CVM-12
Heat Tracing
Monitoring Module

Operating Guide

HeatChek and TraceView are tradenames of Thermon Manufacturing Company.

CVM-12

Heat Tracing Monitoring Module

Index

CVM-12 Heat Tracing Monitoring Module

INTRODUCTION . . .

The CVM-12 is a twelve circuit microprocessor-based module designed specifically for cost effective multi-point heat tracing monitoring. The CVM-12 can monitor for loss of voltage at either the circuit breaker or at the end of a heat tracing circuit through a third wire continuity monitor. As an alternate to voltage monitoring for constant wattage (parallel, series, and power limiting) type heat tracing circuits, the CVM-12 monitoring module (when equipped with current sensing transformers) can also be configured to detect current loss in each heat tracing circuit.

The CVM-12 is especially well suited for use in ambient sensed power distribution panels controlling large numbers of freeze protection heat tracing circuits.

Operating Guide

SPECFICATIONS . . .

The CVM-12 heat tracing monitor has the following specifications:

Module Supply Voltage: 120/240 Vac (field switchable)
Voltage Sensing: 110 Vac to 575 Vac
Power Consumption: 12 watts per module
Module Operating Ambient: -40°F to 158°F (-40°C to 70°C)
Maximum Storage Ambient: 185°F (85°C)
Data Retention: Non-volatile EEPROM
Current Sensors: CT-60 (up to twelve)
Alarm Relay Output: Single pole, double throw rated at 5A at 240 Vac

CERTIFICATIONS/APPROVALS . . .

The CVM-12 heat tracing monitor has the following certifications/approvals:

Canadian Standards Association
For Use in Ordinary Locations

Underwriters Laboratories, Inc.
For Use in General Purpose Industrial Control Panels

For Use in Control Panels (Type Z) in
Hazardous (Classified) Locations
    Class 1, Division 2, Groups A, B, C and D

CVM-12 Heat Tracing Monitoring Module

NOMINAL DIMENSIONS . . .

The CVM-12 heat tracing monitor has the following overall dimensions:
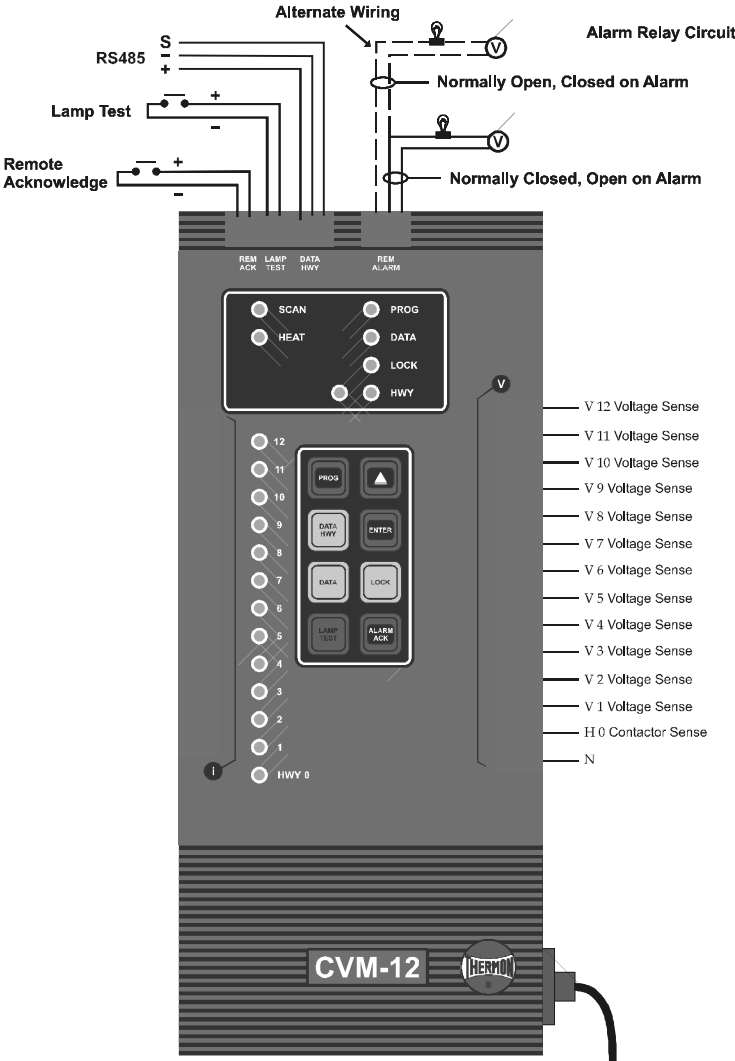

