

# Installation & Operation Manual

## Wireless Outdoor Sensor 087



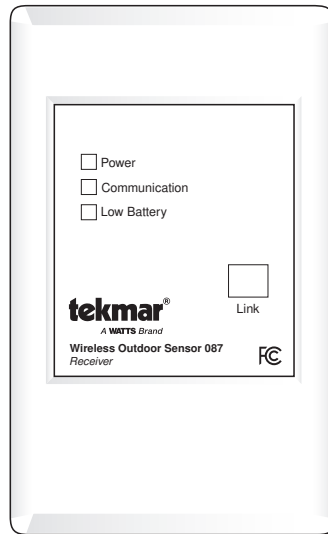
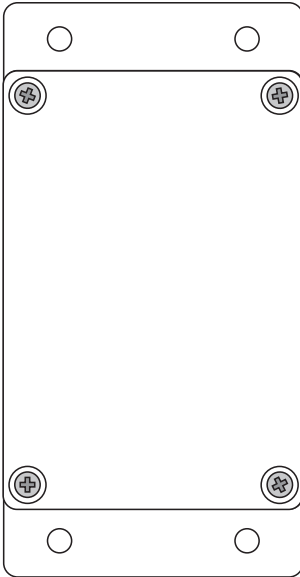
087\_D

08/16

Accessories Replaces: 06/16

## Introduction

The tekmar Wireless Outdoor Sensor 087 provides outdoor temperature measurement in any application without exterior wiring. The Transmitter and Receiver are sold pre-linked and are installation-ready. With exceptional range and a 10-year battery life, the Wireless Outdoor Sensor 087 provides maximum accuracy, convenience and reliability.



## Features

- Compatible with all tekmar controls and thermostats as well as other manufacturers products
- 10K (type 2 and 3), 5K, 12K and 20K resistance setting options
- Low Transmitter battery status indicator on the Receiver
- Power and communication indicator lights
- Transmitter temperature range of -40°F to 140°F (-40°C to 60°C)
- Long battery life (minimum 10 years) with included 1.5V lithium AA batteries
- 5000 ft. (1500 m) open range
- 8 walls / 250 ft. (75 m) indoor range
- Transmits outdoor temperature every 10 minutes.

**tekmar**<sup>®</sup>

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## FCC ID: 2AHQR-10850A IC ID: 21247-10850A

**FCC:** This product has been tested and found to comply with FCC part 15 subpart C. 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 of the device. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

**Warning:** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### Industry Canada

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 under Industry Canada regulations.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### Warning: FCC and IC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this equipment must be installed to provide a separation distance of at least 8 inches (20 cm) from all persons.

Cet équipement est conforme à l'exposition aux radiations de FCC et d'Industrie Canada établies pour un environnement non contrôlé. L'antenne (s) utilisé pour cet équipement doit être installé pour fournir une distance d'au moins 20 cm à partir de toutes les personnes.

## WARNING



It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. tekmar is not responsible for damages resulting from improper installation and/or maintenance.

### To avoid serious personal injury and damage to the equipment:



- Read Manual and all product labels BEFORE using the equipment. Do not use unless you know the safe and proper operation of this equipment.
- Keep this Manual available for easy access by all users.
- Replacement Manuals are available at [tekmarControls.com](http://tekmarControls.com)
- Disconnect all power before opening the control.
- Do not attempt to service the control. There are no user serviceable parts inside the control. Attempting to do so voids warranty.



## NOTICE

This symbol identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

This product is packaged with two AA lithium metal batteries and must be transported in accordance with all relevant and international regulations. Contact your freight company for more information. tekmar is not responsible for damages resulting from improper transportation, installation and/or maintenance. For detailed instructions refer to: <http://tekmarcontrols.com/support/lithium.html>

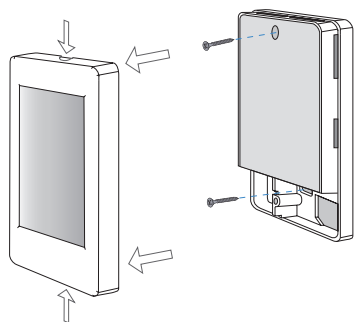
## Step 1 - Install Receiver

When choosing the location for the Receiver unit, consider the following:

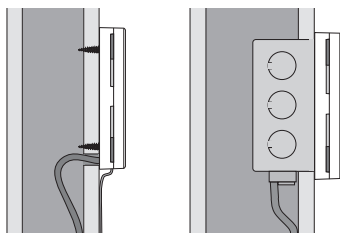
- Interior Wall.
- Keep dry. Avoid potential leakage onto the unit.
- Relative Humidity less than 90%. Non-condensing environment.
- No exposure to extreme temperatures beyond 32 to 122°F (0 - 50°C)
- Away from equipment, appliances, or other sources of electrical interference.
- Easy access for wiring
- Approximately 5 feet (1.5 m) off the finished floor.

