SCOTT SAFETY

INSTRUCTION MANUAL

Model 7600, 6 CHANNEL CONTROLLER

(087-0018 REVISION B)

Modbus is a registered trademark of Modicon Corp.

Warning: Read & understand contents of this manual prior to operation. Failure to do so could result in serious injury or death.

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REVISION HISTORY

Revision B 1/28/2011 Update Section 3, 5, added warranty, added part number mapping, and add Revision History page. Added Scott Safety logos, and contact information.

PART NUMBER MAPPING

Description	**P/N**	**Ordering P/N**
8 Channel Cat Bead Input PCB	10-0191	093-0217
Dual Channel Cat Bead Input PCB	10-0192	093-0297
60Watt Panel Mount Power Supply	10-0153	093-0570
Main I/O Controller PCB	10-0142	093-0216
Auxiliary Relay PCB	10-0144	093-0222
Panel/Rack Mount Enclosure	ST35PM/ 10-0207	093-0330
Wall Mount Enclosure, Fiberglass	ST-35N4	093-0282
Wall Mount Enclosure, Explosion Proof	ST-35XP	093-0284
6 Channel Relay PCB	10-0196	093-0217
I/O Controller PCB	10-0166	093-0216
Main I/O Controller PCB	10-0213	093-0568
Optional Analog Input PCB	10-0171	093-0214
Optional 4-20mA Analog Out PCB	10-0152	093-0215

WARRANTY

Scott Safety, a Division of Scott Technologies, Inc. warrants to Buyer that at the time of delivery this product will be free from defects in material and manufacture and will conform substantially to Scott Safety's applicable specifications. Scott Safety's liability and Buyer's remedy under this warranty are limited to the repair or replacement, at Scott Safety's option, of this Product or parts thereof returned to Seller at the factory of manufacture and shown to Scott Safety's reasonable satisfaction to have been defective; provided that written notice of the defect shall have been given by Buyer to Scott Safety within one (1) year after the date of this product by Scott Safety.

Scott Safety warrants to Buyer that it will convey good title to the Product. Scott Safety's liability and Buyer's remedy under this warranty of title are limited to the removal of any title defects or, at the election of Scott Safety, to the replacement of this Product or parts thereof that are defective in title.

The warranty set forth in paragraph 1 does not apply to parts the Operating Instructions designate as having a limited shelf-life or as being expended in normal use.

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WARNING!

Because this instrument is used to detect and monitor materials and conditions which are listed by OSHA or others as potentially hazardous to personnel and property, the information in this manual must be fully understood and utilized to ensure that the instrument is operating properly and is both used and maintained in the proper manner by qualified personnel. An instrument that is not properly calibrated, operated and maintained by qualified personnel is likely to provide erroneous information, which could prevent user awareness of a potentially hazardous situation for the instrument user, other personnel and property.

If, after reading the information in this manual, the user has questions regarding the operation, application or maintenance of the instrument, supervisory or training assistance should be obtained before use. Factory assistance is available by calling 800-247-7257.

SECTION 1

IMPORTANT SAFETY ISSUES

The following symbols are used in this manual to alert the user of important instrument operating issues:

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions.

This symbol is intended to alert the user to the presence of dangerous voltage within the instrument enclosure that may be sufficient magnitude to constitute a risk of electric shock.

WARNINGS:

- **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 (see Figure 6.2).
- Use a properly rated CERTIFIED AC power (mains) cable installed as per local or national codes
- 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 rate CERTIFIED fuse or current limiter is required to installed as per local or national codes. Markings for positions of the switch or breaker should state (I) for on and (O) for off.
- Clean only with a damp cloth without solvents.
- Equipment not used as prescribed within this manual may impair overall safety.

1.0 GENERAL DESCRIPTION

The Scott Safety, Model 7600, Six Channel Controller is designed to monitor, display, and control alarm event switching for up to six sensor data points. Alarm features such as *ON* and *OFF* delays, A*larm Acknowledge*, and a dedicated horn relay make the well suited for many critical multi-point monitoring applications. Sensor data may be input to the by optional analog inputs or the standard Modbus® RTU *master* port. A Modbus RTU *slave* port is also standard for sending data to PC's, PLC's, DCS's, or even other Controllers. Options such as analog I/O and discrete relays for each alarm are easily added to the addressable I^2C bus.

A high intensity LED display scans the six channel values at a programmable rate. These 12 alphanumeric digits indicate channel #, value with polarity, and six digits of engineering units. A 2 line by 16 character LCD display provides operator interface to *Set-Up* menus allowing configuration for a wide range of industrial applications. All configuration data is retained in non-volatile memory during power interruptions. The LCD also indicates each channel's 16 character *Measurement Name* field when not being utilized for operator interface. This field displays user terminology descriptions of each channel. The front panel is shown below in Figure 1.1.

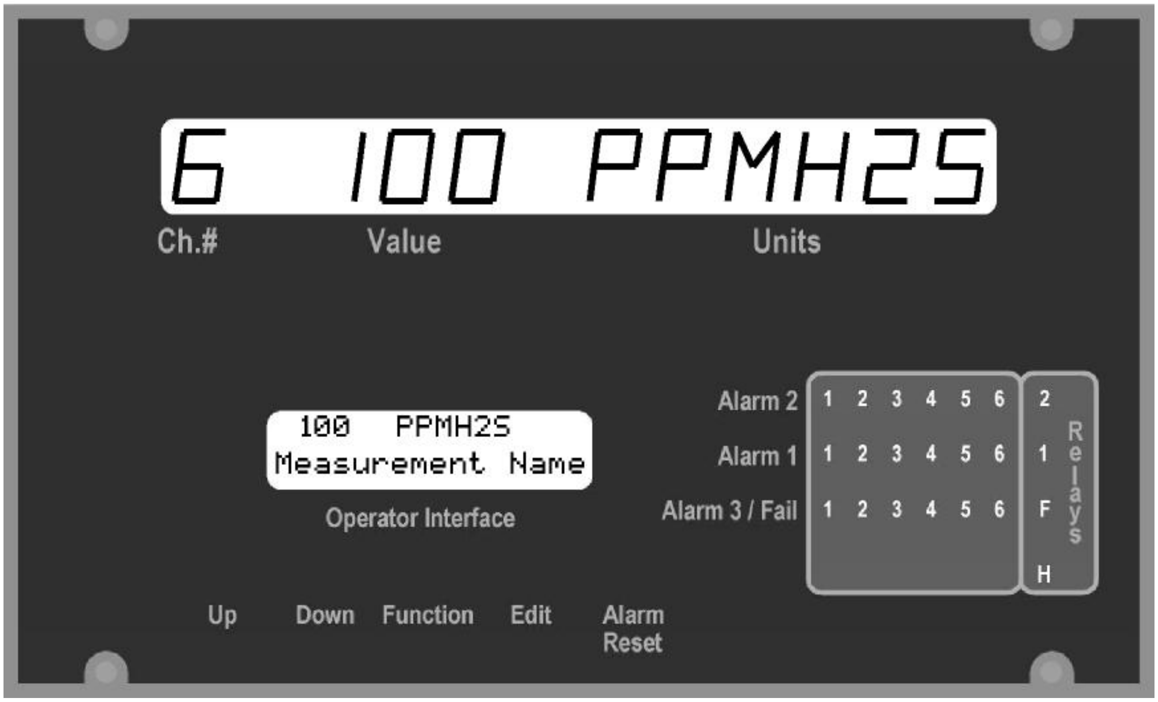


Figure1.1

1.1 SPECIFICATIONS:

1.2. DC POWER SUPPLY REQUIREMENTS

Standard power requirements are 10-30VDC @ 30 watts max applied to terminals 9 & 11 of TB2 on the standard I/O PCB (see section 3.0). Optional features increase power consumption as described below:

- Discrete Relay PCB option; add 2 watts per PCB.
- Analog Input PCB option; add 1/2 watt.
- 4-20mA Output PCB option; add 1 watt.
- Catalytic Bead Sensor Input option; add 9 watts max (depends upon sensor power).
- TB2 terminals 10 & 12 of the standard I/O PCB provide a maximum of 500mA fused output power for powering of auxiliary external devices such as relays, lamps or transmitters. Power consumed from these terminals should be considered when calculating system power consumption.

1.2.1 60 WATT AC – 24VDC POWER SUPPLY

100-240 VAC @2.0A max

The 093-0570 60 watt power supply (Figure 3.9) is for powering the and up to 6 transmitters. A minimum of 5 watts per channel is available for powering of external transmitters.

1.2.2 AMBIENT TEMPERATURE RANGE

-25 to 50 degrees C

1.2.3 HUMIDITY RANGE

0 TO 90% R. H. Non-Condensing.

1.2.4 ALTITUDE

Recommended up to 2000 meters

1.2.5 HOUSINGS

- General purpose panel mount weighing 7 lbs and including hardware for 19" rack mounting (Figure 6.1).
- *NEMA 4X wall mount in fiberglass enclosure weighing 17 lbs (Figure 6.2).
- *NEMA 7 wall mount suitable for DIV 1&2 Groups B,C,D weighing 110 lbs (Figure 6.4).

*Includes non-intrusive magnetic keypad.

1.2.5a NON-INTRUSIVE MAGNETIC KEYPAD

The operator interface includes five front panel *touch* keys. A magnetic keypad option offers these five keys with adjacent magnetic keys. This option is included as a standard item when ordering NEMA 4X weather resistant or NEMA 7 explosion-proof enclosures. It is useful in applications where it may be inconvenient to open the enclosure's door to access the *touch* keypad.

1.2.6 APPROVALS

CSA C22.2 No 1010.1 and ISA S82.02: EN55011 & EN61000 (CE Mark)

SECTION 2

2.0 BASIC OPERATION

Modes of operation are configured via the Operator Interface LCD display. After initial power up, *Normal* mode operation is in effect causing both displays to scan active channels (see Figure 2a). An alternative *Alarm Priority* mode may be configured that only scans channels with alarms (see Figure 2b). *Normal* or *Alarm Priority* mode operation may be halted by initiating the *Manual* mode, allowing unlimited duration viewing of any channel (see Figure 2c). *Manual* mode is entered by pressing the **UP/DOWN** keys simultaneously and using **UP** *or* **DOWN** to step to the desired channel. A *Set-Up* mode is entered by pressing **FUNCTION**, scrolling to the desired menu tree using the **UP/DOWN** keys, and pressing **EDIT** (see Figure 2d). This *Set-Up* mode may be exited by pressing **FUNCTION** again. System critical alarm event switching of relays and front panel alarm LED indicators is not affected by entering the *Set-Up* mode. An

AUTHORIZATION MENU feature may be utilized to prevent malicious and accidental tampering with alarm parameters.

0 PCTLEL Measurement Name	SCANNING ALARMS Measurement Name
Figure 2a (*Normal*)	**Figure 2b (*Alarm***
MANUAL SCAN Measurement Name	F=NORM E=EDIT C1 UP/DN SELECTS CH
Figure 2c (*Manual*)	Figure 2d (*Set-Up*)

2.1 SYSTEM CONFIGURATION

Each Controller requires configuration of *system* and *channel* variables upon initial installation. After power up the controller will be in *Normal* mode or *Alarm Priority* mode, depending upon how it was last powered down. Configuration of system and channel variables requires entering the *Set-Up* mode by pressing **FUNCTION,** then **EDIT**. A menu tree is provided for each of the 6 *channels* and another for *system* variables. Select the tree to be entered by pressing the **UP** or **DOWN** buttons to scroll through C1, C2, C3, C4, C5, C6 SY and press **EDIT** to enter the desired tree.

