Excellence in Compliance Testing

Certification Exhibit

FCC ID: R7PEC6R2S3
IC: 5294A-EC6R1S3

FCC Rule Part: 15.247, 15.249
IC Radio Standards Specification: RSS-210, RSS-247

ACS Project Number: 15-0160

Manufacturer: Landis+Gyr Technology, Inc.
Model: GPR2

Manual

GPR Installation Guide

Publication: 98-1135 Rev AE

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1

Pre-Installation

Before You Begin

This text contains the symbols which are explained below.

NOTE: Notes provide important information about products and installation.

CAUTION: Cautions provide information that you must read to avoid making relatively moderate errors.

WARNING: Warnings provide special, must-read information. If you ignore a warning you may create a safety hazard, omit essential data, or make a critical error.

Safety Overview

NOTE: Proper planning and thorough preparation are critical for successful installation. This chapter outlines basic requirements for the pre-installation phase.

Prior to starting the installation process, you must develop and launch an installer safety training plan for initial, refresher, and ongoing safety training. Ensure that installers receive appropriate initial and refresher training to meet their specific safety-related responsibilities. Installers should be instructed in the following safety elements as well as any site-specific safety issues.

- New duties for which the installer has not previously received training.
- New processes and methodologies representing new risks that are introduced into the installation environment.
- Situations where previously unidentified risks are reported.
- Hazard Communication (Employee Right to Know)
- Lifting
- Safe driving
- Use of hand tools
- Confined space

The installation supervisory team assumes responsibility for ensuring that installers are properly trained, authorized, and continually qualified to perform their work. The team must also take responsibility for the safety of their installers and to assure safe work methodologies. Installers must

understand that their supervisor's responsibility does not relieve them from their individual responsibility to perform the work safely and to follow all safety rules and procedures applicable to their work.

FCC & Industry Canada Information to the User

Manufacturer: Landis+Gyr

Model Name: American Large Diaphragm GPR

FCC ID: R7PEC6R2S3

IC: 5294A-EC6R1S3

Module Model: GPR2

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Consult Landis+Gyr or an experienced radio technician for help.

WARNING: Changes or modifications to this device not expressly approved by Landis+Gyr could void the user's authority to operate the equipment and the product warranty.

RF Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada

This device complies with Industry Canada license-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 radiovexempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doitvpas 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

GPR FCC Label

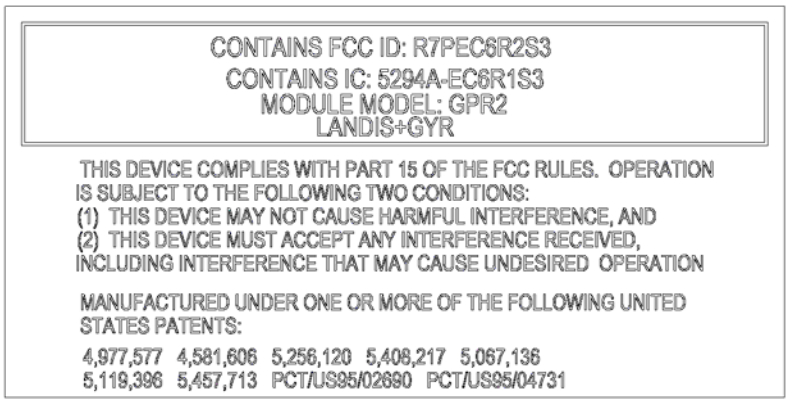


Figure 1 - 1. FCC/Industry Canada ID Label

Compliance

This apparatus is suitable for Class I, Division 1, Group D, Temperature code T3C Hazardous Locations.

WARNING: Substitution of components may impair the suitability for Class I, Division 1 applications. Replace battery only with Landis+Gyr part number 40-1235.

Substitution of components may impair intrinsic safety. Please refer to the notes in Appendix B and to*"Control Drawing 86-1006"* on page -109 for connecting to this intrinsically safe device.

Preliminary Checks

1. The installer will verify correct site, as specified on work order.
2. The installer will verify that the site is safe for installer activity and equipment.
3. The installer will notify the customer of installer presence and activity, telling the customer that meter access is required. If necessary, the installer will have the customer sign the work order.
4. When installing meters, the installer will follow guidelines issued by the utility in addition to those given in this guide.
5. The installer will never perform an installation during a lightning storm or under excessively wet conditions.

Site Requirements

The site must comply with the following criteria:

1. There is no chance that another object will be set over the antenna.

Required Installation Tools

Table 1-1. Typical Gas Meter Module Installation Tool List

Torx Pin Head Driver, T10	Phillips Screwdriver, #2
Flat-tip Screwdriver, 3/16 inch x 4 inch	Flat-tip Screwdriver, 1/4 inch x 5 inch
Phillips Screwdriver, #0, precision	Torque Driver / Wrench, 0.5 inch-pounds to 20 foot-pounds
Torx Pin Head Driver, T15	5/16 Combination Wrench
Wire Brush	Awl, Heavy duty
Scraper, Brass, 1.25 inch wide	

Figure 1 - 2. Examples of some required tools

Recommended Torque Driver Source:
Mountz
1080 N. 11th St. San Jose, CA 95112
Phone: 877-833-1704 or 408-292-2214
Fax: 408-292-2733
e-mail: sales@mountztorque.com

Required Parts

For diaphragm meters, an index cover kit, a dial wheel, and a GPR brackets kit are needed for each meter. (Three part numbers should be ordered for each meter installation).

American Meters Required Materials

Index Cover Kits (Choose One)

Select one Index Cover Kit based on index type or meter size.

Table 1-2. American Meter Index Cover Mini Switch Kits

Description	Part Number	Figure Number
Index Cover Assy, Am AL800, 2-Way SSP (for 5ft & 10ft index)	40-2474	Figure 1 - 4
Index Cover Assy, AL800 100ft, 2-Way SSP (for 100ft index)	40-2475	Figure 1 - 3
Index Cover Assy, Am Res AL425 2-Way SSP (for Residential size meters)	40-2473	

NOTE: American Gasket (28-1473) is included in index cover kits.

Dial Wheels (Choose One)

Select one dial wheel based on index type. Shim is needed for either selection.

Table 1-3. American Large Diaphragm Meter Dial Wheels

	Description	Part Number
A	Dial Wheel, Balanced, C+I, Epoxy (for Plastic dial hand)	40-1538
B	Dial Wheel, Index Face Mount, Epoxy (for Metal dial hand)	40-1742
C	0.030” Shim, Dial Wheel, Orange, Polyester (see NOTE below)	29-1300

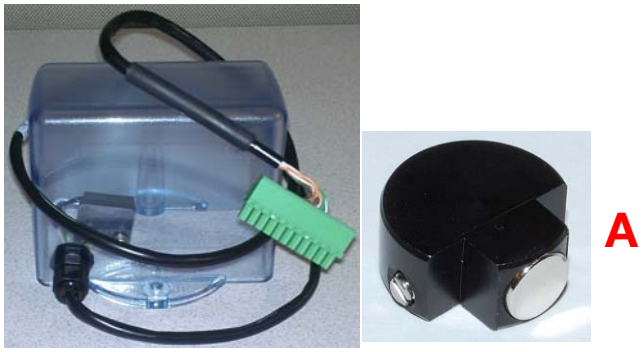


Figure 1 - 3. Mini Switch Kit for Plastic Index (40-2475)

Figure 1 - 4. Mini Switch Kit for Metal Index (40-2474)

Figure 1 - 5. Part No. 29-1300 0.030" thick Shim for front or back mount Dial Wheel Installation

NOTE: Shim 29-1300 can be reused in multiple installations.

CAUTION: Part numbers are subject to change. Contact the Landis+Gyr Supply Chain for the latest part numbers.

NOTE: GPR switch cable color may vary from that shown in photos.

GPR + Brackets Kits (Choose One)

Select one Brackets & Hardware kit based on GPR location on meter.

Table 1-4. American GPR + Brackets Kits

Description	Part Number	Table Number	Figure Number
Kit, GPR Installation, American Large Diaphragm, Alternative Orientation (back-right or front-left)	45-1189	Table C - 1	Figure 2 - 31
Kit, GPR Installation, American Large Diaphragm, Behind Index	45-1190	Table C - 2	Figure 2 - 32
Kit, American Large Diaphragm Alternative Orientation GPR (back-left or front-right)	45-1193	Table C - 3	Figure 2 - 30

NOTE: Individual components and kits may be ordered for installing the GPR with American large diaphragm meters. See Appendix C, *American Kit Sub-Assemblies* for more information.

Figure 1 - 6. GPR with American Large Diaphragm Brackets and Hardware (kit 45-1189)

NOTE: American modules have 3 bracket options; 28-1440, 28-1441, & 28-1443. These are shown in various orientations in Chapter 2.

Rockwell Meters Required Materials

Index Cover Kit

Table 1-5. Rockwell Large Diaphragm Meter GPR Index Cover Kit

Description	Part Number	Figure Number
Index Cover Assy, Rock R750, 2-Way SSP	40-2470	Figure 1 - 7

Dial Wheel

Table 1-6. Rockwell Large Diaphragm Meter GPR Dial Wheel

	Description	Part Number
A	Dial Wheel, Index Back Mount, Epoxy	40-1743
B	0.030" Shim, Dial Wheel, Orange, Polyester (see NOTE below)	29-1300

NOTE: Shim 29-1300 can be reused in multiple installations.

CAUTION: Part numbers are subject to change. Contact the Landis+Gyr Supply Chain for the latest part numbers.

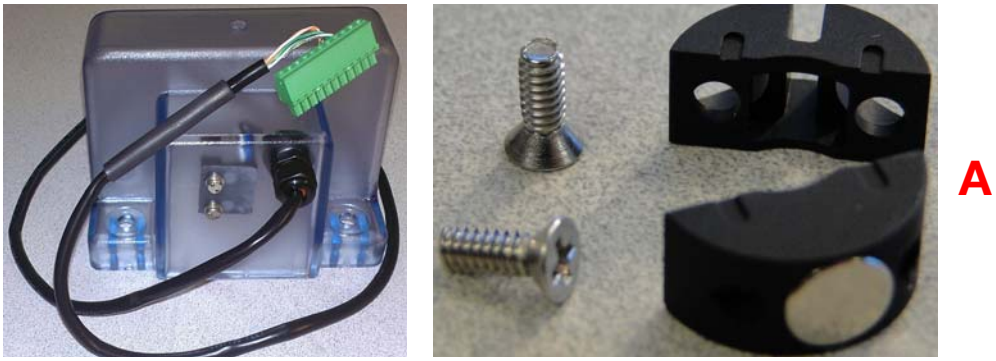


Figure 1 - 7. Rockwell GPR Index Cover and Magnet Wheel

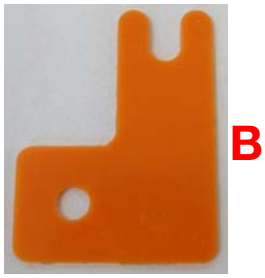


Figure 1 - 8. Part No. 29-1300 0.030" thick Shim for front or back mount Dial Wheel Installation

NOTE: GPR switch cable color may vary from that shown in photos.

GPR + Brackets Kit

Table 1-7. Rockwell Mounting Kit

Description	Part Number	Table Number
Kit, Rockwell Large Diaphragm, GPR	45-1186	Table D - 1

NOTE: Individual components and kits may be ordered for installing the GPR with Rockwell large diaphragm meters. See Appendix D, *Rockwell Kit Sub-Assemblies* for more information.

NOTE: GPR Cover should not be attached until GPR is fully mounted.

Figure 1 - 9. GPR with Rockwell Large Diaphragm Universal Hardware (kit 45-1186)

Schlumberger Meters Required Materials

Index Cover Kit

Table 1-8. Schlumberger Large Diaphragm Meter GPR Index Cover Kit

Description	Part Number	Figure Num;ber
Index Cover Assy, Schl 675, 2-Way SSP	40-2471	Figure 1 - 10

Dial Wheel

Table 1-9. Schlumberger Large Diaphragm Meter GPR Back Mount Wheel

	Description	Part Number
A	Dial Wheel, Index Back Mount, Epoxy	40-1743

CAUTION: Part Numbers Are Subject to Change. Contact the Landis+Gyr Supply Chain for the Latest Part Numbers.

Figure 1 - 10. Schlumberger GPR Index Cover

NOTE: GPR switch cable color may vary from that shown in photos.

GPR + Brackets Kit

Table 1-10. Schlumberger Mounting Kit

Description	Part Number	Table Number
Kit, Schlumberger Large Diaphragm, GPR	45-1187	Table E - 1

NOTE: Individual components and kits may be ordered for installing the GPR with Schlumberger large diaphragm meters. See Appendix E, *Schlumberger Kit Sub-Assemblies* for more information.

NOTE: GPR Cover should not be attached until GPR is fully mounted.

Figure 1 - 11. GPR with Brackets and Hardware (kit 45-1187)

Sprague Meters Required Materials

CAUTION: Part numbers are subject to change. Contact the Landis+Gyr Supply Chain for the latest part numbers.

Index Cover Kit

Table 1-11. Sprague Large Diaphragm Meter GPR Kit

Description	Part Number	Figure Number
Index Cover Assy, Sp 1000, 2-Way SSP (Includes Gasket)	40-2472	Figure 1 - 12

Figure 1 - 12. Sprague 1000 GPR Index Cover Assembly

NOTE: GPR switch cable color may vary from that shown in photos.

NOTE: Gasket is included in index cover kit.

Dial Wheel

Select one based on index type.

Table 1-12. GPR Dial Wheels

	Description	Part Number
A	Dial Wheel, Balanced, C+I, Epoxy (for plastic dial hand)	40-1538
B	Dial Wheel, Index Face Mount, Epoxy (for metal dial hand)	40-1742
C	0.030" Shim, Dial Wheel, Orange, Polyester (see NOTE below)	29-1300

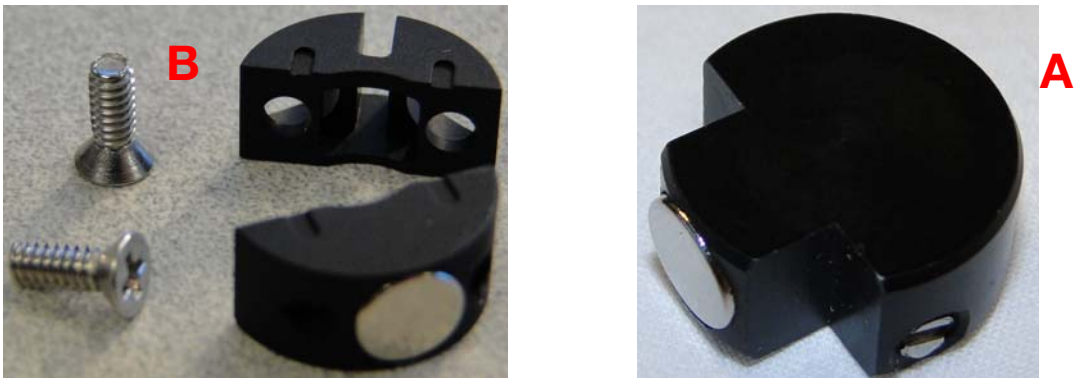


Figure 1 - 13. Front or Back Mount and Balanced Dial Wheels

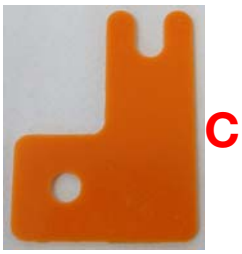


Figure 1 - 14. 0.030 Shim for Magnetic Dial Wheel Installation, Part # 29-1300

NOTE: Shim 29-1300 can be reused in multiple installations.

GPR + Brackets Kit

Table 1-13. Sprague Mounting Kit

Description	Part Number	Table Number
Kit, Sprague Large Diaphragm, GPR	45-1188	Table F - 1

NOTE: Individual components and kits may be ordered for installing the GPR with Sprague large diaphragm meters. See Appendix F, *Sprague Kit Sub-Assemblies* for more information.

NOTE: GPR Cover should not be attached until GPR is fully mounted.

Figure 1 - 15. GPR with Sprague Large Diaphragm Brackets and Hardware (kit 45-1188)

Rotary Required Materials

For rotary meters a cable, GPR, and bracket kit are needed (for GE rotary kit, reference manual 98-1693).

Table 1-14. Rotary Gas Meter Module Installation Tool List

Torx Pin Head Driver, T10	Flat-tip Screwdriver, 1/4 inch x 5 inch
Torx Pin Head Driver, T15	Wire Cutter\Stripper for 19-26-AWG solid conductor wire
Flat-tip Screwdriver, 3/16 inch x 4 inch	Badger Field Splice Kit 62084-001
Torque Driver \ Wrench, 0.5 inch-pounds to 20 foot-pounds	3M Scotchlok E-9Y Crimping Tool or Equivalent
Phillips Screwdriver, #2	3M Scotchlok, Model UY2 or Equivalent

Cable

Select one based on meter type and its interface.

Table 1-15. GPR Rotary Meter Cables

Part #	Description
19-2330	Cable Assembly, Flying Leads, Single Output, Gas C&I 2-Way
19-2331	Cable Assy, Rotary, Flying Leads, Double Output, Gas C&I 2-Way
19-2332	Cable Assy, Rotary, Gas C&I 2-Way (w/ circular Military connector)

GPR

Table 1-16. GPR Installation Components for Rotary Gas Meters

Part #	Description
40-1672	Assy, 2-Way C&I Gas Module

Bracket Kit

Table 1-17. GPR Pipe Mounting Hardware.

Part #	Description
45-2478	GPR Pipe Mount Kit, 1-3 Inch (see NOTES below)
22-1417	TIE WRAP, 10 inch, UV, NYLON, BLACK (see NOTES below)

NOTE: Tie wrap 22-1417 is needed to tie the cables and is not included in kit.

NOTE: For wall mount installations, 45-2478 is not needed.

2

American GPR Index Cover & GPR Install

American Index Cover & and Gas Module Removal

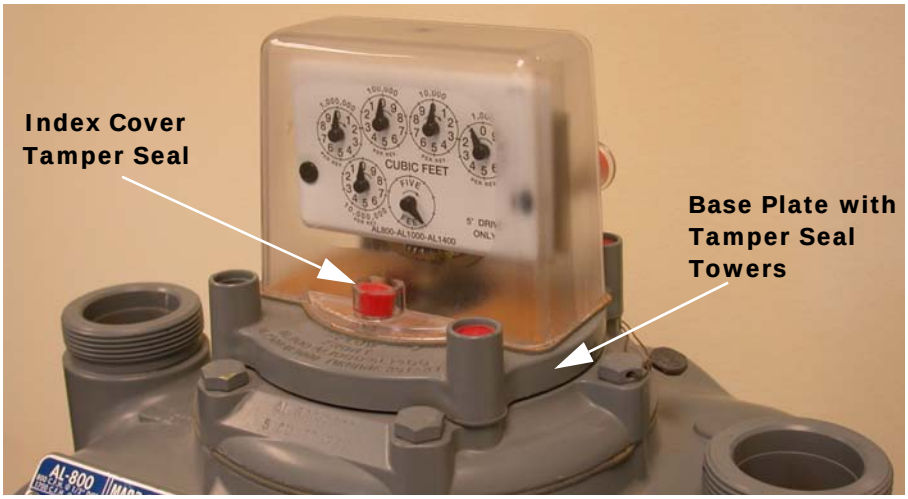


Figure 2 - 1. Legacy American Large Diaphragm Meter

Meter Preparation

1. Remove the tamper seals, screws, and index cover assembly from the meter.
2. If the meter has an existing Commercial Gas Module, perform the following steps.
   - **A.** Remove the index cover tamper seals.
   - **B.** Remove the module bracket tamper seals.

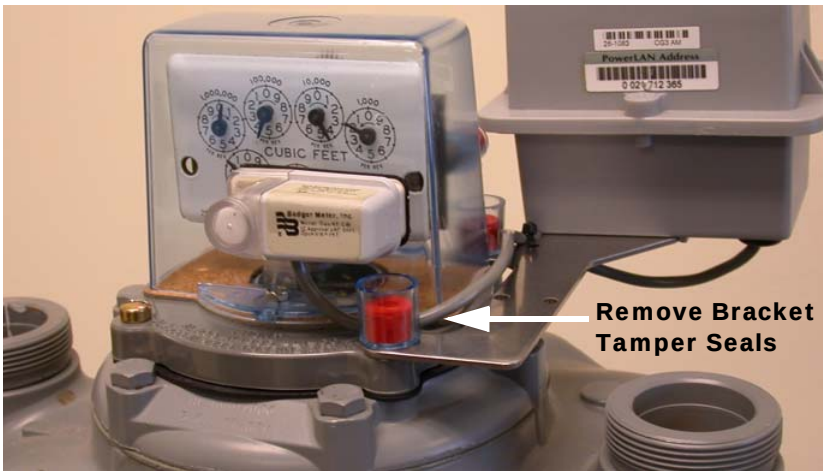


Figure 2 - 2. American Large Diaphragm Meter with Commercial Gas Module

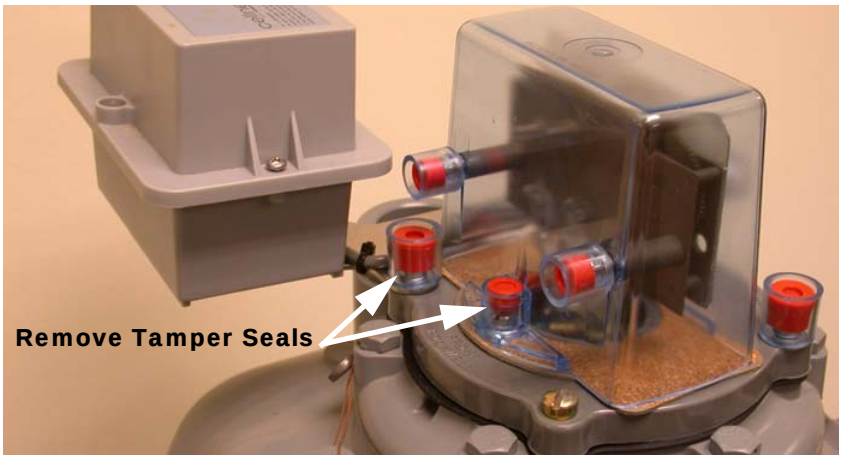


Figure 2 - 3. Remove Index Cover and Module Bracket Tamper Seals

C. Remove the index cover fasteners. If needed, use a 5/16 inch combination wrench to loosen the index cover front bolt.

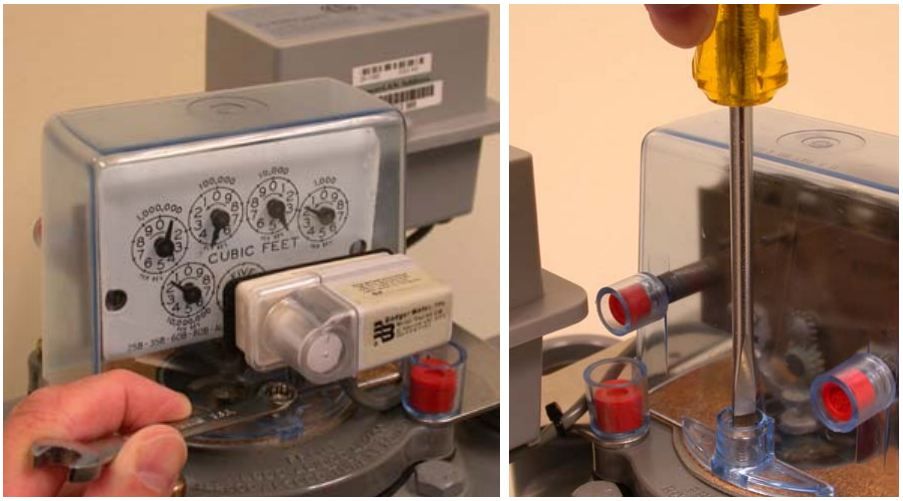


Figure 2 - 4. Remove Index Cover Fasteners

D. Remove the module bracket fasteners and carefully disconnect the module and index cover assembly from the meter.

E. If the original gasket is damaged or cannot be reused, replace the index cover gasket. A scraper and wire brush may be required to remove leftover gasket material.

