

R900[®]G Endpoint Installation and Maintenance Guide





R900[®]G Endpoint Installation and Maintenance Guide

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Transportation: The Federal Aviation Administration prohibits operating transmitters and receivers on all commercial aircraft. When powered, the R900 endpoint is considered an operating transmitter and can not be shipped by air.

FCC Notice

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.

NOTE: 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 not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

RF Exposure Information

This equipment complies with the FCC RF radiation requirements for uncontrolled environments. To maintain compliance with these requirements, the antenna and any radiating elements should be installed to ensure that a minimum separation distance of 20cm is maintained from the general population.



Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Professional Installation

In accordance with section 15.203 of the FCC rules and regulations, the MIU must be professionally installed by trained utility meter installers. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

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Contents

1 Product Description

- Introduction 1
- R900G Programming 2
 - RF Protocol Error Detection 2
 - RF Frequency Control Algorithm 2
 - RF Transmission Period and Randomness 2
- R900G Module Range and Read Success Rates 3
- R900G Endpoint Value-Added Features 3
 - Magnetic Tamper 3
 - Reverse Flow Tamper 3
 - Removal from Meter 3
 - Consecutive Days of No Consumption 3

2 Specifications

- Electrical Specifications 4
 - Transmitter Specifications 4
- R900 MIU Specifications 4
 - Environmental Specifications 4
 - Functional Specifications 4
- Meter Compatibility 5

3 General Installation Guidelines

- Product Unpacking and Inspection 6
 - Tools and Materials 6
 - Safety and Preliminary Checks 7

4 R900G Endpoint - Retrofit Installation

- Installing American AL/AR/AC/AM-175/250/425/630 with Dial or Odometer Index 8
 - R900G Model: 12750-000 8
 - Removing the Index 9
 - Installing the Index and the R900G Endpoint 10

Installing Sensus R200/275/315 with Dial or Odometer Index	11
R900G Model: 12821-000	11
Removing the Index	12
Mounting the R900G Endpoint	13
Installing the Index and the R900G Endpoint	14
Installing Actaris 175/240/250/400/Metris/400A with Dial or Odometer Index	16
R900G Model: 12861-000	16
Removing the Index	16
Install the Index and the R900G Endpoint	17

5 R900G C&I Endpoint — Retrofit Installation

Installing American AL 800/1000/1400/2300/5000 with Top Mount Index	19
R900G Model: 12882-000	19
Removing the Index	20
Programming the R900G C&I Module	21
Installing the Index and the R900G Endpoint	22
Installing Sensus #750/1600/1000/3000/5000/10,000 Large Diaphragm Meters with Top Mount Index ...	24
R900G Model: 12882-200	24
Removing the Index	25
Programming the R900G C&I Module	26
Installing the Index and the R900G Endpoint	28
Installing Actaris/Sprague 675A/800/1000A Large Diaphragm Meters with Top Mount Index	30
R900G Model: 12882-100	30
Removing the Index	31
Programming the R900G C&I Module	33
Installing the Index and the R900G Endpoint	34

6 Programming the R900G Endpoint

Starting the Field Programmer Software	38
Using the Field Programmer Software	40
Querying the R900G Endpoint	41
Using Command Tab	42
Reading the R900G Endpoint	43

Creating Formats for R900G Endpoints 46

 Selecting a Gas Format 47

 Adding or Editing a Gas Format 48

 Editing an Existing Gas Format 48

 Saving the Format 50

 Adding a New Gas Format 51

 Using the Gas Format 52

 Deleting a Format for R900G Endpoints 52

 Checklist 53

 Contact Information 53

Glossary

Index

Notes:

Figures

Figure	Title	Page
1	American AC250, Sensus R-275, Actaris Meters with R900G Endpoints	1
2	American AL800 with R900G C&I Module	3
3	American Meter AC250 with Pressure Compensating Dial Index	8
4	Removing Existing Tamper Plugs	9
5	Index Removal	9
6	American Gas Meter with Index Removed	9
7	Cutting Post of Drive Dog	10
8	Placing the Gas Meter Index on the R900G	10
9	Securing the Index	10
10	R900G Endpoint Drive Dogs	11
11	Using the Mounting Screws	11
12	Sensus R275 with R900G Endpoint	11
13	Puncturing and Removing Tamper Plugs	12
14	Removing Lens Mounting Screws	12
15	Removing Index Mounting Screws	12
16	Mounting to the Meter Casing	13
17	Inserting Mounting Screws	13
18	Checking Drive Dog Engagement	13
19	Drive Dog Alignment	14
20	Securing the Index	14
21	Mounting the Lens Cover	14
22	Removing Screws	15
23	Detaching Washer Runner	15
24	Screw and Washer Assembly	15
25	Assembling Screws with Washer	15
26	Actaris Metris with R900G Endpoint	16
27	Puncturing and Removing Tamper Plugs	16
28	Removing Lens Mounting Screws	16
29	Removing Index Mounting Screws	17
30	Drive Dog Alignment	17
31	Securing the Index	17
32	Mount the R900G	18
33	Securing to Meter Casing	18
34	American Meter AL800 with Top Mount Index	19
35	Removing Index Mounting Plate Screws	20
36	Removing the Index and Mounting Plate	20
37	CE5320 Handheld with Programming Mouse	21
38	Trimble Nomad, R900 BCT, and USB Programming Mouse	21
39	Trimble Ranger with USB Programming Mouse	22
40	Placing the Gas Meter Index on the R900G	22
41	Placing the R900G on the Gas Meter Casing	23

Figure	Title	Page
42	Screw Kit for American C&I - PN 12895-001	23
43	Placing Screws Used to Secure the R900G to the Meter Casing	23
44	Tightening the Mounting Screws	24
45	Sensus Meter #750 with Top Mount Index	24
46	Removing Index Cover Screws	25
47	Removing the Index Cover	25
48	Removing Index Mounting Screws	26
49	CE5320 Handheld with Programming Mouse	26
50	Trimble Nomad, R900 BCT, and USB Programming Mouse	27
51	Trimble Ranger with USB Programming Mouse	27
52	Placing the R900G on the Gas Meter Casing	28
53	Placing the Gas Meter Index on the R900G	28
54	Screw Kit for Sensus - PN 12895-003	29
55	Placing Screws Used to Secure the R900G to the Meter Casing	29
56	Placing the Index Cover over the Index	29
57	Securing the Index Cover to the R900G and the Meter Casing	30
58	Actaris Meter 675A with Top Mount Index	30
59	Removing the Index Cover Screws	31
60	Removing the Index Cover	31
61	Removing Index Mounting Screws	32
62	Removing the Index	32
63	CE5320 Handheld with Programming Mouse	33
64	Trimble Nomad, R900 BCT, and USB Programming Mouse	33
65	Trimble Ranger with USB Programming Mouse	34
66	Placing the R900G on the Gas Meter Casing	34
67	Placing the Gas Meter Index on the R900G	35
68	Mounting the Index to the R900G Module	35
69	Placing the Index Cover over the Index	36
70	Screw Kit for Actaris - PN 12895-002	36
71	Screws Used to Secure the R900G to the Meter Casing	36
72	Tighten the Screws	37
73	Field Programmer Menu	38
74	Initializing Receiver and Mouse	39
75	Program Tab	39
76	Program Tab - Format Name	40
77	Program Result – Confirming Data	40
78	Program Result -- Pass Screen	41
79	Gas Query Screen	41
80	Gas Query Results	42
81	Command Tab	42
82	Gas Read Screen	43

Figure	Title	Page
83	Gas Reading Result Screen	44
84	Tamper Flag Information	44
85	Additional Tamper Information	45
86	Field Programmer Start Screen	46
87	Field Programmer Password Screen	46
88	Gas Preferences Screen	47
89	Available Gas Formats Screen	47
90	Gas New Format Screen	48
91	Gas Format Name Selection List	48
92	Enter a Different Name	50
93	Enter Different Name Dialog	50
94	Gas New Format Screen	51
95	Save Changes to Format Dialog	51
96	Delete Confirmation Dialog	52
97	Delete Button	52

Notes:

Tables

Table	Title	Page
1	Identification Table	5
2	Recommended Tools	7
3	Recommended Materials	7
4	Meter Input Drive Rotation	49
5	PCF Indexes Available from American Meter, Sensus, and Actaris	55

Notes:

1 Product Description

Introduction

This section provides a general description of the R900®G endpoint for various natural gas meters that provide meter consumption and value-added data.

The Neptune R900G endpoint combines the field-proven R900® radio frequency (RF) technology, developed by Neptune Technology Group, into a retrofit module for current residential and commercial natural gas meters from American®, Equimeter® (Sensus®/Rockwell®), and Actaris® (Sprague®). The R900 MIU can attach to new or existing meters, and can transmit meter reading and tamper information from the meter to a handheld, mobile, or a targeted fixed network reading device.

