USER GUIDE

EnergyAxis Gas Module

Copyright Acknowledgements

Elster Integrated Solutions
208 South Rogers Lane
Raleigh, NC 27610
Phone 919-250-5700 Fax 919-250-5439

FCC & Industry Canada Compliance

EnergyAxis Gas Module™ has been granted authorization as a low power modular radio transmitter by the Federal Communications Commission under 47 CFR Part 15.247 and by Industry Canada under RSS-GEN and RSS-210. FCC ID: G8JEAGAS01. Industry Canada ID: 3599-EAGAS01. The device transmits and receives in the frequency range 902.8 – 927.6 MHz. The device may also receive on 451.35 MHz.

The user of this device must maintain a distance of 20cm between the device and any part of the human body, to comply with FCC RF exposure requirements.

This device complies with FCC Part 15 & Industry Canada RSS-GEN/RSS-210 rules. Operation is subject to the following 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.

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 radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation distance between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected (not applicable for the battery-powered EnergyAxis Gas Module™).
- Consult the equipment dealer or an experienced radio/TV technician for help.

WARNING!

Changes or modifications not expressly approved by Elster Integrated Solutions void the user's authority to operate the equipment.

EnergyAxis Gas Module
USER GUIDE

Table of Contents

Chapter One

Introduction

The EnergyAxis Gas Module is the heart of Elster Integrated Solutions' portfolio of products for automated metering infrastructure (AMI).

About this Document

The *EnergyAxis Gas Module User Guide* provides instructions for installing and troubleshooting transponders. It also includes an overview of both AMI in general and EnergyAxis technology in particular.

Actual procedures are covered in two sets of chapters. One is set for direct mounted transponders (transponders connected directly to the meter index) and the other set is for remote-mounted transponders (transponders mounted some distance away from the meter index):

- Chapters 3 and 4 discuss the installation, operation and programming of direct-mounted transponders. These are typically used for residential applications with 1ft and 2 ft meters.

- Chapters 5 and 6 cover installation, operation and programming of remote-mounted transponders. These are typically used for commercial applications with 5 ft and 10 ft meters.

Audience

This document is designed for utility industry installers and supervisory staff. In order to establish appropriate levels of detail for the material, this document assumes the following:

- The user is proficient in installing and EnergyAxis transponders and possesses all the skills necessary to conduct meter installation reading meters of the type currently compatible with and reading by conventional means.
- The user has little or no prior expertise in the EnergyAxis AMI technology.
- The user is familiar with common data entry devices and techniques.
- The user will receive (or has received) instructions for operation of an appropriate EnergyAxis programmer elsewhere (in a separate document or training program).

Conventions

In the interest of brevity and simplicity, this document uses the following conventions:

- Additional information relevant to a given instruction step may be shown in one of three ways:
  1. A bulleted item covers “how-to” and verification information.
  2. *An italicized NOTE contains relevant background information.*
  3. *An italicized and bolded **CAUTION** contains information important to the safety of either the user or the equipment.*
- Where reference to other parties is made, the generic masculine pronouns (he, his, him) are used. This in no way reflects bias or gender discrimination in any manner related to the users, publishers or authors of this document.

Chapter Two

Automated Meter Reading Overview

The EnergyAxis system uses radio frequency (RF) signals to allow utility personnel to automate meter reading activities. This technology is called automated meter infrastructure (AMI). This technology greatly increases the speed at which routes can be covered with a high degree of accuracy.

Basic AMI Components

An automated meter reading system requires the following basic components:

- **Endpoint**—The EnergyAxis Gas Module interfaces with the meter index drive, counts the number of drive dial (proving dial) rotations, receives commands from an interrogator and transmits the index reading and other meter data.
- **Interrogator**—At its simplest, the interrogator remotely reads meter data transmitted by transponders. At more sophisticated levels an interrogator may also program transponders, store route data and verify transponder conditions and data, among other functions.

EnergyAxis AMI System Overview

Elster Integrated Solutions EnergyAxis system portfolio of products permits the remote recording of tamper conditions and the linking of meter latitude and longitude data using the Global Positioning System (GPS).

In every meter reading transmission, gas modules send total consumption data as well as interval consumption data for each of the last 24 hours. The data are stored in the EnergyAxis collector as well as the module's nonvolatile memory, protecting the data against loss. All the data are available for on-request reading.

EnergyAxis Gas modules communicated with an unlicensed frequency hopping spread spectrum RF technology compliant with FCC Rules, Part 15 and Industry Canada RSS-210 in a rage of 902 MHz to 928 MHz.

How the EnergyAxis System Works

Installing EnergyAxis electricity meters builds the infrastructure that allows gas AMI metering to be added at an incremental cost. Therefore, expanding the EnergyAxis network to cover gas metering requires the installation of the EnergyAxis Gas module to the gas meter.

The information acquisition, storage and handling process includes several basic elements:

Meter interface. Using a mechanical-to-digital interface, the EnergyAxis Gas Module senses the output of a utility meter, translates this into electronic form and stores it in the transponder's memory.

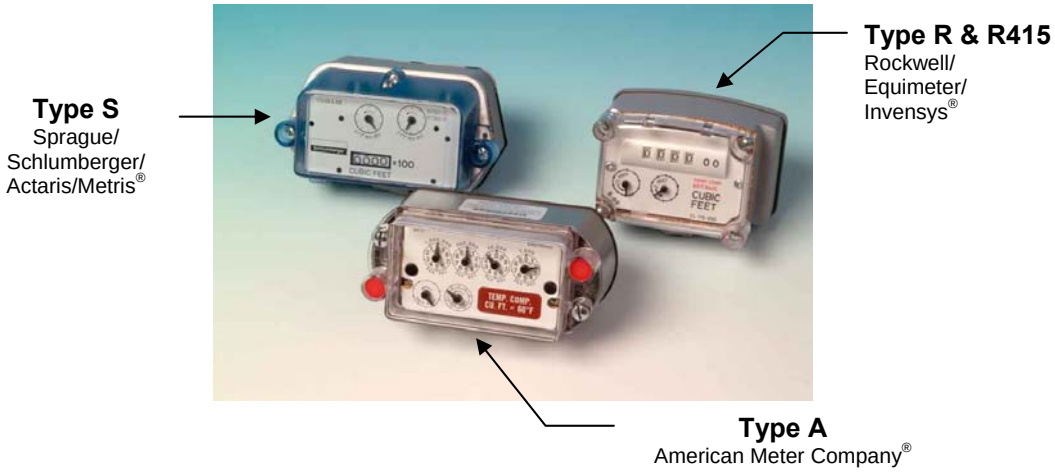
Tamper sense and flagging. When the EnergyAxis Gas Module is installed and programmed, a baseline orientation for its internal tamper sense is set. Any deviation from that baseline setting will trigger a tamper indication.

Transponder data acquisition. The EnergyAxis Gas Module is programmed with a unique serial number at the time of manufacture. Upon installation on a meter, the current (or baseline) meter index reading is also programmed into the transponder's memory. As the meter measures consumption and the index is advanced, the index reading stored in the transponder's memory is automatically updated. The transponder also records changes to the tamper detection sensor.

Pressure-compensation factor. For EnergyAxis Gas Modules a pressure-compensation factor can also be programmed into the transponder memory ensuring the transponder readings match the pressure-compensated mechanical index reading.

