# INSTRUCTION MANUAL

IM58/0890

**MODEL 4011 SERIES**

SINGLE CHANNEL
CONTROLLER

SMC


## sierra monitor corporation

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CONTENTS

## 1.1 PRODUCT DESCRIPTION

### 1.1.1 Introduction

The Model 4011 Single Channel Controller has been designed to interface to an industry standard 4-20mA Module or other standard Voltage/Current Modules (see Specifications) and provide the user with two independent adjustable alarm levels. Each alarm level can be programmed to be either non-Latching or Latching and can also be programmed to activate either when the input level is GREATER THAN the user adjusted alarm level or LESS THAN the user adjusted alarm level. When the Model 4011 is used as a 4-20mA signal loop controller a third alarm is provided which detects loop current being less than 3mA. The outputs of the three Alarms are SPDT relays with contacts rating of 10A at 28VDC or 120VAC and are independently fused at 5A.

The front panel of the Model 4011 consists of a 3 1/2 digit Liquid Crystal Display, three Alarm LEDs, a Reset Pushbutton, four display selection LEDs and a Select Pushbutton. The SELECT button steps the display through one of the four possible selections which will be indicated by the appropriate illuminated LED.

The following are the Display selections:

| | |
|---|---|
| CONC: | The actual concentration Level (0 to 100% or PPM).(Factory Option Available: Any scale from 0 to 1,990 PPM) |
| ALM1: | Alarm Level 1 user adjusted Alarm Level 0-100% or PPM). |
| ALM2: | Alarm Level 2 user adjusted Alarm Level (0-100% or PPM). |
| LOOP: | Actual Loop Current (4-20mA). |

The three alarm indication LEDs on the front panel are Trouble (loop current less than 3mA) Alarm Level 1 and Alarm Level 2. The RESET pushbutton is used to reset the relays when the user has selected Latching or Acknowledge Mode.

The Model 4011 is packaged in a 1/8 DIN Enclosure (1.9H x 3.8W x 6.5D inches) and can be panel mounted. Wiring connection to the controller is via a two piece terminal block which allows disassembly of the controller without disconnection of individual wires.

The controller is supplied in the following configurations.

-Model 4011-00: Controller 4-20mA input, DC, DIN
-Model 4011-10: Controller 4-20mA input, AC, DIN

### 1.1.2 Options

The following options are available on theModel 4011.

A. Power Supply & Battery Charger
Model 4346: 24 VDC @ 1Amp power supply with a trickle charge battery charger. (figure 1B) Capable of powering four Model 4011 controllers.

B. Battery
12 Volt 6.5 AH

C. Chart Recorder
Single channel impact print chart recorder with speed of 2" per hour.

D. Enclosures
Various Nema and Explosion Proof Enclosures are available.

## 2.1 INSTALLATION

### 2.1.1 Site Preparation & Installation

The Model 4011, if panel mounted, requires a 3.58"W x 1.69"H +/- 0.010" cutout. The depth required behind the panel is 8.0" which leaves sufficient space to connect cables at the rear of the enclosure. A properly grounded AC outlet within 6 feet of the enclosure is required.

To install the controller:

1. Remove the two allen screws at the rear of the enclosure that secure the panel mounting bars on the side of the enclosure.
2. Completely remove the bars and insert the Model 4011 through the front of the panel cutout.
3. Reinstall the panel mounting bars and the allen screws. Tighten allen screws until the Model 4011 is securely mounted in panel.
4. Connect the (DC+) wire of the power supply module to the terminal block at the rear of the Controller marked (P) and connect the (DC-) wire of the power supply module to the terminal block at the rear of the Controller marked (G) (figure 1A & 1B).
5. Connect alarm or control devices to the appropriate relay terminals. It is recommended that 18 AWG wire (minimum) be used when connecting to the relay contacts.
6. Connect the 4-20mA remote Sensor Module to the terminal block labeled "P" (Power = +24Vdc), "S" (Signal = 4-20mA) and "G" (Ground). The "P" and "G" positions are also used for connecting the DC Power Supply.
7. If external alarm acknowledge or rest is to be used connect a momentary switch to the terminals marked "GND" and "ACK"
8. If the chart recorder output is to be used connect to terminals marked "AOUT", "+12V" and "GND" for chart recorder power and signal.

