7400 Plus

Four Channel Controller

WARNING

READ AND FOLLOW THE ENTIRE CONTENT OF THIS MANUAL PRIOR TO USE. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

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1. Safety and General Information

WARNING

ALL INDIVIDUALS WHO HAVE OR WILL HAVE RESPONSIBILITY FOR USING OR TESTING THIS PRODUCT MUST READ AND UNDERSTAND THE CONTENTS OF THIS MANUAL. THE PRODUCT WILL PERFORM AS DESIGNED ONLY IF USED AND TESTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. FAILURE TO FOLLOW MANUFACTURER'S INSTRUCTIONS WILL RENDER THE WARRANTY AND APPROVALS NULL AND VOID. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY ALSO RESULT IN SERIOUS INJURY OR DEATH.

1.1. Important Notices

Scott Health and Safety can take no responsibility for use of its equipment if it is not used in accordance with the instructions. If further operational or maintenance details are required but not provided in this manual, contact Scott Health and Safety or their agent. Scott Health and Safety shall not be liable for any incidental or consequential damages in connection with any modifications, errors or omissions in this manual. While every effort has been made to ensure accuracy in this owner's manual, no responsibility can be accepted for errors or omissions. Additionally, industry standards, codes, and legislation are subject to change. This publication is not intended to form the basis of a contract, and the company reserves the right to amend the design, content, and specifications of the detector without notice.

1.2. Certifications and Approvals

UL1604	EN 61000	ISA S82.02	CSA C22.2 No 152
	EN 55011		CSA C22.2 No 1010.1
			CSA C22.2 No 213 (Div 2 Groups A, B, C, D)
			CSA File # 219995

The 7400 Plus enclosure is rated for Class I, Division 2, Groups A,B,C and D or non-hazardous locations only.

1.3. Warnings, Cautions, and Notes

Throughout this document, warnings, cautions, and notes have been interspersed to draw attention to potentially unsafe, hazardous, or unique situations that require user attention. Each warning, caution, or note is labeled and quickly identified using an icon.

WARNING - INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

CAUTION - INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, MAY RESULT IN MINOR OR MODERATE INJURY. IT MAY ALSO BE USED TO ALERT AGAINST UNSAFE PRACTICES.

NOTE - HIGHLIGHTS VARIOUS INSTANCES WHERE AN ATTENTION TO DETAIL IS CRITICAL TO PRODUCT PERFORMANCE.

1.3.1. General Warnings and Cautions

The following list of warnings and cautions pertain to the general use and care of the 7400 Plus.

Failure to follow these warnings and cautions may result in death, injury, or poor equipment performance.

WARNINGS

EQUIPMENT NOT USED AS PRESCRIBED WITHIN THIS MANUAL MAY IMPAIR OVERALL SAFETY.

EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITIBILITY FOR CLASS 1, DIVISION 2.

EXPLOSION HAZARD – DO NOT REPLACE FUSE UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE HAZARD FREE.

EXPLOSION HAZARD – DO NOT DISSCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE HAZARD FREE.

USE A PROPERLY RATED CERTIFIED AC POWER (MAINS) CABLE INSTALLED AS PER LOCAL OR NATIONAL CODES.

FOR DC POWERED UNITS, DC POWER MUST BE FROM A SELV RATED SOURCE.

A CERTIFIED AC POWER (MAINS) DISCONNECT OR CIRCUIT BREAKER SHOULD BE MOUNTED NEAR THE CONTROLLER AND INSTALLED FOLLOWING APPLICABLE LOCAL AND NATIONAL CODES. IF A SWITCH IS USED INSTEAD OF A CIRCUIT BREAKER, A PROPERLY RATED CERTIFIED FUSE OR CURRENT LIMITER IS REQUIRED TO BE INSTALLED AS PER LOCAL OR NATIONAL CODES. MARKINGS FOR POSITIONS OF THE SWITCH OR BREAKER SHOULD STATE (I) FOR ON AND (O) FOR OFF.

CAUTIONS

CLEAN USING ONLY A DAMP CLOTH WITH NO SOLVENTS.

DO NOT USE HAND CLEANERS, LOTIONS, SOAPS, OR ANY CLEANING PRODUCTS CONTAINING SILICONE PRIOR TO OR WHILE HANDLING CATALYTIC BEAD SENSORS, FAILURE TO DO SO MAY POISON SENSORS.

1.4. General Rules of Use

POWER MUST BE ON TO WORK. The 7400 Plus Controller will only operate while powered on.

SHOCK HAZARD! Disconnect or turn off power before servicing this instrument. NEMA 4X wall mount models should be fitted with a locking mechanism after installation to prevent access to high voltages by unauthorized personnel.

LIMIT OF CERTIFICATION. Only the combustible monitor portions of this instrument have been assessed by CSA for 122.2 No. 152 performance requirements. This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

1.5. Warranty

Scott Health & Safety (SCOTT), a division of Tyco International warrants it's 7400 Plus Controller PRODUCTS (THE PRODUCTS) to be free from defects in workmanship and materials for a period twelve (12) months from the date of original manufacture by SCOTT. This warranty applies to all components of THE PRODUCTS.

SCOTT's obligation under this warranty is limited to replacing or repairing (at SCOTT's option) THE PRODUCTS shown to be defective in either workmanship or materials.

To maintain the warranty THE PRODUCT must be installed and maintained in accordance with the operating and maintenance instructions include with THE PRODUCT.

Only personnel of SCOTT or, when directed by SCOTT, authorized SCOTT agents, are permitted to perform warranty obligations. This warranty does not apply to defects or damage caused by any repairs of or alterations to THE PRODUCTS made by owner or any third party unless expressly permitted by SCOTT product manuals or by written authorization from SCOTT.

To obtain performance under this warranty, and as a condition precedent to any duty of SCOTT, the purchaser must return such products to SCOTT, a SCOTT authorized agents or a SCOTT authorized service center. Any product returned to SCOTT shall be sent to "SCOTT HEALTH & SAFETY" (Attn: Warranty Claim Dept.), 4320 Goldmine Road, Monroe, NC 28111.

This warranty does not apply to any malfunction of or damage to THE PRODUCTS resulting from accident, alteration, misuse, or abuse.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN ADDITION, SCOTT EXPRESSLY DISCLAIMS ANY LIABILITY FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN ANY WAY CONNECTED WITH THE SALE OR USE OF SCOTT PRODUCTS, AND NO OTHER FIRM OR PERSON IS AUTHORIZED TO ASSUME ANY SUCH LIABILITY.

1.5.1. Contacting Scott Health & Safety

To contact Scott Health & Safety, call, fax, email or write to:

Scott Health & Safety

4320 Goldmine Road

Monroe, NC 28110

Website: www.scotthealthsafety.com

Phone: 800.247.7257 FAX 704.291.8330

1.6. Acronyms Quick Reference

Throughout the duration of this manual, several acronyms are used. Provided in Table 1-1 is a quick reference chart to quickly identify any acronym that may be unfamiliar to users.

Table 1-1. Acronym Quick Reference List

Acronym	Definition	Acronym	Definition
AC	Alternating Current	mA	Milliamps
A/D	Analog to Digital	mm	Millimeters
ASCII	American Standard Code for Information Interchange	MOV	Metal Oxide Varistor
C	Common or the pole	N/A	Not Applicable
°C	Degrees Celsius	NEC	National Electrical Code
CH_4	Methane	NEMA	National Electrical Manufacturers Association
CO	Carbon Monoxide	NC	Normally Closed (Relay Contact)
CSA	Canadian Standards Association	NO	Normally Open (Relay Contact)
D/A	Digital to Analog	PC	Personal Computer
dB	Decibels	PCB	Printed Circuit Board
DC	Direct Current	PLC	Programmable Logic Controller
DCS	Digital Control System	ppm	Parts per Million
°F	Degrees Fahrenheit	R	Resistance
GND	Ground	RFI	Radio Frequency Interference
H_2S	Hydrogen Sulfide	R.H.	Relative Humidity
Hz	Hertz	RTU	Remote Telemetry Unit
I	Current	SELV	Safety Extra Low Voltage
IEEE	Institute of Electronic & Electrical Engineers	TCP/IP	Transmission Control Protocol/Internet Protocol
LCD	Liquid Crystal Display	VAC	Volts Alternating Current
LEL	Lower Explosive Limit	VDC	Volts Direct Current
		Vpk	Peak Voltage

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2. Introduction

The Scott Health & Safety 7400 Plus Four Channel Controller is designed to display, and control alarm event switching for up to four inputs. Inputs are typically a 4-20mA signal from a transmitter, or signals from sensors directly. The 7400 Plus is equipped with a fault and three alarm levels per channel with features such as ON / OFF delays, latching relays, and alarm Acknowledge. A dedicated horn driver circuit for a local audible alerts is also standard.

Two standard 5-amp alarm relays are configurable via the Alarm Voting menu to make relays trip based upon various alarm combinations. Real-Time Clock and Calendar are also standard. Options such as 4-20mA outputs, discrete relays for each alarm and audible alerts are easily added. RS-485 (MODBUS RTU) or Ethernet (MODBUS TCP) ports are also available for sending data to PC's, PLC's, DCS's, or other Scott Health & Safety controllers.

A 128 x 64 pixel graphic LCD readout displays monitored data as bar graphs, 30-minute trends and engineering units. System configuration is accomplished using displayed menus and the keypad. All configuration data is retained in non-volatile memory during power interruptions.

The five button symbols below the display are magnetically activated using the supplied magnetic wand without opening the enclosure. Opening the enclosure door provides access to the touch keypad.

2.1. Physical Components

Refer to Figure 2-1.

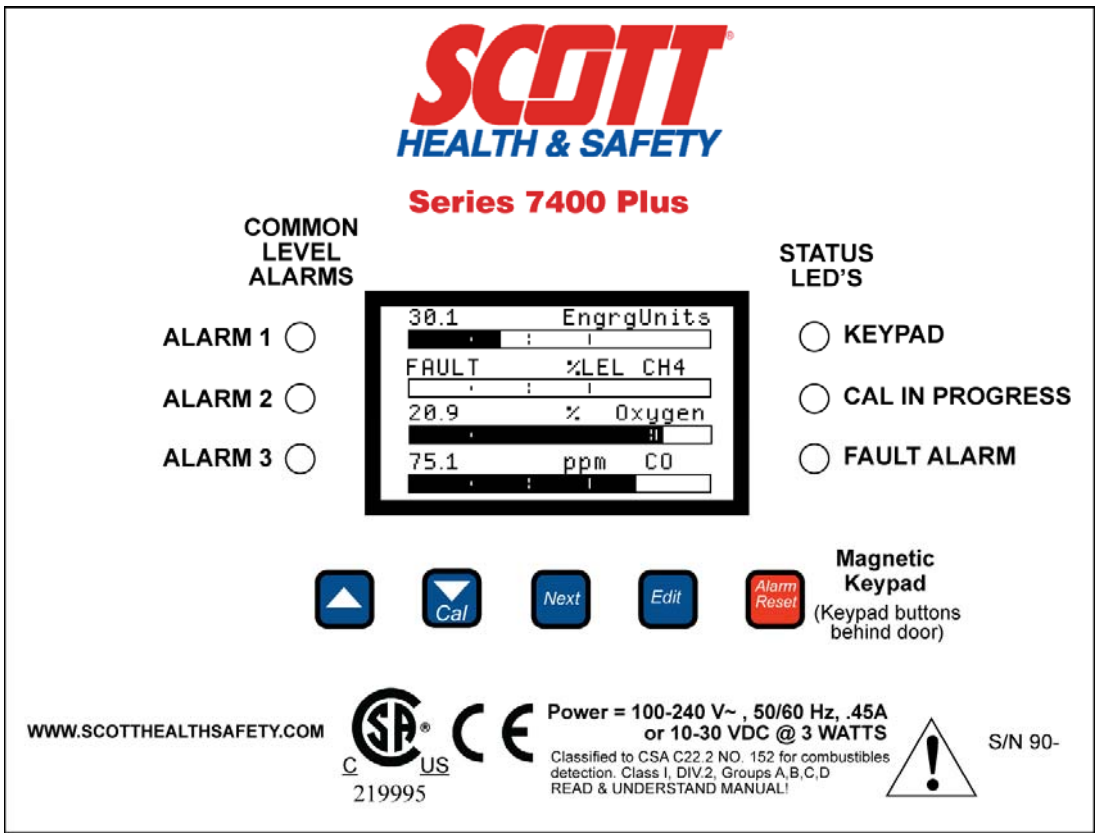


Figure 2-1. External Display

2.1.1. Motherboard

The 7400 Plus Motherboard is the interface between the Display / CPU assembly and all other system I/O devices. Six terminals located at the bottom of the motherboard provide connections for input power, output power, and connection to optional devices. A Universal Switching Power Supply located at the top middle of the motherboard regulates AC input power for distribution to DC components.

Refer to Figure 2-2.

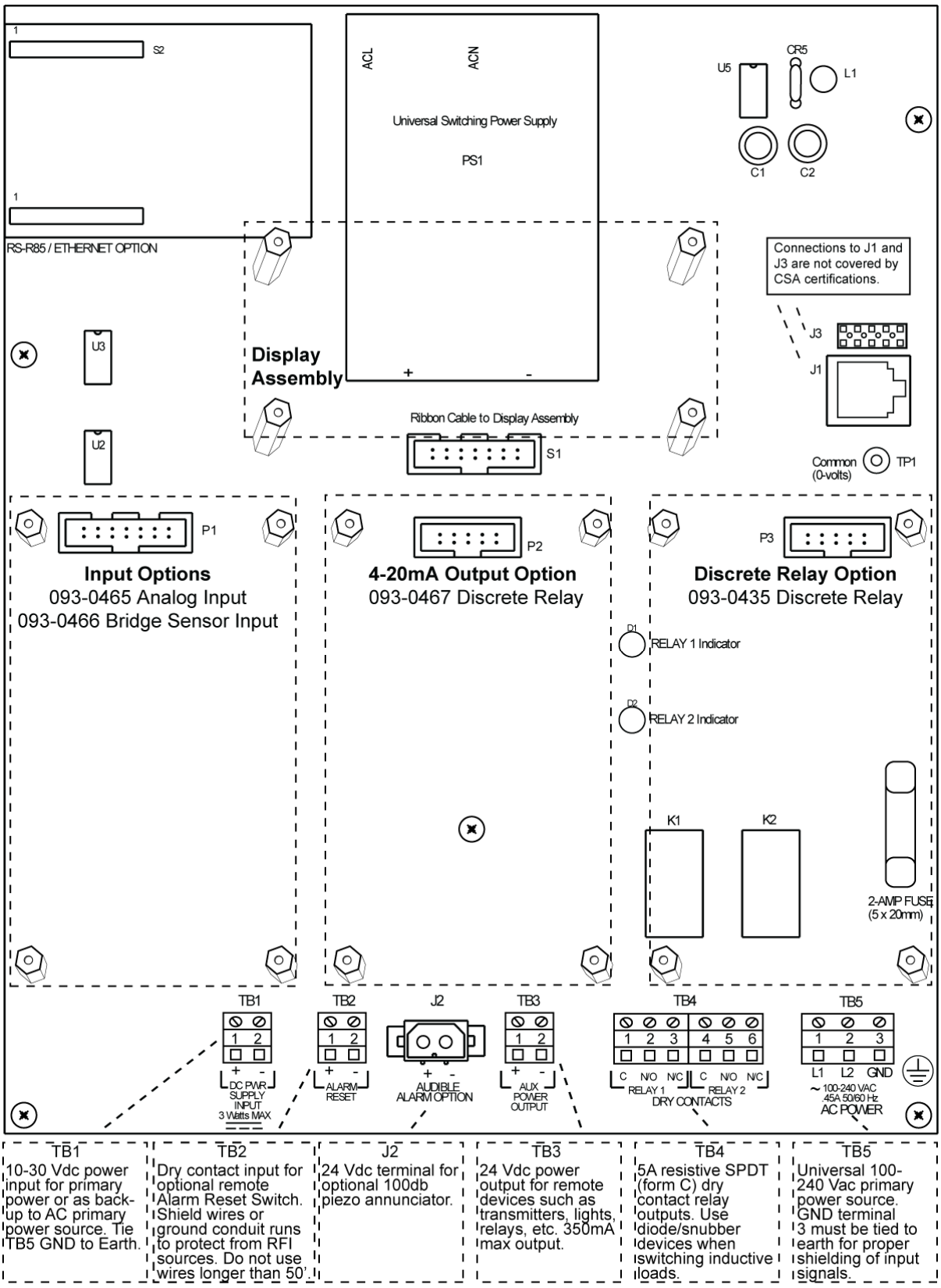


Figure 2-2. Motherboard

- **TB1** - Terminals for DC power input. DC power must be 10-30V DC, max 3 Watts. When connected without an AC power source at TB5, the DC power input is the primary power source for the 7400 plus. When connected with an AC power source, DC power inputted at TB1 is a backup in the event AC power input is lost.