2.1.1 CHANGING VARIABLES USING THE KEYPAD

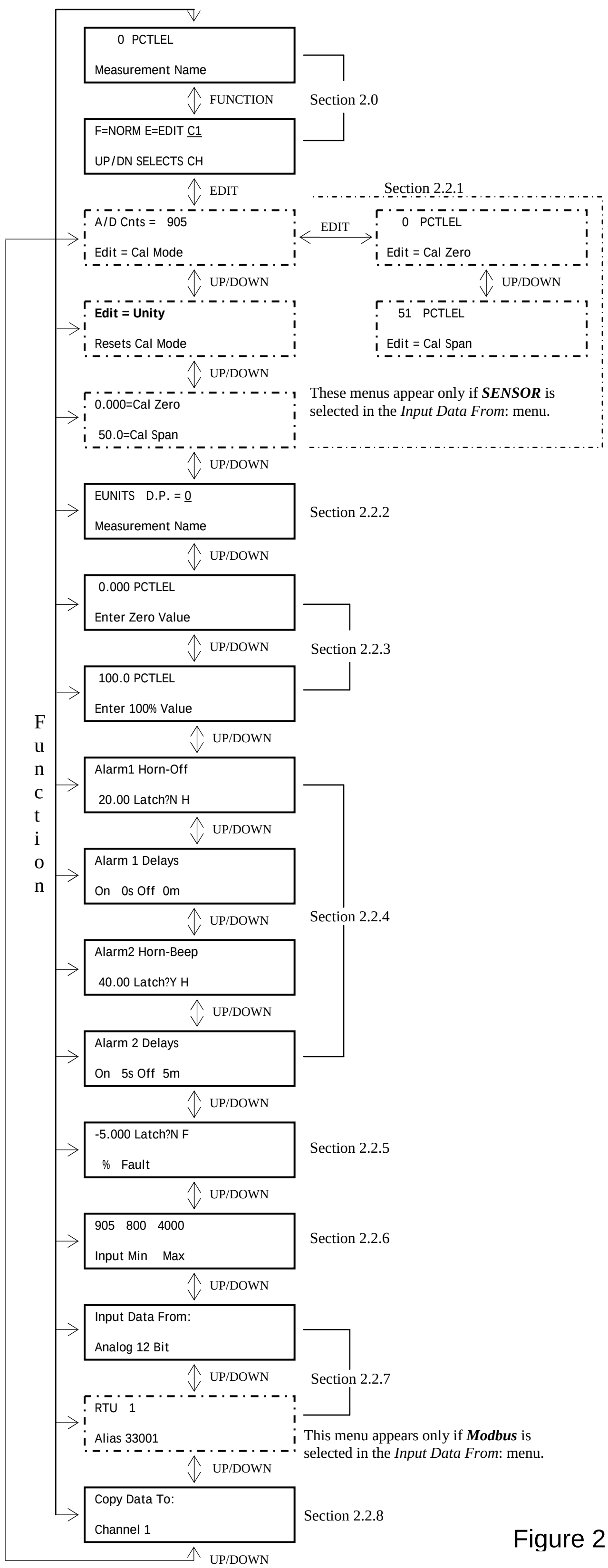
Each menu contains one or more entries to be configured. Some are simple *YES/NO* or *ON/OFF* entries that are toggled by pressing the **EDIT** key. Others, such as the *Measurement Name* and *Engineering Units* fields, may have many different ASCII character possibilities. **EDIT** is used to modify variables within any menu. If the item has only limited entries it toggles each time **EDIT** is pressed. If there are many possible entries, **EDIT** begins a flashing cursor over the item and **UP/DN** scrolls through each available entry. **FUNCTION** moves the flashing cursor to the next position within a field. **EDIT** discontinues the flashing cursor and loads that entry into non-volatile memory.

2.2 CHANNEL CONFIGURATION MENUS

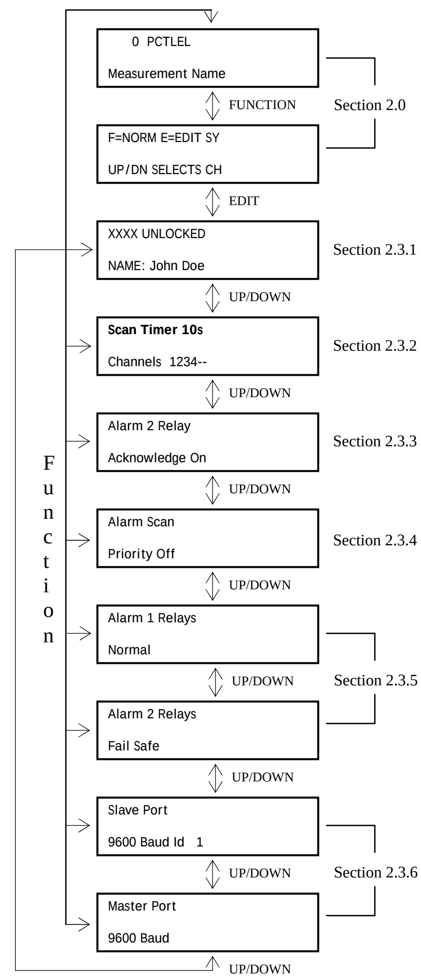
Figure 2.2 shows the menu tree for configuring all *channel* variables on the left side of the page. These only affect the specific channel that has been selected. The *system* menu tree is shown on the right side of the page and is described in section 2.3.

LCD OPERATOR INTERFACE MENU TREES

CHANNEL MENU TREE (See Section 2.2)



SYSTEM MENU TREE (See Section 2.3)



Note: Arrows = Key Strokes

Figure 2.2

2.2.1 CAL MODE

IMPORTANT! Figure 2.3 CAL MODE menus are only visible if the *Input Data From:* menu, described in section 2.2.7, is set for *Sensor*.

Figure 2.3 illustrates how the CAL MODE menus function to allow push button calibration of zero and span values. The correct zero and span set-point values must be entered in order for the to make the correct adjustments. This feature should be utilized only when there are no other zero/span controls within the monitoring system since it is inappropriate to calibrate the same signal at more than one point. Therefore, if calibration is to be performed at another transmitter or monitoring device, the CAL MODE feature should not be used. Unintentional calibrations are reset by the *UNITY GAIN* menu. Unity gain sets zero offset to 0 and span gain to 1.

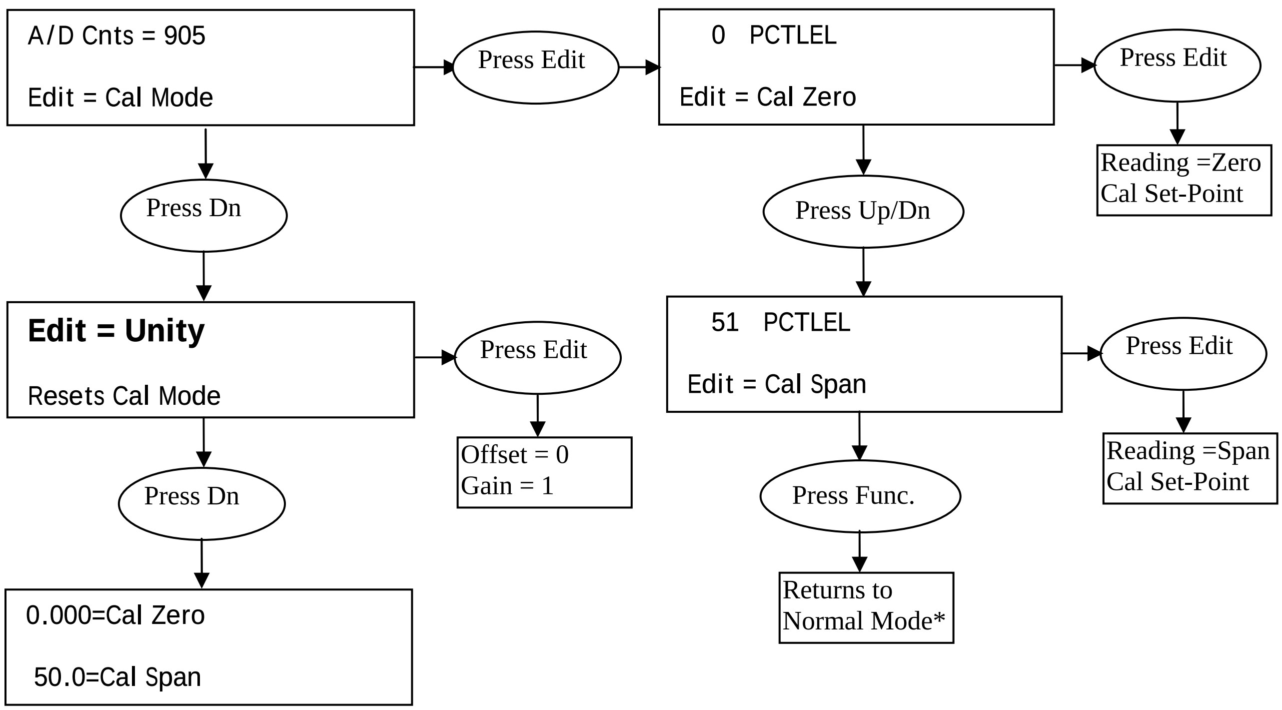


Figure 2.3

The bottom line of the top left menu in Figure 2.3 allows access to the calibration menus by pressing **EDIT**. **EDIT** brings up the CAL ZERO display at the top right of Figure 2.3. The top line displays the live channel value in engineering units and the bottom line states: **EDIT = ZERO CAL**. It is important to understand that pressing **EDIT** now will force this channel's reading to match the zero set-point value previously entered. Therefore, the sensor should have the appropriate stimulus to provide a response approximating the zero set-point. Pressing the **Up** or **Down** buttons from the CAL ZERO menu brings up the CAL SPAN menu. Pressing **EDIT** will cause a span adjustment forcing the reading to match the span set-point value previously entered. Again, the sensor should have the appropriate stimulus to provide a response approximating the span set-point. For example, if an LEL combustible sensor is to be spanned with 50% LEL span gas, the span set-point must be 50%. If 45% LEL is to be used later, the span set-point must be changed to 45% to match the span calibration gas.

2.2.2 DECIMAL POINT RESOLUTION / ASCII FIELDS

The Figure 2.4 menu sets the 6 character *engineering unit* and 16 character *Measurement Name* ASCII fields. Only uppercase letters and numbers 0-9 may be displayed in the engineering unit field since it is difficult to display lowercase letters on the large alphanumeric LED readout. The *Measurement Name* field is displayed only on the LCD and supports upper and lowercase letters along with many other symbols.

Resolution of channel values is also configured in this menu by setting the number digits trailing the decimal point. Values are limited to a maximum of four digits and a polarity sign. auto-ranging displays the highest resolution allowed by this decimal point entry. For example, if three decimal points are entered and the range is 0 to 100ppm, the reading will be **0.000** at 0ppm and **100.0** at 100ppm. However, this may be undesirable due to the high resolution at zero unless the sensor's output is extremely stable. If decimal points are limited to one the 0ppm reading becomes **0.0** and the 100ppm reading remains **100.0**. Resolution may be limited further by setting decimal points to 0. In the above example, this causes 0ppm to display **0** and 100ppm to display **100**.

```
EUNITS   D.P. = 0

Measurement Name
```

Figure 2.4

2.2.3 MEASUREMENT RANGE

The menus shown in Figure 2.5a & 2.5b allow configuration of the measurement range displayed on this channel. These menus work in conjunction with the *A/D Counts* menu described in section 2.2.6 and normally match the range of the input signal's engineering units. For example, if a channel's input is 4-20mA from a transmitter monitoring 0 to 10ppm chlorine, then the zero value should equal 0.000 and the 100% value equal 10.00. The six ASCII engineering units previously entered are automatically displayed to the right of the value as a reminder. The entire 4 digits must appear in this entry so trailing 0's may appear here that are not displayed on the LED readout.

```
 0.000 EUNITS

Enter Zero Value
```

Figure 2.5a

```
 100.0   PCTLEL

Enter 100% Value
```

Figure 2.5b

2.2.4 ALARM 1 / ALARM 2 / HORN RELAY SET-UP

The menus shown in Figure 2.6a & 2.6b allow configuration of ALARMS 1 & 2 and how each affect the horn relay. There are two each of the menus in Figure 2.6 affecting ALARM 1 identical to ALARM 2.

