

TraceNet™ TN Series Heat Tracing Control and Monitoring System



SPECIFICATION GUIDE



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TraceNet™

TN Series Heat Tracing Control & Monitoring System

APPLICATION OVERVIEW

Control and monitoring systems play an essential role in heat tracing applications which range from freeze protecting water lines to maintaining critical process temperatures. While mechanical thermostats have been used successfully for many heat tracing applications, a more complete control and monitoring solution is necessary for most industrial heat tracing applications. Advancements in microprocessor-based technology have made electronic control and monitoring units both cost effective and reliable. Electronic control and monitoring systems ensure accurate temperature measurements, conserve energy and extend system life.

A versatile electric heat tracing control and monitoring network is key to reducing operating cost in plants. Research has shown that the following features are a prerequisite within many industrial heat tracing applications¹:

- Monitor electric heat trace circuit operating and ground/earth leakage currents
- Selectable control method (on/off, proportional, ambient proportional) on a per circuit basis
- Programmable alarm set points, with alarm acknowledgment and reset capability
- Programmable trip set-points for each circuit
- Temperature sensor status indication
- Circuit identifier along with power supply point and process system/location information
- Circuit priority assignment for load shedding
- Communication to host computer via Ethernet
- “Push to Test” ground/earth leakage test feature on a per circuit basis
- Ground/earth leakage interruption capability

TRACENET TN SERIES SYSTEM SPECIFICATIONS

Environmental:

Hazardous and Ordinary Locations,

- Indoor and Outdoor-Solid State Relays

Ordinary Locations,

- Indoor and Outdoor- Power Distribution and Mechanical Relays

Operating Ambient Range: -40°C to 55°C

Enclosures: Type IP54

TraceNet Supply Voltage: 100-277 Vac, 50/60 Hz

Heat Tracing Voltages: 100-600 Vac

User Interface: 133mm x 101mm touch screen

Maximum Number of Circuits: 180 within one CAN bus network

Temperature Sensors per Circuit: Up to six 100 Ω Platinum, 3 wire RTDs

Current Switching Devices:

Solid State Relay*:

1-pole up to 30 Amps

2-pole up to 15 Amps per pole

Mechanical Relay:

Per design requirements

Control Methods:

Process Sensing:

On/Off, On/Off Soft Start, Proportional

Ambient Sensing:

On/Off, Ambient Proportional (APC)

Control Temperature Range: -129°C to 600°C

Alarm Settings:

Low/High Temperature

Low/High Currents

High Ground/Earth Leakage Current

RTD and Relay Faults

Loss of Communication

Trip Settings:

High Temperature/Heater Current/Ground/Earth Leakage Current

Networking Communications:

Internal and External: CAN Bus

External: Ethernet

External Alarm Relays:

Three, solid state rated @ 0.75 Amp resistive (20-277 Vac)

Two, solid state rated at 350 mA (24 Vdc)

* Rating based on heat sinks installed external to panel. Relay ratings have a reduced rating when sinks are used internal to panel or when operated in panel interiors exceeding 60°C. Multiple single pole relays may be used for phase to phase and three phase circuits. Higher voltage rating relays are also available as an option.

CERTIFICATIONS/APPROVALS

TraceNet TN series control and monitoring systems are certified for installation and operation in ordinary and Zone 2 explosive atmospheres.



FMG 12.0018x Ex nA IIC T4 Gc



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Typical Thermon **TraceNet™** TN Series System

(Page Number Listed Below for Additional Information on Each Component)



System shown illustrates a TraceNet TN series control and monitoring system with power distribution installed in an ordinary location.



TraceNet™ TN Series Heat Tracing Control & Monitoring System

TSM1 CENTRAL MONITORING MODULE

The TSM1 serves as the central monitoring and interrogation point for a TraceNet™ network of heat tracing control modules. Through its touch screen monitor, the TSM1 allows the operator to access operating control parameters and operating conditions throughout the heat tracing system network.

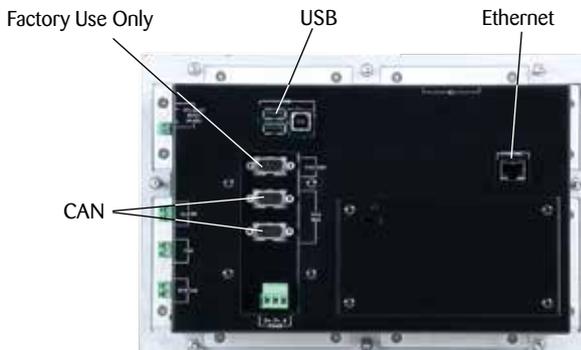


The TSM1 is provided with a CAN bus port to communicate with the family of TraceNet control and measurement modules over a CAN Bus communication cable. In addition, the TSM1 communicates with PC's and DCS systems through an Ethernet port.

TSM1 PRODUCT FEATURES

- Module operates in a wide range of ambient conditions.
- Color display utilizes LED backlighting to maximize service life and is additionally programmable for "sleep mode" operation.
- Utilizes resistive touch screen for user input functions.
- Intuitive graphical friendly user interface.
- Supports external peripheral devices such as keyboard, track ball mouse, and USB data storage.
- Type IP54 panel mount enclosure which may be installed on panel with access door or inside on panel swingout.

