

## SECTION 23 8323

### RADIANT CEILING HEATING SYSTEMS

This section includes editing notes to assist the user in editing the section to suit project requirements. These notes are included as hidden text, and can be revealed or hidden by one of the following methods:

Microsoft Word 2007: Click the OFFICE button, select WORD OPTIONS, select DISPLAY, then select or deselect the HIDDEN TEXT option.

Microsoft Word (earlier versions): From the pull-down menus select TOOLS, then OPTIONS. Under the tab labeled VIEW, select or deselect the HIDDEN TEXT option.

Corel WordPerfect: From the pull-down menus select VIEW, then select or deselect the HIDDEN TEXT option.

#### 1. GENERAL

##### 1. SUMMARY

- A. Section Includes:
  - 1. Radiant ceiling heating panels.
  - 2. Thermostat controls.
  - 3. Connection to power supply.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section [06 1100 - Framing and Sheathing:] [ ] - [ ]: Wood ceiling framing.
  - 3. Section [09 2200 - Metal Suspension Systems:] [ ] - [ ]: Metal ceiling suspension system.
  - 4. Section [09 2900 - Gypsum Board:] [ ] - [ ]: Gypsum board ceilings.
  - 5. Section [09 5100 - Acoustical Ceilings:] [ ] - [ ]: Metal ceiling suspension system.

##### 2. REFERENCES

- A. Canadian Standards Association (CSA) - Canadian Electrical Code
- B. National Fire Protection Association (NFPA) 70 - National Electrical Code.
- C. Underwriters Laboratories, Inc. (UL) - Product Directories.

##### 3. SUBMITTALS

- A. Submittals for Review:
  - 1. Shop Drawings: Include reflected ceiling plans with heating panel layout, panel sizes, and power supply locations.
  - 2. Product Data: Manufacturer's descriptive data for heating panels and accessories, including electrical characteristics.

##### 4. QUALITY ASSURANCE

- A. Installer Qualifications: Minimum [2] [ ] years [documented] experience in work of this Section.
- B. Electrical Products: Tested by Underwriters Laboratories, Inc.
  - 1. Bear UL Listing Mark.
  - 2. Listed in UL Product Directory.

\*\*\*\* OR \*\*\*\*

- C. Electrical Products: Certified by CSA.

\*\*\*\* OR \*\*\*\*

D. Electrical Products: Certified by an independent laboratory approved by authorities having jurisdiction.

5. DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle panels in manner to prevent damage.

6. WARRANTIES

A. Furnish manufacturer's [10] [20] year warranty providing coverage against defects in materials and workmanship.

2. **PRODUCTS**

2.1. MANUFACTURERS

A. Contract Documents are based on products by Therma-Ray ([www.thermaray.com](http://www.thermaray.com)).

B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

2.2. COMPONENTS

A. Radiant Ceiling Heating Panels:

1. Product: Therma-Ray Radiant Heating Panels.
2. Utilize alloy resistance wire element, electrically insulated, rated to 250 degrees C, uniformly distributed over panel face, embedded in 1/2 inch thick gypsum board.
3. Size: [9] [12] [18] inches wide x [2] [3] [4] [5] [6] [7] [8] [9] [10] feet long.
4. Electrical characteristics:
  - a. 120 VAC: [65] [70] [85] [95] [105] [125] [130] [150] [160] [195] [215] watts.
  - b. 208 VAC: [50] [55] [65] [70] [80] [90] [95] [110] [120] [130] [135] [140] [150] [165] [190] [195] [205] [225] [245] [285] [335] watts.
  - c. 240 VAC: [50] [70] [75] [80] [85] [95] [100] [105] [120] [130] [140] [150] [155] [160] [170] [175] [195] [200] [215] [255] [260] [325] watts.
  - d. 277 VAC: [65] [75] [90] [95] [100] [110] [115] [120] [125] [130] [135] [145] [150] [155] [175] [180] [190] [200] [215] [220] [230] [250] [300] [335] watts.
5. End caps: No. PC-1.(used where grounding is **not** required), MC-2 (for use with rigid or flexible, metallic conduit or tubing).
6. Connectors: No. 3M567.