ACCESSORIES . . .

The CVM-12 can be equipped wtih up to twelve CT-60 current sensors (see below) when utilizing the current loss monitoring feature of this module.

Operating Guide

TYPICAL WIRING SCHEMATIC FOR VOLTAGE MONITORING . . .

The CVM-12 may be used to detect the loss of voltage for up to twelve circuit breakers or at the ends of up to twelve heat tracing circuits.
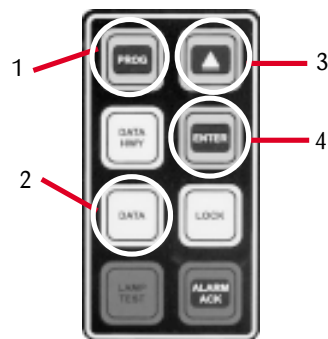
CVM-12 Heat Tracing Monitoring Module

OPERATING THE CVM-12 IN VOLTAGE MONITORING SERVICE . . .

The CVM-12 can scan for the loss of voltage at either the circuit breaker or at the end of the third wire monitor lead (continuity monitoring) through the twelve voltage sense leads connected on the terminal strip at the right hand side of the module.
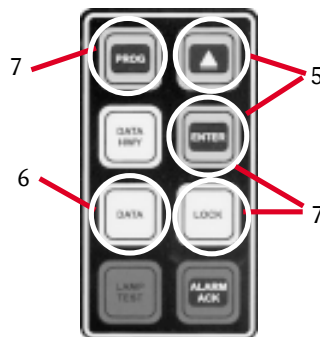
READING THE INITIAL VOLTAGE LEVEL

When the CVM-12 has been installed, the heat tracing installation has been completed and the system is energized, it is necessary to read the normal operating voltage for each circuit into the CVM-12 memory. To read data:

1) Press the "PROG" key.

2) Press the "DATA" key. Note that the "PROG" LED, as well as the "DATA" LED, will illuminate denoting operation in the programming mode and that a circuit number illuminates. If instead, the CVM-12 reverts back to the "SCAN" mode as indicated by an illuminated "SCAN" LED and "LOCK" LED, the CVM-12 is in a secure mode which prevents programming. Proceed to page 16 for procedures necessary to unlock the controller.

3) Press the "UP ARROW" key to scroll through the circuit numbers.

4) Press the "ENTER" key to select the desired circuit for which the normal operating voltage is to be read.

Operating Guide

5) If it is desired to read all the operating voltages at once, press the "UP ARROW" key until all the circuit LED's illuminate. Then press the "ENTER" key. The CVM-12 will then automatically read the circuit's voltages when the "HEAT" LED is illuminated (contactor sense HO input is energized). The CVM-12 will verify which circuits are wired for voltage monitoring (voltage is present at voltage sense input). The normal voltage level for each energized circuit will subsequently be read into memory.

6) The CVM-12 should complete the voltage data acquisition in3 minutes or less. To determine the status of the "DATA" acquisition, press the "DATA" read key while the "DATA" LED is illuminated. This will result in the CVM-12 illuminating the circuit numbers which have yet to be completed. Upon completion of the voltage "DATA" acquisition for all circuits, the "DATA" LED will turn off. Once the "DATA" LED turns off, a press of the "DATA" key will result in the illumination of any circuit numbers which have been determined by the CVM-12 to not be in use. **Warning ... these circuits will not alarm.**

7) To secure the normal circuit voltage readings, press the "PROG" key. The "PROG" LED will illuminate. Sequentially, press the "LOCK" key and the "ENTER" key to lock the normal readings into memory. The "LOCK" LED will now illuminate and a special keying sequence will be required for any later re-read of normal voltage levels.