The **AlarmX Horn-XXXX** menu shown in Figure 2.6a may be set for ***Beep***, ***Off***, or ***On***. **Beep** causes the horn relay to pulse ON/OFF each second when the alarm is active. **On** causes the horn relay to be continuous when the alarm is active. **Off** causes the alarm to have no effect upon the horn relay. Discrete LED indicators on the front panel indicate the status of each alarm and relay. Any *new* alarm event causes the associated LED to flash until **Alarm Reset** occurs causing an *acknowledged* steady on condition. Operators should recognize *new* alarms by a <u>flashing</u> LED. **Alarm Reset** also turns off the horn relay until another new alarm occurs. The bottom line of this menu determines the alarm's trip-point value, latching or non-latching, and high or low trip. The trip-point is entered in engineering units. After the **Latch?** icon, entering **Y** causes that alarm to require a manual **Alarm Reset** to clear. **Y** latches this alarm group's common relay, this channel's LED, and the optional discrete relay if so equipped. The far right character on the bottom line may be set to **H** for high trip alarms or **L** for low trip alarms determining if the alarm becomes active upon exceeding or falling below the trip-point.

```
Alarm1 Horn-Beep

 20.00 Latch?N H
```

Figure 2.6a

```
Alarm 1 Delays

On   5s Off  0m
```

Figure 2.6b

The menus shown in Figure 2.6b allow entering **ON** and **OFF** time delays affecting how long the trip-point must be exceeded before an alarm event transition occurs. **ON** delays are limited to 10 seconds and **OFF** delays may be as long as 120 minutes. Delays are useful in many applications for preventing nuisance alarms and unwanted cycling into and out of alarm conditions.

2.2.5 ALARM 3 / FAIL ALARM

The discrete channel alarms identified as Alarm 3/Fail may be configured either as a 3rd level alarm, or, as a Fail alarm providing notification that the input is out of range in the negative direction. This is controlled by the menu shown in Figure 2.7. It is important to understand that even though the discrete channel alarms may be set as Alarm 3 level alarms, the common relay for this group is always a Fail alarm. The out of range threshold for the channel is the most recent Fail trip point entered prior to changing the menu to alarm 3. The following example describes how to configure both the Fail and Alarm 3 trip points for a channel. If it is desired for the common Fail relay to trip as the input falls below negative 10% of full scale, and the discrete alarms trip as the input exceeds a level, the–10% Fail value must be entered first. Toggle the **A/F** character on the right side of the top line to F and enter –10.00% into the *value* entry. Next, toggle the A/F character back to A and enter the desired Alarm 3 trip level. The Fail value is retained in memory although it no longer appears on the menu.

-10.00 Latch?N F
% Fault

Figure 2.7

2.2.6 RANGE OF A-D COUNTS

The menu in Figure 2.8 defines what range of A-D (analog to digital) counts will provide *Measurement Range* read out values entered previously in section 2.2.3. This menu entry is determined by the A/D converter resolution of the channel's input. For example, if the input is a 12 bit Modbus® device with zero at 800 counts and 100% at 4000 counts, then this menu's MIN should be set at 800 and MAX at 4000. If communicating with the 's optional 12 bit Analog Input PCB the MIN should be 800 and the MAX 4000.

905 800 4000
Input Min Max

Figure 2.8

For questions what to enter in this menu, the variable on the left side of the top line displays actual raw A/D counts currently being read by this channel. This may be utilized to test the input device for what counts are provided for zero and 100% if these values are unknown. Forcing the input device to read zero should provide the A/D counts value needed to make this channel's display also read zero. Likewise, forcing the input device to read 100% should provide the A/D counts value needed to make the channel's display also read 100%.

2.2.7 MODBUS, SENSOR OR ANALOG INPUTS?

Each channel may be independently configured to accept input data from the Modbus RS-485 master port, or, from an analog input card attached to the I^2C bus. **EDIT** toggles the Figure 2.9a menu between *Modbus RTU, Analog* or *Sensor*. Within each of these possibilities are additional choices to accommodate the binary resolution of the input data (8 bit, 10 bit, 12 bit etc.). With *Modbus* selected the menu shown in Figure 2.9b requests the RTU # and the Alias register # location of the data to be retrieved from the RTU. Alias register numbers define the location of the floating point variable representing the input value.

Analog should be selected when the channel's input comes from a transmitter or monitoring device with a calibrated output such as 4-20mA. *Sensor* is identical to *analog* except it activates the 's *Cal Mode* feature. Problems may arise if calibrations are performed in two places upon the same signal so Cal Mode menus are only visible when *Sensor* is selected. The *Sensor* selection should only be used when the input originates from a **non-calibrated** signal source such as the *Catalytic Bead Sensor Input* option described in section 3.3. Applications such as this require the to be used as the calibration point since the sensor signal has no zero and span adjustments.

Input Data From:
Analog 12 bit

Figure 2.9a

RTU 1
Alias 33001

Figure 2.9b

2.2.8 COPY DATA TO?

This menu simplifies the Set-Up procedure by allowing similar channels to be copied from one to another. For example, if all channels are identical except for the *Measurement Name* entry, channel 1 could be configured first and copied to channels 2 – 6. Only *Measurement Name* would then need to be configured on channels 2 – 6. Use **EDIT** to activate the cursor then **UP/DN** to select the channel to copy to. Press **EDIT** once more to copy.

Copy Data To:
Channel 2

Figure 2.10

2.3 SYSTEM CONFIGURATION MENUS

Some items requiring configuration are not specific to each channel but affect the entire system. These are located in the system menu tree shown in Figure 2.2 on the right side of the page. System menus are accessed by pressing **FUNCTION**, then **DOWN** until the ***SY*** icon appears in the upper right of the LCD readout, then **EDIT**.

2.3.1 AUTHORIZATION MODE

The system menu in Figure 2.11 allows locking variables that might prevent critical alarm events if altered. *Viewing* menus is not denied but attempts to *edit* variables displays a brief ***System Locked*** message on the LCD.

Authorized individuals locking the system should first enter a name, phone # or some sort of contact information into the 10 digit field on the bottom line. To lock or unlock the system the correct 4 digit authorization number must be entered into the XXXX field. **UP** or **DOWN** then toggles the UNLOCKED message to LOCKED. It is important to record the 4 digit code since the factory must be consulted if lost.

XXXX UNLOCKED
NAME: 4099257808

Figure 2.11

2.3.2 ACTIVATING CHANNELS / SCAN TIMER

The system menu in Figure 2.12 allows configuration of scan time and inactive channels. The scan timer entry on the top line of this menu sets how many seconds displays remain on an active channel while scanning. This may be from 1 – 99 seconds. The *Channels* entry on the bottom line determines what channels are active. A dash appears for inactive channels as demonstrated in channels 5 & 6 below. Inactive channels are not displayed and do not contribute to alarm events.

```
Scan Timer 10s

Channels  1234--
```

Figure 2.12

2.3.3 ALARM 2 RELAY ACKNOWLEDGE

This menu allows the ALARM 2 common alarm relay to be acknowledged. This means that while an alarm 2 event exists, the relay may be deactivated by an **ALARM RESET**. This is useful for silencing audible devices while personnel work to correct the alarm condition.

```
Alarm 2 Relay

Acknowledge On
```

Figure 2.13

2.3.4 ALARM SCAN PRIORITY

With the *Alarm Scan Priority* feature activated only channels with alarms are scanned by the displays. If no alarms exist then all active channels are scanned. With only one channel in alarm scanning halts on that channel.

```
Alarm Scan

Priority Off
```

Figure 2.14

2.3.5 FAIL SAFE / NORMAL ALARMS

These two menus allow ALARM 1 and ALARM 2 common **and** optional discrete relays to be configured for *fail safe* or *normal* operation. Fail safe means alarm conditions force the relay contacts to their power off, or shelf, state. Therefore, if the loses power the contacts will indicate the alarm condition rather than a safe condition. The common FAIL relay is always fail safe and is typically used to signal trouble conditions such as power or signal loss.

Alarm 1 Relays Fail Safe	Alarm 2 Relays Normal
Figure 2.15a	Figure 2.15b

2.3.6 MASTER / SLAVE SERIAL PORT MENUS

The final two menus in the *system* tree, shown in Figures 2.16a & 2.16b, allow setting baud rates for the *master / slave* Modbus serial ports. The RTU address of the slave port is also entered here. This slave port may be used to transfer data to a host device such as a PC, PLC or DCS. The slave port is addressable, allowing many controllers to be connected to a single RS-485 cable. Section 5 of this manual provides important information describing how to interface to the 's Modbus slave port

Slave Port 9600 Baud Id 1	Master Port 9600 Baud
Figure 2.16a	Figure 2.16b

SECTION 3

3.0 MAIN I/O INTERFACE PCB 093-0216 / 093-0568

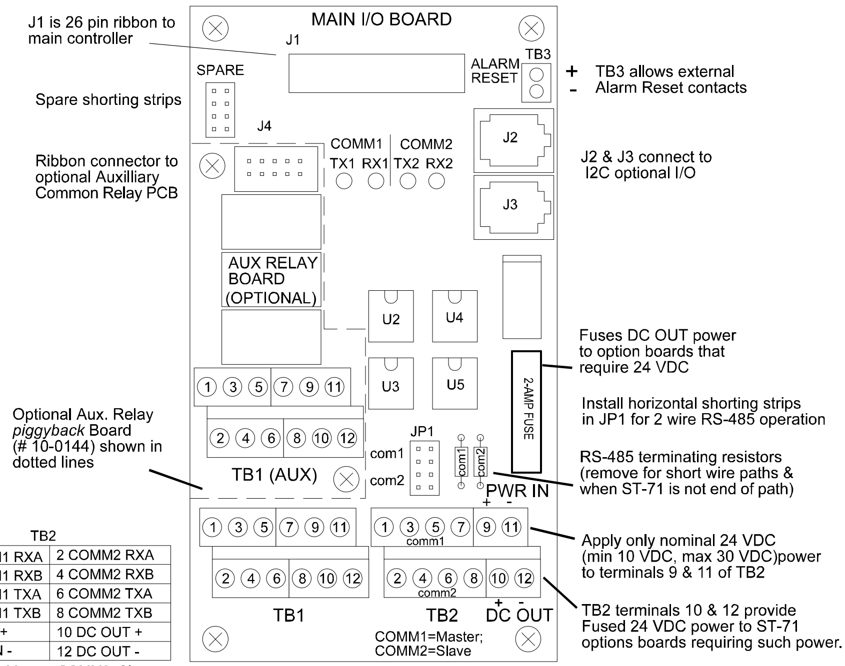
093-0216 and 093-0568 Main I/O Interface PCB's are equivalent except the 093-0568 has ribbon cable connector J1 mounted on the back of the PCB. 093-0216's are supplied on all wall mount models while the 093-0568 is supplied only on the PM panel mount.

