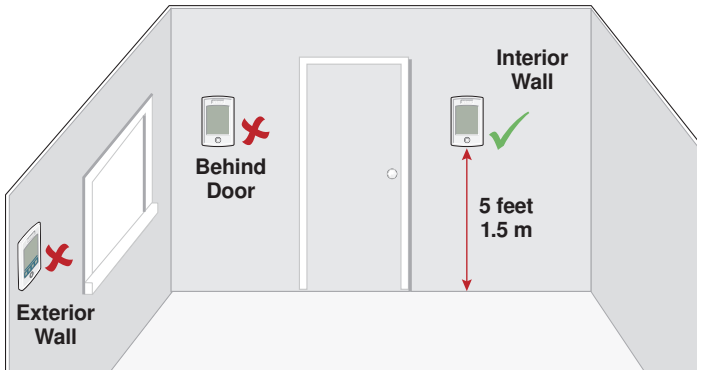
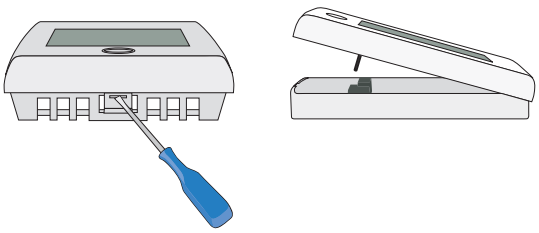
Quick Set-up Guide

Snow Melting Control PM-653

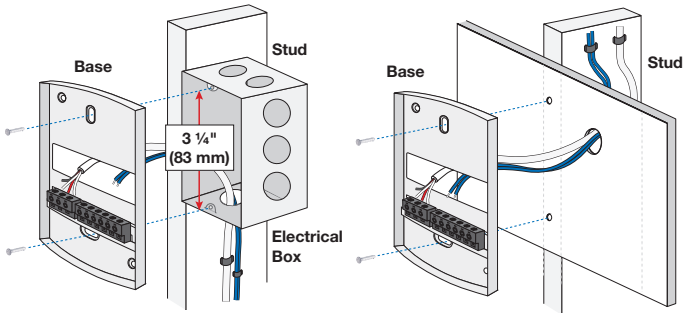
1. Location



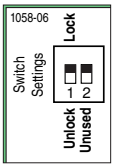
2. Remove Mounting Base



3. Install Mounting Base



4. Switch Settings

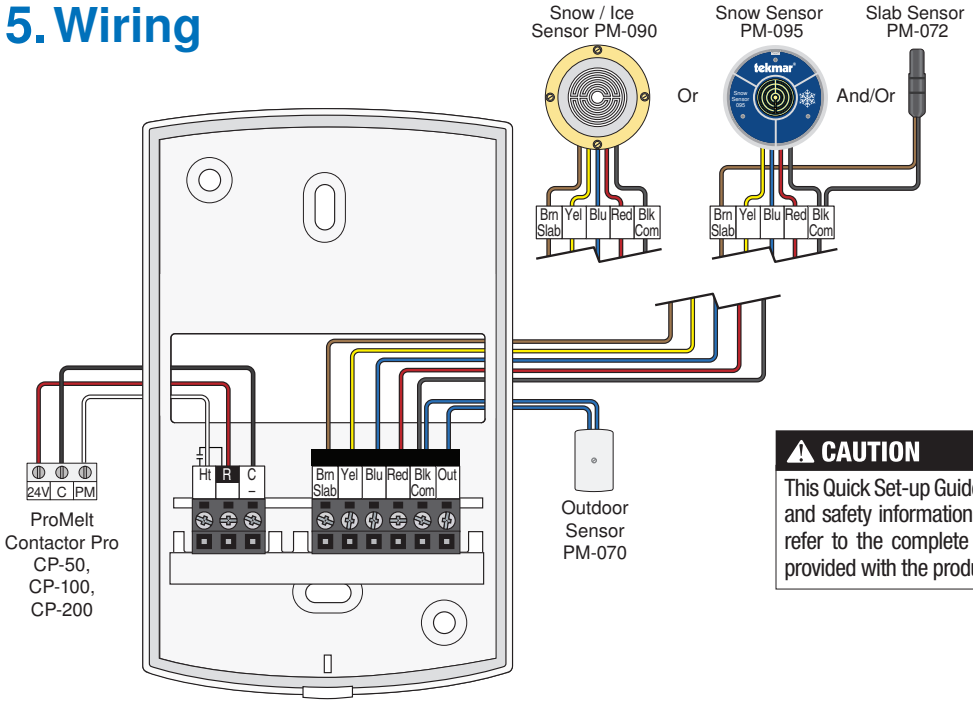


Back of Control

LOCK ACCESS LEVEL
The control is locked and the access level cannot be changed. Set to Lock when installation has been completed.

