Swagelok® Remote Monitoring System
Transmitter – PTF Series Safety Manual

This manual contains important information for the safe and effective operation of the Swagelok® remote monitoring system. Users must read and understand its contents before operating the system.

Swagelok

Contents

Introduction

This document covers the installation, operation, and maintenance of the Swagelok® PTF Series Transmitter. The transmitter is part of the Swagelok Remote Monitoring System.

For further instructions on operating the complete system, see MS-13-347 Swagelok Remote Monitoring System Installation, Operation, and Maintenance Manual

For additional information, see MS-02-490 Swagelok Remote Monitoring System Application Guide.

Swagelok Company
29500 Solon Rd, Solon, OH 44139

Safe Product Use

Follow any enclosed instructions and refer to the product application guide for detailed product information. When using a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user. Improper selection or misuse of the product may result in serious personal injury or property damage.

Signal Words and Alert Symbols

WARNING	Statements that indicate a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Statements that indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Statements that indicate a hazardous situation which, if not avoided, could result in damage to the equipment or other property.

Safety alert symbol indicating a potential personal injury hazard.

Warnings

WARNING: Read the entire safety information section and user's manual before using this product. Failure to do so can result in serious injury.

WARNING: The transmitter and gateway are intended to be used as specified within this document. To avoid personal injury and/or damage to equipment, do not attempt to alter or tamper with the transmitter.

WARNING: To avoid personal injury and/or damage to equipment, do not attempt to remove a transmitter from a system while it is under pressure.

WARNING: There is a risk of explosion if the battery is replaced with an incorrect battery type. To avoid personal injury and/or damage to equipment, always use the correct battery type.

NOTICE: Pressure sensors will be visible through the Swagelok fitting port in the rear-ported configuration. Do not insert any tools or sharp objects into the bore as damage to the sensing diaphragm, which would impact transmitter performance, can result.

Special Conditions of Use

WARNING: Enclosure contains aluminum. Care must be taken to avoid hazard due to impact of friction.

AVERTISSEMENT: Le boîtier contient de l'aluminium. Prenez soin d'éviter tout danger dû aux chocs ou aux frottements.

WARNING: Potential Electrostatic Discharge - Use damp cloth to clean product.

AVERTISSEMENT: Décharge électrostatique potentielle. Utilisez un chiffon humide pour nettoyer le produit.

