



# ATI-5100

## Leak/Level Monitor

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### INSTRUCTIONS

#### Installation, Operation & Maintenance of the ATI-5100 Leak/Level Monitor

(formerly AMC-5100)



### IMPORTANT

Please read these installation and operating instructions completely and carefully before starting. Failure to do so will void warranty.

filename:  
ATI.MAN.5100

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**A.T.Monitors**, a division of Armstrong Technologies Inc.  
14 Birch Drive, Kemptonville, Ontario, K0G 1J0, CANADA  
Tel: 613-258-5225 • Fax: 613-258-2698  
E-mail: [info@atmonitors.com](mailto:info@atmonitors.com) • Internet: [www.atmonitors.com](http://www.atmonitors.com)

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## **1 - WARRANTY**

The ATI-5100 Leak/Level Monitor is warranted against defects in material and workmanship for a period of one (1) year from date of shipment. During the warranty period, *Armstrong Technologies Inc. (ATI)* will repair or replace components that prove to be defective in the opinion of ATI. ATI is not liable for auxiliary interfaced equipment, or consequential damage. This warranty shall not apply to any product, which has been modified in any way, which has been repaired by any other party other than a qualified technician or authorized ATI representative, or when such failure is due to misuse or conditions of use.

### **1.1 - LIABILITY**

All ATI products must be installed and maintained according to instructions. Only qualified technicians should install and maintain the equipment. ATI shall have no liability arising from auxiliary interfaced equipment, for consequential damage, or the installation and operation of this equipment. ATI shall have no liability for labour or freight costs, or any other costs or charges in excess of the amount of the invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SPECIFICALLY THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.

### **1.2 - MODIFICATIONS AND SUBSTITUTIONS**

Due to an ongoing development program, ATI reserves the right to substitute components and change specifications at any time without incurring any obligations.

### **1.3 - PRODUCT RETURN**

All products returned for warranty service will be by prepaid freight and they will only be accepted with an R.G.A. number issued by ATI. All products returned to the client will be freight collect.

### **WARNING**

<p><b>USING ELECTRICALLY OPERATED EQUIPMENT NEAR GASOLINE OR OTHER COMBUSTIBLE VAPOURS MAY RESULT IN FIRE OR EXPLOSION, CAUSING PERSONAL INJURY AND PROPERTY DAMAGE. CHECK TO ASSURE THE WORKING AREA IS FREE FROM SUCH HAZARDS DURING INSTALLATION OR WHEN PERFORMING MAINTENANCE, AND USE PROPER PRECAUTIONS.</b></p>
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## 3 - PRODUCT DESCRIPTION

### 3.1 - GENERAL DESCRIPTION

The ATI-5100 is a multi-sensor liquid and vapour detection system designed to continuously monitor for any water, liquid petroleum, and vapour leaks. The system can monitor twelve zones of liquid sensors in any combination, and four vapour sensor locations. The monitor features the following, as shown in FIGURES 1 and 2:

### 3.2 - EXTERNAL FEATURES

- |                            |   |
|----------------------------|---|
| 1- MOUNTING HOLES          | For the convenience of mounting the monitor on any flat surface. There are 6 holes (3 per side) internally located in the narrow sections on the left and right.  |
| 2- CLEAR FRONT COVER       | To protect the front panel and the alarm reset switch.  |
| 3- KEY LOCK                | To secure the front cover, restricting access to the alarm reset switch.  |
| 4- POWER ON INDICATOR      | Power is indicated by a green LED.  |
| 5- BATTERY INDICATOR       | With backup batteries installed, a low voltage is indicated by a yellow LED.  |
| 6- LIQUID ALARM INDICATORS | Liquid leaks, levels and/or vacuum loss are indicated by 12 red LEDs.   |
| 7- VAPOUR ALARM INDICATORS | Presence of petroleum vapour is indicated by 4 red LEDs. Can also be used with our liquid sensors.  |
| 8- AUDIO ALARM INDICATOR   | The buzzer (internal) will activate when any alarm condition is detected. It will also beep at 1 minute intervals when the low battery indicator is on.   |
| 9- ACKNOWLEDGE SWITCH      | The acknowledge switch is provided to silence the buzzer. After a 2 hour delay, the buzzer will reactivate.   |
| 10- RESET SWITCH           | The reset switch (on front panel) will to turn off all alarms, once the alarm condition has been resolved.  |
| 11- TERMINAL CHAMBER       | All the connections are made to terminal blocks, located in the bottom section of the enclosure, behind a removable cover.  |
| 12- ENCLOSURE LATCHES      | Secure both halves and clear cover of the enclosure. To gain access to the jumpers, battery(s) and fuses, simply pull out the latches on the right side and unhook them to open the clear cover or enclosure. |