CVM-12 Heat Tracing Monitoring Module

READING THE INITIAL VOLTAGE LEVEL

When the CVM-12 has been installed, the heat tracing installation has been completed and the system is energized, it is necessary to read the normal operating voltage for each circuit into the CVM-12 memory. To read data:

1) Press the "PROG" key.

2) Press the "DATA" key. Note that the "PROG" LED, as well as the "DATA" LED, will illuminate denoting operation in the programming mode and that a circuit number illuminates. If instead, the CVM-12 reverts back to the "SCAN" mode as indicated by an illuminated "SCAN" LED and "LOCK" LED, the CVM-12 will verify that each circuit is wired for voltage monitoring (voltage is present on each circuit input). The normal voltage level for each enabled circuit will subsequently be read into memory.

3) Press the "UP ARROW" key to scroll through the circuit numbers.

4) Press the "ENTER" key to select the desired circuit for which the normal operating voltage is to be read.
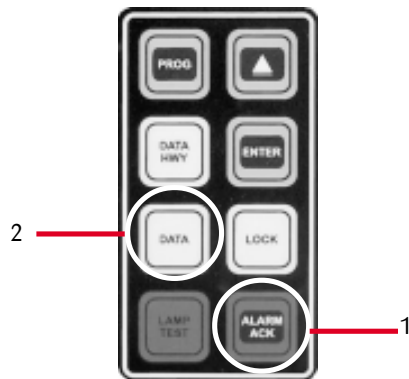
Operating Guide

TYPICAL WIRING SCHEMATIC FOR CURRENT LOSS MONITORING . . .

When equipped with CT-60 current sensors, the CVM-12 may be used to detect a 25% loss of current in a heat tracing circuit. The typical wiring schematic for this is as shown below.
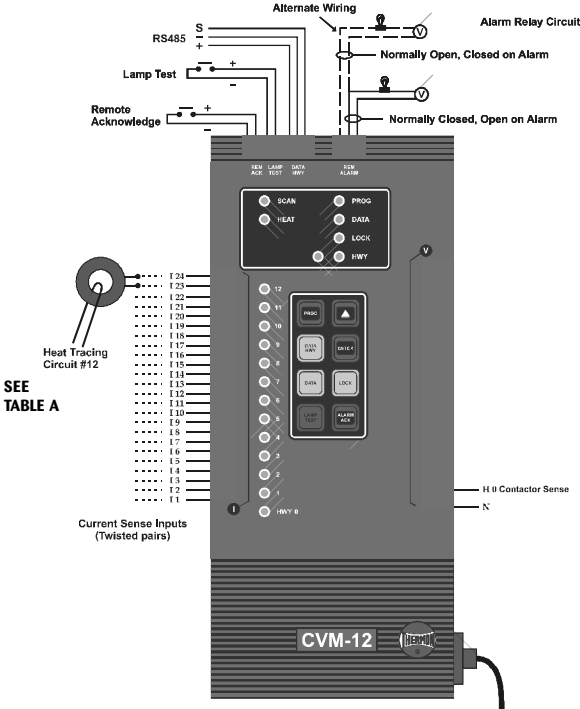
| TABLE A	
Operating Circuit Amperage Range	**Number of Wire Passes Through Current Transformer**
.5A to .999A	8
1.0A to 1.999A	4
2.0A to 3.999A	2
4.0A to 60A	Straight Thru

11

CVM-12 Heat Tracing Monitoring Module

OPERATING THE CVM-12 IN CURRENT MONITORING SERVICE . . .