Certified PTF Transmitter Part Numbers

SS-PTF - S6M R - 1799

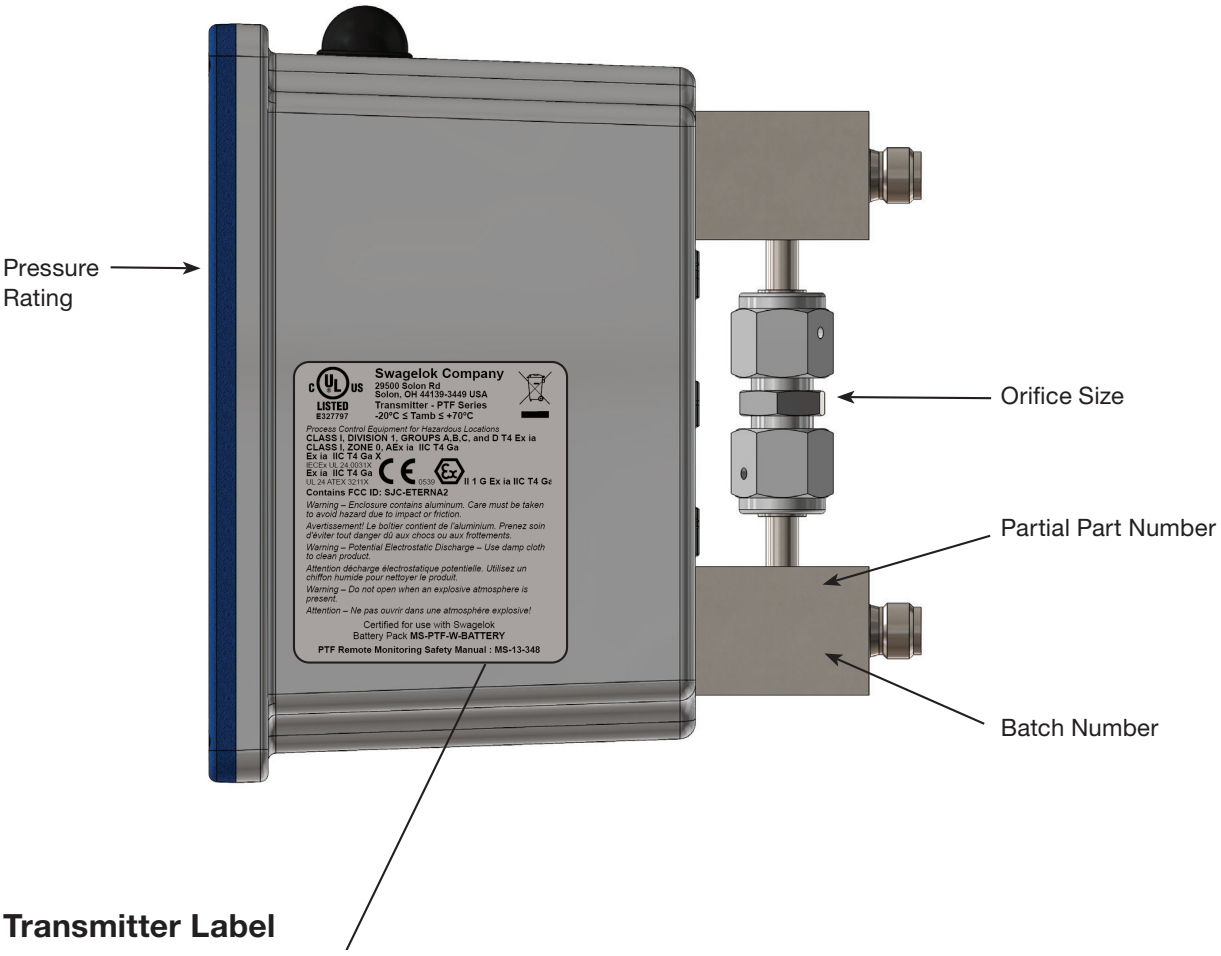
Base Model
SS-PTF

Fitting Type
S4 = 1/4 in. Swagelok Fitting
S6M = 6 mm Swagelok Fitting

Internal Orifice Diameter
BLIND = Blind (no orifice)
BT = Bore-thru diameter - 0.1800 in.
Any four digits from 0001 to 1799 representing the orifice diameter in inches to the ten thousandths place.

Pressure Connection Configuration
R = Rear Ported
V = Vertically Ported

Product Marking



Transmitter Label

Swagelok Company
29500 Solon Rd
Solon, OH 44139-3449 USA
Transmitter - PTF Series
-20°C ≤ Tamb ≤ +70°C

Process Control Equipment for Hazardous Locations
CLASS I, DIVISION 1, GROUPS A,B,C, and D T4 Ex ia
CLASS I, ZONE 0, AEx ia IIC T4 Ga
Ex ia IIC T4 Ga X
IECEx UL 24.0031X
Ex ia IIC T4 Ga
UL 24 ATEX 3211X
0539
II 1 G Ex ia IIC T4 Ga
Contains FCC ID: SJC-ETERNA2

Warning – Enclosure contains aluminum. Care must be taken to avoid hazard due to impact or friction.

Avertissement! Le boîtier contient de l'aluminium. Prenez soin d'éviter tout danger dû aux chocs ou aux frottements.

Warning – Potential Electrostatic Discharge – Use damp cloth to clean product.

Attention décharge électrostatique potentielle. Utilisez un chiffon humide pour nettoyer le produit.

Warning – Do not open when an explosive atmosphere is present.

Attention – Ne pas ouvrir dans une atmosphère explosive!

Certified for use with Swagelok
Battery Pack **MS-PTF-W-BATTERY**

PTF Remote Monitoring Safety Manual : MS-13-348

From the factory, Swagelok PTF transmitters are marked with a partial part number on the sensor body. The orifice size is marked on one hex flat of the restrictor. This facilitates changing the restrictor orifice in the field.

Grounding

CAUTION: The transmitter enclosure is a grounded device. To tie to earth ground, ensure a stable ground connection is made to the connected system. To avoid potential injury or damage to equipment, exercise caution in hazardous locations so there are not multiple grounds in a single area.

Battery Safety Information

Swagelok Company

Ordering Number: MS-PTF-BKIT

WARNING: The batteries contain lithium metal thionyl chloride ($Li/SOCl_2$) cells. To avoid risk of injury and/or accidental release of hazardous chemicals to the environment, the batteries should not be opened, disassembled, or incinerated.

WARNING: To avoid personal injury, never attempt to disassemble or otherwise modify batteries.