### NOTICE

**DO NOT mount the Transmitter or Receiver in a metal enclosure, or on a surface with conductive properties. It will reduce the signal strength and affect the communication distance and reliability.**



Grasp the front cover by the fingertip grips on the top and bottom of the enclosure and pull the front cover off.



The enclosure is either mounted flush onto a wall or it can be placed onto a 2" x 4" non-conductive electrical box. The mounting holes in the enclosure accept #6 screws. Wiring to the control enters the wiring chamber through the back or bottom of the enclosure.

## Step 2 - Provide Power

### NOTICE

**A separate power supply is required for the Receiver when connecting to a 24 V (ac) powered control. Refer to Service Bulletin 094 for details on connecting to boilers.**

### 24 V (ac) Power to the Receiver unit

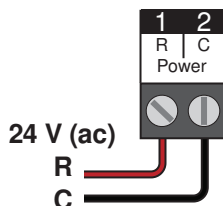
Connect the 24 V (ac) power supply to the R and C terminals (1 and 2) on the Receiver unit. Replace the cover.

*A loss of power to the Receiver will result in an open circuit output.*

### Batteries in the Transmitter unit

Remove the cover from the Transmitter unit. Insert the included batteries as marked on the battery holder.

**1.5V lithium batteries are required to provide the specified battery life and temperature range. Alkaline batteries have short life spans and may fail during cold weather.**

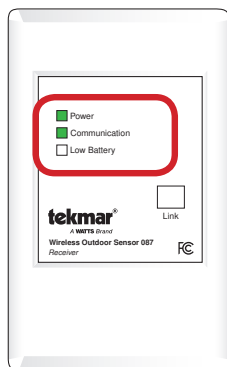
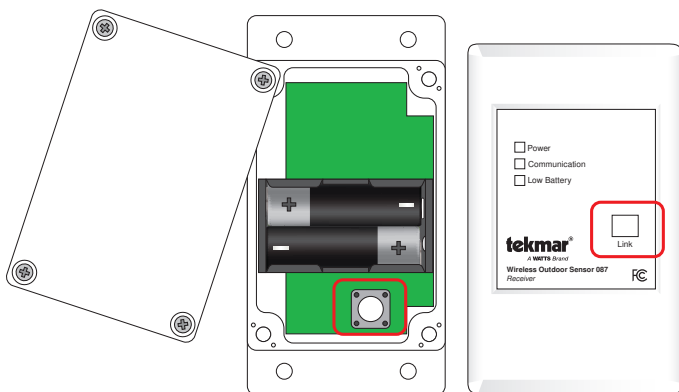


### Step 3 - Confirm Link

If the communication light is displayed on the control, the transmitter is linked properly.

If the light is not on, the devices will need to be linked.

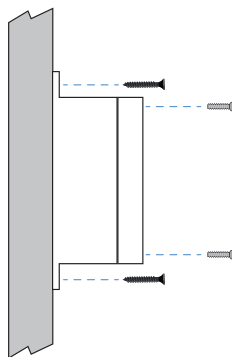
Remove the cover on the Transmitter so that the button below the battery terminals can be accessed. Press and hold both the button on the Transmitter and the button on the Receiver simultaneously for 5 seconds and release. Upon release, the linkup process will begin; the communication LED on the Receiver will flash 8 times. Linking is successful when the communication LED is steady on.



The Link button on the Receiver can also be used as a reset. If pushed, the Receiver will revert to a power-up condition; a temperature of 75°F (24°C) will be reported until the first transmission is received (up to 10 minutes).

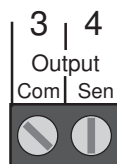
### Step 4 - Install Transmitter

- The Transmitter should be mounted on a northern exterior wall away from direct sunlight. 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.
- The 087 should not be exposed to heat sources such as ventilation or window openings.
- The 087 should be installed at an elevation above the ground that will prevent accidental damage or tampering.
- Do not install the Transmitter on a conductive surface.
- The Transmitter will send outdoor temperature data every 10 minutes.



