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

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SYSTEM NOMENCLATURE

Y M C 2 - S 0756 A A

- Mod Level
- Refrigerant R-134a
- Capacity in KW

COMPRESSOR NOMENCLATURE

M1 B - 197 F A A

- Gas Path Revision Level
- Impeller Design Revision Level

VESSEL NOMENCLATURE

E A 25 14 271 B R 1 1 F C R

- Inlet from Front View
  - R = Right
  - L = Left
- Waterbox Type
  - C = Compact
  - M = Marine
- Water Connection Type
  - F = Flanges
  - G = Grooved Standard
  - A = Victaulic AGS
- Number of Passes
- Water Side Pressure Code
  - 1 = 150 psi
  - 3 = 300 psi
- Nominal Inside Diameter (Inches)
- Nominal Length (Feet)
- Marketing Tube Number
- Tube Code
  - B = 3/4" Code 1
  - C = 3/4" Code 2
  - D = 3/4" Code 3
  - E = 3/4" Code 4
  - 2 = 1" Code 1
  - 3 = 1" Code 2
  - 4 = 1" Code 3
  - 5 = 1" Code 4
- Vessel Refrigerant Pressure Code
  - R = Code 180
  - S = Code 235
  - T = Code 300
  - U = Code 350
  - V = Code 400

VARIABLE SPEED DRIVE NOMENCLATURE

HYP 0490 X H 15 D - 40 A

- Mod Level
- 40 = 380V 60Hz
- 50 = 400V 50Hz
- 46 = 460V 60Hz
- 68 = 415V 50Hz
- D = Disconnect Switch
- B = Circuit Breaker
- Liquid DWP
  - 15 = 150 psi
  - 30 = 300 psi
- Hyp
- Amps
- X = Factory Mount
- R = Retrofit Model
- H = YMC² Chiller
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SECTION 1 - DESCRIPTION OF SYSTEM AND FUNDAMENTALS OF OPERATION

SYSTEM OPERATION DESCRIPTION

This manual covers the operation of the YMC² Chiller with M1B motor, but having two separate means of capacity control and motor cooling based on the compressor gas path revision level A or B as identified in the compressor model number. See the compressor nomenclature description at the front of this manual. Items in this manual will be specified pertinent to only one specific compressor gas path revision level where applicable and defined separately for either style in other cases. Watch for notes regarding the separate varieties when reviewing the information.

The YORK Model YMC² Chiller is commonly applied to large air conditioning systems, but may be used on other applications. The chiller consists of hermetic motor mounted to a compressor, condenser, evaporator and variable flow control.

The chiller is controlled by a modern state of the art Microcomputer control center that monitors its operation. The control center is programmed by the operator to suit job specifications. Automatic timed start-ups and shutdowns are also programmable to suit nighttime, weekends, and holidays. The operating status, temperatures, pressures, and other information pertinent to operation of the chiller are automatically displayed and read on a graphic display. Other displays can be observed by pressing the keys as labeled on the control center. The chiller with the OptiView control center is applied with a Variable Speed Drive.

In operation, a liquid (water or brine to be chilled) flows through the cooler, where boiling refrigerant absorbs heat from the liquid. The chilled liquid is then piped to fan coil units or other air conditioning terminal units, where it flows through finned coils, absorbing heat from the air. The warmed liquid is then returned to the chiller to complete the chilled liquid circuit. (See Figure 2 on Page 10)

FIGURE 1 - MODEL YMC² CHILLER
FIGURE 2 - REFRIGERANT FLOW-THRU CHILLER

Legend:

- High Pressure Vapor
- High Pressure Liquid Refrigerant
- Low Pressure Liquid Refrigerant
- Low Pressure Vapor

COMPRESSOR

HOT GAS BYPASS VALVE

DISCHARGE CHECK VALVE

ISOLATION VALVE

CONDENSER

SUB-COOLER

ISOLATION VALVE

LIQUID LEVEL VALVE

EVAPORATOR (FALLING FILM)

SUCTION BAFFLE

LIQUID COOLING FOR MOTOR STATOR

ROTOR COOLING GAS VENT (GAS PATH REV A COMPRESSORS ONLY)

PRE-ROTATION VANES

SUCTION

DISCHARGE

FIGURE 2 - REFRIGERANT FLOW-THRU CHILLER
FIGURE 3 - COMPRESSOR PREROTATION VANES

The refrigerant vapor, which is produced by the boiling action in the cooler, flows to the compressor where the rotating impeller increases its pressure and temperature and discharges it into the condenser. Water flowing through the condenser tubes absorbs heat from the refrigerant vapor, causing it to condense.

The condenser water is supplied to the chiller from an external source, usually a cooling tower. The condensed refrigerant drains from the condenser into the liquid return line, where the variable orifice meters the flow of liquid refrigerant to the cooler to complete the refrigerant circuit.

The major components of a chiller are selected to handle the refrigerant, which would be evaporated at full load design conditions. However, most systems will be called upon to deliver full load capacity for only a relatively small part of the time the unit is in operation.

CAPACITY CONTROL

The speed at which the compressor rotates establishes the pressure differential that the chiller can operate against. As speed is reduced, the chiller power use is reduced. At reduced capacity requirements where condenser pressure is also reduced, the motor speed is reduced as much as possible while maintaining chilled water temperature and sufficient pressure differential. When the speed cannot be further reduced due to pressure difference required for the specified leaving chilled water temperature setting and available cooling to the condenser, other means to reduce refrigerant gas flow are used to manage capacity. Compressor models M1B-197FAA and M1B-205FAA use a device called prerotation vanes (PRV) at the entrance to the impeller to reduce capacity (See Figure 3). Regardless of chiller compressor model, the chiller also has a mechanism called Variable Geometry Diffuser (VGD) at the exit of the impeller that was designed to mitigate "stall". Stall is an effect caused by slow refrigerant gas passing through the compressor at reduced flow rates needed for low capacity operation. Compressor models with gas path revision level “B” do not have operating prerotation vanes, they are fixed full open, but use the VGD also as a capacity control device instead.

A final optional means to reduce capacity called Hot Gas Bypass (HGBP) is available regardless of compressor model. When selected for an application, HGBP is used to re-circulate some refrigerant through the compressor without using it for cooling the chilled liquid. Although this does not reduce power consumption, it greatly reduces the capacity of the chiller for maximum turndown.

The YMC uses these mechanisms in a controlled order to maintain best efficiency.

MAGNETIC BEARINGS

The chiller driveline operates on magnetic bearings which are controlled by the Magnetic Bearing Controller (MBC). This controller receives commands to levitate the rotor and to enable a rotation interlock as required.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

The YORK OptiView™ control center for YMC² is a microprocessor based control system for R134a centrifugal chillers. It controls the leaving chilled liquid temperature and maintains required pressure to avoid surge via pre-rotation vane controls, motor drive speed and optional hot gas bypass. It has the ability to limit motor current and shell pressures.

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 numerical 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 tables starting on Page 114 of this manual.

Some screens, displayed values, programmable setpoints and manual control shown in this manual 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 York YMC² Service Manual (Form 160.78-M2). These parameters affect chiller operation and should never be modified by anyone other than a qualified Service Technician. They are shown in this manual for reference only.

Advanced diagnostics and troubleshooting information for Service Technicians are included in York YMC² Service Manual (Form 160.78-M2). Also included in the Service manual are detailed descriptions of chiller features, such as the Refrigerant Level Control, Hot Gas Bypass, Remote Setpoints, Smart Freeze Protection, variable geometry diffuser, magnetic bearing controller.

The control center expands the capabilities of remote control and communications. By providing a common networking protocol through the Building Automation System (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 BAS 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 Opti-view Control Center microboard. The control center is equipped with the 031-02430-006 Microboard.

Software versions (C.OPT.01.xx.yyy) are alpha-numeric codes that represent the application, language package and revision levels per below. Each time the controls portion or language section is revised, the respective revision level increments.

- C – Commercial chiller
- OPT - Used on Microboard 031-02430-006
- 16 – YMC² 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)

Software upgrades should only be performed by a Service Technician.
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 the keypad when the chiller is set to local mode,
- remotely through digital inputs in digital or analog remote mode, or
- by the E-Link Gateway in BAS (ISN) remote mode.

When the control is changed to local mode from any other source, it will remain in RUN if already running or remain in STOP if already stopped. A hardware Safety Stop button is also located on the side of the panel.

**SAFETY STOP**

When depressed, the chiller will not run under any condition. For safety reasons, this position is required for many maintenance tasks to be completed.
The safety stop button must be rotated clockwise to release the stop condition. The safety stop is not intended for normal shutdown of the chiller. If used, an immediate stop occurs, which by passes the programmed controlled shutdown.

**INTERFACE CONVENTIONS**

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 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 ‘✓’ key is pressed to bring up a dialog prompting the user to enter a new setpoint value. The ‘X’ key cancels cursor mode. (See the Schedule Screen for an example.)

**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.
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 speaking person should navigate to the USER Screen (using the preceding Navigation chart) and select English.

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.

<table>
<thead>
<tr>
<th>ANALOG INPUT</th>
<th>ENGLISH RANGE</th>
<th>METRIC RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOW</td>
<td>HIGH</td>
</tr>
<tr>
<td>Leaving Chilled Liquid Temperature</td>
<td>0.0</td>
<td>82.0</td>
</tr>
<tr>
<td>Return Chilled Liquid Temperature</td>
<td>0.0</td>
<td>94.1</td>
</tr>
<tr>
<td>Leaving Condenser Liquid Temperature</td>
<td>8.0</td>
<td>133.5</td>
</tr>
<tr>
<td>Return Condenser Liquid Temperature</td>
<td>8.0</td>
<td>133.5</td>
</tr>
<tr>
<td>Evaporator Refrigerant Temperature (Optional)</td>
<td>0.0</td>
<td>126.1</td>
</tr>
<tr>
<td>Discharge Temperature</td>
<td>31.8</td>
<td>226.3</td>
</tr>
<tr>
<td>Condenser Pressure (R134a)</td>
<td>0.0</td>
<td>315.0</td>
</tr>
<tr>
<td>Condenser Temperature (R134a)*</td>
<td>-98.7</td>
<td>106.1</td>
</tr>
<tr>
<td>Evaporator Pressure (R134a)</td>
<td>5.5</td>
<td>77.4</td>
</tr>
<tr>
<td>Evaporator Temperature (R134a)*</td>
<td>-44.9</td>
<td>64.7</td>
</tr>
<tr>
<td>Refrigerant Level</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Drop Leg Refrigerant Temperature</td>
<td>0.0</td>
<td>121.7</td>
</tr>
<tr>
<td>Motor Housing Temperature</td>
<td>31.8</td>
<td>226.3</td>
</tr>
</tbody>
</table>

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

OPERATOR SETPOINTS QUICK REFERENCE

The most common Operator level setpoints can be found on the following screens:

Leaving Chilled Liquid Temperature: Evaporator Screen
Shutdown Temperature Offset: Evaporator Screen
Restart Temperature Offset: Evaporator Screen
Local Input Current Limit: VSD Screen
Pulldown Demand Limit: VSD Screen
Pulldown Demand Time: VSD Screen
Head Pressure Setpoint (When The Feature Is Enabled: Condenser – Head Pressure Control)
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW
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 and/or condenser cooling 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.

Input % Full Load Amps
This displays the percentage of full load amps utilized by the system.

Input Power (kW)
This displays the total input power used by the system.

Operating Hours
Displays the cumulative operating hours of the chiller.

Motor Run (LED)
Is ON when the digital output controlling the VSD contact is on.

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 OP-
The OPERATOR level will allow the customer to change all of the setpoints required to operate the chiller system. The OPERATOR access level reverts to the VIEW 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 Screen.) This option will not be present if the chiller is presently configured to print History, New Data, which continuously logs.

**Clear Fault**  
*Access Level Required: VIEW*  
(Software version C.OPT.16.01.213 limited to SERVICE)  
When safety conditions have been detected, the chiller is shutdown, and the main status display of the chiller will display a message indicating the cause of the shutdown. Using this key, the fault and message can be cleared once the condition has been removed. The key only shows when the condition can be cleared.

**Warning Reset**  
*Access Level Required: OPERATOR*  
Use of this key acknowledges a warning condition and resets the message display associated with it.

**Start**  
*Access Level Required: OPERATOR*  
This key is only available when the chiller is in local mode and does not have a local run request. Pressing this key allows selection of enter to run or cancel to abort to stopped.

**Soft Stop**  
*Access Level Required: OPERATOR*  
This key is only available when the chiller is in local mode and has a local run request. It shows in place of the start key. Pressing this key allows selection of enter to stop or cancel to remain running. Enter causes the chiller to close pre-rotation vanes, open Hot Gas Bypass (if available), and ramp the chiller to stopped. This is the preferred method for performing a local shutdown.

**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 surge protection, Magnetic Bearing Control, Variable Geometry Diffuser, and PRV calibration.

**Capacity Control**  
A detailed view of all the parameters associated with capacity control.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

VSD
A detailed view of the motor and VSD parameters. 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 10 shutdown conditions, and provides for trending operating parameters.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW

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

DISPLAY ONLY

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

Input % Full Load Amps
This displays the percentage of full load amps utilized by the system.

Input Current Limit Setpoint
Displays the current limit value in use. This value could come from a 0-20mA, 4-20mA, 0-10VDC or 2-10VDC input in Analog Remote mode, PWM signal in Digital Remote mode, E-Link Gateway interface in BAS (ISN) mode, or a locally programmed value.

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.

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 programmed temperature setpoint for the evaporator liquid. This value could come from a 0-20mA, 4-20mA, 0-10VDC or 2-10VDC input in Analog Remote mode, PWM signal in Digital Remote mode, E-Link Gateway interface in BAS (ISN) mode, or a locally programmed value.
**Condenser Pressure**
Displays the refrigerant pressure in the condenser.

**Condenser Saturation Temperature**
Displays the saturation temperature in the condenser.

**Evaporator Pressure**
Displays the present refrigerant pressure in the evaporator.

**Evaporator Saturation Temperature**
Displays the present saturation temperature in the evaporator.

**Delta P**
Displays the pressure difference between the condenser and evaporator (condenser minus evaporator). This is also called the Head Pressure. Only appears when Head Pressure Control is enabled.

**Head Pressure Setpoint**
Displays the active Head Pressure Setpoint to which the head pressure is being controlled. Only appears when Head Pressure Control is enabled.

**PROGRAMMABLE**
There are no programmable fields on this screen.

**NAVIGATION**

**Home**
Causes an instant return to the Home Screen.
OVERVIEW
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 Temperature Difference
Displays the difference between the Leaving Chilled Liquid temperature and the Evaporator Refrigerant temperature. The Evaporator Refrigerant temperature will be represented by the Refrigerant Temperature sensor input if the sensor is enabled, otherwise it will be represented by the Evaporator Saturation temperature.

Evaporator Pressure
Displays the present refrigerant pressure in the evaporator.

Leaving Chilled Liquid Temperature Setpoints – Setpoint
Displays the present setpoint to which the chiller is operating, whether controlled locally or remotely.

Leaving Chilled Liquid Temperature Setpoints - Shutdown
Displays the Leaving Chilled Liquid Temperature at which the chiller will shutdown on LEAVING CHILLED LIQUID – LOW TEMPERATURE. This temperature is entered as an offset with the LEAVING CHILLED LIQUID TEMPERATURE CYCLING OFFSET – SHUTDOWN setpoint below. Although the offset setpoint is changed manually, the offset being used can change automatically to prevent the leaving chilled liquid temperature from going below the minimum allowed value: 36°F (water), 34°F (water with smart freeze enabled) or 6°F (brine). The offset being used is displayed as “Effective Offset”. Refer to setpoint description below.
Leaving Chilled Liquid Temperature Setpoints

- Restart
Displays the Leaving Chilled Liquid Temperature at which the chiller will restart after it has shutdown on LEAVING CHILLED LIQUID – LOW TEMPERATURE cycling shutdown. This temperature is set as an offset using the LEAVING CHILLED LIQUID TEMPERATURE CYCLING OFFSET – RESTART setpoint, displayed as “Offset” adjacent to this value.

Leaving Chilled Liquid Temperature Setpoints
- Remote Range
Displays the temperature range proportional to a remote analog input as selected according to the programmable values description below.

Leaving Chilled Liquid Temperature Setpoints (Shutdown) – Effective Offset
Displays the present value of the leaving chilled liquid temperature shutdown offset in effect.

Leaving Chilled Liquid Temperature Setpoints (Restart) – Offset
Displays the value set for leaving chilled liquid temperature restart offset.

Evaporator Saturation Temperature
Displays the present saturation temperature in the evaporator, determined from evaporator pressure.

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 contacts (RUN or STOP).

Evaporator Refrigerant Temperature
Displays the temperature of the refrigerant in the evaporator, if the sensor is enabled.

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 (0-20mA, 4-20mA, 0-10VDC or 2-10VDC) 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 as 10, 20, 30, or 40°F above the Base setpoint (see the Remote Leaving Chilled Liquid Temperature Setpoint Range description above). Additionally, E-Link Gateway (in BAS (ISN) 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 Base setpoint value, but rather is the setpoint value itself.

When the chiller is running, performing capacity control, any change to the active LCHLT setpoint results in a ramp from the old value to the new value at the programmed LCHLT setpoint ramp rate.

Local Leaving Chilled Liquid Temperature - Range
Access Level Required: OPERATOR
This is the range over which an analog (0-20mA, 4-20mA, 0-10VDC or 2-10VDC) 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 as 10, 20, 30 or 40°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 - 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 64°F below the setpoint, to a minimum cut-out of 36°F (water), 34°F (water with Smart Freeze enabled) or 6°F (brine). Anytime the Leaving Chilled Liquid Temperature setpoint is decreased, the shutdown threshold decreases to the new LCHLT active setpoint minus offset at a rate equal to the programmed LCHLT Setpoint Ramp Rate. Anytime the Leaving Chilled Liquid Temperature setpoint is increased, the shutdown threshold increases to the new leaving chilled liquid temperature active setpoint minus offset at a rate = 1/2 the programmed LCHLT Setpoint Ramp Rate.

The offset being used is displayed as Effective Offset in the upper right area of the display. Usually, the Offset used is the same as the value programmed for the SHUTDOWN setpoint. However, the Offset being used will automatically change based on the values programmed for the LEAVING CHILLED LIQUID TEMPERATURE setpoint and the SHUTDOWN setpoint, to prevent the leaving chilled liquid temperature from going below the minimum allowed value: 36°F (water), 34°F (water with smart freeze enabled) or 6°F (brine). For example, if the leaving Chilled Liquid Temperature setpoint is set to 45°F (water) and the SHUTDOWN setpoint is set to 4°F, the Effective Offset is displayed as 4°F. If the leaving setpoint is lowered to 38°F, the Effective Offset will change to 2°F. If the leaving chilled setpoint is raised back to 45°F, the Effective Offset will revert back to the SHUTDOWN setpoint.

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 70°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.

Refrigerant (Enabled / Disabled)
Access Level Required: SERVICE
The Evaporator Refrigerant Sensor must be enabled via this toggle before the system will utilize the new, enhanced resolution input. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).

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. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).

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. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).

NAVIGATION

Home
Causes an instant return to the Home Screen.
FIGURE 8 - CONDENSER SCREEN

OVERVIEW
This screen displays a cutaway view of the chiller condenser. All setpoints relating to the condenser side of the chiller are maintained on this screen. 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.

Subcooling 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.

High Pressure Switch (Open/Closed)
Displays the present position of the high pressure switch. This will indicate open when a High Pressure fault is present.
Condenser Liquid Flow Switch
Indicates whether flow is present in the condenser.

Condenser Liquid Pump (Run/Stop)
Displays the command presently sent by the control center to the Condenser Liquid Pump run contacts.

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 position command to the level control valve in percent of travel with 0% full closed to 100% full open.

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 and initiate high condenser pressure capacity control override.

Fault Acknowledge
*Access Level Required: SERVICE*
This allows clearing of the High Condenser Pressure Fault while Shutdown (Condenser-High Pressure Stopped). Service Technicians refer to YORK YMC2 Service Manual (Form 160.78-M2).

NAVIGATION

Home
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.

Head Pressure Control
*Access Level Required: SERVICE*
Moves to a subscreen allowing programming and viewing of the Head Pressure Control setpoints and parameters. Only appears when Head Pressure Control is enabled.
OVERVIEW

This screen displays all parameters related to the Head Pressure Control feature. It also allows for setting of the setpoints applicable to this feature.

If equipped with this optional feature, it must be enabled on the SETUP Screen. Once enabled, this screen is accessible from the CONDENSER Screen.

The Condenser water flow animation will show flow when the Condenser Liquid Flow Switch senses flow is present.

A complete explanation of the Head Pressure Control feature is contained in YORK YMC2 Service Manual (Form 160.78-M2).

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC2 Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

DISPLAY ONLY

Entering Condenser Liquid Temperature
Displays the temperature of the liquid as it enters the standard condenser tube bundle.

Leaving Condenser Liquid Temperature
Displays the temperature of the liquid as it leaves the standard condenser tube bundle.

Delta P
Displays the pressure difference between the condenser and evaporator (condenser minus evaporator). This is also called the Head Pressure.

Head Pressure Setpoint
Displays the active Head Pressure Setpoint to which the head pressure is being controlled.

Control Valve Command
Displays the position command being sent to the control valve. Displayed over the range of 0.0% to 100%. The actual value of the output signal for a given error depends on whether the PID OUTPUT setpoint is set to DIRECT or REVERSE. If set to DIRECT, the 0.0% output will be at minimum; the 100% output will be at maximum. If set to REVERSE, the 0.0% output will be at maximum; the 100% output will be at minimum.

Control Valve Control Mode
Displays whether the Control valve is in automatic or manual control.
PROGRAMMABLE

Head Pressure Setpoint
Sets the pressure differential to which the Control Valve will control the Head Pressure. (15.0 to 60 PSID; default 23.0 PSID)

Control Valve Output Settings - Type
Sets the output signal to the Control Valve to be in the form of either 0-10VDC or 4-20mA. (default 0-10v)

Control Valve Output Settings - PID Output
Allows the output signal to the Control Valve to be set to DIRECT or REVERSE acting. When set to DIRECT, the voltage or current signal to the Control Valve is at minimum for a 0% command and at maximum for a 100% command. When set to REVERSE, the voltage or current signal to the Control Valve is at maximum for a 0% command and at minimum for a 100% command.

Control Valve Output Settings - Set
Allows the Control Valve to be manually set to a predetermined position between 0.0% and 100%. (default 0.0%)

Control Valve Output Settings - Auto
Places the Control Valve in automatic control.

Change Setpoints
Used to enter the Head Pressure Control PID variables. Pressing this key places a green box around the first changeable setpoint. Use the up/down, left/right arrows 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. Using the numeric keys, enter desired value and then, press the ENTER ✓ key.

Head Pressure Control - P
Sets the Proportional Gain of the Head Pressure Control (0.00 to 5.00; default 2.00). Use the Change Setpoints key as described above to select/enter this setpoint.

Head Pressure Control – I
Sets the Integral Gain of the Head Pressure Control (0.00 to 5.00; default 2.00). Use the Change Setpoints key as described above to select/enter this setpoint.

Head Pressure Control – D
Sets the Derivative Gain of the Head Pressure Control (0.00 to 5.00; default 0.00). Use the Change Setpoints key to select/enter this setpoint.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Condenser
Returns to the Condenser Screen.
OVERVIEW

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.

A Variable Orifice is used to control the condenser refrigerant level to the Refrigerant Level Setpoint. The control thresholds are applied in two different zones, as determined by the error relationship between the actual refrigerant level and the Level Setpoint. Zone 1 parameters are used when the error is less than or equal to the programmed Zone transition delta. Zone 2 parameters are used when the error is greater than the programmed Zone transition delta. When transitioning from Zone 2 to Zone 1, the error must be less than or equal to the programmed Zone transition delta for the programmed Zone transition time (seconds) before the Zone 1 parameters are used. If the error is greater than the programmed Zone transition delta, the Zone 2 parameters are immediately implemented.

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC® Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

DISPLAY ONLY

Refrigerant Level

Displays the present level of refrigerant in percent over the length of the condenser refrigerant level sensor. 0% is at or below the bottom of the sensor. 100% is at or above the top of the sensor. The refrigerant level is animated in the cutaway view of the condenser. When the actual level is 0% to 15%, the level is shown about 50% full. When the actual level is 16% to 31%, the level is shown about 60% full. When the actual level is 32% to 47%, the level is shown about 70% full. When the actual level is 48% to 63%, the level is shown about 80% full. When the actual level is 64% to 79%, the level is shown as about 90% full. Actual levels above 79% shown as 100% full.
### Active Level Setpoint
Displays the refrigerant level target that the chiller is controlling to. This value is determined as level setpoint or ramp up target, depending on state.

### Level Control State
Indicates the zone control state currently in effect for the Refrigerant Level control.

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactive</td>
<td>NOT in Effect</td>
</tr>
<tr>
<td>Start-up Hold</td>
<td>Start-up delay is in effect</td>
</tr>
<tr>
<td>Zone 1</td>
<td>Zone 1 control is in effect</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Zone 2 control is in effect</td>
</tr>
<tr>
<td>Zone 2 to Zone 1</td>
<td>Control is Zone 2, error has crossed to Zone 1, and the transition delay timer is counting down.</td>
</tr>
<tr>
<td>Manual</td>
<td>Control in Manual</td>
</tr>
</tbody>
</table>

### Transition Time Remaining
Displays the time remaining in the Programmable Zone Transition timer when transitioning from Zone 2 to Zone 1. When transitioning from Zone 2 parameter set to Zone 1 parameter set, the Zone 1 error requirement must be met for this delay before Zone 1 parameters are used.

### Ramp Up Time Remaining
Displays the time remaining in the Ramp Up time countdown timer while a Refrigerant Level target ramp is in effect.

