NGC-30

Raychem

Advanced heat-tracing control system

PRODUCT OVERVIEW

Heat-tracing system

NGC-30 system

Remote configuration and monitoring with Raychem Supervisor software

The Raychem NGC-30 is a multi-circuit electronic control, monitoring and power distribution system for heat-tracing used in process-temperature maintenance and freeze-protection applications. The NGC-30 system can control up to 260 circuits and monitor up to 1040 temperature inputs with multiple networked panels. The Raychem NGC-30 Controller can accommodate temperature inputs from a remote temperature sensor multiplexor (RMM3). Each panel can control anywhere from 5 to 120 individual heat-tracing circuits and is available with power distribution as an option. The Raychem NGC-30 is available with two output types: an electromechanical relay (EMR) or a solid-state relay (SSR). Both types allow circuit switching up to 60 A at 600 Vac with single or three-phase power. Up to four Resistance Temperature Detector (RTD) inputs for each heat-tracing circuit allow for a variety of combinations of temperature control, monitoring, and alarming. Systems can be configured for nonhazardous and hazardous locations. The ability to monitor and configure the controller is available both locally and remotely with the User Interface Unit (UIT3) and the Raychem Supervisor software.

CONTROL

The Raychem NGC-30 measures temperatures with 3-wire, 100-ohm platinum RTDs. The temperature information can be transferred to the Raychem NGC-30 control panel through an RTD directly connected to the Raychem NGC-30 panel, or through an optional Remote Monitoring Module (RMM3). Each RMM3 accepts up to eight RTDs. The RMM3s are typically located near the desired measurement location (RTDs). Multiple RMM3s are networked over a single twisted pair communication cable to the Raychem NGC-30, significantly reducing the cost of RTD field wiring. With EMRs and SSRs, the Raychem NGC-30 can be configured for On/Off, ambient sensing, and proportional ambient sensing modes. Additionally, with SSRs, the panel can be configured for proportional, power limiting, and soft start modes.

MONITORING

The Raychem NGC-30 can measure up to 12 control parameters including ground-fault, temperature, and current variables to ensure system integrity. Configurable alarm settings provide options for local or remote alarms. 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 Distributed Control System (DCS).

GROUND-FAULT PROTECTION

National electrical codes require ground-fault equipment protection on all heat-tracing circuits. Heat-tracing circuits equipped with Raychem NGC-30 controllers do not require additional ground-fault detection equipment, simplifying installation and reducing costs.

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LOCAL MONITORING AND CONTROL

The Raychem NGC-30 system is configured with a User Interface Terminal (UIT3) that has an LCD color display with touch screen technology. This UIT3 provides an easy user interface for programming without using keyboards. The UIT3 is rated for ordinary and hazardous, indoor or outdoor locations and can be mounted on the panel door. An option is also available to have the User Interface Terminal not mounted on the panel door but located remotely from the panel. The remote stand-alone User Interface Terminal, with a NEMA 4 enclosure is available for mounting remotely in a nonhazardous, indoor or outdoor location.

COMMUNICATIONS

The Raychem NGC-30 units can be networked to a host PC running Windows®-based Raychem Supervisor client-server software for central programming, status review, and alarm annunciation. The Raychem NGC-30 can also be networked into Modbus capable systems such as Distributed Control Systems (DCS) or Programmable Logic Controllers (PLC). Raychem NGC-30 units support the Modbus® protocol and are available with an RS-485 or 10/100Base-T Ethernet communication interface.

GENERAL

Area of use	Raychem NGC-30-EMR for nonhazardous locations Raychem NGC-30-EMR with Z purge for hazardous locations Raychem NGC-30-SSR for hazardous locations
Approvals	**Nonhazardous Locations** ETL LISTED CONFORMS TO ANSI/UL STD. 508 UL STD. 508A CERTIFIED TO CAN/CSA C22.2 NO. 286 **Hazardous Locations** (EMR purged version) ETL LISTED CONFORMS TO ANSI/UL STD. 508 UL STD. 508A CERTIFIED TO CAN/CSA C22.2 NO. 286 ETL LISTED CONFORMS TO NFPA STD 496 **Hazardous Locations** (SSR version) ETL LISTED CONFORMS TO UL STD 508A ANSI/ISA STD 12.12.01 CERTIFIED TO CSA STD C22.2 NO. 213 CSA STD C22.2 NO. 286
Supply voltage	100–277 Vac, +5%/–10%, 50/60 Hz common supply for controller and heat-tracing circuit Up to 600 Vac for heat-tracing circuit when controller is powered from a separate circuit

