

# ProMelt<sup>®</sup>

Electric Snow Melting Mats and Cables

## Installation Manual

Model Series SM and SC



Please note that local codes may require this product and/or the control to be installed or connected by an electrician

# Welcome to ProMelt Electric Snow Melting

SunTouch ProMelt products are a simple way to eliminate snow and ice from surfaces. This instruction manual is provided as a guide to installing ProMelt Mat and ProMelt Cable, including design considerations, mat and cable installation, control installation, precautions, and surfacing guidelines.

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## Specifications for ProMelt Mat:

ProMelt Mat is a complete heating mat consisting of a series resistance heating cable and a single power lead for easy single-point connection. The heating cable is pre-formed into a mat to provide consistent spacing and quick roll-out installation on the job site. The heating mat length cannot be cut to fit.

**Sizes:** Widths 2, 3 feet (61, 91 centimeters)

Lengths 5 up to 56 feet (1.5 to 17 meters)

**Voltages:** 120, 208, 240, 277 VAC, 1-phase

**Watts:** 50 W/sqft (170 Btu/h/sqft) and 38 W/sqft (130 Btu/h/sqft)

Maximum heater current: 24 amps (see table 1)

Maximum circuit load: 50 amps

GFEP (ground fault equipment protection) required for each circuit

**Listing:** ETL Listed for U.S. and Canada under UL 515, IEEE 515.1, and

CAN/CSA C22.2 No. 130-03

Listing file number: 3151992

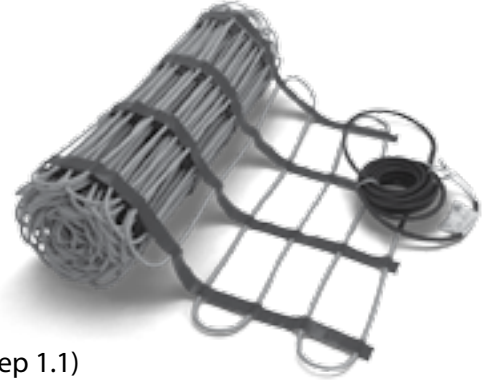
**Application:** Outdoor use only, embedded in concrete, asphalt, sand (see Step 1.1)

Minimum bend radius: 1 inch (25mm)

Maximum exposure temperature (continuous and storage): 221°F (105°C)

Maximum exposure temperature (short-term for asphalt covering): 285°F (140°C)

Minimum installation temperature: 40°F (4.5°C)



## Specifications for ProMelt Cable:

ProMelt Cable is a complete heating cable consisting of a series resistance heating cable and a single power lead for easy single-point connection. The heating cable length cannot be cut to fit.

**Voltages:** 120, 208, 240, 277 VAC, 1-phase

**Watts:** 50 W/sqft (170 Btu/h/sqft), spaced at 3 inches on-center

38 W/sqft (130 Btu/h/sqft), spaced at 4 inches on-center

(Cable is designed to operate at approximately 12.5 W/linear foot of cable at rated voltage.)

Maximum heater current: 24 amps (see table 1)

Maximum circuit load: 50 amps

GFEP (ground fault equipment protection) required for each circuit

**Listing:** ETL Listed for U.S. and Canada under UL 515, IEEE 515.1, and CAN/CSA C22.2 No. 130-03

Listing file number: 3151992

**Application:** Outdoor use only, embedded in concrete, asphalt, sand (see Step 1.1)

Minimum bend radius: 1 inch (25mm)

Maximum exposure temperature (continuous and storage): 221°F (105°C)

Maximum exposure temperature (short-term for asphalt covering): 285°F (140°C)

Minimum installation temperature: 40°F (4.5°C)



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**Installation must be performed by qualified personnel, in accordance with local codes, ANSI/NFPA 70 (NEC Article 426) and Section 62 of the CEC Part I.**












Limited Warranty: For complete product warranty information, please refer to the web site. (see back of manual)

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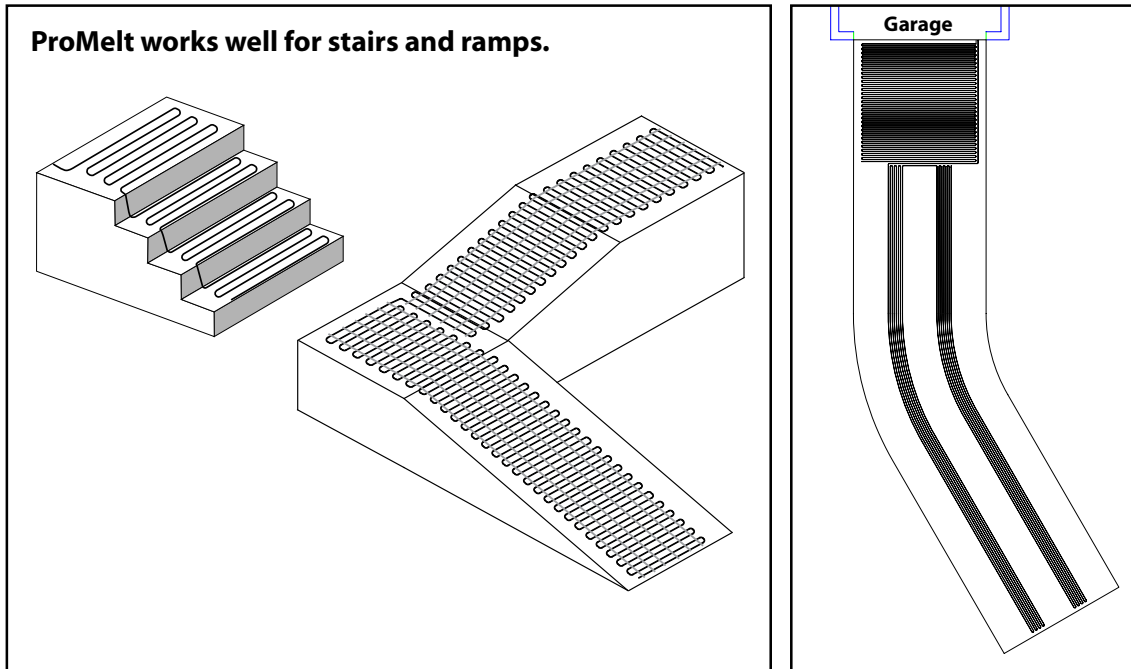
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## **WARNING**

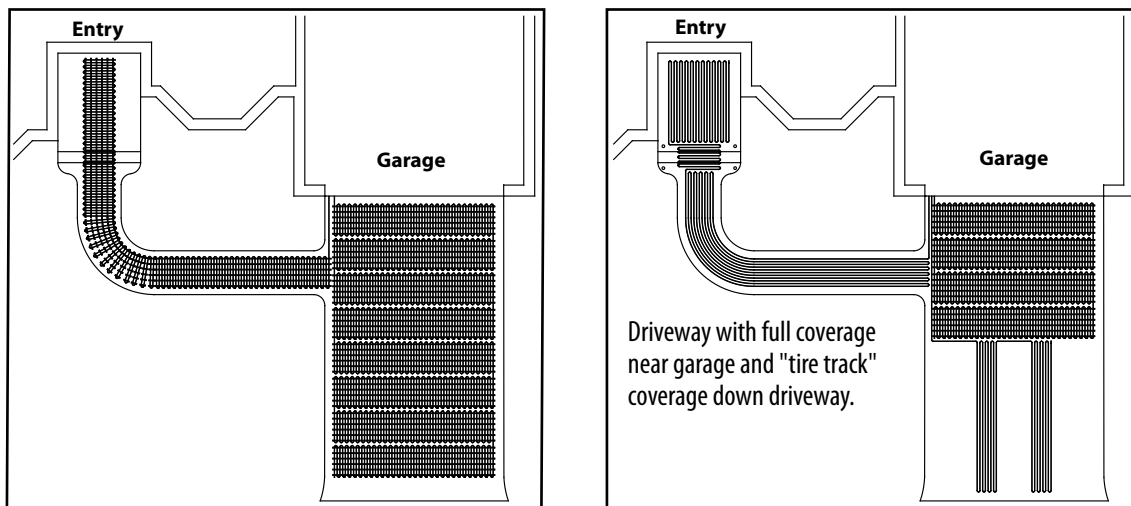
**Installation must be performed by qualified personnel, in accordance with local codes and standards. Read these important warnings and all installation instructions prior to installation. Failure to do so can result in fire, shock, property damage, personal injury and/or death.**

-  **NEVER** cut or modify the heating cable. The power lead may be cut shorter if necessary, but never removed from the heating cable.
-  **NEVER** overlap or cross over the heating cable on itself, or place heating cable closer than 2 inches from another heating cable or power lead cable.
-  **NEVER** pull any of the heating cable or factory splices into any conduit.
-  **NEVER** attempt to repair a damaged cable. Contact the factory for assistance.
-  **ALWAYS** de-energize all circuits before installing or servicing.
-  **ALWAYS** completely embed the heating cable and factory splices in concrete, sand, or asphalt.
-  **ALWAYS** avoid placing the heating cable any closer than 2 inches from other items such as underground cable or piping to keep from overheating them.
-  **ALWAYS** keep ends of the power leads dry before and during installation.
-  **ALWAYS** provide ground fault protection (GFEP) for the snow melting system. This may be at the circuit breaker or the control.
-  **ALWAYS** pay close attention to voltage and amperage requirements of the circuit breaker, control, and snow melting system.
-  **ALWAYS** install in accordance with all local codes and the National Electrical Code (ANSI/NFPA 70 especially Article 426) and Section 62 of the Canadian Electrical Code (CEC) Part I.