The CVM-12 can scan for a loss of heat tracing current of 25% or more through the twelve current sensors connected on the terminal strip at the left hand side of the module.
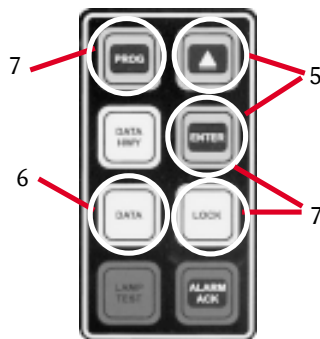
READING THE INITIAL CURRENT LEVEL

When the CVM-12 has been installed, the heat tracing installation has been completed and the system is energized, it is necessary to read the normal operating current for each circuit into the CVM-12 memory. To read data:

1) Press the "PROG" key.

2) Press the "DATA" key. Note that the "PROG" LED, as well as the "DATA" LED, will illuminate denoting operation in the programming mode and that a circuit number illuminates. If instead, the CVM-12 reverts back to the "SCAN" mode as indicated by an illuminated "SCAN" LED and "LOCK" LED, the CVM-12 is in a secure mode which prevents programming. Proceed to page 16 for procedures necessary to unlock the controller.

3) Press the "UP ARROW" key to scroll through the circuit numbers.

4) Press the "ENTER" key to select the desired circuit for which the normal operating current is to be read.
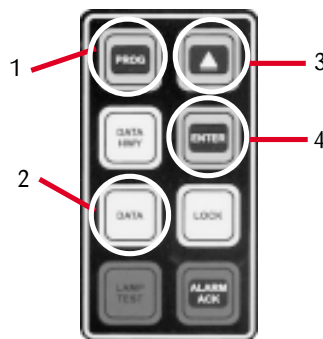
Operating Guide

5) If it is desired to read all the operating currents at once, press the "UP ARROW" key until all the circuit LED's illuminate. Then press the "ENTER" key. The CVM-12 will then automatically read the circuit's current when the "HEAT" LED is illuminated (contactor sense H0 input is energized). The CVM-12 will verify which circuits are wired for current monitoring (current is sensed at the CT-60 current transformers which are connected to the CVM-12). The normal current level for each enabled circuit will subsequently be read into memory.

6) The CVM-12 should complete the current data acquisition in 20 minutes or less. To determine the status of the "DATA" acquisition, press the "DATA" read key while the "DATA" LED is illuminated. This will result in the CVM-12 illuminating the circuit numbers which have yet to be completed. Upon completion of the current "DATA" acquisition for all the circuits, the "DATA" LED will turn off. Once the "DATA" LED turns off, a press of the "DATA" key will result in the illumination of any circuit numbers which have been determined by the CVM-12 to not be in use. **Warning ... these circuits will not alarm.** If a circuit is known to be active and yet the circuit number LED illuminates when the "DATA" key is pressed, it is possible that the total current read within the CT-60 is less than 4 Amperes. If so, refer to Page 11 Table A for the number of loops through the CT-60 and adjust the wiring for this circuit.

7) To secure the normal circuit current readings, press the "PROG" key. The "PROG" LED will illuminate. Sequentially, press the "LOCK" key and the "ENTER" key to lock the normal readings into memory. The "LOCK" LED will now illuminate and a special keying sequence will be required for any later re-read of normal current levels.


13

CVM-12 Heat Tracing Monitoring Module

THE CVM-12 IN SCAN MODE

Once the initial current "data read" is complete, the CVM-12 will begin to continually scan each of the twelve heat tracing circuits and will alarm should the current drop by more than 25%. If an alarm condition does occur, the common alarm relay will activate (open or close depending on wiring configuration). In addition, the alarm will appear as a flashing circuit number to the left of the keypad.

1) Press the "ALARM ACK" key to acknowledge all circuit numbers which are in alarm. Once the "ALARM ACK" key is pressed, the circuit number(s) which are in alarm will stop flashing but will remain illuminated until the circuit current once again exceeds 75% of the normal value. In addition, the common alarm action clears and the contacts will be reset.