3. Meter base plates without built-in tamper seal cups/towers, must use tamper seals and cups as shown in Figure 2 - 5.

Figure 2 - 5. Cover Gasket and Base Plate with Optional Tamper Cup & Seal

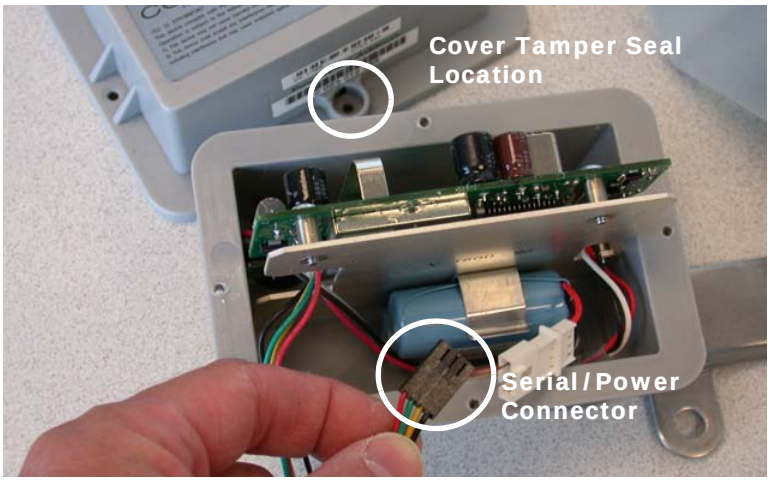


Figure 2 - 6. Commercial Module Cover Removed

4. Swipe each end of the module with an RF Buster or magnet to force the module to save meter data to non-volatile memory. Remove the Commercial Gas Module tamper seals, screws, and cover. Disconnect the battery.
5. The Commercial Gas Module must be disassociated from the meter.
6. Disconnect the module from the programming device. Leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.

American Mini Switch Kit Installation

Meter Preparation

1. Remove the tamper seals and screws from the index cover as shown in the following photos.

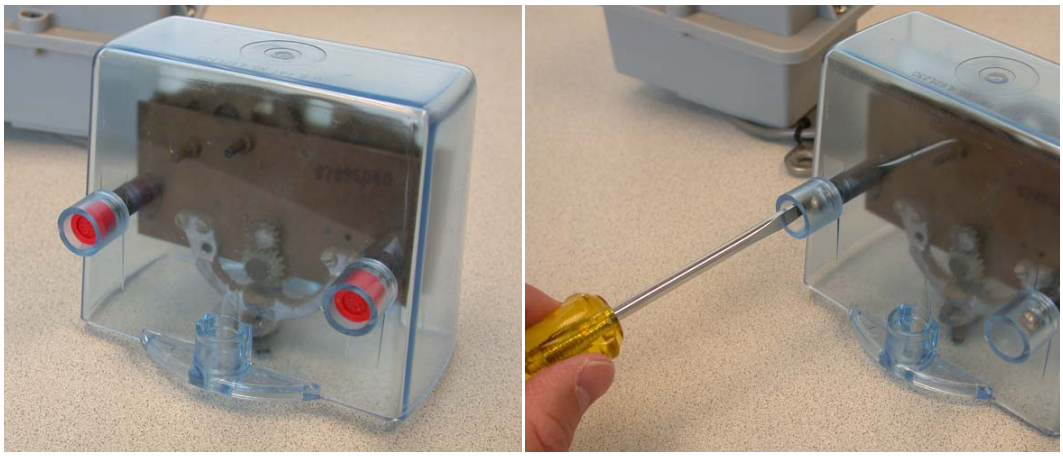


Figure 2 - 7. Remove Index Cover Tamper Seals and Screws

2. Gently push the Badger dial wheel toward the front of the index cover and away from the index dial pointer. Lift the index out of the cover.

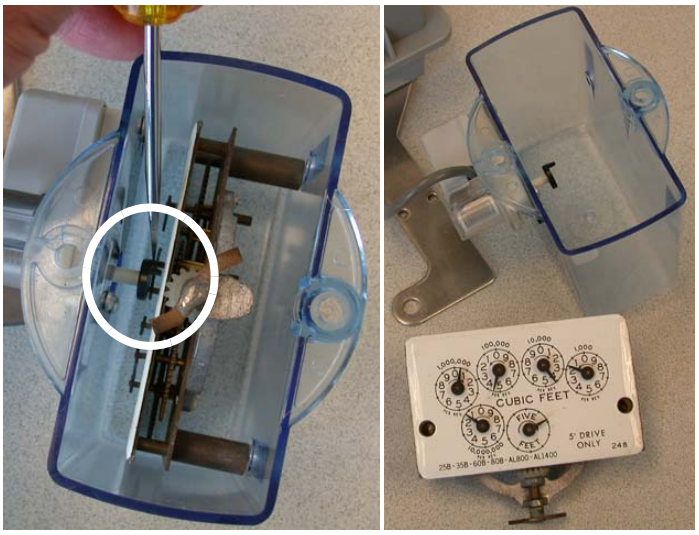


Figure 2 - 8. Disengage Badger Dial Wheel from Index; Remove Index from Cover

3. Inspect the index and replace it if any of the following conditions exists:

- Pointers are loose on their shafts.
- Index face contains cracked or peeling enamel.
- Index drive mechanism does not rotate easily.

WARNING:
The Index Face Mount Dial Wheel (40-1742) must be used with metal pointer indexes.

The Balanced dial wheel (40-1538) must be used on plastic pointer indexes.

Installing Index Face Mount Dial Wheels on Metal Pointer Indexes

WARNING: For Index Face Mount Dial wheels with alignment slots, the wheels must be installed so that the alignment slots on each wheel half are on top as shown in the next figure.

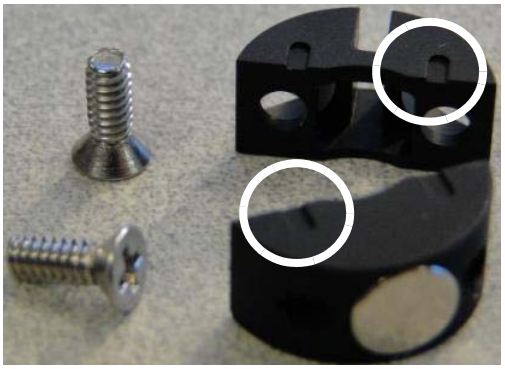


Figure 2 - 9. Where Alignment Slots Are Present On Index Face Mount Dial Wheels, The Slots Must Be Installed On Top

NOTE: For wheels WITHOUT alignment slots, there is no top or bottom, and there is no special consideration regards dial wheel assembly.

1. Insert screws into the notched dial wheel half.

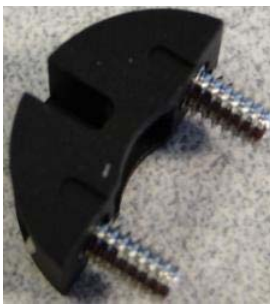


Figure 2 - 10. Magnetic Dial Wheel Half with Screws Inserted

2. Rotate the index drive mechanism so that the metal proving/test pointer is in an upward direction.

NOTE: For wheels WITHOUT alignment slots, there is no top or bottom, and there is no special consideration regards dial wheel assembly.

3. Position the screw-bearing notched wheel half for installation by sliding it downward over the index proving/test pointer tip as shown in Figure 2 - 11. The two alignment slots and pointer notch must be visible on top of the wheel half.

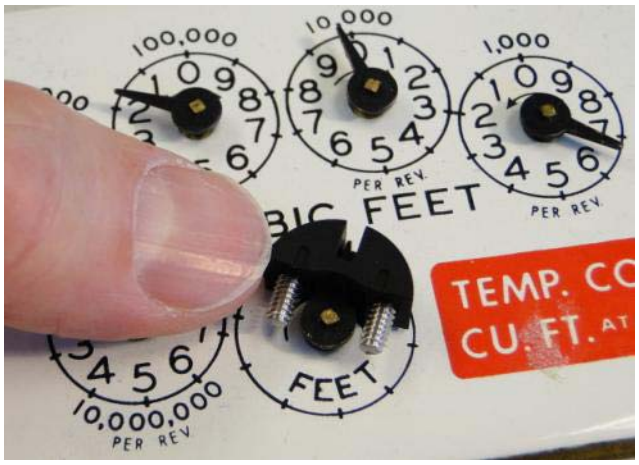


Figure 2 - 11. Slide Screw-bearing Wheel Half Over Index Proving/Test Pointer Tip

4. Position the bottom wheel half against the back of the index pointer. Use a small Phillips-type screwdriver and turn each screw a few turns until they begin to thread into the bottom wheel half. Do not tighten the screws.

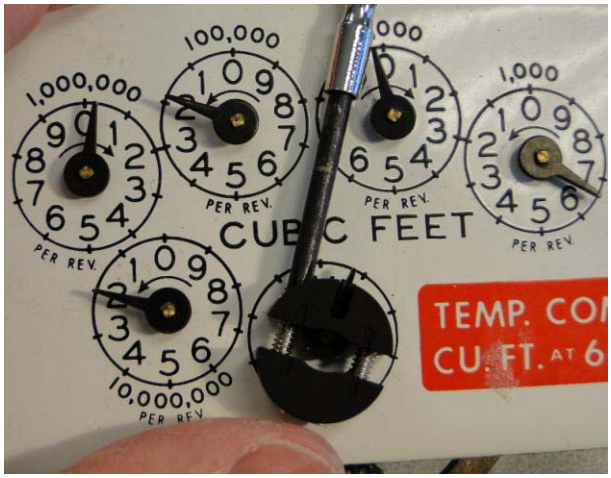


Figure 2 - 12. Thread Screws into Bottom Wheel Half

5. Insert the 0.030 inch thick spacer shim beneath the dial wheel as shown in Figure 2 - 13. Hold the dial wheel as shown. Tighten each screw a few turns at a time so that the two wheel halves remain parallel with each other. Tighten the screws to 3.5 inch-pounds (± 0.50 inch-pounds). Remove the spacer shim.

WARNING: The main index drive shaft must remain free to rotate while the wheel screws are tightened to prevent damage to the index pointer and pointer shaft.

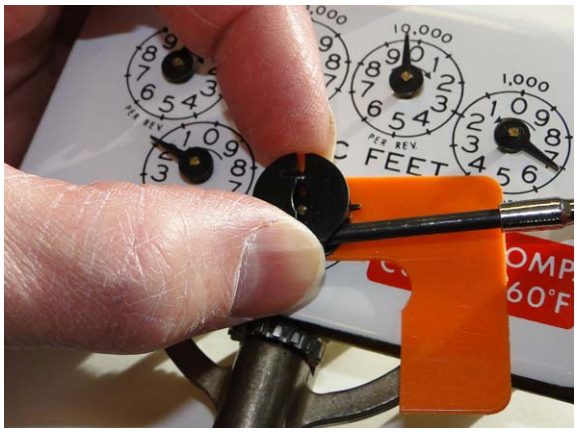


Figure 2 - 13. Insert 0.030 inch thick Shim and alternately tighten the Dial Wheel Screws to 3.5 inch-pounds (± 0.50 inch-pounds).

WARNING: To avoid damaging the index pointer and dial wheel, take care not to over-tighten the set screws.

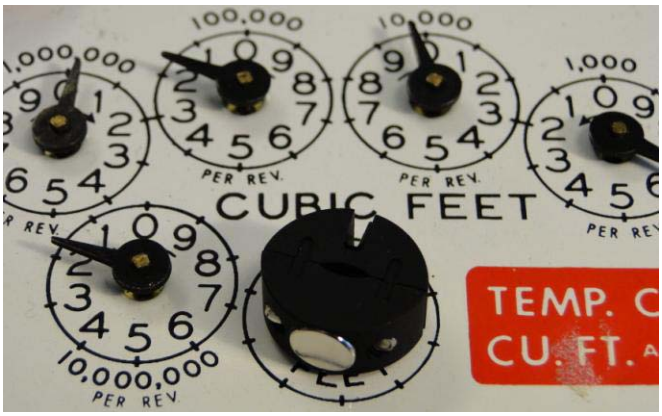


Figure 2 - 14. Index Face Mount Dial Wheel Installed

6. Verify that the dial wheel rotates freely without rubbing the index surface.

CAUTION: The installed dial wheel shall not move from the installed position, and cannot physically contact the index face or other pointers on the index. If contact occurs, the index should be replaced with an approved index. If the replacement index has plastic pointers, make sure you follow the applicable Dial Wheel installation instructions for plastic pointers instead (use the Balanced Dial Wheel).

Installing Balanced Dial Wheels on Plastic Pointer Indexes

1. Using a small flat blade screw driver, turn each screw counter-clockwise until the tip of each screw is flush with the inner surface of the wheel.

Figure 2 - 15. Top View - Balanced Wheel With Screws Backed Out

Figure 2 - 16. Bottom View - Balanced Wheel

2. Position the Balanced dial wheel over the plastic index proving/test pointer as shown in the following figures. The bottom of the dial wheel is slotted so that it may only be installed with the slot in the same direction as the index pointer.
3. Insert the 0.030” thick shim beneath the dial wheel. (An orange colored shim is shown for illustrative purposes to stand out clearly against the index surface)
4. Position the index facing upward on a work surface or in the palm of your hand so that the main drive shaft points away from contact with all surfaces as shown in the following figures.
5. Gently press the wheel against the shim with your index finger or thumb. The dial wheel must be level with the surface of the index.
6. Evenly tighten each screw to 1.20 ± 0.10 in-lb.

WARNING: The main index drive shaft must remain free to rotate as the wheel screws are tightened to prevent damage to the index pointer and pointer shaft

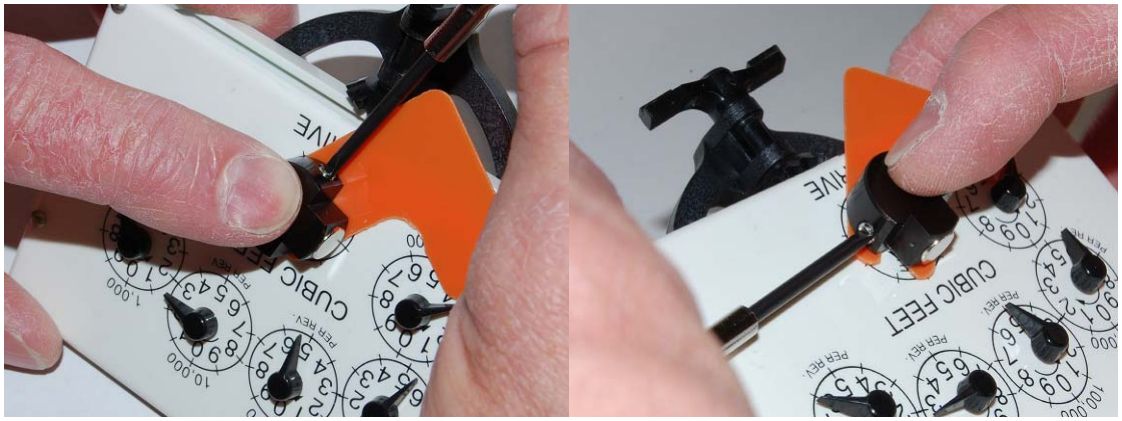


Figure 2 - 17. Tighten Dial Wheel Screws to 1.20 inch-pounds (± 0.10 inch-pound)

WARNING: Take care not to over-tighten the set screws to avoid damaging the index pointer and dial wheel. The installed dial wheel shall not move from the installed position, and cannot

physically contact the index face or other pointers on the index. If contact occurs, the index should be replaced with an approved index.

7. Remove the shim and verify that the wheel rotates freely while remaining level with the index surface.

Figure 2 - 18. Balanced Dial Wheel Installed

Installing Index Into Index Cover

1. Gently press the cable toward the front of the cover to provide clearance for installation of the index and to prevent stress or damage to the wires.

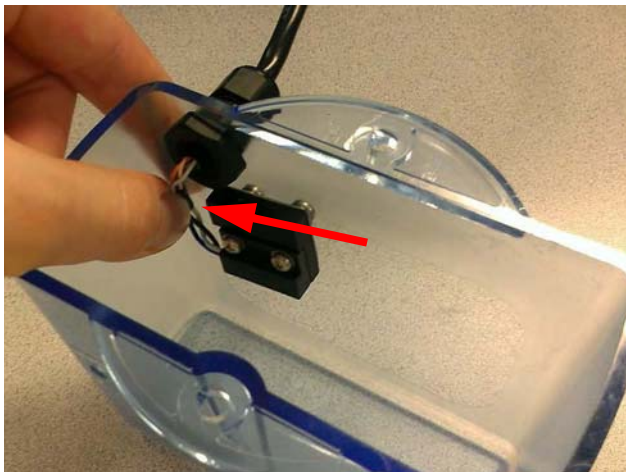


Figure 2 - 19. Gently Move Cable To Provide Clearance For Index

2. Hold the index at an angle to initially clear the wires and gently slide it into the cover while holding the wires out of the way as shown.

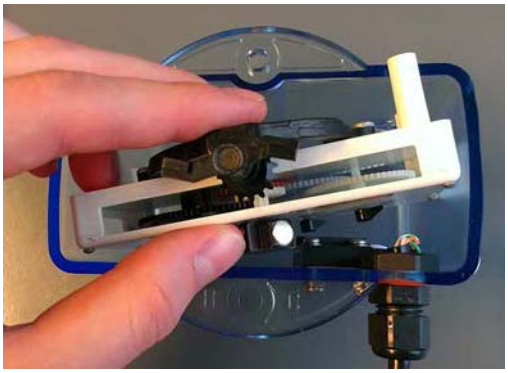


Figure 2 - 20. Insert the Index At an Angle To Clear Wires and Switch During Installation

3. As the index passes by the wires toward the switch, gently rotate the index into its normal mounting position.

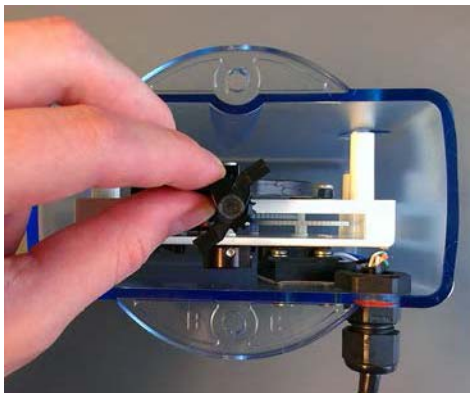


Figure 2 - 21. Position Index In Normal Mounting Location

4. From the hardware kit, install the two smaller tamper cups, washers, and screws as shown in the following photos. Use the Type 25 8-18 x 3/4 inch, self-threading screws (part# 22-1174) with plastic indexes. Use the 8-32 x 5/8 inch machine screws (part# 22-0310) with metal indexes. Torque the screws to 9 inch-pounds (+/- one inch-pound).

CAUTION: New plastic indexes may require the mounting holes to be pre-threaded prior to installation into the cover. Pre-threading the plastic index's mounting holes will help prevent damage to the index during installation.

Figure 2 - 22. Left: Self-Threading Screws / Right: Machine Screws

5. Install the tamper seals.

NOTE: Cable color may vary from that shown in photos.

Figure 2 - 23. Install Index Screws and Tamper Seals

Figure 2 - 24. Balanced Dial Wheel on Plastic Pointer Index

GPR Direction

The GPR must face away from nearby walls and should be installed in a location unobstructed by gas pipes. Refer to *"American Changing GPR Orientation"* on page -35 for instructions. Refer to Appendix A *GPR Waterproofing* for waterproofing guidelines before attaching connectors. Photos are for reference only: GPR cover and battery should not be connected until Chapter 6.

WARNING: The GPR and bracket must not interfere with access to the meter pressure tap. There must be adequate room for connections to the pressure tap (refer to the following photo).

Figure 2 - 25. Meter Pressure Tap

GPR Mounting

1. Using two #12-24 x 1/2 inch screws (part# 22-0185), install the GPR Mini Switch cover assembly as shown in the following photographs.

CAUTION: Check the index cover switch cable assembly for nicks, abrasions, or any damage prior to installing the assembly onto the meter.

2. Install a new index cover gasket as required. Tighten the screws to 20 inch-pounds (± 5 inch-pounds.

Figure 2 - 26. Tighten Front and Rear Cover Screws to 20 in-lbs (± 5 in-lbs)

WARNING: Take care not to pinch the index cover switch cable assembly in any way, especially during the following installation steps:

During index cover and cable assembly installation onto the meter.
During GPR enclosure cover installation.
Between the GPR and meter brackets and meter.

3. Install front and rear index cover tamper seals.
4. Coil the excess cable. Route it behind the index cover and dress it beneath the GPR bracket.

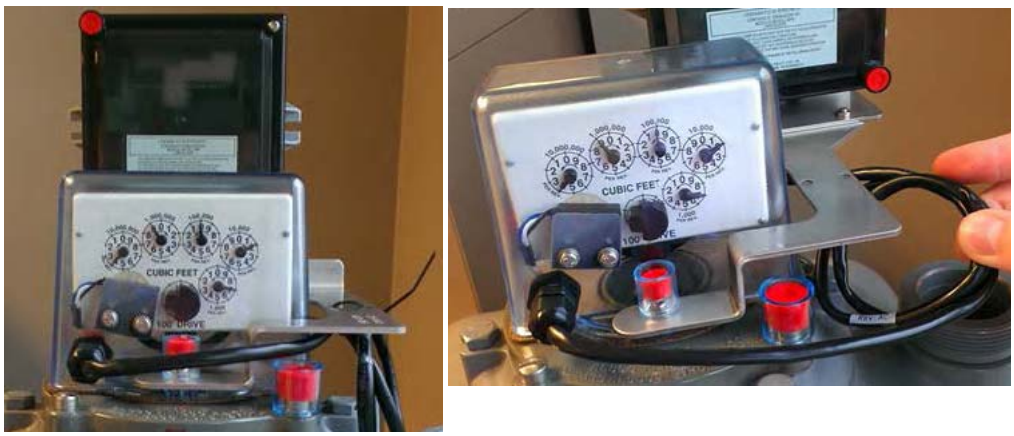


Figure 2 - 27. GPR at C enter Rear - Using 28-1441Bracket

5. Secure the cable to the bracket immediately below the GPR housing with a black nylon zip tie as shown in Figure 2 - 28.

Figure 2 - 28. GPR at C enter Rear - Using 28-1441Bracket

Figure 2 - 29. Final Installation

American Changing GPR Orientation

The GPR must face away from nearby walls. The GPR should be installed in a location unobstructed by gas pipes. Different mounting options are shown in the following photographs. Choose a mounting option before attaching battery and GPR cover.

