ProSoft TECHNOLOGY

Where Automation Connects.

Multipoint Wireless I/O System

BM-xxxx-GM1K

March 4, 2020

USER MANUAL

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Multipoint Wireless I/O System User Manual
March 4, 2020

ProSoft Technology® Product Documentation

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Contents

1 Preface

Thank you for choosing the Multipoint Wireless I/O System.

This document describes the hardware components and how to install and operate the Multipoint Wireless I/O radios (Gateways).

This document also describes how to maintain and troubleshoot the device.

If you have any questions about this product, please call or email:

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CAUTION: Field wiring connections shall be made in accordance with Article 504 of the National Electrical Code, ANSI/NFPA70.

CAUTION: The Gateway must be installed within an enclosure that requires a tool to access. This is to prevent inadvertent disconnection of any of the power wiring, signal wiring or communication cables.

ATTENTION: Le Gateway doit être installé dans une enceinte qui nécessite un outil d'accès. Ce est pour éviter toute déconnexion accidentelle de l'un des câbles câblage de puissance, câblage ou de communication signaux.

WARNING: Ensure installation of the Gateway meets applicable state and national electrical code requirements. The installation of the Gateway should only be performed by a qualified installer or a factory representative.

AVERTISSEMENT: Veiller à l'installation de la passerelle répond Etat et des exigences nationales de code de l'électricité. L'installation de la Gateway ne doit être effectuée par un installateur qualifié ou un représentant de l'usine.

WARNING: To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

AVERTISSEMENT: Pour éviter l'inflammation d'atmosphères inflammables ou combustibles, débrancher l'alimentation avant l'entretien.

WARNING: EXPLOSION HAZARD – Substitution of components impair suitability for Zone 2.

AVERTISSEMENT: RISQUE D'EXPLOSION - Le remplacement de composants nuire à la conformité pour la Zone 2

WARNING: EXPLOSION HAZARD – Do not separate/disconnect connectors when energized.

AVERTISSEMENT: RISQUE D'EXPLOSION - Ne pas séparer / débrancher les connecteurs lorsque excité.

WARNING: EXPLOSION HAZARD – Do not use USB connectors in hazardous area.

AVERTISSEMENT: RISQUE D'EXPLOSION - Ne pas utiliser les connecteurs USB en zone dangereuse.

WARNING: EXPLOSION HAZARD – Do not service when an explosive atmosphere is present.

AVERTISSEMENT: RISQUE D'EXPLOSION - Ne pas service lorsque une atmosphère explosive est présente.

WARNING: EXPLOSION HAZARD – Do not use reset switch in hazardous area.

AVERTISSEMENT: RISQUE D'EXPLOSION - Ne pas utiliser le commutateur de réinitialisation en zone dangereuse.

Note: This equipment is suitable for use in Class I, Division 2 Groups A, B, C, and D or non-hazardous locations only.

1.1 Document Revision Level

This section provides a history of the revision changes to this document.

Revision	ECO Number	Date	Description
		4-Mar-2020	'MMCX' antenna connector references changed to 'SMA'
		24-Aug-2016	Added Wiring Examples
-		10-Feb-2016	Initial release

1.2 COMPLIANCE

1.2.1 Important Information to the User

- This device MUST be professionally installed only by a factory representative or a trained authorized technician.
- Changes or modifications not expressly approved by the manufacturer may void the user's authority to operate the equipment.
- This BM-0900-GM1K and BM-2400-GM1K 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.
- The BM-0900-GM1K contains a FHSS (Frequency Hopping Spread Spectrum) and FSK (Frequency Shifting Key) modulation RF transceiver for the 902-928 MHz ISM band, designed to meet FCC 15.247, and is used in industrial control and monitoring applications.
- BM-2400-GM1K operates in 2.4GHz band.
- The BM-0868-GM1K is ETSI compliant and operates in the 868MHz band. It is not FCC compliant.
- The BM-0915-GM1K operates in the 900MHz band and is compliant with Australian RF regulations (RCM).

1.2.2 FCC RF Exposure

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

1.2.3 FCC Compliance Statement

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 communications 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 of the following measures:

- Reorient or relocate the antenna.
- Increase the separation between the equipment and receiver.
- Consult the manufacturer for technical help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or use of unshielded cables is likely to result in interference to radio and television reception. The user is cautioned that changes or modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

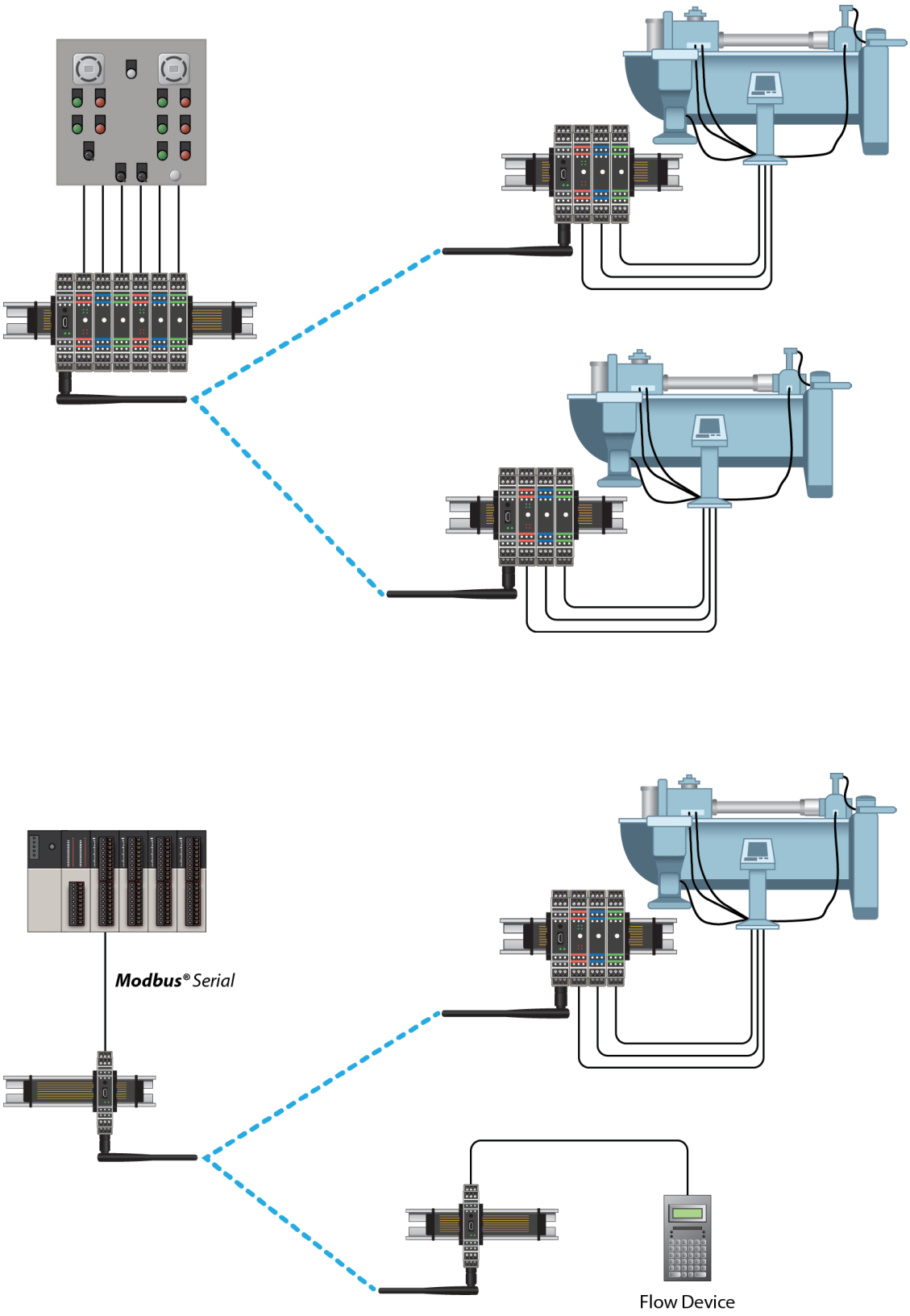
1.3 Certifications

C ETL LISTED US	Class I Division 2, Groups A, B, C, D T4 Ex nA nC IIC T4 Class I, Zone 2, AEx nA nC IIC, T4 Gc Tamb: -40 ˚C to +80 ˚C Power Supply: 9-30 Vdc Powered by Class 2 Circuit
CE Ex II 3 G	**ATEX** Sira 15ATEX4134X Ex nA IIC T4 Gc Tamb: -20 ˚C to +80 ˚C Power Supply: 9-30 VDC (24V Typical) 0.25A Peak, 0.20 Continuous. Power leads to terminals must be a maximum of 1 meter in length.
IECEx	**IECEx** SIR 15.0055X, Ex nA nC IIC, T4 Gc Tamb: -20 ˚C to +80 ˚C Power Supply: 9-30 VDC (24V Typical) 0.25A Peak, 0.20 Continuous

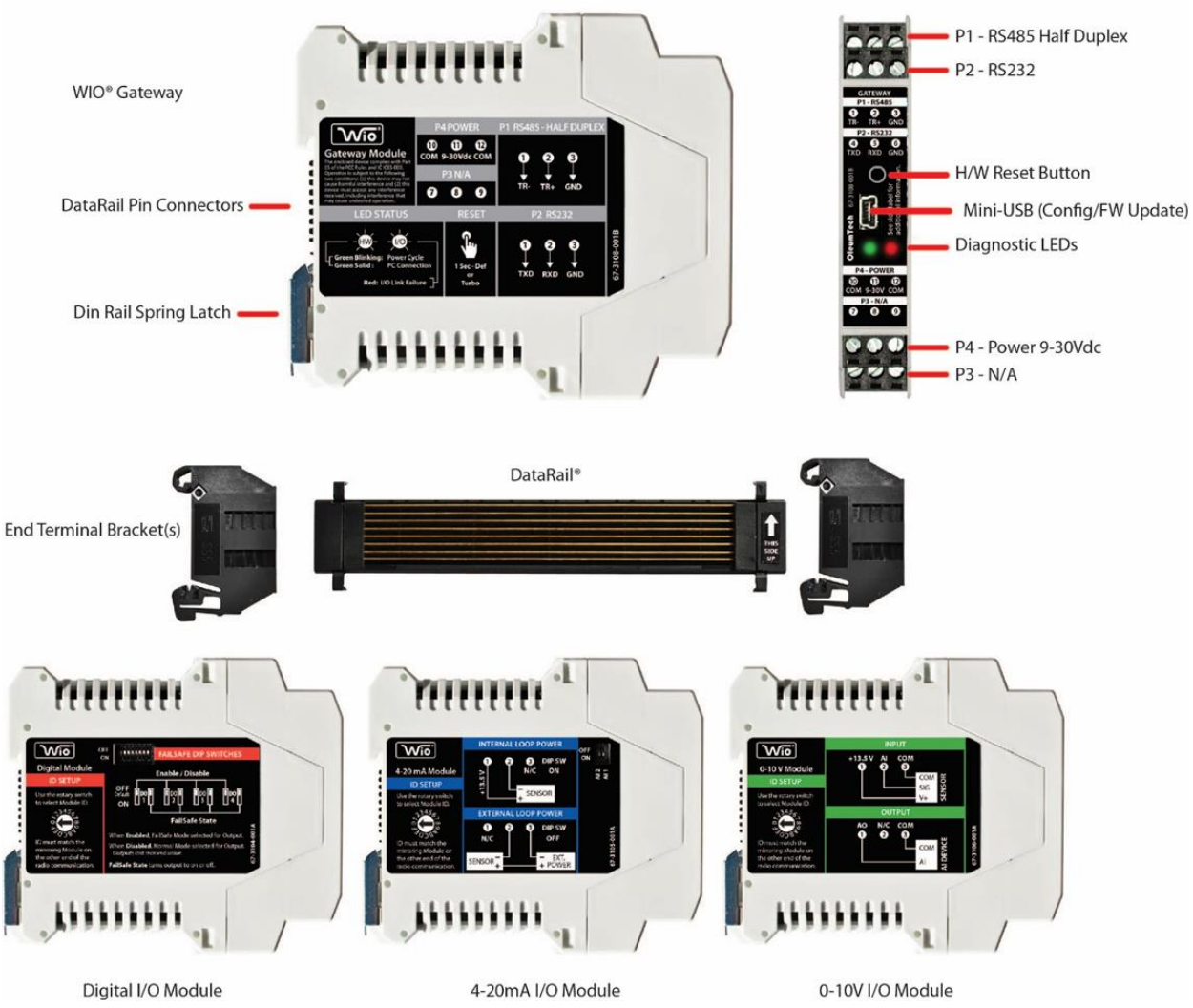
2 Product & System Overview

2.1 Product Highlights

- Wireless Gateway Functionality with Seamless I/O Expansion Capabilities
  - Virtually adds as many Gateways to a network for creating a highly scalable, efficient distributed I/O network
  - Point-to-Point, Point-to-Multipoint, Peer-to-Peer, Repeater Functions
  - Secure Over-the-Air Encryption (AES) and Site Authentication
  - 900 MHz, 868 MHz, or 2.4 GHz License-Free ISM Band
- Direct Interface to WIO I/O Expansion Modules via DataRail
  - Digital I/O Module, 4x DI + 4x DO, (Isolated)
  - 4-20 mA I/O Module, 2x AI + 2x AO, (Isolated)
  - 0-10 V I/O, 2x AI + 2x AO, (Isolated)
- Local Serial Interface
  - RS232 or RS485 (Software Selectable)
  - Modbus Master or Slave
  - 1920 Modbus Register Holding Table
- Ordered as a Kit: Includes DataRail® and Mounting Hardware
- 35 mm DIN Rail Required for Mounting (Sold Separately)


Modbus® Serial
Flow Device

2.2 Hardware Overview



Digital I/O Module | 4-20mA I/O Module | 0-10V I/O Module

2.3 Items Required for Setup

2.3.1 Gateway Setup

- WIO® Gateway
- DataRail® (for Interfacing WIO I/O Modules)
- 2x End Terminal Brackets
- DataRail Covers to protect any unused part of the DataRail
- External Power Source for Gateway (9-30 VDC)
- Antenna for Gateway (Bulkhead, Omni, or Yagi)
- Antenna Cable (N to SMA Connector)
- N to N Antenna Cable and Lighting Arrestor (Optional)
- External Enclosure for Gateway (NEMA)
- DIN Rail (35mm) Sold Separately

2.3.2 Other Device Setup

- WIO Digital I/O Module
- WIO 4-20 mA I/O Module
- WIO 0-10 V I/O Module

2.3.3 Configuration Cables

- Configuration: USB to Mini USB Cable 15 ft (WX-1001-CA2)

2.3.4 Software and PC

- Wireless I/O Designer Software vx.x or Higher
- PC with:
  - Microsoft Windows Vista or Later
  - 1 GHz or Faster Processor
  - 256 MB or More RAM
  - 20 MB Hard Disk Space or More
  - USB and/or Serial Port

2.3.5 Modbus Master

- Modbus Device (RS232 or RS485), RTU, PLC, HMI, etc...

2.3.6 Modbus Slave

- Modbus Slave Device (RS232 or RS485), RTU, PLC, HMI, etc...

2.3.7 Tools

- Screwdriver Set including Technician’s Screwdriver, Adjustable Wrench
- Any Other Tools Depending on Site and Equipment

2.3.8 Internet Access

- Internet access required for downloading Software, Firmware, or Documents

3 Configuration/Installation Sequence

3.1 Configuration

1. Download and install latest Wireless I/O Designer Software.

2. Check for latest Wireless Gateway Firmware on Download Center.

3. Create a Project File Using Wireless I/O Designer.

4. If upgrading Firmware, follow these instructions
   a. Physically Connect Gateway to PC and supply power
   b. Open Connect screen and click “Flash”
   c. Locate new Firmware file and click “Open”
   d. DO NOT DISCONNECT OR TURN POWER OFF while upgrading Firmware (It may take a few minutes for upgrading process to finish)
   e. Wait until LED turns off

5. Install WIO Gateway on DIN rail using supplied DataRail.

6. Attach desired I/O Modules to system (Modbus Slave ID).

7. Power up Gateway (9-30 VDC) and wait until boot-up sequence is complete. (LED will turn off once boot-up is complete)

8. Connect PC to Gateway.

9. USB to Mini USB Cable 15 ft (WX-1001-CA2).

10. Identify COM Port for use in Wireless I/O Designer (Device Manager).

11. Select a Gateway in Project Tree.

12. Update Gateway with Project File.

13. Confirm Gateway Configuration Download OK in Build Tab Window.

3.2 Installation

1. Install Gateway inside a NEMA or IEC enclosure
   a. Install WIO Gateway on DIN rail using supplied DataRail (DataRail optional for use with I/O Modules)

2. Attach desired I/O Modules to system (Modbus Slave ID) - optional

3. Follow best grounding practices (Section 4.2)

4. Setup and connect an Antenna with Lightening Arrestor to Gateway

5. Connect Gateway to third-party Serial device(s)

6. Power up Gateway

7. Power up/reboot any impacted sensors/devices if necessary

8. Verify RF and data communications
   a. Use Modbus Register Polling and Write features in Wireless I/O Designer
   b. Verify communication from third-party device(s) or SCADA system

3.3 LED States (Status Indicators)

#	State	Green LED
1	Booting up	Long blink + 5 short blinks
2	Device On or Off	Off
3	Connected to PC / Updating in Progress / Firmware Upgrade	Solid green
4	Device updated/programmed	Long blink + 5 short blinks
5	Device Failure	Continuous short blinks

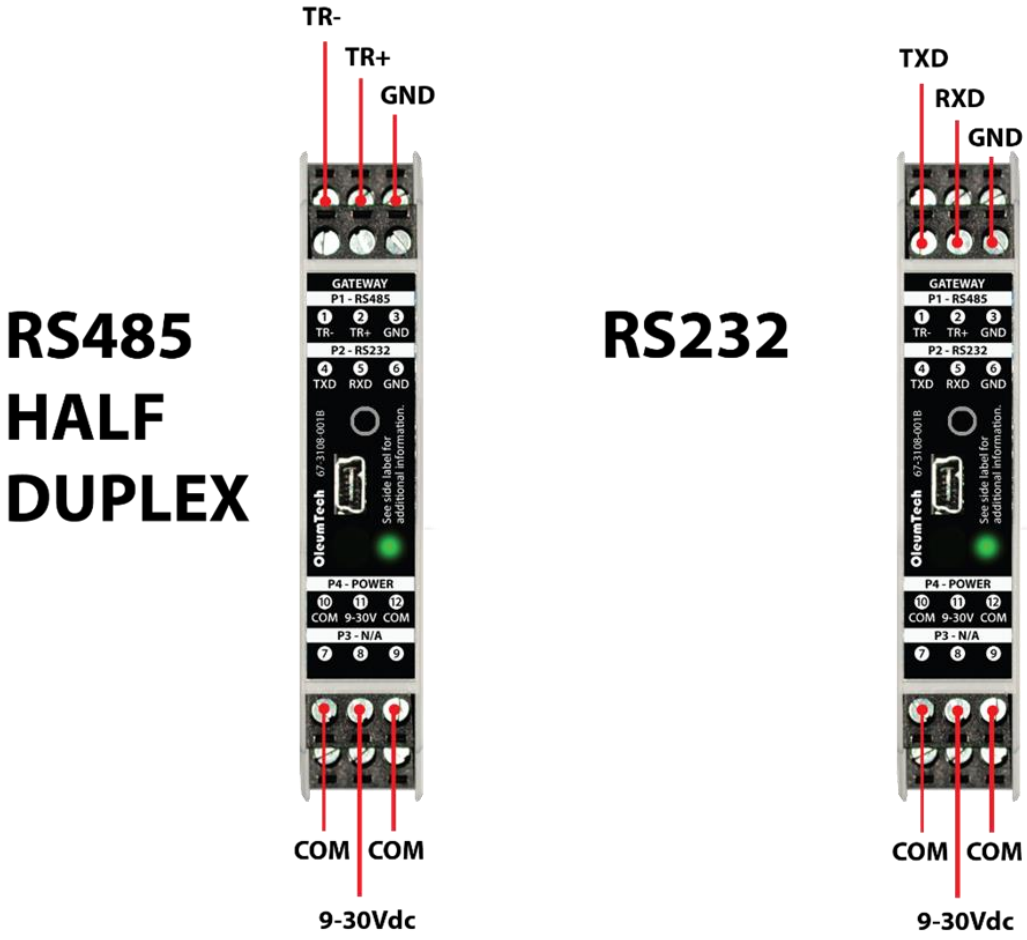
When device failure has occurred try following actions:

- Check power source
- Replace radio module
- Call Tech Support

4 Wiring Diagrams (Serial and Power)

Please use the following wiring diagrams and jumper settings to connect a third-party device to the Wireless Gateway.

4.1 Serial/RTU Port and Power



For CE certification, the power leads to the terminals must be a maximum of 1 meter in length.

4.2 Grounding Best Practices

It is important to effectively earth ground the Wireless Gateways and I/O Modules to ensure safety, prevent static electricity damage, and to provide protection from lightning and/or electrical surges in the area. Ensure the enclosures in which the Gateways or I/O Modules are mounted are properly earth grounded as defined by the NEC.

A true earth ground physically consists of a conductive pipe or rod driven into the earth. Rod electrodes shall not be less than 8 feet (2.44 m) in length and consist of the following materials and installed in the following manner:

- Electrodes shall be copper clad or their equivalent and shall be not less than 5/8 inch (15.875 mm) in diameter, or listed non-ferrous rods or their equivalent and not less than 1/2 inch (12.7 mm) in diameter.
- The electrode shall be installed such that at least 8 feet (2.44 m) of length is in contact with the soil. It shall be driven to a depth of not less than 8 feet (2.44 m). The electrode shall be driven at an oblique angle not to exceed 45 degrees from vertical or shall be buried in a trench that is at least 2 1/2 feet (.762 m) deep. The upper end of the electrode shall be flush with or below ground level. If ground end and the grounding electrode conductor attachment are above ground, ensure protection against physical damage.

Terre Des Meilleures Pratiques (Françias)

Il est important de efficacement TERRE Wireless Gateways et modules E / S pour assurer la sécurité, prévenir les dommages de l'électricité statique et la protection contre la foudre et / ou les surtensions électriques dans la région. Se assurer que les enclos dans lesquels les passerelles ou modules E / S sont montés sont correctement relié à la terre tel que défini par le NEC (National Electrical Code.