2.3. ACCESSORIES

A. Thermostat Controls: No. SR-240/120 ThermaRay Comfort Controller.

3. **EXECUTION**

3.1. INSTALLATION

- A. Install panels and accessories in accordance with manufacturer's instructions, approved Shop Drawings, and [NFPA 70.] [Canadian Electrical Code.]
- B. Locate controllers [where indicated.] [\_\_\_\_.]
- C. Place panels between framing members.
- D. Secure panels in position using temporary strapping provided by panel manufacturer.
- E. Wire panels to branch circuits in parallel.
- F. Place end caps over panels, connectors, and feed wires.
- G. Connect to power supply and control wiring.

### 3.2. TESTING

- A. Test installed panels at rated voltage using ammeter. Ensure that ammeter values are same as calculated for heating load.

END OF SECTION

# RC Panels

## Radiant Ceiling Heating Panels



### Applications

- Single dwelling homes
- Assisted Living Facilities
- Condominiums
- Basements
- Townhouses



Enjoy the surrounding warmth of a radiant ceiling heating system.

The ceiling panels come in different lengths allowing you to heat any sized room. With individual controls allowing you to set both the temperature of each room the way you like it and not wasting energy in doing so.

**Radiant Heat:** Radiant energy travels in straight lines and is absorbed by objects in the room, warming the space. Air quality is maintained because no forced air movement occurs with radiant heating.

**Maintenance Free:** Radiant panels have no moving parts, so they are maintenance free and can provide years of quiet, safe and clean operation.

**Warranty:** 20 years on the heater.

### Standard Construction Features

**Heating Element** – High quality alloy resistance wire is dielectrically insulated with a PTFE compound rated for 250°C (482°F).

**Panel Design** – Panel is made of 1/2 inch thick gypsum with a wire embedded within.

**Electrical** – 2 non-heating lead wires are connected in parallel to a direct burial wire using 3M567 self tapping connectors and a plastic cover slide over the connections for added protection.

**Watt Density Range** - 17 –21 watts per square foot when energized on design voltage

**Installation Requirements** – Heaters are installed in the ceiling between the joists or strapping before the finished drywall is installed.

No change to your construction method is needed.

A room by room heat loss should be done to ensure enough heat is install based on the design and the location.

Once panels are connected and verified using ohm meters, the ceiling drywall can be installed as normal.



# RC Series

## Radiant Ceiling Heating Panels

### Control Options

All SRDP models are rated for the following voltages:  
120V, 208V, 240V 277V, 347V

Catalog Number	Description
SR-LV	Low Voltage thermostat c/w plaster ring. Floor or remote limit sensor(s) must be ordered at the same time. Requires connection to the SRDP2 (Distribution Panel)
SR-LV-B	Same as the SR-LV but with a box ring for double gang electrical box instead of the plaster ring
SR Sensor	15' (4.5 m) Long. Longer lengths available
SRDP2-10-10	Distribution Panel with 10 RJ 45 ports for thermostats and 10 - 20 amp relays
SRDP2-10-20	Distribution Panel with 10 RJ 45 ports for thermostats and 20 - 20 amp relays
SRDP2-20-20	Distribution Panel with 20 RJ 45 ports for thermostats and 20 - 20 amp relays