### Startup Delay Remaining
Displays the time remaining in the Startup Delay time countdown timer while Startup Delay is in effect.

### Level Control Valve Command
Displays the position command to the level control valve in percent of travel with 0% full closed to 100% full open.

### PROGRAMMABLE

#### Level Setpoint
Specifies the desired refrigerant level to be maintained in the condenser, as a percent of the level sensor span.

#### [Refrigerant Level Control] Open (Manual)
This key puts the Level Control into manual mode and changes the command to the variable orifice, toward open by the manual increment value.

#### [Refrigerant Level Control] Close (Manual)
This key puts the Level Control into manual mode and changes the command to the variable orifice toward close by the manual increment value.

#### [Refrigerant Level Control] Manual Increment
This key enables the change increment to be set for manual control. It displays the increment in a textbox.

#### [Refrigerant Level Control] Auto
Returns the Level Control to automatic mode.

#### [Refrigerant Level Control] Set (Manual)
This key allows manual programming of a fixed level control valve command percentage. This key puts level valve control in manual mode, fixed to the value specified.

### NAVIGATION

#### Home
Causes an instant return to the Home Screen.

#### Condenser
Returns to the Condenser Screen.

#### Setpoints
*Access Level Required: SERVICE*
Moves to the subscreen allowing programming of refrigerant control setpoints.
OVERVIEW

This screen is available at service level access and allows the service technician to set the refrigerant level control operational settings. The following fields require login access level of SERVICE. Service technicians refer to YORK YMC2 Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

DISPLAY ONLY

Refrigerant Level
Same as Refrigerant Level Control Screen.

Active Setpoint
Same as Refrigerant Level Control Screen.

Level Control State
Same as Refrigerant Level Control Screen.

PROGRAMMABLE

Transition Time Remaining
Same as Refrigerant Level Control Screen.

Ramp Up Time Remaining
Same as Refrigerant Level Control Screen.

Startup Delay Remaining
Same as Refrigerant Level Control Screen.

Level Control Valve Command
Same as Refrigerant Level Control Screen.

Startup Position
Access Level Required: SERVICE
Specifies the position commanded to the level control valve during shutdown. Automatic valve control begins from this position upon chiller run. (20% to 100%, default 50%)

Startup delay
Access Level Required: ADMIN
Specifies a delay time from the start of chiller run until automatic control of refrigerant level begins.
Ramp Time
Access Level Required: ADMIN
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.

Zone Transition Delta
Specifies the percentage increment away from level setpoint for the control to switch zones of control.

Zone Transition Time
Specifies the continuous time level error must be in Zone 1 on a transition from Zone 2 before switching to Zone 1 control.

Zone 1 and Zone 2 PID Gains
Specifies the control gains for Zone 1 or Zone 2 level control. The change setpoints key enables these for edit in ADMIN level access.

NAVIGATION
Home
Causes an instant return to the Home Screen.

Level Control
Causes an instant return to the Refrigerant Level Control Screen.
OVERVIEW

This screen displays a cutaway view of the chiller compressor, revealing the impeller, and shows all conditions associated with the compressor. In addition, with the proper Access Level, the pre-rotation vanes may be calibrated. Animation of the compressor impeller indicates whether the chiller is presently in a RUN condition. This screen also serves as a gateway to subscreens for calibrating the pre-rotation vanes, jumping to capacity control for manual controls, and displaying MBC, Surge and VGD detail.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

DISPLAY ONLY

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

Discharge Superheat
Displays the Discharge superheat, calculated as (Discharge Temperature – Condenser Saturation temperature).

PRV Opening (LED) - Gas Path Revision "A" Only
Indicates whether the output control is commanding the PRV's to open.

PRV Closing (LED) - Gas Path Revision "A" Only
Indicates whether the output control is commanding the PRV's to close.

Motor Run (LED)
Indicates ON when the digital output run command to the VSD is on.

Pre-Rotation Vane Command Position - Gas Path Revision "A" Only
Displays the control output position command to the PRV as a percentage between 0 and 100%.

Pre-Rotation Vanes Position - Gas Path Revision "A" Only
This value displays the present position of the pre-rotation vanes as a percentage between 0 and 100%.

Input % Full Load Amps
Displays the chiller current as a percentage of the job input Full Load Amps (FLA) value.

Motor % Full Load Amps
Displays the current to the motor as a percentage of the motor maximum current.

VSD Output Frequency
Displays the VSD frequency.

PROGRAMMABLE

There are no programmable fields on this screen.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Capacity Control
Access Level Required: SERVICE
Causes an instant transfer to the Capacity Control Screen.

MBC
Access Level Required: SERVICE
Moves to the subscreen allowing view of the Magnetic Bearing Controller parameters and event log. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).

Surge
Access Level Required: VIEW
Moves to the subscreen that allows viewing and programming of the Surge Protection feature. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).

VGD
Access Level Required: VIEW
Moves to the subscreen that allows viewing and programming of the Variable Geometry Diffuser feature. Programming requires an access level of SERVICE.

PRV Calibrate - Gas Path Revision "A" Only
Access Level Required: SERVICE
Only available if the chiller is stopped. Moves to the subscreen allowing calibration of the Pre-rotation vanes. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).
OVERVIEW
This screen displays the orientation of the magnetic bearing axes relative to the compressor driveline. Pertinent parameters transmitted to the control panel from the Magnetic Bearing Controller (MBC) are displayed on this screen. Many parameters are shown in the diagram in the locations they represent. The left end of the motor shaft graphic represents the Impeller End Bearing. The right end of the motor shaft graphic represents the Opposite Impeller End Bearing.

DISPLAY ONLY

V13 Position
Displays the shaft position in micrometers from center along the radial axis designated “V” for the Impeller End Bearing.

W13 Position
Displays the shaft position in micrometers from center along the radial axis designated “W” for the Impeller End Bearing.

W1 (Current)
Displays the magnetizing current to the upper bearing on the radial axis designated “W” for the Impeller End.

W3 (Current)
Displays the magnetizing current to the lower bearing on the radial axis designated “W” for the Impeller End.

V1 (Current)
Displays the magnetizing current to the upper bearing on the radial axis designated “V” for the Impeller End.

V3 (Current)
Displays the magnetizing current to the lower bearing on the radial axis designated “V” for the Impeller End.

V24 Position
Displays the shaft position in micrometers from center along the radial axis designated “V” for the Opposite Impeller End Bearing.

Z1 (Current)
Displays the magnetizing current to the axial bearing at the Impeller End.

Z12 Position
Displays the shaft position in micrometers from center along the axial axis.

V24 Position
Displays the shaft position in micrometers from center along the radial axis designated “V” for the Opposite Impeller End Bearing.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

**W24 Position**
Displays the shaft position in micrometers from center along the radial axis designated “W” for the Opposite Impeller End Bearing.

**W2 (Current)**
Displays the magnetizing current to the upper bearing on the radial axis designated “W” for the Opposite Impeller End.

**W4 (Current)**
Displays the magnetizing current to the lower bearing on the radial axis designated “W” for the Opposite Impeller End.

**V2 (Current)**
Displays the magnetizing current to the upper bearing on the radial axis designated “V” for the Opposite Impeller End.

**V4 (Current)**
Displays the magnetizing current to the lower bearing on the radial axis designated “V” for the Opposite Impeller End.

**Z2 (Current)**
Displays the magnetizing current to the axial bearing at the Opposite Impeller End.

**MBC Control Mode**
Displays whether the MBC is in Manual or Automatic Control.

**[MBC Status] Delevitated Mode (LED)**
Indicates the MBC is reporting itself in Delevitated status via Modbus Data.

**[MBC Status] Levitated Mode (LED)**
Indicates the MBC is reporting itself in Levitated status via Modbus Data.

**[MBC Status] Rotation Mode (LED)**
Indicates the MBC is reporting itself in Rotation mode via Modbus Data.

**[MBC Status] MBC Shutdown (LED)**
Indicates the MBC is reporting a shutdown fault via Modbus Data.

**[MBC Outputs] Rotation Allowed (LED)**
Indicates the MBC rotation allowed contacts are closed by the control Digital Input.

**[MBC Outputs] MBC Fault (LED)**
Indicates the MBC fault contacts are opened, indicating a fault, by the control Digital Input.

**Motor Speed**
Indicates the compressor motor rotational speed.

**DC Bus Voltage**
Indicates voltage of the DC Bus, which supplies the MBC.

**Rotor Elongation**
Indicates the thermal growth of the motor shaft as determined by the difference in the impeller end position sensor and the opposite impeller end position sensor.

**Motor Housing Temperature**
Indicates the motor housing temperature measured from a thermistor inserted externally.

**Landing Counter**
Indicates the number of counts of events where shaft displacement exceeded a gap threshold while rotating.

**PROGRAMMABLE**

**Levitate/Delevitate**
*Access Level Required: SERVICE*
Allows the technician to manually levitate or delevitate the shaft when the MBC is powered by sufficient DC Bus voltage. Sets the control mode to MANUAL.

**Auto**
*Access Level Required: SERVICE*
Returns MBC Control to Automatic as required to run the chiller.

**NAVIGATION**

**Home**
Causes immediate return to the Home Screen.

**Compressor**
Causes immediate transfer to the Compressor Screen.

**MBC Details**
Moves to the subscreen showing additional detailed MBC parameters.

**MBC Event Log**
Moves to the subscreen showing the MBC collection of event history logs.
OVERVIEW

This screen displays the orientation of the magnetic bearing axes relative to the compressor driveline similar to the MBC Screen. Additional pertinent parameters transmitted to the control panel from the Magnetic Bearing Controller (MBC) are displayed on this screen. Many parameters are shown in the diagram in the locations they represent. The left end of the motor shaft graphic represents the Impeller End Bearing. The right end of the motor shaft graphic represents the Opposite Impeller End Bearing.

DISPLAY ONLY

Z1 Temperature
Displays the temperature measured at the impeller end bearing assembly.

VW13 Vibration
Displays the vibration amplitude at rotational frequency, radially at the impeller end bearing position sensors.

VW24 Vibration
Displays the vibration amplitude at rotational frequency, radially at the opposite impeller end bearing position sensor.

Z2 Temperature
Displays the temperature measured at the opposite impeller end bearing assembly.

Z12 Vibration
Displays the vibration amplitude for specific frequencies measured axially by the position sensors.

Magnetic bearing currents as described for the MBC Screen are repeated on this screen:

- W1 (Current)
- V1 (Current)
- Z1 (Current)
- V3 (Current)
- W3 (Current)
- W2 (Current)
• V2 (Current)
• Z2 (Current)
• V4 (Current)
• W4 (Current)

[MBC Status] AVR (LED)
Indicates the MBC is reporting its automatic vibration reduction feature is active via Modbus Data.

[MBC Status] ABS (LED)
Indicates the MBC is reporting its automatic balancing system feature is active via Modbus Data.

Motor Speed
Indicates the compressor motor rotational speed.

DC Bus Voltage
Indicates the voltage of the DC Bus, which supplies the MBC.

MBC Operation Time
Indicates the cumulative time of operation of the MBC since initial power up.

MBC Rotation Time
Indicates the cumulative time the MBC was in rotation state since initial power up.

MBC Amplifier Temp
Displays the temperature measured at the MBC bearing current amplifier board.

MBC Converter Temp
Displays the temperature measured at the MBC DC-DC converter board.

PROGRAMMABLE
There are no programmable fields on this screen.

NAVIGATION

Home
Causes immediate return to the Home Screen.

Compressor
Causes immediate transfer to the Compressor Screen.

MBC
Causes immediate return to the MBC Screen.
OVERVIEW
This screen displays the event history logs saved in the Magnetic Bearing Control Program.

This log is only populated when the MBC is powered up and communication has been initialized with the OptiView. OptiView does not store this data separately.

DISPLAY ONLY
This screen displays the chiller event history. There are no other display only fields.

PROGRAMMABLE
PRINT
Generates a hard copy output at the Event Log.

NAVIGATION
Home
Causes immediate return to the Home Screen.

Compressor
Causes immediate transfer to the Compressor Screen.

MBC
Causes immediate return to the MBC Screen.
OVERVIEW

This screen displays a cutaway view of the chiller compressor and all parameters relating to the Surge Protection feature. All setpoints relating to this screen are maintained on this screen.

The Surge Protection feature detects surge events and provides a running count of the surges detected over the lifetime of the chiller. It allows the user to define how many surges are excessive and how the control will react to an excess surge condition. When excess surging is detected, it can be configured to shutdown the chiller. The sensitivity of this surge detection is set by the Sensitivity Setpoint on this screen.

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.

Surge Detected (LED)
Illuminates momentarily when a surge is detected by the Surge Protection feature.

Surge Count
This is the total number of surges accumulated by the Surge Protection feature.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

PROGRAMMABLE

**Shutdown (Enabled/Disabled)**  
*Access Level Required: OPERATOR*  
Allows the user to select whether the chiller will shut-down or continue to run when an Excess Surge situation has been detected.

If this setpoint is Enabled a safety shutdown is performed when the SURGE WINDOW COUNT exceeds the COUNT LIMIT setpoint.

"SURGE PROTECTION – EXCESS SURGE" is displayed with shutdown.

**Count Window**  
*Access Level Required: OPERATOR*  
Allows the user to define the period of time (1 to 5 minutes; default 5; 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 4; 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, and the SHUTDOWN setpoint is Enabled, the chiller will perform a safety shutdown and display "SURGE PROTECTION – EXCESS SURGE".

**Surge Sensitivity**  
*Access Level Required: SERVICE*  
Allows the user to define the surge detection sensitivity of the Surge Protection feature. 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 Total Surge Count to zero.

NAVIGATION

**Home**  
Causes an instant return to the Home Screen.

**Compressor**  
Causes an instant return to the Compressor Screen.
OVERVIEW

This screen displays information pertinent to the VGD operation. Also, the VGD can be manually controlled from this screen.

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC² Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.
DISPLAY ONLY

Active Stall Voltage
Displays the Stall Detector output voltage (x.xxVdc), as received by the Microboard, from the stall board.

Active Stall Voltage Type
Displays STANDARD or ENHANCED to indicate whether the Active Stall Voltage has enhanced filtering applied when necessary to normalize flow noise.

Active High Limit
Displays the present value of the stall voltage High Limit to which the control compares the stall detector voltage input to determine appropriate reaction with the VGD. This limit varies according to drive speed and suction conditions.

Active Low Limit
Displays the present value of stall voltage Low Limit to which the control compares the stall detector voltage input to determine appropriate reaction with the VGD. This limit varies according to drive speed and suction conditions.

Mach Number
Displays the compressor calculated mach number, based on drive speed and suction conditions.

VGD Closing (LED)
Illuminates when a close signal is being applied to the VGD.

VGD Opening (LED)
Illuminates when an open signal is being applied to the VGD.

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 a qualified Service technician.

Maximum VGD Position - Gas Path Revision "A" Only
Displays calculated limit that the VGD is permitted to open to in probing mode.

VGD Command - Gas Path Revision "B" Only
Displays the position command from the control to the VGD.

Surge Detected (LED)
Illuminates for 5 seconds each time a surge is detected.

VGD Count
Displays the number of times the Stall Detector Board output voltage goes above the High Limit setpoint. The count can be cleared with in ADMIN access level using the VGD Cycle Count key on the VGD Setpoints Screen.

VGD Time ( __Days __Hrs __Min __Sec)
Displays the accumulated time the Stall Detector Board output voltage is greater than the High Limit Setpoint while the chiller is running.

VGD Control State
Displays the current state of the VGD control. The states are: Stall Waiting, Stall Reacting, Probing - Gas Path A, Capacity Control - Gas Path B, Surge Reacting, Surge Waiting, and Manual.

Time Remaining
While the VGD is in the Stall Waiting State, displays the time remaining in the “Probe Wait Time” interval (value programmed as the Probe Wait Time Setpoint).

Discharge Pressure
Displays the compressor discharge pressure as sensed by the transducer used for the stall signal determination.

Condenser Pressure
Displays the condenser pressure sensed by the condenser shell transducer.

Head Pressure
Displays the resultant of the Condenser Pressure minus the evaporator pressure.

Pre-Rotation Vanes Position - Gas Path Revision "A" Only
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 a qualified Service Technician.
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 control of the VGD to automatic.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Compressor
Causes an instant return to the compressor Screen.

VGD Setpoints
Access Level Required: SERVICE
Move to the subscreen that allows programming of the Variable Geometry Diffuser setpoints.

VGD Calibrate
Access Level required: SERVICE
Move to the subscreen that allows the VGD calibration procedure to be performed.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW

The Variable Geometry Diffuser and prerotation vane setpoints are maintained on this screen.

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC² Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints and displayed values.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

DISPLAY ONLY

Active Stall Voltage
Displays the Stall Detector output voltage (x.xxVdc), as received by the Microboard.

Active Stall Voltage Type
Displays STANDARD or ENHANCED to indicate whether the Active Stall Voltage has enhanced filtering applied when necessary to normalize flow noise.

Active High Limit
Displays the present value of the stall voltage High Limit to which the control compares the stall detector voltage input to determine appropriate reaction with the VGD. This limit varies according to drive speed and suction conditions.

Active Low Limit
Displays the present value of stall voltage Low Limit to which the control compares the stall detector voltage input to determine appropriate reaction with the VGD. This limit varies according to drive speed and suction conditions.

Mach Number
Displays the compressor calculated mach number, based on drive speed and suction conditions.

VGD Closing (LED)
Illuminates when a close signal is being applied to the VGD.

VGD Opening (LED)
Illuminates when an open signal is being applied to the VGD.

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 a Service technician.

Maximum VGD Position - Gas Path Revision "A" Only
Displays calculated limit that the VGD is permitted to open to in probing mode.

VGD Command - Gas Path Revision "B" Only
Displays the position command from the control to the VGD.

Surge Detected (LED)
Illuminates for 5 seconds each time a surge is detected.

VGD Count
Displays the number of times the Stall Detector Board output voltage goes above the High Limit setpoint. The count can be cleared with in ADMIN access level using the VGD Cycle Count key on the VGD Setpoints Screen.

VGD Time ( __Days __Hrs __Min __Sec)
Displays the accumulated time the Stall Detector Board output voltage is greater than the High Limit Setpoint while the chiller is running.

VGD Control State
Displays the current state of the VGD control. The states are: Stall Waiting, Stall Reacting, Probing - Gas Path A, Capacity Control - Gas Path B, Surge Reacting, Surge Waiting, and Manual.

PROGRAMMABLE

Surge React Time
Specifies the length of the close pulse applied to the VGD in response to a surge. (1-30 seconds; default 5)

Surge Wait Time
Specifies the length of the wait state before entering the probing state. (0.5-5 minutes)

Probe Wait Time
Specifies how long the VGD control remains in the Stall Waiting state before entering the Probing state. (0.5-15 minutes; default 10)

Open Pulse
Specifies the length of the open pulse applied to the VGD during 10 second periods while in the Probing state. (1-9 seconds; default 2)

High Limit
Specifies the Stall Detector Board output voltage baseline used by the stall control to determine when to initiate action. This value represents an acceptable amount of stall noise. (0.35-1.2VDC; default 0.50)

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 0.1VDC above the newly entered Low Limit value.
Low Limit
In the Stall Reacting State, the VGD is driven closed until the Stall Detector Board output voltage decreases to a threshold determined from this level. (0.30-0.80VDC; default 0.45)

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

VGD Count
Access Level Required: ADMIN
Allows the user to clear the VGD Cycle Count.

PRV VGD Inhibit - Gas Path Revision "A" Only
If PRV position exceeds this value, the VGD is pulsed open according to the open pulse setpoint, and does NOT respond to the stall detector voltage. Normal control resumes at or below this position. (40% to 100%, default 95%)

PRV Offset - Gas Path Revision "A" Only
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. (0-5%; default 3)

VGD Start Position
Sets the position the VGD is set to for the beginning of chiller run.

NAVIGATION

Home
Causes an instant return to the Home Screen.

VGD
Access Level Required: SERVICE
Causes an instant return to the Variable Geometry Diffuser Screen.
VARIABLE GEOMETRY DIFFUSER CALIBRATION SCREEN

OVERVIEW

The screen provides instructions and means to set the VGD position feedback calibration for full open and full closed. This is required prior to chiller start.

NOTE

The following fields require a login access level of SERVICE. Service Technicians refer to YORK YMC² Service Manual (Form 160.78-M2) for operation instructions and explanation of all programmable setpoints and displayed values.
DISPLAY ONLY

VGD Opening (LED)
Indicates the VGD is opening.

VGD Closing (LED)
Indicates the VGD is closing.

VGD Feedback Voltage
Indicates the voltage from the VGD feedback potentiometer.

VGD Actuator Control Mode
Indicates control status for the VGD actuator.

VGD Calibrated (LED)
Illuminated when calibration has been performed with 0% voltage < 100% voltage.

100% VGD Voltage
Indicates VGD feedback voltage accepted as the 100% (full open) calibration value.

0% VGD Voltage
Indicates VGD feedback voltage accepted as the 0% (full closed) calibration value.

PROGRAMMABLE

Set 100% VGD - Gas Path Revision “A” Only
Accepts the present VGD feedback voltage as the 100% calibration value.

Set 0% VGD - Gas Path Revision “A” Only
Accepts the present VGD feedback voltage as the 0% calibration value.

Start Calibration - Gas Path Revision “B” Only
Initiates the automatic calibration process for the VGD potentiometer in compressor Gas Path Revision “B” configuration. See YORK YMC\textsuperscript{2} Service Manual (Form 160.78-M2) for details of the process.

NAVIGATION

Home
Causes an instant return to the Home Screen.

VGD
Access Level Required: SERVICE
Causes an instant return to the Variable Geometry Diffuser Screen.
OVERVIEW
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 following fields require a login access level of SERVICE. Service Technicians refer to YORK YMC2 Service Manual (Form 160.78-M2) for operation instructions and explanation of all programmable setpoints and displayed values.

DISPLAY ONLY

PRV Opening (LED)
Indicates the pre-rotation vanes are opening.

PRV Closing (LED)
Indicates the pre-rotation 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.

PROGRAMMABLE

Start Calibration
This option is hidden after calibration has started. Service Technicians refer to YORK YMC2 Service Manual (Form 160.78-M2) for an explanation of this setpoint.

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.
OVERVIEW

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. This screen also provides a means for a Service Technician to control PRV, Speed, and Optional Hot Gas Bypass Valve manually for maintenance or service.
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.

Input Current % FLA
Displays the percent of useful job full load current presently supplied to the chiller, determined from the highest of the three phase Input Currents/(Input Job FLA setting/0.9).

[Input 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.

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 motor current percent limit, which is a percentage of the minimum of VSD and motor maximum current limits.

Entering Chilled Liquid
Displays the temperature of the chilled liquid as it enters the evaporator.

Leaving Chilled Liquid
Displays the temperature of the chilled liquid as it leaves the evaporator.

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 (0°F to 10°F, default 5°F) with a minimum value of the programmed LCHLT Setpoint. 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.

Entering Condenser Liquid Temperature
Displays the temperature of the condenser liquid entering the condenser.

Capacity Control Output Devices
Displays the following for each of the devices that is available: VSD (Variable Speed Drive), PRV (Pre-rotation Vanes) - Gas Path A, VGD (Variable Geometry Diffuser) - Gas Path B or HGBP (Hot Gas Bypass Valve)

- **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 PRV, VGD or HGBP valve.
- **Feedback:** Displays the present speed feedback from the VSD or present position feedback from the PRV or VGD position potentiometer.
- **Control Mode:** Displays whether the device is under Automatic or Manual control.
- **Active Min:** Displays the prevailing minimum value to which the control to the device is limited, based upon surge controls or operating limits.

**PROGAMMABLE**

**Select VSD Control**
*Access Level Required: SERVICE*
Pressing this button causes VSD Control to be selected for manual control, the LED to be lit and the heading over the manual control buttons to display “Manual Control – VSD”.

**Select PRV Control - Gas Path A**
*Access Level Required: SERVICE*
Pressing this button causes PRV Control to be selected for manual control, the LED to be lit and the heading over the manual control buttons to display “Manual Control – PRV”.

**Select VGD Control - Gas Path B**
*Access Level Required: SERVICE*
Pressing this button causes VGD Control to be selected for manual control, the LED to be lit and the heading over the manual control buttons to display “Manual Control – VGD”.

**Select HGBP Control**
*Access Level Required: SERVICE*
Pressing this button causes HGBP Control to be selected for manual control, the LED to be lit and the heading over the manual control buttons to display “Manual Control – HGBP”.

**Manual Increment**
*Access Level Required: SERVICE*
This key enables the change increment to be set for manual control of the selected device. It also contains a text box displaying the manual increment for manual control. The value shall display in tenths when VSD Control is selected, integers when PRV or VGD Control is selected and integers when HGBP Control is selected.

**Increase**
*Access Level Required: SERVICE*
Pressing this button will set the selected device’s state to Manual if it had been in Auto and will increase the device’s present control command by an amount equal to the Manual Increment.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

Decrease
Access Level Required: SERVICE
Pressing this button will set the selected device’s state to Manual if it had been in Auto and will decrease the device’s present control command by an amount equal to the Manual Increment.

Set
Access Level Required: SERVICE
Pressing this button will open a dialog box where the user can manually enter a command value for the selected device. Once a legitimate value has been entered and the Enter key pressed, the Selected device’s state shall be set to Manual if it had been in Auto and the Selected device’s control command shall be set to the entered value.

Auto
Access Level Required: SERVICE
Pressing this button will set the selected device’s control state to Auto. This button shall only be shown when the selected device’s state is Manual.

NAVIGATION

Home
Causes and instant return to the Home Screen.

Compressor
Causes an instant navigation to the Compressor Screen.

VSD
Causes an instant navigation to the VSD Screen.

