NEPTUNE TECHNOLOGY GROUP

ARB UTILITY MANAGEMENT SYSTEMS WATER | ELECTRIC | GAS

R450 Wall and Pit User's Manual

ARB UTILITY MANAGEMENT SYSTEMS WATER | ELECTRIC | GAS

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Trademarks used in this manual

R450 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 condition that this device does not cause harmful interference.

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.

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.

R450 Wall and Pit MIU User's Manual

Literature No. UM R450 09.06

Part No. XXXXX-XXX

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1 Product Description

This section provides a general description of the R450 Meter Interface Unit (subsequently referred to as R450 MIU or MIU).

The R450 MIU by Neptune is a compact electronic device that collects meter reading data from an encoder register. It then transmits the data for collection.

The R450 MIU is easily installed and requires an Federal Communications Commission (FCC) license to operate.

Figure 1 Wall MIU

Figure 2 Pit MIU

Product Description

R450 MIU Programming

The MIU is NOT field programmable. At the factory, each of the following items are programmed into the MIU:

Serial numbers – Each MIU is given two unique serial numbers/identification numbers (two IDs for compound units). Even numbers are given to the single registers and odd numbers are given to a two-networked registers unit. Custom serial numbers are 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.

Low Battery RF Emissions

The MIU stops RF transmissions when the battery discharges below the normal operating voltage.

2 Specifications

This section provides you with the specifications for the R450 MIU.

Electrical Specifications

Encoder Register Interface

Supported Encoder Maximum Cable Length

Neptune ARB® V[2]	300 feet (91 meters)
Neptune ProRead (ARB® VI) and E-Coder (ARB® VII)	500 feet (152 meters)
Invensys ECR II®and ECR III®[3]	200 feet (61 meters)
Networked Neptune ProRead (ARB VI) / E-Coder (ARB VII)	250 feet (76 meters)

[2]The length, which meets manufacturers' published specification for wire length between encoder and remote receptacle, is based on solid 3 conductor wire, 22 AWG.

[3]Only specific formats of ECRIII programming are compatible. Contact Neptune for details.

