

 BY JOHNSON CONTROLS	NEW RELEASE Form: 160.84-PW2 (913) YMC² MOD B CHILLER WITH M2 COMPRESSOR UNIT WIRING AND FIELD CONTROL MODIFICATIONS									
WIRING DIAGRAMS	<table border="0"> <tr> <td>CONTRACTOR _____</td> <td>PURCHASER _____</td> </tr> <tr> <td>ORDER NO. _____</td> <td>JOB NAME _____</td> </tr> <tr> <td>YORK CONTRACT NO. _____</td> <td>LOCATION _____</td> </tr> <tr> <td>YORK ORDER NO. _____</td> <td>ENGINEER _____</td> </tr> </table>		CONTRACTOR _____	PURCHASER _____	ORDER NO. _____	JOB NAME _____	YORK CONTRACT NO. _____	LOCATION _____	YORK ORDER NO. _____	ENGINEER _____
CONTRACTOR _____	PURCHASER _____									
ORDER NO. _____	JOB NAME _____									
YORK CONTRACT NO. _____	LOCATION _____									
YORK ORDER NO. _____	ENGINEER _____									
☐ REFERENCE DATE _____	☐ APPROVAL DATE _____	☐ CONSTRUCTION DATE _____								

JOB DATA:

CHILLER MODEL NO. YMC² _____

NO. OF UNITS _____

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: 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 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 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 this document and any referenced materials. This individual shall also be familiar with and comply with all applicable 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:



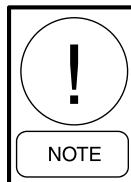
Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.



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 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 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>.

Operating/service personnel maintain responsibility for the applicability of these documents to the equipment.

If there is any question regarding the applicability of these documents, the technician 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
YMC ² Installation	160.84-N1
YMC ² Field Connections	160.84-PW1
YMC ² Unit Renewal Parts	160.84-RP1
YMC ² Unit Operations and Maintenance Manual	160.84-OM1
YMC ² Unit Service	160.84-M1
YMC ² OptiView™ Service	160.84-M2

NOMENCLATURE

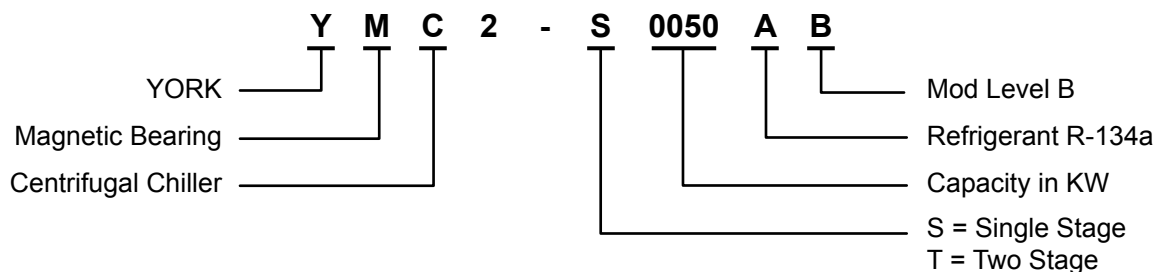


TABLE OF CONTENTS

SECTION 1 - UNIT WIRING	7
Power Panel Cable	21
MBC Power Cable	22
VGD1 Power Cable	23
Power Panel (PDE) to OptiView™ Cable	24
VGD Command / Position Feedback Cable	25
Run Permissive Circuit	27
System Architecture	28
Power Distribution Diagram	29
Power Panel Wiring Diagram	30
OptiView™ Power Wiring	32
Low Voltage I/O Wiring Diagram	34
I/O Wiring – Low Voltage / Control	36
I/O Wiring – Control Voltage	38
I/O Wiring – Control Voltage	40
Interpanel Connections	42
I/O Wiring Options	44
SECTION 2 - FIELD CONTROL MODIFICATIONS	49
Remote Mode Ready to Start Contacts	50
Cycling Shutdown Alarm Contacts	50
Safety Shutdown Alarm Contacts	50
Run Contacts	50
Warning Alarm Contacts	51
Remote Start and Stop Contacts from Energy Management System	51
Auxiliary Safety Shutdown	51
Remote/Local Cycling Devices	51
Multi-Unit Cycling Shutdown	52
Chilled Liquid Pump Run (TB2-44/45)	52
Condenser Liquid Pump Run (TB2-150/151)	52
Condenser Liquid Flow Sensors	53
Thermal Type Flow Sensor	53
Paddle Type Flow Sensor	53
Chilled Liquid Flow Sensors	54
Paddle Type Flow Sensor	54
Remote Current Limit Setpoint	54
Remote Leaving Chilled Liquid Setpoint	56
External Signal for Refrigeration Unit Failure	58
Auxiliary Safety Shutdown	59
Optional Head Pressure Control	59
SECTION 3 - ENERGY MANAGEMENT SYSTEMS	61

LIST OF FIGURES

FIGURE 1 - Unit Device Locations	10
FIGURE 2 - Unit Device Locations	11
FIGURE 3 - OptiView™ Component Layout	12
FIGURE 4 - Power Panel (PDE) Component Layout	12
FIGURE 5 - Power Panel Wiring Diagram	13
FIGURE 6 - OptiView™ Control Panel Wiring Diagram	14
FIGURE 7 - OptiView™ Control Panel – TB6 Detail	16
FIGURE 8 - OptiView™ Control Panel – TB7 Detail	16
FIGURE 9 - Microboard (031-02430) Details	17
FIGURE 10 - I/O Board (031-01743) Details	18
FIGURE 11 - LTC I/O Board (031-02895) Details	19
FIGURE 12 - Stall Detector Board (031-02418) Details	20
FIGURE 13 - Electronic Expansion Valve (EEV) Board (025-44604) Details	20
FIGURE 14 - Power Panel Cable (Power Panel to VSD)	21
FIGURE 15 - MBC Power Cable (Power Panel to MBC)	22
FIGURE 16 - VGD1 Power Cable (Power Panel to VGD1)	23
FIGURE 17 - Power Panel (PDE) to OptiView™ Cable	24
FIGURE 18 - VGD Command / Position Feedback Cable (OptiView™ to VGD2)	25
FIGURE 19 - Component Connection Details	26
FIGURE 20 - Run Permissive Circuit	27
FIGURE 21 - System Architecture	28
FIGURE 22 - Power Distribution Diagram	29
FIGURE 23 - Power Panel Wiring Diagram	30
FIGURE 24 - OptiView™ Power Wiring	32
FIGURE 25 - I/O Wiring Low Voltage	34
FIGURE 26 - I/O Wiring – Low Voltage / Control	36
FIGURE 27 - I/O Wiring – Control Voltage	38
FIGURE 28 - I/O Wiring – Control Voltage	40
FIGURE 29 - Interpanel Connections	42
FIGURE 30 - I/O Wiring Options	44
FIGURE 31 - Motor Connections	46
FIGURE 32 - MBC to Motor Housing	46
FIGURE 33 - Feedthrough – MBC Power Z1	47
FIGURE 34 - Feedthrough – MBC Signal Z1	47
FIGURE 35 - Feedthrough – MBC Power Z2	48
FIGURE 36 - Feedthrough – MBC Signal Z2	48
FIGURE 37 - Remote Ready to Start Contacts	50
FIGURE 38 - Cycling Shutdown Alarm Contacts	50
FIGURE 39 - Safety Shutdown Alarm Contacts	50
FIGURE 40 - Run Contacts	51
FIGURE 41 - Warning Alarm Contacts	51
FIGURE 42 - Remote Start / Stop Contacts from Energy Management System	51
FIGURE 43 - Auxiliary Safety Shutdown	51
FIGURE 44 - Remote/Local Cycling Devices	52
FIGURE 45 - Multi-Unit Cycling Shutdown	52
FIGURE 46 - Chilled Liquid Pump Run	52
FIGURE 47 - Condenser Liquid Pump Run	52
FIGURE 48 - Condenser Flow Switches	53
FIGURE 49 - Chilled Liquid Flow Switches	54
FIGURE 50 - Remote Current Limit Setpoint with 0-10VDC or 2-10VDC Signal	55
FIGURE 51 - Remote Current Limit Setpoint with 0-20mA or 4-20mA Signal	55
FIGURE 52 - Remote Current Limit Setpoint with PWM Signal	56
FIGURE 53 - Remote Leaving Chilled Liquid Temp. Setpoint with 0-10VDC or 2-10VDC Signal	57
FIGURE 54 - Remote Leaving Chilled Liquid Temp. Setpoint with 0-20mA or 4-20mA Signal	58
FIGURE 55 - Remote Leaving Chilled Liquid Temp. Setpoint	58

LIST OF FIGURES (CONT'D)

FIGURE 56 - Auxiliary Safety Shutdown Input	59
FIGURE 57 - Optional Head Pressure Control Output	59

LIST OF TABLES

TABLE 1 - Unit Device Locations	9
--	---

SECTION 1 - UNIT WIRING

1

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 160.84-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 TB4 terminals 1 and 13 (Line 839) (see Note 7). If a cycling device is installed, the jumper must be removed between terminals 1 and 13.
6. A remote start-stop switch may be connected to TB4 terminals 1 and 7 (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 VAC for connections to TB4 on 031-01743 board.
- 8.
9. A jumper is installed between TB6 terminals 24 and 25 for normal operation.
- 10.
11. Contact rating is 5 AMPs resistive at 250 VAC and 30 Volts DC, 2 AMP inductive (.4 PF) at 120 VAC and 30 VDC.
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.

LEGEND

LABEL	DESCRIPTION
1BR	6 AMP CIRCUIT BREAKER, OV PANEL
4BR	6 AMP CIRCUIT BREAKER, OV PANEL
1FU	20 AMP FUSE, POWER PANEL
2FU	125 AMP FUSE, POWER PANEL
4FU	125 AMP FUSE, POWER PANEL
6FU	20 AMP FUSE, POWER PANEL
7FU	20 AMP FUSE, POWER PANEL
8FU	6 AMP FUSE, POWER PANEL
9FU	6 AMP FUSE, POWER PANEL
1T	POWER SUPPLY TRANSFORMER 1
2T	POWER SUPPLY TRANSFORMER 2
CFS	CONDENSER LIQUID FLOW SWITCH
CLCV	CONDENSER LEVEL CONTROL VALVE
CP	CONDENSER PRESSURE
EEV	ELECTRONIC EXPANSION VALVE
EFS	CHILLED LIQUID FLOW SWITCH
EP	EVAPORATOR PRESSURE
FU	FUSE
HGBP	HOT GAS BYPASS
HPC	HEAD PRESSURE CONTROL
HPCO	HIGH PRESSURE CUTOUT
LLS	CONDENSER REFRIGERANT LEVEL
MBC	MAGNETIC BEARING CONTROLLER
MCV	MOTOR COOLING VALVE
MOV	METAL OXIDE VARISTOR
OV	OPTIVIEW™ CONTROL PANEL
PDE	POWER PANEL
PRV	PRE-ROTATION VANE
PS1	POWER SUPPLY, OV PANEL
RT1	LEAVING CHILLED WATER TEMP.
RT2	DISCHARGE TEMP.
RT4	LEAVING CONDENSER WATER TEMP.

LABEL	DESCRIPTION
RT5	ENTERING CONDENSER WATER TEMP.
RT6	DROP LEG REFRIGERANT TEMP.
RT7	EVAPORATOR REFRIGERANT TEMP.
RT9	ENTERING CHILLED WATER TEMP.
RT14	MOTOR HOUSING TEMPERATURE 1
RT15	POWER PANEL AMBIENT TEMP.
SBPV	STOP BYPASS VALVE
SD1	STALL DETECTOR
TB	TERMINAL BLOCK
UPS	UNINTERRUPTED POWER SUPPLY
VGD	VARIABLE GEOMETRY DIFFUSER
VSD	VARIABLE SPEED DRIVE

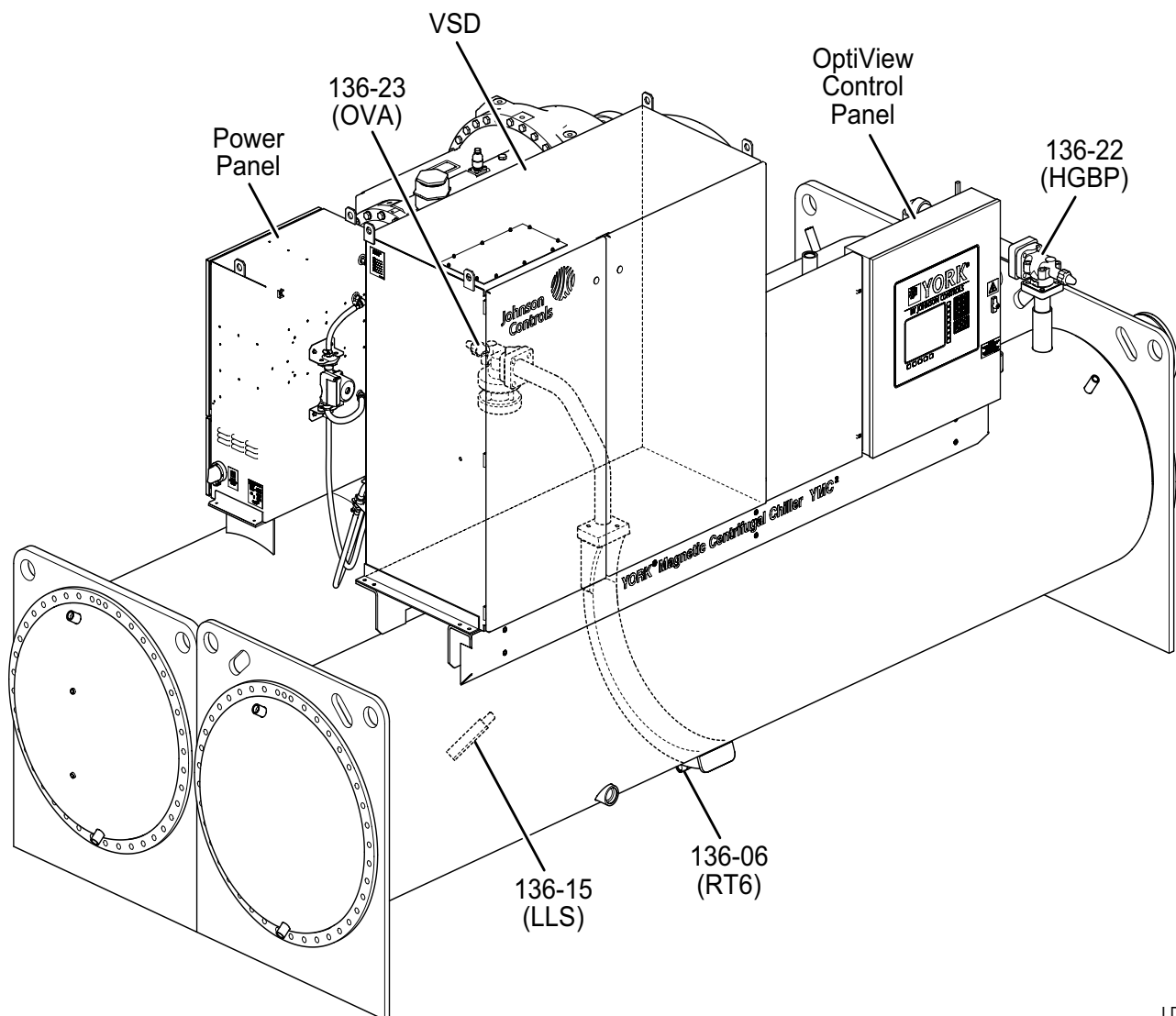
WIRE COLORS

YE	YELLOW
GN	GREEN
RD	RED
OR	ORANGE
BL	BLUE
BK	BLACK
BR	BROWN
WH	WHITE
GR	GREY
V	VIOLET
G/Y	GREEN / YELLOW

— — —	FIELD INSTALLED WIRING
—————	FACTORY INSTALLED WIRING
— — —	FACTORY SYSTEM WIRING
	TERMINAL BLOCK CONNECTION POINT
	COMPONENT TERMINAL CONNECTION
	JACK AND PLUG CONNECTION

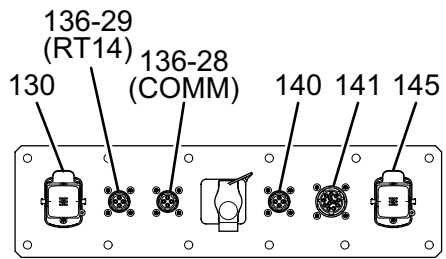
TABLE 1 - UNIT DEVICE LOCATIONS

ITEM	DESCRIPTION	SOURCE	DESTINATION
130	OV to MBC	OptiView	MBC
134	OV to VSD		VSD
135	Motor Power	VSD	Motor
136-01	Leaving Chilled Liquid Temperature	OptiView	RT1
136-02	Discharge Temperature		RT2
136-04	Leaving Condenser Liquid Temperature		RT4
136-05	Entering Condenser Liquid Temperature		RT5
136-06	Drop Leg Refrigerant Temperature		RT6
136-07	Evaporator Refrigerant Temperature		RT7
136-09	Entering Chilled Liquid Temperature		RT9
136-11	Evaporator Pressure		EP
136-12	Condenser Pressure		CP
136-15	Condenser Refrigerant Level Sensor		LLS
136-17	Modbus to VSD		Comm
136-22	Hot Gas Bypass		HGBP
136-23	Condenser Level Control Valve		OVA
136-24	Discharge Pressure	OptiView	SD1
136-26	Chilled Liquid Flow Switch		EFS
136-27	Condenser Liquid Flow Switch		CFS
136-28	Modbus to MBC		Comm
136-29	Motor Housing Temperature		RT14
136-32	VGD Command / Feedback		VGD
136-33	Motor Cooling Valve Command		MCVC
140	Motor Speed	VSD	MBC
141	Motor Stator Temperature		
144	Power Panel Input		Power Panel
145	MBC Power	Power Panel	MBC
146	VGD Power		VGD
147	OV Power		OV

