

# Interface Manual

## Wireless I/O Module Mini

*SignalFire Number: WIOM-MINI-IOMIX1-xxxx*



The SignalFire Wireless I/O Module Mini can send analog and digital I/O to a SignalFire Gateway or mirror the digital I/O wirelessly another Wireless I/O Mini Module, acting as a wire replacement.

The SignalFire Wireless I/O Module Mini has the following features:

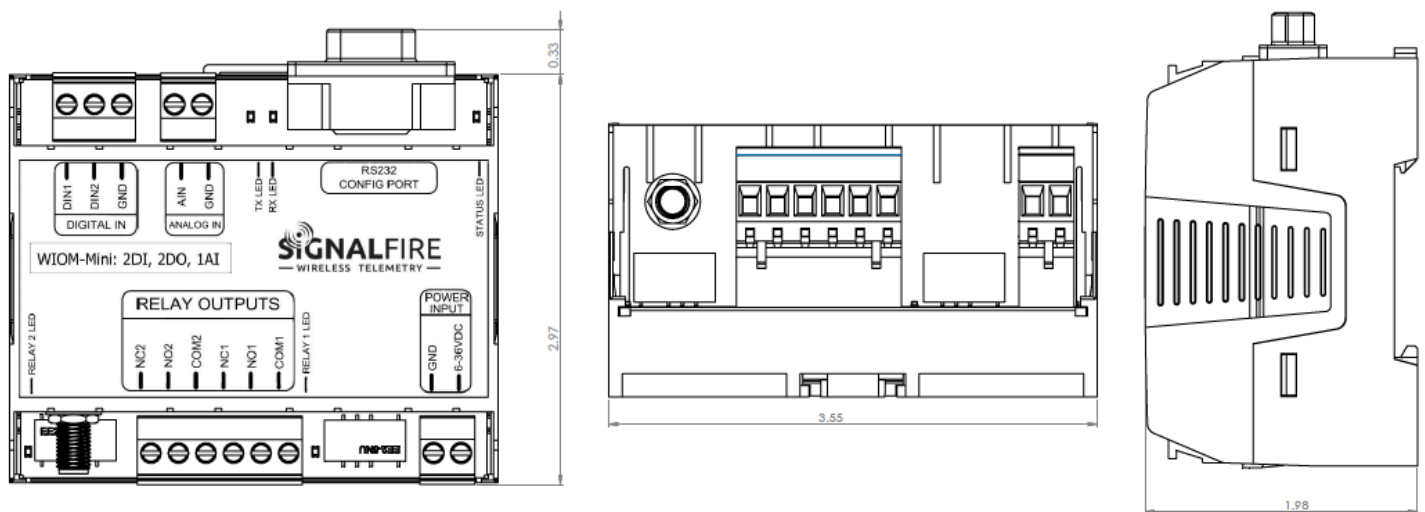
- 1 Analog input (1-5V)
- 2 Digital inputs
- 2 Relay outputs (2 SPDT)
- Wide range DC power input, 6-36 VDC
- Low power consumption
- DIN rail mount with pluggable screw terminal blocks
- Status LEDs

## Specifications

2

Power	6-36 VDC (25mA average @12V no relays energized, additional 15mA max for each energized relay)
Temperature Rating	-40°C to +65°C
Analog Input	0-5V Signal (10V Max)
Digital Inputs	Dry Contact or 30 Volts Max (push-pull), 2kHz maximum frequency
Digital Outputs	2 SPDT's, max 30 VDC @ 2 Amps, 250 VAC @ 0.25 Amps
Radio Frequency	902-928MHz ISM Band, FHSS radio, RP-SMA connector FCC and IC Certified. Contains FCC ID: W8V-SFTS500, IC: 8373A-SFTS500
Compliance	Certified for use in Class I, Division 2, Groups A, B, C, D. Temperature Code T5

## Dimensions



## Hazardous Location Certification

The Wireless IO Module is rated Class 1 Division 2 non-incendive.



**WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE COMPONENTS UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS.**

*AVERTISSEMENT : RISQUE D'EXPLOSION . NE PAS RETIRER OU REMPLACER LES COMPOSANTS QUE L'ALIMENTATION EST DÉBRANCHÉ OU ZONE EST LIBRE DE CONCENTRATIONS IGNITIBLE.*



**WARNING – EXPLOSION HAZARD Substitution of components may impair suitability for Class I, Division 2**

AVERTISSEMENT - RISQUE D'EXPLOSION. La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de classe I, division 2



**WARNING – EXPLOSION HAZARD Do not disconnect while circuit is live unless area is known to be nonhazardous**

AVERTISSEMENT - RISQUE D'EXPLOSION. Ne débranchez pas lorsque le circuit est en direct , sauf si la zone est connue pour être nonhazardous



**WARNING – The Wireless IO Module must be installed in a suitable enclosure for intended environment**

AVERTISSEMENT - Le module IO sans fil doit être installé dans une enceinte appropriée pour l'environnement prévu



**WARNING – All wiring methods must be in accordance with the NEC**

AVERTISSEMENT - Toutes les méthodes de Essorez doivent être en conformité avec la NEC

## Connections and Components

### Power

Power must be provided by the Power Input screw terminals (6-36VDC). The module power requirements at 12VDC is 25mA average plus 15mA per energized relay channel.

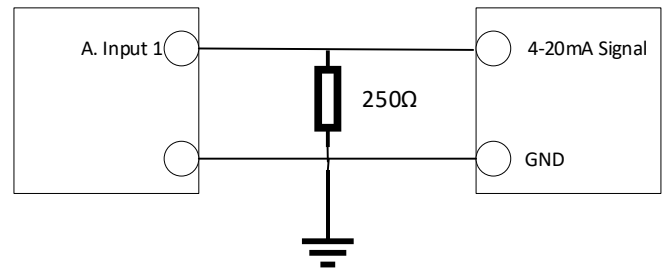
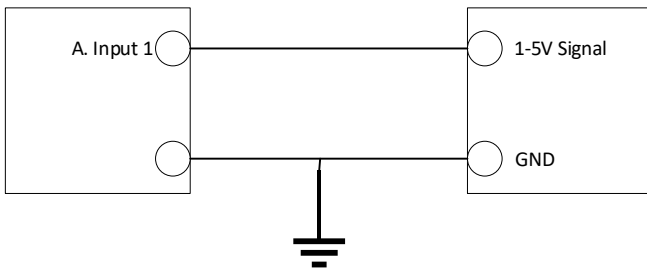
### Antenna

The antenna port is standard RP-SMA connector. Connect this port to a suitable 900MHz antenna. SignalFire can supply a variety of antennas for use with the modules.

### Analog Input

The analog input operates as a passive voltage input (1-5V).

Wire the analog voltage to the set of screw terminals. Maximum input voltage is 10 Volts. If the input is a 4-20mA signal, use a high-precision 250 $\Omega$  resistor from the analog input terminal to ground to convert the signal to 1-5V.



### Digital Inputs

The digital inputs (2 total) can be dry contact or voltage (must be push-pull and pull to ground, 30 Volts max). Be sure to connect the ground bus from the module to either the ground of the voltage device or the dry contact.

The digital inputs report their current state, as well as input frequency. The DI pulse counter increments only when the state changes from 0 to 1. The Instantaneous Frequency registers are the number of pulses per second within 2 seconds of check-in multiplied by 10. The Average Frequency registers are the number of pulses per second over the period between two check-ins multiplied by 10. The Counts/Min registers are the total number of pulses per minute between two check-ins multiplied by 10.

## Digital (Relay) Outputs

There are two relay outputs, both SPDT's. The relays are rated for the following:

30 VDC @ 2 Amps

125 VAC @ 0.5 Amps

Be sure to use a flyback diode as needed for inductive loads such as solenoids.

