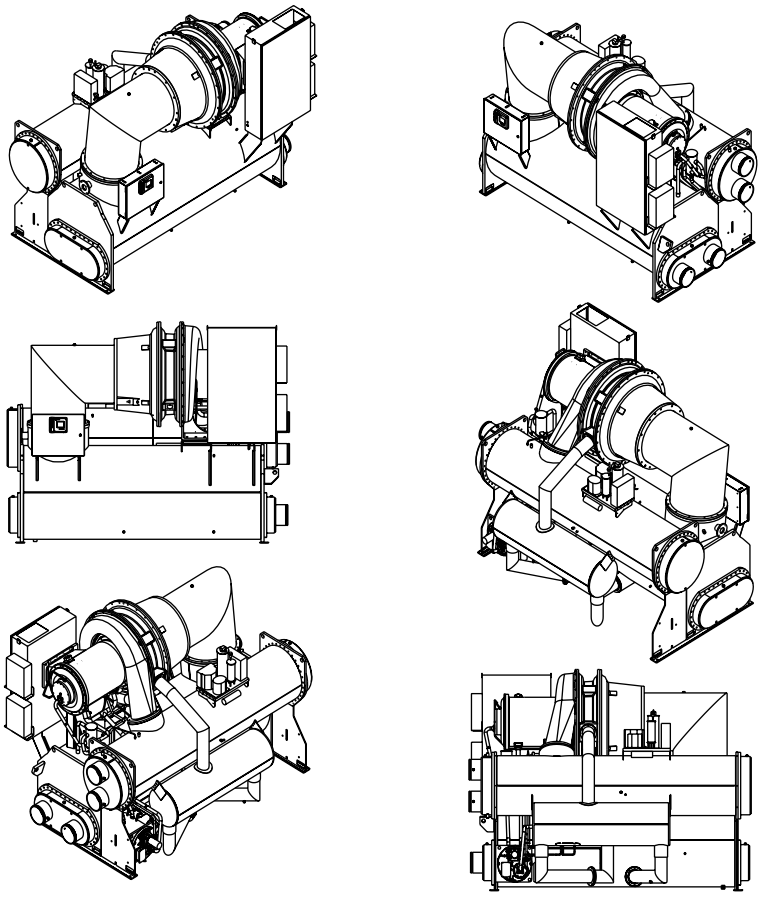
Installation – Electrical Information

Water-Cooled CenTraVac™ With CH530



Required Installation Information:
CVHE-SVN01A-EN – General Information
CVHE-SVN02A-EN – Piping Information
CVHE-SVN03A-EN – Electrical Information

X39640647010

CVHE-SVN03A-EN

Warnings and Cautions

Notice

Warnings and Cautions appear at appropriate locations throughout this manual.

Read these carefully.

Warning: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices and where property-damage-only accidents could occur.

Contents

Electrical Information

Note: Unit-mounted starters are available as an option on most CVHE, CVHF, and CVHG units with wye delta, and solid-state starters, with nominal voltages of up to 600 volts and unit mounted medium voltage across-the-line starters..

While this option eliminates most field-installed wiring requirements, the electrical contractor must still complete the electrical connection for: (1) Power supply wiring to the starter, (2) Other unit control options present, and (3) Any field-supplied control devices.

General Requirements

⚠ WARNING

HAZARDOUS VOLTAGE!

Use extreme caution when measurements, adjustments, or other service-related work is performed with power on. Failure to use caution could cause death or serious injury.

⚠ WARNING

ROTATING PARTS!

Use extreme caution when measurements, adjustments, or other service-related work is performed with power on. Failure to use caution could cause death or serious injury.

As you review this manual, along with the wiring instructions presented in this section, keep in mind that:

Typical field connection requirements for remote-mounted starters are shown at the end of the manual, and summarized in Table 1.

All field-installed wiring must conform to National Electric Code (NEC) guidelines, as well as to any applicable state and local codes. Be sure to satisfy proper equipment grounding requirements per NEC.

All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

Note: The typical customer connection diagrams shown in this manual are representative of standard CVHE, CVHF and CVHG units, and are provided only for general reference. Always refer to the actual wiring diagrams that shipped with the chiller for specific as built electrical schematic and connection information.

Adaptive Frequency Drive Option

The following information is recommended when installing a drive.

Do not modify or cut Adaptive Frequency Drive enclosure to provide electrical access. Removable panels have been provided for this purpose. Modify these panels only; away from enclosure. Refer to installation information shipped with the adjustable frequency drive or submittal drawings.

CAUTION

TO AVOID DAMAGE TO STARTER COMPONENTS, remove debris inside the starter panel. Failure to do so may cause an electrical short that seriously damages the starter components.

Electrical Information

Table 1 – CVHE, CVHF, and CVHG Standard and Optional Field Wiring Requirements

Power Supply wiring (to Starter Panel) Standard wiring: (To Terminal Block) (2X3) 3-Phase Power Supply Starter and Motor Junction Box Interconnection (Remote starter only)	**Starter Panel Terminals** 2X3-L1, L2, L3, GROUND T1 thru T6, GROUND (as applicable by starter type)		
Alternate Wiring: (To Circuit Breaker) (2Q1)	2Q1-L1,L2,L3, GROUND		
Starter to UCP 120VAC control wiring	**Starter Panel Terminals**	**Unit Control Panel Terminations**	
120VAC Power Supply	2X1-1, 2X1-2, GROUND	1X1-1, 1X1-12	
High Pressure Cutout (3S1)	2X1-4, 2X1-6	1X1-4, 1X1-3	
Oil Pump Interlock (2K11)	2X1-7, 2X1-8	1A7-J2-4, 1A7-J2-2	
UCP Control Wiring (120 VAC)	**Unit Control Panel Terminations**	**Input or Output Type**	**Contacts**
Standard Circuits:			
Chilled Water Flow Proving Input (5S1)	1X1-5 to 1A6-J3-2	Binary Input	Normally Open, closure with flow
Condenser Water Flow Proving Input (5S2)	1X1-6 to 1A6-J2-2	Binary Input	Normally Open, closure with flow
Chilled Water Pump Relay Output	1A5-J2- 4 to 6	Binary Output	Normally Open
Condenser Water Pump Relay Output	1A5-J2-1 to 3	Binary Output	Normally Open
Optional Circuits			
Alarm Relay MAR (Non-Latching) Output	1A8-J2-1 to 3	Binary Output	Normally Open
Limit Warning Relay Output	1A8-J2-4 to 6	Binary Output	Normally Open
Alarm Relay MMR (Latching) Output	1A8-J2-7 to 9	Binary Output	Normally Open
Compressor Running Relay Output	1A8-J2-10 to 12	Binary Output	Normally Open
Maximum Capacity Relay Output	1A9-J2-1 to 3	Binary Output	Normally Open
Head Relief Request Relay Output	1A9-J2-4 to 6	Binary Output	Normally Open
Purge Alarm Relay Output	1A9-J2-7 to 9	Binary Output	Normally Open
Ice Making Relay Output	1A10-J2-4 to 6	Binary Output	Normally Open
Free Cooling Relay Output	1A11-J2-4 to 6	Binary Output	Normally Open
Low Voltage Circuits (less than 30 VAC)	**Unit Control Panel Terminations**	**Input or Output Type**	
Standard Circuits			
External Auto Stop Input	1A13-J2-1 to 2	Binary Input	Closure required for normal operation
Emergency Stop Input	1A13-J2-3 to 4	Binary Input	Closure required for normal operation
Optional Circuits			
External Base Loading Enable Input	1A18-J2-1 to 2	Binary Input	Normally Open
External Hot Water Control Enable Input	1A18-J2-3 to 4	Binary Input	Normally Open
External Ice Machine Control Enable Input	1A19-J2-1 to 2	Binary Input	Normally Open
Free Cooling Input Enable Input	1A20-J2-1 to 2	Binary Input	Normally Open
RLA Compressor Output	1A15-J2-1 to 3	Analog Output	2-10 vdc, or 4-20 mA
External Condenser Pressure Output or Refrigerant Differential Pressure output	1A15-J2-4 to 6	Analog Output	2-10 vdc, or 4-20 mA
External Current Limit Setpoint Input	1A16-J2-2 to 3	Analog Input	2-10 vdc, or 4-20 mA
External Chilled Water Setpoint	1A16-J2-5 to 6	Analog Input	2-10 vdc, or 4-20 mA
External Base Load Setpoint Signal	1A17-J2-2 to 3	Analog Input	2-10 vdc, or 4-20 mA
Generic Refrigerant Monitor Input	1A17-J2-4 to 6	Analog Input	2-10 vdc, or 4-20 mA
Outdoor Air Temperature sensor	IPC bus Connection and sensor	Communication and sensor.	

Electrical Information

Power Supply Wiring

To assure that power supply wiring to the starter panel is properly installed and connected, review and follow the guidelines outlined below.

3-Phase Power Source

1. Verify that the starter nameplate ratings are compatible with the power supply characteristics and with the electrical data on the unit nameplate.
2. If the starter enclosure must be cut to provide electrical access, exercise care to prevent debris from falling inside the enclosure. If the starter cabinet has a removable panel, be sure to remove the panel from the unit before drilling holes.

CAUTION

TO AVOID DAMAGE TO STARTER COMPONENTS, remove debris inside the starter panel. Failure to do so may cause an electrical short that seriously damages the starter components.

3. Use copper conductors to connect the 3-phase power supply to the remote or unit-mounted starter panel.

CAUTION

USE ONLY COPPER CONDUCTORS FOR TERMINAL CONNECTIONS. Failure to do so may cause corrosion or overheating, and starter damage.

4. Size the power supply wiring in accordance with the Minimum Circuit Ampacity (MCA) shown on the unit nameplate. (MCA = (RLA x 1.25) + Control Power Load)
5. Make sure that the incoming power wiring is properly phased; each power supply conduit run to the starter must carry the correct number of conductors to ensure equal phase representation. See Figure 1.
6. As you install the power supply conduit, make sure that this position does not interfere with the serviceability of any of the unit components, nor with structural members and equipment.

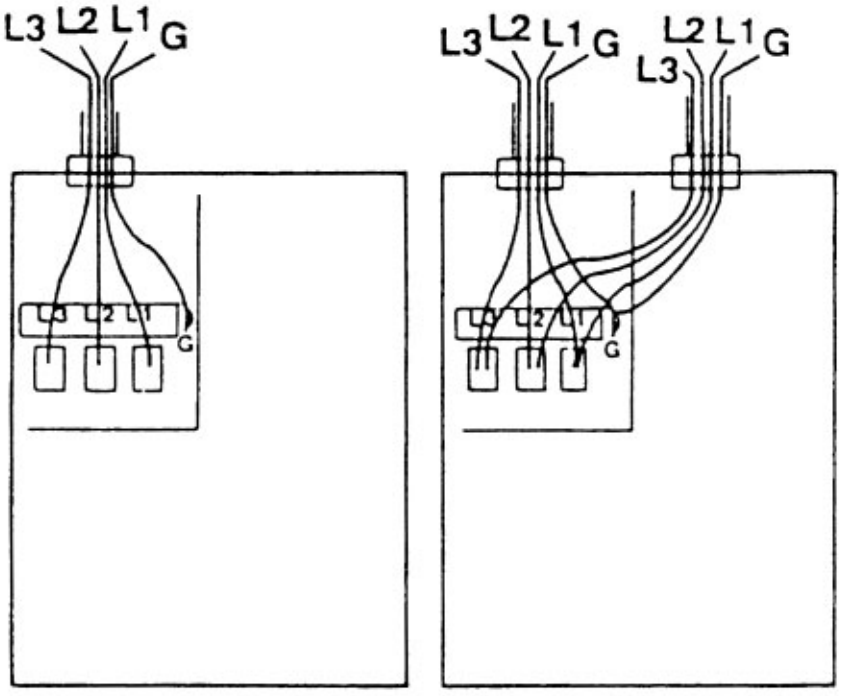
Also, assure that the conduit is long enough to simplify any servicing that may be necessary in the future (e.g., starter removal).

Note: Use flexible conduit to enhance serviceability and minimize vibration transmission.

Circuit Breakers and Fusible Disconnects

Size the circuit breaker or fuse disconnect in compliance with NEC or local guidelines.

Figure 1 – Proper Phasing for Starter Power Supply Wiring and Conduit Loading



Electrical Information

Optional PFCCs

Power factor correction capacitors (PFCCs) are designed to provide power factor correction for the compressor motor. They are available as an option.

Note: Remember that the PFCC nameplate voltage rating must be greater than or equal to the compressor voltage rating stamped on the unit nameplate. See Table 2 to determine what PFCC is appropriate for each compressor voltage application.

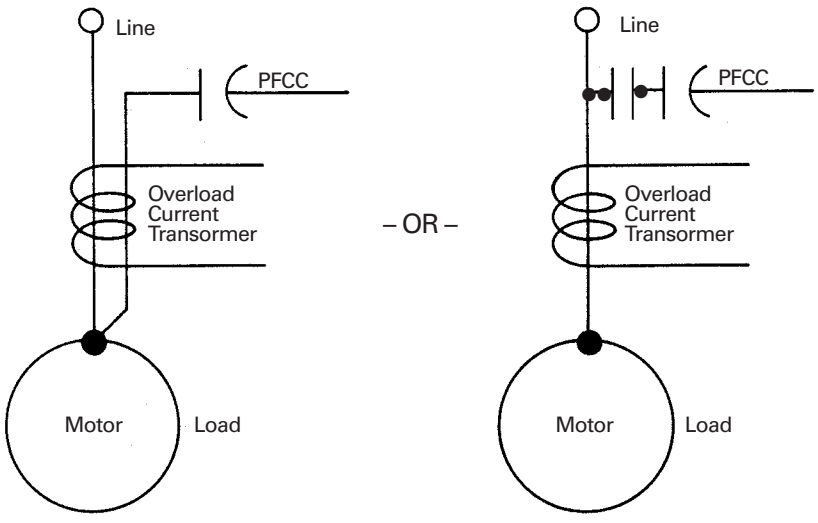
CAUTION

PFCCS MUST BE WIRED INTO THE STARTER CORRECTLY! Failure to do so may cause misapplication of these capacitors and result in a loss of motor overload protection and subsequently cause motor damage.

Table 2 – PFCC Design Voltage Sizing per Compressor Voltage Application

PFCC Design Voltage	Compressor Motor Rating (See Unit Nameplate)
240/60 Hz	208V/60 Hz
480V/60 Hz	380V/60 Hz 440V/60 Hz 460V/60 Hz 480V/60 Hz
600V/60 Hz	575V/60 Hz 600V/60 Hz
2400V/60 Hz	2300V/60 Hz
	2400V/60 Hz
PFCC Rating	Compressor Motor Rating (See Unit Nameplate)
480V/50 Hz	346V/50 HZ 380V/50 HZ 400V/50 Hz 415V/50 Hz
4160V/60 Hz	3300V/60 Hz 4160V/60 Hz

Figure 2 – PFCC Leads Routed through Overload Current Transformer



Note: See the attached wiring diagram for more detail.

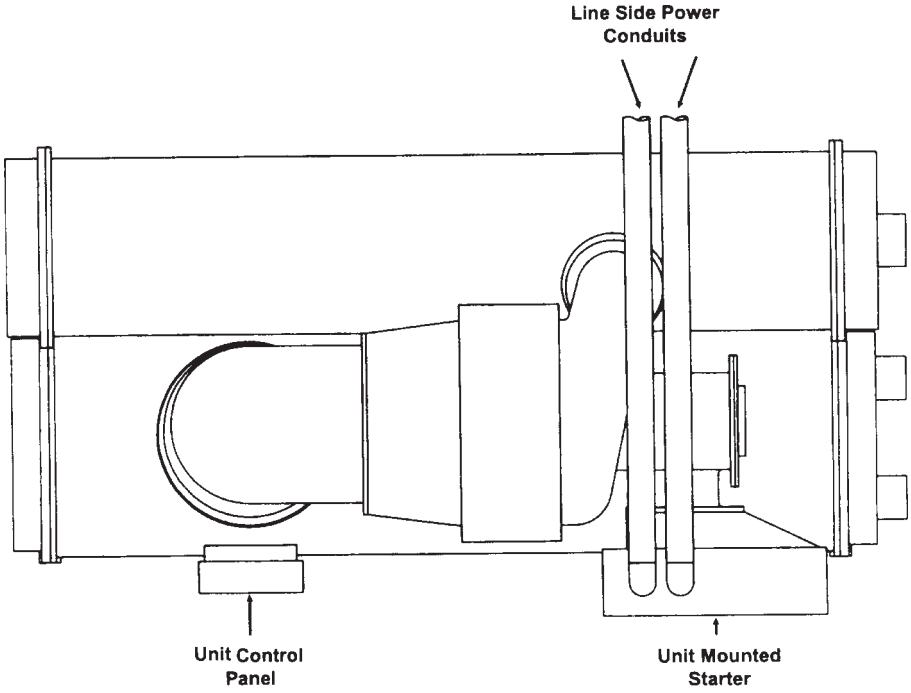
Electrical Information

Interconnecting Wiring

Typical equipment room conduit layouts with and without unit-mounted starters are shown in Figures 3 and 4, respectively.

Keep in mind that the interconnecting wiring between the starter panel, compressor and UCP control panel is factory-installed with unit-mounted starters but must be field-installed when a remote-mounted starter is used.

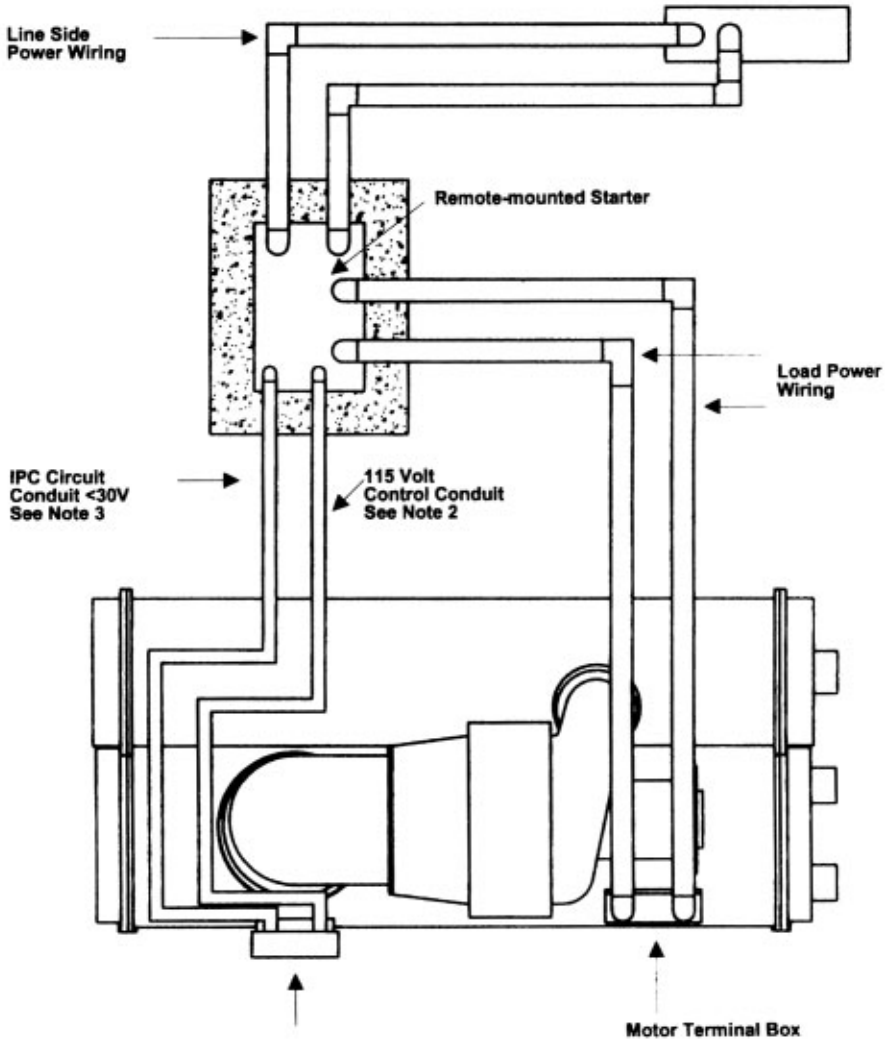
Figure 3 – Typical Equipment Room Layout with Unit-Mounted, Wye-Delta



Note:
See Starter submittal drawing for location of incoming wiring to the starter.

Electrical Information

Figure 4 – Typical Equipment Room Layout with Remote-Mounted Wye-Delta Starter



Notes:
1. Refer to the unit field connection diagram for approximate UCP knockout locations.
2. 115-volt conduit must enter the higher than 30 Vdc Class I portion of the unit control panel.
3. IPC circuit conduit must enter the Low Voltage Class II portion of the UCP.
4. See starter submittal drawing for location of incoming wiring to the starter.

Electrical Information

Starter to Motor (Remote-Mounted Starters Only)

Ground Wire Terminal Lugs
Ground wire lugs are provided in the motor terminal box and in the starter panel.

Terminal Clamps
Terminal clamps are supplied with the motor terminals to accommodate either bus bars or standard motor terminal wire lugs. Terminal clamps provide additional surface area to minimize the possibility of improper electrical connections.

Wire Terminal Lugs
Wire terminal lugs must be field-supplied.

1. Use field-provided crimp-type wire terminal lugs properly sized for the application.

   Note: Wire size ranges for the starter line and load-side lugs are listed on the starter submittal drawings supplied by the starter manufacturer or Trane. Carefully review the submitted wire lug sizes for compatibility with the conductor sizes specified by the electrical engineer or contractor.

2. A terminal clamp with a 3/8" bolt is provided on each motor terminal stud; use the factor-supplied Belleville washers on the wire lug connections.

   Figure 5 illustrates the juncture between a motor terminal stud and terminal clamp.

3. Tighten each bolt to 24 foot-pounds.

4. Install but do not connect the power leads between the starter and compressor motor. (These connections will be completed under supervision of a qualified Trane service engineer after the prestart inspection).

CAUTION

ENSURE THE POWER SUPPLY WIRING AND OUTPUT TO MOTOR WIRING ARE CONNECTED TO THE PROPER TERMINALS. Failure to do so will cause catastrophic failure of the starter and, or motor

Bus Bars
Install the bus bars between the motor terminals when a low-voltage "across-the-line", "primary reactor/ resistor," "auto transformer" or customer-supplied solid-state, or customer-supplied AFD.

Be sure to bus motor terminal T1 to T6, T2 to T4, and T3 to T5.

Note: Bus bars are not needed in high-voltage applications since only 3 terminals are used in the motor and starter.

Starter to UCP (Remote-Mounted Starters Only)

Electrical connections required between the remote-mounted starter and the unit control panel are shown in an example of a point-to-point starter-to-UCP connection diagram as shown at the end of the manual.

Note: Install control voltage conduit into control voltage section of chiller control panel and starter panel. Do not route with low voltage (30 volts) conduit wires.

When sizing and installing the electrical conductors for these circuits, follow the guidelines listed.

CAUTION

TO AVOID DAMAGE TO STARTER COMPONENTS, remove debris inside the starter panel. Failure to do so may cause an electrical short that seriously damages the starter components.

1. If the starter enclosure must be cut to provide electrical access, exercise care to prevent debris from falling inside the enclosure. Do not cut AFD enclosure.
2. Use only shielded twisted pair for the interprocessor communication (IPC) circuit between the starter and the UCP on remote mounted starters. Recommended wire is Beldon Type 8760, 18 AWG for runs up to 1000 feet.

   Note: The polarity of the IPC wire pair is critical for proper operation.
3. Separate low-voltage (less than 30V) wiring from the 115V wiring by running each in its own conduit.
4. As you route the IPC circuit out of the starter enclosure, make sure that it is at least 6" from all wires carrying a higher voltage.
5. For UCP IPC shielded twisted pair wiring, the shield should be grounded on one end only at UCP at 1X1-G. The other end should be unterminated and taped back on the cable sheath to prevent any contact between shield and ground.

Refer to Figure 6 for wiring information on UCP Control Panel connections.

NOTE

MAINTAIN AT LEAST 6 INCHES BETWEEN LOW-VOLTAGE (<30V) AND HIGH VOLTAGE CIRCUITS. Failure to do so could result in electrical noise that may distort the signals carried by the low-voltage wiring, including the IPC.

Electrical Information

Figure 5 – Terminal Stud, Clamp and Lug Assembly

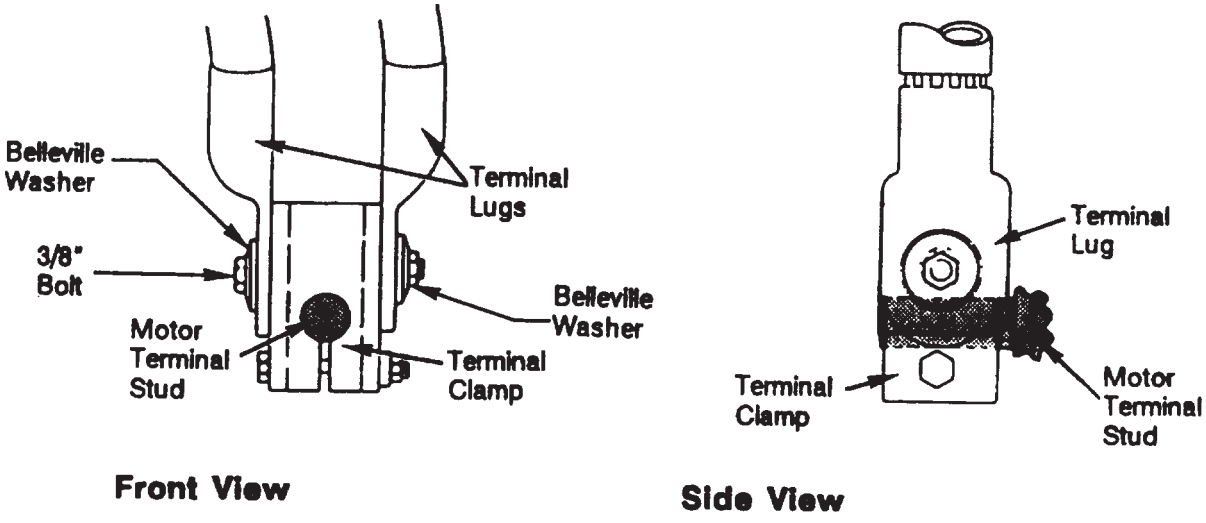


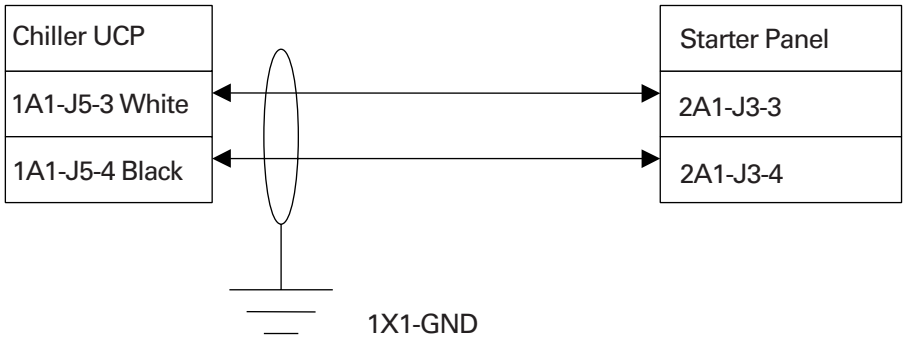
Figure 6 – UCP Control Panel Connections

Trane-Supplied Remote Starter Connections

*1X1-		2X1-
1	1A-115VAC (H)	1
12	2A-115VAC (N)	2
3	3B-Run Relay	6
4	4B- Start Relay	4
1A7-J2-4	9A- Oil Pump Interlock	7
1A7-2-2	10A-Oil Pump Interlock	8

*__Note:__ The wire is retained in the clamp by the force of the spring which pushes the wire against the connecting bar. Use care to ensure full insertion of screwdriver into terminal block wire release mechanism. Proper tool engagement is required to release the tension for wire insertion.

Unit Control Panel to Starter Panel Interprocessor Communications Link.



Ground Shield at UCP end only.

Electrical Information

UCP Electrical Specifications

Following is a requirements list for the UCP in the control panel:

Note that the control panel is designed to receive input from the secondary of a power transformer in the starter panel.

1. **Nominal Voltage:** 115/110 VAC, 60/50 Hz with operating range of 98 to 127 VAC, inclusive.
2. **Maximum VA:** 4K VA (40-amp fuse) for units with the refrigerant pump
3. Power input wiring must be at least 6" [152 mm] from low-voltage, less than 30V wiring.
4. All signal inputs are low-voltage less than 30V.
5. UCP Storage Range: -40°F to 158°F (-40°C to 70°C) i.e., not applicable for chiller.

Water Pump Interlock Circuits and Flow Switch Input

Chilled Water Pump. Wire the evaporator water pump contactor (5K1) to a separate 120 volt single phase power supply with 14 AWG, 600 volt copper wire, then connect this circuit to 1A5-J2-6. Then use 1A5-J2-4 120 VAC output to allow the UCP to control the evaporator water pump, or wire the 5K1 contactor to operate remotely and independently of the UCP.

Chilled Water Proof of Flow
Wire the auxiliary contacts of the evaporator water pump contactor (5K1) in series with the flow switch (5S1) installed in the evaporator supply pipe. Use 14 AWG, 600-volt copper wire.

Connect this circuit to UCP terminals IX1-5 to 1A6-J3-2.

When installed properly, the chilled water interlock circuit will only allow compressor operation if the evaporator pump is running and providing at least the minimum water flow required.

Condenser Water Pump. Wire the condenser water pump contactor (5K2) to a separate 120-volt, single-phase power supply with 14 AWG, 600-volt copper wire; then connect this circuit to UCP terminals 1A5-J2-3. Then use 1A5-J2-1 120 VAC output to allow UCP to control the condenser pump.

Condenser Water Proof of Flow
Next, use 14 AWG, 600-volt copper wire to connect the auxiliary contacts of the condenser water pump contactor (5K2) in series with the flow switch (5S2) installed in the condenser supply pipe.

Connect this circuit to UCP terminals 1X1-6 to 1A6-J2-2.

When installed properly, the condenser water lock circuit will only allow the compressor to operate if the condenser pump is running and providing at least the minimum water flow required.

Electrical Information

Temperature Sensor Circuits

All temperature sensors are factory-installed except the optional outdoor air temperature sensor. This sensor is required for the outdoor air temperature type of chilled water reset. Follow the guidelines below to locate and mount the outdoor air temperature sensor. Mount the sensor probe where needed, however, mount the sensor module in the UCP.

The outdoor temperature sensor similar to the unit mounted temperature sensors in that it consists of the sensor probe and the module. A four-wire IPC bus is connected to the module for 24 vdc power and the communications link.

We recommend mounting the sensor module within the UCP and the sensor two wire leads be extended and routed to the outdoor temperature sensor probe sensing location. This assures the four wire IPC bus protection and provides access to the module for configuration at start-up.

The sensor probe lead wire between the sensor probe and the module can be separated by cutting the two wire probe lead leaving equal lengths of wire on each device; the sensor probe and the sensor module. Note this sensor and module are matched and must remain together or inaccuracy may occur. These wires can then be spliced to with two 14-18 AWG 600V wires of sufficient length to reach the desired outdoor location, maximum length 1000 feet (305 meters). The module four-wire bus must be connected to the UCP four-wire bus using the Trane approved connectors provided.

The sensor will be configured (given its identity and become functional) at start-up when the serviceman performs the start-up configuration. It will not be operational until that time.

Note: If shielded cable is used to extend the sensor leads, be sure to tape off the shield wire at the junction box and ground it at the UCP. If the added length is run in conduit, do not run them in the same conduit with other circuits carrying 30 or more volts.

NOTE

MAINTAIN AT LEAST 6 INCHES BETWEEN LOW-VOLTAGE (<30V) AND HIGH VOLTAGE CIRCUITS. Failure to do so could result in electrical noise that may distort the signals carried by the low-voltage wiring, including the IPC.

Optional Relay Circuits

Optional Control and Output Circuits

Install various optional wiring as required by the owner's specifications.