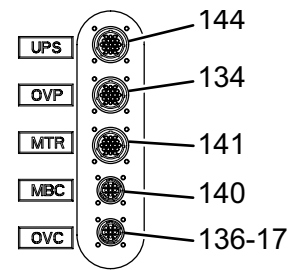


LD14644a

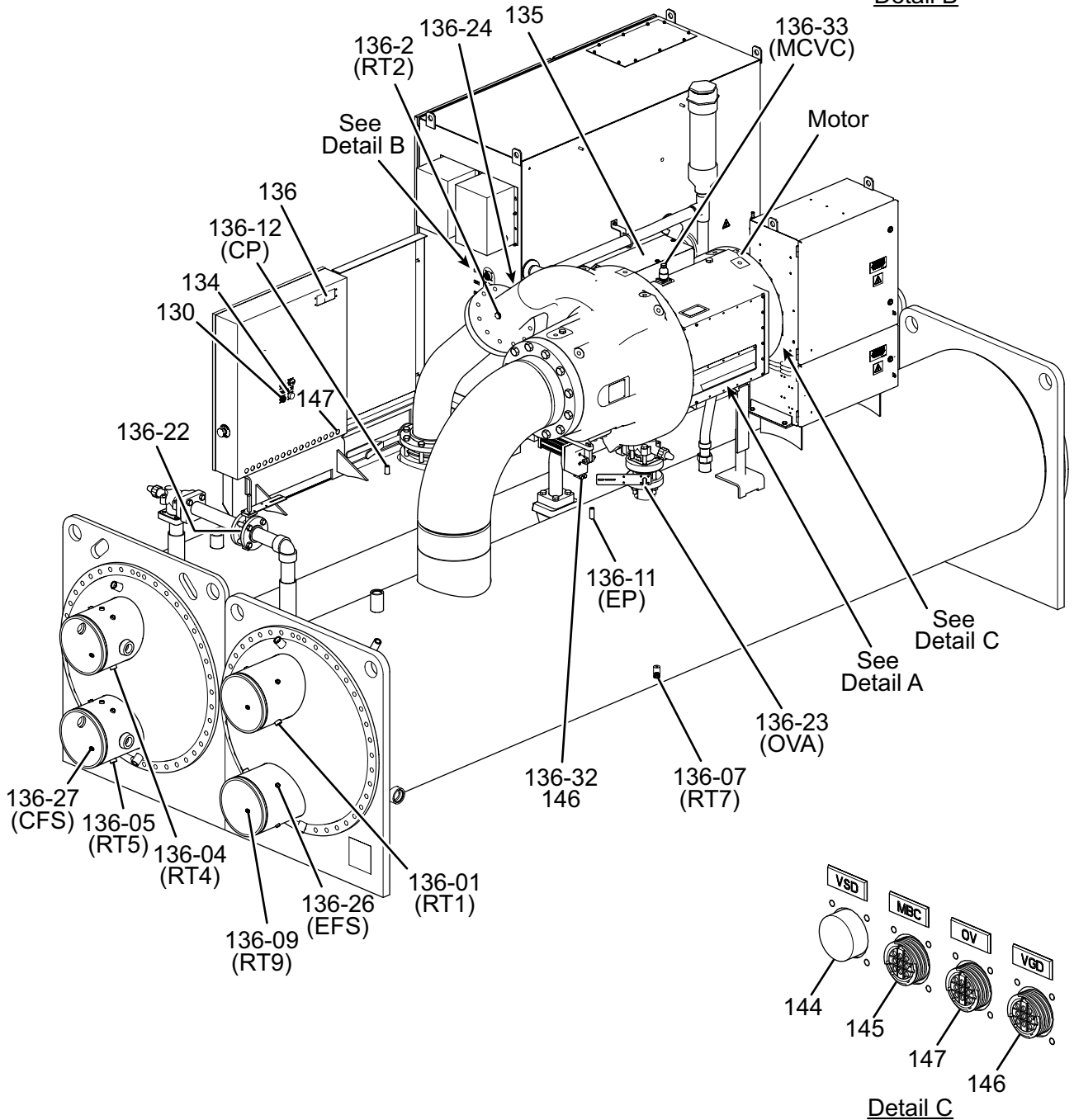
FIGURE 1 - UNIT DEVICE LOCATIONS



Detail A



Detail B



Detail C

LD14643a

FIGURE 2 - UNIT DEVICE LOCATIONS

092-17591-116
REV-

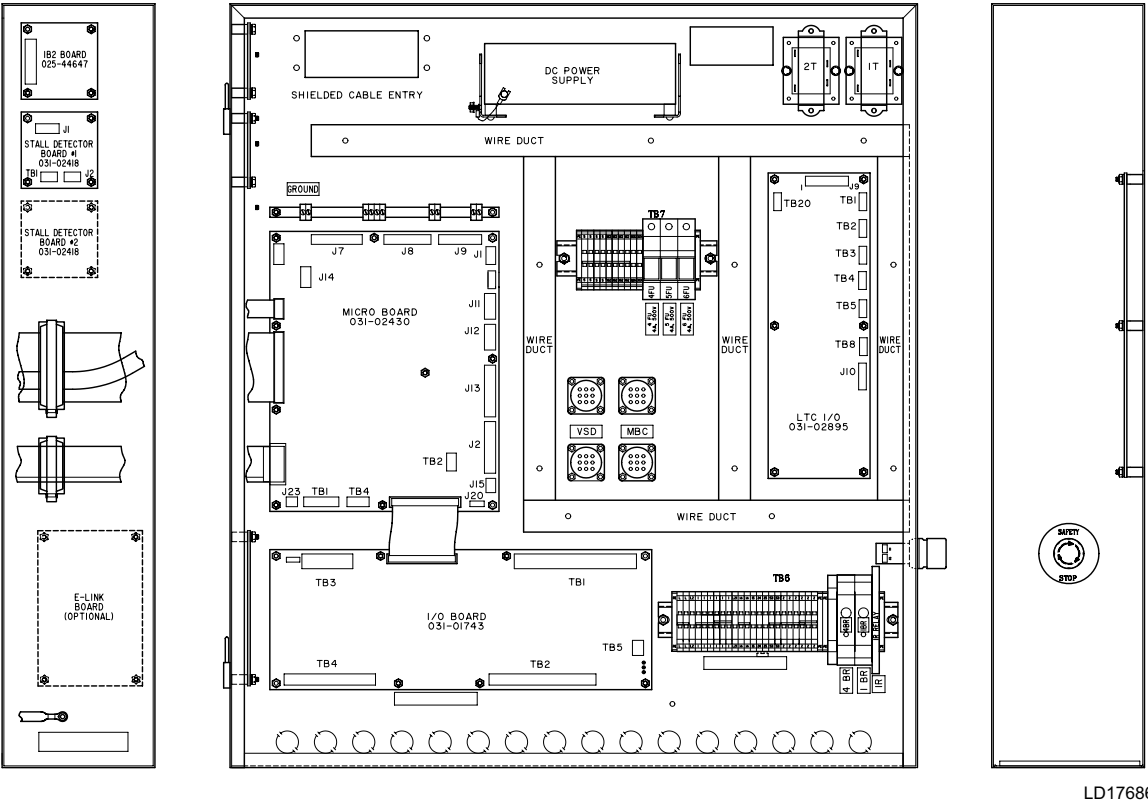


FIGURE 3 - OPTIVIEW™ COMPONENT LAYOUT

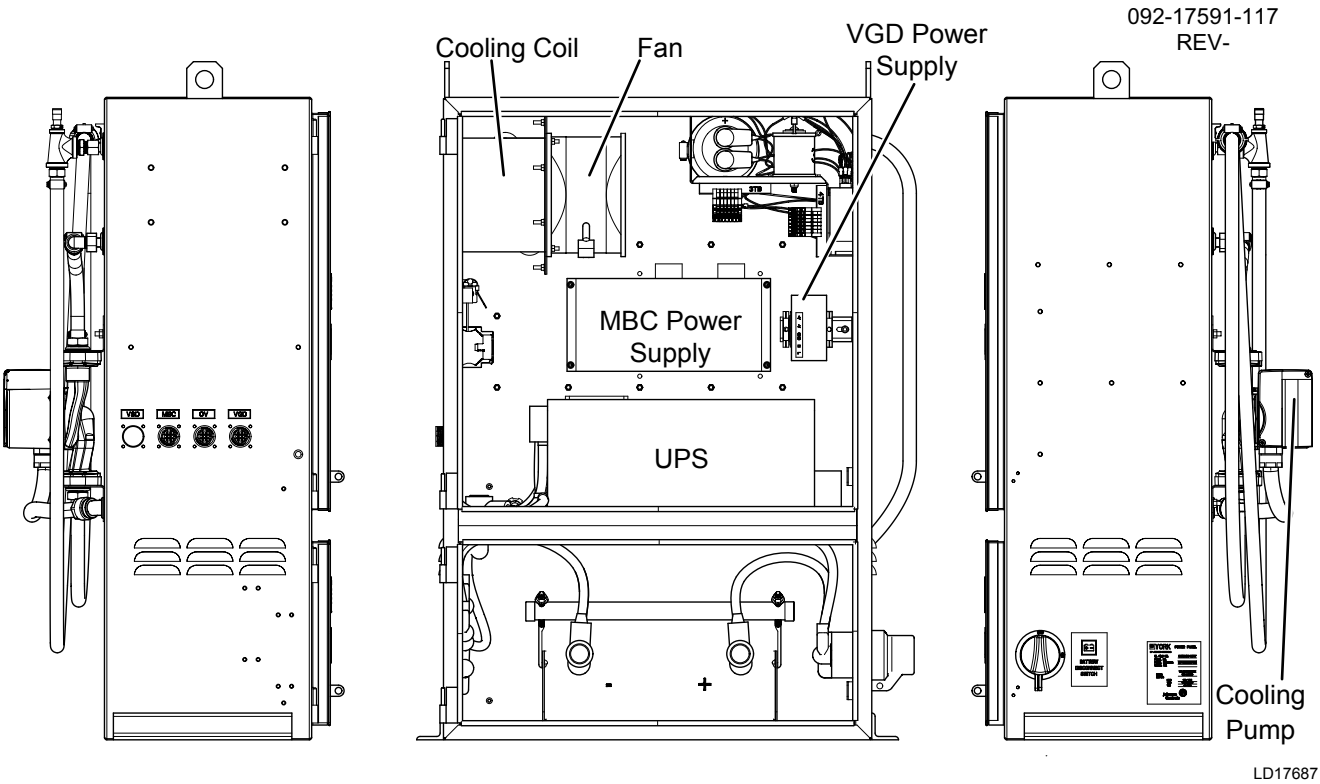
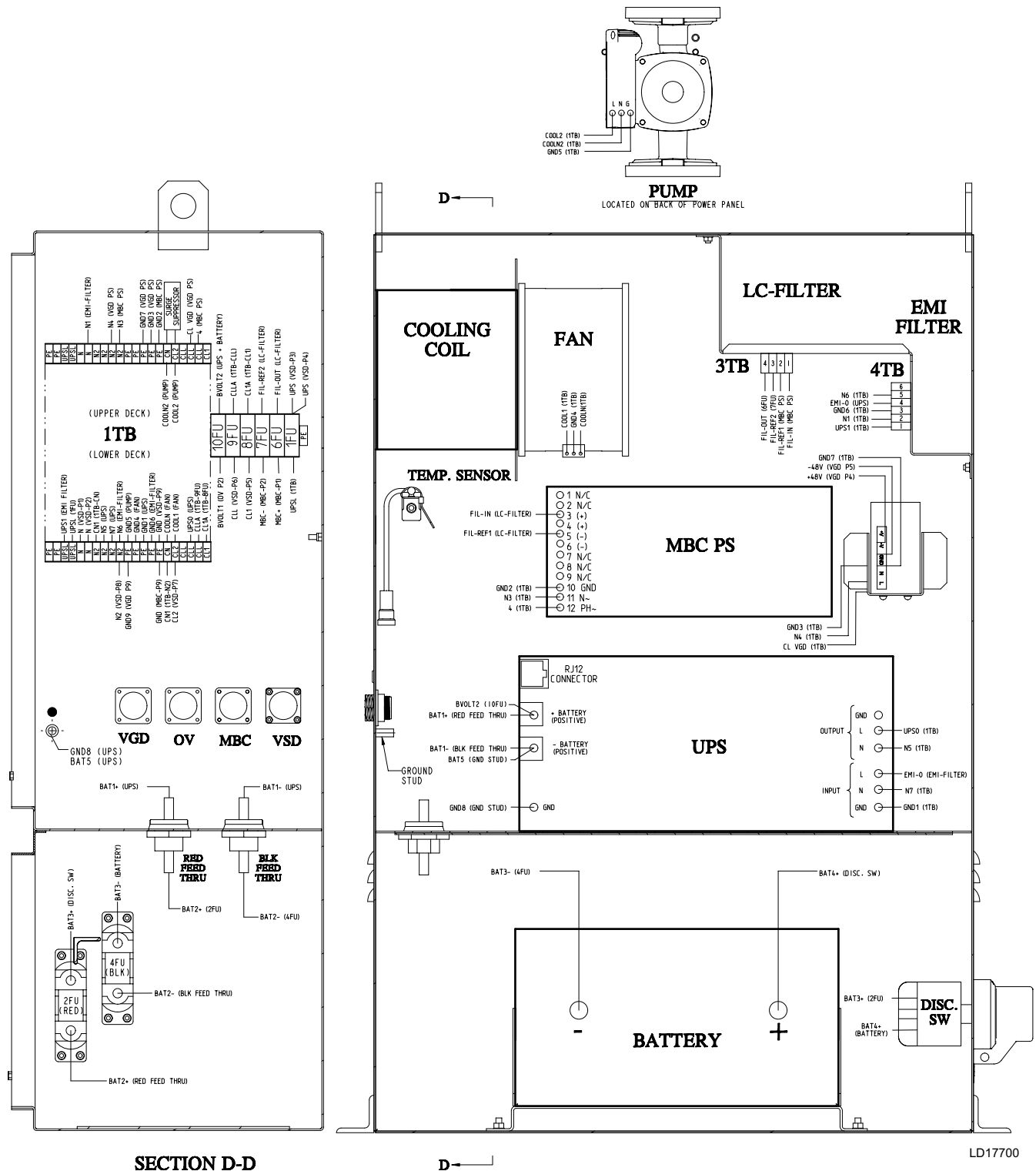


FIGURE 4 - POWER PANEL (PDE) COMPONENT LAYOUT

071-06620-100
REV B

1



NOTE: For wiring of connector VGD, see Figure 16 on page 23. For wiring of connector OV, see Figure 17 on page 24. For wiring of connector MBC, see Figure 15 on page 22. For wiring of VSD connector, see Figure 14 on page 21.

FIGURE 5 - POWER PANEL WIRING DIAGRAM

[illegible]

LD17836

FIGURE 6 - OPTIVIEW™ CONTROL PANEL WIRING DIAGRAM

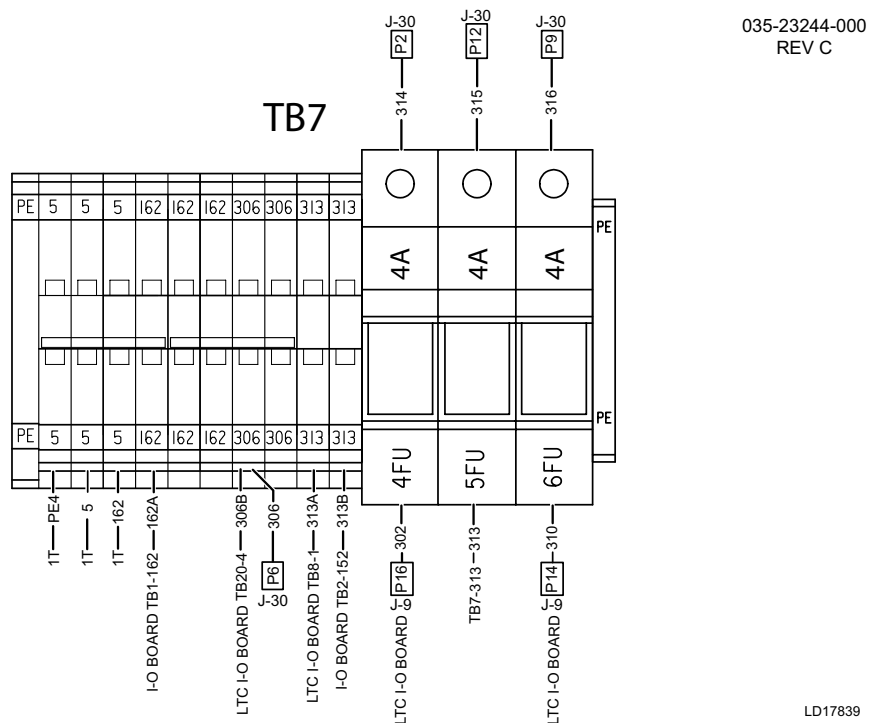
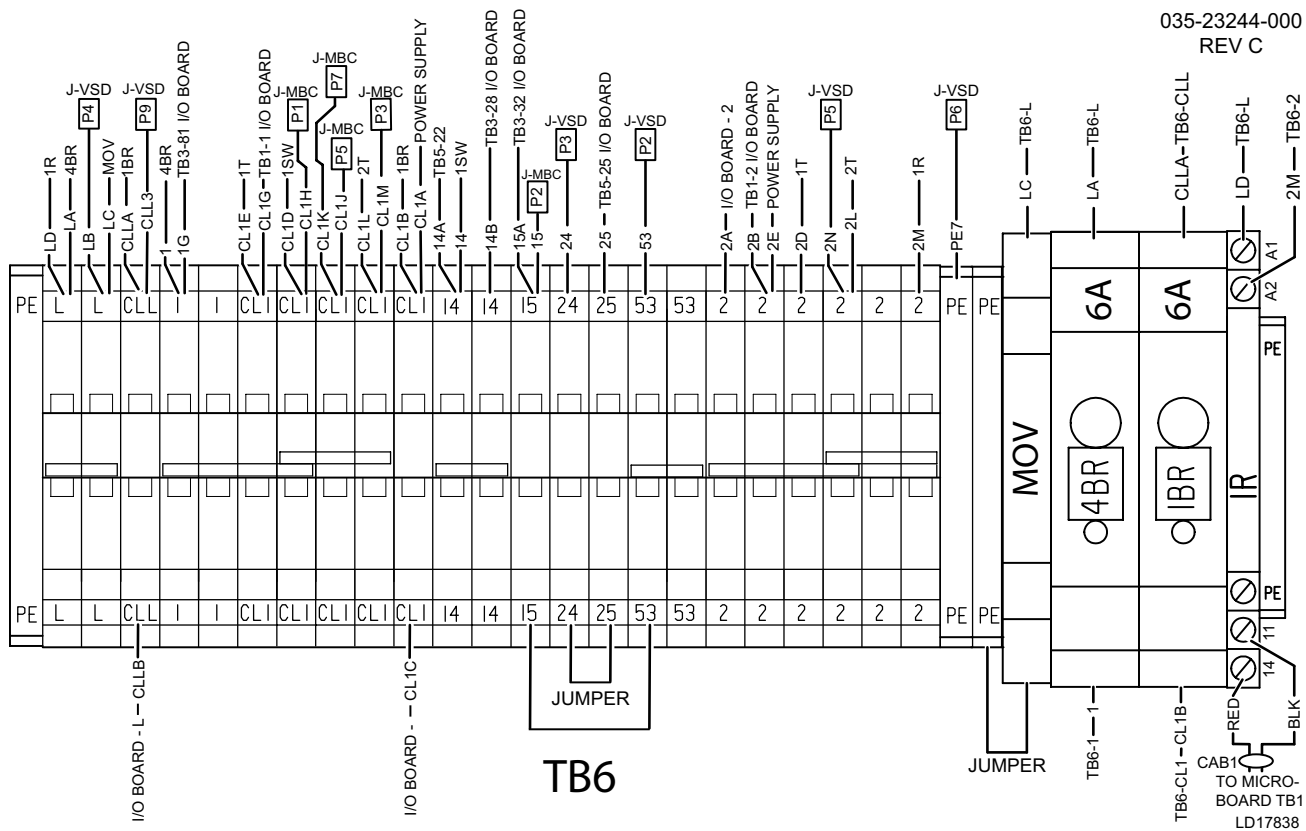
RIGHT SIDE WALL

SCREW TORQUE FOR:
TBI, TB2, TB3, TB4, TB5:

PHOENIX (GREEN)	- 0.5Nm (4.4 lb. in.)
WEIDMULLER (BLACK)	- 0.5Nm (4.4 lb. in.)
AMP (GRAY)	- 0.5Nm (4.4 lb. in.)



FIGURE 6 - OPTIVIEW™ CONTROL PANEL WIRING DIAGRAM (CONT'D)



031-02430

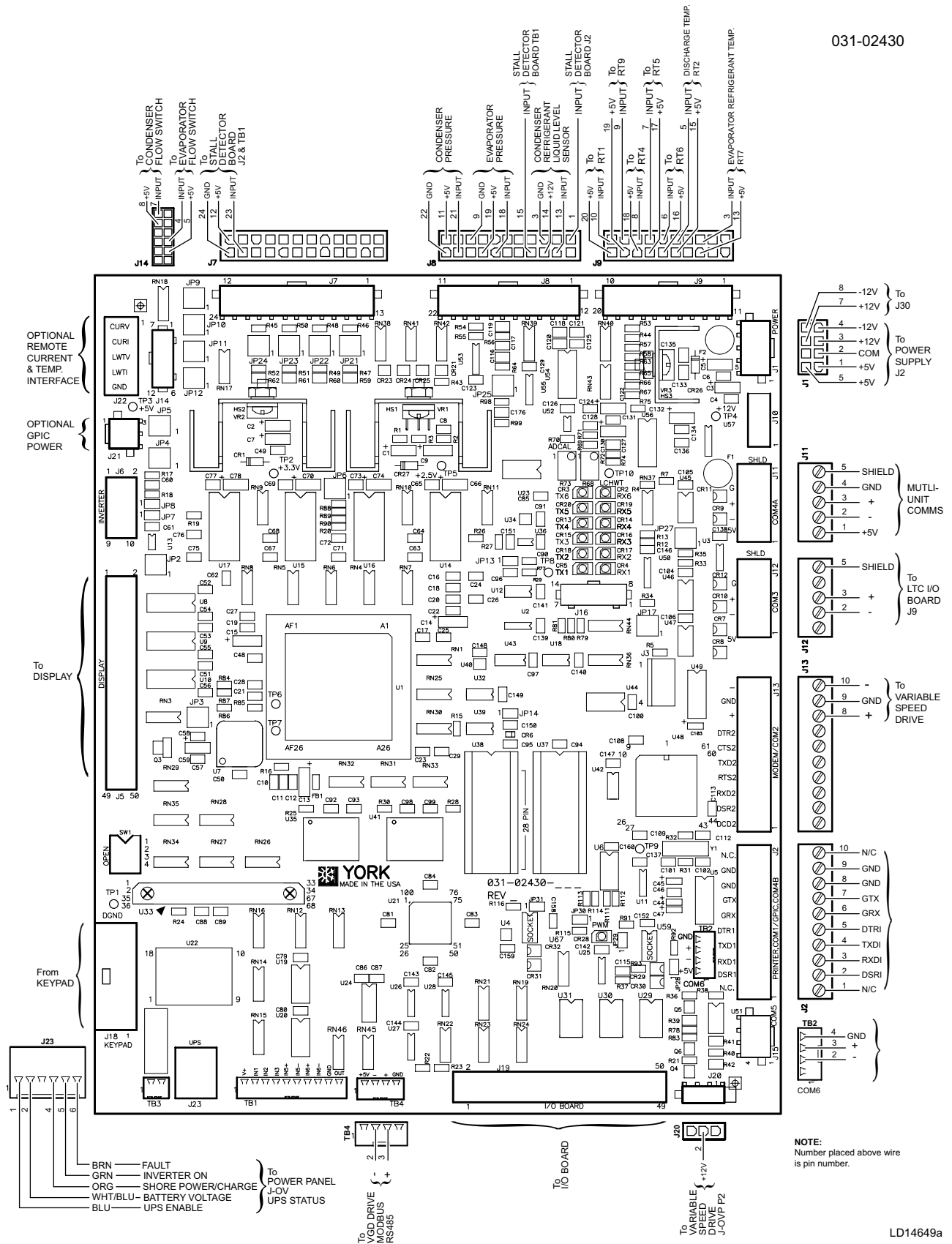
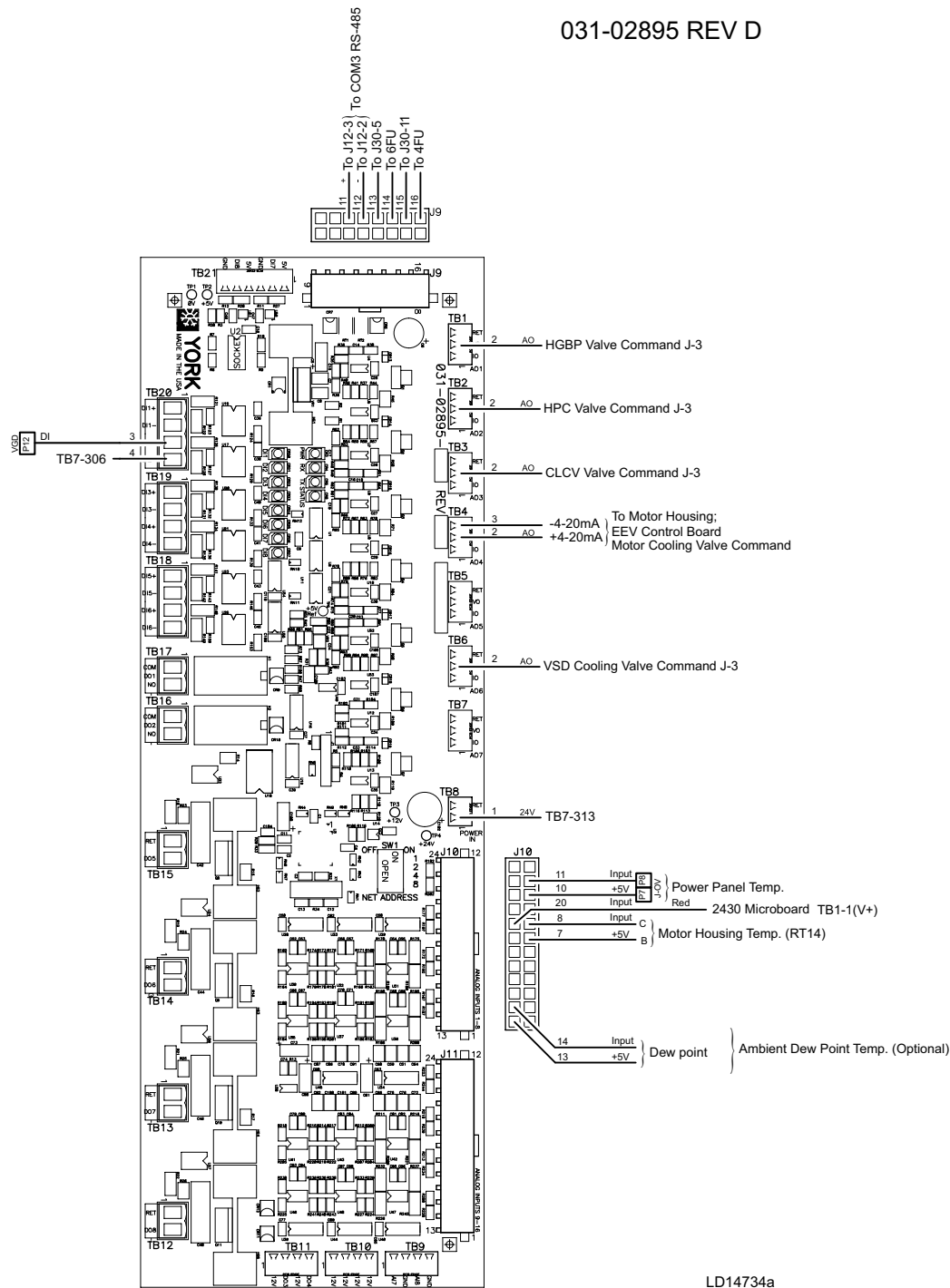


FIGURE 9 - MICROBOARD (031-02430) DETAILS



031-02895 REV D



LD14734a

FIGURE 11 - LTC I/O BOARD (031-02895) DETAILS



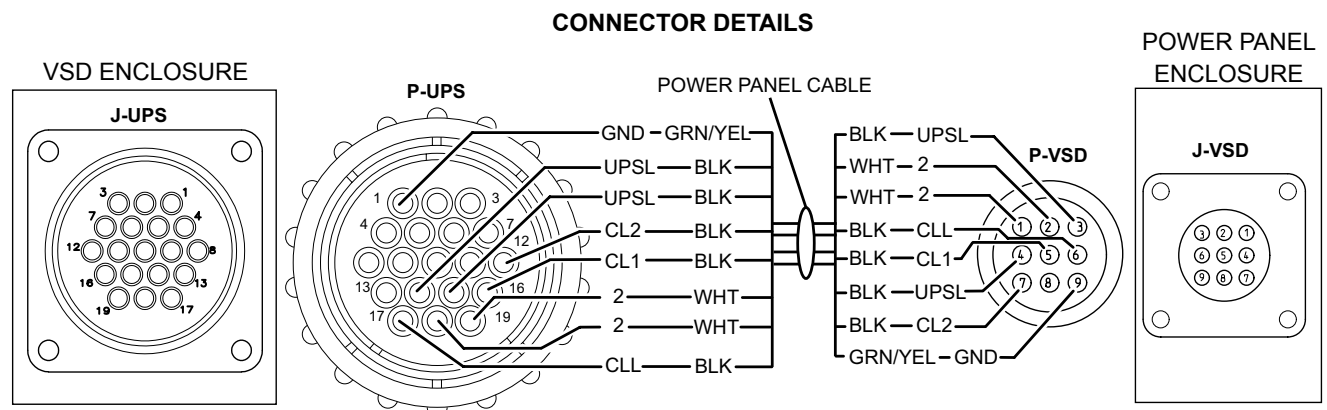
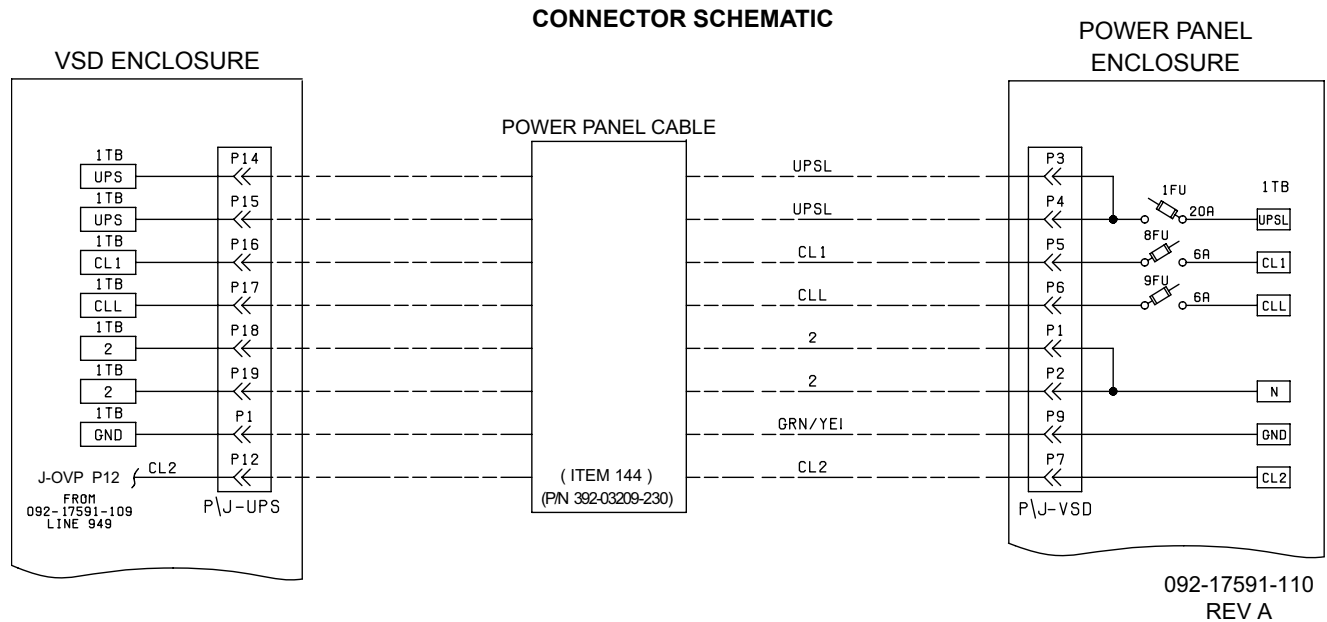
POWER PANEL CABLE

The figure below details the Power Panel Cable connections and wiring. This cable runs from J-VSD on the power panel enclosure to J-UPS on the VSD enclosure (for locations see *Figure 2 on page 11*, details B and C). The connector schematic documenting this wiring is also provided for reference.



