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MAINTENANCE

FRICK QUANTUM COMPRESSOR CONTROL PANEL

VERSION 4.1x

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DANGER — **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

WARNING — **Indicates a potentially hazardous situation or practice which, if not avoided, will result in death or serious injury.**

CAUTION — **Indicates a potentially hazardous situation or practice which, if not avoided, will result in damage to equipment and/or minor injury.**

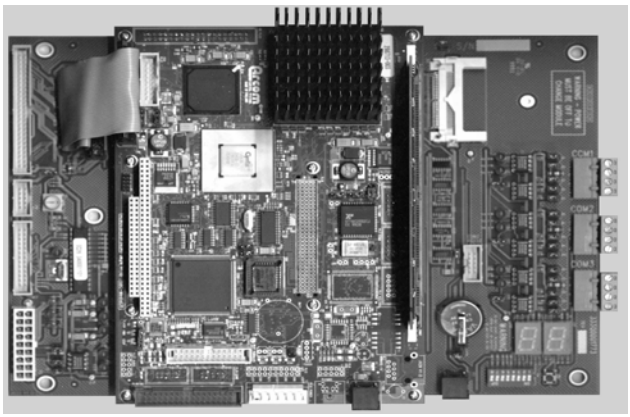
NOTE: Indicates an operating procedure, practice, etc., or portion thereof which is essential to highlight.

Quantum Identification

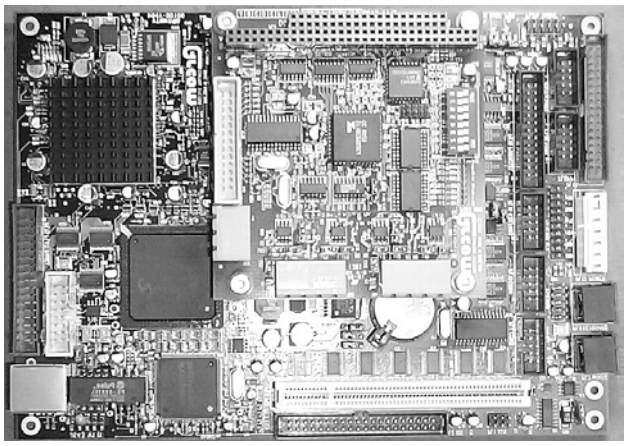
Frick Controls has over the years, strived to remain on the cutting edge of microprocessor technology and development. And because of the ever-increasing speed, memory, features and power of microprocessors, Frick Controls will, from time to time, introduce the latest advancement in microprocessor control technology.

Our microprocessor family has shared the name **Quantum,** over the past five years. There are currently four controllers within this family. The first two of these controllers (known as Quantum 1 and Quantum 2) are no longer in production, and as such, will not be further mentioned in this manual. The two current members in production of the Quantum family are the Quantum 3, and the Quantum 4. It is critical to the end user to be able to identify the differences between these controllers. Refer to the section in this manual entitled "Quantum 3 Main Board History and Identification" and "Quantum 4 Main Board History and Identification" for additional information as to how to identify the particular Quantum controller that you have.

Throughout this manual, the two different controllers will be talked about for the most part as one (as they do function the same). Where there is a difference between these boards, as in jumpers or wiring, the different models will be identified by name. This is why it is important for you to be aware of which Quantum board you have.



Quantum 3



Quantum 4

TROUBLESHOOTING THE QUANTUM CONTROL PANEL

This section contains information on troubleshooting and making corrections to the boards and control circuits of the Quantum. Reference the drawings at the end of this manual.

GENERAL INFORMATION:

The components within the control panel can be inadvertently damaged by static electricity or mishandling. Only qualified technicians should directly handle these components.

1. DO NOT attempt to make corrections to the power supply without shutting off the power to the control panel. Accidental shorts can irreparably damage the processor boards or the display screen.
2. DO NOT HANDLE the panel boards when their cables are disconnected without first attaching a properly grounded wrist ground strap to prevent static electrical discharge from your body.

Most problems encountered with the microprocessor and control circuits will be the result of a wiring fault, a blown fuse, faulty I/O module or failure of a peripheral control such as a solenoid coil or a pressure transducer. Faults in the computer, while possible, are unlikely. If a fault develops in the computer, the probability is that all functions will cease and the display screen will go blank. The control system of the compressor consists of an AC (high voltage) side, which can be either 120 volts, or 230 volts, and a DC (low voltage) side. The AC side actuates solenoids, relays, alarms, and other electromechanical functions. The DC side operates the computer and it's various sensors.

When working within the panel, the AC high voltage side, which can be either nominal 120 VAC or nominal 230 VAC, CAN CAUSE INJURY OR DEATH.

To troubleshoot the low-voltage side of the control circuits, it is necessary to have the following tools:

1. Accurate digital multimeter*
2. Small wire stripper
3. Small screwdriver
4. Small snip nose pliers
5. Wrist Grounding strap*
6. Static free grounded work surface

Note: Proper panel voltage refers to the AC (high voltage) that has been supplied to the panel which could be either nominal 120 VAC or nominal 230 VAC (Reference the Control Panel Power Specifications).

Some problems that are encountered involve troubleshooting the panels digital inputs and outputs. The Digital I/O (Input/Output) boards have six Digital I/O (DIO) board connectors labeled P1 through P6. The input and output modules are wired into a DIO connector plug. Position 3 pro-vides power and position 4 is a neutral on the DIO connectors.

WHAT TO DO BEFORE CALLING THE FACTORY

- The “Operating Status” screen is shown.

When someone calls in to the factory with a Quantum problem, they usually don’t provide enough information. An example of this is the statement that the Quantum is not “booting” (the main processor board is not starting). Unfortunately, this description is usually vague and only means that there is nothing on the display. A blank screen could be the result of many different problems. Following is a list of possible reasons for no display:

- No power
- Loose or Faulty Display Cable or Inverter Cable
- Bad Display
- Bad Backlight Inverter
- Bad Backlight Fluorescent Tube
- Faulty CPU Board
- Wrong Combination of Display, Cable, Inverter, or Software

Before calling the factory for assistance, review the following information and try to discover and resolve your Quantum problem.

WHAT SHOULD OCCUR WHEN POWERING UP THE PANEL

The first thing that should be checked when troubleshooting the Quantum is it’s powering up sequence.

When powering up the Quantum the following sequence of events are indicative of a properly working main processor board:

Quantum 3

- The LED’s for +5V, +12V, and –12V will turn on solid. (Lower left corner of Main PCB)
- LED KB will begin to blink. (Left side of Main PCB)
- Several initialization screens will appear (these will look very similar to the way the screen of a desktop computer appears when it is booting.
- The last of the initialization screens is the “System Configuration” screen.
- The screen will go blank for several seconds.
- The “Operating Status” screen is shown.

After the Quantum has properly powered up, the following sequence of events is indicative of proper communication to the analog and digital boards:

- The TX/RX LED’s near the white connector will begin to blink.
- The Analog and Digital I/O boards TX/RX lights should be blinking.
- Each I/O board should have the power LED (next to the white connector) lighted and the “Active” LED (next to the blue DIP switch) should be blinking.

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- Green PWR (Power) LED will turn on solid (upper right corner of main PCB).
- Red FLASH LED will begin to intermittently during the Boot process. It will then go out once the "Operating Status" screen appears.
- LED D8 (on the smaller board) will start to blink at the rate of about once per second. It will continue to blink after the Quantum has booted.
- Once the screen displays "Loading…", LED's D4 , D5, D7 and D8 will be on solid.
- The "Operating Status" screen will appear.
- Once actual data has been displayed on this screen, LED D13 will come on solid and D10, D11, and D12 will start to flash at a quick rate.

After the Quantum has properly powered up, the following sequence of events is indicative of proper communication to the analog and digital boards:

- The TX/RX LED’s near the white connector will begin to blink.
- The Analog and Digital I/O boards TX/RX lights should be blinking.
- Each I/O board should have the power LED (next to the white connector) lighted and the “Active” LED (next to the blue DIP switch) should be blinking.

WHAT IF THE “OPERATING STATUS” SCREEN IS NOT SHOWN

If the “Operating Status” screen is not shown, check the following items:

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1. If no LED’s are lighted, then check power AC and DC.
2. Check if the lighting of the LED’s is occurring as de-scribed in the “What Should Occur When Powering Up The Panel” section.
    - If the powering up sequence continues to repeat without displaying the “Operating Status” screen, then there is a booting problem.

3. Check if an error message is displayed when booting.
    - Be sure to write down any error messages that appear.

4. Check that the software is OK:
    - Is the correct software installed?
    - Did you just install new software?
    - If you need to clear the numerical setpoint and calibration areas of memory for any reason, clear the memory as described in the S90-010 FSI publication**. NOTE: This information will be replaced by factory default values, so any**

setpoint and calibration data values that need to be customized must be reentered.

5. Check for bad connections.
6. Check the display. If the CPU board is booting but you have no display, check the following:
   - Check the LCD backlight tube. Look very closely at the display to see if anything is visible in the dark screen. You will need good lighting and look for any “ghost” type image. If it appears that there is something on the screen but very dark, the problem maybe the LCD backlight tube. On the LG Philips, NEC and Sharp displays this tube is field replaceable. On the Samsung LCD display it is not available and the display will have to be replaced. You must take the display apart to identify the display manufacturer.
   - Verify that both the display cable and the inverter cable are firmly seated. It may be necessary to remove the video cable from the back of the LCD display and reseat it to be sure it is connected properly. **Note: This is a small connector and caution should be observed so that it is not damaged due to excessive force.**
   - Check the backlight inverter connector (P4). When the Quantum board is mounted in the panel, this connector is located at the middle left of the board. The pins on the right side are odd numbered, with pin P(1) at the bottom - pin P(9) at the top. The pins on the left side are even numbered, with pin P(2) at the bottom - pin P(10) at the top. After the Quantum has booted, pin P(3) should measure +2.4Vdc, pins P(4) and P(5) are DC grounds, and pins P(6) and P(7) should measure +12Vdc. A bad inverter will also cause a dark display.
   - Reference the "Display Assembly Component Replacement Guide" at the end of this section and check that the LCD, LCD cable, and software versions are matched correctly.

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1. If no LED’s are lighted, then check power AC and DC.
2. Check if the lighting of the LED’s is occurring as de-scribed in the “What Should Occur When Powering Up The Panel” section.
   - If the powering up sequence continues to repeat without displaying the “Operating Status” screen, then there is a booting problem.
3. Check if an error message is displayed when booting.
   - Be sure to write down any error messages that appear.
4. Check that the software is OK:
   - Is the correct software installed?
   - Did you just install new software?
   - If you need to clear the numerical setpoint and calibration areas of memory for any reason, clear the memory as described in the S90-010 FSI publication**. NOTE: This information will be replaced by factory default values, so any setpoint and calibration data values that need to be customized must be reentered.**
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   - Verify that both the display cable and the inverter cable are firmly seated. It may be necessary to remove the video cable from the back of the LCD display and reseat it to be sure it is connected properly. **Note: This is a small connector and caution should be observed so that it is not damaged due to excessive force.**
   - Reference the "Display Assembly Component Replacement Guide" that follows, and check that the LCD, LCD cable, and software versions are matched correctly.

DISPLAY ASSEMBLY COMPONENT REPLACEMENT GUIDE
Quantum 3

DESCRIPTION	MANUFACTURER			
	SAMSUNG	NEC (OBSOLETE)	SHARP	LG PHILIPS (CURRENT)
10.4” TFT Display	333Q0001180	333Q0001494	333Q0001581	649C1078H01
Backlight Inverter	333Q0001582 (OR 333Q0001181)	333Q0001495	333Q0001582	333Q0001582
Cable - CPU to Display	640B0036H01	640B0043H01	640B0045H01	640B0065H01
Cable - CPU to Inverter	640B0032H01	640B0044H01	640B0032H01	640B0032H01
Replacement - Backlight	Not Available	333Q0001587	333Q0001588	333Q0001785
Display Replacement Assy.	640C0021G01	640C0021G01 Rev (A)	640C0021G01 Rev (B)	640C0052G01

DISPLAY ASSEMBLY COMPONENT REPLACEMENT GUIDE
Quantum 4

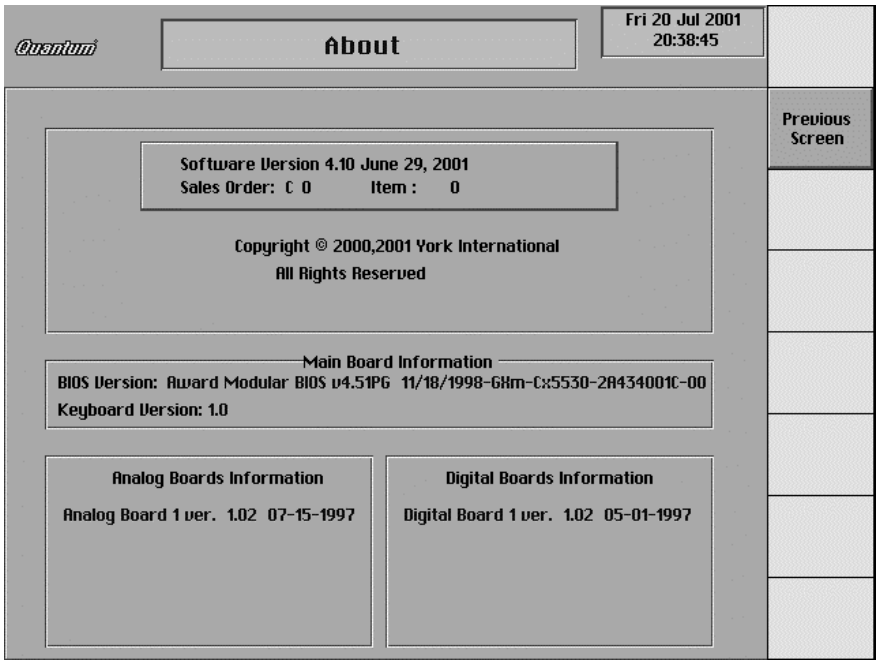
DESCRIPTION	MANUFACTURER			
	SAMSUNG	NEC (OBSOLETE)	SHARP	LG PHILIPS (CURRENT)
10.4” TFT Display	333Q0001180	SEE NOTE "A"	333Q0001581	649C1078H01
Backlight Inverter	333Q0001582 (OR 333Q0001181)		333Q0001582	333Q0001582
Cable - CPU to Display/Inverter	649D4824H01		649D4824H01	649D4824H01
Replacement - Backlight	Not Available		333Q0001588	333Q0001785
Display Replacement Assy.	640C0021G01		640C0021G01 Rev (B)	640C0052G01

NOTE A: When upgrading from a Quantum 3 with an NEC Display, to the Quantum 4, the display will need to be upgraded also. Order 640C0021G01 to replace the display.

TROUBLESHOOTING ANALOG AND DIGITAL PROBLEMS

The information that follows in this section can help locate problems that can occur with Analog and Digital input and output circuit boards.

"About" Screen



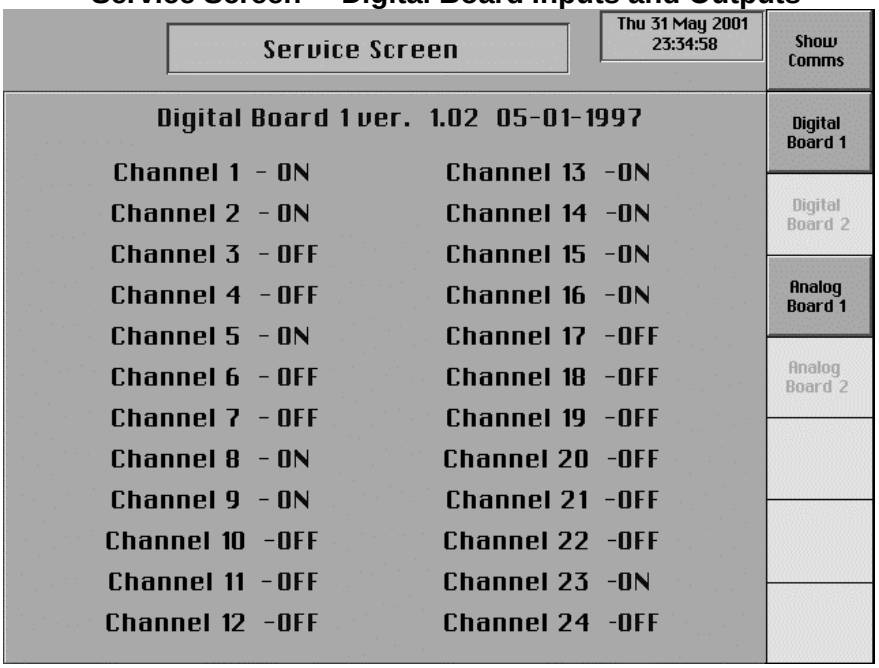
The "About" screen shows the Analog and Digital boards that have been detected. If a board has lost communications, a shutdown will be issued. All outputs are turned off on a Digital Board that has lost communications. All outputs will get set to their minimum value range on an Analog Board that has lost communications. A loss of communications to an analog board will probably result in sensor fault shutdown messages that are associated with the sensors on that board.

Diagnosing an Analog or Digital Board Problem

The Analog and Digital Boards have built-in features that help to troubleshoot faulty boards. Following is a description of the built-in features:

1. The Analog and Digital Boards have an "Active " LED indicator on the board that blinks when the board's software is running.
   - If the "Active" LED is not blinking, check to ensure that the EPROM is installed properly.
2. There is also a "Power" LED that lights when DC power is applied to the board.
   - If the power LED is not lighted, check the cable for proper connectivity. **Note: Each board provides the necessary connections to feed all signals to the following connectors. If the auxiliary Analog or Digital Board is not present then a jumper plug (Part # 640B0039H01) must be installed to daisy chain the signals.**
3. The main indication of communications is the RX/TX LED's on the I/O board. These LED's should blink in response to the blinking of the main processor board's I/O communication activity RX/TX LED's. If the RX LED on the I/O board is blinking but the board was not detected on the "About" screen, or an I/O Comm failure occurs, check the address of the board.
   - Reference the "JUMPER AND DIPSWITCH SETTINGS" section later in this manual. This section contains the dipswitch settings for addressing the Analog and Digital I/O Boards numbers (1) through (6). When these switches are properly set, the main processor board is able to serially communicate with each board and provide control signals and data exchange.

"Service Screen" - Digital Board Inputs and Outputs



Troubleshooting Digital Inputs and Outputs

The "Service Screen" has been provided to view the raw data from a Digital Board. There is a separate screen for each of the Digital Boards that are present. Digital values are shown as ON or OFF.

Checking the Digital Inputs and Outputs

Some problems that are encountered involve troubleshooting the digital inputs and outputs. The Digital I/O (Input / Output) boards have six Digital I/O (DIO) board connectors labeled P1 through P6. The input and output modules are wired to a DIO connector plug. Position 3 provides power and position 4 is a neutral on the DIO connectors. Position 1, 2, 5, and 6 are signal connections.

The Digital I/O board's I/O modules are configured by proper module selection, AC or DC, operating voltage, input or output, and moving the fuse to the "in" or "out" position. An LED is associated with each module and displays the state of each module. A lighted LED represents an Input that is "High" or an Output that is "On". Each of the sixteen modules has a corresponding software configuration screen.

If a properly configured Digital I/O is not responding correctly, first look at the digital board on the "Service Screen" and check if the module is on. If it is not on, check if the LED on the digital board is also not lit. If the LED is not lit, then check the fuse. If the fuse is OK, then check the module.

FUSE TESTING AND REPLACEMENT

1. Power off the panel.
2. Open the panel door.
3. Remove the questionable fuse.
4. Place the questionable fuse into the fuse tester at the bottom of each digital I/O board.
5. Power on the panel.
6. Check the LED on the tester. If the LED is lit, the fuse is OK.
7. Power off the panel.
8. If the fuse is faulty, replace the fuse with a new plug-type fuse (Part # 333Q0001326).

Input and Output Module Testing and Replacement

1. Power off the panel.
2. Open the panel door.
3. Replace the questionable module.
4. Power on the panel.
5. If it is an output module, check for proper panel voltage on the DIO connector plug. Check the voltage between position 4 (neutral) and the associated position to the output module.
6. If it is an input module, check if the associated LED is on when power is applied to the module.

Troubleshooting an Output

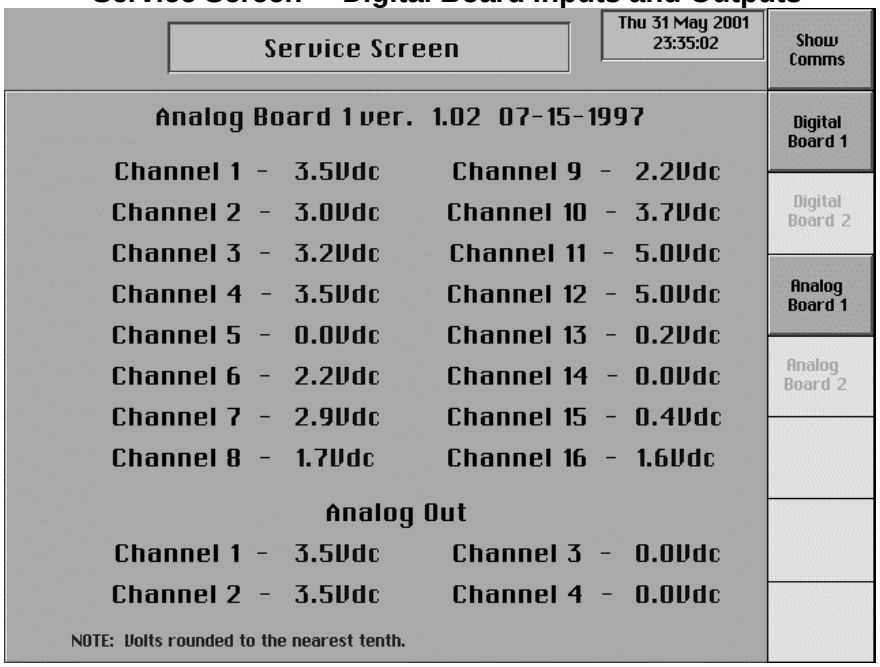
1. Make sure the LED associated with the output is on when power is applied to the module.
2. If the LED is not on when it should be and there is no operating condition preventing it, contact the Frick Service Department.
3. If the LED is on when it should be, check for proper panel voltage on the DIO connector plug. Check the voltage between the position 4 (neutral) and the associated position to the output module.
4. If the voltage is OK, check for proper panel voltage between the associated position to the output module on the DIO connector and the associated position on the terminal strip.

5. If the voltage is OK, check the wiring external to the panel.
6. If voltage is not OK, check the fuse.
7. If the fuse is OK then check the module.
8. If the module is OK, check for proper panel voltage on the DIO connector plug between position 3 (Hot) and position 4 (neutral).

Troubleshooting an Input

1. Make sure the LED associated with the input is on when power is applied to the module.
2. If the LED is on then the fuse and input module are good.
3. If the LED is on and there is no input voltage, replace the input module.
4. If the LED is not on when power is applied, check the fuse.
5. If the fuse is good, replace the input module.

"Service Screen" - Digital Board Inputs and Outputs



Troubleshooting Analog Inputs and Outputs

The “Service Screen” has been provided to view the raw data from an Analog Board. There is a separate screen for each of the Analog Boards that are present. Analog values are converted from binary to show volts. The error factor is ± .05 volts.

Checking The Analog Inputs and Outputs

The Analog I/O Boards have numerous jumpers that must be properly selected. There are sixteen analog input channels that can be selected for 4-20ma, 0-5Vdc, or ICTD. Channel #16 will also take the 0-5 Amp motor CT as an input. All of these jumper settings are listed later in this manual (Jumper and Dipswitch Settings Section). Besides properly setting the hardware jumpers, each channel is setup in software for the proper transducer type and range, and each transducer must also be calibrated through the appropriate sensor calibration screen. Improper setup of either the hardware or software will result in improper operation or range.

The most common fault associated with the reading of the analog channels other than hardware or software setup problems fall into one of the following categories: Sensor fault, wiring problem, improper grounding of system.

An open wire, shorted wire, or faulty sensor will usually give a reading at either the minimum or maximum end of the range scale. An erratic reading or a reading that seems to float up and down is usually indicative of a grounding problem. When a single transducer or cable is shorted to earth (or system) ground, this can show up as a whole assortment of problem channels. The easiest way to find a short to earth problem is to disconnect all the sensor plugs and ohm out each plug screw terminal to earth for open (infinite) impedance. All sensors should read open to earth with the exception of the CT motor current channel. One side of the CT is grounded in the Motor Control Center (MCC). (The third pin on pressure sensors is ground.)

ADDING AND REPLACING BOARDS

QUANTUM

Replacing the Main Board involves a Flash Card memory load which will clear the current setpoints and data stored in the non-volatile memory on the main board. It is suggested that the operator first record all control setpoints prior to board re-placement. **Factory Setup settings will also be lost.** The setpoint data sheets are useful for recording this information. Make sure that the operator can access Factory Setup to restore all compressor specific settings.

The procedure to replace the main board is outlined below:

1. Shut off control power.
2. Remove the old board from the machine and the new board from its packing and place both on an anti-static surface.
3. Remove the battery from the old board and install in the new board.
4. Then install the modified replacement board in the panel.
5. Verify that all jumpers are installed properly.
6. Follow the directions in the Factory Setup manual (S90-10-FSI) for the procedure to reload a program Flash Card.

ANALOG AND DIGITAL BOARDS

The procedure to replace an analog or a digital board is outlined below:

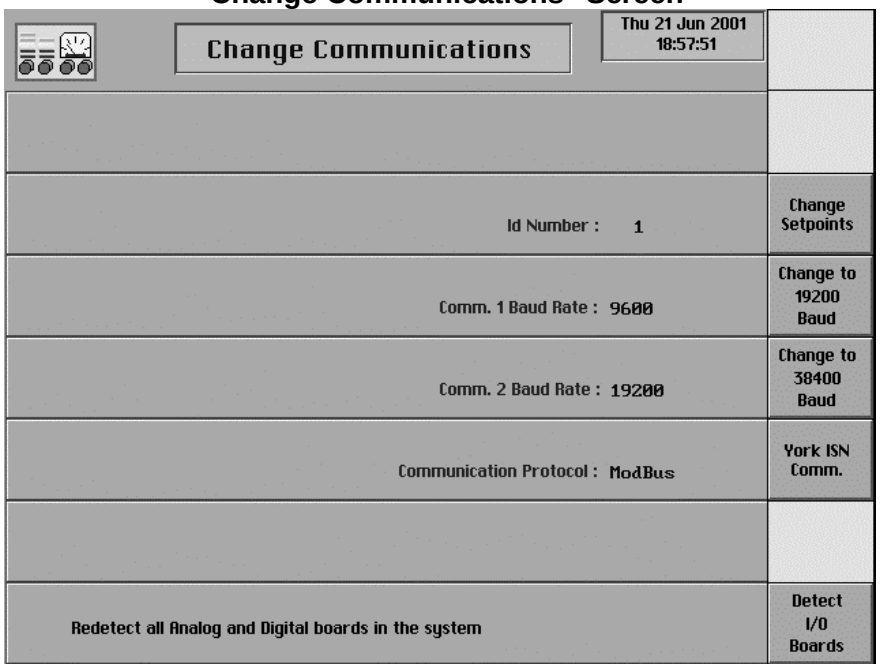
1. Shut off control power.
2. Remove the old board from the machine and the new board from its packing and place both on an anti-static surface.
3. Remove any required chip(s) from the defective board and install them in the replacement board.
4. Check that all jumpers, dip switches and components are properly setup on the new board as it was on the old board.
5. Install the modified replacement board in the panel.

The procedure to add an analog or a digital board is outlined below:

1. Remove the new board from its packing and place it on an antistatic surface.
2. Make sure the board's dip switch ID has been set properly.
3. Check that all jumpers and components are properly setup.
4. Shut off control power.
5. Install the new board in the panel. See the Control Center Assembly (drawing no. 640D0070) for proper mounting location of the board.
6. To prevent possible noise problems from improper wiring:
   - When routing wiring to the terminal strip, keep as much separation as possible between the analog boards wiring and the AC control wiring of the digital I/O boards.
   - DO NOT run any AC lines parallel to sensor lines!!

After replacing or installing an analog or digital board and powering on the control panel, select **[Detect I/O Boards]** from the "Change Communications" display in Panel Setup. This selection provides a method to detect all connected Analog and Digital boards. If a board has been removed, a communication error shutdown will be issued until this key is selected. The "About" screen will show what was detected.

"Change Communications" Screen



Replacing Analog And Digital Boards

After replacing or installing an Analog or Digital board and applying power on the control panel, select **[Detect I/O Boards]** from the "Change Communications" screen in Panel Setup. This selection provides a method to detect all connected Analog and Digital boards. The "About" screen will show what was detected.

DISPLAY REPLACEMENT

1. Shut off control power.
2. Remove the defective display.
3. Install the new display.

TROUBLESHOOTING A PROBLEM THAT APPEARS UNEXPLAINABLE

When there is a problem that makes no sense due to unexplainable things happening, then check the following:

1. It is important to know if the unit ever worked properly.
2. If the unit used to work properly, try to determine when the problem first showed up.
3. It is important to know if the problem occurs randomly, frequently, or all the time.
4. Check what the temperature is in the engine room and at the panel. Is it very hot or very cold?
   - Make sure that the motor is not blowing exhaust air on the control panel.
5. If it just started to act up, then check if there was recently a severe lightning storm, fire, flood, or a plant accident. If any of the following conditions are possible, then check for it:
   - Has any water, refrigerant, or oil leaked into the panel or conduit?
   - Is the conduit with the Slide Valve or Slide Stop full of liquid?
   - Is the Slide Stop potentiometer cover filled with water?
6. If it just started to act up, then check if anything was recently changed in the system (i.e. software or hardware.)
7. If it just started to act up, then check if any service was recently done to the compressor or it's electrical system?
8. If there is communication wiring connecting the panel to another panel or device, then check the following:
   - If the Quantum is unexplainably shutting down, try disconnecting the communications cable to see if the problem goes away.
   - Check if the communications cable shields are tied to machine ground at only one location. For a PLC or Opto22 based system, the shield should normally be tied only at the PLC or Opto22 panel. For dual sequencing machines, the shield should only be tied to ground in one panel, typically the "Lead" machine.
   - Check that you are using the Frick recommended communications cable. See manual to match proper cable with type of communications (i.e., RS-422, RS-232, RS-485, or some other type of factory communication bus system.)
9. If this is an older plant, has the plant wiring been brought up to code?
10. Do you have power wiring mixed with control wiring?
11. Do you have power wiring mixed with sensor wiring?
12. Do you have power wiring mixed with communications wiring?
13. Check that the starter panel is grounded to the plant transformer. There are usually four wires: 3 for the 3 phases and 1 for plant ground.
14. Check that the motor is grounded to the starter panel. There are usually four wires: 3 for the phases and 1 for ground.
15. Ensure that one side of the motor current transformer is grounded in the motor starter panel. The wire to the control panel terminal #2 is usually the only one grounded.
16. Check that the pressure transducers are properly grounded. The two types of transducers you may have are as follows: an older type has an 8 to 10 inch 3-conductor pigtail coming out of the transducer. This type will have the attaching cable's shield cut off and insulated at the transducer end. The shield is then tied to a panel ground terminal in the panel. The newer type has the cable as an integral part of the housing and has the shield crimped to the case at the transducer end. This type of transducer has the cable's shield cut off and insulated in the control panel.
17. Check that the temperature transducers are properly grounded. The temperature probes usually have two short wires coming out of the sensor, and are tied to a shielded cable at the thermal well head. The shield is grounded at the temperature probe and insulated at the panel end.
18. Check if one of the temperature probes has a signal wire shorted to machine ground. To do this, first pull the orange plug from the micro board and then use an Ohmmeter and check each white wire to machine ground and each black wire to machine ground.
19. Check that all inductive loads (i.e. Coils, Solenoids, or Relays, etc.) connected to the I/O output modules have surge suppressers across them, preferably at the devices and not at the panel end.
20. If the compressor control settings unexplainably change modes, it may be a noise problem affecting the keypad's input circuit. Check if it works OK with the keypad cable disconnected. If it works OK, then check the grounding as described above. If the grounding is OK then replace the keypad.
21. Make sure that you have a continuous ground back to the power source. The ground connection must be aluminum or copper. A conduit ground will not work. Do not drive a ground stake at the compressor since extraneous currents will be attracted to the compressor.
22. Make sure that there is no AC wiring lying next to the printed circuit board.
23. Unexplainable compressor auxiliary failures are usually indicative of noise due to wiring problems (i.e. incorrect earth grounds, mixed power and control wiring, unsuppressed coils, etc)
24. If the compressor is unexplainably shutting down, check if the machine shares control transformer power with something else. Make sure each compressor has its own isolation transformer in the motor control center off of the three-phase bus with the secondary properly grounded.

TROUBLESHOOTING CHART FOR FRICK QUANTUM CONTROL PANEL (REFER TO WIRING DIAGRAMS)

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
DISPLAY IS INOPERATIVE	Check for power at the panel. See if any of the diagnostic lamps on the Main Board are blinking or any lights are blinking on the other boards. If no lights are blinking, make sure the control power switch is switched on. If there are still no lights, then check the circuit breaker (2CB). If the breaker is not tripped, check for power into 2CB. If there is no power, check the external power being supplied. If power from 2CB, check power supply for input AC and output DC level. Shut off power to the panel and first confirm that connector CN2 is connected (on back of display). This is a delicate connection and care should be used to reconnect it. Confirm that CN1 and CN2 of the backlight inverter are connected. Confirm that the display harness (and inverter for the Quantum 3) on the main board are cabled and that all other cables and wires connections are made. Reference Dwg. No. 640D0070 sheet 2.
OIL PUMP DOES NOT START	The LED (D3) for Output 3 (MOD 3) of Digital I/O Board #1 should be on when Manually On is selected for the oil pump mode. If the pump does not start when the LED is on, check for the proper panel voltage between position 4 and 5 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F3) and if the fuse is OK, check the output module (MOD 3). If the voltage was OK, check for the proper voltage between position 5 on the P1 DIO connector and position 8 on the terminal strip. If voltage is OK, check for the proper voltage between position 8 and 2 on the terminal strip. If the voltage is OK, check at the oil pump. The Oil Pump #1 Auxiliary Contact switches voltage to Input 4 (MOD 4) of Digital I/O Board #1 when the auxiliary contacts are closed. If the input does not turn on, check if the LED (D4) is lit when it should be. If it isn't, check the fuse (F4) and if the fuse is OK, check the input module (MOD 4).
OIL PUMP IS RUNNING BUT THE COMPRESSOR DOES NOT START	If shutdown message "Compressor Starting, Low Oil Pressure - Shutdown" is displayed, refer to the section in the compressor manual on troubleshooting the oil pump system. For compressor models with a slide valve: Verify that the Slide Valve has unloaded to or below the "Highest Slide Valve Position to allow starting the compressor" setpoint. If the slide valve has not unloaded, troubleshoot the hydraulic system. Compressor will not start until the Slide Valve is unloaded. Output 1 (MOD 1) of Digital I/O Board #1 controls the motor starter. If the motor does not start when the LED (D1) is on, check for the proper panel voltage between position 4 and 1 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F1) and if the fuse is OK, check the output module (MOD 1). If the voltage was OK, check for the proper voltage between position 1 on the P1 DIO connector and position 18 on the terminal strip. If voltage is OK, check for the proper voltage between position 18 and 2 on the terminal strip. If the voltage is OK, check the interposing relay (By others).
COMPRESSOR AUXILIARY SHUTDOWN	Output 1 controls the Compressor Start Relay (By others). If the compressor does not start and the LED (D1) for Output 1 (MOD 1) is on, check for the proper panel voltage between position 4 and 1 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F1) and if the fuse is OK, check the output module (MOD 1). If the voltage was OK, check for the proper voltage between position 1 on the P1 DIO connector and position 18 on the terminal strip. If voltage is OK, check for the proper voltage between position 18 and 2 on the terminal strip. If the voltage is OK, check the interposing relay (By others). The Compressor Starter Auxiliary Contacts turn on Input 2 (MOD 2) of Digital I/O Board #1 when they are closed. These contacts are located on the Compressor Starter. If the input does not turn on check if the LED (D2) is lit when it should be. If it isn't, check the fuse (F2) and if the fuse is OK, check the input module (MOD 2).