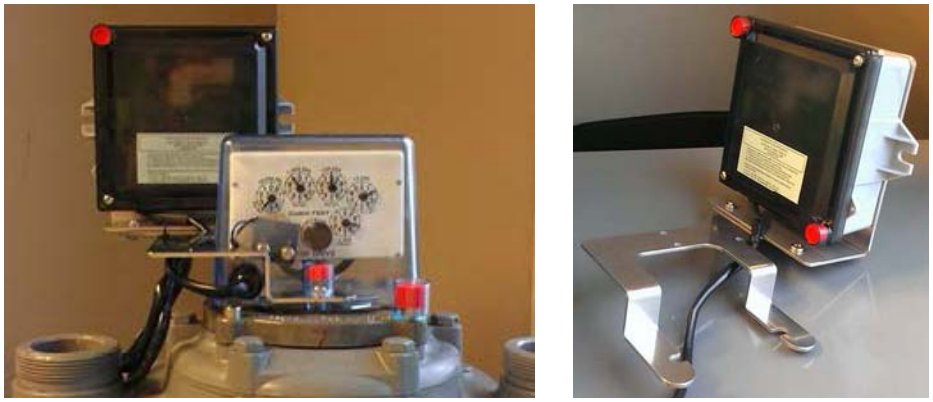


Figure 2 - 30. GPR at Left Rear - Using 28-1443 Bracket

Figure 2 - 31. GPR at Right Rear - Using 28-1440 Bracket

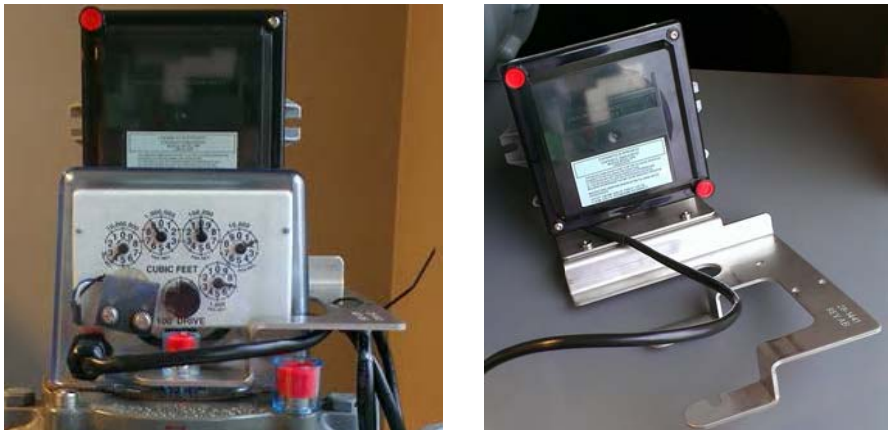


Figure 2 - 32. GPR at C enter Rear - Using 28-1441Bracket

1. Lay the GPR face down. Remove the two screws and washers holding the two brackets together as shown in Figure 2 - 33.

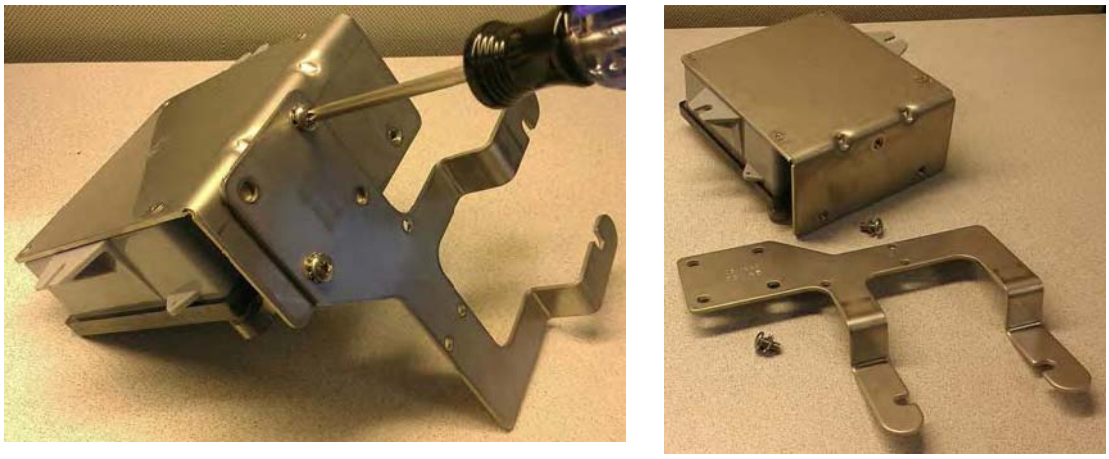


Figure 2 - 33. GPR Bracket Disassembly

2. Determine the appropriate GPR direction.
3. Install the two screws and lock washers. Tighten the screws to 30 inch-pounds (+/- 2 inch-pounds).

CAUTION: If the meter's pipe route prevents installing the GPR as described in this manual, the GPR may be mounted in a remote location away from the meter, such as on a wall or a

gas pipe. The maximum cable length between the Mini Switch and GPR must not exceed 200 feet.

CAUTION: In a remote GPR Mounting environment, Pipe Bracket Kit 45-2478 may be used to install the GPR on suitable plumbing pipes.

3

Rockwell GPR Index Cover & GPR Install

Rockwell Index Cover & Gas Module Removal

Meter Preparation

1. Remove the tamper seals, screws, and index cover assembly from the meter.

   If there is no Commercial Gas Module connected to the meter, it will appear as below.

Figure 3 - 1. Legacy Rockwell Large Diaphragm Meter Index Cover Front And Rear Views

Figure 3 - 2. Remove Index Cover Tamper Seals, Screws. and Index Cover

2. If the meter has a Commercial Gas Module, perform the following steps.

   A. Remove the index cover tamper seals.

   B. Remove the module bracket fasteners and carefully disconnect the module and index cover assembly from the meter.

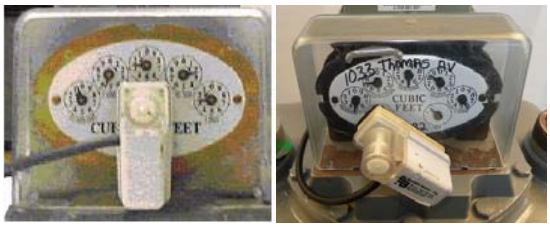


Figure 3 - 3. Center Dial and Offset Dial Mount Rockwell Commercial Index Covers

NOTE: There are two types of Rockwell Commercial index covers. Shown at left in Figure 3 - 3 is the Center Dial Mount and at right is the Offset Dial Mount. Both types may be removed from the meter in the same manner as shown in the next illustration.

Figure 3 - 4. Remove Module Bracket Tamper Seals, Screws, and Gas Module Assembly

3. Remove the 5/16-18 x 3/8-inch index frame screws and index mounting frame assembly from the meter. Set the screws aside for later use.

CAUTION: DO NOT remove the index from the mounting frame unless the frame or index is damaged.

For proper meter operation, the frame screw tabs should be approximately 90 degrees (perpendicular) to the upper portion of the frame containing the index.

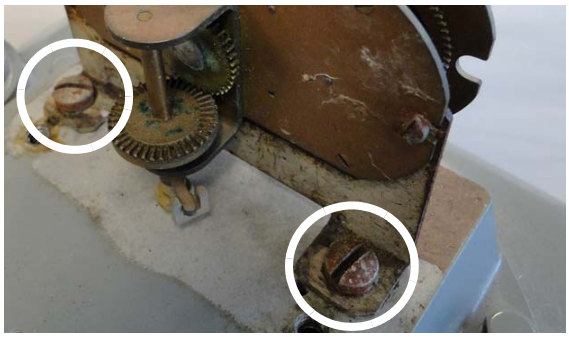


Figure 3 - 5. Index Frame Screws and Frame Tabs

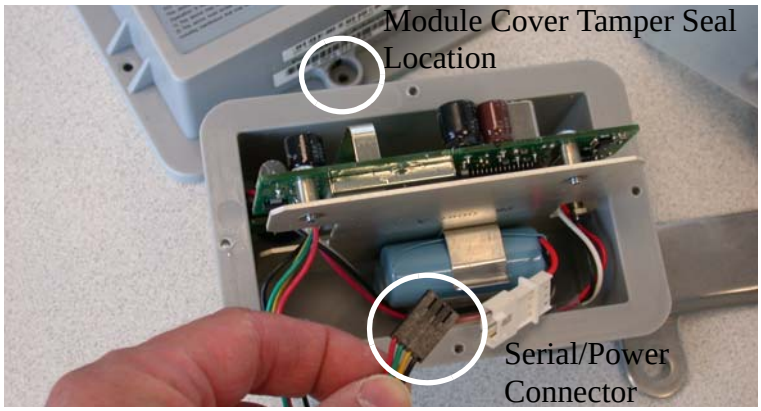


Figure 3 - 6. Commercial Module Cover Removed

4. Swipe each end of the module with an RF Buster or magnet to force the module to save meter data to non-volatile memory. Remove the Commercial Gas Module tamper seals, screws, and cover. Disconnect the battery.
5. The Commercial Gas Module must be disassociated from the meter.
   - **A.** If RIMS is used to manage gas module installations, leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.
   - **B.** If GPRep is used to install the gas modules, connect the laptop PC and Shooter Box or USB Shooter programming cable to the module Serial/Power connector. Follow the procedures on using GPRep “MRB Mode” outlined in the “GPRep User Guide,” Landis+Gyr publication 98-1119.
6. Disconnect the module from the programming device. Leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.

Rockwell Mini Switch Kit Installation

Meter Preparation

1. Inspect the index and replace it if any of the following conditions exists:
   - Pointers are loose on their shafts.
   - Index face contains cracked or peeling enamel.
   - Index drive mechanism does not rotate easily.

NOTE: The GPR module gets readings from a dial wheel mounted on the vertical drive shaft behind the index. The cover is installed on the meter with the sensor in the cover positioned on the BACK side of the index.

Installing Back Mount Dial Wheels

Figure 3 - 7. Alignment Slots Top of Each Wheel Half

1. Insert one screw into the notched dial wheel half.
2. If the dial wheel halves have alignment slots, position them so that the slots on each half are aligned. Turn the screw until it begins to thread into the threaded bottom wheel half as shown in the following figures.

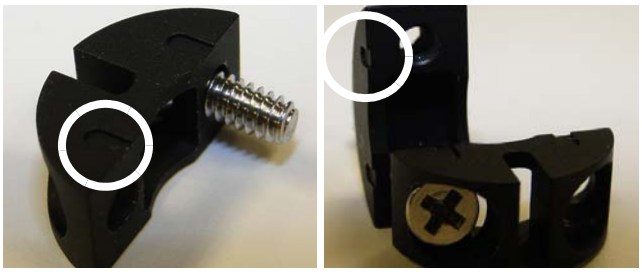


Figure 3 - 8. Notched Wheel Half with Screw Inserted

NOTE: For wheels WITHOUT alignment slots, there is no top or bottom, and there is no special consideration regarding dial wheel assembly.

3. Slide threaded wheel half behind the rear vertical index drive shaft.

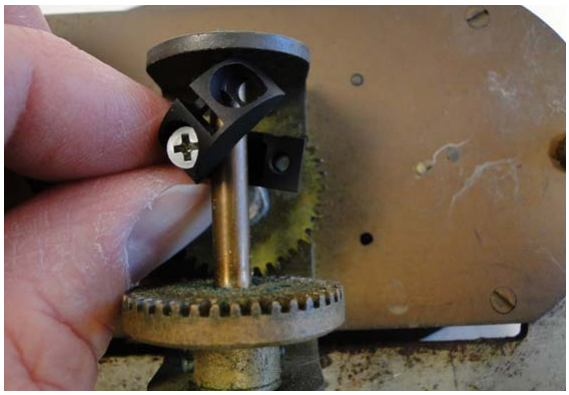


Figure 3 - 9. Place the Screw-bearing Notched Wheel Around the Index Drive Shaft

4. Rotate the notched wheel half in front of the shaft and insert the second screw.
5. Use a small Phillips-type screwdriver and turn each screw a few turns until they begin to thread into the threaded wheel half.
6. Insert the 0.030 inch thick spacer shim between the dial wheel and the index top shaft support as shown in the next figure.

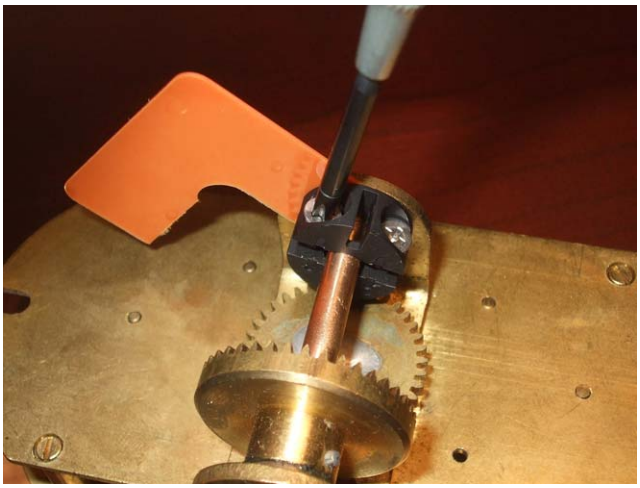


Figure 3 - 10. Shim insertion

7. Press the dial wheel upward against the shim. The wheel must be held flush with the shim while tightening the screws.
8. Tighten each screw a few turns at a time so that the two wheel halves remain parallel with each other, keeping the dial wheel hole centered on the shaft. Tighten the screws to 3.5 inch-pounds ± 0.5 inch-pound).

WARNING: To avoid damaging the dial wheel, take care not to overtighten the set screws.

9. Remove the shim. Verify that:
   - the index shaft rotates freely
   - the wheel does not wobble on the shaft or rub against the frame

Installing the Index

1. Install the index and frame assembly onto the meter.
2. Align the index drive shaft arm with the meter as shown in the next figure.
3. Using the 5/16-18 x 3/8” index frame screws that were set aside at the beginning of this procedure, tighten the screws to 18 foot-pounds. ± 2 foot-pounds.

NOTE: For proper meter operation, the index frame screw tabs should be about 90 degrees (perpendicular) to the upper portion of the frame containing the index.

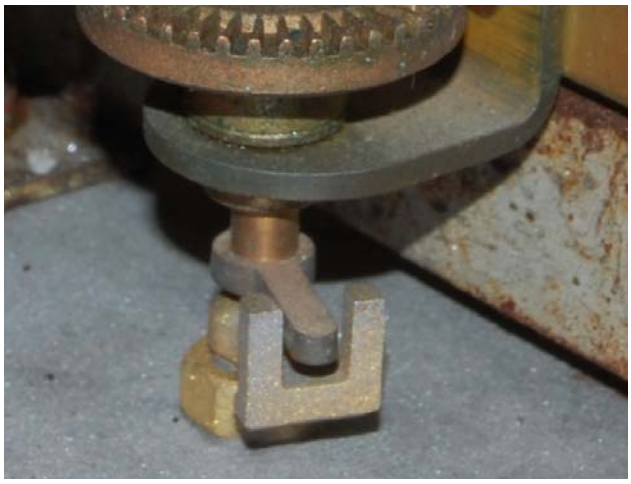


Figure 3 - 11. Index Drive Shaft Arm Alignment

If the index must be replaced or if the index has been removed from the frame, install the index to the frame and tighten the 8-32 x 3/16 inch screws to 10.5 inch-pounds (± 1.5 inch-pound).

CAUTION: The index MUST be installed with the mounting bracket inside the index back plate, as shown in the following photograph.

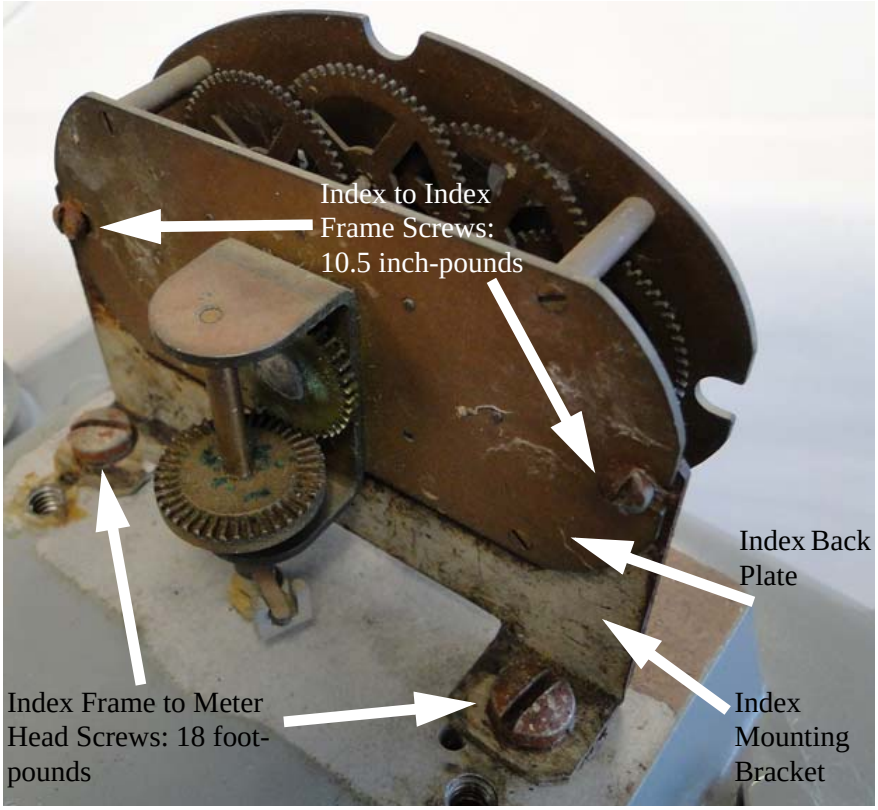


Figure 3 - 12. Index Frame to Meter Head; Index to Index Frame Screws

4. Tighten the index frame to meter head screws to 18 foot-pounds (+/- 2 ft-lbs). Tighten the index to index frame screws to 10.5 inch-pounds (± 1.5 inch-pounds).

GPR Direction

The GPR must face away from nearby walls and should be installed in a location unobstructed by gas pipes. Refer to *"Rockwell Changing GPR Orientation"* on page -47 for instructions. Refer to Appendix A *GPR Waterproofing* for waterproofing guidelines before attaching connectors. Photos are for reference only: GPR cover and battery should not be connected until Chapter 6.

WARNING: The GPR and bracket must not interfere with access to the meter pressure tap. There must be adequate room for connections to the pressure tap (refer to the following photo).

Figure 3 - 13. Meter Pressure Tap

GPR Mounting

CAUTION: Check the index cover switch cable assembly for nicks, abrasions, or any damage prior to installing the assembly onto the meter.

1. Install the GPR bracket onto the index cover so that the bracket slot straddles the cable strain relief as shown in Figure 3 - 14.
2. Use the two 5/16-18 x 1.25" screws and tamper cups provided in the parts kit to attach the GPR bracket onto the index cover as shown in Figure 3 - 14. Tighten the screws to between 15 and 20 inch-pounds, as shown in Figure 3 - 15.

Figure 3 - 14. Install GPR Bracket, Screws and Tamper Cups

3. Install tamper seals into the tamper cups as shown in Figure 3 - 17 and Figure 3 - 18.

Figure 3 - 15. Tighten Bracket Screws 15 to 20 inch-pounds

NOTE: Sensus (Rockwell/Equimeter) does not specify nor recommend a gasket between the index cover and meter head. The meter parts list and assembly diagram do not include an index cover gasket.

WARNING: Take care not to pinch the index cover switch cable assembly in any way, especially during the following installation steps:

during index cover and cable assembly installation onto the meter.
during GPR enclosure cover installation.
between the GPR and meter brackets and meter.

Figure 3 - 16. Coil Excess Cable

4. Coil the excess cable as shown in the photographs above.
5. Route the cable behind the index cover and dress it beneath the GPR bracket as shown in the previous photo. Take care not to crimp the cable or pull the cable tight.
6. Secure the coiled cable to the GPR bracket with a black nylon zip tie.

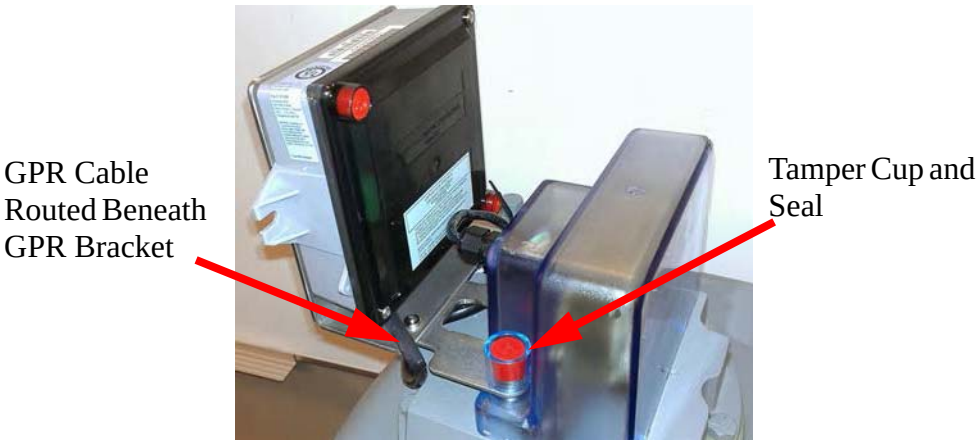


Figure 3 - 17. Install a Seal In Each Tamper Cup

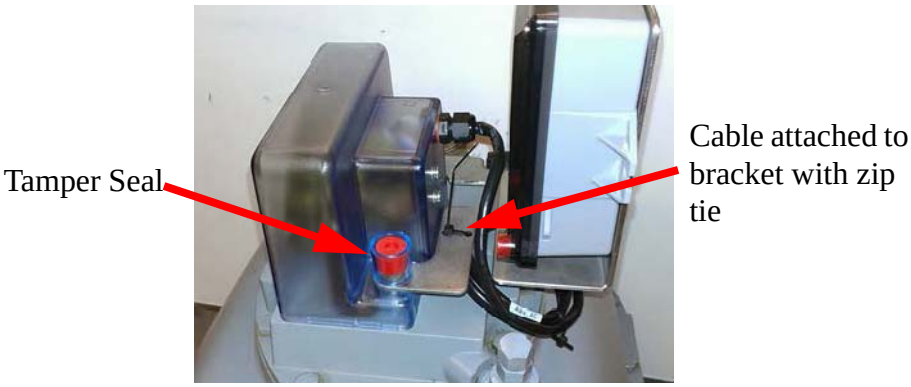


Figure 3 - 18. Attach Cable to Bracket with Black Zip Tie

Figure 3 - 19. GPR and Index Cover Installed in Both Orientations

Rockwell Changing GPR Orientation

The GPR must face away from nearby walls and toward the nearest Router or Electric Meter. The GPR should be installed in a location unobstructed by gas pipes. Different mounting options are shown in the following photographs. Choose mounting option before attaching battery and GPR cover.

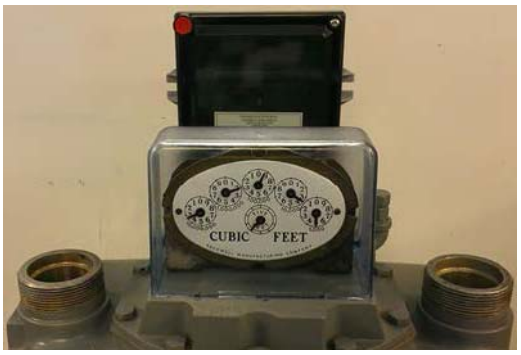


Figure 3 - 20. GPR Facing Forward-Center

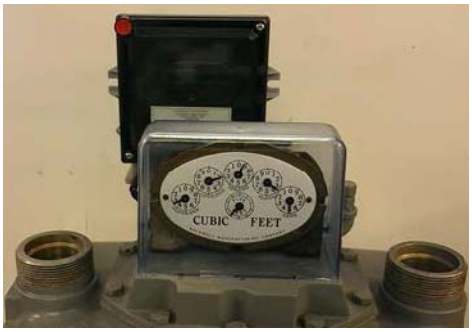


Figure 3 - 21. GPR Facing Forward-Left

1. Remove the two screws and washers holding the two brackets together as shown in Figure 3 - 22.

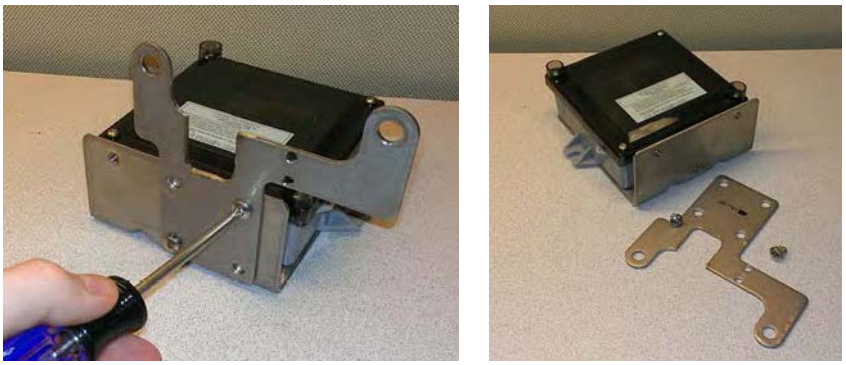


Figure 3 - 22. GPR Bracket Disassembly

2. Determine the appropriate GPR direction.
3. Install the two screws and lock washers. Tighten the screws to 30 inch-pounds (+0 / -2 inch-pound).

CAUTION: If the meter's pipe route prevents installing the GPR as described in this manual, the GPR may be mounted in a remote location away from the meter, such as on a wall or a gas pipe. The maximum cable length between the Index Cover Assembly and GPR must not exceed 200 feet.

In a remote GPR Mounting environment, Pipe Bracket Kit 45-2478 may be used to install the GPR on suitable plumbing pipes. Remote GPR mounting is beyond the scope of this manual.

4

Schlumberger GPR Index Cover & GPR Install

Schlumberger Index Cover & Gas Module Removal

WARNING: The Schlumberger/Actaris 675-1000 meter is designed so that the index may face the front or rear of the meter. Landis+Gyr only supports GPR cover use when installed:

with the index facing the front of the meter

where the meter inlet pipe is located at the left side of the meter.