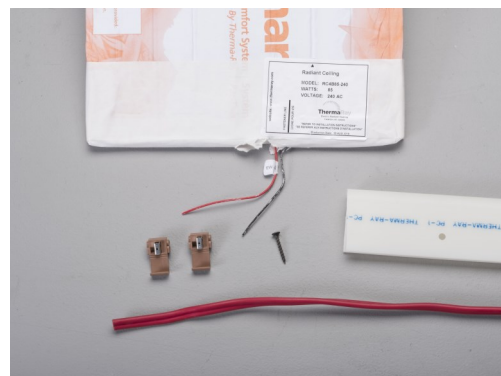
### SRDP2-20/20



### Field Installed Options

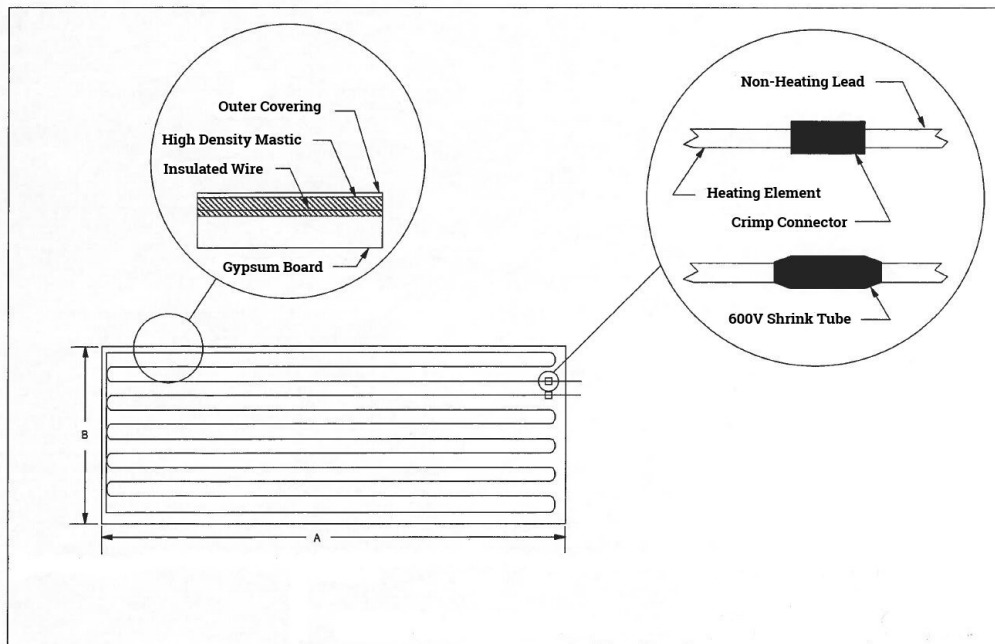
(shipped loose for field installation)

Catalog Number	Description
3M567	Self-tapping connector for use with 12 AWG direct burial wire.
PC-1	A plastic endcap that is slid over the 3M567 connectors as a precaution to protect the feed wire and connections. The endcap is screwed (a screw is included) to the panel on the black line as indicated



# RC panels

## Radiant Ceiling Heating panels



Cutaway view of a  
Radiant Ceiling  
Heating Panel



# RC Panels

## Radiant Ceiling Heating Panels

### Sizing

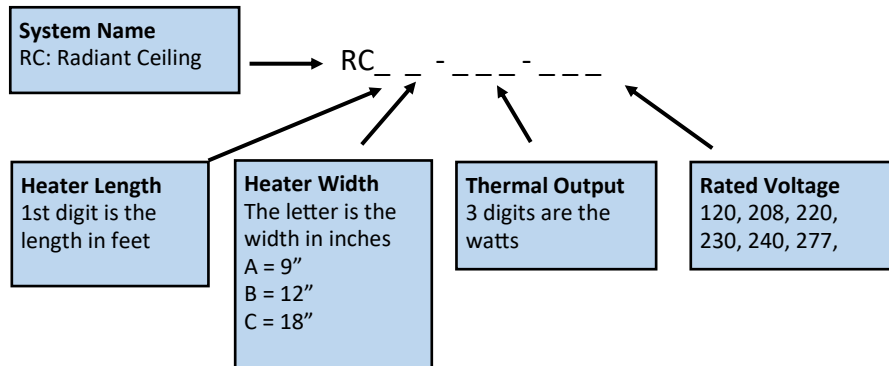
“A” panels = 9” (inches) wide. They fit between 12” (inch) on center joist spacing.

“B” panels = 12” (inches) wide. They fit between 16” (inch) on centre joist spacing.

“C” panels = 18” (inches) wide. They fit between 18” (inch) on centre joist spacing.

