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Certification Exhibit

**FCC ID: P2SNTR900GDL
IC: 4171B-NTR900GDL**

**FCC Rule Part: 15.247; 15.249
IC Radio Standards Specification: RSS-210**

ACS Report Number: 10-0053.W06

**Manufacturer: Neptune Technology Group, Inc.
Model: R900GDL**

Manual

R900G Endpoint Installation and Maintenance Guide





ARB UTILITY MANAGEMENT SYSTEMS | WATER | ELECTRIC | GAS


R900G[™] Endpoint Installation and Maintenance Guide

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver 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.

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

R900G Installation and Maintenance Guide

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Notes:

1 Product Description

This section provides a general description of the R900G 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 R900G will attach to new or existing meters, and will transmit consumption and tamper information from the meter to a handheld, mobile, or a targeted fixed network reading device.

The R900G 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 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 R900G module uses frequency-hopping spread spectrum technology to avoid RF interference and enhance security. The R900G module transmits the consumption data, tamper conditions and value-added data, and a unique 10-digit RF MIU ID every 14 seconds. The R900G Endpoint is a Factory Mutual (FM) approved intrinsically safe device for Class I, Division 1, Group C & D hazardous (classified) locations.



Figure 1 AC250 with R900G Endpoint



Figure 2 Sensus R-275 with R900G Endpoint

R900G Programming

The R900G is field-programmable via an Infrared (IR) port. At the factory, each of the following items is programmed into the MIU:

- Serial number - Each R900G 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 R900G module updates the meter reading every 15 minutes.
- Time between R900G module transmissions - The time between R900G module transmissions is set for approximately 14 seconds. Custom time intervals are not available.

Field programmable features include the following:

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

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 R900G 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 R900G modules will interfere with one another.

R900G Module Range and Read Success Rates

The R900G module is a radio frequency 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 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.

R900G Endpoint Value-Added Features (continued)

Magnetic Tamper

The R900G 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 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 is equipped with a tilt switch. When the R900G 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 sets a flag in the event of 7 consecutive days of no consumption. In the event that 14 consecutive days are reached, a separate flag displays.

2 Specifications

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

Electrical Specifications

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

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
FM Approval	Class I, Division 1, Groups C and D

Specifications - R900G MIU

Environmental Specifications

Operating Temperature	-22° to 149°F (-30° 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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Dimensions and Weight

Dimensions	Refer to Figure 3
Weight	1.0 lbs. (454 grams)

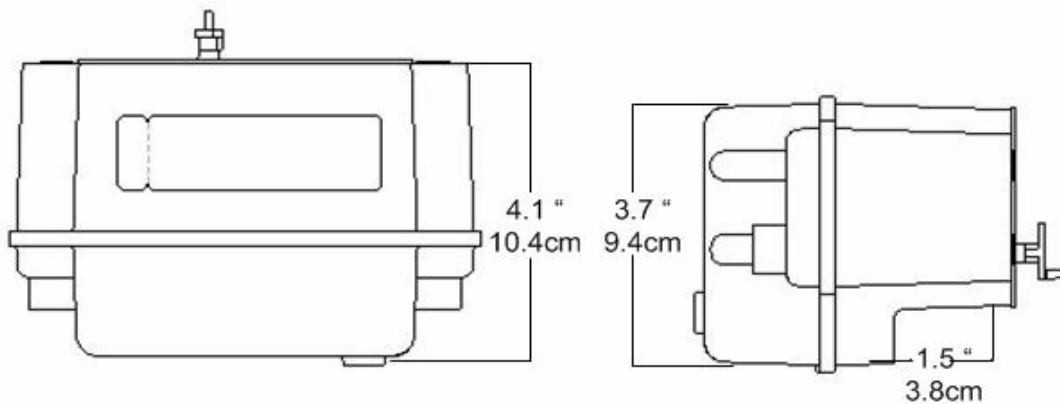


Figure 3 R900G MIU Dimensions

Meter Compatibility

The following table represents all current residential and top-mount commercial American, Sensus, Equimeter, and Actaris models.

Table 1 Identification Table

Gas Meter Mfr	Gas Meter Models	Neptune Part Number
Residential Meters		
American® Meter	AL/AR/AC/AM-175/250/425	12750-000
Sensus®/Invensys®/ Rockwell®/Equimeter®	R-200/275/315 (Cubic Foot Registration)	12821-000
Sensus®/Invensys®/ Rockwell®/Equimeter®	#415 (Cubic Foot Registration)	12821-100
Actaris®/Sprague®	175/250/400A METRIS	Availability to be announced at a later date
Commercial Meters		
American® Meter	AC-630	12750-000
American® Meter	AL-800/AL-1000 AL-1400/2300/5000	Availability to be announced at a later date.
Sensus®/Invensys®/ Rockwell®/Equimeter®	#750/1600/ 3000/5000,10000	
Actaris®/Sprague®	675A, 800A, 1000A	

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 may be 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 materials to transport the equipment to the site and 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 that may have occurred during shipment.



