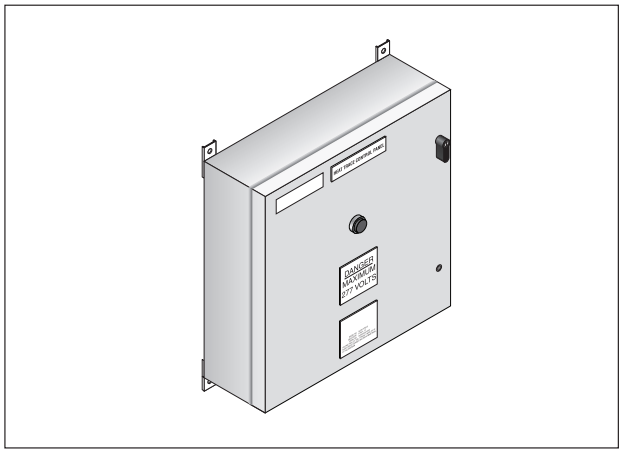
nVent

RAYCHEM

ACS-PCM2-5

Power Control Module for use with RAYCHEM ACS-UIT2 Installation Instructions



APPROVALS/CERTIFICATIONS

Nonhazardous Locations

c UL US LISTED

UL STD 508A
CAN/CSA C22.2 NO. 14

DESCRIPTION

The nVent RAYCHEM 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-UIT2.

The ACS-PCM2-5 enclosure is rated NEMA 4/12 and is approved for nonhazardous indoor and outdoor locations that are subject to freezing.These instructions describe how to mount the ACS-PCM2-5 and make the various power, communications, and RTD wiring connections. All electrical connections, maintenance and servicing must be done by a qualified electrician.

If your application conditions are different, or if you have questions, please contact your nVent representative or contact nVent directly at (800) 545-6258.

TOOLS REQUIRED

- Drill to mount enclosure
- Small flat-head screwdriver
- Phillips (cross-head) screwdriver

ADDITIONAL MATERIALS REQUIRED

- RS-485 cable (Belden #8761 or Carol # C2514)
- Wall fasteners for surface mounting (four screws)
- nVent RAYCHEM ACS-30 Programming Guide (H58279)
- nVent RAYCHEM ACS-UIT2 Installation Instruction (H58239)

General

Ambient Operating Temp.	–13°F to 122°F (–25°C to 50°C)
Dimensions	24 in. W X 24 in. H X 6.75 in. D (610 mm W X 610 mm H X 171 mm D)
Enclosure Rating	NEMA 4/12 (Indoor/outdoor locations)
Weight	70 lbs (31.75 kg)
Humidity	0 – 90% non-condensing
Fuse	Bussman MDL
Input	100 – 277 Vac (from Ch 1 to power control devices)

Control Contactors

Rating	3-pole – 30 A/pole 277 V Max
Type	Sprecher-Schuh CA7-16-10-12D
Quantity	5

Connection Terminals

Power Supply/Line/Load	#22 – 8 AWG
RS-485	#24 – 12 AWG
RTD	#24 – 12 AWG

Communication to ACS-UIT2

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-UIT2.

Line Current Sensors

Max current	60 A
Accuracy	± 2% of reading

Ground-Fault Sensors

Range	10 – 200 mA
Accuracy	± 4% of range at 30 A line current

Temperature Sensors

Type	100-ohm platinum RTD, 3-wire, α = 0.00385 ohm/ohm/°C Can be extended with a 3-conductor shielded cable of 20 ohm maximum per conductor
Quantity	Up to five wired directly to each ACS-CRM

⚠ WARNING:

FIRE Hazard: Do not mount the ACS-PCM2-5 in a hazardous location.

