



REDUCED CIRCUIT VERSIONS AND CUSTOM CONFIGURATIONS AVAILABLE

Control Unit
40 Circuit Capability

Systems Can Be Wall,
Rack or Floor Mounted

NEMA 4, 4X or 12
Enclosures

Ambient Temperature:
-40°F to +130°F
-40°C to +55°C

Current Monitoring
50 mA to 30A
Ground Leakage Monitoring
1 to 250 MA

Power Handling:
85 VAC to 600 VAC Capability

1.1 Description of Circuit Management System

This circuit management system (referenced to as "CM-2") is a scanning microprocessor based distributive digital control and monitoring system that has been specifically designed for use with electric heat tracing systems. This

system provides temperature control for each heat tracing circuit while communicating additional information to operations personnel such as temperature alarms, circuit faults, sensor failure and communication failures. When

provided with available heater cable monitoring options, the CM-2 can monitor each circuit for voltage, current, continuity and ground fault leakage.

1.2 Description of System Components

The circuit management system is mounted in a NEMA 12, 4 or 4X enclosure that can be wall, rack or floor mounted. The system is available in configurations up to 40 circuits and is environmentally hardened for use in

various plant locations. The standard versions of the CM-2 can be installed in Division 2 hazardous locations with the use of purged enclosures. Consult Nelson for options on Division 2 non-purged units. Individual CM2 systems

throughout a facility can be connected to a central PC running RS-485 host communications software. All alarm and control functions can be accessed from the central location.

1.2.1 Control Unit

The CM-2 control unit provides the temperature control, information display and alarm status for up to 40 individual heat tracing circuits. Specific circuit information is displayed on a 2-line, 20 character fluorescent display that provides superior visibility in difficult lighting conditions. The second line on the display provides plain English explanation and prompts to assist in programming and data display operations. Data entry is provided by a 24 key membrane keypad protected by two levels of password

security. A group-programming feature is provided to program blocks of circuits with one input sequence. All instructions and data are protected by a non-volatile memory eliminating the need to reload control and alarm information after an extended power outage. An auto test cycle feature is provided to switch heaters on periodically and check for developing fault conditions. The CM-2 control unit is manufactured using only the highest quality industrial grade electronic components. All circuit boards are

conformal coated and ribbon cables connections are gold-plated to reduce the possibility of corrosion. A manual override switch is provided to control the heat tracing in the unlikely event of CPU failure.

DISPLAY INFORMATION

- Control Setpoint
- Alarm Status
- Heater Current (GF Option)
- Ground Leakage Current (GF Option)



ALARM INFORMATION

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> • High Temperature Alarm • Low Temperature Alarm • Heater Alarm • Sensor Failure Alarm • Communications Failure Alarm • Memory Failure Alarm | <ul style="list-style-type: none"> • Loss of Voltage Alarm (/1 Option) • Loss of Current Alarm (/1 Option) • Loss of Continuity Alarm (/1 Option) | <ul style="list-style-type: none"> • High Current Alarm (GF Option) • Low Current Alarm (GF Option) • Ground Leakage Alarm (GF Option) |
|---|--|---|

