

Overview and Product Identification

Analog Output Modules receive data from a BAPI 418 MHz receiver or 900 MHz receiver through a four-wire RS 485 bus. Up to 127 different Analog Output Modules can be connected on the data bus to send multiple variables to the controller.

Resistance Output Module (ROM): Converts the communication data from a Wireless Receiver into a Resistance for the DDC controller. The unit can be factory calibrated to output a thermistor curve for temperature signals, please consult the product label for the exact type.

Voltage Output Module (VOM): Converts the communication data from the Wireless Receiver into a linear 0 to 5 volt or 0 to 10 volt signal for the DDC controller. The unit can be factory calibrated for temperature or humidity, please consult the product label for the exact type.

Current Output Module (COM): This loop powered unit converts the communication data from the Wireless Receiver or a Washdown into a linear 4-20mA signal for the DDC controller. The unit can be factory calibrated for temperature or humidity, please consult the product label for the exact type.

Setpoint Output Module (SOM): Converts the communication data from a Wireless Receiver into a resistance, or voltage depending on model. The unit can be factory calibrated to output a setpoint signal from a wireless room transmitter, please consult the product label for the exact type.

Relay Output Module (RYOM or RYOL): Converts the communication data from a Wireless Receiver into a floating solid state switch closure for the DDC controller. The RYOM is a "momentary" version while the RYOL is a "latching" version.

Note:

The "Momentary" Relay Output Module (RYOM) is **ONLY** used with the Wireless Room Transmitter with Setpoint and Override. Training of the RYOM is covered in the installation/operation sheet for the Wireless Room Transmitter with Setpoint and Override (20357_ins_wireless_temp_xmtr_set_ovr.pdf) which is available on the BAPI website or by contacting a BAPI sales representative.

The "Latching" Relay Output Module (RYOL) is **ONLY** used with the Wireless Universal Input Transmitter. Training of the RYOL is covered in the installation/operation sheet for the Wireless Universal Input Transmitter (24227_ins_wireless_Input_xmtr.pdf) which is available on the BAPI website or by contacting a BAPI sales representative.

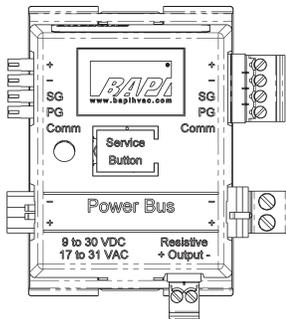


Fig. 1:
Resistance Output Module, or
Setpoint Output Module with
resistance output

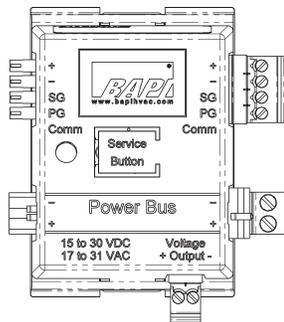


Fig. 2:
Voltage Output Module, or
Setpoint Output Module
with voltage output.

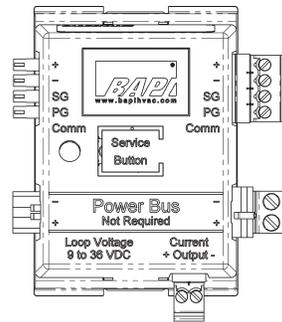


Fig. 3:
Current Output Module,
Loop Powered

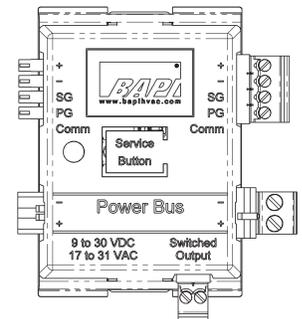


Fig. 4:
Relay Output Module.

Analog Output Module Training

The installation process requires that each transmitter is trained to its associated output modules so that they communicate with each other. Pushing buttons in a defined sequence on the units will bind them together.

