

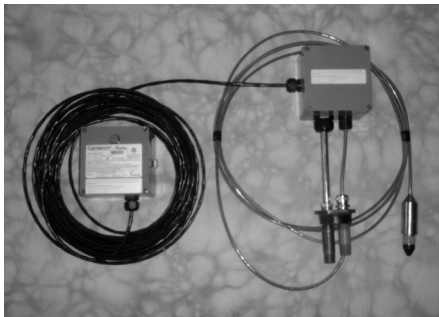
Centeron™ Pressure Monitor Adapter For Tanks That Are Not Freely Vented Instruction Manual

Model: PMP Series

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Revision A

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1.0 Introduction

This manual describes how to install, test, and service the Centeron™ Pressure Monitor Adapter for tanks that are not freely vented. This Monitor is part of the Centeron™ Level Monitoring System that includes the Data Collection System and Controller(s).

This guide does not include how to install, test, maintain or troubleshoot the Controller(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 Centeron™ Pressure Monitor is a member of Robertshaw's Spread Spectrum Radio Frequency (RF) family of products. This Monitor detects level, temperature, low battery, and system status and broadcasts this data to the system's Controller.

The Monitor is calibrated and pre-programmed at the factory with the Transmitter ID, Property Code, and Transmission Frequency. No field programming of the Monitor is required.

2.2 Operation

The Centeron Pressure Monitor is packaged in a NEMA 4X Approved, ABS housing. A second housing of the same type contains a terminal block that facilitates the connection of a pressure sensor to the remotely mounted Monitor. This junction box on top of the tank also allows the pressure sensor to be vented back into the top of the tank. Venting into the tank allows the sensor to compensate for small pressure changes associated with a tank that is not freely vented. The Centeron Pressure Monitor measures liquid level by detecting pressure changes on the pressure sensor. This level information is calculated and transmitted to the Controller using a spread spectrum radio signal in the 902–928 MHz bandwidth. Level information transmitted by the Monitor is in hundredths of a percent of the full scale pressure sensor measurement range.

The Monitor is powered by a replaceable 3-Volt battery that is designed to provide at least two (2) years life in normal service.

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: Robertshaw Industrial Products Division does not support field changes or modifications to any of the Centeron™ 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 our 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.

Required tools and equipment:

- Pipe wrench for removing existing tank plug or fitting
- Any bushings necessary to provide a 2" NPT opening on top of the tank
- Wrench capable of spanning 2.5" hex for installing mounting adapter
- Teflon thread tape or pipe sealing compound
- #2 Phillips screwdriver
- Small slotted screwdriver (blade width 1/8" maximum)
- Crescent wrench capable of spanning 1" hex

3.1 RF Site Guidelines

The Centeron™ 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 Centeron™ Monitor and Controller will provide optimum radio reception.
- The Centeron™ Monitor and Controller 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 Centeron™ Monitor and Controller the distance between these units should be limited to less than 500 feet.
- Multiple obstructions (such as two or more walls or a tank and a wall) between the Monitor and Controller 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 Controller may reflect and scatter RF energy and reduce radio signal strength at the Controller.

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

- Even small metal objects such as tank vents or toolboxes between the Monitor and Controller can significantly reduce radio signal strength if they are within a few feet of the Monitor or Controller. These objects can reflect radio signals and cause a RF “shadow” which may prevent radio signals from reaching the Controller.
- 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 and “bullet-proof” 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 Centeron™ Controller.
- The Centeron™ Controller should be mounted as high as is reasonably possible to improve its ability to receive radio signals. For example, placing the Controller on a high shelf would be preferable to setting the unit on a floor near ground level. Installing the Controller on the second floor of a two-story structure would be more desirable than installing it on the ground floor. Installing the Controller in an underground basement should be avoided.

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

3.2 Handling Guidelines

The Centeron™ 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 pull on the pressure sensor cable. Do not attempt to disassemble the Monitor except as described in section 5.1 (Battery Replacement). Do not loosen the compression fittings that attach the sensor cable or vent tube to the junction box.

3.3 Mounting

After the Controller has been successfully setup, the Tank Adapter and 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.