Verify the physical pin orientation on the plug or jack. The pin orientation will be different for the wiring side and for the mating side.

1



LD17825

FIGURE 14 - POWER PANEL CABLE (POWER PANEL TO VSD)

MBC POWER CABLE

The figure below details the MBC Power Cable connections and wiring. This cable runs from the J-MBC on the power panel enclosure to J-PDE on the MBC motor housing (for locations see *Figure 2 on page 11*, details A and C, *Figure 31 on page 46*, and *Figure 32 on page 46*). The connector schematic documenting this wiring is also provided for reference.



Verify the physical pin orientation on the plug or jack. The pin orientation will be different for the wiring side and for the mating side.

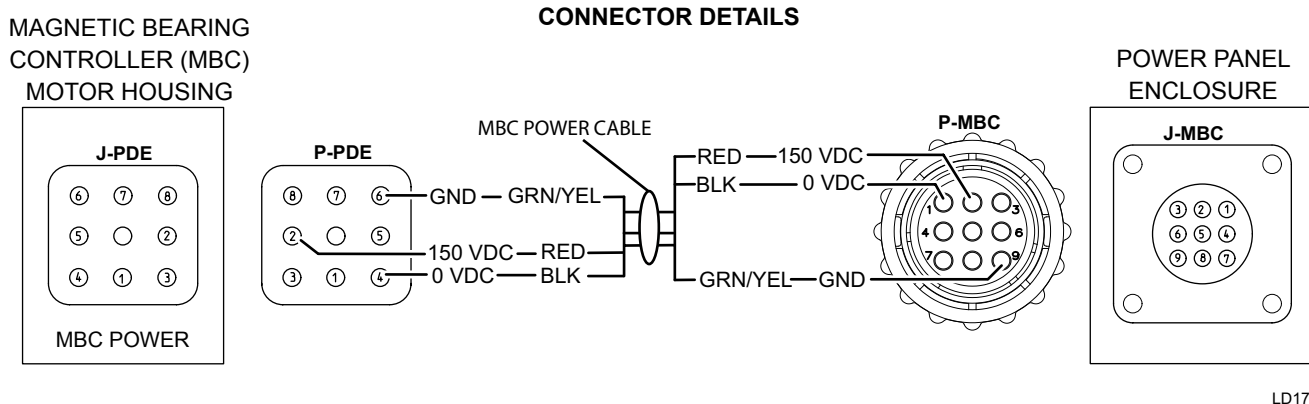
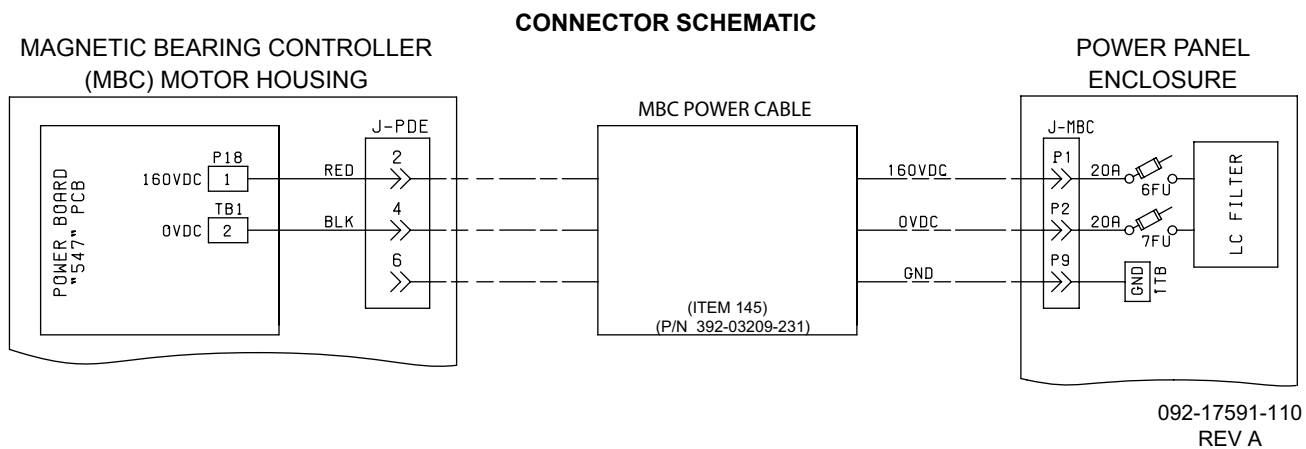


FIGURE 15 - MBC POWER CABLE (POWER PANEL TO MBC)

VGD1 POWER CABLE

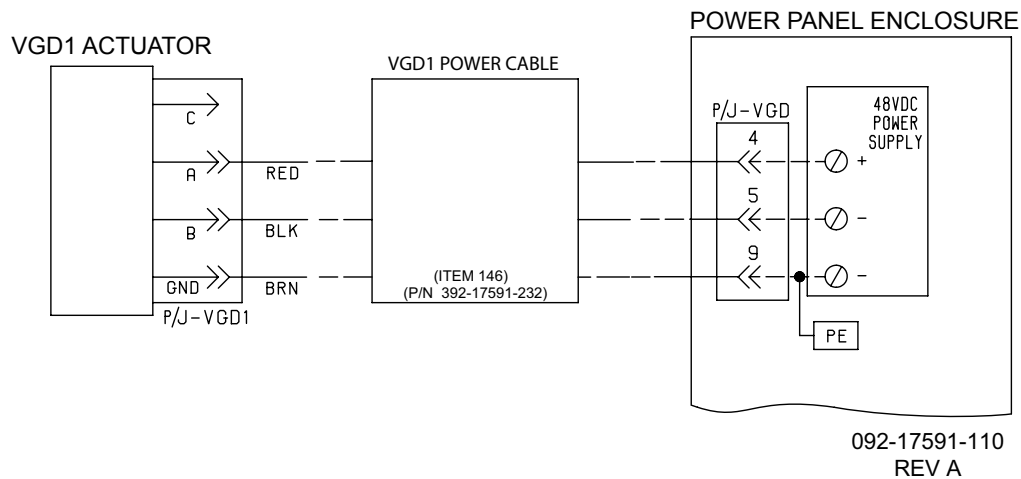
The figure below details the VGD1 Power Cable connections and wiring. This cable runs from J-VGD on the power panel enclosure to J-VGD1 on the VGD1 actuator (for locations see *Figure 2 on page 11*, detail C). The connector schematic documenting this wiring is also provided for reference.



Verify the physical pin orientation on the plug or jack. The pin orientation will be different for the wiring side and for the mating side.

1

CONNECTOR SCHEMATIC



CONNECTOR DETAILS

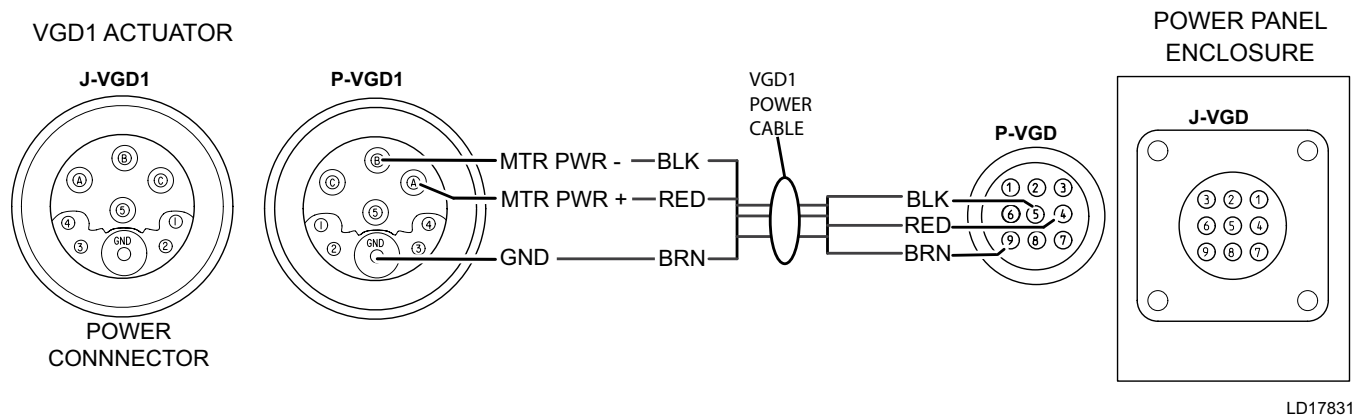


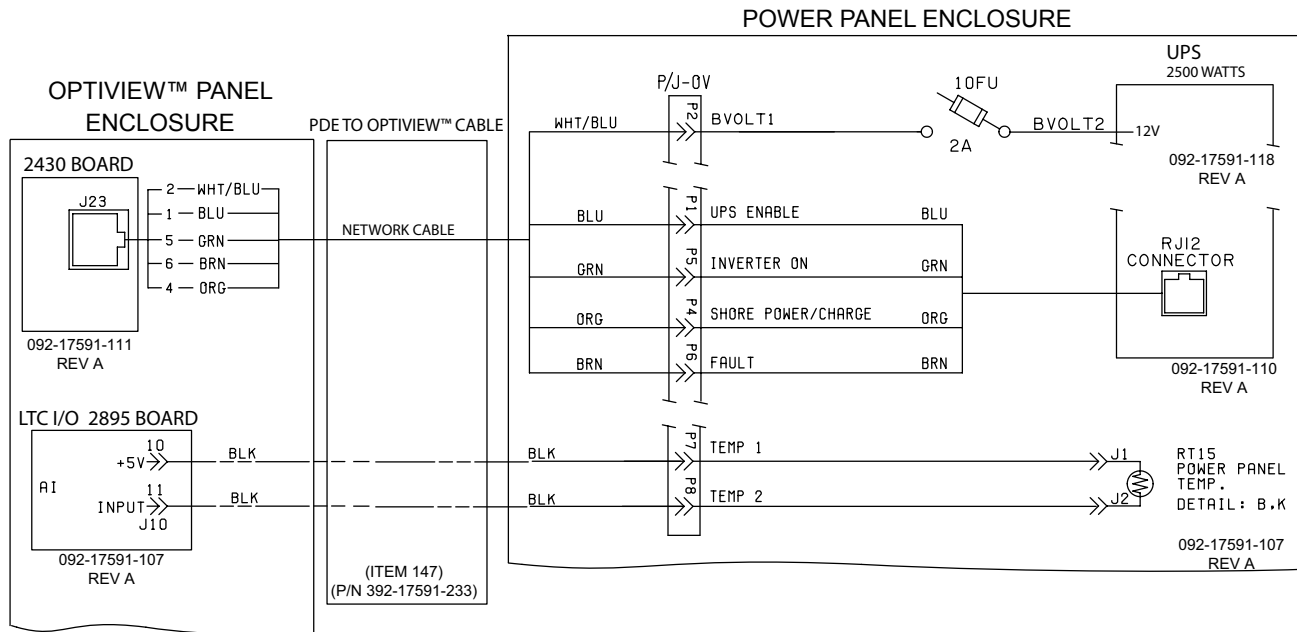
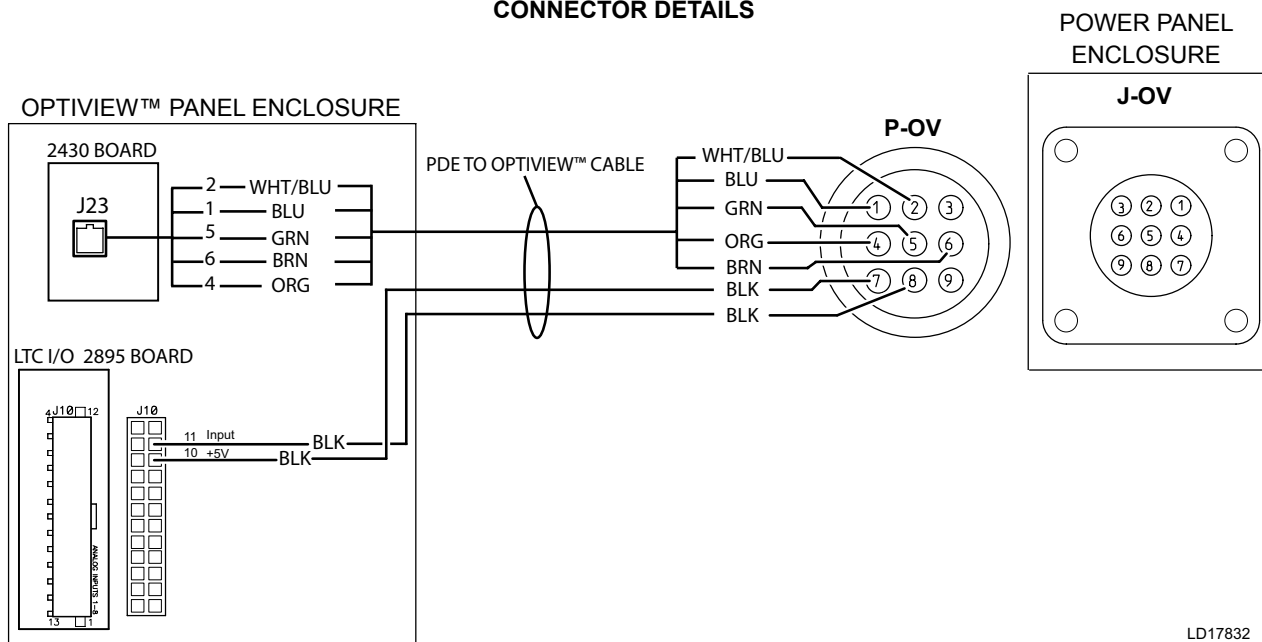
FIGURE 16 - VGD1 POWER CABLE (POWER PANEL TO VGD1)

POWER PANEL (PDE) TO OPTIVIEW™ CABLE

The figure below details the Power Panel (PDE) to OptiView™ Cable plug and wiring. This cable runs from the OV connector on the power panel enclosure to the OptiView™ panel enclosure (for locations, see *Figure 2 on page 11*, and detail C for the OV connector). For ease of reference of the P/J OV connector schematic, the Power Panel enclosure image below is a combination of three electrical schematics.



Verify the physical pin orientation on the plug or jack. The pin orientation will be different for the wiring side and for the mating side.

CONNECTOR SCHEMATIC**CONNECTOR DETAILS**

LD17832

FIGURE 17 - POWER PANEL (PDE) TO OPTIVIEW™ CABLE

VGD COMMAND / POSITION FEEDBACK CABLE

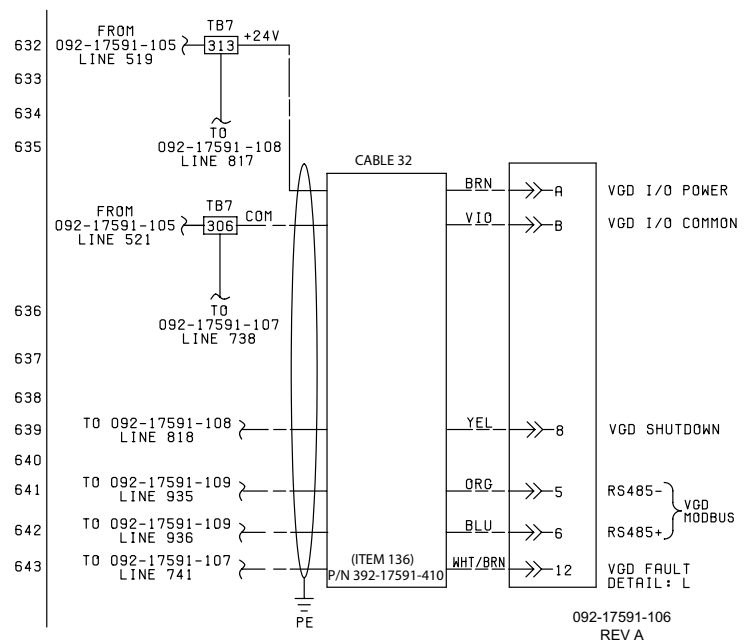
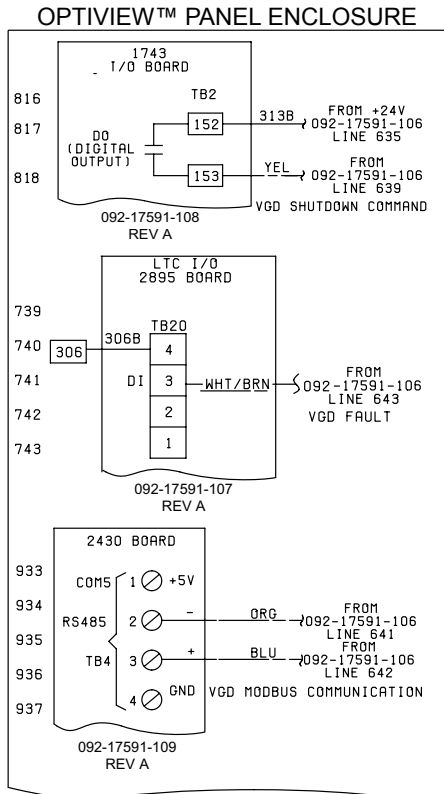
The figure below details the VGD Command / Position Feedback cable connections and wiring. This cable runs from the OptiView™ panel enclosure to J-VGD2 on the VGD1 actuator (for locations see *Figure 2 on page 11*). For ease of reference of the Cable 32 connector schematic, sections of four electrical schematics are provided in the image below.



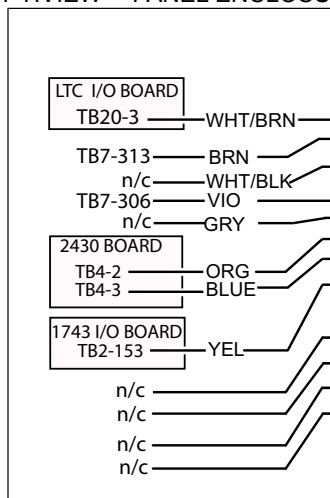
Verify the physical pin orientation on the plug or jack. The pin orientation will be different for the wiring side and for the mating side.

1

CONNECTOR SCHEMATIC



OPTIVIEW™ PANEL ENCLOSURE



CONNECTOR DETAILS

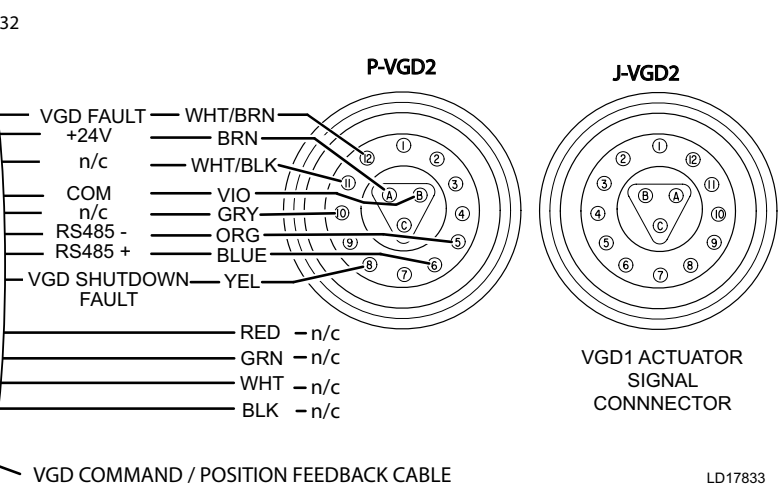
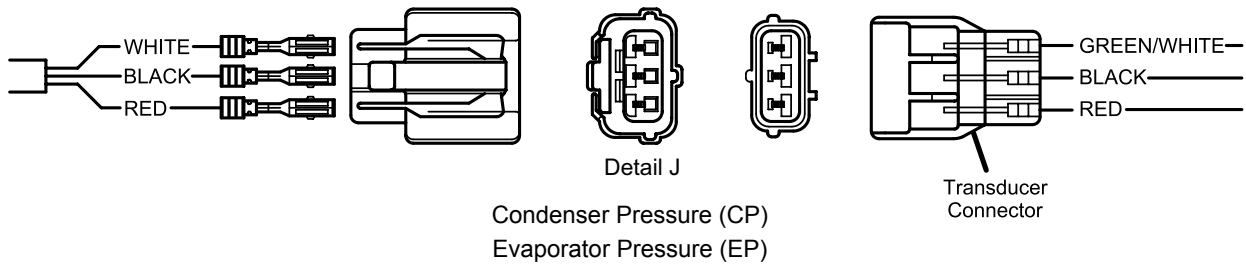
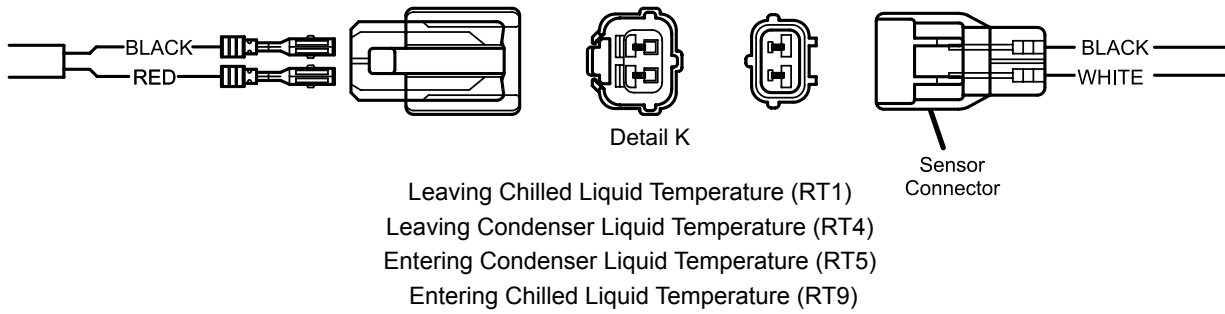
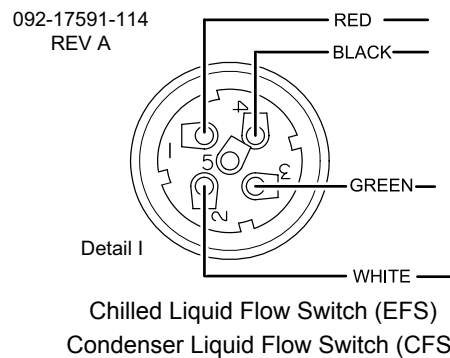
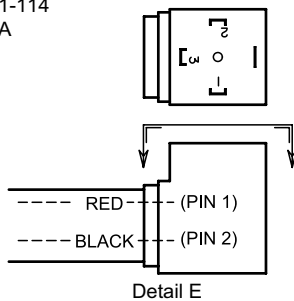