# Some Typical ProMelt Installations



**ProMelt Mats and Cables can be used in combination to fit a variety of areas.**



## Phase 1: Designing the System

### STEP 1.1

**Determine general areas where you want to install ProMelt Mat/Cable** Applications include driveways, walkways, patios, permanent ramps, masonry steps and benches, shipping docks, under garage door seals and more. The ProMelt Mat/Cable can be used anywhere outdoors in residential or commercial locations where snow or ice accumulates. The ProMelt Mat/Cable must be completely embedded in concrete, sand, thick mortar bed, or asphalt.

ProMelt Mat/Cable cannot be installed indoors, in industrial locations, or areas with hazardous classifications. It cannot be used for gutter or pipe freeze protection or roof snow melt. Do not install the mat/cable on or under non-masonry stairs or decks made of wooden or composite materials. Do not install the mat/cable in the deck around a pool, in-ground hot-tub, or similar (see National Electrical Code article 680, consult your local inspector for further details).



ProMelt Mat/Cable may be used to heat an outdoor area, such as a patio. This application requires special installation considerations and controls. Please see Step 1.6 for details.

Heating performance is never guaranteed. The amount of heat added to the area is dependent on many factors such as air and ground temperature, wind speed, solar heat, moisture, etc. If you have any questions regarding expected performance in your application, please contact the factory.

## STEP 1.2

**Make a drawing and measure the area where you want snow melting to occur.** Eliminate those areas where ProMelt cannot be installed, keeping in mind the following obstructions and allowances:

- For most applications, the base under the mat/cable must be a minimum of 2 inches of masonry, asphalt, or similar material. The mat/cable must be completely covered by a minimum of 1-1/2 inches of material. (See Phase 4 Finish Surfaces for more details.)
- For a deck or similar elevated application, the mat/cable must have a minimum of 1 inch of masonry below and a minimum of 1 inch of material covering the entire mat/cable. (See Phase 4 Finish Surfaces for more details.)
- Mat/Cable cannot be laid within 6 inches of the edges of slabs. In asphalt, this is increased to 12 inches from the edge where no curb is provided.
- Avoid crossing expansion joints in a slab, unless proper technique and protection steps are followed (see Step 3.14).
- Avoid placing the heating cable any closer than 2 inches from other items such as underground cable or piping to keep from overheating them.
- Allow at least 2 inches between adjacent cables, but not more than 4 inches, between adjacent cables or sections of a mat where the mat tape is cut and turned to fill the area.
- Mat/Cable must be laid such that the surface will not have other obstructions placed on top, capturing heat or allowing potential damage from mounting brackets, bolts, or similar (pedestals, support columns, walls, light posts, or similar)

Also, consider the following precautions:



**WARNING: THE HEATING CABLE CANNOT BE CUT TO LENGTH.** Order the correct size mat or cable to fit the area. Modifying the heating cable is not allowed and may lead to overheating, damage, and fire hazard.

- The heating cable and factory splices of ProMelt Mat/Cable must be completely embedded in the concrete, sand, or asphalt. Never try to use up excess heating cable in surrounding soil, walls, or other unprotected applications.
- Never overlap the heating cable on itself or place heating cable closer than 2 inches from other heating cable.
- Only the power lead may exit this area. It will be pulled through conduit to protect it up to a junction box. NEVER pull any of the heating cable or factory splices into any conduit.

**See typical installations on page 4.**

## STEP 1.3

**Determine where junction box(es) may be placed** to receive the ProMelt Mat/Cable power leads. This is important to ensure the mat(s) and/or cable(s) you select fill the area correctly and with the best connection locations.

It is best to locate junction boxes on a wall indoors and within the distance of the power leads on the mat/cable. ProMelt mat/cable comes standard with 20-foot long power leads, but may be custom ordered up to 50 feet long if necessary.

If a junction box must be located outdoors, it is recommended it be installed above grade and be properly Listed for rain tight use outdoors. If it must be installed at or below grade, use properly Listed watertight items and follow box manufacturer guidelines for protection and connection seals.

## STEP 1.4 (ProMelt Mat Only)

Select the ProMelt Mat(s) you need. (for ProMelt Cable sizes see next page)

**WATTAGE:** Decide what heat output is required. Your design must consider weather conditions and how critical it is to clear the heated area.

Mat with 50 watts per square foot heat output are sufficient to clear most moderate and heavy snowfall rates.

Mat with 38 watts per square foot heat output are sufficient to clear most light to moderate snowfall rates.

**SIZE:** ProMelt Mat is manufactured in a variety of sizes as shown in Table 1. If the exact size of mat is not found in the Table, select the next smaller mat size.

**AMPS and VOLTS:** Pay careful attention to the amps to make sure your controls, circuit breaker panel, and wiring will have the proper capacity. Design everything to handle 125 percent of heating mat load:

-20 amp circuit for load up to 16 amps

-30 amp circuit for load up to 24 amps

-40 amp circuit for load up to 32 amps

-50 amp circuit for load up to 40 amps

-70 amp circuit for load up to 50 amps

### Table 1 (mat sizes)

#### 38W/sqft @ 120VAC

2 ft wide			
Model	Length	Amps	Ohms
SM3812000524	5.0	3.2	42 - 53
SM3812001024	10.0	6.3	20 - 25
SM3812001524	15.0	9.5	13 - 17
SM3812002024	20.0	12.7	7 - 10
SM3812002524	25.0	15.8	6 - 8
SM3812003024	30.0	19.0	4 - 6

#### 38W/sqft @ 240VAC

2 ft wide			
Model	Length	Amps	Ohms
SM3824001024	10.0	3.2	65-81
SM3824002024	20.0	6.3	31-39
SM3824003024	30.0	9.5	20-26
SM3824004024	40.0	12.7	14-19
SM3824005024	50.0	15.8	11-15
SM3824006024	60.0	19.0	9-13

#### 50W/sqft @ 208VAC

2 ft wide			
Model	Length	Amps	Ohms
SM5020800724	7.0	3.4	59 - 74
SM5020801124	11.0	5.3	40 - 50
SM5020801424	14.0	6.7	28 - 35
SM5020801824	18.0	8.7	23 - 29
SM5020802024	20.0	9.6	17 - 22
SM5020802424	24.0	11.5	15 - 20
SM5020802824	28.0	13.5	13 - 17
SM5020803424	34.0	16.3	10 - 13
SM5020803824	38.0	18.3	9 - 12
SM5020804224	42.0	20.2	8 - 11
SM5020804824	48.0	23.1	7 - 10

#### 50W/sqft @ 208VAC

3 ft wide			
Model	Length	Amps	Ohms
SM5020800536	5.0	3.6	64 - 80
SM5020801036	10.0	7.2	30 - 38
SM5020801536	15.0	10.8	14 - 19
SM5020802036	20.0	14.4	11 - 15
SM5020802536	25.0	18.0	9 - 12
SM5020803036	30.0	21.6	7 - 9

#### 50W/sqft @ 240V

2 ft wide			
Model	Length	Amps	Ohms
SM5024000824	8.0	3.3	68 - 84
SM5024001224	12.0	5.0	43 - 54
SM5024001624	16.0	6.7	32 - 40
SM5024002024	20.0	8.3	26 - 32
SM5024002424	24.0	10.0	21 - 27
SM5024002824	28.0	11.7	18 - 23
SM5024003224	32.0	13.3	15 - 19
SM5024003624	36.0	15.0	13 - 17
SM5024004024	40.0	16.7	12 - 15
SM5024004424	44.0	18.3	11 - 14
SM5024004824	48.0	20.0	10 - 13
SM5024005224	52.0	21.7	8 - 11

#### 50W/sqft @ 240VAC

3 ft wide			
Model	Length	Amps	Ohms
SM5024000536	5.0	3.1	64 - 80
SM5024001036	10.0	6.3	30 - 38
SM5024001536	15.0	9.4	20 - 25
SM5024002036	20.0	12.5	14 - 18
SM5024002536	25.0	15.6	11 - 15
SM5024003036	30.0	18.8	9 - 12
SM5024003536	35.0	21.9	8 - 11

#### 50W/sqft @ 277VAC

2 ft wide			
Model	Length	Amps	Ohms
SM5027700924	9.0	3.2	77 - 95
SM5027701424	14.0	5.1	51 - 63
SM5027701824	18.0	6.5	36 - 45
SM5027702424	24.0	8.7	31 - 39
SM5027702824	28.0	10.1	24 - 31
SM5027703224	32.0	11.6	20 - 26
SM5027703624	36.0	13.0	17 - 22
SM5027704024	40.0	14.4	15 - 19
SM5027704424	44.0	15.9	13 - 17
SM5027704824	48.0	17.3	12 - 16
SM5027705224	52.0	18.8	11 - 14
SM5027705624	56.0	20.2	8 - 11

#### 50W/sqft @ 277VAC

3 ft wide			
Model	Length	Amps	Ohms
SM5027701036	10.0	5.4	55 - 68
SM5027701536	15.0	8.1	29 - 37
SM5027702036	20.0	10.8	19 - 25
SM5027702536	25.0	13.5	14 - 18
SM5027703036	30.0	16.2	11 - 15
SM5027703536	35.0	19.0	11 - 14

## STEP 1.4 (ProMelt Cable Only)

### Select the cables you need.

WATTAGE: Decide what heat output is required. Your design must consider weather conditions and how critical it is to clear the heated area.

