## Job Data:

- **Chiller Model No.** YMC<sup>2</sup>
- **No. of Units**

## Wiring Diagrams

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Order No.</th>
<th>York Contract No.</th>
<th>York Order No.</th>
<th>Purchaser</th>
<th>Job Name</th>
<th>Location</th>
<th>Engineer</th>
</tr>
</thead>
</table>

- **Reference Date**: 
- **Approval Date**: 
- **Construction Date**: 

---

**Issue Date:**

October 28, 2016
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 OptiView™ 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

<table>
<thead>
<tr>
<th>Manual Description</th>
<th>Form Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>YMC² Installation</td>
<td>160.78-N1</td>
</tr>
<tr>
<td>YMC² Unit Re-assembly</td>
<td>160.78-N2</td>
</tr>
<tr>
<td>YMC² Field Connections</td>
<td>160.78-PW1</td>
</tr>
<tr>
<td>YMC² Unit Renewal Parts</td>
<td>160.78-RP1</td>
</tr>
<tr>
<td>YMC² OptiView™ Renewal Parts</td>
<td>160.78-RP2</td>
</tr>
<tr>
<td>YMC² Unit Operations and Maintenance Manual</td>
<td>160.78-O1</td>
</tr>
<tr>
<td>YMC² OptiView™ Control Center Operation Manual</td>
<td>160.78-O2</td>
</tr>
<tr>
<td>YMC² Unit Service</td>
<td>160.78-M1</td>
</tr>
<tr>
<td>YMC² OptiView™ Service</td>
<td>160.78-M2</td>
</tr>
</tbody>
</table>

NOMENCLATURE

YORK
Magnetic Bearing
Centrifugal Chiller

Mod Level A
Refrigerant R-134a
Capacity in KW
S = Single Stage
T = Two Stage
# TABLE OF CONTENTS

## SECTION 1 - UNIT WIRING

### 7

## SECTION 2 - FIELD CONTROL MODIFICATIONS

### 39

- Remote Mode Ready To Start Contacts
- Cycling Shutdown Contacts
- Safety Shutdown Contacts
- Run Contacts
- Anticipatory/Alarm Contacts
- Remote Start And Stop Contacts From Energy Management System
- Auxiliary Safety Shutdown
- Remote/Local Cycling Devices
- Multi-Unit Sequence
- Chilled LIQUID Pump Starter (TB2-44/45)
- Condenser Motor Pump Starter (TB2-150/151)
- Condenser Flow Sensors
- Thermal Type Flow Sensor
- Paddle Type Flow Sensor
- Evaporator Flow Sensors
- Thermal Type Flow Sensor
- Paddle Type Flow Sensor
- Two Unit Sequence Control
- Multiple Units (Two) – Series Operation
- Multiple Units (Two) – Parallel Operation – Individual Unit Pumps
- Multiple Units (Two) – Parallel Operation – Single Chilled Water Pump
- Remote Current Limit Setpoint
- Remote Leaving Chilled Liquid Setpoint
- External Signal For Refrigeration Unit Failure
- Run Contacts/Remote Run Light And Shutdown Indicator Plus Ems
- Optional Head Pressure Control

