

# Alarm Rat Single Point Hazardous Gas Monitors

AC/DC Models: AR-PR(x#)-2N

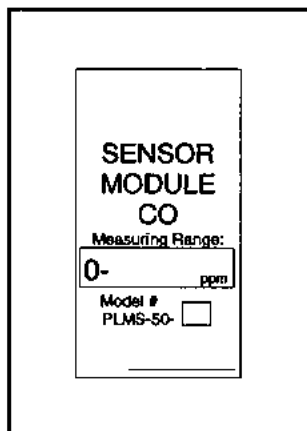
AR-PR(x#)-2D

4-20mA Models: AR-PR-(x#)-3

Alarm Rat Separation Kits

Model: UA-SEP-K2

Version 3.0



*"INNOVATORS IN GAS DETECTION"*

**BWF**  
TECHNOLOGIES

**Alarm Setpoints:**

**The Alarm Rat is shipped ready for use, factory calibrated, with the Alarm levels set at:**

**Alarm 1: \_\_\_\_\_**

**Alarm 2: \_\_\_\_\_**

**Alarm 3: \_\_\_\_\_**

**To change Alarm Settings refer to pages 14 to 16.**

**Designed: For Use in Non-Hazardous Areas**  
**Warranty: Instrument — 2 Years Parts and Labor**  
**Sensors — 2 Year Warranty**

**WARRANTY REGISTRATION CARD MUST BE  
RETURNED TO VALIDATE THE WARRANTY**

## **Alarm Rat Hazardous Gas Monitors Single Point Models and 4-20 mA Models Installation and Operation Manual**

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**IMPORTANT:**

**PLEASE READ THIS ENTIRE MANUAL AND FOLLOW THE INSTRUCTIONS AND RECOMMENDATIONS CONTAINED HEREIN IN ORDER TO ENSURE PROPER AND SAFE INSTALLATION AND FUNCTIONING OF THE ALARM RAT SINGLE POINT ALARM MONITOR.**

**USE OF THE REMOTE ALARM RAT REQUIRES A FULL UNDERSTANDING OF THE OPERATING AND MAINTENANCE INSTRUCTIONS. IT IS ONLY TO BE USED FOR THE PURPOSES SPECIFIED IN THE MANUAL.**

**BW TECHNOLOGIES AUTHORIZED SERVICE REPRESENTATIVES AND PARTS MUST BE USED IN CARRYING OUT REPAIRS FOR THE UNIT IN ORDER TO MAINTAIN THE VALIDITY OF THE WARRANTY PROVIDED WITH THE ALARM RATS. MODIFICATION OF COMPONENTS OR USE OF NON-BW PARTS, INCOMPLETE OR USED PARTS WILL ALSO INVALIDATE THE WARRANTY.**

**ALARM RAT MODEL NUMBER**

<b>AR-PR</b>	<b>(x)</b>	<b>(#)</b>	<b>2</b>	<b>N or D</b>
<b>ALARM RAT</b>	<b>GAS CODE</b> CO = M H <sub>2</sub> S = H	<b>MEASURING RANGES</b> 1-9	<b>GENERATION</b>	<b>DISPLAY</b> N = NONE D = WITH

**INDEX OF VARIABLES**

**VARIABLES**

N or D

(x)

(#)

**DESCRIPTION**

N = ALARM RAT without LCD display

D = ALARM RAT with LCD display

BW Gas Code (TABLE A)

Instrument Measuring Ranges 1 to 9 (TABLE B): Up to nine Instrument Measuring Ranges are available for each gas, only the most common are listed. Contact BW Technologies for other Instrument Measuring Ranges.

**TABLE A: BW GAS CODE**

**TABLE B: MEASURING RANGE**

<b>GAS</b>	<b>BW GAS CODES</b>
NH <sub>3</sub>	A
CO	M
Cl <sub>2</sub>	C
ClO <sub>2</sub>	V
C <sub>2</sub> H <sub>5</sub> OH	B
C <sub>2</sub> H <sub>4</sub> O	E
H <sub>2</sub>	Y
HCl	L
HCN	Z
H <sub>2</sub> S	H
NO	N
NO <sub>2</sub>	D
O <sub>2</sub> 0-25%	X
O <sub>3</sub>	G
SO <sub>2</sub>	S

**PPM MEASURING RANGES**

<b>GAS</b>	<b>1</b>	<b>2</b>
Ammonia.....	0 to 50.....	0 to 100
Carbon Monoxide.....	0 to 500.....	0 to 1000
Chlorine .....	0 to 5.0.....	0 to 10.0
Chlorine Dioxide.....	0 to 5.00.....	0 to 1.00
Ethanol.....	0 to 500.....	0 to 1000
Ethylene Oxide.....	0 to 10.0.....	0 to 20.0
Hydrogen .....	0 to 100.....	0 to 200
Hydrogen Chloride .....	0 to 10.0.....	0 to 20.0
Hydrogen Cyanide .....	0 to 20.0.....	0 to 50.0
Hydrogen Sulfide.....	0 to 100.....	0 to 50
Nitric Oxide .....	0 to 50.....	0 to 100
Nitrogen Dioxide.....	0 to 10.0.....	0 to 20.0
Oxygen .....	0 to 25.0%	
Ozone .....	0 to 1.00.....	0 to 2.00
Sulfur Dioxide .....	0 to 100.....	0 to 50

**OTHER MODELS:** Substitute Variables: ? = N (no display) or D (with display)

Complete with 4-20 mA Output:..... AR-PR(x#)-3?

Alarm Rat with sensor separation Flue Vessel Mount: Contact BW

## **INTRODUCTION:**

The BW Alarm Rat is the complete single point continuous gas monitoring and alarm system with all the features built in: superbright Visual Alarms and a 110 dB Audible Alarm, three alarm relays, a Power/Fail alarm, a Power/Fail relay and an ON indicator.

The plug-in gas specific electrochemical sensors have a high reserve of activity with a diffusion limiting barrier that results in superior performance. Virtually maintenance-free with non-intrusive 90 day calibration, they are backed by a BW two year warranty. The modular, plug-in electronics are encapsulated to protect against corrosive environments and moisture invasion.

Calibrate Mode simplifies System start-up and calibration. The timed automatic reset to normal operation insures monitoring integrity.

Select one to three alarm levels that are easily set with slide switches. Full flexibility is built-in to control and activate field interfaces with a N/O and a N/C and two commons for each normally energized relay.

The gas sensed or the measuring range are simply changed with plug-in modules. Add a 3.5 digit display at any time with the plug-in kit.

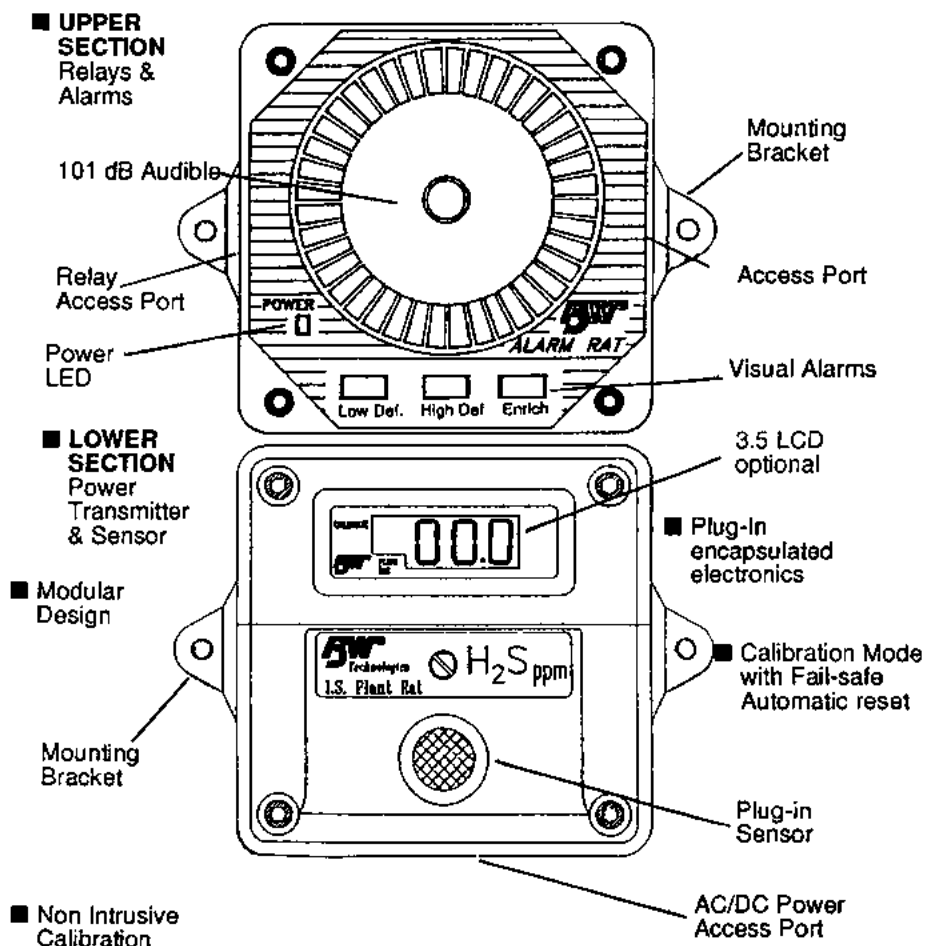
Totally modular in design, the Alarm Rat is cost effective to install and maintain. The 3 component housing has built-in mounting flanges and three wiring access ports. The Alarm Rat RF/EMI shielded enclosure prevents false alarms. The power input circuit is RF filtered protecting RF frequencies from intervening via input wiring.

The standard separation kit or duct mount kit can be added at any time. A special model is available if a Flue Vessel Mount is required, specify at the time the Alarm Rat is ordered. As well, a splash guard/calibration cup and process baffle are available.

The Alarm Rat is 110 VAC and 24 VDC compatible can be ordered for 220 VAC operation. A 4-20 mA model is available to tie into a Controller or the Plant communication system.

The Alarm Rat is fully tested and calibrated, and user settable alarm points are set to normal industry standards at the factory. After installation it is ready for use. The Alarm Rat will provide years of reliable service.

**FIGURE 1: ALARM RAT**



**COMES COMPLETE WITH:**

1. Four 15 Amp Relays
2. 101 dB Audible Siren
3. Visual Alarms:
  1. Fail-safe
  2. Low, Mid & High Alarms
4. Three Access Ports
5. Electrochemical Sensor
6. Built-in Mounting Flanges
7. Relays — N/O, N/C & 2 Commons

**USER-SELECTABLE:**

1. Number of Alarm Levels (one, two or three)
2. Alarm Setpoints for each level
3. Power: 110 AC or 24 DC
4. Relay Wiring Configurations
5. Audible Enable/Disable etc.