TSM1 CONNECTION PORTS



TSM1 SPECIFICATIONS

Operating supply voltage.....	24 Vdc
Power consumption.....	8 Watts (up to 41 watts with display heater option)
Clock speed.....	200 MHZ
Processor.....	32 bit
Firmware operating system.....	Windows CE
User hardware interface.....	resistive touchscreen 133 mm x 101 mm 640 x 480 VGA LCD TFT display with LED backlight
Input/Output ports	Ethernet/USB
Maximum storage temperature.....	85°C
Minimum storage temperature	-40°C
Minimum ambient temperature	-30°C (with optional heater -40°C)
Alarm outputs	three solid state relays rated at 75 mA (20-277 Vac)

TSM1 DIMENSIONAL DATA



TSM1 MONITORING CAPACITY

A TSM1 can be interconnected in a CAN bus network having up to 30 PCM6 modules and/or up to 90 TM6 modules. A single TSM1 can monitor up to 180 tracing circuits with a maximum of 540 RTD sensors (3 RTDs per circuit) or 102 circuits with a maximum of 612 RTD sensors (6 RTDs per circuit) or other circuit/RTD combinations.

TRACENET COMMUNICATION DISTANCE

The TSM1 can be interconnected to TraceNet™ modules in a CAN bus network having total cumulative distance of up to 1000 feet (305 m). A CAN repeater module is available for extending network distance and isolation if necessary.

SPECIFICATION GUIDE

PM6 POWER MODULE with Solid State Relays

The PM6 serves as the power switching module, using solid state relays for a TraceNet™ network of heat tracing control modules.

PM6 PRODUCT FEATURES

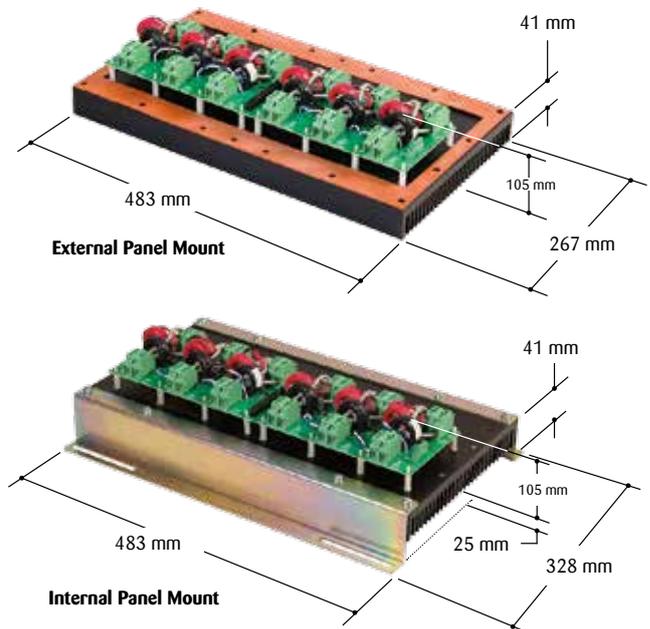
- Operates in a wide range of ambient conditions.
- Single or dual pole solid state switching.
- Nickel plated terminal construction.
- Black anodized aluminum heat sink capable of dissipating the heat generated by a total of 180 Amps continuous (30 Amps for single pole relay or 15 Amps per pole for double pole relay).
- Standardly supplied with polycarbonate touch safe cover for increased operator touch safety.
- Includes a ground/earth leakage circuit test loop which allows the operator to conduct a functionality test on each circuit.
- Measures ground/earth leakage and heater operating currents.

PM6 COMPONENT SPECIFICATIONS

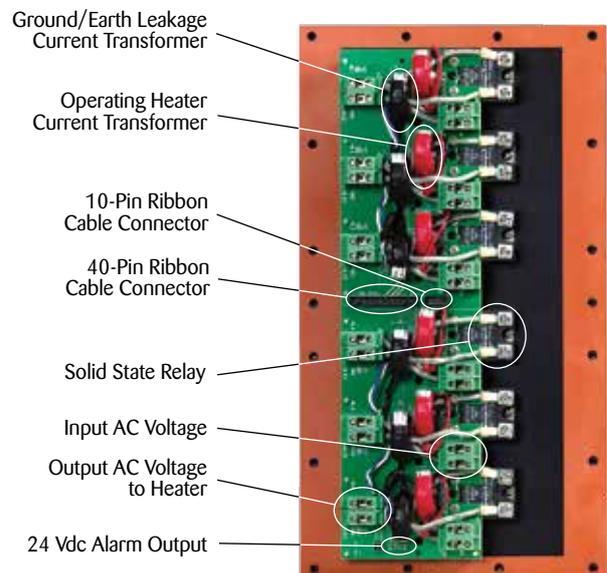
Circuit Control Capacity..... up to six heat trace circuits
 Single pole relay switching capacity..... 30 Amps at 240 Vac*
 Dual pole relay switching capacity 15 Amps at 240 Vac*
 Maximum power consumption less than 3 Watts
 Relay power connection 40-Pin header ribbon cable
 Ground/earth leakage test connection....10-Pin header ribbon cable
 Maximum storage temperature..... 85°C
 Minimum storage temperature -40°C
 Oper. ambient temp. range..... -40°C to 70°C
 Power terminal connections..... 0.5 to 10 mm², 630 Vac
 Printed circuit board conformally coated
 Alarm two 24 Vdc @ 350 mA each