Setpoints
Access Level Required: SERVICE
Moves to the Capacity Control Setpoints subscreen that allows the Service Technician to verify and edit values significant to capacity control. This button will only be shown and enabled when the Access Level is Service or greater. Service Technicians refer to YORK YMC Service Manual (Form 160.78-M2).
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW
This screen displays information pertaining to the Variable Speed Drive (VSD).

DISPLAY ONLY
Motor Run (LED)
Indicates whether the digital output from the controls is commanding the motor to RUN.
VSD Fault (LED)
Indicates the VSD is reporting a fault.

Input % Full Load Amps
Displays the input current as a percentage of the job Full Load Amps (FLA) value, based on the highest phase.

Input Current Limit Setpoint
Displays the input current limit value in use. This value could come from a 0-20mA, 4-20 mA, 0-10VDC or 2-10VDC input in Analog Remote mode, PWM signal in Digital Remote mode, E-Link Gateway interface in BAS (ISN) mode, or a locally programmed value.

Pulldown Demand Time Left
Displays the time remaining in the programmed pulldown period if the value is nonzero.

VSD Output Voltage
Displays the output voltage measured to the motor.

VSD Output Frequency
Displays the present output frequency to the motor.

Max Chiller Frequency
Displays the maximum value that the Output frequency is limited to for the chiller, based on configuration.

Input Power
Displays the total input Kilowatts measured by the VSD.

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

Output Current (RMS) - Phase A, B, C
Displays the RMS current measured to the motor, per phase.

PRV Position - Gas Path “A” Only
Displays the pre-rotation vane position as a value between 0 and 100%.

VGD Position - Gas Path “B” Only
Displays the variable geometry diffuser position as a value between 0 and 100%.

Input kVA
Displays the supply kva measured by the VSD.

Input Power Factor
Displays the relationship between the Input Power and the Supply kVA.

Rated Motor Voltage
Displays the motor voltage rating, based on configuration.

Maximum Motor Current
Displays the maximum motor current, based on configuration.

Motor % Full Load Amps
Displays the percentage of maximum motor current presently delivered, based on highest phase.

Voltage Total Harmonic Distortion - (L1, L2, L3)
Displays the Total Harmonic Distortion (THD) for each of the voltage lines as calculated by the VSD.

Input Current Total Demand Distortion - (L1, L2, L3)
Displays the Total Dynamic Distortion (TDD) for each of the supply current lines as calculated by the VSD.

PROGRAMMABLE

Local Input Current Limit
*Access Level Required: OPERATOR*
Allows the user to specify the maximum allowed input current (as a percentage of job FLA). When the input current reaches this value, the input current override takes effect. When the unit is operated via BAS (ISN) control mode the ISN current limits will override the pulldown demand limit and current limit set points. It is assumed that the BAS algorithms will reset current limits as required.

Pulldown Demand Limit
*Access Level Required: OPERATOR*
Allows the user to specify the current limit value (as a percentage of FLA) to which the chiller will be limited during the specified pulldown limit time. This value will override the input Current Limit value during this time period. This function is used to provide energy savings following chiller start-up. When the unit is
operated via BAS (ISN) control mode the ISN current limits will override the pulldown demand limit and current limit set points. It is assumed that the BAS algorithms will reset current limits as required.

**Pulldown Demand Time**  
*Access Level Required: OPERATOR*  
Allows the user to set a period of time for which the pulldown demand limit will be in effect after the chiller starts.

**kWH Reset**  
*Access Level Required: ADMIN*  
Allows the user to reset the cumulative Kilowatt Hours to zero (0). Service Technicians refer to *YORK YMC² Service Manual (Form 160.78-M2).*

**Input Job Full Load Amps**  
*Access Level Required: SERVICE*  
Allows entry of the job input full load amp limit within a range limited from 10% to 100% of the VSD nominal input current at nominal line voltage.

**NAVIGATION**

**Home**
Causes an instant return to the Home Screen.

**VSD Details**
Moves to the subscreen which provides more information about the Variable Speed Drive.

**Capacity Control**
Moves to the Capacity Control Screen.

**Motor Details**  
*Access Level Required: SERVICE*  
Moves to a subscreen that provides information and setpoints pertinent to the Motor Monitoring feature.
OVERVIEW
This screen displays more detailed parameters associated with the Variable Speed Drive. This screen also provides a means for a Service Technician to access setpoints or control the DC Bus manually for maintenance or service.

DISPLAY ONLY
VSD Command
The command from OptiView control to the VSD. Commands are as follows:
- 0 = Off
- 1 = Pre-Regulate
- 2 = Run
- 3 = Manual Precharge
- 4 = Manual Pre-Regulate
- 5 = Soft Shutdown

VSD Control State
Displays the control state of the VSD. States are as follows:
- 0 = Idle
- 1 = Precharge
- 2 = Pre-Regulate
- 3 = Waiting for Run
- 4 = Run
- 5 = Stop
- 6 = Unit trip
- 7 = Water Pump
- 8 = Test Mode
- 9 = Manual Precharge
- 10 = Man Pre-Regulate
- 11 = Soft Shutdown
- 12 = Precharge Re-init
- 13 = Check DCCT

VSD Inverter State
- 0 = Stop
- 1 = Dwell
- 2 = Run
- 3 = Run Voltage Control
- 4 = Test Mode
- 5 = Faulted
- 6 = Check DCCT
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

VSD Output Frequency
Displays the present output frequency to the motor.

Phase Rotation
Displays the phase rotation sequencing

Output Current Rating
Indicates VSD size reported from VSD.

Motor Run (LED)
Indicates the digital output from the controls is commanding the motor to RUN.

DC Bus Regulating (LED)
Indicates the VSD is regulating the DC bus.

Precharge Complete (LED)
Indicates the VSD DC bus has been pre-charged.

Input Current Limit (LED)
Indicates the chiller input current is at the Job FLA limit.

Cooling System (LED)
Indicates the relay controlling the VSD water pump output is energized.

Precharge Active (LED)
Indicates the VSD is pre-charging the DC bus.

DC Bus Voltage
Displays the DC Bus voltage.

Total Supply kVA
Displays the total kilovolt-Amps measured by the VSD.

Input Voltage Peak (L1, L2, L3)
Displays the three-phase input peak voltages measured by the VSD (Neutral to Line).

Input Voltage RMS (L1, L2, L3)
Displays the three-phase input RMS voltages across each line.

Input Current RMS (L1, L2, L3)
Displays the three-phase input current values measured by the VSD.

Output Voltage RMS (Phase A, B, C)
Displays the three-phase output RMS voltages across each line.

Output Current RMS (Phase A, B, C)
Displays the three-phase output current values measured by the VSD.

Rectifier Baseplate Temperature (L1, L2, L3)
Displays the VSD input rectifier baseplate temperatures at each phase.

Inverter Baseplate Temperature (Phase A, B, C)
Displays the VSD output inverter baseplate temperatures at each phase.

Internal Ambient Temperature
Displays the ambient temperature inside the VSD cabinet from two sensors as reported by the VSD.

PROGRAMMABLE

Manual DC Bus
Access Level Required: SERVICE
Provides a means to set manual Precharge or Preregulate of the VSD DC Bus while the chiller is stopped with no VSD faults present. The selection Disabled returns to automatic.

Manual Cooling
Access Level Required: SERVICE
Enabled provides a means to operate the VSD coolant pump and fans while the chiller is stopped. The selection Disabled returns to automatic.

Test Mode
Enables the Service Technician to check for proper gating of the IGBTs in the inverter. The inverter's PWM modulator shall repetitively gate the inverter's IGBTs in the following manner while the test mode is enabled: three upper IGBTs on for one second, all IGBTs off for one second, three lower IGBTs on for one second, all IGBTs off for one second. Service technicians reference VSD Service Manual (Form 160.78-M3) for operation of this feature.

The following conditions must all be met for test mode to initiate:

- The VSD must be OFF (not in pre-charge or run);
- DC link voltage must be less than 50 V.
- No VSD faults exist
- The Test mode lockout timer is not timing. The Test mode lockout timer shall time four minutes, after being initiated by either of the following two conditions:
  1. The system has transitioned from Run to Stop mode; or
  2. The VSD logic board has just powered up.
NAVIGATION

Home
Causes an instant return to the Home screen.

VSD
Causes an instant return to the Home screen.

Setpoints
Access Level Required: ADMIN
Moves to the subscreen which provides for entry and edit of VSD input and control setpoints.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

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OVERVIEW
This screen displays information pertinent to the Motor Temperature Monitoring feature. The feature consists of motor winding temperature and motor housing temperature. Also, individual winding temperature sensors can be disabled on this screen.

DISPLAY ONLY
Motor Run (LED)
Illuminates when the Optiview control center is commanding the motor to run.
%Input Full Load Amps
Displays the input current as a percentage of chiller full load amps.

Output Frequency
Displays the frequency at which the VSD is operating the motor. This value is returned from the VSD Logic Board.

PRV Position - Gas Path Revision “A” Only
Displays the present pre-rotation vanes position as a value between 0% (closed) and 100% (full open).

VGD Position - Gas Path Revision “B” Only
Displays the present variable geometry diffuser position as a value between 0% (closed) and 100% (full open).

Motor Temperatures
Displays the enabled motor winding temperatures for phase A, B and C. Individual temperatures can be disabled using the TEMPERATURE DISABLE Setpoint. The software prevents more than 4 of the 6 motor temperature sensors to be disabled. When an individual temperature is disabled, the temperature data box does not appear. Any input that registers as 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. A maximum of 6 temperatures is used to calculate the average.

Motor Housing Temperature
Display the temperature of the motor housing sensed at the thermistor on the motor externally.

VSD
Returns to the VSD Screen.

Features Applicable to Gas Path Revisions "B" Only
Compressor Gas Path Revision B uses the motor housing temperature as the process variable to control the motor cooling electronic expansion valve. The valve is opened to lower temperature and throttled closed to raise it. The target temperature is entering condenser temperature plus the programmable setpoint offset.

DISPLAY
Motor Housing Temperature Setpoint
Displays the target temperature for the motor cooling control. It is equal to entering condenser water temperature plus the programmable setpoint offset.

Motor Cooling Valve Command
Output to the motor cooling valve in percent from 0% (closed) to 100% Opened

Motor Cooling Control State
Displays whether the motor cooling valve is in Auto or Manual control.

PROGRAMMABLE
Setpoint Offset
Access Level Required: SERVICE
Determines the target motor housing temperature above condenser entering temperature. (-10 to 50°F, default 10)

Minimum Housing Temperature
Access Level Required: SERVICE
Sets the minimum allowable motor housing temperature. (55.0 to 100.0°F, default 55)

Maximum Winding Temperature
Access Level Required: ADMIN
Sets the maximum winding temperature which enlists an over-ride of the motor cooling valve control to open further to not exceed this value. Set at 200°F.

Kp, Ti, TD
Access Level Required: ADMIN
Control gains for the motor cooling valve.

NAVIGATION
Home
Causes an instant return to the Home Screen.
**Manual Increment**  
*Access Level Required: SERVICE*  
Sets the increment by which the motor cooling valve command will be adjusted when in manual control.

**Open/Close**  
*Access Level Required: SERVICE*  
Changes the motor cooling valve command by one unit of the manual increment setting. Changes control to Manual.

**Set**  
*Access Level Required – SERVICE*  
Allows for input of a specific command percentage to the motor cooling valve. Changes control to Manual.

**Auto**  
*Access Level Required – SERVICE*  
Shown only when motor cooling is in Manual. Changes back to Automatic control.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

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

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 Offset – Shutdown from the Leaving Chilled Liquid Temperature – Setpoint. If this value is below the absolute minimum allowed shutdown temperature the minimum value is displayed.

Leaving Chilled Liquid Temperature Cycling – Restart
Displays the Leaving Chilled Liquid Temperature at which the chiller will restart after it has shut down due to over-cooling temperature. This value is calculated by adding the Leaving Chilled Liquid Temperature Cycling Offset – Restart to the Leaving Chilled Liquid Temperature – Setpoint.

Input Current Limit Setpoint
Displays the active Input Current Limit setpoint. This is the minimum of the locally or remote (received via 0-10VDC, 2-10VDC, 0-20mA or 4-20mA input or PWM) programmed Current Limit setpoint or pulldown limit. In BAS (ISN) remote mode, the remote setpoint is received from the E-Link Gateway interface.
PROGRAMMABLE

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, 0-10VDC or 2-10VDC) 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 as either 10°F, 20°F, 30°F or 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 - 55.0°F.

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, 0-10VDC or 2-10VDC) 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 up to 10.0°F, 20.0°F, 30.0°F, or 40°F above the Base setpoint (see the Remote Leaving Chilled Liquid Temperature Setpoint Range description above). Additionally, E-Link Gateway (in 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 Base setpoint value, but rather is the setpoint value itself.

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 64°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 allowed 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) for the next ten (10) minutes. If Smart Freeze is enabled, the threshold is 34.0°F for the next 10 minutes. After ten (10) minutes have elapsed, the shutdown threshold becomes the programmed setpoint value.

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 70°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.

Remote Analog Input Range
Access Level Required: OPERATOR
This setpoint defines, for the control center, 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 0-10VDC or 0-20mA, this setpoint must be programmed for 0-10VDC. If the remote signal is 2-10VDC or 4-20mA, this setpoint must be programmed for 2-10VDC.

Local Input Current Limit
Access Level Required: OPERATOR
Allows the user to specify the maximum allowed chiller input current (as a percentage of FLA). When the chiller input current reaches this value, the input current override takes effect. When the unit is operated via BAS (ISN) control mode the ISN current limits will override the pulldown demand limit and current limit set points. It is assumed that the BAS algorithms will reset current limits as required.
**Pulldown Demand Limit**
*Access Level Required: OPERATOR*
Allows the user to specify the current limit value (as a percentage of Full Load Amps) to which the chiller will be limited during the specified pulldown limit time. This value will override the Input Current Limit value during this time period. This function is used to provide energy savings following chiller start-up.

**Pulldown Demand Time**
*Access Level Required: OPERATOR*
Allows the user to set a period of time for which the pulldown demand limit will be in effect after the chiller starts.

**Print**
Generates Setpoints print report.

**NAVIGATION**

**Home**
Causes an instant return to the Home Screen.

**Setup**
Moves to the subscreen allowing setup of general system parameters.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW

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 YORK YMC Service Manual (Form 160.78-M2), establishes this configuration per the desired operation. This screen also serves as a gateway to more subscreens for defining general system parameters.

DISPLAY ONLY

Liquid Type
Displays Water or Brine

Refrigerant Selection
Shows R134a selected at factory level.

PROGRAMMABLE

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.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

Clock (Enabled / Disabled)
Access Level Required: OPERATOR
Allows the user to enable or disable the real-time clock in order to conserve battery life. The clock will be disabled during manufacturing and must be enabled at system commissioning. In addition, when preparing for prolonged shutdown the clock should once again be disabled.

12/24 Hr
Access Level Required: OPERATOR
Allows the user to specify the format in which the time will be presented. This setpoint affects the display of the time on the chiller panel and on all reports generated. The 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 "ENTER" key. A dialog box appears with the range of settings.

Chilled Liquid Pump Operation
Access Level Required: SERVICE
Allows a Service Technician to select chilled liquid pump control contacts (I/O Board TB2-44/45) operation as either Standard or Enhanced. Service Technicians refer to YORK YMC\textsuperscript{2} Service Manual (Form 160.78-M2).

Line Voltage
Access level Required: SERVICE
Allows a Service Technician to program the applicable supply line voltage

Line Frequency
Access level Required: SERVICE
Allows as service technician to program the line frequency to 50 or 60hZ.

Power Failure Restart
Access Level Required: OPERATOR
Allows the user to select Manual or Automatic restart after power failure.

Head Pressure Control
Access Level Required: SERVICE
Allows the Service Technician to enable or disable the Head Pressure Control feature. Service Technicians refer to YORK YMC\textsuperscript{2} Service Manual (Form 160.78-M2).

Hot Gas Control (Enabled/Disabled)
Access level required: SERVICE
Enables and disables the optional Hot gas Bypass Control feature.

Flow Switch
Access Level Required: SERVICE
Used to enter the applicable Flow Switch type. YMC\textsuperscript{2} chillers could be equipped with either Paddle-type or Thermal-Type Flow sensors. The actual type installed must be entered to allow the program to read the correct input. Service Technicians refer to YORK YMC\textsuperscript{2} Service Manual (Form 160.78-M2).

NAVIGATION

Home
Causes an instant return to the Home Screen.

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

User
Moves to the subscreen allowing configuration of user preferences.

Comms
Moves to the subscreen allowing configuration of system communications.

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

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

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

Diagnostics
Access Level Required: SERVICE
Moves to the subscreen allowing limited diagnostic capability while operating. Service Technicians refer to YORK YMC\textsuperscript{2} Service Manual (Form 160.78-M2).
### OVERVIEW

The schedule screen contains more programmable values than a normal display screen. As such, each programmable value is not linked to a specific button. Instead 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

This screen displays the chiller schedule. There are no other display options.

### PROGRAMMABLE

**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 week, 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 monitoring function which enforces the scheduled starting and stopping of the chiller.

Repeat Sunday Schedule  
Access Level Required: OPERATOR
Duplicates the schedule defined for Sunday for the remainder of the standard weekdays.

Reset All Exception Days  
Access Level Required: OPERATOR
Deletes all programming for exception days within the next 6 weeks.

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.

Print
Generates a Schedule print report.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Setup
Return to the previous Setup Screen.
OVERVIEW

This screen allows definition of custom User ID’s and matching passwords. This allows the building administrator to assign custom passwords to those who are authorized to maintain the chiller.

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 "V" (ENTER) key is pressed and the value may be entered.

DISPLAY ONLY

This screen displays attributes assigned to User IDs. There are no other display options.

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 ▲ 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. The selections are: English, French, German, Hungarian, Italian, Japanese, Portuguese, Simplified Chinese, Spanish, and Traditional Chinese.

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 YORK YMC® Service Manual (Form 160.78-M2).
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 *YORK YMC² Service Manual (Form 160.78-M2)*.

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 *YORK YMC² Service Manual (Form 160.78-M2)*.

NAVIGATION

**Home**
Causes an instant return to the Home Screen.

**Setup**
Return to the Setup Screen.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW
This screen allows definition of the necessary communications parameters. Refer to SECTION 4 - PRINTERS on Page 145 of this manual for details on the Printer connections and setup. Presently, there are no COM 2 communications features available.

DISPLAY ONLY
This screen displays attributes assigned to COMMS IDs. There are no other display options.

PROGRAMMABLE
Chiller ID
Access Level Required: OPERATOR
Define the numeric chiller ID when used within a BAS network of chillers. This ID number is also printed at the top of reports obtained with a local printer.

Printer Setup
Access Level Required: OPERATOR
Pressing either 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 "✓" 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)
Define 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.
COM 2 Setup
COM2 button is shown only in TESTOP or ADMIN access levels. COM2 serial port is used for VSD communications.

COM 2 Baud Rate
Define the baud rate at which the panel shall communicate through the modem port.

COM 2 Data Bit(s)
Define the number of data bits with which the panel shall communicate to the modem port.

COM 2 Parity Bit(s)
Define the number of parity bits with which the panel shall communicate through the modem port.

COM 2 Stop Bit(s)
Define the number of stop bits with which the panel shall communicate through the modem port.

GPIC Report
Access Level Required: ADMIN
Allows view of GPIC objects.

NAVIGATION
Home
Causes an instant return to the Home Screen.

Setup
Return to the Setup Screen.
OVERVIEW
This screen allows definition of the necessary communications parameters for the printer. Refer to SECTION 4 - PRINTERS on Page 145 of this manual for details on 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
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.

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.

Printer Type
Access Level Required: SERVICE
Define the printer type connected to the chiller system.

Print Report
Access Level Required: OPERATOR
Select the report type to print when the Print Report key is selected. This can vary from Status report (present system parameters), Setpoints report (present value of the system setpoints), Schedule report (present value of the system schedule times), or a Sales Order Data report (information provided on the Sales Order screen). A print report is generated upon completion of selection.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

Print All Histories
Access Level Required: OPERATOR
Generate a report of the system data at the time of all stored shutdowns.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Setup
Return to the Setup Screen.
OVERVIEW
This screen allows definition of the sales order parameters. The Commissioning date is entered by the YORK/Johnson Controls Service Technician at the time of chiller commissioning. These values should never be changed or entered by anyone other than a qualified Service Technician. Entry instructions are included in the YORK YMC Service Manual (Form 160.78-M2). The remainder of the values are entered at the YORK Factory during the manufacturing of the chiller.

DISPLAY ONLY

Model Number
Factory defined model number of the chiller system.

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

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

Compressor Model
Factory defined model number of the Compressor. Critical entry for proper Chiller Operation. Technicians see YORK YMC Service Manual (Form 160.78-M2).

Evaporator Model
Factory defined model number of the Evaporator.

Condenser Model
Factory defined model number of the Condenser.

VSD Model
Factory defined model number of the VSD.

Condenser and Evaporator Design Load Information
Factory defined description of the condenser and evaporator parameters according to the original rating.

Nameplate Information
Factory defined information about the chiller configuration.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

PROGRAMMABLE

Commissioning Date
Access Level Required: SERVICE
Define the date at which the chiller was commissioned.

Job Name and Location
Access Level Required: SERVICE
Factory defined job name and location the chiller is destined for.

Print
This generates a listing of the Sales Order data.

NAVIGATION

Home
Causes an instant return to the Home Screen.

Setup
Return to the Setup Screen.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW
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. Value is reset to zero when the chiller enters Coastdown. It remains at zero while shutdown and during “MBC Startup”.

PROGRAMMABLE
Control Source
Access Level Required: OPERATOR
Define whether the control of the chiller will be Local, Digital Remote, Analog Remote, Modem Remote or BAS (ISN) Remote.

Number of Starts
Access Level Required: ADMIN
Displays the number of the starts the chiller has initiated. This may be reprogrammed to a desired value, (generally when this value has been reset due to a Microboard replacement), but should not be done so arbitrarily.

Operating Hours
Access Level Required: ADMIN
Displays the total accumulated run time of the chiller. This may be reprogrammed to a desired value (generally when this value has been reset due to a Microboard replacement), but should not be done arbitrarily.

Edit Phone Numbers
Access Level Required: SERVICE
Displays up to two service phone numbers. The Regional service phone number is displayed as the first number. Although the label and number can be
changed appropriately, the default for this entry is “Johnson Controls North American Toll Free Number 1-800-861-1001”. 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. Service Technicians refer to *YORK YMC*² Service Manual (Form 160.78-M2).

**NAVIGATION**

**Home**
Causes an instant return to the Home Screen.

**Setup**
Return to the Setup Screen.
OVERVIEW

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 History Details subscreen.

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 (Panel rocker switch)
- Remote (Digital, Analog or BAS (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 Ten 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

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

Print All Histories

This generates a report listing the status of the chiller parameters at the time of each of the stored shutdowns.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

NAVIGATION

Home
Causes an instant return to the Home Screen.

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

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

Custom 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

FIGURE 41 - HISTORY DETAILS SCREEN

OVERVIEW
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 / Page Down
Scroll up in the displayed data (if applicable).

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

NAVIGATION

Home
Causes an instant return to the Home Screen.

History
Causes a return to the History Screen.
OVERVIEW

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. Service technicians refer to YORK YMC Service Manual (Form 160.78-M2).

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.

![Security Log Screen Diagram]

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

DISPLAY ONLY

Category
Displays the category of the setpoint (motor, evaporator, condenser, etc.).

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.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

Page Up
Scroll up in the displayed data (if applicable).

Page Down
Scroll down in the displayed data (if applicable).

NAVIGATION

Home
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.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW

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.

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC® Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

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
Causes an instant return to the Home Screen.

History
Access Level Required: SERVICE
Causes an instant return to the History Screen.
OVERVIEW
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
This screen display attributes assigned to Custom screen. There are no other display options.

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

NAVIGATION
Home
Causes an instant return to the Home Screen.

History
Causes an instant return to the History Screen.

Setup
Access Level Required: OPERATOR
Causes a jump to the subscreen that allows selection of the parameters to be displayed.
OVERVIEW

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

The following fields require login access level of SERVICE. Service technicians refer to YORK YMC2 Service Manual (Form 160.78-M2) for operation instructions and explanations of all programmable setpoints, zone parameters and displayed values.

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 parameter(s) 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 (✓) key. A dialog box is displayed permitting data entry. Using the numeric 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.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

NAVI\n
GATION

Home
Causes a return to the Home Screen.

Custom View
Access Level Required: SERVICE
Causes a return to the Custom View Screen.
### OVERVIEW

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**
- **TRIGGERED**

(Not applicable to Flash Memory Card version C.MLM.01.04.xxx and earlier).

When plotting reaches the end of the X-axis, and 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 similar to...
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

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

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. Refer to SECTION 4 - PRINTERS on Page 145 of this manual for printout examples.

Data Select

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

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

X-Axis

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

Causes a return to the Home Screen.

History

Causes a return to the History Screen.

Trend Setup

Access Level Required: OPERATOR

Only displayed if the trending is stopped. Causes a jump to a subscreen for configuring the trending display.
OVERVIEW
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
This screen displays chiller trend setup fields. There are no display only field.

PROGRAMMABLE
Chart Type
Access Level Required: OPERATOR
Selects CONTINUOUS, ONE SCREEN or TRIGGERED.

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:
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

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 "▼" ENTER 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 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 (If compressor application is other than “P”, applies only to Flash memory card version C.MLM.01.02 or later). 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.

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 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.

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.
OVERVIEW

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 manual).

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

This screen displays trending start/stop fields. There are no display only fields on this screen.
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 manual. 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):
- 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 manual. 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.
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

OVERVIEW
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.

