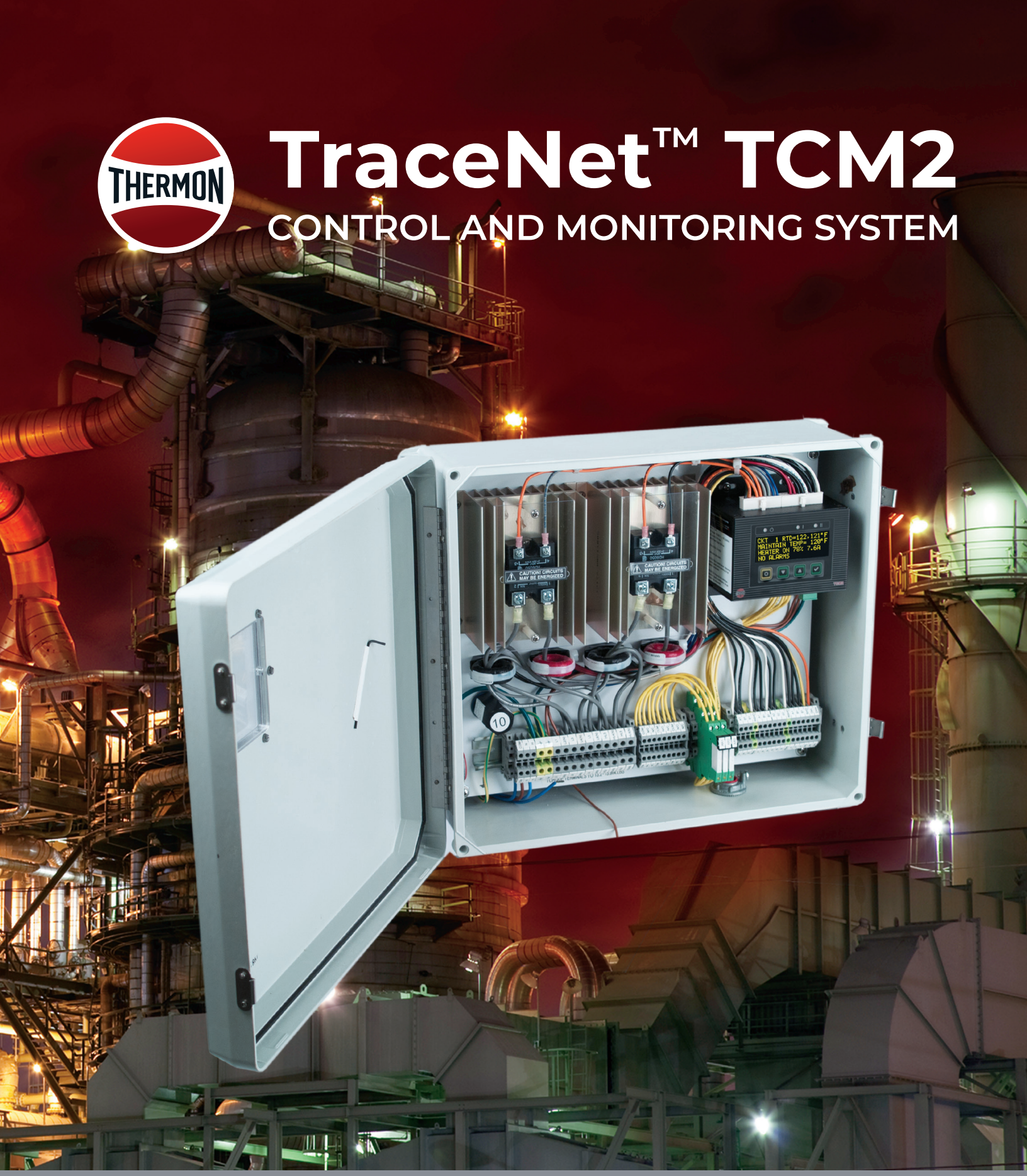
TraceNet™ TCM2

CONTROL AND MONITORING SYSTEM



Specification Guide

TraceNet™ TCM2

CONTROL AND 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 technology have made modern control and monitoring units both cost effective and reliable. Thermon 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 applications:

- Monitor electric heat trace circuit operating and ground/earth leakage currents
- Selectable control method (On/Off, On/Off With Soft Start, 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
- Communication to host computer via RS485 serial communication.
- "Push to Test" ground/earth leakage test feature on a per circuit basis
- Ground/earth leakage interruption capability

TCM2 PANEL CERTIFICATIONS/APPROVALS[1]

TraceNet TCM2 control and monitoring systems are approved/certified for installation and operation in Ordinary and Hazardous locations.

The TCM2 meets the requirements of NFPA 13 for Fire Sprinkler main line applications as outlined in UL 515A. Please contact your sales representative for further information and documentation.

Ordinary Locations:

ANSI/UL 61010-1
CAN/CSA-C22.2 No. 61010-1

EN61010-1

Hazardous Locations (Classified)[2]:

CL I, Div 2, Gp BCD T4
ANSI/ISA 12.12.01
CSA C22.2 No. 213

TRACENET TCM2 SYSTEM SPECIFICATIONS

Environmental:

Hazardous Locations,
- Indoor and Outdoor - Solid State Relays

Ordinary Locations,
- Indoor and Outdoor - Power Distribution and Mechanical Relays and/or Solid State Relays

Enclosures: Type 4, 4X, IP54 *

TraceNet Module Supply Voltage: 100-240 Vac, 50/60 Hz

Heat Tracing Voltages: 100-600 Vac

User Interface: 76 mm (3'') x 25 mm (1") OLED 4 line, 20 character display

Standard Number of Circuits: Two within one control panel

Temperature Sensors per Circuit: Up to two 100 W Platinum, 3-wire RTD's

Current Switching Devices:
Solid State Relay:
Refer to Table 1
Mechanical Relay:
Per design requirements

Control Methods:
Process Sensing:
On/Off, On/Off With Soft Start, Proportional
Ambient Sensing:
On/Off, On/Off With Soft Start, Ambient Proportional (APC and APCM)
Control Temperature Range: -129°C (-200°F) to 600°C (1112°F)

Alarm Settings (per circuit)**:**
Low/High Temperature
Low/High Current
High Ground/Earth Leakage Current
RTD and Circuit Faults

Secondary Alarm Settings (with trip option):
High Temperature, High Heater Current, Ground / Earth Leakage Current

Network Communications:
RS-485
Ethernet/Wireless (requires optional communication module)

Auxiliary Internal Output Power: 9 Watts at 24 Vdc

Alarm Outputs:
Three dry contacts rated 24 Vdc or 120/240 Vac, 6 A

* Additional panel types are available. Contact Thermon for details.

Notes:

1. For equipment in explosive atmospheres, to avoid electrostatic discharge, clean the viewing window with a damp cloth only. If the equipment is not installed and operated within the specifications and limitations indicated by Thermon, then the protection provided by the equipment may be voided.
2. Refer to installation/operating instructions for maximum ambient temperature rating relative to the allowable current carrying ampere ratings.

PRODUCT DATASHEET

TRACENET™ TCM2

CONTROL AND MONITORING MODULE

APPLICATION

The TCM2 is a microprocessor-based temperature control and monitoring module developed specifically for heat tracing applications. The unit provides control and monitoring capabilities via digital information display for one or two heat tracing circuits with input from up to two RTDs per circuit.