Chapter Three

EnergyAxis Direct Gas-meter Transponder Overview



The EnergyAxis Direct Gas-meter Transponder (DGT) is designed for use with most residential diaphragm meters. EnergyAxis Direct Gas-meter Transponders for residential meters are available in three distinct types:

- **Type A** = American Meter Company® products
- **Type R & R415** = Rockwell / Equimeter / Invensys®
- **Type S** = Sprague / Schlumberger / Actaris / Metris®

The EnergyAxis DGT can be programmed for use with a fixed factor, pressure-compensated index.

The EnergyAxis DGT maintains the current time and date, which are used to manage the recording of real-time data for retrieval as required during the normal read cycle.

In addition to maintaining index reading, the transponder:

- Stores 35 daily index readings in separate electronic indexes recorded at the start of the utility day. (The utility day start time is programmable).
- Maintains interval data for each 15 minute, 30 minute or 60 minute interval (default). Up to 35 days of 60 minute interval data will be stored by our module.

EnergyAxis Direct Gas-meter Transponder and Components

The EnergyAxis Direct Gas-meter Transponder is available for three types of meters. The transponder has a high impact plastic housing with rubber gasket and it includes the following components:

- RF transmitter
- RF receiver
- Tamper switch
- Transmit and receive antennas
- Battery
- Electronic components

The meter's existing index and index cover are attached to the EnergyAxis gas-meter transponder during installation.

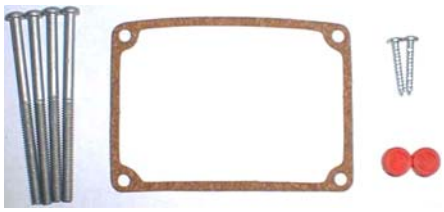
The index cover is not shipped with the standard transponder, but may be purchased separately, if needed. (See page 16)

Identifying the Components

To determine the transponder type for each meter, refer to the photo on the previous page.

Each shipment of transponders includes all of the hardware necessary to successfully install a transponder onto a meter. This hardware includes index screws to attach the index to the transponder, three or four longer bolts to attach the transponder/index assembly to the meter, two vandal plugs, and an index cover gasket as shown in the photos below. Index covers are sold separately.

Type A hardware



Type R & R415 hardware

Type S hardware

This hardware can also be purchased separately.

	EnergyAxis Direct Gas-meter Transponder H/W by Meter Type (and P/N)					
Meter Manufacturer	**American (A)**		**Invensys/Rockwell (R & R415)**		**Metris/Sprague (S)**	
Index screw	52800P063	1	10528P002	2	52800P063	1
Meter mounting bolt	10529P001	3	10529P003	4	10529P002	5
Index cover gasket	11401P001	6	11401P002	7	11401P003	8
Vandal plug (tamper seal)	52548P010	---	11302P002	---	11302P003	---

Screws

The following photos indicate the actual size and shape of the different screws and index cover gaskets used.

Index Screws

1
3/8" Sheet Metal
(A, S)

2
7/8" Sheet Metal
(R & R415)

Meter Mounting Bolts

3
2¼" partial
thread
(A)

4
3" partial
thread
(R & R415)

5
2" full
thread
(S)

Index Cover Gaskets

6
Cork Index
Cover Gasket
(A)

7
Cork Index
Cover Gasket
(R & R415)

8
Cork Index
Cover Gasket
(S)

How the EnergyAxis Direct Gas-meter Transponder Works

When a EnergyAxis DGT is installed on a meter the installer programs the mechanical index reading into the transponder.

Converting Mechanical Count into Electronic Form

During normal operation, the mechanical index accumulates its count. The transponder keeps track of the index reading by counting the number of rotations of the index's drive dial.

Storing Readings

Once a day, at a pre-programmed time specified by the utility, the transponder stores the current index reading into the electronic index for that day.

The transponder maintains daily reading history for the past 35 days.

Between 1 an 4 interval values per hour—can accumulate consumption in separate electronic indexes as well.

Operation Cycle

To maximize battery life, the EnergyAxis gas-meter transponder changes from its normal, low-power quiescent state every 2 seconds into an intermediate power state for 5.5 milliseconds in order to perform three tasks:

- Update the electronic indexes for the meter reading, daily reading and interval reading
- Poll the tamper detection switch
- Check to see if a valid interrogation signal is being received

If and when a valid interrogation signal is received, a two-way communication link is established.

Meter reading data is then transmitted to the interrogator.

Data collected by an interrogator is validated and stored for uploading to Route Manager Software later.

Specifications

The following table shows the specifications of the EnergyAxis Direct Gas-meter Transponder:

EnergyAxis DGT Specifications	
Power	One (1) lithium–thionyl chloride 2750 mAmp-hours; 20 years calculated life under normal working conditions. The battery can be easily replaced in the field.
FCC Compliance	47CFR Part 15.247: A user license is not required (G8JEAGAS01)
RF Transmitter	
RF Receiver	
Materials	• Housing: high-impact plastic, weatherproof, UV protected for outdoor installation. • Circuit-card assembly: conformal-coated • Corrosion–protected external-housing screws
Operating Temperature Range	
Storage Temperature Range	
Humidity	
Weight	
Serial Numbers	

Chapter Four

EnergyAxis Direct Gas-meter Transponder Installation

Installing the EnergyAxis DGT on any of the four types of meters (A, R415, R and S) is quick and easy.

We estimate the complete process (including initial baseline programming) will take an experienced installer about five minutes to complete, assuming all tools, equipment and materials are on hand.

Tools, Equipment and Materials

All or some of the following items may be needed in order to install the transponder, depending upon the type of meter/index and the condition of the old index cover and gaskets:

- EnergyAxis Direct Gas-meter Transponder
- EnergyAxis Handheld interrogator/programmer
- Index screws (2 each) *
- Meter mounting bolts (3 or 4 each, depending upon the meter type) *
- Index cover (if old one is not reusable)
- Index cover gasket *
- Putty knife or scraper (to remove old gaskets)
- #2 Phillips screwdriver
- Awl (to remove existing vandal plugs)
- Vandal plugs (2 each) *
- Pressure-compensation factor value, if needed (obtain from Elster Integrated Solutions)

** Supplied with the transponder*

Preparation and Installation

Preparation

1. Prior to removing the existing index and index cover, verify that the transponder style is compatible with the meter style.

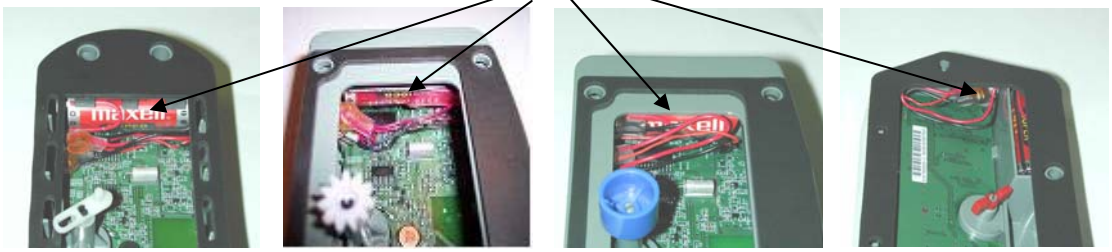
Type A

Type R415

Type R

Type S

2. Verify the transponder battery is properly seated, and that the battery wires are tucked neatly beside it, out of the way of the wriggler and other transponder components.



