



# Portable Gas Monitor (PGM-IR) Infrared Sensor Replacement Instruction 3015-5508

Rev. 3 – January 2018

## 1. Scope

These instructions describe how to replace the IR sensor in the Portable Gas Monitor (example shown in Figure 1). It is assumed that the user is familiar with the operation of the appropriate monitor model. If necessary, refer to the corresponding instruction manual for detailed operation and maintenance information. Table 1 provides a list of the appropriate instructions and parts necessary for each model, and additional information to assist in identification (supported gas types and internal bladder bag presence).



Patent 6,590,690



Figure 1. Sample Replacement IR Sensor (Left) and PGM-IR in Soft Case (Right)

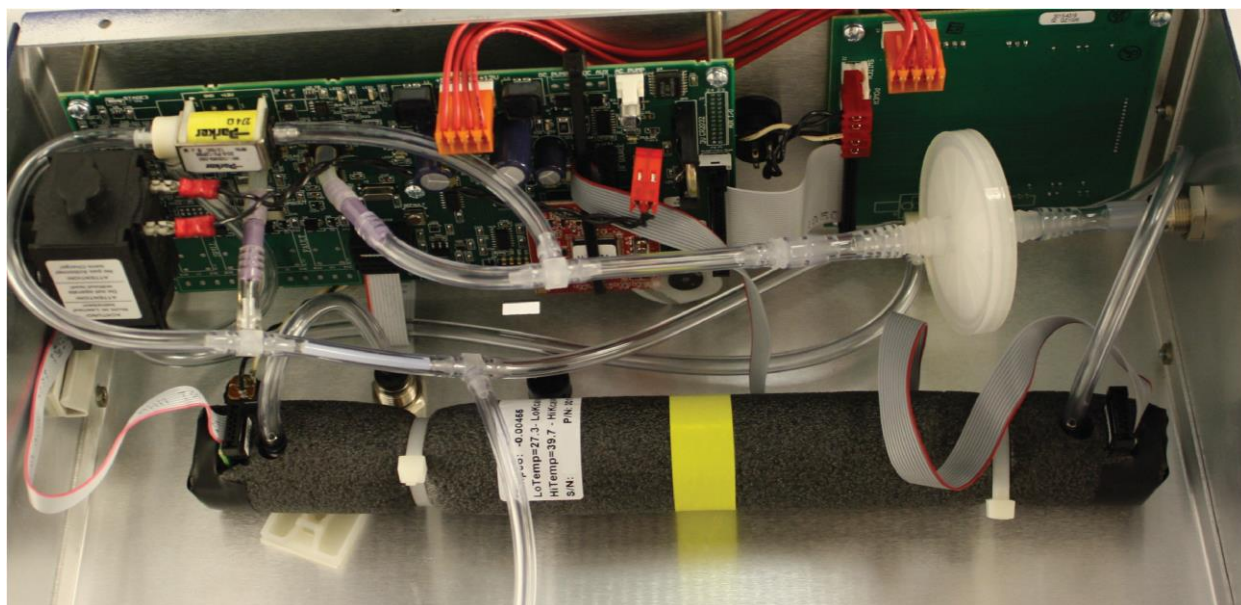
Table 1: Part Number Information

| PGM-IR Model | Supported Gas Type | IR Sensor Replacement Kit | Solo IR Sensor* | Instruction Manual | Purge Air (Bladder) Bag? |
|--------------|--------------------|---------------------------|-----------------|--------------------|--------------------------|
| 3015-5148    | SF <sub>6</sub>    | 3015-5509                 | 3015-5087       | 3015-5150          | Yes                      |
| 3015-4484    |                    |                           |                 | 3015-4584          |                          |
| 3015-5420    | Refrigerant        | 3015-4721                 | 3015-5086       | 3015-5466          | No                       |
| 3015-5696    |                    |                           |                 |                    |                          |
| 3015-8000    |                    |                           |                 |                    |                          |
| 3015-8003    |                    |                           |                 |                    |                          |
| 3015-8001    | CO <sub>2</sub>    | 3015-5759                 | 3015-5090       | 3015-9000          |                          |
| 3015-8002    |                    |                           |                 |                    |                          |

\* Not for individual sale.



**NOTE:** The solo IR sensor part numbers in Table 1 are used for ID purposes only. To order a replacement kit for your sensor, use the IR Sensor Replacement Kit part number. For example, to order a replacement kit for a solo sensor labeled with model number 3015-5087, order IR Sensor Replacement Kit 3015-5509.



