Large Diaphragm Gas IMU Installation Guide

PN 224-010001 (for American meters)

Silver Spring® NETWORKS

January 25, 2016, Rev 5

Silver Spring® NETWORKS

What this guide covers

This guide covers only the physical aspects of Gas IMU installation for commercial index top-mount gas meters.

There are other steps required in the installation process, such as recording the current meter read and other parameters that are needed for programing the IMU itself. Please refer to the applicable programing guide for those steps.

25 January 2016

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Safety First!

⚠ CAUTION

- **Always follow applicable standards for safety!**

- **Refer to the meter documentation for further safety information.**

- **Follow your employer's best practices.**

- **If you smell gas, report it to the utility.**

- **Do not use power tools!**

Large Diaphragm Gas IMU
Installation Guide - American, Rev 5

25 January 2016
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Gas IMU Use Warning

WARNING!

Device connected to the IMU must meet the following requirements:

- **Maximum Voltage Out: V_O = 0 VDC**
- **Maximum Current Out: I_O = 0 amps**
- **Capacitance Allowed: $C_a \leq 680$ µF**
- **Inductance Allowed: L_a = 0 H (no inductance allowed)**

IMU Interface values:

- **Maximum Voltage Out:* V_O = 3.6 VDC**
- **Maximum Current Out*: I_O = 43 amps**
- **Maximum Input Voltage Allowed: V_{max} = 0**
- **Maximum Input Current Allowed: I_{max} = 0**
- **Maximum Internal Capacitance: C_i = 389 µF**
- **Maximum Internal Inductance: L_i = 7.5 µF**
- **Maximum Input Power: P_i = 0**

*Under fault conditions only; not nominal operating parameters

- **Hazardous Location Class 1 Division 1 Group D. Temperature Code T4A**

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RF Exposure Notice (509)

- The antenna of this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- The device should be installed so that people will not come within 20 cm (8 in.) of the antenna.

- This equipment has been tested and found to comply with Part 15 of the FCC Rules, and with Industry Canada license-exempt RSS standard(s). This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  - Reorient or relocate the receiving antenna.

  - Increase the separation between the equipment and receiver.

*Modifications to the Gas IMU not
expressly approved by Silver Spring Networks
may void your authority to operate the IMU.*

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Canadian Compliance

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Overview

1. Inspect the Gas IMU remote box.

2. Inspect the direct mount enclosure.

3. Remove the index assembly from the meter.

4. Clean the meter surface.

5. Align the direct mount enclosure to the meter.

6. Place the optional mounting plate.

7. Install the index assembly on the direct mount enclosure.

8. Install index assembly tamper protection.

9. Trim the pulser cable wires.

10. Connect the pulser cable to the Gas IMU.

11. Tighten the liquid-tight connector on the Gas IMU remote box.

12. Cinch and trim the zip tie.

13. Connect the battery.

14. Inspect the Gas IMU remote box gasket.

15. Wake up the Gas IMU.

16. Fasten the Gas IMU remote box lid.

17. Install the Gas IMU remote box tamper seals.

18. Determine the Gas IMU remote box mounting configuration.

19. Attach the mounting plate to the Gas IMU remote box.

20. Mount the Gas IMU remote box.

21. Dress the pulser cable.

22. Verify the installation.

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Kit Components

Verify that all components are present in the installation kit.

Component	Qty.	Part Number
Gas IMU	1	177-000027
Direct mount enclosure	1	178-0399-00
Fillister head screws **18-18 x 2.8”**	4	400-0183-00
Tamper wire	1	591-0084-00

25 January 2016

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Kit Components (continued)

Component		Qty.	Part Number
Gas IMU gel splices		3	180-0005-00 (packaged together)
Gas IMU remote box tamper seals		2	**Note:** The Gas IMU gel spices, Gas IMU remote box tamper seals, and the screws and nuts for attaching the Gas IMU remote box to the mounting plate are part of 180-0010-00, which is included with 180-0005-00.
Nuts – for attaching the Gas IMU remote box to the mounting plate 10-24		2	
Screws - for attaching the Gas IMU remote box to the mounting plate 10-24 x 1/2"		2	
Gas IMU remote box mounting plate		1	
Pipe clamp –for securing the Gas IMU remote box to a pipe		1	
Gas IMU remote box lid screws 6-32 x 7/8"		4	

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Components

Enclosure cover

Direct mount enclosure

Fillister head screws
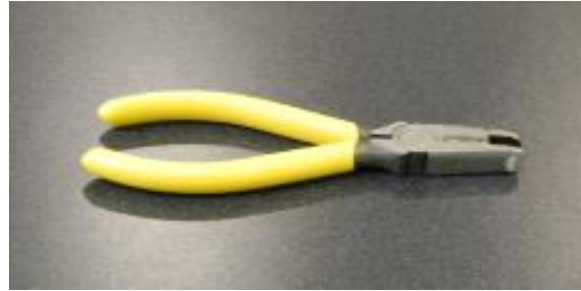
Tamper seals and wire

Required Tools

Wire cutters

Gel cap connection tool

Nut driver

Service magnet

Pliers, such as 6-inch slip joint pliers

Optionally, a wire brush or scraper

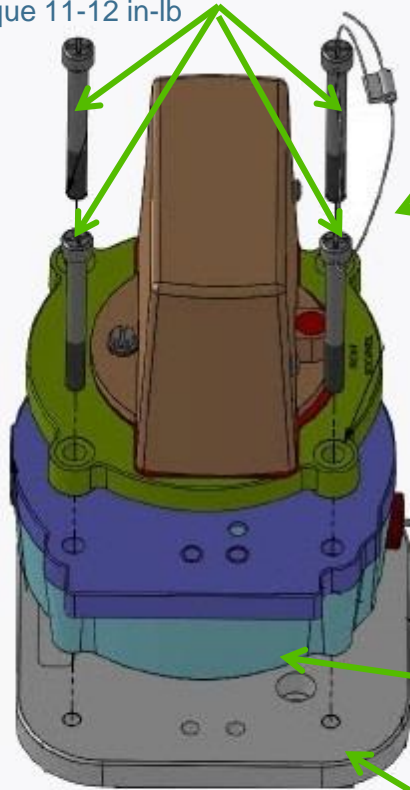# Required Tools (continued)

2.5-11.5"- pounds pre-set adjustable torque range screwdriver
05074720002 B003KN3GDC, available on Amazon

11.0-29"- pounds variable torque adjustment range screwdriver
05074711002 B003KN3GAK, available on Amazon

Assembly Drawing – Complete

Fillister head screws
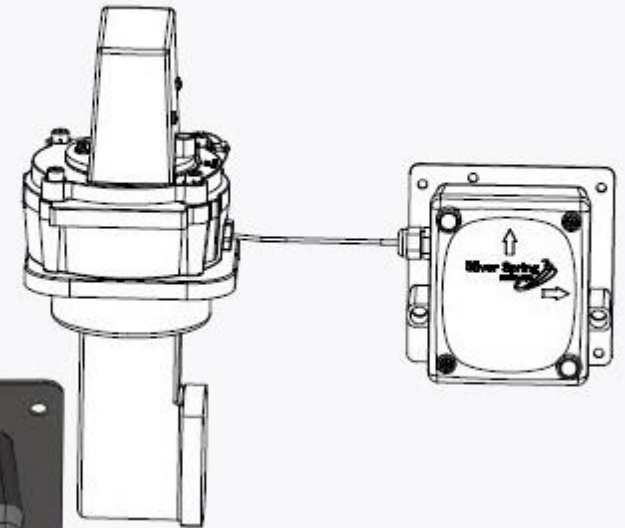Torque 11-12 in-lb

Tamper wires for meters without tamper seal cups

Gas IMU remote box mounting plate

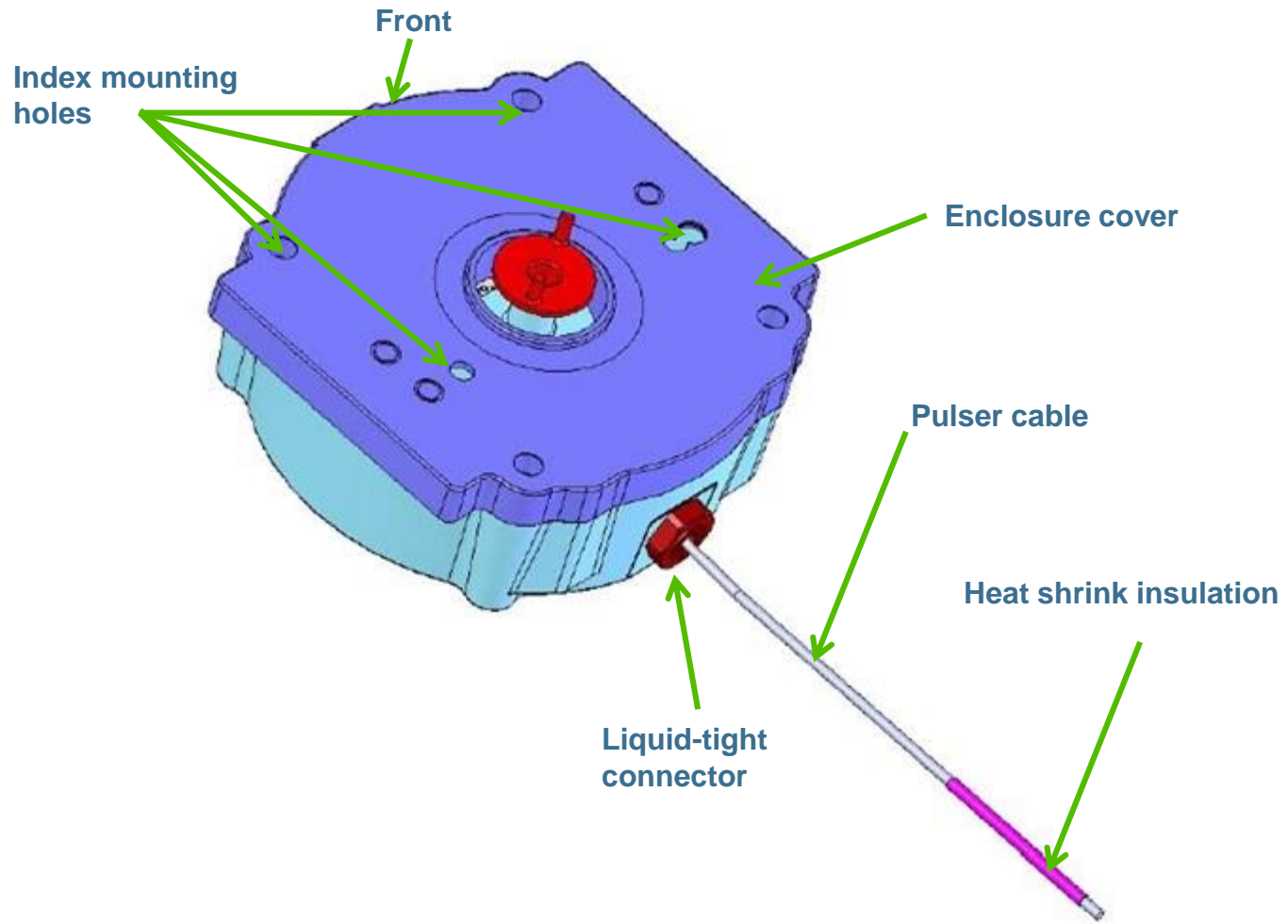Direct mount enclosure with pulser cable

Interface plate

Gas IMU remote box

Assembly Drawing – Direct Mount Enclosure

Front

Index mounting holes

Enclosure cover

Pulser cable

Heat shrink insulation

Liquid-tight connector

Assembly Drawing – Gas IMU Remote Box

Tamper seals

Liquid-tight connector
Torque 14 in-lb

Pulser cable

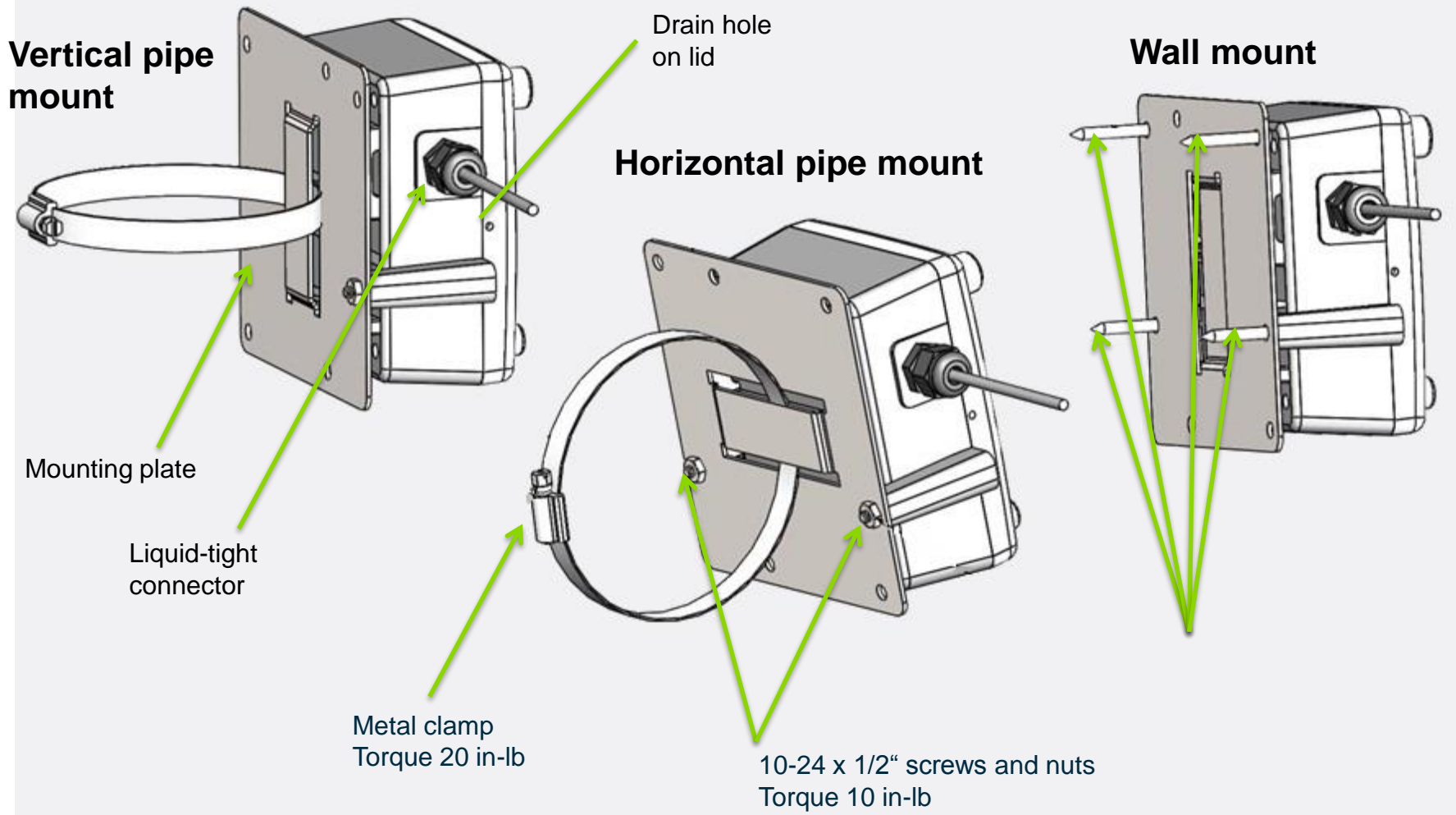Pulser cable
zip tie

6-32 x 7/8 " screws,
Torque 5.0 in-lb

Pulser cable
wires

Antenna bar

Gel splices

Large Diaphragm Gas IMU
Installation Guide - American, Rev 5

25 January 2016
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Assembly Drawing – Gas IMU Remote Box Pipe and Wall Mounts

Vertical pipe mount

Drain hole on lid

Wall mount

Horizontal pipe mount

Mounting plate

Liquid-tight connector

Metal clamp
Torque 20 in-lb

10-24 x 1/2" screws and nuts
Torque 10 in-lb

Note: An optional mounting plate that places the remote box closer to the index assembly is available and is discussed later in this guide.
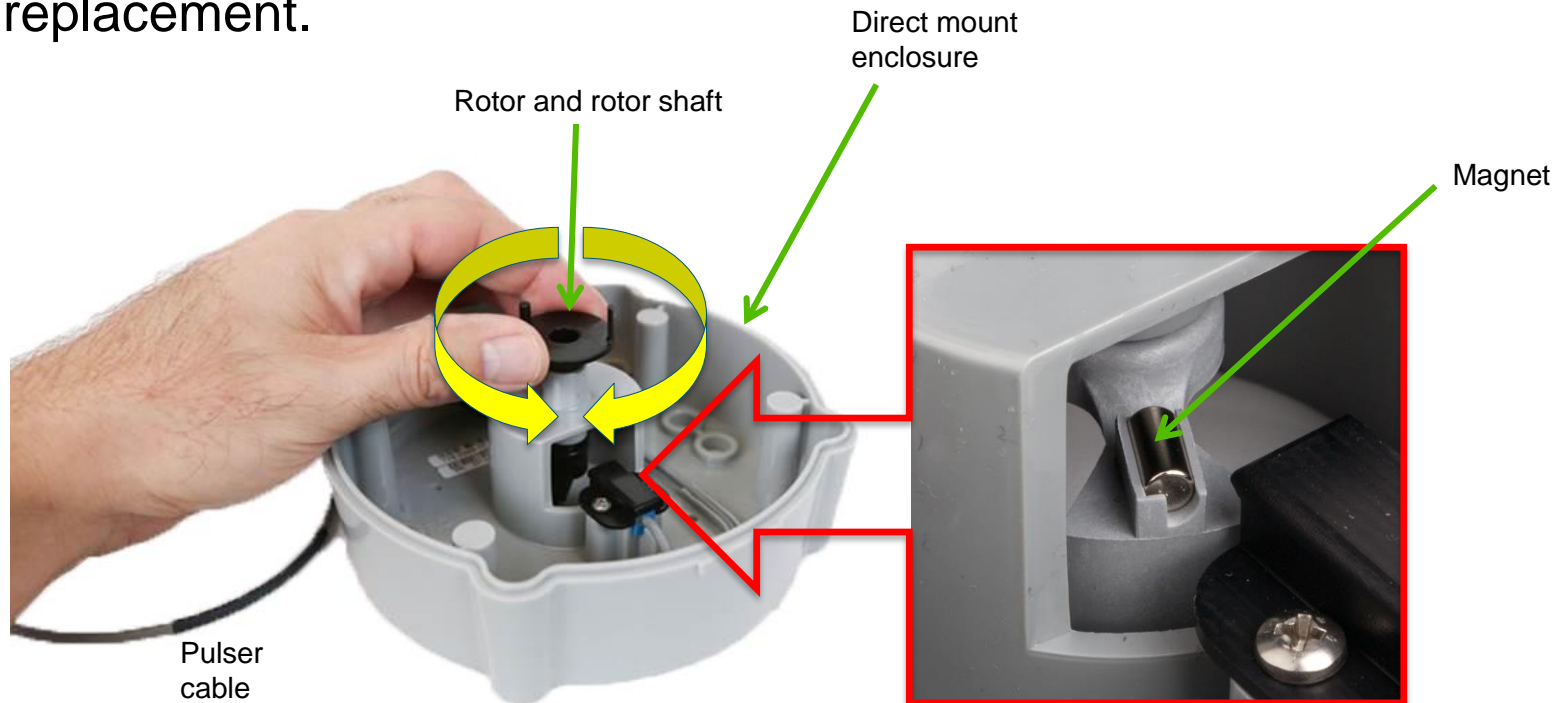
Inspecting the Gas IMU Remote Box

- Verify that the Gas IMU remote box is not cracked and that the MAC address label is present.

- Remove the remote box lid.

- Verify that the battery wires are undamaged.

If the remote box assembly is damaged, return it to your supervisor and get a replacement.

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Inspecting the Direct Mount Enclosure

- Ensure that the direct mount enclosure is not cracked.

- Ensure that the pulser cable is not cut.

- Ensure that the rotor shaft turns smoothly and that the magnet is present. If the magnet is missing, contact your supervisor for a replacement.

Direct mount enclosure

Rotor and rotor shaft

Magnet

Pulser cable

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Removing the Index Assembly from the Meter

Unscrew the index assembly screws and lift the index off of the meter.

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Cleaning the Meter Surface

Using a wire brush or scraper, clean the meter surfaces where the direct mount enclosure will interface with the meter. Be sure to remove any remaining parts of the old gasket.
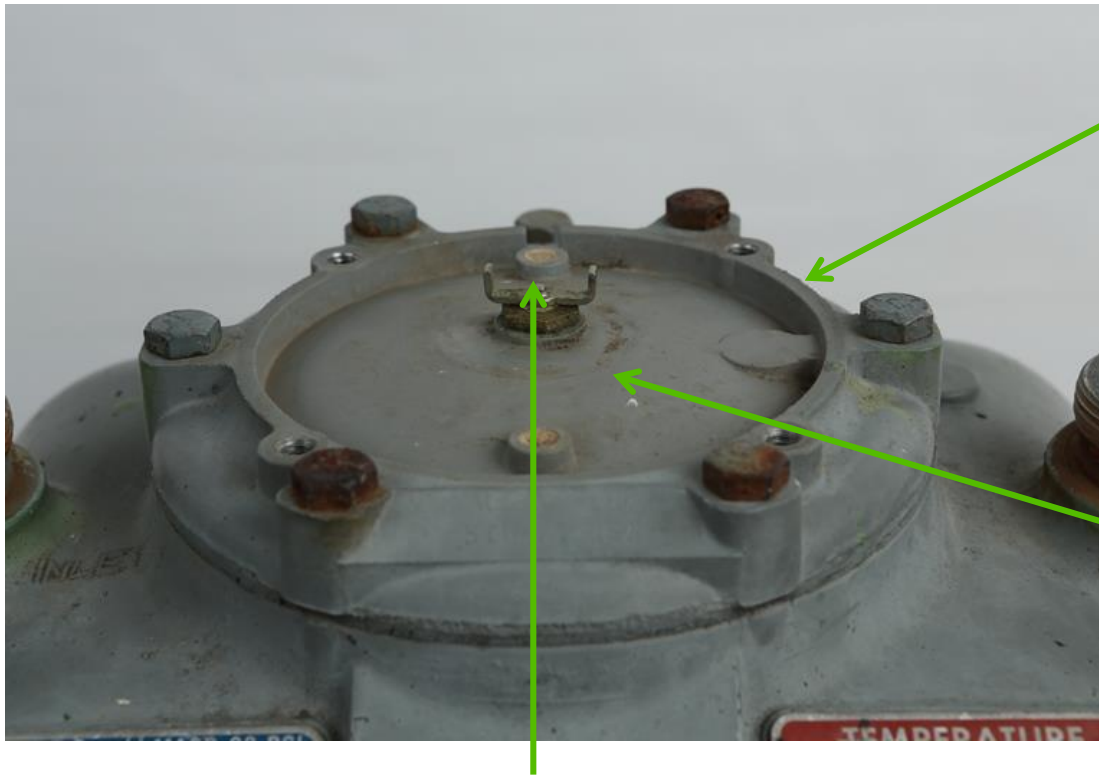

Clean the mounting lip

Clean the mounting surface around the meter drive wriggler

Meter drive wriggler

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Aligning the Direct Mount Enclosure to the Meter

- Ensure that the rotor gear and meter drive wriggler do not interfere with each other.

- Ensure that the rectangular tabs on the direct mount enclosure face the front of the meter with the pulser cable leading toward the back.

Rotor gear

Meter drive wriggler

Rectangular tabs to front
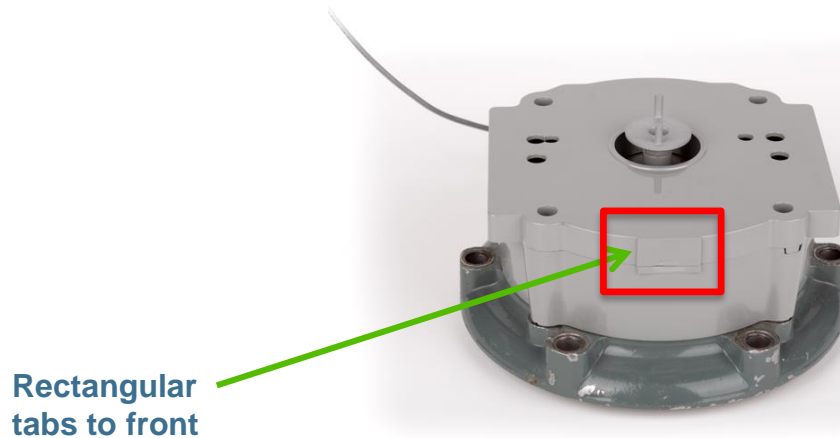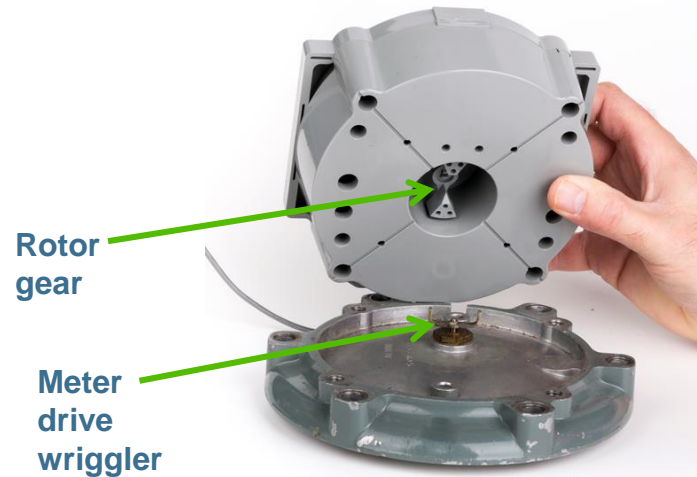
Placing the Optional Mounting Plate

If you are using the optional mounting plate to mount the remote box behind the meter, place the plate over the cover assembly as shown.

Front of direct mount enclosure

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Installing the Index Assembly on the Direct Mount Enclosure

1. Place the index assembly on the direct mount enclosure.

2. Using the your fingers, loosely fasten the four 18-18 x 2.8" screws through the index assembly and enclosure.

3. Tighten the screws using the torque indicated on the **Assembly Drawing** pages with an alternating tightening pattern.
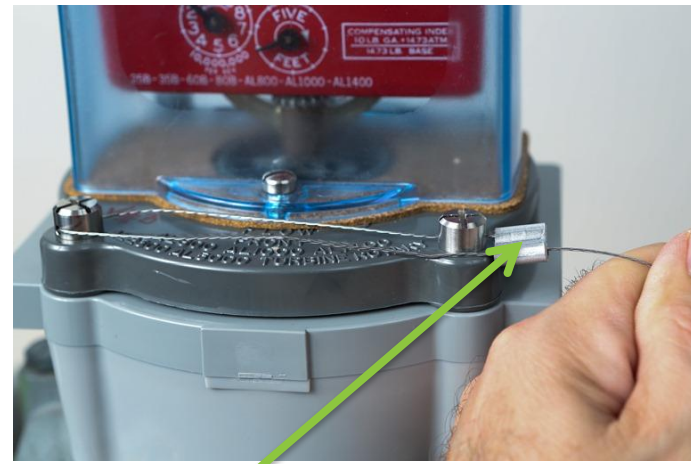
Front of direct mount enclosure

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Installing Index Assembly Tamper Protection

- If the index assembly has a tamper cup, push the tamper seal into the cup with a nut driver.

- If the index assembly uses a tamper wire, thread the tamper wire through the Fillister head screws and crimp the wire seal with pliers.

Index assembly with tamper cup uses a tamper seal

Index assembly without a tamper cup uses a tamper wire with wire seal

Large Diaphragm Gas IMU
Installation Guide - American, Rev 5

25 January 2016

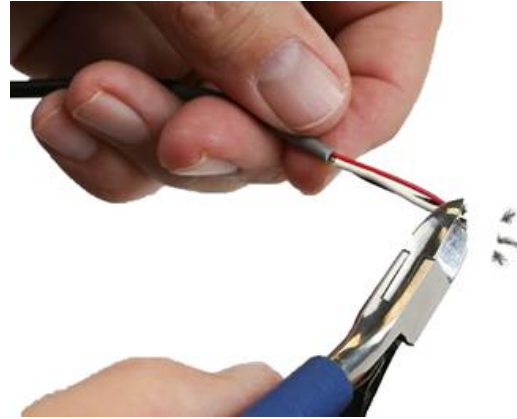*Silver Spring Networks Confidential*

About Extending Gas IMU Cables

You can extend the Gas IMU pulser cable provided with the kit up to 800 feet as described on this page if needed for the IMU to communicate over the Silver Spring mesh network without loss of consumption pulses when using Silver-Spring-recommended splicing material and process.

1. Determine if you need to locate the IMU further away from the meter than the existing pulser cable allows.

2. If you need to extend the pulser cable, Silver Spring recommends using a product similar to the following:
   NATIONAL WIRE & CABLE SR10-7833 REVISION_.A, SIX CONDUCTORS OF STRANDED 24AWG, INDIVIDUALLY INSULATED, CABLED AND SHIELDED WITH OVERALL FOIL SHIELD AND DRAIN WIRE, AND EXTRUDED WITH AN OVERALL SANTOPRENE BLACK JACKET

3. Ensure that the IMU is using Silver Spring UtilOS firmware 2.14.3001 or later. This version provides cut-cable detection and accurate counting for cables up to 800 feet. You can have total cable lengths up to approximately 50 feet with earlier versions of the firmware although there is no cut-cable detection in such cases.

4. Trim all cable ends (as discussed on the next page) and splice the cable extension onto the pulser cable using appropriate gel caps (similar to those Silver Spring provides for the IMU-end connections—for example, Silver Spring 916-000001 or Tyco 552795-2).

5. Use at least two zip ties with at least a one-inch space between them to secure the extension cable to the pulser cable and prevent stress on the gel spliced connections, and wrap with appropriate tape (for example, Rubber Mastic Tape such as 3M Scotch Rubber Mastic Tape 2228). Ensure that the tape covers the jacket ends and the splices.

Trimming the Pulser Cable Wires

Using the wire cutter, trim the end of the three wires at the end of the pulser cable so no bare wires are exposed.

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Connecting the Pulser Cable to the Gas IMU

1. Open the Gas IMU remote box lid with the Phillips screwdriver and set it aside.

Large Diaphragm Gas IMU
Installation Guide - American, Rev 5

25 January 2016
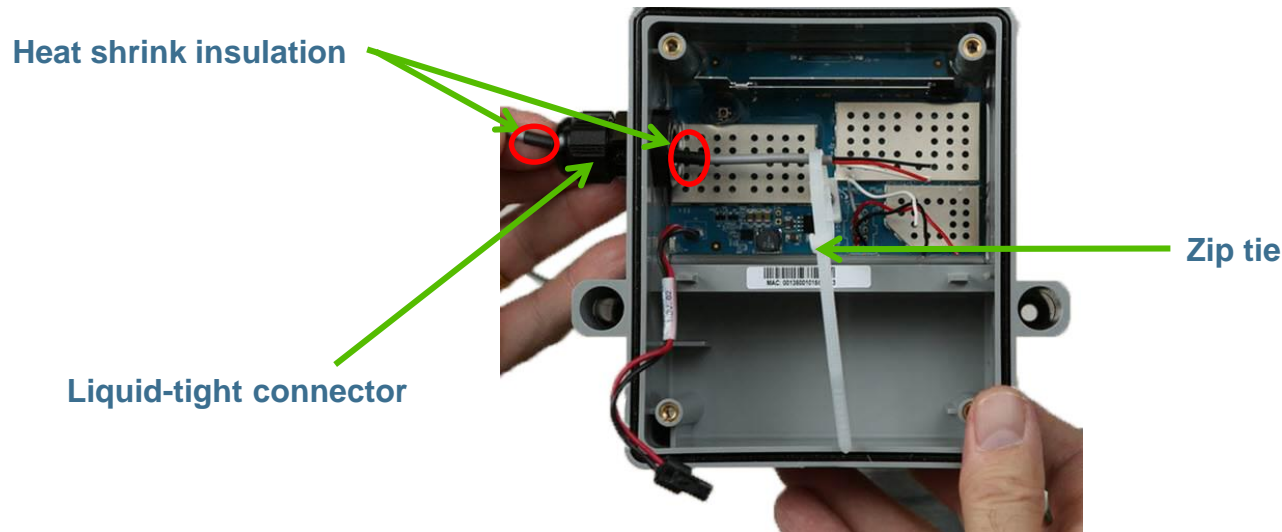*Silver Spring Networks Confidential*

Connecting the Pulser Cable to the Gas IMU
(continued)

Note: If you are using the optional mounting plate to mount the remote box behind the meter, you can route the pulser cable through the lower, oblong hold in the plate, but you need to do this before securing the cable to the IMU.

