



29449\_ins\_RCV-418-WAM

# Wireless Asset Monitor (WAM) 418MHz Receiver

## Installation & Operating Instructions

rev. 12/16/15

### Overview

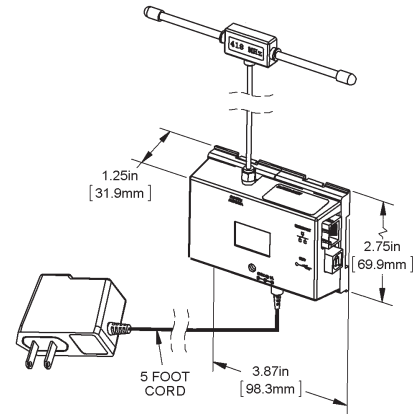
The Wireless Asset Monitor (WAM) unit receives data from all BAPI wireless 418 MHz sensor/transmitters. The receiver delivers the data simultaneously to the serial Universal Serial Bus (USB) output for local use and to the RJ45 Ethernet port for communication with the BAPI WAM Website or to a web address of your choice.

Antennas of various lengths are available for ease of installation and optimal reception. The EZ mount system allows for DIN rail, snaptrack or surface mounting.

The parts included with this device are:

BA/RCV418-WAM .....WAM Receiver  
 BA/PPS-5DC-25 .....Plug-in Power Supply  
 BA/ANTxxx .....Antenna  
 BA/CBL-USB-AB-3 ....USB/A to USB/B, 3' cable  
 BA/CBL-CAT5E-5 .....Ethernet straight CAT5E, 5' cable

**Fig. 1:** Wireless Asset Monitor (WAM) Receiver



### Associated WAM Website and WAM Receiver Configuration

The WAM Receiver is set up to communicate to the BAPI WAM Website at [wam.bapisensors.com](http://wam.bapisensors.com). This website lets the user monitor their sensor/transmitters from anywhere in the world with a web browser. The website is password protected and the customer has full administrative control over their locations, users, devices and alerts through their login.

The Ethernet port can be network configured to send the WAM receiver sensor data stream to a web server or to a computer or to a local BAS system network and connect via Dynamic Host Configuration Protocol (DHCP) or a Static IP. The Ethernet data stream can be configured as ASCII Hex or JSON formats.

The USB output from the WAM Receiver simultaneously streams wireless sensor data as serial ASCII Hex data to a local computer or BAS system.

Note: As shipped, the WAM Gateway is configured with default settings as DHCP and the BAPI Web site IP address. This is easily changed by the user through a web browser using the IP address of the WAM Gateway and the internal WAM Gateway Configurator. See below for details. If the IP address is changed to a local IP address, then the BAPI WAM website cannot be used.

### Customer Provided Equipment and Materials

The user must provide an active local internet-accessible port for this receiver if the Website or smart phone access is going to be used. The user's computer must have the following software and one of the following browsers to access the WAM website.

**Required Supporting Software:** Oracle JAVA or Adobe Flash Player

**Web Browsers Supported:** Microsoft Internet Explorer 7, Mozilla Firefox 11, Apple Safari 5.1, Google Chrome v18 (or newer versions of any of these).

If a local ethernet IP or serial connection is used, then custom interface software will be required to integrate to the BAS equipment.

### Mounting

#### Transmitter & Receiver Location Considerations:

- Transmission distances will vary based on environment. Air or clear windows present no attenuation or obstruction.
- 100 feet is the maximum that can be expected if there are no obstructions between the transmitter and receiver.
- In general, each obstruction will half the expected transmission distance of 100 feet.
- Obstructions include but are not limited to; walls, partitions, floors, ceilings, doors, tinted glass, ground, many people, vehicles, foliage, rain, snow and fog. Materials such as wood, drywall, plaster, brick, and concrete attenuates the signal but will let it pass (if it's not too thick) at a reduced signal strength.
- Blockage materials include metal of any thickness (solid or metal screen) which blocks the RF signal propagation but also will allow the RF signal to bounce around potential obstacles. Anything that holds water absorbs the signal to the point of blockage like rain, fog, crowds of people, ground, dense foliage etc. Elevator shafts and stairwells usually block RF signals.

