(((MiWSN)))

Wireless Sensors Network

Mi-Sensor-1 and Mi-Gateway-1

User Manual

Contents

Certifications (FCC and IC)

Contains Mi-Sensor-1 FCC ID: AUF-S1 and Mi-Gateway-1 FCC ID: AUF-G1
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Contains Mi-Sensor-1 IC: 10170A-S1 and Mi-Gateway-1 IC: 10170A-G1
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

1   Mi-Sensor-1

1.1   Sensor Introduction

The Mi-Sensor-1 is a multifunction battery powered wireless sensor capable of simultaneously monitoring Temperature, Motion/Shock, Button Press, Presence and one port function consisting of Contacts or Moisture/Water or Humidity or Light or Milli-volts AC or Milli-volts DC or Capacitance or Amp Hours.

1.2   Battery Installation

Open sensor by prying case open by hand. Insert CR2032 battery in holder ensuring to observe polarity indicator on battery and battery holder.

WARNING – Incorrect installation will damage sensor and void warranty.

1.3   Sensor Installation

Configure sensor using gateway CONFIGURE page. See gateway sensor configuring section for details.

Test sensor signal strength at the location the sensor is intended to be used by pressing the test button on the sensor and viewing the sensor message signal strength (RSSI) on the gateway STATUS page. If signal strength is too low or the gateway is unable to receive the sensor test message, try adjusting the sensor and gateway orientation, and location. Additional gateways may be used to extend range.

For temperature and motion sensing, the sensor only needs to be placed in a suitable location.

If the sensor is being use to sense the presence of a liquid or contact closure, attach the supplied sensing wire to the sensor moisture/contact terminal block. Each of the two wire ends are inserted into the two larger terminal block holes. You may use your own supplied 18-24 AWG wire if the supplied wire is not suitable for your application. To release the wire from the terminal block, insert a pin into the two smaller slots of the terminal block.
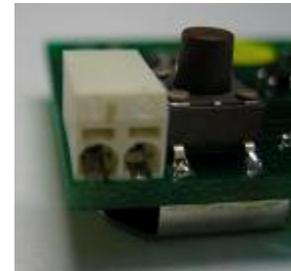
For moisture/water sensing, the other ends of the wire should be spaced about 3mm (1/8 inch) apart and placed in a location where they can come in contact with the liquid.

For motion/shock monitoring, attached sensor to object to monitor.

For contact sensing, the other ends of the wire should be attached to a dry contact closure element such as a door open/close contact containing a reed switch.

For light sensing, a PDV-P9203 light element is inserted into the port.

For humidity sensing, an HCH-1000-002 humidity element is inserted into the port. The Humidity element may require calibration. To calibrated the sensor place sensor saturated sodium salt chamber and press test button for greater than 10 seconds. See Tech notes section for detailed procedure.

For voltage sensing, the port is connected to the voltage source. The source must not exceed +- 0.3V for AC and 1.0V for DC or damage will occur. The GROUND pin is the second pin from the edge as see in the photo above.

For capacitance sensing, connect the port to a surface to measure relative capacitance.

For amp hour sensing, the port is connected to a current transformer element with built-in load resistor. The full-scale output must not exceed 0.3 VAC. The element wires maybe connected in any order. WARNING; have a qualified electrician connect the element to the line to be monitored.

Attach double sided tape to the sensor and then attach sensor to its final sensing location.

1.4   Sensor Notifications

The sensors will send notification to the email account specified in the gateway Setup page. Notifications consist of alarm conditions or periodic reports as defined in the Configure Page of the gateway and configured into the sensor. Notifications are delivered as email or phone text messages with the subject line fields separated by commas and formatted as follows:

!	❸	▽	From	Subject	Received ▽	
		✉ me		MiWSN1,Test,WSNG.Test1.58,Motion=No,Cntct=No,Bat=OK,Temp=19C,RSSI=-39	23/01/2012 2:24 PM	
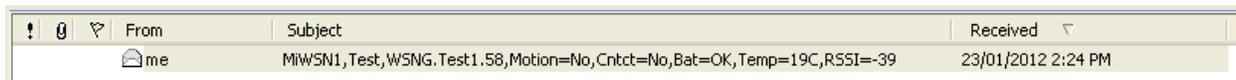
Field	Description
1	Indicates the message is from a **MiWSN1** network.
2	Indicates the message type. Types are: **Test** – the test button on the sensor was pressed. **Alarm** – an alarm notification condition exists with Motion, Cntct, Bat, or Temp **Report** – sent periodically if configured. **Reset** – the sensor battery was inserted, or a battery is very low.
3	The gateway name plus the sensor name plus an event number signifying where the message came from. The event number is incremented each time the sensor sends a message.
4	**Motion =** indicates Yes there is motion or No motion.
5	This will change based on how you configured the port. Blank when port is disabled. **Cntct =** indicates Yes if there is moisture or contacts are closed and No if the contacts are dry or open. **dlx=** light level in LUX*10 **RH=** relative humidity. **mVAC=** milli-volts AC

	mVDC= milli-volts DC **cs=** relative capacitance count. **mVh=** accumulated milli-volt hours. Multiply by the current element rating to convert to Amp Hours. Multiply again by line voltage to convert to Watt Hours.
6	**Bat =** indicates if the battery is OK or Low. A low battery should be replaced.
7	**Temp =** indicates the current temperature. C indicates Celsius and F indicates Fahrenheit.
8	**RSSI=** indicates the signal strength of the message received by the gateway. The farther away from the gateway the sensor is, the lower the signal strength will be. Signal strength is measured in dBm units.