* Rating based on heat sinks installed external to panel. Relay ratings have a reduced rating when sinks are used internal to panel or when operated in panel interiors exceeding 60°C. Higher voltage rating relays are also available as an option.

PM6 DIMENSIONAL DATA



PM6 CONNECTION DIAGRAM





PCM6RM POWER CONTROL MODULE

The PCM6RM module serves as the primary power control module for a TraceNet™ network of heat tracing control modules. Powered by a 24 VDC power supply, the PCM6RM delivers the control signals to the PM6 or RM6 power modules and sends current and ground/earth leakage current transformer information onto the CAN bus data stream. The PCM6RM receives RTD information from CAN bus data stream and controls heat tracing power based on the RTD reading.



The PCM6RM communicates to both the TSM1 and TM6RM/TM6DR modules through the CAN bus data link.

PCM6RM PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- Conformally coated for use in panels located in indoor or outdoor environments.
- When connected to an RM6 module, it controls up to six individual mechanical or solid state relays.
- When connected to a PM6 module, it controls up to six solid state relays.
- The PCM6RM module has the following control modes:
 1. On-Off
 2. On-Off with Soft-Start (solid state relays only)
 3. Proportional (solid state relays only)
 4. Ambient Proportional (solid state relays only)
- Activates test functions including:
 1. Ground/Earth Leakage Fault Circuit Test
 2. Loss of Heater Current Test
- Activates programmed control function based on the temperature values provided by up to 6 RTDs.
- Monitors ground/earth leakage and heater operating current in heat tracing circuits.

PCM6RM COMPONENT SPECIFICATIONS

Operating supply voltage.....	24 Vdc
Maximum power consumption	1.4 Watts
Input/Output communication.....	CAN bus ports (operating at 125 Kbps)
Maximum storage temperature.....	85°C
Minimum storage temperature	40°C
Oper. ambient temp. range.....	-40°C to 70°C
CAN bus	9-pin D-SUB
Ground/Earth leakage circuit fault test connection	10-Pin header ribbon cable
Relay power connections.....	40-Pin header ribbon cable

PCM6RM MOUNTING

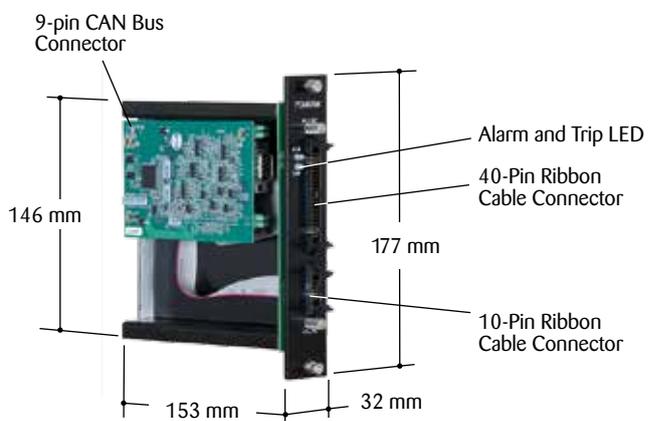
The PCM6RM comes in a ready-to-install rack mount enclosure. The PCM6RM minimizes space requirements and provides an easy and efficient method for installation.

A maximum of 12 PCM6RM modules can be installed into a BPM12 back plane and rack module which can be linked via ribbon cable to other TraceNet modules. Refer to the BPM12 section of this guide for more details.

PCM6RM DIMENSIONAL DATA AND CONNECTION DIAGRAM



PCM6RM Rack Mount



SPECIFICATION GUIDE

PCM6DR POWER CONTROL MODULE

The PCM6DR module serves as an alternate power control module for a TraceNet™ network of heat tracing control modules. Powered by a 24 VDC power supply, the PCM6DR delivers the control signal to the PM6 and/or RM6 power modules, sends ground/earth leakage, and heater current operating information to a CAN bus data stream. The PCM6DR receives RTD information from the CAN bus data stream and controls heat tracing power based on the RTD reading.



The PCM6DR communicates to both the TSM1 and TM6RM/TM6DR modules through the CAN bus data link.

PCM6DR PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- Conformally coated for use in panels located in indoor or outdoor environments.
- When connected to an RM6 module, it controls up to six individual mechanical or solid state relays.
- When connected to a PM6 module, it controls up to six solid state relays.
- The PCM6DR module has the following control modes:
 1. On-Off
 2. On-Off with Soft-Start (solid state relays only)
 3. Proportional (solid state relays only)
 4. Ambient Proportional (solid state relays only)
- Activates test functions including:
 1. Ground/Earth Leakage Fault Circuit Test
 2. Loss of Heater Current Test
- Activates programmed control function based on the temperature values provided by up to 6 RTDs.
- Monitors ground/earth leakage and heater operating current in heat tracing circuits.