ENCLOSURE

Protection/materials	NEMA 12 (indoors painted steel) NEMA 4/3R (outdoors, painted steel) NEMA 4X/3RX (outdoors, stainless steel)
Operating temperature UIT3 installed	Without distribution: –40°F to 140°F (–40°C to 60°C) Below –40°F (–40°C), space heater and thermostat must be used With distribution: 14°F to 140°F (–10°C to 60°C) Below 14°F (–10°C), space heater and thermostat must be used Maximum ambient temperature for the panel: +40°C
Storage temperature UIT3 installed	–13°F to 167°F (–25°C to 75°C) –40°F to 149°F (–40°C to 65°C)
Relative humidity	0% to 90%, noncondensing

CONTROL

Heat-tracing circuits	One NGC-UIT3 can configure and monitor up to 260 heat-tracing circuits
Relay types	3-pole, electromechanical (EMR versions) 1-, 2-, or 3-pole solid-state relays (SSR versions)
Voltage, maximum	240 Vac nominal, 50/60 Hz (standard), up to 600 VAC nominal (optional)
Current, maximum per circuit* *Depending on panelboard amperage rating, the maximum current may not be used on all circuits.	EMR: 30 A @ 104°F (40°C) or 60 A @ 104°F (40°C) SSR: 30 A @ 104°F (40°C) or 60 A @ 104°F (40°C)
Control algorithms	EMR: On/Off, Ambient on/off, PASC (proportional ambient sensing control) SSR: On/Off, Ambient on/off, PASC (proportional ambient sensing control), Proportional (includes soft start for all SSR control modes)
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)

MONITORING

Temperature	Low alarm range	–99°F to 900°F (–73°C to 482°C) or OFF
	High alarm range	–99°F to 900°F (–73°C to 482°C) or OFF
Ground fault	Alarm range	10 mA to 200 mA
	Trip range	10 mA to 200 mA or OFF
Current	Low alarm range	0 A to 100 A (where 0 equals OFF)
	High alarm range	0 A to 100 A (where 0 equals OFF)
Voltage	100–277 Vac supply voltage to heat-tracing	
	Note: Voltage monitoring consumes one control circuit.	
Autocycle	Each circuit can be programmed from 1 to 1000 hours or OFF	

TEMPERATURE SENSOR INPUTS

Monitoring	Raychem NGC-30 system can monitor up to 1040 (260 x 4) temperatures
Quantity per circuit	Up to four temperature inputs can be assigned to one circuit
Temperature sources	Hard-wired, optional RMM3 Module
Temperature inputs per control point	Standard:
	• One input standard per control point
	Optional:
	• Up to three additional RTDs per control point connected via RMM3
Temperature inputs per NGC-UIT3	Hard-wired:
	• Up to 260 hard-wired temperature inputs, one per circuit
	RMM3 (optional):
	• Up to 128 RTD inputs via RMM3 Modules. Up to 8 RTDs per RMM3 Module and up to 16
	• RMM3 Modules per Raychem NGC-30 controller
Types	100 Ω platinum RTD, 3-wire, α = 0.00385 ohms/ohm/°C
	Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor
	(Note: power wire and RTD wire should not be housed in the same conduit).

ALARM OUTPUTS

Relay Outputs	3 SPDT Form C. Rating: 3 A 100–277 Vac
	Each relay may be assigned to alarm outputs

PROGRAMMING AND SETTING

Method	Via UIT3 (User Interface Terminal)
Units	°F or °C
Digital display	
Memory	Nonvolatile, restored after power loss
Stored parameters (measured)	Minimum and maximum temperatures, contactor cycle count, heater time in use
Alarm conditions	Low/high temperature, low/high current, ground-fault alarm and trip, RTD failure, communications failure, relay failure, relay count, total time heater energized, contactor failure

USER INTERFACE TERMINALS (UITS)

UIT3	Area Classification: Nonhazardous (Unclassified) or Hazardous Locations
	Usage: NEMA 4 (indoors or outdoors)

LANGUAGE SUPPORT

English, Spanish, French, German, Russian, Chinese, Italian, Czech, Polish, Lithuanian

CONNECTION TERMINALS

Heating cable output	Screw terminals, 20–6 AWG (30 A versions), 14–2 AWG (60 A versions)
Ground	14–4 AWG ground bar
RTD/alarm/communications	28–12 AWG spring clamp terminals