Optional Tracer Communication Interface

This control options allows the UCP to exchange information such as chiller status and operating set points with a Tracer system.

Figure 7 illustrates how such a communication/control network might appear.

Note: The circuit must be run in separate conduit to prevent electrical noise interference.

Additional information about the Tracer Comm option is published in the installation manual and operator's guide that ships with the Tracer.

Unit Start-Up

All phases of initial unit start-up must be conducted under the supervision of a qualified local service engineer. This includes pressure testing, evacuation, electrical checks, refrigerant charging, actual start-up and operator instruction.

Advance notification is required to assure that initial start-up is scheduled as close to the requested date as possible.

Starter Module Configuration

The starter module configuration settings will be checked (and configured for Remote Starters) during start-up commissioning. To configurate starter module, and perform other starter checks, it is recommended that the line voltage three phase power be turned off and secured (locked out), and then a separate source control power (115 vac) be utilized to power up the control circuit. To do this, remove control coil circuit fuse, typically 2F4, and then connect separate source power cord to starter terminal block 2X1-1 (H), 2X1-2 (N), and Ground. Use the "as-built starter schematic" to assure correct fuse and terminals. Verify correct fuse is removed, control circuit connections are correct, then apply the 115 vac separate source power to service the controls.

Forms Information

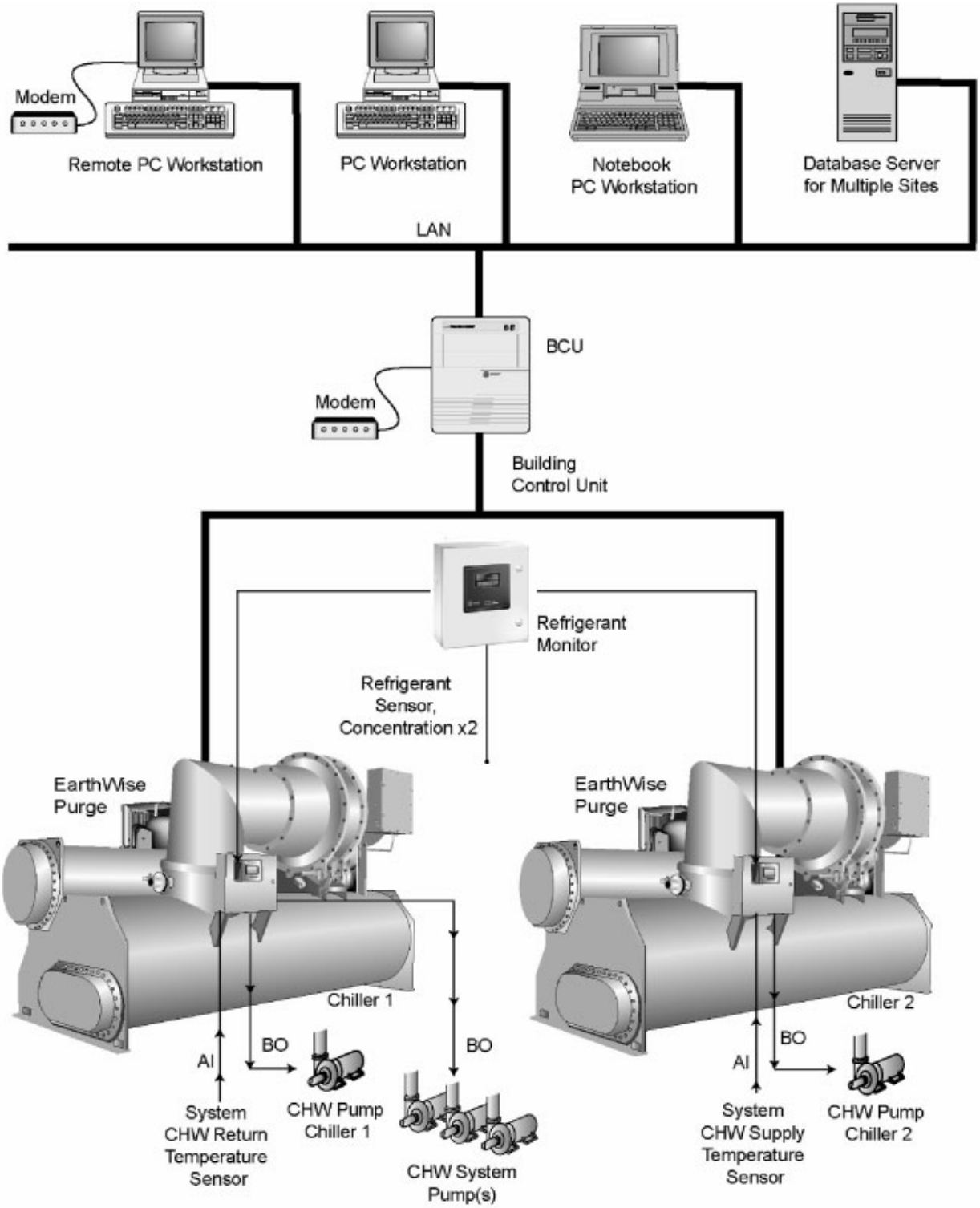
Samples of start-up and operating forms along with other helpful forms are found in the Operation Maintenance manual which can be obtained from the nearest Trane office.

It is recommended that the serviceman contact the local Trane office to obtain the most recent printing date of the form. The forms in the operation and maintenance manual are only current at the time of printing of the manual.

After obtaining the most recent form, complete all the information and forward it to your local Trane office..

Electrical Information

Figure 7 – Illustrates Communication/Control Network to Chiller Units with CH530



Wiring Drawings

Schematic Wiring Drawings

The following pages consist of typical wiring drawings for an CVHE, CVHF or CVHG chiller. However, please refer to the submittals and drawings that actually shipped with the unit.

Refer to the chiller operation and maintenance manual for an example of a typical sequence of operation for a Unit Mounted Wye-Delta Starter.

In the starter drawings, shown in this manual, all starter variables are the same in the Sequence of Operation except the Maximum Acceleration Time.

Table 3 provides a listing of included schematics, connection diagrams and field wiring drawings to follow.

Table 3 also shows variables of the Maximum Acceleration Time for all starter drawings in this manual.

Table 3 – Wiring Addendum

Type of Drawing	Drawing Number	Maximum Acceleration Time (seconds)
Field Wiring Layout Drawings		
Legend (Unit Mounted Wye-Delta Starter)	2309-4922-B	–
Unit Mounted Wye-Delta Starter	2309-4902-A	27
Unit Mounted Solid-State Starter	2309-4904-A	15
Unit Mounted Across-the-Line	2309-4906-A	6
Unit Mounted Adaptive Frequency Drive	2309-4912-B	30
Remote Wye-Delta Starter	2309-4903-A	27
Remote Mounted Solid-State Starter	2309-4905-A	15
Remote Across-the-Line Starter	2309-4909-A	6
Remote Primary Reactor Starter	2309-4910-A	11
Remote Auto Transformer Starter	2309-4911-A	11
Customer Supplied Wye-Delta Starter	2309-4913-A	27
Customer Supplied Primary Reactor and Auto Transformer Starter	2309-4914-A	11
Customer Supplied Across-the-Line Starter	2309-4915-A	6
Customer Supplied Solid-State Starter	2309-4916-A	20
Purge Schematic	2309-4917-A	–
Aftermarket Purge Schematic	2309-4918-A	–
Unit Controls Schematic	2309-4919-A	–
System Controls Schematic	2309-4920-C	–
Options Schematic	2309-4921-A	–
Connection Diagrams		
Standard Connection Diagram Panel with Options	2309-4923-A	–
Field Connection Trane Starter	2309-4935-A	–
Customer Supplied Starter	2309-4936-A	–
Unit Wiring – Standard	2309-4937-A	–
Unit Wiring – Optional	2309-4938-A	–
Purge Control Panel (Unit Mounted	2309-4939-A	–
Purge Control Panel (Aftermarket)	2309-4940-A	–

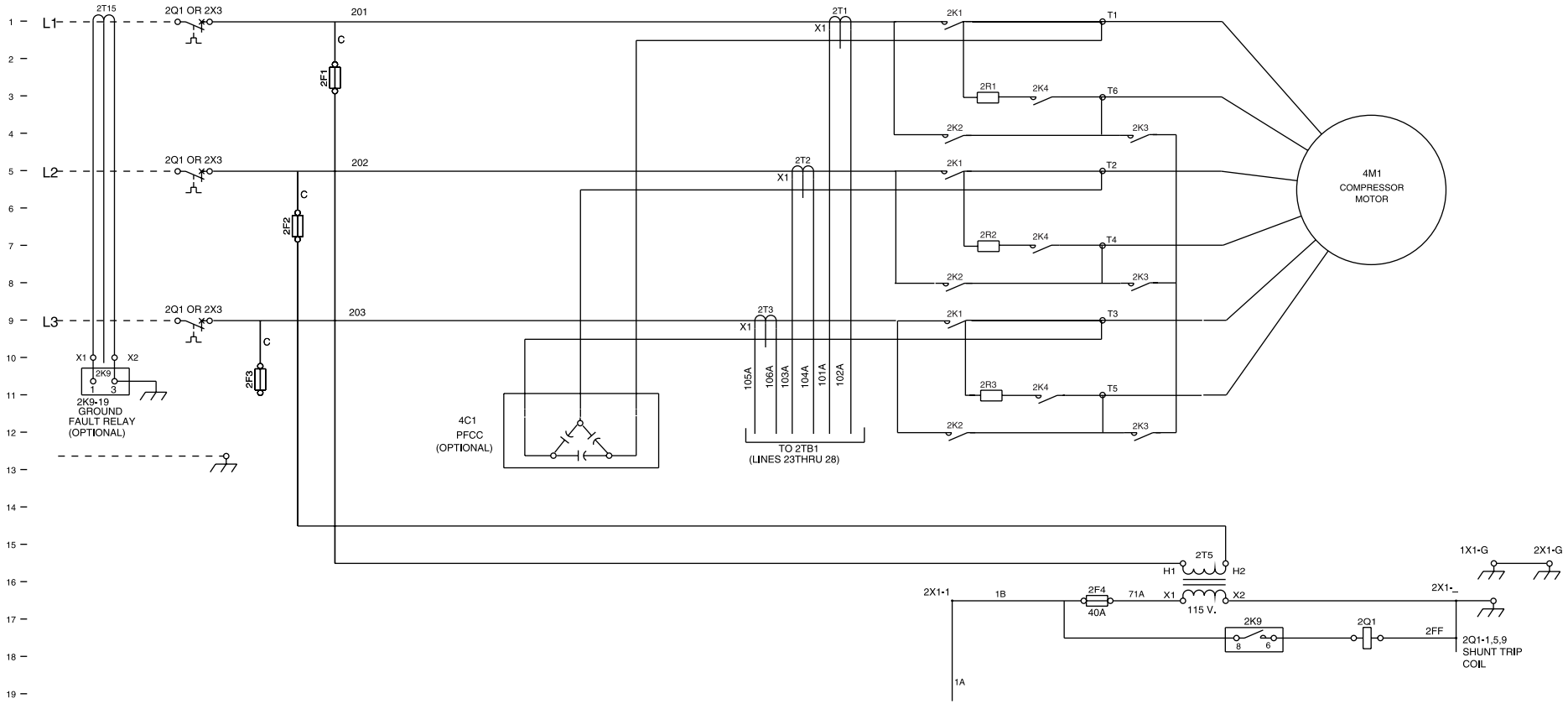
Note: These are typical drawings only. Refer to specific as-built schematics for actual unit drawings which represent the unit wiring as shipped.

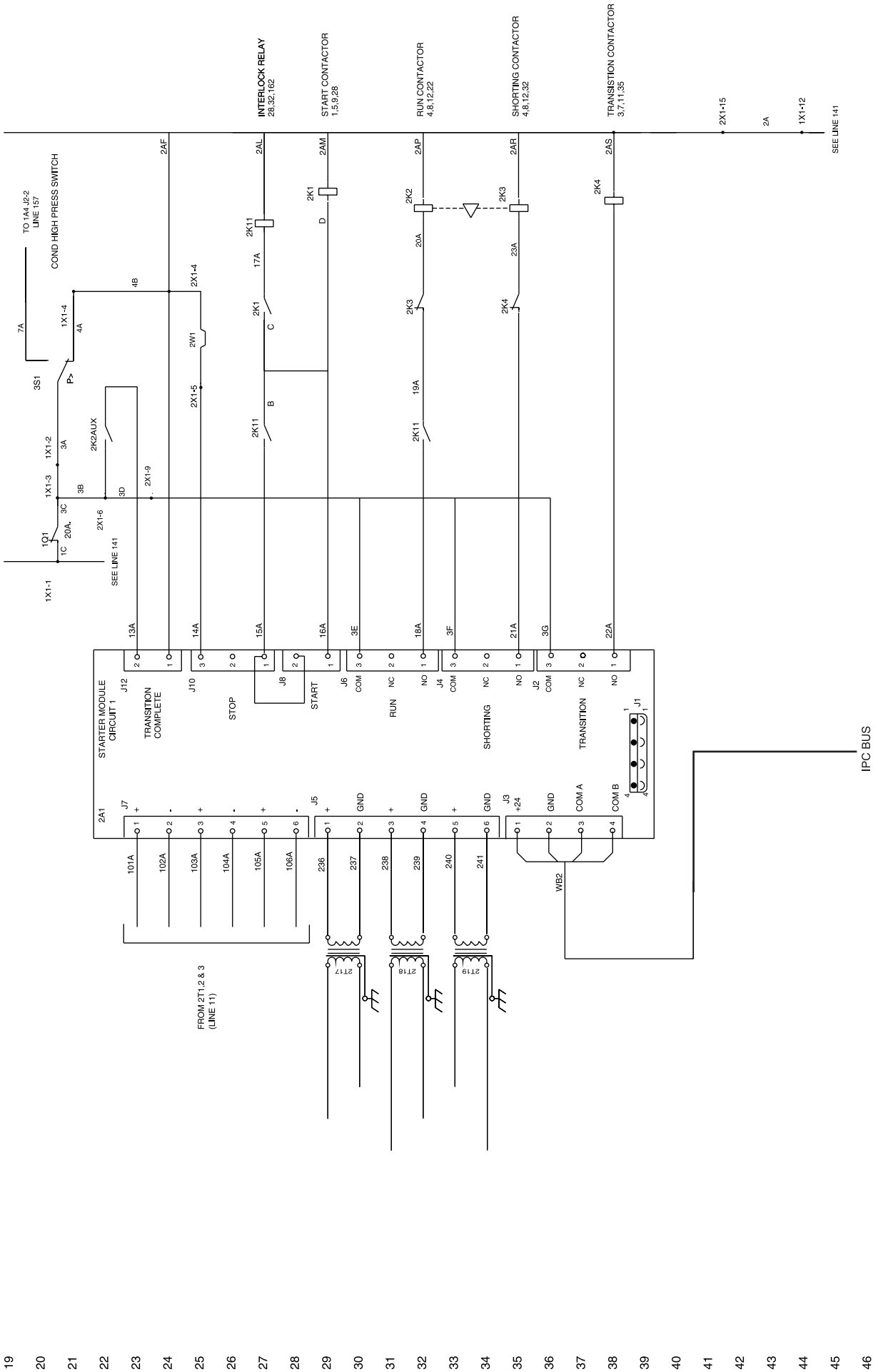
CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
UNIT MOUNTED WYE-DELTA STARTER

2309-4902

UNIT MOUNTED WYE-DELTA STARTER

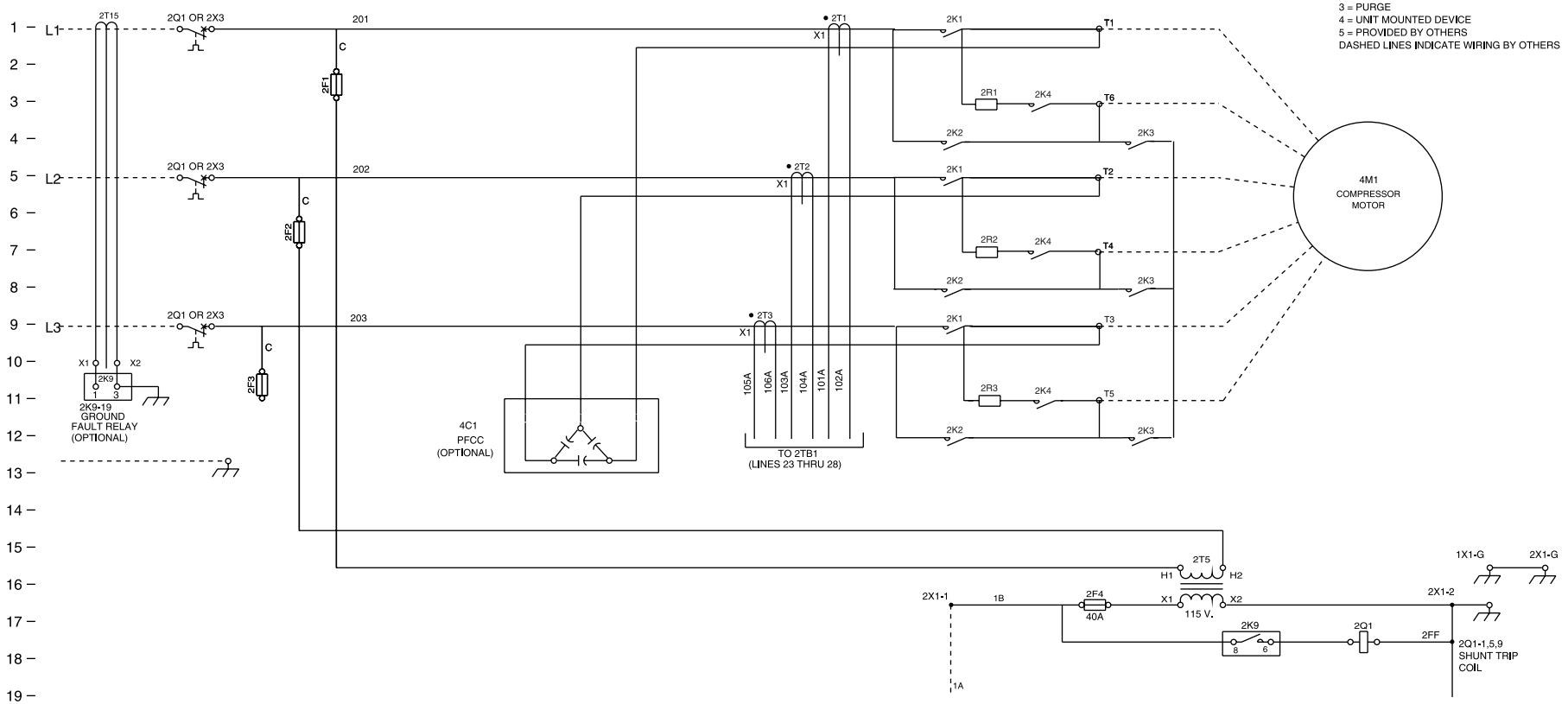
PREFIX CODE
1 = MAIN CONTROL PANEL
2 = STARTER PANEL
3 = PURGE
4 = UNIT MOUNTED DEVICE
5 = PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS

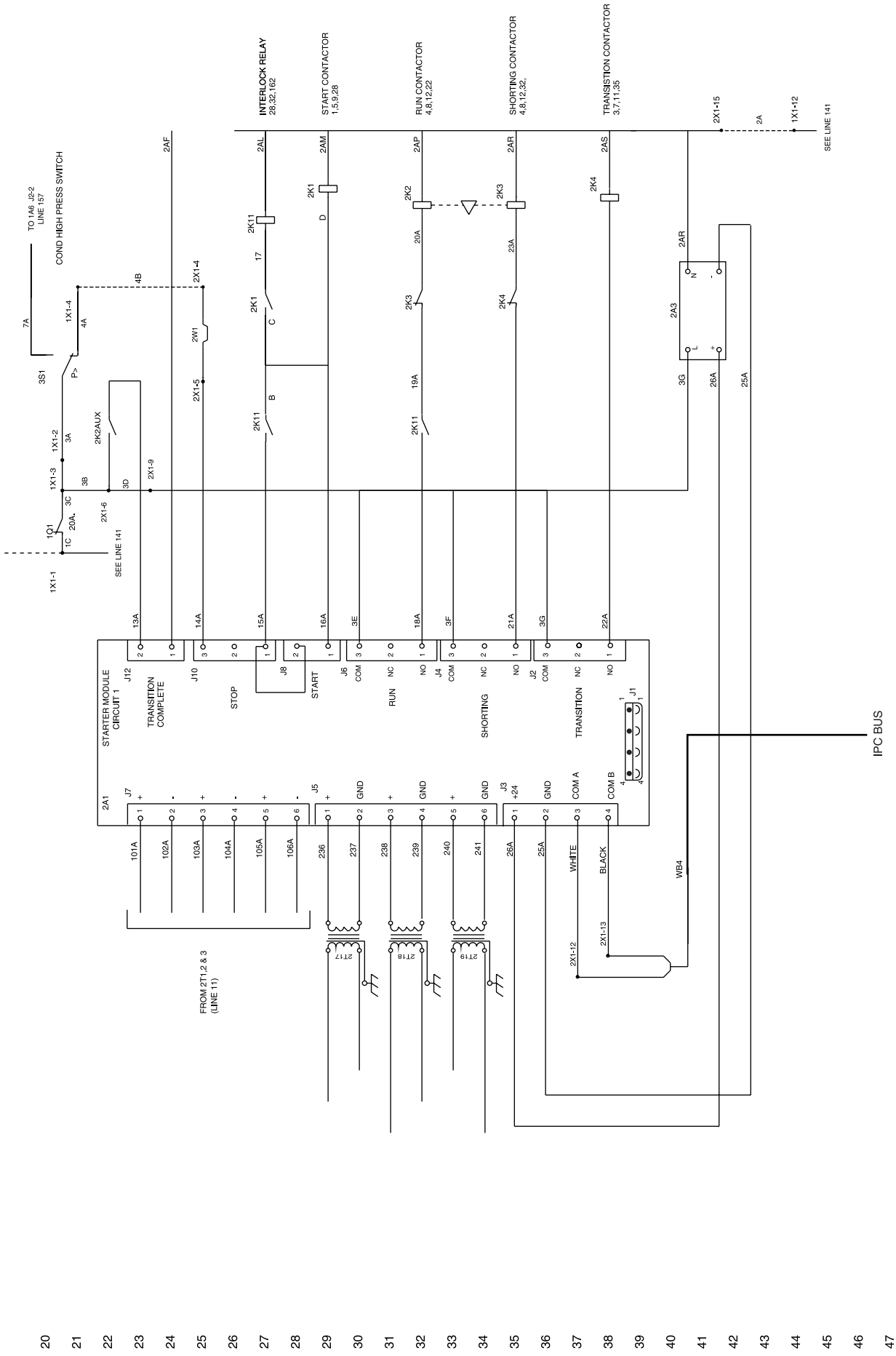



INTERLOCK RELAY
28,32,162
START CONTACTOR
1,5,9,28
RUN CONTACTOR
4,8,12,22
SHORTING CONTACTOR
4,8,12,32
TRANSISTION CONTACTOR
3,7,11,35
2X1-15
2A
1X1-12
SEE LINE 141
TO 1A4 J2-2
LINE 157
COND HIGH PRESS SWITCH
3S1
2K2AUX
1Q1
20A.
SEE LINE 141
1X1-1
STARTER MODULE
CIRCUIT 1
TRANSITION
COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
GND
COM A
COM B
+24
FROM 2T1,2 & 3
(LINE 11)
2T17
2T18
2T19
WB2
IPC BUS

2309-4903

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
REMOTE MOUNTED WYE-DELTA STARTER



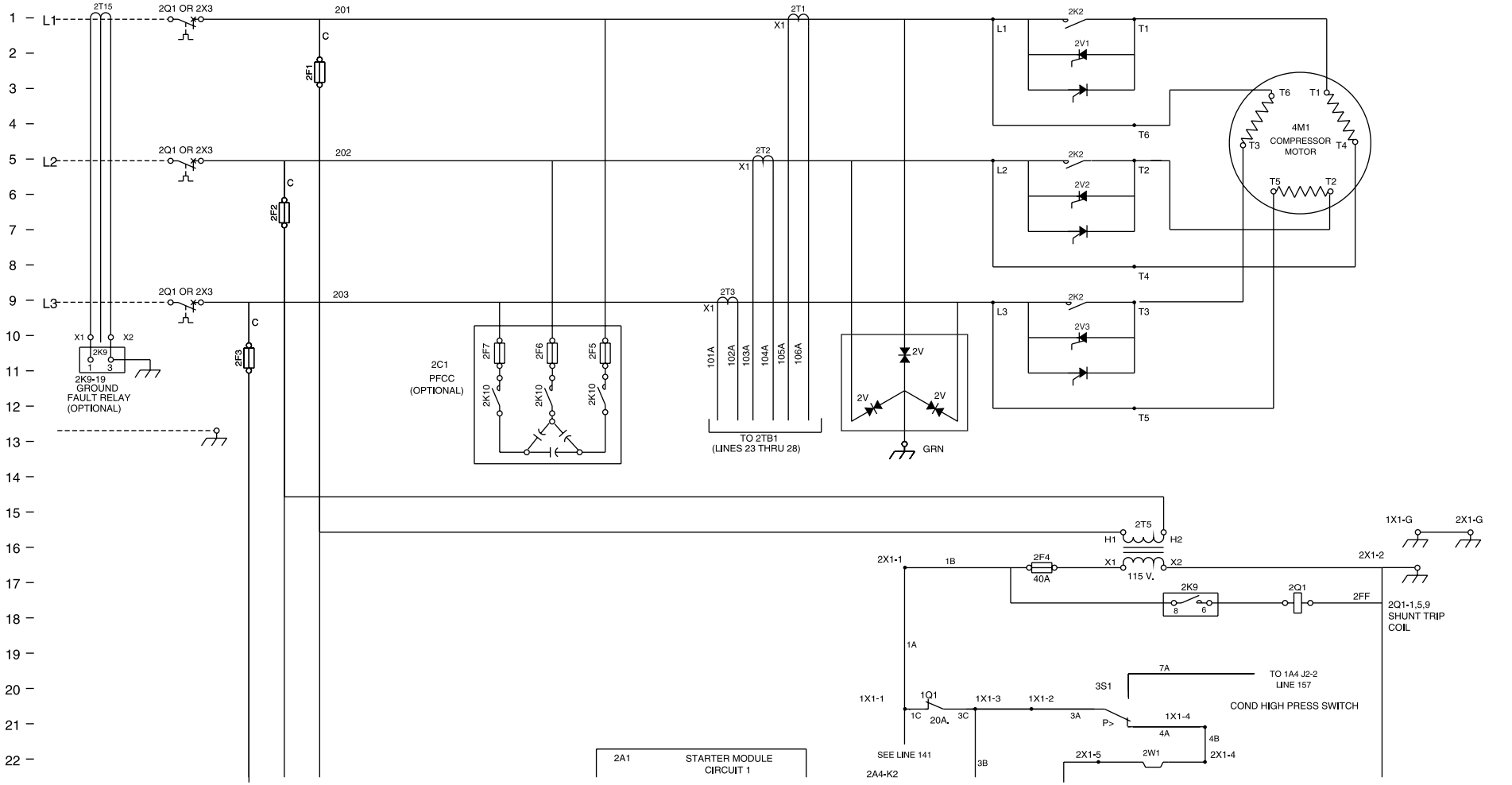

INTERLOCK RELAY
28,32,162
START CONTACTOR
1,5,9,28
RUN CONTACTOR
4,8,12,22
SHORTING CONTACTOR
4,8,12,32,
TRANSITION CONTACTOR
3,7,11,35
COND HIGH PRESS SWITCH
TO 1A6 J2-2
LINE 157
SEE LINE 141
STARTER MODULE
CIRCUIT 1
TRANSITION
COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
FROM 2T1,2 & 3
(LINE 11)
WHITE
BLACK
IPC BUS

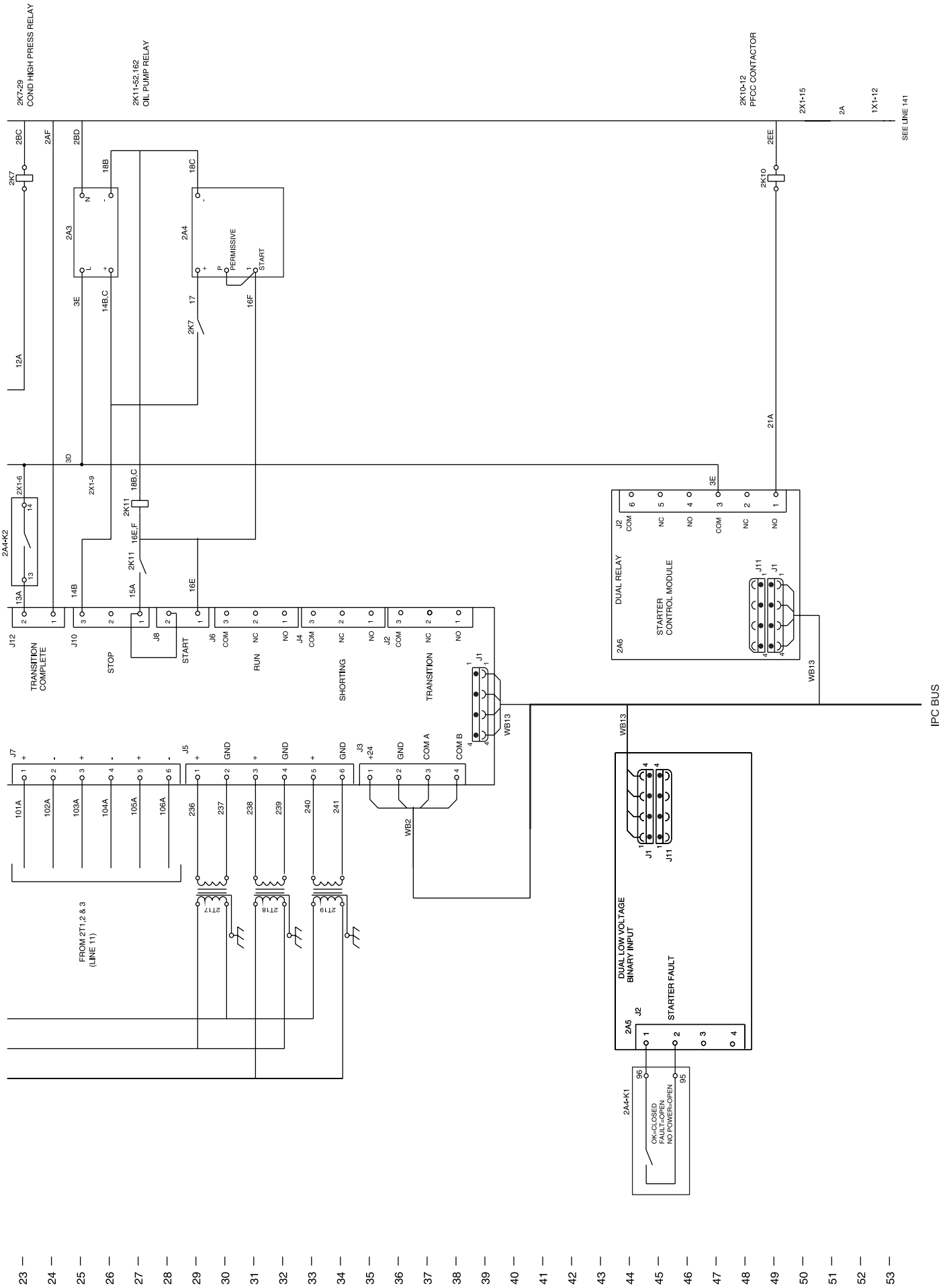
2309-4904

UNIT MOUNTED SOLID STATE STARTER

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
UNIT MOUNTED SOLID STATE STARTER

PREFIX CODE
1 = MAIN CONTROL PANEL
2 = STARTER PANEL
4 = UNIT MOUNTED DEVICE
5 = PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS



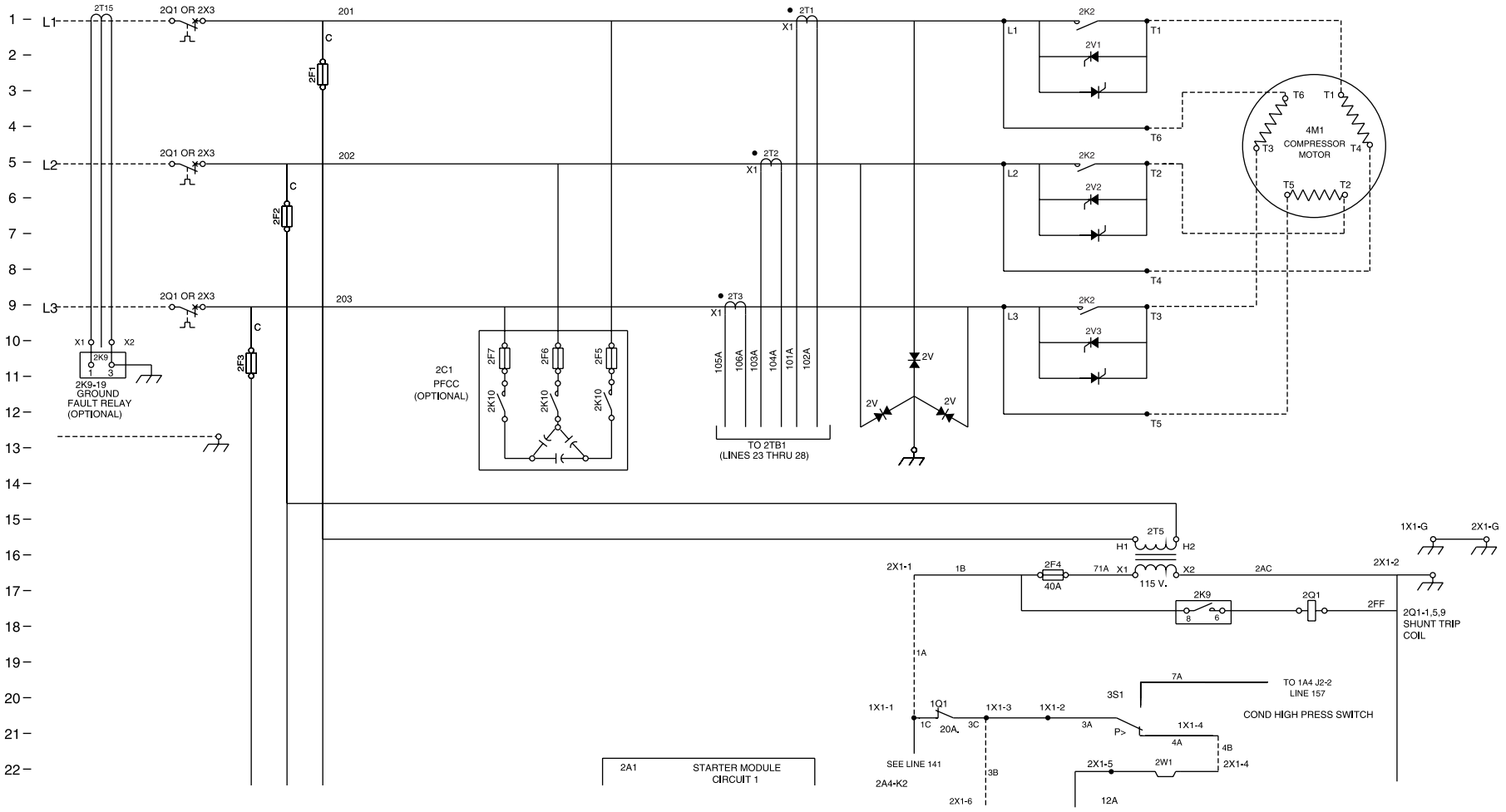

2K7-29
COND HIGH PRESS RELAY
2K11-52,162
OIL PUMP RELAY
2K10-12
PFCC CONTACTOR
2X1-15
2A
1X1-12
SEE LINE 141
2K7
2K10
2A3
2A4
PERMISSIVE
START
2A4-K2
2K11
STOP
START
TRANSITION COMPLETE
RUN
SHORTING
TRANSITION
2A6
DUAL RELAY
STARTER CONTROL MODULE
WB13
IPC BUS
WB2
FROM 2T1,2 & 3 (LINE 11)
2T17
2T18
2T19
2A5
DUAL LOW VOLTAGE BINARY INPUT
STARTER FAULT
2A4-K1
OK=CLOSED
FAULT=OPEN
NO POWER=OPEN
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53

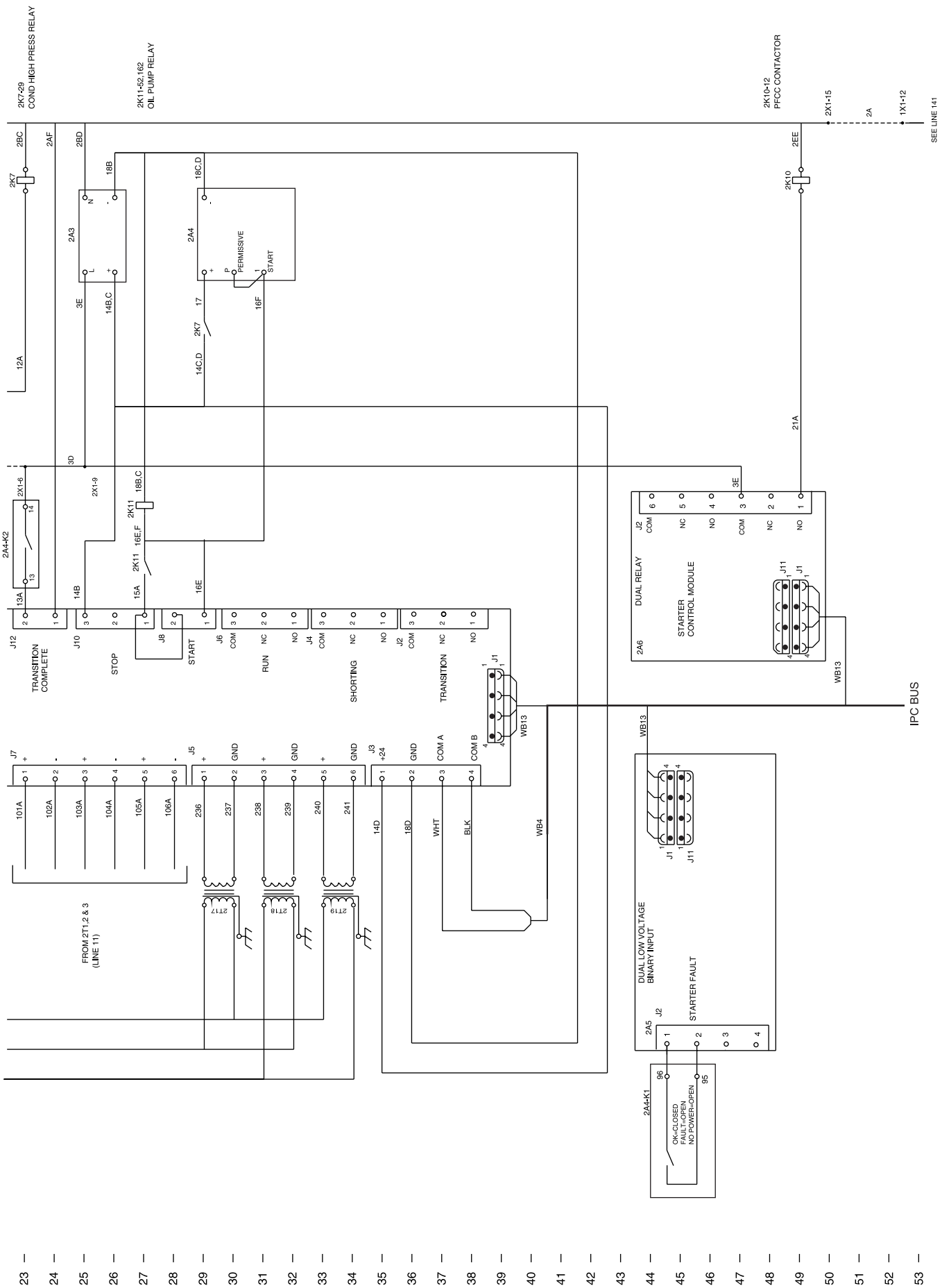
2309-4905

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
REMOTE MOUNTED SOLID STATE STARTER

REMOTE MOUNTED SOLID STATE STARTER

PREFIX CODE
1 = MAIN CONTROL PANEL
2 = STARTER PANEL
4 = UNIT MOUNTED DEVICE
5 = PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS

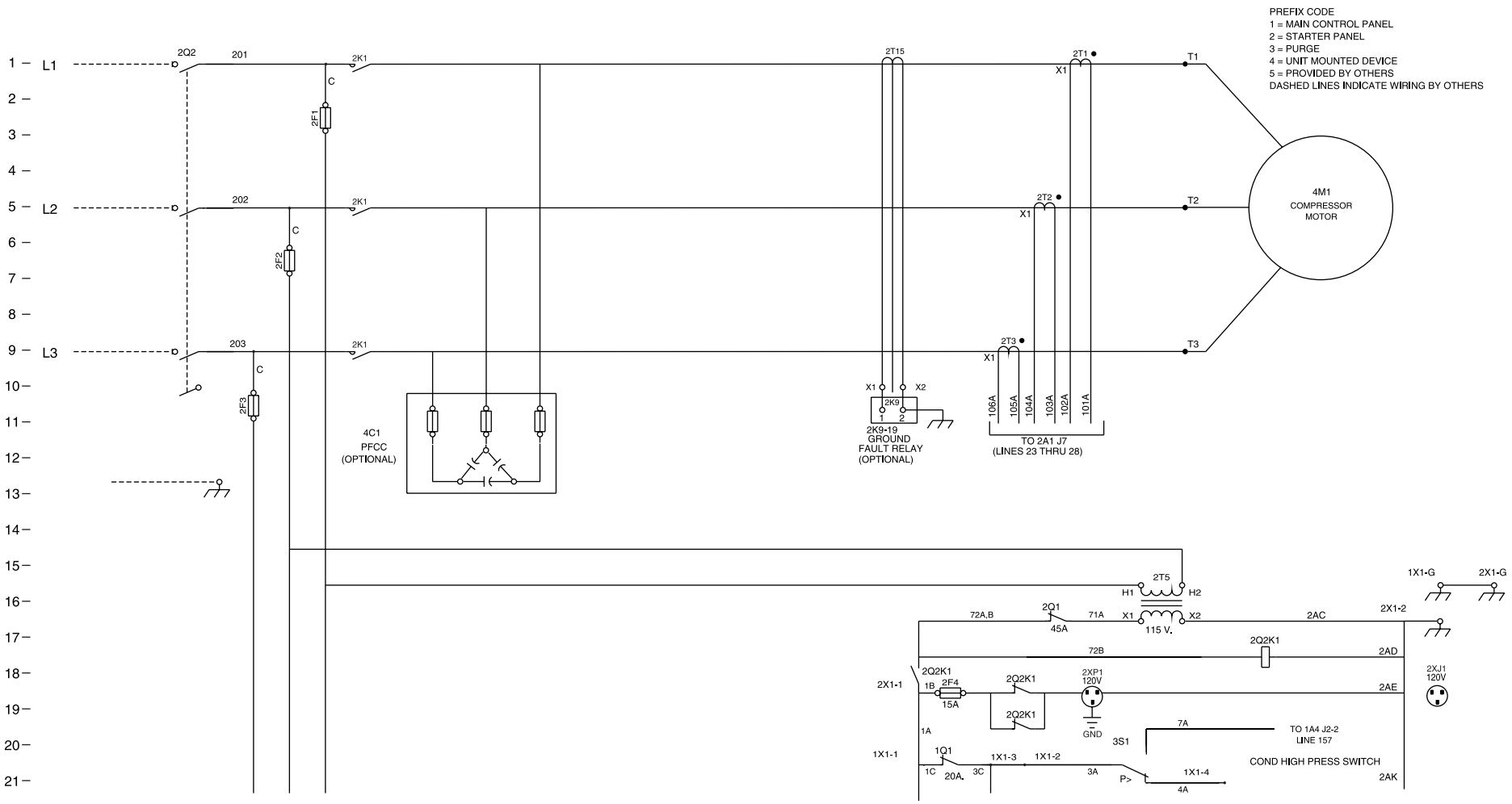


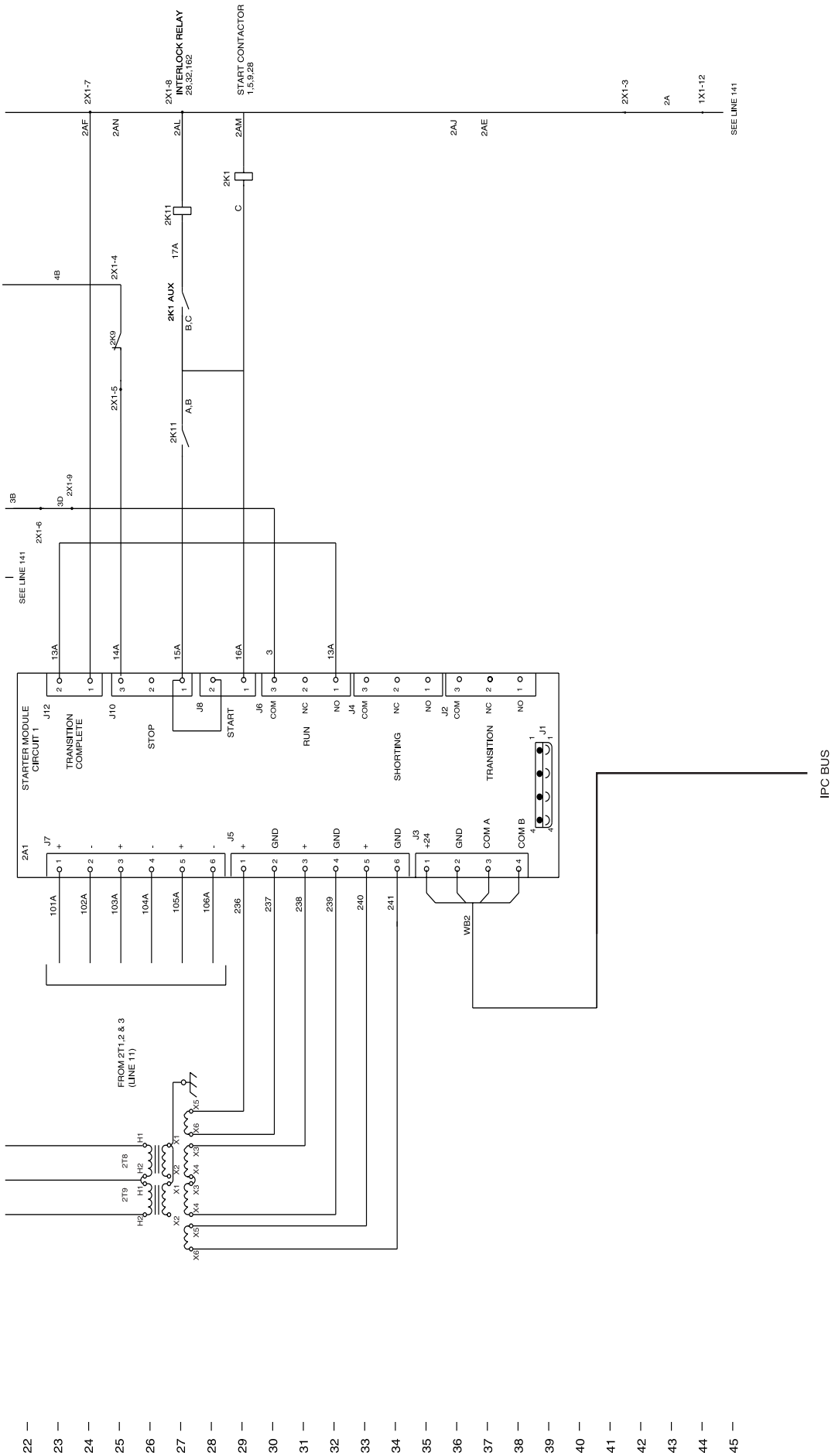

2K7-29
COND HIGH PRESS RELAY
2K11-52,162
OIL PUMP RELAY
2K10-12
PFCC CONTACTOR
2X1-15
2A
1X1-12
SEE LINE 141
2BC
2AF
2BD
2K7
2K10
2EE
18B
18C,D
2A3
2A4
N
L
P
PERMISSIVE
START
3E
14B,C
17
16F
2K7
14C,D
12A
21A
3D
2X1-6
2X1-9
18B,C
2K11
2A4-K2
16E,F
15A
14B
16E
13A
J12
J10
J8
J6
J4
J2
J1
TRANSITION COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
COM
NC
NO
2A6
DUAL RELAY
STARTER CONTROL MODULE
J2
J11
WB13
IPC BUS
J7
J5
J3
101A
102A
103A
104A
105A
106A
236
237
238
239
240
241
GND
+24
COM A
COM B
14D
18D
WHT
BLK
WB4
FROM 2T1,2 & 3 (LINE 11)
2T17
2T18
2T19
DUAL LOW VOLTAGE BINARY INPUT
2A5
STARTER FAULT
2A4-K1
96
95
OK=CLOSED
FAULT=OPEN
NO POWER=OPEN

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
UNIT MOUNTED ACROSS THE LINE STARTER

2309-4906

UNIT MOUNTED ACROSS THE LINE STARTER



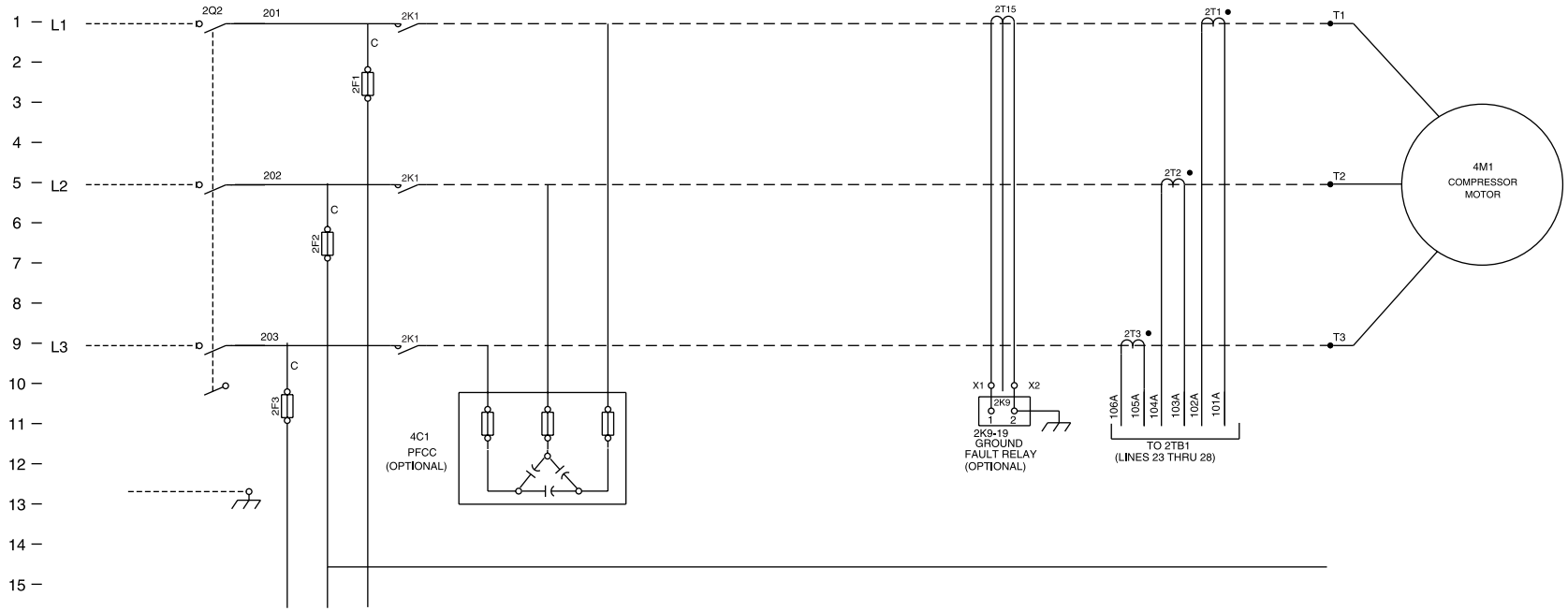

2X1-7
2X1-8
INTERLOCK RELAY
28,32,102
START CONTACTOR
1,5,9,28
2X1-3
2A
1X1-12
SEE LINE 141
2AF
2AN
2AL
2AM
2AJ
2AE
2K1
C
2K11
17A
2K1 AUX
B,C
2X1-4
4B
2K9
2X1-5
2K11
A,B
3B
3D
2X1-9
2X1-6
SEE LINE 141
13A
14A
15A
16A
3
13A
STARTER MODULE
CIRCUIT 1
2A1
J12
TRANSITION
COMPLETE
J10
STOP
J8
START
J6
COM
NC
NO
RUN
J4
SHORTING
J2
TRANSITION
J1
J7
J5
J3
+24
GND
COM A
COM B
101A
102A
103A
104A
105A
106A
236
237
238
239
240
241
WB2
IPC BUS
FROM 2T1,2 & 3
(LINE 11)
2T8
2T9
H1
H2
X1
X2
X3
X4
X5
X6
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45

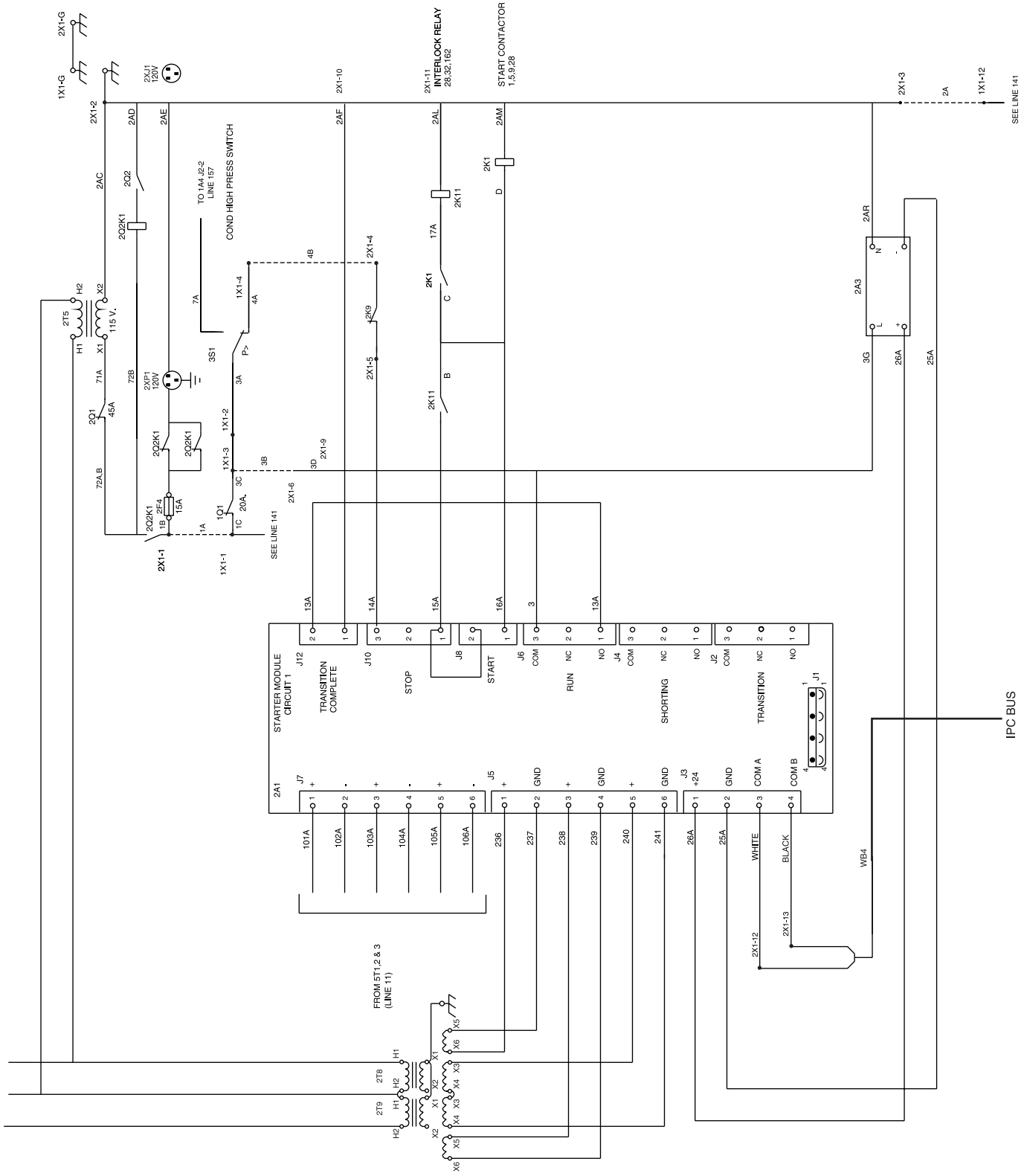
CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
REMOTE MOUNTED ACROSS THE LINE STARTER

2309-4909 A

REMOTE MOUNTED ACROSS THE LINE STARTER

PREFIX CODE
1 = MAIN CONTROL PANEL
2 = STARTER PANEL
3 = PURGE
4 = UNIT MOUNTED DEVICE
5 = PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS



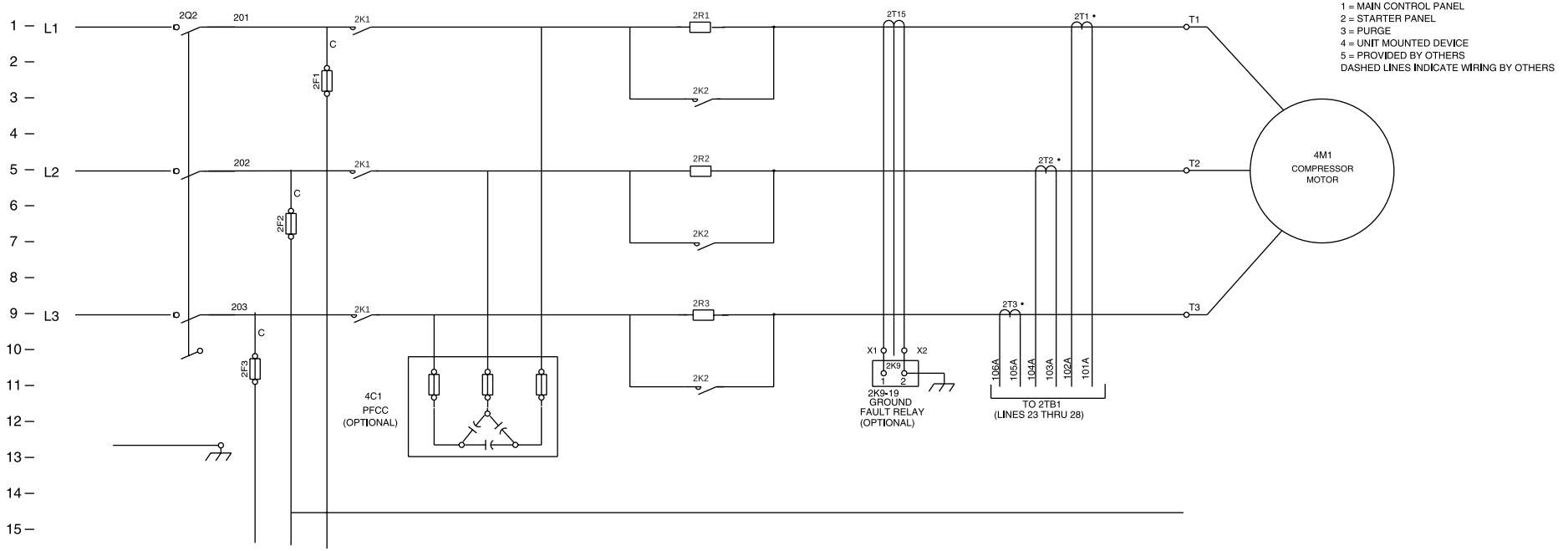

1X1-G
2X1-G
2X1-2
2AD
2AE
2AC
2Q2
2Q2K1
2XU1
120V
2X1-10
2X1-11
INTERLOCK RELAY
28,32,162
START CONTACTOR
1,5,9,28
2K1
D
2K11
2AL
2AM
2X1-3
2A
1X1-2
SEE LINE 141
TO 1A4 J2-2
LINE 157
COND HIGH PRESS SWITCH
7A
4B
2X1-4
1X1-4
4A
2K9
2K1
17A
C
2K11
B
2AR
2A3
3G
26A
25A
2T5
H2
X2
H1
X1
115 V.
71A
72B
2XP1
120V
3S1
P>
3A
2X1-5
2Q1
45A
72A,B
2Q2K1
1X1-3
3C
3B
3D
2X1-9
2X1-6
2F4
15A
1B
1A
1Q1
1C
20A.
2X1-1
1X1-1
13A
14A
15A
16A
3
J12
J10
J8
J6
J4
J2
J1
TRANSITION
COMPLETE
STOP
START
COM
NC
NO
RUN
SHORTING
TRANSITION
STARTER MODULE
CIRCUIT 1
2A1
J7
J5
J3
+24
GND
COM A
COM B
101A
102A
103A
104A
105A
106A
236
237
238
239
240
241
26A
25A
WHITE
BLACK
WB4
2X1-12
2X1-13
IPC BUS
FROM 5T1,2 & 3
(LINE 11)
2T8
2T9
X1
X2
X3
X4
X5
X6

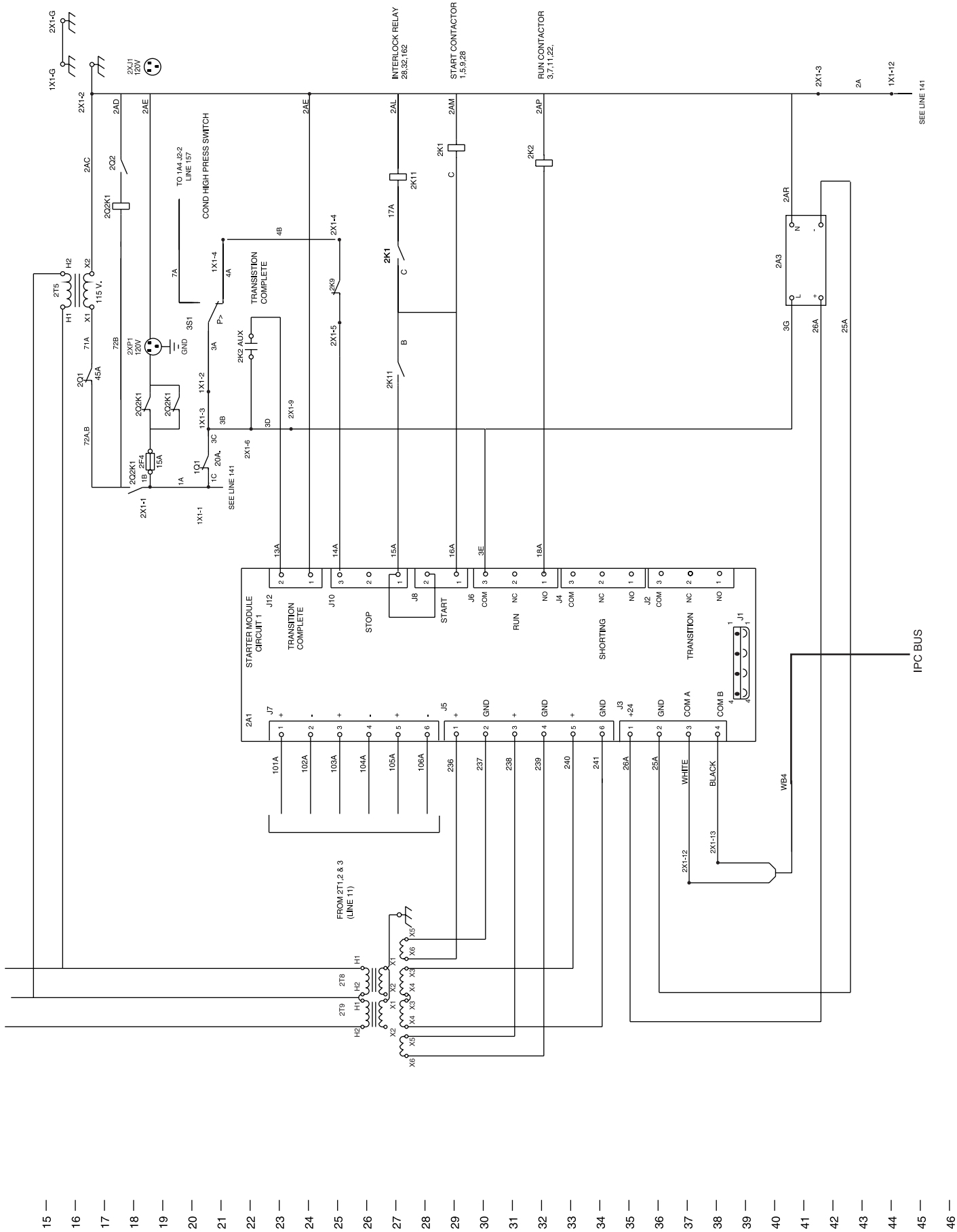
CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
REMOTE MOUNTED PRIMARY REACTOR STARTER

