Mueller SYSTEMS

Mi.Node M
Installation Manual

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FCC Information:

Changes or modifications not expressly approved by the Mueller Systems could void the user's authority to operate the equipment.

IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

IC Information

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

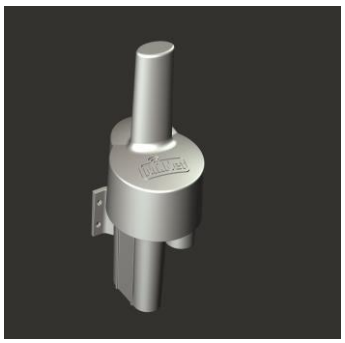
Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

1. Introduction

The Mueller Systems Mi.Node M is intended for indoor and outdoor use as an unattended Automatic Metering Infrastructure (AMI) and control device. The Mi.Node M is fully self-contained and battery powered device with no user accessible controls.



The Mi.Node M for Residential Metering ("Mi.Node M") is a device that incorporates a microcontroller, 915MHz ISM band transceiver (simplex operation), and battery (DC power supply) for the purpose of logging and forwarding water meter readings to the Mueller Systems servers. The readings are forwarded to server via other Mi.Node M, Mi.Hub data collectors, or Smart Meters at assigned times. The Mi.Node M will also autonomously send messages to the server when various events or alert conditions are detected, such as potential leak or theft of service.

Meter reading interval is remotely settable. Information retrieved from the meters registers are temporarily stored within the Mi.Node M's solid-state memory. On a specified interval, the Mi.Node M will automatically transmit this information to the Mueller Systems AMI server via other meters or MIHUBs using the Radio Frequency (RF) network. The Mueller Systems AMI server analyzes and archives the readings.

The contents of this installation manual are intended for technically qualified personnel of water and energy distribution utilities who have been trained and are technically qualified in local safety procedures for installation of the device.

2. Construction

The Mi.Node M product consists of a printed circuit board which is encapsulated to provide complete protection against shock and water intrusion. The enclosure is made of UV stable, high density thermoplastic and is completely waterproof. The UV stable, thermoplastic housing design provides a compact, waterproof enclosure that is lightweight and easy to handle and install. The Mi.Node M has integral mounting brackets for both pit and wall installations. One D size lithium battery provides plenty of power for reading the register and sending RF data.

- In order to protect the AMI device electronics from moisture ingress the design incorporates the use of thermoplastic injection molded housings, rubber seals, a potting compound that completely incases the internal electronics and a coated circuit board which combine to provide a formidable barrier of protection against water intrusion.
- Internal wire strain relief has been built into the housing to protect the wire connections against damage. Please note that meters or registers should never be carried while supported only by the Mi.Node M transmitter or wiring.
- A monopole antenna is located in the upper housing to provide powerful RF communication.
- A single D cell long life Lithium battery is located in the lower housing which provides power for register interrogation and data transmission for a calculated battery life of up to 20 years.

- There are no customer serviceable parts inside the Mi.Node M housing. Batteries are not replaceable.
- The electronic design utilizes the latest RF microchip technology which increases reliability when compared to older RF designs.

3. Installation

Mi.Node M modules support two mounting options, either mounting to a ½" PVC pipe for pit set installations or affixed to the side of a building. Pit set installations require no drilled holes through the lid and are mounted beneath the polymer meter box lid for security and ease of installation on PVC pipe. Surface mounts are easily accomplished with the integral mounting brackets and two screws (not included).

3.1 Pit Set Installation

⚠ Please note that meters or registers should **never** be carried while supported only by the AMR transmitter or wiring.

Tools Required: Length of ½" PVC pipe for pit depth, hammer

1. PVC pipe should be cut to the proper length and installed deep enough in the floor of each meter box that subsequent flooding will not allow the stake and Mi.Node M to change position. The Mi.Node M includes a ½" female PVC pipe fitting for easy pit installation.
2. For maximum radio performance, once installed, the top of the transmitter should be located approximately ½" inch below the pit lid in the center of the meter box to maximize RF performance.
3. Once the PVC stake is installed, the Mi.Node M should be pushed down onto the stake by hand until the interference fit engages securely. Two solid stops are molded into the PVC Installation Slot in order to prevent the wire from being pinched when installed.

