compressor Switch or any fault other than “Leaving Chilled Liquid Temp – Low Temperature”, “Remote Stop”, “Multi-Unit Cycling – Contacts Open”, “System Cycling #X-Contacts Open” or “Control Panel – Schedule” occur, it will immediately enter “System Coastdown”. To restart the chiller after an operator initiated Soft shutdown, the Start button on the Home screen must be pressed if in local or, if in remote, the BAS must command a restart after the Start button is pressed.

NAVIGATION

System
Used to provide additional system information.

Evaporator
A detailed view of all evaporator parameters, including the programmable Leaving Chilled Liquid Setpoints.

Condenser
A detailed view of all condenser parameters, including control of the liquid level functions.

Compressor
A detailed view of all the compressor parameters. This includes pre-rotation vane control, Hot Gas Bypass Control, Proximity Probe calibration, and PRV calibration.

Capacity Control
A detailed view of all the Capacity Control parameters showing what overrides are in effect and what the active capacity control output states are.

Motor
A detailed view of the motor controller parameters, specific to the controller type presently utilized on the chiller system. This allows programming of the Current Limit and the Pulldown Demand Limit values.

Setpoints
This screen provides a single location to program the most common system setpoints. It is also the gateway to many of the general system setup parameters such as Date/Time, Display Units, Scheduling, Printer Setup, etc.

History
This screen provides access to a snapshot of system data at each of the last 50 shutdown conditions.

SYSTEM SCREEN

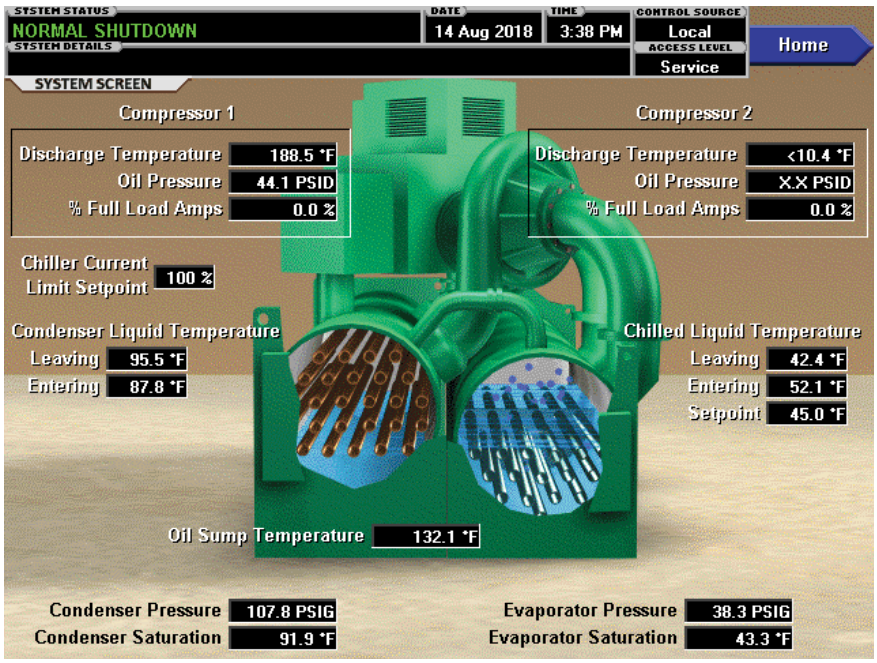

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FIGURE 5 - SYSTEM SCREEN

This screen gives a general overview of common chiller parameters for both shells.

DISPLAY ONLY

Compressor 1

Discharge Temperature

Displays the temperature of the refrigerant in its gaseous state at discharge of the compressor #1 as it travels to the condenser.

Oil Pressure

Displays the pressure differential between the Pump oil pressure transducer (output of oil filter) for compressor #1 and the Sump oil pressure transducer. The displayed value includes offset pressure derived from auto-zeroing during the system prelube. If either of the transducers used to calculate this differential is out of range, the display will show XX.X.

% Full Load Amps

Displays the percentage of compressor motor #1 full load amps being utilized by compressor #1 motor.

Compressor 2

Discharge Temperature

Displays the temperature of the refrigerant in its gaseous state at discharge of the compressor #2 as it travels to the condenser.

Oil Pressure

Displays the pressure differential between the Pump oil pressure transducer (output of oil filter) for compressor #2 and the Sump oil pressure transducer. The displayed value includes offset pressure derived from auto-zeroing during the system prelube. If either of the transducers used to calculate this differential is out of range, the display will show XX.X.

% Full Load Amps

Displays the percentage of compressor #2 full load amps being utilized by compressor #2 motor.

Chilled Liquid Temperature - Leaving

Displays the temperature of the liquid as it leaves the evaporator.

Chilled Liquid Temperature - Entering

Displays the temperature of the liquid as it enters the evaporator.

Chilled Liquid Temperature - Setpoint

Displays the active temperature setpoint to which the chiller is controlling the evaporator liquid. This value could come from a 0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

Evaporator Pressure

Displays the present refrigerant pressure in the evaporator.

Evaporator Saturation Temperature

Displays the present saturation temperature in the evaporator.

Condenser Liquid Temperature - Leaving

Displays the temperature of the liquid as it leaves the condenser.

Condenser Liquid Temperature - Entering

Displays the temperature of the liquid as it enters the condenser.

Condenser Pressure

Displays the refrigerant pressure in the condenser.

Condenser Saturation Temperature

Displays the saturation temperature in the condenser.

Oil Sump Temperature

Displays the temperature of the oil in the sump.

Chiller Current Limit Setpoint

Displays the Chiller Current Limit Setpoint. The Chiller Current Limit Setpoint could be from a 0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC input in Analog remote mode or PWM input in Digital remote mode or SC-EQ communication interface in ISN (BAS) remote mode or a Local Chiller Limit Setpoint entered at the Keypad.

This setpoint is in effect after the Lead Compressor Pulldown Time setpoint has elapsed and for the remainder of system run.

PROGRAMMABLE

None

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

EVAPORATOR SCREEN

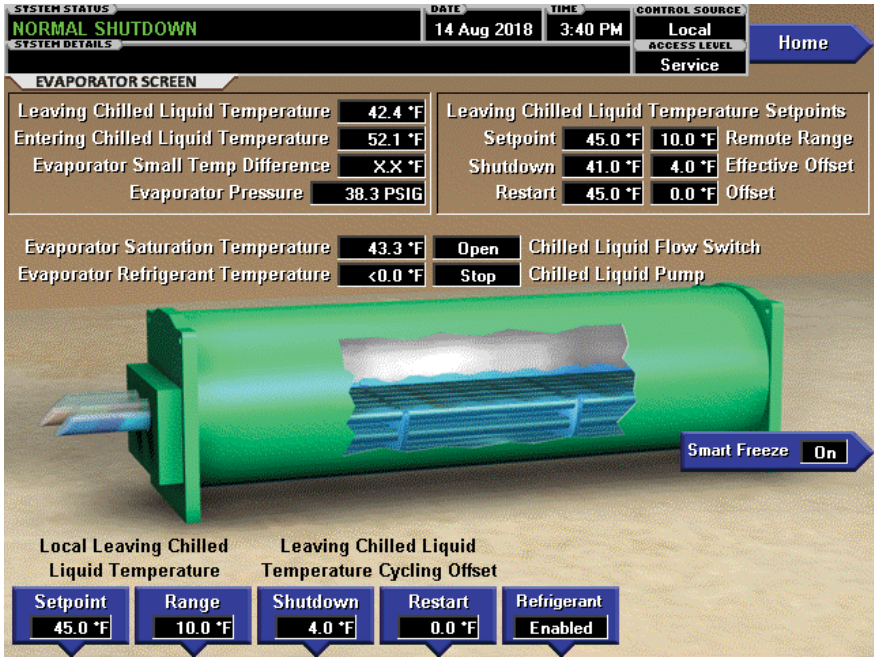

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FIGURE 6 - EVAPORATOR SCREEN

This screen displays a cutaway view of the chiller evaporator. All setpoints relating to the evaporator side of the chiller are maintained on this screen. Animation of the evaporation process indicates whether the chiller is presently in a **RUN** condition. Animation of the liquid flow indicates chilled liquid flow.

DISPLAY ONLY

Leaving Chilled Liquid Temperature

Displays the temperature of the liquid as it leaves the evaporator.

Entering Chilled Liquid Temperature

Displays the temperature of the liquid as it enters the evaporator.

Evaporator Small Temp Difference

Displays the difference between the Leaving Chilled Liquid temperature and the Evaporator Refrigerant temperature. The Evaporator Refrigerant temperature is measured by the Refrigerant Temperature sensor input if the sensor is present, otherwise it is calculated from the Evaporator Saturation temperature.

Evaporator Pressure

Displays the present refrigerant pressure in the evaporator.

Evaporator Saturation Temperature

Displays the present saturation temperature in the evaporator.

Evaporator Refrigerant Temperature

Displays the temperature of the refrigerant in the evaporator, if the sensor is present.

Chilled Liquid Flow Switch (Open / Closed)

Displays whether the liquid flow is present in the evaporator.

Chilled Liquid Pump

Displays the command presently sent by the control center to the Chilled Liquid Pump (RUN or STOP).

Leaving Chilled Liquid Temperature Setpoints

Setpoint

Displays the present setpoint to which the chiller is operating, whether controlled locally or remotely.

Shutdown

Displays the Leaving Chilled Liquid Temperature at which the chiller will shut down to avoid over-cooling the building. By default this value is 4°F below the Leaving Chilled Liquid Setpoint, but is adjustable.

Restart

Displays the Leaving Chilled Liquid Temperature at which the chiller will restart after it has shut down due to over-cooling temperature. By default, the chiller will restart at the Leaving Chilled Liquid Temperature Setpoint, but is adjustable.

PROGRAMMABLE

Local Leaving Chilled Liquid Temperature - Setpoint

Access Level Required: OPERATOR

This value allows the user to define the Leaving Chilled Liquid Temperature that is to be maintained by the chiller. It is programmable over the range of 38.0°F to 70.0°F (water) or 10.0°F to 70.0°F (brine). If Smart Freeze (see below) is enabled, the range is 36.0°F to 70.0°F (water). A remote device can provide an analog signal (0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC) in Analog Remote mode, or PWM signal in Digital Remote mode that changes the setpoint by creating an offset above the operator programmed Base Leaving Chilled Liquid Temperature setpoint. This offset may be defined between 10.0°F and 40.0°F above the Base setpoint (see the Remote Leaving Chilled Liquid Temperature Setpoint Range description below). Additionally, an SC-EQ (in ISN BAS Remote mode) can define the setpoint through communications. In this case, the incoming setpoint is not an offset, but rather is the setpoint value itself.

Local Leaving Chilled Liquid Temperature - Remote Range

Access Level Required: OPERATOR

This is the range over which an analog (0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC) in Analog Remote Mode or a digital signal (PWM) in Digital remote mode can reset the Leaving Chilled Liquid Temperature setpoint above the operator programmed Base Setpoint (see below). Programmable between 10°F and 40°F, with a default of 10°F, it is added to the Base value to create a range over which the remote device can reset the setpoint. For example, if this setpoint is programmed for 10°F and the operator programmed value is 45°F, then the remote device can set the Leaving Chilled Liquid Temperature setpoint over the range 45.0°F to 55.0°F.

Leaving Chilled Liquid Temperature Cycling Effective Offset - Shutdown

Access Level Required: OPERATOR

This value allows the user to specify the Leaving Chilled Liquid Temperature at which the chiller will shut down on a **LEAVING CHILLED LIQUID – LOW TEMPERATURE** cycling shutdown. This is done by defining an offset below the Leaving Chilled Liquid Temperature setpoint. It is programmable over a range of 1°F to 70°F below the setpoint, to a minimum cutout of 36°F (water), 34°F (water with Smart Freeze enabled) or 6°F (brine). It establishes the minimum allowable temperature for the Leaving Chilled Liquid Temperature and prevents over-cooling of the building. Anytime the Leaving Chilled Liquid Temperature setpoint is increased, the shutdown threshold is 36.0°F (water) or 6.0°F (brine) and then ramped up to the desired setpoint at the rate of 0.1°F/second. If Smart Freeze (see below) is enabled, the initial threshold is 34.0°F.

Leaving Chilled Liquid Temperature Cycling Offset - Restart

Access Level Required: OPERATOR

This value allows the user to specify the Leaving Chilled Liquid Temperature at which the chiller will restart after a shutdown on a **LEAVING CHILLED LIQUID – LOW TEMPERATURE** cycling shutdown. This is done by defining an offset above the Leaving Chilled Liquid Temperature setpoint. It is programmable over a range of 0°F to 35°F above the setpoint, to a maximum restart value of 80°F. The chiller will automatically restart when this temperature is reached. This setpoint can be used to reduce chiller cycling by delaying the chiller restart until the cooling load has increased.

Brine Low Evaporator Cutout

Access Level Required: SERVICE

This value is only available in Brine mode. It allows the user to specify the Evaporator Pressure at which a safety shutdown is initiated.

Smart Freeze (Off / On)

Access Level Required: SERVICE

This value is only available if the chiller is not in Brine mode. It allows the user to enable the Smart Freeze Point Operation which allows the chiller to run closer to the freeze point without shutting down.

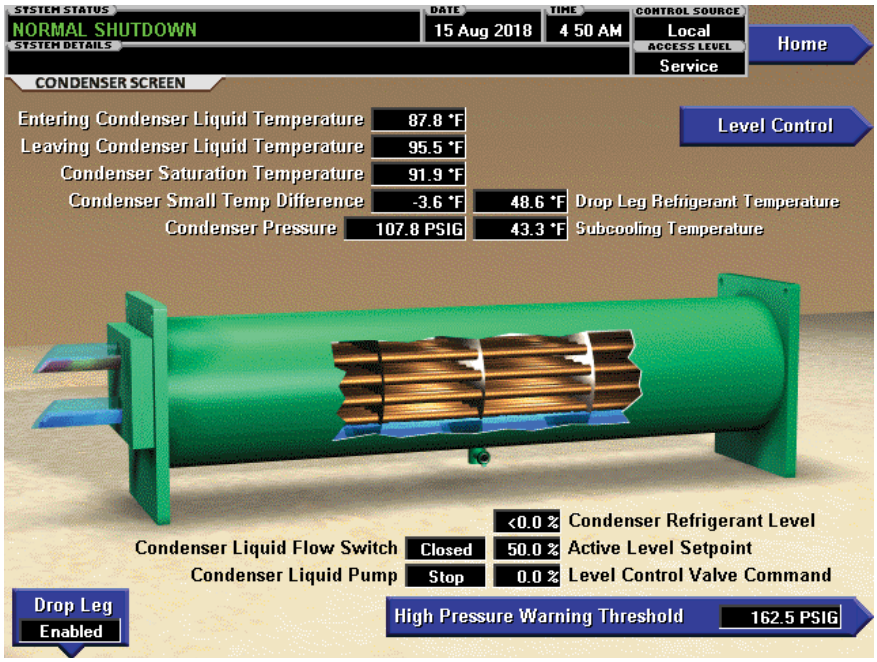
Refrigerant (Enabled / Disabled)
Access Level Required: SERVICE
When an Evaporator Refrigerant Sensor has been installed it must be enabled via this toggle before the system will utilize the sensor.

NAVIGATION

Home

Access Level Required VIEW
Causes an instant return to the Home Screen.

CONDENSER SCREEN



LD27846

FIGURE 7 - CONDENSER SCREEN

This screen displays a cutaway view of the chiller condenser. Animation indicates condenser liquid flow. This screen also serves as a gateway to controlling the Refrigerant Level.

DISPLAY ONLY

Entering Condenser Liquid Temperature

Displays the water temperature as it enters the condenser.

Leaving Condenser Liquid Temperature

Displays the water temperature as it leaves the condenser.

Condenser Saturation Temperature

Displays the saturation temperature in the condenser.

Condenser Small Temperature Difference

Displays the difference between the Condenser Refrigerant temperature and the Leaving Condenser Liquid temperature. The Condenser Refrigerant temperature will be represented by the Condenser Saturation temperature.

Condenser Pressure

Displays the refrigerant pressure in the condenser.

Drop Leg Refrigerant Temperature

Displays the temperature of the refrigerant in the drop leg between the condenser and evaporator shells, if the sensor is present and "Enabled".

Sub-Cooling Temperature

Displays the difference between the Condenser Refrigerant temperature and the Drop Leg Refrigerant temperature. The Condenser Refrigerant temperature will be represented by the Condenser Saturation temperature. If the Drop Leg sensor is not present, this temperature is not displayed.

Condenser Liquid Flow Switch (Open / Closed)

Indicates whether flow is present in the condenser.

Condenser Liquid Pump (Run / Stop)

Indicates whether Condenser liquid pump is operating.

Condenser Refrigerant Level

Displays the present position of the refrigerant level.

Active Level Setpoint

Displays the setpoint to which the refrigerant level is being controlled.

Level Control Valve Command

Displays the current Refrigerant Valve command.

PROGRAMMABLE

High Pressure Warning Threshold

Access Level Required: SERVICE

This value allows the user to define the condenser pressure at which the chiller will initiate a warning.

Drop Leg (Enabled / Disabled)

Access Level Required: SERVICE

When a Drop Leg Refrigerant Sensor has been installed it must be enabled via this toggle before the system will utilize the new, enhanced resolution input.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

Refrigerant Level Control

Access Level Required: SERVICE

Moves to the subscreen allowing programming of the refrigerant liquid level control setpoints.

REFRIGERANT LEVEL CONTROL SCREEN

LD27847

FIGURE 8 - REFRIGERANT LEVEL CONTROL SCREEN

This screen displays a cutaway view of the chiller condenser, along with the liquid refrigerant level sensor and variable orifice. Setpoints relating to the liquid level control are maintained on this screen. Through animation, the variable orifice position is displayed. Also, the refrigerant flow control valve (variable orifice) can be manually operated. It is only accessible with a Service Level Password.

DISPLAY ONLY

Condenser Refrigerant Level

Displays the present position of the liquid level. The refrigerant level is animated in the cutaway view of the condenser. When the actual level is 0% to 15%, the level is shown as 50% full. When the actual level is 16% to 31%, the level is shown as 60% full. When the actual level is 32% to 47%, the level is shown as 70% full. When the actual level is 48% to 63%, the level is shown as 80% full. When the actual level is 64% to 79%, the level is shown as 90% full. Actual levels above 79%, are shown as 100% full.

NOTE

Requires a login access level of SERVICE.

Subcooler Effectiveness

The Subcooler Effectiveness is evaluated with the following calculation and compared to a high and low limit. (Cond Sat Temp-Drop Leg Ref Temp)/(Cond Sat Temp-Entering Cond Liq Temp). This value is typically near 0.8 at design conditions.

Level Control State

Indicates one of the following states the level control routine is in: Manual, Inactive, Startup Hold, Setpoint Ramp, PID Control, Hold.

Startup Delay Remaining

The level valve is held at the starting position until 15 seconds after start to allow the system to stabilize. Then the valve position is controlled by the PID loop. This read box displays the remaining seconds until PID control.

Level Control Valve Command

Indicates the valve command as a percentage of full open. It is only displayed when the valve control method is analog.

PROGRAMMABLE

Level Setpoint

Displays the setpoint to which the refrigerant level is being controlled. (Adjustable 20 to 80%; default 50% requires Service Password)

Startup Position

Sets the starting position of the refrigerant valve to allow the system to match the load quicker. (Adjustable 0 to 100%; default 50% requires Service password)

Startup Delay

The amount of time the refrigerant level valve PID waits after start before it starts controlling the valve position. This allows the system to stabilize before making valve position changes. (Set at 15 seconds but is adjustable with an Admin password)

Ramp Time

After the chiller has been running for the level control startup delay time, if the refrigerant level is less than the Level Setpoint, a linearly increasing ramp is applied to the Level Setpoint. This ramp allows the level to go from the present level to the programmed Level Setpoint over a period of time programmed as the Ramp Up Time. This setpoint can only be changed with ADMIN level access.(1 to 5 minutes; default 1)

Lag Start Setpoint

Sets the refrigerant level setpoint for starting the Lag Compressor to help prevent starving the evaporator and tripping on low evaporator pressure. (Adjustable 10 to 90%; default 20% requires Service password)

Manual Increment

This sets the percentage the refrigerant valve will manually be driven with each press of the Open or Close buttons. (0.1 to 10%; default 1.0%, requires Service password)

Open

Pressing this button will set the Condenser Level Control Valve Mode to Manual if it had been in Auto and will increase the current Condenser Level Control Valve Command by an amount equal to the Manual Increment, with a maximum of 100.0%.

Close

Pressing this button will set the Condenser Level Control Valve Mode to Manual if it had been in Auto and will decrease the current Condenser Level Control Valve Command by an amount equal to the Manual Increment, with a minimum of 0.0%.

Set

Pressing this button will open a dialog box where the user can manually enter a valve command. Once a legitimate value has been entered and the Enter key pressed, the Condenser Level Control Valve Mode shall be set to Manual if it had been in Auto and the Condenser Level Control Valve Command shall be set to the entered value. (Requires Service password)

High Threshold

Sets the high limit for the Subcooler Effectiveness Warning. (Adjustable 0 to 100%; default 50% requires Service password)

Low Threshold

Sets the low limit for the Subcooler Effectiveness Warning. (Adjustable 0 to 100%; default 50% requires Service password)

KP

Sets the Proportional value of the PID control loop. (Adjustable 0.1 to 15; default 1.0 requires Admin password)

Ti

Sets the Integral value of the PID control loop. (Adjustable 0.1 to 200; default 100 requires Admin password)

Td

Sets the Derivative value of the PID control loop. (Adjustable 0.0 to 200; default 0.0 requires Admin password)

NAVIGATION

Home

Access Level Required: SERVICE

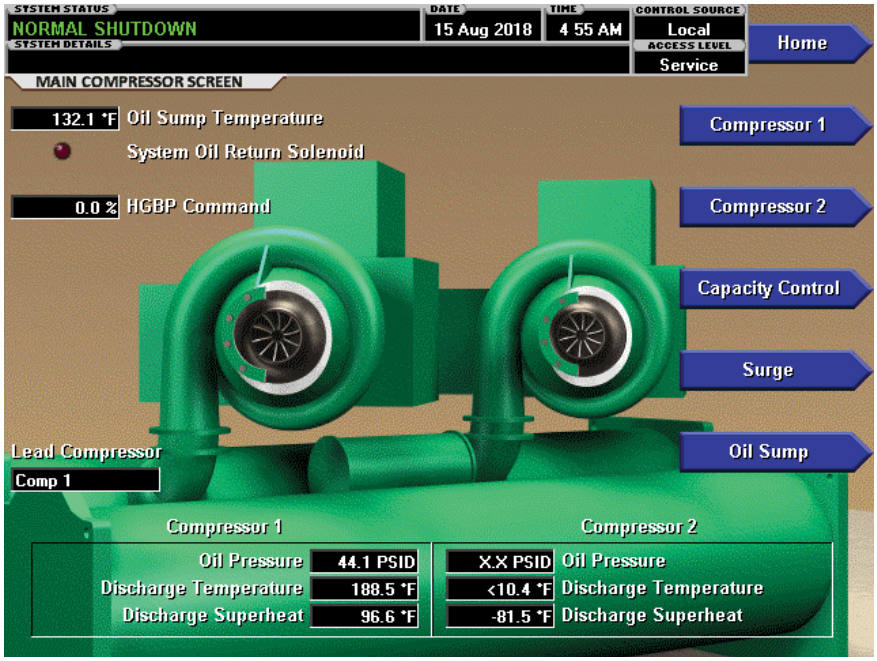
Causes a return to the Home Screen

Condenser

Access Level Required: SERVICE

Causes a return to the Condenser Screen

MAIN COMPRESSOR SCREEN



LD27848

FIGURE 9 - MAIN COMPRESSOR SCREEN

This screen displays a cutaway of the chiller compressors, revealing the impellers. Animation of the impeller indicates when the compressor is running. Several compressor related conditions are shown. This screen also serves as a gateway to subscreens for Capacity Control, Surge protection and the Oil Sump.

DISPLAY ONLY

Oil Sump Temperature

Displays the temperature of the oil in the Sump.

System Oil Return Solenoid (LED)

Illuminates when the solenoid is energized.

HGBP Command

Displays the value of the Hot Gas Bypass Valve command over the range of 0% (closed) to 100% (fully open). Only displayed if Hot Gas Bypass feature has been enabled on the OPERATIONS Screen.

Lead Compressor

Displays which compressor has been selected as the lead compressor. The lead compressor is selected upon receipt of a start signal. The compressor that has the least amount of run time that is ready to run is selected as the lead compressor.

Compressor 1

Oil Pressure

Displays the pressure differential between the Pump Oil Pressure transducer for compressor #1 and the common Sump oil pressure transducer. If either of these transducers are out of range, the display field will show XX.X PSID. The displayed value includes the offset pressure derived from auto-zeroing during the system pre-lube period. The offset pressure is the pressure differential between compressor #1 Pump Oil Pressure Transducer and the Sump Oil Pressure transducer outputs during a three (3) second period beginning ten (10) seconds into the system pre-lube period. During this time, the transducers are sensing the same pressure and their outputs should indicate the same pressure. However, due to accuracy tolerances in transducers, differences can exist. Therefore, to compensate for differences between transducers and assure differential pressure sensing accuracy, the offset pressure is subtracted algebraically from the differential pressure. The offset pressure calculation is not performed if either transducer is out of range. The offset value is taken as 0 PSI in this instance. If compressor #2 is already running when bringing compressor #1 online, the offset calculation used will be that which was calculated during compressor #2 pre-lube.

Discharge Temperature

Displays the temperature of the refrigerant in its gaseous state at the discharge of the compressor #1 as it travels to the condenser.

Discharge Superheat

Displays compressor #1 discharge superheat, calculated as (discharge temperature – condenser saturation temperature).

Compressor 2

See the *Compressor 1* explanations.

PROGRAMMABLE

None

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

Compressor 1 and 2

Access Level Required: SERVICE

Only displayed in Service access level. Moves to a subscreen that allows calibration of the Proximity Probe and Pre-rotational Vanes and viewing of parameters for compressor #2. Also, manual control of the Discharge Valve and Pre-rotation Vanes is performed on this screen.

Capacity Control

Access Level Required: VIEW

Navigates to the Capacity Control Screen where the Operator can view any override conditions that are in effect and the status of the Capacity Control Output devices. That screen also provides access to the Capacity Cycling and Hot Gas screens.

Surge

Access Level Required: VIEW

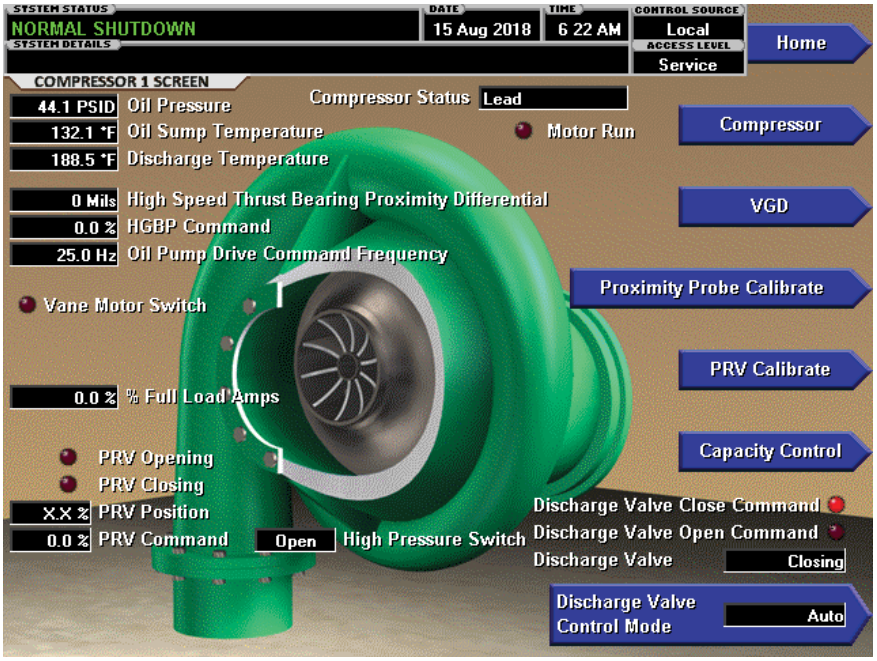
Moves to a subscreen that allows viewing and programming of the Surge Protection feature.

Oil Sump

Access Level Required: VIEW

Moves to a subscreen that allows viewing of the Oil Pumps parameters and access to the individual pump screens.

COMPRESSOR 1 OR 2 SCREEN



LD27849

FIGURE 10 - COMPRESSOR 1 SCREEN

This screen displays a cutaway of the compressor #1 or #2, revealing the impeller. Animation of the impeller indicates when the compressor is running. Parameters related to the compressor are displayed here. Also, compressor manual control functions are performed here. The Pre-rotation Vanes and Discharge Valve can be manually controlled. This screen also serves as a gateway to subscreens to calibrate the Pre-rotation vanes and Proximity Probe.

NOTE

Requires login access level of SERVICE.

DISPLAY ONLY

Oil Pressure

Displays the pressure differential between the Pump Oil Pressure transducer for the compressor and the common Sump oil pressure transducer. If either of these transducers are out of range, the display field will show XX.X PSID. The displayed value includes the offset pressure derived from auto-zeroing during the system pre-lube period. The offset pressure is the pressure differential between the compressor Pump Oil Pressure Transducer and the Sump Oil Pressure transducer outputs during a three (3) second period beginning ten (10) seconds into the system pre-lube period. During this time, the transducers are sensing the same pressure and their outputs should indicate the same pressure. However, due to accuracy tolerances in transducers, differences can exist. Therefore, to compensate for differences between transducers and assure differential pressure sensing accuracy, the offset pressure is subtracted algebraically from the differential pressure. The offset pressure calculation is not performed if either transducer is out of range. The offset value is taken as 0 PSI in this instance. If one compressor is already running when bringing on the second compressor, the offset calculation used will be that which was calculated during the first compressor pre-lube.

Oil Sump Temperature

Displays the temperature of the oil sump.

Discharge temperature

Displays the discharge temperature.

High Speed Thrust Bearing Proximity Differential

Displays the distance between the high speed thrust collar and the tip of the Proximity Probe for compressor #1. This measurement takes into account the reference position established at the time of chiller manufacture.

HGBP Command

Indicates the Hot Gas Bypass Command 0% (Closed to 100% (Open). Only displayed if Hot Gas option is installed and enabled on the Operations screen.

Oil Pump Drive Command Frequency

Indicates the VSOP Drive Command Frequency, 0 Hz to 60 Hz.

Vane Motor Switch (LED) (Open/Closed)

Illuminates when the compressor vanes are in the fully closed position. When Off, indicates open.

Compressor Status

Displays whether compressor has been selected as the lead or Lag compressor. The lead compressor is selected upon receipt of a start signal. The compressor that has the least amount of run time that is ready to run is selected as the lead compressor.

% Full Load Amps

Displays compressor motor current as a percentage of full load amps of the compressor motor.

PRV Opening (LED)

Illuminates when an open command is being applied to the Pre-Rotation Vanes.

PRV Closing (LED)

Illuminates when an close command is being applied to the Pre-Rotation Vanes.

PRV Position

Displays the position (0% to 100%) of the pre-rotation vanes.

PRV Command

Displays the position command (0% to 100%) for the pre-rotation vanes.

Discharge Valve Close Command (LED)

Illuminates when a close command is being applied to the compressor Discharge Valve.

Discharge Valve Open Command (LED)

Illuminates when an open command is being applied to the compressor Discharge Valve.

Discharge Valve

Indicates the status of the compressor Discharge Valve as closing, closed, opening or opened.

High Pressure Switch

Indicates the status of the compressor High Pressure Switch. (Open or Closed)

PROGRAMMABLE

Software does not allow manual Pre-rotation Vanes control on a shutdown compressor while the other compressor is running. This helps minimize rotation of this compressor if its Discharge Valve is not fully sealed.

Discharge Valve Control Mode (Manual/Auto)

Only displayed if the compressor is stopped. This key puts the compressor Discharge Valve in manual or automatic operation. When in manual operation, this key is used to manually open or close the valve.

NAVIGATION

Home

Causes an instant return to the Home Screen.

Compressor

Causes an instant return to the Main Compressor Screen.

VGD

Access Level Required: SERVICE

Only displayed if VGD feature enabled on Operations Screen. Moves to the subscreen that allows viewing and programming of the Variable Geometry Diffuser (VGD) feature for the compressor.

Proximity Probe Calibrate

Only available if chiller is stopped. Moves to the subscreen that allows calibration of the High Speed Thrust Bearing Proximity Probe for the compressor.

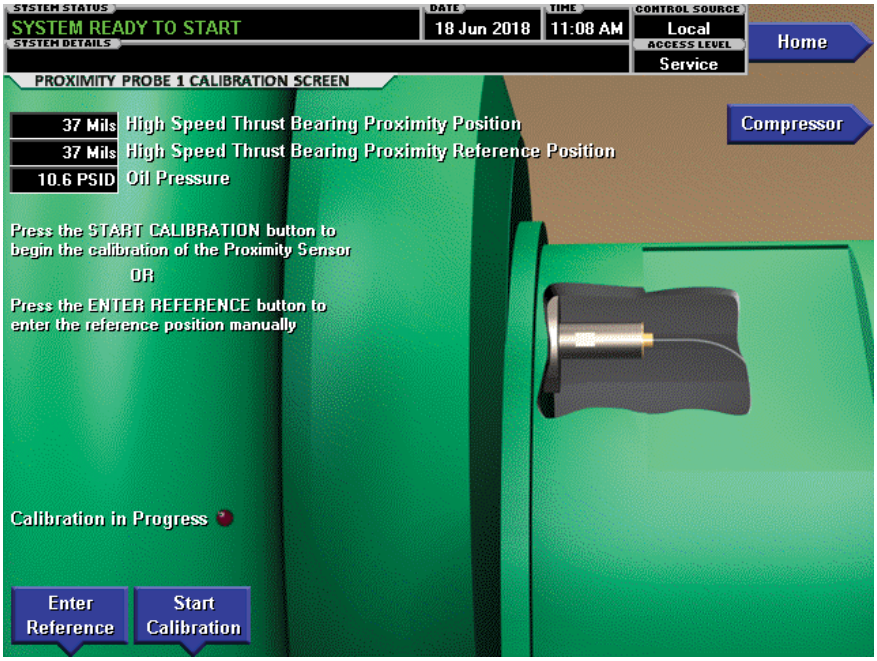
PRV Calibrate

Only available if the chiller is stopped. Moves to the subscreen that allows calibration and manual control of the Pre-rotation Vanes for the compressor.

Capacity Control

Navigates to the Capacity Control screen.

PROXIMITY PROBE CALIBRATION SCREEN



LD27850

FIGURE 11 - PROXIMITY PROBE CALIBRATION SCREEN

This screen displays a cutaway view of the chiller compressor, revealing the proximity probe sensor and provides the capability of calibrating the proximity probe sensor. The appearance of this screen is the same for compressor #1 and compressor #2.

NOTE

Requires a login access level of SERVICE.

DISPLAY ONLY

High Speed Thrust Bearing Proximity Position

Displays the distance between the high-speed thrust collar and the proximity probe that is used to measure the position.

High Speed Thrust Bearing Proximity Reference Position

Displays the presently defined offset reference position. This value is defined at the conclusion of a calibration sequence.

Oil Pressure

Displays the pressure differential between the pump oil pressure transducer (compressor bearing input) and the sump oil pressure transducer. If either of the transducers used to calculate this differential is out of range, the display field will show XX.X.

Calibration in Progress (LED)

Indicates that the calibration sequence is in progress.

Calibration Messages

These are text messages which step the user through the calibration process and indicate its success or failure.

PROGRAMMABLE

Enter Reference

Allows the Service Technician to enter a previously recorded reference when replacing a microboard.

Start Calibration

This starts the calibration procedure. This key is hidden after calibration has started.

Cancel Calibration

This option only becomes available after the calibration has started.

Accept Calibration

The key is pressed to accept the calibration. This key option only becomes available after the calibration sequence is complete.

Fault Acknowledge

This option is only displayed if a fault is present. Allows clearing of High Speed Thrust Bearing related shutdowns.

NAVIGATION

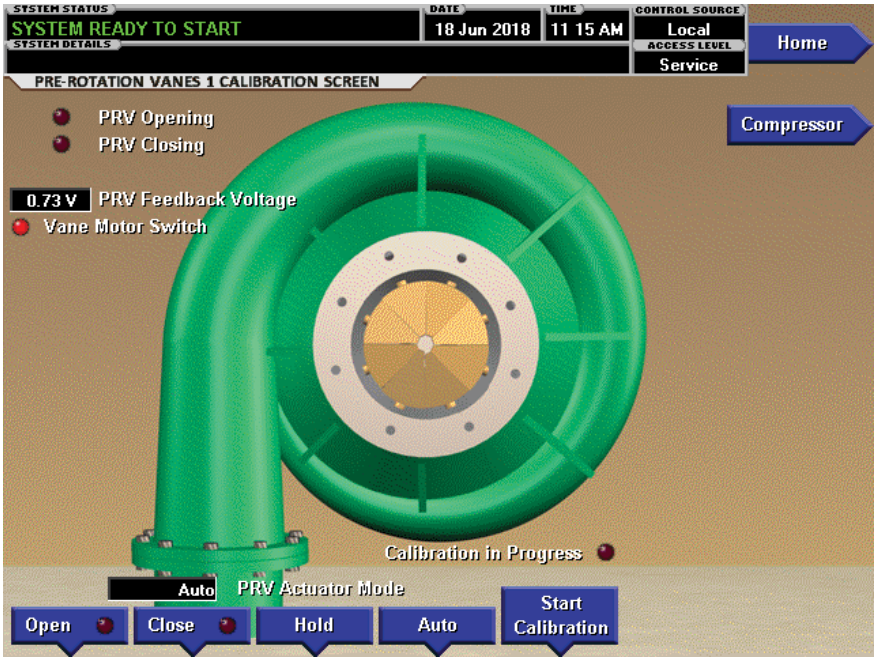
Home

Causes an instant return to the Home Screen.

Compressor

Return to the Compressor Screen.

PRE-ROTATION VANES CALIBRATION SCREEN



LD27851

FIGURE 12 - PRE-ROTATION VANES CALIBRATION SCREEN

This screen displays a cutaway view of the chiller compressor, revealing the pre-rotation vanes and provides the capability of calibrating the pre-rotation vanes. The appearance of this screen is the same for compressor #1 and compressor #2.

NOTE

Requires a login access level of SERVICE.

DISPLAY ONLY

PRV Opening (LED)

Illuminates when the vanes are opening.

PRV Closing (LED)

Illuminates when the vanes are closing.

Calibration in Progress (LED)

Indicates the calibration sequence is in progress.

Calibration Messages

These are text messages which step the user through the calibration process and indicate its success or failure.

PRV Feedback Voltage

Displays the Pre-Rotation Vanes position potentiometer feedback voltage.

Vane Motor Switch (LED)

Illuminates when the vane motor switch is closed.

PROGRAMMABLE

Open

Pressing this button sets the PRV control to Manual and drives the PRV in the open direction.

Close

Pressing this button sets the PRV control to Manual and drives the PRV in the closed direction.

Hold

Pressing this button stops the PRV at the present position.

Auto

Pressing this button returns the PRV control to Automatic program control.

Start Calibration

Pressing this button initiates the PRV Calibration sequence. This option is hidden after calibration has started.

Cancel Calibration

This option only becomes available after calibration has started.

NAVIGATION

Home

Causes an instant return to the Home Screen.

Compressor

Return to the Compressor Screen.

VARIABLE GEOMETRY DIFFUSER (VGD) SCREEN

LD27852

FIGURE 13 - VARIABLE GEOMETRY DIFFUSER 1 SCREEN

This screen displays information pertinent to the compressor VGD operation. Also, the VGD can be manually controlled from this screen. Screens for VGD 1 and 2 are similar.

