YORK®	Supersedes: 161.01-PW2 (318) Form: 161.01-PW2 (718)
WIRING DIAGRAMS	**YZ MOD A FIELD CONTROL MODIFICATIONS**

CONTRACTOR _____	PURCHASER _____
ORDER NO. _____	JOB NAME _____
JCI CONTRACT NO. _____	LOCATION _____
JCI ORDER NO. _____	ENGINEER _____

☐ REFERENCE DATE _____	☐ APPROVAL DATE _____	☐ CONSTRUCTION DATE _____

JOB DATA:

CHILLER MODEL NO. YZ _____

NO. OF UNITS _____

SYSTEM _____

MOTOR _____

VARIABLE SPEED DRIVE (VSD) _____

EVAPORATOR _____

CONDENSER _____

STAGE END _____

Issue Date:
July 18, 2018

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

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

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

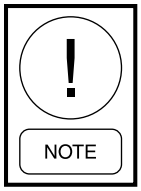
SAFETY SYMBOLS

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

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

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

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



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

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

CHANGEABILITY OF THIS DOCUMENT

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

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

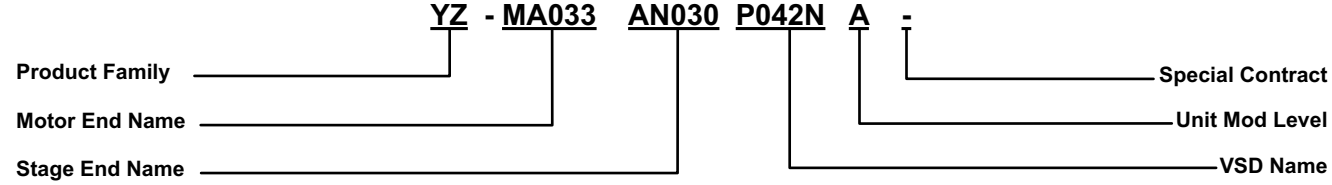
CHANGE BARS

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

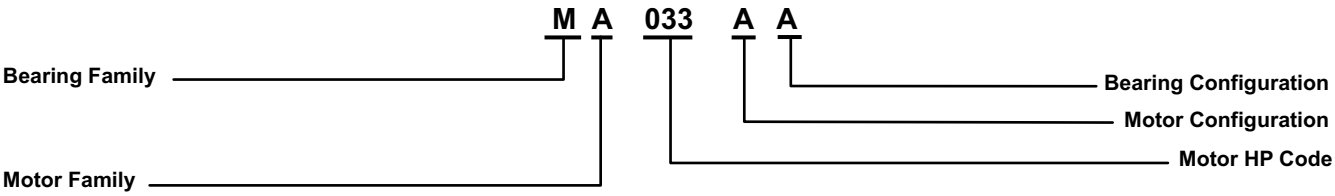
ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
YZ Unit Operations and Maintenance Manual	161.01-OM1
YZ Installation and Re-assembly Manual	161.01-N1
YZ Installation Checklist and Request for Startup	161.01-CL1
YZ Startup Checklist	161.01-CL2
YZ Field Connections	161.01-PW1
YZ VSD Wiring Diagrams	161.01-PW3
YZ Field Connections and Unit Wiring	161.01-PW4
Centrifugal Chiller Long Term Storage	50.20-NM5

SYSTEM NOMENCLATURE



MOTOR END NAMING



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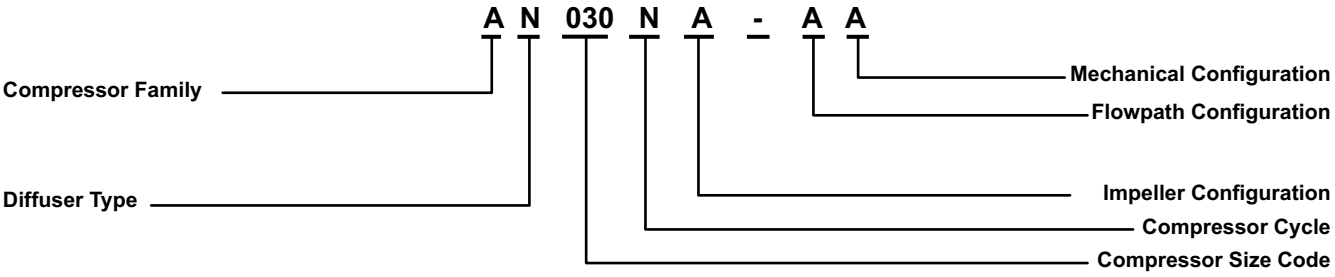
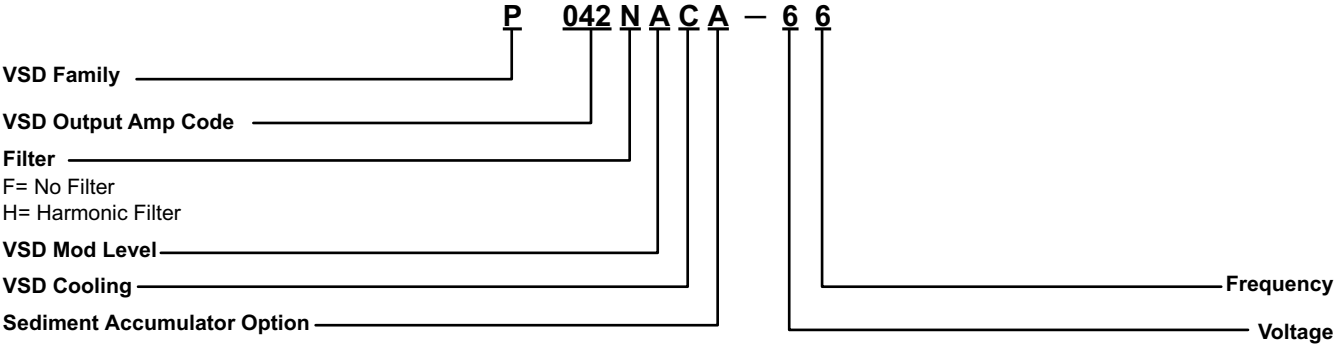