The training process is easiest on a test bench with the units within arm's reach of each other. Training can be done in the field but requires two people and a set of walkie talkies or cell phones. Be sure to place an identification mark on the transmitter and associated output modules after they have been trained so that they can be matched together at the job site.

If more than one variable is transmitted by the transmitter (temperature, humidity and setpoint for instance), each variable requires a separate output module. Perform the training sequence for each output module. Any transmitted variable can be trained to more than one output module. If a Repeater is used in the system, be sure it is powered and within reception range of the transmitter and the 900 MHz Receiver to train the output modules.

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Specifications subject to change without notice.

Analog Output Module Training continued...

TEMPERATURE OR HUMIDITY VARIABLE TRAINING

1. To train an output module to a temperature or humidity variable, select the Resistance, Voltage or Current Output Module calibrated to the proper temperature or humidity range and connect it to the wireless receiver. Note: Multiple output modules can be trained to the same transmitter.
2. Apply power to the receiver which will supply power to the connected output modules. The power LED on the receiver will light and remain lit. **(Current Output Modules must have loop power supplied to the module itself before they can be trained.)**
3. Remove the cover of the room transmitter and remove the battery tabs or install the batteries, observing polarity as shown in Fig 5. Or open the cover of the BAPI-Box on non-room transmitters and remove the battery tabs or install the batteries as shown in Fig 6. The "transmit LED" will flash about once every 20 seconds, indicating a transmission.
4. Press and hold down the "Service Button" on the top of the output module (Fig 7) that you wish to train. Then, press and release the "training button" (Fig 5 & 6) on the transmitter. When the output module receives the "training transmission" from the transmitter, the output module's red LED will light steady. Release the "Service Button" on the output module and the red LED will go out. The transmitter and output module are now trained to each other. During normal operation, the output module's LED will flash about once every 20 seconds indicating data reception from the transmitter trained to it.

Note: Combination transmitters send both the temp and humidity data when the "Training Button" is pressed. However, each Output Module is configured at the time of order as a temp, humidity, setpoint or override module and will only recognize the relevant data and will ignore the rest.

5. Mount the transmitter at the desired location, removing the batteries if needed. (The units will remain trained through power failures and battery replacement.)

SETPOINT VARIABLE TRAINING

1. To train an output module to a Setpoint variable, select the Setpoint Output Module (SOM) calibrated to the proper setpoint range and connect it to the wireless receiver. Note: Multiple output modules can be trained to the same transmitter variable.
2. Apply power to the receiver which will supply power to the connected output modules. The LED on the Receiver will light and remain lit.
3. Remove the cover of the room transmitter and remove the battery tabs or install the batteries, observing polarity as shown in Fig 5. The "transmit LED" will flash about once every 20 seconds, indicating a transmission.
4. Press and hold down the "Service Button" on the top of the output module (Fig 7). Then, press and release the VERRIDE button on the transmitter (Fig 5). (Note: If the unit was not ordered with an override function, then the VERRIDE button will be shorter and will not extend outside the case but will still be accessible upon removing the cover.) When the output module receives the "Training Setpoint" info from the transmitter, the output module's red LED will light. Release the "Service Button" on the output module and the red LED will go out. The transmitter and output module are now trained to each other. During normal operation, the output module's LED will flash about once every 20 seconds indicating data reception.
5. Mount the transmitter at the desired location, removing the batteries if needed. (The units will remain trained through power failures and battery replacement.)