Meter Preparation

1. Remove the tamper seals, screws, and index cover assembly from the meter.
2. If the meter has a Landis+Gyr Commercial Gas Module, perform the following steps.
   - **A.** Remove the index cover tamper seals.
   - **B.** Remove the module bracket tamper seals.
   - **C.** Remove the module bracket fasteners and index cover screws.
   - **D.** Carefully disconnect the module and index cover assembly from the meter.

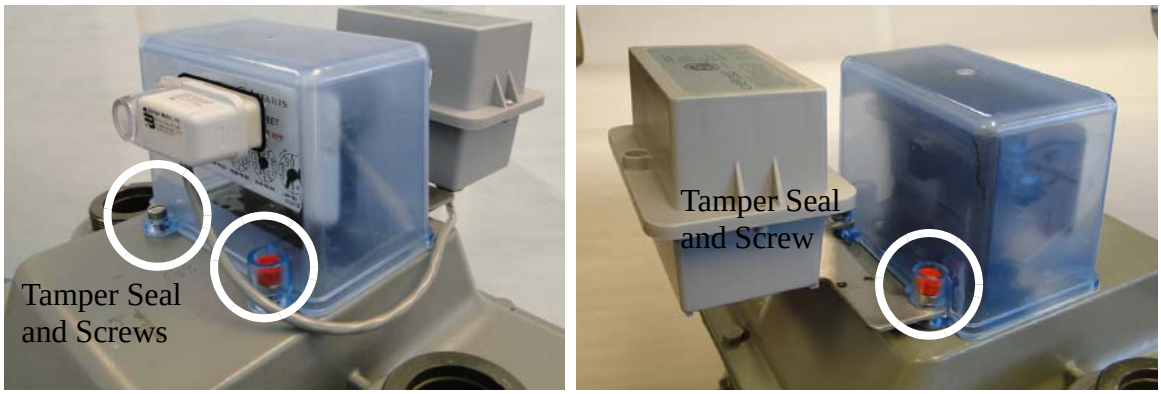


Figure 4 - 1. Front and Rear Views: Index Cover with Commercial Gas Module and Bracket

3. Two types of Legacy Schlumberger/Actaris 675 index mounting brackets may be encountered during GPR Index Cover installations.

Index Mounting Bracket Types

Unsupported Mounting Bracket Assembly

The next three figures illustrate an example of an index mounting bracket assembly NOT supported by the Schlumberger/Actaris GPR Index cover. This bracket assembly must be replaced with Itron (Schlumberger/Actaris) part number 55045404.

A. Remove the index mounting bracket assembly screws as shown in the following Figure (red circles). Save the screws. They will be used again later.

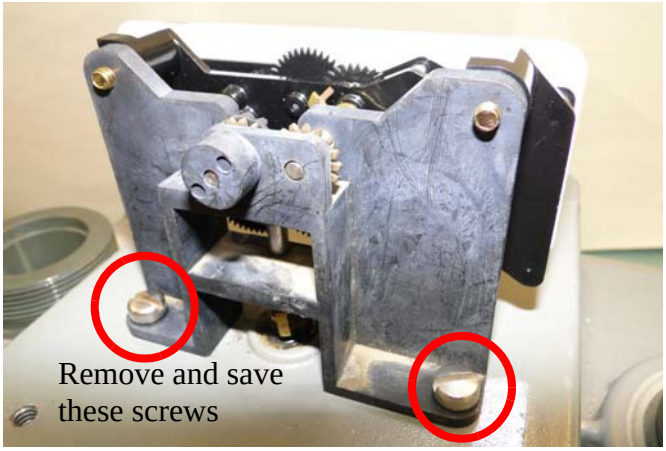


Figure 4 - 2. Unsupported Index Mounting Bracket Assembly

B. Remove the index screws and index from the mounting bracket as shown in the next two figures. Save the screws. They will be used again later.

Figure 4 - 3. Remove Index and Screws; Discard the Unsupported Bracket Assembly

C. Indexes with part numbers 050556 and 050557, in good condition, should be set aside. They may be used again later.

D. Discard the index mounting bracket assembly shown in Figure 4 - 4 and replace it with Itron (Schlumberger/Actaris) part number 55045404 shown in Figure 4 - 5.

Figure 4 - 4. Index Removed from Unsupported Bracket Assembly

Supported Mounting Bracket Assembly

The index mounting bracket assembly shown in the next two figures, Itron (Schlumberger/Actaris) part# 55045404, is supported with the GPR index cover.

A. Remove the index mounting bracket assembly screws as shown in the following figure (red circles). Save the index screws. They will be used during reassembly.

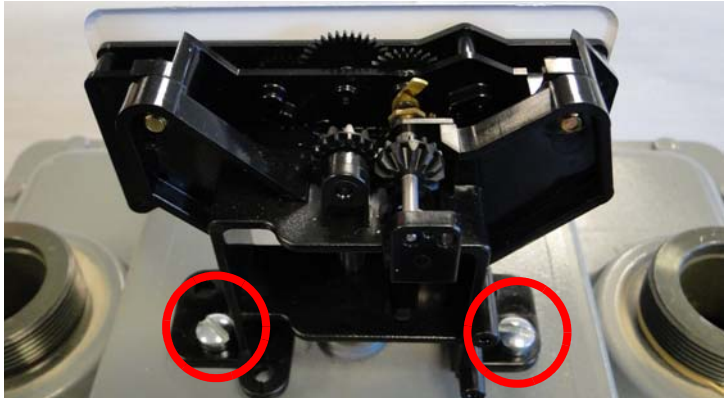


Figure 4 - 5. Rear View of Supported Index Mounting Bracket Assembly

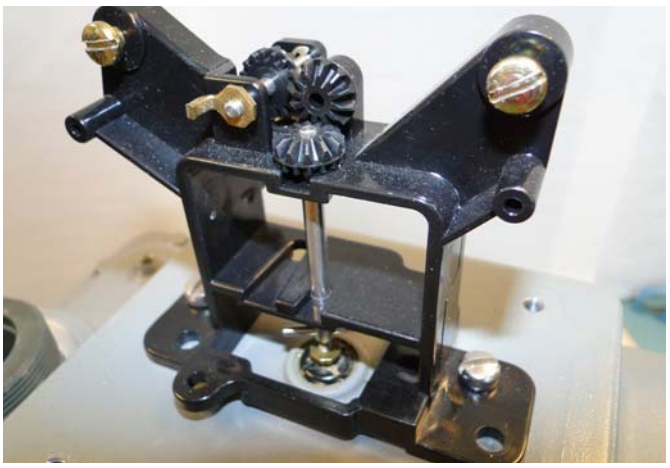


Figure 4 - 6. Front View of Supported Index Bracket with Index Removed

CAUTION: For illustrative purposes, the index has been removed from the mounting bracket assembly in Figure 4 - 6. During on-site installations, DO NOT remove the index from this type

of mounting bracket unless the index is defective or damaged. See “Meter Preparation” on page 49 for index approval criteria.

1. Remove the original gasket material from the meter. A scraper and wire brush may be required to remove gasket material still adhering to meter mounting surfaces.
2. Swipe each end of the module with an RF Buster or magnet to force the module to save meter data to non-volatile memory. Disconnect the battery.
3. Remove the Commercial Gas Module tamper seals, screws, and cover. Disconnect the battery

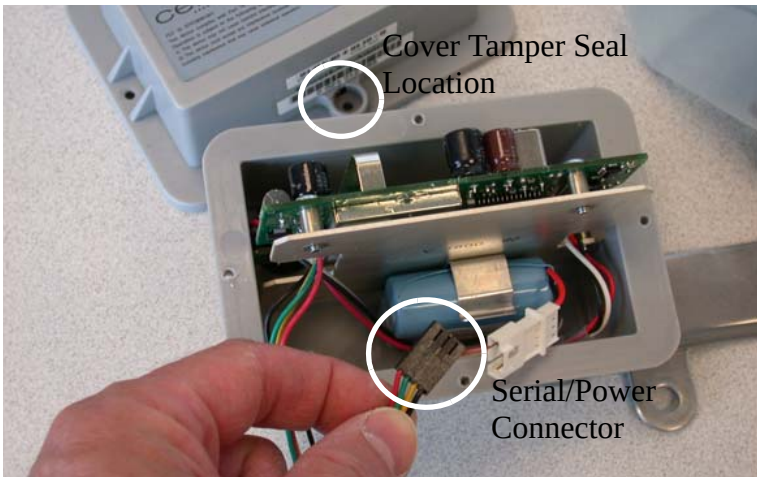


Figure 4 - 7. Disconnect Commercial Module Battery

4. The Commercial Gas Module must be disassociated from the meter.
   - **A.** If RIMS is used to manage gas module installations, leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.
   - **B.** If GPREP is used to install the gas modules, connect the laptop PC and Shooter Box or USB Shooter programming cable to the module Serial/Power connector. Follow the procedures on using GPREP “MRB Mode” outlined in L+G document, “GPREP User Guide 98-1119.”
5. Disconnect the module from the programming device. Leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.

Schlumberger Mini Switch Kit Installation

Meter Preparation

NOTE: The GPR assembly gets readings from a dial wheel mounted on the horizontal shaft behind the index. The cover is installed on the meter with the sensor in the cover positioned on the back side of the index.

Inspect the index and replace it if any of the following conditions exists:

- Pointers are loose on their shafts.
- Index face contains cracked or peeling enamel.
- Index drive mechanism does not rotate easily.

Perform the following steps if the index must be replaced:

Figure 4 - 8. Index Screw and Drive Details

1. Turn index screws (shown by red circles) counter clockwise enough to loosen and gently slide the old index screw tabs from beneath the screws using a right-to-left motion.
2. Slide the replacement index screw tabs beneath the screws using a left-to-right motion as shown in the photo at right in Figure 4 - 8.
3. Verify that the index drive mechanisms of both the bracket and index (red arrows) are aligned and free to rotate without binding.
4. Itron recommends tightening the screws “hand-tight” or 6 to 12 inch-pounds. The Itron specification is listed as “3 to 6 inch-pounds (after relaxation)” in their published documents.

Installing Back Mount Dial Wheels

Figure 4 - 9. Alignment Slots On Top of Each Wheel Half

1. Insert one screw into the notched dial wheel half.
2. If the dial wheel halves have alignment slots, position them so that the slots on each half are aligned. Turn the screw until it begins to thread into the threaded bottom wheel half as shown in the following figures.

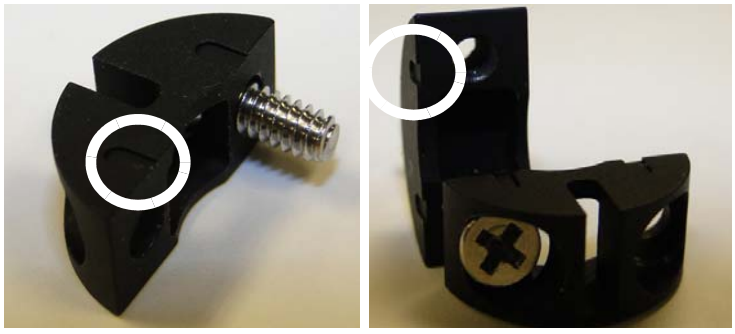


Figure 4 - 10. Alignment Slots Top of Each Wheel Half

NOTE: For wheels WITHOUT alignment slots, there is no top or bottom, and there is no special consideration regarding dial wheel assembly.

3. Slide threaded wheel half beneath the rear horizontal index drive shaft.

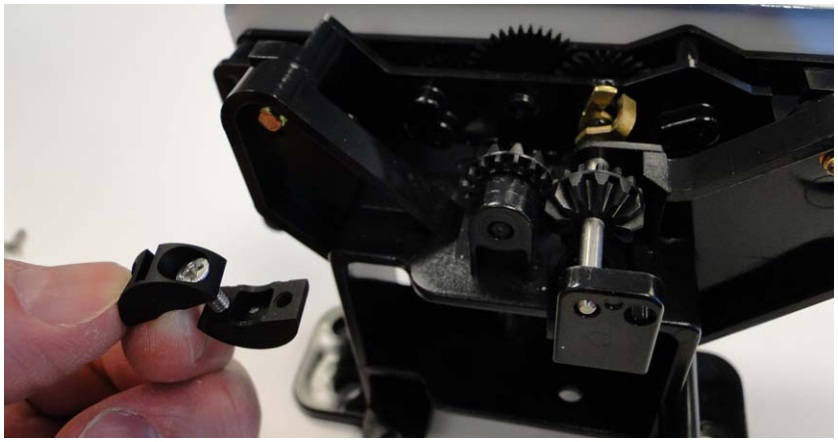


Figure 4 - 11. Slide Threaded Wheel Half Beneath the Index Drive Shaft

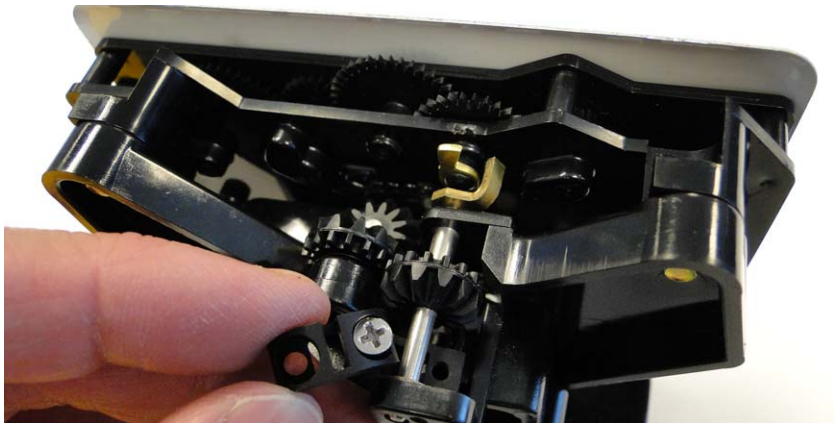


Figure 4 - 12. Slide Threaded Wheel Half Beneath Shaft

4. Rotate the notched wheel half over the top of the shaft and insert the second screw.

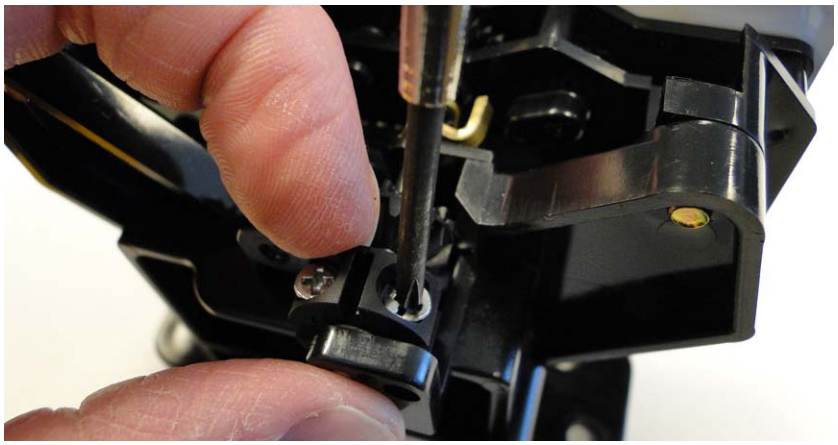


Figure 4 - 13. Turn Each Screw a Few Turns

5. Use a small Phillips-type screwdriver and turn each screw a few turns until they begin to thread into the lower wheel half.

6. Press wheel lightly but evenly against the shaft snap ring located at the rear of the shaft. The dial wheel must not touch the gears on the shaft.
7. Tighten each screw a few turns at a time so that the two wheel halves remain parallel with each other, and the dial wheel hole is centered on the shaft. Tighten the screws to 3.5 inch-pounds ± 0.50 inch-pounds.

WARNING: Avoid damaging the dial wheel. Take care not to overtighten the set screws.

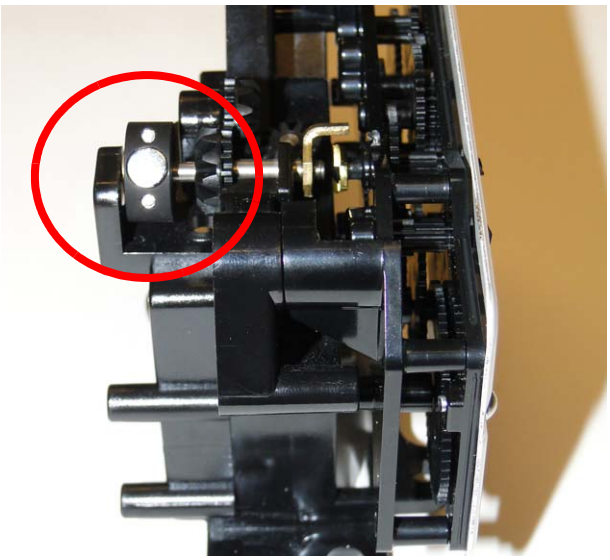


Figure 4 - 14. Dial Wheel on Shaft

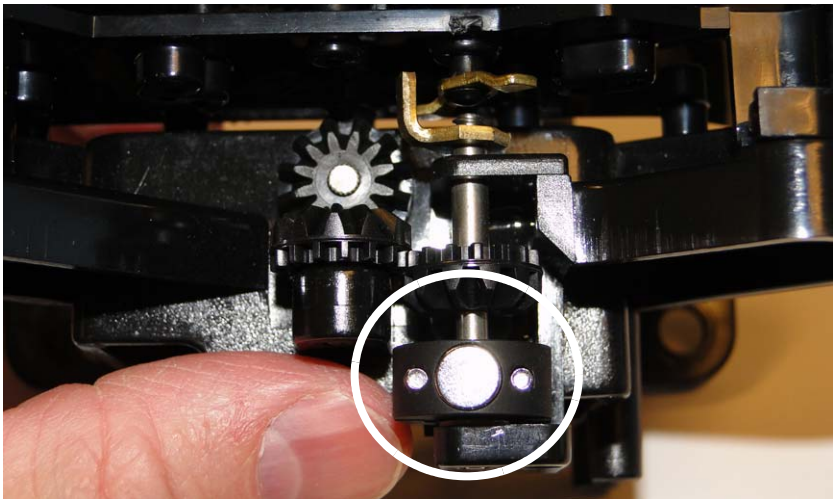


Figure 4 - 15. Top View of Installed Dial Wheel

8. Install the index mounting bracket assembly onto the meter using the original screws. Tighten the screws to 6 - 12 in-lb.

NOTE: The Schlumberger/Actaris 1000 meter is designed so that the index may face the front or rear of the meter. Landis+Gyr only supports use of the GPR cover when installed with the index facing the front of the meter where the meter inlet pipe is located at the left side of the meter.

GPR Direction

If at all possible, the GPR must face away from nearby walls and should be installed in a location unobstructed by gas pipes. Refer to *"Schlumberger Changing GPR Orientation"* on page -58 for instructions. Refer to Appendix A *GPR Waterproofing* for waterproofing guidelines before attaching connectors. Photos are for reference only: GPR cover and battery should not be connected until Chapter 6.

GPR Mounting

NOTE: The Schlumberger/Actaris GPR index cover comes with a silicone gasket. The installer is not required to install a separate gasket.

CAUTION: Check the index cover switch cable assembly for nicks, abrasions, or any damage prior to installing the assembly onto the meter.

1. Install the GPR cover assembly as shown in the following photographs. The Solid State Switch must be located at the rear of the index.
2. Insert two 1/4x20x5/8 inch screws provided in the parts kit into the index cover front screw holes. Turn the screws clockwise until they begin to thread into the index cover mounting holes. Do not tighten the screws.
3. Insert the GPR Bracket into the index cover rear tamper cup slot as shown below.

WARNING: Take care not to pinch the index cover switch cable assembly in any way, especially during the following installation steps:

During index cover and cable assembly installation onto the meter.

During GPR enclosure cover installation.

Between the GPR and meter brackets and meter.

Figure 4 - 16. Slide Bracket into Index Cover Tamper Cup Slot

4. Insert two 1/4x20x5/8 inch screws into the index cover rear screw holes. Tighten all index cover screws to between 15 to 20 inch-pounds.
5. The cable may be routed above or below the mounting bracket as shown in the following photos. Use the routing method that provides the best security and protection to the cable.

Figure 4 - 17. Coil the Excess Cable

Figure 4 - 18. Route and Attach the Excess Cable

6. Attach the excess coiled cable to the GPR bracket with a black nylon zip tie as shown in the previous figures.

CAUTION: The cable should slope downward and away from the index cover to aid the water tight strain relief in preventing water from entering the cover. Do NOT crimp or pull the cable tight.

7. Insert tamper seals into the tamper cups.

Figure 4 - 19. GPR and Index Cover Assembly Installed On a Schlumberger Large Diaphragm Meter

WARNING: The index cover switch cable assembly must not be pinched in any way, especially under the following circumstances:

During index cover and cable assembly installation onto the meter.

During GPR enclosure cover installation.

Between the GPR and meter brackets and meter.

Schlumberger Changing GPR Orientation

The GPR must face away from nearby walls and toward the nearest Router or Electric Meter. The GPR should be installed in a location unobstructed by gas pipes. Different mounting options are shown in the following photographs. Choose mounting option before attaching battery and GPR cover.

Figure 4 - 20. GPR Facing Left

Figure 4 - 21. GPR Facing Right

1. Lay the GPR on its back. Remove the two screws and washers holding the two brackets together as shown in the next figure.

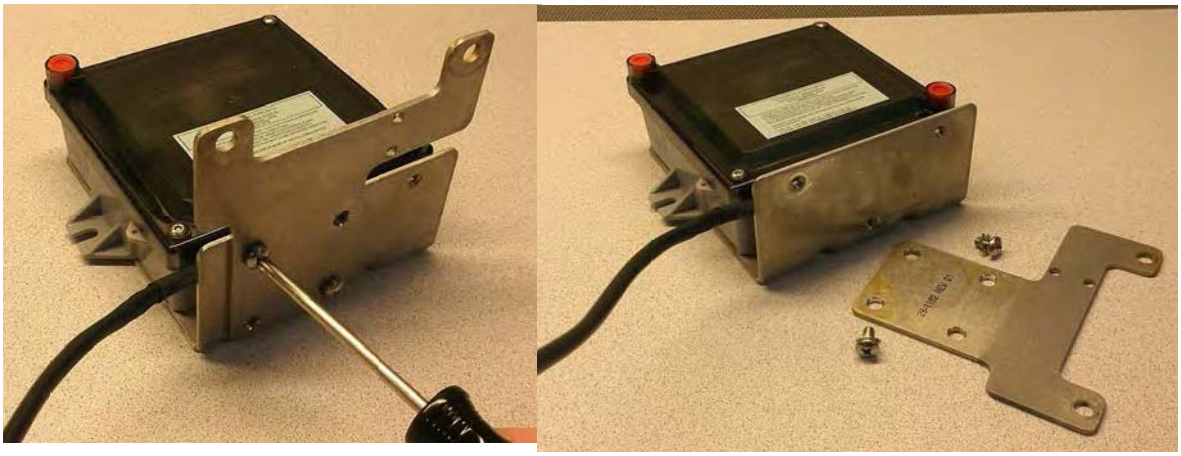


Figure 4 - 22. GPR Bracket Disassembly

2. Determine the appropriate GPR direction.
3. Install the two screws and lock washers. Tighten the screws to 30 inch-pounds (+ / - 2 inch-pounds).

CAUTION: If the meter's pipe route prevents installing the GPR as described in this manual, the GPR may be mounted in a remote location away from the meter, such as on a wall or a gas pipe. The maximum cable length between the Index Cover Assembly and GPR must not exceed 200 feet.

In a remote GPR Mounting environment, Pipe Bracket Kit 45-2478 may be used to install the GPR on suitable plumbing pipes. Remote GPR mounting is beyond the scope of this manual.

5

Sprague GPR Index Cover & GPR Install

Sprague Index Cover & Gas Module Removal

Meter Preparation

1. Remove the tamper seals, screws, and index cover assembly from the meter.
2. If a Commercial Gas Module is present, remove the tamper seals and screws.