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.
# MASTER SLOT NUMBERS LIST FOR USE WITH TREND FEATURE

<table>
<thead>
<tr>
<th>SLOT #</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>SYSTEM</strong></td>
</tr>
<tr>
<td>256</td>
<td>Chiller Operating State</td>
</tr>
<tr>
<td>257</td>
<td>Cooldown Time Remaining</td>
</tr>
<tr>
<td>259</td>
<td>Safety Relay</td>
</tr>
<tr>
<td>260</td>
<td>Cycling Relay</td>
</tr>
<tr>
<td>261</td>
<td>Warning Relay</td>
</tr>
<tr>
<td>262</td>
<td>Operating Hours</td>
</tr>
<tr>
<td>263</td>
<td>Run Time (in seconds)</td>
</tr>
<tr>
<td>264</td>
<td>Number Of Starts</td>
</tr>
<tr>
<td>427</td>
<td>Run Permissive</td>
</tr>
<tr>
<td>267</td>
<td>Remote Ready To Start</td>
</tr>
<tr>
<td></td>
<td><strong>EXTERNAL CONTACT</strong></td>
</tr>
<tr>
<td>280</td>
<td>Is Remote Stop Closed</td>
</tr>
<tr>
<td>281</td>
<td>Is Remote Start Closed</td>
</tr>
<tr>
<td>282</td>
<td>Is MultiUnit Cycling Closed</td>
</tr>
<tr>
<td>283</td>
<td>Is Remote Cycling Closed</td>
</tr>
<tr>
<td>284</td>
<td>Is Auxiliary Safety Open</td>
</tr>
<tr>
<td></td>
<td><strong>JUMPER</strong></td>
</tr>
<tr>
<td>287</td>
<td>Is Diagnostics Enabled</td>
</tr>
<tr>
<td>288</td>
<td>Liquid Type</td>
</tr>
<tr>
<td>289</td>
<td>Chilled Liquid Pump Operation</td>
</tr>
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<td>291</td>
<td>Power Failure Restart</td>
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<tr>
<td></td>
<td><strong>OPTIONS</strong></td>
</tr>
<tr>
<td>304</td>
<td>Control Mode</td>
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<td>305</td>
<td>System Language</td>
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<td>Chiller ID Number</td>
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<td>Display Mode</td>
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<td>336</td>
<td>Log in Level</td>
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<td>337</td>
<td>Log in User ID</td>
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<td></td>
<td><strong>SCHEDULE</strong></td>
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<td>512</td>
<td>Is Schedule Enabled</td>
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<td><strong>EVAPORATOR</strong></td>
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<tr>
<td>1792</td>
<td>Leaving Chilled Liquid Temperature</td>
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<tr>
<td>1793</td>
<td>Temperature Differential</td>
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<td>Chilled Liquid Flow Switch</td>
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<td>Chilled Liquid Pump</td>
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<tr>
<td>1806</td>
<td>Shutdown Temperature</td>
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<tr>
<td>1807</td>
<td>Return Chilled Liquid Temperature</td>
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<tr>
<td>1808</td>
<td>Evaporator Pressure</td>
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<tr>
<td>1809</td>
<td>Evaporator Saturation Temperature</td>
</tr>
<tr>
<td>1810</td>
<td>Evaporator Small Temp Difference</td>
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<tr>
<td>1812</td>
<td>Evaporator Refrigerant Temperature</td>
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<td><strong>CONDENSER</strong></td>
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<td>Leaving Condenser Liquid Temperature</td>
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<td>2049</td>
<td>Condenser Liquid Flow Switch</td>
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<td>Condenser Pressure</td>
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<td>Condenser Saturation Temperature</td>
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<td>Condenser Small Temperature Difference</td>
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<td>2057</td>
<td>High Pressure Switch</td>
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<td>High Pressure Warning Threshold</td>
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<td><strong>SUBCOOLING</strong></td>
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<td>2059</td>
<td>Sub Cooling Temperature</td>
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<td></td>
<td><strong>DROP LEG REFRIGERANT</strong></td>
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<td>2061</td>
<td>Drop Leg Refrigerant Temperature</td>
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<td><strong>COMPRESSOR</strong></td>
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<td>1296</td>
<td>Discharge Temperature</td>
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<td>1299</td>
<td>Discharge Superheat</td>
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<tr>
<td></td>
<td><strong>PRE-ROTATION VANES</strong></td>
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<tr>
<td>1280</td>
<td>Vane Motor Switch</td>
</tr>
<tr>
<td>1281</td>
<td>Pre-Rotation Vanes Position</td>
</tr>
<tr>
<td>1282</td>
<td>Pre-Rotation Vanes Opening</td>
</tr>
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<td>1283</td>
<td>Pre-Rotation Vanes Closing</td>
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<td>1284</td>
<td>Are Vanes Holding</td>
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<td>1285</td>
<td>Control Mode</td>
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<tr>
<td>18011</td>
<td>PRV Auto/Manual Mode</td>
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<td>18027</td>
<td>PRV Ramp</td>
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<td>18026</td>
<td>PRV Command Position</td>
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<td><strong>SURGE</strong></td>
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<td>8280</td>
<td>Stall Detector Board Output Voltage</td>
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<td>8236</td>
<td>ACC Surge Detected</td>
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<td>8317</td>
<td>Stall DC Pressure Voltage</td>
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<td>8319</td>
<td>Surge Avoidance Surge Detected</td>
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<td>8238</td>
<td>Surge Avoidance Surge Count</td>
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<td><strong>REFRIGERANT LEVEL CONTROL</strong></td>
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<tr>
<td>8205</td>
<td>Refrigerant Level Position</td>
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<td>8206</td>
<td>Refrigerant Level Setpoint</td>
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<td>8207</td>
<td>Active Refrigerant Level Setpoint</td>
</tr>
<tr>
<td>8209</td>
<td>Control Mode</td>
</tr>
<tr>
<td>8210</td>
<td>Is Pulldown in Effect</td>
</tr>
<tr>
<td>8211</td>
<td>Startup Delay Remaining</td>
</tr>
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<td>8212</td>
<td>Startup Delay In Effect</td>
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### Optiview Control Center Introduction

#### Slot # Description

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<tr>
<th>Slot #</th>
<th>Description</th>
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<td>Start-up Position</td>
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<tr>
<td>8214</td>
<td>Level Control State</td>
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<td>8208</td>
<td>Level Control Valve Command</td>
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**Leaving Chilled Liquid**

<table>
<thead>
<tr>
<th>Slot #</th>
<th>Description</th>
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<tbody>
<tr>
<td>1792</td>
<td>Temperature</td>
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<tr>
<td>1793</td>
<td>Temperature Differential</td>
</tr>
<tr>
<td>1794</td>
<td>Is Flow Switch Closed</td>
</tr>
<tr>
<td>1795</td>
<td>Is Pump On</td>
</tr>
<tr>
<td>1796</td>
<td>Local Temperature Setpoint</td>
</tr>
<tr>
<td>1797</td>
<td>Remote Temperature Setpoint</td>
</tr>
<tr>
<td>1798</td>
<td>Remote BAS (ISN) Temperature Setpoint</td>
</tr>
<tr>
<td>1799</td>
<td>Remote Modem Temperature Setpoint</td>
</tr>
<tr>
<td>1800</td>
<td>Selected Temperature Setpoint</td>
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<tr>
<td>1802</td>
<td>Remote Temperature Range</td>
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<tr>
<td>1803</td>
<td>Restart Temperature Offset</td>
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<tr>
<td>1804</td>
<td>Restart Temperature Offset</td>
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<tr>
<td>1805</td>
<td>Shutdown Temperature Offset</td>
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<td>1806</td>
<td>Shutdown Temperature Setpoint</td>
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<tr>
<td>1818</td>
<td>Remote Digital Temperature Setpoint</td>
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**Return Chilled Liquid**

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<tr>
<td>1807</td>
<td>Temperature</td>
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**Smart Freeze Protection**

<table>
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<tbody>
<tr>
<td>1815</td>
<td>Is Control Enabled</td>
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**Variable Geometry Diffuser**

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<tbody>
<tr>
<td>8280</td>
<td>Active Stall Voltage</td>
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<td>18305</td>
<td>Active Stall Voltage Type</td>
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<td>18135</td>
<td>Mach Number</td>
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<tr>
<td>18137</td>
<td>Active High Limit</td>
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<td>18138</td>
<td>Active Low Limit</td>
</tr>
<tr>
<td>18983</td>
<td>VGD Position (FAA compressor)</td>
</tr>
<tr>
<td>18294</td>
<td>Maximum VGD Position (FAA compressor)</td>
</tr>
<tr>
<td>8281</td>
<td>VGD Opening</td>
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<td>8282</td>
<td>VGD Closing</td>
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<tr>
<td>8290</td>
<td>VGD Control State</td>
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<tr>
<td>17408</td>
<td>Discharge Pressure</td>
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**Motor**

<table>
<thead>
<tr>
<th>Slot #</th>
<th>Description</th>
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<tbody>
<tr>
<td>2305</td>
<td>Is Motor Starter On</td>
</tr>
<tr>
<td>2306</td>
<td>Input % FLA</td>
</tr>
<tr>
<td>2307</td>
<td>Is Motor Controller Switch Open</td>
</tr>
<tr>
<td>2308</td>
<td>Current Limit Local Setpoint</td>
</tr>
<tr>
<td>2309</td>
<td>Current Limit Analog Setpoint</td>
</tr>
<tr>
<td>2310</td>
<td>Current Limit Remote BAS (ISN) Setpoint</td>
</tr>
<tr>
<td>2311</td>
<td>Current Limit remote Modem Setpoint</td>
</tr>
<tr>
<td>2312</td>
<td>Current Limit Selected Setpoint</td>
</tr>
<tr>
<td>2313</td>
<td>Pulldown Demand Time Remaining</td>
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**Variable Speed Drive**

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>2305</td>
<td>Motor Run</td>
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<tr>
<td>3047</td>
<td>VSD Fault</td>
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<td>18085</td>
<td>Input % Full Load Amps</td>
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<tr>
<td>2823</td>
<td>VSD Output Voltage</td>
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<tr>
<td>2822</td>
<td>VSD Output Frequency</td>
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<td>20788</td>
<td>Max Chiller Frequency</td>
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<td>2818</td>
<td>Input Power</td>
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<tr>
<td>2819</td>
<td>Input kW Hours</td>
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<tr>
<td>2878</td>
<td>L1 Voltage Total Harmonic Distortion</td>
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<tr>
<td>2879</td>
<td>L2 Voltage Total Harmonic Distortion</td>
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<tr>
<td>2880</td>
<td>L3 Voltage Total Harmonic Distortion</td>
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<tr>
<td>3014</td>
<td>L1 Input Current Total Demand Distortion</td>
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<tr>
<td>3015</td>
<td>L2 Input Current Total Demand Distortion</td>
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<td>3016</td>
<td>L3 Input Current Total Demand Distortion</td>
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<td>Input kVA</td>
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<td>Input Power Factor</td>
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<td>2306</td>
<td>Motor % Full Load Amps</td>
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<td>20784</td>
<td>VSD Command</td>
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<td>3051</td>
<td>VSD Control State</td>
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<td>3050</td>
<td>VSD Inverter State</td>
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<td>3058</td>
<td>Precharge Active</td>
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<tr>
<td>3044</td>
<td>Precharge Complete</td>
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<td>3057</td>
<td>DC Bus Regulating</td>
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<tr>
<td>3027</td>
<td>DC Bus Voltage</td>
</tr>
<tr>
<td>2829</td>
<td>Cooling System</td>
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<tr>
<td>3053</td>
<td>L1 Input Voltage (Peak)</td>
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<td>3054</td>
<td>L2 Input Voltage (Peak)</td>
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<td>3055</td>
<td>L3 Input Voltage (Peak)</td>
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<td>2872</td>
<td>L1 Input Voltage (RMS)</td>
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<tr>
<td>2873</td>
<td>L2 Input Voltage (RMS)</td>
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<td>2874</td>
<td>L3 Input Voltage (RMS)</td>
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<td>3008</td>
<td>L1 Input Current (RMS)</td>
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<td>3009</td>
<td>L2 Input Current (RMS)</td>
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<td>L3 Input Current (RMS)</td>
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<td>3018</td>
<td>Phase A Output Voltage (RMS)</td>
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<td>3019</td>
<td>Phase B Output Voltage (RMS)</td>
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<td>Phase C Output Voltage (RMS)</td>
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<td>3021</td>
<td>Phase A Output Current (RMS)</td>
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<td>Phase B Output Current (RMS)</td>
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<td>Phase C Output Current (RMS)</td>
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</tbody>
</table>
### SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

#### SLOT # | DESCRIPTION
--- | ---
3031 | Phase A Rectifier Baseplate Temperature
3032 | Phase B Rectifier Baseplate Temperature
3033 | Phase C Rectifier Baseplate Temperature
3034 | Phase A Inverter Baseplate Temperature
3035 | Phase B Inverter Baseplate Temperature
3036 | Phase C Inverter Baseplate Temperature
3029 | Internal Ambient Temperature 1
3030 | Internal Ambient Temperature 2

| SLOT # | DESCRIPTION |
--- | --- |
18297 | Evaporator Pressure (Filtered) |
18300 | VGD Command (FAB compressor) |
18332 | Anti-Surge Transient Offset |
18342 | VGD Position (FAB compressor) |

#### MAGNETIC BEARING CONTROLLER

| SLOT # | DESCRIPTION |
--- | --- |
20992 | Suspension Input Contact |
20996 | Rotation Input Contact |
20997 | Delevitated Mode |
20998 | Suspension Mode |
20999 | Rotation Mode |
21000 | Remote Mode |
21001 | ESD Failure |
21002 | Position V13 |
21003 | Position W13 |
21004 | Position V24 |
21005 | Position W24 |
21006 | Position Z12 |
21007 | Unbalance VW13 |
21008 | Unbalance VW24 |
21009 | Vibration Z12 |
21010 | Current V1 |
21011 | Current V2 |
21012 | Current V3 |
21013 | Current V4 |
21014 | Current W1 |
21015 | Current W2 |
21016 | Current W3 |
21017 | Current W4 |
21018 | Current Z1A |
21019 | Current Z2A |
21020 | Machine Temperature Probe 1 |
21021 | Machine Temperature Probe 2 |
21022 | Electronic Temperature Probe 1 |
21023 | Electronic Temperature Probe 2 |
21024 | Rotor Elongation |
21025 | Motor Speed |
21027 | Landing Counter |
21028 | Operation Time |
21029 | Rotation Time |
21030 | Events Number |
21031 | ESD Snapshot |
21032 | Decel Snapshot |
21033 | AVR |
21034 | ABS |
21035 | Landing After Reset |

#### MOTOR MONITORING

| SLOT # | DESCRIPTION |
--- | --- |
3059 | Motor Temperature 1 |
3060 | Motor Temperature 2 |
3061 | Motor Temperature 3 |
3062 | Motor Temperature 4 |
3063 | Motor Temperature 5 |
3064 | Motor Temperature 6 |
19148 | Average Winding Temperature |
2362 | Motor Housing Temperature |
18361 | Motor Housing Temperature Setpoint (FAB compressor) |
18362 | Motor Cooling Valve Command (FAB compressor) |

#### CAPACITY CONTROL

| SLOT # | DESCRIPTION |
--- | --- |
1281 | PRV Position (FAA compressor) |
2822 | VSD Output Frequency |
18023 | HGBP Command |
18024 | Active Minimum PRV Position (FAA compressor) |
18026 | PRV Command (FAA compressor) |
18041 | Condenser Pressure Override Threshold |
18042 | Evaporator Pressure Override Threshold |
18058 | Head Pressure |
18093 | Active Anti-Surge Minimum Frequency |
18122 | VSD Frequency Command |
18143 | Input Current Override Threshold |
18251 | Motor Current Override Threshold |
18273 | Control State |
18274 | Active Load Limit |
18288 | Speed of Sound |
18289 | Isentropic Head |
18290 | Omega |
18291 | Surge Mach |
18292 | Surge Frequency |
18293 | Anti-Surge Minimum Frequency |
18295 | Leaving Chilled Liquid Temperature (Filtered) |
18296 | Condenser Pressure (Filtered) |
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<tr>
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<th>DESCRIPTION</th>
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<tbody>
<tr>
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<td>Operation Mode</td>
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<tr>
<td>21037</td>
<td>Alarm 1</td>
</tr>
<tr>
<td>21038</td>
<td>Alarm 2</td>
</tr>
<tr>
<td>21039</td>
<td>Alarm 3</td>
</tr>
<tr>
<td>21040</td>
<td>ESD Failure</td>
</tr>
<tr>
<td>21041</td>
<td>MBC Fault</td>
</tr>
<tr>
<td>21042</td>
<td>Stop Bypass Valve</td>
</tr>
<tr>
<td>21043</td>
<td>Rotation Allowed</td>
</tr>
<tr>
<td>21045</td>
<td>Control Mode</td>
</tr>
</tbody>
</table>
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. For convenience they are listed in alphabetical order.

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

Warning messages will scroll between all those standing. Shutdowns will show first occurrence. For messages specific to the Variable Speed Drive, refer to the applicable YMC Variable Speed Drive Service (Form 160.78-M3).

TABLE 2 - STATUS MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYCLING SHUTDOWN – AUTO RESTART</td>
<td>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.</td>
</tr>
<tr>
<td>MBC STARTUP</td>
<td>A chiller start has been initiated so the VSD is commanded to precharge to raise VSD DC bus voltage to power up the Magnetic Bearing Controller (MBC). Then MBC conditions are verified and transitioned to levitate the driveline rotor (MBC Levitation Mode). The progress of the MBC startup is described in the Details Line of the Status Bar.</td>
</tr>
<tr>
<td>SAFETY SHUTDOWN – MANUAL RESTART</td>
<td>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 key.</td>
</tr>
</tbody>
</table>
| SOFT SHUTDOWN                        | The chiller is performing a Soft Shutdown. Simultaneously, the Hot Gas Bypass Valve is commanded to 100% open (if Hot Gas Bypass is Enabled), the compressor Prerotation Vanes (PRV) are commanded to the programmed PRV Shutdown Position and the Level Control Valve is commanded to 100% open. The motor drive speed is slowed from its initial speed to the minimum required to prevent surge. Then the motor drive speed is ramped to 0 Hz. The chiller then transitions to coastdown. Soft Shutdown in initiated by the following:
  - Leaving Chilled Liquid – Low Temperature
  - Local Panel Stop Key
  - Remote Stop
  - Any MBC Fault occurs
  - Multi-Unit Cycling – Contacts Open
  - System Cycling – Contacts Open
  - Control Panel – Schedule
  If the local panel safety stop switch is pressed or any chiller shutdown faults other than those listed above occur, Soft Shutdown is immediately terminated and a System Coastdown will occur. |
| START INHIBIT                        | The chiller is prevented from being started due to the reason displayed on the Details Line of the Status Bar. |
| SYSTEM COASTDOWN                     | The chiller has shut down and removed the run signal from the motor variable speed drive (VSD). The system is waiting for confirmation that the driveline has stopped rotating. When the MBC and VSD report drive frequency of 0Hz for 5 seconds, coastdown is considered completed. Then, after 60 seconds delay the VSD Precharge command is released. DC power for the Magnetic Bearing Controller (MBC) will cease. |
| SYSTEM READY TO START                | The chiller is shut down but will initiate start upon receipt of a Local or Remote start signal. The Magnetic Bearing Controller (MBC) does not have the driveline rotor levitated. The Hot Gas Bypass Valve position (if present) is set to the programmed Hot Gas Startup Position. The Level Control Valve position is set to the programmed Condenser Level Control Valve Startup Position. The Prerotation Vanes (PRV) are driven to the programmed PRV Startup Position. |
| SYSTEM RUN                           | The chiller is running under the condition described in the Details Line of the Status Bar. |
| SYSTEM STOPPED                       | The chiller is running under the condition described in the Details Line of the Status Bar. |
TABLE 3 - RUN MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAVING CHILLED LIQUID CONTROL</td>
<td>The chiller is running, controlling the Leaving Chilled Liquid to the Leaving Chilled Liquid Temperature Setpoint. There are no system conditions inhibiting this operation.</td>
</tr>
<tr>
<td>WARNING – VSD DC BUS ACTIVE</td>
<td>This non-annunciating message alerts that the DC Bus is precharged or pre-regulated for a state outside of chiller run. It is set when the VSD indicates a precharge or pre-regulated state or DC Bus voltage &gt;50v in the stopped state. A countdown timer shows with this message to indicate the time remaining in a precharge or pre-regulate command while stopped.</td>
</tr>
<tr>
<td>VSD – HIGH INPUT CURRENT LIMIT</td>
<td>The Chiller Input current is greater than or equal to the Active Current Limit Setpoint. The Current Limit Setpoint is programmed over a range of 30 to 100% of the Chiller Full Load Amps (FLA). The Active limit is the minimum of the Local, pulldown (if active), and Remote Current Limit Setpoints in Remote mode or the remote value in BAS (ISN) mode. While this condition is in effect, chiller capacity control is in override to reduce current. Normal LCHLT capacity control operation is resumed and this message automatically clears when the input current decreases below this limit. The highest of the three phase input currents divided by the programmed Job Input FLA is compared to the limit for this override.</td>
</tr>
<tr>
<td>VSD – INPUT PULLDOWN LIMIT</td>
<td>The chiller input current will be limited by the pulldown demand limit setpoint. The message clears when the pulldown demand time expires.</td>
</tr>
</tbody>
</table>

TABLE 4 - MBC STARTUP MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING FOR CHILLED LIQUID FLOW</td>
<td>The chilled liquid flow switch input is not reading voltage indicating the presence of chilled liquid flow from the flow switch. Indication of chilled liquid flow is required during the MBC Startup state to allow transition to chiller run.</td>
</tr>
<tr>
<td>WAITING FOR MBC LEVITATION</td>
<td>The OptiView has issued a MBC Levitate command to the MBC and is waiting for confirmation from the MBC that De-levitated mode is OFF, Levitated mode is ON, and the input from the digital Rotation Allowed contacts on the MBC is high at OptiView I/O board terminal TB3-30. This message precedes “Waiting for Chilled Liquid Flow”.</td>
</tr>
<tr>
<td>WAITING FOR VSD PREREGULATION</td>
<td>The OptiView has issued a VSD Pre-Charge/Pre-Regulate command to the VSD and is waiting for confirmation from the VSD that it has achieved regulated DC bus voltage and is awaiting a run command. This message precedes “Waiting for MBC Levitation”.</td>
</tr>
</tbody>
</table>

TABLE 5 - START INHIBIT MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTI-RECYCLE XXMIN/SEC</td>
<td>The chiller is inhibited from starting because the anti-recycle time has not yet elapsed. Time remaining is displayed. A 15 second delay exists from Stop to Start.</td>
</tr>
<tr>
<td>LINE FREQUENCY NOT SET</td>
<td>This start inhibit is set when the Line Voltage setpoint is &quot;INVALID&quot;. Line Frequency is set invalid on a new or cleared BRAM until programmed.</td>
</tr>
<tr>
<td>LINE VOLTAGE NOT SET</td>
<td>This start inhibit is set when the Line Voltage setpoint is &quot;INVALID&quot;. Line Voltage is set invalid on a new or cleared BRAM until programmed.</td>
</tr>
<tr>
<td>PRV NOT CALIBRATED</td>
<td>The Pre-rotation vanes calibration procedure has not yet been performed.</td>
</tr>
<tr>
<td>VGD NOT CALIBRATED</td>
<td>The Variable Geometry Diffuser calibration procedure has NOT yet been performed.</td>
</tr>
</tbody>
</table>
### TABLE 6 - WARNING MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING – MBC – LANDING COUNTER HIGH</strong></td>
<td>The MBC landing counter has accumulated 30 events where the motor shaft displacement exceeded 120 µm (80% of the air gap space to the touchdown bearing) while shaft rotation is detected. This warning is released only when a service technician checks the shaft air gap measurement for acceptability and resets the MBC according to the driveline service manual YORK YMC² Service Manual (Form 160.78-M2).</td>
</tr>
<tr>
<td><strong>WARNING – MBC – ROTATION MODE OFF</strong></td>
<td>During the time the MBC Rotation Mode is commanded ON by the microboard via serial comms this warning is set if the MBC reports Rotation Mode is OFF by serial comms. This warning is inhibited if MBC communication is not initiated and during the first 15 seconds after the Rotation Mode is commanded ON. This warning is released when Rotation Mode status matches the microboard command to the MBC.</td>
</tr>
<tr>
<td><strong>WARNING – MOTOR – HIGH CURRENT LIMIT</strong></td>
<td>The chiller motor current is greater than or equal to the Motor Overload current limit. The Motor Overload current limit is predetermined from the motor model and Maximum VSD Output Current. While this condition is in effect, chiller capacity control is in override to reduce current. Normal LCHLT capacity control operation is resumed and this message automatically clears when the motor current decreases below this limit.</td>
</tr>
<tr>
<td><strong>WARNING – CONDENSER – HIGH PRESSURE LIMIT</strong></td>
<td>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 chiller capacity is in override to reduce pressure. This message automatically clears and normal LCHLT capacity control restored when the Condenser pressure decreases to below the Setpoint.</td>
</tr>
<tr>
<td><strong>WARNING – CONDENSER OR EVAPORATOR XDCR ERROR</strong></td>
<td>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 mode. Condition not checked in Brine mode.</td>
</tr>
<tr>
<td><strong>WARNING – CONDENSER OR VGD SENSOR FAILURE</strong></td>
<td>The difference between the Stall Pressure Transducer output (discharge pressure) and the Condenser Pressure Transducer output has exceeded 0.28 VDC for 3 continuous minutes while the chiller was running. This feature verifies the operation of the 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) is driven to the full open position and held there until this warning is manually cleared. When cleared, the VGD returns normal operation.</td>
</tr>
<tr>
<td><strong>WARNING – EVAPORATOR – LOW PRESSURE LIMIT</strong></td>
<td>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 chiller capacity control is in override to increase suction pressure. This message automatically clears and normal LCHLT capacity control restored when the Evaporator pressure increases to the reset value.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EVAPORATOR PRESSURE THRESHOLDS</th>
<th>Water</th>
<th>Brine</th>
<th>Water</th>
<th>Brine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warning Threshold (PSIG)</strong></td>
<td>27.0</td>
<td>+2.0&gt; Safety Setpoint</td>
<td>28.0</td>
<td>+3.0&gt; Safety Setpoint</td>
</tr>
</tbody>
</table>

