RAYCHEM
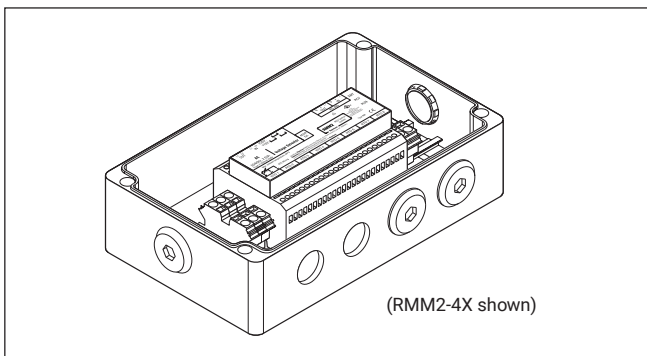
RMM2

Heat-Tracing Remote Monitoring Module for the nVent RAYCHEM NGC Control System Installation Instructions

(RMM2-4X shown)

TOOLS REQUIRED

- 3 mm slotted screwdriver
- 3/8 hex key (for RMM2-4X only)
- Needle nose pliers
- Wire stripper/cutter

APPROVALS

Nonhazardous locations

c(UL)us Type NM

LISTED
80BJ ENERGY MANAGEMENT
EQUIPMENT SUBASSEMBLY AND
GENERAL SIGNALING
EQUIPMENT SUBASSEMBLY

Hazardous locations

c(UL)us

RMM2-4X (RMM2 with Type 4X Enclosure)
Class I, Division 2, Groups A, B, C, D
Class II, Division 2, Groups F, G

LISTED
9Z63 TEMPERATURE
INDICATING EQUIPMENT
FOR USE IN HAZARDOUS
LOCATIONS

DESCRIPTION

The nVent RAYCHEM remote monitoring module (catalog no. RMM2) is part of the RAYCHEM NGC Control System. The RMM2 takes inputs from up to 8 RTDs that measure pipe, vessel, or ambient temperatures in a heat-tracing system. Multiple RMM2 units communicate with a RAYCHEM NGC controller using a single RS-485 bus (a shielded, twisted pair).

Refer to the specific RAYCHEM NGC controller Installation and Operation manual for additional information. For technical support call nVent at (800) 545-6258.

MONITORING SYSTEM COMPONENTS AND ACCESSORIES

RMM2	RMM2 module without enclosure (for use with user-supplied enclosures.)
RMM2-4X	Reinforced polyester Type 4X enclosure with RMM2, grounding hardware and four plugs. For Ordinary and Division 2 hazardous locations.

Additional Materials Required

User supplied enclosure	Agency-approved enclosure fitted with an aluminum DIN 35 rail and grounding hardware. For Ordinary and Division 2 hazardous locations only.
RTDs	For measuring temperatures. Make RTD selection based on temperature range of heat-tracing application. Up to eight three-wire RTDs may be used.

Extension wire

MONI-RTD-WIRE	Shielded cable with three 22 AWG wires; PVC insulation; for use as RTD lead wire. 1000 ft reel.
MONI-RS485-WIRE	Shielded cable with twisted pair of 22 AWG wires; PVC insulation; for use as RS-485 bus. 1000 ft reel.

Conduit drain

JB-DRAIN-PLUG-3/4IN	PN 278621 (recommended for Division 2 locations)

KIT CONTENTS

| Item	Qty	Description
A	1	RMM2 module
B	2	Spare fuses - 200 mA 250 V
C	2	Jumpers (Use 2 jumpers for 115 V or 1 jumper for 230 V)
D	1	Product label (for user supplied enclosures only)
	1	Enclosure - not shown (for RMM2-4X only)
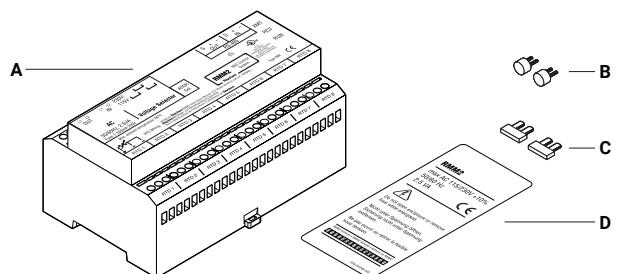
This component is an electrical device that must be installed correctly to ensure proper operation and to prevent shock or fire. Read these important warnings and carefully follow all of the installation instructions.