## Step 5: Sensor Terminal Wiring

Connect 2-conductor wire between the control or device and the sensor terminals (3 and 4) on the Receiver. **This connection is polarity sensitive. Wire the sensor 'Com' terminal on the Receiver to the sensor 'Com' terminal on the control or boiler.** At power-up the Receiver will report a temperature of 75°F (24°C) until the first temperature transmission is received (up to 10 minutes). **Wait up to 10 minutes to verify that the temperature at the control is accurate.** If the temperature displayed at the control is unreasonably hot the wires may be reversed.



**To outdoor sensor terminals on tekmar or other manufacturers control**

## Loss of Communication Troubleshooting

If the Communication LED is not on, please try the following:

1. Confirm that the Receiver is powered with 24 V (ac) by observing that the green Power LED is on.
2. Locate the Transmitter. Remove the cover, and push the button located below the battery terminals. The LED will flash once to indicate transmission. Locate the Receiver, and see if the Communication LED is on. If it does not come on, it may be one of two problems:
  - The Transmitter may be out of range. Try moving the Transmitter closer to the Receiver. Push the transmission button inside the Transmitter and confirm that the communication LED turns green.
  - The battery life of the Transmitter batteries may have expired. This is likely the issue if the batteries have been in extended service. They can be replaced with 1.5V lithium batteries.
  - The link may have been interrupted. Try re-linking the devices, as described on page 4.
3. If the communication LED remains off for over 30 minutes, please call Customer Support at (250) 545-7749 or email [tekmar.customerservice@wattswater.com](mailto:tekmar.customerservice@wattswater.com).

## LED Operation

LED Indicator	Status	Description
Power	Green	Normal operation
	Off	No power. Check that the wires are securely connected to the device.
Communication	Green	Signal is good.
	Off	No signal. There is a loss of communication or the Transmitter battery is dead, resulting in an open circuit error on the control.
	Flashing	Signal is weak. Consider relocating a device to obtain a stronger signal.
Low Battery	Red	Battery life is low. Replace within 3 months.
	Off	Battery is good.

## Sensor Resistance Settings

DIP switches in the right side of the wiring chamber are configured to match the sensor requirements of the connected control. See below for equipment compatibility:

Setting	Boilers	Controls
5k	<ul style="list-style-type: none"> <li>Viessmann Vitodens-100W WB1B</li> </ul>	<ul style="list-style-type: none"> <li>Heat Timer (excl. EPU-CH)</li> </ul>
10k Type 2	<ul style="list-style-type: none"> <li>Laars Mascot</li> <li>Laars Neotherm</li> <li>Viessmann models after 2012 (incl. Vitodens 100W B1HA &amp; B1KA, 200 B2HA &amp; B2HB, 222 B2TA &amp; B2TB, Vitocrossal 300 CU3A)</li> <li>Lochinvar</li> <li>Allied SG, AAA and 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> <li>ATH</li> <li>Navien</li> <li>Camus</li> </ul>	<ul style="list-style-type: none"> <li>tekmar reset controls and thermostats</li> <li>Honeywell AQ2000</li> <li>Uponor CCN</li> </ul>
10k Type 3	<ul style="list-style-type: none"> <li>Buderus GB Series</li> </ul>	<ul style="list-style-type: none"> <li>Taco iWorx</li> </ul>
12k	<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>	
20k		<ul style="list-style-type: none"> <li>Honeywell Building Controls</li> </ul>

### 10K Type 2 NTC Thermistor (tekmar)



Resistance	Temperature
336095	-40°F (-40°C)
242426	-31°F (-35°C)
176801	-22°F (-30°C)
130307	-13°F (-25°C)
97007	-4°F (-20°C)
72910	5°F (-15°C)
55303	14°F (-10°C)

Resistance	Temperature
42316	23°F (-5°C)
32651	32°F (0°C)
25395	41°F (5°C)
19903	50°F (10°C)
15714	59°F (15°C)
12493	68°F (20°C)
10000	77°F (25°C)

Resistance	Temperature
8056	86°F (30°C)
6530	95°F (35°C)
5325	104°F (40°C)
4367	113°F (45°C)
3601	122°F (50°C)
2985	131°F (55°C)
2487	140°F (60°C)