Refer to the Table 1 to determine the correct wire gauge for the distance the Sensor Module will be from the Model 4011 Controller. The manufacturer recommends Belden cable UL-1007 or UL1015 of the appropriate gauge.

| Wire Gauge | Maximum Cable Length(ft) |
|---|---|
| 20 | 2,000 |
| 18 | 3,000 |
| 16 | 4,000 |
| 14 | 6,500 |
| 12 | 9,000 |

TABLE 1
CABLE GAUGE AND LENGTH

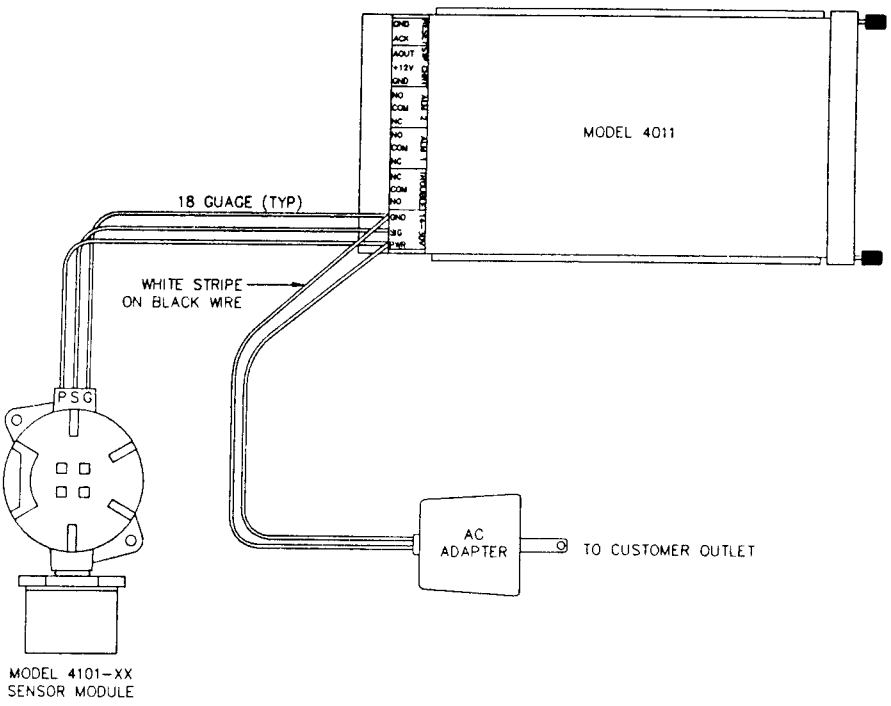



FIGURE 1-A
MODEL 4011 CONTROLLER(WITH AC ADAPTER)