2. Thread 4 to 6 inches of the pulser cable through the Gas IMU remote box liquid-tight connector and the zip tie. The black heat shrink insulation on the cable must be centered through the opening to keep the cable snug.
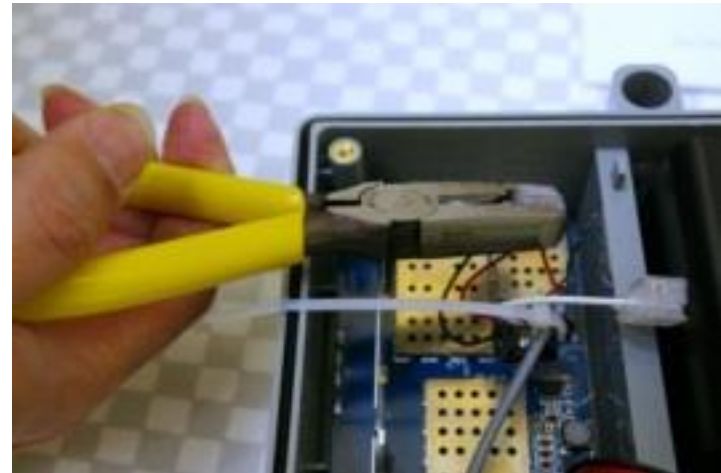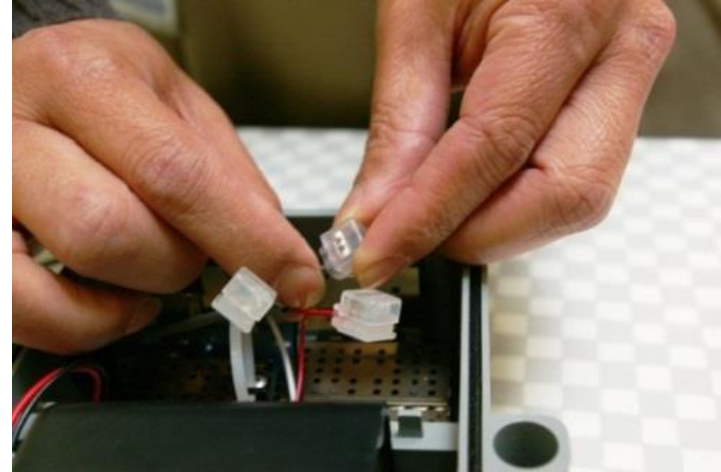

Heat shrink insulation

Zip tie

Liquid-tight connector

Connecting the Pulser Cable to the Gas IMU
(continued)

Note: Do NOT strip the insulation from the wires when you connect the cable to the gel splices.
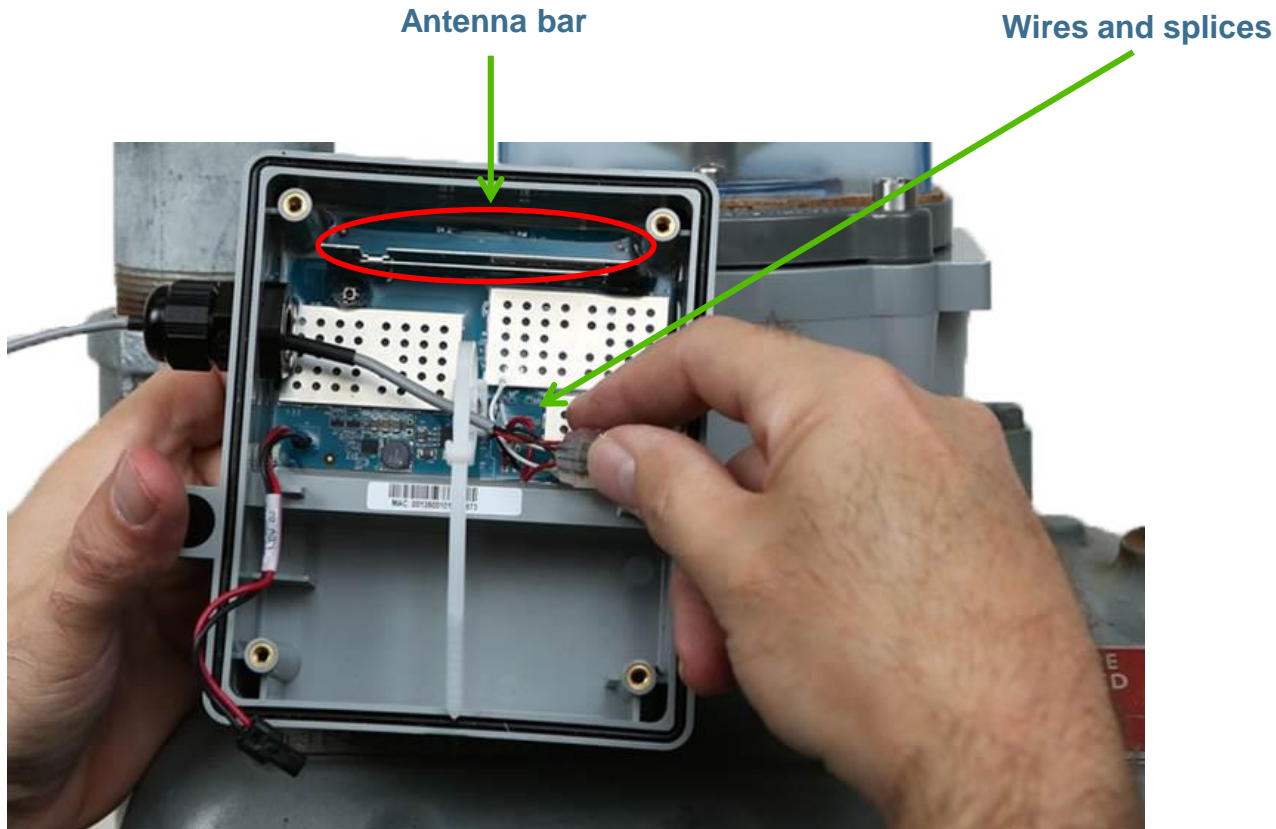
3. Inside the Gas IMU remote box, insert each of the wire pairs (red and red, black and black, white and white) into a gel splice and push all the way into the splice.

4. Close each gel splice by squeezing it with the gel cap connection tool. The gel splices pierce the insulation to make the electrical connection.

25 January 2016

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Connecting the Pulser Cable to the Gas IMU
(continued)

5. Gently tug on the wires to ensure that they are secure.
6. Tuck the wires and splices away from the metal antenna bar.
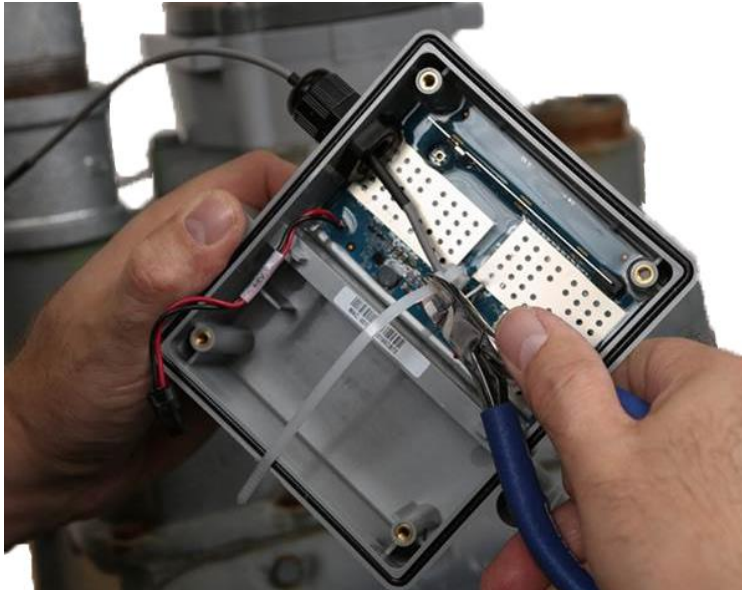
Antenna bar

Wires and splices

Tightening the Liquid-Tight Connector on the Gas IMU Remote Box

Tighten the liquid-tight connector using the torque specification on the **Assembly Drawing** pages.

Liquid-tight connector

25 January 2016

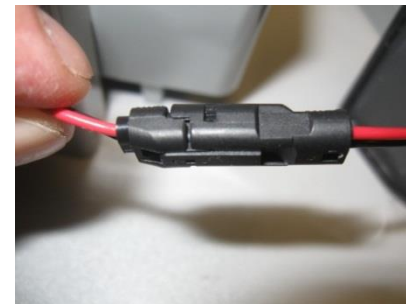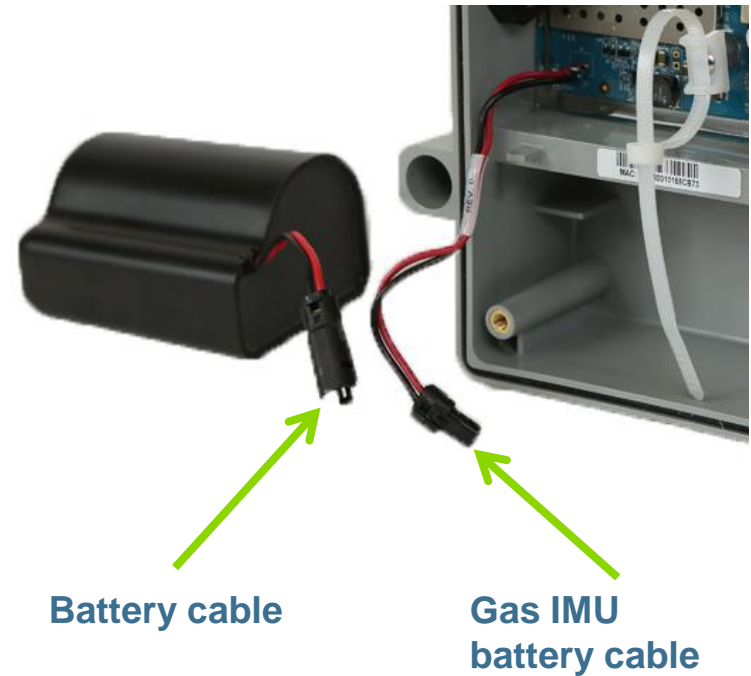*Silver Spring Networks Confidential*

Cinching and Trimming the Zip Tie

1. In order to keep the wires away from the antenna bar, cinch the zip tie until snug.

2. Trim off the end of the zip tie.

25 January 2016

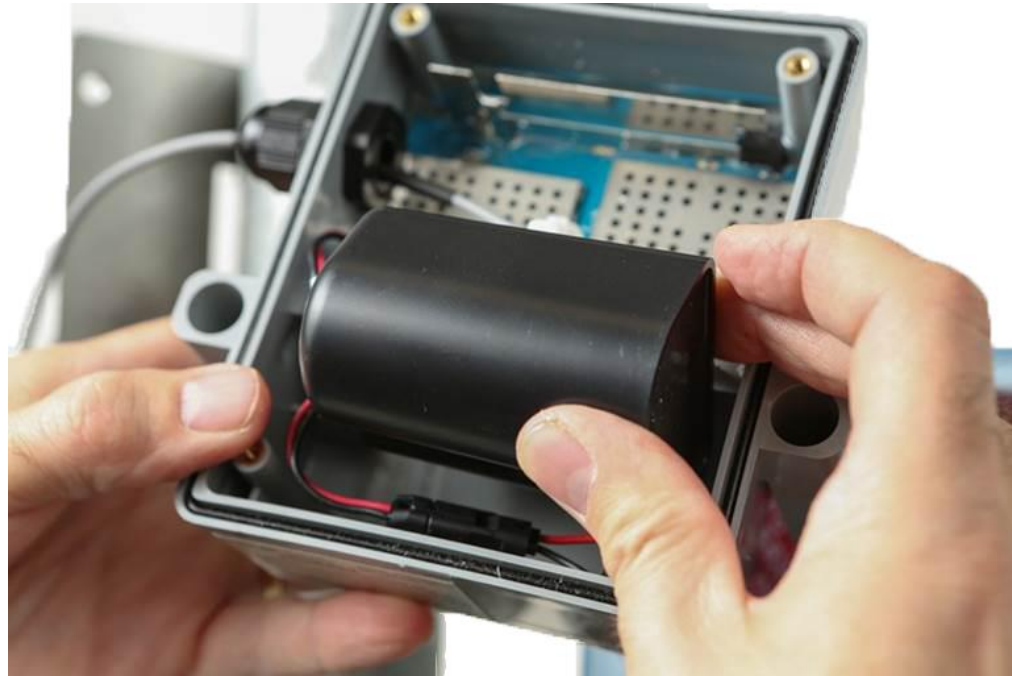*Silver Spring Networks Confidential*

Connecting the Battery

1. Align the battery connectors so the red wires connect to red and black to black.

2. Press the connectors together until the lock snaps in place.

3. The connectors are keyed. If they do not snap together, double check the connector alignment.

Battery cable

Gas IMU battery cable

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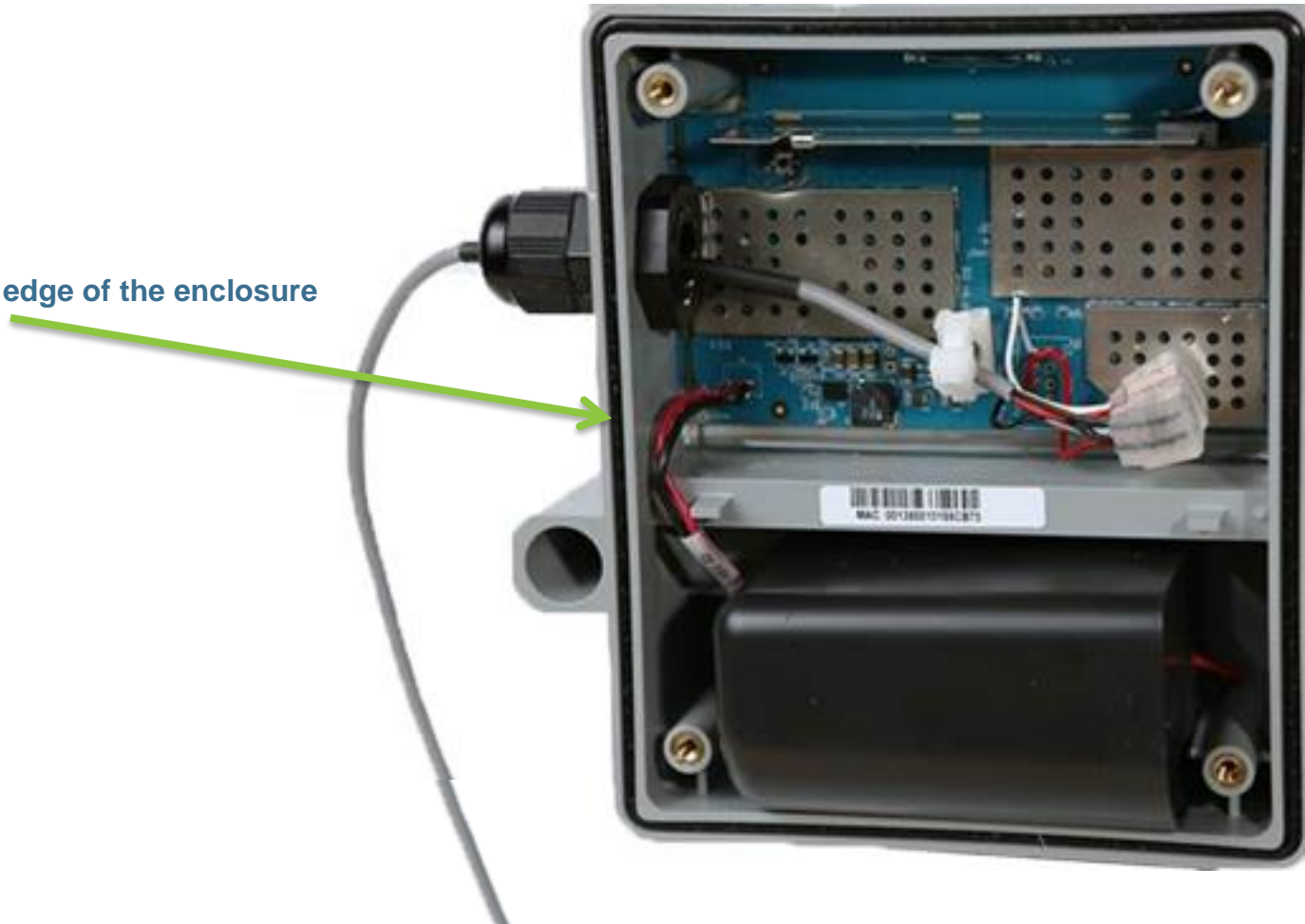
Connecting the Battery (continued)

4. When the wires are connected, the LED should start flashing.

5. Place the battery in the battery compartment as shown.

6. After the LED *stops* flashing, wait for two minutes before attempting to swipe the unit with a service magnet (as described on the **Waking up the Gas IMU** page).

25 January 2016

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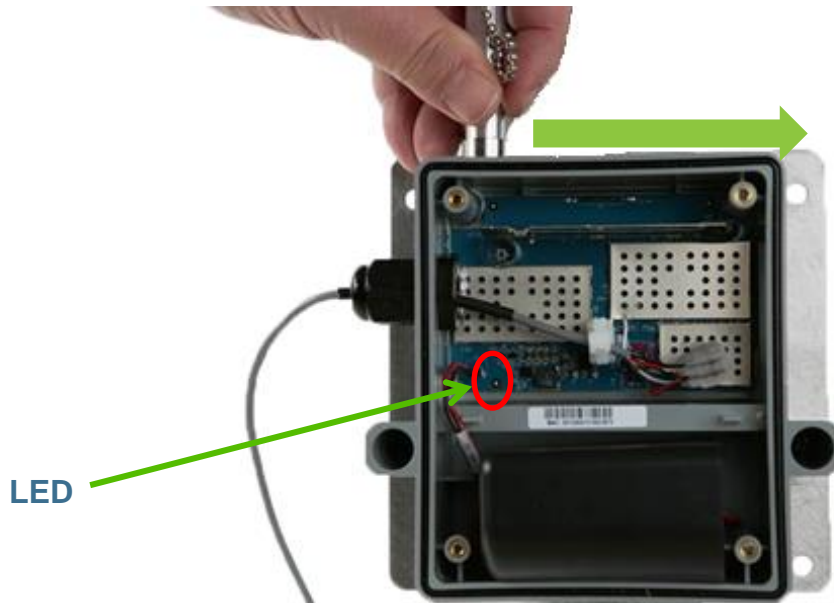
Inspecting the Gas IMU Remote Box Gasket

Inspect the Gas IMU remote box gasket to ensure that it will seal the area between the box and the lid.

Gasket around the edge of the enclosure

Waking up the Gas IMU

1. When you are ready to program the Gas IMU, slowly pass the service magnet across the top of the IMU as shown below (for 2 to 5 seconds).

2. Verify that the LED located at the left side of the Gas IMU turns on and then blinks.

LED

Fastening the Gas IMU Remote Box Lid

1. Fit the lid on the Gas IMU remote box. The lid fits the box in one orientation, and the four lid screws cannot be inserted and fastened if the orientation is reversed.

2. Install the four 6-32 x 7/8" lid screws.

3. Tighten the screws using the torque specification on the **Assembly Drawing** page.

Installing the Gas IMU Remote Box Tamper Seals

Install the two red tamper seals in the Gas IMU remote box tamper cups.

Tamper seals

Determining Gas IMU Remote Box Mounting Configuration

If you are using the mounting plate provided in the kit, locate a nearby pipe or wall for mounting the Gas IMU remote box vertically or horizontally.

- Ensure that the pulser cable is long enough to reach from the direct mount enclosure to the IMU mounting location.

- Note that the arrows on the remote box lid indicate the correct orientation for both vertical and horizontal mounting.
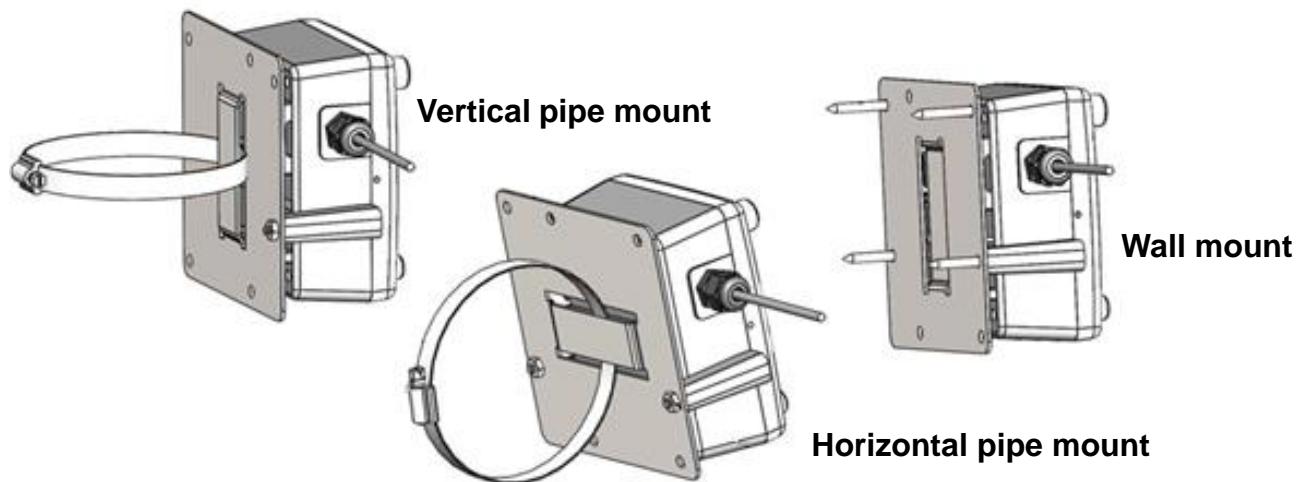
Arrow that points up for a vertical mount

Arrow that points up for a horizontal mount

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Attaching the Mounting Plate to the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, attach the Gas IMU remote box to the mounting plate with the two 10-24 x 1/2" screws and 10-24 flanged nuts using one of the configurations shown below, and torque the screws as specified on the **Assembly Drawing** pages.

2. If you choose to mount the remote box to a wall, use four #10 Fillister or round head screws (these are not included in the kit).

Vertical pipe mount
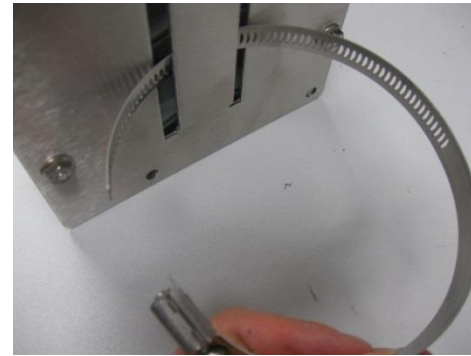
Wall mount

Horizontal pipe mount

Attaching the Mounting Plate to the Gas IMU Remote Box (continued)

3. When installed properly, one of the two lid drain holes must be facing down. Never mount with a lid drain hole facing up.

25 January 2016

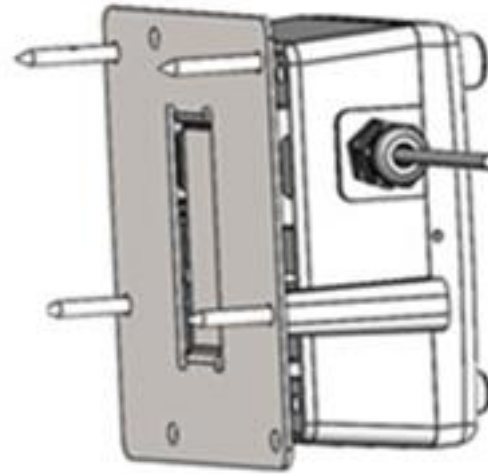*Silver Spring Networks Confidential*

Mounting the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, guide the metal clamp through the slot in the mounting plate.

2. Wrap the metal clamp around the pipe and secure using the torque specified on the **Assembly Drawing** pages.

25 January 2016

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Mounting the Gas IMU Remote Box (continued)

3. If you are mounting the remote box to a wall, insert the four #10 Fillister or round head screws you provide through the mounting plate and secure to the wall.

Mounting the Gas IMU Remote Box (continued)

4. An optional mounting plate is available that places the remote box closer to the index assembly. For details, contact your Silver Spring representative. The torque specifications provided for the mounting plate in the kit on the **Assembly Drawing** pages apply for this mounting plate and hardware also. After installing, be sure to secure the pulser cable with zip ties as shown and trim the ties.
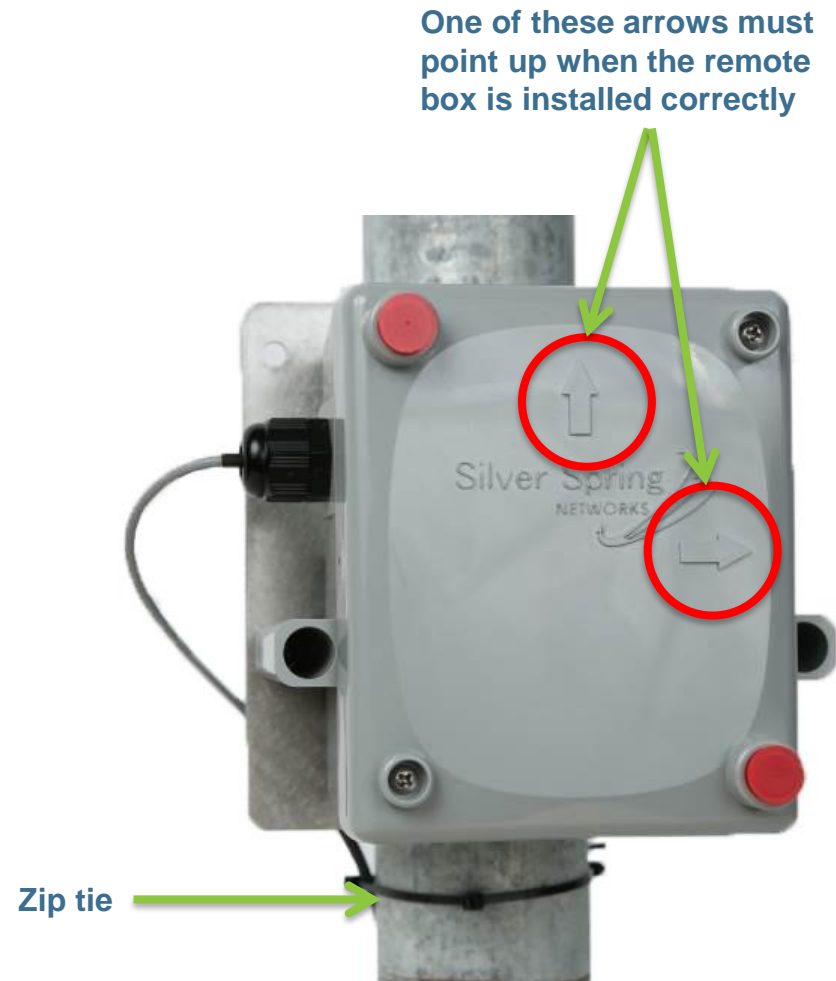
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Dressing the Pulser Cable and Verifying the Installation

1. For pipe installations, use the zip tie to secure the pulser cable to the pipe.

   The completed remote box installation should look similar to this illustration.

2. After you have completed the installation, verify that, when gas is flowing, the meter's index dials are moving.

One of these arrows must point up when the remote box is installed correctly

Zip tie

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Completed Installation

The completed installation should look similar to the illustrations on this page (shown below with the optional mounting plate used).

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Large Diaphragm Gas IMU Installation Guide

PN 224-020001 (for Rockwell meters)

March 4, 2016, Rev 6

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4 March 2016

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Safety First!

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- **Always follow applicable standards for safety!**

- **Refer to the meter documentation for further safety information.**

- **Follow your employer's best practices.**

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- **Do not use power tools!**

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WARNING!

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- **Maximum Current Out: I_O = 0 amps**
- **Capacitance Allowed: $C_a \leq$ 680 µF**
- **Inductance Allowed: L_a = 0 H (no inductance allowed)**

IMU Interface values:

- **Maximum Voltage Out:* V_O = 3.6 VDC**
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- **Maximum Input Current Allowed: I_{max} = 0**
- **Maximum Internal Capacitance: C_i = 389 µF**
- **Maximum Internal Inductance: L_i = 7.5 µF**
- **Maximum Input Power: P_i = 0**

*Under fault conditions only; not nominal operating parameters

- **Hazardous Location Class 1 Division 1 Group D. Temperature Code T4A**

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- The device should be installed so that people will not come within 20 cm (8 in.) of the antenna.

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    - Reorient or relocate the receiving antenna.

    - Increase the separation between the equipment and receiver.

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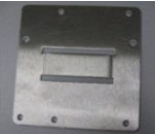
Overview

1. Inspect the Gas IMU remote box.
2. Inspect the direct mount enclosure.
3. Remove the index assembly from the meter.
4. Clean the meter surface.
5. Attach the index assembly to the direct mount enclosure cover.
6. Attach the direct mount enclosure to the meter.
7. Attach the direct mount enclosure cover.
8. Prepare the index assembly.
9. Install the index assembly on the direct mount enclosure.
10. Trim the pulser cable wires.
11. Connect the pulser cable to the Gas IMU.
12. Tighten the liquid-tight connector on the Gas IMU remote box.
13. Cinch and trim the zip tie.
14. Connect the battery.
15. Inspect the Gas IMU remote box gasket.
16. Wake up the Gas IMU.
17. Fasten the Gas IMU remote box lid.
18. Install the Gas IMU remote box tamper seals.
19. Determine the Gas IMU remote box mounting configuration.
20. Attach the mounting plate to the Gas IMU remote box.
21. Mount the Gas IMU remote box.
22. Dress the pulser cable.
23. Verify the installation.

Kit Components

Verify that all components are present in the installation kit.

