

Installation Manual  
WAV-0110  
WAV-0111  
WAV-0112  
Version 1.009

The HBX logo consists of the letters "HBX" in a bold, black, sans-serif font. The letters are centered between two horizontal red bars. The top bar is slightly longer than the bottom bar, and both are positioned above and below the text respectively.

**HBX**

WAV-0110  
WAV-0111  
WAV-0112

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HBX Control Systems Inc.

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# Table of Contents

## HBX WAV-0110 WIRELESS OUTDOOR SENSOR

### Introduction

This manual will help with the installation, parameter setting, troubleshooting and general maintenance requirements for the Controller. To guarantee the safe and reliable operation of this Control, you must first read this manual in detail and take particular note to any and all warnings or caution directives prior to connecting to AC power.

Only suitably qualified individuals with formal training in electrical and HVAC controls should attempt the installation of this equipment. Incorrect wiring and installation will affect the warranty provided with this unit. Wiring must be completed in accordance with the codes and practices applicable to the jurisdiction for the actual installation.

The HBX WAV-0110 is a microprocessor based controller and as such is not to be regarded as a safety (limit) control. Please consult and install the heating or cooling appliance in accordance with the manufacturer's recommendations.

### SAFETY SYMBOLS AND WARNINGS:



#### Extreme Hazard -

This action poses a serious threat that could result in personal injury or death, as well as permanent damage to the equipment. Proceed with caution.



#### Moderate Hazard -

This action may cause personal injury or have adverse effects on the installation process if handled incorrectly.



#### Disconnect Power Source -

The presence of low voltage(24VAC) or high voltage(120VAC) could result in personal injury or permanent damage to components or equipment.



#### Point of Interest -

This point clarifies pertinent information, or brings your attention to an action that may have adverse effects on the installation process.

## RECEIVING, INSPECTION AND STORAGE

This HBX WAV-0110 has gone through rigorous quality control tests at the factory before shipment. After receipt and before installation perform the following checks:

### Receipt

After receiving, inspect the unit for any possible physical damage that may have occurred during transportation.

### Inspection

After unpacking the unit make sure the box contains:

- 1 x Base Unit
- 1 x Outdoor Unit
- 2.5mm Screwdriver
- 2 x AA Batteries (installed in Outdoor Unit)
- Instruction Manual

Make sure the part number on the unit corresponds to the part number on the original box.

### Storage

The WAV-0110 should be kept in its original shipping carton prior to installation. In order to retain the warranty coverage it should be stored properly:

- Store in a clean dry place
- Store within an ambient temperature range of +10°C to +40°C
- If possible, store in an air-conditioned environment where the relative humidity is less than 95%
- Do not store in places where the unit may come into contact with corrosive gases or liquids
- Do not store in an area or upon an unstable surface where it may become damaged due to falling

## HBX WAV-0110 WIRELESS OUTDOOR SENSOR

### Description

The HBX WAV-0110 Control is designed to be a microprocessor based outdoor wireless sensor system. It is easy to install, requiring minimal wiring for simple installation. The weather resistant sensor is reliable and has a minimum two year battery life.

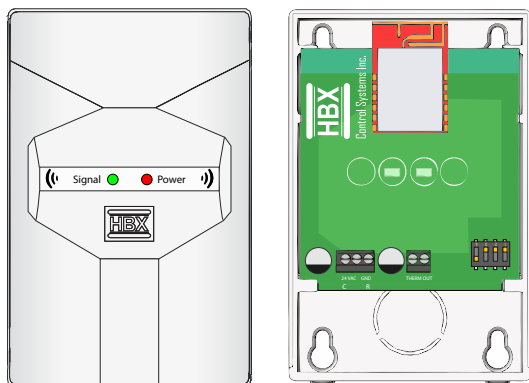
Some features of the HBX WAV-0110 are:

- Temperature range: -20°F to 225°F  
(operating temperature range down to -40°F)
- Proprietary pairing and communication protocol
- 500, 5k, 10k, 12k Ohm thermistor options built in; dipswitch selectable
- Provides a 2000 ft. open air range
- Ability to use External Sensor on Outdoor Unit
- Outdoor unit can pair with up to 5 base units.

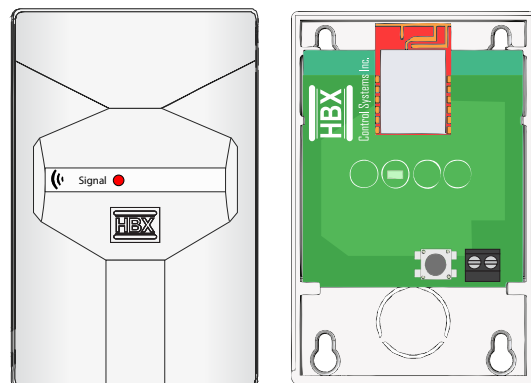
The HBX WAV-0110 consists of two components:

- Base Unit: This box is designed to be the interface between the controller and the outdoor unit.
- Outdoor Unit: This weather resistant box contains a thermistor sensing element to provide a reliable outdoor temperature to the base unit.