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
OIL HEATERS DO NOT OPERATE	The oil heaters should operate only when the compressor is NOT running and the oil separator temperature is not greater than or equal to the “Oil Heater Off Above” setpoint. If the oil heaters do not work and the LED (D21) for Output 21 (MOD 21) is on, check for the proper panel voltage between position 4 and 1 on the P6 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F21) and if the fuse is OK, check the output module (MOD 21). If the voltage was OK, check for the proper voltage between position 1 on the P6 DIO connector and position 9 on the terminal strip. If voltage is OK, check for the proper voltage between position 9 and 2 on the terminal strip. If the voltage is OK, check the Oil Heater Relay (1CR). If the problem hasn’t been located, check the circuit breaker (1CB). If the breaker is not tripped, check power into 1CB. If OK check between Wires 103 and 106. If the Oil Heater Relay (1CR) is closed, check for proper panel voltage between wires 106 and 102. If OK, check the Oil Heater.
COMPRESSOR DOES NOT LOAD and/or UNLOAD* (Compressor that steps on Capacity)	For a 4-Step compressor, verify that the 50% SV (Solenoid Valve) is energized BEFORE the 75% SV is energized. For a 3-Step compressor, verify that 75% SV is energized BEFORE the 100% SV. Feel hydraulic tubing to the compressor unloading pistons. If tubing is hot, inspect the unloader pistons for worn parts or improper seating. Check that the hydraulic valves feeding the solenoid valve as well as those feeding the unloader pistons are open. Confirm that hydraulic tubing and wiring is properly connected. Check the solenoid valve coil to see if it has been damaged. **NOTE: Verify that the proper capacity control setpoint has been programmed.**
COMPRESSOR WILL ONLY PARTIALLY LOAD* (Compressor that steps on Capacity)	With the first SV (solenoid valve) properly energized, verify that the second SV energizes and then check the third SV if there is one for this compressor model. Check that the hydraulic valves feeding the first SV as well as those feeding the compressor unloading pistons are open. Inspect the compressor unloading ports for worn or improperly seated parts.
SLIDE VALVE DOES NOT LOAD and/or NLOAD*	Verify that the Slide Valve is in the AUTO mode and that capacity control is calling for load and/or unload. Output 5 (MOD 5) controls the Slide Valve Load Solenoid. If LED (D5) for Output 5 (MOD 5) is on, check for the proper panel voltage between position 4 and 1 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F5) and if the fuse is OK, check the output module (MOD 5). If the voltage was OK, check for the proper voltage between position 1 on the P2 DI O connector and position 17 on the terminal strip. If voltage is OK, check for the proper voltage between position 17 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. Output 6 (MOD 6) controls the Slide Valve Unload Solenoid. If the LED (D1) for Output 6 (MOD 6) is on, check for the proper panel voltage between position 4 and 2 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F6) and if the fuse is OK, check the output module (MOD 6). If the voltage was OK, check for the proper voltage between position 2 on the P2 DIO connector and position 16 on the terminal strip. If voltage is OK, check for the proper voltage between position 16 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. **NOTE: Verify that the proper capacity control setpoint has been programmed.**

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
SLIDE STOP DOES NOT INCREASE and/or DECREASE* Some Compressor Models: Slide Stop Increase = Decrease to 3.5Vi Slide Stop Decrease = Decrease to 2.2Vi	Verify that the Slide Stop is in the AUTO mode and that the VI Ratio is calling for a VI increase or decrease. Output 7 (MOD 7) controls Slide Stop Increase Solenoid. If the LED (D7) for Output 7 (MOD 7) is on, check for the proper panel voltage between position 4 and 5 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F7) and if the fuse is OK, check the output module (MOD 7). If the voltage was OK, check for the proper voltage between position 5 on the P2 DIO connector and position 15 on the terminal strip. If voltage is OK, check for the proper voltage between position 15 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. Output 8 (MOD 8) controls the Slide Stop Decrease Solenoid. If the LED (D8) for Output 8 (MOD 8) is on, check for the proper panel voltage between position 4 and 6 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F8) and if the fuse is OK, check the output module (MOD 8). If the voltage was OK check for the proper voltage between position 6 on the P2 DIO connector and position 14 on the terminal strip. If voltage is OK, check for the proper voltage between position 14 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve.
LIQUID INJECTION SOLENOID DOES NOT ENERGIZE* (Liquid Injection Refrigerant Cutout - LICO)	Verify that the Liquid Injection TXV is modulating properly and not feeding excessive liquid to LICO the compressor. This solenoid SHOULD be de-energized when the compressor is off. This solenoid should be energized if the oil temperature equals or exceeds the “Oil Temperature On At” setpoint for the delay time. Output 9 controls the Liquid Injection Solenoid. If the LED (D9) for Output 9 (MOD 9) is on, check for the proper panel voltage between position 4 and 1 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F9) and if the fuse is OK, check the output module (MOD 9). If the voltage was OK, check for the proper voltage between position 1 on the P3 DIO connector and position 13 on the terminal strip. If voltage is OK, check for the proper voltage between position 13 and 2 on the terminal strip. If the voltage is OK, check the solenoid.
HI Vi LIQUID INJECTION PORT SOLENOID DOES NOT ENERGIZE*	Output 10 controls the Hi Vi Liquid Injection Port solenoid. If the LED (D10) for Output 10 (MOD 10) is on, check for the proper panel voltage between position 4 and 2 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F10) and if the fuse is OK, check the output module (MOD 10). If the voltage was OK check for the proper voltage between position 2 on the P3 DIO connector and position 12 on the terminal strip. If voltage is OK, check for the proper voltage between position 12 and 2 on the terminal strip. If the voltage is OK, check the solenoid. **NOTE: For an RXB and a GST compressor model, this output should only be on when the Vi is at 5.0.**
ECONOMIZER*	Output 11 (MOD 11) controls the Economizer Solenoid Valve. If the LED (D11) for Output 11 (MOD 11) is on, check for the proper panel voltage between position 4 and 5 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F11) and if the fuse is OK, check the output module (MOD 11). If the voltage was OK, check for the proper voltage between position 5 on the P3 DIO connector and position 11 on the terminal strip. If voltage is OK, check for the proper voltage between position 11 and 2 on the terminal strip. If the voltage is OK, check the solenoid. **NOTE: The economizer output should only be on when the slide valve is at or above the 90% position.**
ALARM CIRCUIT DOES NOT ENERGIZE	Output 22 (MOD 22) controls the Alarm Circuit. The Alarm should turn on only when there is an alarm or shutdown. If the Alarm does not occur when these conditions are found and the LED (D22) for Output 22 (MOD 22) is on, check for the proper panel voltage between position 4 and 2 on the P6 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F22) and if the fuse is OK, check the output module (MOD 22). If the voltage was OK, check for the proper voltage between position 2 on the P6 DIO connector and position 21 on the terminal strip.

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
CONTROL PANEL DOES NOT RESPOND TO REMOTE CONTROL SIGNALS	Digital I/O Board 2, Inputs 3 through 5 can be used to operate the compressor from a remote location. **NOTE: Check the Operating display to verify that the compressor and the Slide Valve are in REMOTE.** If the Input 3 (MOD 3) does not turn on, check if the LED (D3) is lit when it should be. If it isn't, check the fuse (F3) and if the fuse is OK, check the input module (MOD 3). If the Input 4 (MOD 4) does not turn on, check if the LED (D4) is lit when it should be. If it isn't, check the fuse (F4) and if the fuse is OK, check the input module (MOD 4). If the Input 5 (MOD 5) does not turn on, check if the LED (D5) is lit when it should be. If it isn't, check the fuse (F5) and if the fuse is OK, check the input module (MOD 5).
MOTOR LOAD CONTROL(FORCED UNLOAD) OCCURS AT HIGH MOTOR AMPS	The current transformer is used to convert the AC motor amps to a DC voltage signal for the microprocessor. If the %FLA reading from the Operating display is incorrect, contact the Frick Service Department.
MOTOR LOAD CONTROL(FORCED UNLOAD) OCCURS AT LOW MOTOR AMPS	The current transformer is used to convert the AC motor amps to a DC voltage signal for the microprocessor. If the %FLA reading from the Operating display is incorrect, contact the Frick Service Department.
PRESSURES ON THE OPERATING SCREEN DO NOT APPEAR CORRECT	TEST 1 - Shut down the compressor and allow pressures to equalize. Discharge pressure and oil pressure should have the same reading. TEST 2 - If either oil pressure or discharge pressure read different pressures, one or both transducers are at fault. Valve off the suction transducer from the unit and open the vent valve on transducer manifold to atmosphere. If the suction transducer reads atmospheric pressure, then the transducer in Test 1, which agrees with the suction transducer, is correct. The transducer which disagrees is defective. **NOTE: Reference the Pressure Transducer Conversion Data Chart.**
COMPRESSOR WITH SLIDE VALVE DOES NOT AUTOMATICALLY LOAD OR UNLOAD*	Verify that the Slide Valve Mode **[AUTO]** key has been pressed and AUTO appears under Slide Valve Mode on the "Operating Status" screen. If the problem persists, see the Troubleshooting section SLIDE VALVE DOES NOT LOAD and/or UNLOAD.
COMPRESSOR THAT STEPS ON CAPACITY DOES NOT AUTOMATICALLY LOAD OR UNLOAD*	Verify that the Capacity Mode **[AUTO]** key has been pressed and AUTO appears under Capacity Mode on the "Operating Status" screen. If the problem persists, see the Troubleshooting section COMPRESSOR DOES NOT LOAD and/or UNLOAD.

* If applicable

COMPRESSOR MODEL DIFFERENCES

FRICK GRAM	RWB, SC GSV, YLC	RXB* GST*	RXF	RDB 3-Step GSB 3-Step	RDB 4-Step	Other
Slide Valve Reading	0-100%	0-100%	0-100%	N/A	N/A	0-100%
Slide Valve Setpoints	Yes	Yes	Yes	N/A	N/A	Yes
Slide Valve Calibration	Yes	Yes	Yes	N/A	N/A	Yes
Capacity Reading	N/A	N/A	N/A	50,75,100	25,50,75,100	N/A
Slide Stop Reading	2.2-5.0	2.2,3.5,5.0	2.2,3.5,5.0	N/A	N/A	N/A
Slide Stop Calibration	N/A	N/A	N/A	N/A	N/A	N/A
DX Circuit Option	Yes	Yes	Yes	N/A	N/A	Yes
Hot Gas Bypass/SV Setpoints Option	Yes	Yes	Yes	N/A	N/A	Yes
Remote Slide Valve Position Option	Yes	Yes	Yes	N/A	N/A	Yes
Sequence by Comp. Sequencing	Yes	Yes	Yes	N/A	N/A	Yes
Forced unload Inhibit load delay setpoint	N/A	N/A	N/A	Yes	Yes	N/A

* Or other variable VI
N/A = Not Applicable

JUMPER AND DIPSWITCH SETTINGS

DIGITAL BOARD

DIGITAL I/O BOARD COMMUNICATIONS SETTINGS

J5	In	120 ohm long communications line termination.
	out*	No termination. (standard setting)
J7	In	RS-422/485 transmit pull-up for long communications lines.
	out*	No pull-up. (standard setting)
J8	In	RS-422 transmit pull-up for long communications lines.
	out*	No pull-up. (standard setting)
J9	In	RS-422/485 receive pull-down for long communications lines.
	out*	No pull-down. (standard setting)
J10	In	RS-422 receive pull-down for long communications lines.
	out*	No pull-down. (standard setting)

* = standard setting

DIGITAL I/O BOARD DIPSWITCH SETTINGS

	SW1	SW2	SW3	SW4	SW5	SW6
Board #1	on	on	on	on	off	on
Board #2	off	on	on	on	off	on
Board #3	on	off	on	on	off	on
Board #4	off	off	on	on	off	on
Board #5	on	on	off	on	off	on
Board #6	off	on	off	on	off	on

ANALOG BOARD

ANALOG BOARD COMMUNICATIONS SETTINGS

J33	In	RS-422/485 receive pull-down for long communications lines.
	Out *	No pull-down. (standard setting)
J34	In	RS-422/485 transmit pull-up for long communications lines.
	Out *	No pull-up. (standard setting)
J35	In	RS-422 receive pull-down for long communications lines.
	Out *	No pull-down. (standard setting)
J36	In	RS-422 transmit pull-up for long communications lines.
	Out *	No pull-up. (standard setting)
J37	In	120 ohm long communications line termination.
	Out *	No termination. (standard setting)

ANALOG BOARD DIPSWITCH SETTINGS

	SW1	SW2	SW3	SW4	SW5
Board #1	On	On	On	On	Off
Board #2	Off	On	On	On	Off
Board #3	On	Off	On	On	Off
Board #4	Off	Off	On	On	Off
Board #5	On	On	Off	On	Off
Board #6	Off	On	Off	On	Off

ANALOG BOARD #1

Input Channel #1 – Suction Temperature

J1	Out	0-5 volt input
	1-2	4-20 ma. input
	2-3*	ICTD input (standard setting)

Input Channel #2 - Discharge Temperature

J2	Out	0-5 volt input
	1-2	4-20 ma. input
	2-3*	ICTD input (standard setting)

Input Channel #3 - Oil Temperature

J3	Out	0-5 volt input
	1-2	4-20 ma. input
	2-3*	ICTD input (standard setting)

Input Channel #4 – Oil Separator Temperature

J4	Out	0-5 volt input
	1-2	4-20 ma. input
	2-3*	ICTD input (standard setting)

Input Channel #5 – Leaving Process Temperature**

J5	Out	0-5 volt input
	1-2	4-20 ma. input
	2-3*	ICTD input (standard setting)

Input Channel #6 - Oil Pressure

J6	out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #7 - Oil Filter Pressure**

J7	Out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #8 - Discharge Pressure

J8	Out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #9 – Suction Pressure

J9	Out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #10 - Balance Piston Pressure**

J10	Out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #11 - System Discharge Pressure**

J11	Out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input

Input Channel #12 - Remote Capacity Control Setpoint**

J12	Out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #13 - Remote Slide Valve Position**

J13	Out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #14 - Slide Valve**

J14	In	All other input types (0-5 volt, 4-20 ma., ICTD)
	out*	Slide valve potentiometer input. (std setting)
J15	out*	0-5 volt input (standard setting)
	1-2*	4-20 ma. Input
	2-3	ICTD input
J16	in	All other input types (0-5 volt, 4-20 ma., ICTD)
	out*	Slide valve potentiometer input. (std setting)

Input Channel #15 - Slide Stop**

J17	in†	All other input types (0-5 volt, 4-20 ma., ICTD)
	out*	Slide stop potentiometer input. (std setting)
J18	out*	0-5 volt input (standard setting)
	1-2†	4-20 ma. Input
	2-3†	ICTD input
J19	in†	All other input types (0-5 volt, 4-20 ma., ICTD)
	out*	Slide valve potentiometer input. (std setting)

Input Channel #16 - Motor Amps

	J20	J21	J22
0-5 amp CT input*	out (std)	out (std)	in (std)
0-5 volt input	out	out	out
4-20 ma. input	in	out	out
ICTD input	out	in	out

Output Channel #1 - Future

J26	1-2	0-20 ma. output.
	2-3	4-20 ma. output
J39	1-2	4-20 ma. output
	2-3	0-20 ma. Output
IC's	install	U15 & U7 Connect to P10 terminals 1 & 2

Output Channel #2 - Future

J25	1-2	0-20 ma. output.
	2-3	4-20 ma. output
J40	1-2	4-20 ma. output
	2-3	0-20 ma. output
IC's	install	U15 & U6 Connect to P10 terminals 3 & 4

Output Channel #3 - Slide Valve Position \ Capacity**

J24	1-2	0-20 ma. output.
	2-3*	4-20 ma. output (standard setting)
J41	1-2*	4-20 ma. output (standard setting)
	2-3	0-20 ma. output
IC's	install	U15 & U5 Connect to P10 terminals 5 & 6

Output Channel #4 – Remote Control Setpoint**

J23	1-2	0-20 ma. output.
	2-3*	4-20 ma. output (standard setting)
J42	1-2*	4-20 ma. output (standard setting)
	2-3	0-20 ma. output
IC's	install	U15 & U4 Connect to P10 terminals 7 & 8

** If applicable
† RWF compressor standard setting

Note: IC's must also be installed in order to enable the analog output options. U15 along with at least one IC (U4,U5,U6 or U7) installed will enable the channel.

ANALOG BOARD #2

Input Channel #1 - Future Pid #1

J1	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #2 - Future Pid #2

J2	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #3 – Manifold Pressure Eng. Drive

J3	out*	0-5 volt input
	1-2	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #4 - Entering Process Temperature**

J4	out	0-5 volt input
	1-2	4-20 ma. Input
	2-3*	ICTD input (standard setting)

Input Channel #5 - Temp.\Pressure Monitoring Aux. #1**

J5	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #6 - Temp.\Pressure Monitoring Aux. #2**

J6	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #7 - Temp.\Pressure Monitoring Aux. #3**

J7	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #8 - Temp.\Pressure Monitoring Aux. #4**

J8	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #9 - Temp.\Pressure Monitoring Aux. #5**

J9	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #10 - Temp.\Pressure Monitoring Aux. #6**

J10	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #11 - Temp.\Pressure Monitoring Aux. #7**

J11	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #12 - Temp.\Pressure Monitoring Aux. #8**

J12	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #13 - Temp.\Pressure Monitoring Aux. #9**

J13	out	0-5 volt input
	1-2*	4-20 ma. Input (standard setting)
	2-3	ICTD input

Input Channel #14 - Side Load \ Economizer**

J14	in*	All other input types. (0-5 volt, 4-20 ma., ICTD)
	out	Slide valve potentiometer input.
J15	out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input
J16	in*	All other input types. (0-5 volt, 4-20 ma., ICTD)
	out	Slide valve potentiometer input.

Input Channel #15 – Main Oil Injector

J17	in*	All other input types. (0-5 volt, 4-20 ma., ICTD)
	out	Slide valve potentiometer input.
J18	out*	0-5 volt input (standard setting)
	1-2	4-20 ma. input
	2-3	ICTD input
J19	in*	All other input types. (0-5 volt, 4-20 ma., ICTD)
	out	Slide valve potentiometer input.

Input Channel #16 - Kw Monitoring**

	J20	J21	J22
0-5 amp CT input	out	out	in
0-5 volt input	out	out	out
4-20 ma. input*	in (std)	out (std)	out (std)
ICTD input	out	In	out

Output Channel #1 – Future

J26	1-2	0-20 ma. output.
	2-3	4-20 ma. output
J39	1-2	4-20 ma. output
	2-3	0-20 ma. output
IC's	install	U15 & U7 Connect to P10 terminals 1 & 2

Output Channel #2 - Future

J25	1-2	0-20 ma. output.
	2-3	4-20 ma. output
J40	1-2	4-20 ma. output
	2-3	0-20 ma. output
IC's	install	U15 & U6 Connect to P10 terminals 3 & 4

Output Channel #3 – Variable Speed Motor Drive

J24	1-2	0-20 ma. output.
	2-3*	4-20 ma. output
J41	1-2*	4-20 ma. output
	2-3	0-20 ma. output
IC's	install	U15 & U5 Connect to P10 terminals 5 & 6

Output Channel #4 - Condenser**

J23	1-2	0-20 ma. output.
	2-3*	4-20 ma. output (standard setting)
J42	1-2*	4-20 ma. output (standard setting)
	2-3	0-20 ma. output
IC's	install	U15 & U4 Connect to P10 terminals 7 & 8

** If applicable

Note: IC's must also be installed in order to enable the analog output options. U15 along with at least one IC (U4, U5, U6, or U7) installed will enable the channel.

Communications Settings - Quantum 3

COM-1 (Jumpers located adjacent to connector TB1)

Link 1	In* out	Pull down Rx- / Tx- (RS485) or Rx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down
Link 2	in out*	Terminate Rx / Tx (RS485) or Rx (RS422) lines with a 120W resistor. (standard setting) No termination (standard setting)
Link 3	in* out	Pull up Rx+ / Tx+ (RS485) or Rx- (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No termination.
Link 4	in* out	Pull down Tx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down.
Link 5	in* out	Pull up COM2 Tx+ (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No pull down.
Link 16	A* B	RS485 (standard setting) RS422

COM-2 (Jumpers located adjacent to connector TB2)

Link 6	In* out	Pull down Rx- / Tx- (RS485) or Rx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down
Link 7	in out*	Terminate Rx / Tx (RS485) or Rx (RS422) lines with a 120W resistor. (standard setting) No termination (standard setting)
Link 8	in* out	Pull up Rx+ / Tx+ (RS485) or Rx- (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No termination.
Link 9	in* out	Pull down Tx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down.
Link 10	in* out	Pull up COM2 Tx+ (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No pull down.
Link 17	A* B	RS485 (standard setting) RS422
Link 19	in* out	Select RS422/RS485 comms mode. (standard setting) Select RS232 comms mode.

COM-3 (Jumpers located adjacent to connector TB3)

Link 11	In* out	Pull down Rx- / Tx- (RS485) or Rx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down
Link 12	in out*	Terminate Rx / Tx (RS485) or Rx (RS422) lines with a 120W resistor. (standard setting) No termination (standard setting)
Link 13	in* out	Pull up Rx+ / Tx+ (RS485) or Rx- (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No termination.
Link 14	in* out	Pull down Tx- (RS422) line to GND (0V) via a 10K resistor. (standard setting) No pull down.
Link 15	in* out	Pull up COM2 Tx+ (RS422) line to VCC (5V) via a 10K resistor. (standard setting) No pull down.
Link 18	A* B	RS485 (standard setting) RS422

Quantum 4 Communications Jumpers

COM-1 (TB1)

Link 2	in out*	Terminate COM1 Rx / Tx (RS-485) or COM1 Rx (RS-422) lines with a 120W resistor. No termination (standard setting)
Link 7	In* out	Pull down COM1 Rx- / Tx- (RS-485) or COM1 Rx- (RS-422) line to GND (0V) via a 10K resistor. (standard setting) No pull down
Link 8	in* out	Pull up COM1 Rx+ / Tx+ (RS-485) or COM1 Rx- (RS-422) line to VCC (5V) via a 10K resistor. (standard setting) No termination.
Link 9	in* out	Pull down COM1 Tx- (RS-422) line to GND (0V) via a 10K resistor. (standard setting) No pull down.
Link 10	in* out	Pull up COM1 Tx+ (RS-422) line to VCC (5V) via a 10K resistor. (standard setting) No pull down.
Link 16	A* B	COM1 RS-485 (TB1) (standard setting) COM1 RS-422 (TB1)

* = standard setting

COM-2 (TB2 - TB3)

Link 1	in out*	Terminate COM2 Rx / Tx (RS-485) or COM2 Rx (RS-422) lines with a 120W resistor. No termination (standard setting)
Link 3	In* out	Pull down COM2 Rx- / Tx- (RS-485) or COM2 Rx- (RS-422) line to GND (0V) via a 10K resistor. (standard setting) No pull down
Link 4	in* out	Pull up COM2 Rx+ / Tx+ (RS-485) or COM2 Rx- (RS-422) line to VCC (5V) via a 10K resistor. (standard setting) No termination.
Link 5	in* out	Pull down COM2 Tx- (RS-422) line to GND (0V) via a 10K resistor. (standard setting) No pull down.
Link 6	in* out	Pull up COM2 Tx+ (RS-422) line to VCC (5V) via a 10K resistor. (standard setting) No pull down.
Link 11	A* B	COM2 RS-485 (TB2) (standard setting) COM2 RS-422 (TB2)
Link 17	in* out	Select RS-422/RS-485 comms mode for COM2 (TB2). (standard setting) Select RS-232 comms mode for COM2 (TB3).

* = standard setting

TB1 - COM1 RS-485/422 (Used for Sequencing):

4-way screw terminal

Pin	Signal (RS-422)	Signal (RS-485)
4	COM1 TX+	-
3	COM1 TX-	-
2	COM1 RX+	COM1 TX+ / RX+
1	COM1 RX-	COM1 TX- / RX-

TB2 - COM2 RS-485/422 (Standard Communications):

4-way screw terminal

Pin	Signal (RS-422)	Signal (RS-485)
4	COM2 TX+	-
3	COM2 TX-	-
2	COM2 RX+	COM2 TX+ / RX+
1	COM2 RX-	COM2 TX- / RX-

TB3- COM2 RS-232 (Standard Communications):

3-way screw terminal

Pin	Signal (RS-422)
3	Ground
2	RX
1	TX

SETPOINT DATA SHEETS

In most cases, updating software on the Quantum panel will require clearing the current setpoints and data stored in the nonvolatile memory on the main board. It is suggested that the operator first record all control setpoints prior to performing program chip upgrades. Panel Setup and Factory Setup settings will be lost when software is updated. The setpoint data sheets are useful for recording this information.

FACTORY SETUP

Compressor model:

RWBII	RXB	RXF	RDB, 4-STEP	RDB, 3-STEP	GSV II	GST	GSB	GRAM/Other

SC	YLC	YORK S7	Other Var VI	Other Manufacturer

Oil pump:

Demand	No pump	Prelube	Cycling	Full time	Shaft w/Aux	Shaft	Dual

Oil filter:

Yes	No

Refrigerant:

R11		R134a		R717	
R12		R290 - Propane		R1270 - Propylene	
R13		R404a		R744 - CO_2	
R22		R500		R771	
R113		R502		User-Defined	
R114		R503			

K-factor (If User-Defined): _____

Dual discharge control (used for swing machines):

Enabled	Disabled

Liquid injection cooling:

Enabled	Disabled

Main oil injection control (used for close-coupled, 2-stage packages):

Enabled	Disabled

FACTORY SETPOINTS

Volume Ratio (Vi) Range

Low (Default: 2.2)	High (Default: 5.0)	Dead Band (0.0 - 1.00)

Oil Pump (Low Oil Pressure):

Running Alarm (Differential)	Off Alarm (Differential)	Alarm delay (secs.)	Running Shutdown (Differential)	Off Shutdown (Differential)	Shutdown delay (secs.)

NOTE: The default settings are dependent on the type of compressor pump and it's running status as described in the "Control Setup - Oil Setpoints" display section. These settings rarely need altered and alteration may cause serious consequences.

Slide Valve Travel (Default: 190)

Separator Velocity Control:

Reference % (0%)	Compression Ratio (4.00)

Maximum discharge pressure value: _____ (range: 0 - 380 psig, default 225 psig)

Sales Order: C_____ Item: _____

Balance Piston Setup:

Enable	Disable	Output on slide valve % default 70%	Output off slide valve % default 60%	Ignore Delay (0 - 10) min. default 5	Fail Delay (0 - 10) min. default 2

Oil Log Setup:

Enable	Disable	Fail Delay(15 - 120) sec. default 30

Main Oil Injection Safeties:

Enable	Disable	Actual Setpoint (5.0 - 50.0 PSIG) default 15	Fail Delay(0 - 60) sec. default 30

Ram DBS Starter:

Enabled	Disabled

PANEL SETUP

Pressure units:

Psia	Psig	BarA	Bar	Kpaa

Temperature units:

°F	°C

Language:

English	Danish	German	Spanish	Other

Communications:

ID Number: _____ (range: 0 - 99)

Comm. 2 Baud rate:

1200	2400	4800	9600*	19200	38400	76800	115200

*Default

Communication Protocols:

Frick*	Allen Bradley	Modbus	York ISN

*Default

Capacity Control Selection:
Select capacity control (2 maximum)
Suction pressure _____
Process temperature _____
Discharge pressure (air compressor mode) _____
Discharge temperature (heat pump mode) _____

Selected Options:

Auxiliary 1&2:

Disable	auxiliary 1	auxiliary 2	auxiliary 1 & 2

Power Failure Restart:

Enabled	Disabled

Input module capacity control selection (used with PLC to select capacity control mode):

Enabled	Disabled

Compressor Sequencing:

Disable	Sequence Mode 1	Sequence Mode 2 (Gram)	Compressor Interlock

Condenser Control:

Disable	Digital	Analog	Digital & Analog

Suction Pressure Pull Down:

Enabled	Disabled

Hot Gas Bypass/SV Setpoint:

Enabled	Disabled

Auxiliaries 3-8:

Enabled	Disabled

Pumpdown DX Circuit:

Enabled	Disabled

Kilowatt Monitor Calibration and Setup:

Enabled	Disabled

Auxiliary Analog Temperatures and Pressures:

Enabled	Disabled

Entering Process Temperature:

Enabled	Disabled

Slide Valve Position Control:

Enabled	Disabled

Remote Control Setpoint:

Enabled	Disabled

Permissive Start:

Disable	Always Active	Starting

Run Hours: _____

Power Assist:

Enable	Disable	Delay (0-60) sec. default = 15

Screen Color Setting:

Standard	Monochrome	Blue

Screen Saver (10 minutes) _____ (range is 0-60 minutes)

Enabled	Disabled

CALIBRATION

(while in factory setup)

Pressure Transducers and Temperature Sensors:

Pressure Transducer	Transducer High End (default is 485.3 psig**)	Transducer Low End (default is 30.0 hg.)	Sensor Type 1 - 5 Vdc, 0 - 5 Vdc (default = 1 - 5 Vdc)
Suction**			
Discharge			
Oil			
Filter			
System Discharge			
Balance Piston			

** The default High End for the Suction Pressure Transducer is 185.3 psig.

Temperature Sensor	Sensor High End (default is 463.1 O F)	Sensor Low End (default is -459.4 O F)	Sensor Type ICTD 1 - 5 Vdc, 0 - 5 Vdc (default = ICTD)
Suction			
Discharge			
Oil			
Separator			
System Discharge			
Leaving Process			
Entering Process			

Remote Control Calibration:

Capacity Control #1 (CC1): _____

Capacity Control #2 (CC2): _____

Remote Setpoint	Top end Value (20mA)	Bottom End Value (4mA)
CC1 Incoming		
CC1 Outgoing		
CC2 Incoming		
CC2 Outgoing		

Calibrate Slide Valve Position Dead Band %: _____ (Default is 1%)

York S7 - Level Position:

Actual Setpoint	Proportional Band	Dead Band

Auxiliary Analog	Text	Units	Sensor High End (default is 485.3 psig)	Sensor Low End (default is 30.0 in hg.)	Sensor Type ICTD, 1 - 5 Vdc, 0 - 5 Vdc (default = 1 - 5 Vdc)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10*					

* = default text is Economizer

Kilowatt Monitor Calibration:

Top End Value (20mA) kW (Default is 500.0)	Bottom End Value (4mA) kW (Default is 0.0)

Analog Output Setup:

	Analog Output 1	Analog Output 2	Analog Output 3
Input Channel to Output			

CAPACITY CONTROL SETPOINTS

SUCTION PRESSURE CONTROL MODE #1

	setting	default	range
Capacity control setpoint	_____	20 psig	30" - 135 psig
Upper proportional band	_____	4 psig	0 - 20 psig
Upper dead band	_____	5 psig	0 - 10 psig
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	4 psig	0 - 20 psig
Lower dead band	_____	5 psig	0 - 10 psig
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start pressure	_____	25 psig	30" - 135 psig
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop pressure	_____	15 psig	30" - 135 psig
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	2 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

SUCTION PRESSURE CONTROL MODE #2

	setting	default	range
Capacity control setpoint	_____	20 psig	30" - 135 psig
Upper proportional band	_____	4 psig	0 - 20 psig
Upper dead band	_____	5 psig	0 - 10 psig
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	4 psig	0 - 20 psig
Lower dead band	_____	5 psig	0 - 10 psig
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start pressure	_____	25 psig	30" - 135 psig
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop pressure	_____	15 psig	30" - 135 psig
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	2 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

PROCESS TEMP CONTROL MODE #1

	setting	default	range
Capacity control setpoint	_____	40°F	-238 - 302°F
Upper proportional band	_____	4°F	0 - 20 °F
Upper dead band	_____	1°F	0 - 10°F
Upper cycle time	_____	4 sec.	0 - 60 sec.
Lower proportional band	_____	4°F	0 - 20 °F
Lower dead band	_____	1°F	0 - 10°F
Lower cycle time	_____	4 sec.	0 - 60 sec.
Autocycle start temp	_____	45°F	-238 - 302°F
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop temp	_____	36°F	-238 - 302°F
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low process temp stop load	_____	35°F	-238 - 302°F
Low process temp force unload	_____	34°F	-238 - 302°F
Low process temp alarm	_____	33°F	-238 - 302°F
Low process temp alarm delay	_____	3 sec.	0 - 60 sec.
Low process temp shutdown	_____	32°F	-238 - 302°F
Low process temp shutdown delay	_____	3 sec.	0 - 60 sec.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

PROCESS TEMP CONTROL MODE #2

	setting	default	range
Capacity control setpoint	_____	40°F	-238 - 302°F
Upper proportional band	_____	4°F	0 - 20 °F
Upper dead band	_____	1°F	0 - 10°F
Upper cycle time	_____	4 sec.	0 - 60 sec.
Lower proportional band	_____	4°F	0 - 20 °F
Lower dead band	_____	1°F	0 - 10°F
Lower cycle time	_____	4 sec.	0 - 60 sec.
Autocycle start temp	_____	45°F	-238 - 302°F
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop temp	_____	36°F	-238 - 302°F
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low process temp stop load	_____	35°F	-238 - 302°F
Low process temp force unload	_____	34°F	-238 - 302°F
Low process temp alarm	_____	33°F	-238 - 302°F
Low process temp alarm delay	_____	3 sec.	0 - 60 sec.
Low process temp shutdown	_____	32°F	-238 - 302°F
Low process temp shutdown delay	_____	3 sec.	0 - 60 sec.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

DISCHARGE PRESSURE CONTROL MODE #1

	setting	default	range
Capacity control setpoint	_____	150 psig	0 - 350** psig
Upper proportional band	_____	5 psig	0 - 20 psig
Upper dead band	_____	1 psig	0 - 10 psig
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	5 psig	0 - 20 psig
Lower dead band	_____	1 psig	0 - 10 psig
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start pressure	_____	160 psig	0 - 350** psig
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop pressure	_____	140 psig	0 - 350** psig
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	2 sec.	0 - 60 sec.

** based on maximum discharge pressure setting in factory setup.

DISCHARGE PRESSURE CONTROL MODE #2

	setting	default	range
Capacity control setpoint	_____	150 psig	0 - 350** psig
Upper proportional band	_____	5 psig	0 - 20 psig
Upper dead band	_____	1 psig	0 - 10 psig
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	5 psig	0 - 20 psig
Lower dead band	_____	1 psig	0 - 10 psig
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start pressure	_____	160 psig	0 - 350** psig
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop pressure	_____	140 psig	0 - 350** psig
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	2 sec.	0 - 60 sec.

** based on maximum discharge pressure setting in factory setup.

DISCHARGE TEMP CONTROL MODE #1

	setting	default	range
Capacity control setpoint	_____	150°F	32 - 482°F
Upper proportional band	_____	4°F	0 - 20°F
Upper dead band	_____	1°F	0 - 10°F
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	4°F	0 - 20°F
Lower dead band	_____	1°F	0 - 10°F
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start temp	_____	160°F	32 - 482°F
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop temp	_____	140°F	32 - 482°F
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

DISCHARGE TEMP CONTROL MODE #2

	setting	default	range
Capacity control setpoint	_____	150°F	32 - 482°F
Upper proportional band	_____	4°F	0 - 20°F
Upper dead band	_____	1°F	0 - 10°F
Upper cycle time	_____	3 sec.	0 - 60 sec.
Lower proportional band	_____	4°F	0 - 20°F
Lower dead band	_____	1°F	0 - 10°F
Lower cycle time	_____	3 sec.	0 - 60 sec.
Autocycle start temp	_____	160°F	32 - 482°F
Autocycle start delay	_____	1 min.	0 - 60 min.
Autocycle stop temp	_____	140°F	32 - 482°F
Autocycle stop delay	_____	1 min.	0 - 60 min.
Low suction pressure stop load	_____	10 psig	30" - 135 psig
Low suction pressure force unload	_____	5 psig	30" - 135 psig
Low suction pressure alarm	_____	2 psig	30" - 135 psig
Low suction pressure alarm delay	_____	3 sec.	0 - 60 sec.
Low suction pressure shutdown	_____	0 psig	30" - 135 psig
Low suction pressure shutdown delay	_____	3 sec.	0 - 60 sec.

COMPRESSOR SAFETIES

DISCHARGE SAFETIES

	setting	default	range
High discharge temp stop load	_____	180°F	0 - 249.8°F
High discharge temp force unload	_____	190°F	0 - 249.8°F
High discharge temp alarm	_____	200°F	0 - 249.8°F
High discharge temp alarm delay	_____	5 sec.	0 - 60 sec.
High discharge temp shutdown	_____	212°F	0 - 249.8°F
High discharge temp shutdown delay	_____	5 sec.	0 - 60 sec.
Starting Differential Pressure Below	_____	100 psig	0-380**psig
High disch press mode #1 stop load	_____	190 psig	0-380**psig
High disch press mode #1 force unload	_____	200 psig	0-380**psig
High disch press mode #1 alarm	_____	220 psig	0-380**psig
High disch press mode #1 alarm delay	_____	2 sec.	0 - 5 sec.
High disch press mode #1 shutdown	_____	225 psig	0-380**psig
High disch press mode #1 shutdown delay	_____	2 sec.	0 - 5 sec.
High disch press mode #2 stop load	_____	190 psig	0-380**psig
High disch press mode #2 force unload	_____	200 psig	0-380**psig
High disch press mode #2 alarm	_____	220 psig	0-380**psig
High disch press mode #2 alarm delay	_____	2 sec.	0 - 5 sec.
High disch press mode #2 shutdown	_____	225 psig	0-380**psig
High disch press mode #2 shutdown delay	_____	2 sec.	0 - 5 sec.