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 may need to successfully install the R900 MIU or to replace the MIU’s internal battery.



Some items may not apply to your specific installation or the list may not contain all required tools or materials.

Table 2 Recommended Tools

Item	Description/ Recommendation	Use
Tool Kit	Contains standard tools including: <ul style="list-style-type: none"> • 1/8" flat head screwdriver • 1/4" 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 CE5320X handheld loaded with R900G programming software • Apex receiver • Field Programmer 	To program the index, and so forth, by the field programmer

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 will need access to the gas meter.
- 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 numbers 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 model required for the specific gas meter model being installed. Refer to Table Table 1 on page 6.

Complete the following instructions to install an R900G Endpoint according to the model required for the specific gas meter you are installing.

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 4 American Meter - AC250 with Temperature Compensating Dial Index

Removing the Index



Figure 5 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 5.)



Figure 6 Index Removal

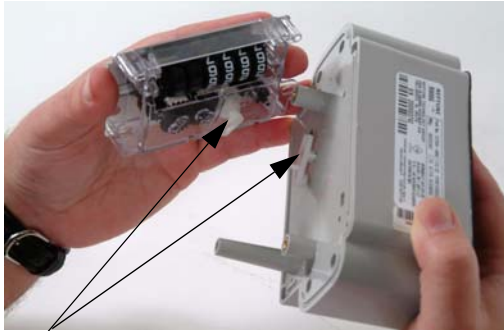
- 2 Use a large screwdriver to remove and discard the four lens mounting screws and the lens. (See Figure 6.)



Figure 7 American Gas Meter with Index Removed

- 3 Remove the gasket. Use a putty knife to remove any excess gasket 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 7.)

Installing the Index and the R900G Endpoint



Drive Dogs

Figure 8 Placing the Gas Meter Index on the R900G

Complete the following steps to install the Index and the R900G Endpoint to the meter body casing.

- 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 2 index mounting screws removed from the meter in Step 4 during “Removing the Index” on page 10. (See Figure 7 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 to 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 mate 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.

The following figure illustrates the Sensus Model R200/275/315 with Dial or Odometer Index.



Figure 12 Sensus R200/275/315 with Dial or Odometer Index

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 Index Screws 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 15.)

Install the Index and the R900G Endpoint.



Figure 16 Drive Dog Alignment

- 4 Place the gas meter index on the front of the R900G Endpoint ensuring that the two drive dogs are aligned for engagement. (See Figure 16.)



Figure 17 Securing the Index

- 5 Secure the index to the R900G housing using the 2 index mounting screws removed from the meter in Step 3 during “Removing the Index” on page 10. (See Figure 15 and Figure 17.)



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



Figure 18 Mount the R900G

- 6 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 mate without causing any binding or potential for disengagement. (See Figure 18.)



Figure 19 Securing to Meter casing

- 7 Slide the cover over the R900G Endpoint housing.
- 8 Use the four mounting screws (supplied) to secure the cover and the R900G Endpoint to the gas meter casing. (See Figure 19.)
- 9 Install two tamper plugs (supplied) into the recess in the cover.
- 10 Seat firmly.

5 Programming the R900G Endpoint

To program an R900G Endpoint, use the Neptune CE5320X handheld with Equinox software to display and process the information.



Figure 20 Neptune CE5320X Handheld with Field Programmer

Starting the R900G Programmer Software

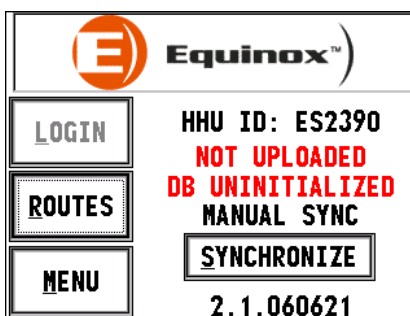


Figure 21 Equinox Main Screen

- 1 Start the R900G Programmer Software by completing the following steps from the Equinox Start Screen. See Figure 21.
- 2 While on the Equinox main screen, touch **MENU**.

