ECO SENSORS, INC.

REMOTE ALARM PANEL
Model RAP-2

INSTRUCTIONS FOR USE

GENERAL

The model RAP-2 is a remote alarm panel for gas and other detection instruments. It is designed to work with various Eco Sensors® instruments including the C-21, C-30ZX, EE-1, EE-2, OS-1X, OS-3, OEM-1, and OEM-2. The RAP-2 can alarm by detection of closed relay contacts, signals exceeding DC voltage input thresholds and signals exceeding 4-20 mA current input thresholds. The alarm is in the form of a flashing red strobe lamp and a pulsating audio alarm which can be turned off by its *Acknowledge* button. When the alarm is activated a relay with both normally open and normally closed contacts is activated. The RAP-2 can be located many hundreds of feet or meters from the gas instruments if the connection wiring has minimum loss and there is no outside signal interference. The unit should be powered by 14 volts via the DC power jack (which is the output of many "12 volt" AC adapters or 14-30 AC or DC by a terminal block connection. 12 volts power input may work satisfactorily in all cases except for certain 4-20 mA output situations.

Functions
1 - A 0-2 volt DC signal in will give a 4-20 mA signal out.
2 - A 4-20 mA signal in will give a 4-20 mA signal out.
3 - There is an alarm threshold setpoint pot on the RAP-2 board which can be adjusted over the 0-1 volt or 4-12 mA input range to set the point where the flashing strobe and pulsating audio alarm and the output relay is activated.

CONNECTIONS

Before the RAP-2 is mounted on a wall or equipment rack, etc., you should understand where the external connections are made to its circuit board, and which ones you will use. All external wiring is forced through the elastomer wiring glands at the bottom of the enclosure unless you prefer to use the knockouts on the sides of the enclosure. Refer to the board layout drawing on the other side of this instruction sheet.

POWER INPUT (14-18 VDC to the power jack or 14-30 VAC or VDC to TB1)
AC adapter If you are using an AC adapter with a 2.5 mm plug to match our board jack, check to see if the adapter plug will access the jack. If the bottom of the enclosure prevents this, you usually can make the adapter fit by temporarily moving the circuit board by removing its four mounting screws, inserting the plug, and reinstalling the circuit board. Alternately, you can cut the adapter DC output plug off its wire, strip and tin the leads, and install these at end terminals marked AC1/+ and GND/- of terminal block TB1 at the upper left of the board. The input voltage should not exceed 18 VDC in the jack or 30 V in TB1.

The 14 VDC output connected to the RAP-2 requires is the actual output of many 12 VDC 500 mA adapters.. In many cases 12 VDC power input should work satisfactorily. See discussion in OPERATION below.

AC or DC supply voltage input to TB1 (14-30 volts AC or DC) If AC bring the wiring to the terminals labeled AC1/+ and AC2/+. If DC wire to the terminal AC1/+ and GND/-. The ground wire, if there is one, should be connected to GND/-. Check for 12 VDC at test points +12 V and GND.
Earth Ground (if required or available) Attach to a GND terminal of TB7 on the lower right edge of the board.

SIGNAL INPUT (external relay contacts, 0-2 VDC, or 4-20 mA)
External relay contacts External relay contacts should be normally open. Connect to the two terminals TB2 at the upper right side of the board.
0-2 VDC Two steps:
(1) Jumper terminals SELECT and VOLTAGE of TB4 on the center right side of the board and
(2) Connect the 0-2 VDC input wiring to the + and - terminals of TB3 on the lower right side of the board.
4-20 mA Two steps:
(1) Jumper terminals SELECT and CURRENT LOOP of TB4 and
(2) Connect the 4-20 mA loop wires to the + and GND terminals of TB5 on the upper right side of the board.