## INSTALLATION OF THE ALARM RAT

## ALL MODELS

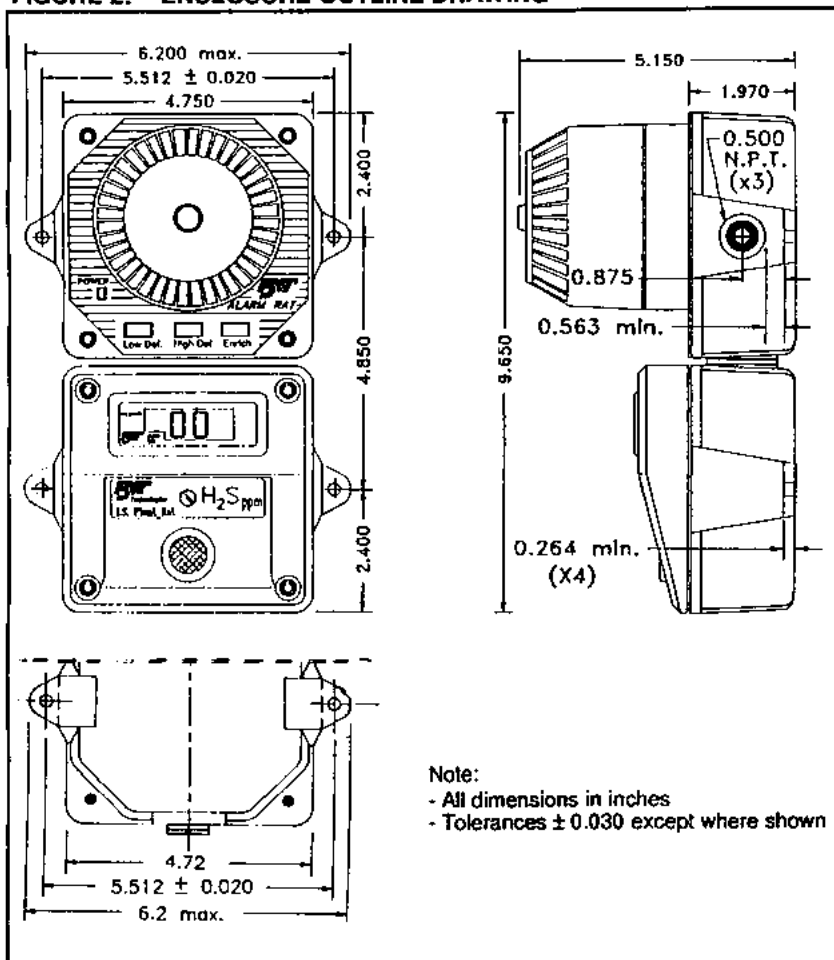
**MODULAR ENCLOSURES:** The four part enclosures of the ALARM RAT simplifies installation. The metal back enclosures are equipped with three 1/2 inch wiring ports and four pre-drilled mounting flanges.

**RECOMMEND:** Qualified personnel should perform the installation according to local, applicable electrical codes, regulations and safety standards. Parts list and assembly Drawing on page 26.

**LOCATION:** Select the most suitable location for the ALARM RAT. We suggest that the sensor be positioned approximately 12 in. (30 cm) below the level of a potential hazardous gas release for gases heavier than air, and 12 inches (30 cm) above the level of a potential hazardous gas release for gases lighter than air in a non-hazardous area. Give consideration to air currents.

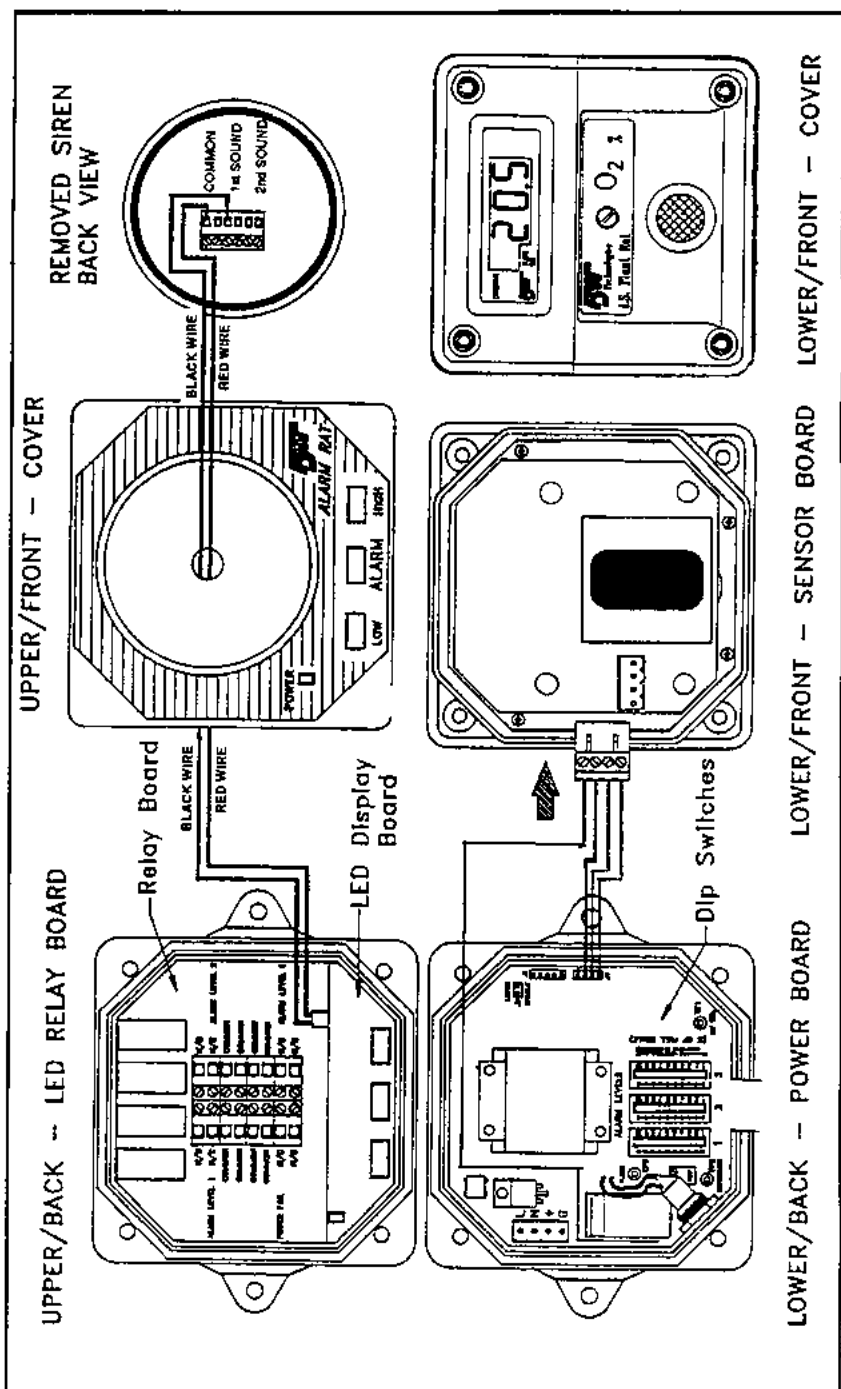
- (a) Affix the Alarm Rat using the four mounting flanges with the appropriate hardware (not supplied) in the desired location. All dimensions are shown in the OUTLINE DRAWING.

**FIGURE 2: ENCLOSURE OUTLINE DRAWING**





**FIGURE 3: WIRING DIAGRAM**



## 2. CABLE INSTALLATION of the AC/DC POWERED ALARM RATS

USER SELECTABLE CHOICES: POWER:110 VAC & 24 DC (compatible 220 VAC optional)

PVC CABLE: Three wire 14 to 22 AWG

1. Remove lower faceplate.
2. Install the 1/2 inch n.p.t. compression fitting supplied. Except See Note 1 & 2

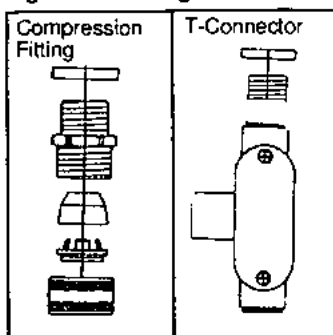
NOTE 1: Alarm Rats with Sensor Separation Kits: Require a T-connector installed in the Alarm Rat to provide a grounding point for the Kit. Install the kit (page 8 & 9) before proceeding to #2.

NOTE 2: ♦ 4-20 mA ALARM RATS: Use a T-connector.

NOTE 3: CABLE IN CONDUIT: Thread the conduit directly into the 1/2 in. n.p.t. port. Conduit must be flush with enclosure inside edge and fixed in place protecting the dipswitches.

2. Feed the power cable through.
3. Strip approximately 6 in.(15 cm) of outside jacket cover. Strip wires approx.1/4 inch.
4. Make certain that the cable jacket is intact with either fitting and or conduit.

Fig. 4A Fig.4B



T-Connector: BW part # M0840K or purchase at your local hardware store.

### 3. POWER CONNECTION to the ALARM RAT

GENERAL: The Power Terminal Connector is grounded to the enclosure.

- (a) The 4-pin power terminal connector located at "TB1" on the Power Board. Unplug the female half, screw in wires as shown in Table 1.

**CAUTION:** To avoid damaging the circuitry, check that connections are correct before applying power.

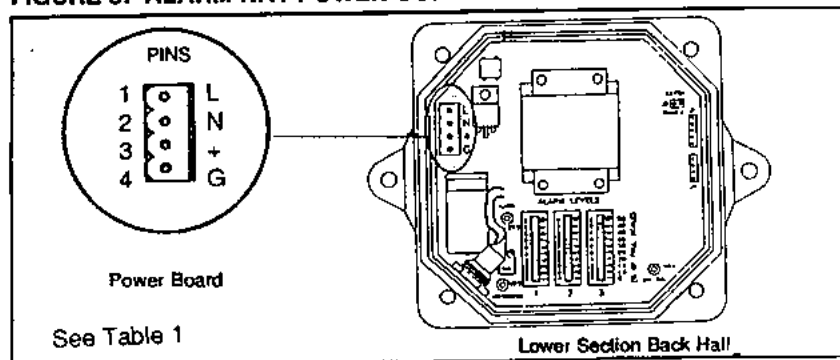
TABLE 1: POWER SUPPLY and CONNECTIONS:

Pin#	110 & 220 VAC
1.	"L" Line Power (Hot)
2.	"N" Neutral
3.	"+" no connection
4.	"G" Ground

OR

Pin	24 VDC
"L"	no connection
"N"	no connection
"+"	+24 VDC
"G"	Ground

FIGURE 5: ALARM RAT POWER CONNECTIONS



## INSTALLATION (cont'd)

**NOTE:** BEFORE (#4) Power to Sensor Board Array Connection proceed to "SETTING ALARM SETPOINTS". See pages 14 and 15 on setting the dipswitches for Alarm Levels and Setpoints.

### NOW CONNECT #4 - ALL AC/DC ALARM RATS

♦ **4-20 mA ALARM RATS:** See 4-20 mA section to connect Supply/Return Signal to the Controller on Pages 10 & 11.

#### 4. POWER BOARD to SENSOR BOARD CONNECTOR:

**General:** Connect the Sensor Board Array located on the front faceplate of the lower half of the ALARM RAT. The 4-pin Terminal Block at "J4" is factory wired, ready to plug-in.