### EVAPORATOR PRESSURE THRESHOLDS
<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING – EXCESS SURGE DETECTED</td>
<td>(Applies only if Surge Protection SHUTDOWN feature is Disabled) The Surge Window Count has exceeded the Count Limit. Message can be manually cleared after the Surge Window Count is less than or equal to the Count Limit, or the SHUTDOWN feature is Enabled or the chiller is stopped. To clear message press WARNING RESET key on HOME Screen when logged in at OPERATOR (or higher) access level.</td>
</tr>
<tr>
<td>WARNING – MOTOR – HIGH HOUSING TEMPERATURE</td>
<td>The Motor Housing Temperature is greater than or equal to 167°F (75°C). This warning is released when Motor Housing Temperature is less than 158°F (70°C).</td>
</tr>
<tr>
<td>WARNING - MOTOR – HIGH WINDING TEMPERATURE</td>
<td>This warning occurs when any of the enabled motor winding temperatures exceeds 275°F (135°C) for 3 continuous seconds. This warning will automatically clear when all winding temperatures decrease below the warning threshold. Also it will not act on any individual winding temperature sensor that has been disabled with the TEMPERATURE DISABLED Setpoint on the Motor Details Screen.</td>
</tr>
<tr>
<td>WARNING – REAL TIME CLOCK FAILURE</td>
<td>During the initialization process that occurs when power is applied to the control center, test data is written to a location in the BRAM battery backed memory device (IC location U52 on Microboard). This data is then read from the BRAM and compared to the test data. If the read data is not the same as that which was written to the device, it is assumed the BRAM and Real time Clock operation is defective and this message is displayed. The BRAM should be replaced by a qualified Service Technician. This message automatically clears when the BRAM problem has been solved.</td>
</tr>
<tr>
<td>WARNING – SETPOINT OVERRIDE</td>
<td>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 mode.</td>
</tr>
<tr>
<td>WARNING – VSD – INPUT VOLTAGE IMBALANCE</td>
<td>Line voltage imbalance shall be calculated, for every VSD communications cycle, as:</td>
</tr>
</tbody>
</table>
|                                                   | \[
|                                                   | \[ V_{imb\%} = \frac{\max (|V_{ab} - V_{avg}|, |V_{bc} - V_{avg}|, |V_{ca} - V_{avg}|)}{V_{avg}} \times 100\% \] \]                                         |
|                                                   | where \( V_{ab}, V_{bc}, \) and \( V_{ca} \) are line-to-line total rms voltages received from the drive, max is the function which selects the largest of its arguments, and:                                                                                           |
|                                                   | \[
|                                                   | \[ V_{avg} = \frac{|V_{ab}| + |V_{bc}| + |V_{ca}|}{3} \] \]                                                                                                                                         |
|                                                   | If \( V_{imb\%} \) exceeds 5% continuously for 45 seconds, the warning will be displayed. The 45 second timer shall reset and the warning shall clear if three consecutive imbalance readings fall below the 5% threshold. |
### TABLE 7 - ROUTINE SHUTDOWN MESSAGES

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL STOP</td>
<td>A local shutdown command has been received by pressing the Keypad Stop key.</td>
</tr>
<tr>
<td>REMOTE STOP</td>
<td>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 BAS (ISN) (Integrated Systems Network) Remote mode via the E-Link Gateway serial communications. If the chiller is running when this occurs, the chiller performs a soft shutdown.</td>
</tr>
</tbody>
</table>

### TABLE 8 - CYCLING SHUTDOWN MESSAGES

The chiller will automatically restart when the cycling condition clears. Service and troubleshooting information is contained in the *YORK YMC² Service Manual* (Form 160.78-M2) and *YMC² Variable Speed Drive Service* (Form 160.78-M3).

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHILLED LIQUID – FLOW SWITCH OPEN</td>
<td>The Chilled Liquid Flow Switch has remained open for 5 continuous seconds while the chiller was running, in soft shutdown, or at least 45 seconds after MBC startup is initiated. The chiller will automatically restart when the flow switch closes.</td>
</tr>
<tr>
<td>CONDENSER – FLOW SWITCH OPEN</td>
<td>The Condenser water flow switch has remained open for 5 continuous seconds while the chiller was running or in soft shutdown. This check is bypassed until “System Run” is achieved. The chiller will automatically restart when the flow switch closes.</td>
</tr>
<tr>
<td>CONTROL PANEL – LOSS OF CONTROL VOLTAGE</td>
<td>The control power input signal at I/O board TB3-81 was low for 1 second continuous. This signal is used to determine when the digital inputs are affected by a panel power loss versus an actual condition for their devices. This fault is not expected on an actual loss of microboard power, because the processor will be off before the fault delay.</td>
</tr>
<tr>
<td>CONTROL PANEL – POWER FAILURE</td>
<td>A Control Power failure has occurred. If the power failure occurred while the chiller was running, it will automatically restart when power is restored. 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 following instructions in <em>YORK YMC² Service Manual</em> (Form 160.78-M2).</td>
</tr>
<tr>
<td>CONTROL PANEL – SCHEDULE</td>
<td>The programmed Daily Schedule Setpoint has shutdown the chiller. If this occurs while the chiller is running, a Soft Shutdown is performed. The chiller will automatically restart at the next scheduled start time.</td>
</tr>
<tr>
<td>EVAPORATOR – LOW PRESSURE</td>
<td>The evaporator pressure, as sensed by the Evaporator Transducer, has decreased to the shutdown threshold. For water cooling applications, the shutdown threshold is a fixed value. For Brine cooling applications, the 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 following instructions in <em>YORK YMC² Service Manual</em> (Form 160.78-M2). The chiller will restart after the evaporator pressure increases to the restart threshold. If this shutdown occurs 3 times in a 90 minute period, an EVAPORATOR-LOW PRESSURE safety shutdown is initiated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SHUTDOWN (PSIG)</th>
<th>RESTART (PSIG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Cooling-R134a</td>
<td>25.0</td>
<td>25.1</td>
</tr>
<tr>
<td>Brine Cooling-R134a</td>
<td>6.0 to 25.0 as programmed</td>
<td>+0.1&gt; Shutdown threshold</td>
</tr>
</tbody>
</table>
### TABLE 8 - CYCLING SHUTDOWN MESSAGES (CONT’D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPANSION I/O – SERIAL COMMUNICATIONS</td>
<td>Valid communication between the microboard and the LTC I/O Board have been disrupted for 3 consecutive attempts. The chiller will automatically restart when valid communication is received.</td>
</tr>
<tr>
<td>LEAVING CHILLED LIQUID – LOW TEMPERATURE</td>
<td>The Leaving Chilled Liquid Temperature has decreased to the programmed Shutdown Temperature Setpoint. If the chiller is running when this occurs, a Soft Shutdown is performed. The chiller will automatically restart when the temperature increases to the programmed Restart Temperature Setpoint.</td>
</tr>
<tr>
<td>MBC – HIGH AMPLIFIER TEMPERATURE</td>
<td>This Cycling Shutdown is set when the MBC amplifier temperature exceeds 140°F (60 ºC). This condition is determined by the Optiview control software from temperature data transmitted through the serial comms. The shutdown is released when amplifier temperature drops 18°F (10 ºC) below the trip value.</td>
</tr>
<tr>
<td>MBC – HIGH DC/DC TEMPERATURE</td>
<td>This Cycling Shutdown is set when the MBC DC/DC Converter board temperature exceeds 167°F (75 ºC). This condition is determined by the Optiview control software from temperature data transmitted through the serial comms. The shutdown is released when DC/DC converter temperature drops 18°F (10 ºC) below the trip value.</td>
</tr>
<tr>
<td>MBC – SERIAL COMMUNICATIONS</td>
<td>This Cycling Shutdown is set when an invalid or no response is received from the MBC to a Modbus command from the panel for 8 successive requests. It shall be triggered by the Modbus communications task when its fault conditions are met (thresholds of consecutive timeouts, ID mismatches, checksum failures, or error packets). It is released when a valid response is received. This fault becomes active during the Stopped State or the MBC Startup State when the MBC initializes (VSD DC Bus Voltage has increased enough power the MBC). It stays active during Run and Soft Shutdown, and becomes inactive at coastdown or stop when the DC Bus Voltage is less than 100V.</td>
</tr>
<tr>
<td>MBC SHUTDOWN – REQUESTING FAULT DATA</td>
<td>The MBC has shutdown the chiller and the control center has not yet received the cause of the fault from the MBC via the serial communications link. The MBC shuts down the chiller by opening the MBC Emergency Shutdown (ESD) contacts (located on the MBC control board and connected between TB6-15 and TB6-53 in the control center). The microboard in the control center then sends a request for the cause of the fault to the MBC control board over the serial link. Since serial communications are initiated every 2 seconds, this message is typically displayed for a few seconds and then replaced with one of the other MBC fault messages in this section.</td>
</tr>
<tr>
<td>MBC – SPEED SIGNAL FAULT</td>
<td>This Cycling Shutdown is set when the MBC looses the speed signal that is expected from the VSD while the MBC is commanded in Rotation Mode. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the transmission is reestablished. A 10 second bypass exists when the initial command to Rotation Mode occurs.</td>
</tr>
<tr>
<td>MBC – STARTUP FAILURE</td>
<td>This Shutdown is set when the chiller fails to exit the MBC startup state within 60 seconds, during a chiller start. Refer to YORK YMC² Service Manual (Form 160.78-M2) for conditions necessary to complete MBC startup successfully. Check fault history details to determine which specific conditions were not met.</td>
</tr>
<tr>
<td>MBC – STOP (FAULT) CONTACTS OPEN</td>
<td>Refer to “MBC Shutdown – Requesting Fault Data” message above. If the control center’s microboard does not receive the cause of the MBC ESD fault over the serial link within 10 seconds after the ESD contacts open is recognized, it is assumed it is not forthcoming and that message is replaced with this message.</td>
</tr>
<tr>
<td>MBC – V13 LOW FREQUENCY DISPLACEMENT</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated V at the impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MESSAGE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>MBC – V13 POSITION</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated V at the impeller end radial magnetic bearing during Levitation or Rotation mode (approximately 1/2 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – V24 LOW FREQUENCY DISPLACEMENT</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated V at the opposite-impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – V24 POSITION</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated V at the opposite-impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – W13 LOW FREQUENCY DISPLACEMENT</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated W at the impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – W13 POSITION</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated W at the impeller end radial magnetic bearing during Levitation or Rotation mode (approximately 1/2 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – W24 LOW FREQUENCY DISPLACEMENT</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated W at the opposite-impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – W24 POSITION</td>
<td>The MBC has measured shaft displacement is greater than 75 µm from center in the orthogonal radial axis designated W at the opposite-impeller end radial magnetic bearing during Levitation or Rotation mode over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when displacement is less than 75 µm.</td>
</tr>
<tr>
<td>MBC – VW13 VIBRATION</td>
<td>The MBC has measured synchronous speed (first harmonic) shaft vibration at the impeller end radial magnetic bearing is greater than 60 µm from 0 to the peak amplitude in Rotation mode. This condition is monitored only when the AVR and ABS filter is on, which occurs for speed above 80 Hz. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when vibration is less than 60 µm.</td>
</tr>
</tbody>
</table>
### TABLE 8 - CYCLING SHUTDOWN MESSAGES (CONT’D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBC – VW24 VIBRATION</td>
<td>The MBC has measured synchronous speed (first harmonic) shaft vibration at the opposite-impeller end radial magnetic bearing is greater than 60 µm from 0 to the peak amplitude in Rotation mode. This condition is monitored only when the AVR and ABS filter is on, which occurs for speed above 80 Hz. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when vibration is less than 60 µm.</td>
</tr>
<tr>
<td>MBC – Z12 LOW FREQUENCY DISPLACEMENT</td>
<td>The MBC has measured shaft displacement is greater than 100 µm axially from the design running position over a 7 second window (approximately 1/3 of the air gap space to the touchdown bearing axially). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This warning is released when displacement is less than 100 µm.</td>
</tr>
<tr>
<td>MBC – Z12 POSITION</td>
<td>The MBC has measured shaft displacement is greater than 100 µm axially from the design running position (approximately 1/2 of the air gap space to the touchdown bearing axially). The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when displacement is less than 100 µm.</td>
</tr>
<tr>
<td>MULTIUNIT CYCLING – CONTACTS OPEN</td>
<td>The Multiunit Cycling contacts connected to I/O Board TB4-9, have opened to initiate a cycling shutdown. If the chiller is running when this occurs, the Pre-rotation Vanes are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the contacts close.</td>
</tr>
<tr>
<td>SYSTEM CYCLING – CONTACTS OPEN</td>
<td>The System Cycling contacts connected to I/O Board TB4-13, have opened to initiate a cycling shutdown. If the chiller is running when this occurs, the Pre-rotation Vanes are driven fully closed prior to shutting down the chiller. The chiller will automatically restart when the contacts close.</td>
</tr>
<tr>
<td>VSD – DC BUS PRE-REGULATION</td>
<td>The dc link voltage has not attained within +/-50 V of the dc link voltage setpoint defined by the motor and line voltages (750V for YMC(^2)) within 2 seconds after the boost rectifier’s closed loop control has been enabled. The VSD logic board shall disable boost rectifier’s IGBT gating signals during this fault. The VSD logic board shall time 10 seconds before clearing the fault and allowing another pre-charge to start. The VFD’s fan(s) and water pump(s) shall remain energized during this time. The VSD logic board shall allow up to three consecutive pre-charge-related or pre-regulation-related faults faults to occur. After the third consecutive pre-charge-related fault, Safety Shutdown message “VSD – DC BUS PRE-REGULATION LOCKOUT” is generated.</td>
</tr>
<tr>
<td>VSD – HIGH DC BUS VOLTAGE</td>
<td>The VSD’s DC link voltage is continuously monitored and if the level exceeds 878VDC, ±28VDC a Bus Over-Voltage shutdown is initiated. If this shutdown occurs, it will be necessary to look at the level of the 460VAC applied to the drive. The specified voltage range is 414 to 508VAC. If the incoming voltage is in excess of 508VAC, steps should be taken to reduce the voltage to within the specified limits.</td>
</tr>
<tr>
<td>VSD – HIGH INTERNAL AMBIENT TEMPERATURE</td>
<td>The VSD logic board contains two inputs from two temperature sensors, which monitor the unit’s internal ambient temperature. This shutdown is generated when the higher of the two ambient temperatures exceeds a high limit of 158°F (70°C). The unit’s fan(s) and water pump(s) remain energized until the internal temperature drops below 148°F (64°C), after which they shall be de-energized and the fault can be cleared. Some potential causes for this shutdown are internal VSD fan failure, VSD water pump failure, entering condenser water temperature higher than design, condenser water flow lower than required, fouled VSD heat exchanger, or restriction of condenser water to the VSD.</td>
</tr>
</tbody>
</table>
SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

TABLE 8 - CYCLING SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSD – HIGH PHASE A INPUT CURRENT</td>
<td>Phase A input current exceeded the value listed for a given model of drive. The three input currents are monitored with Hall-effect current sensors, and their instantaneous values compared to the limit. A current in excess of the limit causes this cycling shutdown. If three high input current cycling shutdown faults occur on any phase within 90 minutes, the third fault in the 90 minute period causes a Safety Shutdown. If the safety shutdown occurs, the chiller can be restarted after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td></td>
<td><strong>DRIVE AMP RATING</strong></td>
</tr>
<tr>
<td></td>
<td>490</td>
</tr>
<tr>
<td></td>
<td>0490A</td>
</tr>
<tr>
<td></td>
<td>744</td>
</tr>
<tr>
<td>VSD – HIGH PHASE B INPUT CURRENT</td>
<td>See “VSD – HIGH PHASE A INPUT CURRENT” message preceeding.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE C INPUT CURRENT</td>
<td>See “VSD – HIGH PHASE A INPUT CURRENT” message preceeding.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE A MOTOR CURRENT</td>
<td>Phase A motor current exceeded the value listed for a given model of drive. The three motor currents are monitored with Hall-effect current sensors, and their instantaneous values compared to the limit. A current in excess of the limit causes this cycling shutdown. If three high motor current cycling shutdown faults occur on any phase within 90 minutes, the third fault in the 90 minute period causes a Safety Shutdown. If the safety shutdown occurs, the chiller can be restarted after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td></td>
<td><strong>DRIVE MODEL</strong></td>
</tr>
<tr>
<td></td>
<td>490, 0490A</td>
</tr>
<tr>
<td></td>
<td>744</td>
</tr>
<tr>
<td>VSD – HIGH PHASE B MOTOR CURRENT</td>
<td>See “VSD – HIGH PHASE A MOTOR CURRENT” message preceeding.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE C MOTOR CURRENT</td>
<td>See “VSD – HIGH PHASE A MOTOR CURRENT” message preceeding.</td>
</tr>
<tr>
<td>VSD INITIALIZATION FAILED</td>
<td>Upon application of power, all boards go through the initialization process. At this time, memory locations are cleared, program jumper positions are checked and serial communications links are established. There are several causes for an unsuccessful initialization as follows:</td>
</tr>
<tr>
<td></td>
<td>• The control center and the VSD must be energized at the same time. The practice of pulling the fuse in the control center to remove power from the control center will create a problem. Power-up must be accomplished by closing the main disconnect on the VSD cabinet with all fuses in place. A power interruption to the VSD Logic board will also generate this message.</td>
</tr>
<tr>
<td></td>
<td>• The Eproms must be of the correct version for each VSD board and they must be installed correctly. The eproms are created as a set, and cannot be interchanged between earlier and later versions.</td>
</tr>
<tr>
<td></td>
<td>• Serial data communications must be established. Refer to VSD – Serial Communications fault. If communications between the VSD Boards, and control center Microboard does not take place during initialization, this message will be generated. The Serial communications can be verified by selecting the VSD DETAILS screen from the MOTOR screen and observing the Full Load amps value. A zero displayed for this and other VSD parameters, indicates a serial communications link problem.</td>
</tr>
<tr>
<td>VSD – LOGIC BOARD POWER SUPPLY</td>
<td>This shutdown is generated by the VSD logic board and it indicates that the low voltage power supplies for the logic boards have dropped below their allowable operating limits. The power supplies for the logic boards are derived from the secondary of the 120 to 24VAC transformer, which in turn, is derived from the 480 to 120VAC control power transformer. This message usually means the power to the VSD has been removed.</td>
</tr>
</tbody>
</table>

FORM 160.78-O2
ISSUE DATE: 5/22/2017

JOHNSON CONTROLS
### TABLE 8 - CYCLING SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VSD – LOGIC BOARD PROCESSOR</strong></td>
<td>This shutdown is generated if a communications problem occurs between the two microprocessors on the VSD Logic Board.</td>
</tr>
<tr>
<td><strong>VSD – LOW DC BUS VOLTAGE</strong></td>
<td>Following a successful dc-link pre-charge and pre-regulation, the dc-link under-voltage shutdown is generated when the dc link voltage falls below the trip level for 10 ms. The trip level is set to 720VDC (30VDC below the calculated DC link voltage setpoint of 750VDC for both 60 Hz and 50 Hz units).</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE A INPUT BASEPLATE TEMPERATURE</strong></td>
<td>The temperature of the IGBT module of the input rectifier’s phase A has decreased below the low limit of 37°F (2.7°C). All phase temperatures have to increase above the fault-reset threshold of 42°F (5.5°C), for this fault to be cleared.</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE B INPUT BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – LOW PHASE A INPUT BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE C INPUT BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – LOW PHASE A INPUT BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE A MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>The temperature of the IGBT module of the inverter’s phase A has decreased below the low limit of 37°F. All phase temperatures have to increase above the fault-reset threshold of 42°F, for this fault to be cleared.</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE B MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – LOW PHASE A MOTOR BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – LOW PHASE C MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – LOW PHASE A MOTOR BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – NOT RUNNING</strong></td>
<td>The VSD has not reported run state via serial communications for 8 seconds while the microboard issues a VSD run command. The fault is released when the microboard command is “Stopped State”.</td>
</tr>
<tr>
<td><strong>VSD – PHASE A INPUT DCCT OFFSET</strong></td>
<td>Upon the assertion of a precharge command, the output voltage of each of the DCCTs which sense the input current will be monitored. The first value of each of those output voltages will be compared against an offset threshold level of +/- 24.4 mv. If this threshold level is not exceeded, an average of eight readings on each DCCT output will be taken and used for DCCT offset compensation. If the offset threshold at initialization exceeded this threshold, this shutdown is generated.</td>
</tr>
<tr>
<td><strong>VSD – PHASE B INPUT DCCT OFFSET</strong></td>
<td>See “VSD – PHASE A INPUT DCCT OFFSET” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – PHASE C INPUT DCCT OFFSET</strong></td>
<td>See “VSD – PHASE A INPUT DCCT OFFSET” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – PHASE A INPUT GATE DRIVER</strong></td>
<td>The VSD boost rectifier’s IGBT gate driver boards monitor their power supply voltages, as well as the saturation voltage drop across each main IGBT while turned on. If a voltage on the Phase A boost rectifier IGBT gate driver board falls out of the prescribed limit, the gate driver board shall turn the rectifier’s IGBTs off and send this shutdown.</td>
</tr>
<tr>
<td><strong>VSD – PHASE B INPUT GATE DRIVER</strong></td>
<td>See “VSD – PHASE A INPUT GATE DRIVER” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – PHASE C INPUT GATE DRIVER</strong></td>
<td>See “VSD – PHASE A INPUT GATE DRIVER” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – PHASE A MOTOR GATE DRIVER</strong></td>
<td>The VSD inverter’s IGBT gate driver boards monitor their power supply voltages, as well as the saturation voltage drop across each IGBT while turned on. If a voltage on the Phase A gate driver board exceeds the prescribed limit, the gate driver board shall turn the inverter’s IGBTs off and send this shutdown.</td>
</tr>
<tr>
<td><strong>VSD – PHASE B MOTOR GATE DRIVER</strong></td>
<td>See “VSD – PHASE A MOTOR GATE DRIVER” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – PHASE C MOTOR GATE DRIVER</strong></td>
<td>See “VSD – PHASE A MOTOR GATE DRIVER” message preceding.</td>
</tr>
</tbody>
</table>
### TABLE 8 - CYCLING SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSD – PRECHARGE – LOW DC BUS VOLTAGE 1</td>
<td>During Pre-charge, the dc-link voltage must reach at least low threshold which is determined by Line Voltage Setpoint (see the table below) within 4 seconds after the pre-charge signal has been commanded. If this condition is not met, this shutdown is generated. The VSD logic board shall time 10 seconds before clearing the fault and allowing another pre-charge to start. The VFD’s fan(s) and water pump(s) shall remain energized during this time. The VSD logic board shall allow up to three consecutive pre-charge-related faults to occur. After the third consecutive pre-charge-related fault, Safety Shutdown message “VSD – PRECHARGE LOCKOUT” is generated.</td>
</tr>
<tr>
<td><strong>LINE VOLTAGE</strong></td>
<td><strong>LOW THRESHOLD (VOLTS)</strong></td>
</tr>
<tr>
<td>460</td>
<td>50</td>
</tr>
<tr>
<td>380/415</td>
<td>41</td>
</tr>
<tr>
<td>230</td>
<td>25</td>
</tr>
<tr>
<td>VSD – PRECHARGE – LOW DC BUS VOLTAGE 2</td>
<td>During Pre-charge, the dc-link voltage must reach at least high threshold which is determined by Line Voltage Setpoint (see the table below) within 15 seconds after the pre-charge signal has been commanded. If this condition is not met, this shutdown is generated. The VSD logic board shall time 10 seconds before clearing the fault and allowing another pre-charge to start. The VFD’s fan(s) and water pump(s) shall remain energized during this time. The VSD logic board shall allow up to three consecutive pre-charge-related faults to occur. After the third consecutive pre-charge-related fault, Safety Shutdown message “VSD – PRECHARGE LOCKOUT” is generated.</td>
</tr>
<tr>
<td><strong>LINE VOLTAGE</strong></td>
<td><strong>LOW THRESHOLD (VOLTS)</strong></td>
</tr>
<tr>
<td>460</td>
<td>500</td>
</tr>
<tr>
<td>380/415</td>
<td>414</td>
</tr>
<tr>
<td>230</td>
<td>250</td>
</tr>
<tr>
<td>VSD – RUN SIGNAL</td>
<td>Redundant RUN signals are generated by the control center; one via TB6-24 and the second via the Serial Communications link. Upon receipt of either of the two RUN commands by the VSD, a 5 second timer shall commence timing. If both run commands are not received by the VSD Logic Board within 5 seconds, a shutdown is performed and this message is displayed. This is generally indicative of a wiring problem between the control center and the VSD.</td>
</tr>
<tr>
<td>VSD – SERIAL COMMUNICATIONS</td>
<td>This message is generated by OptiView when communications between the control center Microboard and the VSD Logic Board, causes no response over 3 attempts consecutively. This is generally indicative of defective wiring between 2TB on the VSD Logic Board and the Microboard J13.</td>
</tr>
<tr>
<td>VSD – SERIAL RECEIVE</td>
<td>The VSD logic board does not receive valid communication from the control panel for 10 consecutive seconds.</td>
</tr>
<tr>
<td>VSD SHUTDOWN – REQUESTING FAULT DATA</td>
<td>The VSD has shutdown the chiller and the control center has not yet received the cause of the fault from the VSD via the serial communications link. The VSD shuts down the chiller by opening the Motor Controller <strong>VSD Stop Contacts</strong> (located on the VSD Logic Board and connected between TB6-16 and TB6-53 in the control center). The Microboard in the control center then sends a request for the cause of the fault to the VSD Logic Board over the serial link. Since serial communications are initiated every 2 seconds, this message is typically displayed for a few seconds and then replaced with one of the other VSD fault messages.</td>
</tr>
<tr>
<td>VSD – SINGLE PHASE INPUT POWER</td>
<td>The VSD monitors the rms value of each of the three line-to-line voltages on a cycle-by-cycle basis. If the rms value of any one of the three line-to-line voltages falls below 200 Vrms in any one cycle, this shutdown is generated.</td>
</tr>
<tr>
<td>VSD – STOP (FAULT) CONTACTS OPEN</td>
<td>Refer to “VSD Shutdown – Requesting Fault Data” message above. If the control center’s Microboard does not receive the cause of the Fault over the Serial Link within 20 seconds, it is assumed it is not forthcoming and that message is replaced with “VSD – STOP CONTACTS OPEN” message.</td>
</tr>
</tbody>
</table>
TABLE 9 - SAFETY SHUTDOWN MESSAGES

The chiller can be started after manual resets are performed as detailed below. Service and troubleshooting information is contained in the YORK YMC Service Manual (Form 160.78-M2) and YMC Variable Speed Drive Service (Form 160.78-M3).