** based on maximum discharge pressure setting in factory setup.

SUCTION SAFETIES

	setting	default	range
High suction pressure stop load	_____	120 psig	0 - 200 psig
High suction pressure force unload	_____	130 psig	0 - 200 psig
High suction pressure alarm	_____	140 psig	0 - 200 psig
High suction pressure alarm delay	_____	2 sec.	0 - 60 sec.
High suction pressure shutdown	_____	150 psig	0 - 200 psig
High suction pressure shutdown delay	_____	2 sec.	0 - 60 sec.

ENTERING PROCESS TEMPERATURE

	setting	default	range
Low entering process shutdown	_____	-463°F	-463 - 482°F
Low entering process shutdown delay	_____	0 sec.	0 - 99 sec.
Low entering process alarm	_____	-463°F	-463 - 482°F
Low entering process alarm delay	_____	0 sec.	0 - 99 sec.
High entering process alarm	_____	482°F	-463 - 482°F
High entering process alarm delay	_____	0 sec.	0 - 99 sec.
High entering process shutdown	_____	482°F	-463 - 482°F
High entering process shutdown delay	_____	0 sec.	0 - 99 sec.

HIGH LEVEL SHUTDOWN DELAY

	setting	default	range
High Level Shutdown delay	_____	5 sec.	0 - 60 sec.

MOTOR CONTROL

	setting	default	range
Motor amps	_____	100	0 - 3000
Volts	_____	480	0 - 5000
Service factor	_____	1.15*	0.0 - 2.0
Horse power	_____	100	0 - 3000
CT factor	_____	100*	0 - 3000
Recycle delay	_____	20 min.	20 - 255 min.
High motor amps stop load	_____	110 amps	0 - 3000 amps
High motor amps force unload	_____	115 amps	0 - 3000 amps
High motor amps alarm	_____	120 amps	0 - 3000 amps
High motor amps alarm delay	_____	5 sec.	0 - 60 sec.
High motor amps shutdown	_____	125 amps	0 - 3000 amps
High motor amps shutdown delay	_____	5 sec.	0 - 300 sec.
Low motor amps shutdown	_____	25 amps	0 - 60 amps
Low motor amps shutdown delay	_____	30 sec.	0 - 60 sec.
Force unload inhibit delay (if applicable)	_____	120 sec.	10 - 300 sec.

*Blank if Ram DBS Starter

POWER FAILURE RESTART

Time after power failure allowing restart: _____ Hour _____ Minutes (Default 10 min.)

RAM DBS MOTOR STARTER

	setting	default	range
Locked Rotor Current	_____	0.0% FLA	300 - 800% FLA
Stall Time	_____	0 sec.	0 - 60 sec.
Jam Current Level	_____	0.0% FLA	100 - 600% FLA
Jam Run Delay	_____	0 sec.	0 - 60 sec.
Service Factor	_____	0.0% FLA	75 - 125% FLA
Cur. Unbalance Alarm Level	_____	0.0% FLA	2.0 - 25% FLA
Cur. Unbalance Alarm Delay	_____	0 sec.	0 - 240 sec.
RTD Temperature Alarm Level	_____	32.0° F	32 - 500° F
RTD Temperature Trip Level	_____	32.0° F	32 - 500° F

OIL SETPOINTS

	setting	default	range
Low oil separator temp alarm	_____	55°F	49 - 100°F
Low oil separator temp alarm delay	_____	5 sec.	0 - 300 sec.
Low oil separator temp shutdown	_____	49°F	49 - 100°F
Low oil separator temp shutdown delay	_____	5 sec.	0 - 300 sec.
Oil heater off above:	_____	122°F	100 - 150°F
High oil temp alarm	_____	158°F	100 - 230°F
High oil temp alarm delay	_____	5 sec.	0 - 60 sec.
High oil temp shutdown	_____	167°F	100 - 230°F
High oil temp shutdown delay	_____	5 sec.	0 - 60 sec.
Low oil temp alarm	_____	55°F	49 - 100 °F
Low oil temp alarm delay	_____	5 sec.	0 - 60 sec.
Low oil temp shutdown	_____	49°F	49 - 100°F
Low oil temp shutdown delay	_____	5 sec.	0 - 60 sec.

MAIN OIL INJECTION

On at Discharge Temp. (32 – 212 deg.F) default 150	delay (0-300 sec) default 5

LIQUID INJECTION

On at Oil Temp. (100 – 150 deg.F) default 122	delay (0-300 sec) default 5

FILTER PRESSURE SETPOINTS

	setting	default	range
High filter pressure alarm	_____	25 psig	0 - 60 psig
High filter pressure alarm delay	_____	10 min.	0 - 5 min.
High filter pressure shutdown	_____	30 psig	0 - 60 psig
High filter pressure shutdown delay	_____	15 min.	0 - 5 min.

SLIDE VALVE SETPOINTS

	setting	default	range
Highest slide valve position to allow starting of the compressor:	_____	10%	0 - 100%
Autocycle minimum position	_____	10%	0 - 100%
hot gas bypass or slide valve setpoint On when below	_____	0%	0 - 100%
slide valve setpoint 1 On when below	_____	0%	0 - 100%
slide valve setpoint 2 On when below	_____	0%	0 - 100%

OPTIONS

SETBACK SCHEDULE

	1st Start Time	1st Stop Time	2nd Start Time	2nd Stop Time
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

CONDENSER CONTROL SETPOINTS

Condenser Control Setpoint	_____	(range: 0 - 350 psig)	(default: 0.0 psig)

Digital Control

Digital Control upper dead band	_____	(range: 0 - 20 psig)	(default: 0.0 psig)
Digital Control upper dead band delay	_____	(range: 0 - 60 sec.)	(default: 0.0 psig)
Digital Control lower dead band	_____	(range: 0 - 20 psig)	(default: 0.0 psig)
Digital Control lower dead band delay	_____	(range: 0 - 60 sec.)	(default: 0.0 psig)
Condenser Output #1 sequence order	_____	(range: 0 - 4, 0 = disabled)	(default: 0.0 psig)
Condenser Output #2 sequence order	_____	(range: 0 - 4, 0 = disabled)	(default: 0.0 psig)
Condenser Output #3 sequence order	_____	(range: 0 - 4, 0 = disabled)	(default: 0.0 psig)
Condenser Output #4 sequence order **	_____	(range: 0 - 4, 0 = disabled)	(default: 0.0 psig)

** if only digital was enabled

Analog Control

Analog Control upper dead band	_____	(range: 0 - 20 psig)	(default: 0.0 psig)
Analog Control lower dead band	_____	(range: 0 - 20 psig)	(default: 0.0 psig)
Analog Control response time	_____	(range: 1 - 20 (slow - fast))	(default: 10)

COMPRESSOR SEQUENCE SETPOINTS

Sequence position A compressor ID#	_____	(range: 0 - 99, 0 = disabled)	(default: 0.0 psig)
Sequence position B compressor ID#	_____	(range: 0 - 99, 0 = disabled)	(default: 0.0 psig)
Sequence position C compressor ID#	_____	(range: 0 - 99, 0 = disabled)	(default: 0.0 psig)
Sequence position D compressor ID#	_____	(range: 0 - 99, 0 = disabled)	(default: 0.0 psig)

	setting	default	range
Position A minimum slide valve position	_____	0%	0 - 100%
Position A compressor start delay	_____	5 min.	0 - 60 min.
Position A compressor stop delay	_____	5 min.	0 - 60 min.
Position A minimum compressor run time	_____	20 min.	0 - 60 min.
Position B minimum slide valve position	_____	0%	0 - 100%
Position B compressor start delay	_____	5 min.	0 - 60 min.
Position B compressor stop delay	_____	5 min.	0 - 60 min.
Position B minimum compressor run time	_____	20 min.	0 - 60 min.

	setting	default	range
Position C minimum slide valve position	_____	0%	0 - 100%
Position C compressor start delay	_____	5 min.	0 - 60 min.
Position C compressor stop delay	_____	5 min.	0 - 60 min.
Position C minimum compressor run time	_____	20 min.	0 - 60 min.
Position D minimum slide valve position	_____	0%	0 - 100%
Position D compressor start delay	_____	5 min.	0 - 60 min.
Position D compressor stop delay	_____	5 min.	0 - 60 min.
Position D minimum compressor run time	_____	20 min.	0 - 60 min.
load limiting slide valve position	_____	0%	0 - 100%
load limiting duration	_____	0 min.	0 - 60 min.

AUXILIARY INPUTS SETUP

Auxiliary	Disabled	Text	Alarm Check Always *	Alarm Check Running	Shutdown Check Always	Shutdown Check Running	Delay (0-99) sec. (Default 5)
Auxiliary 1							
Auxiliary 2							
Auxiliary 3							
Auxiliary 4							
Auxiliary 5							
Auxiliary 6							
Auxiliary 7							
Auxiliary 8							

*Default

SUCTION PULL-DOWN

	Pressure Band (default 5)	Amount of Time (min.)(default
Suction Pressure Reduction Step		

AUXILIARY ANALOGS

Auxiliary	Disabled	Text	Check Always	Check Running
Auxiliary 1				
Auxiliary 2				
Auxiliary 3				
Auxiliary 4				
Auxiliary 5				
Auxiliary 6				
Auxiliary 7				
Auxiliary 8				
Auxiliary 9				
Auxiliary 10 *				

Auxiliary	High Shutdown **	High Shutdown delay***	High Alarm **	High Alarm delay***	Low Alarm **	Low Alarm delay**	Low Shutdown **	Low Shutdown delay***
Auxiliary 1								
Auxiliary 2								
Auxiliary 3								
Auxiliary 4								
Auxiliary 5								
Auxiliary 6								
Auxiliary 7								
Auxiliary 8								
Auxiliary 9								
Auxiliary 10 *								

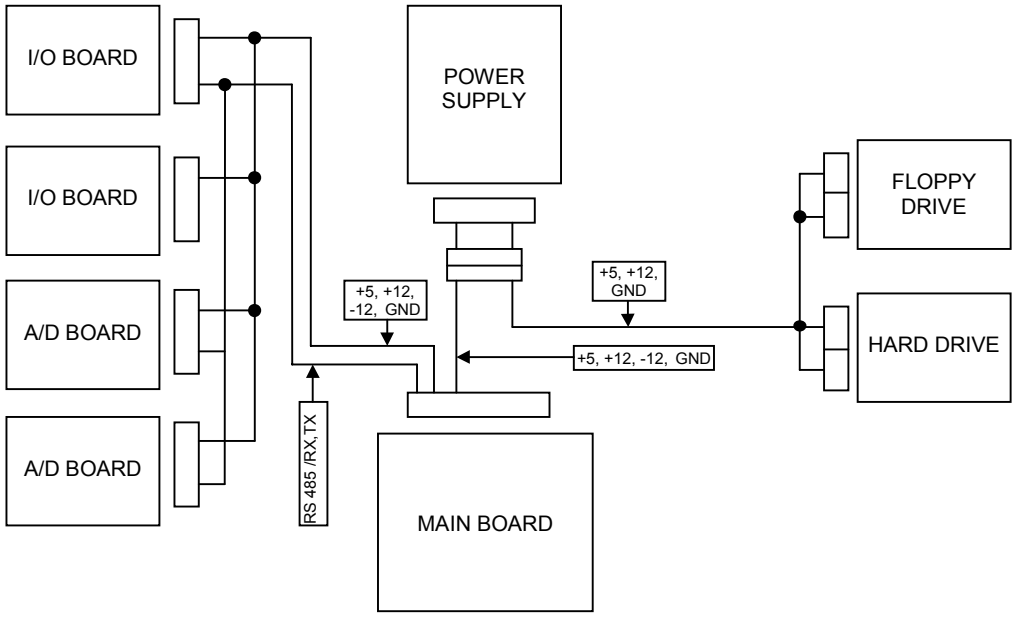
* = default text is Economizer
** Pressure range is 30” - 985.3 psig.; Temperature range is -459.4 - 500.0 °F.
*** 0 - 99 seconds

PUMPDOWN/DX CIRCUITS

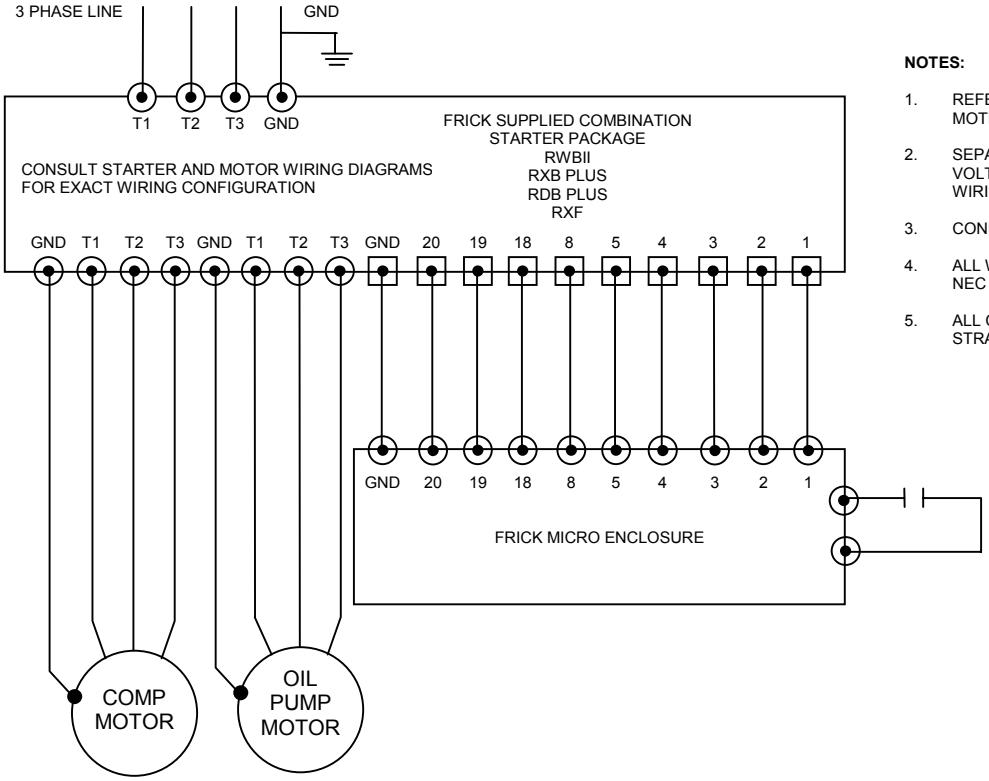
Pumpdown off when above (30.0 Hg - 85.3 psig) default 20.0 psig	Delay (0 - 60 min.) default 0 min.

DX Circuit	On when running Always	On when running And at slide valve %	Off when below (0 - 100) % Default (85%)	On when above (0 - 100) % Default (90%)
1				
2				

FLOW DIAGRAM D.C. VOLTAGE HARNESS



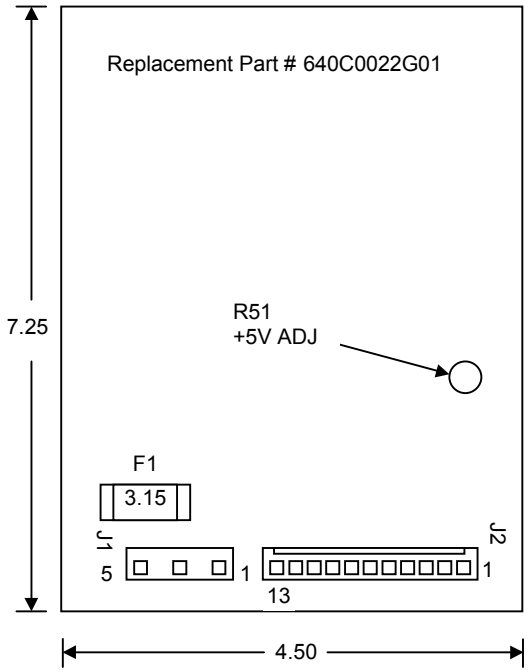
POINT-TO-POINT FIELD WIRING DIAGRAM



NOTES:

1. REFER TO MOTOR NAMEPLATE FOR CORRECT MOTER CONNECTION.
2. SEPAERATE CONDUIT RUNS FOR CONTROL VOLTAGE WIRING AND MOTOR CONNECTION WIRING.
3. CONDUIT GROUNDS ARE NOT ACCEPTABLE.
4. ALL WIRING MUST BE PER LATEST EDITION OF THE NEC AND LOCAL CODES.
5. ALL CONTROL VOLTAGE WIRING TO BE 14 AWG STRANDED COPPER WIRE.

QUANTUM PANEL DC POWER SUPPLY DIAGRAM (CONDOR)



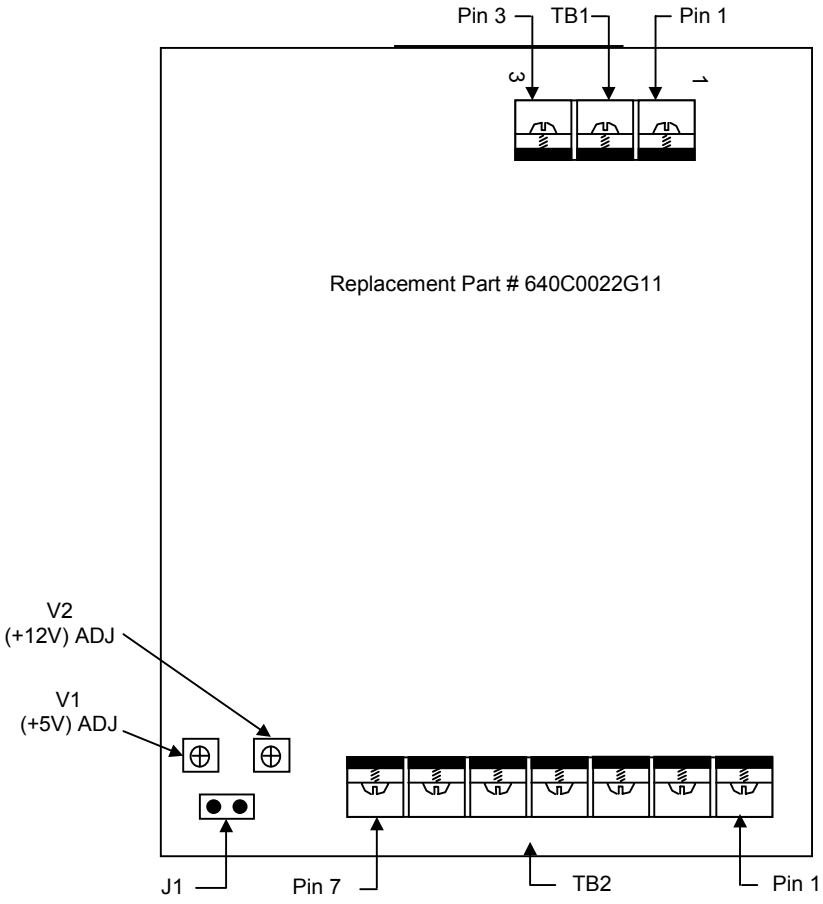
INPUT: J1	
AMP P/N: 640445-5 .312 CTR CONNECTOR, 3 CIRCUITS	
Pin 1	AC GROUND
Pin 3	AC NEUTRAL
PIN 5	AC LINE

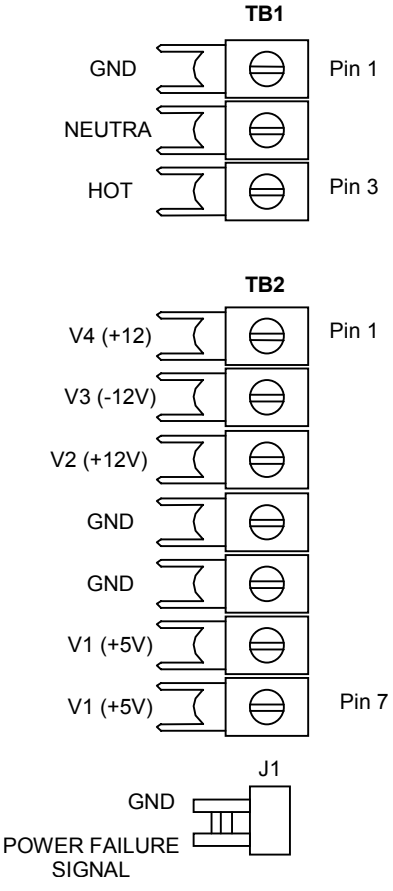
OUTPUT 1	+5.1V
OUTPUT 2	+24V
OUTPUT 3	-12V
OUTPUT 4	12V

MATING CONNECTORS: MOLEX		
	HOUSING	CONTACT
INPUT	26-03-4050	08-52-0113
OUTPUT	26-03-4131	08-52-0113

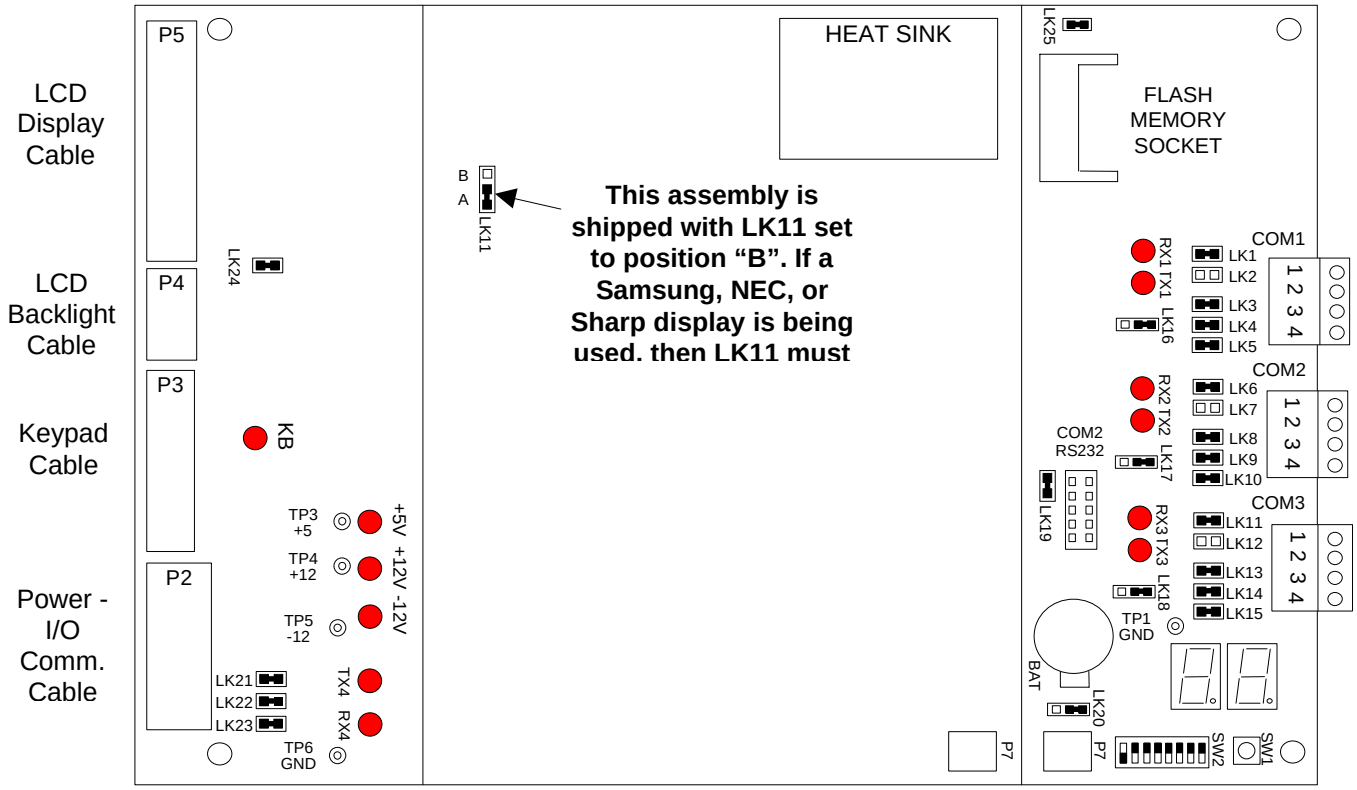
INPUT: J2	
AMP P/N: 1-640445-3 .156 CTR CONNECTOR, 13 CIRCUITS	
PIN 1	OUTPUT #1
PIN 2	OUTPUT #1
PIN 3	OUTPUT #1
PIN 4	COMMON
PIN 5	COMMON
PIN 6	COMMON
PIN 7	COMMON
PIN 8	OUTPUT #2
PIN 9	OUTPUT #2
PIN 10	POWER FAIL
PIN 11	OUTPUT #3
PIN 12	COMMON
PIN 13	OUTPUT #4

QUANTUM PANEL D.C. POWER SUPPLY DIAGRAM (POWER-ONE)





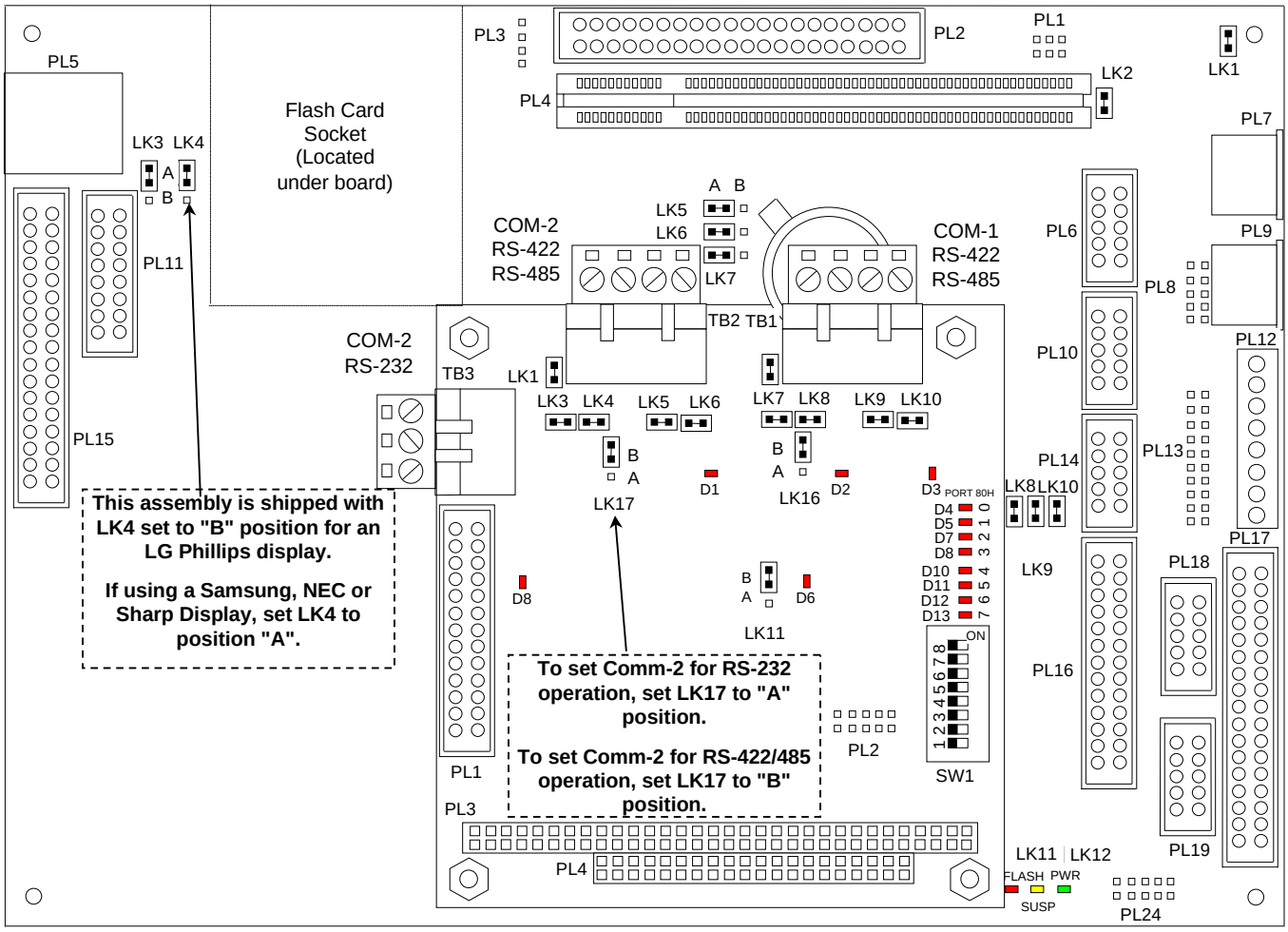
QUANTUM 3 MAIN PROCESSOR BOARD
(Part #: 649C1079H01)



Top Board Has Only One (1) User Selectable Option
(Link 11 is the only modifiable link)

Dip Switch Pack

QUANTUM 4 MAIN PROCESSOR BOARD
(Part #: 649C1082H01)



Quantum 4 Motherboard Jumpers

LK1	Watchdog timer timeout selection
In	2 second timeout
Out *	8 second timeout

LK2	Watchdog timer Enable
In *	Enabled
Out	Disabled

LK3	Backlight Voltage
A	+5V Backlight
B *	+12V Backlight

LK4	LCD Panel Power Supply Voltage
A	+5V Supply (Samsung, NEC or Sharp Displays)
B *	+3.3V Supply (LG Phillips Display)

LK5	COM4 IRQ Routing
A	IRQ3
B *	IRQ10

LK6	COM3 IRQ Routing
A	IRQ4
B *	IRQ11

LK7	Clear CMOS / Battery Disable
A *	Battery Backup Enabled
B	Battery Backup Disabled (CMOS RAM Cleared)

LK8	RS-485 Receiver
In *	RS-485 Receiver Enabled
Out	RS-485 Receiver Disabled

LK9	RS-485 Termination
In *	RS-485 Terminated
Out	RS-485 Not Terminated

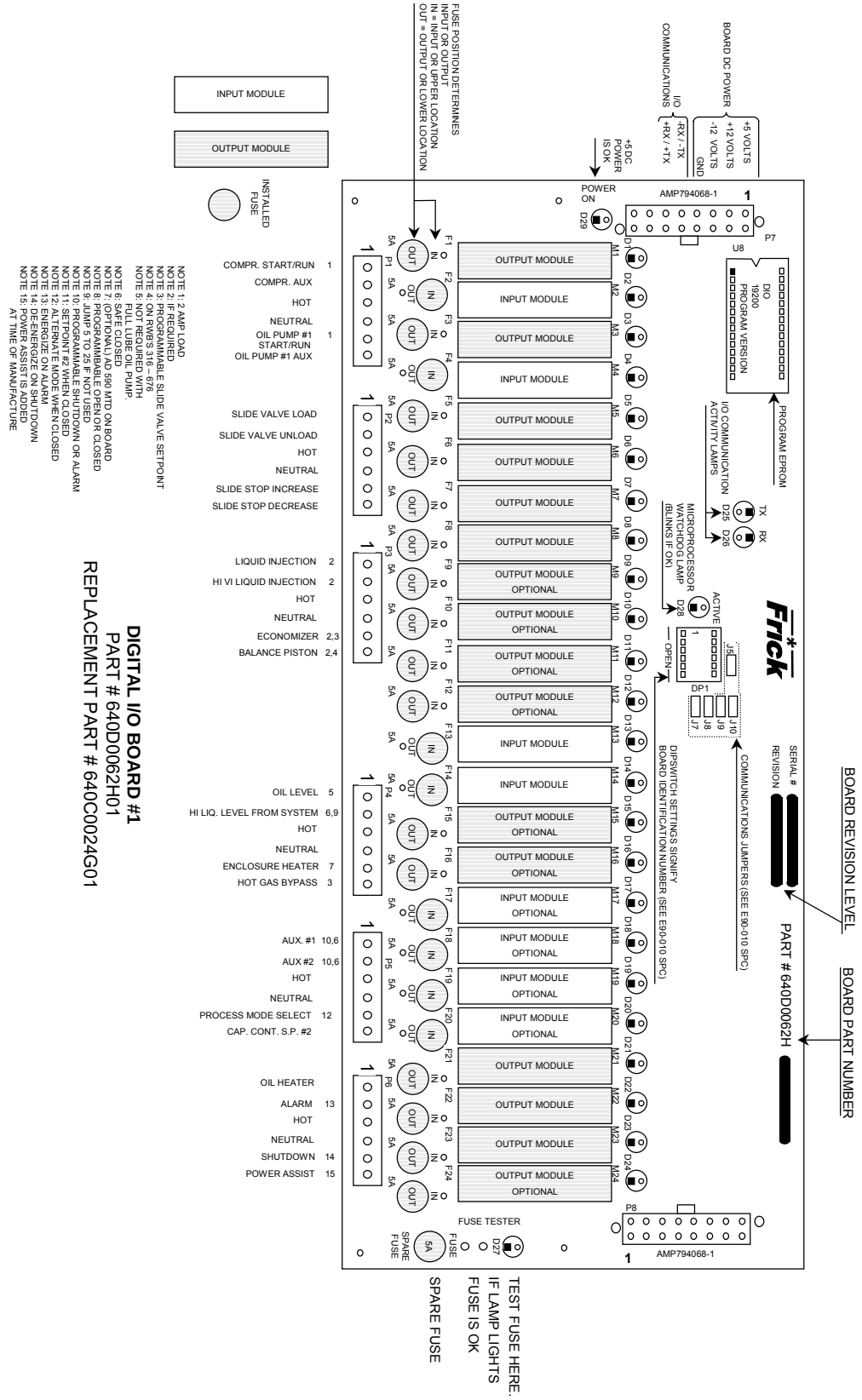
LK10	RS-422 Termination
In	RS-422 Terminated
Out *	RS-422 Terminated

LK11	User Application Link
In *	Bit 1 of 259H "Logic 1"
Out	Bit 1 of 259H "Logic 0"

LK12	User Application Link
In *	Bit 2 of 259H "Logic 1"
Out	Bit 2 of 259H "Logic 0"