DISTRIBUTION (FOR RAYCHEM NGC-30-EMR ONLY)

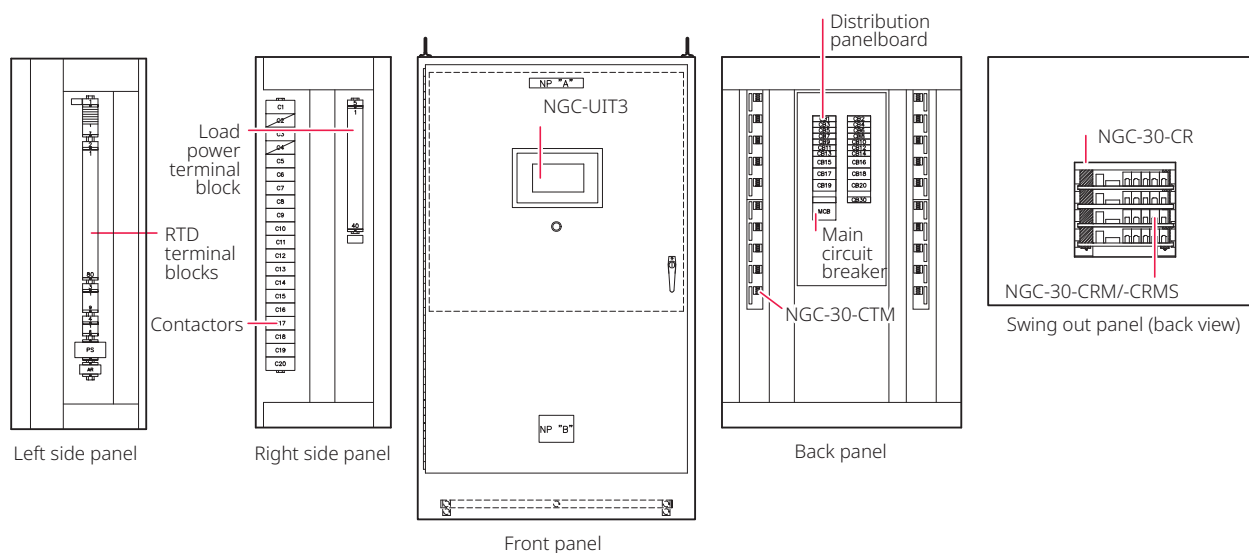| Load power	120 / 208 / 240 / 277 / 347 / 480 / 600 Vac	
Circuit breaker amperage rating	120 Vac	20 A, 30 A, 40 A, 50 A
	208, 240, 277, 347, 480, 600 Vac	20 A, 30 A, 40 A, 50 A, 60 A

TYPICAL RAYCHEM NGC-30 LAYOUT

Multipoint temperature control with ground-fault/current/temperature monitoring and optional distribution.

The Raychem NGC-30 is a multipoint electronic control, monitoring, and power distribution system for heat-tracing used in process temperature maintenance and freeze protection applications. The system contains Raychem controllers, multiple individual Electromechanical Relays (EMRs), or Solid-State Relays (SSRs) and an optional assembled circuit breaker panelboard with a main breaker.

The Raychem NGC-30 provides the following alarming features per control point.

- High/low temperature
- Ground fault
- High/low current fault
- RTD failure

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

Left side panel

Right side panel

Front panel

Back panel

Swing out panel (back view)

EMR PANELS

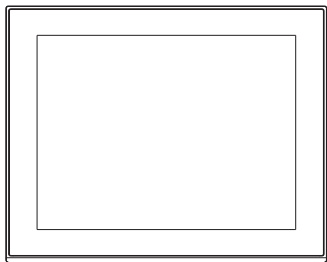| Number of Control Points	Panelboard Size	EMR Panel Size with or without Panelboard (Nominal)	
5	18 space	48"H x 36"W x 12"D	(wall mount)
10	18 space	48"H x 36"W x 16"D	(wall mount)
10	30 space	72"H x 36"W x 16"D	(includes 12" floor stands)
15, 20, 25	30 space	72"H x 36"W x 25"D	(includes 12" floor stands)
15, 20, 25	42 space	84"H x 36"W x 25"D	(includes 12" floor stands)
25, 30	42 space	84"H x 36"W x 25"D	(includes 6" floor stands)
35, 40	42 space	90"H x 36"W x 25"D	(includes 6" floor stands)

