**Raychem NGC-40**

**PANEL MOUNTED ADVANCED MODULAR HEAT-TRACING CONTROL SYSTEM**

**PRODUCT OVERVIEW**

The Raychem NGC-40 is a multipoint electronic control, monitoring and power distribution system with a unique single-point controller architecture providing the most reliable central control and monitoring solution for your Heat Management System.

By taking advantage of innovative modular packaging techniques, the Raychem NGC-40 system provides configuration and component flexibility so that it may be optimised for a customer’s project specific needs.

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**CONTROL MODULES: NGC-40-HTC & NGC-40-HTC3**

The Raychem NGC-40 uses a single controller module per heat-tracing circuit for maximum reliability. The Raychem NGC-40 control system can be powered between 100 to 240 Vac, while mechanical contactors (EMRs) or solid-state relays (SSRs) allow circuit switching up to 60 A at 600 Vac.

There are dedicated control modules available for single phase (NGC-40-HTC) and three-phase (NGC-40-HTC3) heat-tracing circuits. The Raychem NGC-40 control modules include ground-fault detection and protection. The control modules guarantee precise single phase and three-phase line current measurements. Up to eight (8) temperature sensors (RTDs) can be used for each heat-tracing circuit allowing a variety of temperature control, monitoring, and alarming configurations. The Raychem NGC-40 provides alarm outputs and digital inputs. The alarm output can be used to control an external annunciator. The digital input is programmable and may be used for various functions such as forcing outputs on and off or generating alarms, making the system more flexible to match each customer’s specific needs.

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**SIL2 SAFETY TEMPERATURE LIMITER: NGC-40-SLIM**

The Raychem NGC-40 has a SIL2 certified safety temperature limiter module. The module can be used with up to 3 temperature inputs for three phase heat-tracing circuits. The limiter can be associated with a Raychem NGC-40 controller and use current information for latching the trip functionality. The front panel of the limiter module has LED indicators for various status conditions. The front panel also provides a button to confirm new set trip point, a reset trip button and a reset alarm button. The module has one output for the contactor and one output for external alarm annunciation. The safety temperature limiter can be reset via the digital input, the user interface Touch 1500 and Raychem Supervisor.
IO MODULE: NGC-40-IO

In addition to hardwiring an RTD directly into a Heat Trace Control module, RTDs can be wired to Input/output modules (NGC-40-IO) within the panel and assigned to heat-tracing circuits through software. This means that a Raychem NGC-40 system can be optimised for the specific application needs. Each IO module accepts up to four additional RTD inputs.

RMM2

The Raychem NGC-40 works with the MONI-RMM2 module. Each RMM2 module installed in the field can accept up to 8 RTDs. 16 RMM2 Modules can be daisy chained together via RS-485 for a total of 128 temperature inputs. Since multiple RMM2s can be networked over a single cable to the Raychem NGC-40, the cost of RTD field wiring will be significantly reduced.

COMMUNICATION MODULE: NGC-40-BRIDGE

The Raychem NGC-40 system supports multiple communications ports, allowing serial interfaces (RS-485 and RS-232) and network connections (Ethernet) to be used with external devices. All communications with the NGC-40 panel are accomplished through the NGC-40-BRIDGE module which acts as the central router for the system, connecting the panel’s control modules, IO modules, safety limiter modules, RMM2 Modules, as well as upstream devices such as Raychem Touch 1500 touch screen, Raychem Supervisor and Distributed Control System (DCS). Communications to devices external to the NGC-40 panel are done via Modbus® protocol over Ethernet, RS-485 or RS-232.