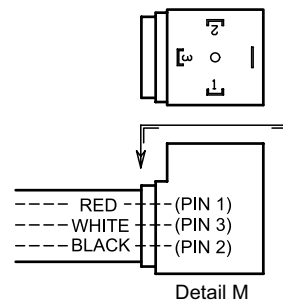
FIGURE 18 - VGD COMMAND / POSITION FEEDBACK CABLE (OPTIVIEW™ TO VGD2)

092-17591-115
REV A

LD14736a

092-17591-114
REV A

Discharge Temperature (RT2)
 Drop Leg Refrigerant Temperature (RT6)
 Evaporator Refrigerant Temperature (RT7)

092-17591-115
REV A

Condenser Refrigerant Level Sensor (LLS)
 Discharge Pressure Transducer (SD1)

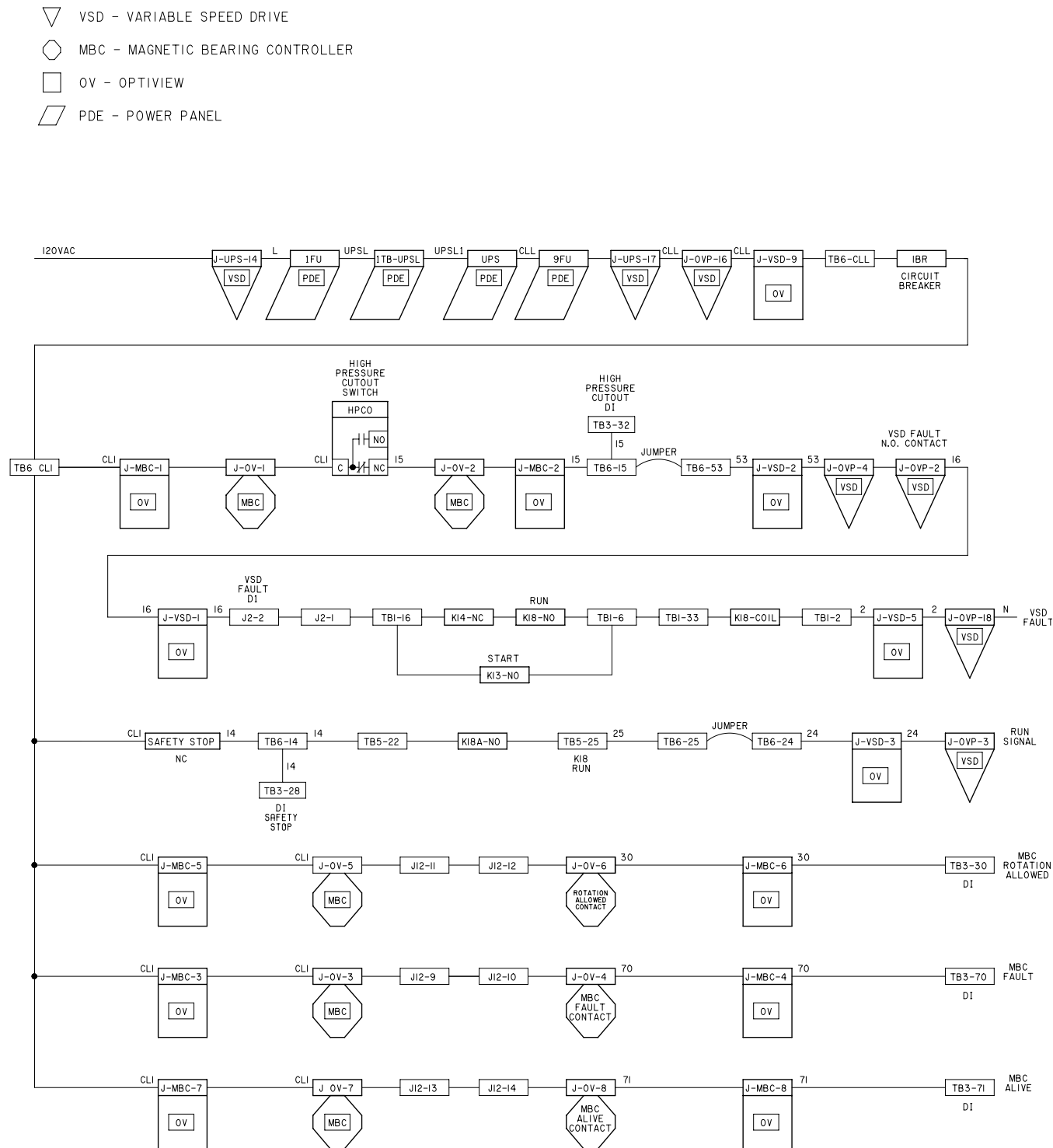
LD14735b

FIGURE 19 - COMPONENT CONNECTION DETAILS

RUN PERMISSIVE CIRCUIT

1

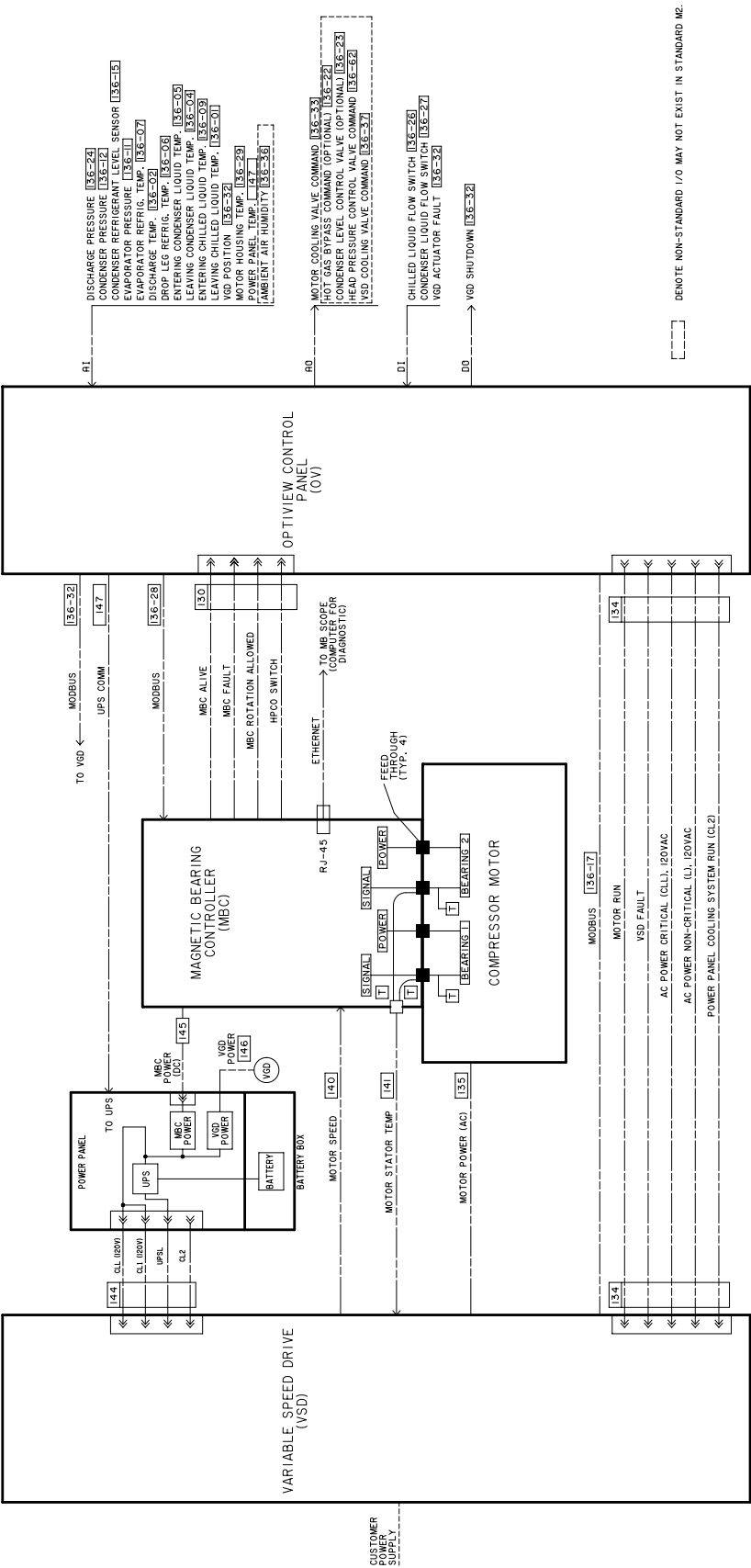
092-17591-112
REV-



LD17683

FIGURE 20 - RUN PERMISSIVE CIRCUIT

SYSTEM ARCHITECTURE



092-17591-101
REV -

DENOTE NON-STANDARD I/O MAY NOT EXIST IN STANDARD M2.

LD17671

FIGURE 21 - SYSTEM ARCHITECTURE

POWER DISTRIBUTION DIAGRAM

092-17591-103
REV A

1

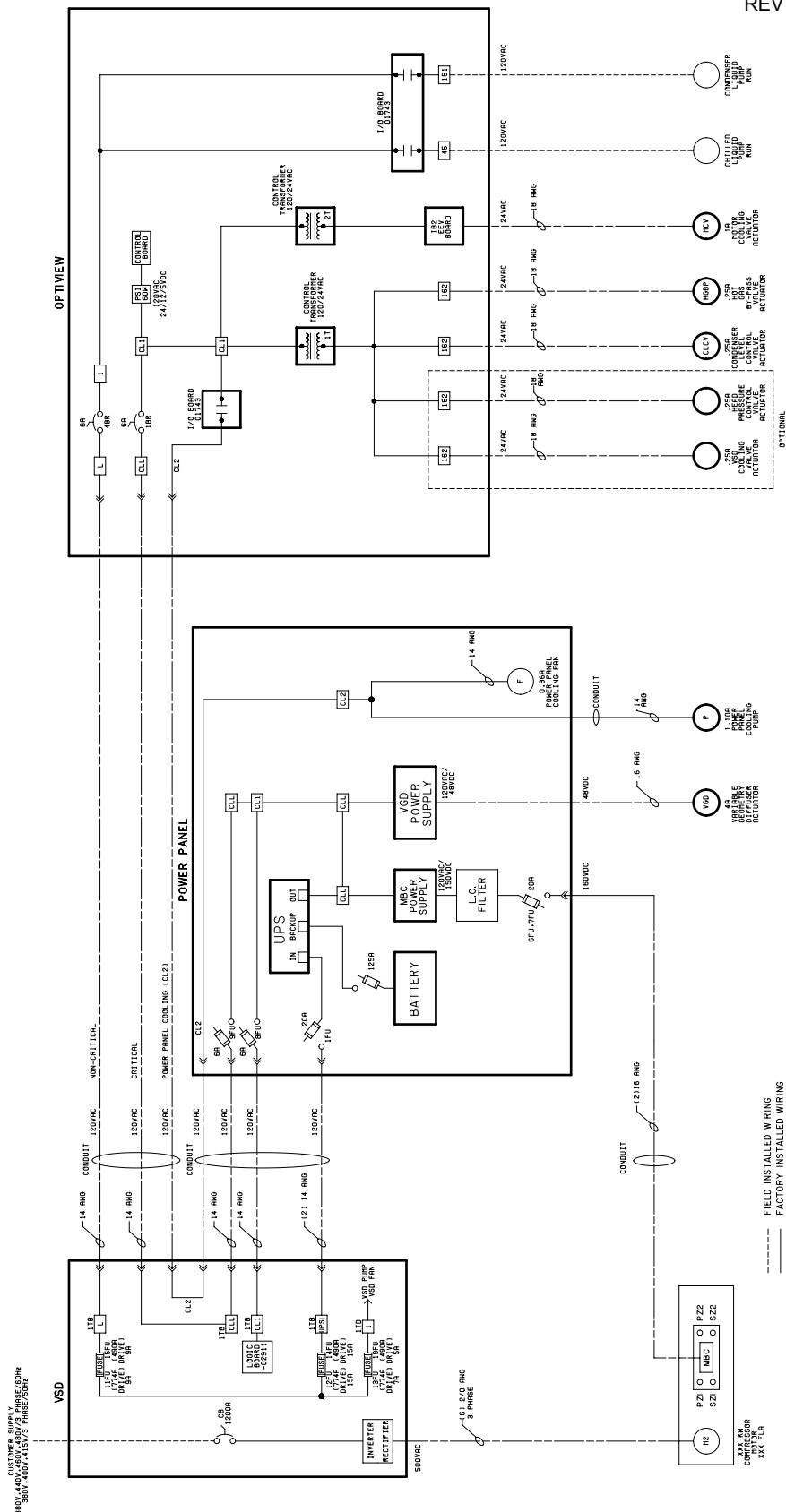
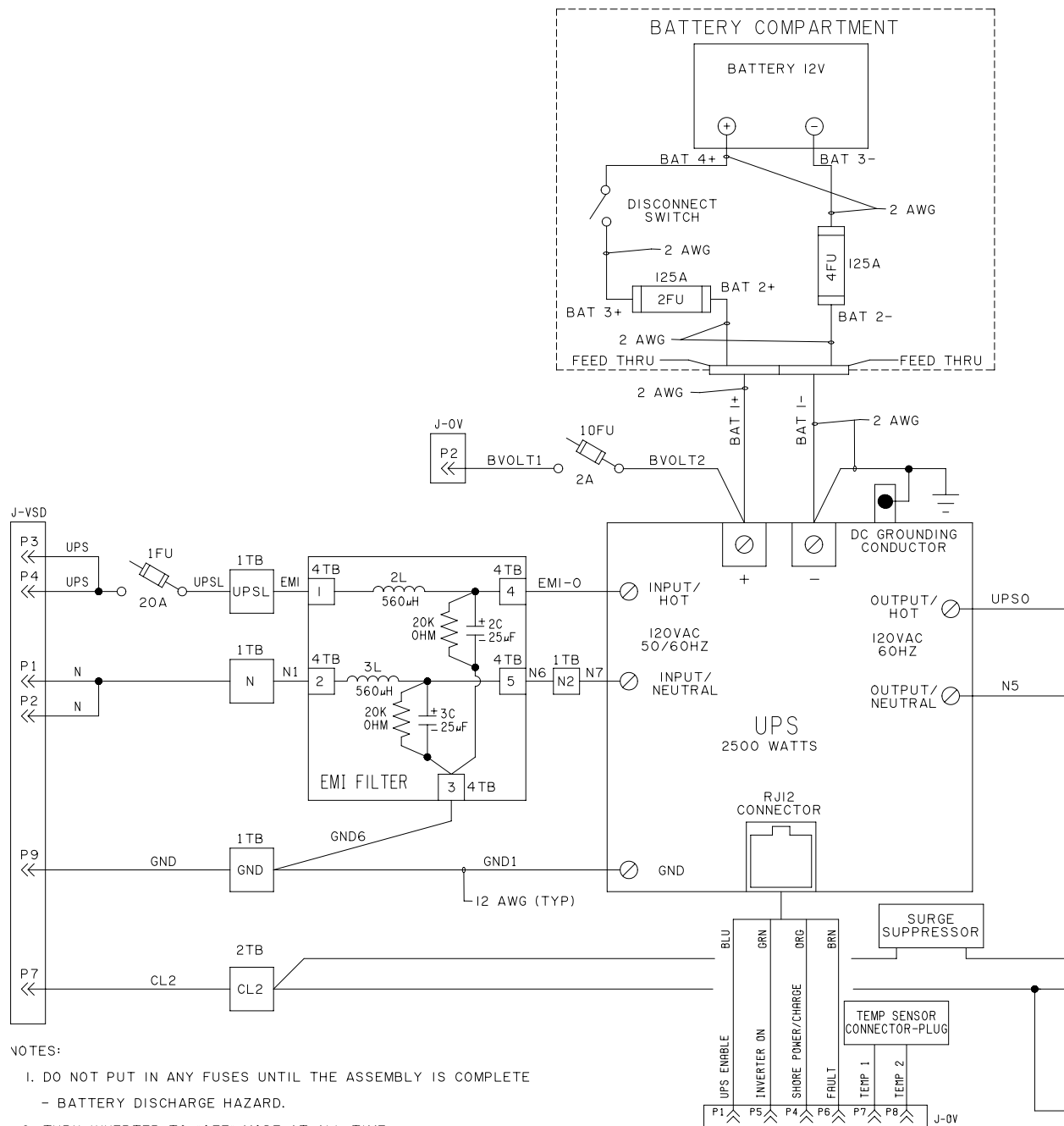


FIGURE 22 - POWER DISTRIBUTION DIAGRAM

POWER PANEL WIRING DIAGRAM

092-17591-118
REV A



LD17688a

FIGURE 23 - POWER PANEL WIRING DIAGRAM

1

The schematic diagram illustrates the power supply system for the LD17689a, detailing the connections for various power supplies and cooling components.

VSD and OV Power Supplies:

- VSD CRITICAL:** Connected to CL1 (6A, 8FU) and CL1A (2TB).
- OV CRITICAL:** Connected to CLL (6A, 9FU) and CLLA (2TB).

VGD PS (240 WATTS):

- Input: CL VGD (120VAC) connected to 2TB and CLL.
- Output: 48VDC (+) connected to P5 and P6 (J-VSD).
- Grounding: (N) connected to GND7 and GND3.

MBC PS (1000 WATTS):

- Input: AC INPUT PH (120VAC) connected to 2TB and 1TB (N4).
- Input: AC INPUT N connected to 1TB (N3).
- Output: OUTPUT+ (150VDC) connected to FIL-IN and 3TB (1).
- Output: OUTPUT- connected to FIL-REF1 and 3TB (2).
- Grounding: GND2 connected to ground.

LC FILTER:

- Input: FIL-IN (3TB 1) connected to 7 (1R, 1 OHM) and 1D (diode).
- Output: FIL-OUT (3TB 4) connected to 1L (10 mH) and 1C (12 mF).
- Grounding: 20K OHM resistor connected to 3TB (3) and ground.

J-MBC:

- Output: FIL-OUT (6FU, 20A) connected to P1 (MBC+).
- Output: FIL-REF2 (7FU, 20A) connected to P2 (MBC-).
- Grounding: 1TB (GND) connected to P9.

Cooling Components:

- FAN:** Connected to COOLN, COOL1, and GND4.
- PUMP:** Connected to COOLN2, COOL2, and GND5.
- CONDUIT:** Connected to COOLN2 and COOL2.

Other Connections:

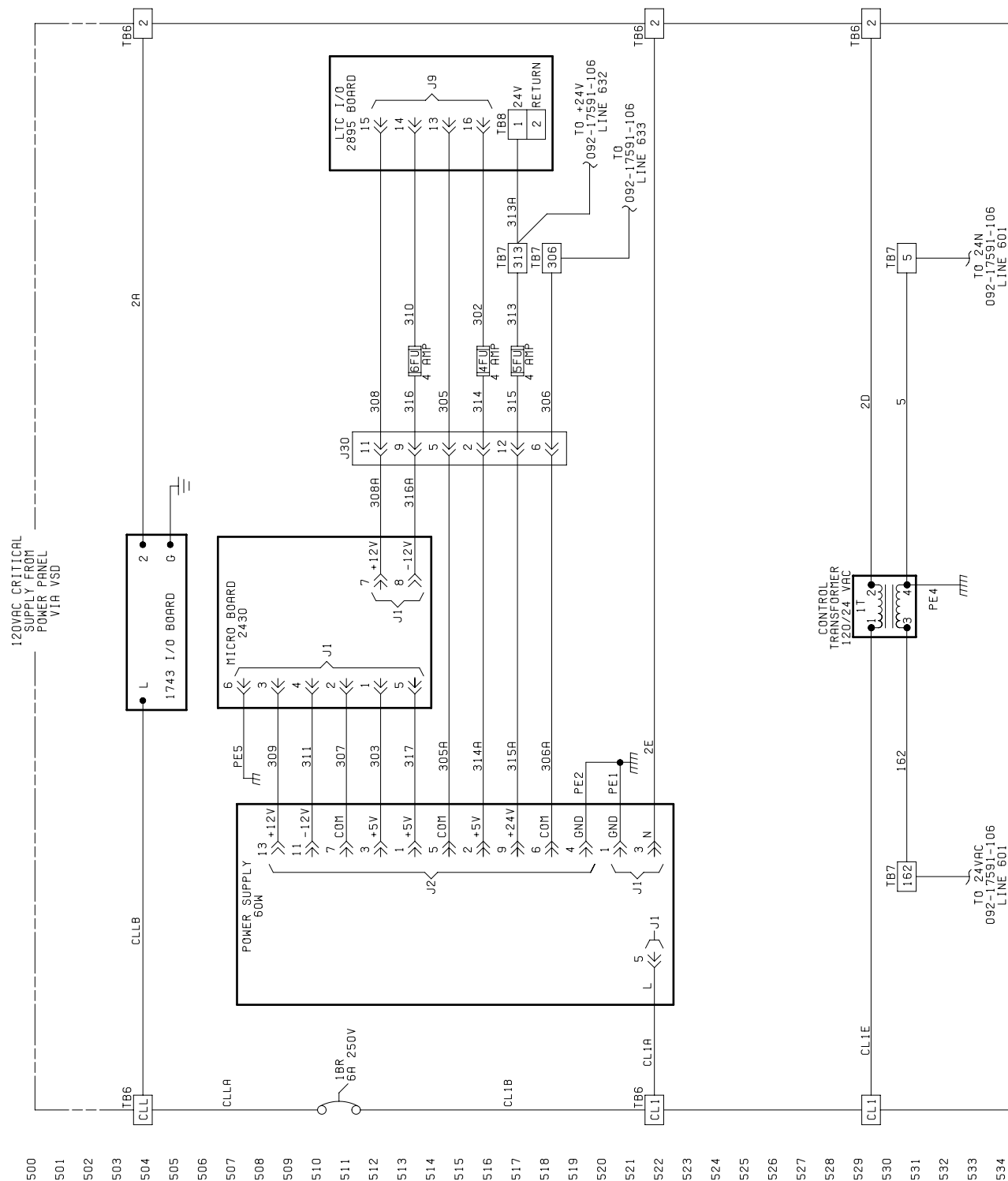
- 1TB (GND) connected to P9 (J-VSD).
- 1TB (GND) connected to P9 (J-MBC).

