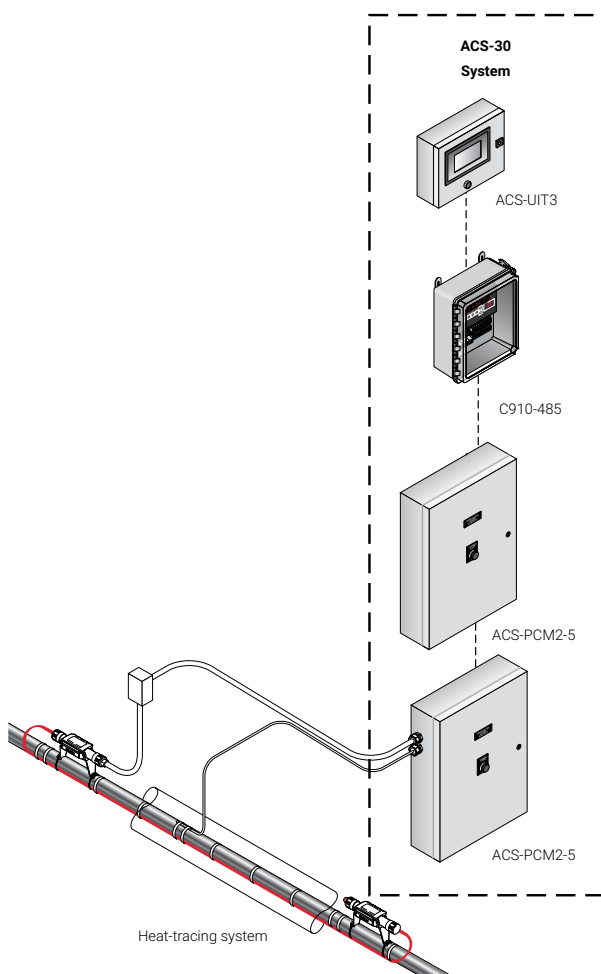


## Multipoint commercial heat-tracing system

### PRODUCT OVERVIEW



The nVent RAYCHEM ACS-30 Advanced Commercial Control System is a multipoint electronic control and monitoring system for heat-tracing applications. These applications include commercial freeze protection, surface snow melting, roof and gutter de-icing, and flow and temperature maintenance.

The ACS-30 system can control up to 260 circuits with multiple networked ACS-PCM2-5 panels, or nVent RAYCHEM C910-485 controllers for single circuit system extension. The nVent RAYCHEM ACS-PCM2-5 panel can directly control up to 5 individual heat-tracing circuits using electromechanical relays rated at 30 A up to 277 V. Four Resistance Temperature Detector (RTD) sensor inputs can be assigned for each heating cable circuit providing a variety of temperature control, monitoring, and alarm options. The ACS-30 can be fitted with 16 nVent RAYCHEM RMM modules, providing an additional 128 temperature inputs to a maximum of 388 inputs.

#### Control

The ACS-30 is pre-programmed with parameters for commercial hot water temperature maintenance, pipe freeze protection, flow maintenance, freezer frost heave prevention, surface snow melting, roof and gutter de-icing prevention and floor heating applications. The pre-programmed application settings significantly simplify setting up multiple heating cable circuits. Based on the application the ACS-30 can be configured for On/Off, Ambient Sensing, Proportional Ambient Sensing (PASC), and timed duty cycle control modes for HWAT applications.

The ACS-30 measures temperatures with 3-wire, 100-ohm platinum RTDs connected directly to the unit, or through optional Remote Monitoring Modules. Each RMM module accepts up to eight RTDs. Up to 16 RMM modules can be networked over a single RS-485 cable to the ACS-30, significantly reducing the cost of RTD wiring.

The built-in calendar function for hot water temperature maintenance, floor heating and greasy waste applications provides flexible timed set points providing energy savings.