CAUTION

REGARDLESS OF AN AC POWER INPUT AT TB5, POWER TO THE 7400 PLUS MUST BE GROUNDED TO EARTH USING TERMINAL 3 OF TB5. FAILURE TO DO SO COULD CAUSE COMPONENT DAMAGE.

- **TB2** - Terminals for a remote alarm reset switch. If enabled in the menu options, Relay 2 may be acknowledged and deactivated using a remote alarm reset switch. Relay 1 will always remain unaffected to ensure an indication of an alarm remains.
- **J2** - 24VDC output for the optional 100db piezo annunciator.
- **TB3** - 24 VDC universal output power supply with up to 350mA available to power optional remote devices such as alarms, horns, lights, relays, etc. 24VDC is only outputted when AC power is available to the 7400 Plus. Refer to Figure 2-4 for distribution of AC and DC power.

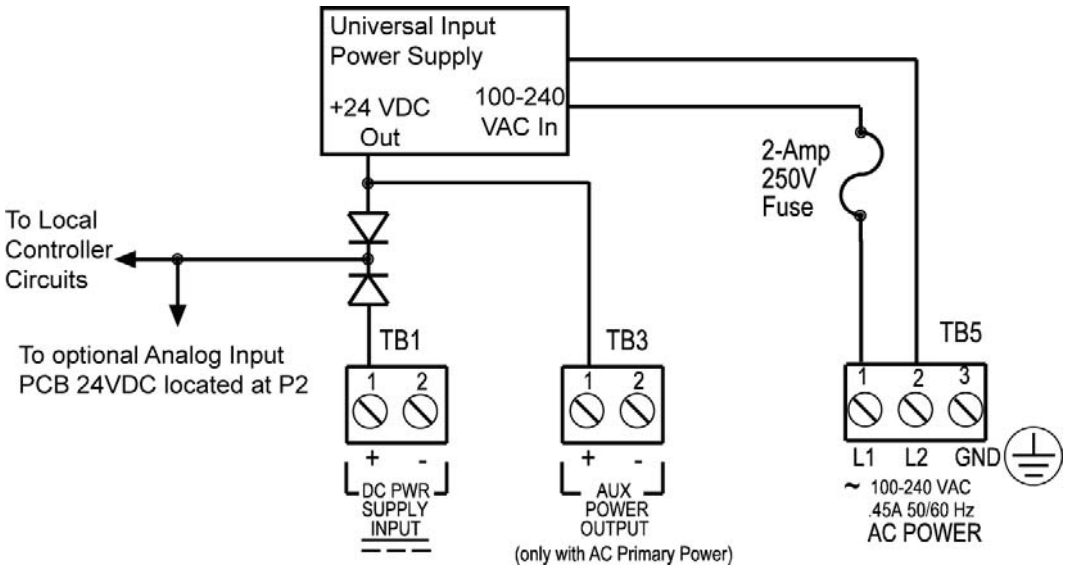


Figure 2-3. Power Distribution

- **TB4** - Provides output power for standard relays K1 and K2. Each relay is 5A resistive SPDT (form C) dry contact.

CAUTION

RELAYS ARE RATED FOR RESISTIVE LOADS. INDUCTIVE LOADS, SUCH AS CONTACTOR COILS OR MOTORS MAY CAUSE CONTACT ARCING, WHICH EMITS RFI INTO THE SENSOR SIGNALS. USE APPROPRIATE SNUBBERS AND MOV'S ACROSS INDUCTIVE LOADS AND KEEP WIRING AWAY FROM SIGNAL WIRES. FAILURE TO DO SO COULD RESULT IN RFI AND NEGATIVELY EFFECT EQUIPMENT PERFORMANCE.

- **TB5** - Terminals for AC power input. AC power must be 100-240VAC, 0.45A, 50/60Hz. Terminal 3 must be grounded to earth.

The Display / CPU assembly attaches to the motherboard with 4-standoffs and connects via ribbon cable to S1. Input options that may be installed into the Input Option P1 connector located on the lower left side of the motherboard are an Analog Input PCB or a Bridge Sensor Input PCB. The P2 connector may have an optional 4-20mA Output PCB. The P3 connector may have an optional Discrete Relay PCB. Another optional device that may be connected to the motherboard is MODBUS RTU RS-485 interface.

2.1.2. Internal Display Assembly

Removing the enclosure door provides access to the Internal Display Assembly.

Refer to Figure 2-4.

The Display assembly has three screens to show the status of the four monitored channels. A Quad screen is the default with a numerical representation of the values.

A Bar Graph Screen can be displayed by activating the **NEXT** key. Arrows below the bars indicate alarm trip point values, making it easy to identify channels at or near alarm. The direction the horizontal 45 degree arrow side points indicates either a HIGH (as shown on Channel 1) or LOW (as shown on Channel 2) trip. Left and Right hand arrows located at the ends of each bar graph point towards Channel Alarm LED's on the front panel.

Activating the NEXT key from the Bar Graph display displays the Trend screen. This screen is a line graph depicting the current and previous thirty minutes of monitoring on each channel.

SW1-SW5 can be pressed to activate the switches instead of using the magnetic wand when the Internal Display Assembly is accessible.

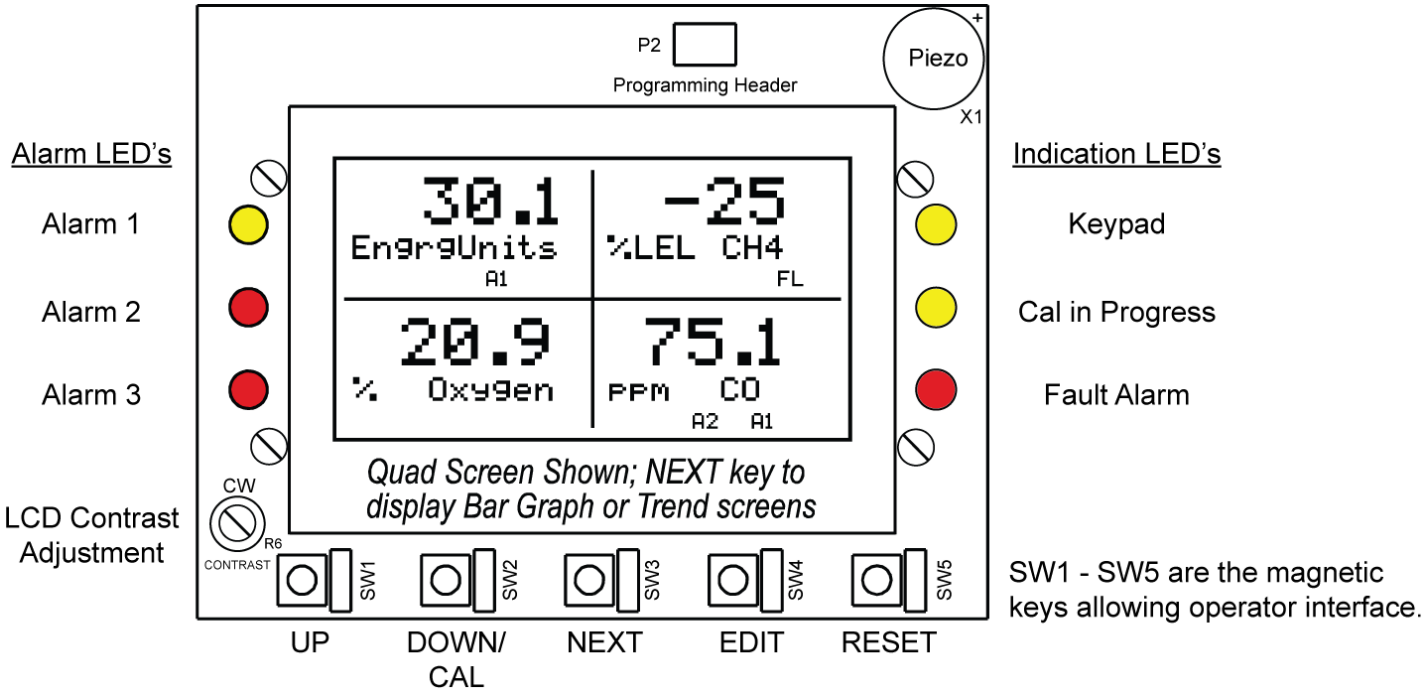


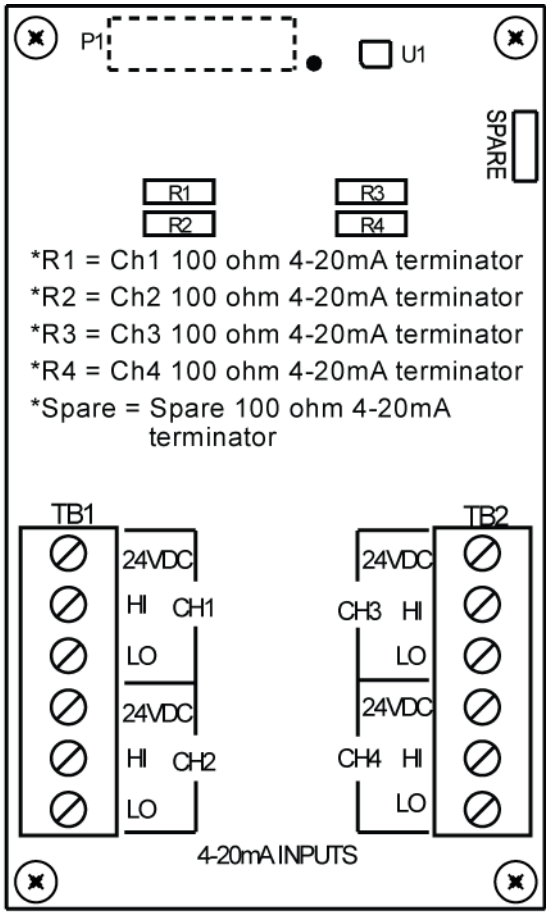
Figure 2-4. Internal Display Assembly

2.1.3. Input Options

2.1.3.1. Analog Input Option

The Analog Input PCB (P/N 093-0465) option may be installed at P1 on the motherboard.

Refer to Figure 2-5.



Refer to Figure 2-6 for transmitter wiring diagrams.

Figure 2-5. Analog Input PCBA

The Analog Input Option allows interfacing 7400 Plus to field transmitters having 4-20mA or voltage outputs. Remove socketed 100 ohm (R1 – R4) terminators for 0-4 VDC max voltage inputs. The Analog Input PCBA utilizes a 12-bit A/D converter such that 4mA provides 400 counts and 20mA 2000 counts. Min/Max raw counts menus default to 400/2000 but may be adjusted between 0/4095, refer to Paragraph 4.4.1.3 for more detailed information.

TB1 & TB2 provide each channel's terminals for receiving analog inputs. TB1 & 2 also provides 4 terminals connected to the 7400 Plus internal 24 VDC power supply for powering external transmitters.

Figure 2-6 shows proper wiring for both 2-wire and 3-wire transmitters.

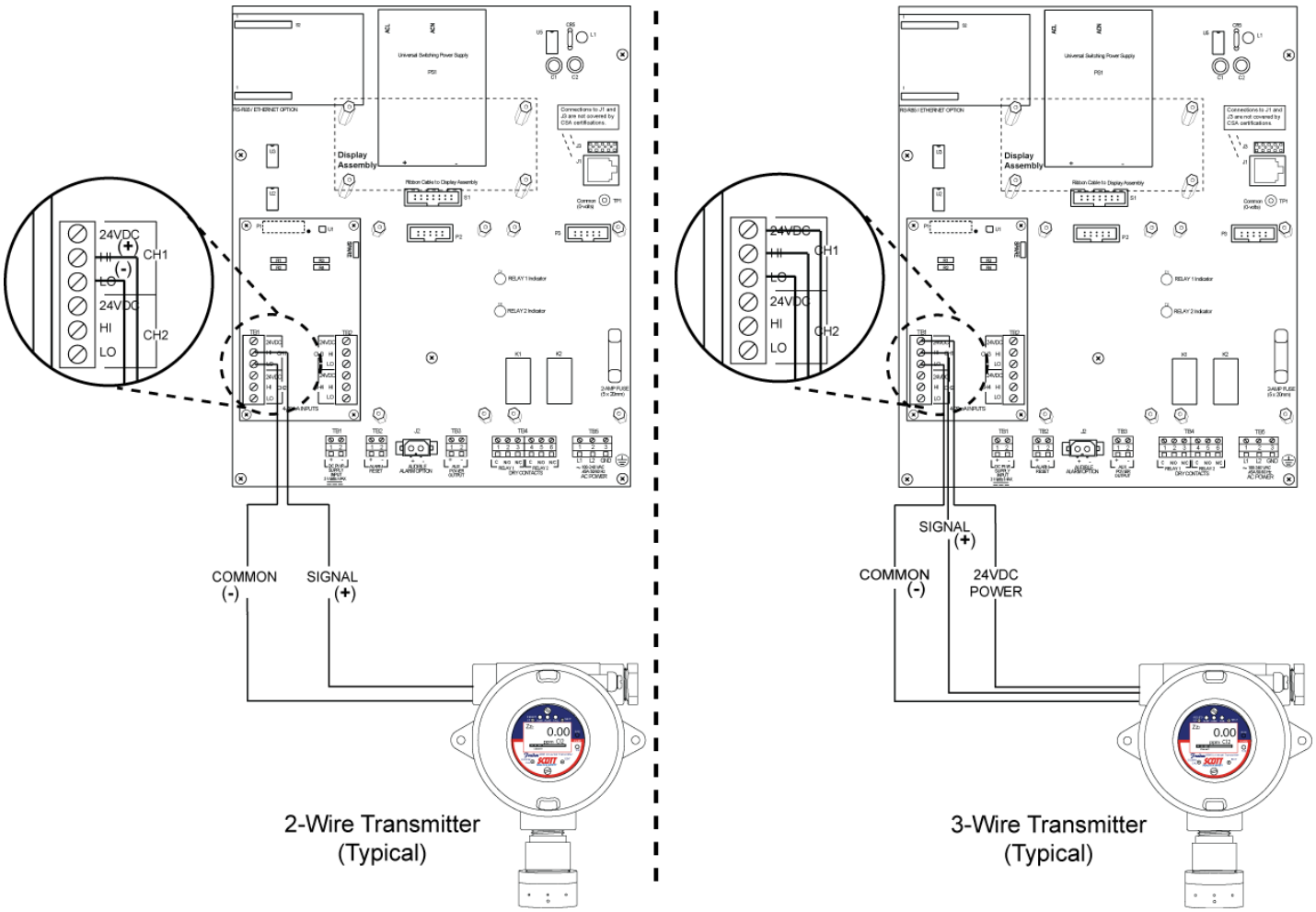
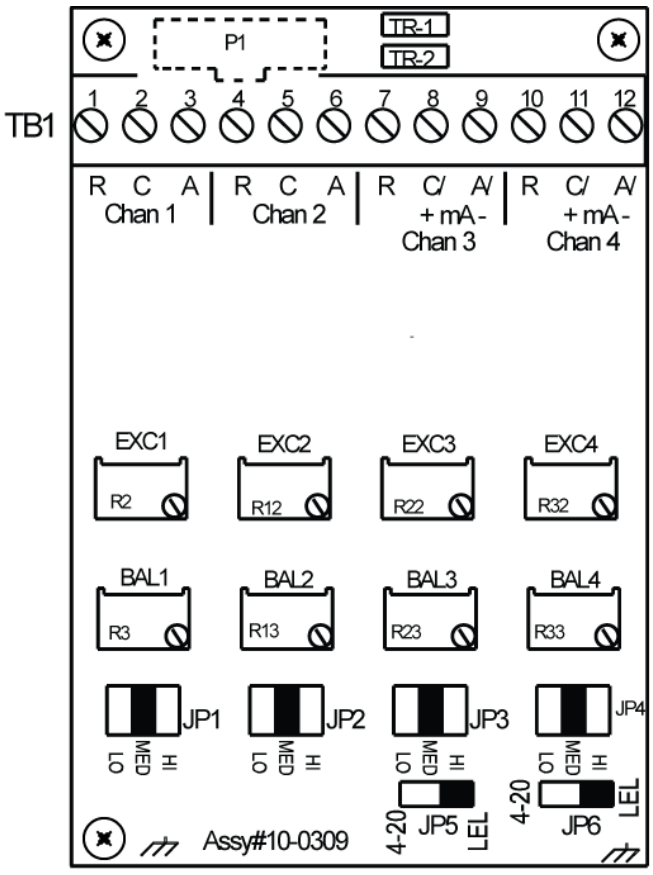


Figure 2-6. External Transmitter Wiring

2.1.3.2. Bridge Sensor Input Option

The Quad Channel Bridge Sensor Input PCBA (P/N 093-0466) option may be installed in P1 of the motherboard.

Refer to Figure 2-7.