2309-4910 A

REMOTE PRIMARY REACTOR STARTER

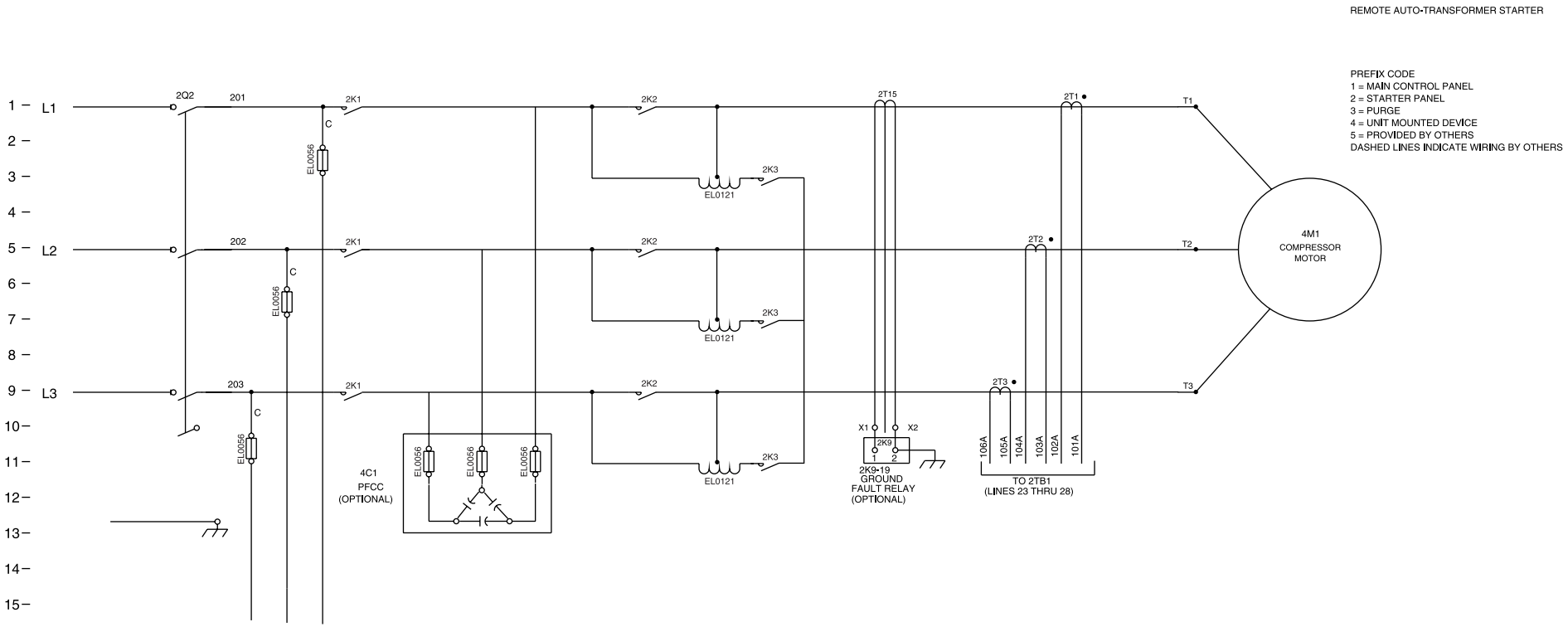
PREFIX CODE
1 = MAIN CONTROL PANEL
2 = STARTER PANEL
3 = PURGE
4 = UNIT MOUNTED DEVICE
5 = PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS

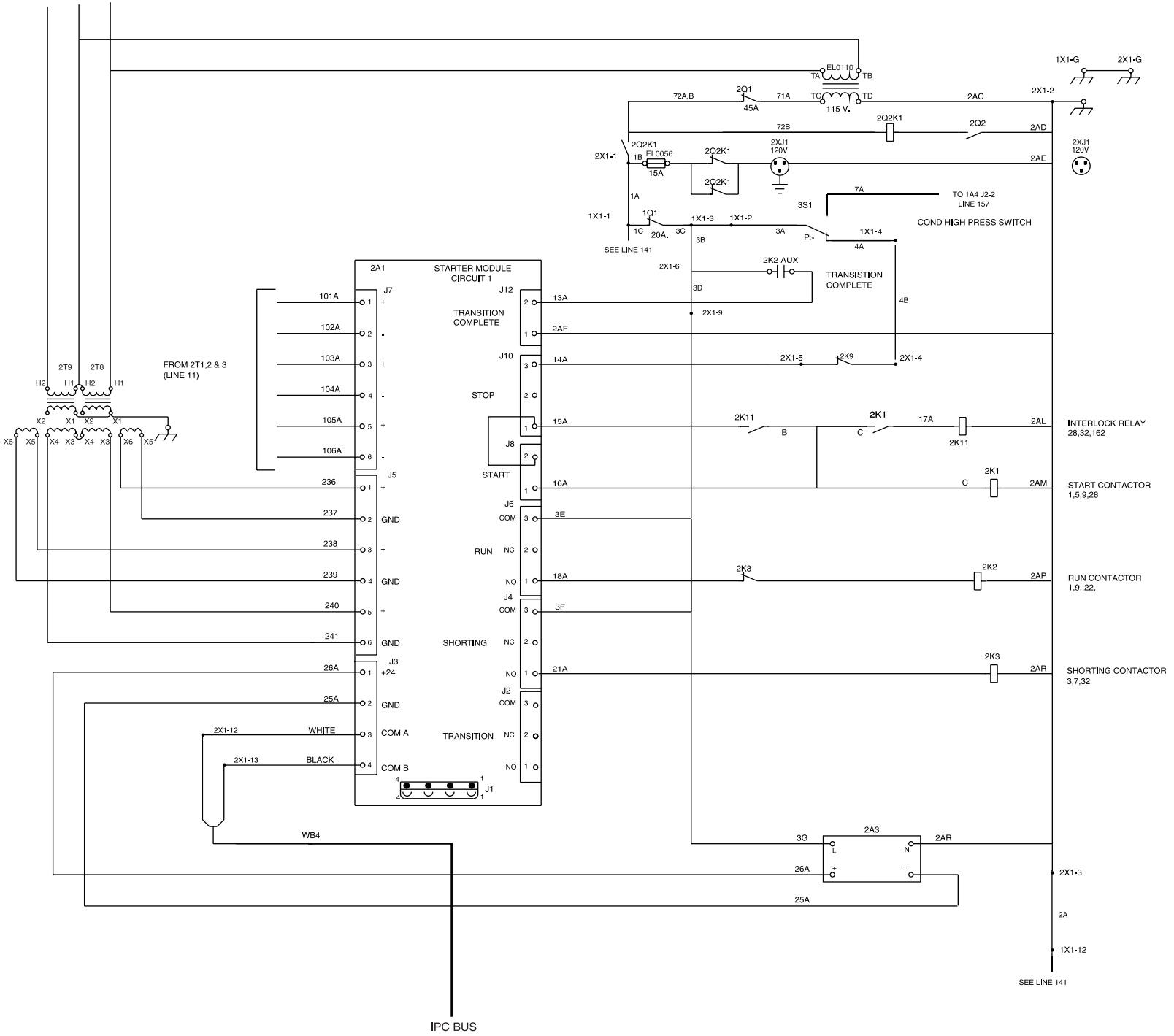



1X1-G
2X1-G
2XJ1 120V
2X1-2
2AD
2AE
2AC
2Q2
2Q2K1
TO 1A4 J2-2 LINE 157
COND HIGH PRESS SWITCH
2T5 H1 H2 X1 X2 115 V.
2Q1
71A
45A
72B
72A,B
2XP1 120V
GND
3S1
P>
7A
1X1-4
4A
3A
TRANSITION COMPLETE
2K2 AUX
4B
2X1-4
2K9
2X1-5
2X1-9
1X1-2
1X1-3
3B
3C
3D
2X1-6
2F4
15A
1B
1A
1Q1
1C
20A.
2X1-1
1X1-1
SEE LINE 141
INTERLOCK RELAY 28,32,162
START CONTACTOR 1,5,9,28
RUN CONTACTOR 3,7,11,22,
2AL
2AM
2AP
2K1
2K11
17A
B
C
2K2
2AR
2A3
N
L
+
-
3G
26A
25A
2X1-3
2A
1X1-12
SEE LINE 141
STARTER MODULE CIRCUIT 1
2A1
J12
TRANSITION COMPLETE
J10
STOP
J8
START
J6
COM
NC
NO
RUN
J4
SHORTING
J2
TRANSITION
J1
13A
14A
15A
16A
3E
18A
J7
J5
J3
+24
GND
COM A
COM B
101A
102A
103A
104A
105A
106A
236
237
238
239
240
241
26A
25A
WHITE
BLACK
WB4
2X1-12
2X1-13
IPC BUS
FROM 2T1,2 & 3 (LINE 11)
2T8
2T9
H1
H2
X1
X2
X3
X4
X5
X6

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
REMOTE MOUNTED AUTO-TRANSFORMER STARTER

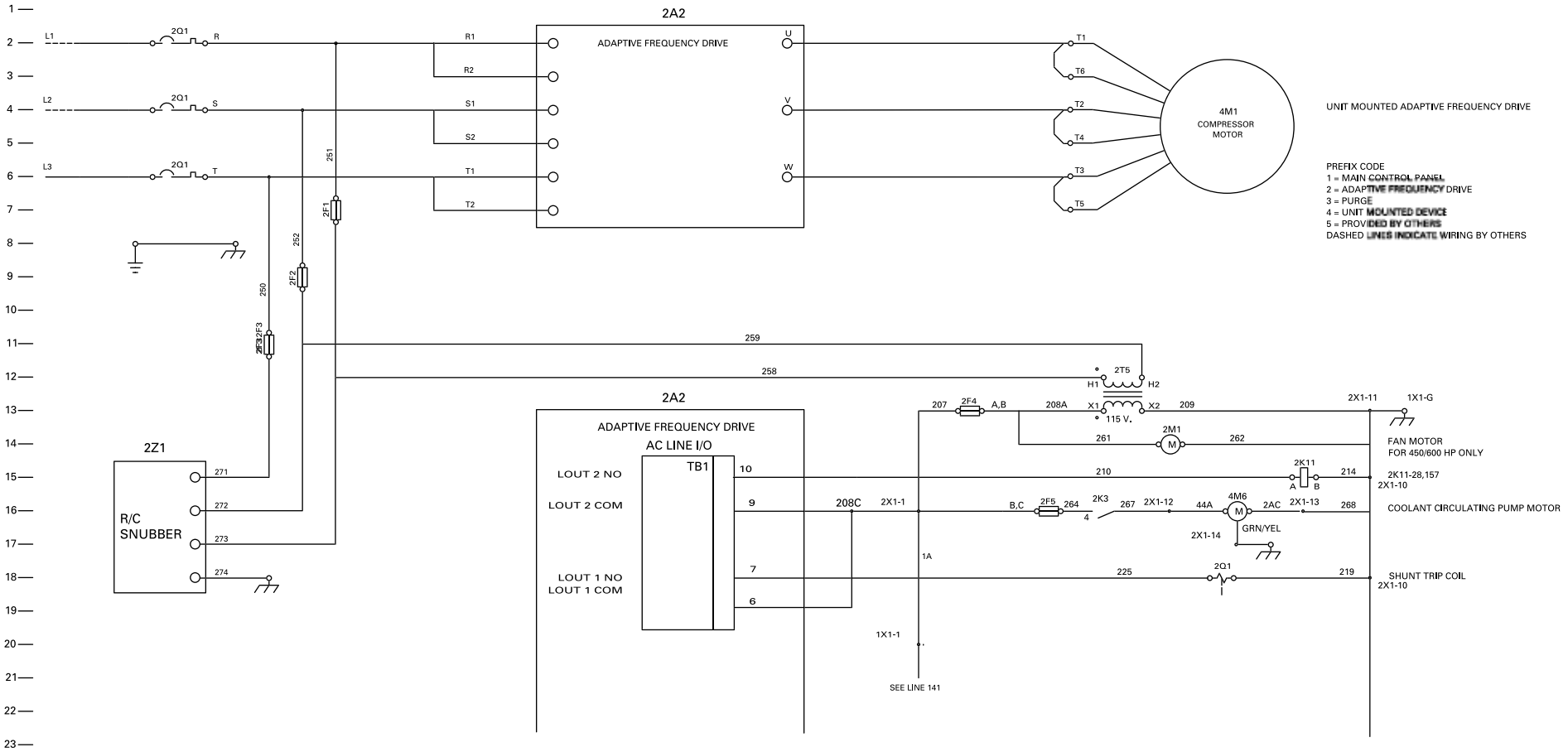
2309-4911 A

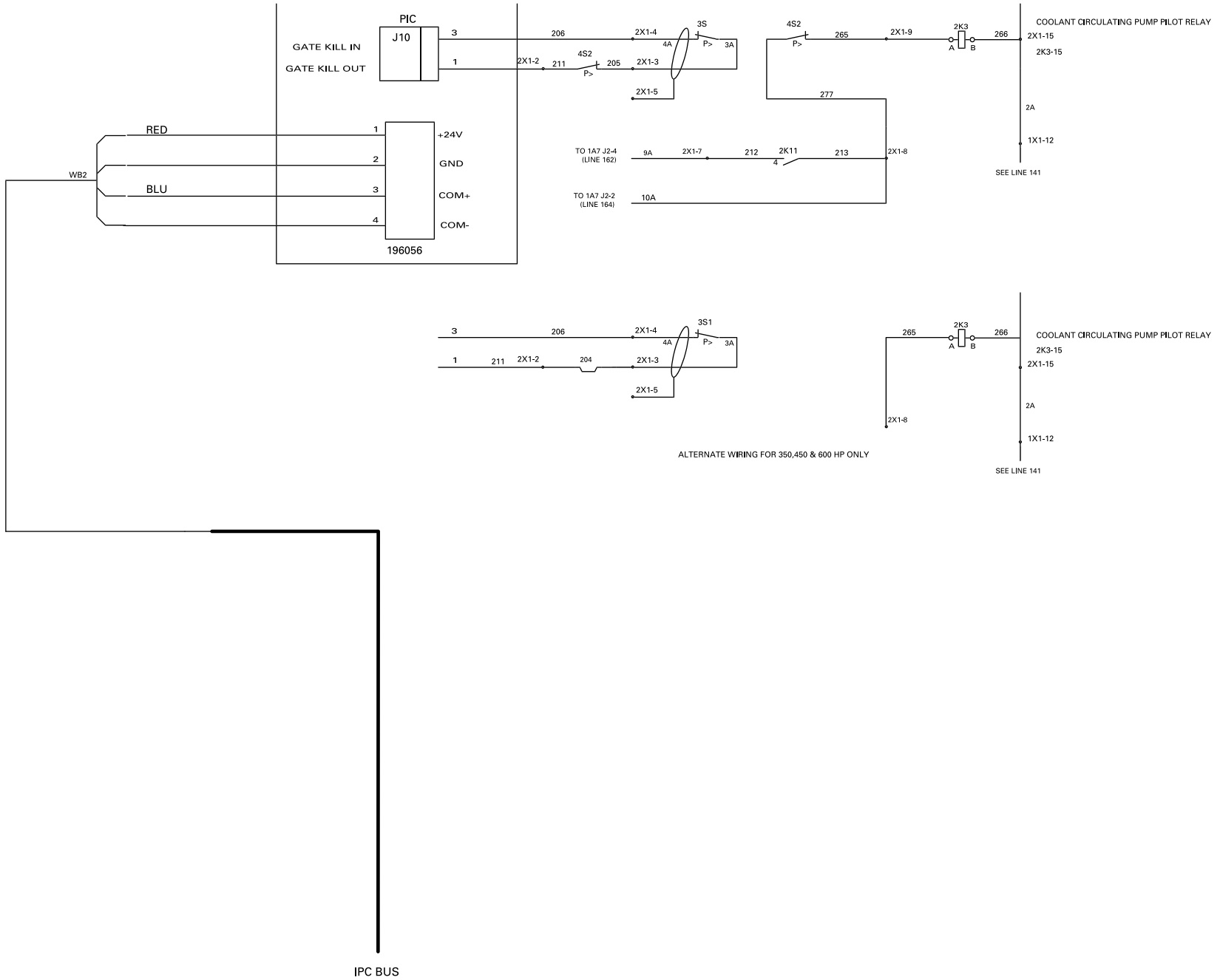



EL0110
TA
TB
TC
TD
115 V.
72A,B
71A
2Q1
45A
2AC
2X1-2
1X1-G
2X1-G
72B
2Q2K1
2Q2
2AD
2XJ1
120V
2X1-1
1B
EL0056
15A
2AE
1A
3S1
7A
TO 1A4 J2-2
LINE 157
COND HIGH PRESS SWITCH
1X1-1
1Q1
1C
20A.
3C
1X1-3
1X1-2
3A
P>
1X1-4
4A
3B
SEE LINE 141
2X1-6
2K2 AUX
TRANSISTION
COMPLETE
3D
4B
2X1-9
2A1
STARTER MODULE
CIRCUIT 1
J7
J12
J10
J8
J5
J6
J4
J2
J3
J1
101A
102A
103A
104A
105A
106A
236
237
238
239
240
241
26A
25A
2X1-12
WHITE
2X1-13
BLACK
COM A
COM B
+24
GND
TRANSITION
COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
COM
NC
NO
13A
2AF
14A
15A
16A
3E
18A
3F
21A
2X1-5
2K9
2X1-4
2K11
2K1
17A
2AL
INTERLOCK RELAY
28,32,162
2AM
START CONTACTOR
1,5,9,28
2AP
RUN CONTACTOR
1,9,,22,
2AR
SHORTING CONTACTOR
3,7,32
2K3
2K2
2T9
2T8
H2
H1
X2
X1
X6
X5
X4
X3
FROM 2T1,2 & 3
(LINE 11)
WB4
2A3
3G
L
N
2X1-3
2A
1X1-12
SEE LINE 141
IPC BUS

HERMETIC CENTRIFUGAL LIQUID CHILLER
CENTRAVAC®
CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
UNIT MOUNTED ADAPTIVE FREQUENCE DRIVE

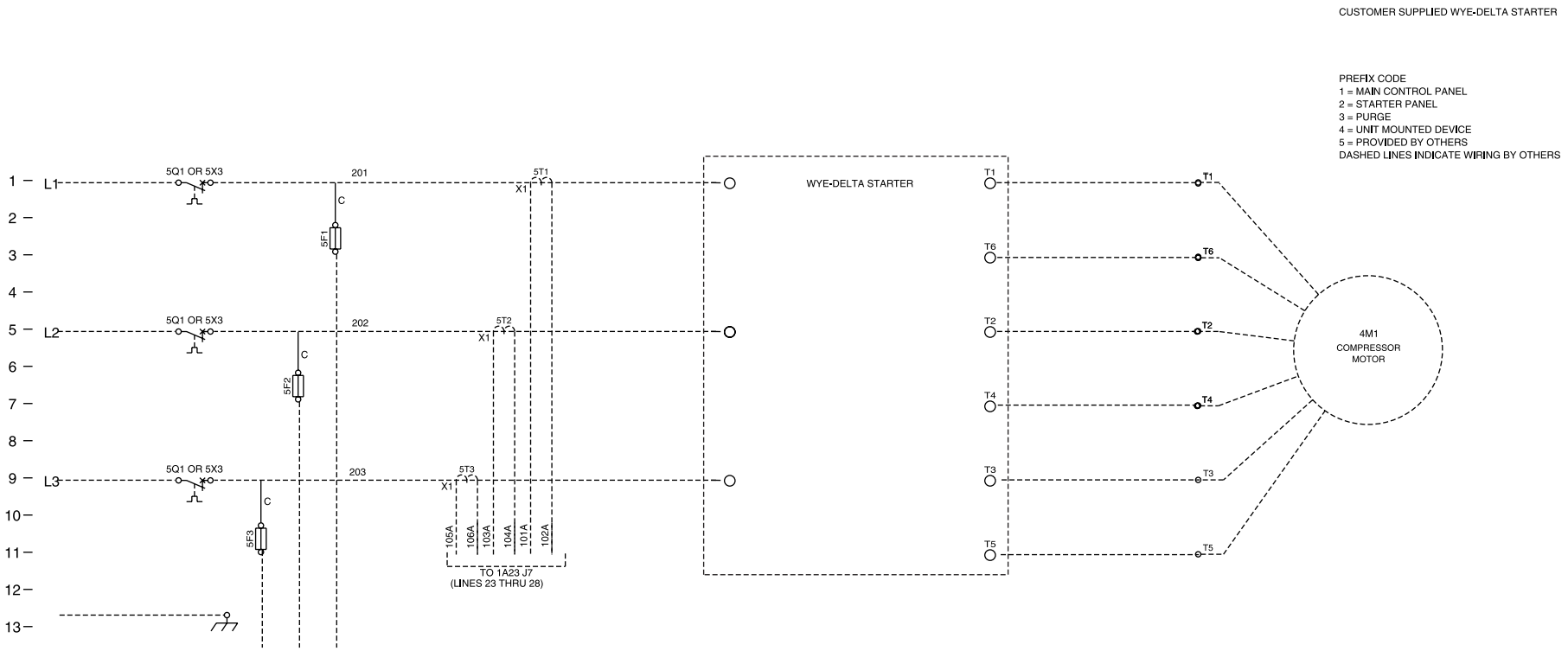
2309-4912 B

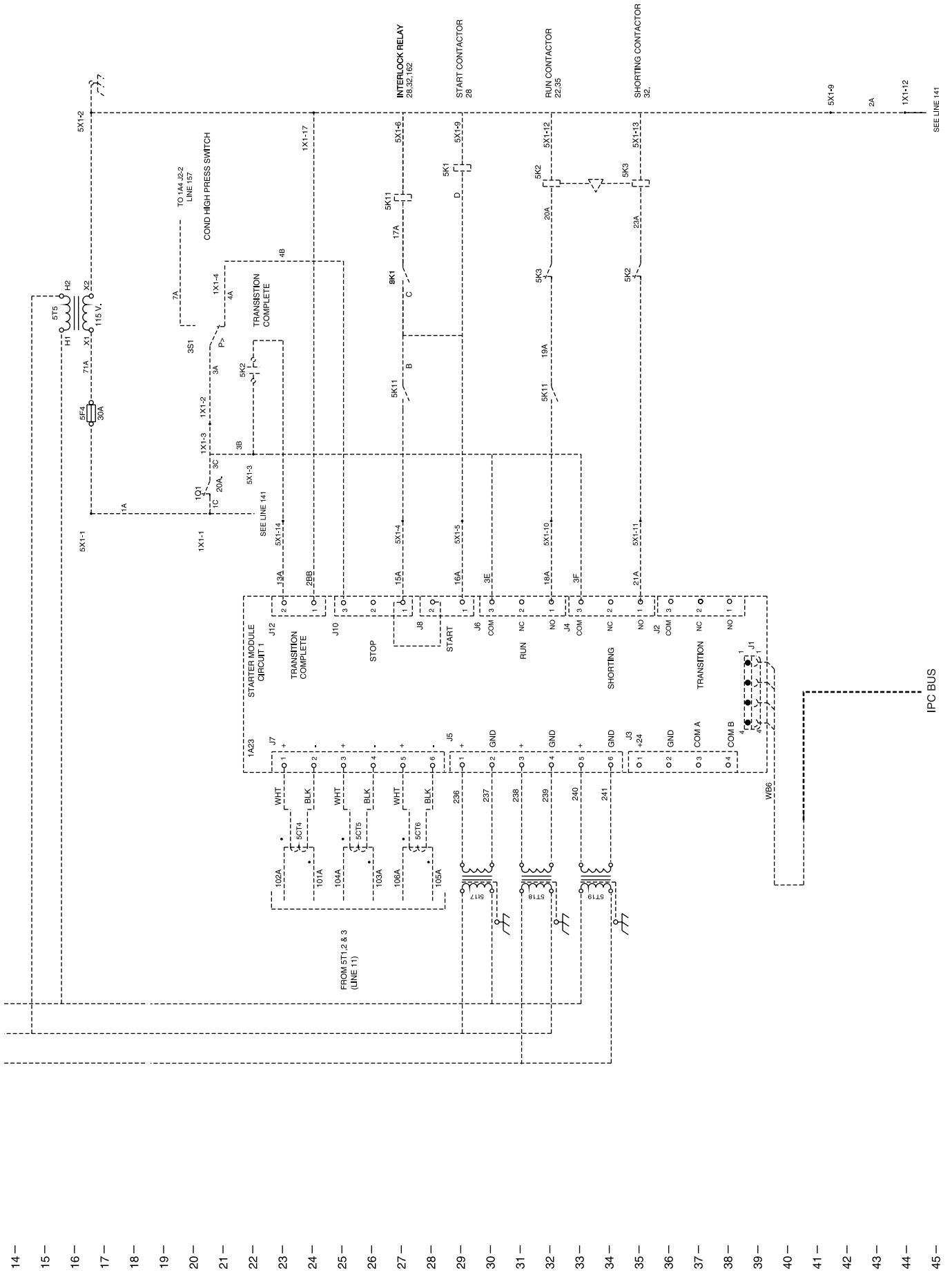



PIC
J10
GATE KILL IN
GATE KILL OUT
3
1
206
211
205
2X1-2
2X1-4
2X1-3
2X1-5
4S2
3S
4A
3A
P>
4S2
265
2X1-9
2K3
A
B
266
COOLANT CIRCULATING PUMP PILOT RELAY
2X1-15
2K3-15
277
2A
1X1-12
SEE LINE 141
TO 1A7 J2-4
(LINE 162)
9A
2X1-7
212
2K11
4
213
2X1-8
TO 1A7 J2-2
(LINE 164)
10A
RED
BLU
WB2
1
2
3
4
+24V
GND
COM+
COM-
196056
3S1
204
ALTERNATE WIRING FOR 350,450 & 600 HP ONLY
IPC BUS

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
CUSTOMER SUPPLIED WYE-DELTA STARTER

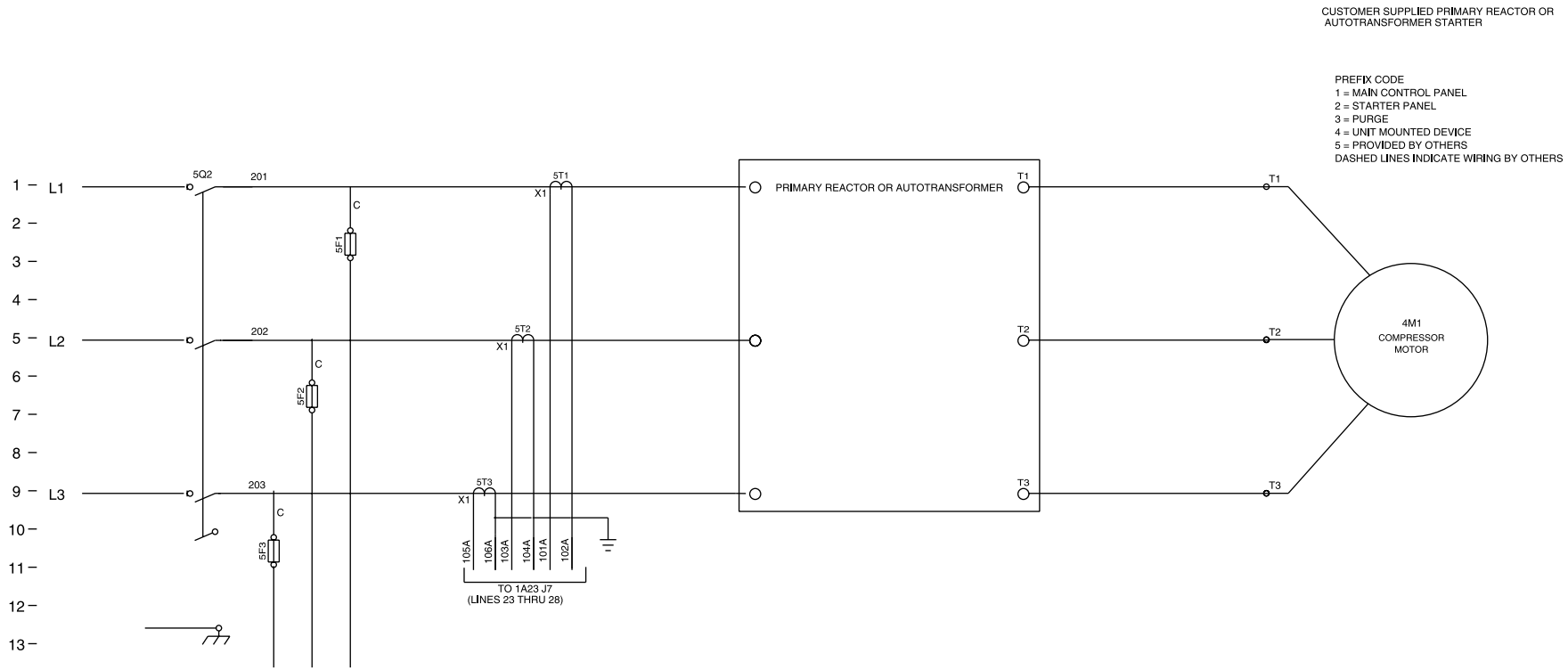
2309-4913 A

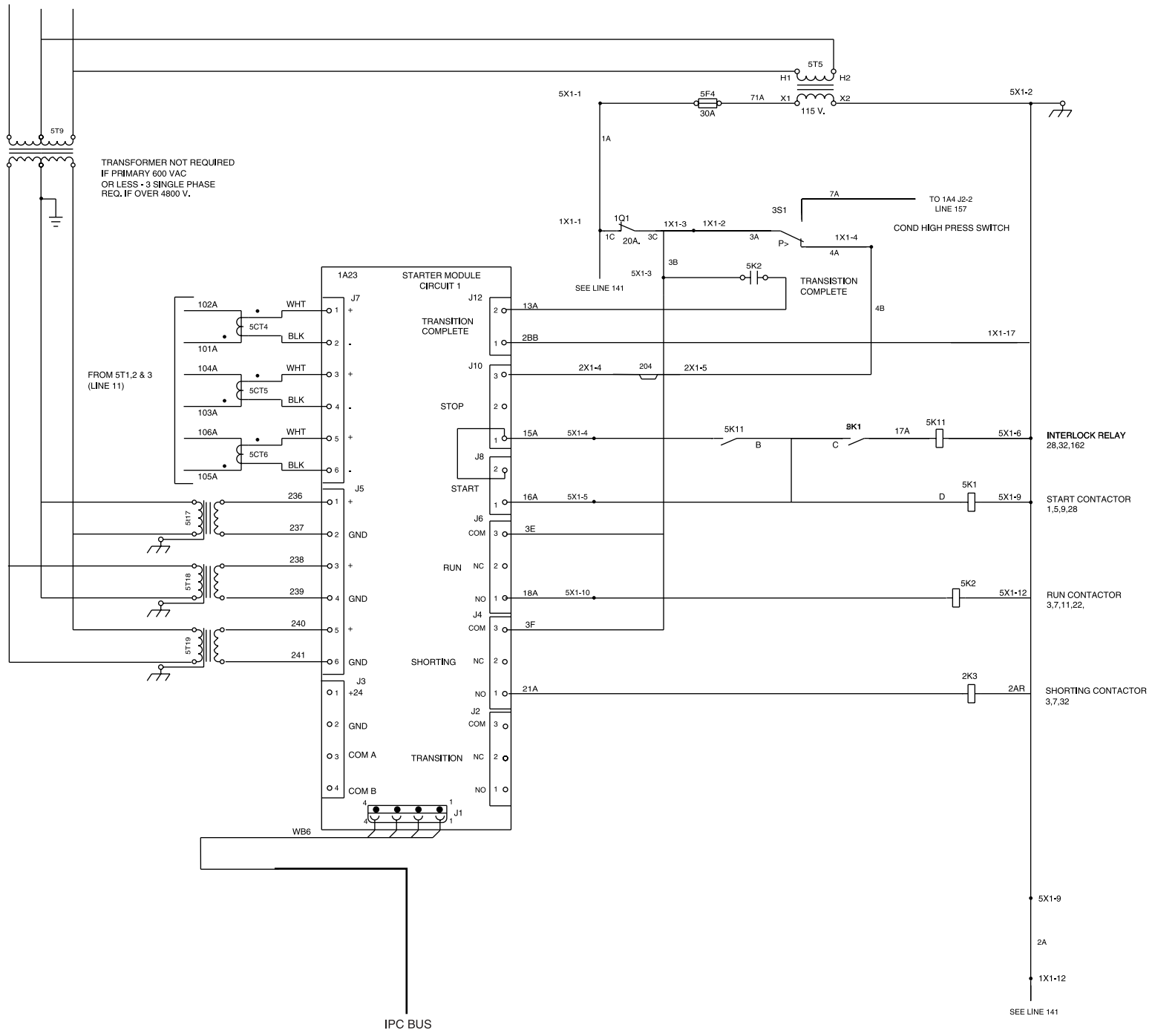



INTERLOCK RELAY
28,32,162
START CONTACTOR
28
RUN CONTACTOR
22,35
SHORTING CONTACTOR
32,
COND HIGH PRESS SWITCH
TRANSITION COMPLETE
STARTER MODULE CIRCUIT 1
IPC BUS
SEE LINE 141
FROM 5T1,2 & 3 (LINE 11)
TO 1A4 J2-2 LINE 157
115 V.
5X1-2
5X1-1
1X1-1
1X1-17
5X1-9
5X1-12
5X1-13
5X1-6
5X1-14
5X1-4
5X1-5
5X1-10
5X1-11
1X1-12
5K1
5K2
5K3
5K11
8K1
5F4
30A
5T5
WB6
J1
J2
J3
J4
J5
J6
J7
J8
J10
J12
STOP
START
RUN
SHORTING
TRANSITION
COM A
COM B
GND
+24
WHT
BLK