LD17689a

FIGURE 23 - POWER PANEL WIRING DIAGRAM (CONT'D)

OPTIVIEW™ POWER WIRING

092-17591-105
REV A



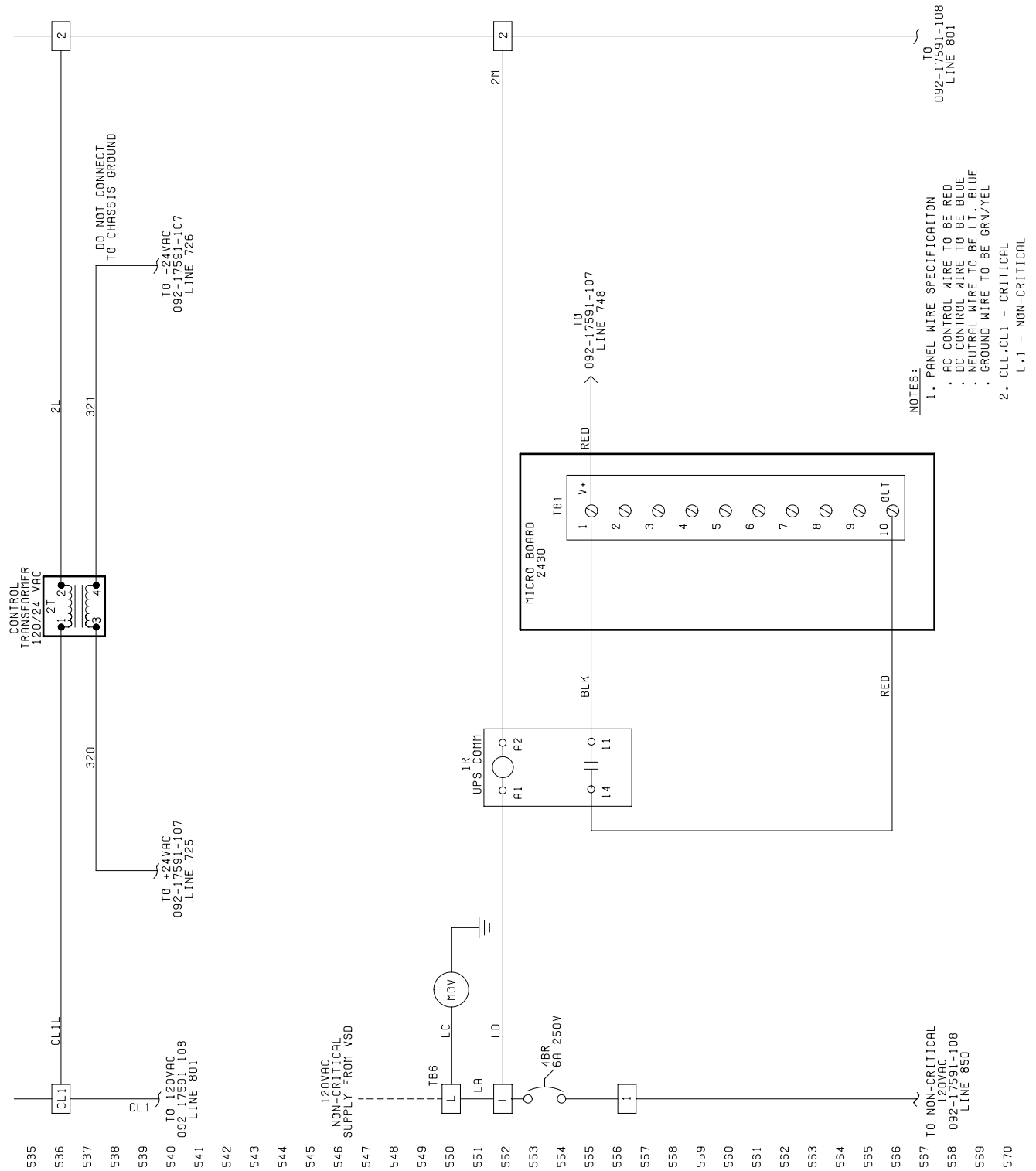
LD17684a

FIGURE 24 - OPTIVIEW™ POWER WIRING

OPTIVIEW™ POWER WIRING (CONT'D)

1

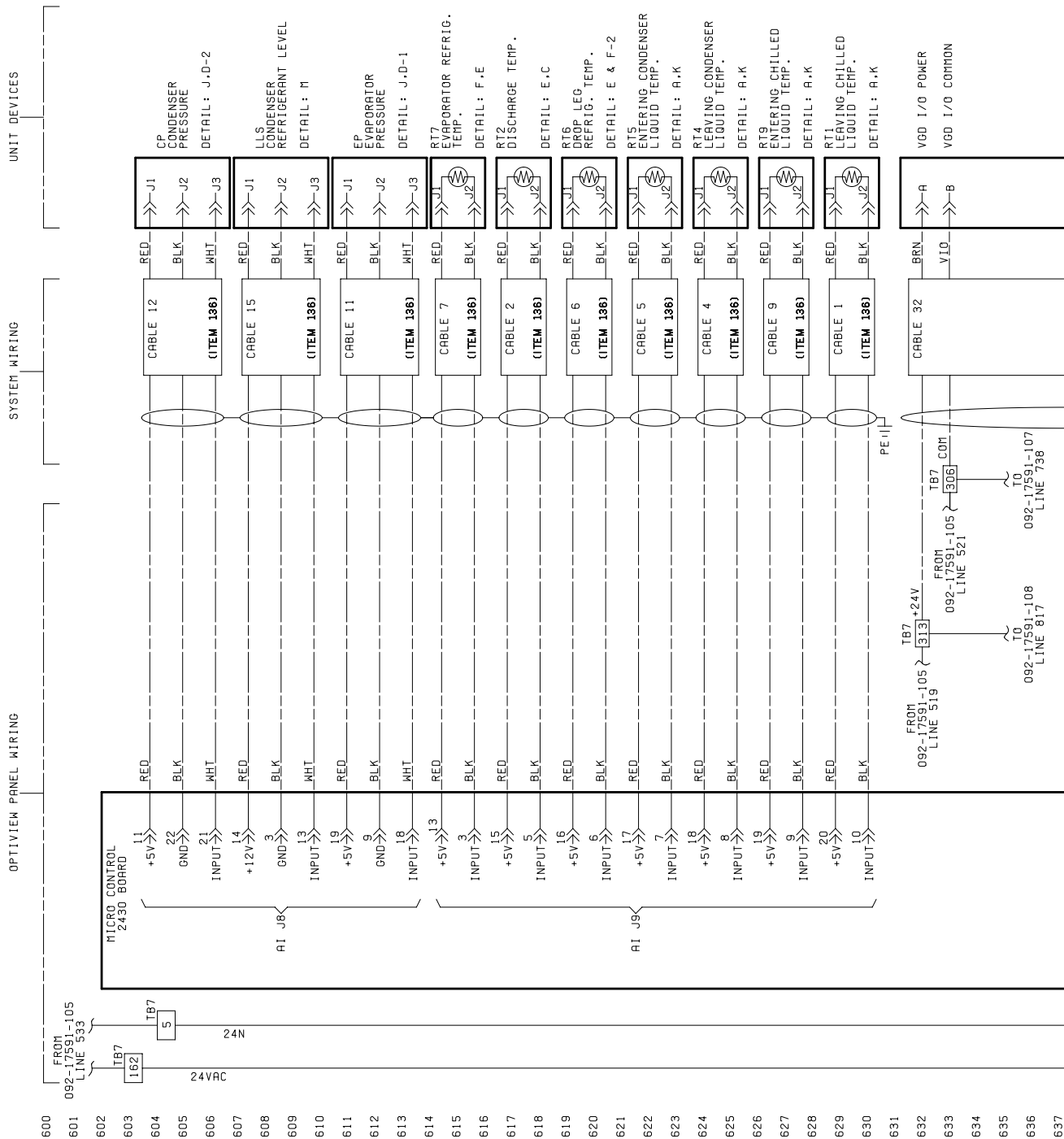
092-17591-105
REV A



LD17685a

FIGURE 24 – OPTIVIEW™ POWER WIRING (CONT'D)

LOW VOLTAGE I/O WIRING DIAGRAM

092-17591-106
REV A

LD17668a

FIGURE 25 - I/O WIRING LOW VOLTAGE

LOW VOLTAGE I/O WIRING DIAGRAM (CONT'D)

1

092-17591-106
REV A

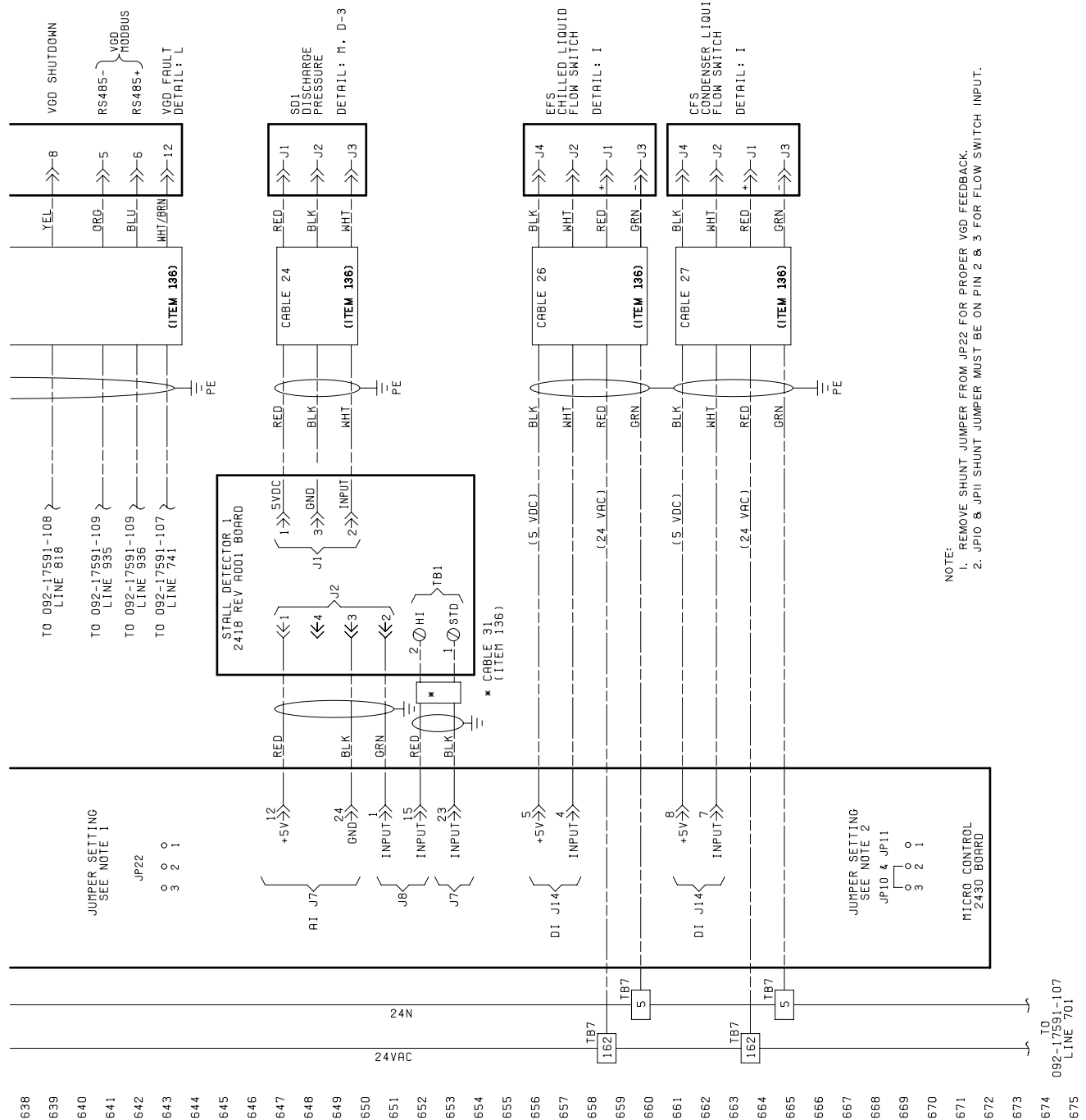
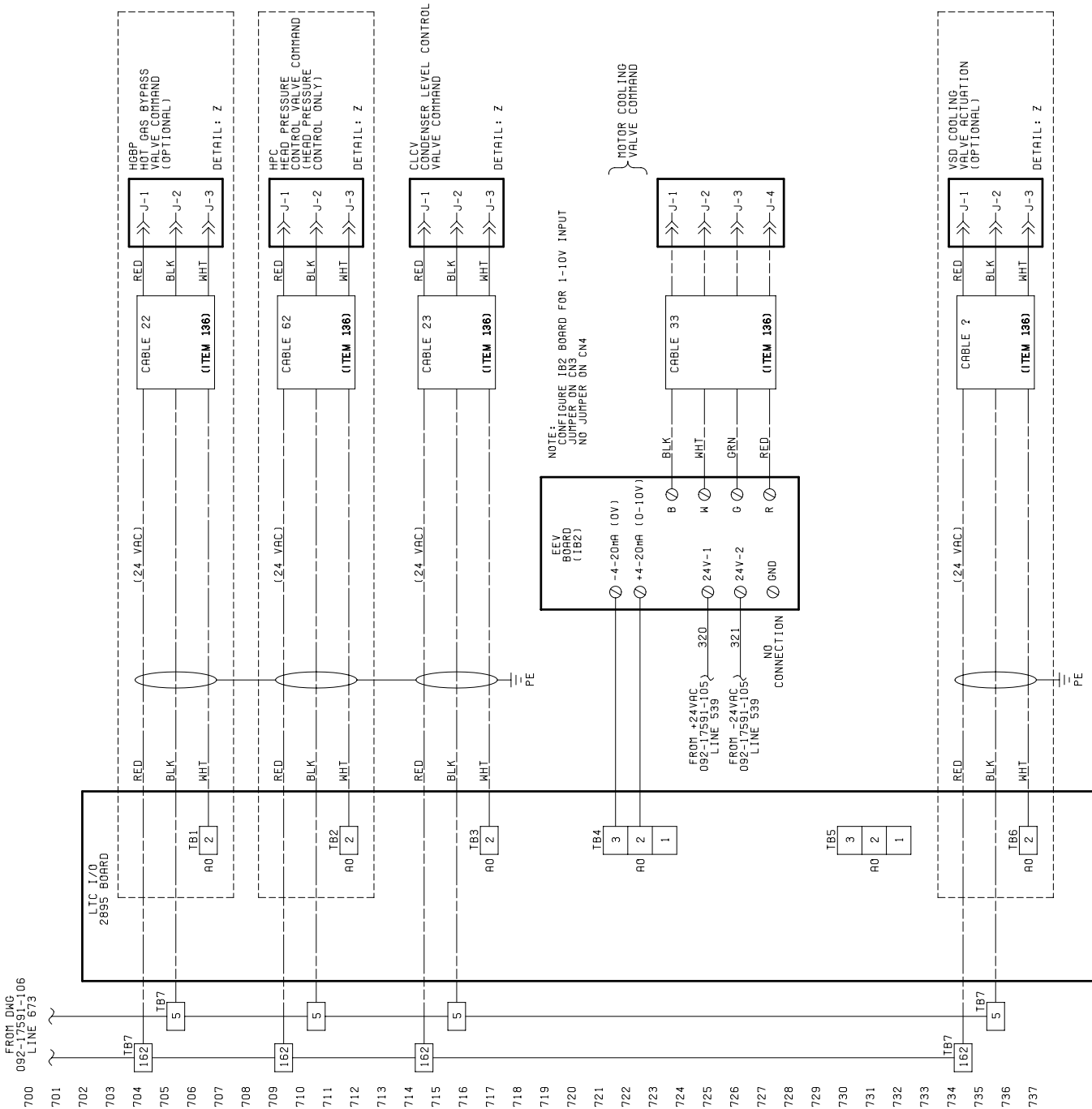


FIGURE 25- I/O WIRING LOW VOLTAGE (CONT'D)

I/O WIRING – LOW VOLTAGE / CONTROL

092-17591-107
REV A

LD17673a

FIGURE 26 - I/O WIRING – LOW VOLTAGE / CONTROL

I/O WIRING – LOW VOLTAGE / CONTROL (CONT'D)

1

092-17591-107
REV A

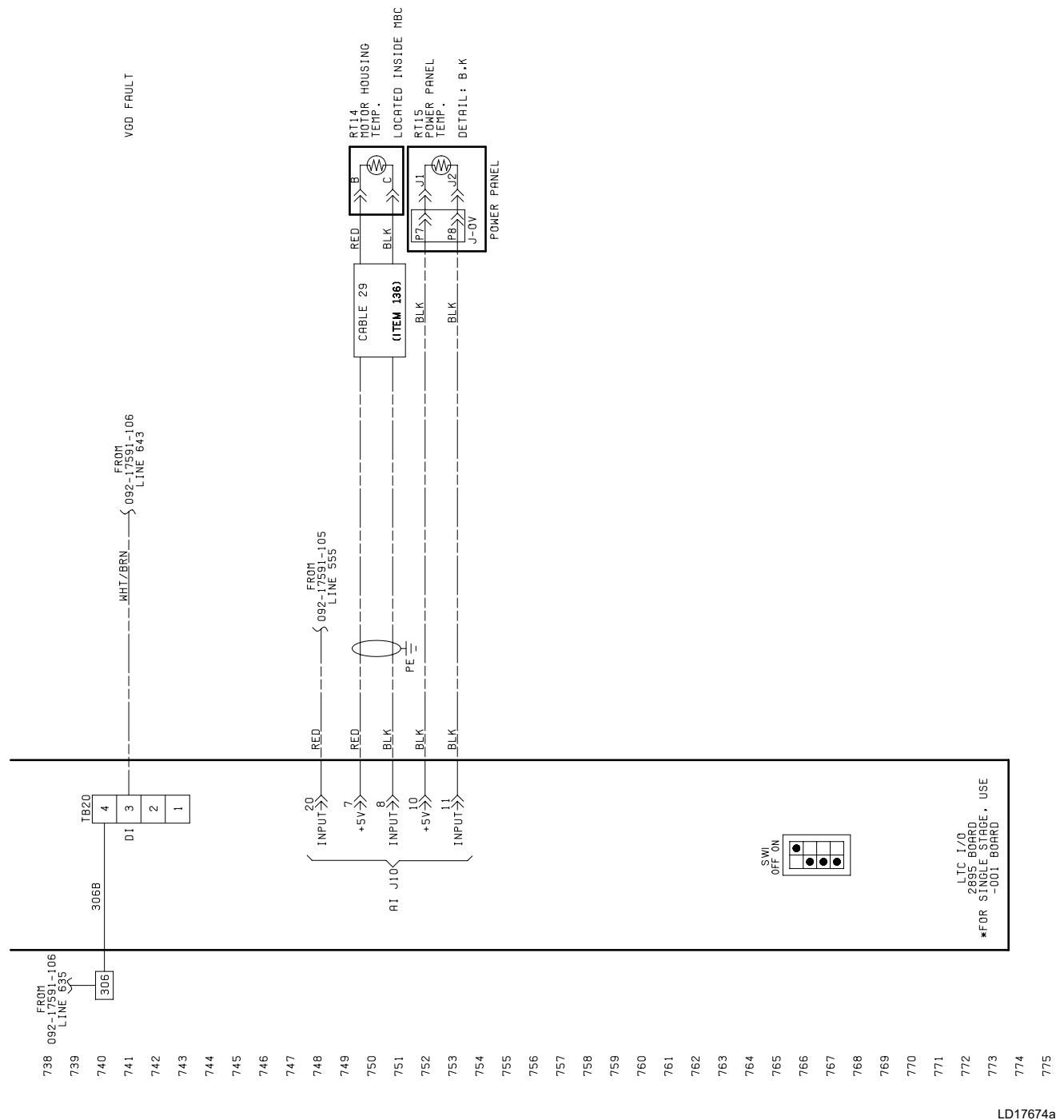
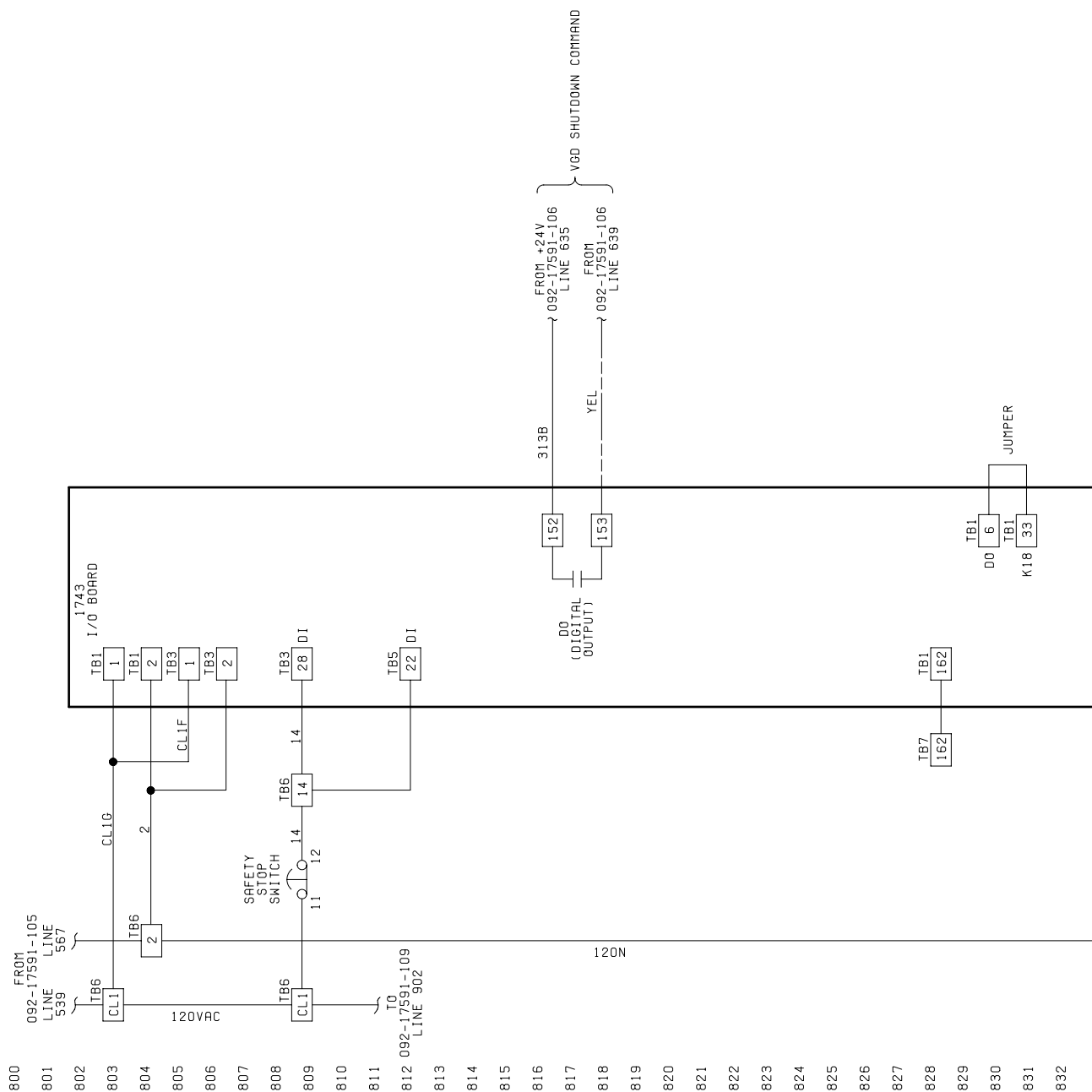


FIGURE 26 – I/O WIRING – LOW VOLTAGE / CONTROL (CONT'D)