VARIABLE SPEED DRIVE NOMENCLATURE



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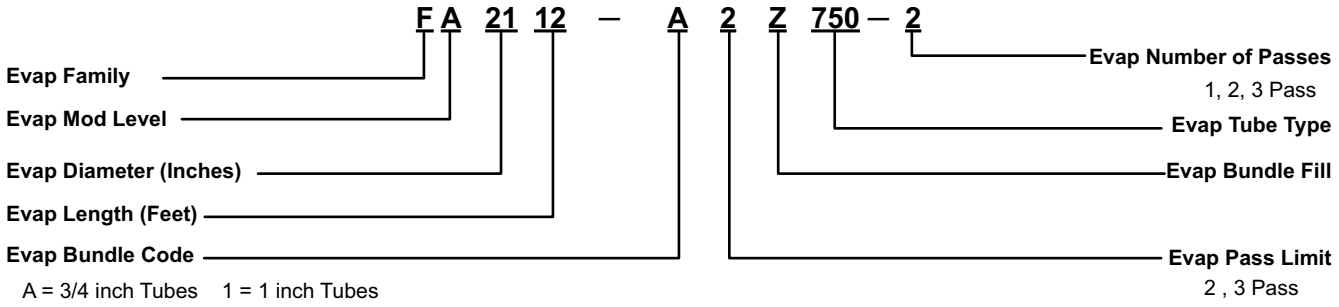
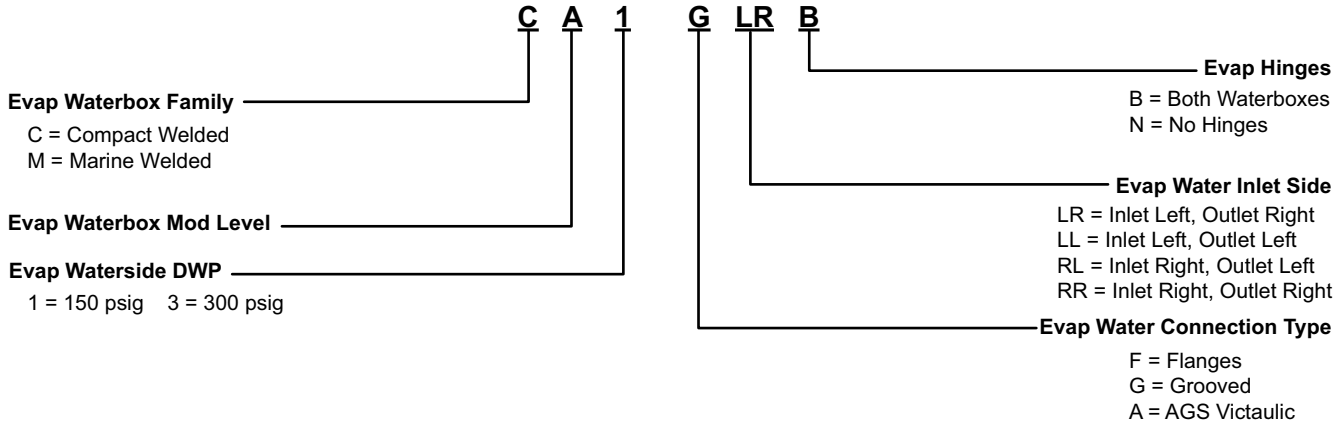
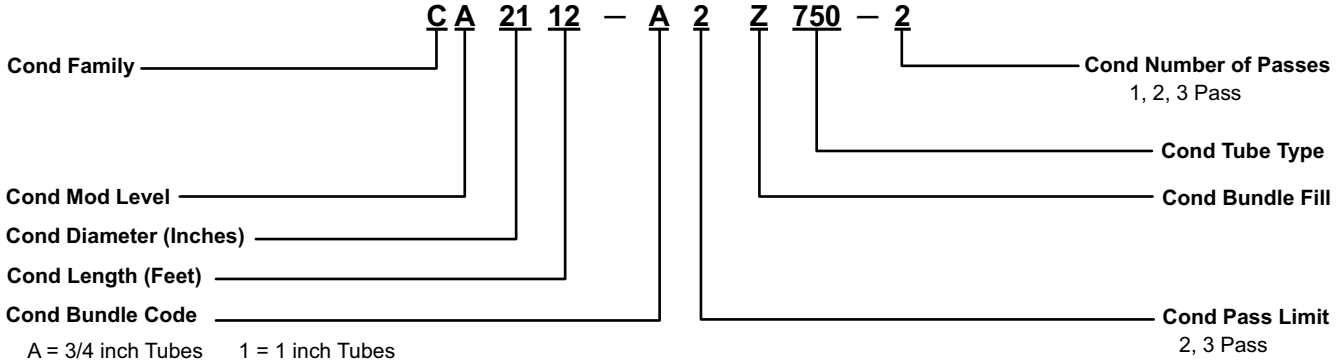
EVAPORATOR NAMING



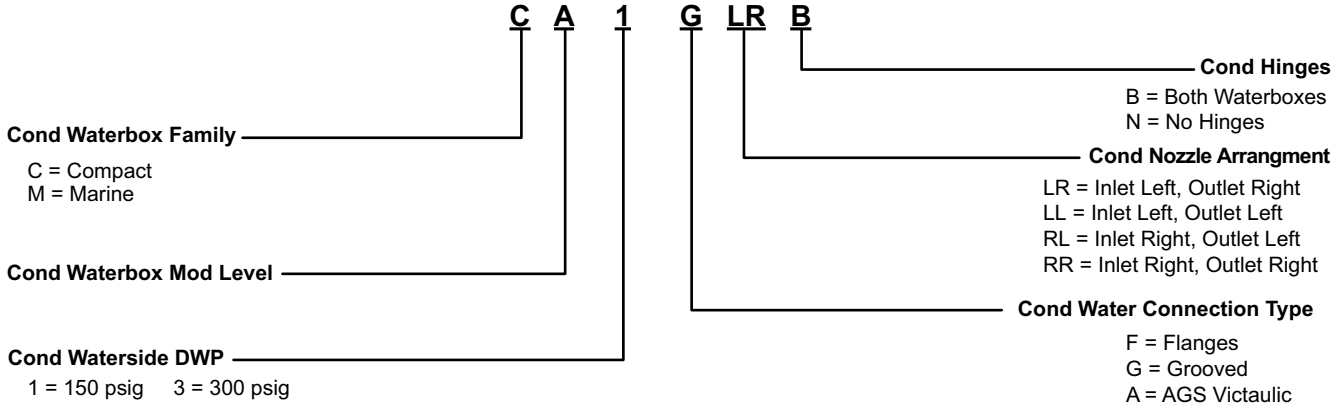
EVAPORATOR WATERBOX NAMING



CONDENSER NAMING



CONDENSER WATERBOX NAMING



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SECTION 1 - FIELD CONTROL MODIFICATIONS

1. This document guides with recommended field control wiring modifications (by others) to the standard OptiView™ Control Center Wiring Diagram.
2. If more than one of these modifications is to be utilized with a particular unit, additional consideration must be given to the application to ensure proper functioning of the control system. Consult your Johnson Controls representative.
3. The additional controls and wiring for these modifications are to be furnished and installed in the field by others (see *Warning on page 2*).
4. The controls specified are recommended for use, but other controls of equal specifications are acceptable.
5. All wiring shall be in accordance with the National Electrical Code (NEC), and applicable State and Local Codes.
6. Each 115VAC field connected inductive load, i.e. relay coil, motor starter coil, etc., shall have a transient suppressor wired (by others) in parallel with its coil, physically located at the coil. Spare transient suppressors are furnished in a bag in the OptiView™ Control Center.
7. The OptiView™ Control Center is factory furnished for Auto Restart After Power Failure as a standard function. The control center can be field changed from Auto Restart to Manual Restart after a power failure with a setpoint in the control software setup screen.
8. Two (2) unit controls schemes are suitable for 8° – 12°F (3.9° – 6.1°C) water range. Constant chilled liquid flow is assumed at all loads. For other requirements, contact your Johnson Controls representative.
9. Lead selection and cycling of lag units is available for three (3) units: Kit No. 366-44684D (*see Product Drawing Form 160.00-PA1.1*) in NEMA I enclosure. Consult your Johnson Controls representative.
10. Maximum allowable current draw for the sum of all loads is 2 Amps holding, 10 AMPS inrush Refer to *YZ Field Connections and Unit Wiring (Form 161.01-PW2), for OptiView Control Center wiring diagrams.*
11. Refer to *YZ Field Connections and Unit Wiring (Form 161.01-PW2),* for the following and required field wiring connections on the OptiView-Control Center.
    - Chilled liquid pump run contacts (TB2-44 and TB2-45)
    - Condenser liquid pump run contacts (TB2-150 and TB2-151)
12. The Chilled Liquid Flow Switch is a safety control. It must be connected to prevent operation of the chiller whenever chilled liquid flow is stopped. In addition to protecting the chiller, use of the chilled liquid flow switch can be accomplished in several other ways including, two flow switches, a flow switch and a relay, or separate contacts on the same flow switch.
13. Do not apply voltage on field wiring terminal blocks TB4 and TB6 in YORK OptiView™ Control Center, as 115VAC source is fed from TB6 terminals 1 and 2.