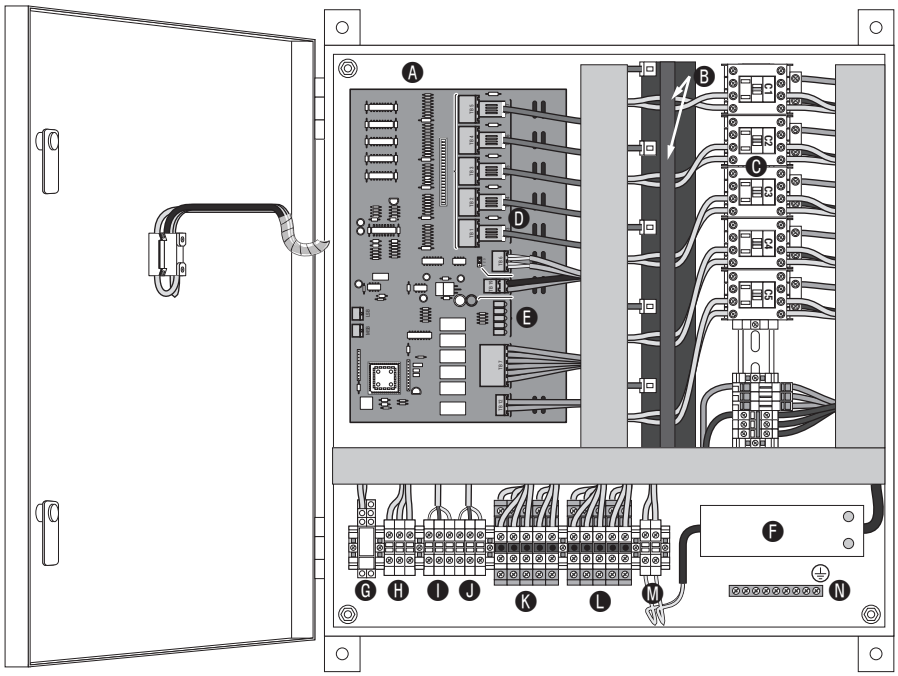
SHOCK HAZARD: Follow all local electrical safety procedures. Disconnect power before servicing or opening this unit.

⚠ IMPORTANT:

The ACS-PCM2-5 is an electronic unit. During installation, take the following precautions to avoid damage to its electronic components.

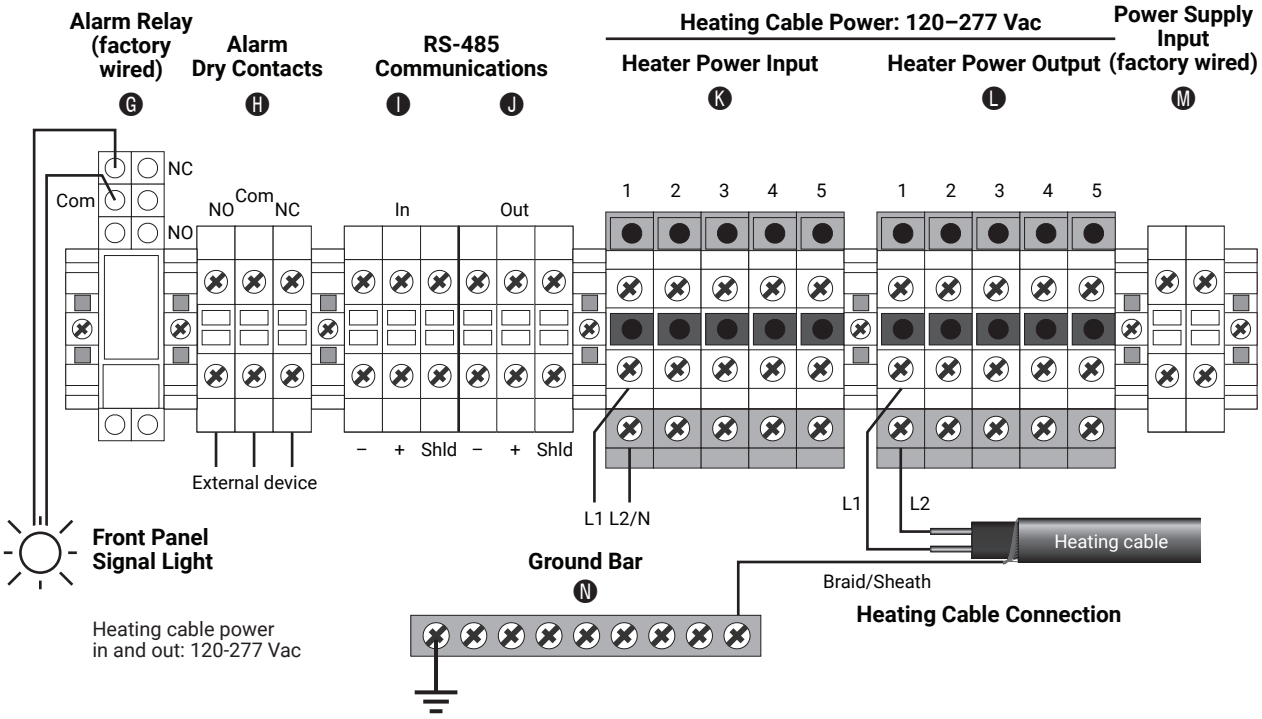
- Handle with care to avoid mechanical damage.
- Keep electronics dry.
- Avoid exposure to static electricity.
- Avoid contamination with metal filings, liquids, or other foreign matter.
- Take care to protect the user interface board on the enclosure door.
- Use agency-approved conduit bushings, adapters, and cable glands to keep the enclosure protected from dust and fluids.