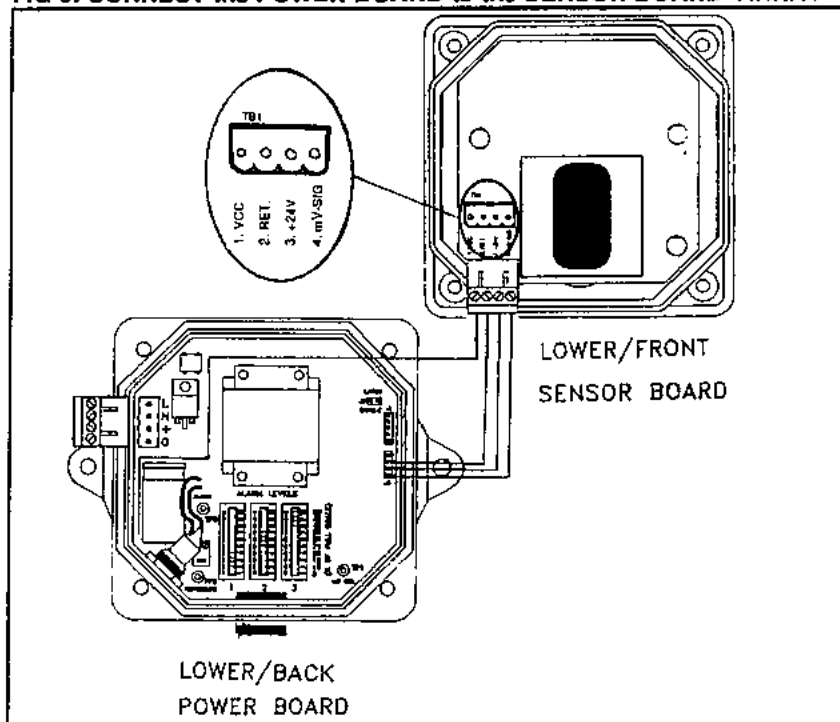
- (a) Plug the 4-pin terminal block connector located off "J4" on the power board in the lower back half of the ALARM RAT into the ALARM RAT SENSOR BOARD (lower front half of the ALARM RAT) at the "TB1" position. See Figure 6 below.

**NOTE:** A 60 millivolt signal may be accessed off Pin 4 if required.

**CAUTION:** Ensure the block is properly oriented before plugging in and that both 4-pin Terminal Blocks are fully seated. Ensure all power connections are correct.

- (b) Replace the lower front faceplate complete with board array.

**FIG 6: CONNECT the POWER BOARD to the SENSOR BOARD ARRAY**



## INSTALLATION OF THE 4-20mA ALARM RAT MODELS: AR-PR(x)(#)-3(?)

**DESIGN & SYSTEM SPECIFICATION:** The AR-PR-3 ALARM RAT is a 4-20 mA current loop powered device. Powered directly by the 4-20 mA current signal line, the monitor adjusts the RETURN current in the loop to correspond to the level of gas measured by the sensor.

**CONTROL SYSTEMS:** With a directly linear output the 4-20 mA ALARM RAT will be compatible with existing 4-20 mA systems.

**POWER SUPPLY:** Ensure the Control source power supply meets the minimum requirements of all components in your system (i.e. alarms, relays etc.). We recommend for system integrity that the power supply be regulated.

**FAULT MODE:** If a system fault occurs or the sensor is degrading (i.e. negative drift by more than 5% of full scale) the 4-20 mA ALARM RAT will transmit a signal of approx. 3.5 milliamps or less, indicating a fault.

### 4-20mA ALARM RAT System Design Specifications

4-20mA ALARM RAT: Voltage Supply:	12 to 35 volts
Power:	Energized 4-20mA loop from Control source
Max Current Draw:	20 milli-amps
Separation Kit:	Max distance 250 ft.
System:	Total Loop Resistance: 650 ohms at 24 VDC
Shielded PVC Cable	4-20 mA Output: 2 conductor w/ drain wire 14-24 AWG
	Line Power: 3 conductor, 14-24 AWG
	Cable O.D.: 0.125 to 0.375 in. (3.175 to 9.525 cm) (or substitute 5 conductor cable for both)

**TRANSMISSION FORMULA:** The following formula determines the signal transmission range:

$$\text{Maximum Distance} = \left\{ \frac{(V_p - V_t)}{0.02} - R_c \right\} / (2 \times R_l)$$

Where:  $V_p$  = power supply voltage (min)  
 $V_t$  = transmitter supply voltage  
 $R_c$  = total controller resistance (typically 250 ohms)  
 $R_l$  = line resistance per 350 m (1160 ft.)

### INSTALLATION: POWER and 4-20mA OUTPUT LINE

1. Install a T-connector with male nipple and sealing washer into the ALARM RAT 1/2 inch lower port (lower faceplate removed). Fix in place. If using conduit, thread the conduit for the lines (and if applicable the Separation Kit) directly into the T-Connector.

NOTE: T-Connector: Order BW Kit M0840K, or a T-connector with male nipple for a 1/2 inch access can be purchased from a local supplier.

**CAUTION:** The male nipple should not interfere with the dipswitches.

2. Remove the T-Connector cover.
- 3a. **POWER CABLE :** Feed the line power cable through to the ALARM RAT and connect as shown on page 8, Table 1.
- 3b. **4-20 mA OUTPUT CABLE:** Feed the Cable from the Controller through to the opening in the T-Connector. Strip approximately 8 in. (15cm) of outside jacket. Strip wires approx. 1/4 inch.
4. **Ground the 4-20 mA Output cable shield** to a grounding lug inside the T-Connector: To avoid radio frequency interference the shield (including mylar) and all spare wires must be grounded. Simply tying a bare drain wire will not ground the shield.

## INSTALLATION OF THE 4-20mA ALARM RAT MODELS: AR-PR(x)(#)-3(?)

### 4-20 mA OUTPUT CONNECTION to the ALARM RAT

- On the lower front ALARM RAT is a second 4-pin female terminal block at "TB1". The male mate is wired to the Power Board.  
Controller Connection:
  - Pin 2: The (-) negative (Return Signal) wire
  - Pin 3: The (+) positive (24V Power) wire
- Plug the male 4-pin terminal block into the female half ensuring that it is correctly positioned. Damage to the boards may occur if the connections are incorrect.

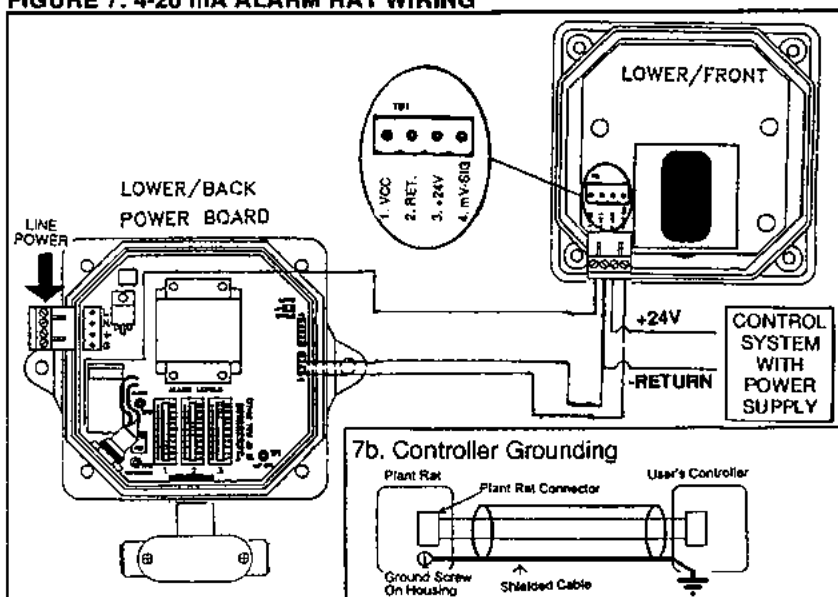
### INSTALLATION: SEPARATION KIT WIRING (IF APPLICABLE)

- Repeat steps 3 and 4 above using a separate grounding lug in the T-Connector. To configure and wire the UA-SEP-K2 see p. 12 & 13.

### SETTING the ALARM SETPOINTS

- See pages 14 and 15.

FIGURE 7: 4-20 mA ALARM RAT WIRING



### CONTROLLER CONNECTION AND CALIBRATION

General: Follow the Control System Manuals to complete and calibrate the Control System.

**NOTE:** The Power Supply must be capable of supplying the voltage needed to power the current loop.

- Ground the shield and drain wire of the Controller supply/return line, see above. Complete installation of site interfaces (alarms, etc.).

#### CALIBRATE THE CONTROL SYSTEM:

The Measuring Range for this ALARM RAT is written on the ALARM RAT Manual Cover. Set the Controller as follows:

4 mA = ZERO ( % or ppm)

20 mA = Full Scale (Measuring Range - Manual Cover)

Example: If the Measuring Range of a H<sub>2</sub>S Monitor is 0 to 100 ppm

0 = 4mA    100 (Full Scale) = 20 mA

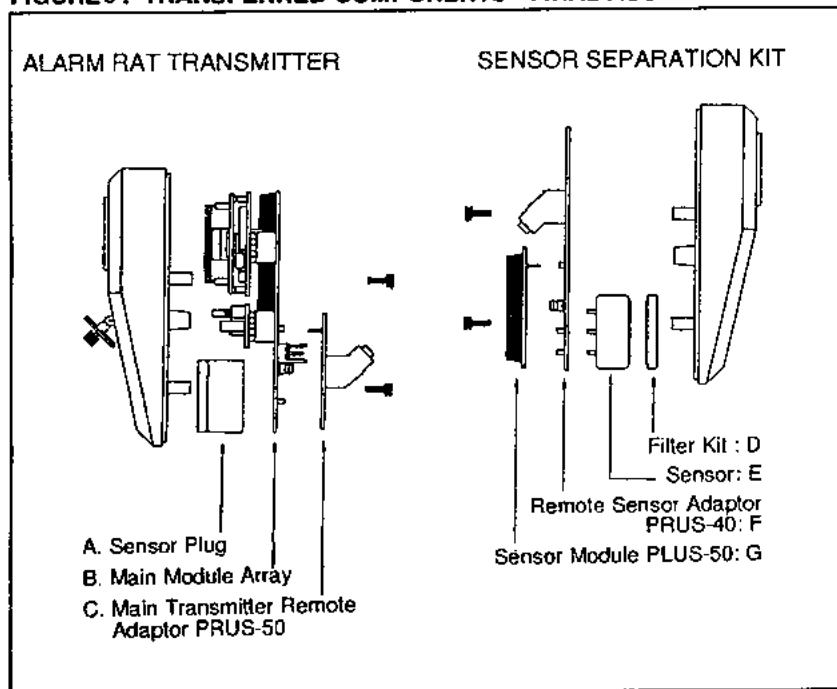
**NOTE:** UA-SEP-K2 Parts List and Assembly Drawing on Page 27.

1. Remove the Faceplates from both units (Note: If shipped together the ALARM RAT (Transmitter) and Separation Kit will be configured ready for cable installation. Check Fig. 8 and 10. Proceed to p. 13.).

Transferring Plug-In Components: See Figure 8 for Final Assembly.