**Base Unit WAV-0111**



**Outdoor Unit WAV-0112**



## TECHNICAL DATA AND DIMENSIONS

### Technical Data

- 1 x Power Contact: 24VAC
- 2 x Contact output

### Storage:

+10°C to 40°C

### Languages:

English

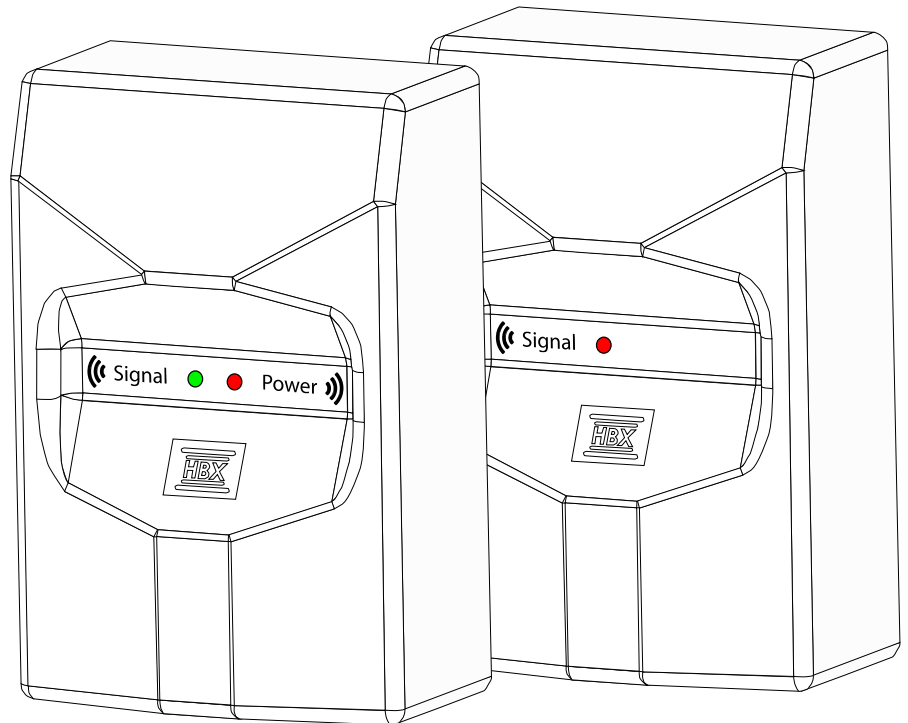
### Weight:

0.177kg

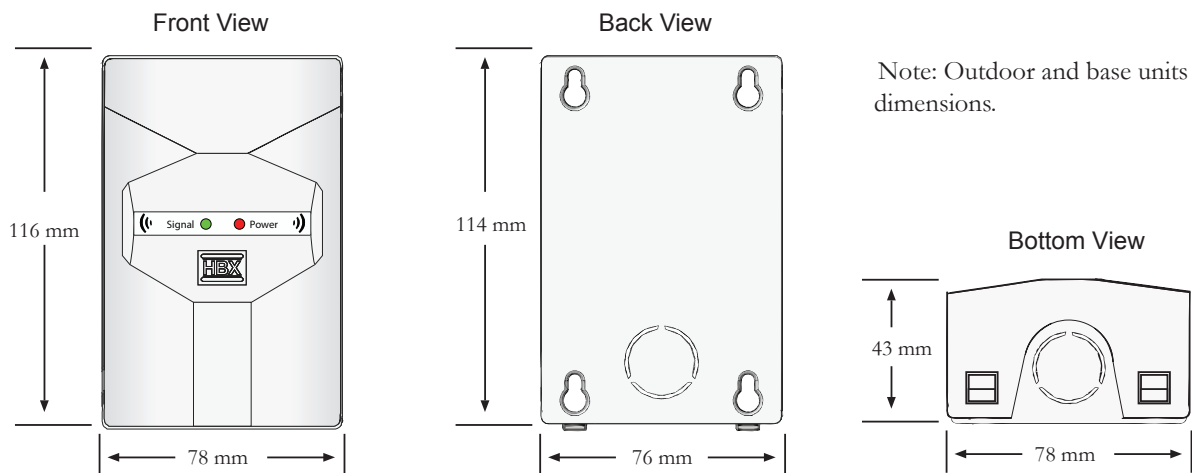
### RF Info:

Contains IC: 7693A-24J40MB

Contains FFC ID: 0A3MRF24J40MB



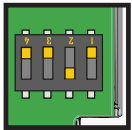
### Dimensions



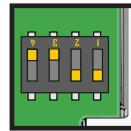
## WIRING AND INSTALLATION

### Setting the Dipswitches

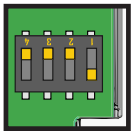
The Dipswitches enable you to configure the Wireless Outdoor Sensor to work with different thermistor curves. See FIG 1 to select the appropriate thermistor curve.



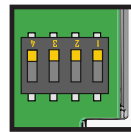
Dip 1 ON only: 500 Ohms



Both ON: 12k Ohms



Dip 2 ON only: 5k Ohms



Both OFF : 10k Ohms\*

**\*Default Setting**

FIG 1

### Mounting and Wiring the Base Unit

- Place a flat screwdriver into the top part of the base unit. Pry the screwdriver up on the back of the plastic and then pull off the front cover.
- Supply 24 VAC power to the terminals in the base unit. This connection provides power to the microprocessor. (see FIG 2A/2B)



**Make sure to wire the thermistor section to the control AFTER powering the WAV-0110.**

- Connect 18 AWG or similar wire to the 'THERM OUT' terminals in the base and run the wire from here to the outdoor sensor control terminal. See FIG 2A for regular setup, and FIG 2B for Vitodens 200 setup.