#### Antenna Mount Guidelines:

- For best antenna location selection, an RF survey is recommended using BAPI's Field Verifier Kit (available as a loaner).

**Continued on next page...**

Specifications subject to change without notice.

### Mounting continued...

- Do not mount the antenna behind any objects. The receiver may be located inside a metal enclosure but the antenna must be outside the enclosure.
- The Antenna should be mounted as far away from metal plates or bars as possible to avoid RF energy being reflected back or blocked by the metal.
- Mounting to drywall between studs, ceiling tiles, brick, glass or concrete is very common. Mounting to ceiling T-Bar is common but will affect performance distance due to the metal in the T-Bar and the horizontal orientation.

BAPI recommends conducting a bench test before permanently mounting the WAM Receiver. Place the WAM Receiver and sensor/transmitters in the desired locations (100 feet open field range). Temporarily terminate (per the "Termination" section) but do not permanently mount the receiver or antenna until communication between the receiver and sensor/transmitters has been verified per the "Commissioning and Setup" section. After communication is verified, mount the units.

### Mounting the WAM Receiver:

1. Position the WAM Receiver within range of the 418MHz sensor/transmitters (100 feet open field range).
2. Position the 418 MHz antenna to a nonconductive surface with the antenna in a vertical orientation and exposed in open air. Do not mount antenna behind any objects. If the receiver is mounted inside a metal enclosure, mount the antenna outside of the enclosure.
3. Secure the antenna cable without kinking the cable or placing any mechanical stress on the antenna or cable. (Do not wrap the cable around the antenna.)
4. The 418 MHz antenna is shipped loose. Connect the antenna by turning the antenna nut onto the receiver's antenna fitting. The receiver antenna should be within range of the 418MHz transmitters (100 feet open field range).
5. Complete the "Termination" sect. and then "Commissioning and Setup" sect. to temporarily test all the communication.
6. After verifying communication permanently mount the Receiver using snaptrack, din rail or a flat surface with #4 screws.
7. Re-verify communication between the transmitters, receiver and the WAM Website or the BAS computer interface.

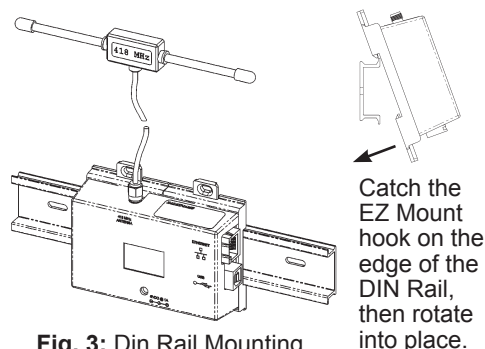


Fig. 3: Din Rail Mounting

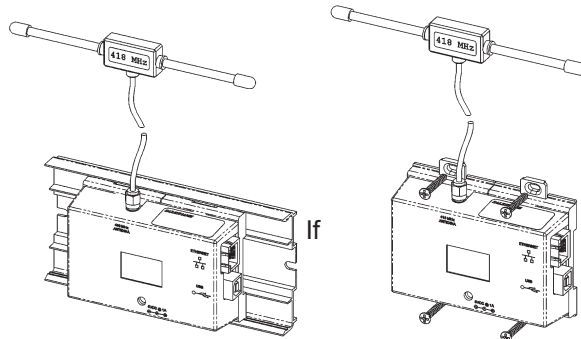


Fig. 4: Snaptrack Mounting

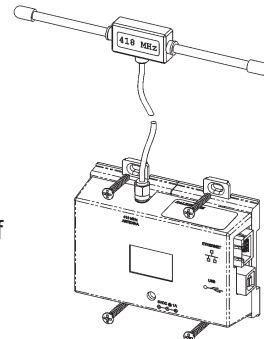


Fig. 5: Surface Mounting

### Termination

Figure 6 shows all the possible receiver connections. There are two possible uses for the WAM receiver.