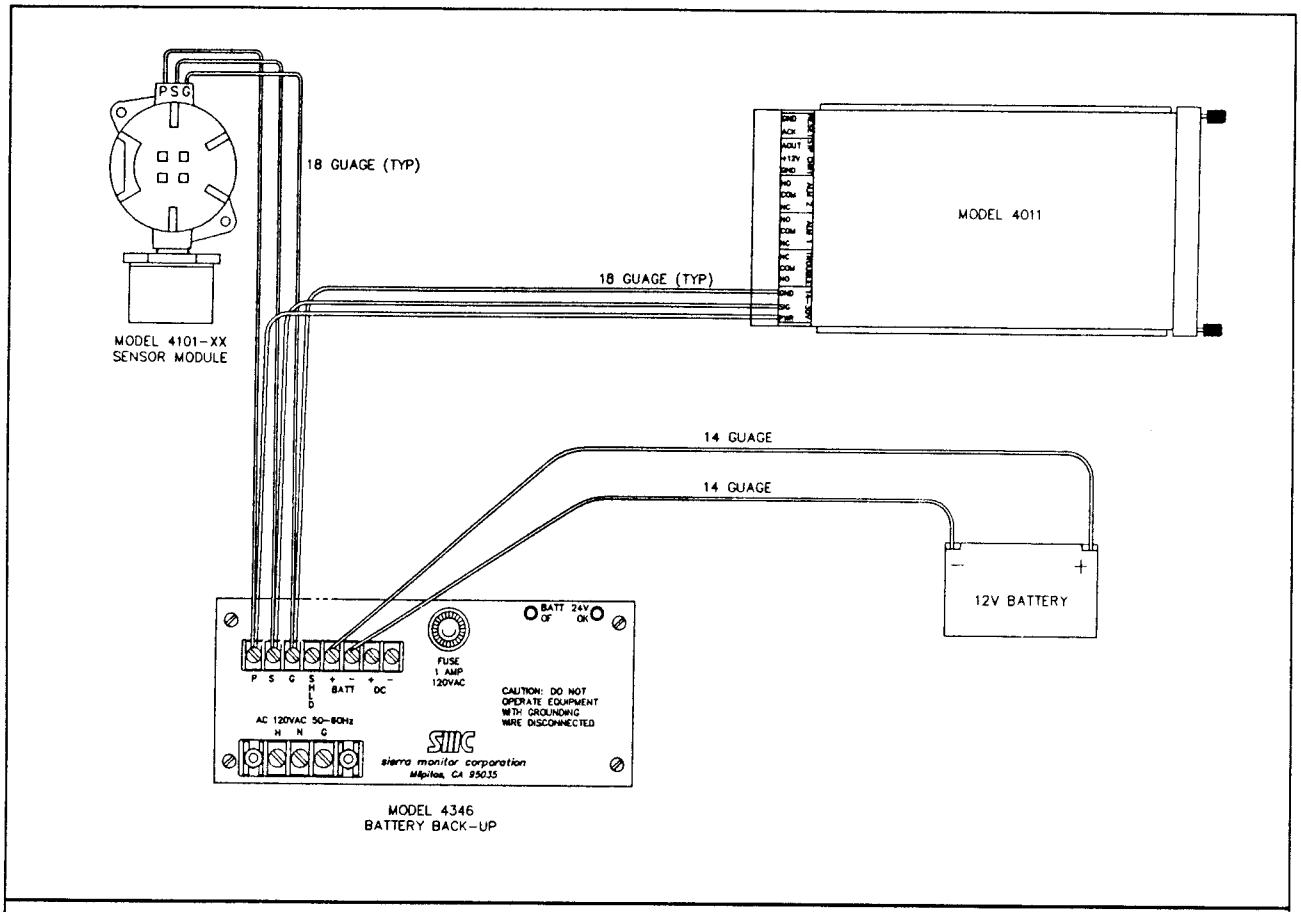



FIGURE 1B
MODEL 4011 CONTROLLER(WITH BATTERY BACK-UP)

### 2.1.2 Start-up Procedure

After all the wiring has been installed plug the Power supply into an AC outlet. The CONC LED (GRN LED) on the front panel should be ON and the LCD should be displaying 00.0 if the loop current is 4ma or less. If not make sure that the wiring from the power supply is correct.

If the unit has a Power Supply with trickle charged battery connect the 12v battery (see figure 1B) and turn ON power. The 24v OK LED and Battery OK LED should be ON, if not check for blown fuses. If any fuses are blown check wiring before re-applying power.

Alarm 1 and Alarm 2 are preset at the factory to default levels of 10% and 50% full scale respectively.