• 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.

• NOTE: Leave these instructions with the end user for reference and future use.

RAYCHEM NGC SYSTEM LAYOUT

Typical example of individual control with NGC-30-CRM and RMM2 modules for ground-fault trip/monitoring and temperature/heating-cable current monitoring. RMM2 remote monitoring modules collect RTD inputs and communicate with the NGC controller using a single RS-485 bus.
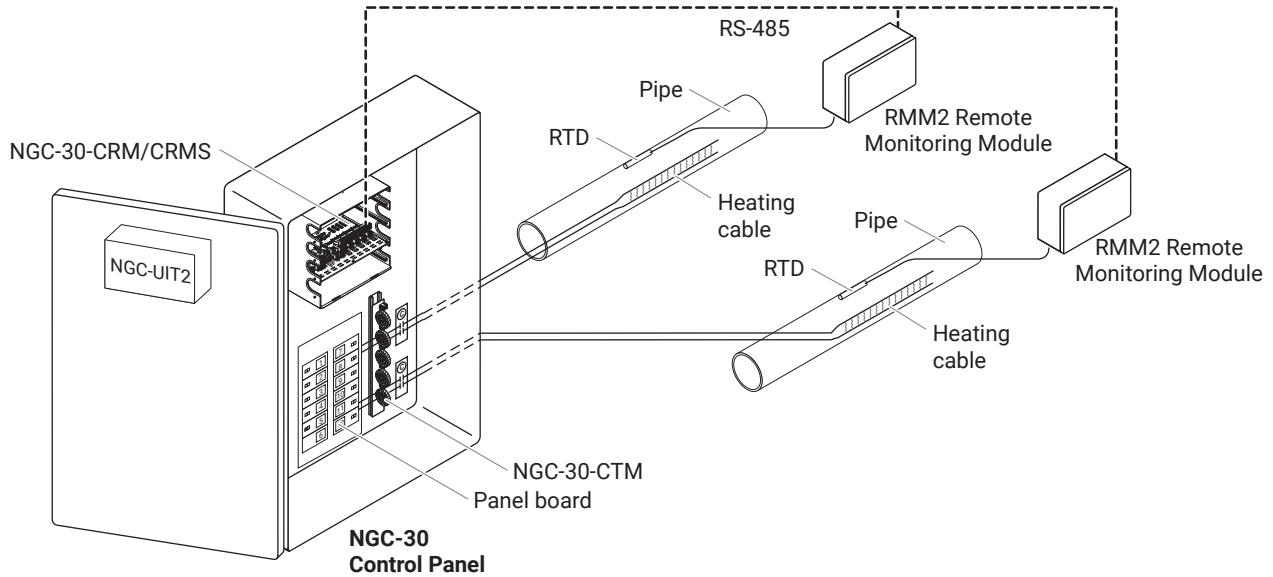
RAYCHEM REMOTE MONITORING MODULE (RMM2)

1 Fuse 200 mA 250V (two spare fuses are supplied with the RMM2)

2 Terminals for power input with provision for daisy-chaining

3 Voltage selector jumpers: Use one for 230V applications (default); use two for 115V applications (see Step 7 on page 4).