RATINGS

Control and monitoring capacity ..... 2 heat tracing circuits
Module supply voltages ..... 100 to 240 Vac
Controlled output load voltage ..... 100 to 600 Vac[1]
Storage ambient ..... -40°C to 80°C (-40°F to 176°F)
Power clamp function ..... Programmable from 20%-100%
Temperature input ..... up to two, 3-wire platinum 100 Ohm RTDs per circuit
Temperature control range ..... -40°C to 600°C (-40°F to 1112°F)
Control band ..... Programmable in increments of 1 degree
Module dimensions (H x W x D) ..... 118 x 119 x 83 mm (4.65" x 4.7" x 3.25")
High operating current alarm ..... 1 to 300 Amps[2]
Low operating current alarm ..... 0 to 299 Amps[2]
Ground/earth leakage alarm/trip ..... 20 to 250 mA (in 1 mA increments)
Alarm outputs ..... rated to 100 mA
Self-test frequency ..... Programmable from 2 to 99 hours
Communication ..... Modbus ASCII/RTU via RS485[3]
Auxiliary power output ..... 9 W @ 24 Vdc

CERTIFICATIONS/APPROVALS

The TCM2 meets the requirements of NFPA 13 for Fire Sprinkler main line applications as outlined in UL 515A. Please contact your sales representative for further information and documentation..

ANSI/UL 61010-1
CAN/CSA-C22.2 No. 61010-1

EN61010-1

Hazardous Locations (Classified)[4]:

CL I, Div 2, Gp BCD T4
ANSI/ISA 12.12.01
CSA C22.2 No. 213

-40°C ≤ Ta ≤ 60°C

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PRODUCT FEATURES

A TCM2 control and monitoring unit offers the following features:

Reduces Man-hours: With the simplified, 4-button user interface, operators can quickly program the TCM2. The new TCM2 wiring harness allows maintenance personnel to swiftly install, remove, and conduct troubleshooting of the system.

Improved Control Methods: The TCM2 utilizes multiple control methods, similar to the Thermon TCM18 (On/Off, Soft-Start, Proportional) and features the upgraded Ambient Proportional Control (APC and APCM) that employs the energy saving method of Ambient Proportional Control with the higher current capacity of the mechanical relay.

Upgraded Communications: The TCM2 can network with any Thermon Controller to the Genesis Network or any plant DCS system via RS-485 in either MODBUS ASCII or RTU. In the panel, the TCM2 can employ a converter to offer MODBUS TCP/IP Ethernet.

Notes
1. For load voltages above 600 Vac, contact factory.
2. For higher amperage ratings, contact factory.
3. Ethernet or wireless communication via optional accessory modules.
4. When used within Thermon TraceNet TCM2 control panels.

TCM2 CONTROL METHODS

Heat tracing circuits are typically controlled with the TCM2 via zero-crossing solid state relays or mechanical relays, which will allow any of four modes of operation:

- On-Off Control - The TCM2 delivers heat to hold the heated object above the programmed maintain temperature and within the programmed control band. It uses minimal switching to maximize the life of mechanical relays.
- On-Off Control with Soft Start - The TCM2, upon turn-on, ramps from zero power to 100 % power over a period of 3 minutes. This reduces the effects of high in-rush current on a cold power start. It then continues in the On-Off Control mode.
- Proportional - The TCM2, upon reaching the maintenance temperature, begins to reduce power until a level is attained that results in holding the maintenance temperature at a steady level with minimal control overshoot.
- Ambient Proportional Control (APC or APCM) - The TCM2 senses the ambient temperature and applies 100% power at the minimum ambient set point. Then it linearly reduces power to a level of 20%, and turns off at the temperature at which heating is no longer required. With mechanical relays the APC becomes APCM, allowing a 20, 25, or 33 minute cycle time to be selected.