#### Example Model Names:

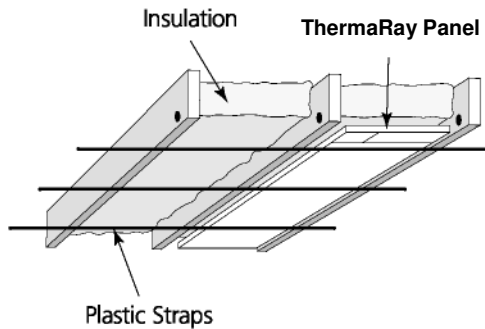
RC7B150-240



VOLTAGE	WATTS	LENGTH (feet)	WIDTH (inches)	CATALOGUE #	WEIGHT (lbs)
240	130	8	9	RC8A130-240	10.2
240	95	6	9	RC6A095-240	7.7
240	70	4	9	RC4A070-240	5.1
240	175	8	12	RC8B175-240	13.6
240	200	7	12	RC7B150-240	11.9
240	600	6	12	RC6B130-240	10.2
240	460	5	12	RC5B105-240	8.5
240	320	4	12	RC4B085-240	6.8
240	280	3	12	RC3B070-240	5.1
240	260	8	18	RC8C260-240	20.4
240	230	7	18	RC7C230-240	17.9
240	195	6	18	RC6C230-240	15.3
240	160	5	18	RC5C160-240	12.8
240	130	4	18	RC4C130-240	10.2
240	95	3	18	RC3C095-240	7.7
240	70	2	18	RC2C070-240	5.1



*Whether you're a contractor, architect, builder or homeowner, creating the perfect indoor environment has always been an ultimate challenge. ThermaRay, the world's #1 name in thermal comfort systems introduces you to the ultimate heating solution. Please take the time to read this installation guide carefully before you begin. Remember, accurate measurements are the key to success for a proper installation!*



**Diagram 1.** ThermaRay panels slide into position easily, below the insulation and above the plastic strapping. The insulation is permitted to come in direct contact with the panel. There is maximum insulation level of R60 that may be installed above the panel. For residential construction consult the local building code for recommended minimum insulation values in your area. It is highly recommended to insulate between floors to obtain maximum efficiency and comfort.

## CEILING SYSTEM Installation Guide

### MECHANICAL INSTALLATION

ThermaRay panels are designed to be installed above gypsum ceilings (inaccessible ceiling installations). The panels are placed between the ceiling framing members, or between the furring strips if the ceiling is cross-furred. Panels are to be installed in open, unobstructed ceiling areas and never above partitions, cupboards, lighting fixtures, track lighting, acoustic tiles, decorative ceiling beams or other items, which may restrict the heat transfer of the panels or where the panels may be subject to physical damage.

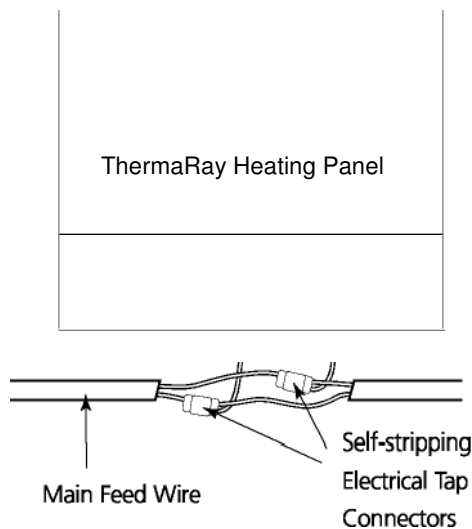
During installation, the panels can be temporarily held in place by plastic strapping, available from the distributor. (**See Diagram 1**) The suspension system enables the panels to be secured until electrical connections can be made, and the finished ceiling installed. Use 3/8 inch (10mm) or longer staples or screws to secure plastic strapping to the underside of framing members or furring strips.

The number of panels needed in an area must equal or exceed the heat-loss calculation for that same area.