REMOTE MODE READY TO START CONTACTS

When closed, these contacts signify the following:

14. The OptiView™ Control Center is in, “Hardwire” or “BAS” remote operating mode, allowing for energy management system or remote start/stop control (See *Figure 1 on page 8*).
15. All chiller safety cutout controls are in the normal position, so they will allow the unit to start.
16. All chiller cycling cutout controls are in the normal position, so they will allow the unit to start.
17. If applicable anti-recycle timer has timed out, a closure of the Remote Mode Ready to Start Contacts then signifies that the unit shall start when the Energy Management System maintains the Remote Stop Contact open and momentarily closes the Remote Start Contact. When the Remote Mode Ready to Start Contacts close, the OptiView™ Control Center will display SYSTEM READY TO START message.

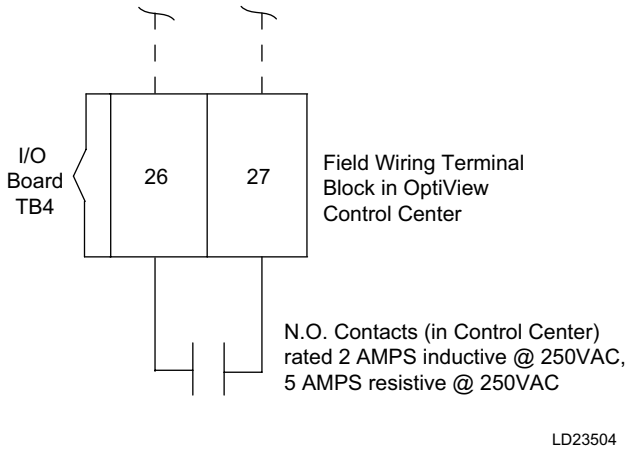

FIGURE 1 - REMOTE READY TO START CONTACTS

CYCLING SHUTDOWN ALARM CONTACTS

When closed, these contacts signify that the unit is not permitted to start due to a CYCLING shutdown condition. The unit will automatically restart after the cycling condition is no longer present. Refer to *YZ Operations and Maintenance* (*Form 161.01-OM1*), for a list and explanation of all Cycling Shutdowns. While these contacts are closed, the OptiView™ Control Center will display CYCLING SHUTDOWN – AUTO RESTART on the System Status Bar and the cause of the shutdown on the System Details bar of the display. Cycling Shutdown contacts function in all operating modes.

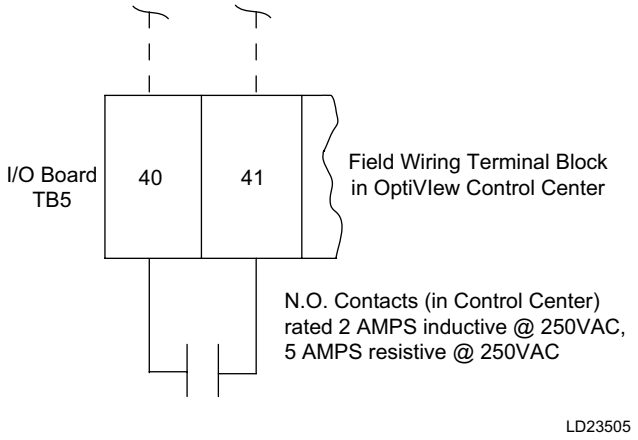

FIGURE 2 - CYCLING SHUTDOWN ALARM CONTACTS

SAFETY SHUTDOWN ALARM CONTACTS

When closed, these contacts signify the unit is not permitted to start due to a SAFETY shutdown alarm condition. Safety shutdowns require a manual reset procedure to be performed before the unit can be restarted. *Refer to YZ Operations and Maintenance* (*Form 161.01-OM1*), for a list and explanation of all the Safety Shutdowns. While these contacts are closed, the OptiView™ Control Center will display SAFETY SHUTDOWN – MANUAL RESTART on the System Status Bar and the cause of the shutdown on the System Details Bar of the display. These contacts will remain closed until the safety condition no longer exists and a manual reset is performed by pressing the Clear Faults key on the control panel. After which the unit restarts. Safety Shutdown Alarm contacts function in all operating modes.

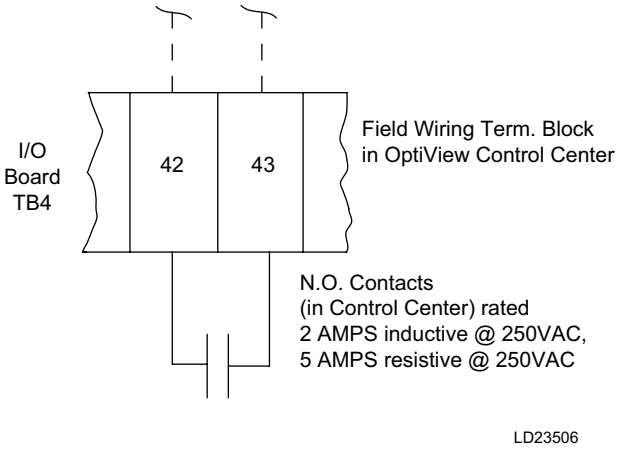

FIGURE 3 - SAFETY SHUTDOWN ALARM CONTACTS

RUN CONTACTS

When closed, these contacts (see *Figure 4 on page 9)* signify that the unit is operating. The OptiView™ Control Center will display a System Run Message.

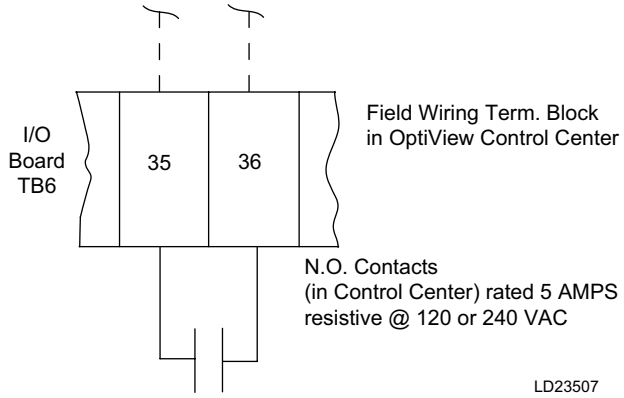

FIGURE 4 - RUN CONTACTS

WARNING ALARM CONTACTS

These contacts will close whenever one or more of the WARNING conditions occur. Refer to all warning conditions listed in *YZ OptiView™ Operation (Form 161.01-M2)*. The contacts remain closed as long as the warning condition is in effect. For most warnings, the contacts automatically open when the condition is no longer present. While for certain warnings, the contacts will open only after the condition is no longer present and the WARNING RESET key is pressed in Operator (or higher) access level.