TCM2 CURRENT RATING

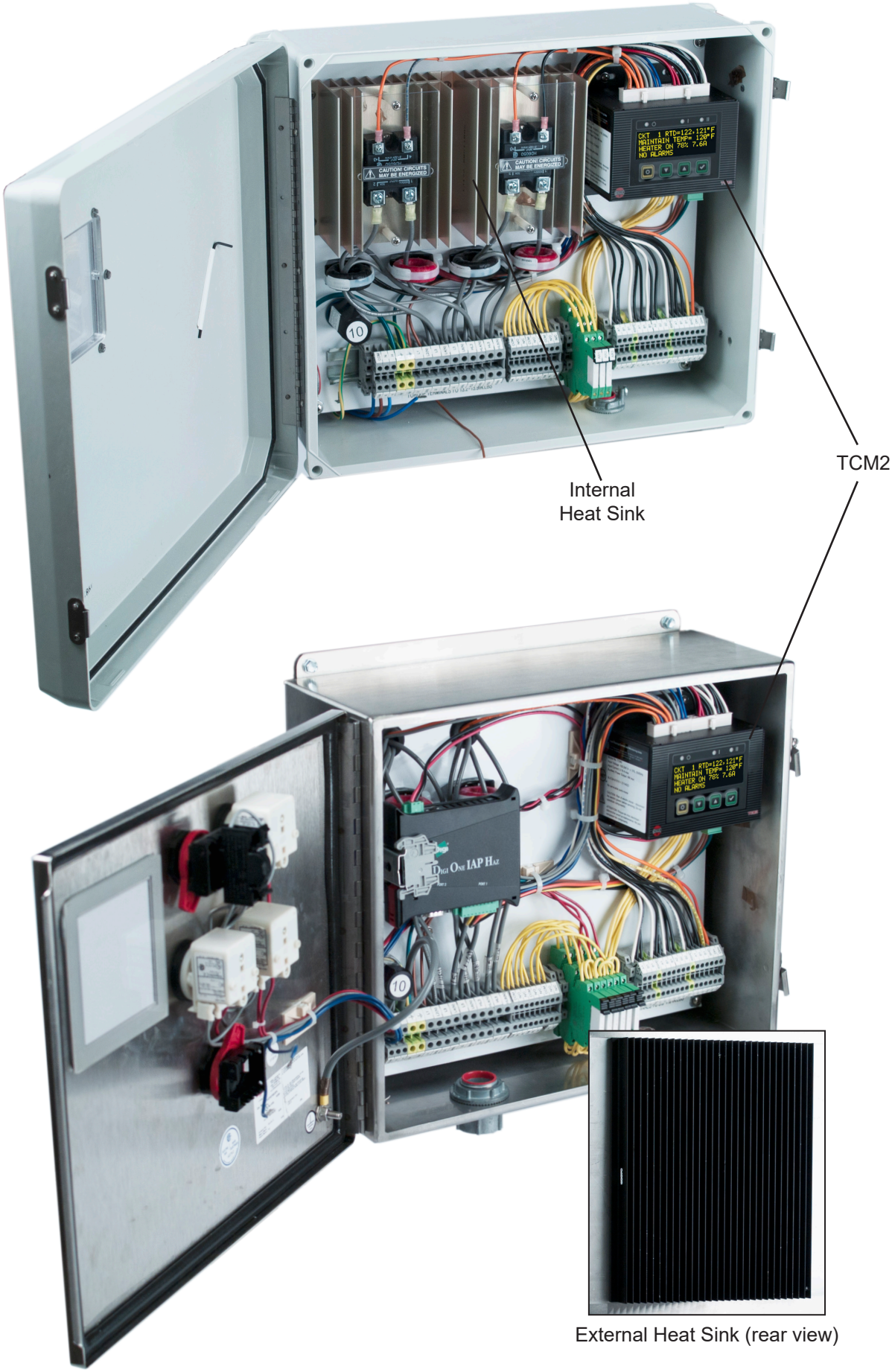
The ambient operating conditions, enclosure size, number of circuits, and the relay heat sink style all affect the current ratings. Table1 below provides current ratings for typical design configurations. Note that the 4°C (40°F) ambient ratings are used for freeze protection applications where the heater circuits would be de-energized above 4°C (40°F)