50 watts per square foot: sufficient to clear most moderate and heavy snowfall rates

38 watts per square foot: sufficient to clear most light to moderate snowfall rates

SIZE: Select a cable in Table 2 to fit the Heated Area measured in Step 1.2. ProMelt Cable is manufactured in a variety of sizes as shown. If the exact size of cable is not found in the Table, select the next smaller cable size.

AMPS and VOLTS: Pay careful attention to the amps to make sure your controls, circuit breaker panel, and all wiring will have the proper capacity. Design circuit protection and wiring to handle 125 percent of heating cable load:

-20 amp circuit for load up to 16 amps

-30 amp circuit for load up to 24 amps

-40 amp circuit for load up to 32 amps

-50 amp circuit for load up to 40 amps

-70 amp circuit for load up to 50 amps

## Table 2 (cable sizes)

### 120VAC

Model	50 W/sqft 3" Spacing (Sq Feet)	38 W/sqft 4" Spacing (Sq Feet)	Cable Length (Feet)	Amp Draw	Ohms
SC50120008	8	10	29	3.3	31 - 39
SC50120015	15	20	59	6.3	15 - 19
SC50120020	20	26	78	8.3	13 - 17
SC50120030	30	39	118	12.5	7 - 9
SC50120040	40	53	158	16.7	5 - 7
SC50120053	53	69	208	22.1	4 - 6

### 208VAC

Model	50 W/sqft 3" Spacing (Sq Feet)	38 W/sqft 4" Spacing (Sq Feet)	Cable Length (Feet)	Amp Draw	Ohms
SC50208014	14	19	55	3.4	60 - 74
SC50208020	20	26	78	4.8	36 - 46
SC50208030	30	39	118	7.2	30 - 38
SC50208035	35	46	138	8.4	23 - 29
SC50208040	40	53	158	9.6	18 - 23
SC50208045	45	59	178	10.8	14 - 19
SC50208055	55	72	218	13.2	13 - 17
SC50208060	60	79	238	14.4	11 - 15
SC50208065	65	85	257	15.6	10 - 13
SC50208075	75	98	297	18.0	9 - 12
SC50208080	80	105	317	19.2	8 - 11
SC50208090	90	118	357	21.6	7 - 9

### 240VAC

Model	50 W/sqft 3" Spacing (Sq Feet)	38 W/sqft 4" Spacing (Sq Feet)	Cable Length (Feet)	Amp Draw	Ohms
SC50240015	15	20	59	3.1	64 - 79
SC50240025	25	33	98	5.2	46 - 57
SC50240030	30	39	118	6.3	30 - 38
SC50240040	40	53	158	8.3	26 - 33
SC50240045	45	59	178	9.4	20 - 25
SC50240055	55	72	218	11.5	18 - 23
SC50240060	60	79	238	12.5	14 - 18
SC50240065	65	85	257	13.5	12 - 16
SC50240075	75	98	297	15.6	11 - 15
SC50240080	80	105	317	16.7	10 - 13
SC50240090	90	118	357	18.8	9 - 12
SC50240105	105	137	417	21.9	8 - 11

### 277VAC

Model	50 W/sqft 3" Spacing (Sq Feet)	38 W/sqft 4" Spacing (Sq Feet)	Cable Length (Feet)	Amp Draw	Ohms
SC50277018	18	24	71	3.2	77 - 95
SC50277030	30	29	118	5.4	55 - 68
SC50277035	35	46	138	6.3	36 - 45
SC50277045	45	59	178	8.1	29 - 37
SC50277055	55	72	218	9.9	24 - 31
SC50277060	60	79	238	10.8	19 - 25
SC50277070	70	92	277	12.6	17 - 21
SC50277075	75	98	297	13.5	14 - 18
SC50277080	80	105	317	14.4	12 - 16
SC50277090	90	118	357	16.2	11 - 15
SC50277105	105	137	417	19.0	11 - 14
SC50277115	115	150	456	20.8	9 - 12

## **STEP 1.5 (ProMelt Cable only)**

If the cable is to be laid on top of an existing slab, select enough Cable Strap to secure the cable to the surface. One box contains 25 ft. of strap, enough to secure about 50 sq. ft. of cable at 4-ft parallel spacing. Cable strap is usually spaced no more than 3 to 4 feet apart.

## **STEP 1.6**

### **Select the controls and sensors for your ProMelt Mats/Cables.**

Various types of controls may be used. If you need assistance in selection, see our product catalog, contact your local dealer, or call the factory. Always consult your electrician and designers to ensure proper sizing, location, and site capabilities.

Refer to the Appendix for typical wire diagrams.

The following guidelines are given to help identify the best solution.

#### **Determine Zoning:**

*One Zone.* In many instances all the areas can be heated at the same time with one control. The control can be connected to many cables and mats with multiple circuit breakers if needed. One sensor will tell the control when to operate.

*Multiple Zones.* In some instances it may be preferable to have some areas heated separately from other areas. This could be the case if you want to snowmelt the sidewalks in front of a store automatically first, then melt rear entrance areas manually later. In these cases, each “zone” will require its own control and sensor. Do not try to control multiple zones with one sensor.

#### **Determine Sensing:**

*Pole-mount sensing.* This is the recommended method of sensing moisture and temperature in the area. The PM-2B, PM-5, and PM-224 are controls with the moisture sensor attached directly on top of the control, so it needs to be mounted on a conduit in a location that will receive the snowfall on top of the control. The PM-824 control has the moisture sensor attached to a 10ft long cable, so this sensor may be mounted on a bracket or conduit away from the building to receive the snowfall, while the control is mounted on an outside wall. The PM-224 and PM-824 are low-voltage and therefore must be used with the Contactor Pro. All of these controls provide reliable automatic detection of the snow and adjustable delay times to allow complete melting of the snow.

*In-slab sensing.* The PM-HSC5 sensor mounts directly into the slab where snow melting is placed. The location for this sensor must be chosen carefully to ensure proper operation. This is also a low-voltage sensor and must be used with the Contactor Pro.

#### **Determine Load Size to Select Controls:**

*Small Load.* Calculate the total “amp draw” of the mats and/or cables you have selected for the zone (see Tables 1 and 2). If the total is 30 amps or less, then you may select one of the following:

- A PM-2B control (120VAC, 208VAC, or 240VAC only), for the simplest, direct control, or
- A Contactor Pro, and either the PM-224 sensor control or PM-824 sensor control, or
- A Contactor Pro and an in-slab sensor PM-HSC5.

*Large Load.* If the total “amp draw” of the mats and/or cables for the zone is over 30 amps, you may select one of the following:

- A PM-5 control (120VAC, 208VAC, or 240VAC only, up to 60 amps), for the simplest, direct control, or
- A Contactor Pro, and either the PM-224 sensor control or PM-824 sensor control, or
- A Contactor Pro and an in-slab sensor PM-HSC5.



### **Outdoor Heating Application:**

If the ProMelt is intended to add heat to the space or objects in the area, special consideration must be given to the controls and sensing since the goal is different from snow melting.

If the ProMelt is to be used for both automatic snow melting and heating, first follow the guidelines above for selecting the snow sensing and control solution.

Select the desired heating control:

- A 24VAC "slab sensing" thermostat control may be used. It may be connected to the Contactor Pro™ panel along with the snow melt sensor, allowing either one to operate the system. Plan to install the sensor included with this thermostat into conduit for protection in the slab. Refer to the Appendix for wiring diagrams and the instructions provided with the selected thermostat for details.
- Other controls may be used as long as they have an indicator that the system is heating, are sized properly for the system, and are rated for the application and location selected.

DO NOT operate the ProMelt system in ambient temperatures above 68°F (20°C), except for a brief test. Heating performance is never guaranteed. The amount of heat added to the area is dependent on many factors such as air and ground temperature, wind speed, solar heat, moisture, etc. If you have any questions regarding expected performance in your application, please contact the factory.

### **STEP 1.7**

**Consult with your electrician** to make sure the mats/cables, control, and design you have selected will work properly.

- The ProMelt Mat/Cable and its control must be placed on a dedicated power supply from the circuit breaker panel.
- The ProMelt Mat/Cable is a resistance heating system and should be considered as a continuous load for branch circuit sizing purposes.
- The circuit breaker must open all ungrounded conductors at the same time. A GFEP type (typically 30 mA trip) is required to directly protect the ProMelt Mat/Cable.
- Circuit breaker size and circuit wiring should be designed to 125 percent of heating mat load:
  - 20 amp circuit for load up to 16 amps
  - 30 amp circuit for load up to 24 amps
  - 40 amp circuit for load up to 32 amps
  - 50 amp circuit for load up to 40 amps
  - 70 amp circuit for load up to 50 amps
- Follow NEC, CEC, and local code guidelines for branch circuit wiring, conduit, and junction box installations. Outdoor and underground junction boxes and conduit must meet rain tight or watertight requirements as required.

### **STEP 1.8**

Insulation is not recommended underneath snow melt or exterior heated areas if vehicular traffic will be present as compression of the insulation may occur over time. Improper type or use may cause cracking of the slab and possible damage to the ProMelt Mat/Cable.

# Phase 2: Preparations

Before installing ProMelt, make sure to fully check out the products, and carefully plan your site. The following steps may not necessarily occur in the order shown, depending on contractor and electrician scheduling and variations in site preparation requirements. A good discussion with all parties involved will help eliminate costly errors and damages.

## ***INSPECT MAT/CABLE, CONTROL, and SENSOR***

### **STEP 2.1**

Remove the ProMelt Mat/Cable, control, and sensor from their packages. Inspect them for any visible damage and verify everything is the correct size and type according to your plan and order. Do not attempt to install a damaged product.