### BRANCH CIRCUIT CONNECTION

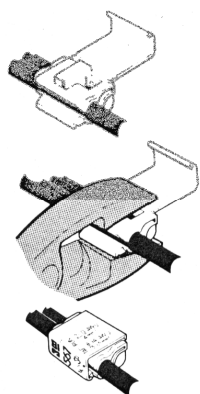
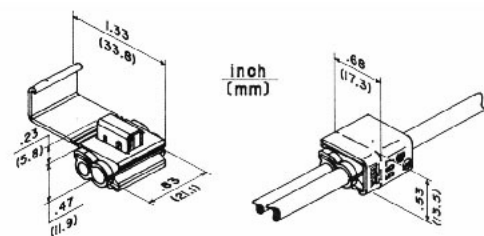
ThermaRay panels are connected in parallel to the branch circuit. Canadian installation shall be made according to the provision of Section 62 of the Canadian Electrical Code, part 1 and to regulations of all authorities having jurisdiction. U.S. installations are to be made in accordance with the National Electrical Code and local codes where applicable. Installations outside North America should conform to applicable local codes. The heater load, once determined, can be divided into as many circuits as needed. 12 AWG (2.0 mm) copper 2-conductor, non-metallic sheathed cable is recommended for installation of panels. In areas where type NM cable is not permitted, metal enclosures are available for use with rigid or flexible, metallic conduit or tubing. (See Installation Instructions Supplement for Metal Wiring Enclosures.) When determining the number of branch circuits required to accommodate the heating load, note that the branch circuit must be de-rated in accordance with either the Canadian Electrical Code, National Electrical Code, or local codes as applicable. It is not recommended that wire size greater than 12 AWG (2.0 mm) be used to connect the panels to the branch circuit. After the panels are secured in place and the number of branch circuits determined, they are connected to the branch circuit. For proper performance ensure the supply voltage matches the voltage stamped on the panel. **DO NOT connect heating panel to a higher voltage.** Connection to lower voltages is permitted but will cause the panel to operate at a reduced wattage and may lead to a system with insufficient capacity to heat the intended area. The supply wire of 12 AWG (2.0 mm) 2-conductor non-metallic cable is connected to the transient lead (pigtail lead) of the heater panels with 3M Scotchlok® self-stripping electrical tap connectors (Type 567), (**See Diagram 2**). Upon completion of the wiring assembly, the panel connections are visible and available for inspection by local authorities.





**Diagram 2.** Connecting the main feed to the individual panel is easily done using tap-on connectors. Note that **ONLY** the outer insulation jacket of the main feed is removed.

### 3M567 Self Stripping Electrical Tap Connectors



**INSTRUCTIONS**  
Use only with insulated wire. Do not strip insulation.

1. Slip circuit (run) wire into side slot. Insert fixture (tap) wire up to stop.
2. Make connection with 9" electrician's (lineman's) pliers, by driving "U" contact down flush with top of connector.
3. Close hinged cover until it locks.