The R900G endpoint is a one-way RF module that operates in the unlicensed 902-928MHz band. The data is transmitted through a high power signal to an enhanced data collection device, providing utilities with an automatic meter reading (AMR) solution with accurate consumption data, reduced meter reading times, and higher meter reading success rates.

The R900G endpoint meets both FCC Part 15.247 and Industry Canada Class B regulations, allowing for a high output power AMR module that greatly increases range and meter reading success rates. The R900 MIU module uses frequency-hopping spread spectrum technology to avoid RF interference and enhance security. The R900 MIU module transmits the meter reading data, tamper conditions and value-added data, and a unique 10-digit RF MIU ID every 14 seconds. The R900G endpoint is both an Underwriters Laboratory (UL) and Factory Mutual (FM) approved intrinsically safe device for Class I, Division 1, Group C & D hazardous (classified) locations.



Figure 1 American AC250, Sensus R-275, Actaris Meters with R900G Endpoints

R900G Programming

At the factory, each of the following items is programmed into the MIU:

- **Serial number** - Each R900 MIU module is given a unique serial number/identification number. To eliminate the possibility for duplicate ID numbers, custom serial numbers are not available.
- **Time between meter readings** - The R900 MIU module updates the meter reading every 15 minutes.
- **Time between R900 MIU module transmissions** - The time between R900 MIU module transmissions is set for approximately 14 seconds. Custom time intervals are not available.

The R900 MIU is field-programmable via an Infrared (IR) port. Field programmable features include the following:

- Existing index reading.
- Pressure compensation factor.
- Test hand registration.



The R900G can be programmed with the CE5320 handheld, Trimble Nomad, or the Trimble Ranger handheld (with its internal receiver, along with the USB Programming Mouse). When programming with the Trimble Nomad you must have a R900® Belt Clip Transceiver (BCT) v1.7 and a USB programming mouse. Before programming R900G modules using the Trimble Nomad, you must first pair with the R900 BCT.

RF Protocol Error Detection

The radio frequency (RF) protocol is composed of a header, data packet, and an error detection mechanism that reduces the possibility of erroneous data.

RF Frequency Control Algorithm

The R900 MIU module's frequency-hopping spread spectrum has a sequence of at least 50 different channels for transmitting data. Associated with the 50 channels are 50 frequencies that can be pre-selected in a pseudo random manner. These 50 frequencies are coded into the software.

RF Transmission Period and Randomness

The randomness algorithm is defined so that no two consecutive transmissions from the two R900 MIU modules can interfere with one another.

R900G Module Range and Read Success Rates

The R900G module is an RF device that complies with FCC Part 15.247 allowing for a higher output power device. The higher output power coupled with the sensitivity of Neptune's meter reading systems enhances a utility's range, minimizing the reading time while maximizing read success rates.

R900G Endpoint Value-Added Features

The R900G endpoint provides tamper detection. The remote reading capabilities of the R900G eliminate the monthly visual inspection of gas meters for evidence of tampering.

Magnetic Tamper

The R900G endpoint has the capability of detecting the use of a large outside magnetic field (capable of saturating sensors) being brought near the shaft sensor. If this occurs, the magnetic tamper flag displays.

Reverse Flow Tamper

The R900G endpoint has the capability of detecting reverse rotation of the meter output shaft. If such a tamper occurs, the volume increments in the normal fashion, and the reverse-flow tamper flag displays. Reverse flow is managed so that the RF read continues to match the meter index.

Removal from Meter

The R900G endpoint is equipped with a tilt switch. When the R900G endpoint is removed, the removal from meter flag displays.

Consecutive Days of No Consumption

The meter can be removed from service for unknown periods without authorization. This mode of tampering can be detected by monitoring the number of consecutive days of no consumption.

The R900G endpoint sets a flag in the event of seven consecutive days of no consumption. In the event that 14 consecutive days are reached, a separate flag displays.



Figure 2 American AL800 with R900G C&I Module

2 Specifications

This section provides you with the specifications for the R900G endpoint.

Electrical Specifications

Power	Lithium battery with Hybrid Layer Capacitor (HLC)
-------	---

Transmitter Specifications

Transmit Period	Every 14 seconds
Transmitter Channels	50
Channel Frequency	902-928 MHz
Output Power	Meets FCC Part 15.247
FCC Verification	Part 15.247
UL listed and FM Approval	Class I, Division 1, Groups C and D

R900 MIU Specifications

Environmental Specifications

Operating Temperature	-40° to 149°F (-40° to 65°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)
Operating Humidity	0 to 95% condensing

Functional Specifications

MIU ID	10 digits
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Meter Compatibility

The following table represents all current residential and top-mount commercial Elster/American, Sensus/Invensys®/Equimeter/Rockwell, and Itron/Actaris/Schlumberger®/Sprague® models.

Table 1 Identification Table

Gas Meter Manufacturer	Gas Meter Models	Neptune Part Number
Residential Meters		
Elster/American Meter	AL/AR/AM/AC 175/250/425	12750-000
Sensus/Invensys/ Equimeter/Rockwell	R-175/R-200/R-275/#315 (2-Foot Drive 11-tooth)	12821-000
Sensus/Invensys/ Equimeter/Rockwell	R-175/R-200/R-275/#315/#415 (1-Foot Drive 12-tooth)	12821-010
Sensus/Invensys/ Equimeter/Rockwell	#415 (2-Foot Drive 18-tooth)	12821-100
Itron/Actaris/ Schlumberger/Sprague	175/240/250/METRIS/400A (slant face index)	12861-000
Commercial Meters		
Elster/American Meter	AC-630	12750-000
Elster/American Meter	AL-800/AL-1000 AL-1400/2300/3000/5000	12882-000
Sensus/Invensys/ Equimeter/Rockwell	#750/1600/ 3000/5000,10000	12882-000
Itron/Actaris/ Schlumberger/Sprague	675A, 800A, 1000A	12882-000

3 General Installation Guidelines

This section describes tools, materials, and general installation information for the R900G endpoint.

Product Unpacking and Inspection

Upon receipt of the product, the following unpacking and inspection procedures should be performed.



If damage to the shipping container is evident upon receipt, request the carrier to be present when the product is unpacked.

Carefully open the shipping container, follow any instructions that are marked on the exterior. Remove all packing materials surrounding the product and carefully remove the product from the container.

Retain the shipping container and all packing materials in order to transport the equipment to the site in the event the product needs to be returned to the manufacturer for any reason.

Visually inspect the product and applicable accessories for any physical damage such as loose or broken parts or any other sign of damage.



If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

Tools and Materials

Tables 2 and 3 show the recommended tools and materials you can use to successfully install the R900 MIU or to replace the MIU's internal battery.



Table 2 is not a complete list of tools and Table 3 is not a complete list of materials.



If you are using N_SIGHT™ R900® version 4.7 or later, the Field Programmer software is now integrated into the handheld software. Navigate with the following steps:

Tap



Table 2 Recommended Tools

Item	Description/ Recommendation	Use
Tool Kit	Contains standard tools including: <ul style="list-style-type: none"> • 1/8-inch flat head screwdriver • 1/4-inch flat head screwdriver • #1 Phillips screwdriver • Pliers – wire-cutting, long-nose utility • Cordless electric drill/screwdriver (optional) • Putty knife 	Various installation procedures performed by the utility
IR Programming Device	<ul style="list-style-type: none"> • Neptune CE5320 handheld and a LEMO cable programming mouse or • Trimble Nomand handheld, a USB programming mouse and a R900 BCT • Trimble Ranger handheld, with its internal receiver, along with the USB Programming Mouse. 	To program the index by the Field Programmer software

Table 3 Recommended Materials

Item	Description/Recommendation	Use
Site Work Order	Documentation provided by your utility	Receiving and recording information about the work site

Safety and Preliminary Checks

Observe the following safety and preliminary checks before and during each installation:

- Verify that you are at the location specified on the Site Work Order.
- Verify that the site is safe for you and your equipment.
- Notify the customer of your presence, and tell the customer that you need access to the gas meter.
- Verify that the site work order has a meter interface unit (MIU ID) number.
 - If the site work order does not have an MIU ID number on it, write in the ID number(s) of the MIU you are about to install.
 - If the site work order already has an MIU ID number on it, verify that it matches the ID number on the MIU you are about to install.

4 R900G Endpoint - Retrofit Installation



Before proceeding with the installation, make sure the R900G endpoint number matches the model required for the specific gas meter model being installed. Refer to Table 1 on page 5.

Complete the following instructions to install an R900G endpoint according to the model required for the specific gas meter.

Installing American AL/AR/AC/AM-175/250/425/630 with Dial or Odometer Index

R900G Model: 12750-000

The following figure illustrates the American Models AL/AR/AC/AM-175/250/425 with dial or odometer Index.



Although meters vary by manufacturers, the steps are similar.