Animations for the diffuser ring are based on the Control Status: Probing – moves right to left (opening), Stall Reacting or Surge reacting – left to right (closing), all other states – stopped and shown at a point midway between full left and full right.

Animation for stall detection is shown in the diffuser gap while a stall is occurring (Stall Detector voltage is above the related High Limit threshold).

DISPLAY ONLY

Stall Detector Voltage

Displays the Stall Detector output voltage (x.xxVDC), as received by the Microboard.

High Limit

Displays the High Stall Detector Voltage Limit. Set in the VGD Setpoints Screen with Service Level Access.

Low Limit

Displays the Low Stall Detector Voltage Limit. Set in the VGD Setpoints Screen with Service Level Access.

Mach Number

Displays the speed of the compressor.
(Mach Number = Tip Speed / Speed of Sound)

VGD Closed Limit Switch

Displays the status of the VGD Limit Switch. Displayed as CLOSED when the VGD is in the fully closed position. Otherwise, displayed as OPEN.

VGD Opening (LED)

Illuminates when an open signal is being applied to the VGD.

VGD Closing (LED)

Illuminates when a close signal is being applied to the VGD.

VGD Position

Shows the position of the VGD. 0% to 100% open.

Maximum VGD Position

Shows the maximum calculated value that the VGD will be allowed to open for the present condition. (0% to 100%). Opening too far could cause surge.

Surge Detected (LED)

Illuminates momentarily when a surge is detected by the Surge Protection feature. If equipped with a VSD or MV VSD, these are only the surges detected while the drive is running at maximum frequency.

Stall Count

Displays the number of times the Stall Detector Board output voltage goes above the High Limit setpoint while the compressor is running. The VGD Time and Count can be cleared simultaneously using the VGD Cycle Count/Timer key displayed in ADMIN access level. Maximum value is 999999 and will automatically rollover when the count is exceeded.

Stall Time (__Days __Hrs __Min __Sec)

Displays the accumulated time the Stall Detector Board output voltage is greater than the High Limit Setpoint while the compressor is running. The VGD Time and Count can be cleared simultaneously using the VGD Cycle Count/Timer key displayed in ADMIN access level. Maximum value is 999999 and will automatically rollover when the count is exceeded.

VGD Actuator Mode

Displays the current VGD control mode. (Open, Close, Hold or Auto)

Discharge Pressure

Displays the Discharge Pressure Transducer reading.

Condenser Pressure

Displays the Condenser Pressure Transducer value.

Head Pressure

Displays the Head Pressure value. [(Condenser Pressure - Evaporator Pressure) / Evaporator Pressure]

PROGRAMMABLE

[VGD] Open (Manual)

This key puts the VGD in manual mode and sends an open command to the VGD.

[VGD] Close (Manual)

This key puts the VGD in manual mode and sends a close command to the VGD.

[VGD] Hold (Manual)

This key puts the VGD in manual mode and sends a hold command to the VGD.

[VGD] Auto

This key returns the VGD to automatic mode.

VGD Count/Timer Clear

Access Level required: ADMIN

Allows clearing of the VGD Count and Time simultaneously.

NAVIGATION

Home

Access Level Required: SERVICE

Causes an instant return to the Home Screen.

Compressor 1

Access Level Required: SERVICE

Causes an instant return to the compressor Screen.

VGD 2

Access Level Required: SERVICE

Moves to the VGD 2 subscreen that allows viewing of compressor 2 VGD parameters.

VGD Setpoints

Access Level Required: SERVICE

Move to the subscreen that allows programming of the Variable Geometry Diffuser setpoints.

Calibration

Access Level Required: SERVICE

Only available if compressor 1 is stopped. Moves to the subscreen that allows calibration of compressor 1 VGD.

VARIABLE GEOMETRY DIFFUSER (VGD) SETPOINTS SCREEN

LD27853

FIGURE 14 - VARIABLE GEOMETRY DIFFUSER SETPOINTS SCREEN

The Variable Geometry Diffuser setpoints for VGD 1 and 2 are maintained on this screen. All setpoints require a login access level of Service unless otherwise noted.

DISPLAY ONLY

VGD 1

Stall Detector Voltage

Displays the Stall Detector output voltage (x.xxVDC), as received by the Microboard.

PRV Position

Displays the position of the Pre-Rotation Vanes over the range of 0% (fully closed) to 100% (fully open). Displayed as XXX until calibration procedure is performed by Service Technician.

VGD Position

Displays the position of the VGD over the range of 0% (fully closed) to 100% (fully open). Displayed as XXX until calibration procedure is performed by Service Technician.

VGD Opening *(LED)*

Illuminates when an open signal is being applied to the VGD.

VGD Closing *(LED)*

Illuminates when a close signal is being applied to the VGD.

VGD 2

Stall Detector Voltage

Displays the Stall Detector output voltage (x.xxVDC), as received by the Microboard.

PRV Position

Displays the position of the Pre-rotation vanes over the range of 0% (fully closed) to 100% (fully open). Displayed as XXX until calibration procedure is performed by Service Technician.

VGD Position

Displays the position of the VGD over the range of 0% (fully closed) to 100% (fully open). Displayed as XXX until calibration procedure is performed by Service Technician.

VGD Opening *(LED)*

Illuminates when an open signal is being applied to the VGD.

VGD Closing *(LED)*

Illuminates when a close signal is being applied to the VGD.

PROGRAMMABLE

PRV VGD Inhibit

(40% to 100%; default 90%). Applicable to dual compressor operation only. Both VGD's will be pulsed open according to the OPEN PULSE Setpoint as long as both compressor's PRV's are above this value. While this is in effect, "PRV Position Override" is displayed as Control Status.

PRV Offset

(0%-5%; default 3%) – This setpoint applies to both VGD controls. If the VGD control is in the Stall Waiting state and the Pre-rotation vanes position changes by more than this value, the Probing state will be entered. If the PRV Offset is set to 0%, the Stall Waiting state is performed based only on the "Probe Wait Time" setpoint interval.

Surge React

(1-30 seconds; default 5) – This setpoint applies to both VGD controls. Specifies the length of the close pulse applied to the VGD in response to a surge.

Probe Wait

(0.5-15 minutes; default 10) – This setpoint applies to both VGD controls. Specifies how long the VGD control remains in the Stall Waiting or Surge Waiting states before entering the Probing state.

Open Pulse

(1-5 seconds; default 2) – This setpoint applies to both VGD controls. Specifies the length of the open pulse applied to the VGD during 10 second periods while in the Probing state.

Override Delta

(1% to 10%; default 5%) - This setpoint applies to both VGD controls. This setpoint specifies the maximum allowed difference (1% to 10%) between the Lead VGD position and the Lag VGD position while the VGD Position Override is in effect. The override starts when the lag compressor pre-rotation vanes position is greater than or equal to 80% of the lead compressor pre-rotation vanes. While this override is in effect, if the difference between the Lead VGD position and the Lag VGD position is greater than the Override Delta setpoint, the VGD with the higher position is driven closed until it is within the allowed difference. "VGD Position Override" is displayed as Control Status while the override is in effect.

Extreme Stall Duration

(10 to 20 minutes; default 10) – This setpoint applies to both VGD controls. This setpoint specifies the maximum allowed time an extreme stall condition can exist before the VGD operation is disabled and driven to the full open (100%) position.

VGD 1

High Limit

(0.5-1.2 VDC; default 0.8) – Specifies the Stall Detector Board output voltage that represents an acceptable amount of stall noise.

The minimum difference between the High Limit setpoint and the Low Limit setpoint is 0.1 VDC. If a Low Limit setpoint is entered which is less than 0.1 VDC below the High Limit setpoint, the High Limit setpoint is adjusted so that it is 0.1 VDC above the newly entered Low Limit value.

*L*ow Limit

(0.4-0.8 VDC; default 0.6) – in the Stall Reacting State, the VGD is driven closed until the Stall Detector Board output voltage decreases to this level.

The minimum difference between the High Limit setpoint and the Low Limit setpoint is 0.1 VDC. If a Low Limit setpoint is entered which is less than 0.1 VDC below the High Limit setpoint, the High Limit setpoint is adjusted so that it is 0.1 VDC above the newly entered Low Limit value.

VGD 2

High Limit

(0.5-1.2 VDC; default 0.8) – Specifies the Stall Detector Board output voltage that represents an acceptable amount of stall noise.

The minimum difference between the High Limit setpoint and the Low Limit setpoint is 0.1 VDC. If a Low Limit setpoint is entered which is less than 0.1 VDC below the High Limit setpoint, the High Limit setpoint is adjusted so that it is 0.1 VDC above the newly entered Low Limit value.

Low Limit

(0.4-0.8VDC; default 0.6) – in the Stall Reacting State, the VGD is driven closed until the Stall Detector Board output voltage decreases to this level.

The minimum difference between the High Limit setpoint and the Low Limit setpoint is 0.1 VDC. If a Low Limit setpoint is entered which is less than 0.1 VDC below the High Limit setpoint, the High Limit setpoint is adjusted so that it is 0.1 VDC above the newly entered Low Limit value.

NAVIGATION

Home

Access Level Required: Service

Causes an instant return to the Home Screen

VGD 1

Access Level Required: Service

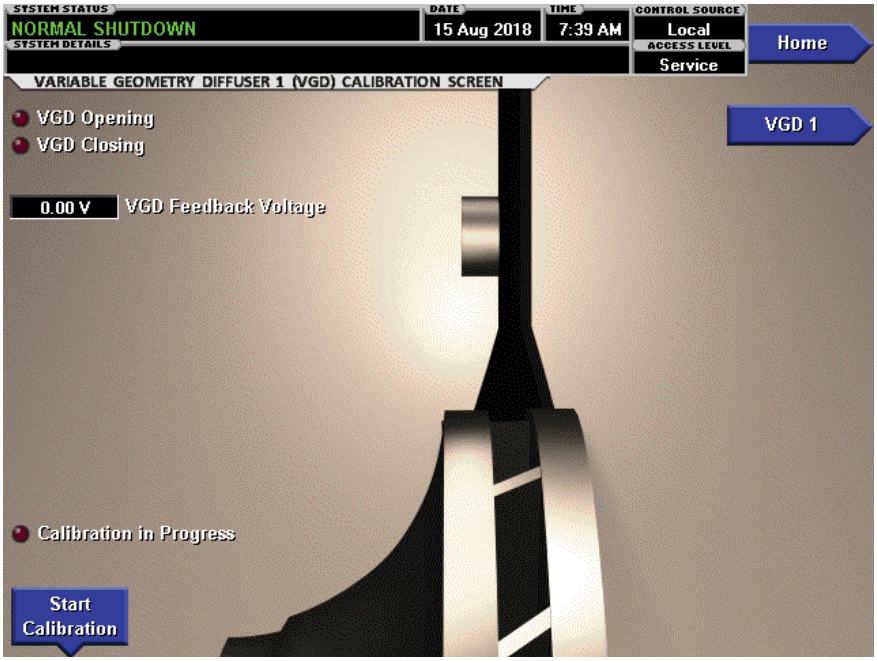
Causes an instant return to the Variable Geometry Diffuser 1 Screen

VGD 2

Access Level Required: Service

Causes an instant return to the Variable Geometry Diffuser 2 Screen

VARIABLE GEOMETRY DIFFUSER (VGD) CALIBRATION SCREEN



LD27854

FIGURE 15 - VARIABLE GEOMETRY DIFFUSER 1 CALIBRATION SCREEN

This screen allows calibration of the compressor Variable Geometry Diffuser position potentiometer.

NOTE

Requires a login access level of SERVICE.

DISPLAY ONLY

VGD Opening (LED)

Illuminates when an open signal is being applied to the VGD.

VGD Closing (LED)

Illuminates when a close signal is being applied to the VGD.

VGD Feedback Voltage

Displays the VGD position potentiometer feedback voltage.

Calibration In Progress (LED)

Illuminates when a calibration sequence is in progress.

Calibration Messages

These are text messages which step the user through the calibration process and indicate its success or failure.

PROGRAMMABLE

Start Calibration

Initiates the calibration start.

Cancel Calibration

This button is displayed during the VGD calibration process. It allows the user to cancels a calibration sequence that is in progress.

NAVIGATION

Home

Access Level Required: SERVICE

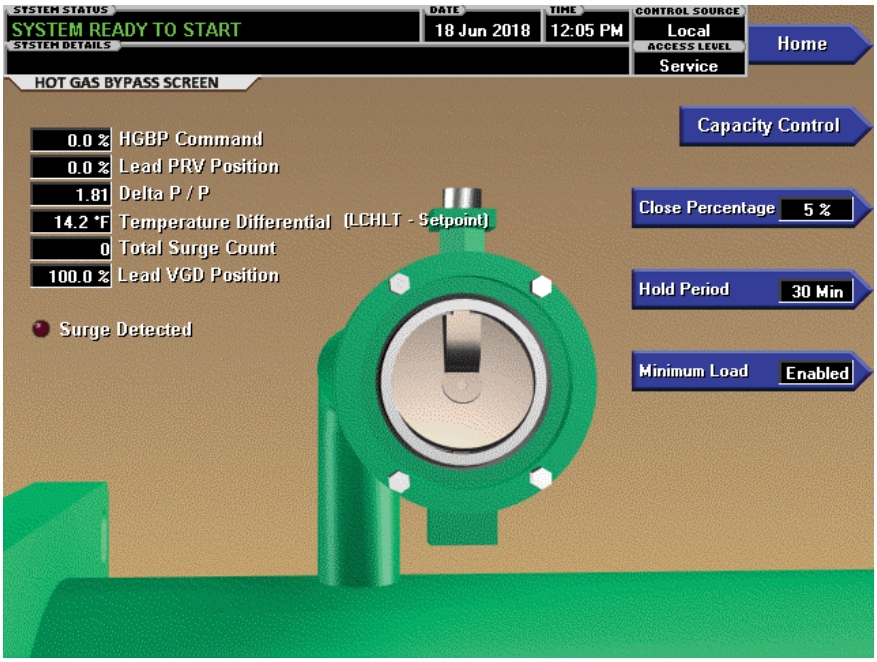
Causes an instant return to the Home Screen.

VGD 1 or 2

Access Level Required: SERVICE

Moves to the VGD 1 subscreen that allows viewing of the associated VGD parameters.

HOT GAS BYPASS SCREEN



LD27855

FIGURE 16 - HOT GAS BYPASS SCREEN

This screen displays a cutaway view of the Hot Gas Bypass Valve. All setpoints relating to Hot Gas Bypass control are maintained on this screen. Also, related Hot Gas Bypass control parameters are displayed for reference. Through animation, the relative valve position is displayed. In addition, the valve can be manually operated.

NOTE

Requires access level of SERVICE.

DISPLAY ONLY

HGBP Command

Displays the position of the Hot Gas valve over the range of 0% (closed) to 100% (fully open). The valve position is animated. When the actual position is 0% to 19%, the valve is shown fully closed. When actual position is 20% to 39% the valve is shown 25% open. When actual position is 40% to 59%, the valve is shown 50% open. When actual position is 60% to 79%, the valve is shown as 75% open. Positions greater than 79% shown as full open.

Lead PRV Position

Displays the position of the Lead Compressor Pre-Rotation Vanes over the range of 0% (closed) to 100% (fully open). Displayed at XXX until calibration procedure is performed by service technician.

Delta P/P

A parameter that represents system differential or "Head". It is calculated as [(condenser pressure – evaporator pressure) / evaporator pressure]

Temperature Differential

The difference between the Leaving Chilled Liquid Temperature and the Leaving Chilled Liquid Temperature Setpoint. It is calculated by subtracting the Leaving Chilled Liquid temperature from the Leaving Chilled Liquid Temperature Setpoint.

Total Surge Count

This is the total number of surge events that have been detected over the lifetime of the chiller.

Lead VGD Position

Displays the position of the Lead Compressor VGD over the range of 0% (closed) to 100% (fully open). Displayed at XXX until calibration procedure is performed by service technician.

Surge Detected (LED)

Illuminated for 5 seconds each time a surge is detected.

PROGRAMMABLE

Close Percentage

This is the incremental amount that the Hot Gas Valve will be closed at 10 minute intervals after the HOLD period has elapsed. (Programmable 5 to 15 %, Default 5%).

Hold Period

This is the period of time after no more surges are detected that the Hot Gas Valve will begin to close. (Programmable 30 minutes to 120 minutes, Default 30 minutes).

Minimum Load

Enables or disables the Minimum Load function.

NAVIGATION

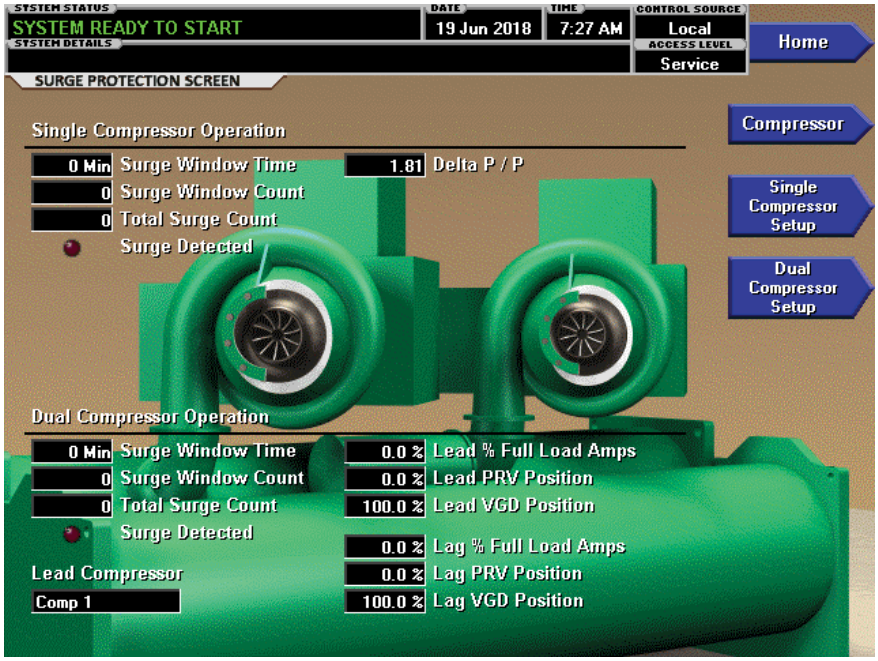
Home

Causes an instant return to the Home Screen

Capacity Control

Causes an instant return to the Capacity Control Screen.

SURGE PROTECTION SCREEN



LD27856

FIGURE 17 - SURGE PROTECTION SCREEN

This screen displays both single compressor and dual compressor surge protection parameters. An LED illuminates when a surge event is detected. Impeller animation indicates when a compressor is running. This screen also serves as a gateway to subscreens for viewing and programming of the single compressor and dual compressor surge protection setpoints.

DISPLAY ONLY

Single Compressor Operation

Surge Window Time

When the lead compressor is started, this value counts up from 1 minute to the time programmed as the COUNT WINDOW Setpoint. When it reaches a count equal to the COUNT WINDOW setpoint, it doesn't increment anymore and the number of single-compressor surge events in the oldest minute is discarded and the number of single–compressor surge events in the most recent minute are added, thus providing a rolling count of the total single-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. This value is reset when one or both compressors have shutdown.

Surge Window Count

Displays the number of single-compressor surge events that have occurred in the last 1 to 5 minutes (as programmed with the COUNT WINDOW setpoint). If the single-compressor has been running for less than the COUNT WINDOW setpoint minutes, it is the number of dual-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. The count is cleared when the one or both compressors have shutdown.

Total Surge Count

Displays the total number of single-compressor surge events that have occurred over the lifetime of the chiller.

Surge Detected *(LED)*

Illuminates for 5 seconds each time a single-compressor surge event is detected.

Delta P/P

A parameter that represents the system differential or "Head Pressure". It is calculated as (condenser pressure – evaporator pressure) / evaporator pressure.

Dual Compressor Operation

Surge Window Time

When the lag compressor is started, this value counts up from 1 minute to the time programmed as the COUNT WINDOW Setpoint. When it reaches a count equal to the COUNT WINDOW setpoint, it doesn't increment anymore and the number of dual compressor surge events in the oldest minute is discarded and the number of dual–compressor surge events in the most recent minute are added, thus providing a rolling count of the total dual-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. This value is reset when one or both compressors have shutdown.

*S*urge Window Count

Displays the number of dual-compressor surge events that have occurred in the last 15 to 120 minutes (as programmed with the COUNT WINDOW setpoint). If the lag compressor has been running for less than the COUNT WINDOW setpoint minutes, it is the number of dual-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. The count is cleared when the one or both compressors have shutdown.

Total Surge Count

Displays the total number of dual-compressor surge events detected over the lifetime of the chiller.

Surge Detected *(LED)*

Illuminates for 5 seconds each time a dual-compressor surge is detected.

Lead Compressor

Identifies the compressor that has been assigned as the lead compressor.

Lead % Full Load Amps

Displays the motor current of the lead compressor as a percentage of the full load amps of that compressor motor.

Lead PRV Position

Displays the position of the lead compressor pre-rotation vanes.

Lead Variable Geometry Diffuser Position

Displays the position of the lead compressor Variable Geometry Diffuser.

Lag % Full Load Amps

Displays the motor current of the lag compressor as a percentage of the full load amps of that compressor motor.

Lag PRV Position

Displays the position of the lag compressor pre-rotation vanes.

Lag Variable Geometry Diffuser Position

Displays the position of the lag compressor Variable Geometry Diffuser

PROGRAMMABLE

None

NAVIGATION

Home

Access Level required: VIEW

Causes an instant return to the Home Screen

Compressor

Access Level Required: VIEW

Causes an instant return to the Compressor Screen.

Single Compressor Setup

Access Level Required: VIEW

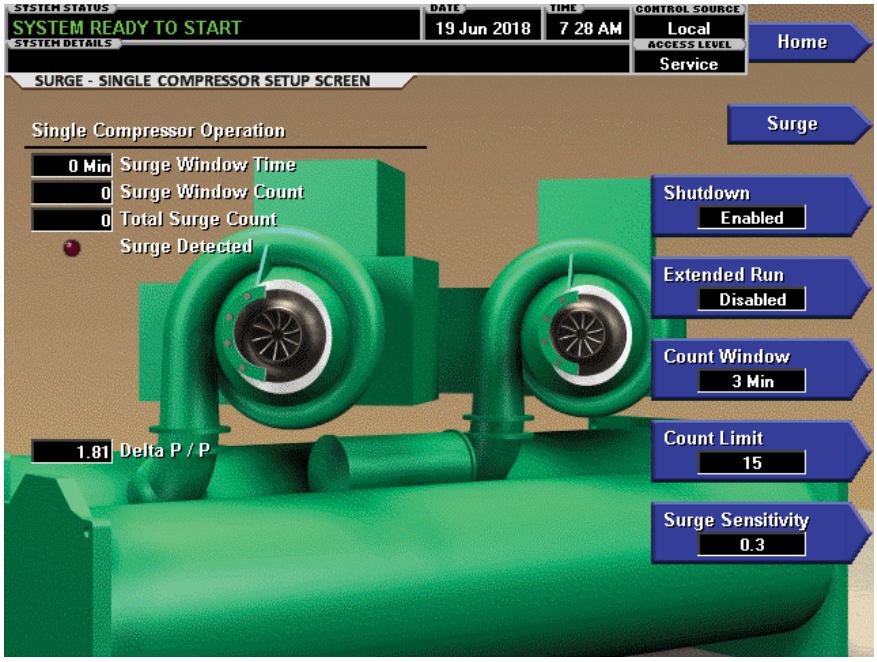
Moves to a subscreen that allows viewing and programming of the surge protection applied when only one compressor is running.

Dual Compressor Setup

Access Level Required: VIEW

Moves to a subscreen that allows viewing and programming of the surge protection applied when both compressors are running.

SURGE PROTECTION SCREEN (SINGLE-COMPRESSOR OPERATION)



LD27857

FIGURE 18 - SURGE PROTECTION SCREEN (SINGLE COMPRESSOR OPERATION)

This screen displays the single-compressor surge protection parameters. The setpoints applicable to this feature are maintained here. An LED illuminates when a surge event is detected during single-compressor operation.

NOTE

This screen and all parameters displayed here apply to single-compressor operation only.

DISPLAY ONLY

Delta P/P

A parameter that represents the system differential or "Head pressure". It is calculated as (condenser pressure – evaporator pressure) / evaporator pressure.

Surge Window Time

When the chiller enters run mode, this value counts up to the time programmed as the COUNT WINDOW setpoint. When it reaches the COUNT WINDOW minutes, the number of surge events in the oldest minute is discarded and the number of surge events in the most recent minute is added, thus providing a rolling count of the total surge events that have occurred in the last COUNT WINDOW minutes. This value is reset when the chiller shuts down.

Surge Window Count

Displays the number of surge events that have occurred in the last 1 to 5 minutes as programmed with the COUNT WINDOW setpoint. If the chiller has been running for less than the COUNT WINDOW minutes, it is the number of surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. The count is cleared when the chiller shuts down.

Total Surge Count

Displays the total number of surge events detected over the lifetime of the unit (up to a maximum of 65535).

Surge Detected (LED)

Illuminates for 5 seconds each time a surge is detected.

Extended Run Time Remaining

Displays the time remaining in the 10-minute "EXTENDED RUN" period. During this period, the Pre-rotation vanes are driven closed and "Warning – Surge Protection – Excess Surge Limit" is displayed. Refer to operation under *Count Limit* below.

PROGRAMMABLE

Shutdown (Enabled/Disabled)

Access Level Required: OPERATOR

Allows the user to select whether the chiller will shutdown or continue to run when an Excess Surge situation has been detected.

If this setpoint is Enabled and the EXTENDED RUN setpoint is Disabled, a safety shutdown is performed when the SURGE WINDOW COUNT exceeds the COUNT LIMIT setpoint.

If this setpoint is Enabled and the EXTENDED RUN setpoint is Enabled, a safety shutdown is performed if the SURGE WINDOW COUNT exceeds the COUNT LIMIT setpoint at the completion of the 10 minute Extended Run period.

"Surge Protection – Excess Surge" is displayed with either shutdown.

If this setpoint is Disabled, refer to operation under *Count Limit* below.

Extended Run (Enabled/Disabled)

Access Level Required: OPERATOR

Allows the user to select the surge correction/avoidance EXTENDED RUN mode. This will be implemented when an Excess surge situation is detected as follows: Anytime the SURGE WINDOW COUNT exceeds the COUNT LIMIT, the Pre-rotation vanes are driven closed for the next 10 minutes. While this load inhibit is in effect, "Warning – Surge Protection – Excess Surge Limit' is displayed. When 10 minutes have elapsed, the warning message and load inhibit are automatically cleared, provided the SURGE WINDOW COUNT is less than or equal to the COUNT LIMIT. If the SHUTDOWN setpoint is Enabled, and the SURGE WINDOW COUNT exceeds the COUNT LIMIT at the completion of this period, a safety shutdown is performed and "Surge Protection – Excess Surge" is displayed.

If the Hot Gas Bypass control is Enabled, the Hot gas Bypass Valve position must be 100% before the Extended Run mode is implemented.

Count Window

Access Level Required: OPERATOR

Allows the user to define the period of time (1 to 5 minutes; default 3) in which the number of surge events (SURGE WINDOW COUNT) are compared to the maximum allowed (COUNT LIMIT), for the purpose of detecting an excess surge situation.

Count Limit

Access Level Required: OPERATOR

Allows the user to define the maximum number of surge events (4 to 20; default 15) that can occur within a defined period of time before an Excess Surge situation is detected. If the SURGE WINDOW COUNT exceeds the COUNT LIMIT, an Excess Surge situation has occurred.

When an Excess Surge situation is detected, the action depends upon the following:

- If both the SHUTDOWN and EXTENDED RUN setpoints are Disabled, the chiller will continue to run, displaying the message "Warning – Excess Surge detected".
- If the SHUTDOWN setpoint is Enabled and the EXTENDED RUN setpoint is Disabled, the chiller will perform a safety shutdown and display "Surge Protection – Excess Surge".
- If the SHUTDOWN setpoint is Disabled and the EXTENDED RUN setpoint is Enabled, the Pre-rotation Vanes are driven closed for 10 minutes and "Warning – Surge Protection – Excess Surge Limit" is displayed. When the 10 minutes have elapsed, if the SURGE WINDOW COUNT is less than or equal to the COUNT LIMIT, this message and load inhibit are automatically cleared. Alternating with this message is "Warning – Excess Surge Detected" that continues after the 10 minute period has elapsed until manually cleared with the Warning Reset key.

- If both the SHUTDOWN and EXTENDED RUN setpoint are Enabled, the 10 minute Extended RUN mode is invoked as described above. However, if the SURGE WINDOW COUNT exceeds the COUNT LIMIT at the completion of the 10 minute extended run period, a safety shutdown is performed and "Surge Protection – Excess Surge" is displayed.

Surge Sensitivity

Access Level Required: SERVICE

Allows the user to define the surge detection sensitivity. Selectable over the range of 0.3 to 1.3; default 0.3. The smaller the number, the greater the sensitivity.

Clear Surge Count

Access Level Required: ADMIN

Allows user to set the Single Compressor Total Surge Count to zero.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen

SURGE

Access Level Required: VIEW

Causes an instant return to the Main Surge Screen.

SURGE PROTECTION SCREEN (DUAL-COMPRESSOR OPERATION)

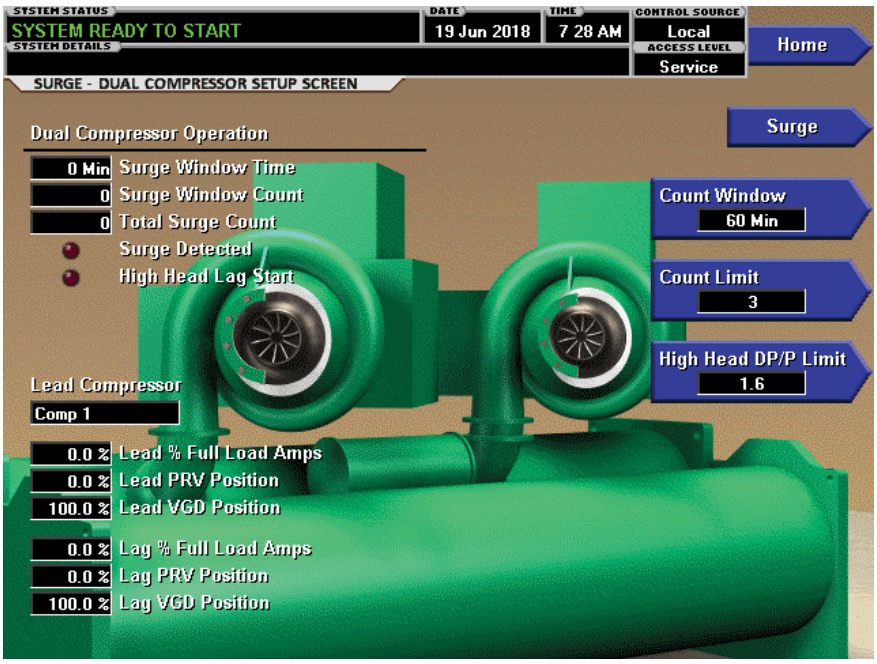


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FIGURE 19 - SURGE PROTECTION SCREEN (DUAL COMPRESSOR OPERATION)

This screen displays the dual-compressor surge protection parameters. The setpoints applicable to this feature are maintained here. An LED illuminates when a surge event is detected during dual-compressor operation.

NOTE

This screen and all parameters displayed here apply to dual-compressor operation only.

DISPLAY ONLY

Surge Window Time

When the lag compressor is started, this value counts up from 1 minute to the time programmed as the COUNT WINDOW Setpoint. When it reaches a count equal to the COUNT WINDOW setpoint, it no longer increments and the number of dual compressor surge events in the oldest minute is discarded and the number of dual–compressor surge events in the most recent minute are added, thus providing a rolling count of the total dual-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. This value is reset when one or both compressors have shutdown.

Surge Window Count

Displays the number of dual-compressor surge events that have occurred in the last 15 to 120 minutes (as programmed with the COUNT WINDOW setpoint). If the lag compressor has been running for less than the COUNT WINDOW setpoint minutes, it is the number of dual-compressor surge events that have occurred within the last number of minutes displayed as the SURGE WINDOW TIME. The count is cleared when the one or both compressors have shutdown.

Total Surge Count

Displays the total number of dual-compressor surge events detected over the lifetime of the chiller.

Surge Detected (LED)

Illuminates for 5 seconds each time a dual-compressor surge is detected.

High Head Lag Start (LED)

Illuminates when a High Head Lag Start condition exists. The lag chiller is prone to surge on start when a high head condition exists. During these conditions, the lead compressor will be unloaded before the lag compressor is started.

Lead Compressor

Identifies the compressor that has been assigned as the lead compressor.

Lead % Full Load Amps

Displays the motor current of the lead compressor as a percentage of the full load amps of that compressor motor.

Lead PRV Position

Displays the position of the lead compressor pre-rotation vanes position.

Lead VGD Position

Displays the position of the lead compressor Variable Geometry Diffuser.

Lag %Full Load Amps

Displays the motor current of the lag compressor as a percentage of the full load amps of that compressor motor.

Lag PRV Position

Displays the position of the lag compressor pre-rotation vanes position.

Lag VGD Position

Displays the position of the lag compressor Variable Geometry Diffuser.

PROGRAMMABLE

Count Window

Access Level Required: OPERATOR

Allows the user to define the period of time (15 to 120 minutes; default 60) in which the number of surge events are compared to the Count Limit threshold. Each time a surge occurs, the Surge Window Count increments. If the Surge Window count is less than or equal to the Count Limit, a close signal is applied to both compressor #1 and #2 Pre-Rotation Vanes until compressor #1 motor current is within 20% of compressor #2. While the vanes are closing, "Warning – Anti Surge- Excess Surge Limit" is displayed until the motor currents are balanced with 20%, whereupon it automatically clears. If the Surge Window Count exceeds the Count Limit, the lag compressor is taken off line and "Warning – Anti Surge –Surge Limit Exceeded" is displayed. This is displayed until manually reset with the Warning Reset Key.

Count Limit

Access Level Required: OPERATOR

Allows the user to define the maximum number of surge events (2 to 8; default 3) that can occur within the programmed Count Window period of time before the lag compressor is taken off line. Each time a surge occurs, the Surge Window Count is incremented. If the Surge Window Count. If the number of surge events within the Count window exceeds the Count Limit, the lag compressor is taken off line and "Warning – Anti Surge – Surge Limit Exceeded" is displayed. This will be displayed until manually cleared with the Warning Reset key.

Clear Surge Count

Access Level required: ADMIN

Allows user to reset dual compressor Total Surge Count to zero.

High Head DP/P Limit

Access Level required: SERVICE

Specifies the Delta P/P head condition [(Condenser pressure - Evaporator pressure) / Evaporator pressure], above which the Lead compressor's Pre-rotation Vanes will be driven closed while the Lag compressor is starting. This avoids surging during high head conditions.

NAVIGATION

Home

Access Level required: VIEW

Causes an instant return to the Home Screen.

Surge

Access Level Required: VIEW

Causes an instant return to the Main Surge Screen.

CAPACITY CONTROL SCREEN

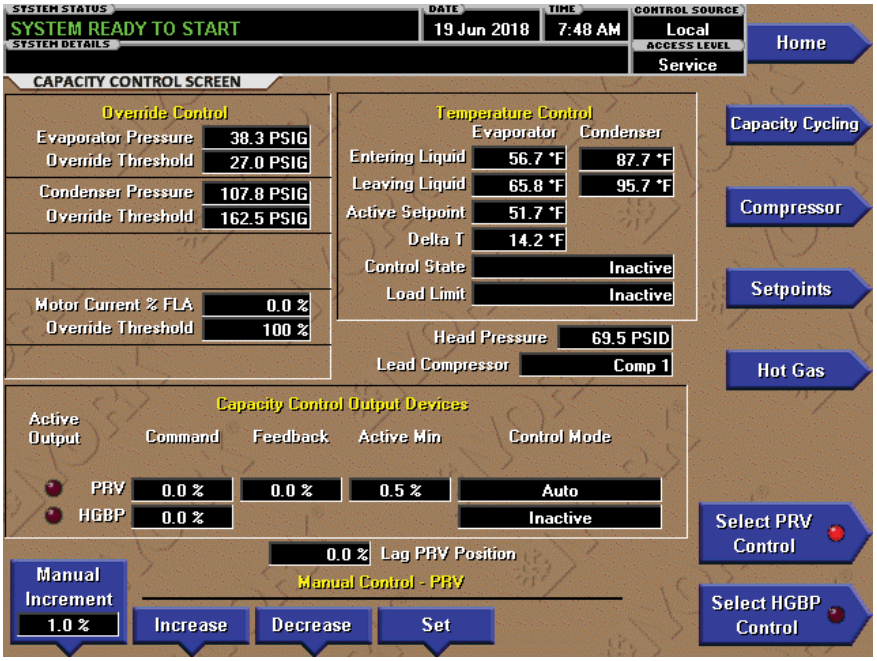

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FIGURE 20 - CAPACITY CONTROL SCREEN

This screen displays the pertinent parameters associated with capacity control in relation to Leaving Chilled Liquid temperature, current and pressure overrides, and anti-surge control.

DISPLAY ONLY

Evaporator Pressure

Displays the pressure in the evaporator.

[Evaporator Pressure] Override Threshold

Displays the evaporator pressure setpoint below which the low evaporator pressure capacity control override takes effect.

Condenser Pressure

Displays the pressure in the condenser.

[Condenser Pressure] Override Threshold

Displays the condenser pressure setpoint above which the high condenser pressure capacity control override takes effect.

Motor Current % FLA

Displays the percentage of maximum motor current delivered to the motor, determined from the highest of the three phase Motor Currents/Maximum Motor Current Limit.

[Motor Current % FLA] Override Threshold

Displays the active input current percent limit, which is the minimum of Local Input Current Limit, Remote Input Current Limit, and Pulldown Current Limit or BAS (ISN) current limit.

Entering Liquid - Evaporator

Displays the temperature of the chilled liquid as it enters the evaporator.

Entering Liquid - Condenser

Displays the temperature of the condenser liquid entering the condenser.

Leaving Liquid - Evaporator

Displays the temperature of the chilled liquid as it leaves the evaporator.

Leaving Liquid - Condenser

Displays the temperature of the liquid leaving the condenser.

Active LCHLT Setpoint

Displays the active temperature setpoint to which the chiller is set to control liquid leaving the evaporator. The Active Setpoint is a target to the Local, Remote or BAS (ISN) LCHLT programmed setpoint, depending on the control source selected. When the chiller is not running, the Active Setpoint is set to Entering Chilled Liquid Temperature - LCHLT Setpoint Start Offset When the VSD starts, the Active LCHLT Setpoint is ramped to the programmed LCHLT Setpoint at the programmable LCHLT Setpoint Ramp Rate. When the chiller is running, performing capacity control, any change to the programmed LCHLT setpoint results in a ramp from the old Active Setpoint value to the new LCHLT setpoint value at the programmed LCHLT Setpoint Ramp Rate.

Delta T

Displays the difference between the temperature of the chilled liquid leaving the evaporator and the Leaving Chilled Liquid Active Setpoint.

Control State

Displays the present source controlling the command to the capacity control devices, based on conditions as follows:

- Inactive - Capacity Control is not active
- Temperature Control - Capacity Control is active with no overrides acting
- Input Current - Input Current Override is in control
- Motor Current - Motor Current Override is in control
- Condenser Pressure - Condenser Pressure Override is in control
- Evaporator Pressure - Evaporator Pressure Override is in control
- Low LCHLT - LCHLT low temperature Override is in control

Load Limit

Displays if any load limiting control is acting on the temperature control output to the capacity control devices. The field indicates the following:

- Inactive - Capacity Control is not active
- None - No limit is in effect
- Input Current
- Motor Current
- Condenser Pressure
- Evaporator Pressure

Head Pressure

Displays the difference between condenser refrigerant pressure and evaporator refrigerant pressure.

Lead Compressor

Displays which compressor is lead.