#### Regular Setup

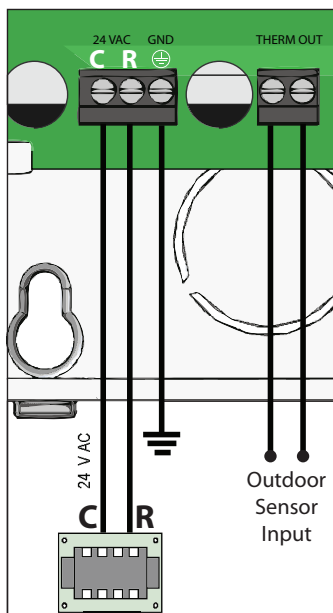


FIG 2A



If you are using an existing transformer to connect the Base Unit, make sure the “C” and “R” wires are connected to the right terminal.



Use a separate power supply for the Base Unit when connecting to a 24 VAC powered control.



Ensure Proper setup, or damage will occur to the board.



Try not to mount the Base Unit by high voltage wiring or equipment, especially contactors or high voltage switching devices.

#### Vitodens 200 Setup ONLY

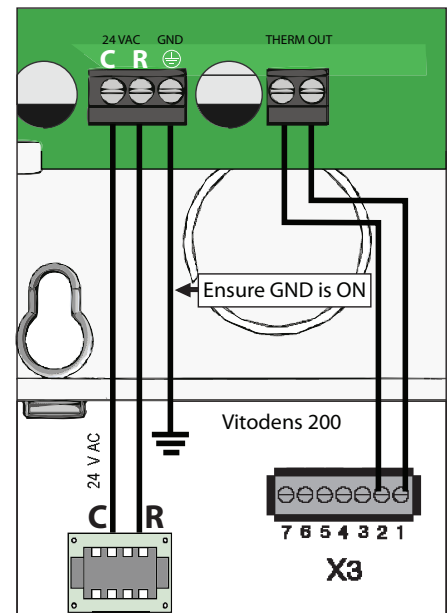
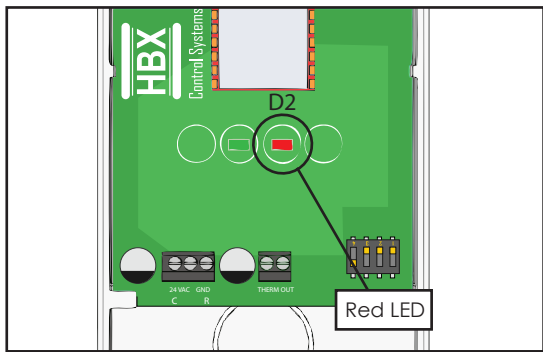


FIG 2B

### Initial Setup and Pairing

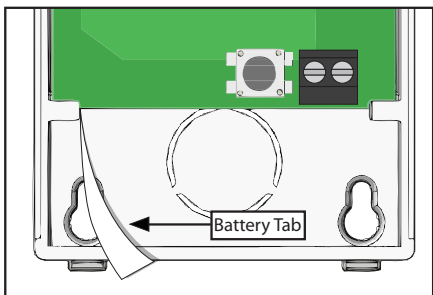
- Once you connect 24 VAC to the base unit, the red power LED (D2) will start to flash (after a 15 seconds startup process). (see FIG 3)



Base Unit

FIG 3

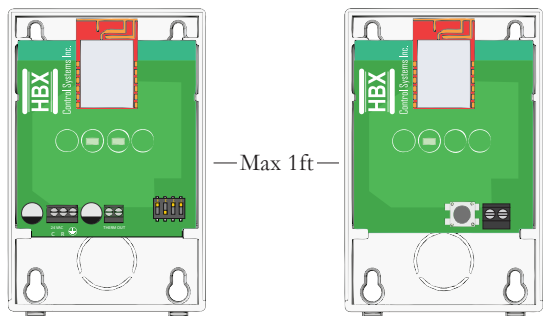
- Remove the battery tab from the outdoor unit. (see FIG 4)



Base Unit

FIG 4

- Hold the outdoor unit within 1 foot of the base unit during this pairing. (see FIG 5)

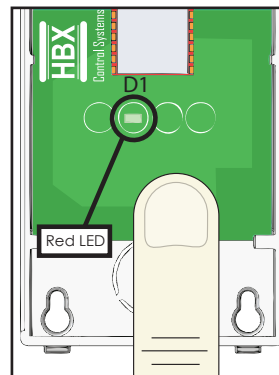


Base Unit

FIG 5

Outdoor Unit

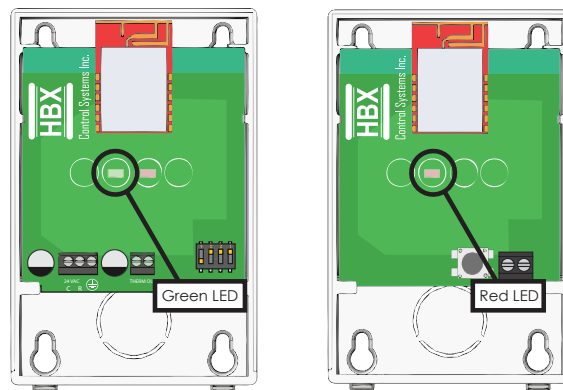
- Push and hold the button located on the outdoor sensor until the red LED light turns off (approx. 15 seconds), then release the button. The LED will switch back on after a few seconds as it is initiating the pairing process. (see FIG 6)