**Figure 2. Internal Components Showing the IR Sensor (Bench) of a PGM-IR**

## 2. Items Required

- IR Sensor Replacement Kit which includes:
  - IR sensor assembly (p/n: see Table 1)
  - cable ties, qty: 2 (p/n: 3015-2835)
  - this instruction manual (p/n: 3015-5508)
- Medium Phillips head screwdriver
- Small flat blade screwdriver
- Wire cutters (for removing cable ties)

## 3. Disassemble the Chassis

Gain access to the IR sensor by disassembling the monitor's metal chassis as follows.

| Step | ✓ | Description  |
|------|---|--|
| 1.   |   | Unplug the battery pack from the Portable Monitor.                                     |
| 2.   |   | Remove the Monitor and its battery pack from the soft carrying case.                   |
| 3.   |   | Remove a total of 10 screws from the locations shown in Figure 3.                      |
| 4.   |   | Carefully separate the metal chassis, being careful not to puncture the purge-air bag. |

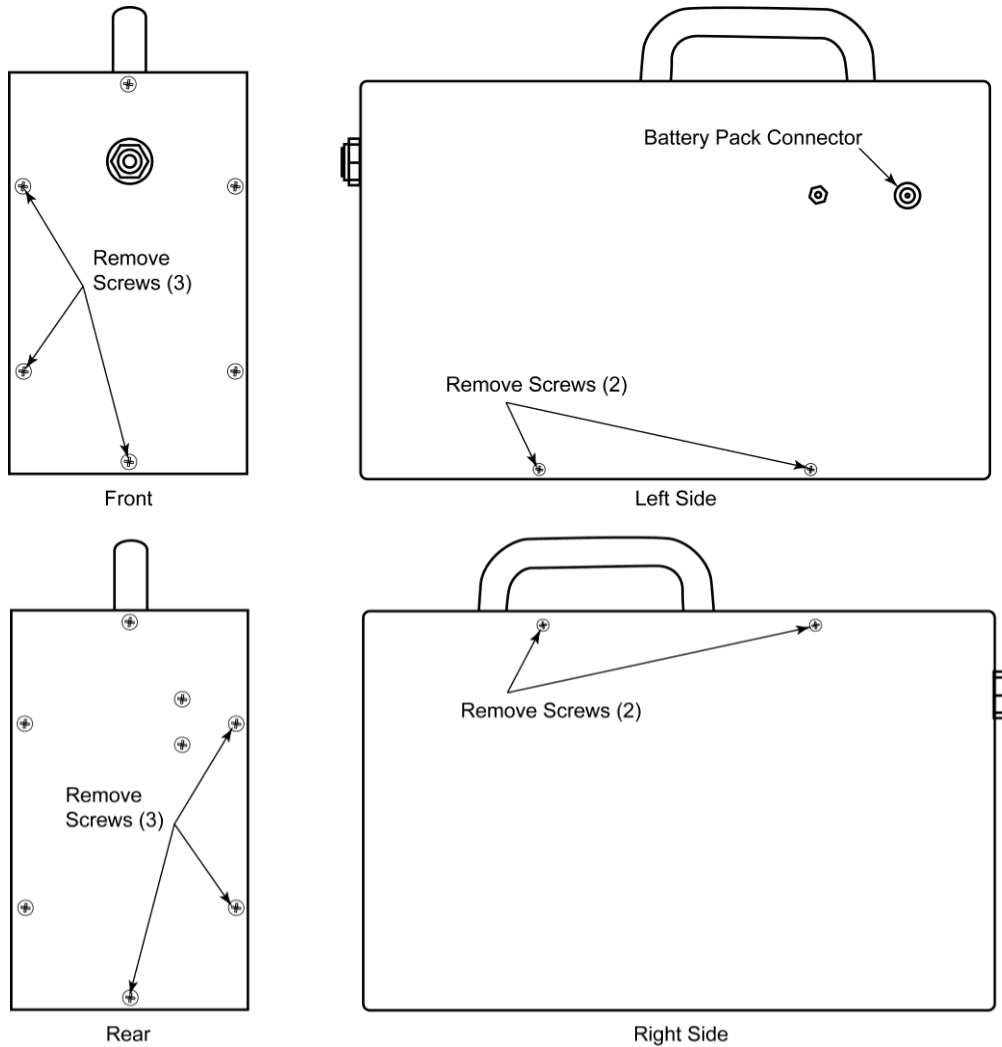


Figure 3. Disassembling the Chassis

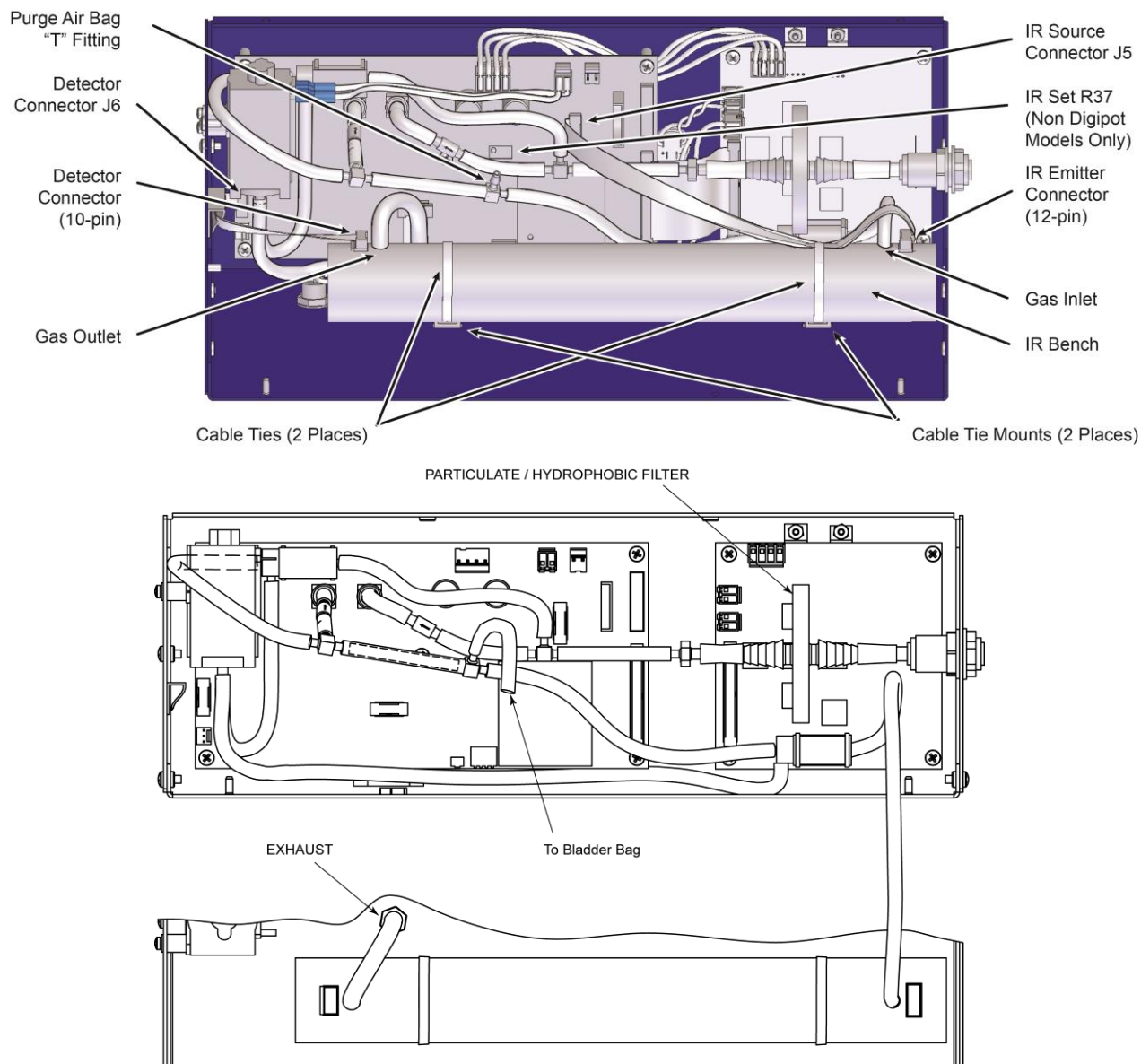
#### 4. Remove the IR Sensor

| Step | ✓ | Description   |
|------|---|---|
| 5.   |   | Review the internal components of the monitor, shown below, before proceeding. Note that Figure 4 shows <b>R37</b> – an analog potentiometer which is used to adjust the IR emitter drive level. This component is only present on older models that do not have the software Digipot feature (which enables IR emitter adjustments via the keypad/display rather than the <b>R37</b> potentiometer). |
| 6.   |   | Refer to Figure 4 and Figure 5 while performing the following steps to remove the old IR sensor.  |
| 7.   |   | If present, turn <b>R37</b> six full revolutions counter-clockwise.   |



Figure 4: R37 Component (On Non Digipot Models Only)