#### Monitoring

To assist with energy management the ACS-30 monitors the power consumption of each heating cable circuit for up to five years of operation. The data may be graphically displayed daily, weekly, monthly or yearly. The ACS-30 measures 12 control parameters including ground fault, temperature, and current to ensure system integrity. Configurable alarm settings provide

options for local or remote alarms. These alarms can be programmed to send notification of the alarm event by e-mail to user-selected distribution. The system can be set to periodically check for heating cable faults, alerting maintenance personnel of a pending heat tracing problem. This helps avoid costly downtime. Dry contact relays are provided for alarm annunciation back to a Building Management System (BMS).

**Ground-fault protection**

National electrical codes require ground-fault equipment protection on all heat-tracing circuits. The ACS-30 controller has integrated ground-fault equipment protection and therefore does not require additional ground-fault protection, simplifying installation and reducing costs.

**Installation**

The ACS-30 system is configured with the User Interface Terminal (nVent RAYCHEM ACS-UIT3) that has an LCD color display with touch-screen technology. The ACS-UIT3 provides an intuitive user interface for programming without keyboards or cryptic labels. The ACS-30 Program Integrator application tool is available to program, edit and download circuit parameters through the local USB port or from a remote location. The ACS-UIT3 comes in a Type 4X enclosure suitable for nonhazardous, indoor or outdoor locations and comes complete with wiring terminals and an alarm signal light.

**Communications**

The ACS-30 System supports the Modbus® protocol and is available with RS-232, RS-485 or 10/100Base-T Ethernet communication interface. nVent RAYCHEM ProtoNode multi-protocol gateways are available to integrate the ACS-30 into BACnet® and Metasys® N2 BMS systems.

**Complete system**

The ACS-30 is supplied as a complete modular system, ready for field connections to convenient power distribution panels and temperature sensor input, reducing the cost of heating cable installation.

**ACS-30 SYSTEM**

Multipoint temperature control with ground-fault/current/temperature monitoring when used with the ACS-UIT3

The ACS-30 is a multipoint electronic control, monitoring, and power relay system for heat-tracing cables used in commercial heat-tracing applications. The system consists of a ACS-UIT3 and up to 52 ACS-PCM2-5 power control panels. C910-485 controllers may also be connected to the system for multiple, single circuit extensions. RMM heat-tracing remote monitoring modules may also be used with the ACS-30 system to expand the number of temperature measurement points.

- The ACS-30 provides the following alarming features per control point.
- High/low temperature
  - Ground fault
  - RTD failure

The ACS-30 provides ground-fault monitoring and protection for every heat-tracing circuit and fulfills the requirements of national electrical codes.

**ACS-30: HEATING CABLE APPLICATION PROGRAMMING SUMMARY**

Control Mode Functions			
Application	nVent RAYCHEM Heating Cable	Control Mode	Control Settings
Hot Water Temperature Maintenance	HWAT	Preset power duty cycle (HWAT Design Wizard)	<ul style="list-style-type: none"><li>• Constant temp</li><li>• Variable schedule<ul style="list-style-type: none"><li>– Maintain</li><li>– Economy</li><li>– Off</li><li>– Heat Cycle (R2 only)</li></ul></li></ul>
Floor Heating	RaySol MI heating cable QuickNet	Floor sensing	<ul style="list-style-type: none"><li>• Constant temp</li><li>• Variable schedule<ul style="list-style-type: none"><li>– Maintain</li><li>– Economy</li><li>– Off</li></ul></li><li>• Circuit override through RTD or external device</li></ul>