Figure 3 American Meter AC250 with Pressure Compensating Dial Index

Removing the Index



Figure 4 Removing Existing Tamper Plugs

Complete the following steps for index removal.

- 1 Use a large, flat head screwdriver to puncture and remove existing tamper plugs, if present. See Figure 4.



Figure 5 Index Removal

- 2 Use a large screwdriver to remove and discard the four lens mounting screws and the lens. See Figure 5.



Figure 6 American Gas Meter with Index Removed

- 3 Remove the gasket. Use a putty knife to remove any excess from the meter body casing.
- 4 Use a small screwdriver to remove the two index mounting screws. Do not discard these screws as they are needed to mount the existing index to the R900G housing. See Figure 6.

Installing the Index and the R900G Endpoint

Complete the following steps to install the index and the R900G endpoint to the meter body casing.



Figure 7 Cutting Post of Drive Dog



American 5B 225 meters only: If you are installing an R900G endpoint on a 5B 225 aluminum case meter, cut the post of the drive dog to prevent it from rubbing on the nut that holds the meter drive dog in place. See Figure 7.

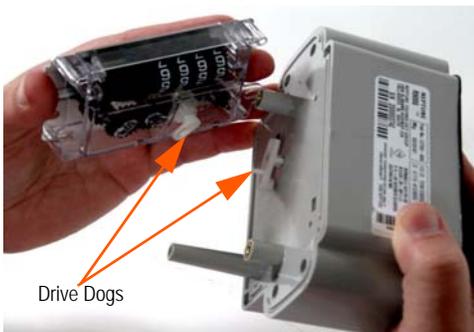


Figure 8 Placing the Gas Meter Index on the R900G

- 1 Place the gas meter index on the front of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 8.



Figure 9 Securing the Index

- 2 Secure the index to the R900G housing using the two index mounting screws removed from the meter in Step 4 during “Removing the Index” on page 9. See Figure 6 and Figure 9.



- When attaching the gas meter index to the R900G endpoint, make sure it is securely mounted.
- The Sensus/Equimeter version uses a gear for the index. Make sure the drive dog mates with the drive gear.



Figure 10 R900G Endpoint Drive Dogs

- 3 When mounting the R900G endpoint to the front of the gas meter casing, ensure that the gas meter drive dog engages with the R900G endpoint drive dog. These two drive dogs must line up without causing any binding or potential for disengagement. See Figure 10.



Figure 11 Using the Mounting Screws

- 4 Slide the cover over the R900G endpoint housing.
- 5 Use the four mounting screws (supplied) to secure the cover and the R900G endpoint to the gas meter casing. See Figure 11.
- 6 Install two tamper snap seals (supplied) into the recess in the cover.
- 7 Seat firmly.

Installing Sensus R200/275/315 with Dial or Odometer Index

R900G Model: 12821-000



The following steps are the same for installation of R900G model: 12821-100 on Sensus model #415.

Figure 12 illustrates the Sensus model R200/275/315 with dial or odometer index.



Figure 12 Sensus R275 with R900G Endpoint

Removing the Index



Figure 13 Puncturing and Removing Tamper Plugs

Complete the following steps for index removal.

- 1 Use a large, flat head screwdriver to puncture and remove existing tamper plugs, if present. See Figure 13.



Figure 14 Removing Lens Mounting Screws

- 2 Use a large screwdriver to remove and discard the four lens mounting screws and the lens. See Figure 14.



Figure 15 Removing Index Mounting Screws

- 3 Remove the two index mounting screws. See Figure 15.



Do not discard these screws as they are needed to mount the existing index to the R900G housing.

Mounting the R900G Endpoint



When mounting the R900G endpoint to the front of the gas meter casing, ensure that the gas meter drive dog gear engages with the R900G drive dog. These two gears must line up without causing any binding or potential for disengagement.

Complete the following steps for mounting the index.

- 1 Use two of the screws provided to mount the R900G endpoint to the meter casing. See Figure 16.



Figure 16 Mounting to the Meter Casing

- 2 Insert screws in the upper left-hand corner and the lower right-hand corner of the endpoint (see Figure 17). The R900G endpoint has been modified with seating surfaces for these two screws in these corners.
- 3 Tighten these two screws.



Figure 17 Inserting Mounting Screws

- 4 Check the drive dog gear engagement between the R900G endpoint and the meter. See Figure 18.



Figure 18 Checking Drive Dog Engagement

Installing the Index and the R900G Endpoint

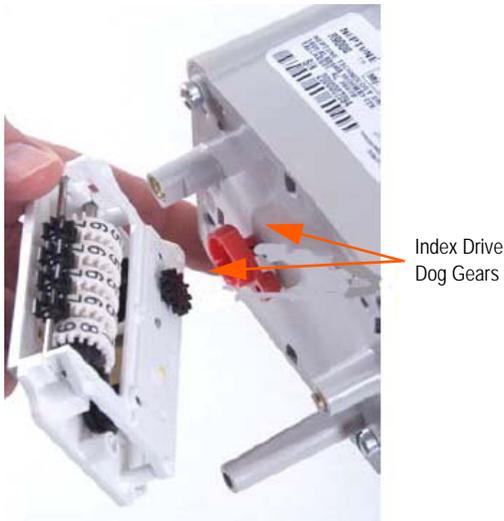


Figure 19 Drive Dog Alignment

Complete the following steps to install the index and the R900G endpoint.

- 1 Place the gas meter index on the front of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 19.



For the following steps, reuse the screws from index removal from the meter.



Figure 20 Securing the Index

- 2 Secure the index to the R900G using the two index mounting screws provided by the meter manufacturer. See Figure 20.



Figure 21 Mounting the Lens Cover

- 3 Use the remaining two screws to mount the lens cover over the index and on to the R900G endpoint.
- 4 Insert these two screws in the upper-right and lower-left hand corner of the R900G endpoint.
- 5 Tighten these two screws. See Figure 21.
- 6 Install two tamper snap seals (supplied) over these two screws.



Figure 22 Removing Screws



Figure 23 Detaching Washer Runner



Figure 24 Screw and Washer Assembly



Figure 25 Assembling Screws with Washer

7 Remove the top-left and bottom-right screws. See Figure 22.

8 Detach washers from plastic runner. See Figure 23.

9 Trim, if needed.

10 Orient both washers with the flat side facing away from the meter. See Figure 24.

11 Assemble screws using the washers to the R900G and gas meter as shown in Figure 25.



Large washer is assembled to top-left and smaller washer assembled to the bottom-right.

Installing Actaris 175/240/250/400/Metris/400A with Dial or Odometer Index

R900G Model: 12861-000

The following figure illustrates the Actaris model 175/240/250/400/Metris/400A with dial or odometer index.



Figure 26 Actaris Metris with R900G Endpoint

Removing the Index

Complete the following steps for index removal.

- 1 Use a large, flat head screwdriver to puncture and remove existing tamper plugs, if present. See Figure 27.



Figure 27 Puncturing and Removing Tamper Plugs

- 2 Use a large screwdriver to remove and discard the three lens mounting screws and the lens. See Figure 28.



Figure 28 Removing Lens Mounting Screws



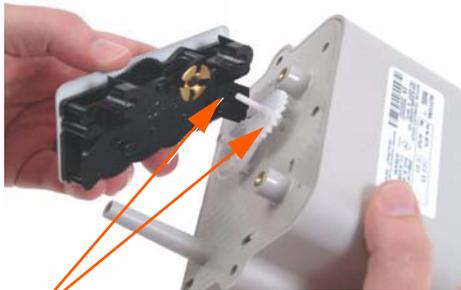
Figure 29 Removing Index Mounting Screws

- 3 Remove the two index mounting screws. Do not discard these screws as they are needed to mount the existing index to the R900G housing. See Figure 29.



Do not discard these screws as they are needed to mount the existing index to the R900G housing.

Install the Index and the R900G Endpoint.



Drive Dogs

Figure 30 Drive Dog Alignment

- 1 Place the gas meter index on the front of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 30.



Figure 31 Securing the Index

- 2 Secure the index to the R900G endpoint housing using the two index mounting screws removed from the meter in Step 3 of "Removing the Index". See Figure 29 and Figure 31.



When attaching the gas meter index to the R900G endpoint, make sure it is securely mounted.



Figure 32 Mount the R900G

- 3 When mounting the R900G endpoint to the front of the gas meter casing, ensure that the gas meter drive dog engages with the R900G endpoint drive dog. These two drive dogs must line up without causing any binding or potential for disengagement. See Figure 32.



Figure 33 Securing to Meter Casing

- 4 Slide the cover over the R900G endpoint housing.
- 5 Use the three mounting screws (supplied) to secure the cover and the R900G endpoint to the gas meter casing. See Figure 33.
- 6 Install two tamper plugs (supplied) into the recess in the cover.
- 7 Seat firmly.

