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FRICK® QUANTUM™ LX COMPRESSOR CONTROL PANEL

VERSION 6.8x

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THE FOLLOWING PUBLICATIONS ARE AVAILABLE FROM THE JOHNSON CONTROLS® WEBSITE jci.com

090-022 O	Frick® Quantum™ LX Control Panel Operation – Service
090-020 CS	Frick® Quantum™ LX Control Panel Communications Setup (setup and wiring for data communication using available protocols)
090-020 M	Frick® Quantum™ Control Panel Maintenance (repair and troubleshooting)

WARNING — Indicates an imminently hazardous situation 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 death or serious injury.

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

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

INTRODUCTION TO THE QUANTUM™ CONTROL SYSTEM

INTRODUCTION

The Quantum™ LX panel differs from previous Quantum™ panels primarily in the software operating system. The hardware portion (with the exception of the new international style keypad and cable) remains the same. The Frick® Quantum™ LX control system consists of five major areas:

- **Quantum™ 4 Controller** - The brains of the system. The combination of the hardware (Quantum™ 4 board) and the software program that runs on it creates what we call the Quantum™ LX system. The Quantum™ 4 board communicates with all of the Digital and Analog boards. This communication allows the Quantum™ to read the status of all the I/O boards, and display the data on the interface screen. The Quantum™ 4 acts on this data, and provides the necessary control information to the I/O boards to provide the appropriate control of all input and output signals, based upon the configuration of installed features and options of the compressor package. Operator interaction is provided through the keypad, as well as informational status to the display. Interaction to the outside world is provided through industry-standard communications protocols. Additional information about the Quantum™ 4 can be found under the **QUANTUM™ 4 CONTROLLER** section found later in this manual.

- **Power Supply** - Provides the necessary operating voltages for the proper operation of all control components. Additional information about the power supply can be found under the **POWER SUPPLY** section found later in this manual.

- **Digital Input / Output Boards** - Digital (on/off) signals are sent and received by these boards. The output signals are used for energizing solenoids, valves, contactors, relays, etc., and the input signals are used to sense the condition of switches, relay contacts, auxiliary contacts, etc. This board runs an independent software program from the Quantum™ 4 to control devices, and communicates the status of all devices back to the Quantum™ 4. Additional information about the Digital Boards can be found under the **DIGITAL BOARD** section found later in this manual.

- **Analog Input / Output Boards** - Analog (variable) signals are sent and received by these boards. The output signals are used for controlling VFDs, modulated valves, etc., and the input signals are used to read the values being sent from pressure transducers, temperature sensors, etc. This board runs an independent software program from the Quantum™ 4 to control devices, and communicates the status of all devices back to the Quantum™ 4. The Analog board has 24 analog inputs, and 8 analog outputs. Additional information about the Analog board can be found under the **ANALOG BOARD** section found later in this manual.

- **Operator Interface** - This section actually consists of two major components; the Display and the Keypad. The Display is used to show the operator, via a graphical interface, the actual status of all compressor values. Warnings and shutdowns (and history/trending), pressure and temperature values, digital I/O status, setpoints, etc. are viewed on this display. The Keypad is used by the operator to enter data to the Quantum™ controller such as setpoint values, calibration data, etc. Additional information about the Display can be found under the **DISPLAY** section found later in this manual.

THE CONTROL PANEL ENCLOSURE

The Frick® Quantum™ LX control panel enclosure utilizes available space efficiently and the small size allows it to be used on all of our compressor packages. The panel is also equipped with the necessary posts and hardware to add options in the field. They may also include a second analog and/or digital board, enclosure heater and air-circulating fan.

Dimensions of the standard panel are 18x22x10 inches (WxHxD) and weighs approximately 75 pounds with all options. Typically the panel will be mounted on the package, but it is also designed for easy wall mounting as well. Refer to the Control Center Assembly drawing 649D5151 for the layout for this standard enclosure.

The DC power/communications harness in this panel is color-coded. This will make wire identification much easier. The coding is as follows:

- +5vdc - RED
- +12vdc - YELLOW
- -12vdc - PURPLE
- Common/Ground - BLACK
- +RX/TX - BLUE
- -RX/TX - BLUE w/WHITE stripe

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 its 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 (capable of reading to DC/AC, mA to the hundreds place)
2. Small wire stripper
3. Small screwdriver (with insulated shaft)
4. Small snip nose pliers
5. Wrist Grounding strap
6. Static free grounded work surface

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

WHAT TO DO BEFORE CALLING THE FACTORY

Many times when a suspected Quantum™ 4 problem is called in to the factory, not enough information is provided for the service personnel to assist in solving the problem. This is because the caller most likely is not aware of the type of information that would be useful to factory personnel in helping to identify and correct the problem. 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. The following is a list of possible reasons for no display:

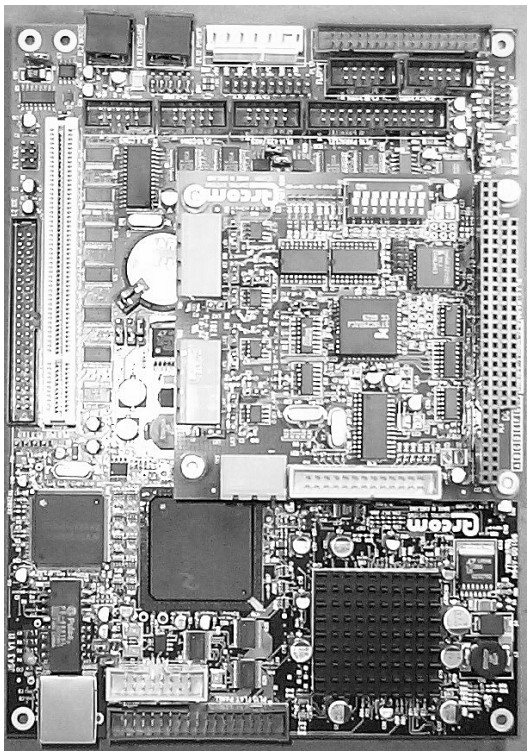
- No power
- Loose or Faulty Display Cable or Inverter Cable
- Bad Display
- Bad Backlight Inverter
- Bad Backlight Fluorescent Tube
- Wrong Combination of Display, Cable, Inverter, or Software
- Faulty CPU Board

Before calling the factory for assistance, review the information on the following pages and try to discover and resolve your Quantum™ LX problem. The actual cause of most problems is usually not with the Quantum™ 4 board itself, but with something external. However, on the rare occasion that the problem has been identified as being the Quantum™ 4 board, use the following section as a guideline for replacing it.

QUANTUM™ 4 CONTROLLER BOARD

INTRODUCTION

Frick® Controls has strived to remain on the cutting edge of microprocessor technology and development. Because of the ever-increasing speed, memory features, and power of microprocessors, Frick® will continue to introduce the latest advancement in microprocessor control technology.



Quantum™ 4 Board

WHAT SHOULD OCCUR WHEN APPLYING POWER

The first thing that should be checked when troubleshooting the Quantum™ 4 board is it's powering up sequence.

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

- Green PWR (Power) LED will turn on solid.
- Red FLASH LED will flash several times early in the boot sequence. It is normally not lit.
- 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™ 4 has booted. The only time that this flashing rate is interrupted, is when a key is pressed on the keypad.
- The display should show several DOS (text) style screens. A penguin image will appear in the upper left corner of the screen as the boot sequence progresses.
- Just before fully booting, a *Loading* bar will appear at the bottom of the screen, showing the percent of load that has completed.
- The ***Operating Status*** screen will appear.

After the Quantum™ 4 has properly powered up, the following sequence of events is indicative of proper communication to the analog and digital boards:

- The Analog and Digital I/O boards TX/RX lights should be blinking.
- Each I/O board should have the power LED lighted and the *Active* LED should be blinking.

WHAT IF THE *OPERATING STATUS* SCREEN IS NOT SHOWN

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

1. If no LED's are lit, then check AC and DC power. Refer to the *Power Supply* section.
2. Check if the lighting of the LED's is occurring as described in the *What Should Occur When Applying Powering* section.
    - If the powering up sequence continues to repeat without displaying the ***Operating Status*** screen, then there is a booting problem.
3. Check for bad connections.
4. Check if an error message is displayed when booting.
    - Be sure to write down any error messages exactly as they appear.
5. 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 Software Maintenance section of this manual. **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.

6. Remove Flashcard and reboot. This will cause the Quantum™ 4 to boot under a pre-LX operating software. If it boots properly under this older software, then trying re-booting from the Flashcard again. If it doesn't boot with the card, then the Flashcard could be corrupted, and needs to be replaced.

7. Check the display. If the Quantum™ 4 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. Using a beam type source of good lighting, such as a flashlight, look for any *ghost* type image. If it appears that there is something on the screen but very dark, the problem may be with 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. There may be a sticker on the display mounting plate. If there is, it will have a part number that describes the type of display. If there is no sticker, you must take the display apart to identify the display manufacturer.

   - Verify that both the display cable and the inverter cable are firmly seated. These cables both originate from the same connector on the Quantum™ 4. 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.**

   - Refer to the *Operator Interface* section and check that the LCD, LCD cable, and software versions are matched correctly.

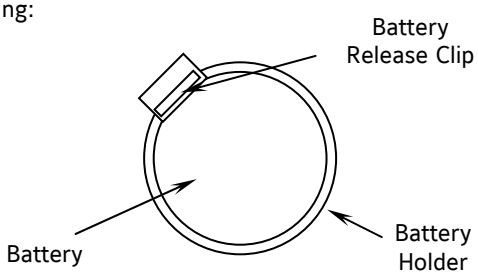
BATTERY FUNCTION AND REPLACEMENT

The Quantum™ 4 board utilizes a battery to maintain correct date and time for the purpose of stamping warnings and shutdowns with the date and time that they occurred. If the date and time are not being maintained properly, it may indicate that the battery is not functioning, and should be replaced. The battery may be ordered through Baltimore Parts (P/N 333Q0001786) or may be purchased at most electronic shops (manufacturers P/N CR-2032).

The battery is partially covered by the communications daughter board, and is located directly beneath the COM1 port (it may be necessary to unplug any connector that is plugged into COM1 to fully access the battery).

To replace the battery, ensure that the Control Power switch has been turned OFF.

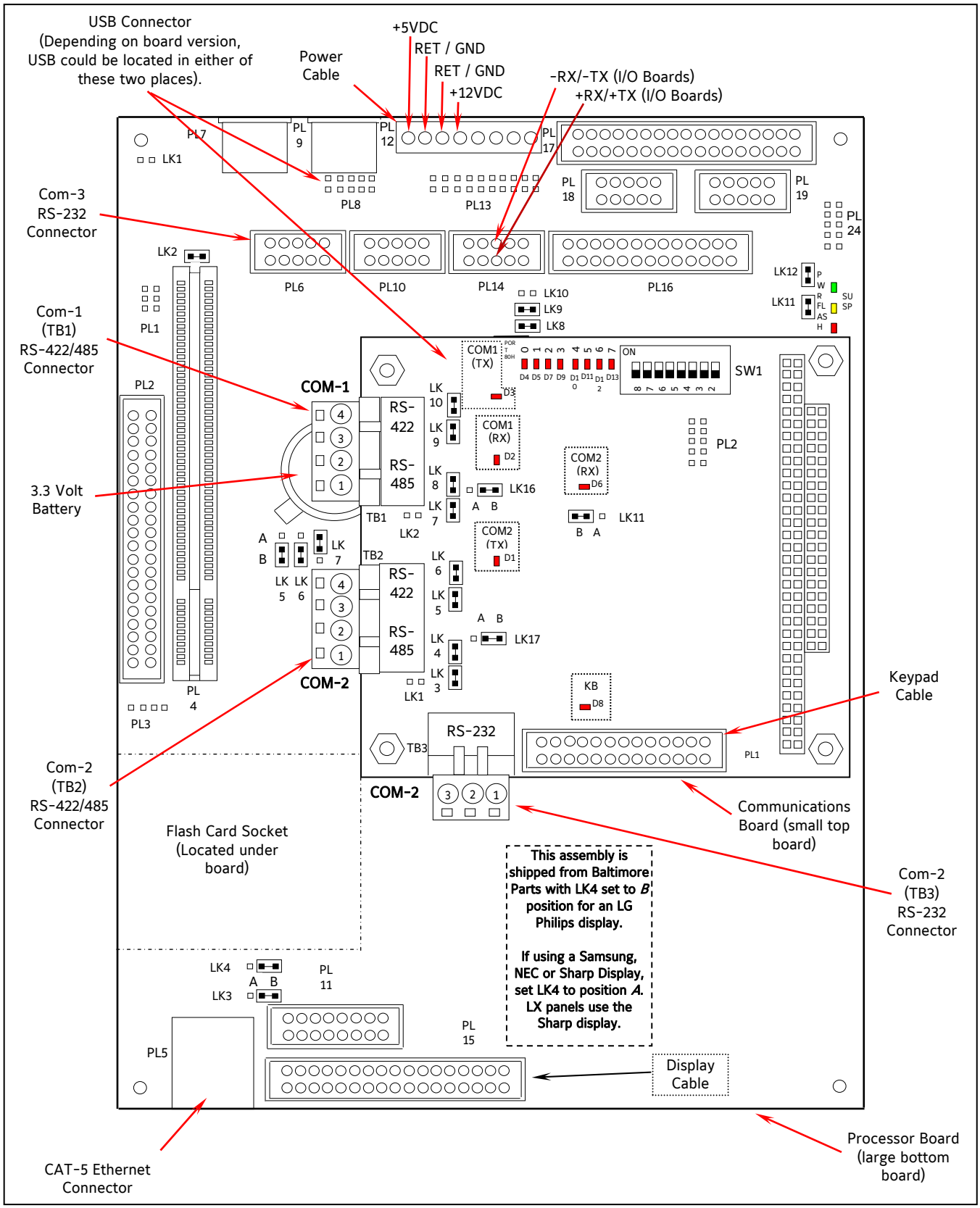
Locate the Battery Release Clip on the following drawing:



Simply push the clip away from the battery, to release the battery from the holder. Remove the battery, observing the orientation. Take a new battery and place it into the holder in the same orientation as the old battery (the side with the writing must be facing out). Reinstall the COM1 plug (if removed), and return the Control Power switch back to ON.

Once the Quantum™ 4 has rebooted, the correct Date and Time must be set.

QUANTUM™ 4 BOARD



Note: There are duplicate numbers for the links on the processor (larger) board and the communications (smaller) board. If you must make a change to a jumper (link), ensure that you modify the correct link.

QUANTUM™ 4 BOARD SETTINGS

Processor Board Jumpers

LK1	in out*	2 second Watchdog timer timeout 8 second Watchdog timer timeout
LK2	in* out	Watchdog timer Enabled Watchdog timer Disabled
LK3	A B *	+5V Backlight Voltage (Samsung, NEC, Sharp) +12V Backlight Voltage (LG Philips Display)
LK4	A B *	+5V LCD Supply (Samsung, NEC, Sharp) +3.3V LCD Supply (LG Philips Display)
LK5	A B *	COM4 IRQ3 COM4 IRQ10
LK6	A B *	COM3 IRQ4 COM3 IRQ11
LK7	A * B	Battery Backup Enabled Battery Backup Disabled (CMOS Cleared)
LK8	in* out	RS-485 Receiver Enabled RS-485 Receiver Disabled
LK9	in* out	RS-485 Terminated RS-485 Not Terminated
LK10	in out*	RS-422 Terminated RS-422 Not Terminated
LK11	in* out	Remove link and reboot to clear data table (this will cause all setpoints and custom data entry back to default). Replace LK11 after program has restarted.
LK12	in* out	*Standard* Quantum™ LX keypad configuration. *Modified* Quantum™ LX keypad (TAB is in the middle of the Direction arrows).

* Standard Setting

Communications Board Jumpers

Com-1 (TB1)

LK2	in out*	Terminate COM1 No termination	RS-422/485
LK7	in out*	Pull down COM1 No pull down	RS-422/485 (Rx-/Tx-)
LK8	in out*	Pull up COM1 No pull up	RS-422/485 (Rx-/Tx+)
LK9	in out*	Pull down COM1 No pull down	RS-422 (Tx-)
LK10	in out*	Pull up COM1 No pull up	RS-422 (Tx+)
LK16	A B*	COM1 RS-422 (TB1) COM1 RS-485 (TB1)	

* Standard Setting

Com-2 (TB2 - TB3)

LK1	in out*	Terminate COM2 No termination	RS-422/485
LK3	in out*	Pull down COM2 No pull down	RS-422/485 (Rx-/Tx-)
LK4	in out*	Pull up COM2 No pull up	RS-422/485 (Rx-/Tx+)
LK5	in out*	Pull down COM2 No pull down	RS-422 (Tx-)
LK6	in out*	Pull up COM2 No pull up	RS-422 (Tx+)
LK11	A B*	Select RS-232 for COM2 (TB2) Select RS-422/RS-485 for COM2 (TB3)	
LK17	A B*	COM2 RS-422 (TB2) COM2 RS-485 (TB2)	

* Standard Setting

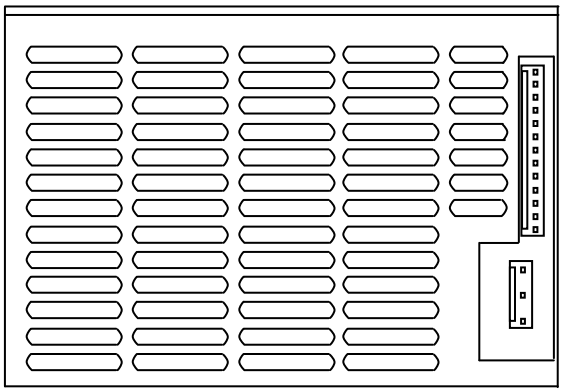
POWER SUPPLY

DESCRIPTION

The power supply used in the Quantum™ control panel is the Condor GLC-75D, and is shown below. This power supply provides the following DC voltages:

- +5 VDC
- +12 VDC
- -12 VDC
- +24 VDC

Of these four voltages, only the +5 VDC may be adjusted. Refer to the following page for the location of this potentiometer adjustment. If either the +12, -12 or +24 VDC is out of acceptable range, first check for short or a blown fuse. If no reason can be found for the loss of any DC voltages, then the power supply will need to be replaced.



Power Supply

MEASURING VOLTAGES

All circuit boards within the Quantum™ control panel require accurately adjusted DC voltages in order to function properly. These voltages consist of +5 VDC, -12 VDC, +12 VDC and +24 VDC. Periodic measurement and adjustment of the DC power system is highly recommended for optimum system operation. Over time, it is possible for temperature, humidity, vibration and component age, to degregate the accuracy of these voltages. When any of the DC voltages begin to stray from their optimum range (especially +5 VDC), mysterious problems can begin to arise.

All four DC voltages originate from the power supply. They are then daisychained to the main board, and then on to all connected Digital and Analog boards. Refer to the Flow Diagrams for the Quantum™ 4.

Even with a perfectly adjusted supply, it is possible for a potential drop in voltage at each connection point within the daisychain. This drop normally is in the millivolt range, but under some conditions, the drop can be much greater (as high as tenths of a volt). By the time the voltage reaches the last board in the daisy chain, and all of these potential voltages drops are considered, the combined drop can be such that serious problems can be apparent. Some examples of serious problems could be:

- Loss of or intermittent communications failures.
- A shutdown message stating *Digital Board x Reset* (where "x" is replaced by the number of the Digital Board that failed)
- An shutdown message stating *Digital Board x Comm. Fail - Shutdown* (where "x" is replaced by the number of the Digital Board that failed)
- An shutdown message stating *Analog Board x Comm. Fail - Shutdown* (where "x" is replaced by the number of the Analog Board that failed)
- Numerous sensor fault shutdown messages.
- Quantum™ 4 reboots for no apparent reason.
- Improper readings of analog pressures and temperatures.
- LED's on the Quantum™ 4 are lit, but nothing appears on the display.

In order to properly measure the DC power, it must be checked at the Quantum™ 4 main board, and verified for acceptable total voltage drop at the end of the daisy chain (last I/O board). For the +5 VDC (on either power supply), if the voltage at the Quantum™ 4 is in the range of +5.15 to +5.20), and the voltage being read at the last I/O board is greater than +5.0 V, it can be assumed that the +5 V power is correctly adjusted. For the +12 VDC, if the range at the last I/O board is between +11.8 and +12.2 VDC (+12.00 is ideal), it can be assumed that the +12 V power is correct. The range for this voltage is not critical at the Quantum™ 4 main board, and the reading does not need to be taken there.

CAUTION! Measuring and adjusting the power supply voltages require the control power switch to be energized. Extreme care must be observed when taking any readings, as 120 or 230 VAC (depending on incoming system voltage) is present within the power supply. Adjusting the supply requires the use of a small screwdriver with an insulated shaft (refer to NS-10-02) inserted into the supply to access an adjusting potentiometer. It is possible for the screwdriver (and the person making the adjustment) to come into contact with potentially lethal voltages.

FUSE REPLACEMENT

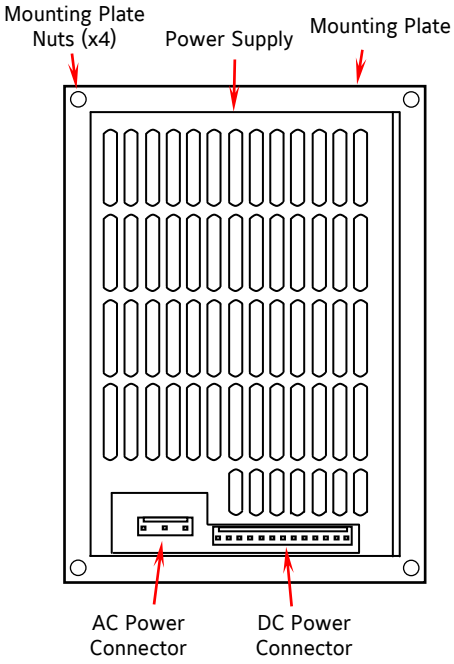
If voltage is NOT present at any of the DC power points, but proper AC voltage is measured at the AC input, one problem could be that there is a short on the DC Power Harness.

To isolate the problem:

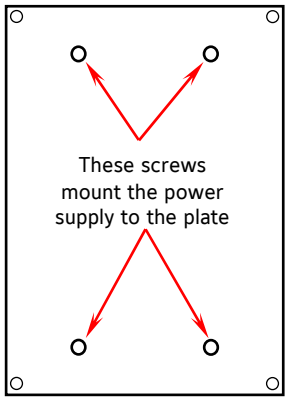
1. Turn the Control Power switch to OFF.
2. Unplug the DC power connector from the power supply.
3. Turn the Control Power switch back ON.
4. Measure the voltages on the DC power output connector of the power supply as shown at the end of this section.
5. If the proper voltages are present, the problem is external to the power supply, and further troubleshooting should be performed.

If there are NO DC voltages present, then the problem could be that the internal power supply fuse is blown. To access and replace this fuse, please follow these instructions:

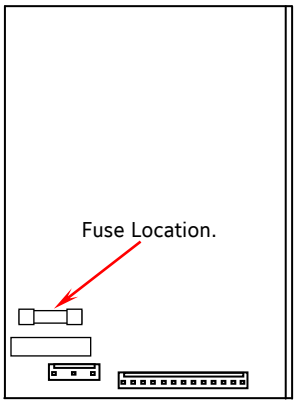
1. Ensure that the Control Power switch has been turned OFF.
2. Remove the AC and DC power connectors from the power supply.
3. The power supply is mounted to a plate. Remove the four mounting plate nuts (one from each corner).



4. Remove the power supply from the enclosure, and turn it over (so power supply is facing down).
5. Four screws attach the power supply to the mounting plate, remove the four screws.



6. Remove the three Philips head screws located on the bottom of the power supply, and two on the side. Notice that there are also three slotted screws on the side of the supply, DO NOT remove these.
7. Carefully lift of the slotted cover. This will expose the circuit board, as shown here:



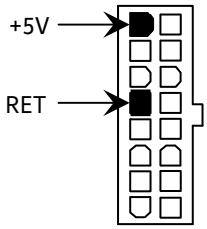
8. Locate the fuse on the circuit board from the above drawing. It is mounted in a clip. Pry up on one end of the fuse and extract the fuse.
9. Verify that the fuse in question is actually bad, and if so, replace the bad fuse with a known good one. Fuses may be ordered from Baltimore Parts (P/N 649A0954H19). This fuse is rated for 3.15 amps @ 250 volts.
10. Reassemble the power supply in the reverse order that it was disassembled.
11. Mount the power supply on to its mounting plate.
12. Place the power supply/mounting plate back onto the studs in the enclosure, and secure with the mounting nuts.
13. Reattach the AC and DC power harnesses.
14. Turn the Control Power switch to ON.
15. Verify that DC voltages are now present on the DC power connector. The 5 VDC may now be adjusted per the adjustment procedure on the following page.

ADJUSTMENT

To perform measurements and adjustments on the power supply voltages, use a reliable, calibrated Digital Volt Meter (DVM). The DVM should be accurate to 1/100 of a volt DC. With the control power switch turned *ON*, wait until the ***Operating Screen*** appears. This is because the graphics required to create this screen will draw more current than when the screen is showing the normal *POST* style messages during a boot up. If the screen never appears however (possibly due to a voltage problem), you will need to proceed regardless of what is or is not displayed.

Ensure that the meter is set to the proper range (DC, 0-50 V or equivalent), as well as observing proper wire polarity. Measure the +5 Vdc first. Place the negative lead on the common (return) pin, and the positive lead on the +5 VDC pin as shown. Verify that the DVM is displaying in the range of +5.15 to +5.20. If the reading is outside of this range, then using a thin, flat bladed, insulated screwdriver, insert the tip into the access hole for the appropriate voltage potentiometer (refer to the diagram on the following page for adjustment location). **NOTE: Extreme care must be used when adjusting the +5 VDC potentiometer. Adjustment should only be performed by qualified personnel, using an insulated screwdriver.**

While watching the DVM, slowly rotate the screwdriver blade clockwise to increase the voltage or counter-clockwise to decrease. Once the voltage has been adjusted, remove the DVM probes from the Quantum™, and install them into the white connector on the last I/O board in the daisy chain, as shown below:



Check the reading on the DVM. If the reading at the Quantum™ 4 has been adjusted properly, then this reading can be no lower than +5.0 DC. If the voltage is less, check all of the daisy chain connections on the blue DC-I/O harness. Ensure that all of its connectors are tight. If all connections are good, then go back and start measuring over again, this time beginning at the first board in the daisy chain. Continue checking the voltage at each connection, until you locate the point at which the voltage drop is excessive. This will usually indicate a connection that is not being made properly, or the sockets within the connector are weak. In either case, the DC-I/O wire harness may need replacing.

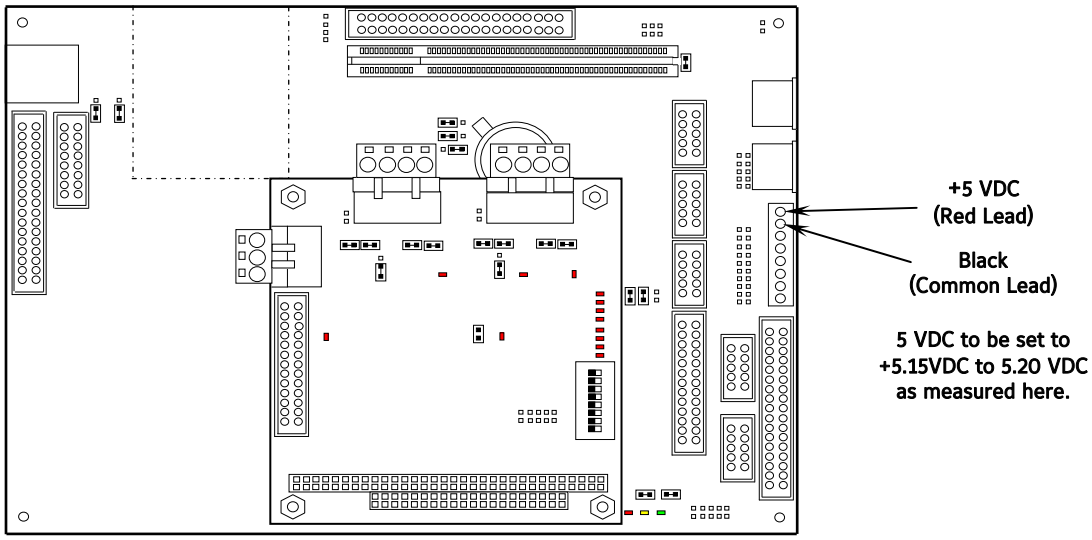
Next measure the +12 VDC. Perform the same steps as with the +5 VDC measurement, with the exception that you will not need to measure at the Quantum™. Measure directly at the last connection. If the voltage is low, ensure that there is not an excessive voltage drop in the daisy chain. If the voltage is out of range, then the supply itself may need replaced.

The -12 VDC may be measured the same as the other voltages, however, this voltage is not adjustable on any supply, so if the harness is not the culprit, the supply may need to be replaced.

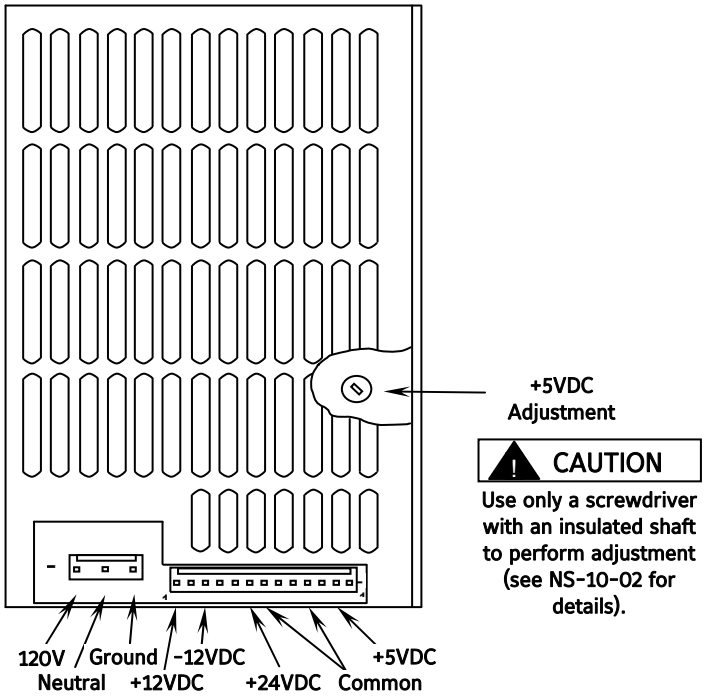
POWER SUPPLY REPLACEMENT

If the power supply is found to be bad, or not capable of acceptable adjustment, it will need replacing. When ordering this replacement, you will receive an upgrade kit. The purpose of this kit is to allow for the upgrading of the I/O DC power harness, at the same time as replacing the power supply. Refer to the Recommended Spare Parts list for the upgrade part number. This upgrade kit will include the following components:

- Screws (6-32 x 3/8 flat head)
- Power supply (Condor)
- DC power cable harness (this is an improved version of the previous power cable)



+5 DC VOLTAGE MEASUREMENT LOCATION



DC POWER SUPPLY PIN ASSIGNMENTS

INPUT: J1

AMP P/N: 640445-5
.312 CTR CONNECTOR, 3 CIRCUITS

Pin 1	AC GROUND
Pin 3	AC NEUTRAL
PIN 5	AC LINE

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 (+5.1V)
PIN 2	OUTPUT #1 (+5.1V)
PIN 3	OUTPUT #1 (+5.1V)
PIN 4	COMMON
PIN 5	COMMON
PIN 6	COMMON
PIN 7	COMMON
PIN 8	OUTPUT #2 (+24V)
PIN 9	OUTPUT #2 (+24V)
PIN 10	POWER FAIL
PIN 11	OUTPUT #3 (-12V)
PIN 12	COMMON
PIN 13	OUTPUT #4 (+12V)

DIGITAL BOARD

INFORMATION

The information that follows in this section can help locate problems that can occur with Digital Input and Output circuit boards.

DIGITAL BOARD DESCRIPTION

The Digital board is a small microprocessor board and is programmed to control discrete outputs, or accept discrete inputs, from external electrical devices. Each Digital board has the capability of 24 independent channels or I/O (Input/Output). Each channel that is used needs a module plugged into it. A yellow module indicates that it is used for Inputs. A black module is used for Outputs. The standard Quantum™ LX compressor control can have up to two Digital boards (depending on options).

COMMUNICATIONS LED'S

The main board is in constant communication with all Digital (and Analog) Boards. You will notice on each Digital and Analog board, that there are a pair of LED's labeled as RX and TX. These letters represent Receive (RX) and Transmit (TX). These LED's should be flashing at a high rate during normal operation. This indicates that the main board, and the Digital board that you are looking at, are properly communicating with each other.

- Reference the *JUMPER AND DIPSWITCH SETTINGS* section later in this manual. This section contains the dipswitch settings for addressing the Digital I/O boards. When these switches are properly set, the main board is able to serially communicate with each I/O board and provide control signals and data exchange. If these switches are not properly set, the result will be lost or failed communications, or the wrong outputs being energized, or the wrong inputs being received.

CONNECTIONS TO THE QUANTUM™ 4

As stated earlier, the Quantum™ LX standard compressor control system utilizes up to two Digital, and two Analog boards. To connect these boards together so that the Quantum™ LX can control them, they must be interconnected with a wiring harness that provides all of the necessary D.C. voltage requirements, as well as the communications capabilities. Two different harnesses have been used and a diagram of each of these wiring harnesses can be found later in this manual (see the Power I/O Wiring Harness drawings). Depending on the type of panel, the following harness will be used:

- **Special Panel** (36 & 48 Inch Panels) - This harness has an 18-pin connector at one end that plugs into the Quantum™ 4. Another connector plugs into the power supply. The remaining four connectors (16-pin) will plug into each of the Digital and Analog boards in the system.

  Upon close examination of this harness, you will notice that each of the connectors for both the main board and the four I/O boards, have two rows of connections. The wires that are inserted into the positions of one row are internally daisy chained on each I/O board, to continue the voltages and signals to the adjacent row. Therefore, any time that a connector is unplugged from the daisy chain, these voltages and signals cannot continue through the daisy chain to the next board. Whenever a plug is not to be inserted into a board, either for service or if not all boards are present, then a shunting plug (refer to Recommended Spare Parts list) must be installed onto the open connector.

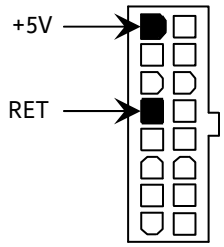
  The four wires that feed from the power supply to the Quantum™ 4 provide all of the necessary D.C. voltage that is required (+5 Vdc, -12 Vdc, +12 Vdc, and Return or Common). The voltages are passed through the connector on the main board, and two new signals are generated by the main board to be passed on through the daisy chain to the I/O boards. These two signals are the RX (receive) and TX (transmit). These signals are the means by which the main board communicates to the I/O.

- **Standard Panel** (22 & 28 Inch Panels) - This harness has a 7-pin connector at one end that plugs into the Quantum™ 4 at PL12, and provides power. A second 10-pin connector plugs into PL14 of the Quantum™ 4, and is used for communications. Another connector plugs into the power supply. The remaining four connectors (16-pin) will plug into each of the Digital and Analog boards in the system (up to four total). This harness varies from the Special panel harness in that there are two main branches; one feeds the digital boards, the other feeds the analog boards.

The Digital boards only require the +5 Vdc voltage and the Return (or common) for logic power. The communications signals (RX & TX) are required by all boards.

LOGIC VOLTAGE (POWER) LED

Located on the Digital Board is a *Power* LED. This LED will be illuminated as long as the *Control Power* switch is ON, and the proper voltage is present at the power supply. The power supply generates the +5 Vdc voltage and passes it on through the Power-I/O harness. This LED does not indicate however that the proper voltage is necessarily present at the board, only that the voltage is enough to energize the voltage sensing circuitry. If a voltage related problem is suspected with regard to a Digital Board, the only way to actually determine this is to read the voltage on a Digital Voltage Meter (DVM). This may be accomplished by locating the white power / communications connector on the board. Notice that the Digital Board has one of these connectors on both ends of the board. The associated power / communications harness will only be plugged into one of these connectors. Take the red (positive) probe of the DVM and carefully insert the end into the "+5V" lead, and the black (negative) probe end into the "RET" (Return or Common) lead, as shown below:



Set the DVM to read *DC*, and set the proper range. The voltage reading must read a minimum of +5.0 Vdc. The Power-I/O harness will have an associated voltage drop at each board connection. As an example, if you are reading the voltage at the first I/O board in the daisy chain, and it reads 4.98 Vdc, you can be assured that the voltage at the subsequent connections for the remaining boards will be lower yet. The voltage will need to be corrected for proper operation of the system. The cause for a low voltage reading could be:

- The power supply may need adjustment (see the section on power supplies).
- The Power-I/O communications harness has a problem (a new harness may be needed).
- A problem may exist with one of the I/O boards (Digital or Analog).
- 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 (see Recommended Spare Parts List) must be installed to daisy chain the signals.**

The most common symptom that is exhibited by a low +5 Vdc voltage to the Digital Boards is an alarm message that reads *Digital Board Reset Shutdown*.

ACTIVE LED

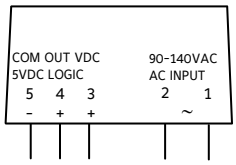
The Digital Boards have an *Active* LED indicator on the board that blinks when the board's software is running.

If the *Active* LED is not blinking, check to ensure that the EPROM is installed properly. The EPROM is located in chip slot U8, next to the power connector.

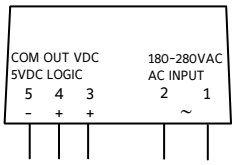
DIGITAL INPUTS

A Digital Input is the portion of the hardware that allows devices such as limit switches, relay contacts, and level switches, to interface with the Quantum™ LX. The software program within the Quantum™ LX is constantly looking at these Input channels, via communications, and based upon whether a control voltage is present or not, will provide the necessary control for an associated Output channel. For instance, if a control voltage is present on the Oil Level Sensor input, the software will determine that the Separator has sufficient oil level for the oil heaters to be energized (if the temperature of the oil is also sensed to be low. Temperature sensing will be discussed in the Analog Input section).

There are two possible varieties of Digital Input modules used on standard compressor control packages. One is for 120 Volt controls, and the other is for 240 volt controls. Both of these module styles are yellow in color. A side profile of these modules is shown below:



120 VAC Input



240 VAC Input

These Input modules, can be identified as to their operating voltage by looking at either the side, as shown above, or from the top. You will notice the module operating voltage printed on the top, and the voltage range printed on the side.

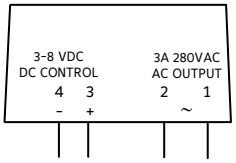
Never plug a 120 Volt Input module into a 240 Volt system, and vice-versa. Never plug an Output module into a position designated for an Input module.