### 40

### 41

### 42

### 43

### 44

### 46

### 48

### 50

### 51

## SECTION 3 - ENERGY MANAGEMENT SYSTEMS

### 53
LIST OF FIGURES

FIGURE 1 - Unit Device Locations ......................................................................................................................... 8
FIGURE 2 - OptiView Component Layout ................................................................................................................... 10
FIGURE 3 - Microboard (031-02430-006) Details .................................................................................................... 11
FIGURE 4 - Microboard (031-03630-007) Details .................................................................................................... 12
FIGURE 5 - I/O Board (031-01743) Details ................................................................................................................ 13
FIGURE 6 - OptiView Control Panel TB6 and TB7 Details .......................................................................................... 13
FIGURE 7 - LTC I/O Board (031-02895) Details ....................................................................................................... 14
FIGURE 8 - Stall Detector Board (031-02418) Details ............................................................................................. 15
FIGURE 9 - Connector Details ................................................................................................................................... 15
FIGURE 10 - Component Connection Details ........................................................................................................ 16
FIGURE 11 - Power Distribution Diagram 490A and 744A ....................................................................................... 17
FIGURE 12 - Electrical Ground Diagram 490A and 744A ....................................................................................... 18
FIGURE 13 - Run Permissive Circuit ....................................................................................................................... 19
FIGURE 14 - Motor Cooling Valve - Interface (BM1 Model B Only) ........................................................................ 20
FIGURE 15 - OptiView Power Wiring 02430 MICROBOARD .................................................................................. 21
FIGURE 16 - OptiView Power Wiring 03630 MICROBOARD .................................................................................. 22
FIGURE 17 - Low Voltage I/O Wiring Diagram ...................................................................................................... 24
FIGURE 18 - I/O Control Wiring ................................................................................................................................ 27
FIGURE 19 - I/O Control Wiring HYP490VSD .......................................................................................................... 30
FIGURE 20 - I/O Control Wiring HYP744VSD .......................................................................................................... 32
FIGURE 21 - I/O Wiring Options ................................................................................................................................. 34
FIGURE 22 - Motor Connections ............................................................................................................................... 36
FIGURE 23 - MBC Interconnection Diagram ........................................................................................................... 37
FIGURE 24 - Remote Ready To Start Contacts ......................................................................................................... 40
FIGURE 25 - Cycling Shutdown Contacts ................................................................................................................ 40
FIGURE 26 - Safety Shutdown Contacts .................................................................................................................. 40
FIGURE 27 - Run Contacts .......................................................................................................................................... 40
FIGURE 28 - Anticipatory/Alarm Contacts ............................................................................................................... 41
FIGURE 29 - Remote Start And Stop Contacts From Energy Management System Contacts .................................. 41
FIGURE 30 - Auxiliary Safety Shutdown .................................................................................................................. 41
FIGURE 31 - Remote/Local Cycling Devices ........................................................................................................... 42
FIGURE 32 - Multi-Unit Sequence ................................................................................................................................ 42
FIGURE 33 - Chilled Liquid Pump Starter ................................................................................................................. 42
FIGURE 34 - Condenser Motor Pump Starter ........................................................................................................... 42
FIGURE 35 - Condenser Flow Switches .................................................................................................................... 43
FIGURE 36 - Evaporator Flow Sensors .................................................................................................................... 44
FIGURE 37 - Two Unit Sequence Control ................................................................................................................ 45
FIGURE 38 - Multiple Units (Two) - Series Operation ............................................................................................... 45
FIGURE 39 - Multiple Units (Two) Parallel Operation - Individual Unit Pumps .......................................................... 46
FIGURE 40 - Multiple Units (Two) Parallel Operation - Single Chilled Water Pump .................................................. 46
FIGURE 41 - Remote Current Limit Setpoint with 0-10VDC or 2-10VDC Signal ....................................................... 46
FIGURE 42 - Remote Current Limit Setpoint with 0-20mA or 4-20mA Signal ......................................................... 47
FIGURE 43 - Remote Current Limit Setpoint with PWM Signal ............................................................................... 47
FIGURE 44 - Remote Leaving Chilled Liquid Temp. Setpoint With 0-10VDC or 2-10VDC Signal ......................... 48
FIGURE 45 - Remote Leaving Chilled Liquid Temp. Setpoint With 0-20mA or 4-20mA Signal ............................. 49
FIGURE 46 - Remote Leaving Chilled Liquid Temp. Setpoint With PWM Signal .................................................. 50
FIGURE 47 - Run Contacts / Remote Run Light and Shutdown Indicator Plus EMS ............................................. 51
FIGURE 48 - Auxiliary Safety Shutdown Input ....................................................................................................... 51
FIGURE 49 - Optional Head Pressure Control Output .............................................................................................. 52
SECTION 1 - UNIT WIRING

1. This wiring diagram describes the standard electronic control scheme for use with a YORK Variable Speed Drive.

2. Field wiring to be in accordance with the National Electrical Code (N.E.C.) as well as all other applicable codes and specifications. See Form 160.78-PW1 for Field Connections. CAUTION: Field wiring contacts may have voltage present when power is removed. Field wiring contacts could be connected to external power sources.

3. Numbers along the left side of diagram are line identification numbers.

4. Main Control Panel Class 1 Field Wiring Terminal connection points are indicated by numbers within a rectangle I.E. 15.

5. To cycle unit ON and OFF automatically with contacts other than those shown, install a cycling device between terminals 1 and 13 (see Note 7). If a cycling device is installed, the jumper must be removed between terminals 1 and 13.

6. To stop the unit and NOT permit it to start again, install a stop device between terminals 1 and 8 (see Note 7). A remote start-stop switch may be connected to terminals 1, 7, and 8 (see Note 7). Remote start-stop switch is operative only in the “Remote” operating mode.

7. Device contact rating to be 5 milliamperes at 115 Volts AC.

8. Contact rating is 5A resistive at 120 Volts AC or 240 Volts AC.

9. A jumper is installed between terminals 24 and 25 for normal operation.

10. Solid state motor overload contact is set to trip a 105% FLA.

11. Contacts rating is 5 AMPs resistive at 250 Volts AC and 30 Volts DC, 2 AMP inductive (.4 PF) at 120 Volts AC and 30 Volts DC.

12. Field connected control power supply is not required, as control transformer is supplied on variable speed drive.

13. Maximum allowable current draw for the sum of all loads is 2 Amps holding, 10 Amps inrush.

14. Each 115VAC Field-connected inductive load: I.E. Relay Coil, Motor Starter Coil, etc. will have a transient suppressor wired in parallel with its coil, physically located at the coil.

15. Spare transient suppressors and control circuit fuses are supplied in a bag attached to the green ground screw in lower left corner of the control panel.
SECTION 1 - UNIT WIRING

Fig. 1 - Unit Device Locations

- Magnetic Bearing Controller
- Variable Speed Drive
- OptiView Control Panel
- Liquid Level Sensor
- Orifice Valve Actuator
- Drop Leg Refrigerant Temperature (RT6)
FIGURE 1 – UNIT DEVICE LOCATIONS (CONT’D)
FIGURE 2 - OPTIVIEW COMPONENT LAYOUT
FIGURE 3 - MICROBOARD (031-02430-006) DETAILS

NOTE: Number placed above wire is pin number.
FIGURE 4 - MICROBOARD (031-03630-007) DETAILS
SECTION 1 - UNIT WIRING

**FORM 160.78-PW2  
ISSUE DATE: 10/28/2016**

---

**TB1-L (VSD)**

**P3**

**J-PRV**

120VAC

**J1-5**

**TB1-1 / TB3-1**

**E-STOP**

**TB3-28**

**TB2-150**

**P3**

**J-VSD**

**P6**

**J-VSD**

**P3**

**J-VGD**

**P2**

**J-VGD**

**P2**

**J-VSD**

**P3**

**J-VSD**

**P2**

**J-PRV**

120 N

120 N

**TB6-14**

**HPC0 P3**

**TB3-32**

**TB5-25**

**PUMP MOTOR STARTER (SUPPLIED BY OTHERS)**

**1T**

**CONTROL XFMR**

120/24 VAC

**TB**

6T

B7

**JUMPER**

1T

**CONTROL XFMR**

120/24 VAC

---

**FIGURE 6 - OPTIVIEW CONTROL PANEL TB6 AND TB7 DETAILS**

---

**NOTE:**

Number placed above wire is pin number.