Panel Layout



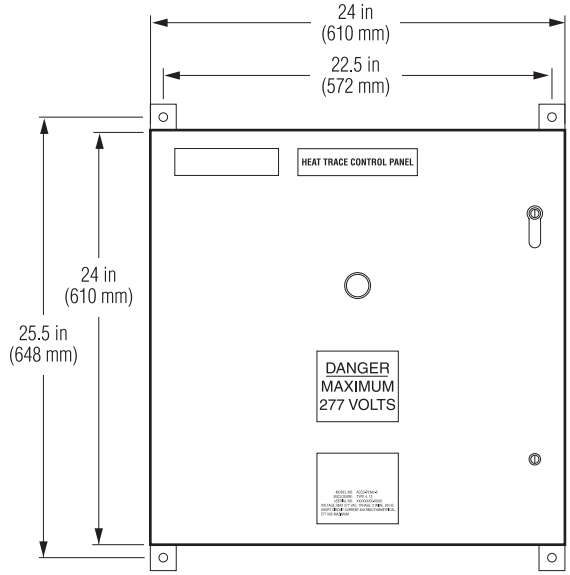
Item	Qty	Description
A	1	ACS-CRM (card rack module)
B	1	NGC-30-CTM (current transfer module)
C	5	3-pole contactors
D	5	RTD Inputs
E	9	Status LEDs
F	1	120–277 Vac to 12 Vdc power supply
G	1	Alarm relay
H	1	Dry alarm contacts
I	3	RS-485 (IN) terminal blocks
J	3	RS-485 (OUT) terminal blocks
K	5	Line in terminal blocks
L	5	Load out terminal blocks
M	3	Power supply input
N	1	Grounding bar

ACS-PCM2-5 Terminal Block Layout



Mounting the Enclosure

The RAYCHEM ACS-PCM2-5 controller must be mounted in a non-hazardous location. The panel is rated NEMA 4/12 with an ambient range of –13°F to 122°F (–25°C to 50°C).



Heater Power Input and Ground (See schematic on Page 2)

Heater Power Input Ⓚ and Ground Ⓝ

1. Locate the Heater Power Input (Ⓚ) terminal block (No 1 – 10) and connect per the ACS-PCM2-5 Terminal Block Layout on page 2. Depending upon size and type of the remotely located branch circuit breakers*, use the appropriate size and number of wires from the circuit breaker to the Heater Power Input terminals.
2. Locate the Ground Bus bar (Ⓝ) and using the appropriate size wire, connect a common ground wire from the branch circuit breaker panel board.

Note:

1. The ACS-PCM2-5 has integrated ground-fault circuit protection and therefore does not require additional ground-fault protection when connecting it to power.
2. Circuit breakers can be the following:

Voltage	# of poles	Connection	Maximum C.B. size
*120	1	phase to neutral	30 A
208	2	phase to phase	30 A
240	2	phase to phase	30 A
*277	1	phase to neutral	30 A

*For 120 and 277 V, bring a separate neutral from each breaker

Heater Power Output and Ground

Heater Power Output Ⓙ and Ground Ⓝ

1. Locate the Ground Bus bar (Ⓝ) and using the appropriate size wire, connect a ground wire from the ground bus bar to the heating cable's power connection enclosure and terminate to the heating cable's braid.