Outdoor Unit

FIG 6

- Once paired, the outdoor sensor will blink 3 times. Wireless pairing is successful when you see the green LED on the base unit flash. The green LED should flash up to 6 times, indicating good signal strength. You can then put the front cover on both the base and the outdoor sensor. At this point, you will install the outdoor sensor. (see FIG 7)



Base Unit

Outdoor Unit

FIG 7

## Multiple Base Unit Setup

Use these settings to configure multiple base units with one outdoor sensor.

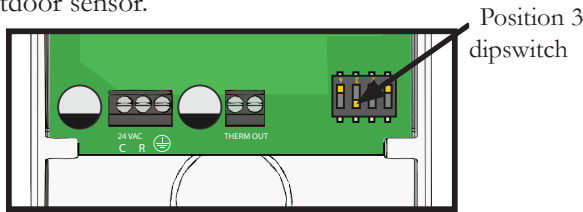


FIG 8

Step 1: Pair the outdoor unit to one of the Base units as per normal pairing procedure. Only power the unit that you would like to pair with during this process.

Step 2: Make sure that the **position 3** dipswitch on all the base units are in the ON position(Down). This will allow the paired base unit to talk to all other base units (FIG 8).

Step 3: Wire and power additional base units as described on Page 6.

## Mounting the Outdoor Unit

- The HBX WAV-0110 can be mounted directly onto a wall.
- In order to prevent heat transmitted through the wall from affecting the sensor reading, it may be necessary to install an insulating barrier behind the enclosure.
- Mount the sensor on an exterior NORTH wall. Choose a location protected from direct sunlight.
- Keep the sensor away from any wiring that may be outside and also at least 1 foot from any metal in all directions so there is not interference with the wireless sensor (FIG 9).



**Do not mount the outdoor sensor with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor.**



**Unit is not Water proof. Ensure that the outdoor sensor is protected from prolonged exposure to water.**

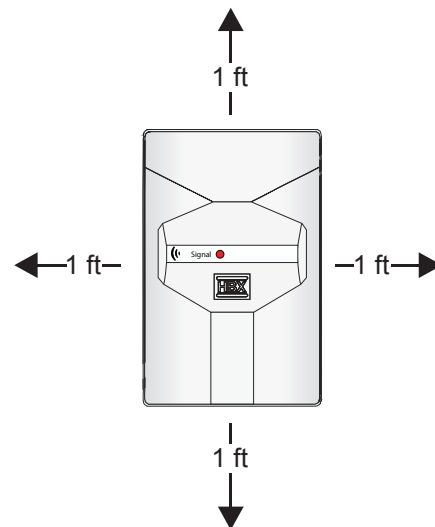


FIG 9

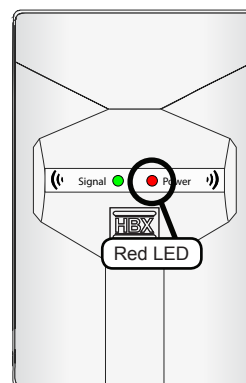
## Verify Wireless Pairing

After the base unit and the outdoor unit are installed and the wireless pairing process is complete, verify the wireless operation.

### Steps to take for verification:

1. Press the button on the outdoor unit once. The red LED will flash on the outdoor unit to indicate a transmit.
2. The green signal strength on the base unit should flash up to 6 times based on the signal strength, six being the strongest signal.
3. Wireless verification is complete

## Battery Life Indicator



Check the RED power LED on the base unit. (FIG 10) If the LED flashes twice per second (Four times faster than average), it indicates that the Outdoor Unit will require new batteries within 3 months. (FIG 11)

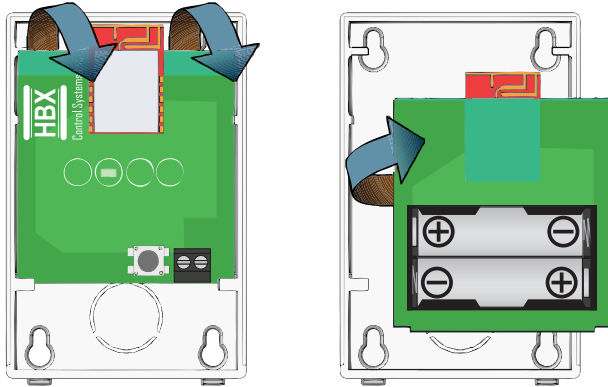
FIG 10



## Changing the Batteries

Flip Forward and Out

Flip and Replace Batteries



Outdoor Unit

FIG 11

## Loss of Communication Mode

The Loss of Communication mode occurs when the base unit has lost communication with the outdoor unit for more than 3 hours.

When the WAV-0110 is in this mode, the base unit will output a resistance for 0°F on the control it has been connected to.