Une véritable prise de terre se compose physiquement d'un tuyau conducteur ou tige entraînée dans la terre. Électrodes de Rod ne sont pas moins de 8 pieds (2,44 m) de longueur et se compose des matières suivantes et installé de la manière suivante:

- Les électrodes doivent être en cuivre plaqué ou leur équivalent et ne doit pas être moins de 5/8 de pouce (15,875 mm) de diamètre, ou listé tiges non-ferreux ou leur équivalent et pas moins de 1/2 pouce (12,7 mm) de diamètre.
- L'électrode doit être installée de telle sorte que au moins huit pieds (2,44 m) de longueur est en contact avec le sol. Il est conduit à une profondeur d'au moins 8 pieds (2,44 m). L'électrode doit être conduit à un angle oblique de ne pas dépasser 45 degrés de la verticale ou sera enterré dans une tranchée qui est au moins 2 1/2 pieds (0,762 m) de profondeur. L'extrémité supérieure de l'électrode doit être de niveau avec ou au-dessous du niveau du sol. Si la fin du sol et le conducteur l'attachement de l'électrode de mise à la terre sont au dessus du sol, assurer une protection contre les dommages physiques.

4.3 Grounding Gateways

- Battery negative should never be common with earth ground.
- For fiberglass enclosures, the backplane inside may be connected to earth ground. Typically, there is a lug specifically for this connection. The equipment inside the enclosure however, should not be common with the backplane in this case.
- For steel enclosures, battery negative should not be common with the enclosure as the enclosure will usually be common with the pole supporting it (basically earth ground).

A. Where bulkhead (black phantom) antennas are used, the inner surface, outer surface, and inner wall of the hole drilled, should be isolated from the antenna. Use the rubber washers supplied by the manufacturer to isolate the antennas from the enclosures (use thickest washer on exterior side of enclosure).

B. Where external antennas, such as omni-directional and yagi, are utilized, a polyphaser is typically used. The actual connection between lightening arrestor and antenna cable should be isolated. The lightening arrestor itself has its own lug designed to be connected to earth ground.
    - Once all wiring and grounding recommendations have been followed it is important to test the ground resistance at the grounding rod to assure a good ground. The most effective grounding method is direct connection to earth ground with minimal impedance. An impedance of less than 5 Ohms is recommended.
    - For more details on proper grounding electrodes and grounding electrode conductors, consult the National Electrical Code.

CAUTION: Ensure field wiring connections are in accordance with Article 504 of the National Electrical Code, ANSI/NFPA70. For more details on proper grounding electrodes and grounding electrode conductors, consult the National Electrical Code.

Terre passerelles et modules E / S: (Français)

- Négative batterie ne doit jamais être commun avec la terre.
- Pour les enveloppes en fibre de verre, le fond de panier à l'intérieur peut être relié à la terre. Typiquement, il se agit d'un ergot spécifiquement pour cette connexion. L'équipement intérieur de l'enceinte ne devrait toutefois pas être commun avec le fond de panier dans ce cas.

A. Pour les enveloppes d'acier, négatif de la batterie ne doit pas être commun avec l'enceinte, l'enceinte sera généralement commun avec le pôle le soutenir (essentiellement de la terre).
   A. Où cloison (Phantom Black) antennes sont utilisées, la surface intérieure, la surface extérieure, et la paroi intérieure du trou foré, doit être isolé de l'antenne. Utilisez les rondelles en caoutchouc fournies par le fabricant pour isoler les antennes des enceintes (utiliser la plus épaisse rondelle sur le côté extérieur de l'enceinte).

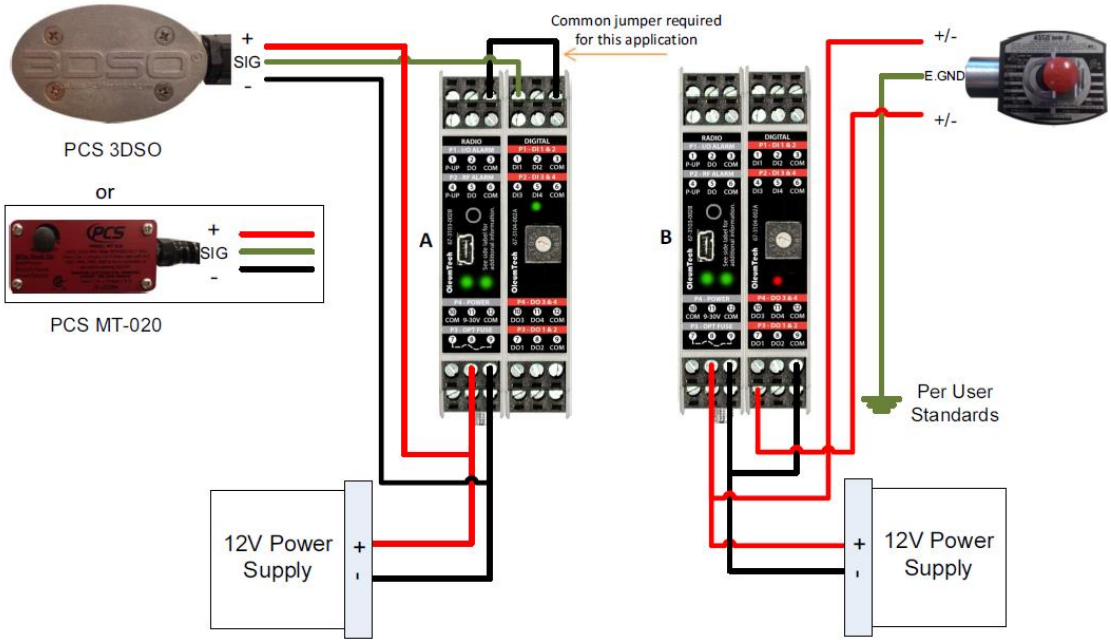
B. Lorsque les antennes externes, tels que omnidirectionnelle et Yagi, sont utilisés, un Polyphaser est généralement utilisé. La connexion réelle entre Polyphaser et le câble d'antenne doit être isolé. Le Polyphaser lui-même a sa propre patte destinée à être reliée à la terre.
   - Une fois que toutes les recommandations de câblage et de mise à la terre ont été suivies, il est important de tester la résistance du sol à la tige de mise à la terre pour assurer un bon sol. La méthode de mise à la terre la plus efficace est la connexion directe à la terre avec une impédance minimale. Une impédance inférieure à 5 Ohms recommandée.

5 Wiring Examples

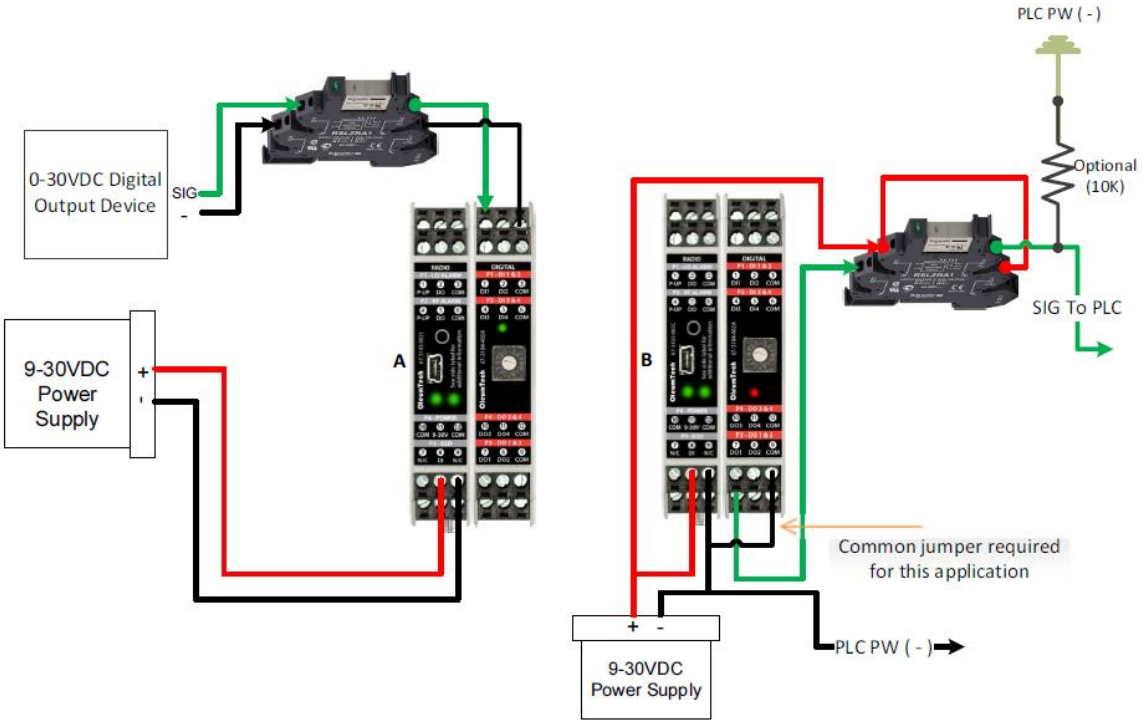
5.1 Wiring External Power

This application involves an Arrival Sensor wired to the discrete input DI1 of Station-A Digital Wireless I/O Module and wirelessly triggering a Solenoid wired to the discrete output DO1 on the Station-B Digital Wireless I/O Module.

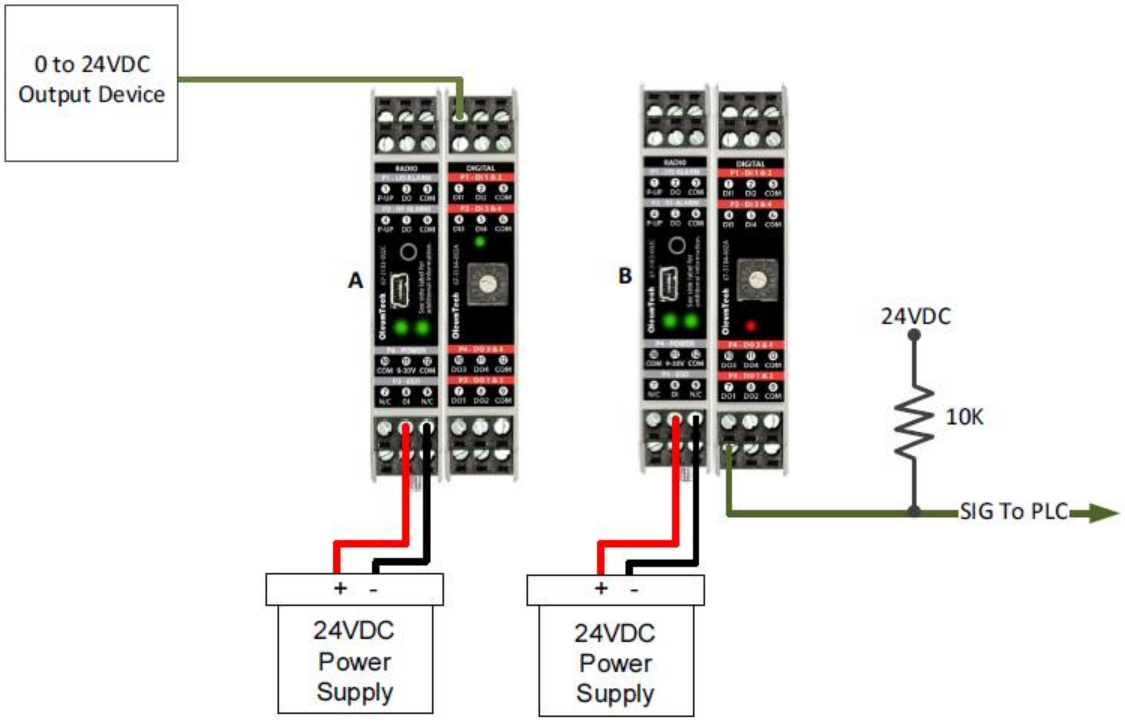
- **Arrival Sensor** (Externally Powered PCS Ferguson 3DSO & PCS MT-020)
- **Solenoid** (ASCO Red Hat EF8314H301) Connection to the Wireless I/O System.



5.2 Active High 0-30V Input to Wireless I/O System

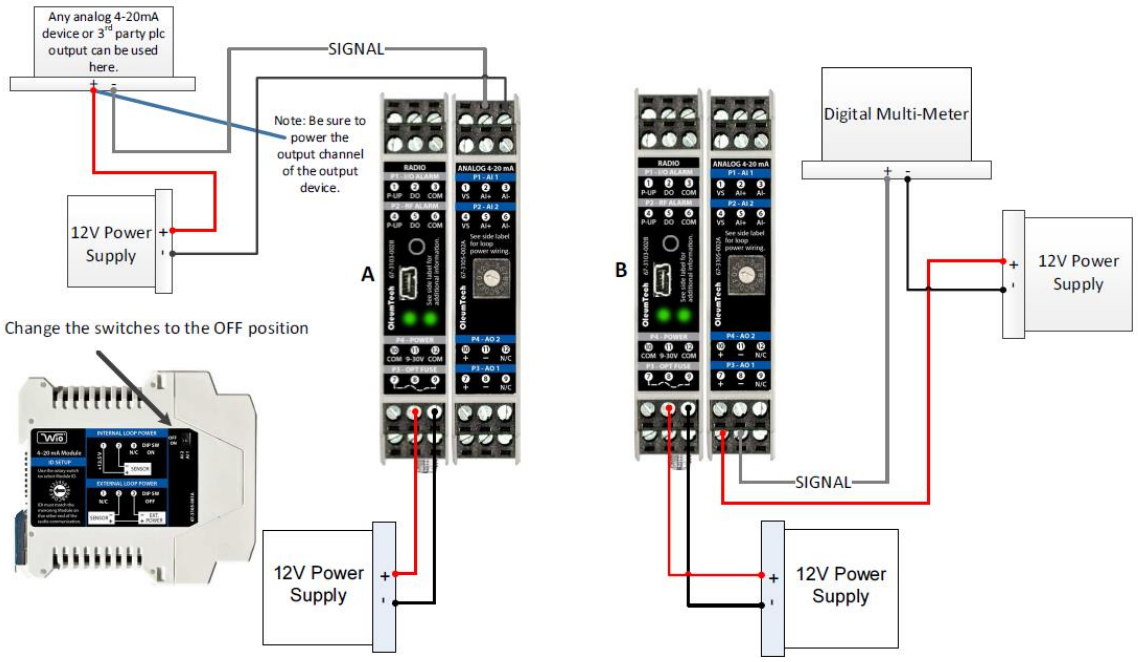


5.3 Active Low 24 VDC Input to Wireless I/O DIO System



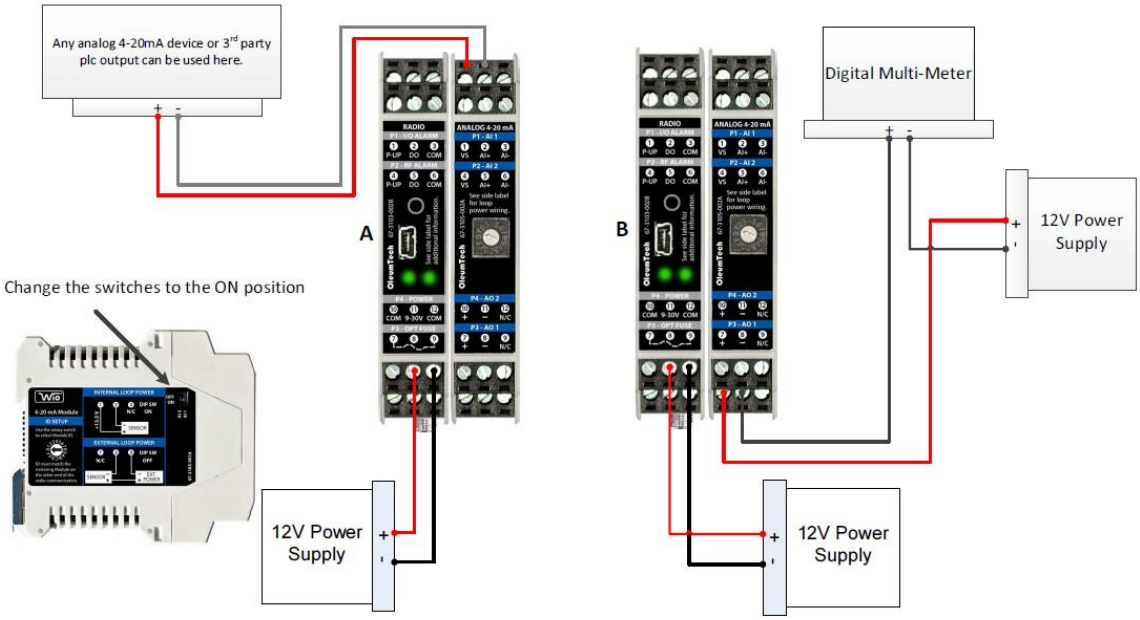
5.4 4-20 mA Wireless I/O System Wiring and External Power Switch Position

This application involves the AI of a 4-20mA output device (or 4-20mA output signal) wired to a 4-20mA module at AI+ on bank A. Then, using a DMM, measuring the 4-20mA output on bank B.



5.5 4-20mA Wireless I/O System Wiring and Internal Power Switch Position

This application involves the AI of a 4-20mA output device (or 4-20mA output signal) wired to a 4-20mA module at AI+ on bank A. Then, using a DMM, measuring the 4-20mA output on bank B.



6 Installation

The following procedure describes how to install a Gateway inside a NEMA 4X-type enclosure (or an enclosure with a minimum IP 54 rating and that complies with IEC 60079-0 and IEC60079-15). Before you perform this procedure, be sure the Gateway meets applicable grounding requirements in the enclosure – see previous section).

Special Conditions for Use

I. Install the Gateway inside a NEMA 4X-type enclosure (or an enclosure with a minimum IP 54 rating that complies with IEC 60079-0 and IEC60079-15). Mounting of the Gateway within a suitable enclosure will cause the internal ambient enclosure temperature to be higher than the maximum external enclosure ambient temperature. The Gateway shall not form part of the external enclosure (panel mounted, for example). All cable entries into the enclosure shall be fitted with IECEx certified cable glands that have a minimum ingress protection of IP54. The cable glands shall have an operating temperature range equal to or greater than the ambient operating temperature.

II. USB connectors are not for use in hazardous areas and will be internal to installation in an IECEx certified IP54 enclosure.

III. Any Ethernet connectors used shall be checked to ensure that the mechanical retaining clip is undamaged and provides a mechanically secured and retained connection.

IV. Transient protection shall be provided on the supply to limit transients to 42 Vpk.

Installation (Français)

La procédure suivante décrit l'installation correcte d'un Gateway. Avant d'effectuer cette procédure, se assurer que le Gateway répond aux exigences de mise à la terre en vigueur dans l'enceinte - voir la section précédente).

Conditions spéciales pour une utilisation

I. Installez le Gateway l'intérieur d'un boîtier NEMA 4X-type (ou une enceinte avec un minimum IP 54 notation compatible avec la CEI 60079-0 et IEC60079-15). Le montage de l' Gateway dans un boîtier approprié provoquera la température interne de l'enceinte ambiante soit supérieure à la température ambiante enceinte externe maximale. Le Gateway ne fait pas partie de l'enceinte externe (monté sur panneau, par exemple). Toutes les entrées de câble dans l'enceinte doivent être munis d'IECEx presse-étoupes conformes qui ont un minimum de protection d'entrée IP54. Les presse-étoupe ont une plage de température de fonctionnement égale ou supérieure à la température ambiante de fonctionnement.

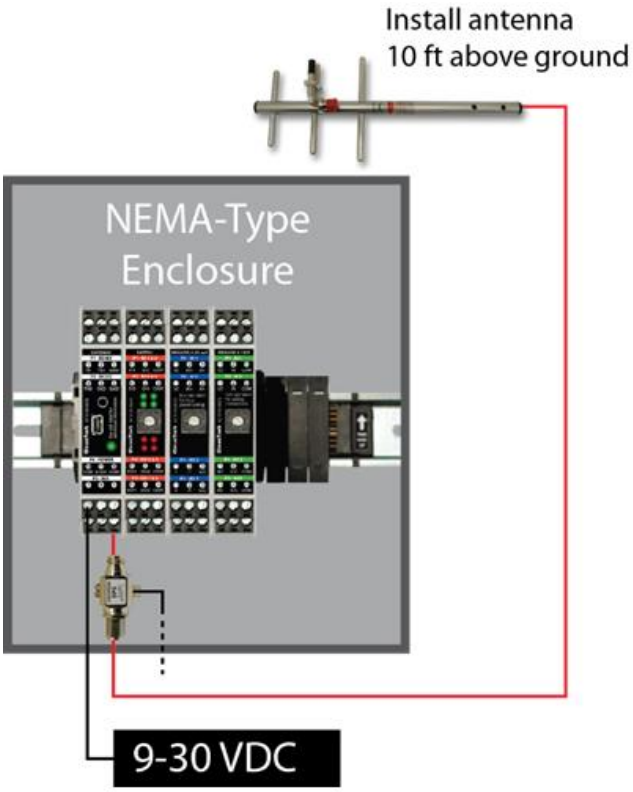
II. Connecteurs USB ne sont pas pour une utilisation en zone dangereuse et seront internes à l'installation dans un certifié IP54 IECEx.

III. Les connecteurs Ethernet utilisés doit être vérifiée pour se assurer que le clip de fixation mécanique est en bon état et offre une connexion sécurisée et mécaniquement retenu.

IV. Protection contre les transitoires doivent être fournis sur la fourniture de limiter les transitoires à un maximum de 42 Vpk.

6.1 Outdoor Enclosure Installation

1. Install or use existing outdoor NEMA-type enclosure.
2. Ensure the WIO Gateway meets applicable grounding requirements in the enclosure.
3. Install a 35 mm x 7.5 mm DIN rail (at least 166 mm (6.5-inch) wide) inside the enclosure.
4. Provide external power supply: 9-30 VDC.
5. Provide antenna and antenna cable with SMA end to connect to WIO Gateway.
   a. There are various types of antennas including bulkhead, omni, and yagi. Please use the appropriate type for your application.
6. Connecting a lightning arrestor is highly recommended.
7. Install antenna (performing a RF site survey prior to installation is recommended).
8. Make/drill a hole on the bottom of the enclosure to run wires. (user must supply own O-ring/sealing)
9. Run conduit for power and antenna cable.
10. Connect antenna cable to antenna and then feed cable into enclosure.
11. Feed power wiring into enclosure.