### **STEP 2.2**

Record the mat/cable information in Table 3, on the following page. Give this information to the homeowner to keep in a safe place.

The mat/cable model number, serial number, voltage, and resistance range are shown on a nameplate label attached to the power leads. **Do not remove this nameplate label. The electrical inspector will need to see this.**

### **STEP 2.3**

Use a digital multi-meter to measure the resistance between the conductors of the mat power leads. Record these resistances in **Table 3** under "Out of the box before installation".

The resistance between the white lead wires should be within the resistance range on the nameplate label. If it is a little low, it may be due to low air temperatures or meter calibration. Consult the factory if you are in doubt.

The resistance between the white leads and ground lead should be "open", usually indicated by an "OL" or whatever your meter shows when the test leads are not touching anything. If there is any change in the reading, record this information and contact the factory before installing. This could indicate damage, test lead problems, or a number of other issues. Try "pinning" the test leads to the mat/cable lead wires against a hard non-metal surface if your readings fluctuate.

### **STEP 2.4**

Your electrician should perform an insulation resistance test on the mat. A megohmmeter (e.g. Megger®) adjusted to a minimum 1000 VDC should give a measured value at least 20 megohm (MΩ). Do not apply over 1500 VDC.

**⚠ WARNING:** Megohmmeters apply high voltage and could shock or cause serious injury if improperly used. Follow megohmmeter instructions for safe and proper use.



**The LoudMouth™ monitor shown at left will constantly monitor the heating wire during the entire installation process. If the wire is cut or damaged during installation, this device sounds an alarm. The LoudMouth will prevent burying a damaged wire below hardened concrete.**



**Please use the Mat/Cable resistance log on next page**

### Table 3 - Mat/Cable Resistance Log

	Mat/Cable 1	Mat/Cable 2	Mat/Cable 3
Mat/Cable serial number			
Mat/Cable model number			
Mat/Cable voltage			
Mat/Cable resistance range			
<b>OUT OF THE BOX BEFORE INSTALLATION</b>			
Mat/Cable white 1 to white 2			
Mat/Cable white 1 to ground			
Mat/Cable white 2 to ground			
<b>AFTER MAT/CABLE IS SECURED IN PLACE</b>			
Mat/Cable white 1 to white 2			
Mat/Cable white 1 to ground			
Mat/Cable white 2 to ground			
<b>AFTER COVERINGS ARE APPLIED</b>			
Mat/Cable white 1 to white 2			
Mat/Cable white 1 to ground			
Mat/Cable white 2 to ground			
<b>Retain this log to retain the warranty! Do not discard!</b>			

### **BASE MATERIAL**

#### **STEP 2.5**

Prepare the site that you want to heat with ProMelt Mat/Cable. This includes making sure all utilities and obstructions are accounted for.

#### **STEP 2.6**

##### General

Ensure the base is a smooth, well-compacted and solid base. If the mat/cable is to be placed on existing slab, inspect it for any sharp or loose objects, or other potentially damaging issues.

Ensure proper slope and drainage to avoid water buildup in any heated or surrounding areas. This is especially important for brick paver applications, as melted water may re-freeze and heave surrounding sand and paver areas.

Follow local building codes and construction guidelines for grade requirements and slab thickness in your area. Ensure that the base is at the proper height to allow the total slab thickness needed and that the cable will be embedded at the proper distance below the top surface to avoid damaging the cable. It is very important for the cable to be completely embedded.

#### **STEP 2.7**

##### Concrete Application

For a new pour, attach reinforcement, such as wire mesh or rebar, over the base at the required level below the top surface. You must use "chairs" or other appropriate objects to raise the wire mesh to the correct level. The ProMelt Mat/Cable will be attached to this reinforcement later. It is very important for the cable to be completely embedded in concrete.

Protect or remove sharp protrusions by bending them over, capping, or cutting. Sharp edges may damage the heating cable.

#### **STEP 2.8**

##### Asphalt Application

Apply a first course over the gravel base and compact it. The ProMelt Mat/Cable will be secured to the top of this later. Allow it to cool enough to work on before installing ProMelt Mat/Cable.

## STEP 2.9

### Paver or Stone Applications

Follow guidelines recommended by the paver manufacturer. If a coarse of sand is to be applied over the gravel base, the mat/cable must **first** be secured in place and then covered with a minimum 1-1/2 inch layer of sand to completely embed the mat.

## STEP 2.10

### Ceramic or Stone Tile Applications

ProMelt mats or cables can be installed in the structural slab or in a thick mortar bed above a structural slab. In either case, the base material should be prepared according to section 2.7 Concrete Application.

# ELECTRICAL

## STEP 2.11

Install junction boxes in the location(s) planned during the design process Phase 1 (see Step 1.3).

## STEP 2.12

Install conduit and branch circuit wiring from the circuit breaker panel to the control location, and from the control to the junction boxes. Follow local code for wire size, conduit requirements, and proper installation procedure.

## STEP 2.13

Install conduit from the junction box to the edge of the slab to be heated. Extend this conduit into the slab edge about 2 to 6 inches and attach a bushing to the end to prevent damaging the mat/cable power leads.

- Follow electrical code for burial depth of the conduit.
- Plan carefully if you are installing edge pavers, edge drainage systems, landscaping, or other items that affect where the conduit comes in.

## STEP 2.14

If a PM-HSC-5 slab sensor is to be embedded in the heated area, install conduit from the control location to the desired slab location. When installing the PM-HSC-5 slab sensor in asphalt, it is necessary to encapsulate the sensor housing in a 12"x12" concrete pad. Follow the sensor instructions for proper placement and connections.

## STEP 2.15

Install the circuit breaker size and type as determined earlier in step 1.7 (Designing the System). DO NOT connect the branch wiring to the breaker yet.

## STEP 2.16

Label the circuit breaker in the panel which feeds this snow melt mat/cable system with "Snow Melt" or similar.

# Phase 3: Installation of Mat and/or Cable

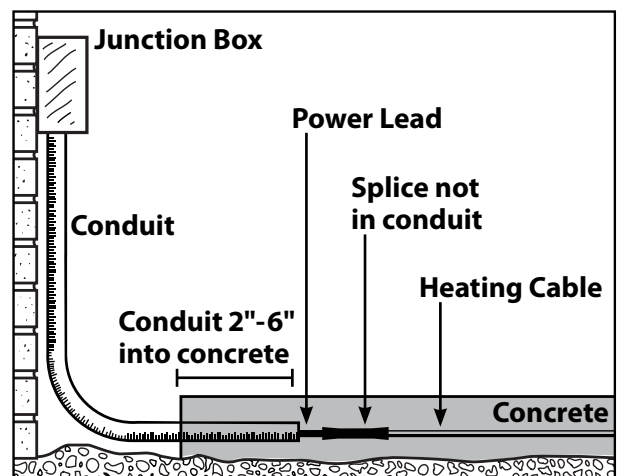
The following Steps 3.1 through 3.12 cover installation basics. Steps 3.13 through 3.14 cover some specific applications and their special requirements.

## BASIC INSTALLATION

### STEP 3.1

Determine a time to install the mat/cable when equipment, heavy tools, and site traffic will be minimal to keep from possibly damaging the product. Be prepared to apply the surfacing courses over the mat/cable the same day so it will be protected from damage.

If installing mat/cable in the upper layer of a two-stage concrete slab or the upper layer of an asphalt application, the mat or cable should be completely ready for the second stage. There is limited



time between stages, as the slab should not be allowed to fully cure or the asphalt to completely cool. Therefore, if using ProMelt Cable, you may want to lay it out and tie it to rewire that can be quickly lifted into place after the first stage is laid. This might also be preferable for a mat installation, although if mats are pre-cut and shaped to the area, they generally can be rolled into place fairly quickly.

If a slab sensor is installed in this second layer, plan ahead so this does not cause the first layer to cure or cool too much.

Inspect the area and remove any sharp objects.


Install in temperatures at least 40°F (4.5°C).

### STEP 3.2

Begin by test-fitting the mat or cable in the area to be heated. For mat, unroll it completely. Turn and flip it by cutting the tape where needed. Make sure it fits the area properly. For cable, make sure it fits the area with no excess cable.

**IMPORTANT:** This heating cable CANNOT be cut shorter to fit! Do not overlap or cross over heating cable on itself. Do not space heating cable closer than 2 inches.

- Mat/cable cannot be laid closer than 6 inches from the edges of slabs. In asphalt, this is increased to 12 inches from the edge where no curb is provided.
- Avoid crossing expansion joints in a slab, unless proper technique and protection steps are followed (see Step 4.14 on page 16).
- Avoid placing the heating cable any closer than 2 inches from other items such as underground cable or piping to keep from overheating them.
- Allow at least 2 inches, but not more than 4 inches, between adjacent mats or sections of a mat where the mat tape is cut and turned to fill the area.

 **WARNING:** The heating cable and factory splices of ProMelt Mat and/or Cable **must be completely embedded in the concrete, sand, or asphalt.** Never try to use up excess heating cable in surrounding soil, walls, or other unprotected applications. The factory splice and heating cable can not be inside the conduit.

- Do not repeatedly bend the heating cable, and never bend factory splices.