2) Pressing the "DATA" key when in Scan mode will result in the illumination of any circuit numbers which have been determined by the CVM-12 to be in use. These circuits will not alarm.
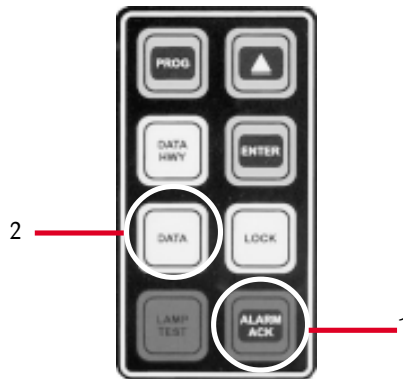
DATA HIGHWAY COMMUNICATIONS . . .

When the CVM-12 is connected into an RS 485 two wire twisted pair data highway, alarm events can be sent back to the facility DCS or to a PC which has been set up with TraceView Plus communications software. Through its ModBus communications protocol, the CVM-12 will report to the PC or to the DCS the following information:

        1) the circuit number in alarm
        2) the CVM-12 data highway address
        3) the alarm status (alarm, alarm acknowledged, or alarm cleared)

CVM-12 Heat Tracing Monitoring Module

READING AND PROGRAMMING THE DATA HIGHWAY ADDRESS

1) The data highway address may be checked when in the scan mode by simply pressing the "DATA HWY" key. The left "HWY" LED will first illuminate and a number LED will illuminate to the left of the keypad. This number indicates the "tens place" digit of the data highway address.

2) Pressing the "DATA HWY" key again illuminates the right "HWY" LED signifying the "ones place" digit in the data highway address. For example, the successive illumination of a four and a five will indicate that this CVM-12 is set as the data highway address 45.

3) To re-program the data highway address (the CVM-12 must be in an un-locked[1] condition to do this), press the "PROG" key.

4) Then press the "DATA HWY" key. The "PROG" LED will illuminate indicating that you are in the programming mode of operation. Subsequently, the left "HWY" LED will illuminate and the current "tens place" digit will illuminate.

5) Press the "UP ARROW" key to scroll to a new numeric value.

6) Press the "ENTER" key to select the new value.

7) Press the "DATA HWY" key again and the "ones place" digit will illuminate.

8) Again press the "UP ARROW" key to scroll to a new value.

9) Press the "ENTER" key to select the new value.

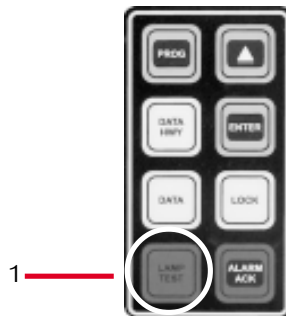[1]Refer to page 16 for the "Unlock" procedure.
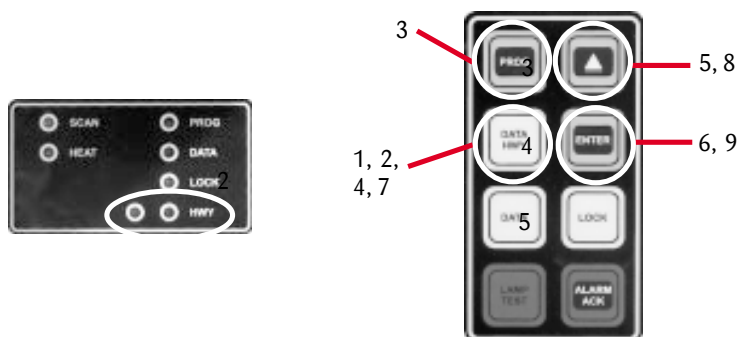
Operating Guide

OTHER FEATURES . . .

The CVM-12 has several other features which may be found useful.

LAMP TEST

1) Pressing the "LAMP TEST" key will result in all LED's in the CVM-12 illuminating.
This provides reassurance to the user that the CVM-12 is ready and able to
properly report all information and alarm events.