1. For WAM Website applications, the power plug, antenna and CAT5 Ethernet cable are all that needs to be connected for operation.
2. For local computer interface application, the power plug, antenna and either one or both of the communication cables may be used for interface with the local computer.

The receiver is powered by a plug-in 5VDC power supply provided with the unit. The plug is inserted into the "power in" jack on the side of the receiver. The provided antenna is screwed into the antenna jack. The RJ45 jack is connected to the local Ethernet jack via the provided straight-through CAT5 cable.

Note: If connecting directly to a computer, the receiver IP address must be changed to achieve the communication. A CAT5 crossover cable will also be required (not provided).

### Termination

Termination	Description
Power Jack	Plug-in from Power Supply
RP-SMA	Antenna Screw-In Jack
RJ45 Jack	Ethernet Output to BAPI Website or Direct to Computer
USB-B	ASCII Serial Output Direct to a Computer

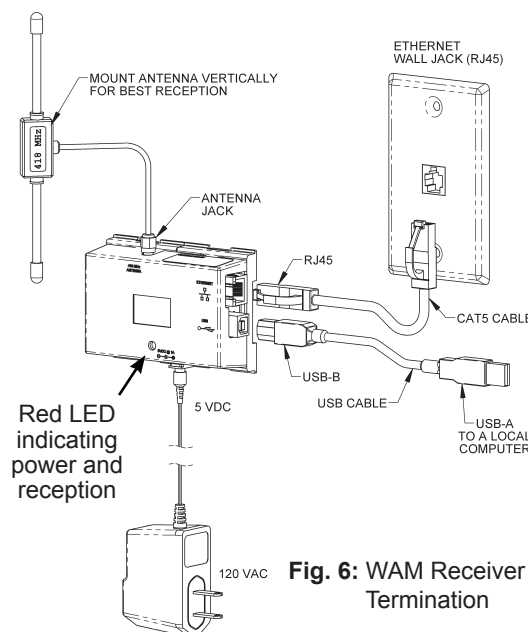


Fig. 6: WAM Receiver Termination

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### Termination continued...

#### Wi-Fi Adaptor Application Interface

Any Wi-Fi adaptor should work with the BAPI, BA/RCV418-WAM receiver. However, BAPI recommends that a quality and well known Wi-Fi adaptor manufacture is chosen. Be sure the company has a good reputation, good documentation and a good technical support department.

#### General Installation Steps:

1. The adaptor should be placed close to the WAM receiver to avoid long communication runs between the adaptor and receiver.
2. Most Wi-Fi adaptors require a 120VAC receptacle to accommodate a plug-in power supply.
3. Set up the Wi-Fi adaptor of your choice by following the directions included with the adaptor for the local Ethernet system.
4. Connect a straight Ethernet cable from the WAM RJ45 output to the RJ45 jack input of the Wi-Fi adaptor.
5. The WAM sends each payload in a continuous stream of standard ASCII formatted data as each transmission is received, first-in, first-out.
6. Test the Ethernet HTTP operation by accessing the BAPI WAM web site or local Ethernet Telnet on port 1000 for a local connection running the free "BAPI Wireless Receiver Test Program" or a free program called PuTTY from the <http://www.putty.org> web site. Just click on "putty.exe" to upload the program. PuTTY is a substitution for the old Microsoft HyperTerminal program Microsoft use to offer in older Microsoft operating systems.
7. Each payload reception should be displayed indicating a good connection. The BAPI Wireless Receiver Test Program offers a bit more information data by parsing out the data but all you need to confirm is that the payload is received to verify operation.