The base unit will indicate that it is in this mode by blinking both LED's , five times every three seconds (see FIG 12).

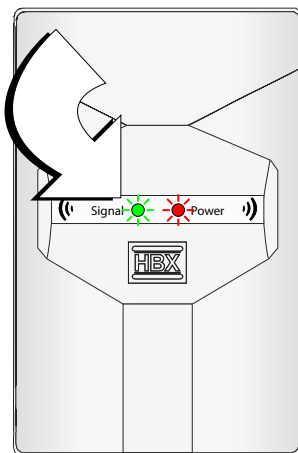


FIG 12

## Loss of Communication Troubleshooting

### Step 1

Disconnect power from the base unit for 30 seconds and reconnect it. Once the unit is powered back up it can take up to 15 minutes for the outdoor unit to communicate with the base unit. During this time you will still be in “Loss of Communication” mode. If you do not wish to wait UP TO 15 minutes, you can go to the outdoor sensor and press the button, (referred to on page 7) which will force the outdoor unit to send a temperature to the base unit. If after trying this step the base unit is still in “Loss of Communication” mode, proceed to Step 2.

### Step 2

Remove the cover from the outdoor unit and press the button. The RED LED should light up when the button is pressed. If it does not or is very dim this indicates that the batteries are dead and need to be changed. If after trying this step the base unit is still in “Loss of Communication” mode, proceed to Step 3.

### Step 3

Try powering down the outdoor sensor by taking out one battery for 30 seconds. After re-inserting the battery wait 15 seconds then press the button on the unit. If after trying this step the base unit is still in “Loss of Communication” mode, proceed to Step 4.

### Step 4

Try re-pairing the units. See page 7 for instructions. If after trying this step the base unit is still in Loss of Communication mode, proceed to Step 5.

### Step 5

Call HBX Tech support:

Telephone: +1 (403) 720 0029

Toll Free: +1 (855) 554 6629

Fax: +1 (403) 720 0054

support@hbxcontrols.com

## THERMISTOR OUTPUT CURVES



Dip 1 ON only: 500 Ohms



Dip 2 ON only: 5k Ohms



Both OFF : 10k Ohms\*

\*Default Setting



Both ON: 12k Ohms

Temp (°C)	Temp (°F)	Resistance (Ω)
-29	-20	426
-26	-15	433
-23	-10	440
-21	-5	447
-18	0	454
-15	5	461
-12	10	469
-9	15	476
-7	20	483
-4	25	490
-1	30	497
2	35	504
4	40	511
7	45	519
10	50	526
13	55	533
16	60	540
18	65	547
21	70	554
24	75	561
27	80	568
29	85	576
32	90	583
35	95	590

Temp (°C)	Temp (°F)	Resistance (Ω)
-30	-22	88340
-20	-4	48487
-10	14	27648
0	32	16325
10	50	9952
20	68	6247
25	77	5000
30	86	4028
40	104	2662
50	122	1801
60	140	1244
70	158	876

Temp (°C)	Temp (°F)	Resistance (Ω)
-29	-20	166342
-23	-10	115710
-18	0	86463
-12	10	61711
-7	20	47052
-1	30	34367
4	40	26686
10	50	19903
16	60	15000
21	70	11942
27	80	9164
32	90	7401
38	100	5774
43	110	4727
49	120	3743
54	130	3099
60	140	2488
65	150	2011
71	160	1693
77	170	1385
82	180	1177
88	190	974
93	200	836

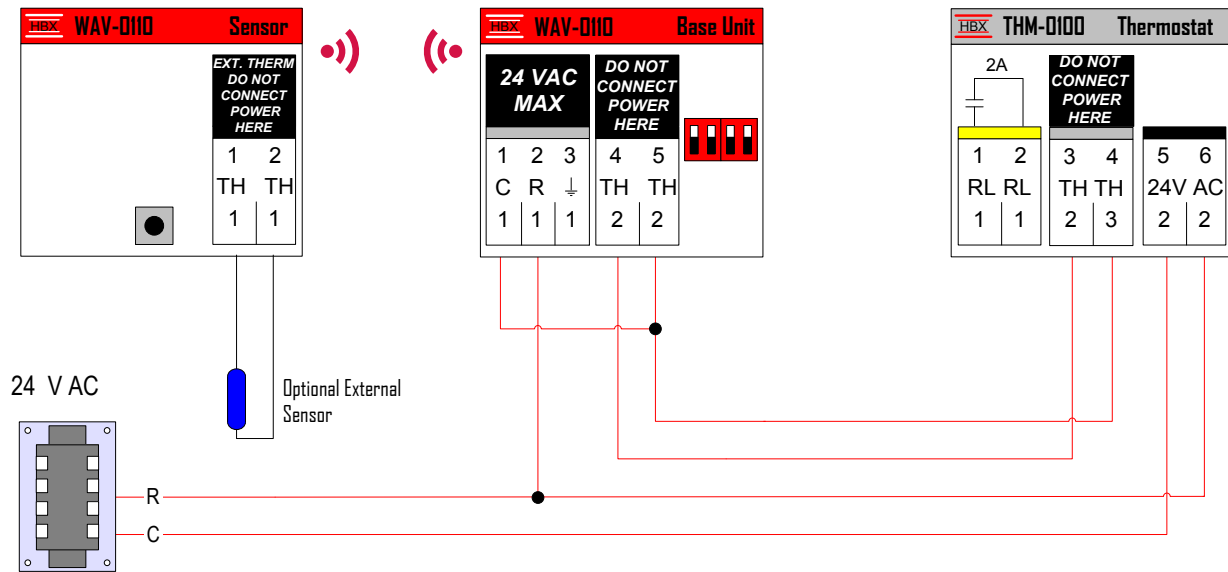
Temp (°C)	Temp (°F)	Resistance (Ω)
-29	-20	162502
-23	-10	119526
-18	0	88748
-12	10	66496
-7	20	50262
-1	30	38311
4	40	29441
10	50	22804
16	60	17905
21	70	14157
27	80	11268
32	90	9025
38	100	7274
43	110	7153
49	120	4810
54	130	3945
60	140	3252
65	150	2649
71	160	2201
77	170	1836
82	180	1538
88	190	1294
93	200	1092