WARNING: Fire, explosion, or severe burns may result if mistreated. Do not short circuit, recharge, disassemble, incinerate, heat above 100C, or expose contents to water.

AVERTISSEMENT : Tout mauvais traitement peut provoquer un incendie, une explosion ou des brûlures graves. ne pas court-circuiter, recharger, démonter, incinérer, chauffer au-dessus de 100°c ou exposer le contenu à l'eau.

Safe Handling

Do Not:

- Short circuit the terminals
- Expose to temperatures above the temperature rating of the battery
- Force over-discharge (voltage below 0.0V)
- Incinerate
- Crush or puncture
- Immerse in liquids

In the event of battery rupture and/or leakage, wear personal protective equipment (PPE) and contain the spill. Ventilate the area. Then cover the spill with sodium carbonate (Na_2CO_3) or a 1:1 mixture of soda ash and slaked lime. Protect the battery/spill from water, rain, and snow. Place the damaged battery in an approved container (after cooling if necessary) and dispose according to local regulations.

Disposal Considerations

1. Dispose in accordance with the applicable local, state, and/or country regulations.
2. Disposal should be performed by licensed professional disposal firms that are knowledgeable in federal, state, and/or local requirements of hazardous waste treatment and hazardous waste transportation.
3. Never incinerate as a means of disposal.
4. Battery recycling should be done by an authorized facility.

Transmitter Ratings and Specifications

Characteristic	Rating
General	
Operating Pressure	0 to 145 psig (0 to 10 bar)
Proof Pressure	1900 psig (130 bar)
Burst Pressure	3500 psig (241 bar)
Electrical Ratings	3.6V 19Ah
Pressure Accuracy	Max ± 0.15%FS Total Error Band (incl pressure and temperature variation): ± 0.7%
Operating Temperature	–4 to 158°F (–20 to 70°C)
Flow Accuracy (Accuracy claims are at calibration point)	Full Scale: ± 7% Accuracy Class: G = 7%, qG = 50%, per VDI/VDE 3513 Sheet 2: 2008①
Max Viscosity (For Liquid Service)	Up to 50 cP
Expected Delta Pressure Between Sensors at Max Flow②	~ 5 psi
Long-Term Stability	Max ± 0.2% Full Scale (per year of service) Limited to max ± 3 mbar
Turn-Down Ratio	10:1
Environment	
Ambient Temperature	-20°C to 70°C
Vibration	IEC-60068-2-6, 10 to 500Hz, 5g
Ingress Protection	IP65, Type 4X
North American Class-Division	Class I Division 1 Groups A, B, C, and D T4
North American Zone (USA)	Class I Zone 0 AEx ia IIC T4 Ga
North American Zone (Canada)	Class I Zone 0 Ex ia IIC T4 Ga X
ATEX (Europe)	II 1 G Ex ia IIC T4 Ga
IECEx (International)	Ex ia IIC T4 Ga
Wireless Compliance	FCC

Standard liter definition: Standard conditions (std liters/min std liters/h nitrogen flow ranges) are defined as 14.7 psia (1.01 bar) at 60°F (15°C)

① In accordance with VDI/VDE 3513 Sheet 2: 2008, accuracy class is effectively equivalent to permissible error above q_G = 50%.

where:

G = Constant permissible error in percent of measured value above q_G

q_G = Flow limit value in percent of full scale

Above q_G, the permissible error is constant. Below q_G, the permissible error increases toward lower flow rates inversely proportional.

In sizing a restrictor, q_G = 50% allows for the greatest accuracy above 50% of the full scale. For assistance with PTF restrictor selection, contact your authorized Swagelok sales and service representative. Fluid media, temperature, pressure, viscosity, and density also must be considered in selecting a transmitter.

② Delta pressure determined under factory calibration conditions as listed below. If product is used under different conditions, delta pressure may be different at max flow.

Installing Transmitter Into Fluid System

CAUTION: Check the connections on the restrictor kit before connecting to a fluid system. To avoid risk of transmitter damage or bodily injury, ensure there is zero pressure in the system to which the transmitter is being connected. Unexpected pressure when swapping out a pressure gauge for the transmitter can cause transmitter damage or bodily injury.

WARNING: To avoid risk of injury, do not attempt to connect a transmitter to a system that exceeds any of the ratings. Follow the specified ratings of the transmitter to determine if a transmitter can be added into a fluid system.

NOTICE: Pressure sensors will be visible through the Swagelok fitting port in the rear-ported configuration. Do not insert any tools or sharp objects into the bore as damage to the sensing diaphragm, which would impact transmitter performance, can result.