Control Mode Functions			
Application	nVent RAYCHEM Heating Cable	Control Mode	Control Settings
Greasy Waste Disposal and Temperature Maintenance	XL-Trace	Line sensing	<ul style="list-style-type: none"> <li>Constant temp</li> <li>Variable schedule <ul style="list-style-type: none"> <li>Maintain</li> <li>Economy</li> <li>Off</li> </ul> </li> </ul>
Pipe Freeze Protection	XL-Trace	Ambient, PASC or line sensing	<ul style="list-style-type: none"> <li>Constant temp</li> <li>Circuit override through external device</li> </ul>
Fuel Oil Flow Maintenance	XL-Trace	Ambient, PASC or line sensing	<ul style="list-style-type: none"> <li>Constant temp</li> <li>Circuit override through RTD or external device</li> </ul>
Freezer Frost Heave Prevention	RaySol MI heating cable	Floor sensing	<ul style="list-style-type: none"> <li>Constant temp</li> <li>Variable schedule <ul style="list-style-type: none"> <li>Maintain</li> <li>Off</li> </ul> </li> </ul>
Surface Snow Melting	ElectroMelt MI Heating Cable	Ambient or surface temp External controller	Constant temp External snow controller
Roof and Gutter De-icing	IceStop MI Heating Cable	Ambient or surface temp External controller	Constant temp External snow controller

### TEMPERATURE MONITOR ONLY

Five temperature monitor only channels

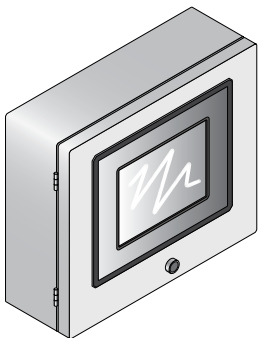
Low and high temperature alarms

### VARIABLE SCHEDULE

Setpoint calendar with:

- 7 days/week calendar
- 48 - 1/2 hr time blocks/day
- Daily schedule copy function

### ACS-UIT3 (USER INTERFACE TERMINAL)



The ACS-30 User Interface Terminal is a panel-mounted display for use with the ACS panel. The ACS-UIT3 has an 8.4 inch (21.7 cm) VGA color display with touchscreen technology, and provides an easy user interface for programming without keyboards or cryptic labels. It has RS-485, RS-232, or 10/100Base-T Ethernet communications ports that allow communication with external Distributed Control Systems or Building Management Systems. BACnet to Modbus protocol gateways with the Modbus registries pre-programmed are available. A USB interface is included for easy configuration and firmware upgrades. The ACS-UIT3 is designed for use on indoor or nonhazardous location installations and is rated for Type 4 environments.

#### General

Approvals

Nonhazardous Locations



Area of use

Nonhazardous, indoors and outdoors (IP65, Type 4)

Supply voltage

100 – 240 Vac +/-10%, 50/60 Hz

Operating temperature

-25°C to 50°C (-13°F to 122°F)

Supply terminal

26–12 AWG

Storage temperature

-25°C to 80°C (-13°F to 176°F)

Dimensions

386 mm W x 336 mm H x 180 mm D, (15.21 in. W x 13.21 in. H x 7.09 in. D)

## Alarm outputs

Relay outputs

Three form C relays rated at 12 A @ 250 Vac. One relay used for common alarm light. Relays may be assigned for alarm outputs.

## Network connection

Local port/remote

RS-232/RS-485 ports (RS-485, 2-wire isolated) may be used to communicate with host BMS computers using the ProtoNode-RER or ProtoNode-RER-10K.

Local RS-232

A non-isolated, 9 pin D sub male

Remote RS-485 #2

10 pin terminal block, 24–12 AWG, (0.2 mm to 2.5 mm<sup>2</sup>) wire size

Data rate

9600 to 57600 baud

Maximum cable length

For RS-485 not to exceed 1200 m (4000 ft). Cable to be shielded twisted pair.

Field port

RS-485, 2-wire isolated. Used to communicate with external devices, such as ACS-PCM2-5, C910-485, and RMM module. Maximum cable length not to exceed 1200 m (4000 ft). Cable to be shielded twisted pair.