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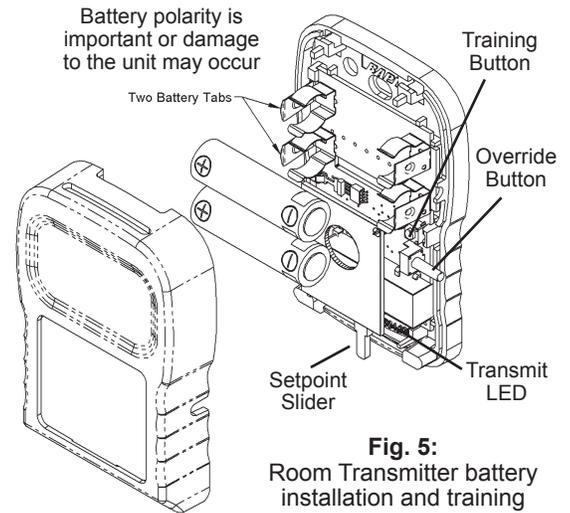


Fig. 5:
Room Transmitter battery installation and training

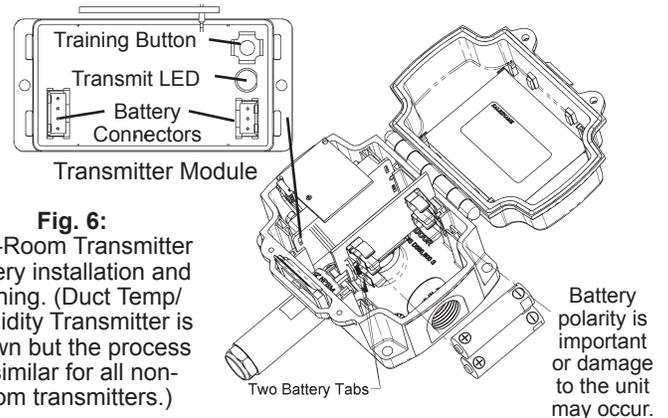


Fig. 6:
Non-Room Transmitter battery installation and training. (Duct Temp/Humidity Transmitter is shown but the process is similar for all non-room transmitters.)

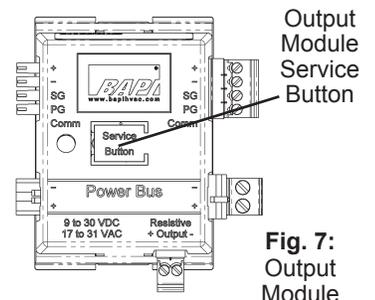


Fig. 7:
Output Module

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Analog Output Module Training continued...

OVERRIDE FUNCTION TRAINING

Training of the Relay Output Modules and the Override Function on other Analog Output Modules is covered in the installation/operation sheets "20357_ins_wireless_temp_xmtr_set_ovr.pdf" and "27986_Wireless_System_Ins.pdf" which are available on the BAPI website or by contacting a BAPI sales representative.

Note on Training of systems with a Repeater: If a Repeater (BA/RPT49) is used, be sure it is powered and within reception range of the receiver to train the output modules. Also, if a repeater is used, then the receiver must be the 900 MHz version (BA/RCV-900-EZ) rather than the 418 MHz version.

Mounting of the 418 MHz Receiver, 900 MHz Receiver and Analog Output Modules

The 418 MHz Receiver, 900 MHz Receiver and Analog Output Modules can be mounted in snap track, DIN Rail or surface mounted. The text and figures refer to the 418 MHz Receiver, but the mounting process is the same for both receivers.

SNAPTRACK MOUNTING

Push in the blue mounting tabs on the bottom of the receiver and output modules. These units will now fit into the board slots of 2.75" snap track. Insert the receiver at the far left of the snap track, then insert each analog output module and slide it to the left until its connectors are fully mated into the receiver or the next analog output module. You may attach up to 127 analog output modules to a receiver.

If your output modules cannot fit in one piece of snap track, then mount another piece of snap track nearby and insert the additional modules. Connect wires from the right side of the first string of modules to the left side of the second string of modules on the second snap track. (See "Extending the RS485 Network" on pg. 5.) This configuration requires one or more Pluggable Terminal Block Connector Kits (BA/AOM-CONN).