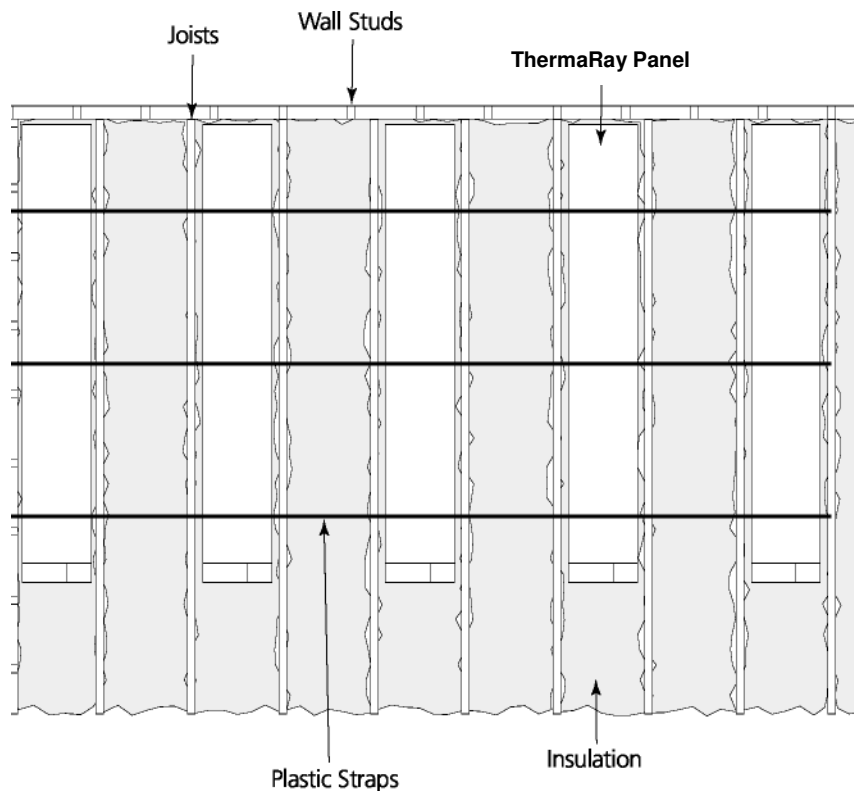
## PANEL OPERATION TEST

Each heater has been individually checked at the factory. After panel installation, the entire circuit should be tested, to check the on-site electrical work. Two methods of testing will be discussed in the following paragraphs.

**Full Power Available** – Apply rated voltage to the heater load circuit. Branch loads are to be read with a suitable ammeter. The ammeter value should be the same as that calculated for the heating load and, if the values agree, all panels are operating. If the values do not agree, installation should be re-checked. For a physical check without a meter, it is only necessary to feel the panels. If they are warm, they are working.

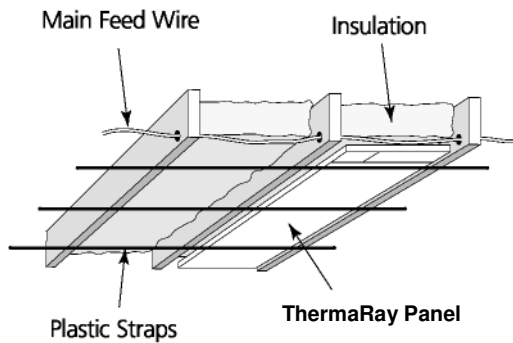
**Without Power Available** – This check of the panel installation requires the use and knowledge of an ohm meter. A resistance measurement is taken at the load circuit, with all other circuits isolated. This will give the total resistance of the heater load. Knowing the total heater load of the panel in watts and heater rated voltage, a simple calculation will give the same values as that read on the ohm meter.

View from below

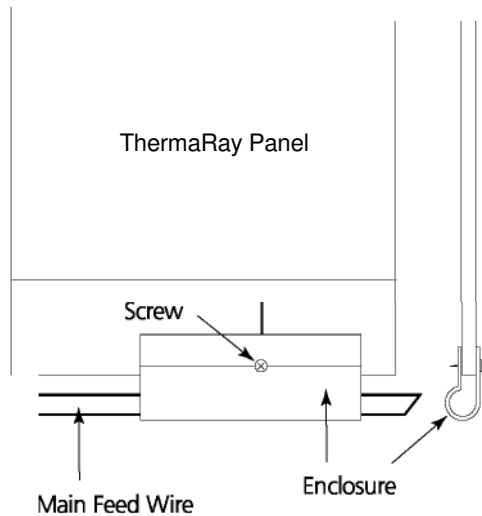


Example: for the branch circuit of 1500 watts and panel rated voltage of 240, the resistance will be 38.4 ohms:

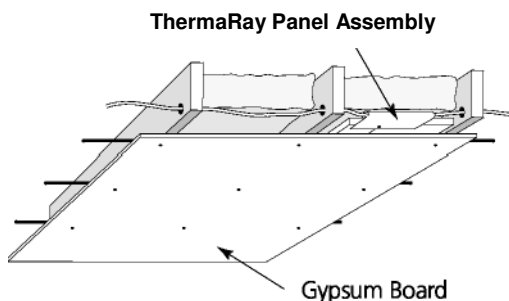
$$\text{Formula: } \frac{\text{voltage} \times \text{voltage}}{\text{wattage}} = \text{resistance in ohms, Example: } \frac{240 \times 240}{1500} = 38.4 \text{ ohm}$$



**Diagram 3.** The main feed wire is run in through the joists, as shown above. Proper positioning of the main feed wire results in easy connecting.