Field RS-485 #1

10 pin terminal block, 24–12 AWG, (0.2 mm to 2.5 mm<sup>2</sup>) wire size

Data rate

To 9600 baud

LAN

10/100 Base-T Ethernet port with Link and Activity Status LEDs

USB port

USB 2.0 Host port Type A receptacle (X2)

## LCD display

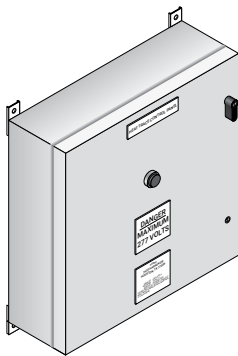
Display

LCD is a 8.4 in color XGA with integral LED backlight.

Touch screen

5-wire resistive touch screen interface for user entry; compatible with glove use

## ACS-PCM2-5 POWER CONTROL PANEL



The ACS-PCM2-5 enclosure is rated NEMA 4/12 and is approved for nonhazardous indoor or outdoor locations. The ACS-PCM2-5 provides ground fault and line current sensing, alarming, switching (electromechanical relays) and RTD inputs for five heat tracing circuits when used with the ACS-UIT3. ACS-30 General (RPN P000001232) panels are available to satisfy special applications which require higher voltage, higher switching capacity, panel heaters, etc. Contact nVent at 1 (800) 545-6258 for design assistance.

## General

Approvals

Nonhazardous Locations



Ambient operating temperature

–13°F to 122°F (–25°C to 50°C)

Dimensions

24" W x 24" H x 6.75" D (610 mm W x 610 mm H x 171 mm D)

Enclosure rating

NEMA 4/12 (indoor/outdoor locations)

Control supply voltage

90 - 280 V dropped to 12 V with switching power supply

Weight

70 lbs (31.75 kg)

Humidity

0–90% non-condensing

Fuse

Bussman MDL

## Heating cable circuit contactors

Rating

3-pole – 30 A/pole 277 Vac

Type

Sprecher-Schuh CA7-16-10-12D

Quantity

5

## Temperature sensors

Type	100-ohm platinum RTD, 3-wire, $\alpha = 0.00385 \text{ ohm/ohm/}^{\circ}\text{C}$ Can be extended with a 3-conductor shielded cable of 20 ohm maximum per conductor
Quantity	Up to five wired directly to the ACS-CRM

## Communication to ACS-UIT3, ACS-PCM2-5 panels, C910-485 and RMM module

Type	2-wire RS-485
Cable	One shielded twisted pair
Length	4000 ft (1200 M) maximum
Quantity	Up to 52 ACS-PCM2-5 panels may be connected to one ACS-UIT3

## Line current sensors

Max current	60 A
Accuracy	$\pm 2\%$ of reading

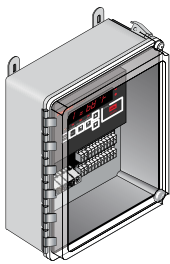
## Ground-fault sensors

Range	10–200 mA
Accuracy	$\pm 2\%$ of reading

## Connection terminals

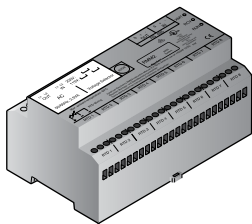
Power supply/line/load	#22 – 8 AWG
RS-485	#24 – 12 AWG
RTD	#24 – 12 AWG

## C910-485 ELECTRONIC CONTROLLER (OPTIONAL)



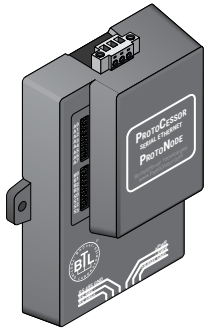
The C910-485 controller Part No. 10170-026 is a compact, full-featured, microprocessor-based, single-point commercial heating cable control system with integrated equipment ground-fault protection. The C910-485 provides control and monitoring of electric heating cable circuits for commercial heating applications. The C910-485 can be set to monitor and alarm for high and low temperature, low current, and ground-fault level. The C910-485 includes an RS-485 communication module to remotely configure, control and monitor the heating cable circuits through a building management system (BMS).