I/O WIRING – CONTROL VOLTAGE

092-17591-108
REV A

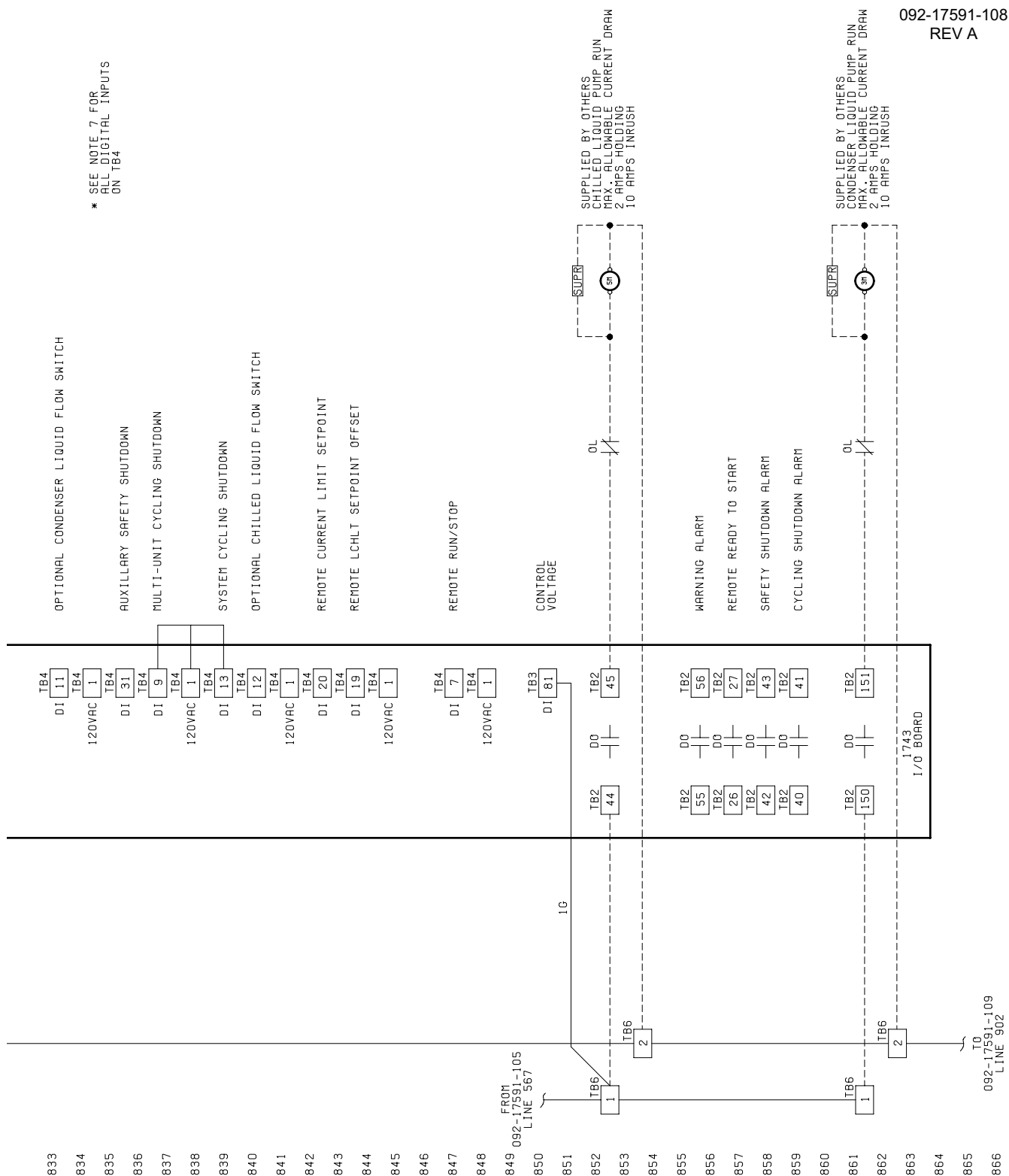


LD17677a

FIGURE 27 - I/O WIRING – CONTROL VOLTAGE

I/O WIRING – CONTROL VOLTAGE (CONT'D)

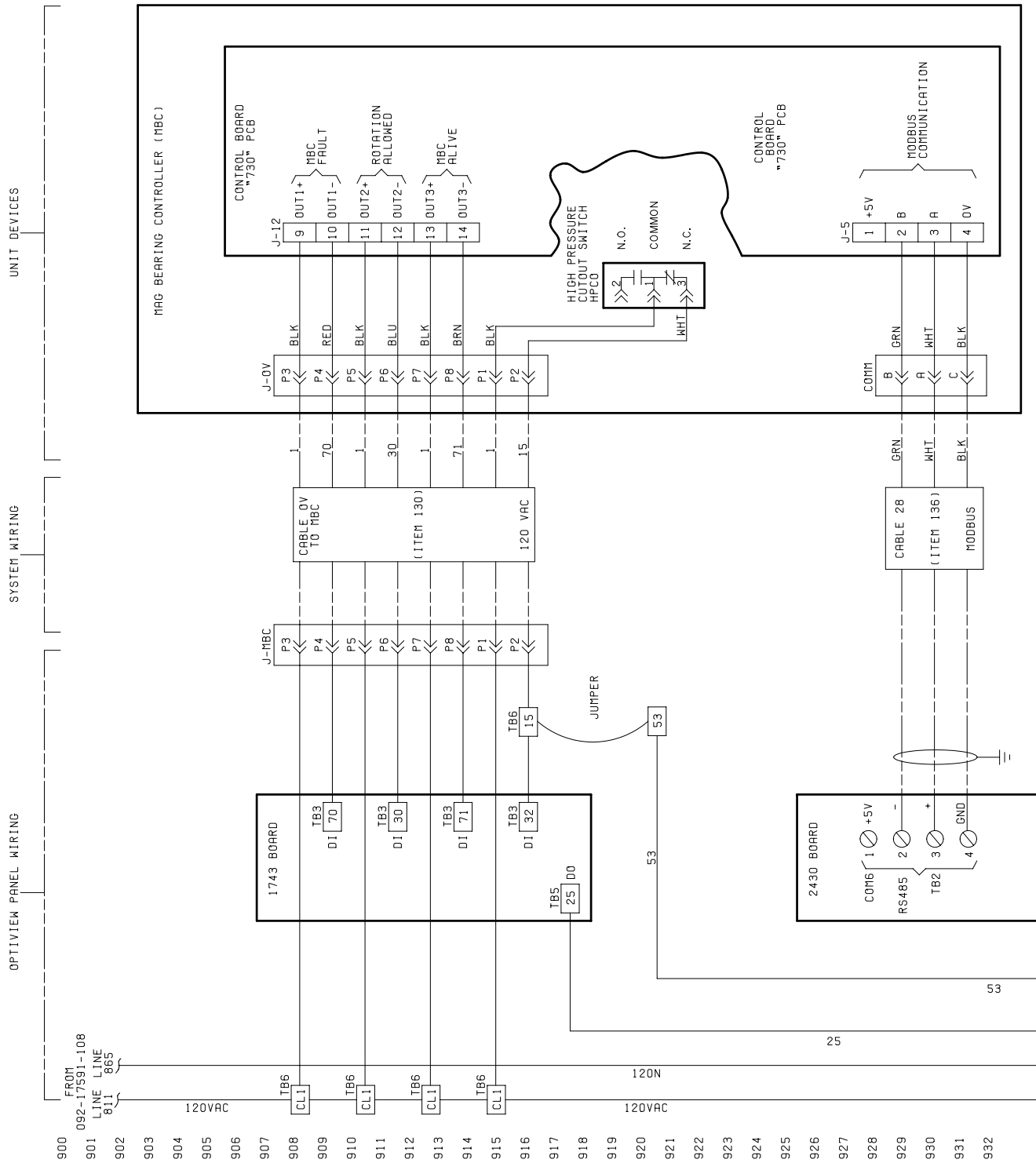
1



LD17678a

FIGURE 27 – I/O WIRING – CONTROL VOLTAGE (CONT'D)

I/O WIRING – CONTROL VOLTAGE

092-17591-109
REV A

LD17675a

FIGURE 28 - I/O WIRING – CONTROL VOLTAGE

I/O WIRING – CONTROL VOLTAGE (CONT'D)

1

092-17591-109
REV A

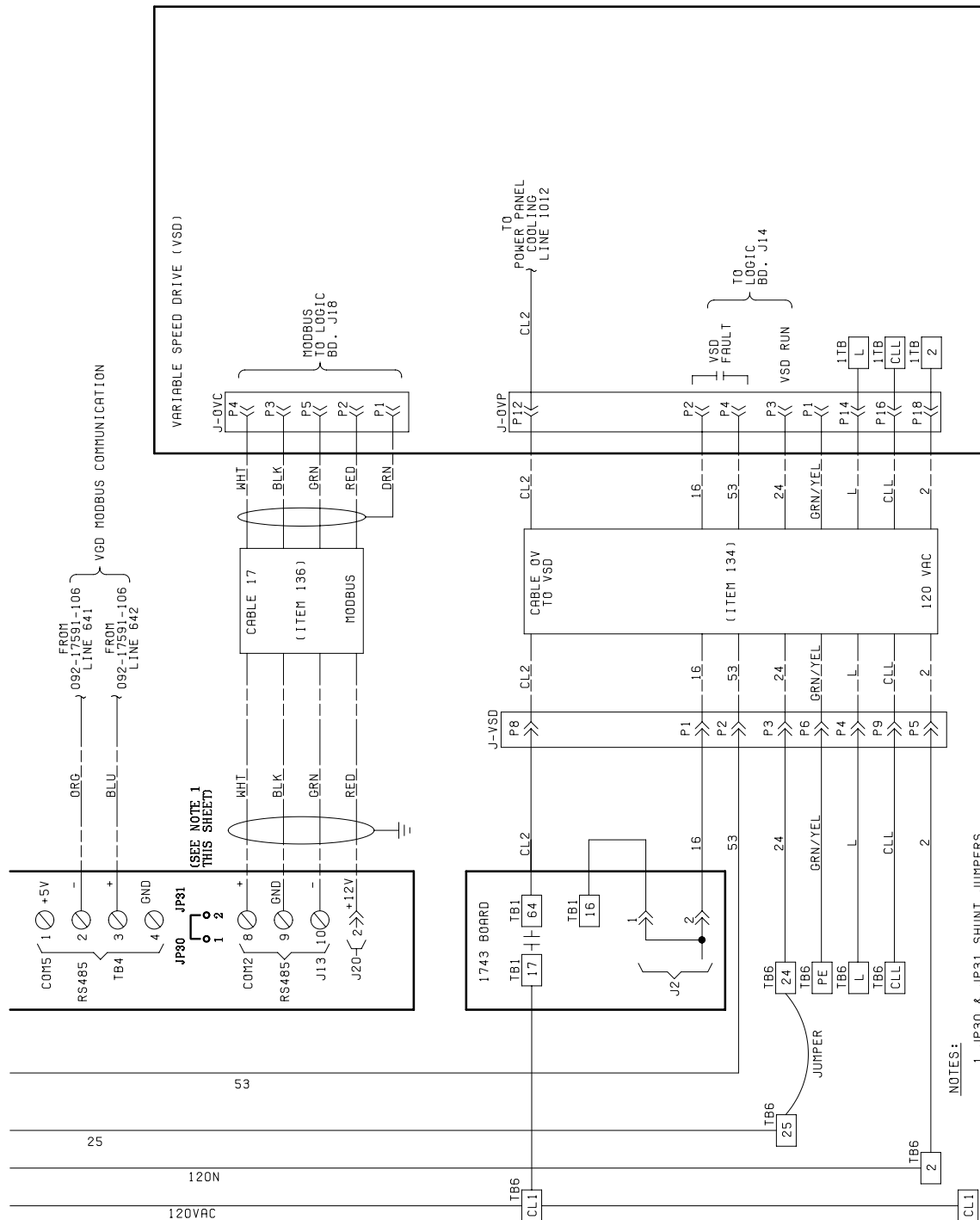


FIGURE 28 – I/O WIRING – CONTROL VOLTAGE (CONT'D)

INTERPANEL CONNECTIONS

092-17591-110
REV A

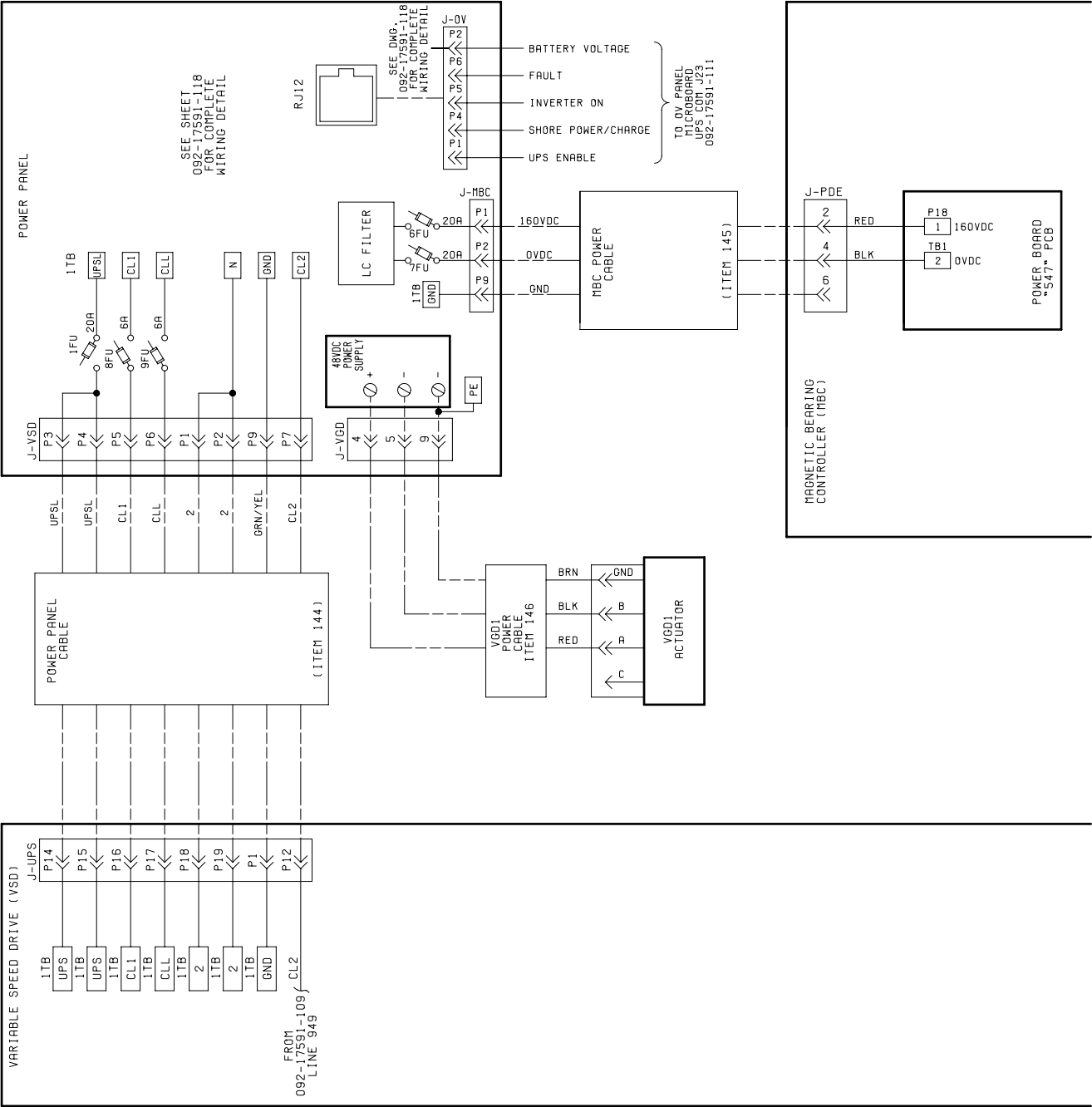


FIGURE 29 - INTERPANEL CONNECTIONS

INTERPANEL CONNECTIONS (CONT'D)

1

092-17591-110
REV A

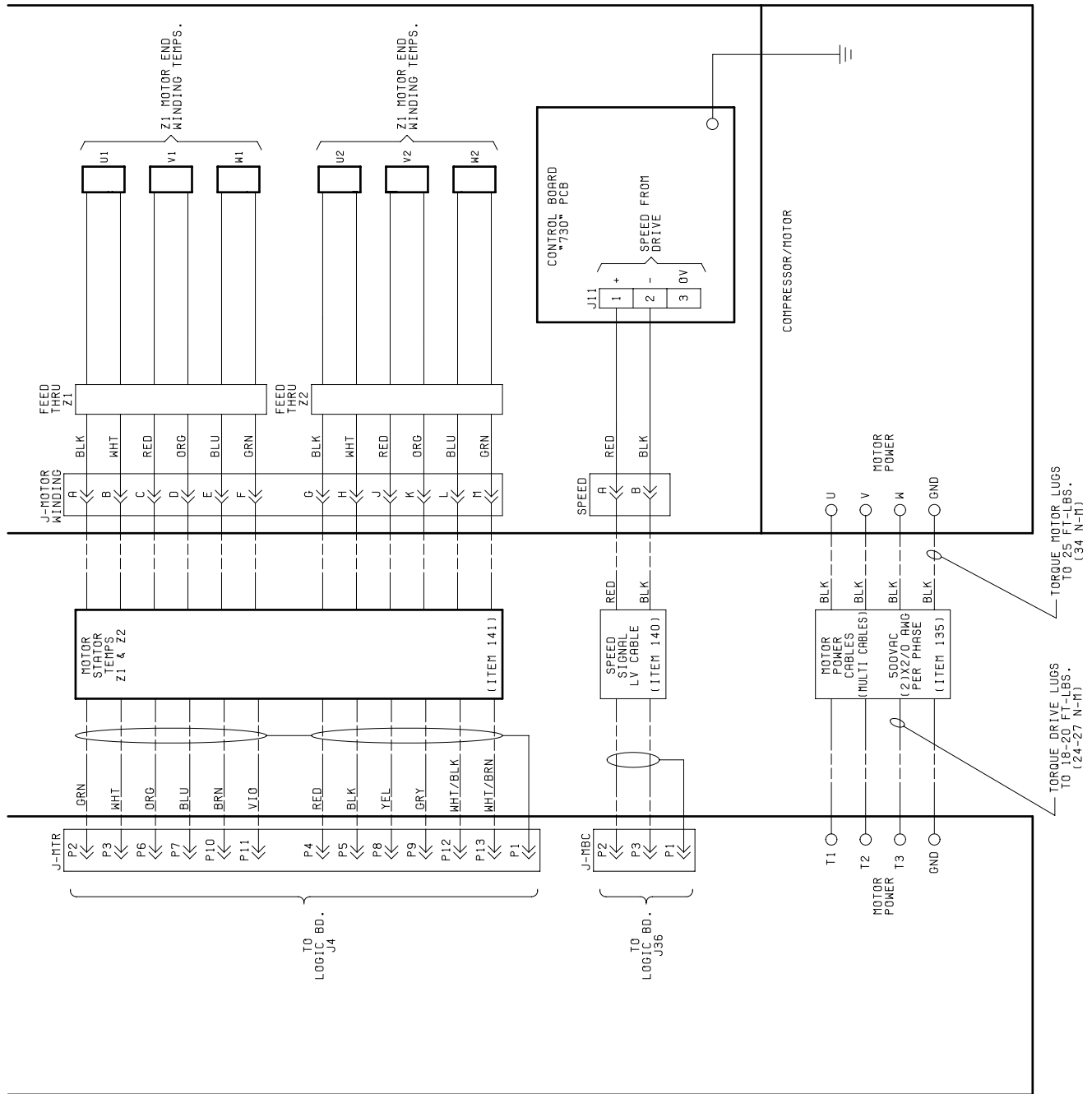
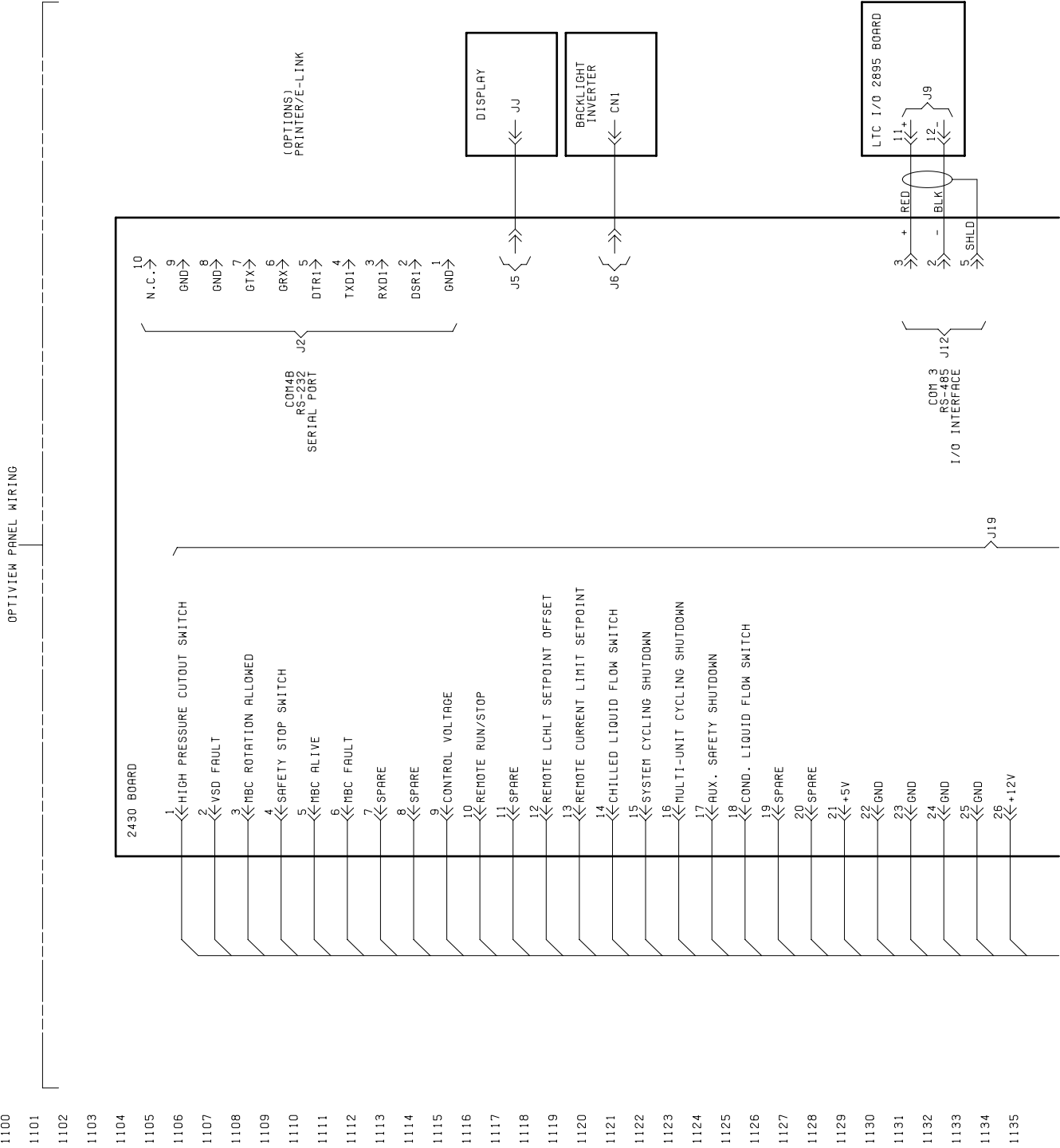


FIGURE 29 – INTERPANEL CONNECTIONS (CONT'D)