### Commissioning and Setup

#### A. Commissioning: (Hardware Checkout)

1. The red LED on the receiver illuminates when power is present and a transmission is received.
2. If 418MHz transmitters are transmitting and within range, the red LED will blink each time a reception is received.
3. If the Ethernet jack is connected, the left side green LED on the jack indicates the network is linked.
4. If the Ethernet jack is connected, the right side green LED on the jack indicates the network activity. It normally is blinking showing the network activity. If this LED stays dark, then there may be a network problem with a connection or the router. An active blinking of this LED indicates data is being transferred.
5. Proceed with energizing at least one wireless transmitter to check if the receiver is working. The red LED on the WAM receiver will blink with each wireless transmission/reception. Write down the serial number of the transmitter as it will be needed later. It is normally located on the antenna or battery holder. (Example Serial #: A0858018)
6. If any of the LEDs mentioned above are not visibly active, then there could be a problem with the Power or Ethernet connections and they should be checked out.

#### B. Auto Load WAM Website Setup: (Software/Firmware)

1. Be sure the power supply is connected as shown in the "Termination Section". The Red LED should be "Off". Once a transmission is received, the Red LED will illuminate.
2. Be sure the network is connected using the provided Ethernet cable as shown in the "Termination Section" and the Ethernet jack LEDs are operating as described in "Commissioning" Steps 3 and 4 above.
3. The unit will now begin sending data to the BAPI website automatically.
4. You may now open your browser and go to the WAM website ([wam.bapisensors.com](http://wam.bapisensors.com)). You then enter your password to enter your personal system web site. If you do not have your password then contact the BAPI WAM support team. 1-608-735-4800 or [wam@bapisensors.com](mailto:wam@bapisensors.com)
5. A wireless transmitter must be entered into the WAM website in order to check the complete communication connection. The following is the quick registration process.
  - a. Energize one of your wireless transmitters. (This may have been done in the "Commissioning" Step 5 above.)
  - b. Then go to the Register Device Page on the WAM website and enter the data below.

Name: Any name of your choosing.

Description: Any description of your choosing.

Location: A drop-down list of all the locations available to the user. Select the location from the list.

Sensor Model: A drop-down list of common sensor models. Choose the model from the list.

Serial Number: Enter the unique serial number of the transmitter you energized. It is normally located on the antenna or battery holder. (Example Serial #: A0858018)

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### Commissioning and Setup continued...

Device Status: Click "Enabled" to monitor the data from this sensor or "Disabled" to disregard.

Default Alerts: Adds a "No Data for 720 Minutes" alert for the device. If no data is received from this device for 720 minutes, then an alert is generated. This countdown timer can be changed by the customer.

Save: Clicking the "Save" button will save the data.

6. Full WAM Website instructions can be found at the BAPI website: bapihvac.com.

7. New points take up to 5 minutes to negotiate the startup process. Existing points normally update within 1 minute from the transmission reception. If you have any problems contact the BAPI WAM support team at 1-608-735-4800 or wam@bapisensors.com

Note: If you intend to use the BAPI WAM website for data collection, you can stop here. If you are connecting to a local computer, then continue to "Local Computer Setup" below.

### C. Local Computer Setup: (Load Software for local computer connection)

There are three folders provided in the WAM Gateway Utilities that is downloaded from bapihvac.com. The first folder contains the interface document file and should be read thoroughly before proceeding. The second folder contains the USB drivers needed to connect to the USB port on the WAM receiver. The third folder contains the utility files. This third folder has two main programs as shown below.

A. The "Wireless Receiver Test Program" is used to test if the receiver is receiving data and delivering data to the USB and RJ45 Ethernet port.

B. The "TCP IP Discover Tool" identifies the IP address assigned to the WAM Receiver by the local Dynamic Host Configuration Protocol (DHCP) network.

Note: The "WAM Gateway Configurator" is used to define the website URL that the receiver will send the data to. The default URL is to the WAM website "wam.bapisensors.com" and this can be changed to a different URL for Ethernet operation. See the WAM Gateway Configurator" section of this document.

### Wireless Receiver Test Program

The WAM receiver has a red LED indicating power has been applied. This LED also blinks each time a wireless signal is received. For a single reception this blink is very fast. If a further check is desired, a Wireless Receiver Test Program located in the technicians computer and connected to the WAM USB port is used. This program is downloaded from the BAPI Website at bapihvac.com.