Type A Type R415 Type R Type S

NOTE: When transporting transponders to the field for installation please take care not to jar the housing and dislodge the battery from the bracket.

Installing Index onto Transponder

1. Remove the existing index cover and index (or transponder) from the meter (An awl can be used to remove the existing vandal plugs)
   - Clean any debris from index and cover.

Type A

Type R415

Type R

Type S

2. Remove the gasket and any adhesive material from the meter.
   - Use a scraper or putty knife.
3. Align index wriggler with transponder wriggler, as shown below.

Type A

Type R415

Type R

Type S

4. Attach the index to transponder.
   - Use two (2) appropriate index screws.

   ***CAUTION**: Do not over tighten index screws.*

Checking Mechanical Operation

This procedure will verify the attached index rotates freely and without resistance.

1. Rotate the index drive dial 3 times clockwise.
2. If it turns easily, rotate the drive dial 3 times counterclockwise.
   - This will remove counts or subcounts from the mechanical index.)
   - If it does *not* turn easily, first rotate the drive dial 3 times counterclockwise to remove subcounts from the mechanical index. Second, unscrew the index/transponder assembly and repeat from Step 3 of the previous section.

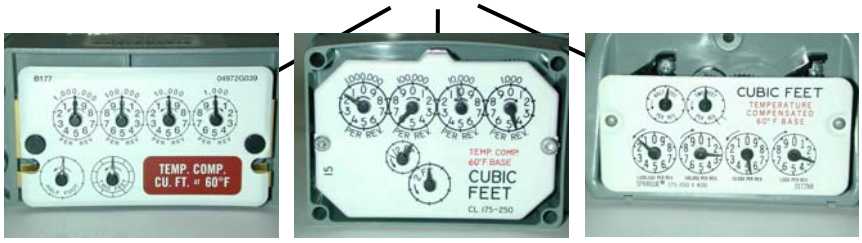
NOTE: Subcounts added to the electronic index during this procedure will be cleared when the index reading is programmed into the transponder.

Checking Mechanical Index to Electronic Index Operation

This procedure will verify the electronic index is properly recording counts and subcounts corresponding with those of the mechanical index.

1. Rotate the transponder wriggler till the drive dial is in the 12 o'clock position.

Drive dial hand in 12 o'clock position



Type A Type R415 & R Type S

2. Electronically read the transponder subcounts.
   - Use an Handheld or other suitable interrogator/programmer.
   - Remember the subcount value.
3. Facing the index, rotate the drive dial 3 times counterclockwise. Stop at the 12 o'clock position.
4. Electronically read the new transponder subcounts.
   - Use an Handheld or other suitable interrogator/programmer.
   - Observe the new subcount value and calculate the difference between it and the starting subcount value.
5. If the new subcount value is *exactly* 3 subcounts higher than the original reading, proceed to step 8.
6. If the new subcount value is *less than* 3 subcounts higher, consider whether the subcounts may have rolled over during the test.
   - If it appears the discrepancy *is* due to rollover, proceed to step 8.
7. If the new subcount value is *less than* 3 subcounts higher, repeat this procedure from Step 1.
   - If the procedure fails a second time, replace transponder with a new one.

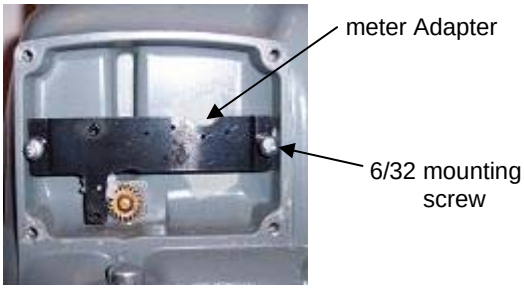
8. By using an Handheld or other suitable interrogator/programmer, verify that the pre-divider is correct. (The pre-divider for a 1-ft drive is 100 and the pre-divider for a 2-ft drive is 50; refer to the Appendix for the definition of pre-divider).

9. Remove any subcounts or counts from the mechanical index by rotating the drive dial clockwise by the same number of counter-clockwise rotations that were placed on the mechanical index in the previous steps.

Mounting the Transponder/Index Assembly

NOTE: Be sure to have your transponder/index assembly, screwdriver, index cover and index cover gasket within easy reach before starting this procedure.

1. **For Rockwell 415 Transponders Only:** Install the meter adapter to the meter using the two 6/32 supplied in the assembly. *Note: Make sure the gears on the adapter and meter are properly meshed.*



2. Visually align transponder wriggler with meter wriggler or meter adapter (drive dog).
   - If wriggler cannot be put in a fixed position, position it correctly by rotating the drive dial with your finger.

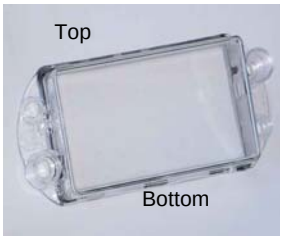
3. Mate the transponder wriggler with the meter wriggler or meter adapter (drive dog) and hold the mated assembly against the meter.

4. While holding the assembly against the meter, gently try to turn the drive wheel clockwise, then counterclockwise.
   - If the drive wheel meets resistance in both directions, it is properly mated. Proceed to Step 4.
   - If it meets no resistance in either direction, and can rotate freely through an angle of 360 degrees and beyond, then make sure the meter is completely free of old gasket material and forcefully press the transponder into the meter. Repeat this step (Step 3). If the unit still does not correctly engage with the meter, return it to Elster Integrated Solutions.

- **For American Meter Transponders Only**: If the American Meter transponder meets resistance in one direction then turns 360 degrees the other way before again meeting resistance, it is not properly mated. Repeat from Step 1.

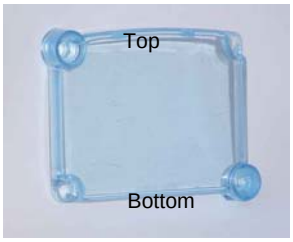
CAUTION: *It is very important that the wriggler on the transponder is correctly engaged onto the meter. If it is not, it could produce an erroneous indication during utility leak test procedures that monitor drive dial (proving dial) movement. Incorrectly engaged wrigglers could also cause meter damage. CORRECT EXECUTION OF STEPS 1, 2 and 3 IS CRITICAL.*

5. Verify that the gasket material on the index cover is free of rips or tears.
   - If it is not, remove the damaged gasket from the index cover and replace with a new one.
6. Place the index cover and index cover gasket onto the transponder/ index assembly.
   - Verify the index cover is properly oriented with its vent holes at the bottom.
   - See photos below for orientation cues.



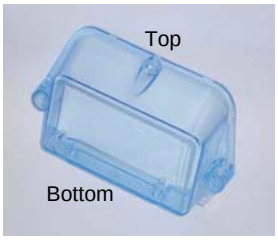
Type A

Top edge of lens has continuous ridges; bottom has intermittent ridges. Left flange contains an "L"
P/N 10001P001



Type R415 & R

Rectangular lens with a curved top and flat bottom.
P/N 10001P003



Type S

Angled lens with a single screw groove at the top and two screw holes on the sides.
P/N 10001P002

7. Screw the transponder/index/cover assembly to the meter and tighten bolts to secure assembly to meter.
   - Use the appropriate mounting bolts provided.
   - Recommended torque range is 16-24 in-lbs.
8. Install the tamper seals into the index cover receptacles.