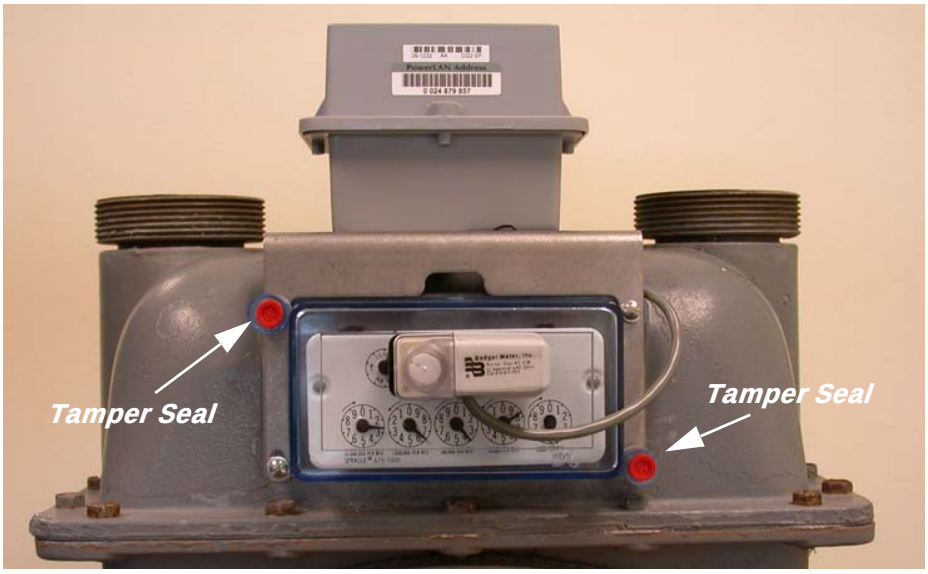


Figure 5 - 1. Legacy Sprague Large Diaphragm Meter with Commercial Gas Module

3. Remove the bracket and Index Cover assembly. Take care not to damage the meter index.

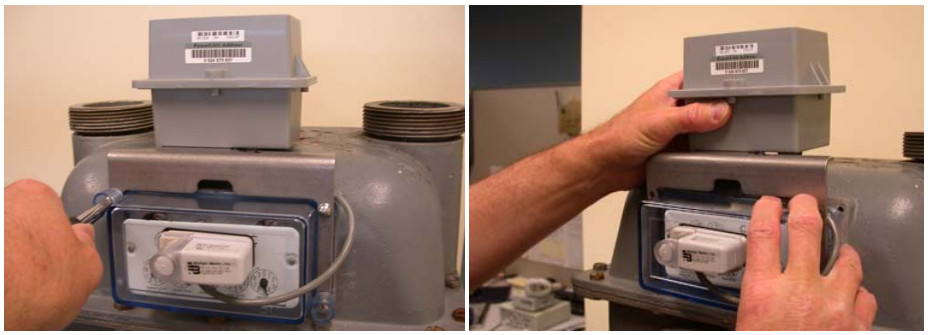


Figure 5 - 2. Remove Tamper Seals and Screws – Carefully Remove Module & Bracket Assembly

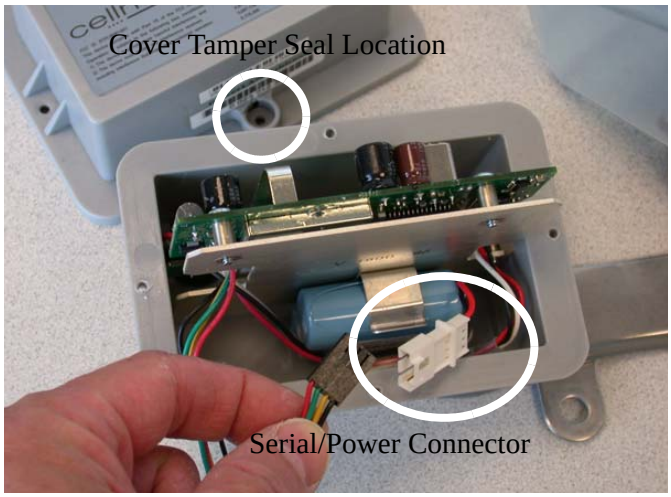


Figure 5 - 3. Commercial Module Cover Removed

4. Swipe each end of the module with an RF Buster or magnet to force the module to save meter data to non-volatile memory. Remove the Commercial Gas Module tamper seals, screws, and cover. Disconnect the battery.

5. The Commercial Gas Module must be disassociated from the meter.

A. If RIMS is used to manage gas module installations, leave the battery disconnected, replace the module cover, and return module to the Landis+Gyr cross-dock.

B. If GPRep is used to install gas modules, connect the laptop PC and Shooter Box or USB Shooter programming cable to the module Serial/Power connector.

Follow the procedures on using GPRep “MRB Mode” outlined in Landis+Gyr document “GPRep User Guide 98-1119.”

6. Disconnect the module from the programming device. Leave the battery disconnected, replace the module cover, and return the module to the Landis+Gyr cross-dock.

7. Remove all of the original gasket material from the meter. Clean the gasket surface of the meter with a wire brush and a gasket scraper. The index may need to be removed during gasket removal to prevent damage and avoid gasket material entering the index gears.

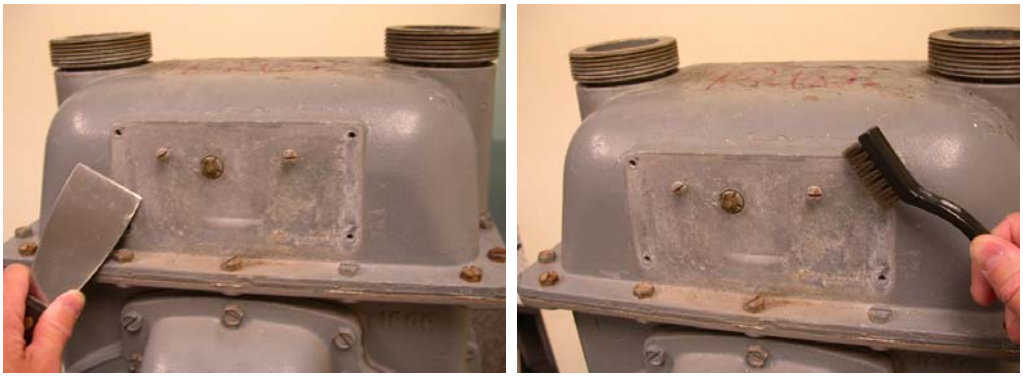


Figure 5 - 4. Removing Old Gasket Material with a Scraper and a Wire Brush

8. Inspect the index. Replace it if:

- index pointers are loose on their shafts
- the index face contains cracked or peeling enamel
- Index drive mechanism does not rotate easily

Sprague Mini Switch Kit Installation

WARNING: The Front mount dial wheel must be used with metal pointer indexes. The Balanced Dial wheel must be used on plastic pointer indexes.

CAUTION: Take care not to over-tighten the set screws to avoid damaging the index pointer and dial wheel.

Installing Front Mount Dial Wheels on Metal Pointer Indexes

1. Remove the index from the meter. Place the screws aside for re-use at the end of this process.

WARNING: To maintain proper clearance, the Front mount dial wheel must be installed so that, if alignment slots are present, the alignment slots on each wheel half are on top as shown in Figure 5 - 5.

Figure 5 - 5. Alignment Slots Top of Each Wheel Half

NOTE: For wheels WITHOUT alignment slots, the dial wheel has no top or bottom, and there is no special consideration regarding dial wheel assembly.

2. Insert screws into the notched dial wheel half.

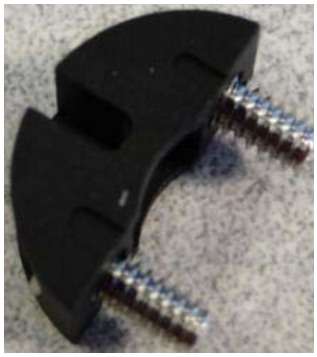


Figure 5 - 6. Notched Wheel Half with Screws Inserted

3. Rotate the index drive mechanism so that the metal proving/test pointer is in an upward direction.

4. Position the screw-bearing notched wheel half for installation by sliding it downward over the index proving/test pointer tip as shown in Figure 5 - 7. If present, the two alignment slots and pointer notch must be visible on top of the wheel half.

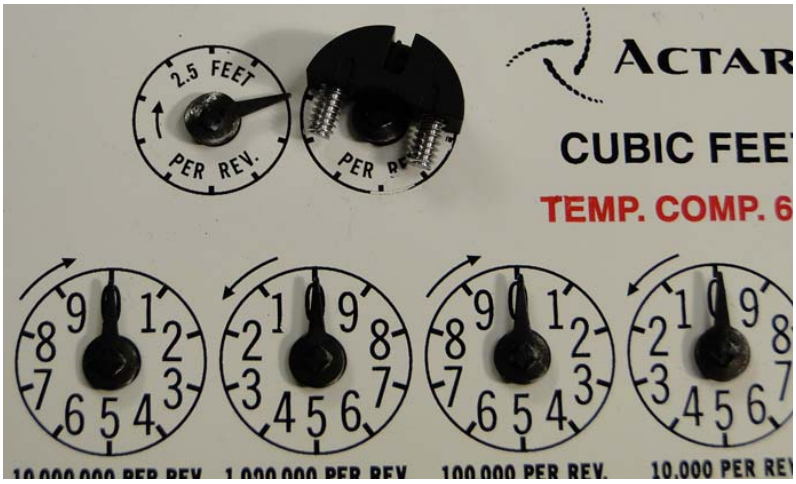


Figure 5 - 7. Slide Screw-bearing Notched Wheel Half over Index Proving/Test Pointer Tip

5. Position the threaded wheel half against the rounded end of the index pointer. Use a small Phillips-type screwdriver and turn each screw a few turns until they begin to thread into the threaded wheel half. Do not tighten the screws.

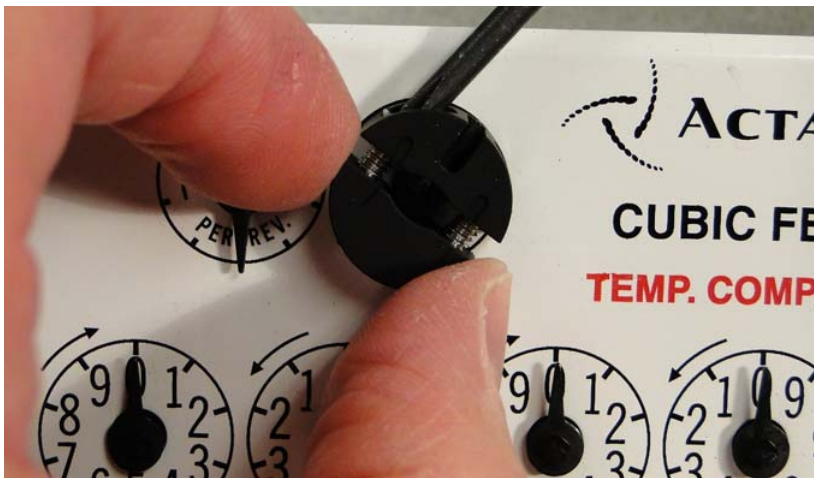


Figure 5 - 8. Thread Screws Into threaded Wheel Half

6. Insert the 0.030 inch thick spacer shim beneath the Front mount dial wheel as shown in Figure 5 - 9. Hold the dial wheel as shown. Tighten each screw a few turns at a time so that the two wheel halves remain parallel with each other. Tighten the screws to 1.2 ± 0.1 inch-lbs. Remove the spacer shim.

WARNING: The main index drive shaft must remain free to rotate while the wheel screws are tightened to prevent damage to the index pointer and pointer shaft.

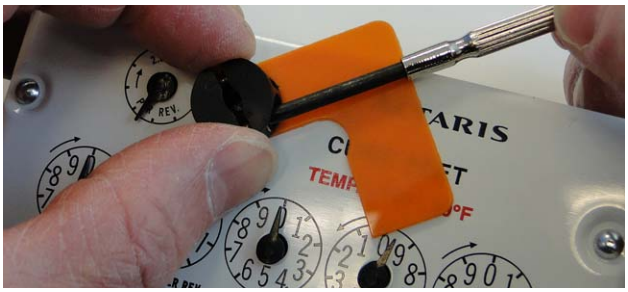


Figure 5 - 9. Insert Shim and Alternately Tighten Screws To 1.2 inch-lbs. (±0.10 inch-lbs.)

WARNING: To avoid damaging the index pointer and dial wheels, take care not to over-tighten the set screws.

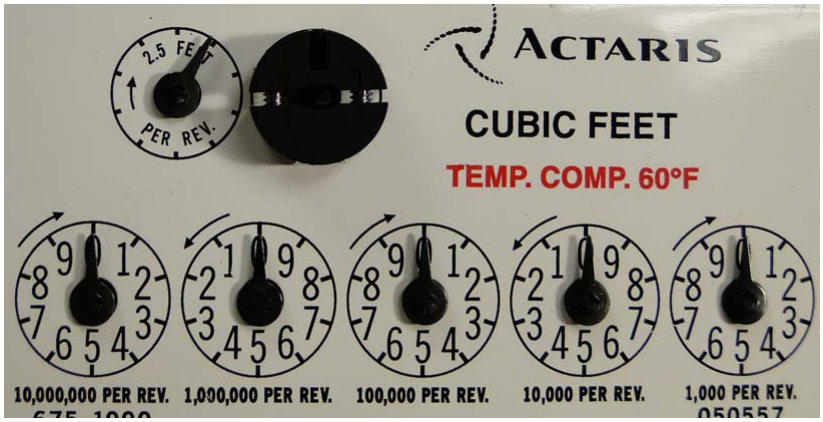


Figure 5 - 10. Front Mount Dial Wheel Installed

7. Verify that the dial wheel rotates freely without rubbing the index surface. Rotate the wheel several times as shown in the next figure to verify that the wheel does NOT contact adjacent index pointers.

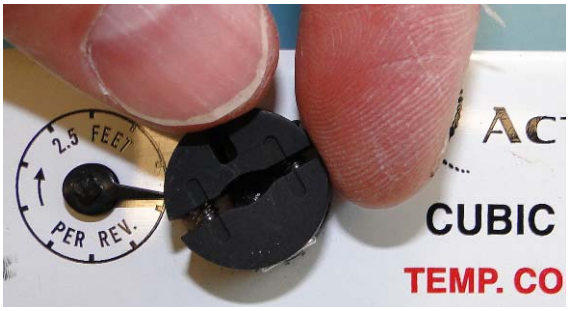


Figure 5 - 11. Dial Wheel Must Not Contact Adjacent Pointers As It Rotates

CAUTION: The installed dial wheel shall not move from the installed position, and cannot physically contact the index face or other pointers on the index.

If contact occurs, Landis+Gyr recommends replacing the metal pointer index with an index using plastic pointers so that the Balanced Dial Wheel can be used.

If dial wheel contact with the adjacent proving pointer tip is unavoidable, 1/4 of the adjacent proving pointer tip may be removed with diagonal cutters, but only with permission from the utility customer.

8. Install the index onto the meter using the original screws that were placed aside in the first step of this process. If the index has a brass mounting bracket, tighten the index screws to a torque value of 6 - 12 inch-pounds. If the index uses a plastic mounting bracket, tighten the index screws to a torque value of 15 - 20 inch-pounds.

CAUTION: Use caution when tightening the index screws to prevent damage to the index.

9. Confirm that the index's center of rotation is aligned with the meter dog's center of rotation. Adjust the index alignment as needed. The magnet wheel center of rotation **must be aligned** with the meter index drive mechanism center of rotation, shown by ***RED ARROWS*** in the following photos.

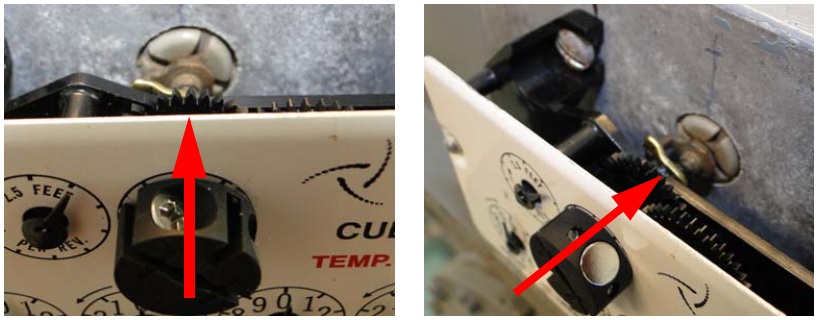


Figure 5 - 12. Wheel Center Of Rotation Must Align With Meter Drive Center Of Rotation

Installing Balanced Dial Wheels on Plastic Pointer Indexes

1. Using a small flat blade screw driver, turn each screw counter-clockwise until the tip of each screw is flush with the inner surface of the wheel.

Figure 5 - 13. Top View - Balanced Dial Wheel

Figure 5 - 14. Bottom View - Balanced Dial Wheel

2. Position the Balanced dial wheel over the plastic index proving/test pointer as shown in the following figures. The bottom of the dial wheel is slotted so that it may only be installed with the slot in the same direction as the index pointer.
3. Insert the 0.030 inch thick shim beneath the dial wheel.

4. Gently press the wheel against the shim with your index finger or thumb. The dial wheel must be level with the surface of the index.
5. Evenly tighten each screw to 1.2 ± 0.10 inch-pounds.

WARNING: The main index drive shaft must remain free to rotate as the wheel screws are tightened to prevent damage to the index pointer and pointer shaft

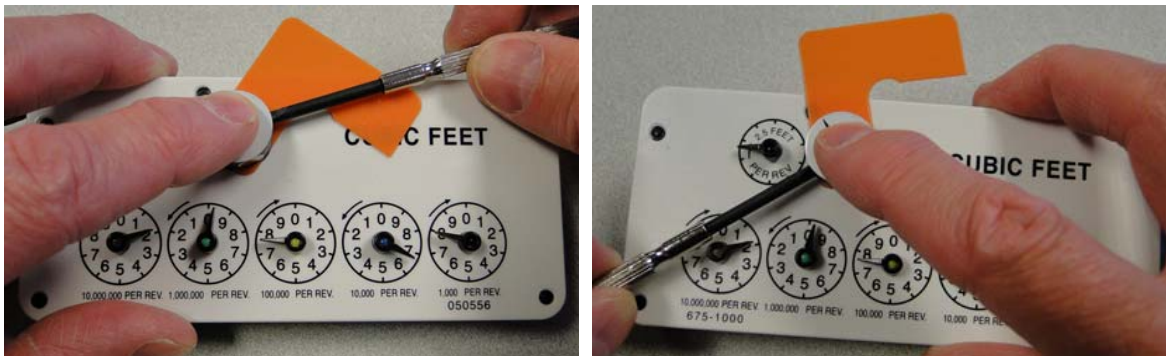


Figure 5 - 15. Tighten Dial Wheel Screws to 1.2 ± 0.10 Inch-Pounds

WARNING: Take care not to over-tighten the set screws to avoid damaging the index pointer and dial wheel.

The installed dial wheel shall not move from the installed position, and cannot physically contact the index face or other pointers on the index. If contact occurs, the index should be replaced with an approved index.

6. Remove the shim and verify that the wheel rotates freely while remaining level with the index surface.

Figure 5 - 16. Balanced Dial Wheel Installed

7. Install the index onto the meter using the original screws. The meter's drive dog must be inserted into a groove on the index drive mechanism as shown in Figure 5 - 17.
8. Confirm that the index's center of rotation is aligned with the meter dog's center of rotation. Adjust the index alignment as needed. The magnet wheel center of rotation **must be aligned** with the meter index drive mechanism center of rotation, shown by ***RED ARROWS*** in the following photos. Tighten the index screws to a torque of 15 - 20 inch-pounds.

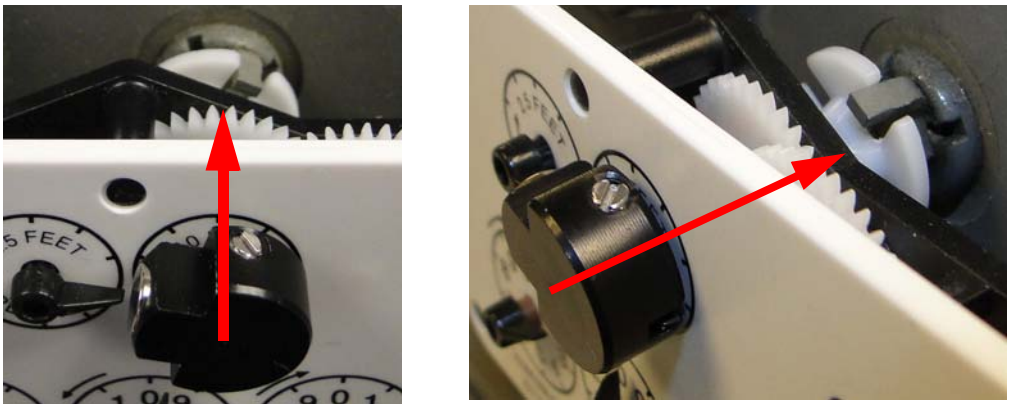


Figure 5 - 17. Wheel Center Of Rotation Must Align With Meter Drive Center Of Rotation

GPR Direction

Before performing the following steps, determine the direction that the GPR will face. The GPR must face away from nearby walls and should be installed in a location unobstructed by gas pipes. Refer to *"Sprague Changing GPR Orientation"* on page -72 for instructions.

GPR Mounting

Refer to Appendix A *GPR Waterproofing* for waterproofing guidelines before attaching connectors. Photos are for reference only: GPR cover and battery should not be connected until Chapter 6.

1. Bend about three inches of cable into a loop and attach the cable to the bracket with a nylon zip tie as shown in the following figure. Do not bend the cable so much as to crimp it. This provides additional security for the cable and serves as a drip loop.

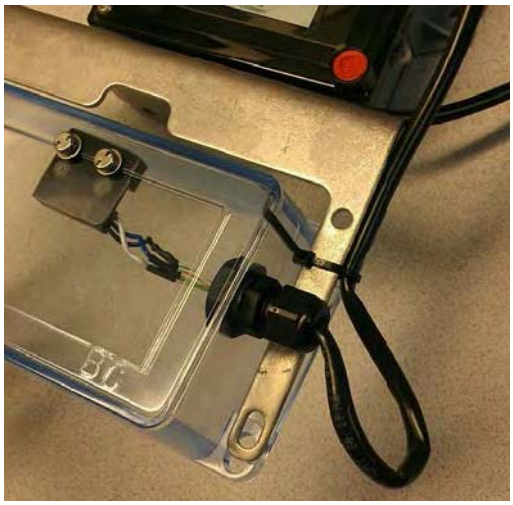


Figure 5 - 18. Switch Cover and GPR Assembly, with drip loop

NOTE: The cable strain relief is water tight and does not require a drip loop

2. Position the GPR bracket assembly over the cover edges as shown in Figure 5 - 18.

CAUTION: Check the index cover switch cable assembly for nicks, abrasions, or any damage prior to installing the assembly onto the meter.

3. Coil the excess cable and route it behind the bracket as shown in Figure 5 - 19. Position the cable behind the bracket and secure the cable to the bracket immediately below the GPR housing with a black nylon zip tie. Do not completely tighten the zip tie. The cable must remain free to move until the GPR has been installed on the meter.

Figure 5 - 19. Excess Coiled Cable Attached Beneath GPR Bracket

Figure 5 - 20. Excess Coiled Cable Attached Beneath GPR Bracket

WARNING: Take care not to pinch the index cover switch cable assembly in any way, especially during the following installation steps:

During index cover and cable assembly installation onto the meter.
During GPR enclosure cover installation.
Between the GPR and meter brackets and meter.

4. Install the GPR index cover and GPR assembly over the meter dial index as shown in the next figure. The cover must be installed with the 1/8 inch thick cork gasket provided with the GPR index kit.

Figure 5 - 21. Switch Wires Must Not Interfere With Index Pointers

5. Route the cable between the GPR bracket and top of the meter so that the cable has minimal slack protruding from behind the bracket. Verify that the cable is not pinched between the bracket and meter.

If the cable will not fit beneath the GPR bracket, or if the cable is subject to pinching or abrasion between bracket and meter, attach the excess coiled cable to the top of the index cover bracket, immediately below the GPR as shown in the next figure.

Figure 5 - 22. Cable Optionally Routed Above Index Cover Bracket

6. Tighten the nylon zip tie so that the cable is snug against the bracket. Cut away excess tie length.

7. Install the two 10-24 x 3/4 inch index cover screws with flat washers. Install one at lower left and the other at upper right. Do not tighten these screws.

8. Install two tamper cups, plastic washers, and 10-24 x 7/8 inch screws in the remaining cover holes. Tighten all four cover screws to a torque value of 20 inch-pounds.

Figure 5 - 23. Tamper Cups and Screws

9. Verify that the magnet wheel does not contact the switch. A visible gap must exist between the wheel and switch as shown in the following photograph.