TABLE 1: MAXIMUM HEATER CURRENT THROUGH EACH SOLID STATE RELAY SWITCH

Enclosure Option	Module Type	SSR30A (single pole relay)(4)		SSR15A (double pole relay) (4)		SSR30B (single pole relay) (4)		SSR15B (double pole relay) (4)		SSR50C(1) Up to 3 single pole Relays(3)		SSR30B/2R (single pole relay) (4)	
		4°C (40°F)	40°C (104°F)	4°C (40°F)	40°C (104°F)	40°F (4°C)	40°C (104°F)	4°C (40°F)	40°C (104°F)	4°C (40°F)	40°C (104°F)	4°C (40°F)	40°C (104°F)
P2 SS2	TCM2-1	30	19	22	9	30	30	24	15	---	---	30	25
P3 SS3	TCM2-1	30	24	24	12	30	30	24	15	---	---	30	30
	TCM2-2	30	12	19	6	30	30	24	14.75	---	---	---	---
SS3	TCM2-1	---	---	---	---	46(1,2)	46(1,2)	---	---	---	---	---	---
SS4	TCM2-1	30	24	24	12	30	30	24	15	60(2)/50(2)	60(2)/50(2)	30	28
	TCM2-2	30	24	24	12	30	30	24	15	60(2)/50(2)	60(2)/50(2)	---	---

The following notes apply to the table above:
(1) Relays in separate enclosure from control module.
(2) Amperage values over 30 only apply to higher amperage relays such as HD60125.
(3) 60 Amps applicable w/only 1 or 2 relays.
(4) A double-pole relay or 2 single-pole relays per circuit are required for 208 Vac and 240 Vac Heat Trace to break both power legs.