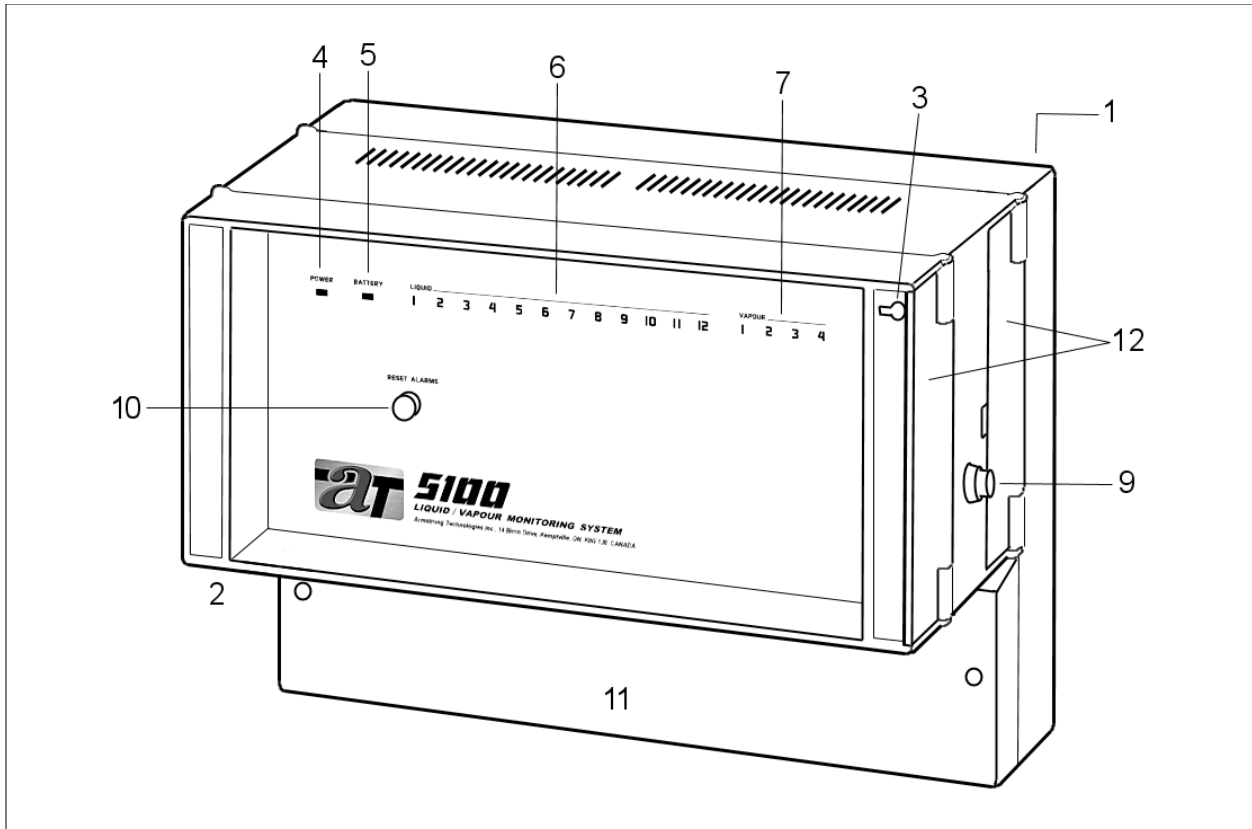


FIGURE 1: External features of the ATI-5100 monitor.

### 3.3- INTERNAL FEATURES

- |                                   |   |
|-----------------------------------|---|
| 13- POWER TERMINAL BLOCK          | For line voltage connections (120 VAC, 60 Hz).  |
| 14- POWER SWITCHES                | Main AC power is controlled by 2 knife switches on the power terminal block.  |
| 15- FUSE HOLDERS                  | Mounted on the power supply p.c.board. (OPEN power switches to replace fuses)   |
| 16- TRANSFORMER                   | A class II, step down transformer runs the internal circuitry at low voltages.  |
| 17- POWER OUTPUT TERMINAL BLOCK   | These terminals supply the 12VDC power to all other circuit boards.   |
| 18- BACKUP BATTERY TERMINAL BLOCK | These terminals keep the battery backup system charged, and allow the batteries to operate the unit when the main AC power fails. |

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19- VAPOUR SENSOR TERMINAL BLOCK	For connection of up to four ATI-F4000 remote vapour sensor modules. Can also be used with the ATI-5020 explosion-proof probes of one to four liquid level detection points. <b>NOTE: Can also be used with any of our other liquid sensors in non-hazardous areas only.</b>
20- VAPOUR RELAY CONTACT JUMPERS	There are four SPDT relays which work with vapour alarms. The relays can be jumper configured for NC or NO contacts.
21- VAPOUR RELAY CONTACT TERMINAL BLOCK	For connection of external devices to the relay contacts.
22- LIQUID RELAY CONTACT JUMPERS	There are twelve SPDT relays which work with liquid alarms. The relays can be jumper configured for NC or NO contacts.
23- LIQUID RELAY CONTACT TERMINAL BLOCK	For connection of external devices to the relay contacts.
24- LIQUID SENSOR TERMINAL BLOCK	For connection of remote water and liquid petroleum sensors, in hazardous and non-hazardous areas. <b>NOTE: Intrinsic Safety barrier protected, for sensors in hazardous areas.</b>
25- WATER/PETROLEUM SELECT JUMPERS	These jumpers are used to configure each channel of the liquid section to function with either a water (Normally Open) or petroleum (Normally Closed) sensor.