## SUPPORTED PRODUCT EXAMPLES

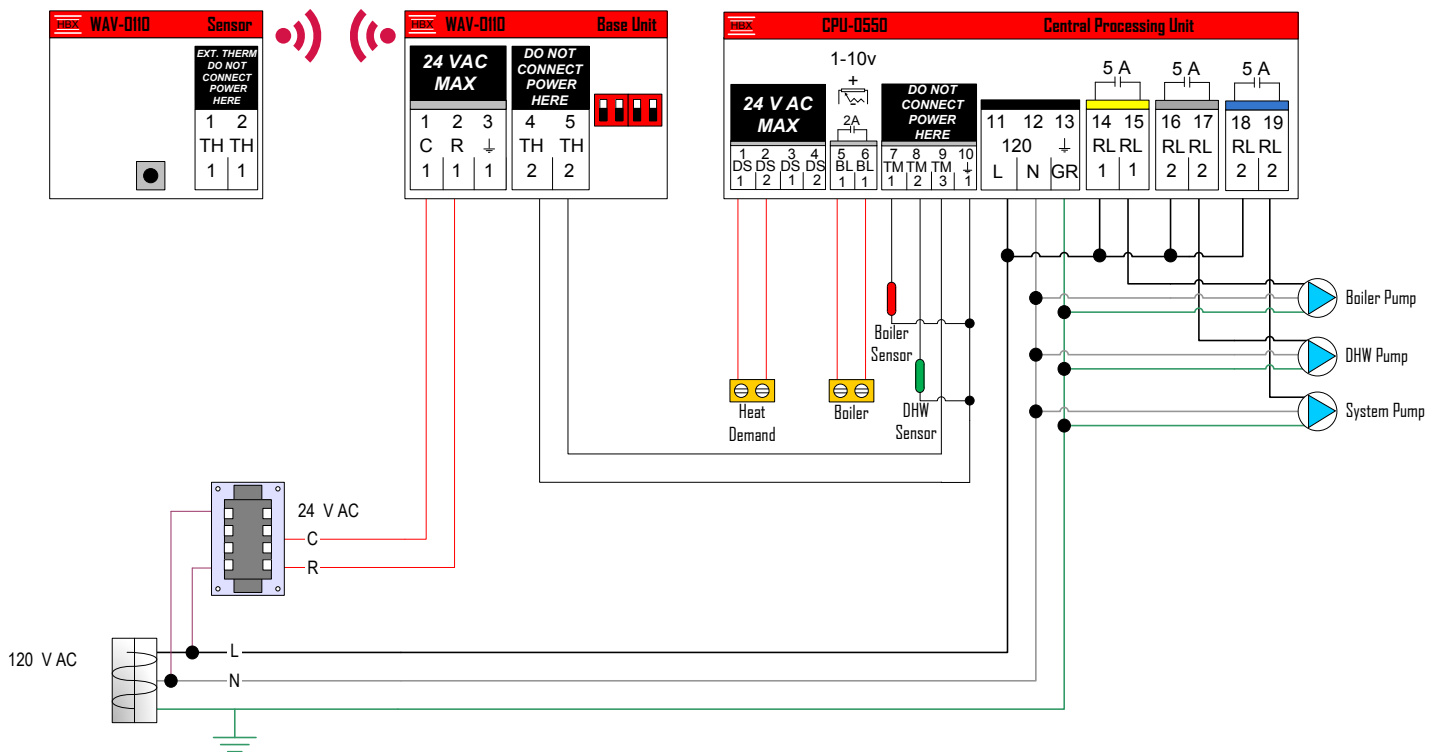
Setting	Boiler Model	Control Model
<b>5K</b>	<ul style="list-style-type: none"> <li>• Viessmann Vitodens- 100W</li> </ul>	<ul style="list-style-type: none"> <li>• Heat Timer (excluding EPU-CH)</li> </ul>
<b>10K</b>	<ul style="list-style-type: none"> <li>• Laars Mascot</li> <li>• Laars Neotherm</li> <li>• Viessmann (excluding Vitodens-100W)</li> <li>• Lochinvar</li> <li>• Camus</li> <li>• ATH</li> <li>• Navien</li> <li>• Buderus GB Series</li> <li>• Allied SG, AAA &amp; Electric</li> <li>• IBC SL, VFC</li> <li>• Slant/Fin CHS</li> <li>• NTI Trinity &amp; Vmax</li> <li>• Raypak</li> <li>• RBI</li> <li>• Smith Boiler</li> </ul>	<ul style="list-style-type: none"> <li>• Honeywell AQ2000</li> <li>• Uponor CCN</li> <li>• Taco iWorx</li> <li>• HBX Controls</li> </ul>
<b>12K</b>	<ul style="list-style-type: none"> <li>• Peerless Purefire</li> <li>• IBC DC &amp; HC Series</li> <li>• Triangle Tube Prestige Solo &amp; ACVMax</li> <li>• HTP Elite</li> <li>• Allied HSE</li> <li>• Bosch Greenstar</li> <li>• Weil-McLain Ultra Series 3, Evergreen &amp; 97+</li> <li>• Slant/Fin Lynx</li> <li>• Slant/Fin Jaguar</li> </ul>	