1. Download the Receiver Test Program into your technicians test computer from the BAPI Website at bapihvac.com.

2. The USB drivers may not be in the technician's computer. In this case download the FTDI Drivers from the BAPI Website at bapihvac.com. Note: Many newer computers already have these drivers factory loaded.

3. Power up and connect the WAM gateway to your computer via the provided USB cable.

4. Run the Test program and each wireless reception will be displayed as it is received with a time stamp. See Fig. 7.

5. Look for each remote sensor transmitter and reposition the sensor transmitter or WAM antenna as needed to ensure reliable reception with each one.

Serial Number	Reading1	Reading2	Reading3	Reading4	Timestamp
282078F5000000A9	0				2013-10-07 11:43:07
28B4C91E000000C1	22.31				2013-10-07 11:43:07
70151000	22.45	22.73			2013-10-07 11:43:08
80910041	1	6468794	22.44		2013-10-07 11:43:08
90665038	22.39	45.24			2013-10-07 11:43:08
9081801900000000	22.56				2013-10-07 11:43:09
9084301D	1	3629202	50.04		2013-10-07 11:43:10
9112002000000000	65535				2013-10-07 11:43:11
9117007A	2	1833	0	55799	2013-10-07 11:43:11
A0249014	22.88				2013-10-07 11:43:08
A04520AC	20.62	628.23			2013-10-07 11:43:07
A1047838	22.61				2013-10-07 11:43:14
A1150199	1	3517462	48.95		2013-10-07 11:43:05
A11501A1	1	8380964	50.22		2013-10-07 11:43:12
B0242000	22.58				2013-10-07 11:43:05
B0247844	20.78				2013-10-07 11:43:08
B02688C8	20.74				2013-10-07 11:42:57
B02688C8	20.59				2013-10-07 11:43:12
B02688D8	22.94				2013-10-07 11:43:05
B0448810	22.42				2013-10-07 11:42:07
C0470084	23.06				2013-10-07 11:43:04
C04700AC	23.06				2013-10-07 11:42:57
C07510B8	23.1	48.65			2013-10-07 11:43:11
D0569000	0				2013-10-07 11:43:07
D0569004	0				2013-10-07 11:43:07
D0569010	22.76	0	0	0	2013-10-07 11:43:13
D0569024	22.88				2013-10-07 11:42:53
D056902C	22.76	48.51			2013-10-07 11:43:02
D0570020	22.97	51.12			2013-10-07 11:42:55
D8569024	80.71	OFF			2013-10-07 11:43:04
D856902C	36.22	OFF			2013-10-07 11:43:12

Fig. 7: Wireless Receiver Test display

### Wireless Receiver Test - Table Description

Column 1: Shows the transmitter serial number

Column 2: Shows the First parameter in the payload (Usually Temperature in °C)

Column 3: Shows the Second parameter in the payload (Usually Humidity in RH%)

Column 4: Shows the Third parameter in the payload (Multiple values depending on transmitter type)

Column 5: Shows the Fourth parameter in the payload (Multiple values depending on transmitter type)

Column 6: Shows the last reception time stamp

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### TCP/IP Discover Tool

The WAM Gateway is shipped in the Dynamic Host Configuration Protocol (DHCP) mode. In order to find the IP address BAPI has provided an IP address discover program that can be down loaded from our web site at bapihvac.com.

1. Download and install the WAM Gateway Utilities from our web site at bapihvac.com on your test computer.
2. Power up and connect the WAM gateway to the building Ethernet network using the provided cable.
3. Connect your computer to the building Ethernet network.
4. Run the discover program in your computer and the DHCP address will be displayed. See Fig. 8 which shows 2 WAM receivers.