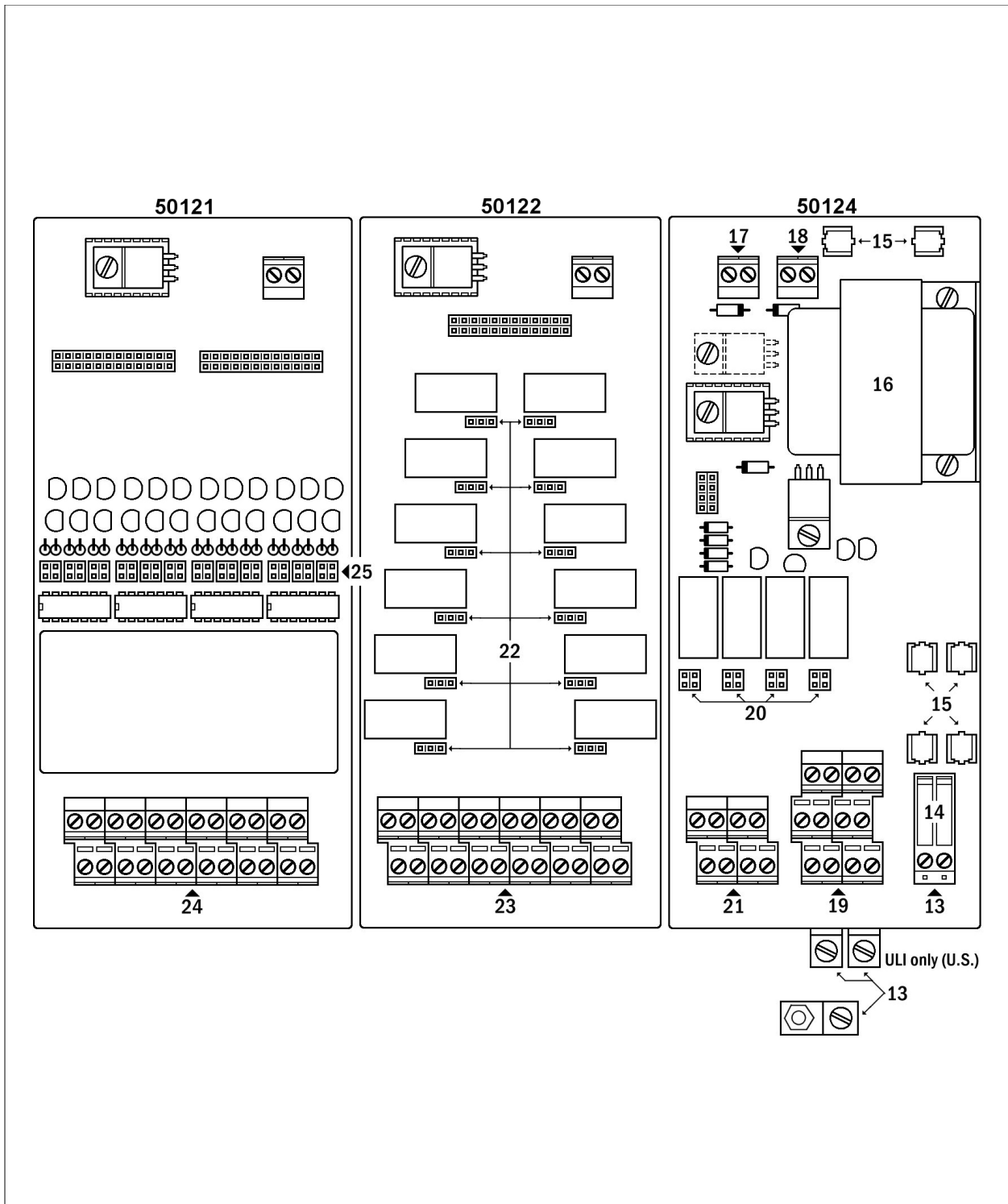


FIGURE 2: Internal features of the ATI-5100 monitor.

## 4 - INSTALLATION

Follow the guidelines in this section for proper locations and installation of the ATI-5100 Leak/Level Monitor. Although different practices can be followed, the proper method of installation and use of approved mounting hardware and sealing fittings is highly recommended to ensure sound and durable installation.

### 4.1 - LOCATION AND MOUNTING

Care should be taken to securely fasten the monitor (via six internal mounting holes) to a solid, vertical, non-vibrating surface or structure. Use the template provided to locate the mounting holes for drilling.

**CAUTION: All cable entry MUST BE through the BOTTOM of the monitor enclosure only. Other entry locations will allow foreign materials to enter the enclosure, causing possible damage to the internal components.**

Mount the monitor in a NON-HAZARDOUS area (e.g. manager's office, control room) where the unit can be observed periodically.

Mount the sensors in the appropriate locations for the detection of various petroleum products and liquid levels according to the local municipal, provincial, state and/or federal regulations. Refer to the suggested application drawing(s) supplied with the sensors.

### WARNING

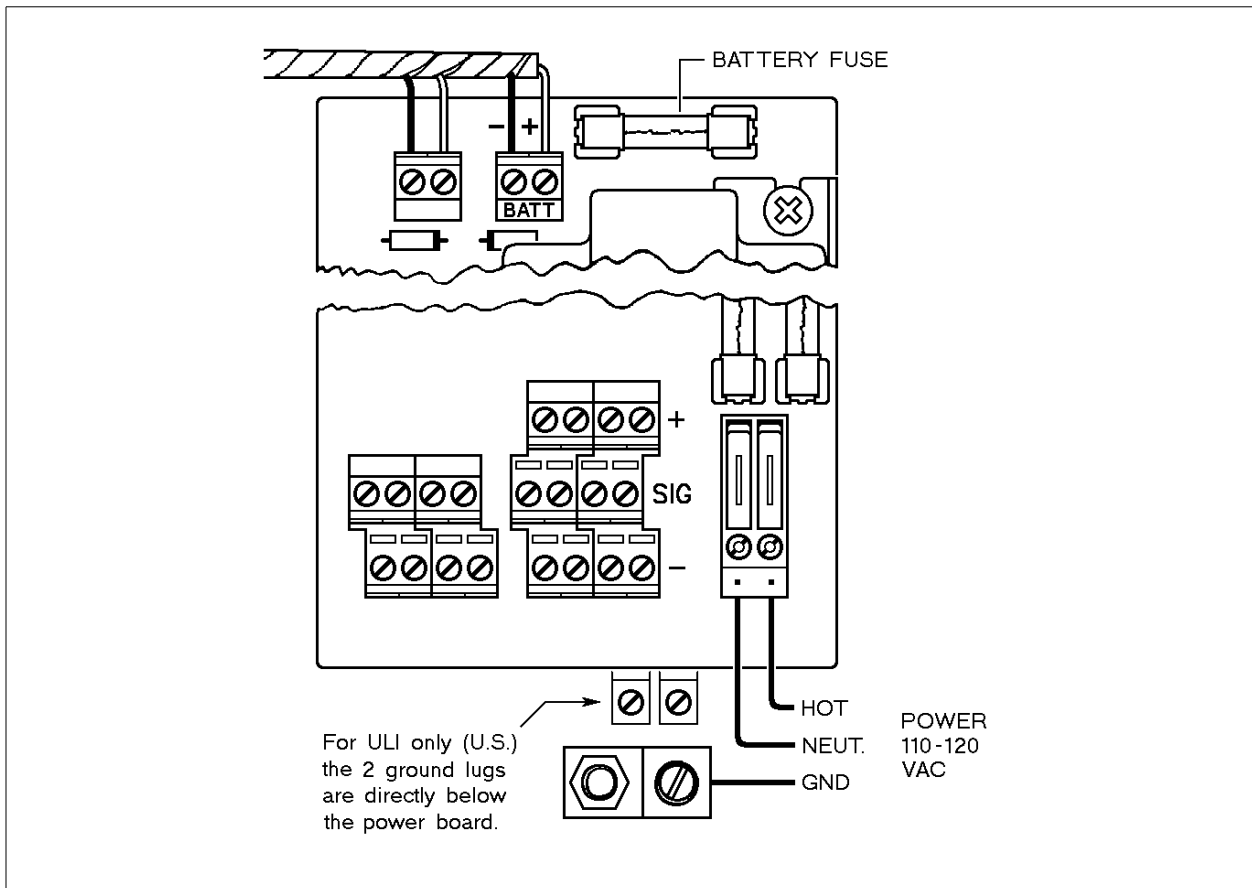
- ALL cables MUST pass through conduit seals installed between the hazardous (Class I, Division 1 or 2) and non-hazardous areas, for safety reasons and to comply with the local municipal, provincial, state, or federal electrical regulations.
- For ULI only (U.S.) follow the National Electrical Code (NFPA 70) and the automotive & Marine Service Station Code (NFPA 30A).