Type A

Type R415

Type R

Type S

9. Remove the semi-detached label from the transponder and attach it to your paperwork.

Programming the EnergyAxis Direct Gas-meter Transponder

Although transponders may contain default or utility-specified values that are programmed during manufacturing, it is important to program certain data only *after* the transponder has been installed in the field:

- Transponders can accumulate subcounts during shipping, handling and installation due to the movement of its wriggler.
- The transponder's tamper sensing switch must be told which orientation should be considered its normal (not tampered) condition.

Therefore, all transponders (even those mated with indexes set at 0000) should be programmed *after installation on the meter*.

When the transponder is programmed, it also automatically sets the tamper flag to "false" or "not tampered," establishing its normal condition in the transponder's memory.

NOTE: Even transponders factory-installed on meters must be programmed at the time the meter is installed in the field.

Programming Procedure

NOTE: For specific instructions for programming transponders, please refer to the appropriate interrogator/programmer user guide.

NOTE: Always verify the display of the utility-lan id on the Handheld with that same value on the module itself to insure that programming is being completed for the correct module..

NOTE: If required, be sure to have on hand the pressure compensation factor. (Obtain from Elster Integrated Solutions.)

1. Read the transponder.
   - Place interrogator/programmer close to the transponder, especially if other transponders are nearby.
   - If no other transponders are within 6 feet, use Wildcard function to find transponder serial number.
   - If other transponders are within 6 feet, enter the serial number of the desired transponder.
2. Visually read the meter's mechanical index.

3. Program the electronic index to match the meter ‘s mechanical index.
    - This will also reset the transponder subcounts to zero.
4. If required, program the pressure compensation factor now.
    - Compensation factors are unique for specific indexes and can be obtained by contacting Elster Integrated Solutions Customer Service Department at (919) 250-5700.
5. Read the transponder.
    - If the electronic index matches the meter ‘s mechanical index, installation is complete.
    - If the electronic index does *not* match the meter ‘s mechanical index, repeat procedure from Step 1.
    - If the transponder still does not program, replace it with a new one.

Chapter Five

EnergyAxis Remote Gas-meter Transponder Overview

The EnergyAxis Remote Gas-meter Transponder (RGT) is compatible with American Meter C&I meters. The pulser board is used for both 5-ft and 10-ft indexes.

EnergyAxis RGT Style	Meter Type	Part Number*
Meter Mount	5 ft.	52807K551-100
	10 ft.	52807K551-100

** Part numbers are subject to change. Be sure to include item description when ordering.*

*NOTE: The EnergyAxis RGT can be purchased without the 5/1010-ft pulser board so that third-party pulser kits may be attached***.**

Additional EnergyAxis pulser boards with mounting kits are also available:

EnergyAxis Pulser Board w/ Mounting Kit		Part Number*
Pulser board, 2 mounting screws, 6 spacers	5 ft.	52807K001
	10 ft.	52807K002

** Part numbers are subject to change. Be sure to include item description when ordering.*

How it Works

The EnergyAxis RGT is designed for use with commercial gas meters where the meter/index design prohibits direct transponder attachment.

A “pulser” circuit board is interfaced with the index gears to provide an electronic “pulse” that translates each turn of the mechanical gear into electronic pulses. These pulses are sent via a cable to the transponder where they are recorded as consumption values.

Most applications accommodate connection of the transponder within one foot of the meter. However, certain applications (where the meter is obscured by metallic materials that can block radio signals, for example) a remote transponder with a longer cable may be special ordered so that the transponder can be mounted farther away from the meter in a position more favorable for interrogation.

Features and Capabilities

The EnergyAxis RGT can be programmed for use with a fixed factor, pressure-compensated index.

The transponder maintains current time and date, which are used to manage the recording of real-time data for retrieval as required during the normal read cycle.

In addition to maintaining index reading, the transponder:

- Stores 35 daily index readings in separate electronic indexes recorded at the start of the utility day. (The utility day start time is programmable.)
- Maintains up to four time-of-use (TOU) electronic indexes that each have programmable start and stop times.

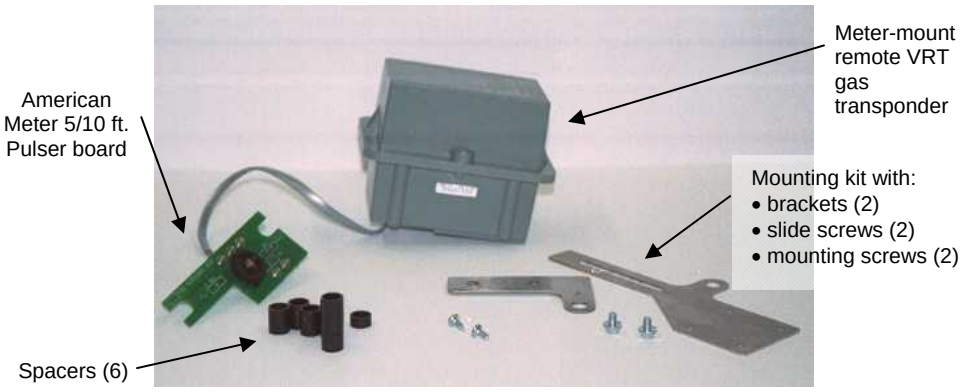
EnergyAxis Remote Gas-meter Transponder Construction

The EnergyAxis RGT is available for American Meter 5-foot and 10-foot meters. The transponder has a high impact plastic housing with rubber gasket and it includes the following internal components:

- RF transmitter
- RF receiver
- Tamper switch
- Transmit and receive antennas
- Battery
- Electronic components

The meter's existing index and index cover are attached to the EnergyAxis RGT pulser board during installation.

Identifying the Components (Meter Mount)



Each shipment of EnergyAxis RGTs includes all the hardware necessary to successfully install a transponder onto a meter.

You will receive:

- The meter-mount transponder
- A 5-ft /10-ft meter pulser board connected to the transponder by a standard one-foot cable.

CAUTION: Use extreme care transporting and installing the pulser board. The glass reed switches are extremely fragile. Keep the protective bubble wrap on the pulser board until installation.

- Six (6) plastic spacers (2 short, 2 tall/fat post, 2 tall/thin post) to position the pulser board on the index
- Meter mounting kit (2 brackets with 2 hex-head slide screws and 2 Phillips-head screws)

Meter-mounting hardware can also be purchased separately. See table below for part numbers.

To Order Additional Meter-mount Hardware	
Item	**Part Number**
Meter Mounting Kit (2 brackets, 2 mounting screws, 2 hex slide screws)	52805K004
Pulser Mounting Kit (6 spacers)	52807K003

** Part numbers are subject to change. Be sure to include item description when ordering.*

Chapter Six

EnergyAxis Remote Gas-meter Transponder Installation

Installing the EnergyAxis RGT on American Meter 5-ft and 10-ft meters is quick and easy.

We estimate the complete process (including initial baseline programming) will take an experienced installer about five minutes to complete, assuming all tools, equipment and materials are on hand.

Tools, Equipment and Materials

All or some of the following items may be needed in order to install the transponder.