The most basic Controller requires only the I/O PCB shown in Figure 3.1 for interfacing to field wiring. The primary power supply is applied to terminals 9 & 11 of TB2. This may be from 10 – 30 VDC. **WARNING**! **HIGH VOLTAGES SUCH AS 115 VAC APPLIED TO THESE TERMINALS MAY CAUSE SEVERE DAMAGE!** DC output terminals 10 & 12 on TB2 provide up to 500mA of output power for powering remote devices such as lamps, transmitters etc.

This PCB includes both ***master** (COMM 1)* and ***slave** (COMM 2)* RS-485 Modbus ports, 5 amp form C relays for each common alarm event (A1, A2, FAULT/A3 & HORN), and power supply I/O terminals. JP1 allows the RS-485 ports to be configured for 2 or 4 wire operation. A 26 pin ribbon cable connects the I/O PCB to the CPU and Display nest assembly. Two I^2C bus connectors allow addition of optional functions such as analog I/O and discrete alarm relays for each channel.

Horizontal jumpers installed in JP1 connect the RS-485 port's RX & TX lines, simplifying 2 wire daisy chains by providing additional terminals for incoming and outgoing cables. For example, installing the 2 COM 1 jumpers connects screw terminals 1 & 5 and terminals 3 & 7. Socketed RS-485 terminating resistors R6 (COMM 1) and R12 (COMM 2) are located on the MAIN I/O board. These resistors should be removed if communication wire lengths are very short (less than 25 feet), or, if the port is not at the end of the communication line.

An optional Auxiliary Relays *piggyback* PCB (part 093-0222) may be added to the I/O PCB via ribbon cable J4. These add another form C contact set to the common A1, A2 and HORN alarms. Auxiliary Relay contacts are available at the TB1 (AUX) terminals shown in Figure 3.1.



TB1 AUX. RELAYS (OPTION # 10-0144)

1 A1 - NO	2 N/A
3 A1 - COM	4 N/A
5 A1 - NC	6 N/A
7 A2 - NO	8 HORN - NO
9 A2 - COM	10 HORN - COM
11 A2 - NC	12 HORN - NC

TB1

1 A1 - NO	2 A3 - NO
3 A1 - COM	4 A3 - COM
5 A1 - NC	6 A3 - NC
7 A2 - NO	8 HORN - NO
9 A2 - COM	10 HORN - COM
11 A2 - NC	12 HORN - NC

TB2

1 COMM1 RXA	2 COMM2 RXA
3 COMM1 RXB	4 COMM2 RXB
5 COMM1 TXA	6 COMM2 TXA
7 COMM1 TXB	8 COMM2 TXB
9 DC IN +	10 DC OUT +
11 DC IN -	12 DC OUT -

COMM1=Master; COMM2=Slave

Main I/O PCB WITH COMMON RELAYS #10-0142

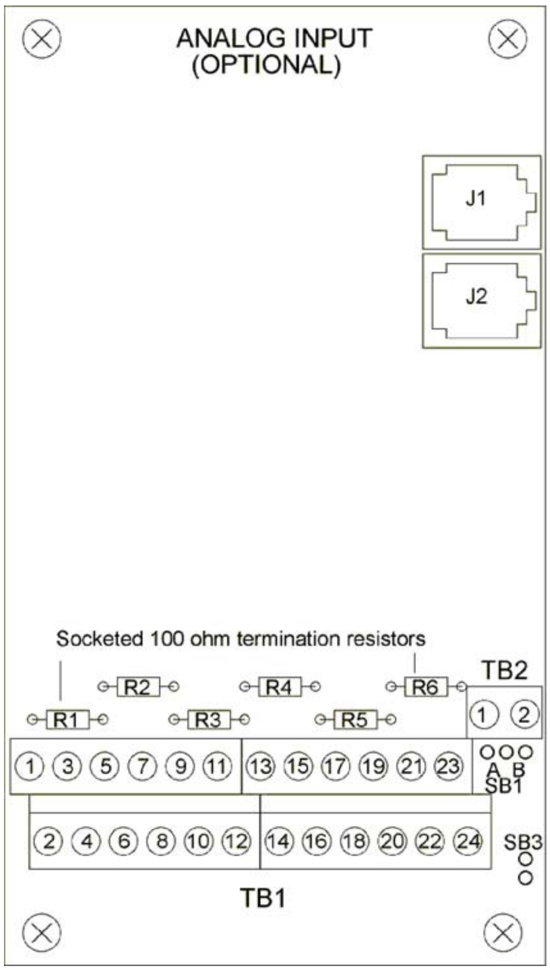
Figure 3.1

3.1 OPTIONAL ANALOG INPUT PCB 093-0214

Many transmitters or sensors have analog output signals and the 10 bit *Analog Input PCB*, shown in Figure 3.2, is available to accept these. TB1, with 24 positions, offers four terminals per channel to distribute power and receive analog inputs. These are **EXC + / -** and **HI / LO** inputs. TB2, with only two positions, is for connecting the power supply for powering external transmitters. SB1 and SB3 are solder bridge configuration jumpers that determine the wiring between TB1 & TB2. Precision 100 ohm resistors (R1 – R6) between each channel's IN LO and IN HI terminals are socketed termination resistors for 4-20mA inputs. These may be removed if voltage inputs are to be applied.

EXC –, **EXC +** and **IN LO** terminals are bussed together as shown by the wiring schematic in Figure 3.3. **EXC +** terminals are tied directly to TB2-2. **EXC -** terminals are tied directly to TB2-1 when solder bridge jumper SB1 is in the "*A*" position. IN LO terminals are tied to TB2-1 when SB1 is in the "*B*" position. With SB3 installed, all **EXC -** terminals are tied to the chassis/*earth* ground. SB1 in the "A" position and SB3 installed are normal factory settings. This provides terminals for landing drain wires from shielded cables and bussing allows transmitter power to be brought into the system at a single point. Transmitter power is available at each channel's **EXC + / IN LO** terminals and simplifies field wiring.

Figure 3.4 shows typical wiring to 3 wire transmitters and Figure 3.5 for 2 wire transmitters. In rare cases when a 4 wire transmitter's negative power terminal must be isolated from the negative signal terminal, **EXC -** is available for carrying the negative power. For such applications remove SB3 and move SB1 to the "A" position.



TB1

1 CH1 EXC-	2 CH1 IN LO
3 CH1 EXC+	4 CH1 IN HI
5 CH2 EXC	6 CH2 IN LO
7 CH2 EXC+	8 CH2 IN HI
9 CH3 EXC -	10 CH3 IN LO
11 CH3 EXC+	12 CH3 IN HI
13 CH4 EXC-	14 CH4 IN LO
15 CH4 EXC+	16 CH4 IN HI
17 CH5 EXC-	18 CH5 IN LO
19 CH5 EXC+	20 CH5 IN HI
21 CH6 EXC-	22 CH6 IN LO
23 CH6 EXC+	24 CH6 IN HI

TB2

* 1 RMT PWR
2 RMT EXC+

*SB1-A = TB2-1 = EXC-
SB1-B = TB2-1 = IN LO

SB3 = EXC- = Chassis

Figure 3.2

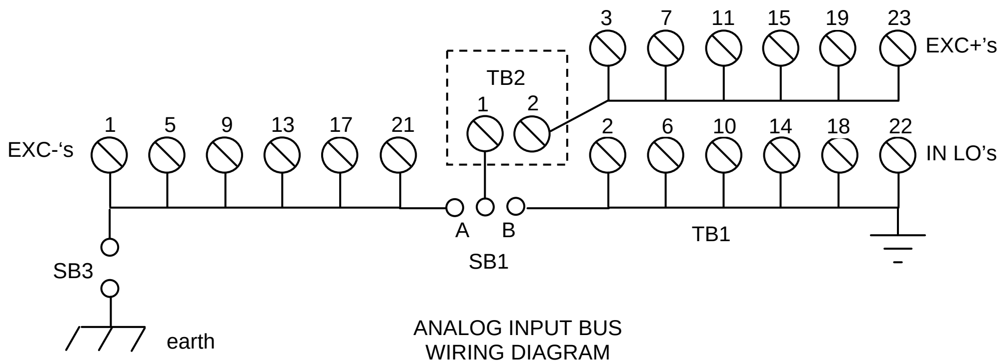


Figure 3.3

Typical 3 Wire Transmitter Wiring

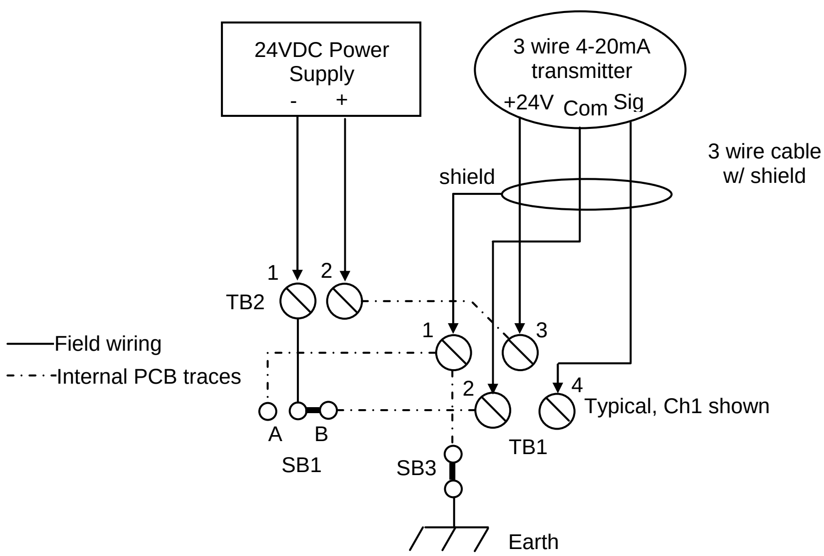


Figure 3.4

Typical 2 Wire Transmitter Wiring

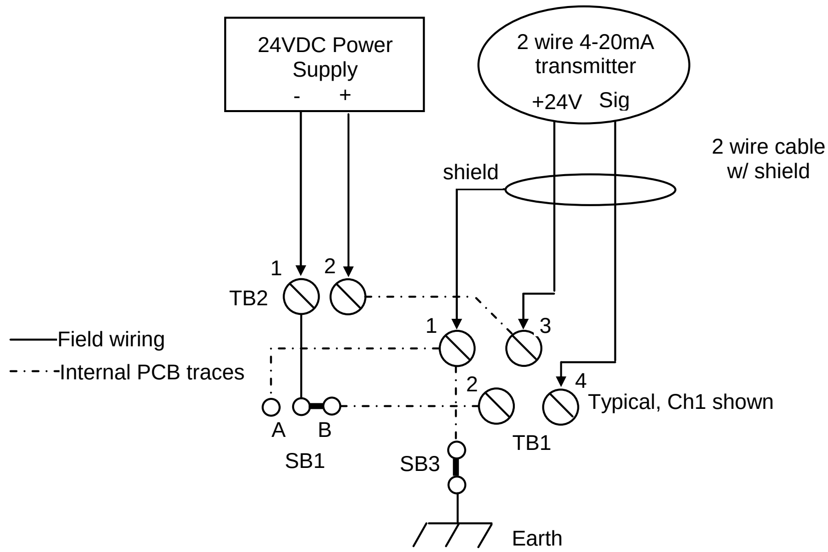
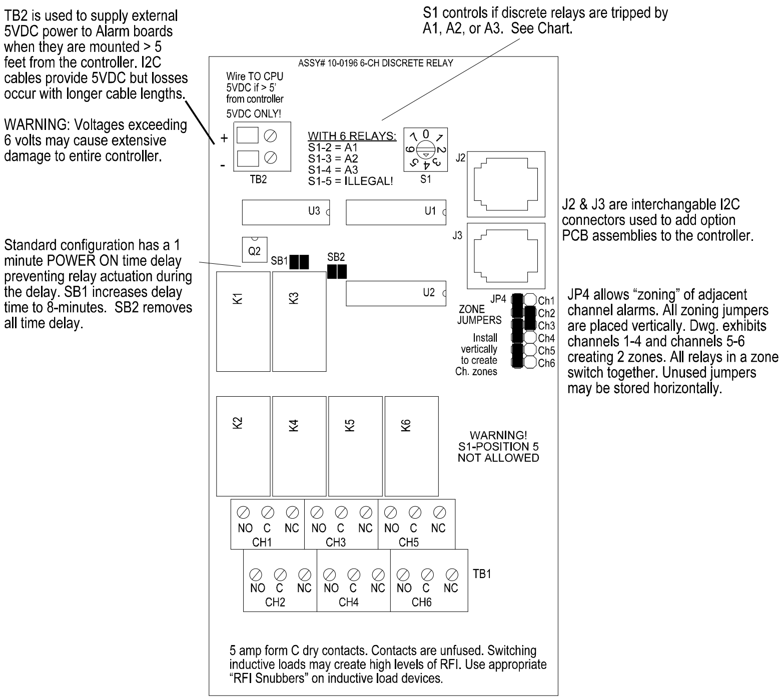