Capacity Control Output Devices

Displays the following for each of the devices that is available: VSD (Variable Speed Drive if installed), VGD (Variable Geometry Diffuser) or HGBP (Hot Gas Bypass Valve if installed)

- Active Output (LED): Indicates which device is currently selected by the control for manipulation.
- Command: Displays the output command from the control to the device in Hertz to the VSD or in percent of full open to the VGD or HGBP valve.
- Feedback: Displays the present speed feedback from the VSD or present position feedback from the VGD.
- Active Min: Displays the prevailing minimum value to which the control to the device is limited, based upon surge controls or operating limits.
- Control Mode: Displays whether the device is under Automatic or Manual control or inactive.

Lag PRV Position

Displays the Pre-Rotation Vane position of the Lag compressor.

PROGRAMMABLE

Select PRV Control

Allows a service technician to set the PRV to be manually controlled.

Select HGBP Control

Allows a service technician to set the Hot Gas Bypass to be manually controlled.

Manual Increment

Sets the percentage amount that the PRV or HGBP will move with each press of the Manual Increase or Decrease button. (Adjustable between 0.1% and 10%)

Increase

Opens the selected PRV or HGBP with each press by the amount set in the Manual Increment setting.

Decrease

Closes the selected PRV or HGBP with each press by the amount set in the Manual Increment setting.

Set

Allows the service technician to set the selected PRV or HGBP to a desired position between 05 and 100% for testing.

Auto

Returns the manually controlled PRV or HGBP back to Automatic program control.

NAVIGATION

Home

Causes an instant return to the Home screen.

Capacity Cycling

Causes an instant jump to the Capacity Cycling screen where the Operator can set the Compressor staging and lockout a compressor.

Compressor

Causes an instant navigation to the Compressor screen.

Setpoints

Navigates to the Capacity Control Setpoints screen.

Hot Gas

Causes an instant navigation to the Hot Gas screen if that option is installed.

CAPACITY CONTROL SETPOINTS SCREEN

LD27860

FIGURE 21 - CAPACITY CONTROL SETPOINTS SCREEN

This screen displays the capacity control setpoints. A Service Level password is required to access this screen.

DISPLAY ONLY

All other parameters are view only and may be requested by Product Technical Support or Chiller Engineering when assisting in troubleshooting.

PROGRAMMABLE (REQUIRES SERVICE PASSWORD)

Change Setpoints

Pressing this button highlights the first of the changeable parameters, LCHLT Setpoint Ramp Rate.

LCHLT Setpoint Ramp Rate

When the chiller is not running, the Active Setpoint is set to Entering Chilled Liquid Temperature minus a programmable offset (default 5°F), but not adjusted to less than the programmed LCHLT setpoint. When the compressor motor starts, the Active LCHLT Setpoint is ramped from this value to the programmed LCHLT Setpoint at the programmable LCHLT Setpoint Ramp Rate (default 0.1°F/second). This keeps the chiller from undershooting setpoint excessively during pull-down. Any time the programmed setpoint is changed during operation, the active setpoint is ramped to the new value at this rate. (Adjustable 0.1°F/second to 2.0°F/second, Default 0.1°F/second)

LCHLT Setpoint Start Offset

The LCHLT setpoint offset above the Active setpoint. (Adjustable 0.0°F to 10.0°F, Default 5.0°F)

Lead PRV Start Position

The desired start position of the Lead compressor PRV. (Adjustable 0% to 100%, Default 0%)

Gear Ratio Override

Allows the technician to add a buffer above the operating surge plane by adjusting this parameter. (Adjustable 0.0000 to 7.0000, Default 0.0000)

NAVIGATION

Home

Navigates to the Home screen.

Capacity Control

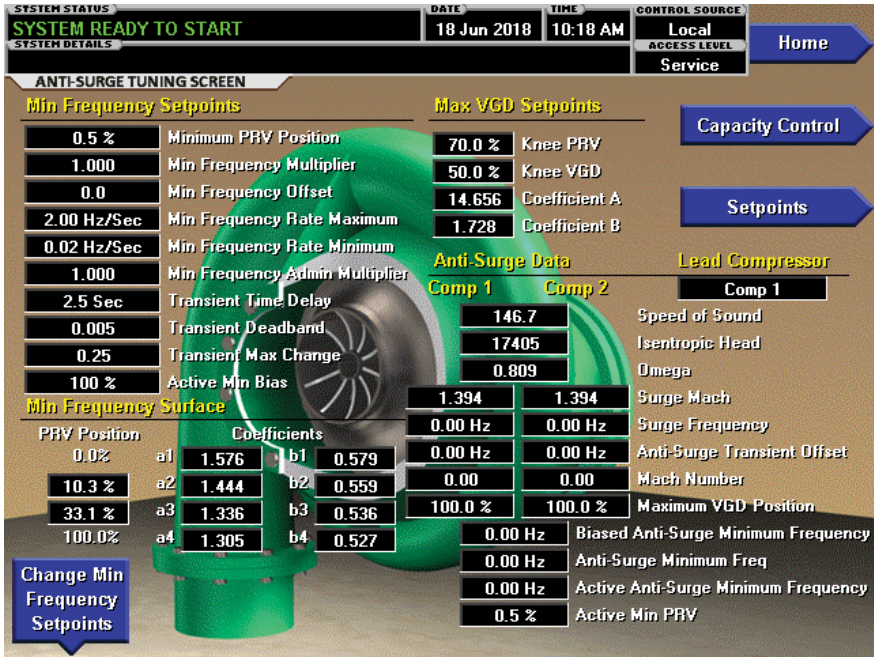
Returns to the Capacity Control screen.

Anti-Surge Tuning

Navigates to the Anti-Surge Tuning screen.

2

ANTI-SURGE TUNING SCREEN



LD27861

FIGURE 22 - ANTI-SURGE TUNING SCREEN

This screen displays the Anti-Surge Tuning parameters. A Service Level password is required to access this screen.

DISPLAY ONLY

All other parameters are view only and may be requested by Product Technical Support or Chiller Engineering when assisting in troubleshooting.

PROGRAMMABLE

There are no Programmable setpoints on this screen. The technician may be asked to provide a picture of this screen by Product Technical Support or Chiller Engineering when assisting in troubleshooting.

LCHLT Setpoint Ramp Rate

When the chiller is not running, the Active Setpoint is set to Entering Chilled Liquid Temperature minus a programmable offset (default 5°F), but not adjusted.

LCHLT Setpoint Start Offset

The LCHLT setpoint offset above the Active setpoint. (Adjustable 0.0°F to 10.0°F, Default 5.0°F)

Lead PRV Start Position

The desired start position of the Lead compressor PRV. (Adjustable 0% to 100%, Default 0%)

Gear Ratio Override

Allows the technician to add a buffer above the operating surge plane by adjusting this parameter. (Adjustable 0.0000 to 7.0000, Default 0.0000)

NAVIGATION

Home

Navigates to the Home screen.

Capacity Control

Returns to the Capacity Control screen.

Anti-Surge Tuning

Navigates to the Anti-Surge Tuning screen

CAPACITY COMPRESSOR CYCLING SCREEN

LD27862

FIGURE 23 - CAPACITY COMPRESSOR CYCLING SCREEN

This screen allows the user to specify the chiller load conditions under which the lag compressor is cycled on and off. Both compressors are not started at the same time. The lead compressor is started first. If it does not meet the load requirements as established with the following setpoints, the lag compressor is started. After the lag compressor is running, it will be shutdown if the load decreases to the point established by the following setpoints. Parameters pertinent to chiller loading are displayed. Also, compressor #1 or #2 can be selected for lockout.

DISPLAY ONLY

Temperature Differential (Leaving Chilled Liquid Temperature - Setpoint)

Displays the difference between the Leaving Chilled Liquid Temperature and the Leaving Chilled Liquid Temperature Setpoint.

Delta T Rate

Displays the rate of change of the Leaving Chilled Liquid Temperature as “X.X ºF/Minute”. Value displayed represents a five-point rolling average obtained as follows: After the first 3 minutes of chiller run time, the Leaving Chilled Liquid Temperature is sampled once every minute. The previous reading is subtracted from the present reading and the last 5 results are averaged to obtain a five-point rolling average. Displayed as zero when chiller is not running.

Lead % Full Load Amps

Displays the motor current of the lead compressor as a percentage of the full load amps of that compressor motor.

Lead PRV Position

Displays the position of the lead compressor pre-rotation vanes position.

Lead VGD Position

Displays the position of the lead compressor Variable Geometry Diffuser.

Lead VSD Output Frequency

Displays the value of the lead compressor VSD output frequency if a VSD is installed.

Lag % Full Load Amps

Displays the motor current of the lag compressor as a percentage of the full load amps of that compressor motor.

Lag PRV Position

Displays the position of the lag compressor pre-rotation vanes position.

Lag VGD Position

Displays the position of the lag compressor Variable Geometry Diffuser.

Lag VSD Output Frequency

Displays the value of the lag compressor VSD output frequency if a VSD is installed.

Lead Compressor

Identifies the compressor that has been assigned as the lead compressor.

High Head Lag Start (LED)

Illuminates when a High Head Lag Start condition exists.

Reduced Speed Lag Start (LED)

Illuminates when the lag compressor is to start if the lead compressor VSD is running at less than maximum speed.

Lag Compressor Control

Displays the control state of the lag compressor as follows. Normally, the lag compressor progresses through the following states in the order presented.

"Stopped"

The lag compressor is in this state when locked out, in anti-recycle, its vane motor switch is open or shutdown by the Surge Protection feature.

"Inhibited"

The lag compressor is prevented from running because the Chiller Pulldown Demand Limit Setpoint is less than or equal to 50% (during the Chiller Pulldown Period) or the Chiller Current Limit Setpoint is less than or equal to 50% (during the Chiller Steady State Period), but is otherwise able to run.

"Waiting For Pulldown Delay"

Displayed during the first 8 minutes of the Chiller Pulldown Period. Delay consists of a 3 minute bypass when the chiller first enters the run state followed by a 5 minute evaluation period to establish the first 5-point rolling average of the Delta T Rate.

"Checking Minimum Rate" and "Waiting Minimum Rate Time"

When the 8 minute Pulldown Delay is finished, the Chiller Pulldown Period continues until the Leaving Chilled Liquid Temperature is within 2ºF of the Leaving Chilled Liquid Temperature Setpoint. During this period, the Delta T Rate is compared to the Minimum Rate Setpoint and the Minimum Rate Time Setpoint to determine if the lead compressor is meeting the load requirement. If the Delta T Rate is less than the programmed Minimum Rate Setpoint for a period equal to the Minimum Rate Time Setpoint and the Chiller Pulldown Limit Setpoint is above 50%, the lag compressor is brought on line. "Checking Minimum Rate" is displayed after the Pulldown Delay is finished and until either the Delta T Rate is less than the Minimum Rate Setpoint (whereupon "Waiting Minimum Rate Time" is displayed), the Chiller Pulldown Period is no longer in effect (whereupon "Checking Maximum Delta T" is displayed) or the Chiller Pulldown Limit Setpoint is set to 50% or less. When "Waiting Minimum Rate Time" is displayed, it will be displayed until the Chiller Pulldown Period has ended (whereupon "Checking Maximum Delta T" is displayed), the Delta T Rate is less than the Minimum Rate Setpoint (whereupon "Checking Minimum rate" is again displayed), the Minimum Rate Time has expired (whereupon the lag compressor is brought on line and "Preparing Chiller for Lag Run" is displayed) or the Chiller Pulldown Demand Limit is set to 50% or less.

"Checking Maximum Delta T" and "Waiting Maximum Delta T Time"

When the Leaving Chilled Liquid Temperature is within 2ºF of the Leaving Chilled Liquid Temperature Setpoint, the Chiller Pulldown Period ends and the Chiller Steady State Period begins. During this period, the Temperature Differential is compared to the Maximum Delta T Setpoint and the Maximum Delta T Time Setpoint to determine if the lead compressor is meeting the load requirement. If the Temperature Differential exceeds the Maximum Delta T Setpoint for a period equal to the Maximum Delta T Time and the Chiller Current Limit is above 50%, the lag compressor is brought on line. "Checking Maximum Delta T" is displayed after the Chiller Pulldown Period is no longer in effect and until the Temperature Differential exceeds the Maximum Delta T Setpoint (whereupon "Waiting Maximum Delta T Time" is displayed) or the Chiller Current Limit is set to 50% or less. When "Waiting Maximum Delta T Time" is displayed, it is displayed until the Temperature Differential does not exceed the

Maximum Delta T Setpoint (whereupon "Checking Maximum Delta T" is displayed), the Maximum Delta T Time has expired (whereupon "Preparing Chiller for Lag Run' is displayed and the lag chiller is brought on line) or the Chiller Current Limit Setpoint is set to 50% or less.

"Preparing Chiller for Lag Run"

Displayed while bringing the lag compressor on line. Displayed during the prelube period and until the Discharge Valve has fully opened (whereupon "Waiting Minimum Run Time" is displayed). When bringing the lag compressor on line, a normal prelube is performed. However, the oil pressure transducer Auto-zeroing is not performed. The offset calculations done during the lead compressor prelube are used. The lag compressor prelube is fixed at 50 seconds.

"Waiting Minimum Run Time"

Displayed for the first 30 minutes after the lag compressor is brought line. Once both compressors are running, they are run for at least 30 minutes (unless the Anti-Recycle feature has been disabled, a fault is detected or a Local or Remote stop is received).

"Checking Minimum Load" and "Waiting Minimum Load Time"

After the 30 minute Minimum Run Time waiting period, the lag compressor will be shutdown if the lead compressor motor current goes below the Low Load Setpoint for a period equal to the Low Load Time Setpoint. After the 30 minute Minimum Run Time has elapsed, "Checking Minimum Load" is displayed until the lead compressor motor current decreases below the Low Load Setpoint (whereupon "Waiting Minimum Load Time" is displayed). "Waiting Minimum Load Time" is displayed until the lead motor current is no longer less than the Low Load Setpoint or the Minimum Load Time has expired (whereupon a soft shutdown is performed on the lag compressor and "Unloading Before Shutdown" is displayed).

"Unloading Before Shutdown"

Displayed while the Pre-rotation vanes are closing during a Soft Shutdown of the lag compressor. If the decision is made to shutdown the lag compressor while continuing to run the lead compressor, a Soft Shutdown is performed on the lag compressor.

Time Remaining

Displays the time remaining on the following timers:

- "Waiting for Pulldown Delay"
- "Waiting Minimum Run Time"
- "Waiting Minimum Rate Time"
- "Waiting Maximum Delta T Time"
- "Waiting Minimum Load Time"

Minimum Rate and Minimum Rate Time

Access Level Required: VIEW

Allows the user to define the minimum rate of change of the Leaving Chilled Liquid Temperature that must be met by the lead compressor during the Chiller Pulldown Period (this period is in effect until the Leaving Chilled Liquid Temperature is within 2ºF of setpoint). If this requirement is not being met, the lag compressor is started. After the lead compressor has been running for 3 minutes, the Leaving Chilled Liquid Temperature is sampled once every minute for 5 minutes to establish a 5 point rolling average that makes up the displayed Delta T Rate value. This 8 minute period is the Pulldown Delay Period (see *"Waiting For Pulldown Delay"* above). When the Pulldown Delay is finished, and for the remainder of the Chiller Pulldown Period, if the Delta T Rate is less than the Minimum Rate Setpoint (0.5ºF/minute to 2.0ºF/minute; default 1.0ºF/minute) for a period equal to the Minimum Rate Time Setpoint (1 to 20 minutes; default 5 minutes) and the Pulldown Demand Limit Setpoint is above 50%, the lag compressor is brought on line.

Maximum Delta T and Maximum Delta T Time

Access Level Required: VIEW

Allows the user to define the criteria that determines if the lead compressor is meeting the load requirement during the Chiller Steady State Period. If the requirement is not being met, the lag compressor is started. After the Chiller Pulldown Period has ended, the Chiller Steady State Period begins and is in effect until the chiller is shutdown. During this period, if the Temperature Differential (Leaving Chilled Liquid temperature minus Setpoint) exceeds the Maximum Delta T Setpoint (1.0ºF to 5.0ºF; default 1.0ºF) for a period equal to the Maximum Delta T Time Setpoint (1 to 20 minutes; default 5), the lag compressor is brought on line.

Low Load and Low Load Time

Access Level Required: SERVICE

Allows the user to define the criteria that determines if the lag compressor should be shutdown because the lead compressor is meeting the load requirement. After the 30 minute Minimum Run Time (see *"Waiting Minimum Run Time"* above), if the lead compressor motor current goes below the Low Load Setpoint (20% to 60%; default 45%) for a period of time equal to the Low Load Time Setpoint (1 to 20 minutes; default 5), a Soft Shutdown will be performed on the lag compressor.

PROGRAMMABLE

Compressor Lockout

Access Level Required: OPERATOR

Allows the user to lockout compressor #1 or #2. When locked out, the selected compressor will be prevented from running.

A compressor can be locked-out while both compressors are running, without shutting down the entire chiller. A soft shutdown will be performed on the running compressor selected for lockout and its status is changed to lag (if not already the lag compressor already). Upon completion of coastdown, the selected compressor will remain locked out until the lockout is released. With previous software versions, a compressor can be locked-out only while it is shutdown.

Compressor Mode

Access Level Required: OPERATOR

Allows the user to select Staged, Single, or Dual Compressor operating mode.

Staged Mode - The second compressor is brought on line to meet the load requirement.

Single Mode - The operation is restricted to one compressor only. When starting the chiller in Single Compressor mode, the operator does not designate which compressor will run. Rather, the "Lead" compressor is automatically selected by the software per normal operation. The "lag" compressor will not be brought on line, regardless of the load requirement. If Single Compressor Mode is selected while both compressors are running, a soft shutdown is performed on the "Lag" compressor. All faults for this inhibited compressor are continued to be handled. If the chiller is shutdown while running in Single Compressor mode, the software selects the "Lead" compressor as it normally does on a subsequent restart.

Dual Mode - This mode is only available when the starters are either VSD or MVVSD. Both of the compressors are started and stopped together and act as one compressor.

NAVIGATION

Home

Access Level Required: VIEW

Causes a return to the Home screen.

Capacity Control

Access Level Required: VIEW

Causes a return to the Capacity Control screen.

OIL SUMP SCREEN

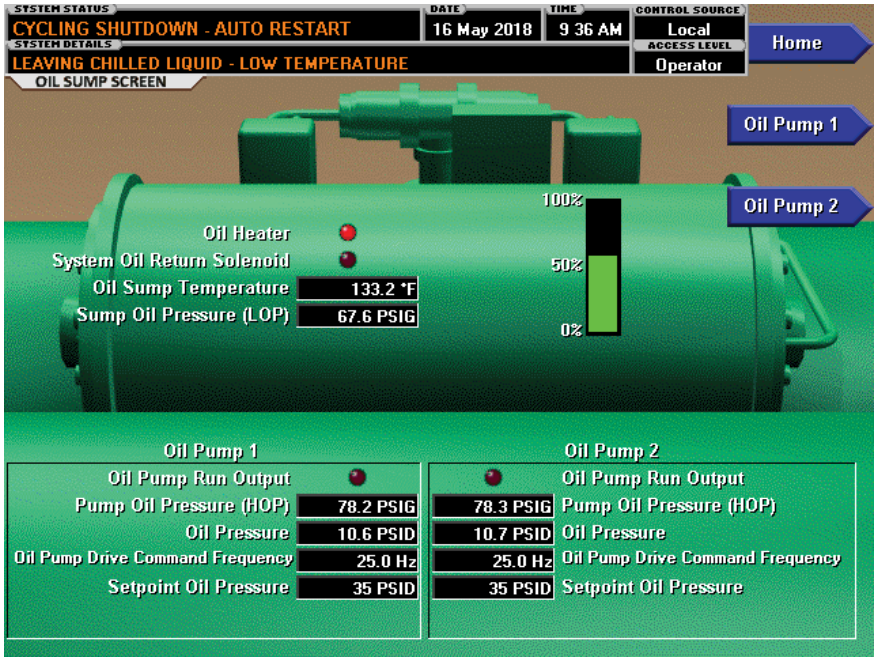


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FIGURE 24 - OIL SUMP SCREEN

This screen displays a close-up of the chiller oil sump with pertinent oil system status, pressures and temperatures. This screen also serves as a gateway to subscreens that allow programming of setpoints for the Variable Speed Oil Pumps for compressor #1 and #2.

DISPLAY ONLY

Oil Heater (LED)

Illuminates when the oil heater output is energized.

System Oil Return Solenoid (LED)

Illuminates when the oil solenoid output is energized.

Oil Sump Temperature

Displays the temperature of the oil in the sump.

Sump Oil Pressure (LOP)

Displays the low side oil pressure measured at the sump.

Oil Pump 1

Oil Pump Run Output (LED)

Illuminates when compressor #1 Variable Speed Oil Pump is being commanded to run.

Pump Oil Pressure (HOP)

Displays the high side oil pressure measured at the compressor #1 bearing input.

Oil Pressure

Displays the pressure differential between the Pump oil pressure (HOP) transducer for compressor #1 and the common Sump oil pressure (LOP) transducer. If this compressor is the lead compressor, includes offset pressure derived from auto-zeroing during the compressor #1 pre-lube. However, if compressor #2 is the lead compressor, this value includes offset pressure derived from auto-zeroing during compressor #2 Pre-lube (refer to auto-zeroing explanation under the Compressor Screen). If either transducer used to calculate this differential is out of range, the display field will show XX.X.

Oil Pump Drive Command Frequency

Displays the speed command applied to compressor #1 Variable Speed Oil Pump.

Setpoint or Target Oil Pressure

Displays the oil pressure setpoint that compressor #1 Variable Speed Oil Pump is controlling to. During the pre-lube and for the first 15 seconds of System Run, this is the target Setpoint, and is fixed at 45.0 PSID. For the remainder of compressor #1 run, it is the programmed Setpoint Oil Pressure.

Pulldown Time Remaining

Displays the time remaining until the user programmed Setpoint Oil Pressure is used. While this clock is decrementing, the Target Oil Pressure Setpoint (fixed at 45.0 PSID) is in effect.

Oil Pump 2

Oil Pump Run Output (LED)

Illuminates when compressor #2 Variable Speed Oil Pump is being commanded to run.

Pump Oil Pressure (HOP)

Displays the high side oil pressure measured at the compressor #2 bearing input.

Oil Pressure

Displays the pressure differential between the Pump oil pressure (HOP) transducer for compressor #2 and the common Sump oil pressure (LOP) transducer. If this compressor is the lead compressor, includes offset pressure derived from auto-zeroing during compressor #2 Pre-lube. However, if compressor #1 is the lead compressor, this value includes offset pressure derived from auto-zeroing during compressor #1 Pre-lube (refer to auto-zeroing explanation under the Compressor Screen). If either transducer used to calculate this differential is out of range, the display field will show XX.X.

Oil Pump Drive Command Frequency

Displays the speed command applied to compressor #2 Variable Speed Oil Pump.

Setpoint or Target Oil Pressure

Displays the oil pressure that compressor #2 Variable Speed Oil Pump is controlling to. During the pre-lube and for the first 15 seconds of System Run, this is the Target Setpoint and is fixed at 45.0 PSID. For the remainder of compressor #2 run, it is the programmed Setpoint Oil Pressure.

Pulldown Time Remaining

Displays the time remaining until the user programmed Setpoint Oil Pressure is used. While this clock is decrementing, the Target Oil Pressure Setpoint (fixed at 45.0 PSID) is in effect.

Oil Level (bar graph)

Displays the oil level in the oil sump as a vertical graph. The range of the graph is 0% to 100%. Three colors are used as follows: 0% to 35% - red; >35% to 80% - green; >80% to 100% - yellow. Only displayed if enabled using the Oil Level Detection (Enable/Disable) key.

PROGRAMMABLE

Oil Level Detection (Enable/Disable)

Access Level Required: SERVICE

Allows the user to enable or disable the Oil Level Detection feature. When enabled, displays the oil level in the oil sump as a vertical graph.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

Oil Pump 1

Access Level Required: VIEW

Moves to a subscreen that allows manual control and programming of the setpoints for compressor #1 Variable Speed Oil Pump.

Oil Pump 2

Access Level Required: VIEW

Moves to a subscreen that allows manual control and programming of the setpoints for compressor #2 Variable Speed Oil Pump.

OIL PUMP 1 AND 2 SCREEN

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FIGURE 25 - OIL PUMP 1 SCREEN

This screen displays the chiller oil sump along with the compressor oil cooler. All of the setpoints for compressor Variable Speed Drive Oil Pump are maintained here. The oil pump can be manually controlled from here. The screen is identical for oils pumps 1 and 2.

DISPLAY ONLY

Oil Pump Run Output (LED)

Illuminated when the associated compressor Variable Speed Oil Pump Drive is being commanded to run. Otherwise, it is extinguished.

Oil Pressure

Displays the pressure differential between the associated Pump oil pressure (HOP) transducer and the common Sump oil pressure (LOP) transducer. If this compressor is the lead compressor, includes offset pressure derived from auto-zeroing during the compressor prelube of the lead compressor. However, if compressor #2 is the lead compressor, this value includes offset pressure derived from auto-zeroing during compressor #2 Pre-lube (refer to auto-zeroing explanation under the Compressor Screen). If either transducer used to calculate this differential is out of range, the display field will show XX.X.

Pump Oil Pressure (HOP)

Displays the high side oil pressure measured at the compressor bearing input.

Oil Pump Drive Command Frequency

Displays the speed command that is being applied to the compressor Oil Pump Variable Speed Drive.

Setpoint or Target Oil Pressure

Displays the oil pressure setpoint that Variable Speed Oil Pump is controlling to. During the pre-lube and for the first 15 seconds of System Run, this is the target Setpoint, and is fixed at 45.0 PSID. For the remainder of compressor run, it is the programmed Setpoint Oil Pressure.

Oil Seal Lubrication Time Remaining

If a Standby Lubrication is in progress on compressor #1, displays the time remaining in the 2-minute operation.

Next Oil Seal Lubrication

If compressor #1 is not running, displays the time remaining until the next Standby Lubrication.

Pulldown Time Remaining

Displays the time remaining until the user programmed Setpoint Oil Pressure is used. While this clock is decrementing, the Target Oil Pressure Setpoint (fixed at 45.0 PSID) is in effect.

Manual Oil Pump Operation Time Left

Displays the time remaining in the 10-minute manual oil pump operation.

PROGRAMMABLE

Manual Pump (Enable/Disable)

Access Level Required: OPERATOR

This key allows the user to turn on (Enable) and off (Disable) the Variable Speed Oil Pump. The pump will be allowed to run for a maximum of 10 minutes. If a longer running time is desired, it must be Enabled again. Manual Oil Pump control is prevented (and the button is not displayed) during System Pre-lube, System Run, Proximity Probe Calibration, Seal Lubrication and System Coastdown.

Standby Lube (Enabled/Disabled)

Access Level Required: SERVICE

Allows the user to Enable or Disable the Standby Lube operation. When Enabled, this feature causes the Variable speed Oil Pump to operate for 2 minutes at 24 hour intervals while the chiller is shutdown.

Pressure Setpoint

Access Level Required: SERVICE

This key allows the user to define the oil pressure setpoint that compressor #1 Variable Speed Oil Pump will control to during automatic speed control operation. Range is 20.0 to 45.0 PSID, Default 35.0 PSID.

Control Period

Access Level Required: SERVICE

Allows the user to define the output interval of the increment or decrement speed commands to the compressor Variable Speed Oil Pump. Presently, it is set to 0.9 seconds and cannot be changed.

Variable Speed Oil Pump Speed Control

Set

Access Level Required: SERVICE

This key allows the user to specify a fixed speed at which compressor #1 Variable Speed Oil Pump will run when in manual speed control mode. The range is 25 Hz to 60 Hz.

Raise

Access Level Required: SERVICE

With the Oil Pump running, this key puts compressor #1 Variable Speed Oil Pump into manual speed control mode and increments the speed command by 0.5 Hz each time it is pressed.

Lower

Access Level Required: SERVICE

With the Oil Pump running, this key puts compressor #1 Variable Speed Oil Pump into manual speed control mode and decrements the speed command by 0.5 Hz each time it is pressed.

Auto

Access Level Required: SERVICE

This key returns compressor #1 Variable Speed Oil Pump control to automatic speed control mode, where the speed command is based on the Oil Pressure Setpoint.

NAVIGATION

Home

Access Level Required: VIEW

Causes a return to the Home Screen.

Oil Sump

Access Level Required: VIEW

Causes a return to the Oil Sump Screen.

MOTOR STARTER SCREEN

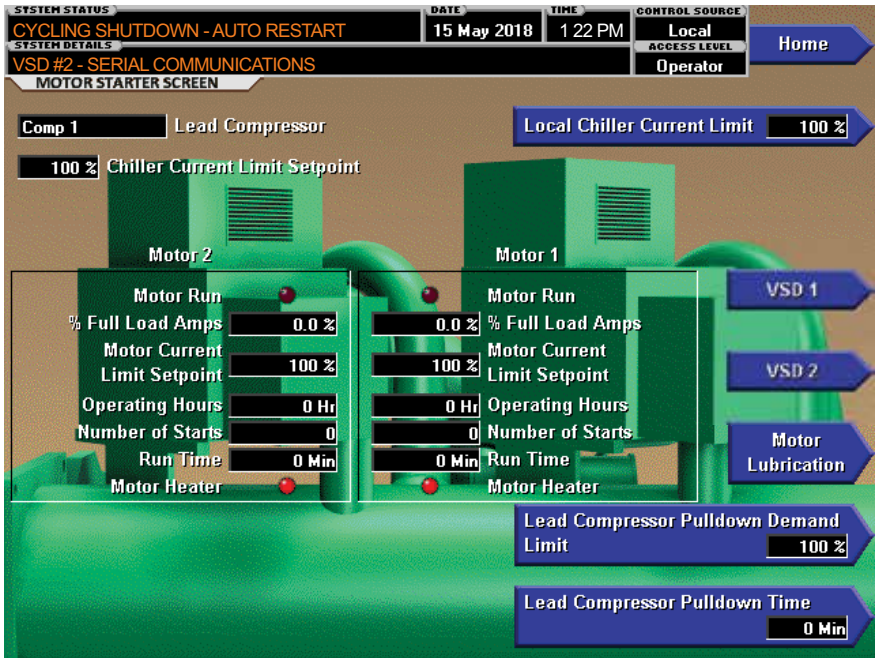

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FIGURE 26 - MOTOR STARTER SCREEN

This screen displays information pertaining to the Motor Starter.

DISPLAY ONLY

Lead Compressor

Displays whether compressor 1 or compressor 2 is the lead compressor.

Motor Run (LED)

Separate indication showing whether the digital output from the controls is commanding motor 1 or motor 2 to RUN.

% Full Load Amps

Displays the motor current as a percentage of the Full Load Amps (FLA) value for motor 1 and motor 2.

Motor Current Limit Setpoint

Displays the current limit value in use. This value could come from a 0 to 20 mA, 4 to 20 mA, 0 to 10 VDC or 2 to 10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

Operating Hours

Individually indicates the total number of hours compressor 1 and compressor 2 have run.

Number of Starts

Individually indicates the total number of times compressor 1 and compressor 2 have started.

Motor Heater (LED)

Indicates whether the digital output from the controls is commanding the optional motor heater on for each motor. This LED is not displayed if the option is not installed.

PROGRAMMABLE

Local Chiller Current Limit

Access Level Required: OPERATOR

Sets the maximum current draw of the chiller when run in the Local Mode. This is the total current of motor 1 and motor 2 added together. (Adjustable between 30 and 100%, Default = 100%)

Lead Compressor Pulldown Demand Limit

Access Level Required: OPERATOR

Sets the maximum current draw of the lead compressor during initial start for the selected Pulldown Time. (Adjustable between 30 and 100%, Default = 100%)

Lead Compressor Pulldown Time

Access Level Required: OPERATOR

Sets the amount of time that the lead compressor pulldown demand limit setpoint will be in effect. (Adjustable between 0 and 255 minutes, Default = 0 minutes).

NAVIGATION

Home

Access Level Required: VIEW

Returns user to the Home screen.

VSD 1

Access Level Required: VIEW

Moves to the subscreen which provides more information about Variable Speed Drive 1.

VSD 2

Access Level Required: VIEW

Moves to the subscreen which provides more information about Variable Speed Drive 2.

LOW VOLTAGE VARIABLE SPEED DRIVE SCREEN

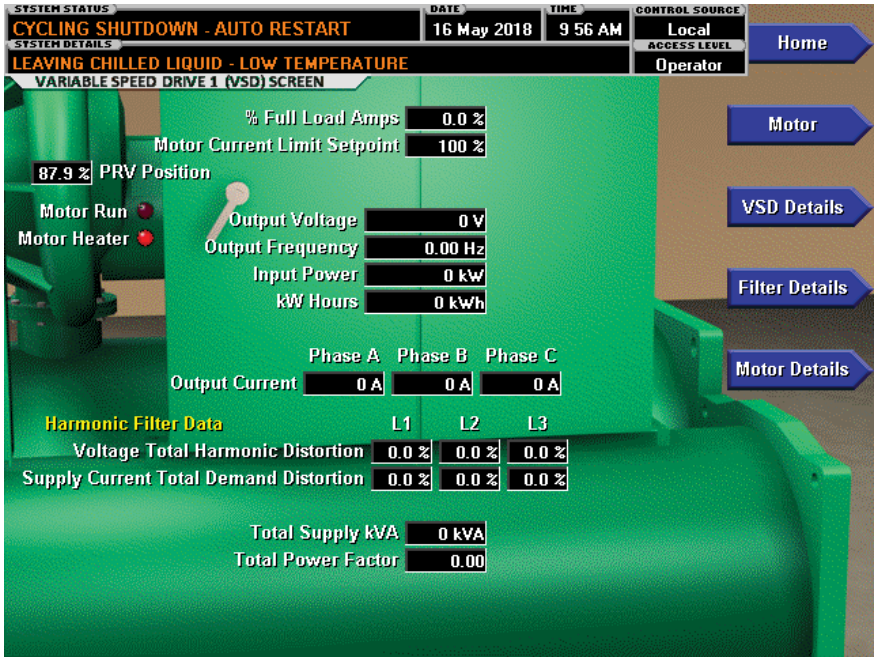

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FIGURE 27 - LOW VOLTAGE VARIABLE SPEED DRIVE SCREEN

This screen displays information pertaining to the Low Voltage Variable Speed Drive (VSD), if installed. There are two similar screens available: one for VSD 1 and another for VSD 2.

DISPLAY ONLY

Motor Run (LED)

Indicates whether the digital output from the controls is commanding the motor to RUN.

Motor Heater (LED)

Indicates whether the digital output from the controls is commanding the optional motor heater on. This LED is not displayed if the option is not installed.

% Full Load Amps

Displays the motor current as a percentage of the Full Load Amps (FLA) value.

Motor Current Limit Setpoint

Displays the current limit value in use. This value could come from a 0 to 20 mA, 4 to 20 mA, 0 to 10 VDC or 2 to 10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

PRV Position

Displays the Pre-rotation Vane position as a value between 0 and 100%.

Pulldown Demand Time Left

Displays the time remaining in the programmed pulldown period if the value is nonzero.

Output Voltage

Displays the output voltage measured to the motor.

Output Frequency

Displays the present output frequency to the motor.

Input Power

Displays the total kilowatts measured by the VSD or Harmonic Filter, if installed.

KW Hours

Displays the cumulative amount of kilowatts used over time as the VSD motor controller operates.

Output Current - Phase A, B, C

Displays the phase current measured to the motor.

Voltage Total Harmonic Distortion - (L1, L2, L3)

Displays the Total Harmonic Distortion (THD) for each of the voltage lines as calculated by the optional filter.

Supply Current Total Demand Distortion - (L1, L2, L3)

Displays the Total Dynamic Distortion (TDD) for each of the supply current lines as calculated by the optional filter.

Supply kVa

Displays the supply kVa measured by the optional filter.

Total Power Factor

Displays the relationship between the Input Power and the Supply kVA when the optional filter is installed.

PROGRAMMABLE

None.

NAVIGATION

Home

Access Level Required: VIEW

Returns user to the Home screen.

Motor

Access Level Required: VIEW

Navigates to the Motor screen.

VSD Details

Access Level Required: VIEW

Moves to the subscreen, which provides more information about the Variable Speed Drive.

Filter Details (Harmonic Filter installed only)

Access Level Required: VIEW

Moves to the subscreen, which provides more information about the Harmonic Filter.

Motor Details

Access Level Required: VIEW

Moves to a subscreen that provides information pertinent to the Motor Monitoring feature.

MEDIUM VOLTAGE VARIABLE SPEED DRIVE SCREEN

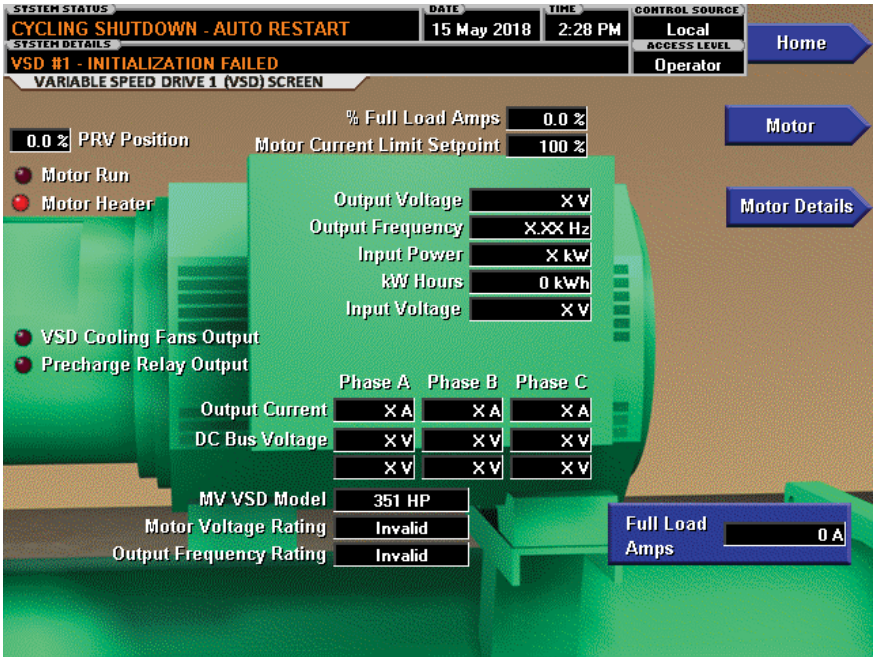

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FIGURE 28 - MEDIUM VOLTAGE VARIABLE SPEED DRIVE SCREEN

This screen displays information pertaining to the Medium Voltage Variable Speed Drive (MVVSD), if installed. There are two similar screens available: one for VSD 1 and another for VSD 2.

DISPLAY ONLY

PRV Position

Displays the Pre-rotation Vane position as a value between 0 and 100%.

Motor Run (LED)

Indicates whether the digital output from the controls is commanding the motor to RUN.

Motor Heater (LED)

Indicates whether the digital output from the controls is commanding the optional motor heater on. This LED is not displayed if the option is not installed.

% Full Load Amps

Displays the motor current as a percentage of the Full Load Amps (FLA) value.

Pulldown Demand Time Left

Displays the time remaining in the programmed pulldown period if the value is nonzero.

Output Voltage

Displays the output voltage measured to the motor.

Output Frequency

Displays the present output frequency to the motor.

Input Power

Displays the total kilowatts measured by the VSD or Harmonic Filter, if installed.

KW Hours

Displays the cumulative amount of kilowatts used over time as the MVVSD motor controller operates.

Input Voltage

Displays the input voltage to the MVVSD as reported by the MVVSD.

Output Current

Displays the average of the 3-phase output current to the motor. Value is provided by the MV VSD.

DC Bus Voltage (Phase A, B, C)

Displays the three phases of DC bus voltage upper and lower buses.

MVVSD Model

Displays the model number as received from the MV-VSD.

Motor Voltage Rating

Displays the voltage rating of the MVVSD as received from the MVVSD. Displayed as 2300 V, 3300 V or 4160 V. If an invalid value is received, INVALID is displayed and the chiller will not be allowed to run.

