THERMOSTAT INSTALLATION

INSTALLATION INSTRUCTIONS FOR DIGITAL THERMOSTAT #5110740

PREPARATION: This is a Low Voltage Thermostat. Before installing this thermostat, verify that the system is a low voltage heating system. If necessary, check with your local dealer.

NOTE: Leave these instructions with the homeowner for future reference.

- Find a location about 5 ft above the floor that has a constant temperature, and is not subject to big swings in temperature. Avoid mounting close to; oven, fireplace, outside door, air conditioning register, TV, or full sun.
- WARNING!!! Turn off the main power switch before installing the thermostat.
- Release the front cover by pressing the tab on the top of the front cover with a screwdriver (see figure 1).
- Remove the front cover with your hand holding both sides of the cover (see figure 2).
- Remove the terminal cover to get access to the terminals by pushing a small flat screwdriver into the gap from the front and push the tab toward the center to open the cover.
  Pull the cover straight up (see figure 3).
- Route the wires through the cutout in the base and mount the thermostat to the wall with two screws (see figure 4).
- Install the thermostat wire as necessary following the guide in Fig. 5. And tighten the screws.
  - For heating applications, use terminals #1 & #5
- Install the two AAA batteries as shown in Fig. 5.
- Replace the terminal cover. Replace the front cover onto the base.
- Turn on power to the system for operation.


Fig. 1


Fig. 2


Fig. 3


Fig. 4

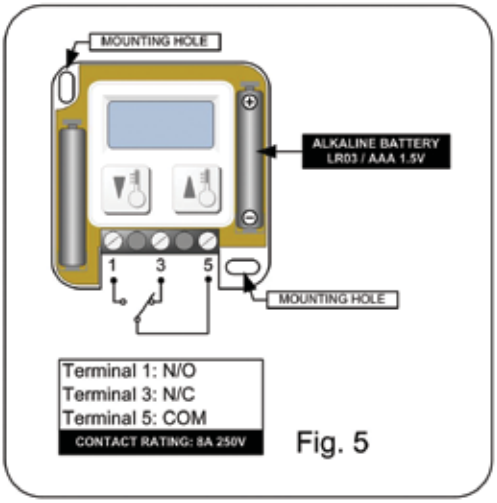
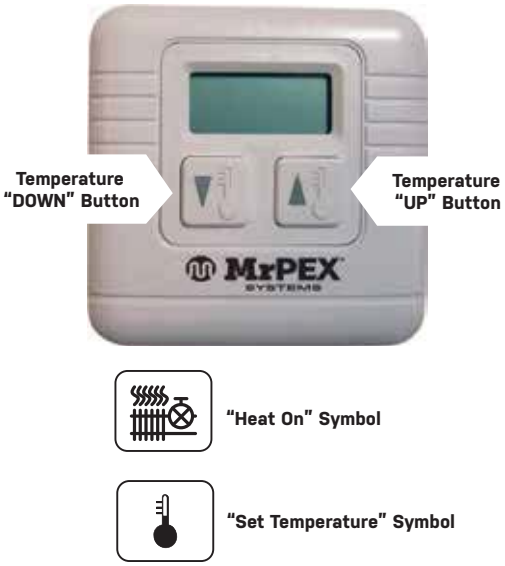


Fig. 5

NOTE: See pages 104–105 for electrical sample schematics..

TESTING THE OPERATION

- Start by briefly pressing either the "UP" or "DOWN" button. The set⊠point temperature will start flashing with "Heat On" and "temperature set" symbols.
- While still flashing, push the "UP" or "DOWN" buttons to set the temperature at least 2 degrees above current ambient temperature. Each push of the button moves the set-point 1 degree F. Wait 15 seconds until the display stops flashing. The "Heat On" symbol should now stay on and a faint click should be heard indicating that the heat⊠demand relay has engaged. If this does not occur, wait for another 3 minutes. It is possible that the thermostat is in "Short cycle elimination mode". This means that if the set⊠point is changed more than once within a 3 minute period, the thermostat will wait another 3 minutes to make sure that any appliance that is connected will not short cycle. If the thermostat still does not engage "Heat On" mode. Check wiring to make sure both the thermostat and associated wiring is connected correctly.