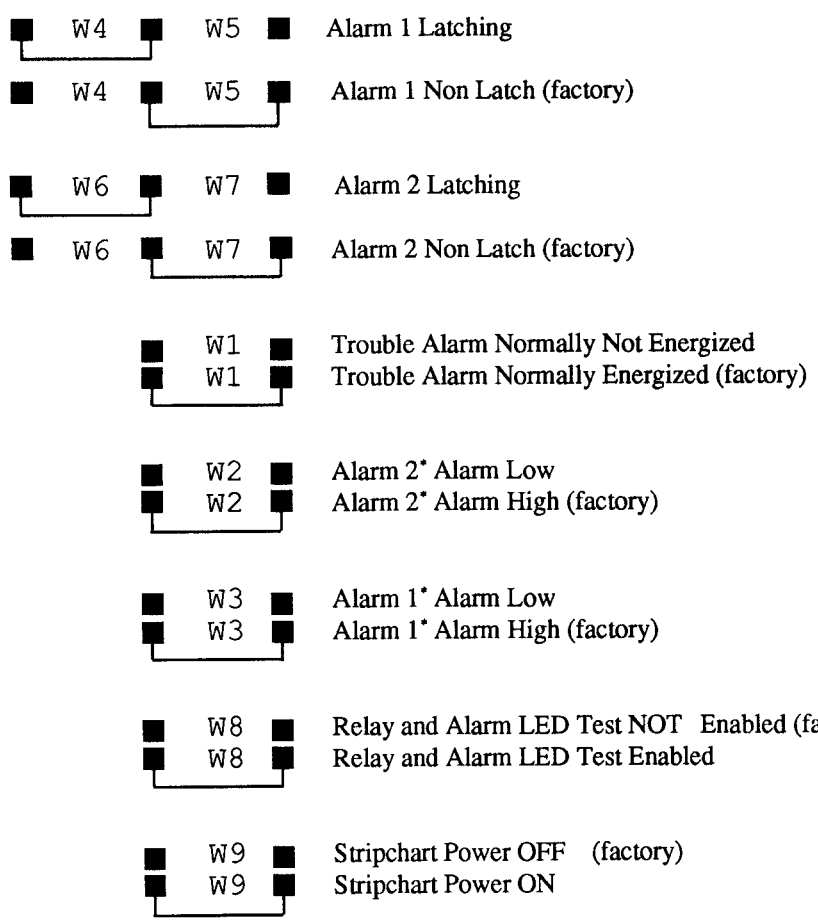
#### 2.1.2.1 Alarm Adjustments

To change the alarm levels for Alarm 1 and Alarm 2 first select the appropriate Alarm level to be displayed using the SELECT button to step through the choices available. Next loosen the two thumbscrews on the front panel to remove the face plate. Alarm 1 adjustment potentiometer is in the bottom righthand corner and above it is Alarm 2 adjustment potentiometer. Using a small jewelers screwdriver adjust the respective potentiometer until display shows the required setting. When Alarm adjustments are complete replace front panel and change display back to CONC (figure 2).

NOTE: There is a deliberate hysteresis built into the alarm function to avoid oscillation when the input (or 4-20mA Calibrator) remains close to the set point. This hysteresis will cause the alarm to activate at the set point and turn off at a slightly lower level than the set point (or higher level if alarm level is programmed to activate on the falling edge).

#### 2.1.2.2 Alarm and Relay Configuration

Table 2 shows the positions for the jumpers to be set for each alarm function. The default factory settings are indicated. To change settings turn OFF all power sources to the controller and unplug terminal block. Remove the two screws in the upper side of the rear clear panel and slide controller board out of the case. Lift the jumpers using needle nose pliers and remove/replace them as required.




* Alarm low indicates the relay will energize when the input value is below the set point.

** Alarm high indicates the relay will energize when the input value is above the set point.

TABLE 2
ALARM AND RELAY JUMPER POSITIONS

### 2.1.2.3 Alarm Test

To test Alarm Relays and Alarm status LEDs loosen the two thumbscrews on the front panel to remove the face plate. The TEST jumper block is located between the two alarm adjustment pots on the display. Using a small jewelers screwdriver temporarily short the jumper posts together. See Figure 2. All three alarm relays will be energized and the three ALARM LEDs will turn ON.

NOTE: The Trouble relay is normally energized if loop current is greater than 3mA and will remain energized when the TEST jumper block is temporarily shorted. Test the trouble relay by removing 4 mA input or removing all system power.