Figure 3.5

3.2 OPTIONAL DISCRETE RELAY PCB 093-0217

An optional *Discrete Relay PCB*, shown in Figure 3.5, adds six 5 amp form C relays per six channel alarm group. Each PCB may be jumper configured to function for ALARM 1, ALARM 2 or ALARM 3/FAIL. Alarm groups, or zones, may be created by connecting adjacent channels together using JP4 as shown. This creates an *OR* function with selected channels; causing *any* alarm included in the zone to actuate *all* relays.



6 Channel Discrete Relay Option #10-0196

Figure 3.6

3.3 OPTIONAL CATALYTIC BEAD SENSOR INPUT BOARD 093-0217

An optional *Catalytic Bead Sensor Input* board allows these popular combustible gas detectors to be connected directly to the without additional signal conditioning or transmitters. Up to three dual channel 093-0297 modules may be installed in each 8-channel 093-0217. Each 093-0297 channel is equipped with a bridge amplifier and 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 into a FAULT condition upon sensor failure or removal.

This option may also be configured to accept 4-20mA inputs for mixing catalytic bead sensors and current loops into the same board. Placing any channel’s 2 position LEL/4-20mA jumper into 4-20mA position and installing the associated precision 100 ohm socketed resistor allows 4-20mA signals to be applied to it’s C & A terminals. The 093-0297 sensor modules are not required for channels accepting 4-20mA.

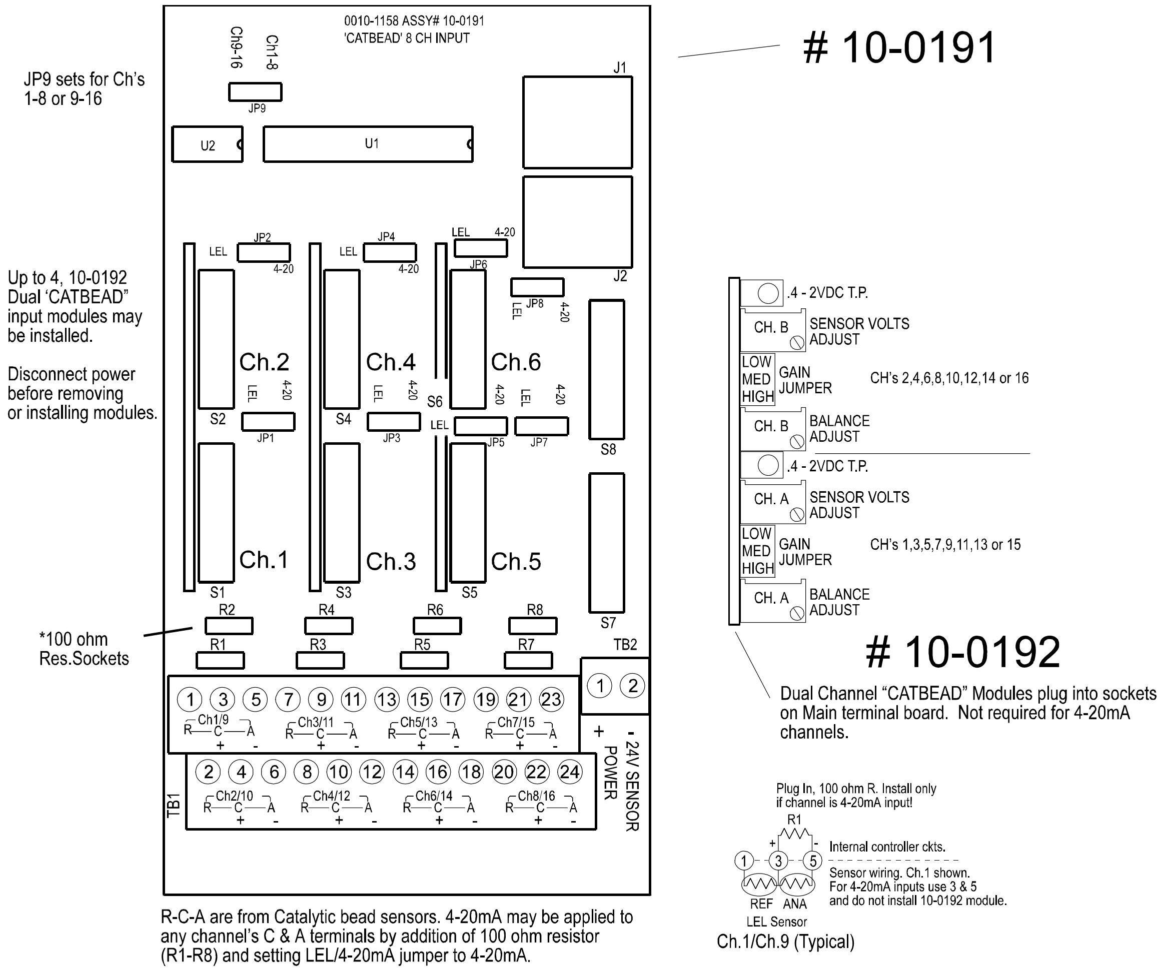
Channels receiving input data from this board should have the *Data From:* menu set for *Sensor*, as described in section 2.2.4. This activates *Cal Mode* menus described in section 2.2.7 needed to *zero* and *span* sensor readings. After performing the one time only *Initial Setup* as described below, all subsequent calibrations are by the ’s electronic Cal Mode menus.

3.3.1 CATALYTIC BEAD SENSOR INITIAL SETUP

Catalytic bead sensors vary widely in power requirements and sensitivity. It is therefore important to configure each channel to match the sensor with which it will operate.

1. Prior to connecting sensors, apply power to the system. Note this PCB requires 24VDC power be connected to its TB2 terminals 1 & 2 as shown in Figure 3.5. Suitable fused power is available from the Main I/O board's TB2 terminal 10 & 12 (see Figure 3.1). Measure the voltage between each channel's A and R terminals and set the *Voltage Adjust* potentiometers for the correct sensor excitation voltage. This may range from 1.5 volts to 7.5 volts depending upon sensor specifications. **Sensors may be damaged by accidental over voltage conditions. It is recommended the *Voltage Adjust* potentiometer screws be covered by a dollop of RTV or similar material after completion of this procedure to avoid accidental over voltage conditions.**
2. Remove system power and connect sensor wires to the R-C-A terminals. Reapply system power and confirm correct voltage across each sensor's A & R terminals. Note: If sensor wires are long, it may be necessary to measure the excitation voltage at the sensor end to compensate for I^2R losses in the wiring.
3. With the minus voltmeter lead on TB2-2 (common), connect the plus lead to the channel's test point. With zero air on that sensor, adjust it's *Balance* potentiometer for .4 volts at the test point.
4. Apply 50% LEL combustible span gas to the sensor and allow the test point voltage to stabilize. Two volts = 100% input to the A – D Converter and .4 volts = 0%. Therefore, 1.2 volts = 50%. Place the 3 position *Coarse LEL Gain* jumper into the position which reads between .8 volts and 1.2 volts on the test point with 50% LEL gas on the sensor. Gain settings for each jumper position are as follows: no jumper = 1, LOW = 7, MED = 21, HI = 41. Multiple jumpers have an additive affect upon gain, so the LOW and MED jumpers together provide a gain of 28.

Initial setup is now complete and normally only requires repeating if a sensor is replaced. Final calibration of this channel may now be performed using the 's electronic Cal Mode feature described in section 2.2.1.



"CATBEAD" Sensor Option #10-0191 / 10-0192

Figure 3.7

3.4 OPTIONAL 4-20mA ANALOG OUTPUT BOARD 093-0215

An optional 10 bit 4-20mA analog output board, shown in Figure 3.7, may be connected to the I^2C bus. Each channel's output will transmit 4mA for 0% readings and 20mA for 100% readings. Loop drive capability depends upon the level of the 's primary DC power supply. With at least 20 volts DC primary power they 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. This PCB requires 24VDC power be connected to it's TB2 terminals 1 & 2 as shown in Figure 3.7. Suitable power is available from the Main I/O board's TB2 terminal 10 & 12 (see Figure 3.1).