### 4.2- WIRING THE SYSTEM

All terminals are located in the terminal chamber section of the monitor (see FIGURE 1). For maximum noise rejection, cable shields and metal conduits should be grounded at the monitor. A cable size of 22 AWG is recommended for wiring the sensors.

**POWER SUPPLY**     The monitor operates on 120 vac, 60 hz. The main ac power connects to the power terminal block and ground located inside the monitor (see FIGURES 2 and 3).

- RELAYS** There are sixteen SPDT relays (12 liquid & 4 vapour) which activate with liquid alarms and vapour alarms causing contact transfer. The jumpers (see FIGURE 7) are used to configure the relays for Normally OPEN or CLOSED contacts. The relay contacts are rated up to 1 Amp @ 125/250 VAC, 30VDC. External alarms or devices connect to the relay contact terminal blocks (see FIGURE 7).
- SENSORS** Each liquid sensor connects to a pair of terminals on the liquid sensor terminal block, using a 2 or 4 conductor shielded cable. This circuit is rated intrinsically safe. (See Section 5.1.1 to configure).
- Each vapour sensor connects to 3 terminals (-,sig,+) on the vapour sensor terminal block, using 3-conductor cable. Each ATI-5020 probe or level (wire colour pair) connects to 2 terminals (-,sig) on the same terminal block. (Refer to the electrical codes for wiring regulations). Vapour sensors and ATI-5020 probes are explosion-proof.
- BATTERIES (optional)** The backup battery system is the final connection to be made. First, the insulation must be removed from the loose wire leads near the BATT terminal block, at the top of the power board. Then connect the black lead to ground (-) and the red lead to the positive (+).



**FIGURE 3: Connections for the main AC power.**

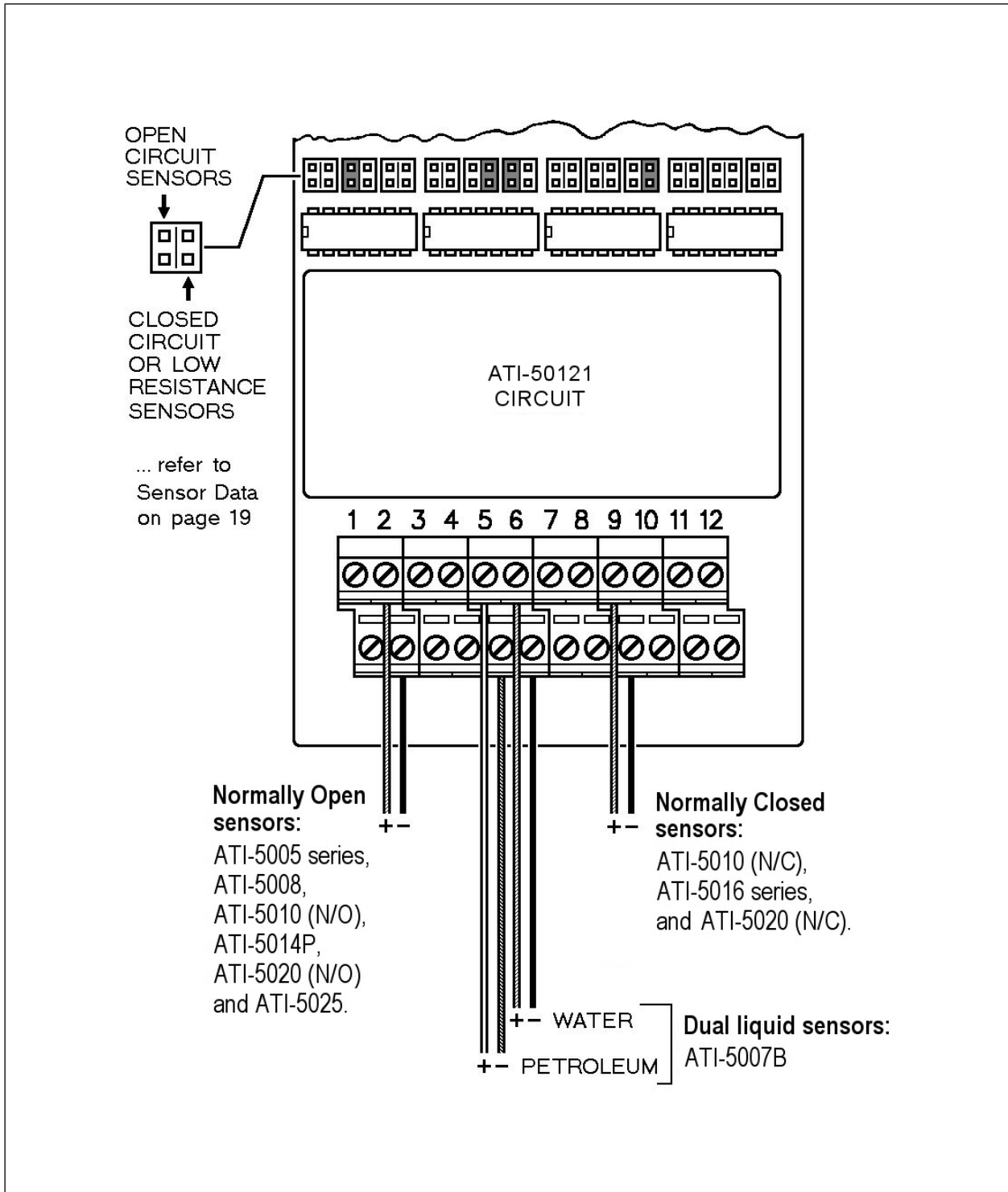
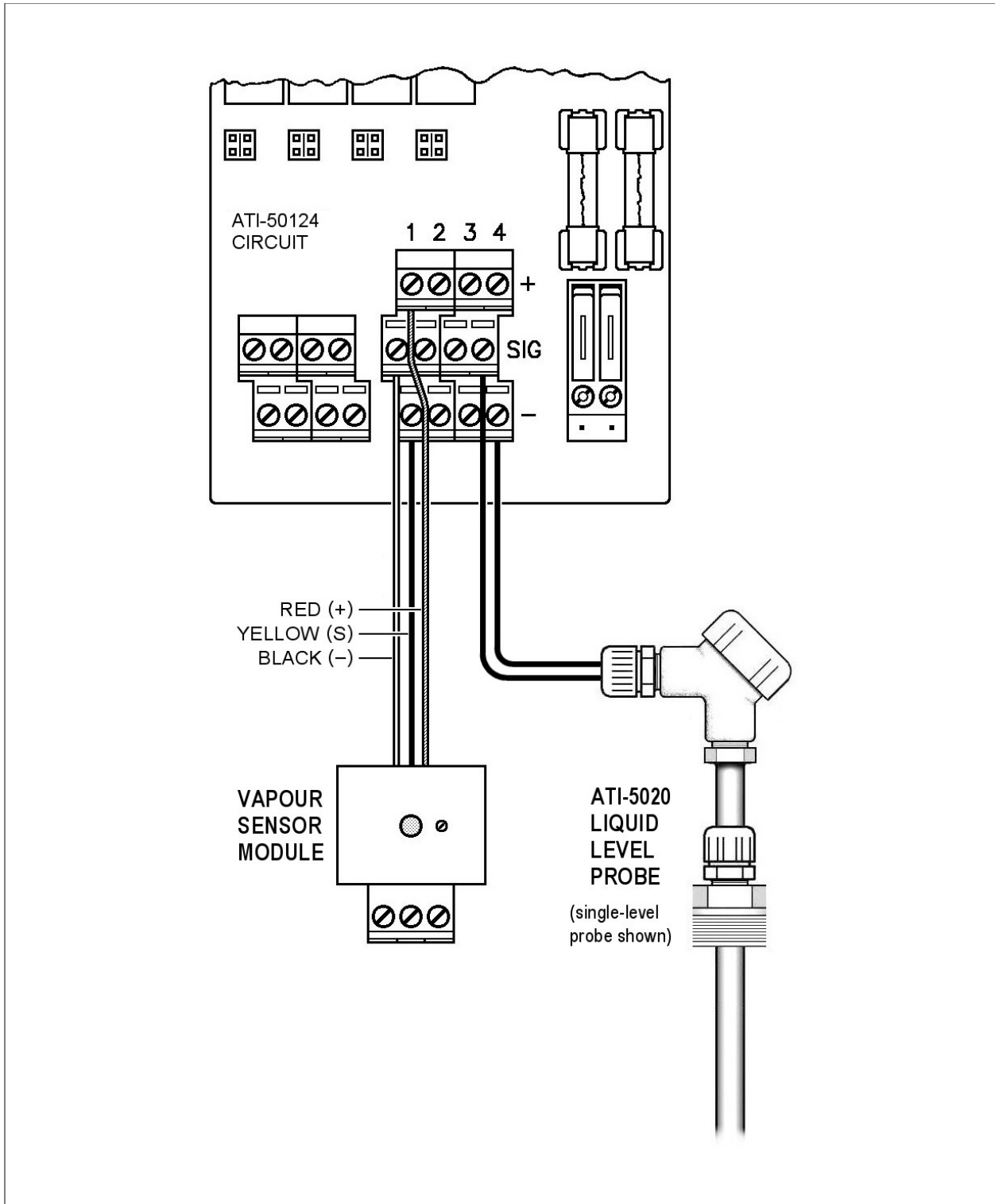