## REMOTE MONITORING MODULE (OPTIONAL)



A Remote Monitoring Module (RMM2, Part No: 051778-000; RMM3, Part No: To be defined) is used to collect additional temperatures for control and monitoring of the heat-tracing circuit by the ACS-PCM2-5 control panel, through the ACS-UIT3 user interface terminal. The RMM module accepts up to eight RTDs that measure pipe, vessel, or ambient temperatures. Multiple RMM modules communicate with a single ACS-UIT3 to provide centralized monitoring of temperatures. A single twisted-pair RS-485 cable connects up to 16 RMM modules for a total monitoring capability of 128 temperatures. The RMM modules are placed near desired measurement locations. The RMM2 is available for DIN rail mount or pre-installed inside a polycarbonate NEMA-4X enclosure (Part No: 523420-000).

## PROTOCOL GATEWAY (OPTIONAL)



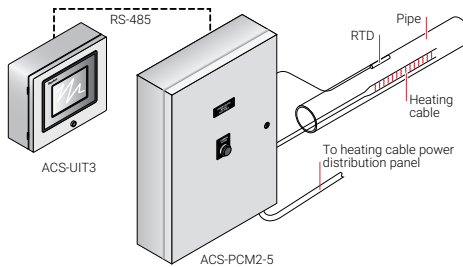
The ProtoNode is an external, high performance multi-protocol gateway for customers needing protocol translation between BACnet® or Metasys® N2 Building Management Systems (BMS) and the ACS-30 controller.

The PROTONODE-RER-1.5K (Part No P000002008) is for ACS-30 systems with up to 5 PCM panels. The ProtoNode-RER-10K (Part No P000001983) is for ACS-30 systems with up to 34 PCM panels.

## TYPICAL CONFIGURATIONS FOR THE ACS-30 SYSTEM

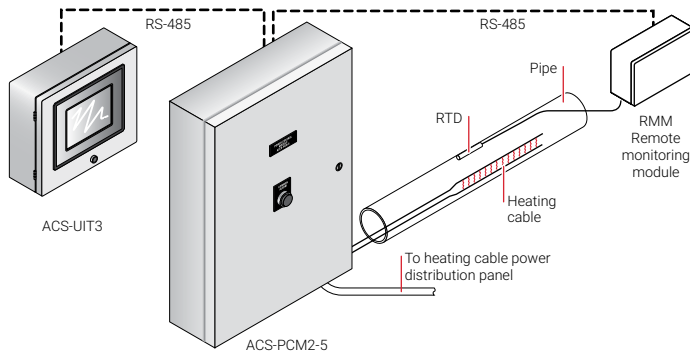
### Individual controls

- Monitors ground-fault current and alarms/trip control contactor upon fault
- Monitors heater current
- Monitors pipe temperature (via RTD inputs wired back to the ACS-PCM2-5 or RMM module)



### Individual controls with RMM module

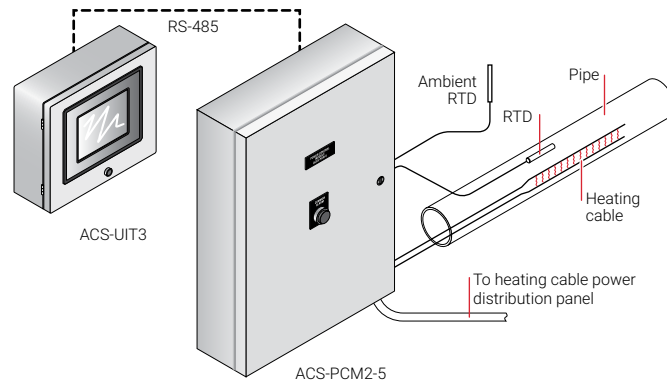
- Monitors ground-fault current and alarms/trip control contactor upon fault
- Monitors heater current
- Monitors pipe temperature (via RTD inputs wired back to the ACS-PCM2-5)
- Using optional RMMs (remote monitoring modules) mounted in the field, up to 128 RTD inputs can be added to the ACS-30 system
- The RMM modules allow the RTD cables to be terminated locally and only a single RS-485 twisted wire pair brought back to the panel. This results in a significant reduction in field wiring.