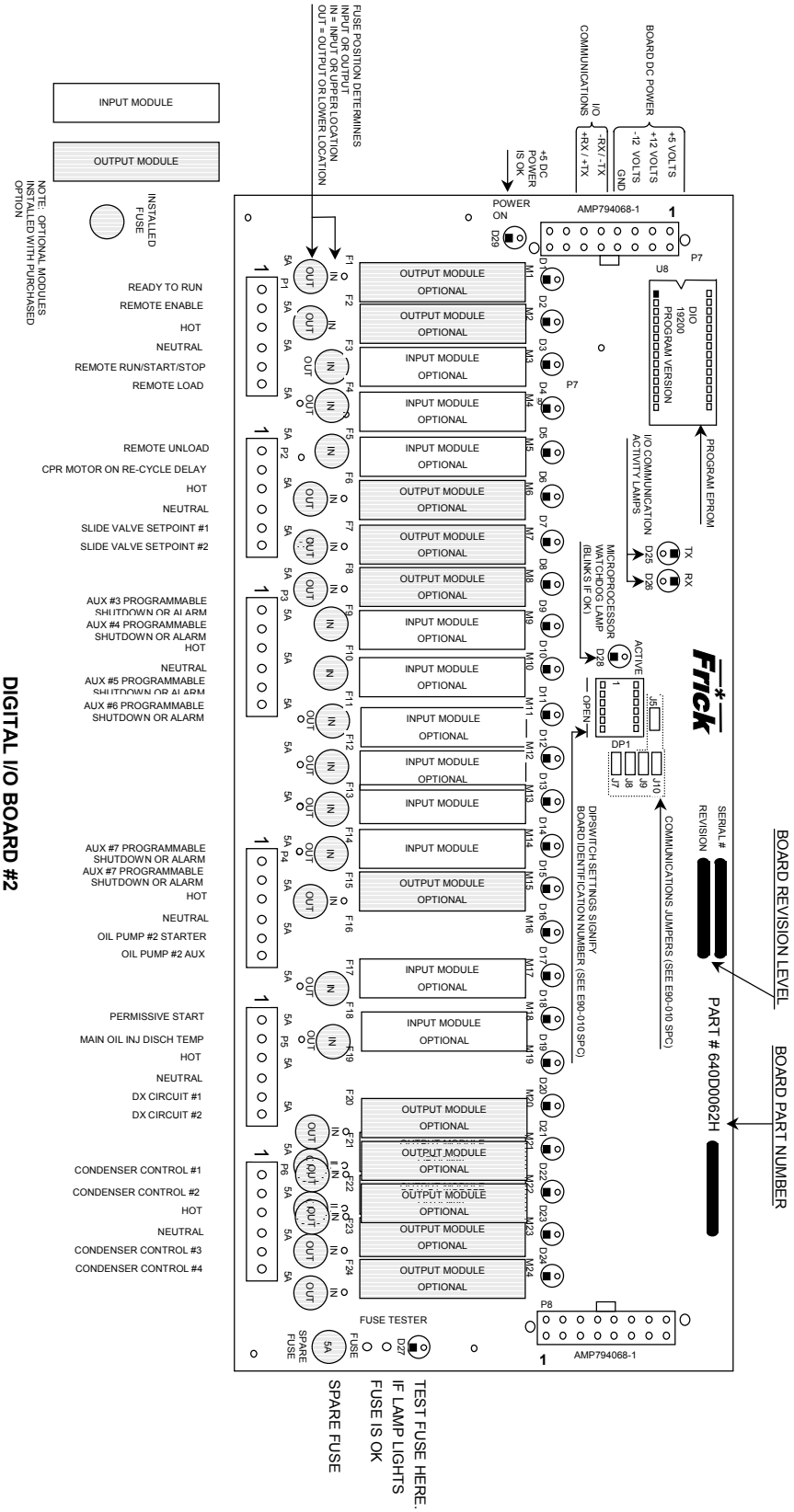
* Standard Setting

DIGITAL I/O BOARD #1



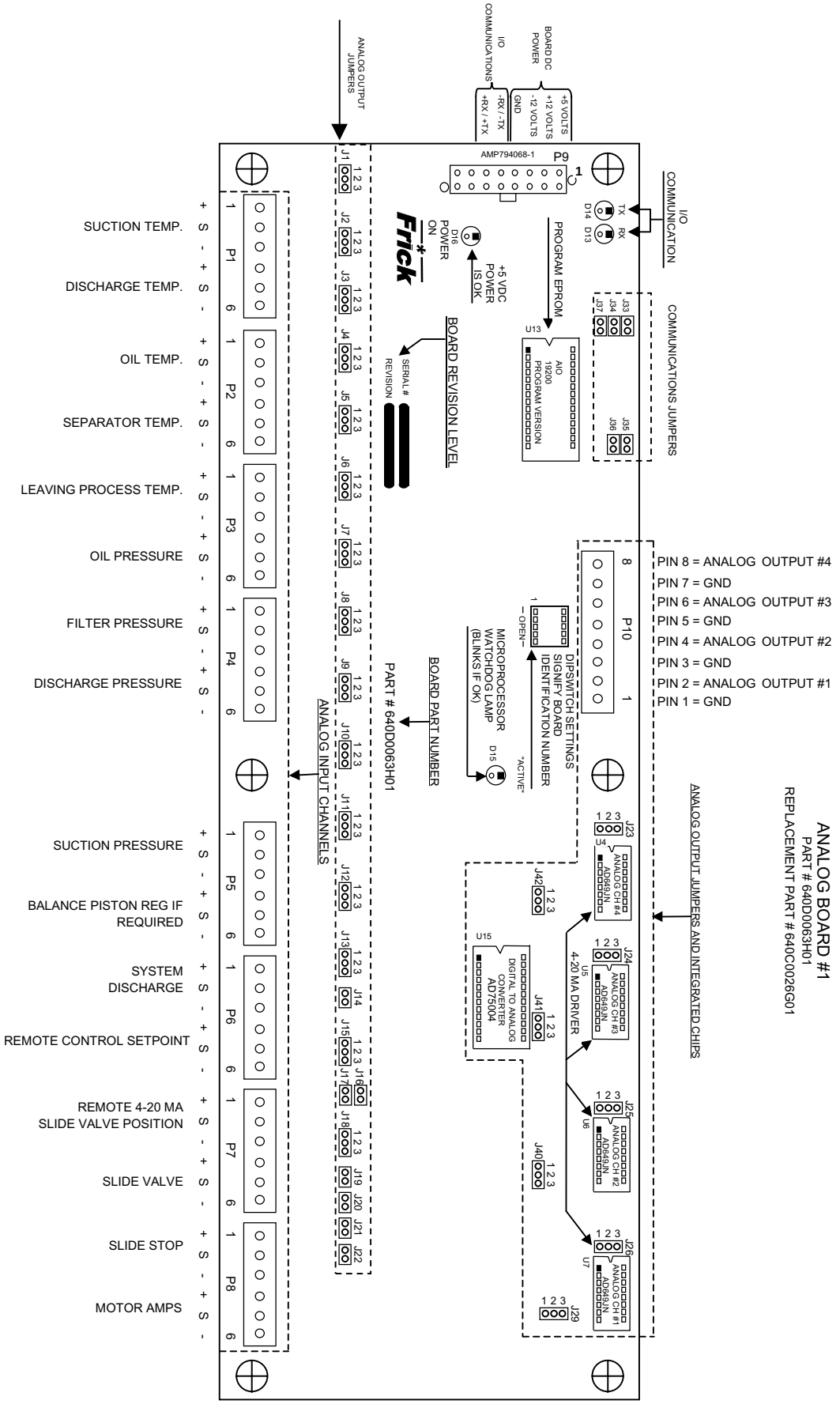
DIGITAL I/O BOARD #1
PART # 640D0062H01
REPLACEMENT PART # 640C0024G01

DIGITAL I/O BOARD #2

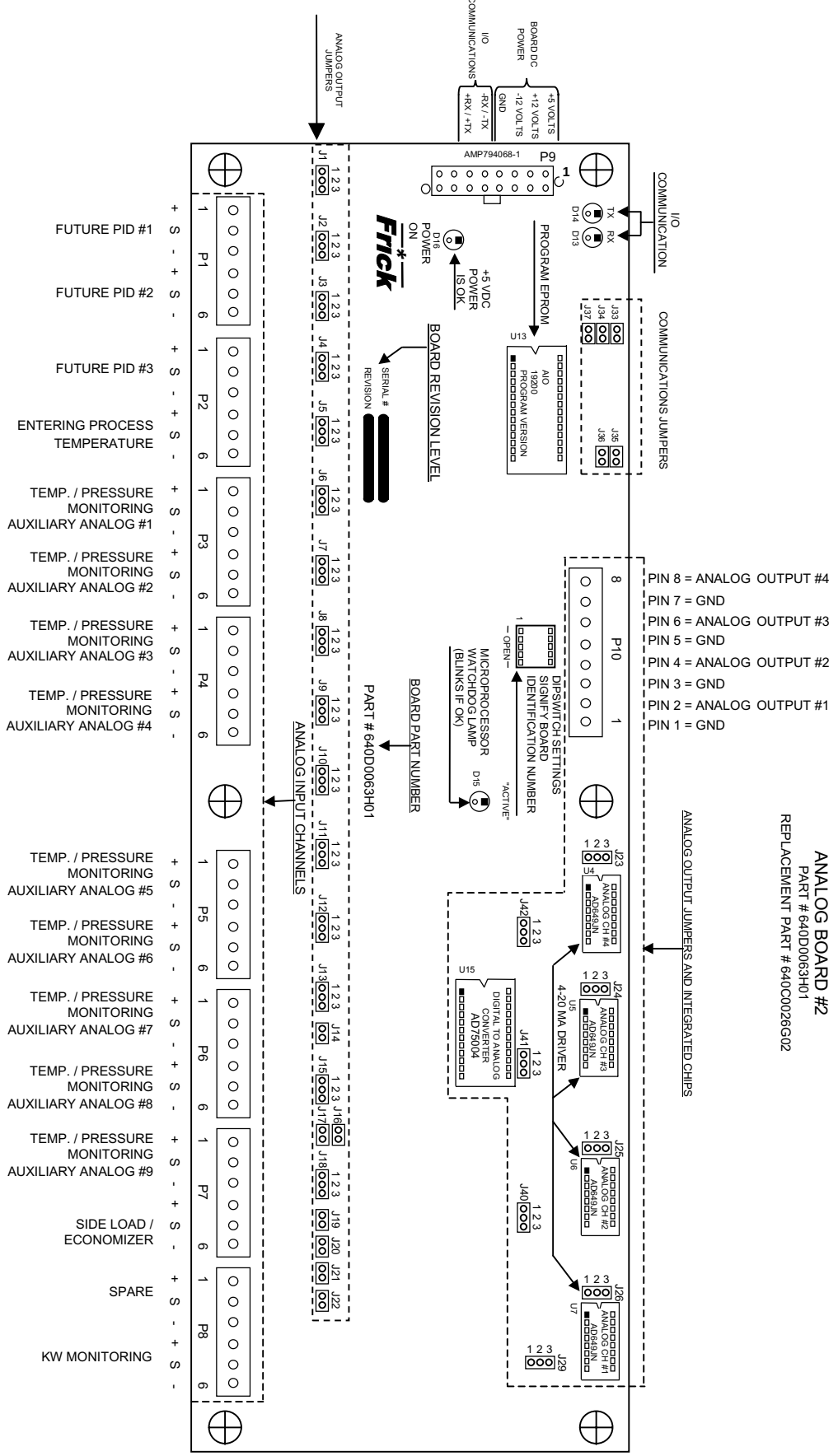


DIGITAL I/O BOARD #2
PART # 640D0062H01
REPLACEMENT PART # 640C0024G02

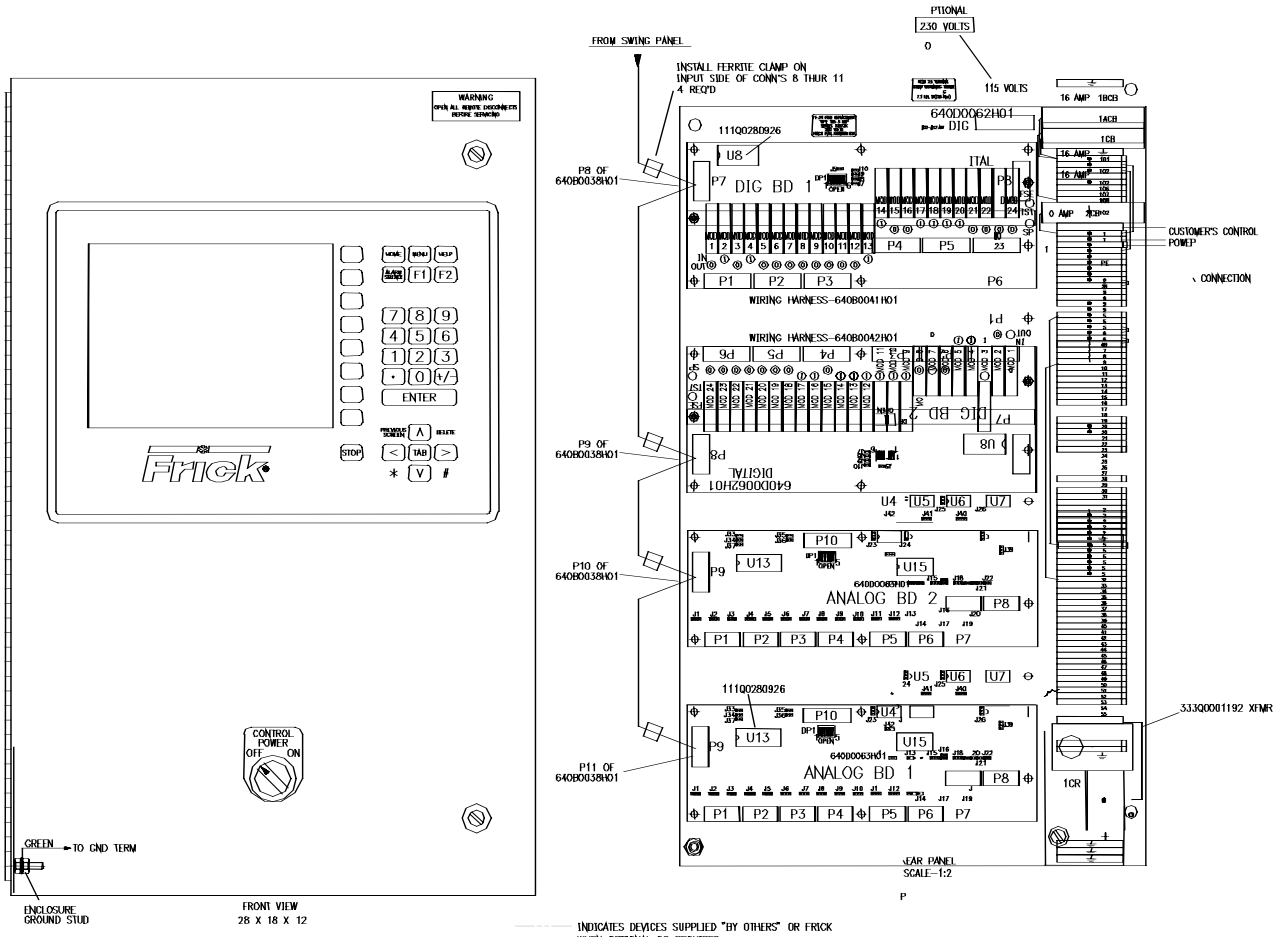
ANALOG BOARD #1

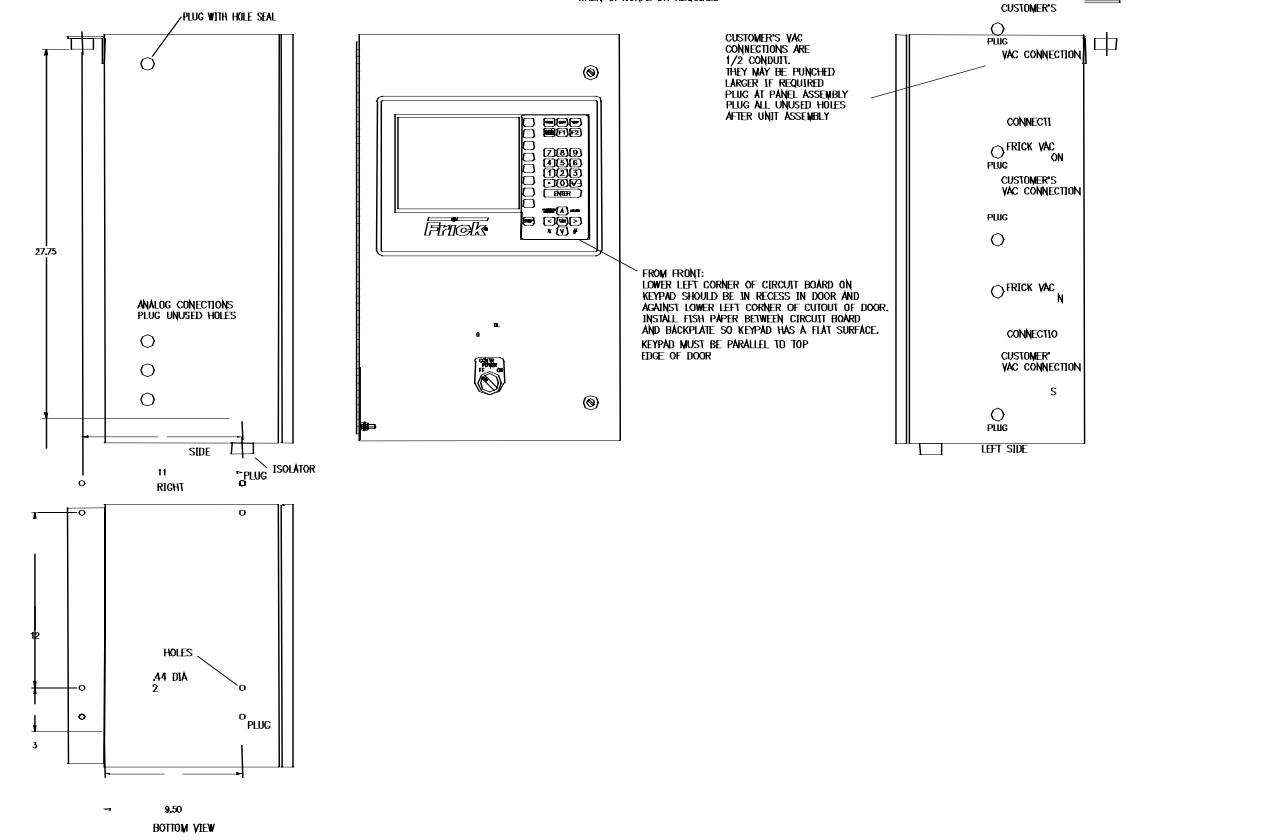


ANALOG BOARD #2

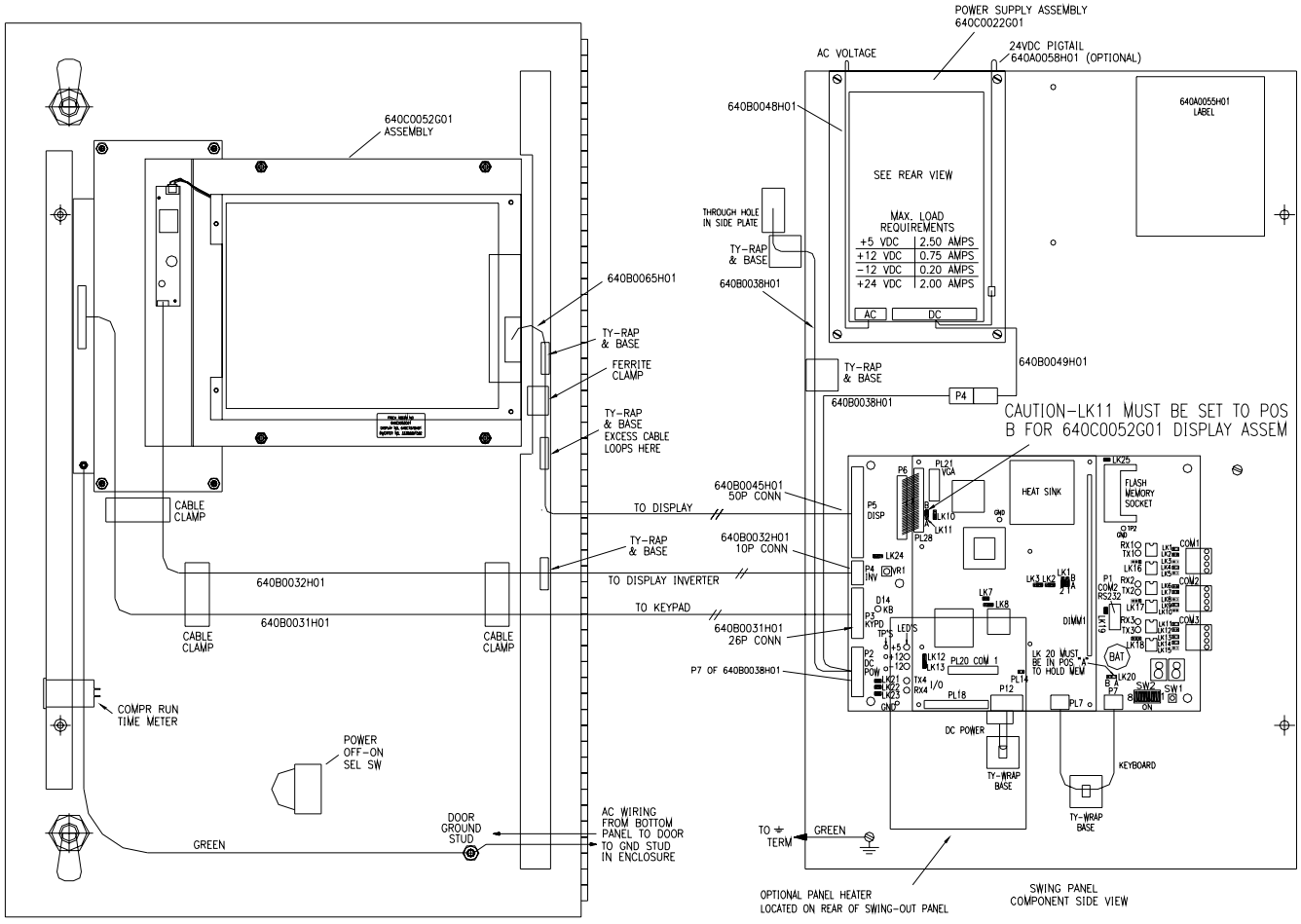


QUANTUM 3 CONTROL CENTER ASSEMBLY (Sheet 1 of 2)



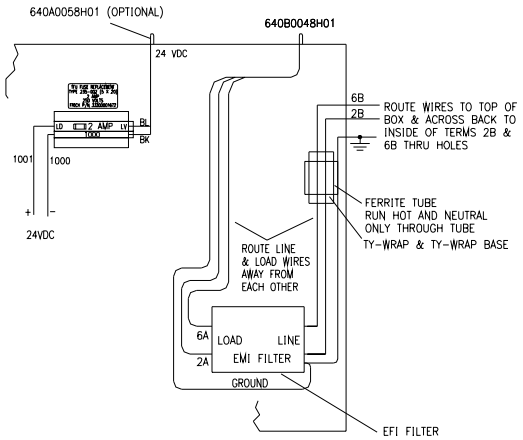


QUANTUM 3 CONTROL CENTER ASSEMBLY (Sheet 2 of 2)

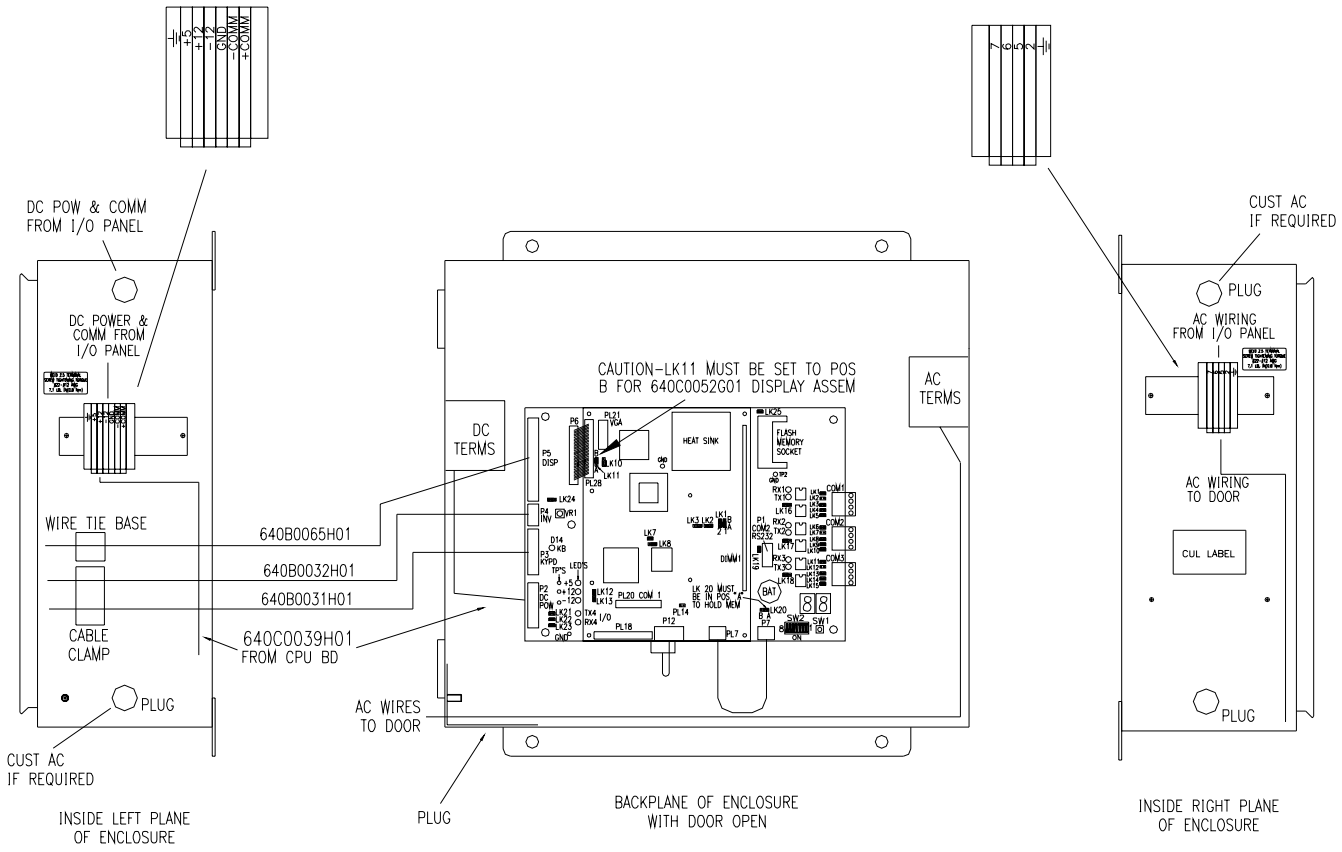


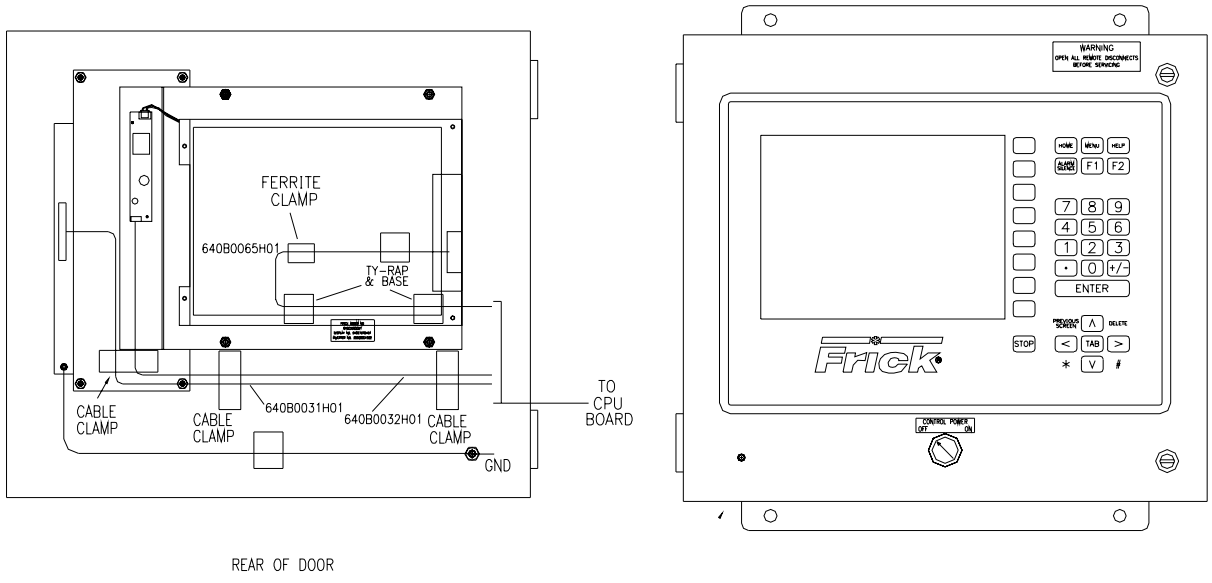
REAR VIEW OF DOOR WITH SWING-OUT PANEL OPEN

REAR VIEW OF POWER SUPPLY WIRING

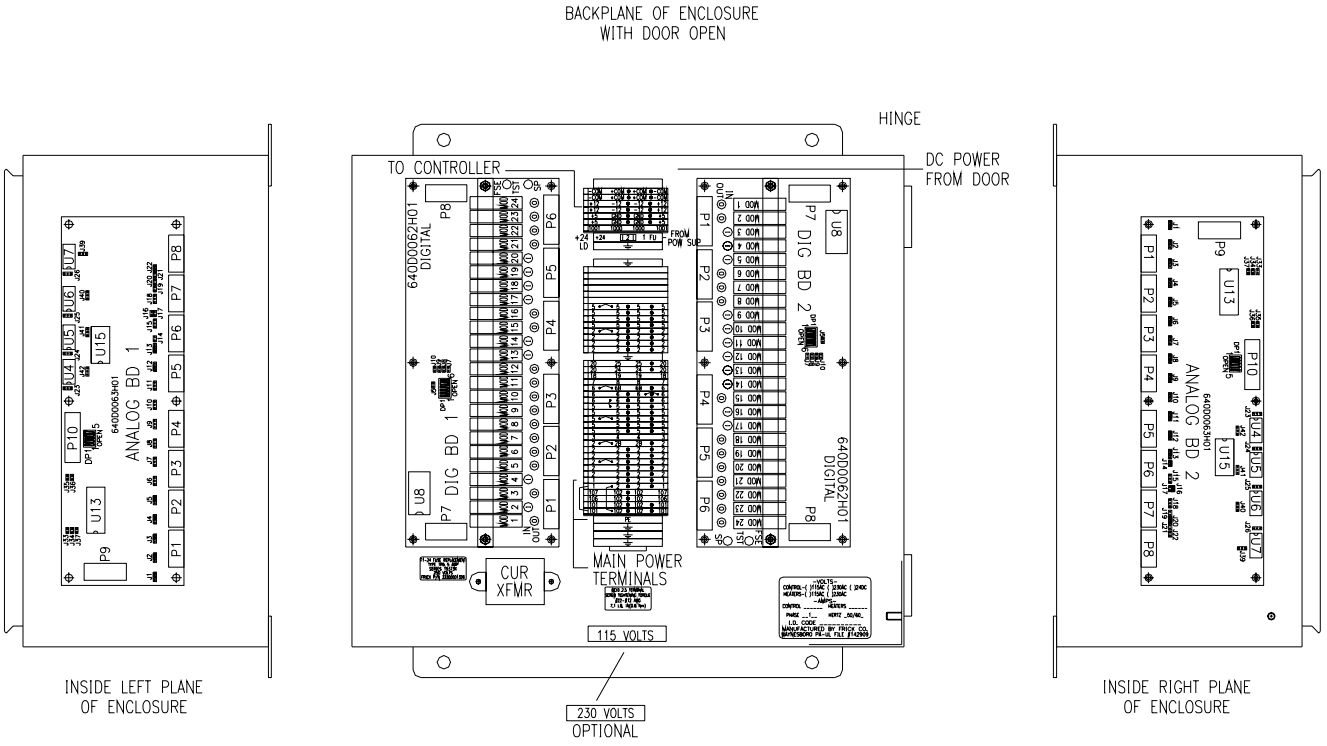


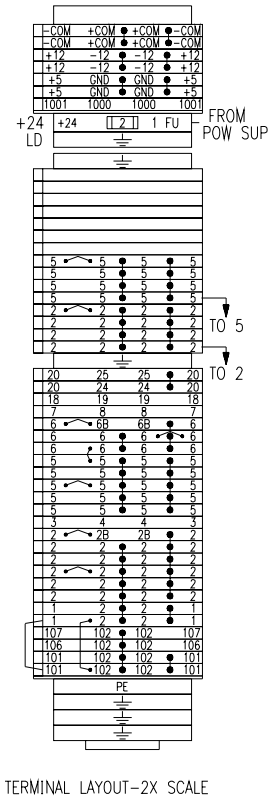
QUANTUM 3 CONTROL CENTER ASSEMBLY (Sheet 1 of 2) RXF 12-50 ONLY



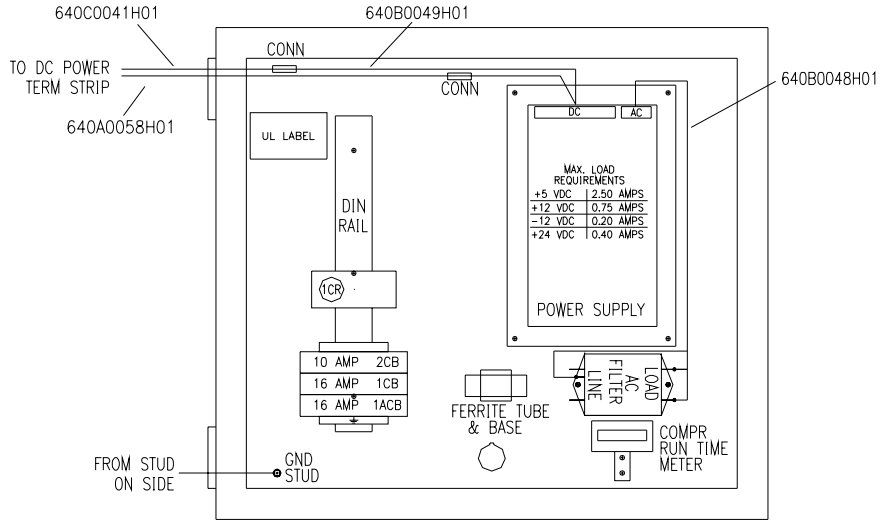


QUANTUM 3 CONTROL CENTER ASSEMBLY (Sheet 2 of 2) RXF 12-50 ONLY



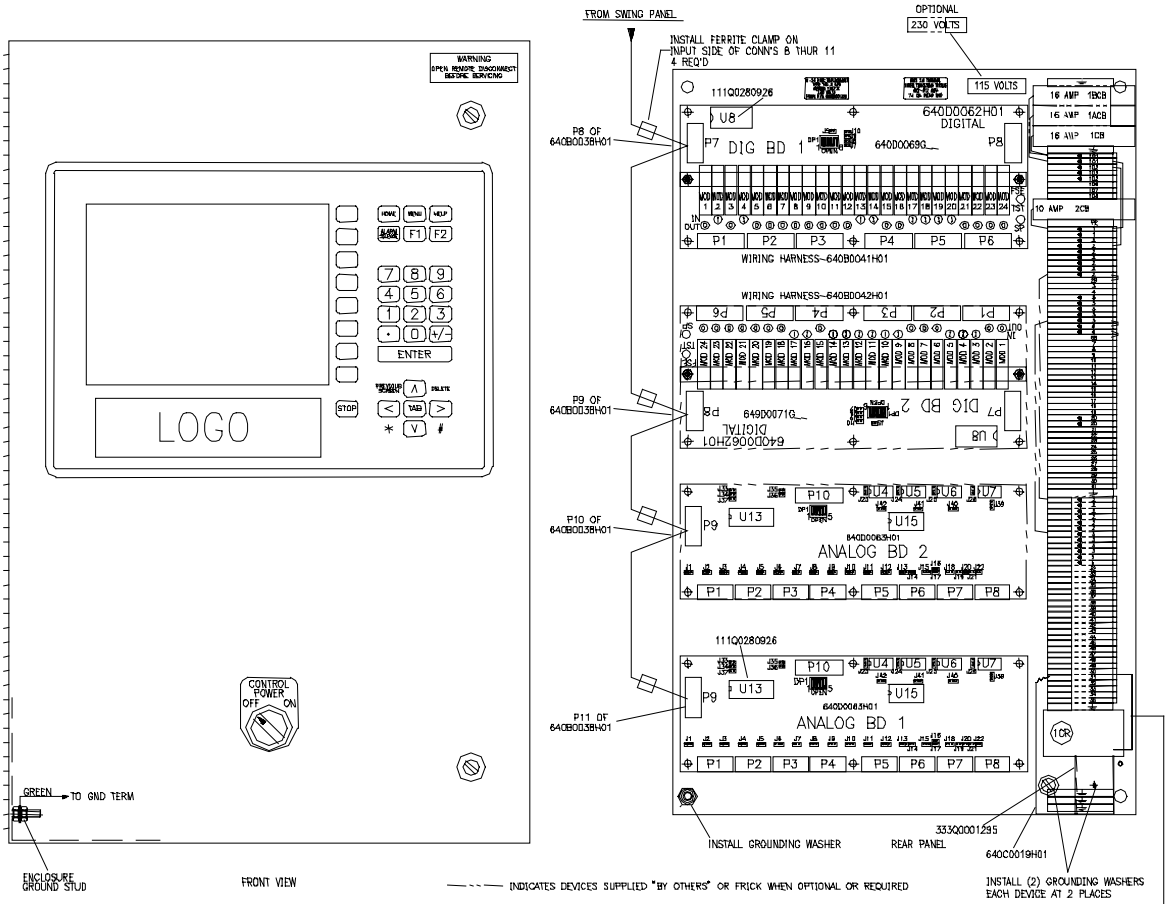


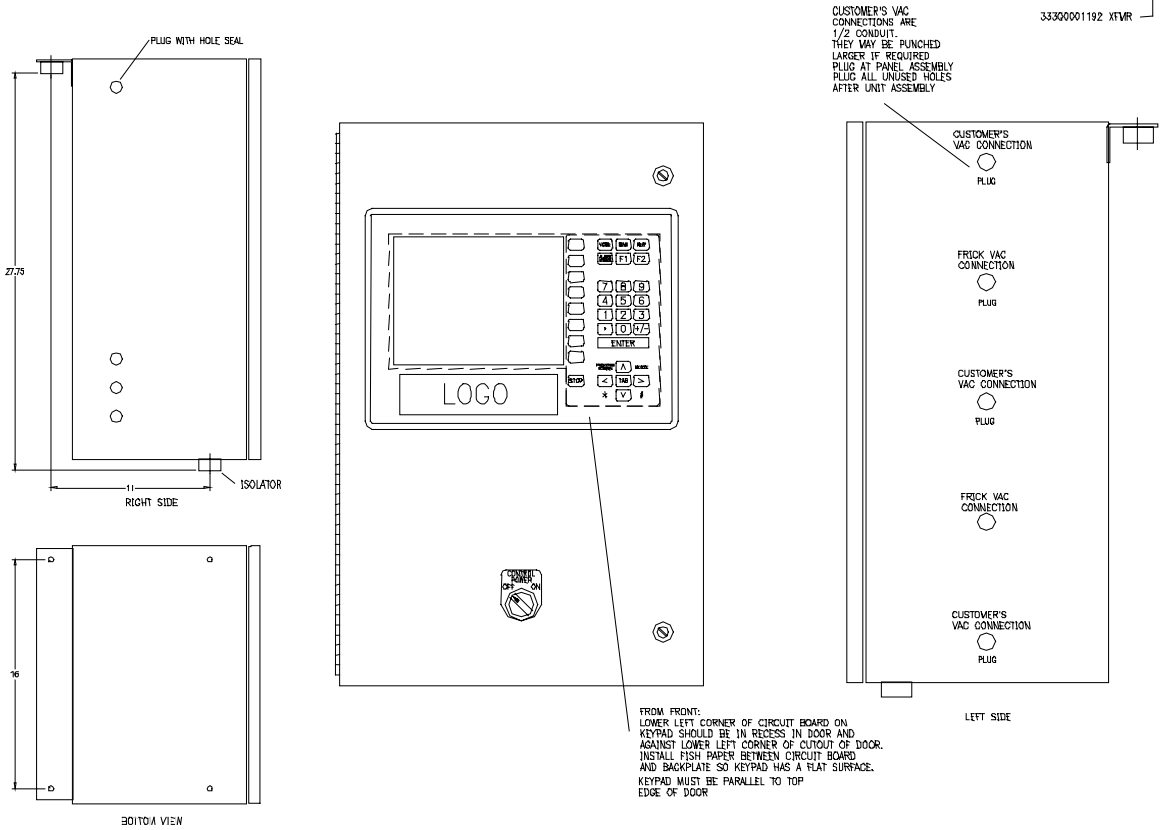
TERMINAL LAYOUT–2X SCALE



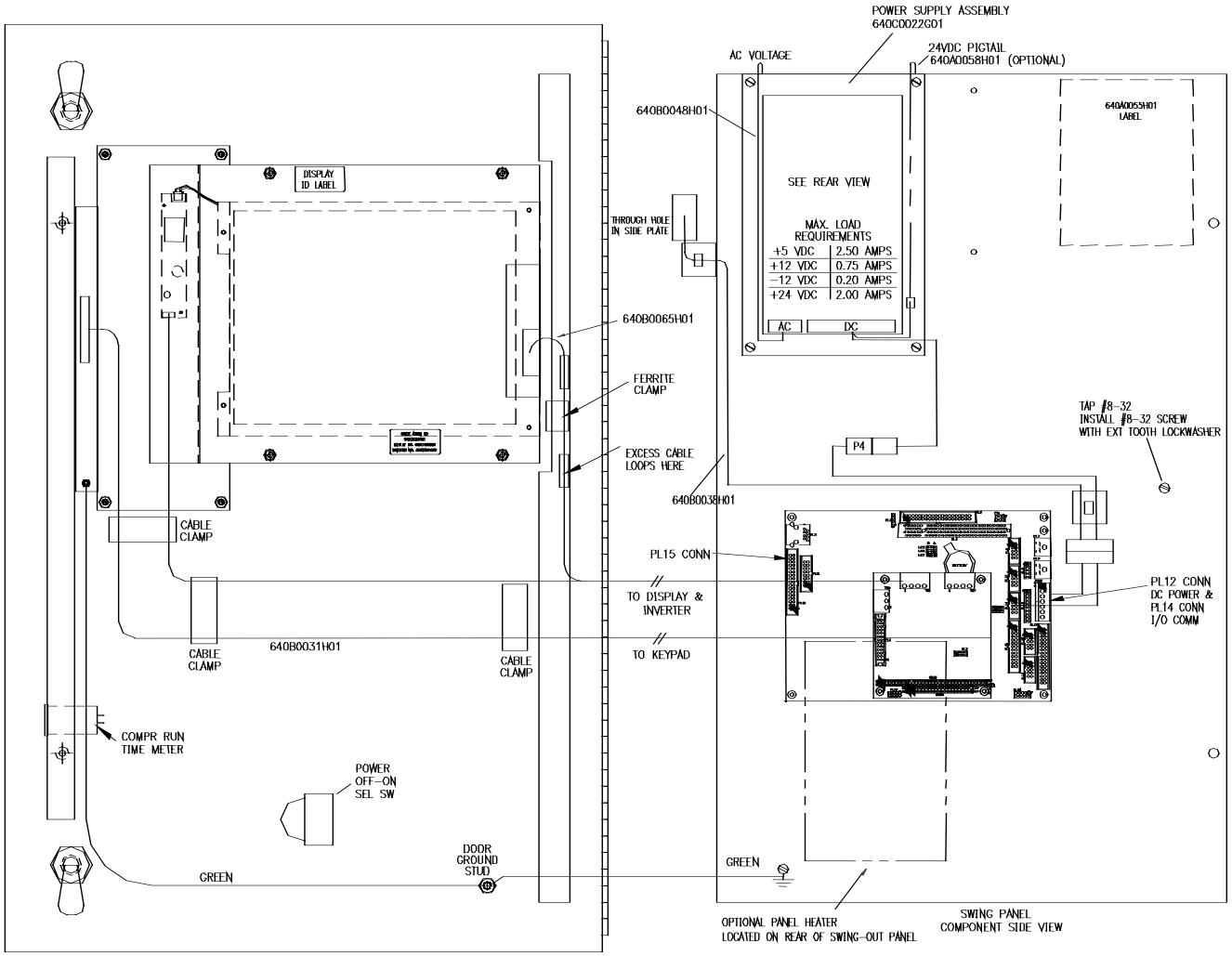
REAR OF DOOR

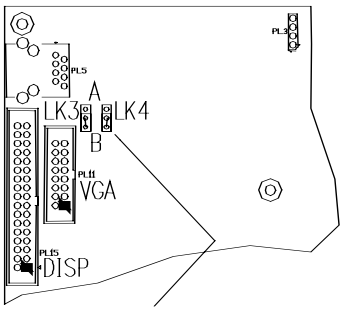
QUANTUM 4 CONTROL CENTER ASSEMBLY (Sheet 1 of 2)