I/O WIRING OPTIONS

092-17591-111
REV A

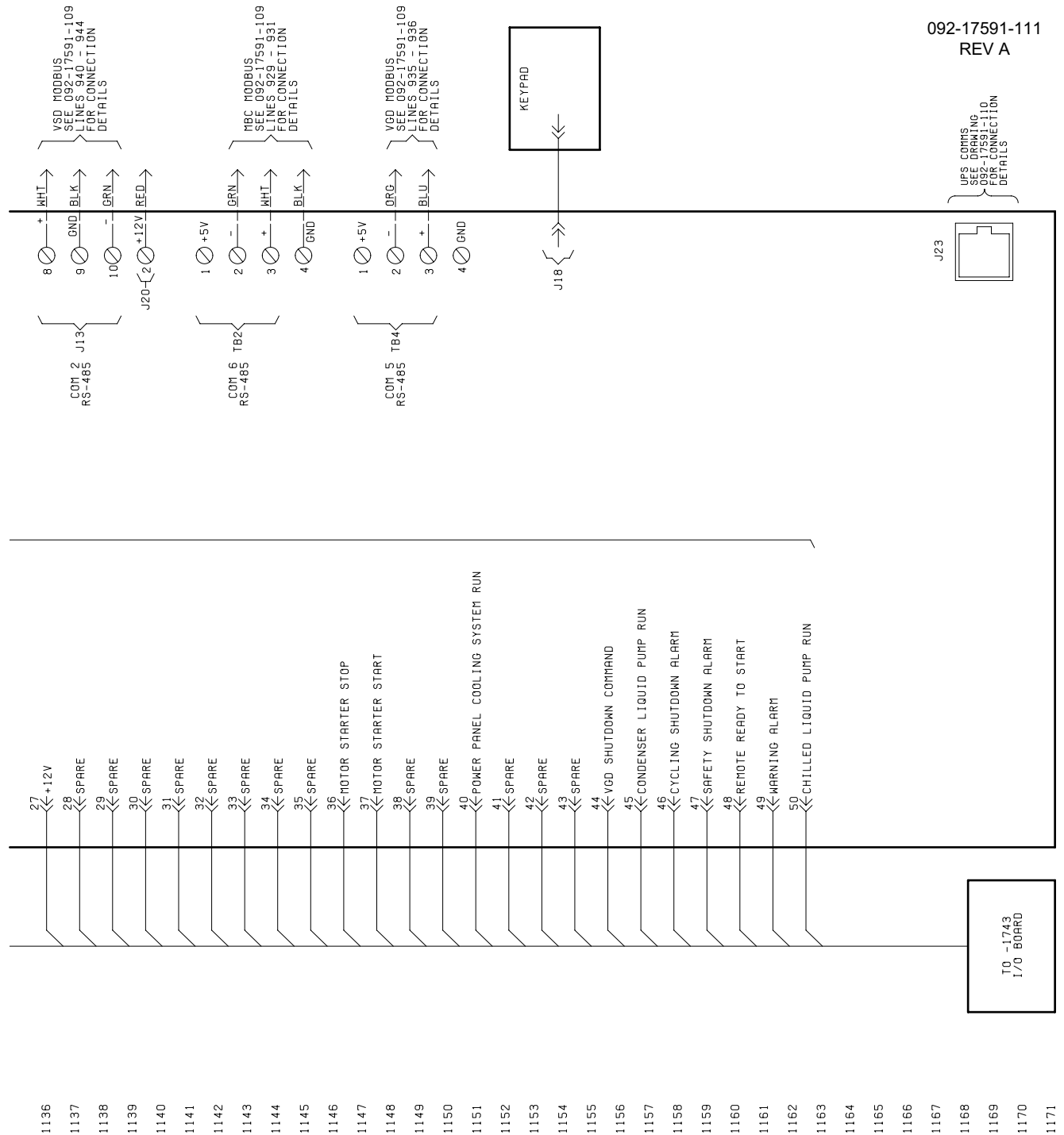


LD17681a

FIGURE 30 - I/O WIRING OPTIONS

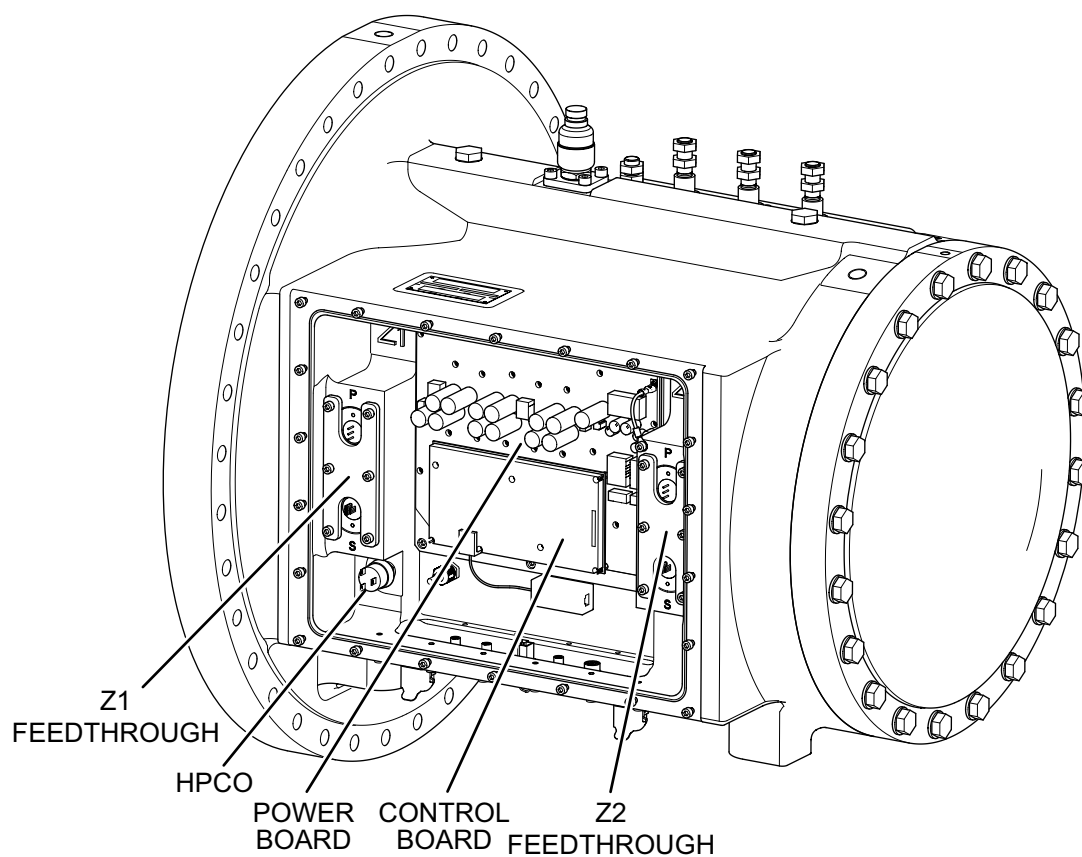
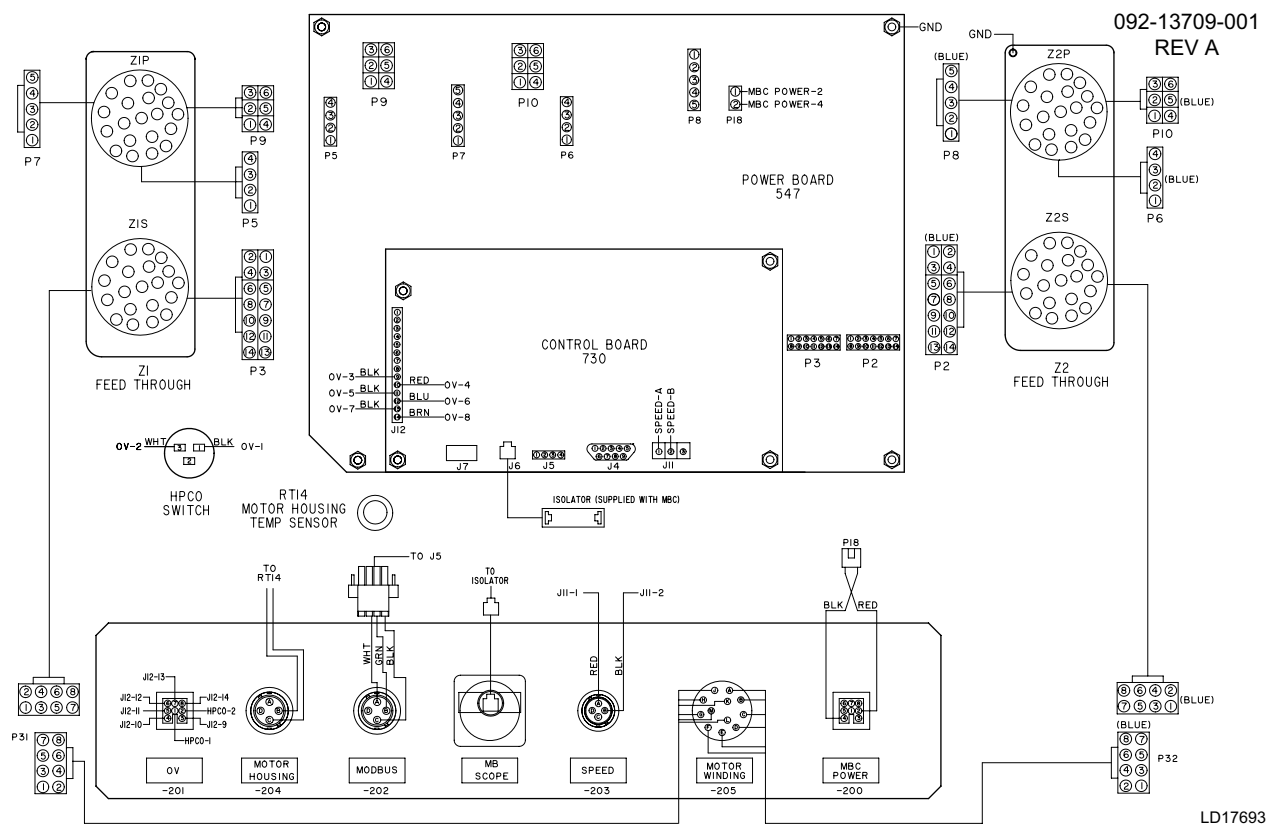
I/O WIRING OPTIONS (CONT'D)

1



LD17682a

FIGURE 30 – I/O WIRING OPTIONS (CONT'D)

**FIGURE 31 - MOTOR CONNECTIONS****FIGURE 32 - MBC TO MOTOR HOUSING**

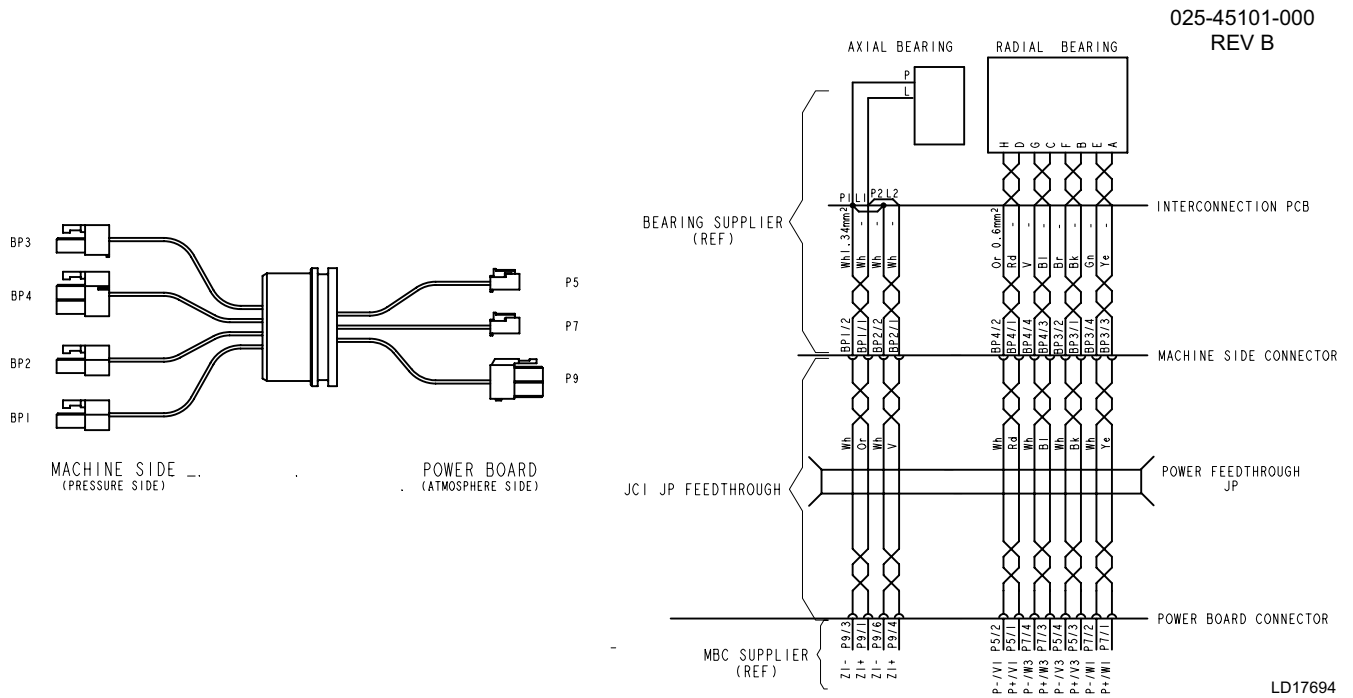


FIGURE 33 - FEEDTHROUGH – MBC POWER Z1

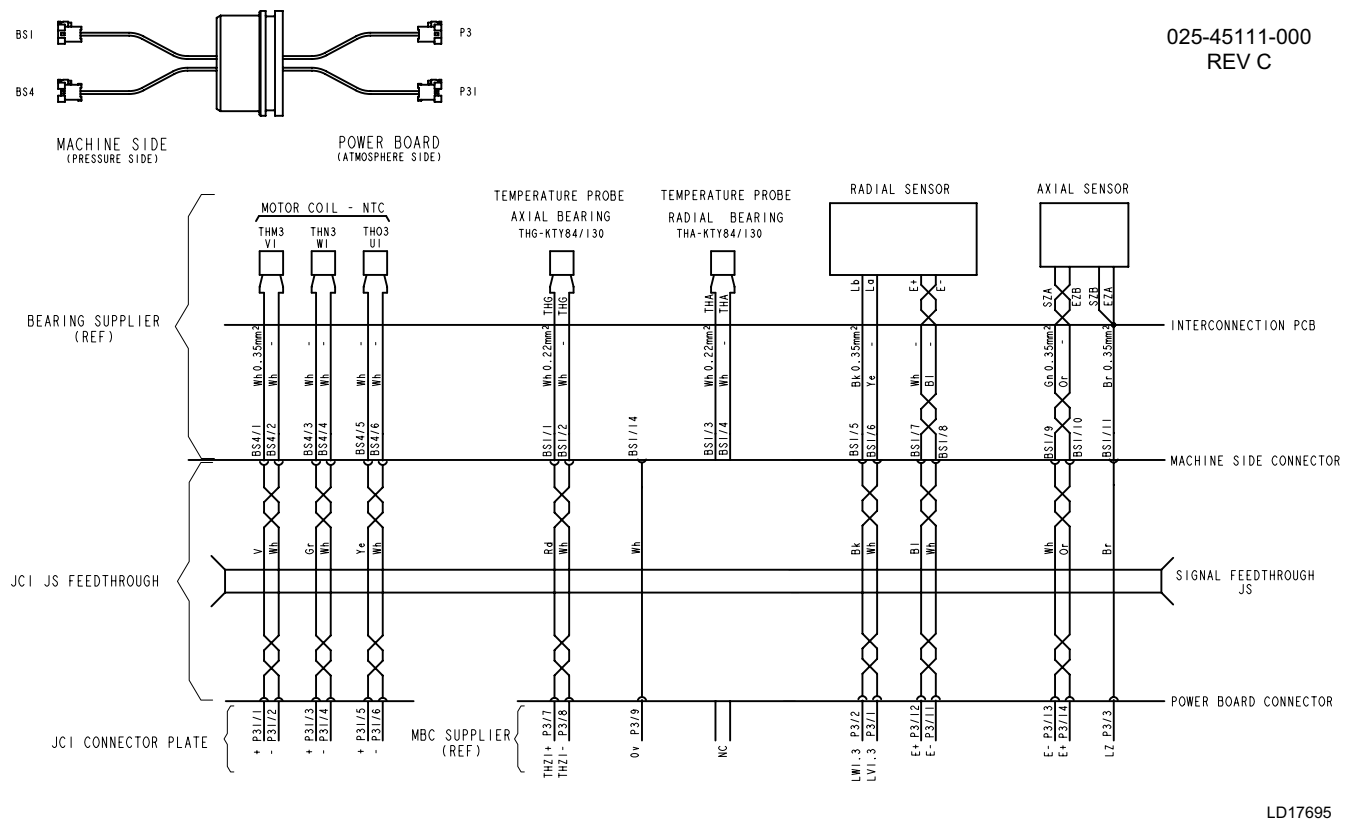


FIGURE 34 - FEEDTHROUGH – MBC SIGNAL Z1

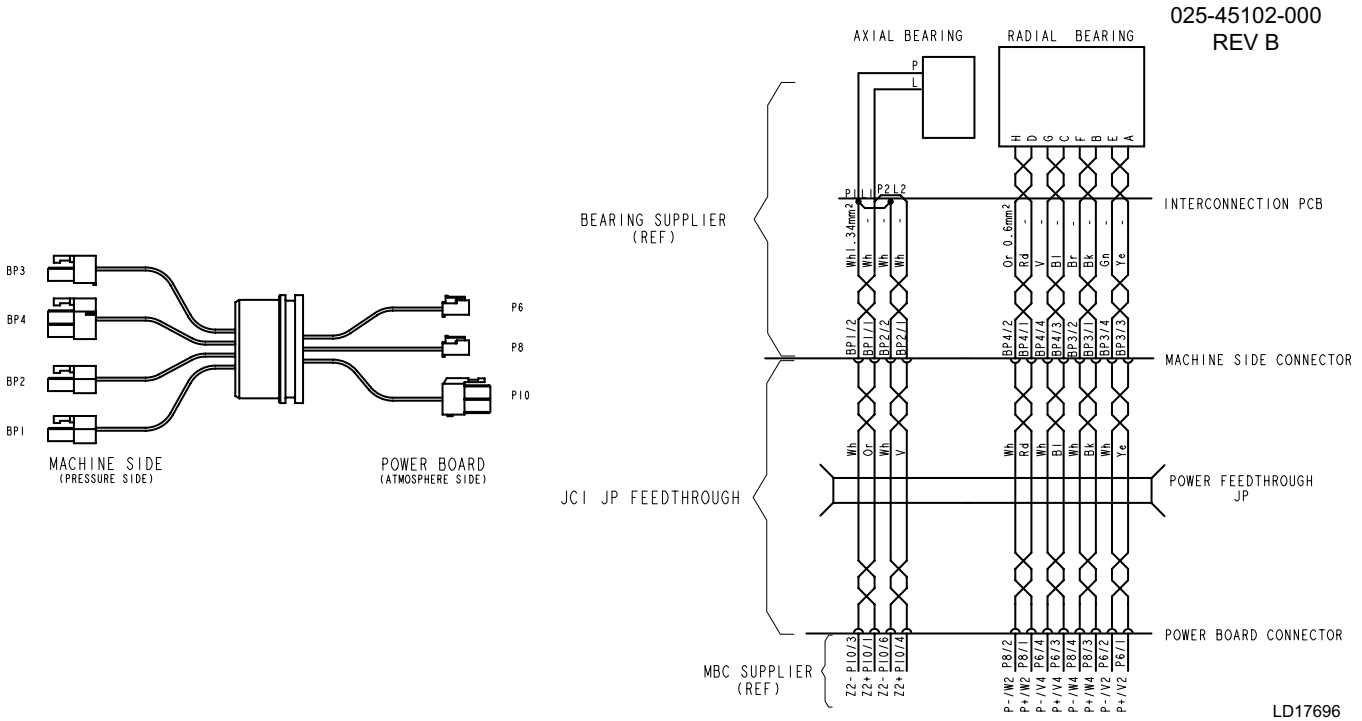


FIGURE 35 - FEEDTHROUGH – MBC POWER Z2

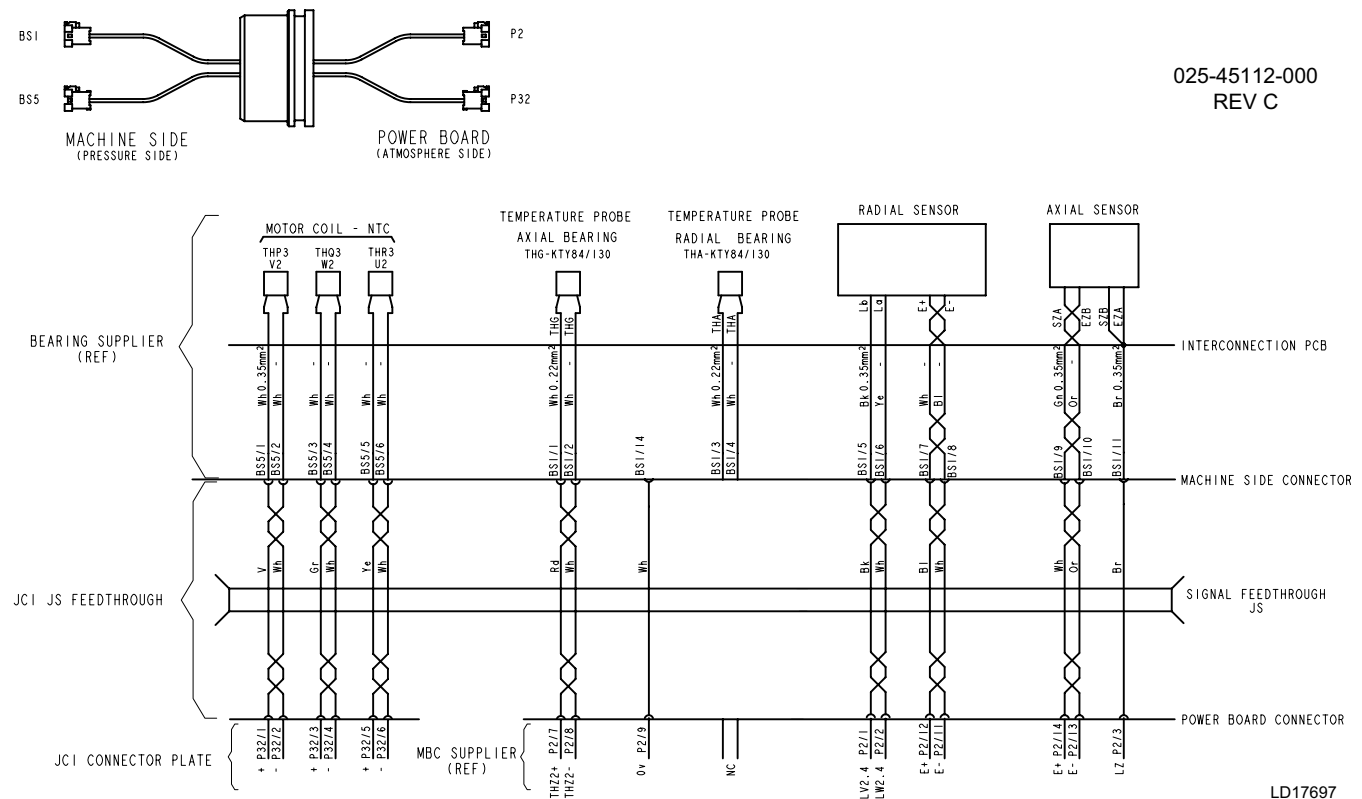


FIGURE 36 - FEEDTHROUGH – MBC SIGNAL Z2

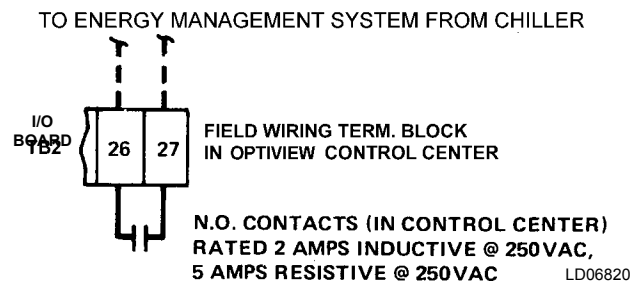
SECTION 2 - FIELD CONTROL MODIFICATIONS

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 (3.9° – 6.1°C) water range. Constant chilled liquid 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. Maximum allowable current draw for the sum of all loads is 2 Amps holding, 10 Amps inrush – see OptiView™ Control Center Wiring Diagram in this manual.
11. Refer to *YMC² Field Connections (Form 160.84-PW1)* for required field wiring connections on the OptiView™ Control Center for:
 - 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. The use of the chilled liquid 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.
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:

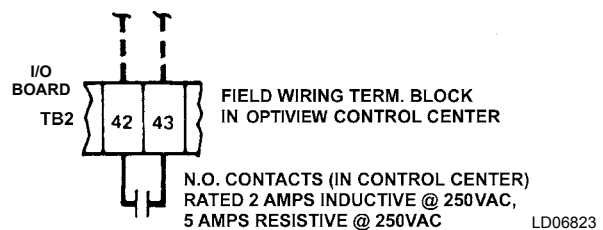
1. The OptiView™ Control Center is in “digital”, “analog” or “BAS” remote operating mode, allowing for energy management system or remote start/stop control (See *Figure 37 on page 50*).
2. All chiller safety cutout controls are in the normal position, so they will allow the unit to start.
3. All chiller 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. When the Remote Mode Ready to Start Contacts close, the OptiView™ Control Center will display SYSTEM READY TO START message.

**FIGURE 37 - REMOTE READY TO START CONTACTS****CYCLING SHUTDOWN ALARM 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. *YMC² Operations and Maintenance (Form 160.84-OM1)* provides a list and explanation of all Cycling Shutdowns. While these contacts are closed, the OptiView™ Control Center will display CYCLING SHUTDOWN – AUTO RE-START 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.

TO ENERGY MANAGEMENT SYSTEM FROM CHILLER**FIGURE 38 - 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 be performed before the unit can be restarted. *YMC² Operations and Maintenance (Form 160.84-OM1)* 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 Alarm contacts function in all operating modes.

TO ENERGY MANAGEMENT SYSTEM FROM CHILLER**FIGURE 39 - SAFETY SHUTDOWN ALARM CONTACTS****RUN CONTACTS**

When closed, these contacts (see *Figure 40 on page 51*) signify that the unit is operating. The OptiView™ Control Center will display a System Run Message.