You will notice that when a module is plugged into the Digital board, there is a fuse located directly adjacent to the module. This fuse is of the pluggable variety, and must be plugged into the *IN* position for an Input module.

DIGITAL OUTPUTS

A Digital Output is the portion of the hardware that the Quantum™ LX is to control (energize). These devices include solenoids, relay coils, and heaters to be energized, based upon the logic within the Quantum™ LX software program.

There is one variety of Digital Output modules used on standard compressor control packages. This one module will handle both 120 Volt controls, and 240 volt controls. This module is black in color. A side profile of this module is shown below:



120/240 VAC Output

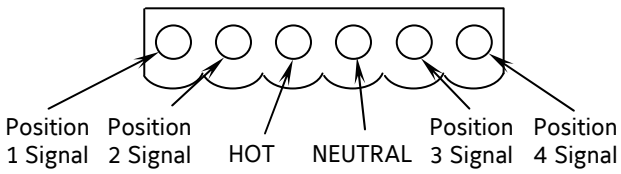
Although this Output module is labeled as 280 VAC on the top, and on the side, it can be used on both 120 and 240 volt applications.

Never plug an Input module into a position designated for an Output module.

You will notice that when a module is plugged into the Digital Board, there is a fuse located directly adjacent to the module. This fuse is of the pluggable variety, and must be plugged into the *OUT* position for an Output module.

CHECKING THE DIGITAL INPUTS AND OUTPUTS

Some problems that may be 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. Positions 1, 2, 5, and 6 are signal connections, as shown below:



The Digital 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 lit LED represents an Input that is *High*, receiving a signal or an Output that is *On*.

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 one end of each Digital I/O Board (refer to the Digital Board drawings at the end of this section for exact fuse tester location).
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, check for external shorts on the corresponding circuit, the replace the fuse with a new plug-type fuse (refer to Recommended Spare Parts list).

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.

6. If you are receiving an Alarm or Shutdown from a digital input in which the adjacent LED indicator light is on, check the ***Service Screen*** to see if that channel is turning on and off. If so, replace the input module.

REPLACING A DEFECTIVE DIGITAL BOARD

The procedure to replace a Digital board is outlined below:

1. Shut off control power.

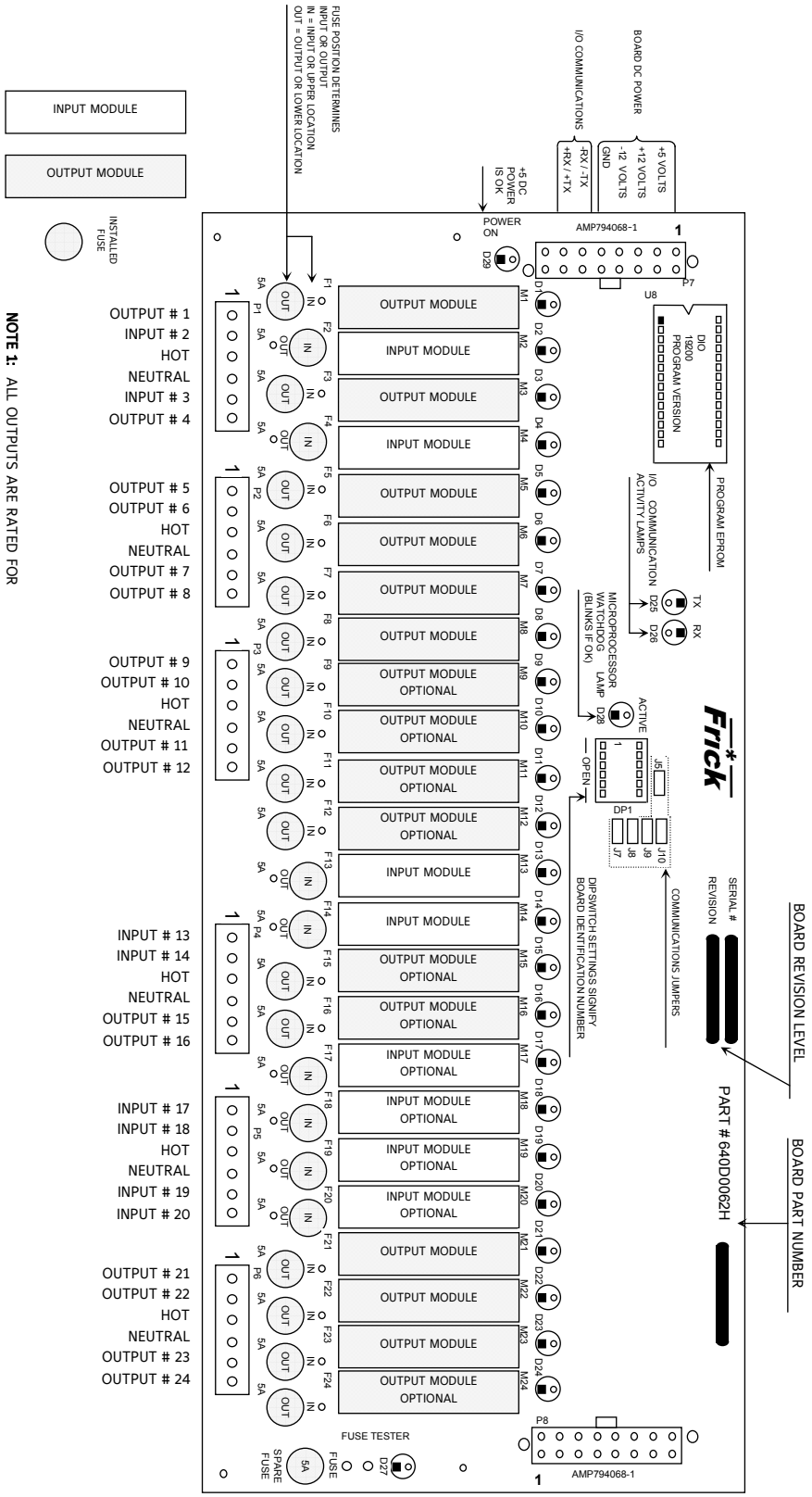
2. Remove the old board from the machine and the new board from its packing and place both on an anti-static surface.

3. Check that all jumpers, dipswitches and components are properly setup on the new board as it was on the old board (refer to the Digital Settings tables near the end of this section).

4. Install the modified replacement board in the panel.

After replacing or installing a Digital Board and powering on the control panel, select **[Redetect I/O Boards]** from the *Menu* > *Configuration* > *Communications* screen. This selection provides a method to detect all connected Digital and Analog 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.

DIGITAL I/O BOARD #1 PICTORIAL

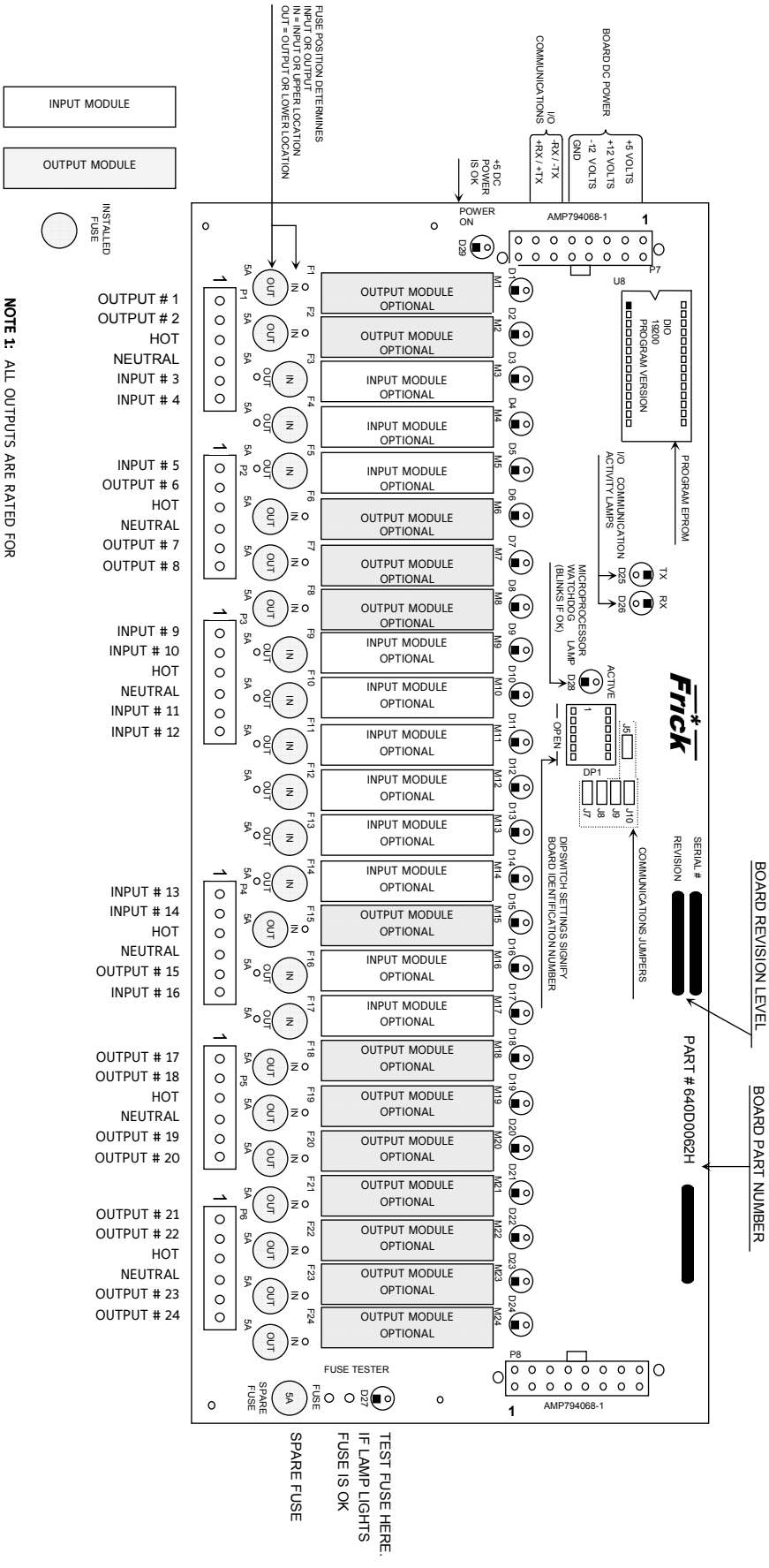


NOTE 1: ALL OUTPUTS ARE RATED FOR A MAXIMUM 2 AMP LOAD.

NOTE 2: OPTIONAL MODULES INSTALLED WITH PURCHASED OPTION

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

DIGITAL I/O BOARD #2 PICTORIAL



NOTE 1: ALL OUTPUTS ARE RATED FOR A MAXIMUM 2 AMP LOAD.

NOTE 2: OPTIONAL MODULES INSTALLED WITH PURCHASED OPTION

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

DIGITAL BOARD SETTINGS

COMMUNICATIONS SETTINGS

The following table is to be used when configuring the Quantum™ for external communications.

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

* = standard setting

DIPSWITCH SETTINGS

The following table is to be used to set the digital board addresses. If there is only one board installed, it should be set as board #1, if there are two boards they each need to be set according to the wiring diagrams

	SW1	SW2	SW3	SW4	SW5	SW6
Board #1	on	on	on	on	off	on
Board #2	off	on	on	on	off	on

ANALOG BOARD

OVERVIEW

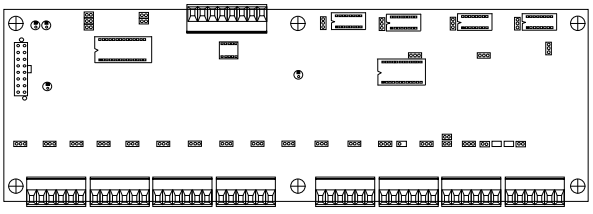
The Frick Quantum™ 4 control panel is capable of reading external analog devices, such as temperature probes and pressure sensors. It uses these input signals for the purpose of monitoring and control. As an example, if an external temperature sensor began to read a higher than expected temperature in some area, the controller would sense this change, and provide the necessary output control signal to remedy the situation. Unlike a digital signal, which is typically either an on or off state, an analog signal can assume a wide variety of states, such as a temperatures probe reading a wide range of temperatures.

The method used for receiving (and sending) these signals, is the analog board. The analog devices are wired directly to the board, and the on-board software/hardware converts the electrical signals received from these devices into data, which is then sent on to the Quantum™ 4 control board via communications.

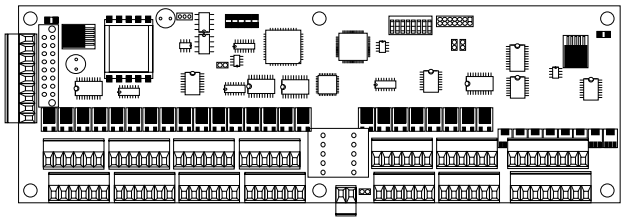
ANALOG BOARD VERSIONS

There have been two different varieties of Analog Board which have been used:

- **20 Channel** - This board featured sixteen input and four output channels. The board also required jumpers to be manually set for each channel, so that the signal could be properly interpreted by the hardware. This board has been discontinued as of June 2003 and replaced by a newer version, which improves the capabilities and enhances the features. The description in this manual will concentrate on the 32 channel analog board design, with occasional mention of the 20 channel design as a reference. If additional information is required regarding this earlier version board, please consult S90-010 M Ver. 4.5x and earlier, or contact the factory. A drawing of this board is shown here:



- **32 Channel** – This board replaces the 20 channel analog board effective June 2003. It features twenty-four input channels, and eight output channels. Rather than using physical jumpers to configure each channel, this is now done through the software. A more detailed description of the operation of this board is provided in the sections that follow. A drawing of this board is shown here:



ANALOG BOARD DESCRIPTION

The Analog Board is actually a small microprocessor board and is programmed to control analog outputs, or accept analog inputs, from external electrical devices. Each enhanced board has the capability of 24 independent input channels. With the Quantum™ LX Compressor Control, these I/O channels are dedicated through the software and external wiring, as to the function of each channel. The Quantum™ LX controller can utilize up to two separate analog boards (Analog Board #1 and #2), depending on the selected options. This can consist of any combination of 20 channel or 32 channel boards. For example, board #1 can be of the 20 channel design, while board #2 can be of the 32 channel design.

For each of the boards that are installed, they will each have specific I/O (Input / Output) functions. For the operating software to distinguish board #1 from #2, each board must be properly addressed as #1 and #2 using the dipswitches on each board (see *Analog Board Dipswitch Settings* chart for this information). This allows the operating software to know what channel of which board a signal is being received from.

For example, the first channel of Analog Board #1 is dedicated to reading Suction Temperature. By having the dipswitches set correctly, the software will know which of the two possible boards to look at in order to read the correct channel one.

COMMUNICATIONS LED'S

The Quantum™ 4 controller is in constant communication with the Analog (and Digital) Board(s). You will notice on each Analog and Digital board, that there is a pair of LED's that are labeled as RX and TX. These letters represent receive (RX) and Transmit (TX). These LED's should be flashing at a high rate during normal operation. This indicates that the Quantum™ LX board and the board that you are looking at are properly communicating with each other.

- Refer to the *JUMPER AND DIPSWITCH SETTINGS* section later in this section. This section contains the dipswitch settings for addressing the Analog I/O Boards. When these switches are properly set, the Quantum™ 4 is able to serially communicate with each I/O board and provide control signals and data exchange. If these switches are not properly set, the result can be one of the following:

  - Lost or failed communications (displayed in the *Communications Status* box on the Home screen)
  - The wrong analog input signals being received
  - The wrong analog output signals being sent from the board.

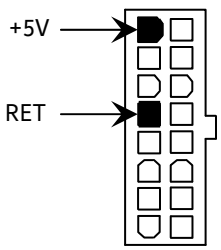
CONNECTIONS TO THE QUANTUM™ 4

Refer to the same titled section in the Digital Board description for the connections.

LOGIC VOLTAGE (POWER) LEDS

Located on the 32 channel Analog Board are two power LEDs. The first of these is D1 LED (+5Vdc), and will be illuminated as long as the Control Power switch is ON, and the proper voltage is present at Analog Board connector P3. The power supply generates the +5 Vdc voltage, and passes it on through the Power-I/O harness. This LED does not indicate however that the proper voltage is necessarily present at the board, only that the voltage is enough to energize the voltage sensing circuitry.

If a voltage related problem is suspected with regard to an Analog Board, the best way to actually determine this is to read the voltage on a DVM (Digital Volt Meter). This may be accomplished by locating the white power / communications connector on the board. Notice that the Analog Board has only one of these connectors. The associated power/communications harness plugs in to it. Take the red (positive) probe of the DVM and carefully insert the end into the +5V lead, and the black (negative) probe end into the *RET* (Return or Common) lead, as shown below:



Set the DVM to read DC, and set the proper range. The voltage reading must read a minimum of +4.98 Vdc. The Power-I/O harness will have an associated voltage drop at each board connection. As an example, if you are reading the voltage at the first I/O board in the daisy chain, and it reads 4.98 Vdc, you can be assured that the voltage at the subsequent connections for the remaining boards will be lower yet. The voltage will need to be corrected for proper operation of the system.

The cause for a low voltage reading could be:

- The power supply may need adjustment (see the section on power supplies).
- The Power-I/O communications harness has a problem (a new harness may be needed).
- A problem may exist with one of the I/O boards (Digital or Analog).
- If the power LED is not lighted, check the cable for proper connectivity. **Note: (For the OLD harness only) 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.**

The second power LED is D5 (+24Vdc). This +24Vdc voltage is generated on the Analog Board from the +5Vdc supply being fed from the Quantum™ 4 power supply. If the +5Vdc is present as stated earlier, then this LED will illuminate if the on-board +24Vdc supply is functioning properly.

ACTIVE LED

The Analog Boards (both styles) have an *Active* LED indicator that blinks when the board's software is running.

If the *Active* LED is not blinking, it could be an indication that the internal program is not running. Try powering the Quantum™ 4 controller off, then back on to see if the *Active* light starts blinking. If not, a new board may be required.

ANALOG INPUTS

An Analog Input is the portion of the hardware that allows devices such as temperature sensors and pressure transducers to interface with the Quantum™ LX. The software program within the Quantum™ LX is constantly looking at these Input channels, via communications, and based upon what the voltage or current level of the channel is, will provide the necessary control for an associated action. For instance, if the digital input for the Oil Level Sensor is energized, and the Oil Separator Temperature sensor signal causes the value to drop below the setpoint, the Separator will determine that the Oil Heater needs to be energized. (Digital Inputs are discussed in the Digital Input section).

Analog inputs arrive at the board on connectors P4 through P10. Each of these connectors can receive two channels (for a total of twenty-four).

Each of the twenty-four analog input channels is board software configurable to select for the following type of input signals:

Analog Board Input Configuration Table

Channel	ICTD	0-5Vdc	0-10Vdc	0-20mA	POT (Potentiometer)	CT (Motor Current)	Accelerometer (Vibration Monitoring)	RTD (Motor Protection Only)
1	*	*	*	*				*
2	*	*	*	*				*
3	*	*	*	*				*
4	*	*	*	*				*
5	*	*	*	*				*
6	*	*	*	*				*
7	*	*	*	*				*
8	*	*	*	*				*
9	*	*	*	*				*
10	*	*	*	*				*
11	*	*	*	*				*
12	*	*	*	*				*
13	*	*	*	*				*
14	*	*	*	*	*			
15	*	*	*	*	*			
16		*	*	*		*		
17	*	*	*	*			*	*
18	*	*	*	*			*	*
19	*	*	*	*			*	*
20	*	*	*	*			*	*
21	*	*	*	*			*	*
22	*	*	*	*			*	*
23	*	*	*	*			*	*
24	*	*	*	*			*	*

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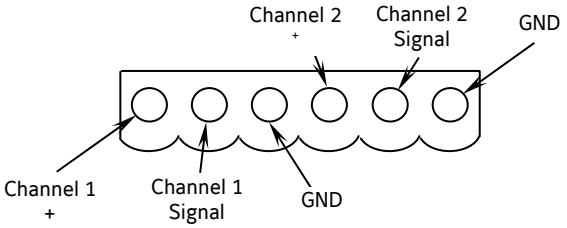
ANALOG OUTPUTS

An Analog Output is the portion of the hardware that the Quantum™ LX uses to provide control. With the Quantum™ LX, this output is dedicated for a 4-20 mA signal that is outputted to an external device, and cannot be changed through the software configuration. This device is usually a customer specific application, such as to simply receive a signal back from the Quantum™ 4 providing the Slide Valve Position to an external application (perhaps a PLC), as an example.

TROUBLESHOOTING THE ANALOG INPUTS AND OUTPUTS

Some problems that are encountered involve troubleshooting the Analog inputs and outputs. The Analog Board has twelve Analog I/O board connectors labeled P4 through P10. The external Analog devices are wired to a connector plug. Position 1 connects to the plus (+) of the external device for channel 1, position 2 connects to the signal (SIG) of the external device for channel 1 and position 3 connects to ground (GND) of the external device for channel 1. Position 4 connects to the plus (+) of the external device for channel 2, position 5 connects to the signal (SIG) of the external device for channel 2 and position 6 connects to ground (GND) of the external device for channel 2, as shown below:



Each channel is setup through software calibration for the proper transducer type and range, and each transducer must 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 improper 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.)

REPLACING A DEFECTIVE ANALOG BOARD

The procedure to replace an Analog board is outlined below:

1. Shut off control power.
2. Unplug all connectors from the board.
3. Remove the old board from the machine and remove the new board from its packing and place both on an anti-static surface.
4. Check that all jumpers and dipswitches are properly setup on the new board as it was on the old board.
5. Install the modified replacement board in the panel.
6. Plug all connectors back in.
7. Turn on control power.
8. After replacing or installing an Analog Board and powering on the control panel, select **[Redetect I/O Boards]** from the *Menu* > *Configuration* > *Communications* screen. 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 **[Redetect I/O Boards]** key resets the memory of the processor as to which boards it requires communications from. Therefore, it is important to check the **[About]** screen to see which boards have been detected relative to the I/O boards actually in the panel.

PHD VIBRATION ANALYSIS

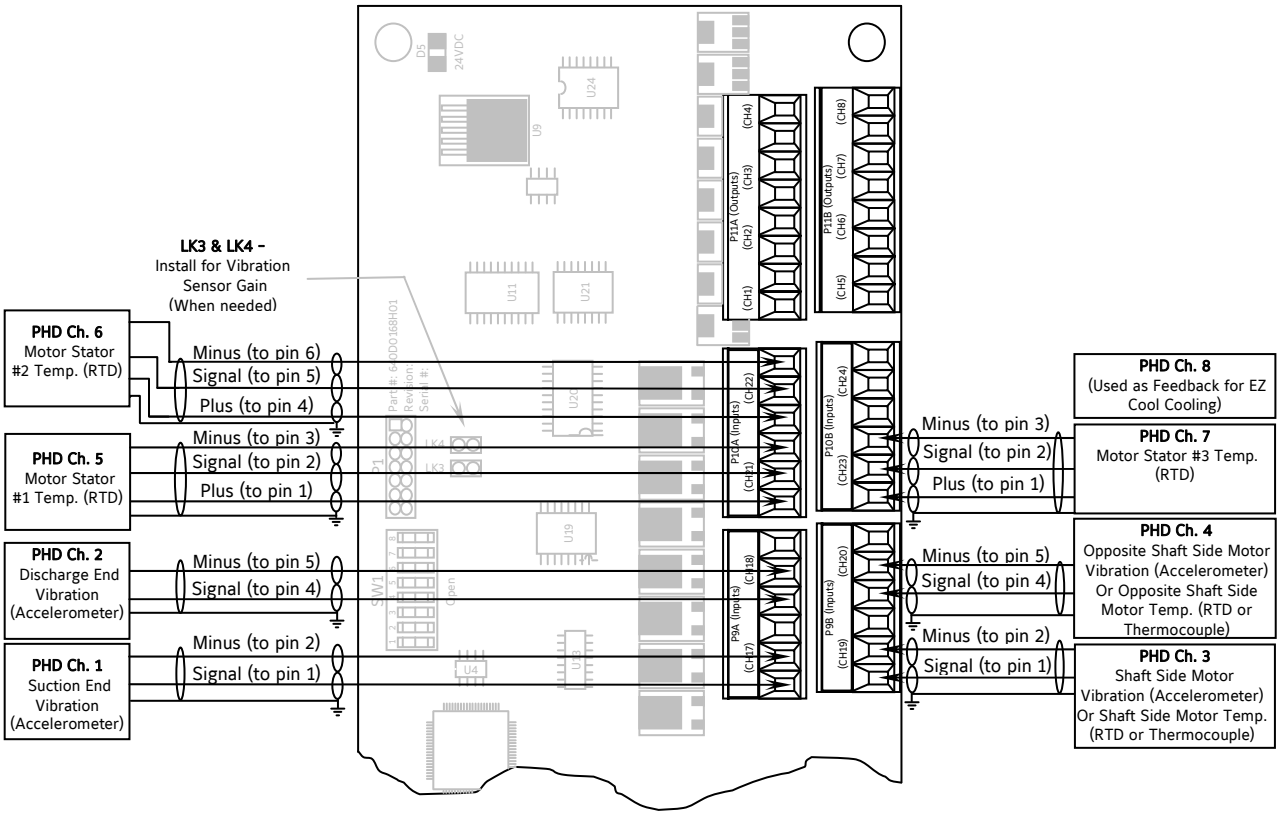
The Frick™ 32 channel analog board has the built-in capability to directly receive signals from vibration accelerometers, and motor stator RTDs (100 Ω platinum) which are mounted on the compressor housing and/or the motor/shaft. The purpose of these devices is to monitor compressor motor/shaft vibration and/or motor temperature.

Accelerometers transmit continuous signals to the analog board. The Quantum™ 4 software monitors these signals, and can detect any variations in the frequency of the vibration. As the vibrations increase over time (due to bearing wear), predefined setpoint limits may be exceeded, and a warning will be generated from the Quantum™ 4 to the display screen, warning the operator of the condition. If the alarm is not addressed, a shutdown will occur to prevent damage to the compressor. Likewise, if an RTD is used for bearings, it will measure the temperature of the motor bearings and stator, which will increase (due to the failing bearings causing increased friction).

Typically, all PHD related connections will be to Analog Board # 1. However, if Auxiliary Analog monitoring is required also, then this additional wiring would connect to an optional Analog Board # 2. Refer to the drawing at the bottom of this page for the wiring connections of the different possible configurations.

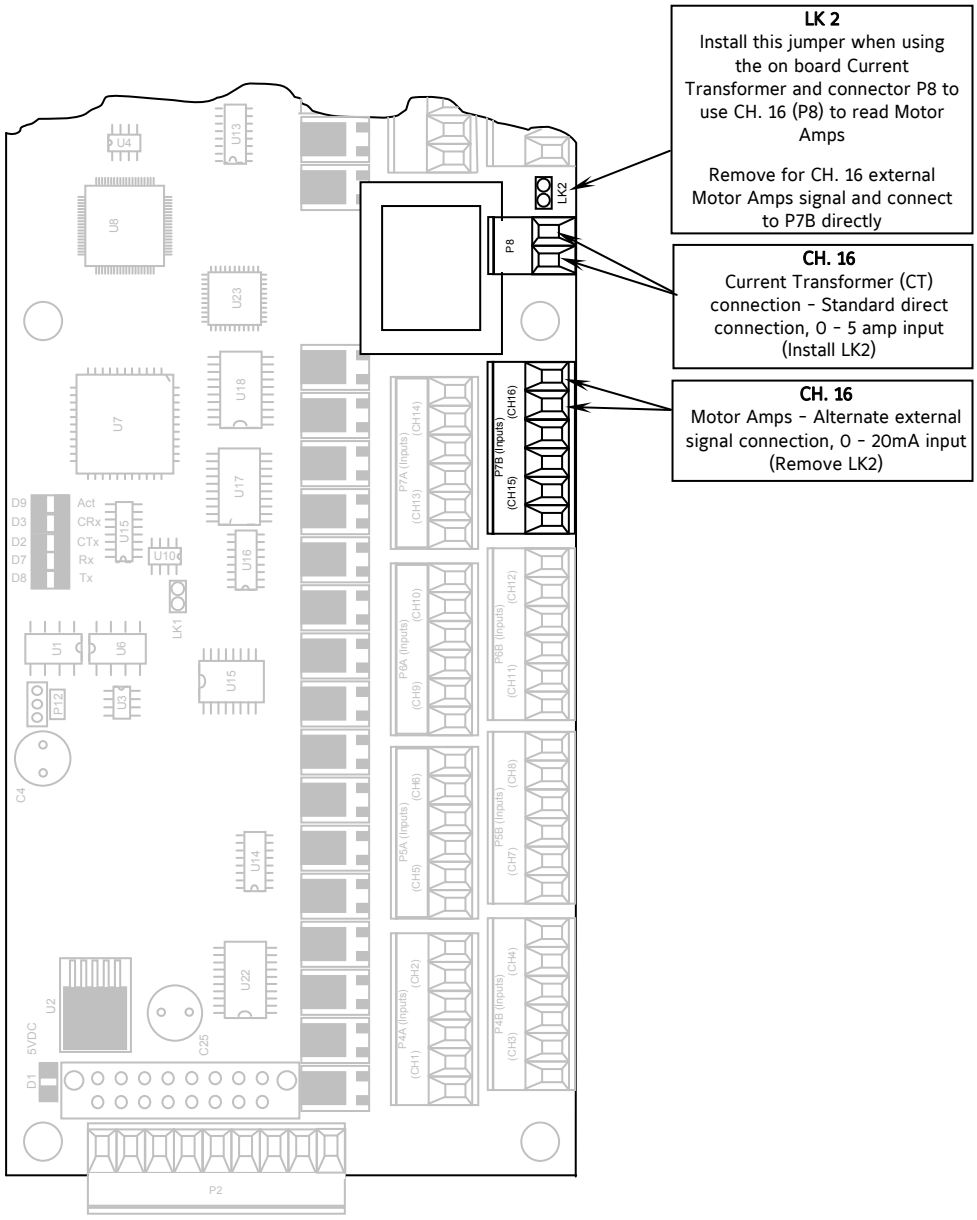
The full wiring diagram may be found later in this manual in the ***Quantum™ 4 Drawings*** section. Additional information on PHD vibration monitoring and theory may be found in the ***PhD Vibration Monitoring System*** manual (E70-020 TB).

PHD Connections (Analog Board # 1)

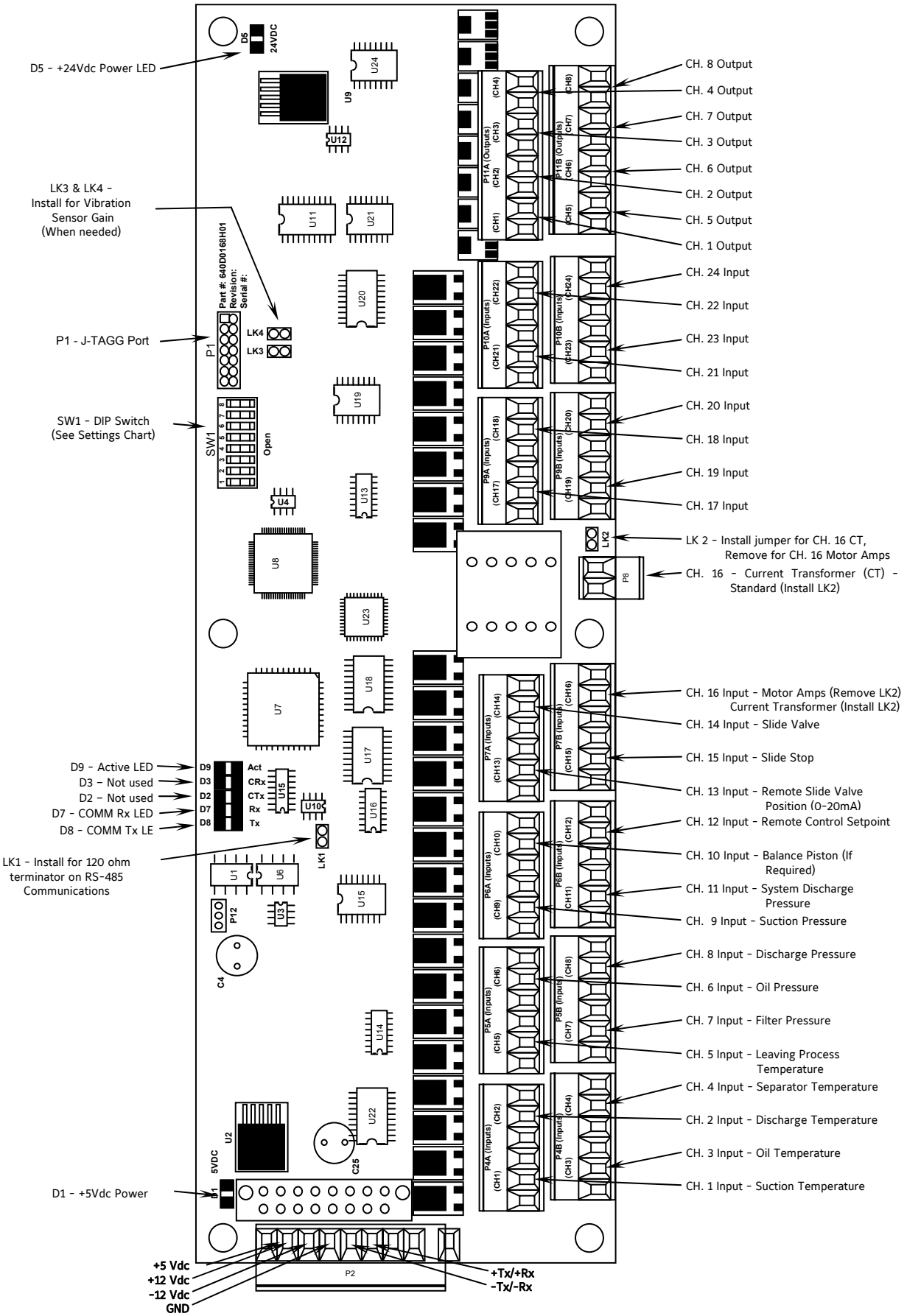


CURRENT TRANSFORMER (MOTOR AMPS)

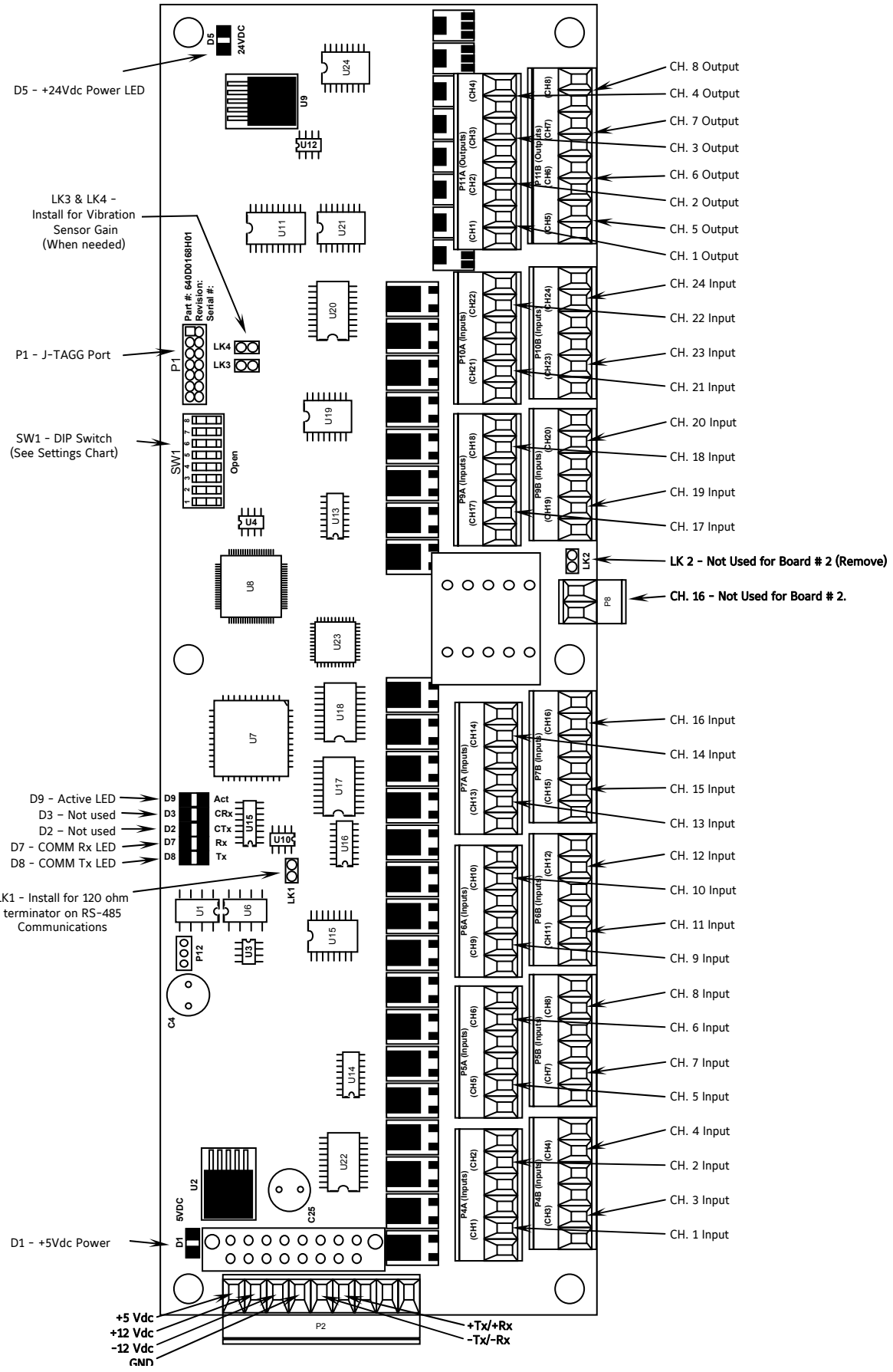
Channel 16 of Analog Board 1 is dedicated to reading motor amps, either through the use of the on board current transformer when using a 0-5 amp CT, or from an external source. When reading motor amps directly at the P8 terminal strip from a CT, the input signal cannot exceed 5 amps. If you are using an external DC Ma or voltage device, remove the jumper at Link 2, and connect the wiring to connector P7B. If you intend on utilizing the on-board current transformer, then install Link 2, and connect the wiring to Channel 16, as shown in the diagram below:



ANALOG BOARD #1 PICTORIAL



ANALOG BOARD #2 PICTORIAL



ANALOG BOARD SETTINGS

COMMUNICATIONS

The following table is to be used when configuring the Quantum™ 4 for external communications.