### STEP 3.3

Place the power leads of the mat/cable next to the conduit entry. The electrician will pull this through the conduit later. Make sure it is positioned so that **no part of the splice connection or the heating cable will be pulled into the conduit.**

### STEP 3.4

#### Concrete Application

**ProMelt Mat:** Begin laying out and securing the mat about every 2 feet to the reinforcement mesh or rebar using plastic cable ties around the heating cable. Turn the cable tie ends downward, or trim them so they will not poke up through the surface layers. Do not use metal ties as they may damage the cable.

If installing on top of existing slab, secure the mat by nailing through the tape every 2 feet or so. NEVER strike the heating cable with a hammer.

**ProMelt Cable:** Begin securing the heating cable at the desired spacing to the reinforcement mesh or rebar using plastic cable ties. These cable ties should be applied at the ends of each run and at every 3 to 4 feet. Turn the cable tie ends downward, or trim them so they will not poke up through the surface layers. Do not use metal ties as they may damage the cable.

If installing on top of existing slab, secure CableStrap to the surface. Use nails or similar, every 6 to 10 inches. CableStrap should be placed at either end of the heated area, and additional straps should be applied every 3 to 4 feet in between to hold the cable in place during surfacing.

### STEP 3.5

#### Asphalt Application

**ProMelt Mat:** Begin laying and securing the mat to the first course, using nails, staples or similar into the mat tape every 2 feet or so. Make sure it is laid flat. Do not use metallic nails or staples directly over the heating cable. Be careful not to damage the heating cable.

**ProMelt Cable:** Secure CableStrap to the surface. Use nails or similar, every 6 to 10 inches. CableStrap should be placed at either end of the heated area, and additional straps should be applied every 3 to 4 feet in between to hold the cable in place during surfacing.



### STEP 3.6

#### Stone or Paver Application

**ProMelt Mat:** Begin laying out the mat and secure it onto the base with landscape fabric stakes or similar over the mat tape every 2 feet or so. Make sure it is laid flat. Do not use metallic stakes or staples directly over the heating cable. Be careful not to damage the heating cable.

**ProMelt Cable:** Secure plastic mounting cable ties to the gravel base, driving long nails or similar through the head of the cable tie. These cable ties should be applied at the end of each run and at every 3 to 4 feet. Do not use metallic cable ties as they may damage the cable.

Lay out the cable and secure with the cable ties.

### Step 3.7

#### Ceramic or Stone Tile Applications

1) Dry-set or Latex-Portland Cement (thin-set) Mortar Application – For this application, the mat or cable is installed in the concrete slab base, no less than 1.5" and no deeper than 2" below the top surface, so follow recommendations in section 3.4 for mat or cable.

2) Cement Mortar or Thick-set Application – For this application, the cable will be installed in a minimum 1.25" thick mortar bed above the structural slab.

**ProMelt Mat:** Begin laying out the mat and securing to the top of the slab with nails, staples, or similar through the tape every 2 feet or so. Never strike the heating cable with a hammer. Minimum 1.25" mortar bed will be installed over the cables.

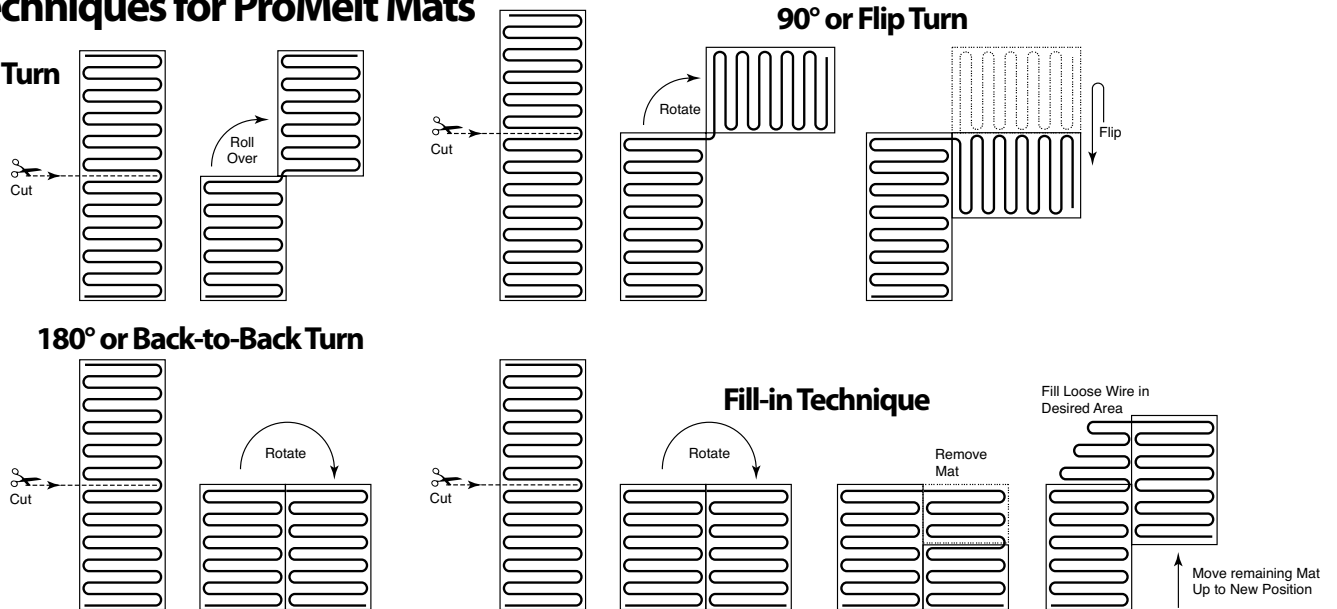
**ProMelt Cable:** Secure CableStrap to the surface of the slab, using nails spaced every 6 to 10 inches. CableStraps should be placed at either end of the heated area for the initial layout. Additional straps should be placed every 3 to 4 feet to hold the cables in place during application of the thick-set mortar. Minimum 1.25" mortar bed will be installed over the cables.

### STEP 3.8 (ProMelt Mat Only)

If you need to cut and turn the mat, or fill odd areas, you may use scissors to carefully cut the tape holding the heating cables. Heating cables should be secured at about 3 inches apart, and no less than 2 inches apart.

**CAUTION:** Be careful not to kink or sharply bend the heating cable. A minimum bend radius of **1 inch** should be maintained.

### Turn techniques for ProMelt Mats



### STEP 3.9

Use a digital multi-meter to measure the resistance between the conductors and ground wire of the mat/cable power leads again. Record these resistances in **Table 3** under "After mat/cable is secured in place".

### STEP 3.10

Feed the power leads through the conduit into the junction box, leaving at least 6 inches of free lead length. Secure the heating cable and splice so that they will not be pulled into the conduit.

Insert a generous amount of electrical conduit sealant into the conduit end around the power leads to prevent water entry

### STEP 3.11

If a slab sensor is being installed, place the sensor socket according to the instructions included with the sensor. Secure and seal it to the conduit installed earlier. It should be located halfway between heating cables and in an area that is recommended by the sensor manufacturer. Make sure the top of the sensor will be flush with the surface of the finish layer. Make sure it is protected with a cap or seal.

### STEP 3.12

Take a photo of the mat/cable installation. This can be very helpful later for utility work, changes to the site, etc. to avoid possible damage. Keep the photos with this installation manual.



**PM-HSC5 Slab Sensor**

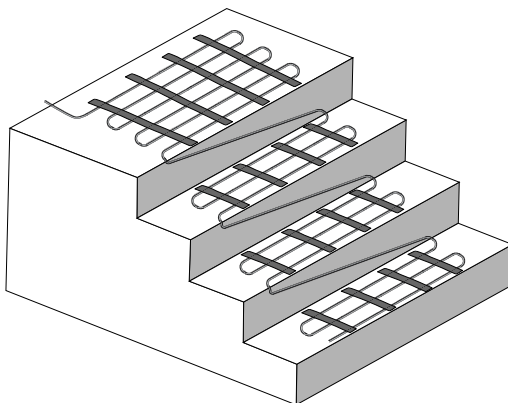
## SPECIAL APPLICATIONS

### STEP 3.13

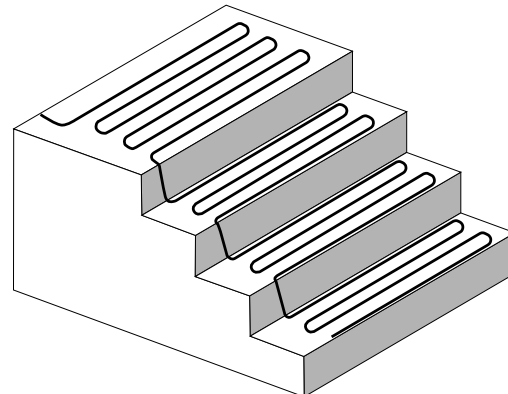
**Stairs:** If you are installing **ProMelt Mat** onto stairs, carefully cut the tape holding the heating cable. If installing **ProMelt Cable**, skip the previous step. Secure a single run of cable to the side of a riser. Lay 3 or 4 runs of cable on the tread area as needed and continue up each stair. Follow these guidelines:

- Lay cable no greater than 3 inches from the front edge of the finished tread. Otherwise this edge may not snow melt properly.
- Lay cable at least 6 inches from the side edges of the finished tread.
- Account for future hand railings that could be mounted onto the tread, especially in the middle of a long tread if required. Use a marker or indicate on drawings where the railing may be installed safely later.
- Avoid pinching or sharply bending the cable. At the corner of the riser and tread, keep a minimum 1-inch radius bend, but secure it flat enough that the surface concrete or pavers will not pinch the cable.
- Do not install the mat/cable on or under non-masonry stairs such as wooden or composite construction.