**Diagram 4.**



**Diagram 5.** As soon as the ThermaRay panels are connected to the main feed and the filled wiring closures are in place, the final installation of ceiling gypsum board or wood can begin.

## FINAL INSTALLATION

After inspection and completion of the equipment check, the wiring enclosure (Endcap) is completely filled with drywall ready-mixed compound, quick-setting drywall compound, or fire-proof caulking compound or expanding foam. The Endcap is then placed over the connector and slid onto the panel. Alternatively, a bulk-loading caulking gun or the expanding foam may be used to completely fill the enclosure from each end, after it has been mechanically attached to the panel. (*See Diagram 3*)

To attach the Endcap to the panel, slide the Endcap over the panel, connectors and feed wire. Align the hole in the Endcap with the Fastener Line marked on the panel. The Fastener Line is located between (and marks the location of) the two cold panel connection leads. Then use the screw supplied with the Endcap to secure the Endcap to the panel. (Endcap, screw and connectors are available from the distributor for each panel). (*See Diagram 4*)

The use of high quality ThermaRay Comfort Controllers are recommended for proper system performance and warranty

If a ceiling vapour barrier is used, it may be placed either above or below the panels. It can be placed between the panel and the finished gypsum ceiling. Should polyethylene vapour barriers be used, one certified to Canadian standard CAN/CGSB 51.34-M86 or equivalent is recommended.

Warning sticker must be attached to the electrical service panel. Ensure that all branch circuits supplying radiant heating are clearly marked as such.

Panel installation is now complete, and the finished gypsum board or wood can be directly attached to the ceiling framing members, or furring strips, completely enclosing the ThermaRay panel in the ceiling. It is recommended not to use a ceiling finish with an R-value of more than R5. (For wood ceilings this is usually 1/2 "thickness or less) (*See Diagram 5*)

## CAUTION:

- Panels must be turned off before taping and/or painting ceiling and left off until joint compound has fully cured.
- ThermaRay panels must not be placed over wood framing members, partitions, cupboards, acoustic tiles, or other obstructions or come in contact with plastic piping.
- Electrician should be consulted before ThermaRay ceiling is punctured or modified.
- Cellulose insulation is not recommended unless it meets or exceeds standard CGSB 510GP-60M or equivalent and must not contact face of heater panel.
- Use only copper conductor supply wire.
- Oil based paints are not recommended for ceiling application.
- Do not install heating panels in a room over an unheated crawl space unless floor is properly insulated.
- Basement ceiling must be insulated for proper system performance.
- A Class A ground-fault circuit-interrupter shall be used with this heating device.