2. ALARM RAT: Remove Main Board Array (4 thumbscrews); unplug the Sensor and (E) PLUS-50 Sensor Module Board, remove the (D) Sensor Filter Kit. See Fig. 21 page 25.
3. SENSOR SEPARATION KIT: a) (See Fig. 23 Page 27) Remove Board Array (4 thumbscrews), remove the Sensor Plug from the faceplate, unplug the "Main Transmitter Remote Sensor Adaptor" (PRUS-50).  
b) (Fig 5) Plug (E) Sensor into (F) Remote Sensor Adaptor Board, place (D) Sensor Filter Kit, gasket up in the faceplate. Replace (F) PRUS-40 Module (4 screws). Plug-in (G) PLUS-50 "Sensor Module".
4. ALARM RAT: Insert (A) Sensor Plug Kit in the Faceplate. Replace (B) Main Board Array (4 screws). Then Plug-in (C) PRUS-50 Remote Adaptor.

**FIGURE 8: TRANSFERRED COMPONENTS - FINAL ASSEMBLY**



## INSTALLATION & WIRING THE REMOTE SENSOR

UA-SEP-K2

A. Install Base Enclosure(s) (Page 6).

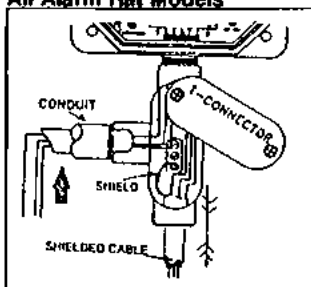
**Caution 1:** Separation Kit Cable distance not to exceed 250 ft.

B. **Cable Installation:** Use 4-wire conductor cable 22-14 AWG. Use shielded cable or cable in conduit to prevent RF line interference. Outside Diameter of Cable to be from 0.125 to 0.375 in. (3.175 to 9.525 mm).

C. **Grounding Cable Shield:**

- (1) Thread the Shielded Cable or Conduit directly into the T-connector.
- (2) Feed cable through. Strip approx. 8 in (15 cm) of outside jacket cover. Strip wire approximately 1/4 in.
- (3) Remove cover of T-connector and ground cable shield to the grounding lug located inside. Replace T-connector cover.
- (4) Ground Shield at Remote Sensor.

Fig. 9: T-connector  
All Alarm Rat Models



D. **Connect the cable to both 4-Pin 30° Terminal Blocks:**

**Caution 2:** Connect the wires correctly. See Board labels and Figure 6.

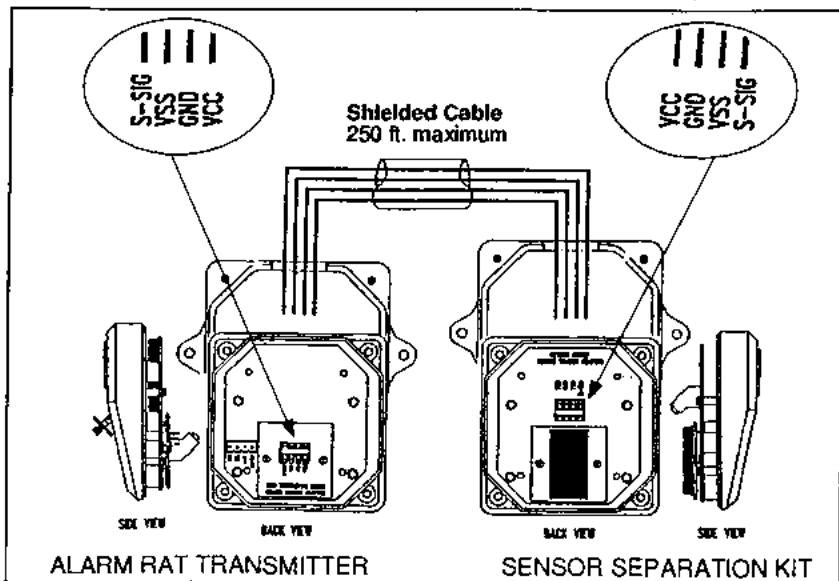
- (1) Connect the (+) wire to VCC pins
- (2) Connect the ground wire to GND pins
- (3) Connect the (-) wire to VSS pins
- (4) Connect the Signal wire to S-SIG pins

E. Replace the Sensor Separation Faceplate.

F. Now Install the main signal/power cable in the ALARM RAT (page 8).

G. When added to a previous install, calibrate the Alarm Rat & Separation Kit after installation is complete.

FIGURE 10: WIRING THE REMOTE SENSOR TO THE TRANSMITTER



**SETTING the ALARMS** (Note: For Measuring Range See Manual Cover)  
**GENERAL:** The ALARM RAT has 4 Alarms, three user selectable Alarms triggered by the presence of the hazardous gas being monitored, and one Power Fail Alarm. Each Alarm controls a built-in relay and activates a color-coded LED Visual Alarm and/or the Audible Alarm.

**USER-SELECTABLE CHOICES:**

1. NUMBER of ALARM LEVELS — one, two, or three
2. ALARM SETPOINTS ⊕ Low, Mid, High Alarms (O<sub>2</sub> See Below)
3. SIREN ALARM LEVEL — Low, Mid or High
4. SIREN OUTPUT — Decibel level and oscillation

**A. SETTING ALARM SETPOINTS**

**Alarm Levels:** The user can select 1, 2 or 3 different alarm levels by setting the dipswitches at the same or different set points.

**TABLE 2: ALARM, RELAY and LED SETTINGS**

ALARM DIP SWITCHES	ALARM LEVELS		VISUAL LED DISPLAY	ACTIVATES RELAY
	Toxic	Oxygen		
1	LOW	LOW Def.	Yellow	Relay 1
2	MID	HIGH Def.	Red	Relay 2
3	HIGH	Enrichment	Flashing Red	Relay 3

1. To set the alarm levels for the corresponding alarm LED and relay, use the sliding DIPSWITCHES on the ALARM RAT POWER BOARD in the lower back section.

**(1a) TOXIC ALARM RATS:**

**DIPSWITCH SETTINGS** (applies to all 3 switches):

Full Scale is the Measuring Range the ALARM RAT is set at (Table 3).

**TABLE 3: Toxic Alarm Rats**

Dipswitch Setting	Equivalent PPM Setting of Full Scale
10	50%
9	45%
8	40%
7	35%
6	30%
5	25%
4	20%
3	15%
2	10%
1	5%

**(1b) OXYGEN ALARM RATS:**

Dipswitches 1 & 2 Measure O<sub>2</sub> Deficiency conditions.

**TWO Deficiency Levels:** Set Dipswitch 2 at a lower position than switch 1.

**ONE Deficiency Level:** Set Dipswitch 1 and 2 at the same position.

**ENRICHMENT Level:**

**Ambient Air Condition:** Dipswitch 3 must be set at # 10 (22.5%). Otherwise it will be in constant alarm.

**Process Control:** Dipswitch 3 may be set to alarm when oxygen levels exceed a desired level. Note: The setting must be higher than switch 1 (Low Def.) deficiency.

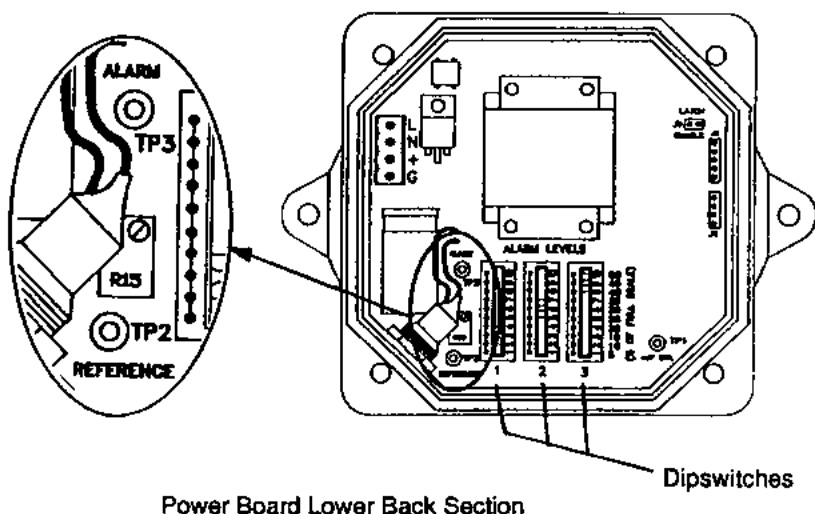
**TABLE 4: Oxygen Alarm Rats**

Dipswitch Setting	Equivalent PPM Setting of Full Scale
10	Enrichment 22.5%
9	Deficiency 21.0%
8	Deficiency 19.5%
7	Deficiency 18.0%
6	Deficiency 16.5%
5	Deficiency 15.0%
4	Deficiency 13.5%
3	Deficiency 12.0%
2	Deficiency 10.5%
1	Deficiency 9.5%



## A. SETTING ALARM SETPOINTS (continued)

FIGURE 11: SETTING ALARM LEVEL DIPSWITCHES:



2. The Trimpot at R15 determines the alarm levels for the dipswitches. It is factory set: **DO NOT ADJUST.**

**NOTE:** If the LCD and alarm points do not correspond, check the test points at TP3 (+ALARM) and TP2 (-REFERENCE) with your voltmeter. The reading should be 30 mV. To set the three dipswitch scales, adjust trimpot (R15) clockwise to increase or counterclockwise to decrease the mV reading.

**TOXIC ALARM RAT NOTE:** If the reading is 30 mV and the LCD reading does not correspond with the alarm points — the test gas is inaccurate or the ALARM RAT is not properly calibrated (re-calibrate).

**OXYGEN ALARM RAT NOTE:** If the reading is 45 mV and the LCD reading does not correspond with the alarm points — the test gas is inaccurate or the ALARM RAT is not properly calibrated (re-calibrate).

- Dipswitch 2: Set to alarm at a lower O<sub>2</sub> percentage or the same as dipswitch 1
- Dipswitch 3: **Normal Atmospheric Monitoring:** Must be set at 22.5%.

**Process Control Monitoring:** Can be set to any desired level as long as the enrichment level exceeds the Low Deficiency Alarm Setpoint.

## B. POWER FAIL ALARM

**NOTE:** If power fails, the system is de-energized providing you with an alarm contact on all 4 relays. The Power LED is lit green when the system is energized.

## C1. SIREN ALARM SETTINGS ( Alarm Setpoint and Audible)

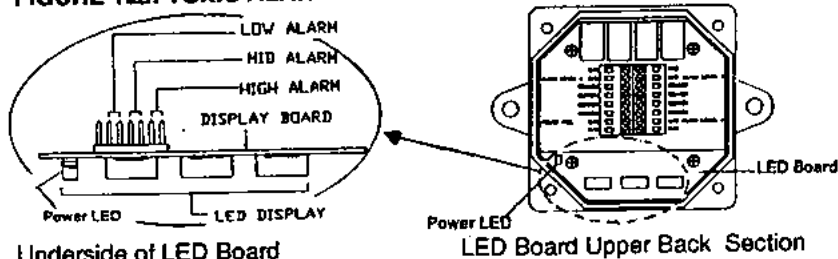
**GENERAL:** The siren is activated by either Low, Mid, or High Alarm by moving a jumper block located on the underside of the LED board (upper back section). The siren audible level is adjustable and it can be set to oscillate or not.

**NOTE:** It is factory-set on High Alarm to oscillate at 101 dB Pins are easily accessible under the board.

**TOXIC ALARM RAT: Siren Alarm Level Setting:**  
The siren is factory-set on the HIGH Alarm. To reset the Siren Alarm, insert the jumper block on the desired Alarm Point.