NOTE: If the LCD changes from displaying the ambient temperature to "Lo", install new AAA size alkaline batteries.

INSTALLATION INSTRUCTIONS FOR DIGITAL THERMOSTAT #5110519

BEFORE YOU START

CAUTION:
Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. This electronic control is not intended for use as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit.

ABOUT YOUR THERMOSTAT

The Radiant Thermostat 519 accurately controls the room and/or floor temperature for a hydronic heating zone using Pulse Width Modulation (PWM) technology. Simple up and down buttons and a display with large type make this thermostat easy to read and use. A Slab Sensor 5110079 is included to measure floor temperature to protect the floor from overheating and enhance comfort. This easy to install thermostat is a direct replacement for the tekmar Thermostat 509.

Tools Required

- Jeweller screwdriver
- Phillips head screwdriver
- Wire Stripper

Materials Required

- 18 AWG LVT Solid Wire (Low Voltage Connections)

INSTALLATION LOCATION

Choose the placement of the thermostats early in the construction process to enable proper wiring during rough-in.

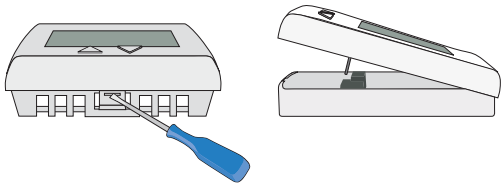
Consider the following:

- Interior Wall.
- Keep dry. Avoid potential leakage onto the control.
- Relative Humidity less than 90%. Non-condensing environment.
- No exposure to extreme temperatures beyond 32-122°F (0-50°C).
- No draft, direct sun, or other cause for inaccurate temperature readings.
- Away from equipment, appliances, or other sources of electrical interference.
- Easy access for wiring, viewing, and adjusting the display screen.
- Approximately 5 feet (1.5 m) off the finished floor.
- The maximum length of wire is 500 feet (150 m).
- Strip wire to 3/8" (10 mm) for all terminal connections.
- Use standard 4 conductor, 18 AWG wire.

REMOVING THE THERMOSTAT BASE

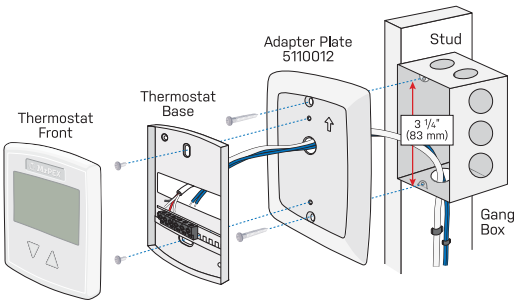
To remove the thermostat base:

- Locate the tab on the bottom of the thermostat.
- Push the tab with either your thumb or with a screwdriver.
- Lift the thermostat front away from the thermostat's base.



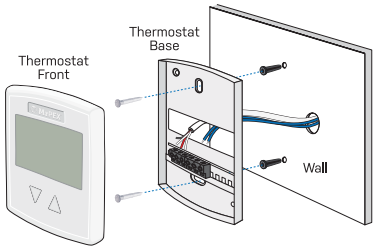
If a single gang box is used:

- Adapter Plate 5110012 is required (sold separately).
- Feed the wiring through the hole in the adaptor plate and the thermostat base.
- Fasten the adaptor plate to the gang box.
- Fasten the base of the thermostat to the adaptor plate.
- Terminate wiring to the wiring strip.
- Push the thermostat front onto the thermostat base.



If mounting directly to the wall:

- Drill holes and install the wall anchors.
- Feed the wiring through the large hole in the thermostat base.
- Fasten the thermostat base to the wall using the wood screws to the wall anchors.
- Terminate wiring to the wiring strip.
- Push the thermostat front onto the thermostat base.