It is **recommended** to connect each transmitter to the gateway and test the wireless connection before physically installing it into the system.

If the current restrictor kit needs to be exchanged out for a different size, see the instructions Transmitter Restrictor Kit in Swagelok *Remote Monitoring System Manual*, MS-13-347.

NOTE: The transmitter enclosure is a grounded device. To tie to earth ground, ensure a stable ground connection is made to the connected system.

NOTE: The over-voltage protection, shielding, and bonding are in accordance with the applicable IEC standards.

Notice: A filter with an element nominal pore size less than the orifice diameter should be used upstream to avoid the blockage of the restrictor kit.

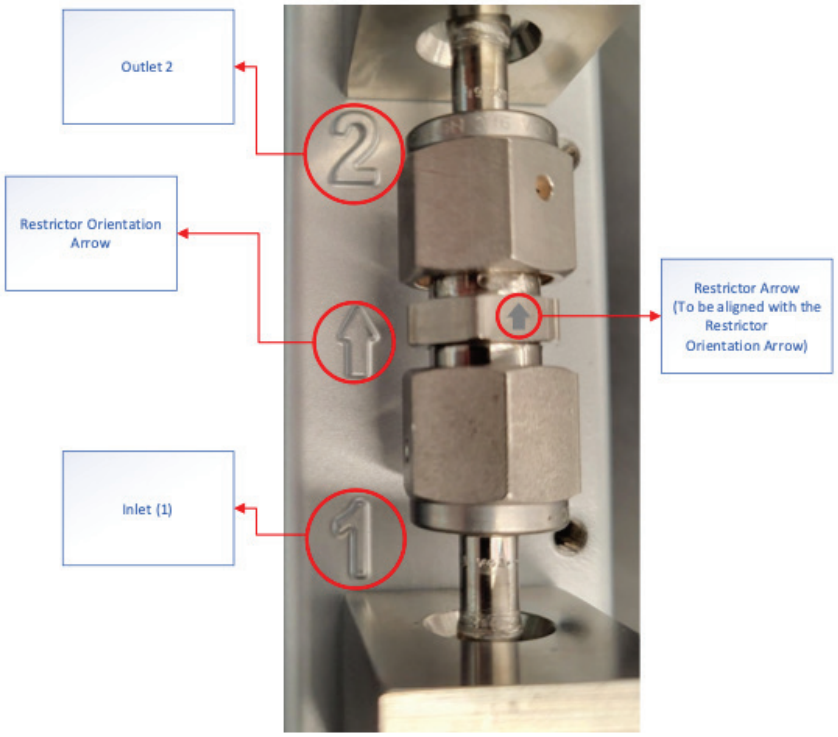
Installation Instructions

When mounted in the standard configuration of bottom to top, the transmitter measures flow with the bottom port as the inlet (1), and the top port as the outlet (2). Each restrictor is calibrated in the flow direction indicated by the marked flow arrow.

The transmitter will work if the restrictor is placed in either direction, however, the accuracy levels may be compromised if it is placed in the reverse direction.

For accurate readings, make sure the restrictor orientation arrow on the transmitter body and the restrictor arrow on the restrictor point the same direction for proper flow. Connect the transmitter to your system by following the end connection instructions for the connection type.

WARNING: To avoid risk of injury, ensure the system is depressurized before replacing any current transmitters within the system.



RECOMMENDATION: Before installation into the fluid system, use the **Menu** button on the transmitter and navigate to **Tare Device** screen to set the sensors to the atmosphere of the location where the transmitter is being installed. The taring should be done in the location where the transmitter will be installed, but before it is connected to pressure. See View Device Details in Swagelok *Remote Monitoring System Manual*, MS-13-347 for instructions on taring the transmitter.

Installation Steps

There are two different configurations (vertical and rear ported) for installing the transmitter into a system. Both the vertical and the rear ported configurations utilize standard 1/4 in. (6 mm) Swagelok connections.

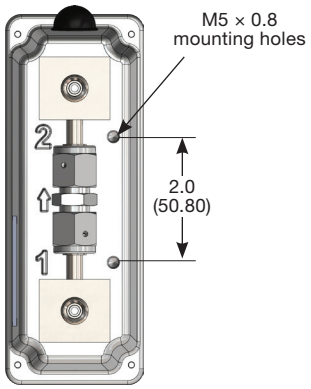
Vertically Ported

Rear Ported

1. Connect transmitter to system. To connect to the Swagelok standard end, use the Swagelok *Tube Fitting Instructions*, MS-12-01.
   NOTE: Use backup wrench on sensor bodies to avoid transmitting fitting torque to restrictor.