UNLOCK ACCESS LEVEL
The control is unlocked and the access level may be changed. Go to the Toolbox menu to change the access level. Set to Unlock during the installation process.

5. Wiring

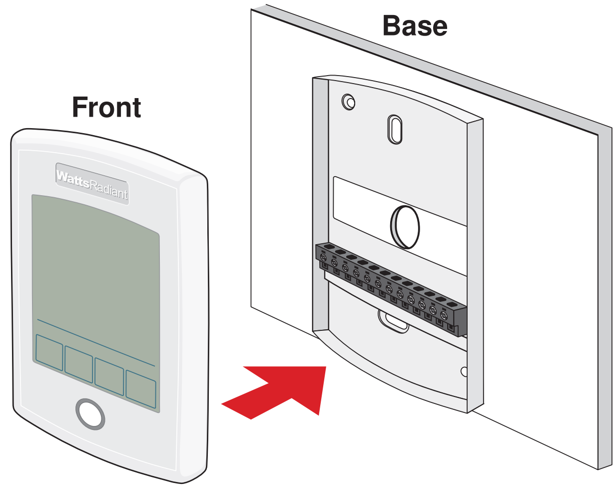


⚠ CAUTION

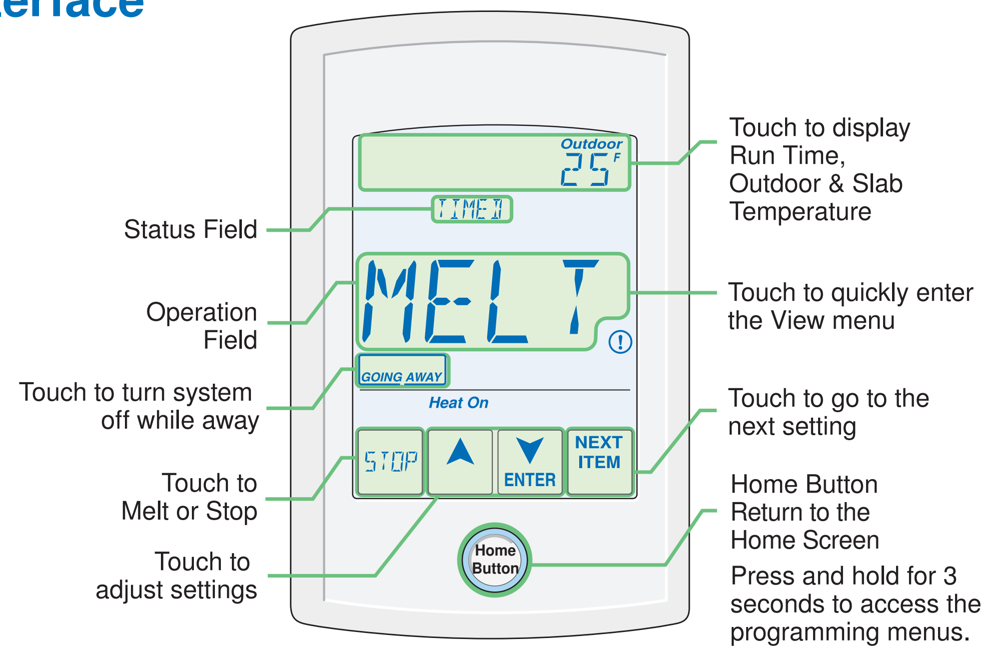
This Quick Set-up Guide is not intended to provide full installation instructions and safety information. In order to avoid property damage or injury, please refer to the complete installation manual and product safety information provided with the product.

