Pressure Monitor Instruction Manual

Model: G4PM Series

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Revision B

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1.0 Introduction

This manual describes how to install, test, and service the Pressure Monitor. The Pressure Monitor is part of a Level Monitoring System that includes the Data Collection System and Gateway(s).

This guide does not include how to install, test, maintain or troubleshoot the Gateway(s) or Data Collection System. Refer to these products' respective instruction manuals.

The description herein is based on a standard installation.

2.0 Product Overview

2.1 Description

The Pressure Monitor detects level, temperature, low battery, and system status and broadcasts this data to the system's Gateway.

The Monitor is calibrated and pre-programmed at the factory with the Transmitter ID and Transmission Frequency. No field programming of the Monitor is required. Key operating features such as Transmission Frequency and alarm settings can be sent to the Monitor from the Data Collection website.

2.2 Operation

The Pressure Monitor consists of a NEMA 4X Approved, ABS housing. The housing protects the Monitor's electronic circuitry and permits connection of Pressure Sensor. The Pressure Monitor measures liquid level by detecting pressure changes on the Pressure Sensor. This level information is calculated and transmitted to the Gateway.

The Monitor is powered by two replaceable batteries. Battery life depends on the Transmission Frequency selected for the Monitor.

2.3 Environmental Specifications

The following environmental specifications should be observed when installing the Monitor:

- Operating Temperature Range: -40°C to +80°C (-40°F to +176°F)
- The Housing is designed to meet or exceed NEMA 4X.
- UV life: 10 years exposure to direct sunlight.
- Chemical Exposure: The unit is designed for outdoor service. The housing material of the Monitor is ABS, which has very good chemical resistance to most fuels, oils, and acids.

2.4 Certifications

2.4.1 FCC Notice—Radio Frequency Communications

The Monitor generates and uses radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause interference to radio and television reception. The Monitor has been tested and found to comply with the specifications in Part 15 of Radiators and FCC Rules for Class B Computing Devices.

CAUTION: Do not make field changes or modifications to any of the Level Monitoring System equipment unless they are specifically covered in this manual. All adjustments must be made at the factory under the specific guidelines set forth in the manufacturing processes. Any modification to the equipment will void the manufacturer's warranty and could void the user's authority to operate the equipment and render the equipment in violation of FCC Part 15, Subpart C, 15.247.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.4.2 Safety and Regulatory

The Monitor is designed to comply with UL Standards for Intrinsically Safe Apparatus for use in Class I, Division 1, Group D locations. The Monitor conforms to UL 913 and has been certified to CAN/CSA Standard C22.2 No. 157.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE.

3.0 Installation

The following sections of this manual explain in detail the site selection and installation process:

3.1 RF Site Guidelines

The Pressure Monitor contains sensitive measurement circuitry and a radio transmitter. Large metal objects such as buildings and vehicles may affect the transmission of radio signals. Electrical equipment may produce electronic noise that could adversely affect signal quality.

- Direct line of sight between the Monitor and Gateway will provide optimum radio reception.

- The Monitor and Gateway can communicate at distances up to one mile under optimum line-of-sight conditions.

- When obstructions such as walls, buildings, and vehicles exist between the Monitor and Gateway the distance between these units should be minimized.

- Multiple obstructions (such as two or more walls or a tank and a wall) between the Monitor and Gateway should be avoided, if possible.

- Electrically conductive objects such as metal buildings, concrete reinforcement rods, tanks, silos, and vehicles reflect radio signals. This reflection can be either an advantage or disadvantage to good radio reception at a particular installation site:

    1. Metal objects between the Monitor and Gateway may reflect and scatter RF energy and reduce radio signal strength at the Gateway.

    2. Metal objects behind the Monitor or Gateway may increase the radio signal strength at the Gateway by reflecting radio signals toward the Gateway.

- Even small metal objects such as tank vents or toolboxes between the Monitor and Gateway can significantly reduce radio signal strength if they are within a few feet of the Monitor or Gateway. These objects can reflect radio signals and cause a RF "shadow" which may prevent radio signals from reaching the Gateway.

- Objects which are not electrically conductive such as wooden or fiberglass buildings, non-reinforced masonry, trees, plastic, and glass have less effect on radio signals than metal objects.

- Windows and wooden doors can provide radio signals access into otherwise closed metal buildings. However, "low-E" window glass may have a thin metallic coating, which can reflect radio signals.

- Strong electromagnetic fields such as those found in close proximity to power lines, large electric motors, generators, electric fences, and transmitter antennas may interfere with the radio signals received by the Gateway.