Output Frequency Rating

This is the rated output frequency communicated by the MVVSD. This value is the maximum drive frequency (Hz) when the MVVSD receives a 100% speed command from the OptiView Control Center. If the value received is not 50 Hz or 60 Hz, INVALID is displayed. If this is the case, then the Motor Voltage Rating (above) determines the maximum frequency as follows:

- Motor Voltage Rating: 2300 V, 3300 V, or 4160 V
- Output Frequency Rating: 60 Hz or 50 Hz

Full Load Amps

Access Level Required: VIEW

Displays the maximum amps at which the motor can operate.

VSD Cooling Fans Output (LED)

Illuminates when the digital output from the MVVSD control is commanding the Cooling Fans to RUN.

Precharge Relay Output (LED)

Illuminates when the digital output from the MVVSD control is commanding the Precharge Relay ON.

NAVIGATION

Home

Access Level Required: VIEW

Returns user to the Home screen.

Motor

Access Level Required: VIEW

Moves to a subscreen that provides more information about the motor.

Motor Details

Access Level Required: VIEW

Moves to a subscreen that provides information and setpoints pertinent to the Motor Monitoring feature.

MOTOR LUBRICATION SCREEN

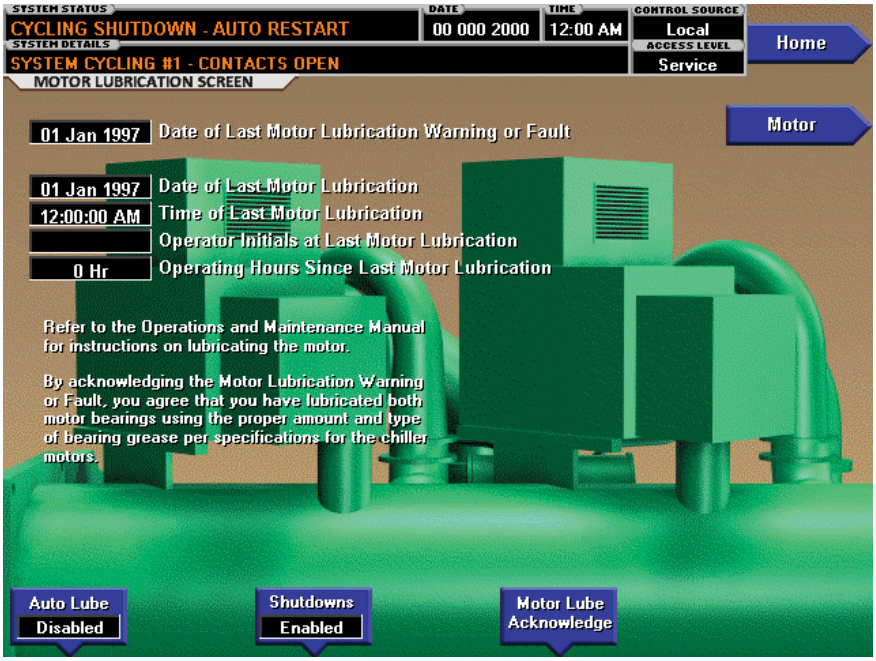

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FIGURE 29 - MOTOR LUBRICATION SCREEN

This feature provides an indication when the compressor motor lubrication is required. The lubrication requirement and notification is based on the "Operating Hours Since Last Motor Lubrication". The greater of either Motor Operating Hours #1 or Motor Operating Hours #2 is used for this value. There are up to three levels of notification, each indicating an increasing level of urgency. "Warning – Motor Bearing Lube Suggested" is displayed when the hours exceed 1000 hours. If there is no response, "Warning – Motor Bearing Lube Required" is displayed when the hours exceed 1200 hours. If there is still no response, a safety shutdown is performed when the hours exceed 1400 hours and "Motor – Lack of Bearing Lubrication" is displayed. See the *Display Messages* section of this document for details of these messages.

To provide a record of when a motor lubrication is performed, the Operator enters his/her initials, name or user ID using the Motor Lube Acknowledge key. This entry implies both motors were lubricated. The date and time of this entry is automatically logged as the Date of Last Lubrication and Time of Last Lubrication. This also clears any motor lubrication warning or safety that is in effect and resets the Operating Hours Since Last Lubrication to zero.

DISPLAY ONLY

Date of Last Motor Lubrication Warning or Fault

Displays the date of the last motor lubrication warning or safety shutdown.

Date of Last Motor Lubrication

Displays the date of the last motor lubrication. This parameter is automatically recorded when the Operator enters his/her initials, name or user ID using the Motor Lube Acknowledge key.

Time of Last Motor Lubrication

Displays the time of the last motor lubrication. This parameter is automatically recorded when the Operator enters his/her initials, name or user ID using the Motor Lube Acknowledge key.

Operator Initials at Last Motor Lubrication

Displays the initials, name or user ID entered by the Operator when both motors have been lubricated. Entered as a 3 to 8 character string using the Motor Lube Acknowledge key.

Operating Hours Since Last Motor Lubrication

Displays the run hours (in whole hours) accumulated since the last motor lubrication. The greater of Motor #1 Operating Hours or Motor #2 Operating Hours is used for this calculation. The value is reset to zero whenever the Operating Hours (on the Operations Screen) is reset to zero or whenever the Operator enters his/her initials, name or user ID using the Motor Lube Acknowledge key.

PROGRAMMABLE

Motor Lube Acknowledge

Access Level Required: OPERATOR

When both motors have been lubricated, the Operator must acknowledge the lubrication has been performed. This is done by pressing the Motor Lube Acknowledge button and then entering his/her initials, name or user ID as a 3 to 8 character string. The entry is displayed as the Operator Initials at Last Lubrication and implies that both motors have been lubricated. The date and time of this entry is automatically logged as the Date of Last Motor Lubrication and Time of Last Motor Lubrication. This entry also resets the Operating Hours Since Last Lubrication to zero.

This entry also resets the motor lubrication warning messages: “Warning – Motor Bearing Lube Suggested”, “Warning – Motor Bearing Lube Required” and safety shutdown “Motor – Lack of Bearing Lubrication”.

Enter your initials, name or user ID using the following procedure. The entry must be a minimum of 3 characters and a maximum of 8 characters.

1. At the keypad, log in at OPERATOR access level using Password 9 6 7 5.
2. Press the Motor Lube Acknowledge key. A dialog box appears. A red box highlights the first changeable location.
3. Use the ▲▼keys to scroll sequentially through the alphabet to enter letters or numbers. Each time the ▲ is pressed, the next higher sequential alphabet letter or number is displayed. Each time the ▼is pressed, the next lower alphabet letter or number is displayed. When the desired letter or number is displayed, use the ► key to forward space the red box for the next entry. Use the ◄ key to backspace, if necessary. To write over an existing entry or to place a blank space, scroll to the beginning of the alphabet. The selection prior to the letter A is a blank space. Use the ● key to enter a period/decimal point. During the entry process, if it is desired to exit the dialog box and retain the previous entry, press the CANCEL (X) key.
4. When all of the desired characters have been entered, press the ENTER (√) key.

Motor Lube Date

Access Level Required: ADMIN

Allows modification of the Date of Last Motor Lubrication.

Auto Lube

Access Level Required: SERVICE

This setpoint accommodates those chillers that are equipped with the optional Automatic Motor Lubrication hardware that automatically lubricates the motor at regular intervals. Since chillers equipped with this hardware don’t require manual lubrication, the lubrication warnings displayed at 1000, 1200 and 1400 (safety shutdown) operating hours since last lubrication are unnecessary. Therefore, when the automatic lubrication hardware is present, this setpoint must be ENABLED. With this setting, no lubrication warnings or safety shutdown will occur. If DISABLED, as it should be when not equipped with the automatic lubrication hardware, the motor lubrication warnings and safety shutdown will occur at the associated operating hours.

Shutdowns

Access Level Required: SERVICE

If the Auto Lube setpoint above is set to DISABLED, the SHUTDOWN Setpoint is used to enable or disable the safety shutdown that occurs at 1400 operating hours since last lubrication. The safety shutdown can be enabled or disabled per the customer's preference. If enabled, the safety shutdown will occur at the normal 1400 hours. If disabled, a warning will be displayed but the safety shutdown will not occur.

NAVIGATION

Home

Access Level Required: VIEW

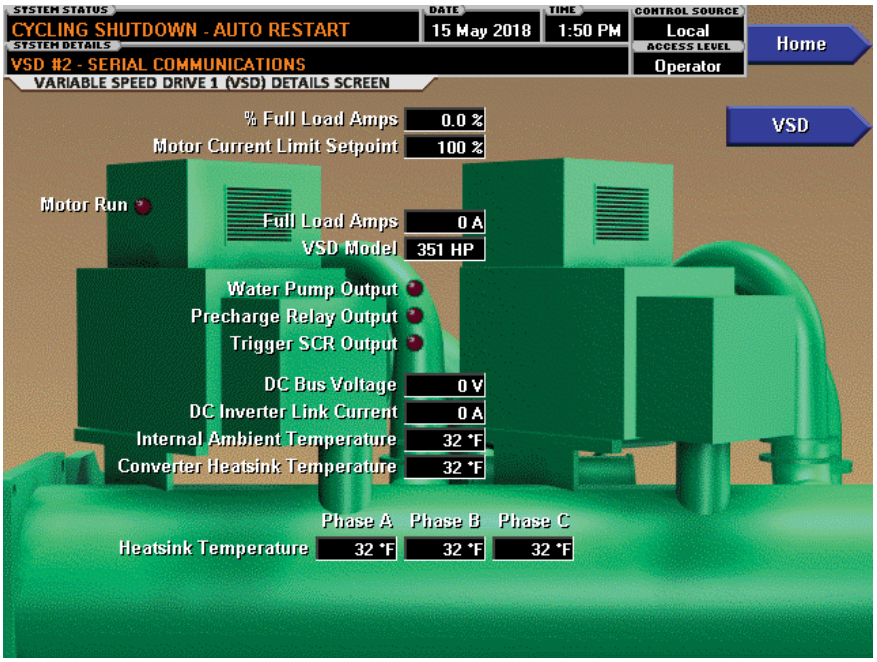
Causes an instant return to the Home screen.

Motor

Access Level Required: VIEW

Causes an instant return to the Motor screen.

VARIABLE SPEED DRIVE (VSD) DETAILS SCREEN



LD27869

FIGURE 30 - VARIABLE SPEED DRIVE (VSD) DETAILS SCREEN

This screen displays more detailed information pertaining to the Variable Speed Drives (VSDs). There are two separate screens: one for VSD 1 and one for VSD 2. However, the information is similar.

DISPLAY ONLY

Motor Run (LED)

Indicates whether the digital output from the controls is commanding the motor to RUN.

% Full Load Amps

Displays the motor current as a percentage of the Full Load Amps (FLA) value. For the Variable Speed Drive, this is the data returned by the VSD Logic Board.

Motor Current Limit Setpoint

Displays the current limit value in use. This value could come from a 0 to 20 mA, 4 to 20 mA, 0 to 10 VDC or 2 to 10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

Pulldown Demand Time Left

Displays the time remaining in the programmed pulldown period if the value is nonzero.

Full Load Amps

Displays the Full Load Amps value as reported by the VSD.

VSD Model

Displays the VSD model as reported by the VSD.

Water Pump Output (LED)

Indicates whether the relay controlling the water pump output is energized.

Precharge Relay Output (LED)

Indicates whether the relay controlling the precharge output is energized.

Trigger SCR Output (LED)

Indicates whether the relay controlling the Trigger SCR Output is energized.

DC Bus Voltage

Displays the DC Bus voltage as reported by the VSD.

DC Inverter Link Current

Displays the DC Inverter link current as reported by the VSD.

Internal Ambient Temperature

Displays the ambient temperature inside the VSD cabinet as reported by the VSD.

Converter Heatsink Temperature

Displays the heatsink temperature of the converter as reported by the VSD.

Heatsink Temperature

Displays the baseplate temperatures of the 3 phases of the VSD inverter as reported by the VSD.

PROGRAMMABLE

None.

NAVIGATION

Home

Access Level Required: VIEW

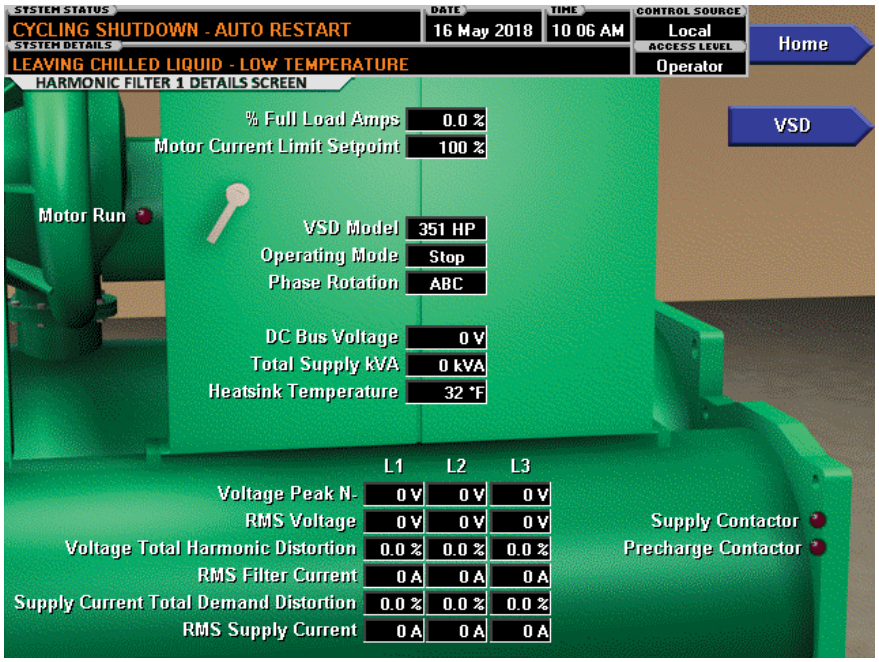
Returns user to the Home screen.

VSD

Access Level Required: VIEW

Returns user to the VSD screen.

HARMONIC FILTER DETAILS SCREEN



LD27870

FIGURE 31 - HARMONIC FILTER DETAILS SCREEN

This screen displays more detailed information pertaining to the optional IEEE-519 Harmonic Filter. There are two separate screens. One for each filter but the information is similar.

DISPLAY ONLY

Motor Run (LED)

Indicates whether the digital output from the controls is commanding the motor to RUN.

% Full Load Amps

Displays the motor current as a percentage of the Full Load Amps (FLA) value. For the Variable Speed Drive this is the data returned by the VSD Logic Board.

Motor Current Limit Setpoint

Displays the current limit value in use. This value could come from a 0 to 20 mA, 4 to 20 mA, 0 to 10 VDC or 2 to 10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

VSD Model

Displays the VSD model as reported by the VSD logic board.

Operating Mode (Run / Stop)

Indicates whether the Harmonic Filter is operating or not.

Phase Rotation

Displays the phase rotation detected by the Harmonic Filter (A, B, C or C, B, A).

DC Bus Voltage

Displays the DC Bus voltage as measured by the Harmonic Filter.

Total Supply kVA

Displays the total supply kilovolt-amperes measured by the Harmonic Filter.

Heatsink Temperature

Displays the temperature of the Harmonic Heatsink (baseplate).

Voltage Peak (N-L1, N-L2, N-L3)

Displays the 3-phase peak voltages as measured by the Harmonic Filter (Neutral to Line).

RMS Voltage (L1-L2, L2-L3, L3-L1)

Displays the 3-phase RMS voltages across each line.

Voltage Total Harmonic Distortion (L1, L2, L3)

Displays the 3-phase voltage Total Harmonic Distortion (THD) measurements.

RMS Filter Current (L1, L2, L3)

Displays the 3-phase filter current values as measured by the Harmonic Filter.

Supply Current Total Demand Distortion (L1, L2, L3)

Displays the 3-phase Current Total Demand Distortion (TDD) measurements.

RMS Supply Current (L1, L2, L3)

Displays the 3-phase RMS currents for each line.

Supply Contractor (LED)

Indicates whether the output to the supply contractor is energized.

Precharge Contractor (LED)

Indicates whether the output to the precharge contractor is energized.

PROGRAMMABLE

None.

NAVIGATION

Home

Access Level Required: VIEW

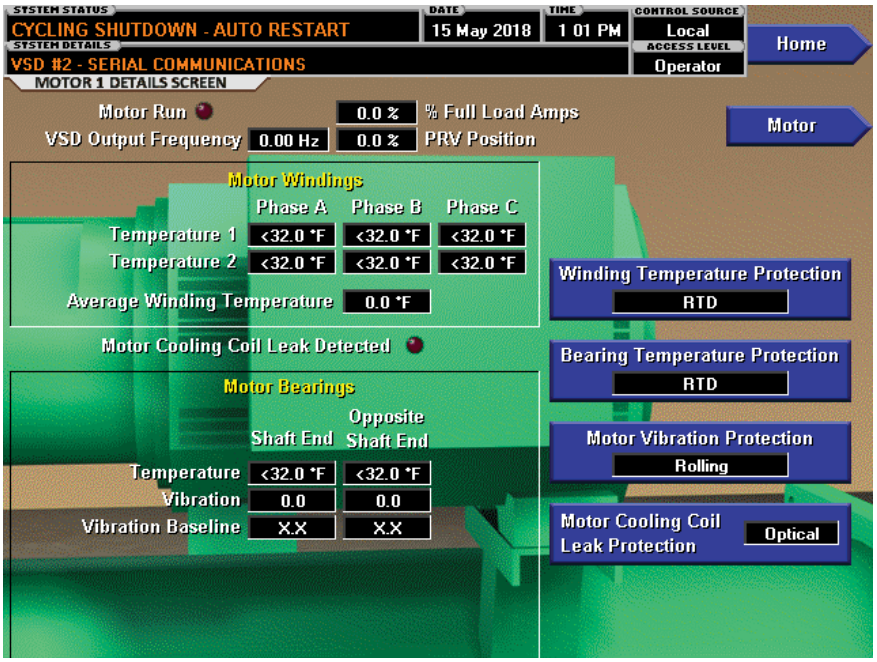
Returns the user to the Home screen.

VSD

Access Level Required: VIEW

Returns the user to the VSD screen.

MOTOR DETAILS SCREEN



LD27871

FIGURE 32 - MOTOR DETAILS SCREEN

This screen displays information pertinent to the optional Motor Monitoring feature. The feature is an additional circuit board and sensors for each motor which can monitor motor winding temperatures, motor bearing temperatures, motor bearing vibration and provide motor cooling coil leak detection if installed. The motor could be equipped with either RTD's or Thermistors for winding and bearing temperature monitoring. Motor cooling coil leak detection could be done with either an optical or float type of sensor. This screen is similar for both Motor 1 and Motor 2.

DISPLAY ONLY

Motor Run (LED)

Illuminates when the OptiView Control Center is commanding the motor to run.

% Full Load Amps

Displays the motor current as a percentage of chiller Full Load Amps.

VSD Output Frequency

Only displayed when Motor Drive Type Setpoint is set to any VSD type. Displays the frequency at which the VSD is operating the motor. This value is provided by the VSD Logic Board.

PRV Position

Displays the present Pre-rotation Vanes position as a value between 0% (closed) and 100% (full open).

Motor Windings

Temperature

Displays the enabled Motor Winding Temperatures for phase A, B and C. When winding RTD's are enabled, there are 2 temperatures displayed per phase. If Thermistors are installed then only one temperature is displayed per phase. If any sensor has failed and is disabled, its reading will not be displayed. Any RTD sensor that registers as an open is considered invalid and displays as XXX.X.

Average Winding Temperature

This value is calculated as the average of all enabled and valid Motor Winding Temperatures. Any winding temperature that registers as open, out of range or disabled is not used in the calculation. When RTD's are used for winding temperature measurement, there are a maximum of 6 temperatures used to calculate the average. When Thermistors are used, there are a maximum of 3 temperatures used to calculate the average. The text description and data box do not appear when the Winding Temperature Protection option is not installed.

Motor Cooling Coil Leak Detected (LED)

Illuminates when the enabled Motor Cooling Coil Leak Detector indicates a leak. The LED and text description do not appear when the Motor Cooling Coil Leak Protection option is not installed.

Motor Bearings

Temperature

Displays the enabled Shaft End and Opposite End motor bearing temperatures. Any RTD input that registers as an open RTD, is considered invalid and displays as XXX.X. When the Bearing Temperature Protection option is not installed, no temperatures are displayed and the heading, text and data boxes do not appear.

Vibration

Displays the Shaft End and Opposite End vibration values. The vibration values are not in any particular units of measure. They are relative values. The larger the number, the greater the magnitude of vibration represented. When the Motor Vibration Protection option is not installed, no vibration values are displayed and the heading, text and data boxes do not appear.

Vibration Baseline

Displays the Shaft End and Opposite End vibration values established during the initial startup of the chiller.

PROGRAMMABLE

None.

NAVIGATION

Home

Access Level Required: VIEW

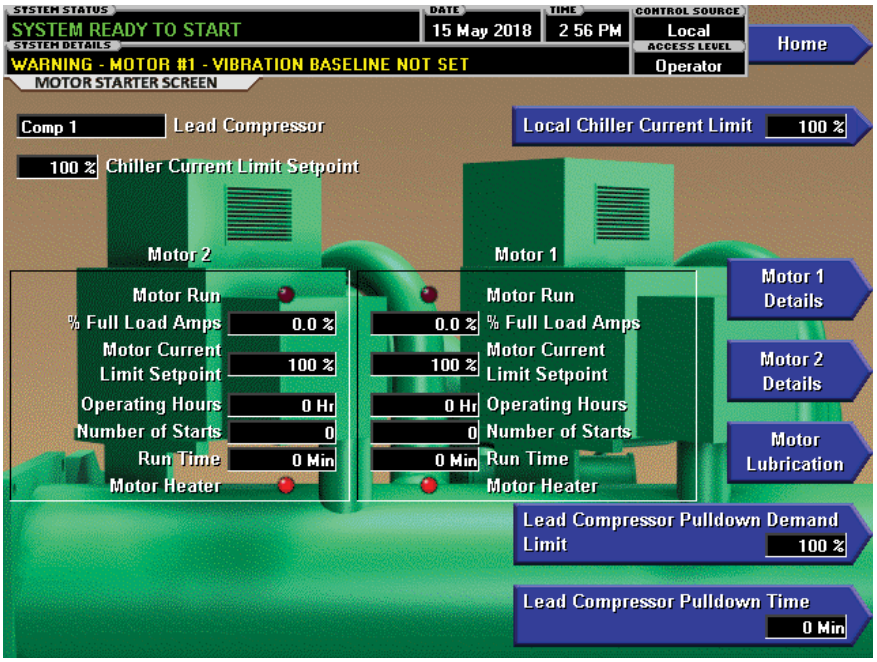
Returns the user to the Home screen.

Motor

Access Level Required: VIEW

Returns the user to the Motor screen.

ELECTRO-MECHANICAL STARTER SCREEN



LD27872

FIGURE 33 - ELECTRO-MECHANICAL STARTER SCREEN

This screen displays all information pertaining to both compressor motors operation when the chiller is using Electro-Mechanical Starters. Also the Current Limit setpoints are maintained here.

DISPLAY ONLY

Lead Compressor

Identifies the compressor that has been selected as the lead compressor.

Chiller Current Limit Setpoint

Displays the Chiller Current Limit Setpoint. The Chiller Current Limit Setpoint could come from 0-20mA, 4-20 mA, 0-10 VDC or 2-10 VDC in Analog Remote mode, PWM in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or the Local Chiller Current Limit Setpoint that is entered at the Keypad. The Chiller Current is the total motor current being conducted by the chiller. If only one compressor motor is running, that is the Chiller Current. If both compressor motors are running, the Chiller Current is the total of both motors, with the Pre-rotation Vanes operated to achieve equal current to both motors. The Chiller Full Load Amps (FLA) is the total of compressor #1 motor and compressor #2 motor FLA ratings, with each motor having an equal FLA rating. For example, if the Chiller FLA is 1600 amps, the FLA of each motor is 800 amps. The Chiller Current Limit Setpoint is expressed as a percentage (30% to 100%) of Chiller FLA. In this example, the chiller FLA is 1600 amps. If the Chiller Current Limit Setpoint is set at 70%, the Chiller Current is limited to 1120 amps. If only one motor is running, the Motor Current Limit (see *Motor Current Limit Setpoint* below) for that motor would be set to 100% and it would be allowed to operate at its maximum of 800 amps, However, if both motors are running, each would be limited to 560 amps per motor, producing a Chiller Current of 1120 amps.

This setpoint is in effect after the Lead Compressor Pulldown Time setpoint (see below) has elapsed and for the remainder of system run.

Motor 1 and 2

Motor Run (LED)

Illuminated when compressor #1 motor is being commanded to run. Otherwise, extinguished.

% Full Load Amps

Displays the motor current of compressor #1 motor as a percentage of the full load amps of that motor.

Motor Current Limit Setpoint

Displays the current limit being applied to compressor #1 motor.

If both compressor motors are running, it displays the active Chiller Current Limit value.

If only compressor motor #1 is running:

- If the Lead Compressor Pulldown Time Setpoint is in effect, it is the Lead Compressor Pulldown Demand Limit Setpoint value.
- If the Lead Compressor Pulldown Time Setpoint is not in effect, it is twice the Chiller Current Limit, up to 100%.

Operating Hours

Displays the total accumulated run time of compressor #1.

Number of Starts

Displays the total accumulated number of starts of compressor #1.

Run Time

Displays the amount of time in days, hours and minutes that compressor #1 motor has been running since the last start signal was received. Value is reset to zero when compressor #1 enters Coastdown. It remains at zero while shutdown.

PROGRAMMABLE

Local Chiller Current Limit

Access Level Required: OPERATOR

Allows the user to specify the maximum allowed Chiller Current. The Chiller Current is the total motor current being conducted by the chiller. If only one compressor motor is running, that is the Chiller Current. If both compressor motors are running, the Chiller Current is the total of both motors, with the Pre-rotation Vanes operated to achieve equal current to both motors. The Chiller Full Load Amps (FLA) is the total of compressor #1 motor and compressor #2 motor FLA ratings, with each motor having an equal FLA rating. For example, if the Chiller FLA is 1600 amps, the FLA of each motor is 800 amps. The Chiller Current Limit Setpoint is expressed as a percentage (30% to 100%) of Chiller FLA. In this example, the chiller FLA is 1600 amps. If the Chiller Current Limit Setpoint is set at 70%, the Chiller Current is limited to 1120 amps. If only one motor is running, the Motor Current Limit (see Motor Current Limit Setpoint above) for that motor would be set to 100% and it would be allowed to operate at its maximum of 800 amps, However, if both motors are running, each would be limited to 560 amps per motor, producing a Chiller Current of 1120 amps.

This setpoint is in effect after the Lead Compressor Pulldown Time setpoint (see below) has elapsed and for the remainder of system run.

Lead Compressor Pulldown Demand Limit

Access Level Required: OPERATOR

Allows the user to specify a motor current limit (30% to 100% FLA) that's applied to the Lead compressor motor during the time period programmed as the LEAD COMPRESSOR PULLDOWN TIME Setpoint. This current limit applies to the full load amps of the Lead compressor motor only, not the Chiller Full Load Amps (total of both compressors). For example, if the Chiller Full Load Amps is 2000 A, then each compressor's FLA is 1000 A. If set to 80%, then the lead compressor motor current would be limited to 800 A (80% x 1000) for the duration of this period.

Lead Compressor Pulldown Time

Access Level Required: OPERATOR

This setpoint is used to limit the chiller to single compressor operation for a specified duration (0-255 minutes) when starting the chiller. While this pulldown time is in effect, "System in Lead Compressor Pulldown" is displayed on the system details line along with the time remaining in the period. During this time, only the lead compressor is permitted to run. The lag compressor will not be brought on line. After this time has elapsed, the lag compressor can be brought on line per normal operation. While this period is in effect, the lead compressor motor current will be limited to the value programmed for the **Lead Compressor Pulldown Demand Limit** Setpoint (30-100% FLA).

After the Lead Compressor Pulldown Time Setpoint has elapsed, the chiller current limit will be limited to the value programmed for the Current Limit Setpoint.

NAVIGATION

Home

Access Level Required: VIEW

Causes a return to the Home screen.

Motor 1 Details

Access Level Required: VIEW

Displays the motor temperatures and vibration readings if the optional Motor Monitoring system is installed on Motor 1.

Motor 2 Details

Access Level Required: VIEW

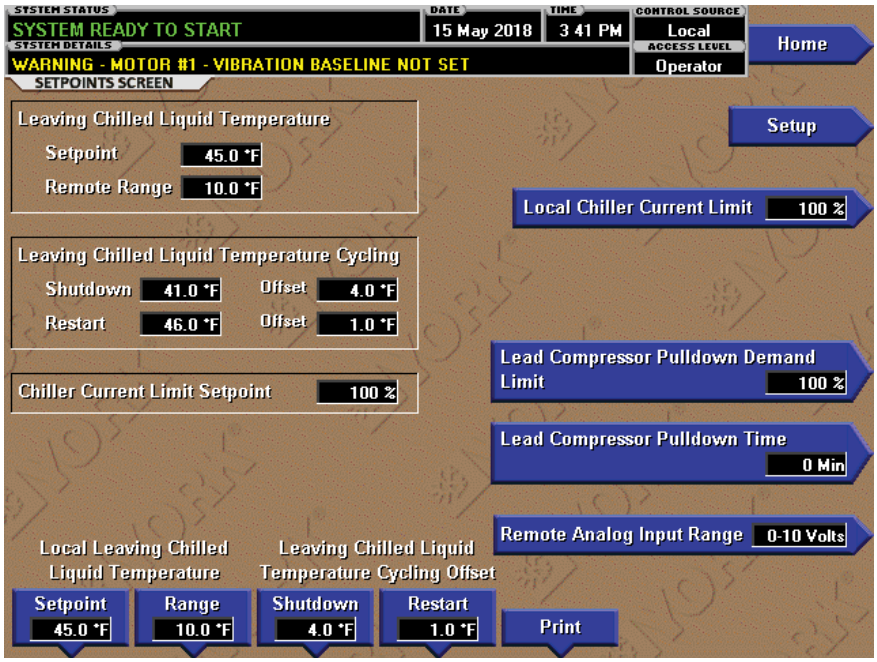
Displays the motor temperatures and vibration readings if the optional Motor Monitoring system is installed on Motor 2.

Motor Lubrication

Access Level Required: VIEW

Moves to the subscreen allowing operator acknowledgement of the compressor motor lubrication and viewing of the compressor motor lubrication parameters.

SETPOINTS SCREEN



LD27873

FIGURE 34 - SETPOINTS SCREEN

This screen provides a convenient location for programming the most common setpoints involved in the chiller control. This screen also serves as a gateway to a subscreen for defining the setup of general system parameters.

DISPLAY ONLY

Leaving Chilled Liquid Temperature

Setpoint

Displays the present setpoint to which the chiller is operating whether controlled remotely or locally. This value could come from a 0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC input in Analog Remote mode, PWM signal in Digital Remote mode, SC-EQ communications interface in ISN (BAS) mode, or a locally programmed value.

Remote Range

Displays the Remote Range which is set by the Local Leaving Chilled Liquid Temperature Range setpoint. It is a value between 10ºF and 40ºF added to the Local LCHLT Setpoint defining the maximum Remote LCHLT setpoint.

Leaving Chilled Liquid Temperature Cycling

Shutdown

Displays the Leaving Chilled Liquid Temperature at which the chiller will shut down to avoid over-cooling the building. This value is calculated by subtracting the Leaving Chilled Liquid Temperature Cycling Shutdown Offset from the Leaving Chilled Liquid Temperature Setpoint. If this value is below the absolute minimum allowed shutdown temperature the minimum value is displayed.

Restart

Displays the Leaving Chilled Liquid Temperature at which the chiller will restart after it has shut down due to cycling off on low water temperature. This value is calculated by adding the Leaving Chilled Liquid Temperature Cycling Restart Offset to the Leaving Chilled Liquid Temperature Setpoint.

Chiller Current Limit Setpoint

Displays the current limit that is in effect during the Chiller Steady State period (this period is in effect after the Chiller Pulldown Period is no longer in effect). The Chiller Current Limit Setpoint could be from a 0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC input in Analog remote mode or PWM input in Digital remote mode or SC-EQ communication interface in ISN (BAS) remote mode or a Local Chiller Limit Setpoint entered at the Keypad. The Chiller Pulldown Period is in effect from the instant the chiller enters “System Run” until the Leaving Chilled Liquid Temperature is within 2ºF of the Leaving Chilled Liquid Temperature Setpoint. During this period, the Chiller Pulldown Demand Limit Setpoint is in effect. The Chiller Current Limit Setpoint is in effect for the remainder of “System Run”.

PROGRAMMABLE

Local Leaving Chilled Liquid Temperature - Setpoint

Access Level Required: OPERATOR

This value allows the user to define the Leaving Chilled Liquid Temperature that is to be maintained by the chiller. It is programmable over the range of 38.0°F to 70.0°F (water) or 10.0°F to 70.0°F (brine).

If Smart Freeze is enabled, the range is 36.0°F to 70.0°F (water). A remote device can provide an analog signal (0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC) in Analog Remote mode, or PWM signal in Digital Remote mode that changes the setpoint by creating an offset above the operator programmed Local Leaving Chilled Liquid Temperature setpoint. This offset may be defined between 10.0°F and 40.0°F above the Local setpoint (see the Remote Leaving Chilled Liquid Temperature Setpoint Range description). Additionally, an SC-EQ in ISN (BAS) Remote mode can define the setpoint through a serial data stream. In this case, the incoming setpoint is not an offset that is applied to the locally programmed setpoint value, but rather is the setpoint value itself.

Local Leaving Chilled Liquid Temperature - Range

Access Level Required: OPERATOR

This is the range over which an analog signal (0-20 mA, 4-20 mA, 0-10 VDC or 2-10 VDC) in Analog Remote Mode or a digital signal (PWM) in Digital remote mode can reset the Leaving Chilled Liquid Temperature setpoint above the operator programmed Base Setpoint (see below). Programmable between 10°F and 40°F, with a default of 10°F, it is added to the Local Setpoint value to create a range over which the remote device can reset the setpoint. For example, if this setpoint is programmed for 10°F and the operator programmed Local value is 45°F, then the remote device can set the Leaving Chilled Liquid Temperature setpoint over the range 45.0°F - 55.0°F.

Leaving Chilled Liquid Temperature Cycling Offset - Shutdown

Access Level Required: OPERATOR

This value allows the user to specify the Leaving Chilled Liquid Temperature at which the chiller will shut down on a LEAVING CHILLED LIQUID – LOW TEMPERATURE cycling shutdown. This is done by defining an offset below the Leaving Chilled Liquid Temperature setpoint. It is programmable over a range of 1°F to 70°F below the setpoint, to a minimum cutout of 36°F (water) or 6°F (brine). It establishes the minimum allowed temperature for the Leaving Chilled Liquid Temperature and prevents overcooling of the building. Anytime the Leaving Chilled Liquid Temperature setpoint is increased, the shutdown threshold is ramped from the current setpoint to the new setpoint at the rate of 0.1°F per second to prevent the chiller from immediately tripping on low water temperature.

Leaving Chilled Liquid Temperature Cycling Offset - Restart

Access Level Required: OPERATOR

This value allows the user to specify the Leaving Chilled Liquid Temperature at which the chiller will restart after a shutdown on a LEAVING CHILLED LIQUID – LOW TEMPERATURE cycling shutdown. This is done by defining an offset above the Leaving Chilled Liquid Temperature setpoint. It is programmable over a range of 0°F to X°F where X = 80 minus the LCHLT Setpoint. The chiller will automatically restart when this temperature is reached. This setpoint can be used to reduce chiller cycling by delaying the chiller restart until the cooling load has increased.

Local Chiller Current Limit

Access Level required: OPERATOR

Allows the user to specify the maximum allowed Chiller Current while running. Adjustable between 30% and 100%; default = 100%.

Lead Compressor Pulldown Demand Limit

Access Level Required: OPERATOR

Allows the user to specify the maximum allowed Chiller Current during the Lead Compressor Chiller Pulldown Period. The Chiller Pulldown Period is in effect from the instant the chiller enters “System Run” until the Leaving Chilled liquid temperature is within 2ºF of the Leaving Chilled Liquid Temperature Setpoint or the Lead Compressor Pulldown Time has expired. Adjustable between 30% and 100%; default = 100%.

Lead Compressor Pulldown Time

Access Level Required: OPERATOR

Allows the user to specify the amount of time that the Lead Compressor Pulldown Demand Limit will be in effect. Adjustable between 0 and 255 minutes; default = 0 minutes.

Remote Analog Input Range

Access Level Required: OPERATOR

Defines the remote signal range applied for remote reset of the Leaving Chilled Liquid temperature Setpoint and Current Limit Setpoint in ANALOG remote mode. If the remote signal is 0-10 VDC or 0-20 mA, this setpoint must be programmed for 0-10 VDC. If the remote signal is 2-10 VDC or 4-20 mA, this setpoint must be programmed for 2-10 VDC.

Print

Access Level Required: VIEW

Prints the Setpoints report.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home screen.

Setup

Access Level Required: VIEW

Moves to the subscreen allowing setup of general system parameters.

SETUP SCREEN

FIGURE 35 - SETUP SCREEN

This screen is the top level of the general configuration parameters. It allows programming of the time and date, along with specifications as to how the time will be displayed (12 or 24 hour format). In addition, the chiller configuration, as determined by the state of the Microboard Program Jumpers and Program Switches is displayed. A qualified Service Technician, following instructions in Service Manual (Form 160.69-M1-C), establishes this configuration per the desired operation. This screen also serves as a gateway to more subscreens for defining general system parameters.

PROGRAMMABLE

Refrigerant Selection

Access Level Required: SERVICE

Displays **R134a** or **R22** as set by position of SW1-1 On = R134a.

Liquid Type

Displays **Water** or **Brine** as set by position of SW1-2 Off = Water.

Chilled Liquid Pump Operation:

Access Level Required: SERVICE

Displays as **Standard** or **Enhanced**.

Anti-Recycle:

Access Level Required: SERVICE

Selectable as **Disabled** or **Enabled**.

Power Failure Restart:

Access Level Required: SERVICE

Selectable as **Manual** or **Automatic**.

Motor Drive Type

Access Level Required: SERVICE

Sets the type of Starter that is installed. EM, VSD - 60 Hz, VSD - 50 Hz, or MVVSD.

Coastdown Time

Access Level Required: SERVICE

Sets the Coastdown Time: **Standard** (150 seconds) or **Enhanced** (15 minutes – Steam Turbine applications)

Pre-Run

Access Level Required: OPERATOR

Sets the duration of the system pre-lube: **Standard** (50 seconds) or **Extended** (180 seconds)

Line Frequency

Access Level Required: SERVICE

Sets the Line Frequency: 50 Hz or 60 Hz.

Motor Heaters

Access Level Required: SERVICE

Is set to Enabled if optional Motor Heaters are installed or Disabled if they are not installed.

Safety Stop

Access Level Required: SERVICE

Displays Enabled, indicating that the Safety Stop switch is installed on the control panel.

Present Date

Access Level Required: OPERATOR

Allows the user to specify the present date. This value is critical to logging system shutdowns accurately and for utilizing the scheduling capabilities. When prompted to enter a date value, the user must enter the day, month, and four-digit year (using leading zeroes as necessary). If within range, the value will be accepted. If out of range, the user is prompted for the information again. At this point the user may retry the date entry, or cancel the programming attempt.

Present Time

Access Level Required: OPERATOR

Allows the user to specify the present time. This value is critical to logging system shutdowns accurately and for utilizing the scheduling capabilities. When prompted to enter a time value, the user must enter the hour and minute desired (using leading zeroes as necessary). If the chiller is presently set to 24-hour mode, the time must be entered in the 24-hour format. Otherwise, the user must also select AM or PM for the entered time. If out of range, the user is prompted for the information again. At this point, the user may retry the time entry or cancel the programming attempt.