RAYCHEM TOUCH 1500

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RAYCHEM SUPERVISOR SOFTWARE

The Raychem Supervisor software package provides a remote, graphic interface for the Raychem NGC-40. The software allows the user to configure and monitor various NGC systems from a central location. It also provides an audible alarm tone, acknowledges and clears alarms; and contains advanced features such as data logging, trending, implement changes in batches, and other useful functions. Users can access all information from anywhere in the world, making Raychem Supervisor a powerful management tool for the entire Heat Management System.
### GENERAL RAYCHEM NGC-40 CONTROLLER MODULES

<table>
<thead>
<tr>
<th>Application type</th>
<th>The Raychem NGC-40 units shall be installed in non-hazardous areas. Hazardous area approved sensors shall be used when the system is applied to heat-tracing circuits in hazardous areas.</th>
</tr>
</thead>
</table>

| Approval certification | CE | ETL | For other countries contact your local Pentair representative. |

### ELECTROMAGNETIC COMPATIBILITY

<table>
<thead>
<tr>
<th>Emissions</th>
<th>EN 61000-6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunity</td>
<td>EN 61000-6-2</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 Vdc +/- 10%</td>
</tr>
<tr>
<td>Internal power consumption</td>
<td>&lt; 2.4 W per module</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>-40°C to 65°C (-40°F to 149°F)</td>
</tr>
<tr>
<td>Ambient storage temperature</td>
<td>-40°C to 75°C (-40°F to 167°F)</td>
</tr>
<tr>
<td>Environment</td>
<td>PD2, CAT III</td>
</tr>
<tr>
<td>Maximum altitude</td>
<td>2,000 m (6,562 ft)</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 – 90% non-condensing</td>
</tr>
<tr>
<td>Mounting</td>
<td>Din Rail – 35 mm</td>
</tr>
</tbody>
</table>

### CAN NETWORKING PORT

| Type | 2-wire isolated CAN-based peer to peer network. Isolated to 24 Vdc – verified by 500 Vrms dielectric withstand test |
| Connection | Two 8-pin RJ-45 connectors [both may be used for Input or Output connections] Protocol Proprietary NGC-40 |
| Topology | Daisy chain |
| Cable length | 10 m (33 ft) maximum |
| Quantity | Up to 80 HTC/HTC3 and IO modules per network segment |
| Address | Unique, factory assigned |

### CONNECTION TERMINALS AND HOUSING

| Wiring terminals | Spring-type, 0.5 to 2.5 mm² [24 to 12 AWG] |
| Housing Size | 45.1 mm (1.78 in) wide x 87 mm (3.43 in) high x 106.4 mm (4.2 in) deep |

### Module specific information

**NGC-40-HTC**

| Temperature Sensors | Type 100 Ω platinum RTD, 3-wire, α = 0.00385 ohms/ohm/ºC Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor 100 Ω, Ni-Fe, 2-wire. Can be extended with a 2-wire shielded cable of 20 Ω maximum per conductor |
| Quantity Temperature sensors | One per NGC-40-HTC/HTC3 module |
| Measuring range | Temperature range from -80°C to +700°C (-112°F to 1292°F) |
| Current measurement | Internal to the module |
| Current measurement NGC-40-HTC | 1 for single-phase line current measurements, 60A, +/- 2% of range |
| Current measurement NGC-40-HTC3 | 3 for three-phase line current measurements, 60A, +/- 2% of range |
| Ground-fault | 1 for ground-fault measurements, 10-250 mA, +/- 2% of range |
| Alarm Relay | Dry contact relay voltage free. Relay contact rated 250 V/3 A 50/60 Hz [EC] and 277 V/3 A 50/60 Hz [cCSAus]. Alarm relay is programmable. N0 and NC contacts available. |
| Contactor Output Relay | Relay contact rated 250 V/3 A 50/60 Hz [EC] and 277 V/3 A 50/60 Hz [cCSAus]. |
| SSR Output | 12 Vdc @ 45 mA max per output |
| Digital Input | Multi-purpose input Multi-purpose input for connection to external dry (voltage-free) contact or DC voltage. May be user programmable for: not used/force off/force on functions. It can be configured to be active open or active closed. |