- The Gateway should be mounted as high as is reasonably possible to improve its ability to receive radio signals. For example, placing the Gateway on a high shelf would be preferable to setting the unit on a floor near ground level. Installing the

Gateway on the second floor of a two-story structure would be more desirable than installing it on the ground floor. Installing the Gateway in an underground basement should be avoided.

Warning: For maximum RF reception, mount the Monitor within 500 feet of the Gateway, avoid mounting Monitor inside a fully closed metal building, and avoid close proximity to large electrical equipment.

3.2 Handling Guidelines

The Pressure Monitor is designed to provide many years of reliable service in demanding outdoor environments. However, the Monitor and Pressure Sensor contain sensitive measurement circuitry and should be handled carefully. Do not throw or drop the Monitor and Pressure Sensor. Do not attempt to disassemble the Monitor except as described in section 5.1 (Battery Replacement). Do not loosen the Body Hex and Seating Nut of the Pigtail Fittings that attaches the Cable of the Sensor to the Pressure Monitor Housing.

3.3 Mounting

After the Gateway has been successfully setup, the Monitor can be mounted to the tank by following these instructions:

Warning: If the tank contains flammable liquid or vapor, extinguish all flames and smoking material before performing the Monitor installation procedure.

- Submersible units: Insert the Sensor thru the tank opening on top of tank, and lower the sensor to the bottom of the tank. Install the Pigtail Fitting to the opening of the tank. Hand-tighten Sealing Nut as far as possible. Hold the Body Hex stationary with a wrench. Using a second wrench, tighten the Sealing Nut until the cable is securely held in place.

- Tank mount units: Thread the Pressure Sensor securely into the pressure port at the bottom of the tank.

Caution: The Pressure Sensor must be installed in a manner that avoids entrapment of air. Entrapped air will cause erroneous pressure readings.

- Following RF guidelines in section 3.1, securely mount the Monitor either above the top of tank or the side of tank with properly orientation.

3.4 Activation

3.4.1 Monitors with optional Pushbutton Transmit Switch

- Monitors with optional Pushbutton Transmit Switch are factory prewired and are activated by removing the clear plastic film, thereby releasing the button.

- Once activated, the Monitor will make measurements and transmit its data.

- Additional manual transmissions can be sent by pressing and releasing the button.

3.4.2   Monitors without optional Pushbutton Transmit Switch

- Ground yourself by either wearing an anti-static wrist strap or by touching a grounded metal object (such as a copper water pipe).
- Open the cover of the Pressure Monitor Housing,
- Pull the Disable Jumper from JP3 (See Figure 1) completely out of the PCA of the Monitor. This will activate the Monitor to make measurements and transmit its data.
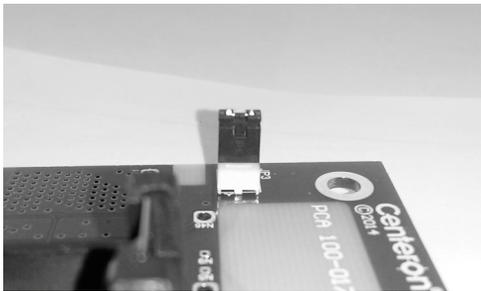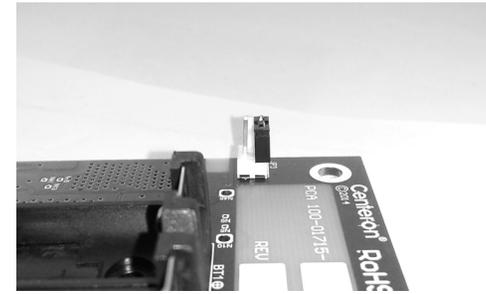

Figure 1. Disable Jumper in disable position

- Once the Disable Jumper is removed from the PCA of the Monitor, the Gateway should flicker its green "Monitor" LED to indicate that it successfully received a Monitor transmission.

Note: A second installer could verify this by watching the Gateway during Monitor activation.

Note: Store the Disable Jumper by turning the Jumper 90° from original position and place it on one pin of JP3 for future use if needed. (See Figure 2)

Figure 2. Disable Jumper in enable position

To activate multiple Monitors, repeat above steps.

Note: After activation, secure the cover of the Monitor Housing.

4.0 Troubleshooting and Testing

This section contains procedures for testing the Pressure Monitor and provides information troubleshooting the monitor installation.