CVM-12 Heat Tracing Monitoring Module

**UNLOCKING THE CONTROLLER SETTINGS**

If at some point in the life of the heat tracing system a modification is required which may alter the normal operating voltage or current on a particular circuit, or if a new data highway address is desired, it is possible to unlock the initially programmed values and read in the new data.

1) Press the "PROG" and "LOCK" key sequentially.

2) Press the "UP ARROW" key until the circuit number LED corresponding to the desired "tens place" of the data highway address illuminates.

Tens Place   Ones Place
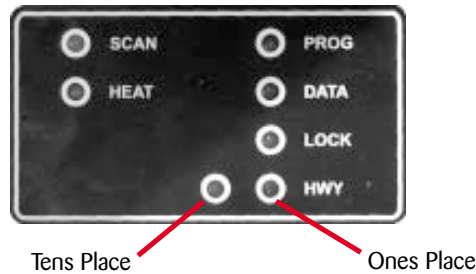
3) Press "ENTER".

4) Press the "UP ARROW" key until the circuit number LED corresponding to the desired "one's place" of the data highway address illuminates.

5) Press "ENTER" again and the "LOCK" LED will turn off indicating that any or all circuit normal operating values may be re-set.
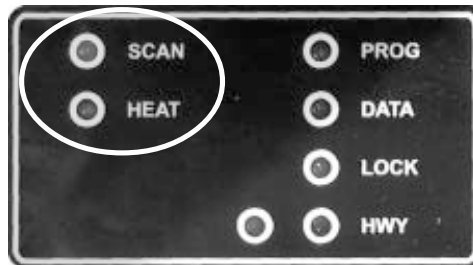
Proceed with re-programming as previously described.
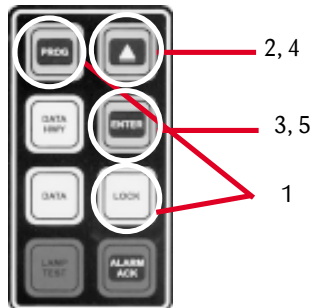
Operating Guide

SCAN LED

The CVM-12 is provided with a "SCAN" LED. This LED illuminates when the CVM-12 is operating in the SCAN mode of operating and monitoring each heat tracing circuit.

HEAT LED

The CVM-12 is provided with a "HEAT" LED. This LED illuminates when the contactor sense voltage is detected (power is being supplied to the heat tracing circuits).

REMOTE PUSHBUTTON ACCESS

The CVM-12 may be wired to external panel mounted pushbuttons to both acknowledge alarms and also to do a lamp test without the need to open the panel.

CVM-12 Heat Tracing Monitoring Module

VOLTAGE SELECTION SWITCH

The CVM-12 may be switched from 240 Vac (the factory setting) to 120 Vac by pressing the rocker switch on the right side of the module. Note that this rocker switch also contains a 1 Amp fast blow type fuse.
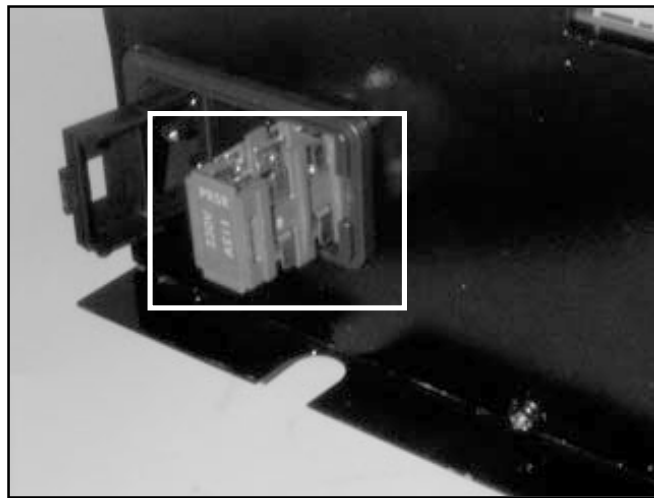
MIXED MODE MONITORING