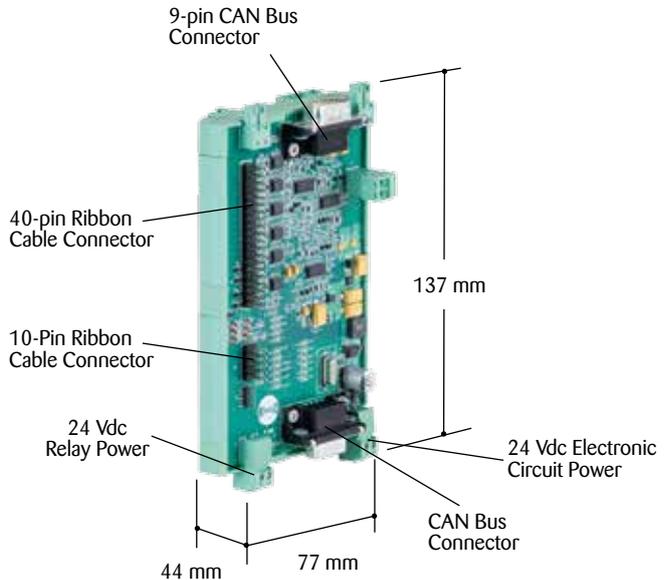
PCM6DR COMPONENT SPECIFICATIONS

Operating supply voltage.....	24 Vdc
Maximum power consumption.....	1.4 Watts
Input/Output communication.....	CAN bus ports (operating at 125 Kbps)
Maximum storage temperature.....	85°C
Minimum storage temperature.....	-40°C
Oper. ambient temp. range.....	-40°C to 70°C
CAN bus.....	9-pin D-SUB
Ground/Earth leakage circuit fault test connection	10-Pin header ribbon cable
Relay power connections.....	40-Pin header ribbon cable

PCM6DR MOUNTING

The PCM6DR is provided in a DIN rail mount configuration and is most often used in heat tracing control systems of eighteen circuits or less.

PCM6DR DIMENSIONAL DATA AND CONNECTION DIAGRAM





TraceNet™ TN Series Heat Tracing Control & Monitoring System

TM6RM TEMPERATURE MONITORING MODULE

The TM6RM serves as the temperature sensing component for a TraceNet™ system of heat tracing control modules. The TM6RM receives temperature sensor information via a ribbon cable from the RTB6. Powered by 24 Vdc, the TM6RM sends a CAN bus stream of communications which identifies the RTD's and the values of each temperature being measured to both the TSM1, PCM6RM, and PCM6DR modules.



TM6RM MOUNTING

The TM6RM comes in a ready-to-install rack mount enclosure. The TM6RM minimizes space requirements and provides an easy and efficient method for installation.

A maximum of 12 TM6RM modules can be installed into a BPM12 back plane and rack module linked via ribbon cable to other TraceNet modules. Refer to the BPM12 section of this guide for more details.

TM6RM DIMENSIONAL DATA AND CONNECTION DIAGRAM



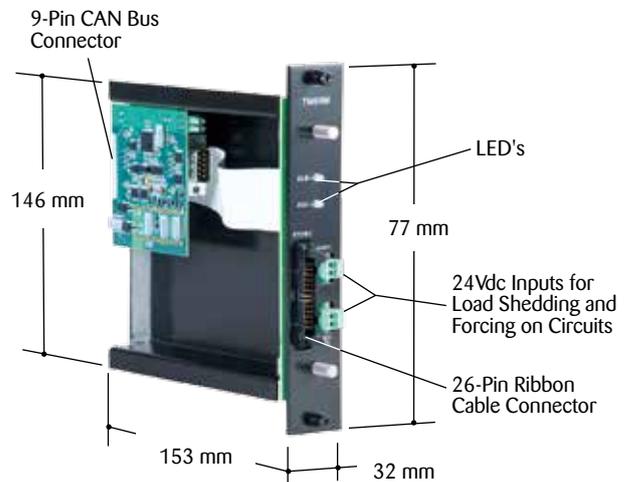
TM6RM Rack Mount

TM6RM PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- Pluggable type terminal blocks allowing ease of installation of field wiring to terminals.
- Conformal coated for use in panels located in indoor or outdoor environments.

TM6RM COMPONENT SPECIFICATIONS

Operating supply voltage..... 24 Vdc
 Maximum power consumption 0.7 Watts
 Input/Output communication..... CAN bus port
 (operating at 125 Kbps)
 Maximum storage temperature..... 85°C
 Minimum storage temperature -40°C
 Oper. ambient temp. range..... -40°C to 70°C
 CAN bus 9-Pin D-SUB
 Temperature sensor connection.. 26-Pin header ribbon cable



SPECIFICATION GUIDE

TM6DR TEMPERATURE MONITORING MODULE

The TM6DR serves as an alternate temperature sensing module for a TraceNet™ system of heat tracing control modules. The TM6DR receives temperature sensor information directly from RTDs. Powered by 24 Vdc, the TM6DR sends a CAN bus stream of communications which identifies the RTD's and the values of each temperature being measured to both the TSM1, PCM6RM, and PCM6DR modules.