Specifications - R450 Pit 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

Register Reading	8 digits
MIU ID	9 digits

Dimensions and Weight

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

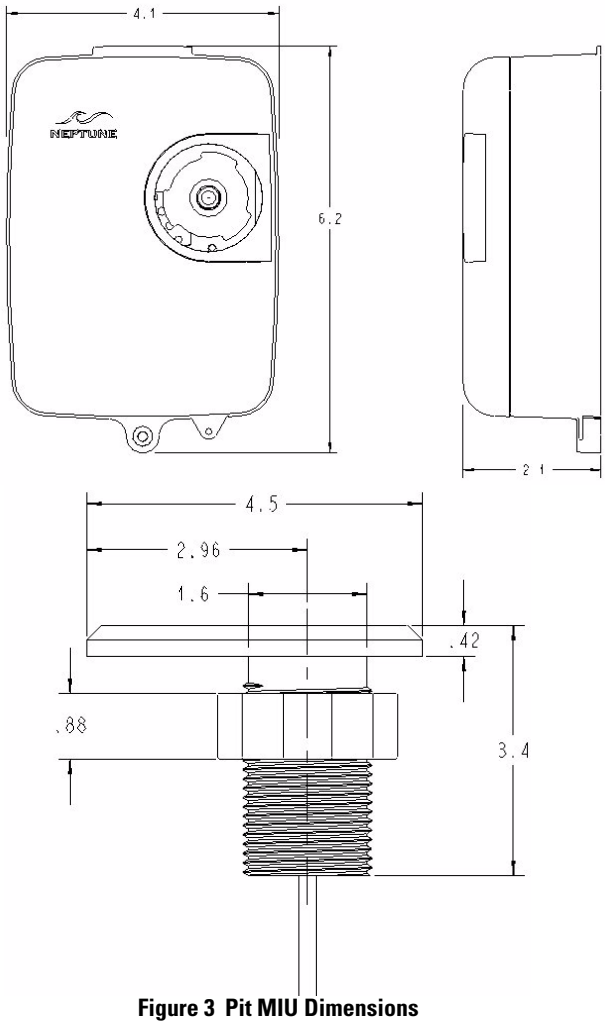

Figure 3 Pit MIU Dimensions

Specifications - R450 Wall 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

Register Reading	8 digits
MIU ID	9 digits

Dimensions and Weight

Dimensions	Refer to Figure 4
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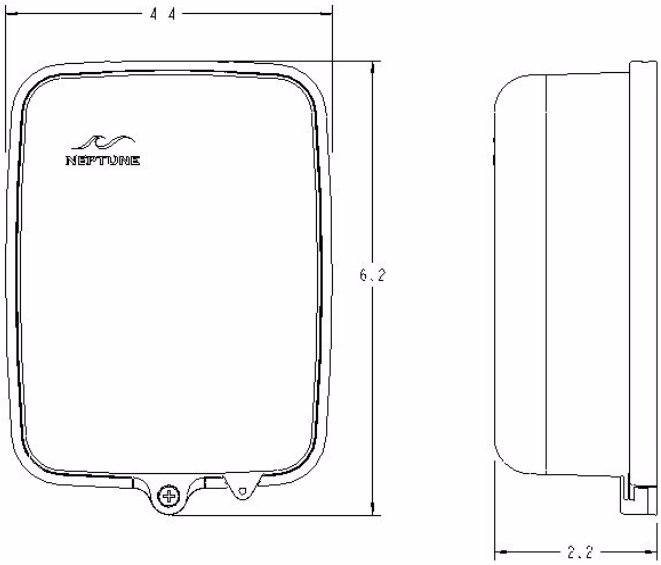


Figure 4 Wall MIU Dimensions

3 General Installation Guidelines

This section describes tools, materials, and general installation information for the R450 MIU.

Tools and Materials

Tables 1 and 2 show the recommended tools and materials you may need to successfully install the R450 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 • Needle-nose pliers • Wire stripper • Diagonal cutters • Electrician's knife • Hammer • Crimping Tool Part #: 5500-158	Various installation procedures performed by the utility
Magnet	6 lb. force Part #: 12287-001	Activating the MIU

Table 2 Recommended Materials

Item	Description/Recommendation	Use
Cable	Solid 3 conductor, #22 AWG (black/green/red) Part#: 6431-352	Connecting MIU to encoder register
Moisture protection compound	Novaguard sealant Part #: 96018-072	Covering exposed wires and terminal screws on register and MIU

Table 2 Recommended Materials

Item	Description/Recommendation	Use
Scotchloks	Part #: 8138-125	Splicing replacement battery wire and connecting Wall MIU or replacement Pit MIU to encoder register
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.

Verifying/Preparing the Encoder Register

This R450 MIU is designed for use with the following encoder registers:

- ARB III, IV, and V
- ProRead (ARB VI)
- ProRead AutoDetect
- E-Coder (ARB VII)
- Invensys ECRII, ECR III *

*when programmed in ECR II 6-wheel format

Before installing an MIU, the encoder register must be correctly wired and/or programmed to work with the MIU. ProRead (ARB VI) encoder registers do not require programming.

When a ProRead (ARB VI) encoder register is used, the non-AutoDetect ProRead (ARB VI) register must be programmed for three-wire mode.

If connecting the MIU to a new ProRead (ARB VI) encoder register, or if a three-conductor cable is already connected to a ProRead (ARB VI) encoder register, ensure that the ProRead (ARB VI) register is programed for three-wire mode using the ProRead (ARB VI) programmer and its RF/MIU 6, 8, or 10ID TDI format. This can be accomplished through the ProRead (ARB VI) receptacle before removing the receptacle.

Installation of at Register (Non Pre-Wired or Potted Only)

1 Before wiring the pit encoder register, make sure the cable is long enough. Then, when the installation is complete, the pit lid can be removed easily without straining the cable.

2 Use only 22 AWG cable to make the connection from the encoder register to the MIU.

3 Remove the terminal screw cover from the encoder register.

4 Strip off 3/4" of jacket from the cable, leaving only the three insulated wires.

5 Taking precautions not to nick or cut the insulation on the three wires, strip off 1/2" of insulation from each of the three wires.

