June 2022

Description

Moore Industries' SPT Site-Programmable Transmitter is an advanced signal conditioner that packs exceptional flexibility, accuracy, and ease-of-use into a compact, universally mountable DIN-style housing.

Accepting T/C, RTD, millivolt, or ohms input in a host of ranges, sensor types, and connection schemes, the SPT provides isolated, process-ready output. Just flick a switch to choose 4-20mA or 1-5V.

Field-selectable input and output, Smart-Ranging, power auto-sensing, and DIN-style packaging that mounts on either G-type or Top Hat rail makes the SPT an ideal "plant standard," and a "universal spare" for all your temperature sensing applications.

Forget Complex, Expensive, and Time-consuming Configurators and Calibrators—SPT setup and calibration is as simple as pushing a button. Its large, LCD screen leads the user through a simple menu system with all programming options spelled out in "plain-English." All settings are stored in the unit's non-volatile memory, protected from power loss or unauthorized changes. Parameters can be viewed at any time without affecting unit operation.
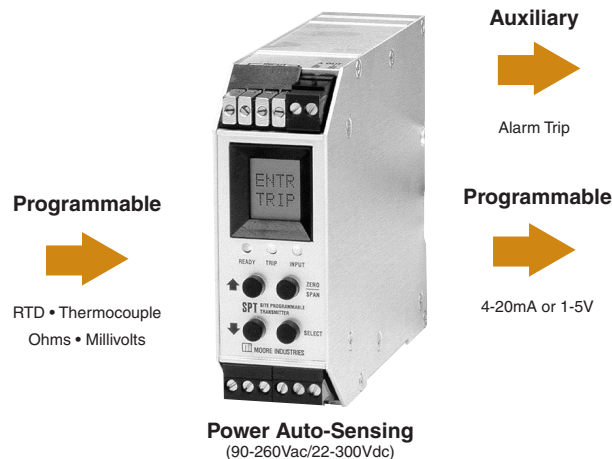
Setting a new standard in flexibility and ease of use, the SPT Site-Programmable Transmitter installs on G-type and Top Hat DIN rails, and programs with the touch of a button.

Features

- **Fast and Easy to Configure and Calibrate.** No tools, no calibrators, no configurators, no protocols—With the SPT you get the power, accuracy, and flexibility of digital technology without any cumbersome or expensive add-on equipment.

- **Programmable Input, Range, and Configuration.** The SPT accepts input from all common ISA T/C's and 2-, 3-, or 4-wire RTD's, as well as direct input for ohm or millivolt sources. There are menu selections for output based on a single sensor, the average of multiple sensors, and dual sensor differentials.

- **Programmable Output and Display.** Easy-access controls provide a simple means of changing from 4-20mA (source or sink) to 1-5V (consult the factory for other ranges). The intuitive menu display choices for linearized or non-linearized, proportional output, and precise, "real-time" display of input in either °C or °F.

- **Worldwide Power "Auto-Sensing."** The SPT automatically accepts every common ac and dc power input, from 22-300Vdc or 90-260Vac. There are no jumpers or switches to set. Just plug it in and go.

Auxiliary

Alarm Trip

Programmable

RTD • Thermocouple
Ohms • Millivolts

Programmable

4-20mA or 1-5V

Power Auto-Sensing
(90-260Vac/22-300Vdc)

Certifications

Factory Mutual Research Corporation (FMRC)
Non-Incendive – Class I, Division 2, Groups A, B, C, D
Suitable For: Class II, Division 2; Class III, Divisions 1 & 2

FM APPROVED

CSA **Canadian Standards Association (CSA)**
General (Ordinary) Location – *NTRL/C*

SPT

Site-Programmable, Isolated
Temperature Transmitter

Specifications

Performance

Maximum Unit Error:
Output Accuracy + Cold
Junction Reference Accuracy
+ Input Accuracy
(See Table 1, "Accuracy")
Output Accuracy: ±0.03%
of output span
**Cold Junction Reference
Accuracy:** ±0.25°C