HIGH Alarm: Relay 3
MID Alarm: Relay 2
LOW Alarm: Relay 1

**FIGURE 12a: TOXIC ALARM RAT SIREN JUMPER BLOCK SETTING**



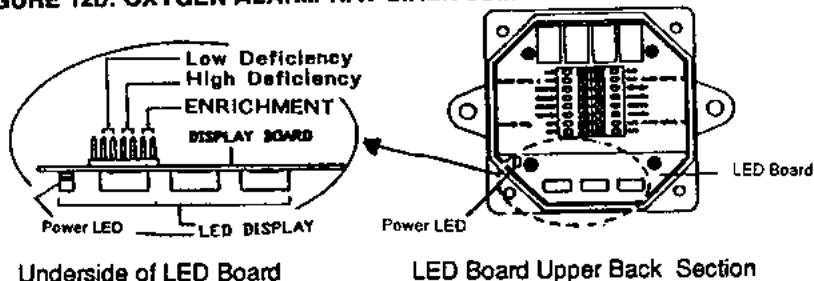
Underside of LED Board

LED Board Upper Back Section

**OXYGEN ALARM RAT:** The siren is factory-set on the HIGH Deficiency and Enrichment Alarms. To reset the Deficiency Siren alarm move the jumper block to LOW Deficiency Alarm.

Enrichment Alarm: Relay 3
High Deficiency: Relay 2
LOW Deficiency: Relay 1

**FIGURE 12b: OXYGEN ALARM RAT SIREN JUMPER BLOCK SETTING**



Underside of LED Board

LED Board Upper Back Section

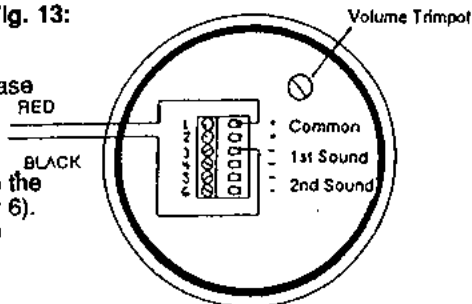
## C2. AUDIBLE LEVEL

- Unscrew the Siren.
- Adjust the trimpot counterclockwise to lower sound output, clockwise to increase sound level.

## C3. OSCILLATING FEATURE

- To disable the oscillating feature move the black wire to "Second Sound" (pin 5 or 6). Pins 3 or 4 ("First Sound") enable the Oscillating feature.

Fig. 13:



## RELAYS

**GENERAL:** There are four (4) 15 Amp SPDT relays. Numbers 1, 2 & 3 are Alarm Relays activated by the user-set alarm levels. Number 4 is the Power Fail Relay. With four wiring contacts for each relay, the wiring of the field interfaces can be configured to the site's requirements. The RELAY BOARD is located in the upper back section of the ALARM RAT. Two 1/2 in. n.p.t. access ports are provided for wiring the relays.

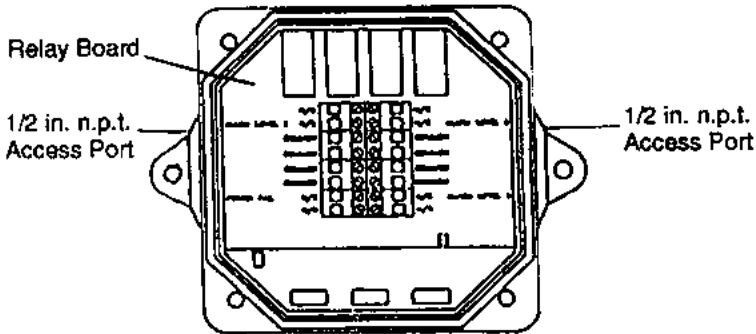
### USER-SELECTABLE CHOICES:

1. The number of outside options to activate — UP TO 4
2. Which relays will be activated by which alarm level and/or by the Power Fail Relay.
3. Select N/C or N/O.
4. Relay wiring configuration. The ALARM RAT has two commons per relay — select individual commons or one common for 2, 3 or all 4 relays.

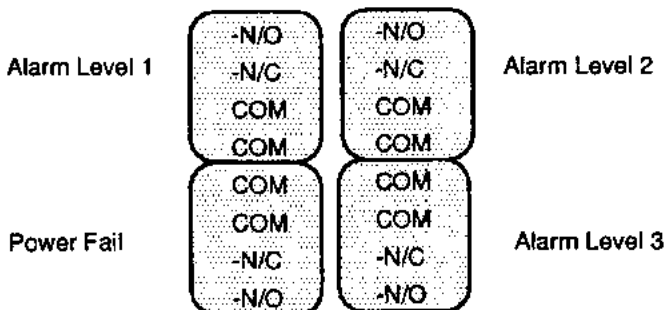
#### 1. Wiring the Relays:

Strip wire and connect to selected points. Fasten screws.

**FIGURE 14: RELAY BOARD (Upper/Back )**



**FIGURE 15 : EXAMPLE:** Each Relay has two commons.



## CALIBRATION MODE

### GENERAL:

Calibration Mode is triggered by:

- A. Power Up** - Eliminating False Alarms while circuitry stabilizes.
- B. CAL Door** - (Opening the hinged door switches Calibration Mode "ON". LCD MODELS: The Calibrate Flag (←) lights and the LCD readout will continue to show the input gas present.)

The ALARM RAT remains in Calibration Mode until:

- A. Automatic Reset** - In 5 minutes the ALARM RAT returns to Normal Operating Mode which ensures unit integrity. To re-activate Calibration Mode close and re-open the CAL Door.
  - B. Current Meter** - Calibration Mode is deactivated when the probes are inserted into the (+) and (-) test points.
- ❖ **4-20 mA ALARM RAT Models:** In Calibration Mode the 4-20 mA ALARM RAT, isolated from the system loop, sends a steady 4 mA current output (ZERO reading) to the Control System regardless of the gas present. The unit resets automatically (5 mins) into the system loop providing a reading at the controller of the gas present. When calibrating with a LCD readout CAL MODE prevents false alarms at the Controller.

## POWER-UP

1. Supply power to the ALARM RAT. Calibration Mode is activated.

**Warm-Up:** For most sensors allow a 30 second warm-up period (at 20°C). Warm-up periods may vary slightly with temperature.

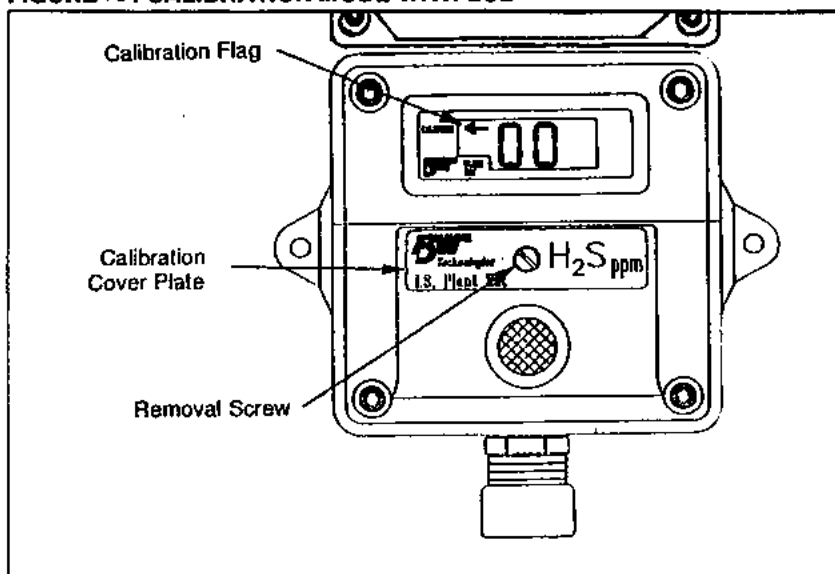
**EXCEPT:** Ammonia, Ethanol, Ethylene Oxide and Nitric Oxide: Allow 2 to 3 hours  
Hydrogen Chloride: Allow 24 to 48 hours.

**Power Supply:** To check ALARM RATS without the LCD module, simply open Calibration Door (turn thumbscrew counter clockwise) and insert a current meter. A normal reading will be between 4 to 20 mA depending on the sensor and amount of the target gas present.

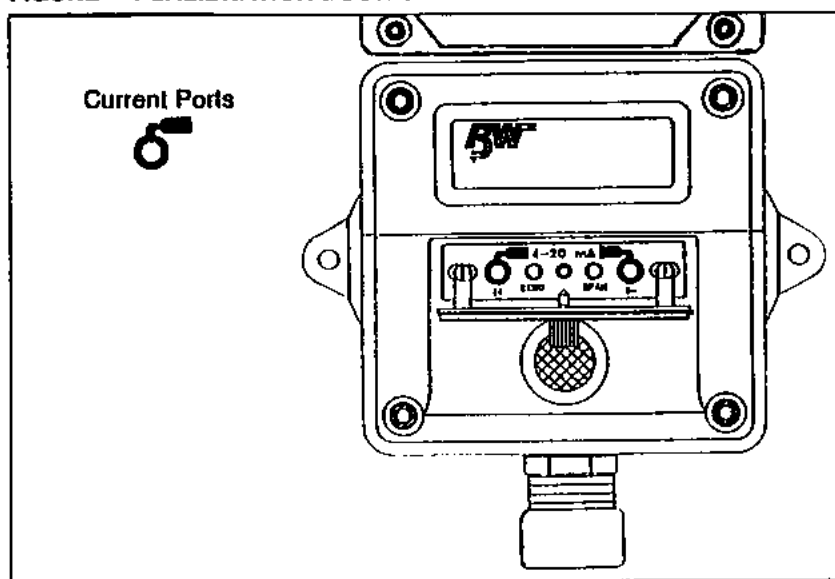
ALARM RATS with the LCD Module - the display will be lit, the monitor will indicate it is in calibration mode with a lit arrow flag, the monitor will automatically go to Normal Operating Mode in 5 minutes.

2. The ALARM RAT is fully tested and calibrated at the factory. Check the ZERO setting and apply Gas to verify system parameters. Recalibrate if there is a variance.

**FIGURE 16: CALIBRATION MODE WITH LCD**



**FIGURE 17: CALIBRATION DOOR OPEN**



## CALIBRATION - GENERAL INSTRUCTIONS

**GENERAL:** Calibration is a simple straight-forward one-man procedure. For maximum accuracy, calibrate with a mixture in the range where most measurements will be made. Where this is not possible, a mixture towards the top of the sensor range should be chosen. Do not use Calibration Gas exceeding the sensor range, as calibration may be inaccurate and the sensor damaged. Table 9 page 28 gives concentrations and flow rates providing optimum performance and a minimum gas hazard. For most purposes a 2 minute exposure is satisfactory.

**RECOMMEND:** Use high quality calibration gas. Calibration will ONLY be as accurate as the gas used. Check expiry dates. Apply Zero and/or Span gas for approximately 2 minutes.

**Calibration Tubing:** Use Teflon tubing

1. Insert the calibration plug (provided) and open the hinged CAL Door. Remove both blanking plugs and attach Calibration tubing to one access. Ensure the other access is open for gas flow.