**ProMelt Mat on stairs**



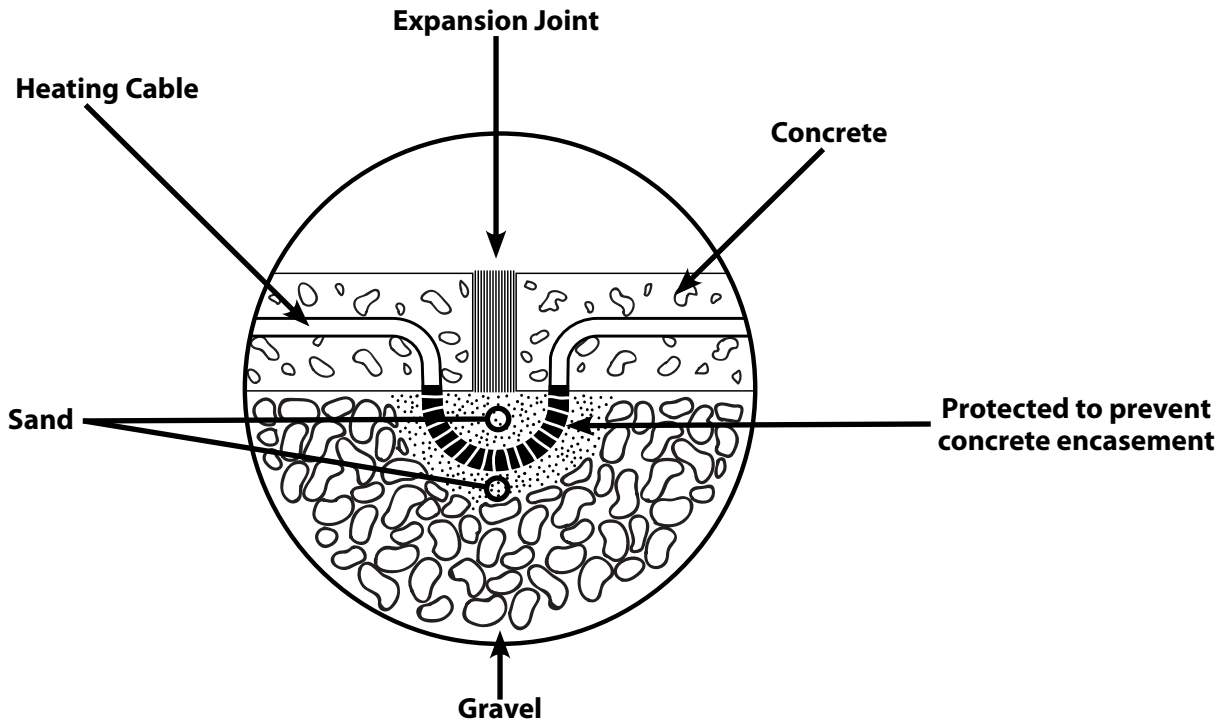
**ProMelt Cable on stairs**



### STEP 3.14

**Expansion Joints:** ProMelt heating cable must never be run through an expansion joint. Doing so may cause damage to the cable with slab movement. It is recommended to lay the mat so these joints are avoided.

However, if it is necessary, a portion of the heating cable may be dropped into the grade below the expansion joint as shown. Fill around the cable with at least 1 inch thick sand. The loop of heating cable should be long enough to allow flexing, and must not be embedded into the concrete (the sand should protect against this) since this would not allow the cable to flex with slab movement.



## Phase 4: Finish Surfaces

### STEP 4.1

Before beginning work, inspect the mat/cable for damage and secure any mat/cable that may have come loose.

**To avoid burying any possible damage that may have occurred since the mat was laid, the following tests should be performed:**

Use a digital multi-meter to measure and record the resistance between the conductors of the mat/cable power leads again (see Step 2.3). If possible, your electrician should perform an insulation resistance test on the mat/cable. A megohmmeter (e.g. Megger®) adjusted to a minimum 1000 VDC should give a measured value at least 20 megohm (MΩ). Do not apply over 1500 VDC.

**CAUTION:** Be prepared to install a marker plate or other identification indicating the presence of ProMelt in the slab. This will help avoid damage from future site work. Install a marker plate where clearly visible in each snow-melted area. A marker plate is placed flush in the wet concrete surface or soft asphalt surface. Other types of surfaces should be made to allow the marker plate to be installed flush with the surface. Do not damage the heating cable.

## STEP 4.2

### Concrete Application

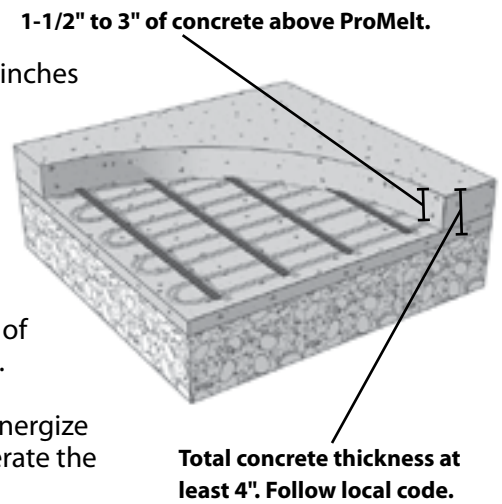
Pour concrete over the base and ProMelt Mat/Cable so that no less than 1-1/2 inches and no more than 3 inches covers the top of the heating cables. The slab should be a minimum of 4 inches thick total. Driveways normally require thicker. Follow building code requirements for required thicknesses.



**CAUTION:** Do not use sharp tools which could damage the ProMelt. Blunted shovels should allow you to work the concrete carefully into all areas.

- Make sure the heating cable is fully embedded as well as 2 to 6 inches of the conduits enclosing the power lead and slab sensor wiring (if used).

Allow the concrete to fully cure as required by the concrete supplier. Do not energize the ProMelt Mat/Cable except to briefly test it, as this would improperly accelerate the curing and potentially cause concrete damage.



## STEP 4.3

### Asphalt Application

If required, apply a prime coat to the first course or untreated base over the top of the cable.

Use 1/2" aggregate or smaller. Larger aggregate can cut or pinch the cable.

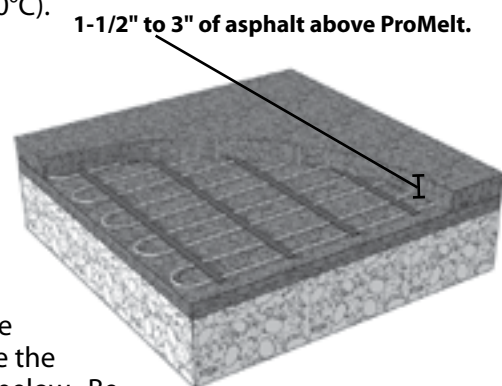
Before applying, ensure the asphalt temperature is not greater than 285°F (140°C). Good compaction of the asphalt requires a certain temperature range of installation, depending on the type of asphalt being installed.

Manually lay the asphalt onto the area. Do not apply with asphalt machines as they may damage the cable.

Spread the asphalt so that no less than 1-1/2 inches and no more than 3 inches covers the top of the heating cables.

Compact the asphalt with a small power roller or compactor. Avoid using large power rollers which may compress aggregate into the cable. If possible, move the roller perpendicular with the cable direction to help avoid stress on the cable below. Be careful not to stop or start the roller over the mats as this could cause the asphalt to shift, potentially damaging the cables.

- Make sure the heating cable is fully embedded as well as 2 to 6 inches of the conduits enclosing the power lead and slab sensor wiring (if used).
- **DO NOT** energize the ProMelt system until the asphalt is fully cooled and cured per the manufacturer.



## STEP 4.4

### Stone or Paver Application

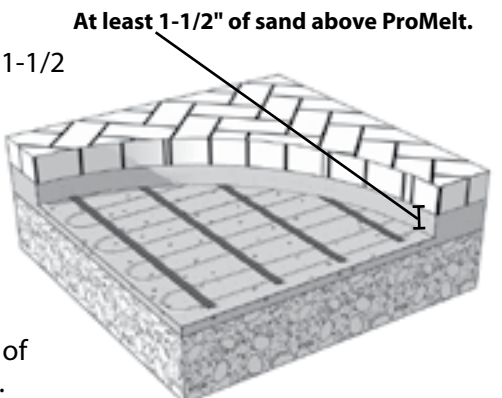
Manually spread sand over the top of the cables and base so that no less than 1-1/2 inches covers the top of the heating cables. Be careful not to use sharp tools.

Compact the sand as recommended by the paver supplier, being careful not to uncover any of the ProMelt Mat/Cable and not to damage the conduits coming into the area. Use hand compacting tools around the conduit area. Add more sand if necessary to maintain minimum 1-1/2 inches over all of the cables and conduit.

- Make sure the heating cable is fully embedded as well as 2 to 6 inches of the conduits enclosing the power lead and slab sensor wiring (if used).

Place the pavers over the top and finish as required.

The thicker the mass that ProMelt is embedded in, or the deeper the cable is beneath the finish surface, the longer it will take to melt snow from a cold start. Thermal masses thicker than 4" total thickness may have response times that are unacceptably long, and may need to use control strategies that minimize the response time.