## Portable Gas Monitor (PGM-IR) Infrared Sensor Replacement



**Figure 5. Monitor Components in Various PGM-IR Models**

| Step | ✓ | Description  |
|------|---|--|
| 8.   |   | Disconnect the tubing from the purge-air bag "T"-fitting, and then lay aside the chassis-half containing the purge-air bag. (This step does not apply to models without the purge air bladder bag.)  |
| 9.   |   | Pull the 10-pin and 12-pin electrical connectors from their sockets on the IR sensor. Note that these connectors may have been secured in place for shipping purposes with hot-glue or wire ties. As necessary, carefully pry the hot-glue from each connector or cut off the wire ties. |
| 10.  |   | Pull the tubing from the gas-inlet and gas-outlet fittings on the IR sensor.   |
| 11.  |   | Using wire cutters, cut the two cable ties that secure the IR sensor to the chassis, and then remove the sensor.   |

## 5. Install the New IR Sensor

| Step        | ✓                    | Description  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
|-------------|----------------------|--|-------------|----------------------|--|--|--|--------|--------|--------|--------|--------|--|--|--|--|--|
| 12.         |                      | <p>Record calibration label information (found on the new IR sensor) into Table 2 for use later in this procedure. Refer to Figure 6. Note that calibration information is dependent on the gas type supported by the IR sensor. For example, refrigerant and SF<sub>6</sub> sensors use a single calibration parameter (TEMPCO). CO<sub>2</sub> sensors use five parameters.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>INSTRUMENT<br/>TEMPERATURE COEFFICIENT:<br/><br/>-0.00458</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>Tempco: -0.00458<br/>LoTemp = 27.3 LoKcal = 1.021<br/>HiTemp = 39.7 HiKcal = 0.980<br/>S / N: AB##### P/N: 3015-####</p> </div> </div> <p><b>Figure 6. Sample IR Sensor Labels: Refrigerant and SF<sub>6</sub> (Left); CO<sub>2</sub> (Right)</b></p> <p><b>Table 2: Calibration Parameters Worksheet</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">All Sensors</th> <th colspan="4">CO<sub>2</sub> Only</th> </tr> <tr> <th>TEMPCO</th> <th>LOTEMP</th> <th>HITEMP</th> <th>LOKCAL</th> <th>HIKCAL</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | All Sensors | CO <sub>2</sub> Only |  |  |  | TEMPCO | LOTEMP | HITEMP | LOKCAL | HIKCAL |  |  |  |  |  |
| All Sensors | CO <sub>2</sub> Only |  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| TEMPCO      | LOTEMP               | HITEMP   | LOKCAL      | HIKCAL               |  |  |  |        |        |        |        |        |  |  |  |  |  |
|             |                      |  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 13.         |                      | To begin the installation of the new IR sensor, remove the protective caps from the gas-inlet and gas-outlet fittings on the new IR sensor.  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 14.         |                      | Position the new sensor inside the chassis so that the end with the 12-pin electrical connector (IR Source) is located on the <i>right</i> , and that the gas fittings are facing upwards.   |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 15.         |                      | Reconnect the tubing that was removed in step 8 to the gas-inlet and gas-out fittings on the IR sensor.  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 16.         |                      | Plug the 12-conductor ribbon cable from IR SOURCE connector J5 on the main board into the 12-pin IR emitter connector.   |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 17.         |                      | Plug the 10-conductor ribbon cable from DET connector J6 on the main board into the 10-pin IR sensor connector.  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 18.         |                      | Using the two cable ties supplied in the kit, secure the sensor to the cable-tie mounts on the side wall of the chassis. Note that the 12-conductor ribbon cable is secured in place by positioning it under the cable tie. Cut off any cable-tie excess.  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 19.         |                      | Check to ensure that the new IR sensor is properly secured, and that all tubing and electrical connectors are tight.   |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 20.         |                      | Reconnect the tubing from the purge-air bag onto its tee-fitting. (This step does not apply to models without the purge air bladder bag.)  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 21.         |                      | Connect the battery pack to the monitor's battery connector, and then turn ON the monitor.   |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |
| 22.         |                      | Allow the monitor to warm-up for at least ½ hour before proceeding.  |             |                      |  |  |  |        |        |        |        |        |  |  |  |  |  |