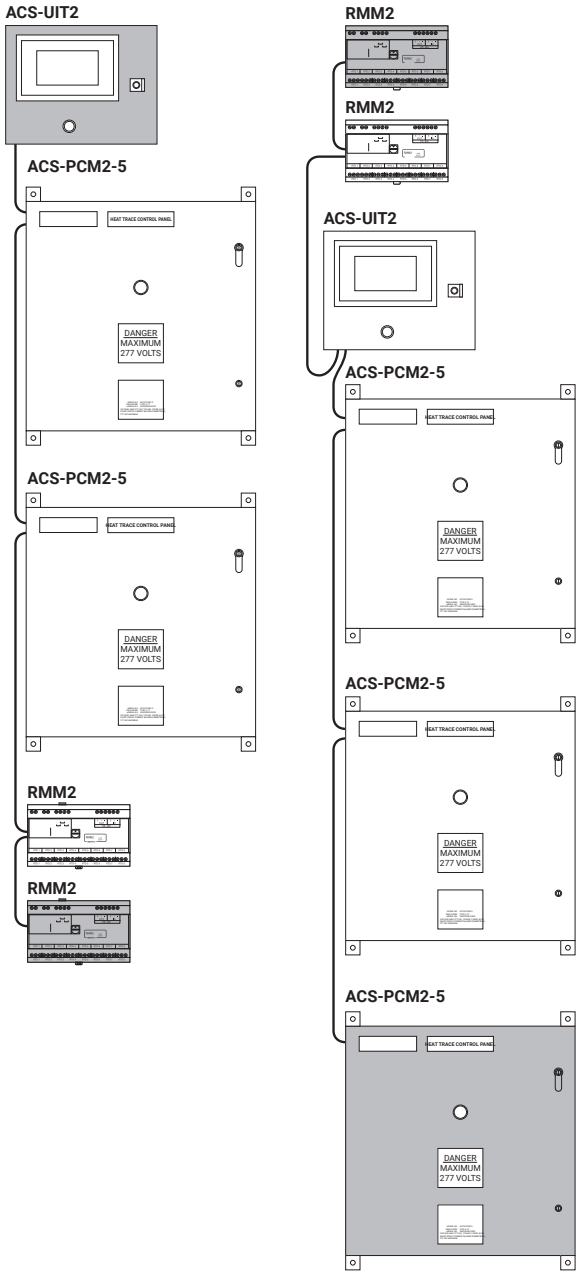
Control Power

No additional voltage supply is required to power the internal ACS-CRM board, alarm light and contactors. Theses devices are powered from 100-277 Vac tapped from circuit 1 heating cable power input. If a dedicated input power supply is required contact nVent for assistance.

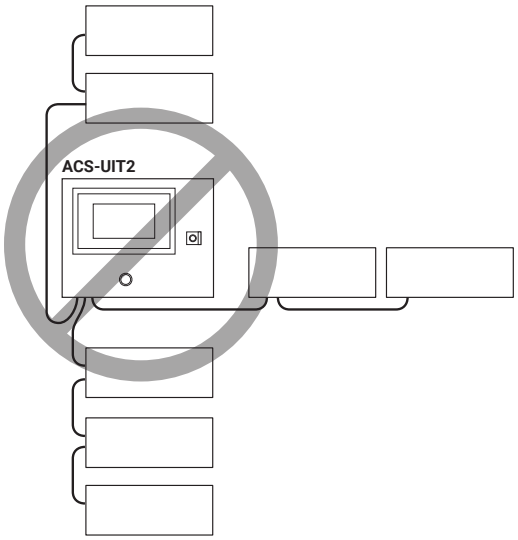
Connecting the RS-485 Device Network

The ACS-UIT2 display is typically linked to a network of RAYCHEM ACS-PCM2-5 power panels (incorporating the ACS-CRMs) and optional RMM2 devices. These are connected to the RAYCHEM ACS-UIT2 using an RS-485 communication cable (shielded, two conductor, twisted pair). The following illustration shows how the RS-485 network for the ACS system can be configured.