### TO SET ZERO:

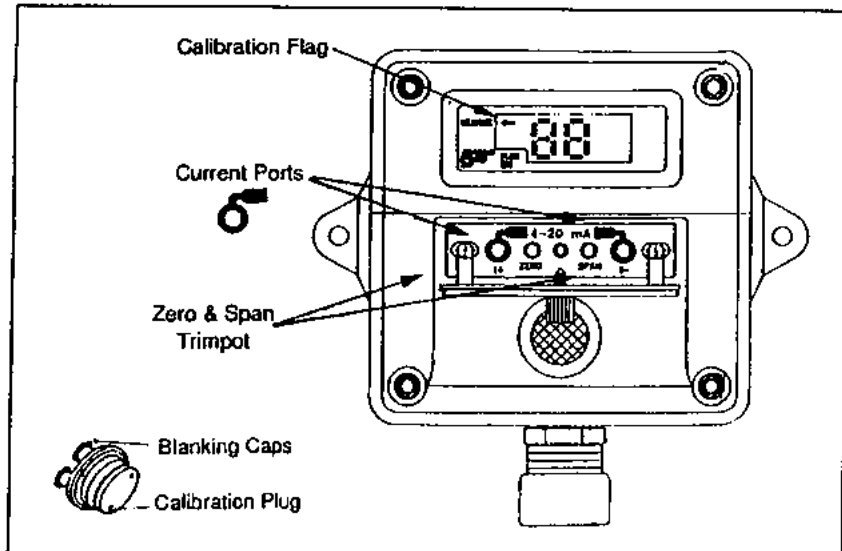
- a) **TOXIC SENSORS:** In air, clear of interfering gases, simply set the ZERO. In the case of background gas use "Zero Gas" (Pure Air) or 100% Nitrogen ( $N_2$ ) to set zero.
- b) **OXYGEN SENSOR:** The Zero drift is negligible over the life of the oxygen sensor. If zeroing is required, 100% Nitrogen ( $N_2$ ) MUST be used.

**TO SET SPAN:** Apply a known concentration of quality calibration gas. Proceed to 2A or 2B.

**Sample Tubing:** (Separation Kit) Teflon Tubing is directly attached to the Coupler (supplied) for remote application of gas. The time gas has to be applied will vary depending on length of tubing (max. 250 feet).

\* Calibration coupler diameter 0.1975 in (4.92 mm).

**FIGURE 18: CALIBRATE**



## A. CALIBRATE WITH BACKLIT LCD DISPLAY

**GENERAL:** The calibration Flag (Arrow) is lit when the Alarm Rat is in Calibration Mode. The monitor's display will continue to show the level of input gas.

- Simply set ZERO and SPAN.

**ZERO:** Adjust the Zero trimpot to read "00:00" (ppm or %) on the LCD display.

**SPAN:** Verify that the arrow is still lit. Adjust Span until the LCD reads the known concentration of test gas.

## B. CALIBRATE WITH CURRENT METER

**GENERAL:** Calibration Mode is de-activated when using a current meter. A reading of 4 mA represents no gas (00.0) and 20 mA represents full scale (ALARM RAT Measuring Range).

- Insert the test probes into the + and - ports.

**ZERO:** Adjust the Zero trimpot until the Current Meter reads 4 mA.

**SPAN:** Apply gas and adjust the Span trimpot until the current meter reading corresponds to the correct value. The current is equal to the value calculated by the following equation.

$$[(C_c/C_f) \times 16 \text{ mA}] + 4 \text{ mA} = \text{ammeter reading (mA)}$$

Where  $C_c$  = Concentration of calibration/test gas

$C_f$  = Full scale (Measuring Range)

**EXAMPLE:** The calculation is as follows with 28 ppm Test Gas and a H<sub>2</sub>S ALARM RAT with a Measuring range of 0-100 ppm.

$$[(28/100) \times 16 \text{ mA}] + 4 \text{ mA} = 8.48 \text{ mA}$$

**TABLE 5: SAMPLE READINGS ( $C_f$  = Full Scale)**

$C_f$	Gas Concentration					Current Meter Reading					$C_f$
	0-10	0-25	0-50	0-100	0-1000	0-10	0-25	0-50	0-100	1-1000	
m A	0	0	0	0	0	4.00	4.00	4.00	4.00	4.00	m A
	0.5	2.5	5	5	50	4.80	5.60	5.60	4.80	4.80	
	1	5	10	10	100	5.60	7.20	7.20	5.60	5.60	
	1.5	10	15	15	150	6.40	10.40	8.80	6.40	6.40	
	2	15	20	20	200	7.20	13.46	10.40	7.20	7.20	
	3	20	30	30	300	8.80	16.80	13.60	8.80	8.80	
	5	25	50	50	500	12.00	20.00	20.00	12.00	12.00	
	10	-	-	100	1000	20.00	-	-	20.00	20.00	

- Turn OFF gas, remove the Calibration Plug, close CAL Door and tighten thumb screw to prevent dust and moisture invasion.

❖ 4-20 mA ALARM RATS Models: When Calibrating with a current meter the Controller will be affected.

**SPECIAL NOTE:** Chlorine Dioxide (ClO<sub>2</sub>) Calibration Procedure: It is recommended that a Cl<sub>2</sub> generator be used to calibrate a chlorine dioxide instrument. Chlorine may be used as a surrogate gas for occasional sensor verification.

Instrument  
ISPR2-DV#

Sensitivity to ClO<sub>2</sub>

uA/ppm

3.10 ± 25%

Sensitivity to Cl<sub>2</sub>

uA/ppm

1.25 ± 0.25%

ClO<sub>2</sub> = Equivalent = Cl<sub>2</sub> Application

⚠ Therefore 5 ppm Cl<sub>2</sub> = 2.02 ppm ClO<sub>2</sub>

**GENERAL:** Designed for cost-effective operation and minimal maintenance, the ALARM RAT provides continuous monitoring of hazardous gas situations. The Alarm Rat provides superior stable performance and cost effective operation.

### **1. NORMAL OPERATION**

- (a) ON Indicator: The green "POWER" LED is lit when the unit is powered.

### **2. ALARM CONDITION:**

In the event of a hazardous gas alarm:

NOTE: 1. The Alarm Rat is designed to be set by the user for up to three alarm levels.

VISUAL 2. The Level 1, 2 or 3 Alarm LED will be triggered.

RELAY 3. Relay 1, 2 or 3 will be triggered.

4. The relays automatically return to normal operating mode when the alarm condition no longer exists.

SIREN 5. Will trigger at the alarm level it is set at.

### **3. POWER FAILURE:**

The ALARM RAT enters Calibration Mode when power is restored, preventing false system start-up alarms. With the Automatic Reset feature you do not have to reset the monitor.

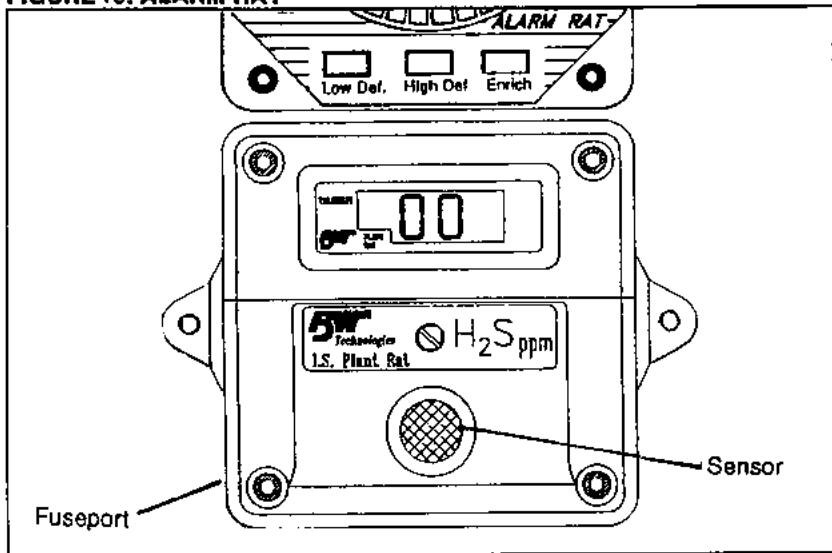
- (a) If the power fails, the system will de-energize providing you with an alarm contact on all 4 relays. The Green LED will go out.

MODELS AP-PR(x)(#)-2D (With Display) The large 3.5 digit backlit LCD readout provides a highly visible continuous readout of the target gas present.

MODELS AP-PR(x)(#)-3D (With 4-20mA output) Provides a continuous readout at the Controller.



**FIGURE 19: ALARM RAT**



## MAINTENANCE

**GENERAL:** The ALARM RAT is designed to provide years of service with only regular care and minimal maintenance. With all sensitive electronics, encapsulated on modular plug-in boards, they are protected from corrosive contaminants, water and tampering.

1. At regular intervals visually inspect, test and calibrate with gas to ensure optimum operating conditions. See calibration Table 9 page 28 for recommended calibration periods.
2. An accurate maintenance log of all maintenance, calibration and occurrences must be kept for the proper service of this product.

**FUSE ACCESS PORT:** There is a 0.5 Amp fuse to protect the circuitry from power fluctuations. In the event of power loss check the fuse. Fuse Access Port is on the lower right hand corner of lower metal case.

**SENSOR SCREENS:** Each unit is equipped with a replaceable, washable screen. The sensor's built-in screen is washable as well. If the screen is plugged with dust or particulates, simply replace or clean Screen(s) with a soft clean brush using mild soap and warm clean water.

**CAUTION:** Do not expose the Sensor to high pressure water spray. Although the sensors have a high degree of poison resistance to common vapors and gases, they should not be exposed to solvents (i.e. paint fumes) and organic solvents.

**SENSOR STORAGE:** Storage Life: 3 months in Container provided. Replacement sensors should be stored in their containers in a refrigerator or in a clean area between 0°C (32°F) and 20°C (68°F). Some sensors are equipped with a shorting link across two pins - leave this intact until use.

## SERVICE TROUBLESHOOTING CHART

GENERAL: The chart is intended as a guide to correct problems in the field. Prior to reaching any conclusion that a problem exists. Check:

- A. Power connections are correct and terminal blocks fully seated on the boards.
- B. The 4-pin Terminal (Power) block is fully seated on the board

TABLE 6

FAULT	PROBABLE CAUSE	SOLUTION
<b>ALL ALARM RATS</b>		
No response to gas	Sensor screen dirty	Clean
	Faulty or expired Sensor	Replace Sensor
Apparent false alarm	Puff of Gas	Monitor is functioning
	Not properly calibrated	Check test gas, Recalibrate
	Solvent Fumes or interference from high levels of related gas	Remove the source
No Display or No reading on Current Meter	Fuse blown	Replace fuse
	No power to the unit	Supply power
	Terminal block not connected	Connect terminal block to board
	Incorrect power connections	Check power connections
Reading Erratic	Display board fault	Replace display board
	Faulty sensor	Replace sensor
Zero & Span do not have enough range	Sensor expired	Replace sensor
	Sensor board fault	Change sensor board
	Display board fault	Replace display board
Radio interference	Review grounding	Use shielded cable
Erratic output of NH <sub>3</sub> , HCl, NO, C <sub>2</sub> H <sub>4</sub> , or C <sub>2</sub> H <sub>5</sub> OH	Power interrupted or Sensor replaced	Refer to Power Up Notes
<b>SENSOR SEPARATION KIT</b>		
Water in product	Mounted horizontally	Install drip loops
<b>4-20 mA Alarm Rat</b>		
Signal does not reach Controller	Maximum distance reached	Verify loop resistance &/or move add power supply
	Controller does not operate	Review Controller relay ratings and trouble shoot controller
Zero & Span do not have enough range	Controller not adjusted correctly	Reconfigure Controller setting
	Controller range set wrong Shields not terminated	Reconfigure controller settings Ground both ALARM RAT & Controller

If a problem still persists call:

BW Toll Free at 1-800-663-6164 or 1-403-248-9226

Fax 1-403-273-3708

## SERVICING THE ALARM RAT

**GENERAL:** The electronics are all protected on encapsulated plug-in board modules for easy field service and replacement.