OUTPUTS
Relay The relay has contacts rated at 5 A 250 V.
Normally open contacts: connect to terminals N.O. and COM of TB6 at the lower bottom edge of the board.
Normally closed contacts: connect to terminals N.C. and COM of TB6.
The relay contacts are fail safe because the open contacts close and the closed contacts open if the RAP 2 loses power (the same as the alarm condition).
4-20 mA Connect to terminals 4-20 mA and GND of TB7 at the lower right of the board.

SETPOINT This is the screwdriver adjustment pot with the 0-100 (percent of full range) calibration marked on it. It is located in the upper left of center of the board. *Do not adjust this setpoint pot below 25%.* It adjusts over 0-1 V input or 4-12 mA input.

INSTALLATION

The RAP-2 is usually mounted on a wall or equipment panel by the "feet" or "brackets" and screws found in the shipment. These can be mounted on the sides or top and bottom. All wiring can be passed through the conical elastomer cable seals at the bottom of the enclosure, or other wiring access can be made through knockouts on the side of the enclosure. *Caution! The enclosure itself is made of polycarbonate and fiberglass and is difficult to machine.*

OPERATION

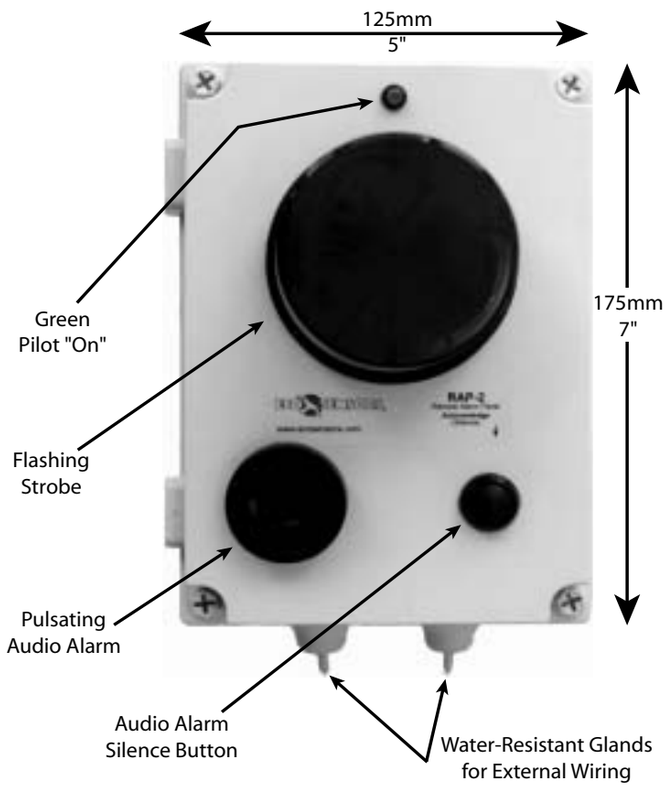
Temporarily jumper the two terminals of TB2. This will simulate a distant relay closing and will show if the strobe, audio alarm and output relay are working. When shorting the terminals on TB2, the red strobe will flash, the audio alarm will sound (it can be silenced by pressing the front panel ***Acknowledge (Silence)*** button) and the output relay will close. Remove this jumper.

An optional test is to touch the probes of a DC voltmeter to test points +12 V and GND just above the Alarm Setpoint potentiometer. The voltage should read 12 volts (this is an internal circuit voltage and not the external power supply voltage). The RAP-2 will work as low as about 11 volts (corresponding to about 12 volts from the power supply) if its 4-20 mA output circuit is not sending a signal on to a high resistance (>150 ohm) load. The voltage should not perceptibly fluctuate when the strobe is flashing.

Set the Alarm Threshold Setpoint to 100%. Cause the output of the gas sensing instrument connected to the RAP-2 to rise above 1 volt (or 12 mA if the signal is sent by a current loop circuit). Upon reaching 1 volt or 12 mA, the small green LED on the circuit board should go out and the flashing strobe and pulsing audio alarm should go on. This test should be done with the instrument and alarm panel installed in order to test for signal voltage drops, interferences, etc.