TYPICAL THERMON TRACENET™ TCM2 SYSTEMS



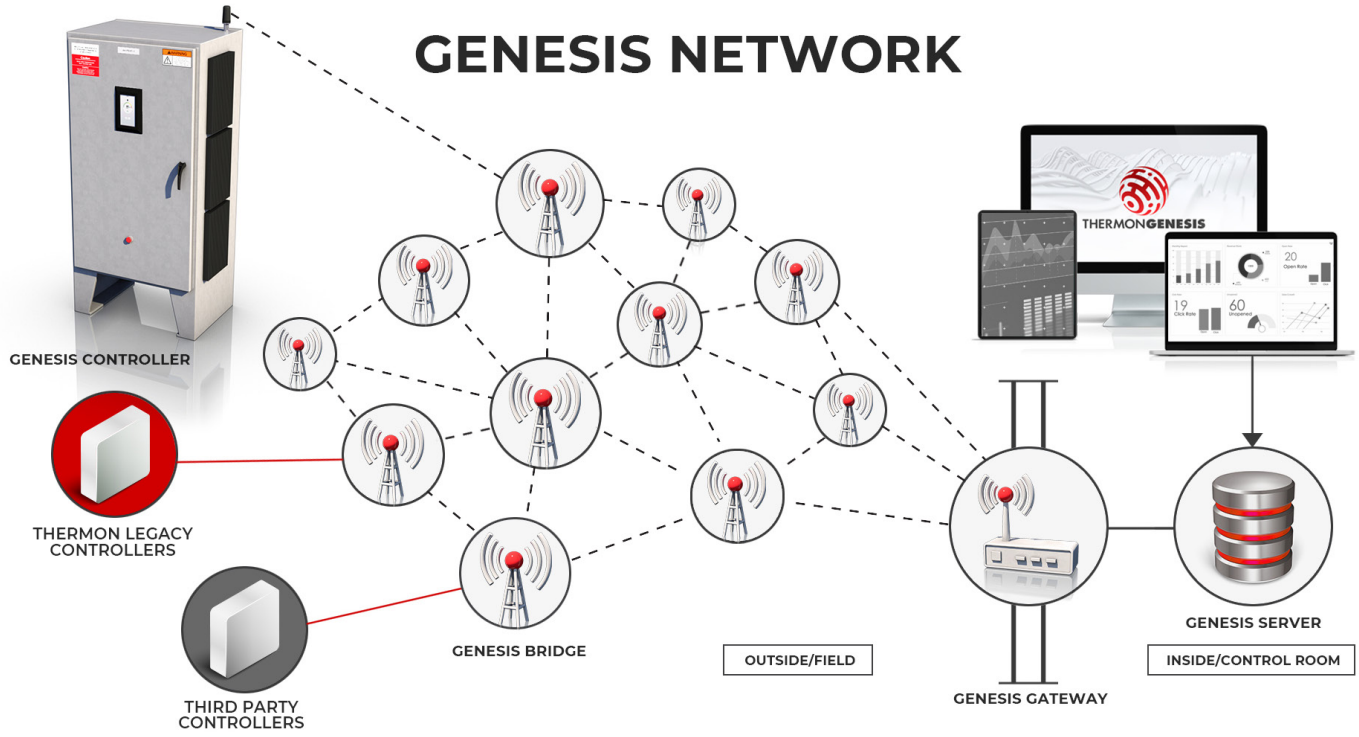
GENESIS NETWORK

The Thermon Genesis™ Network consists of a control room server, a gateway, and a collection of field deployed bridges/nodes that form a wireless mesh communications network. Alternatively, the network can be made via a traditional wired Ethernet network. The Genesis™ Network connects all heat trace panels and controllers to the control room and gives visibility of all assets from a single dashboard and user interface that can be accessed from any browser. In addition to the Genesis Controller, the components of the Genesis Network Include:

- **Thermon Genesis Bridge –** node for wireless mesh communications
- **Thermon Genesis Gateway –** access point to/from the control room
- **Thermon Genesis Server –** supervisory and data analytics software

DCS (DISTRIBUTED CONTROL SYSTEMS) COMMUNICATIONS

Genesis Controller Systems communicate via Ethernet to the plant DCS. The same operating data and control capabilities that are available through the Genesis Network are also accessible in the plant control room at the DCS.



PRODUCT REFERENCE LEGEND

TCM2 - 2 - SSR30B/2R - 240 - I - 1P2 - H1 - 1 - 3 - P/N

TraceNet TC Series

Number of Heat Trace Circuits

1 = 1 Circuit

2 = 2 Circuits

Heat Sink/Relay Options

SSR30A/xR = x Single Pole Solid State Relay(s) With Type A Heat Sink

SSR30B/xR = x Single Pole Solid State Relay(s) With Type B Heat Sink

SSR15A/xR = x Double Pole Solid State Relay(s) With Type A Heat Sink

SSR15B/xR = x Double Pole Solid State Relay(s) With Type B Heat Sink

SSR50C/xR = x Single Pole Solid State Relay(s) With Type C Heat Sink

M301/xR = x Single Pole Mechanical Relay(s) Ordinary Locations Only

M302/xR = x Double Pole Mechanical Relay(s) Ordinary Locations Only

x = number of circuits (1 or 2)

Voltage Option

120 = 100-240 Vac Controller, 120 Vac Heat Trace

240 = 100-240 Vac Controller, 208-240 Vac Heat Trace

277 = 100-240 Vac Controller, 277 Vac Heat Trace

480 = 100-240 Vac Controller, 480 Vac Heat Trace

600 = 100-240 Vac Controller, 600 Vac Heat Trace

User Interface

I = Internal

E = External (Future)

Quantity and Enclosure Type

xP2 = x Fiberglass, Type 4X (IP54), 305 x 356 x152 mm (12" x 14" x 6")

xSS2 = x Stainless Steel, Type 4X (IP54), 305 x 356 x152 mm (12" x 14" x 6")

xP3 = x Fiberglass, Type 4X (IP54), 406 x 356 x 152 mm (16" x 14" x 6")

xSS3 = x Stainless Steel, Type 4X (IP54), 406 x 356 x 152 mm (16" x 14" x 6")

xSS4 = x Stainless Steel, Type 4X (IP54), 914 x 762 x 406 mm (36" x 30" x 16")

Note: For heat trace circuit voltages above 277 Vac, dual enclosures are required ("x" above will be 2).

Location

O = Ordinary Locations

H1 = Classified Locations (Divisions)

H2 = Ex Explosive Atmospheres (Zones) (Future)

Communications

1 = RS485

2 = RS485/Ethernet

Alarm Outputs

1 = Standard

2 = Standard and Trip

3 = Standard, Trip, and System

4 = Standard with Panel Light

5 = Standard and Trip with Lights

6 = Standard, Trip, and System with Lights

Thermon Part Number

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