## TYPICAL CONFIGURATIONS FOR THE ACS-30 SYSTEM

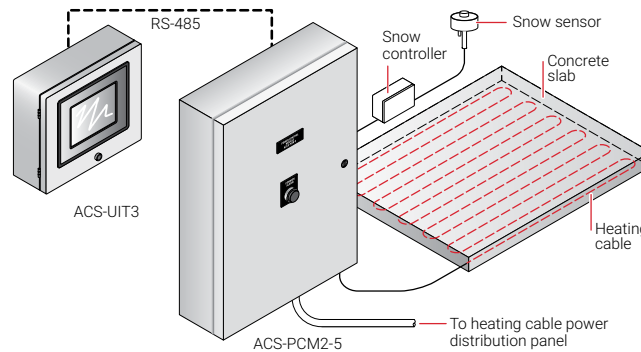
### Individual ambient control

- Monitors ground-fault current and alarms/trip control contactor upon fault
- Monitors heater current
- Monitors pipe temperature (via RTD inputs wired back to the ACS-PCM2-5 or RMM module)



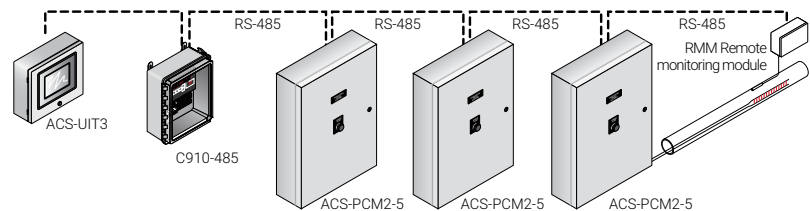
### Individual external control for surface snow melting and roof & gutter application

- Monitors ground-fault current and alarms/trip control contactor upon fault
- Monitors heater current
- Monitors pipe temperature (via RTD inputs wired back to the ACS-PCM2-5 or RMM module)
- Connects to snow controllers (via RTD input) to power circuits when snow/ice melting is required



### Multipanel configuration

- Multiple panels can be ganged together for control using a single nVent RAYCHEM User Interface Terminal
- Communications is accomplished using RS-485 protocol
- Up to 260 heat trace circuits can be supported using this architecture



## CUSTOM CONFIGURATIONS FOR THE ACS-30 SYSTEM

### Control

Heat-tracing circuits

One ACS30-UIT3 can configure and monitor up to 260 heat-tracing circuits

Relay types

3-pole, electromechanical (EMR versions)

Voltage, maximum

240 Vac nominal, 50/60 Hz (standard), 600 Vac nominal (optional)

Current, maximum per circuit\*

EMR: 30 A @ 104°F (40°C) or 60 A @ 104°F (40°C)

\*Depending on panelboard amperage rating, the maximum current may not be used on all circuits.

Approvals



Control algorithms

EMR: On/Off, Ambient on/off, PASC (proportional ambient sensing control)

Control range

−99°F to 900°F (−73°C to 482°C)

Dead band

1°F to 50°F (1°C to 50°C) (On/Off control only)

### Distribution

Load power

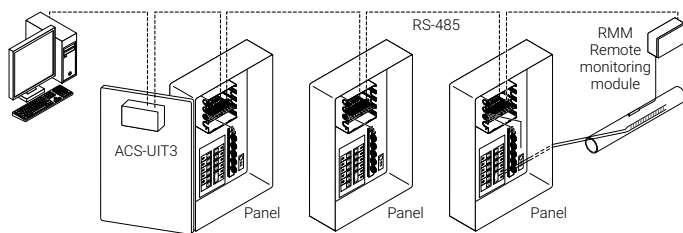
120 / 208 / 240 / 277 / 347 / 480 / 600 Vac