Component	Qty.	Part Number
Gas IMU remote box	1	975-0122-00
Direct mount enclosure with pulser cable	1	178-0494-00

Installation kit
• Fillister head screws, 5/16-18 x 3/4", 316 SST (2)
  For attaching the index to the direct mount enclosure
• Hex nuts, 5/16-18, 316 SST (2)
  For attaching the index to the direct mount enclosure
• Lock washers, 5/16", SST (2)
  For attaching the index to the direct mount enclosure
• Fillister head screws, 5/16-18 x 3.0", 316 SST (2)
  For attaching the index cover to the direct mount enclosure and meter head
• Tamper plugs (2)
	1	180-0095-00

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Kit Components (continued)

Component	Qty.	Part Number
Gas IMU gel splices	3	180-0005-00 (packaged together) **Note:** The Gas IMU gel spices, Gas IMU remote box tamper seals, and the screws and nuts for attaching the Gas IMU remote box to the mounting plate are part of 180-0010-00, which is included with 180-0005-00.
Gas IMU remote box tamper seals	2	
Nuts – for attaching the Gas IMU remote box to the mounting plate 10-24	2	
Screws - for attaching the Gas IMU remote box to the mounting plate 10-24 x 1/2"	2	
Gas IMU remote box mounting plate	1	
Pipe clamp –for securing the Gas IMU remote box to a pipe	1	
Gas IMU remote box lid screws 6-32 x 7/8"	4	

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Components

Direct mount enclosure

Enclosure cover

Tamper seals

Screws, washers, and nuts

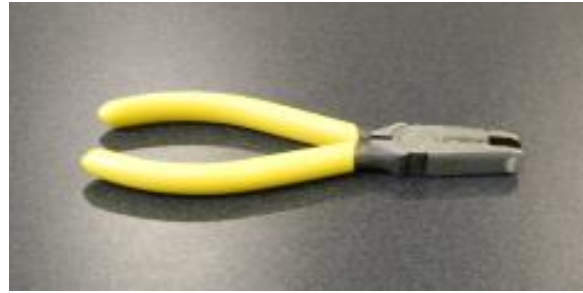Fillister head screws

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Required Tools

Wire cutters

Gel cap connection tool

Nut driver

Service magnet

Pliers, such as 6-inch slip joint pliers

Optionally, a wire brush or scraper

Large Diaphragm Gas IMU
Installation Guide - Rockwell, Rev 6

4 March 2016
Silver Spring Networks Confidential

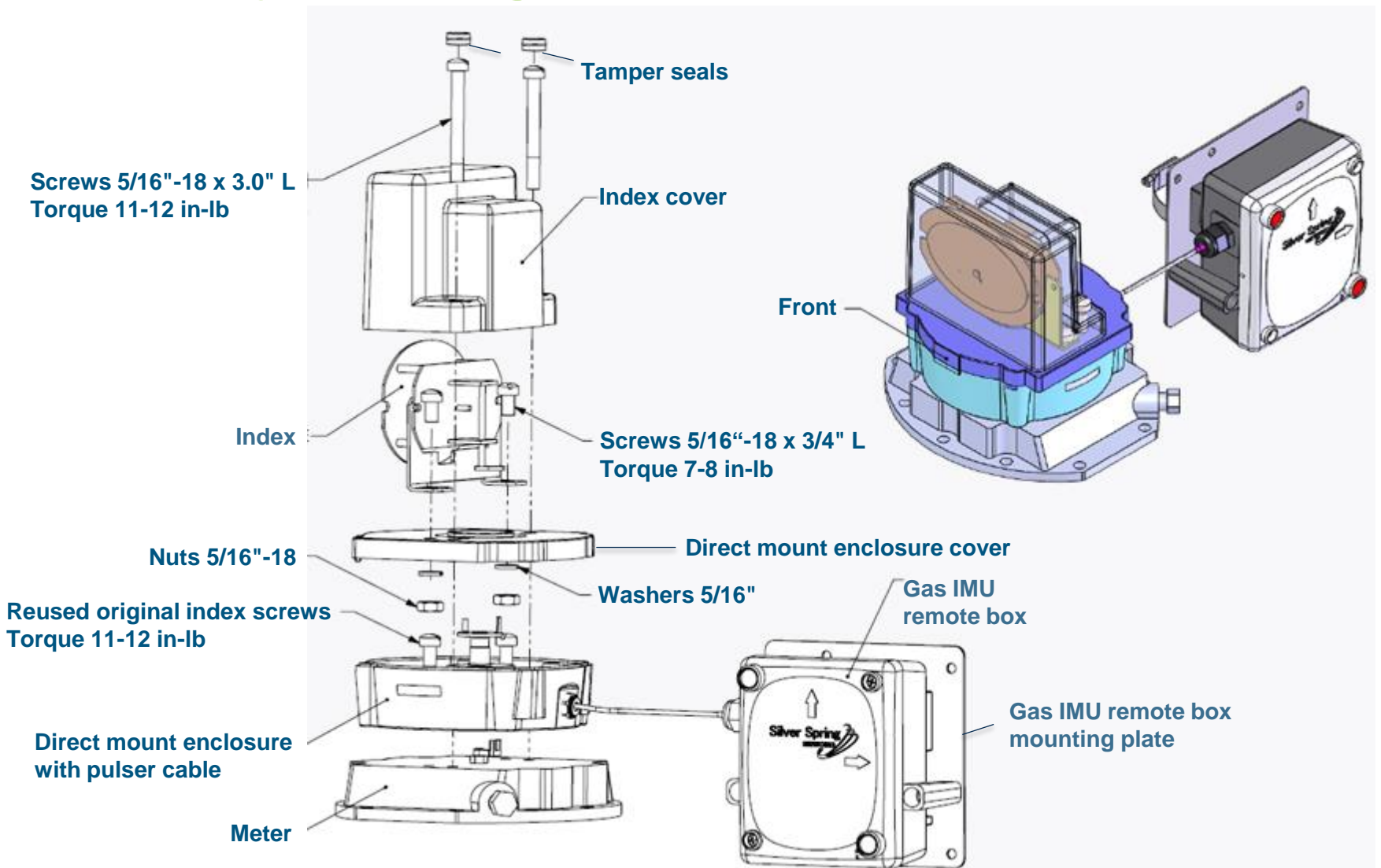# Required Tools (continued)

2.5-11.5"- pounds pre-set adjustable torque range screwdriver
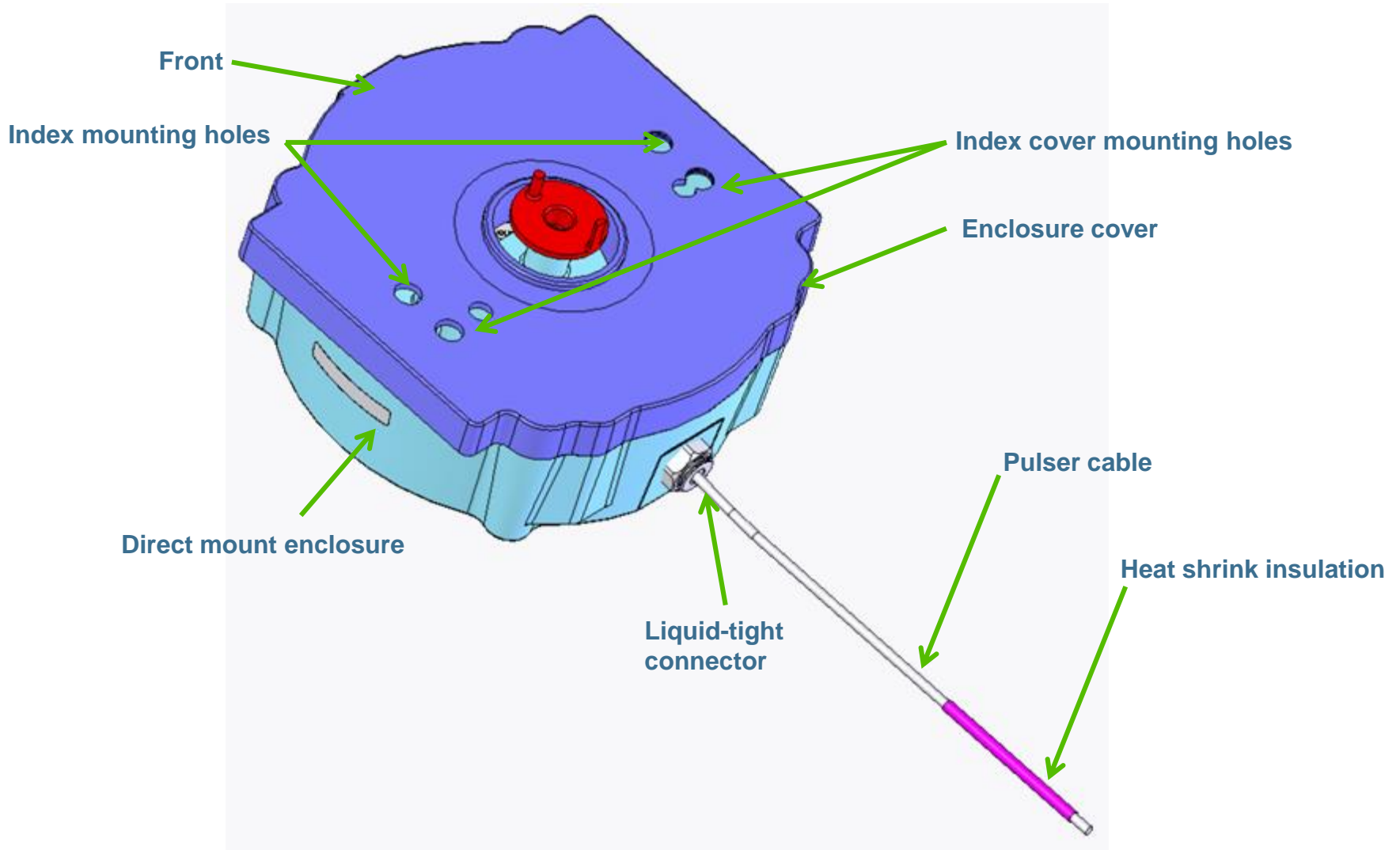05074720002 B003KN3GDC, available on Amazon

11.0-29"- pounds variable torque adjustment range screwdriver
05074711002 B003KN3GAK, available on Amazon

Assembly Drawing – Complete

Tamper seals

Screws 5/16"-18 x 3.0" L
Torque 11-12 in-lb

Index cover

Front

Index

Screws 5/16"-18 x 3/4" L
Torque 7-8 in-lb

Nuts 5/16"-18

Direct mount enclosure cover

Reused original index screws
Torque 11-12 in-lb

Washers 5/16"

Gas IMU
remote box

Direct mount enclosure
with pulser cable

Gas IMU remote box
mounting plate

Meter

Assembly Drawing – Direct Mount Enclosure

Front

Index mounting holes

Index cover mounting holes

Enclosure cover

Direct mount enclosure

Pulser cable

Heat shrink insulation

Liquid-tight connector

4 March 2016

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Assembly Drawing – Gas IMU Remote Box

Tamper seals

**Liquid-tight connector
Torque 14 in-lb**

Pulser cable

**Pulser cable
zip tie**

**6-32 x 7/8 " screws,
Torque 5.0 in-lb**

**Pulser cable
wires**

Antenna bar

Gel splices

Assembly Drawing – Gas IMU Remote Box Pipe and Wall Mounts

Vertical pipe mount

Drain hole on lid

Horizontal pipe mount

Wall mount

Mounting plate

Liquid-tight connector

Metal clamp
Torque 20 in-lb

10-24 x 1/2" screws and nuts
Torque 10 in-lb

Note: The four screws shown here are not included in the kit.

Note: An optional mounting plate that places the remote box closer to the index assembly is available and is discussed later in this guide.
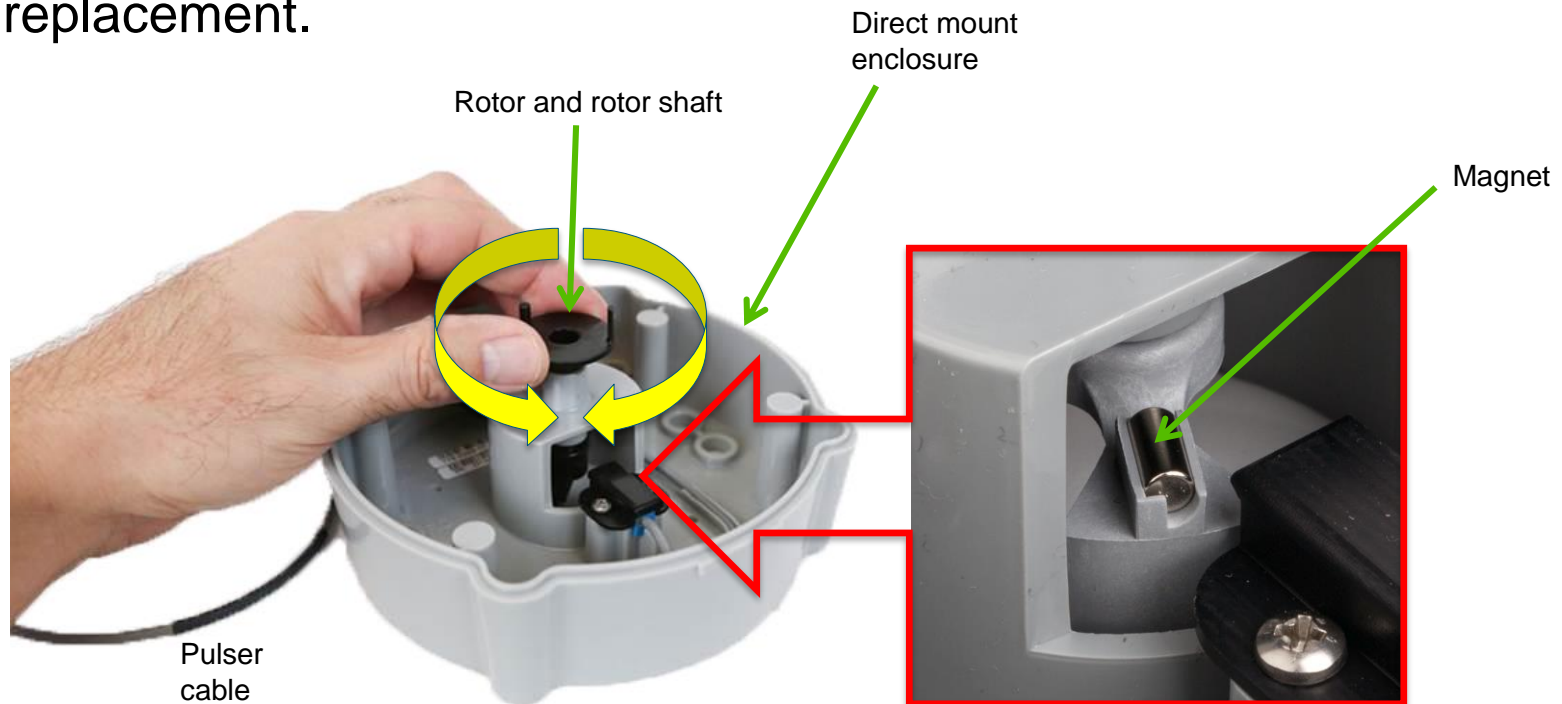
Inspecting the Gas IMU Remote Box

- Verify that the Gas IMU remote box is not cracked and that the MAC address label is present.

- Remove the remote box lid.

- Verify that the battery wires are undamaged.

If the remote box assembly is damaged, return it to your supervisor and get a replacement.

Inspecting the Direct Mount Enclosure

- Ensure that the direct mount enclosure is not cracked.

- Ensure that the pulser cable is not cut.

- Ensure that the rotor shaft turns smoothly and that the magnet is present. If the magnet is missing, contact your supervisor for a replacement.

Direct mount enclosure

Rotor and rotor shaft

Magnet

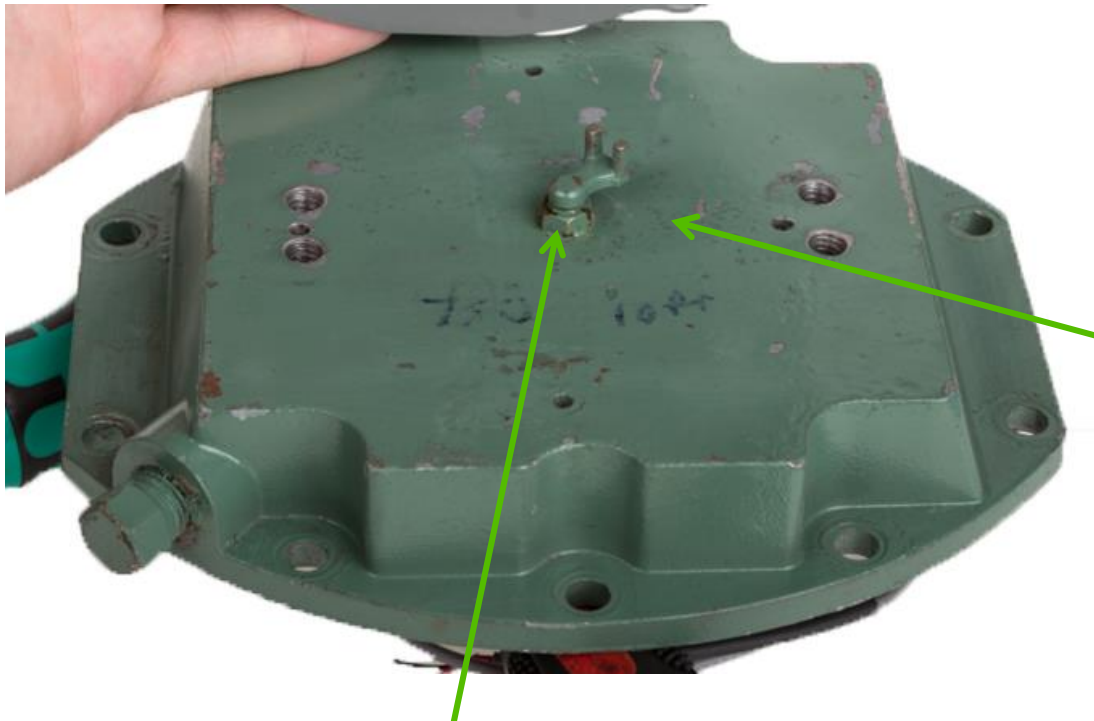Pulser cable

Removing the Index Assembly from the Meter

1. Note which direction the index is facing before you remove it so you reinstall it later facing the same direction.

2. Unscrew the index cover screws and remove the index cover.

3. Unscrew the index screws and remove the index.

Important: Save the index screws along with the index and index cover. You will use these screws later to attach the direct mount enclosure to the meter.

4 March 2016

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Cleaning the Meter Surface

Using a wire brush or scraper, clean the meter surfaces where the direct mount enclosure will interface with the meter. Be sure to remove any remaining parts of the old gasket.


Clean the mounting surface around the meter drive wriggler

Meter drive wriggler

Attaching the Index Assembly to the Direct Mount Enclosure

Align the index with the direct mount enclosure cover and secure the index with the two 5/16-18 X 3/4" screws from the kit using the torque indicated on the **Assembly Drawing** pages.

4 March 2016

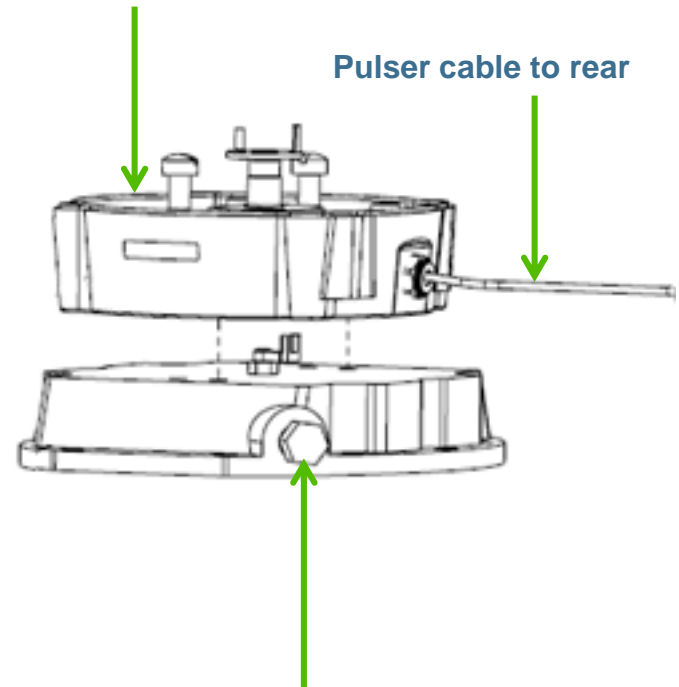*Silver Spring Networks Confidential*
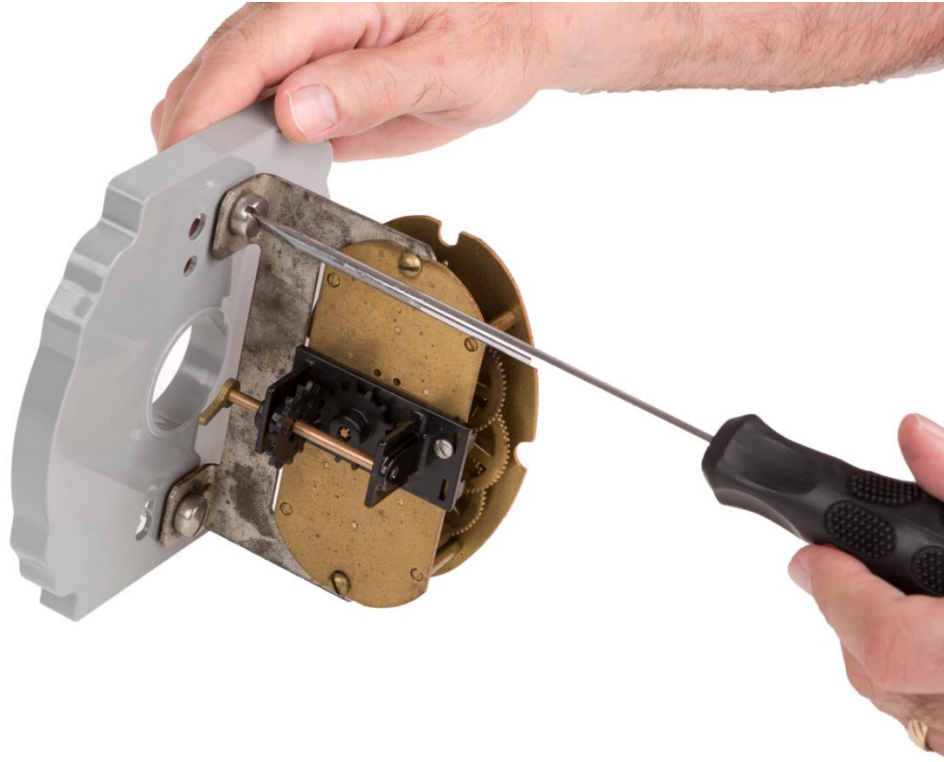
Attaching the Direct Mount Enclosure to the Meter

1. Using the bolt on the back of the meter for orientation, place the direct mount enclosure on the meter with the rectangular tab on the direct mount enclosure facing the front of the meter and the pulser cable leading toward the back.

Rectangular tab to front

Pulser cable to rear

Bolt on meter to rear

Rectangular tab to front

Attaching the Direct Mount Enclosure to the Meter
(continued)

2. Ensure that the rotor gear and meter drive wriggler do not interfere with each other and that the wriggler does not straddle the rotor gear when you place the direct mount enclosure in position.


Rotor gear

Meter drive wriggler

4 March 2016

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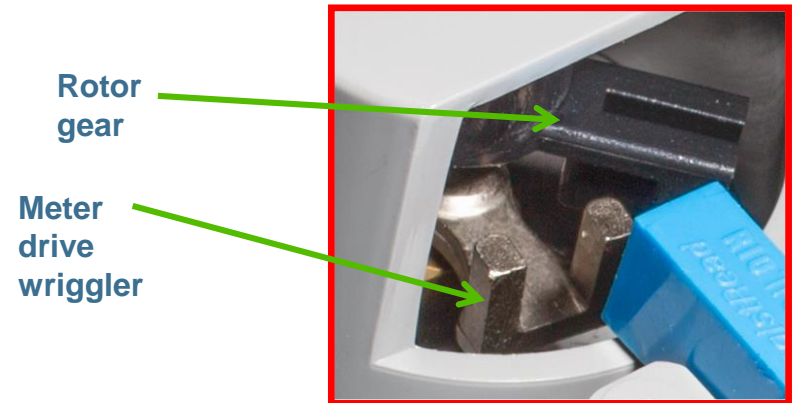
# Attaching the Direct Mount Enclosure to the Meter
(continued)

3. Secure the direct mount enclosure to the meter with the two screws you removed from the index previously. Ensure that the rotor gear and meter drive wriggler remain positioned as described in the previous step while you do this.

Note: You might not be able to fully tighten the screws depending on the depth of the holes in the meter. This is acceptable.
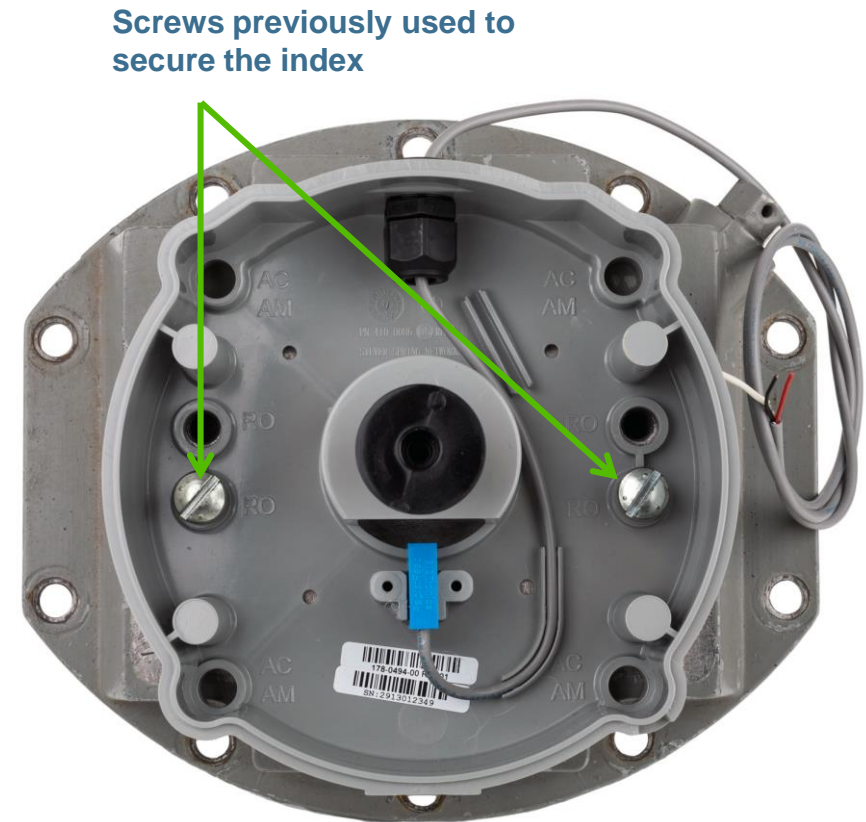
Screws previously used to secure the index

4 March 2016

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Attaching the Direct Mount Enclosure Cover

1. Align the index and direct mount enclosure cover with the direct mount enclosure.

2. Ensure that the cover tab and the direct mount enclosure tabs both face the front, and that the cover key in the front, right corner sits in the matching enclosure slot with the pulser cable leading toward the back.


Pulser cable

Direct mount enclosure cover and tabs

Direct mount enclosure front

Cover key and enclosure slot
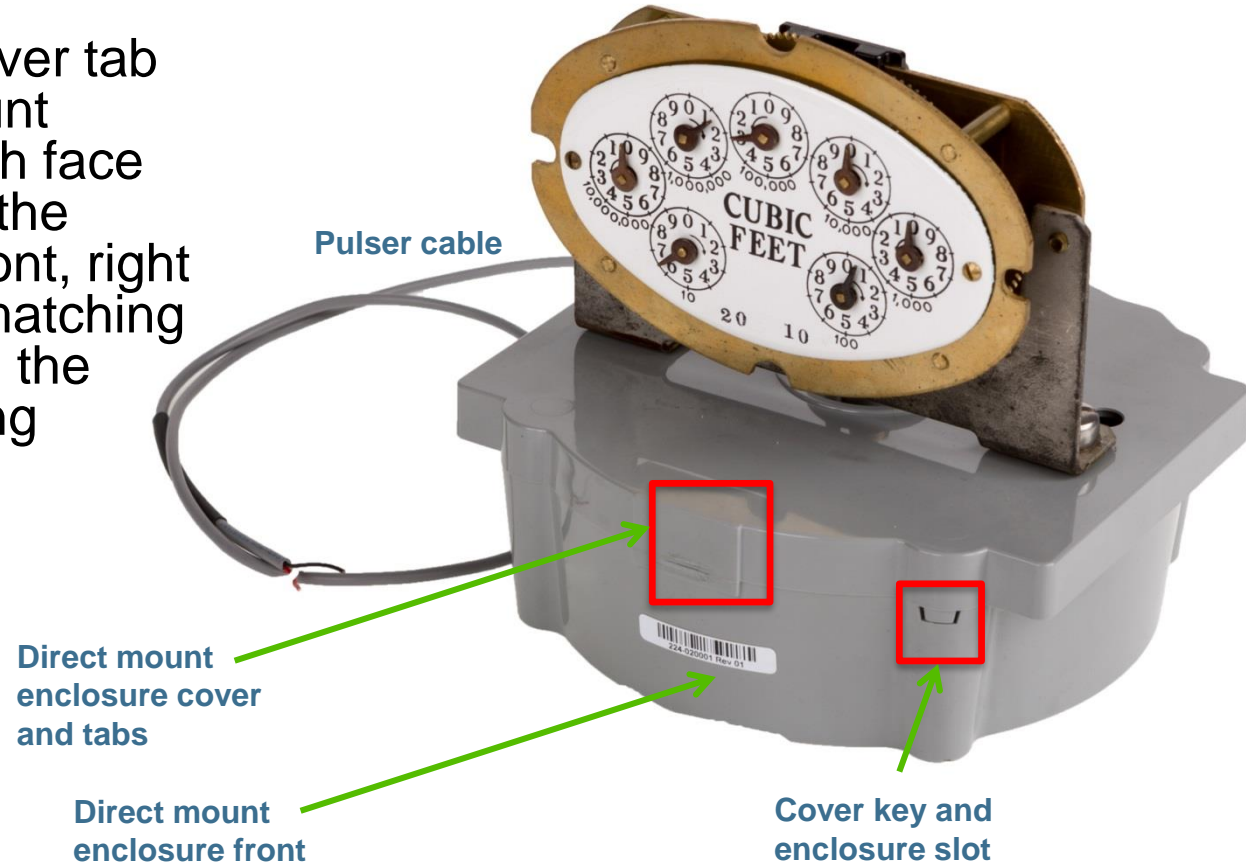
Preparing the Index Assembly

Verify that the index drive shaft is centered over the index drive rotor.

For right/left alignment: Loosen the indicated screws (in red boxes), slide the index in the index slots right or left as needed, and resecure the screws.

For front/back alignment: Loosen the indicated screws (in blue boxes)—and nuts under the direct mount enclosure cover—that secure the index frame to the cover, reposition the index frame front or back as needed, and resecure the screws and nuts.
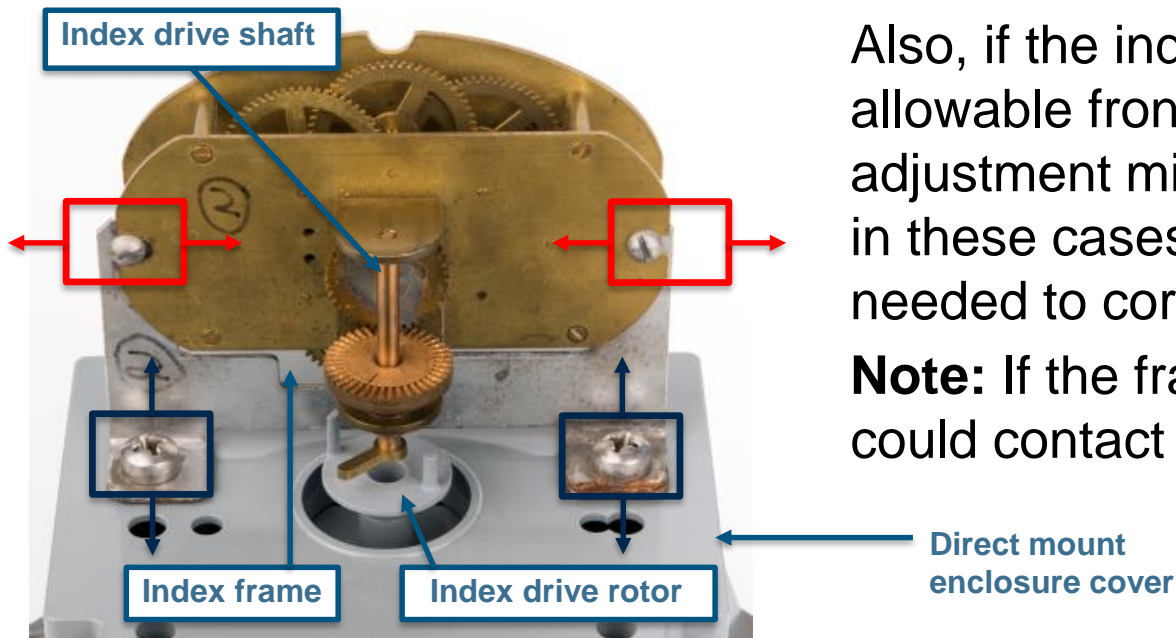
Also, if the index frame is bent, the allowable front/back range of adjustment might not be adequate; in these cases, bend the frame as needed to correct the alignment.

Note: If the frame is bent, the index could contact the index cover.

Index drive shaft

Index frame

Index drive rotor

Direct mount enclosure cover

4 March 2016

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Installing the Index Cover on the Direct Mount Enclosure

1. Place the index cover on the direct mount enclosure with the cover extension facing the back.

2. If you are using the optional mounting plate to mount the remote box behind the meter, place the plate over the cover assembly as shown.

Optional mounting plate

Front of direct mount enclosure

Front of meter
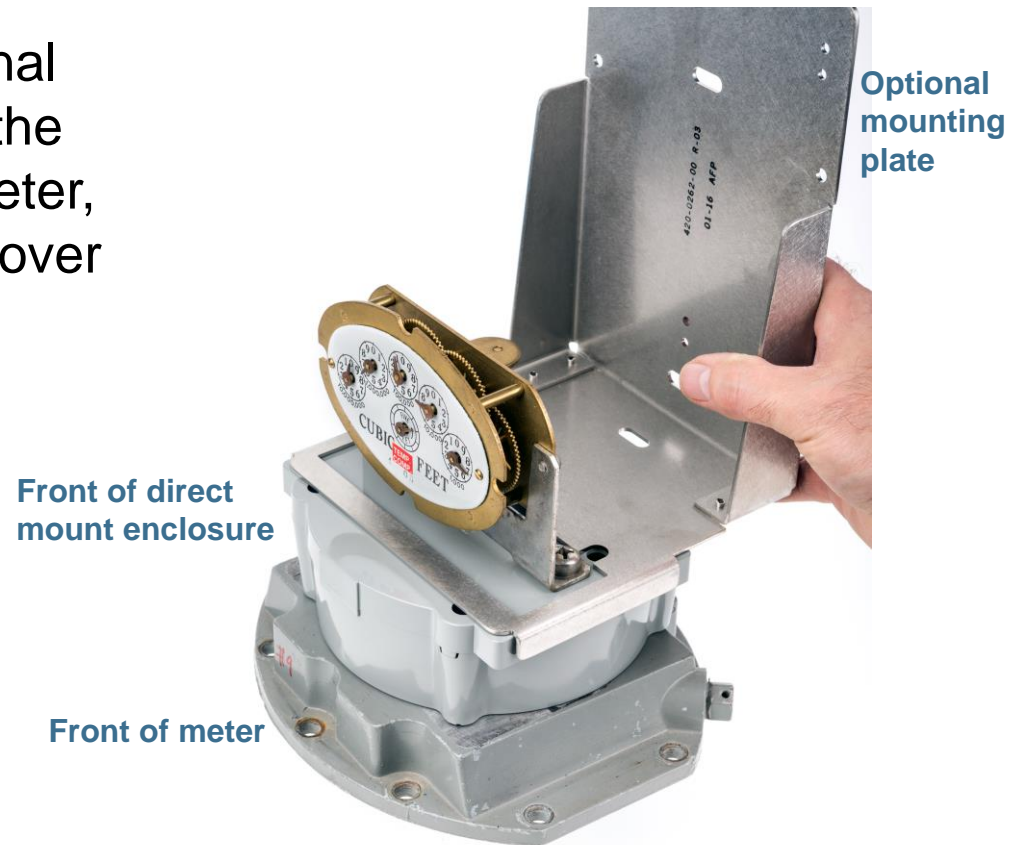
Installing the Index Cover on the Direct Mount Enclosure

1. Place the index cover on the direct mount enclosure with the cover extension facing the back.

2. Using your fingers, loosely fasten the two 5/16-18 X 3.0" screws through the index cover and enclosure.

3. Tighten the screws using the torque indicated on the **Assembly Drawing** pages with an alternating tightening pattern.