- Select an appropriate mounting bung on top of the tank. Remove any existing plugs or fittings and install any bushings necessary to provide a 2” NPT internally threaded opening in which to mount the Tank Adapter.
- Carefully insert the pressure sensor into the 2” NPT opening on top of the tank and gently lower it to the bottom. Be extremely careful not to damage the sensor cable on any sharp edges of the threaded opening. Any excess sensor cable should be fed into the tank. Apply thread tape or pipe sealing compound to the Adapter threads. Install the Adapter in the tank opening and tighten it with a wrench. Torque should only be applied to the wrenching flats on the mounting fitting, not to any other feature of the junction box or vent tube assembly.
- Once the sensor and Tank Adapter has been installed on the tank, the wire leading to the Centeron Monitor can be connected. Loosen the four cover screws on the junction box cover and remove the cover. Insert one end of the three-wire tray cable through the compression seal on the side of the junction box. Connect the ground wire (green, clear, or white insulation) to the terminal labeled “Shield (G)” near the center of the junction box. Connect the white wire to the terminal labeled “Signal (In)”. Connect the red wire to the terminal labeled “Supply (+)”. Tighten all three terminal block screws to 5 inch-pounds of torque. Tighten the compression nut that seals this cable at the junction box to 22 inch-pounds of torque. Replace the junction box cover and tighten the four Phillips head screws to 5 inch-pounds of torque.
- Following the RF guidelines in section 3.1 of this manual, securely mount the Monitor box either on top of tank or on the side of tank. The compression fitting and vent on the Monitor must be oriented horizontally or pointing downward, not sloping upward. Follow the instructions that are included with the supplied Magnetic Mounting Kit (Part Number 086646A0001) if this is the selected Monitor mounting method.
- Once the Monitor has been mounted, the wire leading to junction box can be connected. Coil and secure excess cable between the junction box and Monitor to prevent it from becoming tangled or damaged. Loosen the four cover screws

on the Monitor cover and remove the cover. Insert the three-wire tray cable through the compression seal on the bottom of the Monitor housing. Connect the ground wire (green, clear, or white insulation) to the terminal labeled “Shield (G)” in the upper right hand corner of the Monitor circuit board. Connect the white wire to the terminal labeled “Signal (In)”. Connect the red wire to the terminal labeled “Supply (+)”. Tighten all three terminal block screws to 5 inch-pounds of torque. Tighten the compression nut that seals this cable at the Monitor to 60 inch-pounds of torque. Verify that the wires leading from the pushbutton switch on the Monitor housing are connected to header J3 on the Monitor circuit board. Replace the Monitor cover and tighten the four Phillips head screws to 5 inch-pounds of torque.

3.4 Activation

- Monitors with the external Pushbutton Transmit Switch are activated by removing the clear plastic film, thereby releasing the button.
- Once activated, the Monitor will make measurements and burst transmissions on a factory-programmed interval. The Controller should flicker the green “Test” LED to indicate that it successfully received a Monitor transmission. The Controller will then call the Data Collection System to report the initial measurement information.

Note: A second installer could verify this activity by watching the Controller LEDs during Monitor activation.

- Additional manual transmissions can be sent by pressing and releasing the button on the Pressure Monitor. However, the Centeron Controller will not necessarily make phone calls for each of these measurements unless it is programmed to do so.
- Securing the pushbutton in the depressed position will disable the Monitor.

To activate multiple Monitors, repeat the above steps.

3.5 Site Survey

Appendix C contains a Site Survey Form, which should be filled out by the installer and retained for future reference.

Supply the following information:

- Contact Name
- Contact Address
- Contact Telephone Number
- GPS Location (latitude/longitude)
- Product Name
- Product ID
- Tank Orientation (horizontal/vertical cylinder, oblong, etc.)
- Tank Geometry (diameter, length, width, etc.)
- Tank Contents (diesel fuel, gasoline, etc.)

Figure 1 shows an example of a completed Site Survey form.

Figure 1. Example Completed Site Survey Form

Robertshaw Centeron™ Level Monitoring System Pressure Monitor Site Survey Form	
Contact Name:	John Smith
Contact Address:	12345 Elm Street Anywhere, USA 12345
Contact Telephone Number:	(123) 456-7890
GPS Location (latitude/longitude):	35° 57' 12" North - 83° 56' 44" West
Product Name:	Centeron™ Pressure Monitor
Product ID:	P000001
Tank Orientation (horizontal/vertical cylinder, oblong, etc.):	Vertical cylinder
Tank Geometry (diameter, length):	144" outside diameter X 300" height
Tank Contents:	Diesel fuel

4.0 Troubleshooting and Testing

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

If the Monitor is not operating properly locate the solution below:

Concern

Monitor has never reported to the Data Collection System

Solution

Verify that the Controller is properly installed. Refer to the Controller Instruction Manual for installation verification.