## Status LEDs

The Wireless I/O Mini node has a green status LED which blinks indicating the module is running. The status LED also indicates the signal strength between it and its module pair. In addition, there are TX/RX LEDs to indicate radio messages to/from the module.

The status LED will blink once a second if it is not connected to another module. If the node is connected to its paired module, it will blink a link quality code every 3 seconds.

3 Blinks = Strong Signal

2 Blinks = Good Signal

1 Blink = Weak Signal

Each relay output also has a green LED which turns on while the relay is energized.

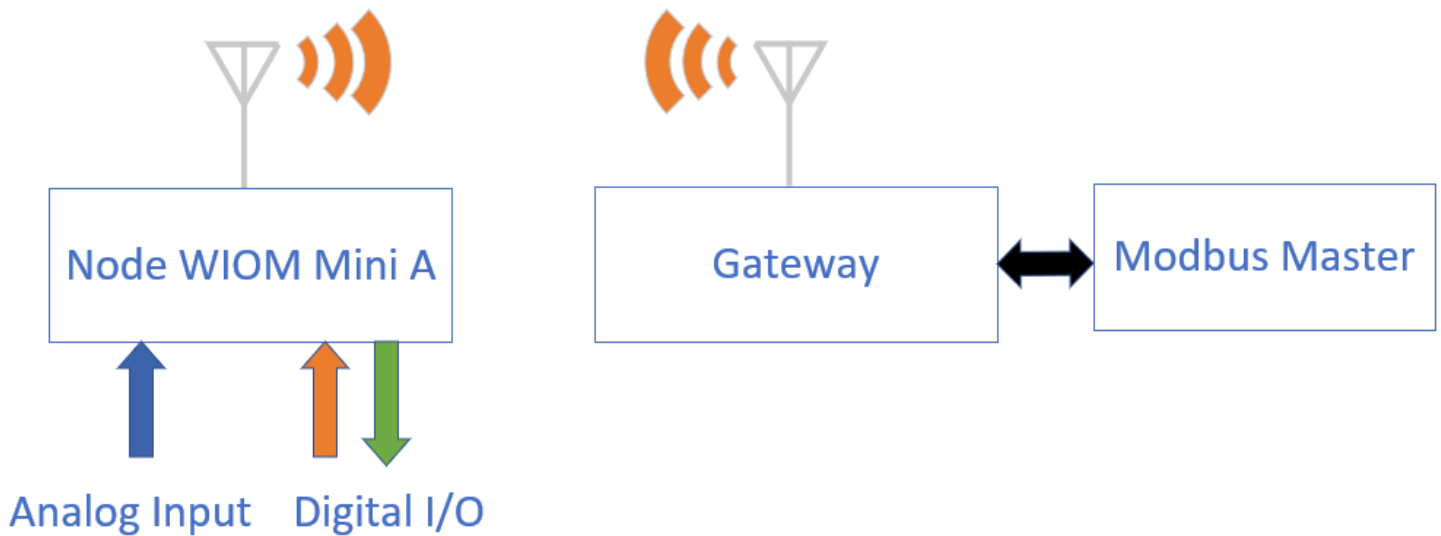
## Modes of Operation

6

The Wireless I/O Module Mini can be run in two software settable “system modes”: **Node**, and **Point-to-Point**. The ToolKit has a Radio Mode dropdown that can be set to either Node or Gateway. For the WIOM Minis to operate in Node mode, all WIOM Minis on the network must be set to Node and they will communicate with a SignalFire Gateway. For Point-to-Point, set one WIOM Mini to Gateway and one WIOM Mini to Node, on a network that has no other devices.