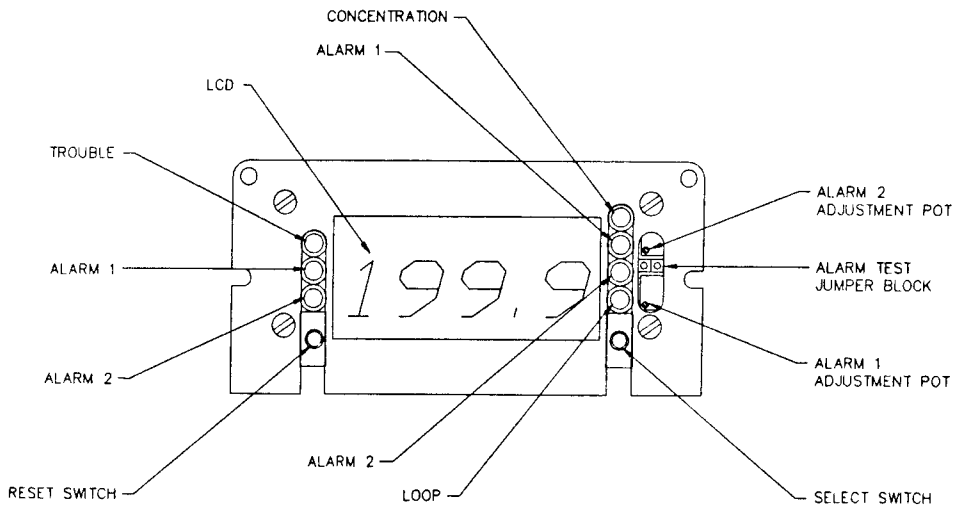



FIGURE 2
MODEL 4011 CONTROLLER DISPLAY(FRONT VIEW)

## 3.1 CALIBRATION

### 3.1.1 4-20mA Calibration

Calibration of the Model 4011 is only required if the CONC display does not read 00.0 +/- 00.2 with a 4.00mA loop current or the display does not read 100.0 +/- 0.2 with a 20.00mA loop current. Turn power OFF to unit. Remove front panel by unscrewing the two thumbscrews and removing the front section. Next remove the screws in the top left and right corner of the display board. Remove the display board with the ribbon cables connected and be careful not to have any part of the circuit board touch any metal surfaces. Turn power ON to unit. Adjust R10-20K (OFFSET) potentiometer (see figure 3) for 0.000v +/-0.001v at TP1 with 4.00mA loop current. The reading on the display when set to CONC should be 00.0 +/- 00.2. Adjust R9-10K (GAIN) potentiometer for 1.000v +/- 0.001v at TP2 with 20.000mA loop current. The reading on the display when set to CONC should be 100.0 +/- 00.2.

