FCC Part 15.247
Transmitter Certification

Frequency Hopping Spread Spectrum Transmitter

Test Report

FCC ID: P2SNTGR900G

FCC Rule Part: 15.247

ACS Report Number: 06-0101-15C

Manufacturer: Neptune Technology Group, Inc.
Model: R900G

Installation and Operators Guide

NEPTUNE TECHNOLOGY GROUP

ARB UTILITY MANAGEMENT SYSTEMS WATER ELECTRIC GAS

R900G Endpoint Installation and Maintenance Guide

Neptune engages in ongoing research and development to improve and enhance its products. Therefore, Neptune reserves the right to change product or system specifications without notice.

Trademarks used in this manual

R900G is a trademark of Neptune Technology Group Inc. R900 is a trademark of Neptune Technology Group Inc. Other brands or product names are the trademarks or registered trademarks of their respective holders.

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.

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.

NEPTUNE
TECHNOLOGY GROUP

ARB UTILITY MANAGEMENT SYSTEMS WATER | ELECTRIC GAS

R900G ™ Installation and Maintenance Guide

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

Literature No. IM R900G 03.06

Part No.XXXXX-XXX

Neptune Technology Group Inc.

1600 Alabama Highway 229

Tallassee, AL 36078

Tel: (334) 283-6555

Fax: (334) 263-7299

1 Product Description

2 Specifications

3 General Installation Guidelines

4 R900G Endpoint - Retrofit Installation

Figures

Notes:

Tables

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 for American, Equimeter (Sensus/Rockwell), and Actaris (Sprague) gas meters for an automatic meter reading (AMR) solution that provides utilities with accurate consumption, reduced meter reading times, and higher meter reading success rates.

The R900G is a one-way RF module that operates in the unlicensed 902-928MHz bandwidth. The data is transmitted via a high power signal to an enhanced data collection device, boosting range and meter reading success rates, while reducing meter reading time.

The R900G will attach to new or existing meters, and encodes consumption and tamper information from the meter to a handheld, mobile, or a targeted fixed network reading device.

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 R900 module uses frequency-hopping spread spectrum technology to avoid RF interference and enhance security. The R900 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 an Factory Mutual (FM) approved device for Class 1, Division 1 rating.

The R900G module is designed to offer advantages to utility organizations of all sizes:

Increases meter reading accuracy

Maximizes read success rates while minimizing reading time

Provides value-added data, such as, tamper indications, reverse flow, and no consumption data.

- Low cost of implementation and rapid ROI

The Neptune R900G endpoints are available in all current residential and top-mount commercial meters for American, Equimeter, and Actaris natural gas meters

Figure 1 R900G Endpoint

R900G Programming

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

Serial number - Each R900 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 metrology reads - The R900 module reads the meter metrology every 14 seconds.

- Time between R900 module transmissions - The time between R900 module transmissions is set for approximately 14 seconds. Custom time intervals are not available

Field progammable features are the following:

Existing index reading

Pressure compensation

Test hand registration

RF Protocol Error Detection

The Radio Frequency (RF) protocol is comprised of a header, data packet, and an error detection mechanism that reduces the possibility of erroneous data.

RF Frequency Control Algorithm

The R900 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.

The R900 module avoids 914 MHz to prevent potential collisions with the Advantage probe.

RF Transmission Period and Randomness

The random period generation uses the same random seed created for the channel definition to generate the transmission randomness. The randomness algorithm is defined so that no two consecutive transmissions from the two R900 modules will interfere with one another.

R900 Module Range and Read Success Rates

The R900 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 indications, such as, removal.

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	910-920 MHz
Output Power	Meets FCC Part 15.247
FCC Verification	Part 15.247
FM Approval	Class 1, Division 1

[1]This feature may result in a minor discrepancy between the actual reading on the register and the reading on the hand-held or mobile unit. The discrepancy results from a time lapse up to an hour between the time the MIU reads the encoder and the time the MIU is read. This discrepancy will be corrected within the next hour when the MIU takes a new reading

Specifications - R900G MIU

Environmental Conditions

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

Dimensions and Weight

Dimensions	Refer to Figure 2
Weight	1.0 lbs. (454 grams)

Figure 2 R900G MIU Dimensions

Meter Compatibility

All Current Residential and Top-mount Commercial American, Equimeter, and Actaris

3 General Installation Guidelines

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

Tools and Materials

Tables 1 and 2 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 1 Recommended Tools

Item	Description/ Recommendation	Use
Tool Kit	Contains standard tools including: • Assorted screwdrivers • Assorted allen wrenches	Various installation procedures performed by the utility
IR programming device	CE5320X	To Program the index, etc.

Table 2 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 water 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

American Models AM-175/250

Index Removal

Complete the following steps for index removal.

1 Use a flathead screwdriver to puncture and remove the tamper plugs, if present.

2 Use a large screwdriver to remove and discard the four lens mounting screws and the lens.

3 Remove the gasket.

4 Use a small screwdriver to remove the index mounting screws and the index.

Mounting of Index to R900G Endpoint

Complete the following steps to mount the index to a R900G Endpoint.

Carefully mate the drive dog from the index to the drive dog of the R900G Endpoint.

2 Secure the index to the module using the two index screw from Step 4 in the previous section.

3 Place clear plastic covers over the front of the unit.

4 Use the four mounting screws that are supplied to attach the entire assembly to the gas meter main case.

5 Program the installation.

6 Test the installation

7 Place new tamper plugs over the screws.

Index

R

S

T

V

W