4-20 mA 100 ohm Terminating Resistors - TR1 (Ch3) or TR2 (Ch4) must be installed only when a transmitter is the input source

R2/R12/R22/R32 - R2 (Ch1), R12 (Ch2), R22 (Ch3), and R32 (Ch4) are the Sensor Balance Voltage Adjustment Pots

R3/R13/R23/R33 - R3 (Ch1), R13 (Ch2), R23 (Ch3), and R33 (Ch 4), are the Sensor Balance Voltage Adjustment Pots

JP1/JP2/JP3/JP4 - JP1 (Ch1), JP2 (Ch2), JP3 (Ch3), and JP4 (Ch4) are Course Gain Jumpers that are set for the gain of the Bridge Amplifier

JP5/JP6 - JP5 (Ch3) and JP6 (Ch4) must be placed in the position of the the cat bead source, either Sensor (LEL) or Transmitter (4-20).

Figure 2-7. Bridge Sensor Input PCBA

The Bridge Sensor Input PCBA allows these sensors to be connected directly to the 7400 Plus without additional signal conditioning or transmitters. Each channel is equipped with a bridge amplifier, balance potentiometer, and an adjustable switching regulator for setting the correct sensor excitation voltage. A 3-position coarse gain jumper allows setting the gain of the bridge amplifier. Fault supervision circuitry forces the 7400 Plus into a FAULT condition upon sensor failure or removal.

This option may also be configured to accept 4-20 mA inputs into channels 3 & 4 to allow mixing cat-bead sensors and 4-20 mA current loops into the same board. Placing either channel's 2-position LEL/4-20mA jumper (JP5 or JP6) into the 4-20 mA position and installing the associated precision 100 ohm socketed resistor, allows 4-20 mA signals to be applied to the mA+ / mA- terminals. Precision 100 ohm resistors are taped to the inside of the 7400 Plus enclosure.

NOTE

WHEN INSTALLING A CAT BEAD SENSOR, A ONE TIME ONLY INITIAL SETUP IS REQUIRED. REFER TO PARAGRAPH 3.4 FOR MORE INFORMATION.

2.1.3.2.1. Cat Bead Sensor Input Wiring Diagrams

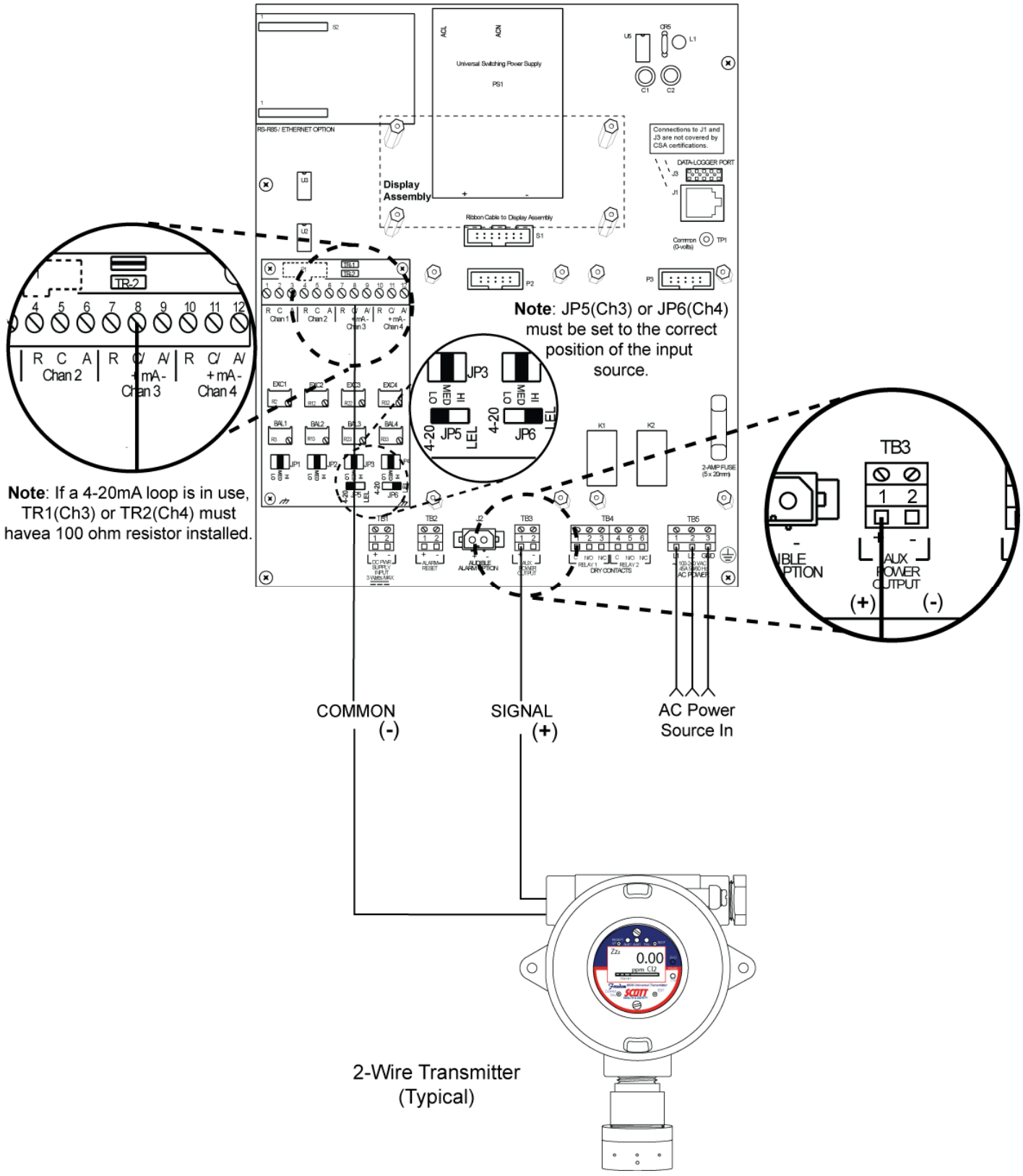


Figure 2-8. 2-Wire Transmitter (Typical) to Bridge Sensor Input PCB

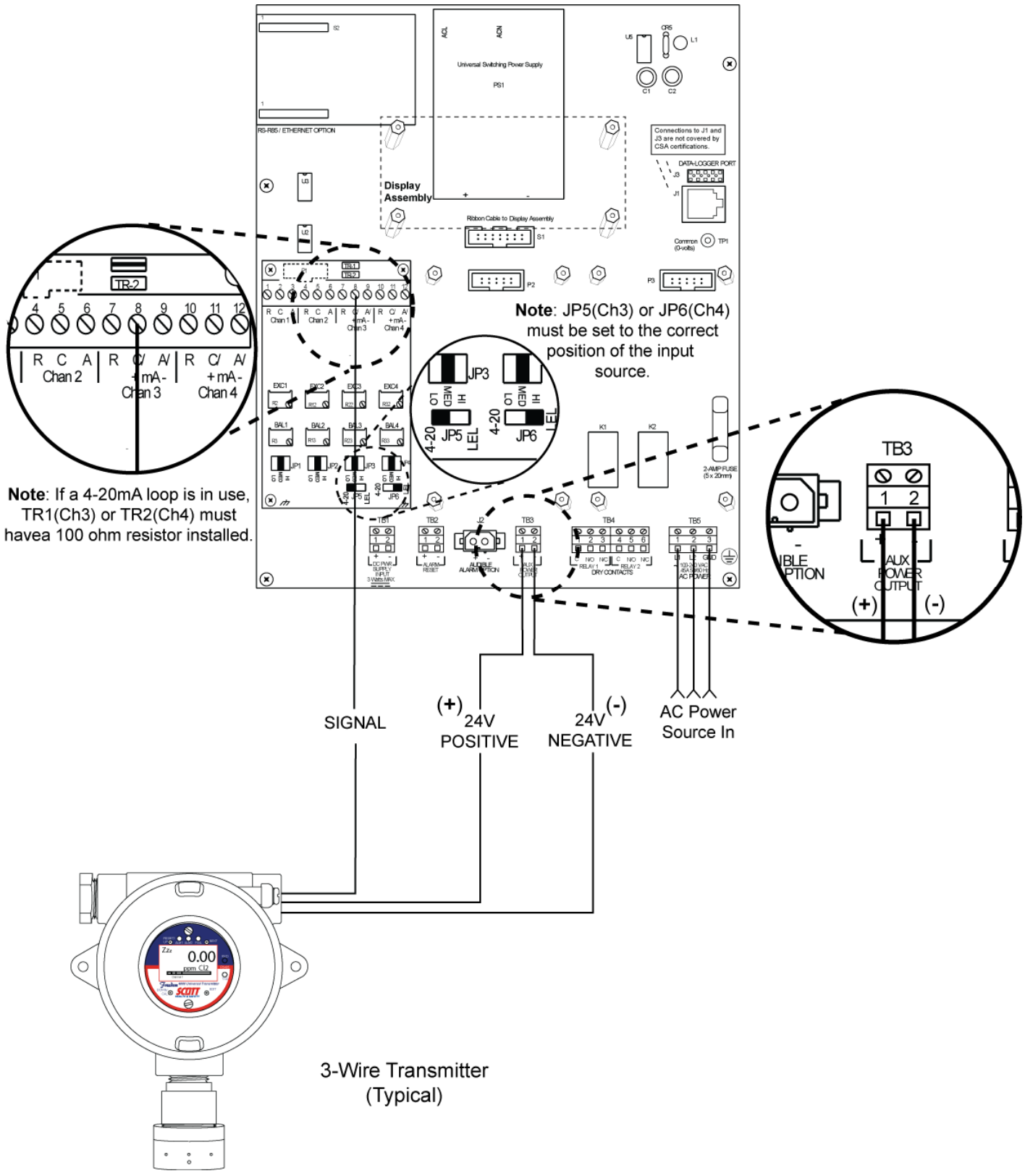


Figure 2-9. 3-Wire Transmitter (Typical) to Bridge Sensor Input PCB

2.1.4. 4-20 mA Analog Output Option

The 10-bit 4-20mA analog output board (P/N 093-0467) option may be installed at P2 on the Motherboard.

Refer to Figure 2-10.

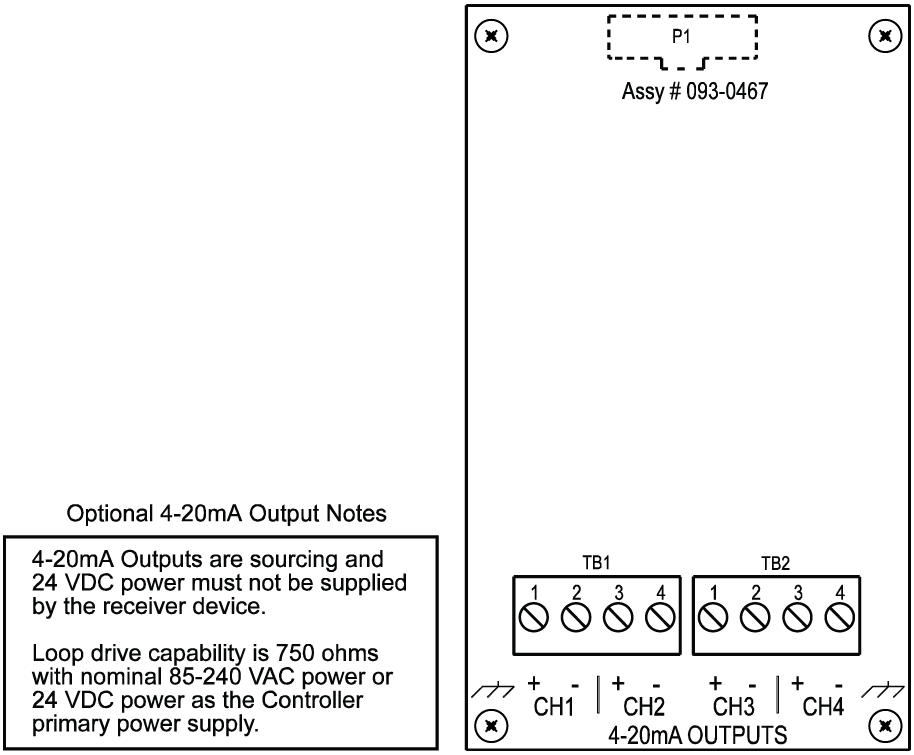


Figure 2-10. 4-20mA Analog Output PCBA

Each channel output will transmit 4mA for 0% readings and 20mA for 100% readings. If the 7400 Plus primary power is 100 – 240 VAC or at least 24 VDC, 4-20mA outputs are capable of driving 20mA through a 750 ohm load. Outputs are self powered and DC power should not be provided by the receiving device.

Precision calibration of the 4-20mA output DAC (digital to analog converter) is accomplished via the **Analog Setup** menu. Refer to Paragraph 4.4.1.3 for more details.

2.1.5. Discrete Relay Option

The Discrete Relay PCB (P/N 093-0435) option may be installed at P3 on the Motherboard.

CAUTION

RELAYS ARE RATED FOR RESISTIVE LOADS. INDUCTIVE LOADS, SUCH AS CONTACTOR COILS OR MOTORS MAY CAUSE CONTACT ARCING, WHICH EMITS RFI INTO THE SENSOR SIGNALS. USE APPROPRIATE SNUBBERS AND MOV'S ACROSS INDUCTIVE LOADS AND KEEP WIRING AWAY FROM SIGNAL WIRES. FAILURE TO DO SO COULD RESULT IN RFI AND NEGATIVELY EFFECT EQUIPMENT PERFORMANCE.

Refer to Figure 2-11.

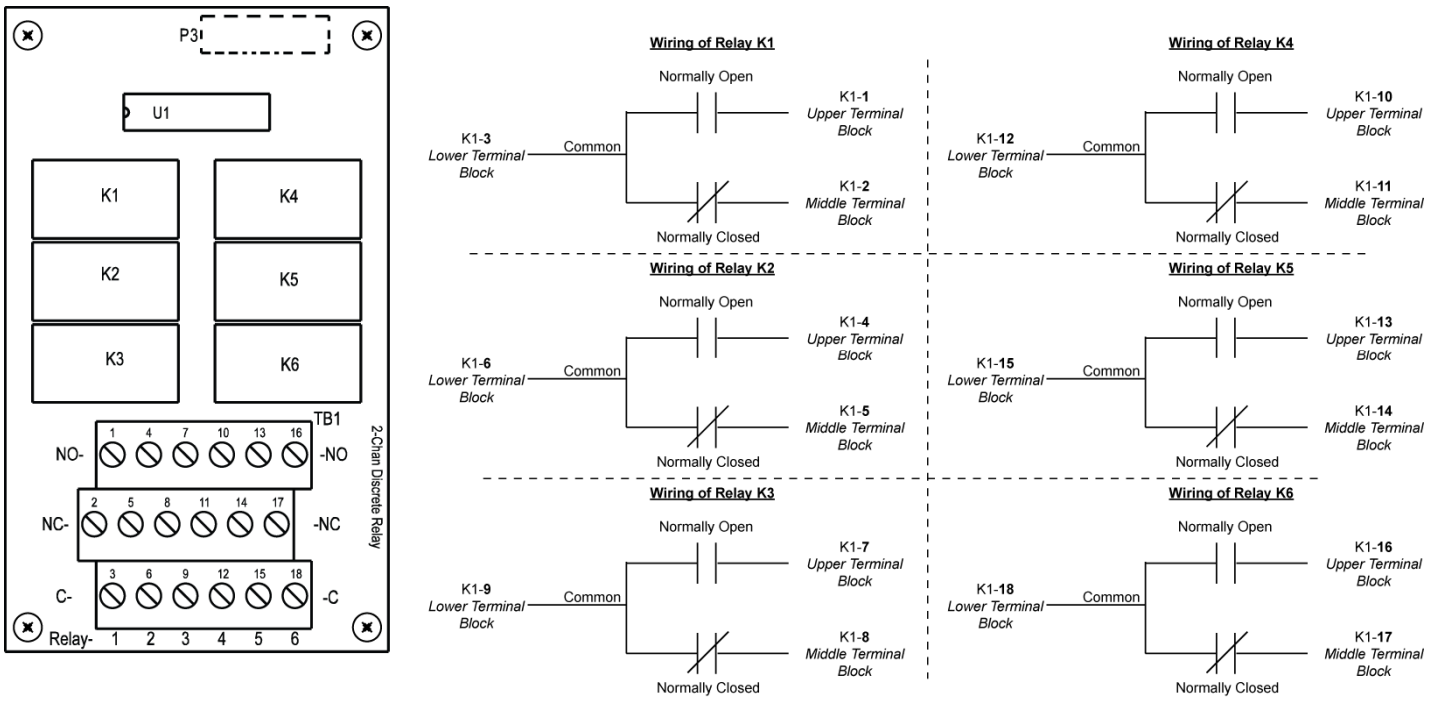


Figure 2-11. Discrete Relay PCB

This optional PCB adds six 5 amp form C relays. These optional relays are programmed using the Relay Setup Menu as described in Paragraph 4.4.1.1. Each relay can be programmed to activate based on any number of alarm conditions as defined by the operator using the alarm vote

2.1.6. MODBUS RS-232/RS-485 Interface Option

The MODBUS option PCB (P/N 093-0438) adds both RS-232 and RS-485 MODBUS RTU slave ports.

