FCC Part 15.247 Certification
Test Report

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Manufacturer: Neptune Technology Group, Inc.
Equipment Type: Utility Meter Data Transmitter
Model: E-Coder R900

Manual

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E-Coder R900 Wall and Pit
Installation and Maintenance Guide

E-Coder™) R900

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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.

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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1 Product Description

This section provides a general description of the Integrated E-Coder R900 MIU register (subsequently referred to Integrated E-Coder R900 MIU). The Integrated E-Coder R900 MIU by Neptune is an integrated register that contains both the E-Coder and R900 technologies in one register that collects meter reading data. It then transmits the data for collection by the meter reader. A walk-by handheld, mobile or fixed network unit receives the data and stores it to be downloaded into the utility billing system for processing.

The Integrated E-Coder R900 MIU is easily installed and operates within an RF band which does not require an operating license. The Integrated E-Coder R900 MIU meets FCC regulations part 15.247, allowing higher output power and greater range. The Integrated E-Coder R900 MIU uses frequency-hopping spread spectrum technology to avoid RF interference and enhance security. The transmitted data is updated at 15 minute intervals and is transmitted every 14 seconds. A unique 10-digit MIU ID is included in the transmission of data. This allows the meter to be read by a walk-by handheld, mobile or fixed network data collection units. The Integrated E-Coder R900 MIU is designed to offer advantages to utility organizations of all sizes:

- Increases meter reading accuracy
- Eliminates "hard to read" meters
- Protects utility liability by increasing meter reader safety
- Requires no external wiring or programming
- Provides enhanced 8-digit AMR meter reading
- Provides proactive customer service benefits (leak, tamper and backflow detection)

Figure 1 Integrated E-Coder R900 MIU Picture

Integrated E-Coder R900 MIU Programming
The Integrated E-Coder R900 MIU is NOT field-programmable. At the factory, each of the following items is programmed into the MIU:

- Serial number – Each MIU is given a unique serial number/identification number.
- Time between MIU transmissions – The time between MIU transmissions is set for approximately 14 seconds. Custom time is not available.

RF Protocol Error Detection
The RF protocol is comprised of a header, data packet, and an error detection mechanism that reduces the erroneous data.

RF Frequency Control Algorithm
The MIU'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 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 two MIUs will interfere with one another.

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2 Specifications

This section provides you with the specifications for the Integrated E-Coder R900 MIU.

Electrical Specifications

Transmitter Specifications

Power: Lithium battery
Transmit Period:

- Every 14 seconds - Single register configuration

Transmitter Channels: 50
Channel Frequency: 910-920 MHz
Output Power Meets: FCC Part 15.247
FCC Verification: Part 15.247

Environmental Conditions

Functional Specifications

Dimensions and Weight

Figure 2 E-Coder)R900 Basement Version Dimensions

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
Register Reading: 3-8 digits
MIU ID: 10 digits
Dimensions: Refer to Figure 2
Weight: 1.08 lbs or 490 grams

3 General Installation Guidelines

This section describes tools, materials, and general installation information for the R900 MIU.

Tools and Materials
Tables 1 and 2 show the recommended tools and materials you may need to successfully install the Integrated E-Coder R900 MIU or to replace the MIU's 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:
• Screwdrivers
• Hammer
• Flashlight

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 How to activate LCD using the light sensor

The light sensor is recessed under the small round hole near the center of the dial face. The hole is marked with a light bulb graphic (see figure). The light sensor activates the LCD display for several minutes when the unit is exposed to a light source. For example, a unit mounted in the basement would turn on the LCD for several minutes after the room light is turned on. A unit mounted in an outside pit would turn on the LCD for several minutes after the pit lid is opened exposing the unit to daylight. If the LCD is currently off, the LCD may be reactivated by covering the dial plate with your hand for about two seconds. In bright sunlight, it may be necessary to close the cover or the pit lid momentarily. If the LCD does not reactivate as expected, try shining a flashlight on the light sensor.

5 How to Read

It is important to become familiar with the information available from the meter. To identify this information the following icons and displays are helpful.

Table 2: Icons and Displays

Photo Cell, located inside the circular hole designated with the light bulb icon on the face of the Integrated E-Coder R900 MIU, supplies the method top activate the LCD. It is activated by light.

Flow/Leak Indicator shows the direction of flow through the meter:
ON Water in use
OFF Water not in use.
Flashing Water is running slowly/low flow indication.
Leak indicator displays a possible leak:
OFF No leak indicated.
Flashing Intermittent leak indicated.
Water used during at least ½ of the 15-minute intervals in the last 24 hours (96 15-minute intervals in a 24-hour period).
Continuous
ON
Continuous leak indicated.
Water used during all 15-minute intervals in the last 24 hours.
Nine-digit LCD displays the meter reading in billing units of gallons or cubic feet.
Last **three** digits Testing units used for meter testing.
Fifth & Sixth reading digits
Reading units.
First **four** digits
Typical billing digits.

6 Common Causes of Leaks

If the leak indicator is flashing or continuously on, the E-Coder)R900 is indicating that a possible leak may exist. Leaks can result from various circumstances. To better help you identify a possible leak, the following table contains some common causes of leak problems that can occur:

Table 3: Possible Leaks

Possible Cause of Leak
Intermittent Leak
Continuous Leak
Outside faucet, garden or sprinkler system leaking
Toilet valve not sealed properly
Toilet running
Faucet in kitchen or bathrooms leaking
Ice-maker leaking
Soaker hose in use
Leak between the water meter and the house.
Washing machine leaking
Dishwasher leaking
Hot water heater leaking
Watering yard for more than eight hours
Continuous pet feeder

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7 How to tell if water is in use

To determine if water is in use, complete the following steps:
1 Check the flow indicator, by watching for two minutes.
2 Determine the following conditions:
• If the arrow is **Flashing**, then water is running very slowly.
• If the arrow is continuous **ON**, water is running.
• If the arrow does not flash, water is not running.