   WARNING: To avoid risk of injury, make sure to check the physical system installation at all connection points before pressurizing the system.

2. Transmitters are manufactured with two M5 x 0.8 mounting holes to enable proper support.



Maintenance and Repairs

Transmitter Fittings Removal from System

WARNING: To avoid risk of injury, ensure system is depressurized before doing any maintenance on the transmitter. Either check the pressure using the digital control panel or by pressing the pressure button on the transmitter to confirm the pressure is showing MIN.

CAUTION: To avoid risk of injury, do not attempt to power on the transmitter when the lid of the transmitter is open.

NOTE: Remove the transmitter from the system and transfer to a workbench for maintenance. For information on removing a transmitter from a system, see Removing Transmitter from System on page 12.

Transmitter Restrictor Kit

WARNING: To avoid risk of injury, ensure system is depressurized before doing any maintenance on the transmitter. Either check the pressure using the digital control panel or by pressing the pressure button on the transmitter to confirm the pressure is showing MIN.

NOTE: Remove the transmitter from the system and transfer to a workbench for maintenance. For information on removing a transmitter from a system, see Removing Transmitter from System in Swagelok *Remote Monitoring System Manual*, MS-13-347.

Swagelok transmitters can measure the following flow ranges with a 10:1 turn down ratio. The full-scale flow is determined by the installed restrictor orifice diameter.

Restrictor Size	Orifice Diameter, in. (mm)	Flow Measurement Ratings			
		Nitrogen, slpm	**Nitrogen,** scfm	**Water,** ccm	**Water,** gpm
0045	-0.0045 (-0.11)	0.02 to 0.2	0.0007 to 0.007	–	–
0096	-0.0096 (-0.24)	0.1 to 1.0	0.003 to 0.03	–	–
0211	-0.0211 (-0.54)	0.5 to 5.0	0.02 to 0.2	37.9 to 379	0.01 to 0.1
0421	-0.0421 (-1.07)	2.0 to 20	0.07 to 0.7	151.4 to 1514	0.04 to 0.4
0803	-0.0803 (-2.04)	8.0 to 80	0.3 to 3.0	643.5 to 6435	0.17 to 1.7
1061	-0.1061 (-2.69)	14 to 140	0.5 to 5.0	1135.6 to 11356	0.3 to 3

Each restrictor is laser marked with flow direction, calibration value, and orifice diameter as shown below.

Flow Direction **Calibration Value** **Orifice Diameter**

When mounted in the standard configuration of bottom to top, the transmitter measures flow with the bottom port as the inlet (1), and the top port as the outlet (2). Each restrictor is calibrated in the flow direction indicated by the marked flow arrow. The transmitter will work if the restrictor is placed in either either direction; however, flow accuracy can be affected when placed in the reverse direction. Match up the flow arrows on the transmitter and restrictor for proper flow direction.

Removing Transmitter from Fluid System

WARNING: To avoid risk of injury, ensure the lines are depressurized before uninstalling a transmitter or making any changes to the system.

CAUTION: To avoid damage to the sensor, do not attempt to touch the sensor with any type of probing instrument.

CAUTION: To avoid damage to the transmitter, only open the lid of the transmitter in a safe location.

WARNING: See Safety in Swagelok *Remote Monitoring System Manual*, MS-13-347 for information on safety ratings and the protective techniques used for intrinsic safety.

Removal Steps

1. Ensure that the system is depressurized before removing a transmitter from the system.

2. Power down the transmitter before disconnecting the physical transmitter. If the transmitter is powered on, power off the transmitter by holding down the power button for 5 to 10 seconds until the screen says POWER OFF.
NOTE: For removing a transmitter from the gateway, see Remove Transmitter from Gateway in Swagelok *Remote Monitoring System Manual*, MS-13-347.

3. To disconnect the transmitter, use the Swagelok *Tube Fitting Instructions*, MS-12-01, to disassemble the connections.

Installing a Restrictor

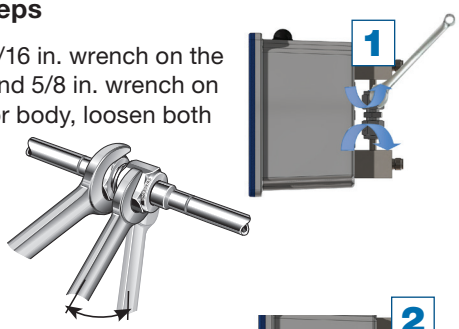
For installation or changing of a restrictor kit, follow the instructions below for installation.