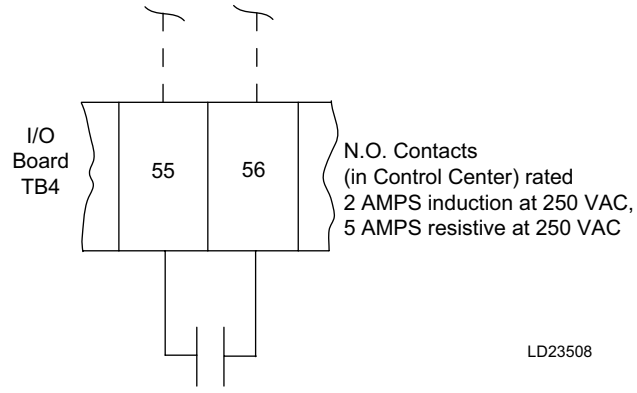

FIGURE 5 - WARNING ALARM CONTACTS

REMOTE START AND STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

When the OptiView™ Control Center is in the "Hard-wire" remote operating mode with the Remote Start/Stop contacts open (see *Figure 6 on page 9)*, the unit will start via a closure of the Remote Start/Stop contacts. A subsequent opening of the Remote Start/Stop contacts causes the chiller to shut down. The Opti-View™ Control Center will display REMOTE STOP because the Energy Management System Remote Start/Stop contact has commanded the unit to shutdown.

Maintained contacts must be used for START and STOP.

NOTE

Even when the chiller is applied with Remote Start-Stop and the Control Center is in "Remote Operating Mode", a SAFETY STOP from the OptiView Control Center, by an operator or others can STOP the compressor and prevent the chiller from restarting. However, the operator cannot locally start the compressor using the LOCAL start keypad button, when the control center is in the "remote" operating mode.

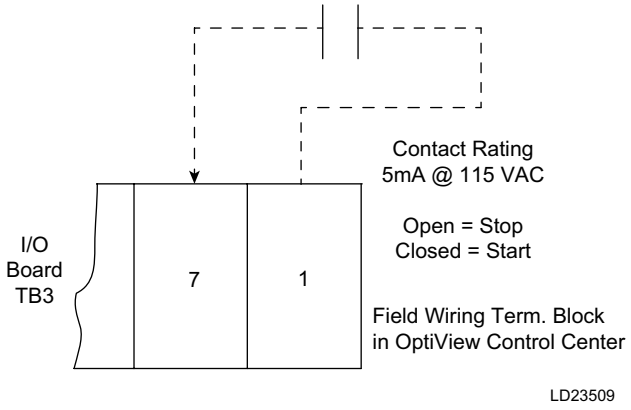

FIGURE 6 - REMOTE START / STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

AUXILIARY SAFETY SHUTDOWN

When 115 VAC is switched to TB2-31 from a chiller source at TB2-1, a safety shutdown of the chiller is commanded. The contacts must open and a manual reset is performed at the panel to restart.

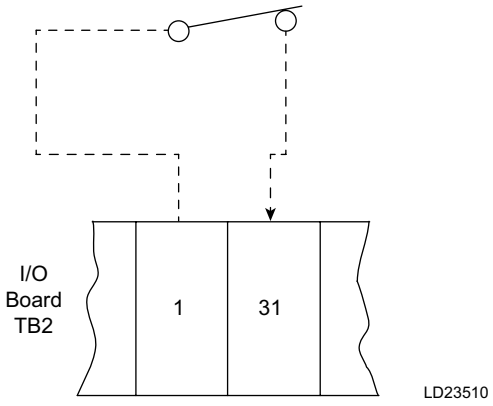

FIGURE 7 - AUXILIARY SAFETY SHUTDOWN

REMOTE/LOCAL CYCLING DEVICES

The closure of an automatically reset device across this input will permit the unit to operate in all operating modes. Conversely, opening device contacts will inhibit the unit from operating. The OptiView™ Control Center will then display the following messages.

- CYCLING SHUTDOWN – AUTO RESTART
- SYSTEM CYCLING – CONTACTS OPEN.

NOTE

The OptiView Control Center allows automatic start and stop configuration of the unit on a daily basis, at pre-defined time intervals. In the control center clock, select daily schedule of Start and Stop time (Sunday through Saturday including holidays in a week) as a standard feature, up to one week at a time. An additional program timer is not required for this.

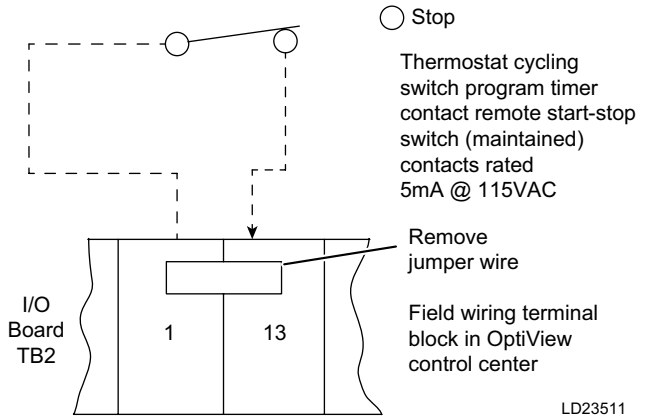

FIGURE 8 - REMOTE/LOCAL CYCLING DEVICES

MULTI-UNIT CYCLING SHUTDOWN

For multiple chiller installation applications, Multi-Unit Cycling Shutdown contacts are available to start and stop each unit. The maintained closure of device contacts across TB2-1 and TB2-9 will permit the unit to operate in all the operating modes with a standing Run command. Conversely, opening device contacts will inhibit the unit from operating. The OptiView™ Control Center will then display the following messages:

- CYCLING SHUTDOWN – AUTO RESTART
- MULTIUNIT CYCLING – CONTACTS OPEN

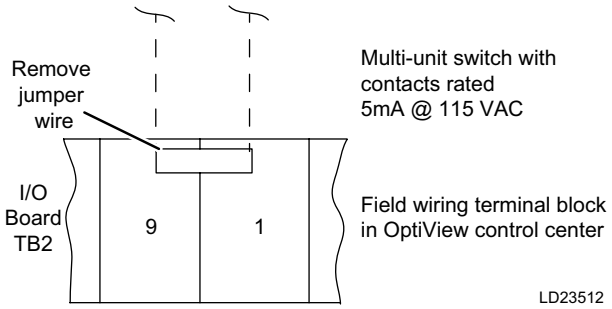

FIGURE 9 - MULTI-UNIT CYCLING SHUTDOWN

CHILLED LIQUID PUMP RUN (TB4-44/45)

When the chiller is started, the contacts close immediately upon entering “MBC Startup”. Normally, they open in coincidence with the receipt of a STOP command or a fault other than those listed below.