Stability: ±0.1% of
calibrated span, max. over
six months

Output Response:
800 milliseconds (msec),
max., for output to reach full
scale in response to a full
scale input step change
Alarm Response:
700 msec, max., from input
change to alarm output for
step change on input with
trip point at midpoint of step

Ripple: 15mV*, peak-
to-peak max., for voltage
output; 10mV*, peak-to-
peak, max., when measured
across a 250Ω resistor for
current ;
* Spec'd at frequencies up to 120Hz

Sensor Excitation Current:
.25mA, nominal

Burnout Protection: User-
programmable. Front panel
push buttons select upscale
or downscale drive
Output Protection:
Transient protection on
output

**Performance
(continued)**

Output Limiting Capability:
117% of span, max.; 115%,
typical

Load Capability: 1200Ω,
max. for current outputs
(4-20mA) when configured
as internally powered
(source mode); 2000Ω max.
for current outputs when
configured as externally
powered (sink mode)

Input Impedance: 10Ω, min.
(T/C and mV inputs)

Load Effect: ±0.01% of
span from 0 to max. load
resistance on current output

Line Voltage Effect:
±0.001% of span for a 1V
change in line voltage
(ac or dc)

Isolation: 1000Vrms
between case, input, output,
and power terminals
NOTE: High voltage effect of ±0.001%
of span/V possible with prolonged
exposure to ac voltages above 200Vac

**Input Over-Voltage
Protection:** ±5.0Vdc

**Ambient
Conditions
Ratings**

RFI/EMI Protection:
30V/M – ABC ≤ 0.5% error
in reading, when tested
according to SAMA Standard
PMC 33.1

Noise Rejection: Common
Mode, 120dB@60Hz;
Normal Mode, 30dB@60Hz

**Ambient
Conditions
Ratings
(continued)**

**Operating Temperature
Range:** –25°C to +65°C
(–13°F to +149°F)

**Storage Temperature
Range:** –40°C to +80°C
(–40°F to +176°F)

Humidity Range: 0-95%,
non-condensing

**Effect of
Ambient
Temperature**

On Maximum Unit Error
(refer to Table 1, "Accuracy")**:**
±0.005% of span per °C,
max., ±15ppm of input signal

**On Reference Junction
Compensation:** ±0.5% per
50°C change in ambient
temperature

Adjustments

Four, front panel push buttons
control settings for Zero,
Span, Alarm Trip Point, etc.
Easy-access, internal settings
select current or voltage
output and high/low alarm
function; Internal jumper
and menu password protect
parameter settings

Display: 2X4 character,
backlit, alphanumeric LCD
LEDs: Dual-color TRIP light
shows green for non-alarm,
red for alarm (dual color);
Dual-color INPUT light
shows green for input within
rated range, red for sensor/
wire failure or overrange;
READY light indicates normal
operation, extinguishes in the
event of any internal failure

Weight 383 g (13.5 oz)

Intelligent Site-Programmability
— Exceptional Ease of Use

No hand-held configurator or sophisticated bench calibra-
tion equipment is needed to get the SPT up and running.
Install "generic" SPT's in all types of temperature sen-
sor applications in the plant. The "plain-English" menu
system takes the user through setup parameters quickly,
making on-site programming practical and cost-effective.

Setup Security. All configuration data is stored safely in
non-volatile memory. Easy-access controls and a security
password protects setup from inadvertent or unauthorized
changes.

Programmable features include:

- **Input.** RTD type and number of wires, ISA T/C type,
  direct mV, or ohms.
- **Output.** Current or voltage (Set with easy-access
  internal controls).
- **Reference Junction Compensation.**
- **Differential or Averaging of inputs.**
- **Alarms.** Trip point, deadband, delay, high/low.
  (-C option required for contact closure output.)
- **Zero and Full Scale.** Smart-Ranging, or bench
  check with field inputs.