4. Push the tamper seals into the index cover tamper cups with a nut driver.

Index cover tamper cups

Cover extension
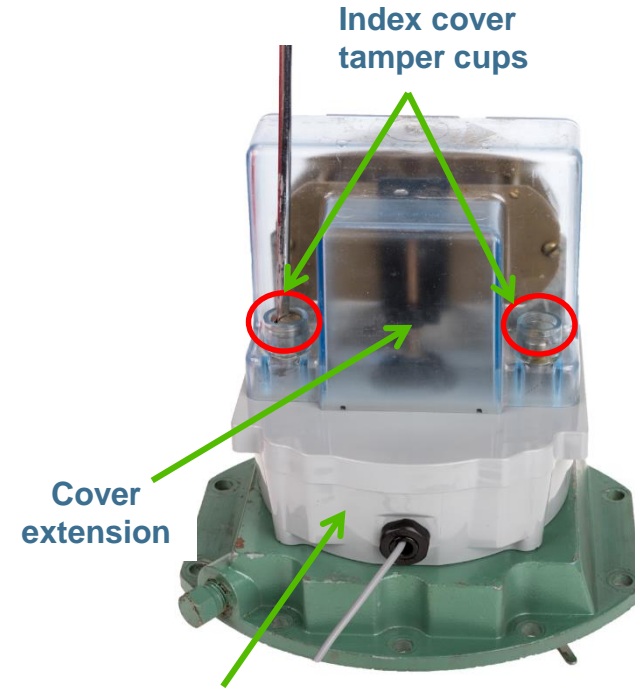
Rear of direct mount enclosure
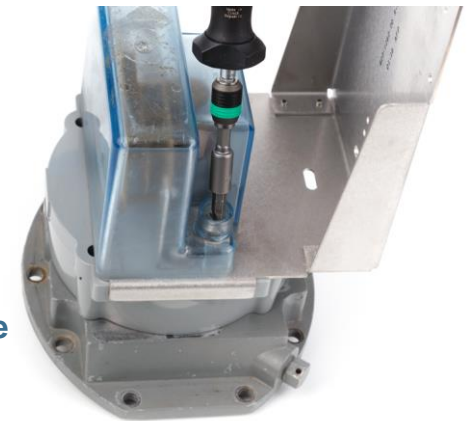
Installing with the optional mounting plate

4 March 2016

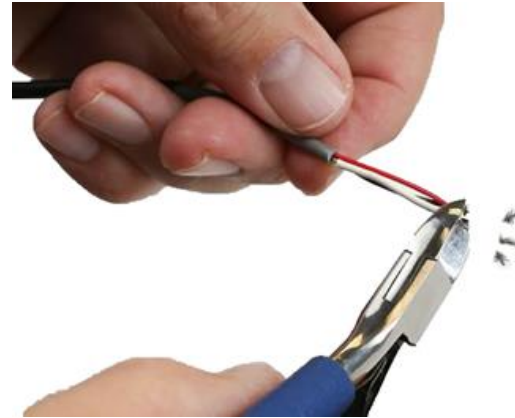*Silver Spring Networks Confidential*

About Extending Gas IMU Cables

You can extend the Gas IMU pulser cable provided with the kit up to 800 feet as described on this page if needed for the IMU to communicate over the Silver Spring mesh network without loss of consumption pulses when using Silver-Spring-recommended splicing material and process.

1. Determine if you need to locate the IMU further away from the meter than the existing pulser cable allows.

2. If you need to extend the pulser cable, Silver Spring recommends using a product similar to the following:
    NATIONAL WIRE & CABLE SR10-7833 REVISION_.A, SIX CONDUCTORS OF STRANDED 24AWG, INDIVIDUALLY INSULATED, CABLED AND SHIELDED WITH OVERALL FOIL SHIELD AND DRAIN WIRE, AND EXTRUDED WITH AN OVERALL SANTOPRENE BLACK JACKET

3. Ensure that the IMU is using Silver Spring UtilOS firmware 2.14.3001 or later. This version provides cut-cable detection and accurate counting for cables up to 800 feet. You can have total cable lengths up to approximately 50 feet with earlier versions of the firmware although there is no cut-cable detection in such cases.

4. Trim all cable ends (as discussed on the next page) and splice the cable extension onto the pulser cable using appropriate gel caps (similar to those Silver Spring provides for the IMU-end connections—for example, Silver Spring 916-000001 or Tyco 552795-2).

5. Use at least two zip ties with at least a one-inch space between them to secure the extension cable to the pulser cable and prevent stress on the gel spliced connections, and wrap with appropriate tape (for example, Rubber Mastic Tape such as 3M Scotch Rubber Mastic Tape 2228). Ensure that the tape covers the jacket ends and the splices.

Trimming the Pulser Cable Wires

Using the wire cutter, trim the end of the three wires at the end of the pulser cable so no bare wires are exposed.

Connecting the Pulser Cable to the Gas IMU

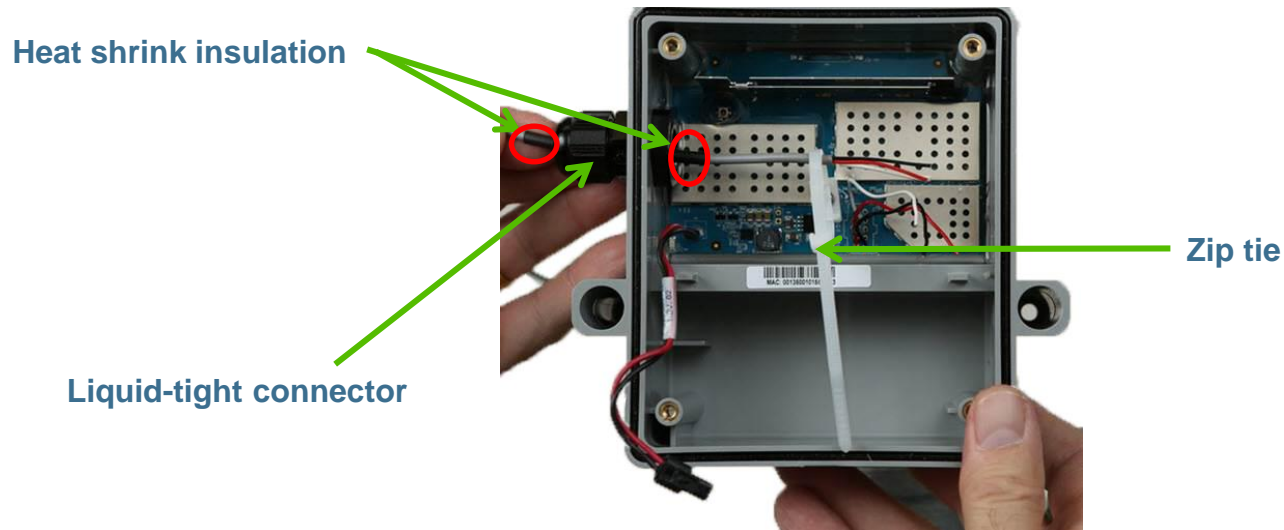1. Open the Gas IMU remote box lid with the Phillips screwdriver and set it aside.

4 March 2016
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Connecting the Pulser Cable to the Gas IMU
(continued)

Note: If you are using the optional mounting plate to mount the remote box behind the meter, you can route the pulser cable through the lower, oblong hold in the plate, but you need to do this before securing the cable to the IMU.

2. Thread 4 to 6 inches of the pulser cable through the Gas IMU remote box liquid-tight connector and the zip tie. The black heat shrink insulation on the cable must be centered through the opening to keep the cable snug.
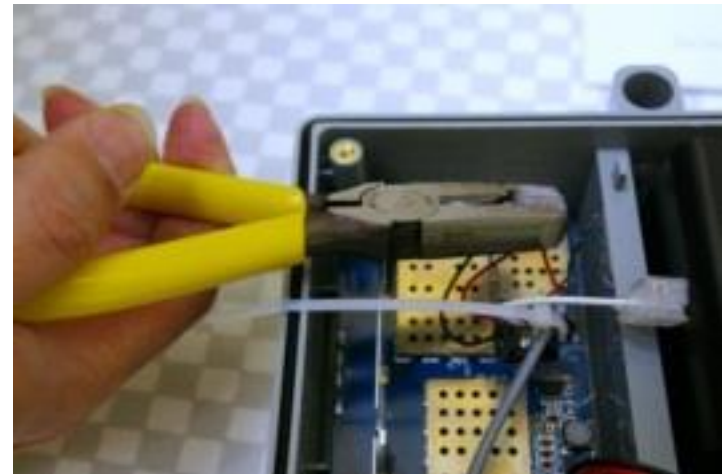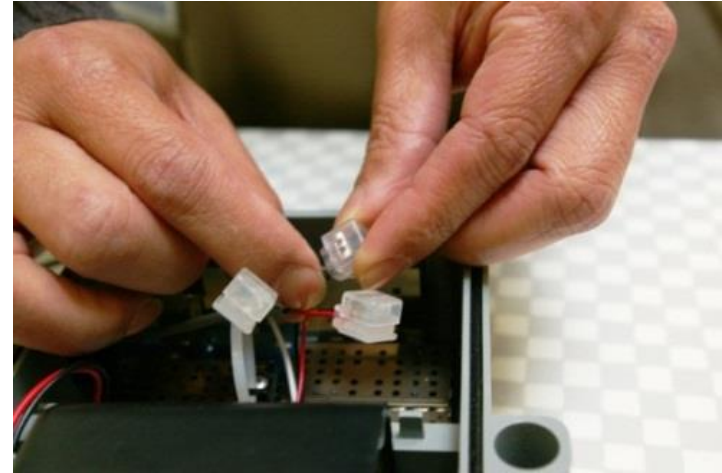

Heat shrink insulation

Liquid-tight connector

Zip tie

Connecting the Pulser Cable to the Gas IMU
(continued)

Note: Do NOT strip the insulation from the wires when you connect the cable to the gel splices.
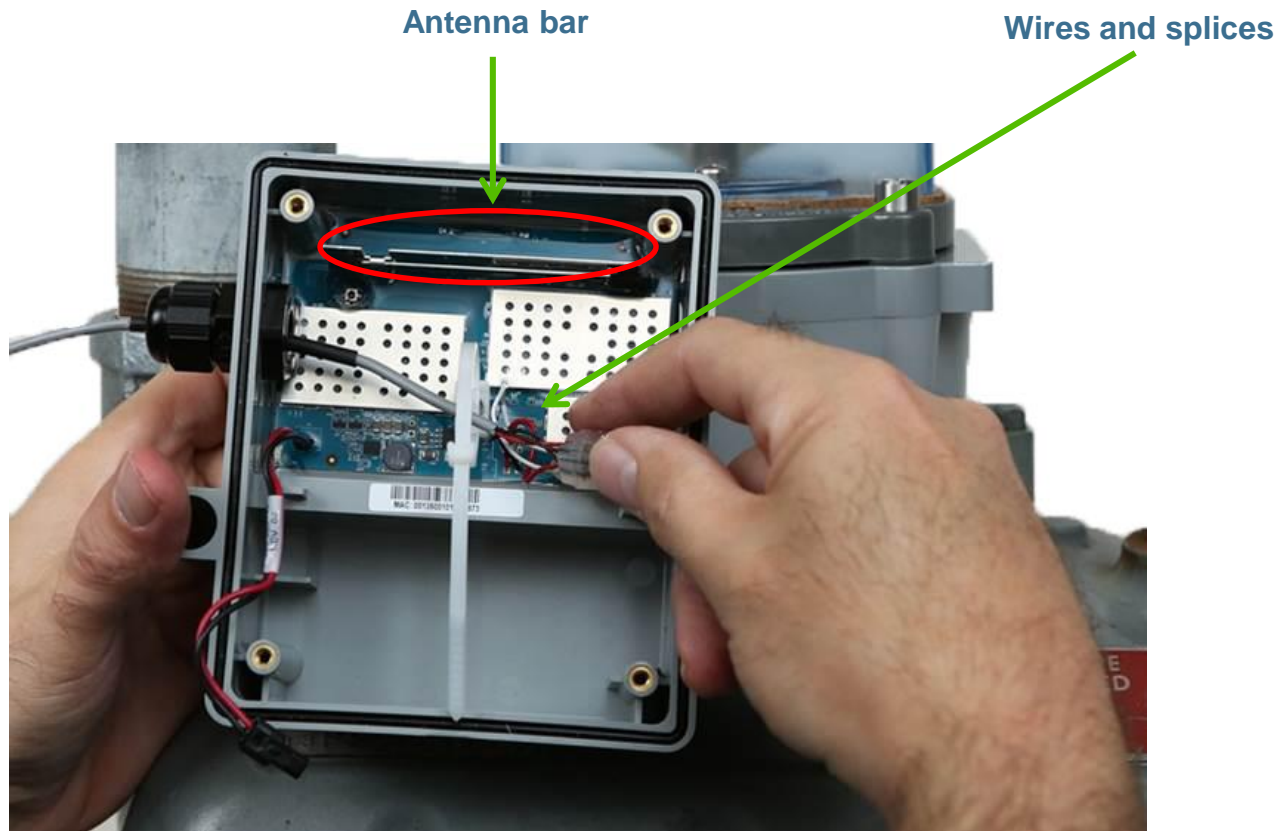
3. Inside the Gas IMU remote box, insert each of the wire pairs (red and red, black and black, white and white) into a gel splice and push all the way into the splice.

4. Close each gel splice by squeezing it with the gel cap connection tool. The gel splices pierce the insulation to make the electrical connection.

4 March 2016

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Connecting the Pulser Cable to the Gas IMU
(continued)

5. Gently tug on the wires to ensure that they are secure.
6. Tuck the wires and splices away from the metal antenna bar.

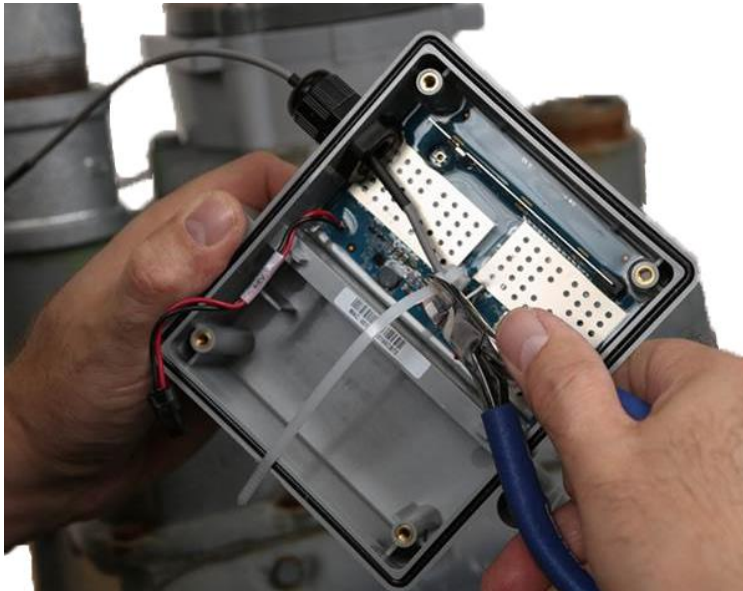**Antenna bar**

Wires and splices

Tightening the Liquid-Tight Connector on the Gas IMU Remote Box

Tighten the liquid-tight connector using the torque specification on the **Assembly Drawing** pages.

Liquid-tight connector

4 March 2016

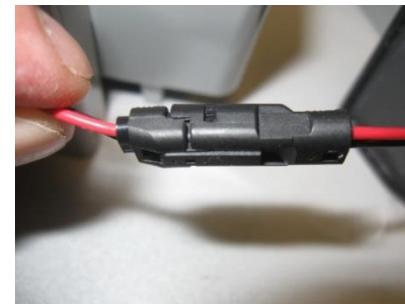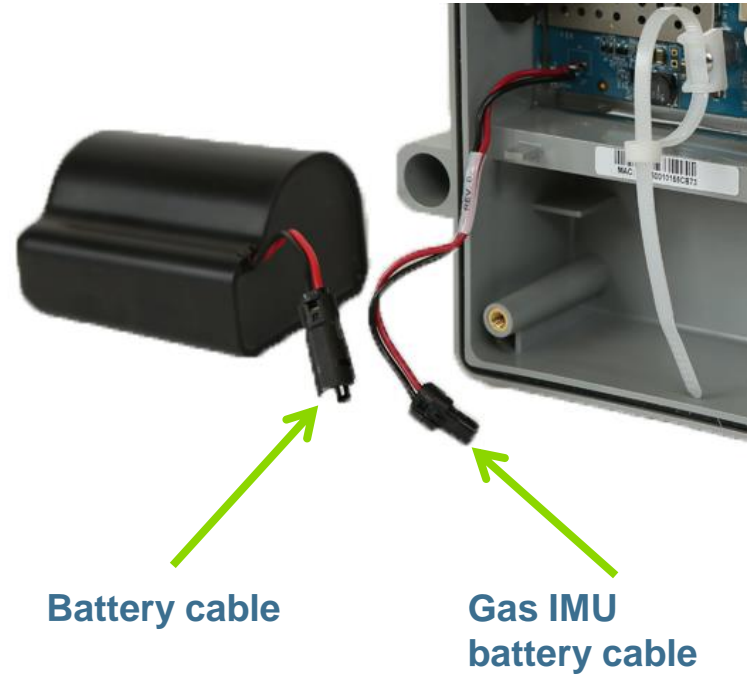*Silver Spring Networks Confidential*

Cinching and Trimming the Zip Tie

1. In order to keep the wires away from the antenna bar, cinch the zip tie until snug.
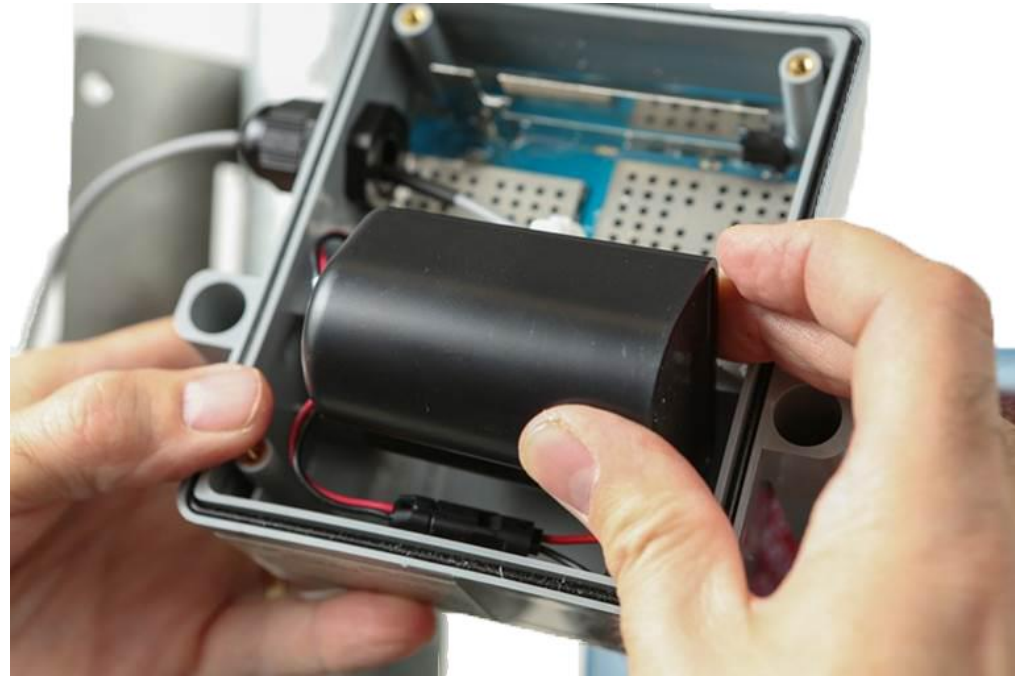
2. Trim off the end of the zip tie.

Connecting the Battery

1. Align the battery connectors so the red wires connect to red and black to black.

2. Press the connectors together until the lock snaps in place.

3. The connectors are keyed. If they do not snap together, double check the connector alignment.

Battery cable

Gas IMU battery cable

Connecting the Battery (continued)

4. When the wires are connected, the LED should start flashing.

5. Place the battery in the battery compartment as shown.

6. After the LED *stops* flashing, wait for two minutes before attempting to swipe the unit with a service magnet (as described on the **Waking up the Gas IMU** page).

Inspecting the Gas IMU Remote Box Gasket

Inspect the Gas IMU remote box gasket to ensure that it will seal the area between the box and the lid.

Gasket around the edge of the enclosure

Waking up the Gas IMU

1. When you are ready to program the Gas IMU, slowly pass the service magnet across the top of the IMU as shown below (for 2 to 5 seconds).

2. Verify that the LED located at the left side of the Gas IMU turns on and then blinks.

LED

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Fastening the Gas IMU Remote Box Lid

1. Fit the lid on the Gas IMU remote box. The lid fits the box in one orientation, and the four lid screws cannot be inserted and fastened if the orientation is reversed.

2. Install the four 6-32 x 7/8" lid screws.

3. Tighten the screws using the torque specification on the **Assembly Drawing** page.

Installing the Gas IMU Remote Box Tamper Seals

Install the two red tamper seals in the Gas IMU remote box tamper cups.

Tamper seals

4 March 2016

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Determining Gas IMU Remote Box Mounting Configuration

If you are using the mounting plate provided in the kit, locate a nearby pipe or wall for mounting the Gas IMU remote box vertically or horizontally.

- Ensure that the pulser cable is long enough to reach from the direct mount enclosure to the IMU mounting location.

- Note that the arrows on the remote box lid indicate the correct orientation for both vertical and horizontal mounting.
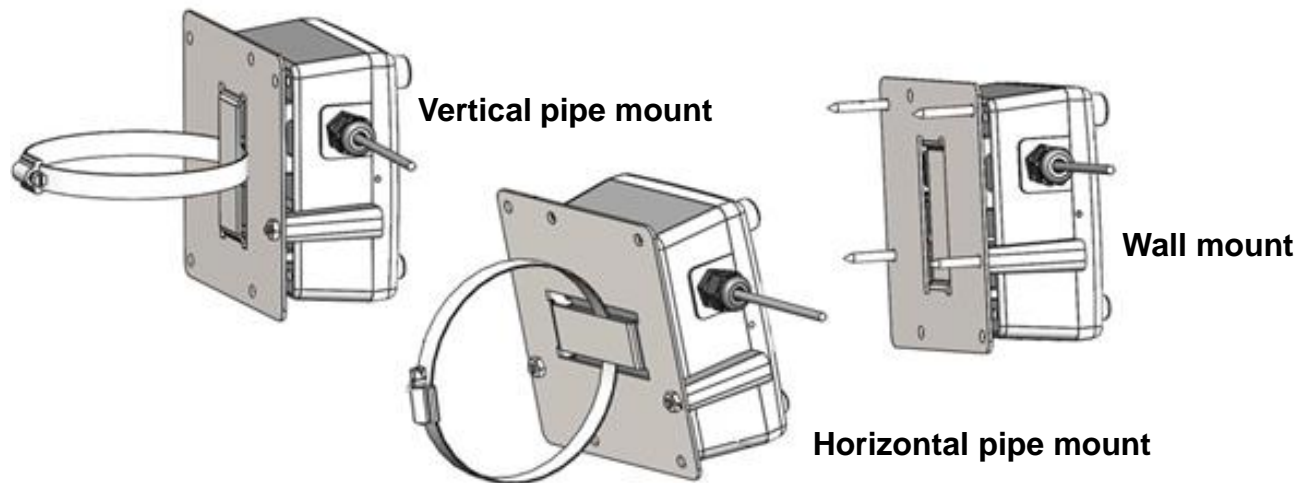
Arrow that points up for a vertical mount

Arrow that points up for a horizontal mount

Attaching the Mounting Plate to the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, attach the Gas IMU remote box to the mounting plate with the two 10-24 x 1/2" screws and 10-24 flanged nuts using one of the configurations shown below, and torque the screws as specified on the **Assembly Drawing** pages.

2. If you choose to mount the remote box to a wall, use four #10 Fillister or round head screws (these are not included in the kit).

Vertical pipe mount

Wall mount
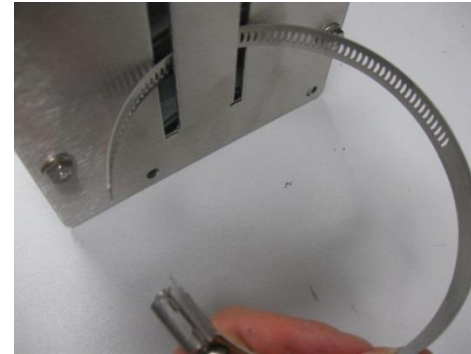
Horizontal pipe mount

Attaching the Mounting Plate to the Gas IMU Remote Box (continued)

3. When installed properly, one of the two lid drain holes must be facing down. Never mount with a lid drain hole facing up.

4 March 2016

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Mounting the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, guide the metal clamp through the slot in the mounting plate.
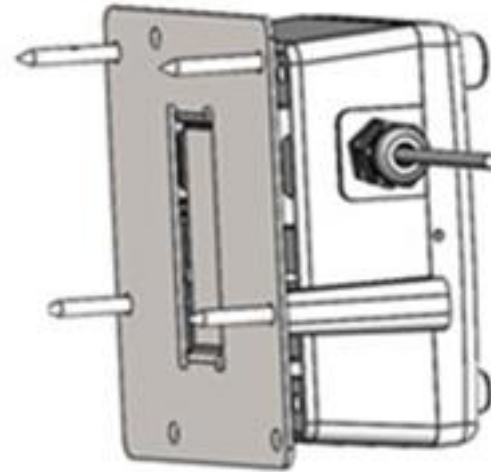

2. Wrap the metal clamp around the pipe and secure using the torque specified on the **Assembly Drawing** pages.

Mounting the Gas IMU Remote Box (continued)

3. If you are mounting the remote box to a wall, insert the four #10 Fillister or round head screws you provide through the mounting plate and secure to the wall.

4 March 2016

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Mounting the Gas IMU Remote Box (continued)

4. An optional mounting plate is available that places the remote box closer to the index assembly. For details, contact your Silver Spring representative. The torque specifications provided for the mounting plate in the kit on the **Assembly Drawing** pages apply for this mounting plate and hardware also. After installing, be sure to secure the pulser cable with zip ties as shown and trim the ties.

4 March 2016
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Dressing the Pulser Cable and Verifying the Installation

1. For pipe installations, use the zip tie to secure the pulser cable to the pipe.

   The completed remote box installation should look similar to this illustration.

2. After you have completed the installation, verify that, when gas is flowing, the meter's index dials are moving.

One of these arrows must point up when the remote box is installed correctly

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NETWORKS

Zip tie

4 March 2016

Completed Installation

The completed installation should look similar to the illustrations on this page (shown with the optional mounting plate used).

Large Diaphragm Gas IMU
Installation Guide - Rockwell, Rev 6

4 March 2016

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What This Guide Covers

This guide covers only the physical aspects of Gas IMU installation for commercial index top-mount gas meters.

There are other steps required in the installation process, such as recording the current meter read and other parameters that are needed for programing the IMU itself. Please refer to the applicable programing guide for those steps.

25 January 2016

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Safety First!

⚠ CAUTION

- **Always follow applicable standards for safety!**

- **Refer to the meter documentation for further safety information.**

- **Follow your employer's best practices.**

- **If you smell gas, report it to the utility.**

- **Do not use power tools!**

Gas IMU Use Warning

WARNING!

Device connected to the IMU must meet the following requirements:

- **Maximum Voltage Out: V_O= 0 VDC**
- **Maximum Current Out: I_O = 0 amps**
- **Capacitance Allowed: $C_a \leq$ 680 µF**
- **Inductance Allowed: L_a = 0 H (no inductance allowed)**

IMU Interface values:

- **Maximum Voltage Out:* V_O = 3.6 VDC**
- **Maximum Current Out*: I_O = 43 amps**
- **Maximum Input Voltage Allowed: V_{max} = 0**
- **Maximum Input Current Allowed: I_{max} = 0**
- **Maximum Internal Capacitance: C_i = 389 µF**
- **Maximum Internal Inductance: L_i = 7.5 µF**
- **Maximum Input Power: P_i = 0**

*Under fault conditions only; not nominal operating parameters

- **Hazardous Location Class 1 Division 1 Group D. Temperature Code T4A**

RF Exposure Notice (509)

- The antenna of this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- The device should be installed so that people will not come within 20 cm (8 in.) of the antenna.

- This equipment has been tested and found to comply with Part 15 of the FCC Rules, and with Industry Canada license-exempt RSS standard(s). This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  - Reorient or relocate the receiving antenna.

  - Increase the separation between the equipment and receiver.

Modifications to the Gas IMU not expressly approved by Silver Spring Networks may void your authority to operate the IMU.

25 January 2016
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Canadian Compliance

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Overview

1. Inspect the Gas IMU remote box.
2. Inspect the direct mount enclosure.
3. Remove the index assembly from the meter.
4. Clean the meter surface.
5. Attach the index assembly.
6. Attach the direct mount enclosure cover.
7. Align the direct mount enclosure to the meter.
8. Install the index assembly on the direct mount enclosure.
9. Install index assembly tamper protection.
10. Trim the pulser cable wires.
11. Connect the pulser cable to the Gas IMU.
12. Tighten the liquid-tight connector on the Gas IMU remote box.
13. Cinch and trim the zip tie.
14. Connect the battery.
15. Inspect the Gas IMU remote box gasket.
16. Wake up the Gas IMU.
17. Fasten the Gas IMU remote box lid.
18. Install the Gas IMU remote box tamper seals.
19. Determine the Gas IMU remote box mounting configuration.
20. Attach the mounting plate to the Gas IMU remote box.
21. Mount the Gas IMU remote box
22. Dress the pulser cable.
23. Verify the installation.

25 January 2016

Kit Components

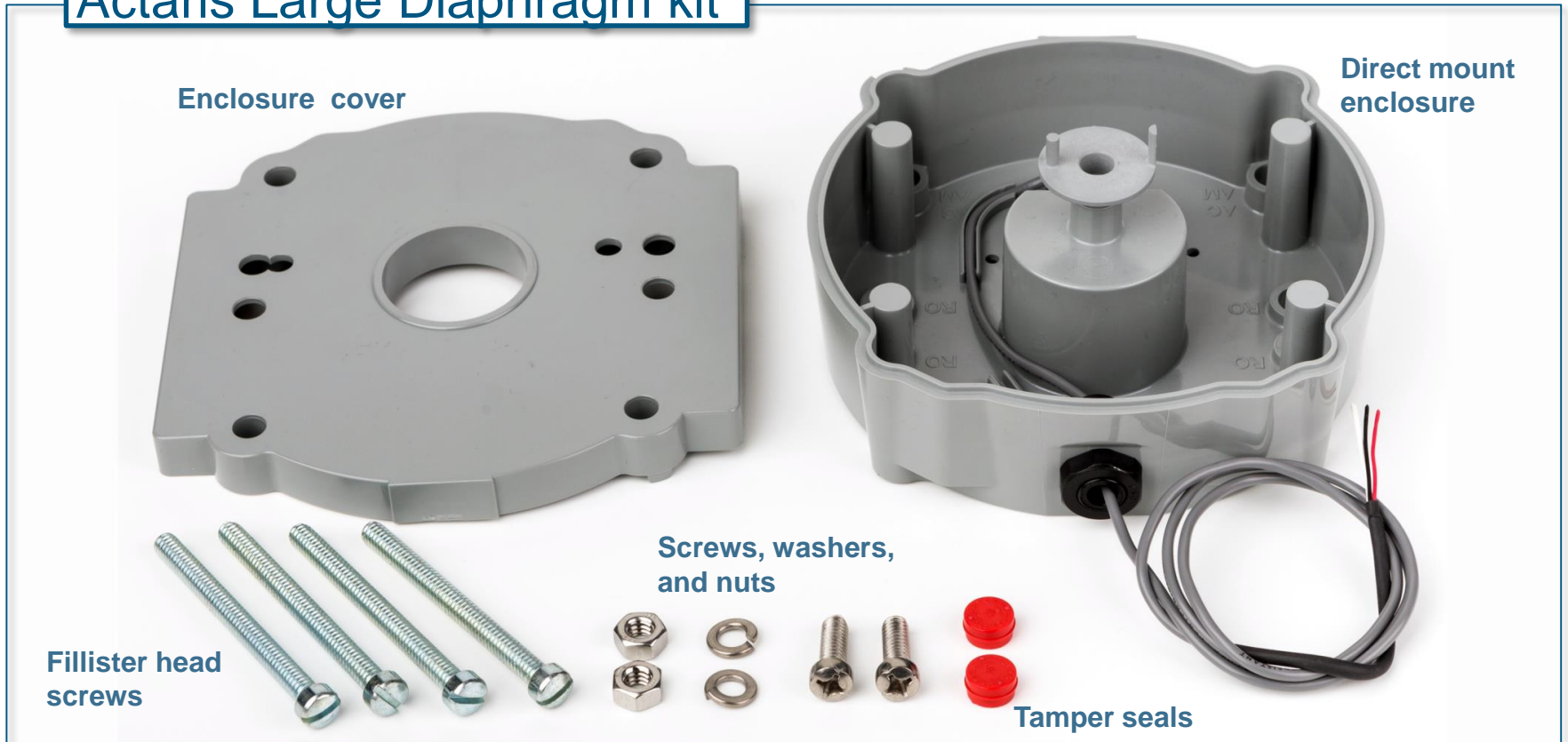Verify that all components are present in the installation kit.