6.2 WIO Gateway and I/O Module(s) Assembly

WARNING: Power must be disconnected or turn off prior to attaching or removing any I/O Modules from the system – failure to comply may cause damage hardware.

6.2.1 Standalone Mode Assembly

1. Attach WIO Gateway directly onto a 35mm DIN rail.

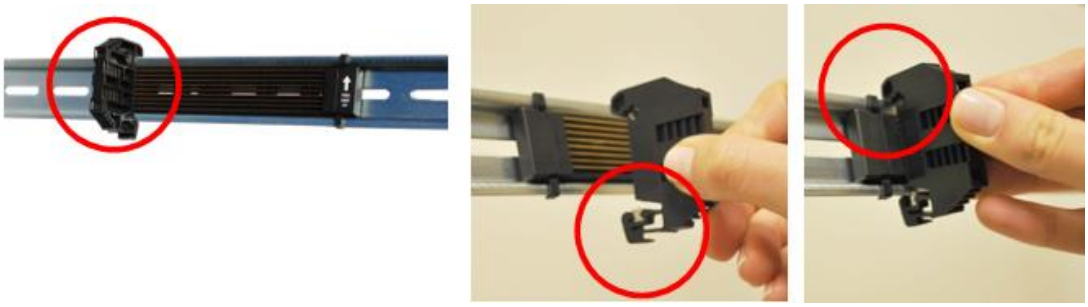
6.2.2 I/O Expansion Mode Assembly

1. Securely attach DataRail onto a 35 mm x 7.5 mm DIN rail by gently pressing on all four (4) corner clips.

CAUTION: Must attach DataRail with arrow pointing up.

2. Secure DataRail to DIN rail by attaching an End Terminal Bracket.

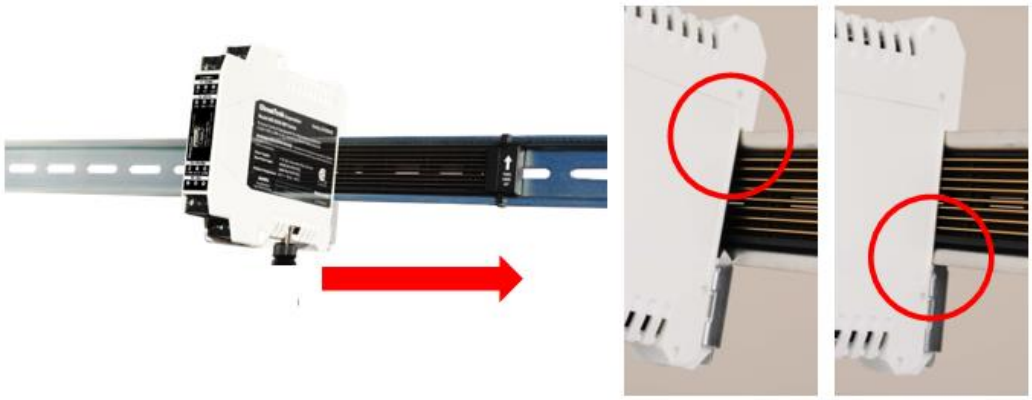
a. Hook the metal end of the Bracket to DIN rail and then snap the other end onto DIN rail into place. (Be sure to position the Bracket far left of the DataRail where metal blades meet the plastic)



Attach components from left to right without gap.

3. Attach Radio Module to DataRail (place it next to the Bracket without a gap).

a. Latch the top hook onto the rail, then snap-in the spring-loaded clip into place.



b. Connect Antenna. Radio Module is equipped with SMA (female) connector. For outdoor installation, place a lightning arrestor between Antenna and Radio Module connection.

1) Firmly hold and connect SMA end of the antenna cable to Gateway Radio (listen for a “click” sound for confirmation).
2) Connect Lightning Arrestor (optional – highly recommended)
3) Drilling a hole may be required for routing antenna cable – use 5/16” or larger diameter, user must supply own O-ring/sealing
4) Use proper fittings to seal hole for antenna cable

5) Where bulkhead (black phantom) antennas are used, the inner surface, outer surface, and inner wall of the hole drilled, should be isolated from the antenna. Use the rubber washers supplied by manufacturer to isolate the antennas from the enclosures (use thickest washer supplied by manufacturer to isolate the antennas from the enclosures (use thickest washer on exterior side of enclosure).
6) Install antenna and connect all cables
7) Must install omni or bulkhead antenna in upright position
Do not mount sideways!

4. Attach I/O Module(s) to the system.

a. Place Modules in any combination (do not leave gaps between Modules).

b. When using more than five (5) I/O Modules, determine maximum I/O Module combination by using power budget calculator found at: http://psft.com/BLJ

WARNING: Power must be disconnected prior to attaching or removing any I/O Modules from the system – failure to comply may cause damage to the I/O Module(s).

c. Then, use the 16-position Switch located on the front of each I/O Module to set device ID(s). Each of the Modules must be set to its own ID for the system to function properly. Enter this ID when configuring that Module in the Wireless I/O Designer software.

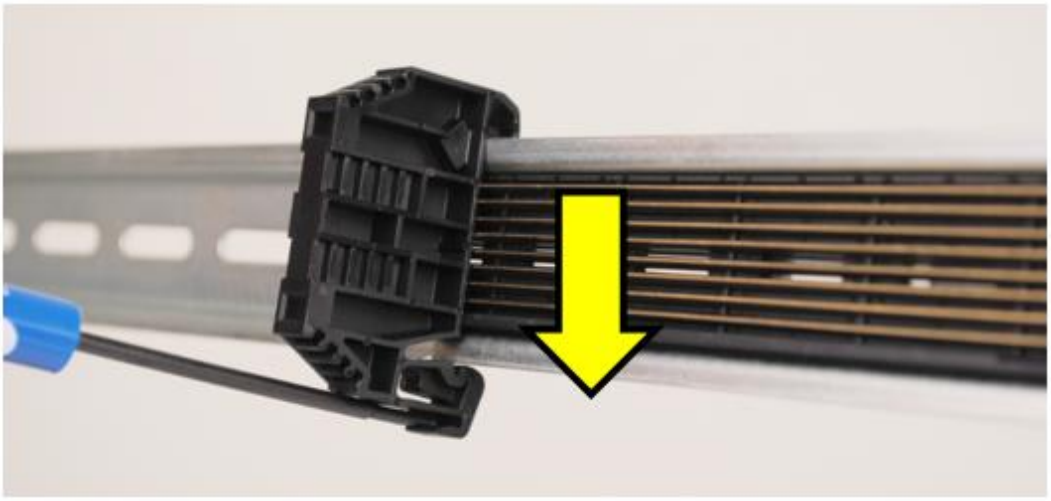
5. Attach the other End Terminal Bracket to secure the Modules (place it next to the last module without leaving a gap).

6. Protect any unused DataRail slots with Cover. Snap-off extra pieces and store for future use.

7. Terminate I/O and supply power as required. Use solid or stranded wire (AWG) 28-12.

6.2.3 How to Detach Components from DataRail

1. End Terminal Bracket can be removed from din rail by inserting the tip of a flathead screwdriver into the removal slot. Control the direction with the screwdriver handle to pull the latch away from the din rail for safe removal.

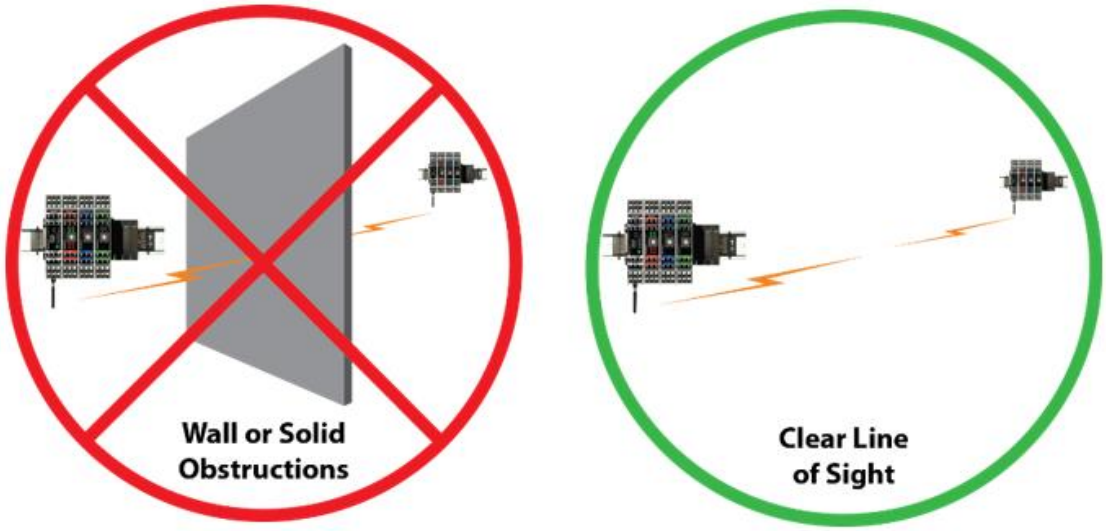


2. WIO Modules can be removed from the din rail by inserting the tip of a flathead screwdriver into removal slot located on the metal clip. Lift-up on the screwdriver handle to pull the spring-loaded clip away from the din rail for safe removal.

7 RF Setup Notes

7.1 Clear Line of Sight

Clear line of sight with minimal obstructions for best wireless (RF) communication. Performing an RF survey is highly recommended prior to commissioning especially for long range applications.



7.2 Maximum RF Range

The final RF range depends on many factors including Tx power settings, type of antenna and cables, antenna setup, clear line of sight, and terrain and environment.

7.3 RF Timeout Tag

When setting up end nodes, RF Timeout tag can also be added as a Modbus register for monitoring RF health. Timeout trigger is normally set to three times the tx interval. This means when the data packet is missed on three consecutive intervals attempts, the RF timeout will be flagged.

0=RF OK; 1= RF Timeout

7.4 RF Refresh - See *RF Refresh Time Tags* (page 66)

7.5 Maximum Number of Gateways Supported in a Network

The Wireless I/O Designer supports a total of 1000 Gateways Modules to be added to a single network. Whether you have two, ten, or fifty Gateways in a network, a network's true capacity depends on radio frequency, RF range, RF bandwidth, RF bit rate, tx and read interval, and other environmental factors.

When designing a complex system, please consult with a ProSoft application engineer.

8 Wireless I/O Designer

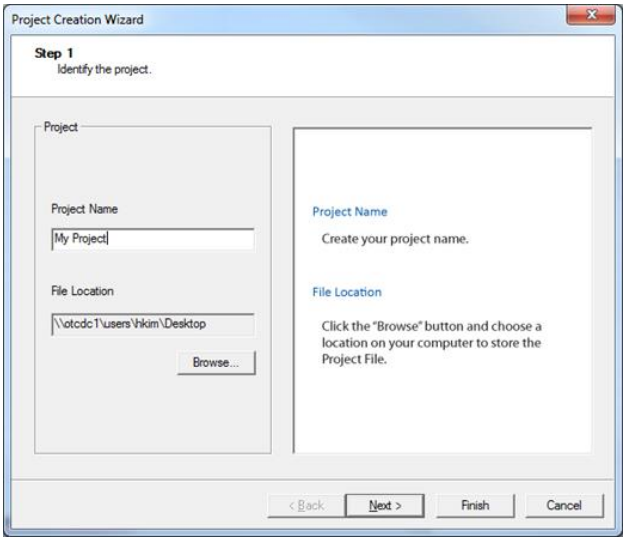
Wireless I/O Designer Software Version 1.0 or higher is required to run the WIO gateway.

8.1 Wireless I/O Designer Software Download

1. Run the Wireless I/O Designer Software from your PC.

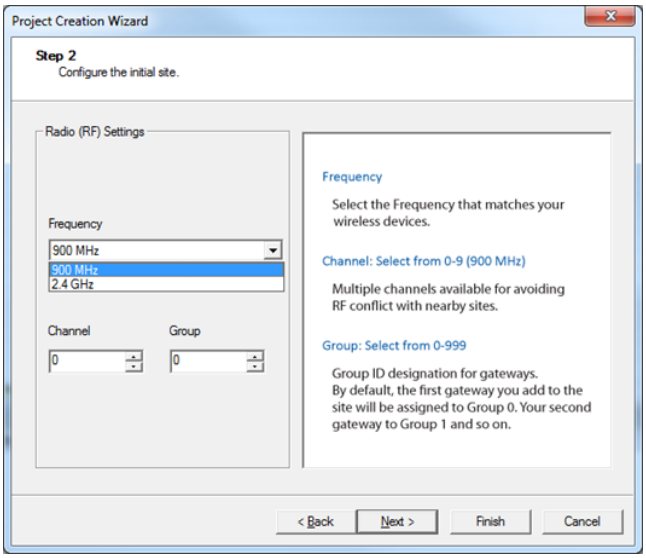
2. Click **New Project** in the Project Creation Wizard.

3. Project Settings
   a. Create a **Project Name**.
   b. Select **File Location** by clicking the **Browse** button.



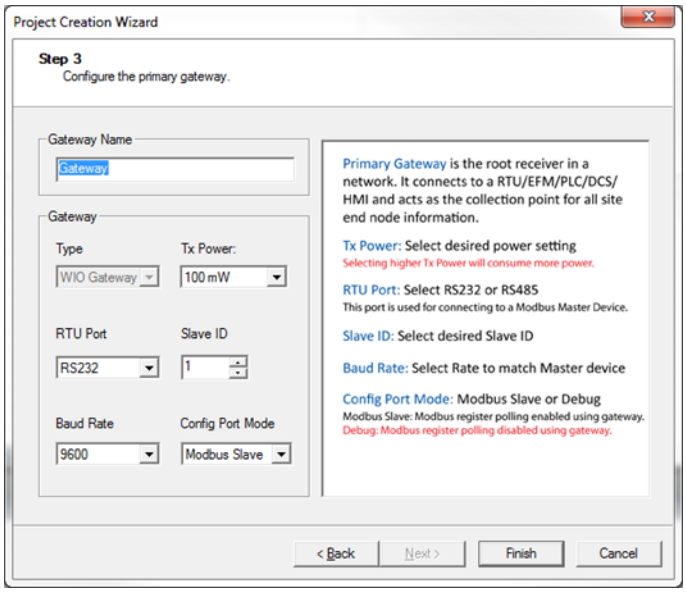
c. Click **Next**.

4. RF Settings



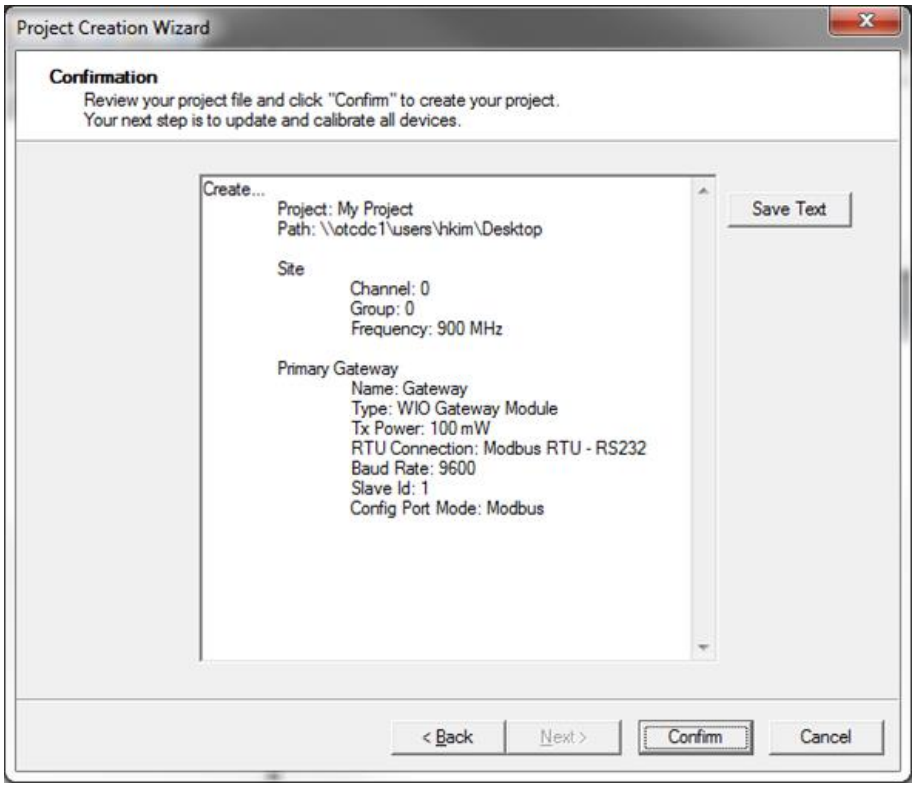
a. Select the **Frequency** that matches the Radio Frequency (RF) of the wireless devices.
b. Select the **Channel** to avoid any RF conflict with any nearby sites.
c. Select **Group** - by default, the first Gateway you add to the site will be assigned to Group 0. The second Gateway added will be assigned Group 1 and so on.
d. Click **Next**.

5. Configure Primary Wireless Gateway / RTU Port 1 Settings.



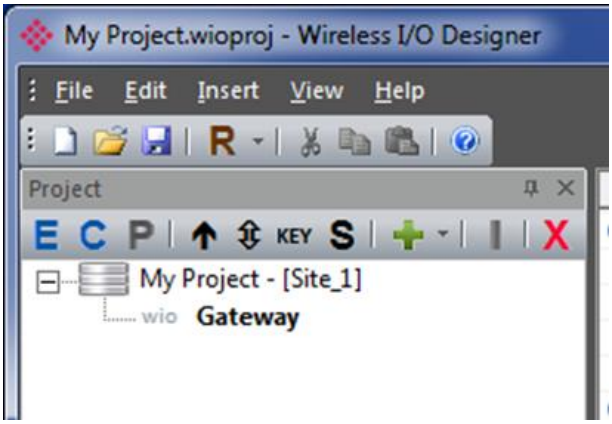
a. Create **Gateway Name**.
b. Select **Tx Power** - (Note: Selecting higher Tx Power consumes more power).
c. Select **RTU Port** RS232 or RS485 (Terminal Block). This port is used for connecting to a Master Device: PLC, RTU, DCS, HMI, or EFM.

   If using Gateway as a Master, the RTU port settings can be changed after exiting the Project Creation Wizard.
d. Select **Slave ID**.
e. Select **Baud Rate** that matches the Master device.
f. Set **Config Port Mode** as Modbus Slave or Debug
   i. Modbus Slave enables a PC as Master to perform read Modbus registers and write to registers.
   ii. Debug mode provides ability to view live processes for troubleshooting.
g. Click **Finish**.

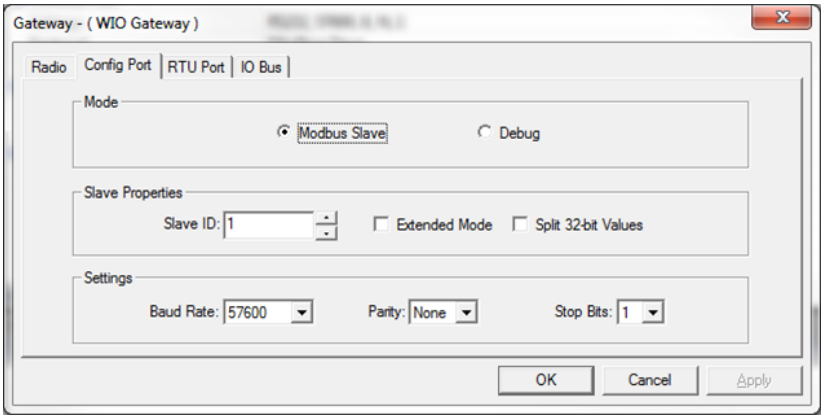


h. Verify the Project and Network Configuration.
i. Click **Confirm** or **Back** for rework.

8.2 Verify Project File

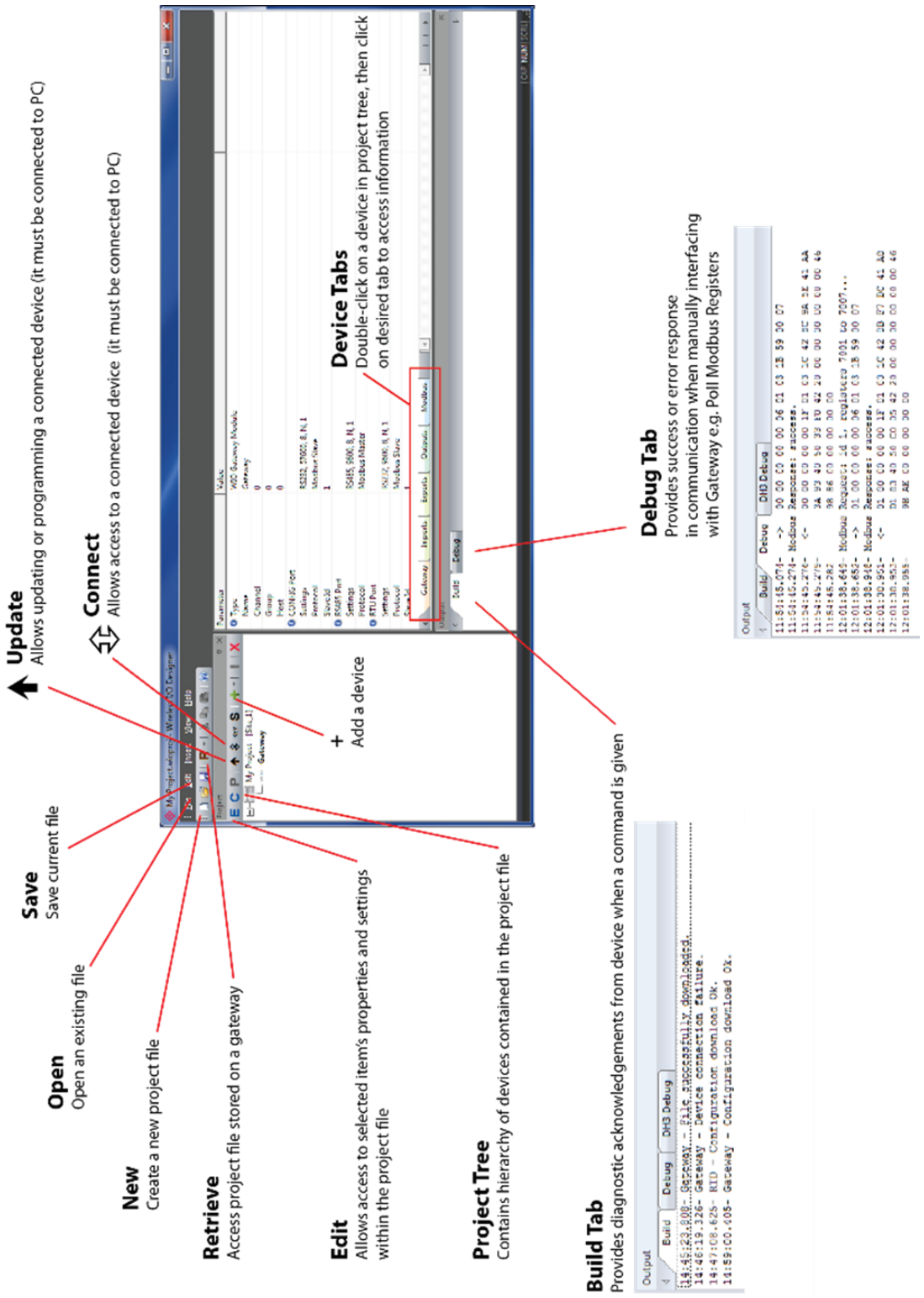


1. Review **Project Tree** window.
2. To review or change device properties:
   a. Click on the desired **Gateway** in the Project Tree.
   b. Click the **E** (Edit) button.