1.5   Sensor Precautions

     Do not place the sensor in liquid.

     Do not expose the sensor to heat in excess of 85 degrees Celsius,

     Do not drop the sensor onto a hard surface.

2   Mi-Gateway-1

2.1   Gateway Introduction

 The Mi-Gateway-1 receives wireless messages from multiple Mi-Sensor-1 sensors and sends them to an email account or text message to a phone using your Local Area Network (LAN) to Internet connection. The Mi-Gateway-1 has a built-in web server that is accessed with any web browser to configure all parameters of the Mi-Gateway-1 and Mi-Sensor-1. The Mi-Gateway-1 plugs into your LAN and is powered from an AC outlet.

2.2   Gateway Installation

Connect the gateway to your router or local area network using the supplied CAT-5 cable. If required, a CAT-5 cable up to 30m (100 feet) maybe used. Your network should have a DHCP server connected to it in order for the gateway to receive its initial IP address.

Connect the gateway to an AC outlet using the supplied AC/DC adapter. The green link LED on the gateway should turn on. You should see periodic pulses on the orange activity LED.

Place the gateway in a location that provides the best reception of sensor messages. The gateway has the best reception when attached to a vertical surface using the provided adhesive pads. Other orientations will work, but may be less sensitive to sensor messages.

Access the gateway management interface using your web browser to configure the gateway and sensors as described in the following pages.

2.3   Gateway Reset

If you need to reset the gateway parameters to the original factory settings you can perform the following steps (all previously stored gateway settings are lost and the sensors will retain their configured settings):

a) Remove power from the gateway.
b) Press the Reset button.
c) Apply power to the gateway.
d) Hold the Reset button for at least 5 seconds.
e) Release the Reset button.

2.4   Gateway Repeater Function

The gateway may be used as a repeater to extend the range of the gateway connected to the local area network (LAN). When in this mode the gateway does not need to be connected to the LAN and may be placed in any location within range of an existing gateway and where power is available.

2.5   Gateway Web Management Interface

The gateway management interface may be accessed using your web browser. Type the name of the gateway in your web browser address bar. The default name of the gateway is http://wsng.

If your network does not support name resolution, you should type the IP address of the gateway into your browser. You can find this address in your DHCP server's active client list.

After successful login to the gateway, you will be presented with the Setup Page.

2.6   Gateway Login Authentication

By default the gateway does not require you to provide a login name and password. If you have enabled login authentication you will be presented with a login authentication dialog similar to the following. Enter the User ID and User Password parameters specified in the Setup Page. If you forget your User ID and Password, you may Reset the gateway to default settings.

2.7   Setup Page

This page has one time setup parameters needed to specify the local IP network, RF network, and SMTP email. Enter the parameters and use the Test Email button to verify that they work before pressing the Save-Reboot button. The setup parameters are described in the following paragraphs:

User ID and User Password - provides secure access to the gateway web interface. Leave these blank for no authentication.

MAC Address – is the 6-byte hex MAC address of the gateway. Each gateway must have a unique MAC address on the IP network.

Host Name – is the name of the gateway. You enter this into the web browser to access the web management interface. This is the network name reported in Emails. The default is WSNG.

RF Channel – is the channel the network operates on. Valid channels are 0 to 15. Channel 0 is 2405 MHz and Channel 15 is 2480 MHz. Channel spacing is 5 MHz.

RF Key – is a 2 byte hex key used to encrypt RF messages. Only messages encrypted with the correct key will be processed.

RF Repeat - this will enable the gateway message repeater function. When this is set to "Yes" the gateway will retransmit valid sensor messages. This retransmission allows the gateway to be used as a repeater to extend the range of sensor transmissions. When acting as a repeater the gateway does not need to be plugged into a LAN.

Temp Units - specifies Fahrenheit or Celsius temperature units.

IP Type - the gateway will use Static or Dynamic IP addressing to join the local network. If dynamic addressing is used, the gateway gets the next 5 parameters from the local DHCP server. If static addressing is used, the user specifies the next 5 parameters.

IP Address – is the IP Address of the gateway.

Subnet Mask – is the Subnet Mask of the gateway.

Gateway – if the IP address the gateway uses for external access.

Primary DNS and Secondary DNS – is the first and second IP addresses the gateway uses to resolve Internet names.

Enable Emails - Enable sending Emails for messages reported by sensors.

SMTP Server and Port – is the name and portof the outgoing Email server.

Use SSL – to encrypt email, use SSL.

SMTP Account and Password – is the account name and password used for authentication.

Notify Email Address – is the email address used to send messages to. Messages are formatted in the subject line of the Email. Multiple email addresses separated by a comma may be used.