---

**FIGURE 5 - I/O BOARD (031-01743) DETAILS**

---

**FIGURE 7 - I/O BOARD (031-01743) DETAILS**

---

**NOTE:**

Number placed above wire is pin number.
SECTION 1 - UNIT WIRING

FIGURE 7 - LTC I/O BOARD (031-02895) DETAILS
FIGURE 8 - STALL DETECTOR BOARD (031-02418) DETAILS

LEAVING CHILLED LIQUID TEMPERATURE (RT1)
LEAVING CONDENSER LIQUID TEMPERATURE (RT4)
Entering Condenser Liquid Temperature (RT5)
Entering Chilled Liquid Temperature (RT9)

FIGURE 9 - CONNECTOR DETAILS
SECTION 1 - UNIT WIRING

FIGURE 10 - COMPONENT CONNECTION DETAILS

HIGH PRESSURE CUTOUT

To OptiView Control Panel

COMPONENT CONNECTION DETAILS

RED BLACK WHT

VGD POTENTIOMETER

RED BLK WHT

To OptiView Control Panel - Early Release Units

DISCHARGE TEMPERATURE DROP LEG REFRIGERANT TEMPERATURE EVAPORATOR REFRIGERANT TEMPERATURE

To OptiView Control Panel

RED BLACK
(PIN 1) (PIN 2)

LIQUID LEVEL SENSOR STALL DETECTOR PRESSURE TRANSDUCER
FIGURE 11 - POWER DISTRIBUTION DIAGRAM 490A AND 744A
FIGURE 12 - ELECTRICAL GROUND DIAGRAM 490A AND 744A
RUN PERMISSIVE CIRCUIT

FIGURE 13 - RUN PERMISSIVE CIRCUIT
FIGURE 14 - MOTOR COOLING VALVE - INTERFACE (BM1 MODEL B ONLY)

NOTES:
1. IB2 Board Jumper CN2 must be out (only on one pin) for "open on rise" operation.
2. IB2 Board Jumper CN3 must be in (across both pins) for 0-10VDC input signal.
3. IB2 Board Jumper CN4 must be out (only on one pin).

LEGEND

1BR  6 AMP CIRCUIT BREAKER
1T  POWER SUPPLY TRANSFORMER
CFS  CONDENSER WATER FLOW SWITCH
CP  CONDENSER PRESSURE
EFS  EVAPORATOR FLOW SWITCH
EP  EVAPORATOR PRESSURE
FU  FUSE
HGBP  HOT GAS BYPASS
HPCO  HIGH PRESSURE CUTOUT
1R  COMPRESSOR MOTOR RELAY
LLS  CONDENSER LIQUID LEVEL SENSOR
MBC  MAGNETIC BEARING CONTROLLER
MOV  METAL OXIDE VARISTOR
OVA  LEVEL CONTROL ORIFICE VALVE ACTUATOR
PRV  PRE-ROTATION VANE
RT1  LEAVING CHILLED WATER TEMPERATURE
RT2  DISCHARGE TEMPERATURE

RT4  LEAVING CONDENSER WATER TEMPERATURE
RT5  RETURN CONDENSER WATER TEMPERATURE
RT6  EVAPORATOR REFRIGERANT TEMPERATURE
RT7  EVAPORATOR REFRIGERANT TEMPERATURE
RT9  RETURN CHILLED WATER TEMPERATURE
SBPV  STOP BYPASS VALVE
SD  STALL DETECTOR
SUPR  TRASIENT SUPPRESSOR
TB  TERMINAL BLOCK
VGD  VARIABLE GEOMETRY DIFFUSER
VSD  VARIABLE SPEED DRIVE

IB2 INTERFACE BOARD

NOTE

Microboard

OPTIVIEW PANEL

115VAC

24V-1

24V-2

+24VAC

LD15994
OPTIVIEW POWER Wiring

Mod Level A with 031-02430-006 Microboard

FIGURE 15 - OPTIVIEW POWER WIRING 02430 MICROBOARD
OPTIVIEW POWER WIRING

Mod Level B with 031-03630-007 Microboard

FIGURE 16 - OPTIVIEW POWER WIRING 03630 MICROBOARD
Figure 17 - Low Voltage I/O Wiring Diagram (Cont'd)

Notes:
1. Remove shunt jumper from JP22 for proper VDD feedback.
THIS PAGE INTENTIONALLY LEFT BLANK
FIGURE 18 - I/O CONTROL WIRING
NOTE: See Device Details Drawings.
FIGURE 19 - I/O CONTROL WIRING HYP490VSD
FIGURE 22 - MOTOR CONNECTIONS
FIGURE 23 - MBC INTERCONNECTION DIAGRAM
SECTION 2 - FIELD CONTROL MODIFICATIONS

1. These FIGURES show 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 insure proper functioning of the control system. Consult your YORK/Johnson Controls representative.

3. The additional controls and wiring for these modifications are to be furnished and installed in the field by others (see Warnings 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, 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 Manual Restart After Power Failure as a standard function. The control center can be field changed from Manual Restart to Auto 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 water range. Constant chilled water flow is assumed at all loads. For other requirements contact your YORK/Johnson Controls representative.