3. To add another Gateway:
   a. Click on Site in the Project Tree.
   b. Click the **+** (Insert) button.
   c. Select desired Gateway
4. To rename a device:
   a. Right-click over a device in the Project Tree.
   b. Select **Rename**.
5. To remove a device from Project Tree:
   a. Click on the desired device.
   b. Click the **X** (Delete) button.

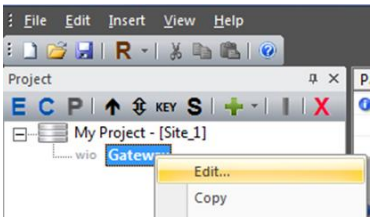
8.3 Wireless I/O Designer – Main Screen View



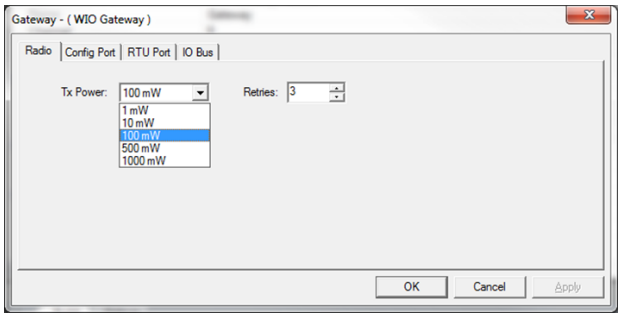
8.4 Editing Gateway Properties

After making any changes, you must update the Gateway for changes to take into effect.

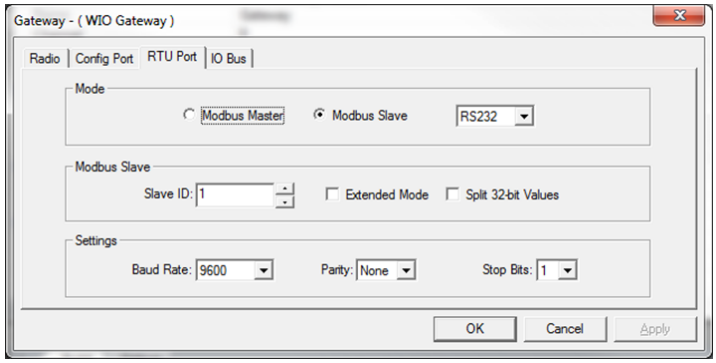
1. Accessing the Gateway properties window
   a. Click on **Gateway** in project tree and right-click and select **Edit** or click on the **E** button.



2. Radio Tab
   a. Allows adjusting of Tx power level and number of transmission retries.
      i. Higher Tx level consumes more power.

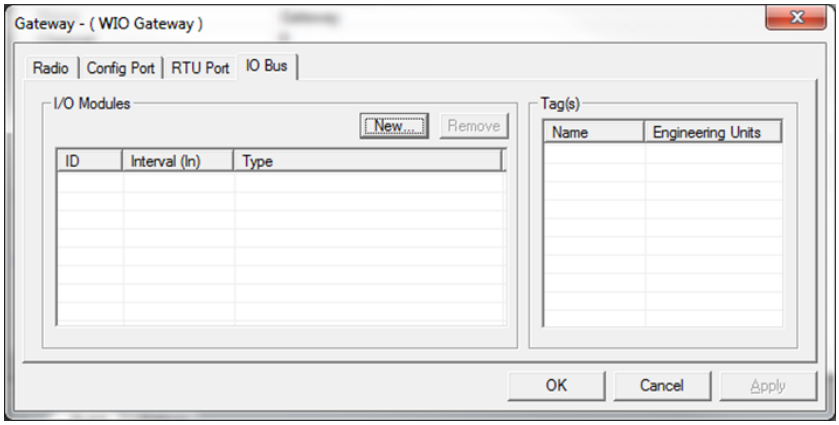


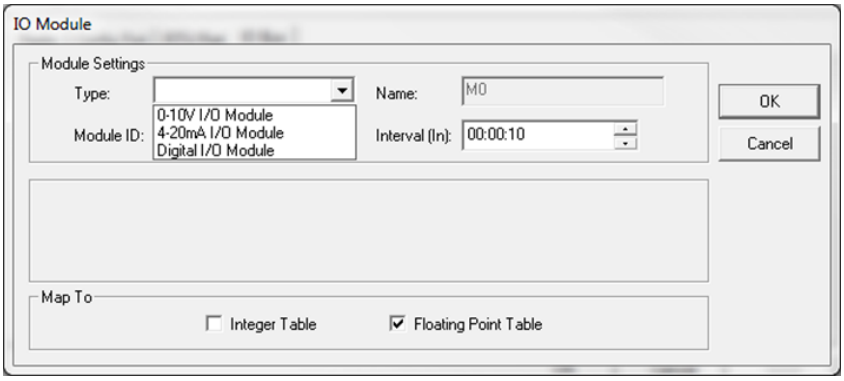
3. Serial/RTU Port Tab
   a. Allows configurations of Serial/RTU port.
   b. RTU port can be set as a Modbus Master or Modbus Slave
   c. Can be configured to RS232 or RS485
   d. Use the appropriate port settings to match with connecting device



4. Config Port Tab
   a. Allows configurations of Config (COM) port.
   b. **Mode**:
      i. Modbus Slave enables Modbus poll/write feature
      ii. Debug enables debugging
   c. **Modbus Slave**: Leave As-Is
   d. **Settings**: Leave As-Is

5. I/O Bus
   a. Allows Insertion of WIO I/O Modules: Digital, 4-20 mA, 0-10 V (isolated)
   b. Covered in next section



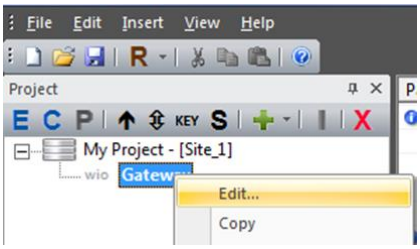


8.5 Adding and Configuring I/O Modules

WIO® I/O Modules can easily be integrated with a WIO Gateway through Wireless I/O Designer Software for I/O expansion. Any I/O Module added to a WIO Gateway becomes an extension of the WIO Gateway. Thus, the I/O points are accessible through Gateway's properties.

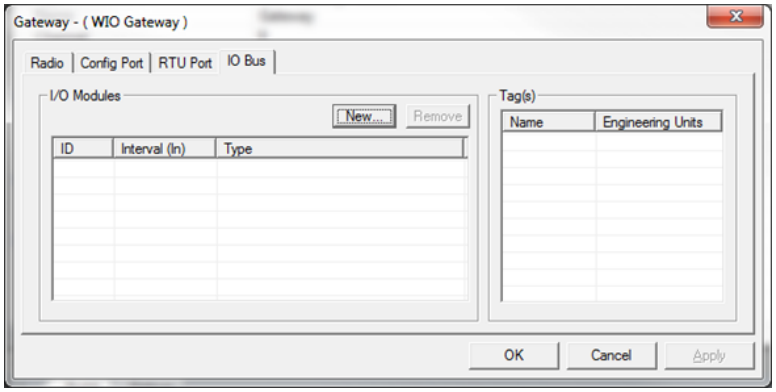
1. Accessing the Gateway properties window

a. Click **Gateway** in project tree, then right-click and select **Edit** or click on the **E** button.

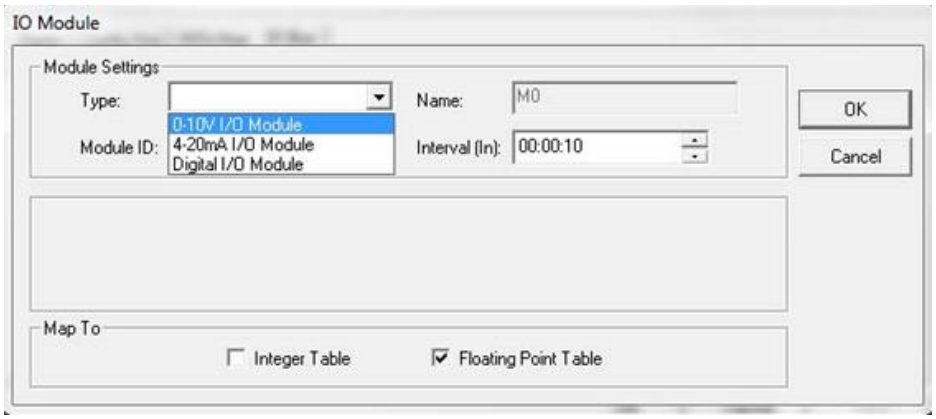


2. I/O Bus Tab

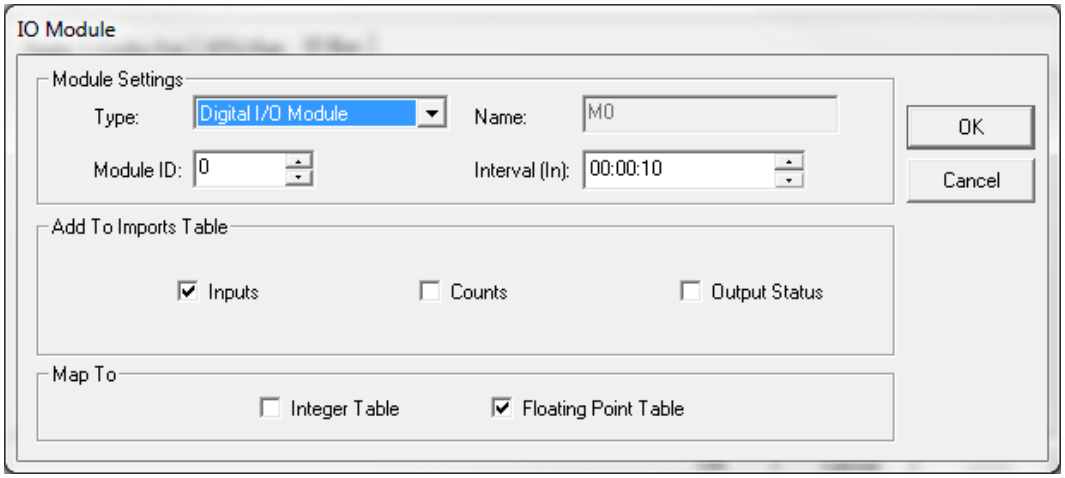
a. Click **New**.



b. Select the proper **I/O Module**.



8.5.1 Digital I/O Module



1. **Name**: Create a name
2. **Module ID**: Slave ID number
3. Select Read **Interval** (Outputs are based on change and not interval)
4. Check desired imports for Modbus mapping
   a. Inputs
   b. Counts
   c. Output status (On/Off)
5. Map to: Integer (16-bit), Floating Point (32-bit), or both

6. DIP Switch Functionality

   DIP switches available on the Digital I/O Module provide users configuration options for the digital outputs.

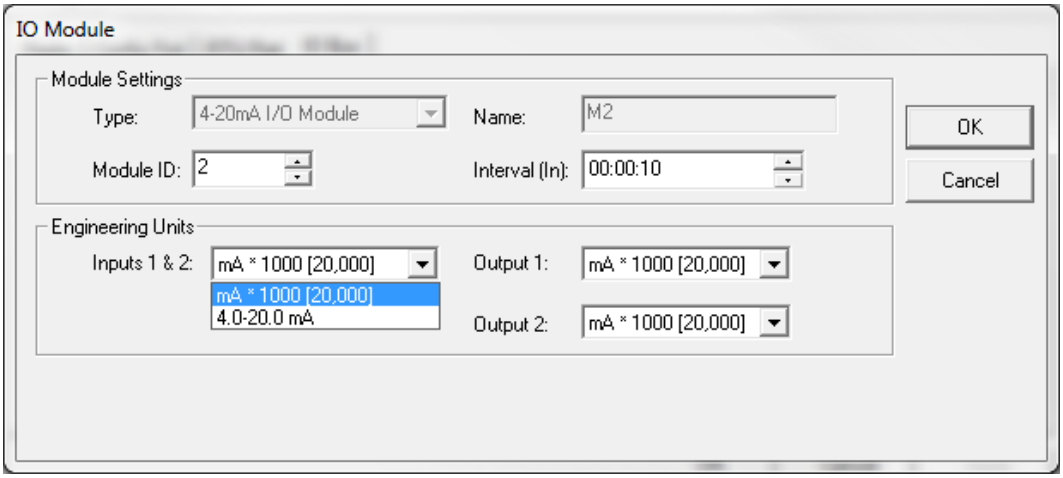
a. Odd-numbered DIP Switches (1, 3, 5, 7)
1-DO1, 3-DO2, 5-DO3, 7-DO4

   i. Normal/non-pulsed mode (Default / Off position)
   ii. Pulsed mode (On position)

b. Even-numbered DIP Switches (2, 4, 6, 8)
2-DO1, 4-DO2, 6-DO3, 8-DO4

   i. Normally open mode (Default / Off position)
   ii. Normally closed mode (On position)

8.5.2 4-20 mA I/O Module



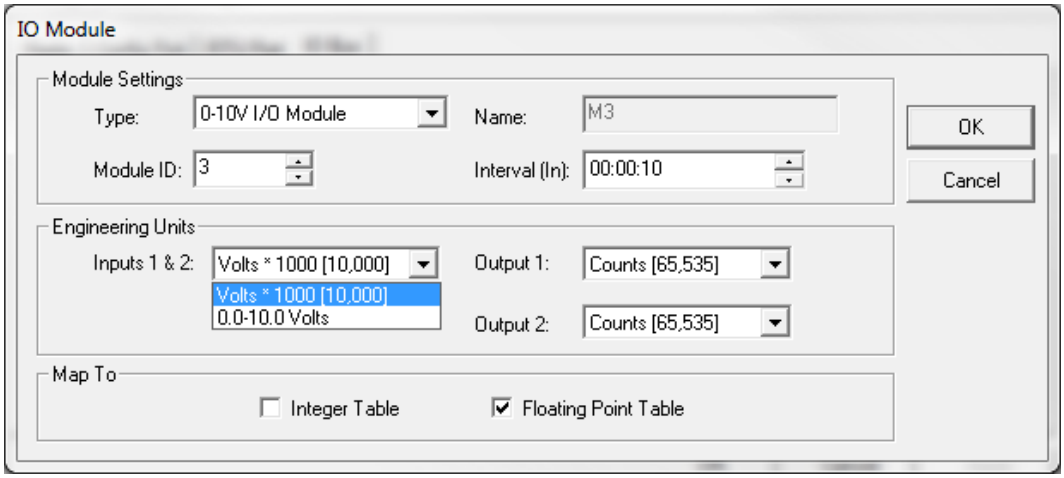
1. **Name**: Create a name
2. **Module ID**: Slave ID number
3. Select Read **Interval** (Outputs are based on change and not interval)
4. Analog Settings
   a. Select settings for Input 1 and 2
      i. mA * 1000 (20,000)
      ii. 4.0 to 20.0 mA

   b. Select settings for Output 1
      i. mA * 1000 (20,000)
      ii. % * 100 (10,000)
      iii. 4.0 to 20.0 mA
      iv. 0.0 to 100.0%

   c. Select settings for Output 2
      i. mA * 1000 (20,000)
      ii. % * 100 (10,000)
      iii. 4.0 to 20.0 mA
      iv. 0.0 to 100.0%

5. Map to: Integer (16-bit), Floating Point (32-bit), or both

8.5.3 0-10 V I/O Module

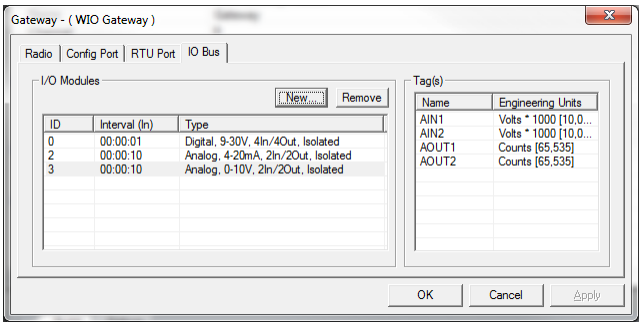


1. **Name**: Create a name
2. **Module ID**: Slave ID number
3. Select Read **Interval** (Outputs are based on change and not interval)
4. Analog Settings
   a. Select settings for Input 1 and 2
      i. Volts * 1000 (10,000)
      ii. 0.0 to 10.0 Volts

   b. Select settings for Output 1
      i. Counts (65,535)
      ii. Volts * 1000 (10,000)
      iii. 0.0 to 10.0 Volts
      iv. 0.0 to 100.0%

   c. Select settings for Output 2
      i. Counts (65,535)
      ii. Volts * 1000 (10,000)
      iii. 0.0 to 10.0 Volts
      iv. 0.0 to100.0%

5. Map to: Integer (16-bit), Floating Point (32-bit), or both
6. Click **OK** when finished adding I/O module(s).



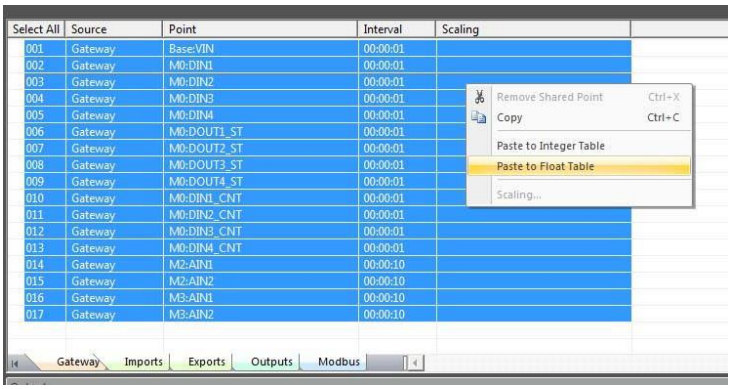
7. Adding Input Points to the Modbus Table

a. Double-click on the **Gateway** in Project Tree.

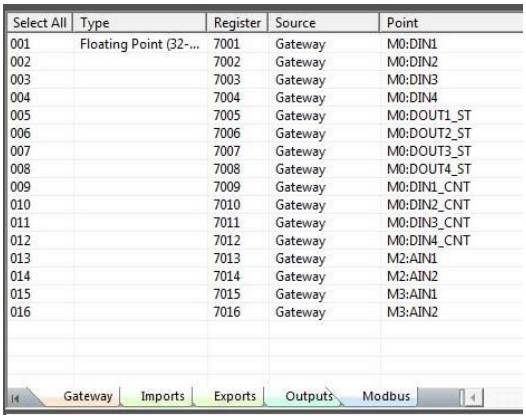
b. Click on the **Imports** tab.

c. Select/highlight the newly added Inputs.

d. Right-click and select paste to integer or float table.



e. Click on **Modbus** tab and view pasted input points.



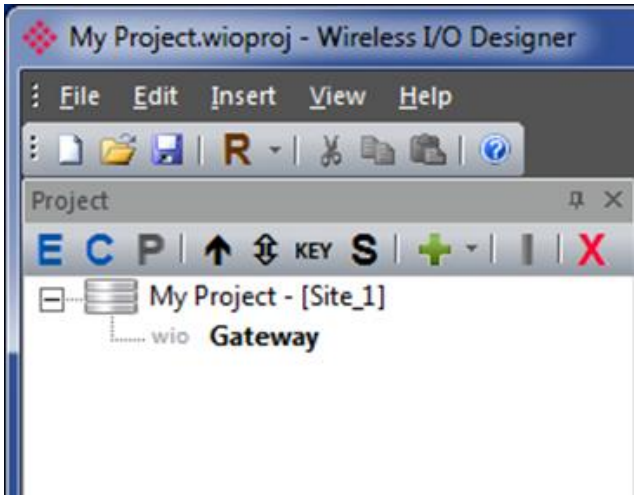
7. Save the Project file.

8. Update the Gateway for changes to take place.

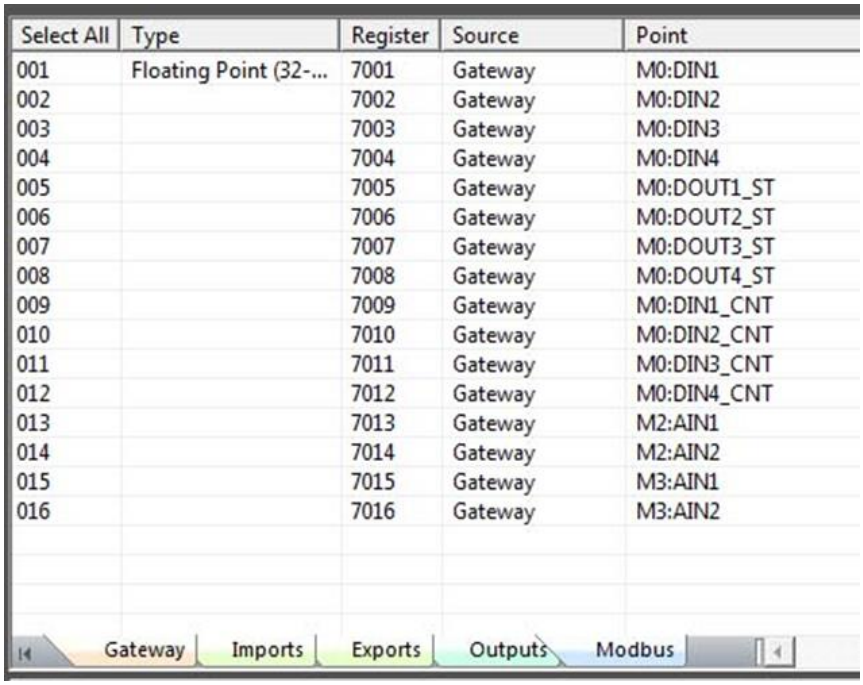
8.6 Modbus Mapping Table Management

The BM-xxxx-GM1K supports up to 1,920 Modbus registers.