## WAV-0110 with Optional External Sensor connected to THM-0100

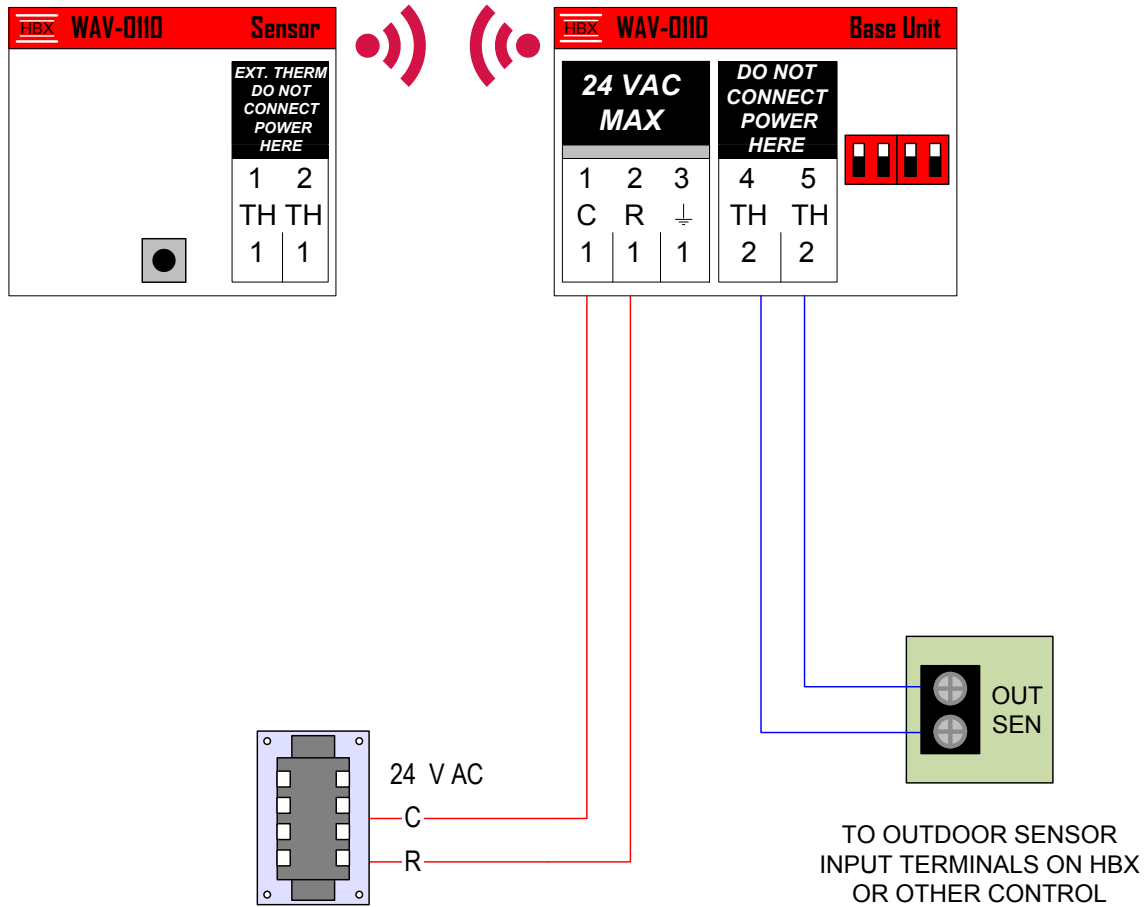
On the outdoor unit control board, there is an external thermistor input beside the pairing button. When not using an external sensor, the control will use a built in thermistor. When wiring an external sensor into this input, it will automatically alternate between the built-in board sensor to the external sensor.



## WAV-0110 connected to CPU-0550



## WAV-0110 connected to Other Control



**Limited Warranty**

HBX Controls warrants each of its products to be free from defects in workmanship and materials under normal use and service for a period of 24 months from date of manufacture or 12 months from date of purchase from an HBX Authorized Dealer, if within the above documented period after date of manufacture.

If the product proves to be defective within the applicable warranty period, HBX on its sole discretion will repair or replace said product. Replacement product may be new or refurbished of equivalent or better specifications, relative to the defective product. Replacement product need not be of identical design or model. Any repair or replacement product pursuant to this warranty shall be warranted for not less than 90 days from date of such repair, irrespective of any earlier expiration of original warranty period. When HBX provides replacement, the defective product becomes the property of HBX Controls.