Component	Qty.	Part Number
Gas IMU	1	975-0122-00
Direct mount enclosure	1	178-0492-00
Fillister head screws **1/4-20 X 2 3/4"**	4	400-0195-00

Large Diaphragm Gas IMU
Installation Guide - Actaris, Rev 3

25 January 2016

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Kit Components (continued)

Component		Qty.	Part Number
Gas IMU gel splices		3	180-0005-00 (packaged together)
Gas IMU remote box tamper seals		2	**Note:** The Gas IMU gel spices, Gas IMU remote box tamper seals, and the screws and nuts for attaching the Gas IMU remote box to the mounting plate are part of 180-0010-00, which is included with 180-0005-00.
Nuts – for attaching the Gas IMU remote box to the mounting plate 10-24		2	
Screws - for attaching the Gas IMU remote box to the mounting plate 10-24 x 1/2"		2	
Gas IMU remote box mounting plate		1	
Pipe clamp –for securing the Gas IMU remote box to a pipe		1	
Gas IMU remote box lid screws 6-32 x 7/8"		4	

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Components

Actaris Large Diaphragm kit

Enclosure cover

Direct mount enclosure

Fillister head screws

Screws, washers, and nuts

Tamper seals

Note: Some IMUs have one tamper seal already installed in the battery door. In that case, there will be two seals in the kit. Otherwise, there are three seals in the kit.

Required Tools

Wire cutters

Gel cap connection tool

Nut driver

Service magnet

Pliers, such as 6-inch slip joint pliers

Optionally, a wire brush or scraper

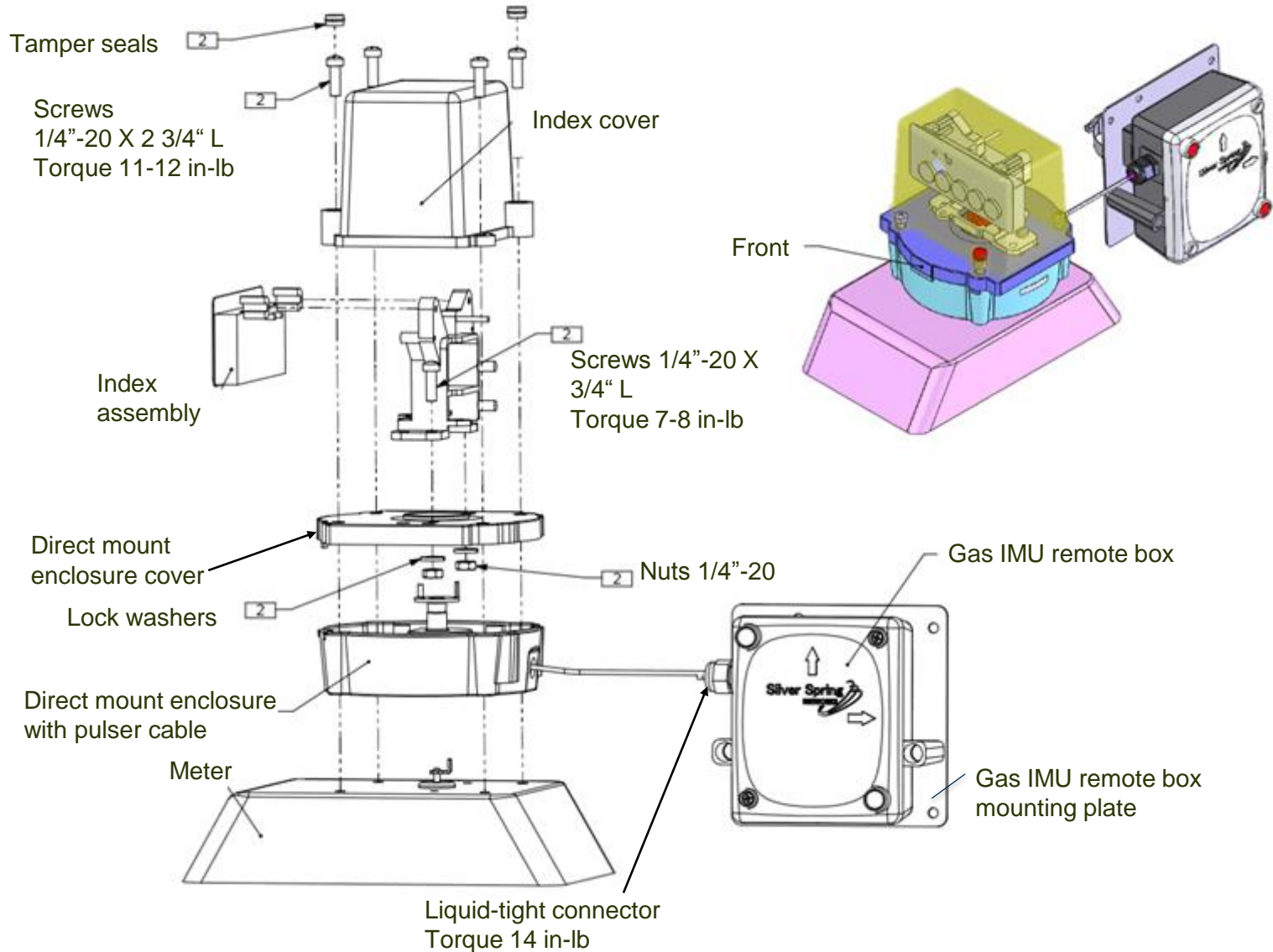# Required Tools (continued)

2.5-11.5"- pounds pre-set adjustable torque range screwdriver
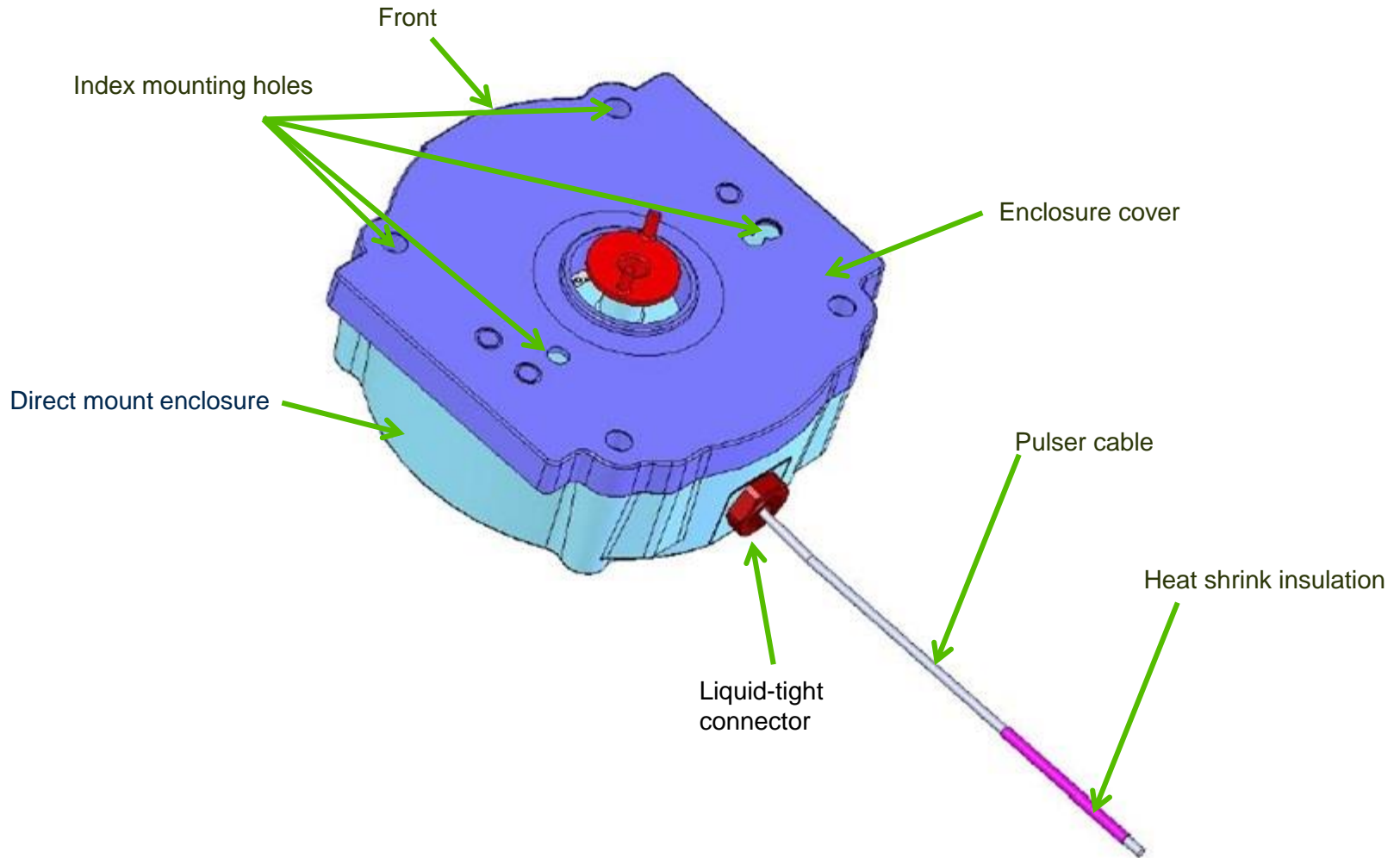05074720002 B003KN3GDC, available on Amazon

11.0-29"- pounds variable torque adjustment range screwdriver
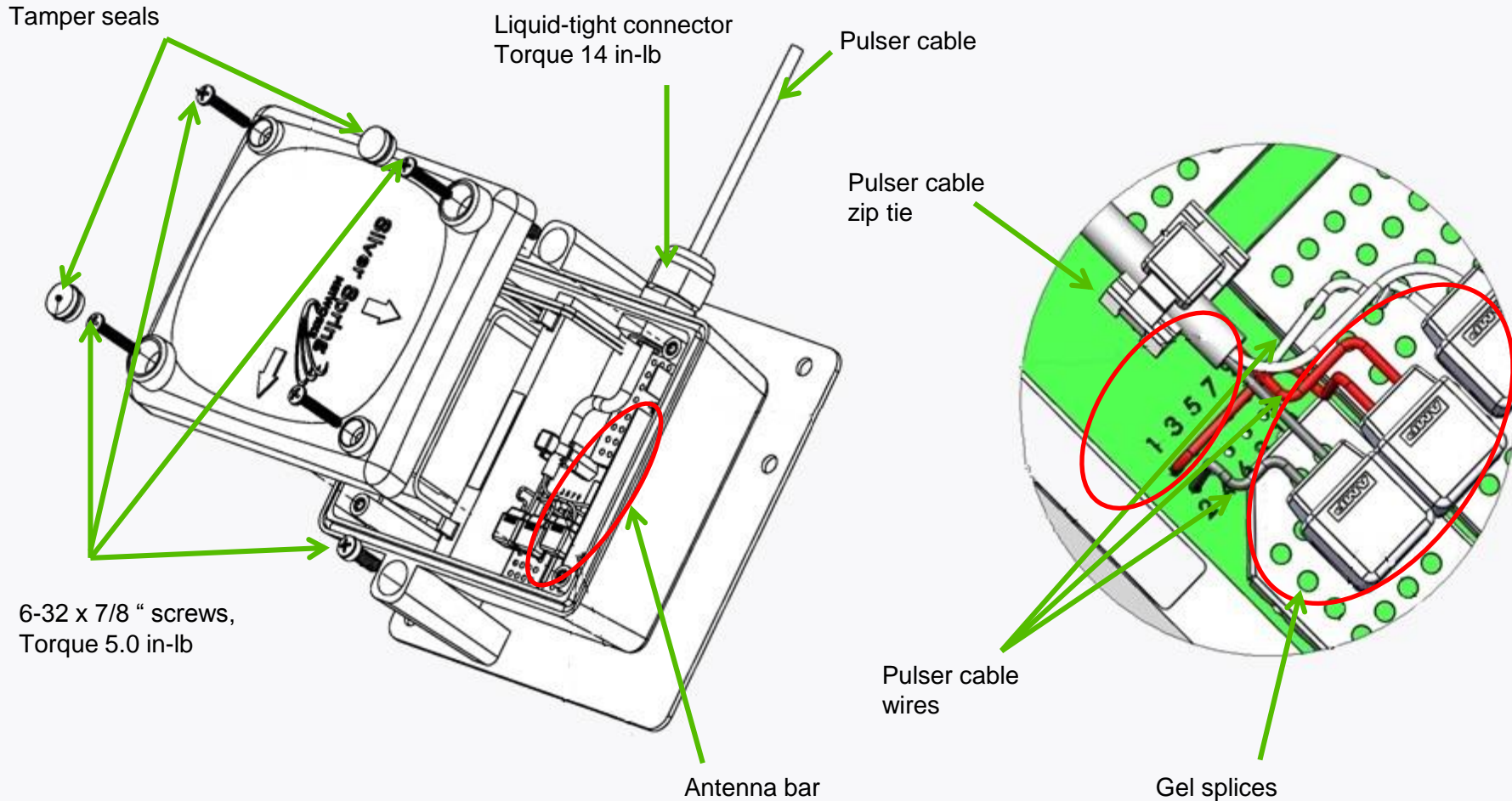05074711002 B003KN3GAK, available on Amazon
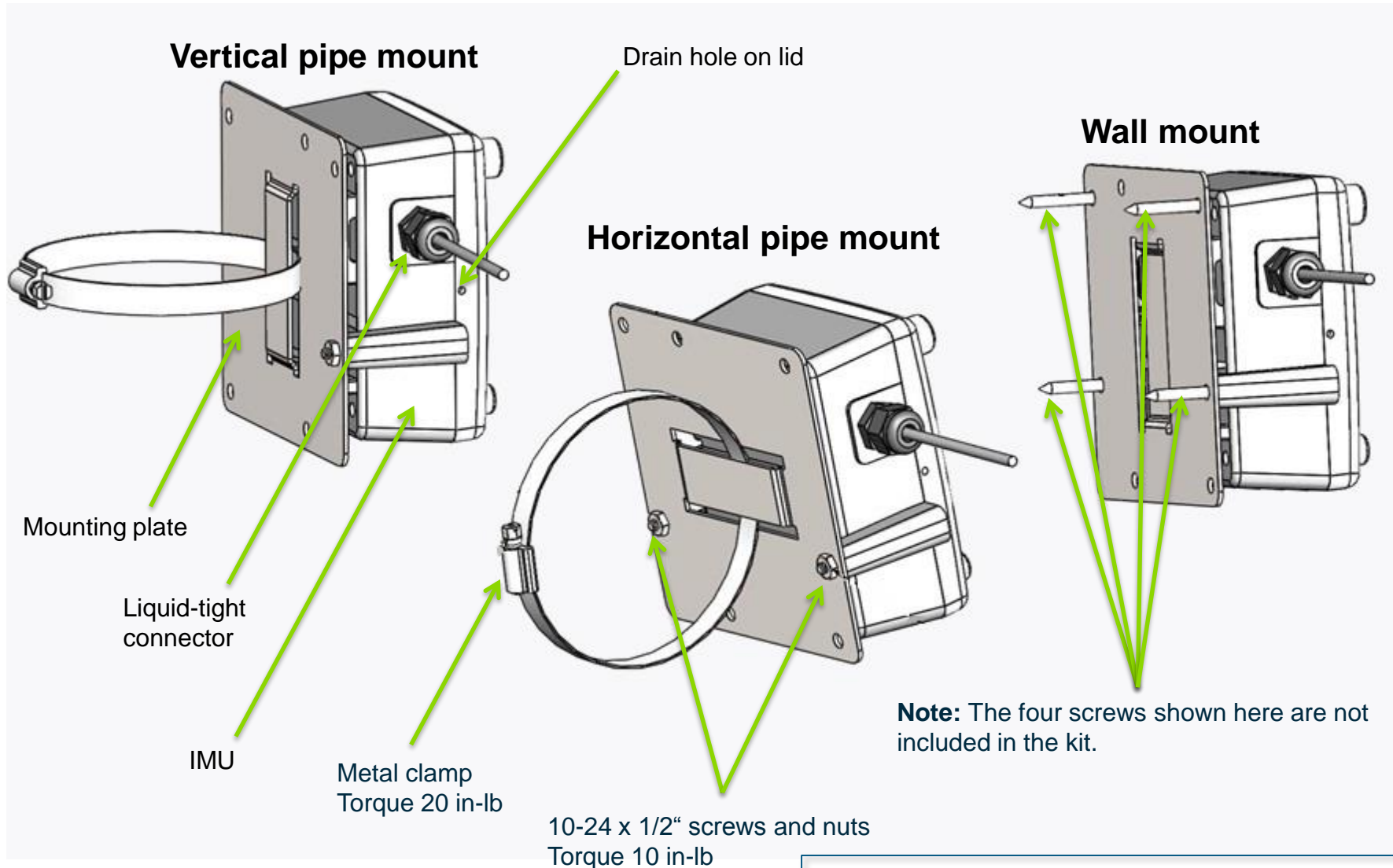
Assembly Drawing – Complete

Tamper seals

Screws
1/4"-20 X 2 3/4" L
Torque 11-12 in-lb

Index cover

Index assembly

Screws 1/4"-20 X 3/4" L
Torque 7-8 in-lb

Front

Direct mount enclosure cover

Lock washers

Nuts 1/4"-20

Direct mount enclosure with pulser cable

Meter

Gas IMU remote box

Gas IMU remote box mounting plate

Liquid-tight connector
Torque 14 in-lb

Assembly Drawing – Direct Mount Enclosure

Front

Index mounting holes

Enclosure cover

Direct mount enclosure

Pulser cable

Heat shrink insulation

Liquid-tight connector

Assembly Drawing – Gas IMU Remote Box

Tamper seals

Liquid-tight connector
Torque 14 in-lb

Pulser cable

Pulser cable
zip tie

6-32 x 7/8 " screws,
Torque 5.0 in-lb

Pulser cable
wires

Antenna bar

Gel splices

Assembly Drawing – IMU Pipe and Wall Mounts

Vertical pipe mount

Drain hole on lid

Horizontal pipe mount

Wall mount

Mounting plate

Liquid-tight connector

IMU

Metal clamp
Torque 20 in-lb

10-24 x 1/2" screws and nuts
Torque 10 in-lb

Note: The four screws shown here are not included in the kit.

Note: An optional mounting plate that places the remote box closer to the index assembly is available and is discussed later in this guide.

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Inspecting the Gas IMU Remote Box

- Verify that the Gas IMU remote box is not cracked and that the MAC address label is present.

- Remove the remote box lid.

- Verify that the battery wires are undamaged.

If the remote box is damaged, return it to your supervisor and get a replacement.
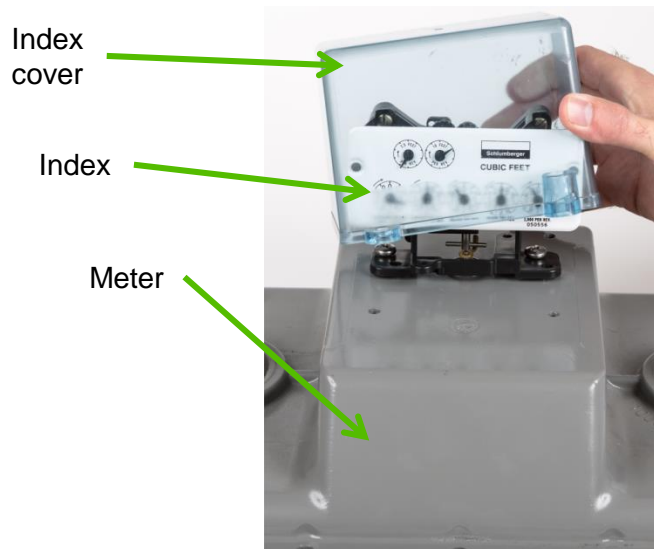
Inspecting the Direct Mount Enclosure

- Ensure that the direct mount enclosure is not cracked.

- Ensure that the pulser cable is not cut.

- Ensure that the rotor shaft turns smoothly and that the magnet is present. If the magnet is missing, contact your supervisor for a replacement.
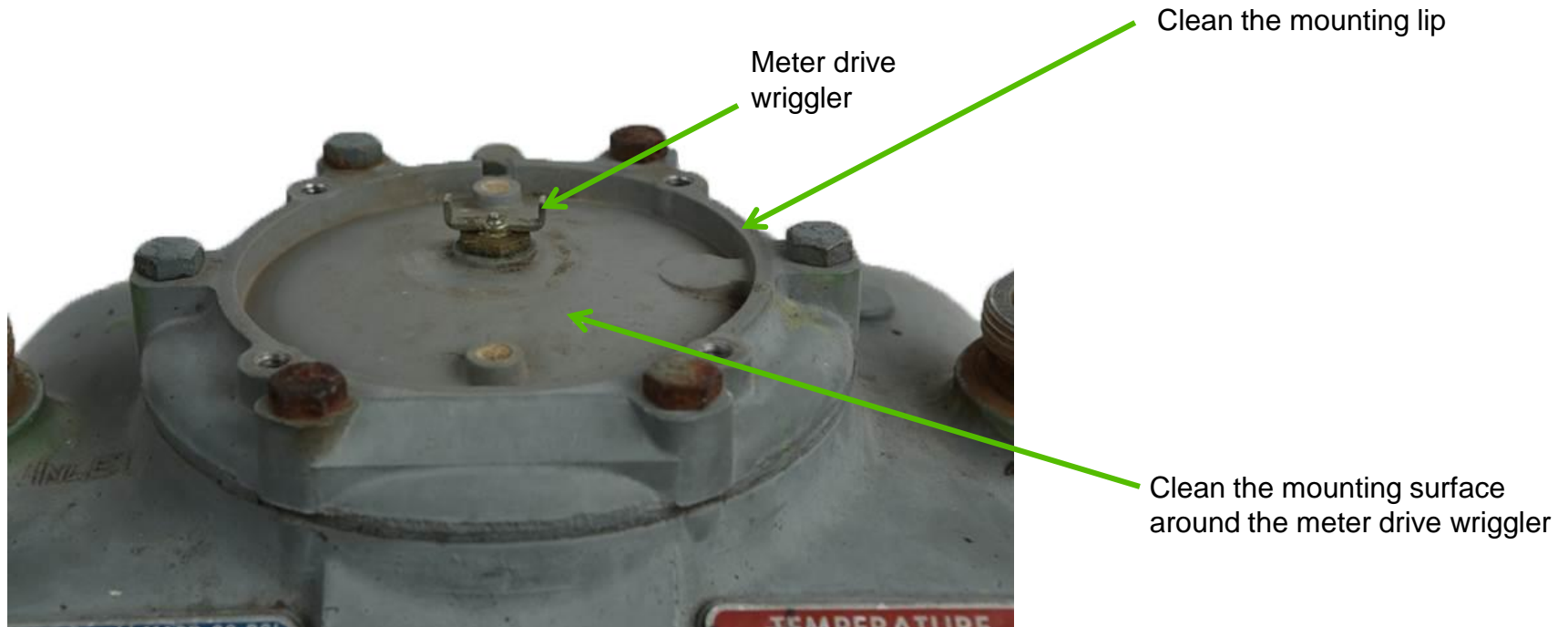

Rotor and rotor shaft

Direct mount enclosure

Magnet

Pulser cable

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Removing the Index Assembly from the Meter

1. Note which direction the index is facing before you remove it so you reinstall it later facing the same direction.

2. Unscrew the index cover screws and remove the index cover.

3. Unscrew the index screws and remove the index.

Important: Save the index screws along with the index and index cover. You will use these screws later to attach the direct mount enclosure to the meter.

Index cover

Index

Meter

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Cleaning the Meter Surface

Using a wire brush or scraper, clean the meter surfaces where the direct mount enclosure will interface with the meter. Be sure to remove any remaining parts of the old gasket.

Clean the mounting lip

Meter drive wriggler

Clean the mounting surface around the meter drive wriggler

Attaching the Index Assembly

Align the index with the direct mount enclosure cover and secure the index with the two 1/4"-20 X 3/4" L screws from the kit using the torque indicated on the **Assembly Drawing** pages.

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Attaching the Direct Mount Enclosure Cover

1. Align the index and direct mount enclosure cover with the direct mount enclosure.

2. Ensure that the cover tab and the direct mount enclosure tabs both face the front, and that the cover key in the front, right corner sits in the matching enclosure slot with the pulser cable leading toward the back.

Direct mount enclosure cover and tabs

Front

Cover key and enclosure slot

Pulser cable
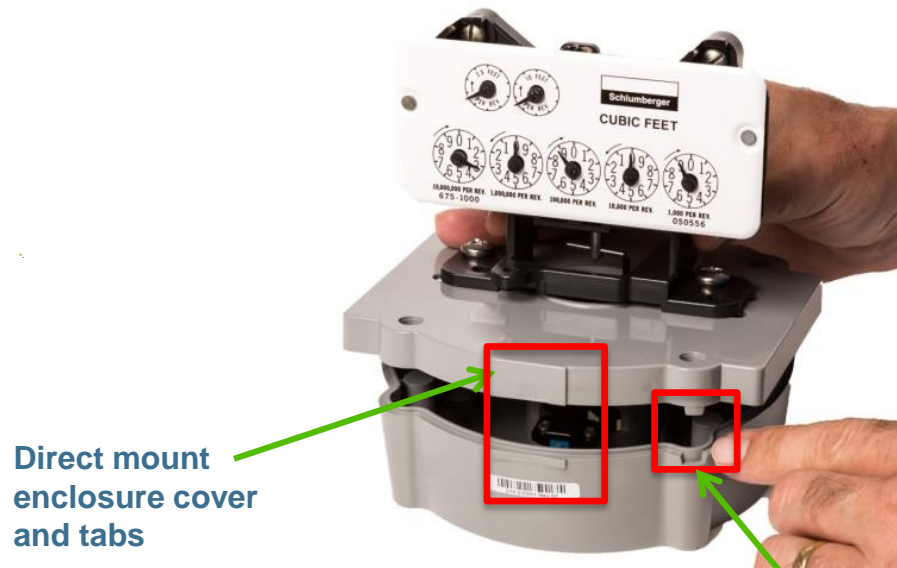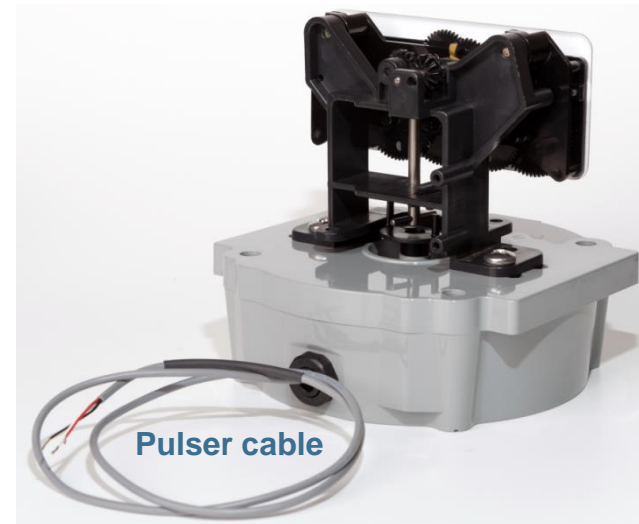
Back

Aligning the Direct Mount Enclosure to the Meter

- Ensure that the IMU rotor gear and meter drive wriggler do not interfere with each other.

- Ensure that the rectangular tab on the direct mount enclosure faces the front of the gas meter with the pulser cable leading toward the back.

Direct mount enclosure rectangular tab

IMU rotor gear

Meter drive wriggler

Meter front

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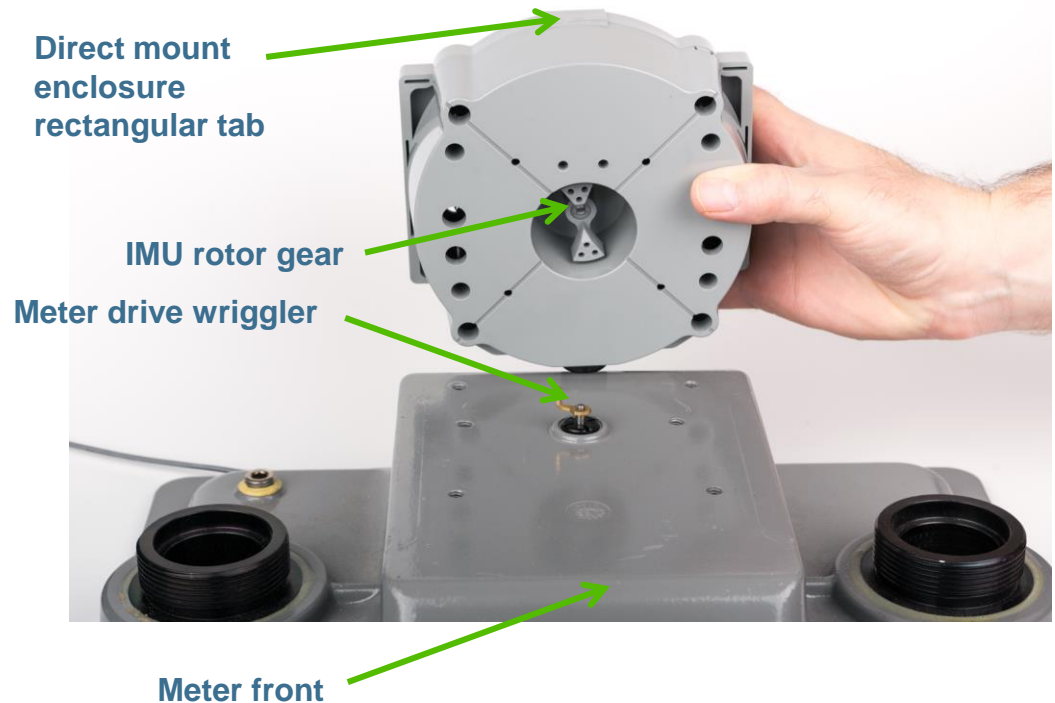
Installing the Index Assembly on the Direct Mount Enclosure

1. Place the index and cover assembly on the direct mount enclosure.

2. If you are using the optional mounting plate to mount the remote box behind the meter, place the plate over the cover assembly as shown.

Optional mounting plate

Front of direct mount enclosure

Front of meter

Large Diaphragm Gas IMU
Installation Guide - Actaris, Rev 3

25 January 2016

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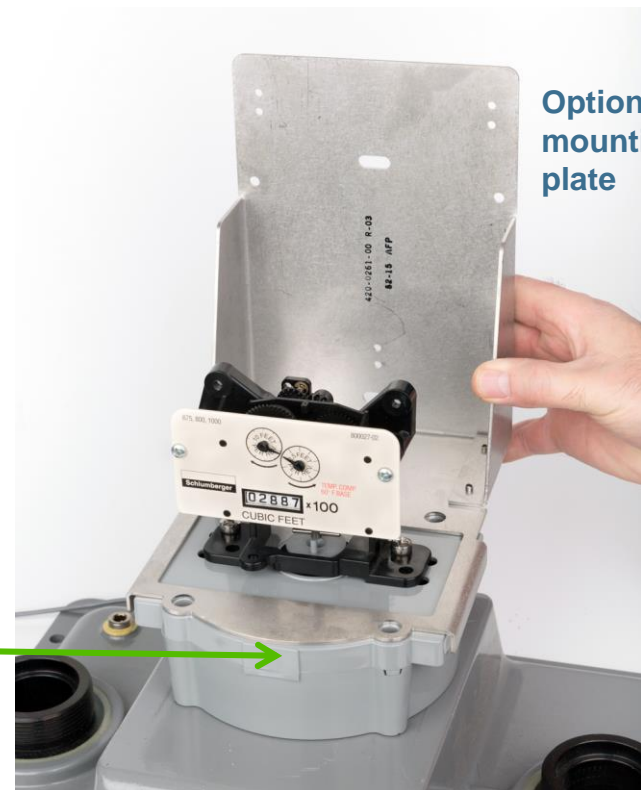
Installing the Index Assembly on the Direct Mount Enclosure (continued)

3. Using your fingers, loosely fasten the four 1/4"-20 X 2 3/4" L screws through the index cover and enclosure.

4. Tighten the screws using the torque indicated on the **Assembly Drawing** pages with an alternating tightening pattern.