SunTouch® electric floor heating & snow melting

6. Install the Control



7. User Interface



8. Critical Settings

The System Menu provides settings on how to configure and operate the mechanical equipment.

Item Field	Description
SNOW/ICE SENSOR	**SNOW / ICE SENSOR** Select if a Snow / Ice Sensor PM-090, or Snow Sensor PM-095 is installed. Default = 090
SLAB SENSOR	**SLAB SENSOR** Select if a Slab Sensor PM-072 is installed to measure the slab temperature. Default = ON
MAX MELT DAYS	**MAXIMUM MELT TIME** Select to limit the amount of melting run time. Default = 3.0 days

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SunTouch®
electric floor heating & snow melting

A Watts Water Technologies Company

tekmar®
Snow Sensor 095

095_D
05/13

Snow Melting | Replaces: New

Installation & Operation Manual

Introduction

The Snow Sensor 095 is an aerial mounted sensor that detects falling snow and allows a tekmar Snow Melting Control 653 or 654 to automatically start the snow melting equipment. System stop is provided by the control's timer or by manual disable. The 095 mounts to a nominal 1/2" (16 mm) metal or PVC conduit or pole. The 095 is well suited for adding automatic start to an existing snow melt system.

For use with tekmar Snow Melting Control type: 653 or 654

Installation

Caution

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death. It is the installer's responsibility to ensure that this control is safely installed according to all applicable codes and standards. Please follow these step-by-step instructions to gain a full understanding of this device.

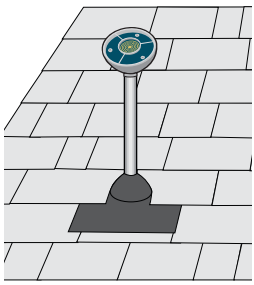
Step 1 - Check the Contents

Check the contents of this package. If any of the contents listed are missing or damaged, please refer to the Limited Warranty and Product Return Procedure on the back of this brochure and contact your wholesaler or tekmar sales representative for assistance.

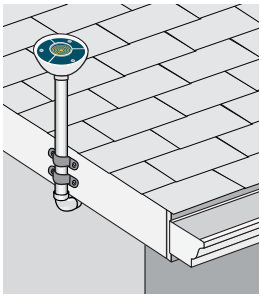
Type 095 includes • One Snow Sensor 095 • One Installation and Operation Manual 095_D.

Step 2 - Choosing a Location for the Sensor

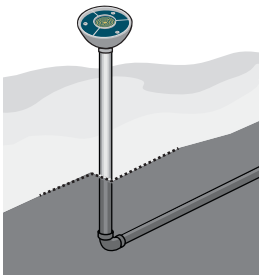
The sensor should be installed outside on a nominal 1/2" (16 mm) PVC or rigid metal conduit pole either on a roof or to the side of the snow melting surface. The sensor must be located away from trees, building overhangs or other locations that may interfere with falling snow. Avoid installing in locations where the sensor may be vandalized. It is best to point the front face of the sensor in the direction of any prevailing wind.



Roof Mounted
Ensure water-proof installation with flashing boot or similar method



Roof Mounted
Conduit fastened to fascia board



Ground Mounted
Conduit run under-ground with a pole above surface

Step 3 - Rough In Wiring

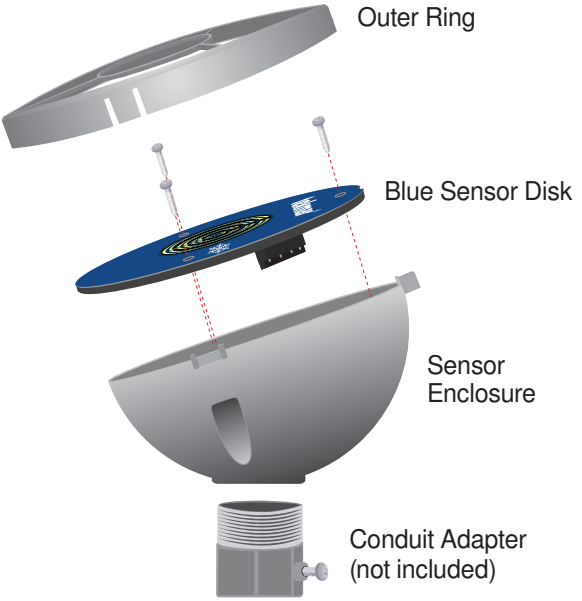
Install a nominal 1/2" (16 mm) PVC or metal conduit from the tekmar Snow Melting Control to the chosen sensor location. Pull 4 conductor 18 AWG wire from the sensor location to the control location through the conduit. The maximum wire length between the sensor and the control is 500' (150 m).