NOTE

FOLLOW CORRECT IEEE RS-232 AND RS-485 INSTALLATION GUIDELINES WHEN USING THE MODBUS INTERFACE OPTION.

Refer to Figure 2-10.

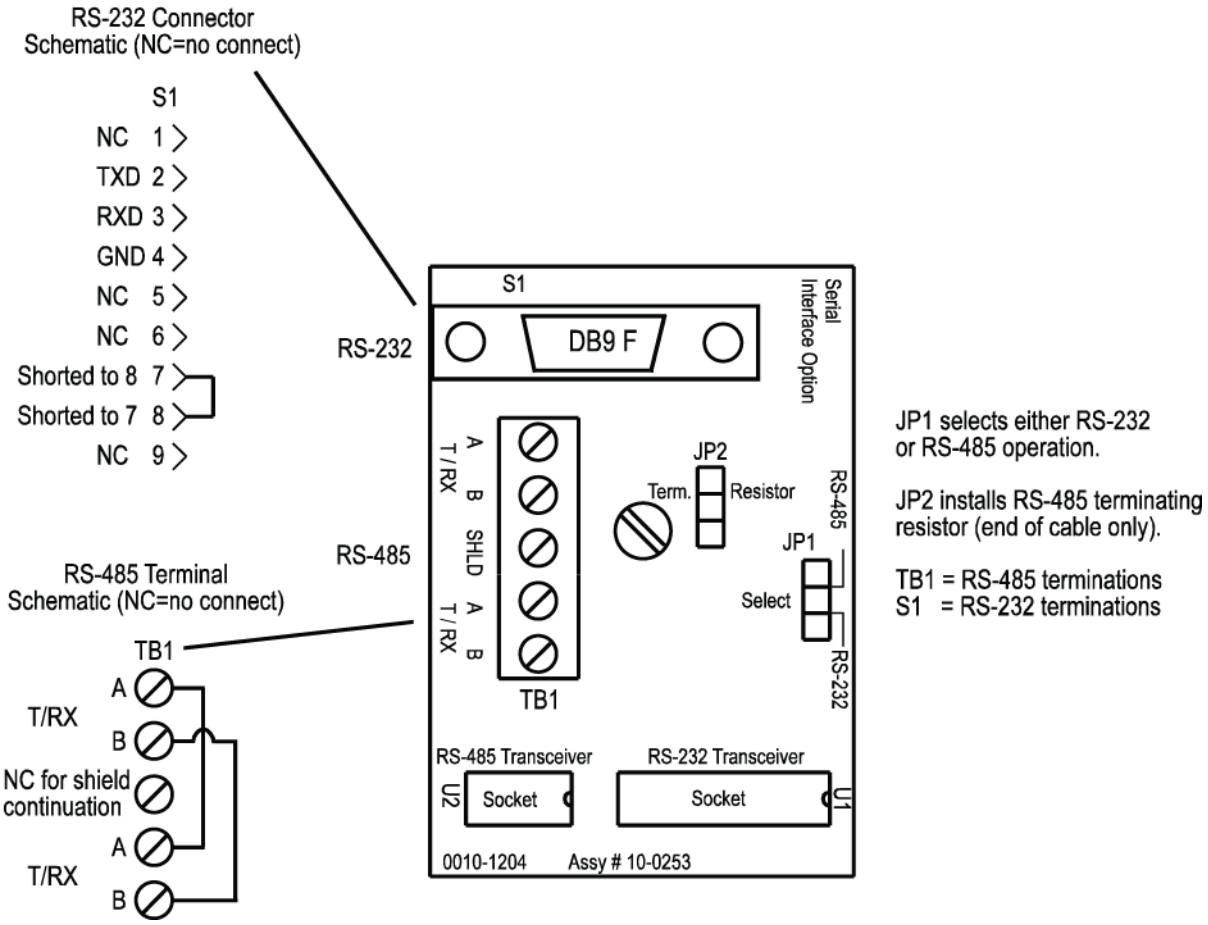


Figure 2-12. MODBUS Interface PCBA

This optional PCB mounts to connectors on the upper left corner of the 7400 Plus Motherboard. TB1 provides two pairs of T/Rx terminals and a floating terminal for shield continuation to multi-drop 7400 Plus's onto an RS-485 cable without doubling wires into the same screw terminals. RS-232 interface is made by connecting to DB9 connector S1.

Refer to the Appendix for a list of all MODBUS registers and their function codes.

2.2. Using the Keypad

Navigation of the Menus displayed on the LCD is accomplished using the **UP**, **DOWN/CAL**, **NEXT**, **EDIT**, and **ALARM RESET** magnetic keys. Press, where used in this manual, refers to activating the magnetic key with the magnetic wand.

Upon entering a menu, a pointer controlled by the **UP/DOWN** keys indicates the selected item.

YES/NO or *ON/OFF* entries toggled by pressing the **EDIT** key. Others, such as *Channel ID* and *Eunits* fields, may have many ASCII character possibilities.

Allowed ASCII characters are:
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz blank space !”#$%&`()*+,-./0123456789:;<=>?@

EDIT places a cursor under the item and **UP/DOWN** scrolls through each allowed entry. The **NEXT** key moves the cursor to the next position within a field. When the field is complete, **EDIT** clears the cursor and loads the field into non-volatile memory where it is retained indefinitely. Without a cursor present, the **NEXT** key returns to the previous menu one menu at a time and will eventually return the LCD to the data display.

ALARM RESET notifies the 7400 Plus that the user acknowledges an alarm and when pressed will deactivate any optional audible alarms. Flashing indicators will change from flashing to a steady state.

2.3. Specifications

Supply Voltage:	10-30VDC (Alternate), 3 Watts or 100-240VAC (Primary), 50/60Hz, 0.45 amp max, 20 Watts max steady state

NOTE

LOADS REQUIRING GREATER THAN 24VDC REQUIRE AN EXTERNAL AC/DC SUPPLY. NEC CLASS 2, 50 WATT EXTERNAL POWER SUPPLIES ARE AVAILABLE FOR DIV. 1 AND 2, P/N 093-0469 AND P/N 093-0468. THESE SUPPLIES ARE APPROVED FOR USE IN POTENTIALLY HAZARDOUS INSTALLATIONS AND INCLUDE A NEMA 4X WEATHER RATING. CONTACT SCOTT H&S FOR MORE INFORMATION.

Power Consumption:	Minimum: 1.5 Watts @ 10-30VDC
	Maximum: 12 Watts @ 24VDC
Temperature Range:	-25 to 50 °C (-13 to 122 °F)
Humidity Range:	0 to 90% R.H. Non-Condensing
Altitude:	Up to 2000 Meters (6562 feet)
Housing/Installation Categories:	NEMA 4X, DIV 2 Groups A, B, C, D; Cat. II and pollution degree 3; NEMA 4x; IP66
	NEMA 7, DIV 1 Groups B, C, D; with o-ring in door to satisfy NEMA 4
Relays:	Common Form C, dry contacts (Standard)
	5 Amp for 28VDC and ~250VAC (Resistive Loads)

CAUTION

APPROPRIATE DIODE (DC LOADS) OR MOV (AC LOADS) SNUBBER DEVICES MUST BE INSTALLED WITH INDUCTIVE LOADS TO PREVENT RFI NOISE SPIKES. RELAY WIRING IS TO BE KEPT SEPARATE FROM LOW LEVEL SIGNAL WIRING. FAILURE TO DO SO COULD CAUSE FAULTY RELAY ACTIVATION.

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3. Physical Installation

3.1. Installation Considerations

3.2. Mounting the 7400 Plus

The standard 7400 Plus wall mounted unit is NEMA 4X rated. The terminal cover must be installed with the bevel on top to prevent moisture from entering the internal components. Two screws on the enclosure door must remain in place to maintain the rating of Class I, Division 2, Groups A,B,C and D or non-hazardous locations only.

Two ¾" NPFT fittings are provided on the bottom side of the unit to route electrical connections and connect conduit. Conduit runs should not be weight bearing. Use provided mounting holes to wall mount the 7400 Plus.

Refer to Figure 3-1.

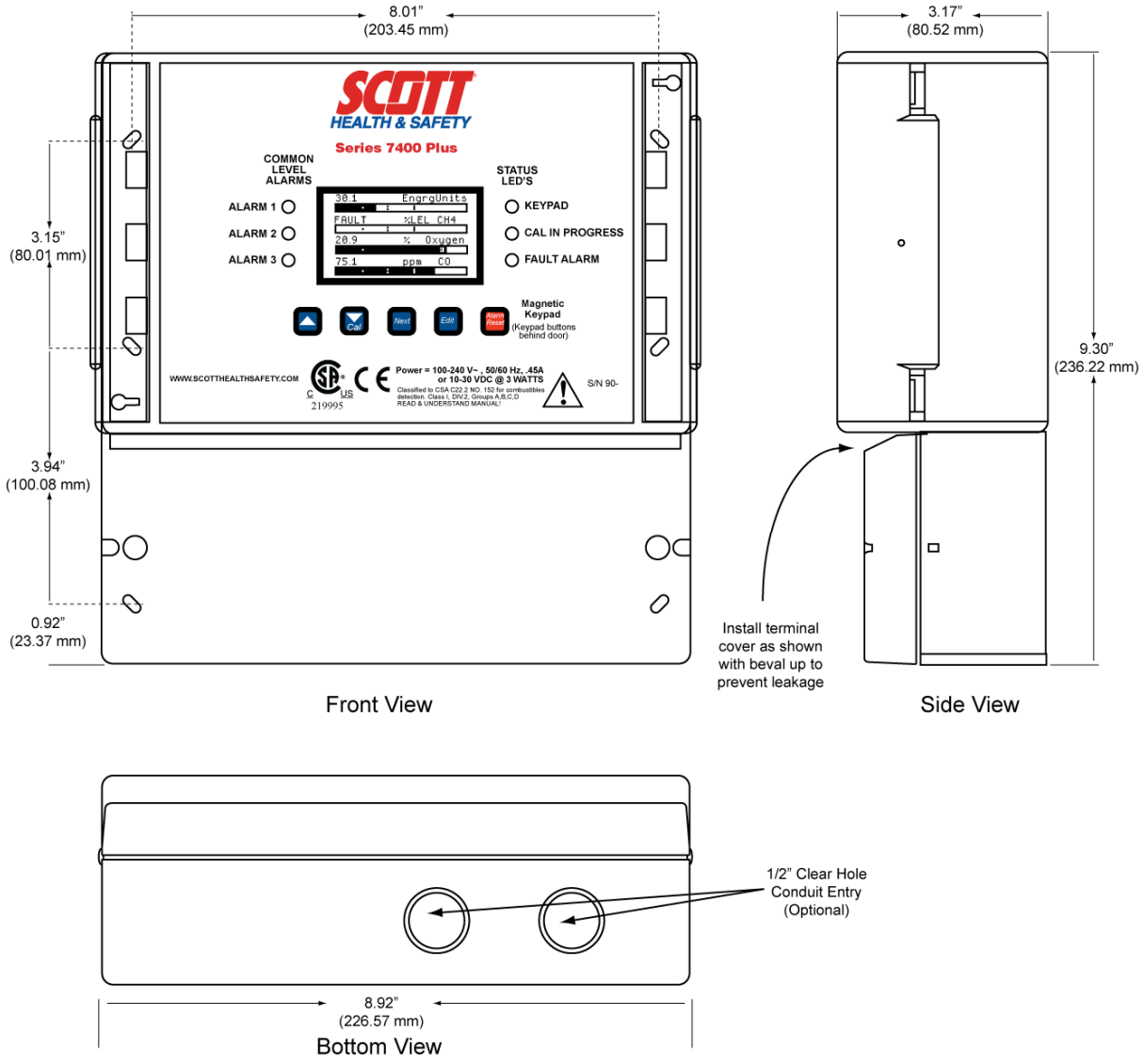

Figure 3-1. Mounting Dimensions

3.2.1. Optional NEMA 7 Explosion Proof Enclosure

The NEMA 7 wall mount enclosure is an optional aluminum case for mounting the 7400 Plus in potentially hazardous environments. It is rated for DIV 1 & 2; Groups B,C,D.

Refer to Figure 3-2.

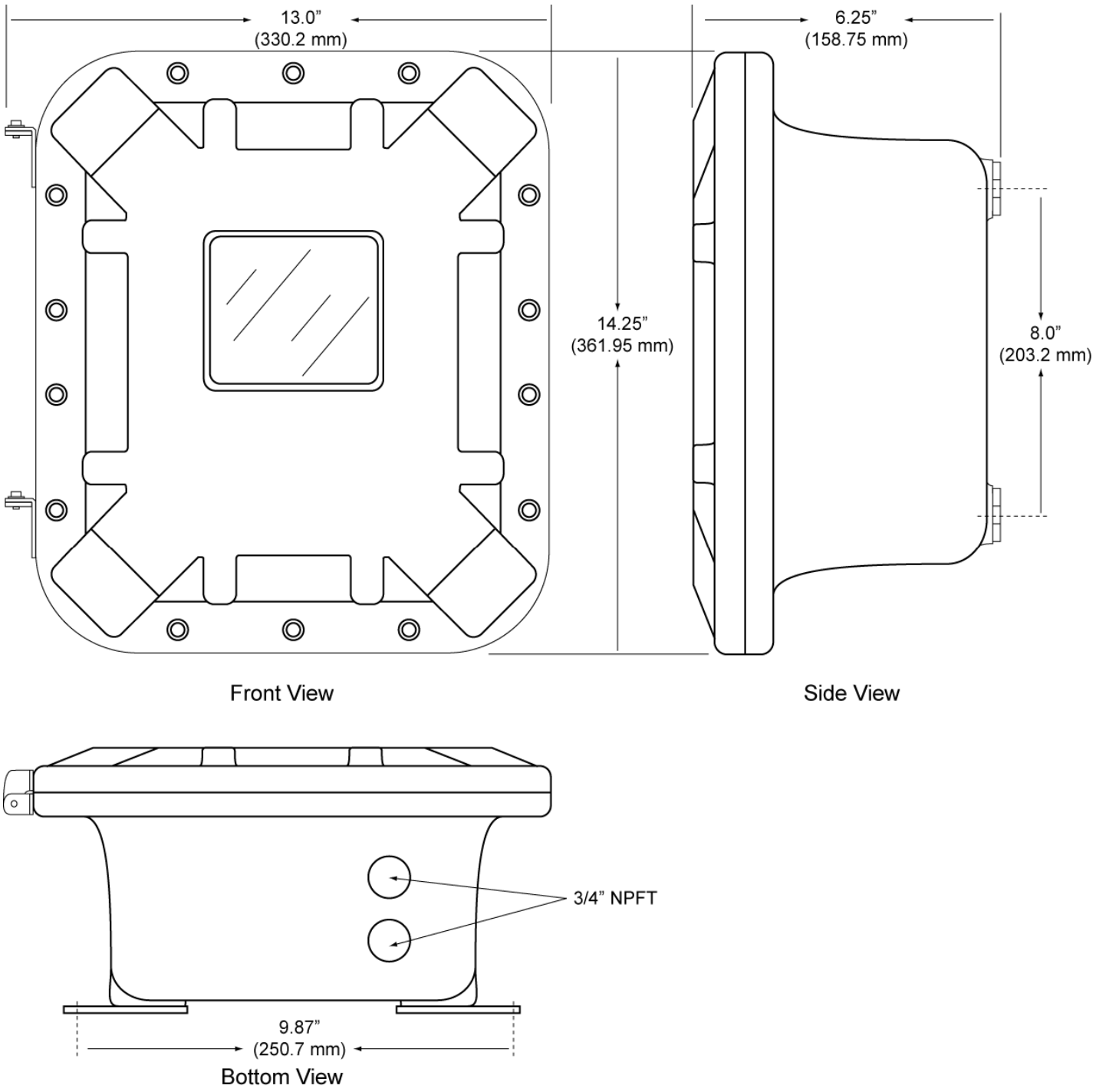

Figure 3-2. NEMA 7 Enclosure

3.3. Electrical Configurations

3.3.1. Electrical Codes

To meet prevailing electrical codes, use conduit and all other materials required for electrical wiring in hazardous areas. Install wiring according to National Electrical Code (NEC) Articles 501-517.

WARNING

NON-METALLIC ENCLOSURES ARE NOT GROUNDED BY METAL CONDUIT. TO GROUND INTERNAL COMPONENTS, A PROPER EARTH GROUND MUST BE CONNECTED TO TB5-GND TERMINAL. FAILURE TO DO SO CAN CAUSE ELECTRICAL GROUNDS AND DAMAGE ELECTRONIC COMPONENTS, OR RISK OF ELECTRICAL SHOCK.

WARNING

NON-METALLIC ENCLOSURE DOES NOT PROVIDE GROUNDING BETWEEN CONDUIT CONNECTIONS. USE GROUNDING TYPE BUSHINGS AND JUMPER WIRES. ALL FIELD WIRING MUST HAVE INSULATION SUITABLE FOR AT LEAST 250V. FAILURE TO DO SO CAN CAUSE ELECTRICAL GROUNDS AND DAMAGE ELECTRONIC COMPONENTS, OR RISK OF ELECTRICAL SHOCK.