**NGC-40-HTC3**

| Temperature Sensors | Type 100 Ω platinum RTD, 3-wire, α = 0.00385 ohms/ohm/ºC Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor 100 Ω, Ni-Fe, 2-wire. Can be extended with a 2-wire shielded cable of 20 Ω maximum per conductor |
| Quantity Temperature sensors | One per NGC-40-HTC/HTC3 module |
| Measuring range | Temperature range from -80°C to +700°C (-112°F to 1292°F) |
| Current measurement | Internal to the module |
| Current measurement NGC-40-HTC | 1 for single-phase line current measurements, 60A, +/- 2% of range |
| Current measurement NGC-40-HTC3 | 3 for three-phase line current measurements, 60A, +/- 2% of range |
| Ground-fault | 1 for ground-fault measurements, 10-250 mA, +/- 2% of range |
| Alarm Relay | Dry contact relay voltage free. Relay contact rated 250 V/3 A 50/60 Hz [EC] and 277 V/3 A 50/60 Hz [cCSAus]. Alarm relay is programmable. N0 and NC contacts available. |
| Contactor Output Relay | Relay contact rated 250 V/3 A 50/60 Hz [EC] and 277 V/3 A 50/60 Hz [cCSAus]. |
| SSR Output | 12 Vdc @ 45 mA max per output |
| Digital Input | Multi-purpose input Multi-purpose input for connection to external dry (voltage-free) contact or DC voltage. May be user programmable for: not used/force off/force on functions. It can be configured to be active open or active closed. |
### NGC-40-SLIM

**Functional Safety Approval**

**Conditions of use**
- See installation instructions

**Measuring range**
- Temperature range limiter from +50°C to +500°C (-22°F to 932°F)

**Temperature Sensor**
- Type: 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. Quantity: 3 per NGC-40-SLIM module.

**Digital Input**
- Used for resetting the safety temperature limiter remotely. The Digital Input will be for connection to external dry (voltage free) contactor or DC voltage. The input shall be 5 – 24 VDC/1mA max with 100 ohms of loop resistance and configured as active low.

### NGC-40-IO

**Temperature Sensors**
- Type 100 Ω platinum RTD, 3-wire, α = 0.00385 ohms/ohm/ºC. Can be extended with a 3-conductor shielded cable of 20 Ω maximum per conductor. Quantity: Up to four wired directly to each NGC-40-IO module.

**Alarm Relay**
- Dry contact relay (voltage free). Relay contact rated 250 V/3 A 50/60 Hz [EC] and 277 V/3 A 50/60 Hz [cCSAus]. Alarm relay is programmable. N0 and NC contacts available.

**Digital Input**
- Multi-purpose input. Multi-purpose input for connection to external dry (voltage-free) contact or DC voltage. May be user programmable for: not used/force off/force on functions. It can be configured to be active open or active closed.

### NGC-40-BRIDGE

**Communications COM1, COM2**
- Type: 2-wire RS-485
- Cable: One shielded twisted pair
- Length: 1,200 m (4,000 ft) maximum
- Quantity: Up to 255 devices per port
- Data rate: 9600, 19.2K, 38.4K, 57.6K, 115.2K baud
- Data bits: 7 or 8
- Parity: None, even, odd
- Stop bits: 0, 1, 2
- Tx delay: 0 – 5 sec.
- Protocol: Modbus RTU or ASCII
- Connection terminals: Spring-type terminals

**Communications COM3**
- Type: RS-232
- Cable: Custom TTC# 10332-005
- Length: 15 m (50 ft) maximum
- Data rate: 9600, 19.2K, 38.4K, 57.6K, 115.2K baud
- Data bits: 7 or 8
- Parity: None, even, odd
- Stop bits: 0, 1, 2
- Tx delay: 0 – 5 sec.
- Protocol: Modbus RTU or ASCII
- Connection terminals: RJ-11

### Ethernet
- Type: 10/100 BaseT Ethernet network
- Length: 100 m (328 ft)
- Data rates: 10 or 100 MB/s
- Protocol: Connection terminals
- Connection terminals: Shielded 8-pin RJ-45 connector on front of module
**NGC-40-PTM**

Connection terminals Spring-type, 0.5 to 2.5 mm² [24 to 18 AWG]. As the current to the modules require up to 2.05 A @ 24Vdc (20 modules - see CAN Bus connection diagrams) the minimum wire size to the module shall be 1.0 mm² (AWG18).