## Step 4.5

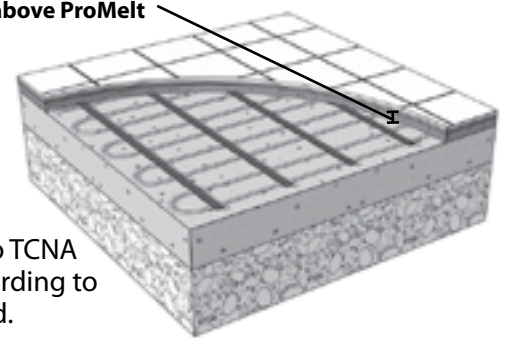
### Ceramic or Stone Tile Applications

For either application below, exterior-grade materials should be selected and installed per manufacturer's recommendations. Only vitreous (non-porous) tile should be used as other tile will absorb moisture which will lead to failure. The maximum thickness above the cable should be no less than 1.5 and no more than 2.5". A movement joint should be installed between any heated and non-heated area.

1) Dry-set or Latex-Portland Cement (thin-set) Mortar Application – In this application, the mat or cable is already installed in the concrete slab. The primary concern is to install a cement mortar bond coat (thin-set) and tile according to Tile Council of North America (TCNA) recommendations for exterior applications (F102-07). Mortar and grout materials should be as specified per American National Standards Institute (ANSI) for exterior applications.

2) Cement Mortar or Thick-set Application – In this application, the mat or cable is installed above the structural slab in a thick mortar bed and bond coat according to TCNA F101.07. A 1.25" minimum mortar bed should be placed over the cable or mat according to ANSI A108.1A guidelines. Above this layer, the mortar bond coat and tile is installed.

1-1/2" to 2.5" of "specified material" above ProMelt



## STEP 4.6

Use a digital multi-meter to measure the resistance between the conductors of the mat/cable power leads again. Record these resistances in **Table 3** under "After coverings are applied".

# Phase 5: Controls and Sensors

Refer to Typical Wiring Diagrams on pages 20 and 21.

## STEP 5.1

De-energize all circuits feeding this system before doing any electrical work.

## STEP 5.2

If a PM-HSC5 slab sensor is being installed, uncover the cap or seal on the embedded sensor socket. Feed the sensor leads through the conduit up to the control. Secure the sensor into the socket and finish this installation as required by the sensor manufacturer.

## STEP 5.3

Make wire connections at junction boxes for the ProMelt Mat/Cable power leads to the power wiring from the control. If the junction box is located outdoors, it is highly recommended to use wet location rated wire nuts or crimps to avoid corrosion.

## STEP 5.4

Install the control at its location according to the instructions provided with the control. Make wiring connections to the power source and to the sensor wires and mat/cable lead wires. **Caution:** *The ground wire supplied with the mat/cable must be connected to a suitable grounding/earthing terminal.*

## STEP 5.5

After careful inspection of all wiring, connect the power supply wiring to the ground fault type circuit breaker and turn it on.

## STEP 5.6

Follow instructions for the control to set it up. The sensor should not allow the system to energize the ProMelt until proper conditions exist. The control may allow you to temporarily test the system for just a few minutes. If you have a clamp-on type electrical test meter, energize the system briefly and verify it is drawing the proper level of current into the mat/cable as planned.

Do not fully energize the ProMelt, except for this brief test, until the concrete is cured or asphalt is cool. Heating the ProMelt too soon could cause improper curing of the surface materials.

**CAUTION:** Do not operate the system with air temperatures above 68°F (20°C) except for this brief test. This will stress the materials and reduce the life of the heating cable and may cause damage to the materials and heating cables.



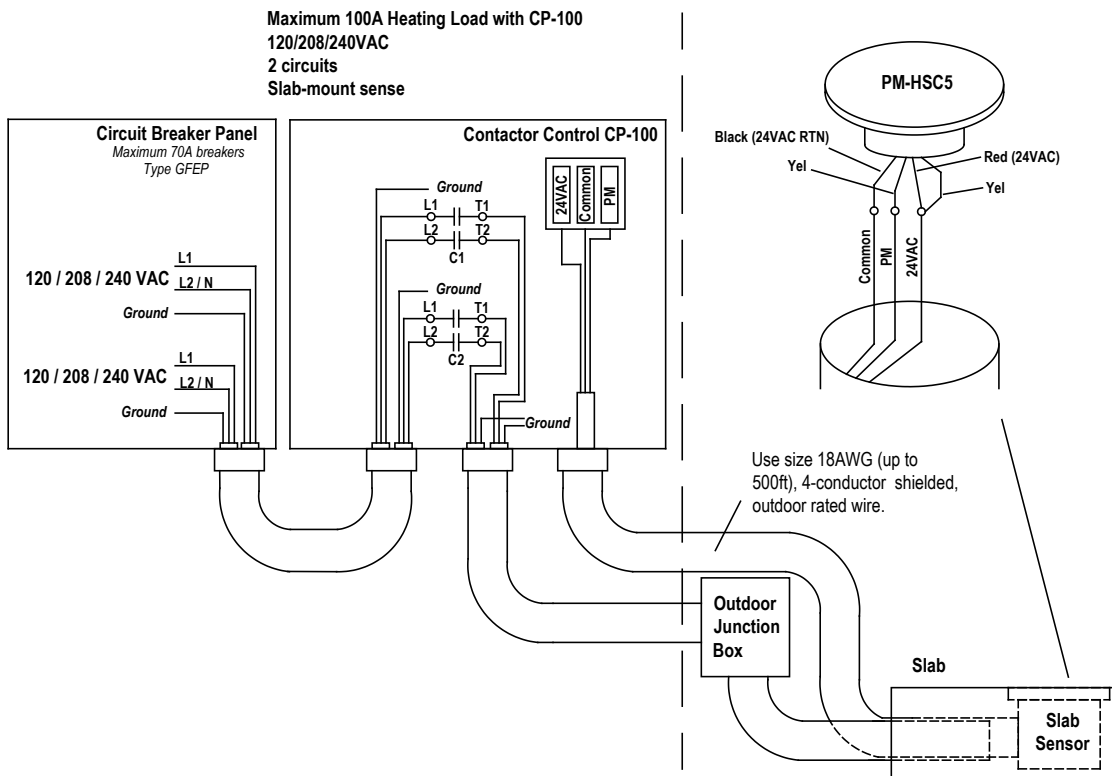
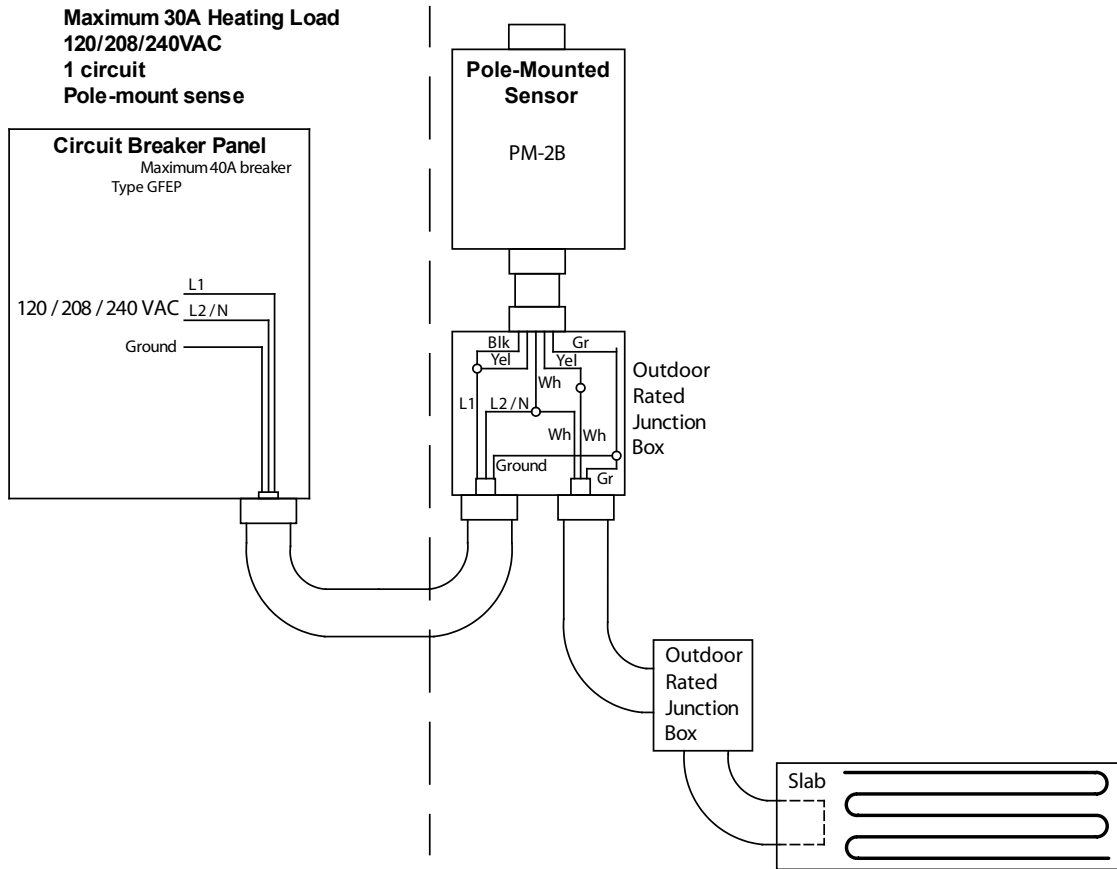
# Troubleshooting

If not qualified to perform electrical installations, it is strongly recommended that a qualified, licensed electrician be hired to install the heating cables and related electrical components. If problems with the system arise, please consult the troubleshooting guide below. Any troubleshooting work should be done with the power removed from the circuit, unless otherwise indicated. Call the factory for further assistance (see contact information on back cover).