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUXILIARY SAFETY – CONTACTS CLOSED</td>
<td>The Auxiliary Safety shutdown input, connected to I/O Board TB4-31 senses 115 VAC, initiating a safety shutdown. This input is a general-purpose, user defined safety shutdown input. The chiller can be started after the contacts open and the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>CONDENSER – HIGH PRESSURE</td>
<td>The condenser pressure, as sensed by the Condenser Transducer, has increased to greater than 180.0 PSIG (R134a). The chiller can be started after the pressure decreases to is less than 120.0 PSIG (R134a) and the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>CONDENSER – HIGH PRESSURE CONTACTS OPEN</td>
<td>The contacts of the electro-mechanical high pressure safety device, located on the condenser shell, have opened because this device has detected a pressure greater than 204±7 PSIG. The contacts will automatically close when the condenser pressure decreases to is less than 160±10 PSIG. The chiller can be started after the contacts close and the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>CONDENSER – HIGH PRESSURE – STOPPED</td>
<td>The condenser pressure exceeded 160.0PSIG (R134a) while the chiller was stopped. High temperature condenser water flowing through the condenser while the chiller is shutdown can cause a condenser high pressure condition resulting in loss of refrigerant. This safety fault anticipates this problem by annunciating the condenser high pressure condition. The chiller can be restarted after a Service Technician performs a special reset preset procedure contained in YORK YMC Service Manual (Form 160.78-M2).</td>
</tr>
<tr>
<td>CONDENSER – PRESSURE TRANSDUCER OUT OF RANGE</td>
<td>The Condenser Pressure Transducer is indicating a pressure that is is less than 6.8 PSIG or greater than 300.0 PSIG. 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 CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>CONTROL PANEL – POWER FAILURE</td>
<td>A Control Power failure has occurred. If the power failure occurred while the chiller was running, it will automatically restart when power is restored. 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 following instructions in YORK YMC Service Manual (Form 160.78-M2).</td>
</tr>
<tr>
<td>DISCHARGE – HIGH TEMPERATURE</td>
<td>The discharge temperature, as sensed by the Discharge Temperature Thermistor, has increased to greater than 220.0°F (104°C). The chiller can be started after the temperature decreases to less than 220.0°F (104°C) and the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>DISCHARGE – LOW TEMPERATURE</td>
<td>The discharge temperature, as sensed by the Discharge Temperature Thermistor, has decreased to less than 30.0°F (-1.1°C). The chiller can be started after the temperature increases to greater than 30.0°F (-1.1°C) and the CLEAR FAULT key is pressed.</td>
</tr>
</tbody>
</table>
TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EVAPORATOR – LOW PRESSURE</strong></td>
<td>The evaporator pressure, as sensed by the Evaporator Transducer, has decreased to the shutdown threshold and caused cycling shutdown three times in a 90 minute period. For water cooling applications, the shutdown threshold is a fixed value. For Brine cooling applications, the 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 following instructions in <strong>YORK YMC² Service Manual (Form 160.78-M2)</strong>. The chiller can be started after the evaporator pressure increases to the restart threshold and the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td><strong>SHUTDOWN (PSIG)</strong></td>
<td><strong>RESTART (PSIG)</strong></td>
</tr>
<tr>
<td>Water Cooling -R134a</td>
<td>25.0</td>
</tr>
<tr>
<td>Brine Cooling -R134a</td>
<td>6.0 to 25.0 as programmed</td>
</tr>
</tbody>
</table>
| **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, (using procedure in **YORK YMC² Service Manual (Form 160.78-M2)**), this parameter is used as the evaporator refrigerant temperature and the freeze threshold is 32.8°F (4.4°C). 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 (1.1°C). 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: 

\[ \text{# seconds to freezing} = \frac{4053.7}{\text{(freeze threshold} - \text{evap. refrigerant temp.)}} \]

Smart Freeze is activated only if the feature has been Enabled by a Service technician (following instructions in **YORK YMC² Service Manual (Form 160.78-M2)**) and the Leaving Chilled Liquid temperature Setpoint is less than 38.0°F (3.3°C). |
| **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 (1.4°C) to +25.0°F (14.75°C). If the Transducer and Thermistor are accurate, the Evaporator Saturated temperature should not be greater than 2.5°F warmer nor greater than 25.0°F (14.75°C) 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 CLEAR FAULT key is pressed. |
### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT’D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| **EVAPORATOR – TRANSCLUDER 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 using instructions in *YORK YMC Service Manual (Form 160.78-M2)*.  
  - NOT in Brine cooling mode  
  - Smart Freeze is enabled  
  - Evaporator Temperature Sensor (RT7) or Evaporator Saturation Temperature is indicating a temperature of less than 32.0°F (0°C).  
  The chiller can be started after the temperatures are within 3.0°F (1.77°C) of one another and the CLEAR FAULT key is pressed. |
<p>| <strong>MBC – CABLE FAULT</strong>             | This Safety Shutdown is set when the MBC does not detect continuity expected through a set of supervisory pins through an embedded jumper in either of the two main electrical cable assemblies. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the connector to cable supervisory jumper continuity is restored. The chiller can be started when the condition is released and the Optiview panel CLEAR FAULTS key is pressed. |
| <strong>MBC – CUSTOMER SERIAL LINK DISABLED</strong> | This Safety Shutdown is set when the MBC Local/Remote Modbus command is not reported from the MBC as set for panel control. This would be caused if the MBC were accessed via a computer using diagnostic software and the serial communication setting then changed in the Remote Command tab from Customer Serial Link to another choice. The chiller can be started when the MBC setting is restored to Customer Serial Link using the diagnostic software according to Form 160.78-M1 and the OptiView panel CLEAR FAULTS key is pressed. |
| <strong>MBC – DATA ACQUISITION FAULT</strong>  | This Safety Shutdown is set when the MBC detects an internal communication problem on the AMB control board. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the MBC recognizes proper internal communication after a reboot. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULT key is pressed. |
| <strong>MBC – DSP COMMUNICATION</strong>       | This Safety Shutdown is set when the MBC control board detects a communication error across circuit boards in the MBC. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the board-level communication failure is resolved. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed. |
| <strong>MBC – DSP INITIALIZATION</strong>      | This Safety Shutdown is set when the MBC control board software fails to initialize. The MBC is determining software parameters are not correct. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. The condition may require reloading the control parameters to the control. The condition is released on a successful re-boot. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed. |
| <strong>MBC – DSP INTEGRITY</strong>           | This Safety Shutdown is set when an internal problem occurs on the AMB control board. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the board-level communication failure is resolved. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed. |</p>
<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MBC – DSP WATCHDOG</strong></td>
<td>This Safety Shutdown is set when the MBC determines a lapse in internal microprocessor activity through its Watchdog device. The MBC Watchdog Fault contacts open. The MBC will not react to a levitation mode change command via serial comms. The MBC remains in the levitation mode it was in when the fault occurred until power is removed. Power is automatically removed when the VSD is stopped and the precharge command ceases so the DS bus, which powers the MBC depletes. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – EEPROM</strong></td>
<td>This Safety Shutdown is set when a data discrepancy occurs with the EPROM on the AMB control board. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the board-level communication failure is resolved. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – EXCESSIVE SHUTDOWNS</strong></td>
<td>This Safety Shutdown is set if 3 MBC Cycling Shutdowns occur in a 15 minute window. It is released when all MBC faults clear. The 15 minute window begins with the first MBC fault. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – FLASH MEMORY CLEAR</strong></td>
<td>This Safety Shutdown is set when an internal problem occurs with the memory chip on the AMB control board. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the board-level communication failure is resolved. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – FLASH MEMORY WRITE</strong></td>
<td>This Safety Shutdown is set when an internal problem occurs with the memory chip on the AMB control board. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the board-level communication failure is resolved. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – HIGH AMPLIFIER TEMPERATURE</strong></td>
<td>This Safety Shutdown is set when the MBC amplifier temperature exceeds 176°F (80°C) for 2 seconds continuous. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until the VSD rotation signal indicates less than 10 Hz. The MBC de-levitates the rotor. The shutdown is released when amplifier temperature drops 5.4°F (3.1°C) below the trip value. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – HIGH BEARING CURRENT</strong></td>
<td>This Safety Shutdown is set when the MBC has determined any of the driveline Magnetic Bearing excitation currents exceeds the maximum Power Amplifier rating, programmed at 4A, for 10 seconds continuous. The MBC ESD Fault contacts open. The MBC remains in Levitation mode attempting to keep the motor shaft levitated until the VSD rotation signal indicates greater than 10 Hz. This shutdown is released when all of the bearing currents are less than 4A. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – HIGH BEARING Z1 TEMPERATURE</strong></td>
<td>This Safety Shutdown is set when the MBC detects a temperature greater than 266°F (130°C) on the impeller end axial magnetic bearing. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until the VSD rotation signal indicates is less than 10 Hz. This shutdown is released when temperature is less than 266°F (130°C). The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – HIGH BEARING Z2 TEMPERATURE</strong></td>
<td>This Safety Shutdown is set when the MBC detects a temperature greater than 266°F (130°C) on the opposite-impeller end axial magnetic bearing. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until the VSD rotation signal indicates is less than 10 Hz. This shutdown is released when temperature is less than 266°F (130°C). The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
</tbody>
</table>
### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MBC – HIGH DC/DC TEMPERATURE</strong></td>
<td>This Safety Shutdown is set when the MBC DC/DC Converter board temperature exceeds 203°F or 95°C for 2 seconds continuous. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until the VSD rotation signal indicates is less than 10 Hz. Then the MBC de-levitates the rotor. The shutdown is released when the DC/DC converter temperature drops 5.4 °F (3 °C) below the trip value. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – NO LEVITATION</strong></td>
<td>This Safety Shutdown is set when OptiView software is commanding MBC Levitation Mode ON but the Rotation Allowed digital input from the MBC contacts is not reading high. This fault is inhibited if no VSD DC Bus Voltage is present and during the first 15 seconds after the Levitation Mode ON command is sent. This fault is released when the chiller is stopped. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – OSCILLATOR FAULT</strong></td>
<td>This Safety Shutdown is set when the MBC has determined either the radial or axial position sensor internal Oscillator, which drives the position sensor coils, is overloaded for 1 second continuous. This is a result of an open or short in the connection to the shaft position sensors or a failure on the board. LED V1 or V2 illuminated on the oscillator board indicates a failure with radial position or elongation channels. LED V3 or V4 illuminated on the oscillator board indicates a failure with the axial position. The MBC ESD Fault contacts open. This shutdown is released when the Oscillator voltage drop is normal. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – OVERSPEED FAULT</strong></td>
<td>This Safety Shutdown is set when the MBC determines the rotor speed exceeds the programmed setpoint of 458 Hz for 0.1 seconds continuous. Rotor speed is transmitted to the MBC from the VSD. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the speed signal no longer exceeds the setpoint, which should occur when the chiller is stopped. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – POWER SUPPLY FAULT</strong></td>
<td>This Safety Shutdown is set when the MBC detects overload on the Wide Input Range power supply board or indicates abnormal voltage at the DC/DC converter. The Wide Input Range power supply board overload is detected by monitoring temperature at the transformer. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when voltage is restored. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – ROTOR ELONGATION</strong></td>
<td>This Safety Shutdown is set when the MBC has calculated the algebraic difference between the displacement at shaft impeller end axial position sensor and the shaft opposite-impeller end axial position sensor is greater than the value calculated by linear interpolation between 300 µm at 436 Hz to 350 µm at zero Hz. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the difference in displacements no longer exceeds these values. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>MBC – SPEED SIGNAL FAULT</strong></td>
<td>This Safety Shutdown is set when the MBC has the speed signal cycling fault three times in a 90-minute window. The window is started when not currently in a window and a MBC Speed Signal cycling fault is received. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC buss power depletes. This shutdown is released when the transmission is reestablished. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
</tbody>
</table>
### SECTION 2 - OPTIVIEW CONTROL CENTER INTRODUCTION

**TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)**

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY STOP</td>
<td>This is set when the panel safety stop hardware pushbutton is depressed, removing input from the I/O Board terminal TB3-28 for &gt; 500msec. continuous. It also sets the local command to STOP. The chiller can be started when the pushbutton is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>MBC – STARTUP FAILURE</td>
<td>This Safety Shutdown is set when the chiller initiates three MBC-STARTUP FAILURE Cycling Shutdown in a 90 minute period. Refer to YORK YMC Service Manual (Form 160.78-M2) for conditions necessary to complete MBC startup successfully. Check fault history details to determine which specific conditions were not met.</td>
</tr>
<tr>
<td>MBC – UNAUTHORIZED ROTATION</td>
<td>This Safety Shutdown is set when the MBC detects a rotor speed signal from the VSD while the Levitation Mode is not activated. The MBC ESD Fault contacts open. The MBC remains in Levitation mode with the motor shaft levitated until commanded to de-levitate over serial comms or VSD DC bus power depletes. This shutdown is released when the MBC Levitation or Rotation mode is activated or the VSD speed signal indicates no shaft rotation. The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>MOTOR – HIGH WINDING TEMPERATURE</td>
<td>This safety shutdown occurs when either of the following conditions are present: • Any of the enabled motor winding temperatures exceeded the programmed High Winding Temperature Shutdown Threshold of 302˚F (150˚C). or • The Average Winding Temperature has exceeded the programmed High Winding Temperature Shutdown threshold for 3 continuous seconds. The chiller can be started after all winding temperatures decreased to at least 18˚F (10˚C) below the shutdown threshold and the COMPRESSOR is stopped. The safety shutdown will not act on any individual winding temperature sensor that has been disabled with the TEMPERATURE DISABLE Setpoint on the Motor Details Screen.</td>
</tr>
<tr>
<td>MOTOR – HIGH HOUSING TEMPERATURE</td>
<td>This Safety Shutdown is set when Motor Housing Temperature is greater than or equal to 185 °F (85 °C). This fault is released when Motor Housing Temperature is less than 158 °F (70 °C). The chiller can be started when the condition is released and the OptiView panel CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>SALES ORDER - INVALID COMPRESSOR MODEL</td>
<td>This safety shutdown is set when the Compressor Model field entered on the Setpoints – Setup –Sales Order screen does not conform to the format expected. The format is defined below and the data can be found on the compressor nameplate if it ever needs re-entry in the control:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOTOR</th>
<th>MOTOR REV</th>
<th>SS/LS IMP DIAM</th>
<th>SS/LS ROTATION</th>
<th>SS/LS IMP REV</th>
<th>SS/LS FLOW REV :Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>3 -</td>
<td>4 5 6</td>
<td>7</td>
<td>8</td>
<td>9 :Position</td>
</tr>
</tbody>
</table>

The control uses specific characters from this field to determine control parameters and methods. This shutdown is initiated if any of the following are true: • MOTOR is anything other than M1 • MOTOR REV is anything other than ‘B’ • Character other than '-' between position 3 and 4 • SS/LS IMP DIAM is anything other than 164, 174, 186, 197 or 205 • SS/LS ROTATION is anything other than 'F' • SS/LS IMP REV is anything other than a character ‘A’ through ‘Z’ • SS/LS FLOW REV is anything other than a character ‘A’ through ‘B’ The fault released when none of the above statements are true. Then the CLEAR FAULTS key on the Home screen can be pressed and the chiller started.
TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURGE PROTECTION – EXCESS SURGE</td>
<td>(Applies only if Surge Protection SHUTDOWN feature is Enabled) The Surge Window Count surge events exceeded the Count Limit setpoint. The chiller shuts down as soon as the count exceeds the limit. The chiller can be started after the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td>WATCHDOG – SOFTWARE REBOOT</td>
<td>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 COMPRESSOR switch is placed in the Stop-Reset (O) position.</td>
</tr>
<tr>
<td>VSD – DC BUS LOCKOUT – DO NOT CYCLE POWER</td>
<td>When the unit is stopped in a mode where no command exists to energize the DC bus, the DC bus voltage is monitored and checked against a threshold level of 50V every five minutes. If the DC bus voltage is higher than the threshold value, this shutdown is generated. When the condition clears and VSD input modules tested and determined acceptable the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – DC BUS PRE-REGULATION LOCKOUT</td>
<td>If the unit fails to complete pre-regulation (due to VSD – DC BUS PRE-REGULATION fault), it shall have to repeat pre-charge in order to attempt another pre-regulation. The VSD logic board shall wait 10 seconds before clearing the dc-link voltage pre-regulation fault and allowing another pre-charge to start. The unit’s fan(s) and water pump(s) shall remain energized during this wait time. The VSD logic board shall allow up to three consecutive pre-charge-related or pre-regulation-related faults (i.e. VSD-DC BUS REGULATION or any of the faults applicable to VSD-PRECHARGE LOCKOUT) to occur. After the third consecutive fault, this shutdown is generated. The VSD logic board shall disable boost rectifier’s IGBT gating signals (if the third fault occurred during pre-regulation). When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – GROUND FAULT</td>
<td>This message is generated when the sum of the 3 phases of instantaneous input current values are greater than the shutdown value for a period of 1 second for the given model of drive listed below. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE A INPUT BASEPLATE TEMPERATURE</td>
<td>This shutdown occurred because the Input Baseplate Temperature exceeded the shutdown value for the given model of drive listed below. After the unit trips, the VSD fan(s) and water pump(s) shall remain energized until the temperatures of all three rectifier’s phases drop below the fault-reset threshold of 165°F (73.8°C). In April of 2016 the shutdown control for the fan(s) and pump(s) was changed. The control will now keep the fan(s) and pump(s) running for 2 minutes after the fault occurred. This change occurred in software version C.HYP.03.04.01, and C.HYP.04.04.01. When this happens, the unit’s fan(s) and water pumps shall be de-energized. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE B INPUT BASEPLATE TEMPERATURE</td>
<td>See “VSD – HIGH PHASE A INPUT BASEPLATE TEMPERATURE” message preceeding.</td>
</tr>
<tr>
<td>VSD – HIGH PHASE C INPUT BASEPLATE TEMPERATURE</td>
<td>See “VSD – HIGH PHASE A INPUT BASEPLATE TEMPERATURE” message preceeding.</td>
</tr>
</tbody>
</table>

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### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>DRIVE MODEL</th>
<th>GROUND CURRENT SHUTDOWN VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>490, 0490A</td>
<td>40 Amps</td>
</tr>
<tr>
<td>744</td>
<td>120 Amps</td>
</tr>
</tbody>
</table>

### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>DRIVE MODEL</th>
<th>HIGH PHASE A INPUT BASEPLATE TEMPERATURE SHUTDOWN VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>490, 0490A</td>
<td>190°F (87.8°C)</td>
</tr>
<tr>
<td>744</td>
<td>170°F (76.6°C)</td>
</tr>
</tbody>
</table>
### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VSD – HIGH PHASE A MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>The chiller has shutdown because the motor baseplate temperature exceeded the high limit of 190°F (87.7°C). After the unit trips, the VSD fan(s) and water pump(s) shall remain energized until the motor baseplate temperatures of all phases drop below the fault-reset threshold of 165°F (73.8°C). In April of 2016 the shutdown control for the fan(s) and pump(s) was changed. The control will now keep the fan(s) and pump(s) running for 2 minutes after the fault occurred. This change occurred in software version C.HYP.03.04.01, and C.HYP.04.04.01. When this happens, the unit’s fan(s) and water pump(s) shall be de-energized. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – HIGH PHASE B MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – HIGH PHASE A MOTOR BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – HIGH PHASE C MOTOR BASEPLATE TEMPERATURE</strong></td>
<td>See “VSD – HIGH PHASE A MOTOR BASEPLATE TEMPERATURE” message preceding.</td>
</tr>
<tr>
<td><strong>VSD – HIGH TOTAL DEMAND DISTORTION</strong></td>
<td>This shutdown indicates the input current to the VSD is not sinusoidal. This shutdown will occur if the TDD exceeds 25% continuously for 45 seconds. TDD is an acronym for Total Demand Distortion, a term defined by the IEEE Std 519-1992 standard as the “total root-sum-square harmonic current distortion, in percent of the maximum demand load current (15 or 30 min demand)”. The displayed TDD is the total RMS value of all the harmonic current supplied by the main power to the VSD divided by the chiller Full Load Amps, in percent. The chiller can be started after the CLEAR FAULT key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – INVERTER PROGRAM FAULT</strong></td>
<td>Inverter program fault – When some internal code exception of Inverter happens such as divide-by-zero, out-of-range parameter, etc., the unit shall trip and the Raptyr logic board shall indicate the inverter program fault and the error information including module number and line number via the communications link. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – INPUT CURRENT OVERLOAD</strong></td>
<td>The highest of the three input RMS currents is monitored and compared against 105% of the job input current at 90% line voltage. Because the job input current setting is at nominal line voltage and this fault is based on power, and accounts for low-tolerance line voltage, its threshold is 105%/90%=116.7%. If this value is exceeded continuously for 10 seconds, this shutdown is generated. The 10 s timer is reset if three consecutive RMS current values fall below the overload threshold. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – INPUT DCCT OFFSET LOCKOUT</strong></td>
<td>If three consecutive VSD – Phase A, B or C Input DCCT Offset cycling faults occur, this safety shutdown is generated to require investigation and manual reset. When the condition clears and VSD input modules determined acceptable, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – LOGIC BOARD PLUG</strong></td>
<td>A jumper is located in the rectifier and inverter DCCT plugs to feedback a digital signal to indicate if the plugs are installed or not. If either plug is not installed, a low value is read on the digital input causing the unit to trip, and this shutdown is generated. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td><strong>VSD – MOTOR CURRENT IMBALANCE</strong></td>
<td>The three phase compressor motor current imbalance was greater than 30% continuously for 45 seconds. The imbalance is not checked until the chiller has been running for at least 45 seconds and the average of the three phases of motor current is greater than 80% of the programmed 100% chiller Full Load Amps. The average is calculated as: $I_{ave} = \frac{(I_a+I_b+I_c)}{3}$. The imbalance is calculated as: $(I_a-I_{ave}) + (I_b-I_{ave}) + (I_c-I_{ave}) x 100 \over 2(I_{ave})$. The Variable Speed Drive detects the unbalance condition and advise the OptiView control center Microboard via serial communications. The chiller can be started after the CLEAR faults key is pressed.</td>
</tr>
</tbody>
</table>
### TABLE 9 - SAFETY SHUTDOWN MESSAGES (CONT'D)

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSD – 105% MOTOR CURRENT OVERLOAD</td>
<td>The highest of the three motor RMS currents is monitored and compared against 105% of the motor current limit of 525A. If this value is exceeded continuously for 40 seconds, this shutdown is generated. The 40 second timer shall reset if three consecutive RMS current values fall below the overload threshold. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – MOTOR CURRENT THD FAULT</td>
<td>Motor current (inverter output) total harmonic distortion (THD) level is exceed. The fault is based on a fixed value of measured harmonic current from the inverter. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – PHASE A INPUT DCCT</td>
<td>The input current in each phase to the VSD is measured during the precharge time. If the input current does not exceed the shutdown value for the given model of drive listed below, then this shutdown is generated.</td>
</tr>
<tr>
<td></td>
<td><strong>DRIVE MODEL</strong></td>
</tr>
<tr>
<td></td>
<td>0490A, 490</td>
</tr>
<tr>
<td></td>
<td>744</td>
</tr>
<tr>
<td>VSD – PHASE B INPUT DCCT</td>
<td>See “VSD – PHASE A INPUT DCCT” message preceeding.</td>
</tr>
<tr>
<td>VSD – PHASE C INPUT DCCT</td>
<td>See “VSD – PHASE A INPUT DCCT” message preceeding.</td>
</tr>
<tr>
<td>VSD – PHASE A MOTOR DCCT</td>
<td>This shutdown determines if the cable at the motor DCCT is connected. This shutdown is generated 1.5 seconds after the motor run command if the motor current does not exceed 25 amps.</td>
</tr>
<tr>
<td>VSD – PHASE B MOTOR DCCT</td>
<td>See “VSD – PHASE A MOTOR DCCT” message preceeding.</td>
</tr>
<tr>
<td>VSD – PHASE C MOTOR DCCT</td>
<td>See “VSD – PHASE A MOTOR DCCT” message preceeding.</td>
</tr>
<tr>
<td>VSD – PRECHARGE LOCKOUT</td>
<td>If the unit fails to complete pre-charge (due to VSD – PRECHARGE – LOW DC BUS VOLTAGE or VSD – PRECHARGE – HIGH DC BUS VOLTAGE), the VSD logic board shall time 10 seconds before clearing the fault and allowing another pre-charge to start. The unit’s fan(s) and water pump(s) shall remain energized during this time. The VSD logic board shall allow up to three consecutive pre-charge-related faults to occur. After the third consecutive pre-charge-related fault, this shutdown is generated. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD – RECTIFIER PROGRAM FAULT</td>
<td>When some internal code exception of Rectifier happens such as divide-by-zero, out-of-range parameter, etc., the unit shall trip and the Raptyr Logic Board shall indicate the rectifier program fault and the error information including module number and line number via the communications link. When the condition clears, the chiller can be started after the CLEAR FAULTS key is pressed.</td>
</tr>
<tr>
<td>VSD SHUTDOWN – REQUESTING FAULT DATA</td>
<td>The VSD has shut down the chiller and the control center has not yet received the cause of the fault from the VSD, via the serial communications link. The VSD shuts down the chiller by opening the Motor Controller “VSD Stop Contacts” (located on the VSD Logic Board and connected between TB6-16 and TB6-53 in the control center). The Microboard in the control center then sends a request for the cause of the fault to the VSD Logic Board over the serial link. Since serial communications are initiated every 2 seconds, this message is typically displayed for a few seconds and then replaced with one of the other VSD fault messages.</td>
</tr>
<tr>
<td>VSD - INVERTER PROGRAM FAULT</td>
<td>This drive will be used on 2 different motor designs. It is necessary to validate that the inverter software is correct for the motor designed used in the application. To ensure that the correct software is installed in the VSD logic board, three pieces of data must state that the correct inverter software is installed in the VSD logic board for this shutdown not to occur. The software in the VSD logic board U38, must match the condition on J2 pin 14 and the programmed motor selection from the chiller control center.</td>
</tr>
<tr>
<td>MESSAGE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>VSD - LINE VOLTAGE PHASE LOCK LOOP</td>
<td>The drive will automatically determine the input voltage frequency. The information about the input voltage frequency is provided to the drive logic board by the line voltage isolation board. If the driver logic board cannot determine that the input voltage frequency is 50 or 60 Hz then this shutdown will occur.</td>
</tr>
<tr>
<td>VSD - LINE VOLTAGE PHASE ROTATION</td>
<td>The input of the drive is not sensitive to the phase rotation of the input voltage, but internally to the drive the rotation must remain the same. The output of the line voltage isolation board cannot shown CBA rotation when the input voltage to the drive is really ABC rotation. There are 2 methods within the VSD logic board to determine the line voltage phase rotation. If these 2 methods do not report the same phase rotation then this shutdown will occur.</td>
</tr>
</tbody>
</table>
OPTISPEED COMPRESSOR DRIVE
OVERVIEW

The new YORK OptiSpeed Compressor Drive (OSCD) is specifically designed for the application of driving a permanent magnet high speed motor with magnetic bearings used on the YORK Model YMC² Centrifugal Liquid Chiller. This type of design allows the chiller to be design as a complete system, and take full advantage of the strengths of each major component within the system. This method of design is a superior approach to using general purpose components off the shelf that may not work well together.