QUANTUM 4 CONTROL CENTER ASSEMBLY (Sheet 2 of 2)

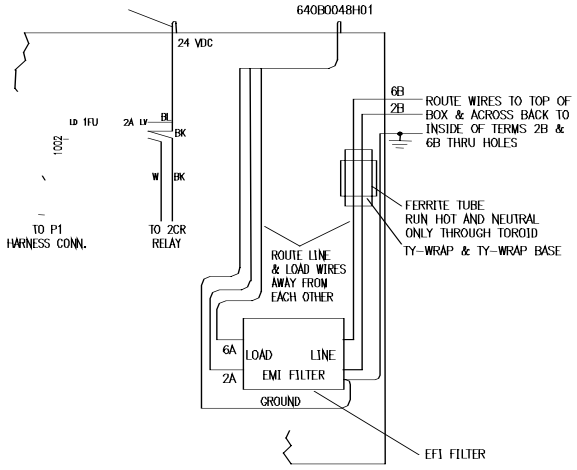




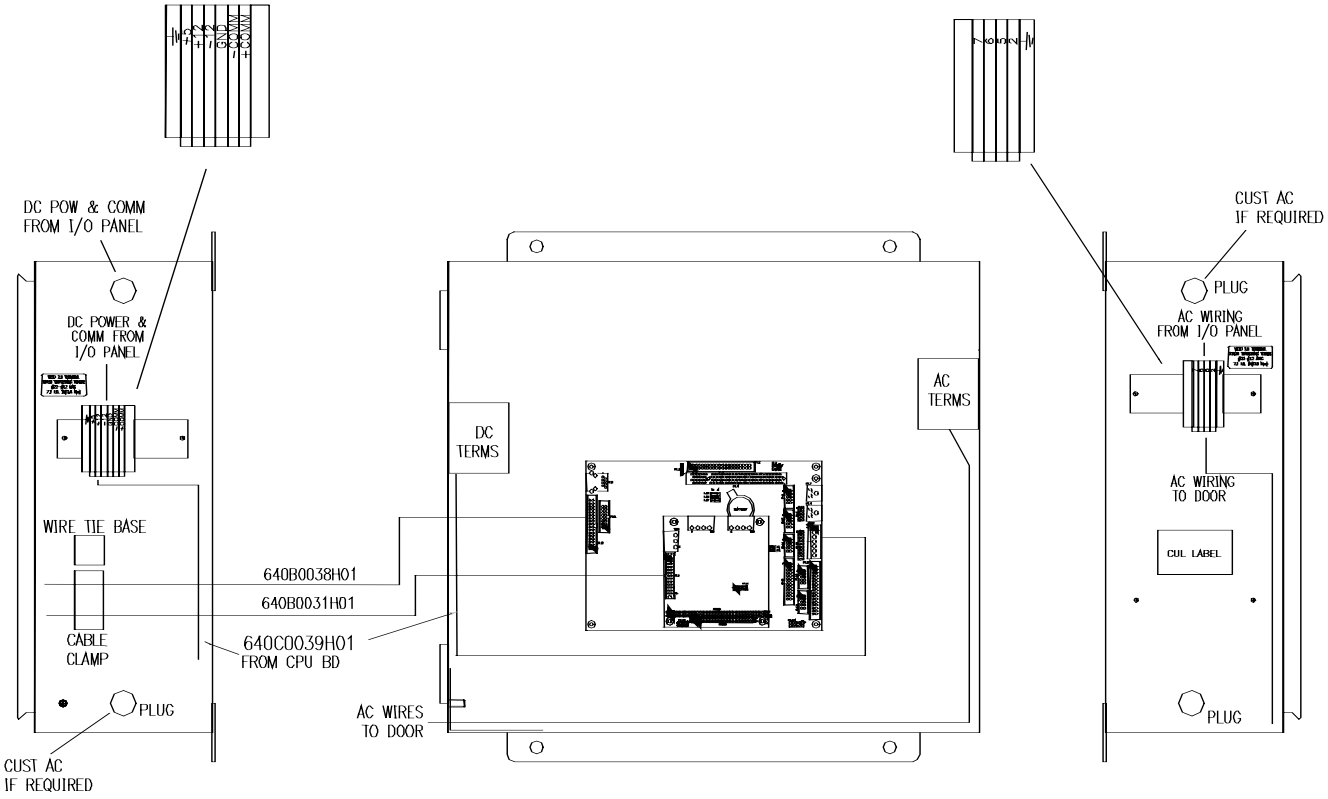
"B" POSITION IS THE BOTTOM 2 PINS OF LK4
LK4 IS SHOWN IN POSITION "B"

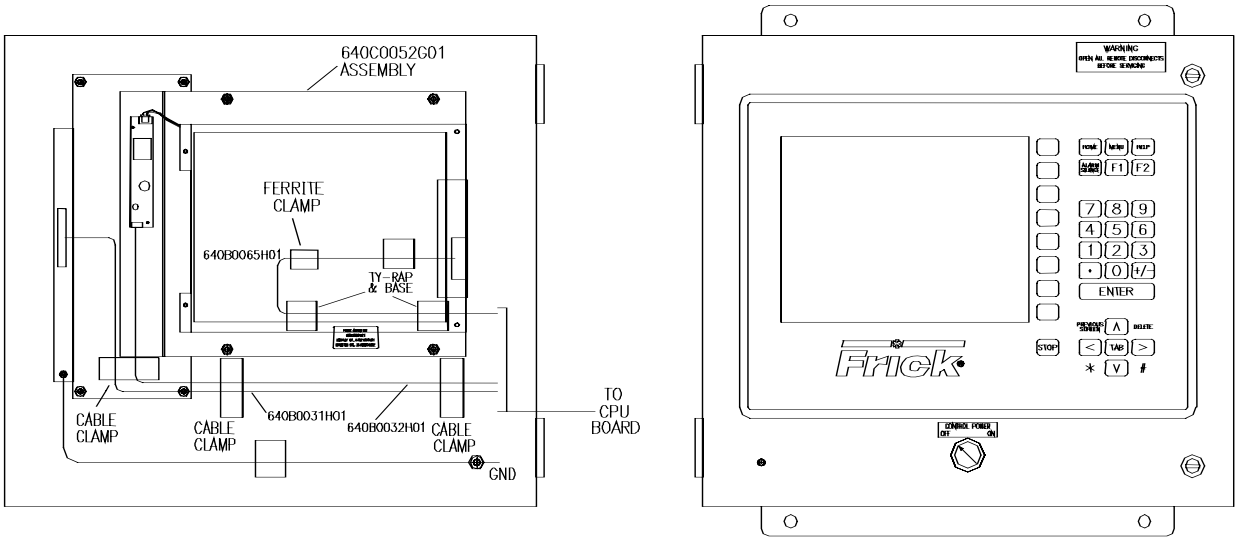
INVERTER VOLTAGE IN POSITION "B" IS +12V
LK3 IS SHOWN IN POSITION "B"

2X VIEW OF LK3 & LK4
POSITION

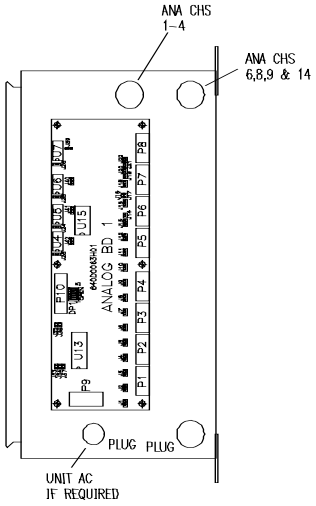


QUANTUM 4 CONTROL CENTER ASSEMBLY (Sheet 1 of 2) RXF 12-50 ONLY

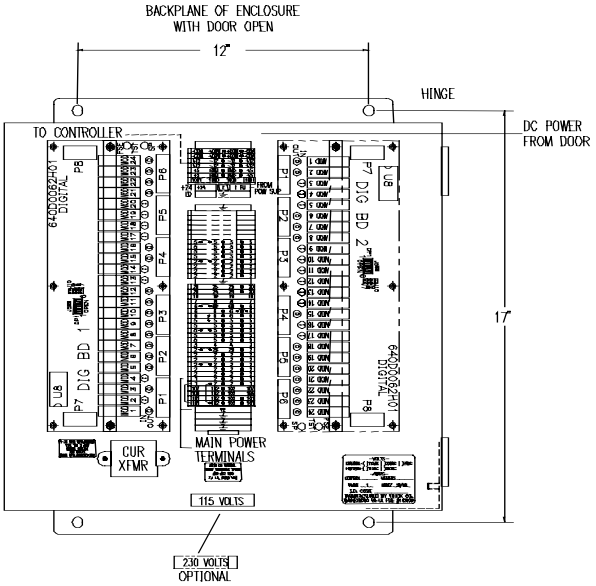




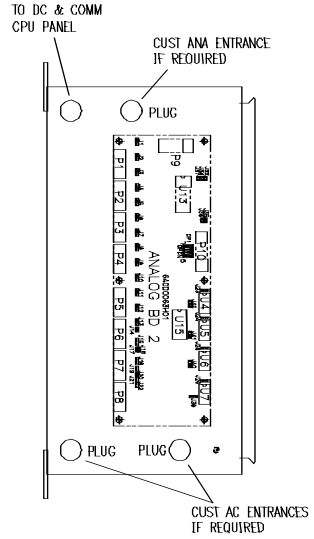
QUANTUM 4 CONTROL CENTER ASSEMBLY (Sheet 2 of 2) RXF 12-50 ONLY



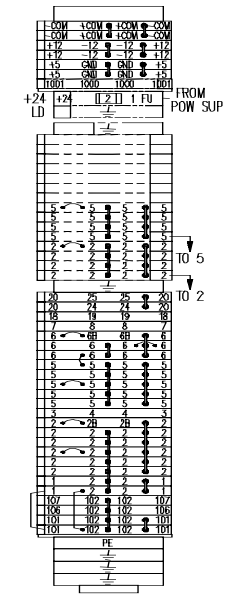
INSIDE LEFT PLANE
OF ENCLOSURE



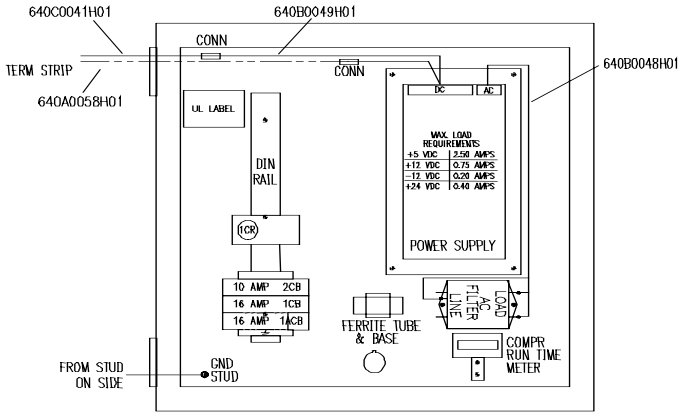
BACKPLANE OF ENCLOSURE
WITH DOOR OPEN



INSIDE RIGHT PLANE
OF ENCLOSURE

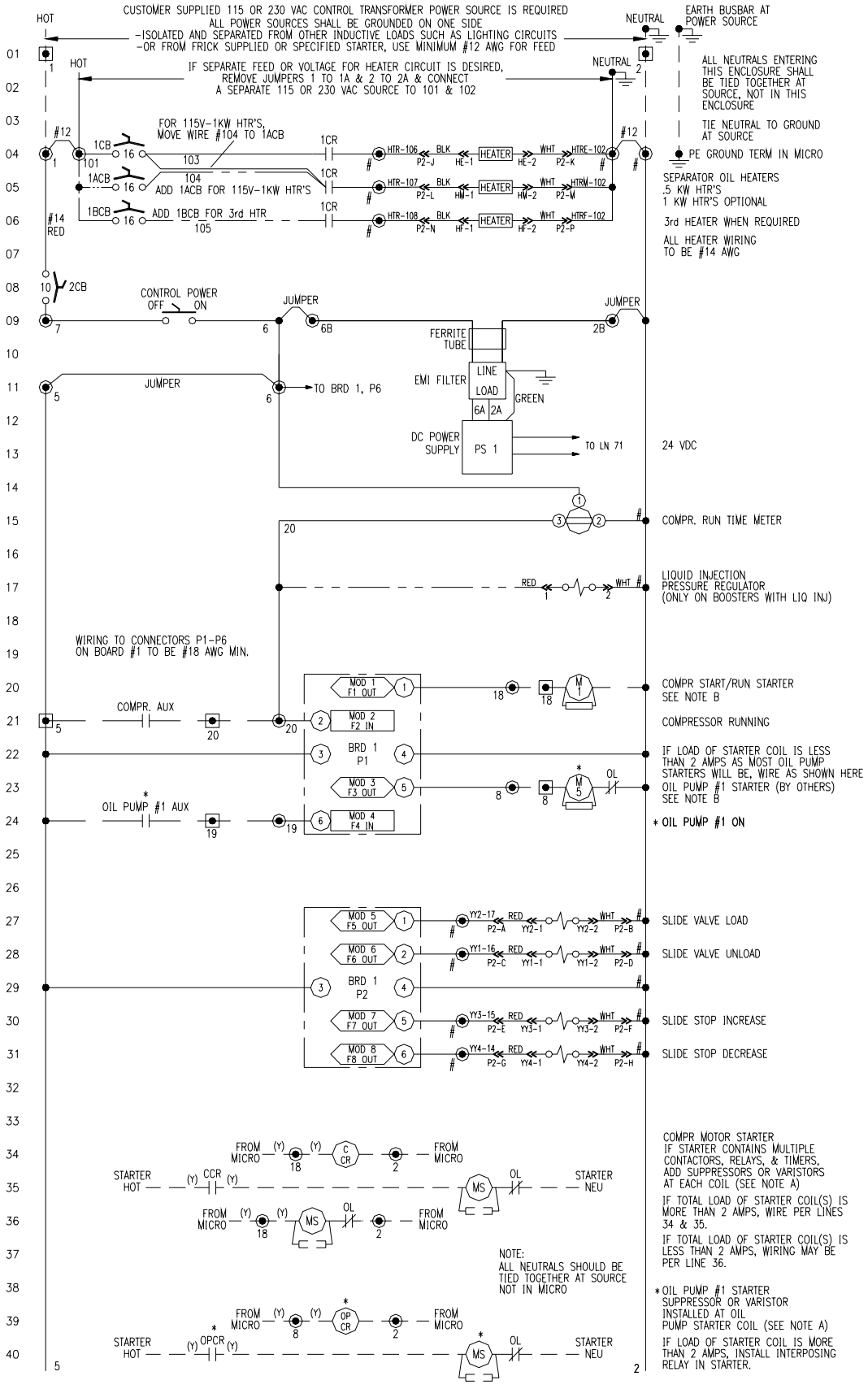


TERMINAL LAYOUT-2X SCALE

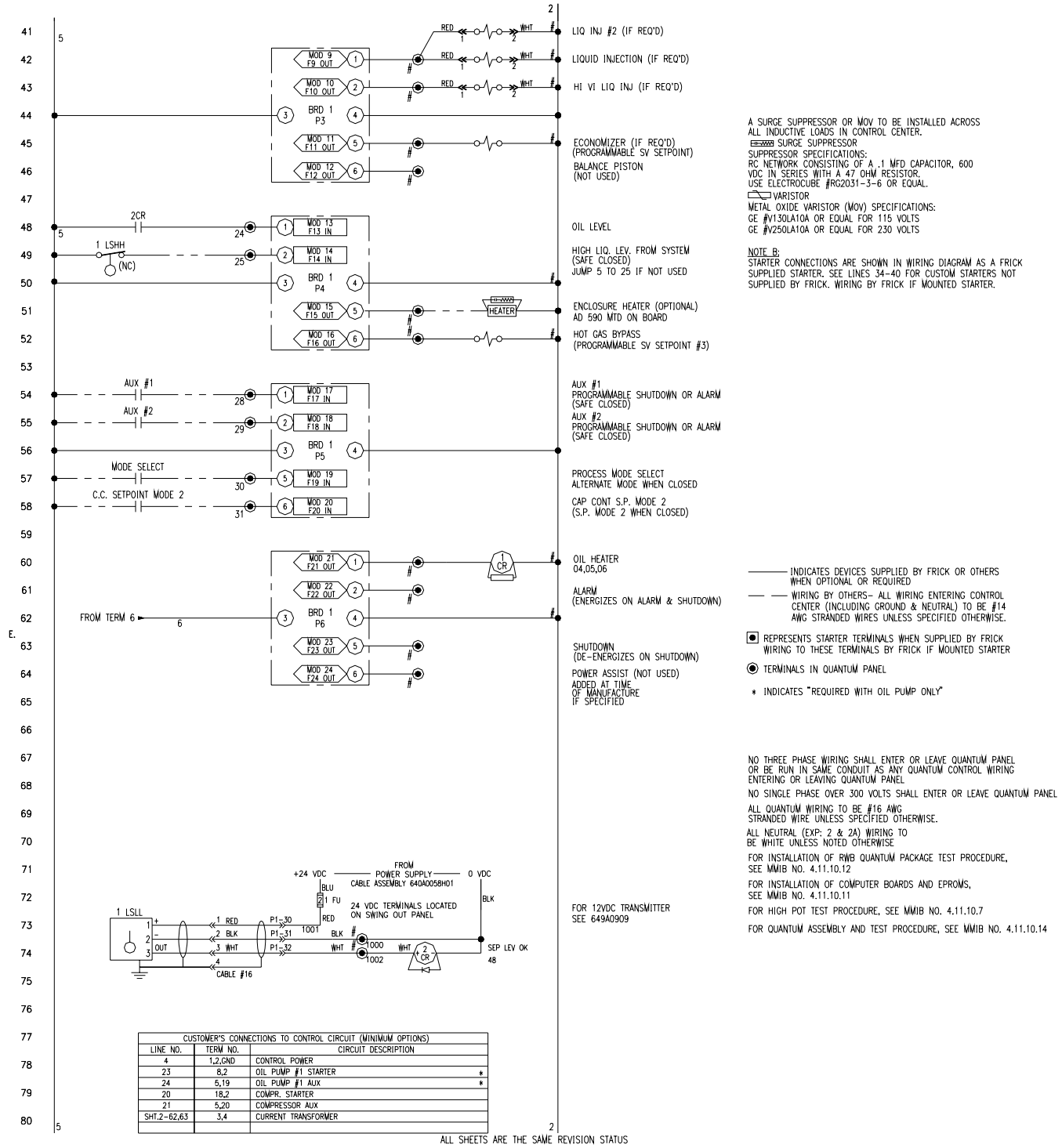


REAR OF DOOR

WIRING DIAGRAM - RWF (Sheet 1 of 4)



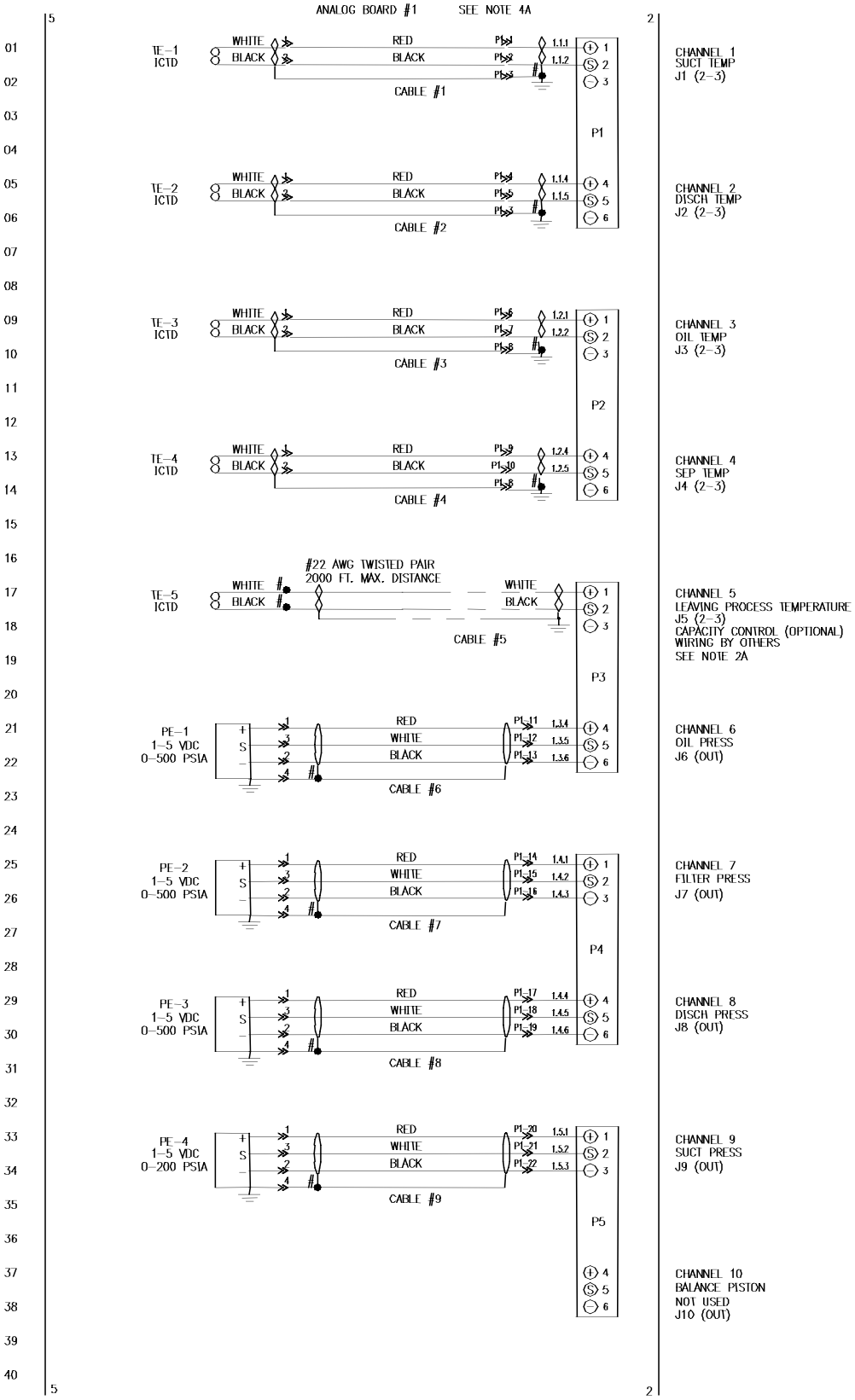
WIRING DIAGRAM - RWF (Sheet 2 of 4)



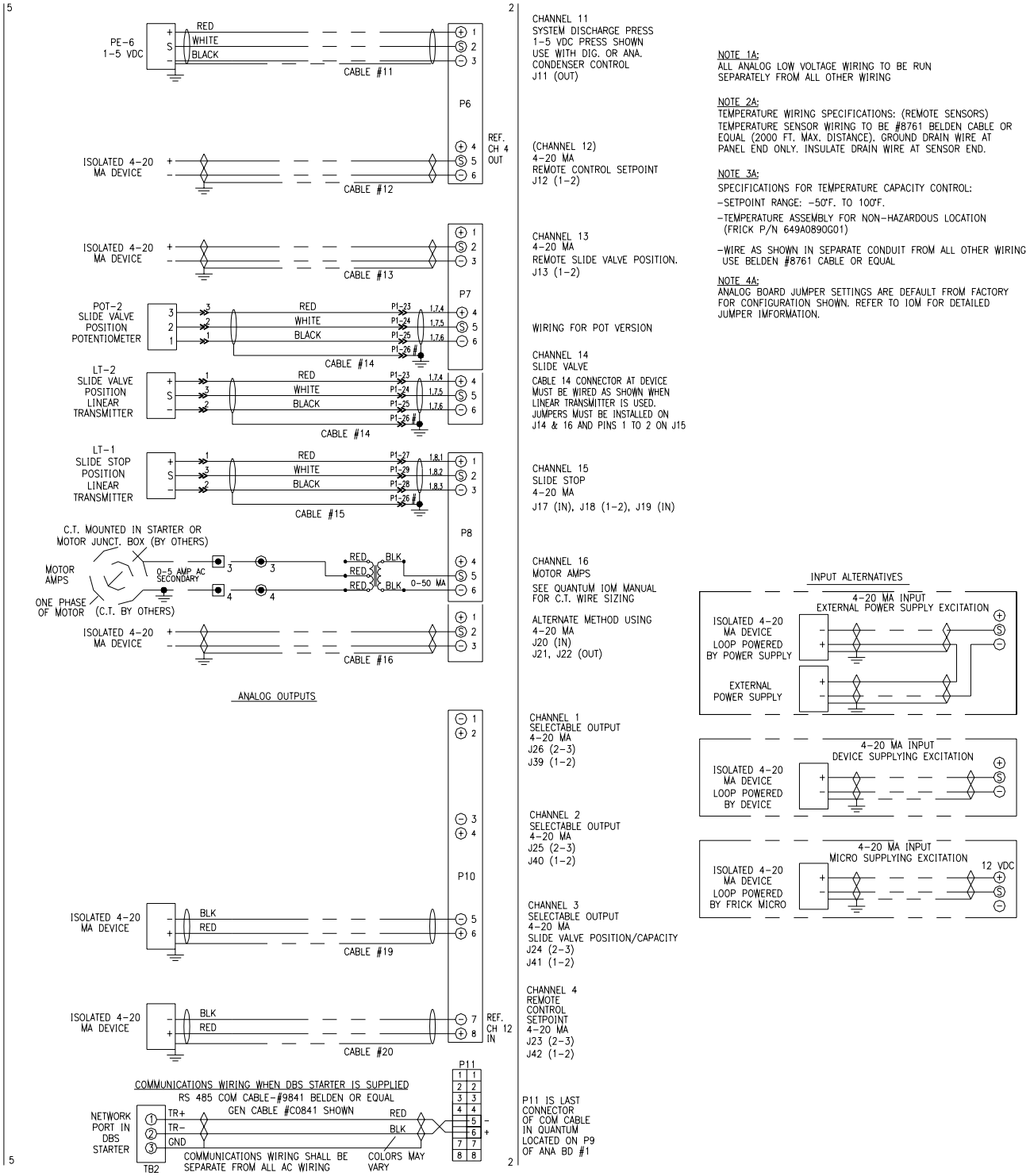
CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)			
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION	
4	1,2,GND	CONTROL POWER	
23	8,2	OIL PUMP #1 STARTER	*
24	5,19	OIL PUMP #1 AUX	*
20	18,2	COMPR. STARTER	
21	5,20	COMPRESSOR AUX	
SHT.2-62,63	3,4	CURRENT TRANSFORMER	

ALL SHEETS ARE THE SAME REVISION STATUS

WIRING DIAGRAM - RWF (Sheet 3 of 4)



WIRING DIAGRAM - RWF (Sheet 4 of 4)



CHANNEL 11
SYSTEM DISCHARGE PRESS
1-5 VDC PRESS SHOWN
USE WITH DIG. OR ANA.
CONDENSER CONTROL
J11 (OUT)

(CHANNEL 12)
4-20 MA
REMOTE CONTROL SETPOINT
J12 (1-2)

CHANNEL 13
4-20 MA
REMOTE SLIDE VALVE POSITION.
J13 (1-2)

WIRING FOR POT VERSION

CHANNEL 14
SLIDE VALVE
CABLE 14 CONNECTOR AT DEVICE MUST BE WIRED AS SHOWN WHEN LINEAR TRANSMITTER IS USED. JUMPERS MUST BE INSTALLED ON J14 & 16 AND PINS 1 TO 2 ON J15

CHANNEL 15
SLIDE STOP
4-20 MA
J17 (IN), J18 (1-2), J19 (IN)

CHANNEL 16
MOTOR AMPS
SEE QUANTUM IOM MANUAL FOR C.T. WIRE SIZING

ALTERNATE METHOD USING
4-20 MA
J20 (IN)
J21, J22 (OUT)

CHANNEL 1
SELECTABLE OUTPUT
4-20 MA
J26 (2-3)
J39 (1-2)

CHANNEL 2
SELECTABLE OUTPUT
4-20 MA
J25 (2-3)
J40 (1-2)

CHANNEL 3
SELECTABLE OUTPUT
4-20 MA
SLIDE VALVE POSITION/CAPACITY
J24 (2-3)
J41 (1-2)

CHANNEL 4
REMOTE CONTROL SETPOINT
4-20 MA
J23 (2-3)
J42 (1-2)

P11 IS LAST CONNECTOR OF COM CABLE IN QUANTUM LOCATED ON P9 OF ANA BD #1

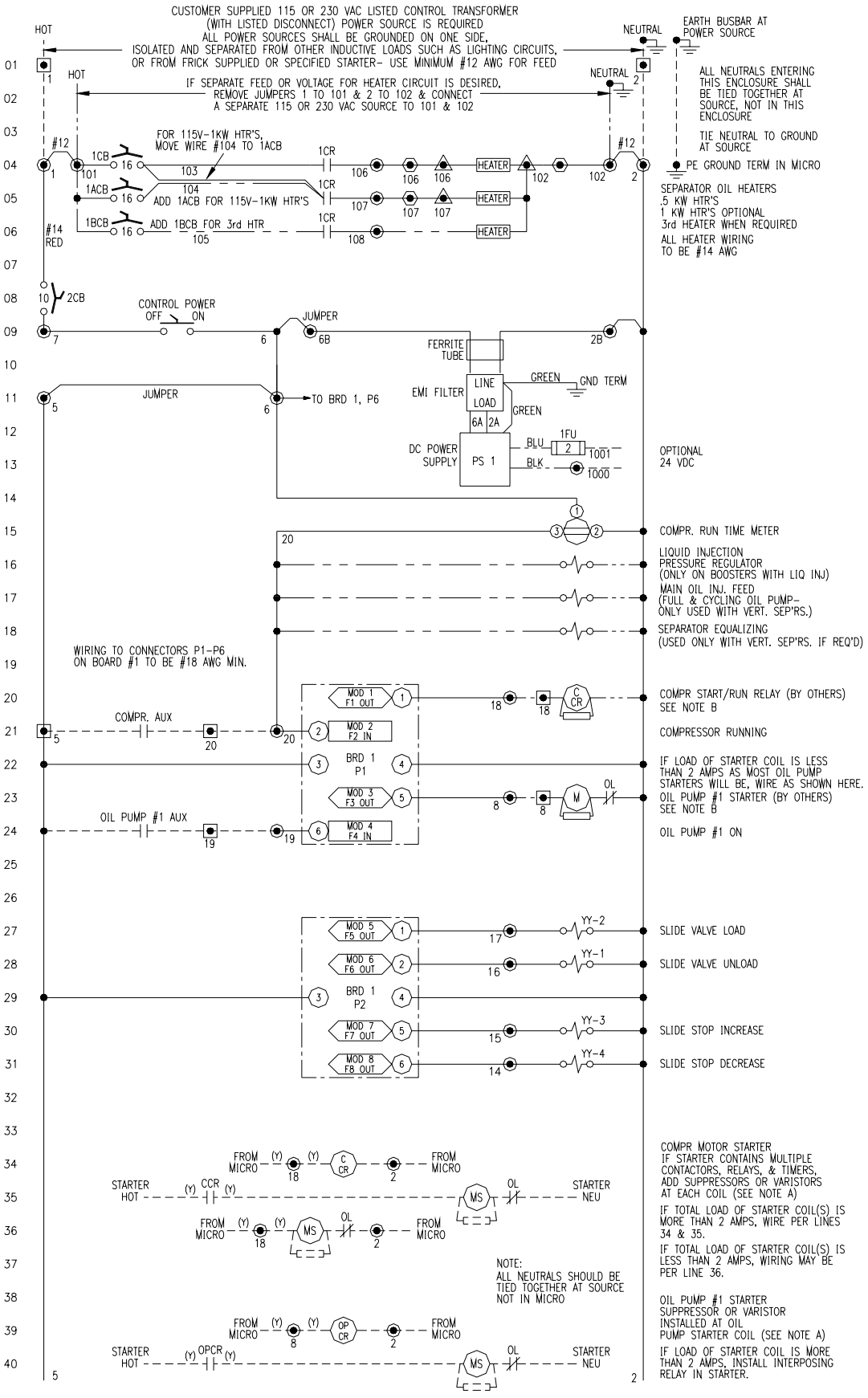
NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN SEPARATELY FROM ALL OTHER WIRING

NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS: (REMOTE SENSORS)
TEMPERATURE SENSOR WIRING TO BE #8761 BELDEN CABLE OR EQUAL (2000 FT. MAX. DISTANCE). GROUND DRAIN WIRE AT PANEL END ONLY. INSULATE DRAIN WIRE AT SENSOR END.