LK1	In	120 ohm long communications line termination.
	Out *	No termination.

* default setting

CURRENT TRANSFORMER (CT)

Analog Board # 1

LK2	In *	Install for CT (Current Transformer)
	Out	Remove to read Motor Amps on P7B.

* default setting

Analog Board # 2

LK2	In	(Must be removed)
	Out *	Remove (Not Used)

* default setting

VIBRATION

LK3	LK4	Gain Ratio
Out	Out	1 : 1
Out *	In *	11 : 1
In	Out	21 : 1
In	In	31 :1

* default setting

DIPSWITCH SETTINGS (USED TO SET THE BOARD ADDRESS)

The following table is to be used to set the analog board addresses. If there is only one board installed, it should be set as board #1, if there are two boards they each need to be set according to the wiring diagrams

	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Board #1	Off	Off	Off	Off	Off	Off	Off	Off
Board #2	On	Off	Off	Off	Off	Off	Off	Off

ANALOG BOARD COMPARISION CHART

Description	20 Channel Analog Board		32 Channel Analog Board	
Input Channels	16		24	
Output Channels	4 (driver chips required)		8 (no driver chips required)	
On Board CT (Current Transformer)	No (external transformer required)		Yes (transformer incorporated on board)	
On Board Vibration Circuit	No		Yes (no external modules required)	
Channel Configuration	Jumpers		Software	
Dimensions	4" x 11"		4" x 11" (fits original board footprint)	
Types of Inputs:				
4-20 mA	Yes		Yes	
0 - 5 volt	Yes		Yes	
1 - 5 volt	Yes		Yes	
ICTD	Yes		Yes	
RTD (100 platinum)	No		Yes (currently for motor RTD inputs only)	
Service Dates	Sept. 96 - May, 2003		June 2003 - Present	
Replacement Part Numbers	**Analog Board 1**	**Analog Board 2**	**Analog Board 1**	**Analog Board 2**
Baltimore Parts Replacement	640C0026G01	640C0026G02	640C0057G01	640C0057G02
Field Installation Kit	N/A	640C0057G11	N/A	640C0057G12

OPERATOR INTERFACE

DESCRIPTION

The Quantum™ 4 Operator Interface actually consists of two components: A color 10-1/2" (diagonally measured) graphic display and a membrane touch keypad. The display is used to view information coming from the Quantum™ 4 controller, while the keypad allows the user to enter information into the controller.

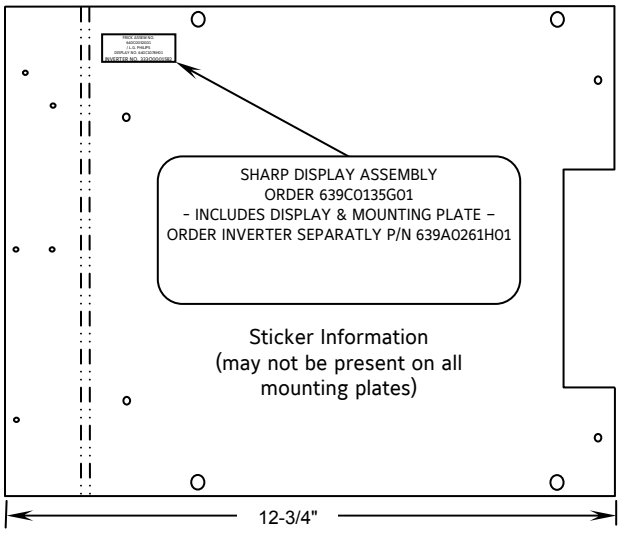
DISPLAY ASSEMBLY

The Display assembly consists of a 640 x 480 resolution, LCD screen (which includes a fluorescent backlight tube, a backlight inverter circuit board, and a wiring harness). Refer to the Parts List near the end of this manual for specific replacement part numbers.

NOTE: Before replacing a display unit, ensure that the symptom is not actually being caused by a bad fluorescent tube, inverter or harness.

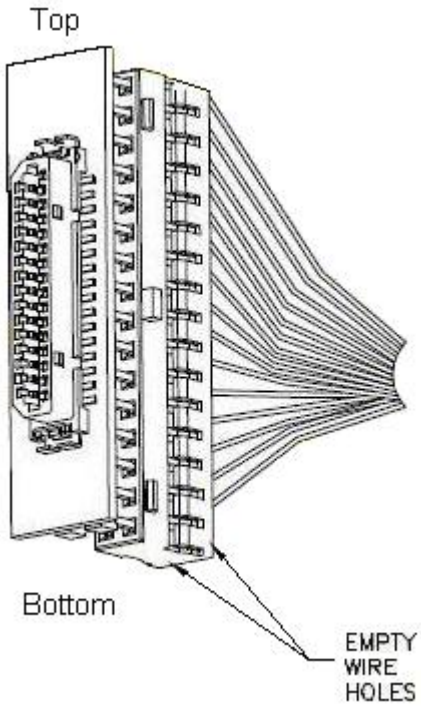
DISPLAY REPLACEMENT

1. Shut off control power.
2. Remove the defective display.
3. Install the new display.
4. Verify the jumper (link) settings per the table near the bottom of this page.
5.



Display Mounting Plate

Note: The end of the display cable that plugs into the display has an adapter connector plugged into it, which adapts the display cable to the display. When unplugging the display cable from the back of the display, it is possible that the display cable connector may separate from the display adapter connector. If this occurs, refer to the following drawing to ensure proper connector orientation when plugging the display cable back into the display:



With the display connector held as shown, orient the display harness to plug onto the back pins with the 2 empty wire holes oriented down toward the bottom as shown.

Quantum™ 4 Motherboard Display Jumpers (links)

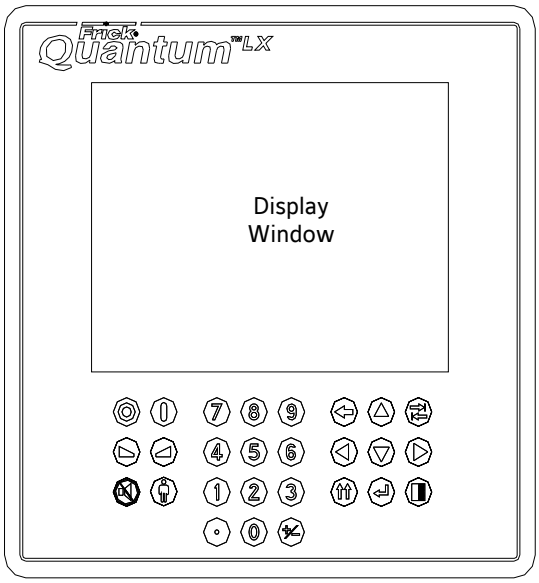
Link Number	Link Position	Description
LK3	A B*	+5V Backlight Voltage (Not used) +12V Backlight Voltage (All Displays)
LK4	A* B	+5V LCD Supply (Samsung, NEC, Sharp) +3.3V LCD Supply (LG Philips Display)

*** standard setting**

(Refer to "Quantum™ 4 Board Settings" for location of jumpers)

KEYPAD

The Quantum™ 4 keypad is shown here:



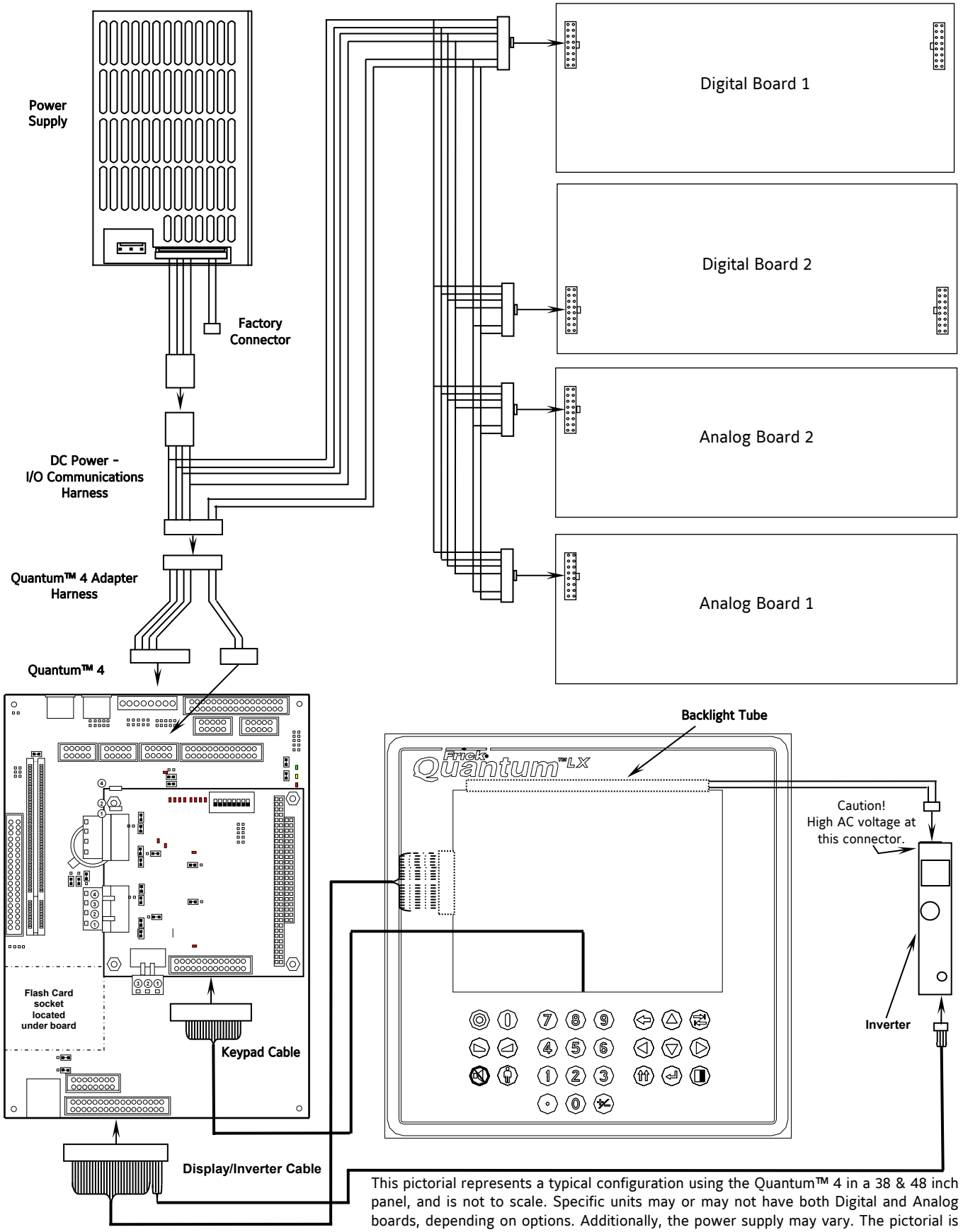
The Keypad consists of two areas, the Display window and the Keypad itself. The Display window is simply a clear portion of the Keypad assembly which the Display is able to be viewed through.

The Keypad area consists of a series of 27 membrane switches. Depressing each switch (key) should result in an audible tactile clicking sound. To ensure that each key is actually functioning, visually inspect the D8 LED located on the Quantum™ 4 control board. This LED will normally flash on and off at a rate of about once-per-second. Pressing a key on the keypad will interrupt this flash rate, and repeatedly depressing a key will cause the LED to flash each time a key is pressed.

KEYPAD REPLACEMENT

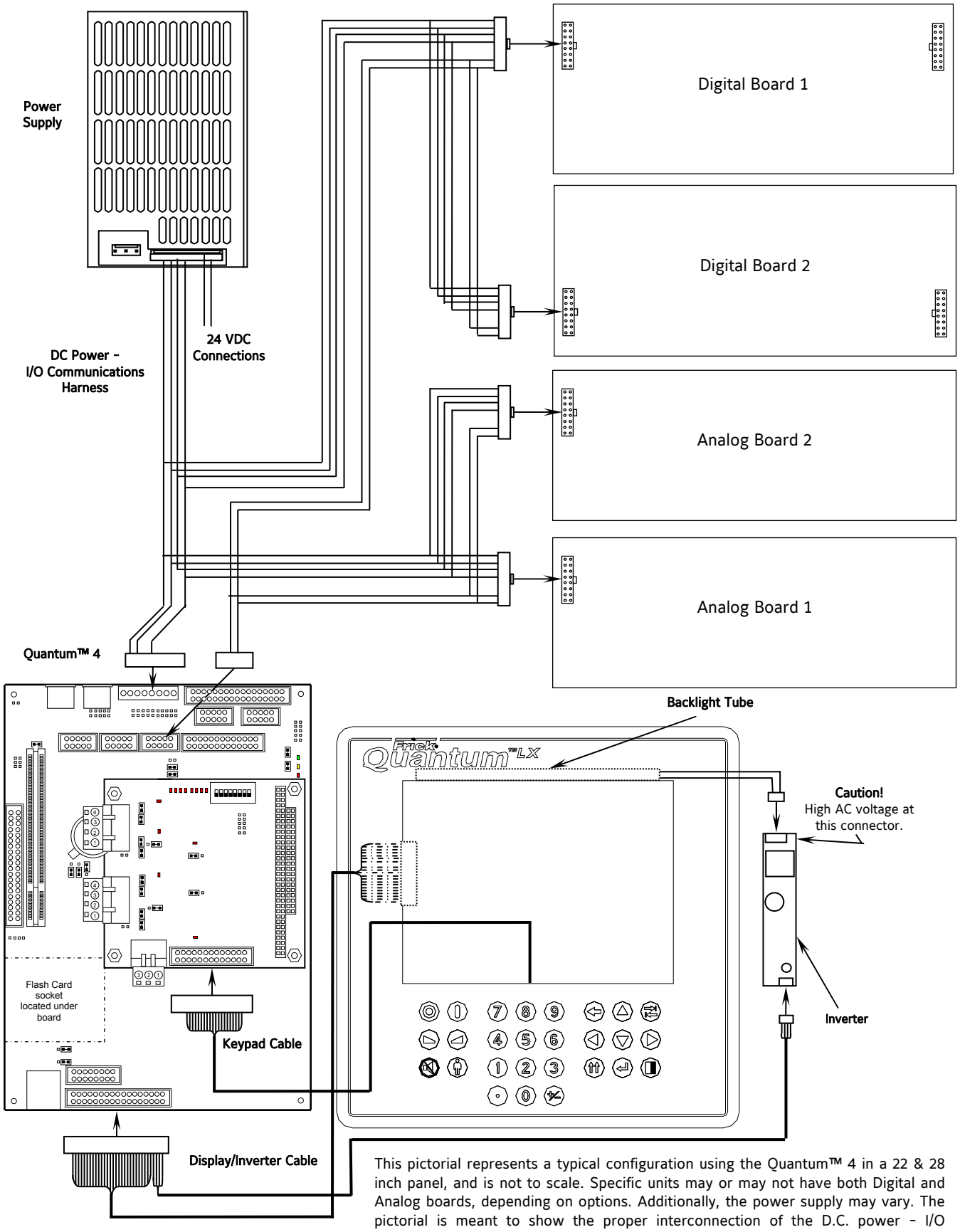
1. Shut off control power.
2. Unplug the defective keypad from the Quantum™ 4 board.
3. The keypad is affixed to the controller door with a double-sided tape film. Start by lifting the keypad at one of the corners. Once the keypad starts to break free from the underlying tape, continue pulling. A carefully used putty knife can help to separate the keypad from the adhesive.
4. Once the keypad has been entirely removed, you will notice that much of the double-backed tape is remaining on the panel door. Carefully using a window scraper style razor will remove most of this tape. Be careful not to scratch the paint outside of the keypad footprint.
5. Take the new keypad, and feed the flat cable through the slotted opening at the bottom of the display area.
6. Remove the paper backing of the keypad to expose the double-backed tape underneath.
7. Carefully align the keypad on the door, ensuring that the display is centered within the window of the keypad. Once you are satisfied with the position, firmly press the keypad into place.
8. Plug the keypad cable back into the Quantum™ 4.
9. Turn Control power back on.
10. Test the new keypad as described earlier.

QUANTUM™ 4 FLOW DIAGRAM - D.C. VOLTAGE/COMMUNICATIONS HARNESS (36 & 48 INCH PANELS)



This pictorial represents a typical configuration using the Quantum™ 4 in a 38 & 48 inch panel, and is not to scale. Specific units may or may not have both Digital and Analog boards, depending on options. Additionally, the power supply may vary. The pictorial is meant to show the proper interconnection of the D.C. power - I/O communications harness, keyboard cable and display harness and hardware components.

QUANTUM™ 4 FLOW DIAGRAM - D.C. VOLTAGE/COMMUNICATIONS HARNESS (22 & 28 INCH PANELS)



This pictorial represents a typical configuration using the Quantum™ 4 in a 22 & 28 inch panel, and is not to scale. Specific units may or may not have both Digital and Analog boards, depending on options. Additionally, the power supply may vary. The pictorial is meant to show the proper interconnection of the D.C. power - I/O communications harness, keyboard cable and display harness and hardware components.

SERVICE SCREENS

SERVICE - Digital Board Inputs and Outputs

Digital I/O

Board 1 Channels				Board 2 Channels			
1	Off	13	On	1	Off	13	On
2	Off	14	On	2	Off	14	On
3	Off	15	Off	3	Off	15	Off
4	Off	16	Off	4	Off	16	Off
5	Off	17	On	5	Off	17	On
6	Off	18	On	6	Off	18	On
7	Off	19	On	7	Off	19	On
8	Off	20	On	8	Off	20	On
9	Off	21	Off	9	Off	21	Off
10	Off	22	On	10	Off	22	On
11	Off	23	Off	11	Off	23	Off
12	Off	24	Off	12	Off	24	Off

ACCESSING: → Service... → Digital

DESCRIPTION: This Digital ***Service Screen*** has been provided to view the raw data from a Digital Board. Digital values are shown as ON or OFF

SERVICE - Analog Board Inputs and Outputs

Analog Inputs (data units are Volts DC)

Board 1 Channels				Board 2 Channels			
1	3.62	13	0.62	1	4.95	13	0.00
2	2.93	14	0.27	2	4.95	14	0.00
3	2.78	15	0.29	3	4.95	15	0.00
4	3.16	16	0.18	4	0.63	16	0.00
5	1.16	17	2.37	5	0.00	17	0.00
6	2.11	18	1.80	6	0.00	18	0.00
7	4.03	19	4.58	7	0.00	19	0.00
8	1.83	20	5.00	8	0.00	20	0.00
9	2.98	21	5.00	9	0.00	21	0.00
10	0.62	22	4.18	10	0.00	22	0.00
11	0.88	23	5.00	11	0.00	23	0.00
12	0.60	24	0.33	12	0.00	24	0.00

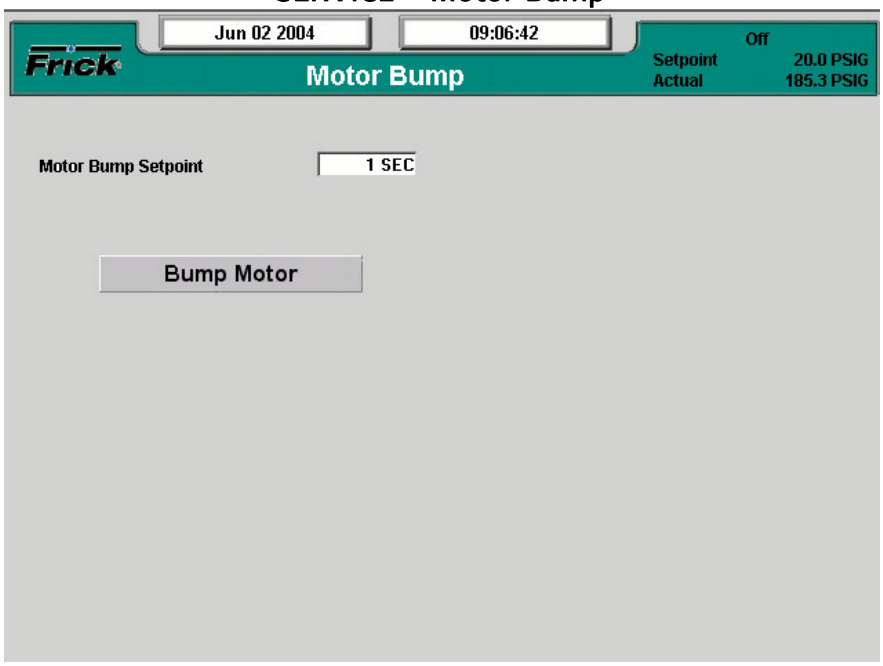
Analog Outputs (data units are Volts DC)

Board 1 Channels				Board 2 Channels			
1	0.00	5	1.00	1	1.00	5	0.00
2	0.00	6	1.00	2	0.00	6	0.00
3	1.22	7	0.00	3	1.00	7	0.00
4	0.00	8	0.00	4	0.00	8	0.00

ACCESSING: → Service... → Analog

DESCRIPTION: The Analog ***Service Screen*** has been provided to view the raw data from an Analog Board. Analog values are converted from binary to show volts. The error factor is +/- .05 volts.

SERVICE - Motor Bump



ACCESSING: → Service... → Motor Bump

DESCRIPTION: The ***Motor Bump*** screen has been provided as a way for the service technician to verify proper motor rotation.

The following setpoint box appears on this screen:

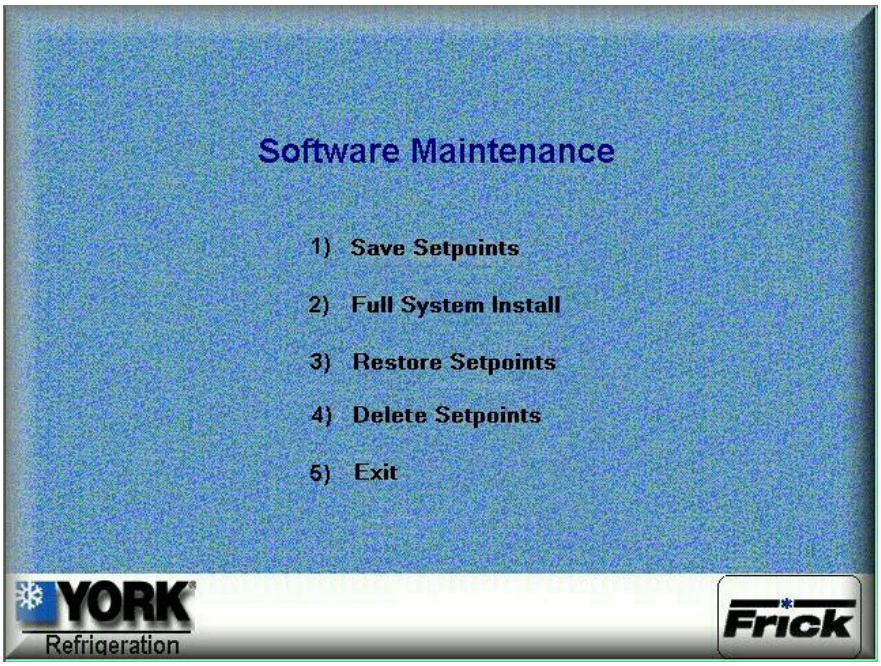
Motor Bump Setpoint - A value from 0 to 15 seconds may be entered here. This value is the amount of time that the compressor motor will be energized for once the Bump Motor toggle switch has been selected.

The following toggle switch has been provided:

Bump Motor - When this button has been highlighted, and the **[Enter]** key pressed, the compressor motor will be energized for the period of time as set in the *Motor Bump Setpoint* box. It is during this motor spin time, that the technician can view the motor shaft, for determining proper rotation. **NOTE: Use extreme care in performing this operation. The compressor shaft linkage must be disconnected from the motor prior to performing this test!**

For safety reasons, the **[Bump Motor]** toggle switch only appears in local mode (at the panel itself). It will not appear when viewing this panel remotely.

SERVICE – Software Maintenance



ACCESSING: → Service... → Software Maintenance

DESCRIPTION: The ***Software Maintenance*** screen has been provided as a way for the user to upload the operating software to their system, to save setpoints or to restore setpoints. **NOTE:** Before accessing this screen, it is recommended that a USB adapter, with a USB drive device (P/N 649A1063G01) be plugged into the PL8 USB port of the Quantum™.

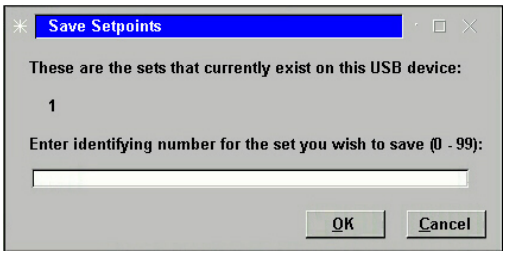
NOTE: This procedure covers updating *from version 6.07 or above*. Use caution when accessing this screen remotely with a web browser.

Perform the following steps to prepare the Quantum™ LX for software maintenance:

- Ensure that all setpoint values have been documented as a safety precaution. Install a USB device into the provide connection on the Quantum™.
- Stop the compressor.
- With power ON, insert the USB device into port PL8 USB. Ensure that the tabbed key of the drive connector is plugged in as shown in Figure 1 of this section.
- Go to User Level 2. The default password is 20.
- Press the **[Menu]** key.
- Cursor down to *Service...* and press the **[Enter]** key.
- Cursor down to *Software Maintenance* and press the **[Enter]** key.

The following selections have been provided:

1) **Save Setpoints** – Use this option to save all setpoints and custom text to a USB device as a form of backup:
   - Press **[1]** to *Save Setpoints*.
   - The software program will read the USB device, and the following dialog box will appear:



   - Any numerals that appear on the center line of this box will represent units that have already been saved (from 0 to 99). If no units have yet been saved, the center line will be blank.
   - Enter a number on the keypad that corresponds to the unit number that you wish to save, and then press **[Enter]**. If the unit number has not been saved before, the setpoints will be saved to a file on the USB

device (a progress bar will appear asking you to *Please Wait...* In the future, any time you try to write the setpoints to this number, you will be prompted with a message telling you that *the set number already exists – do you wish to overwrite it?* Answer by highlighting the *Yes* button, and pressing **[Enter]** if you do indeed wish to overwrite the values. If you enter a number that does not appear on the center line, no such warning will appear.

- After the file has been written or updated, the dialog boxes will disappear, and you can either exit, or continue with another function.

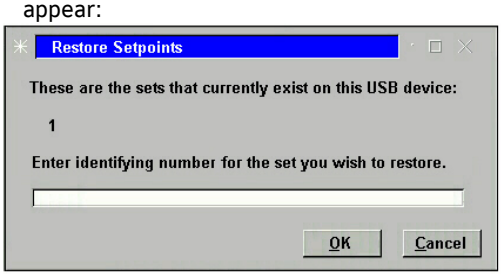
2) **Full System Install** - Use this option to install the program:

- Ensure that all setpoint values have been documented as a safety precaution.
- Press **[2]** to do a *Full System Install*.
- If a valid USB device with the operating system loaded on it is plugged in, the software will be loaded. If however, there is no USB device installed, or the device does not contain the operating software, the following dialog box will appear:

- If the above dialog box appears, you must insert a valid software upgrade USB device.

3) **Restore Setpoints** – Use this option to re-load previously saved setpoints and custom text to the Quantum™.

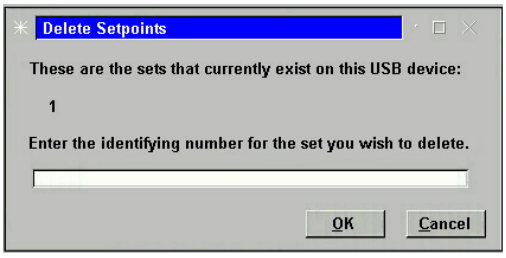
- Ensure that all setpoint values have been documented as a safety precaution. Install the previously saved setpoint USB device into the provided connection on the Quantum™.
- Press **[3]** to *Restore Setpoints*.
- The software program will read the USB device, and the following dialog box will appear:



- Any numerals that appear on the center line of this box will represent units that have already been saved (from 0 to 99). If no units have yet been saved, the center line will be blank and therefore there are no setpoints to restore.
- Enter a number on the keypad that corresponds to the unit number that you wish to restore, and then press **[Enter]**.
- A progress bar will appear asking you to *Please Wait...*
- After the file has been written or updated, the dialog boxes will disappear, and you can either exit, or continue with another function.

Delete Setpoints – Use this option to delete the setpoints and custom text for a particular unit:

- Ensure that all setpoint values have been documented as a safety precaution. Install the previously saved setpoints USB device into the provided connection on the Quantum™.
- Press the **[4]** button.
- The software program will read the USB device, and the following dialog box will appear:



- Any numerals that appear on the center line of this box will represent units that have already been saved (from 0 to 99). If no units have yet been saved, the center line will be blank, and therefore there are no setpoints to delete.
- Enter a number on the keypad that corresponds to the unit number that you wish to delete, highlight the *Ok* button, and then press **[Enter]**. You will be prompted with a new dialog box which will ask you *OK to delete set number (0-99)?*
- Highlight the *Yes* button, and press **[Enter]**. The dialog box will be updated with a new message stating that *Set number (0-99) has been deleted!*
- Press **[Enter]** to return to the Software Maintenance menu.

5) **Exit** - Use this selection to leave this screen:

- While leaving the USB device plugged in, press **[5]** to *Exit*.
- During the reboot of the Quantum™ LX, a message will appear that says, *"A System Update file has been detected on the mounted USB device. Do you wish to perform this update?"* Select **[Yes]**, and a System Update will be performed.
- At the conclusion of the System Update, a message will appear that says, *"The USB device can now be removed and power should be recycled."* Follow these instructions.

Setpoint Defaults When Performing A Quantum™ LX Software Upgrade

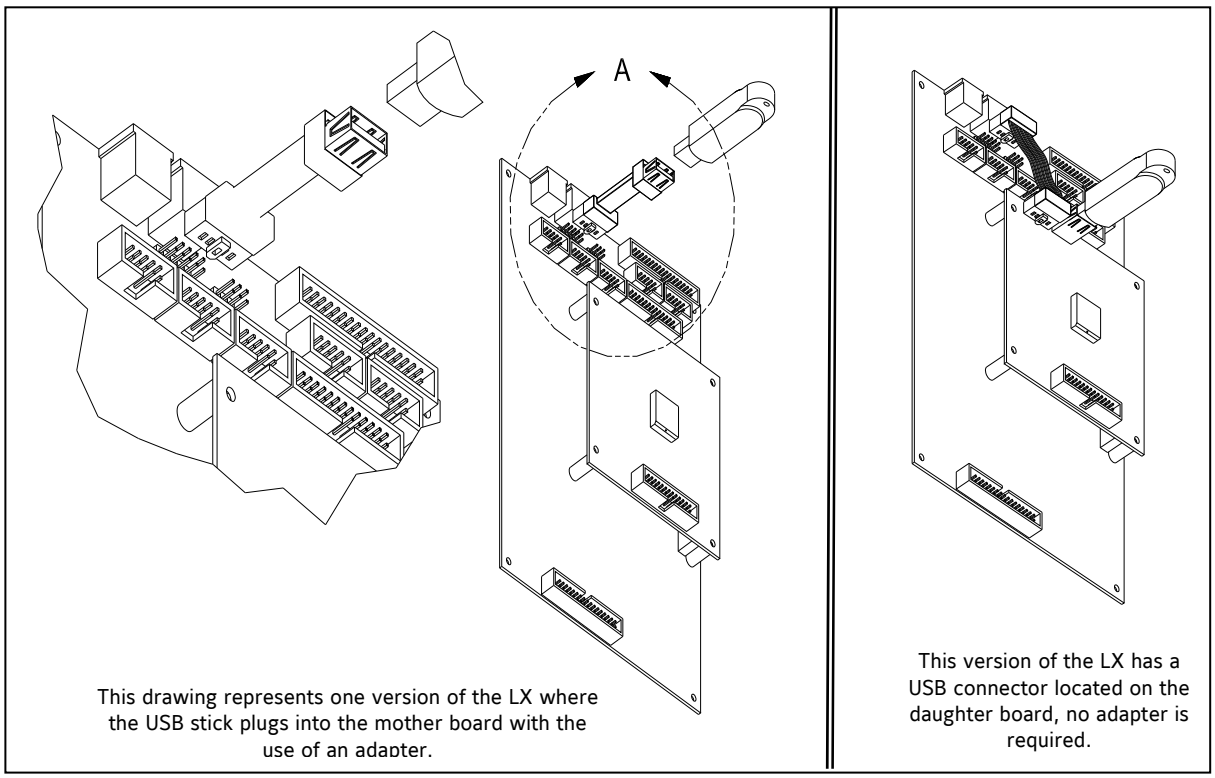
The term software upgrade refers to the whole procedure of Saving Setpoints, Full System Installs, and Restoring Setpoints when on the Software Maintenance screen. They get set to these default values even after a Restore Setpoints is performed, so the individual doing the upgrade must then set them manually to what they need to be if they are critical to the application.

To determine the setpoints and their defaults that would be affected by a revision upgrade, find the row or rows corresponding to the Software Version that you will be upgrading to. On that row or rows you can see the setpoints and their related defaults.

Here are some examples:

- If upgrading from 6.48 to 6.51, then both the *PowerPAC Flag* and the *Ethernet Process Enable* setpoints will be changed to the defaults shown for each.
- If upgrading from 6.48 to 6.52, then the *PowerPAC Flag*, *Ethernet Process Enable*, *Regulation Mode* and *Max Slide Valve timer* setpoints will be changed to the defaults shown for each.
- If upgrading from 6.51 to 6.55 (both shown on this chart), then the *PowerPAC Flag*, *Ethernet Process Enable* would have already been changed when you had initially upgraded to 6.51 and will not change again. But now that you are upgrading to 6.55, additionally the *Regulation Mode, Max Slide Valve timer, Compressor Type*, *Pump Type*, *Process Leaving Temp. Safeties*, *Compressor Types in the Sequencing Systems* and the *Compressor Start #'s in the Sequencing Systems* setpoints will be changed to the defaults shown for each.

The main message here is ensure that the Setpoint Data Sheets within this manual are filled out, and that when performing any software upgrade, first save your existing setpoints to a Setpoint Saver Card for later use. After completing an upgrade to one of the versions shown here, and then restoring your original setpoints, review this chart and compare the setpoints shown against what the program sees, and make changes to these defaults as necessary.



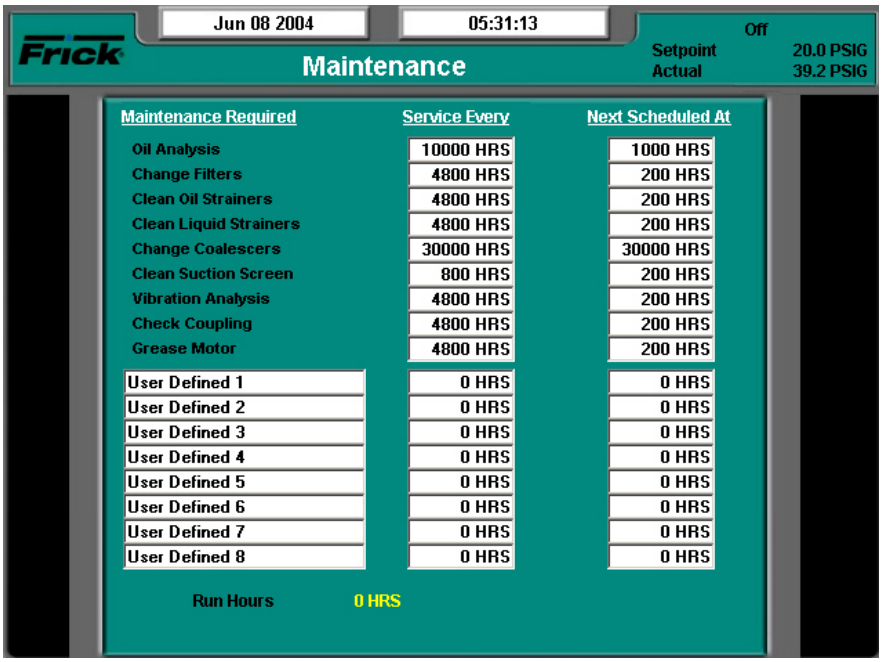
This drawing represents one version of the LX where the USB stick plugs into the mother board with the use of an adapter.

This version of the LX has a USB connector located on the daughter board, no adapter is required.

USB Memory Stick Plug-in locations

Setpoint Description	Default	Software Version
Ethernet Configuration		6.11
PowerPAC Flag	No	6.51
Ethernet Process Enable	Disabled	6.51
Regulation Mode	Mode 1	6.52
Max Slide Valve Timer	30 (tenths of secs)	6.52
Compressor Type	RWF	6.55
Pump Type	Demand	6.55
Process Leaving Temp. Safeties	Disabled	6.55
Compressor Types in the Sequencing Systems	RWF	6.55
Compressor Start #'s in the Sequencing Systems	1	6.55
Filter Differential Calculation	Filter – Oil	6.58
Allen Bradley Checksum Type for Comm 1, 2, & 3	BCC	6.58
Minimum Capacity Position setpoint		Only when versions 6.58-6.61 upgrading to 6.62 or 6.63
Pump Type	Demand	6.59
Added Kw (Kilowatt) capability to Trending list (Real Time & History Trending)	N/A	6.65
NOTE: The warnings below may appear after upgrading from version 6.53 or below. This is due to a sensor input out of range, usually because the input is not used. If this is the case, you can disable the input (if it is not used) to clear the warning.		
Low Rem Capacity Sensor Warning	Menu > Calibration > Motor Miscellaneous	
Low RPM Sensor Warning	Menu > Calibration > Motor Miscellaneous	
Low Manifold Pressure Sensor Warning	Menu > Calibration > Pressure	
Low Filter Pressure Sensor Warning	Menu > Calibration > Pressure	

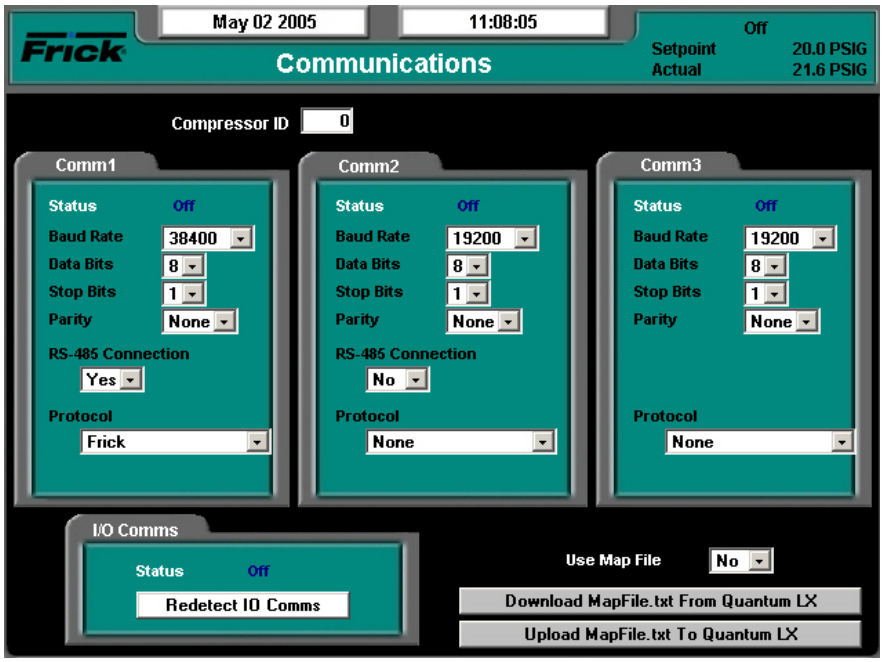
SYSTEM STATUS - Maintenance



ACCESSING: → System Status... → Maintenance

DESCRIPTION: This screen has been provided to aid the service technician with keeping track of system maintenance, and can be accessed from the ***System Status*** screen. From here, the service technician can view up to eight (8) user definable maintenance schedules. Each of the schedules may be custom named. This screen is based upon the Maintenance Schedule that is provided in the IOM manual for the specific compressor package. For additional information about this screen, refer to 090-022 O (Operation Manual).