If using PVC conduit, do not run the wires parallel to telephone or power lines. If the sensor wires are located in an area with strong sources of electromagnetic noise, shielded cable or twisted pair should be used. If using shielded cable, one end of the shield wire should be connected to the Com terminal on the Snow Melting Control and the other end should remain free. The shield must not be connected to earth ground.

Step 4 - Disassembly

1. Remove the outer ring by pulling up on the three catches.
2. Remove the three screws.
3. Remove the blue sensor disk from the sensor enclosure.

Avoid scratching any part of the surface of the blue sensor disk. Scratches will result in corrosion not covered by warranty.



Step 5 - Painting the Sensor

The sensor enclosure is made of an off-white plastic material that is UV stable. The plastic enclosure may be spray painted to match the color of the building. **Do not paint the blue sensor disk as this will damage the sensor.**

Step 6 - Mounting

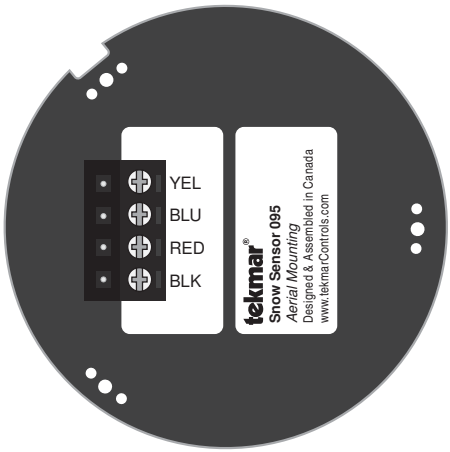
The conduit pole can be either PVC plastic or rigid metal. The conduit pole should be mounted plumb using a level.

- When using PVC plastic conduit a nominal 1/2” (16mm) PVC male terminal adapter with locknut is recommended.
- When using rigid metal, a nominal 1/2” (16mm) rigid metal conduit adapter with set screw is recommended.

1. Pull the 4 conductor wire through the conduit.
2. Install the sensor body with conduit adapter to the conduit. For PVC conduit use PVC cement adhesive. For rigid metal conduit, tighten the set screw until the conduit adapter is firmly attached to the conduit.
3. Fish the 4 conductor wire though the sensor body and place on top of the conduit adapter. Point the sensor body towards the prevailing wind direction, if any. Thread the locknut onto the conduit adapter and screw until tight.

Step 7 - Wiring

Remove the wiring terminal block by pulling up from the blue sensor disk. Connect the 4 conductor wire to the yellow (YEL), blue (BLU), red (RED) and black (BLK) wiring terminations. If the installed 4 conductor cable uses a different color code, then make a note of the wire color versus the wiring terminal color names. Push the wiring terminal plug onto the pins of the blue sensor disk. At the Snow Melting Control location, connect the corresponding wires to the yellow, blue, red and black wire terminations.



Step 8 - Assembly

1. Align the blue sensor disk tekmar logo with the highest point of the sensor enclosure body. The blue sensor disk has a notch that ensures the sensor is installed in the correct position.
2. Insert the three screws into the holes and screw them until tight. Do not over tighten.
3. Align the three notches of the outer ring with the sensor body and push down until each of the three corners have snapped on tight.

Maintenance

The sensor is installed in a harsh environment. Accumulation of dirt on the surface of the sensor may affect snow detection. The sensor should be checked on a periodic basis and, when necessary, cleaned.

1. Remove the outer ring by pulling up on the three catches.
2. A cloth with warm soapy water can be used to clean any dirt.
3. Rinse with water.
4. Align the three notches of the outer ring with the sensor body and push down until each of the three corners have snapped on tight.