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
CUSTOMER SUPPLIED PRIMARY REACTOR OR AUTO-TRANSFORMER STARTER

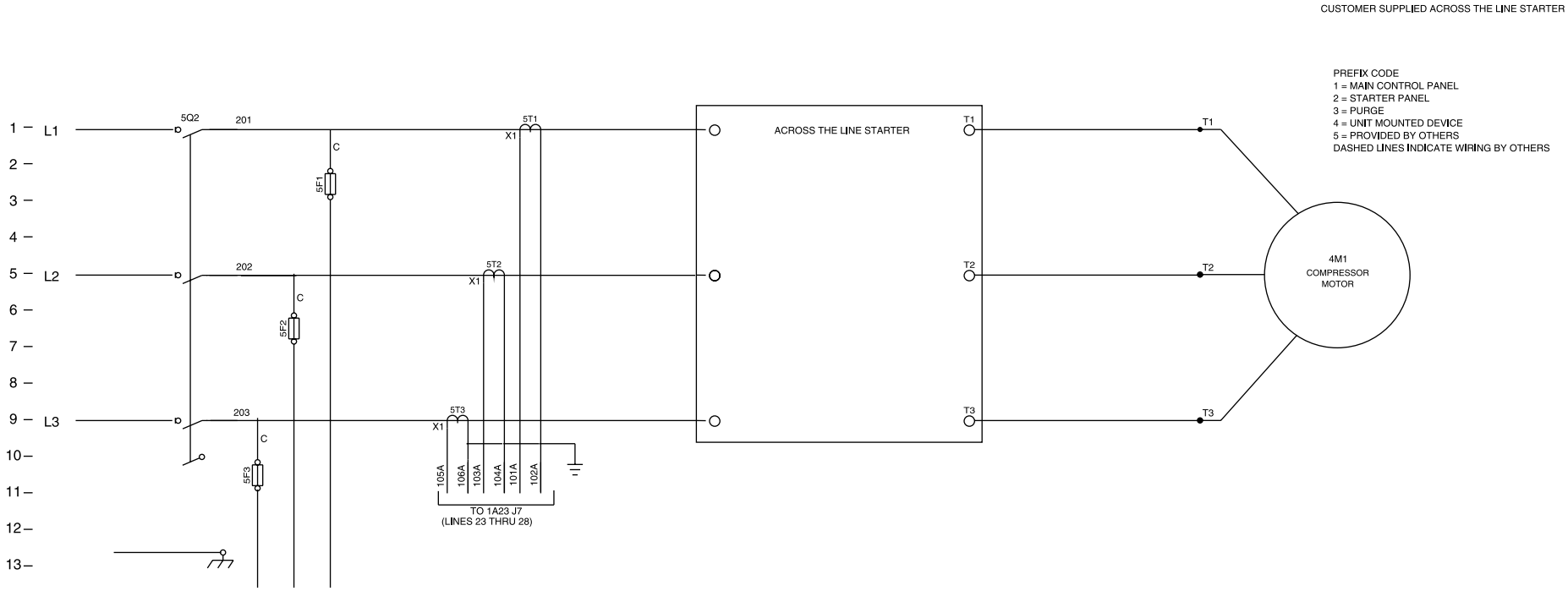
2309-4914 A

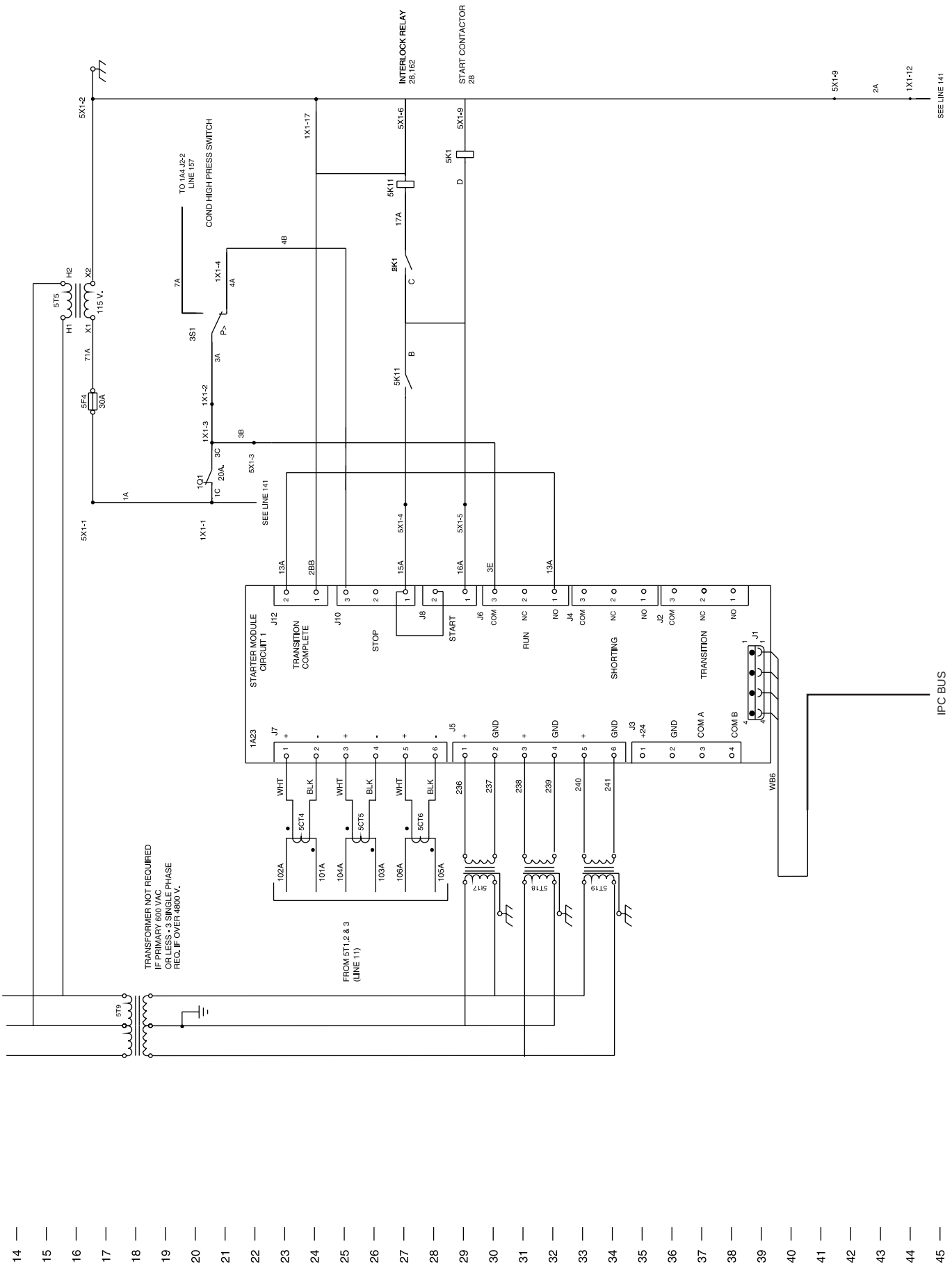



5T9
TRANSFORMER NOT REQUIRED
IF PRIMARY 600 VAC
OR LESS - 3 SINGLE PHASE
REQ. IF OVER 4800 V.
5T5
H1
H2
X1
X2
115 V.
5F4
30A
71A
5X1-1
5X1-2
1A
1X1-1
1Q1
1C
20A.
3C
1X1-3
1X1-2
3A
3S1
7A
TO 1A4 J2-2
LINE 157
COND HIGH PRESS SWITCH
P>
1X1-4
4A
3B
5K2
5X1-3
SEE LINE 141
TRANSISTION
COMPLETE
4B
1A23
STARTER MODULE
CIRCUIT 1
FROM 5T1,2 & 3
(LINE 11)
102A
WHT
5CT4
BLK
101A
104A
WHT
5CT5
BLK
103A
106A
WHT
5CT6
BLK
105A
J7
J12
TRANSITION
COMPLETE
13A
2BB
1X1-17
J10
2X1-4
204
2X1-5
STOP
15A
5X1-4
5K11
B
8K1
C
17A
5K11
5X1-6
INTERLOCK RELAY
28,32,162
J8
START
16A
5X1-5
D
5K1
5X1-9
START CONTACTOR
1,5,9,28
J5
236
237
GND
238
239
GND
240
241
GND
5T17
5T18
5T19
J6
COM
3E
RUN
NC
NO
18A
5X1-10
5K2
5X1-12
RUN CONTACTOR
3,7,11,22,
J4
COM
3F
SHORTING
NC
NO
21A
2K3
2AR
SHORTING CONTACTOR
3,7,32
J3
+24
GND
COM A
COM B
J2
COM
TRANSITION
NC
NO
J1
WB6
IPC BUS
5X1-9
2A
1X1-12
SEE LINE 141

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
CUSTOMER SUPPLIED ACROSS THE LINE STARTER

2309-4915 A

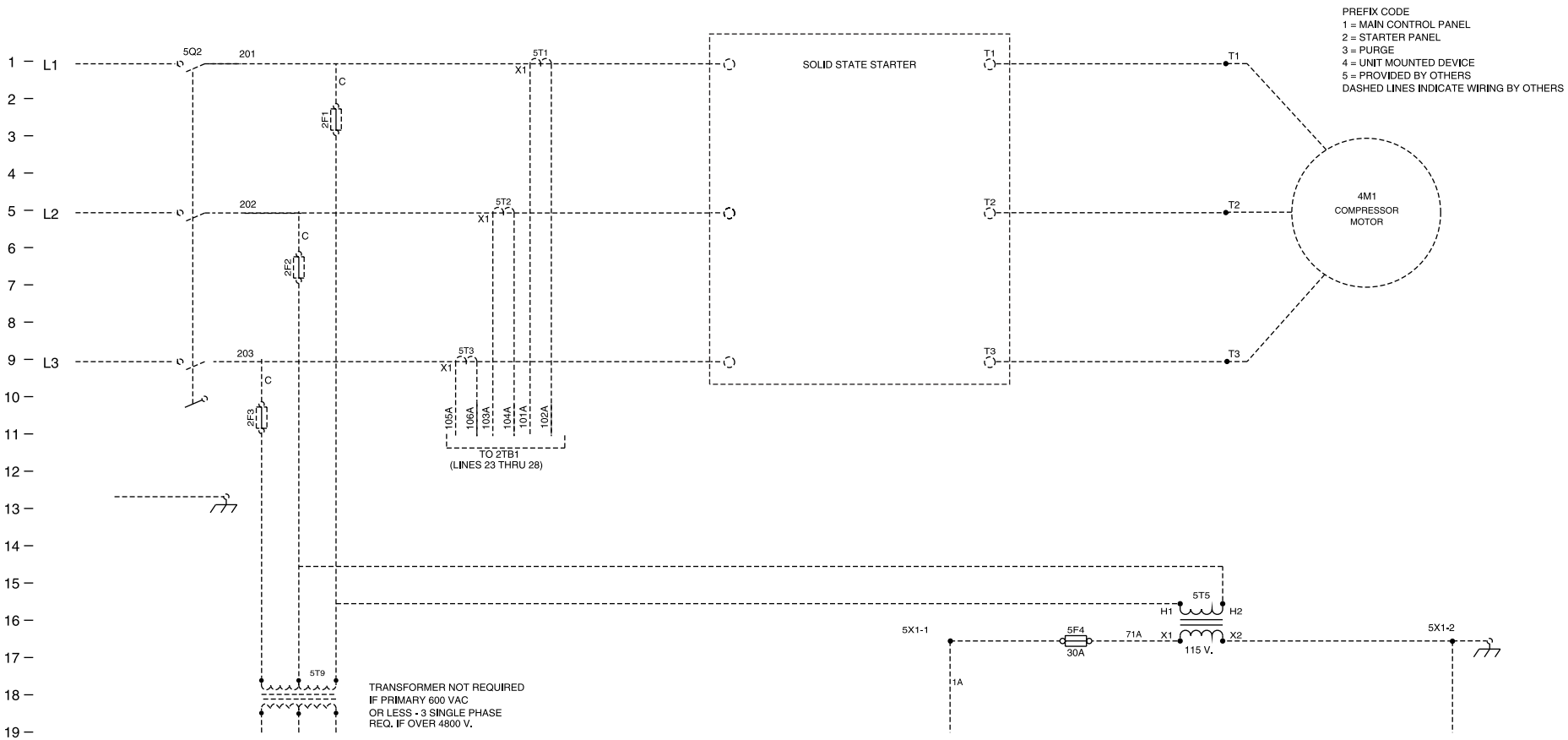


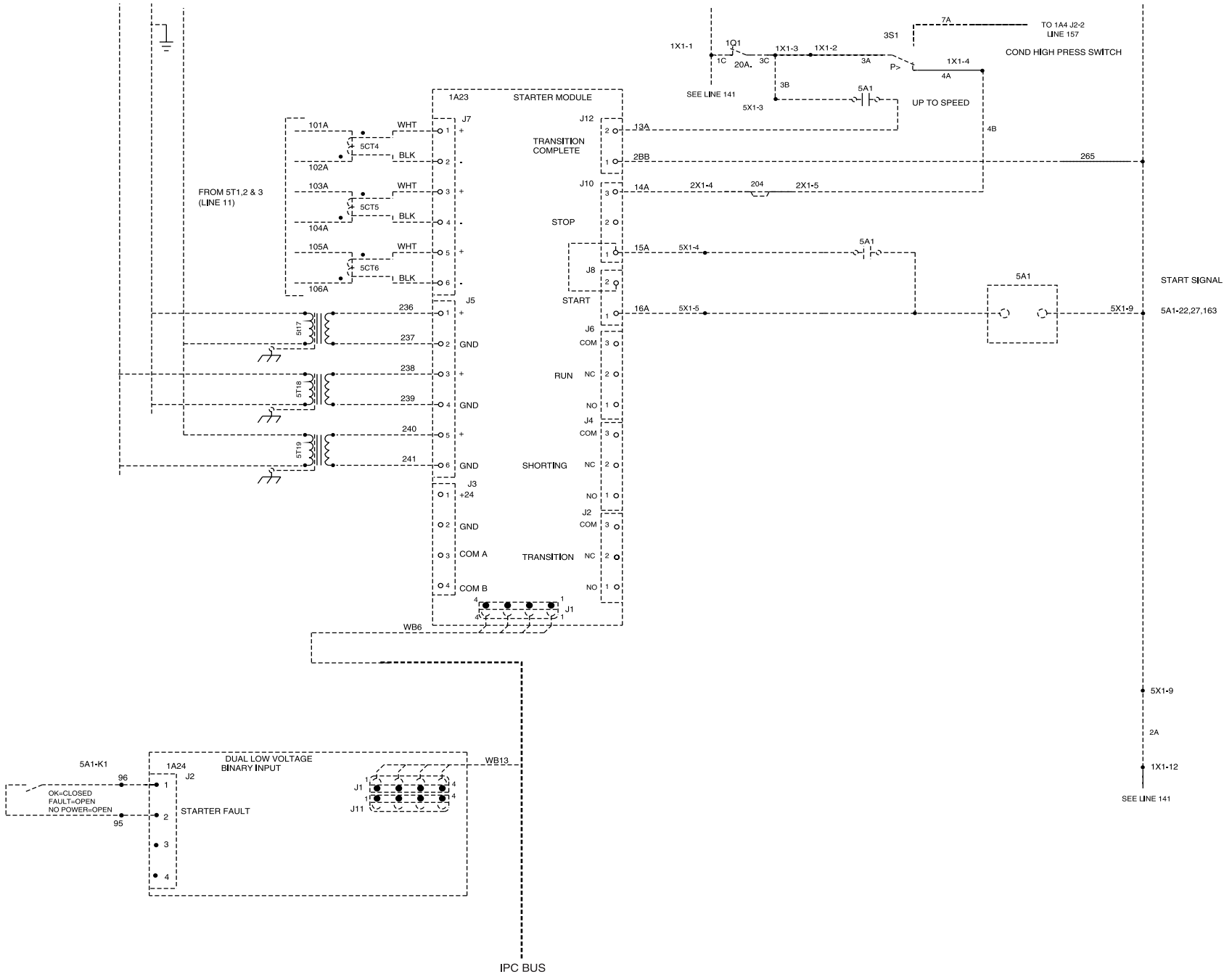

INTERLOCK RELAY
28,162
START CONTACTOR
28
5X1-2
5X1-9
2A
1X1-12
SEE LINE 141
TO 1A4 J2-2
LINE 157
COND HIGH PRESS SWITCH
1X1-17
5X1-6
5K1
5K11
17A
8K1
4B
7A
1X1-4
4A
5T5
H2
X2
115 V.
H1
X1
71A
3S1
P>
3A
5F4
30A
1X1-2
1X1-3
3B
3C
1Q1
20A.
1C
5X1-3
1A
5X1-1
1X1-1
SEE LINE 141
13A
2BB
15A
5X1-4
16A
5X1-5
3E
13A
STARTER MODULE
CIRCUIT 1
1A23
J12
J10
J8
J6
J4
J2
J7
J5
J3
J1
TRANSITION
COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
COM
NC
NO
+24
GND
COM A
COM B
IPC BUS
WB6
WHT
BLK
5CT4
5CT5
5CT6
102A
101A
104A
103A
106A
105A
236
237
238
239
240
241
5T17
5T18
5T19
TRANSFORMER NOT REQUIRED
IF PRIMARY 600 VAC
OR LESS, 3 SINGLE PHASE
REQ. IF OVER 4800 V.
5T9
FROM 5T1,2 & 3
(LINE 11)

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
CUSTOMER SUPPLIED SOLID STATE STARTER

2309-4916 A

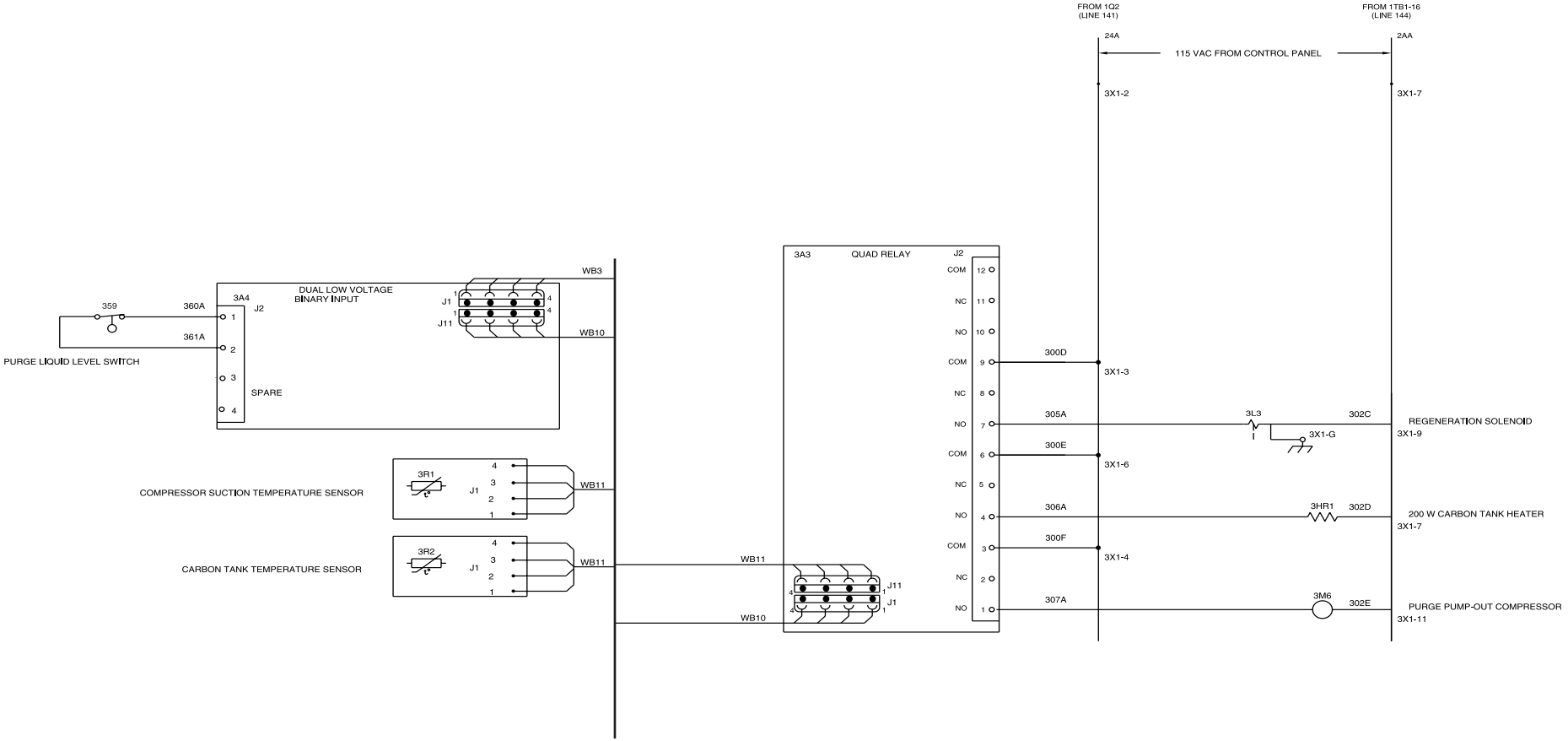
CUSTOMER SUPPLIED SOLID STATE STARTER

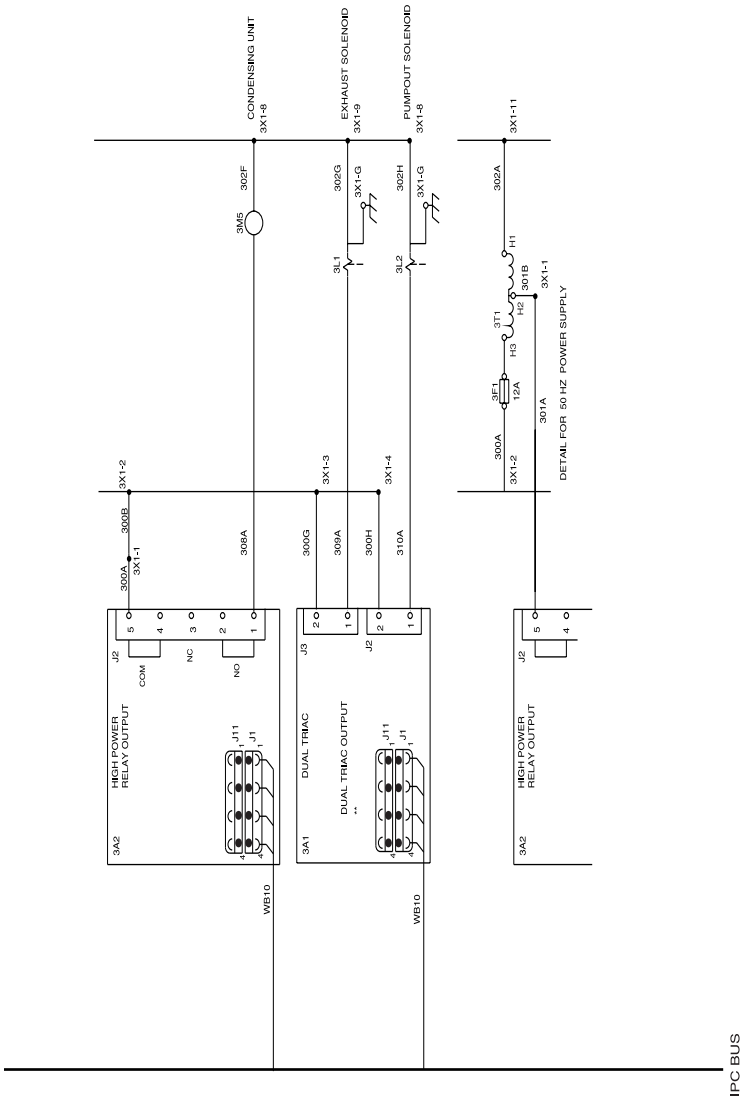



1A23 STARTER MODULE
FROM 5T1,2 & 3 (LINE 11)
101A
102A
103A
104A
105A
106A
5CT4
5CT5
5CT6
WHT
BLK
J7
J5
236
237
238
239
240
241
5T17
5T18
5T19
GND
+24
COM A
COM B
J3
J1
WB6
J12
TRANSITION COMPLETE
J10
STOP
J8
START
J6
RUN
J4
SHORTING
J2
TRANSITION
COM
NC
NO
13A
2BB
14A
15A
16A
265
2X1-4
2X1-5
204
5X1-4
5X1-5
5A1
1X1-1
1Q1
1C
20A.
3C
1X1-3
1X1-2
3A
3S1
7A
TO 1A4 J2-2 LINE 157
COND HIGH PRESS SWITCH
P>
1X1-4
4A
4B
3B
5X1-3
UP TO SPEED
SEE LINE 141
START SIGNAL
5X1-9
5A1-22,27,163
2A
1X1-12
SEE LINE 141
5A1-K1
96
95
OK=CLOSED
FAULT=OPEN
NO POWER=OPEN
1A24
J2
DUAL LOW VOLTAGE BINARY INPUT
STARTER FAULT
J11
WB13
IPC BUS