The CVM-12 may be operated with some of the twelve circuits within a module being set up for current loss monitoring and the remaining circuits set up for voltage loss monitoring. The CVM-12 automatically checks for the presence of a current sensor and thus is able to detect the exact equipment configuration. It is, however, not possible to do both current loss and voltage loss monitoring on the same circuit.
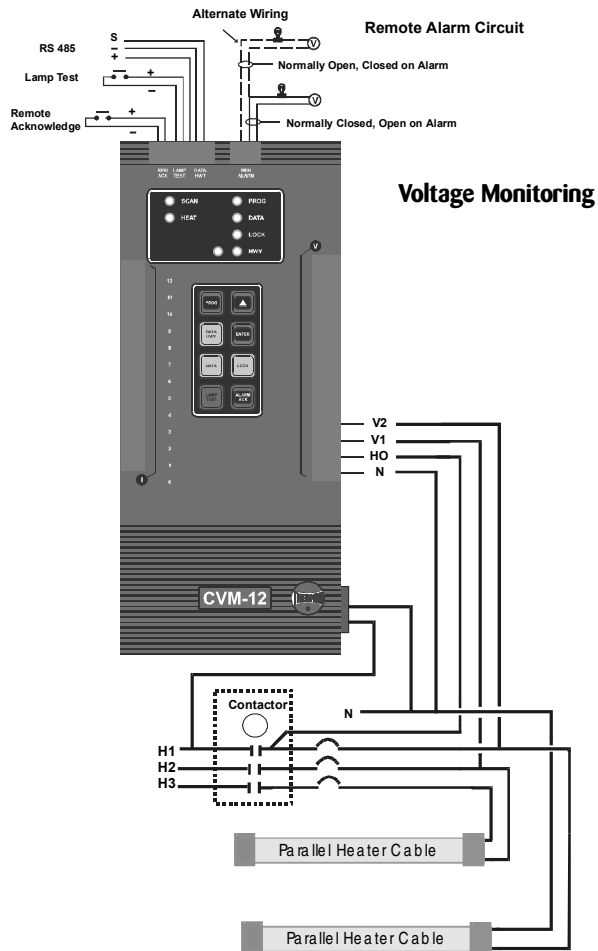
TYPICAL APPLICATION CONFIGURATIONS FOR THE CVM-12 . . .

CIRCUIT BREAKER MONITORING

By connecting the voltage sense leads to the downstream side of the circuit breaker, the CVM-12 can alarm if the circuit breaker is inadvertently off when the ambient temperature activated contactor turns on.

The wiring configuration is as detailed in the schematic below.

21

CVM-12 Heat Tracing Monitoring Module

THIRD WIRE CONTINUITY MONITORING

An auxiliary third wire is sometimes provided with heat tracing cable in order to detect that voltage is present at the far end of a heat tracing circuit. The CVM-12 can monitor the presence of voltage back in the power distribution panel.