NEW SLAB SENSOR 5110079 INSTALLATION

Thin-Set or Thin-Pour Applications

If the floor covering is to be installed over either a thin-set or thin-pour material of sufficient depth, the 5110079 slab sensor can be placed directly into either the thin-set material or the thin-pour material and covered over. Ensure that the sensor is located in such a position that the attached wire is able to reach to a suitable junction location. Splices within the thin-set or thinpour should be avoided to ensure trouble free operation. The sensor should be located mid way between the heating elements to ensure a proper temperature reading.

Thin Floor Coverings (less than 3/8" (10 mm))

If a thin floor covering is to be installed directly to the subfloor, a groove 1/8" (4 mm) wide by 1/16" (2 mm) deep can be cut into the surface of the subfloor to accommodate the wire for the sensor. Ensure that the sensor is located in such a position that the attached wire is able to reach to a suitable junction location. Splices under the floor covering should be avoided to ensure trouble free operation. A groove 3/16" (5 mm) wide by 3/16" (5 mm) deep by 1-3/4" (45 mm) long should be cut to accommodate the sensor. The sensor should be located mid way between the heating elements to ensure a proper temperature reading

Thick Floor Coverings (greater than 3/8" (10 mm))

If a thick floor covering is to be installed directly to the subfloor, a groove 1/8" (4 mm) wide by 1/16" (2 mm) deep can be cut into the back of the flooring material to accommodate the wire for the sensor. Ensure that the sensor is located in such a position that the attached wire is able to reach to a suitable junction location. Splices under the floor covering should be avoided to ensure trouble free operation. A groove 3/16" (5 mm) wide by 3/16" (5 mm) deep by 1-3/4" (45 mm) long should be cut to accommodate the sensor. The sensor should be located mid way between the heating elements to ensure a proper temperature reading.

NOTE: If it isn't practical to cut a groove in the surface covering, follow the method used for thin floor coverings.

RETROFIT SLAB SENSOR 5110079 INSTALLATION

Tile Floor Coverings

If a Slab Sensor 5110079 is to be installed into an existing tile floor with sufficiently large grout lines, the sensor and wire can be installed in one of the grout lines between the tiles. Select a low traffic area of the floor that is mid way between the heating elements for the sensor location. Ensure that the sensor is located in such a position that the attached wire is able to reach to a suitable junction location. Splices within the grout should be avoided to ensure trouble free operation. Remove the appropriate grout line and place the sensor and wire in the floor. Re-grout the area.

Installing the Sensor to the Bottom of a Subfloor

If the sensor is to be installed to the bottom of a subfloor, cut a piece of 1" (25 mm) thick rigid insulation into a 6" (150 mm) by 6" (150 mm) square. A groove 3/16" (5 mm) wide by 3/16" (5 mm) deep by 1-3/4" (45 mm) long should be cut into the insulation to accommodate the sensor. Place the sensor in the groove and sandwich the sensor between the insulation and the subfloor. Use a suitable fastening method to affix the insulation to the subfloor.

SLAB SENSOR 5110079 WIRING

Caution: Do not run sensor wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference, shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit.

The Slab Sensor 5110079 is supplied with 10' (3 m) of cable. If a longer length is required, 24 AWG or larger wire can be spliced onto the two wires from the sensor. The splices should be properly soldered and protected in an accessible junction box. Follow the sensor testing instructions given in this brochure and then connect the wires to the control.

SLAB SENSOR 5110079 TESTING

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 room temperature using the thermometer. Disconnect the Sen and Com wires from the thermostat. Using an electrical meter, measure the resistance of the Sen and Com wires at the thermostat location. Using the temperature versus resistance table, estimate the temperature measured by the sensor. The sensor measurement 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. Once the test has been completed, reconnect the Sen and Com wires to the thermostat. Do not apply voltage to the temperature sensor terminals at any time as damage to the sensor may result.