4 Terminals for RS-485 bus with provision for daisy-chaining

5 Shorting block to select RS-485 termination mode for last RMM2 module in network

6 LEDs which indicate communications activity

7 Rotary switch (16 position) to assign RS-485 address

8 LED which indicates power to the RMM2

9 Terminals for RTD lead wires

10 Orange slotted tab

11 Clear plastic cover

Note: Use a small slotted screwdriver to pry clear plastic cover off the RMM2 module. When replacing cover make sure "RTD1" on the clear cover is aligned with "RTD1" on the RMM2 module. Press firmly on cover until it is fully engaged.
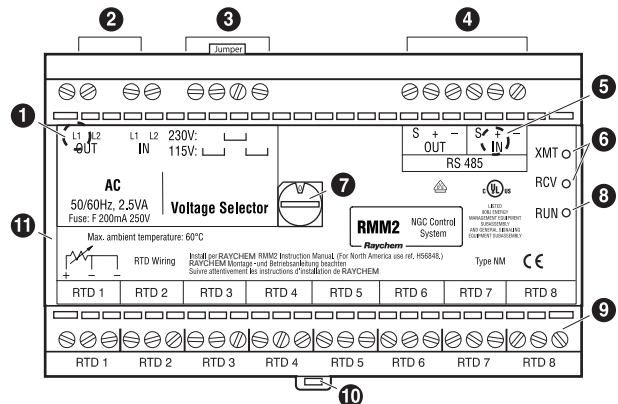
A qualified electrician should install the RMM2 following these installation instructions.

A. MOUNT RMM2 IN AN ENCLOSURE SELECTED FOR THE APPLICATION

1. Select an electrical enclosure suitable for the use environment.

The RMM2 attaches to a DIN 35 rail in an electrical enclosure. User supplied enclosures must have grounding terminals.

The RMM2 is powered with line voltage in appropriate enclosure. To select the enclosure, consider the area classification (e.g. non-hazardous or Division 2 hazardous area), the location (indoors or outdoors; exposure to moisture and/or dust) and the chemical environment.

- To meet the requirements for Division 2 locations and typical industrial environments, nVent offers the RMM2 with a fiberglass reinforced polyester enclosure rated Type 4X (catalog number RMM2-4X).

Use agency-approved glands and fittings to maintain Type rating of enclosure.

The enclosure noted in the previous paragraph is configured specifically for the RMM2. If a different enclosure is used for Division 2 locations and typical Industrial environments, it must be fitted with the following hardware to mount the RMM2:

- DIN 35 rail to which to attach the RMM2. The rail should fit the enclosure and be at least 6-1/2 in. (180 mm) long.
- Grounding hardware.
- Rail end stops to hold the RMM2 in position may be needed.

Mounting this hardware on a separate panel (which attaches to the enclosure) may simplify the configuration.

Note: The operating temperature range of the RMM2 is −40°F to 140°F (−40°C to 60°C). If the enclosure is mounted in an area that may drop below −40°, it should be fitted with a suitable space heater.

2. Drill or punch entries into the enclosure before mounting the RMM2.

The RMM2 is an electronic device that could be damaged by filings or other debris. The RMM2-4X comes supplied with six 3/4 inch conduit entries for installation of power wiring, RS-485 cables, and RTDs. The enclosure will need entries for the following connections:

- Each RTD to be connected (up to 8)
- RS-485 bus (incoming and outgoing)
- Power and ground wiring (incoming and outgoing)

To help determine the best entry arrangement, see the illustration on page 2, which shows the terminal arrangement on the RMM2. Typically, power wiring is run in one entry, RS-485 cables in another entry, and RTDs in the remaining 4 entries.

Note: To prevent water ingress, use conduit drains if applicable and do not make conduit entries in the top of the enclosure.

3. Mount the electrical enclosure.

Mount the enclosure so that the RMM2 will not be exposed to abuse or damage.

- Do not attach the enclosure to pipes or equipment that could subject the unit to continued vibration.
- **Important:** Do not locate the enclosure where the RMM2 could be subjected to temperatures inside the enclosure of greater than 140°F (60°C) (e.g. directly exposed to sunlight in hot climates).
- Use mounting hardware suitable for the Type rating of the enclosure.
- Apply the RMM2 product label onto the cover of user supplied enclosures.