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
Mat/cable resistance measurement is outside the range printed on the nameplate label.	An analog ohmmeter (using a moving needle) was used to take the reading.	Obtain a digital ohmmeter (multi-meter) able to read 0 to 20,000 (20k) ohms ( $\Omega$ ) and re-measure the resistance.
	If measurement shows an open or short circuit, the heating cable has been damaged.	Record resistances between all power lead wires and contact the manufacturer.
	If measurement is just a little low or high, air temperature has affected the resistance.	If possible, place the mat/cable in a room 65-75 °F (18-24°C) and re-measure after an hour.
	The resistance measurement could be from more than one mat/cable.	Disconnect all cables/mats from each other and from controls and re-measure.
	The ohmmeter (multimeter) is set to the wrong scale.	If the ohmmeter (multi-meter) has multiple ranges (e.g. 200 $\Omega$ , 2k $\Omega$ , 20k $\Omega$ , 200k $\Omega$ , 20M $\Omega$ ) set the range to 200 $\Omega$ and re-measure.
Snow/ice is not melting.	Mat/cable has been damaged.	Measure mat/cable resistances (see Phase 2) between all power lead wires as shown in Phase 3 of this manual. If there is an open or short-circuit damage, record these resistances and contact the manufacturer.
	Ground fault has tripped.	Try resetting the ground fault on the circuit breaker ONCE. If it trips again, do not continue to try resetting it. Check for loose wire connections in the breaker panel, junction boxes, controls, etc. Measure mat/cable resistances (see Phase 2) between all power lead wires as shown in Phase 3 of this manual. If there is an open or short-circuit damage, record these resistances and contact the manufacturer.
	Incorrect voltage applied.	Briefly energize the system and use a multi-meter to measure the voltage between power lead wires of the mat/cable. Check voltage ratings for each control and cable to make sure they match. If possible, use an "amp clamp" meter to measure the current into each mat/cable.
	Mats/cables are connected in series.	Multiple mats/cables must be connected in "parallel".
System operates continuously.	Incorrect wiring. Control was "bypassed".	Check wire connections. See wiring instructions with control and in this manual.
	Faulty control. Relay is not opening properly.	Check instructions with the control.

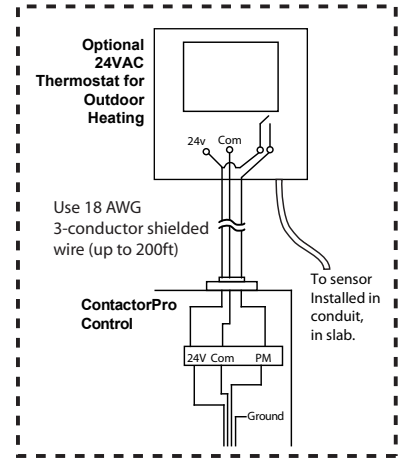
# Appendix: Typical Wiring Diagrams

Following are examples of typical wiring connections for the ProMelt systems. Carefully read and follow the instructions given with each control for complete information. All electrical work must be performed by a qualified personnel, in accordance with local codes, ANSI/NFPA 70(NEC Article 426) and section 62 of the CEC part 1.

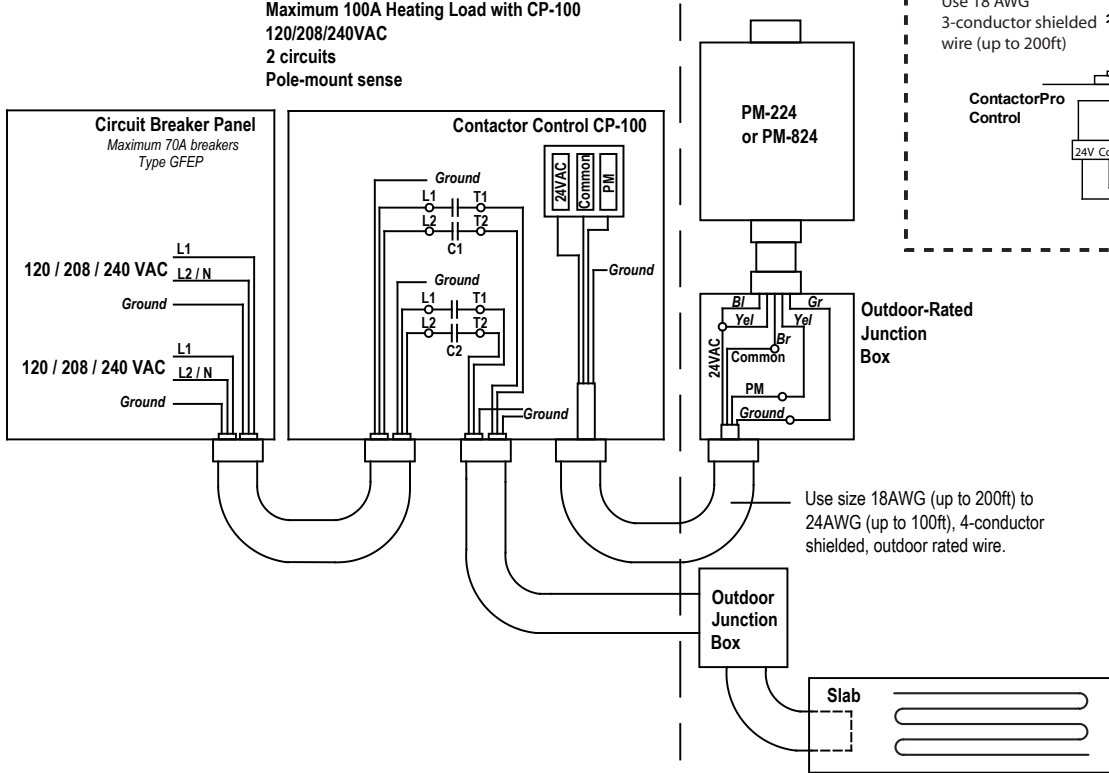


**Wiring for optional Outdoor Heating Thermostat.**

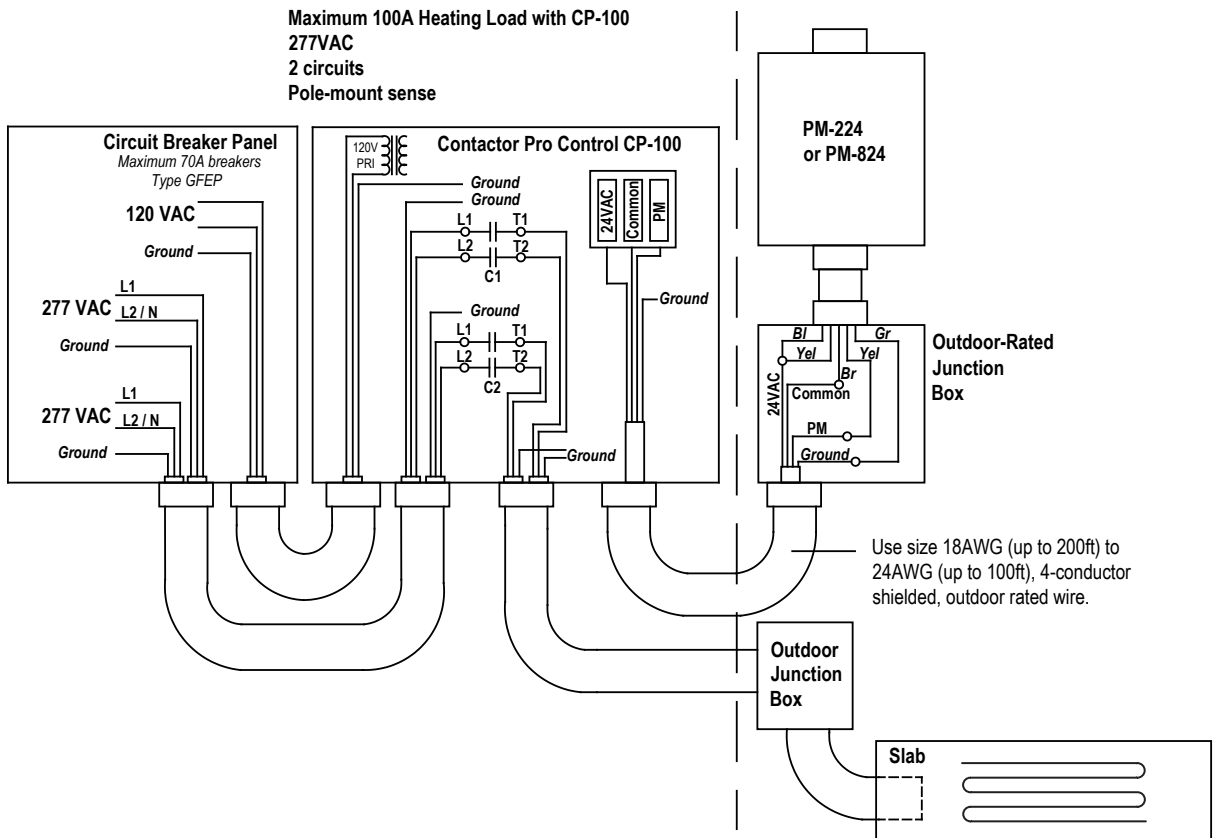
(located indoors, install per manufacturer instructions)



**Maximum 100A Heating Load with CP-100**  
**120/208/240VAC**  
**2 circuits**  
**Pole-mount sense**



**Maximum 100A Heating Load with CP-100**  
**277VAC**  
**2 circuits**  
**Pole-mount sense**











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