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
PRODUCTION PURGE

2309-4917 A

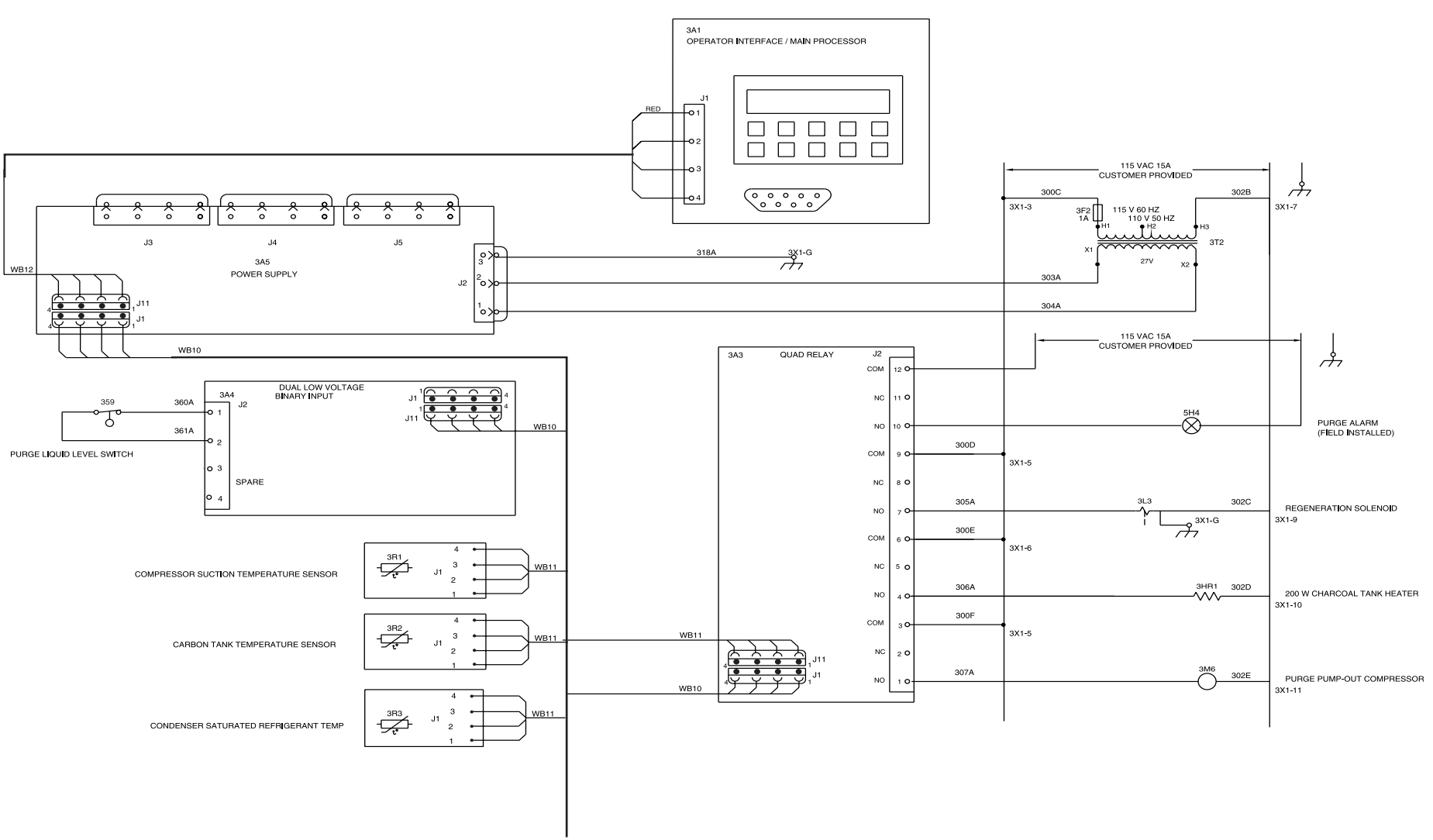


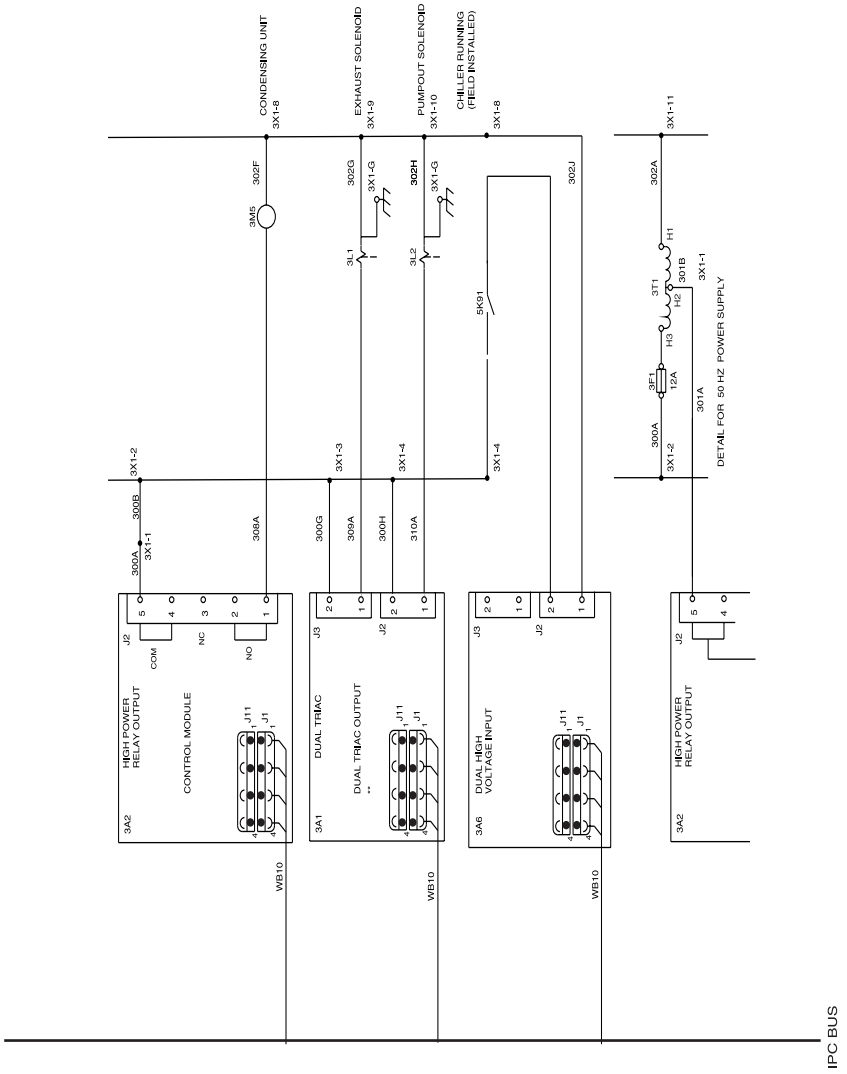


86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
AFTERMARKET PURGE

2309-4918 A

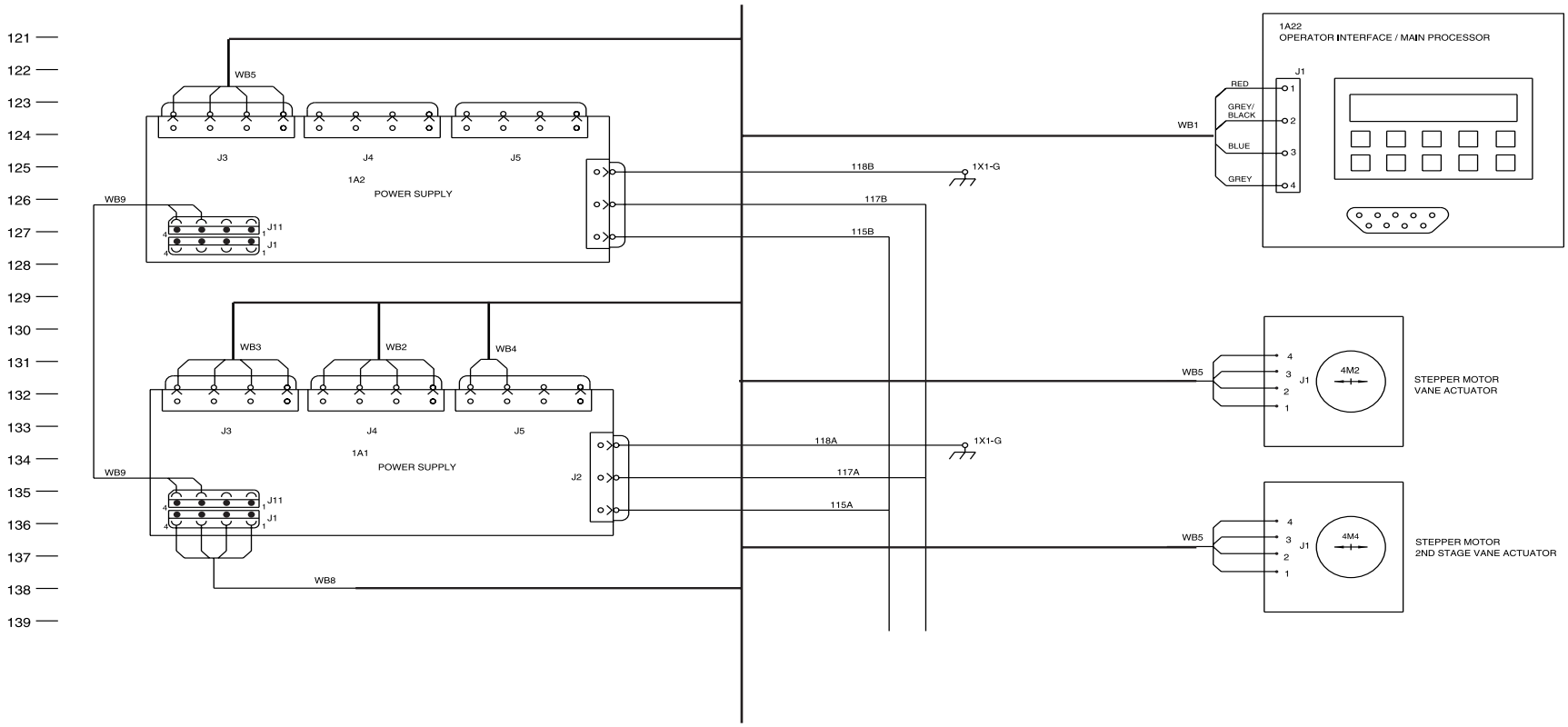


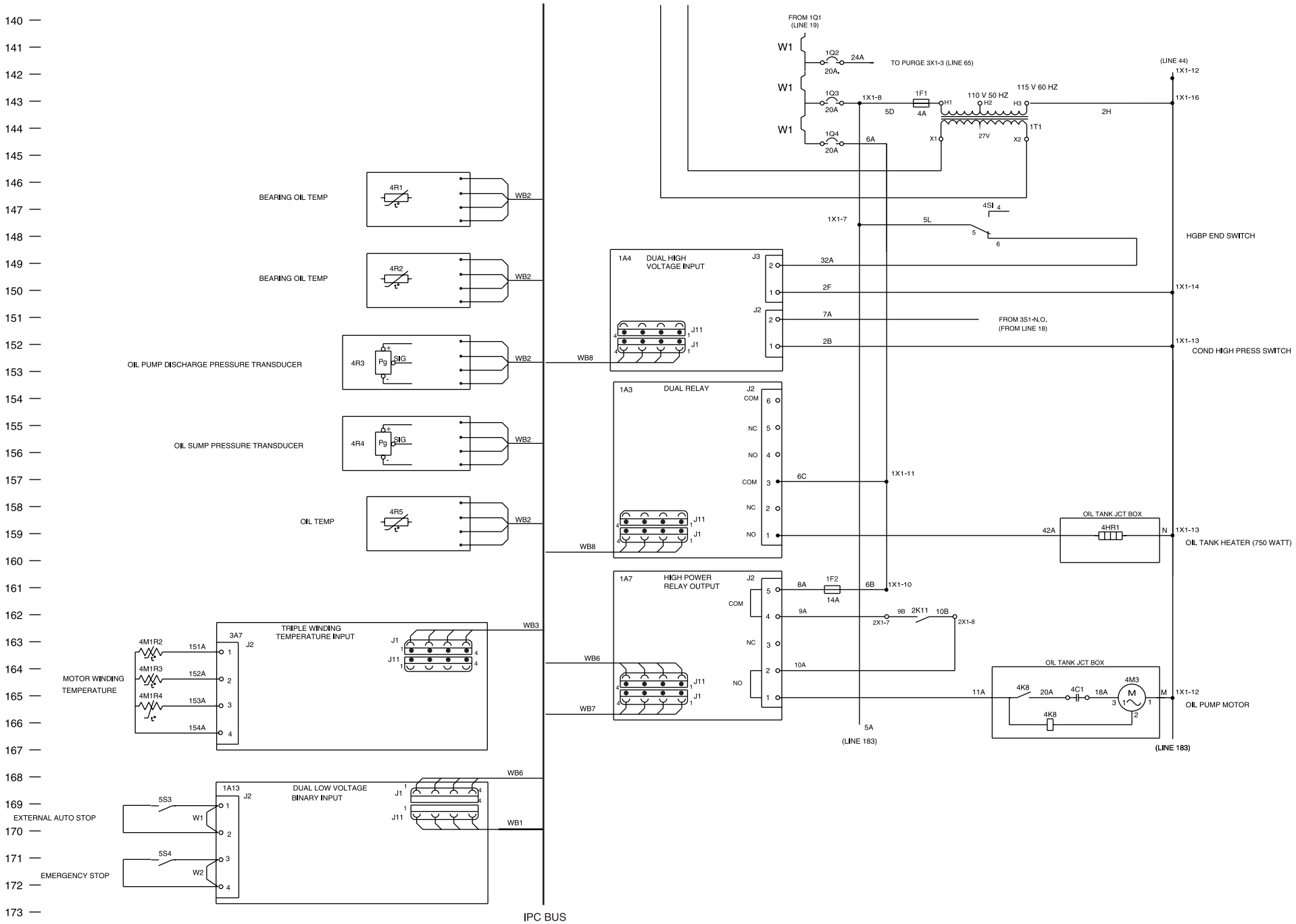


87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
UNIT CONTROLS SCHEMATIC

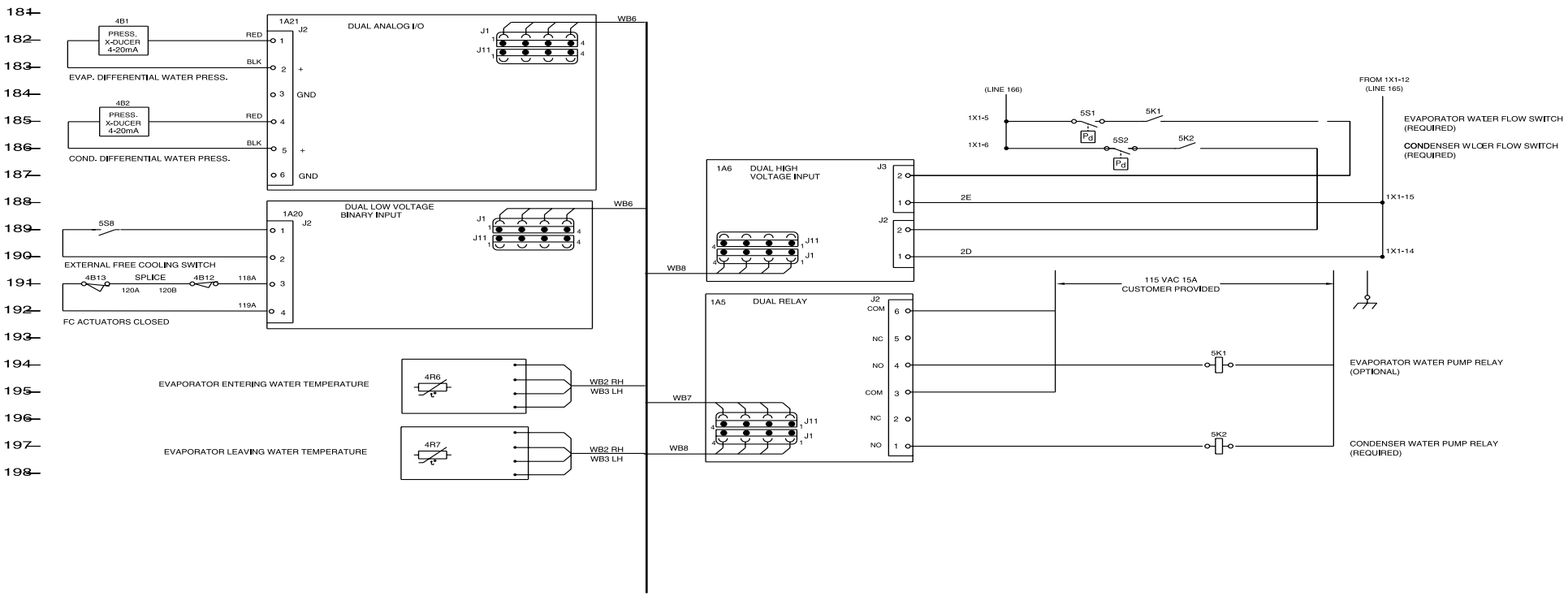
2309-4919 A

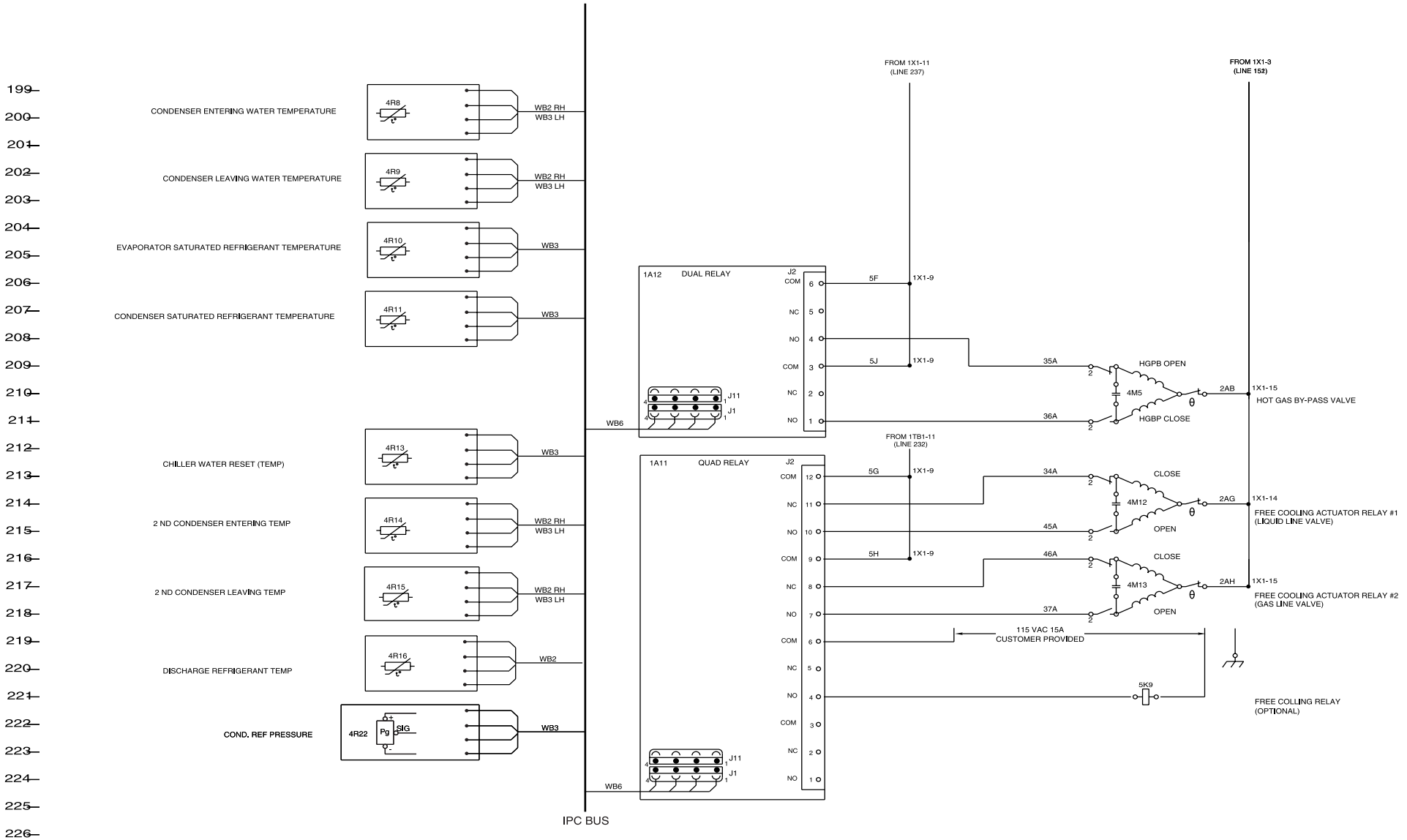



140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
FROM 1Q1
(LINE 19)
W1
1Q2
24A
20A.
TO PURGE 3X1-3 (LINE 65)
(LINE 44)
1X1-12
W1
1Q3
20A
1X1-8
5D
1F1
4A
H1
H2
H3
110 V 50 HZ
115 V 60 HZ
1X1-16
2H
W1
1Q4
20A
6A
X1
27V
X2
1T1
4SI
4
1X1-7
5L
5
6
HGBP END SWITCH
BEARING OIL TEMP
4R1
WB2
1A4
DUAL HIGH
VOLTAGE INPUT
J3
2
1
32A
2F
1X1-14
BEARING OIL TEMP
4R2
WB2
J2
2
1
7A
FROM 3S1-N.O.
(FROM LINE 18)
2B
1X1-13
COND HIGH PRESS SWITCH
OIL PUMP DISCHARGE PRESSURE TRANSDUCER
4R3
Pg
SIG
WB2
WB8
J11
J1
1A3
DUAL RELAY
J2
COM
NC
NO
COM
NC
NO
6
5
4
3
2
1
6C
1X1-11
OIL SUMP PRESSURE TRANSDUCER
4R4
Pg
SIG
WB2
OIL TANK JCT BOX
42A
4HR1
N
1X1-13
OIL TANK HEATER (750 WATT)
OIL TEMP
4R5
WB2
WB8
1A7
HIGH POWER
RELAY OUTPUT
J2
COM
NC
NO
5
4
3
2
1
8A
1F2
14A
6B
1X1-10
9A
2X1-7
9B
2K11
10B
2X1-8
10A
11A
OIL TANK JCT BOX
4K8
20A
4C1
18A
4M3
M
3
1
2
M
1X1-12
OIL PUMP MOTOR
4K8
5A
(LINE 183)
(LINE 183)
WB3
WB6
WB7
TRIPLE WINDING
TEMPERATURE INPUT
3A7
J2
J1
J11
4M1R2
4M1R3
4M1R4
151A
152A
153A
154A
1
2
3
4
MOTOR WINDING
TEMPERATURE
WB6
1A13
DUAL LOW VOLTAGE
BINARY INPUT
J2
J1
J11
5S3
W1
1
2
EXTERNAL AUTO STOP
WB1
5S4
W2
3
4
EMERGENCY STOP
IPC BUS

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
SYSTEM CONTROLS SCHEMATIC

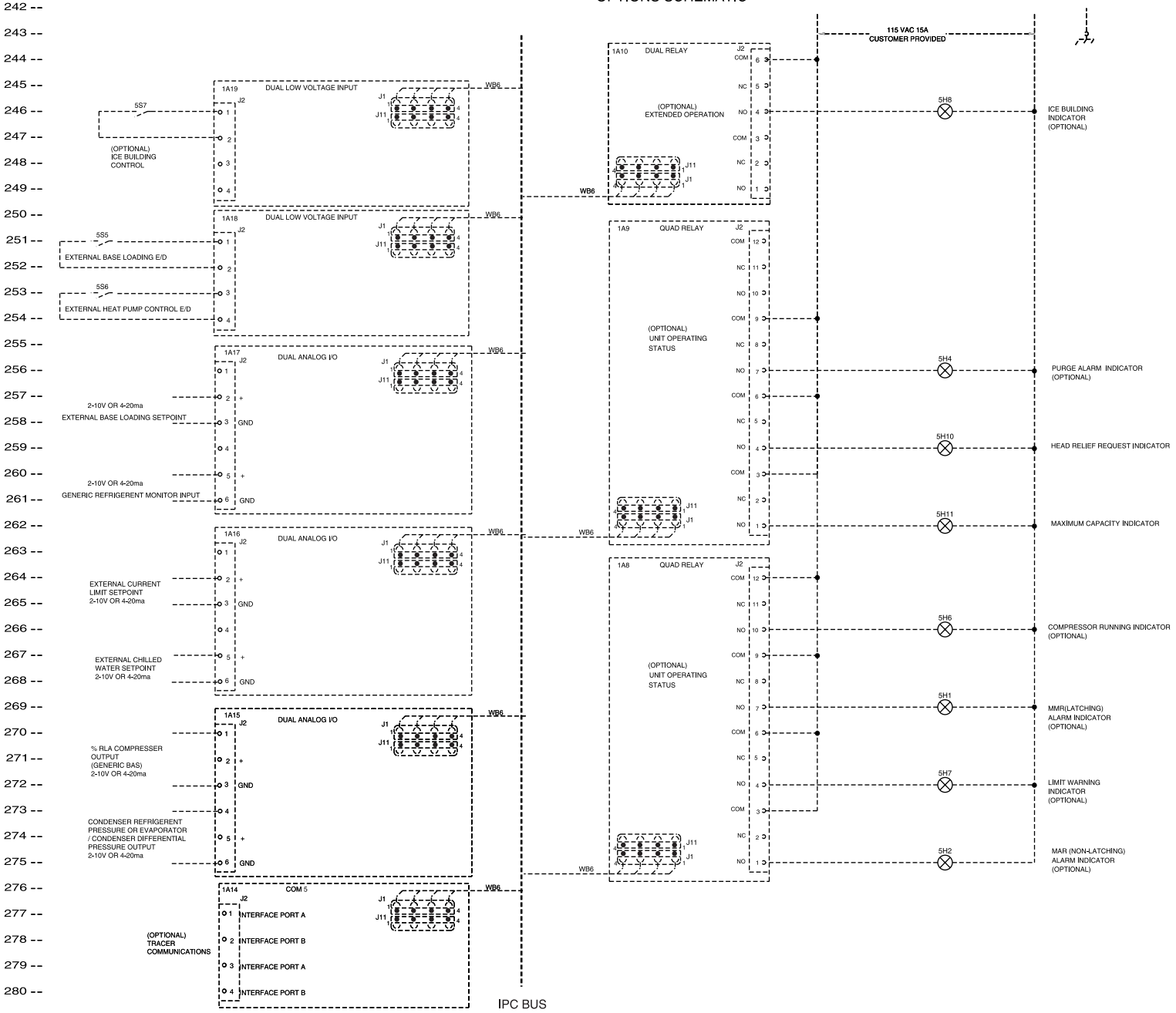
2309-4920 A




199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
CONDENSER ENTERING WATER TEMPERATURE
4R8
WB2 RH
WB3 LH
CONDENSER LEAVING WATER TEMPERATURE
4R9
WB2 RH
WB3 LH
EVAPORATOR SATURATED REFRIGERANT TEMPERATURE
4R10
WB3
CONDENSER SATURATED REFRIGERANT TEMPERATURE
4R11
WB3
CHILLER WATER RESET (TEMP)
4R13
WB3
2 ND CONDENSER ENTERING TEMP
4R14
WB2 RH
WB3 LH
2 ND CONDENSER LEAVING TEMP
4R15
WB2 RH
WB3 LH
DISCHARGE REFRIGERANT TEMP
4R16
WB2
COND. REF PRESSURE
4R22
Pg
SIG
WB3
WB6
WB6
IPC BUS
1A12 DUAL RELAY
J2
COM 6
NC 5
NO 4
COM 3
NC 2
NO 1
J11
J1
1A11 QUAD RELAY
J2
COM 12
NC 11
NO 10
COM 9
NC 8
NO 7
COM 6
NC 5
NO 4
COM 3
NC 2
NO 1
J11
J1
FROM 1X1-11
(LINE 237)
5F
1X1-9
5J
1X1-9
FROM 1TB1-11
(LINE 232)
5G
1X1-9
5H
1X1-9
35A
HGPB OPEN
4M5
36A
HGBP CLOSE
2AB
1X1-15
HOT GAS BY-PASS VALVE
FROM 1X1-3
(LINE 152)
34A
CLOSE
4M12
45A
OPEN
2AG
1X1-14
FREE COOLING ACTUATOR RELAY #1
(LIQUID LINE VALVE)
46A
CLOSE
4M13
37A
OPEN
2AH
1X1-15
FREE COOLING ACTUATOR RELAY #2
(GAS LINE VALVE)
115 VAC 15A
CUSTOMER PROVIDED
5K9
FREE COLLING RELAY
(OPTIONAL)

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG
OPTIONS SCHEMATIC

2309-4921 A



HERMETIC CENTRIFUGAL LIQUID CHILLER

CENTRAVAC®

CH 530 SCHEMATIC WIRING CVHE, CVHF, CVHG

LEGEND

DEVICE LOCATION PREFIX CODE
1= MAIN PANEL MOUNTED
2= STARTER PANEL MOUNTED
3= PURGE MOUNTED
4= FRAME MOUNTED DEVICE
5= PROVIDED BY OTHERS
DASHED LINES INDICATE WIRING BY OTHERS

Note: This legend applies to unit mounted Wye-Delta Starter.

DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
1A1	POWER SUPPLY #1	
1A2	POWER SUPPLY #2	PAGE 3
1A3	OIL TANK HEATER CONTROL	
1A4	CONDENSER HIGH PRESSURE CUT-OUT SWITCH	
1A5	CONDENSER,EVAPORATOR WATER PUMP RELAYS	
1A6	CONDENSER, EVAPORATOR WATER FLOW SWITCH	
1A7	OIL/REFRIGERANT PUMP MOTOR CONTROL	
1A8	UNIT OPERATING STATUS	
1A9	UNIT OPERATING STATUS	
1A10	ICE BUILDING RELAY	
1A11	FREE COOLING CONTROL RELAYS	
1A12	HOT GAS BY-PASS CONTROL RELAYS	
1A13	EXT. AUTO/STOP & EMERGENCY STOP INPUT	
1A14	TRACER COMUNICATIONS COMM 4	
1A15	%RLA & COND. REFR. PRESSURE OUTPUT	PAGE 5
1A16	EXT. CURRENT LIMIT & CHILLED WATER SETPOINTS	
1A17	EXT. BASE LOADING AND REFRIGERENT MONITOR	
1A18	EXTERNAL BASE LOADING & HOT WATER E/D	
1A19	EXTERNAL ICE MAKING COMMAND	
1A20	EXTERNAL FREE COOLING COMMAND	PAGE 4
1A21	WATER DIFERENTIAL PRESSURE INPUT	
1A22	DYNA VIEW OPER. INTERFACE/ MAIN PROCESSOR	
1F1	CONTROL POWER FUSE	143
1F2	OIL PUMP FUSE	161
1Q1	CIRCUIT BREAKER - STARTER	21
1Q2	CIRCUIT BREAKER - PURGE	141
1Q3	CIRCUIT BREAKER - UNIT CONTROL	143
1Q4	CIRCUIT BREAKER - MOTOR CONTROL	145
1T1	CONTROL POWER TRANSFORMER	144
1X1	CONTROL PANEL TERM BLOCK	
2C1	POWER FACTOR CORRECTION CAPACITOR	12
2A1	STARTER MODULE	
2F1,2,3	PRIMARY STARTER FUSING	3,6,10
2F4	SECONDARY CONTROL POWER FUSE	16
2K1	START CONTACTOR	29
2K2	RUN CONTACTOR	32
2K3	SHORTING CONTACTOR	35
2K4	TRANSISTION CONTACTOR	38
2K9	GROUND FAULT RELAY	17
2K11	INTERLOCKING RELAY	27
2Q1	CIRCUIT BREAKER - LINE VOLTAGE	1,5,9
2T1,2,3	CURRENT TRANSFORMERS	2,5,8
2T5	CONTROL POWER TRANSFORMER	12
2T6,7,8	POTENTIAL TRANSFORMER	18,20,22
2X1	CONTROL TERM. STRIP	
2X3	LINE TERMINAL BLOCK	
3A1	PURGE PUMPOUT & EXHAUST SOLENOIDS	
3A2	PURGE CONDENSING UNIT	
3A3	PURGE PUMPOUT, HEATER & REGEN SOLINOID	
3A4	PURGE LIQUID LEVEL SWITCH INPUT	
3A7	MOTOR WINDING TEMPERATURE	164
3HR1	PURGE CARBON TANK HEATER	82
3L1	PURGE EXHAUST SOLENOID	94
3L2	PURGE PUMPOUT SOLENOID	96
3L3	PURGE REGENERATION SOLENOID	79
3M5	PURGE CONDENSING UNIT	91
3M6	PURGE PUMP-OUT COMPRESSER	85
3R1	PURGE REFRIGERENT COMPRESSOR SUCTION TEMP.	165
3R2	PURGE CARBON TANK TEMPERATURE SENSOR	75
3S1	CONDENSER HIGH PRESS SWITCH	19
3S9	PURGE LIQUID LEVEL SWITCH	77

DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
4B1	EVAPORATOR WATER DIFERENTIAL PRESSURE	182
4B2	CONDENSER WATER DIFERENTIAL PRESSURE	185
4B12	FREE COOLING DISCHARGE ACTUATOR CLOSED	191
4B13	FREE COOLING SUCTION ACTUATOR CLOSED	191
4C1	OIL/REFRIGERANT PUMP CAPACITOR	165
4HR1	OIL TANK HEATER	159
4K8	OIL/REFRIGERANT PUMP MOTOR CONTROL RELAY	166
4M1	COMPRESSOR MOTOR	5
4M2	INLET GUIDE VANE ACTUATOR FIRST STAGE	131
4M3	OIL/REFRIGERANT PUMP MOTOR	165
4M4	INLET GUIDE VANE ACTUATOR SECOND STAGE	137
4M5	HOT GAS BY-PASS ACTUATOR	210
4M12	FREE COOLING DISCHARGE ACTUATOR	214
4M13	FREE COOLING SUCTION ACTUATOR	217
4M1R2,3 & 4	MOTOR WINDING TEMPERATURE 1, 2 & 3	165
4R1	INBOARD BEARING TEMPERATURE SENSOR	146
4R2	OUTBOARD BEARING TEMPERATURE SENSOR	149
4R3	OIL PUMP DISCHARGE PRESSURE TRANSDUCER	153
4R4	OIL TANK PRESSURE TRANSDUCER	156
4R5	OIL TANK TEMPERATURE SENSOR	159
4R6	EVAPORATOR ENTERING WATER TEMPERATURE SENSOR	195
4R7	EVAPORATOR LEAVING WATER TEMPERATURE SENSOR	197
4R8	CONDENSER ENTERING WATER TEMPERATURE SENSOR	200
4R9	CONDENSER LEAVING WATER TEMPERATURE SENSOR	203
4R10	SATURATED EVAPORATOR REFRIGERANT TEMP. SENSOR	205
4R11	SATURATED CONDENSER REFRIGERANT TEMP. SENSOR	207
4R13	OUTDOOR AIR TEMPERATURE SENSOR	212
4R14	SECOND CONDENSER ENTERING WATER TEMP. SENSOR	215
4R15	SECOND CONDENSER LEAVING WATER TEMP. SENSOR	217
4R16	COMPRESSOR DISCHARGE REFRIGERANT TEMP. SENSOR	220
4R22	CONDENSER REFRIGERANT PRESSURE TRANSDUCER	222
4S1	HOT GAS BY-PASS VALVE CLOSED	148
5K1	EVAPORATOR WATER PUMP CONTACTOR	194
5K2	CONDENSER WATER PUMP CONTACTOR	197
5K9	FREE COOLING RELAY	221
5H1	LATCHING ALARM INDICATOR	269
5H2	NON-LATCHING ALARM INDICATOR	275
5H4	PURGE ALARM INDICATOR	256
5H6	COMPRESSOR RUNNING INDICATOR	266
5H7	LIMIT WARNING INDICATOR	272
5H8	ICE BUILDING INDICATOR	246
5H10	HEAD RELIEF REQUEST INDICATOR	259
5H11	MAXIMUM CAPACITY INDICATOR	262
5S1	EVAPORATOR WATER FLOW SWITCH	185
5S2	CONDENSER WATER FLOW SWITCH	186
5S3	EXTERNAL AUTO/ STOP	169
5S4	EXTERNAL EMERGENCY STOP	171
5S5	EXTERNAL BASE LOADING COMMAND	251
5S6	EXTERNAL HEAT PUMP CONTROL COMMAND	253
5S7	EXTERNAL ICE BUILDING COMMAND	246
5S8	EXTERNAL FREE COOLING COMMAND	189

⚠ WARNING	⚠ AVERTISSEMENT	⚠ CAUTION
HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.	VOLTAGE HASARDEUX! DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN. FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.	USE COPPER CONDUCTORS ONLY! UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

NOTES:

1. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. CHECK SALES ORDER TO DETERMINE IF WIRING IS REQUIRED FOR SPECIFIC OPTIONS.
2. CAUTION - DO NOT ENERGIZE UNIT UNTIL CHECK-OUT AND START-UP PROCEDURES HAVE BEEN COMPLETED.