Ordering Information

Unit	Input	Output	Power	Option	Housing
SPT	**TPRG** Programmable (Temperature). User-set, via integral LCD and menus, for input from RTD, T/C, mV or direct Ω RTD Range: 100 to 1000Ω, –200 to +850°C (–328 to 1562°F) T/C Range: –270 to +1836°C (–454 to +3308°F) Millivolts Range: –10 to 120mV Ohms Range: 0 to 4000Ω Menus provide the following selections*: Pt RTD, with α 3916, 3928, 3926, 3923, 3911, 3902, 3850, or 3750 Ni with α 672; Cu with α 427; 2-, 3-, or 4-wire inputs, multiple sensor averaging and dual sensor differential * Factory Calibration Available ISA T/C Types J, K, E, T, R, S, N, and B	**PRG** Programmable. User-set via easy-access internal controls for either 4-20mA or 1-5V, internally or externally powered (source/sink) (Other ranges available. Consult factory for availability)	**U** Universal Power. Power Auto-sensing automatically switches for safe power input from 22-300Vdc or 90-260Vac Power consumption: 2-3W, nominal **24DC**	**–C** Contact Closure Relay output SPDT, form C, rated 5A @ 250Vac or 24Vdc, or 0.5A @ 125Vdc, non-inductive. Failsafe/non-failsafe is field selectable through a switch. **–SP2** Special high excitation current for noisy 10 ohm copper RTDs for stator temperature. (700msec max. response time for step change on input with trip point at midpoint of step).	**DIN** Universal DIN-style housing mounts on both 32 mm, G-type (EN50035) and 35 mm, Top Hat (EN50022) rail

To order, choose: Unit / Input / Output / Power / Option [Housing] from bold face type above
Model Number Example: SPT / TPRG / PRG / U / -C [DIN]

Figure 1. *An Overview of the SPT's Intuitive Configuration/Calibration Menu*

SPT
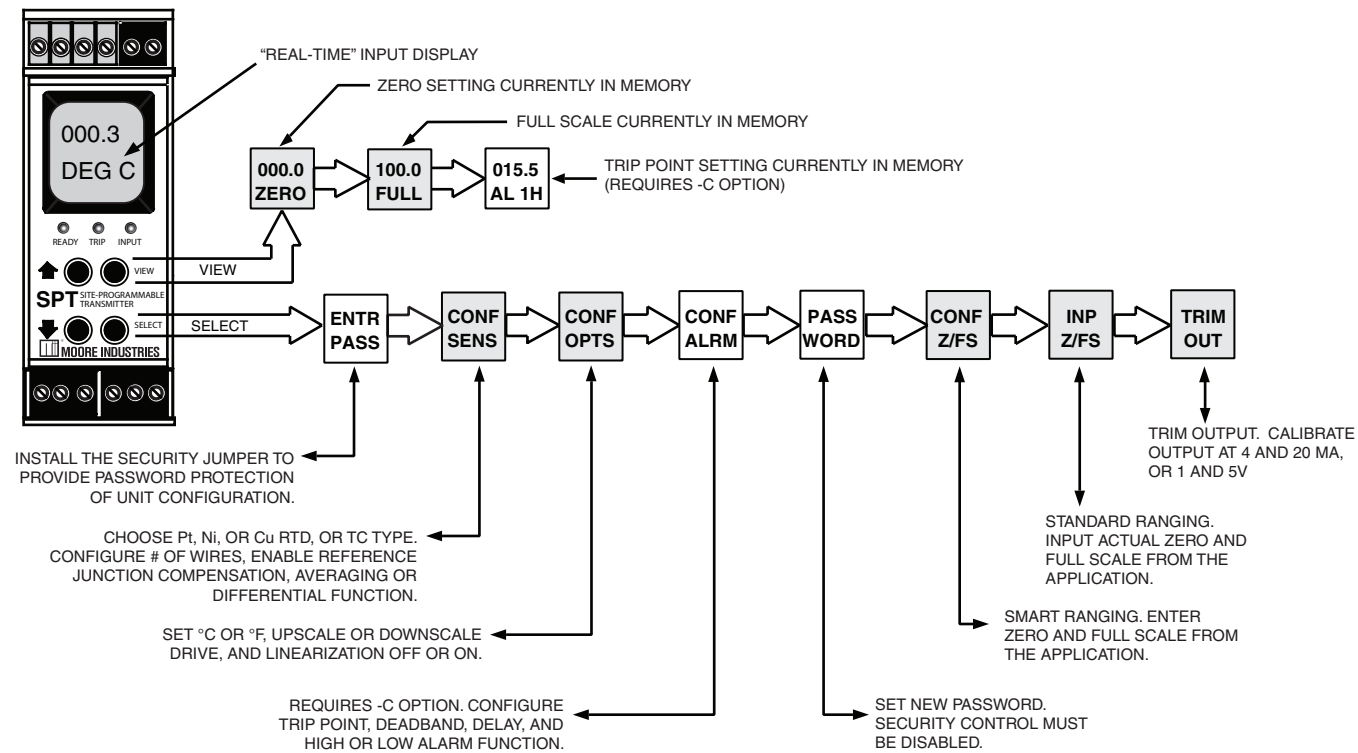
Site-Programmable, Isolated Temperature Transmitter