SSR PANELS

Number of Control Points	SSR Panel Size without Panelboard (Nominal)	
5	36"H x 30"W x 12"D	(wall mount)
10	48"H x 36"W x 16"D	(wall mount)
15, 20	72"H x 36"W x 24"D	(includes 6" floor stands)
25, 30	84"H x 36"W x 24"D	(includes 6" floor stands)
35, 40	90"H x 36"W x 24"D	(includes 6" floor stands)

SYSTEM COMPONENTS
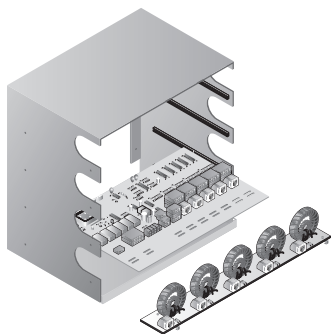
User Interface Terminal (NGC-UIT3M-EX)

The Raychem NGC-30 User Interface Terminals (NGC-UIT3M-EX) are panel-mounted displays for use with the Raychem NGC-30 panel. Each NGC-UIT3M-EX has a 11.3 inch x 8.9 inch (28.7 cm x 22.6 cm) LCD color display with touch-screen technology, and provides an easy user interface for programming without using keyboards. It has RS-485, or 10/100Base-T Ethernet communications ports that allow communication with the Raychem Supervisor software and external Distributed Control Systems. A USB interface is included for easy configuration and firmware upgrades.

The NGC-UIT3M-EX is designed for use in nonhazardous and hazardous locations (Class I, Division 2; Groups A, B, C, D) The NGC-UIT3M-EX can be installed locally on the panel door.

Card Rack Modules (Raychem NGC-30-CRM/-CRMS), Current Transformer Module (Raychem NGC-30-CTM) and Card Rack (Raychem NGC-30-CR)
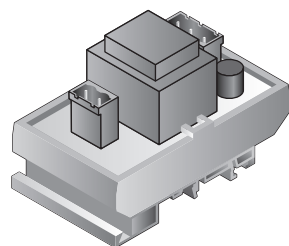
The Card Rack (Raychem NGC-30-CR) is mounted in a panel and it houses up to four Card Rack modules (Raychem NGC-30-CRM/S). The Card Rack Modules (Raychem NGC-30-CRM/S) with the associated Current Transformer Module (Raychem NGC-30-CTM) provide ground fault and line current information. The Card Rack modules also provide RTD input, alarming and switching of the Electrical Mechanical (Raychem NGC-30-CRM) and Solid State Relays (Raychem NGC-30-CRMS) for five heat tracing circuits.

A typical panel consists of 8 Card Rack Modules wired together via a twisted pair (RS-485) cable for a total of 40 heating cable circuits. Additional panels can be connected to a single User Interface Terminal to create a heat-tracing system of up to 260 circuits.

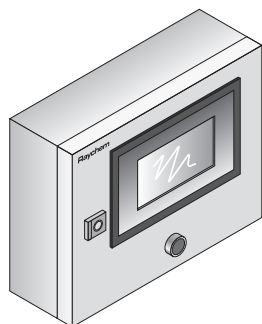### Voltage Monitoring Module (Raychem NGC-30-CVM) (optional)

The Voltage Monitoring Module monitors the actual voltage being used by the Raychem NGC-30-CRM/-CRMS. The Raychem NGC-30-CVM module uses one channel on one CRM/-CRMS board in a panel.

ADDITIONAL SYSTEM COMPONENTS (ORDERED SEPARATELY)

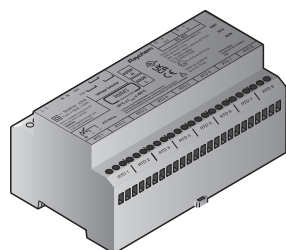### Remote User Interface Terminal (NGC-UIT3-ORD-R)

The Remote User Interface Terminal (NGC-UIT3-ORD-R) is a stand-alone display for use with the Raychem NGC-30 panel. The NGC-UIT3-ORD-R is mounted remotely (in a nonhazardous location). It has a 11.3 inch x 8.9 inch (28.7 cm x 22.6 cm) LCD color display with touch-screen technology, and provides an easy user interface for programming without using keyboards. It is rated NEMA 4 (IP 65), and must be mounted in a nonhazardous indoor or outdoor location.