Save-Reboot – selecting this button will save all Setup parameters and reboot the gateway if needed.

Test Email – selecting this button will send a test email to the Notify Email Address to verify that Email parameters are setup correctly. A success or fail message will be displayed after the send is complete. This can be received within a second, but may take approximately 60 seconds if incorrect parameters are set. The received email subject will indicate that it is from the MiWSN network, is a "TestEmail", and which gateway it came from.

!	0	▽	From	Subject	Received ▽
			✉ me	MiWSN1,TestEmail,WSNG	23/01/2012 2:24 PM

2.8   Rebooting Page

When parameters are changed that affect the network operation, the gateway will automatically reboot and the web browser will present the Setup Page after a successful boot. If wrong network parameters were saved and the gateway does not respond, you can reset to factory defaults by holding down the button on the gateway for 5 seconds when turning power on.

2.9   Configure Page

This page is used to enter parameters needed for the operation of a sensor. The sensor will save these parameters. Sensor defaults will be loaded by holding the sensor test button for at least 5 seconds when the gateway in not on the Configuring page. The defaults do no monitoring and report nothing (power savings when not in use). The Configure parameters are described in the following paragraphs.

Sensor Name – used to identify the sensor messages displayed on the Status page and in Email messages.

Motion Alarm - the sensor has an accelerometer that will indicate Yes when motion is present and No when no motion is present. The sensor can send an alarm on detecting motion or absence of motion.

Motion Threshold – is the sensitivity to motion. 1=most sensitive, 99=least sensitive.

Port Function – the sensor can monitor one port function selected from the drop down list.

Sample – port pins. 0=Open/Dry, 1=Close/Wet.
Alarm Close/Wet – send alarm when port is Closed or Wet.
Alarm Open/Dry – send alarm when port is Open or Dry.
Disable – Do not monitor port. This saves battery power.
mVDC – measure milli-volts DC.
mVAC – measure RMS milli-volts AC.
mVh - integrate and accumulate milli-volt hours.
Humidity – measure relative humidity.
Light – measure light level in LUX*10
CapSen – measure relative capacitance in counts.

Port High Alarm – the sensor will send an alarm when the port values greater than this value.

Port Low Alarm – the sensor will send an alarm when the port values less than this value.

Battery Alarm - occurs when the sensor battery needs replacing.

Temp High Alarm - occurs when the sensor temperature becomes greater than the specified temperature in degrees. Leave blank to ignore. Range is -30C to +60C.

Temp Low Alarm - occurs when the sensor temperature becomes less than the specified temperature in degrees. Leave blank to ignore. Range is -30C to +60C.

Report Period - the sensor will send a periodic report at programmable intervals. Range is 1 to 9999 minutes. Enter 0 to disable reports. A non-calibrated clock is used.

Configure – selecting this button will place the gateway in the Configuring mode. When in this mode, sensors can be configured with the above parameters by holding the sensor test button for at least 5 seconds.

2.10   Configuring Page
This page allows sensors to be configured with the Configure parameters. Sensors should be close to the gateway when performing this operation.

Selecting the OK button will cancel the Configuring mode and take the user to the STATUS screen where if a sensor is correctly configured a Config Report Type will be displayed for the configured sensor. If you do not see a Config Report Type, the sensor test button was not held for greater than 5 seconds, or the sensor is out of range.

2.11   Status Page

This page displays the most recent messages reported by sensors. The Status parameters are described in the following paragraphs:

Name - of the sensor.

Report Time - in Days:Hours:Minutes:Seconds since the sensor sent the message.

Report Type - of message sent by the sensor. Config is sent after successful sensor configure, Test is sent when the sensor test button is pressed quickly, Reset is sent on very low battery or replacement, Alarm is sent when an alarm condition is detected, and Report is sent on programmable time intervals if the Report Period is not zero. Test, Reset, Alarm, and Report messages will cause an Email to be sent to the Notify Email Address.

Motion - state of Motion sensor. No or Yes.

Temp - current sensor temperature in units specified in the Setup Page.

Port - state of sensor port based on sensor configuration.
     Blank – disabled
     0 – Open or Dry
     1 – Closed or Wet.
     dlx – Light level
     RH – Relative humidity level. If greater than 100 the sensor element is not calibrated.
     mVAC – RMS milli-volts AC value.
     mVDC – milli-volts DC value.
     cs – relative capacitance value
     mVh – integrated and accumulated milli-volts.

Battery - state of sensor battery condition. OK or Low.

RSSI - Received Signal Strength Indicator measurement in dBm from the message sent by the sensor. This is an indication of signal quality, with -7 being the best and -91 the weakest.

Refresh – selecting this button refreshes the messages displayed.

Clear – selecting this button deletes all status messages.

RF Energy – is a measure of the channel noise floor at time of page refresh. –91 indicate a quiet channel. The larger the number, the greater the noise.

2.12   Help Page
The gateway has a basic help page built in to aid the user when the User Manual is not handy.

Warranty Information

If it does not work, return it and it will be replaced for the cost of shipping and handling.
Does not include abuse or batteries.

Limitation of Warranty and Remedies.

Use at your own risk.