Figure 5 - 24. Gap Must Be Visible Between Wheel and Switch

10. Install tamper seals into the tamper cups as shown in Figure 5 - 25.

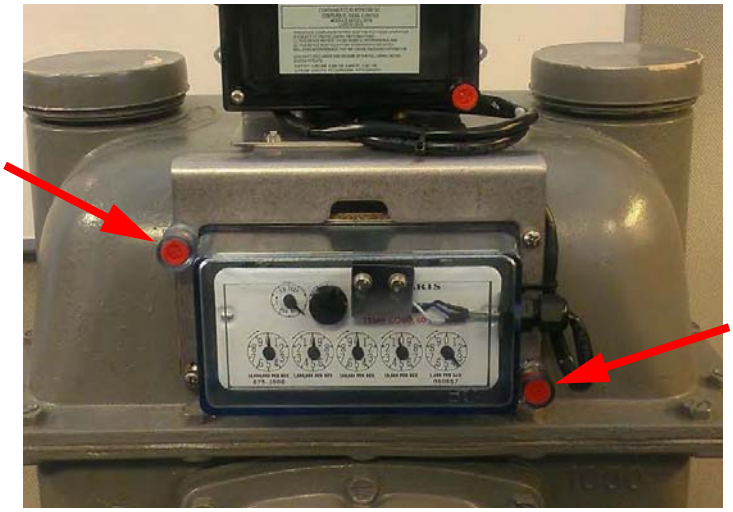


Figure 5 - 25. GPR Assembly installed on a Sprague Large Diaphragm Meter

WARNING: Take care not to pinch the index cover switch cable assembly in any way, especially during the following installation steps:

During index cover and cable assembly installation onto the meter.

During GPR enclosure cover installation.
Between the GPR and meter brackets and meter.

Sprague Changing GPR Orientation

The GPR must face away from nearby walls and toward the nearest Router or Electric Meter. The GPR may be oriented in three different directions:

- Forward toward the front of the meter
- 90 degrees toward the left side of the meter
- 90 degrees toward the right side of the meter

The previous instructions show the GPR facing towards the front of the meter.

The following figures show the other two possible orientations.

Choose mounting option before attaching battery and GPR cover.

Figure 5 - 26. GPR Facing Right Side of Meter

Figure 5 - 27. GPR Facing Left Side of Meter

1. Lay the GPR face down. Remove the two screws and washers holding the two brackets together as shown in Figure 5 - 28.

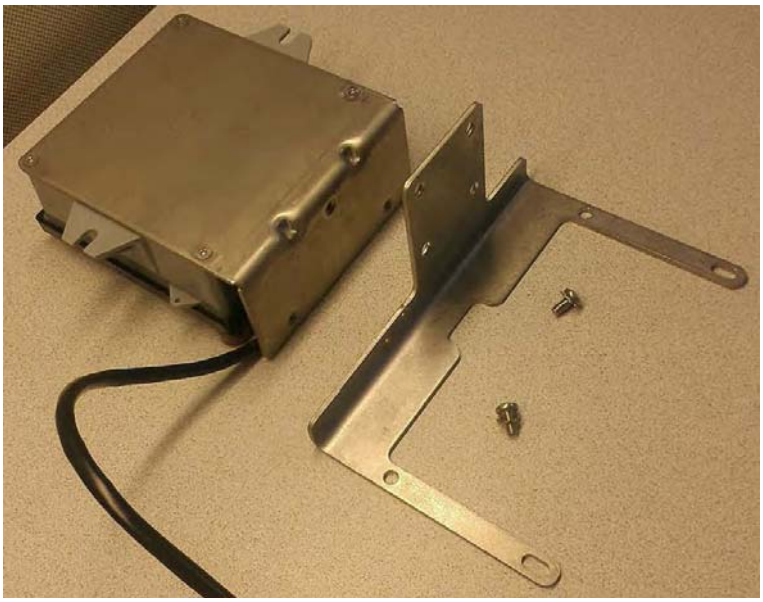


Figure 5 - 28. GPR bracket disassembly

2. Determine the appropriate GPR direction.

WARNING: The GPR must be mounted in the forward-most position on the lower bracket so that the gas pipes do not interfere with data transmissions. Refer to the following figures for additional detail.

Figure 5 - 29. Left-Facing GPR Shown Extended Forward to Avoid Gas Pipe Interference

WARNING: A right-facing GPR must have the cable routed as shown in Figure 5 - 30. The cable must not be routed around the edge of the GPR bracket (Figure 5 - 31), where it may be exposed to unknown hazards.

Figure 5 - 30. For Right-facing GPR Installs, Route Cable As Shown

Figure 5 - 31. Do Not Route the Cable In Front of the GPR Bracket - Route the Cable As Shown in Figure 5 - 30

Figure 5 - 32. GPR Facing Left Side of Meter

Figure 5 - 33. GPR Facing Right Side of Meter

3. Install the two screws and lock washers. Tighten the screws to 30 inch-pounds (+0 / -2 inch-pounds).

CAUTION: If the gas meter's pipe route prevents installing the GPR as described in this manual, the GPR may be mounted in a remote location away from the meter such as on a wall or a gas pipe. The maximum cable length between the Index Cover Assembly and GPR must not exceed 200 feet.

Remote GPR mounting is beyond the scope of this manual.

CAUTION: In a Remote GPR Mounting environment, Pipe Bracket Kit 45-2478 may be used to install the GPR on suitable plumbing pipes.

6

Index Cover Pulser Install and Operation Start Up

Introduction

The index cover pulser has a single channel. The channel is for measuring gas volume pulses. The pulser is type Form-C. Before starting a module in for the first time, double check the following:

- The index cover is properly installed to the meter index.
- The GPR module is properly mounted to the meter.

NOTE: The output of the pulser is to be connected to Channel B on the GPR.

NOTE: It is the responsibility of the user to make sure the output pulse meets the minimum pulse ON/OFF time of 50ms/50ms.

NOTE: If the battery is unplugged, do not connect the battery until the module is ready for operation to start.

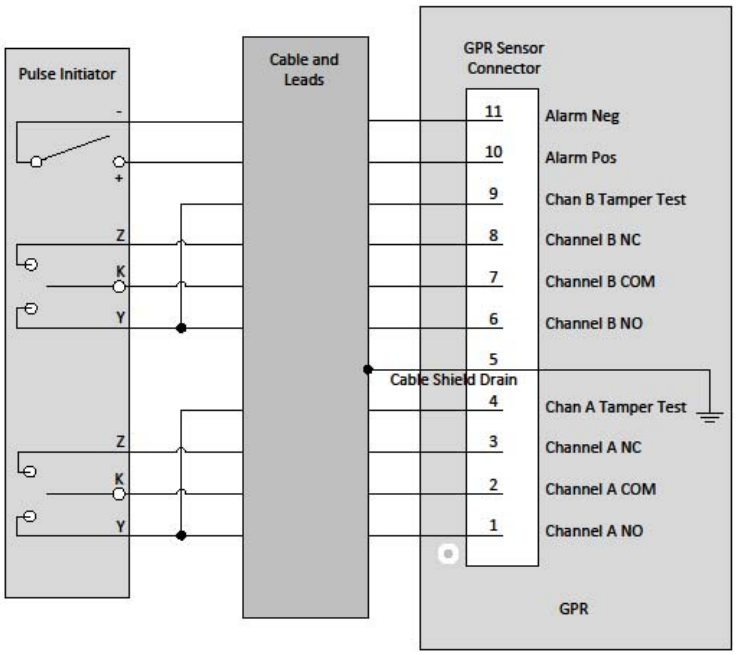


Figure 6 - 1. Sensor Channels

Interface to a Single Form-C Volume Output

The interface to a single Form-C volume pulse output from the index cover is shown in the figure and table below.

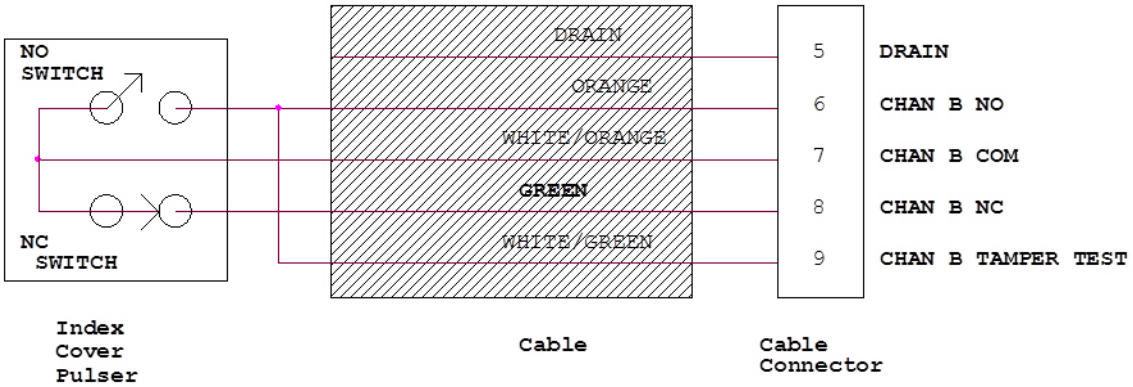


Figure 6 - 2. Wiring for a Single Form-C Volume Input

NOTE: The cable connector is shown downside up.

Figure 6 - 3. Cable to GPR Connection for a Single Form-C Volume Input

Table 6 - 1. Single Form-C Volume Wiring Definitions

GPR Sensor			Index Cover	
GPR Sensor Connector Pin #	**Signal and Description**	**Lead Color**	**Terminal**	**Description and notes**
1	N/C	N/A	N/A	Not Applicable
2	N/C	N/A	N/A	Not Applicable
3	N/C	N/A	N/A	Not Applicable
4	N/C	N/A	N/A	Not Applicable
5	Ground	Drain	N/A	Not Applicable
6	CHAN B NO, Channel B normally open	Orange	NO	Normally Open
7	CHAN B COM, Channel B common	WHITE/ORANGE	COM	Common
8	CHAN B NC	Green	NC	Normally Closed
9	CHAN B TAMPER TEST, channel B tamper test	WHITE/GREEN	NO	Tamper Test
10	N/C	N/A	N/A	Not Applicable
11	N/C	N/A	N/A	Not Applicable

The connector on the cable is mated to the channel B on the GPR Sensor Connector as shown in the figure below.

NOTE: Battery should not be connected until GPR is fully mounted.

Start the GPR Operation In Install Mode

By now, the GPR should be fully mounted without it's cover (Rockwell meter shown for reference):

Figure 6 - 4. Mounted GPR

The GPR module, as received from the contract manufacturer, should have the correct Network LAN ID and CRC numbers already configured. The GPR, when installed for the first time, will start operation in Install Mode. Install Mode is a temporary operation mode during which the GPR initiates the first network synchronization, and performs auto-registration to Command Center. To be able to sync to a network the GPR must have the same CRC number as that of the Network. During auto-registration the GPR requests for operation and meter specific configurations from Command Center. When the new configuration data is obtained, the GPR reconfigures itself, reboots, and then changes operation to Normal Mode.

To start the GPR in Install Mode follow the procedure below.

1. Apply dielectric Grease Compound to the sensor cable connector and make the connection as described in the interface section above. See Appendix A *GPR Waterproofing* for more information.
2. Apply Di-Electric Grease Compound to the battery connector. See Appendix A *GPR Waterproofing* for more information.
3. Install the sensor cable connector before the battery connector to avoid creating false counts.
4. Apply power to the module by making the battery connection.
5. Remove and discard the foam between battery and PCBA.
6. Observe the LED on the module for proper start up. Shortly after power is applied, the LED will flash once every 5 seconds for 60 seconds to indicate to the installer that the module is in Installation Mode and is operating normally. If an error is encountered, the LED will flash twice per second to indicate there is error and continue flashing until power is disconnected.
7. If the module started operation correctly, mount the cover using the next 3 steps.
8. Arrange the GPR Pulse Input and Battery Interface cables as shown in Figure 6 - 5. The cables must not interfere with or block the GPR antenna. Pull the wires over the connector as shown.

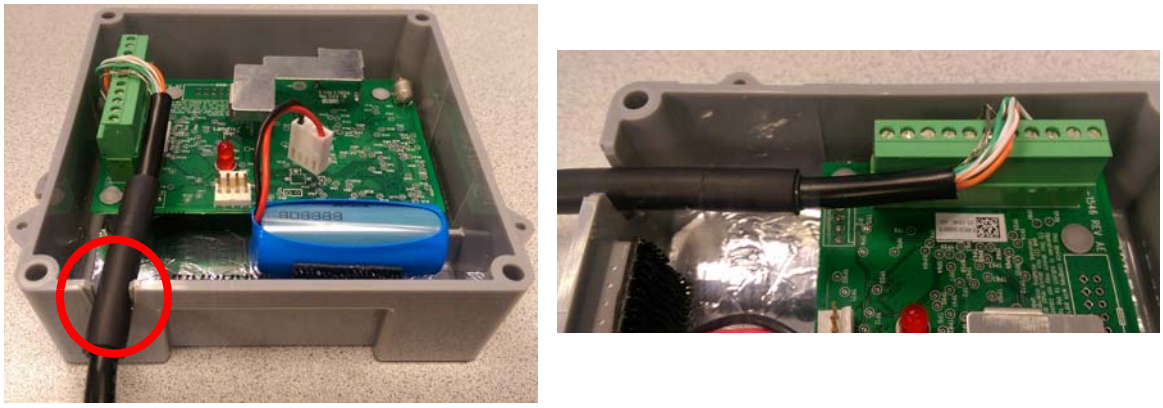


Figure 6 - 5. Pulse Interface Cable's Shrink Tubing Must Route Through GPR Strain Relief Slot

9. Install the GPR cover using the four security Torx screws included with the GPR. The cover must be installed with the gasket tab inserted into the strain relief slot located at the bottom left corner of the GPR enclosure as shown in the following photos.

Figure 6 - 6. GPR Cover Gasket Tab and Cover Strain Relief Slot

10. Tighten the screws to 13 inch-pounds (± 1 inch-pound).

Figure 6 - 7. GPR Cover Screws

11. Install tamper seals into the tamper cups that are part of the GPR cover.

12. Installation is now complete.

Figure 6 - 8. GPR Installation Complete

7

Electronic Pulser Installation

GPR Mounting

The GPR module will be mounted vertically and upright, on a pipe-mounting bracket in proximity to the pulse output of the gas meter or electric corrector, to minimize the cable length. This bracket can accommodate pipe diameters in the range of 2" to 3". Optionally, the GPR can be mounted on a nearby vertical surface. The cable will be routed in order to minimize its exposure to possible damage. Figure 1 below shows a typical installation.

Figure 7 - 1. GPR Mounting Example

Installation Instructions for Outdoor Meters

1. Find a mounting location on a pipe near the pulse output of the meter. Attach the GPR enclosure to the mounting bracket as shown in the following figures.

NOTE: The GPR must face away from nearby walls and should be installed in a location unobstructed by gas pipes.

A. Determine whether the GPR is to be installed on a horizontal or vertical pipe.

- Figure 7 - 4 shows an example bracket orientation for horizontal pipe installations.
- Figure 7 - 5 shows an example bracket orientation for vertical pipe installations.

B. Attach the GPR enclosure to the L-shaped bracket through the smaller holes with four 6-20 x ½ inch security Torx screws from the GPR Pipe Mounting Kit (45-2478).

NOTE: The GPR must be installed on the bracket with the cable entry notch located at the BOTTOM of the enclosure to prevent dirt and moisture from collecting inside the enclosure.

Figure 7 - 2. Enclosure Cable Entry Notch

C. Using a T-10 security Torx driver, tighten the screws to 10 in-lbs (+/- 2 in-lbs). Tighten the screws using a crisscross pattern to secure the enclosure to the bracket.

Figure 7 - 3. Attach GPR to Mounting Bracket

NOTE: The four longer security Torx screws are GPR enclosure cover screws. Cover screws are included in the 40-1672 GPR kit.

2. Secure the mounting bracket with GPR to the pipe.

A. Hold the GPR bracket assembly against the pipe so that the GPR is vertical and upright.

B. Insert V-bolt (28-1319) through the 2 middle holes in the bracket (28-0396).

C. Add flat washers, then split-lock washers. Thread nuts over split-lock washers and tighten to **45 +/- 5.0 in-lbs**.

Figure 7 - 4. GPR/Bracket Assembly for Horizontal Pipe Installation

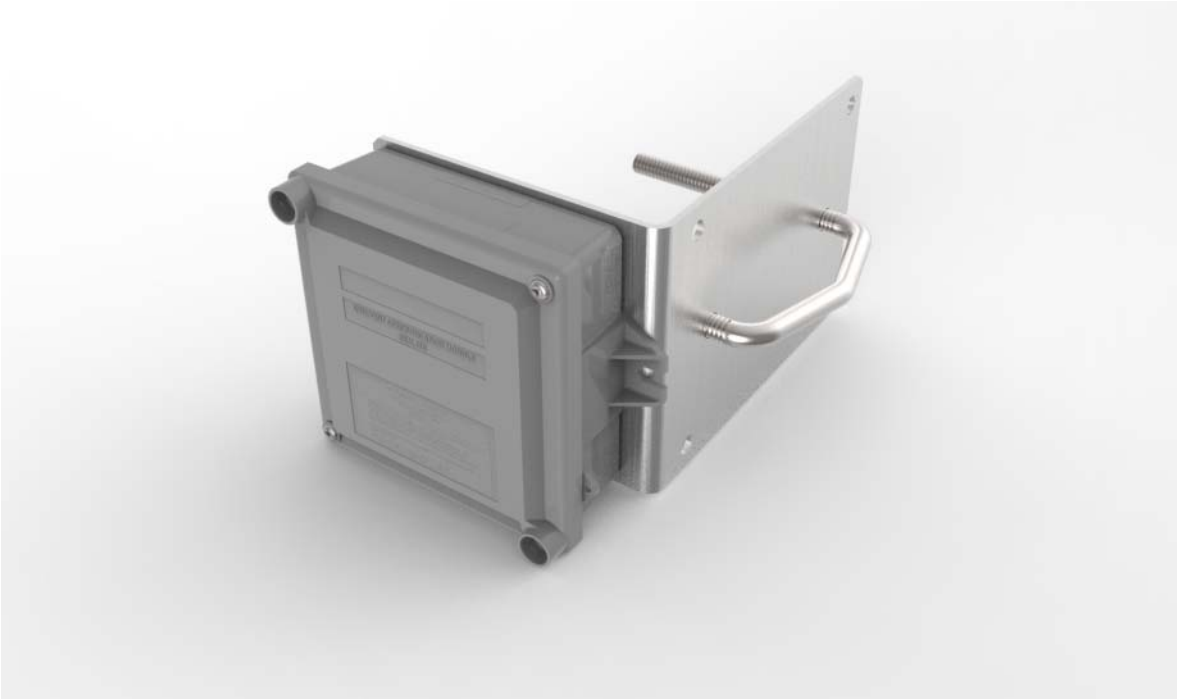


Figure 7 - 5. GPR/Bracket Assembly for Vertical Pipe Installation

3. Select the appropriate cable for the meter model and pulser type onto which the GPR is to be installed.
   - **Refer to the individual meter model and pulser type sections below for information on cable selection.**
4. Route the signal transmission cable along the most direct and convenient route between the Meter and the GPR (preferably along the pipe). Secure the transmission cable to the pipe with black nylon UV-rated tie wraps in locations along the pipe 12" apart.
5. Connect the cable to meter\pulser.
   - Refer to the individual meter model and pulser type sections that follow.
   - Refer to the instructions in the following sections on circular Military Style (MS) connectors and cable splicing and crimping.

WARNING: Refer to the meter and pulser manufacturers' instructions and warnings on electrical wiring and electrostatic discharge. Local electrical codes must be followed when wiring AMR devices in a gas metering environment.

Electronic Pulser Installation

Electronic pulsers include electronic rotary meters and electronic volume correctors (EVC). Typical electronic pulsers have configurable pulse output channels. An output channel may be configured for corrected, uncorrected, alarm, or not used. The installation information provided in this section is to help guide the user with installing a GPR module to an electronic pulser

GPR Telemetry Specifications

- The GPR can support two volume pulse inputs and one alarm input. The pulse inputs are organized into three channels referenced to the sensor PCB connector on the GPR circuit board:
  - By design the hardware counting channels are labeled A and B. In Command Center, channels 1 and 2 are used.
    - Channel A = Command Center channel 2
    - Channel B = Command Center channel 1
  - Channel A. Optional volume input.
  - Channel B. Primary volume input.
  - Alarm. Alarm input.
- Both channel A and B can support Form-A or Form-C type pulsers.
- The alarm channel can support Form-A or Form-B type pulsers.
- Minimum ON/OFF input pulse width is 50 mSec / 50 mSec.
- Nominal switch bias voltage is 3.0V.
- Nominal switch bias current is 30 uA.

NOTE: The billing or primary output on the pulser is to be connected to Channel B on the GPR.

NOTE: It is the responsibility of the user to make sure the output pulse meets the minimum pulse ON/OFF time. This is usually a configurable parameter for electronic volume correctors.

NOTE: When both channels, A and B, are connected and used as volume inputs in an installation, it is highly recommended that both channels are connected and configured for type Form-A at the pulser side as well as the GPR side. If Form-C is used in a dual volume input configuration, the battery life of the GPR is not guaranteed.

NOTE: The GPR should not be connected to any output that has power. It is a good practice to measure the output of the pulser before installing to the GPR. Voltage above 6.0V can cause damage to the GPR and will violate the intrinsic safety rating.

NOTE: If the battery is unplugged, do not connect the battery until the module is ready for operation to start.

Table 7 - 1. Definitions

Term	Definition
NO	Normally Open
NC	Normally Closed
COM	Common
N/C	No Connection
Pulser	The pulse generating device on the meter, such as an electronic volume corrector or electronic rotary meter
Form-A	SPST, normally open switch, requires the COM and NO terminals
Form-B	SPST, normally closed switch, requires the COM and NC terminals
Form-C	SPDT switch, requires the COM, NO, and NC terminals
GPR Sensor Connector	This is the connector on the GPR's circuit board, not the one on the cable
K	Common terminal, COM
Y	Normally open terminal, NO
Z	Normally closed terminal, NC

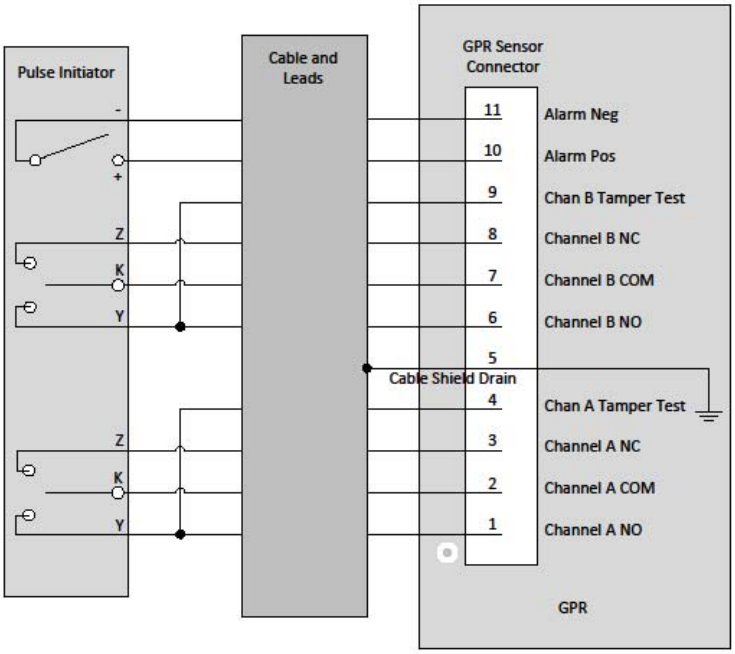


Figure 7 - 6. Sensor Channels

The figure below shows location of the Pin #1 on the GPR sensor connector and where the battery connection is.

NOTE: Battery should not be connected until GPR is fully mounted.