Warranty Service, within the applicable warranty period, may be obtained by contacting your nearest HBX Controls office via the original Authorized Agent and requesting a Return Material Authorization Number (RMA #). Proof of purchase in the form a dated invoice/receipt must be provided to expedite the issuance of a Factory RMA.

After an RMA number has been issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit. The RMA number must be visible on the outside of the package and a copy included inside the package. The package must be mailed or otherwise shipped back to HBX with all costs of mailing/shipping/insurance prepaid by the warranty claimant.

Any package/s returned to HBX without an approved and visible RMA number will be rejected and shipped back to purchaser at purchaser's expense. HBX reserves the right, if deemed necessary, to charge a reasonable levy for costs incurred, additional to mailing or shipping costs.

**Limitation of Warranties.**

If the HBX product does not operate as warranted above the purchasers sole remedy shall be, at HBX's option, repair or replacement. The foregoing warranties and remedies are exclusive and in lieu of all other warranties, expressed or implied, either in fact or by operation of law, statutory or otherwise, including warranties of merchantability and fitness for a particular purpose/application. HBX neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale, installation maintenance or use of HBX Controls products.

HBX shall not be liable under this warranty; if its testing and examination discloses that the alleged defect in the product does not exist or was caused by the purchasers or third persons misuse, neglect, improper installation or testing, unauthorized attempts to repair or any other cause beyond the range of intended use, or by accident, fire, lightning or other hazard.

**Limitation of Liability.**

In no event will HBX be liable for any damages, including loss of data, loss of profits, costs of cover or other incidental, consequential or indirect damages arising out of the installation, maintenance, commissioning, performance, failure or interruption of an HBX product, however caused and on any theory of liability. This limitation will apply even if HBX has been advised of the possibility of such damage.

**Local Law.**

This limited warranty statement gives the purchaser specific legal rights. The purchaser may also have other rights which vary from state to state in the United States, from Province to Province in Canada and from Country to Country elsewhere in the world.

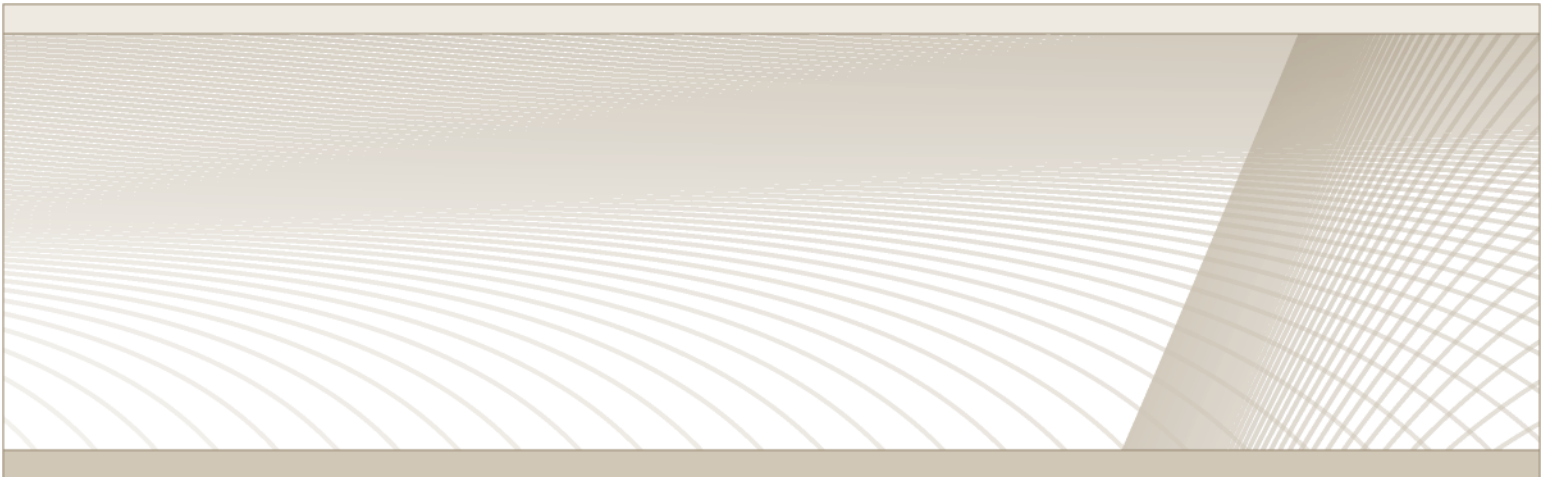
To the extent this Limited Warranty Statement is inconsistent with local law, this statement shall be deemed modified to be consistent with such local law. Under such local law, certain disclaimers and limitations of this statement may not apply to the purchaser. For example, some states in the United States, as well as some governments outside the United States (including Canadian Provinces), may: Preclude the disclaimers and limitations in this statement from limiting the statutory rights of a consumer (e.g. United Kingdom); Otherwise restrict the ability of a manufacturer to enforce such disclaimers or limitations; or Grant the purchaser additional warranty rights which the manufacturer cannot disclaim, or not allow limitations on the duration of implied warranties.





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