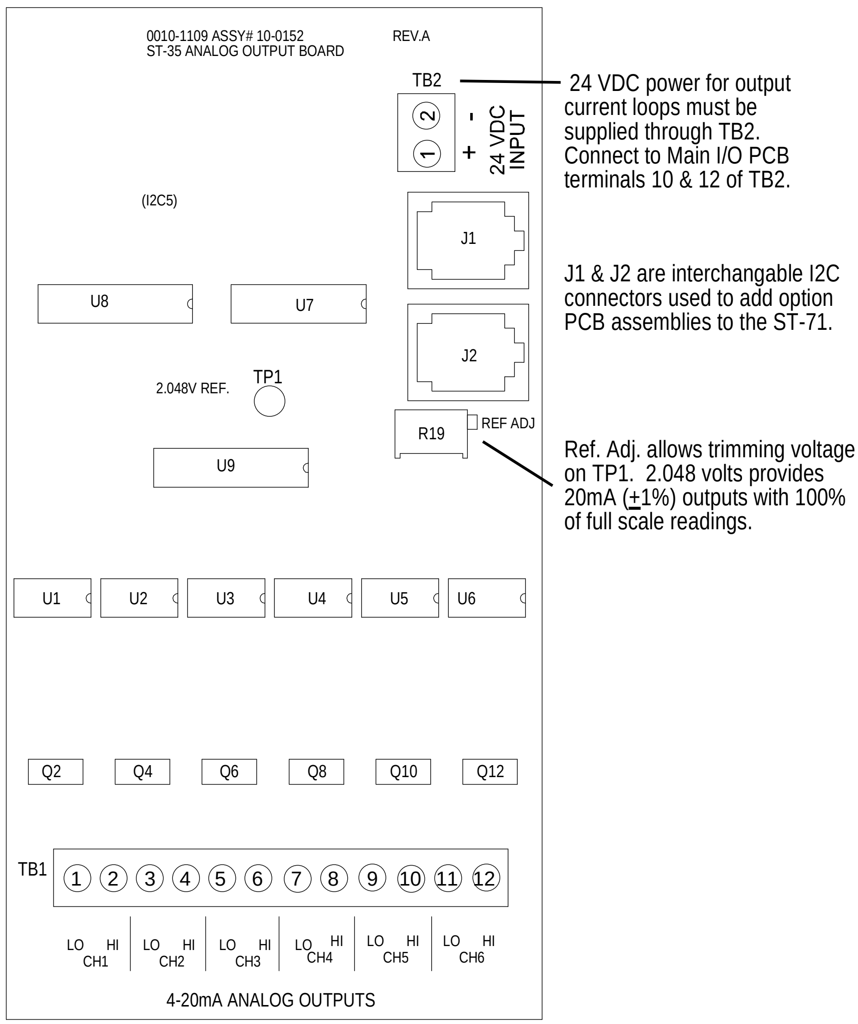
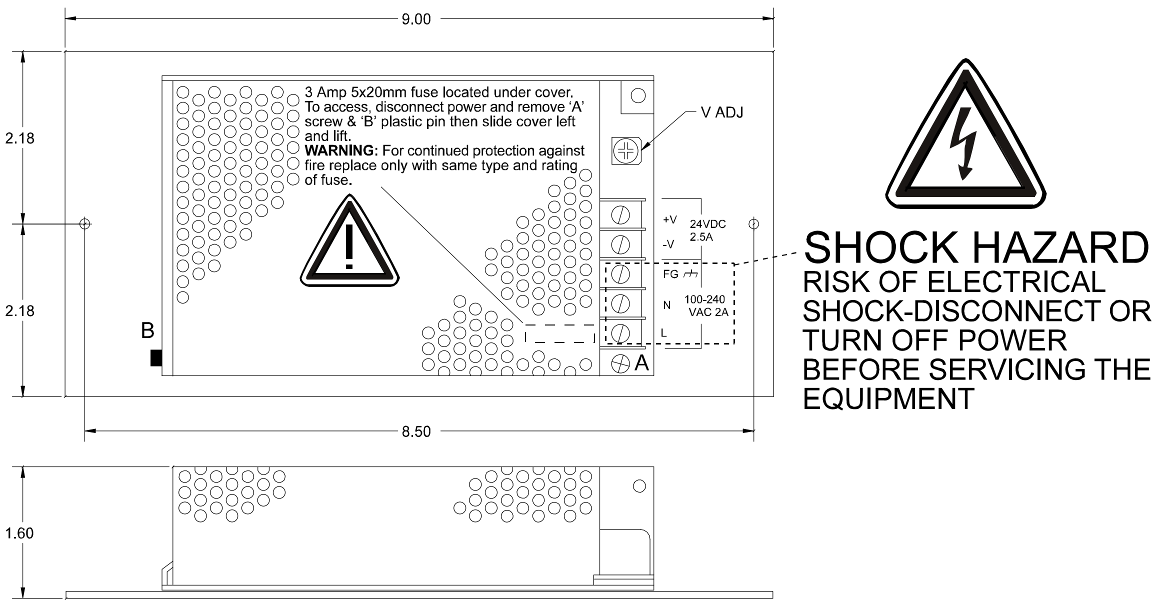


Figure 3.8

3.5 OPTIONAL 24VDC 60 WATT POWER SUPPLY 093-0570

The Controller may be powered from 10-30VDC or 18VAC from a step down isolation transformer. However, many applications require 24VDC power to drive the monitors or transmitters providing inputs to the . A 60 watt AC / DC power supply (Figure 3.9) may be included for these applications. This supply has a universal 100VAC to 240VAC input range and requires no modification between 115VAC and 220VAC installations. When installed at the factory, it is pre-wired to provide 24VDC primary power for the controller as well as any transmitters or monitors that may be connected by the end user.



60 Watt 24 VDC Power Supply Option # 10-0153

Figure 3.9

SECTION 4

4.0 SYSTEM DIAGNOSTICS

The restores configuration data from non-volatile memory each time power is applied. During this several second long procedure the LCD operator interface flashes messages stating firmware revision and what I^2C options are connected. These messages are useful indications of the status of options such as discrete relays, analog outputs and others.

A *System Diagnostic Mode* may also be entered while power is applied. This mode offers menus, shown in Figure 4.1, for testing LED's, relays and analog I/O. To enter this mode press and hold the **EDIT** key while simultaneously pressing the **UP/DOWN** keys. A brief error code message appears. <u>Immediately</u> press and hold the **FUNCTION** key until a DIAGNOSTIC MODE message appears on the top line of the LCD readout. **UP/DOWN** keys are used to move through the various testing procedures. Pressing **ALARM/RESET** at any time will return the to the normal monitoring mode. With no keys pressed for 5 minutes, the diagnostic mode times out and automatically returns to the normal mode.

It is very important to understand that **CHANNEL INPUT DATA IS NOT PROCESSED DURING THE DIAGNOSTICS MODE**. It is possible to miss important input values while utilizing this mode and appropriate safeguards should be in place. However, the Diagnostics Mode can prove invaluable when testing I/O since relays and analog outputs may be stimulated without driving inputs to precise levels.

LCD SYSTEM DIAGNOSTIC MODE MENU TREES

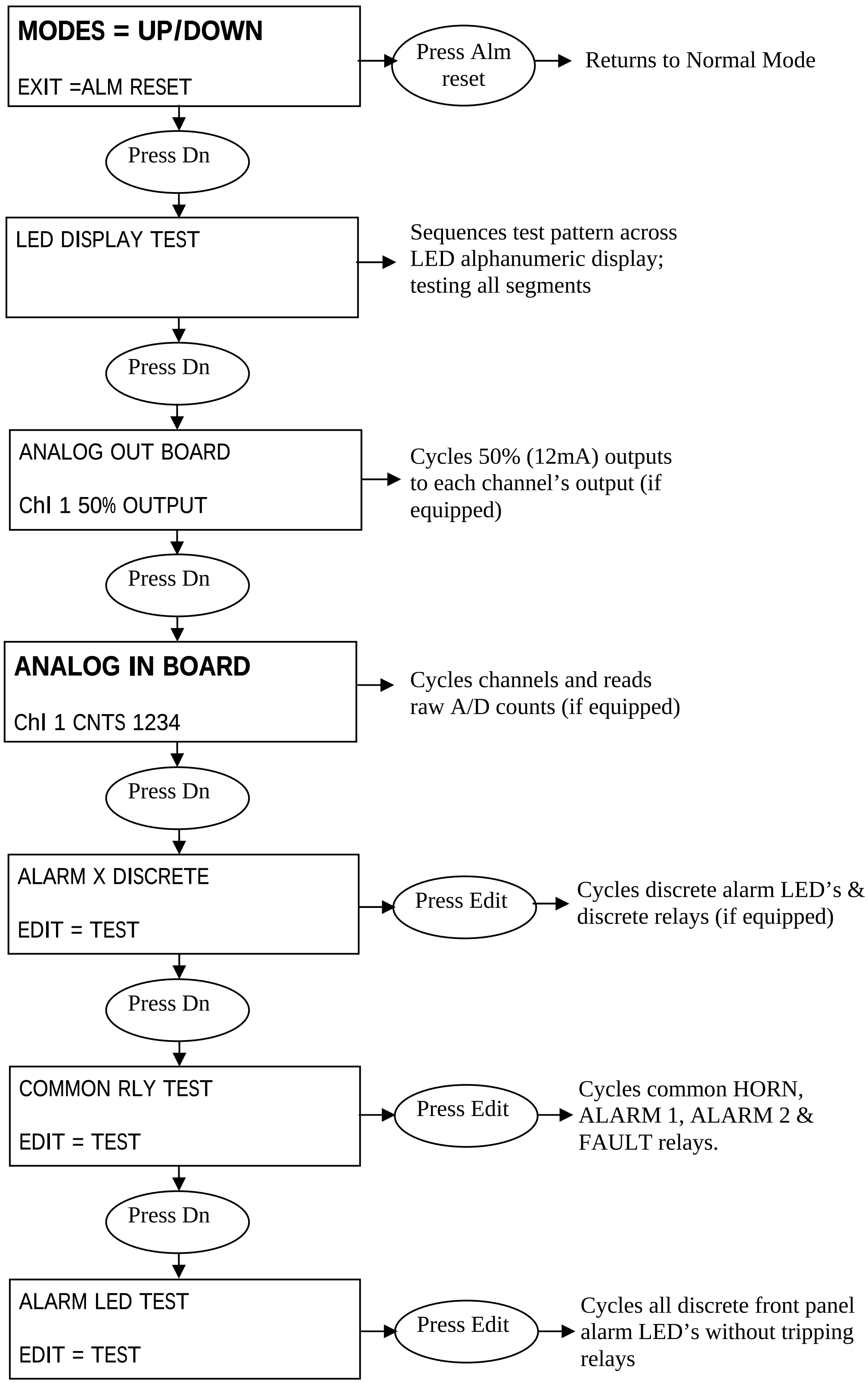


Figure 4.1

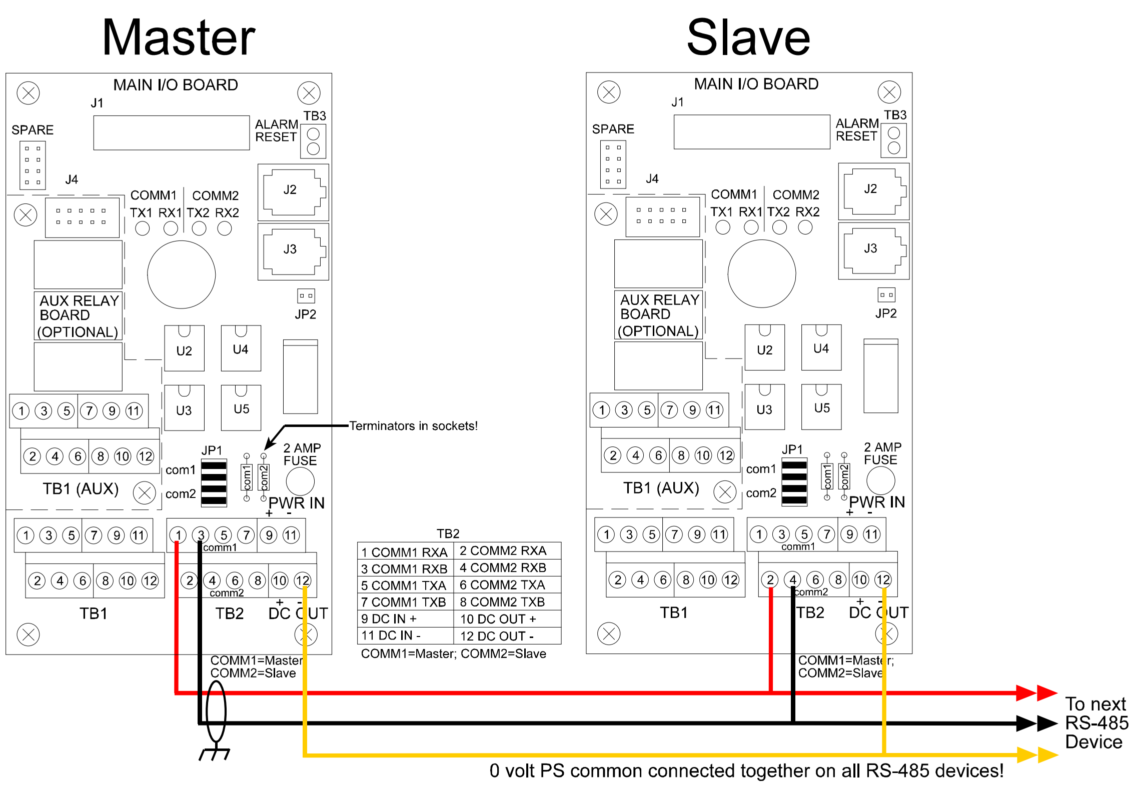
SECTION 5

5.0 MODBUS RS-485 PORTS

The is equipped with *Master* (COMM 1), and *Slave* (COMM 2), modbus RTU ports. Port configurations are described in sections 2.2 and 2.3 of this manual. Section 5.1 defines register locations of data available via the slave port.