DIN RAIL MOUNTING

Push out the blue mounting tabs on the bottom of the receiver and output modules. These units will now snap onto DIN Rail. Catch the EZ mount hook on the edge of the DIN rail as shown in Fig 10. Then rotate into place.

Attach the receiver at the far left of the DIN Rail, then attach each analog output module and slide it to the left until its connectors are fully mated into the receiver or the next analog output module. You may attach up to 127 analog output modules to a receiver.

If your output modules cannot fit onto one piece of DIN Rail, then mount another piece nearby and attach your additional modules. Connect wires from the right side of the first string of modules to the left side of the second string of modules on the second DIN Rail. (See "Extending the RS485 Network..." on pg. 5.) This configuration requires one or more Pluggable Terminal Block Connector Kits (BA/AOM-CONN).

SURFACE MOUNTING

Push out the blue mounting tabs on the bottom of the receiver and output modules. Attach the receiver to the surface by inserting a screw in each blue tab. Attach Analog Output Modules by placing each one against the surface and sliding it to the left until its connectors are fully mated into the receiver or the next analog output module. Attach each module to the surface with two screws, one in each blue tab. You may attach up to 127 analog output modules to a receiver.

If your output modules cannot fit in one straight line on the surface, then mount a second string of modules nearby. Connect wires from the right side of the first string of modules to the left side of the second string of modules. (See "Extending the RS485 Network..." on pg. 5.) This configuration requires one or more Pluggable Terminal Block Connector Kits (BA/AOM-CONN).

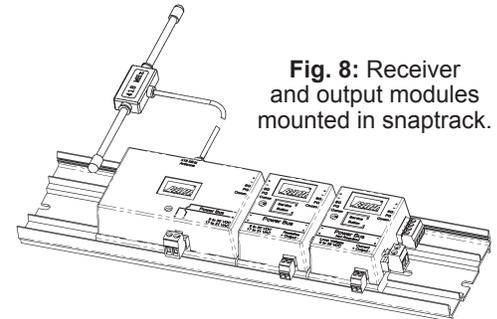


Fig. 8: Receiver and output modules mounted in snaptrack.

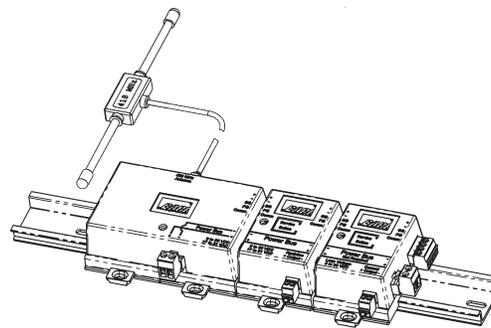


Fig. 9: Receiver & output modules mounted on DIN Rail.

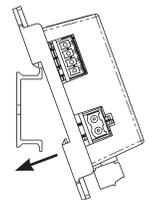


Fig. 10: Catch the EZ Mount hook on the edge of the DIN Rail, then rotate into place.