4. Attach the RMM2 to the DIN 35 rail.

Position the RMM2 with RTD connections on the same side as conduit entry holes in enclosure.
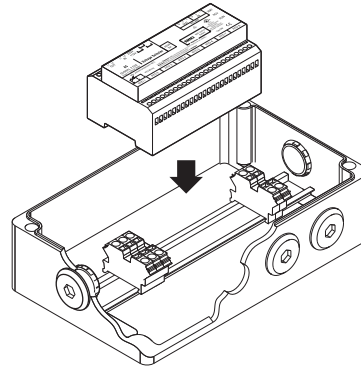

(RMM2-4X shown)

- Slip the green tabs on the underside of the RMM2 under one side of the DIN 35 rail. Pivot the RMM2 towards the DIN rail until the orange tab makes contact with the rail. Press the RMM2 towards the rail until the orange tab (**10**) snaps over the rail. Do not use excessive force.
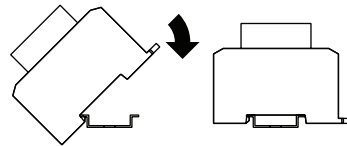
- To remove the RMM2 from the DIN rail, slip a small slotted screwdriver into the rectangular slot in the orange tab, push the tab away from the DIN rail, and pivot the RMM2 away from the rail.
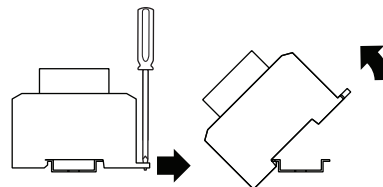
B. CONNECT POWER AND GROUND WIRING AND SELECT VOLTAGE OPERATING RANGE

⚠ **WARNING: Shock Hazard. Shut off power to power cable before proceeding.**

Note: For hazardous area installations, input and output (I/O) wiring and conduit seals must be installed in accordance with applicable Division 2 requirements.

### 5. Connect wiring from the power source to designated terminals on RMM2

Use only copper conductors. Connect power wires to the terminals marked L1 and L2 on the RMM2. If power is being daisy chained, be sure to maintain polarity of L1 and L2 wiring for incoming and outgoing wires. Connect the ground wire(s) to the grounding terminals mounted on the DIN rail.
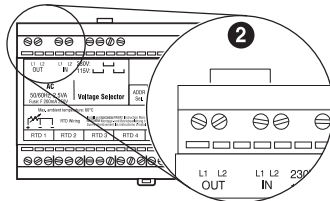
The terminals can accept wires from 24 to 12 AWG. We recommend 12 AWG flexible stranded wire with branch circuit protection sized accordingly. Cable should have a minimum temperature rating of 149°F (65°C).

6. Connect ground wiring.

Use only copper conductors. Connect ground wires to ground terminals in the enclosure.
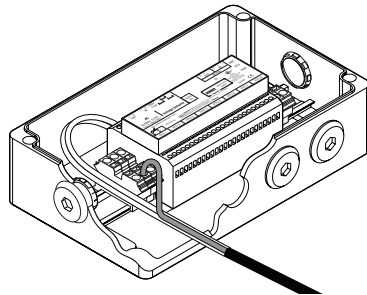
Note: If a ground wire is part of the power cable, it must be longer than the other two conductors for strain relief.

The RMM2-4X uses spring clamp terminals. These terminals have a steel spring that clamps the wire to a copper bus bar. This provides improved vibration resistance, reduced maintenance and faster installation.

To connect wires, firmly insert a flat-blade screwdriver (Ⓐ) into the square hole to open the spring. When fully inserted, the screwdriver will lock into place, allowing you to remove your hand and insert the wire into the round hole (Ⓑ). Remove the screwdriver to clamp the wire. The wire is held securely against the bus bar for low contact resistance over time without the need to periodically retighten screws.

Screwdriver slot
Wire hole
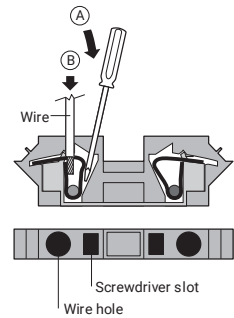
7. Select the voltage operating range

Connect the supplied jumpers to the appropriate terminals (❸) to select input voltage. The RMM2 comes supplied jumpered for 230 volts.
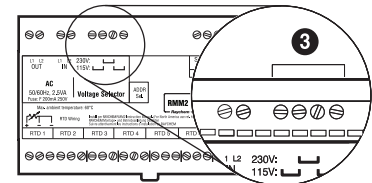
The RMM2 has terminals for 8 three-wire, 100 Ω platinum RTDs; do not use other types of RTDs. Select RTDs appropriate for the usage and temperature requirements.