TM6DR PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- Pluggable type terminal blocks allowing ease of installation of field wiring to terminals.
- Conformal coated for use in panels located in indoor or outdoor environments.

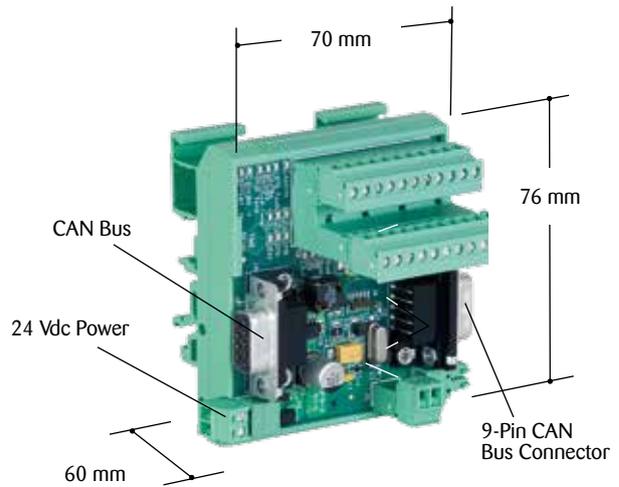
TM6DR COMPONENT SPECIFICATIONS

Operating supply voltage..... 24 Vdc
Maximum power consumption 0.7 Watts
Input/Output communication.....CAN bus ports
(operating at 125 Kbps)
Maximum storage temperature..... 85°C
Minimum storage temperature -40°C
Oper. ambient temp. range..... -40°C to 70°C)
CAN bus 9-Pin D-SUB

TM6DR MOUNTING

The TM6DR is provided in a DIN rail mount configuration and is most often used in heat tracing control systems having eighteen circuits or less. The TM6DR is also used in remote temperature sensing pods.

TM6DR DIMENSIONAL DATA AND CONNECTION DIAGRAM



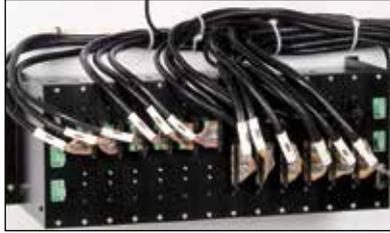


TraceNet™

TN Series Heat Tracing Control & Monitoring System

BPM12 BACK PLANE RACK MODULE

The BPM12 is a twelve space back plane board and a rack mounting enclosure system. It is specifically designed to house PCM6RM and TM6RM heat tracing control and temperature sensing modules.



The BPM12 allows for the convenient installation of up to twelve PCM6RM and/or TM6RM modules. For example, in an ambient sensing configuration with sixty six heat trace circuits, a BPM12 is configured with one TM6RM and eleven PCM6RM modules.

In a typical process control configuration, a BPM12 is configured with six TM6RM and six PCM6RM modules.

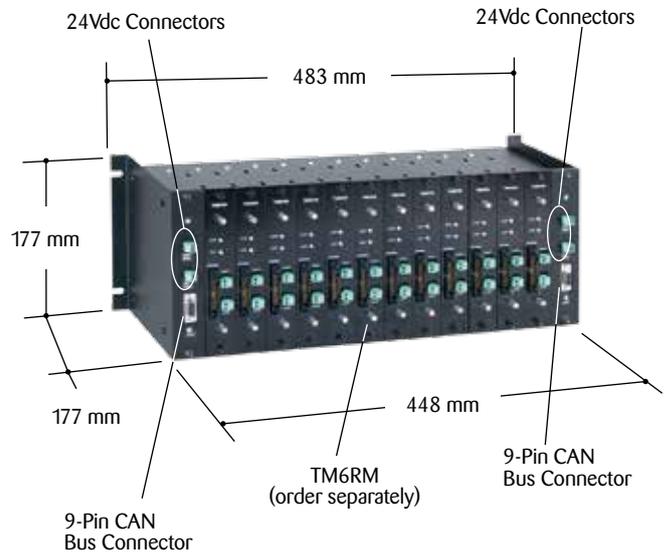
BPM12 PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- Black powder coated alodine aluminum construction.

BPM12 COMPONENT SPECIFICATIONS

Operating supply voltage.....	24 Vdc
Input /Output communication.....	CAN bus ports (operating at 125 Kbps)
Maximum storage temperature.....	85°C
Minimum storage temperature	-40°C
Oper. ambient temp. range.....	-40°C to 70°C
CAN bus	9-Pin D-SUB
Supply power connections.....	screw terminal type 0.14 to 1.5 mm ²
Printed circuit board	conformally coated

BPM12 DIMENSIONAL DATA AND CONNECTION DIAGRAM



SPECIFICATION GUIDE

RM6 RELAY INTERFACE MODULE

The RM6 is a DIN rail mountable six circuit relay interface module for linking individual solid state or mechanical relays via ribbon cable to a PCM6RM/DR module. The RM6 comes with individual terminal strips which allow the interconnection of individually mounted ground/earth leakage and heater operating current sensing transformers as well as the ground/earth leakage circuit fault test loop.