1. Double-click on **Gateway** in the Project Tree.



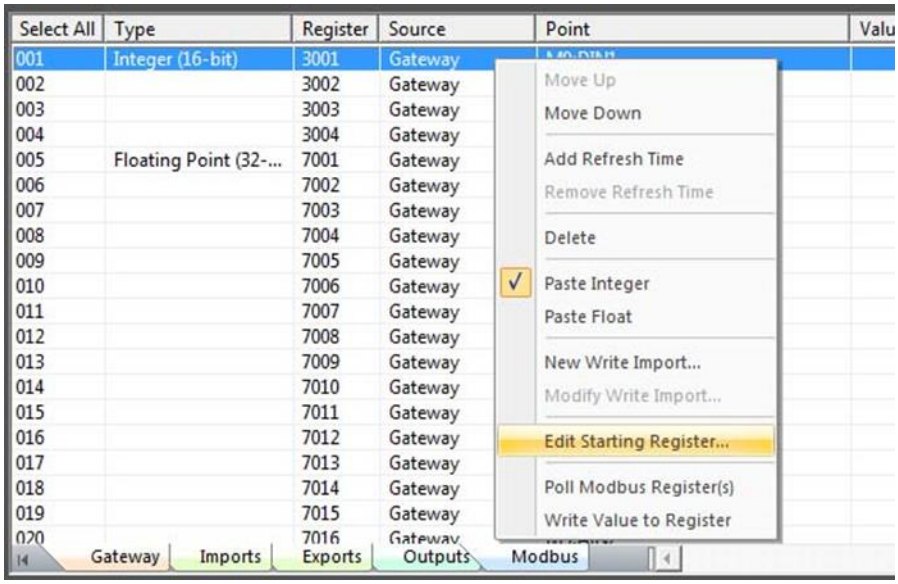
2. Click on **Modbus** Tab.



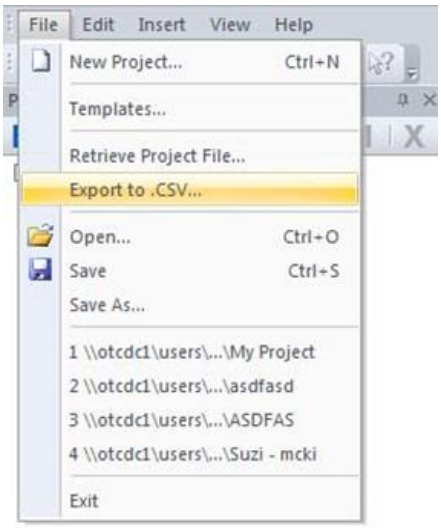
Select All	Type	Register	Source	Point
001	Floating Point (32-...	7001	Gateway	M0:DIN1
002		7002	Gateway	M0:DIN2
003		7003	Gateway	M0:DIN3
004		7004	Gateway	M0:DIN4
005		7005	Gateway	M0:DOUT1_ST
006		7006	Gateway	M0:DOUT2_ST
007		7007	Gateway	M0:DOUT3_ST
008		7008	Gateway	M0:DOUT4_ST
009		7009	Gateway	M0:DIN1_CNT
010		7010	Gateway	M0:DIN2_CNT
011		7011	Gateway	M0:DIN3_CNT
012		7012	Gateway	M0:DIN4_CNT
013		7013	Gateway	M2:AIN1
014		7014	Gateway	M2:AIN2
015		7015	Gateway	M3:AIN1
016		7016	Gateway	M3:AIN2

3. Edit registers if necessary
   a. Remove: Right-click over desired register and select **Delete** function
   b. Rearrange: Use click and drag function of mouse

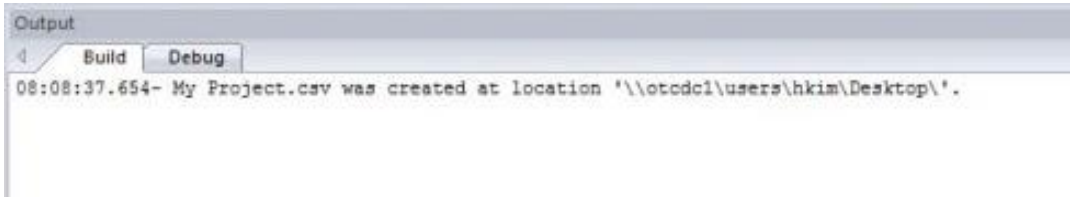
4. Edit 16-bit **Starting Register** if necessary
   a. 16-bit register starting point can be changed (Range: 0 to 3001)
   b. Right-click over any 16-bit Modbus register and select **Edit Starting Register**.



5. Export Modbus Mapping Table to view outside of Wireless I/O Designer.



a. Click on **File** menu.
b. Select **Export to .CSV…**
c. The exported file gets automatically saved to the same directory as the Project File.



d. You can also check the **Output Build** tab window for visual confirmation.
e. MS Excel is recommended for opening the exported .csv file.

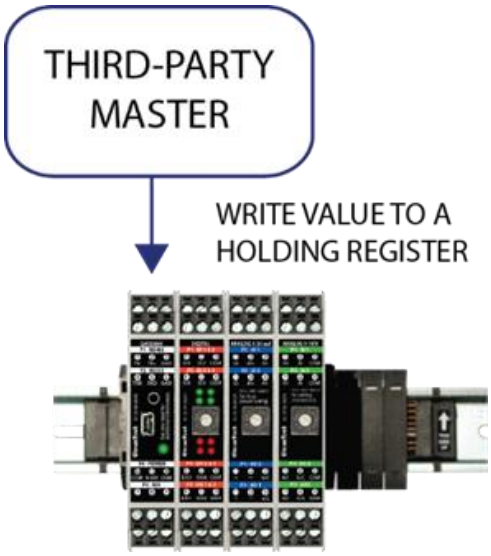
6. Save File.
a. When a project file is modified, the file should be saved and the impacted device(s) must be updated for the changes to take into effect.

8.7 Output Control – WIO Modules

In order to relay data from a third-party Modbus Master device to a point or output in an OleumTech network, a Modbus Write function must be created in primary Gateway's Modbus table. Once the function is created, then this point can be mapped to an output or shared with another device within the network.

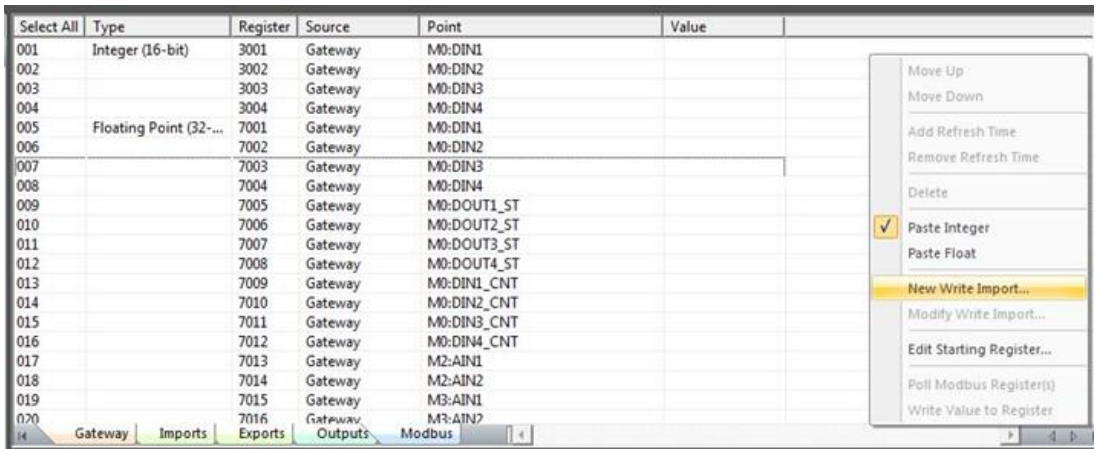
A Master device connected to the Gateway have access to write to the same Modbus holding register(s). Last written command supersedes all other commands.

The gateway must be set up as a Slave to allow this function.

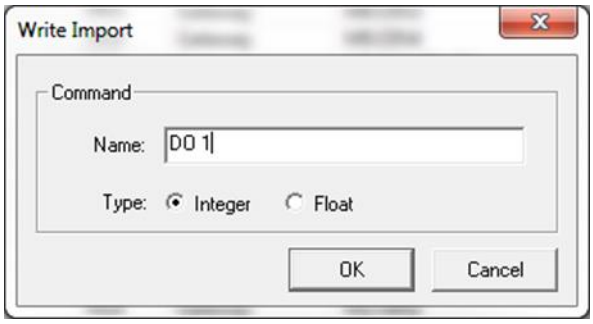


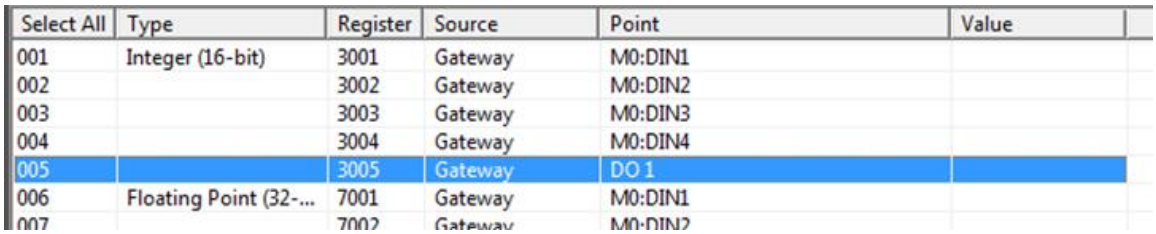
8.7.1 Writing outputs using third-party Modbus Master device

1. Double-click on **Gateway** in the Project Tree.
2. Select the **Modbus** tab.
3. Right-click anywhere in the window, and select **New Write Import**.

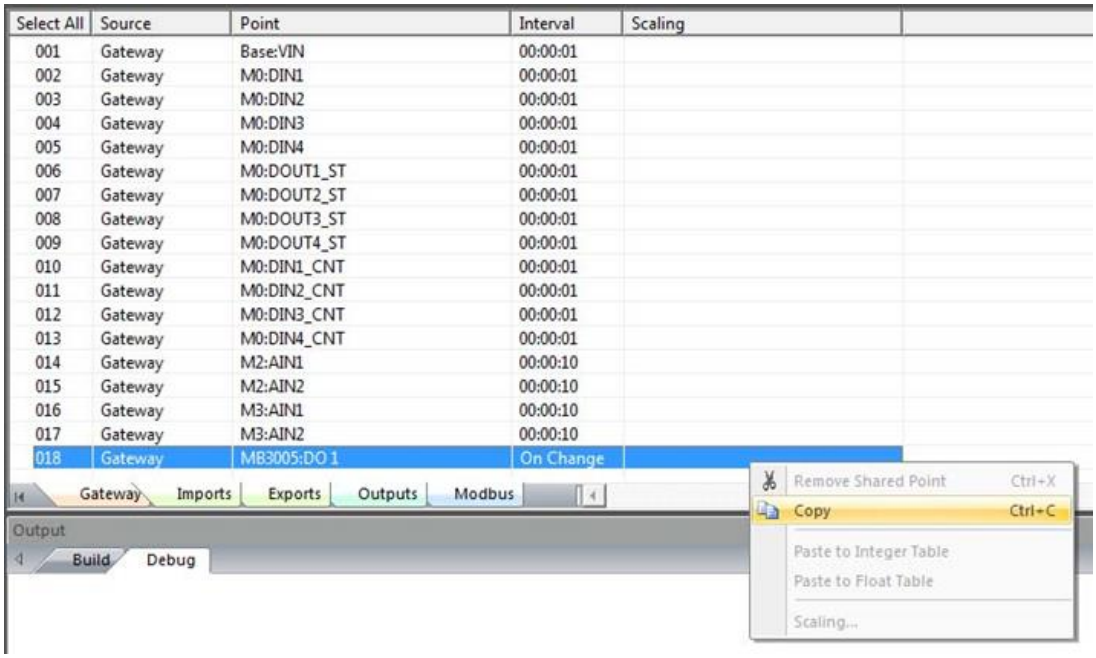


4. Create a name for the write command.

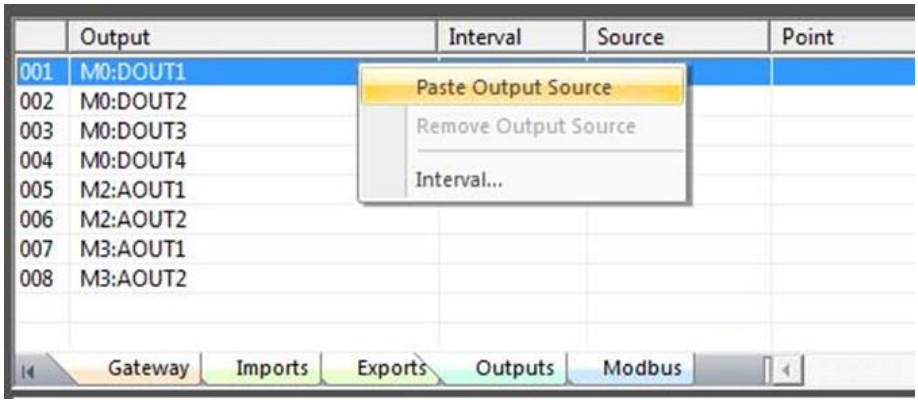




5. Select the **Imports** tab and right-click on the newly created **Write** command and select **Copy**.



6. Select **Outputs** tab and right-click on an output point and select **Paste Output Source**.

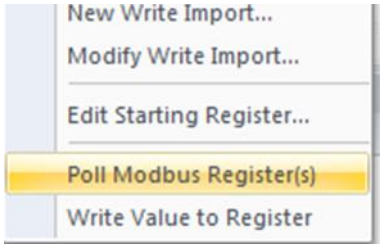


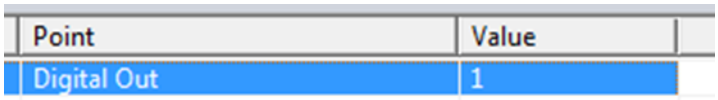
7. Save project file.
8. Update the Gateway for changes to take effect.

8.7.2 Viewing the Current Value Status

A Modbus Master can write values to the Gateway as either 16 or 32-bit holding registers.

1. Click on the **Modbus** tab, then **Poll Modbus Register(s)** to view current value status.





2. Verify output signal on I/O Module.

9 COM Port Setup and Wireless I/O Designer

9.1 COM Port Setup

The WIO Gateway configuration requires the use of a USB to Mini-USB cable to connect to a PC.

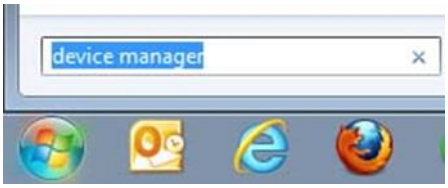
1. Connect power to Gateway (9-30 V).

2. Connect USB end of USB to Mini-USB Cable to PC's USB Port.

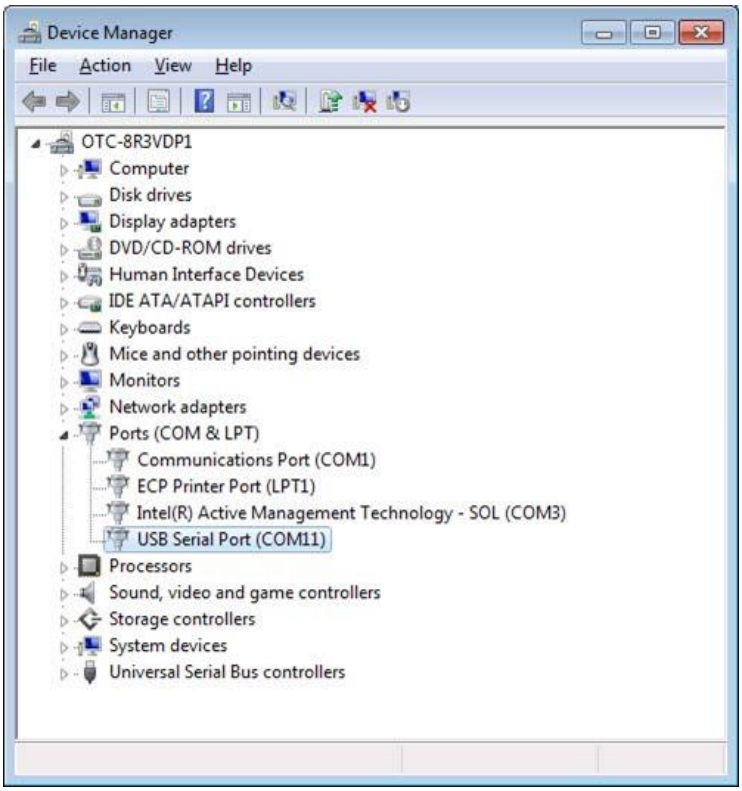
3. Connect Mini-USB end to WIO Gateway.

4. Identify the COM Port on your PC. (This process is generally automatic and may not be required)

   a. Open **Device Manager** on your PC (Using Windows 7)
      i. You must have Admin rights to PC.
      ii. Click on *Windows* icon at bottom left corner of screen.
      iii. Type "device manager" in the search box and press **Enter**.

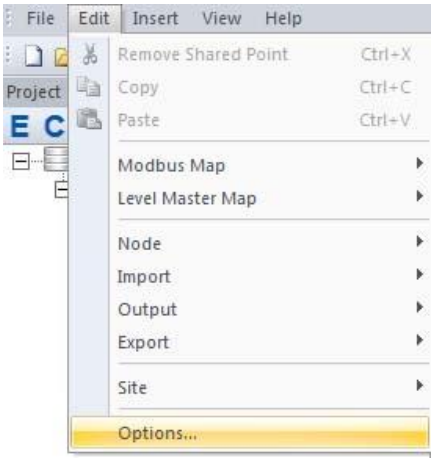


iv. Identify COM Port ID



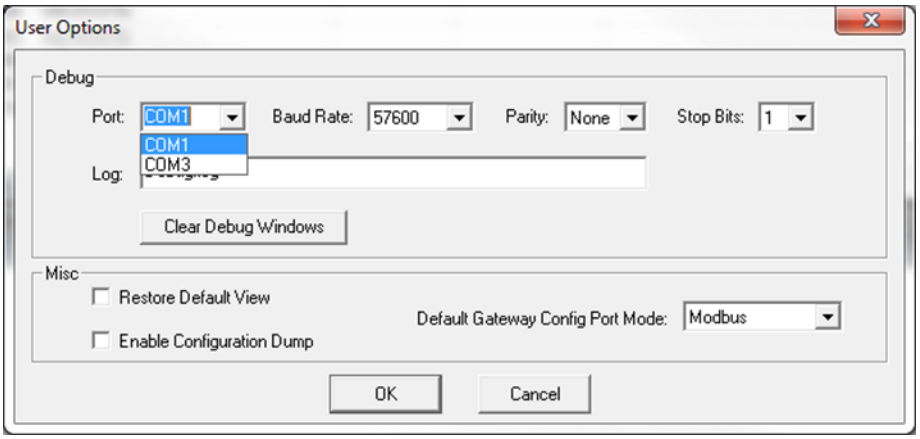
5. Select COM Port in Wireless I/O Designer.

a. Click **Edit** menu and select **Options.**



b. Select COM Port ID that matches what you found in Device Manager

i. Use dropdown box to select COM Port.



c. DO NOT CHANGE THE BAUD RATE!

i. This baud rate setting is for your PC COM Port.

ii. Wireless Transmitters are designed to only work with 57600 baud rate.

iii. To change Modbus Master baud rate settings, you must edit it under Gateway properties.

9.2 Gateway Update (Program / Configure)

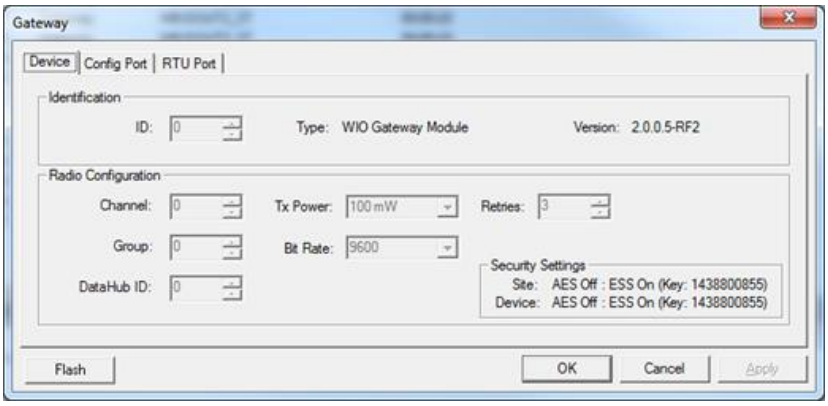
1. Connect power to Gateway (9-30 V).
2. Connect USB end of USB to Mini-USB Cable to PC's USB Port.

3. Connect Mini-USB end to WIO Gateway.

4. Upgrade Gateway firmware with latest version (Not necessary with newly shipped product, skip to Step 5)

   a. Download Gateway firmware from *Download Center.*
   b. Click on Gateway in the Project Tree.
   c. Click  (**Connect to Device**) button.

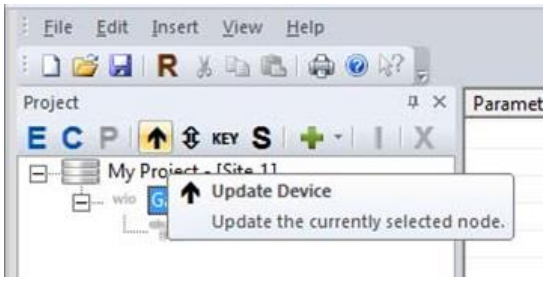
   d. Click **Flash** button to begin the update Firmware process.