A. LEAVING CHILLED LIQUID - LOW TEMPERATURE cycling shutdown.

B. If Chilled Liquid Pump Operation is set to ENHANCED, MULTIUNIT CYCLING - CONTACTS OPEN or SYSTEM CYCLING - CONTACTS OPEN cycling shutdown.

C. LEAVING CHILLED LIQUID FLOW SWITCH OPEN cycling shutdown.

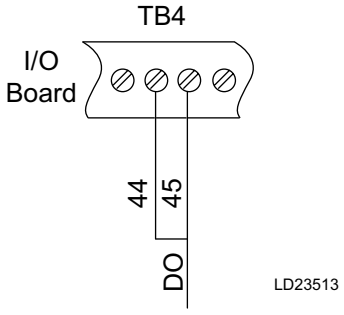

FIGURE 10 - CHILLED LIQUID PUMP RUN

CONDENSER LIQUID PUMP RUN (TB5-150/151)

Contacts close coincident with "MBC Startup" and open in coincidence with the receipt of a chiller STOP command or any fault other than CONDENSER-FLOW SWITCH OPEN cycling shutdown.

Contacts also close when Saturated Condenser Temperature is less than 35.0 °F (1.7 °C) . This helps mitigate condenser freeze due to plant issues in brine applications. If the contacts are closed only due to the Saturated Condenser Temp, they are opened when Saturated Condenser Temperature returns above 40°F (4.4 °C).

If it is desired to supply the dry contacts with 115VAC power from the OptiView™ Control Panel to control the Condenser Pump Motor Starter, a field installed wire must be connected from TB9-22 to I/O Board TB5-150. Then connect I/O Board TB5-151 to the Condenser Pump Motor Starter.

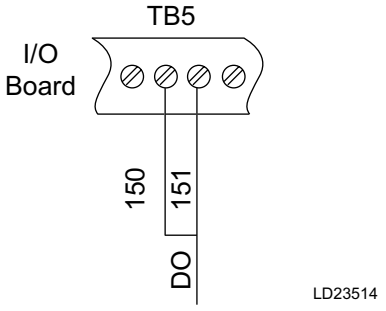

FIGURE 11 - CONDENSER LIQUID PUMP RUN

CONDENSER LIQUID FLOW SENSORS

The Thermal-type Flow Sensor interfaces with the Microboard and Paddle-type Flow Sensor interfaces with the I/O board.

For the program to read the appropriate inputs for the flow sensor status, the actual flow sensor type used must be entered at the keypad OPERATIONS Screen using Service Access Level. Enter "J14" for Thermal-type or "TB" for Paddle-type. Refer to *YZ Operations and Maintenance* (Form 161.01-OM1).

When flow is sensed, the flow sensor contacts are closed. Opening of the flow sensor contacts (no flow) for 30 continuous seconds causes a cycling shutdown displaying CONDENSER - FLOW SWITCH OPEN. The flow sensor status is bypassed for the first 30 seconds of "System Run".

THERMAL TYPE FLOW SENSOR

When the Thermal-type Flow Switch is used, the flow switch uses the cooling effect of liquid to sense flow.

When the flow of liquid is sensed, the solid state relay output is turned on conducting current through the microboard load resistor to the +5VDC applying greater than +4VDC to the microboard input J14-7.

When no flow of liquid is sensed, the solid state relay output is turned off which results in less than 1VDC to the microboard input and the OptiView™ Control Center will display the following messages:

- CYCLING SHUTDOWN – AUTO RESTART
- CONDENSER FLOW SWITCH OPEN.

PADDLE TYPE FLOW SENSOR

If desired, a Condenser Liquid Flow Interlock can be applied. The following two flow switches are available, at an additional cost:

- McDonnel type F61MG-1c, max. 150 psi (YORK Part No. 024-26116)
- McDonnel type FS7-4W, max. 300 psi (YORK Part No. 024-12144)

If Paddle-type (Digital) is selected and no condenser flow sensor is used, a jumper must be installed between TB2-1 and TB2-11.

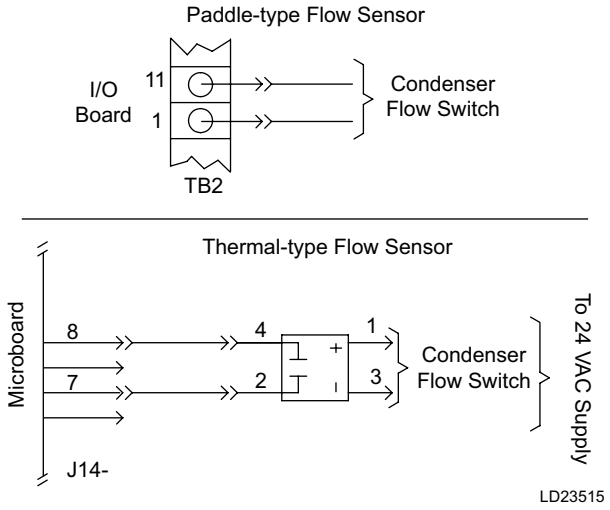

FIGURE 12 - CONDENSER FLOW SWITCHES

When condenser liquid is flowing, the flow switch contact will close. Opening the Condenser Liquid Flow Switch Contacts for 2 continuous seconds will cause unit shutdown. The flow switch status is continuously checked from 30 seconds into “System Run”. Then the OptiView™ Control Center will display the following messages:

- CYCLING SHUTDOWN – AUTO RESTART
- CONDENSER FLOW SWITCH OPEN.

CHILLED LIQUID FLOW SENSORS

The Thermal-type Flow Sensor interfaces with the microboard and Paddle-type Flow Sensor interfaces with the I/O board.

For the program to read the appropriate inputs for the flow sensor status, the actual flow sensor type used must be entered at the keypad OPERATIONS Screen using Service the Access Level. Enter “J14” for Thermal-type or “TB” for Paddle-type. Refer to *YZ Operations and Maintenance* (*Form 161.01-OM1*).

When liquid flow is sensed, the flow sensor contacts are closed. Opening of the flow sensor contacts (no flow) for 2 continuous seconds causes a cycling shutdown displaying LEAVING CHILLED LIQUID - FLOW SWITCH OPEN. The flow sensor status is bypassed for the first 25 seconds of “System Prelube".

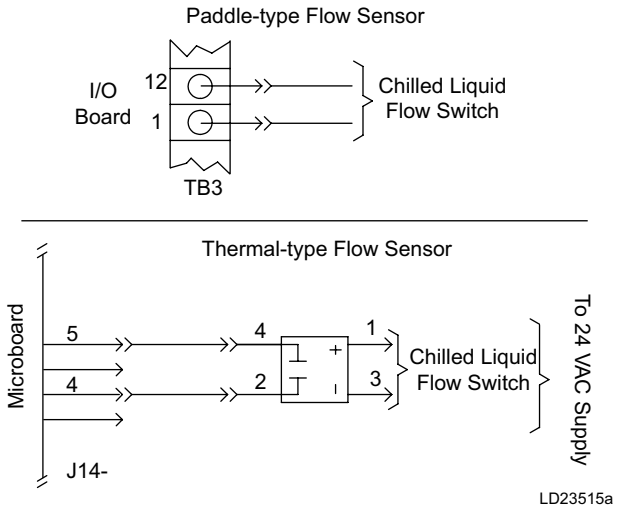

FIGURE 13 - CHILLED LIQUID FLOW SWITCHES

THERMAL TYPE FLOW SENSOR

When the Thermal-type Flow Switch is used, the flow switch uses the cooling effect of liquid to sense flow.