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



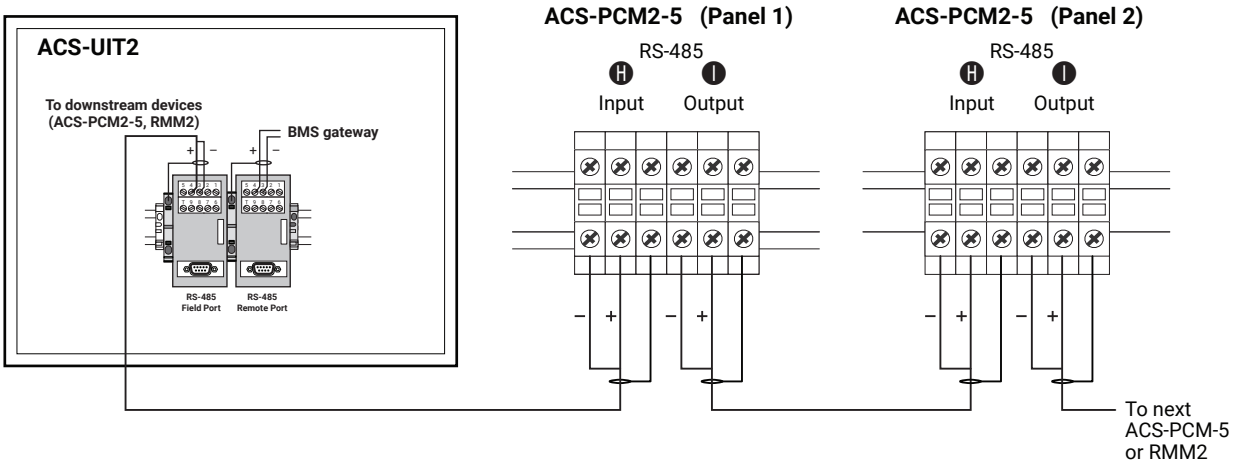
Branching of the network is not allowed.
Connect no more than two RS-485 cables to any device.



In order for the RS-485 network to work properly, you must enable the termination resistor for the first and last device. The devices shown in gray in the illustration above represent the devices for which you must enable the termination resistors. The devices that are not grayed out represent the devices for which you should not enable the termination resistors.

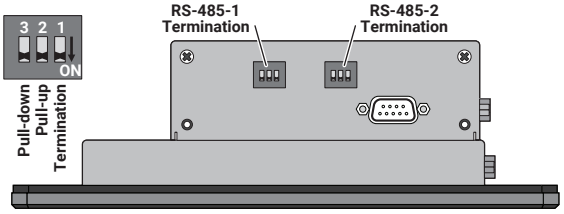
Connection

You must make an RS-485 connection from the ACS-UIT2 to the ACS-CRM board in the ACS-PCM2-5 panel. To make this connection, a pre-wired terminal block has been provided in the ACS-UIT2 (TB3- terminals 1, 2, and 3) and in the ACS-PCM2-5 panel (TB (Ⓗ) and (Ⓘ)). Connect the RS-485 wire from TB3 in the ACS-UIT2 and the other end to the TB (Ⓗ) in the ACS-PCM2-5 panel maintaining the correct polarity. If the ACS-UIT2 or ACS-CRM is the first or last device in the RS-485 network, see below for details on how to terminate the RS-485 network.



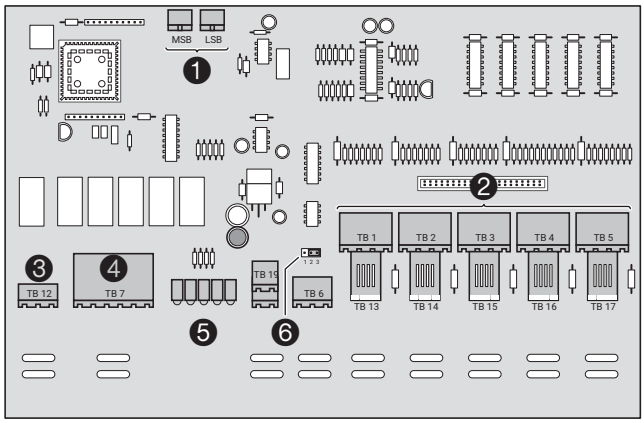
Termination of RS-485 Network (if First or Last in Network)

ACS-UIT2



Switch	Position		Comments
	On	Off	
Pull-down	(As-shipped default) RS-485 network "–" signal **is forced** to a determinate state when idle.	RS-485 network "–" signal **is not forced** to a determinate state when idle.	One device (typically this ACS-UIT2) on the RS-485 network should force the network "–" signal to a determinate state.
Pull-up	(As-shipped default) RS-485 network "+" signal **is forced** to a determinate state when idle.	RS-485 network "+" signal **is not forced** to a determinate state when idle.	One device (typically this ACS-UIT2) on the RS-485 network should force the network "+" signal to a determinate state.
Termination	(As-shipped default) RS-485 network **is terminated** with 120-ohm resistor.	RS-485 network **is not terminated.**	Terminate the device (ACS-UIT2 or other) that is at each end of the RS-485 network, for a total of two terminated devices. No other devices on the network should be terminated.