## 6. Adjust Power Level for IR Emitter

| Step | ✓ | Description   |
|------|---|---|
| 23.  |   | To access the monitor's set-up mode and display the IR emitter power adjustment screen, locate and view the Portable Monitor's display.   |
| 24.  |   | With the monitor in its MEASURE mode, press both the LEFT and RIGHT buttons simultaneously to display the FUNCTION MENU screen.   |
| 25.  |   | With the monitor in its FUNCTION MENU, use the keypad buttons to place the arrow (>) on the display next to the DIAG (models <i>with</i> bladder bag) or CAL (models <i>without</i> bladder bag) function.  |
| 26.  |   | Press the RIGHT Arrow and ENTER buttons simultaneously to display the revision screen and access the FACTORY MENU.  |
| 27.  |   | Press the ESC button to display FACTORY MENU.   |
| 28.  |   | Use the keypad buttons to place the arrow (>) on "IR." Press the ENTER button to display the IR emitter adjustment screen.  |
| 29.  |   | <p>Change the IR emitter drive level to a value between 325 and 350 mW by using the UP/DOWN arrow keys (in newer models). See below. Note that the other values (V, mA, and R) may vary from what is shown in the display. Press ENT to save the DIGIPOT value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>V=5.181    mA=74.9<br/>R=68.3    mW= 343</p> </div> <p>If the R37 pot (located on main PCB board) is present (in older models), change the drive level by adjusting R37 clockwise.</p> |
| 30.  |   | Press the ESC button and then proceed to the next section and adjust the DIGIPOT as necessary.  |

## 7. Adjust the IR Sensor Voltage

| Step | ✓ | Description   |
|------|---|---|
| 31.  |   | <p>With the arrow (&gt;) next to the DIGIPOT function, press the ENTER button to display the IR sensor voltage adjustment screen.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>&gt;DIGIPOT    TEMPCOS<br/>P CAL        IR</p> </div>  |
| 32.  |   | <p>While observing the IR VOLT reading, use the Up/Down Arrow buttons to obtain a reading of <math>4.2 \pm 0.1</math> volts. (The last two digits are largely unstable, so the tenths decimal place is the first "usable" digit). Note that the DIGIPOT value may vary from what is shown in the display on the right. Press ENT to save the DIGIPOT value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>DIGIPOT=193<br/>IR VOLT=4.200</p> </div> |



**IMPORTANT:** If IR VOLT does not reach 4.2 volts by adjusting the digipot, then return to step 23 to reduce the IR emitter power by 75 mW and repeat the DIGIPOT adjustment.



## 8. Update Calibration Information

| Step | ✓ | Description  |
|------|---|--|
| 33.  |   | <p>Scroll to TEMPCOS and press ENTER. Enter your recorded TEMPCO value from Table 2 using the keypad buttons. Press ENTER to save the new value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>DET=&gt;xx. xxxxxx</p> </div> <ul style="list-style-type: none"> <li>• For CO<sub>2</sub> sensors, continue to step 34 to enter additional calibration information.</li> <li>• For refrigerant and SF<sub>6</sub> sensors, skip to step 38.</li> </ul> |
| 34.  |   | <p>Scroll to EDIT LT and press ENTER. Enter the previously recorded LOTEMP value from Table 2 using the keypad buttons. Press ENTER to save the new value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>EDIT LO TEMP<br/>xx. x</p> </div>  |
| 35.  |   | <p>Scroll to EDIT HT and press ENTER. Enter the previously recorded HITEMP value from Table 2 using the keypad buttons. Press ENTER to save the new value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>EDIT HI TEMP<br/>xx. x</p> </div>  |
| 36.  |   | <p>Scroll to EDIT LP and press ENTER. Enter the previously recorded LOKCAL value from Table 2 using the keypad buttons. Press ENTER to save the new value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>EDIT LO FACTOR<br/>x. xxx</p> </div>   |
| 37.  |   | <p>Scroll to EDIT HP and press ENTER. Enter the previously recorded HIKCAL value from Table 2 using the keypad buttons. Press ENTER to save the new value.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>EDIT HI FACTOR<br/>x. xxx</p> </div>   |
| 38.  |   | Press the ESC button twice to exit the monitor's FACTORY and FUNCTION menus.   |
| 39.  |   | Upon exiting the menus, a purge cycle will be performed. After this, the monitor will automatically return to its MEASURE mode. Ensure there are no faults present.  |
| 40.  |   | Turn OFF the monitor and reassemble the chassis using the 10 screws removed earlier (see page 2).  |
| 41.  |   | Replace the monitor back into the soft carrying case and connect the battery pack.   |
| 42.  |   | The monitor can now be placed back into service.   |





THE MEASURABLE DIFFERENCE

**Bacharach, Inc.**

621 Hunt Valley Circle, New Kensington, PA 15068 USA

Toll Free: 1-800-736-4666 • Phone: +1-724-334-5000 • Fax: +1-724-334-5001

Website: [www.mybacharach.com](http://www.mybacharach.com) • E-mail: [help@mybacharach.com](mailto:help@mybacharach.com)