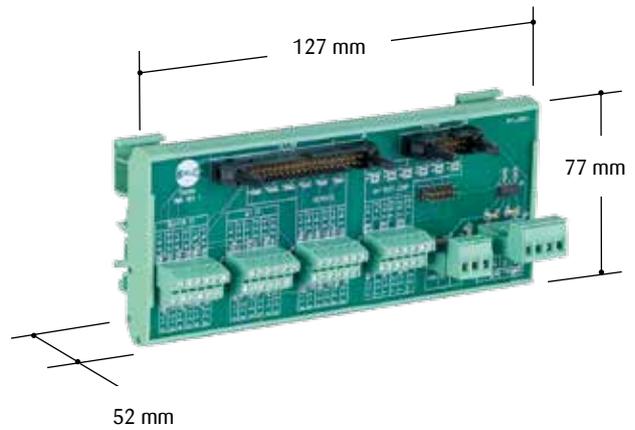
RM6 PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- DIN rail mountable.
- Conformally coated printed circuit board for use in panels located in indoor and outdoor environments.

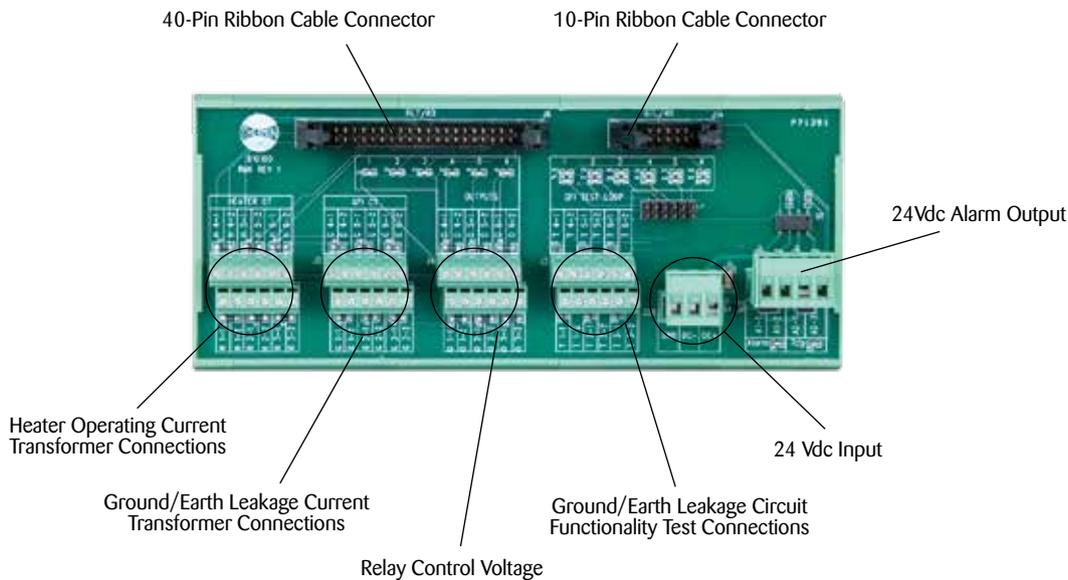
RM6 COMPONENT SPECIFICATIONS

Maximum storage temperature.....85°C
Minimum storage temperature-40°C
Oper. ambient temp. range..... -40°C to 70°C
Terminal connections.....0.14 to 2.5 mm²
Earth leakage test connection 10-Pin header ribbon cable
Relay connection 40-Pin header ribbon cable

RM6 DIMENSIONAL DATA



RM6 CONNECTION DIAGRAM

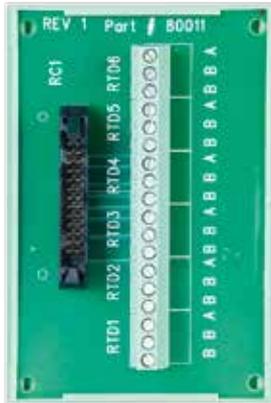




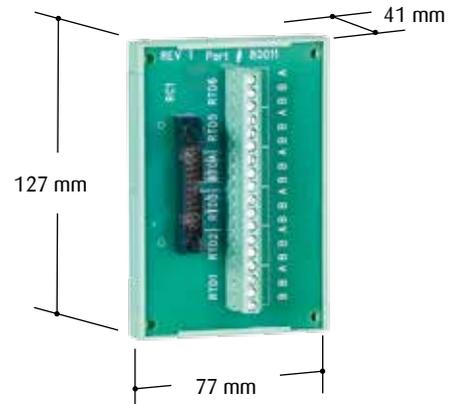
TraceNet™ TN Series Heat Tracing Control & Monitoring System

RTB6 RTD INTERFACE MODULE

The RTB6 is a DIN rail mountable six RTD sensor input module which links the field RTD wiring to the TM6RM via ribbon cable.