REQUIRED

3. ALL CUSTOMER CONTROL CIRCUIT WIRING MUST HAVE A MINIMUM RATING OF 150 VOLTS.
4. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OUTSIDE THE UNITED STATES, OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY.
5. EVAPORATOR AND CONDENSER FLOW SWITCHES ARE REQUIRED. THEY MUST BE INSTALLED AND WIRED TO THE TRANE PANEL BY THE INSTALLING CONTRACTOR. PURCHASE OF SWITCHES FROM TRANE IS OPTIONAL.

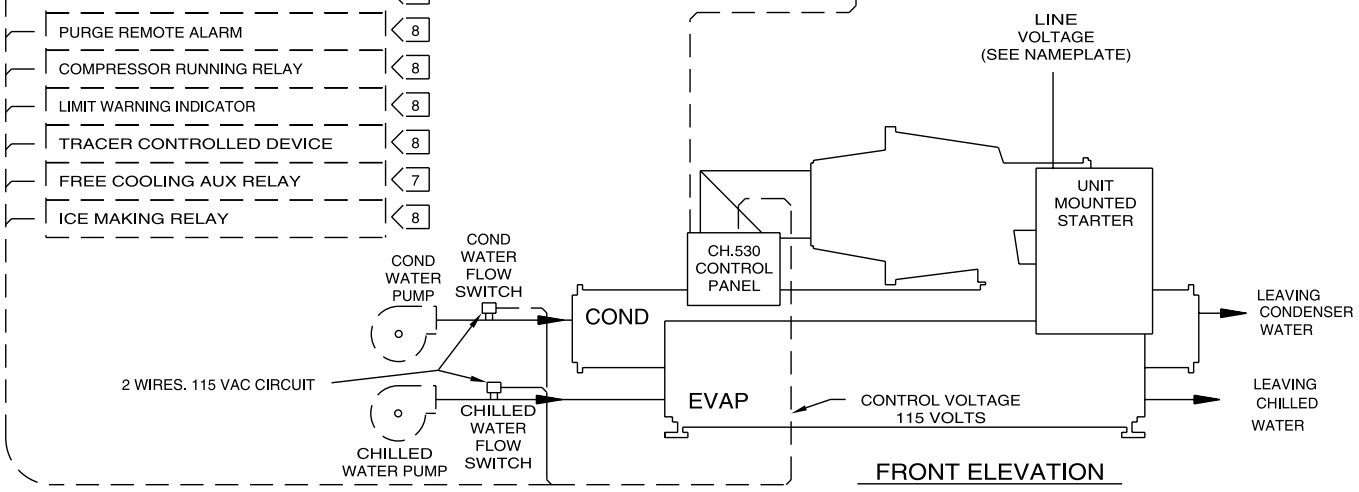
6. 2 WIRES, 115 VAC CIRCUIT, SEPARATE POWER SUPPLY IS REQUIRED. MINIMUM CONTACT RATING AT 115 VAC - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC OPTIONAL.
7. 2 WIRES, 115 VAC CIRCUIT, SEPARATE POWER SUPPLY IS REQUIRED. CONTACTS ARE N.O. CONTACT RATING - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC.
8. 2 OR 3 WIRES(N.O. &/OR N.C.), 115 VAC CIRCUIT, SEPARATE 115 VAC POWER SUPPLY IS REQUIRED. CONTACTS ARE NO/NC RATINGS - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC.
9. 2-10V OR 4-20ma INPUT
10. 2-10V OR 4-20ma OUTPUT
11. CUSTOMER SUPPLIED SILVER CONTACTS MUST BE COMPATIBLE WITH DRY CIRCUIT 24 VDC, 12ma RESISTIVE LOAD.
12. SHIELDED PAIR. 30 VOLT OR LESS CIRCUIT. MAX LENGTH 1500 FT. BELDON TYPE 8760 RECOMMENDED.

THE UNIT CONTROL PANEL (CH.530) SUPPLIES A CONTACT OUTPUT TO CONTROL THE CUSTOMER SUPPLIED DEVICES SHOWN BELOW. MAXIMUM FUSE SIZE PER DEVICE - 15 AMPS.

- CHILLED WATER PUMP STARTER — 7
- CONDENSER WATER PUMP STARTER — 6
- HEAD RELIEF REQUEST RELAY — 8
- MAXIMUM CAPACITY RELAY — 8
- REMOTE ALARM RELAY (LATCHING) — 8
- REMOTE ALARM RELAY (NON-LATCHING) — 8
- PURGE PUMP-OUT RUNNING — 8
- PURGE REMOTE ALARM — 8
- COMPRESSOR RUNNING RELAY — 8
- LIMIT WARNING INDICATOR — 8
- TRACER CONTROLLED DEVICE — 8
- FREE COOLING AUX RELAY — 7
- ICE MAKING RELAY — 8

- EXTERNAL FREE COOLING SWITCH — 11
- TRACER OR OTHER TRANE REMOTE DEVICE (COMMUNICATIONS INTERFACE) — 12
- CHILLED WATER RESET INPUT OR EXTERNAL CHILLED WATER SETPOINT — 9
- EXTERNAL CURRENT LIMIT SETPOINT — 9
- PERCENT RLA COMPRESSOR OUTPUT — 10
- ICE BUILDING CONTROL — 11
- BASE LOADING ENABLE/DISABLE — 11
- HEAT PUMP CONTROL ENABLE/DISABLE — 11
- BASE LOADING SETPOINT — 9
- GENERIC REFRIGERENT MONITOR INPUT — 9
- CONDENSER REFRIGERENT PRESSURE OUTPUT — 10
- EXTERNAL AUTO/STOP (CONTACT)
- EMERGENCY STOP NORMAL/TRIP (CONTACT)

LOW VOLTAGE (30V MAX)
2 WIRES, NOT RUN WITH
HIGHER VOLTAGE CIRCUITS.



⚠ WARNING	⚠ AVERTISSEMENT	⚠ CAUTION
HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.	VOLTAGE HASARDEUX! DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN. FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.	USE COPPER CONDUCTORS ONLY! UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

NOTES:

1. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. CHECK SALES ORDER TO DETERMINE IF WIRING IS REQUIRED FOR SPECIFIC OPTIONS.
2. CAUTION - DO NOT ENERGIZE UNIT UNTIL CHECK-OUT AND START-UP PROCEDURES HAVE BEEN COMPLETED.

REQUIRED

3. ALL CUSTOMER CONTROL CIRCUIT WIRING MUST HAVE A MINIMUM RATING OF 150 VOLTS.
4. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OUTSIDE THE UNITED STATES, OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY.
5. EVAPORATOR AND CONDENSER FLOW SWITCHES ARE REQUIRED. THEY MUST BE INSTALLED AND WIRED TO THE TRANE PANEL BY THE INSTALLING CONTRACTOR. PURCHASE OF SWITCHES FROM TRANE IS OPTIONAL.

6. 2 WIRES, 115 VAC CIRCUIT, SEPARATE POWER SUPPLY IS REQUIRED. MINIMUM CONTACT RATING AT 115 VAC - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC OPTIONAL.
7. 2 WIRES, 115 VAC CIRCUIT, SEPARATE POWER SUPPLY IS REQUIRED. CONTACTS ARE N.O. CONTACT RATING - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC.
8. 2 OR 3 WIRES(N.O. &/OR N.C.), 115 VAC CIRCUIT, SEPARATE 115 VAC POWER SUPPLY IS REQUIRED. CONTACTS ARE NO/NC RATINGS - 2.88 INDUCTIVE 1/3 H.P.(.25 kW) AT 115 VAC.
9. 2-10V OR 4-20ma INPUT
10. 2-10V OR 4-20ma OUTPUT
11. CUSTOMER SUPPLIED SILVER CONTACTS MUST BE COMPATIBLE WITH DRY CIRCUIT 24 VDC, 12ma RESISTIVE LOAD.
12. SHIELDED PAIR. 30 VOLT OR LESS CIRCUIT. MAX LENGTH 1500 FT. BELDON TYPE 8760 RECOMMENDED.

THE UNIT CONTROL PANEL (CH.530) SUPPLIES A CONTACT OUTPUT TO CONTROL THE CUSTOMER SUPPLIED DEVICES SHOWN BELOW. MAXIMUM FUSE SIZE PER DEVICE - 15 AMPS.

- CHILLED WATER PUMP STARTER — 7
- CONDENSER WATER PUMP STARTER — 6
- HEAD RELIEF REQUEST RELAY — 8
- MAXIMUM CAPACITY RELAY — 8
- REMOTE ALARM RELAY (LATCHING) — 8
- REMOTE ALARM RELAY (NON-LATCHING) — 8
- PURGE PUMP-OUT RUNNING — 8
- PURGE REMOTE ALARM — 8
- COMPRESSOR RUNNING RELAY — 8
- LIMIT WARNING INDICATOR — 8
- TRACER CONTROLLED DEVICE — 8
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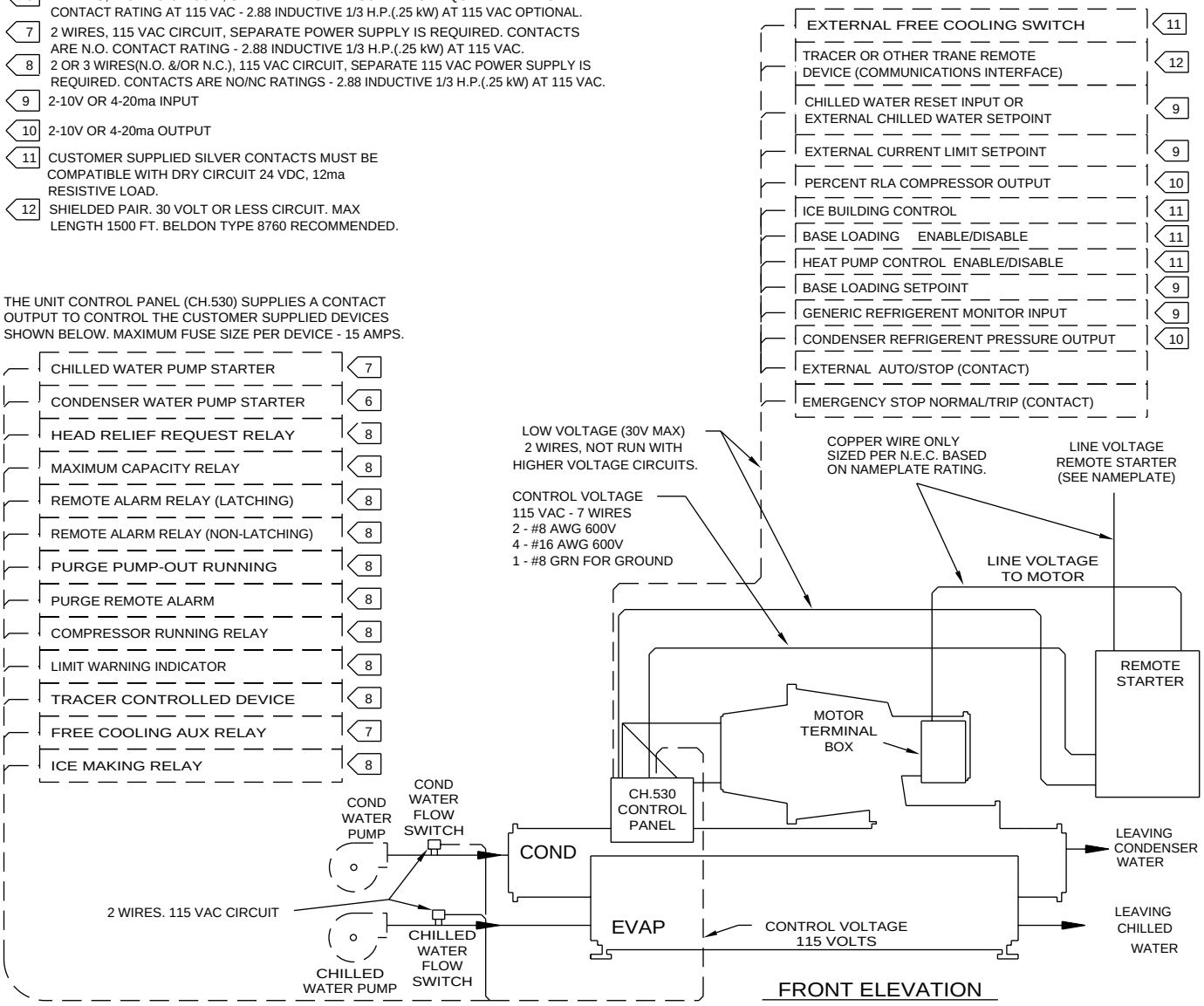
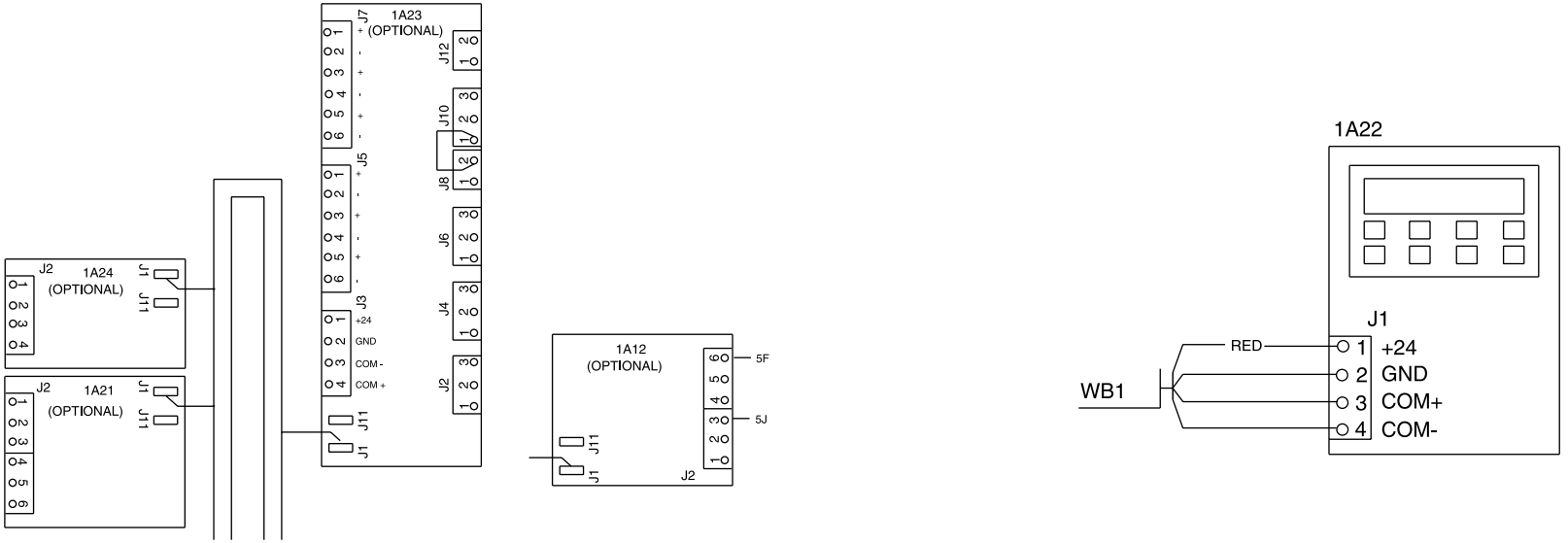
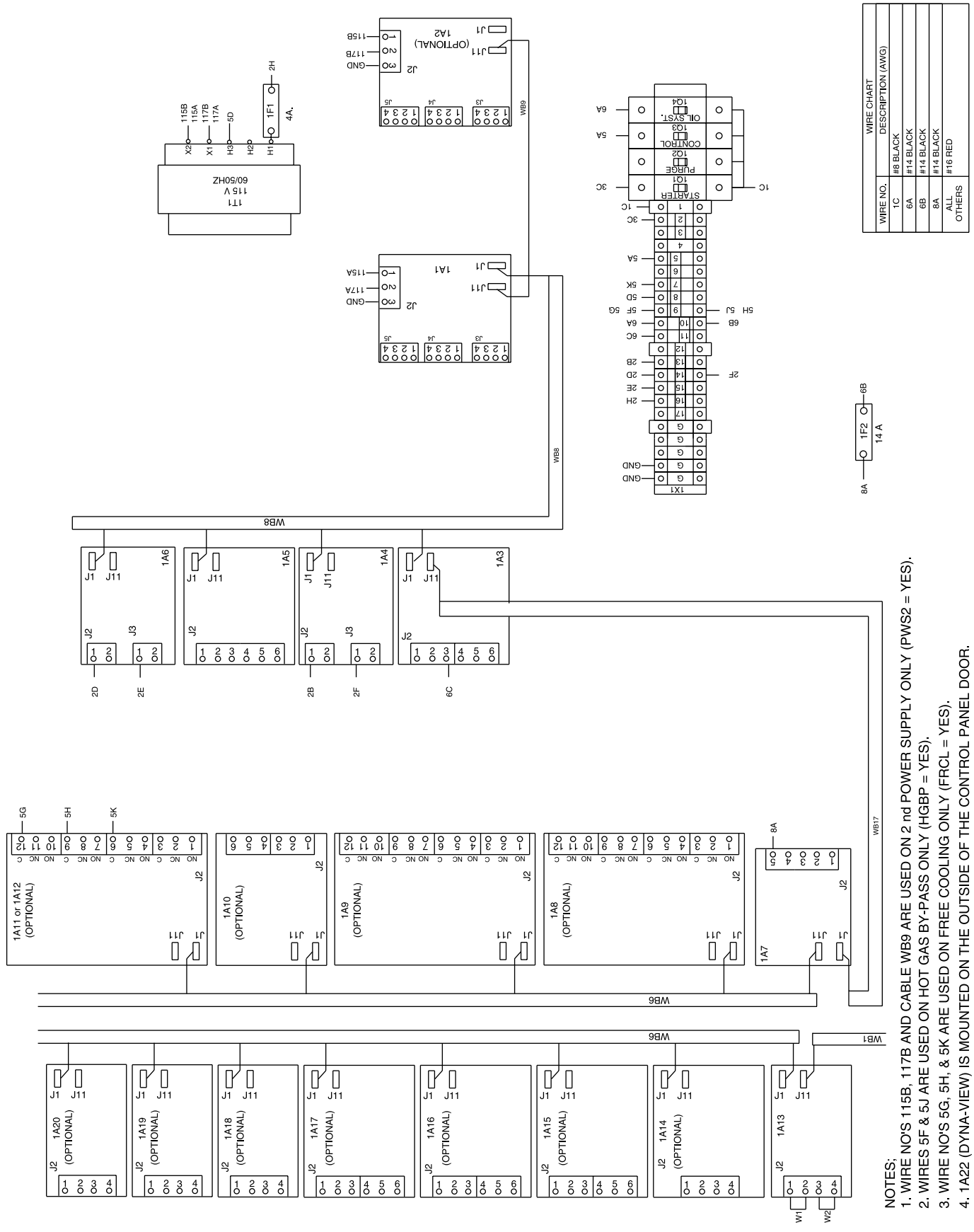
- EMERGENCY STOP NORMAL/TRIP (CONTACT)



UNIT CONTROL PANEL CONNECTION DIAGRAM CH 530 CVHE,CVHF,CVHG

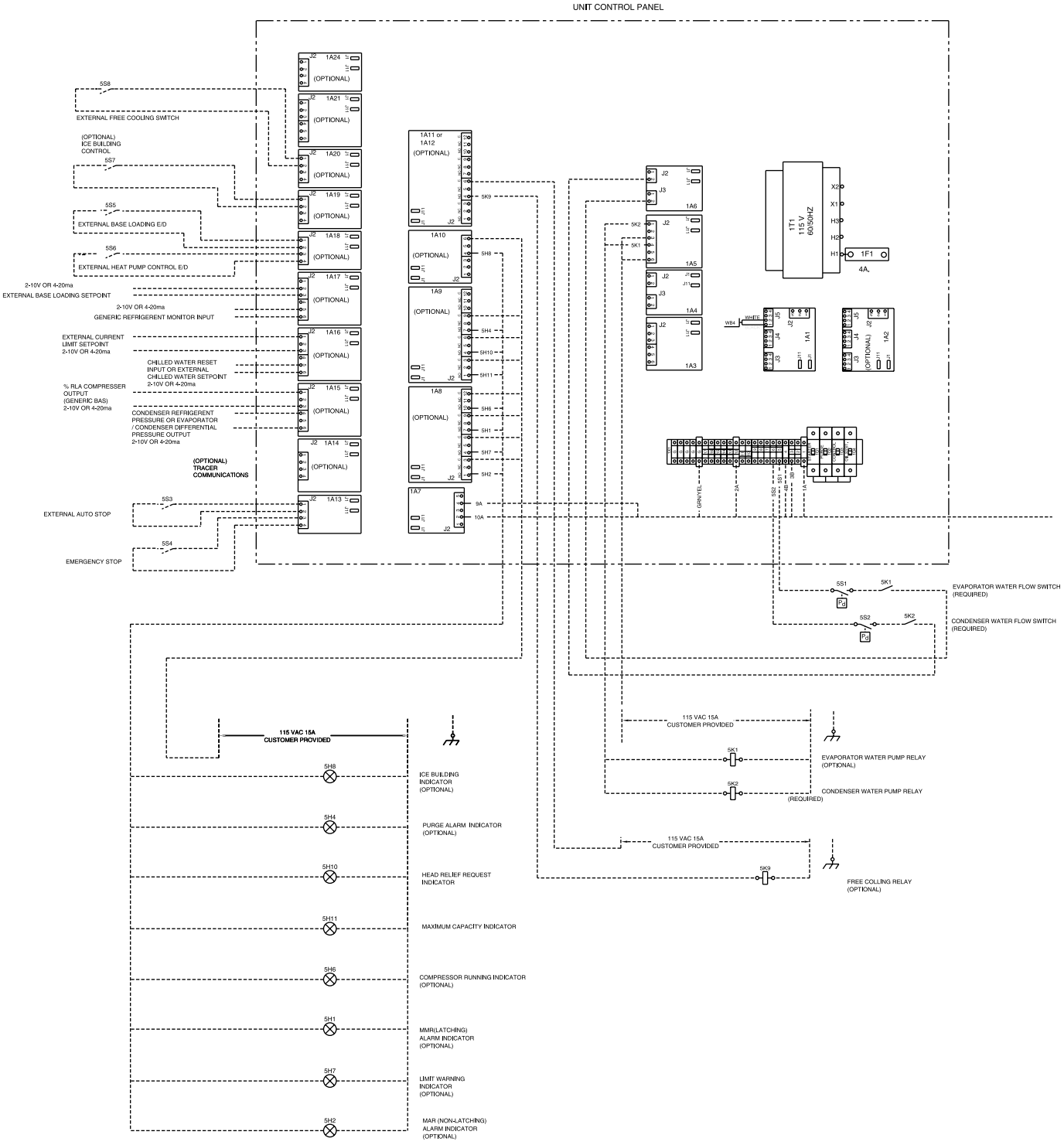
2309-4923 A

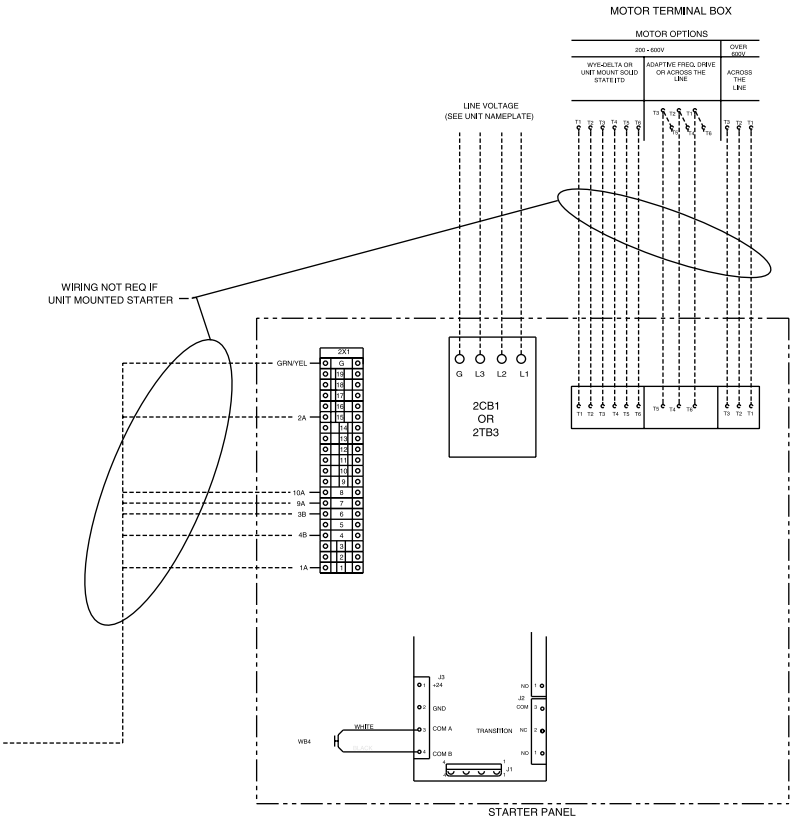



WIRE CHART
WIRE NO. | DESCRIPTION (AWG)
1C | #8 BLACK
6A | #14 BLACK
6B | #14 BLACK
8A | #14 BLACK
ALL OTHERS | #16 RED
NOTES;
1. WIRE NO'S 115B, 117B AND CABLE WB9 ARE USED ON 2 nd POWER SUPPLY ONLY (PWS2 = YES).
2. WIRES 5F & 5J ARE USED ON HOT GAS BY-PASS ONLY (HGBP = YES).
3. WIRE NO'S 5G, 5H, & 5K ARE USED ON FREE COOLING ONLY (FRCL = YES).
4. 1A22 (DYNA-VIEW) IS MOUNTED ON THE OUTSIDE OF THE CONTROL PANEL DOOR.

CONNECTION DIAGRAM
FIELD CONNECTION - TRANE STARTER
CH 530

2309-4935 A



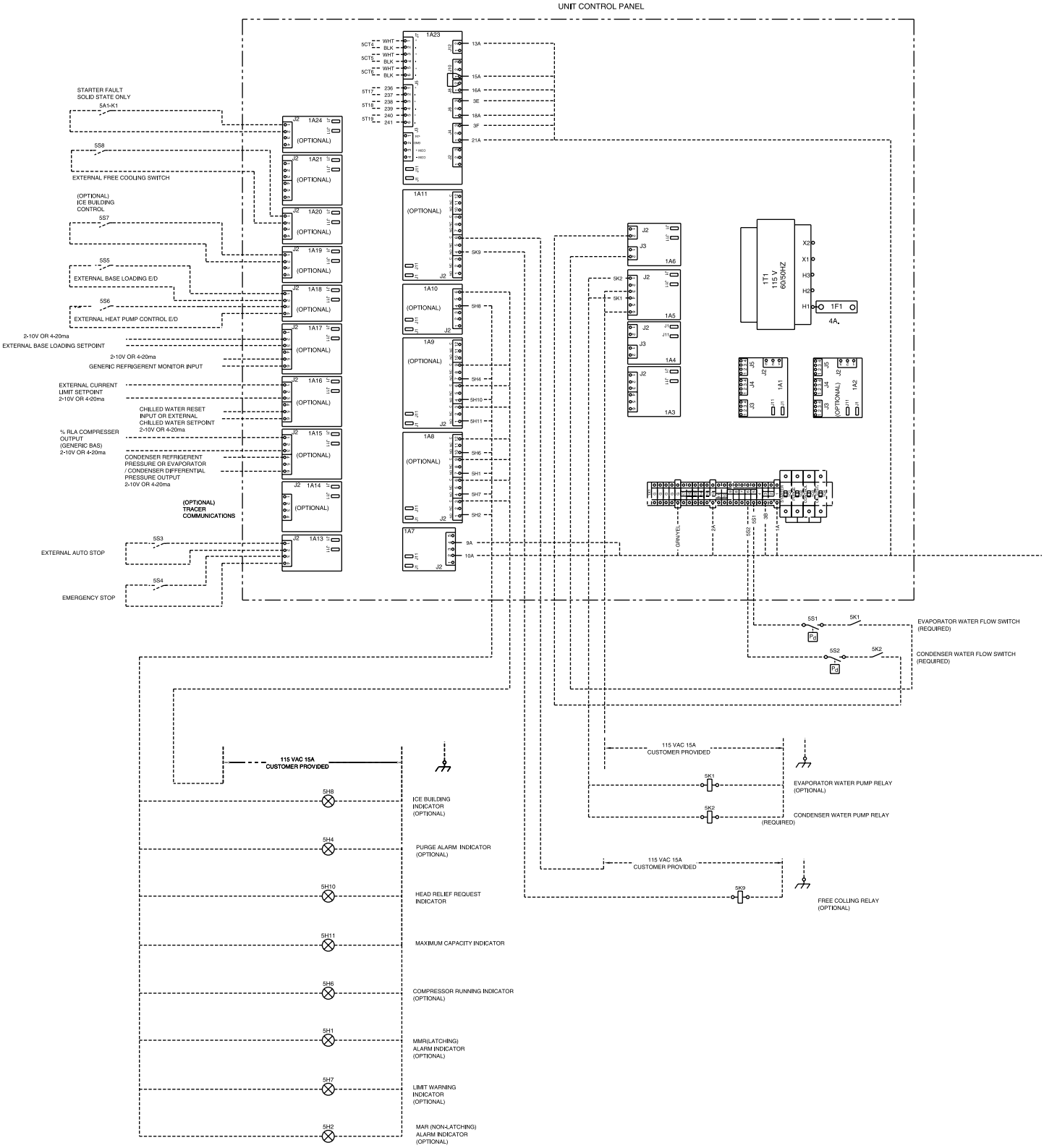


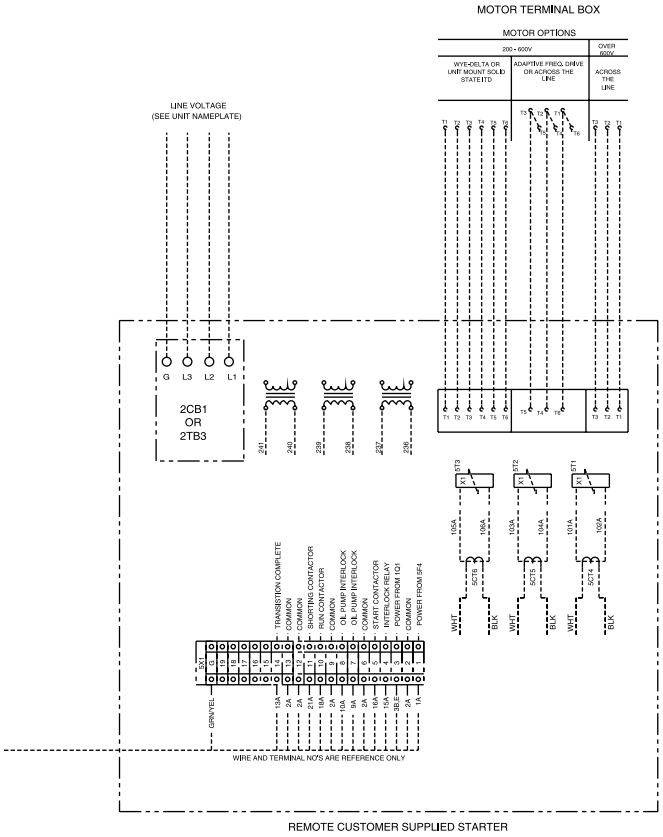
NOTES:

1. DASHED LINES INDICATE FIELD WIRING BY OTHERS. CHECK SALES ORDER TO DETERMINE WHICH OPTIONS ARE SPECIFIED.
2. DO NOT ROUTE LOW VOLTAGE (30V MAX) WITH CONTROL VOLTAGE (115V) AND DO NOT POWER UNIT UNTIL CHECK-OUT AND START-UP PROCEDURES HAVE BEEN COMPLETED.
3. EVAPORATOR AND CONDENSER FLOW SWITCHES ARE REQUIRED. THEY CONTAIN DPDT CONTACTS. THE SEPERATE FLOW SWITCHES ARE RUN IN SERIES WITH SEPERATE AUX CONTACTS FOR THE CONDENSER PUMP AND SEPERATE AUX CONTACTS FOR THE EVAPORATOR PUMP. THEY MUST BE INSTALLED AND WIRED TO THE APPROPRIATE TRANE PANEL BY THE INSTALLING CONTRACTOR. PURCHASE OF SWITCHES FROM THE TRANE CO. IS OPTIONAL.