9. Lead selector and cycling control to provide similar lead selection and cycling of lag units for three (3) units is available: Kit No. 366-44684D (see Product Drawing Form 160.00-PA1.1) in NEMA I enclosure. Consult your YORK/Johnson Controls representative.

10. Sequence control kits (see Figure 37 on page 45) assume a constant chilled water flow and a constant leaving chilled water temperature to sense the cooling load. Sequence control kits are not designed for variable chilled water flow or with reset of the leaving chilled water temperature – see Figure 38 on page 45 and Figure 39 on page 46.

11. Maximum allowable current draw between circuits 24 and 2 for field installed devices is 2 amp holding and 10 amps inrush – see OptiView™ Control Center Wiring Diagram in this manual.

12. For required field wiring connections of the chilled water pump contacts (terminals 44 and 45 on OptiView™ Control Center field wiring terminal block TB2) and chilled water flow switch (terminals 1 and 12 on OptiView™ Control Center field wiring terminal board TB2) Refer to YMC2 Field Connections (Form 160.78-PW1).

13. The Chilled Water Flow Switch is a safety control. It must be connected to prevent operation of the chiller whenever chilled water flow is stopped. The use of the chilled water flow switch for purposes other than protection of the chiller may be accomplished in several ways. Two flow switches, a flow switch and a relay or separate contacts on the same flow switch.

14. Do not apply voltage on field wiring terminal blocks TB4 and TB6 in YORK OptiView™ Control Center, as 115VAC source is fed from terminals 1 and 2.
REMOTE MODE READY TO START CONTACTS

When closed, these contacts signify the following:

1. The OptiView™ Control Center is in “digital”, “analog” or “BAS” remote operating mode, allowing for energy management system or remote start/stop control.

2. All chiller safety cutout controls are in the normal position, so they will allow the unit to start;

3. All chiller cycling cutout controls are in the normal position, so they will allow the unit to start;

4. Any 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 (Figure 29 on page 41). When the Remote Mode Ready to Start Contacts close, the OptiView™ Control Center will display SYSTEM READY TO START message.

SAFETY SHUTDOWN CONTACTS

When closed, these contacts signify the unit is not permitted to start due to a SAFETY shutdown condition. Safety shutdowns require a manual reset procedure be performed before the unit can be restarted. YMC^2 Operations and Maintenance (Form 160.78-O1) provides a list and explanation of all 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. The unit can then be restarted. Safety Shutdown contacts function in all operating modes.

RUN CONTACTS

When closed, these contacts signify that the unit is operating. The OptiView™ Control Center will display a System Run Message.

CYCLING SHUTDOWN CONTACTS

When closed, these contacts signify 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. YMC^2 Operations and Maintenance (Form 160.78-O1) provides 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.
ANTICIPATORY/ALARM CONTACTS

These contacts will close whenever one or more of the WARNING conditions listed in YMC OptiView Operation (Form 160.78-O2) occurs. They will remain closed as long as the condition is in effect. On most warnings, the contacts automatically open when the condition is no longer present. On 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.

TO ENERGY MANAGEMENT SYSTEM FROM CHILLER

REMOTE START AND STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

When the OptiView Control Center is in the “Digital”, “Analog” remote operating mode with the Remote Stop Contacts open, and the Remote Mode Ready to Start Contacts closed (Figure 24 on page 40), the unit will start via a closure of the Remote Start Contacts. A subsequent closure of the Energy Management System Remote Stop Contacts causes the chiller to shut down. The OptiView Control Center will display REMOTE STOP because the Energy Management System Remote Stop Contact has commanded the unit to shutdown.

It is recommended that maintained contacts be used for both START and STOP.

Even when the chiller is applied with Remote Start-Stop (when the Control Center is in the “Remote Operating Mode”), an EMERGENCY STOP by an operator or others can STOP the compressor from the OptiView Control Center and prevent the chiller from restarting. However, the operator cannot locally start the compressor using “compressor” start switch, when the control center is in the “remote” operating mode.

AUXILIARY SAFETY SHUTDOWN

When 115 VAC is switched to TB4-31 from a chiller source at TB4-1, a safety shutdown of the chiller is commanded. The contacts must open and a manual reset performed at the panel to re-start.
SECTION 2 - FIELD CONTROL MODIFICATIONS

MULTI-UNIT SEQUENCE

For multiple chiller installation application, Multi-Unit Sequence contacts are available to start and stop each unit. The maintained closure of a device contacts across terminals 1 and 9 will permit the unit to operate in all the operating modes with the “compressor” switch in the “run” (I) position. Conversely, an opening of the device contacts will inhibit the unit from operating; the OptiView™ Control Center will then display the following message: CYCLING SHUTDOWN – AUTO RESTART and MULTIUNIT CYCLING – CONTACTS OPEN. An accessory sequence control kit for two, three or four units is available from YORK – see Figure 37 on page 45 for Two Unit Sequence Control Kit.

CHILLED LIQUID PUMP STARTER (TB2-44/45)

Dry closure contacts. When the chiller is started, the Contacts close immediately upon entering “MBC Startup”. Normally, they open coincident with receipt of a chiller stop command or fault other than CHILLED LIQUID FLOW SWITCH OPEN cycling shutdown.

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.

CONDENSER MOTOR PUMP STARTER (TB2-150/151)

Dry closure contacts. Contacts close coincident with beginning of “MBC Startup”. They open coincident with receipt of a chiller stop command or fault other than CONDENSER-FLOW SWITCH OPEN cycling shutdown.