When the flow of liquid is sensed, the relay output is turned on conducting current through the microboard load resistor to the +5VDC, applying greater than +4VDC to the microboard input J14-4.

When no flow of liquid is sensed, the relay output is turned OFF, this results in less than 1VDC to the microboard input.

PADDLE TYPE FLOW SENSOR

When Evaporator water is flowing, the flow switch contact will close. If the flow switch opens for 2 seconds, the unit shuts down.

REMOTE MOTOR CURRENT LIMIT SETPOINT

The Remote Motor Current Limit Setpoint can be reset within the range of 100% to 30% Full Load Amps (FLA) by:

- A BAS when an SC-EQ communication card is installed
- Or, by a hard-wired analog 0-10VDC, 4-20mA or digital 1-11 second PWM signal (supplied by others).

The OptiView™ Control Center must be configured appropriately to accept the desired signal in the Remote Control Screen (Home>Setpoints>Remote).

- **Control Source BAS** - The setpoint is communicated by the BAS through the SC-EQ using either BACnet MS/TP, Modbus RTU or the N2 protocol.
- **0-10V** - The reset signal is a 0-10VDC hardwired signal from the BAS. The Microboard jumper JP23 must be removed for this setting.

0-10VDC - As shown in *Figure 14 on page 13*, connect input to Microboard J22-1 (signal) and J22-5 (Gnd). The setpoint varies linearly from 100% to 30% FLA as the input varies from 0-10VDC. This input will only be accepted when the Control Source is set to 0-10. A signal of 0VDC = 100%, a signal of 10VDC = 30%.

Calculate the setpoint for various inputs as follows:

SETPOINT (%) = 100 – (VDC X 7)

For example, if the input is 5VDC, the setpoint would be set to 65% as follows:

SETPOINT (%) = 100 – (5 X 7) = 100 – 35 = 65%

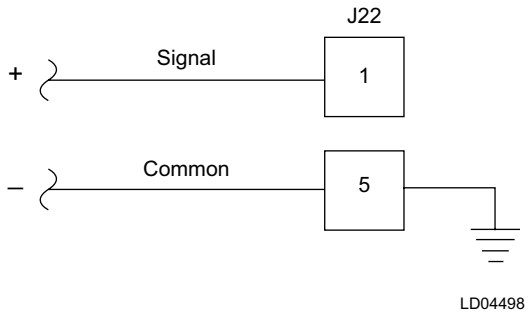

FIGURE 14 - REMOTE MOTOR CURRENT LIMIT SETPOINT WITH 0-10VDC

4-20mA - The reset signal is a 4-20mA hard-wired signal from the BAS. The Microboard jumper JP23 must be installed on pins 1 to 2 for this setting. As shown in *Figure 15 on page 13*, connect input to Microboard J22-2 (signal) and J2-5 (GND). The setpoint varies linearly from 100% to 30% FLA as the input varies from 4-20mA. This input will only be accepted when the Control Source is set to 4-20mA.

Calculate the setpoint for various inputs as follows:

SETPOINT (%) = 100 – [(MA – 4) X 4.375]

For example, if the input is 8mA, the setpoint would be set to 83% as follows:

SETPOINT (%) = 100 – [(8 – 4) X 4.375]
= 100 – (4 X 4.375)
= 100 – 17.5
= 82.5
= 83%

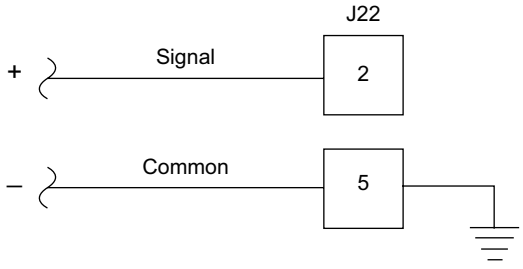

FIGURE 15 - REMOTE MOTOR CURRENT LIMIT SETPOINT WITH 4-20MA SIGNAL

PWM - The Pulse Width Modulation input is in the form of a 1 to 11 second relay contact closure that applies 115VAC to the I/O Board TB3-20 for 1 to 11 seconds. As shown in *Figure 16 on page 13*, connect dry closure relay contacts between I/O Board TB3-20 (signal) and TB3-1 (115VAC).

The setpoint varies linearly from 100% to 30% as the relay contact closure time changes from 1 to 11 seconds. The relay contacts should close once every 30 minutes for 1 to 11 seconds at least, to maintain setpoint to the desired value. If 1 to 11 second closure is not received within 30 minutes of the last closure, the setpoint is defaulted to 100%. A closure is only accepted at rates not to exceed once every 70 seconds. This input will only be accepted when the Control Source is set to PWM.

Calculate the setpoint for various pulse widths as follows:

SETPOINT (%) = 100 – [(PULSE WIDTH IN SECONDS – 1) X 7]

For example, if the relay contacts close for 3 seconds, the setpoint would be set to 86% as follows:

SETPOINT (%) = 100 – [(3 – 1) X 7]
= 100 – (2 X 7)
= 100 – 14
= 86%

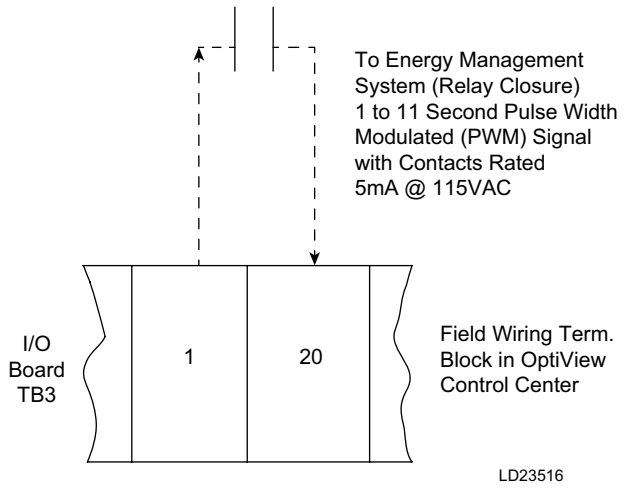

FIGURE 16 - REMOTE MOTOR CURRENT LIMIT SETPOINT WITH PWM SIGNAL

REMOTE LEAVING CHILLED LIQUID SETPOINT

Remote Leaving Chilled Liquid Temperature Setpoint Reset can be accomplished by a BAS when an SC-EQ communication card is installed or by a hard-wired analog 0-10VDC, 4-20mA or digital 1-11 second PWM signal (supplied by others). The OptiView™ Control Center must be configured appropriately to accept the desired signal in the Remote Control Screen (Home >Setpoints>Remote).