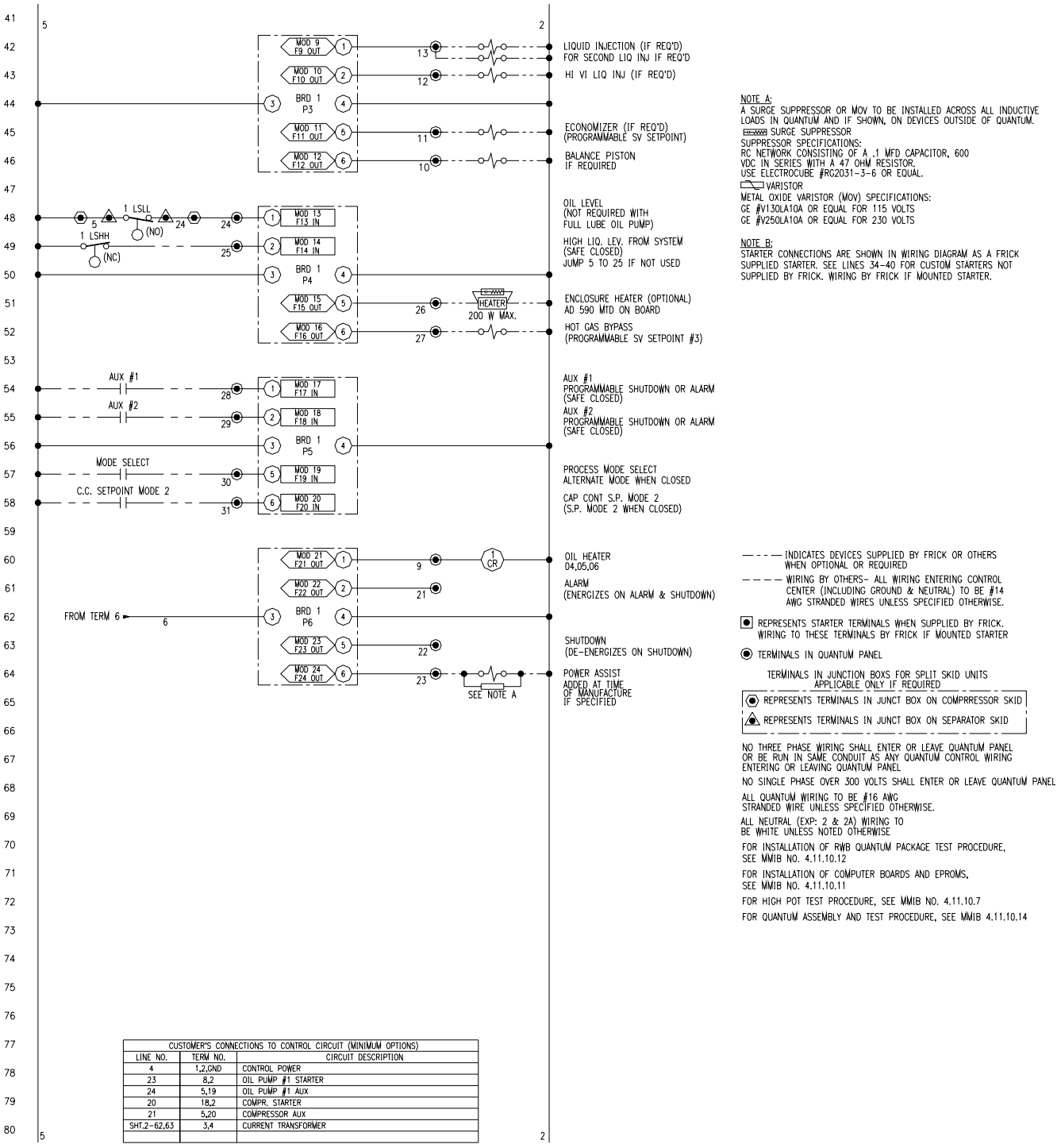
NOTE 3A:
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL:
-SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY FOR NON-HAZARDOUS LOCATION (FRICK P/N 649A0890G01)
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING USE BELDEN #8761 CABLE OR EQUAL

NOTE 4A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO IOM FOR DETAILED JUMPER IMFORMATION.

WIRING DIAGRAM – RWB II (Sheet 1 of 4)



WIRING DIAGRAM – RWB II (Sheet 2 of 4)



NOTE A:
A SURGE SUPPRESSOR OR MOV TO BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.

SURGE SUPPRESSOR
SUPPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A .1 MFD CAPACITOR, 600 VDC IN SERIES WITH A 47 OHM RESISTOR.
USE ELECTROCUBE #RG2031-3-6 OR EQUAL.

VARISTOR
METAL OXIDE VARISTOR (MOV) SPECIFICATIONS:
GE #V130LA10A OR EQUAL FOR 115 VOLTS
GE #V250LA10A OR EQUAL FOR 230 VOLTS

NOTE B:
STARTER CONNECTIONS ARE SHOWN IN WIRING DIAGRAM AS A FRICK SUPPLIED STARTER. SEE LINES 34-40 FOR CUSTOM STARTERS NOT SUPPLIED BY FRICK. WIRING BY FRICK IF MOUNTED STARTER.

— — — — INDICATES DEVICES SUPPLIED BY FRICK OR OTHERS WHEN OPTIONAL OR REQUIRED

— — — — WIRING BY OTHERS– ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14 AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.

REPRESENTS STARTER TERMINALS WHEN SUPPLIED BY FRICK. WIRING TO THESE TERMINALS BY FRICK IF MOUNTED STARTER

TERMINALS IN QUANTUM PANEL

TERMINALS IN JUNCTION BOXS FOR SPLIT SKID UNITS APPLICABLE ONLY IF REQUIRED

REPRESENTS TERMINALS IN JUNCT BOX ON COMPRRESSOR SKID

REPRESENTS TERMINALS IN JUNCT BOX ON SEPARATOR SKID

NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM PANEL

NO SINGLE PHASE OVER 300 VOLTS SHALL ENTER OR LEAVE QUANTUM PANEL

ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS SPECIFIED OTHERWISE.

ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS NOTED OTHERWISE

FOR INSTALLATION OF RWB QUANTUM PACKAGE TEST PROCEDURE, SEE MMIB NO. 4.11.10.12

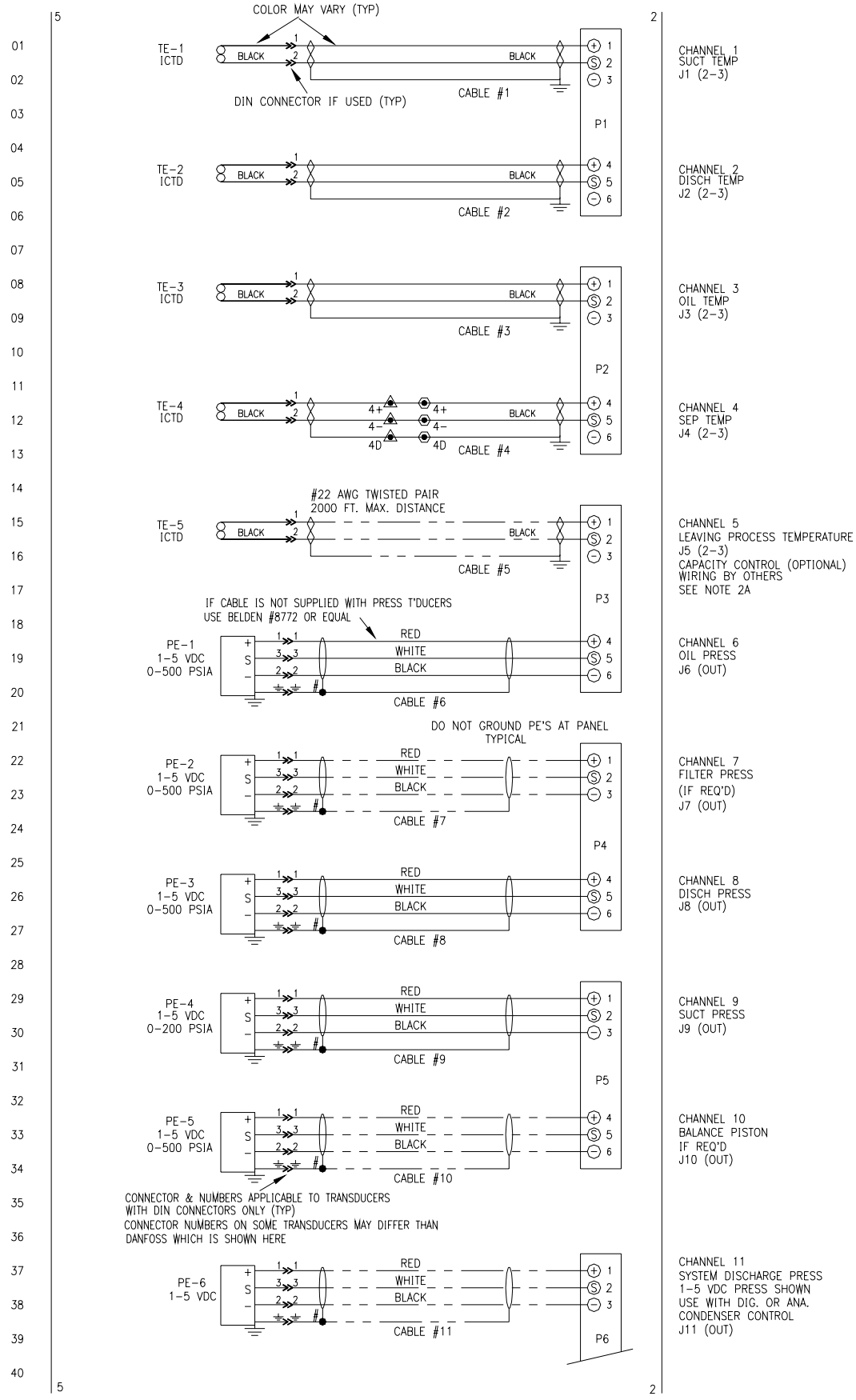
FOR INSTALLATION OF COMPUTER BOARDS AND EPROMS, SEE MMIB NO. 4.11.10.11

FOR HIGH POT TEST PROCEDURE, SEE MMIB NO. 4.11.10.7

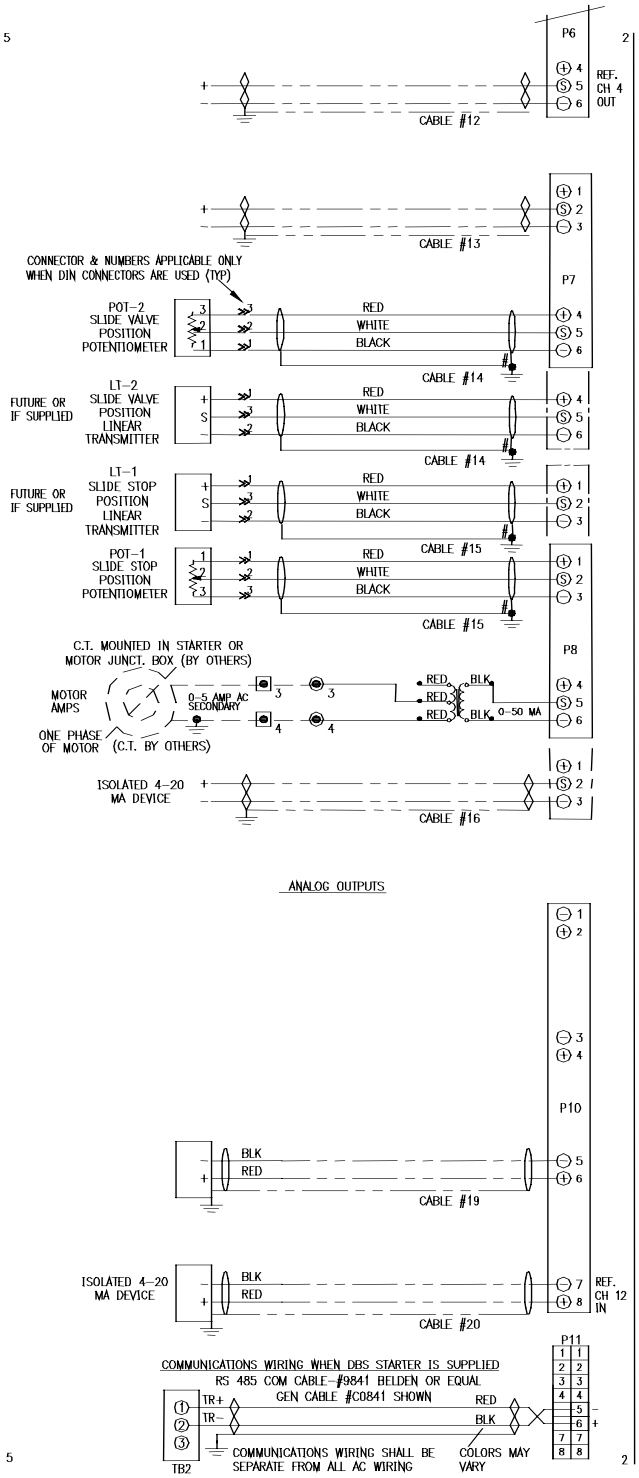
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE, SEE MMIB 4.11.10.14

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)		
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION
4	1,2,GND	CONTROL POWER
23	8,2	OIL PUMP #1 STARTER
24	5,19	OIL PUMP #1 AUX
20	18,2	COMPR. STARTER
21	5,20	COMPRESSOR AUX
SHT.2-62,63	3,4	CURRENT TRANSFORMER

WIRING DIAGRAM – RWB II (Sheet 3 of 4)



WIRING DIAGRAM – RWB II (Sheet 4 of 4)



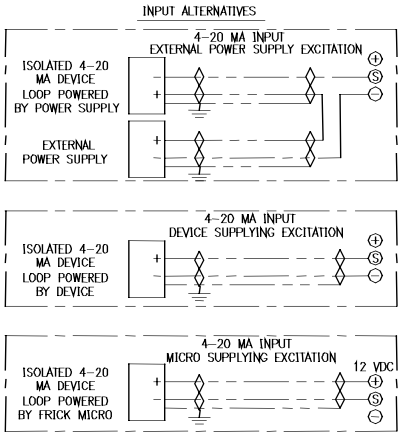
NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER OF TERMINATION IF NOT CONFINED OTHERWISE.

NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS:
IF TEMPERATURE SENSOR WIRING IS IN CONDUIT, USE #8761 BELDEN CABLE OR EQUAL. IF OPEN WIRING, USE #8760 BELDEN CABLE OR EQUAL. GROUND DRAIN WIRE AT PANEL END ONLY ON 4" OR DIN TYPE SENSORS. GROUND AT SENSOR END ONLY ON 1" SENSORS. INSULATE DRAIN WIRE AT OPPOSITE END. 2000 FT. MAX. DISTANCE.

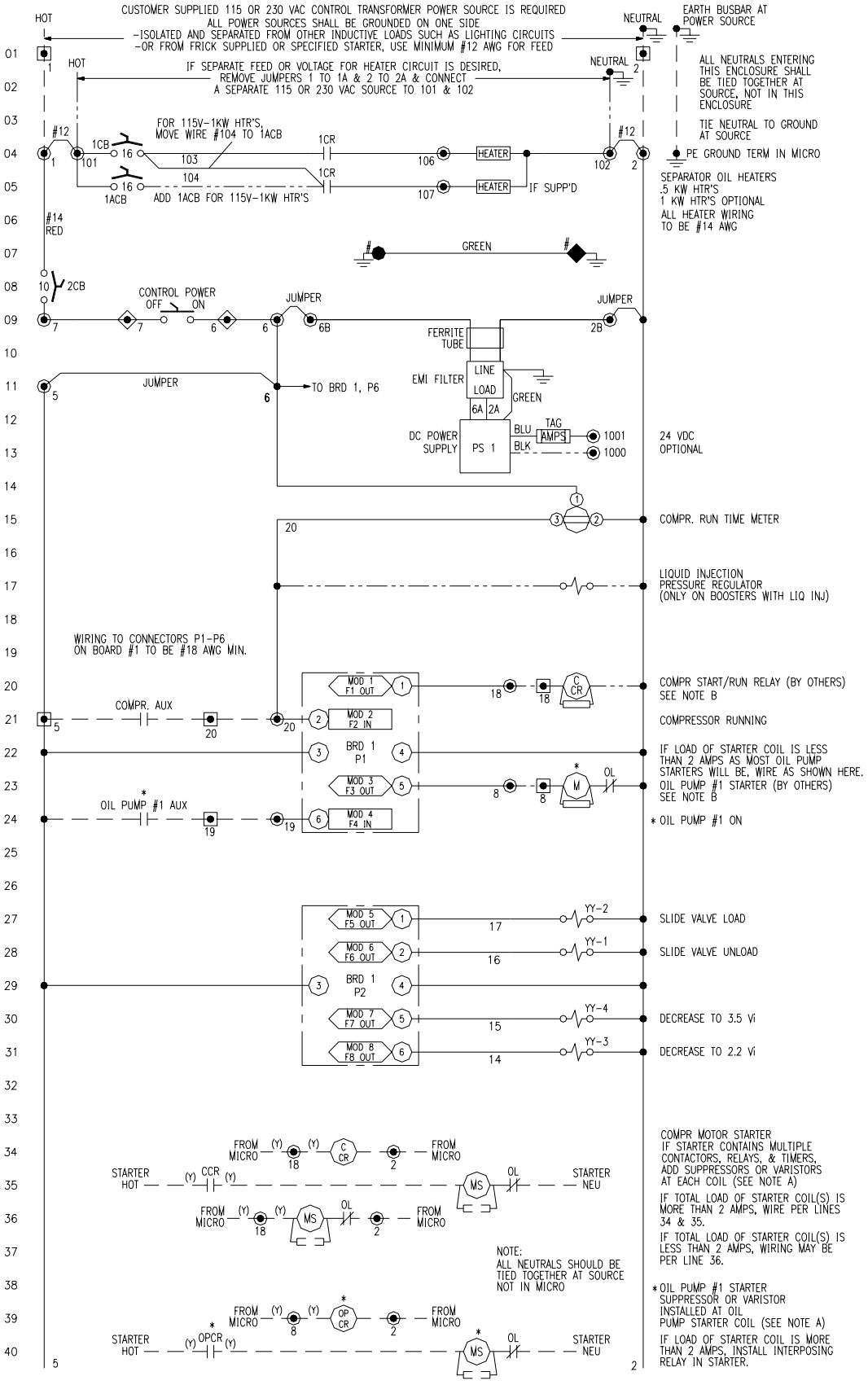
NOTE 3A:
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL:
–SETPOINT RANGE: –50°F. TO 100°F.
–TEMP PROBE SIZE (FRICK P/N 640A0035H01) .312 NOM. DIA. X 1" LG., 304 S.S. WITH (2) 24" LEADS
–MOUNTING IN WELL (FRICK P/N 99OA0062H01) IS DESIRABLE USE HEAT TRANSFER COMPOUND (P\N 111Q0831807)
–WELL FOR ABOVE, 3/4"NPT WELL CONNECTION, 1/2" FPT FOR CONECTION BOX
–TEMPERATURE ASSEMBLY FOR NON–HAZARDOUS LOCATION (FRICK P/N 640C0031G11 INCLUDES ALL PARTS ABOVE)
–WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING USE BELDEN #8761 CABLE OR EQUAL

NOTE 4A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO MAINTENANCE MANUAL FOR DETAILED JUMPER IMFORMATION.

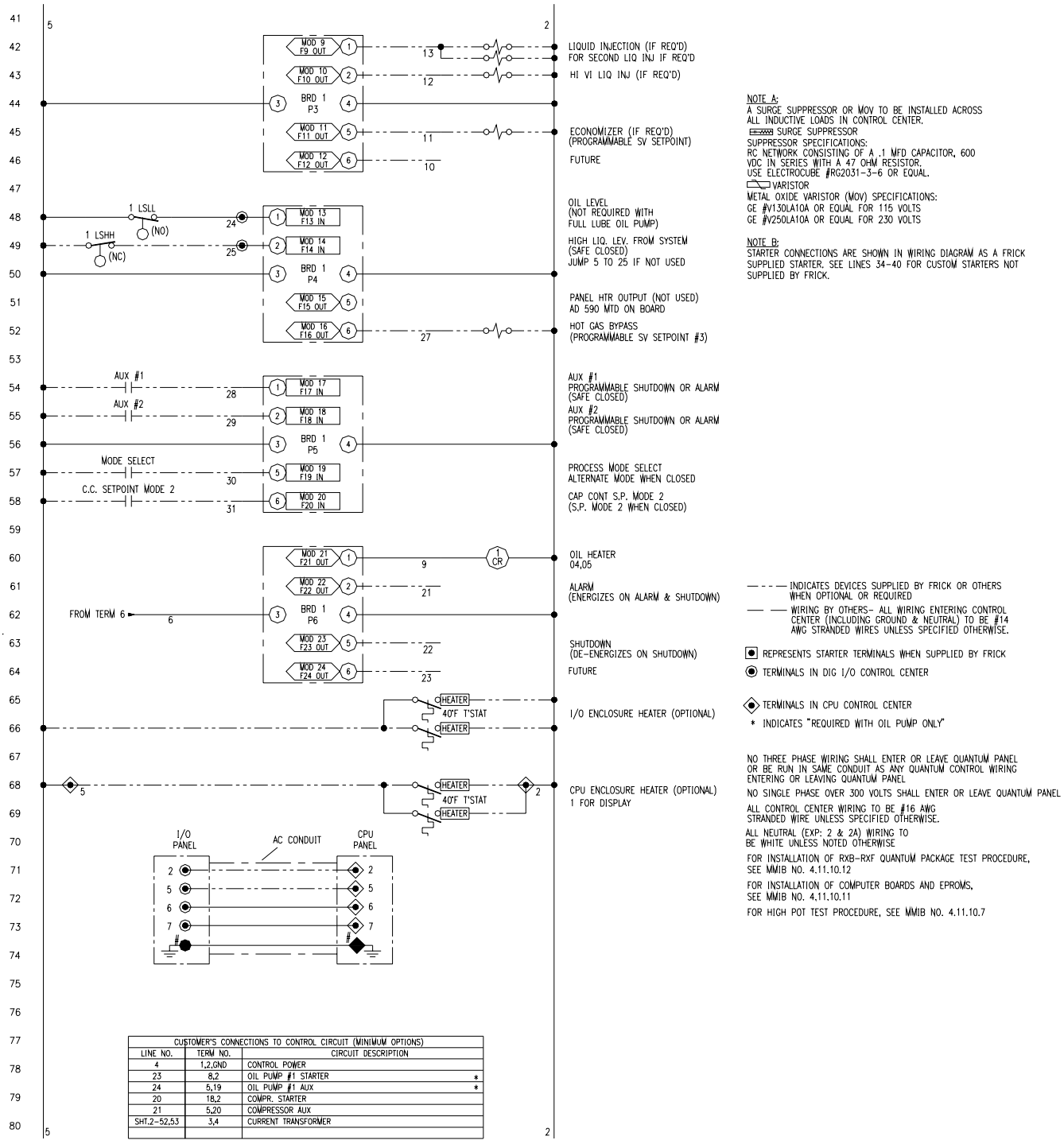
INPUT ALTERNATIVES



WIRING DIAGRAM – RXF (12-50) - (Sheet 1 of 4)



WIRING DIAGRAM – RXF (12-50) - (Sheet 2 of 4)



CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)		
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION
4	1,2,GND	CONTROL POWER
23	8,2	OIL PUMP #1 STARTER *
24	5,19	OIL PUMP #1 AUX *
20	18,2	COMPR. STARTER
21	5,20	COMPRESSOR AUX
SHT.2-52,53	3,4	CURRENT TRANSFORMER

NOTE A:
A SURGE SUPPRESSOR OR MOV TO BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN CONTROL CENTER.
SURGE SUPPRESSOR
SUPPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A .1 MFD CAPACITOR, 600 VDC IN SERIES WITH A 47 OHM RESISTOR.
USE ELECTROCUBE #RG2031-3-6 OR EQUAL.
VARISTOR
METAL OXIDE VARISTOR (MOV) SPECIFICATIONS:
GE #V130LA10A OR EQUAL FOR 115 VOLTS
GE #V250LA10A OR EQUAL FOR 230 VOLTS

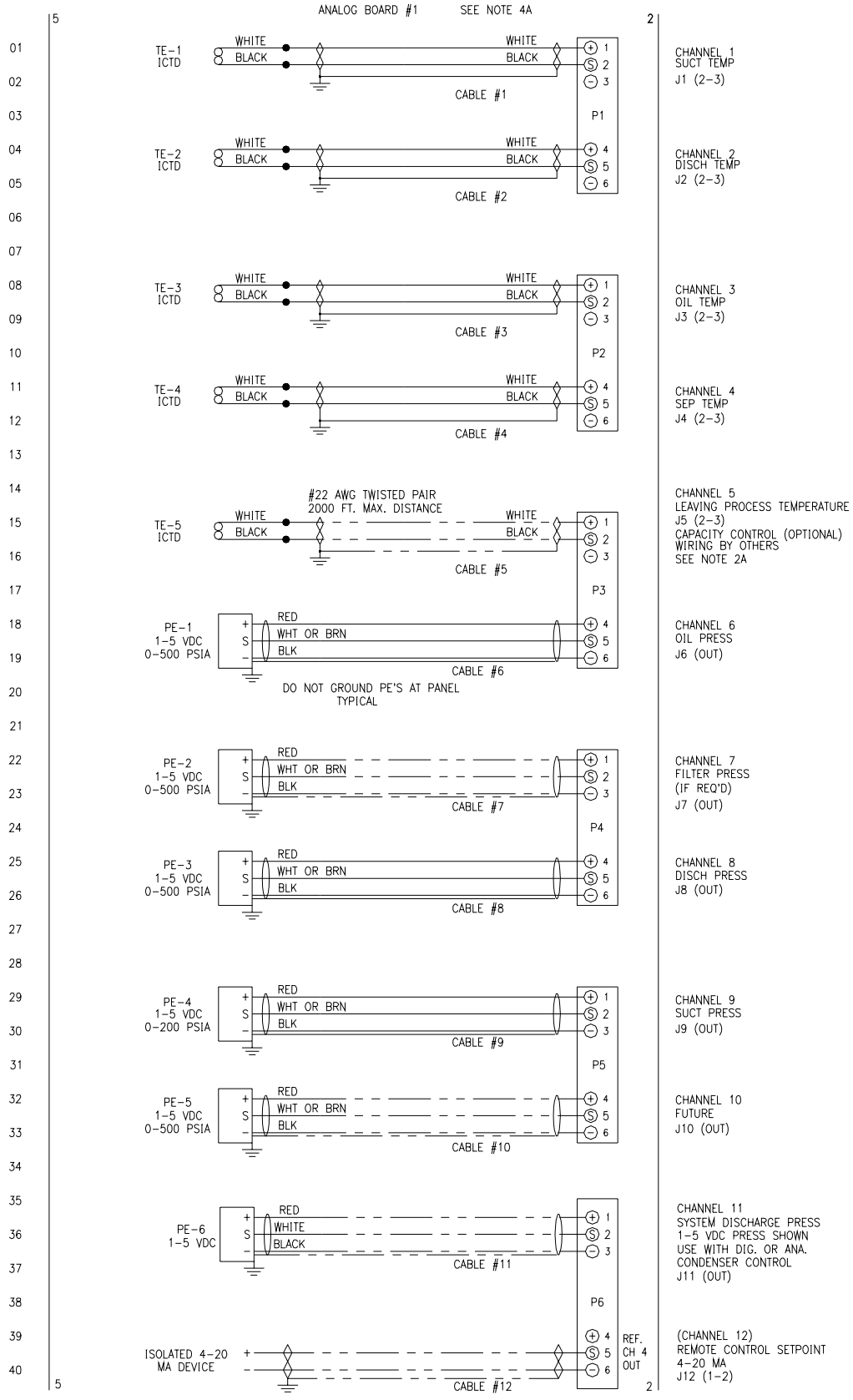
NOTE B:
STARTER CONNECTIONS ARE SHOWN IN WIRING DIAGRAM AS A FRICK SUPPLIED STARTER. SEE LINES 34-40 FOR CUSTOM STARTERS NOT SUPPLIED BY FRICK.

- - - - INDICATES DEVICES SUPPLIED BY FRICK OR OTHERS WHEN OPTIONAL OR REQUIRED
— — WIRING BY OTHERS- ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14 AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.

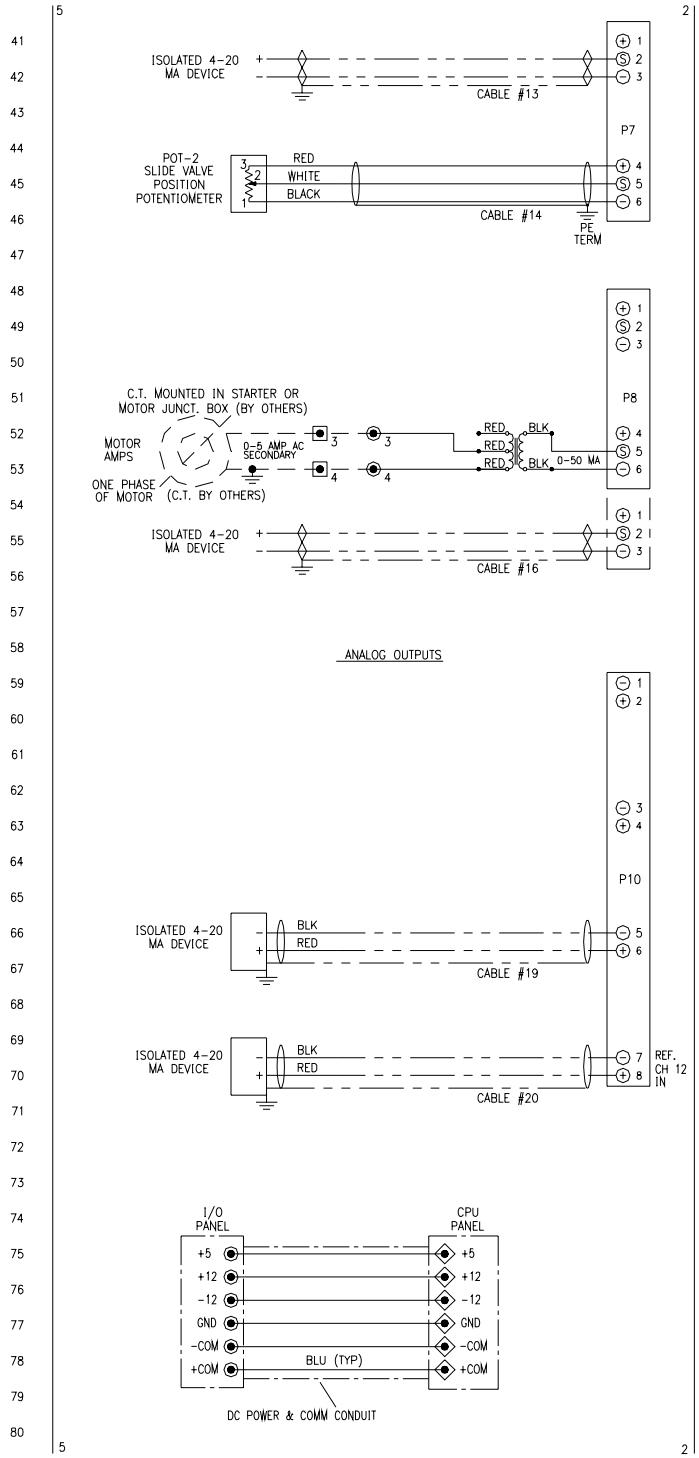
REPRESENTS STARTER TERMINALS WHEN SUPPLIED BY FRICK
TERMINALS IN DIG I/O CONTROL CENTER
TERMINALS IN CPU CONTROL CENTER
* INDICATES "REQUIRED WITH OIL PUMP ONLY"

NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM PANEL
NO SINGLE PHASE OVER 300 VOLTS SHALL ENTER OR LEAVE QUANTUM PANEL
ALL CONTROL CENTER WIRING TO BE #16 AWG STRANDED WIRE UNLESS SPECIFIED OTHERWISE.
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS NOTED OTHERWISE
FOR INSTALLATION OF RXB-RXF QUANTUM PACKAGE TEST PROCEDURE, SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS AND EPROMS, SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE, SEE MMIB NO. 4.11.10.7

WIRING DIAGRAM – RXF (12-50) - (Sheet 3 of 4)



WIRING DIAGRAM – RXF (12-50) - (Sheet 4 of 4)



CHANNEL 13
REMOTE SLIDE VALVE POSITION.
4-20 MA
J13 (1-2)

CHANNEL 14
SLIDE VALVE
J14, J15, J16 (OUT)

CHANNEL 15
FUTURE
J17, J18, J19 (OUT)

CHANNEL 16
MOTOR AMPS
SEE QUANTUM IOM MANUAL FOR C.T. WIRE SIZING
J20, J21 (OUT)
J22 (IN)

ALTERNATE METHOD USING
4-20 MA
J20 (IN)
J21, J22 (OUT)

CHANNEL 1
SELECTABLE OUTPUT
4-20 MA
J26 (2-3)
J39 (1-2)

CHANNEL 2
SELECTABLE OUTPUT
4-20 MA
J25 (2-3)
J40 (1-2)

CHANNEL 3
SELECTABLE OUTPUT
4-20 MA
SLIDE VALVE POSITION/CAPACITY
J24 (2-3)
J41 (1-2)

CHANNEL 4
REMOTE CONTROL SETPOINT
4-20 MA
J23 (2-3)
J42 (1-2)

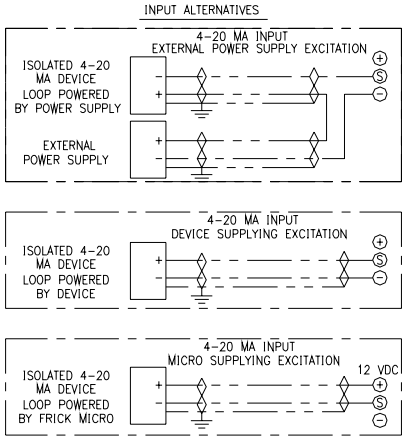
NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING
ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER OF TERMINATION IF NOT CONFINED OTHERWISE

NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS:
IF TEMPERATURE SENSOR WIRING IS IN CONDUIT, USE #8761 BELDEN CABLE OR EQUAL. IF OPEN WIRING, USE #8760 BELDEN CABLE OR EQUAL. GROUND DRAIN WIRE AT PANEL END ONLY ON 4" OR DIN TYPE SENSORS. GROUND AT SENSOR END ONLY ON 1" SENSORS. INSULATE DRAIN WIRE AT OPPOSITE END. 2000 FT. MAX. DISTANCE.