### SENSOR REPLACEMENT

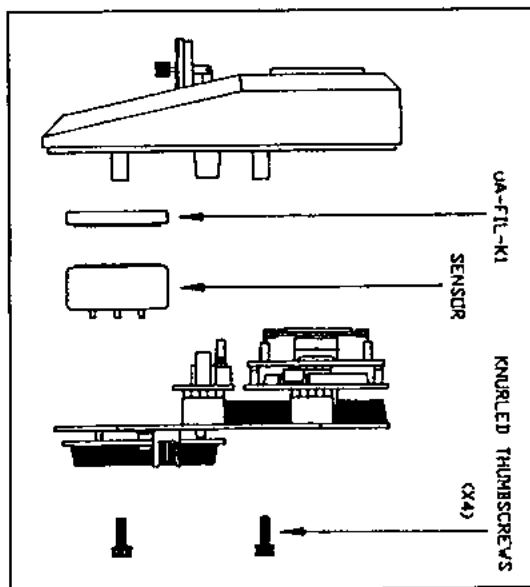
1. Remove the main board from the faceplate of the ALARM RAT (or Separation Kit). Unplug the supply terminal block
2. Unscrew (4 screws) and lift the board array out.
3. Plug in the new socket mounted gas specific sensor into the main board. Ensure it is fully seated.
4. Replace the board array and the 4 screws, do not over tighten the screws placing strain on the board.
5. Plug-in the line terminal block restoring power to the ALARM RAT.
6. Follow START-UP and CALIBRATION PROCEDURES. Calibrate the new sensor.

**CAUTION:** Electrochemical sensors contain acid and should be disposed of according to local regulation and codes.

**FIGURE 20: ALARM RAT LOWER SENSOR SCREEN REPLACEMENT**

### SENSOR SCREEN REPLACEMENT:

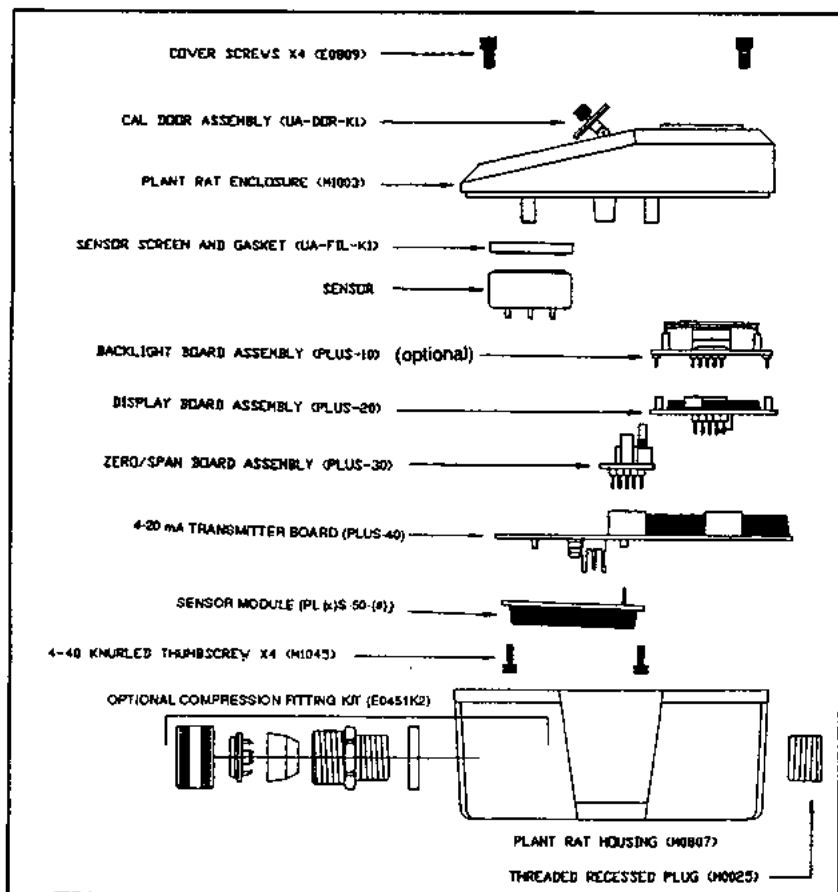
The replaceable UA-FIL-K1 (teflon sensor screen c/w gasket) is washable, but if it becomes torn or plugged follow steps 1 thru 2 above to replace. Ensure the screen side faces the sensor before re-assembly.



**TABLE 7: ALARM RAT LOWER FRONT SECTION All Models**

#	QTY	DESCRIPTION RATING/TOL.	PART #
1	4	COVER SCREWS #10-24 x 3/8" ALLEN KEY Cap	M0809
2	1	CAL DOOR ASSEMBLY	UA-DOR-K1
3	1	PLANT RAT ENCLOSURE	M1003
4	1	SENSOR SCREEN AND GASKET	UA-FIL-K1
5	1	SENSOR	Page 28
6	1	4 PIN TERMINAL BLOCK CONNECTOR - FEMALE	E0817S
7	1	PLUG-IN BACKLIGHT BOARD ASSEMBLY	PLUS-10
8	1	PLUG-IN DISPLAY BOARD ASSEMBLY (Optional)	PLUS-20
9	1	PLUG-IN ZERO/SPAN BOARD ASSEMBLY	PLUS-30
10	1	PLUG-IN 4-20 mA TRANSMITTER BOARD	PLUS-40
11	1	PLUG-IN SENSOR MODULE	PL(x)S-50-(#)
12	4	4-40 KNURLED THUMBSCREWS	M1045
13	1	O-RING CASE SEAL	M0108
14	1	COMPRESSION FITTING KIT (Optional)	E0451K2
15	1	1/2" THREADED RECESSED PLUG	M0025

**FIG. 21: ALARM RAT LOWER FRONT SECTION  
All Models**



**TABLE 8: SENSOR SEPARATION KIT ASSEMBLY PARTS**  
**Model: UA-SEP-K2**

#	QTY	DESCRIPTION RATING/VOL.	PART #
1	4	COVER SCREWS #10-24 x 3/8 " ALLEN KEY Cap	M0809
2	1	GAS SPECIFIC LABEL	Specify
3	1	PLANT RAT ENCLOSURE	M1003
4	1	SENSOR PLUG AND GASKET	M1063K
5	1	REMOTE SENSOR ADAPTOR BOARD	PRUS-40
6	1	TRANSMITTER REMOTE SENSOR ADAPTOR	PRUS-50
7	4	4-40 KNURLED MOUNT THUMBSCREWS	M1055
8	1	O-RING CASE SEAL	M0108
9	1	COMPRESSION FITTING KIT (optional)	E0451K
10	1	BASE HOUSING	M0807

**FIG. 22: SENSOR SEPARATION KIT ASSEMBLY DRAWING**  
**Model: UA-SEP-K2**

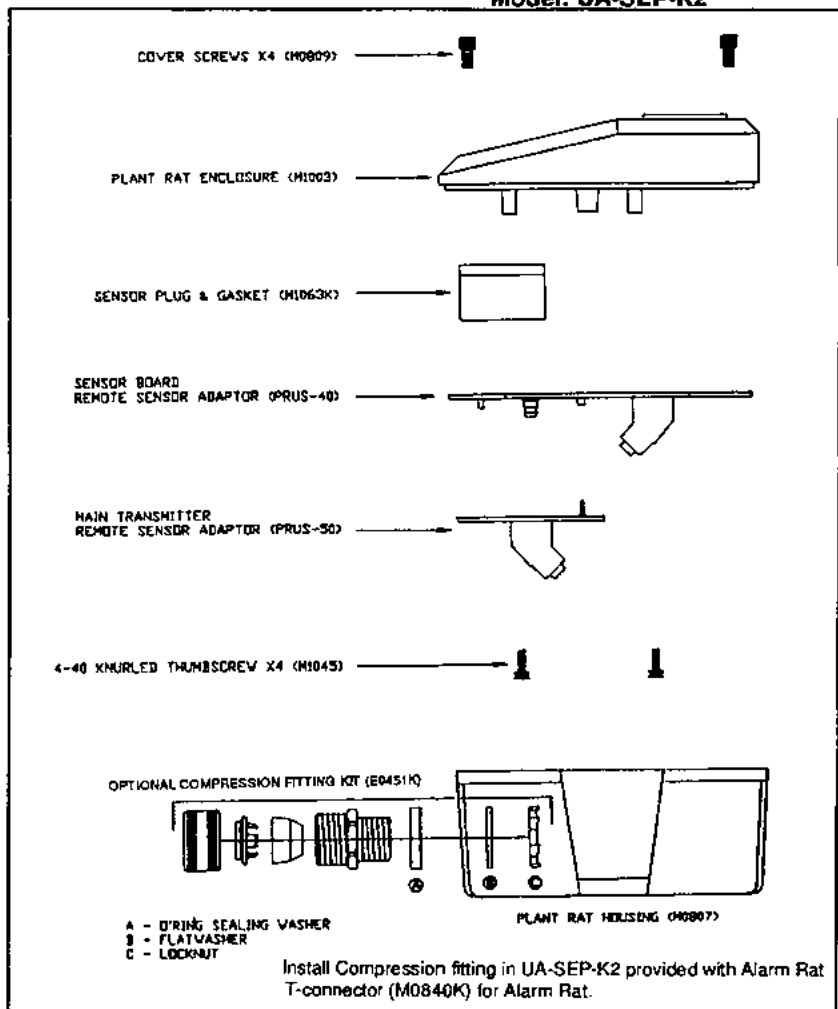


TABLE 9:

OPERATING & CALIBRATION SPECIFICATIONS	
S P E C I F I C A T I O N S	H <sub>2</sub> S ppm
	Primary Sensitivity
	Sensor Max. Range
	Response (Secs. @T <sub>50</sub> )
	Measuring Range
	Resolution @ 20 °C
	Detectable Accuracy @ 20°C
	Repeatability % of signal
	Temperature °C
	°F
	Long-Term Drift Zero:
	(% signal loss/month) Span:
	Warranty
	Calibration:
Recommended Period	
Flow rate: mls per MIN.	
at -ppm or %	
Plug in Sensor #	

TABLE 10:

CROSS SENSITIVITY		
HYDROGEN SULFIDE		
Gas	Conc	Response
CO	300 ppm	≤6
SO <sub>2</sub>	5 ppm	<1
NO	35 ppm	0
NO <sub>2</sub>	5 ppm	≈-1
Cl <sub>2</sub>	1 ppm	≈0.1
H <sub>2</sub>	100 ppm	≤0.2
HCN	10 ppm	0
HCl	5 ppm	0
C <sub>2</sub> H <sub>4</sub>	100 ppm	0

LCD increments 1ppm

Performance data is based on conditions at 20 °C, 50% RH & 1013 mBar.  
**Note 1:** See Manual cover or Check Sensor Module label if changed.