5. Update/Upload Gateway with Project

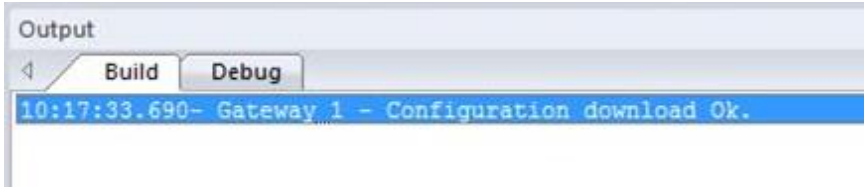
a. Click on **Gateway** in the Project Tree.

b. Click ↑ (**Update Device**) button.



c. If Gateway was used with another Project File, the Site Security Mismatch window will appear. Click **Yes** to proceed.

d. Check **Output Build** tab window for verification of update.



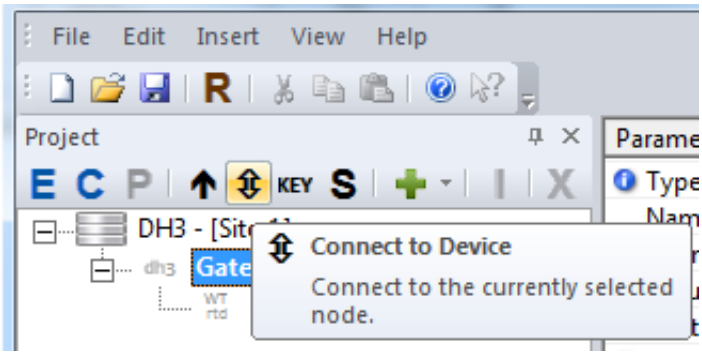
9.3 Connect to Gateway Function in Wireless I/O Designer

When a Gateway is connected to Wireless I/O Designer Software, users can also directly access the settings stored on the device. In Wireless I/O Designer, we call this “connecting to device.” Once connected, there are a variety of actions that can be performed such as checking Firmware version, exporting data log, RTU and Ethernet port settings, and changing date and time.

1. To perform this function, the Gateway must be powered and connected to Wireless I/O Designer (Mini USB or Ethernet).

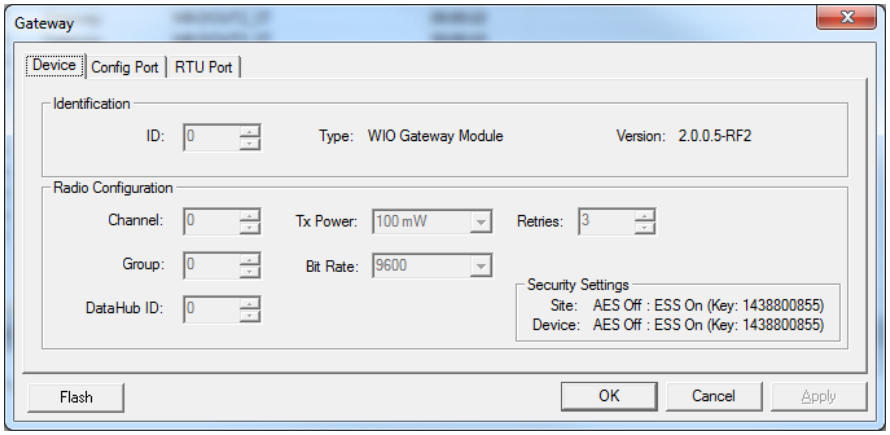
   a. **Connect to Device** shows the current setup of Gateway only.
   b. To change Gateway settings, you must access the properties by clicking the **E** button or using the Edit command, then re-updating the Gateway.

2. Click on **Gateway** in Project Tree and Click  (**Connect)** button.



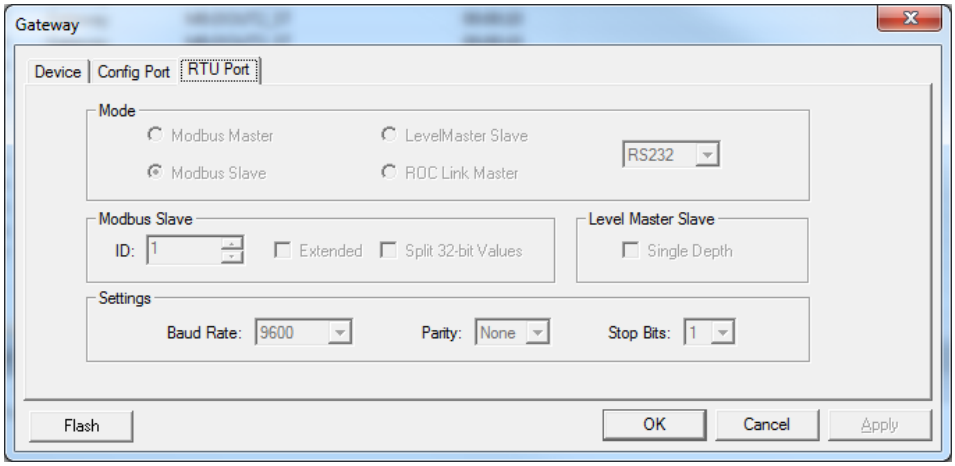
3. **Device** Tab

   a. Displays how the device is set up.
   b. Displays Firmware version.



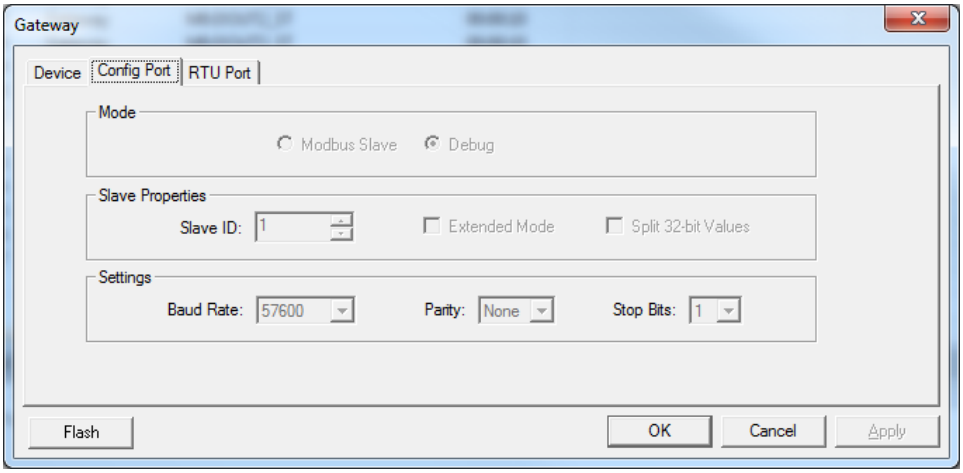
4. **RTU Port** Tab

   a. Displays how the RTU ports are set up



5. **Config Port** Tab

   a. Displays how the Config port is set up for connecting to PC



9.4 Polling Modbus Registers using Wireless I/O Designer

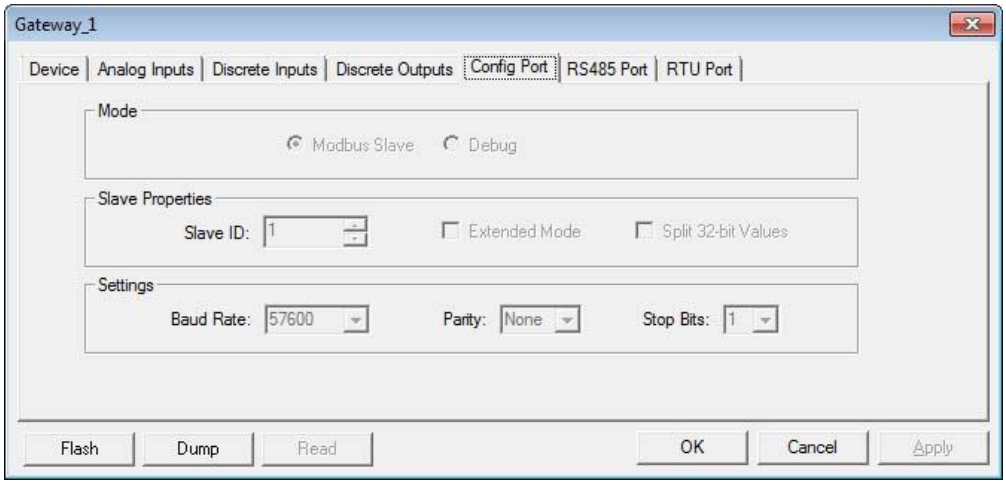
Wireless I/O Designer Software version 1.0 and higher provides users the ability to poll Modbus registers from a Wireless Gateway for installation verification.

This feature allows users to take poll once per command. Continuous polling is not available.

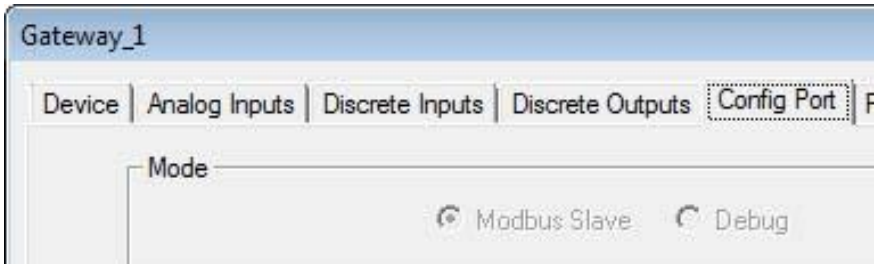
Single, multiple, or all registers can be selected for polling.

When the Gateway's Config port is in Modbus Slave mode, the Debug mode is disabled and vice versa.

1. Open Wireless I/O Designer project file on your PC.
2. Connect Gateway to PC using the proper cables.
3. Click on Gateway in the Project Tree.
4. Click ⇳ (**Connect to Device**) button.
5. Click on the **Config Port** tab.



6. Verify the Gateway is in Modbus Slave Mode.



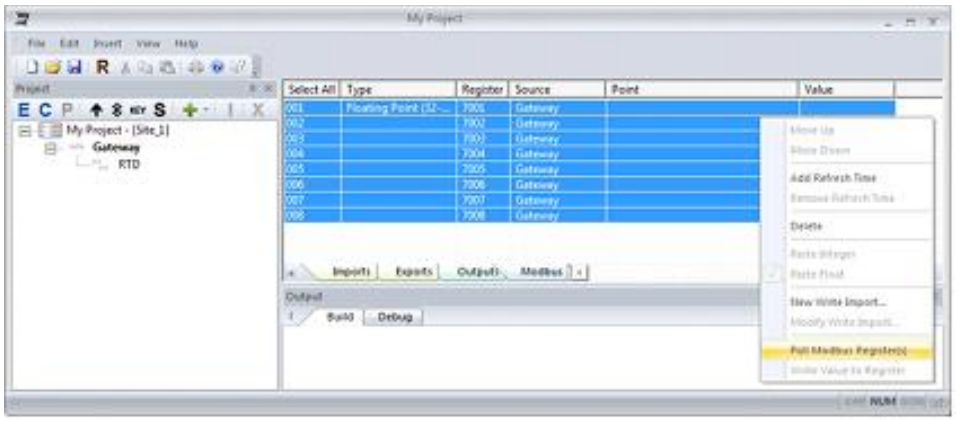
7. If Gateway is not in Modbus Slave Mode, Then:
   a. Click **Cancel** to exit screen.
   b. Click Gateway in the Project Tree.
   c. Click **E** (Edit) button.
   d. Click on **Config Port** tab.
   e. Change mode to *Modbus Slave.*
   f. Click **OK.**
   g. Click ↑ (**Update Device**) button.

8. Double-click on Gateway in the Project Tree.

9. Click on **Modbus** Tab.

10. Select desired registers.

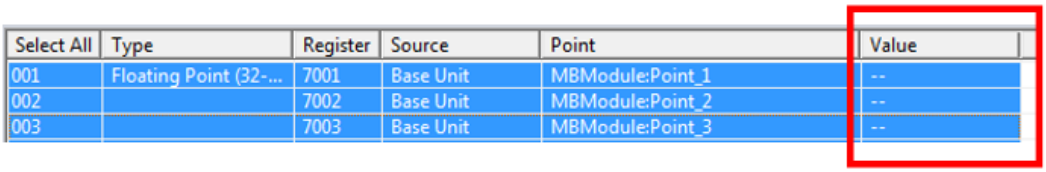
11. Right-click over the highlighted area and select **Poll Modbus Register(s)**.



12. Notice the *Value* column for details.

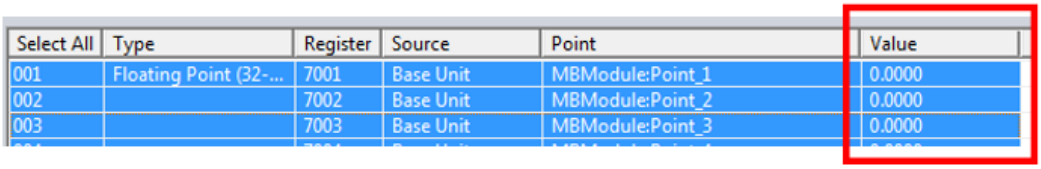
Select All	Type	Register	Source	Point	Value
001	Floating Point (32-...	7001	Gateway		70.8461
002		7002	Gateway		21.5812
003		7003	Gateway		3.2190
004		7004	Gateway		0.0000

13. Troubleshooting
   a. **"- -"** indicates the Gateway's configuration port is set to *Debug* mode. Change to *Slave* mode, then update Gateway and re-poll registers.



Select All	Type	Register	Source	Point	Value
001	Floating Point (32-...	7001	Base Unit	MBModule:Point_1	--
002		7002	Base Unit	MBModule:Point_2	--
003		7003	Base Unit	MBModule:Point_3	--

b. “0” indicates the Gateway’s holding registers are empty. Wait until new data is collected before re-polling registers.



Select All	Type	Register	Source	Point	Value
001	Floating Point (32-...	7001	Base Unit	MBModule:Point_1	0.0000
002		7002	Base Unit	MBModule:Point_2	0.0000
003		7003	Base Unit	MBModule:Point_3	0.0000

9.5 Debug Mode

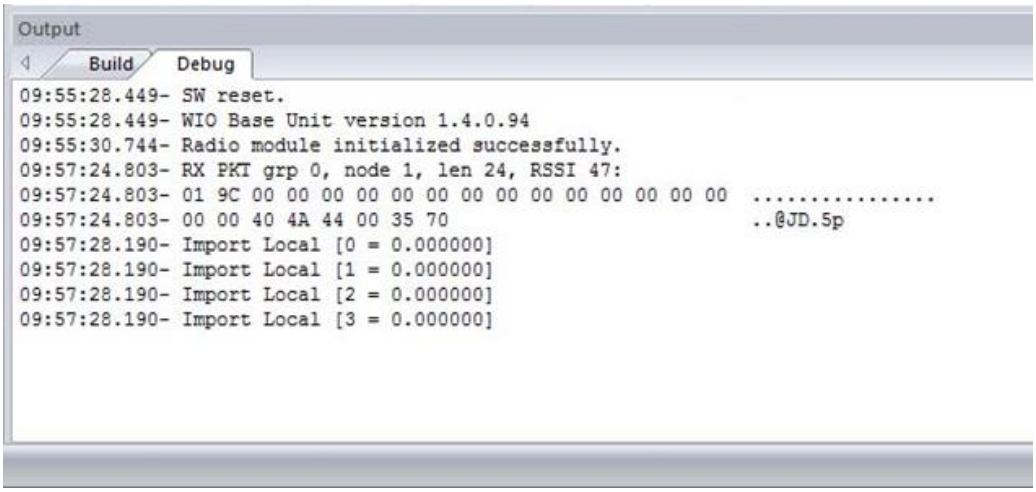
The Wireless I/O Designer Software allows users to view debug information from the Gateway for advanced diagnostic verification.

To use this mode, the Gateway must be set up in Debug mode.

Modbus polling or writing feature using Wireless I/O Designer will be disabled.

1. Follow the instructions on page 56 for setting up the Gateway config port for Debug mode.

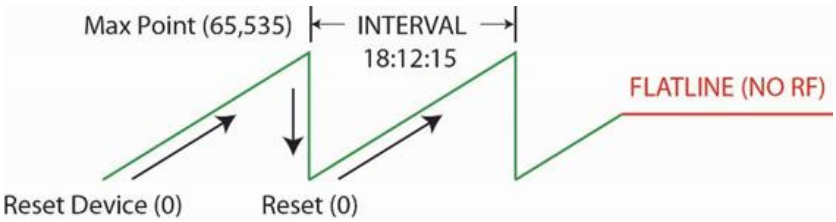
2. Click on the Output **Debug** Tab and information.



9.6 RF Refresh Time Tag(s)

Adding an RF Refresh Time tag to any Modbus point ensures the data that is held in the Modbus table is valid. When the RF Refresh tag is used for trending, a normal graph will look like a sawtooth.

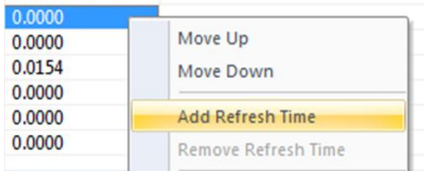
Since there are no RSSI tags available between Gateway to Gateway, adding a RF refresh time tag to any of the shared points (peer-to-peer) can be very valuable.



1. Double-click on **Gateway** in project tree.

2. Click on the **Modbus** tab

3. Right-click on a point and select **Add Refresh Time**.



4. Save the project file and update the impacted devices.

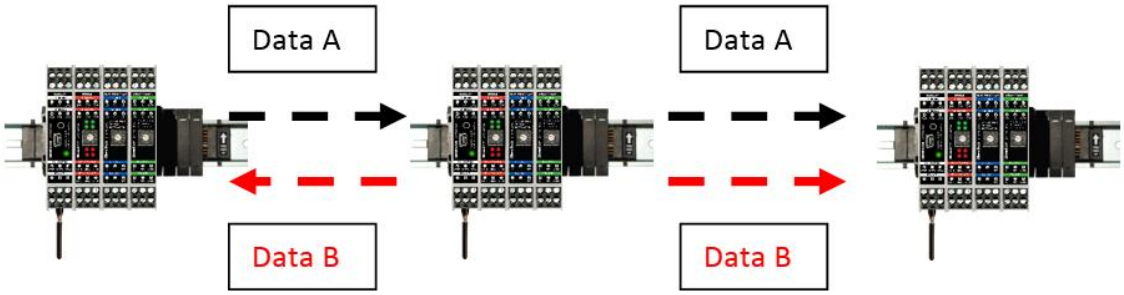
5. Poll Modbus register to verify refresh count.
   i. Refresh count moves in 1 second increments.

      Example: If tx interval is 60 seconds, the RF refresh count will update in increments of 60.

Register	Source	Point	Value
7006	Gateway	RTD:Error	0.0000
7007	Gateway	Base:VIN	12.2345
7008	Gateway	Base:LogStatus	1.0000
7009	Base Unit	Base:AIN1	0.0000
7010	Base Unit	Base:AIN1:Refresh	64848.0000
7011	Base Unit	Base:AIN2	0.0000
7012	Base Unit	Base:AIN3	0.0000

9.7 Distributing I/O Points, Peer-to-Peer / Repeater / Sharing Data

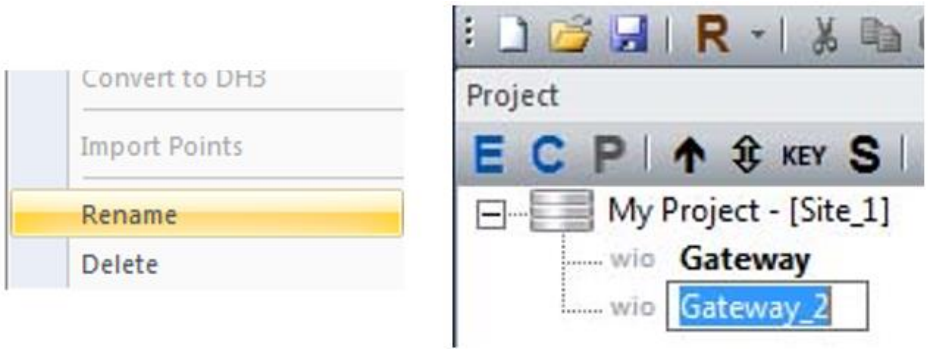
The Wireless I/O Network is extremely flexible by allowing any tags to be shared across multiple Wireless Gateways in a single networking system. Peering allows for more efficient and powerful networking.



The transmit interval, bit rate, environment, and number of interfering nodes play a significant factor in actual RF throughput and peering capabilities.

1. Click on the **Site** level in the project tree and add another Gateway.

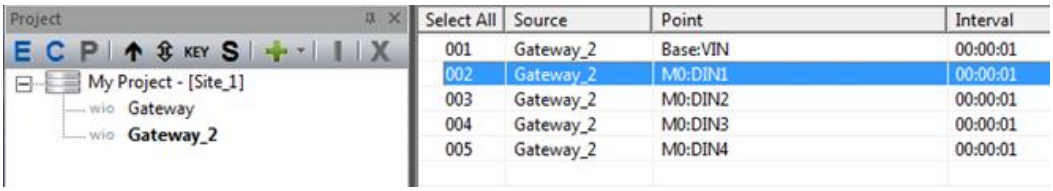
2. Once the device is added, the device name can be edited by right-clicking on the device icon and selecting **Rename**.



3. Add the desired I/O Module(s) to the newly added *Gateway_2*.

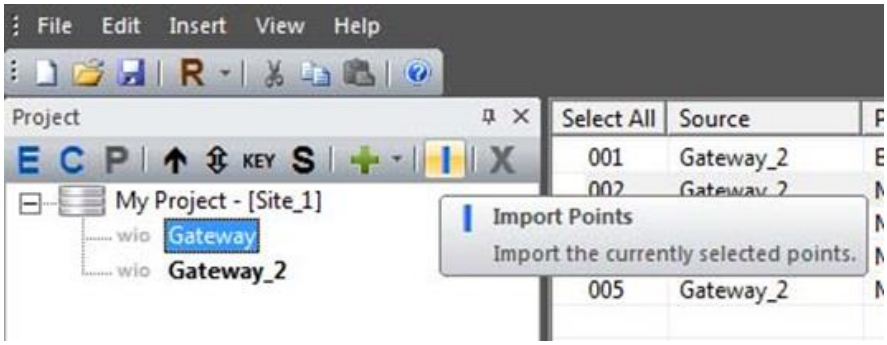
4. Double-click on the newly added *Gateway_2*.