The 100% alarm threshold point corresponds to .1 ppm for the Eco Sensors C-30ZX , 10 ppm for the OS-3, and about 50 ppm for many VOCs sensed by the C-21.

(OVER)



OPTIONS

Certain integrated circuit chips (ICs) are included or omitted depending on the options selected by the customer. These are U6 for voltage input, U7 for 4-20 ma input and U8 for 4-20 mA output. The Threshold Setpoint can be factory adjusted to cover a larger range than 0-1 V input. This type of change should be made in consultation with the factory before shipment of the RAP-2 to you.

AC ADAPTER

For using low voltage power input, such as for bench testing, an AC adapter that delivers 12 volts at 500 mA should be used. Most of these low cost unregulated AC adapters deliver 14 or more volts to a modest load like the RAP-2 so its voltage requirement is satisfied. The AC adapter output plug to fit our jack should have the 5.5 mm/2.5 mm female specification, jack center pin +. These are widely available worldwide. For more complete specifications see our Tech Note P-101.

SPECIFICATIONS

Input Range: 0-2 V (.25-1 V setpoint controllable), 4-20 mA (6-12 mA setpoint controllable), detection of closed relay contacts.
Outputs: 4-20 mA and relay contacts (normally closed and normally open).
Threshold control lower limit: As low as .03 ppm for .1 ppm range instruments, .3 ppm for 1 ppm instruments and 3 ppm for 10 ppm instruments.
Response time and warm-up: None.
Turn-on, turn-off range differential (hysteresis): Approximately .05 volts on voltage input or 1 mA on current loop input.
Temperature and humidity range: 5-35 degrees C and 10-95% relative humidity.
Supply voltage required: 14-30 VDC or AC 500 mA.
Relay ratings: SPDT non-latching. Contacts: 5 amps at 250 volts AC.
Protection Classifications: IP 52. Enclosure is polycarbonate with 10% glass fill. Front cover is pure polycarbonate, hinged and gasketed.
Size and weight: 125 mm wide, 175 mm high, and 77 mm deep (5" X 7" X 3"). The Strobe lamp is 70 mm (2.8") in diameter and protrudes an additional 45 mm (1.8") from the front cover. The weight not including shipping materials is 570 grams (1 1/4 lbs.).

PRECAUTIONS

- Read all instructions in this manual.
- Review safety procedures in testing and operating this system.
- Call a qualified electrician if you have any doubts about voltages, wiring, electrical codes and practices, etc.
- Keep the boards and sensor dry. Never let water or other liquids into the system.
- Do not drop the boards. Damage may not be immediately obvious.
- Do not attempt to service the instrument yourself.

When in doubt, operate the system at least 24 hours in your worst case environment as a test.

LIMITED WARRANTY

This product is warranted against defects in materials and workmanship for own year following the date of purchase by the OEM. This warranty does not include damage to the product as a result of misuse, damage, modifications or alterations, and it does not apply if the instructions in this manual are not followed.

If a defect develops during the warranty period, Eco Sensors at its election will repair the product or replace it with new or reconditioned product of equivalent quality. In the event of replacement with a new or reconditioned product, the replacement will continue the warranty of the original model.