Perform the Monitor test in Section 4.1 with the Monitor installed. If this test is unsuccessful, perform the same test with the Monitor near the Controller 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 3 VDC 2/3A LiMnO₂ Battery by following Section 5.1 and repeat the above tests. If still having problems, refer to Section 5.5 for technical support.

Monitor occasionally misses scheduled report times (i.e., The Data Center reports “Lost Monitor” or Controller calls without updated Monitor data)

The most likely cause is RF interference between the Monitor and Controller. Re-evaluate the installation per Section 3.1 of this manual for anything that might cause reception issues. If these efforts do not resolve the problem then refer to Section 5.5 for technical support.

Monitor reports a low battery status

Replace the 3 VDC 2/3A LiMnO₂ Battery by following Section 5.1 and repeat the above tests. If still having problems, refer to Section 5.5 for technical support.

Monitor reports error codes

Find the error code below:

Code ED01 or ED05: Indicates that the Pressure Sensor is shorted or is installed in improperly tank. (Smaller measurement range sensor is installed in larger size tank

Concern

Monitor reports incorrect level readings

Solution

or the fluid in the tank has a specific gravity significantly greater than 1.0).

Code ED03: Indicates that the Pressure Sensor circuit is open or disconnected, Check the wiring connections at the terminal blocks in the Junction Box and 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 Controller. Record the code number that is reported and refer to Section 5.5 for technical support.

Verify that the actual tank dimensions are entered into the Data Center correctly.

Verify that the tank offset dimension is entered into the Data Center correctly. For most submersible pressure sensor applications the offset will be zero.

Verify that the correct specific gravity has been entered for the fluid in the tank.

Check the actual tank stick reading against the calculated inches of fluid that is reported by the Data Center. Be sure that the stick and Monitor readings were made at approximately the same time so that tank usage and fills do not cause apparent level differences.

4.1 Monitor Test

The Monitor is designed to wake up, take a measurement, and transmit RF data on a preprogrammed schedule or every time the button on the face of the Monitor housing is pressed and released. When the Monitor transmits its RF data, the Controller will acknowledge the receipt of the transmission by blinking the green LED labeled “Test”. If the Controller has never received data from this particular Monitor (this is the case during initial install or after the Controller has been reset), it will then initiate a call to the Data Collection System to report a “New Monitor” and request set-up data. With this in mind, use the following steps to verify installation and troubleshoot system communication problems.

1. Reset the Controller by following the guidelines under the Controller test section of the Controller Instruction Manual. Proceed to the next step only if the above is successful.
2. If testing with the Monitor at the location site, it will be necessary to have one person activate the Monitor while another watches for a response at the Controller. If bench testing, the same person can locate the Monitor close to the Controller in order to watch for a response. Activate the Monitor by pressing and releasing the button on the face of the Monitor housing. Note that the Mounting Adapter and/or pressure sensor does not need to be connected to the Monitor during this test.
3. Verify that the Controller received the RF data transmission by watching “Test” LED flicker. Green flashes indicate that a valid Monitor signal was received. Red flashes indicate that a RF signal was received but that it was not from a Centeron device or that the signal was weak.
4. Verify that the Controller initiates a phone call immediately after receiving the Monitor signal and then returns to Ready mode (See Controller Instruction Manual on how to recognize Ready mode).

Repeat the above test as necessary, using the guidance of Section 4.0 to determine the cause of communication problems.

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 EMBLEMES DÉSIGNÉS NON-DANGEREUX.

Warning: Use Duracell Ultra DL123A Lithium Manganese Dioxide 3 volt battery only.

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

1. Remove the Monitor’s Cover by removing the 4 Phillips head screws.

Caution: Disable the Monitor by securing the pushbutton switch in the depressed position or shorting the terminals of the pushbutton header (J3) on the Monitor circuit board before performing the following procedures.

2. Disconnect three terminal wires from Terminal Block Connector (See Figure 2) and loosen the Sealing Nut of the Pigtail Fitting.
3. Remove the Monitor from the tank and transport it out of the hazardous area.
4. Cut and discard the Tie Wrap that secures the old battery.
5. Remove the old Battery.
6. Insert the new Battery (observing polarity markings molded into the battery holder).

Install a Tie Wrap to secure the new battery. Leave at least 0.25” of untrimmed material at the Tie Wrap latching mechanism.

Figure 2. Terminal Block Connection



7. Re-install the Monitor on the tank.
8. Reconnect three terminal wires to Terminal Block Connector.
9. Release the Transmit Button to active the Monitor.
10. Tighten the Sealing Nut of the Pigtail Fitting to original position.
11. Close the cover of the Monitor Housing and tighten the cover screws to 5 inch-pounds torque.
12. Follow the battery manufacturers' safety and disposal guidelines.