It has RS-485, or 10/100Base-T Ethernet communications ports that allow communication with the Raychem Supervisor software and external Distributed Control Systems. A USB interface is included for easy configuration and firmware upgrades.
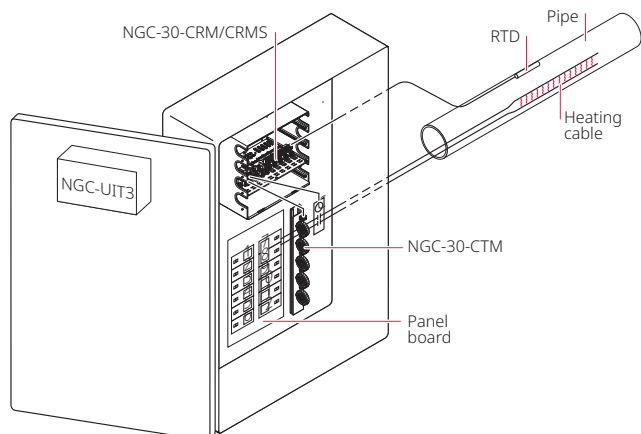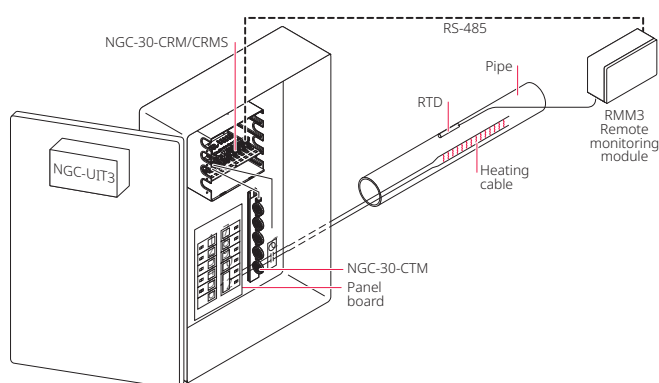
Remote Monitoring Module (RMM3)

A Remote Monitoring Module (RMM3) is used to collect temperatures for control and monitoring of the heat-tracing system by the Raychem NGC-30 control panel. The RMM3 accepts up to eight RTDs that measure pipe, vessel, or ambient temperatures. Multiple RMM3s communicate with a single NGC-UIT3 to provide centralized monitoring of temperatures. A single twisted-pair RS-485 cable connects up to 247 RMM3s for a total monitoring capability of 3952 temperatures. The RMM3s are placed near desired measurement locations in nonhazardous or hazardous locations.

TYPICAL CONFIGURATIONS FOR THE RAYCHEM NGC-30

Individual Controls with Ground-fault Trip/Current/Temperature Monitoring

- Monitors ground-fault current and alarms/trip control contactor upon fault.
- Monitors heater current and alarms upon low or high current conditions.
- Monitors pipe temperature (via RTD inputs wired back to the Raychem NGC-30) and alarms upon low or high current condition.

Individual Controls with RMM3 for Ground-fault Trip/Current/Temperature Monitoring with Networked RTDs
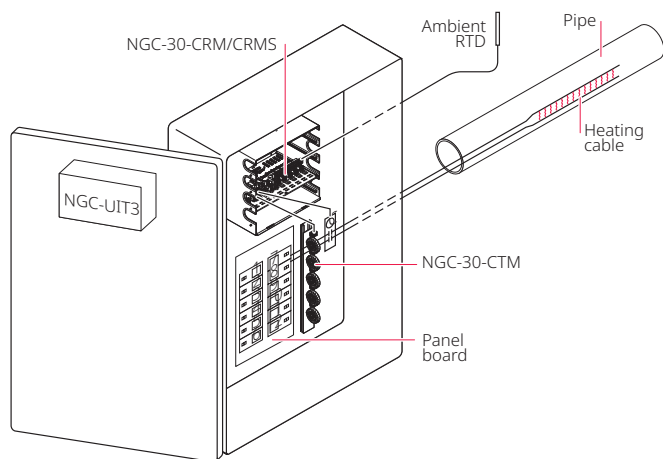

- Monitors ground-fault current and alarms/trip control contactor upon fault.
- Monitors heater current and alarms upon low or high current conditions.
- Monitors pipe temperature (via RTD inputs wired back to the Raychem NGC-30) and alarms upon low or high current conditions.
- Using optional RMM3 (remote monitoring modules) mounted in the field, up to 128 RTD inputs can be added to the Raychem NGC-30 system.
- The RMMs 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.