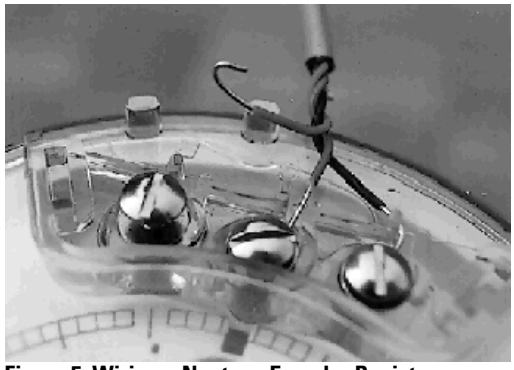


Figure 5 Wiring a Neptune Encoder Register

Table 3 MIU Color Code for Wires

Encoder Register	MIU Wire Color/ Encoder Terminal Marking		
Neptune ARB® III, IV, and V	Black / B	Green / G	Red / R
Neptune ProRead (ARB VI) E-Coder (ARB VII)	Black / B	Green / G	Red / R
ECRII® and ECRIII®	Black / R	Green / B	Red / G

6 If required, connect the 3 conductor wire to the encoder register's terminals per the manufacturer's instructions. See Figure 5 and Table 3.

7 Thread the cable around the strain relief posts of the encoder (Figure 6).

Figure 6 Cable Threaded Around Strain Relief Posts

8 Apply sealant liberally and ensure that it encapsulates the terminal screws and exposed wires. (See Figure 7).

Neptune requires Novaguard G661 sealant or Dow Corning compound 4.

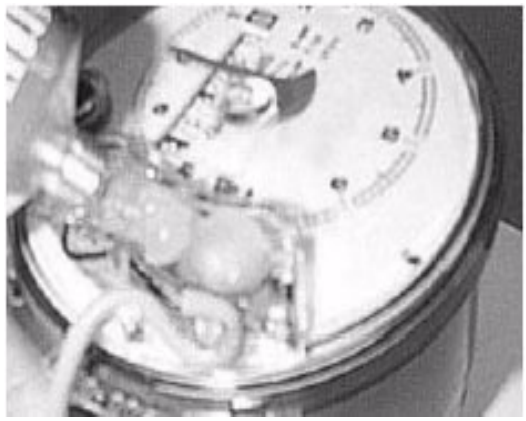


Figure 7 Application of the Sealant

Any leak point can cause a reading failure in a submerged meter setting.

9 Snap the cover onto the encoder register (Figure 8).

Figure 8 Covering the Terminal Screws

10 Run the cable to the MIU, fastening it securely as necessary.

Do not exceed maximum cable lengths as defined in Table 4.

11 If encoder register is pre-wired and potted, use Scotchloks for connecting register to MIU.

12 Proceed to the section specified for either Pit or Wall installation.

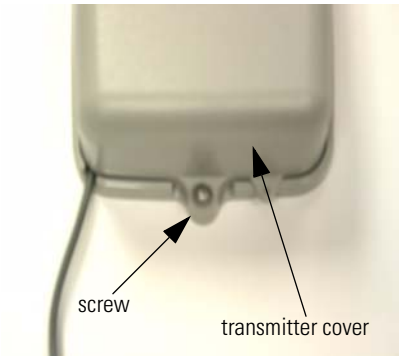
4 Replacing the MIU Battery (Wall and Pit)

Follow these steps to change-out the pit R450 MIU's internal battery:

Removing the Battery

1 Slowly remove the pit lid.

Because the MIU is connected to both the antenna in the pit lid and the meter in the pit base, take care not to strain the cable when removing the lid.



2 Remove the transmitter cover by removing the two Phillips head crews located inside the back cavity of the main housing. (See Figure 9.)

3 Lift the transmitter cover from the MIU.

Figure 9 Removing the MIU Transmitter Cover

4 Remove the battery casing from the main housing by inserting a flat-head screwdriver and dislodging the battery from the battery compartment. (See Figure 10.)

Figure 10 The Battery Compartment

When removing the battery, it may be helpful to press on the connected end while prying the other end.