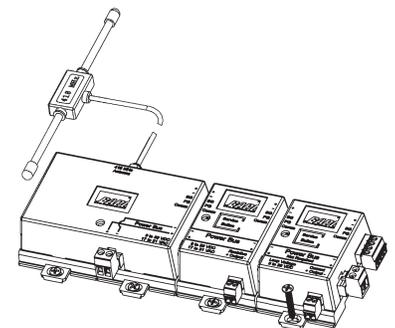
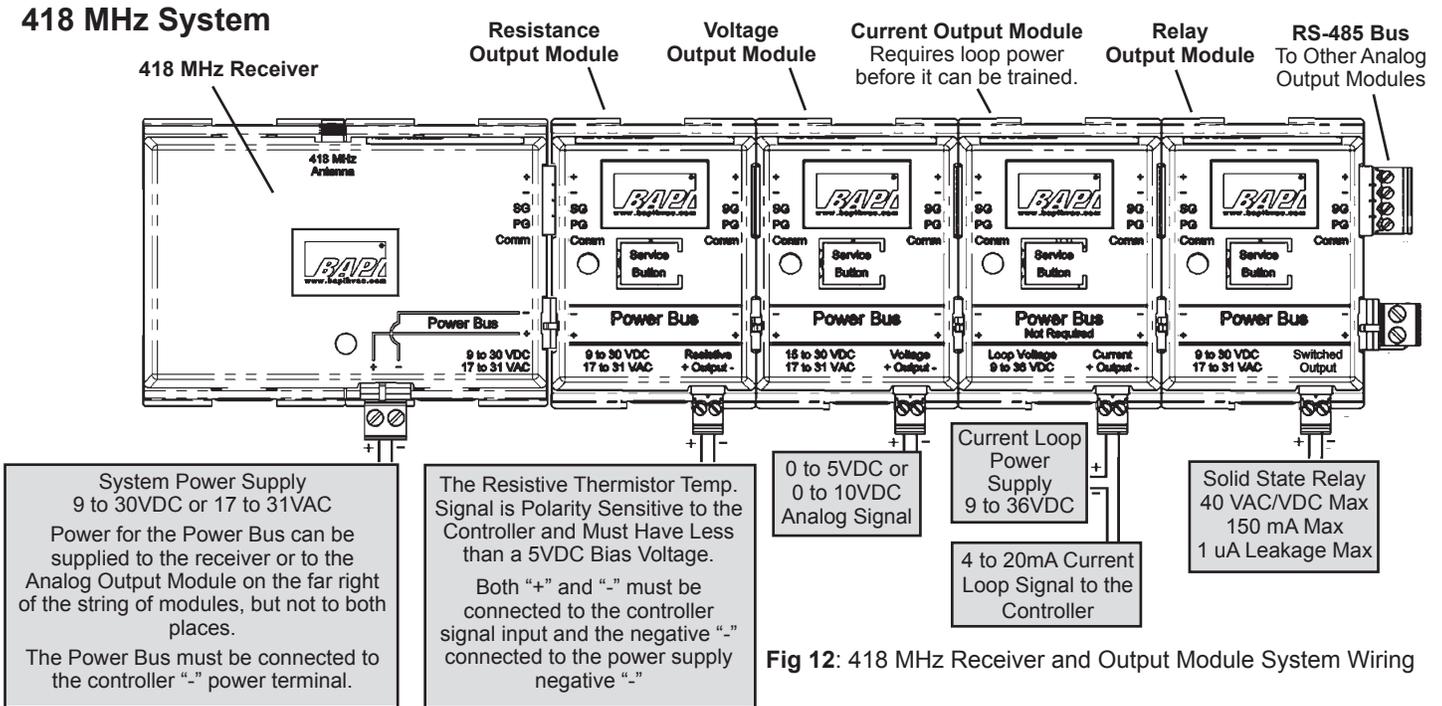


Fig. 11: Receiver and output modules surface mounted.