This new OSCD design builds on the successes of previous designs of being chiller mounted, provide for high levels of energy savings, great integration with the chiller control center, liquid cooled, shell and tube heat exchanger, use of fast switching insulated gate bipolar transistors (IGBT’s), high reliability, and ease of service.

New features include:

• The option of a circuit breaker or disconnect switch.
• Ground fault detection even when a disconnect switch is selected.
• Direct liquid cooling.
• A more accessible cooling system.
• Variable voltage input.
• High speed direct drive motor.
• The harmonic filter is standard on all models.
• Modular lighter weight power units that can be repaired in the field without complete replacement.
• Ease of maintenance.

OPTISPEED COMPRESSOR DRIVE
FEATURES

The new drive design is currently available in the following models: HYP490, HYP0490A and HYP744.

For the first time, the OSCD is offered with a disconnect switch without giving up the ability to detect a ground fault. The OSCD contains 3 input current sensors that will provide the information for the drive logic board to detect a ground fault condition.

Direct liquid cooling is much more efficient way of removing heat from the OSCD. This method also reduces the cooling load on the internal cooling coil. In the past, YORK developed direct liquid cooling for the inverter IGBT modules, but today York is direct liquid cooling the rectifier, inverter, and the output filter inductor.

The cooling system for the OSCD is greatly modified to improve serviceability of the power electronics. Repair of the power electronics no longer requires access to the back of the drive except to drain the cooling system. Also the use of a shell and tube heat exchanger is standard on all models.

The OSCD can now be configured for many different input voltage levels. Lower input voltages may de-rate the input power rating of the OSCD, but the OSCD will produce the same output voltage and will use the same motor.

The harmonic filter is no longer an option, and the function of the harmonic filter is included in a new rectifier module. This type of arrangement for the rectifier no longer requires a separate power unit for the harmonic filter. Also this rectifier is part of the power unit for the inverter, thus reducing the number of parts required and increasing reliability.

The new OSCD control system allows for high speed operation of the compressor motor. This improvement eliminates the need for a gear system between the compressor motor and the compressor. Without a gear system reliability and efficiency are improved.

The new power unit consists of a newly designed bus capacitor, new light weight plastic cooling blocks, new IGBT gate driver design, new rectifier IGBT module, and the cooling system is connected to the front of the power unit for reduce service cost.

The new bus capacitor is the core of the power unit. The new capacitor is made of a material that is much more robust and has a longer lifetime than bus capacitors commonly used in the past. Also, this capacitor contains all of the hardware required to mount all of the other parts to the power unit.

The harmonic filter operation is now part of the input to the OSCD. This feature is no longer an option when the OSCD is used with the YMC² chiller.

New special plastic cooling blocks were designed for this OSCD. These plastic cooling blocks provide a
light weight solution by replacing heavy copper or aluminum cooling blocks, while providing direct liquid cooling for the rectifier and inverter IGBT’s. They also provide a method for mounting the IGBT assemblies to the bus capacitor within the power unit.

The power unit contains all of the items needed for the output of the OSCD in a highly integrated, but modular design. The bus capacitor is the core of the assembly. All of the other items are attached to the bus capacitor. On top of the bus capacitor is the laminated bus structure and the gate driver board. The rectifier and inverter assemblies are attached to each side of the bus capacitor. The rectifier or inverter assemblies can be replaced in the field.

Ease of maintenance is provided by using the communications link between the OptiView panel and the OSCD. The cooling pumps and fans can be turned on from the OptiView panel. This provides for a safer annual coolant changes. The gate driver test is also started from the OptiView panel.

**OPTISPEED COMPRESSOR DRIVE DETAILS (490 AND 744 AMP DRIVES)**

An electronic circuit breaker or disconnect switch connects the three phase input power to input fuses and then onto the AC line inductor, and input filter. Three phase power continues onto the rectifier IGBT’s to the bus capacitor to the inverter, then onto the output filter and the compressor motor.

The AC line inductor provides isolation between the 3 phase power source and the input to the drive. The AC line inductor improves the input current waveform so that it appears more like a sine wave. The input filter reduces the effects of the high frequency switching of the rectifier and provides the inductance for boosting the bus voltage above the peak of the line voltage.

The higher bus voltage is required for harmonic current correction at the input of the OSCD, and to provide the correct output voltage for high speed operation of the compressor motor.

The AC to DC rectifier uses several power devices. Each phase has one or more modules arranged in a parallel connection depending on the amount of output current required. Each rectifier module contains 3 power devices that are called the Upper, Lower, and Aux. device. All three devices are required to rectify and boost the 3 phase input AC voltage into DC voltage in a modified new three-phase bridge configuration. The use of the modified new three-phase bridge configuration in the rectifier permits pre-charge of the DC bus filter capacitors when the chiller enters the start mode, and provides a fast disconnect from the AC line when the chiller enters the stopped mode. This new bridge configuration also provides the harmonic filtering without the need of separate power unit, precharge circuit, and control board.

The DC to AC inverter also uses several power devices. Each phase has one or more modules arranged in a parallel connection depending on the amount of output current required. Each inverter module contains an Upper and Lower device. The Aux. device is not need in the inverter.

The permanent magnet motor used on the YMC\(^2\) chiller requires a near sine wave of voltage. Typically, drives provide a pulse of voltage at the amplitude of the bus voltage for a varying period of time. This waveform is typically known as a square wave. This OSCD contains a direct water cooled output filter.

A new drive logic board was designed to provide all of the logic required to turn on and turn off all of the power devices, turn on and off the cooling fans and pumps, evaluate data from the input and output current sensors, evaluate data about the input and output voltage, and communicated to the OptiView panel.

Other sensors and boards are used to convey information back to the OSCD Logic board, and provide safe operation of the OSCD. Each power module contains a temperature sensor that provides temperature information back to the OSCD logic board. Three Current Transformers monitor the output current from the OSCD power unit and are used to protect the drive and motor from overcurrent conditions. Another 3 Current Transformers monitor the input current to the OSCD to provide current limit, and harmonic current filtering.

**OPTISPEED COMPRESSOR DRIVE DETAILS (0490A AMP DRIVE)**

The 0490A amp drive has the same basic function as the 490 and 744 amp drives, but the precharge of the drive is different.

The precharge is now completed through a precharge and supply contactor, which are control by the drive logic board. During the precharge period the drive logic board will command the precharge contactor to close for 12 seconds. During this time, the voltage will increase across the bus capacitors, and the current will be limited by the precharge resistors. This 12 second period is called the precharge time. After 12 seconds has
passed, a small relay will close, and cause the supply contactor to close. Shortly, after this time the precharge contactor will open. The drive is now precharged and ready to run. All of the precharge faults will remain the same as when the Aux. power device is used to precharge the drive.

The 0490A amp drive contains only one power assembly. It is very similar to the assembly used on the 490 amp drive. The power assembly contains 1 bus capacitor, with 6 power devices attached to both of the outer faces of the bus capacitor. A pair of power devices share a gate driver board. A power supply board mounted on top of the power assembly provides power to the gate driver boards.

**Harmonic Filter Benefits**

The OptiSpeed Compressor Drive (OSCD) system is designed to meet the IEEE Std 519-1992, “IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems”. This reduces the possibility of causing electrical interference with other sensitive electronic equipment connected to the same power source, and reduces power loss in the customer’s switch gear.

In addition, the input power factor of the OSCD is nearly unity.

**Harmonic Filter General Information**

The Harmonic Filter is no longer an option for this style of OSCD. The function of the Harmonic Filter is now integrated into the input of the OSCD. The input rectifier has fast switching transistors instead of SCR’s and diodes. The OSCD can now control the input current waveform to a near sine wave shape by controlling how the rectifiers are turned on and off. The Harmonic Filter of the past injected harmonic current into the input of the OSCD to correct the current waveform.

Since the Harmonic Filter is basically the input to the OSCD there is no need for the additional, precharge, power unit, Harmonic Filter logic board, and contactors for the harmonic filter of yesterday. The Harmonic Filter does not require its own pre-charge time, thus allowing the chiller to start or restart sooner. This is an important benefit to many customers. The reductions in parts counts will improve the reliability of the OSCD, and ease of repair.

A line inductor is still needed to limit the rate of change in the input current. Without the line inductor the input current cannot be properly controlled and harmonic currents would be generated.
SECTION 3 - VSD OPERATION

FIGURE 50 - LEFT SIDE OF HYP744 DRIVE CABINET
FIGURE 51 - RIGHT SIDE OF HYP744 DRIVE CABINET.
FIGURE 52 - LEFT SIDE OF HYP0490A DRIVE CABINET
FIGURE 53 - RIGHT SIDE OF HYP0490A DRIVE CABINET
SECTION 3 - VSD OPERATION

FIGURE 54 - DRIVE LOGIC BOARD

FIGURE 55 - RECTIFIER SIDE OF THE POWER UNIT.

Note: Variable Speed Drive Model HYP744 Shown
OPTISPEED COMPRESSOR DRIVE AND CHILLER OPERATION (490 AND 744 AMP MODELS)

When the chiller enters a start command, the OSCD is commanded to pre-charge, the Aux. power devices are gradually turned on to slowly charge the DC bus capacitors. This is called the pre-charge period, which will last for 12-seconds. After the 12-second time period has expired, the AUX. power devices are gated fully on. The OSCD logic board provides the turn on, and turns off commands for the AUX. power devices during precharge, and during normal running condition. After precharge is complete the AUX. power device will remain turned on for the duration of the run cycle.

During normal chiller run conditions the OptiView panel provides a speed command to the OSCD. The speed command must take into account minimum speed command from the anti-surge control, and the speed required by the leaving chilled liquid control. The OSCD logic board will determine the proper turn-on and turn-off commanded to the IGBT’s to provide the correct RPM.

When the chiller enters a normal stop command the OSCD will continue to follow the speed command from the OptiView panel. The OptiView panel begins to unload the chiller. As the load and pressure across the compressor starts to go down, the output speed of the OSCD will go down. When the capacity control devices (PRV or VGD and sometimes hot gas bypass valve) reaches minimum load position, the OSCD will start to decelerate the motor to 50 Hz. When 50 Hz is reached all rectifier and inverter power devices will be turned off except for the AUX. The OSCD will remain in a precharge state for 60 seconds, and then the AUX. is turned off. The DC link capacitors will start to discharge through the bleeder resistors.

OPTISPEED COMPRESSOR DRIVE AND CHILLER OPERATION (0490A AMP MODEL)

When the chiller enters a start command, the OSCD is commanded to pre-charge, the pre-charge contactor will close and slowly charge the DC Bus capacitors through the pre-charge resistors. This is called the pre-charge period, which will last for 12-seconds. After the 12-second time period has expired, the supply contactor will close and the pre-charge contactor will open. The supply and pre-charge contactors will remain in this state for the duration of the run cycle. The OSCD logic board provides the commands for the supply and pre-charge contactors.

All models of HYP drives will control the motor in the same manner for a normal stop command.
SECTION 4 - PRINTERS

A printer can be connected to the control center’s Microboard to print 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 set-points (Printer, Setpoints)
- **Schedule** - Present value of programmed daily schedule (Printer, Schedule)
- **Sales Order** - Information on 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 printer 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.

The following figures are examples of the different print reports. Solid State Starter application print reports shown.

- Status, refer to *Figure 57 on Page 150*
- Setpoints, refer to *Figure 58 on Page 152*
- Schedule, refer to *Figure 59 on Page 154*
- Sales Order, refer to *Figure 60 on Page 154*
- History, refer to *Figure 61 on Page 155*
- Security Log, refer to *Figure 62 on Page 157*
- Trend, refer to *Figure 63 on Page 157*
- Custom Screen, refer to *Figure 64 on Page 157*

PRINTERS

The following Printers can be used. **Printers must be equipped with an RS-232 Serial interface.**

- **Okidata** –
  Models: 182, 182 turbo, 184 turbo
  Dimensions: 14 in. wide x 10.5 in. deep
  Paper: 8.5 in. wide
  Type: Dot matrix impact
  Purchase: 800-OKIDATA

- **Weigh-Tronix** –
  Models: 2600, 1220
  Dimensions: 2.3 in. wide x 2.8 in. deep
  Paper: 2.25 in. wide
  Type: Dot matrix impact
  Purchase: USA 800-982-6622
  International 707-527-5555

- **Seiko** –
  Printer: DPU414-30B
  Dimensions: 6.3 in. wide x 6.7 in. deep
  Paper: 4.4 in. wide
  Type: Thermal
  Power Supply: PW4007I (required)
  Battery Pak (Ni-Mh): BP4005
  Thermal paper: SS112-025A
  Purchase: Jaco Electronics (formally Repton acquired by Jaco)
  13710 Repton Blvd
  Tampa, Florida 33626
  Phone: 800-800-5441
  [www.jacoelectronics.com](http://www.jacoelectronics.com)
  Purchase Contact: Katy Buelow
  [kbuelow@jacoelect.com](mailto:kbuelow@jacoelect.com)
SECTION 4 - PRINTERS

FIGURE 56 - PRINTERS

OKIDATA MICRONE 184

WEIGH-TRONIX

SEIKO DPU-414
The control center provides the required formatting control codes for the printers above when the printer is selected on the PRINTER Screen in the instructions below. These codes are transmitted through the serial interface to the printer to provide a proper print format. Different printers require different formatting control codes. Other printers might provide proper operation when connected to the control center. However, the print format may not be correct or as desired. Proceed with caution and use the following guidelines if an unlisted printer is selected:

1. All must be capable of RS-232 Serial communications.

2. Primary differences between printers involve the formatting control codes required by the printer. These codes are sent from the control center to the printer. For example, Weigh-Tronix printers require a control code to select 40 column width. This same code is interpreted by the Okidata printer as an instruction to print wide characters. In some instances, a printer will ignore a code it cannot interpret.

3. The control center requires a busy signal from the printer when the printer receive buffer is full. This causes the control center to momentarily terminate data transmission until the printer can accept more data. The busy signal polarity must be asserted low when busy.

**PRINTER CONNECTIONS**

Connect the printers to the control center Microboard as follows. Only one printer can be connected at a time.

| TABLE 10 - OKIDATA 182, 182 TURBO, 184 TURBO |
|-----------------|-----------------|-----------------|
| **Microboard** | **Printer** | **Function** |
| J2-4           | pin 3          | Tx (data to printer) |
| J2-2           | pin 11         | DSR (busy signal from printer) |
| J2-9           | pin 7          | Gnd |
| Cabinet        |                | Shield |

<table>
<thead>
<tr>
<th>TABLE 11 - WEIGH-TRONIX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microboard</strong></td>
</tr>
<tr>
<td>J2-4</td>
</tr>
<tr>
<td>J2-2</td>
</tr>
<tr>
<td>J2-9</td>
</tr>
<tr>
<td>Cabinet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 12 - SEIKO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microboard</strong></td>
</tr>
<tr>
<td>J2-4</td>
</tr>
<tr>
<td>J2-2</td>
</tr>
<tr>
<td>J2-9</td>
</tr>
<tr>
<td>Cabinet</td>
</tr>
</tbody>
</table>

**Hardware required:**

**Cable**

#18 AWG stranded 50 ft. maximum length.

**Connectors**

Microboard

- None. Strip 1/4” insulation from wire and insert into screw terminal block.

Printers

- Okidata - 25 pin plug DB-25P or equivalent; Shell DB-C2-J9 or equivalent.
- Weigh-Tronix - Same as Okidata. Cable assembly available from Weigh-Tronix.
- Seiko - 9-Pin D-type Subminiature (DB-9 pin male).
**PRINTER SETUP**

The selected printer must be configured as follows. Refer to manual provided by Printer manufacturer with respective Printer.

### OKIDATA 182, 182 turbo, 184 turbo Printer

CONTROL BOARD Switch settings:

<table>
<thead>
<tr>
<th>SW</th>
<th>Setting 1</th>
<th>Setting 2</th>
<th>Setting 3</th>
<th>Setting 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>on</td>
<td>Unslashed 0</td>
<td>off</td>
<td>Form Length 11 in.</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
<td>Unslashed 0</td>
<td>on</td>
<td>Form Length 11 in.</td>
</tr>
<tr>
<td>3</td>
<td>off</td>
<td>Unslashed 0</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>off</td>
<td>Form Length 11 in.</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>on</td>
<td>Form Length 11 in.</td>
<td>on</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>off</td>
<td>Auto Line Feed off</td>
<td>on</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>on</td>
<td>8 bit data</td>
<td>off</td>
<td>Enable front panel</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
<td></td>
<td>off</td>
<td></td>
</tr>
</tbody>
</table>

If equipped with a SUPER SPEED serial Board:

<table>
<thead>
<tr>
<th>SW1-1</th>
<th>Setting 1</th>
<th>Setting 2</th>
<th>Setting 3</th>
<th>Setting 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>on</td>
<td>Odd or even parity</td>
<td>No parity</td>
<td>Protocol ready/busy</td>
</tr>
<tr>
<td>2</td>
<td>on</td>
<td>8 bit data</td>
<td>Protocol ready/busy</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>on</td>
<td>Protocol ready/busy</td>
<td>Protocol ready/busy</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>on</td>
<td>Test select</td>
<td>Test select</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>on</td>
<td>Test select</td>
<td>Test select</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>on</td>
<td>Print mode</td>
<td>Print mode</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>on</td>
<td>SDD(-) pin 11</td>
<td>SDD(-) pin 11</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>on</td>
<td>SDD(-) pin 11</td>
<td>SDD(-) pin 11</td>
<td></td>
</tr>
</tbody>
</table>

- SW1-1 on Odd or even parity
- SW1-2 on No parity
- SW1-3 on 8 bit data
- SW1-4 on Protocol ready/busy
- SW1-5 on Test select
- SW1-6 on Print mode
- SW1-7 on SDD(-) pin 11
- SW1-8 on SDD(-) pin 11

**WEIGH-TRONIX Printer**

**IMP-24 Model 2600**

SW1 - off 1200 Baud*

2 - on 1200 Baud*

**Model 1220**

- **Configure Menu**
  - Baud = 1200
  - Data Bits = 8
  - Stop Bits = 1
  - Hshake = Busy-Line
  - Cols = 32
  - Invert = No
  - Font = 5 x 8
  - Mag = None

- **Custom Menu**
  - Auto Seq = No
  - Zero = 0
  - Pound sign = #
  - (Underscore)
  - Busy invert = no
  - Online/offline = yes
  - Ext Ch Set = no
  - Print ready = yes
  - Set Clock = Not Used
  - Reset Seq = Not Used

**If equipped with HIGH SPEED serial board:**

<table>
<thead>
<tr>
<th>SW</th>
<th>Setting 1</th>
<th>Setting 2</th>
<th>Setting 3</th>
<th>Setting 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>off</td>
<td>(-) Low when busy</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>off</td>
<td>1200 Baud*</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>off</td>
<td>1200 Baud*</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>on</td>
<td>1200 Baud*</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Not Used</td>
<td>1200 Baud*</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>off</td>
<td>no parity</td>
<td>1200 Baud*</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>off</td>
<td>Pin 20 and pin 11 act as busy line</td>
<td>1200 Baud*</td>
<td></td>
</tr>
</tbody>
</table>
SEIKO Printer

**DipSW**

1-1 = off  Input-Serial
1-2 = on  Printing speed high
1-3 = on  Auto loading - on
1-4 = off  Auto LF - off
1-5 = on  Setting Command - Enable
1-6 = off  Printing density - 100%
1-7 = on  Printing density - 100%
1-8 = on  Printing, density - 100%

DipSW

2-1 = on  Printing Columns - 40
2-2 = on  User Font Back-up - on
2-3 = on  Character Select - normal
2-4 = off  Zero - slash
2-5 = on  International character set - American
2-6 = on  International character set - American
2-7 = on  International character set - American
2-8 = off  International character set - American

DipSW

3-1 = on  Data length - 8 bits
3-2 = on  Parity Setting - no
3-3 = on  Parity condition - odd
3-4 = on  Busy control - H/W busy
3-5 = on  Baud rate select - 1200*
3-6 = off  Baud rate select - 1200*
3-7 = on  Baud rate select - 1200*
3-8 = off  Baud rate select - 1200*

* Settings shown for 1200 Baud. Other Baud rates can be selected. Refer to Printer manufacturer’s manual supplied with Printer.

**Printer Setup**

**Access Level Required: OPERATOR**

Using the COMMS Screen, the control center must be configured to transmit data in the same format as the Printer is configured to receive the data. The following values must be entered.

- Baud Rate - Set as desired. Value selected must be the same as Printer configuration above.
- Data Bits - 8
- Parity - None
- Stop Bits - 1

**Printer Type**

**Access Level Required: OPERATOR**

Using the PRINTER Screen, the actual Printer type connected to the control center must be entered. Selection determines the control codes that are sent to the Printer. These codes determine such things as lines per inch, character width and general formatting. Available selections are: Okidata, Weigh-Tronix and Seiko.