5 R900G C&I Endpoint — Retrofit Installation



Before proceeding with the installation, make sure the R900G endpoint number matches the model required for the specific gas meter model being installed. Refer to Table 1 on page 5.

Complete the following instructions to install an R900G commercial and industrial (C&I) endpoint according to the model required for the specific gas meter you are installing.

Installing American AL 800/1000/1400/2300/5000 with Top Mount Index

R900G Model: 12882-000

The following figure illustrates an American Model AL 800 with a top mount index.



Figure 34 American Meter AL800 with Top Mount Index

Removing the Index

Complete the following steps for index removal.

- 1 Use a large screw driver to remove and discard the four index mounting plate screws. See Figure 35.



Figure 35 Removing Index Mounting Plate Screws

- 2 Remove the index with the mounting plate still attached. See Figure 36.



Figure 36 Removing the Index and Mounting Plate

Programming the R900G C&I Module

- 3 Program the R900G C&I endpoint prior to installation on the meter. The infrared programming port is located on the top of the module. See Figure 37.



Figure 37 CE5320 Handheld with Programming Mouse

If you are using N_SIGHT R900 version 4.7 or later, the Field Programmer software is now integrated into the handheld software. Navigate with the following steps:



Tap



Figure 38 Trimble Nomad, R900 BCT, and USB Programming Mouse



Figure 39 Trimble Ranger with USB Programming Mouse

Installing the Index and the R900G Endpoint



Complete the following steps to install the index and the R900G endpoint to the meter body casing.

- 1 Place the gas meter index and mounting plate on the top of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 40.

Figure 40 Placing the Gas Meter Index on the R900G

- 2 Place the gas meter index and the R900G endpoint on the top of the meter casing.

Ensure that the gas meter drive dog engages the R900G endpoint drive dog. These two drive dogs must mate without causing any binding or potential for disengagement. See Figure 41.



Figure 41 Placing the R900G on the Gas Meter Casing

- 3 Use the four mounting screws that are supplied, as illustrated in Figure 42, to secure the gas meter index and the R900G endpoint to the gas meter casing. See Figure 43.



Figure 42 Screw Kit for American C&I - PN 12895-001



Figure 43 Placing Screws Used to Secure the R900G to the Meter Casing



- 4 Tighten the four screws and install snap seals into the recess in the index cover. See Figure 44.

Figure 44 Tightening the Mounting Screws

Installing Sensus #750/1600/1000/3000/5000/10,000 Large Diaphragm Meters with Top Mount Index

R900G Model: 12882-200

Figure 45 illustrates a Sensus Model #750 with top mount index.



Figure 45 Sensus Meter #750 with Top Mount Index

Removing the Index

Complete the following steps for index removal.

- 1 Use a large screw driver to remove and discard the two index cover screws. See Figure 46.



Figure 46 Removing Index Cover Screws

- 2 Remove the index cover. See Figure 47.



Figure 47 Removing the Index Cover

- 3 Use a large screw driver to remove and discard the two index mounting screws. See Figure 48.



Figure 48 Removing Index Mounting Screws

Programming the R900G C&I Module

- 4 Program the R900G C&I endpoint prior to installation on the meter. The infrared programming port is located on the top of the module. See Figure 49.



Figure 49 CE5320 Handheld with Programming Mouse

If you are using N_SIGHT R900 version 4.7 or later, the Field Programmer software is now integrated into the handheld software. Navigate with the following steps:



Tap



Figure 50 Trimble Nomad, R900 BCT, and USB Programming Mouse



Figure 51 Trimble Ranger with USB Programming Mouse

Installing the Index and the R900G Endpoint



Figure 52 Placing the R900G on the Gas Meter Casing

Complete the following steps to install the index and the R900G endpoint to the meter body casing.

- 1 Place the R900G endpoint on the top of the meter casing.

Ensure that the gas meter drive dog engages the R900G endpoint drive dog. These two drive dogs must mate without causing any binding or potential for disengagement. See Figure 52.

- 2 Place the gas meter index on the top of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 53.



Figure 53 Placing the Gas Meter Index on the R900G



- 3 Use the shorter of the two mounting screws supplied, as illustrated in Figure 54, to secure the gas meter index to the R900G endpoint and the gas meter casing. See Figure 54.

Figure 54 Screw Kit for Sensus - PN 12895-003



- 4 Tighten the two screws.

Figure 55 Placing Screws Used to Secure the R900G to the Meter Casing



- 5 Place the index cover over the index. See Figure 56.

Figure 56 Placing the Index Cover over the Index

- 6 Use the longer of the two mounting screws that are supplied (see Figure 54 on page 29 - Part Number 12895-003) to secure the index cover to the R900G endpoint and the gas meter casing. See Figure 57.



Figure 57 Securing the Index Cover to the R900G and the Meter Casing

Installing Actaris/Sprague 675A/800/1000A Large Diaphragm Meters with Top Mount Index

R900G Model: 12882-100

The following figure illustrates an Actaris Model 675A with a top mount index.



Figure 58 Actaris Meter 675A with Top Mount Index

Removing the Index



Figure 59 Removing the Index Cover Screws

Complete the following steps for index removal.

- 1 Use a large screw driver to remove and discard the four index cover screws. See Figure 59.



Figure 60 Removing the Index Cover

- 2 Remove the index cover. See Figure 60.

- 3 Use a large screw driver to remove the two index mounting screws. See Figure 61.



Figure 61 Removing Index Mounting Screws



Do not discard these screws as they are needed to mount the existing index to the R900G housing.

- 4 Remove the Index. See Figure 62.



Figure 62 Removing the Index

Programming the R900G C&I Module

- 5 Program the R900G C&I endpoint prior to installation on the meter. The infrared programming port is located on the top of the module. See Figure 63.



Figure 63 CE5320 Handheld with Programming Mouse

If you are using N_SIGHT R900 version 4.7 or later, the Field Programmer software is now integrated into the handheld software. Navigate with the following steps:



Tap



Figure 64 Trimble Nomad, R900 BCT, and USB Programming Mouse



Figure 65 Trimble Ranger with USB Programming Mouse

Installing the Index and the R900G Endpoint



Figure 66 Placing the R900G on the Gas Meter Casing

Complete the following steps to install the index and the R900G endpoint to the meter body casing.

- 1 Place the R900G endpoint on the top of the meter casing.

Ensure that the gas meter drive dog engages the R900G endpoint drive dog. These two drive dogs must mate without causing any binding or potential for disengagement. See Figure 66.



Figure 67 Placing the Gas Meter Index on the R900G

- 2 Place the gas meter index on the top of the R900G endpoint ensuring that the two drive dogs are aligned for engagement. See Figure 67.



Figure 68 Mounting the Index to the R900G Module

- 3 Use the two screws retained in Step 3 of “Removing the Index” (see Figure 61 on page 32) to mount the index to the R900G module, as illustrated in Figure 68.

- 4 Place the index cover over the index. See Figure 69.



Figure 69 Placing the Index Cover over the Index

- 5 Use the four mounting screws that are supplied, as illustrated in Figure 70, to secure the index cover and the R900G endpoint to the meter body casing. See Figure 71.



Figure 70 Screw Kit for Actaris - PN 12895-002



Figure 71 Screws Used to Secure the R900G to the Meter Casing

- 6 Tighten the four screws and install snap seals into the recess in the index cover. See Figure 72.



Figure 72 Tighten the Screws

6 Programming the R900G Endpoint

To program an R900G endpoint, use the integrated Field Programmer software. The following instructions detail how to navigate to this functionality.



All the images in this section are from the Nomad handheld, but the CE5320 and Ranger navigation screens and appearances are the same.

Starting the Field Programmer Software

To start the Field Programmer, complete the following steps.

1 From the N_SIGHT R900 login screen, touch .

2 Touch  **UTILS**.

3 Select  **FIELD** .
PROG

You are now at the Field Programmer menu. See Figure 73.

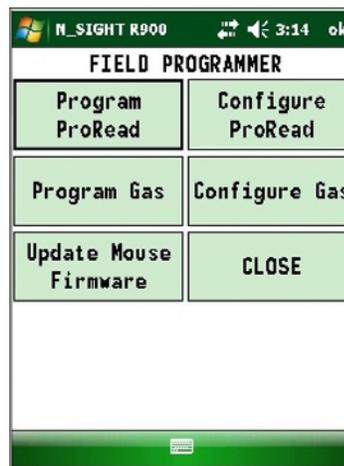


Figure 73 Field Programmer Menu

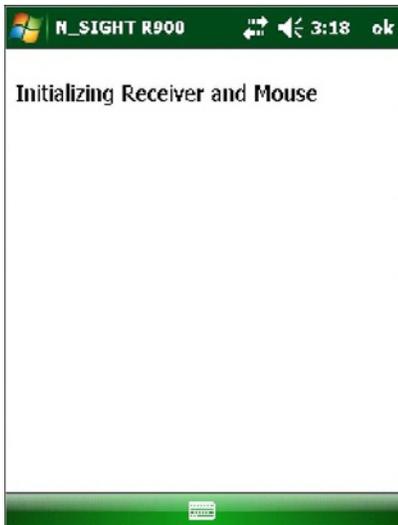


Figure 74 Initializing Receiver and Mouse

- 4 Depending on which handheld you are using, do one of the following.
 - If using a Trimble Nomad handheld, before clicking **Program Gas** (see Figure 73 on page 38), you need to power on your R900 BCT and plug in the USB programming mouse.
 - If using a CE5320 handheld, connect the LEMO programming mouse. Click **Program Gas** after all connections are complete.
 - If using a Trimble Ranger handheld, connect the USB Programming Mouse. Click **Program Gas** after all connections are complete.
- 5 After you have clicked **Program Gas**, allow time for the handheld to initialize the receiver and mouse. See Figure 74.