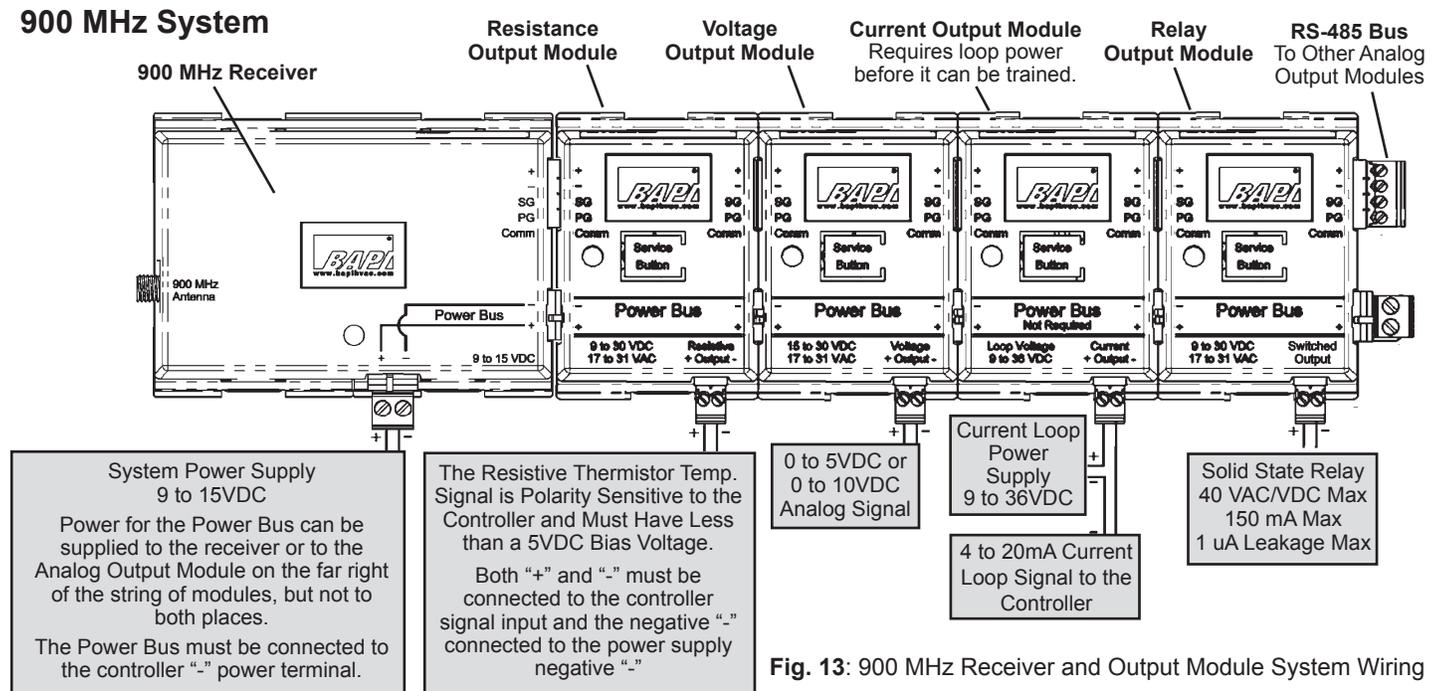
Specifications subject to change without notice.

418 MHz Receiver and 900 MHz Receiver with Analog Output Modules Termination



Termination Notes for 418 MHz and 900 MHz Systems:

1. The wireless receiver and Analog Output Modules are interconnected and require module power along the "Power Bus" terminals. The bus can be powered from either the receiver end on the left or the last output module on the right side. Be sure you have enough DC current or AC VA for all the devices on the bus.
2. The **Current Output Module (BA/COM)** signal is **LOOP POWERED** and must be externally powered with 9 to 36 VDC separate from the Power Bus. The Loop Power must be connected to the Current Output Module before it can be trained.
3. Be sure to follow the polarity (+ or -) symbols listed on each receiver and the output modules to maintain communication and Power Bus integrity.



Specifications subject to change without notice.

Extending the RS485 Network between the Receiver and the Analog Output Modules

The Analog Output Modules may be mounted up to 4,000 feet away from the 418 MHz or 900 MHz Receiver. The total length of all the shielded, twisted pair (TSP) cables shown in Fig. 14 is 4,000 feet (1,220 meters), and "T" taps are not allowed. Connect the terminals together as shown in Fig. 14. BAPI's VC350A EZ Voltage Converter and a small transformer can be used to power the group of Analog Output Modules.

*If the distance from the receiver to the group of Analog Output Modules is greater than 100 feet (30 meters), provide a separate power supply for that group of Analog Output Modules and install a 120Ω load resistor (1/4 watt) across the "+" and "-" communication terminals.