Tools Required:

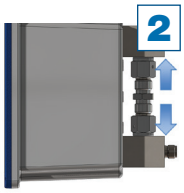
- 5/8 in. wrench
- 11/16 in. wrench

Installation Steps

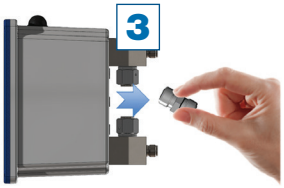
1. Using an 11/16 in. wrench on the VCO® nut and 5/8 in. wrench on the restrictor body, loosen both VCO nuts.



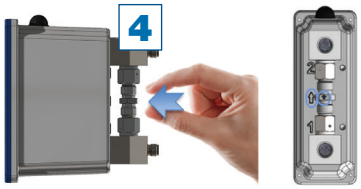
2. Slide the VCO nuts away from each other and toward the bodies.



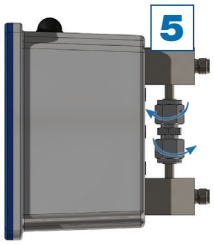
3. Remove old restrictor. Store or discard after removal.

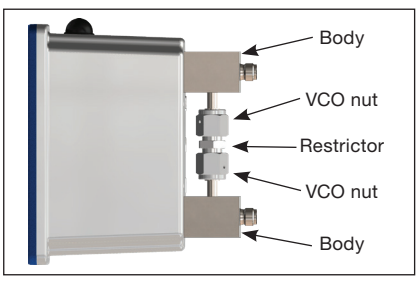


4. Place new restrictor in the gap between the bodies, confirming that the restrictor flow arrow is in same direction as flow arrow on transmitter. If the restrictor gap is too tight for the new restrictor to fit, gently pull bodies outward to expand the gap.

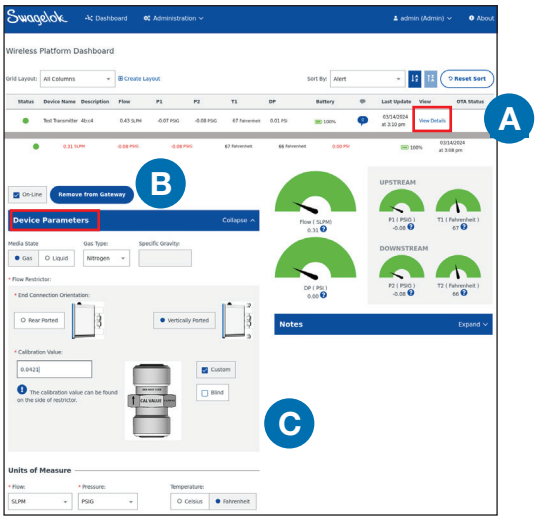


5. Tighten both VCO nuts to finger-tight and then torque them to wrench-tight using an 11/16 in. wrench on the nut and a 5/8 in. wrench on the body.

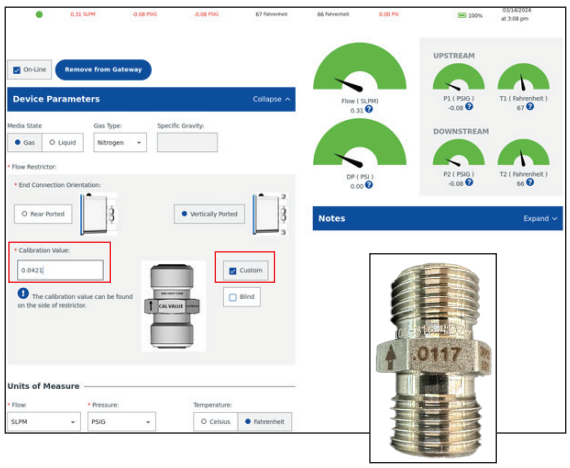




6. After changing the physical flow restrictor, navigate to **Main Dashboard** on the gateway. Go to the transmitter's **View Details** page (A). Select the **Device Parameters** drop-down (B). The **Device Parameters** will display (C).



7. The calibration value of the restrictor is marked on the side of the restrictor. Ensure the **Custom** checkbox is checked and enter that value into the field under **Device Parameters**. A notification box will appear confirming the user wants to change the factory calibration. Select **Yes**. Then, select **Save Device** at the bottom of the page after completing these steps to upload the new configuration values into the transmitter.
NOTE: Changes made to this page upload new data to the transmitter. Do not interrupt the **Save Device** function by navigating anywhere else on the page. The page will automatically reroute back to the main dashboard when complete.