If you receive an error of no device found, you must confirm you have the R900 BCT powered on and the mouse is connected. Refer to the *Neptune Handheld System Users' Manual* to pair the R900 BCT.

After initializing, the program screen appears. The program tab is already chosen and you can choose the **Format Name** for programming. See Figure 75.

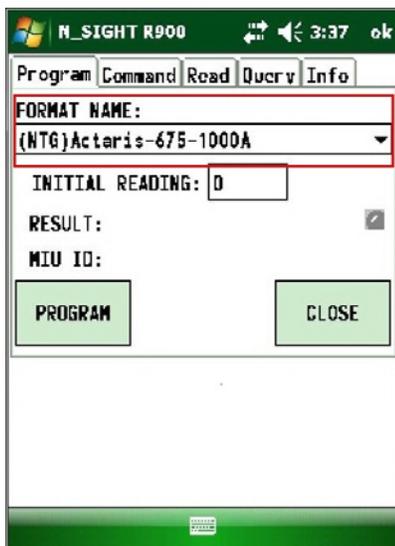


Figure 75 Program Tab

Using the Field Programmer Software

To program the R900G endpoint, complete the following steps.

- 1 Start the Neptune Field Programmer software. Refer to “Starting the Field Programmer Software” on page 38.
- 2 Select the format name from the drop-down menu. See Figure 76.

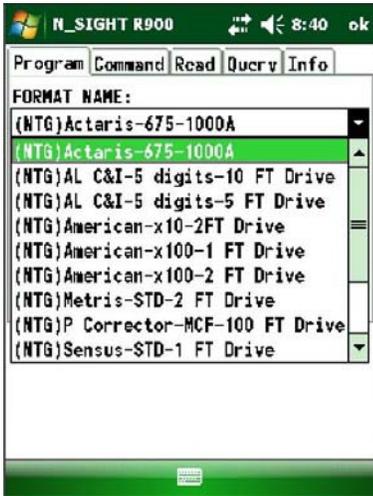


Figure 76 Program Tab - Format Name

- 3 After you have chosen the format name, put in an initial reading value or leave zero (0).
- 4 Align the IR LED to Gas Programming post, and do one of the following to program gas:
 - Press the program button on the mouse. (This button can only be used for Programming; it cannot be used for Read or Query.)
 - Press **Enter**.
 - Touch or click **PROGRAM**.

The Sending Data screen appears to show the progress of the R900G programming. See Figure 77.

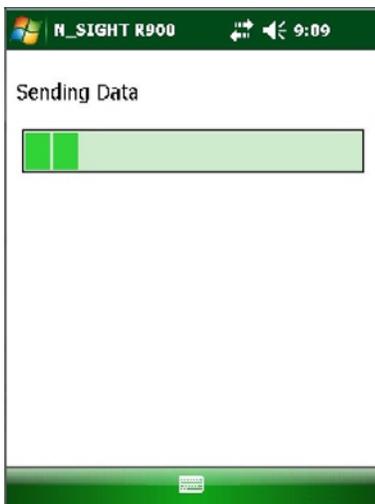


Figure 77 Program Result – Confirming Data

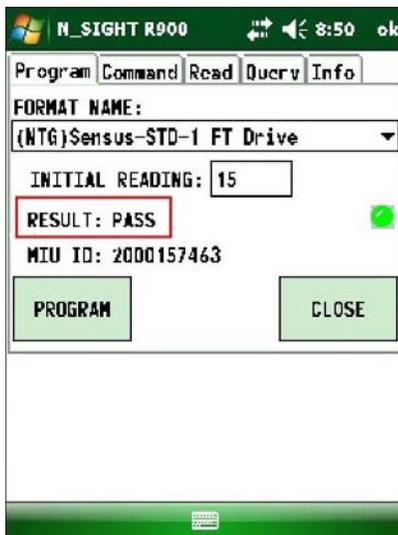


Figure 78 Program Result -- Pass Screen

An audible tone signals the Program Result:

- PASS
- FAIL

The **MIU ID** displays the ID or serial number of the MIU. See Figure 78.

- 5 You can program another gas endpoint by repeating steps 1 through 6, or touch or click  to close the **Program Gas** tab and return to the main screen.

Querying the R900G Endpoint

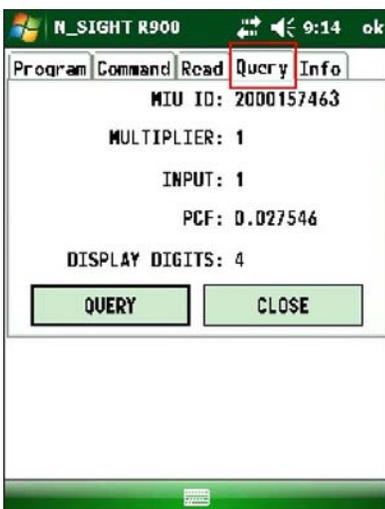


Figure 79 Gas Query Screen

Use the query function to check the current configuration of the R900G. Perform a query after you program the endpoint, or anytime you want to verify that the correct parameters are programmed in the unit.

To query an R900G endpoint, place the mouse on the R900G endpoint and complete the following steps.

- 1 Select the **Query** tab from the top of the program screen.
- 2 Press the black programming mouse button or click the **Query** button to perform a query.

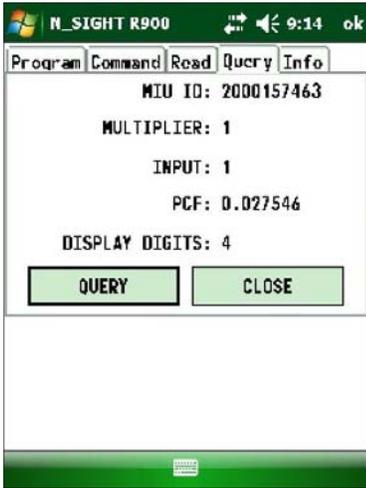


Figure 80 Gas Query Results

The query results appear similar to Figure 80 and can confirm that the R900G endpoint is programmed correctly.

- 3 Repeat steps 1 through 3 to query another endpoint or choose one of the following:
 - Touch or click the **Read** tab to take a reading.
 - Touch or click the **Program** tab to program the register.
 - Touch or click the **Command** tab. See "Using Command Tab" below.
- 4 Touch or click  to close the **Gas Query** tab and return to the main screen.

Using Command Tab

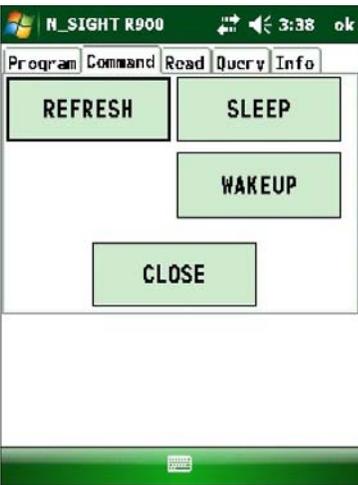


Figure 81 Command Tab

The **Command** tab allows you to perform the following functions at any time you are using the Neptune gas meter program. See Figure 81.

- **Refresh** the data for the R900G endpoint.
- Place the R900G endpoint in **Sleep** mode.
- **Wake up** the R900G endpoint from **Sleep** mode.
- **Close** the Neptune gas meter **Program** tab.



In order to perform these commands, align the mouse with the unit.

To use the **Command Gas** tab, complete the following instructions.

- 1 Start the Neptune Field Programmer software; refer to “Starting the Field Programmer Software” on page 38.
- 2 Select **Program Gas** button from the main screen.
- 3 Select **Command** tab at the top of the screen.

The Command screen appears as illustrated in Figure 81.

- 4 Do one of the following:
 - Touch or click **Refresh** to force the R900G endpoint to transmit the most current reading.
 - Touch or click **Sleep** to place the R900G endpoint in **Sleep** mode.
 - Touch or click **Wakeup** to activate the R900G endpoint from **Sleep** mode.
 - Touch or click  to close the Neptune gas meter program tab.