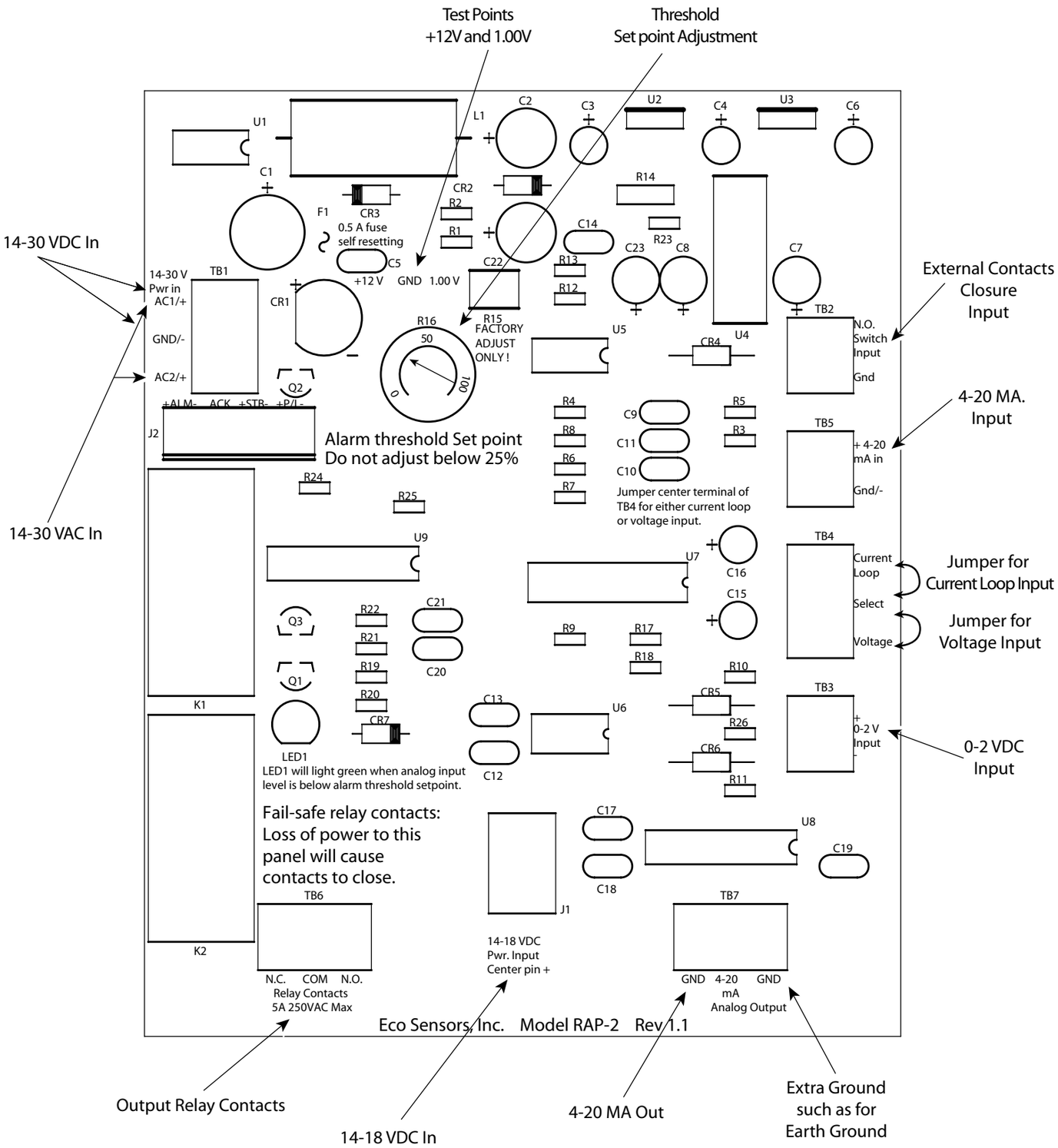
To return this system or any module of it, call your distributor or OEM. OEMs and distributors call Eco Sensors at (800) 472-6626 or e-mail at: sales@ecosensors.com to receive return instructions and a Return Goods Authorization (RGA) number.

Except as provided herein, Eco Sensors makes no warranties, express or implied, including warranties of merchantibility and fitness for a particular purpose. Eco Sensors shall not be liable for loss of use of this instrument or other incidental or consequential damages, expenses or economic loss, or claims for such damage or economic loss.

KEEP THIS MANUAL AND WARRANTY FOR YOUR RECORDS.

Rev. 10/02

ECO SENSORS, INC. RAP-2



CONNECTIONS TO CIRCUIT BOARD
ACCESSED BY OPENING FRONT PANEL