5.2 Warranty

Seller warrants title and that products sold to Buyer shall be free from defects in material and workmanship and shall conform to specifications for a period of one (1) year from purchase for complete units and parts and subassemblies. Warranties on goods sold but not manufactured by the seller are expressly limited to the terms of warranties of the manufacturer of such goods.

Seller makes no representation or warranty of any kind, express or implied, as to merchantability, fitness for particular purpose or any other matter. Upon receipt of definite shipping instructions, Buyer shall return, transportation prepaid, all defective material, or material not conforming to specifications, to Seller, after inspection by Seller, or at Seller's election, subject to inspection by Seller. Material returned by Buyer must be returned in same condition as when received by Buyer. Defective material, or material not conforming to specifications, so returned shall be replaced or repaired by Seller and returned, freight prepaid, without any additional charge, or in lieu of such replacement or repair, Seller, may, at Seller's option, refund the purchase price applicable to such material. Seller agrees to pay return freight charges not exceeding the lowest rail or truck rate which would apply from the original destination on all defective material, or material not meeting specifications. However, Seller shall not be obligated for such charges when material returned proves to be free from defect and to meet specifications. Seller shall hold material that proves to be free from defect and to meet specifications for shipping instructions and Buyer shall furnish such instructions promptly upon request. Seller's liability shall be limited solely to the replacement or repair or to refunding the purchase price applicable to the defective material or material not meeting specifications. Seller shall not be liable for any consequential damages nor any loss, damages or expenses directly or indirectly arising from the use of the material.

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

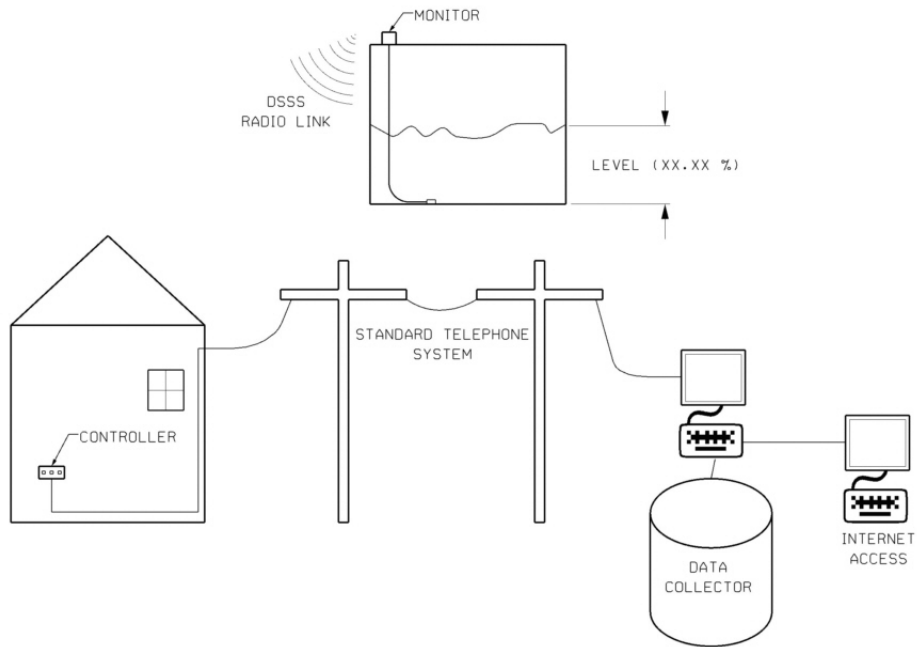
Robertshaw Part Number	Description	Quantity
040037D0001	Instruction Manual	1
086657A0001	Battery Replacement Kit	1
086646A0001	Magnetic Mounting Kit	1

5.5 Service and Technical Support

For service and technical support, contact Robertshaw Industrial Products Technical Support at (865) 981-3118.

Appendix A: Monitoring System

Figure 3. Monitoring System



Appendix C: Site Survey Form

Figure 5. Site Survey Form

Robertshaw Centeron™ Level Monitoring System Pressure Monitor Site Survey Form	
Contact Name:	
Contact Address:	
Contact Telephone Number:	
GPS Location (latitude/longitude):	
Product Name:	
Product ID:	
Product Specific Gravity:	
Tank Orientation (horizontal/vertical cylinder, oblong, etc.):	
Tank Geometry (diameter, length):	
Tank Contents:	



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