3.3.2. Optional External Power Supply

Some applications require 24VDC power in excess of the 12 watts supplied by the 7400 Plus. NEC Class 2 50W external supplies are available for Division 1 (part # 093-0469) and Division 2 (part # 093-0468) potentially hazardous area installations and both also include a NEMA 4X weather rating.

For more information, contact Scott H & S.

3.4. Evaluating Wire Length and Size

The minimum AWG wire size that can be used to connect the power supply to the transmitter is determined by the output voltage of the power supply, the maximum current drawn by the transmitter, and the voltage drop that occurs across the wiring.

When choosing the location of the transmitter and its power supply, the size and length of the power supply wires become an issue if the wiring's voltage drop would cause the transmitter's input voltage to drop below its minimum operating voltage.

The distance 4-20 mA signals can travel is dependent upon several factors including the cable gauge, DC power supply voltage level and impedance of the input of the receiving device. Assuming a nominal 24 VDC power supply if powered by the 7400 Plus, maximum total loop resistance is 750 ohms in a 3-wire mode.

NOTE

SCOTT HEALTH & SAFETY CONTROLLERS HAVE AN INPUT RESISTANCE OF 100 OHMS.

The maximum signal-loop resistance that can be connected to a transmitter's output is 800 ohms @ 24 VDC (400 ohms @ 12 VDC). In almost all cases, the wire size chosen for the power supply leads will be more than adequate for the 4–20 mA signal lead. For example, an 18 AWG wire provides a 4–20 mA signal lead wiring distance of approximately 34,000 feet.

NOTE

MAXIMUM SIGNAL-LOOP RESISTANCE IS DEFINED AS THE SUM OF THE 4–20 MA SIGNAL-WIRE RESISTANCE, THE RECEIVER'S INPUT RESISTANCE (NORMALLY 250 OHMS), AND THE RESISTANCE OF THE COMMON GROUND WIRE BETWEEN THE TRANSMITTER AND POWER SUPPLY.

3.5. Sensor Head Wiring

Each 5.5V Sensor Head is supplied with 6" of wire for direct mounting to the transmitter housing. Each 6V Sensor Head is supplied with 18" of wire, allowing it to be mounted on the transmitter housing either directly, or by a short section of ¾" conduit. Both types of Sensor Heads can have a three conductor cable spliced to the attached wiring for increased distances between the 7400 Plus and the Sensor Head location.

The wiring attached to the Sensor Head is already sealed and requires no additional sealing to conform to NEC requirements for explosion-proof installations, as long as the detector head is mounted no further than 18" from the transmitter [NEC Article 501-5(a)(1)].

Table 3-1 shows the maximum distances 6V (Gold Bell) Sensor Heads may be separated using a three-conductor cable with various wire gauges.

NOTE

THE 5.5V (SCOTT HEAD) DRAWS FAR LESS CURRENT ALLOWING FOR MUCH GREATER LENGTHS OF WIRE. FOR EXAMPLE, USING 18 AWG, THE MAXIMUM DISTANCE IS 1600 FEET (488M).

The added detector-head wiring must meet prevailing electrical codes for hazardous-area installations that specify conduit sealing, explosion-proof fittings, and special wiring methods.

NOTE

THE DETECTOR HEAD'S SAFETY-GROUND WIRE MUST THE SAME SIZE AS THE OTHER TRANSMITTER WIRES.

Table 3-1. Maximum Distance Between 6V Sensor Head and 7200 Plus

6V Sensor Head (Gold Bell)		
AWG	Ohms/Foot @ 85°C (185°F)	Maximum Distance
12	0.0023	106' (32m)
14	0.0031	80' (24m)
16	0.0059	42' (13m)
18	0.0080	31' (9m)

When installing conduit and wiring from the Sensor Head to the 7400 Plus, adhere to the following:

- If the Sensor Head is mounted more than 18" from the 7400 Plus, encase all wire splices in a junction box. Place conduit seals, Crouse-Hinds EYS 216 (or equivalent), between the 7400 Plus and the junction box.
- Use AMP (or equivalent) parallel or butt type splices for all wire connections.
- Ground the junction box.
- Trim any excess wire and connect the detector head's black, white, and red wires to terminal block TB1 terminals R, C, and A on the Cat Bead Input PCB as shown in Figure 3-3.

3.6. Cat Bead Sensor Initial Setup

Each channel must be configured to match the sensor with which it will operate. This procedure must be performed at the time of install on each new bridge sensor.

1) Prior to connecting remote sensors, apply power to the system.
2) Remove the 7200 Plus terminal cover.

WARNING

LIVE VOLTAGE IS PRESENT. TAKE APPROPRIATE ELECTRICAL SAFETY PRECAUTIONS TO PREVENT THE RISK OF ELECTRICAL SHOCK. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OF DEATH.

3) Measure the voltage between each channel's A and R terminals and set the *Voltage Adjust* potentiometers for the correct sensor excitation voltage.

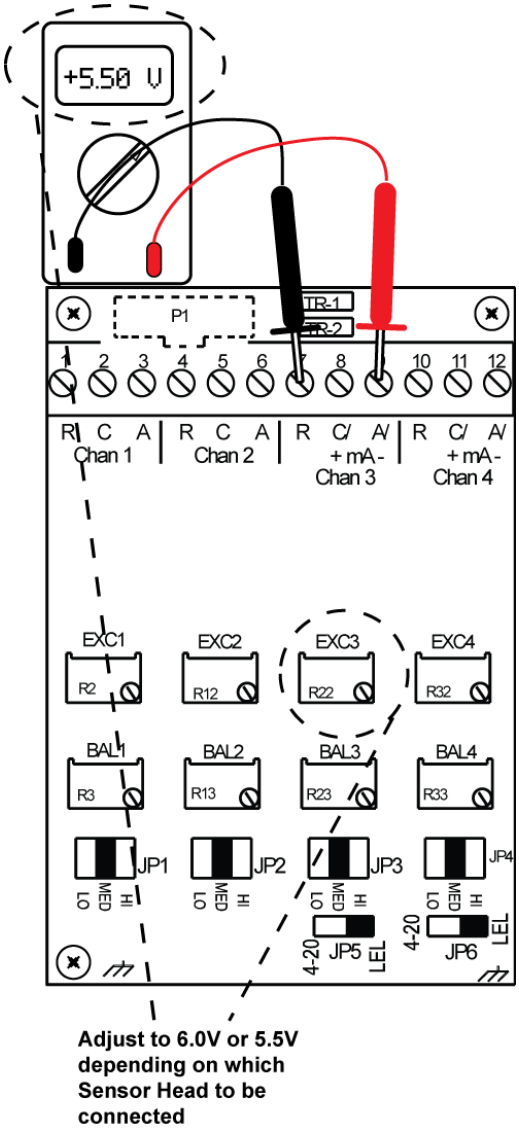

Figure 3-3. Sensor Voltage Adjustment

CAUTION

SENSORS MAY BE DAMAGED BY OVER VOLTAGE CONDITIONS. SCOTT H & S RECOMMEND THE VOLTAGE ADJUST POTENTIOMETER SCREWS BE COVERED BY A DOLLOP OF RTV OR SIMILAR MATERIAL AFTER COMPLETION OF THIS PROCEDURE. OVERVOLTAGE MAY CAUSE DAMAGE TO SENSORS.

4) Remove system power and connect sensor wires to the A-C-R terminals as shown in Figure 3-3 depending on system configuration.

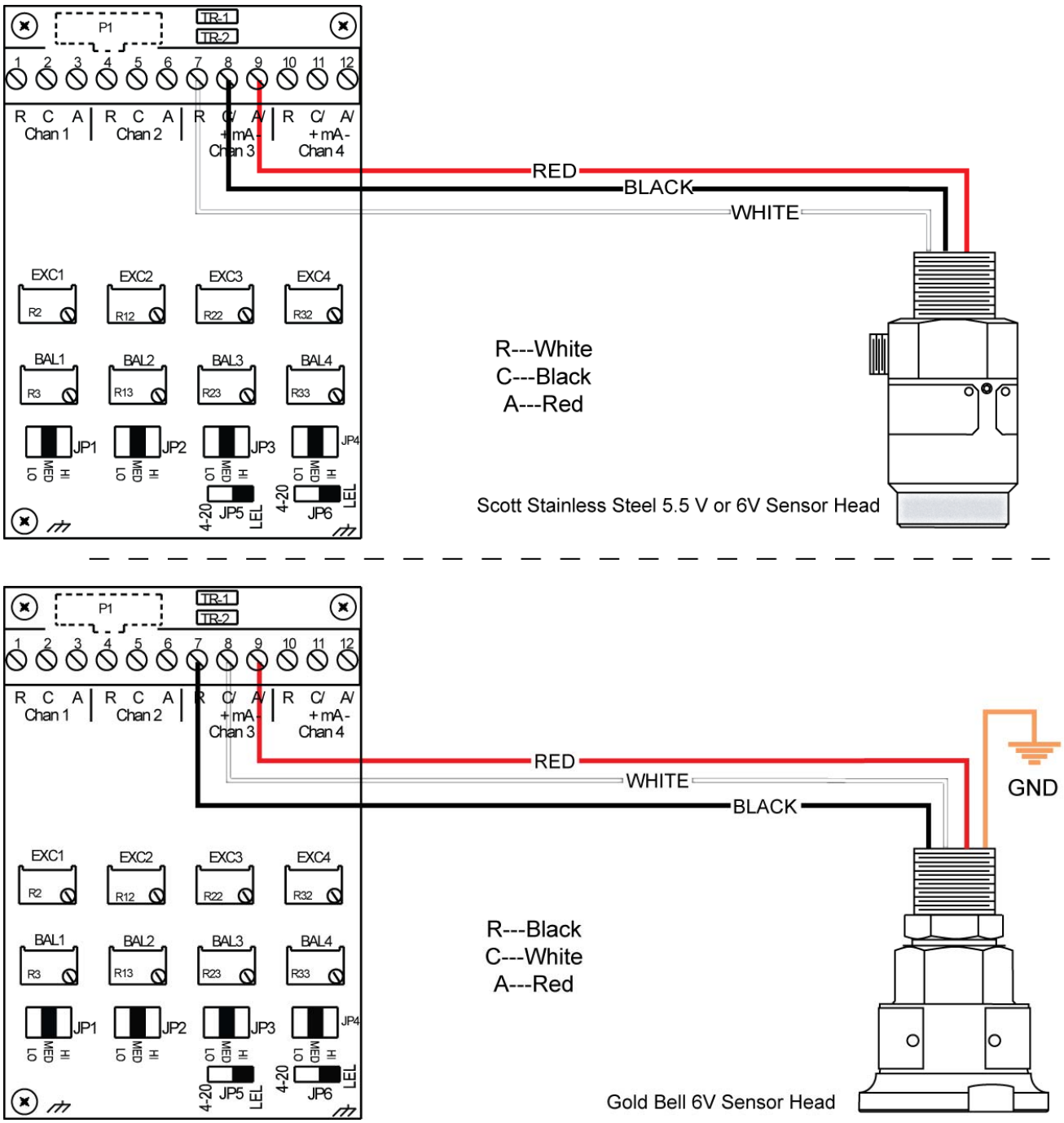

Figure 3-4. Cat Bead Sensor Wiring to Bridge Sensor Input PCB

5) Reapply system power and confirm correct voltage across each sensor's A & R terminals.

NOTE

IF SENSOR HEAD IS REMOTE AND ADDITIONAL WIRE LENGTH HAS BEEN ADDED, IT WILL BE NECESSARY TO MEASURE THE EXCITATION VOLTAGE AT THE SENSOR HEAD TO COMPENSATE FOR I * R VOLTAGE LOSSES IN THE WIRING.

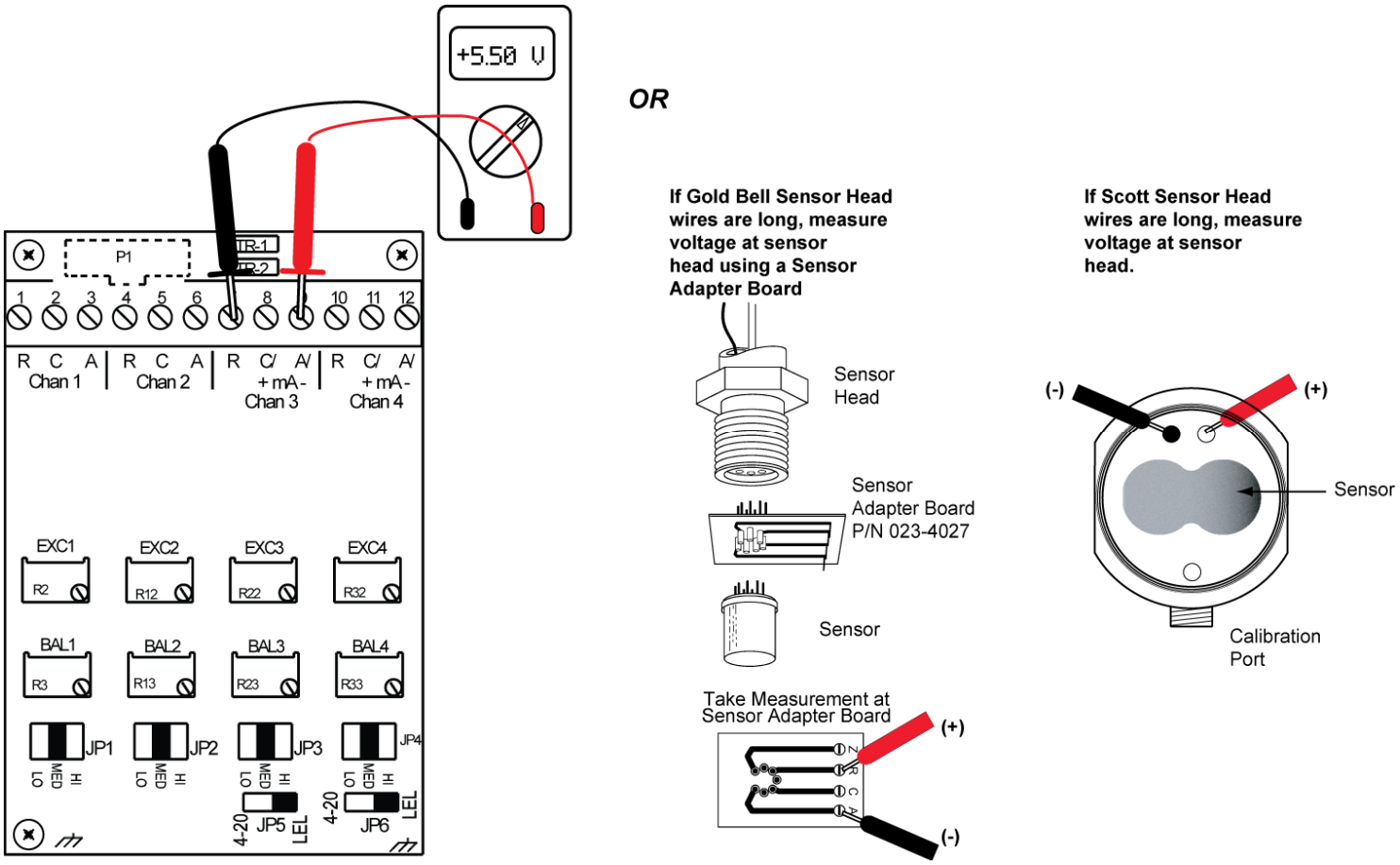

Figure 3-5. Sensor Voltage Measurement

6) With zero air applied to the sensor, adjust the *Balance* potentiometer for a reading of zero on the front panel LCD.