12/24 Hr

Access Level Required: OPERATOR

Allows the user to specify the format in which the time will be presented to the user. This setpoint will affect the display of the time on the chiller panel and on all reports generated. 12-Hour time format will include the AM and PM modifiers and show the range of time between 1:00 and 12:59, while the 24-Hour time format will show the range of time between 0:00 and 23:59.

Change Settings

Access level Required: OPERATOR or higher

Used to enter the following setpoints. Pressing this key places a green selection box around the first changeable setpoint. The access level determines which setpoints can be changed. Use the ▲ and ▼ keys to place the selection box around the desired setpoint. With the setpoint selected, press the ENTER (√) key. A dialog box appears with the range of settings.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home screen.

Schedule

Access Level Required: VIEW

Moves to the subscreen allowing definition of the chiller operation schedule.

User

Access Level Required: VIEW

Moves to the subscreen allowing configuration of user preferences.

Comms

Access Level Required: VIEW

Moves to the subscreen allowing configuration of system communications.

Printer

Access Level Required: VIEW

Moves to the subscreen allowing configuration and control of printer functions.

Sales Order

Access Level Required: VIEW

Moves to the subscreen displaying the Sales Order information for the chiller system.

Operations

Access Level Required: VIEW

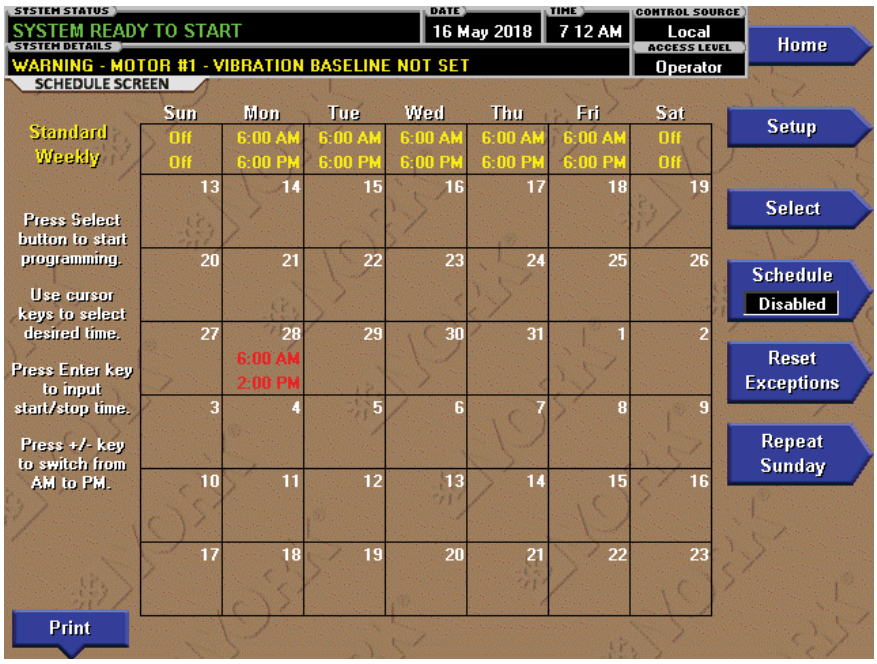
Moves to the subscreen displaying operating parameters of the chiller system.

Diagnostics

Access Level Required: SERVICE

Moves to the subscreen, displaying operating parameters of the chiller system.

SCHEDULE SCREEN



LD27875

FIGURE 36 - SCHEDULE SCREEN

The Select key is used to enable the cursor arrows which are used to highlight the day and the start or stop time the user wishes to modify. At this point the user may press the ' ✔ ' (Check) key to program the Start / Stop times for that day.

In order for the Start / Stop combination to be utilized, each Start time must have a corresponding Stop time which occurs later in the day. The presently programmed schedule for a given day can be cancelled by setting both the Start time and Stop time to 12:00 AM. If the Start time equals the Stop time (with any time other than 12:00 AM), the chiller is OFF for that day. If the user desires the chiller to operate continuously through several days, the Stop time of Day 1 can be set to 11:59 PM and the Start time of Day 2 can be set to 12:00 AM. The chiller will not stop but continue to operate until the stop of Day 2.

The user has the ability to define a standard set of Start / Stop times which are utilized every week. The user may then specify *exception* Start / Stop combinations for any day of the week up to 6 weeks in advance. At the end of each week the schedule for the next week is created by combining the standard week definition and the next defined exception week. The schedule is then updated as each of the exception weeks "shifts down", leaving a new, blank exception week in the 6th week slot.

DISPLAY ONLY

None

PROGRAMMABLE

Select

Access Level Required: OPERATOR

Places a selection box around a start time for a given day. Use ◀,▶,▲ or ▼ cursor arrows to place the box around the desired start or stop time for a given day.

Standard Week Start/Stop Times

Access Level Required: OPERATOR

For each day of the week, the user may specify a time for the chiller to start and a time for the chiller to stop. The times specified in this entry week will be used as the default for every week of chiller operation.

Exception Start/Stop Times

Access Level Required: OPERATOR

For each day of the month, the user may specify a time for the chiller to start and a time for the chiller to stop. These Start / Stop combinations may be scheduled up to five (5) weeks in advance and also for the present week. As each week goes by, the new schedule will be created for the present week using the Exception specification in combination with the Standard week definition, as described above.

Schedule (Enabled / Disabled)

Access Level Required: OPERATOR

Allows the user to enable or disable the schedule function.

Reset Exceptions

Access Level Required: OPERATOR

Deletes all programming for exception days within the next 6 weeks.

Repeat Sunday

Access Level Required: OPERATOR

Duplicates the schedule defined for Sunday for the remainder of the standard weekdays.

Print

Access Level Required: VIEW

Generates a **Schedule** print report.

NAVIGATION

Home

Access Level Required: VIEW

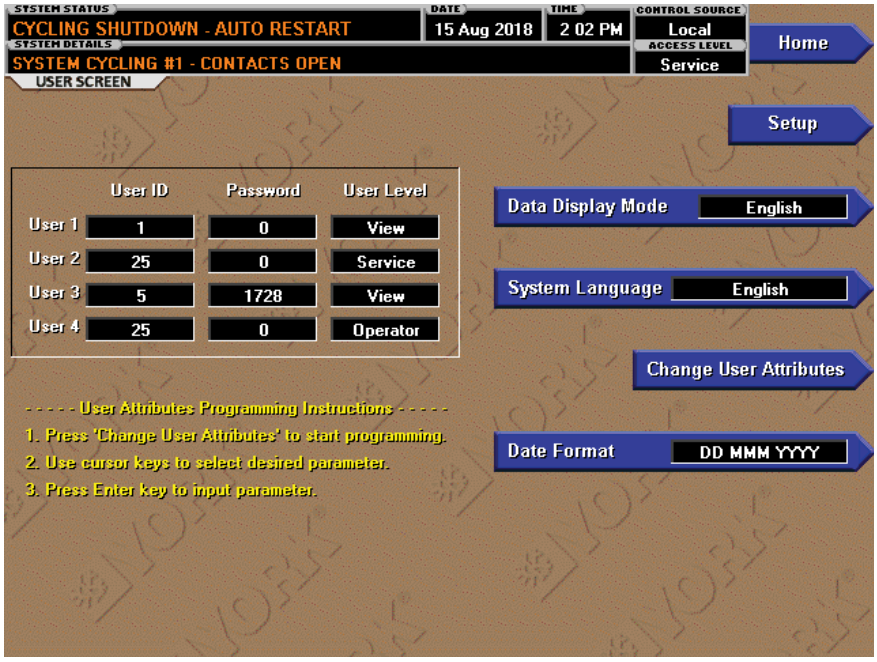
Causes an instant return to the Home Screen.

Setup

Access Level Required: VIEW

Return to the previous setup screen.

USER SCREEN



LD27876

FIGURE 37 - USER SCREEN

This screen allows the Operator to choose what units of measurement to display parameters in, the screen languages, and the date format.

Each Custom User value is not linked to a specific button. Instead, the Change button is pressed which enables the cursor arrows which are used to highlight the Custom User parameter the user wishes to modify. At this point the ' ✔ ' (Check) button is pressed and the value may be entered.

DISPLAY ONLY

None

PROGRAMMABLE

System Language

Access Level Required: OPERATOR

Allows the user to define the language for all Screens. The desired language is selected by scrolling through the list of those available. English is the Default language and is selected by pressing the Up Arrow key when the dialog box appears during the selection process. The selected language will not be displayed until after the user navigates from the USER Screen to another Screen. Available languages are English, Traditional Chinese, Simplified Chinese, French, Portuguese, Spanish, Italian, German, Hungarian, and Turkish.

English / Metric Units

Access Level Required: OPERATOR

Define the unit system (English or Metric) used by the chiller display.

Custom User ID (4)

Access Level Required: SERVICE

This allows the user to specify up to four (4) Custom User ID values. Each user ID will then require a corresponding Password and User Level. A User ID can be defined for various maintenance personnel. Service Technicians refer to *Service Manual (Form 160.79-M1)*.

Custom User Password (4)

Access Level Required: SERVICE

This allows the user to specify up to four (4) Custom Password values. Each Password will then require a corresponding User ID and User Level. Service Technicians refer to *Service Manual (Form 160.79-M1)*.

Custom User Access Level (4)

Access Level Required: SERVICE

This allows the user to specify up to four (4) Custom User Access Levels. Each Access Level will then require a corresponding Password and User ID. Service Technicians refer to *Service Manual (Form 160.79-M1)*.

NAVIGATION

Home

Access Level Required: VIEW

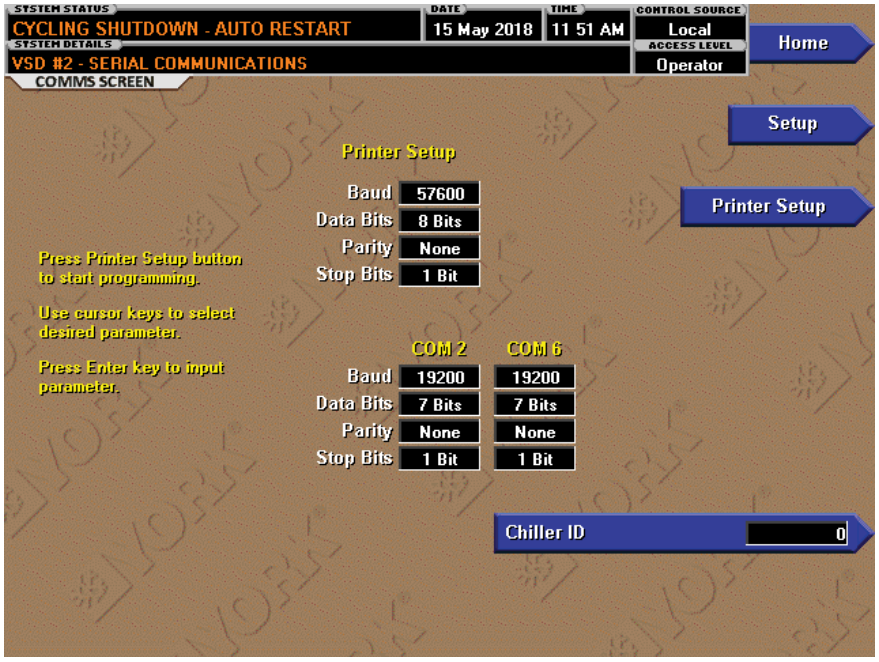
Causes an instant return to the Home Screen.

Setup

Access Level Required: VIEW

Return to the Setup Screen.

COMMS SCREEN



LD27877

FIGURE 38 - COMMS SCREEN

This screen allows definition of the necessary communications parameters. See *SECTION 3 – PRINTERS* for details of the Printer connections and setup. Presently, there are no COM 2 communications features available.

DISPLAY ONLY

COM 2 and COM 6 communication parameters

The microboard will automatically change communication parameters until it finds the correct settings to communicate with the starter logic boards. The starter type must be entered correctly on the Setup Screen.

PROGRAMMABLE

Chiller ID

Access Level Required: OPERATOR

This ID number is printed at the top of reports obtained with a local printer.

Printer Setup

Access Level Required: OPERATOR

Pressing this key places a green selection box around the first changeable parameter. Use the ▲ and ▼ keys to place the selection box around the desired parameter to be changed. With the selection box around the desired parameter, press the ENTER (3) key. A dialog box is displayed permitting data entry.

Printer Baud Rate

Define the baud rate at which the panel shall communicate to the printer.

Printer Data Bit(s)

Defines the number of data bits with which the panel shall communicate to the printer.

Printer Parity Bit(s)

Define the number of parity bits with which the panel shall communicate to the printer.

Printer Stop Bit(s)

Define the number of stop bits with which the panel shall communicate to the printer.

NAVIGATION

Home

Access Level Required: VIEW

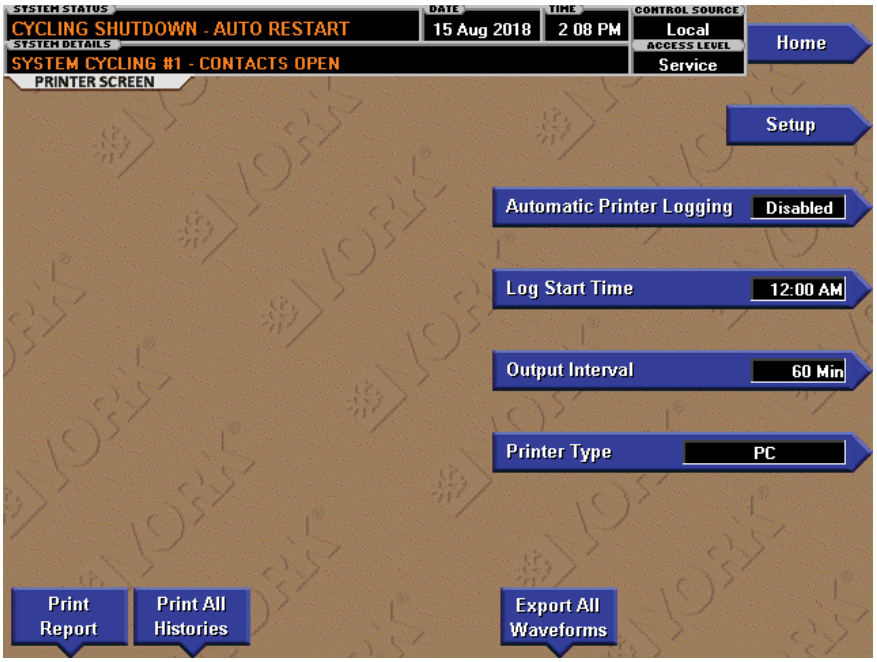
Causes an instant return to the Home screen.

Setup

Access Level Required: VIEW

Returns to the Setup screen.

PRINTER SCREEN



LD27878

FIGURE 39 - PRINTER SCREEN

This screen allows definition of the necessary communications parameters for the printer. See *SECTION 3 – PRINTERS* for details of the Printer connections and setup.

DISPLAY ONLY

Time Remaining Until Next Print

Displays the time until the next print log will occur, if the function is enabled.

PROGRAMMABLE

Automatic Printer Logging (Enabled / Disabled)

Access Level Required: OPERATOR

Enable the printer to begin printing status reports beginning at the programmed start time and recurring at the interval defined above.

Log Start Time

Access Level Required: OPERATOR

Set the time at which scheduled print logs will begin.

Output Interval

Access Level Required: OPERATOR

Define the interval at which log printing will occur between 1 and 1440 minutes.

Printer Type

Access Level Required: OPERATOR

Define the printer type connected to the chiller system.

Print Report

Access Level Required: VIEW

Selects the report type to print: Status, Setpoints, Schedule, Sales, Slots, or Custom report. A print report is generated upon completion of selection.

Print All Histories

Access Level Required: VIEW

Generate a report of the system data at the time of all stored shutdowns.

Export All Waveforms

Access Level Required: VIEW

Generates a file that can be read into a PC running Excel to view the VSD waveforms.

NAVIGATION

Home

Access Level Required: VIEW

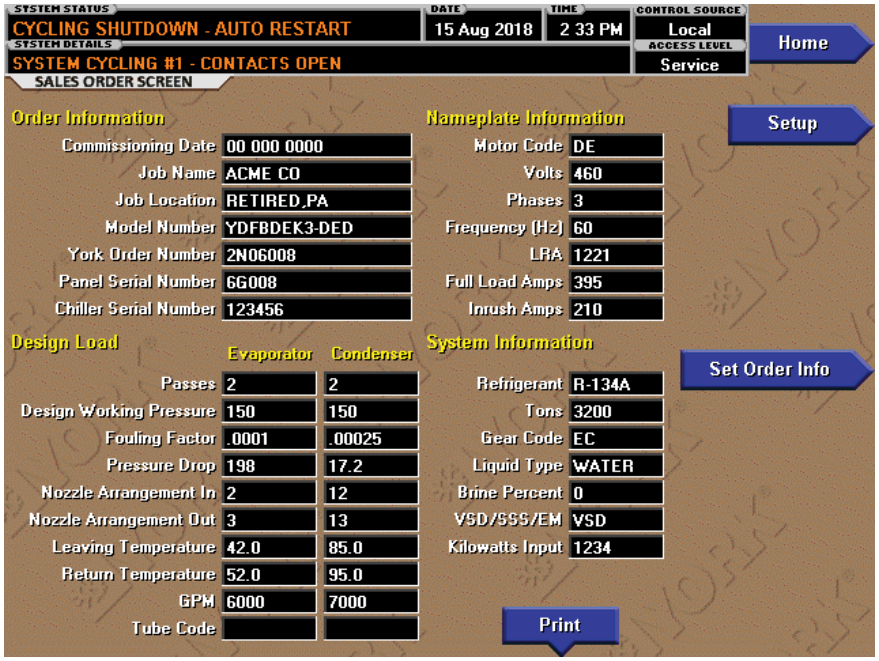
Causes an instant return to the Home screen.

Setup

Access Level Required: VIEW

Return to the Setup screen.

SALES ORDER SCREEN



LD27879

FIGURE 40 - SALES ORDER SCREEN

This screen displays the sales order parameters. The Commissioning date is entered by the YORK Service Technician at the time of chiller commissioning. The remainder of the values are entered at the YORK Factory during the manufacturing of the chiller.

DISPLAY ONLY

Commissioning Date
Displays the date when the chiller was commissioned.

Job Name and Location
Displays the job name and location.

Model Number
Displays the chiller model number.

YORK Order Number
Displays the order number under which the chiller was sold.

Panel Serial Number
Factory-defined serial number for the micropanel.

Chiller Serial Number
Factory-defined serial number for the chiller system.

Condenser and Evaporator Design Load Information
Factory-defined description of the condenser and evaporator configuration at time of shipment.

Nameplate Information
Factory-defined information about the chiller motor configuration. The Full Load and Inrush Amps is the value for each motor.

System Information
Factory-defined conditions for which the chiller was originally rated and sold. The Kilowatts Input is the total for the chiller.

PROGRAMMABLE

None.

Print
Access Level Required: VIEW
This generates a listing of the Sales Order data.

NAVIGATION

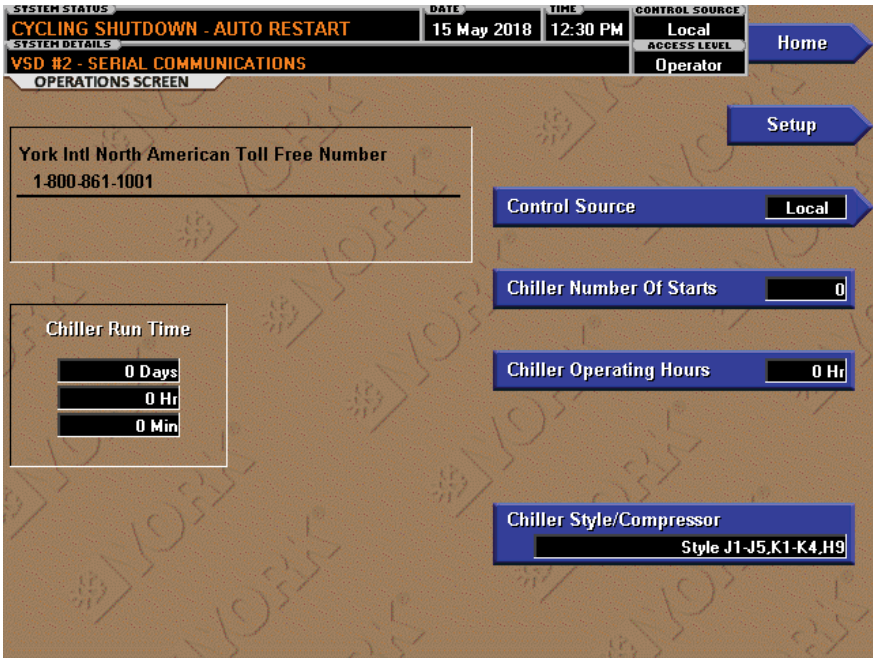
Home

Access Level Required: VIEW
Causes an instant return to the Home screen.

Setup

Access Level Required: VIEW
Return to the Setup screen.

OPERATIONS SCREEN



LD27880

FIGURE 41 - OPERATIONS SCREEN

This screen allows definition of general parameters having to do with the operation of the chiller.

DISPLAY ONLY

Chiller Run Time

Displays the amount of time the chiller has been running since the last start signal was received. The value is reset to zero when the chiller enters Coastdown. It remains at zero while shut down and during "System Prelube".

PROGRAMMABLE

Control Source

Access Level Required: OPERATOR

Defines whether the control of the chiller will be Local, Digital Remote, Analog Remote, Modem Remote, or ISN (BAS) Remote.

Chiller Number of Starts

Access Level Required: ADMIN to Change

Displays the total number of the starts the chiller has initiated.

Chiller Operating Hours

Access Level Required: ADMIN to Change

Displays the total accumulated run time of the chiller.

Edit Phone Numbers

Access Level Required: SERVICE to Change

The Local service phone number is displayed as the second number. Although blank by default, the appropriate label and number can be entered by a Service Technician.

Chiller Style/Compressor

Access Level Required: SERVICE to Change

Used to enter the chiller style/compressor combination. Once the chiller style/compressor combination is entered, the program controls the chiller per the requirements of the entered chiller and compressor. The selection determines the minimum (default) allowable coastdown duration programmable with the COASTDOWN TIME Setpoint on the SETUP Screen.

Hot Gas (Enabled/Disabled)

Access level required: SERVICE

Enables or disables the optional Hot Gas Bypass feature. If equipped with this feature, it should be enabled. Otherwise, it should be disabled.

Flow Switch (TB4/J14))

Access Level Required: SERVICE

Configures the program to read the appropriate input for the chilled and condenser water flow sensors. The chiller will accept either site-installed paddle type (Digital) flow sensors or factory-mounted thermal flow sensors to sense the evaporator and condenser water flow. The paddle type flow sensors, when closed, apply 115 VAC to I/O Board digital inputs on terminal TB4-12 (evaporator) and TB4-11 (condenser). The factory-mounted thermal type flow sensors apply +5 VDC to the Microboard analog inputs at J14.

VGD (Enabled/Disabled)

Access Level Required: SERVICE

Enables and disables the Variable Geometry Diffuser feature. If equipped with this feature, it should be enabled. Otherwise, it should be disabled.

NAVIGATION

Home

Access Level Required: VIEW

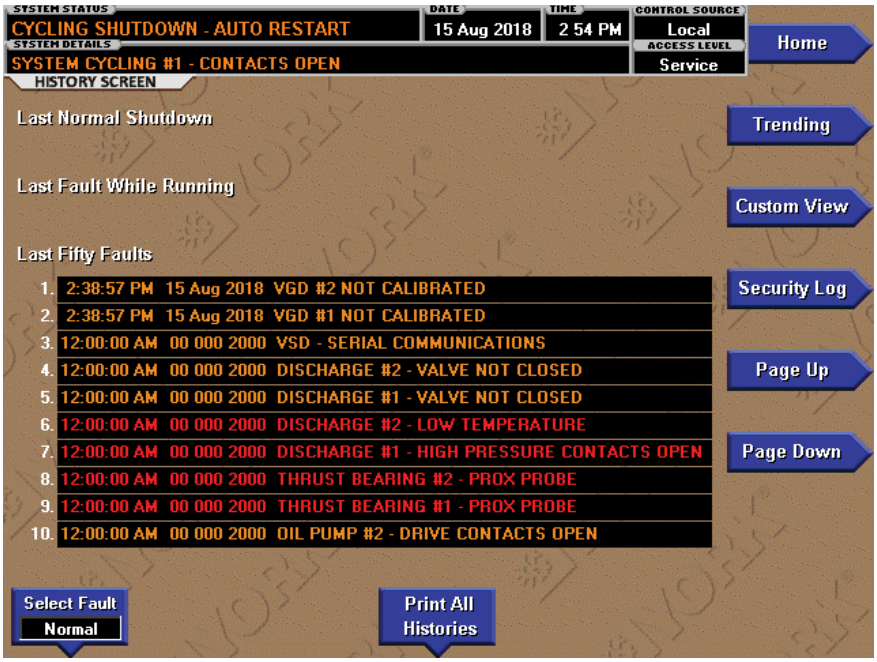
Causes an instant return to the Home screen.

Setup

Access Level Required: VIEW

Return to the Setup screen.

HISTORY SCREEN



LD27881

FIGURE 42 - HISTORY SCREEN

This screen allows the user to browse through the faults. In order to get a more thorough reporting of the system conditions at the time of the recorded shutdown, move to the subscreen **HISTORY DETAILS**.

The user may use the **Select Fault** button to select the history to view. At this point the **View Details** button is used to jump to a subscreen containing stored chiller parameters values at the time of the shutdown. Additionally, the **Print History** button can be used to generate a hard-copy report of the parameter values at the time of the shutdown.

DISPLAY ONLY

Last Normal Shutdown

This window displays the date and time and the description of the last normal shutdown. A normal shutdown is defined as:

- Local (Start Key on Home screen)
- Remote (Digital, Analog, or ISN)

Last Fault While Running

This window displays the date and time and the description of the last safety or cycling shutdown while the system was running.

Last Fifty Faults

This window displays a chronological listing (most recent first) of the date and time and the description of the last ten safety or cycling shutdowns that occur while the system is running or stopped.

PROGRAMMABLE

Print History

Access Level Required: VIEW

This generates a report listing the status of the chiller parameters at the time of the selected shutdown.

Print All Histories

Access Level Required: VIEW

This generates a report listing the status of the chiller parameters at the time of each of the stored shutdowns.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

View Details

Access Level Required: VIEW

Causes a move to a subscreen containing the value of select chiller parameters at the time of the associated shutdown.

Trending

Access Level Required: VIEW

Causes a move to a subscreen allowing the user to view trending data on selected chiller parameters.

Custom View

Access Level required: VIEW

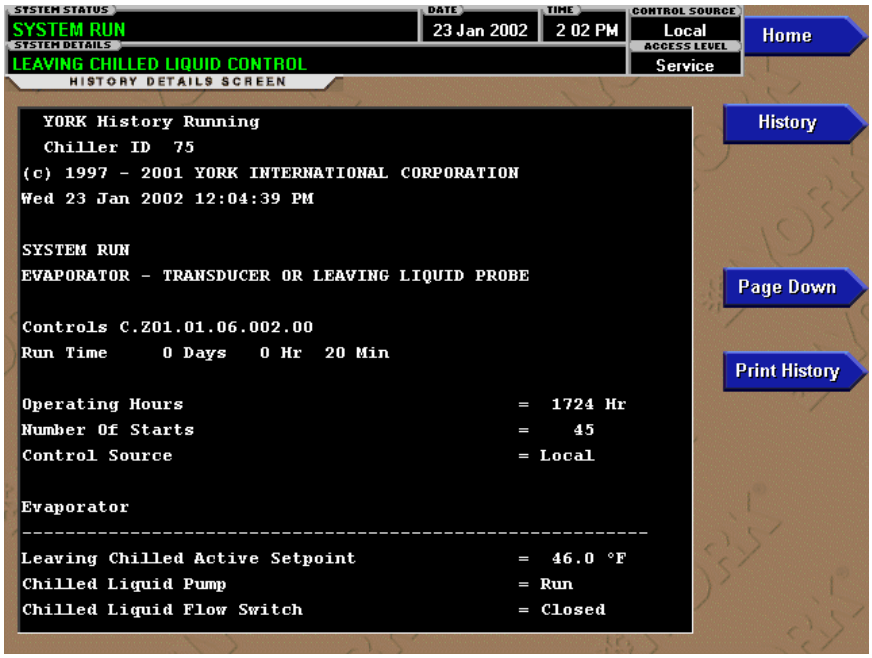
Causes a move to a subscreen allowing the user to view the Custom Setup Screen.

Security Log

Access Level Required: SERVICE

Causes a move to a subscreen allowing the user to view a record of the last 75 setpoint changes.

HISTORY DETAILS SCREEN



00660VIPC

FIGURE 43 - HISTORY DETAILS PAGE

This screen allows the user to see an on-screen printout of all the system parameters at the time of the selected shutdown. Not all screens are shown above. The number of screens required to display all of the data varies according to type of motor starter and options applied.

DISPLAY ONLY

History Printout

This is the on-screen printout of the system parameters.

PROGRAMMABLE

Page Up

Access Level Required: VIEW

Scroll up in the displayed data (if applicable).

Page Down

Access Level Required: VIEW

Scroll down in the displayed data (if applicable).

Print History

Access Level Required: VIEW

This generates a report listing the status of the chiller parameters at the time of the selected shutdown.

NAVIGATION

Home

Access Level Required: VIEW

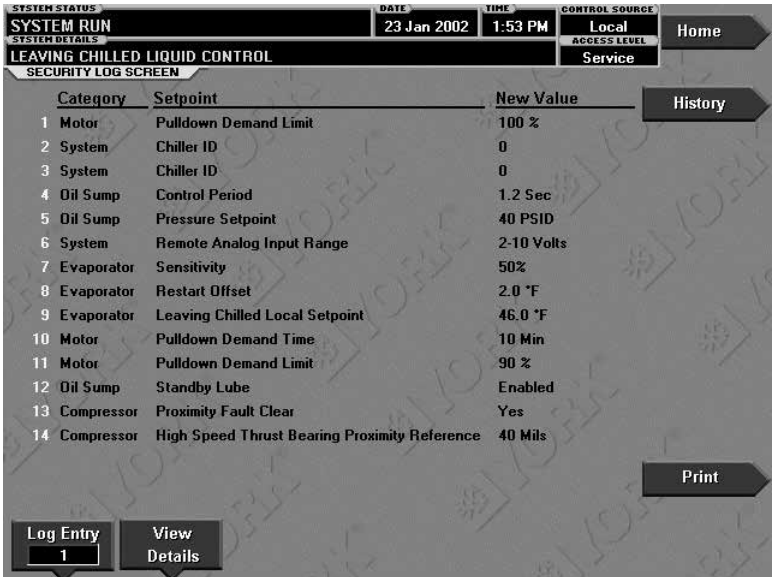
Causes an instant return to the Home Screen.

History

Access Level Required: VIEW

Causes a return to the History Screen.

SECURITY LOG SCREEN

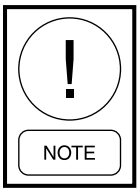


00662VIPC

FIGURE 44 - SECURITY LOG SCREEN

This screen displays a listing of the last 75 setpoint changes. They are listed and numbered in reverse order in which they were changed, with the most recent listed as number 1. Multiple pages are necessary to display all 75 changes. Not all setpoints are logged.

The details of any setpoint change can be viewed by navigating to a subscreen that displays the date and time of the change, Access Level and USER ID used to make the change, the old setpoint value and the new setpoint value.



Requires a login access level of SERVICE.

DISPLAY ONLY

Category

Displays the category of the setpoint (motor, evaporator, condenser, and so on).

Setpoint

Displays the setpoint that was changed.

New Value

Displays the value that was entered at the time of the setpoint change.

PROGRAMMABLE

Log Entry

Allows the user to select a particular setpoint change for detail viewing.

Print

Generates a detailed report of all setpoint changes listed in the setpoint change log.

Page Up

Scroll up in the displayed data (if applicable).

Page Down

Scroll down in the displayed data (if applicable).

NAVIGATION

Home

Access level Required: SERVICE

Causes an instant return to the Home Screen.

History

Access Level Required: SERVICE

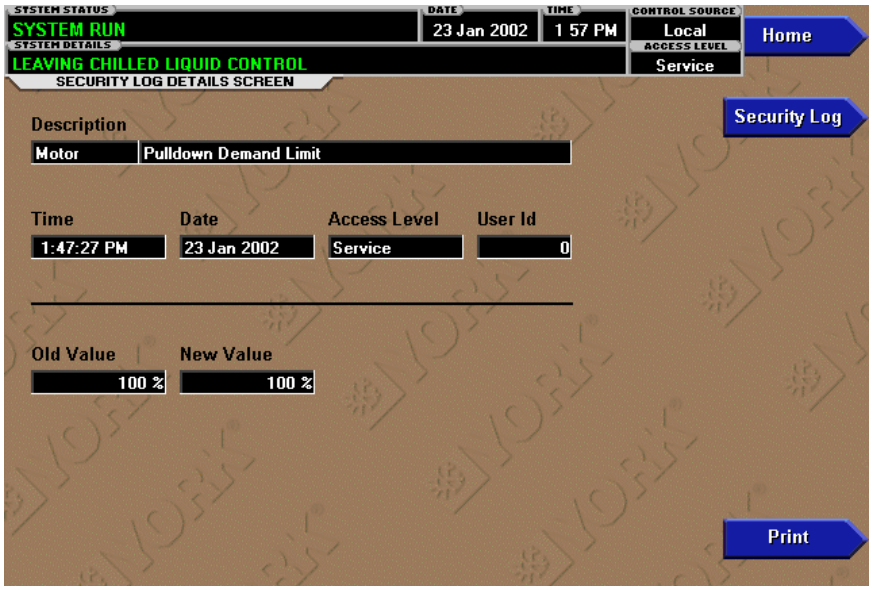
Causes an instant return to the History Screen.

View Details

Access Level Required: SERVICE

Causes a move to a subscreen containing the details of the setpoint change selected with the Log Entry key.

SECURITY LOG DETAILS SCREEN



00663VIPC

FIGURE 45 - SECURITY LOG SCREEN

This screen allows the user to view the details of a logged setpoint change, selected from the list on the Security Log Screen. The date and time the setpoint was changed, the new and old setpoint value and access level and user ID used to make the change are displayed. The data on this screen can be printed.

NOTE

Requires a login access level of SERVICE.

DISPLAY ONLY

Description
Displays the setpoint/category that was changed.

Time
Displays the time the setpoint was changed.

Date
Displays the date the setpoint was changed.

Access Level
Displays the Login Access Level used to make the setpoint change.

User ID
Displays the login User ID used to make the setpoint change.

Old Value
Displays the previous setpoint value.

New Value
Displays the value entered at the time of the setpoint change.

PROGRAMMABLE

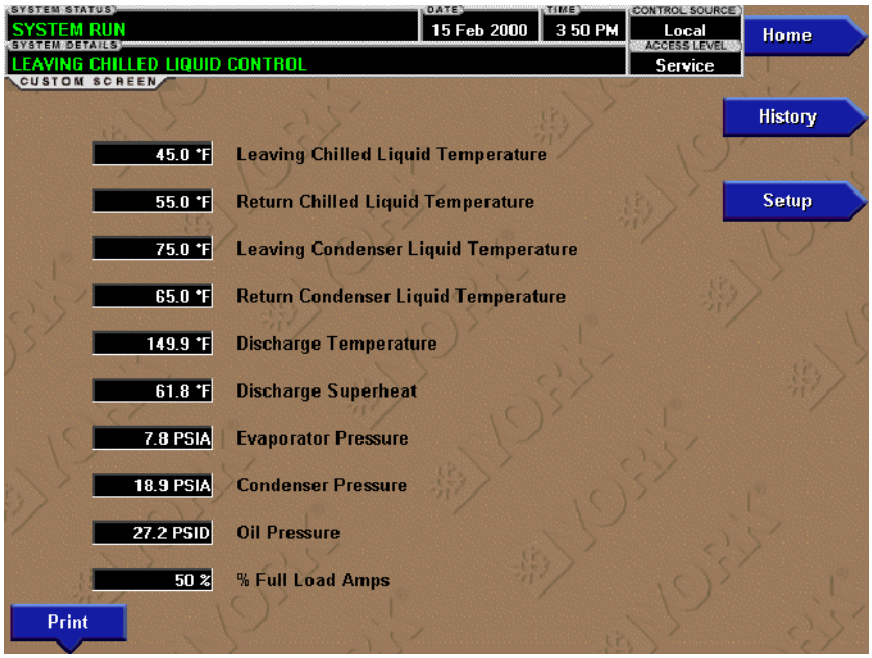
Print
Generates a report of change parameters displayed on this screen.

NAVIGATION

Home
Access Level Required: SERVICE
Causes an instant return to the Home Screen

Security Log
Access Level Required: SERVICE
Causes an instant return to the Security Log Screen.

CUSTOM VIEW SCREEN



00324VIPC

FIGURE 46 - CUSTOM VIEW SCREEN

This screen allows up to 10 Service Technician selected parameters to be displayed. These parameters are selected from a list on the Custom View Setup Screen. This allows the Service Technician to display parameters pertinent to a particular problem during troubleshooting. At completion of the service call, the display can be cleared or the parameters can be left there for monitoring by operations personnel.

DISPLAY ONLY

None

PROGRAMMABLE

Print

Access Level Required: VIEW

This generates a listing of the parameters displayed on this screen.

NAVIGATION

Home

Access Level Required: VIEW

Causes an instant return to the Home Screen.

History

Access Level Required: VIEW

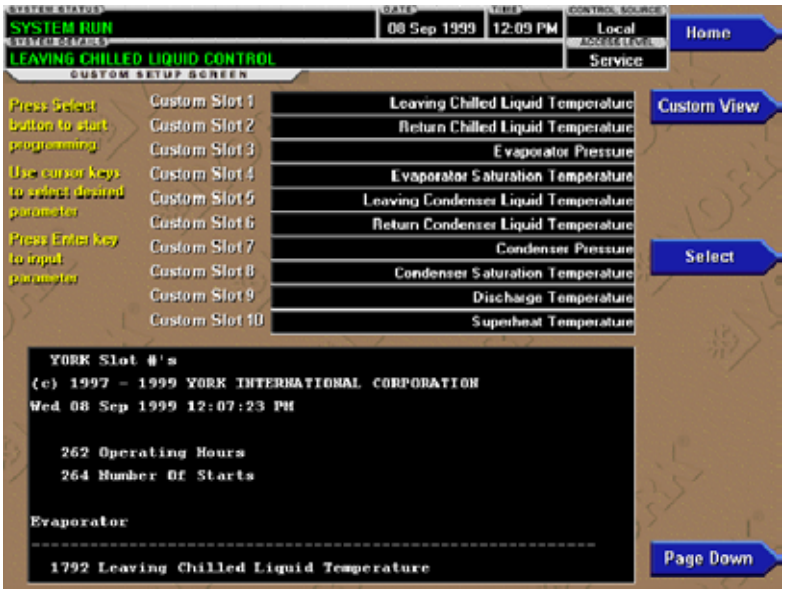
Causes an instant return to the History Screen.

Setup

Access Level Required: SERVICE

Causes a jump to the subscreen that allows selection of the parameters to be displayed.

CUSTOM VIEW SETUP



00325VIPC

FIGURE 47 - CUSTOM VIEW SETUP SCREEN

This screen allows the Service technician to select up to 10 parameters for display on the Custom View Screen.

NOTE

Requires a login access level of SERVICE.

DISPLAY ONLY

Slot Numbers

Lists the available parameters that can be displayed. The desired parameters for display are selected from this list.

PROGRAMMABLE

Page Up

Scroll up through list of available parameters.

Page Down

Scroll down through list of available parameters.

Select

First use the Page Up and Page Down keys to scroll through the Slot Numbers list and note the number of the parameters to be displayed. Pressing the Select key places a green colored selection box around Custom Slot 1. If it is desired to change an already entered parameter, use the 5 and 6 keys to place the selection box around the slot number to be changed. With the selection box around the slot number to be changed or entered, press the ENTER (3) key. A dialog box is displayed permitting data entry. Using the numeric keypad keys, enter the desired slot number and press the ENTER (3) key.