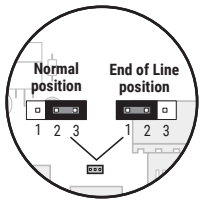
ACS-CRM Ⓐ



❶ Address Switches
❷ RTD Inputs (x5)
❸ Alarm Output
❹ Relay Outputs (x5)
❺ Status LEDs
❻ End of Line (EOL) jumper

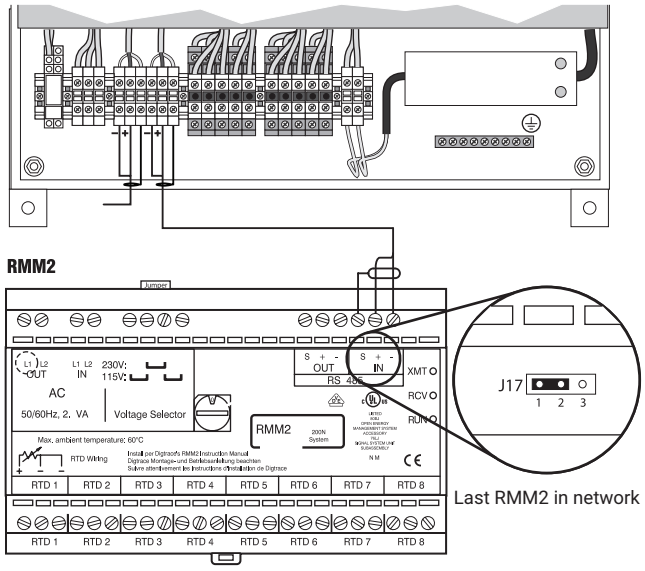
End of Line (EOL) Jumper ❻

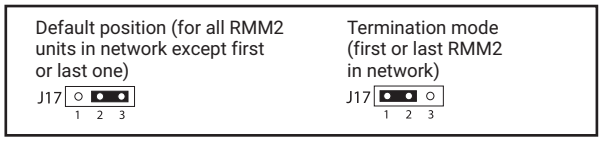
If this device (ACS-CRM) is the last device in the RS-485 network, the J1 jumper needs to bemoved from terminals 2 & 3 to terminals 1 & 2.



Optional nVent RAYCHEM RMM2 Installed in the Field

Refer to the RMM2 Installation Instructions (H56848) for field installation instructions. You must connect an RS-485 cable from the RMM2 to the RAYCHEM ACS-PCM2-5 panel. To make this connection, a prewired terminal block has been provided in the RAYCHEM ACS-PCM2-5 panel. Connect the RS-485 wire from the RMM2 to the RS-485 terminal block (either H or I) while maintaining the correct polarity as shown below. If the RMM2 is the first or last device in the RS-485 network, connect the J17 termination jumper to pins 1 and 2. If the RMM2 is not the first or last device in the RS-485 network, connect the J17 termination jumper to pins 2 and 3.





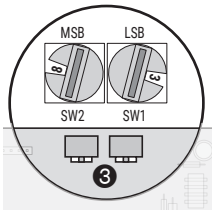
The RMM2 uses address range 32 – 47. Refer to the RMM2 Heat Tracing Remote Monitoring Module Installation Instruction (H56848) for setting address switch.

Setting Address Switches on CRM Board

Address Switches (SW1 & SW2) ❶

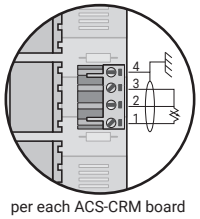
Each ACS-CRM must have a unique communication address. The valid address switch range for the ACS-UIT2 is 1–99. SW1 is the ones digit (0–9) and SW2 is the tens digit (0–9).

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-UIT2.