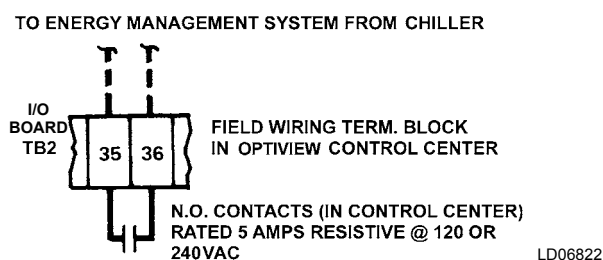


FIGURE 40 - RUN CONTACTS

WARNING ALARM CONTACTS

These contacts will close whenever one or more of the WARNING conditions listed in *YMC² OptiView™ Operation (Form 160.84-02)* 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

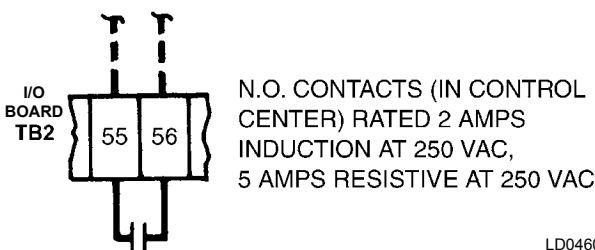
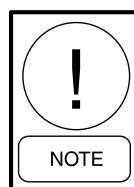


FIGURE 41 - WARNING ALARM CONTACTS

REMOTE START AND STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

When the OptiView™ Control Center is in the “Digital” or “Analog” remote operating mode with the Remote Start/Stop contacts open (see *Figure 42 on page 51*), 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 OptiView™ 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.



Even when the chiller is applied with Remote Start-Stop (when the Control Center is in the “Remote Operating Mode”), a SAFETY 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 the LOCAL start keypad button, when the control center is in the “remote” operating mode.

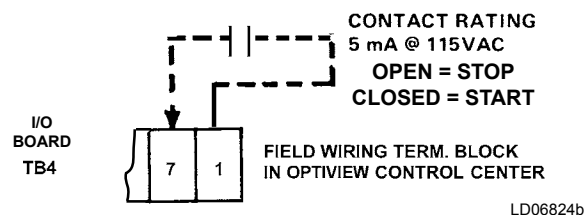


FIGURE 42 - REMOTE START / STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

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.

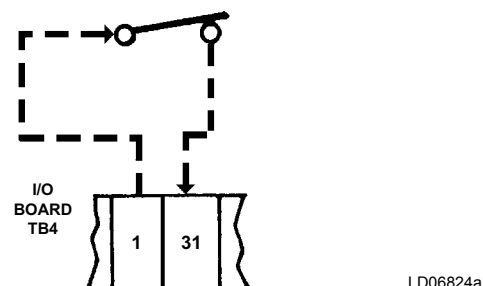
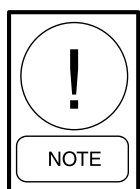


FIGURE 43 - AUXILIARY SAFETY SHUTDOWN

REMOTE/LOCAL CYCLING DEVICES

The closure of an automatic reset device across this input will permit the unit to operate in all operating modes. Conversely, an opening of the device contacts will inhibit the unit from operating; the OptiView™ Control Center will then display the following messages: CYCLING SHUTDOWN – AUTO RESTART and SYSTEM CYCLING – CONTACTS OPEN.



The OptiView Control Center contains a seven day time clock to select daily schedule Start/Stop times (Sunday through Saturday including one or more holidays in week) up to one full week at a time. So automatic start and stop of the unit on a daily basis, at predetermined times, can be programmed as a standard feature; an additional program timer is not required for this function.

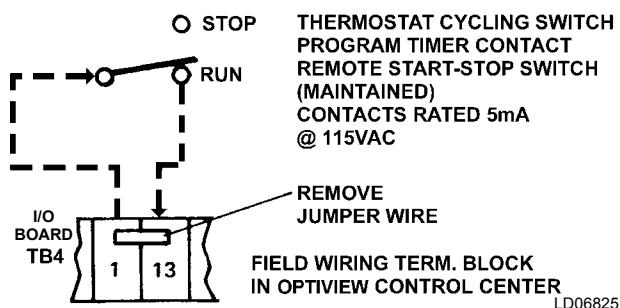


FIGURE 44 - REMOTE/LOCAL CYCLING DEVICES

MULTI-UNIT CYCLING SHUTDOWN

For multiple chiller installation application, Multi-Unit Cycling Shutdown contacts are available to start and stop each unit. The maintained closure of a device contacts across TB4-1 and 9 will permit the unit to operate in all the operating modes with a standing Run command. 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.

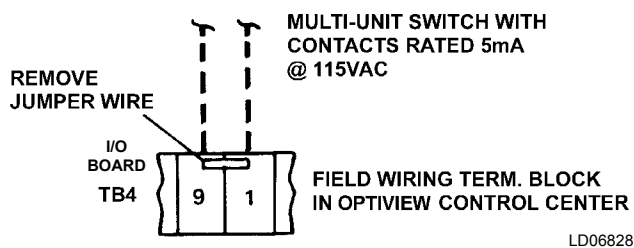


FIGURE 45 - MULTI-UNIT CYCLING SHUTDOWN

CHILLED LIQUID PUMP RUN (TB2-44/45)

Dry closure contacts. When the chiller is started, the contacts close immediately upon entering “MBC Start-up”. Normally, they open coincident with receipt of a stop command or a fault other than those listed in the next column:

- LEAVING CHILLED LIQUID - LOW TEMPERATURE cycling shutdown.
- If Chilled Liquid Pump Operation is set to ENHANCED, MULTIUNIT CYCLING - CONTACTS OPEN or SYSTEM CYCLING - CONTACTS OPEN cycling shutdown.
- LEAVING CHILLED LIQUID FLOW SWITCH OPEN cycling shutdown.

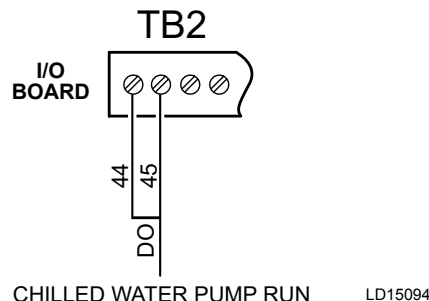


FIGURE 46 - CHILLED LIQUID PUMP RUN

CONDENSER LIQUID PUMP RUN (TB2-150/151)

Dry closure contacts. Contacts close coincident with beginning of “MBC Startup”. Contacts open coincident with receipt of a chiller stop command or 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 40.0 °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 TB5-22 to I/O Board TB2-150. Then connect I/O Board TB2-151 to the Condenser Pump Motor Starter.

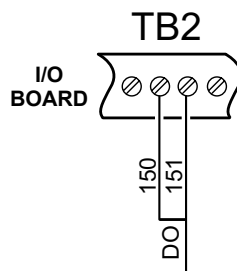


FIGURE 47 - CONDENSER LIQUID PUMP RUN

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 “Analog” for Thermal-type or “Digital” for Paddle-type. Refer to *YMC² Operations and Maintenance (Form 160.84-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, 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.

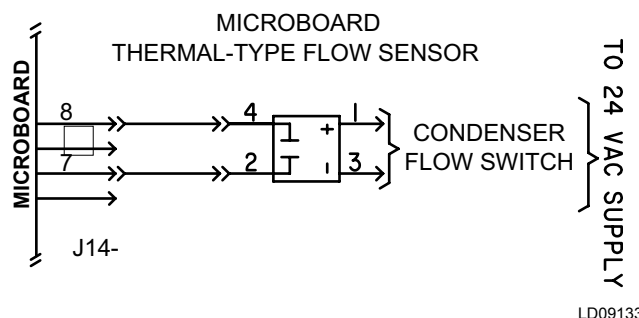
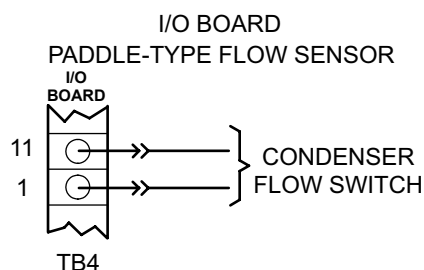


FIGURE 48 - CONDENSER FLOW SWITCHES

PADDLE TYPE FLOW SENSOR

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

- McDonnell type F61MG-1c, max. 150 psi (YORK Part No. 024-26116)
- McDonnell 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 TB4-1 and 11.

When condenser liquid flowing, the flow switch contact will close. Opening of the Condenser Liquid 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.

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 “Analog” for Thermal-type or “Digital” for Paddle-type. *Refer to YMC² Operations and Maintenance (Form 160.84-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”.

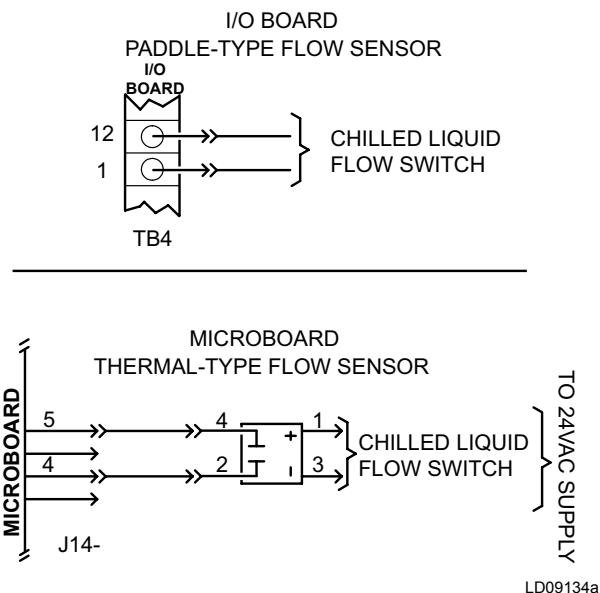


FIGURE 49 - CHILLED LIQUID FLOW SWITCHES

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 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.

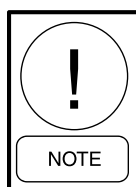
PADDLE TYPE FLOW SENSOR

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

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 below, 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:

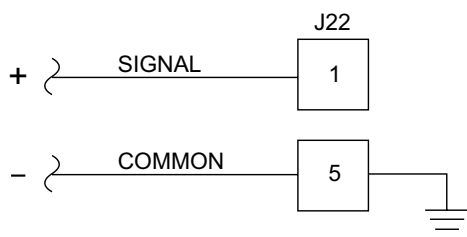
$$\text{SETPOINT (\%)} = 100 - (5 \times 7) = 100 - 35 = 65\%$$

2-10VDC - As shown below, 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:

$$\begin{aligned} \text{SETPOINT (\%)} &= 100 - [(5-2) \times 8.75] \\ &= 100 - [3 \times 8.75] \\ &= 100 - 26.25 = 74\% \end{aligned}$$



LD04498

FIGURE 50 - REMOTE CURRENT LIMIT SETPOINT WITH 0-10VDC OR 2-10VDC SIGNAL

0-20 mA - As shown below, 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:

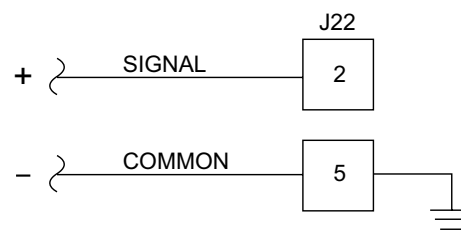
$$\begin{aligned} \text{SETPOINT (\%)} &= 100 - (8 \times 3.5) \\ &= 100 - 28 = 72\% \end{aligned}$$

4-20mA - As shown below, 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:

$$\begin{aligned} \text{SETPOINT (\%)} &= 100 - [(8 - 4) \times 4.375] \\ &= 100 - (4 \times 4.375) \\ &= 100 - 17.5 \\ &= 82.5 \\ &= 83\% \end{aligned}$$



LD04499

FIGURE 51 - REMOTE CURRENT LIMIT 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 TB4-20 for 1 to 11 seconds. As shown below, 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:

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

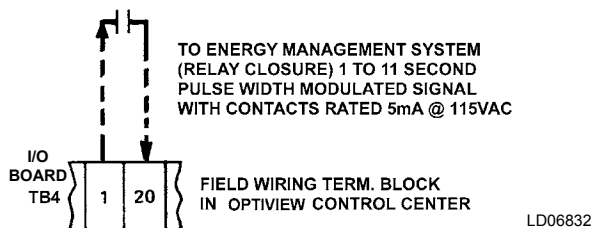


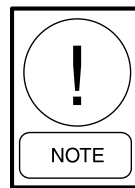
FIGURE 52 - REMOTE CURRENT LIMIT SETPOINT WITH PWM SIGNAL

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 (3.3°C to 21°C) (water applications), 36°F to 70°F (2°C to 21°C) (water applications with Smart Freeze Protection enabled) or 10°F to 70°F (-12.2°C to 21°C) (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 (5°C or 10°C) (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 (4.4°C) and the **Remote Reset Temperature Range** setpoint is programmed for 10°F (5.5°C), the Leaving Chilled Liquid Temperature setpoint can be remotely reset over the range of 40°F to 50°F (20° to 25°C). 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 Reset.

0-10VDC - As shown in *Figure 53 on page 57*, connect input to Microboard J22-3 (signal) and J22-5 (Gnd). A 0VDC signal produces a 0°F (-18°C) offset. A 10VDC signal produces the maximum offset (10 or 20°F) (5 or 10°C) 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:

$$\text{OFFSET (°F)} = \frac{(\text{VDC})(\text{REMOTE RESET TEMP. RANGE})}{10}$$

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

For example, if the input is 5VDC and the Remote Reset Temp. Range Setpoint is programmed for 10°F (-12°C) and the Local Leaving Chilled Liquid Temperature Setpoint is programmed for 40°F (4.4°C), the setpoint would be set to 45°F (7.2°C) as follows:

$$\begin{aligned}\text{OFFSET (}^{\circ}\text{F)} &= \frac{5 \times 10}{10} \\ &= \frac{50}{10} \\ &= 5^{\circ}\text{F}\end{aligned}$$

$$\begin{aligned}\text{SETPOINT (}^{\circ}\text{F)} &= 40 + 5 \\ &= 45^{\circ}\text{F (7.2}^{\circ}\text{C)}\end{aligned}$$

2-10VDC - As shown in *Figure 53 on page 57*, connect input to Microboard J22-3 (signal) and J2-5 (Gnd). A 2VDC signal produces a 0°F (-17.8°C) offset. A 10VDC signal produces the maximum allowed offset (10°F or 20°F) (5°C or 10°C) or 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 the Microboard Program Jumper JP24 has been removed. Calculate the setpoint for various inputs as follows:

$$\text{OFFSET (}^{\circ}\text{F)} = \frac{(\text{VDC} - 2)(\text{REMOTE RESET TEMP. RANGE})}{8}$$

$$\text{SETPOINT (}^{\circ}\text{F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the input is 5VDC and the Remote Reset Temp. Range Setpoint is programmed for 40°F (4.4°C), the setpoint would be set to 43.8°F (6.6°C).

$$\begin{aligned}\text{OFFSET (}^{\circ}\text{F)} &= \frac{(5 - 2)(10)}{8} \\ &= \frac{(3)(10)}{8} \\ &= \frac{30}{8} \\ \text{SETPOINT (}^{\circ}\text{F)} &= 40 + 3.8 \\ &= 43.8^{\circ}\text{F (6.6}^{\circ}\text{C)}\end{aligned}$$

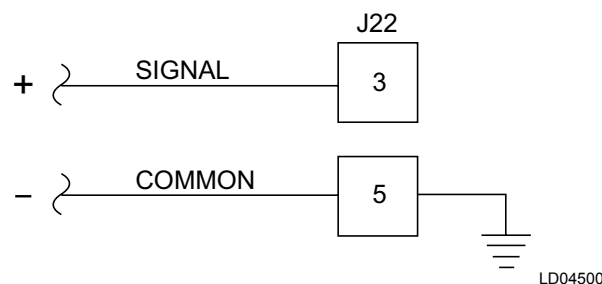


FIGURE 53 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-10VDC OR 2-10VDC SIGNAL

0-20mA - As shown in *Figure 54 on page 58*, connect input to Microboard J22-4 (signal) and J22-5 (Gnd). A 0mA signal produces a 0°F (-17.8°C) offset. A 20mA signal produces the maximum allowed offset (10 or 20°F) (5°C or 10°C) 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:

$$\text{OFFSET (}^{\circ}\text{F)} = \frac{(\text{MA})(\text{REMOTE RESET TEMP. RANGE})}{20}$$

$$\text{SETPOINT (}^{\circ}\text{F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the input is 8mA, the Remote Reset Temp Range Setpoint is programmed for 10°F (-12.2°C) and the Local Leaving Chilled Liquid Temperature Setpoint is programmed for 40°F (4.4°C), the setpoint would be set to 44°F (6.7°C) as follows:

$$\begin{aligned}\text{OFFSET (}^{\circ}\text{F)} &= \frac{(8)(10)}{20} \\ &= \frac{(80)}{20} \\ &= 4^{\circ}\text{F} \\ \text{SETPOINT (}^{\circ}\text{F)} &= 40 + 4 \\ &= 44^{\circ}\text{F (6.7}^{\circ}\text{C)}\end{aligned}$$

4-20mA - As shown in *Figure 54 on page 58*, connect input to MicroBoard J22-4 (signal) and J22-5 (Gnd.). A 4mA signal produces a 0°F (-17.8°C) offset. A 20mA signal produces the maximum allowed offset (10, 20, 30, or 40°F (5, 10, 15, or 20°C) 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:

$$\text{OFFSET} (^{\circ}\text{F}) = \frac{(\text{MA} - 4)(\text{REMOTE TEMP. RESET RANGE})}{16}$$

$$\text{SETPOINT} (^{\circ}\text{F}) = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if input is 8mA, and the Remote Reset Temp. Range setpoint is programmed for 10°F (5°C) and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F (4.4°C), the setpoint would be set to 42.5°F (5.8°C) as follows:

$$\text{OFFSET} (^{\circ}\text{F}) = \frac{(8 - 4)(10)}{16}$$

$$= \frac{(4)(10)}{16}$$

$$= \frac{40}{16}$$

$$= 2.5^{\circ}\text{F}$$

$$\text{SETPOINT} (^{\circ}\text{F}) = 40 + 2.5$$

$$= 42.5^{\circ}\text{F} (5.8^{\circ}\text{C})$$

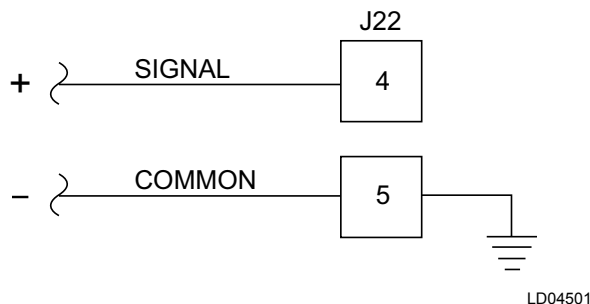


FIGURE 54 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-20MA OR 4-20MA SIGNAL

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 55 on page 58*, 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) (5 or 10°C) 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:

$$\text{OFFSET} (^{\circ}\text{F}) =$$

$$\frac{(\text{PULSE WIDTH IN SECONDS})(\text{REMOTE RESET TEMP. RANGE})}{10}$$

$$\text{SETPOINT} (^{\circ}\text{F}) = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the relay contacts close for 5 seconds and the Remote Reset Temp. Range setpoint is programmed for 10°F (5°C) and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F (4.4°C) the setpoint would be set to 44°F (6.7°C) as follows:

$$\text{OFFSET} (^{\circ}\text{F}) = \frac{(5 - 1)(10)}{10}$$

$$= \frac{(4)(10)}{10}$$

$$= \frac{40}{10}$$

$$= 4^{\circ}\text{F}$$

$$\text{SETPOINT} (^{\circ}\text{F}) = 40 + 4$$

$$= 44^{\circ}\text{F} (6.7^{\circ}\text{C})$$

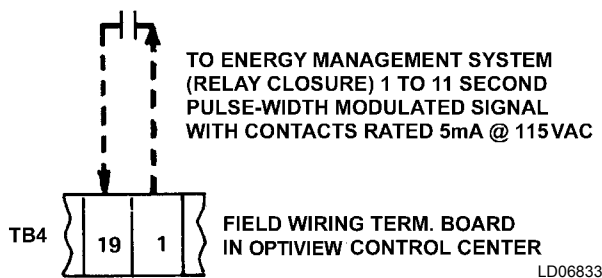
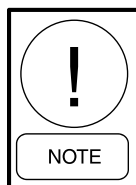


FIGURE 55 - REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT

EXTERNAL SIGNAL FOR REFRIGERATION UNIT FAILURE

When the Safety Shutdown Contacts (see *Figure 39 on page 50*) 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 38 on page 50) 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 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 or Maintained N.O. Switch or Relay Contacts will cause the unit to shutdown and display: SAFETY SHUTDOWN – MANUAL RESTART and AUXILIARY SAFETY – CONTACTS CLOSED. The unit will not restart until the contacts open, the panel CLEAR FAULTS key is pressed and the unit given a start command.

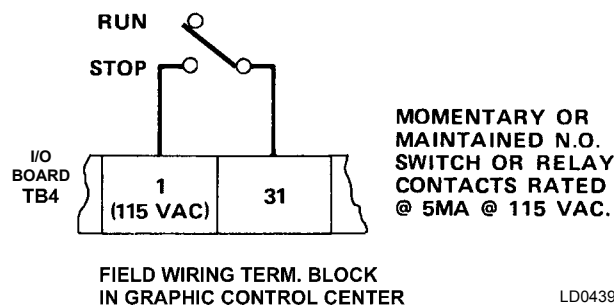


FIGURE 56 - AUXILIARY SAFETY SHUTDOWN INPUT

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 57 on page 59). 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 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. Alternately, a minimum control output setpoint can be programmed for run and stop states. See the *Operation Manual Form 160.84-OM1*.

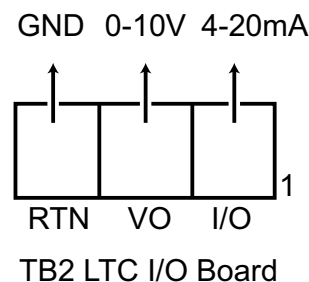


FIGURE 57 - OPTIONAL HEAD PRESSURE CONTROL OUTPUT

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 3 - ENERGY MANAGEMENT SYSTEMS

YMC² chiller design allows for ease of interfacing with 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).

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 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 37 on page 50*
- Cycling Shutdown Alarm – See *Figure 38 on page 50*
- Safety Shutdown Alarm– See *Figure 39 on page 50*
- Run (System Operating) – See *Figure 40 on page 51*
- Warning Alarm – See *Figure 41 on page 51*

Three 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™ Control Center permits connection for the following operation:

- Remote Run/Stop Contacts – See *Figure 42 on page 51*
- Remote/Local Cycling Devices – See *Figure 44 on page 52*
- Multi-unit Cycling Shutdown – See *Figure 45 on page 52*
- 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.
2. When multiple unit installations are controlled by an EMS, remote Run/Stop contacts are available to start and stop each chiller per *Figure 42 on page 51*. 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) 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 dip switch (position 8 of SW1) on the microboard. With the switch in the OFF position, the chilled water pump operates for 30 seconds prior to chiller start, during chiller operation, coastdown, and LWT cycling shutdowns. With the switch in the ON position, 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 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 55 on page 58*. 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.

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 amperes, for 1 to 255 minutes following each compressor start. For more details refer to *YMC² Operations and Maintenance (Form 160.84-O1)*.

6. Controlling the maximum allowable compressor motor amps from 30 to 100% through remote current limit setpoint. Refer to *Figure 52 on page 56* 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 20mA D.C. current signal, a 0 to 10 or 2 to 10VDC signal.

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 E-Link Gateway which may be 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 and remote operator displays. The E-Link Gateway also allows the BAS to start, stop, and reset the chiller's leaving chilled water setpoint and the current limit setpoint.

NOTES



P.O. Box 1592, York, Pennsylvania USA 17405-1592
Copyright © by Johnson Controls 2013
Form 160.84-PW2 (913)
Issue Date: September 27, 2013
New Release

800-861-1001
www.johnsoncontrols.com

Subject to change without notice. Printed in USA
ALL RIGHTS RESERVED