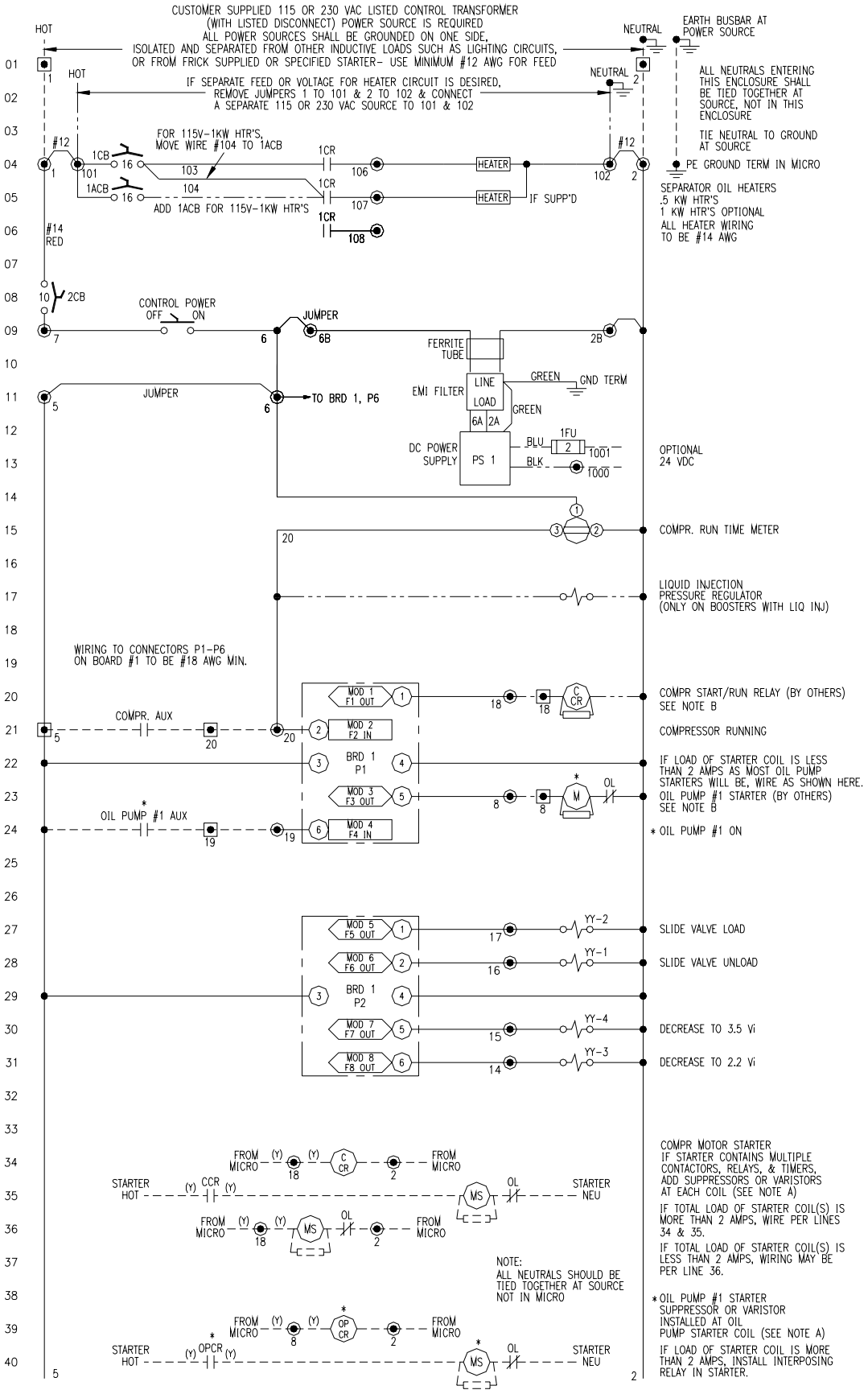
NOTE 3A:
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL:
- SETPOINT RANGE: -50°F. TO 100°F.
- TEMP PROBE SIZE (FRICK P/N 640A0035H01) .312 NOM. DIA. X 1" LG., 304 S.S. WITH (2) 24" LEADS
- MOUNTING IN WELL (FRICK P/N 990A0062H01) IS DESIRABLE USE HEAT TRANSFER COMPOUND (P\N 111Q0831807)
- WELL FOR ABOVE, 3/4"MPT WELL CONNECTION, 1/2" FPT FOR CONECTION BOX
- TEMPERATURE ASSEMBLY FOR NON-HAZARDOUS LOCATION (FRICK P/N 640C0031G11 INCLUDES ALL PARTS ABOVE)
- WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING USE BELDEN #8761 CABLE OR EQUAL

NOTE 4A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO MAINTENANCE MANUAL FOR DETAILED JUMPER IMFORMATION.

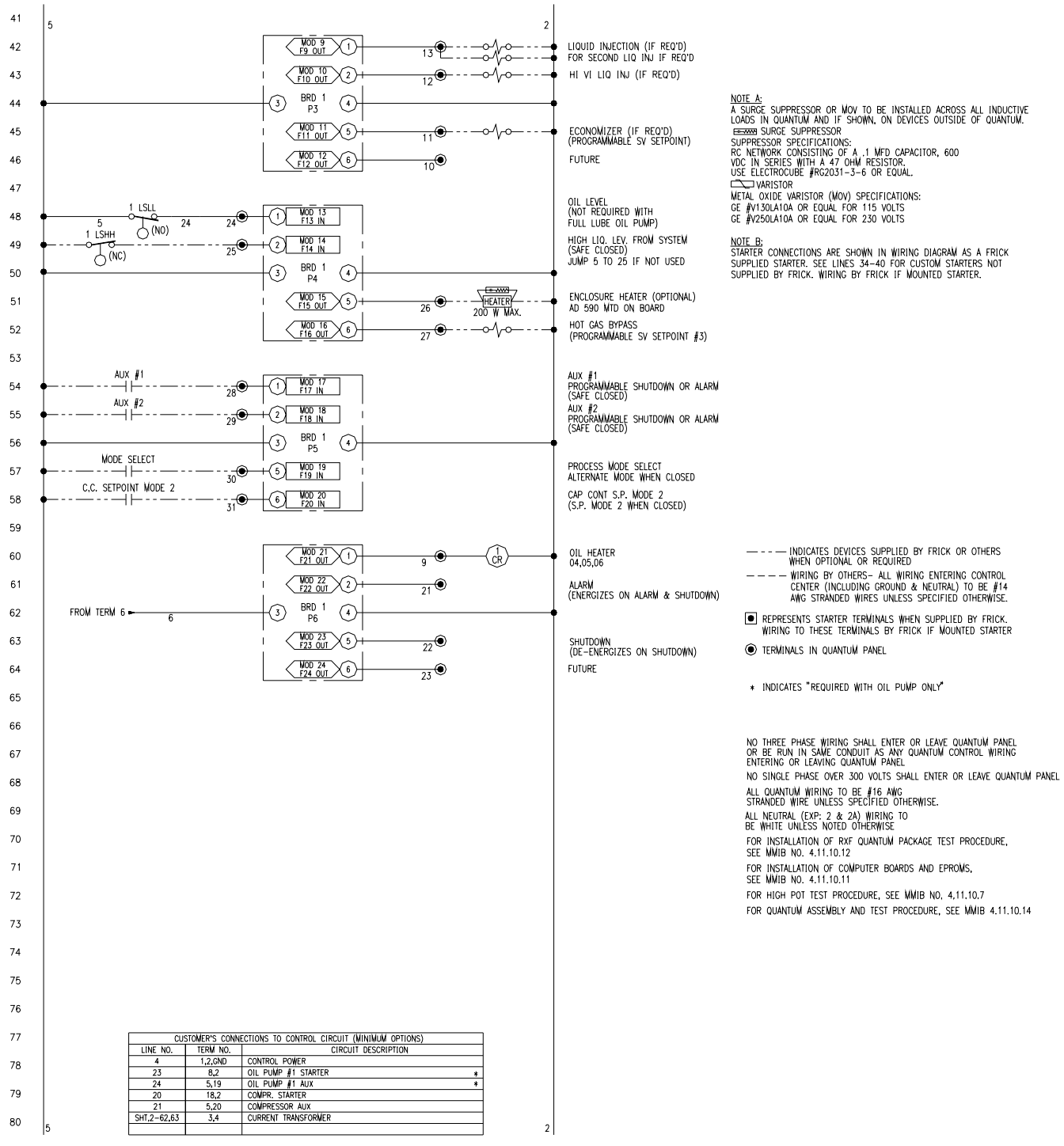
INPUT ALTERNATIVES



WIRING DIAGRAM – RXF (58-101) - RXB (Sheet 1 of 4)



WIRING DIAGRAM – RXF (58-101) – RXB (Sheet 2 of 4)



NOTE A:
A SURGE SUPPRESSOR OR MOV TO BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A .1 MFD CAPACITOR, 600 VDC IN SERIES WITH A 47 OHM RESISTOR.
USE ELECTROCUBE #RG2031-3-6 OR EQUAL.
VARISTOR
METAL OXIDE VARISTOR (MOV) SPECIFICATIONS:
GE #V130LA10A OR EQUAL FOR 115 VOLTS
GE #V250LA10A OR EQUAL FOR 230 VOLTS

NOTE B:
STARTER CONNECTIONS ARE SHOWN IN WIRING DIAGRAM AS A FRICK SUPPLIED STARTER. SEE LINES 34-40 FOR CUSTOM STARTERS NOT SUPPLIED BY FRICK. WIRING BY FRICK IF MOUNTED STARTER.

- - - - INDICATES DEVICES SUPPLIED BY FRICK OR OTHERS WHEN OPTIONAL OR REQUIRED
– – – – WIRING BY OTHERS– ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14 AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.

REPRESENTS STARTER TERMINALS WHEN SUPPLIED BY FRICK. WIRING TO THESE TERMINALS BY FRICK IF MOUNTED STARTER

TERMINALS IN QUANTUM PANEL

* INDICATES "REQUIRED WITH OIL PUMP ONLY"

NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM PANEL

NO SINGLE PHASE OVER 300 VOLTS SHALL ENTER OR LEAVE QUANTUM PANEL

ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS SPECIFIED OTHERWISE.

ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS NOTED OTHERWISE

FOR INSTALLATION OF RXF QUANTUM PACKAGE TEST PROCEDURE, SEE MMIB NO. 4.11.10.12

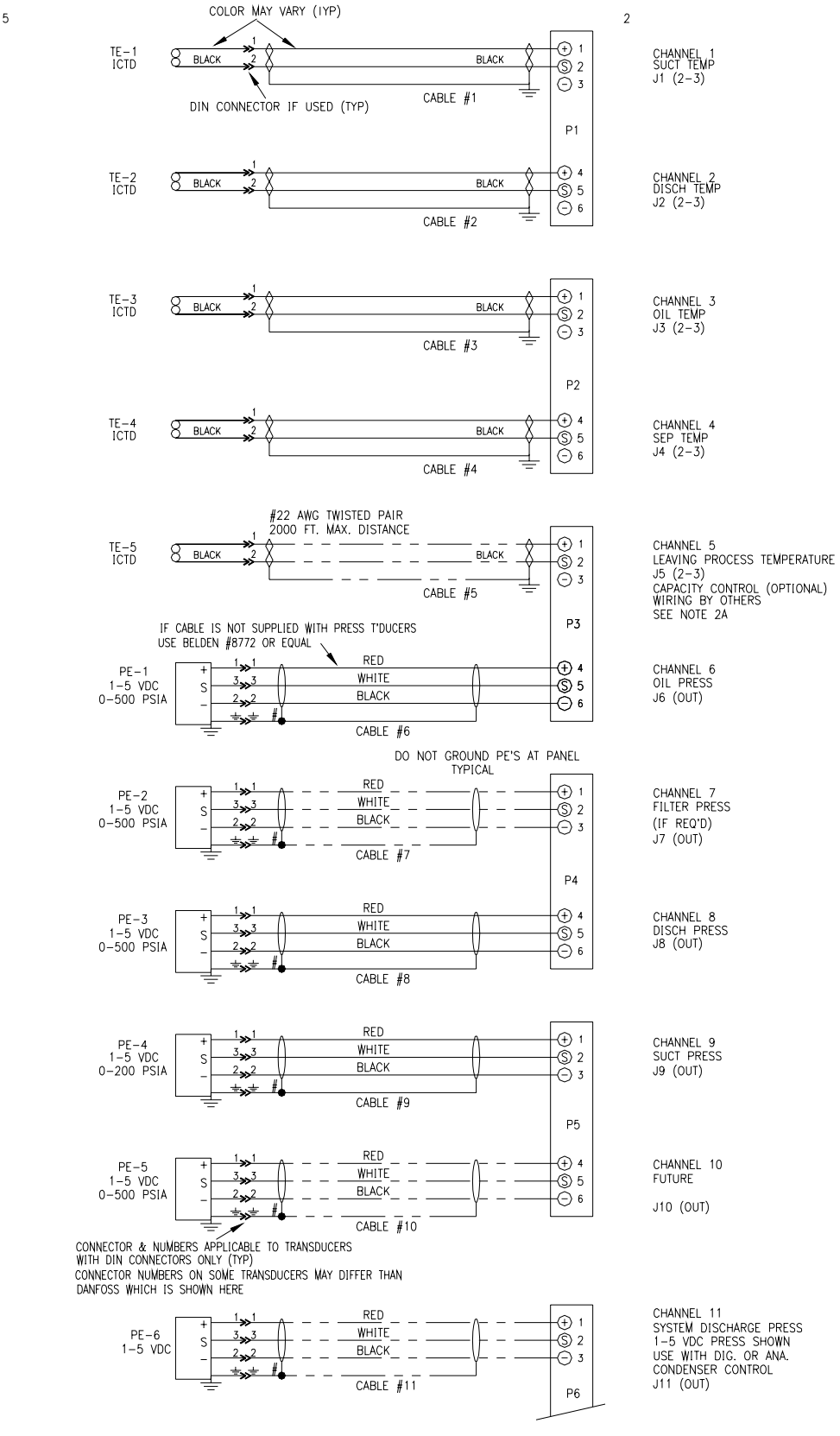
FOR INSTALLATION OF COMPUTER BOARDS AND EPROMS, SEE MMIB NO. 4.11.10.11

FOR HIGH POT TEST PROCEDURE, SEE MMIB NO. 4.11.10.7

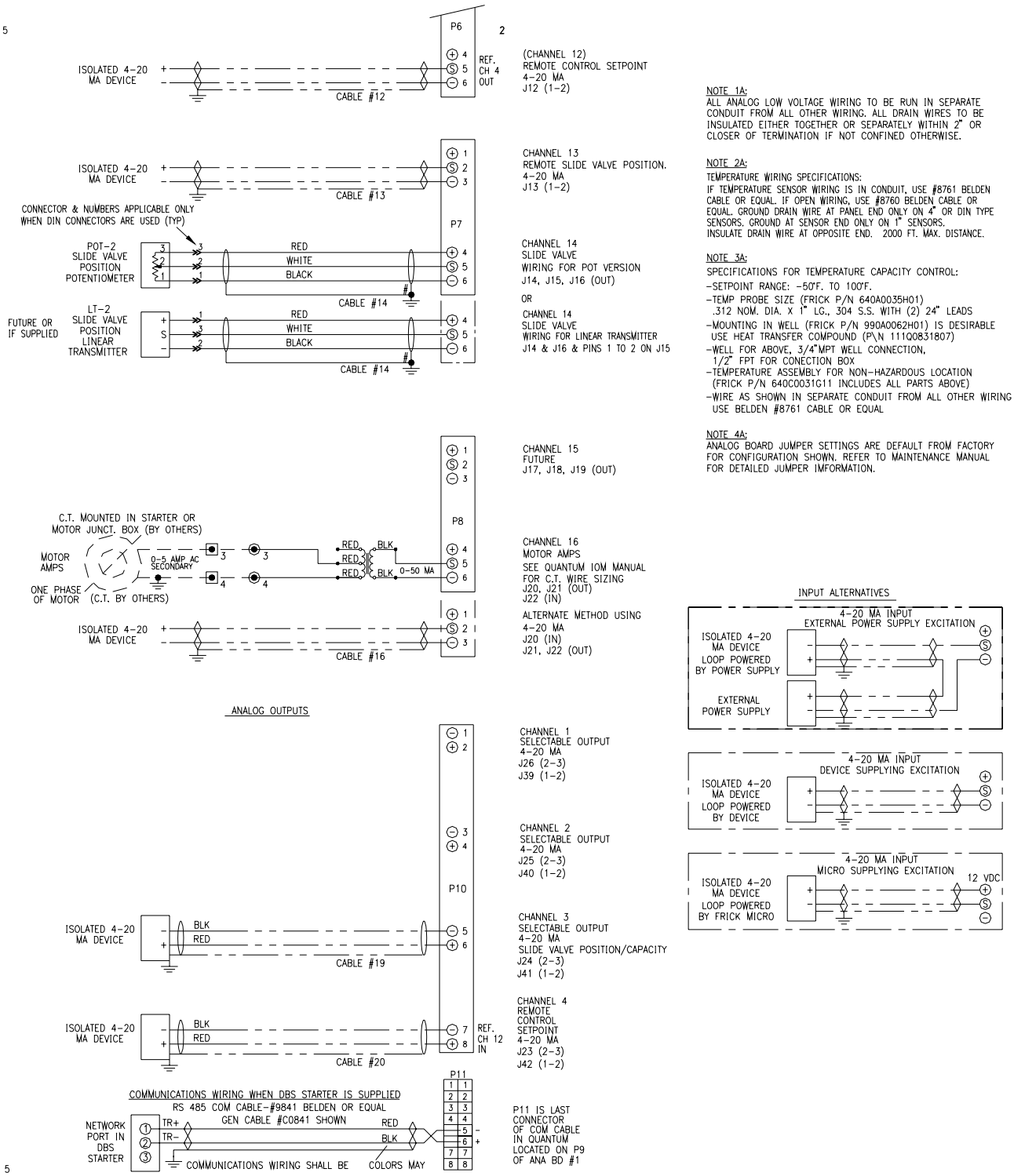
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE, SEE MMIB 4.11.10.14

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)			
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION	
4	1,2,GND	CONTROL POWER	
23	8,2	OIL PUMP #1 STARTER	*
24	5,19	OIL PUMP #1 AUX	*
20	18,2	COMPR. STARTER	
21	5,20	COMPRESSOR AUX	
SHT,2-62,63	3,4	CURRENT TRANSFORMER	

WIRING DIAGRAM – RXF (58-101) – RXB (Sheet 3 of 4)



WIRING DIAGRAM – RXF (58-101) – RXB (Sheet 4 of 4)



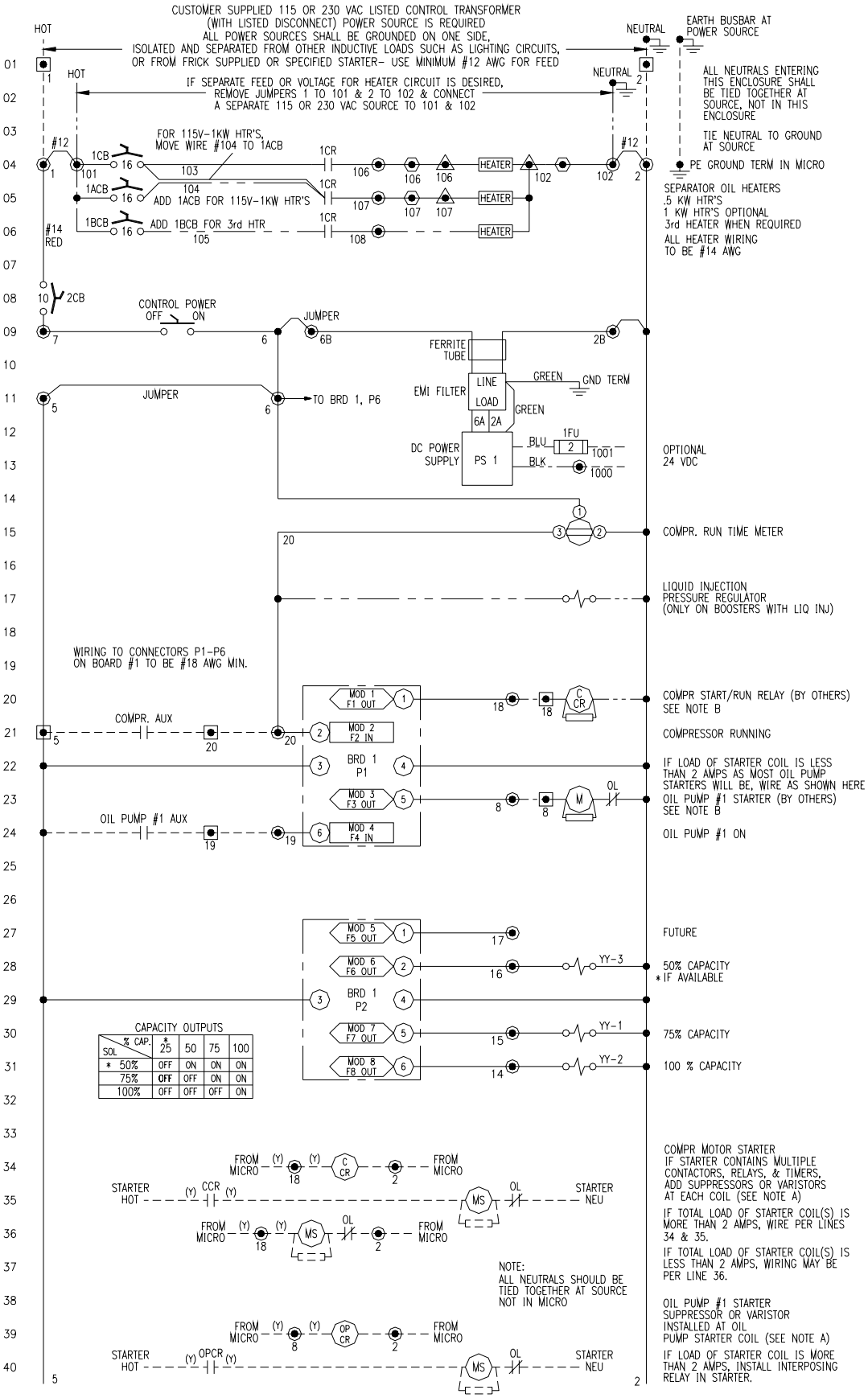
NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER OF TERMINATION IF NOT CONFINED OTHERWISE.

NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS:
IF TEMPERATURE SENSOR WIRING IS IN CONDUIT, USE #8761 BELDEN CABLE OR EQUAL. IF OPEN WIRING, USE #8760 BELDEN CABLE OR EQUAL. GROUND DRAIN WIRE AT PANEL END ONLY ON 4" OR DIN TYPE SENSORS. GROUND AT SENSOR END ONLY ON 1" SENSORS. INSULATE DRAIN WIRE AT OPPOSITE END. 2000 FT. MAX. DISTANCE.

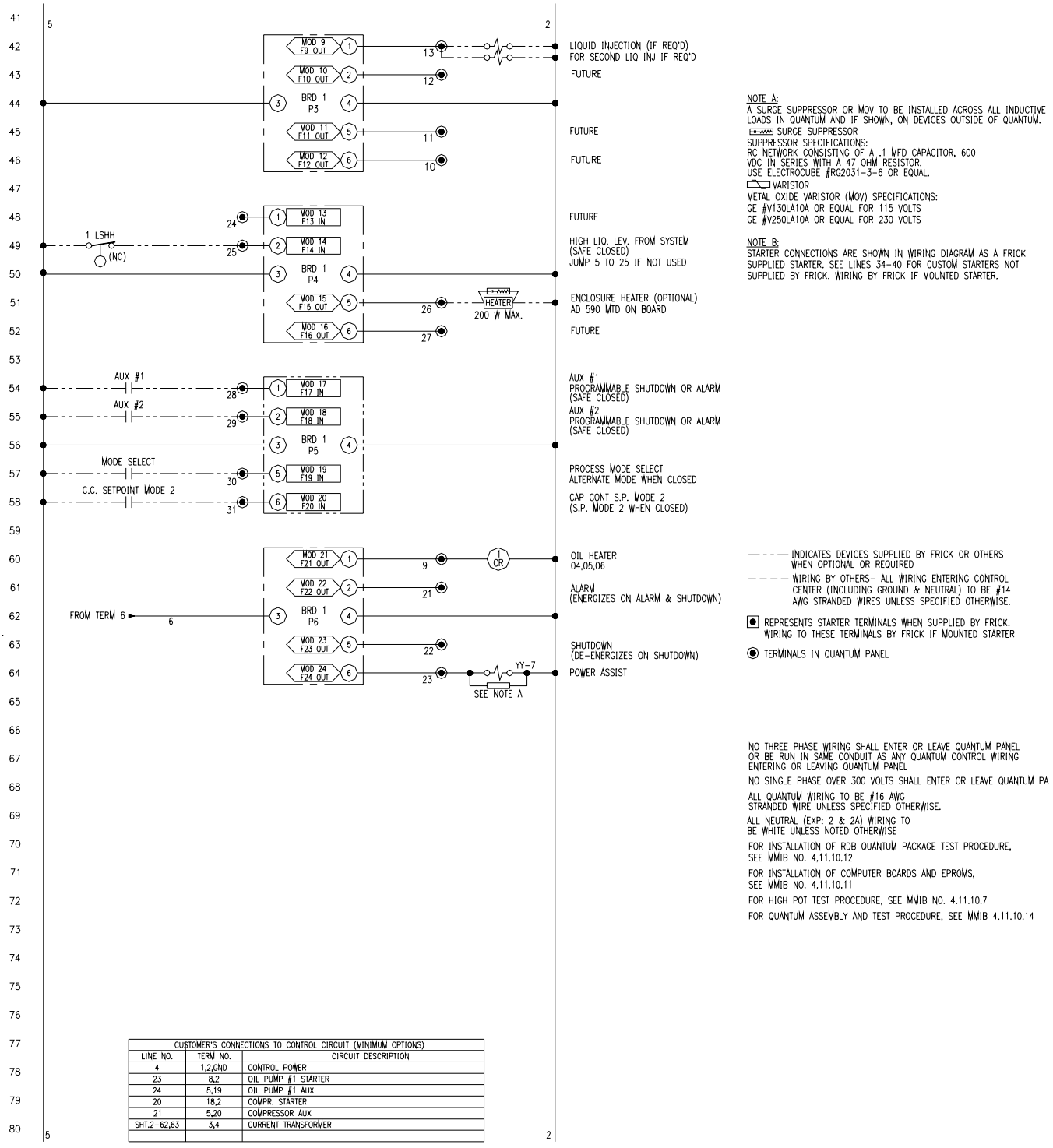
NOTE 3A:
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL:
- –SETPOINT RANGE: –50°F. TO 100°F.
- –TEMP PROBE SIZE (FRICK P/N 640A0035H01) .312 NOM. DIA. X 1" LG., 304 S.S. WITH (2) 24" LEADS
- –MOUNTING IN WELL (FRICK P/N 990A0062H01) IS DESIRABLE USE HEAT TRANSFER COMPOUND (P\N 111Q0831807)
- –WELL FOR ABOVE, 3/4"MPT WELL CONNECTION, 1/2" FPT FOR CONECTION BOX
- –TEMPERATURE ASSEMBLY FOR NON–HAZARDOUS LOCATION (FRICK P/N 640C0031G11 INCLUDES ALL PARTS ABOVE)
- –WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING USE BELDEN #8761 CABLE OR EQUAL

NOTE 4A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO MAINTENANCE MANUAL FOR DETAILED JUMPER IMFORMATION.

WIRING DIAGRAM – RDB (Sheet 1 of 4)



WIRING DIAGRAM – RDB (Sheet 2 of 4)



NOTE A:
A SURGE SUPPRESSOR OR MOV TO BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.

SURGE SUPPRESSOR
SUPPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A .1 MFD CAPACITOR, 600 VDC IN SERIES WITH A 47 OHM RESISTOR.
USE ELECTROCUBE #RG2031-3-6 OR EQUAL.

VARISTOR
METAL OXIDE VARISTOR (MOV) SPECIFICATIONS:
GE #V130LA10A OR EQUAL FOR 115 VOLTS
GE #V250LA10A OR EQUAL FOR 230 VOLTS

NOTE B:
STARTER CONNECTIONS ARE SHOWN IN WIRING DIAGRAM AS A FRICK SUPPLIED STARTER. SEE LINES 34-40 FOR CUSTOM STARTERS NOT SUPPLIED BY FRICK. WIRING BY FRICK IF MOUNTED STARTER.

——— INDICATES DEVICES SUPPLIED BY FRICK OR OTHERS WHEN OPTIONAL OR REQUIRED

– – – – WIRING BY OTHERS- ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14 AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.

REPRESENTS STARTER TERMINALS WHEN SUPPLIED BY FRICK. WIRING TO THESE TERMINALS BY FRICK IF MOUNTED STARTER

TERMINALS IN QUANTUM PANEL

NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM PANEL

NO SINGLE PHASE OVER 300 VOLTS SHALL ENTER OR LEAVE QUANTUM PA

ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS SPECIFIED OTHERWISE.

ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS NOTED OTHERWISE

FOR INSTALLATION OF RDB QUANTUM PACKAGE TEST PROCEDURE, SEE MMIB NO. 4.11.10.12

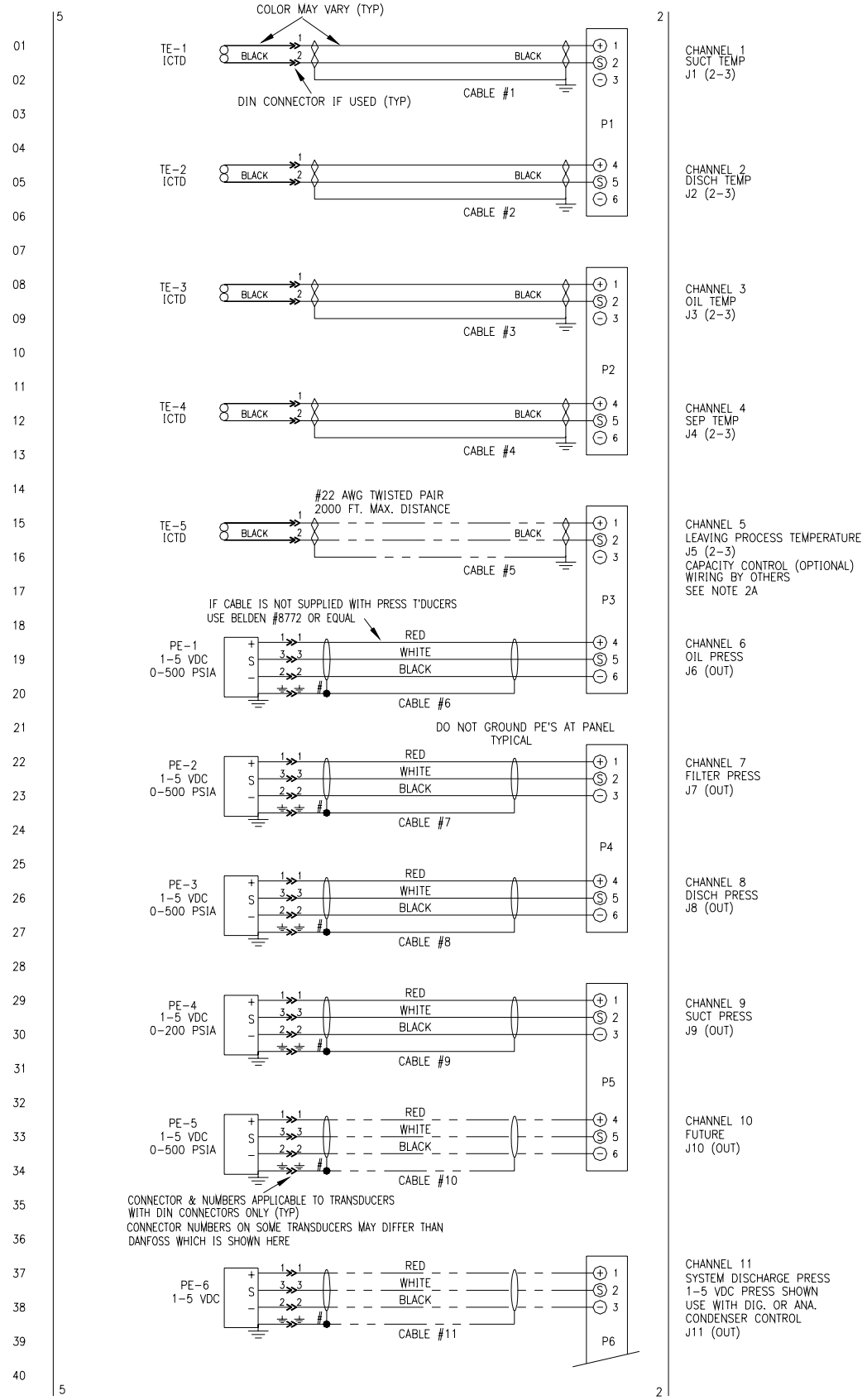
FOR INSTALLATION OF COMPUTER BOARDS AND EPROMS, SEE MMIB NO. 4.11.10.11

FOR HIGH POT TEST PROCEDURE, SEE MMIB NO. 4.11.10.7

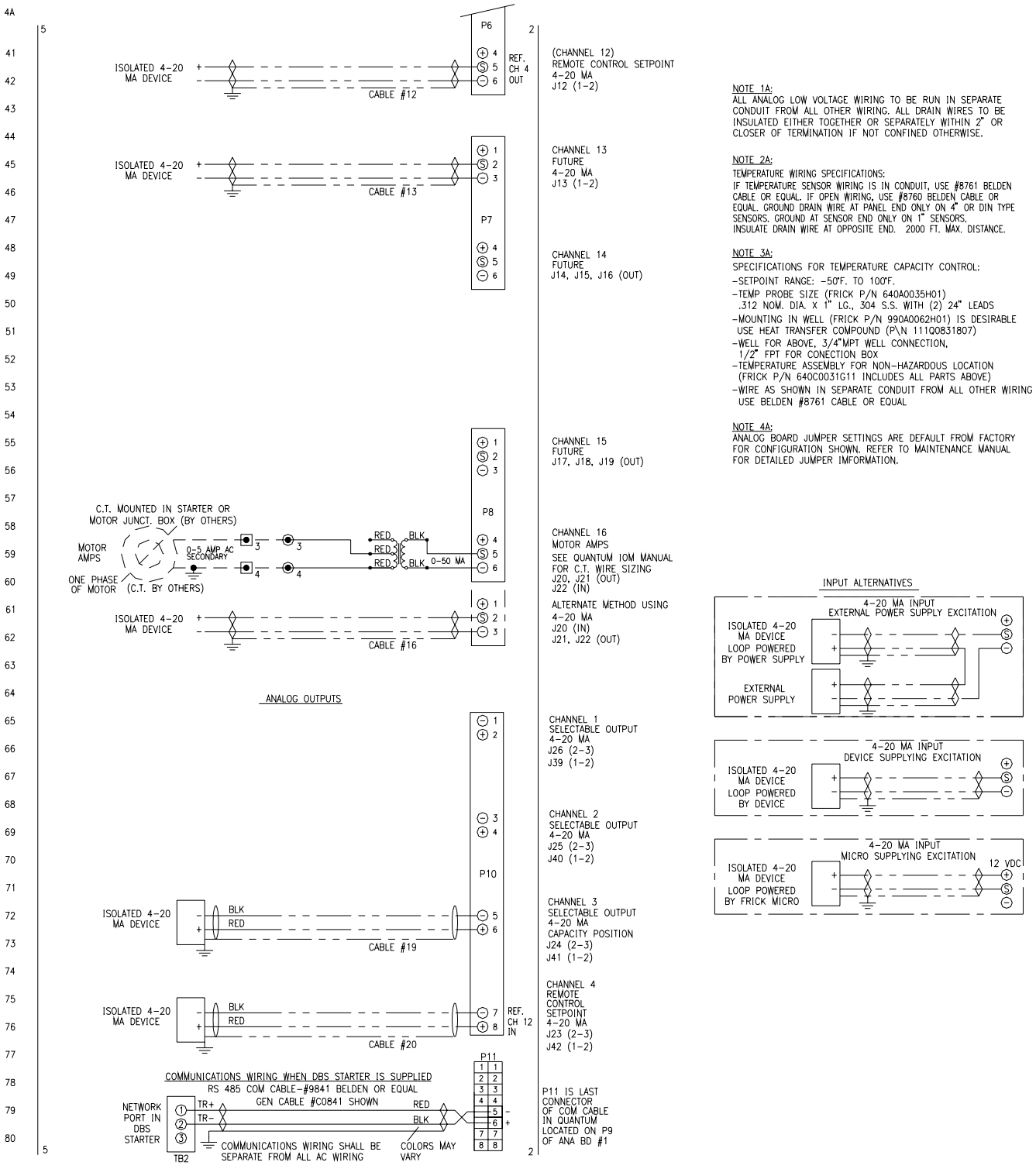
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE, SEE MMIB 4.11.10.14

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)		
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION
4	1,2,GND	CONTROL POWER
23	8,2	OIL PUMP #1 STARTER
24	5,19	OIL PUMP #1 AUX
20	18,2	COMPR. STARTER
21	5,20	COMPRESSOR AUX
SHT.2-62,63	3,4	CURRENT TRANSFORMER

WIRING DIAGRAM – RDB (Sheet 3 of 4)



WIRING DIAGRAM – RDB (Sheet 4 of 4)



NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER OF TERMINATION IF NOT CONFINED OTHERWISE.