**CROSS SENSITIVITY:**

Sensors may exhibit a response to gases other than the target gas. Toxic Sensors have been tested with a number of common cross-interfering gases. The table above shows the typical response to be expected when the sensor is exposed to a given test gas concentration relevant to safety (e.g. TLV (Threshold Limit Values)).

**Note:** All Sensors show no response to CH<sub>4</sub> or CO<sub>2</sub> and with the exception of NH<sub>3</sub> all Sensors show no response to NH<sub>3</sub>.

**SENSOR SPECIFICATIONS:**

**SENSOR TYPES:** Plug-in sensors. Gas by diffusion.

**TOXIC:** 3 Electrode Gas Specific Stabilized Electrochemical cells  
 EXCEPT Ammonia: 4 Electrode Gas Specific Electrochemical

**OXYGEN:** 2 Electrode Electrochemical 2 Year Cell

The sensors combine fuel cell technology with a diffusion limiting barrier and a high reserve of activity that result in stable performance.

A. Position Sensitivity - None

B. Operating Humidity - 15 to 90% non-condensing

C. Operating Pressure Range - 900-1100 mBar (Atmospheric +/- 10%)

## **ALARM RAT INSTRUMENT SPECIFICATIONS** **All Models**

1. **ALARM RAT MONITOR:** Sensing Unit complete with 3-electrode, stabilized electrochemical sensor  
Recommended every 90 days (for most gases)
2. **CALIBRATION**  
Zero and Span: Non-interactive  
Hinged Door Switch: Open, sets Calibration Mode  
Calibration Mode: Isolates Monitor from the current loop  
Automatic Reset: Timed (5 min) automatic reset to Normal Operating Mode in the current loop.
3. **ALARMS**  
Three (3) user-settable Alarm points  
Low, Medium and High  
**Visual:** 4 color-coded LED Indicators for  
1. Power/ON indicator — Green  
2. Low Alarm — Yellow  
3. Mid Alarm — Red  
4. High Alarm — Flashing Red  
**Audible:** High Output, fast pulse electronic siren  
**Output:** 101 dB at 1 meter (3 feet)  
User-settable: 1. Volume  
2. Oscillating Feature
4. **RELAYS:** Four (4) for user supplied interfaces  
**Type:** Four (4) SPDT  
User-configurable — as Low, Mid, High and Fail-safe Alarms
5. **ELECTRONIC SPECIFICATIONS**  
**Supply Voltage:** 110 VAC, 24 DC (220 VAC optional)  
**Current Draw:** 0.5 Amp  
**Output Signal:** Zero: Steady 4 mA  
Span: 4 mA to 20 mA  
Auxiliary: 0 millivolt to 60 millivolt Signal  
**Relay Output:** 15 Amps per relay  
**Fuse:** 0.5 Amp
6. **PHYSICAL SPECIFICATIONS**  
**Size (LxWxH):** 9.75 x 4.75 x 7.6 in (24.75 x 7.6 x 12.7 cm)  
**Weight:** 3.25 lbs. (1.5 kg)  
**Receptacles:** Two 1/2 in. n.p.t. access ports  
**Power Access #1:** With compression fitting for installation  
**Relay Access #2 & #3:** With Blanking Plugs for field interfaces  
**Enclosure:** RFI/EMI shielded Weatherproof  
**Front:** Impact-resistant ABS with Celstran S  
**Back:** Chromate Coated, aluminum silicon alloy
7. **DISPLAY (optional)** **Models:** AR-PR(x#)-2D Large 3.5 digit backlit LCD  
**Readout**  
**Resolution:** 0.01 ppm or % (0-19.99 ppm or %) reading  
0.1 ppm or % (0-199.9 ppm or %) reading  
1.0 ppm or % (0-1999 ppm or %) reading  
**Calibration Indicator:** Lit Arrow Flag
8. **◆ 4-20 mA Output (Optional)** See Models AR-PR(x#)-3(N or D)
9. **Sensor Separation Kit UA-SEP-K2:** Weatherproof RFI/EMI Protected  
**Size (LxWxH):** 4.7 x 4.7 x 3.1 in (12 x12x7.5 cm)  
**Weight:** 1.65 lbs (750 g)  
**Receptacles:** One 1/2 in n.p.t. access port  
**Access:** 1/2 in n.p.t. wiring port  
**Enclosure:** See Alarm Rat
10. **Duct Mont Remote Sensor UA-DUC-K2:** Weatherproof RFI/EMI Protect  
**Size (LxWxH):** 4 x 4.875 x 3.0625 in (15.2 x12.38x7.77 cm)  
**Weight:** 1.12 lbs (510 g)  
**Receptacles:** One 1/2 in n.p.t. access port  
**Access #1:** Electrical: Wiring Port  
**Access #2:** Calibration: Calibration Coupler 0.1975 in ( 4.92 mm) diameter  
**Enclosure:** See Alarm Rat

NOTES:



**The ALARM RAT is complete with no hidden extras.**

**The ALARM RAT single Point Alarm Monitor Comes Complete with:**

**Models: AR-PR(x#)-2N** Electrochemical Sensor  
4 SPDT Relays normally energized  
(3 Alarm Relays and 1 Fail Relay)  
101 dB Audible Alarm  
Three User Selectable Alarm Points  
LED Alarm Indicators  
Three Access Ports c/w 2 plugs  
Built-in Pre-drilled Mounting Flanges  
Accessories Include:  
Manual  
Calibration Plug  
Calibration Screwdriver

**Models: AR-PR(x#)-2D** Complete with Backlit 3.5 LCD Display

**Models: AR-PR(x#)-3N(or D)** Complete with 4-20 mA output signal

**Models:**

**Kits Available:** Note: (x) = BW Gas Code, (#) = Measuring Range

UA-SEP-K2 Sensor Separation Kit

UA-DUC-K2 Duct Mount Remote Sensor Kit

UA-SEP-F5(x#) Flue vessel Sensor separation unit ( Note must be  
be ordered with the Alarm Rat)

PL(x)S-50-(#) Measuring Range Plug-in Module

PL(x)S-50-(#)K Sensor Change Kit

Note: The Backlit LCD Readout Kit can be added at any time, as well the  
Measuring Range or the gas monitored for, can be changed with the  
above plug-in modules in the field.

**Accessories Available:**

SG-CAL-1 Splash Guard/Calibration Cup

PB-CAL-1 Process Baffle

UA-CAL-4 Remote 4 Channel Calibration Center

M0840K T-connector c/w nipple & washer

E0451K2 Compression Fitting for Alarm Rat

E0451K Compression Fitting Kit for UA-SEP-K2

◆ **4-20 mA ALARM RAT BW Controllers:** Specify type, number of channels  
required, and 120 VAC, 230 VAC or 24 VDC Operation.

Note: With a directly linear output the Alarm Rat (Models:  
AR-PR(x#)-3) monitors are compatible with most 4-20 mA  
systems.

\* The ALARM RAT Single Point Monitors combine performance with  
leading-edge Sensing and Electronic Technology. With the built-in Features  
and User-Selectable choices (Alarms, Relays, etc.), the ALARM RAT has  
the versatility to provide the solutions to today's problems and the flexibility  
to provide the answers tomorrow.

## **SPECIAL WARNINGS**

Through engineering, design and testing as well as manufacturing techniques and rigid quality control, BW Technologies supplies the finest gas detection instrumentation available. The user, although, must recognize responsibility for maintaining the instrumentation in operational condition ensuring proper operation and long term use.

The ALARM RAT is designed to provide optimum performance and low maintenance.

1. BW recommends a calibration check on a regular schedule, one at least every 90 days.
2. Do not expose the units to electrical shock and/or expose the units to severe mechanical shock.
3. Do not attach system components that do not meet specified criteria, such as alarms, barriers, cabling and/or control systems.
4. Do not attempt to disassemble, adjust or service the units unless instructions are contained in the manual for that procedure and/or that part is listed as a replaceable part. Use only BW Alarm Rat replacement parts.
5. Do not allow liquids to condense and/or use high power sprays on the instruments.
6. BW Technologies gas detection instruments are primarily SAFETY devices for the protection of personnel and facilities and must be always "ready". With proper calibration and maintenance the Alarm Rat will provide monitoring of hazardous area. The user must assume all liability for misuse of BW Technologies gas detection instruments.
7. The instruments two year warranty will be voided if customer personnel or third parties damage the instrumentation during repair attempts.

Note: Because BW Technologies is constantly developing and improving its product line, we reserve the right to change specifications without notice.

## **BW Technologies Limited WARRANTY**

BW Technologies Ltd. Warrants all sensors, electronics and mechanical components to be free of defects in materials and workmanship under normal use and service for a period of two (2) years from the date of purchase. Gas detection elements which have been poisoned by contaminants are not included in this warranty. Warranty service is available to the original purchaser only. BW will repair or replace the product without charge for parts and labor.

All warranties hereunder are contingent upon the product being placed in normal use and service in the application for which it was intended. This warranty provides only the benefits specified and does not cover defects or repairs needed as a result of acts beyond the control of BW Technologies Ltd. Including but not limited to: any liability arising from auxiliary interfaced equipment, consequential damage, damage by accident, negligence, unauthorized service, tampering or failure to operate in accordance with procedures outlined in this manual; or acts of God. BW Technologies liability under no circumstances will exceed the price paid for the goods claimed to be defective.

This warranty expresses the full extent of BW Technologies liability, and makes no other warranties or guarantees of any kind whatsoever, expressed or implied. This warranty does not cover costs of removal, re-installation or replacement nor contingent expenses of any nature. In all cases this warranty is limited to the cost of the equipment.

Final determination of the nature of responsibility for defective or damaged equipment will be made by BW personnel. BW's responsibility under the above warranty shall be limited to the repair or replacement at BW's option, at no cost to the purchaser for parts or labor, or any product which fails during the warranty period provided that the purchaser has promptly reported such failure to BW in writing and BW, upon inspection, found such product to be defective.

To obtain service under this warranty, the purchaser must obtain a Return Goods Authorization (RGA) number and shipping instructions for the return of any item under this warranty provision and compliance with such instructions shall be a condition of this warranty. This product must be properly packed and shipped to BW or an Authorized Service Representative. BW shall not be liable for shipping charges, nor for damage or loss resulting from the negligent or intentional acts of the shipper or his contract affiliates.

**NOTE:** Any substitution of or any tampering with components without the written permission of BW Technologies Ltd., will result in cancellation of this warranty.

**PLEASE READ THE ENTIRE OPERATION MANUAL AND ALL PRODUCT LABELS AND FOLLOW THE INSTRUCTIONS AND RECOMMENDATIONS CONTAINED THEREIN. A FULL UNDERSTANDING OF THE CONTENTS OF THE MANUAL IS REQUIRED IN ORDER TO ENSURE PROPER INSTALLATION, USE AND FUNCTIONING OF THE EQUIPMENT.**

### **MODIFICATION AND SUBSTITUTION**

Due to ongoing development program, BW Technologies Ltd., reserves the right to modify the design of any substitute components in any of its products without prior notice. All changes are at the sole discretion of BW Technologies Ltd. Who shall not be liable for any costs which may be incurred as a result of such modifications or substitutions.

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