Any time you are using the gas meter program you can use the functions on the Command Gas screen.

Reading the R900G Endpoint

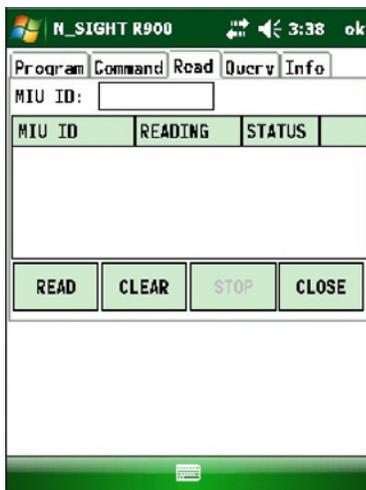


Figure 82 Gas Read Screen

The Field Programmer software is designed to be used as a programming and troubleshooting tool rather than a reading device. However, the Field Programmer is capable of displaying readings.

To read an R900G endpoint, complete the following steps:

- 1 Select **Program Gas** from the Neptune Programmer System start screen.
- 2 Select the **Read** tab.

The Read screen appears. See Figure 82.



Figure 83 Gas Reading Result Screen

- 3 Enter the **MIU ID** to read a specific unit.

Leaving the **MIU ID** blank allows you to receive all readings in a range. See Figure 83.

- 4 Touch or click **READ** on the Field Programmer to collect a reading.



If there is a tamper flag associated with the R900G, the **STATUS** field displays an X. Double-click this line to view all flags for the endpoint. Scroll to view more tamper information. See Figure 84 and Figure 85 on page 45.

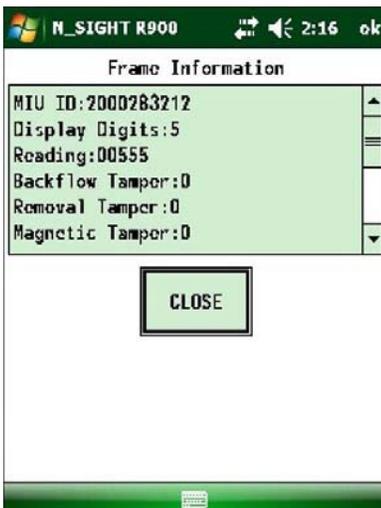


Figure 84 Tamper Flag Information

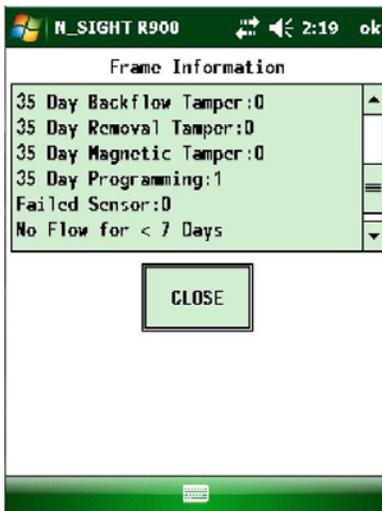


Figure 85 Additional Tamper Information

If an error message appears during a read attempt, it is most likely due to a problem with receiving. Try the following.

- Wait at least one minute.
- Move the handheld farther away from the R900G to prevent saturating the receiver.
- If this does not solve the problem with the CE5320 handheld, remove the antenna to reduce the likelihood of interfering signals in the area. With the Nomad and R900 BCT, turn slightly away from the unit and turn the R900 BCT to face the endpoint.

- 5 Press **Clear** to clear the reading and repeat steps 1 through 4 to read another MIU.



Creating Formats for R900G Endpoints

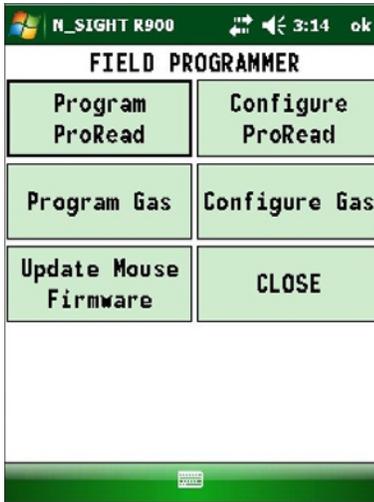


Figure 86 Field Programmer Start Screen

When you program an R900G endpoint, you can work with the format you need. You can do the following:

- Set your preferences for the type of endpoint you are programming.
- Select a format from the list of available formats supplied by Neptune.
- Create a new format that is added to the list of available formats.

To select preferences for programming an R900G endpoint, complete the following steps.

- 1 On the Field Programmer start screen, touch or click **Configure Gas**. See Figure 86.

The login screen appears as illustrated in Figure 87.

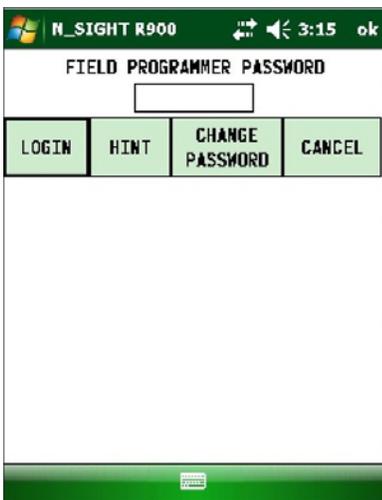


Figure 87 Field Programmer Password Screen

- 2 Type your password (default password is “neptune”).



If you cannot remember your password, you can touch or click **Hint** to display a clue.

On this screen, you can also change your password or cancel logging in to the system.

- 3 Touch or click **LOGIN**.

The Preferences screen appears as illustrated in Figure 88 on page 47.

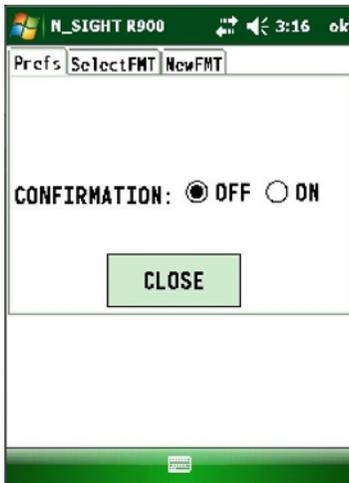


Figure 88 Gas Preferences Screen

Selecting a Gas Format

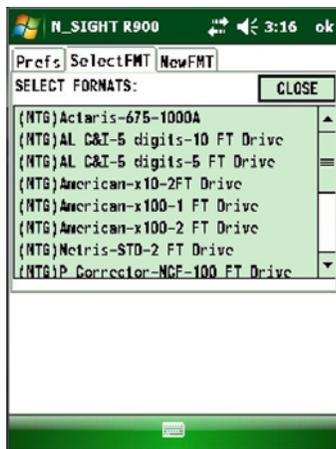


Figure 89 Available Gas Formats Screen

- 4 Select one of the following for Confirmation:
 - Select **OFF** to turn off some confirmation dialogs for actions.
 - Select **ON** to allow all confirmation dialogs for actions.
- 5 Do one of the following:
 - Touch or click **Close** to close the gas configuration and return to the previous screen.
 - Touch or click **SelectFMT** to select a format that is already available for the Field Programmer.
 - Touch or click **NewFMT** to create a new format and add it to the list of available formats.

This feature allows an administrator to select formats that are available to field personnel for programming, as described in “Programming the R900G Endpoint” on page 38.

To select a format for programming an R900G endpoint, complete the following steps.

- 1 Touch or click **SelectFMT** to view formats available to use for programming R900G endpoints. See Figure 89.

The following options appear:

- **Select Formats.**
- **Close.**



Although you can remove a format from the User Selected list, it remains in the Available Formats list.

- 3 Do one of the following:
 - Click **Close** to close the **Gas Configuration** screen and return to the previous screen.
 - Click **NewFMT** to add a new format for **Gas Configuration**.

Adding or Editing a Gas Format

To add a new format and have it appear in the Available Formats list, you can either edit an existing format or add a new format.

Editing an Existing Gas Format

To edit an existing gas format, complete the following steps.

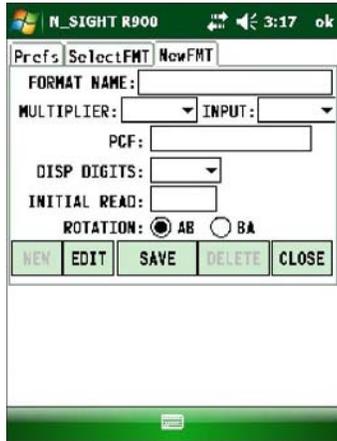


Figure 90 Gas New Format Screen

1 Log in to the Field Programmer:

- Click **Configure Gas**.
- Enter the password (default is “neptune”).
- Click **LOGIN**.

2 Select the **NewFMT** tab.

3 Touch or click **EDIT**. See Figure 90.

The **Format Name** field now becomes a drop-down list. See Figure 91.