Table 1. *SPT Input Codes and Accuracy Ratings*

RTD*	α **	Ω	Range	Input Accuracy	Minimum Span***
Pt	3750	1000	−185°C to +540°C (−301°F to +1004°F)	±0.1°C	
	3850	100, 200, 300, 400, 500, 1000	−200°C to +850°C (−328°F to + 1742°F)	100Ω: ±0.2°C; 200, 300, & 400Ω: ±0.15°C; 500 & 1000Ω: ±0.1°C	Single, 100Ω Sensor: 15°C Averaging 100Ω Sensors: 15°C Differential of 100Ω Sensors: 30°C
	3902	100, 200, 400, 500, 1000	−100°C to +650°C (−148°F to +1201°F)	100Ω: ±0.2°C; 200 & 400Ω: ±0.15°C; 500 & 1000Ω, ±0.1°C	Single, 200Ω Sensor: 10°C Averaging 200Ω Sensors: 10°C Differential of 200Ω Sensors: 20°C
	3911	100, 500	−200°C to +630°C (−328°F to +1166°F)	100Ω: ±0.2°C; 500Ω: ±0.1°C	Single, 500 or 1000Ω Sensor: 7.5°C Averaging 500 or 1000Ω Sensors: 7.5°C
	3916	100	−200 °C to +510°C (−328°F to +950°F)	±0.2°C	Differential of 500 or 1000Ω Sensors: 15°C
	3923	98.129	−200°C to +600°C (−328°F to +1112°F)	±0.2°C	
	3926	100, 200, 470, 500	−200°C to +630°C (−328°F to +1166°F)	200 to 470Ω ±0.15°C; 500Ω: ±0.1°C	
	3928	100	−200°C to +850°C (−328°F to +1742°F)	±0.2°C	
Ni	672	120	−80°C to +320°C (−112°F to +608°F)	±0.14°C	Single Sensor: 10°C Averaging Sensors: 10°C Differential of Multiple Sensors: 20°C
Cu	427	9.035	−50°C to +250°C (−58°F to +482°F)	±1.6°C	Single Sensor: 100°C Averaging Sensors: 100°C Differential of Multiple Sensors: 200°C

Direct Ω*	Range	Input Accuracy	Minimum Span***
Ω	0-4000Ω	±0.4Ω	30Ω

T/C*	Range	Linearization Conformance Range	Input Accuracy	Minimum Span***
J	−210°C to +770°C (−346°F to +1418°F)	−180°C to +760°C (−292°F to +1400°F)	±0.25°C	35°C
K	−270°C to +1390°C (−454°F to +2534°F)	−150°C to +1370°C (−238°F to +2498°F)	±0.3°C	40°C
E	−270°C to +1013°C (−454F to +1855.4°F)	−170°C to +1000°C (−274°F to +1832°F)	±0.25°C	35°C
T	−270°C to +407°C (−454°F to +764.6°F)	−200°C to +400°C (−328°F to +752°F)	±0.25°C	35°C
R	−50°C to +1786°C (−58°F to +3246.8°F)	0°C to +1760°C (−32°F to +3200°F)	±0.5°C	50°C
S	−50°C to +1786°C (−58°F to +3246.8°F)	0°C to +1760°C (−32°F to +3200°F)	±0.5°C	50°C
N	−270°C to +1316°C (−454°F to +2400.8°F)	−130°C to +1300°C (−202°F to +2372°F)	±0.4°C	45°C
B	+200°C to +1836°C (+392°F to +3336.8°F)	+400°C to +1820°C (+752°F to 3308°F)	±0.8°C	75°C

Direct mV*	Range	Input Accuracy	Minimum Span***
mV	−10 to +120mV	±15µV	4mV

* All input types retain site programmability.