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Battery Replacement

The transmitter's battery is located inside the housing and is a nonrechargeable D-Cell lithium battery. For removal of a transmitter from the system, see Removing Transmitter from System on page 12.

WARNING: To avoid risk of injury, do not connect or disconnect the battery in a hazardous location.

WARNING: To avoid risk of injury and/or explosion, always use the correct battery type.

CAUTION: To avoid risk of injury, do not attempt to power on the transmitter when the lid of the transmitter is open.

NOTICE: Removing the transmitter from the system and transferring it to a workbench for maintenance are considered a best practice.

Maintenance Kits

Ordering number: MS-PTF-BKIT

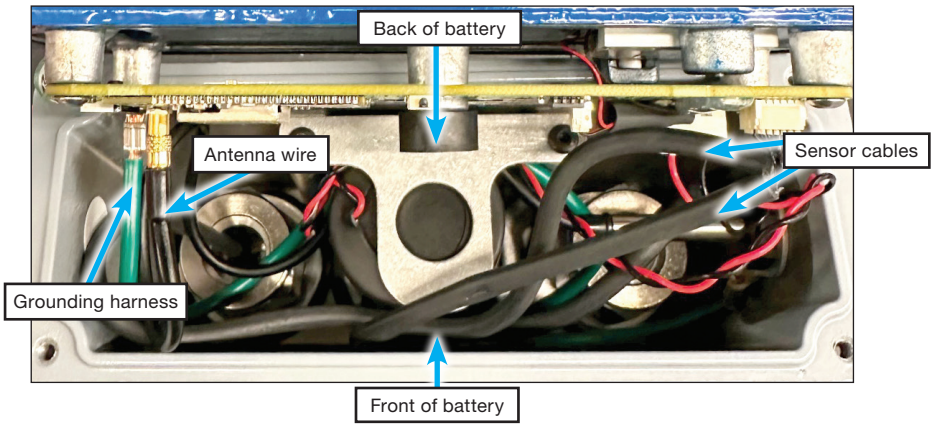
- Battery (Part number: MS-PTF-W-BATTERY)
- Gasket (Part number: EP-PTF-ENCL-GASKET)
- Lid screws (×4)
- Foam insert
- Battery retention screws (×2)

Tools Required

- 3/32 in. hex key – for lid screws
- 5/64 in. hex key – for battery retention screws

Wiring Pinch Points

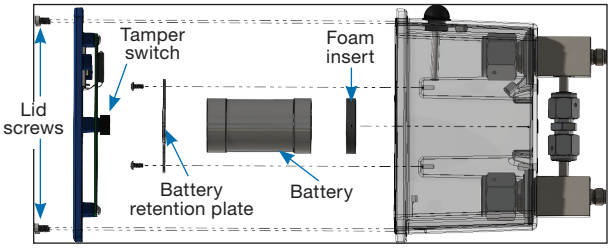
1. Sensor cables should be routed and tucked in front of the battery.
2. Excess ground and antenna wire should be tucked on the back side of the battery.
3. Excess battery wire should be tucked on the back side of the battery.



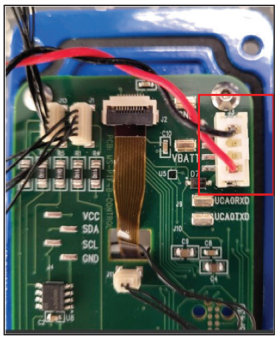
Battery Replacement Steps

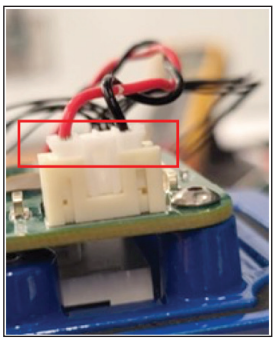
1. If the transmitter is powered on, power off the transmitter by holding down the power button for 5 to 10 seconds until the screen says **POWER OFF**.

2. Remove the four lid screws holding the transmitter lid to the transmitter rear enclosure.
3. Gently pull the lid away from the rear enclosure keeping in mind that wires are attached to the lid.
4. Remove the battery retention screws and plate.