### Node Mode

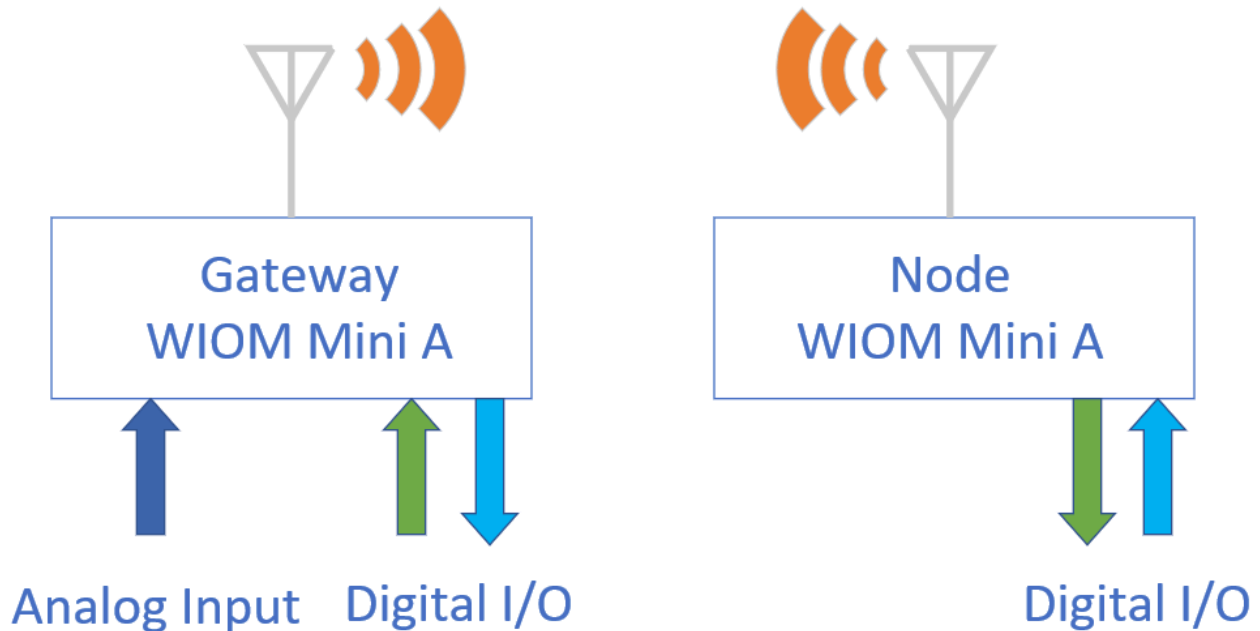
In Node mode, the WIOM Mini will send its analog and digital inputs/outputs to the Gateway. All IO and then be read/set from a PLC via Modbus.



*Node Mode. The Gateway reads all inputs from all nodes, and can control any output of any node as commanded by a PLC*

## Point-to-Point Mode

In Point-to-Point mode, a WIOM Mini that is set to Gateway mode will mirror its digital inputs to the outputs of a Module set to Node, and vice-versa. Point-to-Point mode is only valid for a pair of WIOM Mini modules. For example, if Digital Input 1 on the Gateway is shorted to GND (logic 1), Digital Output 1 on the Node is energized, and vice versa. Because the WIOM Mini A does not have an analog output, the analog input is not used.



*Point-to-Point Mode. Inputs from one module are mirrored as outputs on the other*

When set to Point-to-Point mode, the WIOM Minis will not be viewable through a SignalFire Gateway as they will be on their own network. The module that is set to Gateway will be locked to Slave ID 1.