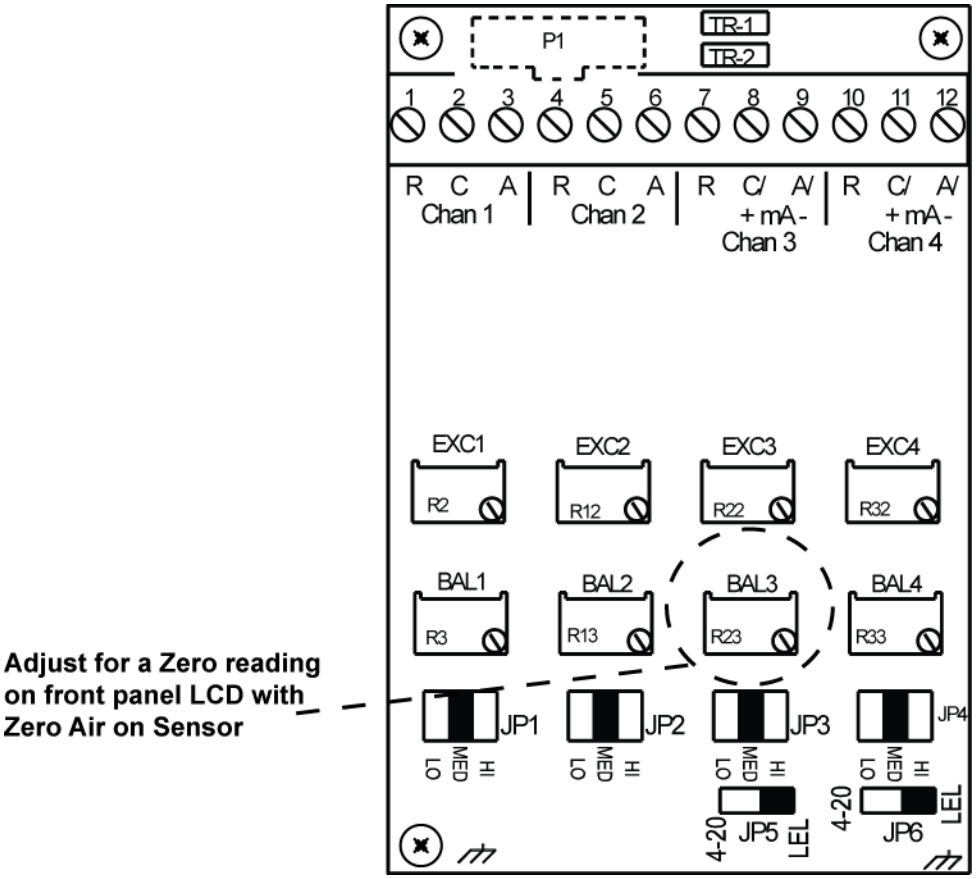

Figure 3-6. Zero Balance

7) Apply 50% span gas to the sensor and allow the reading to stabilize. Position the 3-position *Coarse Gain* jumper into the position that displays a reading at the front Panel LCD of between 45% and 65%. Gain settings for each jumper position are as follows: no jumper = 1, right = 7, middle = 21, left = 41. Multiple jumpers have an additive affect upon gain, so the right and middle jumpers together provide a gain of 28.

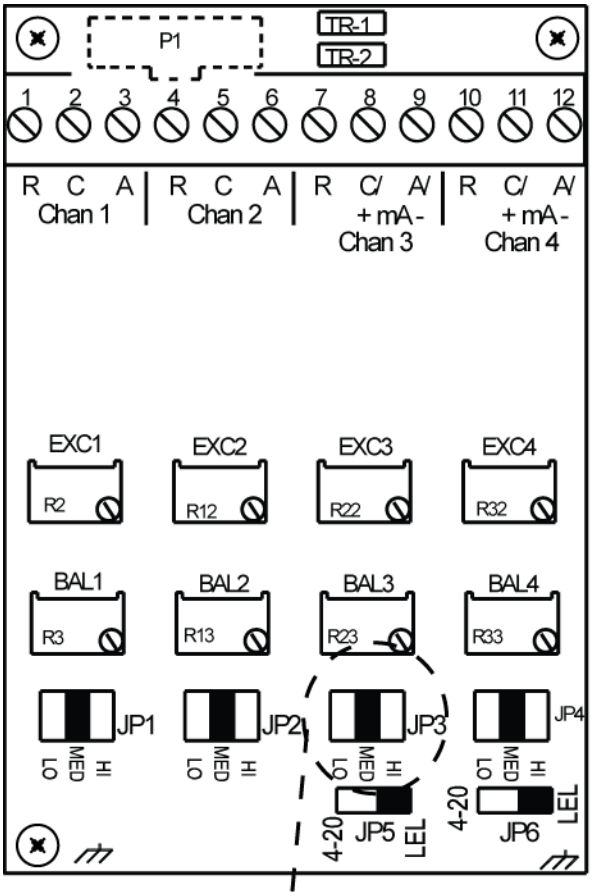

Figure 3-7. Balance Adjustment

Further calibration of this sensor now requires only typical calibration as described in Paragraph 3.7.

3.7. Calibration

Calibration from the 7400 Plus should normally be performed on sensors only. Typical calibration of remote transmitters should occur at the transmitter.

WARNING

OPERATING A DETECTOR THAT HAS EXCEEDED ITS CALIBRATION DATE CAN CAUSE FALSE READINGS OF DETECTED GASES. READINGS OBTAINED WHILE UNIT IS OUT OF CALIBRATION ARE INVALID AND COULD LEAD TO DEATH OR INJURY.

WARNING

LOCAL ALARMS ARE INHIBITED IN THE 7400 PLUS WHILE IN CALIBRATION MODE. VERIFY THE ENVIRONMENT IS CLEAN AND FREE OF HAZARDOUS GASES AND TOXINS OR HAVE MONITORING PERFORMED BY ANOTHER UNIT PRIOR TO CALIBRATING. FAILURE TO DO SO COULD LEAD TO INJURY OR DEATH

CAUTION

THE CALIBRATION MODE IN THE 7400 PLUS SHOULD ONLY BE USED WHEN LOCAL CALIBRATION OF A MONITORING IS NOT POSSIBLE. CALIBRATING AN INPUT SIGNAL AT MORE THAN ONE LOCATION WILL CAUSE INACCURATE READINGS AND COULD LEAD TO INJURY OR DEATH.

Scott Health & Safety recognizes the potential of the 7400 Plus and remote monitors as a life saving device when operated and maintained correctly. As such, verifying proper operation of the 7400 Plus and remote monitors in the form of Span calibration is essential to ensure the 7400 Plus and remote monitors perform as intended in a potentially hazardous environment.

The frequency at which Span calibration occurs is best determined based on local regulatory standards, company policies, and industry best practices. Scott Health & Safety is not responsible for setting policies or practices.

Calibration of the 7400 Plus and remote monitors occurs in two stages. Zero calibration is performed to establish baseline readings of atmospheres that are known to be free of toxic or combustible gases. Span calibration is performed to ensure the monitor detects target gases within specified operating parameters.

Span calibration is the adjustment of the 7400 Plus and remote monitors response to match a known concentration of gas. Sensors can lose sensitivity through normal degradation, exposure to high gas concentrations, or sensor poisoning. Accurate calibration can be achieved only if specific concentrations of the correct gases are used. Span calibration should be performed when a new sensor is installed.

Scott Health & Safety recommends a daily Zero calibration be performed prior to each day's use and when the monitor displays a reading other than its baseline reading in an atmosphere known to be free of any toxic or combustible gases. When an atmosphere is not known to be free of toxic or combustible gases, a Zero Air calibration cylinder may be used.

Optional 4-20mA outputs (if equipped) transmit 1.5mA during CAL MODE and 4mA during the subsequent CAL DELAY to prevent external alarms during calibration.

Follow these 7400 PLUS sensor calibration guidelines:

- Calibration from the 7400 Plus should normally be performed on sensors only. Typical calibration of remote transmitters should occur at the transmitter.
- Calibration accuracy is only as good as the calibration standard accuracy. Scott H & S recommends calibration standards with NIST (National Institute of Standards and Technology) traceable accuracy to increase the validity of the calibration.
- Do not use a gas cylinder beyond its expiration date.
- Calibrate a new sensor before use.
- Allow the sensor to stabilize before starting calibration.
- Calibrate using zero air to ensure the highest accuracy.

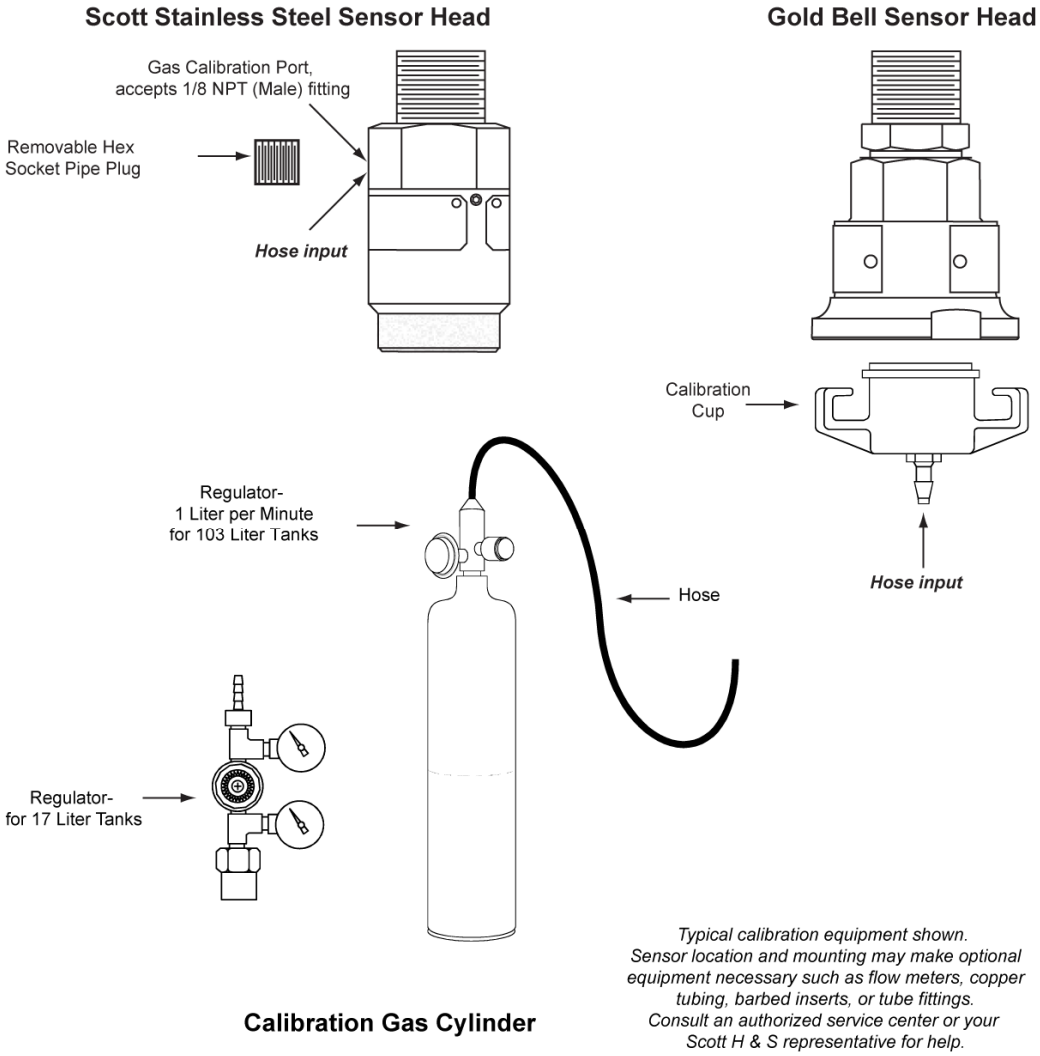

Figure 3-8. Typical Calibration Setup

3.7.1. Determining Span Gas to Use

Typical calibrations are performed using methane gas as the Span Gas. For accurate readings of other types of gas, the Span Gas must match the gas to be measured. However, to calibrate a sensor for detection of other gases, a surrogate gas, propane, can be used. Appendix B details how to apply a K-factor to the propane surrogate gas to obtain detection of other gas types.

3.7.2. Sensor Calibration Procedure

To perform a calibration from the 7200 Plus, perform the following:

NOTE

CAL MODE AUTOMATICALLY EXITS IF NO KEYS ARE ACTIVATED AFTER 5 MINUTES.

1) To enter Cal Mode from any data display, press the **DOWN / CAL** key then use the **UP/DOWN** keys to select the channel to calibrate.
2) Apply Zero gas to the sensor to be calibrated with an appropriate Zero calibration standard. Wait approximately five minutes or until readings are stable at the LCD display, then press the **EDIT** key to perform the Zero calibration.
3) If the Zero calibration is successful, Cal Mode automatically proceeds to the Span check.
4) Apply Span gas to the sensor to be calibrated that matches the selected value set in the Cal Setup Menu. Wait approximately five minutes or until readings are stable at the LCD display, then press the **EDIT** key to perform the Span calibration.

NOTE

REFER TO PARAGRAPH 4.3.3 FOR INFORMATION ON SETTING OR VERIFYING THE SPAN GAS VALUE.

5) If the Span calibration is successful, the display flashes REMOVE CAL GAS and starts the Cal Delay.
6) CAL MODE will be complete after the end of the CAL DELAY.

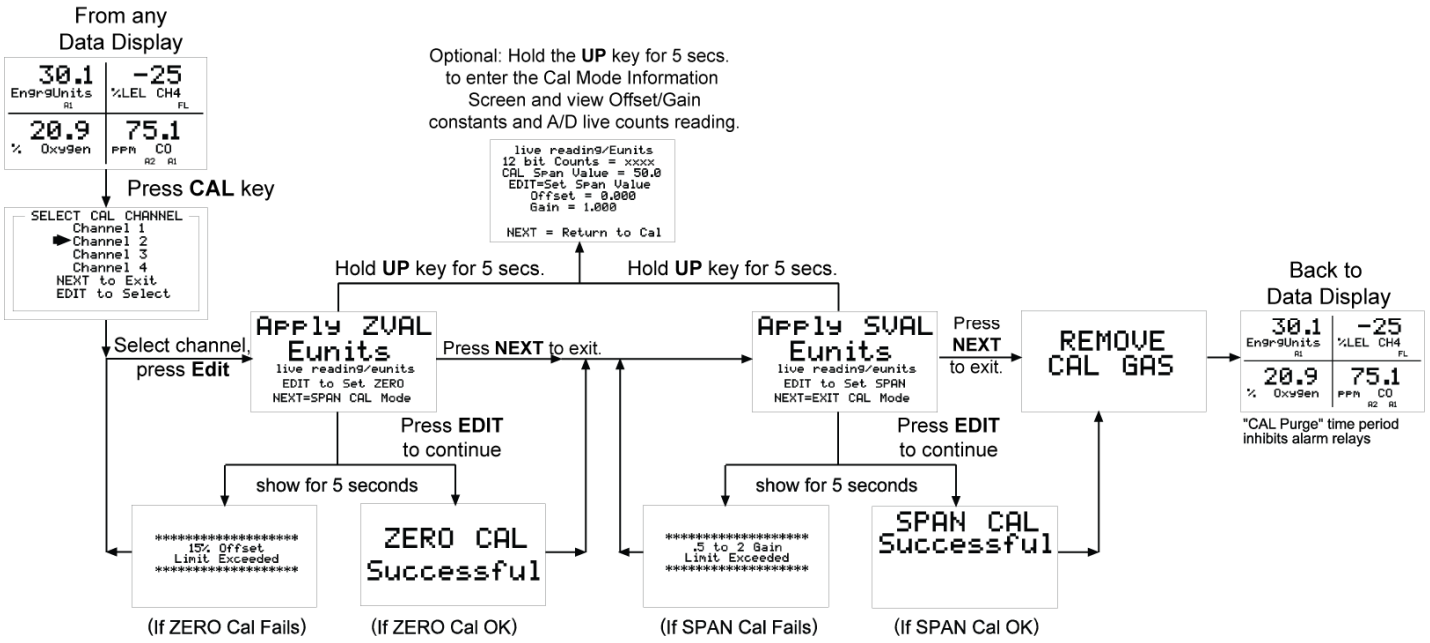

Figure 3-9. Calibration Quick Guide

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4. Operation

4.1. Menu Structure

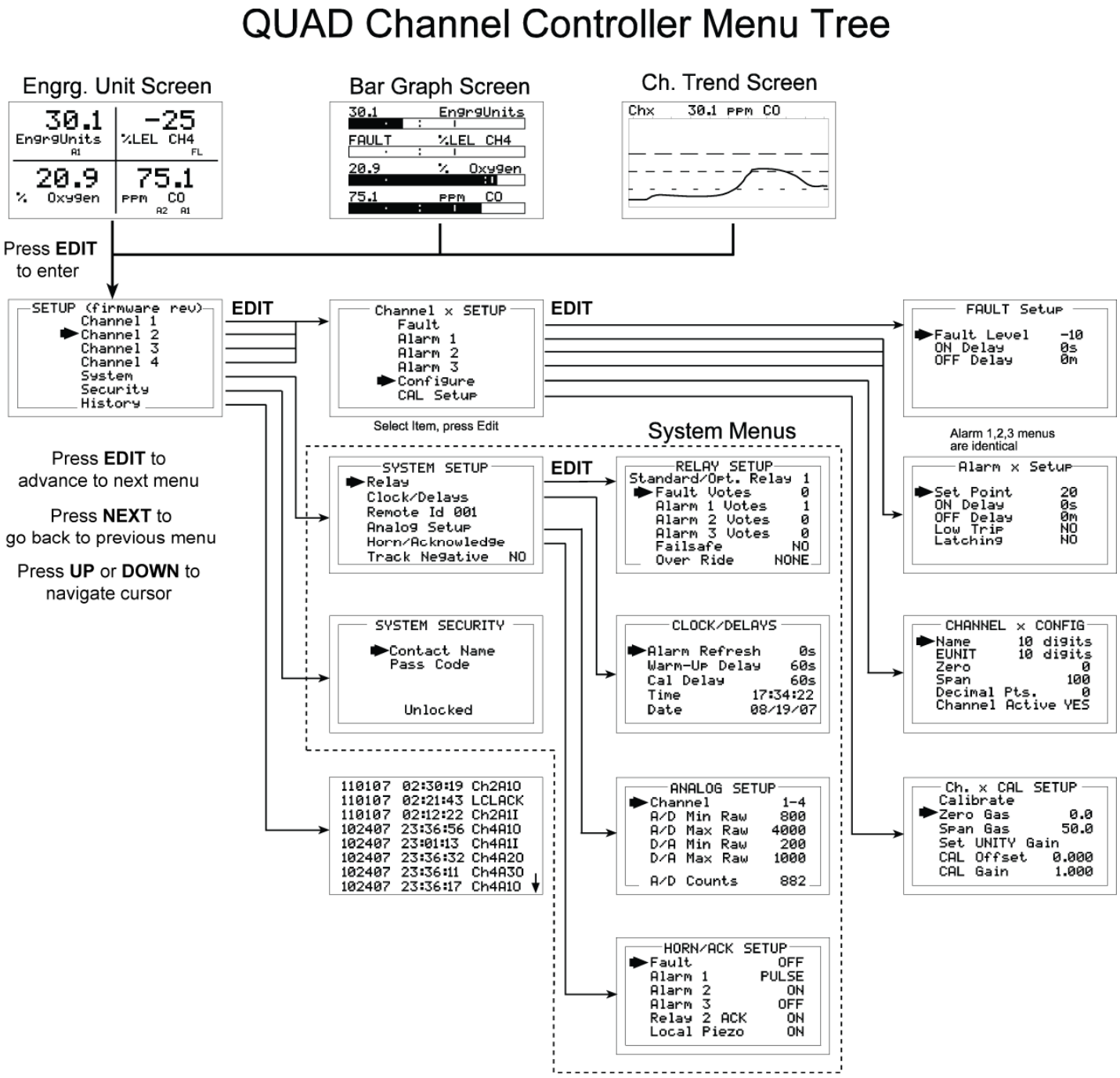

Figure 4-1. Menu Structure of the 7400 Plus

4.2. Data Display Screens

The primary source of operator interface with the 7400 Plus is through the LCD Display. Data can be monitored using any one of three screens. Select the **NEXT** key to cycle between Data Displays screens.