Tools Required:

- 3/8" flat blade screwdriver
- 3/16" flat blade screwdriver
- Nibbling tool or small file
- #1 Phillips screwdriver

Flat blade screwdrivers

Phillips screwdriver

Nibbling tool or small file

Not shown:

- Awl
- 5/16 English socket or adjustable wrench (optional, for meter-mount only)

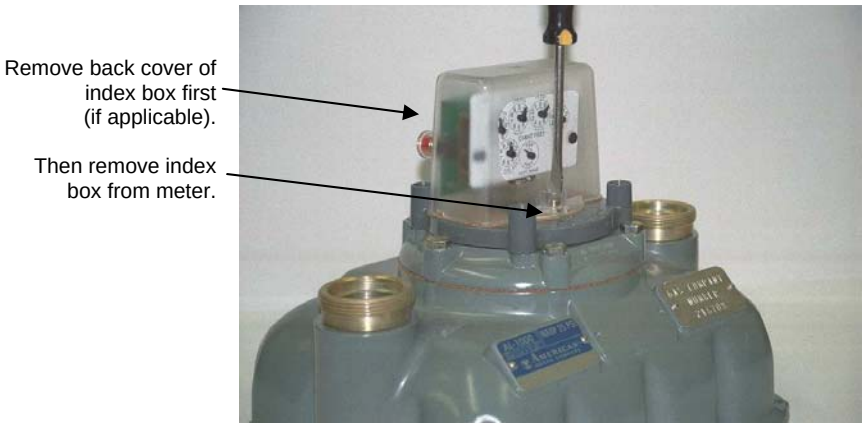
Equipment & Materials

- Replacement seals

Pulser Installation (Meter-mount)

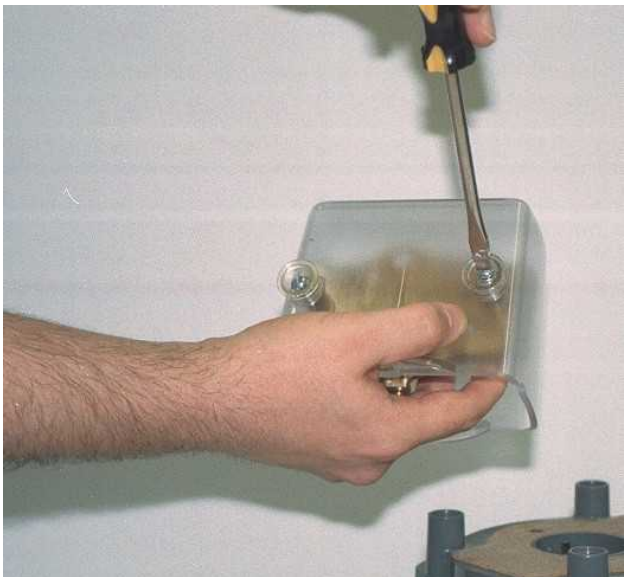
NOTE: Although this section illustrates installation of the 5 ft pulser board, the procedure is essentially the same for the 10 ft pulser board.

1. Remove the index box from the meter.
   - If the meter index box has a back cover, remove the 2 screws that secure it first.

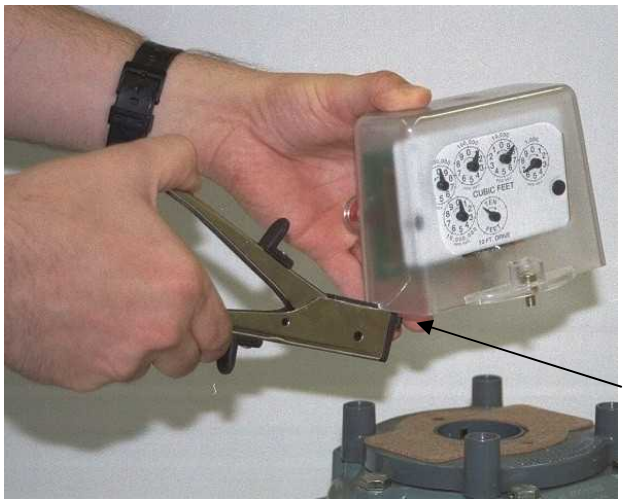


   - Remove the screws securing the index box to the meter.
   - Save all screws.

2. Remove the 2 screws that secure the index to the index box.
   - Save the screws.



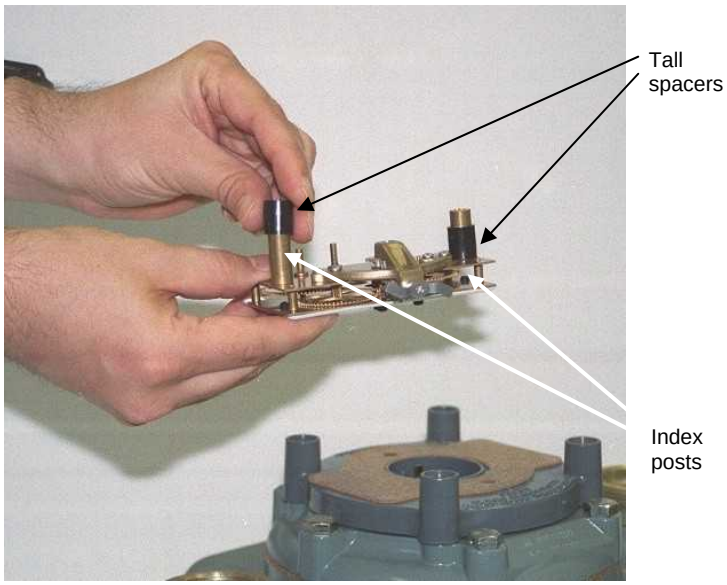
3. Cut a small notch in the base of the index box (on the left side near the back).



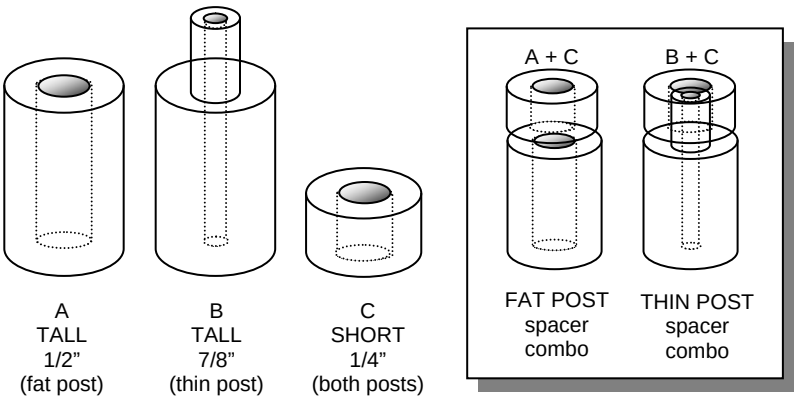
- Use either the nibbling tool or file.
- The notch should be only large enough to allow the connecting cable to pass through.

  CAUTION: *The notched index cover should fit snugly over the cable but not so tightly that the wires inside may be broken or crimped when the box is tightened down.*

4. Place a tall spacer over each of the 2 posts protruding from the back of the index.



- Use either tall spacer A (1/2”) or B (7/8”) depending upon the width of the index post. (See illustration below.)