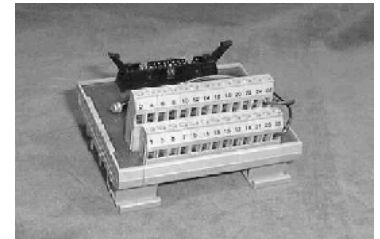
SPECIFICATIONS

- | | |
|-----------------------|--|
| • Accuracy | ± 0.1% of range, ± 1 digit, self-calibrating for RTD's or Thermocouples |
| • Ambient Temperature | -40°F (-40°C) to 130°F (+55°C) operation -40°F (-40°C) to 185°F (+85°C) storage |
| • Relative Humidity | 0 – 95% maximum, non-condensing; boards are conformal coated and special plated connectors are used |
| • Power Input | 24 VDC output (nominal); 18 VDC – 30 VDC operating; 8 watts for control unit only |
| • Hazardous Locations | Factory Mutual Approved for Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; Class III, Divisions 1 and 2, and Ordinary Locations |
| • Capacity | Up to 40 Circuit Versions; CM-2-40 |
| • Memory | All Setpoints, configurations and programs are stored in EEPROMS |
| • Inputs | 100 ohm Platinum (DIN), 3 wire RTD Type J, standard Thermocouple |
| • Outputs | DC: 24 VDC at 100 mA per channel AC: 120 through 250 VAC at 300 mA per channel with Voltage Driver Card |
| • Alarm Relay | 2 sets of Form C contacts, 3A @ 120 VAC or 30 VDC (resistive) |
| • Communications | RS-485, 4800 baud, 4000 feet (1220 meter), single drop, half duplex |
| • Display | Data; 2 line alphanumeric, 20 character per line vacuum fluorescent display tube with filters and anti-glare coating Alarm; LED Four Segment Bar Indicators |
| • Keyboard | Sealed membrane, tactile touch feedback |

1.2.2 INPUT MODULE

The CM-2 Control Unit is user selectable to allow either RTD or thermocouple input. Up to (5) 8-Point input modules may be used with a single control unit. RTD input is by 100 ohm Platinum (DIN), 3 wire; Range

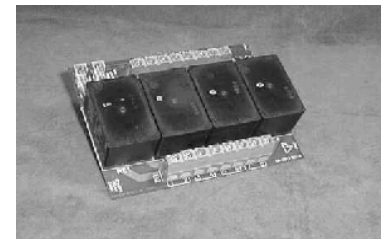
-117°F (-100°C) to 1562°F (850°C); Maximum lead resistance 50 ohms, maximum lead length of 2500 feet (760 meter). Thermocouple input is by Type J, standard; Range -100°F (-73°C) to 1400°F (760°C).



1.2.3 POWER OUTPUT MODULES

The CM-2 system is designed to utilize two optional rated power output modules. Power switching of loads up to 24 amps @ 277 VAC is provided by compact mechanical relays mounted on printed circuit boards. The R configuration utilizing single pole relays provides switching for phase-to-

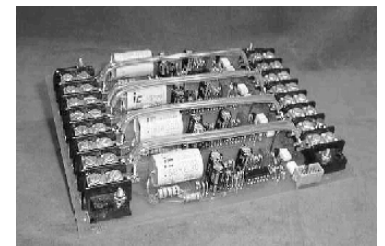
neutral loads, while the R2 configuration utilizing double pole relays provides switching for phase-to-phase loads. For higher amperage loads or voltages greater than 277 VAC, the C configuration provides switching capability up to 50 amps @ 600 VAC.



1.2.5 SENSOR CARD MODULE

Provided as the CM-2/1 option, the sensor card modules provide monitoring of the electrical parameters of each heat tracing circuit. Each card monitors four individual circuits for supply voltage, low current and continuity. Each circuit is designed to

operate on 85 through 300 VAC up to 30 amps. An adjustable potentiometer allows adjustment of the low current alarm to a minimum level of 50 ma.



1.2.6 CURRENT SENSING MODULE

Provided as the CM-2GF option, the current sensing modules provide monitoring of both load current and ground leakage current of each heat tracing circuit. Each circuit is designed to monitor load currents up to 30 amps and ground leakage currents from 1 to 250 mA. Separate alarm and trip settings for

ground leakage current allow alarming of developing faults prior to circuit interruption.



1.3 COMMUNICATIONS

Communication with plant operations is accomplished through the use of Nelson's CM.comm® Host Communications Software. CM.comm® is a PC host communications software package comprised of two 32-bit applications designed to run on Windows 95/98 or NT platforms. These applications work together to allow the user to monitor and update multiple CM-2 temperature controllers via an RS-485 network from a central PC. All data is stored in a standard

Microsoft® Access database for easy access and analysis by other applications. This communications software can connect all versions of Nelson CM units into a single communications and control interface for complete integration of the facility heat tracing.