Jumpered for 230V (default)

Jumpered for 115V
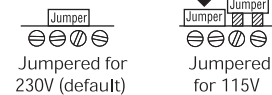
C. CONNECT RTD WIRES TO THE RMM2

Install each RTD in accordance with the installation instructions shipped with it, and run the RTD lead wires to the RMM2.
Note: Each of the three lead wires from each RTD must have a resistance of 20 Ω or less.

8. Connect lead wires from each RTD to the selected RMM2 terminals

The RMM2 accepts up to 8 RTDs. Each RTD connection is numbered; the number identifies the RTD, and determines the order in which the NGC controller displays the RTD
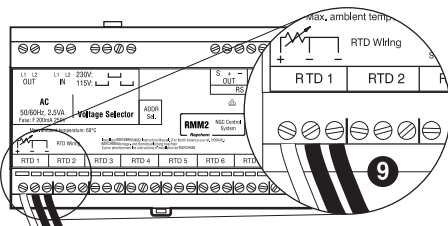
Note: If the RTD lead wires are reversed, the NGC controller will report an incorrect temperature measurement or an RTD error.

measurement. Therefore, order and group the RTD connections in a manner that makes the NGC controller display most meaningful.

The RMM2 cover shows the correct wiring arrangement for the RTD wires. Connect the two RTD lead wires of the same color to the terminals marked "-" (on the right in the illustration below); connect the RTD lead wire that is a different color to the "+" terminal.

If RTD shields are not grounded elsewhere, connect shield to ground terminal in enclosure.

9. Record the location/identification for each RTD

Because the RMM2 terminal connection number identifies the RTD in the RAYCHEM NGC control system, it is important to record the location of each RTD. Use the table on page 7 to record the connections, and label the RMM2 or its enclosure with this RTD identification information.

D. SELECT RS-485 ADDRESS AND CONNECT THE RS-485 BUS

10. Select the RS-485 address for the RMM2

Each RMM2 connected to an NGC controller must have a unique address; if two RMM2s are assigned the same address, communication faults will result. To ensure that you assign a unique address to each RMM2, do the following:

• Review the NGC system layout; if a layout document does not exist, create one. If it has not already been done, assign an RS-485 address to each RMM2 (up to 16) connected to the NGC controller. Record the RS-485 address assignments and save for future reference.

• If you are adding one or more RMM2 to an existing NGC system network, confirm that the RS-485 addresses for existing RMM2s correspond to the system layout. You can do so by observing the NGC controller display. When the NGC controller displays a temperature it identifies the RTD with a two-part tag; the prefix indicates the RMM2 address, and the suffix indicates the terminal number to which the RTD is connected. For example, RTD 33-7 identifies an RTD connected to the RMM2 with RS-485 address 33, RTD terminal 7.

By checking the RS-485 addresses on an existing system, you can avoid potential conflicts that would be confusing and time consuming to troubleshoot otherwise.

Record the RS-485 address selected for the RMM2 you are currently installing, and label the exterior of the enclosure with the address assigned to the RMM2.

11. Set the RS-485 address for the RMM2 using the rotary switch provided

Note the orientation of the clear plastic cover, (**11**) then remove the cover.
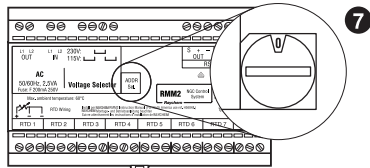
Use a slotted screwdriver to rotate the selector switches to the appropriate positions to select the RS-485 address.

The single character visible on the switch indicates the RS-485 address assigned.

RMM2 Switch Settings

Switch Settings	0	1	2	3	4	5	6	7	8	9
Device Address	32	33	34	35	36	37	38	39	40	41
Switch Settings	A	B	C	D	E	F				
Device Address	42	43	44	45	46	47				

12. Connect the RS-485 bus

Note: Do not make connections to the RS-485 bus while it is connected to an operating NGC controller, or damage and/or alarms could result.