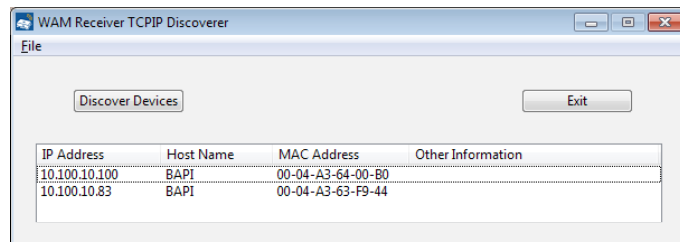


Fig. 8: Discover Program Display

This program is especially useful if you need to access the WAM Gateway Configurator.

### WAM Gateway Configurator

The WAM Gateway is shipped with default settings as DHCP and the BAPI Web site IP address. This is easily changed by the WAM Gateway Configurator which is accessed through a typical web browser using the IP address of the WAM Gateway. (You may need to run the Discover tool described earlier to find the DHCP address) The screen capture of the WAM Gateway configuration page Fig. 9 is displayed with default settings shown. Be sure to note what each value was and what it was changed to.

Note: If the IP address is changed to a local IP address, then the BAPI WAM website cannot be used.

1. Start your WEB Browser and fill in the WAM Gateway IP address. (You may need to run the discover tool to identify the current DHCP address.) Note: Step 1 is not needed if the default settings are used. Step 1 is only needed if the user is setting up a static IP.
2. The screen as shown in Fig 9 will be displayed with all the last known settings. The screen below shows the default settings from the factory.
3. Click on the radio buttons at the beginning of each configuration setting line, and fill in text boxes if appropriate. See static IP details below.
4. Then click on the Save Configuration button to save and activate the new settings.

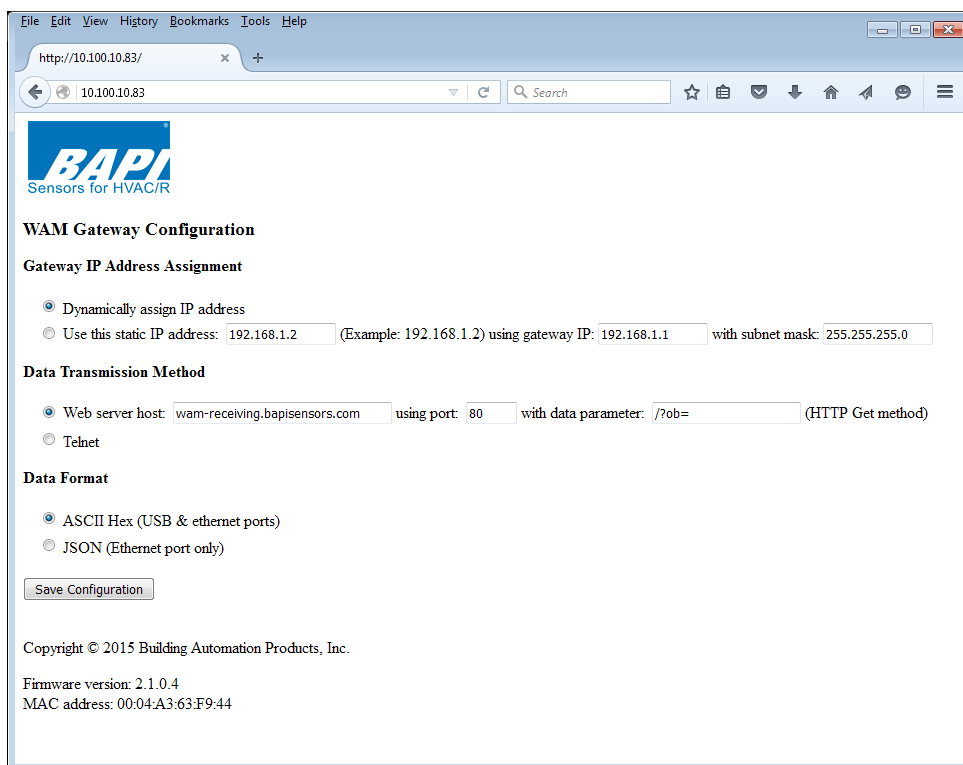


Fig. 9: WAM Gateway Configurator Display (default settings)

Note 1: For a Static IP configuration be sure to write down the new static IP address, Gateway IP address and subnet mask just as you have entered them. If the user desires to return the WAM Gateway to a DHCP configured IP address from a static configured IP address, leave the WAM Gateway powered up with no network cable connected to the ethernet connector. After 1 hour, the WAM Gateway will automatically configure itself back to a DHCP configured IP.