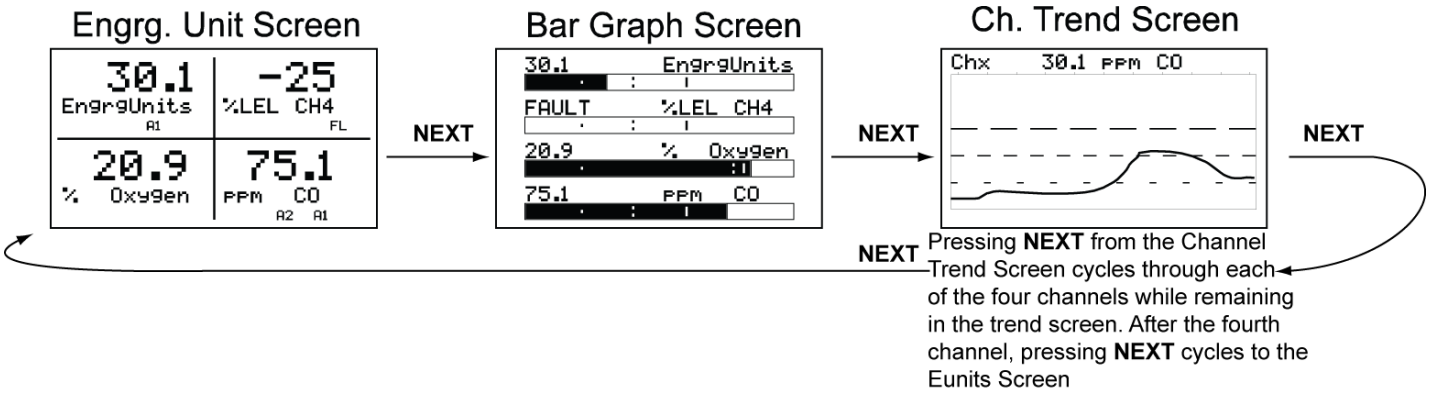

Figure 4-2. Data Display Screens

4.2.1. Engineering Unit Screen

The Engineering Unit Display screen simultaneously displays information of each of the four channels at once. Values are shown with their Eunits tag as well as any alarm of fault indication. A1, A2, A3, and FL icons will appear and flash at the lower right of each reading if the corresponding alarm or fault activates.

Refer to Figure 4-2.

4.2.2. Bar Graph Screen

The Bar Graph screen simultaneously displays information of each of the four channels at once relative to alarm settings. Values and faults are displayed in Eunits above a graphical bar representation of current values against alarm set points. Alarm set points are shown with dashed lines.

Refer to Figure 4-2.

4.2.3. Trend Screen

The Trend screen displays information from a single channel at one time. 30 minutes of data is displayed in a graphical line charted against alarm set points. Alarm set points are shown with dashed lines representing A1, A2, and A3. Viewing of different channels is accomplished by activating the **NEXT** key.

Refer to Figure 4-2.

4.3. Channel Setup Menus

Each of the four monitored channels are customized using the menus for each individual channel as shown in Figure 4-3. From any of the Data Display screens, press **EDIT** to enter the Setup Menu.

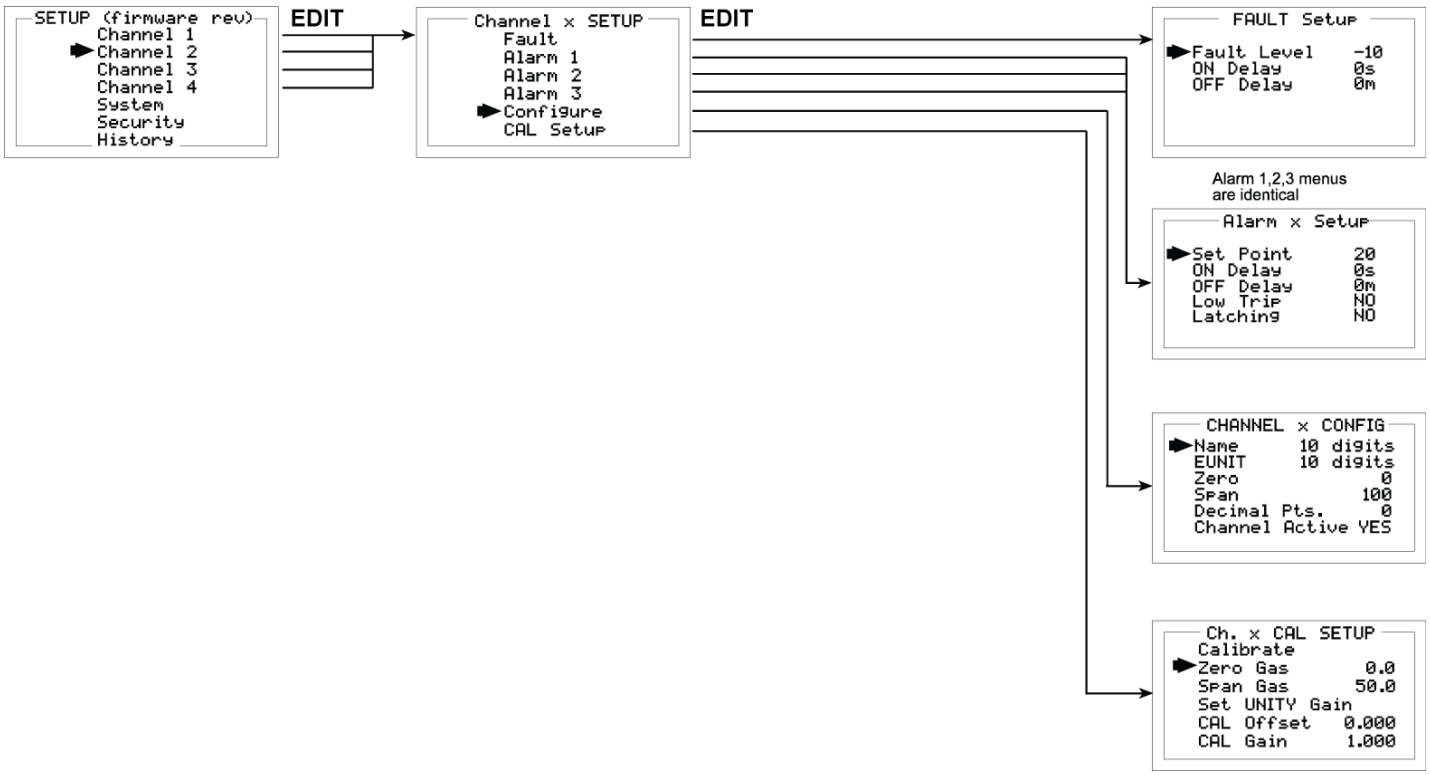

Figure 4-3. Channel Setup Menu

4.3.1. Setup Menu

As shown in Figure 4-3, the Setup Menu is the first menu after pressing the **EDIT** key from any Data Display.

along with a cursor for menu navigation.

Use the **UP** and **DOWN** keys to navigate the pointer to the whichever of the 4 channels desired and press **EDIT**.

4.3.2. Channel Setup Entry Menu

Channel Setup Entry menu allows configuration of all variables for the selected channel including Fault, Alarm 1, Alarm 2, Alarm 3, Configure and CAL Setup.

NOTE

EACH CHANNEL MENU IS IDENTICAL AND MUST BE SET INDIVIDUALLY. OPTIONS SELECTED FOR CHANNEL 1 WILL NOT EFFECT CHANNEL 2 AND SO ON.

4.3.2.1. Fault Menu

Fault alarms are always low trip alarms activated when an input goes below the set point. Fault alarms are not latching.

The Fault alarm, when activated, will cause the associated LED on the lower right side of the front panel to flash until acknowledged by pressing the **ALARM RESET** button. Once acknowledged, the LED will remain steady until either the fault clears or a new alarm occurs' at which point the LED will flash again.

Options available in the Fault menu include:

- **Fault Level** is the set point established at which point the system is able to recognize a fault has occurred.
- **On Delay** sets the time in seconds for a fault condition to delay before reporting a fault condition.
- **Off Delay** sets the time in minutes that a fault condition should remain cleared before removing fault indications.

4.3.2.2. Alarm Menu

Alarm LED's on the left side of the front display are yellow for Alarm 1, and red for Alarms 2 and 3. This is because Typical applications use Alarm 1 as an alert warning, Alarm 2 as a High alarm, and Alarm 3 as a Shut Down indicator. However, there is no functional difference between the three alarms.

Options available in the Alarm Menu include:

- **Set Point** is entered in engineering units and determines the value where the alarm trips. For example, if a channel monitors 0-50 ppm H2S and the desired alarm level is 10 ppm, the correct entry is 10.00. A one percent dead band prevents alarm chatter meaning after tripping an alarm, the input must move at least 1% of full scale back through the set point for the alarm to auto reset.
- **ON Delay / OFF Delay** entries allow ON and OFF time delays affecting how long the trip-point must be surpassed before an alarm event transition occurs. ON delays are limited to 10 seconds while OFF delays may be as long as 120 minutes. Delays are useful in many applications to prevent nuisance alarms and unwanted cycling into and out of alarm conditions.
- **Low Trip** is set to either NO for increasing alarms or YES for decreasing alarms to determine if the alarm activates upon exceeding or falling below the set-point.
- **Latching** determines either manual or automatic alarm reset operation. YES requires a manual **ALARM RESET** to unlatch the alarm even though an alarm condition no longer exists. YES also causes this alarm's common relay, front panel LED, and optional discrete relay to latch. NO allows all outputs for this alarm to automatically reset after the alarm condition clears.

4.3.3. Channel Configure Menu

The Channel Configure menu allows setting the 7400 Plus Name and channel Eunit as 10 digit ASCII fields, defines the measurement range of the ZERO and SPAN entries, number of Decimal Points of resolution the reading will have, and if the channel is Active.

- **Name** allows the user to give the channel a unique name, typically of the gas or toxin the channel is measuring.

- **Eunit** allows the user to give the channel a unique measurement value, for example, ppm or %.
- **Zero** and **Span** values are specified by the user to identify the range of Eunits being measured on a channel from the 4-20mA signal. For example, if a channel is measuring 0-10ppm chlorine, the Zero value should be 0.000 and the Span value 10.00.

NOTE

ZERO AND SPAN VALUES SHOULD ALWAYS BE ENTERED USING FOUR DIGITS IN THIS MENU REGARDLESS OF OPTIONAL DECIMAL POINT SETTINGS.

- **Decimal pts.** sets the number of digits to display beyond the decimal point for the channel display, limited to zero to four digits. At zero digits, a reading of 0 ppm is displayed as 0, while at 4 digits, the reading is displayed as 0.000. Conversely, a reading of 100 ppm would be displayed as 100 at zero digits and 100.0 at four digits.
- **Channel Active** is set to either yes or no depending on whether the channel is being utilized. When No is selected, alarms are inactive on that channel and a line will be drawn though the channel on the LCD display.

4.3.4. Cal Setup Menu

The Calibration Setup Menu supports push button calibration of Zero and Span values. This feature should be utilized only when there are no other zero/span controls within the monitoring system since it is inappropriate to calibrate a signal at more than one point. Therefore, if calibration will be performed at another transmitter or monitoring device, the 7400 Plus Cal Mode feature should not be used.

Options available in the Cal Setup menu include:

- **Zero Gas** allows users to set the Zero Gas value.
- **Span Gas** allows users to set the Span Gas value.
- **Set Unity Gain** resets all calibration data making Cal Offset = 0 and Cal Gain = 1.

4.4. System Configuration Menus

Several system level options are available that effect the 7400 Plus and are not channel specific are shown in Figure 4-4. These include System Setup, Security and History Log.

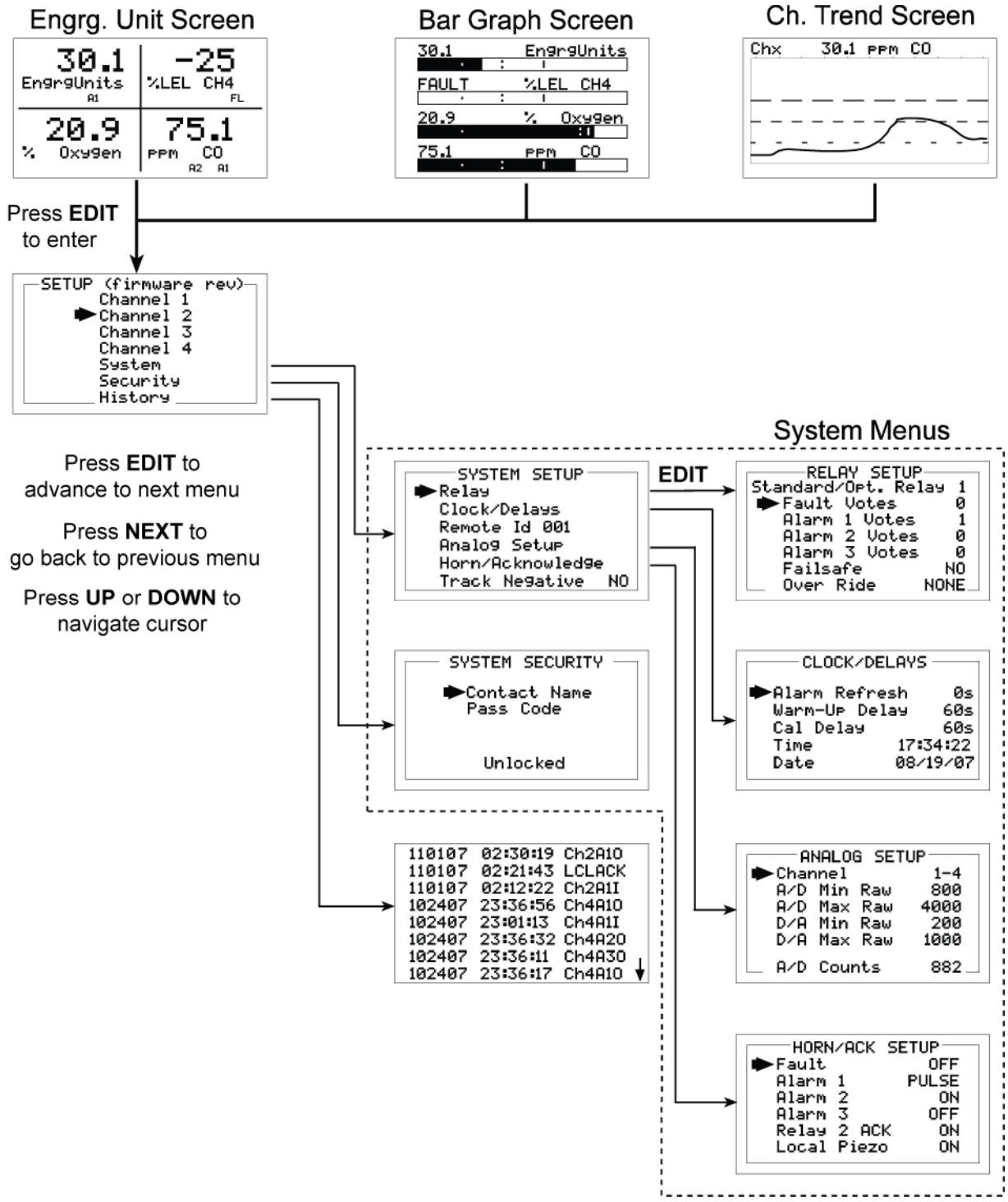

Figure 4-4. System Configuration Menus

4.4.1. System Setup Menu

The System Setup menu allows the user to navigate to further system options affecting all channels, setting a remote ID, and whether to track negative values or not.