5. Select a point or points from the **Imports** tab from *Gateway_2* to share with the Gateway.

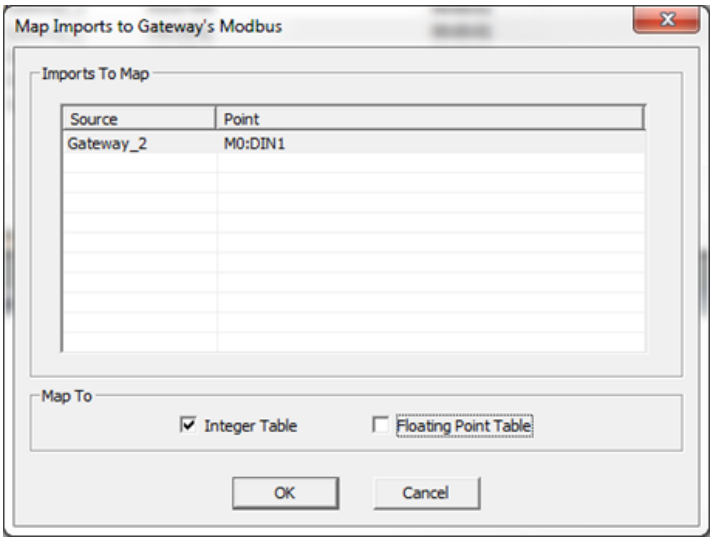


6. Select the *Gateway* (destination) in the project tree you wish to relay the point(s) to.

7. Click on the **I** (**Import Points**) button.

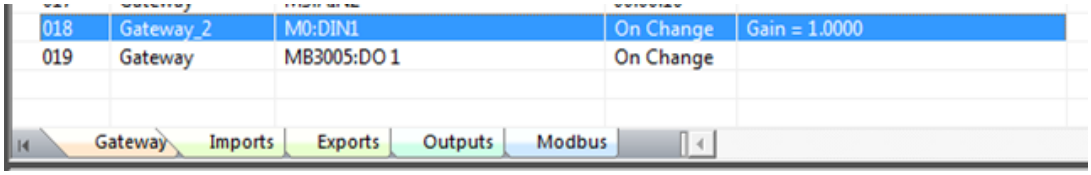


8. Select **Map To** an *Integer Table*, *Float Point Table*, or both.

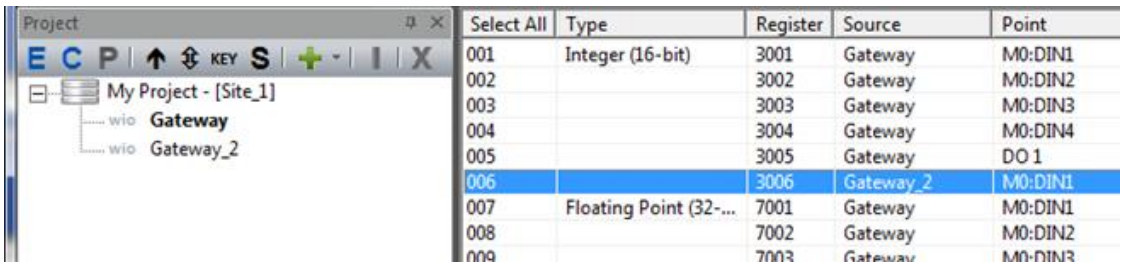


9. Double-click WIO *Gateway*.

10. Click on the **Imports** tab to confirm the point(s) was shared.



11. The point(s) is automatically mapped to its Modbus register holding table.

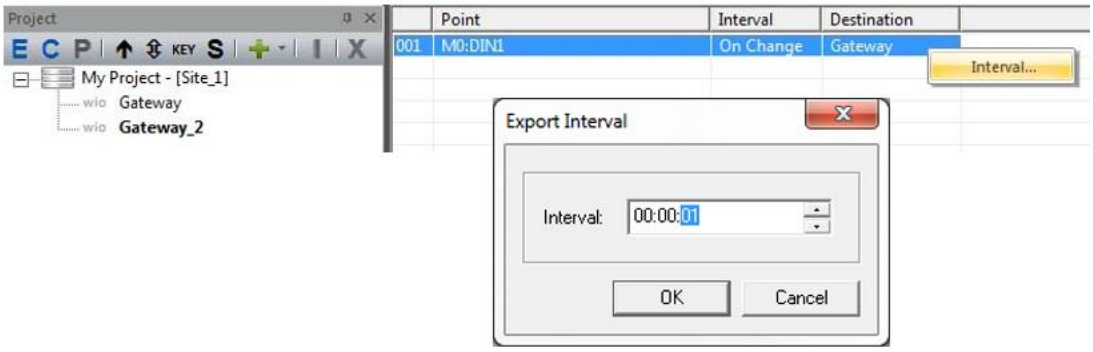


12. Using Shared Point based on interval or on change.

a. Double-click **Gateway_2**.

b. Click on the **Exports** tab.

c. Right-click on the point and select **Interval…**.



d. If the time value equals 0, then the point will be shared on change.

   i. *On Change* means the value changed or new RF packet received.

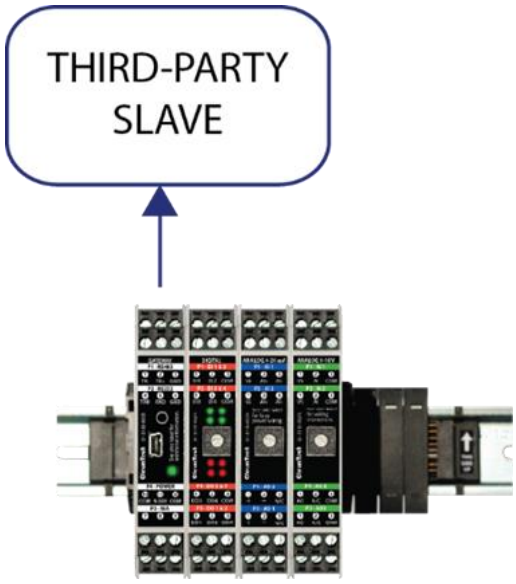
e. If a point is set to a specific interval, then the Gateway will send the point according to the interval, regardless change in value.

13. Save project file.

14. Update both Gateways for changes to take place.

9.8 Modbus Master Function

The Gateway's Serial/RTU port and WIO Gateway's RS485 port can be configured as a Modbus Master.



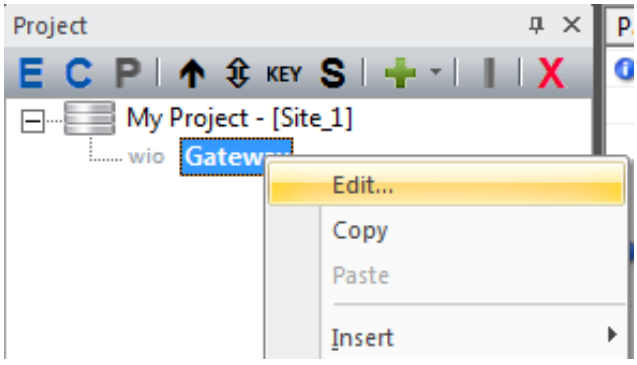
Supported Modbus Function Codes:

- Function Code 3, Read Holding Registers - 16-bit integer, float
- Function Code 4, Read Input Registers - 16-bit integer
- Function Code 6, Write Single Holding Register - 16-bit integer

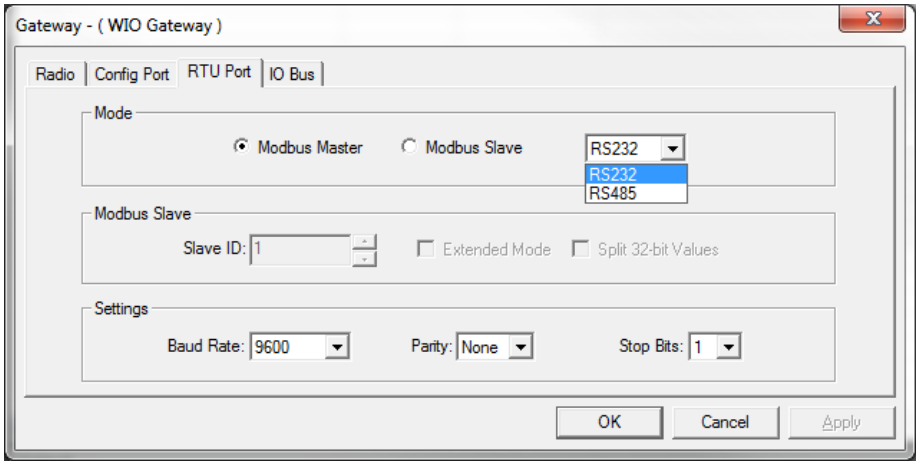
1. Determine if you are using RS232 or RS485 serial mode.

2. Open a *Wireless I/O Designer* project file.

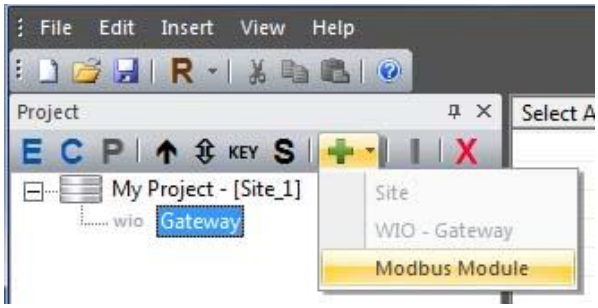
3. Open the Gateway properties by clicking the **E** button or right-clicking on the Gateway icon and selecting **Edit**.



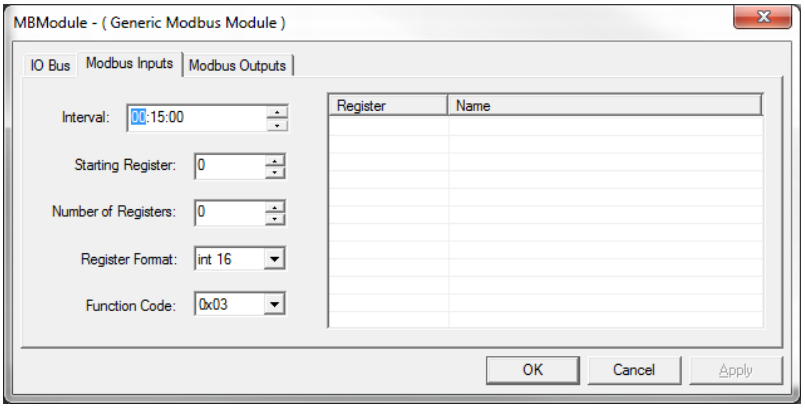
4. RTU port method
   a. Click on the **RTU Port** tab.
   b. Select **Modbus Master** for mode of operation.
   c. Set the port as RS232 or RS485.
   d. Configure the appropriate values in **Settings**.



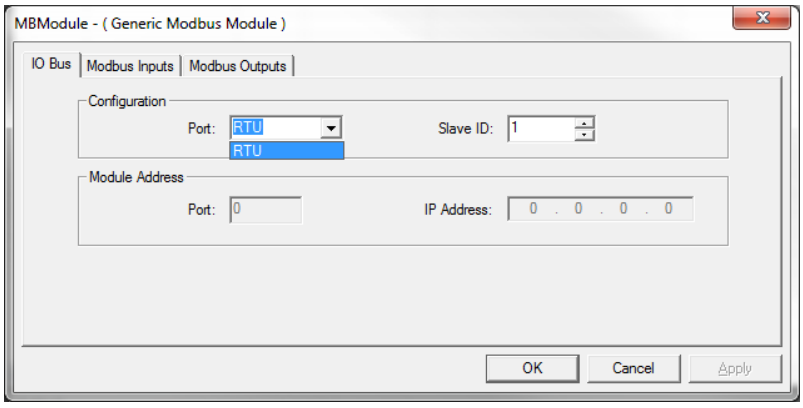
5. Click on **Gateway** in project tree and click **+** (**Add Device**) button and select **Modbus Module**.



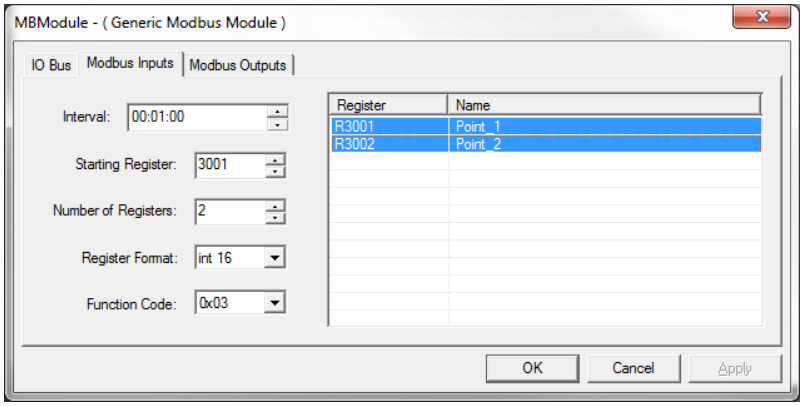
The configuration window opens.



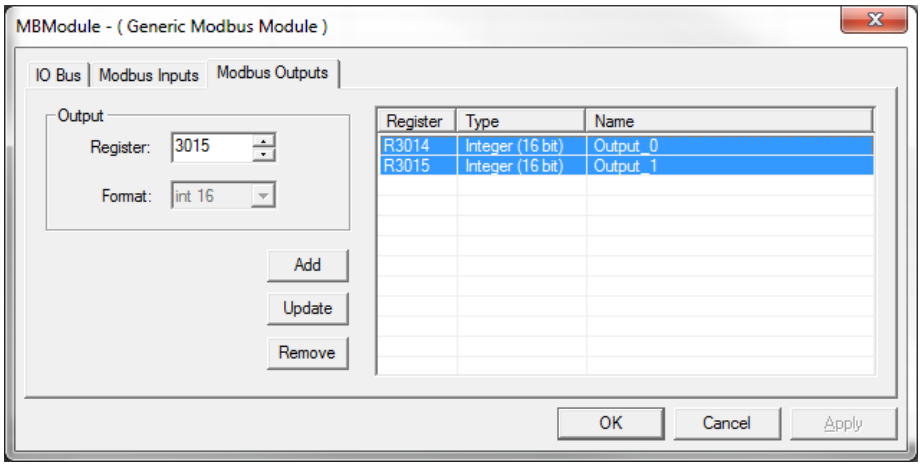
6. Under **IO Bus** tab, select **RTU** port.
   a. Select **Slave ID**.



7. Click on the **Modbus Inputs** tab and configure the input settings.
   a. Set the read **Interval** and the other appropriate settings.



8. Click on the **Modbus Outputs** tab and configure the output settings.

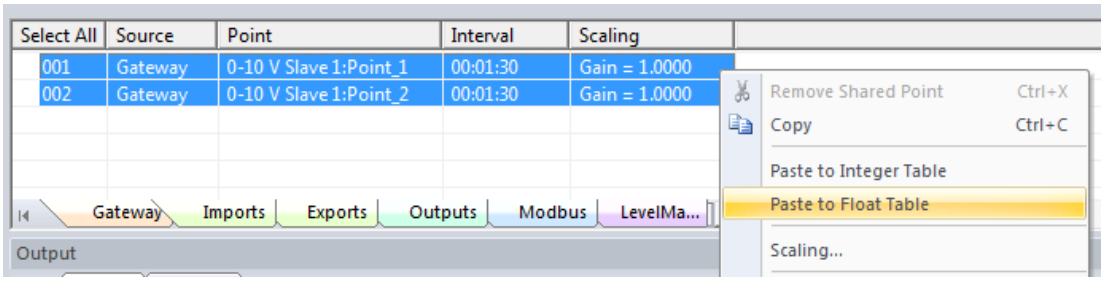


9. Map input read commands to the Gateway's Modbus register holding table.

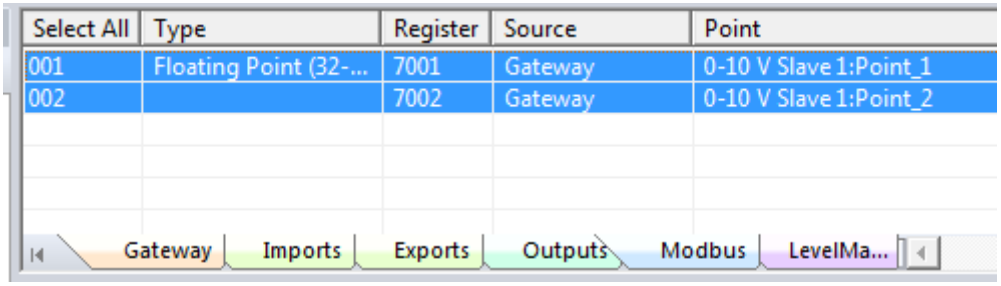
a. Double-click on **Gateway** in the Project Tree.

b. Click on the **Imports** tab.

c. Right-click over the import points and select **Paste to Integer Table** or **Paste to Float Table**.



d. Click on the **Modbus** tab and verify the Modbus register mapping.

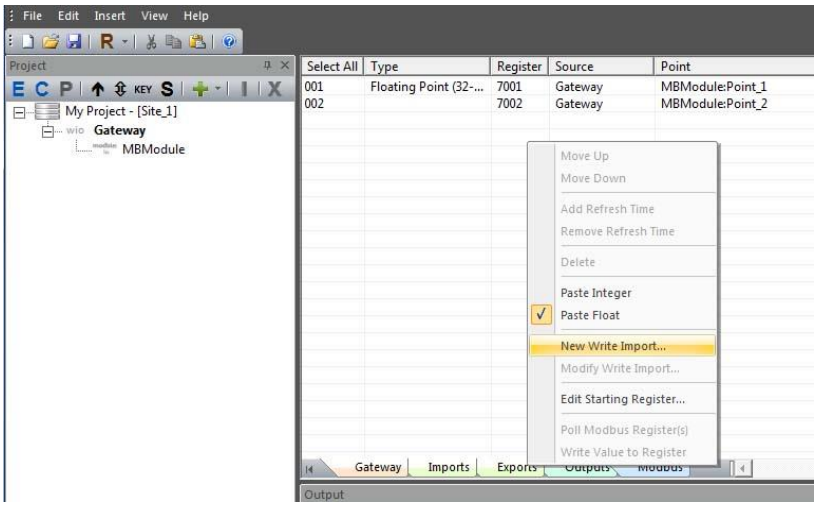


10. How to write to outputs using a third-party Modbus Master device:

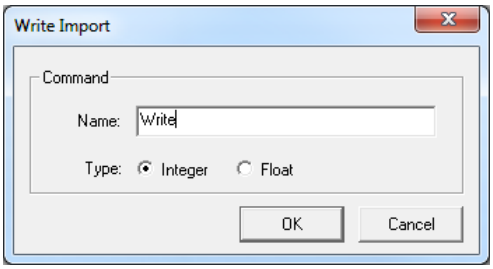
a. Double-click on **Gateway** in the Project Tree.

b. Select the **Modbus** tab.

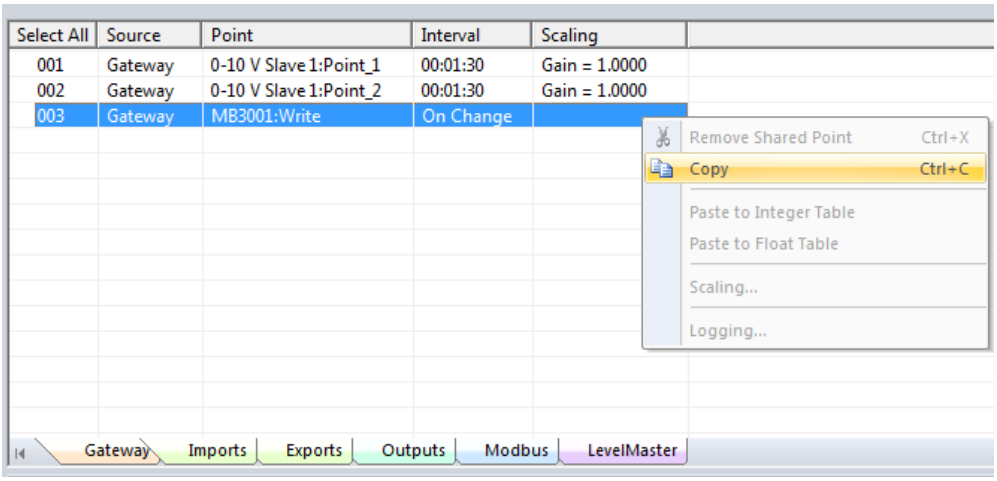
c. Right-click in the Window, and select **New Write Import**.



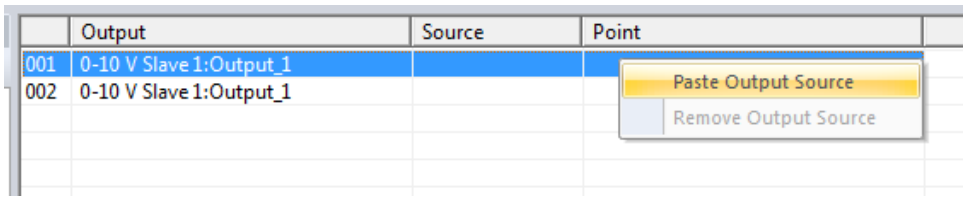
d. Create a name for the write command.

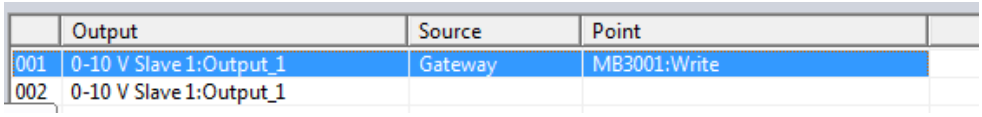


e. Select the **Imports** tab and right-click on the newly created *Write* command. Then select **Copy**.



f. Select the **Outputs** tab and right-click on an output point. Then select **Paste Output Source**.





g. Save project file.

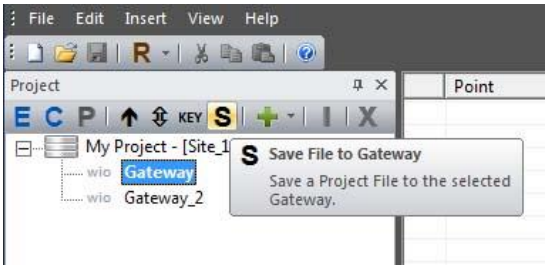
h. Update the Gateway for changes to take place.

