The nVent RAYCHEM ACS-CRM provides ground-fault and line current sensing, alarming, switching and RTD inputs for five heat-tracing circuits when used with the nVent RAYCHEM ACS-UIT2. The ACS-CRM is used to control Electromechanical Relays (EMRs) when installed in the nVent RAYCHEM ACS-PCM2-5 power control panel.

**TOOLS REQUIRED**
- Wire cutters
- RJ11 stripping/crimping tool
- RJ11 connectors
- #36 drill bit
- Screwdriver small blade - standard
- #6-32 tap

**ADDITIONAL MATERIALS REQUIRED**
- Power supply - 12 Vdc @ 400 mA
- RJ11 4 conductor cable

### KIT CONTENTS

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<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>ACS-CRM (card rack module with connectors)</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>NGC-30-CTM (current transformer module)</td>
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</table>

### Line Current Sensors
- Max current: 60 A
- Accuracy: ± 2% of reading

### Ground Fault Sensor
- Range: 10 – 200 mA
- Accuracy: ± 4% of range at 30 A line current

### Outputs
- CRM output relays: Form A 3-Amp @ 277 Vac max 50/60 Hz
- Alarm Relay: Form C 3-Amp @ 277 Vac max 50/60 Hz

### Communication to ACS-UIT
- Type: 2 wire RS-485
- Cable: One shielded twisted pair
- Length: 4000 ft. (1200 M) maximum
- Quantity: Up to 52* ACS-CRM may be connected to one ACS-UIT

### Connection Terminals
- Power supply/Pilot Relay/RTD/Comm Port (RS485): 18 – 12 AWG (0.8 – 3.3 mm²)

* May require an RS-485 repeater if communication length is greater than 4000 ft.

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**WARNING:**

This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

- Component approvals and performance are based on the use of nVent specified parts only. Do not use substitute parts.
- Keep components dry before and during installation.
- Leave these instructions with the end user for reference and future use.

For technical support, call nVent at (800) 545-6258.
Cleaning Instructions

If dust accumulates on the ACS-CRM circuit board use compressed air to remove the dust. Turn off all power to the nVent RAYCHEM ACS-30 panel. Carefully disconnect all cables from a single ACS-CRM card, making sure to label cables so that they can be reconnected after board cleaning. Wear an anti-static wrist strap connected to ground in order to avoid component damage. Remove the CRM circuit card from the card cage and place on a clean lint-free surface.

Use dry compressed air from a can for cleaning circuit boards. (Avoid factory compressed air since it may contain enough moisture or oil to cause permanent damage.) Use short quick blasts to remove dust build-up as necessary. After cleaning, replace the CRM in the same card cage position and reconnect all cables. Remove only one card at a time for cleaning to avoid any problems during re-installation.

Mounting the ACS-CRM Directly to the Panel’s Back Pan

The ACS-CRM is intended to be installed on the backpan of the nVent RAYCHEM ACS-PCM2-5 power control panel.

Use the attached template (see page 7) to locate the 6 mounting holes on the panel’s back pan. Using a #36 drill bit, drill the six holes and using a #6-32 tap, tape the 6 holes.

Install a #6 nylon standoff (1 in. long) between the panel’s back pan and CRM board and secure with the #6-32 screw (1 1/4 in. long).

Optional Card Rack Installation Instructions

Mounting of Card Rack

Use the mounting template shown in the nVent RAYCHEM NGC-30-CRM Installation Instructions (H57723) to mount the rack on a panel backplane. There are four holes (0.188 in. diameter) to secure it to the mounting surface using #8 screws.

Once the card rack is installed, a earth bonding wire (green 18 AWG min.) terminated with a #10 Ring terminal must be connected to the card rack using the ground screw provided.

Note: The card rack must be installed on a non-combustible surface.

ACS-CRM Installation Instructions

- Alarm output
- Relay outputs (5x)
- LEDs (9x)
- Fuse
- 12 Vdc Inputs (5x)
- End of Line (EOL) jumper
- RS-485 Communications
- Line & ground-fault sensor inputs (5x)
- RTD Inputs
- Address Switches

![Diagram of ACS-CRM installation instructions]
Power Supply

The power supply connector (TB19) is a dual two pin connector. Either connector allows for power in (pin #1 (+), pin #2 (–) and bussing of power to other ACS-CRM modules).

**Note:** Power supply must be sized correctly based on the number of ACS-CRM modules.

RS-485 Communications

The RS-485 connector (TB6) is a dual three pin connector. Either connector allows for RS-485 input signals (pin #1 (shield), pin #2 (+), pin #3 (–)) and bussing of RS485 signal to other ACS-CRM modules.

End of Line (EOL) Jumper

If this device (ACS-CRM) is the last device in the RS-485 network, the J1 jumper needs to be moved from terminals 2 & 3 to terminals 1 & 2.

RTD Inputs – Ordinary Area

3 wire RTDs with shield may be connected to RTD Ch1 thru Ch 5 (TB1 - TB5). The two common wires (usually red, red) are connected to terminals 2 & 3, the source (usually white) to terminal 1 and the braid to terminal 4 (earth ground).