## WIOM-Mini to WIOM Mode

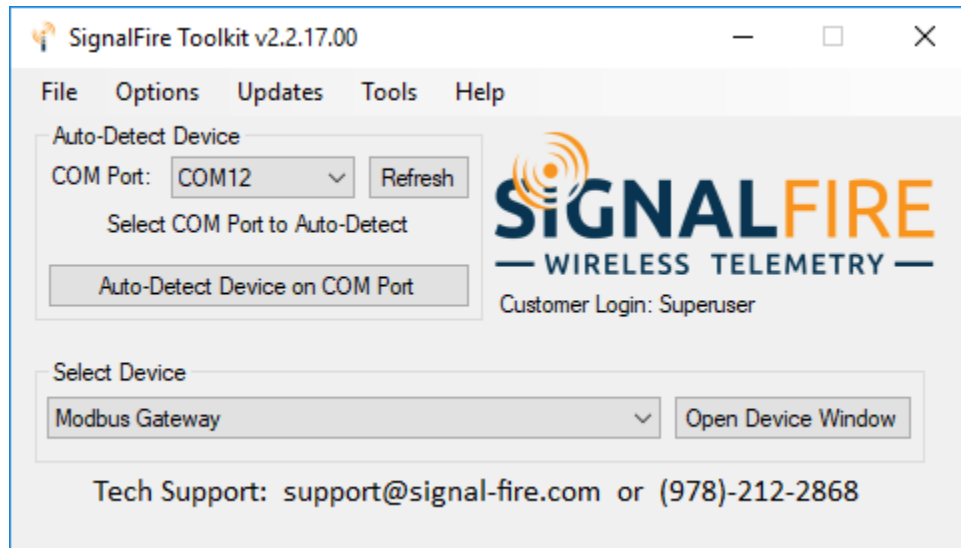
A WIOM Mini and a regular WIOM can also operate in Point-to-Point mode with each other. In this configuration the WIOM will mirror the WIOM Mini A's analog input to its analog output 1. The DI's will be mirrored in both directions. The WIOM must be configured in Gateway mode while the WIOM-mini must be in node mode.

## Configuration

# 8

### Using the SignalFire Toolkit

The SignalFire Toolkit application can be downloaded at [www.signal-fire.com/customer](http://www.signal-fire.com/customer). After installation, launch the software and the main toolkit window will open:



Select the COM port associated with the Wireless IO Module Mini and click “Auto-Detect Device on COM Port.” This will open the device configuration window, where all device settings can be configured.

### Network Settings

The network is set using the SignalFire Toolkit. To join a SignalFire network in Node mode, all Wireless I/O Module Minis must have the same Radio Network, Radio Network Group, and Corporate ID/Encryption Key as the Gateway. For two Wireless I/O Module Minis to communicate in Point-to-Point mode, they must share the same Radio Network, Radio Network Group, and Corporate ID/Encryption but not share those settings with any other SignalFire network.

To use an Encryption Key in lieu of a Corporate ID, check off the “Enable Encryption” box under the Corporate ID. The Corporate ID field will switch over to an Encryption Key field.

Radio Network	1	Set
Radio Network Group	0	Set

The encryption key can be hidden so it cannot be read. This is the most secure option, but if you forget your key, there is no way to recover it – you have to reset the key on every device on its network. To enable this option, select **Set Encryption Key Unrecoverable** under the **Settings** menu.



### Failsafe Operations

In the event of a loss of communication between the node and the gateway, it may be desirable for the outputs to go to a fail state. This is accomplished by setting one or both of the failsafe timers.

**Communication Failsafe Timer** – If the node loses its wireless communications link to the gateway for greater than this time, any failsafe enabled relay will be put into a non-energized state. The relay will remain in this “safe” state until a Modbus command is sent from the Modbus master through the Gateway to energize the coil.

**Message Failsafe Timer** – This is similar to the previous timer, but this indicates the time since a valid Modbus coil write message has been sent from the Modbus master through the SignalFire Gateway. If used, this timeout must be set higher than the Modbus coil write frequency of the Modbus master device. This option is available for both Point-to-Point and Node mode.

### Analog Scaling (Node Mode only)

Analog scaling can be used to scale an analog input to engineering units. For example, for a 0-1000psi sensor set the scale low to 0 and scale high to 1000. The scaled value will now be displayed in the Toolkit and reported to the gateway as a floating point number.

### Digital Input Debounce

In cases where it is desired to accurately totalize digital input counts it may be necessary to enable the digital input debounce timer. The debounce timer is useful when dealing with dry contacts that may otherwise produce extra count when they close. To enable the digital debounce select **Digital Input Debounce** from the settings pull-down menu. A typical value for a dry contact would be 100mS. Any extra counts due to contact bounce within the debounce time setting will be ignored.