9.9 Saving the Project File to the Gateway

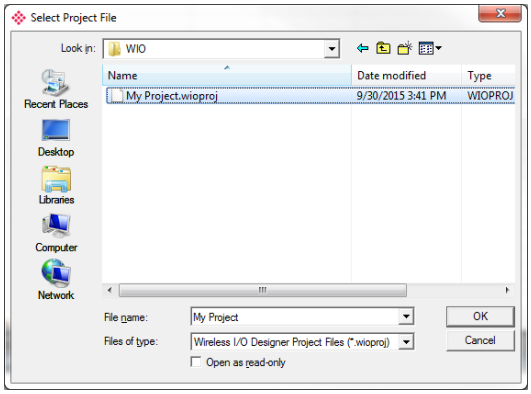
The Wireless I/O Designer Software version 1.0 and higher allows users to save the Project File onto any Gateway. This allows local access to field users.

Note: When a Project File is retrieved, modified, and used for updating devices, be sure to save the revised file back onto the Gateway.

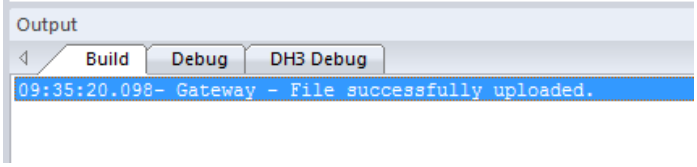
1. Connect the Gateway to your PC.
2. Click on the **Gateway** icon in the Project Tree.
   a. If you have multiple Gateways in a Project File, be sure to note which Gateway will store the Project File.
   b. Using the primary Gateway for saving Project File is recommended.
3. Click the (**Save File to Gateway**) Button.



4. Select the desired project file and click **OK.**



5. The **Build** tab provides confirmation.

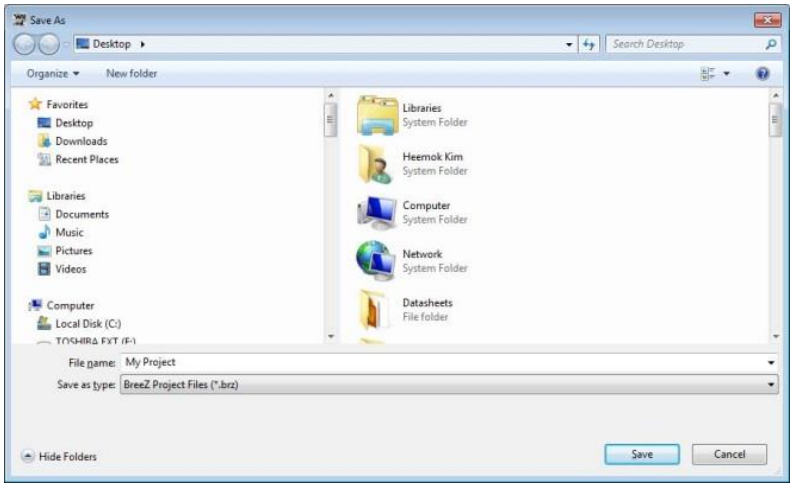


9.10 Retrieving the Project File from the Gateway

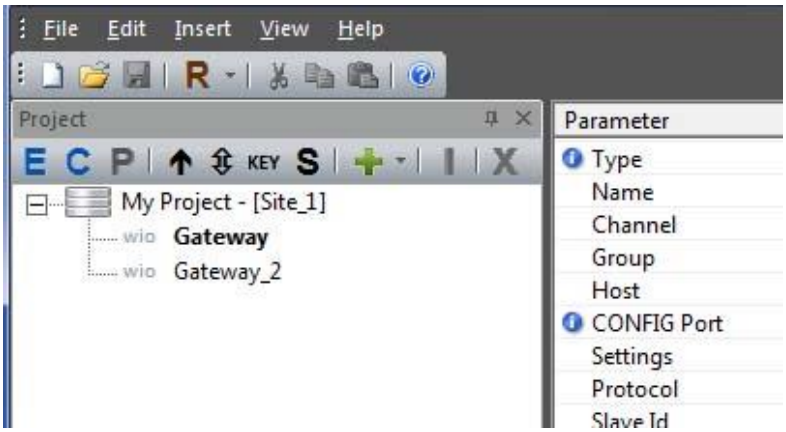
1. Connect the Gateway to your PC.
2. Open the Wireless I/O Designer Software.
3. Close the *Project Creation Wizard.*

4. Click the **R** (**Retrieve Project File**) button.

5. Select a location to save the file.



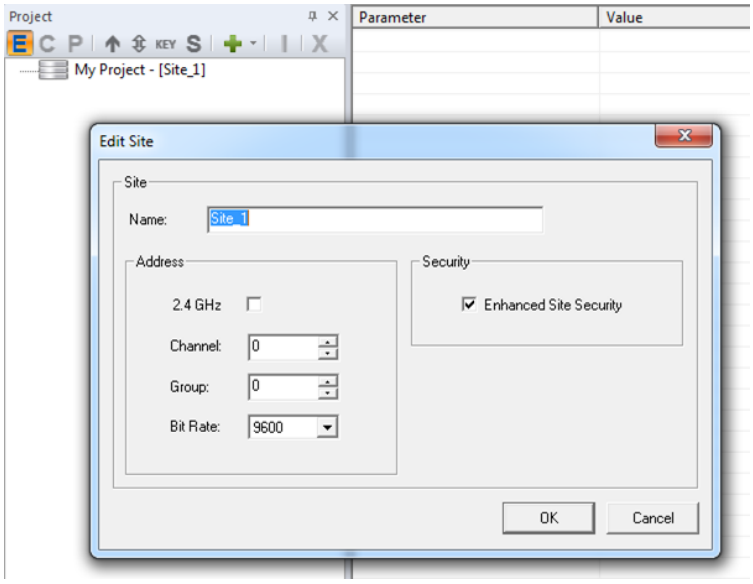
6. The retrieved file will automatically open.



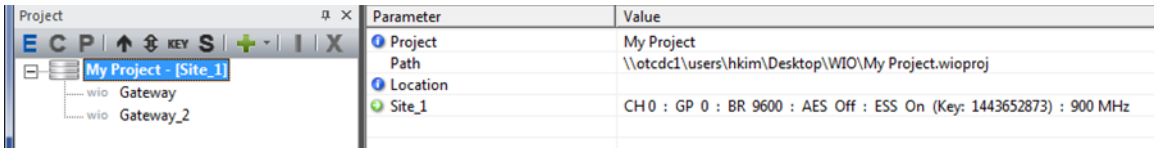
After making any modifications to the project file, be sure to re-save the project file onto the Gateway.

9.11 Wireless Site Security Key

1. By default, the Site Security is automatically enabled when creating a new project file in the Wireless I/O Designer.
   a. Verify the status by viewing the **Site** properties.
   b. Click **Site** in the project tree, then click the **E** (**Edit**) button.
   c. Check the box under **Security**.



   d. Double-click on **Site** in the project tree and site key can be viewed.



2. File saving behavior in relations to Site Security

   a. Key will change when:
      i. Saving a new project file in Wireless I/O Designer.
      ii. Changing a Wireless I/O Designer file name using Windows. (Modifying file name outside of Wireless I/O Designer)
      iii. Opening an existing file in Wireless I/O Designer, then renaming and saving the file.
      iv. Using the **Save As** feature in Wireless I/O Designer, then saving file in a new directory.

b. Key will NOT change when:

i. Opening an existing file in Wireless I/O Designer, modifying it, then saving it.

ii. Making no changes to a file, then saving or closing it.

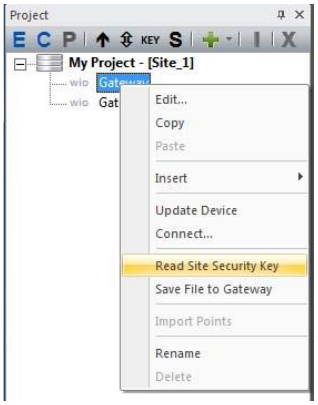
iii. Copying and pasting a project file in Windows.

3. What To Do When Site Security Key is Lost:

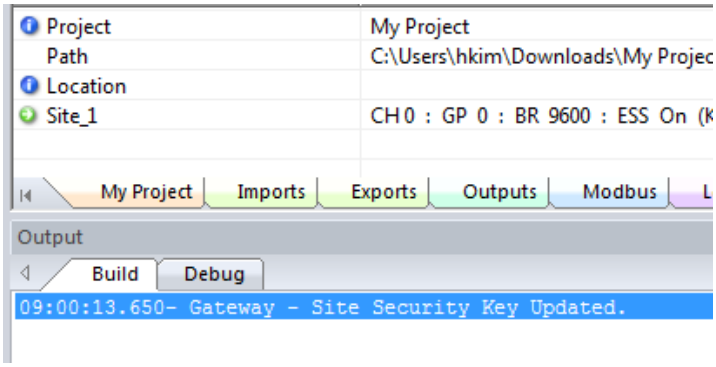
a. Connect the Gateway to your PC.

b. Double-click on **Gateway** in the project tree.

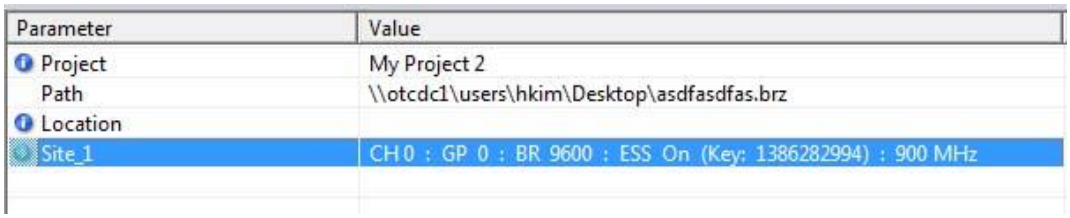
c. Right-click on **Gateway**, then select **Read Site Security Key**.



d. Verify in the **Build** Tab.



e. Double-click on **Site** in the project tree and verify the Site Security Key change.



10 Troubleshooting

1. WIO Gateway Not Communicating with Wireless I/O Designer Software

   If you are unable to communicate with the WIO Gateway using the Wireless I/O Designer Configuration Software:

   - Connect the PC running Wireless I/O Designer Configuration Software to the WIO Gateway
   - Confirm that PC's COM port and the COM port configured in the Wireless I/O Designer Configuration Software are the same.
   - Check that the appropriate device is selected in the Wireless I/O Designer Configuration Software

2. WIO Gateway Not Communicating with a Device

   If the WIO Gateway is not communicating with another Gateway:

   - Update all devices with the same Project File
   - Confirm that the antennas of all devices have a clear line of sight and are within approved distances
   - Change the channel of site and update all devices
   - Increase the Tx power of all devices
   - Confirm that the **Interval** setting for the devices is correct
   - Set the **Retries** setting for 16 if it has been changed
   - Check the firmware of device

3. WIO Gateway Measurements are Always Zero

   If the WIO Gateway measurements are always zero:

   - Enable the desired analog input
   - Verify wire connections
   - Confirm whether the WIO Gateway has been reset

4. WIO Gateway Cannot Communicate via RTU, RS485, or Configuration Port

   If the WIO Gateway cannot communicate through the RTU, RS485, or CONFIG port, verify the jumper settings for the port.

   In Wireless I/O Designer, verify that the proper settings are set for the port.

5. Resetting the WIO Gateway

   The front panel of the WIO Gateway has a reset button for reinitializing the device. The button is recessed to prevent accidental resets.

   To reset the WIO Gateway:

   a. Remove the top cover of the WIO Gateway
   b. Find the reset button on the front of the WIO Gateway
   c. Using a small screwdriver, push in and hold the recessed reset button for at least 10 seconds, then release. The LED flashes five times after the device is reset.

11 General Maintenance

The Wireless Gateway does not require periodic system checks. In general, the transmitter only needs a yearly visual inspection for the following:

- Is the Gateway still securely fastened to the mounting location?
- Are there any visible signs of corrosion, cracks, or residue build-up on the device?
- Has anything about the intended use of the original application changed?

If the Wireless Gateway is securely fastened, with no signs of corrosion, cracks, residue build-up, or if nothing has changed about the location of its intended use, it should continue to operate within designed specification.

If the Wireless Gateway is not securely fastened; if there are signs of corrosion, cracks, residue build-up; or if there has been a change to the location of its intended use resulting in undesirable performance, contact the manufacturer for service instructions.

Cleaning: To prevent static discharge, wipe the outer casing with a damp cloth only.

12 Glossary

16-Bit Integer - a unit of digital information comprised of 16 bits which may be interpreted as: *Unsigned:* 0 to 65,535 (2^{16}–1) or *Signed:* −32,768 (−(2^{15})) to 32,767 (2^{15}–1) value.

32-Bit Float - a method of representing real numbers in a way that can support a wide range of values..

Analog Signal - any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity, i.e., analogous to another time varying signal. For example, in sound recording, fluctuations in air pressure strike the diaphragm of a microphone inducing fluctuations in current produced by its coil. This current is said to be an "analog" of the sound.

Analog Input - a method for measuring an analog signal.

Analog Output - a method for producing an analog signal.

ASCII - The American Standard Code for Information Interchange, is a character-encoding scheme based on the ordering of the English alphabet. ASCII codes represent text in computers, communications equipment, and other devices that use text.

Baud Rate - A number related to the speed of data transmission in a system. The rate indicates the number of electrical oscillations per second that occurs within a data transmission. The higher the baud rate, the more bits per second are transferred.

Bias - while scaling an analog input, the value added to offset the range. Example: range = 500, bias = 100, analog input values scale from 100 (min) to 600 (max).

Bit - a contraction of binary digit, is the basic unit of information in computing and telecommunications; it is the amount of information stored by a digital device that exists in one of two possible distinct states 1 or 0, On or Off, etc...

Bit Rate - RF data rate or rate that RF data is transmitted over-the-air (9.6k, 115.2k-900MHz or 250k-2.4MHz).

Byte - unit of digital information in computing and telecommunications that most commonly consists of eight bits.

Channel - one of either 10 hopping sequences (900MHz) or 12 direct sequence channels (2.4GHz) used to isolate radio communications.

COM Port - a serial communication physical interface through which information transfers in or out one bit at a time.

Configuration Port - the COM Port used to configure a device.

Count All - a method for increasing an unsigned 16 bit integer each time a discrete input is opened or closed (2 counts).

Count High - a method for increasing an unsigned 16 bit integer each time a discrete input is closed (1 count).

Count Low - a method for increasing an unsigned 16 bit integer each time a discrete input is opened (1 count).

CTS - clear to send, a discrete signal indicating permission from the DCE for the DTE to send data to the DCE.

Data Logging – recording of data in two forms: event logging or trending.

DCE - Data Communication Equipment *i.e.* computers and other intelligent devices.

Debounce - the duration of time (ms) in which a discrete signal must remain stable prior to acknowledging a change in state from “On/Closed” to “Off/Open” and vice versa.

Debug - output to the Configuration Port from a connected device providing user insight into its status and operation.

Digital (Discrete) Signal - an electrical signal whereby minor fluctuations of the signal are not meaningful unless they cross above or below a discrete threshold, at which point they are said to be “On/Closed” or “Off/Open.”

DIN Rail Mount - Metal rail of a standard type widely used for mounting circuit breakers and industrial control equipment inside equipment racks.

Discrete Input - a method for measuring a digital (discrete) signal.

Discrete Output - a method for producing a digital (discrete) signal.

Discrete Switch - a device that produces a digital (discrete) signal represented in 0 or 1 for exception reporting purposes.

DTE – Data Terminal Equipment *i.e.* modems, terminals and any other unintelligent device.

Dual Float (Configuration) - Liquid Level Sensor or High Level Switch Sensor set up with two floats to read either product level and interface level liquid levels, or for high and high-high alert notification.

EFM - Electronic Flow Meter.

End Node - OleumTech network device that monitors process conditions.

Enhanced Site Security - Enabling site security reduces the chance that transmitted information can be accessed by unauthorized devices or cross-talk between other devices operating in the area. By default, site security is enabled and it is recommended to keep this default setting.

Error - Status of the last read operation performed by a Transmitter. A status of 0 = OK.

Event Logging – recording of data when by triggered by a specific event

Exports - Values sent to other devices in wireless network.

Extended Mode - Used to set a slave ID higher than 255.

Full Duplex - Four wire communication mode using handshaking.

Ground (GND) - Ground or earth may be the reference point in an electrical circuit from which other voltages are measured, or a common return path for electric current, or a direct physical connection to the Earth.

Group - ID used to configure one or more wireless gateways with its end nodes in a network.

Half Duplex - Two wire communication mode which does not use handshaking.

Handshaking - An automated process of negotiation that dynamically sets parameters of a communications channel established between two entities before normal communication over the channel begins.

Host - Wireless ID of receiver.

Imports - Values received from other devices in wireless network.

Initially On - Upon Power cycle or updating device, the discrete output will be closed.

Interface (Level) - Second level of fluid in tank such as water. Represented by the position of the lower float on the digital liquid level sensor.

Interval - Time delay in which the device will transmit data.

Jumper - A short length of wire used temporarily to complete a circuit or to bypass a break in a circuit. Represented by small pieces placed on pins of the circuit board.

Modbus - A Master/Slave protocol used with programmable electronic devices that allows for communication between many devices connected to the same network.

Modbus Master – The Gateway's Serial RTU port (RS232 or RS485) that polls information from one or more Slave devices in a Modbus network.

Modbus Module - Used when a port on a receiver is set to Modbus Master mode. Used to read and write values to a Modbus Slave device.

Modbus Slave - A device in a Modbus network takes action from a Modbus Master device and responds to it.

Node - term used to identify a System Transmitter, configured to communicate with a System Gateway.

Node Timeout - Transmitter setting that specifies the number of minutes the node checks for radio-frequency activity. If it does not detect radio-frequency activity within this period, it registers a Read Timeout error.

Normally Closed - Digital contact that is closed in normal state.

Normally Open - Digital contact that is open in normal state.

Output Window - shows messages and data associated with various tasks.

Outputs - Values used to source outputs on a device such as analog output, discrete output, or Modbus write registers.

Parity - A bit added to a binary code that indicates parity and is used to check the integrity of data. A parity bit is used as the simplest form of error detecting code.

PLC - Programmable Logic Controller.

Port - Communications Port ID on computer used to configure devices.

Pressure Transducer - Device used to convert pressure to an analog value.

Product (Level) - Top level of fluid in tank such as oil. Represented by the position of the top float on a digital liquid level sensor.

Project Explorer - Window in the Wireless I/O Designer Software that shows a tree of the devices in a project file. The name of the project file (current site) appears at the top of the tree, followed by the Wireless Gateway associated with the project file. Transmitters and Modules are grouped below the Wireless Gateway to which they are assigned.

Project File - Site specific project configuration set up and saved using Wireless I/O Designer software.

Project Name - Name assigned to field site specific project set up and saved using Wireless I/O Designer software.

Pulsed - The discrete output will change state for a specified period of time determined by a Modbus master via a Modbus register write. The value written will be in milliseconds.

Range - Max decimal value to be represented by full scale of analog input.

RAW Units - Digital representation of an analog signal.

Refresh Time - Count that increases every one (1) second. The count is posted each time the corresponding device completes a successful transmission. An unchanging refresh time indicates a failure of the corresponding device.

Relay - A device, usually consisting of an electromagnet and an armature, by which a change of current or voltage in one circuit is used to make or break a connection in another circuit or to affect the operation of other devices in the same or another circuit.

Retries - Number of times the device will send data in the event of a transmission failure before terminating transmit attempts.

RF Timeout - diagnostic indicator for radio communication. To use this value, set the Node Timeout in transmitter's radio setting to double that of the Reading Interval time plus 10 seconds.

RS232 Port – This terminal (P2) is located at the second to the top of WIO Gateway and Modules, used to communicate Modbus via RS232 protocol.

RS485 - Telecommunications standard for binary serial communications between devices. RS485 allows for serial connections between two or more than devices on a networked system.

RS485 Port – This terminal (P1) is located at the top of WIO Gateway and Modules, used to communicate Modbus via RS485 protocol.

RTS - Ready To Send (232 mode).

RTU - Remote Terminal Unit.

RTU Port - Green terminal ports on WIO Gateway & WIO GATEWAY, used to communicate Modbus via RS485 or RS232 protocol.

RX - Receive (RS232 mode).

RX- - Receive Minus (RS485 mode).

RX+ - Receive Plus (RS485 mode).

Scaled Units - Used to convert an analog signal into desired values.

Single Float (Configuration) - Liquid Level Sensor or High Level Switch Sensor set up with one float to read either level liquid levels or for alert notification.

Site – Field location where devices are deployed for use.

Site ID – Unique, customer assigned identification for site location.

Slave ID - ID of the slave device in which Modbus Registers are being requested.

Solenoid - A coil of wire, partially surrounding an iron core that is made to move inside the coil by the magnetic field set up by a current: used to convert electrical to mechanical energy, as in the operation of a switch.

Span - Digital Range of analog to digital converter. Used to signify voltage range of device being used.

Split 32-Bit Values - Used to take a 32 bit float register and divide it into two 16 bit registers.

Stop Bits - Bits sent at the end of every character to allow the receiving signal hardware to detect the end of a character and to resynchronize with the character stream.

Trending – recording of data based on a set interval.

Turbine - Device that produces digital pulses proportional to the rate at which fluid passes through it.

TX - Transmit (RS232 mode).

TX- - Transmit Minus (RS485 mode).

TX Power - Power level at which the radio transmits.

TX+ - Transmit Plus (RS485 mode).

V+ - Positive voltage.

Valve - Used to control the flow of liquids or gas.

Voltage - Electrical potential or potential difference expressed in volts.

13 Support, Service & Warranty

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1. Product Version Number
2. System architecture
3. Network details

If the issue is hardware related, we will also need information regarding:

1. Module configuration and associated ladder files, if any
2. Module operation and any unusual behavior
3. Configuration/Debug status information
4. LED patterns
5. Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: *For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers. Detailed contact information for all our worldwide locations is available on the following page.*

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13.1 Warranty Information

For complete details regarding ProSoft Technology's TERMS & CONDITIONS OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL AUTHORIZATION INSTRUCTIONS please see:
www.prosoft-technology.com/legal

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