Figure 91 Gas Format Name Selection List

4 Touch or click **▼** in **Format Name** to select a format from the available gas formats.

A selection list similar to Figure 91 appears.

After you select a format, all the values associated with it appear. You can then make any necessary changes. See Figure 90.

- 5 Touch or click **▼** in **MULTIPLIER** to select the correct value from 0.01 to 1000 to be used for the format.
- 6 Touch or click the drop-down list for **INPUT** and click to choose the value.

- 7 Type the 9-digit number for the pressure configuration factor index in **PCF**.



Refer to Table 5 of Appendix A. These are examples only. This list does not include every index a utility has in its system. If there are any questions about the correct pressure configuration factor, contact the meter manufacturer.

- 8 Touch or click in **DISP DIGITS** to select one of the following:
- 4 = Initial Reading are in range of 0000 - 9999
 - 5 = Initial Reading are in range of 00000 - 99999
 - 6 = Initial Reading are in range of 000000 - 999999
- 9 Type the actual meter reading in **INITIAL READ**.
- 10 Select **ROTATION** option **AB** (for clockwise rotation) or **BA** (for counter-clockwise). Refer to Table 4.

Table 4 Meter Input Drive Rotation

Meter	Part Number	Rotation
American 250-630	12759-000	BA
Sensus R275 - #415	12821-XXX	AB
Actaris Metris, 250, 400A	12861-000	AB
American AL800 - AL5000	12862-000	BA
Sensus #750 - #10000	12882-200	AB
Actaris 675A - 1000A	12882-100	BA
Dresser AMR adapter kit for American		BA
Instrument Drive - CW		AB
Instrument Drive - CCW		BA

Saving the Format

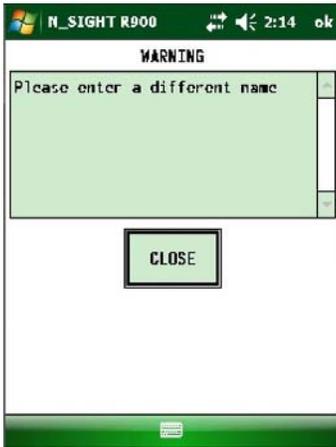


Figure 92 Enter a Different Name

To save the format and add it to the list of available formats, complete the following steps.

- 1 Complete the steps for “Editing an Existing Gas Format” on page 48.
- 2 Touch or click **SAVE**.

A dialog appears similar to Figure 92 asking you to enter a different name for the format.

- 3 Touch or click **CLOSE**.

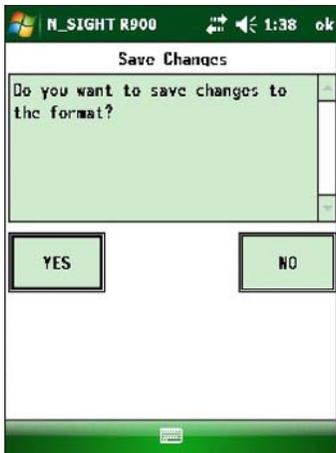


Figure 93 Enter Different Name Dialog

- 4 Type the name of the new format in **Format Name**.

If you selected a standard format and made changes to it, you must type a new name for the format.

Click **SAVE** and a dialog appears similar to Figure 93 asking you if you want to save changes to the format.

- 5 Touch or click **YES** on the dialog and the new format is saved under the name you chose.

The new format is saved to the list of available gas formats.

Adding a New Gas Format



Figure 94 Gas New Format Screen

To add a new gas format, complete the following steps.

- 1 Log in to the Field Programmer by completing steps 1 through 3 in “Selecting a Gas Format” on page 47.
- 2 Select **NewFMT**.
- 3 Touch or click **NEW**. If this option is gray, choose **EDIT**. Then choose **NEW**.

The New Format screen appears with a blank line and no for **Format Name**.

- 4 Type the name of the new format in **Format Name**.
- 5 Complete information for the following items, where applicable.
 - **MULTIPLIER**
 - **INPUT**
 - **PCF** (refer to Table 5 on page 51. Contact the meter manufacturer if you have any questions.)
 - **DISP DIGITS**
 - **INITIAL READ**
 - **ROTATION** (Refer to Table 4 on page 49).
- 6 Touch or click **SAVE**.

A dialog appears similar to Figure 95 asking you if you want to save the changes to the format.

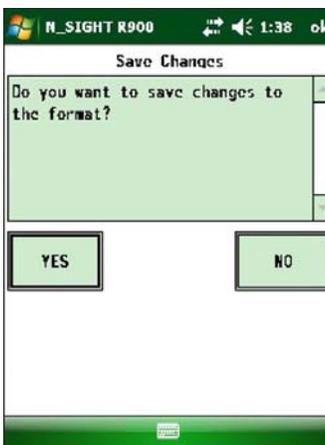


Figure 95 Save Changes to Format Dialog

- 7 Touch or click **Yes** to save the changes to the new format or **No** to cancel.

Using the Gas Format

To use the newly created gas format to program gas registers, complete the following steps.

- 1 Select the **SelectFMT** tab.
- 2 Complete the steps outlined in “Selecting a Gas Format” on page 47.
- 3 Refer to “Programming the R900G Endpoint” on page 38 to program or read the R900G endpoint using the newly created format.

Deleting a Format for R900G Endpoints

To delete a gas format used for programming R900G endpoints, complete the following steps.

- 1 Log in to the Field Programmer by completing steps 1 through 3 in “Selecting a Gas Format” on page 47.

- 2 Select **NewFMT**.

The New Format screen appears as illustrated in Figure 86 on page 46.

- 3 Touch or click **EDIT** since the NewFMT screen now defaults to New, then shift the numbers to compensate.

- 4 Touch or click **DELETE** to delete the format. Figure 96 appears asking you to confirm the deletion.

- 5 Touch or click **Yes** to save the format or **No** to cancel. The format is no longer available for selection on the Field Programmer.

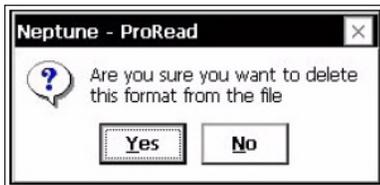
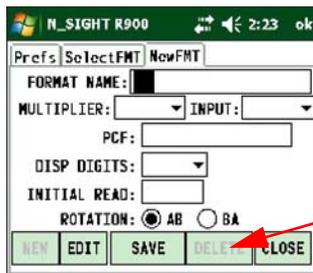


Figure 96 Delete Confirmation Dialog



You cannot delete a standard format from the list of available formats. You can only delete user-defined formats. The **DELETE** button is greyed out if you are choosing a standard format. See Figure 97.



Delete button

Figure 97 Delete Button

Checklist

Before leaving the installation site, be sure to:



Record MIU ID for each R900G endpoint.



Verify that you have followed all requirements of this Installation and Maintenance Guide.



Verify that you have recorded all required information.



Clean up any installation debris.



Verify that the requirements of the site work order have been completed.



Inform the customer that you have completed your work. If you were unable to finish, inform the customer when you are returning to complete the project.

Contact Information

Within North America, Neptune Customer Support is available Monday through Friday, 8:00 AM to 6:00 PM Eastern Standard Time, by telephone or fax.

To contact Neptune Customer Support by phone, call 1-800-647-4832. If all Customer Support Technicians are helping other customers, your call will be routed to the Neptune Customer Support voice mail system. Please leave your name, the name of your company, and your telephone number. Your call will be returned within business hours in the order it was received.

To contact Neptune Customer Support by fax, send a description of your problem to 1-334-283-7497. Please include on the fax cover sheet the best time of day for a Customer Support Technician to contact you. To contact Neptune Customer Support by email, send your letter to the following address: hhsupp@neptunetg.com.