Individual Ambient or PASC Control with Ground-fault Trip/Current/Temperature Monitoring
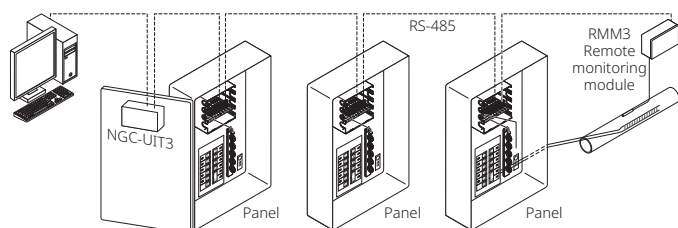

- Monitors ground-fault current and alarms/trip control contactor upon fault.
- Monitors heater current and alarms upon low or high current conditions.

Multi-panel Configuration with RMM3 Module

- 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.
- Raychem Supervisor Software interfaces with the User Interface Terminal via RS-485 or 10/100BaseT Ethernet.

REPLACEMENT COMPONENTS

Description	Catalog Number	Part Number
User Interface Terminal		
User Interface Terminal Nonhazardous (Unclassified) and Hazardous Locations; indoors or outdoors, panel mounting	NGC-UIT3M-EX	10332-052
User Interface Terminal with NEMA 4 Enclosure Nonhazardous (Unclassified) Locations; indoors or outdoor, remote stand-alone mounting	NGC-UIT3-ORD-R	10332-016
Raychem NGC-30 Modules		
Card Rack Module (for EMRs)	NGC-30-CRM	10720-001
Card Rack Module (for SSRs)	NGC-30-CRMS	10720-004
Current Transformer Module	NGC-30-CTM	10720-002
Voltage Monitoring Module	NGC-30-CVM	10720-005
Raychem NGC-30 Auxiliary		
Remote Monitoring Module 115/230 Vac	RMM3	1244-022749
Remote Monitoring Module 24 VDC	RMM3-24VDC	1244-022782
Remote Monitoring Module 115/230 Vac with NEMA 4X Enclosure	RMM3-4X	523420-001
Remote Monitoring Module 24 Vdc with NEMA 4X enclosure	RMM3-24VDC-4X	523420-002

ORDERING DETAILS

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

NGC-30 – XXX – XX – XXX – XXX/XXX – XX – XX/XX (XX) – XXX – X

Output
EMR = Electro-mechanical relay
SSR = Solid-state relay

No. of control points
5, 10, 15, 20, 25, 30, 35, 40

Enclosure
12 = Type 12 (indoors; painted steel)
4 = Type 4 (outdoors; painted steel)
4X = Type 4X (outdoors; 304 stainless steel)

Voltage
120 / 208 Vac
120 / 240 Vac[1]
277 / 480 Vac
347 / 600 Vac

Panelboard
0 = none required

# of control points	Panelboard size 120/208 Vac	120/240 Vac	277/480 Vac	347/600 Vac
5			18	18
10		30	18/30	18
15, 20	30/42	30/42	30/42	30/42
25, 30	30/42	30/42	30/42	30/42
35, 40	42	42	42	42

[1] Single phase
[2] Special – Describe special requirement in detail.

Options
Country Installed
　US = U.S. and Americas (except Canada)
　CA = Canada
E = Environmental purge (Type 4X enclosure only)
H = Enclosure heater
U = NGC-UIT3M-EX installed
V = Voltage monitoring (subtracts one control point)
Z = Z purge (EMR and Type 4X enclosure only; Class I, Division 2 Hazardous Area)
SP = Special[2]
RMx - RMM3 installed (where x represents number of RMM3's)
RT - Ambient RTD installed

Main circuit breaker
0 = none required (choose if no panelboard required)
30 A, 40 A, 50 A, 60 A, 70 A, 80 A, 90 A, 100 A, 110 A, 125 A, 150 A, 175 A, 200 A, 225 A, 250 A

Breaker or SSR or EMR
Breaker
No. of C.B./No. of poles (ampere rating)

No. of control points	Panelboard size	120 Vac (1P)	208 Vac (2P)	240 Vac (2P)	277 Vac (1P)	480 Vac (2P)	347 Vac (1P)	600 Vac (2P)
5	18	5	5	5	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.

SSR without panelboard
Select no. of output devices (SSRs)/ no. of poles/amperage
　Output devices: 5–40
　Poles: 1P or 2P
　Amperage: 30, 60

EMR without panelboard
Select no. of output devices (EMRs)/ amperage
　Output devices: 5–40
　Amperage: 30, 60

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