Figure 5.1 shows how to wire multiple ’s into a Master / Slave configuration. It is very important to understand that RS-485 is not a current loop. The drivers and receivers must share a common ground. This is why “two-wire network” is a misnomer when applied to RS-485 and a third 0V, or **common** wire, must also be run between devices that do not already share the same DC power supply.

Main I/O PCB 10-0142
Shown wired for Master /Slave configuration



Notes:

1. Recommended RS485 cable = Belden 9841 (2-wire) and 9842 (4-wire) or equivalent.
2. 0 volt / PS common points should always be connected together when Master / Slaves are not powered from the same DC power supply.
3. Shown in 2 wire mode with all JP1 jumpers installed. For 4 wire mode remove all JP1 jumpers.
4. Terminators installed only in "end of line" RS-485 devices.

Figure 5.1

5.1 MODBUS SLAVE REGISTER LOCATIONS

The following table describes the ’s modbus slave database. Any portion of this data may be read by a modbus master device such as a PC, PLC or DCS. Since the modbus port is RS-485, many ’s may also be multi-dropped onto the same cable.

MemoryIntAsciiRW
Notes: ASCII which may be read 2 characters at a time or in strings using a multiple register read.

Description	Alias	R/FC	W/FC	Type
Channel 1 tag	40401-40408	3	na	Ascii 2 characters/reg
Channel 2 tag	40409-40416	3	na	Ascii 2 characters/reg
Channel 3 tag	40417-40424	3	na	Ascii 2 characters/reg
Channel 4 tag	40425-40432	3	na	Ascii 2 characters/reg
Channel 5 tag	40433-40440	3	na	Ascii 2 characters/reg
Channel 6 tag	40441-40448	3	na	Ascii 2 characters/reg
Channel 1 eunits	40449-40451	3	na	Ascii 2 characters/reg
Channel 2 eunits	40452-40454	3	na	Ascii 2 characters/reg
Channel 3 eunits	40455-40457	3	na	Ascii 2 characters/reg
Channel 4 eunits	40458-40460	3	na	Ascii 2 characters/reg
Channel 5 eunits	40461-40463	3	na	Ascii 2 characters/reg
Channel 6 eunits	40464-40466	3	na	Ascii 2 characters/reg
Channel 1 Ascii value	40467-40469	3	na	Ascii 2 characters/reg
Channel 2 Ascii value	40470-40472	3	na	Ascii 2 characters/reg
Channel 3 Ascii value	40473-40475	3	na	Ascii 2 characters/reg
Channel 4 Ascii value	40476-40478	3	na	Ascii 2 characters/reg
Channel 5 Ascii value	40479-40481	3	na	Ascii 2 characters/reg
Channel 6 Ascii value	40482-40484	3	na	Ascii 2 characters/reg

MB_FltPtMemRO
Notes: Returned as 15 bit 2s complement with +- 5% oner/underrange applied.

Description	Alias	R/FC	W/FC	Type
Channel 1 float value	33001	4	na	2s comp 15 bit integer
Channel 2 float value	33002	4	na	2s comp 15 bit integer
Channel 3 float value	33003	4	na	2s comp 15 bit integer
Channel 4 float value	33004	4	na	2s comp 15 bit integer
Channel 5 float value	33005	4	na	2s comp 15 bit integer
Channel 6 float value	33006	4	na	2s comp 15 bit integer

MemoryIntRO
Notes: Channel a/d value = direct a/d counts. Alarm status words are bits packed into 16 bit integer where lsb = Channel 1 alarm status and msb = relay status.

Description	Alias	R/FC	W/FC	Type
Channel 1 a/d value	31001	4	n/a	16 bit integer
Channel 2 a/d value	31002	4	n/a	16 bit integer
Channel 3 a/d value	31003	4	n/a	16 bit integer
Channel 4 a/d value	31004	4	n/a	16 bit integer
Channel 5 a/d value	31005	4	n/a	16 bit integer
Channel 6 a/d value	31006	4	n/a	16 bit integer

alarm1 status	31007	4	n/a	16 bit packed status
alarm2 status	31008	4	n/a	16 bit packed status
alarm3 status	31009	4	n/a	16 bit packed status

MemoryIntRW
Notes: Integer representing current channel being displayed.

Description	Alias	R/FC	W/FC	Type
current Channel	30250	4	n/a	integer

CoilDbase
Notes: Set this coil to issue an alarm acknowledge via modbus.

Description	Alias	R/FC	W/FC	Type
remote alarm ack	2001	n/a	5	setable coil

MemoryDiscreteRO
Notes: May be read as single discrete or packed with multiple register read.

Description	Alias	R/FC	W/FC	Type
Channel 1 alarm1	12001	2	n/a	16bit packed integer
Channel 2 alarm1	12002	2	n/a	16bit packed integer
Channel 3 alarm1	12003	2	n/a	16bit packed integer
Channel 4 alarm1	12004	2	n/a	16bit packed integer
Channel 5 alarm1	12005	2	n/a	16bit packed integer
Channel 6 alarm1	12006	2	n/a	16bit packed integer
Channel 1 alarm2	12007	2	n/a	16bit packed integer
Channel 2 alarm2	12008	2	n/a	16bit packed integer
Channel 3 alarm2	12008	2	n/a	16bit packed integer
Channel 4 alarm2	12010	2	n/a	16bit packed integer
Channel 5 alarm2	12011	2	n/a	16bit packed integer
Channel 6 alarm2	12012	2	n/a	16bit packed integer
Channel 1 alarm3	12013	2	n/a	16bit packed integer
Channel 2 alarm3	12014	2	n/a	16bit packed integer
Channel 3 alarm3	12015	2	n/a	16bit packed integer
Channel 4 alarm3	12016	2	n/a	16bit packed integer
Channel 5 alarm3	12017	2	n/a	16bit packed integer
Channel 6 alarm3	12018	2	n/a	16bit packed integer

MbFltPtMemRW
Notes: Real value represents float value without the decimal point such as 123.4 is returned as 1234. Decimal devisor is returned as 1, 10, 100, or 1000 for decimal postion of 1, 2, 3, or 4, where 123.4 would return the value 10.

Description	Alias	R/FC	W/FC	Type
Channel 1 zero real	41001	3	n/a	real w/o decimal point
Channel 2 zero real	41002	3	n/a	real w/o decimal point
Channel 3 zero real	41003	3	n/a	real w/o decimal point
Channel 4 zero real	41004	3	n/a	real w/o decimal point
Channel 5 zero real	41005	3	n/a	real w/o decimal point
Channel 6 zero real	41006	3	n/a	real w/o decimal point
Channel 1 zero decimal	41007	3	n/a	decimal position devisor

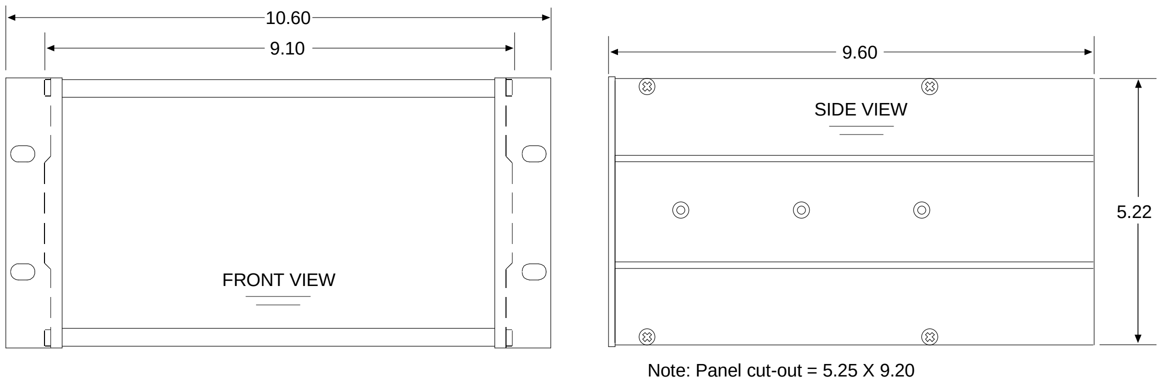
Channel 2 zero decimal	41008	3	n/a	decimal position devisor
Channel 3 zero decimal	41009	3	n/a	decimal position devisor
Channel 4 zero decimal	41010	3	n/a	decimal position devisor
Channel 5 zero decimal	41011	3	n/a	decimal position devisor
Channel 6 zero decimal	41012	3	n/a	decimal position devisor
Channel 1 span real	41013	3	n/a	real w/o decimal point
Channel 2 span real	41014	3	n/a	real w/o decimal point
Channel 3 span real	41015	3	n/a	real w/o decimal point
Channel 4 span real	41016	3	n/a	real w/o decimal point
Channel 5 span real	41017	3	n/a	real w/o decimal point
Channel 6 span real	41018	3	n/a	real w/o decimal point
Channel 1 span decimal	41019	3	n/a	decimal position devisor
Channel 2 span decimal	41020	3	n/a	decimal position devisor
Channel 3 span decimal	41021	3	n/a	decimal position devisor
Channel 4 zero decimal	41022	3	n/a	decimal position devisor
Channel 5 zero decimal	41023	3	n/a	decimal position devisor
Channel 6 zero decimal	41024	3	n/a	decimal position devisor
Channel 1 alarm1 real	41025	3	n/a	real w/o decimal point
Channel 2 alarm1 real	41026	3	n/a	real w/o decimal point
Channel 3 alarm1 real	41027	3	n/a	real w/o decimal point
Channel 4 alarm1 real	41028	3	n/a	real w/o decimal point
Channel 5 alarm1 real	41029	3	n/a	real w/o decimal point
Channel 6 alarm1 real	41030	3	n/a	real w/o decimal point
Channel 1 alarm1 decimal	41031	3	n/a	decimal position devisor
Channel 2 alarm1 decimal	41032	3	n/a	decimal position devisor
Channel 3 alarm1 decimal	41033	3	n/a	decimal position devisor
Channel 4 alarm1 decimal	41034	3	n/a	decimal position devisor
Channel 5 alarm1 decimal	41035	3	n/a	decimal position devisor
Channel 6 alarm1 decimal	41036	3	n/a	decimal position devisor
Channel 1 alarm2 real	41037	3	n/a	real w/o decimal point
Channel 2 alarm2 real	41038	3	n/a	real w/o decimal point
Channel 3 alarm2 real	41039	3	n/a	real w/o decimal point
Channel 4 alarm2 real	41040	3	n/a	real w/o decimal point
Channel 5 alarm2 real	41041	3	n/a	real w/o decimal point
Channel 6 alarm2 real	41042	3	n/a	real w/o decimal point
Channel 1 alarm2 decimal	41043	3	n/a	decimal position devisor
Channel 2 alarm2 decimal	41044	3	n/a	decimal position devisor
Channel 3 alarm2 decimal	41045	3	n/a	decimal position devisor
Channel 4 alarm2 decimal	41046	3	n/a	decimal position devisor
Channel 5 alarm2 decimal	41047	3	n/a	decimal position devisor
Channel 6 alarm2 decimal	41048	3	n/a	decimal position devisor
Channel 1 alarm3 real	41049	3	n/a	real w/o decimal point
Channel 2 alarm3 real	41050	3	n/a	real w/o decimal point
Channel 3 alarm3 real	41051	3	n/a	real w/o decimal point
Channel 4 alarm3 real	41052	3	n/a	real w/o decimal point
Channel 5 alarm3 real	41053	3	n/a	real w/o decimal point
Channel 6 alarm3 real	41054	3	n/a	real w/o decimal point
Channel 1 alarm3 decimal	41055	3	n/a	decimal position devisor