The RS-485 bus allows units with unique addresses to be daisy-chained together along a common bus. To add a new unit to the network, simply daisy-chain the RS-485 bus from the last unit to the new one — or insert the new unit between two existing units on the bus. The order in which units are attached to the RS-485 bus does not matter. There are just two constraints on the RS-485 network:

• Each RMM2 must be assigned a unique address.

• The RS-485 bus must be a continuous string from the NGC controller to the last RMM2 in the system.

Note: The RS-485 bus operates at 5V, and equipment connected to it could be damaged by exposure to higher voltages. Take precautions to avoid exposing the RS-485 wiring to discharge of static electricity or other sources of high voltage potential; in particular, avoid contact with the power supply wiring.

Typical example of RS-485 bus connection for the NGC-30 control system

The RMM2 has two sets of terminals for connections to the RS-485 bus. One terminal block allows the RMM2 to connect to the RS-485 bus, the second allows a continuation of the bus to other RMM2s on the network. Observe polarity, which is indicated on the RMM2 cover.
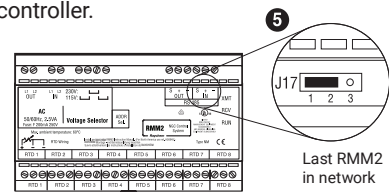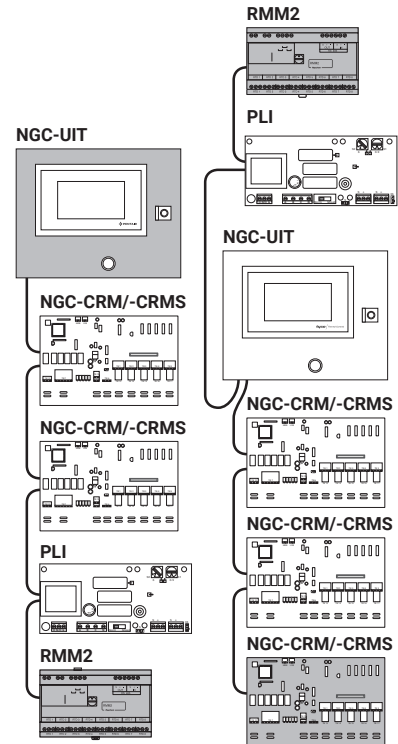
Connect the incoming RS-485 bus to the set of terminals marked "IN", observing the polarity noted on the cover of the RMM2; use the terminal marked "S" for the shield of the RS-485 cable. Connect the continuation of the RS-485 bus to the set of terminals marked "OUT" in the same manner (not required for the last RMM2 in the network).

Device must be mounted in series.
(Terminated devices are shown in gray)

Important: Do not connect the shield of the RS-485 cables to the enclosure's grounding terminal. Connect the shield only to the RMM2 terminals provided. To avoid the potential for spurious ground loops, the RS-485 cable shield should be connected to ground only in the NGC controller.

For the last RMM2 in the network, terminate the RS-485 bus by removing the shorting block on jumper location J17 from 2–3 and placing it across pins 1–2.

Replace the clear plastic cover (**11**) in its original orientation.

Last RMM2 in network

Default position (for all RMM2 units in network except last one)
J17 [1 2 3]

Termination mode (last RMM2 in network)
J17 [1 2 3]

E. INITIALIZE OR UPDATE THE NGC SYSTEM NETWORK AND ASSIGN SETTINGS FOR EACH RTD

RMM2 units are monitored by a central NGC controller. Its system software enables you to trigger the NGC controller to recognize changes to the RMM2 and RTD configuration. Until this software is run, the NGC controller will not monitor new RMM2s or RTDs.

13. Energize all RMM2s in the network

Confirm that the RS-485 network is complete (all RMM2 units and the NGC controller are connected to the RS-485 bus), and that the power to each unit has been turned on.