** Actual α is 0.003750, 0.003850, 0.003902, etc.

*** Recommended Minimum Span. Tighter spans, while available, may result in output inaccuracies.

Total Sensor Diagnostics

With the SPT, Moore Industries continues to fashion the de facto standard for design improvements in everyday applications of the process control industry.

The latest innovation from out engineers, Total Sensor Diagnostics, or TSD, takes our temperature products far beyond the limitations of our competitors.

TSD means no more guessing about the source of a system faults. No more tedious trial-and-error sensor network troubleshooting. The SPT continuously monitors the status of both the input sensor and wiring. If a wire breaks, or if the sensor fails, the front panel LED changes color to flag the problem.

The clear, luminous LCD tells exactly where the failure has occurred, differentiating between one wire and another, an between one of the wires and the sensor itself.

Choose the SPT for your temperature applications, and watch your valuable monthly maintenance man-hours go down. Spend time fixing problems, not searching for them.

BROKEN
LEAD WIRE

RTD
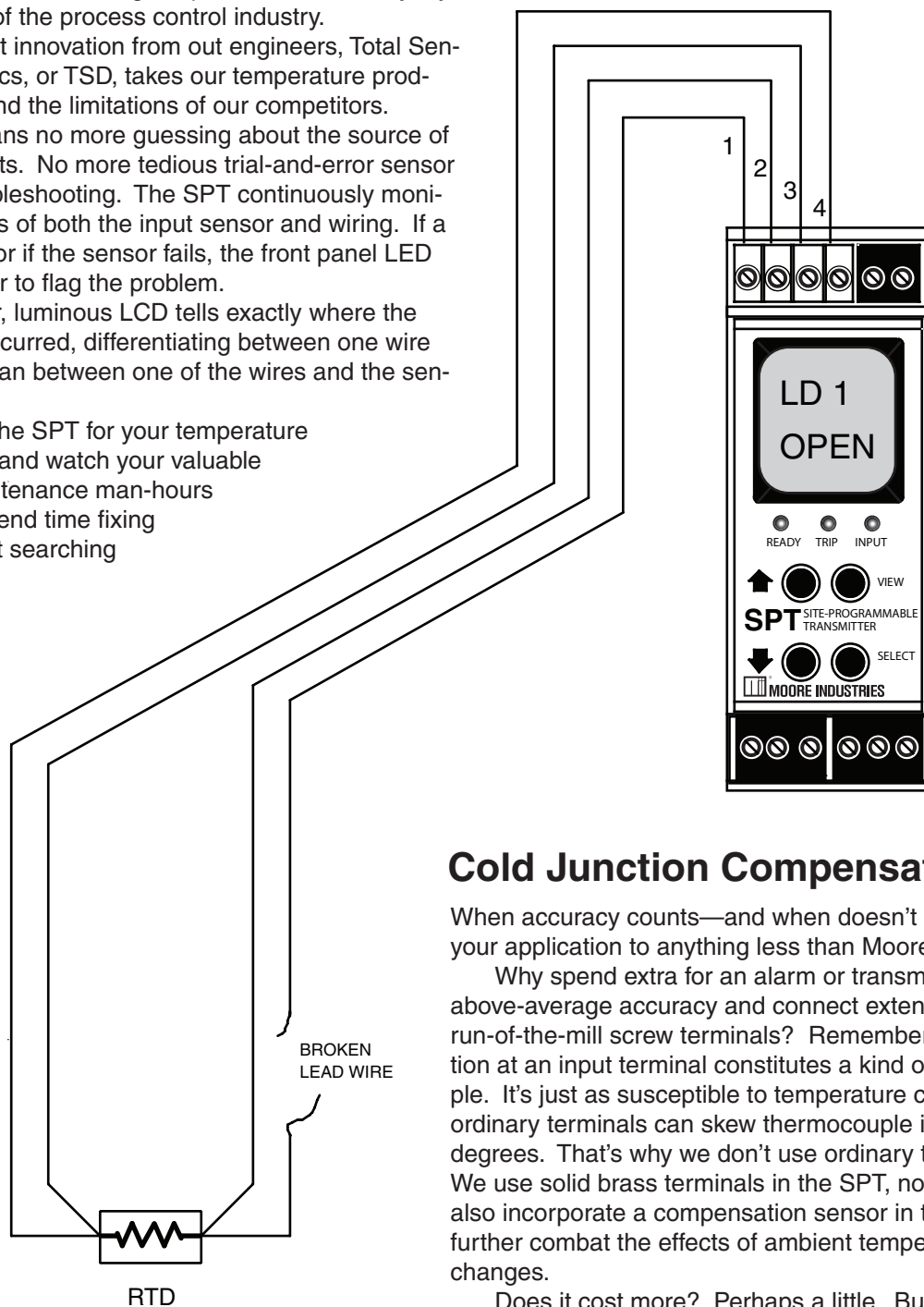
Cold Junction Compensation

When accuracy counts—and when doesn't it?—don't trust your application to anything less than Moore Industries.

Why spend extra for an alarm or transmitter with above-average accuracy and connect extension wires to run-of-the-mill screw terminals? Remember, the connection at an input terminal constitutes a kind of thermocouple. It's just as susceptible to temperature changes, and ordinary terminals can skew thermocouple input by several degrees. That's why we don't use ordinary terminals. We use solid brass terminals in the SPT, not plastic. We also incorporate a compensation sensor in terminal #2 to further combat the effects of ambient temperature changes.

Does it cost more? Perhaps a little. But perhaps accurate control of your process is worth it. The question is not whether you can afford it. The question is, can you afford anything less?

SPT

Site-Programmable, Isolated
Temperature Transmitter
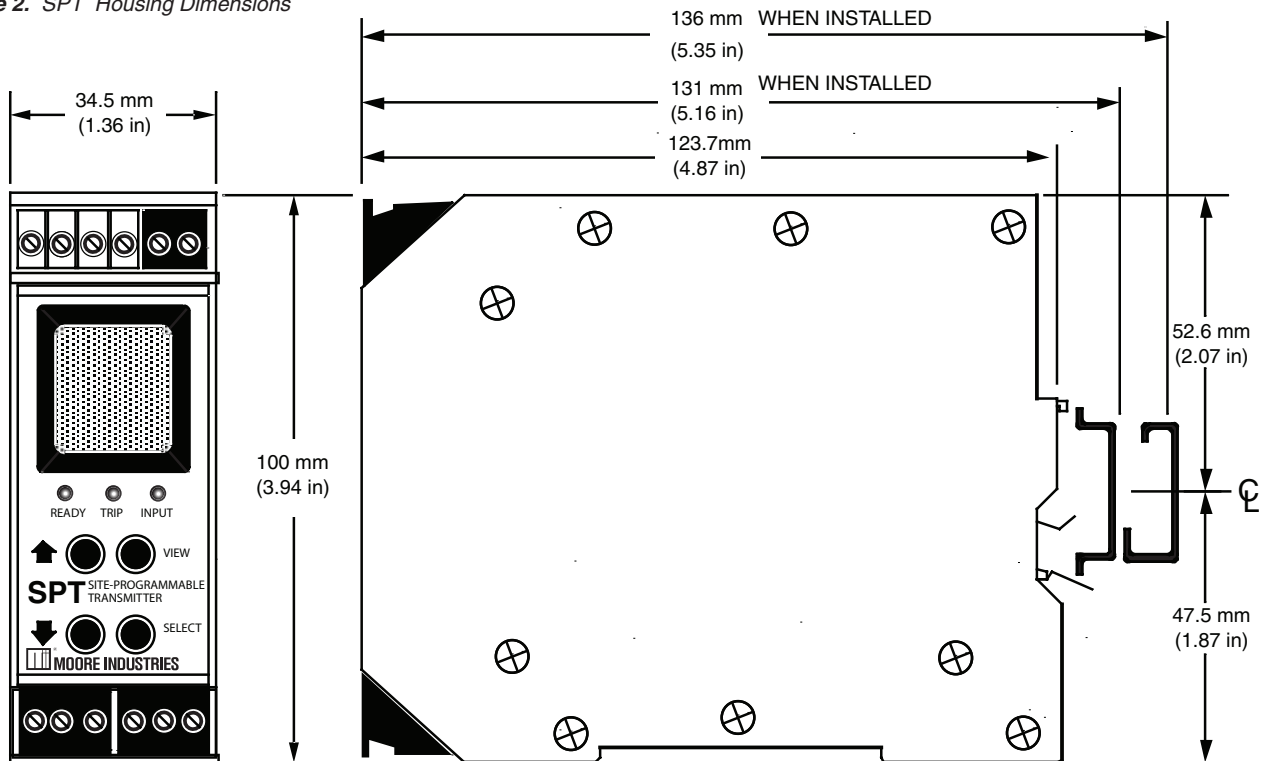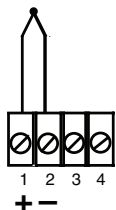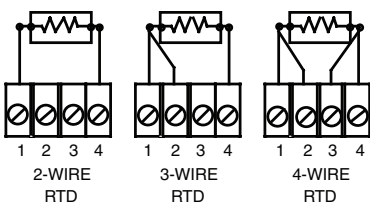
Figure 2. *SPT Housing Dimensions*