Channel 2 alarm3 decimal	41056	3	n/a	decimal	position devisor
Channel 3 alarm3 decimal	41057	3	n/a	decimal	position devisor
Channel 4 alarm3 decimal	41058	3	n/a	decimal	position devisor
Channel 5 alarm3 decimal	41059	3	n/a	decimal	position devisor
Channel 6 alarm3 decimal	41060	3	n/a	decimal	position devisor
Channel 1 fault real	41061	3	n/a	real w/o decimal point	
Channel 2 fault real	41062	3	n/a	real w/o decimal point	
Channel 3 fault real	41063	3	n/a	real w/o decimal point	
Channel 4 fault real	41064	3	n/a	real w/o decimal point	
Channel 5 fault real	41065	3	n/a	real w/o decimal point	
Channel 6 fault real	41066	3	n/a	real w/o decimal point	
Channel 1 fault decimal	41067	3	n/a	decimal	position devisor
Channel 2 fault decimal	41068	3	n/a	decimal	position devisor
Channel 3 fault decimal	41069	3	n/a	decimal	position devisor
Channel 4 fault decimal	41070	3	n/a	decimal	position devisor
Channel 5 fault decimal	41071	3	n/a	decimal	position devisor
Channel 6 fault decimal	41072	3	n/a	decimal	position devisor

SECTION 6

6.1 093-0330 PANEL / RACK MOUNT ENCLOSURE

The PM shown in Figure 6.1 is a half width 19" rack enclosure. It is supplied with hardware that allows mounting in either a full width 19" rack style cabinet or it may be panel mounted in a rectangular cutout. Only two 6 channel I/O option PCB's such as analog input or discrete relays may be mounted directly to the back of the enclosure. Additional 6 channel I/O option PCB's must be located external from the assembly on another mounting plate. A 3 foot length of I^2C cable is also supplied for this purpose. Weight is approximately 7 pounds. Properly ground the enclosure and follow national and local electrical codes.

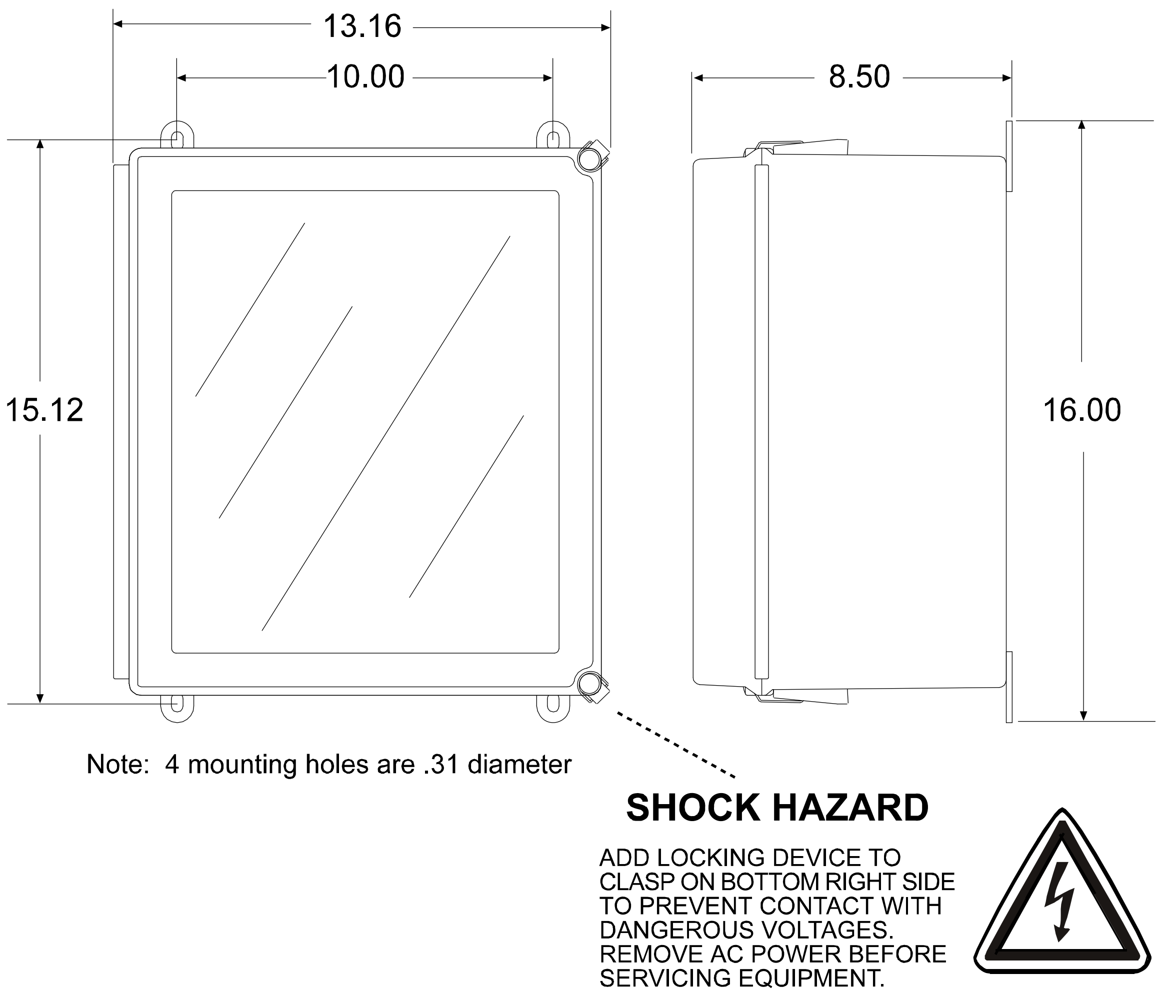


RACK / PANEL MOUNT
(19" RACK SPREADER PLATES &
PANEL MOUNT BEZAL NOT SHOWN)

Figure 6.1

6.2 093-0282 NEMA 4X WALL MOUNT ENCLOSURE

The N4 shown in Figure 6.2 is a fiberglass NEMA 4X wall mount enclosure. Seven 6 channel I/O option PCB's such as analog input or discrete relays may be mounted inside this enclosure. It is suitable for mounting outdoors but an above mounted weather deflector shield is recommended. Weight is approximately 17 pounds. Figure 6.3 provides important warning information concerning correct grounding procedures for non-metallic enclosures. Conduit entries are not provided so installers may place entries as needed. Bottom or lower side areas are recommended. Care must be taken to avoid drilling into circuit boards mounted inside the enclosure. Properly ground the enclosure and follow national and local electrical codes.



NEMA 4X WALL MOUNT

Figure 6.2

GROUNDING OF EQUIPMENT AND CONDUIT

Ground in accordance with the requirements of the National Electrical Code.
Conduit hubs for metallic conduit must have a grounding bushing attached to the hub on the inside of the enclosure. Grounding bushings have provisions for connection of a grounding wire.
Non-metallic conduit and hubs require the use of a grounding wire in the conduit. Grounding bushings are not required.
System grounding is provided by connection wires from all conduit entries to the subpanel or to other suitable point which provides continuity. Any device having a metal portion or portions extending out of the enclosure must also be properly grounded.

TYPICAL GROUNDING ILLUSTRATIONS

METALLIC CONDUIT **NON-METALLIC CONDUIT**

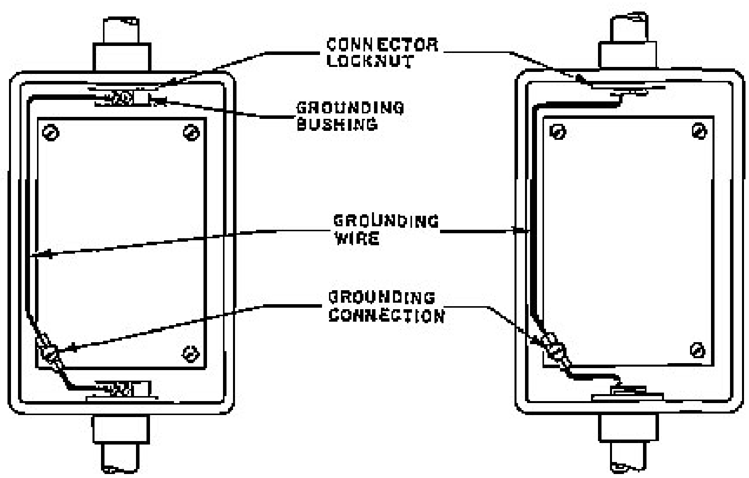
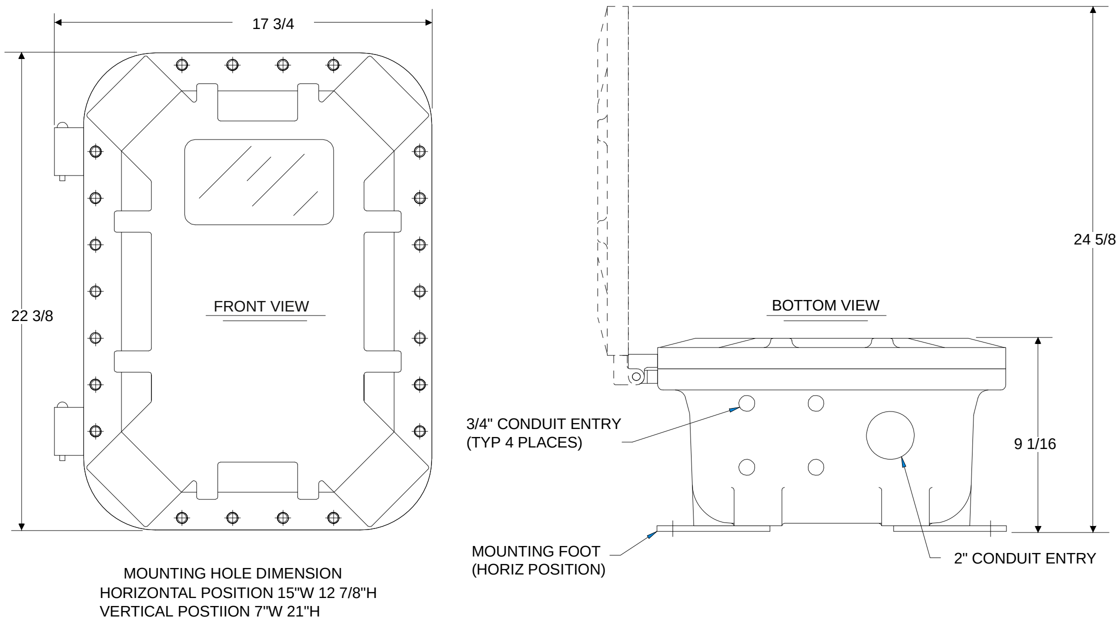


Figure 6.3

6.3 093-0284 NEMA 7 EXPLOSION-PROOF WALL MOUNT ENCLOSURE

The XP shown in Figure 6.4 is aluminum NEMA 7 wall mount enclosure designed for mounting into potentially hazardous areas. Eleven 6 channel I/O option PCB's such as analog input or discrete relays may be mounted inside this enclosure. It is suitable for mounting outdoors but an above mounted weather deflector shield is recommended. Weight is approximately 110 pounds. Properly ground the enclosure and follow national and local electrical codes.



ST-71XP NEMA 7 EXPLOSION PROOF

Figure 6.4

Monroe Corporate Center
PO Box 569
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Telephone 1-800-247-7257
FAX (704) 291-8330
www.scottsafety.com