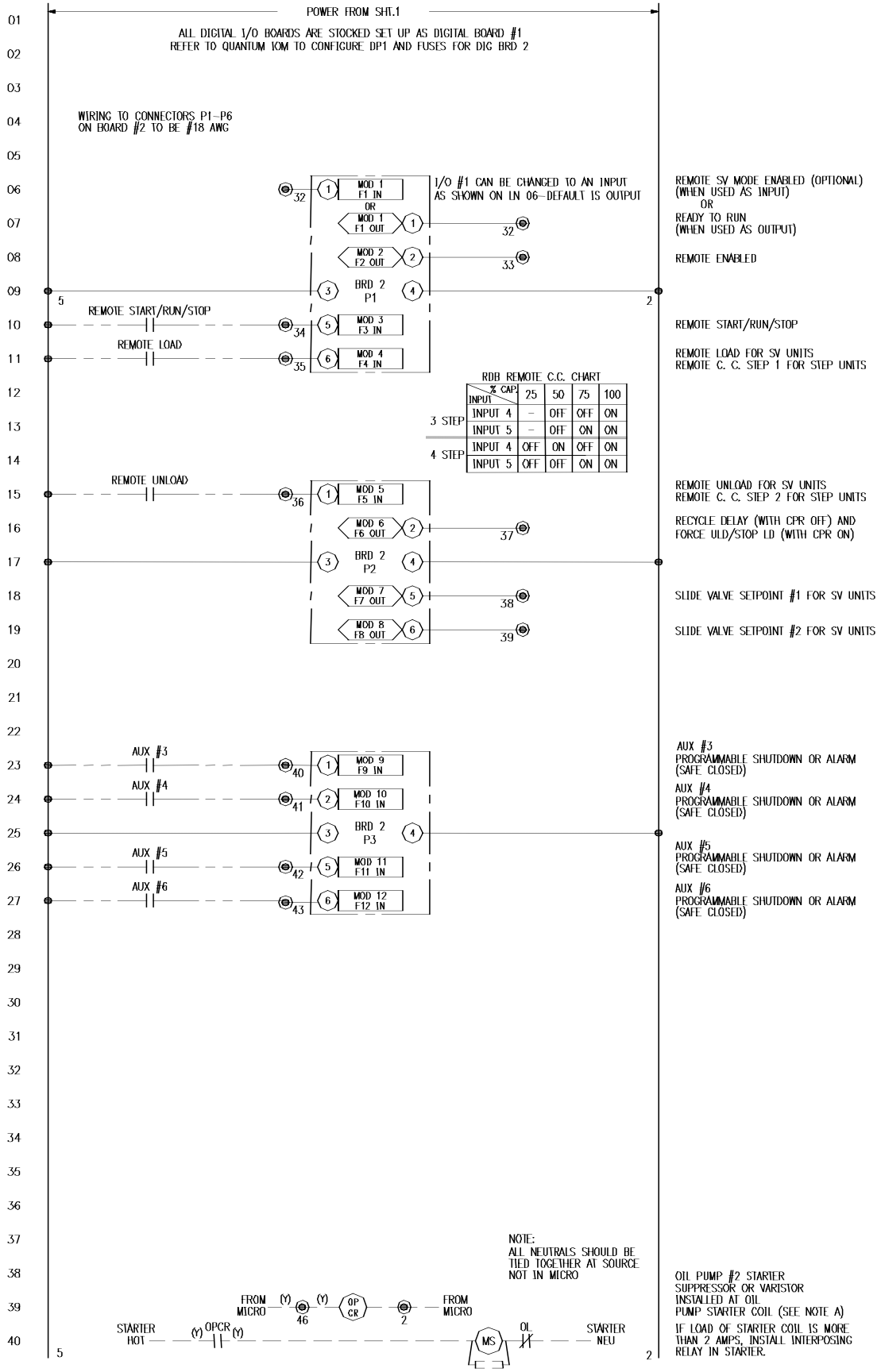
NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS:
IF TEMPERATURE SENSOR WIRING IS IN CONDUIT, USE #8761 BELDEN CABLE OR EQUAL. IF OPEN WIRING, USE #8760 BELDEN CABLE OR EQUAL. GROUND DRAIN WIRE AT PANEL END ONLY ON 4" OR DIN TYPE SENSORS. GROUND AT SENSOR END ONLY ON 1" SENSORS. INSULATE DRAIN WIRE AT OPPOSITE END. 2000 FT. MAX. DISTANCE.

NOTE 3A:
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL:
- SETPOINT RANGE: -50°F. TO 100°F.
- TEMP PROBE SIZE (FRICK P/N 640A0035H01) .312 NOM. DIA. X 1" LG., 304 S.S. WITH (2) 24" LEADS
- MOUNTING IN WELL (FRICK P/N 990A0062H01) IS DESIRABLE USE HEAT TRANSFER COMPOUND (P\N 111Q0831807)
- WELL FOR ABOVE, 3/4"MPT WELL CONNECTION, 1/2" FPT FOR CONECTION BOX
- TEMPERATURE ASSEMBLY FOR NON-HAZARDOUS LOCATION (FRICK P/N 640C0031G11 INCLUDES ALL PARTS ABOVE)
- WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING USE BELDEN #8761 CABLE OR EQUAL

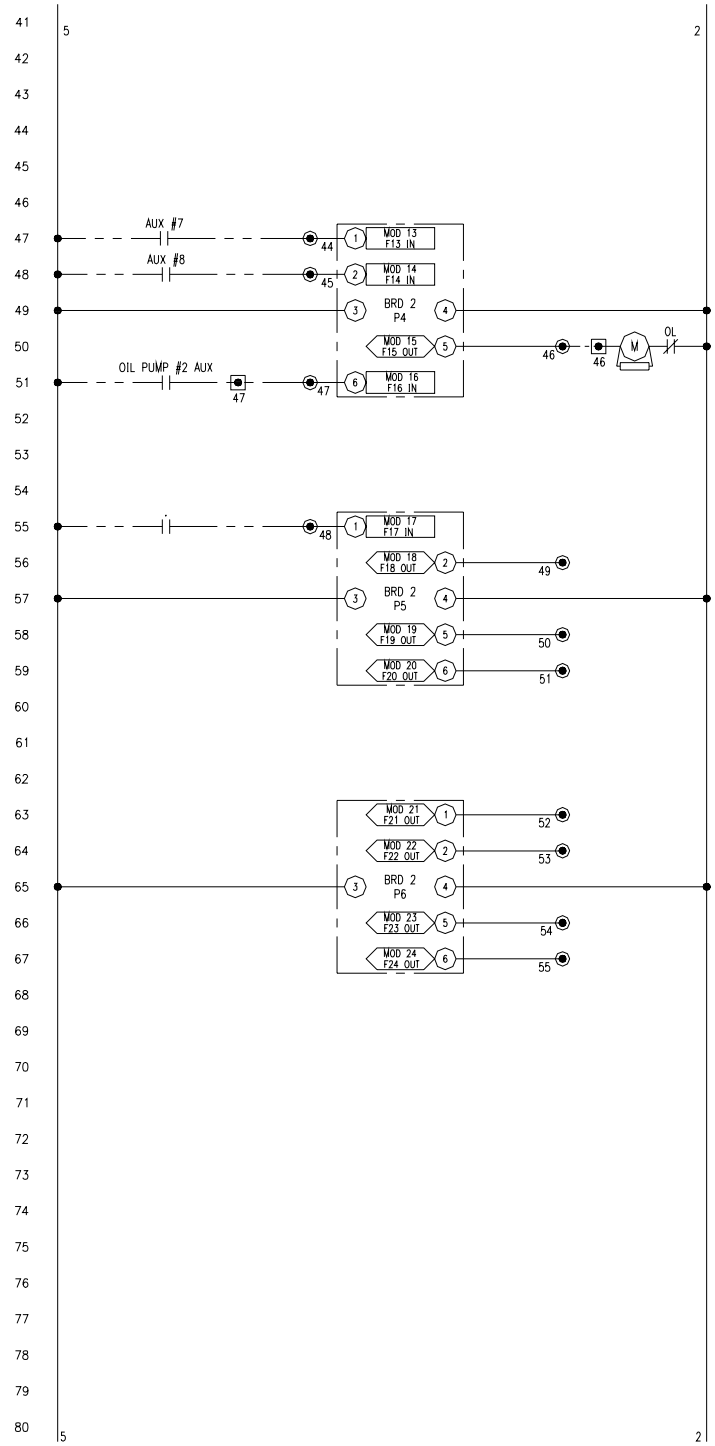
NOTE 4A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO MAINTENANCE MANUAL FOR DETAILED JUMPER IMFORMATION.

INPUT ALTERNATIVES

WIRING DIAGRAM QUANTUM DIGITAL I/O BOARD 2 (Sheet 1 of 2)



WIRING DIAGRAM QUANTUM DIGITAL I/O BOARD 2 (Sheet 2 of 2)



NOTE A:
A SURGE SUPPRESSOR OR MOV TO BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN CONTROL CENTER.
SURGE SUPPRESSOR
SUPPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A .1 MFD CAPACITOR, 600 VDC IN SERIES WITH A 47 OHM RESISTOR.
USE ELECTROCUBE #RG2031-3-6 OR EQUAL.
VARISTOR
METAL OXIDE VARISTOR (MOV) SPECIFICATIONS:
GE #V130LA10A OR EQUAL FOR 115 VOLTS
GE #V250LA10A OR EQUAL FOR 230 VOLTS

— — — INDICATES DEVICES SUPPLIED ONLY WHEN OPTIONAL OR REQUIRED

—— —— WIRING BY OTHERS-- ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14 AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.

REPRESENTS STARTER TERMINALS WHEN SUPPLIED BY FRICK

TERMINALS IN CONTROL CENTER

TERMINALS IN JUNCTION BOXS FOR SPLIT SKID UNITS APPLICABLE ONLY IF REQUIRED

REPRESENTS TERMINALS IN JUNCT BOX ON COMPRRESSOR SKID

REPRESENTS TERMINALS IN JUNCT BOX ON SEPARATOR SKID

NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING MICRO PANEL

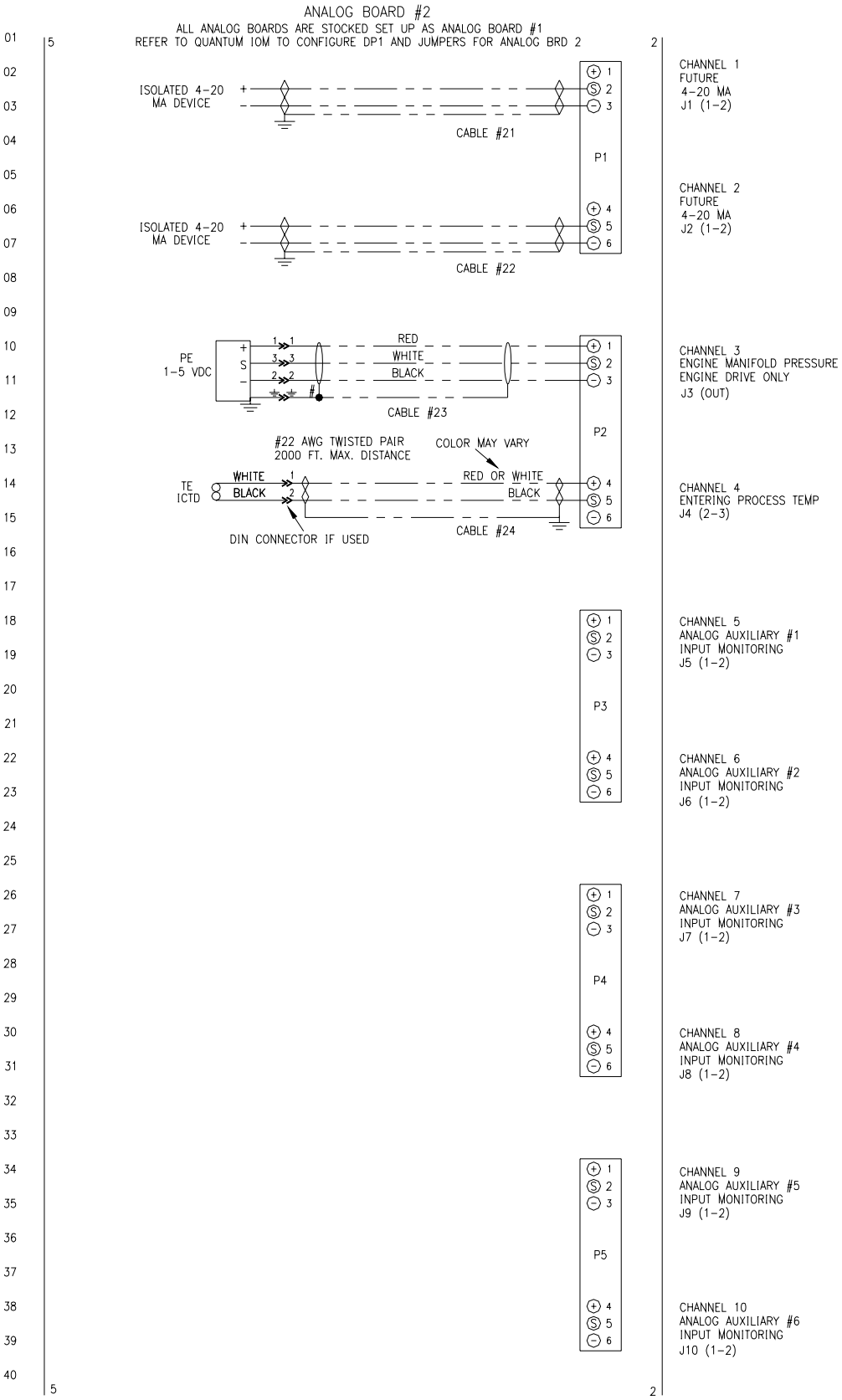
NO SINGLE PHASE OVER 300 VOLTS SHALL ENTER OR LEAVE QUANTUM PANEL

ALL CONTROL CENTER WIRING TO BE #16 AWG STRANDED WIRE UNLESS SPECIFIED OTHERWISE.

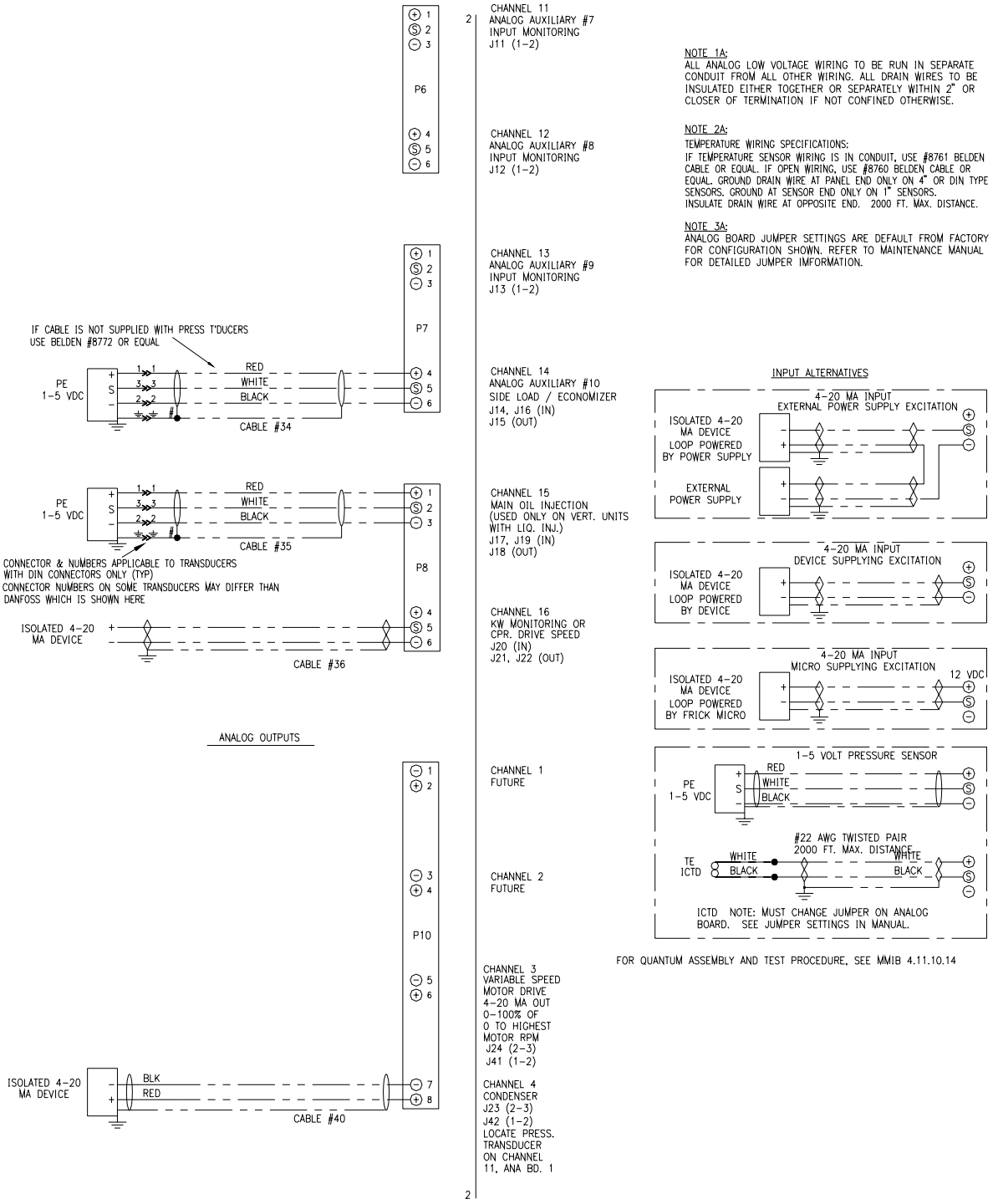
FOR HIGH POT TEST PROCEDURE, SEE MMIB NO. 4.11.10.7

FOR QUANTUM ASSEMBLY AND TEST PROCEDURE, SEE MMIB NO. 4.11.10.14

WIRING DIAGRAM QUANTUM ANALOG I/O BOARD 2 (Sheet 1 of 2)



WIRING DIAGRAM QUANTUM ANALOG I/O BOARD 2 (Sheet 2 of 2)



CHANNEL 11
ANALOG AUXILIARY #7
INPUT MONITORING
J11 (1-2)

CHANNEL 12
ANALOG AUXILIARY #8
INPUT MONITORING
J12 (1-2)

CHANNEL 13
ANALOG AUXILIARY #9
INPUT MONITORING
J13 (1-2)

CHANNEL 14
ANALOG AUXILIARY #10
SIDE LOAD / ECONOMIZER
J14, J16 (IN)
J15 (OUT)

CHANNEL 15
MAIN OIL INJECTION
(USED ONLY ON VERT. UNITS
WITH LIQ. INJ.)
J17, J19 (IN)
J18 (OUT)

CHANNEL 16
KW MONITORING OR
CPR. DRIVE SPEED
J20 (IN)
J21, J22 (OUT)

CHANNEL 1
FUTURE

CHANNEL 2
FUTURE

CHANNEL 3
VARIABLE SPEED
MOTOR DRIVE
4-20 MA OUT
0-100% OF
0 TO HIGHEST
MOTOR RPM
J24 (2-3)
J41 (1-2)

CHANNEL 4
CONDENSER
J23 (2-3)
J42 (1-2)
LOCATE PRESS.
TRANSDUCER
ON CHANNEL
11, ANA BD. 1

NOTE 1A:
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER OF TERMINATION IF NOT CONFINED OTHERWISE.

NOTE 2A:
TEMPERATURE WIRING SPECIFICATIONS:
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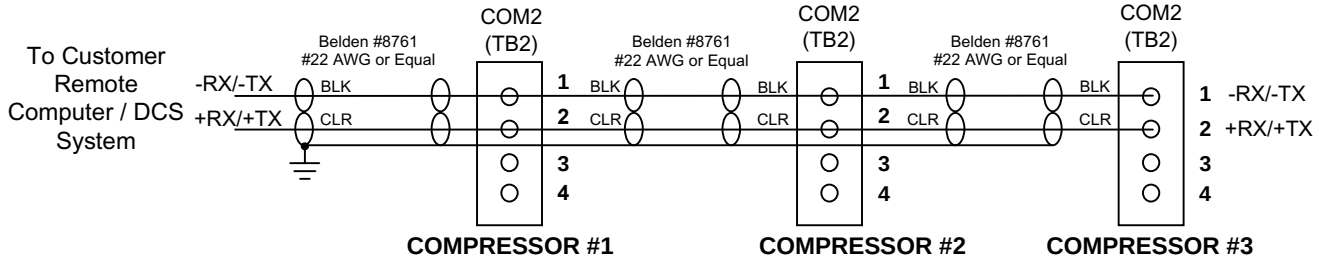
NOTE 3A:
ANALOG BOARD JUMPER SETTINGS ARE DEFAULT FROM FACTORY FOR CONFIGURATION SHOWN. REFER TO MAINTENANCE MANUAL FOR DETAILED JUMPER IMFORMATION.

INPUT ALTERNATIVES

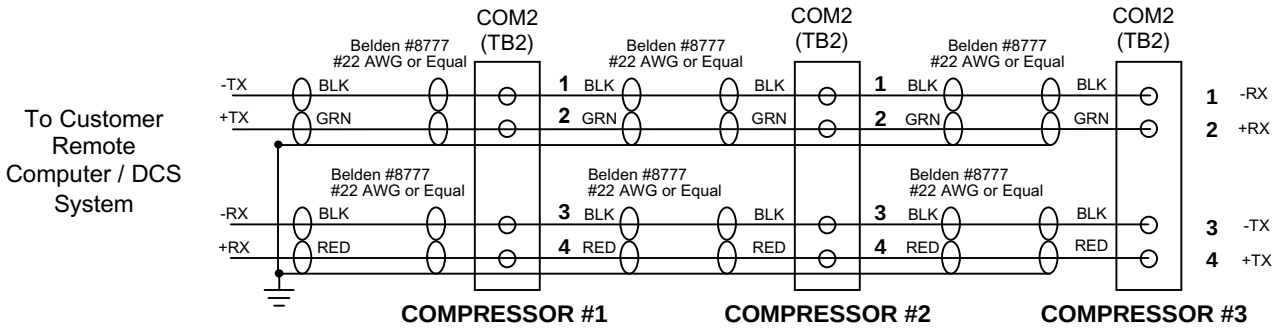
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE, SEE MMIB 4.11.10.14

QUANTUM 3 COMMUNICATIONS WIRING DIAGRAMS

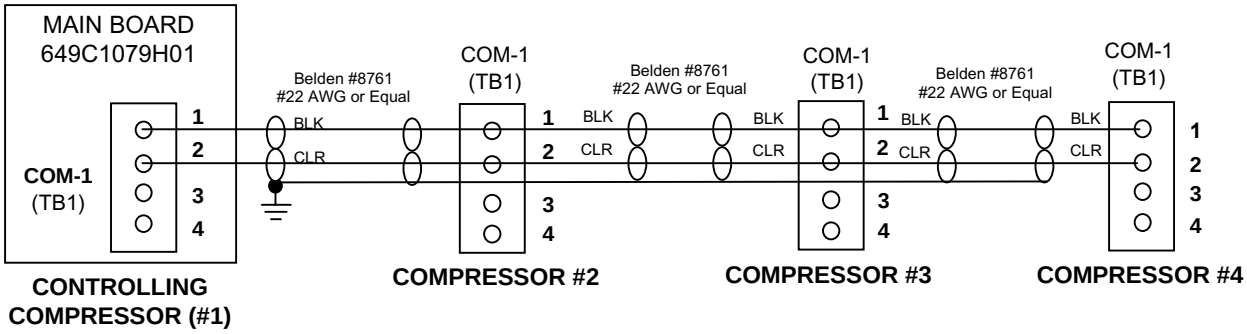
TO CUSTOMER REMOTE COMPUTER/DCS
RS-485 COMMUNICATIONS



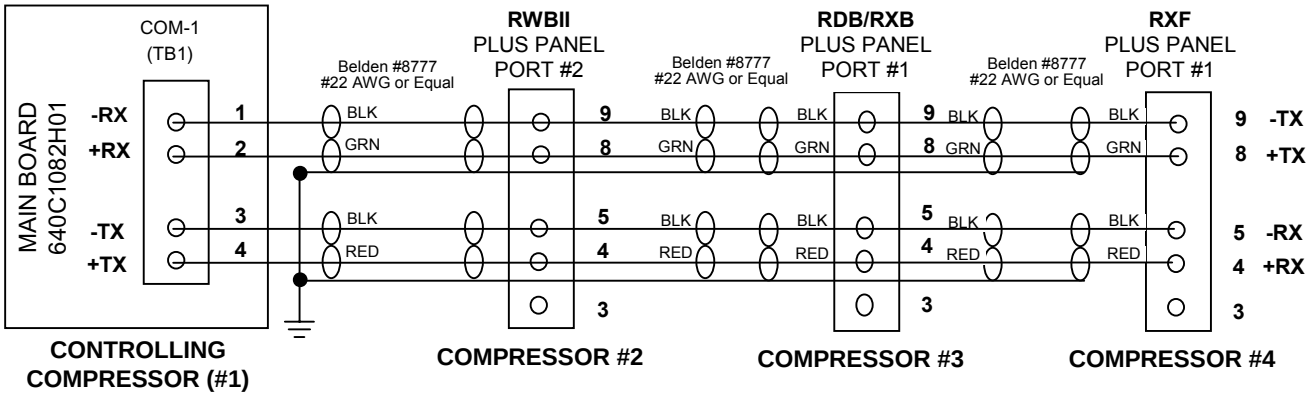
TO CUSTOMER REMOTE COMPUTER/DCS
RS-422 COMMUNICATIONS



MULTICOMPRESSOR SEQUENCING (LEAD-LAG)
RS-485 COMMUNICATIONS

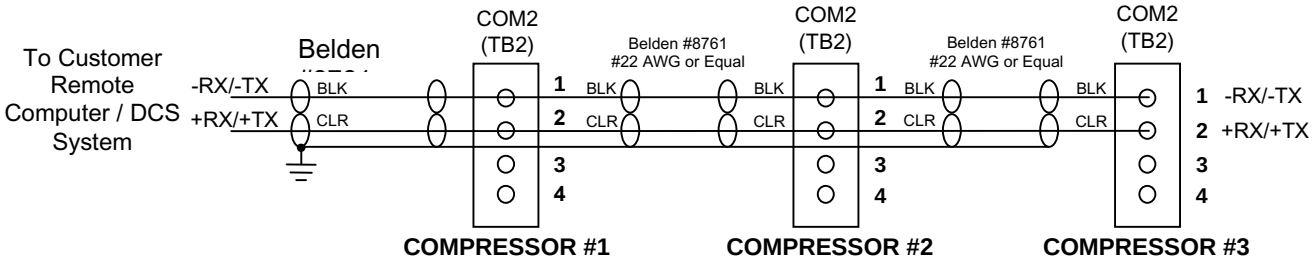


RWB II / RDB / RXB / RXF MULTICOMPRESSOR SEQUENCING (LEAD-LAG)
RS-422 COMMUNICATIONS

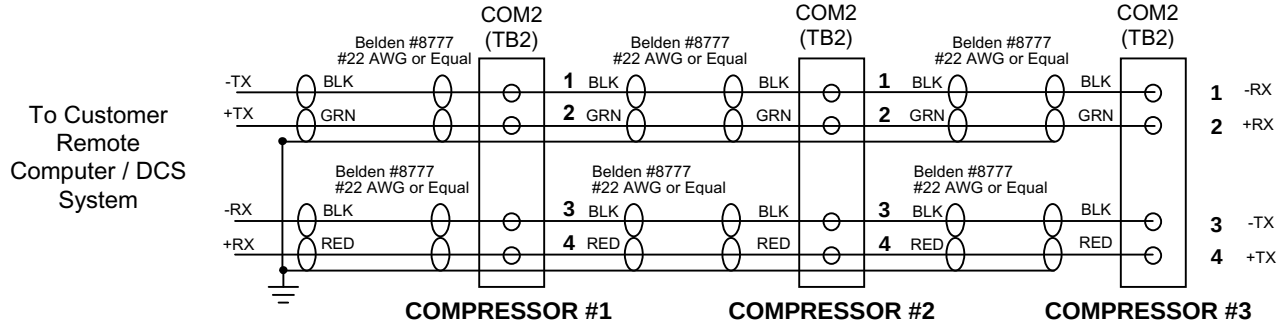


QUANTUM 4 COMMUNICATIONS WIRING DIAGRAMS

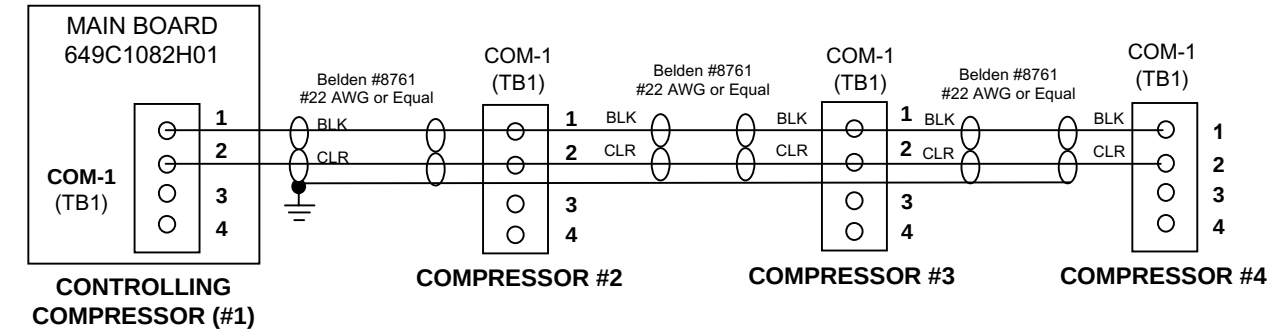
TO CUSTOMER REMOTE COMPUTER/DCS
RS-485 COMMUNICATIONS



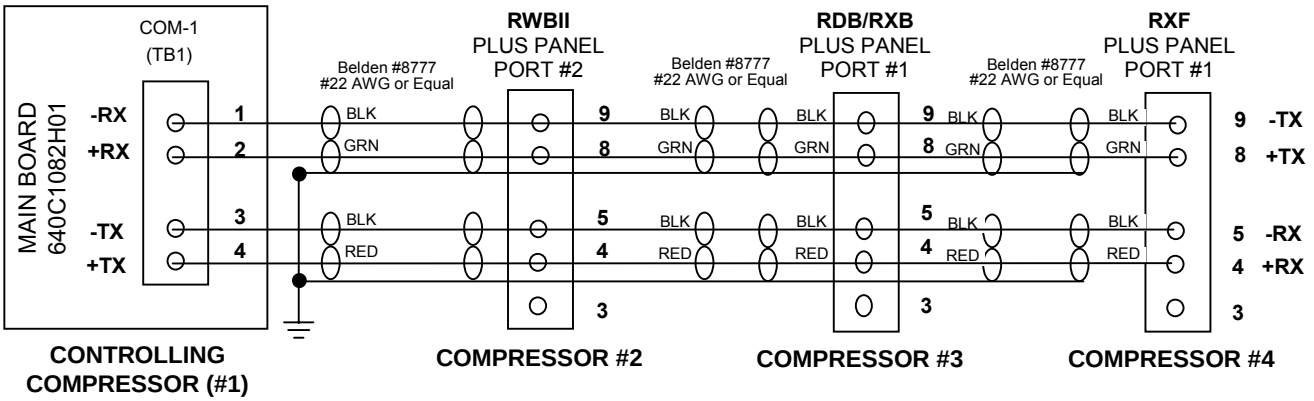
TO CUSTOMER REMOTE COMPUTER/DCS
RS-422 COMMUNICATIONS



MULTICOMPRESSOR SEQUENCING (LEAD-LAG)
RS-485 COMMUNICATIONS



RWB II / RDB / RXB / RXF MULTICOMPRESSOR SEQUENCING (LEAD-LAG)
RS-422 COMMUNICATIONS



PRESSURE TRANSDUCER CONVERSION DATA

(Data Instruments Model SA)

Sensor Voltage	100 psi		200 psi		300 psi		500 psi	
	Range - psig*		Range - psig*		Range - psig*		Range - psig*	
	Low	High	Low	High	Low	High	Low	High
1.0	29.92"	19.74"	29.92"	9.57"	29.92"	7.0"	29.92”	4.1
1.1	29.92"	14.65"	29.92"	0.3	29.92"	4.1	29.92”	16.6
1.2	29.92"	9.57"	29.92"	5.3	22.3"	11.6	17.1”	29.1
1.3	24.83"	4.48"	19.74"	10.3	7.0"	19.1	4.1	41.6
1.4	19.74"	0.3	9.57"	15.3	4.1	26.6	16.6	54.1
1.5	14.65"	2.8	0.3	20.3	11.6	34.1	29.1	66.6
1.6	9.57"	5.3	5.3	25.3	19.1	41.6	41.6	79.1
1.7	4.48"	7.8	10.3	30.3	26.6	49.1	54.1	91.6
1.8	0.3	10.3	15.3	35.3	34.1	56.6	66.6	104.1
1.9	2.8	12.8	20.3	40.3	41.6	64.1	79.1	116.6
2.0	5.3	15.3	25.3	45.3	49.1	71.6	91.6	129.1
2.1	7.8	17.8	30.3	50.3	56.6	79.1	104.1	141.6
2.2	10.3	20.3	35.3	55.3	64.1	86.6	116.6	154.1
2.3	12.8	22.8	40.3	60.3	71.6	94.1	129.1	166.6
2.4	15.3	25.3	45.3	65.3	79.1	101.6	141.6	179.1
2.5	17.8	27.8	50.3	70.3	86.6	109.1	154.1	191.6
2.6	20.3	30.3	55.3	75.3	94.1	116.6	166.6	204.1
2.7	22.8	32.8	60.3	80.3	101.6	124.1	179.1	216.6
2.8	25.3	35.3	65.3	85.3	109.1	131.6	191.6	229.1
2.9	27.8	37.8	70.3	90.3	116.6	139.1	204.1	241.6
3.0	30.3	40.3	75.3	95.3	124.1	146.6	216.6	254.1
3.1	32.8	42.8	80.3	100.3	131.6	154.1	229.1	266.6
3.2	35.3	45.3	85.3	105.3	139.1	161.6	241.6	279.1
3.3	37.8	47.8	90.3	110.3	146.6	169.1	254.1	291.6
3.4	40.3	50.3	95.3	115.3	154.1	176.6	266.6	304.1
3.5	42.8	52.8	100.3	120.3	161.6	184.1	279.1	316.6
3.6	45.3	55.3	105.3	125.3	169.1	191.6	291.6	329.1
3.7	47.8	57.8	110.3	130.3	176.6	199.1	304.1	341.6
3.8	50.3	60.3	115.3	135.3	184.1	206.6	316.6	354.1
3.9	52.8	62.8	120.3	140.3	191.6	214.1	329.1	366.6
4.0	55.3	65.3	125.3	145.3	199.1	221.6	341.6	379.1
4.1	57.8	67.8	130.3	150.3	206.6	229.1	354.1	391.6
4.2	60.3	70.3	135.3	155.3	214.1	236.6	366.6	404.1
4.3	62.8	72.8	140.3	160.3	221.6	244.1	379.1	416.6
4.4	65.3	75.3	145.3	165.3	229.1	251.6	391.6	429.1
4.5	67.8	77.8	150.3	170.3	236.6	259.1	404.1	441.6
4.6	70.3	80.3	155.3	175.3	244.1	266.6	416.6	454.1
4.7	72.8	82.8	160.3	180.3	251.6	274.1	429.1	466.6
4.8	75.3	85.3	165.3	185.3	259.1	281.6	441.6	479.1
4.9	77.8	87.8	170.3	190.3	266.6	289.1	454.1	491.6
5.0	80.3	90.3	175.3	195.3	274.1	296.6	466.6	504.1
At zero psig	**1.388 V**	**1.788 V**	**1.094 V**	**1.494 V**	**1.046 V**	**1.346 V**	**0.968 V**	**1.268 V**

*** Below 0 psig measured in inches of mercury.**

RECOMMENDED SPARE PARTS

Part Number	Description	Spare-1	Spare-2	Spare-3
649C1082H01	Main Pentium processor circuit board (Quantum 4)			yes [1]
649C1079H01	Main Pentium processor circuit board (Quantum 3)			yes [1]
640D0061H01	Main 486 processor circuit board (Quantum 1 & 2)			yes [1]
640D0062H01	Input/output circuit board #1			yes
640C0024G02	Input/output circuit board #2	yes		
640D0063H01	Analog circuit board #1			yes
640C0026G02	Analog circuit board #2			yes
640C0021G01	10.4"diag. LCD color VGA display assembly with backlight			yes
	CCFT inverter and mounting plate. (See guide below)			
640C0022G01	DC power supply (Condor)		yes	yes
640C0022G11	DC power supply (Power-One)		yes	yes
333Q0000116	Input Module 120 volt AC	yes	yes	yes
111Q0281061	Output Module 120/240 volt AC	yes	yes	yes
640D0060H01	Keypad/overlay Frick's			yes
640D0066H01	Keypad/overlay Gram's			yes
333Q0001193	BR2330 battery (two required)			
640B0045H01	Display cable (See guide below)			yes
640B0031H01	Keypad cable			yes
640B0032H01	Back light (CCFT) inverter cable (See guide below)			yes
640B0038H01	DC power harness			yes
333Q0001197	10 Amp circuit breaker			yes
333Q0001198	16 Amp circuit breaker			yes
333Q0000206	Relay, 3 Pole	yes	yes	yes
333Q0000207	Relay base, 3 Pole		yes	yes
333Q0001191	Hour meter			
333Q0001192	2.5V CT. Transformer for motor current step-down.			
333Q0001194	On/off power switch		yes	yes
333Q0001195	On/off power switch contact block		yes	yes
111Q0280958	Surge suppresser	yes	yes	yes
333Q9991418	Filter, Line			
333Q0001326	Fuse, 5 amp, 250 V (I/O board)	yes	yes	yes
333Q0001327	Fuse, .25 amp, 250 V (main board)	yes	yes	yes

Notes:

- **Note 1 – These processor boards are listed for reference. Each Quantum Control will have only one of these boards. Order only the replacement board that is applicable to your controller, not both boards.**
- **Spare-1 - Normal spare parts kept on hand. Operation can wait more than 24 hours to receive replacement parts. Plant typically has back-up compressors.**
- **Spare-2 - Additional spare parts kept on hand. Operation must have parts in less than 24 hours. Plant does not have back-up compressors.**
- **Spare-3 - Critical operation. Plant must have continuous operation.**