### 10K Type 3 NTC Thermistor



Resistance	Temperature
239686	-40°F (-40°C)
179200	-31°F (-35°C)
135185	-22°F (-30°C)
102861	-13°F (-25°C)
78913	-4°F (-20°C)
61020	5°F (-15°C)
47543	14°F (-10°C)

Resistance	Temperature
37313	23°F (-5°C)
29490	32°F (0°C)
23457	41°F (5°C)
18780	50°F (10°C)
15130	59°F (15°C)
12263	68°F (20°C)
10000	77°F (25°C)

Resistance	Temperature
8194	86°F (30°C)
6752	95°F (35°C)
5592	104°F (40°C)
4655	113°F (45°C)
3893	122°F (50°C)
3271	131°F (55°C)
2760	140°F (60°C)

## 5K NTC Thermistor

ON



Resistance	Temperature
168243	-40°F (-40°C)
121342	-31°F (-35°C)
88487	-22°F (-30°C)
65210	-13°F (-25°C)
48540	-4°F (-20°C)
36479	5°F (-15°C)
27666	14°F (-10°C)

Resistance	Temperature
21166	23°F (-5°C)
16325	32°F (0°C)
12698	41°F (5°C)
9952	50°F (10°C)
7857	59°F (15°C)
6247	68°F (20°C)
5000	77°F (25°C)

Resistance	Temperature
4028	86°F (30°C)
3265	95°F (35°C)
2663	104°F (40°C)
2184	113°F (45°C)
1801	122°F (50°C)
1493	131°F (55°C)
1244	140°F (60°C)

## 12K NTC Thermistor

ON



Resistance	Temperature
309396	-40°F (-40°C)
229504	-31°F (-35°C)
171839	-22°F (-30°C)
129824	-13°F (-25°C)
98932	-4°F (-20°C)
76018	5°F (-15°C)
58878	14°F (-10°C)

Resistance	Temperature
45953	23°F (-5°C)
36129	32°F (0°C)
28606	41°F (5°C)
22804	50°F (10°C)
18297	59°F (15°C)
14773	68°F (20°C)
12000	77°F (25°C)

Resistance	Temperature
9803	86°F (30°C)
8053	95°F (35°C)
6651	104°F (40°C)
5522	113°F (45°C)
4607	122°F (50°C)
3862	131°F (55°C)
3252	140°F (60°C)

## 20K NTC Thermistor

ON



Resistance	Temperature
806800	-40°F (-40°C)
574400	-31°F (-35°C)
413400	-22°F (-30°C)
300400	-13°F (-25°C)
220600	-4°F (-20°C)
163500	5°F (-15°C)
162280	14°F (-10°C)

Resistance	Temperature
92240	23°F (-5°C)
70160	32°F (0°C)
53780	41°F (5°C)
41560	50°F (10°C)
32340	59°F (15°C)
25360	68°F (20°C)
20000	77°F (25°C)

Resistance	Temperature
15892	86°F (30°C)
12704	95°F (35°C)
10216	104°F (40°C)
8264	113°F (45°C)
7220	122°F (50°C)
5498	131°F (55°C)
4520	140°F (60°C)

## Technical Data

Wireless Outdoor Sensor 087	
Literature	087_D, 087_C
Dimensions	Transmitter: 5–3/16" H x 2–3/4" W x 2" D (132 x 70 x 50 mm) Receiver: 4–3/4" H x 2–7/8" W x 7/8" D (120 x 74 x 23 mm)
Enclosure	Transmitter: White ABS plastic, NEMA 4X Receiver: White PVC plastic, NEMA Type 1
Packaged Weight	0.92 lb. (420g)
Sensor	NTC thermistor 5K, 10K Type 2, 10K Type 3, 12K and 20K
Approvals	FCC and IC
Operating range	Transmitter: -40 to 140°F (-40 to 60°C) Receiver: Indoor use only, 32 to 122°F (0 to 50°C), RH ≤90% non-condensing
Receiver power	24 V (ac) +/- 10%, 1 VA

## Limited Warranty and Product Return Procedure

**Limited Warranty** *The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product ("Product"), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.*

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer's pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar's instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar's sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and / or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser's agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser's sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar's instructions and / or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar's instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

**Product Warranty Return Procedure** All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser's customers, regarding a potential warranty claim, tekmar's sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.

**WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.  
**For more information: [Watts.com/prop65](http://Watts.com/prop65)**

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All specifications are subject to change without notice

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