Testing and Troubleshooting

If the Snow Melt Control shows an error message describing a sensor failure, perform the following test procedure:

- The 4 conductor wires at the sensor should be disconnected (unplug wiring terminal plug).
- Use a good quality electrical testing meter with an ohm scale range of 0 to 2,000,000 Ohms.

Using the ohmmeter and standard testing practices, measure the resistance between:

1. The yellow (YEL) and black (BLK) wiring terminals to measure a 10 kΩ sensor and use the Temperature vs. Resistance Table to calculate the approximate temperature reading. Measure the surface temperature of the 095 blue sensor disk and compare versus the yellow to black temperature reading.
2. Measure the resistance between the blue (BLU) and black (BLK) wiring terminals. When the sensor surface is clean and dry, the reading should be 2,000,000 Ohms. When the sensor surface is wet it should be between 10,000 and 300,000 Ohms.
3. Measure the resistance between the red (RED) and black (BLK) wiring terminals This reading should be between 45 to 47 Ohms.

If resistance readings are outside of the normal operating range, the sensor has failed. The blue sensor disk can be replaced with the part number M3065 “Replacement Kit for Snow Sensor 095”.

Temperature vs. Resistance Table

Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	90	32	7,334
-45	-43	405,710	95	35	6,532
-40	-40	336,606	100	38	5,828
-35	-37	280,279	105	41	5,210
-30	-34	234,196	110	43	4,665
-25	-32	196,358	115	46	4,184
-20	-29	165,180	120	49	3,760
-15	-26	139,402	125	52	3,383
-10	-23	118,018	130	54	3,050
-5	-21	100,221	135	57	2,754
0	-18	85,362	140	60	2,490
5	-15	72,918	145	63	2,255
10	-12	62,465	150	66	2,045
15	-9	53,658	155	68	1,857
20	-7	46,218	160	71	1,689
25	-4	39,913	165	74	1,538
30	-1	34,558	170	77	1,403
35	2	29,996	175	79	1,281
40	4	26,099	180	82	1,172
45	7	22,763	185	85	1,073
50	10	19,900	190	88	983
55	13	17,436	195	91	903
60	16	15,311	200	93	829
65	18	13,474	205	96	763
70	21	11,883	210	99	703
75	24	10,501	215	102	648
80	27	9,299	220	104	598
85	29	8,250	225	107	553

Technical Data

Snow Sensor 095 *Aerial Mounting*	
Literature	095_C, 095_D
Packaged weight	0.4 lbs (180 g)
Dimensions	1-15/16” H x 3-5/32” O.D. (50 H x 80 O.D. mm)
Enclosure	White PVC plastic, UV stable, NEMA type 1
Operating range	-40 to 122°F (-40 to 50°C)
Compatible equipment	tekmar Snow Melting Control 653, 654

SPECIAL REQUIREMENTS
This sensor must be used with a tekmar Snow Melting Control 653 or 654.

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.

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WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. For more information: www.watts.com/prop65

Installation & Operation Manual

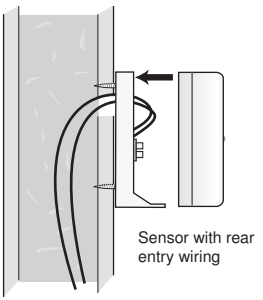
The Outdoor Sensor 070 provides accurate measurement of the outdoor air temperature. Many controls and thermostats can connect to the 070 to measure and display the outdoor temperature.

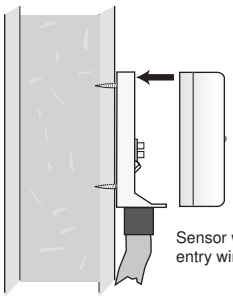
Installation - Outdoor Sensor 070

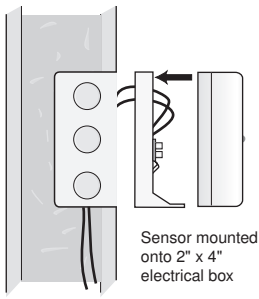
STEP ONE — MOUNTING THE SENSOR

NOTE: The temperature sensor (thermistor) is built into the 070 enclosure.