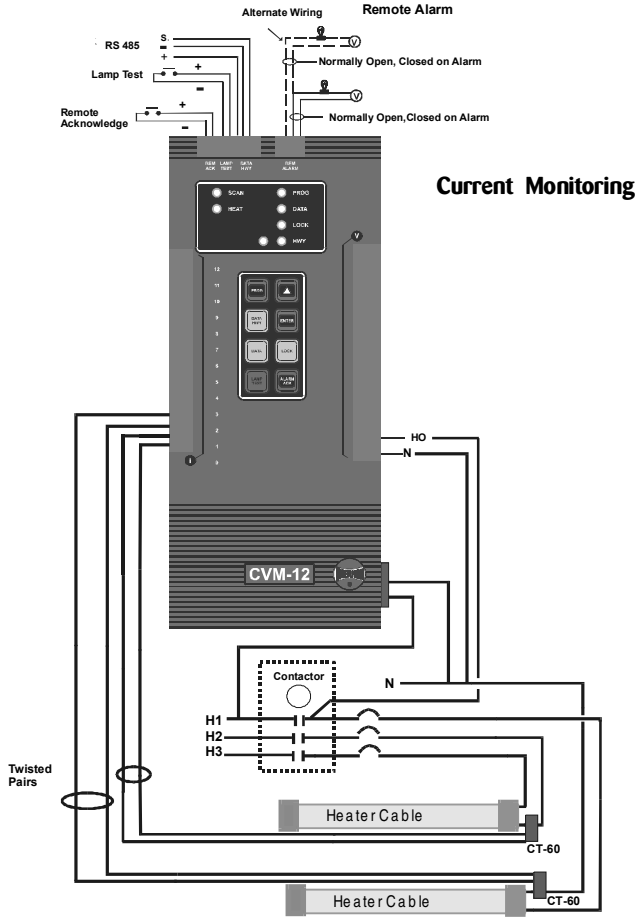Wiring is as detailed in the schematic below.
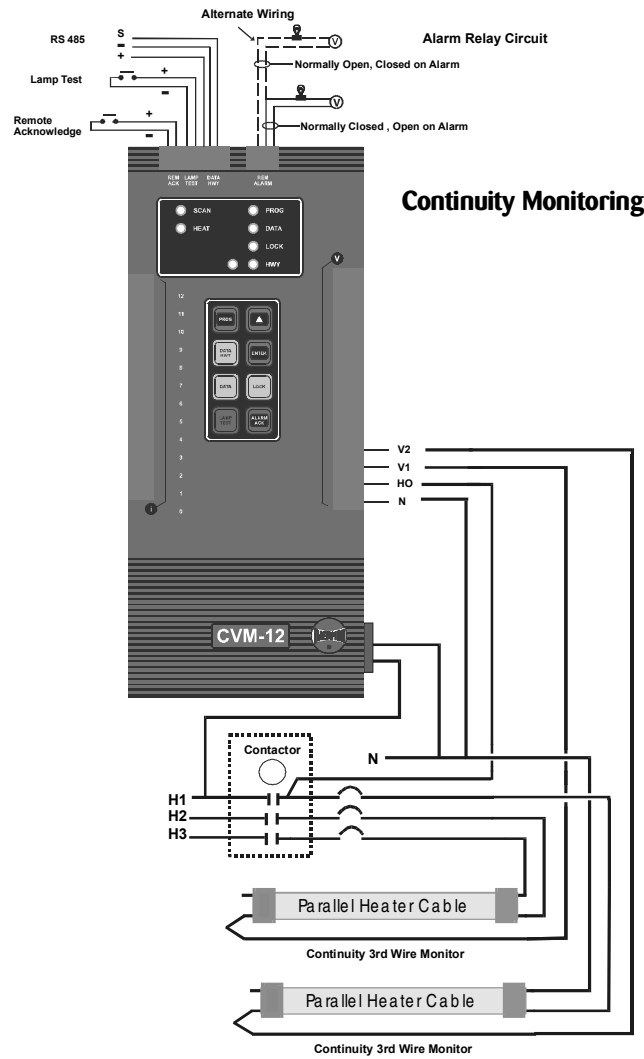
CURRENT LOSS MONITORING

The integrity of constant wattage parallel, series, and power limiting parallel type heat tracing cable circuits can be monitored by checking the magnitude of the current in the circuit.

The CVM-12 can detect when 25% loss of current occurs when wired as shown below.

Note： For lower current ranges, multiple passes of the wire may be required through the current transformer. Refer to Page 10 for details.

23

CVM-12 Heat Tracing Monitoring Module

HELP . . .

The CVM-12 is intended to be used with only the support of this instruction booklet. If special support needs do arise, Thermon provides local support through its area representatives and affiliate companies as well as through a toll free user support line.

For toll free support, dial 1-800-820-HEAT (4328).

Operating Guide

NOTES . . .

CVM-12 Heat Tracing Monitoring Module

NOTES . . .

Operating Guide

NOTES . . .