Custom Slot (1-10)

Use the Select key and numeric keypad keys as described above and enter the slot number from Slot Numbers list. Setting the Slot number to zero clears the display of this slot number.

Clear Display

Pressing this key clears all selected parameters from the Custom View screen.

NAVIGATION

Home

Access Level Required: VIEW

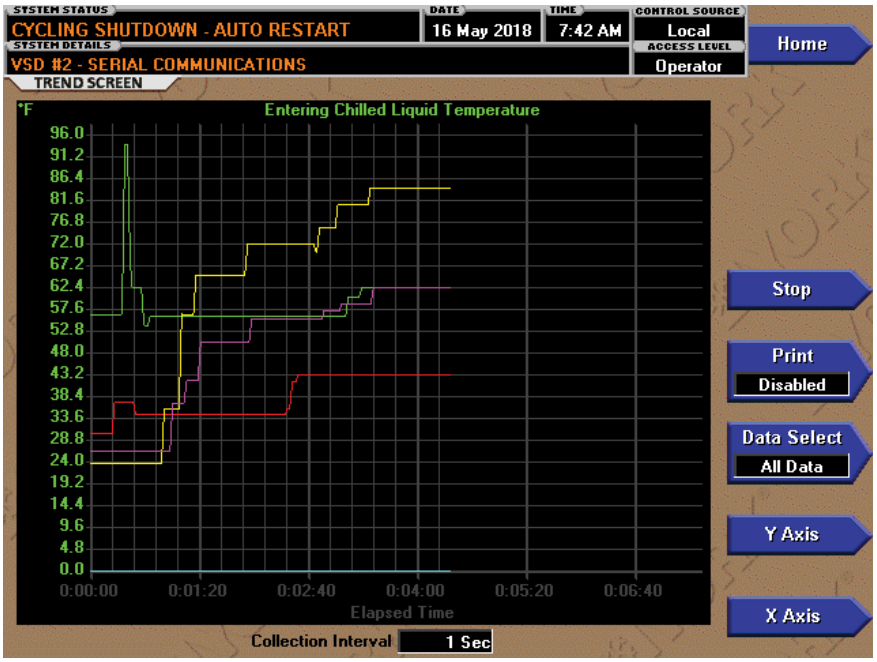
Causes a return to the Home Screen.

Custom View

Access Level Required: SERVICE

Causes a return to the Custom View Screen.

TREND SCREEN



LD27882

FIGURE 48 - TREND SCREEN

As many as six Operator selected parameters (Data Points) can be plotted in an X/Y graph format. The X-Axis is scaled per the selected Data Collection Interval and displayed in a time of day or elapsed time format, as selected with the X-axis toggle key. The Y-Axis is scaled for each parameter per the selected minimum and maximum value for each parameter. Analog parameters are scaled in pressure, temperature, volts, amps, hertz or time. Digital on/off parameters are scaled as zero (off) and one (on). Only one Y-Axis label is displayed at a time. The Y-Axis Toggle Key is used to toggle the Y-Axis labels through the different parameters. The Y-Axis label that is being displayed is identified at the top of the graph. For identification, each plotted parameter and associated Y-Axis labeling is color coordinated.

The DATA SELECT key is used to display all trended Data Points simultaneously or select a single Data Point for display.

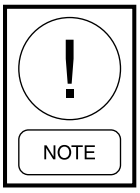
The parameters are sampled at the selected Data Collection Interval and plotted using 450 data points across the X-Axis. If the actual value of the sampled parameter is less than the Y-Axis label minimum for that parameter, the value will be plotted at the minimum value. Similarly, if the actual value is greater than the Y-Axis label maximum for that parameter, the value will be plotted at the maximum value.

There are three types of charts that can be created: ONE SCREEN, CONTINUOUS or TRIGGERED. When plotting reaches the end of the X-axis, if ONE SCREEN is selected, trending stops and data is frozen. If CONTINUOUS is selected, the oldest data is dropped from the left-hand side of the graph at the next collection interval. Thereafter, the oldest data is dropped from the left hand-side of the graph at each data collection interval. If TRIGGERED is selected, data collection can be set to start or stop based upon the selected TRIGGER ACTION (START or STOP). If START is selected, data collection will not begin until the Triggers have been satisfied and any selected TRIGGER DELAY has elapsed. Data collection will stop at the completion of one screen of data as with the ONE SCREEN. If STOP is selected, data collection will not stop until the Triggers have been satisfied and any selected TRIGGER DELAY has elapsed.

If a power failure occurs while the trending is running, the trending is stopped. Upon restoration of power, the last screen of data that was collected will be displayed on the trending screen. The START key must be pressed to initiate a new trend screen.

DISPLAY ONLY

This screen allows the user to view the graphical trending of the selected parameters and is also a gateway to the graph setup screens.



A red screen with the words "TREND MAX MUST BE > TREND MIN" will appear if the Y-Axis minimum has been programmed to a value that is greater than the Y-Axis maximum for any parameter. If this appears, proceed to the Trend Setup Screen to change the values.

PROGRAMMABLE

Start

Access Level Required: OPERATOR

Pressing this key clears the graph, starts a new graph, sets the time of day to the present clock time and begins the trending. This key is only available if trending is stopped. If the selected Chart Type is TRIGGERED and TRIGGER ACTION is set to START, data collection will not begin until the Triggers have been satisfied and any selected TRIGGER DELAY has elapsed. Otherwise, data collection will begin immediately.

Stop

Access Level Required: OPERATOR

Pressing this key stops the trending. The trend data is frozen on the display until another graph is started with the START key. The Stop key is only available if trending is running.

Print

Access Level Required: VIEW

Allows the data on the trend screen to be printed in tabular format. If set to EXISTING, a snapshot of the data presently on the screen is sent to the printer. If set to NEW, all data collected after pressing this key will be sent to the printer as it is collected. If set to DISABLED, no data is sent to the printer. See *SECTION 3 – PRINTERS* for printout example.

Data Select

Access Level Required: VIEW

Allows the user to display all trended data points simultaneously or select a single trended data point for display, hiding the other data points. Selections are ALL DATA or DATA POINT X (1-6).

Y-Axis

Access Level Required: VIEW

This key toggles the Y-Axis labels of the graph. Each key press changes the label to another of the selected parameters.

X-Axis

Access Level Required: VIEW

This key toggles the X-Axis labels of the graph. Each key press alternates the scaling between time of day and elapsed time. The Time of Day scaling is in 24-hour format. The Elapsed Time scaling is the time elapsed since the START key was pressed, starting the trending.

NAVIGATION

Home

Access Level Required: VIEW

Causes a return to the Home Screen.

History

Access Level Required: VIEW

Causes a return to the History Screen.

Trend Setup

Access Level Required:

Only displayed if the trending is stopped. Causes a jump to a subscreen for configuring the trending display.

TREND SETUP SCREEN

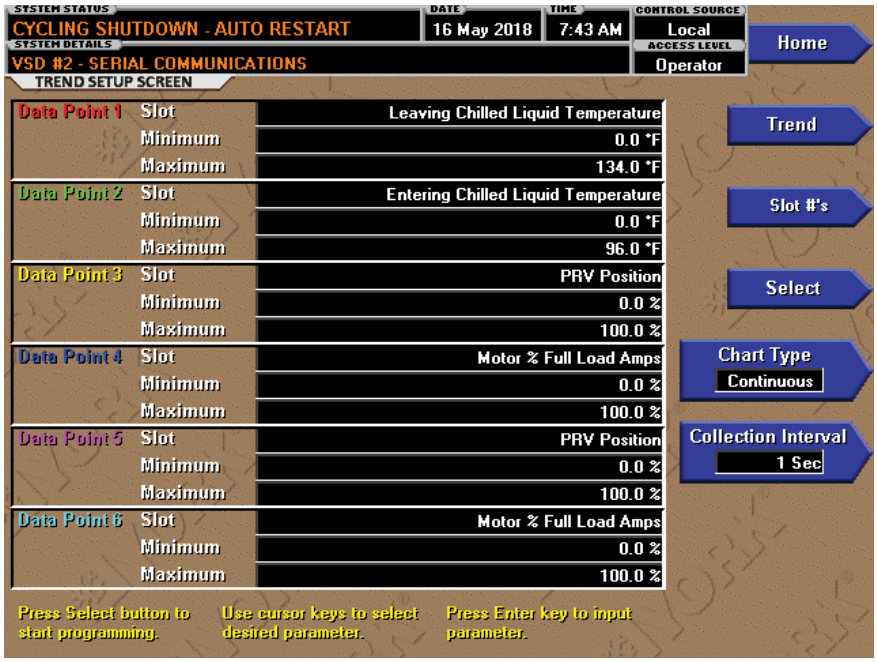


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FIGURE 49 - TREND SETUP SCREEN

This screen is used to configure the trending screen. The parameters to be trended are selected from the Common Slots Screen or Common Slots Master list and entered as Slot Numbers for Data Points 1 through 6. The Y-Axis minimum and maximum values for each parameter are entered as Data Point Min and Data Point Max for Data Points 1 through 6. The interval at which all the parameters are sampled is selected as the Data Collection Interval.

DISPLAY ONLY

None

PROGRAMMABLE

Chart Type

Access Level Required: OPERATOR

Selects CONTINUOUS, ONE SCREEN or TRIGGERED type of graph.

Collection Interval

Access Level Required: OPERATOR

Selects the interval at which the parameters are sampled. There are 450 data points displayed across the X-Axis of the graph. Each point represents the instantaneous value of the parameter. The user selects the time interval between these points. This is called the DATA COLLECTION INTERVAL, or the interval at which the parameter is sampled. This interval is programmable over the range of 1 second to 3600 seconds (1 hour), in one second increments. The selected interval not only determines the sample interval, but also the full screen time display. The full screen time display is a result of the selected interval in seconds, multiplied by the 450 data points. For example, if the Data Collection Interval is programmed for 900 seconds, the parameter would be sampled every 900 seconds, with the last 112.5 hours (4.7 days) of data viewable on the screen. Therefore, the selected interval is a compromise between resolution and full screen time display. Select the desired Data Collection Interval as follows:

1. Determine the desired time interval (in seconds), between data samples.
2. Calculate the full screen time display as follows:
   - 450 x Data Collection Interval = full screen seconds
   - Full screen seconds / 60 = full screen minutes
   - Full screen minutes / 60 = full screen hours
   - Full screen hours / 24 = full screen days
3. Decide if the resultant sample interval and full screen display meet the requirements. If not, select a different sample interval.

Select

Access Level Required: OPERATOR

This key is used to enter the slot numbers and the minimum and maximum Y-Axis values of each parameter to be trended. Pressing this key places a yellow box around Data Point 1 Slot Number. Use the ▲ and ▼ navigation keys to place the box around the value of Data Points 1 through 6 to be changed. With the desired value selected, press the 3 key. A dialog box is displayed permitting data entry.

Data Point Slot # (1-6)

Access Level Required: OPERATOR

Use the SELECT key as described above and enter the slot number from the Common Slots Screen or Master Slot Number List of the desired parameter to be trended. The selected parameter description will be displayed for the Data Point. Setting this slot number to zero will disable trending for that particular Data Point. Any or all points can be disabled.

Data Point Min (1-6)

Access Level Required: OPERATOR

Only displayed if the Associated Slot Number is not Zero. This is the minimum value displayed for the Y-Axis. Selecting a parameter for a Data Point sets this to the default value, which is the lowest value allowed for that parameter. It can be changed to a value that provides a more appropriate resolution for the parameter being monitored. To change, use the SELECT key as described above and enter the desired value. The value must always be set to a value less than the Data Point Max. Otherwise, a red graph is displayed on the Trend Screen with the words “TREND MAX MUST BE > TREND MIN”. If the parameter selected for this data point is a digital type (on/off), this value must be set to zero (0). Zero indicates the OFF state.

Data Point Max (1-6)

Access Level Required: OPERATOR

Only displayed if the associated slot number is not zero. This is the maximum value displayed for the Y-Axis. Selecting a parameter for a Data Point sets this to the default value, which is the highest value allowed for that parameter. It can be changed to a value that provides a more appropriate resolution for the parameter being monitored. To change, use the SELECT key as described above and enter the desired value. The value must always be set to a value greater than the Data Point Min. Otherwise, a red graph is displayed on the Trend Screen with the words “TREND MAX MUST BE > TREND MIN”. There are 20 Y-Axis divisions. If a MIN-MAX span is selected that is not evenly divided by 20, the Program will automatically select the next higher MAX value that makes the span evenly divided by 20 . For example, if 0.0 is selected as the MIN and 69.0 is selected as the MAX, the Program will insert 70.0 as the MAX value. If the parameter selected for this data point is a digital type (on/off), this value must be set to one (1). One indicates the on state.

NAVIGATION

Home

Causes a return to the Home Screen.

Trending

Causes a return to the Trending Screen.

Slot Numbers

Causes a jump to a subscreen that lists the slot numbers of the most commonly monitored parameters. The desired parameters to be plotted are selected from this screen.

Triggers

Causes a jump to the Advanced Trend Setup Screen, where the start/stop Triggers can be setup. Only displayed if TRIGGERED has been selected as Chart Type.

ADVANCED TREND SETUP SCREEN

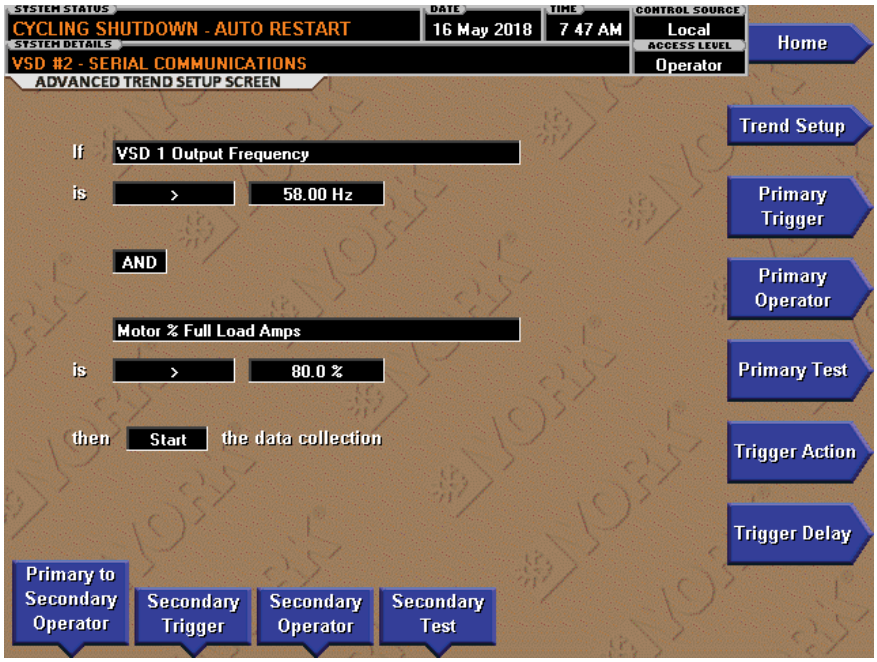

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FIGURE 50 - ADVANCED TREND SETUP SCREEN

The desired data collection start/stop triggers are setup on this screen. The trend data collection can be set to start or stop based upon the status of up to two selected Triggers. The Triggers can consist of digital events or analog parameters compared to thresholds. The Triggers can be used individually or in combination. The digital and analog parameters are selected from the Common Slots Screen (or Master Slot Numbers List in this book).

The parameter selected as the Primary Trigger is compared to a value selected as the Primary Test, using the Primary Operator as a comparator. If it is evaluated as true, then the data collection is started or stopped (after any selected Trigger delay) per the selected Trigger Action.

A Secondary Trigger can be evaluated with the Primary Trigger to start/stop data collection. The Primary to Secondary Operator is used to define the Trigger combinations required to be true to start/stop data collection. The Secondary Trigger is setup and evaluated the same as the Primary Trigger.

Entry fields are as follows:

If Primary Trigger
Is Primary Operator Primary Test

Primary to Secondary Operator

Secondary Trigger
Is Secondary Operator Secondary Test

Then Trigger Action the Data Collection
With a delay of Trigger Delay

After the desired Triggers are set, the START key on the TREND Screen must be manually pressed before the triggers will be evaluated. While waiting for the triggers to start or stop data collection, a status message is displayed in the upper right corner of the TREND Screen describing the pending action.

DISPLAY ONLY

None

PROGRAMMABLE

Primary Trigger

Access Level Required: OPERATOR

Selects the first parameter to be evaluated. Selection is made from the Slot Numbers listing on the Trend Common Slots Screen or the Master Slot Numbers List in this book. Setting this slot number to zero disables the Primary Trigger.

Primary Operator

Access Level Required: OPERATOR

Selects the comparator for the Primary Trigger's relationship to the Primary Test. If the Primary Trigger is an analog value, selections are: <, <=, =, =>, >. If the Primary Trigger is a digital event, selections are: Equal To, Not Equal To.

Primary Test

Access Level Required: OPERATOR

Selects the value or condition that the Primary Trigger is compared to. Selection ranges from the Primary Trigger minimum value to the Primary Trigger maximum value.

Trigger Action

Access Level Required: OPERATOR

Selects whether the trend data collection will Start or Stop when the Trigger comparisons are true. If set to Start, data collection will stop after one screen of data is collected.

Trigger Delay

Access Level Required: OPERATOR

Allows the data collection start or stop to be delayed after the Triggers evaluate as true. The delay is selectable from 1 to 864000 seconds (10 days). Display is in days, hours, minutes and seconds. The delay timer begins when the triggers evaluate as true. If the Trigger Action is set to Start, data collection will begin after the triggers evaluate as true and the delay timer has elapsed. If the Trigger Action is set to Stop, data collection will stop after the Triggers evaluate as true and the delay timer has elapsed.

Primary to Secondary Operator

Access Level Required: OPERATOR

Selects whether the Primary Trigger, Secondary Trigger or both have to be true in order to start or stop data collection. Selections are AND, OR, XOR and None. If NONE is selected, the Secondary Trigger is disabled. Data collection will start/stop (as selected with Trigger Action) when:

- If AND selected: Both Primary AND Secondary are true
- If OR selected: Either Primary OR Secondary (or both) are true
- If XOR selected: Either Primary OR Secondary (but not both) are true

Secondary Trigger

Access Level Required: OPERATOR

Selects the second parameter to be evaluated. Selection is made from the Slot Numbers listing on the Trend Common Slots Screen or the Master Slot Numbers List in this book. Setting this slot number to zero disables the Secondary Trigger.

Secondary Operator

Access Level Required: OPERATOR

Selects the comparator for the Secondary Trigger's relationship to the Secondary Test. If the Secondary trigger is an Analog value, selections are: <, <=, =, =>, >. If the Secondary Trigger is a digital event, selections are: Equal To, Not Equal To.

Secondary Test

Access Level Required: OPERATOR

Selects the value or condition that the Secondary Trigger is compared to. Selection ranges from the Secondary Trigger minimum to the Secondary Trigger maximum.

NAVIGATION

Home

Causes an instant return to the Home Screen.

Trend Setup

Causes an instant return to the Trend Setup Screen.

COMMON SLOTS SCREEN

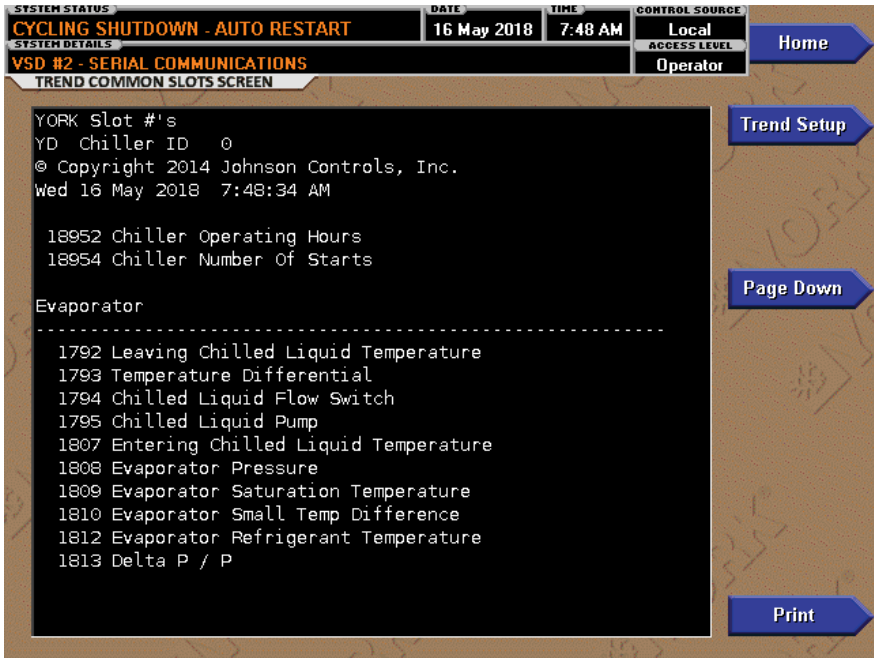

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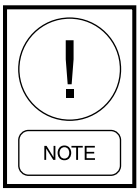
FIGURE 51 - COMMON SLOTS SCREEN

This screen displays the slot numbers of the commonly monitored parameters. The slot numbers for the remainder of the available parameters are listed on the Master Slot Numbers List that follows.

From these lists, select up to six parameters to be trended. Return to the Trend Setup Screen and enter the parameters Slot Numbers into Data Points 1 through 6.



Requires a login access level of OPERATOR or higher.

DISPLAY ONLY

Slot Numbers

These are the slot numbers of the most commonly used parameters.

PROGRAMMABLE

Page Down

Access Level Required: OPERATOR

Scroll down in the displayed data.

Page Up

Access Level Required: OPERATOR

Scroll up in the displayed data.

Print

Access Level Required: OPERATOR

Generates a list of the slot numbers of the available parameters.

NAVIGATION

Home

Causes an instant return to the Home Screen.

Trend Setup

Causes a return to the Trend Setup Screen.

SLOT NUMBERS

SLOT NO	DESCRIPTION
	EVAPORATOR
1792	Leaving Chilled Liquid Temperature
1793	Temperature Differential
1794	Chilled Liquid Flow Switch
1795	Chilled Liquid Pump
1807	Return Chilled Liquid Temperature
1808	Evaporator Pressure
1809	Evaporator Saturation Temperature
1810	Small Temperature Difference
1812	Evaporator Refrigerant Temperature
1813	Delta P / P
	CONDENSER
2048	Leaving Condenser Liquid Temperature
2049	Condenser Liquid Flow Switch
2050	Condenser Liquid Pump
2051	Return Condenser Liquid Temperature
2052	Condenser Pressure
2053	Condenser Saturation Temperature
2054	Small Temperature Difference
2059	Sub Cooling Temperature
2061	Drop Leg Refrigerant Temperature
	REFRIGERANT LEVEL CONTROL
8324	Condenser Active Level Setpoint
8206	Condenser Refrigerant Level
18376	Condenser Level Control State
8325	Condenser Level Control Valve Command
2072	Subcooler Effectiveness
	COMPRESSOR 1
1296	Discharge Temperature
1299	Discharge Superheat
18432	Discharge High Pressure Switch
18460	Discharge Valve
18459	Discharge Valve Close Command
18458	Discharge Valve Open Command
1280	Vane Motor Switch
1281	PRV Position
1282	PRV Opening
1283	PRV Closing
8225	High Speed Thrust Bearing Proximity Differential
	COMPRESSOR 2
18441	Discharge Temperature
18442	Discharge Superheat
18433	Discharge High Pressure Switch
18465	Discharge Valve
18464	Discharge Valve Close Command
18463	Discharge Valve Open Command
18443	Vane Motor Switch
18444	PRV Position
18445	PRV Opening

SLOT NO	DESCRIPTION
18446	PRV Closing
18437	High Speed Thrust Bearing Proximity Differential
	SURGE - SINGLE COMPRESSOR
8236	Surge Detected
8238	Total Surge Count
	SURGE - DUAL COMPRESSOR
18958	Surge Detected
18960	Total Surge Count
	HOT GAS
8231	Valve Position
	OIL SUMP
1537	Oil Sump Temperature
1542	Oil Heater
18497	System Oil Return Solenoid
8193	Sump Oil Pressure (LOP)
19004	Oil Level
	OIL PUMP 1
1539	Oil Pump Run Output
8192	Pump Oil Pressure (HOP)
1536	Oil Pressure
8197	Oil Pump Drive Command Frequency
	OIL PUMP 2
18483	Oil Pump Run Output
18480	Pump Oil Pressure (HOP)
18481	Oil Pressure
18485	Oil Pump Drive Command Frequency
	MOTOR 1
2305	Motor Run
2306	% Full Load Amps
	MOTOR 2
18708	Motor Run
18709	% Full Load Amps
2351	Operating Hours Since Last Motor Lubrication
	VARIABLE GEOMETRY DIFFUSER
8287	Stall Detector Board 1 output voltage
8302	Stall DC Pressure Voltage 1 (Stall Transducer output)
8288	VGD 1 open
8289	VGD 1 close
18968	Stall Detector Board 2 output voltage
19009	Stall DC Pressure Voltage 2 (Stall Transducer output)
18969	VGD 2 open
18970	VGD 2 close
18983	VGD 1 position
18988	VGD 2 position
18993	Lead VGD position
18994	Lag VGD position

SLOT NO	DESCRIPTION
	MOTOR 1
2305	Motor 1 Run
2306	Motor % Full Load Amps
2351	Operating Hours Since Last Motor Lubrication
2818	VSD 1 Input Power
2822	VSD 1 Output Frequency
2823	VSD 1 Output Voltage
2824	VSD 1 Phase A Output Current (RMS)
2825	VSD 1 Phase B Output Current (RMS)
184562826	VSD 1 Phase C Output Current (RMS)
2982	VSD 1 DC Bus Voltage AU
2983	VSD 1 DC Bus Voltage AL
2984	VSD 1 DC Bus Voltage BU
2985	VSD 1 DC Bus Voltage BL
2986	VSD 1 DC Bus Voltage CU
2987	VSD 1 DC Bus Voltage CL
2835	VSD 1 Phase A Heatsink Temperature
2836	VSD 1 Phase B Heatsink Temperature
2837	VSD 1 Phase C Heatsink Temperature
17414	Motor Heater On
	MOTOR 2
18708	Motor 2 Run
18709	Motor % Full Load Amps
2351	Operating Hours Since Last Motor Lubrication
18754	VSD 2 Input Power
18758	VSD 2 Output Frequency
18759	VSD 2 Output Voltage
18760	VSD 2 Phase A Output Current (RMS)
18761	VSD 2 Phase B Output Current (RMS)
18762	VSD 2 Phase C Output Current (RMS)
18849	VSD 2 DC Bus Voltage AU
18850	VSD 2 DC Bus Voltage AL
18851	VSD 2 DC Bus Voltage BU
18852	VSD 2 DC Bus Voltage BL
18853	VSD 2 DC Bus Voltage CU
18854	VSD 2 DC Bus Voltage CL
18771	VSD 2 Phase A Heatsink Temperature
18772	VSD 2 Phase B Heatsink Temperature
18773	VSD 2 Phase C Heatsink Temperature
17415	Motor Heater On

SLOT NO	DESCRIPTION
	CAPACITY CONTROL
18273	Capacity Control State
18274	Active Load Limit
17734	Lead VSD Frequency Command
17739	Lead VSD Output Frequency
18365	Lead VSD Control Mode
18336	Lead Max VGD Position
18337	Lag Max VGD Position
17687	Lead PRV Command
18456	Lead PRV Position
18368	Lead PRV Control Mode
18467	Lag PRV Position
17689	HGBP Command
18366	HGBP Control Mode
17685	Head Pressure
18288	Speed of Sound
18289	Isentropic Head
18290	Omega
18242	Lead Surge Mach
18243	Lag Surge Mach
18305	Lead Anti-Surge Transient Offset
17778	Lag Anti-Surge Transient Offset
17680	Biased Anti-Surge Minimum Frequency
18240	Lead Surge Frequency
18241	Lag Surge Frequency
17681	Active Anti-Surge Minimum Frequency
17682	Lead Active Minimum PRV Position
17777	Evaporator Pressure Override Threshold
17776	Condenser Pressure Override Threshold
18251	Lead Motor Current Override Threshold

DISPLAY MESSAGES

The Status Bar of the Display contains a Status Line and, beneath it a Details Line. The Status Line contains a message describing the operating state of the chiller; whether it is stopped, running, starting or shutting down. The Details Line displays Warning, Cycling, Safety, Start Inhibit and other messages that provide further details of the Status Bar messages. The Status Messages listed below are displayed on the Status Line. All other messages are displayed on the Details Line.

To aid in the meaning of the message, messages are displayed in different colors as follows:

- Normal Operation messages - Green
- Warning messages - Yellow
- Cycling Shutdown messages - Orange
- Safety Shutdown messages - Red

Status Messages

“SYSTEM READY TO START”

The chiller is shut down but will start upon receipt of a Local or Remote start signal.

“CYCLING SHUTDOWN – AUTO RESTART”

The chiller is shut down on a CYCLING shutdown. The cause of the shutdown is still in effect and is displayed on the Details line of the Status Bar. The chiller will automatically restart when the CYCLING condition clears.

“SAFETY SHUTDOWN – MANUAL RESTART”

The chiller is shut down on a **SAFETY** shutdown. The cause of the shutdown is still in effect and is displayed on the Details line of the Status Bar. The chiller can be started after the Safety condition clears and the Operator presses the Clear Fault button on the Home screen.

“SYSTEM PRELUBE”

A chiller start has been initiated and the pre-start lubrication is being performed on the Lead compressor. The Prelube duration is either 50 seconds or 180 seconds, as configured with a Microboard Program Switch. The Pre-lube duration must never be changed by anyone other than a qualified Service Technician. The standard Prelube duration is 50 seconds.

“SYSTEM RUN”

The chiller is running under the condition described in the Details Line of the Status Bar.

“SYSTEM COASTDOWN”

The chiller has shut down and the Post-run lubrication is being performed.

“SYSTEM START INHIBIT”

The chiller is prevented from being started due to the reason displayed on the Details Line of the Status bar.

“SYSTEM UNLOADING BEFORE SHUTDOWN”

Displayed while the Pre-rotation Vanes and Discharge Valves are closing during a soft shutdown of the entire chiller. A soft shutdown is performed on the running compressors for the following shutdowns:

- “Leaving Chilled Liquid Temperature – Low Temperature”
- “Remote Stop” (ISN, Analog Remote or Digital Remote)
- “Control Panel-Schedule”
- “Multiunit Cycling-Contacts Open”
- “System Cycling #1-Contacts Open”
- “System Cycling #1-Contacts Open”
- “Discharge #1-Valve Not Closed”
- “Discharge #2-Valve Not Closed”
- Operator initiated at Keypad

When a soft shutdown is initiated on the entire chiller, a close command is applied to the Pre-rotation Vanes. If both compressors are running, a Vanes close command is applied simultaneously to both compressors. When the Vane Motor Switch for each compressor closes, indicating its vanes have closed (or 3.5 minutes have elapsed, whichever occurs first), a close command is applied to the Discharge Valve for the respective compressor. When the Discharge Valve limit switch closes, indicating the valve has closed (or 40 seconds have elapsed, whichever occurs first), the chiller enters “Coastdown”. If both compressors are running, the chiller will enter “Coastdown” only after both Discharge Valves have closed or timed out.

While the Vanes are closing during a soft shutdown, if a Local stop or any faults listed above occur, the soft shutdown is terminated and the chiller immediately enters “Coastdown”.

Run Messages

“LEAVING CHILLED LIQUID CONTROL”

The chiller is running, controlling the Leaving Chilled Liquid to the Leaving Chilled Liquid Temperature Setpoint. There are no system conditions inhibiting this operation.

"SYSTEM IN LEAD COMPRESSOR PULLDOWN"

Displayed while a LEAD COMPRESSOR PULLDOWN TIME Setpoint (0-255 minutes) is in effect. The time remaining in the period is also displayed. For the duration of this period, only the Lead compressor will be permitted to run. The Lag compressor will not be brought on line during this period. A current limit may be applied to the Lead motor during this period using the LEAD COMPRESSOR PULLDOWN DEMAND LIMIT setpoint (30-100%). See the complete explanation in *SECTION 1 – DESCRIPTION OF SYSTEM AND FUNDAMENTALS OF OPERATION*.

“LEAD MOTOR-HIGH CURRENT LIMIT”

Either the Lead Compressor Pulldown Demand Time Setpoint is in effect and the lead compressor motor current is being limited by the Lead Compressor Pulldown Demand Limit Setpoint, or the Lead Compressor Pulldown Demand Time Setpoint has elapsed and the lead compressor motor current is being limited by the Chiller Current Limit Setpoint.

Refer to the MOTOR screen for details of the conditions above.

When the motor current increases to the “inhibit open” threshold, the Pre-rotation Vanes are inhibited from further opening. This prevents a further current rise. If the current continues to rise to the “start close” threshold, the Vanes begin closing until the current falls to the “stop close” threshold. Automatic Vane operation is resumed and this message automatically clears when the motor current decreases to the “allow open” threshold.

“LAG COMPRESSOR PRELUBE”

A start has been initiated on the lag compressor and the 50 second pre-start lubrication is being performed.

“LAG COMPRESSOR COASTDOWN”

The lag compressor has shutdown and the 150 second post-run lubrication is being Performed on the lag compressor.

“LAG COMPRESSOR UNLOADING BEFORE SHUTDOWN”

Displayed while the Pre-rotation Vanes and Discharge Valves are closing during a soft shutdown of the lag compressor.

“VANES #1 START INHIBIT-MOTOR SWITCH OPEN”

Compressor #1 is inhibited from starting because its Pre-rotation Vanes are not fully closed (Vane Motor Switch open), but compressor #2 is able to run and thus the chiller is not prevented from operating. This message clears when the Vanes have fully closed.

“VANES #2 START INHIBIT-MOTOR SWITCH OPEN”

Compressor #2 is inhibited from starting because its Pre-rotation Vanes are not fully closed (Vane Motor Switch open), but compressor #1 is able to run and thus the chiller is not prevented from operating. This message clears when the Vanes have fully closed.

“MOTOR #1 START INHIBIT – ANTI-RECYCLE”

Compressor #1 is inhibited from starting because its 30 minute anti-recycle period is in Effect, but compressor #2 is able to run. This message clears when the 30 minute timer expires.

“MOTOR #2 START INHIBIT – ANTI-RECYCLE”

Compressor #2 is inhibited from starting because its 30 minute anti-recycle period is in Effect, but compressor #1 is able to run. This message clears when the 30 minute timer expires.

START INHIBIT MESSAGES

“DISCHARGE VALVE #1 - OPEN”

The chiller (both compressors) is inhibited from starting because compressor #1 Discharge Valve is not closed. This start inhibit is released when the valve has fully closed.

“DISCHARGE VALVE #2 - OPEN”

The chiller (both compressors) is inhibited from starting because compressor #2 Discharge Valve is not closed. This start inhibit is released when the valve has fully closed.

“MOTOR #1 – ANTI-RECYCLE”

The chiller (both compressors) is inhibited from starting because compressor #1 motor is in the 30 minute anti-recycle period and compressor #2 is unable to run. This start inhibit is released when the 30 minute timer expires.

“MOTOR #2 – ANTI-RECYCLE”

The chiller (both compressors) is inhibited from starting because compressor #2 motor is in the 30 minute anti-recycle period and compressor #1 is unable to run. This start inhibit is released when the 30 minute timer expires.

“MOTOR #1 – CURRENT >15% FLA”

The chiller (both compressors) is inhibited from starting because a motor current of >15% FLA was detected on compressor #1 while it was not running. This inhibit is set instantly with no delay and the oil pump is started as soon as the motor current is detected. The starting frequency for the Variable Speed Drive Oil Pump is 45 Hz. This inhibit is released when the compressor#1 motor current decreases to < 15% FLA and the Clear Fault button is pressed on the Home screen. A complete 150 second Coastdown is performed when after the inhibit is released.

“MOTOR #2 – CURRENT >15% FLA”

The chiller (both compressors) is inhibited from starting because a motor current of >15% FLA was detected on compressor #2 while it was not running. This inhibit is set instantly with no delay and the oil pump is started as soon as the motor current is detected. The starting frequency for the Variable Speed Drive Oil Pump is 45Hz. This inhibit is released when the compressor#1 motor current decreases to < 15% FLA and the Clear Fault button is pressed on the Home screen. A complete 150 second Coastdown is performed when after the inhibit is released.

“VANES #1 – MOTOR SWITCH OPEN”

The chiller (both compressors) is inhibited from starting because the Pre-rotation Vanes of compressor #1 are not fully closed (Vane Motor Switch is open) and compressor #2 is unable to run. This inhibit is released when the Vanes have fully closed (Vane Motor Switch has closed).

“VANES #2 – MOTOR SWITCH OPEN”

The chiller (both compressors) is inhibited from starting because the Pre-rotation Vanes of compressor #2 are not fully closed (Vane Motor Switch is open) and compressor #1 is unable to run. This inhibit is released when the Vanes have fully closed (Vane Motor Switch has closed).

Warning Messages

“WARNING – CONDENSER OR EVAPORATOR XDCR ERROR”

The Evaporator pressure Transducer is indicating a higher pressure than the Condenser pressure Transducer after the chiller has been running for 10 minutes. This is indicative of a Condenser or Evaporator Transducer failure. This message will be displayed until the condition clears and the WARNING RESET Keypad key is pressed in OPERATOR (or higher) access level. Condition not checked in Brine mode.

“WARNING – CONDENSER OR VGD #1 SENSOR FAILURE”

The difference between Compressor #1 Stall Pressure Transducer output and the Condenser Pressure Transducer output has exceeded 0.28 VDC for 3 continuous minutes while compressor #1 was running. This feature verifies the operation of compressor #1 Stall Transducer and the Condenser transducer. Since both transducers are measuring essentially the same pressure, both outputs should be within the specified tolerance. This message must be manually cleared. It will be displayed until the transducer outputs are within the acceptable range of each other and the WARNING RESET key in SERVICE access level.

While this message is displayed, the Variable Geometry Diffuser (VGD) of both compressors are driven to the full open position (100%) and held there until this warning is manually is cleared. When cleared, the VGD of both compressors return to normal operation.

"WARNING – CONDENSER OR VGD #2 SENSOR FAILURE"

The difference between Compressor #2 Stall Pressure Transducer output and the Condenser Pressure Transducer output has exceeded 0.28 VDC for 3 continuous minutes while compressor #2 was running. This feature verifies the operation of the compressor #2 Stall transducer and the Condenser transducer. Since both transducers are measuring essentially the same pressure, both outputs should be within the specified tolerance. This message must be manually cleared. It will be displayed until the transducer outputs are within the acceptable range of each other and the WARNING RESET key in SERVICE access level.

While this message is displayed, the Variable Geometry Diffuser (VGD) of both compressors are driven to the full open position (100%) and held there until this warning is manually is cleared. When cleared, the VGD of both compressors return to normal operation.

"WARNING – CONDITIONS OVERRIDE VGD #1"

An extreme stall condition has been detected in compressor #1 while it was running. An extreme stall condition exists when the Stall Detector Voltage (output of the Stall Detector Board) exceeds twice the HIGH LIMIT setpoint for the duration programmed in the EXTREME STALL DURATION Setpoint (10 to 20 minutes). While this message is displayed, compressor #1 Variable Geometry Diffuser (VGD) is driven to the full open (100%) position and held there until the message is manually cleared. This protects the VGD ring from possible damage from an extreme stall condition. This message can be cleared after the Stall Detector Voltage returns to less than two times the HIGH LIMIT Setpoint and the WARNING RESET key is pressed in SERVICE access level.