Pulser cable

Front of direct mount enclosure

Front of meter
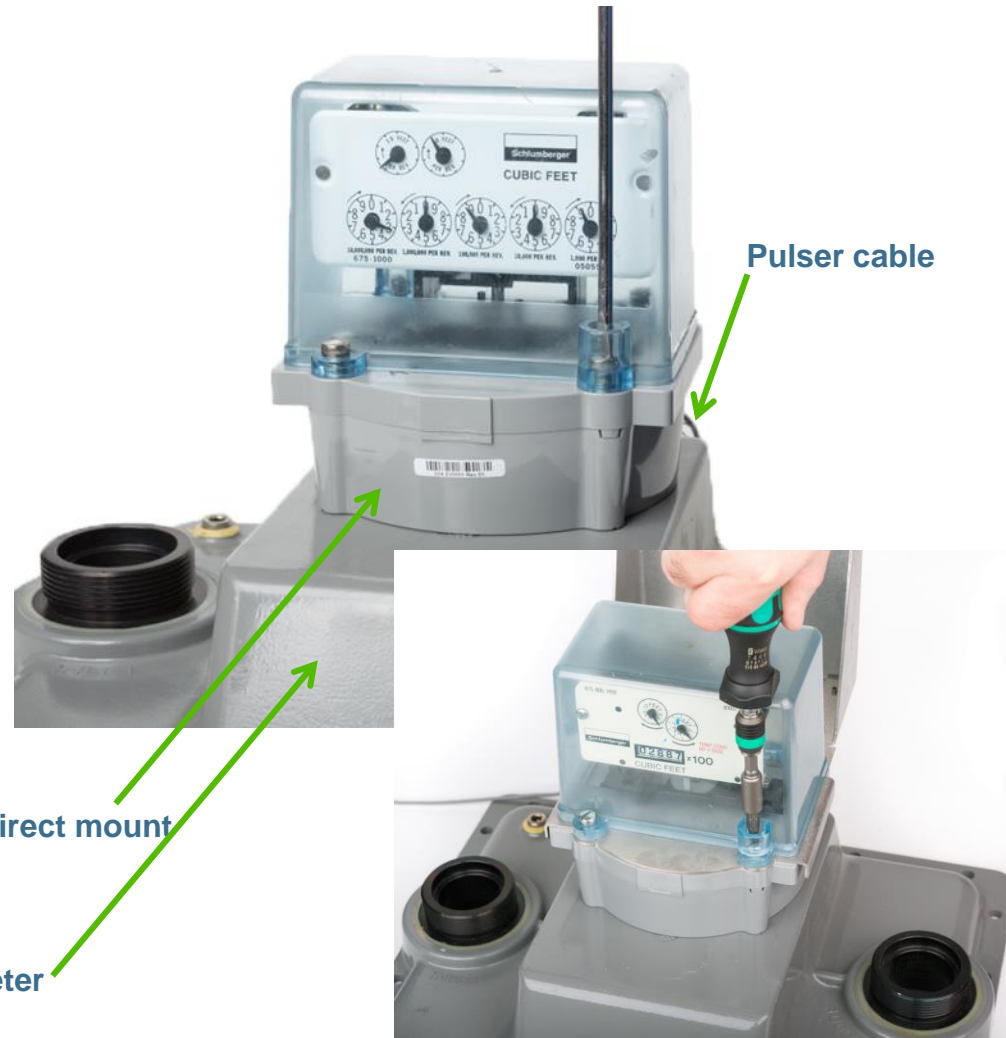
Installing Index Assembly Tamper Protection

If the index assembly has a tamper cup, push the tamper seal into the cup with a nut driver.

Index assembly with tamper cup uses a tamper seal

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About Extending Gas IMU Cables

You can extend the Gas IMU pulser cable provided with the kit up to 800 feet as described on this page if needed for the IMU to communicate over the Silver Spring mesh network without loss of consumption pulses when using Silver-Spring-recommended splicing material and process.

1. Determine if you need to locate the IMU further away from the meter than the existing pulser cable allows.

2. If you need to extend the pulser cable, Silver Spring recommends using a product similar to the following:
   NATIONAL WIRE & CABLE SR10-7833 REVISION_.A, SIX CONDUCTORS OF STRANDED 24AWG, INDIVIDUALLY INSULATED, CABLED AND SHIELDED WITH OVERALL FOIL SHIELD AND DRAIN WIRE, AND EXTRUDED WITH AN OVERALL SANTOPRENE BLACK JACKET

3. Ensure that the IMU is using Silver Spring UtilOS firmware 2.14.3001 or later. This version provides cut-cable detection and accurate counting for cables up to 800 feet. You can have total cable lengths up to approximately 50 feet with earlier versions of the firmware although there is no cut-cable detection in such cases.

4. Trim all cable ends (as discussed on the next page) and splice the cable extension onto the pulser cable using appropriate gel caps (similar to those Silver Spring provides for the IMU-end connections—for example, Silver Spring 916-000001 or Tyco 552795-2).

5. Use at least two zip ties with at least a one-inch space between them to secure the extension cable to the pulser cable and prevent stress on the gel spliced connections, and wrap with appropriate tape (for example, Rubber Mastic Tape such as 3M Scotch Rubber Mastic Tape 2228). Ensure that the tape covers the jacket ends and the splices.

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Trimming the Pulser Cable Wires

Using the wire cutter, trim the end of the three wires at the end of the pulser cable so no bare wires are exposed.

25 January 2016
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Connecting the Pulser Cable to the Gas IMU

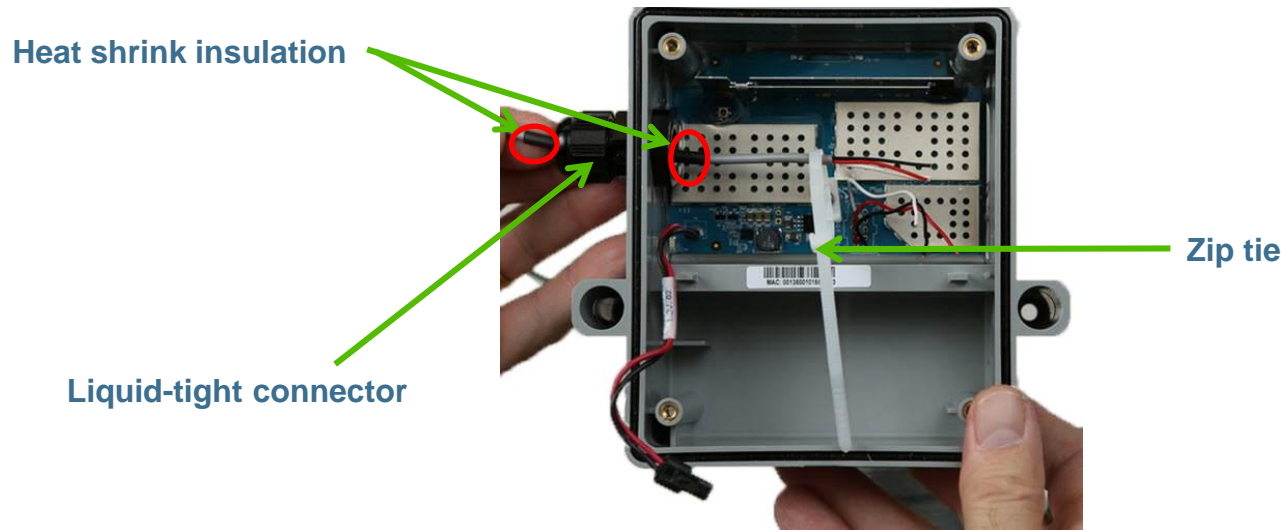1. Open the Gas IMU remote box lid with the Phillips screwdriver and set it aside.

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Connecting the Pulser Cable to the Gas IMU
(continued)

Note: If you are using the optional mounting plate to mount the remote box behind the meter, you can route the pulser cable through the lower, oblong hold in the plate, but you need to do this before securing the cable to the IMU.

2. Thread 4 to 6 inches of the pulser cable through the Gas IMU remote box liquid-tight connector and the zip tie. The black heat shrink insulation on the cable must be centered through the opening to keep the cable snug.

Heat shrink insulation

Liquid-tight connector

Zip tie

25 January 2016

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Connecting the Pulser Cable to the Gas IMU
(continued)

Note: Do NOT strip the insulation from the wires when you connect the cable to the gel splices.

3. Inside the Gas IMU remote box, insert each of the wire pairs (red and red, black and black, white and white) into a gel splice and push all the way into the splice.

4. Close each gel splice by squeezing it with the gel cap connection tool. The gel splices pierce the insulation to make the electrical connection.

25 January 2016

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Connecting the Pulser Cable to the Gas IMU
(continued)

5. Gently tug on the wires to ensure that they are secure.
6. Tuck the wires and splices away from the metal antenna bar.

Antenna bar

Wires and splices

Tightening the Liquid-Tight Connector on the Gas IMU Remote Box

Tighten the liquid-tight connector using the torque specification on the **Assembly Drawing** pages.
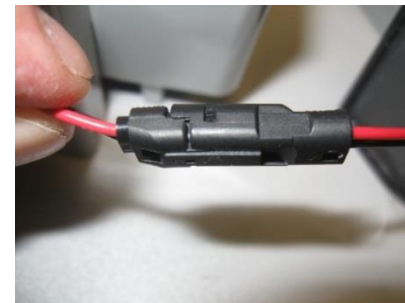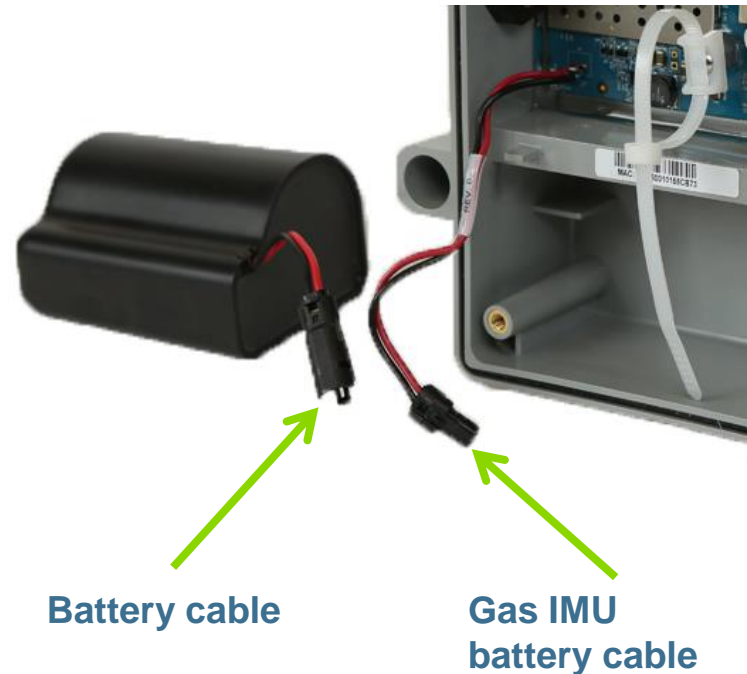

Liquid-tight connector

Cinching and Trimming the Zip Tie

1. In order to keep the wires away from the antenna bar, cinch the zip tie until snug.
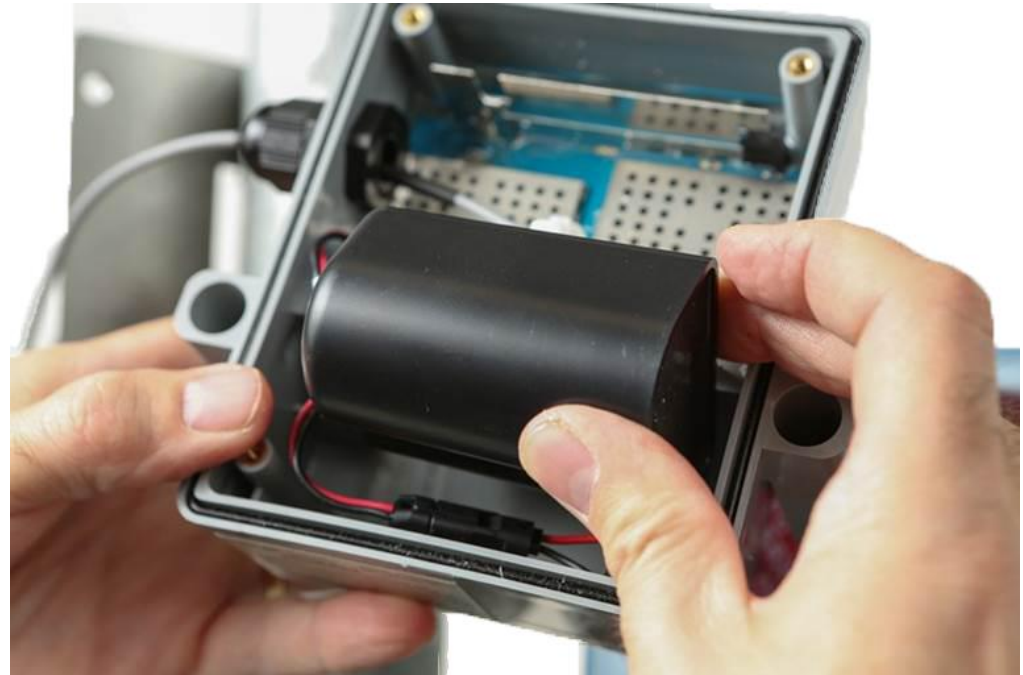2. Trim off the end of the zip tie.

Connecting the Battery

1. Align the battery connectors so the red wires connect to red and black to black.

2. Press the connectors together until the lock snaps in place.

3. The connectors are keyed. If they do not snap together, double check the connector alignment.

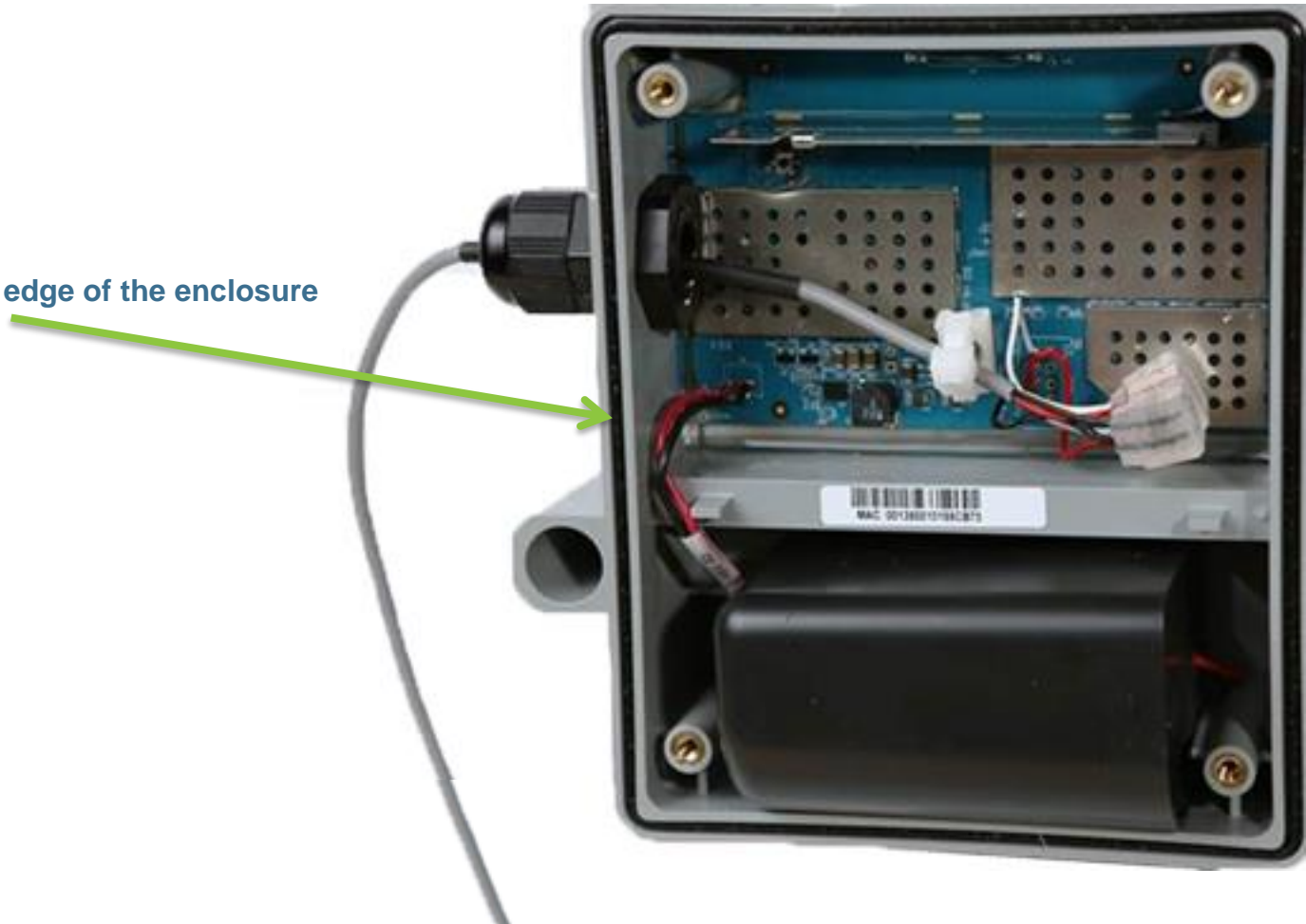**Battery cable**

Gas IMU battery cable

Connecting the Battery (continued)

4. When the wires are connected, the LED should start flashing.

5. Place the battery in the battery compartment as shown.

6. After the LED *stops* flashing, wait for two minutes before attempting to swipe the unit with a service magnet (as described on the **Waking up the Gas IMU** page).
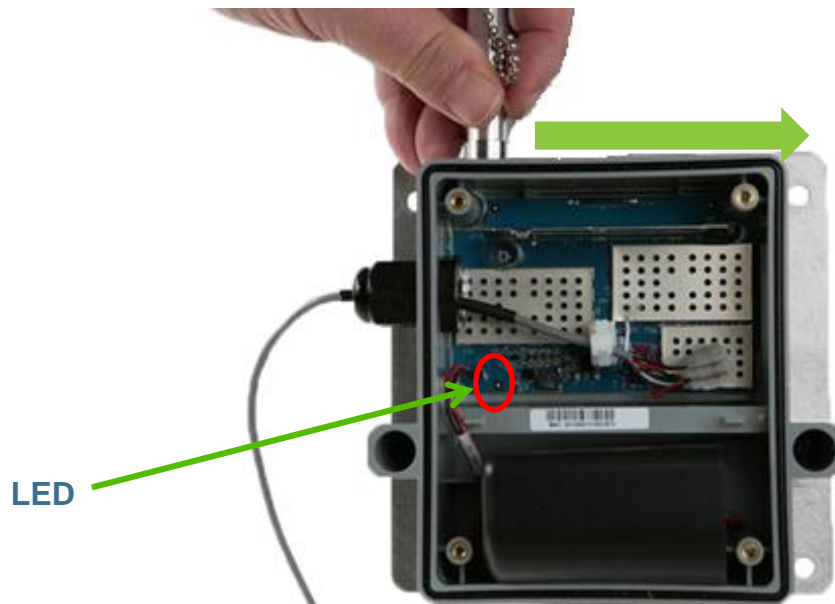
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Inspecting the Gas IMU Remote Box Gasket

Inspect the Gas IMU remote box gasket to ensure that it will seal the area between the box and the lid.

Gasket around the edge of the enclosure

Waking up the Gas IMU

1. When you are ready to program the Gas IMU, slowly pass the service magnet across the top of the IMU as shown below (for 2 to 5 seconds).

2. Verify that the LED located at the left side of the Gas IMU turns on and then blinks.

LED

Fastening the Gas IMU Remote Box Lid

1. Fit the lid on the Gas IMU remote box. The lid fits the box in one orientation, and the four lid screws cannot be inserted and fastened if the orientation is reversed.

2. Install the four 6-32 x 7/8" lid screws.

3. Tighten the screws using the torque specification on the **Assembly Drawing** page.

25 January 2016

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Installing the Gas IMU Remote Box Tamper Seals

Install the two red tamper seals in the Gas IMU remote box tamper cups.

Tamper seals

25 January 2016

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Determining Gas IMU Remote Box Mounting Configuration

If you are using the mounting plate provided in the kit, locate a nearby pipe or wall for mounting the Gas IMU remote box vertically or horizontally.

- Ensure that the pulser cable is long enough to reach from the direct mount enclosure to the IMU mounting location.

- Note that the arrows on the remote box lid indicate the correct orientation for both vertical and horizontal mounting.
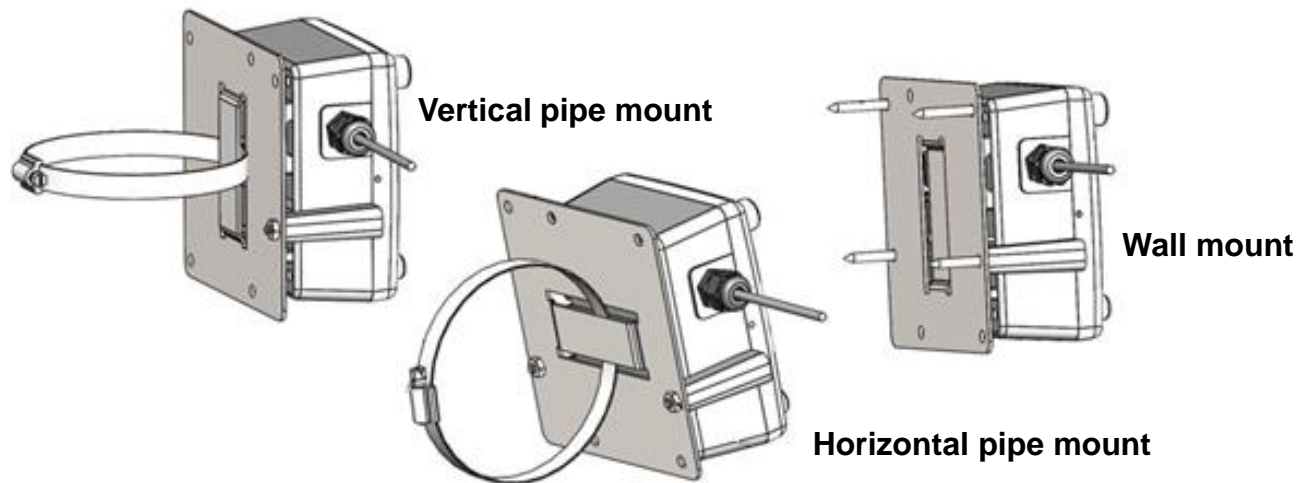

Arrow that points up for a vertical mount

Arrow that points up for a horizontal mount

Attaching the Mounting Plate to the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, attach the Gas IMU remote box to the plate with the two 10-24 x 1/2" screws and 10-24 flanged nuts using one of the configurations shown below, and torque the screws as specified on the **Assembly Drawing** pages.

2. If you choose to mount the remote box to a wall, use four #10 Fillister or round head screws (these are not included in the kit).

Vertical pipe mount

Wall mount
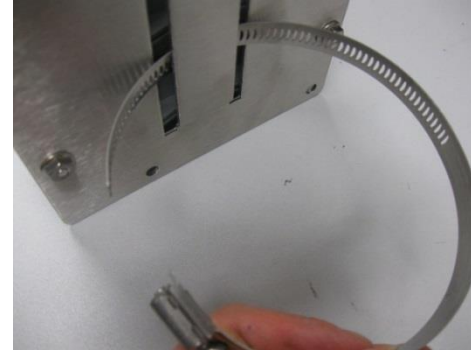
Horizontal pipe mount

Attaching the Mounting Plate to the Gas IMU Remote Box (continued)

3. When installed properly, one of the two lid drain holes must be facing down. Never mount with a lid drain hole facing up.
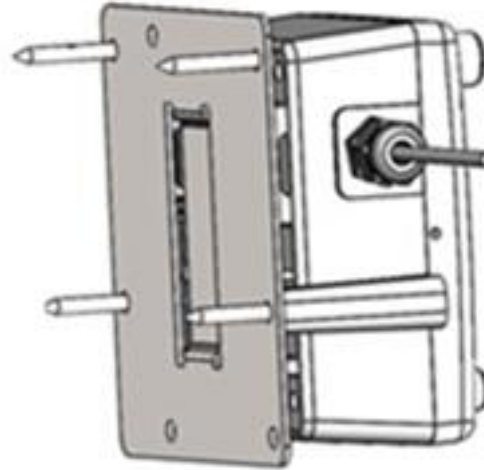
Mounting the Gas IMU Remote Box

1. If you are using the mounting plate provided in the kit, guide the metal clamp through the slot in the mounting plate.

2. Wrap the metal clamp around the pipe and secure using the torque specified on the **Assembly Drawing** pages.

25 January 2016

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Mounting the Gas IMU Remote Box (continued)

3. If you are mounting the remote box to a wall, insert the four #10 Fillister or round head screws you provide through the mounting plate and secure to the wall.

25 January 2016

Mounting the Gas IMU Remote Box (continued)

4. An optional mounting plate is available that places the remote box closer to the index assembly. For details, contact your Silver Spring representative. The torque specifications provided for the mounting plate in the kit on the **Assembly Drawing** pages apply for this mounting plate and hardware also. After installing, be sure to secure the pulser cable with zip ties as shown and trim the ties.
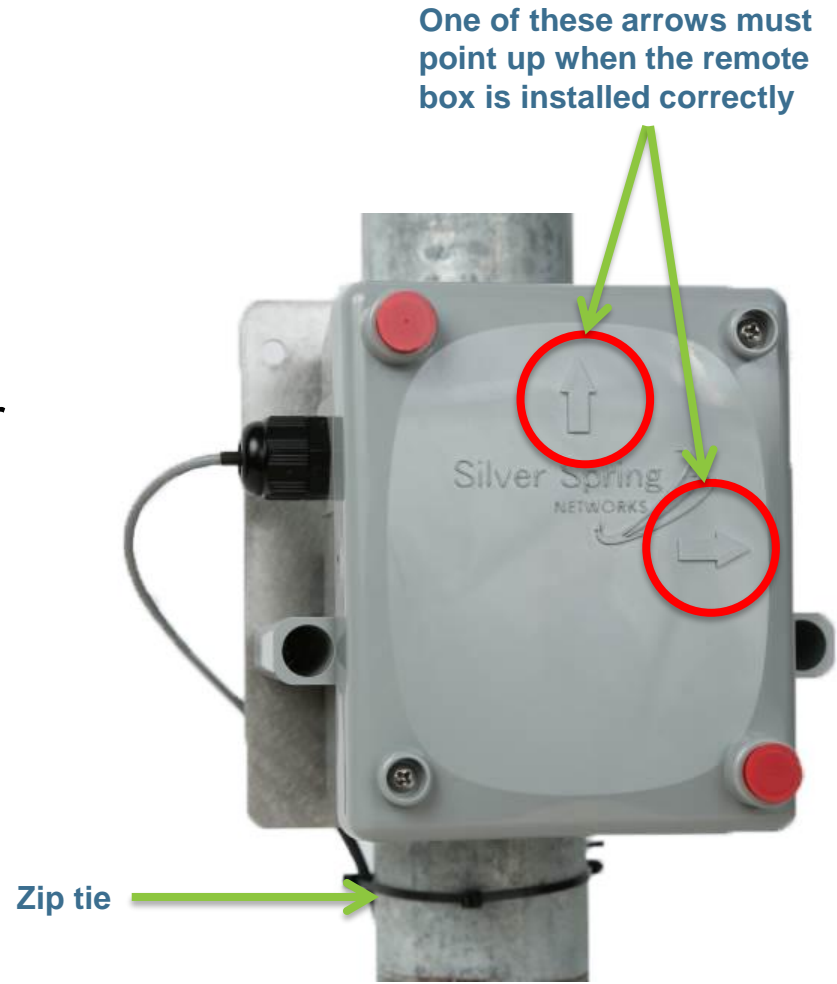
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Dressing the Pulser Cable and Verifying the Installation

1. For pipe installations, use the zip tie to secure the pulser cable to the pipe and trim the ties.

   The completed remote box installation should look similar to this illustration.

2. After you have completed the installation, verify that, when gas is flowing, the meter's index dials are moving.

One of these arrows must point up when the remote box is installed correctly

Zip tie

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Completed Installation

The completed installation should look similar to the illustrations on this page (shown with the optional mounting plate used).

25 January 2016
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Single Channel Rotary and Turbine Meter Gas IMU Installation

October 2011

224-040001

Rev 1

Overview

1. Inspect the pulser cable.
2. Inspect the IMU.
3. Connect the pulser to the IMU.
4. Connect the battery cable connector.
5. Configure the IMU for the field.
6. Inspect the gasket and fasten the IMU enclosure cover.
7. Attach the IMU enclosure to the mounting plate.
8. Mount the IMU on a pipe or wall.

Safety First!

Always follow applicable standards for safety!

Refer to the meter documentation for further safety information.

Follow your employer's best practices.

If you smell gas, report it to the utility.

Do not use power tools!

IMU Use Warning

WARNING!

Device connected to the IMU must meet the following requirements:

- **Maximum Voltage Out: V_O = 0 VDC**
- **Maximum Current Out: I_O = 0 amps**
- **Capacitance Allowed: $C_a \leq 680$ µF**
- **Inductance Allowed: L_a = 0 H (no inductance allowed)**

IMU Interface values:

- **Maximum Voltage Out:* V_O = 3.6 VDC**
- **Maximum Current Out*: I_O = 43 amps**
- **Maximum Input Voltage Allowed: V_{max} = 0**
- **Maximum Input Current Allowed: I_{max} = 0**
- **Maximum Internal Capacitance: C_i = 389 µF**
- **Maximum Internal Inductance: L_i = 7.5 µF**
- **Maximum Input Power: P_i = 0**

*Under fault conditions only; not nominal operating parameters

Hazardous Location Class 1 Division 1 Group D. Temperature Code T4A

RF Exposure Notice (509)

- The antenna of this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- The device should be installed so that people will not come within 20 cm (8 in.) of the antenna.

- This equipment has been tested and found to comply with Part 15 of the FCC Rules, and with Industry Canada license-exempt RSS standard(s). This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  - Reorient or relocate the receiving antenna.

  - Increase the separation between the equipment and receiver.

  - Connect the equipment into an outlet on a circuit different from that to which the receiver disconnected.

Modifications to the IMU not expressly approved by Silver Spring Networks may void your authority to operate the IMU.

Rev 1

Kit Components

Top level component	Qty.	Part Number
Silver Spring IMU (top level, includes hardware)	1	224-040001

IMU sub-components

Screws 10-24 x ½"

Tamper seals

Gel splices

Flanged nuts 10-24
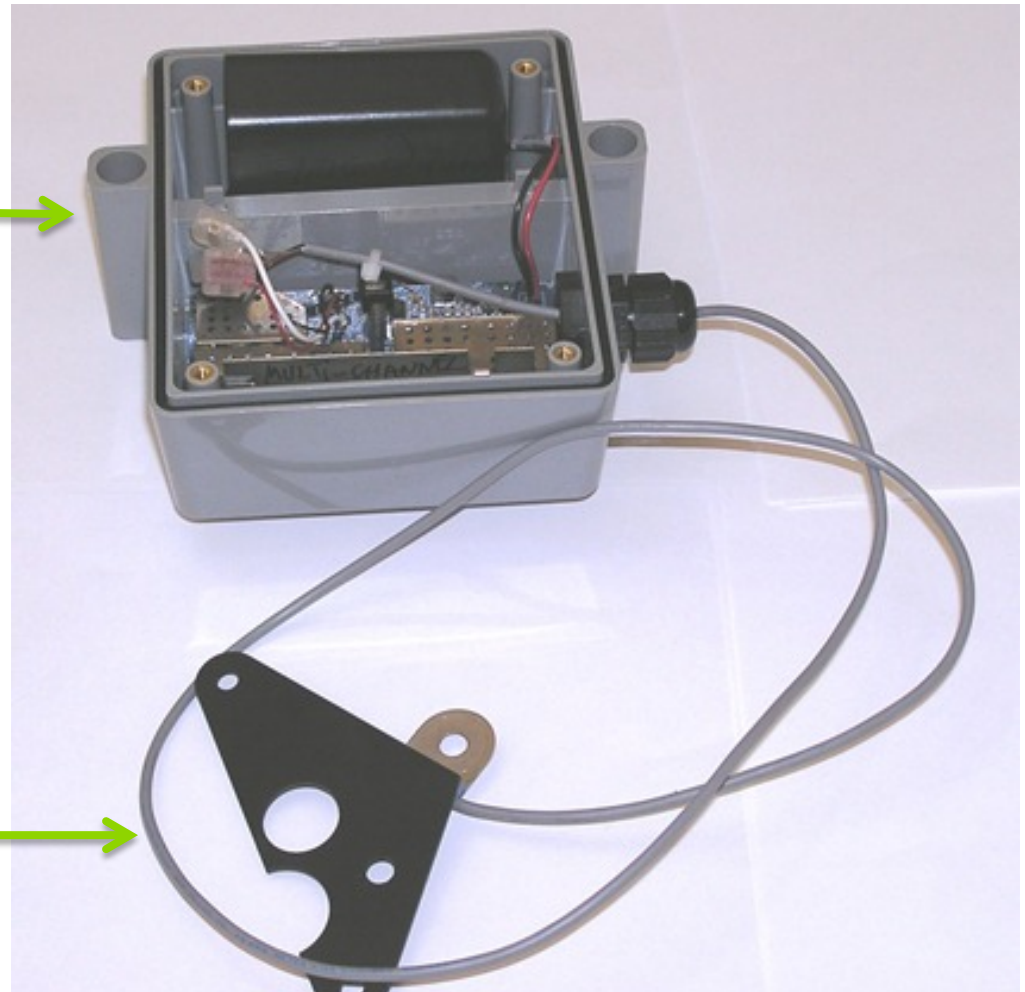

Mounting plate

Pipe clamp

Cover screws, 6-32 x 7/8"

Customer-supplied Component

Customers need to supply a pulser cable to connect to the IMU.