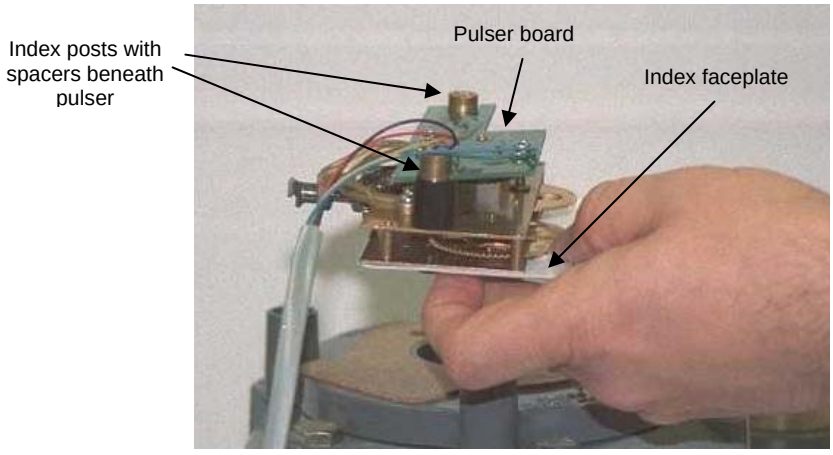


Pulser board spacer types (2 of each type in kit)

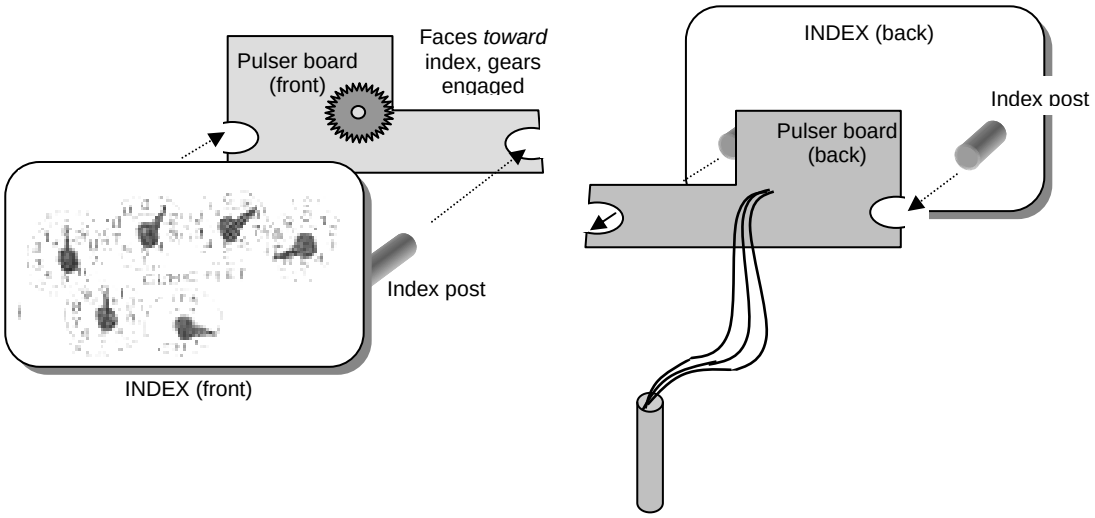
To Order Additional Spacers			
Item			**Part Number***
A	1/2”	Tall spacer for fat post	52807P002
B	7/8”	Tall (2 tiered) spacer for thin post	52807P003
C	1/4”	Short spacer (all)	52807P004

** Part numbers are subject to change. Be sure to include item description when ordering.*

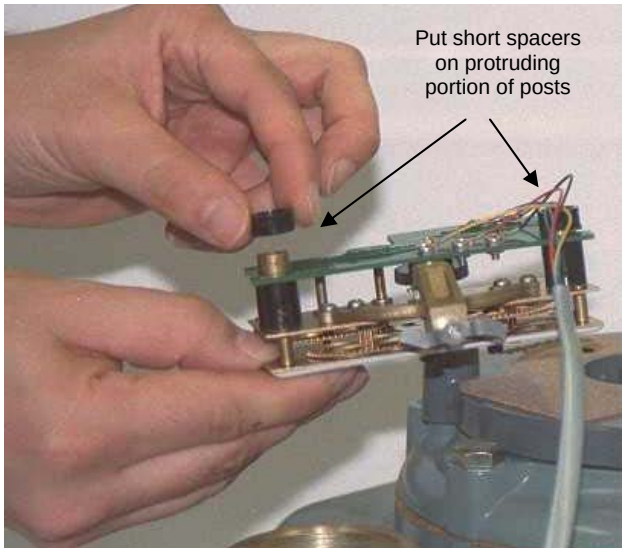
5. Fit the pulser board over the index posts onto spacers:
   - Hold index in one hand, face-down.
   - Position pulser board so that its circular notches align with the index posts and the pulser gear faces the index gears.



   - Slide the pulser board onto the posts.
   - Ensure pulsar gears mate with index gears.
   - Ensure the gears mesh smoothly by turning the input wriggler.
   - *See assembly illustration below.*



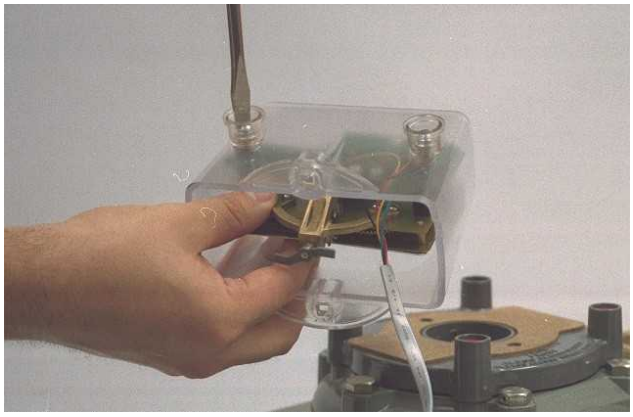
6. Slip one of the short spacers over the portion of each post protruding above the pulser board.



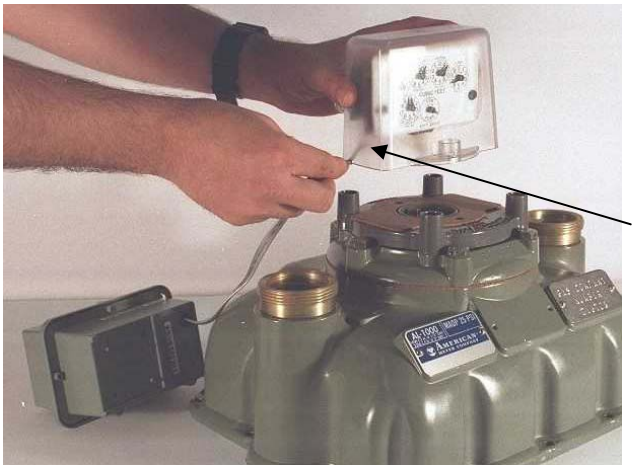
7. Route the pulser wires toward the notch cut earlier in the index box.
   - Be sure the wires are not pinched under either the posts or the spacers.

8. Slide the index/pulser assembly into the index box.

9. Reattach the index/pulser assembly to the index box.
   - Use the 2 screws removed in Step 2.
   - Ensure that the wires are not pinched anywhere before tightening screws.
   - Verify that the index turns without binding.