   ⚠ ***Never hammer Mi.Node M onto the stake*** since this may result in damage to the electronic components inside the unit.
4. Always mount the Mi.Node M in a vertical orientation, with the antenna compartment on top and the battery compartment on the bottom.

3.2 Exterior Wall Mounting

⚠ Tools required: 1 – 1 1/2 inch galvanized, or stainless wood or sheet metal screws (2 per), Phillips screwdriver

1. The open ended wire from the device permits routing through interior walls for external wall mounting when required or direct mounting to exposed floor joists above grade level.

2. Mi.Node M can be directly mounted to almost any flat surface by using the holes shown and common screws in most instances.
3. Vertical orientation of the device is required to maximize RF performance.

3.3 Wiring

Tools Required: 3M-2Y connectors, splitting tube, and a 3M Crimping Tool

Mi.Node M	Red	Green/White	Black
Translator Register	Red	Green/White	Black
Badger ADE Register	Red	Green	Black
Sensus ECR and ICE Registers	Red	Green	Black
Neptune PRORead, AUTORead, E-Coder Registers	Black	Red	Green

Table 1. Mi.Node M Meter Interconnect

3.4 Verification

Following installation the Mi.Tech Hand-held should be used to verify proper installation and operation. Please refer to the Mi.Tech manual.

4. Maintenance

There are no user serviceable items within a Mi.Node M. The battery is sealed within the module and is not replaceable. No cleaning is required.

5. Product Labeling

5.1 Product and FCC/IC Identification

This label is affixed to the face of the Mi.Node M unit. This allows the installer to easily scan the label with the Mi.Tech handheld computer during the installation process. This label includes the Date of Manufacture, the Hardware Version and the Mi.Node M/Serial Number (Node ID) that is used to uniquely address the device and Assembled in USA. The FCC ID is SM6-MINODE-M.

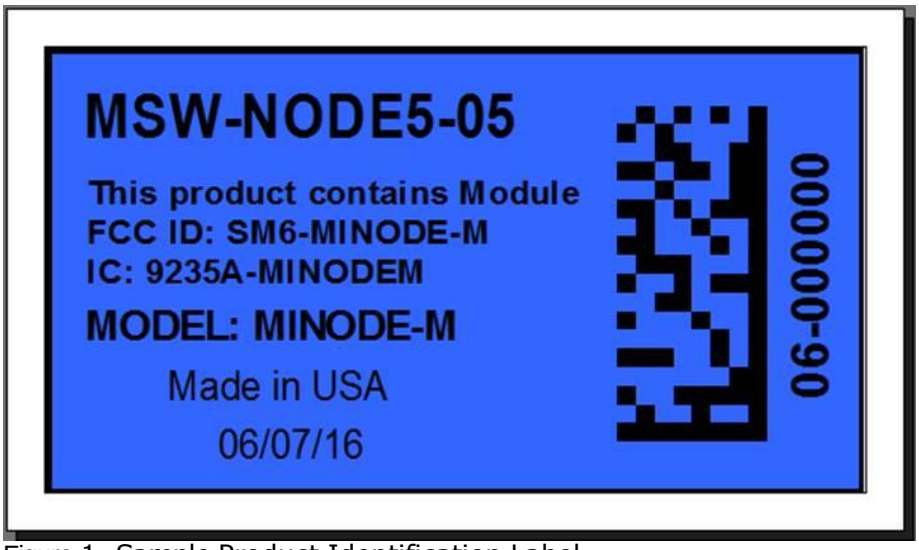


Figure 1. Sample Product Identification Label

5.2 IC Information

This AMI transmitter, model Mi.Node M, operates in the license exempt 902 MHz to 928 MHz ISM band and is certified for operation in Canada. The IC ID is 9235A-MINODEM. Information pertaining to the certification can be found on the web at http://www.ic.gc.ca/eic/site/ceb-bhst.nsf/eng/home.