If it is desired to supply the dry contacts with 115V AC power from the OptiView™ Control Panel to control the Condenser Pump Motor Starter, a field installed wire must be connected from TB5-22 to I/O Board TB2-150. Then connect I/O Board TB2-151 to the Condenser Pump Motor Starter.

CONDENSER 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 “Analog” for Thermal-type or “Digital” for Paddle-type. Refer to YMC2 Operations and Maintenance (Form 160.78-O1).
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”.

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

**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 J7-16.

When no flow of liquid is sensed, the solid state relay output is turned off, this results in less than 1VDC to the microboard input and the OptiView™ Control Center will display the following message: CYCLING SHUTDOWN – AUTO RESTART and CONDENSER FLOW SWITCH OPEN.

**PADDLE TYPE FLOW SENSOR**

If desired, a Condenser Water Flow Interlock can be applied. Flow Switch – McDonnel type FS8W, max. 150 psi (YORK Part No. 024-15793) available at additional cost. If Condenser Water Flow Switch is not used, a jumper must be installed between terminals 1 and 11.

When condenser water is flowing, the flow switch contact will close. Opening of the Condenser Water Flow Switch Contacts for 2 continuous seconds will cause unit shutdown. The flow switch status is checked 30 seconds into “System Run” and continuously thereafter. The OptiView™ Control Center will display the following message: CYCLING SHUTDOWN – AUTO RESTART and CONDENSER FLOW SWITCH OPEN.

**EVAPORATOR 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 “Analog” for Thermal-type or “Digital” for Paddle-type. Refer to YMC² Operations and Maintenance (Form 160.78-O1).

When 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 35 - CONDENSER FLOW SWITCHES**

---

[Diagram of condenser flow switches and sensors]
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 J7-14.

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.

TWO UNIT SEQUENCE CONTROL

Provides that cycling thermostat RWT will automatically cycle either #1 or #2 unit. Timer 3TR is an additional feature which prevents simultaneous starting of lead and lag unit following a power failure and eliminates nuisance starting of lag unit due to periodic fluctuations in temperature. For two unit sequence control kit, order YORK Accessory Kit No. 466-61597T for controls as specified with NEMA 1 enclosure.

RWT has 20°F to 80°F range with adjustable differential of 3-1/2 to 14°F; 6 ft. of capillary with 3/8" x 5" bulb and 1/2" NPT brass well (maximum liquid DWP 300 psig). The thermostat is drawn to indicate its operation closes on rise. A 1/2" pipe coupling in the return chilled water line from the building must be furnished (by others) for RWT control well.

MULTIPLE UNITS (TWO) – SERIES OPERATION

The supply chilled water temperature to the building is normally determined by the “Chilled Liquid Temperature” setpoint for Unit #2. When lead selector position of sequence control kit (Figure 38 on page 45) is Unit #1, the supply chilled water temperature to the building will be the temperature control setpoint on Unit #1 OptiView™ Control Center. If lower temperature is desired, reprogram the “Chilled Liquid Temperature” setpoint for Unit #1.
SECTION 2 - FIELD CONTROL MODIFICATIONS

FIGURE 37 - TWO UNIT SEQUENCE CONTROL

FIGURE 38 - MULTIPLE UNITS (TWO) - SERIES OPERATION
MULTIPLE UNITS (TWO) – PARALLEL OPERATION – INDIVIDUAL UNIT PUMPS

This piping arrangement has a chilled water pump associated with each evaporator that are cycled ON and OFF with the unit. This results in reduced chilled water flow rates whenever a single unit can handle the cooling load. Because no chilled water flows through the inoperative unit, the mixed water temperature peculiar to using a single pump is avoided. When one unit is cut-out by the sequence control (Figure 37 on page 45) the temperature of the supply chilled water does not change.

FIGURE 39 - MULTIPLE UNITS (TWO) PARALLEL OPERATION - INDIVIDUAL UNIT PUMPS

MULTIPLE UNITS (TWO) – PARALLEL OPERATION – SINGLE CHILLED WATER PUMP

For this piping arrangement, each chiller’s water sensor is located in its own leaving water nozzle. This produces a constant “mixed” chilled water temperature when both units are operating. When either unit is cycled off by the sequence control (Figure 37 on page 45), mixed chilled water temperature will rise as a result of uncooled return water flowing through the inoperative unit. For individual unit chilled water pump piping, refer to Figure 39 on page 46.

REMOTE CURRENT LIMIT SETPOINT

The Remote Current Limit Setpoint can be reset over the range of 100% to 30% Full Load Amps (FLA) by supplying (by others) a 0-10VDC, 2-10VDC, 0-20mA, 4-20mA or 1 to 11 second Pulse Width Modulated (PWM) signal to the OptiView™ Control Center. The OptiView™ Control Center must be configured appropriately to accept the desired signal type as follows:

- The appropriate Remote Mode must be selected: Analog Remote Mode must be selected when using a voltage or current signal input. Digital Remote Mode must be selected when using a PWM input.
- If Analog Remote Mode is selected, the Remote Analog Input Range setpoint must be set to “0-10VDC” or “2-10VDC” as detailed below, regardless of whether the signal is a voltage or current input signal type.
- Microboard Program Jumper P23 must be positioned appropriately per the input signal type as detailed below. It is recommended that a qualified Service Technician position this jumper.
Important! The signal type used for Remote Current Limit Setpoint reset and the signal type used for Remote Leaving Chilled Liquid Temperature setpoint reset must be the same. For example, if a 0-10VDC signal is being used for Remote Leaving Chilled Liquid Temperature Reset, then a 0-10VDC signal must be used for Remote Current Limit Reset.