IMU is Silver Spring Networks supplied

Pulser and pulser cable are customer supplied

Required Tools

Wire cutters

AMP gel cap connection tool, PN 231839-1

2.5 -11.5 inch-pound torque setting screwdriver with Phillips tip made by Wera
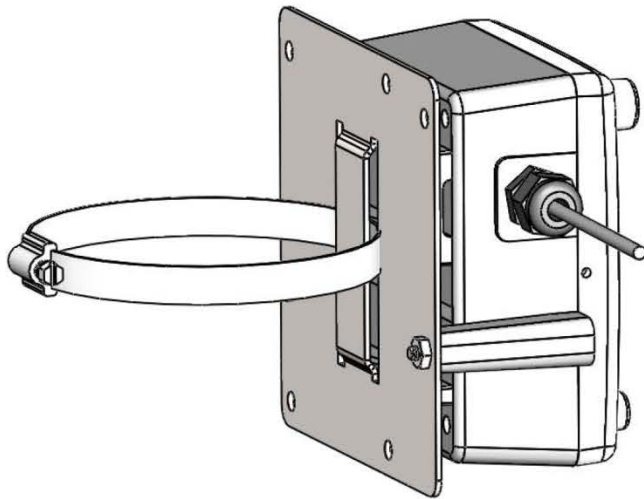
Mfr #: 05074710002
Distributor MSC #: 06150585 or Amazon

Rev 1

Required Tools (continued)

Nut driver

Service magnet

11-29 inch-pound torque setting screwdriver with Phillips tip made by Wera

Mfr #: 05074711002
Distributor MSC #: 05074711002 or Amazon
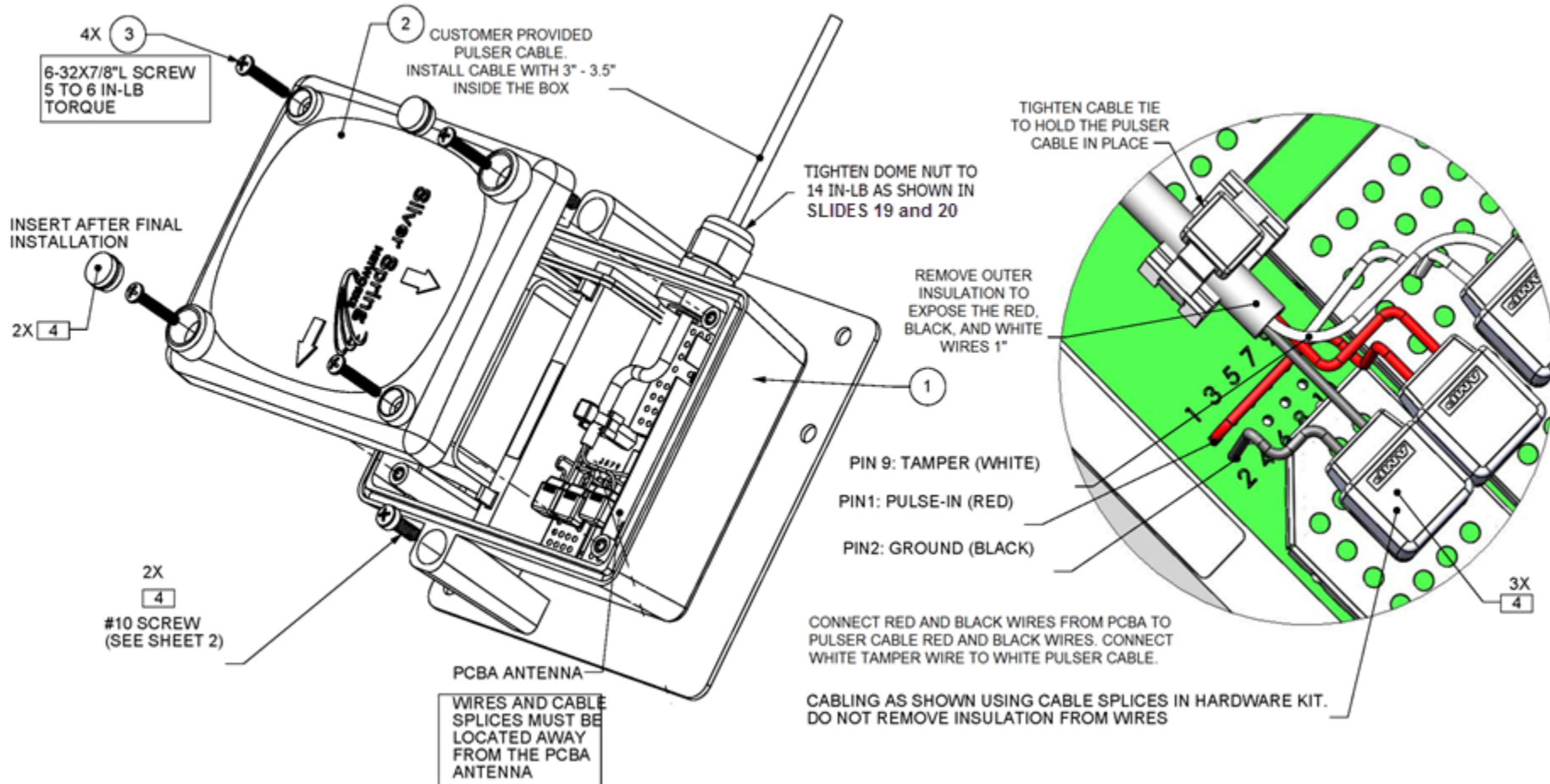
**Note:** The four screws shown here are not included in the kit.
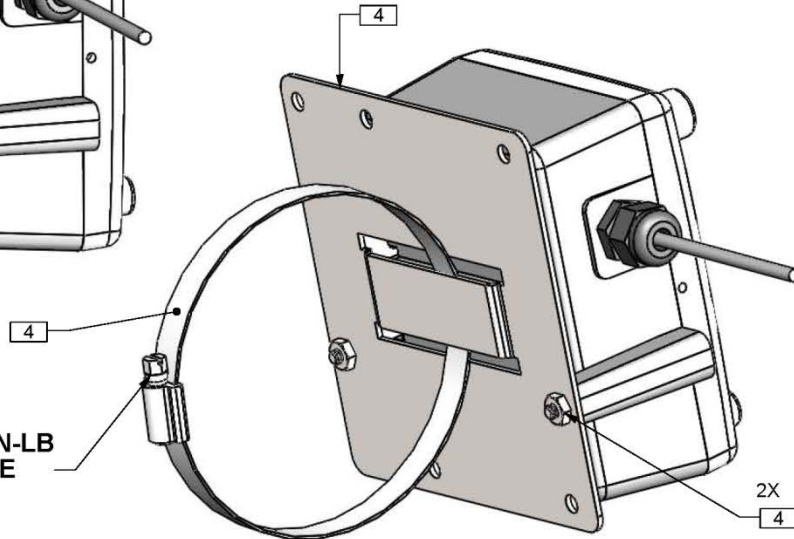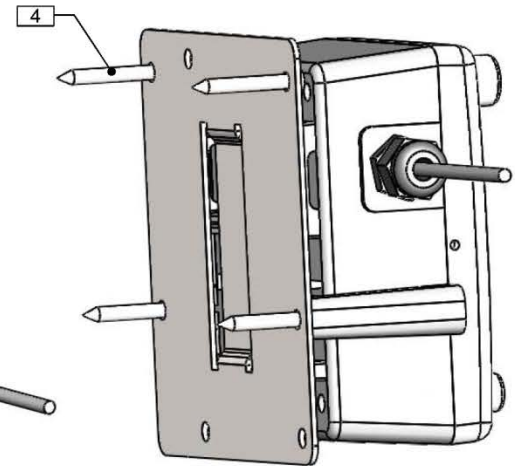
Inspect the Pulser Cable

WARNING! Devices connected to the Silver Spring Networks IMU must not have a characteristic impedance of greater than 680 µF.

Inspect the end of the pulser cable that will connect to the IMU.

- There should be three wires exiting the outside insulation with red, black, and white insulation.
- If necessary, trim any exposed wires so they are flush with the insulation.
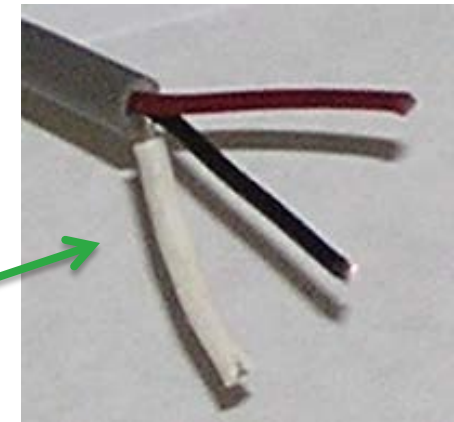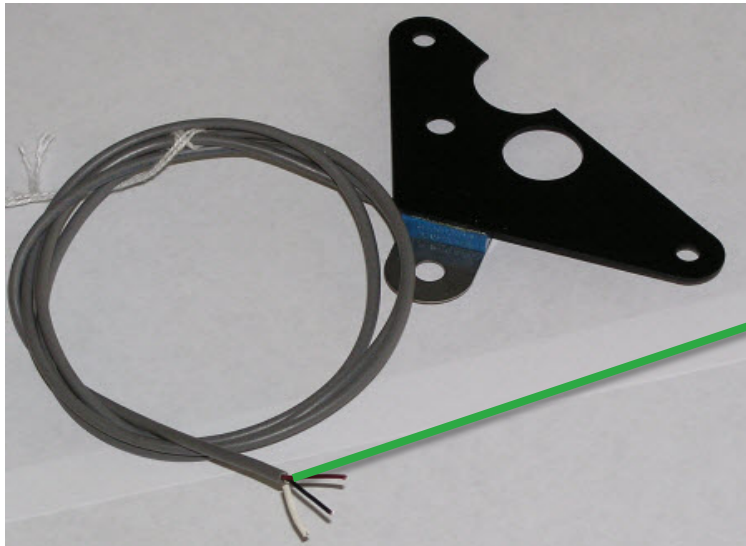
Note: Pulser installation onto the gas meter is not covered here. Refer to the pulser manufacturer's installation instructions.

Rev 1

Inspect the IMU

- Verify that the IMU has three wires.

- Verify that the enclosure is not cracked and that the MAC Address label is present.

- Verify that the battery connectors are undamaged.

- Verify that all components are present in the installation kit. See Kit Components on slide 6.

If the IMU is damaged, return it to your supervisor and get a replacement.
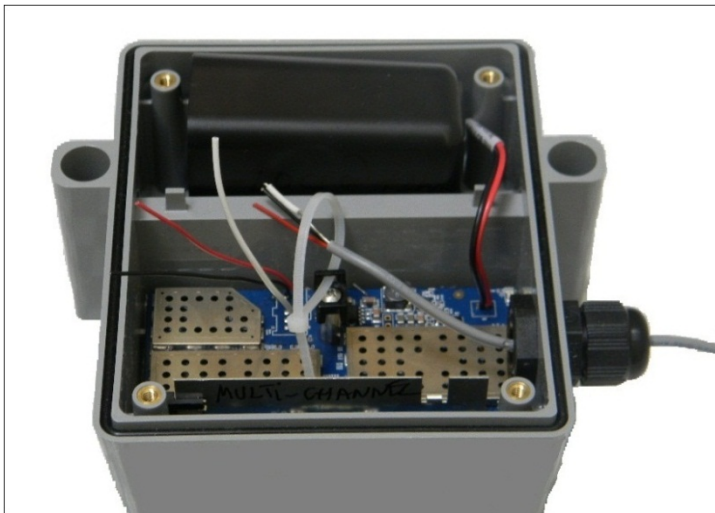
Rev 1

Connect the Pulser to the IMU

Note: IMUs may not be connected in parallel.

1. Thread the pulser cable through the dome nut.

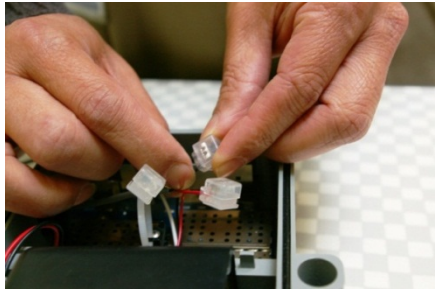2. Thread the pulser cable through the tie wrap.

3. Connect the wire pairs with the gel splices.

   Note: Do NOT strip the insulation from the wires when you connect the cable to the gel splices.

   a) Insert each of the wire pairs (red and red, black and black, white and white) into a gel splice; push all the way forward.
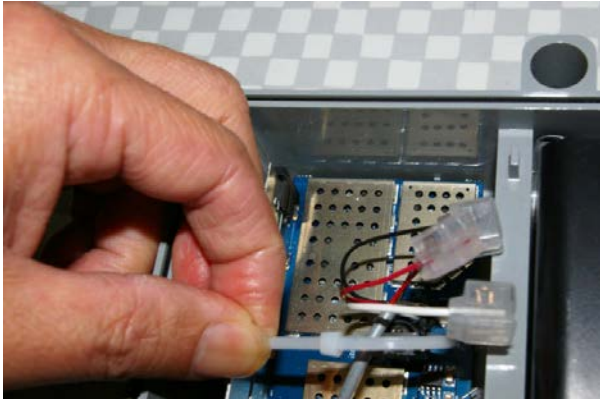

   b) Close each gel splice by squeezing it with the gel cap connection tool.
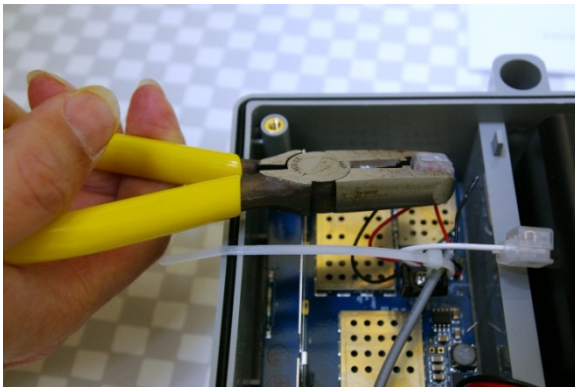
   c) Gently tug on the wires to make sure they are secure.

4. Make sure that the cable tie is between the gel caps and the cable seal connector. Leave ½ to 1" slack between the tie and the gel caps.

5. Tighten the cable tie to hold the cable to the IMU.
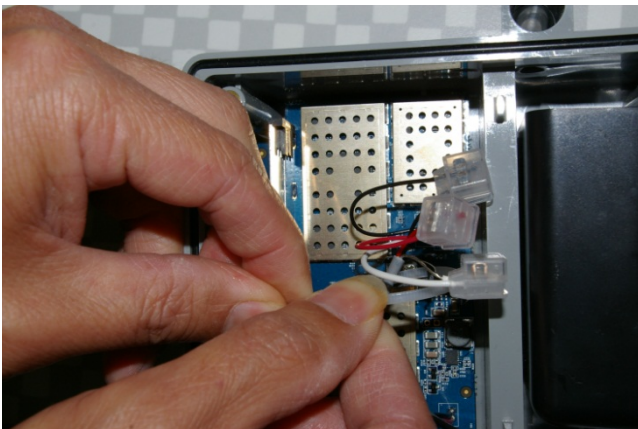
6. Trim the cable tie.
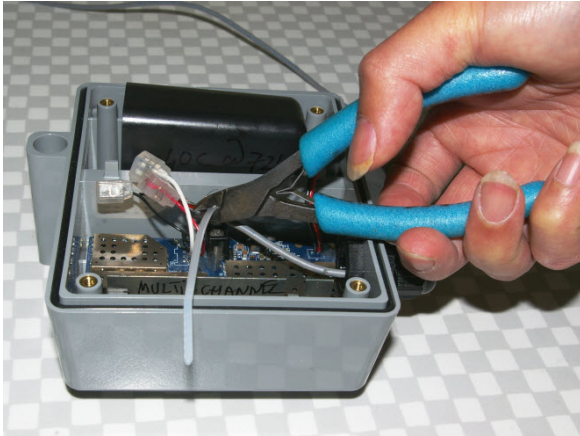
7. Leave 1" of cable slack inside the IMU, and pull the rest of the cable out through the dome nut.
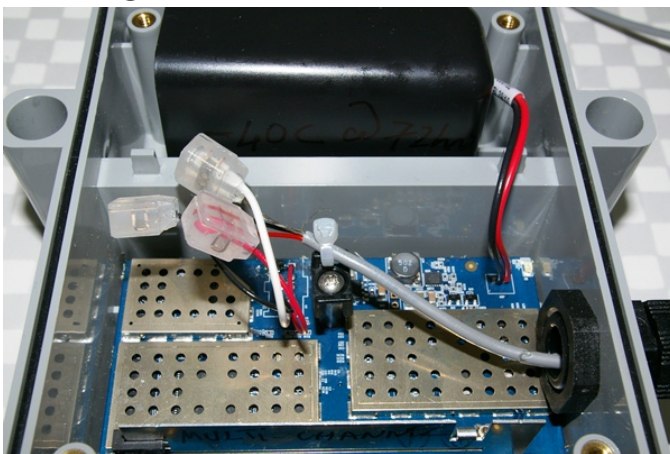
8.   Firmly tighten the dome nut. Torque is 14 inch-pounds with the tool shown on <u>slide 19</u>.
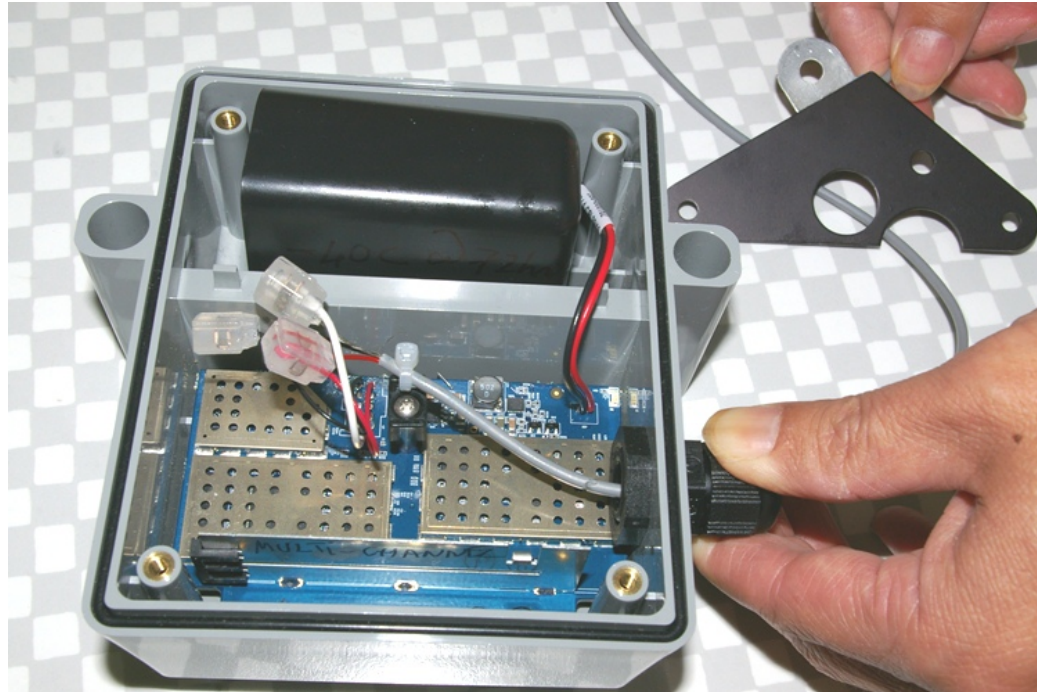
9.   Assemble the 11-29 torque setting screwdriver in the order shown below.

When assembled, it will look like this:

10. Tighten the dome nut to 14 inch-pounds using the 11-29 torque setting screwdriver.

1. Connect the battery cable to the IMU cable.

   The connectors are keyed; you will not need to force them together.
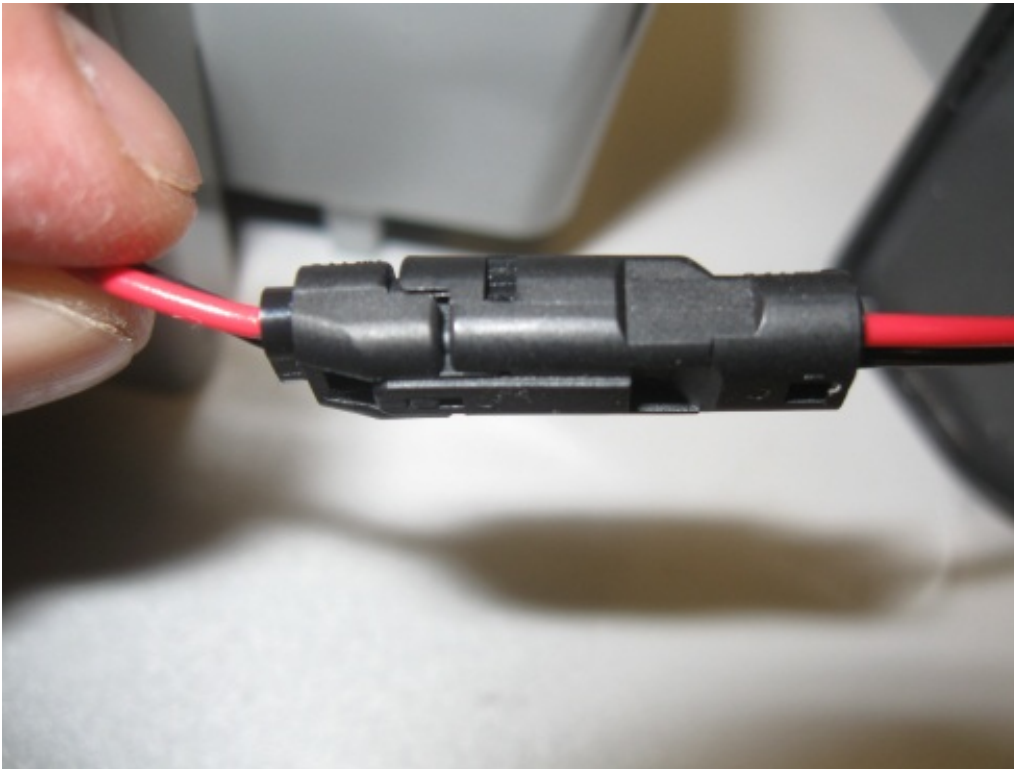
Connect the Battery Cable Connector (continued)

2. Put the battery inside the battery compartment as shown.

   The connector fits underneath the battery and the flat part of the battery should be next to the inside wall.

Configure the IMU for the Field

1. Slowly pass the service magnet once (for two to five seconds) over the top of the IMU.

2. Watch for the light-emitting diode (LED) to flash on the lower left corner of the IMU circuit board.
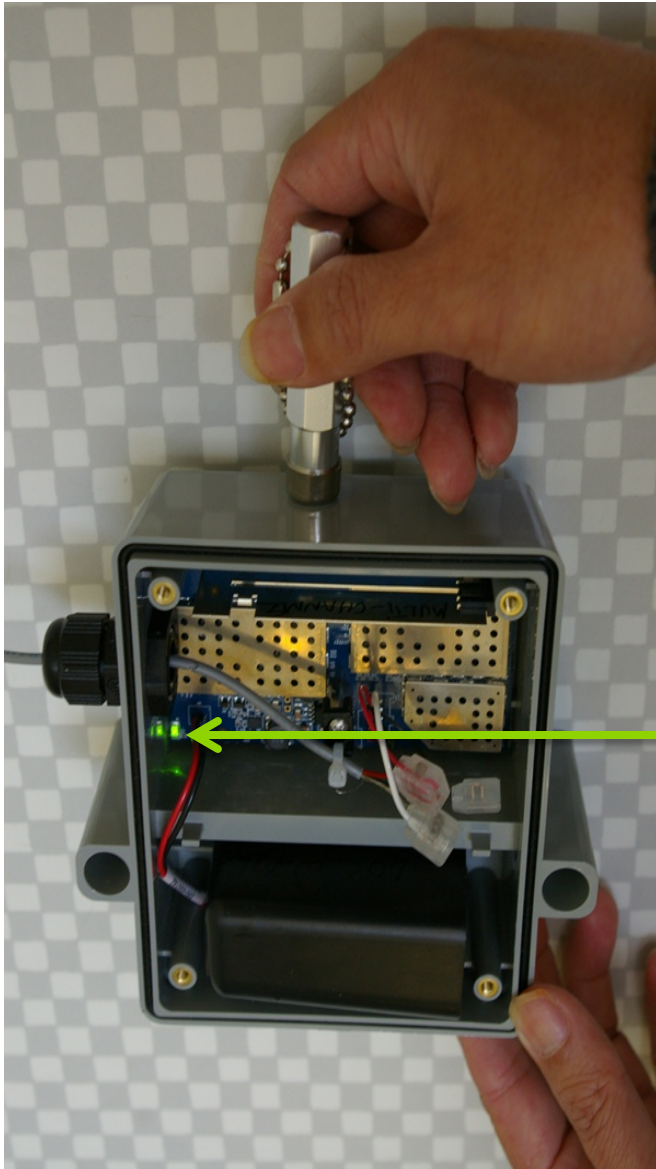
LED

Configure the IMU for the Field (continued)

Notes:

- If you do not see the LED flash, make sure that the battery cable connections are made.

- If you still do not see the LED flash after checking that all battery connections have been made and re-swiping the magnet, return the IMU to your supervisor.

3. Configure the IMU with the programming tool. Field configuration is covered in a separate document.

1. Re-inspect the gasket to ensure it will seal the area between the enclosure and cover.

Gasket around the edge of the enclosure
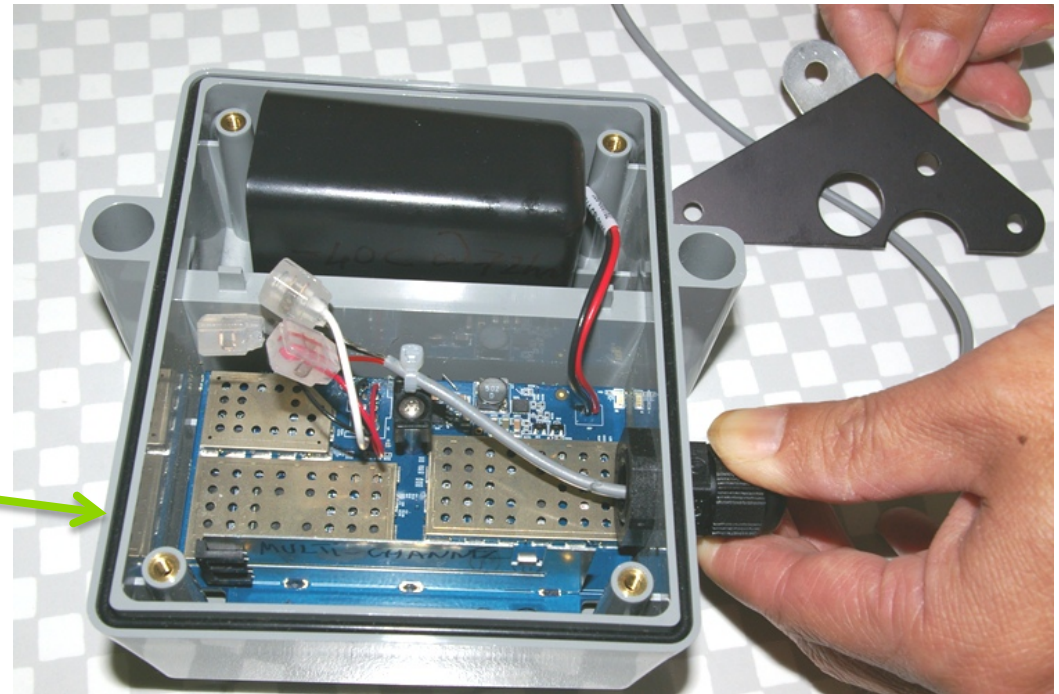
2. Fit the cover on the enclosure, and fasten the cover to the enclosure with the four cover screws. Torque is 5-6 inch-pounds.
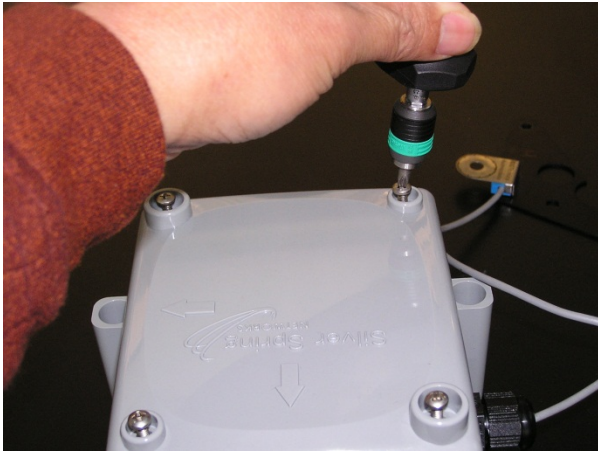
3. Use a nut driver tool to push the two tamper seals into the openings on the IMU cover.

Note: You can also mount the IMU enclosure to a wall with user supplied hardware. For a wall mount, use #10 Fillister or round head screws.

1. Determine where you want to install the IMU. This will determine if the plate should attach to the pipe horizontally or vertically.

    Note: The photo here shows a horizontal attachment. See slide 11 for a view of a vertical attachment.

2. Attach the IMU enclosure to the mounting plate with the two screws and two flanged nuts, torqueing the screws to 13-15 inch-pounds.

Attach the IMU and Mounting Plate to the Pipe

1. Guide the metal clamp through the slot in the mounting plate.
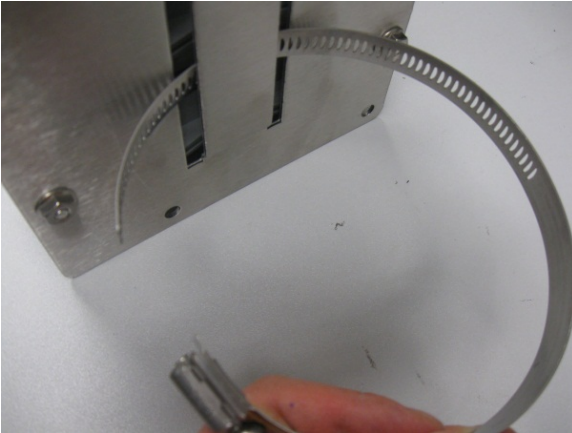
2. Wrap the metal clamp around the pipe.
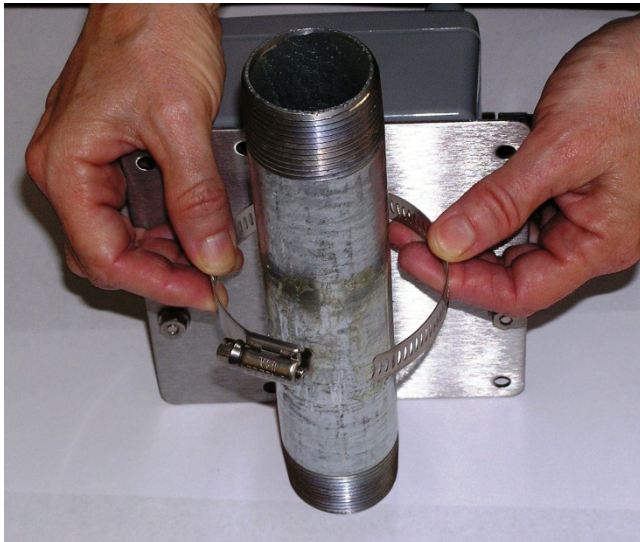
Mount the IMU on the Pipe

1. Tighten the metal clamp around the pipe by torqueing the screw to 20-25 inch-pounds.

2. Dress the cable from the IMU to the pulser if needed.

Multichannel Remote Gas IMU Installation Guide

PN 224-050001 (for the Commercial Multichannel Remote Box)

March 14, 2016, Rev 6

What this Guide Covers

This guide covers only physical aspects of the IMU installation.

There are other steps required in the installation process, such as recording the current meter read and other parameters that are needed for programing the IMU itself. Please refer to the applicable programing guide for those steps.

14 March 2016

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Safety First!

⚠ CAUTION

- **Always follow applicable standards for safety!**

- **Refer to the meter documentation for further safety information.**

- **Follow your employer's best practices.**

- **If you smell gas, report it to the utility.**

- **Do not use power tools!**

14 March 2016
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RF Exposure Notice (509)

- The antenna of this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- The device should be installed so that people will not come within 20 cm (8 in.) of the antenna.

- This equipment has been tested and found to comply with Part 15 of the FCC Rules, and with Industry Canada license-exempt RSS standard(s). This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  - Reorient or relocate the receiving antenna.

  - Increase the separation between the equipment and receiver.

  - Connect the equipment into an outlet on a circuit different from that to which the receiver disconnected.

Modifications to the IMU not
expressly approved by Silver Spring Networks
may void your authority to operate the IMU.

Canadian Compliance

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

14 March 2016
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Overview

1. Inspect the Gas IMU remote box.

2. Identify an Gas IMU remote box installation location.

3. Connect the cable to the corrector.

5. Connect the cable to the Gas IMU remote box.

6. Connect the battery wires.

7. Activate the Gas IMU remote box for programming.

8. Attach the Gas IMU remote box cover.

9. Install the tamper seals.

10. Attach the mounting plate on the Gas IMU remote box.

11. Mount the Gas IMU remote box on a pipe or wall.

Tools

Wire stripper

Small flathead screwdriver

**2.5 -11.5 inch-pound torque setting screwdriver with Phillips tip made by
Mfr #: 05074710002
Distributor MSC #: 06150585
or Amazon or similar**

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Tools (continued)

Phillips head screwdriver

Nut driver
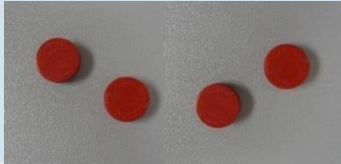
Service magnet

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Components

Verify that all components are present in the installation kit.