14. Use the NGC control system software to initialize or update the network

Run the NGC control system software function to trigger it to recognize new RMM2s and RTDs. Use the "Update Network" function for first time setup, additions, or changes to a system. For example, the NGC-30 Programming Guide (H58186) describes these software functions in Section 3.1 "Setting the Network for Device(s)".

15. If necessary due to problems or questions, check function of individual RMM2 modules

*   Check all connections.
*   Verify that the voltage selector jumpers (**3**) are installed for the appropriate range (see Step 7 on Page 4).

*   Verify that each RMM2 is functioning by confirming that the RUN LED (**8**) is illuminated and the communications XMT and RCV LEDs (**6**) are flashing.
*   Confirm that the RMM2 network does not have any duplicate RS-485 addresses.
*   Check the fuse. If the resistance is greater than 10Ω, replace.

16. Use the NGC control system software to assign settings for each RTD

Run the NGC control system software function to assign settings for each RTD:

*   RTD mode (determining whether it is in Control or Monitoring mode).
*   Low and high temperature alarms (if desired, alarms can be set independently for each RTD, separately from the thresholds assigned for the control group overall).

For example, the NGC-30 Programming Guide (H58186) describes these software functions in Section 3.3.5 "SETUP|RTDS WINDOW".


F. FUSE REPLACEMENT **1**

*   **Important:** Disconnect power before replacing a fuse.
*   Pry off the clear plastic cover (**11**) using a small slotted screwdriver.
*   Use needle nose pliers to remove the fuse marked F200 mA 250V.
*   Install a replacement fuse (supplied with the RMM2).
*   Align "RTD1" on the clear plastic cover (**11**) with "RTD1" on the RMM2. Press firmly on cover until it is fully engaged.

*   Additional replacement fuses may be purchased from an Electrical Supply Distributor

Manufacturer	Catalog no.
Wickmann or	370-0200-041
Schurter	0034.6007

Typical Installation

6 | nVent.com
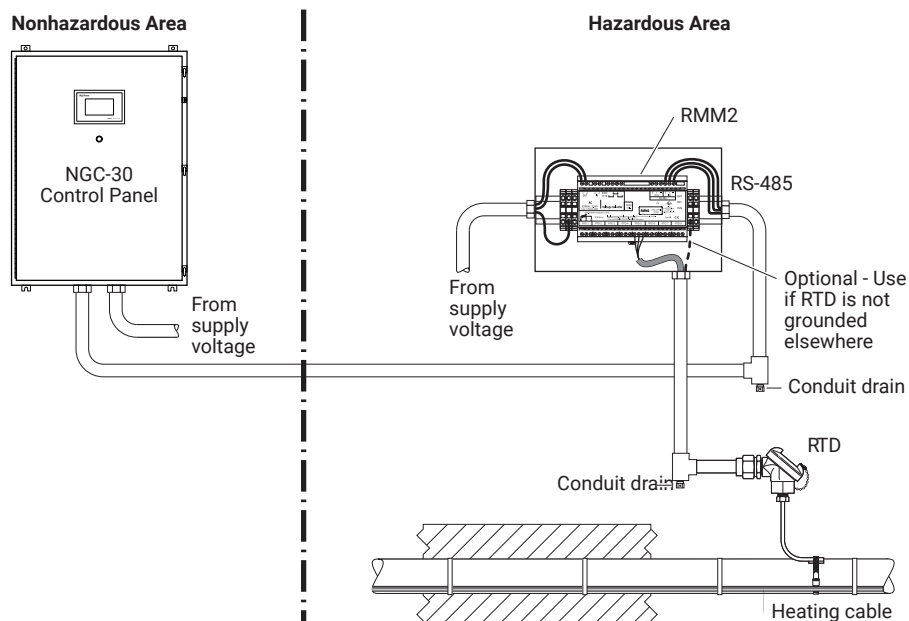
E. INITIALIZE OR UPDATE THE NGC SYSTEM NETWORK AND ASSIGN SETTINGS FOR EACH RTD

RMM2 terminal no.	P&ID or Drawing Identification	Description or location
1		
2		
3		
4		
5		
6		
7		
8		

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