Setting the Remote ID allows setting RTU address for the optional slave MODBUS serial port. This slave port may be used to transfer 7400 Plus data to a host device such as a PC, PLC, DCS or even other Scott Health & Safety Controllers such as the Sentinel 16 Controller. The slave port is addressable, allowing many 7400 Plus controllers to connect to a single RS-485 cable. A converter is available to make this port compatible with Ethernet TCP/IP networks.

4.4.1.1. Relay Setup Menu

The Relay Setup menu allows configuring of both the standard Relay 1 & Relay 2 housed on the motherboard and the six optional relays on the optional discrete relay PCB. Both standard and optional relays are programmed in this menu. Select the relay to be configured by pointing the arrow at the top menu item and press **EDIT**. The field will scroll through all eight possible relays (2 standard and 6 optional).

- **Fault, Alarm 1, Alarm 2, Alarm 3 Votes** controls the channel alarm combinations that will trip the selected relay. Each vote entry requires that quantity of that type alarm to be active before this relay activates. Relays activate when all combinations of votes are met. For example, if setting up standard relay 1, and the desired effect is to have the relay activate whenever a single alarm 1 occurs on any channel, then select Alarm 1 vote equal to 1. However, if the desired relay should activate whenever alarm 1 activates on all four channels, select Alarm 1 votes equal to 4. Each relay can be set to any combination of votes.
- **Failsafe** set for YES causes this relay to be energized when its voting requirements are false (no alarm condition) and de-energized when the alarm vote requirements are true. The primary benefit of failsafe is loss of power places the relay contacts into the alarm condition.
- **Over Ride** menu allows entering one of the 16 different alarms that will trip this relay regardless of the Votes entries. There are four alarms per channel and four channels and any one of these alarms may be used as the Over Ride. This feature is useful when one channel's alarm has more significance than the others.
- **Horn** controls how activating this relay will affect the horn driver circuit connected to J2 on the motherboard. Choices are **NO**, **STEADY** or **PULSE**. Warning level alarms might be set to pulse the horn with high alarms set for steady. Personnel then recognize which alarm level is present by hearing the pulsing or steady horn.
- **Acknowledge ON** (not allowed on Relay 1) allows Relay 2 to be deactivated during alarm conditions by an Alarm Reset. This is useful if another audible device is being driven by the relay. The acknowledge feature is not available for Relay 1 since it is often used for driving a warning light and Relay 2 for driving a horn. It could be dangerous if an operator acknowledged the horn and the light since no indication of the high alarm condition remains.

4.4.1.2. Clock/Delays Menu

The 7400PLUS monitors signals from inputs that may require varying times to stabilize after power is applied and after calibrations are complete.

Options available in the Clock/Delays menu include:

- **Alarm Refresh** menu allows reactivation of Acknowledged alarms after the time period expires. This feature is used primarily to restart audible alarm devices after having been silenced by an acknowledge function (via serial port or pressing the Alarm Reset button). An entry of 0 seconds effectively disables the **Alarm Refresh** function.
- **Warm Up Delay** menu allows setting how long alarm relays remain disabled after power is applied.
- **Cal Delay** determines how long alarm relays are inhibited after completing a calibration.
- **Time** and **Date** menu items are for setting the correct time and date. The 7400 Plus is equipped with a 24-hour clock and calendar. Time of day must be entered in 24 hour mode. For example, 6:00:00 PM must be entered as 18:00:00.

4.4.1.3. Analog Setup Menu

The system Analog Setup menu allows setting the 12-bit A/D (analog to digital) counts and the 10-bit D/A (digital to analog) counts for each of the four channels. The live A/D counts value for the channel selected is also shown on the bottom of the menu.

The default setting for A/D counts is 400 for Min and 2000 for Max. This is based upon a 0-20mA input providing 0-2000 counts, or, 100 counts per mA input.

- **A/D Min / Max Raw** counts menu entries define the input A/D counts range for Zero and Span readings as described in Paragraph 4.3.4. The default settings for each channel are 400 to 2000 counts. Standard inputs yield 400 counts at 4mA and 2000 counts at 20mA but, for example, if a special application requires the Zero reading at 6mA input and the Span reading at 18mA, the correct **A/D Min / Max Raw** counts would be 600 to 1800.00.
- **D/A Min / Max Raw** counts menu entries define the optional (future) 4-20mA output PCB's input. Ideally, 200 to 1000 yields a 4-20mA output but very slight modifications may be needed to provide precise 4mA and 20mA values for each channel.

4.4.1.4. Horn/Acknowledge Menu

The 7400 Plus display PCB is equipped with a small audible piezo that chirps when keys are pressed providing an audible feedback to the operator.

J2 on the motherboard is the driver output for the optional 100dB piezo.

- **Fault**, **Alarm 1**, **Alarm 2**, and **Alarm 3** menu entries allow programming of which alarms activate the optional or, if selected, local piezo. Options include Off, On (Steady), or Pulse.
- **Local Piezo** is selectable to mimic the optional 100dB horn.
- **Relay 2 ACK** determines if standard relay 2 may be acknowledged by an Alarm Reset. ON causes an Alarm Reset to silence the horn even though an alarm condition remains active.

4.4.2. System Security Menu

A 4-digit Pass Code entered and confirmed in this menu item locks all menus. Viewing menus is not denied, but attempts to edit variables flashes the Locked message on the LCD.

Authorized individuals locking the system should first enter a name, phone number, or other contact information into the 12 character field on the top line of the Security screen. To lock or unlock the system the correct 4 digit authorization number must be entered into the Pass Code field.

NOTE

GIVE CAREFUL CONSIDERATION BEFORE LOCKING THE 7400 PLUS MENUS. IF THE 4 DIGIT PASS CODE IS LOST, FORGOTTEN, OR OTHERWISE UNAVAILABLE, THE FACTORY MUST BE CONSULTED.

4.4.3. History Log

The History Log records up to 65 events on 8 screens. Real time events such as Alarm trips, Alarm Acknowledgements, Calibrations and Power Applied will be captured by the 7400 Plus and displayed in the log.

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5. Parts List and Maintenance

5.1. Parts List

Table 5-1. Parts List

Part Description	Scott P/N
Motherboard	093-0446
Analog Input PCB	093-0465
Bridge Sensor/ 4-20mA Input PCB	093-0466
4-20mA Output PCB	093-0467
Discrete Relay PCB	093-0435
MODBUS Interface PCB	093-0438
2A Fuse on Mother PCB	093-0445
CPU Display PCB	093-0538
50W NEAM 4X Div2 Power Supply PCB	093-0468
50W NEAM 7 Div1 Power Supply PCB	093-0469

5.2. Scott Repairs

When returning a product, contact Technical Support to obtain Return Maintenance Authorization number prior to shipping for service repairs.

Phone: 1- 800-247-7257

e-mail: scotttechsupport@tycoint.com

www.scottsafety.com

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Appendix-MODBUS Register and Function Code Summary

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
Read/Write Coils			
Alarm Ack/Reset	2001	1	5
NOTE *AFTER WRITING A TRUE TO THIS REGISTER, THE 7400 PLUS AUTOMATICALLY RETURNS IT TO FALSE.*			
Read Only Discretes			
Chan 1 Fault	12001	2	N/A
Chan 1 Alarm 1	12002	2	N/A
Chan 1 Alarm 2	12003	2	N/A
Chan 1 Alarm 3	12004	2	N/A
Chan 2 Fault	12005	2	N/A
Chan 2 Alarm 1	12006	2	N/A
Chan 2 Alarm 2	12007	2	N/A
Chan 2 Alarm 3	12008	2	N/A
Chan 3 Fault	12009	2	N/A
Chan 3 Alarm 1	12010	2	N/A
Chan 3 Alarm 2	12011	2	N/A
Chan 3 Alarm 3	12012	2	N/A
Chan 4 Fault	12013	2	N/A
Chan 4 Alarm 1	12014	2	N/A
Chan 4 Alarm 2	12015	2	N/A
Chan 4 Alarm 3	12016	2	N/A

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
Standard Relay 1	12017	2	N/A
Standard Relay 2	12018	2	N/A
Optional Relay 1	12019	2	N/A
Optional Relay 2	12020	2	N/A
Optional Relay 3	12021	2	N/A
Optional Relay 4	12022	2	N/A
Optional Relay 5	12023	2	N/A
Optional Relay 6	12024	2	N/A
Input Fault Relay	12025	2	N/A
Read Only Registers			
Product ID	30001	4	N/A
Returns the numeric value 1000 for product ID.			
Firmware Value	30002	4	N/A
Return a numeric value for firmware value as (Version X 100).			
D2A Chan 1	31001	4	N/A
D2A Chan 2	31002	4	N/A
D2A Chan 3	31003	4	N/A
D2A Chan 4	31004	4	N/A
12 bit value representing the D2A value of 800 (0%) to 4000 (100%) after all cal features are applied.			
Chan 1 Status	31005	4	N/A
Chan 2 Status	31006	4	N/A

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
Chan 3 Status	31007	4	N/A
Chan 4 Status	31008	4	N/A
(16 bit status words; bit assignment for each channel) ALARM1_BELOW BIT0 ALARM2_BELOW BIT1 ALARM3_BELOW BIT2 ALARM1_LATCH BIT3 ALARM2_LATCH BIT4 ALARM3_LATCH BIT5 ALARM3_ACTIVE BIT6 CHANNEL_DISABLED BIT7 CHANNEL_CAL BIT8			
System Status Word	31009	4	N/A
(16 bit status word; bit assignment for system status) PIEZO_DRIVE BIT6 HORN_ACK BIT7 K1_HORN_DRIVE BIT8 K2_HORN_DRIVE BIT9 K1_HORN_PULSE BIT10 K2_HORN_PULSE BIT11 K1_FAILSAFE BIT12 K2_FAILSAFE BIT13 K2_ACK BIT14 LOCK BIT15			
Alarm Status Word	31010	4	N/A
(16 bit status word; bit assignment for system status) CHAN1 FAULT BIT0 CHAN1 ALARM1 BIT1 CHAN1 ALARM2 BIT2 CHAN1 ALARM3 BIT3 CHAN2 FAULT BIT4 CHAN2 ALARM1 BIT5 CHAN2 ALARM2 BIT6 CHAN2 ALARM3 BIT7			

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
	CHAN3 FAULT	BIT8	
	CHAN3 ALARM1	BIT9	
	CHAN3 ALARM2	BIT10	
	CHAN3 ALARM3	BIT11	
	CHAN4 FAULT	BIT12	
	CHAN4 ALARM1	BIT13	
	CHAN4 ALARM2	BIT14	
	CHAN4 ALARM3	BIT15	
LED Blink Status	31011	4	N/A
Bit set to 1 = LED Blinking, 0 = LED steady On.			
	CHAN1 FAULT	BIT0	
	CHAN1 ALARM1	BIT1	
	CHAN1 ALARM2	BIT2	
	CHAN1 ALARM3	BIT3	
	CHAN2 FAULT	BIT4	
	CHAN2 ALARM1	BIT5	
	CHAN2 ALARM2	BIT6	
	CHAN2 ALARM3	BIT7	
	CHAN3 FAULT	BIT8	
	CHAN3 ALARM1	BIT9	
	CHAN3 ALARM2	BIT10	
	CHAN3 ALARM3	BIT11	
	CHAN4 FAULT	BIT12	
	CHAN4 ALARM1	BIT13	
	CHAN4 ALARM2	BIT14	
	CHAN4 ALARM3	BIT15	
Relay Status	31012	4	N/A
Bit set to 1 = LED Blinking, 0 = LED steady On.			
	STANDARD RELAY 1	BIT0	
	STANDARD RELAY 2	BIT1	
	OPTION RELAY 1	BIT2	
	OPTION RELAY 2	BIT3	
	OPTION RELAY 3	BIT4	
	OPTION RELAY 4	BIT5	
	OPTION RELAY 5	BIT6	
	OPTION RELAY 6	BIT7	

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
	INPUT FAULT RELAY	BIT8	
	RESERVED	BIT9	
	RESERVED	BIT10	
	RESERVED	BIT11	
	RESERVED	BIT12	
	RESERVED	BIT13	
	RESERVED	BIT14	
	RESERVED	BIT15	
Memory Reals:			
NOTE ***41001-41040 REAL REPRESENTS FLOAT VALUE WITHOUT THE DECIMAL POINT SUCH THAT 123.4 IS RETURNED AS 1234. DECIMAL DIVISOR IS RETURNED AS 1, 10, 100, OR 1000 FOR DECIMAL POSITION OF 1, 2, 3, OR 4, WHERE 123.4 WOULD RETURN THE DEVISOR VALUE OF 10.***			
Chan 1 Zero Real	41001	3	N/A
Chan 1 Zero Divisor	41002	3	N/A
Chan 1 Span Real	41003	3	N/A
Chan 1 Span Divisor	41004	3	N/A
Chan 1 Alarm 1 Real	41005	3	N/A
Chan 1 Alarm 1 Divisor	41006	3	N/A
Chan 1 Alarm 2 Real	41007	3	N/A
Chan 1 Alarm 2 Divisor	41008	3	N/A
Chan 1 Alarm 3 Real	41009	3	N/A
Chan 1 Alarm 3 Divisor	41010	3	N/A
Chan 2 Zero Real	41011	3	N/A
Chan 2 Zero Divisor	41012	3	N/A

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
Chan 2 Span Real	41013	3	N/A
Chan 2 Span Divisor	41014	3	N/A
Chan 2 Alarm 1 Real	41015	3	N/A
Chan 2 Alarm 1 Divisor	41016	3	N/A
Chan 2 Alarm 2 Real	41017	3	N/A
Chan 2 Alarm 2 Divisor	41018	3	N/A
Chan 2 Alarm 3 Real	41019	3	N/A
Chan 1 Alarm 3 Divisor	41020	3	N/A
Chan 3 Zero Real	41021	3	N/A
Chan 3 Zero Divisor	41022	3	N/A
Chan 3 Span Real	41023	3	N/A
Chan 3 Span Divisor	41024	3	N/A
Chan 3 Alarm 1 Real	41025	3	N/A
Chan 3 Alarm 1 Divisor	41026	3	N/A
Chan 3 Alarm 2 Real	41027	3	N/A
Chan 3 Alarm 2 Divisor	41028	3	N/A
Chan 3 Alarm 3 Real	41029	3	N/A
Chan 3 Alarm 3 Divisor	41030	3	N/A
Chan 4 Zero Real	41031	3	N/A
Chan 4 Zero Divisor	41032	3	N/A
Chan 4 Span Real	41033	3	N/A
Chan 4 Span Divisor	41034	3	N/A

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
Chan 4 Alarm 1 Real	41035	3	N/A
Chan 4 Alarm 1 Divisor	41036	3	N/A
Chan 4 Alarm 2 Real	41037	3	N/A
Chan 4 Alarm 2 Divisor	41038	3	N/A
Chan 4 Alarm 3 Real	41039	3	N/A
Chan 4 Alarm 3 Divisor	41040	3	N/A
Memory ASCII Strings			
User Info Chan 1	40401-40405	3	N/A
User Info Chan 2	40406-40410	3	N/A
User Info Chan 3	40411-40415	3	N/A
User Info Chan 4	40416-40420	3	N/A
10 ASCII characters (2 per register) assigned to the unit identifier as bytes.			
EUNITS Chan 1	40421-40425	3	N/A
EUNITS Chan 2	40426-40430	3	N/A
EUNITS Chan 3	40431-40435	3	N/A
EUNITS Chan 4	40436-40440	3	N/A
10 ASCII characters (2 per register) assigned to the engineering units as read bytes.			
Chan 1 ASCII Reading	40441-40443	3	N/A
Chan 2 ASCII Reading	40444-40446	3	N/A
Chan 3 ASCII Reading	40447-40449	3	N/A
Chan 4 ASCII Reading	40450-40452	3	N/A

Table A-1. MODBUS Register and Function Code Summary

Variable Code	Alias	Read Function Code	Write Function
6 ASCII characters (2 per register) reflecting the display readout.			
Firmware Version			
Version	40453-40455	3	N/A
4 ASCII characters (2 per register) reflecting the firmware version.			

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