CONFIGURATION - Communications



ACCESSING: → Configuration... → Communications

DESCRIPTION: The purpose of this screen being shown here is to indicate where the **[Redetect I/O Comms]** key is located. This selection provides a method to detect all connected Analog and Digital boards. For additional information about this screen, refer to 090-020 CS (Communications Manual).

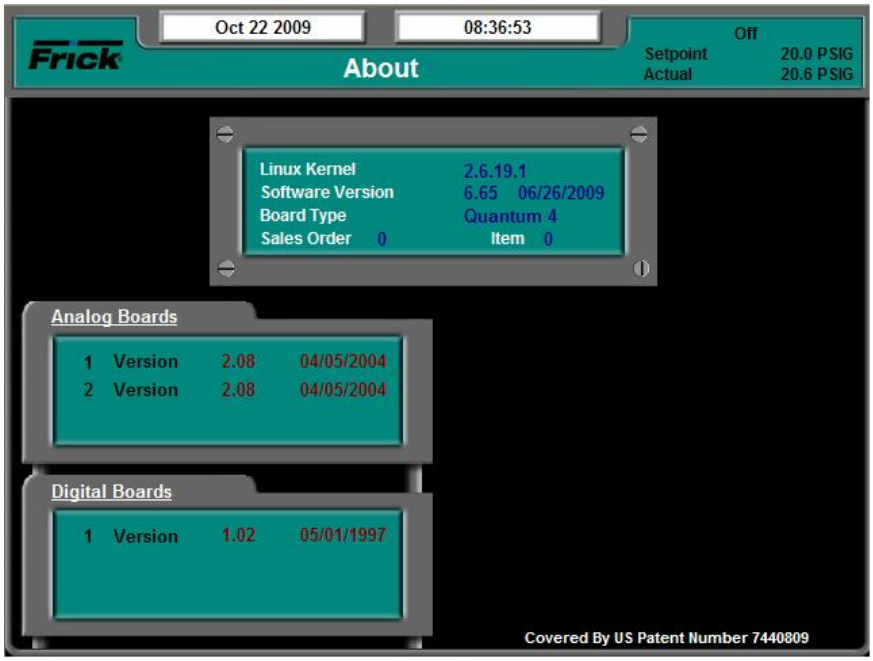
The following are some of the things that can occur that would cause an I/O board to stop communicating with the Quantum™, and would require that you **Redetect I/O Comms**:

- A board has been removed, and power was turned on with the board removed. You would need to replace the board, re-power, and then *Detect I/O Boards*.
- A board has failed in such a way that it cannot properly communicate with the Quantum™ LX.
- A failure with the communications cable which is plugged into the end of each board

If any of these things occur, a communications error shutdown will be issued until this key is selected. You should always view the ***About*** screen to see what has been detected.

MISCELLANEOUS SCREENS

About



ACCESSING: → About

DESCRIPTION: The ***About*** screen shows any 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 inputs will get set to their minimum value range on an Analog Board that has lost communications. A loss of communications to an analog board should result in sensor fault shutdown messages that are associated with the sensors on that board. 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.

TROUBLESHOOTING A PROBLEM THAT APPEARS UNEXPLAINABLE

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

1. Is the panel powered by an isolating power source such as a control transformer in the starter panel?
2. Verify that the panel is not powered from a lighting or utility panel.
3. It is important to know if the unit ever worked properly.
4. 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?
   - Does the conduit with the Slide Valve or Slide Stop contain liquid?
   - Does the Slide Stop potentiometer cover contain any liquid?
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 its 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.
   - Check that you are using the Frick recommended communications cable.
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, sensor or communications wiring?
11. 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.
12. Check that the motor is grounded to the starter panel. There are usually four wires: 3 for the phases and 1 for ground.
13. 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.
14. 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.
15. 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 insulated at the temperature probe and grounded at the panel end.
16. 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 a DVM and check each white wire to machine ground and each black wire to machine ground.
17. 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. Most of the larger factory installed inductive loads should have surge suppressors as well.
18. 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.
19. 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 the three-phase bus with the secondary properly grounded.

TROUBLESHOOTING CHART FOR FRICK® QUANTUM™ LX 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 the display connector is firmly seated. This is a delicate connection and care should be used to reconnect it. Confirm that the connectors at both ends of the backlight inverter are properly connected. Confirm that the display harness is connected properly on the main board. Check the display with a flashlight. If characters are visible, the display is good, but the backlight tube is not on.
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 starter. If all of this is OK, then check the ***Service Screen*** to see if channel 3 is ON. 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). Check the voltage between positions 4 and 6 of the P1 DIO connector. If the LED is ON, check channel 4 on the DIO of Digital Board 1, at the ***Service Screen***.
OIL PUMP IS RUNNING BUT THE COMPRESSOR DOES NOT START	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).

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
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). Check the voltage between positions 2 and 4 of the P1 DIO connector.
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, and that the Oil Level input is made. 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.

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
SLIDE VALVE DOES NOT LOAD and/or UNLOAD*	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.**
SLIDE STOP DOES NOT INCREASE and/or DECREASE*	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 Discharge temperature equals or exceeds the “Discharge 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.

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
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 will be on based on the Economizer On/Off setpoint.**
ALARM CIRCUIT DOES NOT ENERGIZE	Output 22 (MOD 22) controls the Alarm Circuit. The Alarm should turn on only when there is a warning or shutdown. If the Alarm does not occur when these conditions are found and the LED (D22) for Output 22 (MOD 22) is off, 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.
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 I/O.** 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.

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
PRESSURES ON THE OPERATING SCREEN DO NOT APPEAR CORRECT	1st – Check the range and sensor type in the setup of the panel. If this is correct: 2nd – Open transducers that can be isolated from the system and opened to atmosphere, these would be Suction, Oil and Filter (if present). Set these transducers to 0g pressure or atmospheric pressure if your readings are in absolute. Close the transducers from atmosphere and reopen to the system/package. After these pressures have settled down, set the Discharge to match the Oil pressure. **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 Level 1 ***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 Level 1 ***Operating Status*** screen. If the problem persists, see the Troubleshooting section COMPRESSOR DOES NOT LOAD and/or UNLOAD.

* If applicable

COMPRESSOR MODEL DIFFERENCES

FRICK®	RWB, SC	RXB*	RXF	RDB 3-Step	RDB 4-Step	Other
GRAM	GSV, YLC	GST*		GSB 3-Step		
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

SETPOINT DATA SHEETS

Quantum™ LX Version 6.8x (11/04/2010)

In most cases, updating software on the Quantum™ LX 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 upgrades. The setpoint data sheets are useful for recording this information.

The sheets that appear on the following pages are in the order that they are accessed from the Quantum™ LX Menu.

OPERATING VALUES – Used Defined

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description	Value	Default	User Defined Selections
Status 1		Capacity Slide Position	Capacity Slide Position Volume Slide Position Suction Pressure Discharge Pressure Compressor Oil Pressure Main Oil Injection Pressure Economizer Pressure Filter Pressure Intermediate Pressure Balance Piston Pressure System Discharge Pressure Suction Temperature Discharge Temperature Compressor Oil Temperature Oil Separator Temperature Process/Brine Temperature Leaving Process/Brine Temperature Entering Motor Current RPM Auxiliary Analog 1-10 EZ Cool Feedback % Auxiliary Analog 12-20 Manifold Pressure Compressor Vibration – Suction Compressor Vibration – Discharge Motor Vibration – Shaft Side Motor Vibration – Opposite Shaft Side Motor Temp. – Shaft Side Motor Temp. – Opposite Shaft Side Motor Stator # 1-3 None
Status 2		Capacity Slide Position	
Status 3		Capacity Slide Position	
Status 4		Capacity Slide Position	
Status 5		Capacity Slide Position	
Status 6		Capacity Slide Position	
Status 7		Capacity Slide Position	
Status 8		Capacity Slide Position	
Status 9		Enable User Defined Status 9	
Status 10		Enable User Defined Status 10	
Status 11		Enable User Defined Status 11	
Status 12		Enable User Defined Status 12	
Status 13		Enable User Defined Status 13	
Status 14		Enable User Defined Status 14	
Status 15		Enable User Defined Status 15	
Status 16		Enable User Defined Status 16	
Status 17		Enable User Defined Status 17	
Status 18		Enable User Defined Status 18	
Status 19		Enable User Defined Status 19	
Status 20		Enable User Defined Status 20	

MODE SETUP

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description	Value	Default	Mode Selections
Compressor		Manual	Manual Automatic Remote Comm Remote I/O Remote Seq Man. Browser
Capacity		Manual	Manual Automatic Remote Comm Remote I/O Remote 4-20 Remote Seq Man. Browser
Volume		Manual	Manual Automatic
Active Mode		Mode 1	Mode 1 Mode 2 Mode 3 Mode 4
Pump *(only appears if a Pump type has been selected in Configuration)*		Automatic	Manual Automatic

SYSTEM STATUS – Trending Setup

Control	Description	Value	Default	Trending Selections / Ranges
Real Time	Channel 1		Suction Pressure	Capacity Slide Position Volume Slide Position Suction Pressure Discharge Pressure Compressor Oil Pressure Main Oil Injection Pressure Economizer Pressure Filter Pressure Intermediate Pressure Balance Piston Pressure System Discharge Pressure Suction Temperature Discharge Temperature Compressor Oil Temperature Oil Separator Temperature Process/Brine Temperature Leaving Process/Brine Temperature Entering Motor Current RPM Auxiliary Analog 1-10 EZ Cool Feedback % Auxiliary Analog 12-20 Manifold Pressure Compressor Vibration – Suction Compressor Vibration – Discharge Motor Vibration – Shaft Side Motor Vibration – Opposite Shaft Side Motor Temp. – Shaft Side Motor Temp. – Opposite Shaft Side Motor Stator # 1-3 None
	Channel 2		Discharge Pressure	
	Channel 3		Motor Current	
	Channel 4		Enable Real Time Trend Channel 4	
	Channel 5		Enable Real Time Trend Channel 5	
	Channel 6		Enable Real Time Trend Channel 6	
	Channel 7		Enable Real Time Trend Channel 7	
	Channel 8		Enable Real Time Trend Channel 8	
	Recording		10	1.0 to 86400.0 SEC
	Disable Real Time Trending		No	No Yes
History	Channel 1		Suction Pressure	Capacity Slide Position Volume Slide Position Suction Pressure Discharge Pressure Compressor Oil Pressure Main Oil Injection Pressure Economizer Pressure Filter Pressure Intermediate Pressure Balance Piston Pressure System Discharge Pressure Suction Temperature Discharge Temperature Compressor Oil Temperature Oil Separator Temperature Process/Brine Temperature Leaving Process/Brine Temperature Entering Motor Current RPM Auxiliary Analog 1-10 EZ Cool Feedback % Auxiliary Analog 12-20 Manifold Pressure Compressor Vibration – Suction Compressor Vibration – Discharge Motor Vibration – Shaft Side Motor Vibration – Opposite Shaft Side Motor Temp. – Shaft Side Motor Temp. – Opposite Shaft Side Motor Stator # 1-3 None
	Channel 2		Discharge Pressure	
	Channel 3		Motor Current	
	Channel 4		Enable History Trend Channel 4	
	Channel 5		Enable History Trend Channel 5	
	Channel 6		Enable History Trend Channel 6	
	Channel 7		Enable History Trend Channel 7	
	Channel 8		Enable History Trend Channel 8	
	Recording		1	1.0 to 86400.0 MIN
	Disable History Trending		No	No Yes

SYSTEM STATUS – Maintenance

Maintenance Required	Service Every		Next Scheduled At		Range	Units
	Default	User	Default	User		
Oil Analysis	10000		1000		0.0 to 100000.0	HRS
Change Filter	4800		200		0.0 to 100000.0	HRS
Clean Oil Strainers	4800		200		0.0 to 100000.0	HRS
Clean Liquid Strainers	4800		200		0.0 to 100000.0	HRS
Change Coalescers	30000		30000		0.0 to 100000.0	HRS
Clean Suction Screen	800		200		0.0 to 100000.0	HRS
Vibration Analysis	4800		200		0.0 to 100000.0	HRS
Check Coupling	4800		200		0.0 to 100000.0	HRS
Grease Motor	1200		200		0.0 to 100000.0	HRS
User Defined 1	0		0		0.0 to 100000.0	HRS
User Defined 2	0		0		0.0 to 100000.0	HRS
User Defined 3	0		0		0.0 to 100000.0	HRS
User Defined 4	0		0		0.0 to 100000.0	HRS
User Defined 5	0		0		0.0 to 100000.0	HRS
User Defined 6	0		0		0.0 to 100000.0	HRS
User Defined 7	0		0		0.0 to 100000.0	HRS
User Defined 8	0		0		0.0 to 100000.0	HRS

SETPOINTS - Capacity Control Setpoints (Mode 1)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description			Value	Default	Range	Units	
SUCTION PRESSURE MODE	Capacity Control	Setpoint			20.0	0.0 to 185.3	Pressure	PSIG
		Proportional Band	High		15.0	0.0 to 100.0	Pressure (Magnitude)	PSIG
			Low					
		Dead Band	High		0.5	0.0 to 10.0		
			Low					
		Cycle Time	High		3	0.0 to 60.0	Time	SEC
			Low					
		VFD Prop. Band	High		15.0	0.0 to 100.0	Pressure	PSIG
			Low		15.0	0.0 to 100.0		
		VFD Integ. Time	High		30	0.0 to 999.0	Time	SEC
			Low		30	0.0 to 999.0		
	Autocycle	Start	Pressure		25.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
		Stop	Pressure		15.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
	Mode Safeties	Load Inhibit			10.0	0.0 to 185.3	Pressure	PSIG
		Force Unload			5.0			
		Warning	Setpoint		2.0			
			Delay		2	0.0 to 60.0	Time	SEC
		Shutdown	Setpoint		0.0	0.0 to 185.3	Pressure	PSIG
			Delay		3	0.0 to 60.0	Time	SEC
ALL OTHER MODES	Capacity Control	Setpoint						
		Proportional Band	High					
			Low					
		Dead Band	High					
			Low					
		Cycle Time	High					
			Low					
	Autocycle	Start	Temp.					
			Delay					
		Stop	Temp.					
			Delay					
	Mode Safeties	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					
	Low Suction	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					

SETPOINTS - Capacity Control Setpoints (Mode 2)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description			Value	Default	Range	Units	
SUCTION PRESSURE MODE	Capacity Control	Setpoint			20.0	0.0 to 185.3	Pressure	PSIG
		Proportional Band	High		15.0	0.0 to 100.0	Pressure (Magnitude)	PSIG
			Low					
		Dead Band	High		0.5	0.0 to 10.0		
			Low					
		Cycle Time	High		3	0.0 to 60.0	Time	SEC
			Low					
		VFD Prop. Band	High		15.0	0.0 to 100.0	Pressure	PSIG
			Low		15.0	0.0 to 100.0		
		VFD Integ. Time	High		30	0.0 to 999.0	Time	SEC
			Low		30	0.0 to 999.0		
	Autocycle	Start	Pressure		25.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
		Stop	Pressure		15.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
	Mode Safeties	Load Inhibit			10.0	0.0 to 185.3	Pressure	PSIG
		Force Unload			5.0			
		Warning	Setpoint		2.0			
			Delay		2	0.0 to 60.0	Time	SEC
		Shutdown	Setpoint		0.0	0.0 to 185.3	Pressure	PSIG
			Delay		3	0.0 to 60.0	Time	SEC
ALL OTHER MODES	Capacity Control	Setpoint						
		Proportional Band	High					
			Low					
		Dead Band	High					
			Low					
		Cycle Time	High					
			Low					
	Autocycle	Start	Temp.					
			Delay					
		Stop	Temp.					
			Delay					
	Mode Safeties	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					
	Low Suction	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					

SETPOINTS – Capacity Control Setpoints (Mode 3)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description			Value	Default	Range	Units	
SUCTION PRESSURE MODE	Capacity Control	Setpoint			20.0	0.0 to 185.3	Pressure	PSIG
		Proportional Band	High		15.0	0.0 to 100.0	Pressure (Magnitude)	PSIG
			Low					
		Dead Band	High		0.5	0.0 to 10.0		
			Low					
		Cycle Time	High		3	0.0 to 60.0	Time	SEC
			Low					
		VFD Prop. Band	High		15.0	0.0 to 100.0	Pressure	PSIG
			Low		15.0	0.0 to 100.0		
		VFD Integ. Time	High		30	0.0 to 999.0	Time	SEC
			Low		30	0.0 to 999.0		
	Autocycle	Start	Pressure		25.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
		Stop	Pressure		15.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
	Mode Safeties	Load Inhibit			10.0	0.0 to 185.3	Pressure	PSIG
		Force Unload			5.0			
		Warning	Setpoint		2.0			
			Delay		2	0.0 to 60.0	Time	SEC
		Shutdown	Setpoint		0.0	0.0 to 185.3	Pressure	PSIG
			Delay		3	0.0 to 60.0	Time	SEC
ALL OTHER MODES	Capacity Control	Setpoint						
		Proportional Band	High					
			Low					
		Dead Band	High					
			Low					
		Cycle Time	High					
			Low					
	Autocycle	Start	Temp.					
			Delay					
		Stop	Temp.					
			Delay					
	Mode Safeties	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					
	Low Suction	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					

SETPOINTS - Capacity Control Setpoints (Mode 4)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description			Value	Default	Range	Units	
SUCTION PRESSURE MODE	Capacity Control	Setpoint			20.0	0.0 to 185.3	Pressure	PSIG
		Proportional Band	High		15.0	0.0 to 100.0	Pressure (Magnitude)	PSIG
			Low					
		Dead Band	High		0.5	0.0 to 10.0		
			Low					
		Cycle Time	High		3	0.0 to 60.0	Time	SEC
			Low					
		VFD Prop. Band	High		15.0	0.0 to 100.0	Pressure	PSIG
			Low		15.0	0.0 to 100.0		
		VFD Integ. Time	High		30	0.0 to 999.0	Time	SEC
			Low		30	0.0 to 999.0		
	Autocycle	Start	Pressure		25.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
		Stop	Pressure		15.0	0.0 to 185.3	Pressure	PSIG
			Delay		1	0.0 to 60	Time	MIN
	Mode Safeties	Load Inhibit			10.0	0.0 to 185.3	Pressure	PSIG
		Force Unload			5.0			
		Warning	Setpoint		2.0			
			Delay		2	0.0 to 60.0	Time	SEC
		Shutdown	Setpoint		0.0	0.0 to 185.3	Pressure	PSIG
			Delay		3	0.0 to 60.0	Time	SEC
ALL OTHER MODES	Capacity Control	Setpoint						
		Proportional Band	High					
			Low					
		Dead Band	High					
			Low					
		Cycle Time	High					
			Low					
	Autocycle	Start	Temp.					
			Delay					
		Stop	Temp.					
			Delay					
	Mode Safeties	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					
	Low Suction	Load Inhibit						
		Force Unload						
		Warning	Setpoint					
			Delay					
		Shutdown	Setpoint					
			Delay					

SETPOINTS – Sequencing (System 1 Setup)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units	
System 1 Setup	Sequencing		Disabled	Disabled / Enabled	None	
	Setpoint		32.0	-508.0 to 772.0	Temp.	F
	Minimum Run Time		20	0.0 to 300.0	Time	MIN
	High Stage System Link		None	None / System 2 / System 3	None	
1	Sequencing ID		0	0.0 to 255.0	None	
	Start #		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
2	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
3	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
4	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
5	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
6	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
7	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
8	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		

SETPOINTS – Sequencing (System 2 Setup)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units	
System 2 Setup	Sequencing		Disabled	Disabled / Enabled	None	
	Setpoint		32.0	-508.0 to 772.0	Temp.	F
	Minimum Run Time		20	0.0 to 300.0	Time	MIN
	High Stage System Link		None	None / System 1 / System 3	None	
1	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
2	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
3	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
4	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
5	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
6	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
7	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
8	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		

SETPOINTS – Sequencing (System 3 Setup)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units	
System 3 Setup	Sequencing		Disabled	Disabled / Enabled	None	
	Setpoint		32.0	-508.0 to 772.0	Temp.	F
	Minimum Run Time		20	0.0 to 300.0	Time	MIN
	High Stage System Link		None	None / System 2 / System 2	None	
1	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
2	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
3	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
4	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
5	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
6	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
7	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		
8	Sequencing ID		0	0.0 to 255.0	None	
	Start		1	0.0 to 8.0		
	Compressor Mode		Manual	None		
	Capacity Mode		Manual	0 to 100	Percent	%
	Minimum Capacity		0.0	0.0 to 100.0		

SETPOINTS - Sequencing Control

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description	Value	Default	Range	Units	
Average Capacity For Start		90.0	0.0 to 100.0	Percent	%
Full Load Capacity Position		98.0	0.0 to 100.0		
Minimum Capacity Dead Band		1.0	0.0 to 20.0		
Start Failure Reset Delay		12.0	0.0 to 600.0	Time	MIN
Slide Valve Failure Safety		Disabled	Disabled	None	
			Enabled		

SETPOINTS - Compressor Safeties Setpoints

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description			Value	Default	Range	Units	
High Discharge Temperature	Load Inhibit				212.0	32.0 to 250.0	Temperature	F
	Force Unload							
	Warning	Setpoint			205.0			
		Delay			5	0. to 60.0	Time	SEC
	Shutdown	Setpoint			212.0	32.0 to 250.0	Temperature	F
		Delay			5	0.0 to 60.0	Time	SEC
Misc.	Starting Diff. Press. Below				50.0	0.0 to 380.0	Pressure	PSIG
	Dual Mode	Enabled/Disabled			Disabled	None	None	
High Discharge Pressure	Load Inhibit	Modes 1 & 3			190.0	0.0 to 270.0	Pressure	PSIG
		Modes 2 & 4			190.0			
	Force Unload	Modes 1 & 3			200.0			
		Modes 2 & 4			200.0			
	Warning	Modes 1 & 3			220.0			
		Delay			2	0.0 to 5.0	Time	SEC
		Modes 2 & 4			220.0	0.0 to 270.0	Pressure	PSIG
		Delay			2	0.0 to 5.0	Time	SEC
	Shutdown	Modes 1 & 3			270.0	0.0 to 270.0	Pressure	PSIG
		Delay			2	0.0 to 5.0	Time	SEC
		Modes 2 & 4			225.0	0.0 to 270.0	Pressure	PSIG
		Delay			2	0.0 to 5.0	Time	SEC
Misc.	Max. Discharge Pressure				270.0	0.0 to 380.0	Pressure	PSIG
	Highest Cap. To Permit Starting				10	0.0 to 100.0	Percent	%
	Starting Period Before Permitting Cap. Increase				0	0.0 to 999.0	Time	SEC
	Stopping Period for Capacity Unload				30	0.0 to 300.0		
	Compressor Automatic Mode Min. Capacity				10	0.0 to 100.0	Percent	%
	Capacity Unload Assist				Disabled	None	None	
	Separator Velocity Reference				0.00	0.0 to 100.0		
	Compression Ratio				4.00	1.0 to 30.0		
	Liquid Slugging	Warning			10.0	0.0 to 90.0	Temperature	F
		Shutdown			20.0			
High Suction Pressure	Load Inhibit				105.3	0.0 to 200.0	Pressure	PSIG
	Force Unload				115.3			
	Warning	Setpoint			125.3			
		Delay			2	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint			135.3	0.0 to 200.0	Pressure	PSIG
		Delay			2	0.0 to 60.0	Time	SEC
Economizer	Enabled / Disabled				Disabled	None	None	
	On when above				90.0	0.0 to 100.0	Percent	%
	Off when below				85.0			
	Override: Discharge Press. < (suction x 1.6^k)				15.0	0.0 to 100.0	Pressure	PSIG
	Port Value				1.60	0.0 to 5.0	None	
	Pressure Input				Disabled	None		
	Fixed Pressure Setpoint				12.2 Hg	0.0 to 185.3	Pressure (Positive)	PSIG
Balance Piston	Enabled / Disabled				Disabled	None	None	
	On				90	0.0 to 100.0	Percent	%
	Off				85			
	Ignore Delay				5	0.0 to 60.0	Time	MIN
	Fail Delay				2			
Misc.	Oil Log	Enabled / Disabled			Disabled	None	None	
		Delay			30	0.0 to 300.0	Time	SEC
	Main Oil Injection	On When Discharge Temp.	Is Above		150.0	32.0 to 212.0	Temperature	F
			For		5	0.0 to 300.0	Time	SEC

SETPOINTS - Package Safeties

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Low Oil Separator Temperature	Warning	Setpoint		55.0	49.0 to 100.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint		49.0	49.0 to 100.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
Low Comp. Oil Temperature	Warning	Setpoint		55.0	49.0 to 100.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint		49.0	49.0 to 100.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
High Comp. Oil Temperature	Warning	Setpoint		158.0	100.0 to 230.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint		167.0	100.0 to 230.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
Low Comp. Oil Pressure	Warning	Setpoint		25.0	0.0 to 45.0	Pressure	PSIG
		Delay		600	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint		30.0	0.0 to 45.0	Pressure	PSIG
		Delay		900	0.0 to 60.0	Time	SEC
High Filter Pressure	Warning	Setpoint		25.0	0.0 to 344.8	Pressure (Differential)	PSIG
		Delay		10	0.0 to 60.0	Time	MIN
	Shutdown	Setpoint		30.0	0.0 to 344.8	Pressure (Differential)	PSIG
		Delay		15	0.0 to 60.0	Time	MIN
Main Oil Injection	Enabled / Disabled			Disabled	None		
	Shutdown	Setpoint		15.0	5.0 to 50.0	Pressure	PSIG
		Delay		180	0.0 to 999.0	Time	SEC
Misc.	Oil Heater Off Above			120.0	100.0 to 150.0	Temperature	F
	High Level Shutdown Delay			5	0.0 to 60.0	Time	SEC
	Low Oil Level Delay			30	0.0 to 30.0		
	Oil Pump Lube Time Before Starting			0	0.0 to 60.0		
	Dual Pump Transition Time			10			
Pull Down	Enabled / Disabled			Disabled	None		
	Capacity Position			5.0	0.0 to 100.0	Percent	%
	Amount of Time			60	0.0 to 900.0	Time	SEC
Pump Down	Enabled / Disabled			Disabled	None	None	
	On When Suction Above	Setpoint		0.3	0.0 to 200.0	Pressure	PSIG
		Delay		5	0.0 to 60.0	Time	MIN
DX Circuit	#1 Action			Disabled	None		
	#2 Action						
	DX Circuit 1	Off When Below		85.0	0.0 to 100.0	Percent	%
		On When Above		90.0	0.0 to 100.0		
	DX Circuit 2	Off When Below		85.0	0.0 to 100.0		
		On When Above		90.0	0.0 to 100.0		
Liquid Injection	Enabled / Disabled			Disabled	None		
	On When Above	Setpoint		122.0	100.0 to 180.0	Temperature	F
		Delay		5	0.0 to 60.0	Time	SEC
	Dual Port Transition			4.2	0.0 to 5.0	None	
Misc.	Hot Gas Bypass			0.0	0.0 to 100.0	Percent	%
	Power Assist			30	0.0 to 60.0	Time	SEC

SETPOINTS – Motor (Engine/DBS/Motor/Turbine/Vyper)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Name Plate	Motor Amps			100.0	0.0 to 3000.0	Current	AMPS
	Volts			480.0	0.0 to 9999.0	None	
	Service Factor			1.15	0.0 to 2.0		
	Horse Power			100.0	0.0 to 3000.0		
	CT Factor						
	Recycle Delay			20	20.0 to 255.0	Time	MIN
High Motor Amps	Load Inhibit			100.0	0.0 to 3000.0	Current	AMPS
	Force Unload			105.0			
	Warning	Setpoint		110.0			
		Delay		5	0.0 to 60.0	Time	SEC
	Shutdown	Setpoint		115.0	0.0 to 3000.0	Current	AMPS
		Delay		5	0.0 to 60.0	Time	SEC
Low Motor Amps	Shutdown	Setpoint		25.0	0.0 to 750.0	Current	AMPS
		Delay		30	0.0 to 60.0	Time	SEC
	Confirmed Running Motor Amps			20.0	0.0 to 750.0	Current	AMPS
	Starting Motor Amps Ignore Period			5	0.0 to 30.0	Time	SEC
	Read Motor Amps From			DBS	DBS or CT	None	
Motor Starter (See DBS Manual)	Locked Rotor Current			*	300.0 to 600.0	Percent	%
	Stall Time			*	1.0 to 60.0	Time	SEC
	Jam Current Level			*	100.0 to 600.0	Percent	%
	Jam Run Delay			*	0.0 to 60.0	Time	SEC
	Service Factor			*	75.0 to 125.0	Percent	%
	Current Unbalance	Warning Level		*	2.0 to 25.0		
		Warning Delay		*	0.0 to 240.0	Time	SEC
	RTD Temp.	Warning Level		*	32.0 to 500.0	Temperature	F
		Trip Level					

***** These values are returned from the DBS unit via communications

This Setpoint table continues on the next page.

SETPOINTS – Motor (Engine/DBS/Motor/Turbine/Vyper)

-CONTINUED –

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description				Value	Default	Range	Units	
Engine / Turbine	Confirmed Running				450.0	0.0 to 750.0	RPM	RPM
	Starting Maximum Delay				5	0.0 to 60.0	Time	MIN
	Idle Speed				0.0	0.0 to 100.0	Percent	%
	Cool Down Period Before Stopping				0	0.0 to 999.0	Time	SEC
	High RPM	Warning	Setpoint		1900	0.0 to 4000	RPM	RPM
			Delay		1	0.0 to 5.0	Time	SEC
		Shutdown	Setpoint		2000	0.0 to 4000.0	RPM	RPM
			Delay		1	0.0 to 5.0	Time	SEC
	Low RPM	Load Inhibit			1100	0.0 to 3000.0	Speed	RPM
		Force Unload			1075			
		Warning	Setpoint		700			
			Delay		30	0.0 to 180.0	Time	SEC
		Shutdown	Setpoint		600	0.0 to 3000	Speed	RPM
			Delay		30	0.0 to 180.0	Time	SEC
Engine	High Manifold Pressure	Load Inhibit			5.9 Hg	0.0 to 31.0	Pressure	PSIG
		Force Unload			5.1 Hg			
		Warning	Setpoint		4.1 Hg			
			Delay		3	0.0 to 6.0	Time	SEC
		Shutdown	Setpoint		3.1 Hg	0.0 to 45.7	Pressure	PSIG
			Delay		3	0.0 to 60.0	Time	SEC
Engine / Turbine / VFD / Vyper	Drive Output		Maximum		100.0	0.0 to 100.0	Percent	%
			Minimum		50.0			
	Rate of Increase		Setpoint		2.0	0.1 to 25.0		
			Delay		1.0	0.0 to 30.0	Time	SEC
	Rate of Decrease		Setpoint		2.0	0.1 to 25.0	Percent	%
			Delay		1.0	0.0 to 30.0	Time	SEC
	When the S.V. loads to				95.0	0.0 to 100.0	Percent	%
	The Drive Speed will reach				50.0			
	Variable Speed Minimum S.V. Position				25.0			
Skip Frequency Bands	Bottom				0.0	0.0 to 100.0	Percent	%
	Top							
	Bottom							
	Top							
	Bottom							
	Top							
	Bottom							
	Top							
	Bottom							
	Top							

SETPOINTS - Capacity Position

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description	Value	Default	Range	Units
Maximum Capacity Position		100.0	0.0 to 100.0	None
Minimum Capacity Position		0.0		

SETPOINTS - Condenser Digital Control

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Condenser Digital Control Setpoints	Condenser Control Setpoint			30 Hg	0.0 to 485.3	Pressure	
	Module A			0	0 to 4	None	
	Module B						
	Module C						
	Module D						
	Step Up	Deadband		0.0	0.0 to 20.0	Pressure (Magnitude)	PSIG
		Delay		0	0.0 to 60.0	Time	SEC
	Step Down	Deadband		0.0	0.0 to 20.0	Pressure (Magnitude)	PSIG
		Delay		0	0.0 to 60.0	Time	SEC
	High Pressure	Override		200.0	0 to 1000.0	Pressure	PSIG
		Delay		0	0.0 to 60.0	Time	SEC

SETPOINTS - Condenser Analog Control

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units	
Condenser Analog Control Setpoints	Condenser Control Setpoint		30.0 Hg	0.0 to 485.3	Pressure	PSIG
	Analog Output A		Disabled	Disabled or Enabled	None	
	Analog Output B		Disabled	Disabled or Enabled		
	Proportional Band		5.0	0.0 to 100.0	Pressure	PSIG
	Integration Time		30	0.0 to 999.0	Time	SEC
	High Limit		100.0	0.0 to 100.0	Percent	%
	Low Limit		40.0	0.0 to 100.0	Percent	%

SETPOINTS - Miscellaneous

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description		Value	Default	Range	Units	
Remote Capacity Deadband			1.0	0.5 to 20.0	Percent	%
High Comp. Oil Pressure	Enabled / Disabled		Disabled	None	None	
	Shutdown		50.0	0.0 to 500.0	Pressure	PSIG
	Delay		5	0.0 to 60.0	Time	SEC
Max. Slide Valve Timer			30	0.0 to 600.0	Time	SEC
Dewpoint Temp. Warning - Running	Enabled / Disabled		Disabled	None	None	
	Safety Factor		20.0	20.0 to 100.0	Temperature	F
	Delay		5	0.0 to 99.0	Time	MIN
Dewpoint Temp. Warning - Off	Enabled / Disabled		Disabled	None	None	
	Safety Factor		2.0	0.0 to 100.0	Temperature	F
	Delay		5	0.0 to 99.0	Time	MIN
	Heater Control Safety Factor		5.0	0.0 to 100.0	Temperature	F
Maximum Discharge Pressure			270.0	0.0 to 365.3	Pressure	PSIG
Maximum Discharge and Oil. Temp.			250.0	100.0 to 300.0	Temperature	F

SETPOINTS - Scheduling

Control	Hour (0-11)	Min (0-59)	Mode (1-4)	Hour (0-11)	Min (0-59)	Mode (1-4)	Hour (0-11)	Min (0-59)	Mode (1-4)	Hour (0-11)	Min (0-59)	Mode (1-4)
Sunday												
Monday												
Tuesday												
Wednesday												
Thursday												
Friday												
Saturday												
Sunday												

SETPOINTS – PHD Monitoring

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description			Value	Default	Range	Units	
Compressor Bearing	Enabled / Disabled			Disabled	None	None	
	Suction End	High Warning		3.5	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Warning Delay		99	0.0 to 999.0	Time	SEC
		High Shutdown		10.0	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Shutdown Delay		1	0.0 to 999.0	Time	SEC
	Discharge End	High Warning		3.5	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Warning Delay		99	0.0 to 999.0	Time	SEC
		High Shutdown		10.0	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Shutdown Delay		1	0.0 to 999.0	Time	SEC
Motor Bearing	Enabled / Disabled			Disabled	None	None	
	Shaft Side	High Warning		3.5	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Warning Delay		99	0.0 to 999.0	Time	SEC
		High Shutdown		10.0	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Shutdown Delay		1	0.0 to 999.0	Time	SEC
	Opposite Shaft	High Warning		3.5	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Warning Delay		99	0.0 to 999.0	Time	SEC
		High Shutdown		10.0	0.0 to 30.0	(See Manual 070-020 TB)	gF
		High Shutdown Delay		1	0.0 to 999.0	Time	SEC
Motor Stator	Enabled / Disabled			Disabled	None	None	
	Stator #1	High Warning		302.0	32.0 to 500.0	Temperature	F
		High Warning Delay		5	0.0 to 999.0	Time	SEC
		High Shutdown		311.0	32.0 to 500.0	Temperature	F
		High Shutdown Delay		5	0.0 to 999.0	Time	SEC
	Stator # 2	High Warning		302.0	32.0 to 500.0	Temperature	F
		High Warning Delay		5	0.0 to 999.0	Time	SEC
		High Shutdown		311.0	32.0 to 500.0	Temperature	F
		High Shutdown Delay		5	0.0 to 999.0	Time	SEC
	Stator # 3	High Warning		302.0	32.0 to 500.0	Temperature	F
		High Warning Delay		5	0.0 to 999.0	Time	SEC
		High Shutdown		311.0	32.0 to 500.0	Temperature	F
		High Shutdown Delay		5	0.0 to 999.0	Time	SEC

SETPOINTS - PID Setup Page 1 *

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default *	Range *	Units *	
PID 1	Name		EZ Cool LIOC	Refer to 090-022 Operation	None	
	Control		Always			
	Action		Forward			
	Control Point		Disch. Temp.			
	IO Board		Analog 1			
	Output Channel		1			
	Setpoint		145.0		Based upon Control Point	
	Proportional Band		25.0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID 2	Name		PID # 2	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		Analog 1			
	Output Channel		2			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID 3	Name		PID # 3	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID 4	Name		PID # 4	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		

*** Defaults, ranges and Units will be based upon the setting of the Control Point (settings shown are for the default Control Point setting of Capacity Slide).**

SETPOINTS – PID Setup Page 2 *

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default *	Range *	Units *	
PID # 5	Name		PID # 5	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID # 6	Name		PID # 6	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID # 7	Name		PID # 7	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		
PID # 8	Name		PID # 8	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Point		Cap. slide			
	IO Board		None			
	Output Channel		0			
	Setpoint		0		Based upon Control Point	
	Proportional Band		0			
	Integration Time		30.0	0.0 to 1000.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off Value		0.0	0.0 to 100.0		

*** Defaults, ranges and Units will be based upon the setting of the Control Point (settings shown are for the default Control Point setting of Capacity Slide).**

SETPOINTS – Superheat Control Setup*

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default *	Range *	Units *	
SUPERHEAT # 1	Name		Superheat # 1	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Pressure		Suction Pressure			
	Control Temperature		Suction Temperature			
	Output Board		None			
	Output Channel		0			
	Setpoint		10.0		Based upon Control Point	
	Proportional Band		2.0			
	Integration Time		30.0	0.0 to 999.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off		0.0	0.0 to 100.0		
SUPERHEAT # 2	Name		Superheat # 2	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Pressure		Suction Pressure			
	Control Temperature		Discharge Temperature			
	Output Board		None			
	Output Channel		0			
	Setpoint		10.0 F		Based upon Control Point	
	Proportional Band		2.0 F			
	Integration Time		30.0	0.0 to 999.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off		0.0	0.0 to 100.0		
SUPERHEAT # 3	Name		Superheat # 3	Refer to 090-022 Operation	None	
	Control		Disabled			
	Action		Forward			
	Control Pressure		Suction Pressure			
	Control Temperature		Discharge Temperature			
	Output Board		None			
	Output Channel		0			
	Setpoint		10.0 F		Based upon Control Point	
	Proportional Band		2.0 F			
	Integration Time		30.0	0.0 to 999.0	Time (Sec.)	
	High Limit		100.0	-50.0 to 150.0	Percent	%
	Low Limit		0.0	-50.0 to 150.0		
	When Running Off		0.0	0.0 to 100.0		

*** Defaults, ranges and Units will be based upon the setting of the Control Point (settings shown are for the default Control Point setting of Capacity Slide).**

SETPOINTS - Auxiliary Analog Input Safeties – Page 1

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Auxiliary Analog 1	Auxiliary Analog 1			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 2	Auxiliary Analog 2			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 3	Auxiliary Analog 3			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 4	Auxiliary Analog 4			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 5	Auxiliary Analog 5			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC

SETPOINTS - Auxiliary Analog Input Safeties – Page 2

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Auxiliary Analog 6	Auxiliary Analog 6			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 7	Auxiliary Analog 7			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 8	Auxiliary Analog 8			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 9	Auxiliary Analog 9			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
Auxiliary Analog 10	Auxiliary Analog 10			Disabled	Disabled/ Enabled	None	
	Low Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	Low Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Warning	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC
	High Shutdown	Setpoint		30 Hg	0.0 to 420.4	Pressure	PSIG
		Delay		0	0.0 to 999.0	Time	SEC

SETPOINTS – Auxiliary Digital Input Configuration

Control	Description	Value	Default	Range	Units	
Auxiliary Input 1	Name***		Auxiliary Input 1	None	None	
	IO Board		Dig. Bd. 1			
	IO Channel		17			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 2	Name***		Auxiliary Input 2	None	None	
	IO Board		Dig. Bd. 1			
	IO Channel		18			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 3	Name***		Auxiliary Input 3	None	None	
	IO Board		Dig. Bd. 2			
	IO Channel		9			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 4	Name***		Auxiliary Input 4	None	one	
	IO Board		Dig. Bd. 2			
	IO Channel		10			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 5	Name***		Auxiliary Input 5	None	None	
	IO Board		Dig. Bd. 2			
	IO Channel		11			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 6	Name***		Auxiliary Input 6	None	None	
	IO Board		Dig. Bd. 2			
	IO Channel		12			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 7	Name***		Auxiliary Input 7	None	None	
	IO Board		Dig. Bd. 2			
	IO Channel		13			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC
Auxiliary Input 8	Name***		Auxiliary Input 8	None	None	
	IO Board		Dig. Bd. 2			
	IO Channel		14			
	Activity		Disabled			
	Delay		0	0 to 60	Time	SEC

***Chinese version does not have option to change text for auxiliary input Name – default name only available.

SETPOINTS – Auxiliary Digital Output Configuration

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units
Output A	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		Dig. Bd. 2		
	IO Channel		7		
Output B	Analog Channel		Capacity Slide Position	None	
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		Dig. Bd. 2		
	IO Channel		8		
Output C	Analog Channel		Capacity Slide Position	None	
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		Dig. Bd. 2		
	IO Channel		18		
Output D	Analog Channel		Capacity Slide Position	None	
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		
Output E	Analog Channel		Capacity Slide Position	None	
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		

This Setpoint table continues on the next page.