RTB6 DIMENSIONAL DATA



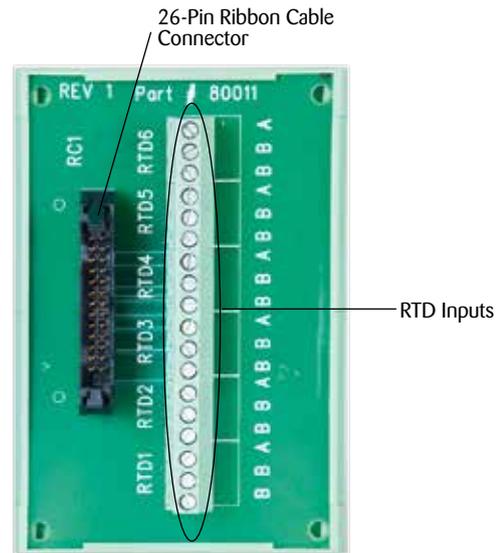
RTB6 PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- DIN rail mountable.
- Conformally coated printed circuit board for use in panels located in indoor and outdoor environments.

RTB6 COMPONENT SPECIFICATIONS

Maximum storage temperature.....	85°C
Minimum storage temperature	-40°C
Oper. ambient temp. range.....	-40°C to 70°C
Terminal connections.....	0.14 to 2.5 mm ²
Maximum RTD capacity	6

RTB6 CONNECTION DIAGRAM



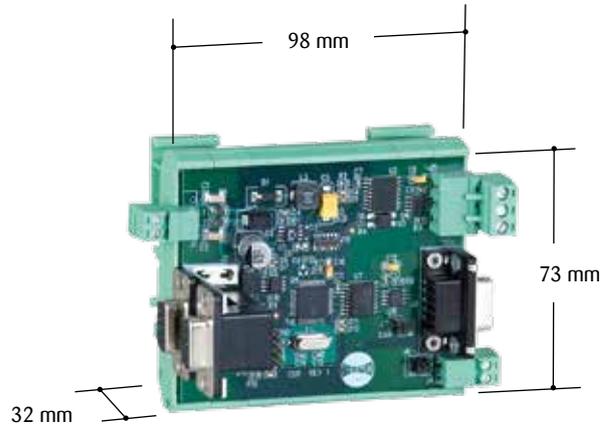
SPECIFICATION GUIDE

CIM1 INTERFACE MODULE

The CIM1 CAN interface module is designed to accept a CAN bus communication input and repeat the communication as received. The CIM1 will isolate the upstream panel communications from potential downstream field disturbances. By repeating the incoming communication in this manner, it is possible to extend the maximum communication distances beyond the 300m(1000 ft) recommended values at 125 Kbps.



CIM1 DIMENSIONAL DATA



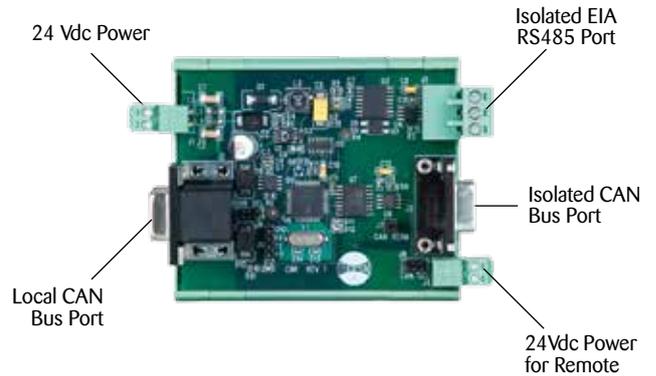
CIM1 PRODUCT FEATURES

- Operates in a wide range of ambient conditions.
- DIN rail mountable.
- Conformally coated printed circuit board for use in panels located in indoor and outdoor environments.

CIM1 COMPONENT SPECIFICATIONS

Nominal voltage..... 24 Vdc
 Power consumption..... 1.3 Watts
 Maximum storage temperature..... 85°C
 Minimum storage temperature -40°C
 Oper. ambient temp. range..... -40°C to 70°C
 RS485 Port Connection..... 0.14 to 2.5 mm²
 nickel plated terminals, 5000 Vrms isolation
 Local CAN Portstwo ports 9 pin D-SUB connectors
 (one port for daisy chain or bus termination with a CBTM)
 Isolated CAN Port..... one port, 9 pin D-SUB Connector,
 5000 Vrms isolation

CIM1 CONNECTION DIAGRAM





TraceNet™ TN Series Heat Tracing Control & Monitoring System

TRACENET POWER SUPPLY MODULES

The TraceNet control and monitoring system utilizes 24 Vdc power supply(s) to provide power to the TraceNet modules. The following power supplies have been certified for use as a component in TraceNet panels located in both ordinary and hazardous locations. Power supply selection is determined by TraceNet certification requirements.