The Extreme Stall condition is not checked under the following conditions:

- While the VGD is in Manual control mode
- While the VGD is fully closed (position is 0%) (VGD Limit Switch closed)
- While the Pre-rotation vanes position is greater than the PRV VGD INHIBIT Setpoint

"WARNING – CONDITIONS OVERRIDE VGD #2"

An extreme stall condition has been detected in compressor #2 while it was running. An extreme stall condition exists when the Stall Detector Voltage (output of the Stall Detector Board) exceeds twice the HIGH LIMIT setpoint for the duration programmed in the EXTREME STALL DURATION Setpoint (10 to 20 minutes). While this message is displayed, compressor #2 Variable Geometry Diffuser (VGD) is driven to the full open (100%) position and held there until the message is manually cleared. This protects the VGD ring from possible damage from an extreme stall condition. This message can be cleared after the Stall Detector Voltage returns to less than two times the HIGH LIMIT Setpoint and the WARNING RESET key is pressed in SERVICE access level.

The Extreme Stall condition is not checked under the following conditions:

- While the VGD is in Manual control mode
- While the VGD is fully closed (position is 0%) (VGD Limit Switch closed)
- While the Pre-rotation vanes position is greater than the PRV VGD INHIBIT Setpoint

"WARNING – HEAD PRESSURE – HIGH HEAD LAG START LIMIT"

Displayed when starting the Lag compressor while a high head condition exists. A high head condition exists when the actual DELTA P/P is greater than the HIGH HEAD DP/P LIMIT Setpoint. To minimize surging while starting the lag compressor under this condition, the lead compressor's Pre-rotation Vanes are driven closed coincident with the start of the Lag compressor's Pre-lube. They will be allowed to open after the Lag compressor is running, the Lag Discharge Valve is open and the Lead and Lag motor currents are balanced within 5%.

"WARNING – ANTI SURGE – EXCESS SURGE LIMIT"

This warning applies to dual compressor operation only. The Pre-rotation Vanes are being load limited because a surge event has been detected while both compressors are running. As a surge avoidance, a close

signal is applied to both the lead and lag compressor vanes until the lowest motor current is greater than or equal to 80% of the highest motor current. The load limit will remain in effect until the lag compressor is shutdown, whereupon the message is cleared.

"WARNING – ANTI SURGE – SURGE COUNT EXCEEDED"

This warning applies to dual compressor operation only. The Surge Window Count exceeded the Count Limit while both compressors were running. To prevent further surging, a soft shutdown is performed on the lag compressor when this warning is displayed. This message will be displayed until manually cleared with the WARNING RESET key in Operator (or higher) Access Level.

"WARNING – COMPRESSOR #1 LOCKED OUT"

Compressor #1 is inhibited from starting because it has been placed in service lockout. This is performed on the Compressor Capacity Cycling Screen.

"WARNING – COMPRESSOR #2 LOCKED OUT"

Compressor #2 is inhibited from starting because it has been placed in service lockout. This is performed on the Compressor Capacity Cycling Screen.

"WARNING – OIL PUMP #1 – SEAL LUBRICATION - LOW PRESSURE"

A minimum of 15 PSID of oil pressure was not achieved in the first 30 seconds of the seal lubrication cycle (or it dropped below this value during the remaining 90 seconds of the cycle) for compressor #1. This message must be manually cleared using the WARNING RESET key in Service access level (or higher). As soon as the message is cleared, another seal lubrication will be attempted. The message will also be cleared if Standby Lube #1 is disabled on OIL PUMP 1 Screen or compressor #1 enters the prelube state.

"WARNING – OIL PUMP #2 – SEAL LUBRICATION - LOW PRESSURE"

A minimum of 15 PSID of oil pressure was not achieved in the first 30 seconds of the seal lubrication cycle (or it dropped below this value during the remaining 90 seconds of the cycle) for compressor #2. This message must be manually cleared using the WARNING RESET key in Service access level (or higher). As soon as the message is cleared, another seal lubrication will be attempted. The message will also be cleared if Standby Lube #2 is disabled on OIL PUMP 2 Screen or compressor #1 enters the prelube state.

"WARNING – LOW OIL LEVEL"

Displayed if the oil level in the oil sump is less than the Minimum Oil Level as shown below. It will automatically clear when the level is greater than the Minimum Oil Level.

CONDITION	MINIMUM OIL LEVEL
No compressors running	50%
1 compressor running	40%
2 compressors running	30%

"WARNING – OIL PUMP #1 – SEAL LUBRICATION IN PROGRESS"

The 2 minute seal lubrication cycle (that occurs once every 24 hours while the compressor #1 is not running) is in progress for compressor #1.

"WARNING – OIL PUMP #2 – SEAL LUBRICATION IN PROGRESS"

The 2 minute seal lubrication cycle (that occurs once every 24 hours while compressor #2 is not running) is in progress for compressor #2.

"WARNING – VANES #1 – UNCALIBRATED"

The Pre-rotation Vanes calibration procedure has not been performed on compressor #1.

"WARNING – VANES #2 – UNCALIBRATED"

The Pre-rotation Vanes calibration procedure has not been performed on compressor #2

"WARNING – SURGE PROTECTION - EXCESS SURGE DETECTED"

This warning applies only to single compressor operation and only if the Surge Protection SHUTDOWN Setpoint is disabled. The Surge Window Count has exceeded the Count Limit setpoint during single compressor operation. This message can be cleared with the Warning Reset key in Operator access level (or higher) after the Surge Window Count is less than the Count Limit.

"WARNING – SURGE PROTECTION – EXCESS SURGE LIMIT"

This warning applies to single compressor operation only and only if the Surge Protection EXTENDED RUN Setpoint is enabled. The chiller is operating in a Surge Protection Extended Run period because the Surge Window Count has exceeded the Count Limit setpoint during single compressor operation. When the Surge Window Count exceeds the Count Limit setpoint, a 10 minute Extended Run period is initiated. During this period, the Pre-rotation Vanes are driven closed. At the end of the 10 minute period, if the Surge Window Count is less than the Count Limit, this message is cleared and Vanes are allowed to load. Otherwise, another 10 minute Extended Run period is initiated.

"WARNING – SETPOINT OVERRIDE"

A blank BRAM battery-backed memory device (IC location U52 on Microboard) or a failure of this device was detected during the initialization process that occurs when power is applied to the Control Center. Due to this failure, any or all of the programmed Setpoints could have been corrupted. Therefore, all Setpoints have been automatically changed to their Default values. All Setpoints will have to be programmed to their desired values. This message will clear when the WARNING RESET key is pressed in OPERATOR (or higher) access level.

"WARNING – CONDENSER – HIGH PRESSURE LIMIT"

The Condenser Pressure exceeds the High Pressure Warning Setpoint threshold, programmed by a Service technician logged in at SERVICE access level. While this condition is in effect, the Pre-rotation Vanes are inhibited from further opening. This message automatically clears and the Vanes are permitted to open when the Condenser pressure decreases to 5 PSIG below the Setpoint.

"WARNING – EVAPORATOR – LOW PRESSURE LIMIT"

The Evaporator pressure has decreased to the Warning threshold. This threshold is fixed in Water cooling applications. In Brine cooling applications, the threshold is a fixed amount above the programmable safety shutdown threshold. The Safety threshold in Brine applications is determined by the Brine solution and is determined by the YORK Factory. While this condition is in effect, the Pre-rotation Vanes are inhibited from further opening. This message automatically clears and the Vanes are permitted to open when the Evaporator pressure increases to the reset value.

	WARNING THRESHOLD (PSIG)		RESET THRESHOLD (PSIG)	
	WATER	BRINE	WATER	BRINE
R134a	27.0	+2.0 >Safety Setpoint	28.0	+3.0>Safety Setpoint

"WARNING – MOTOR BEARING LUBE SUGGESTED"

The Operating Hours Since Last Motor Lubrication has exceeded 1000 hours (the greater of either Motor #1 Operating Hours or Motor #2 Operating Hours is used for this calculation). This warning will be displayed until manually cleared by the Operator or the Operating Hours Since Last Motor Lubrication exceed 1200 hours, whereupon it is replaced by the message "Warning – Motor Bearing Lube Required" below. The Operator clears this message by entering his/her initials, name or user ID in Operator Access Level (or higher) using the Motor Lube Acknowledge key on the Motor Lubrication Screen. See the *Motor Lubrication Screen* for entry instructions. This entry implies both motors were lubricated. The date and time of this entry is automatically logged as the "Date of Last Motor Lubrication" and "Time of Last Motor Lubrication". It also resets the "Operating Hours Since Last Lubrication" to zero. The date this warning occurs is stored as the "Date of Last Motor Lubrication Warning or Fault". This warning message will only be displayed if the AUTO LUBE setpoint on the Motor Lubrication Screen is disabled.

"WARNING – MOTOR BEARING LUBE REQUIRED"

The Operating Hours Since Last Motor Lubrication has exceeded 1200 hours (the greater of either Motor #1 Operating Hours or Motor #2 Operating Hours is used for this calculation). This warning replaces "Warning – Motor Bearing Lube Suggested" above. This warning is displayed until manually cleared by the Operator or the Operating Hours Since Last Motor Lubrication exceed 1400 hours, whereupon it is replaced by the message "Motor – Lack of Bearing Lubrication" below. The Operator clears this message by entering his/her initials, name or user ID in Operator Access Level (or

higher) using the Motor Lube Acknowledge key on the Motor Lubrication Screen. See the *Motor Lubrication Screen* for entry instructions. This entry implies both motors were lubricated. The date and time of this entry is automatically logged as the "Date of Last Motor Lubrication" and "Time of Last Motor Lubrication". It also resets the "Operating Hours Since Last Lubrication" to zero. The date this warning occurs is stored as the "Date of Last Motor Lubrication Warning or Fault". This warning message will only be displayed if the AUTO LUBE setpoint on the Motor Lubrication Screen is disabled.

"POSSIBLE LEAK IN COMPRESSOR 1 DISCHARGE VALVE"

When compressor 2 is running in the lead and compressor 1 (lag) is either stopped or in the last 10 seconds of "System Coastdown", an open Discharge Valve is detected on the lag compressor by comparing the lag compressor Stall Transducer output to the Evaporator Transducer output. If the difference is >16 PSID for at least 1 second, this message is displayed. This check is only performed if the lead compressor has been running for 5 or more seconds, the Evaporator Pressure Transducer is sensing a pressure that is in range (6 – 74 PSIG) and the Stall Transducer is installed and its output is > 0.5VDC.

"POSSIBLE LEAK IN COMPRESSOR 2 DISCHARGE VALVE"

When compressor 1 is running in the lead and compressor 2 (lag) is either stopped or in the last 10 seconds of "System Coastdown", an open Discharge Valve is detected on the lag compressor by comparing the lag compressor Stall Transducer output to the Evaporator Transducer output. If the difference is >16 PSID for at least 1 second, this message is displayed. This check is only performed if the lead compressor has been running for 5 or more seconds, the Evaporator Pressure Transducer is sensing a pressure that is in range (6 – 74 PSIG) and the Stall Transducer is installed and its output is > 0.5VDC.

Routine Shutdown Messages

"REMOTE STOP"

A shutdown command has been received from a remote device. Remote Stop commands can be received in Digital Remote mode via I/O Board TB4-7/8 or in ISN (BAS) Remote mode via the SC-EQ serial communications. If the chiller is running when this occurs, the Pre-rotation Vanes are driven fully closed prior to shutting down the chiller.

"LOCAL STOP"

A local shutdown command has been received by placing the Soft Stop key on the Home screen.

"PLACE COMPRESSOR SWITCH IN RUN POSITION"

The Control Center is in either Digital or ISN (Integrated Systems Network) Remote mode. The Operator is requested to place the COMPRESSOR Switch in the RUN position. The Control Center will not accept a Remote start/stop command unless the switch is in the RUN position.

Cycling Shutdown Messages

"MULTIUNIT CYCLING – CONTACTS OPEN"

The Multiunit Cycling contacts connected to I/O Board TB4-9, have opened to initiate a cycling shutdown on the chiller (both compressors). If the chiller is running when this occurs, the Pre-rotation Vanes on the running compressors are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the contacts close.

"SYSTEM CYCLING #1 – CONTACTS OPEN"

The Remote/Local Cycling contacts connected to the I/O Board TB4-13 have opened to initiate a cycling shutdown on the chiller (both compressors).). If the chiller is running when this occurs, the Pre-rotation Vanes on the running compressors are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the contacts close.

"SYSTEM CYCLING #2 CONTACTS OPEN"

The Remote/Local Cycling contacts connected to the I/O Board TB4-95 have opened to initiate a cycling shutdown on the chiller (both compressors). If the chiller is running when this occurs, the Pre-rotation Vanes on the running compressors are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the contacts close.

"MOTOR CONTROLLER #1 – CONTACTS OPEN"

A motor controller protection device for compressor #1 has initiated a shutdown (both compressors). Normally closed contacts of locally installed external motor protection devices (connected between TB6-15 and TB6-53) and the normally closed "CM" contacts of CM-2 Board #1 (connected between TB6-53 and TB6-16) form a safety circuit in series with the starter run signal. If any of these contacts open and remain open for at least 3 seconds, this shutdown is initiated. The CM-2 board opens its contacts when it detects a motor current overload condition on motor #1. When it detects this condition, the Overload LED on the CM-2 board illuminates and the board's CM contacts open to initiate the shutdown. The LED will remain illuminated and the contacts will remain open until the Reset button on the CM-2 board is pressed. The chiller will automatically restart when the contacts close.

If compressor #1 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"MOTOR CONTROLLER #2 – CONTACTS OPEN"

A motor controller protection device for compressor #2 has initiated a shutdown (both compressors). Normally closed contacts of locally installed external motor protection devices (connected between TB6-15 and TB6-54) and the normally closed "CM" contacts of CM-2 Board #2 (connected between TB6-54 and TB6-82) form a safety circuit in series with the starter run signal. If any of these contacts open and remain open for at least 3 seconds, this shutdown is initiated. The CM-2 board opens its contacts when it detects a motor current overload condition on motor #2. When it detects this condition, the Overload LED on the CM-2 board illuminates and the board's CM contacts open to initiate the shutdown. The LED will remain illuminated and the contacts will remain open until the Reset button on the CM-2 board is pressed. The chiller will automatically restart when the contacts close.

If compressor #2 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"MOTOR CONTROLLER #1 – LOSS OF CURRENT"

The chiller (both compressors) shutdown because the compressor #1 motor current has decreased to < 10% FLA for 25 continuous seconds while it was running. This could be caused by the starter de-energizing or a defect in the motor current detection circuitry to the Control Center. The motor current value is provided by CM-2 board #1 to the Microboard. The chiller will automatically restart at the completion of "Coastdown".

"MOTOR CONTROLLER #2 – LOSS OF CURRENT"

The chiller (both compressors 0 shutdown because compressor #2 motor current has decreased to < 10% FLA for 25 continuous seconds while it was running. This could be caused by the starter de-energizing or a defect in the motor current detection circuitry to the Control Center. The motor current value is provided by CM-2 board #2 to the Microboard. The chiller will automatically restart at the completion of "Coastdown".

"MOTOR CONTROLLER #1 – POWER FAULT"

A motor controller protection device has shutdown the chiller (both compressors). Normally closed contacts of locally installed external motor protection devices (connected between TB6-15 and TB6-53) and the normally closed "CM" contacts of CM-2 Board #1 (connected between TB6-53 and TB6-16) form a safety circuit in series with the starter run signal. If any of these contacts open and reclose in less than 3 seconds, this shutdown is initiated. The CM-2 board opens its contacts and recloses them in less than 3 seconds when it detects a motor current Power Fault condition on motor #1. A Power Fault condition occurs when the motor current drops below 10% FLA. This protects against potential compressor damage due to rapid opening

and reclosure of the motor starter. When it detects this condition, the Power Fault LED on the CM-2 board illuminates and the board's CM contacts open and automatically reclose in less than 3 seconds to initiate the shutdown. The LED will remain illuminated until the Reset button on the CM-2 board is pressed. The chiller will automatically restart when at the completion of "Coastdown".

"MOTOR CONTROLLER #2 – POWER FAULT"

A motor controller protection device has shutdown the chiller (both compressors). Normally closed contacts of locally installed external motor protection devices (connected between TB6-15 and TB6-54) and the normally closed "CM" contacts of CM-2 Board #2 (connected between TB6-54 and TB6-82) form a safety circuit in series with the starter run signal. If any of these contacts open and reclose in less than 3 seconds, this shutdown is initiated. The CM-2 board opens its contacts and recloses them in less than 3 seconds when it detects a motor current Power Fault condition on motor #2. A Power Fault condition occurs when the motor current drops below 10% FLA. This protects against potential compressor damage due to rapid opening and reclosure of the motor starter. When it detects this condition, the Power Fault LED on the CM-2 board illuminates and the board's CM contacts open and automatically reclose in less than 3 seconds to initiate the shutdown. The LED will remain illuminated until the Reset button on the CM-2 board is pressed. The chiller will automatically restart when at the completion of "Coastdown".

"LEAVING CHILLED LIQUID – LOW TEMPERATURE"

The chiller (both compressors) has shutdown because the leaving Chilled Liquid Temperature has decreased to the programmed Shutdown Temperature Setpoint. If the chiller is running when this occurs, the Pre-rotation Vanes on the running compressors are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the temperature increases to the programmed Restart Temperature Setpoint.

"CONTROL PANEL – SCHEDULE"

The programmed Daily Schedule Setpoint has shutdown the chiller (both compressors). If the Chiller is running when this occurs, the Pre-rotation Vanes on the running compressors are driven fully closed prior to shutting down the chiller. The chiller will automatically restart at the next scheduled start time.

"OIL PUMP #1 – DRIVE CONTACTS OPEN"

The Oil Pump Variable Speed Drive for compressor #1 has shutdown the chiller (both compressors). It initiates this shutdown by opening its status contacts connected to the I/O Board TB3-70. The drive initiates a shutdown anytime its internal protection circuits will not permit the Drive to run. The contacts remain open until its internal protection circuits are satisfied and any applicable manual resets are performed. Refer to *YORK Variable Speed Oil Pump Drive Service Manual 160.52-M2*.

If compressor #1 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"OIL PUMP #2 – DRIVE CONTACTS OPEN"

The Oil Pump Variable Speed Drive for compressor #2 has shutdown the chiller (both compressors). It initiates this shutdown by opening its status contacts connected to the I/O Board TB3-71. The drive initiates a shutdown anytime its internal protection circuits will not permit the Drive to run. The contacts remain open until its internal protection circuits are satisfied and any applicable manual resets are performed. Refer to *YORK Variable Speed Oil Pump Drive Service Manual 160.52-M2*.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

“PROXIMITY PROBE – LOW SUPPLY VOLTAGE”

The chiller (both compressors) has shutdown because the Proximity Probe +24 VDC supply voltage has decreased to < the required minimum of +19.0 VDC. The chiller will automatically restart when it increases to > 19.7 VDC. When this condition occurs on a locked out compressor (using the Lockout key on the Capacity Compressor Cycling Screen) this fault does not cause the other compressor to shutdown or prevent it from starting. It is displayed as a warning. This allows the user to know that a fault exists on the locked compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a cycling shutdown as soon as the lockout is removed and will cause the chiller to trip.

“DISCHARGE #1 – VALVE NOT CLOSED”

The chiller (both compressors) has shutdown because compressor #1 Discharge Valve did not fully close (as indicated by the closure of the valve closed end switch) within 40 seconds of receiving the close command. If the chiller was running when this occurred, the Pre-rotation vanes of the running compressors are driven fully closed prior to shutting down the chiller. The chiller will be allowed to restart when the valve closed end switch closes. The end switch position is not considered valid until it has been in the position continuously for at least 3 seconds. This prevents the possibility of initiating a fault due to switch bounce.

“DISCHARGE #2 – VALVE NOT CLOSED”

The chiller (both compressors) has shutdown because compressor #2 Discharge Valve did not fully close (as indicated by the closure of the valve closed end switch) within 40 seconds of receiving the close command. If the chiller was running when this occurred, the Pre-rotation vanes of the running compressors are driven fully closed prior to shutting down the chiller. The chiller will be allowed to restart when the valve closed end switch closes. The end switch position is not considered valid until it has been in the position continuously for at least 3 seconds. This prevents the possibility of initiating a fault due to switch bounce.

“EXPANSION I/O – SERIAL COMMUNICATIONS”

The chiller (both compressors) has shutdown because the serial communications from the I/O Boards to the Microboard has been lost for 20 continuous seconds. The chiller can restart when the serial communications have been restored.

“OIL – LOW TEMPERATURE DIFFERENTIAL”

The chiller (both compressors) is prevented from starting for one of the following reasons. The chiller will automatically restart when the conditions have been satisfied.

The chiller has been shut down for <30 minutes and the oil temperature minus the condenser saturation temperature is <30°F.

-OR-

The chiller has been shut down for > 30 minutes and the oil temperature minus the condenser saturation temperature is < 40°F.

-OR-

Following a Power failure, upon restoration of power, the oil temperature minus the condenser saturation temperature is < 40°F.

“OIL – LOW TEMPERATURE”

The oil temperature has decreased to < 55°F. The chiller will automatically restart when the temperature increases to > 55.0°F and is greater than the Condenser Saturated temperature by 30 or 40°F, as described above in the "OIL – LOW TEMPERATURE DIFFERENTIAL" message description.

“CONTROL PANEL – POWER FAILURE”

A Control Power failure has occurred. If the power failure occurred while the chiller was running, it will automatically restart when power is restored. However, if the power failure duration was < the duration of the “Coastdown” period when power is restored, the remainder of the “Coastdown” will be performed, prior to the chiller starting. This message can indicate a Cycling (auto-restart after power failure) or Safety (manual restart after power failure) shutdown, depend-

ing upon Control Center configuration. It indicates a cycling shutdown when displayed in orange characters; Safety shutdown when displayed in red characters. The Control Center is configured for auto-restart or manual restart after power failure by a qualified Service Technician.

"LEAVING CHILLED LIQUID – FLOW SWITCH OPEN"

The Chilled Liquid Flow Switch has remained open for 2 continuous seconds while the chiller was running or failed to close during the System Pre-lube period. The chiller will automatically restart when the flow switch closes.

"CONDENSER – FLOW SWITCH OPEN"

The Condenser water flow switch has remained open for 30 continuous seconds while the chiller was running. This check is bypassed for the first 30 seconds of "System Run". The chiller will automatically restart when the flow switch closes.

Safety Shutdown Messages

"EVAPORATOR – LOW PRESSURE"

The evaporator pressure, as sensed by the Evaporator Transducer, has decreased to the Safety shutdown threshold. For water cooling applications, the safety shutdown threshold is a fixed value for the respective refrigerant. For Brine cooling applications, the safety shutdown threshold varies according to the concentration of the Brine solution. The Brine shutdown threshold is programmed at the YORK Factory. It should not be changed by anyone other than a qualified Service Technician. The chiller can be started after the evaporator pressure increases to the restart threshold and the Operator presses the Clear Faults button.

	SHUTDOWN (PSIG)	RESTART (PSIG)
WATER COOLING R134A	25.0	25.1
BRINE COOLING R134A	6.0 to 25.0 as programmed	+0.1 > Shutdown threshold

"EVAPORATOR – LOW PRESSURE - SMART FREEZE"

Smart Freeze protection is activated and has shutdown the chiller because the evaporator temperature has been below the Smart Freeze threshold for greater than the allowable number of seconds. If the Evaporator Refrigerant Temperature sensor RT7 is Enabled. This parameter is used as the evaporator refrigerant temperature and the freeze threshold is 32.8°F. If RT7 is not enabled, the evaporator refrigerant temperature used is the Evaporator Saturation Temperature, derived from the Evaporator Pressure Transducer and the freeze threshold is 34.0°F.

The total count is incremented once for every second the evaporator refrigerant temperature is below the freeze threshold (but is never decremented below zero). The number of seconds it will take the chilled liquid to freeze is based on how far the evaporator refrigerant temperature is below the freeze threshold as follows:

seconds to freezing = (4053.7) / (freeze threshold – evap. refrigerant temp.)

Smart Freeze is activated only if the feature has been Enabled by a Service technician and **the Leaving Chilled Liquid** temperature Setpoint is <38.0°F.

"EVAPORATOR – TRANSDUCER OR LEAVING LIQUID PROBE"

A possible defective Evaporator pressure Transducer or Leaving Chilled Liquid temperature Thermistor has been detected. The pressure and temperature that these devices are indicating are not in the correct relationship to each other. The Control Center converts the evaporator pressure to a Saturated Temperature value and compares this value to the Leaving Chilled Liquid temperature (difference = chilled liquid temp – evaporator saturated temp). The difference should not be outside the range of –2.5°F to +25.0°F. If the Transducer and Thermistor are accurate, the Evaporator Saturated temperature should not be > 2.5°F warmer nor > 25.0°F colder than the leaving chilled liquid temperature. In order to initiate a shutdown, the difference must be outside the acceptable range continuously for 10 minutes. The chiller can be started after the Operator presses the Clear Faults button.

“EVAPORATOR – TRANSDUCER OR TEMPERATURE SENSOR”

A possible defective Evaporator pressure Transducer or Refrigerant Temperature Sensor has been detected. The Control Center converts the evaporator pressure to a Saturated Temperature value and compares this value to the optional Evaporator Refrigerant Temperature Sensor. If the difference between these temperatures is greater than 3.0°F, continuously for 1 minute, this shutdown is performed. This check is only performed under the following conditions:

- Chiller has been running for at least 10 minutes
- Evaporator Refrigerant temperature (RT7) has been enabled by a Service technician
- Not in Brine cooling mode
- Smart Freeze is enabled
- Evaporator Temperature Sensor (RT7) or Evaporator Saturation Temperature is indicating a temperature of <32.0°F

The chiller can be started after the temperatures are within 3.0°F of one another and the Operator presses the Clear Faults button.

“DISCHARGE #1 – HIGH PRESSURE CONTACTS OPEN”

The contacts of the electro-mechanical high pressure switch (HP1, located in the discharge line of compressor #1) have opened because it detected a pressure >180.0 psig. The contacts will automatically close when the discharge pressure decreases to < 120.0 psig and the Operator presses the Clear Faults button.

“DISCHARGE #2 – HIGH PRESSURE CONTACTS OPEN”

The contacts of the electro-mechanical high pressure switch (HP2, located in the discharge line of compressor #2) have opened because it detected a pressure >180.0 psig. The contacts will automatically close when the discharge pressure decreases to < 120.0 psig and the Operator presses the Clear Faults button.

“DISCHARGE #1 – HIGH TEMPERATURE”

The chiller (both compressors) has shutdown because the discharge temperature of compressor #1, as sensed by thermistor RT2, has increased to >220.0 ºF. The chiller can be started after the temperature decreases to <220.0 ºF and the Operator presses the Clear Faults button.

If compressor #1 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

“DISCHARGE #2 – HIGH TEMPERATURE”

The chiller (both compressors) has shutdown because the discharge temperature of compressor #2, as sensed by thermistor RT8, has increased to >220.0 ºF. The chiller can be started after the temperature decreases to <220.0 ºF and the Operator presses the Clear Faults button.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

“DISCHARGE #1 – LOW TEMPERATURE”

The chiller (both compressors) has shutdown because the discharge temperature of compressor #1, as sensed by thermistor RT2, has decreased to <30.0 ºF. The chiller can be started after the temperature increases to >30.0ºF and the Operator presses the Clear Faults button.

If compressor #1 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"DISCHARGE #2 – LOW TEMPERATURE"

The chiller (both compressors) has shutdown because the discharge temperature of compressor #2, as sensed by thermistor RT8, has decreased to <30.0 ºF. The chiller can be started after the temperature increases to >30.0ºF and the Operator presses the Clear Faults button.

If compressor #2 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"DISCHARGE #1 – VALVE NOT OPENED"

The chiller (both compressors) has shutdown because compressor #1 Discharge Valve did not fully open (as indicated by the closure of the valve opened end switch) within 40 seconds of receiving the open command. The chiller can be started after the valve "opened" end switch closes for 3 seconds, compressor #1 is stopped, and the Operator presses the Clear Faults button. This prevents the possibility of initiating a fault due to switch bounce.

"DISCHARGE #2 – VALVE NOT OPENED"

The chiller (both compressors) has shutdown because compressor #2 Discharge Valve did not fully open (as indicated by the closure of the valve opened end switch) within 40 seconds of receiving the open command. The chiller can be started after the valve "opened" end switch closes for 3 seconds, compressor #2 is stopped, and the Operator presses the Clear Faults button. This prevents the possibility of initiating a fault due to switch bounce.

"AUXILIARY SAFETY – CONTACTS CLOSED"

The chiller (both compressors) has shutdown because locally installed external safety shutdown contacts connected to I/O Board TB4-31 have closed, initiating a safety shutdown. The chiller can be started after the contacts have opened and the Operator presses the Clear Faults button.

"OIL – HIGH TEMPERATURE"

The chiller (both compressors) has shutdown because the oil temperature, as sensed by thermistor RT3, has increased to >180.0 ºF. The chiller can be started after the temperature decreases to <180.0 ºF. The chiller can be started after the contacts have opened and the Operator presses the Clear Faults button.

"OIL PUMP #1 – DIFFERENTIAL PRESSURE CALIBRATION"

The chiller (both compressors) has shutdown because the Sump oil pressure transducer and compressor #1 Pump oil pressure transducer indicated a differential pressure of >15.0 PSID during the oil pressure transducer auto-zeroing period that begins 10 seconds into "System Prelube" and lasts for 3 seconds. This safety only applies when compressor #1 is the lead compressor. This is indicative of a defective Sump or Pump transducer, since the transducers are sensing the same pressures during this period. The chiller can be started after the Operator presses the Clear Faults button.

If compressor #1 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked- out compressor, it is displayed as a warning. This allows the user to know that a fault exists be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"OIL PUMP #2 – DIFFERENTIAL PRESSURE CALIBRATION"

The chiller (both compressors) has shutdown because the Sump oil pressure transducer and compressor #2 Pump oil pressure transducer indicated a differential pressure of >15.0 PSID during the oil pressure transducer auto-zeroing period that begins 10 seconds into "System Prelube" and lasts for 3 seconds. This fault only applies when compressor #2 is the lead compressor. This is indicative of a defective Sump or Pump transducer, since the transducers are sensing the same pressures during this period. The chiller can be started after the Operator presses the Clear Faults button.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"OIL PUMP #1 – HIGH DIFFERENTIAL PRESSURE"

The chiller (both compressors) has shutdown because the oil pressure differential, as sensed by compressor #1 Pump transducer and the Sump transducer, has increased to >90.0 PSID. This fault is only checked if both the compressor #1 Pump transducer and the Sump transducer are in range. The chiller can be started after the differential is <90.0 PSID and the Operator presses the Clear Faults button.

"OIL PUMP #2 – HIGH DIFFERENTIAL PRESSURE"

The chiller (both compressors) has shutdown because the oil pressure differential, as sensed by compressor #2 Pump transducer and the Sump transducer, has increased to >90.0 PSID. This fault is only checked if both the compressor #2 Pump transducer and the Sump transducer are in range. The chiller can be started after the differential is <90.0 PSID and the Operator presses the Clear Faults button.

"OIL PUMP #1 – LOW DIFFERENTIAL PRESSURE"

The chiller (both compressors) has been shutdown because the differential oil pressure, as sensed by compressor #1 Pump transducer and the Sump transducer, decreased to <15.0 PSID while compressor #1 was running or went below 25.0 PSID during the last 5 seconds of compressor #1 Prelube. This fault is only checked if both the compressor #1 Pump transducer and the Sump transducer are in range. The chiller can be started after the Operator presses the Clear Faults button.

"OIL PUMP #2 – LOW DIFFERENTIAL PRESSURE"

The chiller (both compressors) has been shutdown because the differential oil pressure, as sensed by compressor #2 Pump transducer and the Sump transducer, decreased to <15.0 PSID while compressor #1 was running or went below 25.0 PSID during the last 5 seconds of compressor #1 Prelube. This fault is only checked if both the compressor #2 Pump transducer and the Sump transducer are in range. The chiller can be started after the Operator presses the Clear Faults button.

"OIL PUMP #1 – PRESSURE TRANSDUCER OUT OF RANGE"

The Chiller (both compressors) has shutdown because compressor #1 Pump oil pressure transducer is out of range (< 0.0 PSIG or >300.0 PSIG). The chiller can be started after the pressure is within range and the Operator presses the Clear Faults button.

If compressor #1 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"OIL PUMP #2 – PRESSURE TRANSDUCER OUT OF RANGE"

The Chiller (both compressors) has shutdown because compressor #2 Pump oil pressure transducer is out of range (< 0.0 PSIG or >300.0 PSIG). The chiller can be started after the pressure is within range and the Operator presses the Clear Faults button.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

"OIL SUMP – PRESSURE TRANSDUCER OUT OF RANGE"

The chiller (both compressors) has shut down because the Sump oil pressure transducer is out of range (< 0.0 PSIG or >300.0 PSIG). The chiller can be started after the pressure is within range and the Operator presses the Clear Faults button.

"OIL PUMP #1 – SETPOINT NOT ACHIEVED"

The chiller (both compressors) has shutdown because compressor #1 differential oil pressure, as sensed by compressor #1 Pump transducer and the Sump transducer, failed to meet the following requirements:

1. The differential oil pressure was <35.0 PSID for 5 continuous seconds during the last 10 seconds of compressor #1 prelube or during the first 15 seconds of compressor #1 run.

-OR-

2. After the first 30 seconds of compressor #1 run, the differential oil pressure was < the Setpoint/ Target oil pressure with the oil pump drive speed command at 60 Hz for 5 continuous seconds.

The chiller can be started after the Operator presses the Clear Faults button.

"OIL PUMP #2 – SETPOINT NOT ACHIEVED"

The chiller (both compressors) has shutdown because compressor #2 differential oil pressure, as sensed by compressor #2 Pump transducer and the Sump transducer, failed to meet the following requirements:

1. The differential oil pressure was <35.0 PSID for 5 continuous seconds during the last 10 seconds of compressor #2 prelube or during the first 15 seconds of compressor #2 run.

-OR-

2. After the first 30 seconds of compressor #2 run, the differential oil pressure was < the Setpoint/ Target oil pressure with the oil pump drive speed command at 60 Hz for 5 continuous seconds.

The chiller can be started after the Operator presses the Clear Faults button.

"SURGE PROTECTION – EXCESS SURGE"

(Applies only to single compressor operation and if the Surge Protection SHUTDOWN setpoint is enabled)

The running compressor has shutdown because the Surge Window Count exceeded the Count Limit setpoint. If the Surge Protection Extended Run feature is Disabled, the chiller shutsdown as soon as the count exceeds the limit. If the Extended Run feature is Enabled, this shutdown occurs only if the Surge Window Count exceeds the Count Limit setpoint at completion of the 10 minute Extended Run period. The chiller can be started after the Operator presses the Clear Faults button.

"CONDENSER – HIGH PRESSURE"

The condenser pressure, as sensed by the Condenser Transducer, has increased to >180.0 PSIG (R134a). The chiller can be started after the pressure decreases to < 120.0 PSIG (R134a), and the Operator presses the Clear Faults button.

"CONDENSER – PRESSURE TRANSDUCER OUT OF RANGE"

The Condenser Pressure Transducer is indicating a pressure that is < 6.8 PSIG (R134a), or > 300.0 PSIG (R134a). This is outside the normal operating range of the transducer. This is generally indicates a defective transducer. The chiller can be started after the transducer is indicating a pressure that is within range and the Operator presses the Clear Faults button.

"CONTROL PANEL – POWER FAILURE"

A Control Power failure has occurred. If the power failure duration was < the duration of the applicable "Coastdown" period (2.5 minutes standard; 15 minutes steam turbine), the remainder of the "Coastdown" is performed upon restoration of power. The chiller can be started after the Operator presses the Clear Faults button. This message can indicate a Cycling (auto-restart after power failure) or Safety (manual restart after power failure) shutdown, depending upon Control Center configuration. It indicates a Cycling shutdown when displayed in orange characters; Safety shutdown when displayed in red characters. The Control center is configured for auto-restart or manual restart after power failure by a qualified Service technician.

"THRUST BEARING #1 – PROXIMITY PROBE CLEARANCE"

The chiller (both compressors) has shutdown because the clearance between Compressor #1 high speed thrust collar and the tip of the proximity Probe has increased > +10 mils (instantaneous) or decreased > -25 mils (for 2 continuous seconds) from the Reference Position. The minimum allowed clearance is 23 mils. Therefore, if the Reference Position is < 47 mils, the shutdown will occur when the actual position is < 22 mils. The chiller cannot be started until the special reset procedure is performed as referenced in the CAUTION below.

If compressor #1 is locked-out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

The clearance is only checked during the last 20 seconds of "System Prelube", during "System Run" and during "Coastdown". Therefore, the fault is only detected during those periods. Also, the +10 mil threshold must be exceeded for 2 continuous seconds.

"THRUST BEARING #2 – PROXIMITY PROBE CLEARANCE"

The chiller (both compressors) has shutdown because the clearance between Compressor #2 high speed thrust collar and the tip of the proximity Probe has increased > +10 mils (instantaneous) or decreased > -25 mils (for 2 continuous seconds) from the Reference Position. The minimum allowed clearance is 23 mils. Therefore, if the Reference Position is < 47 mils, the shutdown will occur when the actual position is < 22 mils. The chiller cannot be started until the special reset procedure is performed as referenced in the CAUTION below.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

The clearance is only checked during the last 20 seconds of "System Prelube", during "System Run" and during "Coastdown". Therefore, the fault is only detected during those periods. Also, the +10 mil threshold must be exceeded for 2 continuous seconds (instantaneous with previous software).

This shutdown must be evaluated by a qualified Service Technician prior to starting the chiller. Starting the chiller without this evaluation could result in severe compressor damage. To prevent the chiller from starting without the proper evaluation, restart is inhibited until the clearance is within acceptable limits and a special reset procedure is performed by the Service Technician. The evaluation and reset procedure are contained in Service Manual (Form 160.69-M1-C).

"THRUST BEARING #1 – PROXIMITY PROBE OUT OF RANGE"

The chiller (both compressors) has shutdown because the clearance between compressor #1 high speed thrust collar and the tip of the proximity Probe has decreased to <17 mils. The chiller cannot be started until the special reset procedure is performed as referenced in the CAUTION below.

If compressor #1 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #2 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

The clearance is only checked during the last 20 seconds of "System Prelube", during "System Run" and during "Coastdown". Therefore, the fault is only detected during those periods. Also, the +10 mil threshold must be exceeded for 2 continuous seconds (instantaneous with previous software).

"THRUST BEARING #2 – PROXIMITY PROBE OUT OF RANGE"

The chiller (both compressors) has shutdown because the clearance between compressor #2 high speed thrust collar and the tip of the proximity Probe has decreased to <17 mils. The chiller cannot be started until the special reset procedure is performed as referenced in the CAUTION below.

If compressor #2 is locked out using the Lockout key on the Capacity Compressor Cycling Screen, this fault does not cause compressor #1 to shutdown or prevent it from starting. When this fault occurs on a locked-out compressor, it is displayed as a warning. This allows the user to know that a fault exists on the locked-out compressor. The condition must be corrected prior to the lockout being removed from the compressor. If it is not, the warning condition will revert back to a shutdown as soon as the lockout is removed and will cause the chiller to trip.

The clearance is only checked during the last 20 seconds of "System Prelube", during "System Run" and during "Coastdown". Therefore, the fault is only detected during those periods. Also, the +10 mil threshold must be exceeded for 2 continuous seconds (instantaneous with previous software).

This shutdown must be evaluated by a qualified Service Technician prior to starting the chiller. Starting the chiller without this evaluation could result in severe compressor damage. To prevent the chiller from starting without the proper evaluation, restart is inhibited until the clearance is within +10 to -25 mils of the Reference Position and a special reset procedure is performed by the Service Technician. The evaluation and reset procedure are contained in Service Manual (Form 160.69-M1-C).

"THRUST BEARING #1 – PROXIMITY PROBE UNCALIBRATED"

The chiller (both compressors) is shutdown because the compressor #1 High Speed Thrust Bearing Proximity Reference Position calibration has not been performed. The chiller can be started after the calibration and a special reset procedure has been performed.

"THRUST BEARING #2 – PROXIMITY PROBE UNCALIBRATED"

The chiller (both compressors) is shutdown because the compressor #2 High Speed Thrust Bearing Proximity Reference Position calibration has not been performed. The chiller can be started after the calibration and a special reset procedure has been performed.