SETPOINTS – Auxiliary Digital Output Configuration

-CONTINUED –

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units
Output F	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		
Output G	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		
Output H	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		
Output I	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		
Output J	Analog Channel		Capacity Slide Position	None	None
	< >		>	< or >	
	On When		0.0	-10000.0 to 10000.0	%
	Off When				
	Control When		Disabled	None	None
	IO Board		None		
	IO Channel		0		

SETPOINTS - Panel

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Description		Value	Default	Range	Units	
Panel Heater	On		53.6	32.0 to 77.0	Temperature	F
	Off		55.4			
Remote Enable Output			Disabled	None	None	
Input Module Capacity Mode Selection						
Permissive Start						
Power Fail Restart	Enabled/Disabled					
	Restart Time		0	1.0 to 99.0	Time	MIN
Run Hours			0	0 to 100000		HRS
PLC Interlock			Disabled	None	None	
Remote Control Setpoint						

CALIBRATION – Pressure

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Atmospheric Pressure				14.7	8.0 to 20.0	Pressure	PSIG
Suction	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	0.0 to 985.3		
		High		185.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			9			
Discharge	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			8			
Oil	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			6			
Filter	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			6			
Economizer	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			6			
Balance Piston	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			None			
	IO Channel			10			

This Setpoint table continues on the next page.

CALIBRATION – Pressure

-CONTINUED –

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
System Discharge	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			6			
Main Oil Injection	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			Analog Board 1			
	IO Channel			6			
Manifold	Current value				None	None	
	Offset			0.0	-30.0 to 30.0	Pressure	PSIG
	Range	Low		30.0 Hg	-14.7 to 985.3		
		High		485.3			
	Sensor Signal **			1-5V	None	None	
	IO Board *			None			
	IO Channel			15			

*** IO Board**

None
Analog Board 1
Analog Board 2

**** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

CALIBRATION – Temperature

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Suction	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			Analog Board 1			
	IO Channel			1			
Discharge	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			Analog Board 1			
	IO Channel			2			
Oil	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			Analog Board 1			
	IO Channel			3			
Separator	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			Analog Board 1			
	IO Channel			4			
Process Leaving	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			None			
	IO Channel			5			
Process Entering	Current value				None	None	
	Offset			0.0	-92.2 to 92.2	Temperature	F
	Range	Low		-459.4	-1768 to 1832		
		High		463.1			
	Sensor Signal **			ICTD	None	None	
	IO Board *			None			
	IO Channel			4			
Panel	Current value						
	Offset			0.0	0.0 to 45.0	Temperature	F

*** IO Board**

None
Analog Board 1
Analog Board 2

**** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

CALIBRATION – Capacity/Volume

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description	Value	Default	Range	Units
Capacity	Sensor Signal **		4-20mA	None	None
	IO Board *		Analog Board 1		
	IO Channel		14		
	Travel		196.0	0.0 to 500.0	
Volume	Sensor Signal **		4-20mA	None	None
	IO Board *		Analog Board 1		
	IO Channel		15		
	Bottom of Range		2.2	0.0 to 10.0	
	Top of Range		5.0	0.0 to 10.0	
	Dead Band		0.2	0.0 to 2.0	
	Minimum On Time		0.5	0.0 to 5.0	

CALIBRATION – Motor/Miscellaneous

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units	
Motor Amps	Current value				None	None	
	Sensor Signal **			CT			
	IO Board *			Analog Board 1			
	IO Channel			16			
Kilowatts	Current value				None	None	
	Offset			0.0	-500.0 to 500.0	Kilowatts	kW
	Range	Low		0.0	-1000.0 to 10000.0		
		High		5000.0			
	Sensor Signal **			4-20mA	None	None	
	IO Board *			None			
	IO Channel			16			
RPM	Current value				None	None	
	Offset			0.0	-360.0 to	Speed	RPM
	Range	Low		0.0	-1000.0 to 6000.0		
		High		3600 RPM			
	Sensor Signal **			4-20ma	None	None	
	IO Board *			Analog Board 2			
	IO Channel			16			
Remote Capacity Position	Current value				None	None	
	Offset			0.0	-10.0 to 10.0	Percent	%
	Range	Low		0.0	-1000.0 to 1000.0		
		High		100.0 %			
	Sensor Signal **			4-20Ma	None	None	
	IO Board *			None			
	IO Channel			0			
External Input	Current value				None	None	
	Offset			0.0	-75.0 to 75.0	Pressure	PSIG
	Range	Low		-30.0	-14.7 to 985.3		
		High		485.3 PSIG			
	Sensor Signal **			4-20mA	None	None	
	IO Board *			None			
	IO Channel			12			

*** IO Board**

None
Analog Board 1
Analog Board 2

**** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

CALIBRATION - PhD Monitoring

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units
Compressor Vibration - Suction	Current value				None	gF
	Offset			0.0	-3.0 to 3.0	
	Range (4-20mA only)	Low		0.0	-1000.0 to 1000.0	
		High		30.0		
	Sensor Signal **			Vibration	None	None
	IO Board			None		
	IO Channel			17		
Compressor Vibration - Discharge	Current value				None	gF
	Offset			0.0	-3.0 to 3.0	
	Range (4-20mA only)	Low		0.0	-1000.0 to 1000.0	
		High		30.0		
	Sensor Signal **			Vibration	None	None
	IO Board			None		
	IO Channel			18		
Motor Vibration – Shaft Side	Current value				None	gF
	Offset			0.0	-3.0 to 3.0	
	Range (4-20mA only)	Low		0.0	-1000.0 to 1000.0	
		High		30.0		
	Sensor Signal **			Vibration	None	None
	IO Board			None		
	IO Channel			19		
Motor Vibration – Opposite Shaft Side	Current value				None	gF
	Offset			0.0	-3.0 to 3.0	
	Range (4-20mA only)	Low		0.0	-1000.0 to 1000.0	
		High		30.0		
	Sensor Signal **			Vibration	None	None
	IO Board			None		
	IO Channel			20		
Motor Temperature – Shaft Side	Current value				None	F
	Offset			0.0	-92.3 to 92.3	
	Range (4-20mA only)	Low		-459.4	-1768.0 to 1832.0	
		High		463.1		
	Sensor Signal **			RTD	None	None
	IO Board			None		
	IO Channel			19		
Motor Temperature – Opposite Shaft Side	Current value				None	F
	Offset			0.0	-92.3 to 92.3	
	Range (4-20mA only)	Low		-459.4	-1768.0 to 1832.0	
		High		463.1		
	Sensor Signal **			RTD	None	None
	IO Board			None		
	IO Channel			20		

This Setpoint table continues on the next page.

CALIBRATION – PhD Monitoring
-CONTINUED –

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Control	Description		Value	Default	Range	Units
Motor Stator # 1	Current value				None	F
	Offset			0.0	-92.3 to 92.3	
	Range (4-20mA only)	Low		-459.4	-1768.0 to 1832.0	
		High		463.1		
	Sensor Signal **			RTD	None	None
	IO Board			None		
	IO Channel			21		
Motor Stator # 2	Current value				None	F
	Offset			0.0	-92.3 to 92.3	
	Range (4-20mA only)	Low		-459.4	-1768.0 to 1832.0	
		High		463.1		
	Sensor Signal **			RTD	None	None
	IO Board			None		
	IO Channel			22		
Motor Stator # 3	Current value				None	F
	Offset			0.0	-92.3 to 92.3	
	Range (4-20mA only)	Low		-459.4	-1768.0 to 1832.0	
		High		463.1		
	Sensor Signal **			RTD	None	None
	IO Board			None		
	IO Channel			23		

*** IO Board**

None
Analog Board 1
Analog Board 2

**** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

CALIBRATION - Analog Outputs (Retransmitting Outputs)

Output Channel	Description	Value	Default	Range	Units
A	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		Analog Board 1		
	IO Channel		3		
B	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
C	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
D	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
E	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
F	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
G	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		
H	Input Channel to Retransmit		Capacity Slide Position	None	None
	IO Board *		None		
	IO Channel		0		

*** IO Board**

None
Analog Board 1
Analog Board 2

CALIBRATION - Analog Outputs (VFD / Condenser Outputs)

Output Channel	Description	Value	Default	Range	Units
Compressor VFD	IO Board *		Analog Board 2	None	None
	IO Channel		3		
Condenser Output A	IO Board *		Analog Board 1	None	None
	IO Channel		5		
Condenser Output B	IO Board *		Analog Board 1	None	None
	IO Channel		6		

*** IO Board**

None
Analog Board 1
Analog Board 2

CALIBRATION - Analog Output Calibration

Description	Value	Default	Range	Units
Select Analog Board		Analog Board 1	None	None
Select Analog Output Channel to Calibrate		1		

CALIBRATION – Auxiliaries Analogs (Page 1)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Name	Description		Value	Default	Range	Units	
Auxiliary Analog 1	Name			Auxiliary Analog 1	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 2	Name			Auxiliary Analog 2	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 3	Name			Auxiliary Analog 3	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 4	Name			Auxiliary Analog 4	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 5	Name			Auxiliary Analog 5	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 6	Name			Auxiliary Analog 6	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 7	Name			Auxiliary Analog 7	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 8	Name			Auxiliary Analog 8	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 9	Name			Auxiliary Analog 9	None	None	
	Current value					Pressure	PSIG
	Offset			0.0	-75.0 to 75.0		
	Range	Low		30.0 Hg	0.0 to 1435.6		
		High		485.3			
Auxiliary Analog 10	Name			Auxiliary Analog 10	None	None	
	Current value					Pressure	PSIG
	Offset			30.0 Hg	-75.0 to 75.0		
	Range	Low		0.0	0.0 to 1435.6		
		High		485.3			
EZ Cool Feedback %	Name			EZ Cool Feedback %	None	None	
	Current value				None	Percent	%
	Offset			0.0	-10.0 to 10.0		
	Range	Low		0.0	-1000.0 to 10000.0		
		High		100.0			

*** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

**** Sensor Type**

None	Temperature
Pressure	Other

CALIBRATION – Auxiliaries (Page 2)

(Units will be based upon the settings of the Session Screen, defaults are shown here)

Name	Description	Value	Default	Range	Units
Auxiliary Analog 1	IO Board		Auxiliary Analog 2	None	
	IO Channel		5		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 2	IO Board		Auxiliary Analog 2	None	
	IO Channel		6		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 3	IO Board		Auxiliary Analog 2	None	
	IO Channel		7		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 4	IO Board		Auxiliary Analog 2	None	
	IO Channel		8		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 5	IO Board		Auxiliary Analog 2	None	
	IO Channel		9		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 6	IO Board		Auxiliary Analog 2	None	
	IO Channel		10		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 7	IO Board		Auxiliary Analog 2	None	
	IO Channel		11		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 8	IO Board		Auxiliary Analog 2	None	
	IO Channel		12		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 9	IO Board		Auxiliary Analog 2	None	
	IO Channel		13		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
Auxiliary Analog 10	IO Board		Auxiliary Analog 2	None	
	IO Channel		14		
	Sensor Signal *		1-5 V		
	Sensor Type **		Pressure		
	Units if Type is Other		None		
EZ Cool Feedback %	IO Board		Auxiliary Analog 1	None	
	IO Channel		24		
	Sensor Signal *		4-20mA		
	Sensor Type **		Other		
	Units if Type is Other		%		

*** Sensor Signal Selections:**

None	4-20mA	RTD	Vibration
0-5V	Pot.	CT	1-10V
1-5V	ICTD	RPM	+/- 5V

**** Sensor Type**

None	Temperature
Pressure	Other

CONFIGURATION – Compressor

Control	Description		Value	Default	Range	Units	
Misc.	Sequencing			Disabled	None	None	
	Condenser			Disabled			
	Screen Saver			15	0 to 60	Time	MIN
Capacity	Mode1	Disabled / Enabled		Disabled	Disabled or Enabled	None	
		Channel		Suction Pressure	None		
		Direction		Forward	Forward or Reverse		
	Mode 2	Disabled / Enabled		Disabled	Disabled or Enabled		
		Channel		Disabled	Disabled or Enabled		
		Direction		Forward	Forward or Reverse		
	Mode 3	Disabled / Enabled		Disabled	Disabled or Enabled		
		Channel		Disabled	Disabled or Enabled		
		Direction		Forward	Forward or Reverse		
	Mode 4	Disabled / Enabled		Disabled	Disabled or Enabled		
		Channel		Disabled	Disabled or Enabled		
		Direction		Forward	Forward or Reverse		
Package	Compressor			RWF			
	Pump			No Pump			
	Dual Pump			Disabled			
	Drive			Screw w/Constant Electric			
	Refrigerant			R717			
	Filter			Disabled	Disabled or Enabled		
	Power Pac			No	No or Yes		

CONFIGURATION - Communications

Control	Description	Value	Default	Range	Units
Compressor ID			0	0 to 99	* None
Comm 1	Baud rate		19200	*	
	Data Bits		8	7 to 8	
	Stop Bits		1	1 to 2	
	Parity		None	*	
	Protocol				
Comm 2	Baud rate		19200		
	Data Bits		8	7 to 8	
	Stop Bits		1	1 to 2	
	Parity		None	*	
	Protocol				
Comm 3	Baud rate		19200		
	Data Bits		8	7 to 8	
	Stop Bits		1	1 to 2	
	Parity		None	*	
	Protocol				
Map File	Use Map File		No	*	

*** Refer to 090-022 CS (Communications Setup) for additional information**

CONFIGURATION - Ethernet

Control	Description	Value	Default	Range
IP Data	Address Type		Fixed	Static or Dynamic
	IP Address		*	*
	Gateway Address		*	*
	Subnet Mask		*	*
	Web Server Port		80	0.0 to 99999.0
Naming Data	Host Name		QLX-Host	*
	Workgroup		QLX Compressors	*
	Comment		*	*
Email Data	Email Notification On Shutdown		Disabled	Disabled / Enabled
	Local Email Address		*	*
	Alias Name for Local Email Address			
	Subject			
	SMTP Server Name OR IP Address			
	SMTP Server Port Number		25	0.0 to 99999.0
	Comma-Delimited List Of Email Recipients		*	*
Protocols	ModBus TCP		Disabled	Disabled / Enabled
	Ethernet/IP			
	PROFINET			

*** Refer to 090-020 CS (Communications Setup) for additional information**

CONFIGURATION – Digital I/O (Page 1)

Input/Output	Description	Value	Default	Range
Oil Level Switch	IO Board		Digital Board 1	*
	IO Channel		13	None
Capacity Decrease	IO Board		Digital Board 1	*
	IO Channel		6	None
Capacity Increase	IO Board		Digital Board 1	*
	IO Channel		5	None
Volume Decrease	IO Board		Digital Board 1	*
	IO Channel		8	None
Volume Increase	IO Board		Digital Board 1	*
	IO Channel		7	None
Capacity Step #1	IO Board		None	*
	IO Channel		0	None
Capacity Step #2	IO Board		None	*
	IO Channel		0	None
Capacity Step #3	IO Board		None	*
	IO Channel		0	None
Capacity Step #4	IO Board		None	*
	IO Channel		0	None
Capacity Step #5	IO Board		None	*
	IO Channel		0	None
Capacity Step #6	IO Board		None	*
	IO Channel		0	None
Capacity Step #7	IO Board		None	*
	IO Channel		0	None
Economizer	IO Board		Digital Board 1	*
	IO Channel		11	None
Liquid Injection	IO Board		Digital Board 1	*
	IO Channel		9	None
Oil Heater	IO Board		Digital Board 1	*
	IO Channel		21	None
Hot Gas Bypass	IO Board		Digital Board 1	*
	IO Channel		16	None
Compressor Motor Start Signal	IO Board		Digital Board 1	*
	IO Channel		1	None
Compressor Motor Starter Feedback	IO Board		Digital Board 1	*
	IO Channel		2	None
Oil Pump Start Signal	IO Board		Digital Board 1	*
	IO Channel		3	None
Oil Pump Feedback	IO Board		Digital Board 1	*
	IO Channel		4	None
Full Flow Pump Start Signal	IO Board		None	*
	IO Channel		0	None
Oil Pump #2 Start Signal	IO Board		Digital Board 2	*
	IO Channel		15	None
Oil Pump #2 Feedback	IO Board		Digital Board 2	*
	IO Channel		16	None

*** IO Board**

None	Digital Board 1	Digital Board 2

CONFIGURATION – Digital I/O (Page 2)

Input/Output	Description	Value	Default	Range
High Liquid Level Shutdown	IO Board		Digital Board 1	*
	IO Channel		14	None
Mode Select A	IO Board		Digital Board 1	*
	IO Channel		19	None
Mode Select B	IO Board		Digital Board 1	*
	IO Channel		20	None
Shutdown	IO Board		Digital Board 1	*
	IO Channel		23	None
Warning	IO Board		Digital Board 1	*
	IO Channel		22	None
Balance Piston	IO Board		Digital Board 1	*
	IO Channel		12	None
Panel Heater	IO Board		Digital Board 1	*
	IO Channel		15	None
Permissive Start	IO Board		Digital Board 2	*
	IO Channel		17	None
Ready To Run	IO Board		Digital Board 2	*
	IO Channel		1	None
Remote Enabled	IO Board		Digital Board 2	*
	IO Channel		2	None
Recycle Delay	IO Board		Digital Board 2	*
	IO Channel		6	None
Remote Start/Stop	IO Board		Digital Board 2	*
	IO Channel		3	None
Remote Load	IO Board		Digital Board 2	*
	IO Channel		4	None
Remote Unload	IO Board		Digital Board 2	*
	IO Channel		5	None
Condenser Control Step 1	IO Board		Digital Board 2	*
	IO Channel		21	None
Condenser Control Step 2	IO Board		Digital Board 2	*
	IO Channel		22	None
Condenser Control Step 3	IO Board		Digital Board 2	*
	IO Channel		23	None
Condenser Control Step 4	IO Board		Digital Board 2	*
	IO Channel		24	None
Power Assist	IO Board		Digital Board 1	*
	IO Channel		24	None
Dx Circuit #1	IO Board		Digital Board 2	*
	IO Channel		19	None
Dx Circuit #2	IO Board		Digital Board 2	*
	IO Channel		20	None
Main Oil Injection	IO Board		None	*
	IO Channel		0	None

*** IO Board**

None	Digital Board 1	Digital Board 2

CONFIGURATION – Digital I/O (Page 3)

Input/Output	Description	Value	Default	Range
Liquid Level Increase	IO Board		None	*
	IO Channel		0	None
Liquid Level Decrease	IO Board		None	*
	IO Channel		0	None
PLC Interlock	IO Board		None	*
	IO Channel		0	None
High VI Liquid Injection	IO Board		Digital Board 1	*
	IO Channel		10	None

*** IO Board**

None	Digital Board 1	Digital Board 2

SECURITY

Description		Value	Default	Range
Level 1 Password			****	0.0 to 5000.0
Level 2 Password			****	
Level 3 Password			****	
Password For Current Level Or Higher User Level			PSIG	-999999.0 to 999999.0
Remote Internet Acces	User Name			N/A
	Password		****	

Refer to 090-022 O (Operation) for additional information

SESSION

Description	Value	Default	Range	Units
User Level		0	*	*
Password		None		
Language		English		
Pressure Units		PSIG		
Temperature Units		Fahrenheit		
Date Format		US		

***** Refer to 090-022 O (Operation) for additional information

ABOUT

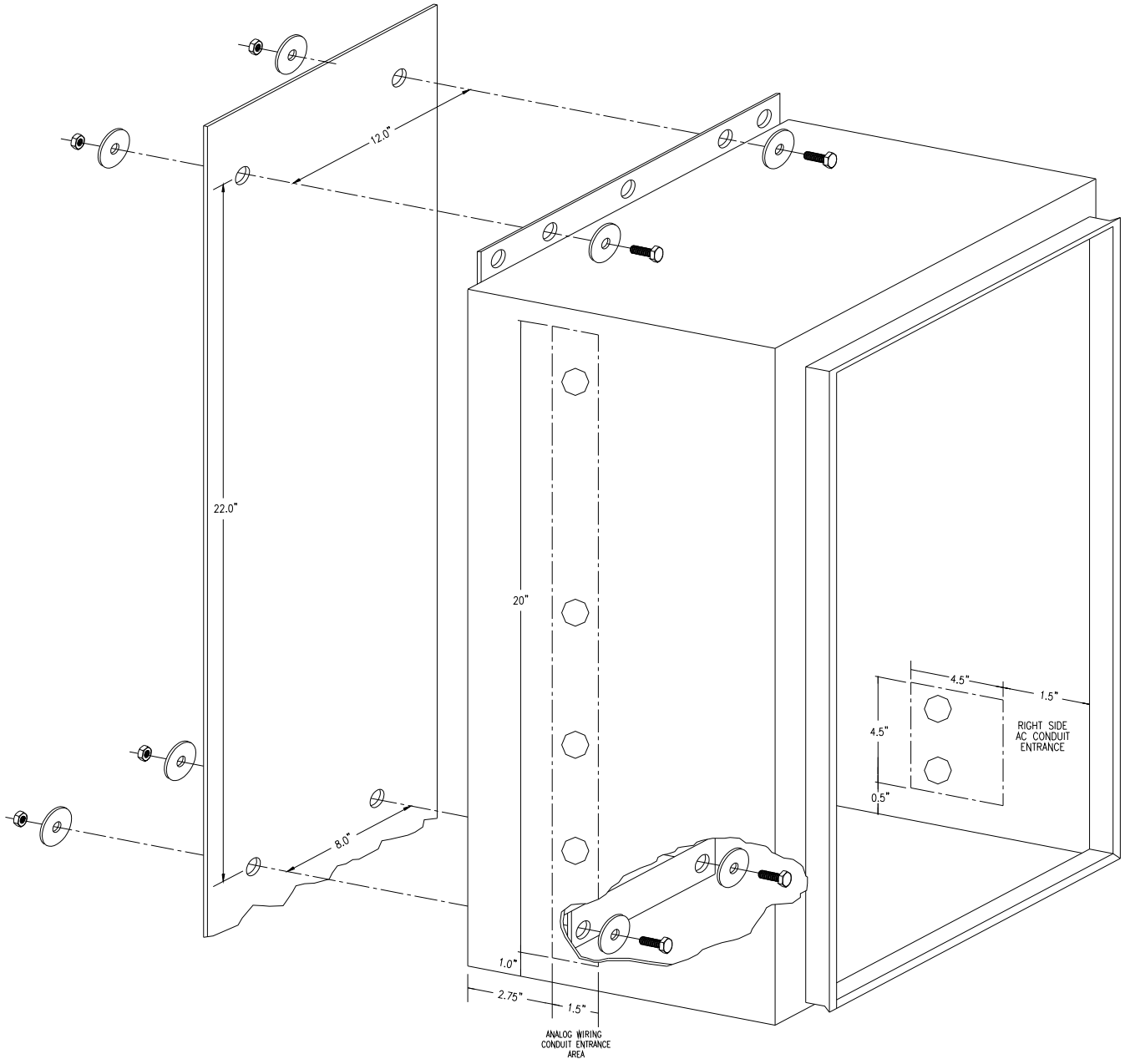
Description	Value	Default	Range	Units
Sales Order		0	0.0 to 9999999	None
Item		0	0.0 to 99999	

QUANTUM™ LX DRAWINGS

This table lists the numbers for the drawings that appear on the following pages. The drawings shown here is the latest revision as of the printing of this manual. These drawings appear here for reference purposes only, and are subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Control Center Assembly	Page	Drawing Number
RXF 12-50 Retro-fit	91	N/A
RWF & RXF 58-101	92 - 95	649D5151 Rev. B
RDB		
RWBII		
Retrofit RXB / RXF 58-101		
Wiring Diagrams	**Page**	**Drawing Number**
RWF & RWFII	96 - 99	649D5154 Rev. F
RWBII	100– 103	649D5155 Rev. E
RXF 12-101	104 – 107	649D5153 Rev. E
RDB	108 – 111	649D5278 Rev. E
PhD for 32 channel Analog Board	112	649D5050 Rev. C
Digital I/O Board 2	113- 114	649D5210 Rev. B
Analog I/O Board 2	115 – 116	649D5211 Rev. D
Harness Drawing	**Page**	**Drawing Number**
Quantum™ I/O & D.C. Power Harness (Special Panels)	117	640B0038 Rev. E
Quantum™ I/O & D.C. Power Harness (Standard Panels)	118	649D5069 Rev. A
Other Drawings	**Page**	
Isolater Repeater Module (Isolates Communications Signals)	119	639C0133 Rev. -
Communications Wiring Diagrams	120	N/A
Point-to-Point Field Wiring Diagram	121	N/A

RXF (12-50) RETROFIT MOUNTING



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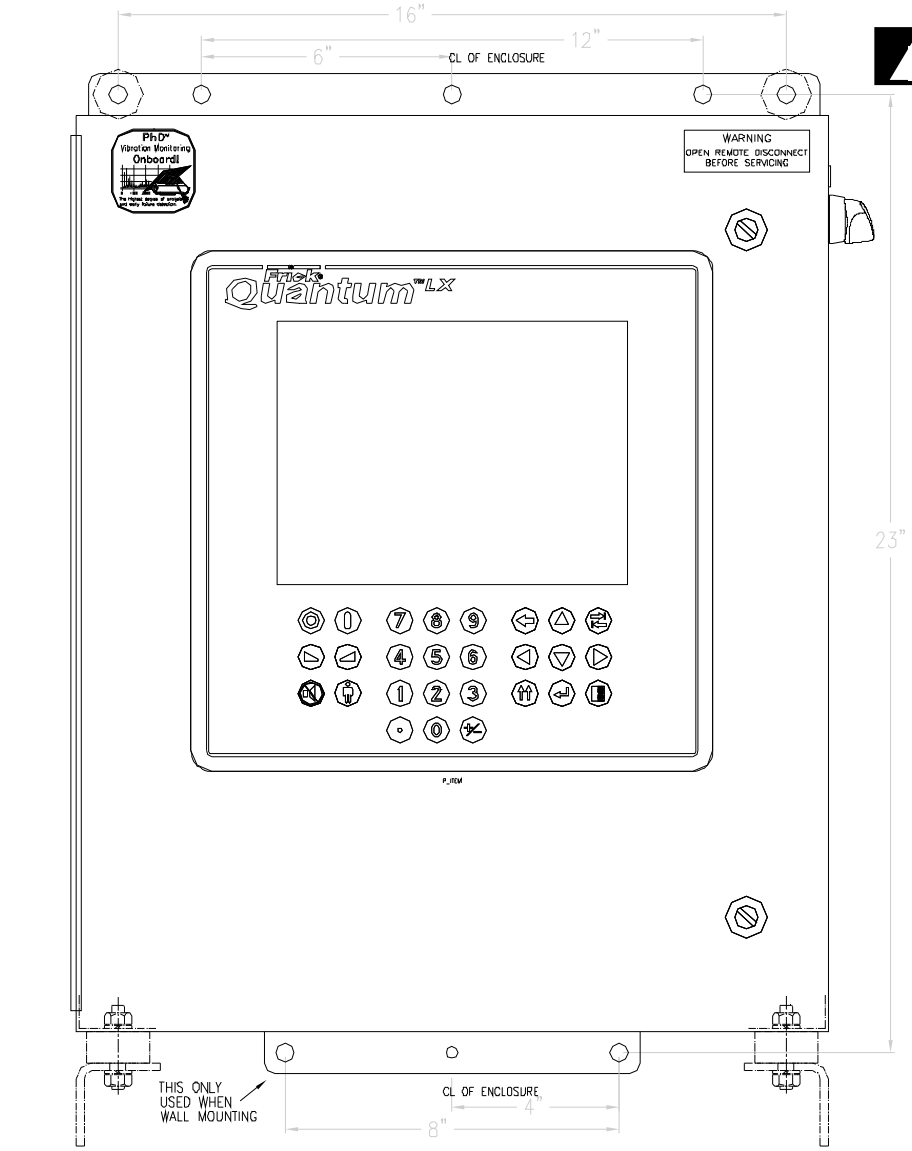
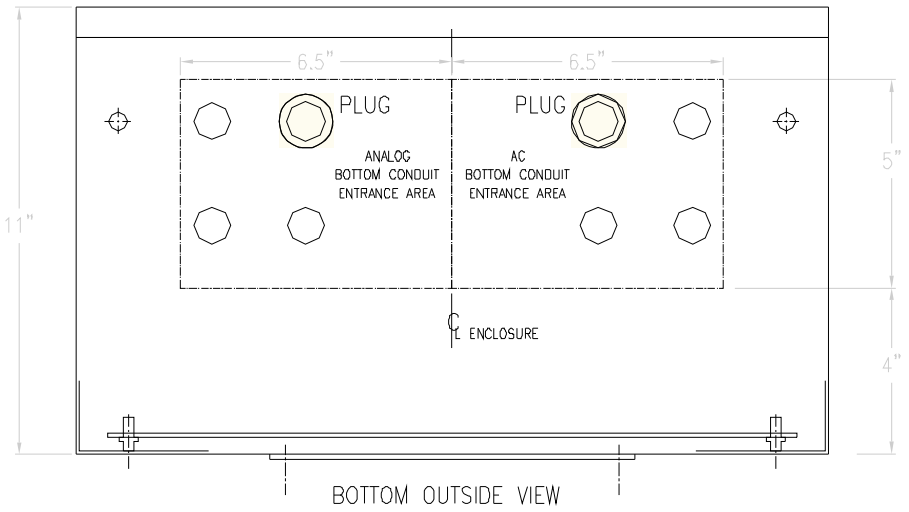
RDB / RWB II / RWF / RXF (58 – 101) CONTROL CENTER ASSEMBLY (Sheet 1 of 4)



FRONT VIEW



BOTTOM OUTSIDE VIEW

DANGER

Do not drill through top of panel.