FIGURE 4: Wiring and programming the liquid sensors.

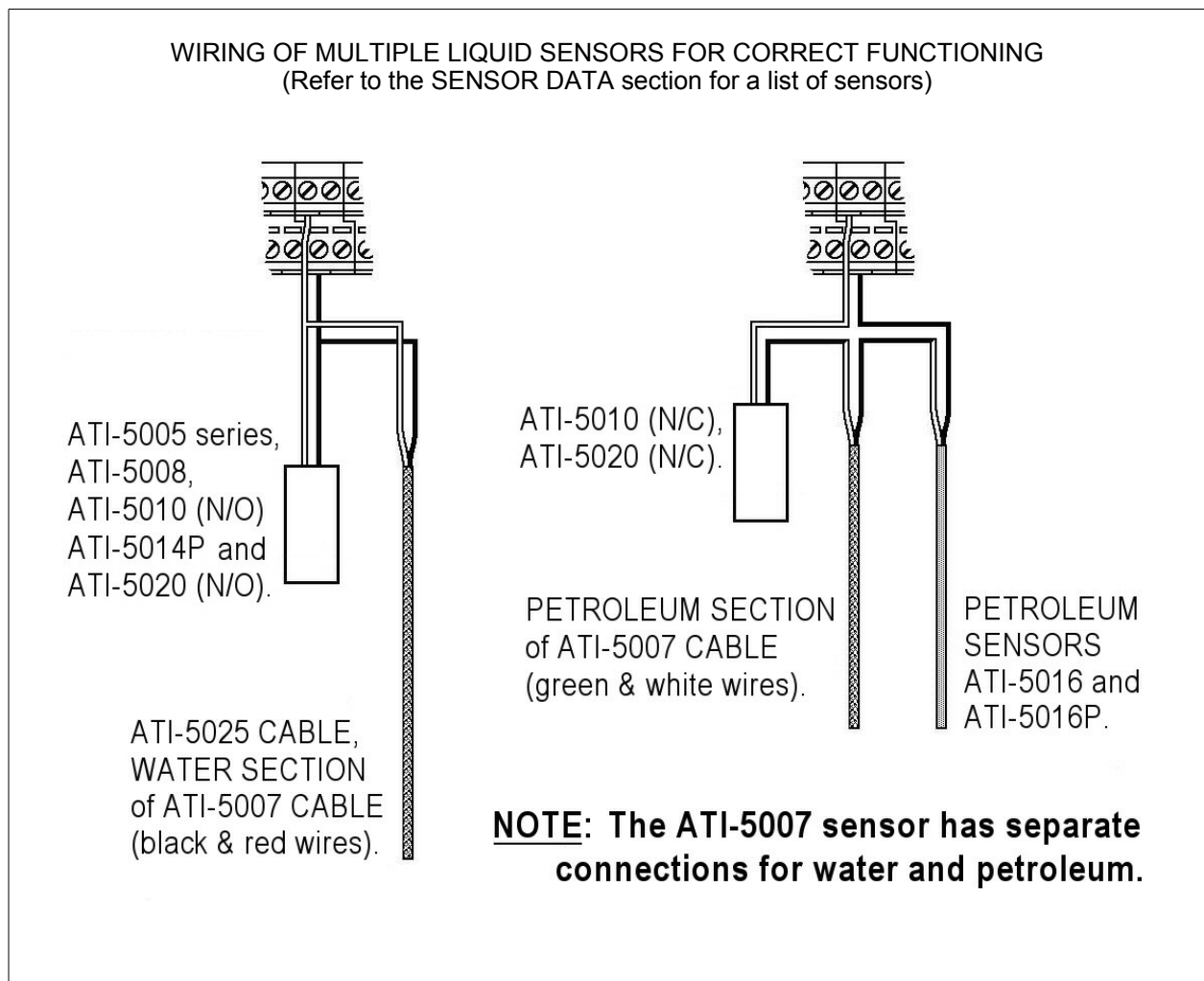


**FIGURE 5: Wiring a vapour sensor module and an ATI-5020 probe.**

### 4.2.1 - WIRING MULTIPLE SENSORS

On the liquid circuit, more than one liquid sensor can be connected to each zone (channel). Each sensor should be on a separate cable but can be wired through the same conduit. The wiring of the liquid sensors must be installed through a conduit sealing fitting and conduit, separate and isolated from the vapour sensor wiring.

An unlimited number of water sensors may be connected in parallel to terminals of one zone on the liquid circuit. Petroleum sensors and sensing cables can only be connected in series (end-to-end), or an extended length of cable may be connected to the terminals of one zone on the liquid circuit. A water sensor and petroleum sensor **MUST NOT** be connected to the same zone terminals. (See FIGURE 6 for wiring multiple liquid sensors.)



**FIGURE 6: Wiring multiple liquid sensors.**

## 5 - CONFIGURATION & OPERATION

**BEFORE turning on the main AC power, MAKE SURE the monitor has been programmed and all connections are properly made. The only on-board programming required is configuring jumpers for the liquid sensors and for the relay contacts.**

### 5.1 - CONFIGURATION

#### 5.1.1 - CONFIGURING LIQUID SENSORS

The jumpers on the liquid circuit are used to configure each zone's output for the non-alarm mode of the type of liquid sensor connected to that zone (channel). One jumper set consists of 2 pairs of pins where one pair is connected together using a jumper clip. (Refer to FIGURE 4 for location and configuring of the output jumpers)

**NOTE: For channels not used, the jumpers must be set in the OPEN CIRCUIT position (left pair of pins).**

When a water sensor is connected, plug the jumper clip onto the left pair of pins for that zone (channel). If a petroleum sensor or a sensing cable is connected, plug the jumper clip onto the right pair of pins.

The vapour sensors are adjusted at the sensor location using only one trimmer. Refer to the vapour sensor manual for this adjustment.

#### 5.1.2 - CONFIGURING RELAY CONTACTS

Each relay can be independently configured to provide Normally Open or Normally Closed contacts. Note that each set of jumpers features long pins and two jumper clips, to equal the current capacity of the relays. The jumpers are located directly below each relay. (Refer to FIGURE 7 for jumper location and programming)

**NOTE: During normal operation, the relays are non-energized (off)**

The liquid relay contacts are configured by default for Normally Open, with the jumper clips (for all channels) on the middle and right pins. For Normally Closed contacts, place the jumper clips onto the left and middle pins.

The vapour relay contacts are configured by default for Normally Open, with the jumper clips on the two left pins. For Normally Closed contacts, place the jumper clips onto the two right pins.

**NOTE: If the monitor was ordered with ENERGIZED relays, ALL of the relay contacts jumpers MUST be configured to function opposite to the ways described in the above paragraphs (see FIGURE 7).  
I.E.: Exchange "left" and "right" in the above paragraphs. (For Normally Open liquid relay contacts, place jumpers onto the left and middle pins)**