10. Position the index box (with index/pulser assembly) over the screw holes in the meter flange.

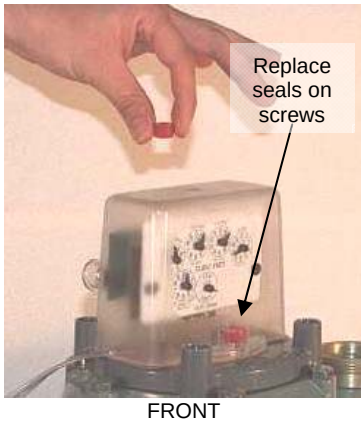


Route the cable through the notch.

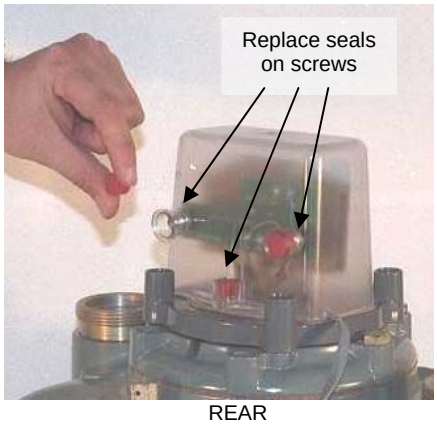
Make sure the end of the insulated covering is well inside the box.

- Ensure that the individual pulser wires are well *inside* the box and the insulated section of cable exits via the notch made in Step 3**. Take precaution to ensure that the index and pulser board are protected from rain or snow.**

11. If the index box has a back cover, reinstall it now.
    - Use the screws removed in Step 1.
12. Mount the index box (and attached index/pulser assembly) to the meter flange.
    - Use the screws removed in Step 1.
13. Reseal all screws with new seals.



FRONT



REAR

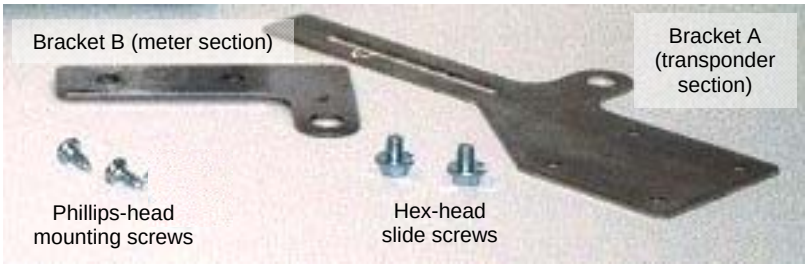
14. Mount the transponder to the meter.
    - Refer to the applicable transponder mounting procedure below for specific instructions.

EnergyAxis RGT Mounting (Meter-mount)

Tools, Equipment and Materials

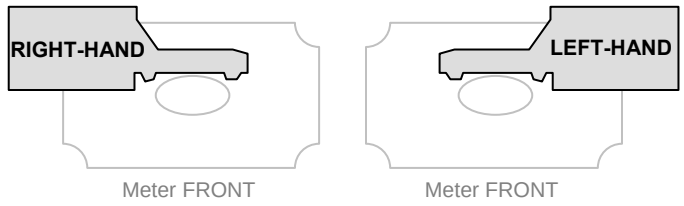
For this part of the installation you will need the following:

- Metal bracket sections (A & B)
- Hex-head slide screws (2)
- Phillips-head mounting screws (2)
- (Optional) 5/16^{ths} English socket or adjustable wrench

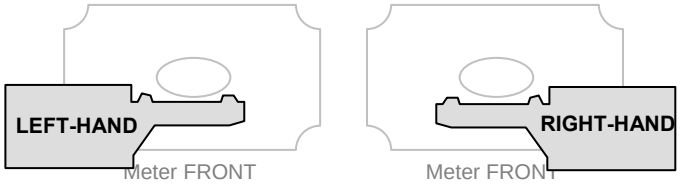


Meter Mounting Positions

The transponder may be installed in either of two positions (left-hand or right-hand) on either the front or back of the meter.



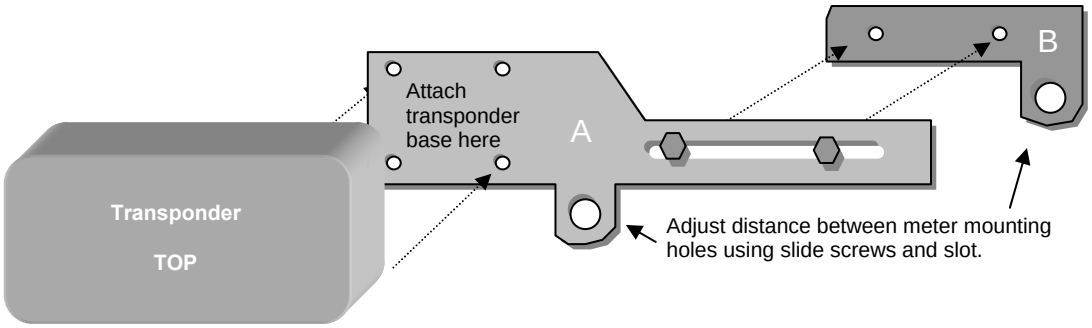
Mounting positions: meter rear



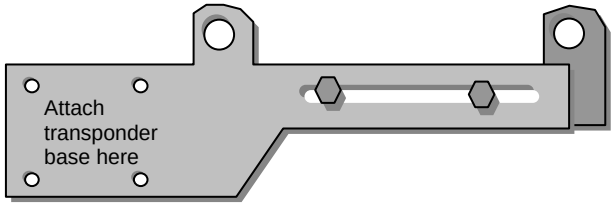
Mounting positions: meter front

Meter-mounting Procedure

The illustrations below show how the meter-mount brackets should be assembled (for right-hand or left-hand mounting) prior to attaching them to the meter.

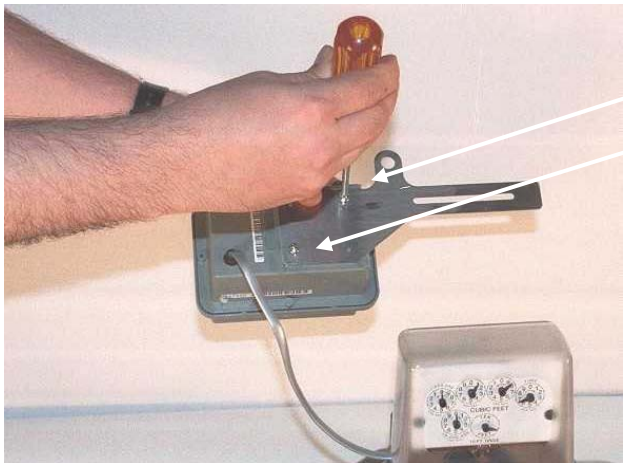


Brackets assembled for RIGHT-HAND mounting



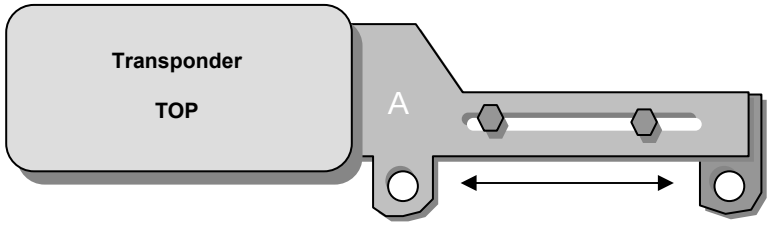
Brackets assembled for LEFT-HAND mounting