Circuit breaker amperage rating

120 Vac  
208, 240, 277, 347, 480, 600 Vac

20 A, 30 A, 40 A, 50 A  
20 A, 30 A, 40 A, 50 A, 60 A

## MULTI-PANEL CUSTOM CONFIGURATION EXAMPLE WITH RMM MODULES



- Multiple panels can be ganged together for control using a single User Interface Terminal.
- Communications is accomplished using RS-485 wiring.
- Up to 260 heat trace circuits can be supported using this architecture.
- Supervisor Software interfaces with the User Interface Terminal via RS-485 or 10/100BaseT Ethernet.

## ORDERING DETAILS

### ACS-30 – Output – No. of Control Points – Enclosure – Voltage – Panelboard – Breaker or EMR – MCB – Options

ACS-30 – XXX – XX – XXX – XXX/XXX – XX – XX/XX (XX) – XXX – XX

#### Output

EMR = Electro-mechanical relay

#### No. of control points

5, 10, 15, 20, 25, 30, 35, 40

#### Enclosure

12 = NEMA 12 (indoors; painted steel)  
4 = NEMA 4/3R (outdoors; painted steel)  
4X = NEMA 4X/3RX (outdoors; stainless steel)

#### Voltage

120 / 208 Vac  
120 / 240 Vac<sup>1</sup>  
277 / 480 Vac  
347 / 600 Vac

#### Panelboard

0 = none required

# of control points	Panelboard size		
	120/208 Vac	120/240 Vac	277/480 Vac
5	18	18	18
10	18	18/30	18/30
15, 20	30/42	30/42	30/42
25, 30	30/42	30/42	30/42
35, 40	42	42	42

<sup>1</sup> Single phase

<sup>2</sup> Require remote ACS30-UIT3

<sup>3</sup> Special - Describe special requirement in detail.

<sup>4</sup> Applies to Canada only

#### Options

Country Installed

US = U.S. and Americas (except Canada)

CA = Canada

H = Electric heater installed

N = No UIT installed<sup>2</sup>

RM = RMM module installed

RT = Ambient RTD installed

S = EUR-5A snow controller installed

U = UIT installed on the closure

P1 = ProtoNode-RER-1.5K

P2 = ProtoNode-RER-10K

#### Main circuit breaker

0 = none required (choose if no panelboard required)

#### Panelboard

size	120/208 Vac	120/240 Vac	277/480 Vac
18	–	–	30, 50, 70, 125
30	50, 100, 150, 225	50, 80, 175, 225	50, 70, 125, 175, 225
42	50, 100, 150, 225	50, 80, 175, 225	50, 70, 125, 175, 225

#### Breaker or EMR

##### Breaker

No. of C.B./No. of poles (ampere rating)

No. of control points	Panelboard size	No. of poles (ampere rating)							
		120 Vac (1P)	208 Vac (2P)	240 Vac (2P)	277 Vac (1P)	480 Vac (2P)	347 Vac (1P)	600 Vac (2P)	
5	18	5 <sup>4</sup>	5 <sup>4</sup>	5 <sup>4</sup>	5	5	5	5	
10	18	–	–	–	10	6	10	6	
10	30	–	–	10	–	–	–	–	
15	30	15	14	14	15	13	15	13	
15	42	–	15	15	–	15	–	15	
20	30	20	9	9	20	8	20	8	
20	42	–	20	20	–	20	–	20	
25	30	25	4	4	25	4	25	4	
25	42	25	16	16	25	15	25	15	
30	30	30	–	–	30	–	30	–	
30	42	–	10	10	–	10	–	10	
35	42	35	6	6	35	5	35	5	
40	42	40	–	–	40	–	40	–	

**Note:** The quantity of breakers must be equal to the number of control points.

#### EMR without panelboard

Select no. of output devices (EMRs)/ amperage

Output devices: 5 – 40  
Amperage: 30, 60

## North America

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