Component	Qty	Size	Part Number
Multichannel Remote Gas IMU with mounting plate	1		975-0013-00
IMU-to-corrector cable	1		590-0026-00

Components (continued)

Component	Qty	Size	Part Number
Pipe clamp	1	9/16' to 2 ½ ''	400-0027-00
Cover screws	4	6-32 X7/8"L	900-000061
Adapter plate screws and nuts	2	10-24 X1/2"	900-000068 400-0026-00
Tamper seals	4		977-000021

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Inspect the Gas IMU Remote Box

1. Verify that there are no cracks in the Gas IMU remote box plastic enclosure, that the MAC address labels are present, and that the inside and outside labels have the same address.
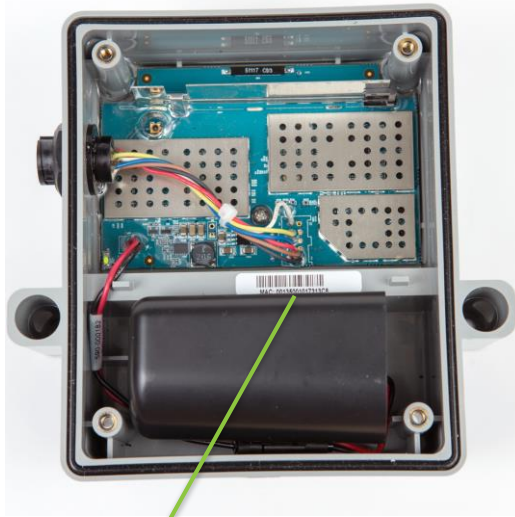
MAC address label inside the IMU

MAC address label on bottom of the IMU

14 March 2016

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Inspect the Gas IMU Remote Box (continued)

2. Remove the box cover and ensure that the battery is not cracked, chipped, or broken.

Battery
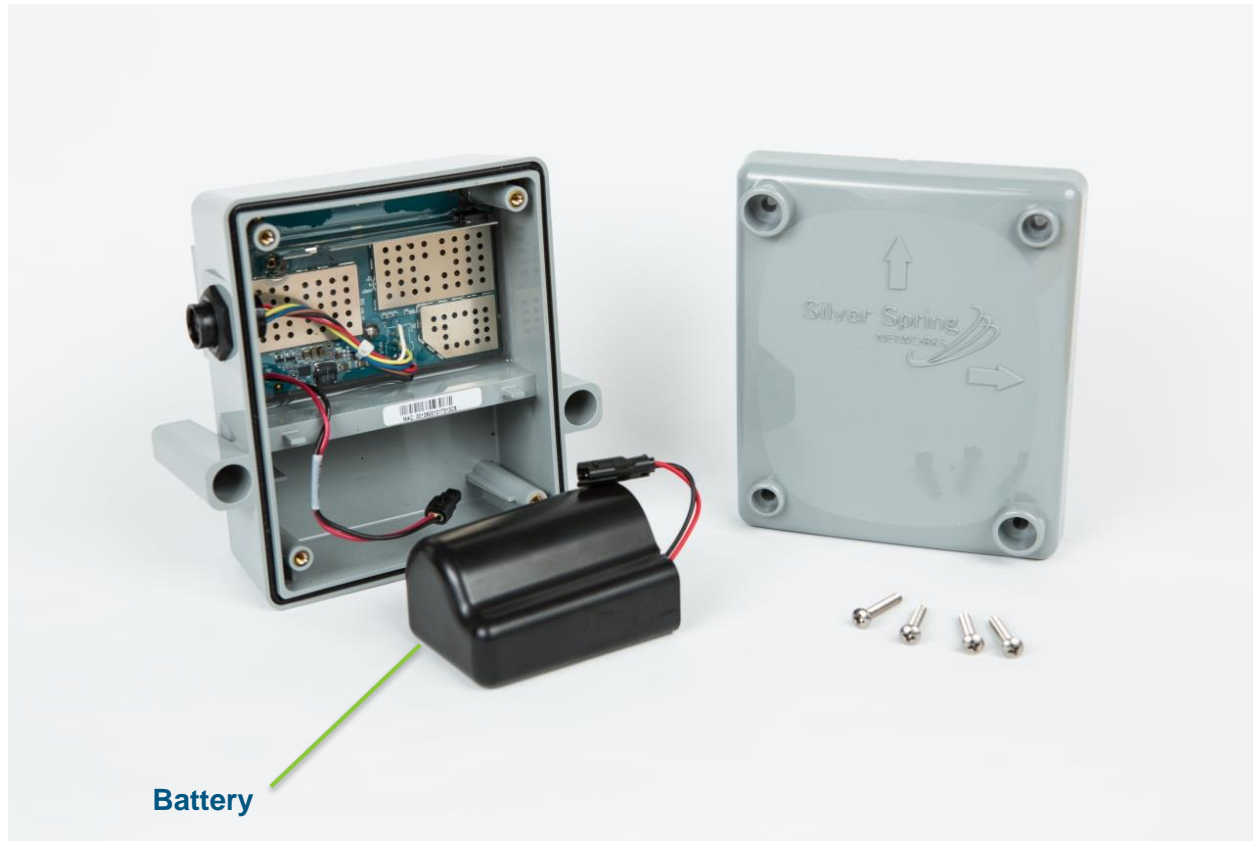
Identify a Gas IMU Remote Box Installation Location

Identify a suitable mounting location for the Gas IMU remote box. To ensure that the cable can reach between the electronic volume corrector and the IMU, the IMU needs to be mounted less than three feet from the corrector.

Electronic volume corrector

Possible wall location for mounting the IMU

Possible pipe location for mounting the IMU

Connect Cable to the Corrector

1. Thread the wire end of the cable through the pulse output fitting on the back of the electronic volume corrector.

Electronic volume corrector

Pulse output fitting

Connect Cable to the Corrector (continued)

2. Use a wire stripping tool to remove two inches of the outer insulation, being careful not to cut or nick any of the wires.

2"
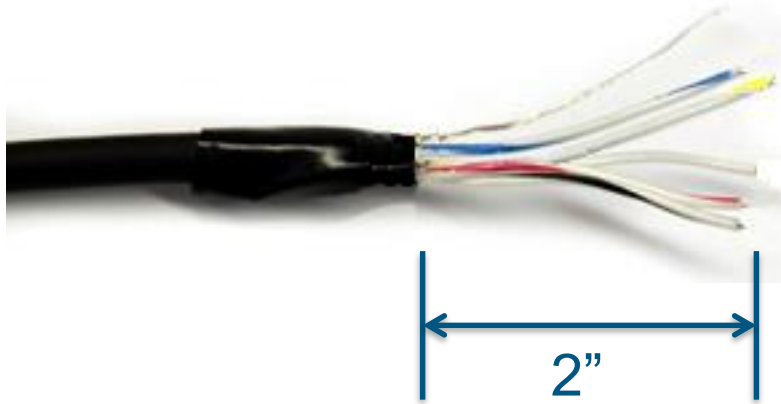
Connect Cable to the Corrector (continued)

3. Strip the red, blue, black, white and Yellow wires as shown below:

Shield (silver braided)

Ground (black)

Channel 1 input (red)*

Channel 2 input (blue)**

Tamper (white)

Alarm+ (yellow)

Not used (brown)
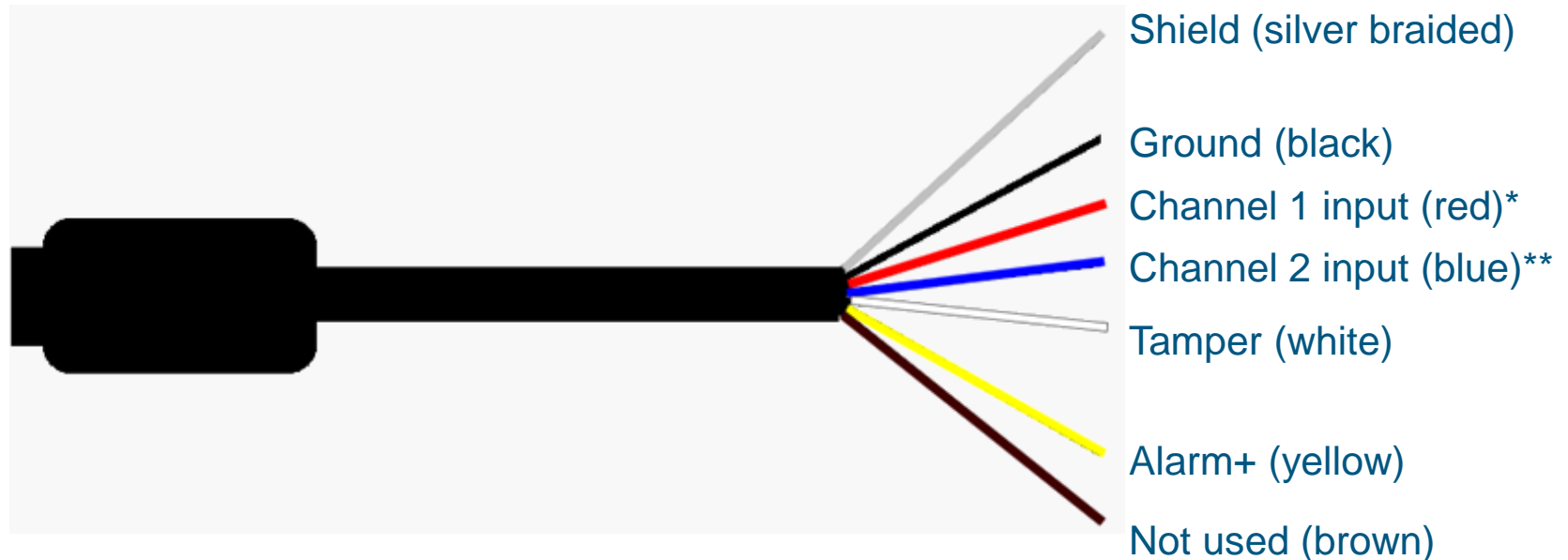
* Channel 1 cable is uncorrected (that is, always uncompensated)

** Channel 2 cable is corrected (that is, always compensated)

Connect Cable to the Corrector (continued)

4. Open the corrector door and locate the terminal block.

5. For correctors that allow terminal block removal, remove the terminal block to connect the wires.

   If it cannot be removed or easily removed, leave it in place while you connect the wires, noting that these instructions apply to connecting wires to a removed terminal block. Refer to the documentation for the orrector model for information regarding terminal block removal options.

6. Check for a label indicating which corrector type you are connecting to and connect using the appropriate wiring diagram from the following pages.

Terminal block

14 March 2016

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Connect Cable to the Corrector (continued)

The picture and configuration on this page are for Honeywell PN: MINI-AT and MINI-ATX.

Shield (silver braided)

Ground (black)

Channel 1 input (red)

Channel 2 input (blue)

Jumper wire

Tamper (white)

Alarm+ (yellow)

K

Ya

Yb

A-

A+

Gecko configuration

Pulse Weight: 100

Number of Dials: 6

Meter Capacity: 20000

Meter Type: Commercial, 2 Channels

Chan 1:
Opening Dial read from mechanical index X 100 CuFt

Chan 2:
Opening Dial read from LCD Display X 1000 CuFt

Notes:

- The jumper wires are not included in the kit
- The brown wire is not used

Connect Cable to the Corrector (continued)

Corrector configuration items for Honeywell PN: MINI-AT and MINI-ATX.

056   Pulser A Out Scaling

Form-A Type Output (uncorrected)

Desired Pulse Output Value = CF X 100

Selected UnCor Units = CCF

        Default = 2.0000

        Configure = 2

057   Pulser B Out Scaling (corrected)

Form-A Type Output

Desired Pulse Output Value = CF X 100

Selected CorVol Units = MCF

        Default = 2.0000

        Configure = 20.0000

090   Corrected Volume Units

        Default = 8 - MCF

        Configure = 8.0000

092   Uncorrected Volume Units

        Default = 7 - CCF

        Configure = 7 - CCF

093   Pulser A Out Select

        Default = 3 – No Output

        Configure = 2 – Unc Vol

094   Pulser B Out Select

        Default = 3 – No Output

        Configure = 0 – Cor Vol

096   Cor Vol Display Res

        Default = 0 – 8 Digits

        Configure = 2 – 6 Digits

097   Unc Vol Display Res

        Default = 0 – 8 Digits

        Configure = 2 – 6 Digits

098   Meter Index Code

        Default = 2 – 10 CF

        Configure = 3 – 100CF

115   Pulse Width

        Default = 0 – 0.0625 seconds

        Configure = 0 – 0.0625 seconds

Connect Cable to the Corrector (continued)

Shield (silver braided)
Ground (black)
Channel 2 input (blue)
Tamper (white)
Alarm+ (yellow)

Jumper wire

K Y_b A- A+

The picture and configuration on this page are for Honeywell PN: MINI-PT.

Gecko configuration

Pulse Weight: 100

Number of Dials: 6

Meter Capacity: 20000

Meter Type: Commercial, 2 Channels

Chan 1: Opening Dial read from mechanical index   X   100   CuFt

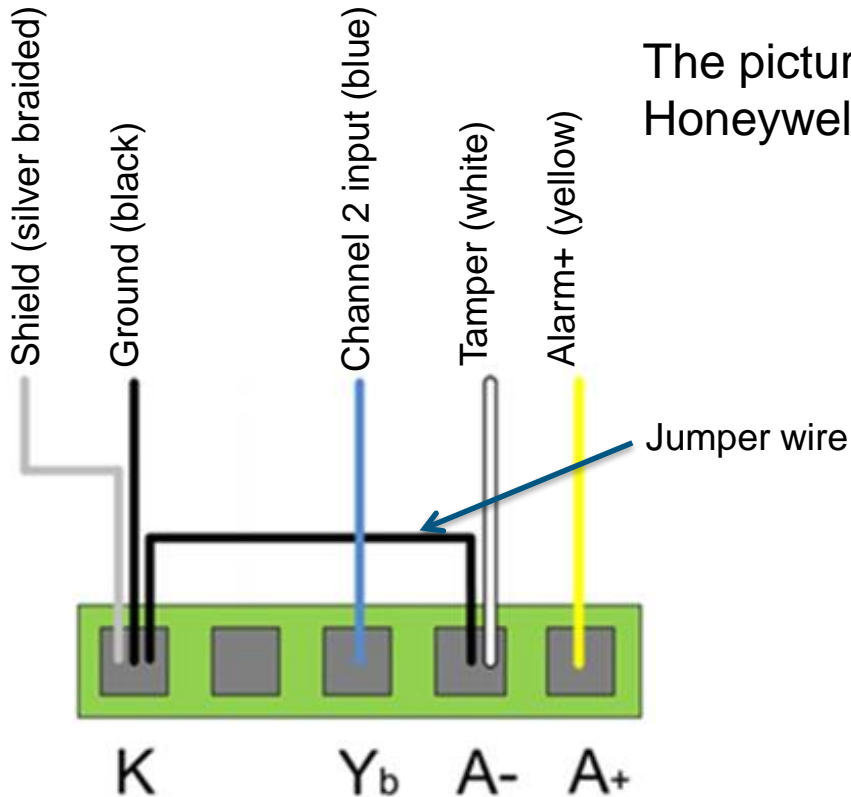Chan 2: Opening Dial read from LCD Display   X   1000   CuFt

Notes:

- Connect black jumper wire also from A- to Rotation Sensor Board TB-Com
- Connect red wire to Rotation Sensor Board TB-NO
- The jumper wires are not included in the kit
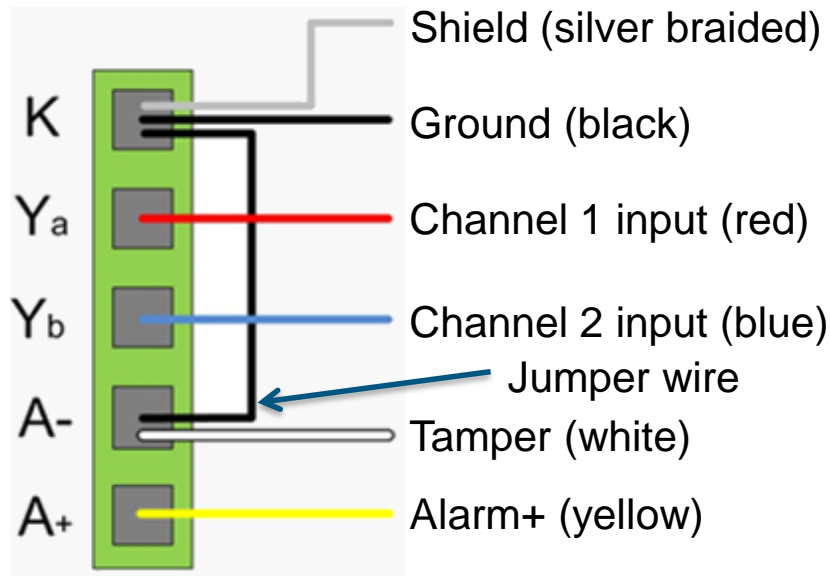- The brown wire is not used

Connect Cable to the Corrector (continued)

Corrector configuration items for Honeywell PN: MINI-PT.

056   Pulser A Out Scaling

Form-A Type Output

Desired Pulse Output Value = CF X 100

Selected CorVol Units = MCF

        Default = 2.0000

        Configure = 20

090   Corrected Volume Units

        Default = 8 – MCF

        Configure = 8 - MCF

092   Uncorrected Volume Units

        Default = 7 – CCF

        Configure = 7 - CCF

093   Pulser A Out Select

        Default = No Output

        Configure = Cor Vol

096   Cor Vol Display Res

        Default = 0 – No Blank

        Configure = 2 – Two Blank (6 Digits)

097   Unc Vol Display Res

        Default = 0 – No Blank

        Configure = 2 – Two Blank (6 Digits)

098   Meter Index Rate

        Default = 2 – 10 CF

        Configure = 3 – 100 CF

115   Pulser Output Time

        Default = 0 – 0.0625

        Configure = 0

14 March 2016

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Connect Cable to the Corrector (continued)

The picture and configuration on this page are for Honeywell PN: MINI-MAX.

K — Shield (silver braided)

K — Ground (black)

Yₐ — Channel 1 input (red)

Y_b — Channel 2 input (blue)

A– — Jumper wire

A– — Tamper (white)

A+ — Alarm+ (yellow)

Gecko configuration

Pulse Weight: 100

Number of Dials: 6

Meter Capacity: 20000

Meter Type: Commercial, 2 Channels

Chan 1: Opening Dial read from mechanical index X 100 CuFt

Chan 2: Opening Dial read from LCD Display X 1000 CuFt

Notes:

- The jumper wires are not included in the kit
- The brown wire is not used

Connect Cable to the Corrector (continued)

Corrector configuration items for Honeywell PN: MINI-MAX.

056   Pulser A Out Scaling

Form-A Type Output (uncorrected)

Desired Pulse Output Value = CF X 100

Selected UnCor Units = CCF

       Default = 2.0000

       Configure = 2

057   Pulser B Out Scaling (corrected)

Form-A Type Output

Desired Pulse Output Value = CF X 100

Selected CorVol Units = MCF

       Default = 2.0000

       Configure = 20.0000

090   Corrected Volume Units

       Default = 8 - MCF

       Configure = 8.0000

092   Uncorrected Volume Units

       Default = 7 - CCF

       Configure = 7 - CCF

093   Pulser A Out Select

       Default = 3 – No Output

       Configure = 2 – Unc Vol

094   Pulser B Out Select

       Default = 3 – No Output

       Configure = 0 – Cor Vol

096   Cor Vol Display Res

       Default = 0 – 8 Digits

       Configure = 2 – 6 Digits

097   Unc Vol Display Res

       Default = 0 – 8 Digits

       Configure = 2 – 6 Digits

098   Meter Index Code

       Default = 2 – 10 CF

       Configure = 3 – 100CF

115   Pulse Width

       Default = 0 – 0.0625 seconds

       Configure = 0 – 0.0625 seconds

14 March 2016

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Connect Cable to the Corrector (continued)

7. If you removed the terminal block to attach the wires, snap it into place on the terminal block plate in the corrector.
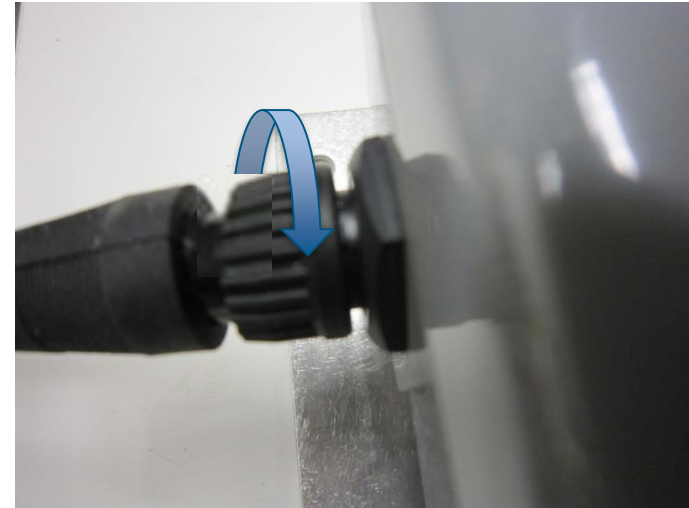
8. Close the corrector door.

14 March 2016
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Connect Cable to the IMU

1. Align the cable pins with the pin holes on the back of the IMU, and push in to secure.

Connect Cable to the IMU (continued)

2. Push the dome nut forward, and turn it clockwise until it clicks.

Dome nut

Ensure that you make the connection correctly. The plastic pieces should line up evenly.

Connect Battery Wires

1. Align the wire connector on the battery with the corresponding connector in the IMU.

2. Snap the wires together. They are keyed, so you do not need to force them together.
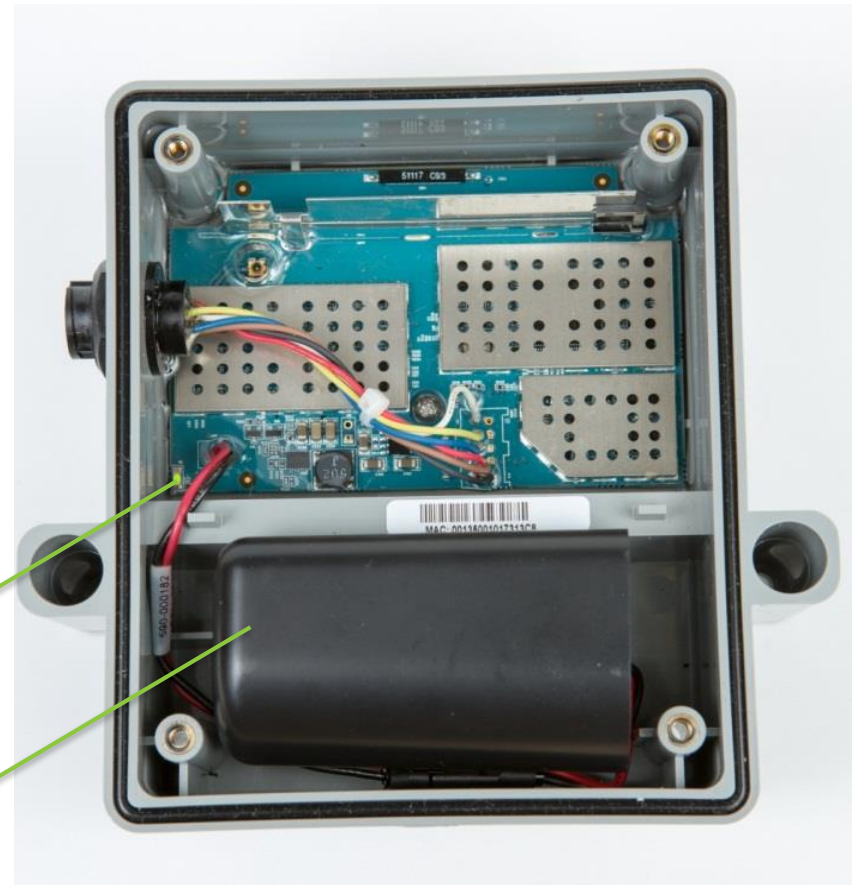

IMU
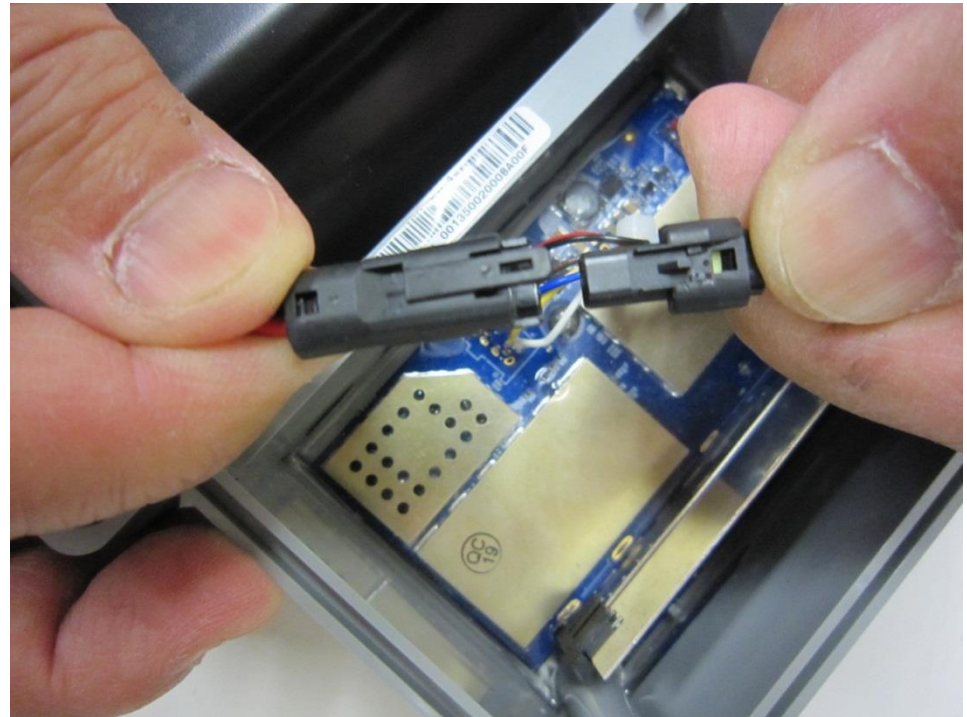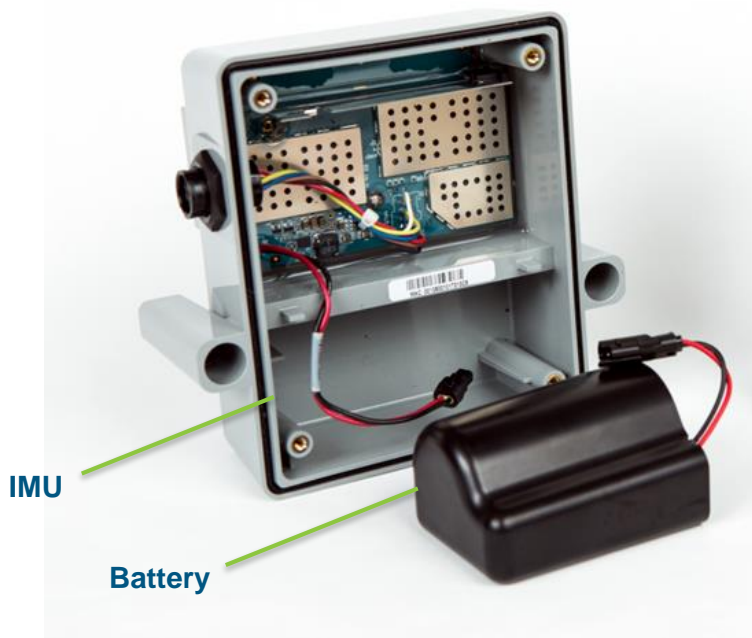
Battery

Connect Battery Wires (continued)

3. One you secure the connectors, the IMU LED should start flashing.

4. Place the battery in the battery compartment as shown.

5. After the LED *stops* flashing, wait for two minutes before swiping the unit with a service magnet.

LED

Battery in compartment

Prepare the IMU for Programming

1. When you are ready to program the IMU, slowly pass the service magnet up and across the top of the IMU as shown below (for 2 to 5 seconds).

2. Verify that the LED located on the IMU turns on and then blinks.

Note: For the installed electronic volume corrector, configure the output for Form-A pulse having a pulse width of 62.5 milliseconds and a period of 125 milliseconds. For details, consult the corrector documentation.

14 March 2016
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Attach the IMU Cover

Fit the IMU cover on the enclosure, and fasten the cover with the four cover screws using a torque-setting screw driver set to 5-6 inch-pounds.

14 March 2016

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Install the Tamper Seals

Use a nut driver to push the two tamper seals into the two large screw rings.

Tamper seals

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Attach the Mounting Plate on the IMU

If you are using the mounting plate provided in the kit, attach the plate to the IMU with the screws and nuts included in the kit. Once the IMU is attached to the mounting plate, it can be installed on a pipe or a wall. The installation kit includes a hose clamp for mounting on a pipe but does not include self-tapping screws for mounting on a wall. The diagram below shows examples of installing the plate for vertical and horizontal pipe mounts, and for a wall mount.
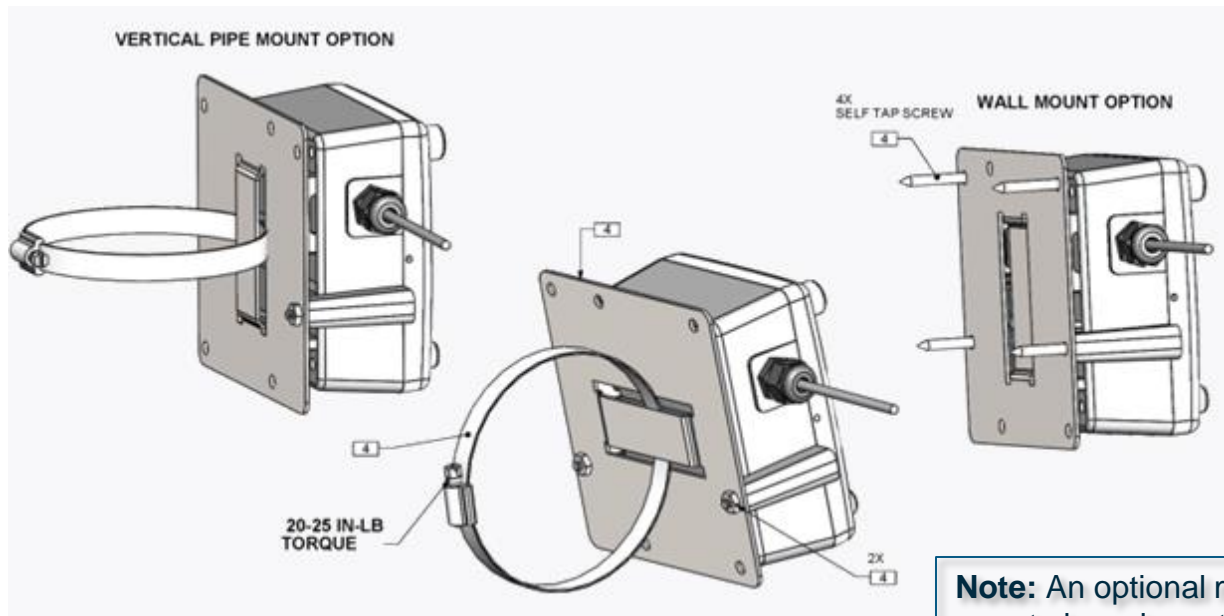
> **Note:** An optional mounting plate that places the remote box closer to the index assembly is available and is discussed later in this guide.

14 March 2016
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Attach IMU Enclosure to Mounting Plate

1. Decide where you want to install the IMU. This will determine if the plate should attach to the pipe horizontally or vertically.
   The photo below shows a horizontal attachment. See slide 33 for a view of a vertical attachment.

Note: You can also mount the IMU enclosure to a wall with user-supplied hardware or with an optional mounting plate that places the IMU closer to the meter. For wall mounting, use #10 Fillister or round-head screws.

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Attach IMU Enclosure to Mounting Plate (continued)

2. Attach the IMU enclosure to the kit or optional mounting plate with the two screws and two flanged nuts, torqueing the screws to 10 inch-pounds.

Attach the IMU and Mounting Plate to the Pipe

1. If you are using mounting plate provided in the kit, guide the metal clamp through the slot in the mounting plate.

2. Wrap the metal clamp around the pipe.

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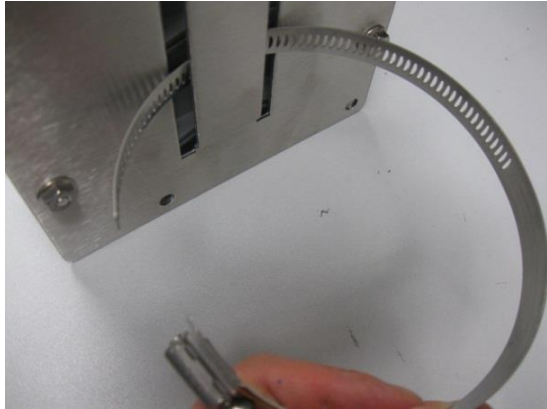
Mount the IMU on the Pipe

1. If you are mounting to a pipe, tighten the metal clamp around the pipe by torqueing the screw to 20 to 25 inch-pounds.

2. Dress the cable from the IMU to the pulser if needed and trim the zip ties.

14 March 2016

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Verify the Installation

The electronic volume corrector and IMU should be connected and installed similar to what is shown below.

14 March 2016

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