"WATCHDOG – SOFTWARE REBOOT"

The Microboard's software Watchdog initiated a Microprocessor reset because it detected that a portion of the chiller operating Program was not being executed. The result of this reset is a Safety shutdown and re-initialization of the Program. This is generally indicative of a severe electrical power disturbance or impending Microboard Failure. The chiller can be started after the Operator presses the Clear Faults button.

"MOTOR – LACK OF BEARING LUBRICATION"

(Software version C.OPT.11.02.300 (and later)).

The Operating Hours Since Last Motor Lubrication has exceeded 1400 hours (the greater of either Motor #1 Operating Hours or Motor #2 Operating Hours is used for this calculation). This message replaces "Warning – Motor Bearing Lube Required" above. This safety shutdown remains in effect until the Operator places the COMPRESSOR Switch in the Stop-reset (O) position and enters his/her initials, name or user ID in Operator Access Level (or higher) using the Motor Lube Acknowledge key on the Motor Lubrication Screen. See the *Motor Lubrication Screen* for entry instructions. This entry implies both motors were lubricated. The date and time of this entry is automatically logged as the "Date of Last Motor Lubrication" and "Time of Last Motor Lubrication". It also resets the "Operating Hours Since Last Lubrication" to zero. The date this warning occurs is stored as the "Date of Last Motor Lubrication Warning or Fault". If the SHUTDOWN setpoint on the Motor Lubrication Screen is disabled, this message will be displayed as a warning but the safety shutdown will not be performed.

"COMPRESSOR 1 PRV NOT FULLY CLOSED"

The chiller (both compressors) has shutdown because compressor 1 Pre-rotation vanes have not fully closed (as indicated by the PRV end-switch) while compressor 2 was running. The chiller can be started after the PRV end switch has closed and the Operator presses the Clear Faults button.

"COMPRESSOR 2 PRV NOT FULLY CLOSED"

The chiller (both compressors) has shutdown because compressor 2 Pre-rotation vanes have not fully closed (as indicated by the PRV end-switch) while compressor 1 was running. The chiller can be started after the PRV end switch has closed and the Operator presses the Clear Faults button.

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SECTION 3 – PRINTERS

PRINTING OVERVIEW

A laptop computer can be connected to the Control Center's Microboard to capture the following reports. The screen from which each report can be generated is listed in parenthesis.

- **Status -** Present system parameters (Printer, Home)
- **Setpoints -** Present programmed values of all setpoints (Printer, Setpoints)
- **Schedule -** Present value of programmed daily schedule (Printer, Schedule)
- **Sales Order -** Information about SALES ORDER Screen (Printer, Sales Order)
- **History -** System parameters at the time of the last normal stop, last fault while running and last 10 faults, whether running or not (Printer, History)
- **Cycling or Safety Shutdown Initiated Print -** Snapshot of all system parameters at instant of shutdown. Automatically occurs if printer is connected at time of shutdown.
- **Trend -** Prints a snapshot of the existing TREND Screen data or prints new data collected after the TREND PRINT key is pressed.

The laptop computer can be permanently connected to the Control Center or connected as required to produce a report. If permanently connected, a DATA LOGGING feature can produce a status report automatically, beginning at an Operator selected start time and occurring at an Operator selected interval thereafter between 1 and 1440 minutes.

The following figures are examples of the different reports:

- *Figure 54* - Status on *Page 150*
- *Figure 55* - Setpoints on *Page 152*
- *Figure 56* - Schedule on *Page 154*
- *Figure 57* - Sales Order on *Page 154*
- *Figure 58* - History on *Page 156*
- *Figure 59* - Security Log on *Page 158.*
- *Figure 60* - Trend on *Page 158.*
- *Figure 61* - CUSTOM Screen on *Page 158.*

CONTROL CENTER SETUP

Automatic Data Logging

Access Level Required: OPERATOR

If automatic data logging is desired, a status report can be automatically printed at a specified interval beginning at a specified time, using the PRINTER Screen. The interval is programmable over the range of 1 minute to 1440 minutes in 1 minute increments. The first print will occur at the programmed START time and occur at the programmed Output Interval thereafter. The time remaining until the next print is displayed on the PRINTER Screen.

- Automatic Printer Logging - Enables and disables automatic data logging.
- Log Start Time - Enter the time the first print is desired.
- Output Interval - Enter the desired interval between prints.

DOWNLOADING SYSTEM PRINTS TO A LAPTOP

Downloading system histories to a file is another useful method to capture system operating conditions. The following instructions are used to establish communication between the OptiView Control Panel and a laptop computer running any Terminal Emulation program such as HyperTerminal, TeraTerm, or PuTTy.

1. Connect the laptop computer to the OptiView as described below. If your computer does not have a RS-232 serial port, you will need a USB to serial converter such as the Digi Edgeport/1.

Laptop (RS-232 Serial Port)			OptiView (Com 1)	
PIN	DESC		Connector	Terminal
2	RX	to	J2	4 (TXD1)
4	DTR	to	J2	2 (DSR1)
5	GND	to	J2	8 GND

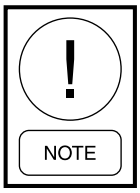
2. On the OptiView Printer Screen, select "PC". This will allow faster data download than the printer selections. SETTINGS should match the Port settings below.

3. Set up the Terminal Emulation program.
   a. Set the Com port for the port that the USB/ Serial adapter is installed on.
   b. Set the Com port communication parameters as follows:

FIELD	VALUE
Bits per second (Baud Rate)	57600
Data bits	8
Parity	None
Stop Bits	1
Flow control	None

   If DTR/DSR is used, set to Hardware.
   If no DTR/DSR, set to None.

4. Set the Terminal program to capture a file, and select the location and enter a file name.
5. Press the Print Screen key on the appropriate screen to be captured. The HyperTerminal will display the printed information and the information will be recorded as a .txt file.



Since the menu options of the various Terminal Emulation programs are different, the user will need to determine the exact steps required to save a file to their PC using the desired program.

The following additional RS232 connections, are used to wire up serial devices for desktop and laptop computers.

RS-232 PIN ASSIGNMENTS (DB25 PC SIGNAL SET) (OLDER DESKTOPS ONLY)	
Pin 1	Protective Ground
Pin 2	Transmit Data
Pin 3	Recieved Data
Pin 4	Request To Send
Pin 5	Clear To Send
Pin 6	Data Set Ready
Pin 7	Signal Ground
Pin 8	Recieved line Signal Detector (Data Carrier Detect)
Pin 20	Data Terminal Ready
Pin 22	Ring Indicator

The connector on the PC has Male pins, therefore the mating cable needs to terminate in a DB25/F (Female pin) connector.

RS-232 PIN ASSIGNMENTS (DB9 PC SIGNAL SET) (MOST LAPTOPS)	
Pin 1	Recieved line Signal Detector (Data Carrier Detect)
Pin 2	Recieved Data
Pin 3	Transmit Data
Pin 4	Data Terminal Ready
Pin 5	Signal Ground
Pin 6	Data Set Ready
Pin 7	Request To Send
Pin 8	Clear To Send
Pin 9	Ring Indicator

The connector on the PC has male pins; therefore, the mating cable needs to terminate DB9/F (female pin) connector.

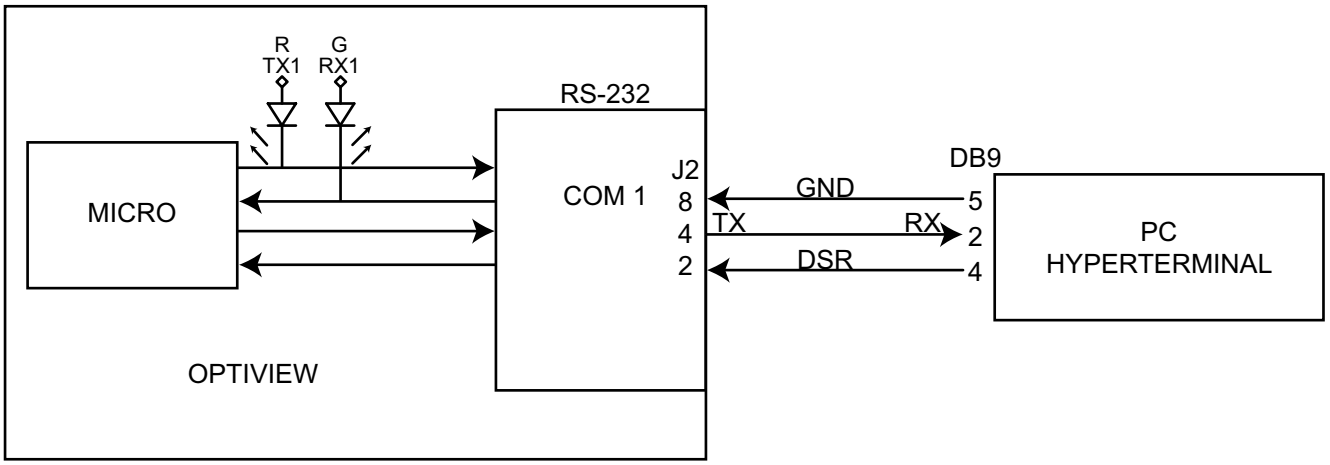
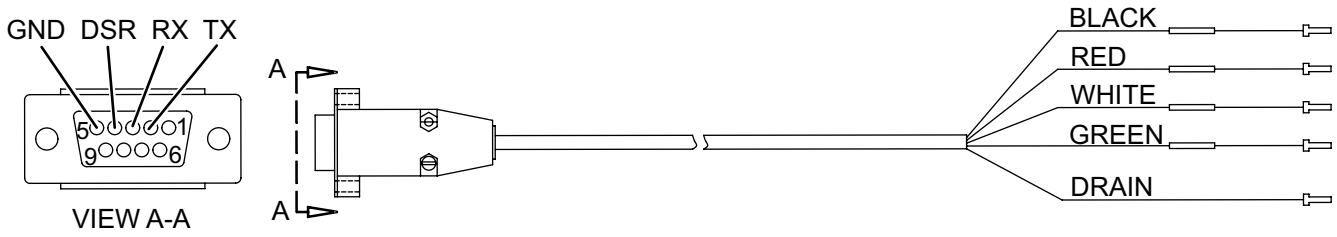


FIGURE 52 - COMMUNICATIONS BLOCK DIAGRAM

A serial cable to go from the OptiView Control Panel to the serial port is available from the parts center (P/N 075-90490-230).



SIGNAL	DB9	COLOR
TX	Position 2	Black
RX	Position 3	Red
DSR	Position 4	White
GND	Position 5	Green

LD27886

FIGURE 53 - OPTIVIEW PANEL TO PC SERIAL CABLE

```
YORK UPDATE
CHILLER ID 0
(c) 1997 - 2001 YORK INTERNATIONAL CORPORATION
Mon 22 Nov 1999 8:50:45 AM

SYSTEM RUN
LEAVING CHILLED LIQUID CONTROL
  [List all warnings presently active]
Controls C.MLM.01.06.102
Run Time 0 Days 2 Hr 59 Min

Operating Hours                          =  25 Hr
Number Of Starts                         =  6
Control Source                           =  Local

Evaporator
-------------------------------------------------------------------------
Leaving Chilled Active Setpoint          =  45.0 ~F
Chilled Liquid Pump                      =  Run
Chilled Liquid Flow Switch               =  Closed
Leaving Chilled Liquid Temperature       =  45.0 ~F
Return Chilled Liquid Temperature        =  55.0 ~F
Evaporator Pressure                      =  75.0 Psig
Evaporator Saturation Temperature        =  44.4 ~F
Evaporator Refrigerant Temperature       =  44.5 ~F
  [If Refrigerant Sensor enabled]
Small Temperature Difference             =  0.5 ~F

Condenser
-------------------------------------------------------------------------
Condenser Liquid Pump                    =  Run
Condenser Liquid Flow Switch             =  Closed
Leaving Condenser Liquid Temperature     =  95.0 ~F
Return Condenser Liquid Temperature      =  85.0 ~F
Condenser Pressure                       =  200.0 Psig
Condenser Saturation Temperature         =  101.4 ~F
Small Temperature Difference             =  6.4 ~F
Drop Leg Refrigerant Temperature         =  83.0 ~F
  [If Drop Leg Sensor enabled]
Sub Cooling Temperature                  =  18.4 ~F
  [If Drop Leg Sensor enabled]

Compressor
-------------------------------------------------------------------------
Discharge Temperature                    =  120.0 ~F
Liquid Line Solenoid                     =  On
  [If Mod C Chiller]
Vent Line Solenoid                       =  On
  [If Mod D Chiller or higher]

Oil Sump
-------------------------------------------------------------------------
Oil Pump Run Output                      =  On
Sump Oil Pressure (LOP)                  =  75.8 Psig
Pump Oil Pressure (HOP)                  =  124.6 Psig
Oil Pressure                             =  47.8 Psid
Oil Sump Temperature                     =  150.0 ~F
Oil Heater                               =  Off
  [If Mod D Chiller or higher]
Oil Return Solenoid                      =  Off
  [If Mod D Chiller or higher]
```

FIGURE 54 - SAMPLE PRINTOUT (STATUS)

```
  [Skip the following section if Hot Gas Bypass is not
  enabled]
Hot Gas
-------------------------------------------------------------------------
Valve Position                           =  15 %
Pre-Rotation Vanes Position              =  75 %

Surge
-------------------------------------------------------------------------
Total Surge Count                        =  127
Surge Window Time                        =  1 Min
Surge Window Count                       =  0

  [Skip the following section if Variable Speed Oil
  Pump is not installed]
Variable Speed Oil Pump
-------------------------------------------------------------------------
Oil Pump Drive Command Frequency         =  25.0 Hz
Pulldown Time Remaining                  =  9.0 Min
  [If Pulldown in effect]

  [Skip the following section if Liquid Level is not
  enabled]
Refrigerant Level Control
-------------------------------------------------------------------------
Refrigerant Level Position               =  35 %
Ramp Up Time Remaining                   =  15 Sec

  [If Ramp Up in effect]
Proximity Probe
-------------------------------------------------------------------------
High Speed Thrust Bearing Proximity Differen =  2 Mils
High Speed Thrust Solenoid                   =  On
[If Mod C Chiller]

  [Skip the following section if Motor Type is not EM]
Electro-Mechanical Starter
-------------------------------------------------------------------------
Motor Run                                =  On
% Full Load Amps                         =  94 %

  [Skip the following section if Motor Type is not Mod A SSS]
Liquid-Cooled Solid State Starter
-------------------------------------------------------------------------
Motor Run                                =  On
% Full Load Amps                         =  94 %
Phase A Voltage                          =  447 V
Phase B Voltage                          =  409 V
Phase C Voltage                          =  442 V
Phase A Current                          =  193 A
Phase B Current                          =  204 A
Phase C Current                          =  190 A

  [Skip the following section if Motor Type is not Mod
  B SSS]
Liquid-Cooled Solid State Starter
-------------------------------------------------------------------------
Starter Model                            =  26L
Motor Run                                =  On
% Full Load Amps                         =  95 %
 kW Hours                                =  20723 kWH
Input Power                              =  8225 kW
```

FIGURE 54 - SAMPLE PRINTOUT (STATUS) (CONT'D)

```
Phase A Voltage                              =  422 V
Phase B Voltage                              =  449 V
Phase C Voltage                              =  449 V
Phase A Current                              =  253 A
Phase B Current                              =  257 A
Phase C Current                              =  262 A
Phase A Temperature                          =  109 ~F
Phase B Temperature                          =  109 ~F
Phase C Temperature                          =  110 ~F

  [Skip the following section if Motor Type is not VSD]
Variable Speed Drive
-------------------------------------------------------------------------------
Motor Run                                    =  On
% Full Load Amps                             =  94 %
Pre-Rotation Vanes Position                  =  75 %
Full Load Amps                               =  402 A
Precharge Relay Output                       =  Off
Trigger SCR Output                           =  On
Water Pump Output                            =  On
 kW Hours                                    =  14528 kWH
Input Power                                  =  150 kW
Output Frequency                             =  60Hz
Output Voltage                               =  800 V
DC Bus Voltage                               =  600 V
DC Inverter Link Current                     =  300 A
Phase A Output Current                       =  195 A
Phase B Output Current                       =  198 A
Phase C Output Current                       =  193 A
Internal Ambient Temperature                 =  88 ~F
Converter Heatsink Temperature               =  102 ~F
Phase A Heatsink Temperature [If TMIII VSD]  = 93 ~F
Phase B Heatsink Temperature [If TMIII VSD]  = 99 ~F
Phase C Heatsink Temperature [If TMIII VSD]  = 97 ~F
Baseplate Temperature [If VyperDrive VSD]    =  106 ~F
```

FIGURE 54 - SAMPLE PRINTOUT (STATUS) (CONT'D)

```
  [Skip the following section if Motor Type is not VSD,
  or Filter is not present]
Harmonic Filter Data
-------------------------------------------------------------------------------
Precharge Contactor                          =  Off
Supply Contactor                             =  On
Operating Mode                               =  Running
Phase Rotation                               =  ABC
Total Supply kVA                             =  148 kVA
Total Power Factor                           =  0.97
DC Bus Voltage                               =  608 V
Heatsink Temperature [If TMIII VSD]          =  102 ~F
Baseplate Temperature [If VyperDrive VSD]    =  102 ~F
Voltage Peak N-L1                            =  200 V
Voltage Peak N-L2                            =  200 V
Voltage Peak N-L3                            =  200 V
L1-L2 RMS Voltage                            =  215 V
L2-L3 RMS Voltage                            =  215 V
L3-L1 RMS Voltage                            =  215 V
L1 RMS Filter Current                        =  150 A
L2 RMS Filter Current                        =  150 A
L3 RMS Filter Current                        =  150 A
L1 RMS Supply Current                        =  152 A
L2 RMS Supply Current                        =  152 A
L3 RMS Supply Current                        =  152 A
L1 Voltage Total Harmonic Distortion         =  1.5 %
L2 Voltage Total Harmonic Distortion         =  1.2 %
L3 Voltage Total Harmonic Distortion         =  1.1 %
L1 Supply Current Total Demand Distortion    =  2.6 %
L2 Supply Current Total Demand Distortion    =  2.3 %
L3 Supply Current Total Demand Distortion    =  2.8 %
```

FIGURE 54 - SAMPLE PRINTOUT (STATUS) (CONT'D)

```
YORK SETPOINTS
CHILLER ID 0
(c) 1997 - 2001 YORK INTERNATIONAL CORPORATION
Mon 22 Nov 1999 8:48:27 AM

Software Versions
-------------------------------------------------------------------------
Controls                                  =  C.MLM.01.04
BIOS                                      =  C.MLM.00.00
Kernel                                    =  0.18
GUI                                       =  0.28
SIO                                       =  0.23
GPIC                                      =  0.04
Ext I/O                                   =
0110112091996
  [Skip if External I/O board is not activated]
VSD [Skip if Motor Type is not VSD]       =  C.VSD.00.00
SSS [Skip if Motor Type is not Mod B SSS] =  C.SSS.01.01

System Information
-------------------------------------------------------------------------
System Language                           =  English
Data Display Mode                         =  English
Control Source                            =  Local
Remote Analog Input Range                 =  0-10 Volts
Clock                                     =  Enabled

Jumper Settings
-------------------------------------------------------------------------
Pre-Run                                   =  Standard
Coastdown                                 =  Standard
Chilled Liquid Pump Operation             =  Standard
Refrigerant Selection                     =  R22
Anti-Recycle                              =  Enabled
Power Failure Restart                     =  Auto
Liquid Type                               =  Water
Motor Type                                =  Fixed Speed

Printer Setup
-------------------------------------------------------------------------
Automatic Printer Logging                 =  Disabled
Log Start Time                            =  12:00 am
Output Interval                           =  60 Min
Printer Type                              =  Okidata
Baud                                      =  9600 Baud
Data Bits                                 =  8 Bits
Parity                                    =  None
Stop Bits                                 =  1 Bit

COM 2 Setup
-------------------------------------------------------------------------
Baud                                      =  19200 Baud
Data Bits                                 =  8 Bits
Parity                                    =  Odd
Stop Bits                                 =  1 Bit

Evaporator
-------------------------------------------------------------------------
Leaving Chilled Local Setpoint            =  45.0 ~F
Leaving Chilled ISN Setpoint              =  45.0 ~F
Leaving Chilled Modem Setpoint            =  45.0 ~F
Leaving Chilled Analog Setpoint           =  45.0 ~F
Leaving Chilled Digital Setpoint          =  45.0 ~F
```

FIGURE 55 - SAMPLE PRINTOUT (SETPOINTS)

```
Remote Range                              =  10.0 ~F
Sensitivity                               =  Normal
Restart Offset                            =  0.0 ~F
Restart Setpoint                          =  45.0 ~F
Shutdown Offset                           =  4.0 ~F
Shutdown Setpoint                         =  41.0 ~F
Brine Low Evaporator Cutout               =  54.3 Psig
Smart Freeze                              =  Off
Refrigerant                               =  Enabled

Condenser
-------------------------------------------------------------------------
High Pressure Warning Threshold           =  246.3 Psig
Drop Leg                                  =  Enabled

Oil Sump
-------------------------------------------------------------------------
Oil Pump Package                          =  Variable
Speed
Standby Lube                              =  On

  [Skip the following section if Variable Speed Oil Pump
  is not installed]
Variable Speed Oil Pump
-------------------------------------------------------------------------
Pressure Setpoint                         =  35 Psid
Control Period                            =  0.9 Sec

Proximity Probe
-------------------------------------------------------------------------
High Speed Thrust Bearing Proximity Referenc = 41 Mils

  [Skip the following section if Liquid Level is not
                                        enabled]
Refrigerant Level Control
-------------------------------------------------------------------------
Level Control                             =  On
Setpoint                                  =  50 %
Period                                    =  3.5 Sec
Proportion Limit Open                     =  15 %
Proportion Limit Close                    =  45 %
Rate Limit Open                           =  10 %
Rate Limit Close                          =  10 %

  [Skip the following section if Hot Gas Bypass is not
  enabled]
Hot Gas
-------------------------------------------------------------------------
Hot Gas                                   =  Enabled
Hold Period                               =  30 Min
Close Percentage                          =  5 %
Minimum Load                              =  1 ~F
Maximum Open                              =  80 %

Surge
-------------------------------------------------------------------------
Surge Sensitivity                         =  0.3
Shutdown                                  =  Enabled
Extended Run                              =  Disabled
Count Limit                               =  15
Count Window                              =  5 Min
```

FIGURE 55 - SAMPLE PRINTOUT (SETPOINTS) (CONT'D)

```
  [Skip the following section if Motor Type is not EM]
Electro-Mechanical Starter
-------------------------------------------------------------------------------
Local Motor Current Limit                  =  100 %
Remote ISN Current Limit                   =  100 %
Remote Analog Current Limit                =  100 %
Remote Digital Current Limit               =  100 %
Remote Modem Current Limit                 =  100 %
Pulldown Demand Limit                      =  100 %
Pulldown Demand Time                       =  0 Min

  [Skip the following section if Motor Type is not Mod A
SSS]
Liquid-Cooled Solid State Starter
-------------------------------------------------------------------------------
Local Motor Current Limit                  =  100 %
Remote ISN Current Limit                   =  100 %
Remote Analog Current Limit                =  100 %
Remote Digital Current Limit               =  100 %
Remote Modem Current Limit                 =  100 %
Pulldown Demand Limit                      =  100 %
Pulldown Demand Time                       =  0 Min
Scale/Model                                =  600 V, 281
Supply Voltage Range                       =  Disabled
Full Load Amps                             =  150 A
Current Imbalance Check                    =  Disabled

  [Skip the following section if Motor Type is not Mod B
SSS]
Liquid-Cooled Solid State Starter
-------------------------------------------------------------------------------
Local Motor Current Limit                  =  100 %
Remote ISN Current Limit                   =  100 %
Remote Analog Current Limit                =  100 %
Remote Digital Current Limit               =  100 %
Remote Modem Current Limit                 =  100 %
Pulldown Demand Limit                      =  100 %
Pulldown Demand Time                       =  0 Min
Starter Model                              =  26L
Voltage Range                              =  440 - 480
Full Load Amps                             =  275 A
Starting Current                           =  1150 A
Open SCR                                   =  Enabled
```

FIGURE 55 - SAMPLE PRINTOUT (SETPOINTS) (CONT'D)

```
Shorted SCR                                =  Disabled

  [Skip the following section if Motor Type is not VSD]
Variable Speed Drive
-------------------------------------------------------------------------------
Local Motor Current Limit                  =  100 %
Remote ISN Current Limit                   =  100 %
Remote Analog Current Limit                =  100 %
Remote Digital Current Limit               =  100 %
Remote Modem Current Limit                 =  100 %
Pulldown Demand Limit                      =  100 %
Pulldown Demand Time                       =  0 Min
Motor HP                                   =  351 HP
Power Line Frequency                       =  60Hz

  [Skip the following section if Motor Type is not VSD]
Harmonic Filter Data
-------------------------------------------------------------------------------
Filter Operation                           =  Enabled
Motor HP                                   =  351 HP

  [Skip the following section if Motor Type is not VSD]
Adaptive Capacity Control
-------------------------------------------------------------------------------
Surge Margin Adjust                        =  0 Hz
Stability Limit                            =  4500
```

FIGURE 55 - SAMPLE PRINTOUT (SETPOINTS) (CONT'D)

```
YORK SCHEDULE

CHILLER ID  3

© 1997 - 1999 YORK INTERNATIONAL CORPORATION

MON 29 MAR 1999     1 27 PM

SCHEDULE                                  =  OFF

STANDARD SCHEDULE

-------------------------------------------------------------------------
SUN   START   =  OFF        STOP   =  OFF

MON   START   =  8:00 AM    STOP   =  5:00 PM

TUE   START   =  8:00 AM    STOP   =  5:00 PM

WED   START   =  8:00 AM    STOP   =  5:00 PM

THU   START   =  8:00 AM    STOP   =  5:00 PM

FRI   START   =  8:00 AM    STOP   =  5:00 PM

SAT   START   =  OFF        STOP   =  OFF

EXCEPTION DAYS

-------------------------------------------------------------------------
02 APR 1999  START  =  OFF       STOP   =  OFF

13 APR 1999  START  =  8:00 AM   STOP   =  10:00 PM
```

FIGURE 56 - SAMPLE PRINTOUT (SCHEDULE)

```
YORK SALES ORDER
CHILLER ID      3
© 1997 - 1999 YORK INTERNATIONAL CORPORATION

MON 29 MAR 1999 1 28 PM

ORDER INFORMATION

-------------------------------------------------------------------------
COMMISSIONING DATE                        =  01 JAN 1999

JOB NAME                                  =

JOB LOCATION                              =

MODEL NUMBER                              =

YORK ORDER NUMBER                         =

PANEL SERIAL NUMBER                       =

CHILLER SERIAL NUMBER                     =

DESIGN LOAD - CONDENSER                   =

-------------------------------------------------------------------------
PASSES                                    =

DESIGN WORKING PRESSURE                   =

FOULING FACTOR                            =

PRESSURE DROP                             =

NOZZLE ARRANGEMENT IN                     =

NOZZLE ARRANGEMENT OUT                    =

LEAVING TEMPERATURE                       =

RETURN TEMPERATURE                        =

GPM                                       =

TUBES                                     =

DESIGN LOAD - EVAPORATOR

-------------------------------------------------------------------------
PASSES                                    =

DESIGN WORKING PRESSURE                   =

FOULING FACTOR                            =

PRESSURE DROP                             =

NOZZLE ARRANGEMENT IN                     =

NOZZLE ARRANGEMENT OUT                    =

LEAVING TEMPERATURE                       =

RETURN TEMPERATURE                        =

GPM                                       =

TUBES                                     =
```

FIGURE 57 - SAMPLE PRINTOUT (SALES ORDER)

```
NAMEPLATE INFORMATION

--------------------------------------------------------------------------------
MOTOR CODE                                =

POWER (VOLTS)                             =

PHASES                                    =

FREQUENCY ( HZ)                           =

LOOKED ROTOR AMPS                         =

FULL LOAD AMPS                            =

INRUSH AMPS                               =

SYSTEM INFORMATION

--------------------------------------------------------------------------------
REFRIGERANT                               =

TONS                                      =

GEAR CODE                                 =

LIQUID TYPE                               =

BRINE PERCENT                             =

KILOWATTS INPUT                           =

VSD / SSS / EM                            =
```

FIGURE 57 - SAMPLE PRINTOUT (SALES ORDER) (CONT'D)

```
YORK HISTORY 1
CHILLER ID 0
(c) 1997 - 2001 YORK INTERNATIONAL CORPORATION
Mon 22 Nov 1999 9:23:12 AM

SYSTEM READY TO START
LCSSS - LOGIC BOARD POWER SUPPLY
  [List any warnings that were active at the time of
shutdown]

Controls C.MLM.01.06.102
Run Time 0 Days 2 Hr 59 Min

Operating Hours                          =  25 Hr
Number Of Starts                         =  6
Control Source                           =  Local

Evaporator
------------------------------------------------------------------------
Leaving Chilled Active Setpoint          =  45.0 ~F
Chilled Liquid Pump                      =  Stop
Chilled Liquid Flow Switch               =  Open
Leaving Chilled Liquid Temperature       =  45.0 ~F
Return Chilled Liquid Temperature        =  55.0 ~F
Evaporator Pressure                      =  75.0 Psig
Evaporator Saturation Temperature        =  44.4 ~F
Evaporator Refrigerant Temperature       =  44.5 ~F
  [If Refrigerant Sensor enabled]
Small Temperature Difference             =  0.5 ~F

Condenser
------------------------------------------------------------------------
Condenser Liquid Pump                    =  Stop
Condenser Liquid Flow Switch             =  Open
Leaving Condenser Liquid Temperature     =  95.0 ~F
Return Condenser Liquid Temperature      =  85.0 ~F
Condenser Pressure                       =  200.0
Psig
Condenser Saturation Temperature         =  101.4 ~F
Small Temperature Difference             =  6.4 ~F
Drop Leg Refrigerant Temperature         =  83.0 ~F
  [If Drop Leg Sensor enabled]
Sub Cooling Temperature                  =  18.4 ~F
  [If Drop Leg Sensor enabled]

Compressor
------------------------------------------------------------------------
Discharge Temperature                    =  120.0 ~F
Liquid Line Solenoid                     =  Off
  [If Mod C Chiller]
Vent Line Solenoid                       =  Off
  [If Mod D Chiller or higher]

Oil Sump
------------------------------------------------------------------------
Oil Pump Run Output                      =  Off
Sump Oil Pressure (LOP)                  =  75.8 Psig
Pump Oil Pressure (HOP)                  =  76.6 Psig
Oil Pressure                             =  0.0 Psid
Oil Sump Temperature                     =  150.0 ~F
Oil Heater                               =  Off
  [If Mod D Chiller or higher]
Oil Return Solenoid                      =  Off
  [If Mod D Chiller or higher]
```

FIGURE 58 - SAMPLE PRINTOUT (HISTORY)

```
  [Skip the following section if Hot Gas Bypass is not
enabled]
Hot Gas
------------------------------------------------------------------------
Valve Position                           =  0 %
Pre-Rotation Vanes Position              =  0 %

Surge
------------------------------------------------------------------------
Total Surge Count                        =  127
Surge Window Time                        =  1 Min
Surge Window Count                       =  0

  [Skip the following section if Variable Speed Oil
Pump                                        is not
installed]
Variable Speed Oil Pump
------------------------------------------------------------------------
Oil Pump Drive Command Frequency         =  25.0 Hz
Pulldown Time Remaining                  =  9.0 Min
  [If Pulldown in effect]

  [Skip the following section if Liquid Level is not
enabled]
Refrigerant Level Control
------------------------------------------------------------------------
Refrigerant Level Position               =  35 %
Ramp Up Time Remaining                   =  15 Sec
  [If Ramp Up in effect]

Proximity Probe
------------------------------------------------------------------------
High Speed Thrust Bearing Proximity Differen =  2 Mils
High Speed Thrust Solenoid               =  Off
  [If Mod C Chiller]

  [Skip the following section if Motor Type is not EM]
Electro-Mechanical Starter
------------------------------------------------------------------------
Motor Run                                =  Off
% Full Load Amps                         =  0 %

  [Skip the following section if Motor Type is not Mod
A SSS]
Liquid-Cooled Solid State Starter
------------------------------------------------------------------------
Motor Run                                =  Off
% Full Load Amps                         =  0 %
Phase A Voltage                          =  447 V
Phase B Voltage                          =  409 V
Phase C Voltage                          =  442 V
Phase A Current                          =  0 A
Phase B Current                          =  0 A
Phase C Current                          =  0 A

  [Skip the following section if Motor Type is not Mod
B SSS]
Liquid-Cooled Solid State Starter
------------------------------------------------------------------------
Starter Model                            =  26L
Motor Run                                =  Off
% Full Load Amps                         =  0 %
 kW Hours                                =  20723
kWH
```

FIGURE 58 - SAMPLE PRINTOUT (HISTORY) (CONT'D)

```
Input Power                                =  0  kW
Phase A Voltage                            =  422 V
Phase B Voltage                            =  449 V
Phase C Voltage                            =  449 V
Phase A Current                            =  0 A
Phase B Current                            =  0 A
Phase C Current                            =  0 A
Phase A Temperature                        =  109 ~F
Phase B Temperature                        =  109 ~F
Phase C Temperature                        =  110 ~F

  [Skip the following section if Motor Type is not VSD]
Variable Speed Drive
-------------------------------------------------------------------------------
Motor Run                                  =  Off
% Full Load Amps                           =  0 %
Pre-Rotation Vanes Position                =  0 %
Full Load Amps                             =  402 A
Precharge Relay Output                     =  Off
Trigger SCR Output                         =  Off
Water Pump Output                          =  Off
 kW Hours                                  =  14528  kWH
Input Power                                =  0  kW
Output Frequency                           =  0 Hz
Output Voltage                             =  0 V
DC Bus Voltage                             =  600 V
DC Inverter Link Current                   =  0 A
Phase A Output Current                     =  0 A
Phase B Output Current                     =  0 A
Phase C Output Current                     =  0 A
Internal Ambient Temperature               =  88 ~F
Converter Heatsink Temperature             =  102 ~F
```

FIGURE 58 - SAMPLE PRINTOUT (HISTORY) (CONT'D)

```
Phase A Heatsink Temperature [If TMIII VSD]  = 93 ~F
Phase B Heatsink Temperature [If TMIII VSD]  = 99 ~F
Phase C Heatsink Temperature [If TMIII VSD]  = 97 ~F
Baseplate Temperature [If VyperDrive VSD] = 106 ~F
  [Skip the following section if Motor Type is not VSD,
  or Filter is not present]
Harmonic Filter Data
-------------------------------------------------------------------------------
Precharge Contactor                        =  Off
Supply Contactor                           =  Off
Operating Mode                             =  Stopped
Phase Rotation                             =  ABC
Total Supply kVA                           =  0 kVA
Total Power Factor                         =  0.00
DC Bus Voltage = 608 V
Heatsink Temperature [If TMIII VSD]        =  102 ~F
Baseplate Temperature [If VyperDrive VSD]  =  102 ~F
Voltage Peak N-L1                          =  200 V
Voltage Peak N-L2                          =  200 V
Voltage Peak N-L3                          =  200 V
L1-L2 RMS Voltage                          =  215 V
L2-L3 RMS Voltage                          =  215 V
L3-L1 RMS Voltage                          =  215 V
L1 RMS Filter Current                      =  0 A
L2 RMS Filter Current                      =  0 A
L3 RMS Filter Current                      =  0 A
L1 RMS Supply Current                      =  0 A
L2 RMS Supply Current                      =  0 A
L3 RMS Supply Current                      =  0 A
L1 Voltage Total Harmonic Distortion       =  1.5 %
L2 Voltage Total Harmonic Distortion       =  1.2 %
L3 Voltage Total Harmonic Distortion       =  1.1 %
L1 Supply Current Total Demand Distortion  =  0.0 %
L2 Supply Current Total Demand Distortion  =  0.0 %
L3 Supply Current Total Demand Distortion  =  0.0 %
```

FIGURE 58 - SAMPLE PRINTOUT (HISTORY) (CONT'D)

```
YORK SETPOINT CHANGE LOG
CHILLER ID 0
(c) 1997 - 2001 YORK INTERNATIONAL CORPORATION
Fri 05 Oct 2001 4:48:04 PM

Log Entry 1 Evaporator - Leaving Chilled Local Setpoint
--------------------------------------------------------------------------
Date                                    =  05 Oct 2001
Time                                    =  4:23:49 PM

Access Level                            =  Service
User Id                                 =  4268
Old Value                               =  46.5 ~F
New Value                               =  48.0 ~F

Log Entry 2 Condenser - High Pressure Warning Threshold
--------------------------------------------------------------------------
Date                                    =  05 Oct 2001
Time                                    =  1:36:12 PM
Access Level                            =  Service
User Id                                 =  4268
Old Value                               =  162.5 Psig
New Value                               =  225.0 Psig

Log Entry 3 Condenser - Drop Leg
--------------------------------------------------------------------------
Date                                    =  05 Oct 2001
Time                                    =  1:36:02 PM
Access Level                            =  Service
User Id                                 =  4268
Old Value                               =  Disabled
New Value                               =  Enabled

Log Entry 4 Evaporator - Refrigerant
--------------------------------------------------------------------------
Date                                    =  05 Oct 2001
Time                                    =  1:35:48 PM
Access Level                            =  Service
User Id                                 =  4268
Old Value                               =  Disabled
New Value                               =  Enabled
```

FIGURE 59 - SAMPLE PRINTOUT (SECURITY LOG REPORT)

```
YORK TREND

CHILLER ID 163

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MON 09 OCT 2000 3:33:47 PM

DATA 1: LEAVING CHILLED LIQUID TEMPERATURE
DATA 2: RETURN CHILLED LIQUID TEMPERATURE
DATA 3: EVAPORATOR PRESSURE
DATA 4: LEAVING CONDENSER LIQUID TEMPERATURE
DATA 5: RETURN CONDENSER LIQUID TEMPERATURE
DATA 6: CONDENSER PRESSURE

  TIME     DATA 1   DATA 2   DATA 3   DATA 4   DATA 5   DATA 6
3:33:47 PM 45.5 °F  55.0 °F 39.0 PSIG 95.0 °F  85.0 °F 120.0 PSIG
3:33:48 PM 45.5 °F  55.0 °F 39.0 PSIG 95.0 °F  85.0 °F 120.0 PSIG
3:33:49 PM 45.5 °F  55.0 °F 39.0 PSIG 95.0 °F  85.0 °F 120.0 PSIG
3:33:50 PM 45.5 °F  55.0 °F 39.0 PSIG 95.0 °F  85.3 °F 120.1 PSIG
3:33:51 PM 45.5 °F  55.2 °F 39.1 PSIG 95.1 °F  85.4 °F 120.2 PSIG
```

FIGURE 60 - SAMPLE PRINTOUT (TREND DATA NEW OR EXISTING POINTS)

```
YORK CUSTOM VIEW
CHILLER ID 0
(c) 1997 - 2001 YORK INTERNATIONAL CORPORATION
Mon 21 Jun 1999 1:28:25 PM

Leaving Chilled Liquid Temperature         = 45.0 ~F
Return Chilled Liquid Temperature = 55.0 ~F
Leaving Condenser Liquid Temperature       = 95.0 ~F
Return Condenser Liquid Temperature        = 85.0 ~F
Evaporator Saturation Temperature = 41.0 ~F
Condenser Saturation Temperature           = 78.5 ~F
Evaporator Pressure                        = 70.0 Psig
Condenser Pressure                         = 140.0 Psig
Oil Pressure                               = 45.0 Psid
% Full Load Amps                           = 50 %
```

FIGURE 61 - SAMPLE PRINTOUT (CUSTOM SCREEN REPORT)

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 1 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4536	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: (45.0°F - 32°) x 0.5556 = 7.22°C

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: 10.0°F range x 0.5556 = 5.6 °C range

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