If the Monitor is not operating properly, try to locate the solution below:

Question	Solution
Has the Monitor ever reported into the Data Collection System?	If Never: Verify that the Gateway is properly installed. Refer to the Gateway Instruction Manual for installation verification. Perform the Activation detailed in Section 3.4 with the Monitor installed. If this test is unsuccessful, perform the same test with the Monitor near the Gateway installation location. If successful only at bench testing, re-evaluate the installation site for RF interference problems and refer to Section 5.5 for technical support. If not successful at either test, continue with troubleshooting. Replace the Battery by following Section 5.1 and repeat the above tests. If still having problems, refer to Section 5.5 for technical support.
Does the Monitor occasionally miss scheduled report times (i.e., The Gateway reports "lost Monitor" to the Data Collection System)?	If Yes: The most likely cause is RF interference problems. Re-evaluate the installation site per Section 3.1 for RF interference problems and refer to Section 5.5 for technical support.
Does the Monitor ever report a low battery status?	If Yes: Replace both batteries by following Section 5.1 and repeat the above tests. If still having problems, refer to Section 5.5 for technical support.
Does the Monitor ever report error codes?	If Yes, find the error code below: Code ED01 or ED05: Indicates that the

Question	Solution
	Pressure Sensor is shorted or is installed in improperly tank. (Smaller measurement range sensor is installed in larger size tank) Code ED03: Indicates that the Pressure Sensor is open or disconnected, Check the connection of the terminal block connector in the Monitor Housing. Code ED06: Indicates that the Pressure Sensor doesn't touch fluid or the tank is almost empty. Code ED07: Indicates that the tank is full of fluid. Other Error Codes: Many other error codes and combinations of error codes can be reported by the monitor or Gateway. Record the code number that is reported and refer to Section 5.5 for technical support.

5.0 Servicing

5.1   Battery Replacement

If it becomes necessary to replace the battery in the Monitor Housing, follow these steps:

WARNING: TO PREVENT IGNITION OF A HAZARDOUS ATMOSPHERE, THE BATTERY MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NONHAZARDOUS.

AVERTISSEMENT: AFIN DE PRÉVENIR L'INFLAMMATION D'ATMOSPHÈRES DANGEREUSES, NE CHANGER LE BATTERIE QUE DANS DES EMPLACEMENTS DÉSIGNÉS NON-DANGEREUX.

Warning: Use Duracell DL123A (quantity 2) batteries only.

Warning: If the tank contains flammable liquid or vapor, extinguish all flames and smoking material before performing the battery replacement procedure.

1. Ground yourself by either wearing an anti-static wrist strap or by touching a grounded metal object (such as a copper water pipe).

2. Remove the Monitor's Cover by removing the 4 Phillips head screws (See Figure2).

3. Avoid contact with circuit board components, if possible. Hands should be clean and dry. Handle circuit board only by the edges.

4. Use the Disable Jumper to short two positions header on the PCB of the Monitor to disable Pressure Monitor (See Figure3).

Caution: When performing next procedures be extremely careful the Monitor is disabled.

5. Disconnect three terminal wires from Terminal Block Connector and loosen the Sealing Nut of the Pigtail Fitting. Note which wires went into which terminal connection so that you'll know how to reinstall them after replacing the batteries.

6. Remove the Monitor from the tank and transport it out of the hazardous area.

7. Cut and discard the Tie Wrap that secures the old battery.

8. Remove **BOTH** old batteries.

9. Insert the new Battery in holder BT2 (observing polarity markings molded into the battery holder).

10. Insert the new Battery in holder BT1 (observing polarity markings molded into the battery holder).

11. Install Tie Wrap that secures the new battery. Trim the free end of the wire tie leaving at least ¼" of un-trimmed material.

12. Re-install the Monitor on the tank.

13. Reconnect three sensor wires to Terminal Block, taking care that all wire strands are inside the Terminal Block and making full contact.

14. Remove the Disable Jumper to active Monitor.

    Note: Store the disable Jumper with turning the Jumper 90° from original position and place it on one pin of two positions header for future use if needed

15. Tighten the Sealing Nut of the Pigtail Fitting to original position.

16. Close the cover of the Monitor Housing. Full cover closure is required for a good seal.

17. Follow the battery manufacturer's safety and disposal guidelines.

5.2   Warranty

Please refer to the Warranty section of the General Terms and Conditions of Sale for warranty information.

5.3   Unit Disposal

The U.S. Environmental Protection Agency regulates the disposal of waste products in the United States. The EPA Regulations are listed in the "Code of Federal Regulations," CFR40, entitled "Protection of Environment." Individual states and local communities also may establish regulations covering the disposal of waste products. These may be more stringent than the federal regulations and may cover the disposal of household waste, which is not included in the federal regulation. Thus, state and local agencies should be contacted for their disposal guidelines. An approved battery-recycling center must dispose of the battery.

5.4   Service Parts List

Part Number	Description	Quantity
496KA003-04	Tie Wrap	1
039911A0001	Battery	2

5.5   Service and Technical Support

For service and technical support, contact your Distributor using the phone number provided on the Monitor or Gateway label.