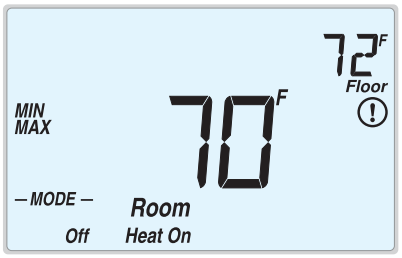
Temperature vs. Resistance Table

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
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

TEMPERATURE		RESISTANCE
°F	°C	Ω
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
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

USER INTERFACE

Home Screen



Heat On	Heat is turned on.
— MODE — Off	The heating system is off.
!	Indicates an error is present.
MIN	The floor is at or below the floor minimum temperature.
MAX	The floor has reached the floor maximum temperature.

SEQUENCE OF OPERATION

Heating Operation

To change the heat temperature setting, push the △ or ▽ button to select a preferred temperature setting. The Heat On symbol is shown on the display when the thermostat is heating. The heat can cycle on and off within +/- 1.5°F (1°C) of the temperature setting.

The floor and air heating can be shut off by holding ▽ the button until Set Room is Off.

To resume heating when the Mode is Off, press the △ button to navigate to the Mode setting, then press the △ button to select Mode Heat. The thermostat will resume heating at the last previously set temperature.

Air Temperature Only

If there is only an air temperature sensor (no floor sensor), the thermostat operates to control your desired air temperature.

Floor Temperature Only

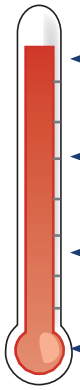
If the air sensor has been disabled, the thermostat will only maintain floor temperature and ignore air temperature. This operation is recommended for areas such as bathrooms to ensure that tile floors are warm to the touch.

Floor and Air Temperature

If the air sensor is turned on and a floor sensor is connected, the thermostat will maintain the desired air temperature as well as a minimum floor temperature.

This operation is recommended for areas with large windows that allow the sun to shine into a room and keep it warm without the need for heat. This can allow the floors to cool off during the afternoon. When the sun goes down, it can take a long time for the floors to get warm again. This may cause the room to cool off too much in the early evening. A floor minimum setting can help with this condition by maintaining a floor minimum temperature. Keep in mind the floor minimum temperature will override the air temperature, and if set too high, may overheat the room.

This operation is also recommended for rooms with hardwood floors. Setting floor minimum and maximum temperatures is a way of enhancing the comfort of the living space while protecting floor coverings.



90°F (32°C)
Feels hot to the touch
« Suggested maximum for all floor types other than wood.

80 to 85°F (26 to 30°C)
Feels warm to the touch
« Bathrooms and kitchens. Suggested maximum for wood floors.

70°F (21°C)
Feels cool to the touch
« Rooms with large windows preventing under heating in the evening.

40 to 45°F (5 to 7°C)
Feels cold to the touch
« Freeze protection for garages.

PROGRAMMABLE SETTINGS

SETTING	DISPLAY
User settings. Press the △ and ▽ buttons together for 3 seconds to enter and advance to the next setting.	
MODE Select heat or off.	MODE HEAT
Range: HEAT, OFF	Default: HEAT
UNITS Select the temperature units.	UNITS F
Range: °F or °C	Default: °F
LIGHT Select when the display back light should operate. Auto operates the backlight for 30 seconds after a keystroke.	LIGHT AUTO
Range: OFF, AUTO, ON	Default: AUTO
SET FLOOR Set the floor minimum temperature. Available when an auxiliary floor sensor is connected and the built-in room sensor is on.	SET FLOOR 72°
Range: OFF, 40 to 122°F (4.5 to 50.0°C)	Default: 72°F (22.0°C)
TYPE Device Type number. Hold the △ button to view the software version.	TYPE 519
ESCAPE Release the △ and ▽ buttons to return to the home screen.	ESCAPE
Installer settings. Press the △ and ▽ buttons together for 5 more seconds.	
AUXILIARY SENSOR Select the type of auxiliary sensor. Available when an auxiliary sensor is automatically detected.	AUXILLARY SENSOR NONE
Range: NONE = no auxiliary sensor, ROOM = Indoor Sensor, FLOR = Slab Sensor, OUT = Outdoor Sensor	Default: OFF
ROOM SENSOR Select if the built-in room temperature sensor is on or off. The built-in room sensor can only be disabled when an auxiliary room or slab sensor is connected.	SENSOR ON ROOM
Range: ON or OFF	Default: ON