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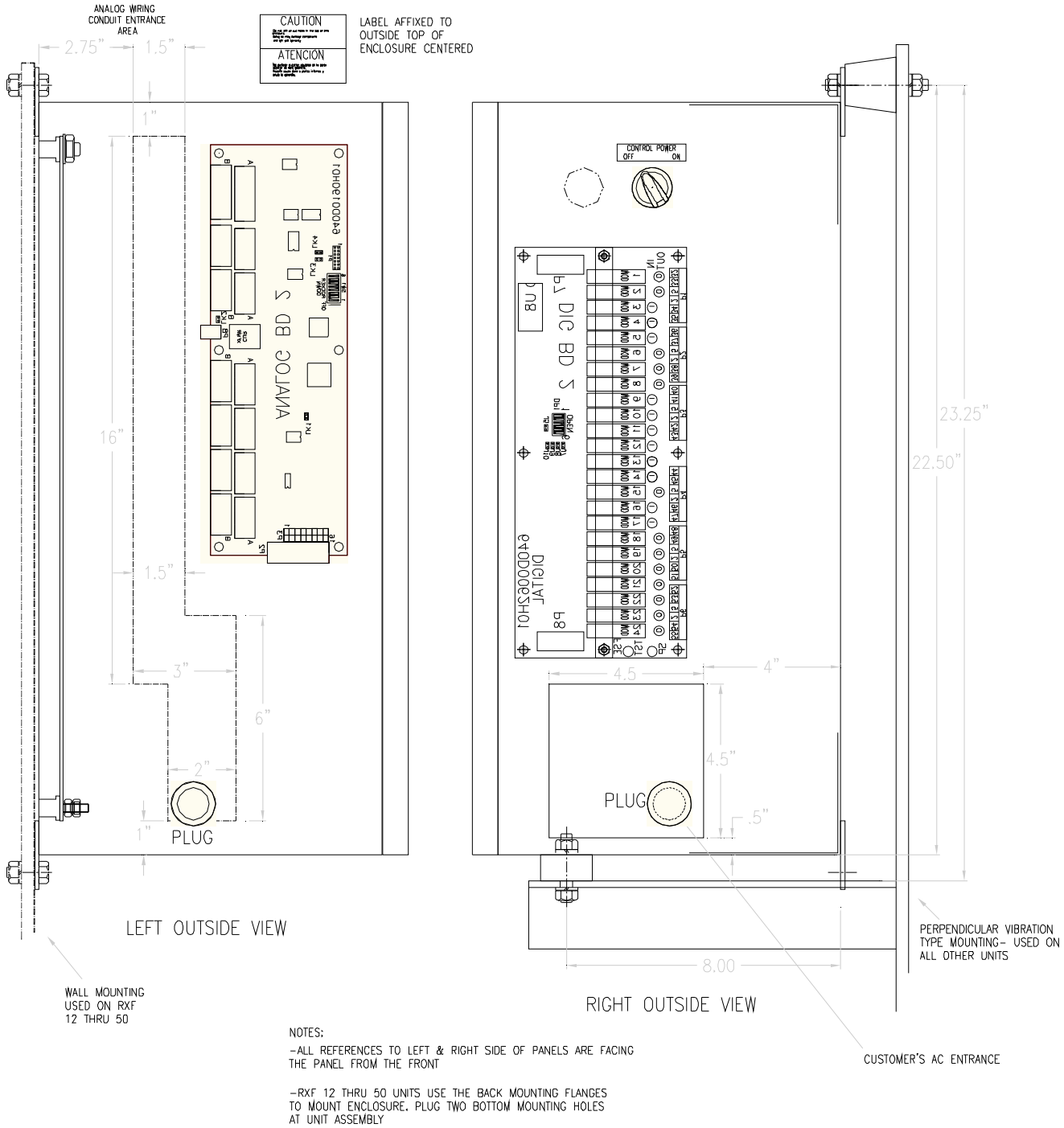
RDB / RWB II / RWF / RXF (58 - 101) CONTROL CENTER ASSEMBLY (Sheet 2 of 4)



NOTES:

-ALL REFERENCES TO LEFT & RIGHT SIDE OF PANELS ARE FACING THE PANEL FROM THE FRONT

-RXF 12 THRU 50 UNITS USE THE BACK MOUNTING FLANGES TO MOUNT ENCLOSURE. PLUG TWO BOTTOM MOUNTING HOLES AT UNIT ASSEMBLY

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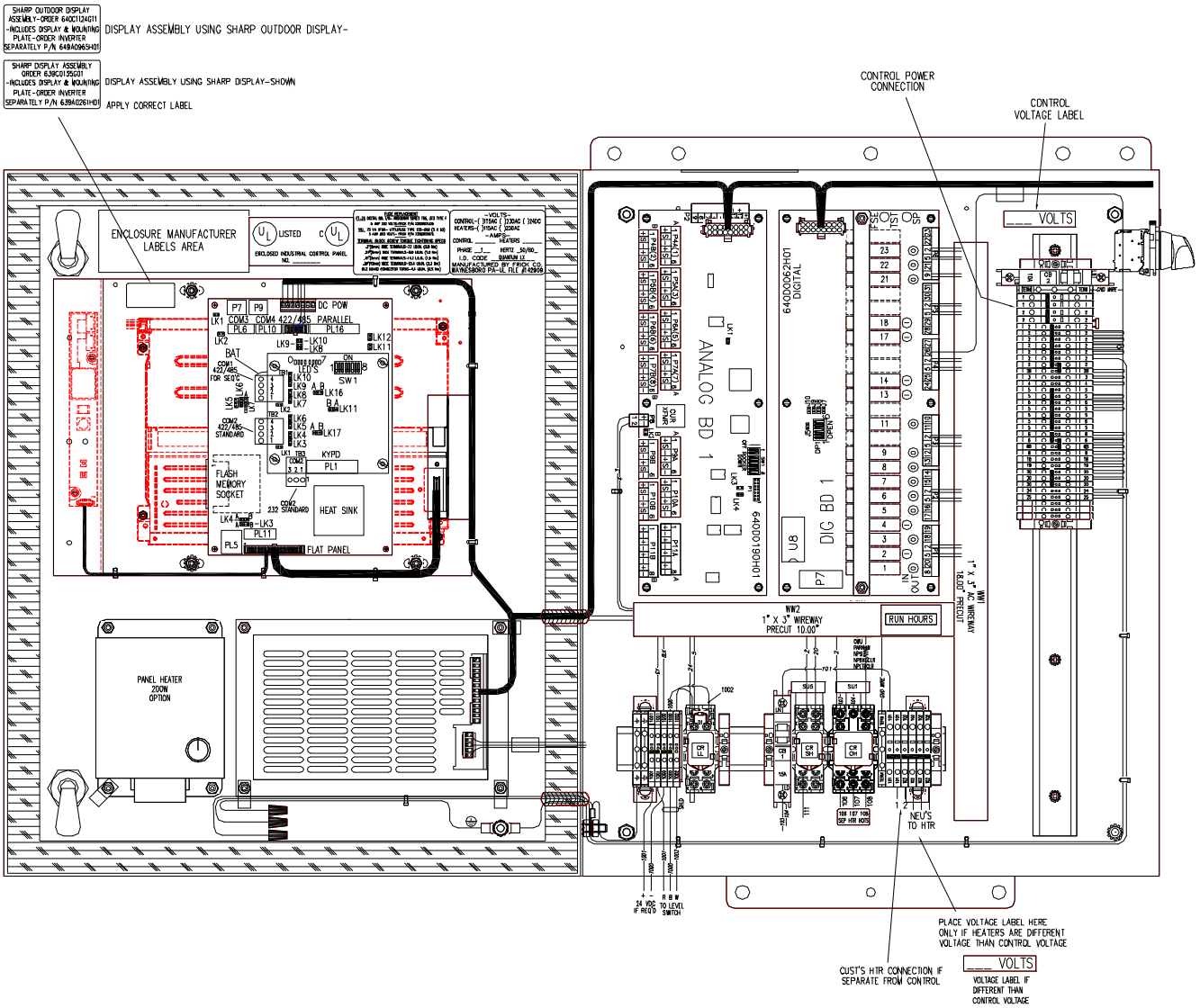
RDB / RWB II / RWF / RXF (58 - 101) CONTROL CENTER ASSEMBLY (Sheet 3 of 4)



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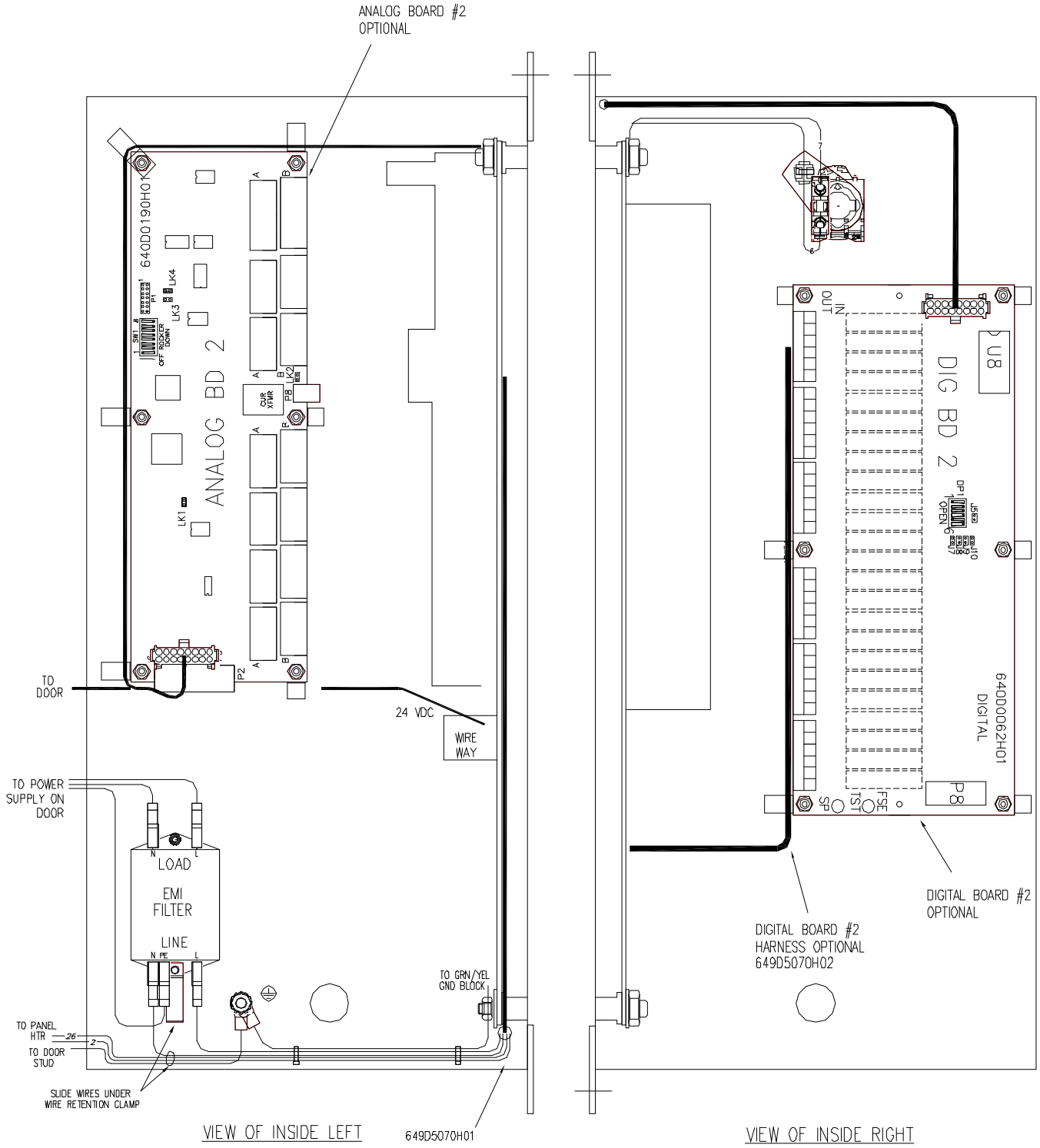
RDB / RWB II / RWF / RXF (58 - 101) CONTROL CENTER ASSEMBLY (Sheet 4 of 4)



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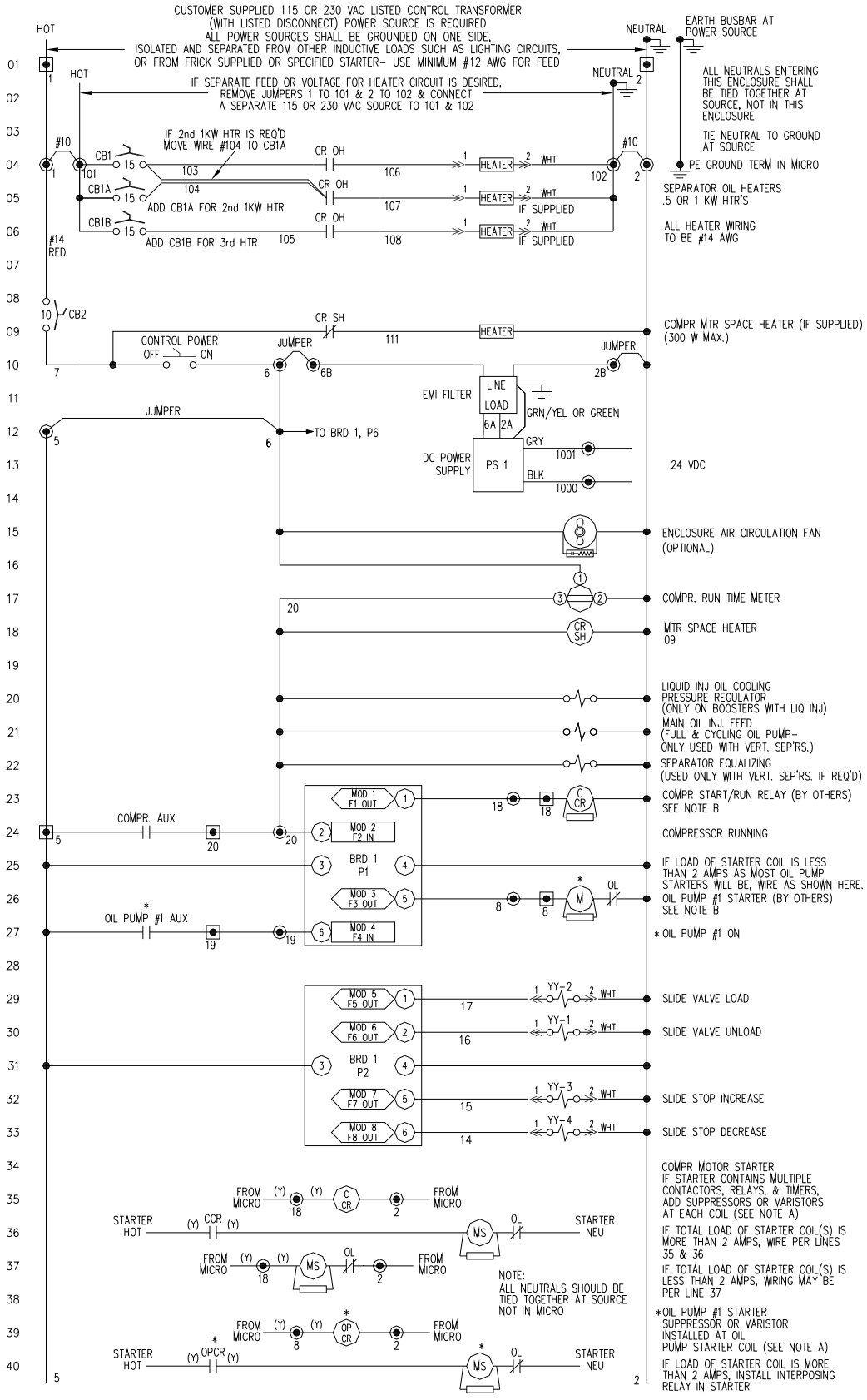
WIRING DIAGRAM – RWF & RWFII (Sheet 1 of 4)



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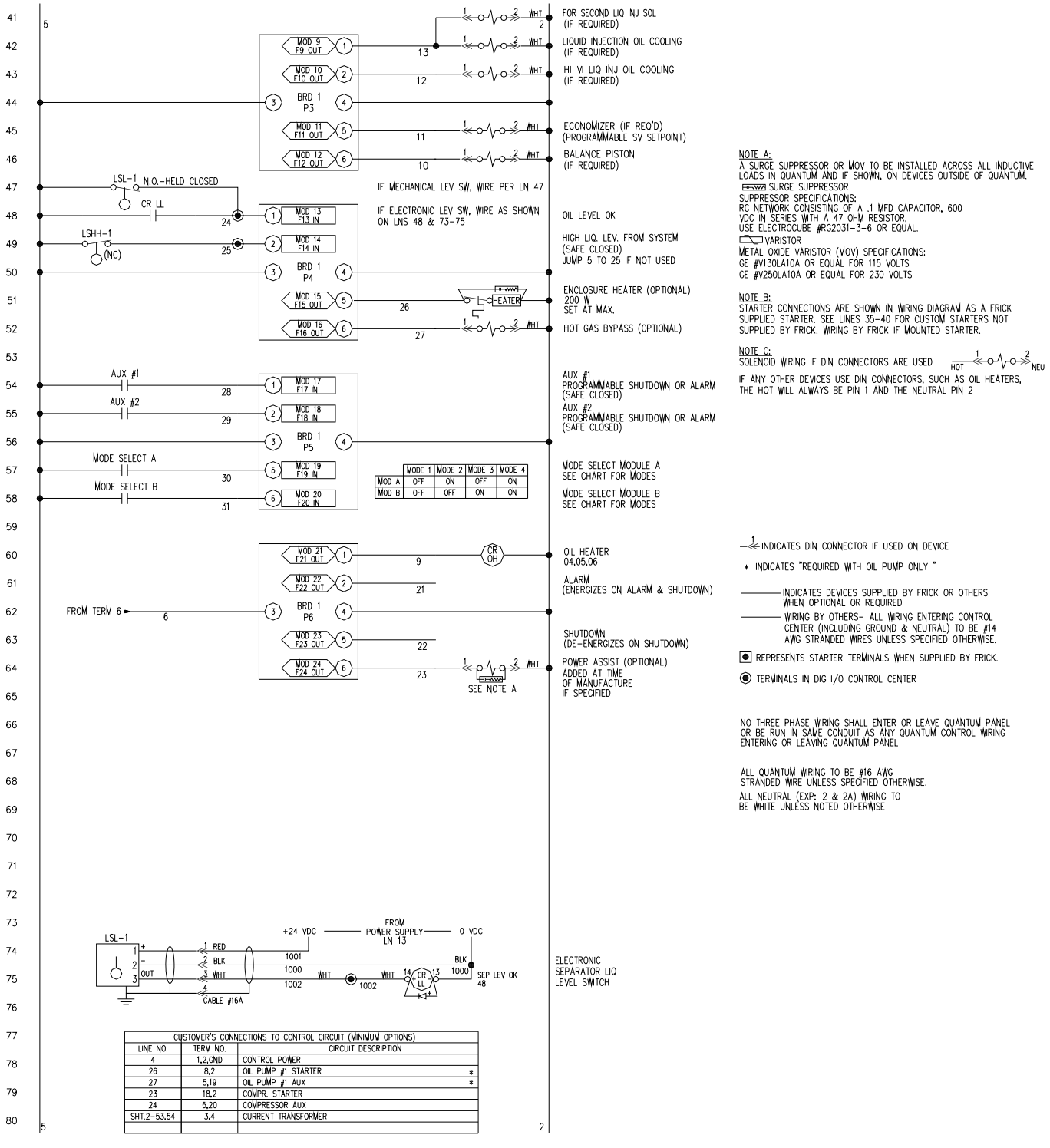
WIRING DIAGRAM – RWF & RWFII (Sheet 2 of 4)



CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)			
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION	
4	1,2,GND	CONTROL POWER	
26	8,2	OIL PUMP #1 STARTER	*
27	5,19	OIL PUMP #1 AUX	*
23	18,2	COMPR. STARTER	
24	5,20	COMPRESSOR AUX	
SHT.2-53,54	3,4	CURRENT TRANSFORMER	

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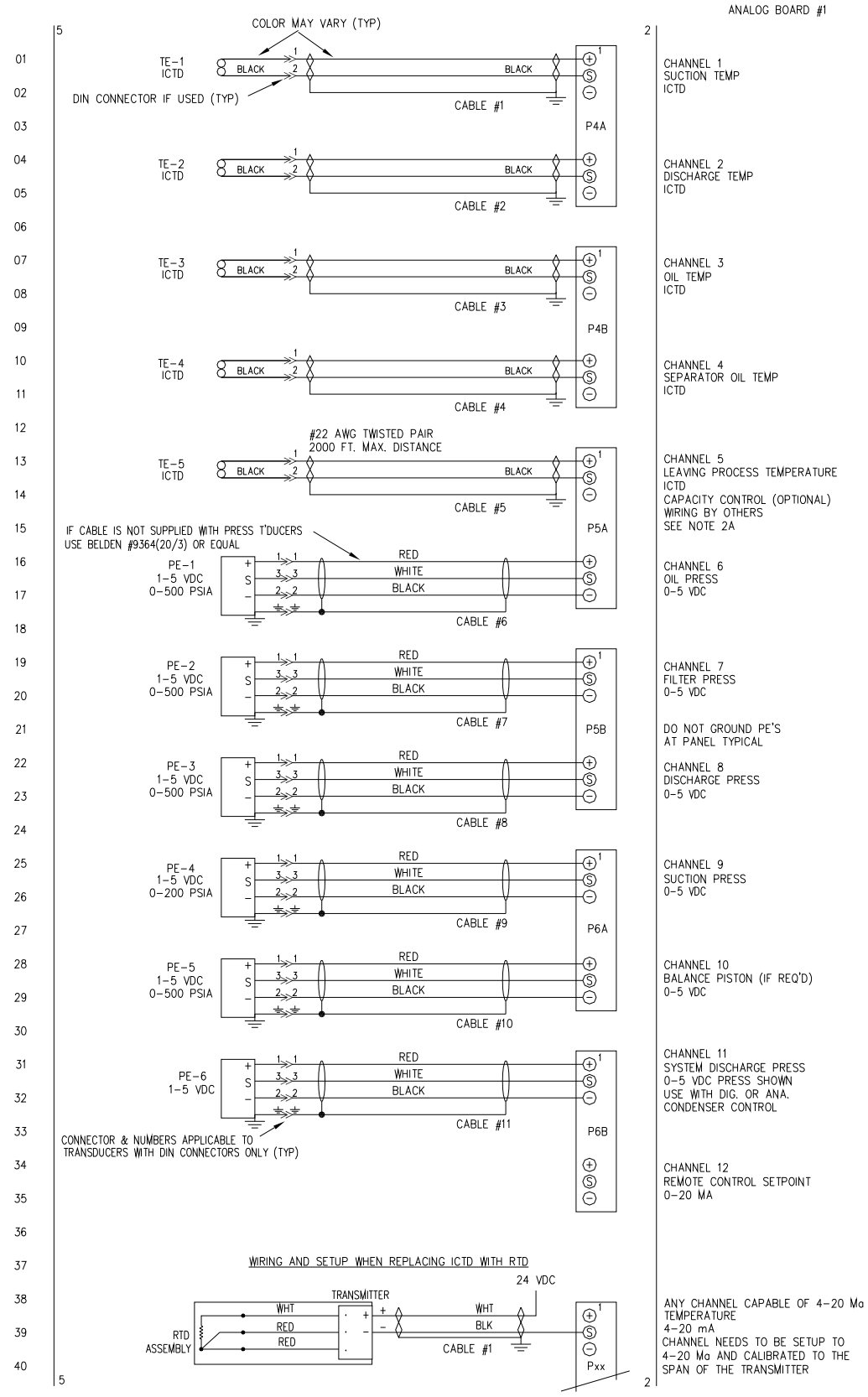
WIRING DIAGRAM – RWF & RWFII (Sheet 3 of 4)



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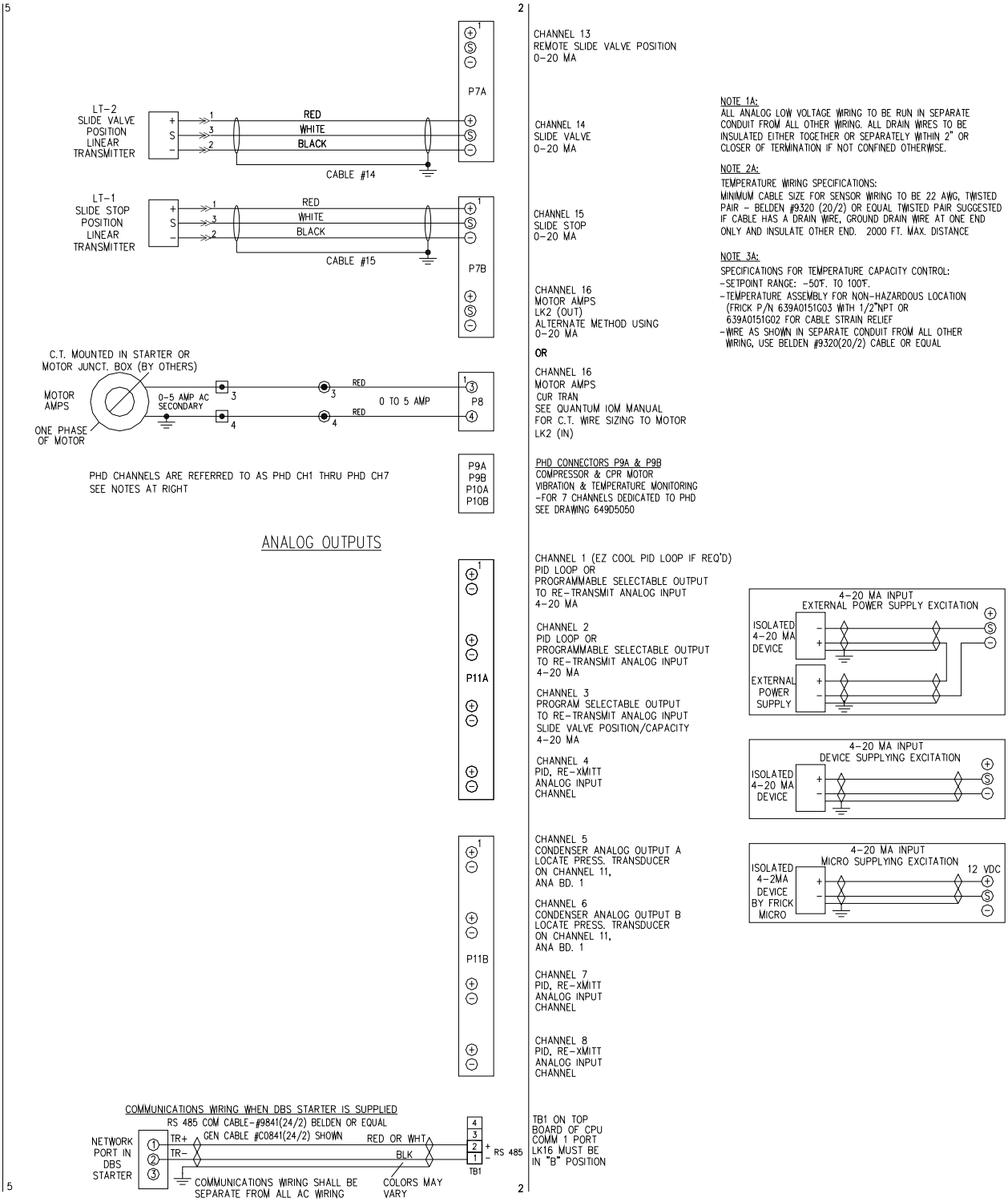
WIRING DIAGRAM – RWF & RWFII (Sheet 4 of 4)



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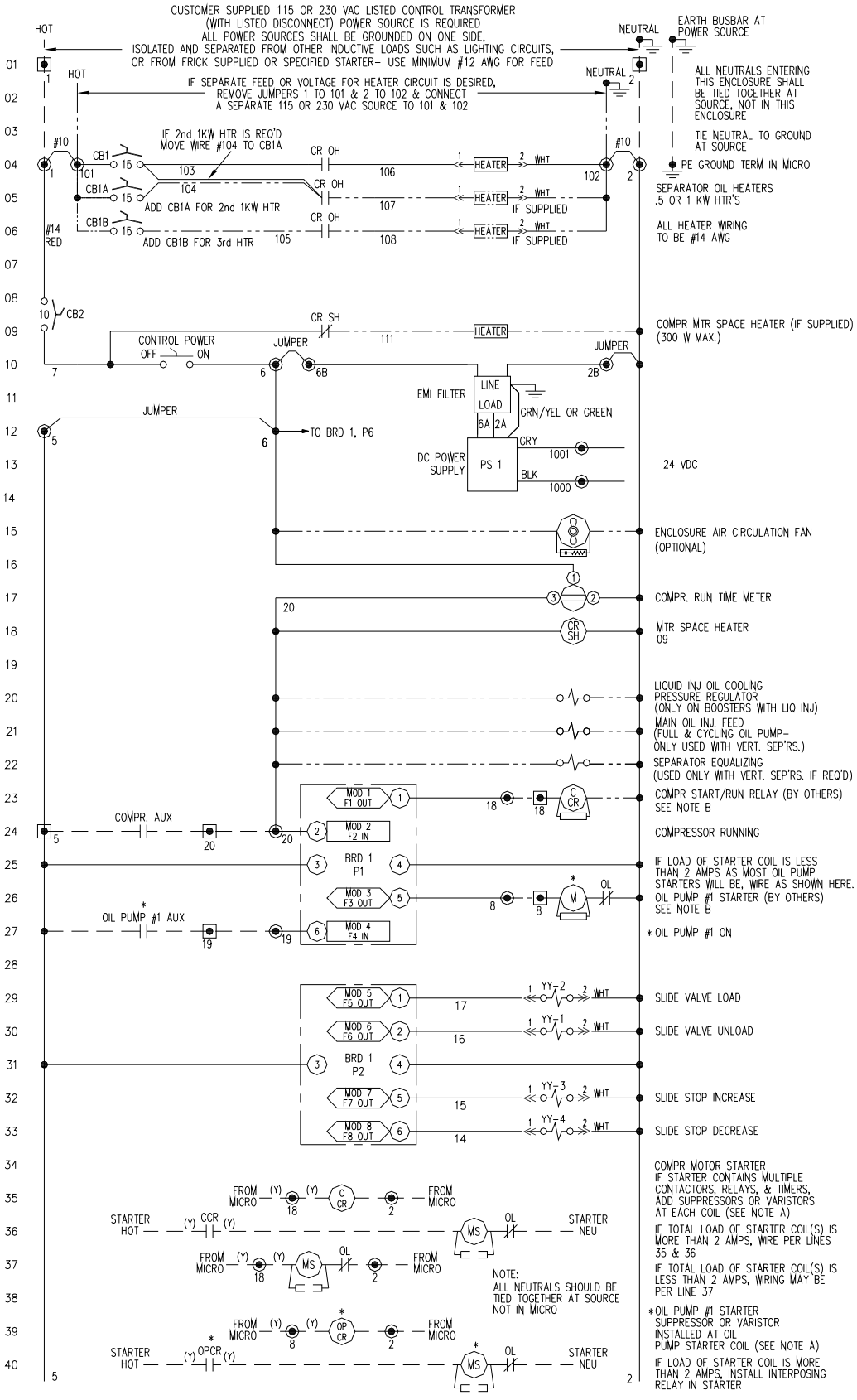
WIRING DIAGRAM – RWB II (Sheet 1 of 4)



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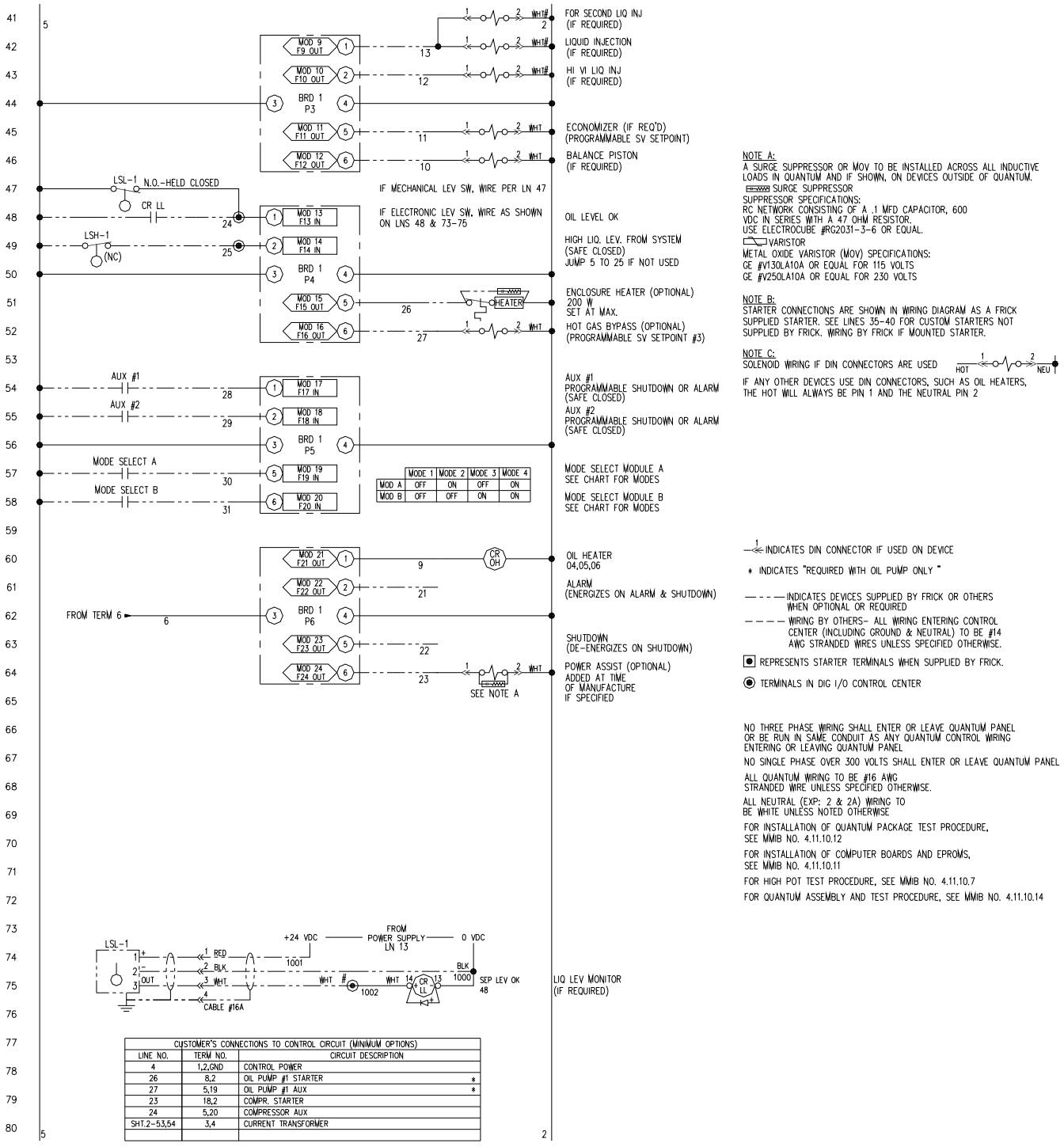
WIRING DIAGRAM – RWB II (Sheet 2 of 4)



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 35-40 FOR CUSTOM STARTERS NOT SUPPLIED BY FRICK. WIRING BY FRICK IF MOUNTED STARTER.

NOTE C:
SOLENOID WIRING IF DIN CONNECTORS ARE USED (1 HOT, 2 NEU)
IF ANY OTHER DEVICES USE DIN CONNECTORS, SUCH AS OIL HEATERS, THE HOT WILL ALWAYS BE PIN 1 AND THE NEUTRAL PIN 2

INDICATES DIN CONNECTOR IF USED ON DEVICE
* INDICATES "REQUIRED WITH OIL PUMP ONLY "
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

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 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 NO. 4.11.10.14

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)		
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION
4	1,2,GND	CONTROL POWER
26	8,2	OIL PUMP #1 STARTER *
27	5,19	OIL PUMP #1 AUX *
23	18,2	COMPR. STARTER
24	5,20	COMPRESSOR AUX
SHT.2-53,54	3,4	CURRENT TRANSFORMER

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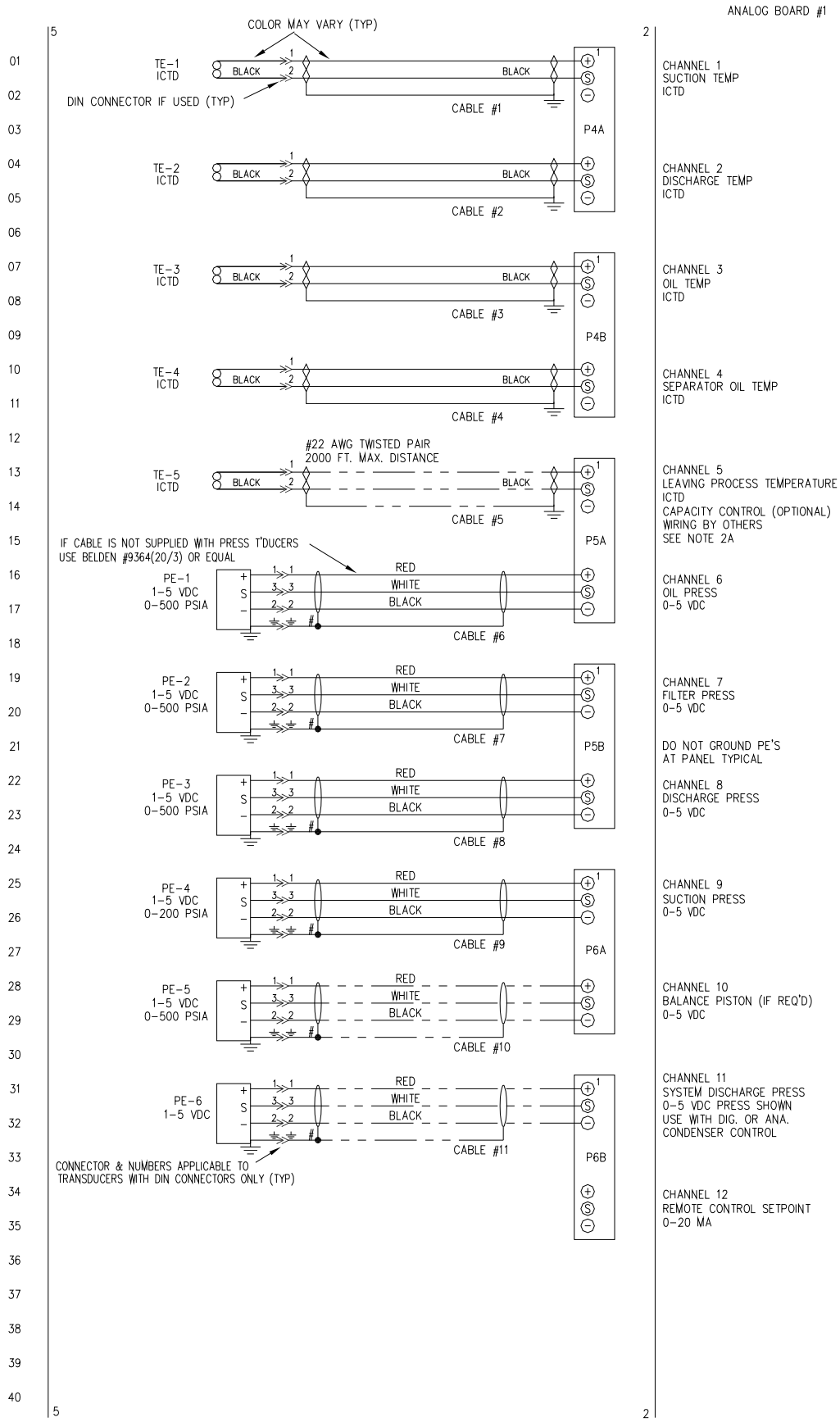
WIRING DIAGRAM – RWB II (Sheet 3 of 4)



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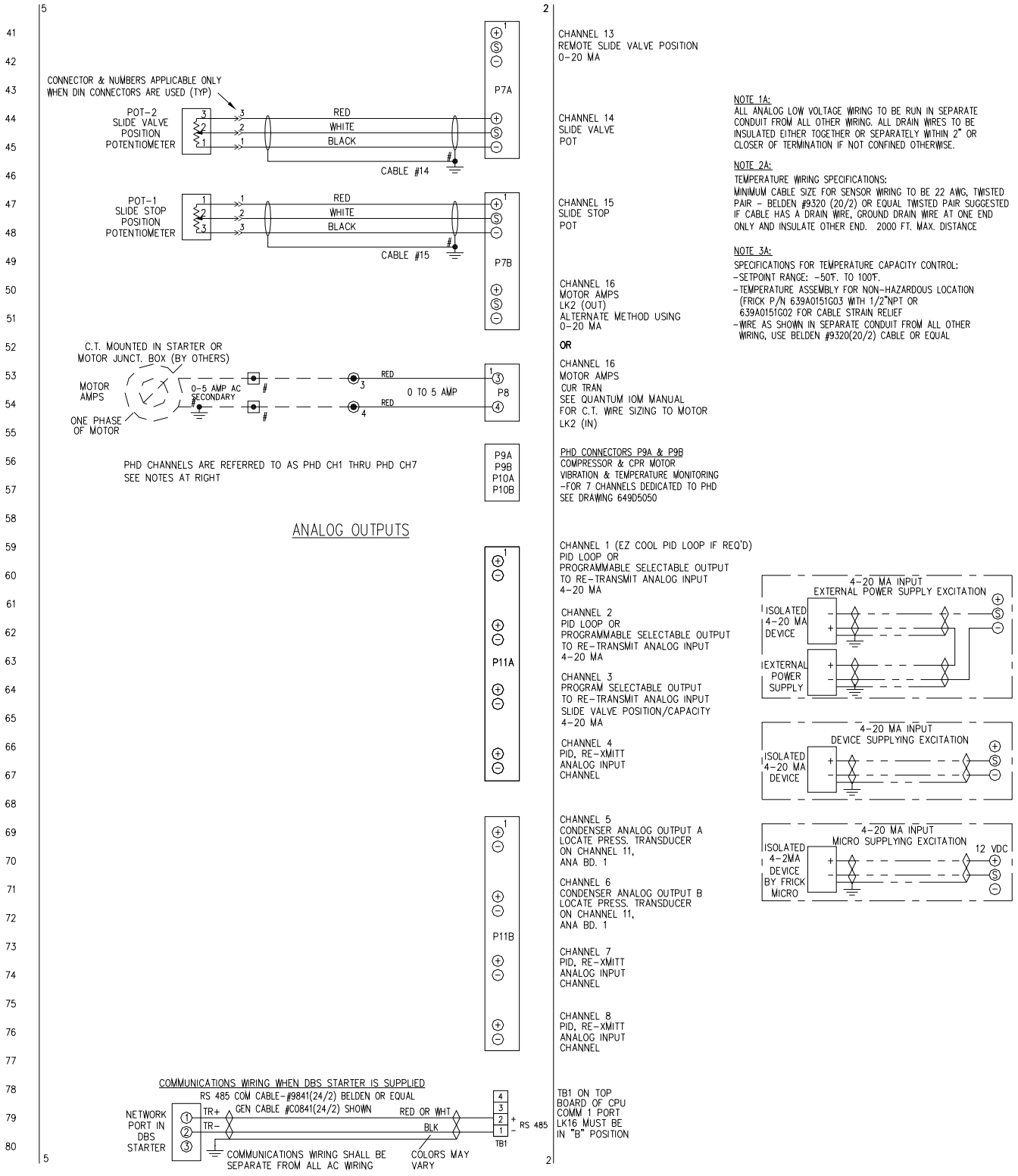
WIRING DIAGRAM – RWB II (Sheet 4 of 4)