Cutting and Splicing the Battery Wires

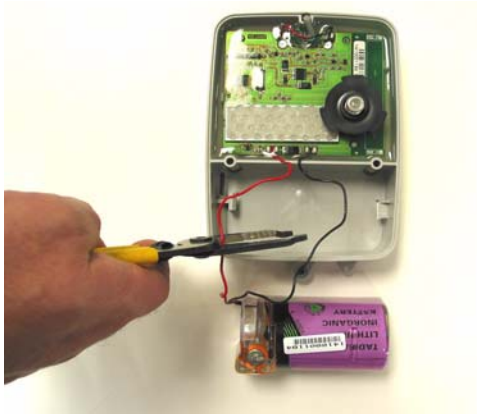


Figure 11 Cutting the Battery Connection

1 As close to the battery casing as possible, cut the battery connection wires one at a time. See Figure 11.

2 Insert battery wire left in MIU ensuring insulation has not been compromised.

Cutting the battery connection wires one at a time prevents shorting.
Ensure the R450 MIU's black wire is connected to the black wire on the new battery (-) and the red wire is connected to the red wire on the new battery (+).

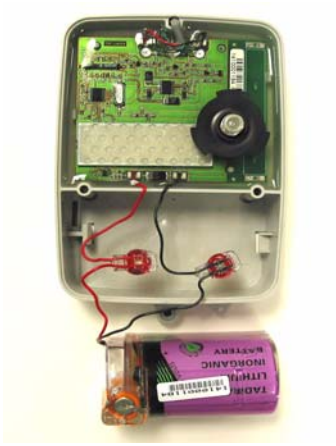


Figure 12 Splicing the New Battery

3 Use Scotchlok to splice the wires from the new battery casing to the wires that were connected to the old battery casing. See Figure 12.

Figure 13 Location of Toroid

4 Be sure to carefully position wires and Scotchloks into compartment in space available next to battery as shown in Figure 13, making sure the wires are not pinched when the battery is snapped into the MIU housing.

Figure 14 Returning Spliced Battery to Main Housing

5 Snap the battery casing into the receiving clips on the main housing. See Figure 14.

6 Reactivate the MIU as shown.

Replacing the Transmitter Cover

1 Secure the transmitter cover using the two Phillips head screws, until the cover is snug and fully seated.

Be careful not to pinch the battery wires between the cover and the housing.

2 Replace the pit lid.

Replacement Parts

Table 4 lists the available replacement parts for the R450 MIU.

Table 4 Available Replacement Parts

Part Name	Part Number
Solid 3 conductor wire, 22 awg (1000 ft.)	6431-352
Dow Corning #4 compound (5.3oz tube)	96018-064
GE Novaguard (4cc Packet)	96018-072
Scotchloks (UG)	8138-125
Battery Assembly	12213-100
Mounting Adapter	12539-001
Fastener Screw	8328-302
Magnet	12287-001
Antenna	12527-000
Flat Washer	8340-054

Notes:

Glossary

antenna (pit)	The MIU antenna used for pit installations.
conical-shaped gasket	The cone-shaped rubber gasket on antenna cable used to seal cable at top of connector housing.
connector housing	The black plastic 1/4-turn connector used to waterproof antenna cable connection to pit MIU.
connector nut	The black plastic nut used to depress conical-shaped gasket and seal antenna cable at the top of connector housing.
flat washer	The washer used to seal cable connector housing to pit MIU.
main housing	The main body of the MIU that attaches to the mounting adapter.
main housing fastener screw	The set screw (Hi-Lo fastener) that holds the main housing to the mounting adapter.
maximum cable length	The length set by the manufacturer for the wire between the encoder and the remote receptacle. The specifications for this length are based on a solid 3 conductor wire.
MIU	Meter Interface Unit.
mounting adapter	The back plate of the MIU that is attached to the wall.
register read time	The default time is once an hour for ProRead and 15 minute interval for E-Coder (ARB VII). Custom time is not available.
seal wire	Wire inserted into the seal holes, adjacent to the main housing fastener screw. This seal must be broken to remove the main housing from the mounting adapter.
serial number	A 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.
strain relief posts	Posts located on the encoder register and the back of the main MIU housing.

terminal screw cover	The plastic cover on the encoder register that protects the terminal screws and exposed wires.
terminal screws	The screws on the encoder register face that are used to connect and anchor the three (3) conductor wire to the register.
transmission time	The time between MIU transmissions. The default is approximately fourteen (14) seconds. Custom time is not available.

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