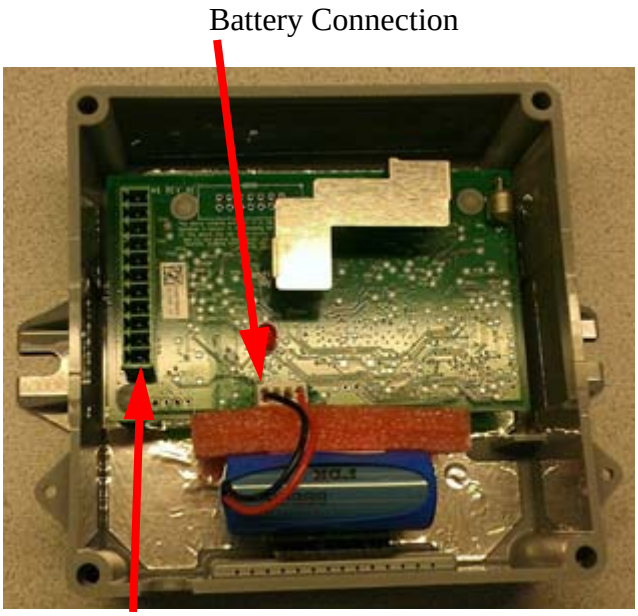


Figure 7 - 7. GPR Module Interior

Interface to a Single Form-A Volume Output

For a single Form-A volume pulse output, connect the pulser to Chan B of the GPR using the recommended cable 19-2330. The installation procedure is as follows.

1. Refer to the user manual of the pulser for information on its pulse outputs interface. The pulse output interface on the pulser may be a terminal block or flying leads. A terminal on the terminal block is usually labeled K, Y, or Z.
2. Connect the DRAIN lead to the drain terminal on the pulser output connector. The drain connection is optional.
3. Connect both the CHAN B NO and CHAN B TAMPER TEST leads to the Y terminal on the pulser output connector.
4. Connect the CHAN B COM lead to the K terminal on the pulser output connector.
5. Apply Di-Electric Grease Compound to the sensor connector.
6. Connect the cable connector to the GPR sensor connector. Make sure the cable connector is correctly mated to the pins on the GPR sensor connector, otherwise the GPR will not detect pulses. See the figures and table below. Make sure pin #5 on the cable connector is mated to pin #5 on the sensor connector.

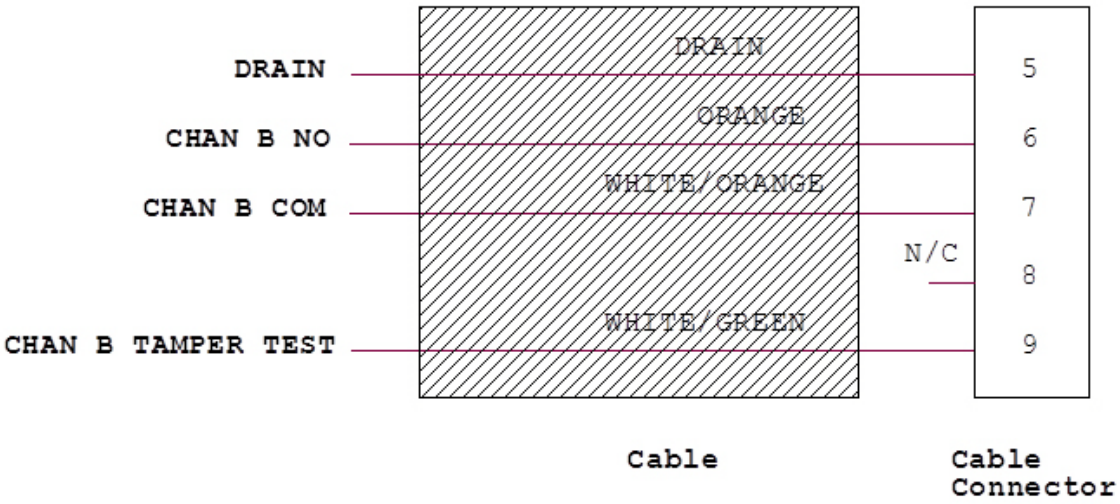


Figure 7 - 8. Wiring for a Single Form-A Volume Input

NOTE: The cable connector is shown downside up.

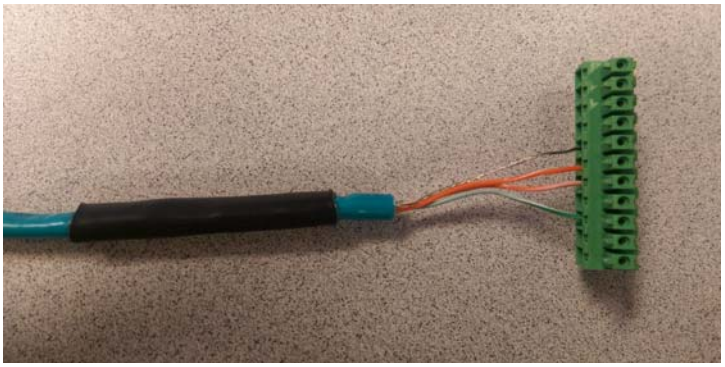


Figure 7 - 9. Cable 19-2330

Table 7 - 2. Single Form-A Volume Input Definitions

GPR 19-2330 Cable			Pulser Output Connector	
GPR Sensor Connector Pin #	**Signal and Description**	**Lead Color**	**Terminal**	**Description and Notes**
1	N/C	N/A	N/A	Not Applicable
2	N/C	N/A	N/A	Not Applicable
3	N/C	N/A	N/A	Not Applicable
4	N/C	N/A	N/A	Not Applicable
5	Ground	Drain	Drain	Connection is optional
6	CHAN B NO, Channel B normally open	Orange	Y	Normally Open
7	CHAN B COM, Channel B common	WHITE/ORANGE	K	Common
8	N/C	N/A	N/A	Not Applicable
9	CHAN B TAMPER TEST, channel B tamper test	WHITE/GREEN	Y	Tamper test
10	N/C	N/A	N/A	Not Applicable
11	N/C	N/A	N/A	Not Applicable

Figure 7 - 10. Cable to GPR Connection for a Single Form-A Volume Input

NOTE: Battery should not be connected until GPR is fully mounted.

Interface to Mil-Spec Circular Connector

For pulsers that have one or two Form-A outputs through a Mil-Spec circular connector, the recommended cable for use is 19-2332. The installation procedure is as follows.

1. Refer to the pulse outputs section of the pulser's installation manual and check to make sure the signal interface corresponds to the definitions shown in the table below.
2. Connect the male circular connector on the cable to the pulse output connector on the pulser.
3. Apply Di-Electric Grease Compound to the sensor connector. See Appendix A *GPR Waterproofing* for more information.
4. Connect the cable connector to the GPR sensor connector.

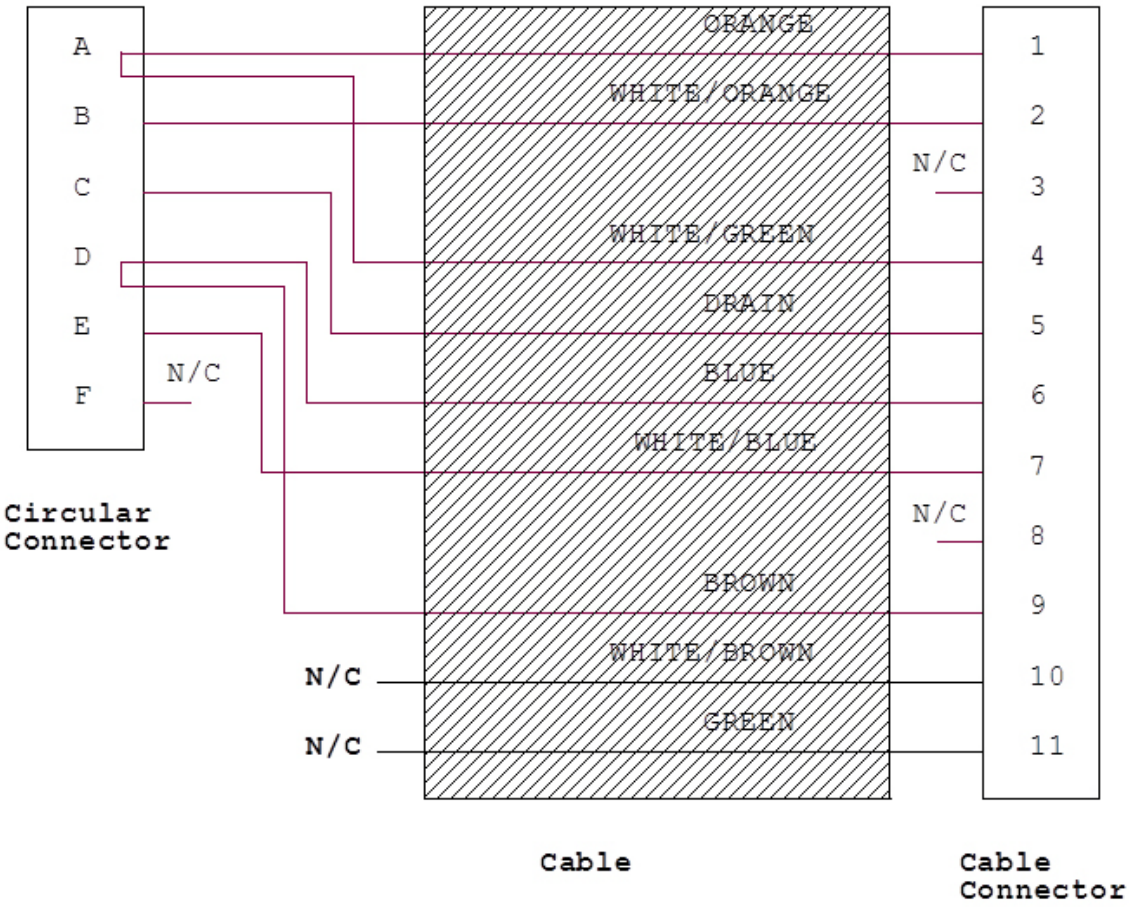


Figure 7 - 11. Circular Connector Wiring for Two Form-A Volume Inputs

NOTE: The cable connector is shown downside up.

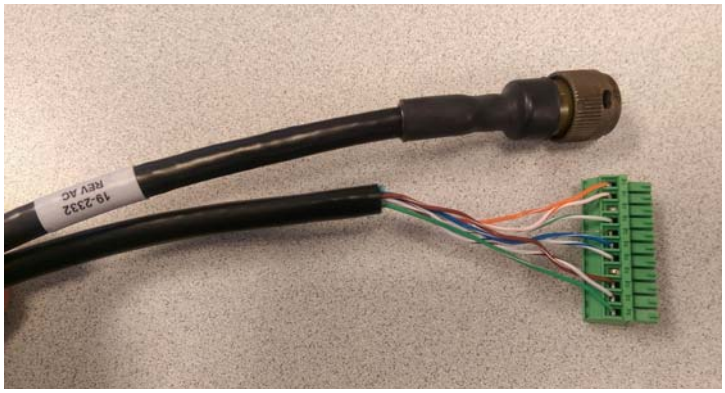


Figure 7 - 12. Cable 19-2332

Table 7 - 3. Two Form-A Volume Inputs Wiring Definitions

GPR 19-2332 Cable			Pulser Output Connector	
GPR Sensor Connector Pin #	**Signal and Description**	**Lead Color**	**Circular Connector Pin Label**	**Description**
1	CHAN A NO, channel A normally open	ORANGE	A	Normally Open
2	CHAN A COM, Channel A common	WHITE/ORANGE	B	Common
3	N/C	N/A	N/A	Not Applicable
4	CHAN A TAMPER TEST, Channel A tamper test	WHITE/GREEN	A	Normally Open
5	Ground	Drain	C	Drain
6	CHAN B NO, Channel B normally open	BLUE	D	Normally Open
7	CHAN B COM, Channel B common	WHITE/BLUE	E	Common
8	N/C	N/A	N/A	Not Applicable
9	CHAN B TAMPER TEST, channel B tamper test	GREEN	D	Normally Open
10	N/C	N/A	N/A	Not Applicable
11	N/C	N/A	N/A	Not Applicable

Interface to Multi-Outputs

The cable 19-2331 can be used for multi-output interfaces such as conduit, cable gland, or terminal block. This cable supports only Form-A volume outputs.

The general installation procedure is as follows.

1. Refer to the pulse outputs section of the pulser's installation manual.
2. Connect the DRAIN lead to the drain terminal on the pulser output connector. The drain connection is optional.

3. Make connection to the volume pulse output channels and alarm channel according to the table below.
4. Apply Di-Electric Grease Compound to the sensor connector. See Appendix A *GPR Waterproofing* for more information.
5. Connect the cable connector to the GPR sensor connector.

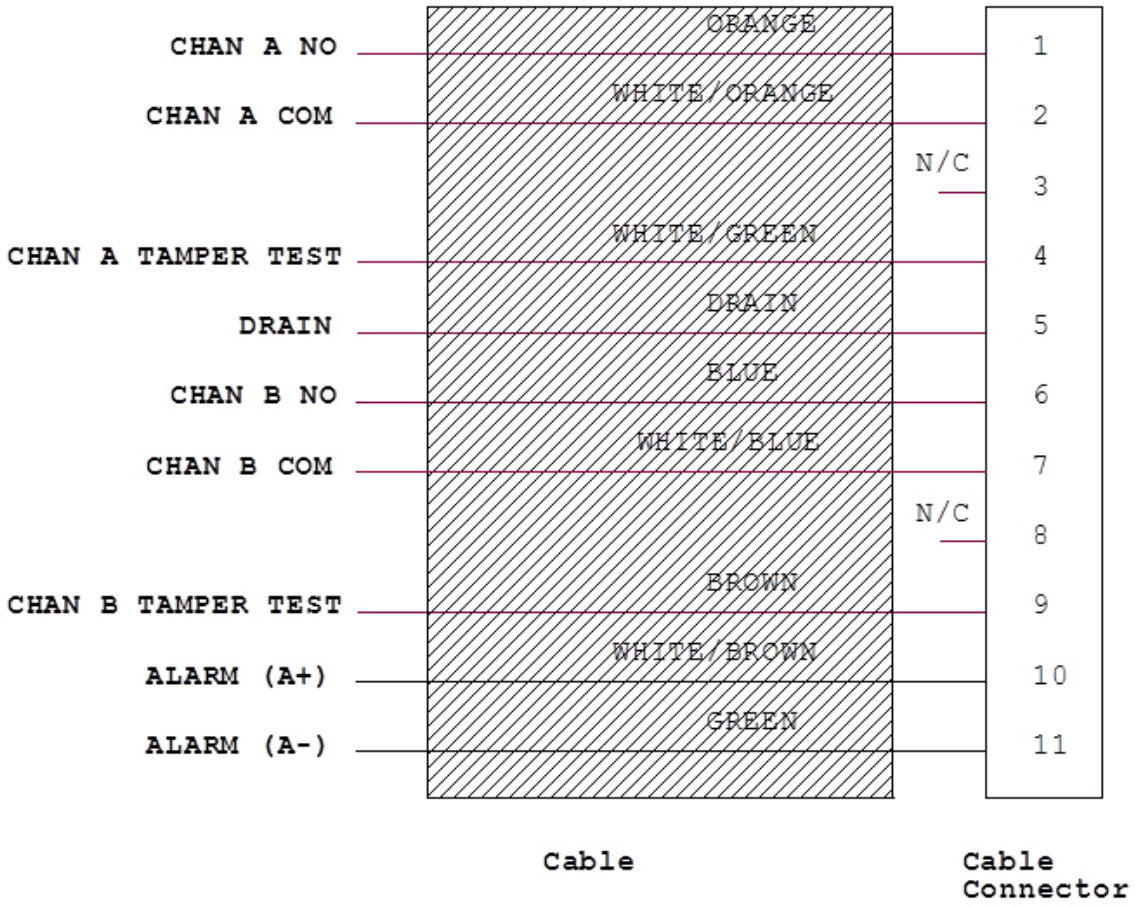


Figure 7 - 13. Flying Leads Wiring for Two Form-A Volume Inputs and Alarm

NOTE: The cable connector is shown downside up.

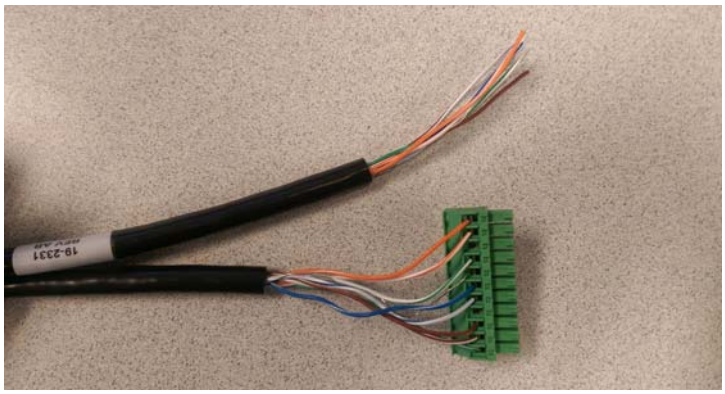


Figure 7 - 14. Cable 19-2331

Table 7 - 4. Two Form-A and Alarm Wiring Definitions

GPR 19-2331 Cable			Pulser Output Connector	
GPR Sensor Connector Pin #	**Signal and Description**	**Lead Color**	**Terminal**	**Description**
1	CHAN A NO, channel A normally open	ORANGE	Y1	Normally Open
2	CHAN A COM, Channel A common	WHITE/ORANGE	K1	Common
3	N/C	N/A	N/A	Not Applicable
4	CHAN A TAMPER TEST, Channel A tamper test	WHITE/GREEN	Y1	Tamper Test
5	Ground	Drain	Drain	Connection is Optional
6	CHAN B NO, Channel B normally open	BLUE	Y2	Normally Open
7	CHAN B COM, Channel B common	WHITE/BLUE	K2	Common
8	N/C	N/A	N/A	Not Applicable
9	CHAN B TAMPER TEST, channel B tamper test	Brown	Y2	Tamper Test
10	ALARM (A+), positive alarm	WHITE/BROWN	A+	No Connection
11	ALARM (A-), negative alarm	GREEN	A-	No Connection

Start the GPR Operation In Install Mode

By now, the GPR should be fully mounted without it's cover.

The GPR module, as received from the contract manufacturer, should have the correct Network LAN ID and CRC numbers already configured. The GPR, when installed for the first time, will start operation in Install Mode. Install Mode is a temporary operation mode during which the GPR

initiates the first network synchronization, and performs auto-registration to Command Center. To be able to sync to a network the GPR must have the same CRC number as that of the Network. During auto-registration the GPR requests for operation and meter specific configurations from Command Center. When the new configuration data is obtained, the GPR reconfigures itself, reboots, and then changes operation to Normal Mode.

Once the GPR is properly mounted and connected to the pulser, it is ready for operation to start. To start the GPR in Install Mode follow the procedure below.

1. The sensor cable should be installed before the battery connection to avoid false counts at startup.
2. Apply dielectric grease compound to the battery connector. See Appendix A *GPR Waterproofing* for more information.
3. Apply power to the module by making the battery connection.
4. Remove the foam between the battery and the PCB and discard it.
5. Observe the LED on the module for proper start up. Shortly after power is applied the LED will flash once every 5 seconds for 60 seconds to indicate to the installer that the module is in Installation Mode, and is operating normally. If an error is encountered, the LED will flash twice per second to indicate there is an error and continue flashing until power is disconnected.
6. If the module started operation correctly, mount the cover as shown in the next 3 steps.
7. Arrange the GPR Pulse Input and Battery Interface cables as shown in Figure 7 - 15. The cables must not interfere with or block the GPR antenna. Pull the wires over the connector as shown.

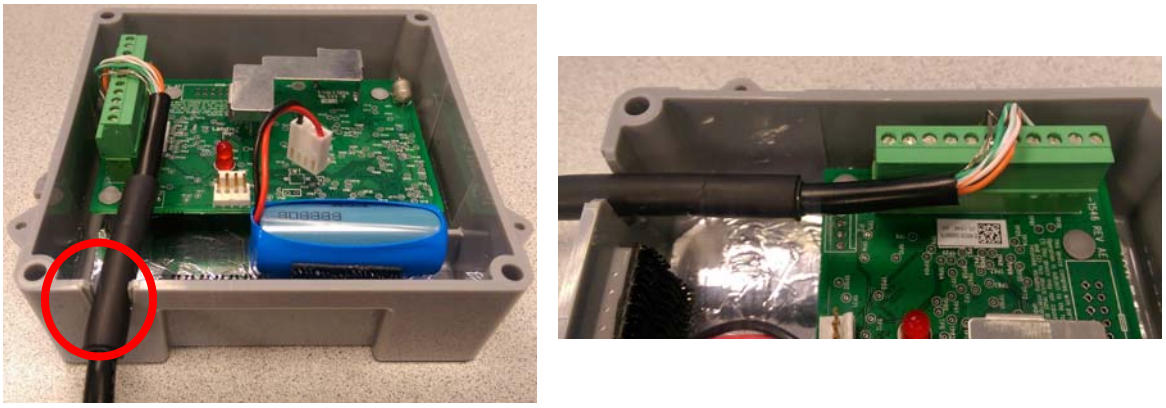


Figure 7 - 15. Pulse Interface Cable's Shrink Tubing Must Route Through GPR Strain Relief Slot

8. Install the GPR cover using the four security Torx screws included with the GPR. The cover must be installed with the gasket tab inserted into the strain relief slot located at the bottom left corner of the GPR enclosure as shown in the following photos.

Figure 7 - 16. GPR Cover Gasket Tab and Cover Strain Relief Slot

9. Tighten the screws to 13 inch-pounds (± 1 inch-pound).

Figure 7 - 17. GPR Cover Screws

10. Install tamper seals into the tamper cups that are part of the GPR cover.

11. Installation is now complete.

A

GPR Waterproofing

Applying Water Sealant to Circuit Board Connections

CRC Di-Electric Grease Compound is recommended as a sealant to prevent water intrusion into the GPR Pulse Input and Battery circuit board connections.

Figure A - 1. CRC Di-Electric Grease Compound

NOTE: Novagard® G661 is also approved as an electrical sealant and is available in 5.3 ounce tubes. It has a shelf-life of eighteen (18) months from the date of manufacture, as indicated by the lot number, when stored in the original, unopened container at, or below, 100°F.

Novagard® G661 may be ordered from:

Novagard Solutions®
5109 Hamilton Avenue
Cleveland, OH 44114
Phone: (216) 881-3890 Facsimile: (216) 881-6977
www.Novagard.com

NOTE: Dow Corning 4 Electrical Insulating Compound is approved as an electrical sealant and may be ordered from:

Ellsworth Adhesives

Part #: 4 CMPD 150G TUBE

W129 N10825 Washington Dr.
Germantown, WI 53022
Phone: 1-877-454-9224
Website: http://www.ellsworth.com/Home.html

NOTE: CRC Di-Electric Grease Compound is electrical grade.

1. Liberally apply CRC Di-Electric Grease Compound ("the compound") to the Battery and GPR Pulse Input circuit board connectors as shown in Figure A - 2 and Figure A - 3.

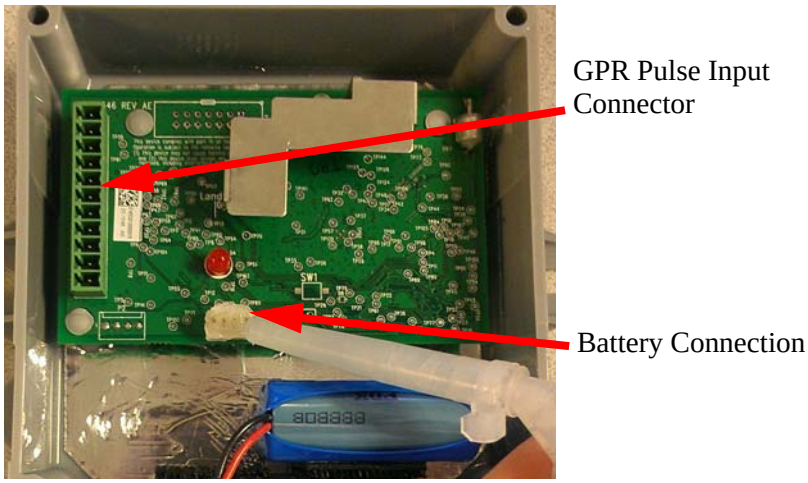


Figure A - 2. Apply the Compound to the Battery Connector

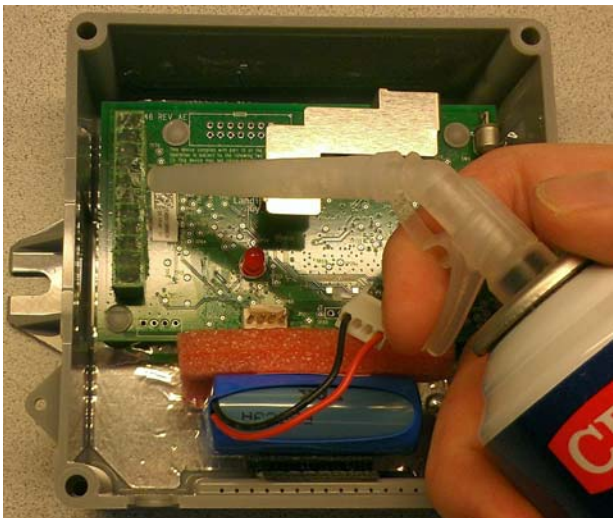


Figure A - 3. Apply the Compound to the GPR Pulse Input Connector

2. Force the compound between the connector pins with a cotton tipped swab or other suitable applicator as shown in Figure A - 4.