The **Leaving Chilled Liquid Temperature Setpoint** is programmable over the range of 36°F to 72°F (2.2°C to 22°C) (water applications) or 10°F to 72°F (-12.2°C to 22°C) (brine applications). The Remote Input Signal Min and Max are user definable to allow complete flexibility for the BAS controls.

0-10VDC - If the Remote Setpoint Min is set to 0 and the Max to 100 then the control signal will set the setpoint for 0-10VDC 0.1VDC = 1°F (If the BAS wants a 42 degree setpoint, they should send a 4.2VDC signal).

If the Remote Setpoint Min is set to 36 and the Max to 46 then the control signal will set the setpoint for 0-10VDC 1.0VDC = 1°F (If the BAS wants a 42 degree setpoint, they should send a 6.0VDC signal).

Note that this reduced range gives more resolution to the setpoint and is similar to the previous way the Temperature Setpoint Reset was performed.

As shown in *Figure 17 on page 14*, connect input to Microboard J22-3 (signal) and J22-5 (GND). The Microboard Program Jumper JP24 must be removed for this.

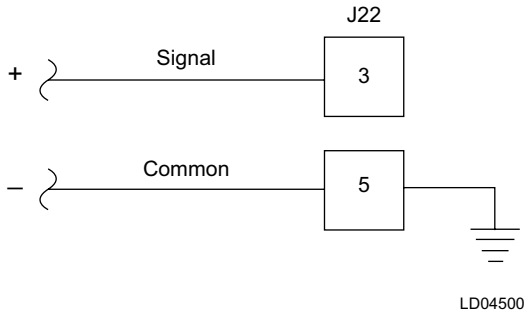

FIGURE 17 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-10VDC SIGNAL

4-20mA - If the Remote Setpoint Min is set to 0 and the Max to 100 then the control signal will set the setpoint or 4-20mA 0.16mA = 1°F (If the BAS wants a 42 degree setpoint they should send a 6.7mA signal).

If the Remote Setpoint Min is set to 36 and the Max to 46 then the control signal will set the setpoint for 4-20mA 1.6mA = 1°F (If the BAS wants a 42 degree setpoint they should send a 9.6mA signal)

Note that this reduced range gives more resolution to the setpoint and is similar to the previous way the Temperature Setpoint Reset was performed.

As shown in *Figure 18 on page 14*, connect input to Microboard J22-4 (signal) and J22-5 (GND.). The Microboard Program Jumper JP24 must be installed on pins 1 and 2 for this setting.

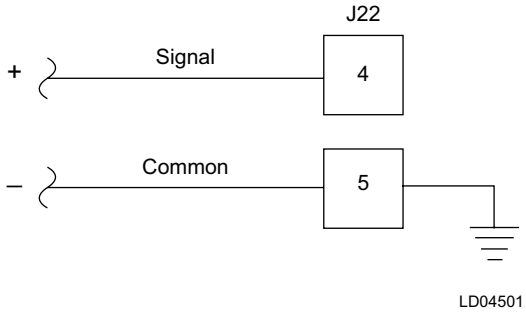

FIGURE 18 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 4-20MA SIGNAL

PWM - The Pulse Width Modulation input is in the form of a 1 to 11 second relay contact closure that applies 115VAC to the I/O Board TB3-19 for 1-11 seconds. As shown in *Figure 19 on page 15*, connect dry closure relay contacts between I/O Board TB3-19 (input) and TB3-1 (115VAC).

The relay contacts should close for 1 to 11 seconds at least once every 30 minutes to maintain the setpoint to the desired value. If a 1 to 11 second closure is not received within 30 minutes of the last closure, the Local Cooling Setpoint. A one second signal will set the setpoint to the Remote Setpoint Minimum value. An 11 second signal will set the setpoint to the Remote Setpoint Maximum value.

- If the Remote Setpoint Min is set to 0 and the Max to 100, then the control signal will set the setpoint for 1-11s 0.1s = 1°F above the min (If the BAS wants a 42 degree setpoint they should send a 5.2 seconds signal).

- If the Remote Setpoint Min is set to 36 and the Max to 46, then the control signal will set the setpoint for 1-11s 1s = 1°F above the min (If the BAS wants a 42 degree setpoint they should send a 7 seconds signal). Note that this reduced range gives more resolution to the setpoint and is similar to the previous way that Temperature Setpoint Reset was performed.

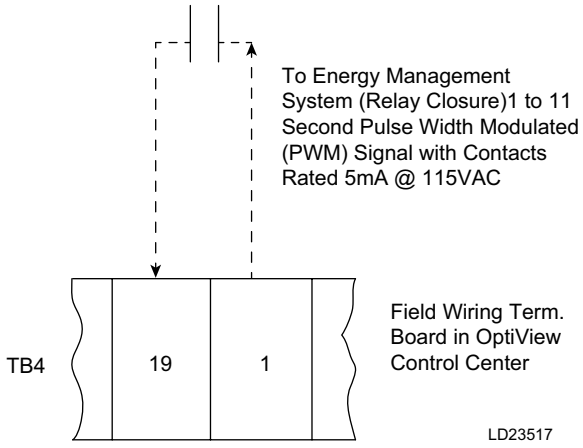

FIGURE 19 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT

EXTERNAL SIGNAL FOR REFRIGERATION UNIT FAILURE

When the Safety Shutdown Contacts (see *Figure 3 on page 8*) are not connected to an Energy Management System, they may be employed to energize a local or remote safety alarm (by others). When the normally open Safety Shutdown Contacts close, the alarm will indicate shutdown of the unit. The cause of shutdown will be one or more of the following safety controls:

- Low oil pressure
- High oil pressure
- High condenser pressure
- Low evaporator pressure
- High oil temperature
- High discharge temperature
- Auxiliary safety
- Power failure, when the **Power Restart** setpoint on the control panel setup screen is set to manual which implies that the chiller requires **Manual Restart After Failure**.

NOTE

If the unit was shut down because of Cycling Shutdown Contacts (see** Figure 2 on page 8**) the alarm will not be energized, but the unit will be shut down. A closure of the safety alarm contacts means that an operator must manually reset and restart the unit.

When the Safety Shutdown contacts close, the Opti-View™ Control Center will display the following message: SAFETY SHUTDOWN – MANUAL RESTART, and cause of shutdown.

AUXILIARY SAFETY SHUTDOWN

The closure of a Momentary, Maintained N.O. Switch or Relay Contacts will cause the unit to shutdown and display the following messages:

- SAFETY SHUTDOWN – MANUAL RESTART
- AUXILIARY SAFETY – CONTACTS CLOSED.

The unit will not restart until the contacts open, the panel CLEAR FAULTS key is pressed and the unit is given a start command.