**Note:** RTD's are not required if monitoring current/ground-faults only or if RTD's are connected via RMM2s.

Common Alarm

The common alarm terminal block (TB12) provides a form C dry contact, rated at 277 Vac max (3A).

When the nVent RAYCHEM ACS-PCM2-5 panel is powered on, the common alarm relay coil is energized and pin 2 is connected to pin 1 (common). This is the "No Alarm" condition for the CRM board.

If the alarm occurs, or the CRM board loses power, the relay coil is de-energized and pin 1 (common) is disconnected from pin 2 and connected to pin 3 to indicate an alarm condition exits.

Address Switches (SW1 & SW2)

Each ACS-CRM must have a unique communication address selected. The valid address switch range when using the ACS-UIT is 1-99. SW1 is the ones digit (0–9) and SW2 is the tens digit (0 or 9).

**Note:** When adding an ACS-CRM to the system, you must first cycle power on the CRM board and then perform a network update at the ACS-UIT.

Ground-Fault/Line Current Sensors

Connections from ACS-CRM to nVent RAYCHEM NGC-30-CTM.

Using an RJ11 connector/cable assembly, connect one end to an RJ11 input (TB13 - TB17) and the other end to the appropriate NGC-30-CTM RJ11 connector.

Ground-Fault/Line Current Cable Assembly

**Notes:** A complete cable may be ordered as part number: 20578010-XXX where XXX = Length (L) in inches.
Mounting of NGC-30-CTM

Each NGC-30-CTM mounts on a DIN 35 rail. It should be located between the terminal block and contactor in the ACS-PCM2-5 power control panel.

NGC-30-CTM Installation Instructions

NGC-30-CTM

- Line & ground-fault sensor outputs (5x)
- Line current sensor (5x)
- Ground-fault current sensor (5x)

Typical GF / LC wiring through transformers

Ground-fault transformer
Line current transformer
Phase / Neu.
Phase

DIN rail mounting foot
DIN rail

3.5 in (89.9 mm)
9.75 in (248 mm)
ACS-PCM2-5

120 - 277 Vac in

12 Vdc

Power Supply +

Alarm relay output

AC voltage up to 277 Vac

To contactor coils (see detail)

Relay drivers

Relay drivers

To heater's power junction box

Pilot relays located on circuit board

Contactor coils

Distribution panel board with standard circuit breakers

ACS-CRM

ACS-CRM

NGC-30-CTM

ACS-UIT2

Touch Screen

12 Vdc

Power Supply +

RTDs

System Layout ACS-CRM
General Installation Instructions

1. The RAYCHEM ACS-30 components must be installed:
   • In compliance with all local electrical and safety codes
   • In an enclosure suitable for the application environment.

2. The RAYCHEM ACS-30 components must be protected by external overcurrent and disconnect devices. This may be a circuit breaker or a combination of disconnect switch and fuses.
   The disconnect device:
   • Must disconnect all ungrounded, current-carrying conductors
   • Should be located in close proximity to the equipment
   • Be within easy reach of the operator
   • Be marked as the disconnecting device for the equipment

3. Supply wiring insulation must be rated for the highest voltage and temperature to be encountered in the application. Conductors must be sized for the application and be protected by an external overcurrent device.

4. Some wiring configurations will use more than one power source and all must be de-energized prior to performing any maintenance on a controller circuit.

5. Protection provided by this equipment may be impaired if the device is used outside of its ratings or for applications other than is intended.

6. Always be sure that the intended location is classified as an area for which the product is approved.

7. The RAYCHEM ACS-30 components have no user serviceable parts. Contact your nVent Representative for service and a Return Authorization if required.

Conducted and Radiated Emissions - Statement Of Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la Classe A conforme à la norme NMB-003 du Canada.

ACS-30 Installation Test Procedures

Once assembled into a panel, the RAYCHEM ACS-PCM2-5 components must be tested as a system to ensure that the ground fault detection circuitry is functional. The following tests must be conducted by qualified personnel familiar with the equipment and its operation, test procedures, and electrical code requirements.

Make as many copies of this checklist as required to document successful tests for each circuit in the panel.

Abbreviations:
- GF = Ground Fault
- CT = Current Transformer

ACS-CRM Board:

Tested By: ____________________________ Date: ____________________________

<table>
<thead>
<tr>
<th>Circuit #1</th>
<th>Circuit #2</th>
<th>Circuit #3</th>
<th>Circuit #4</th>
<th>Circuit #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect the wiring to ensure that all load conductors pass through the GF CT.</td>
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<tr>
<td>Verify that no ground (PE) conductors pass through the GF CT.</td>
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<tr>
<td>Ensure that conductors on the load side of the GF CT are not grounded.</td>
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<tr>
<td>Simulate a GF on the load side of the GF CT large enough to cause the ACS-CRM or ACS-CRMS to trip its output off. This should occur within approx. 1 second of applying the test GF current.</td>
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Completed forms should be retained with the panel and available for inspection by the local Electrical Inspection Authority.