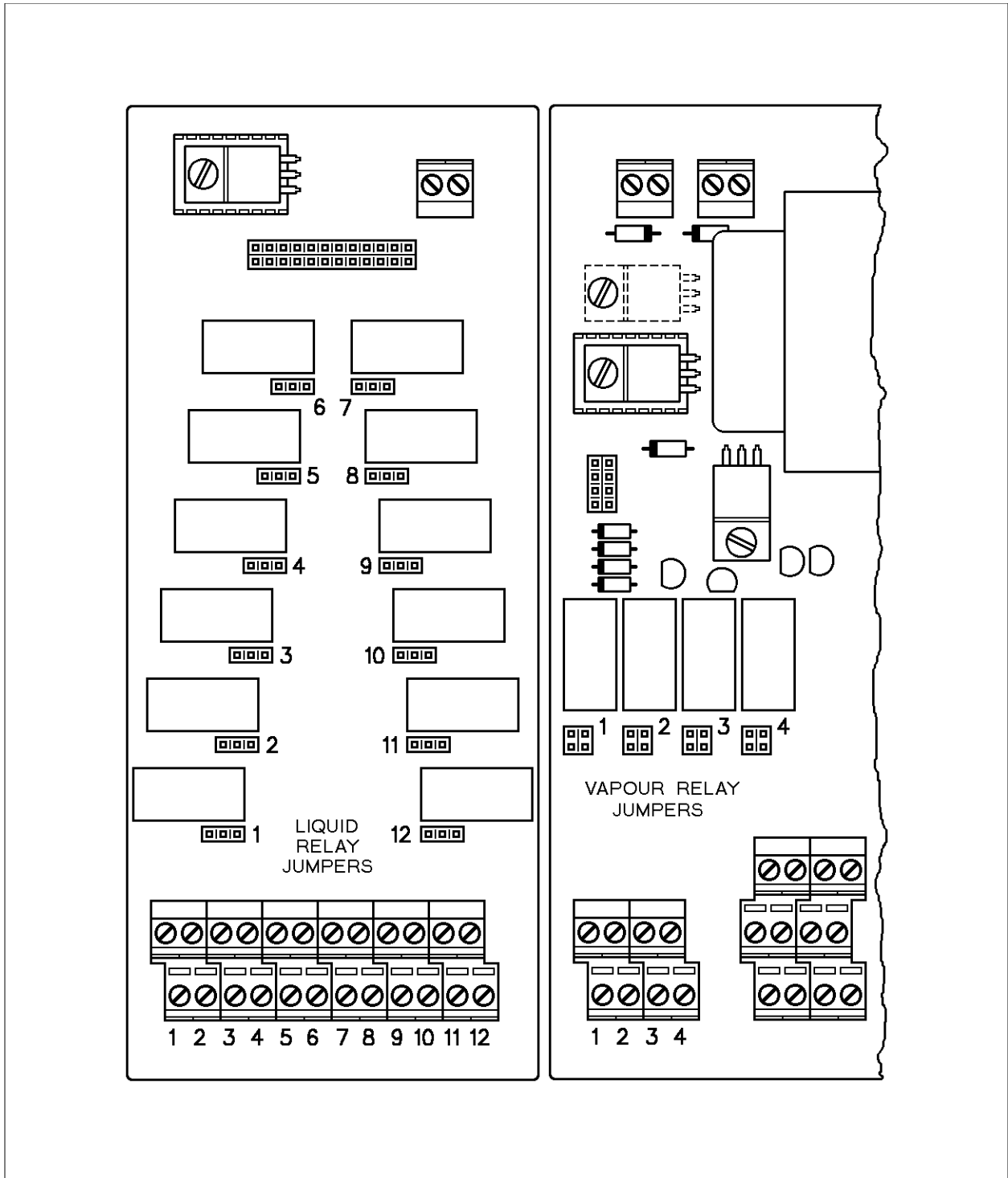


FIGURE 7: Configuring the relay contacts.

## 5.2 - OPERATION

When the main AC power is switched-on or the optional backup batteries are connected, the green power LED will light. A power-on self test will switch the monitor into full alarm for a few seconds, after which the monitor will become fully operational.

**NOTE: The vapour sensors should be operating for 48 hours before any adjustments are to be made.**

During normal operation, the batteries are continuously kept at full charge by the power supply circuit. When the main AC power fails, the backup battery system continues to operate the liquid section of the monitor without interruption for up to 3 hours until AC power is restored.

### 5.2.1 - ALARM ACTIVATION

If any water makes contact with a water sensor, if any liquid petroleum makes contact with a petroleum sensor or sensing cable, or there is a loss of vacuum, the red LIQUID LED and alarm relay (for that zone) and the audio alarm will be activated.

If any petroleum vapours are detected, the red VAPOUR LED and alarm relay (for that zone) and the audio alarm will be activated. For the ATI-5020 probe, when the liquid level reaches a switch point, it will activate an alarm.

When the battery voltage drops below 9.6V, the green POWER LED will turn off, the yellow BATTERY LED will light and the audio alarm will beep at 1 minute intervals until AC power is restored. The switches to acknowledge and reset alarms have no effect on the battery alarm.

### 5.2.2 - ALARM SHUTOFF

When a liquid or vapour alarm occurs, the audio alarm can be shut off by pushing the ACKNOWLEDGE switch on the right side of the monitor. The audio alarm is timed to reactivate approximately 2 hours after this switch is pressed. The alarm LED for that zone (channel) will remain ON as long as the alarm condition exists. If another alarm occurs, the audio alarm will reactivate and the timer will restart.

When the alarm condition is no longer present, pushing the RESET ALARMS switch on the front panel will shut off the audio alarm and timer. The transparent front cover can only be opened with the supplied key.

**The locking, transparent front cover is designed to protect the front panel components from possible damage and also to restrict access to the main control(s) by unauthorized personnel.**

## 6 - PREVENTIVE MAINTENANCE

The monitor should be wiped clean only with a damp cloth following a regular maintenance program. Avoid spraying, submersion and other conditions that could cause a liquid to enter the monitor and cause possible intrinsic damage to the internal components.