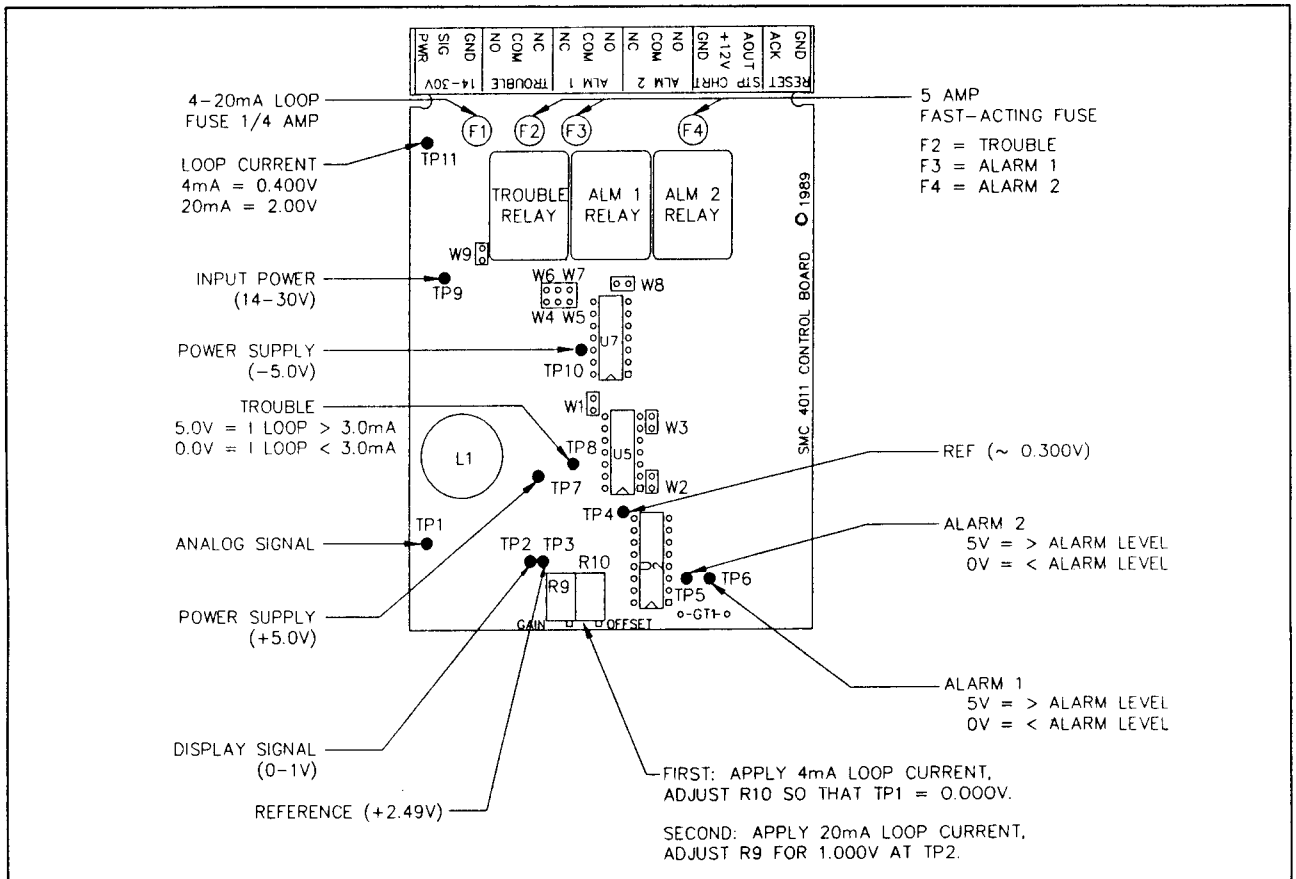



FIGURE 4011
MODEL 4011 COMPONENT LOCATOR

## 3.2 SERVICE

**3.2.1** The only serviceable parts on the Model 4011 are the four fuses on the controller board (A27040). To check to see if fuse is blown turn OFF power and remove the rear clear face plate. Remove fuse in suspect and check for zero ohms with an ohm meter. If fuse resistance is greater than 1 ohm then replace the fuse with the same type.

F1 = 1/4 A Microfuse by LittelFuse p/n 273250

F2-F4 = 5.0 A Microfuse by LittelFuse p/n 273005

## 4.1 SPECIFICATIONS

| | |
|---|---|
| INPUT LEVEL: | Standard: 4-20mA Factory Options: 0-5v, 0-10v, 0-20mA. |
| INPUT RES: | The input loop resistance for the 4-20ma loop is 100 ohms. |
| INPUT SIGNAL: | 14-30 VDC nominal 100ma @24VDC without sensor Module.180ma @20VDC with sensor Module at 20ma loop current. |
| ENCLOSURE: | Standard: 1/8 DIN (1.9"H x 3.8"W x 6.5"D) may be Panel mounted.Optional: Nema 4, Explosion proof |
| DISPLAY: | 3 1/2 Digit Liquid Crystal: Four Display Selections Available: CONCentration, ALARM 1 LEVEL, ALARM 2 LEVEL,LOOP CURRENT. Three Alarm StatusLED:Trouble,Alarm 1,Alarm 2. |
| ALARM LEVELS: | Two alarms available with user adjustable levels. |
| ALARM RELAYS: | User jumper selectable for Latching or Non-Latching. User jumper selectable for Alarming on GREATER or LESS than Alarm Level. |
| TROUBLE RELAY: | Relay de-energizes when loop current is LESS THAN 3mA or when power is removed . |
| CONTACT RATING | :Relay contacts are (SPDT Form C) rated 10@28VDC/ 120VAC and are fused at 5A. |
| ALARM RESET: | External Alarm reset available when alarm relays are programmed for Latching. Alarm Relays will be reset but Alarm Status LEDs will track actual condition. |
| STRIPCHART: | Stripchart Output 0-2v with RL= 1000 ohms minimum. Power available is 12VDC @ 50mA. |
| OTHER: | Modular terminal block that allows disassembly without removal of individual wires. |

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