TSP180 POWER SUPPLY MODULE

The TSP180 power supply module is for use in TraceNet panels located in indoor or outdoor locations.

TSP180 SPECIFICATIONS

Nominal input voltage..... 100 to 240 Vac
 Nominal output.....24 VDC at 3.75 Amps
 Rated power loading..... 115 Watts at 60°C
 Minimum ambient temperature25°C
 Enclosure..... stainless steel
 Mountinghorizontal DIN rail
 Printed circuit board conformally coated

TSP180 DIMENSIONAL DATA



TEX120 POWER SUPPLY MODULE

The TEX120 power supply module is for use in TraceNet panels located in indoor or outdoor locations.

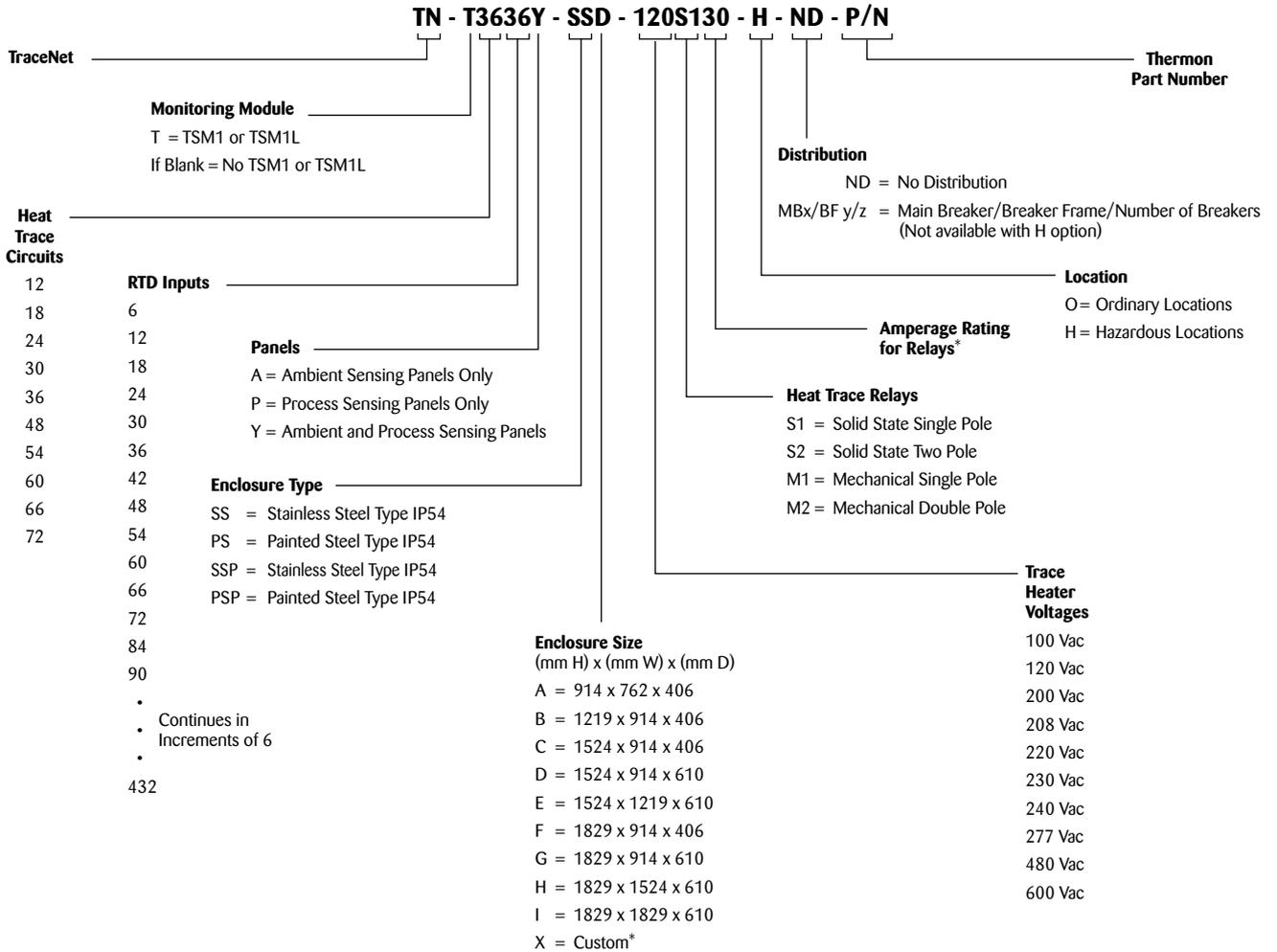
TEX120 SPECIFICATIONS

Nominal input voltage..... 100 to 240 Vac
 Nominal output..... 24 VDC at 5 Amps
 Rated power loading..... 120 Watts at 60°C
 Minimum ambient temperature -40°C
 Enclosure..... die cast aluminum
 Mountingback plate
 Printed circuit board encapsulated

TEX120 DIMENSIONAL DATA



PRODUCT REFERENCE LEGEND



* Contact Thermon for additional information.



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