Note 2: To operate with the BAPI WAM Remote Website, the "Web server host:" line must be the same as shown above. The only exception is the "using port:" line which can be "80" or "8080" and still work with the WAM Remote Website.

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### Building Automation System (BAS) Interface Introduction

The WAM Gateway can be interfaced with a BAS system via the USB port or the RJ45 Ethernet port or both. The data is presented in two formats, ASCII Hex or Java Script Object Notation (JSON). The USB port uses an ASCII serial string with the payload of each transmission coming out in the same order that they were received. The RJ45 Ethernet port uses either an ASCII string or JSON string depending on how the WAM Gateway Configurator was set up. The ASCII Hex and JSON Interface documents must be requested from BAPI Customer Service and are not found on bapihvac.com.

### Diagnostics

#### Possible Problems:

The receiver is not sending data

#### Possible Solutions:

Check for power and proper connections as shown in the "Termination" section.  
Check that the receiver's red LED is blinking on each reception as it should be.  
Check that the RJ45 jack's left LED is "on" indicating a good Ethernet link.  
Check that the RJ45 jack's right LED is "blinking randomly" indicating network activity.  
Make sure the transmitters are operating and within range.  
Run the "Wireless Receiver Test Program".

### Specifications

**Supply Voltage:**..... AC Receptacle Plug-in Power Supply (provided) with 5' cord and 2.5mm DC power jack  
Volts..... 120VAC converter 5VDC@6W

#### Outputs:

Ethernet..... 1 RJ45 Jack (10base-T)  
Serial..... USB-B Jack (USB-2, 19200 baud)

**Serial Payload:** ..... Standard BAPI and Point Six Data Packets (Data Packet Specs Available Upon Request)

#### Termination:

Ethernet..... RJ45 CAT5e straight 5' cable (provided)  
Serial..... USB-B/USB-A male, 3' cable (provided)  
Antenna..... RP-SMA Connector

#### Display Indicator:

Receiver..... One Red LED for Power & Reception  
RJ45 Jack..... Right green LED indicates network activity (Usually blinking).  
Left side green LED indicates link status (On = Linked).

**Antenna:** ..... Dipole or Whip, Selection Per Order

**Mounting:** ..... 35mm DIN Rail, 2.75"x4" Snaptrack or Surface Mount with Tabs

**Enclosure Rating:**..... NEMA 1, (IP 20)

**Enclosure Material:** ..... ABS Plastic, UL94 V-2, Warm White (WMW) Color

**Ambient:** ..... 32° to 140°F (0°-60°C) • 5 to 95% RH, Non-Condensing

**Agency:** ..... RoHS

**Software:** ..... Programs and Manual Downloads from bapihvac.com

WAM Installation doc:..... WAM Installation and Gateway Configurator (RJ45 IP Interface)  
WAM Website doc..... Full WAM Website Instructions and User Guide  
TCP IP Discover..... IP Search Program Identifies Assigned DHCP Network Address  
Receiver Test..... BAPI Wireless Receiver Test Program (accessed by USB port or RJ45 jack)  
FTDI Drivers..... USB Communication Interface

**Software:** ..... Must be requested from BAPI Customer Service and are not available on bapihvac.com.

JSON Interface doc..... Java Script Object Notation (JSON) Gateway interface documentation  
ASCII Hex doc..... A description of the payload for each transmitter and enumerator identification

#### Response Time Typical:

418 MHz Reception..... 100ms Pass Through Delay to Output  
Website Display..... Normally Within 1 Minute  
New Point Registration... Normally Within 5 Minutes

Specifications subject to change without notice.