Note: This configuration requires one or more Pluggable Terminal Block Kits for the extra wire terminations on the left and right side of the Analog Output Modules. Each kit includes 4 connectors.

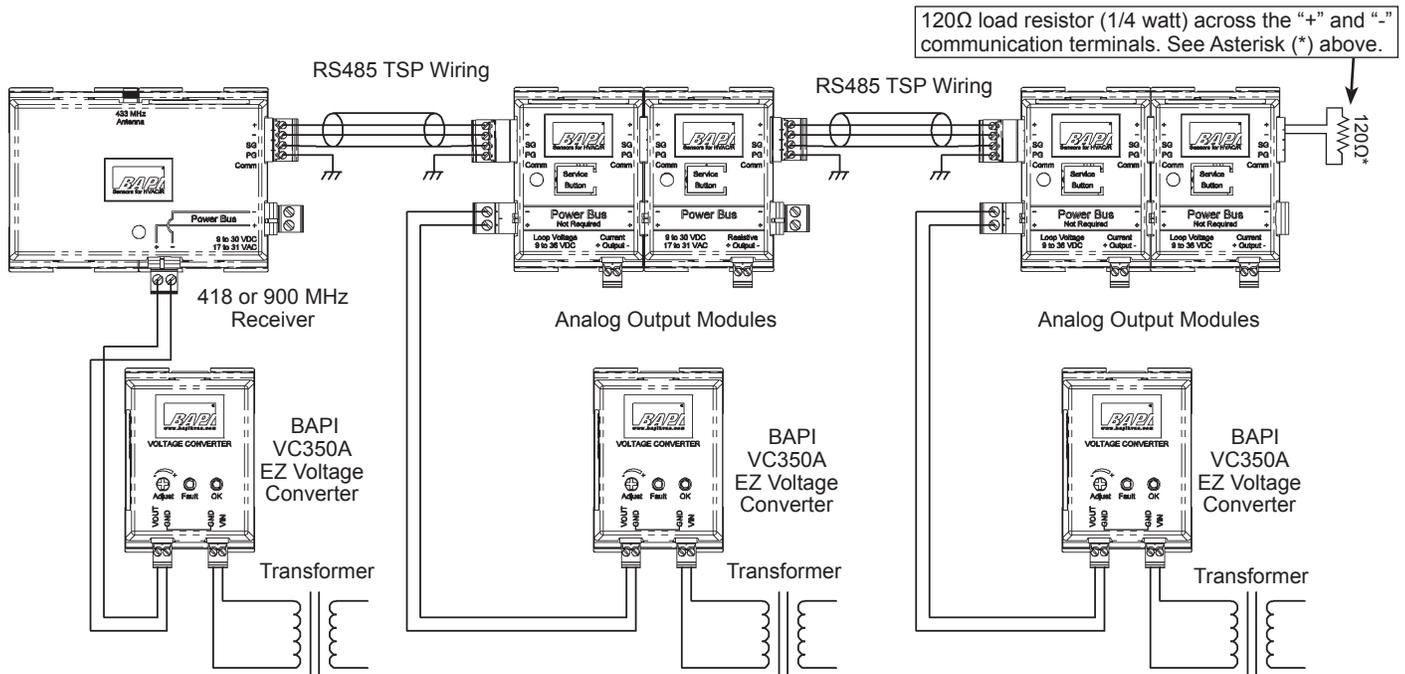
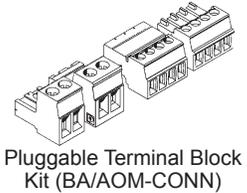


Fig. 14: Extended RS485 Network between the Receiver and the Analog Output Modules

Analog Output Module Specifications

All Analog Output Modules:

Overall Dimensions: 2.5"H x 2"W x 1.25"D, (63.5 x 49 x 31.7mm)

Enclosure Material & Rating: ABS Plastic, UL94 V-0

Resistance Output Module (ROM):