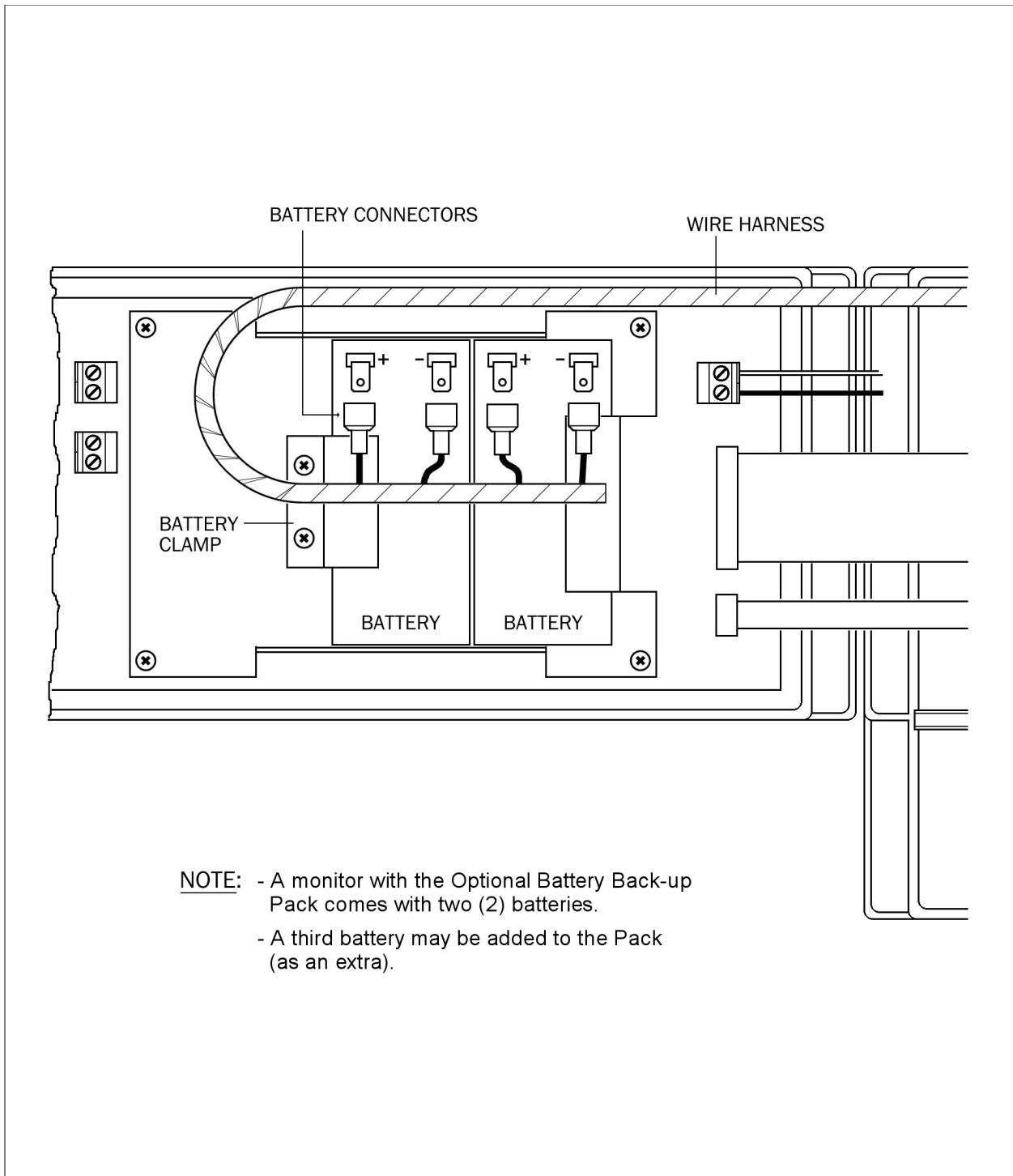
### 6.1- VERIFY OPERATION

To verify the operation of the monitor and sensors, make sure that they are responding to the petroleum vapours and liquid levels. This test should be performed regularly.

### 6.2- BATTERY REPLACEMENT (Optional, contact ATI)

When the batteries can no longer retain their charge, they must be replaced. Refer to FIGURE 8 during the following procedure:

1. Switch OFF the main AC power to the monitor, and also the power going through the relay contacts.
2. Open the enclosure by pulling out the rear latch on the right side of the enclosure and unhook it from the hinge, then open the terminal chamber cover to access the AC power terminal block.
3. Open both AC terminal block knife switches and remove fuses.
4. Carefully unplug ALL the connectors from the battery terminals, then move the wire harness out of the way.
5. While holding the batteries, remove the battery retainer clamp.
6. Dispose of the used batteries in the proper manner (Check with local codes as to proper legal procedures).
7. Peel the protective papers off the adhesive tapes underneath the replacement batteries.
8. Position the new batteries onto the mounting plate with the terminals at the top and facing you, then press and hold the batteries in place.
9. Reinstall the battery retainer clamp. Make sure to firmly hold it against the side of the battery while tightening the screws firmly. **NOTE: Failure to fasten the batteries in place may damage components.**
10. Plug ALL the connectors back onto the battery terminals with the Red wires to Positive (+) and Black to Negative (-).
11. Check to make sure the batteries are firmly mounted, close both knife switches on the AC terminal block and replace the fuses. Close the enclosure, hook the latch onto the bar and push it so it snaps closed, then switch the AC power ON to restore the monitor to normal operation.



**FIGURE 8: Battery replacement procedure.**

## 6.3 - TROUBLESHOOTING

### **BEFORE POWER-UP:**

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Check the fuses.

Check all connections.

### **WHAT TO DO:**

---

Verify that all 3 fuses (on power supply board) are installed properly and are OK (not blown).

Make sure ribbon cable connectors are plugged-in properly.

Make sure that battery connectors and internal wires are secure (If batteries installed).

Verify that all the sensor and relay connections are properly made, and that polarity is correct.

### **ON POWER-UP:**

---

Nothing happens.

### **WHAT TO DO:**

---

Verify that both switches, on the power board, are closed.

Check the two primary fuses on the power board.

Verify that the main AC power has been switched on.

Battery LED is ON instead of power LED

If this situation occurs, press and release the RESET switch. The unit will then be restored to normal operation.

Some Alarm LEDs remain ON (even after Reset).

Make sure that the Liquid jumper is properly configured for the type of sensor connected, for each zone in alarm.

Check sensor location for possible alarm condition.

### **DURING OPERATION:**

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Battery LED is on and Audio is beeping.

### **WHAT TO DO:**

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Battery voltage is low.

Check the main AC power supply to the monitor.

Check the two primary fuses on the power board.

All the LEDs are OFF.

No AC and no BATTERY power. Check battery voltage and connections.

Check ALL three fuses on the power board.

Relays operate auxilliary equipment incorrectly.

Verify that the relay contacts are configured properly (N/O, N/C) for the application. (See section 3.2)

Vapour LED(s) still ON after 48 hours.

Verify vapour sensor connections for correct polarity (+ to +, - to -, and S to S).

Check for 12 to 24 VDC at the vapour module. If OK, check for 3.5 Volts on the sensor side of module.

Check sensor location for possible alarm condition.

To verify the vapour sensor location for contamination, remove the sensor unit and place in a bag filled with clean air. If the LED on the module (inside the housing) goes out, the sensor was exposed to a contaminant. See the vapour sensor manual for more information.

IF YOU HAVE ANY OTHER UNEXPLAINED PROBLEMS, PLEASE CONTACT THE CUSTOMER SERVICE DEPARTMENT AT THE ATI FACTORY.

### 6.3.1- SENSOR DATA

Normal operating (non-alarm) characteristics of all compatible ATI sensors:

<u>MODEL</u>	<u>TYPE</u>	<u>DETECTION</u>	<u>LOOP RESISTANCE</u>
ATI-5005 series	CONDUCTIVITY	Water	Open circuit
ATI-5007	CABLE	Water	Open circuit
		Petroleum	Low resistance ~40 Kohms/ft
ATI-5008	VACUUM	Interstitial space	Open circuit
ATI-5010	LEVEL	Liquid levels	Open circuit
			Closed circuit (float reversed)
ATI-5014P	PROBE	Sump water levels	Open circuit
ATI-5016 series	CABLE or SENSOR	Petroleum	Low resistance ~40 Kohms/ft
ATI-5020	PROBE	Liquid level	Open circuit
ATI-5025	CABLE	Water on floor (area)	Open circuit

During an alarm condition, the operating characteristics of a sensor will reverse itself. A liquid vacuum, pressure, or float sensor's open circuit will become a low resistance closed circuit. A petroleum sensor's low resistance will become a high resistance of more than 10 Megs. For a vapour sensor, the LED on the module will go ON. Any of these conditions will activate an alarm and relay on the monitor.