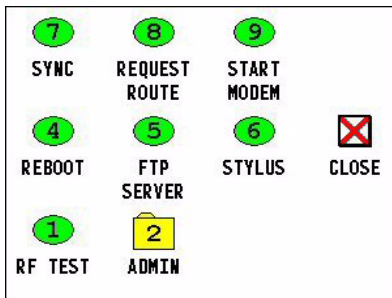


Figure 22 Equinox Menu

The Equinox main menu appear as illustrated in Figure 22.

- 3 Select  **Admin**.

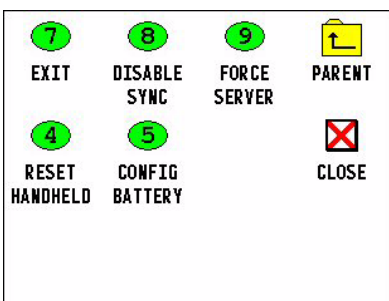


Figure 23 Equinox Administrator Menu

The Equinox Admin menu appears as illustrated in Figure 23.

- 4 Select  **Exit**.

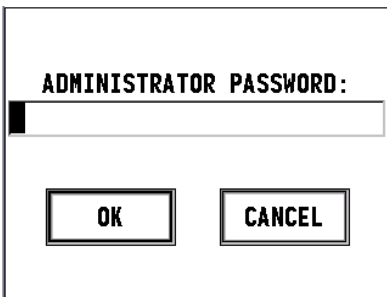



Figure 24 Administrator Password Screen

The Administrator Password screen appears as illustrated in Figure 24.


- 5 When prompted, type in the password provided by your company, such as, **BUBBA**.
- 6 Touch  .



The default password for all factory configured CE5320X Handhelds is BUBBA. If you are unsure of your password, try the default password. If BUBBA is not correct, check with your administrator for the correct password.

The handheld reboots, and the Windows CE.NET screen appears.



The screen backlight will turn off. Press **F3**  to turn on the screen backlight.

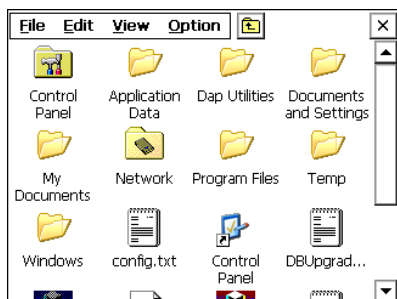


Figure 25 Folder Selection Screen

7 Tap the screen once.

The Folder selection screen appears as illustrated in Figure 25.



Figure 26 R900G Programming Icon

8 Select **My Documents**.

The R900G Programming icon appears as illustrated in Figure 26.



9 Select **R900G Program...**

When the programming software begins, the screen illustrated in Figure 27 appears.



Figure 27 R900G Programming Screen

10 Select the **Program** tab at the top of the screen.

The screen illustrated in Figure 28 appears.

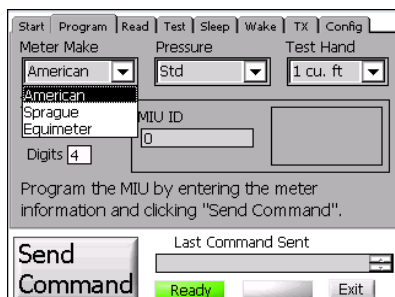


Figure 28 Program Tab



Figure 29 Checksum Match Message

- 11 Make the following selections on this window:
 - From the **Meter Make** drop-down selection list, choose the appropriate setting for the type of meter to program.
 - From the **Pressure** drop-down selection list, choose the appropriate setting for the pressure compensation.
 - From the **Test Hand** drop-down selection list, choose the appropriate resolution.
 - For the **Initial Reading**, type the index reading, for example, 2345.
 - For the number of **Digits**, type the number of reading dials or odometer wheels on the index. This number shall be either 4, 5 or 6.

- 12 When you have entered all the appropriate data,

touch  to program the R900G unit.

- 13 When the programming is complete, the unit returns a **Checksum Match** message, as well as confirmation of the MIU ID as illustrated in Figure 29.



This process takes approximately 5-10 seconds

The checksum match message indicates that the unit is programmed and transmitting.

Checklist

Before leaving the installation site, be sure to:

- Record MIU ID for each R900G endpoint gas meter.
- Verify that you have followed all requirements of this Quick Install 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 of when you'll be back to complete the project.

Contact Information

Within North America, Neptune Support is available Monday through Friday, 8:00 AM to 7:00 PM Eastern Standard Time, by telephone or fax.

To contact Technical Support by phone, call 1-800-645-1892. If all Support Technicians are helping other customers, your call will be routed to the Neptune 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 Technical 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 support technician to contact you. To contact Technical Support by E-mail, send your letter to the following address: hhsupp@neptunetg.com.

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