Resolution: ~0.5°F

ROM-102: 35 to 120°F (1 to 50°C), 10K-2 Thermistor Curve

ROM-103: 32 to 120°F (0 to 50°C), 10K-3 Thermistor Curve

ROM-10311: 32 to 120°F (0 to 50°C), 10K-3 (11K) Therm. Curve

ROM-20: 53 to 120°F (12 to 50°C), 20K Thermistor Curve

Power Consumption: 11.9 mA max. DC, .36 VA max AC

Thermistor Bias: Less than 5 VDC max

Output Resolution: 10 bit

Voltage Output Module (VOM):

Output Voltage Range: 0 to 5 volts or 0 to 10 Volts

Output Current: 1 mA

Power Consumption: 11.9 mA max. DC, .36 VA max AC

Output Resolution: 10 bit

Setpoint Output Module (SOM):

Setpoint Output Ranges: See data sheet

Power Consumption: 11.9 mA max. DC, .36 VA max AC

Output Resolution: 10 bit

Current Output Module (COM):

External Loop Power Required: 9 to 36VDC, 9Vmin (no load)

R-Load Max = $\frac{V_{supply} - X_{mtr} V_{min}}{.02A \text{ Output Max}}$

Loop Impedance: 750Ω @ 24VDC

Output Current Range: 4 to 20 mA (factory calibrated)

Supply Bus Power: Not used by module just feeds through

Output Resolution: 12 bit

Note: Loop must be powered to train the output module.

Relay Output Module:

Relay Output: 40V (DC or AC peak), 150 mA max.

Off state leakage current 1 uA max.

On state resistance 15Ω max.

5 second momentary actuation (RYOM only)

Latching pending next change (RYOL only)

Specifications subject to change without notice.



Wireless System Diagnostics

Possible Problems:

Temperature or Humidity is reading its low limit or high limit, or the LED at the top of the Analog Output Module is blinking rapidly:

Temperature or Humidity reading is coming out the wrong output module

Temperature or Humidity reading is incorrect

Possible Solutions:

- Check for proper wiring and connections from the output modules to the controller.
 - Check to see if the controller's software is configured properly.
 - Check for proper power to the receiver, repeater (if used) and output modules.
 - Retrain the Analog Output Module.
 - Check that the associated transmitter is transmitting (the LED will flash about once every 20 seconds when it transmits). If not, replace the batteries. Check that the associated receiver is receiving the transmissions (its LED will blink right after the transmitter LED if it receives that transmission.) If it is not receiving the transmissions, move it closer to the transmitter or reposition the antenna for maximum reception. **Note:** The receiver will receive transmissions from all transmitters that are within range, not just the one you are testing.
 - Retrain the Analog Output Module.
-
- Check for proper wiring and connections from the output modules to the controller.
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- Check to see if the controller's software is configured properly.
 - Check to see if the correct output module is connected to the correct controller.

Analog Output Module Default Status when Wireless Transmission is Interrupted:

If an output module does not receive data from its assigned transmitter for 15 minutes, the red LED on the top of the module will blink rapidly. If this happens, the individual Analog Output Modules will react as follows:

- Resistance Output Modules (BA/ROM) calibrated for temperature will output the highest resistance in their output range.
- Voltage Output Modules (BA/VOM) calibrated for temperature will set their output to 0 volts.
- Current Output Modules (BA/COM) calibrated for temperature will set their output to 4 mA.
- Voltage Output Modules (BA/VOM) calibrated for humidity will set their output to their highest voltage (5 or 10 volts).
- Current Output Modules (BA/COM) calibrated for humidity will set their output to 20 mA.
- Setpoint Output Modules (BA/SOM) will hold their last value indefinitely.
- Relay Output Modules (BA/RYOM Units Only) will go to their default state (example: open for a normally open unit).

When a transmission is received, the output modules will revert to normal operation in 60 seconds or less.