# RESISTANCE TEST

	220V	230V	240V		220V	230V	240V		220V	230V	240V
WATTS	OHMS	OHMS	OHMS	WATTS	OHMS	OHMS	OHMS	WATTS	OHMS	OHMS	OHMS
105	460.95	503.81	548.57	1300	37.23	40.69	44.30	2700	17.93	19.59	21.33
125	387.20	423.20	460.80	1350	35.85	39.19	42.66	2750	17.60	19.24	20.94
150	322.67	352.67	384.00	1400	34.57	37.79	41.14	2800	17.29	18.89	20.57
175	276.57	302.29	329.14	1450	33.38	36.48	39.72	2850	16.98	18.56	20.21
200	242.00	264.50	288.00	1500	32.27	35.27	38.40	2900	16.69	18.24	19.86
225	215.11	235.11	256.00	1550	31.23	34.13	37.16	2950	16.41	17.93	19.52
250	193.60	211.60	230.40	1600	30.25	33.06	36.00	3000	16.13	17.63	19.20
275	176.00	192.36	209.45	1650	29.33	32.06	34.90	3050	15.87	17.34	18.88
300	161.33	176.33	192.00	1700	28.47	31.12	33.88	3100	15.61	17.06	18.58
350	138.29	151.14	164.57	1750	27.66	30.23	32.91	3150	15.37	16.79	18.28
400	121.00	132.25	144.00	1800	26.89	29.39	32.00	3200	15.13	16.53	18.00
450	107.56	117.56	128.00	1850	26.16	28.59	31.13	3250	14.89	16.28	17.72
500	96.80	105.80	115.20	1900	25.47	27.84	30.31	3300	14.67	16.03	17.45
550	88.00	96.18	104.72	1950	24.82	27.13	29.53	3350	14.45	15.79	17.19
600	80.67	88.17	96.00	2000	24.20	26.45	28.80	3400	14.24	15.56	16.94
650	74.76	81.38	88.61	2050	23.61	25.80	28.09	3450	14.03	15.33	16.69
700	69.14	75.57	82.28	2100	23.05	25.19	27.42	3500	13.83	15.11	16.45
750	64.53	70.53	76.80	2150	22.51	24.60	26.79	3550	13.63	14.90	16.22
800	60.50	66.13	72.00	2200	22.00	24.05	26.18	3600	13.44	14.69	16.00
850	56.94	62.24	67.76	2250	21.51	23.51	25.60	3650	13.26	14.49	15.78
900	53.78	58.78	64.00	2300	21.04	23.00	25.04	3700	13.08	14.30	15.56
950	50.95	55.68	60.63	2350	20.60	22.51	24.50	3750	12.91	14.11	15.36
1000	48.40	52.90	57.60	2400	20.17	22.04	24.00	3800	12.74	13.92	15.15
1050	46.10	50.38	54.85	2450	19.76	21.59	23.51	3850	12.57	13.74	14.96
1100	44.00	48.09	52.36	2500	19.36	21.16	23.04	3900	12.41	13.56	14.76
1150	42.09	46.00	50.08	2550	18.98	20.75	22.58	3950	12.25	13.39	14.58
1200	40.33	44.08	48.00	2600	18.62	20.35	22.15	4000	12.10	13.23	14.40
1250	38.72	42.32	46.08	2650	18.26	19.96	21.73				

CATALOGUE#	WATTS	LENGTH ‘	WIDTH “	WEIGHT LBS
RC8A130-240	130	8	9	10.2
RC6A095-240	95	6	9	7.7
RC4A070-240	70	4	9	5.1
RC8B175-240	175	8	12	13.6
RC7B150-240	150	7	12	11.9
RC6B130-240	130	6	12	10.2
RC5B105-240	105	5	12	8.5
RC4B085-240	85	4	12	6.8
RC3B070-240	70	3	12	5.1
RC8C260-240	260	8	18	20.4
RC7C230-240	230	7	18	17.9
RC6C195-240	195	6	18	15.3
RC5C160-240	160	5	18	12.8
RC4C130-240	130	4	18	10.2
RC3C095-240	95	3	18	7.7
RC2C070-240	70	2	18	5.1

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E-mail: sales@thermaray.com

Printed in Canada



120, 208, 240, 277 volts available.

## ACCESSORIES

**PC-1**  
**MC-2**  
**3M567**  
**RC Strap**  
**SR-LV**

Plastic Endcap  
Metal Endcap for use with conduit  
Connector for #12-2 wire  
Strapping 400/ft  
ThermaRay Comfort Controller Low Voltage with plaster ring (Note: must be used with ThermaRay Distribution panels.)  
ThermaRay Comfort Controller Low Voltage with box ring (Note: must be used with ThermaRay Distribution panels.)

## SR-LV-B

## ThermaRay Distribution Panels

**SRDP2-10-10** 10 communication ports for controls & 10 relays  
**SRDP2-10-20** 10 communication ports for controls & 20 relays  
**SRDP2-20-20** 20 communication ports for controls & 20 relays

Revised: Sept 1, 2020