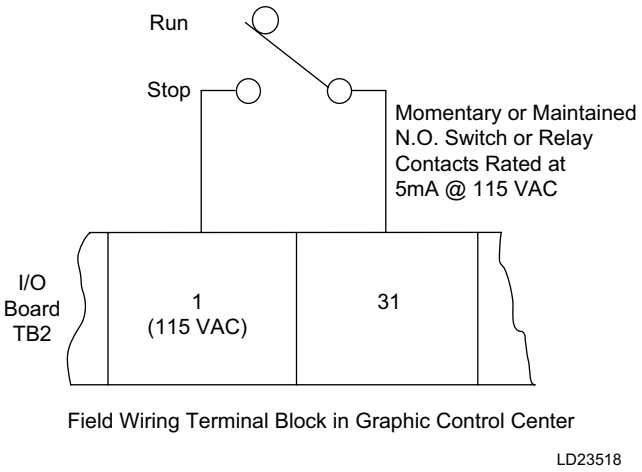

FIGURE 20 - AUXILIARY SAFETY SHUTDOWN INPUT

OPTIONAL HEAD PRESSURE CONTROL

The chiller provides an analog output to control system equipment, to maintain condenser temperature for head pressure control. The output may be used to control a converging or diverting valve, pump VSD, or other suitable equipment.

The 03630 Microboard terminal TB7-1 (4-20mA) to TB7-3 (RTN) will provide a 4-20mA output in proportion to the command from the microprocessor for control. The 03630 microboard terminal TB7-2 (0-10VDC) to TB7-3 (RTN) will provide a 0-10VDC output in proportion to the command from the microprocessor for control (See *Figure 21 on page 16*).

The load connected to these terminals must meet the following specification:

- 0-10V - Input resistance should be greater than 1K ohms.
- 4-20mA - Input resistance must be less than or equal 500 ohms.

During head pressure control operation in a configuration (where the means used by a particular site is to throttle the flow through the single condenser tube bundle in service), the controlled device should be setup to inhibit throttling below the minimum required flow rate through the condenser. This is when the control panel output is at minimum, such that the flow switch requirement is maintained. Alternately, a minimum control output setpoint can be programmed for run and stop states. See the *YZ Operation Manual (Form 161.01-OM1)*.

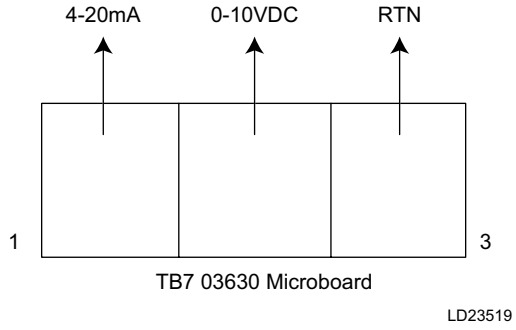

FIGURE 21 - OPTIONAL HEAD PRESSURE CONTROL OUTPUT

SECTION 2 - ENERGY MANAGEMENT SYSTEMS

YZ chiller design allows with an ease to interface with the Energy Management Systems (EMS). The OptiView™ Control Center includes unit status contacts, provisions for remote control inputs and provisions for remote setpoint reset of leaving chilled liquid temperature and current limit for EMS interfacing (see *Note 7 on page 18*).

Five sets of unit status contacts are factory furnished through a field wiring terminal board in the Optiview™ Control Center. Each set of contacts are by default open, single pole, rated at 5 AMPS resistive at 240VAC. The following Chiller status contacts are provided for the unit:

- **Remote Mode Ready to Start** – See *Figure 1 on page 8*
- **Cycling Shutdown Alarm** – See *Figure 2 on page 8*
- **Safety Shutdown Alarm**– See *Figure 3 on page 8*
- **Run (System Operating)** – *See Figure 4 on page 9*
- **Warning Alarm** – See *Figure 5 on page 9*

Three sets of inputs are available to the EMS, allowing for remote control of unit operation. Input device contact rating shall be 5 mA at 115VAC. Field wiring terminal board in the OptiView™ Control Center permits connection for the following operation:

- **Remote Run/Stop Contacts TB3-7 and TB3-1** – See *Figure 6 on page 9*
- **Remote/Local Cycling TB2-13 and TB2-1** – See *Figure 8 on page 10*
- **Multi-unit Cycling Shutdown TB2-9 and TB2-1** – See *Figure 9 on page 10*

Chiller cycling by the Energy Management System should be minimized. It is possible to limit the compressor motor amp draw indirectly or directly by the following methods:

1. Application of Sequence Control Kit: only one unit is running, when a single unit can carry the cooling load.
2. When multiple unit installations are controlled by an EMS, remote Run/Stop contacts are available to start and stop each chiller, see *Figure 6 on page 9*. Contact rating shall be 5 milliamperes at 115VAC.
3. The OptiView™ Control Center has a programmable time clock function as a standard feature with holiday capability. This offers one preset automatic Start-Stop per day on a seven day calendar basis with the ability to program a single additional holiday start and stop time up to a week in advance. Chilled water pump control contacts (see *Note 13 on page 7*) are also provided, allowing for efficient automatic operation of the chilled water pump to reduce energy. Two chilled water pump operating modes are available via the CHW PUMP programming on the OptiView™ Setup Screen. With the Standard setting, the chilled water pump operates for 30 seconds prior to chiller start, during chiller operation, coastdown, and LWT cycling shutdowns. With the Enhanced setting, the chilled water pump operates as above plus it operates during MULTI-UNIT and REMOTE/LOCAL cycling shutdowns.
4. Reduce the compressor-motor kW input (and thus amps) by raising the leaving chilled liquid temperature through remote temperature control setpoint. Remote temperature reset is accomplished by supplying a 1 to 11 second pulse-width modulated signal, refer to *Figure 19 on page 15*. With the through use of the remote temperature control analog input on the microboard, the leaving chilled liquid temperature may be reset via a 4 to 20mA D.C. current signal, or a 0 to 10VDC signal
5. Current limiting of demand during pulldown may be accomplished by using the standard PULLDOWN DEMAND LIMIT function provided in the OptiView™ Control Center. The PULLDOWN DEMAND LIMIT key can be programmed to limit compressor motor current from 30 to 100 percent of full load AMPS, for 1 to 255 minutes following each compressor start. It is only active when the Current Limit Control Source is set to Local. For more details refer to *YZ Operations and Maintenance (Form 161.01-OM1)*.

6. When the Current Limit control Source is set to BAS, 0-10, 4-20 or PWM, the BAS can control the maximum allowable compressor motor AMPS from 30 to 100%, through the Remote Current Limit Setpoint. Refer to *Figure 14 on page 13, Figure 15 on page 13, and Figure 16 on page 13*.

7. The Johnson Controls METASYS™ System may be interfaced with the chiller OptiView™ Control Center to provide unified chiller plant system control. The METASYS™ System directly communicates with the OptiView™ Control Center via the SC-EQ communication card which is installed in the Control Center. All temperatures, pressures, safety alarms and cycling information known to the OptiView™ Control Center are then available to the METASYS™ System for integrated chiller plant control, data logging, and local, remote operator displays. The SC-EQ also allows the BAS to start, stop, and reset the chiller's leaving chilled water setpoint and the current limit setpoint by using the BACnet MS/TP protocol. The SC-EQ also supports other BAS systems using BACnet MS/TP, Modbus RTU or N2 communication protocols.

NOTES

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Form 161.01-PW2 (718)
Issue Date: July 18, 2018
Supersedes: 161.01-PW2 (318)