0-10VDC - As shown in Figure 41 on page 47, 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 Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for 0-10 volts, and Microboard Program Jumper JP23 has been removed. Calculate the setpoint for various inputs as follows:

\[
\text{SETPOINT (\%)} = 100 - (\text{VDC} \times 7)
\]

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

\[
\text{SETPOINT (\%)} = 100 - (5 \times 7) = 100 - 35 = 65\%
\]

2-10VDC - As shown in Figure 41 on page 47, 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 2 to 10VDC. This input will only be accepted when Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for “2-10 Volts” and Microboard Program Jumper JP23 has been removed. Calculate the setpoint for various inputs as follows:

\[
\text{SETPOINT (\%)} = 100 - [(\text{VDC} - 2) \times 8.75]
\]

For example, if the input is 5VDC, the setpoint would be set to 74% as follows:

\[
\text{SETPOINT (\%)} = 100 - [(5 - 2) \times 8.75] = 100 - 26.25 = 74\%
\]

0-20 mA - As shown in Figure 42 on page 47, 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 0-20mA. This input will only be accepted when Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for 0-10 Volts, and Microboard Program Jumper JP23 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

\[
\text{SETPOINT (\%)} = 100 - (\text{mA} \times 3.5)
\]

For example, if the input is 8mA, the setpoint would be set to 72% as follows:

\[
\text{SETPOINT (\%)} = 100 - (8 \times 3.5) = 100 - 28 = 72\%
\]

4-20 mA - As shown in Figure 42 on page 47, 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 Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for “2-10 Volts” and Microboard Program Jumper JP23 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

\[
\text{SETPOINT (\%)} = 100 - [(\text{MA} - 4) \times 4.375]
\]

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

\[
\text{SETPOINT (\%)} = 100 - [(8 - 4) \times 4.375] = 100 - 17.5 = 82.5 = 83\%
\]
SECTION 2 - FIELD CONTROL MODIFICATIONS

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 TB4-20 for 1 to 11 seconds. As shown in Figure 43 on page 48, connect dry closure relay contacts between I/O Board TB4-20 (signal) and TB4-1 (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 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 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 in Digital Remote Mode. Calculate the setpoint for various pulse widths as follows:

\[ \text{SETPOINT} \% = 100 - [(\text{PULSE WIDTH IN SECONDS} - 1) \times 7] \]

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

\[
\begin{align*}
\text{SETPOINT} \% &= 100 - [(3 - 1) \times 7] \\
&= 100 - (2 \times 7) \\
&= 100 - 14 \\
&= 86%
\end{align*}
\]

REMOTE LEAVING CHILLED LIQUID SETPOINT

Remote Leaving Chilled Liquid Temperature Setpoint Reset can be accomplished by supplying (by others) a 0-10VDC, 2-10VDC, 0-20mA, 4-20mA or 1 to 11 second Pulse Width Modulated (PWM) signal to the Control Center. The Leaving Chilled Liquid Temperature Setpoint is programmable over the range of 38°F to 70°F (water applications), 36°F to 70°F (water applications with Smart Freeze Protection enabled) or 10°F to 70°F (brine applications). The Remote Input Signal changes the setpoint by creating an offset above the locally programmed Leaving Chilled Liquid Temperature Base Setpoint value. The setpoint can be remotely changed over the range of 10° or 20°F (as per the locally programmed Remote Reset Temperature Range setpoint) above the Local Leaving Chilled Liquid Temperature Setpoint. For example, if the Local Setpoint is 40°F and the Remote Reset Temperature Range setpoint is programmed for 10°F, the Leaving Chilled Liquid Temperature setpoint can be remotely reset over the range of 40°F to 50°F. The Control Center must be configured appropriately to accept the desired signal type as follows:

- The appropriate Remote Mode must be selected: Analog Remote Mode must be selected when using a voltage or current signal input. Digital Remote Mode must be selected when using a PWM input.
- If Analog Remote Mode is selected, the Remote Analog Input Range setpoint must be set to “0-10VDC” or “2-10VDC” as detailed below, regardless of whether the signal is a voltage or current signal type.
- Microboard Program Jumper JP24 must be positioned appropriately per the input signal type as detailed below. It is recommended a qualified Service Technician position this jumper.

**Important! The signal type used for Remote Leaving Chilled Liquid Temperature Setpoint Reset and the signal type used for Remote Current Limit Setpoint Reset must be the same.** For example, if a 0-10VDC signal is being used for Remote Current Limit Setpoint, then a 0-10VDC signal must be used for Leaving Chilled Liquid Temperature Setpoint Reset.

0-10VDC - As shown in Figure 44 on page 49, connect input to Microboard J22-3 (signal) and J22-5 (Gnd). A 0VDC signal produces a 0°F offset. A 10VDC signal produces the maximum offset (10 or 20°F above the Local Setpoint Value). The setpoint is changed linearly between these extremes as the input varies linearly over the range of 0VDC to 10VDC. This input will only be accepted when Analog Remote Mode is selected. The Remote Analog Input Range setpoint is set for “0-10VDC” and Microboard Program Jumper JP24 has been removed. Calculate the setpoint for various inputs as follows:

\[
\begin{align*}
\text{OFFSET} (\degree F) &= (\text{VDC})(\text{REMOTE RESET TEMP. RANGE}) \\
\text{SETPOINT} (\degree F) &= \text{LOCAL SETPOINT} + \text{OFFSET}
\end{align*}
\]