Connecting RTD Sensors - As Required

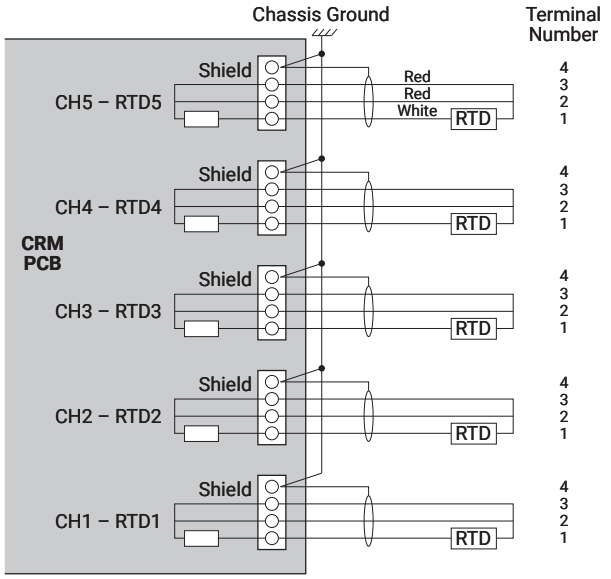
RTD Inputs ❷



per each ACS-CRM board

3-wire RTDs with shield may be connected to RTD Ch1 thru Ch5 (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).

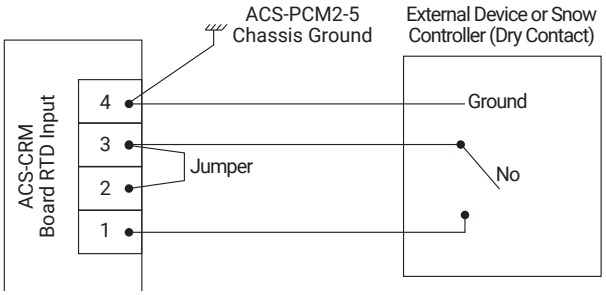
RTD connected directly to the CRM board



Connecting External Device Input (Snow Controller, Override Device)

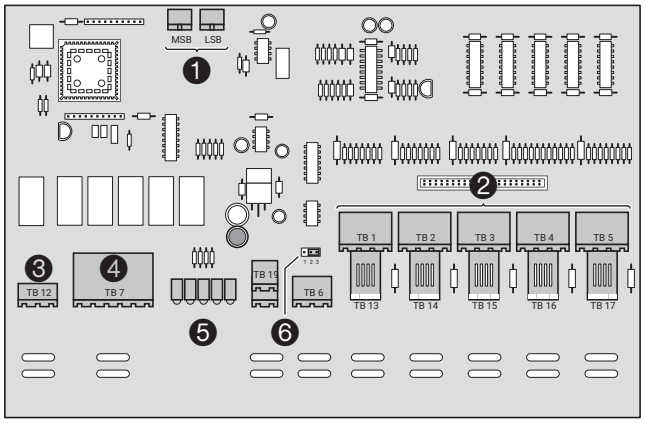
Connect 2-wire shielded cable from the normally open position of the external device dry contacts to the RTD input terminals on the ACS-CRM Board.

Connect the cable to terminals 1 and 3 with a jumper between position 2 and 3 as shown below:

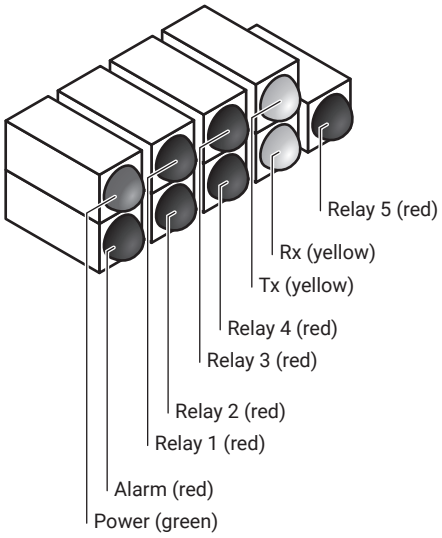


Status LEDs ❺

A cluster of 9 LED's are positioned on the CRM board which present the status of the circuit in the ACS-PCM2-5 panel.



❶ Address Switches
❷ RTD Inputs (x5)
❸ Alarm Output
❹ Relay Outputs (x5)
❺ Status LEDs
❻ End of Line (EOL) jumper



The following table summarizes the Status LEDs:

Function	Color	Description
Power	Green	Indicates power is supplied to the ACS-CRM board.
Alarm	Red	Indicates that the ACS-CRM board registered an alarm condition. Check the ACS-UIT2 screen for events log to determine the alarm condition and to re-set the boards.
Relay 1-5	Red	Indicates that the heating cable relay is energized.
Rx	Yellow	Flickering indicates data reception
Tx	Yellow	Flickering indicates data transmission

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