- Remove the screw and pull the front cover off the sensor enclosure.
- The 070 can either be mounted directly onto a wall or a 2” x 4” electrical box. When the 070 is wall mounted, the wiring should enter through the back or bottom of the enclosure. Do not mount the 070 with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor.
- 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 070 should be mounted on a wall which best represents the heat load on the building (a northern wall for most buildings and a southern facing wall for buildings with large south facing glass areas). The 070 should not be exposed to heat sources such as ventilation or window openings.
- The 070 should be installed at an elevation above the ground that will prevent accidental damage or tampering.

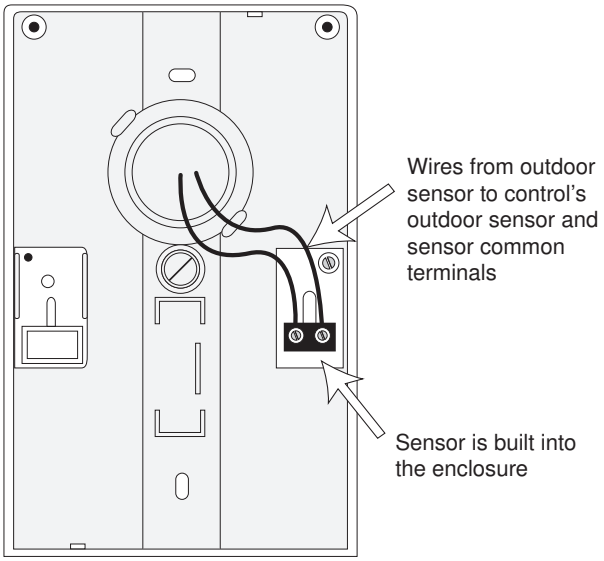

Sensor with rear entry wiring


Sensor with bottom entry wiring


Sensor mounted onto 2" x 4" electrical box

STEP TWO — WIRING AND TESTING THE SENSOR

- Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the 070 to the control. Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground.
- Follow the sensor testing instruction in this brochure and connect the wires to the control.
- Replace the front cover of the sensor enclosure.



Sensor Testing Instructions

A good quality test meter capable of measuring up to 5,000 kΩ (1 kΩ = 1000Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with either a good quality digital thermometer, or if a thermometer is not available, a second sensor can be placed alongside the one to be tested and the readings compared.

First measure the temperature using the thermometer and then measure the resistance of the sensor at the control. The wires from the sensor must not be connected to the control while the test is performed. Using the chart on the following page, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location.

Do not apply voltage to a sensor at any time as damage to the sensor may result.

Resistance Table

Temperature		Resistance
°F	°C	Ω
-50	-46	490,813
-45	-43	405,710
-40	-40	336,606
-35	-37	280,279
-30	-34	234,196
-25	-32	196,358
-20	-29	165,180
-15	-26	139,402
-10	-23	118,018
-5	-21	100,221
0	-18	85,362
5	-15	72,918
10	-12	62,465
15	-9	53,658
20	-7	46,218
25	-4	39,913
30	-1	34,558
35	2	29,996
40	4	26,099

Temperature		Resistance
°F	°C	Ω
45	7	22,763
50	10	19,900
55	13	17,436
60	16	15,311
65	18	13,474
70	21	11,883
75	24	10,501
80	27	9,299
85	29	8,250
90	32	7,334
95	35	6,532
100	38	5,828
105	41	5,210
110	43	4,665
115	46	4,184
120	49	3,760
125	52	3,383
130	54	3,050
135	57	2,754

Temperature		Resistance
°F	°C	Ω
140	60	2,490
145	63	2,255
150	66	2,045
155	68	1,857
160	71	1,689
165	74	1,538
170	77	1,403
175	79	1,281
180	82	1,172
185	85	1,073
190	88	983
195	91	903
200	93	829
205	96	763
210	99	703
215	102	648
220	104	598
225	107	553

Technical Data

Outdoor Sensor 070	
Literature	070_D, 070_C
Packaged weight	0.4 lb. (180 g)
Dimensions	4-1/2” H x 2-7/8” W x 1-1/2” D (73 x 114 x 38 mm)
Enclosure	White PVC plastic, NEMA type 2
Approvals	CSA C US
Operating range	-60 to 140°F (-51 to 60°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892

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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.

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