8 What to do if there is a Leak

The following checklist can be helpful if the E-Coder leak indicator shows a possible leak:
Water-cooled air conditioner or heat pump
Filling a swimming pool
Any continuous use of water for 24 hours

Table 4: Checklist for Leaks

Check all faucets for possible leaks.
Check all toilets and toilet valves.
Check the ice maker and water dispenser.
Check the yard and surrounding grounds for a wet spot or indication of a pipe leaking.

Table 3: Possible Leaks

Possible Cause of Leak
Intermittent Leak
Continuous Leak

9 If Continuous Leak is repaired

If a continuous leak is found and repaired, complete the following steps:
1 Use no water for at least 15 minutes.
2 Check the leak icon.
3 If the leak is OFF, then a leak is no longer indicated.

10 If Intermittent Leak is repaired

If an intermittent leak is found and repaired, complete the following steps:
1 Check the leak icon after at least 24 hours.
2 If the leak has been correctly repaired, the leak icon changes from **Continuous ON** to **Flashing**.

11 Software

A software update is required for EZRoute or RouteMAPS to interpret the advanced feature data communicated from the Neptune E-Coder)R900.

12 Basement Version Installations

This section describes storage and unpacking instructions, preliminary tests, tools, materials, site selection, and installation of the E-Coder)R900 Basement version MIU.

Prior to Installation

Storage
Upon receipt, inspect shipping containers for damage, and inspect the contents of any damaged cartons prior to storage. Once the inspection is complete, store the cartons in a clean, dry environment. Keep in mind that the Integrated E-Coder R900 MIU has an external battery attached. Storage for more than one year may affect product life. Be sure to use a first-in first-out inventory control system. See "Environmental Conditions" on page 4. The unit should not be transmitting until the box is opened and the unit is exposed to a light source.

Unpacking
As with all precision electronic instruments, the Integrated E-Coder R900 MIU should be handled carefully; however, no additional special handling is required. After unpacking the Integrated E-Coder R900 MIU, inspect it for damage. If the unit appears to be damaged or proves to be defective upon installation, notify your Neptune Sales Representative. If one or more items require reshipment, use the original cardboard box and packing material.

Figure E-Coder)R900 Basement Version

Tools and Materials
Tables 1 and 2 on page 6 show the recommended tools and materials you may need to successfully install the Integrated E-Coder R900 MIU or to replace the MIU's external battery pack assembly.

Site Selection

Installation and operation in moderate temperatures increase reliability and product life. See "Environmental Conditions" on page 4. Follow these guidelines when selecting a location to install the Integrated E-Coder R900 MIU:

- The Integrated E-Coder R900 MIU must be installed in a vertical and upright position
- The selected location should be clear of all obstructions
- Avoid installing the MIU behind metal fences or walls
- Some items may not apply to your specific installation or the list may not contain all required tools or materials

Always follow your company's safety practices and installation guidelines when installing an Integrated E-Coder R900 MIU. Never perform an installation during a lightning storm or under excessively wet conditions.

Installing the E-Coder)R900 Basement Version MIU

The steps for installation with pictures will need to be added here.

Testing the Installation

To test the installation, complete the following steps.

1 Power up the handheld unit (HH) test device and start the testing programs provided.

2 When the Integrated E-Coder R900 MIU is installed correctly, its ID number(s) and a meter reading(s) appear on the display of the HH. Verify the correct meter reading(s) by comparing it to the meter's dial. If the readings are the same, proceed to the next section.

To avoid RF signal saturation of the HH, do one of the following:
- **Position yourself at least two to three feet from the Integrated E-Coder R900 MIU**
- **Remove the antenna from the HH**
-

3 If a meter reading does not appear on the HH's display, or the meter reading in the HH's display is not the same as the reading on the meter's dial:
- Make sure battery is properly seated correctly
- Reactivate the LCD by applying a light source to the light sensor
- Test the installation again

4 Verify that the requirements of the site work order have been met and that you have recorded all information.

5 Clean up the installation site before leaving.

13 Maintenance and Troubleshooting

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Replacing the MIU Battery (E-Coder)R900 Basement Version)

Follow these steps to change-out the basement version Integrated E-Coder R900 MIU's external battery assembly:

Removing the Battery Assembly:
1. Remove the tamper nail by using a small flat blade screwdriver and hammer. The blade of the screwdriver needs to be 1/8" to 3/16" wide.
2. Place the end of the screwdriver in the center of the tamper nail as shown in Figure .
3. Use the hammer to drive the screwdriver through the head of the tamper nail. The head of the tamper nail will shear off and the body of the tamper nail will fall out underneath the battery.

4.   Pull up on the battery housing to unsnap the battery.
5.   Slide the battery pack up over the antenna shaft.
6.   Snap in the new battery by sliding it down over the antenna (see Figure). Press down on the battery housing until you hear the snaps engage.
7.   Push in a new tamper nail (see Figure) until it snaps in place. Use of a hammer or other device may be necessary to force the tamper nail into position.
8.   Reactivate the MIU as shown in Figure 20 on page 16. For help with this procedure, refer to "Positioning and Activating the MIU" on page 16.

14 Contact Information

Within the United States, 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 is routed to the Neptune Support voice mail system. Please leave your name, the name of your company, your company's Personal Identification Number (PIN), and your telephone number. Calls are returned within business hours in the order they are 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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