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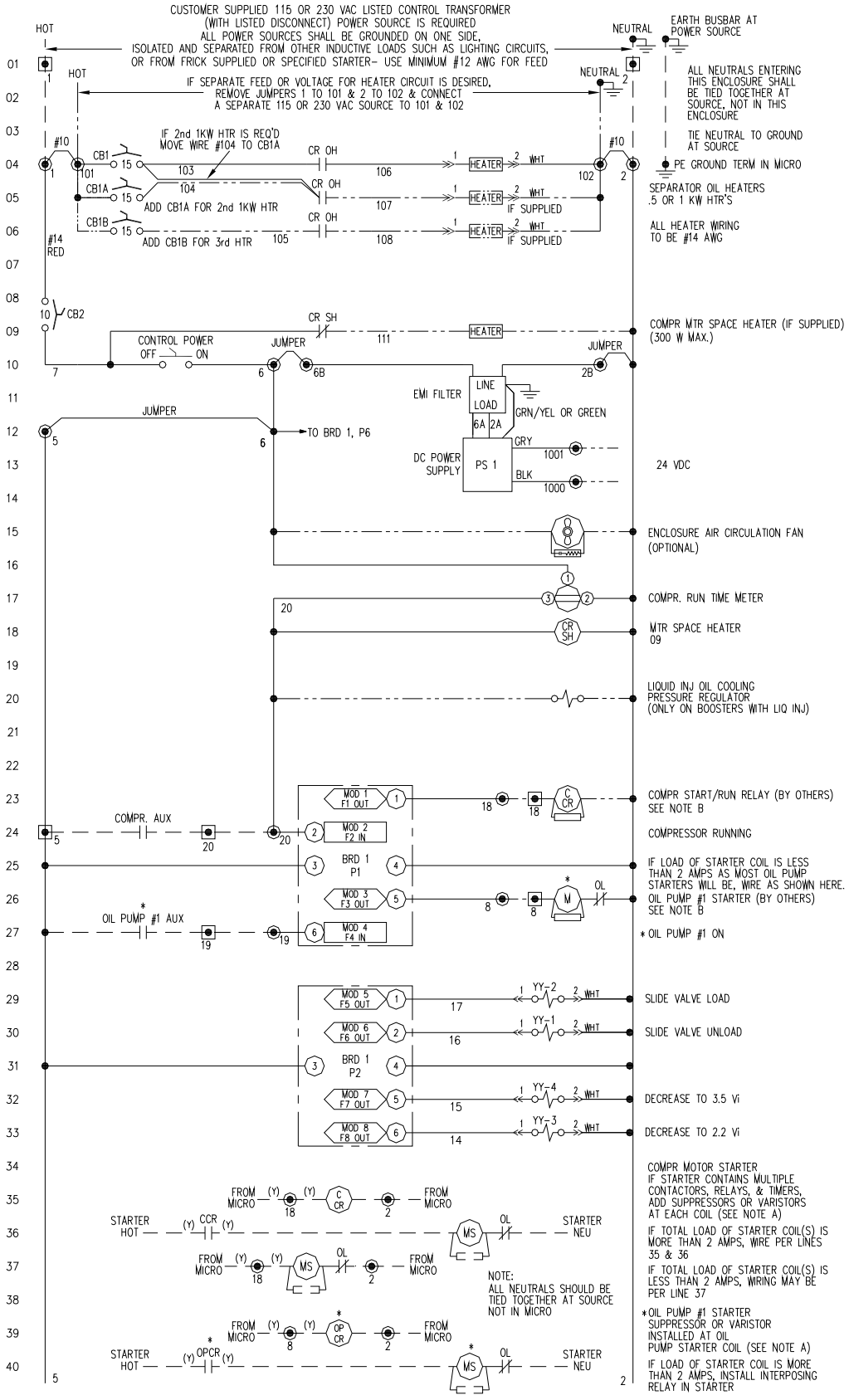
WIRING DIAGRAM – RXF (12-101) - (Sheet 1 of 4)



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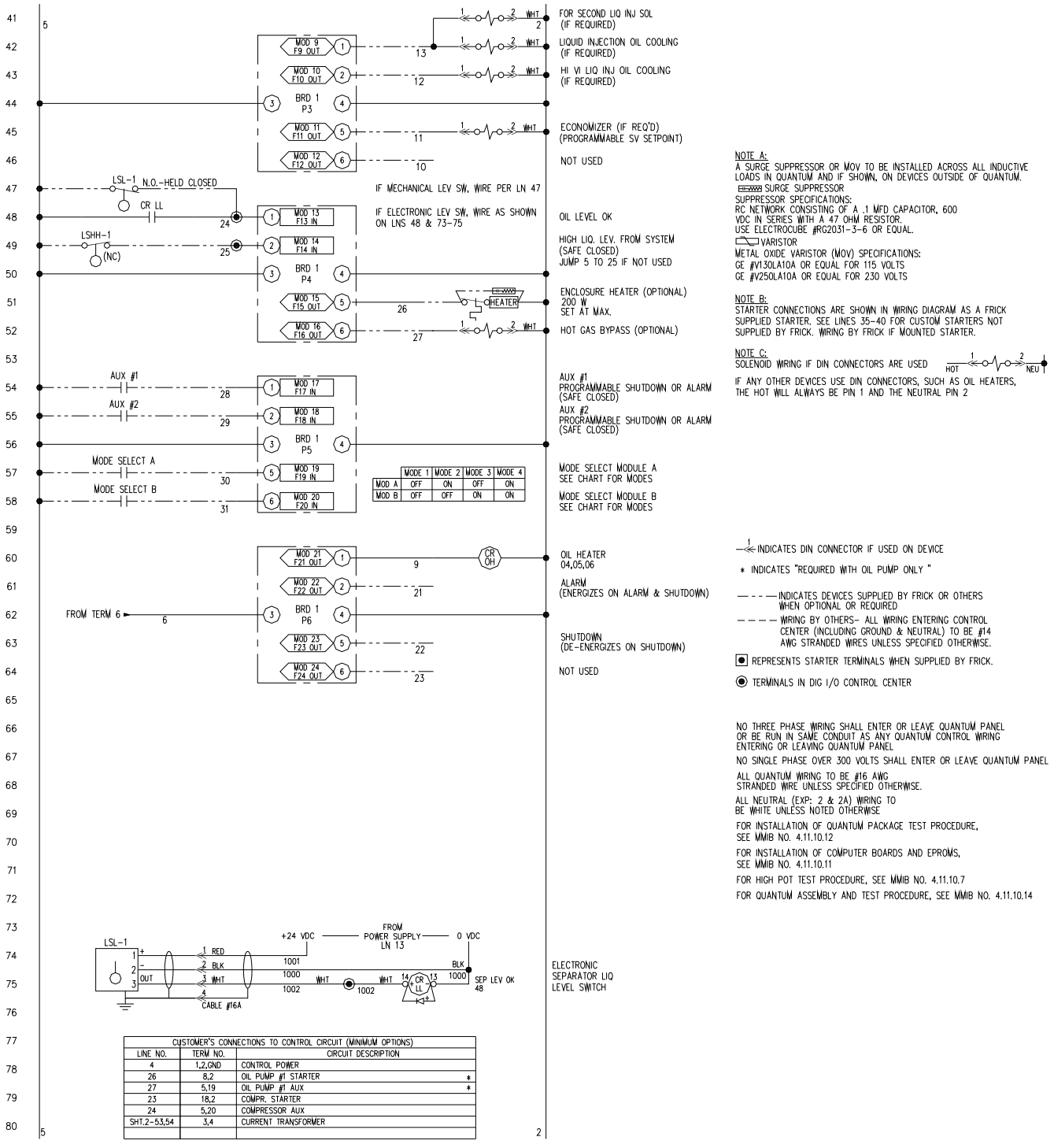
WIRING DIAGRAM – RXF (12-101) - (Sheet 2 of 4)



CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)			
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION	
4	1,2,GND	CONTROL POWER	
26	8,2	OIL PUMP #1 STARTER	*
27	5,19	OIL PUMP #1 AUX	*
23	18,2	COMPR. STARTER	
24	5,20	COMPRESSOR AUX	
SHT.2-53,54	3,4	CURRENT TRANSFORMER	

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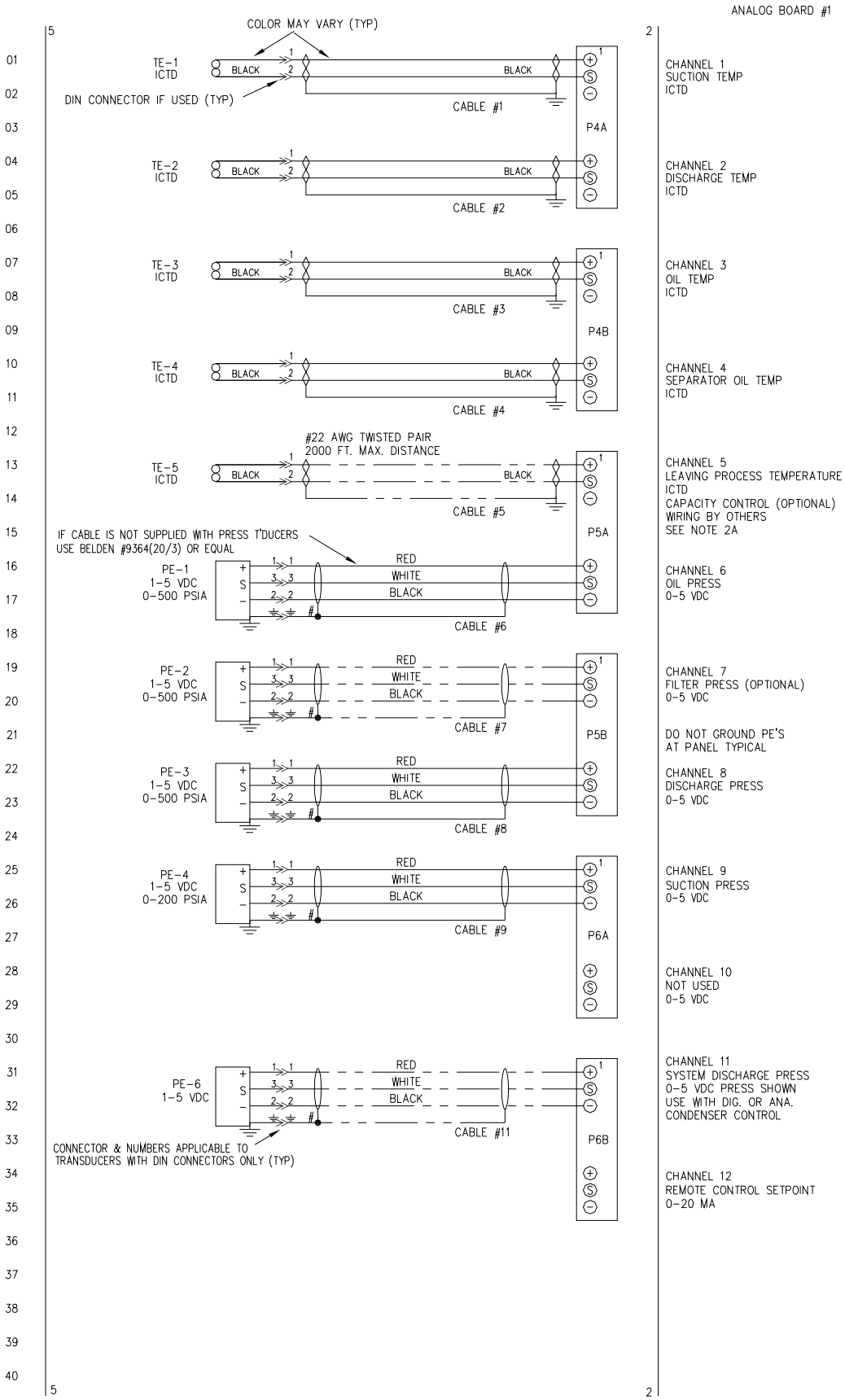
WIRING DIAGRAM – RXF (12-101) - (Sheet 3 of 4)



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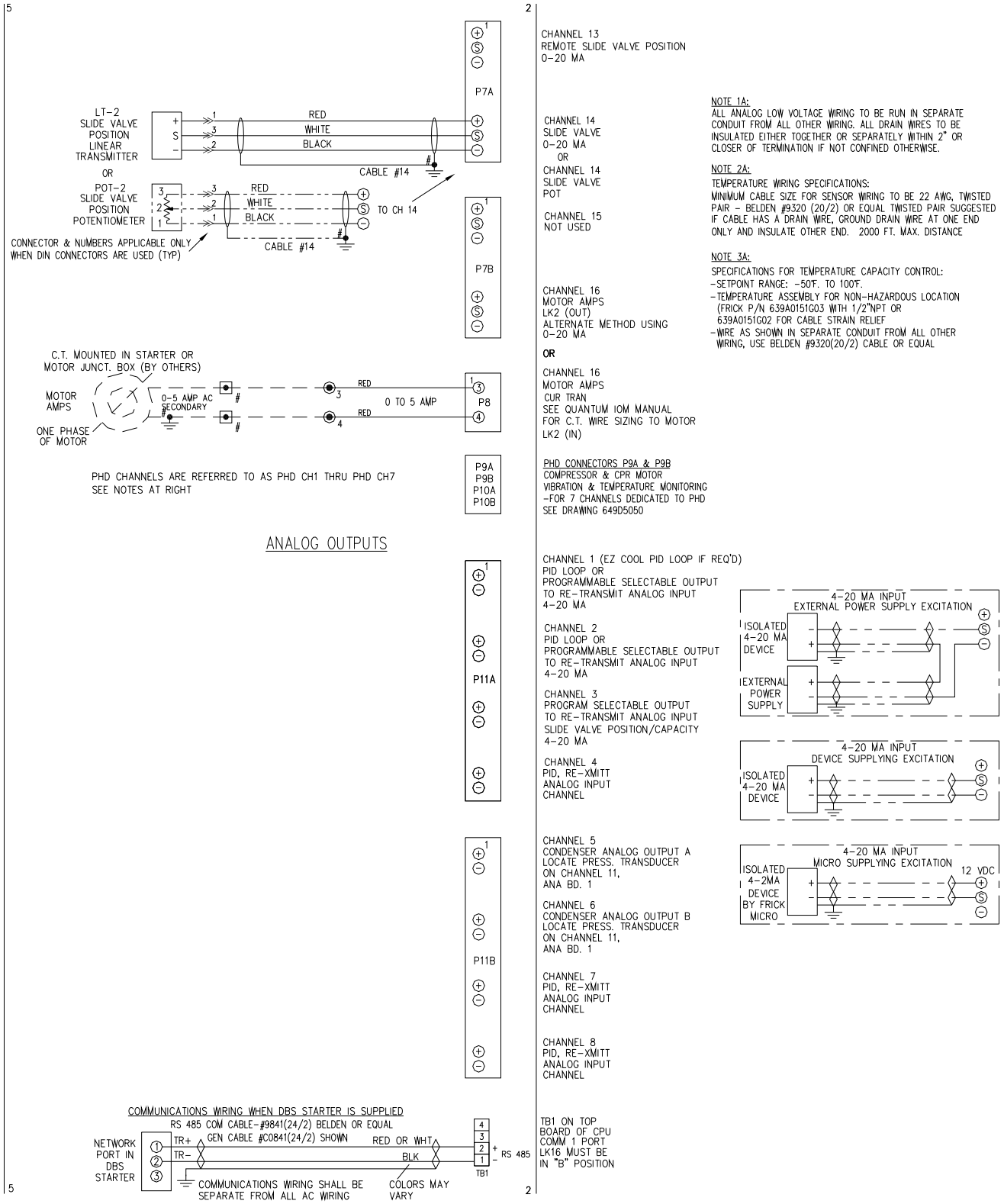
WIRING DIAGRAM – RXF (12-101) - (Sheet 4 of 4)



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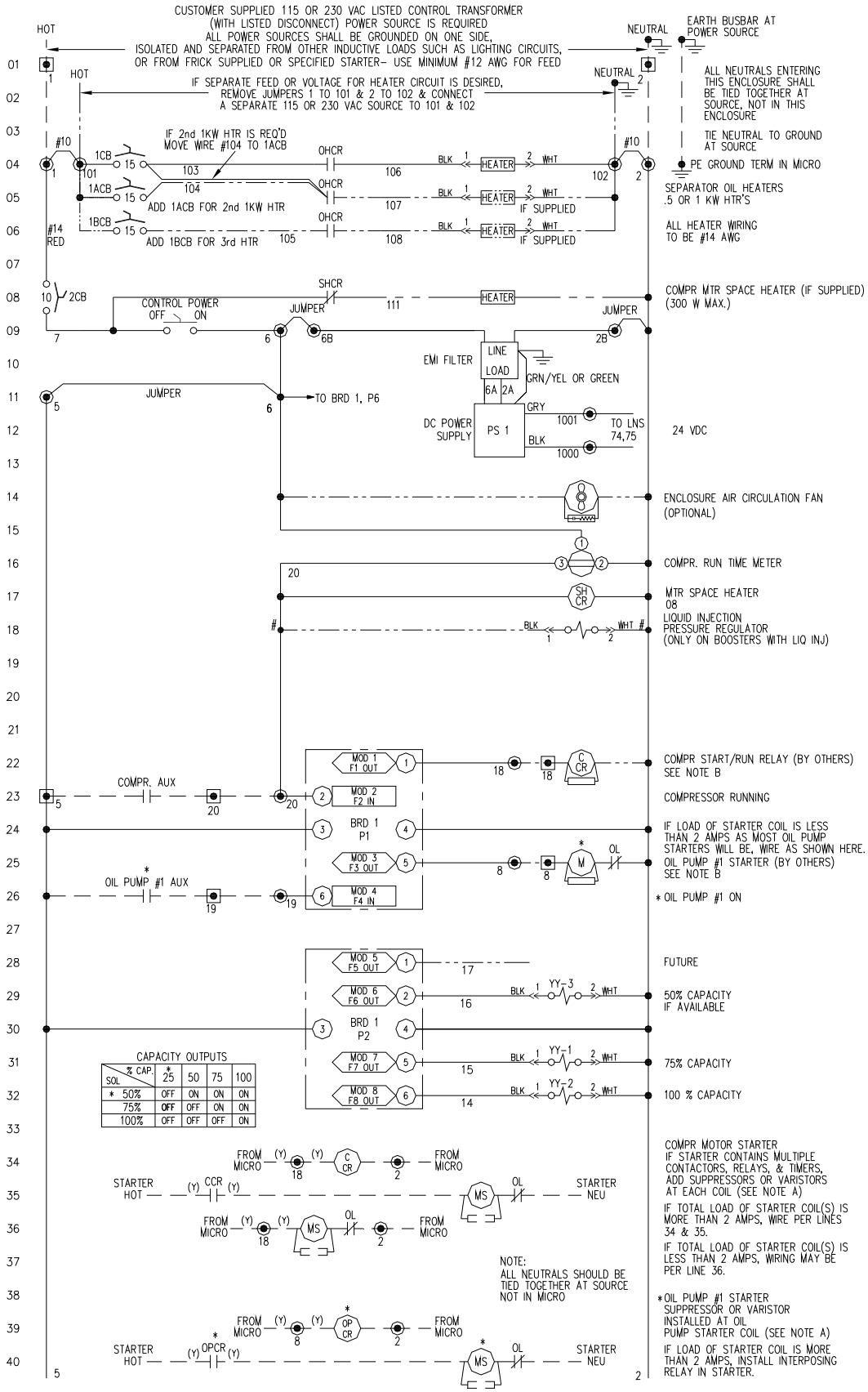
WIRING DIAGRAM – RDB (Sheet 1 of 4)



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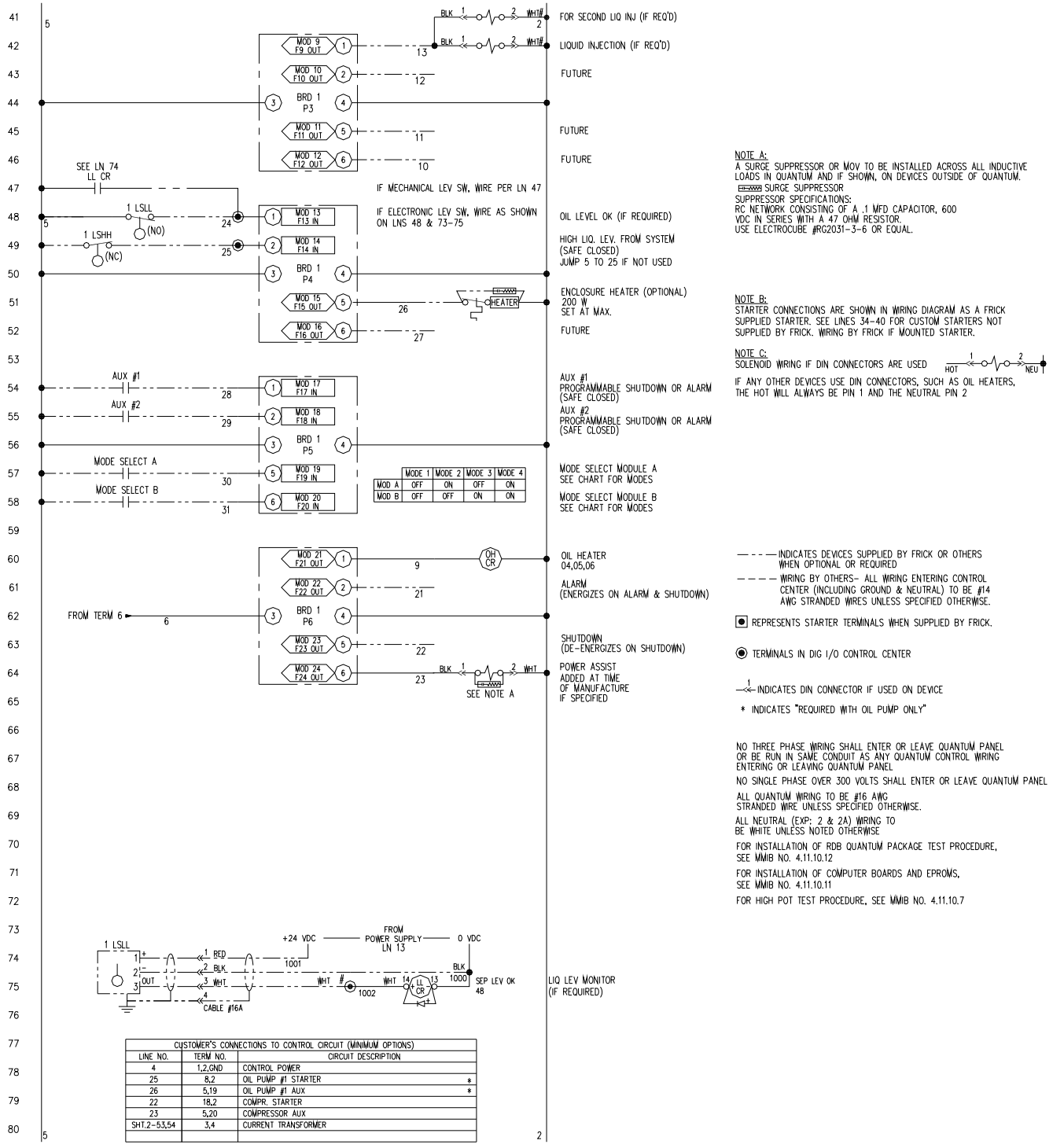
WIRING DIAGRAM – RDB (Sheet 2 of 4)



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.

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.

NOTE C:
SOLENOID WIRING IF DIN CONNECTORS ARE USED (HOT / NEU)
IF ANY OTHER DEVICES USE DIN CONNECTORS, SUCH AS OIL HEATERS, THE HOT WILL ALWAYS BE PIN 1 AND THE NEUTRAL PIN 2

- - - - 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
INDICATES DIN CONNECTOR IF USED ON DEVICE
* 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 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

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)			
LINE NO.	TERM NO.	CIRCUIT DESCRIPTION	
4	1,2,GND	CONTROL POWER	
25	8,2	OIL PUMP #1 STARTER	*
26	5,19	OIL PUMP #1 AUX	*
22	18,2	COMPR. STARTER	
23	5,20	COMPRESSOR AUX	
SHT.2-53,54	3,4	CURRENT TRANSFORMER	

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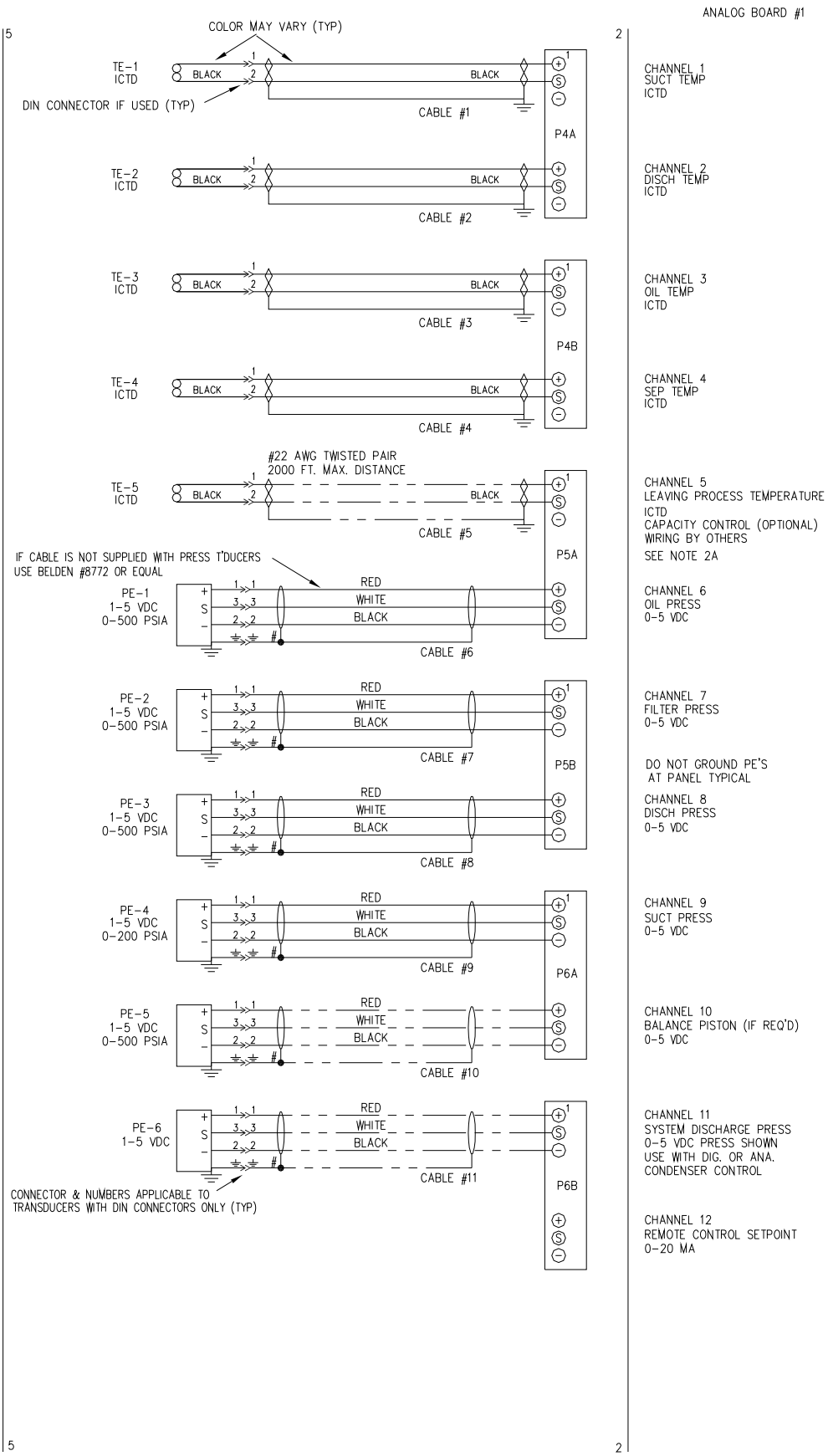
WIRING DIAGRAM – RDB (Sheet 3 of 4)



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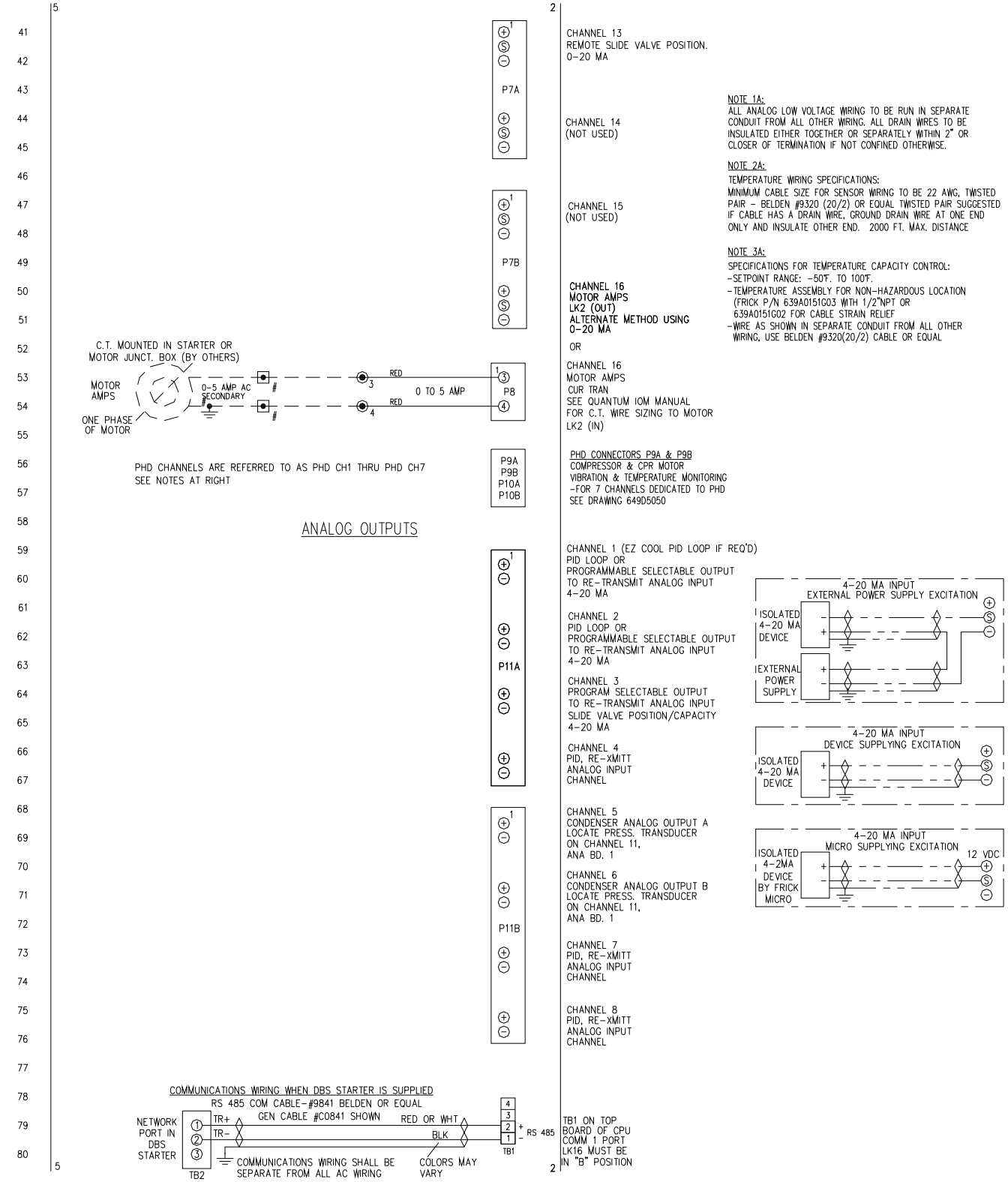
WIRING DIAGRAM – RDB (Sheet 4 of 4)



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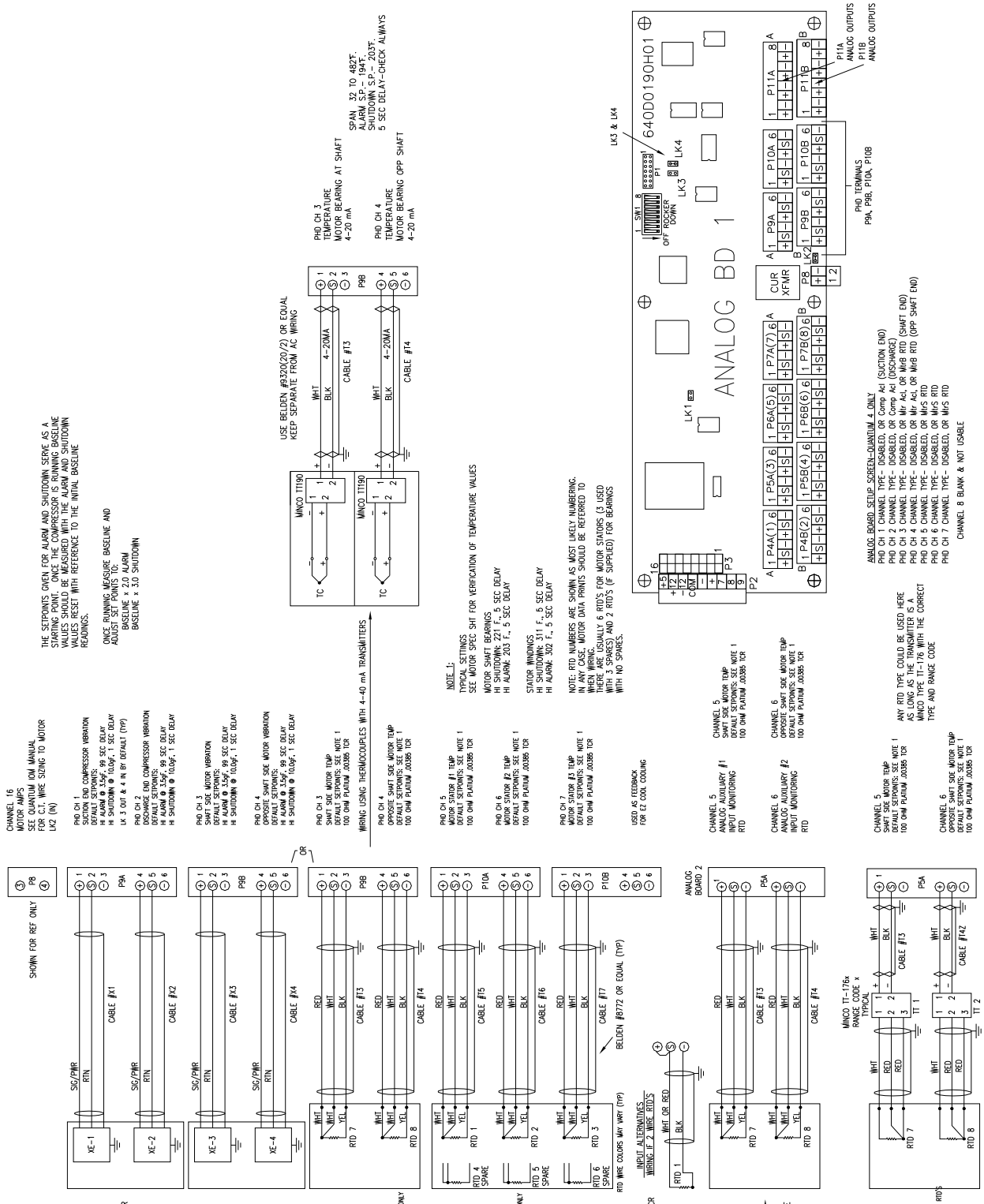
WIRING DIAGRAM PHD



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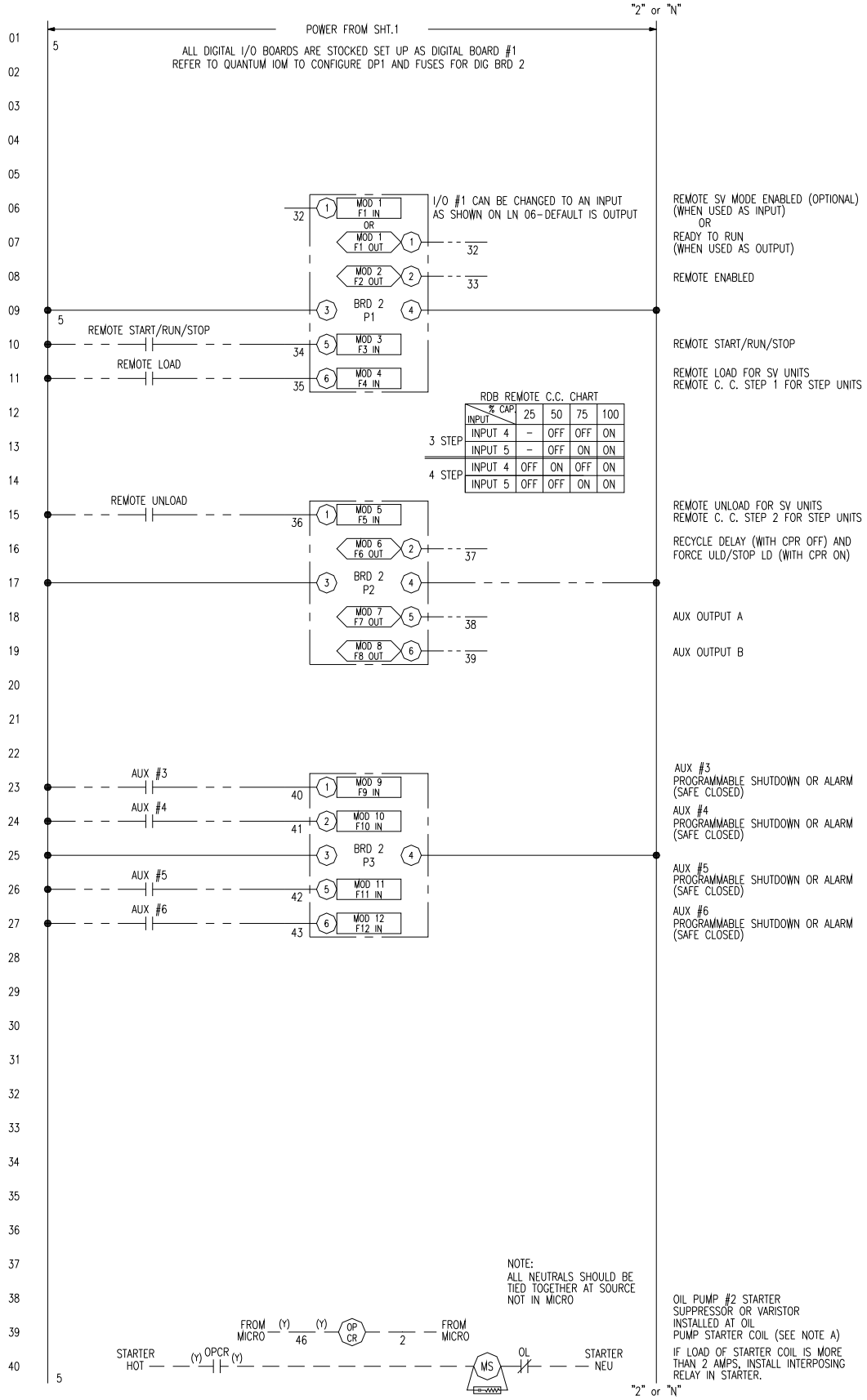
WIRING DIAGRAM - DIGITAL I/O BOARD 2 (Sheet 1 of 2)