CAN networking and module Power Two RJ-45 connectors, one each IN and OUT. Provides CAN bus signals and 24 Vdc power.

**TOUCH 1500**

General

<table>
<thead>
<tr>
<th>Area of use</th>
<th>Nonhazardous, Indoors (IP65, NEMA 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>10 – 30 Vdc</td>
</tr>
<tr>
<td>Amperage rating</td>
<td>Steady state 1.8 A</td>
</tr>
<tr>
<td>Surge current</td>
<td>16 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C to 50°C (32°F to 122°F) w/o space heater, –30°C to 50°C (–22°F to 122°F) using space heater and screen cover</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>–20°C to 60°C (–4°F to 140°F)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>449.9 mm (W) X 315.6 mm (H) X 141.7 mm (D)</td>
</tr>
<tr>
<td>Relay outputs</td>
<td>One Form C relay rated at 12 A @ 250 Vac. Relay is used as a common alarm. To be ordered separately</td>
</tr>
<tr>
<td>Display</td>
<td>LCD is a 15-in XGA, color TFT transflective device with integral CCFL backlight Touch Screen 4-wire resistive touch screen interface for user entry</td>
</tr>
</tbody>
</table>

**NETWORK CONNECTION**

Local/Remote Port

- RS-232/RS-485 ports may be used to communicate with host (Raychem Supervisor Software) or DCS
- 9 pin D sub male

Remote RS-485

- 2-wire isolated, 9 pin D sub male Data rate 9600 to 57600 baud Maximum cable length not to exceed 1200 m (4000 ft). Cable length to be shielded, twisted pair.

Field Port

- RS-485, 2-wire isolated, used for communication with external devices, such as Raychem NGC-40-BRIDGE and Raychem NGC-20. Maximum cable length not to exceed 1200 m (4000 ft). Cable to be shielded twisted pair. Signals 2-wire isolated, 9 pin D sub male Data rate to 9600 baud

LAN

- 10/100 Base-T Ethernet port with Link and Activity Status LEDs (X2)

USB Ports

- USB 2.0 Host port Type A receptacle (X4)

**PART NUMBERS**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGC-40-HTC</td>
<td>NGC-40 single phase heat trace control module</td>
<td>10730-003</td>
</tr>
<tr>
<td>NGC-40-HTC3</td>
<td>NGC-40 three phase heat trace control module</td>
<td>10730-004</td>
</tr>
<tr>
<td>NGC-40-SLIM</td>
<td>NGC-40 Safety Temperature Limiter</td>
<td>1244-010700</td>
</tr>
<tr>
<td>NGC-40-IO</td>
<td>NGC-40 Input - Output Module</td>
<td>10730-001</td>
</tr>
<tr>
<td>NGC-40-BRIDGE</td>
<td>NGC-40 Communication Bridge Module</td>
<td>10730-002</td>
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<tr>
<td>NGC-40-PTM</td>
<td>NGC-40 Power Termination Module</td>
<td>10730-005</td>
</tr>
<tr>
<td>TOUCH1500</td>
<td>TOUCH1500 display kit – 15” Touch screen and Relay Output Module</td>
<td>10332-009</td>
</tr>
<tr>
<td>TOUCH1500R</td>
<td>Touch 1500 in enclosure for remote mounting on wall</td>
<td>10332-020</td>
</tr>
<tr>
<td>RELAY OUTPUT - TOUCH</td>
<td>Relay Output Module /w Modbus for Touch 1500</td>
<td>10332-017</td>
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<tr>
<td>NGC-40-CAN05</td>
<td>NGC-40 CAN Cable Length 5”</td>
<td>20578011-005</td>
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<tr>
<td>NGC-40-CAN48</td>
<td>NGC-40 CAN Cable Length 48”</td>
<td>20578011-048</td>
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<tr>
<td>NGC-40-TB</td>
<td>CANbus termination plug</td>
<td>10392-043</td>
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<tr>
<td>PS-24</td>
<td>24 Vdc Power supply</td>
<td>972049-000</td>
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