Notes:

Appendix A: Pressure Compensation Factor Configuration

Table 5 PCF Indexes Available from American Meter, Sensus, and Actaris

Index Part Number	Drive	Gauge Pressure	Atmospheric Pressure	Base Pressure	Actual Gear Ratio	Pressure Compensation Factor
American Meter - AL/AR/AC/AM/AT 175/210/250/350/425/630 R900G: 12750-000						
52180G066	1 ft ³	2 psig	14.40	14.73	900	1.111111
28538G151	1 ft ³	2 psig	14.73	14.73	883.333333	1.132075
52180G067	2 ft ³	2 psig	14.40	14.73	450	1.111111
0497G116	2 ft ³	2 psig	14.40	14.91	443.055556	1.128527
04972G122	2 ft ³	2 psig	14.73	14.65	445.454545	1.122449
04972G118	2 ft ³	2 psig	14.55	14.73	42.000000	1.131222
04972G124	2 ft ³	2 psig	14.73	14.73	443.055556	1.128527
04972G120	2 ft ³	5 psig	14.40	14.73	381.944444	1.309091
04972G117	2 ft ³	5 psig	14.73	14.91	376.125000	1.329345
04972G119	2 ft ³	5 psig	14.73	14.73	374.305556	1.335807
04972G127	2 ft ³	5 psig	14.40	14.65	376.125000	1.329345
04972G121	2 ft ³	10 psig	14.40	14.73	303.333333	1.648352
Sensus/Equimeter - R275 / R315:R900G: 12821-000						
001-63-537-48	2 ft ³	2 psig	14.40	14.73	445.867	1.121411
001-63-537-41	2 ft ³	5 psig	14.40	14.73	379.911	1.316098
001-63-537-49	2 ft ³	10 psig	14.40	14.73	300.781	1.662339

Table 5 PCF Indexes Available from American Meter, Sensus, and Actaris

Index Part Number	Drive	Gauge Pressure	Atmospheric Pressure	Base Pressure	Actual Gear Ratio	Pressure Compensation Factor
Sensus/Equimeter - 415: R900G: 12821-100						
	2 ft ³	2 psig	14.40	14.73	445.867	1.121411
	2 ft ³	5 psig	14.40	14.73	379.911	1.316098
	2 ft ³	10 psig	14.40	14.73	300.781	1.662339
Sensus/Equimeter - S-275: R900G: 12821-200						
Propane	1 ft ³				36.3025	2.7546296
Sprague/Schlumberger/Actaris - 175/240/250Metris/400A R900G: 12861-000						
017289	2 ft ³	2 psig			447.619050	1.1170213
018207	2 ft ³	14" W.C			491.666700	1.0169491
017228	2 ft ³	5 psig			375.000000	1.3333333
017308	2 ft ³	5 psig			447.916700	1.1162790
135543	2 ft ³	2 psig			447.619050	1.1170213
017308	2 ft ³	2 psig			447.916700	1.1162790
037223	2 ft ³	10 psig			293.333300	1.7045456
037234	2 ft ³	2 psig			178.800000	1.1185682
037234	5 ft ³	10 psig			120.000000	1.6666667
017317	5 ft ³	2 psig			447.619050	1.1170213
017318	2 ft ³	14" W.C			491.666700	1.0169491
017366	2 ft ³	2 psig			447.619050	1.1170213
017367	2 ft ³	14" W.C			491.666700	1.0169491
091238	2 ft ³	2 psig			447.619050	1.1170213

Table 5 PCF Indexes Available from American Meter, Sensus, and Actaris

Index Part Number	Drive	Gauge Pressure	Atmospheric Pressure	Base Pressure	Actual Gear Ratio	Pressure Compensation Factor
091240	2 ft ³	14: W.C			491.666700	1.0169491
135547	2 ft ³	2 psig			447.619050	1.1170213

Notes:

Glossary

AMR	Automatic Meter Reading.
BCT	Belt Clip Transceiver (R900 BCT).
C&I	Commercial and Industrial.
endpoint	An Internet-capable device that measures natural gas consumption of a building or home.
frequency-hopping	One of two basic modulation techniques used in spread spectrum signal transmission. It is the repeated switching of frequencies during radio transmission, often to minimize the effectiveness of electronic warfare - that is, the unauthorized interception or jamming of telecommunications. It also is known as frequency-hopping code division multiple access (FH-CDMA).
flag	R900G endpoint sets a flag in the event of seven consecutive days of no consumption. In the event that 14 consecutive days are reached, a separate flag displays.
gasket	Shaped piece or ring of rubber or other material sealing the junction between two surfaces in a device.
IR	Infrared.
main housing	Main body of the MIU that attaches to the mounting adapter.
main housing fastener screw	Set screw (Hi-Lo fastener) that holds the main housing to the mounting adapter.
MIU	Meter Interface Unit.
mounting adapter	Back plate of the MIU that is attached to the wall.
PCF	Pressure Configuration Factor.
RF	Radio Frequency.

serial number	Unique identification number given to each MIU at the factory. The default value is the last programmed plus one. Custom serial numbers are not available.
spread spectrum	Form of wireless communications in which the frequency of the transmitted signal is deliberately varied. This results in a much greater bandwidth than the signal would have if its frequency were not varied.
tamper	Interference with a meter in order to cause damage or make unauthorized alterations.
transmission time	Time between MIU transmissions. The default is approximately fourteen (14) seconds. Custom time is not available.

Index

A

accessories, meter 6

Actaris

- dial index 16
- drive dog 18
- gas meter models 5
- index removal 16
- odometer index 16
- R900G housing 17

algorithm

- randomness 2
- RF frequency control 2

American

- dial index 8
- drive dog 11
- gas meter models 5
- index removal 9, 12, 16, 18
- odometer index 8
- R900G housing 9

B

battery, lithium 4

C

capacitor, HLC 4

casing, meter body 10

channel

- for transmitting data 2
- frequency 4
- transmitter 4

compatibility, meter 5

conditions, environmental 4

consumption, zero or no 3

D

damage, found when unpacked 6

data collection device 1

detach washers, from plastic runner 15

device

- approved 1
- data collection 1
- higher output power 3
- IR programming 7
- output power 3
- RF 3
- targeted fixed network 1

dial index 16

- Actaris 16
- American 8

drive dog

- Actaris 18
- American 11

E

electrical specifications 4

environmental conditions 4

Equimeter, models 5

evidence, tampering 3

F

FCC

- notice ii
- verification 4

features, value-added 3

Field Programmer software 7

field-programming 2

flag, tamper 3

FM approval 1, 4

frequency-hopping 2

functional specifications 4

G

gasket, removing 9

gear, Sensus/Equimeter version 10

general description 1

general information 6

H

HLC capacitor 4

Hybrid Layer Capacitor 4

I

identification, meter 5

index

- cover screws 25, 31
- dial 16
- mounting screws 9, 10, 12, 17, 26, 32
- odometer 16
- removal 14

index mounting screws 14

index removal

- Actaris 16
- American 9, 12, 16, 18
- Sensus 12

indications, tamper 3

Industry Canada notice iii

inspection, of the R900G endpoint 6

install, R900G endpoint 8

installation

- American meters 8
- before proceeding 8
- importance of professional ii
- preliminary checks 7
- safety 7

Invensys, models 5

IR programming device 7

L

large washer, assembly 15

lens cover, over index 14

M

materials needed 6

meter

- accessories 6
- identification 5

meter compatibility 5

MIU ID 1

model, matching number 8

models, gas meter 5

mouse 7

- field programming (illus.) 21, 26, 33
- USB field programming 2, 7, 39, 40, 41, 42

N

notices

- FCC ii
- Industry Canada iii

O

odometer index 16

- Actaris 16
- American 8
- Sensus 11

operating humidity 4

operating temperature 4

output power 3

P

packing materials, for reshipping 6

period, transmit 4

plugs, tamper 18

power, output 3, 4

preliminary checks 7

programming, R900G 38

R

R900 radio frequency (RF) 1

R900G

- description 1
- general description 1
- housing 10, 17
- interface 4
- module reads 2
- module transmissions 2
- serial number 2
- specifications 4
- tools and materials 6

R900G housing

- Actaris 17
- American 9

radio technology 1

readings 2

reads, success rates 3

remove index 14

retrofit installation 8

reverse rotation 3

RF

- exposure information ii
- frequency 2
- module 1
- protocol, error detection 2
- technology 1
- transmission 2

Rockwell, models 5

S

safety checks 7

saturating sensors 3

screws

- index cover 25, 31
- lens mounting 9, 16
- mounting 24, 30
- mounting (illus.) 23, 29, 36
- mounting plate 20
- mounting, to secure cover 18
- removing 15
- to mount lens cover 14
- to secure R900G to meter casing 23, 29

screws, index mounting 9, 10, 12, 17, 26, 32

screws, mounting for index 14

seals, tamper snap 14

sensor, saturating 3

Sensus

- gas meter models 5
- index removal 12
- odometer index 11
- serial number 2

- site work order 7
- smaller washer, assembly 15
- software, Filed Programmer 7
- software, programming 38
- specifications
 - electrical 4
 - encoder register interface 4
 - environmental conditions 4
 - functional 4
 - MIU ID 4
 - transmitter 4
- Sprague, models 5
- spread-spectrum 2
- standard tools 7
- storage temperature 4

T

- tamper
 - evidence 3
 - flag 3, 44
 - magnetic 3
 - plugs 18
 - reverse flow 3
 - sample screens 44, 45
 - snap seals 14

- temperature, storage 4
- time intervals, custom 2
- tools needed 6
- tools, recommended 7
- transmission
 - randomness 2
 - RF 2
- Transmitter specifications 4

U

- UL listed 1, 4
- unpacking the product 6
- USB field programming 2, 7, 39, 40, 41, 42

V

- verification, FCC 4

W

- washers
 - large 15
 - small 15
- washers, detach from plastic runner 15
- work order, site 7

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