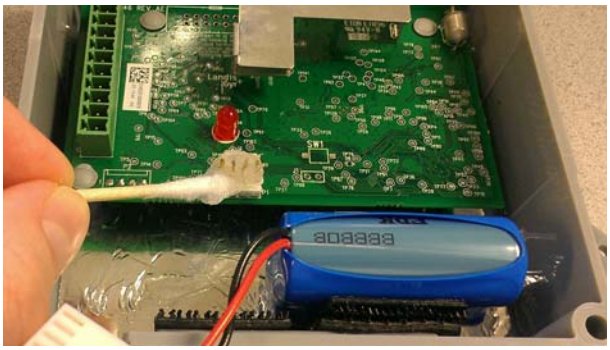


Figure A - 4. Force the Compound between Connector Pins

3. Liberally apply the compound to the connectors of the GPR Pulse Input and Battery Interface cables. Force the compound into ALL holes and cover ALL electrical contacts, as shown in the following photos.

NOTE: The following photos show representative cables to illustrate compound application.

Figure A - 5. Apply the Compound to GPR Cable Connectors: Cover All Contacts

4. First, install the GPR Pulse Input cable, and then the Battery Interface cable, onto the GPR circuit board connectors as shown in Figure A - 6.

WARNING: The GPR Pulse Input cable MUST be installed prior to installing the Battery cable. Do NOT disconnect the Battery cable after it has been installed. Disconnecting the battery may cause unwanted pulses to be counted by the GPR. If the battery is disconnected, reprogram the GPR to clear any unwanted pulse counts, then reconnect the battery.

WARNING: Substitution of components may impair the suitability for Class I, Division 1 applications. Replace battery only with Landis+Gyr part number 40-1235.

5. Liberally apply the compound to the back of each cable connector, forcing the compound into each hole where the wires exit the connectors. The GPR circuit board and cable connectors must be completely covered as shown in Figure A - 6. A cotton tipped swab may be used to force the compound between each wire and into each connector hole.

NOTE: Battery should not be connected until GPR is fully mounted.

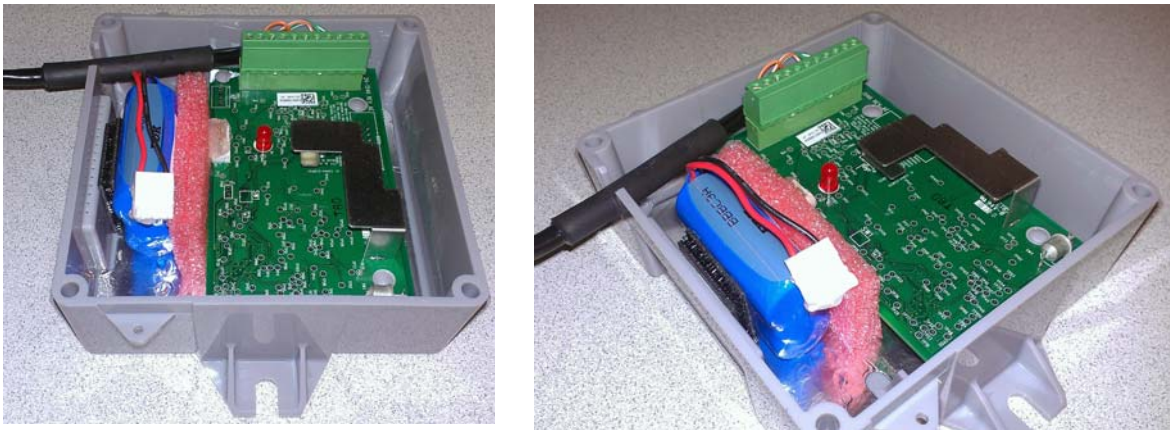


Figure A - 6. The Compound Must Cover Wires and Connectors for Watertight Seal

6. Arrange the GPR Pulse Input and Battery Interface cables as shown in Figure A - 7. The cables must not interfere with or block the GPR antenna. Pull the wires over the connector as shown.

CAUTION: The GPR Pulse Input cable must be inserted into the GPR enclosure strain relief slot as shown. The shrink tubing on the cable must be inserted into the strain relief slot.

NOTE: Battery should not be connected until GPR is fully mounted.

7. Gently press the cable downward into the strain relief slot at midpoint of the heat shrink tubing as shown in the following figures.

Figure A - 7. Arrange Cables As Shown Before Installing the GPR Cover

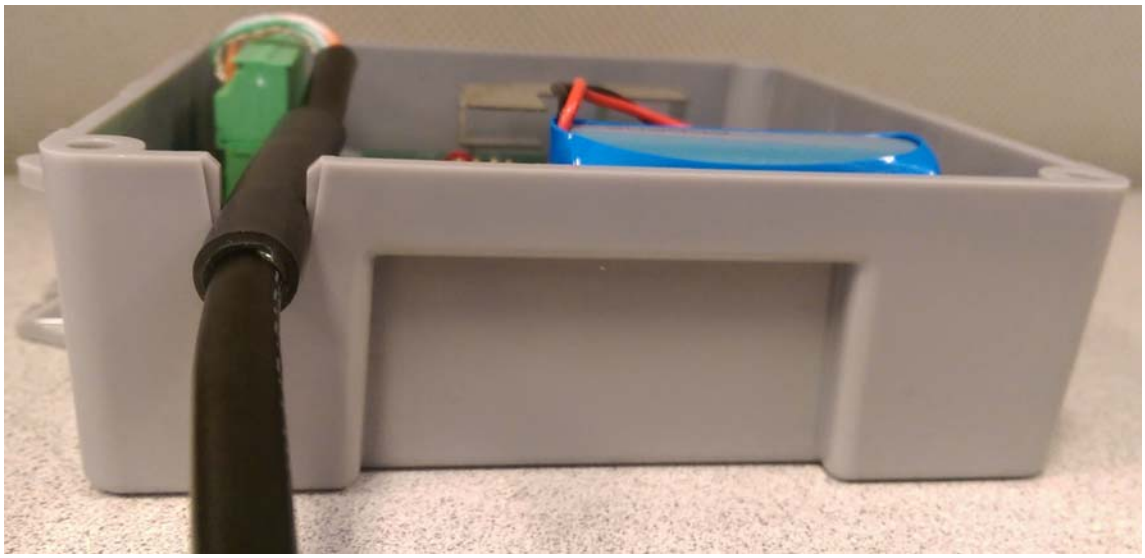


Figure A - 8. Heat Shrink Tubing Midpoint Pressed Into Strain Relief Slot

Ordering Information

CRC Di-Electric Grease Compound

Model: 02085

Description: Di-Electric Grease, Silicone, Net 3.3 oz.

Manufacturer:
CRC Industries Americas Group
885 Louis Drive
Warminster, PA 18974-2869
Phone: (215) 674-4300
Email: info@crcindustries.com
Website: http://www.crcindustries.com/

Novagard® G661 may be ordered from:

Novagard Solutions®

5109 Hamilton Avenue
Cleveland, OH 44114
Phone: (216) 881-3890
Facsimile: (216) 881-6977
www.Novagard.com

Dow Corning 4 Electrical Insulating Compound may be ordered from:

Ellsworth Adhesives

Part #: 4 CMPD 150G TUBE

W129 N10825 Washington Dr.
Germantown, WI 53022
Phone: 1-877-454-9224
Website: http://www.ellsworth.com/Home.html

Cone-Shaped Adhesive Nozzles for Dow 4 Compound may be ordered from:

NOTE: Nozzles listed here have not been tested to verify compatibility with Dow 4 Compound tube threads. Contact each supplier's customer support for additional information.

3M Collision Repair Solutions

3M™ Threaded Cartridge Nozzle Part Number: 08187

UPC: 00051135081877
Stock Number: 60455034698
http://3mcollision.com/products/tools/applicators-and-accessories/3m-threaded- cartridge-nozzle-08187.html

3M Distributors

http://3mcollision.com/dealers/search?zip=30022&lat=34.029613&lng=- 84.23841700000003

DKHardware.com

Phone: 877-509-8040
CRL Screw-On Uncut Standard Urethane Nozzle
Item # UN0Z
http://www.dkhardware.com/product-11007-un0z-screw-on-uncut-standard-urethane- nozzle.html

Ellsworth Adhesives

W129 N10825 Washington Dr.
Germantown, WI 53022
Phone: 1-877-454-9224
Website: http://www.ellsworth.com/Home.html

- Sika Nozzle - Uncut
- Part #: A4006P - 189429
- Description: Uncut nozzle for adhesive dispensing

Sold as pack (6/pack)

http://www.ellsworth.com/display/productdetail.html?productid=1453&Tab=Vendors

- Sika Nozzle - Threaded Cone
- Part #: 883970 - 169853
- Description: Threaded cone nozzle for adhesive dispensing

Sold as pack (6/pack)

http://www.ellsworth.com/display/productdetail.html?productid=1443&Tab=Vendors

B

Installation in Hazardous Locations

Information

The following information describes and limits what can be attached to the GPR in a Division 1 location per the UL certification.

1. GPR Entity Parameters:
   - Uo (Voc) = 6.3 V dc
   - Io (Isc) = 7.34 A
   - Po = 5.91 W
   - Co (Ca) = 207 uF
   - Lo (La) = 43 uH
2. The output current of the GPR is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
3. Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application, and have intrinsically safe entity parameters conforming to Table B - 1 below.

Table B - 1. Conforming Safety Parameters

I.S Equipment		GPR
Ui (or V max)		6.3 V dc
Ii (or I max)		7.34 A
Pi (or P max)	or	5.91 W
Ci + Ccable		207 uF
Li + Lcable		43 uH

4. This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable. The GPRs described in this guide qualify as simple apparatus for the purposes of intrinsic safety.
5. Capacitance and Inductance of the field wiring from the intrinsically safe equipment to the GPR shall be calculated and must be included in the system calculation as shown in Table B - 1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable=60pF/ft., Lcable= 0.2 uH/ft. The total capacitance and inductance of each I.S. device and associated cable is to be added together and cannot exceed the stated Co and Lo values.

6. Where multiples circuits extend from the GPR, they must be installed in separate cables or in one cable having suitable installation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of American Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.
7. Intrinsically safe circuit must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.
8. The GPR has not been evaluated for use by UL in combination with another associated apparatus.

Control Drawing 86-1006

Notes:

1. GPR Entity Parameters:
   Uo (Voc) =6.3 V dc
   Io (Isc) =7.34 A
   Po =5.91 W
   Co (Ca) =207 uF
   Lo (La) =43 uH

2. The output current of the GPR is limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-cuircuit current.

3. Selected intrinsically safe equipment must be third party listed as intrinsically safe for the application, and have intrisically safe entity parameters conforming with Table-1 below.

Table-1:

I.S Equiopment		GPR
Ui (or V max)	> or =	6.3 V dc
Ii (or I max)	> or =	7.34 A
Pi (or P max)	> or =	5.91 W
Ci + Ccable	< or =	207 uF
Li + Lcable	< or =	43 uH

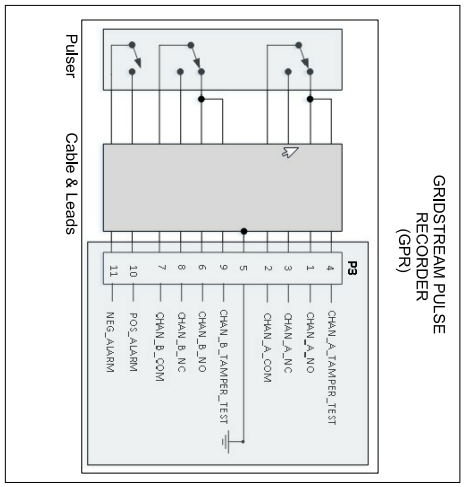
4. This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code(ANSI/NFPA 70), or other local codes, as applicable.

5. Capacitance and Inductance of the field wiring from the intrinsically safe equipment to the GPR shall be calculated and must be included in the system calculation as shown in Table-1. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for industance (Lcable, Li and La or Lo, respectively). Where the cable compacitance and inductance per foot are not known, the following values shall be used: Ccable=60pF/ft., Lcable= 0.2 uH/ft. The total capacidance and inductance of each I.S. device and associated cable is to be added together and cannot exceed the stated Co and Lo values.

6. Where multiples circuits extend from the GPR, they must be installed in separate cables or in one cable having suitable installation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instument Society of American Recommened Practice ISA RP12.6 for installing insintrically safe equipmennt.

7. insintrically safe circuit must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.

8. The GPR has not been evaluated for use in combination with another associated apparatus.



DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [MM] DIMENSIONS ARE AFTER FINISH IS APPLIED ANGLE TOLERANCES DO NOT APPLY TO MARKED 90° ANGLES TOLERANCES ON: DECIMAL ± .1 FRACTION ± 1/64 ANGLES ± 1°
TPI ± .001 2PI ± .002
MUST BE FREE FROM FLASH AND BURRS. BREAK ALL SHARP EDGES. () DENOTES REFERENCE ONLY.

Landis+Gyr

TITLE: **WIRING CONTROL DRAWING, GPR**

THIRD ANGLE PROJECTION

A/CAD

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DRAWN BY: SAM NAJMI	DATED: 03/05/14	SHEET: 1 OF 1
DRAWING NO. **86-1006**		REVISION: AD

Figure B - 1. Wiring Control Drawing

C

American Kit Sub-Assemblies

American Kit Sub-Assemblies

As part of the Required Materials, part number 45-1189, 45-1190, or 45-1193, American Large Diaphragm GPR Kit, includes the following components: 45-1185, GPR Assembly w/ Universal Bracket; 45-1203 Hardware Kit, American Large Diaphragm.

Table C - 1. Kit, GPR Installation, American Large Diaphragm, Alternative Orientation #45-1189

Description	Part Number
Bracket, GPR, C&I Gas, American	28-1440
Hardware Kit, American Large Diaphragm, 2-Way	45-1203
GPR Assembly w/ Universal Bracket	45-1185

NOTE: Bracket 28-1440, can be used in either front-left or back-right orientations.

Table C - 2. Kit, GPR Installation, American Large Diaphragm, Behind Index #45-1190

Description	Part Number
Bracket, GPR, C&I Gas, American, Behind Index	28-1441
Hardware Kit, American Large Diaphragm, 2-Way	45-1203
GPR Assembly w/ Universal Bracket	45-1185

Table C - 3. Kit, American Large Diaphragm Alternative Orientation GPR, #45-1193

Description	Part Number	Table Number
Bracket, GPR, C & I Gas American, Alternate Orientation	28-1443	
GPR Assembly w/ Universal Bracket	45-1185	Table C - 5
Hardware Kit, American Large Diaphragm, 2-Way	45-1203	Table C - 4

NOTE: Bracket, 28-1443, can be used in either front-right or back-left orientations.

Table C - 4. Hardware Kit, American Large Diaphragm #45-1203

	Description	Part Number
A	Cup, Tamper Seal, C&I, 2-Way Gas	22-1384
B	Cup, Tamper Seal, C&I Gas	22-0277
C	Index Screw, Self-threading, 8-18x3/4 inch, Type 25, SS	22-1174
D	Screw, 12-24x1 inch, Fillister Head, Slotted, SS	22-1383
E	Tie Wrap, 3.9 inch, UV, Nylon, Black	30-0502
F	Screw,8-32x5/8 inch, Fillister Head, SS	22-0310
G	Seal, Residential Gas, Security	29-1557
H	Seal, Tamper, C&I Gas	22-0278

Figure C - 1. Hardware Kit #45-1203 for Index Cover and Bracket

Table C - 5. GPR Assembly w/ Universal Bracket #45-1185

Description	Part Number	Table Number
Assy, 2-Way C&I Gas Module	40-1672	
GPR, Bracket, Universal, C&I	28-1308	
Screw, #6x1/2in, Flat Head, Pin-In-Torx, Self-tap, SS	22-1057	
Screw, 10-32x3/8 inch, Pan Head, SS	22-1468	
Washer, #10, EXT LK, SS	22-0119	
Kit, Hardware, Wall Mount Cover (GPR Cover Mounting Kit)	45-1042	Table C - 6

Table C - 6. GPR Cover Mounting Kit #45-1042

Description	Part Number
Seal, Tamper, C&I Gas	22-0278
Screw, #6x1in, Button Head, Pin-In-Torx, T-10, Self-tapping, SS	22-1057

D

Rockwell Kit Sub-Assemblies

Rockwell Kit Sub-Assemblies

As part of the Required Materials, part number 45-1186, Kit, Rockwell Large Diaphragm, GPR, includes the following components:

- 45-1185, GPR Assembly w/ Universal Bracket
- 45-1169, Rockwell Large Diaphragm Index Cover Hardware Kit

Table D - 1. GPR Installation Kit for Rockwell 750 Large Diaphragm Meter #45-1186

Description	Part Number	Table Number
Bracket, MM MTG, C&I Gas, Rockwell	28-1161	
Kit, Rockwell Large Diaphragm Index Cover Hardware	45-1169	Table D - 2
GPR Assembly w/ Universal Bracket	45-1185	Table D - 3

Table D - 2. Kit, Rockwell Large Diaphragm Index Cover Hardware #45-1169

	Description	Part Number
A	Cup, Security, Wedge LOC	22-0281
B	Screw, 5/16 - 18x1.25 LG, SS, FH	22-1358
C	Seal, Tamper, MM, RKWL, Cover	22-0275
D	Tie Wrap, 3.9 inch, UV, Nylon, Black	30-0502

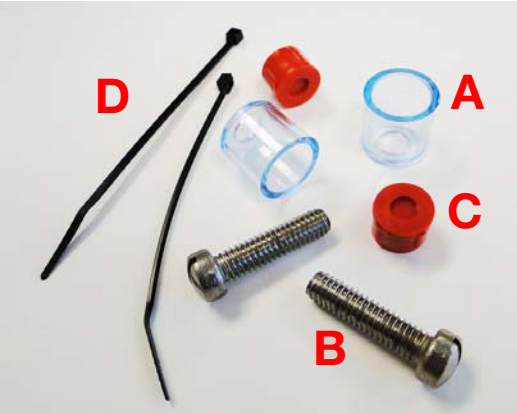

Figure D - 1. Rockwell Large Diaphragm Hardware Kit # 45-1169

Table D - 3. GPR Assembly w/ Universal Bracket #45-1185

Description	Part Number
Assy, 2-Way C&I Gas Module	40-1672
GPR, Bracket, Universal, C&I	28-1308
Screw, #6x1/2in, Flat Head, Pin-In-Torx, Self-tap, SS	22-1057
Screw, 10-32x3/8 inch, Pan Head, SS	22-1468
Washer, #10, EXT LK, SS	22-0119
Kit, Hardware, Wall Mount Cover (GPR Cover Mounting Kit)	45-1042

E

Schlumberger Kit Sub-Assemblies

Schlumberger Kit Sub-Assemblies

As part of the Required Materials, part number 45-1187, the Schlumberger Large Diaphragm GPR Kit, includes the following components:

- 45-1185, GPR Assembly w/ Universal Bracket
- 45-1171 Schlumberger Large Diaphragm Index Cover Hardware Kit.

Table E - 1. Schlumberger Large Diaphragm GPR Kit #45-1187

Description	Part Number	
Bracket, MM MTG, C&I Gas, Schlumberger	28-1162	
GPR Assembly w/ Universal Bracket	45-1185	Table E - 3
Kit, Schlumberger Large Diaphragm Index Cover Hardware	45-1171	Table E - 2

Table E - 2. Kit, Schlumberger Large Diaphragm Index Cover Hardware # 45-1171

	Description	Part Number
A	SEAL,TAMPER,C&I GAS	22-1289
B	SCREW,1/4x20x5/8-inch, FILH, SS	22-0312
C	TIE WRAP, 3.9inch, UV, NYLON, BLACK	30-0502

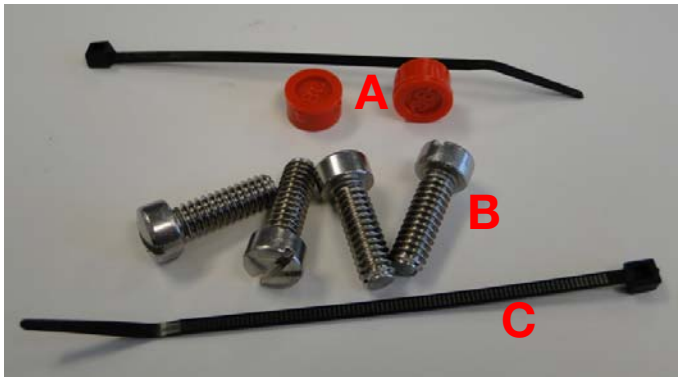

Figure E - 1. Schlumberger Large Diaphragm Index Cover Hardware (Part# 45-1171)

Table E - 3. GPR Assembly w/ Universal Bracket #45-1185

Description	Part Number
Assy, 2-Way C&I Gas Module	40-1672
GPR, Bracket, Universal, C&I	28-1308
Screw, #6x1/2in, Flat Head, Pin-In-Torx, Self-tap, SS	22-1057
Screw, 10-32x3/8 inch, Pan Head, SS	22-1468
Washer, #10, EXT LK, SS	22-0119
Kit, Hardware, Wall Mount Cover (GPR Cover Mounting Kit)	45-1042

F

Sprague Kit Sub-Assemblies

Sprague Kit Sub-Assemblies

As part of the Required Materials, part number 45-1188, Sprague Large Diaphragm GPR Kit, includes the following components:

- 45-1185, GPR Assembly w/ Universal Bracket
- 45-1114, Sprague Large Diaphragm Index Cover Hardware Kit

Table F - 1. GPR Installation Kit for Sprague Large Diaphragm Meters #45-1188

Description	Part Number	Table Number
Sprague Large Diaphragm Index Cover Hardware Kit	45-1114	Table F - 2
GPR Assembly w/ Universal Bracket	45-1185	Table F - 3
Bracket, MM MTG, C&I Gas, Sprague	28-1163	

Table F - 2. Sprague Large Diaphragm Index Cover Hardware Kit #45-1114

	Description	Part Number
A	Washer, Flat, M5, SS	22-0178
B	Cup, Tamper Seal, C&I Gas, Sprague	22-0277
C	Seal, Tamper C&I Gas, Sprague	22-0278
D	Screw, 10-24 x 3/4 inch, FILH, SS	22-1376
E	Screw, 10-24 x 7/8 inch, FILH, Slotted, SS	22-1355
F	Tie Wrap, 3.9 inch, UV, Nylon, Black	30-0502

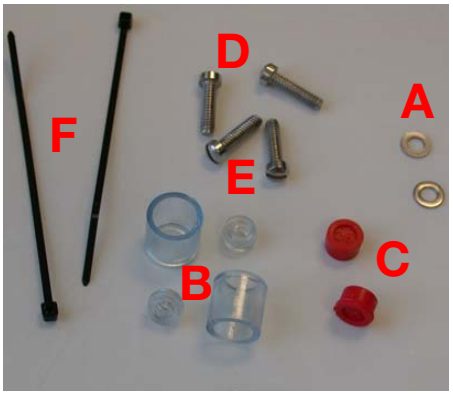

Figure F - 1. Sprague Large Diaphragm Hardware Kit #45-1114 for Index Cover

Table F - 3. GPR Assembly w/ Universal Bracket #45-1185

Description	Part Number
Assy, 2-Way C&I Gas Module	40-1672
GPR, Bracket, Universal, C&I	28-1308
Screw, #6x1/2in, Flat Head, Pin-In-Torx, Self-tap, SS	22-1057
Screw, 10-32x3/8 inch, Pan Head, SS	22-1468
Washer, #10, EXT LK, SS	22-0119
Kit, Hardware, Wall Mount Cover (GPR Cover Mounting Kit)	45-1042