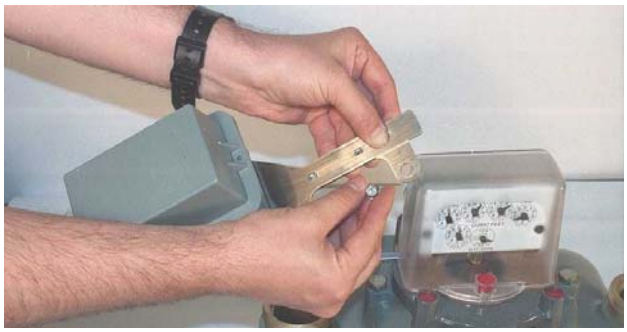
1. Attach bracket A to bottom of the transponder.
   - Use the 2 Phillips-head screws, placed in diagonal positions.
   - Although transponder has only 2 holes on its base, the bracket has 4 holes to accommodate left- or right-hand mounting.
   - Do not over-tighten the screws.



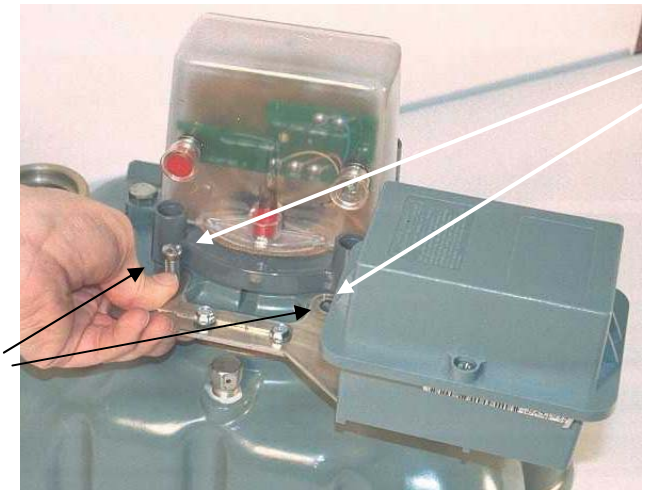
Mount transponder to bracket using the 2 Phillips-head screws in diagonal positions.

2. Connect brackets A and B using the 2 hex-head slide screws.
    - The screw heads should be on the outside of the slot on bracket A, with their threads started in bracket B holes.
    - Slightly finger-tighten the screws so that the bracket width can still be adjusted.
    - The hex screws should be on top—regardless which mounting position you use—when the bracket assembly is connected to the meter.





3. Remove the two slotted screws already attached to the meter in the selected mounting location (front or back).

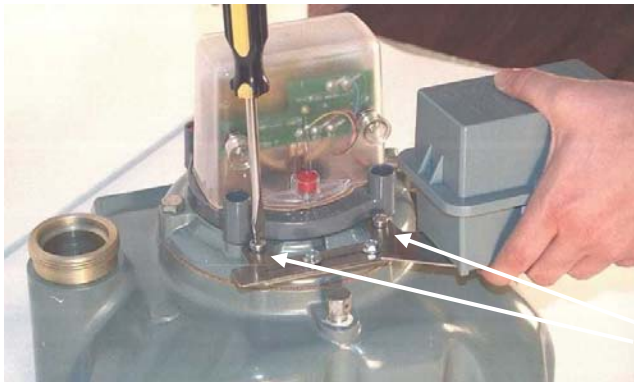


Shown: RIGHT-HAND mounting, meter REAR

4. Position the transponder brackets in the mounting location and adjust the bracket mounting holes to the width of the meter holes.

5. Secure slide screws into position.
   - You may be able to finger-tighten these sufficiently, but it is recommended you use either an adjustable wrench or a 3/16^{ths} English socket to secure the slide.

6. Mount the transponder to meter in desired location.



   - Use the 2 slotted screws previously removed from the meter.
   - Do not over-tighten screws.

7. Dress pulser cable neatly.
   - Tie up or bind any excess cable and position it out of harm's way.

8. Program the transponder to the reading on the index.
   - Refer to the programming procedure at the end of this chapter for specific instructions.

EnergyAxis RGT Programming (All)

NOTE: The procedure for programming the EnergyAxis Remote Gas-meter Transponder is identical to that used for programming the EnergyAxis Direct Gas-meter Transponder as described earlier in this manual.

Although transponders may contain default or utility-specified values that are programmed during manufacturing, it is important to program certain data only *after* the transponder has been installed in the field:

- Transponders can accumulate subcounts during shipping, handling and installation due to the movement of its wriggler.
- The transponder's tamper sensing switch must be told which orientation should be considered its normal (not tampered) condition.

Therefore, all transponders (even those mated with indexes set at 0000) should be programmed *after installation (on meter*).

When the transponder is programmed, it also automatically sets the tamper flag to "false" or "not tampered," establishing its normal condition in the transponder's memory.

NOTE: Even transponders factory-installed on meters must be programmed at the time the meter is installed in the field.

Programming Procedure

NOTE: For specific instructions for programming transponders, please refer to the appropriate interrogator/programmer user guide.

NOTE: If required, be sure to have on hand the pressure compensation factor. (Obtain from Elster Integrated Solutions.)

1. Read the transponder.
    - Place interrogator/programmer close to the transponder, especially if other transponders are nearby.
    - If no other transponders are within 6 feet, use Wildcard function to find transponder serial number.
    - If other transponders are within 6 feet, enter the serial number of the desired transponder.
2. Visually read the meter's mechanical index.
3. Verify that the transponder is programmed for the proper index drive. If it is not re-program it.
4. Program the electronic index to match the meter 's mechanical index.

- This will also reset the transponder subcounts to zero.

5.. If required, program the pressure compensation factor now.

- Compensation factors are unique for specific indexes and can be obtained by contacting Elster Integrated Solutions Customer Service Department at (919) 250-5700.

6.. Read the transponder.

- If the electronic index matches the meter ‘s mechanical index, installation is complete.
- If the electronic index does ***not*** match the meter ‘s mechanical index, repeat procedure from Step 1.
- If the transponder still does not program, replace it with a new one.

Appendix

EnergyAxis Direct Gas-meter Transponders can be programmed (at the factory or in the field) with values specified by the utility.

This Appendix highlights some of the types of data that can be programmed at the factory and the range of selections within each type.

For comprehensive discussion of all programmable transponder data, please refer to the applicable interrogator/programmer user guide.

Pre-Divider

The number of subcounts recorded with each revolution of the drive dial on 1-ft^3 and 2-ft^3 indexes is one. A 1-ft^3 index requires 100 revolutions to yield 100 ft^3 (1 count) and a 2-ft^3 index requires 50 revolutions to yield 100 ft^3 (1 count). Therefore, the pre-divider for a 1-ft^3 index is 100 and for a 2-ft^3 index it is 50.

Pressure-Compensation Factor

When a transponder is used in conjunction with a pressure-compensated index, a pressure-compensation factor can be programmed into the transponder memory by the utility at the time of installation to ensure that the electronic index reading agrees with the mechanical index.

Pressure-compensation factors are unique for specific indexes and can be obtained by contacting Elster Integrated Solutions' Customer Service Department at (919) 250-5700.