For example, if the input is 5VDC and the Remote Reset Temp. Range Setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature
Setpoint is programmed for 40°F, the setpoint would be set to 45°F as follows:

\[
\text{OFFSET (°F)} = \frac{5 \times 10}{10} = 5 \text{°F}
\]

\[
\text{SETPOINT (°F)} = 40 + 5 = 45 \text{°F}
\]

**2-10VDC** - As shown in Figure 44 on page 49, connect input to Microboard J22-3 (signal) and J2-5 (Gnd). A 2VDC signal produces a 0°F offset. A 10VDC signal produces the maximum allowed offset (10°F or 20°F above the Local Setpoint Value). The setpoint is changed linearly between these extremes as the input varies over the range of 2-10VDC. This input will only be accepted when Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for “2-10VDC” and Microboard Program Jumper JP24 has been removed. Calculate the setpoint for various inputs as follows:

\[
\text{OFFSET (°F)} = \frac{(VDC - 2)(\text{REMOTE RESET TEMP. RANGE})}{8}
\]

\[
\text{SETPOINT (°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}
\]

For example, if the input is 5VDC and the Remote Reset Temp. Range Setpoint is programmed for 10°F, the setpoint would be set to 43.8°F.

\[
\text{OFFSET (°F)} = \frac{(5 - 2)(10)}{8} = \frac{(3)(10)}{8} = \frac{30}{8} = 3.8 \text{°F}
\]

\[
\text{SETPOINT (°F)} = 40 + 3.8 = 43.8 \text{°F}
\]

**0-20mA** - As shown in Figure 45 on page 50, connect input to Microboard J22-4 (signal) and J22-5 (Gnd). A 0mA signal produces a 0°F offset. A 20mA signal produces the maximum allowed offset (10 or 20°F above the Local Setpoint Value). The setpoint is changed linearly between these extremes as the input varies over the range of 0-20mA. This input will only be accepted when Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for “0-10VDC” and Microboard Program Jumper J24 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

\[
\text{OFFSET (°F)} = \frac{(MA)(\text{REMOTE RESET TEMP RANGE})}{20}
\]

\[
\text{SETPOINT (°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}
\]

For example, if the input is 8mA, the Remote Reset Temp Range Setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature Setpoint is programmed for 40°F, the setpoint would be set to 44°F as follows:

\[
\text{OFFSET (°F)} = \frac{(8)(10)}{20} = \frac{80}{20} = 4 \text{°F}
\]

\[
\text{SETPOINT (°F)} = 40 + 4 = 44 \text{°F}
\]

**4-20mA** - As shown in Figure 45 on page 50, connect input to MicroBoard J22-4 (signal) and J22-5 (Gnd.). A 4mA signal produces a 0°F offset. A 20mA signal produces the maximum allowed offset (10 or 20°F above the Local Setpoint value). The setpoint is changed linearly between these extremes as the input varies over the range of 0-20mA. This input will only be accepted when Analog Remote Mode is selected, the Remote Analog Input Range setpoint is set for “2-10VDC” and Microboard Program Jumper JP24 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

\[
\text{OFFSET (°F)} = \frac{(MA - 4)(\text{REMOTE TEMP. RESET RANGE})}{16}
\]

\[
\text{SETPOINT (°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}
\]
For example, if input is 8mA, and the Remote Reset Temp. Range setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F, the setpoint would be set to 42.5°F as follows:

\[
\text{OFFSET (°F)} = \frac{(8 - 4)(10)}{16} = \frac{4(10)}{16} = 40 = 2.5°F
\]
\[
\text{SETPOINT (°F)} = 40 + 2.5 = 42.5°F
\]

**FIGURE 45 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-20MA OR 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 TB4-19 for 1-11 seconds. As shown in Figure 46 on page 50, connect dry closure relay contacts between I/O Board TB4-19 (input) and TB4-1 (115VAC). A contact closure time (pulse width) of 1 second produces a 0°F offset. An 11 second closure produces the maximum allowed offset (10 or 20°F above the local setpoint value). 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 setpoint is defaulted to the Local setpoint value. A closure is only accepted at rates not to exceed once every 70 seconds. This input will only be accepted in Digital Remote Mode. Calculate the setpoint for various pulse widths as follows:

\[
\text{OFFSET (°F)} = \frac{(\text{PULSE WIDTH IN SECONDS})(\text{REMOTE RESET TEMP. RANGE})}{10}
\]
\[
\text{SETPOINT (°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}
\]

**FIGURE 46 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH PWM SIGNAL**

**EXTERNAL SIGNAL FOR REFRIGERATION UNIT FAILURE**

When the Safety Shutdown Contacts (see Figure 26 on page 40) 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.

If the unit was shut down because of Cycling Shutdown Contacts (see Figure on page 40) the alarm will not be energized, but the unit will have been 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 OptiView™ Control Center will display the following message: SAFETY SHUTDOWN – MANUAL RESTART, and cause of shutdown.

**RUN CONTACTS/REMOTE RUN LIGHT AND SHUTDOWN INDICATOR PLUS EMS**

When run contacts are required for a Remote Run Light and/or Shutdown Indicator AND Energy Management System (EMS), connect (by others) as shown in the diagram. The EMS, control relay, shutdown and run lights are furnished by others. When the N.O. contacts close, between terminals [35] and [36] on field wiring terminal block TB2 in the OptiView™ Control Center, this indicates that the unit is operating; the remote Run Light will be energized. The unit run contacts open when the unit is shutdown (safety or cycling) and the remote indicator will then be energized. For run contacts to EMS only refer to *Figure 27 on page 40*. When terminals [35] and [36] are not used for an EMS, they may be connected to a remote Run Light. The control relay scheme shown in *Figure 43* can also be applied for a remote Run Light AND a Remote Shutdown Indicator, when an EMS is not used.