## Modbus Register Map

Register Number	Register Address	Description	Function Code	Register Type
<b>Coils (0xxxx)</b>				
<i>Write-only</i>				
00102	101	Relay1 Coil	01, 05	Read/Write
00103	102	Relay2 Coil	01, 05	Read/Write
00112	111	Counter1 Reset Coil	05	Write Only
00113	112	Counter2 Reset Coil	05	Write Only
<b>Holding Registers (4xxxx)</b>				
40122	121	Relay1 Pulse (0 = Off, 1 – 65,535 = Pulse Time (sec))	06	Write Only
40123	122	Relay2 Pulse	06	Write Only
41101	1100	AI1: Voltage Reading (Unsigned int, mV)	03, 04	Read Only
41102	1101	DI1: State (Unsigned int, 1 = Closed or 0 = Open)	03, 04	Read Only
41103	1102	DI2: State	03, 04	Read Only
41104	1103	Relay #1 State (Unsigned int, 1 = ON or 0 = OFF)	03, 04	Read Only
41105	1104	Relay #2 State	03, 04	Read Only
41106	1105	AI1: Scaled Reading (Float High Word)	03, 04	Read Only
41107	1106	AI1: Scaled Reading (Float Low, Word)	03, 04	Read Only
41108	1107	DI1: Total Counts (Unsigned int, High Word)	03, 04	Read Only
41109	1108	DI1: Total Counts (Unsigned int, Low Word)	03, 04	Read Only
41110	1109	DI2: Total Counts (Unsigned int, High Word)	03, 04	Read Only
41111	1110	DI2: Total Counts (Unsigned int, Low Word)	03, 04	Read Only
41112	1111	DI1: Average Frequency (Hz x 10)	03, 04	Read Only
41113	1112	DI1: Instantaneous Frequency (Hz x 10)	03, 04	Read Only
41114	1113	DI1: Counts per minute (x 10)	03, 04	Read Only
41115	1114	DI2: Average Frequency (Hz x 10)	03, 04	Read Only
41116	1115	DI2: Instantaneous Frequency (Hz x 10)	03, 04	Read Only
41117	1116	DI1: Counts per minute (x 10)	03, 04	Read Only
49988	9987 or 65524	Major revision number for the mainboard	03, 04	Read Only
49989	9988 or 65525	Minor revision number for the mainboard	03, 04	Read Only
49990	9989 or 65526	Major revision number for the radio	03, 04	Read Only
49991	9990 or 65527	Minor revision number for the radio	03, 04	Read Only
49992	9991 or 65528	High 16 bits of SFTS node address	03, 04	Read Only
49993	9992 or 65529	Low 16 bits of SFTS node address (the radio ID)	03, 04	Read Only
49994	9993 or 65530	Slave ID readback	03, 04	Read Only
49995	9994 or 65531	Received signal strength of last packet from the slave	03, 04	Read Only
49996	9995 or 65532	Battery voltage of the Modbus client, in millivolts	03, 04	Read Only
49997	9996 or 65533	Minutes until this slave will time out (TTL), unless new data is received	03, 04	Read Only
49998	9997 or 65534	Number of registers cached for this slave device	03, 04	Read Only
49999	9998 or 65535	Remote device type. 63 for WIOM-Mini	03, 04	Read Only

## Technical Support and Contact Information

SignalFire Telemetry  
140 Locke Dr, Suite B  
Marlborough, MA, 01752  
(978) 212-2868  
[support@signal-fire.com](mailto:support@signal-fire.com)

### *Revision History*

Revision	Date	Changes/Updates
1.0	7/25/2019	Initial release
1.1	10/15/2019	Frequency register description
1.2	11/26/2019	Corrected mechanical drawings
1.3	1/16/2020	Corrected part number
1.4	3/5/2020	Minor corrections
1.5	4/24/2020	Added detail on mirror mode
1.6	10/11/2021	Added generic device registers
1.7	11/3/2021	Corrected register map