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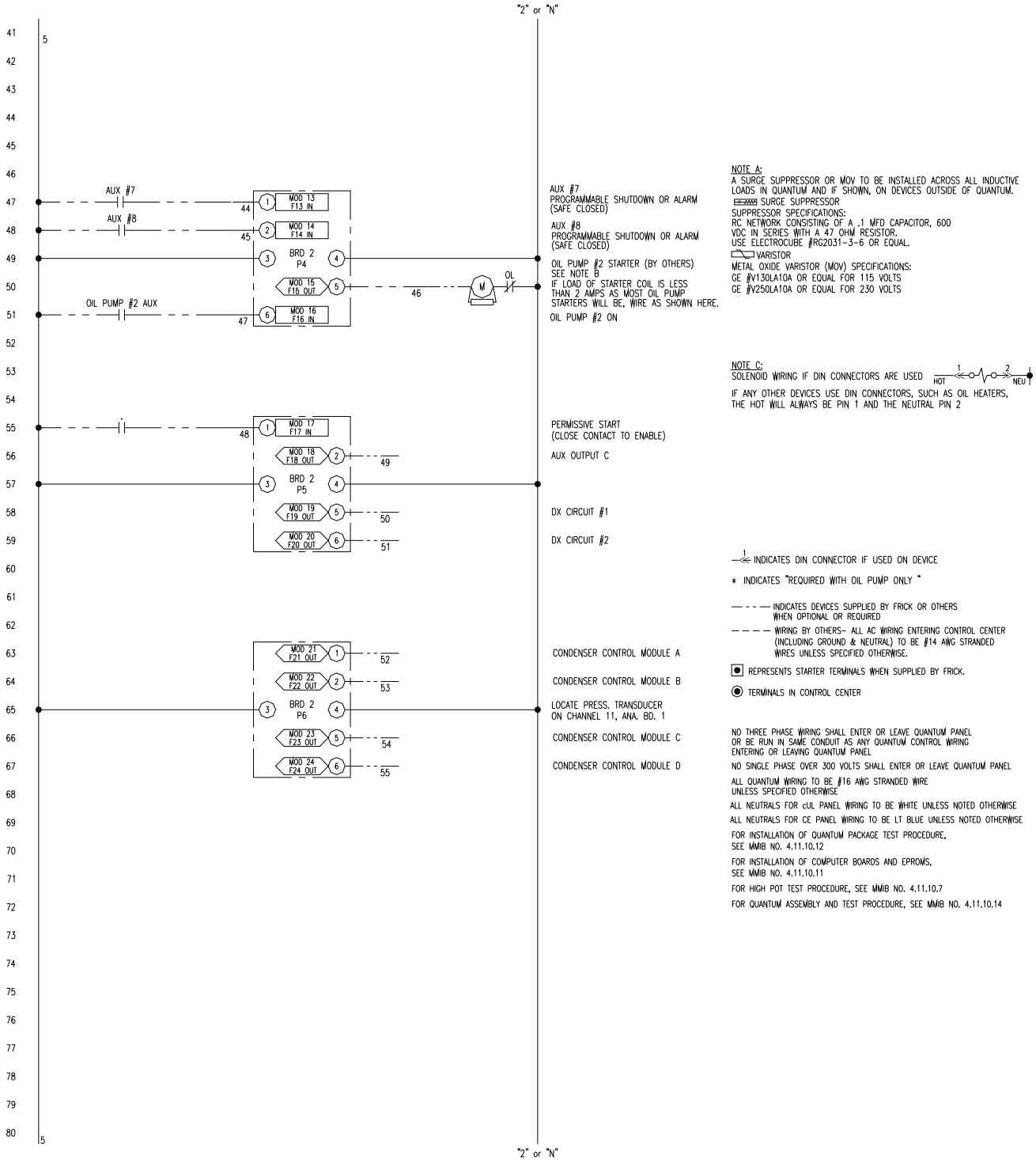
WIRING DIAGRAM - DIGITAL I/O BOARD 2 (Sheet 2 of 2)



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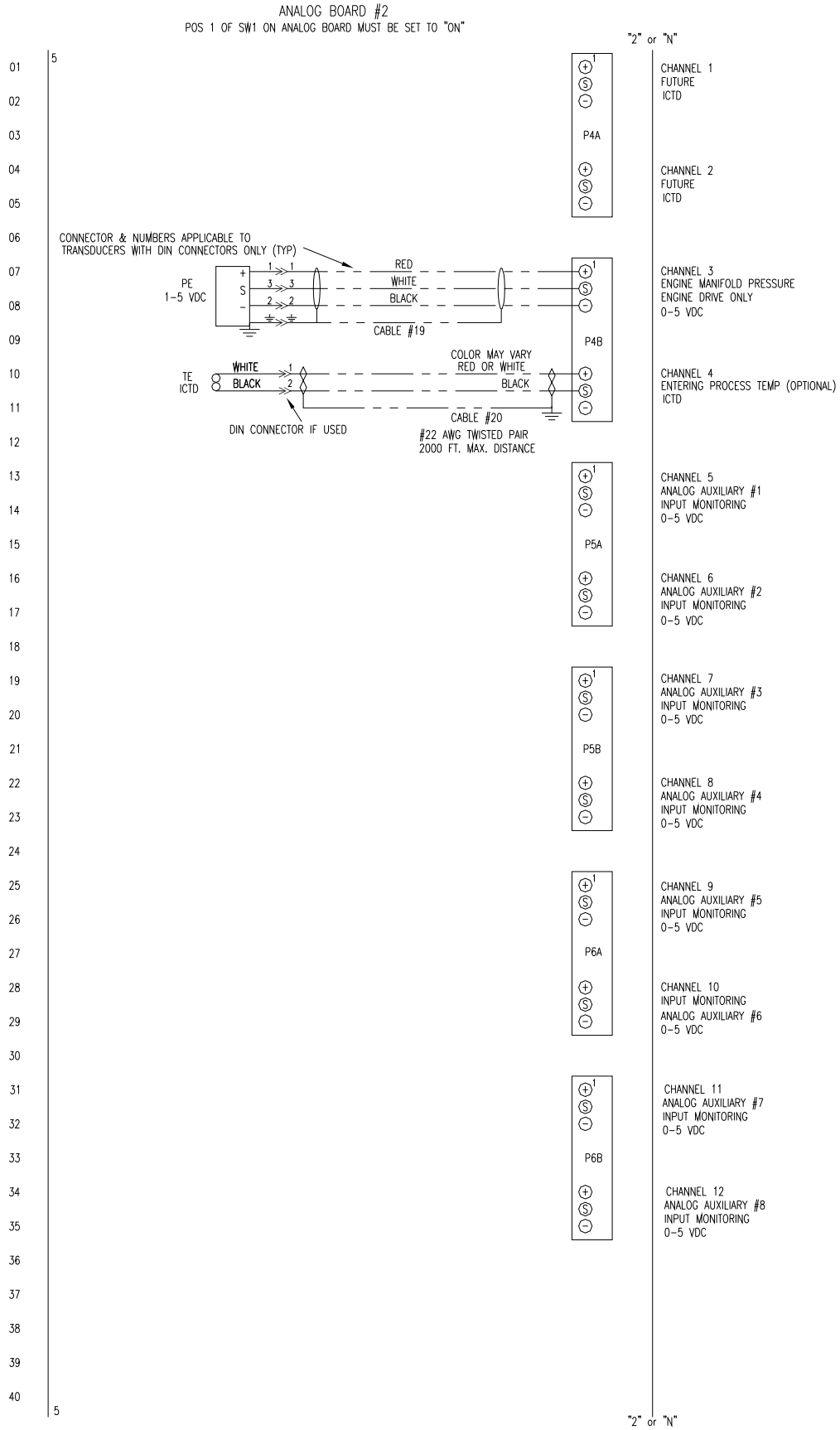
WIRING DIAGRAM - ANALOG I/O BOARD 2 (Sheet 1 of 2)



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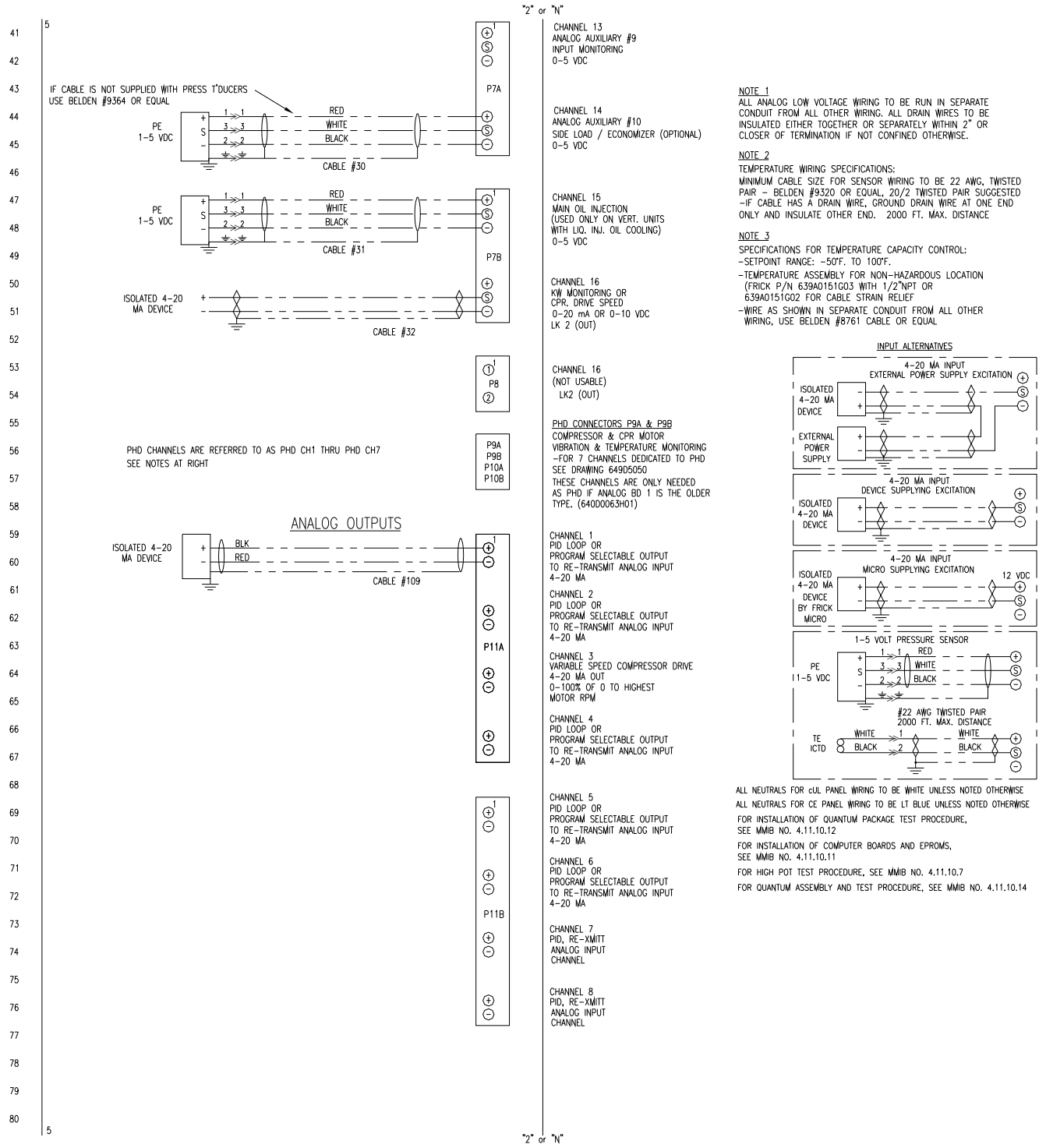
WIRING DIAGRAM - ANALOG I/O BOARD 2 (Sheet 2 of 2)



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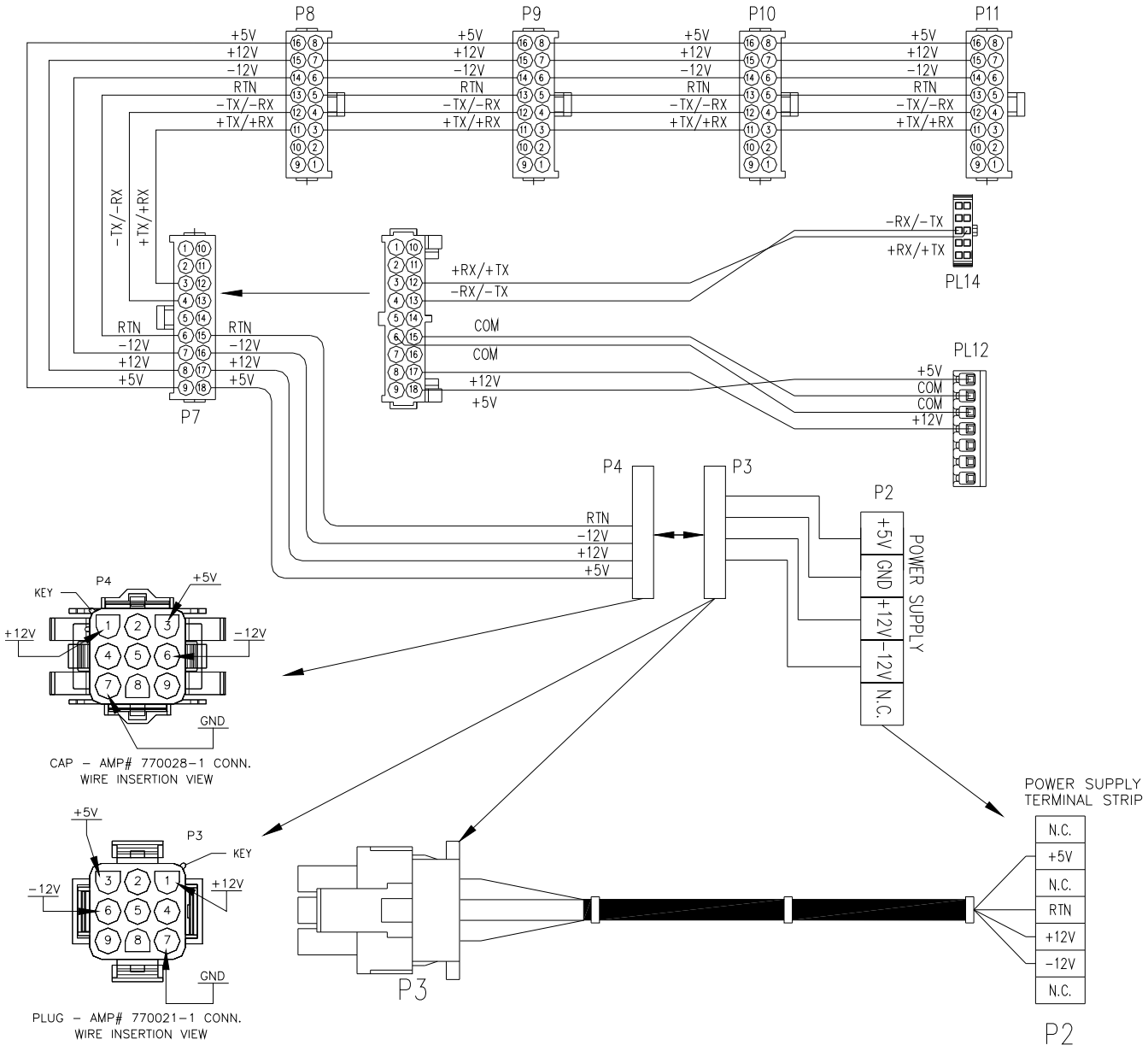
QUANTUM™ I/O & D.C. POWER HARNESS (36 AND 48 INCH PANELS)



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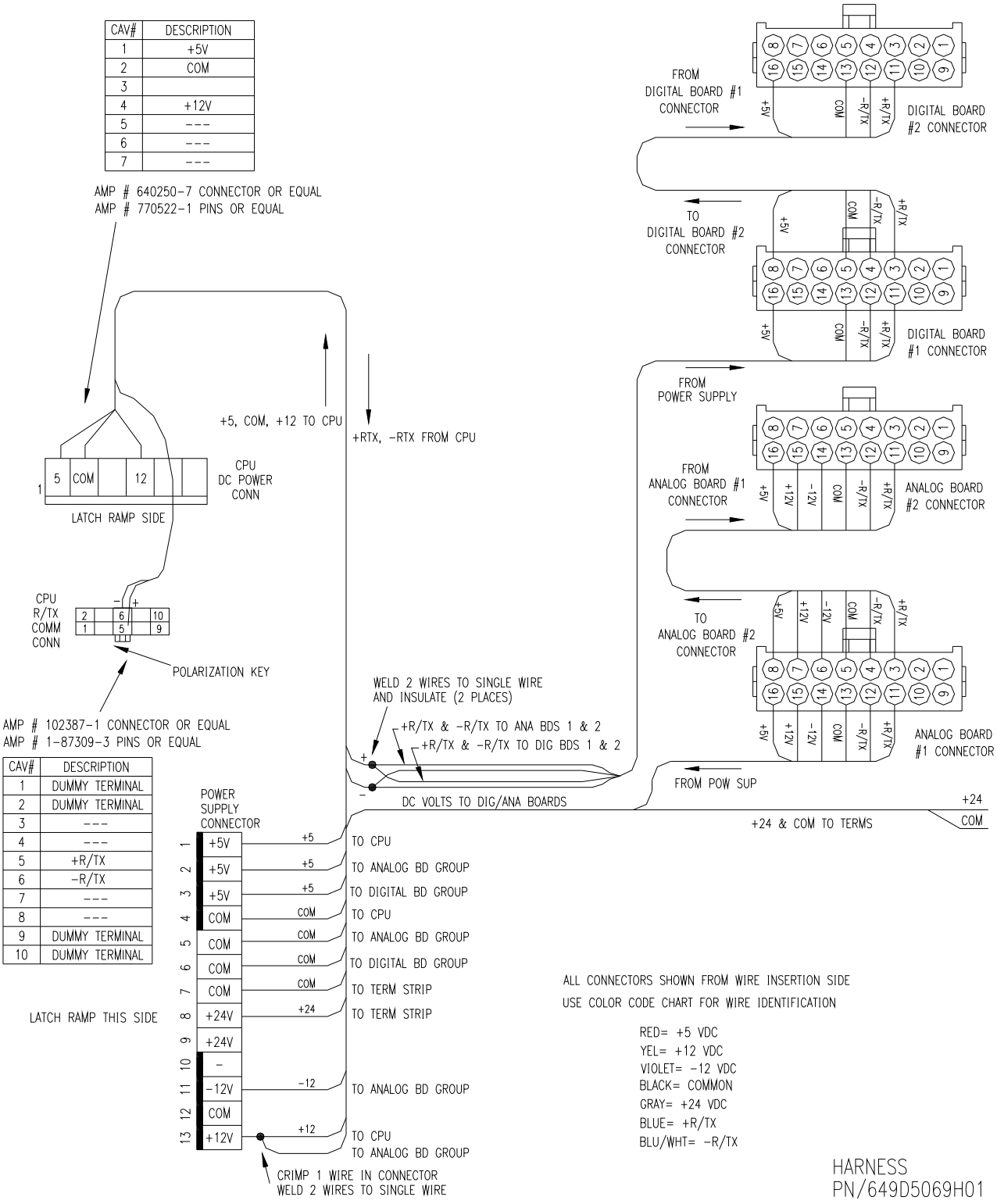
QUANTUM™ I/O & D.C. POWER HARNESS (22 AND 28 INCH PANELS)



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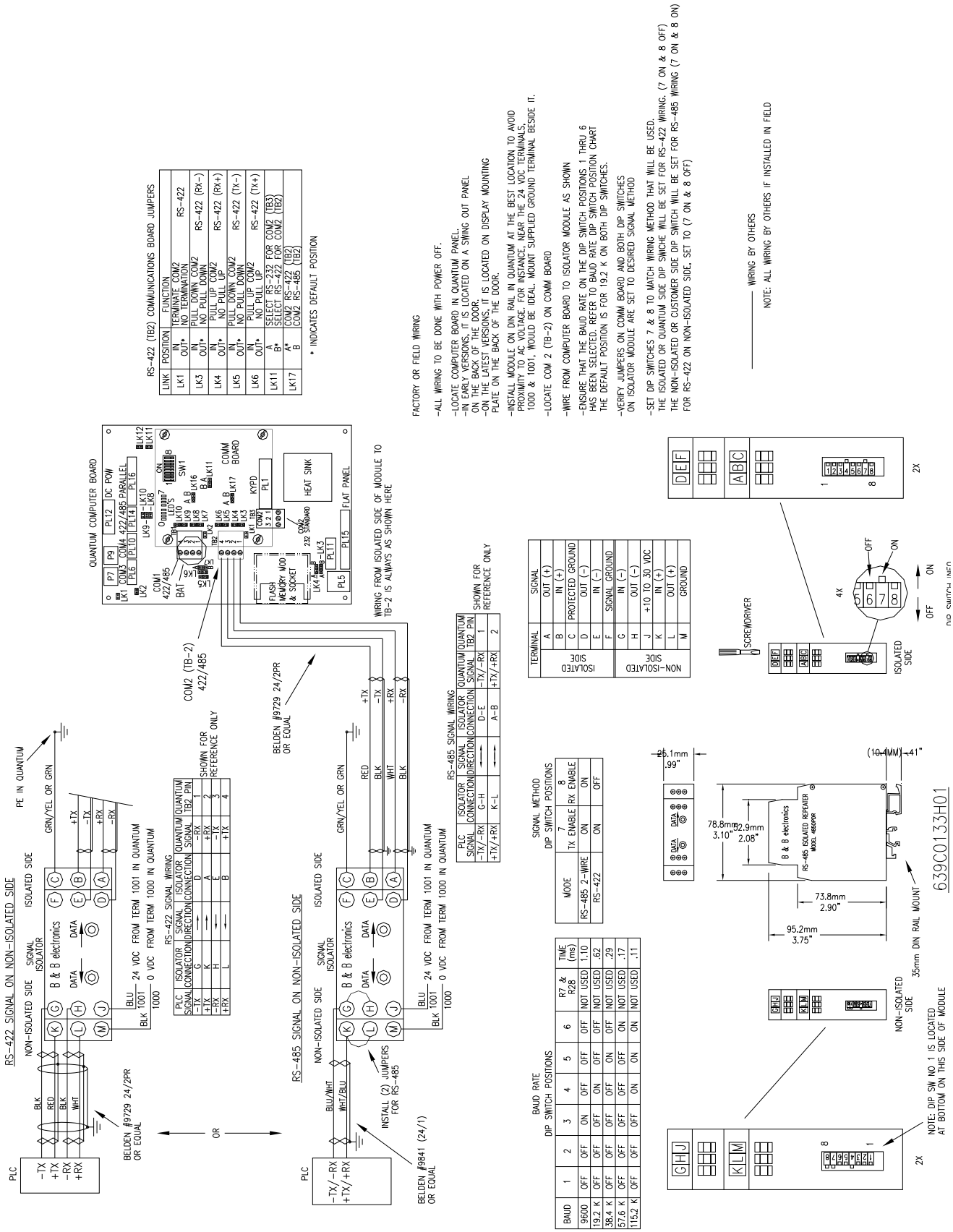
ISOLATER REPEATER MODULE (ISOLATES COMMUNICATIONS SIGNALS)



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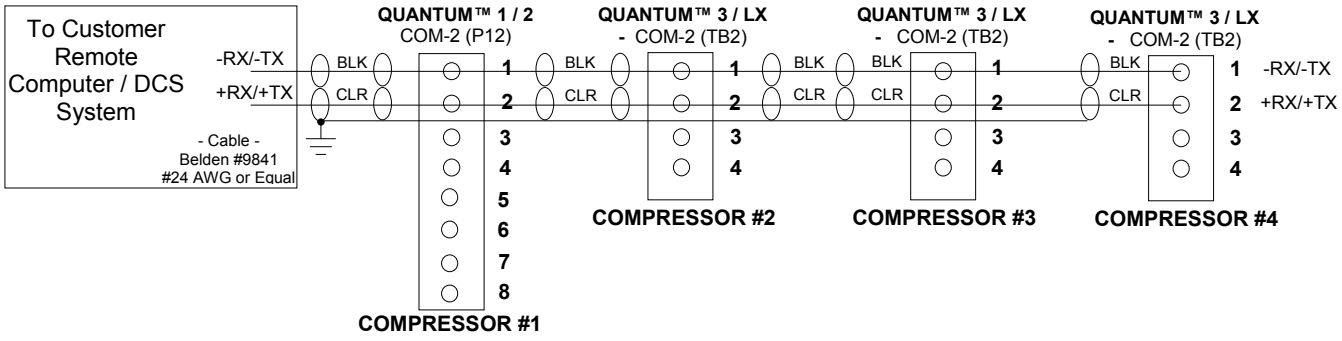
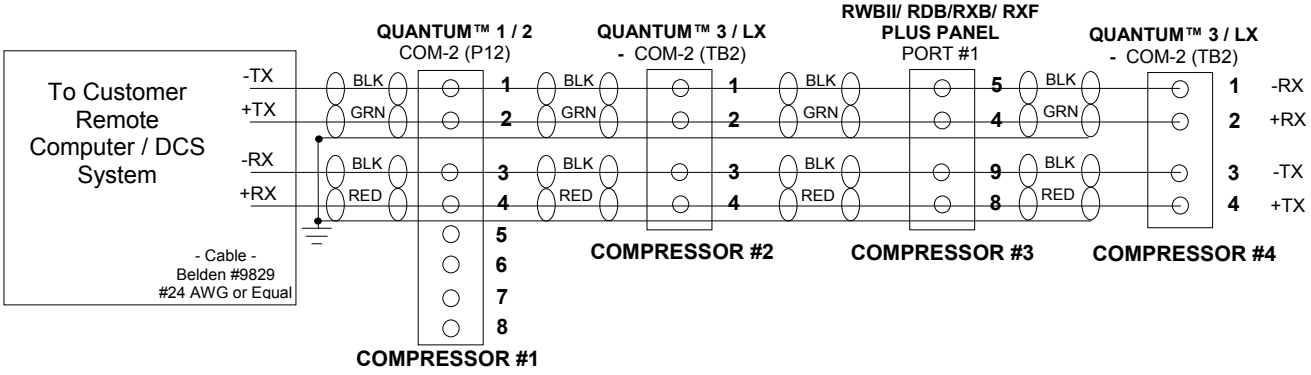
COMMUNICATIONS WIRING DIAGRAMS

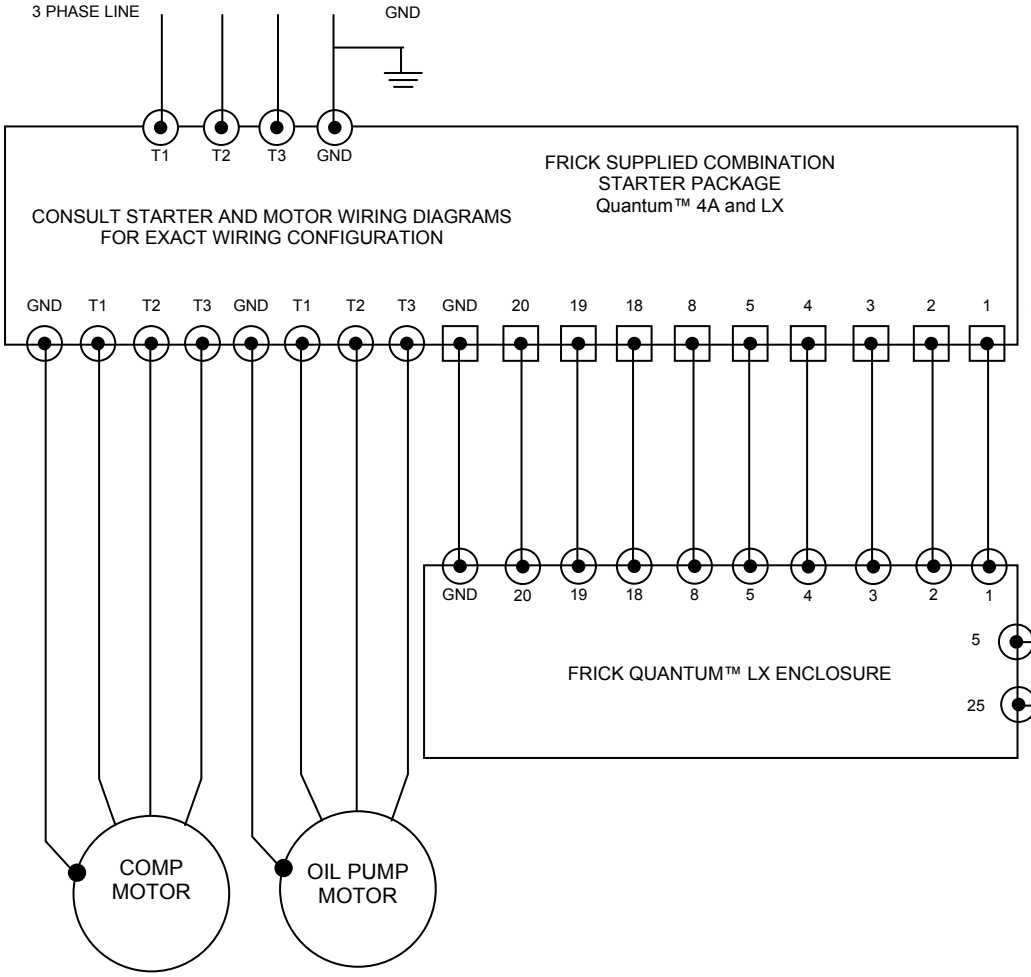
TO CUSTOMER REMOTE COMPUTER/DCS
RS-485 COMMUNICATIONS



TO CUSTOMER REMOTE COMPUTER/DCS
RS-422 COMMUNICATIONS



POINT-TO-POINT FIELD WIRING DIAGRAM



NOTES:

1. REFER TO MOTOR NAMEPLATE FOR CORRECT MOTOR CONNECTION.
2. SEPARATE 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.

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.**

QUANTUM™ LX COMPRESSOR REPLACEMENT PARTS (PAGE 1 OF 3)

Legacy Number	New Number	Description
		Analog Boards
640C0057G01	484532	Analog Board #1 *(Replaces existing 32 channel board #1 only - no hardware)*
640C0057G02	484533	Analog Board #2 *(Replaces existing 32 channel board #2 only – no hardware)*
640C0057G11	484534	Analog Board #1 *(Field Upgrade Kit – Includes 32 channel board #1, connectors & hardware.)*
640C0057G12	484535	Analog Board #2 *(Field Upgrade Kit – Includes 32 channel board #2, connectors & hardware.)*
		Circuit Breakers
639A0206H10	484050	10 Amp circuit breaker
639A0206H15	484053	15 Amp circuit breaker
639A0206H20	484055	20 Amp circuit breaker
		Connectors
649B0903H01	486156	2-Pole connector *(P8 – Analog Board)*
333Q0001258	467049	6-Pole connector *(P1 through P6 – Digital Board, P4A through P10B – Analog Board)*
333Q0001234	467040	8-Pole connector *(P11A and P11B – Analog Board)*
649B0903H02	486157	9-Pole connector *(P2 – Analog Board)*
		Control Power
333Q0001418	467096	Filter, Line
333Q0001191	467024	Hour meter
639A0185H10	483963	2-Pos. Selector Switch *(Control Power)*
639A0185H30	483966	Latch, 3 Across *(Attaches contact block to switch mechanism)*
639A0185H36	483969	Normally Open Contact Block *(for Control Power Switch)*
333Q0000195	466846	Relay base, 2 Pole
333Q0000207	466849	Relay base, 3 Pole
333Q0000196	466847	Relay hold down clips
333Q0001095	466996	Relay, 2 Pole, 24 VDC
333Q0000194	466845	Relay, 2 Pole, 115 VAC
333Q0000898	466979	Relay, 2 Pole, 220 VAC
333Q0000520	466897	Relay, 3 Pole, 24 VDC
333Q0000206	466848	Relay, 3 Pole, 115 VAC
333Q0000897	466978	Relay, 3 Pole, 220 VAC
111Q0280958	455040	Surge suppresser
		Digital Boards
333Q0001172	467015	Output Module, 24 VDC
111Q0281061	455056	Output Module, 24-280 VAC
333Q0001171	467014	Input Module, 24 VDC
333Q0000116	466842	Input Module, 120 VAC
333Q0000789	466949	Input Module, 230 VAC
333Q0001326	467073	Fuse, 5 amp, 250 V
640C0024G01	484494	Digital Board #1 *(Replaces existing board only - no hardware)*
640C0024G02	484495	Digital Board #2 *(Replaces existing board only - no hardware)*
649D5210G11	486364	Digital Board #2 *(Field Upgrade Kit– adds a second digital board for 22 x 18 x 10 panels)*

QUANTUM™ LX COMPRESSOR REPLACEMENT PARTS (PAGE 2 OF 3)

Legacy Number	New Number	Description
		Display Accessories
333Q0001588	N/A	Backlight *(Sharp single bulb – 2 wire)*
333Q0001955	548882	Backlight *(Sharp dual-bulb – 4 wire)*
639A0261H01	484329	CCFT inverter
639D0174H01	484428	Display Harness, 10 inch *(Quantum™ 4 or LX processor mounted on display plate)*
639D0174H11	504876	Display Harness, 21 inch *(Quantum™ 4 or LX processor mounted on swing-out door)*
		Display (Indoor)
639D0175G01	515456	Display Assembly *(when replacing any display other than 639C0135G01)* includes:
		Legacy Number / *New Number*
		Display* — *639C0132H01* / *484379*
		Inverter — *639A0261H01* / *484329*
		Mounting plate — *639C0134H01* / *484382*
		Display Harness, for Quantum™ 1, 2, or 3 Sharp display — *640B0045H01* / *484478*
		Display Harness, for Quantum™ 4 or LX, standard panel — *639D0174H01* / *484428*
		Display Harness for Quantum™ 4 or LX, swing-out door — *639D0174H11* / *504876*
		Harness, Inverter — *639B0101H01* / *484345*
		Hardware
639C0135G01	504877	Display Assembly *(when replacing a 639C0135G01 display only)* includes:
		Legacy Number / *New Number*
		Display* — *639C0132H01* / *484379*
		Mounting plate — *639C0134H01* / *484382*
		Hardware
		Display (Outdoor)
639C0135G11	530292	Display Assembly, *(when replacing a 639C0135G11 or 649C1024G11 display only)* includes:
		Legacy Number / *New Number*
		Display* — *649C1094H01* / *486200*
		Mounting plate — *639C0134H01* / *484382*
		Hardware
		Fans
649A0906G13	N/A	Internal Circulation Fan, Field Install, 24 VDC
649A0906G11	485514	Internal Circulation Fan, Field Install, 115 VAC
649A0906G12	N/A	Internal Circulation Fan, Field Install, 220 VAC
		Flash Cards and Software
649A0884Gxx	N/A	Quantum™ LX Program Flash Card *(the xx indicates program version)*
649A1063G01	485994	Quantum™ LX program upgrade *(USB Drive)*
649A1063G99	485995	Quantum™ LX Setpoint Saver *(USB Drive)*
649D5236G11	486386	Quantum LX upgrade kit *(upgrades from Quantum™ 4 to Quantum™ LX, includes Frick® logo keypad and flash card)*

*These parts cannot be ordered separately

QUANTUM™ LX COMPRESSOR REPLACEMENT PARTS (PAGE 3 OF 3)

Legacy Number	New Number	Description
		Harnesses
649D5070H01	486299	AC harness for Digital board # 1 *(22 x 18 x 10 panel)*
649D5070H02	486300	AC harness for Digital board # 2 *(22 x 18 x 10 panel)*
640B0038H01	484471	DC power-I/O communications harness *(36 x 30 x 14 panel, blue harness)*
649D5069H01	486298	DC power-I/O communications harness *(22 x 18 x 10 panel, color-coded harness)*
640B0031H01	484470	Keypad cable *(used with 640D0060H11 keypad)*
649B0862H01	486153	Quantum™ 4 Adapter Harness *(used with 640B0038H01 harness only)*
640B0039H01	484473	Shunting plug *(used with 640B0038H01 harness only)*
		Keypads
640D0186H01	484621	Keypad/overlay with Frick logo *(Quantum LX)*
640D0060H11	484556	Keypad/overlay with Frick logo for upgrading from Quantum to Quantum LX
		Miscellaneous
333Q0001786	N/A	Battery, 3V *(located on Quantum™ 3 and 4 board)*
640A0032H01	484437	Plexiglas *(mounts in front of display)*
		Panel Heaters
640M0007G16	484626	200 W, 115 VAC
640M0007G18	484627	400 W, 115 VAC
640M0007G27	484632	200 W, 220 VAC
640M0007G21	484629	400 W, 220 VAC
		Power Supply
640C0022G01	484492	DC power supply – Condor GLC-75D *(includes power supply harness)*
649A0954H19	485608	Fuse, 3.15A @ 250V *(for Condor GLC-75D)*
649A1036H08	485887	24 VDC Power Supply, 3 Amp, din-rail mounted *(Power Pac)*
649A1036H12	485889	24 VDC Power Supply, 5 Amp, din-rail mounted *(Power Pac)*
		Quantum™ Boards
649C1091G01	486194	Quantum™ 4 *(Arcom GX1)*
639C0130G01	484378	Communications Daughter board only for Quantum™ 4.
649C1083G01	486181	Upgrade from Quantum™ 1, 2 or 3 to Quantum 4

REMANUFACTURED PARTS

Legacy Number	New Number	Description
640C0024S01	N/A	Digital I/O Board
640C0022S01	N/A	DC Power Supply (Condor to Condor)
640C0057S01	484537	Analog I/O Board (32 Channel)
649C1091S01	486198	Quantum™4 to Quantum™ 4

NOTES:

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