136 mm WHEN INSTALLED
(5.35 in)

131 mm WHEN INSTALLED
(5.16 in)

123.7mm
(4.87 in)

34.5 mm
(1.36 in)

100 mm
(3.94 in)

52.6 mm
(2.07 in)

47.5 mm
(1.87 in)

READY   TRIP   INPUT

VIEW

SPT SITE-PROGRAMMABLE
TRANSMITTER

SELECT

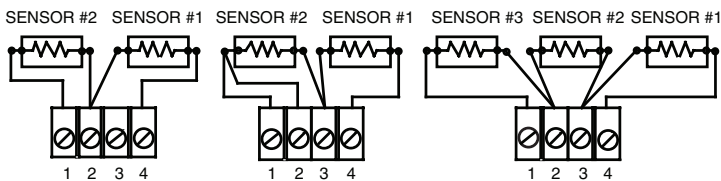**MOORE INDUSTRIES**

Figure 3. *SPT Single- and Multi-Sensor Hookups*

T/C HOOKUP

1 2 3 4
+ −

RTD HOOKUPS

1 2 3 4
2-WIRE
RTD

1 2 3 4
3-WIRE
RTD

1 2 3 4
4-WIRE
RTD

NON-
REMOVABLE
BRASS
TERMINALS

1 2 3 4 5 6

REMOVABLE
TERMINAL
BLOCKS

REMOVABLE
TERMINAL
BLOCKS
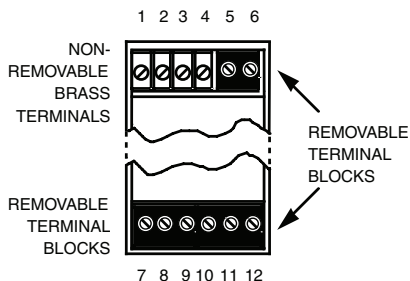
7 8 9 10 11 12

SPT Terminals

1	2	3	4	5	6
+	−			+Analog OUT	−Analog OUT
(See Note 1)	(See Note 1)	(See Note 2)	(See Note 2)		

7	8	9	10	11	12
Relay Normally OPEN	Relay COMMON	Relay Normally CLOSED	POWER AC or DC	POWER AC or DC	GND
(SEE Note 3)	(SEE Note 3)	(SEE Note 3)			

Notes: 1. Reference polarity when connecting T/Cs or other mV sources only.
2. Not used with T/C inputs.
3. Requires -C option.