CONNECTION DIAGRAM
FIELD CONNECTION
CUSTOMER SUPPLIED STARTER
CVHE,CVHF,CVHG

2309-4936 A





NOTES:

1. DASHED LINES INDICATE FIELD WIRING BY OTHERS. CHECK SALES ORDER TO DETERMINE WHICH OPTIONS ARE SPECIFIED.
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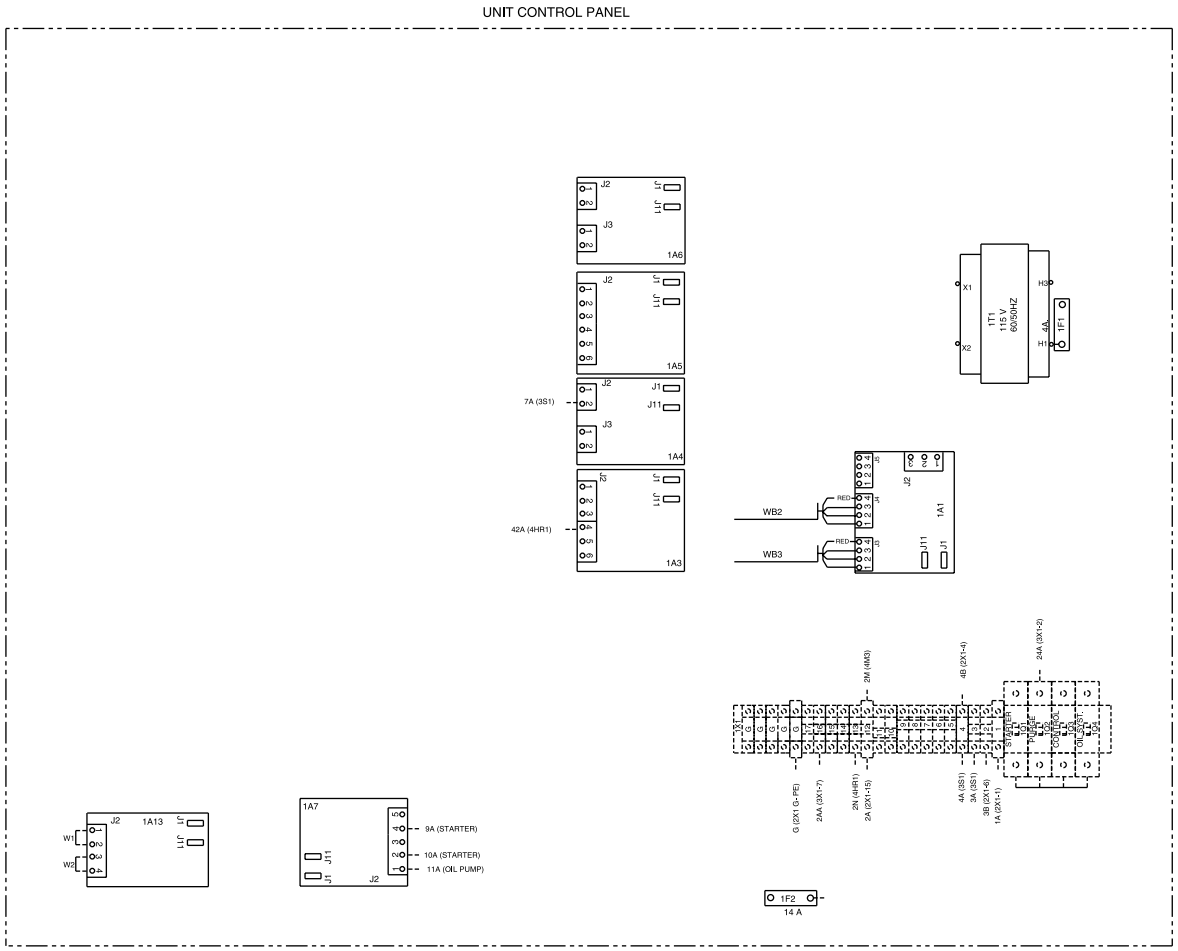
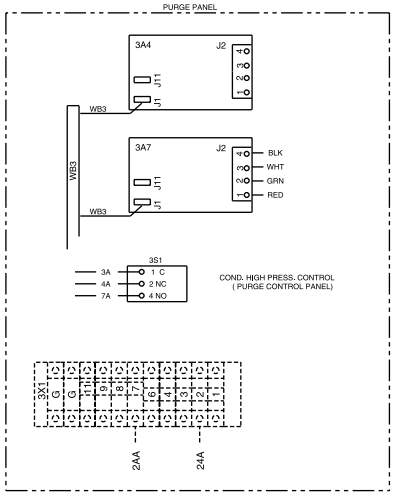
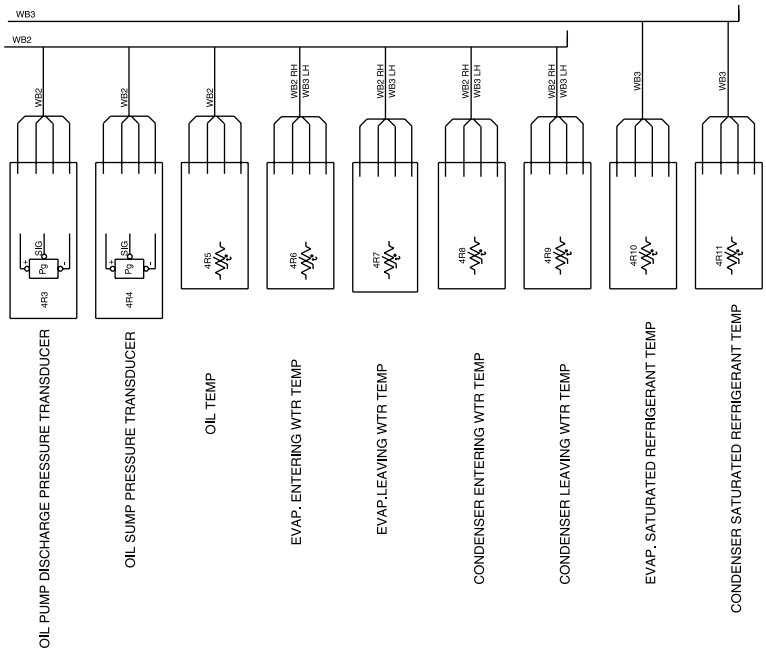
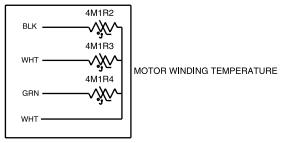
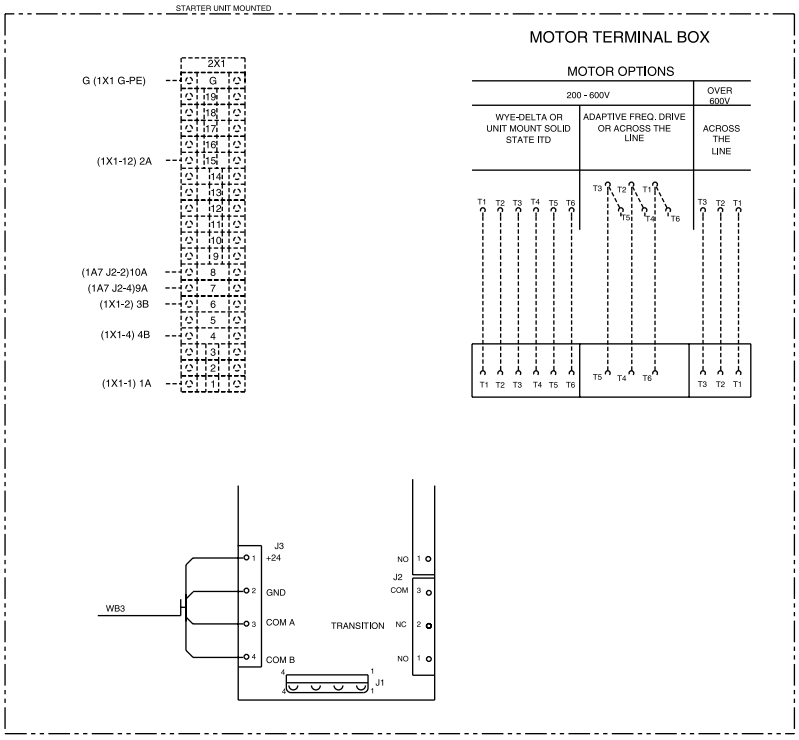


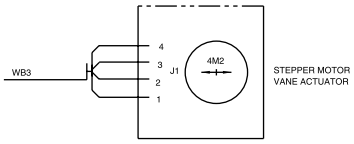


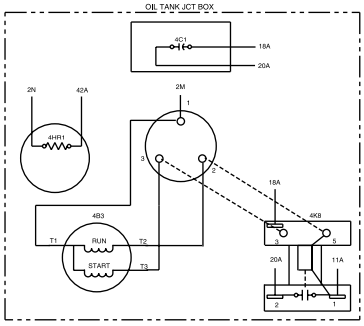


NOTES;
1. WATER TEMP. SENSORS MAY BE CONNECTED TO 4-WIRE COMMUNICATON LINK CABLE WB2 FOR RIGHT HAND END OR WB3 FOR LEFT HAND END DEPENDING ON WATER BOX PASS ARRANGEMENT.


4M1R2
BLK
4M1R3
WHT
4M1R4
GRN
WHT
MOTOR WINDING TEMPERATURE

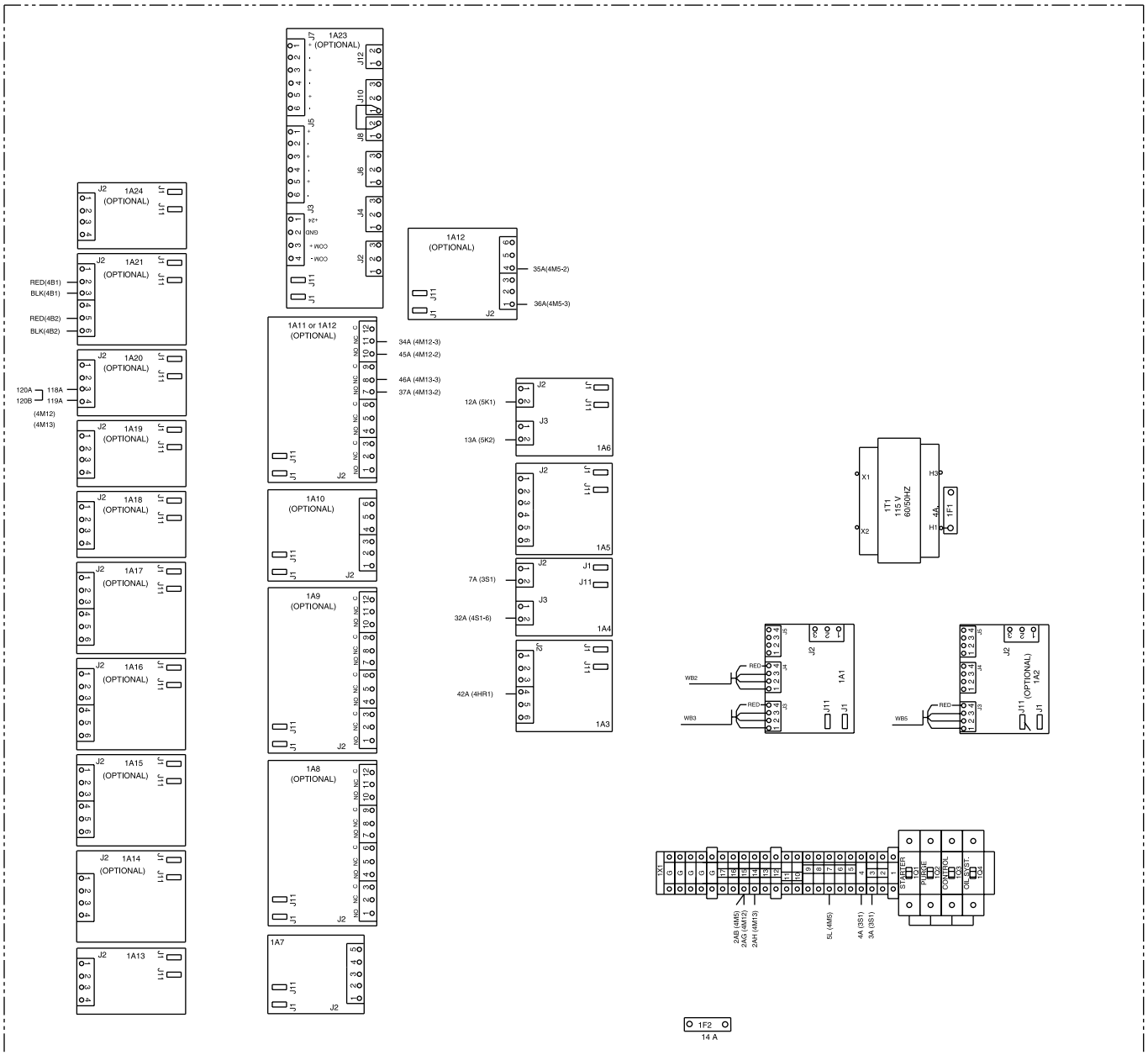

STARTER UNIT MOUNTED
MOTOR TERMINAL BOX
MOTOR OPTIONS
200 - 600V
OVER 600V
WYE-DELTA OR UNIT MOUNT SOLID STATE ITD
ADAPTIVE FREQ. DRIVE OR ACROSS THE LINE
ACROSS THE LINE
2X1
G (1X1 G-PE)
(1X1-12) 2A
(1A7 J2-2)10A
(1A7 J2-4)9A
(1X1-2) 3B
(1X1-4) 4B
(1X1-1) 1A
J3
+24
GND
COM A
COM B
WB3
TRANSITION
J2
NO
COM
NC
J1

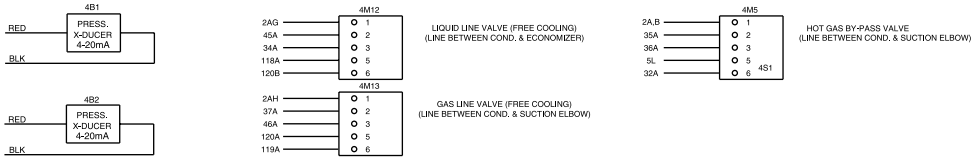

WB3
J1
4M2
STEPPER MOTOR
VANE ACTUATOR

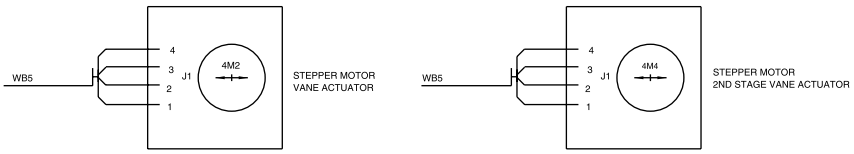

OIL TANK JCT BOX
4C1
18A
20A
2N
42A
2M
4HR1
4B3
RUN
START
4K8
11A

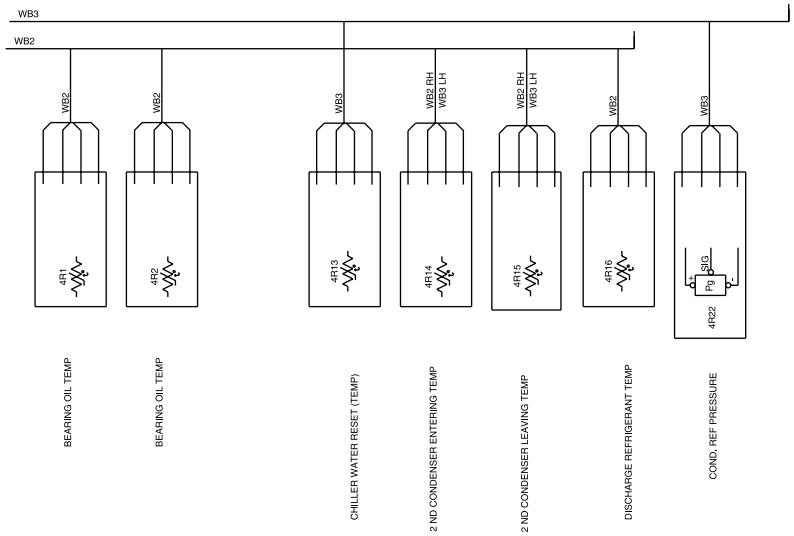
CONNECTION DIAGRAM
UNIT WIRING OPTIONAL
CH 530
CVHE,CVHF,CVHG

UNIT CONTROL PANEL







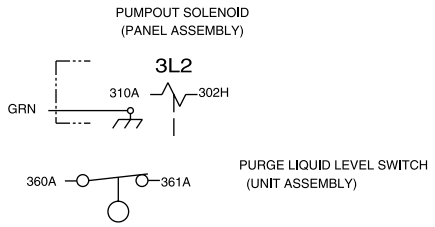


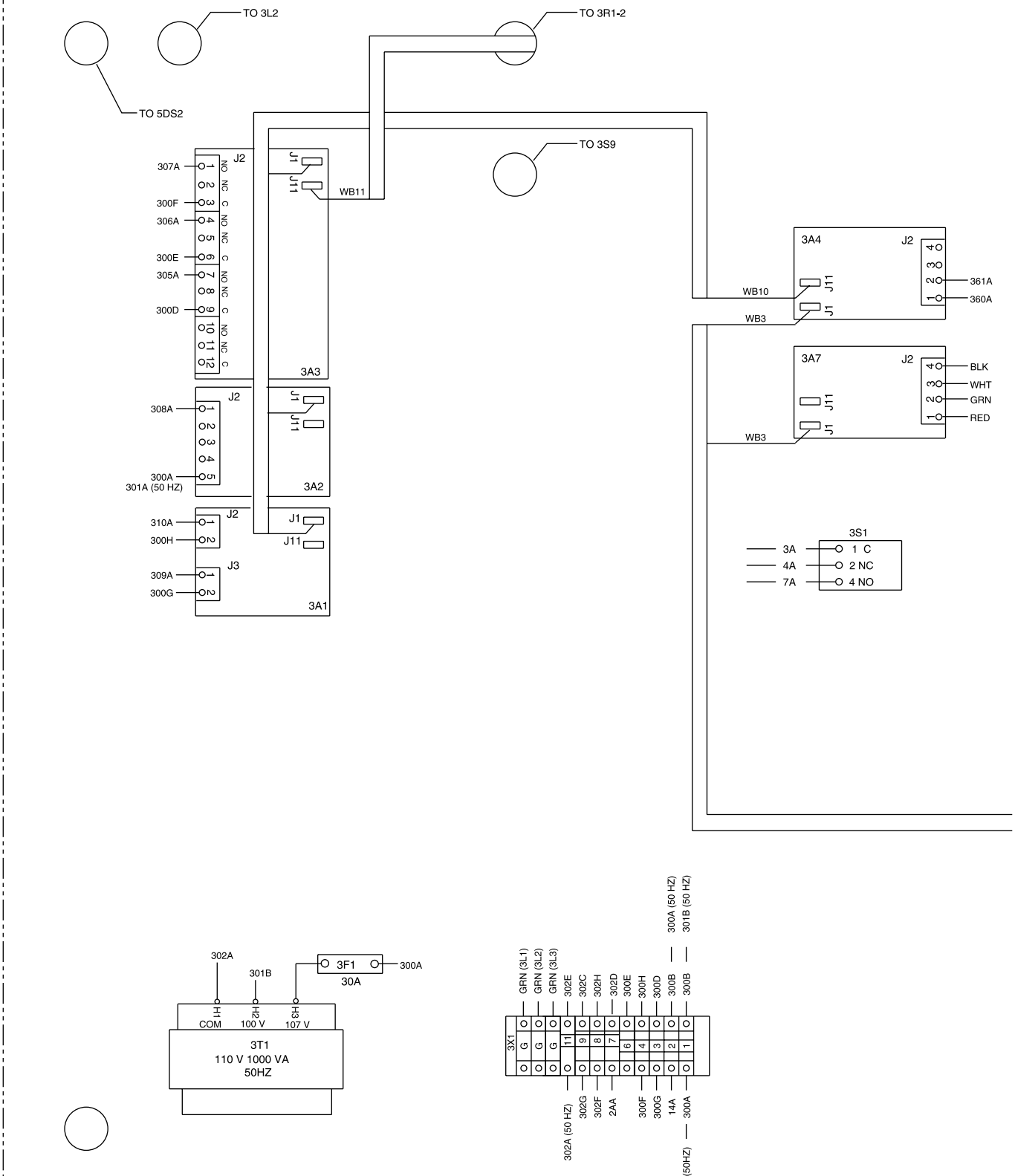
NOTES;

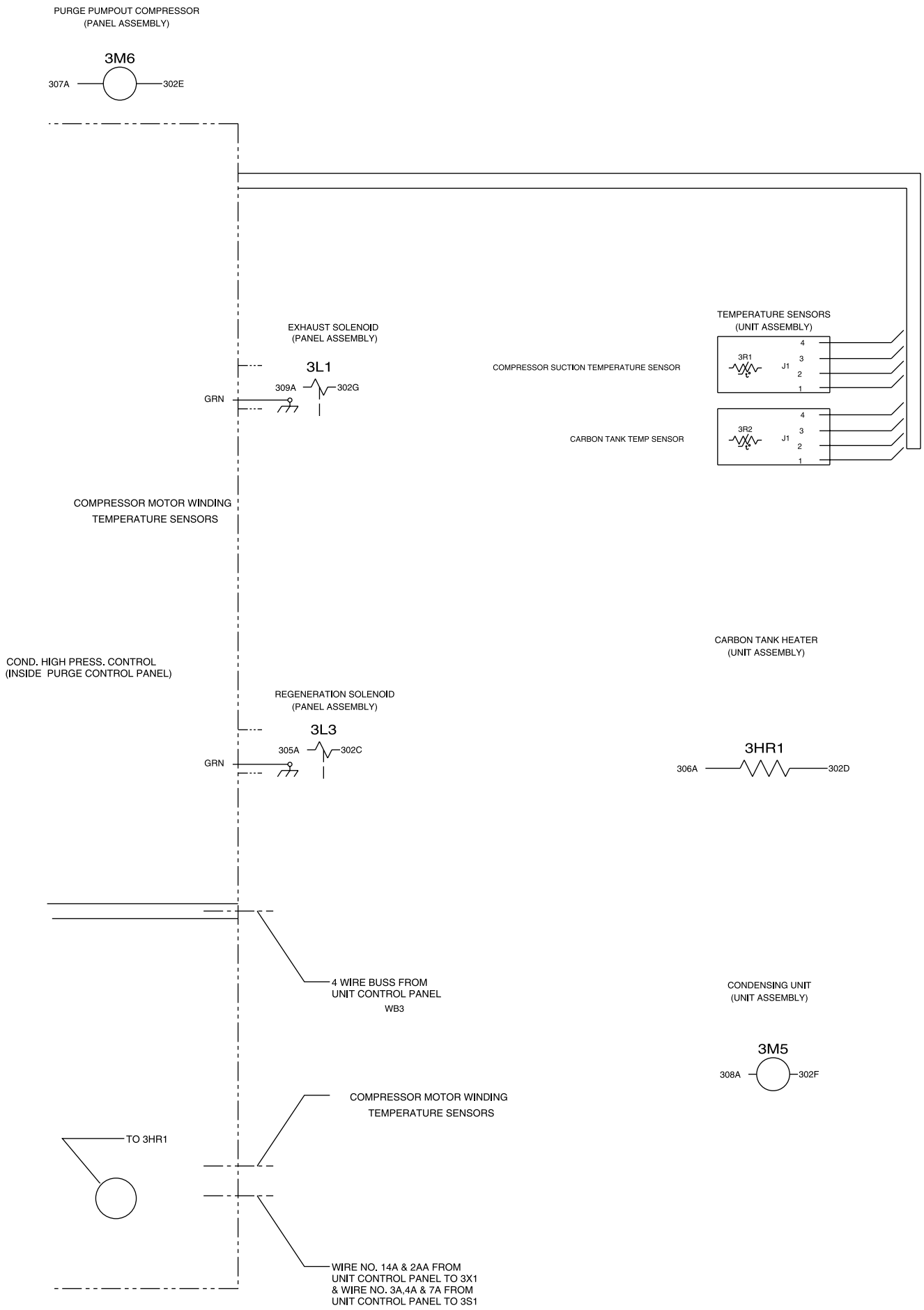
1. WATER TEMP. SENSORS MAY BE CONNECTED TO 4-WIRE COMMUNICATON LINK CABLE WB2 FOR RIGHT HAND END OR WB3 FOR LEFT HAND END DEPENDING ON WATER BOX PASS ARRANGEMENT.

2. WIRING SHOWN IS FOR UNIT MOUNTED STARTER, IF REMOTE STARTER IS USED SEE DRG. 2309-4935 OR IF CUSTOMER SUPPLIED STARTER SEE DRG. 2309-4936.

CONNECTION DIAGRAM
PURGE CONTROL PANEL
CH 530
CVHE,CVHF,CVHG
PRODUCTION

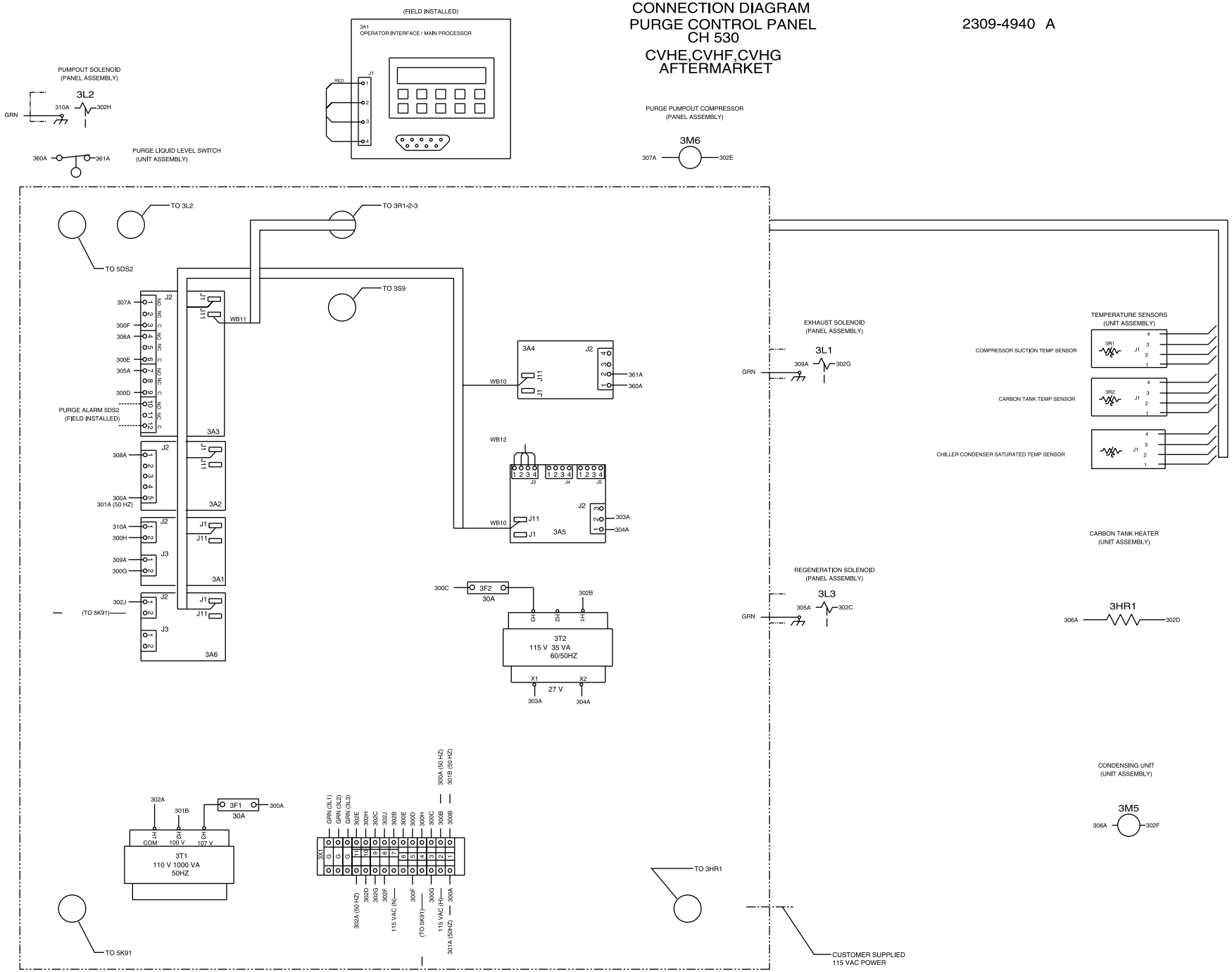





PURGE PUMPOUT COMPRESSOR
(PANEL ASSEMBLY)
3M6
307A
302E
EXHAUST SOLENOID
(PANEL ASSEMBLY)
3L1
309A
302G
GRN
TEMPERATURE SENSORS
(UNIT ASSEMBLY)
COMPRESSOR SUCTION TEMPERATURE SENSOR
3R1
J1
4
3
2
1
CARBON TANK TEMP SENSOR
3R2
J1
4
3
2
1
COMPRESSOR MOTOR WINDING
TEMPERATURE SENSORS
CARBON TANK HEATER
(UNIT ASSEMBLY)
COND. HIGH PRESS. CONTROL
(INSIDE PURGE CONTROL PANEL)
REGENERATION SOLENOID
(PANEL ASSEMBLY)
3L3
305A
302C
GRN
3HR1
306A
302D
4 WIRE BUSS FROM
UNIT CONTROL PANEL
WB3
CONDENSING UNIT
(UNIT ASSEMBLY)
3M5
308A
302F
COMPRESSOR MOTOR WINDING
TEMPERATURE SENSORS
TO 3HR1
WIRE NO. 14A & 2AA FROM
UNIT CONTROL PANEL TO 3X1
& WIRE NO. 3A,4A & 7A FROM
UNIT CONTROL PANEL TO 3S1

CONNECTION DIAGRAM
PURGE CONTROL PANEL
CH 530
CVHE,CVHF,CVHG
AFTERMARKET

2309-4940 A



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e-mail us at comfort@trane.com

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File Number	SV-RF-CTV-CVHE-SVN03A-EN-1001
Supersedes	New
Stocking Location	La Crosse