**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.

**CONTROL CENTER SETUP**

**Chiller ID**

**Access Level Required: OPERATOR**

Using the COMMS Screen, assign an Identification number to the chiller. This number will appear at the top of each report.
FIGURE 57 - SAMPLE PRINTOUT (STATUS)

**YORK LIVE DATA**
**SAMPLE CHILLER**

YMCZ-51055AAS
SHMM-100000
YMCZ Chiller ID 1
(c) 2010 Johnson Controls
Thu 23 Jun 2011 2:22:57 PM

---

**SYSTEM RUN**
Controls C.OPT.16.01.307
Run Time 0 Days 0 Hr 24 Min 41 Sec
Operating Hours = 2268 Hr
Number Of Starts = 156
Control Source = Digital
Run Permissive = True

---

**Evaporator**
Chilled Liquid Pump = Run
Chilled Liquid Flow Switch = Closed
Active LHCLT Setpoint = 42.0 °F
Shutdown Temperature = 40.0 °F
Leaving Chilled Liquid Temperature = 42.1 °F
Entering Chilled Liquid Temperature = 45.2 °F
Evaporator Pressure = 36.2 PSIG
Evaporator Saturation Temperature = 41.2 °F
Evaporator Refrigerant Temperature = 41.2 °F
Evaporator Small Temp Difference = 0.9 °F

---

**Condenser**
Condenser Liquid Pump = Run
Condenser Liquid Flow Switch = Closed
Leaving Condenser Liquid Temperature = 82.7 °F
Entering Condenser Liquid Temperature = 80.4 °F
Condenser Pressure = 91.4 PSIG
Condenser Saturation Temperature = 82.8 °F
Condenser Small Temp Difference = 0.1 °F
Drop Leg Refrigerant Temp = 80.9 °F
Subcooling Temperature = 1.9 °F
Delta P = 55.2 PSIG
Head Pressure Setpoint = 23.0 PSID
PID Control Mode = Head Pressure
Control Valve Command = 0.0 %

---

**Compressor**
Discharge Temperature = 107.2 °F
Discharge Superheat = 24.4 °F
Stop Bypass Valve = Off
PRV Opening = On (Gas Path A)
PRV Closing = Off (Gas Path A)
PRV Actuator Mode = Auto (Gas Path A)

---

**Surge**
Surge Count = 0
Delta P / P = 1.52
Surge Window Time = 3 Min
Surge Window Count = 0

---

**Refrigerant Level Control**
Refrigerant Level = 51.0 %
Active Level Setpoint = 50.0 %
Level Control State = Zone 1
Level Control Valve Command = 7.9 %

---

**Variable Geometry Diffuser**
Active Stall Voltage = 0.29 V
Active Stall Voltage Type = Standard
Active High Limit = 0.53 V
Active Low Limit = 0.48 V
Mach Number = 1.24
VGD Opening = On
VGD Closing = Off
VGD Position = 25.0 % (Gas Path A)
Maximum VGD Position = 25.0 % (Gas Path A)

---

**Variable Speed Drive**
VSD Inverter = D.H044.04.01.02.A01
VSD Rectifier = D.H044.03.01.02.A01
Motor Run = On
VSD Fault = On
Input % Full Load Amps = 30.8 %
VSD Output Voltage = 258 V
VSD Frequency Command = 282.82 Hz
VSD Output Frequency = 282.81 Hz
Max Chiller Frequency = 345.40 Hz
Input Power = 70 kW
Input KW Hours = 44456 kWh
L1 Voltage Total Harmonic Distortion = 9.0 %
L2 Voltage Total Harmonic Distortion = 5.0 %
L3 Voltage Total Harmonic Distortion = 5.0 %
L1 Input Current Total Demand Distortion = 8.0 %
L2 Input Current Total Demand Distortion = 6.0 %
L3 Input Current Total Demand Distortion = 7.0 %
Total Input KVA = 79 kVA
Total Power Factor = 0.89
Motor % Full Load Amps = 32.8 %
VSD Command = Run
VSD Control State = Run
VSD Inverter State = Run Speed Control
Phase Rotation = ABC
Precharge Active = Off
Precharge Complete = True
DC Bus Regulating = Off
DC Bus Voltage = 747 V
Input Current Limit = Off
Cooling System = On

---

**FIGURE 57 - SAMPLE PRINTOUT (STATUS) (CONT’D)**
<table>
<thead>
<tr>
<th><strong>PRV Control Mode</strong></th>
<th>Auto (Gas)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VGD Control Mode</strong></td>
<td>Auto (Gas)</td>
</tr>
<tr>
<td><strong>PRV Position</strong></td>
<td>25.0% (Gas)</td>
</tr>
<tr>
<td><strong>VGD Position</strong></td>
<td>25.0% (Gas)</td>
</tr>
<tr>
<td><strong>PRV Command</strong></td>
<td>25.0% (Gas)</td>
</tr>
<tr>
<td><strong>VGD Command</strong></td>
<td>25.0% (Gas)</td>
</tr>
<tr>
<td><strong>Active Minimum PRV Position</strong></td>
<td>25.0% (Gas)</td>
</tr>
</tbody>
</table>

**Anti-Surge Transient Offset** = 0.00 Hz

**Active Anti-Surge Minimum Frequency** = 0.00 Hz

**Anti-Surge Minimum Frequency** = 0.00 Hz

**Anti-Surge Transient Offset** = 0.00 Hz

---

**Magnetic Bearing Controller**

<table>
<thead>
<tr>
<th><strong>MBC Control Mode</strong></th>
<th>Auto</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MBC Command</strong></td>
<td>Rotation</td>
</tr>
<tr>
<td><strong>Dellevitated Mode</strong></td>
<td>Off</td>
</tr>
<tr>
<td><strong>Levitated Mode</strong></td>
<td>Off</td>
</tr>
<tr>
<td><strong>Motor Speed</strong></td>
<td>282 Hz</td>
</tr>
<tr>
<td><strong>V13 Position</strong></td>
<td>10 -m</td>
</tr>
<tr>
<td><strong>W13 Position</strong></td>
<td>10 -m</td>
</tr>
<tr>
<td><strong>V24 Position</strong></td>
<td>8 -m</td>
</tr>
<tr>
<td><strong>W24 Position</strong></td>
<td>8 -m</td>
</tr>
<tr>
<td><strong>Z12 Position</strong></td>
<td>3 -m</td>
</tr>
<tr>
<td><strong>V1</strong></td>
<td>2.164 A</td>
</tr>
<tr>
<td><strong>V2</strong></td>
<td>1.835 A</td>
</tr>
<tr>
<td><strong>V3</strong></td>
<td>0.533 A</td>
</tr>
<tr>
<td><strong>V4</strong></td>
<td>0.831 A</td>
</tr>
<tr>
<td><strong>W1</strong></td>
<td>1.913 A</td>
</tr>
<tr>
<td><strong>W2</strong></td>
<td>1.803 A</td>
</tr>
<tr>
<td><strong>W3</strong></td>
<td>0.800 A</td>
</tr>
<tr>
<td><strong>W4</strong></td>
<td>0.800 A</td>
</tr>
<tr>
<td><strong>Z1</strong></td>
<td>1.066 A</td>
</tr>
<tr>
<td><strong>Z2</strong></td>
<td>1.427 A</td>
</tr>
<tr>
<td><strong>Rotor Elongation</strong></td>
<td>22 -m</td>
</tr>
<tr>
<td><strong>Motor Housing Temperature</strong></td>
<td>49.5 °F</td>
</tr>
<tr>
<td><strong>Landing Counter</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>VM13 Vibration</strong></td>
<td>6 -m</td>
</tr>
<tr>
<td><strong>VM24 Vibration</strong></td>
<td>5 -m</td>
</tr>
<tr>
<td><strong>Z12 Vibration</strong></td>
<td>0 -m</td>
</tr>
<tr>
<td><strong>Z1 Temperature</strong></td>
<td>109 -F</td>
</tr>
<tr>
<td><strong>Z2 Temperature</strong></td>
<td>72 -F</td>
</tr>
<tr>
<td><strong>MBC Amplifier Temp</strong></td>
<td>97 -F</td>
</tr>
<tr>
<td><strong>MBC Converter Temp</strong></td>
<td>111 -F</td>
</tr>
<tr>
<td><strong>MBC Operation Time</strong></td>
<td>40 Days</td>
</tr>
<tr>
<td><strong>MBC Rotation Time</strong></td>
<td>39 Days</td>
</tr>
<tr>
<td><strong>Number of Events</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of ESD Snapshots</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Number of Deceleration Snapshots</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>AVR</strong></td>
<td>Off</td>
</tr>
<tr>
<td><strong>ABS</strong></td>
<td>On</td>
</tr>
</tbody>
</table>

**Path A)**

**Path B)**

**Path C)**

**Path D)**

---

**MBC Fault** = Off

**Rotation Allowed** = On

**Rotation Mode** = On

**MBC Shutdown** = Off

**Test Mode** = Disabled

**Manual DC Bus** = Disabled

**Manual Cooling** = Disabled

**Magnetic Bearing Controller**

<table>
<thead>
<tr>
<th><strong>Operation</strong></th>
<th><strong>Value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condenser Pressure</strong></td>
<td>46.40 PSIG</td>
</tr>
<tr>
<td><strong>Evaporator Pressure</strong></td>
<td>68.30 PSIG</td>
</tr>
<tr>
<td><strong>Head Pressure</strong></td>
<td>0.0 PSID</td>
</tr>
<tr>
<td><strong>MBC Command</strong></td>
<td>Rotation</td>
</tr>
<tr>
<td><strong>MBC Control Mode</strong></td>
<td>Auto</td>
</tr>
<tr>
<td><strong>MBC Converter Temp</strong></td>
<td>97 -F</td>
</tr>
<tr>
<td><strong>MBC Operation Time</strong></td>
<td>40 Days</td>
</tr>
<tr>
<td><strong>MBC Rotation Time</strong></td>
<td>39 Days</td>
</tr>
<tr>
<td><strong>Number of Events</strong></td>
<td>100</td>
</tr>
<tr>
<td><strong>Number of ESD Snapshots</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Number of Deceleration Snapshots</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>AVR</strong></td>
<td>Off</td>
</tr>
<tr>
<td><strong>ABS</strong></td>
<td>On</td>
</tr>
</tbody>
</table>
YORK SETPOINTS
SAMPLE CHILLER

YMC2-S-0703AA
SGWM-100000
YMC2 Chiller ID 1
(c) 2010 Johnson Controls
Tue 28 Jun 2011 7:59:24 AM

Software Versions

Controls = C.OPT.16.01.307
CC = 3.05
BIOS = C.OPT.00.02
Kernel = 1.21
GP = 1.09
GUI = 0.44
SIO = 1.25
GPIC = 0.13.e.8
Ext I/O = C.EXP.01.00
VSD Inverter = C.HYP.04.01.02
VSD Rectifier = C.HYP.03.01.02
VSD Modbus = 04.01

System Information

Data Display Mode = English
System Language = English
Date Format = DD MMM YYYY
Control Source = ISN
Remote Analog Input Range = 0-10 Volts
Line Voltage = 460V
Line Frequency = 60Hz
Chilled Liquid Pump Operation = Standard
Head Pressure Control = Disabled
Hot Gas Bypass = Enabled
Flow Switch Input = J14
Power Failure Restart = Auto
Clock = Enabled

Jumper Settings

Liquid Type = Water
Refrigerant Selection = R134a

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 = 38400 Baud
Data Bits = 8 Bits
Parity = None
Stop Bits = 2 Bits

Evaporator

Leaving Chilled Local Setpoint = 42.0 °F
Leaving Chilled ISN Setpoint = 42.0 °F
Leaving Chilled Modem Setpoint = 45.0 °F
Leaving Chilled Analog Setpoint = 42.0 °F
Leaving Chilled Digital Setpoint = 42.0 °F
Remote Range = 10.0 °F
Restart Offset = 2.0 °F
Restart Temperature = 44.0 °F
Shutdown Offset = 4.0 °F
Shutdown Temperature = 38.0 °F
Brine Low Evaporator Cutout = 25.0 PSIG
Smart Freeze = Off
Refrigerant = Enabled

Condenser

High Pressure Warning Threshold = 162.5 PSIG
Head Pressure Setpoint = 23.0 PSIG
Type = 0-10V
PID Output = Direct
Refrigerant Level Control

Refrigerant Level Setpoint = 50.0 %
Startup Position = 45.0 %
Startup Delay = 0 Min
Ramp Time = 1 Min
Zone Transition Delta = 5.0 %
Zone Transition Time = 10 Sec
Level Control Zone 1 Proportional = 0.50
Level Control Zone 1 Integral = 1.00
Level Control Zone 1 Derivative = 0.00
Level Control Zone 2 Proportional = 0.70
Level Control Zone 2 Integral = 2.50
Level Control Zone 2 Derivative = 0.00

Variable Geometry Diffuser

PRV VGD Inhibit = 100 %
PRV Offset = 3 %
Surge React Time = 5 Sec
Surge Wait Time = 0.5 Min
Probe Wait Time = 0.5 Min
Open Pulse = 5 Sec
High Limit = 0.50 V
Low Limit = 0.45 V
Broadband Threshold = 0.18 V
100% VGD Voltage = 3.21 V
0% VGD Voltage = 2.03 V
VGD Calibrated = True

FIGURE 58 - SAMPLE PRINTOUT (SETPOINTS)
FIGURE 58 - SAMPLE PRINTOUT (SETPOINTS) (CONT'D)
FIGURE 58 - SAMPLE PRINTOUT (SETPOINTS) (CONT'D)

Variable Speed Drive
---------------------------------------
Local Input Current Limit = 100 %
Remote ISN Input Current Limit = 30 %
Remote Analog Input Current Limit = 100 %
Remote Digital Input Current Limit = 100 %
Remote Modem Input Current Limit = 100 %
Pulldown Demand Limit = 100 %
Pulldown Demand Time = 0 Min
Input Job Full Load Amps = 185 A
Rated Motor Voltage = 507V
Maximum Motor Current = 505 A
Output Current Rating = 525 A
Stator Resistance = 90
Stator Inductance = 6
Rotor Resistance = 90
Rotor Inductance = 0
Magnetizing Inductance = 0
Poles = 2
Motor Back-EMF Constant = 3276
Motor Power Factor = 0
DC Bus Voltage Setpoint = 750 V
Operation Mode = Voltage
Soft Shutdown Frequency = 50.00 Hz
Flux Command = 0
Current Kp = 0
Current Ki = 0
Current Anti-Windup = 0
Flux Kp = 0
Flux Ki = 0
Flux Anti-Windup = 0
Speed Kp = 0
Speed Ki = 0
Speed Anti-Windup = 0
SW Fault Mask 1 = 0
SW Fault Mask 2 = 0
SW Fault Mask 3 = 0

Motor Monitoring
---------------------------------------
Motor Temperature 1 = Enabled
Motor Temperature 2 = Enabled
Motor Temperature 3 = Enabled
Motor Temperature 4 = Enabled
Motor Temperature 5 = Enabled
Motor Temperature 6 = Enabled

Capacity Control
---------------------------------------
VSD Start Frequency = 172.70 Hz
VSD Soft Shutdown Ramp Rate = 20 Hz/Sec
PRV Start Position = 30.0 %
PRV Shutdown Position = 10.0 %
HGBP Start Position = 0.0 %
LCHLT Setpoint Ramp Rate = 0.1 °F/S
LCHLT Setpoint Start Offset = 10.0 °F
Temperature Control Kp = 5.0
Temperature Control Ti = 25.0
Temperature Control Td = 0.0
Temperature Control Max Loading Delta = 1.0
Temperature Control Max Unloading Delta = 1.0
VSD Output Gain = 0.5

VSD Output Gain = 1.0 (Gas Path B)
PRV Output Gain = 1.0 (Gas Path A)
HGBP Output Gain = 1.0
Minimum PRV Position = 5.0 % (Gas Path A)

Min Frequency Multiplier
Min Frequency Offset
Min Freq Rate - HGBP Closed (C.OPT.16.01.213 only)
Min Freq Rate - HGBP Open (C.OPT.16.01.213 only)
Min Freq Rate Maximum - 10.00 Hz/Sec (C.OPT.16.02.213 and later)
Min Freq Rate Minimum - 0.10 Hz/Sec (C.OPT.16.02.213 and later)
Min Frequency Admin Multiplier
Min Frequency Mid Position = 40.0 %
Min Frequency Coefficient a1 = 1.440
Min Frequency Coefficient a2 = 1.315
Min Frequency Coefficient a3 = 1.305
Min Frequency Coefficient b1 = 0.525
Min Frequency Coefficient b2 = 0.497
Min Frequency Coefficient b3 = 0.495
Transient Time Delay = 2.5
Transient Deadb Band = 0.010
Transient Max Change = 0.25
Max VGD Knee PRV = 5.0 % (Gas Path A)
Max VGD Knee VGD = 5.0 % (Gas Path A)
Max VGD Coefficient A = 5.0 (Gas Path A)
Max VGD Coefficient B = 5.0 (Gas Path A)

Evaporator Pressure Load Limit Threshold
Evaporator Pressure Load Limit Delta
Evaporator Pressure Max Override Threshold
Evaporator Pressure Max Override Delta
Condenser Pressure Load Limit Threshold
Condenser Pressure Load Limit Delta
Condenser Pressure Max Override Threshold
Condenser Pressure Max Override Delta
Input Current Load Limit Threshold
Input Current Load Limit Delta
Input Current Max Override Threshold
Input Current Max Override Delta
Motor Current Load Limit Threshold
Motor Current Load Limit Delta
Motor Current Max Override Threshold
Motor Current Max Override Delta
LCHLT Max Override Delta
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

YORK SALES ORDER
YMC2 -CHILLER ID 1
(c) 2010 Johnson Controls
Mon 01 Nov 2010  9:25:18 AM

Order Information

Commissioning Date = York Building 36
Chiller 1
System Model = YMC2xxxxx
York Order Number
Unit Serial Number
Compressor Model
Evaporator Model
Condenser Model
VSD Model

Nameplate Information

---
Capacity (Tons)
Refrigerant
Refrig Weight (lbs)
RPM
Input kW
Voltage
Phases
Frequency
Input Job FLA
Min Circuit Ampacity

Design Conditions - Evaporator

---
Pressure Drop (ft)
Flow (GPM)
Leaving Temperature (°F)
Entering Temperature (°F)
Fouling Factor
Liquid Type
Brine Percent

Design Conditions - Condenser

---
Pressure Drop (ft)
Flow (GPM)
Leaving Temperature (°F)
Entering Temperature (°F)
Fouling Factor
Liquid Type
Brine Percent

Sales Order Setup

---
Finish Panel Setup = No

FIGURE 59 - SAMPLE PRINTOUT (SCHEDULE)

FIGURE 60 - SAMPLE PRINTOUT (SALES ORDER)
FIGURE 61 - SAMPLE PRINTOUT (HISTORY)
VSD Inverter State = Run Speed Control
Phase Rotation = ABC
Precharge Active = Off
Precharge Complete = True
DC Bus Regulating = Off
DC Bus Voltage = 747 V
Input Current Limit = Off
Cooling System = On
L1 Input Voltage (Peak) = 700 V
L2 Input Voltage (Peak) = 678 V
L3 Input Voltage (Peak) = 670 V
L1 Input Voltage (RMS) = 482 V
L2 Input Voltage (RMS) = 481 V
L3 Input Voltage (RMS) = 481 V
L1 Input Current (RMS) = 95 A
L2 Input Current (RMS) = 91 A
L3 Input Current (RMS) = 91 A
Phase A Output Voltage (RMS) = 259 V
Phase B Output Voltage (RMS) = 257 V
Phase C Output Voltage (RMS) = 258 V
Phase A Output Current (RMS) = 161 A
Phase B Output Current (RMS) = 161 A
Phase C Output Current (RMS) = 166 A
Phase A Rectifier Baseplate Temperature = 108 °F
Phase B Rectifier Baseplate Temperature = 103 °F
Phase C Rectifier Baseplate Temperature = 98 °F
Phase A Inverter Baseplate Temperature = 122 °F
Phase B Inverter Baseplate Temperature = 117 °F
Phase C Inverter Baseplate Temperature = 111 °F
Internal Ambient Temperature 1 = 95 °F
Internal Ambient Temperature 2 = 93 °F
Test Mode = Disabled
Manual DC Bus = Disabled
Manual Cooling = Disabled

Motor Monitoring

Motor Temperature 1 = 66 °F
Motor Temperature 2 = 66 °F
Motor Temperature 3 = 66 °F
Motor Temperature 4 = 66 °F
Motor Temperature 5 = 66 °F
Motor Temperature 6 = 66 °F
Average Winding Temperature = 66.0 °F

Capacity Control

Control State = Inactive
Load Limit = Inactive
VSD Frequency Command = 0.00 Hz
VSD Output Frequency = 0.00 Hz
VSD Control Mode = Auto
Active Anti-Surge Minimum Frequency = 0.00 Hz
Anti-Surge Minimum Frequency = 0.00 Hz
Anti-Surge Transient Offset = 0.00 Hz
VGD Command = 25.0% (Gas Path B)
PRV Command = 25.0% (Gas Path A)
VGD Position = 25.0% (Gas Path B)

PRV Position = 25.0% (Gas Path A)
VGD Control Mode = Auto (Gas Path B)
PRV Control Mode = Auto (Gas Path A)
Active Minimum PRV Position = 25.0% (Gas Path A)
HGBP Command = 25.0%
   (only when HGBP enabled)
HGBP Control Mode = Auto
   (only when HGBP enabled)
Head Pressure = 0.0 PSID
Evaporator Pressure (filtered) = 46.40 PSIG
Condenser Pressure (filtered) = 68.30 PSIG
Leaving Chilled Liquid Temperature = 44.80 °F
   (filtered)

Magnetic Bearing Controller

MBC Control Mode = Auto
MBC Command = Rotation
Delevitated Mode = Off
Levitated Mode = Off
Rotation Mode = On
MBC Shutdown = Off
Rotation Allowed = On
MBC Fault = Off
Motor Speed = 282 Hz
V13 Position = 10 -m
W13 Position = 10 -m
V24 Position = 8 -m
Z12 Position = 3 -m
V1 = 2.164 A
V2 = 1.835 A
V3 = 0.533 A
V4 = 0.831 A
W1 = 1.913 A
W2 = 1.803 A
W3 = 0.800 A
W4 = 0.800 A
Z1 = 1.066 A
Z2 = 1.427 A
Rotor Elongation = 22 -m
Motor Housing Temperature = 49.5 °F
Landing Counter = 1
VW13 Vibration = 6 -m
VW24 Vibration = 5 -m
Z12 Vibration = 0 -m
Z1 Temperature = 109 °F
Z2 Temperature = 72 °F
MBC Amplifier Temp = 97 °F
MBC Converter Temp = 111 °F
MBC Operation Time = 40 Days
MBC Rotation Time = 39 Days
Number of Events = 100
Number of ESD Snapshots = 2
Number of Deceleration Snapshots = 2
AVR = Off
ABS = On
FIGURE 63 - SAMPLE PRINTOUT (TREND DATA NEW OR EXISTING POINTS)

FIGURE 64 - SAMPLE PRINTOUT (CUSTOM SCREEN REPORT)
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.

1. Connect the laptop computer to the OptiView as described below.

<table>
<thead>
<tr>
<th>Laptop (RS-232 Serial Port)</th>
<th>OptiView (Com 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN</td>
<td>DESC</td>
</tr>
<tr>
<td>2</td>
<td>RX</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
</tr>
</tbody>
</table>

2. On OptiView Printer Screen, select “PC”. This will allow faster data download than the printer selections. SETTINGS should match “h. Port settings” see below.

3. Setup HyperTerminal
   a. Go to START menu
   b. Select All Programs
   c. Select Accessories
   d. Select Communications
   e. Select HyperTerminal
   f. In the box displayed, it requires a name and icon for the connection. Select a name that is descriptive and select an icon. Select OK.
   g. In the box labeled Connect using the select com port that will connect to the YMC² unit. This port is usually labelled Com 1. Select OK.
   h. Port settings
      - Bits per second: 57600
      - Data bits: 8
      - Parity: None
      - Stop Bits: 1
      - Flow Control: None

4. Set HyperTerminal to capture a file.
   a. Select Transfer from toolbar
   b. Select Capture Text from the drop down menu.
   c. A Capture Text Filebox will be displayed. Verify location and file name.
   d. Select Start.

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.

When the print file has been recorded, select Transfer from the toolbar and capture from the drop down menu and select Stop. This will stop the transfer and allow access to the capture file.

The following additional RS232 connections, are used to wire up serial devices for desktop and laptop computers.

<table>
<thead>
<tr>
<th>RS-232 PIN ASSIGNMENTS (DB25 PC SIGNAL SET) (OLDER DESKTOPS ONLY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
</tr>
<tr>
<td>Pin 2</td>
</tr>
<tr>
<td>Pin 3</td>
</tr>
<tr>
<td>Pin 4</td>
</tr>
<tr>
<td>Pin 5</td>
</tr>
<tr>
<td>Pin 6</td>
</tr>
<tr>
<td>Pin 7</td>
</tr>
<tr>
<td>Pin 8</td>
</tr>
<tr>
<td>Pin 20</td>
</tr>
<tr>
<td>Pin 22</td>
</tr>
</tbody>
</table>

The connector on the PC has Male pins, therefore the mating cable needs to terminate in a DB25/F (Female pin) connector.

<table>
<thead>
<tr>
<th>RS-232 PIN ASSIGNMENTS (DB9 PC SIGNAL SET) (MOST LAPTOPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
</tr>
<tr>
<td>Pin 2</td>
</tr>
<tr>
<td>Pin 3</td>
</tr>
<tr>
<td>Pin 4</td>
</tr>
<tr>
<td>Pin 5</td>
</tr>
<tr>
<td>Pin 6</td>
</tr>
<tr>
<td>Pin 7</td>
</tr>
<tr>
<td>Pin 8</td>
</tr>
<tr>
<td>Pin 9</td>
</tr>
</tbody>
</table>

The connector on the PC has male pins; therefore, the mating cable needs to terminate DB9/F (female pin) connector.
FIGURE 65 - COMMUNICATIONS BLOCK DIAGRAM
The following factors can be used to convert from English to the most common SI Metric values.

### TABLE 13 - SI METRIC CONVERSION

<table>
<thead>
<tr>
<th>MEASUREMENT</th>
<th>MULTIPLY ENGLISH UNIT</th>
<th>BY FACTOR</th>
<th>TO OBTAIN METRIC UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Tons Refrigerant Effect (ton)</td>
<td>3.516</td>
<td>Kilowatts (kW)</td>
</tr>
<tr>
<td>Power</td>
<td>Horsepower</td>
<td>0.7457</td>
<td>Kilowatts (kW)</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>Gallons / Minute (gpm)</td>
<td>0.0631</td>
<td>Liters / Second (l/s)</td>
</tr>
<tr>
<td>Length</td>
<td>Feet (ft)</td>
<td>0.3048</td>
<td>Meters (m)</td>
</tr>
<tr>
<td></td>
<td>Inches (in)</td>
<td>25.4</td>
<td>Millimeters (mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>Pounds (lbs)</td>
<td>0.4536</td>
<td>Kilograms (kg)</td>
</tr>
<tr>
<td>Velocity</td>
<td>Feet / Second (fps)</td>
<td>0.3048</td>
<td>Meters / Second (m/s)</td>
</tr>
<tr>
<td>Pressure Drop</td>
<td>Feet of Water (ft)</td>
<td>2.989</td>
<td>Kilopascals (kPa)</td>
</tr>
<tr>
<td></td>
<td>Pounds / Square Inch (psi)</td>
<td>6.895</td>
<td>Kilopascals (kPa)</td>
</tr>
</tbody>
</table>

#### TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: \((45.0°F - 32°) \times 0.5556 = 7.22°C\)

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: \(10.0°F \text{ range} \times 0.5556 = 5.6 \text{ °C range}\)

#### DISTANCE

The Magnetic Bearing Control positions are given in micrometers, designated by \(\mu m = \text{millimeter/1000}\).