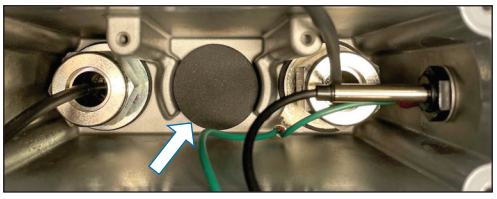


5. With the lid removed, disconnect the battery connector from the circuit board on the lid of the enclosure and remove the battery from the housing. To remove the connector from the board, pull on the plastic top of the connector as opposed to the wires.

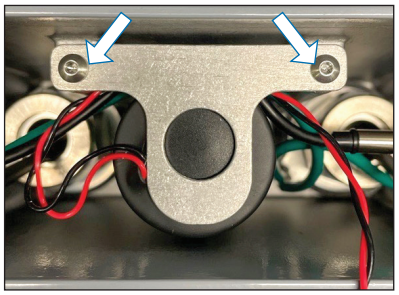




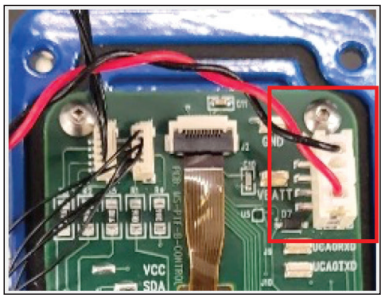
6. **OPTIONAL:** A new foam insert and enclosure lid gasket are provided. If replacement of these items is desired, do the following:
   – Remove old foam battery insert and enclosure lid gasket using a pick or screwdriver.
   – Push new foam battery insert into rear enclosure until it is bottomed.
   – Push new enclosure lid gasket into the lid until it is bottomed, taking care to not twist it.



7. Place the new battery against the foam insert in rear enclosure and install the battery retention plate, being careful not to pinch the battery wire with the retention plate. For installation of the battery retention plate screws, tighten each of the screws to approximately 5 in.·lb (0.34 N·m).
   NOTE: New screws are included with the kit to replace any screws that are lost.

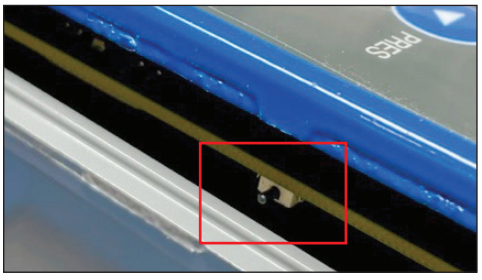


8. Reattach the **battery connector** to the transmitter board.
9. Orient the lid properly for reattaching.



   – The top of the lid (screen and Swagelok logo) should be closest to the antenna.
   – Locate the tamper switch attached to the printed circuit board on one side of the lid.
   – Orient this side of the lid so the tamper switch is depressed first when aligned with the rear enclosure.
   – Align the other side of the lid flush with the enclosure.

When reinstalling the lid of the transmitter, notice that the **tamper switch** is located on the side of the printed circuit board. Reposition one side at a time.



CAUTION: Care must be exercised when aligning the lid. The **tamper switch** that is located on one side of the printed circuit board must not be pinched with the rear enclosure before tightening the screws. Failure to do so may result in breaking the **tamper switch**.

10. Once lid is flush on the rear enclosure, tighten each of the screws to approximately 15 in.·lb (0.34 N·m) in an alternating pattern.

11. Reinstall the transmitter in the system. Turn the unit on and the system will recognize the transmitter. See Installing Transmitter into Physical System on page 9.
NOTE: The gateway will display a notification that the tamper switch has been triggered once it is back online.
12. If a new battery has been installed, reset the battery indicator using the following instructions.
NOTE: Refer to the Battery Safety Information on page 6, for information on old battery disposal.

    Press the **Menu** button, navigate to the **NEW BATT** option, and press the **Confirm** button.

    Use the **Up** button to toggle between **Y** (Yes) and **N** (No). Select **Y** and press the **Confirm** button. This will reset the battery life indicator on the transmitter, and it will return to full.

    NOTE: The battery life is calculated based on current draw during operation of the system. Resetting the battery indicator without replacing the battery will cause the transmitter to indicate a full battery regardless of actual battery life remaining. When installing a new battery, failure to perform the reset of the battery life indicator may result in a premature battery replacement in the future.

    The symbol on the top right of the screen shows the **battery level** on the transmitter.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

Safe Product Selection
When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

⚠ WARNING
Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Each product catalog and user manual is up to date at the time of printing; subsequent revisions to individual product catalogs and user manuals will be posted to www.swagelok.com and will supersede the printed version.

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