SETTING	DISPLAY
SET FLOOR MAXIMUM Set the floor maximum temperature in order to protect the floor covering. Suggested settings: Tile = 90°F (32°C), Wood Floor = 85°F (29°C) F	SET FLOOR MAX 85°
Range: 40 to 122°F (4.5 to 50.0°C), OFF	Default: 85°F (29.5°C)
ESCAPE Release the △ and ▽ buttons to return to the home screen.	ESCAPE

TROUBLESHOOTING

Error Messages

ERROR MESSAGE	DESCRIPTION
SETUP ERR ROOM	**SETUP MENU SAVE ERROR** The thermostat failed to read the Programmable Settings from memory and has reloaded the factory default settings. The thermostat stops normal operation until all Programmable Settings are checked except to provide freeze protection.
SENSOR OPEN ROOM	**ROOM SENSOR OPEN CIRCUIT ERROR** The built-in air temperature sensor has an open circuit fault. Do not confuse this error with the auxiliary room sensor short circuit error. This error cannot be field repaired. Contact your wholesaler or MrPEX Systems sales representative for details on repair procedures.
SENSOR SHRT ROOM	**ROOM SENSOR SHORT CIRCUIT ERROR** The built-in air temperature sensor has a short circuit fault. Do not confuse this error with the auxiliary room sensor short circuit error. This error cannot be field repaired. Contact your wholesaler or MrPEX Systems sales representative for details on repair procedures.
AUX SENSOR OPEN	**AUXILIARY SENSOR OPEN CIRCUIT ERROR** The auxiliary sensor has an open circuit. Check for loose or damaged wires. Locate and repair the problem as described in the Sensor Testing section of this brochure. The error clears after the auxiliary sensor fault is corrected. If the auxiliary sensor was intentionally removed, power the thermostat down and up to clear the error.
AUX SENSOR SHRT	**AUXILIARY SENSOR SHORT CIRCUIT ERROR** The auxiliary sensor has a short circuit. Check for damaged wires. Locate and repair the problem as described in the Sensor Testing section of this brochure. The error clears after the auxiliary sensor fault is corrected.

Frequently Asked Questions

SYMPTOM	LOOK FOR...	CORRECTIVE ACTION
Display powering on and off.	Measure voltage at wiring terminals R and C.	The power supply transformer may have limited VA capacity. A transformer with a larger VA rating is recommended.
Thermostat does not heat.	Mode Off	Thermostat must be in Mode Heat in order to provide heating.

Technical Data

Radiant Thermostat 5110519 ***One Stage Heat***	
Literature	5110519_C, 5110519_D, 5110519_Q, 5110519_U
Control	Microprocessor control. This is not a safety (limit) control
Packaged weight	0.6 lb. (290 g)
Dimensions	3-11/16" H x 3" W x 15/16" D (94 x 76 x 24 mm)
Enclosure	White PVC plastic, NEMA Type 1
Approvals	Meets Class B: ICES & FCC Part 15
Ambient conditions	Indoor use only, 32 to 122°F (0 to 50°C), RH ≤90% non-condensing
Power supply	10 to 30 V (ac/dc), 50/60 Hz, 1.8 VA standby, 56 VA max fully loaded, Class 2
Relay	30 V (ac/dc) 2 A, Class 2 circuits
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892
– Included	Slab Sensor 5110079
– Optional	tekmar type # 070, 072, 073, 076, 077, 079, 084

Slab Sensor 5110079 ***10' (3 m) wire***	
Dimensions	3/16" OD x 1-1/2" (5 OD x 38 mm)
Enclosure	316 stainless steel, 10' (3 m) 24 AWG, 300 volt PVC insulated Zipcord
Approvals	CSA C US
Operating range	-58 to 140°F (-50 to 60°C)
Sensor	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) ß=3892