**OPTIONAL HEAD PRESSURE CONTROL**

The chiller provides optional output for control of system equipment to maintain condenser temperature for heat recovery on a double-bundle condenser unit or for head pressure control. The output may be used to control a converging or diverting valve, pump VSD, or other suitable equipment. The chiller is equipped with the optional LTC I/O board when output is required to control auxiliary equipment to regulate condenser water temperature or flow for the double-bundle heat recovery option or the head pressure control option. LTC I/O board terminal TB2-2 (VO) to TB2-3 (RTN) will provide 0-10VDC output in proportion to the command from the microprocessor for control. LTC I/O board terminal TB2-1 (IO) to TB2-3 (RTN) will provide 4-20mA output in proportion to the command from the microprocessor for control (see *Figure 49 on page 52*). 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.
SECTION 2 - FIELD CONTROL MODIFICATIONS

During head pressure control operation in a configuration where the means used by the particular site is to throttle 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 when the control panel output is at minimum so the flow switch requirement is maintained.

**FIGURE 49 - OPTIONAL HEAD PRESSURE CONTROL OUTPUT**
SECTION 3 - ENERGY MANAGEMENT SYSTEMS

YMC\textsuperscript{2} chiller design allows for ease of interfacing with Energy Management Systems (EMS). The OptiView\textsuperscript{TM} 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).

Five sets of unit status contacts are factory furnished through a field wiring terminal board in the OptiView\textsuperscript{TM} Control Center. Each set of contacts are single pole, normally open, rated at 5 amperes resistive at 240VAC. Chiller status contacts are provided for unit:

- Remote Mode Ready to Start – See Figure 24 on page 40.
- Cycling Shutdown – See Figure 25 on page 40.
- Safety Shutdown – See Figure 26 on page 40.
- Run (System Operating) – See Figure 27 on page 40.
- Anticipatory/Alarm – See Figure 28 on page 41.

Four sets of inputs are available to the EMS, allowing for remote control of unit operation. Input device contact rating shall be 5 milliamperes at 115VAC. Field wiring terminal board (TB4) in the OptiView\textsuperscript{TM} Control Center permits connection for the following operation:

- Remote Stop Contacts – See Figure 29 on page 41.
- Remote Start Contacts – See Figure 29 on page 41.
- Remote/Local Cycling Devices – See Figure 31 on page 42.
- Multi-unit Sequence – See Figure 32 on page 42.

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, so only one unit is running, when a single unit can carry the cooling load – see Figure 37 on page 45.

2. When multiple unit installations are controlled by an EMS, remote start and stop contacts are available to start and stop each chiller per Figure 29 on page 41. Contact rating shall be 5 milliamperes at 115VAC.

3. The OptiView\textsuperscript{TM} 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) 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 panel Setup Screen. With the Chilled Liquid Pump Operation set to STANDARD, the chilled water pump operates for 30 seconds prior to chiller start, during chiller operation, coastdown, and LOW TEMPERATURE cycling shutdowns. With the mode set to ENHANCED, the chilled water pump operates as above plus it operates during MULTI-UNIT and SYSTEM cycling shutdowns.

4. Reduce the compressor-motor kW input (and thus amps), by raising the leaving chilled liquid temperature through remote temperature control setpoint in the “remote” operating mode. When remote temperature reset is accomplished by supplying a 1 to 11 second pulse-width modulated signal, refer to Figure 46 on page 50. Through use of the remote temperature control analog input on the microboard, the leaving chilled liquid temperature may be reset via a 0 to 20 or 4 to 20mA D.C. current signal, a 0 to 10 or 2 to 10VDC signal. Refer to Figure 44 on page 49 or Figure 45 on page 50.

5. Current limiting of demand during pulldown may be accomplished by using the standard PULL-DOWN DEMAND LIMIT function provided in the OptiView\textsuperscript{TM} Control Center. The PULLDOWN DEMAND LIMIT key can be programmed to limit compressor motor current from 30 to 100 percent of full load amperes, for 1 to 255 minutes following each compressor start. For more details refer to YMC\textsuperscript{2} Operations and Maintenance (Form 160.78-O1).
6. Controlling the maximum allowable compressor motor amps from 30 to 100% through remote current limit setpoint. Refer to Figure 43 on page 48 when the remote current limit is accomplished by supplying a 1 to 11 second pulse-width modulated signal in the “remote” operating mode. A jumper configurable analog input is available for remote current limit setpoint via a 0 to 20 or 4 to 20 mA D.C. current signal, a 0 to 10 or 2 to 10 VDC signal. Refer to Figure 41 on page 47 and Figure 42 on page 47.

7. The Johnson Controls METASYSTM System and other BAS Systems may be interfaced with the chiller OptiViewSTM Control Center to provide unified chiller plant system control. The METASYSTM System directly communicates with the OptiViewSTM Control Center via the E-Link Gateway or SC-EQ which may be installed in the Control Center. All temperatures, pressures, safety alarms and cycling information known to the OptiViewSTM Control Center are then available to the METASYSTM System for integrated chiller plant control, data logging, and local and remote operator displays. The E-Link Gateway or SC-EQ also allows the BAS to start, stop, and reset the chiller’s leaving chilled water setpoint and the current limit setpoint. Standard communication protocols supported are BACnet, Modbus RTU and N2.