

## Specifications

### Inputs:

- Ranges: field configurable, see Table 6
- Impedance: >1M Ohms
- Input Bias Current (burnout detection): <1.5 microamp
- Overvoltage: ±10V differential
- Common Mode (Input to Ground): 1500VDC or peak AC, max
- Zero and Span Range:
  - Zero Turn-Up:
    - 0 to 50% of full scale range
  - Span Turn-Down:
    - 100 to 50% of full scale range

### Outputs:

- Voltage Output: field-configurable
  - Ranges: 0-5V, 0-10V
  - Impedance: <10 Ohms
  - Drive: 10mA, max. (1K Ohms, min.)
- Current Output: field-configurable
  - Ranges: 0-1mA, 4-20mA
  - Impedance: >100K Ohms
- Compliance: 10V, max. (500 Ohms, max. @ 20mA)

### Pin Connections

- 1 Power (Hot)
- 2 No Connection
- 3 Power (Neu)
- 4 Do not use
- 5 Input (+)
- 6 Input (-)
- 7 Output (+)
- 8 Output (-)

### Accuracy (Including Linearity, Hysteresis):

- see Table 5
- Response Time(10-90%):**
  - 500 mSec, typical
- Stability:**
  - ±0.04%/°C of full scale range

### Isolation:

- 1500VDC or peak AC between input, output and power

### ESD Susceptibility:

- Meets IEC 801- 2, Level 2 (4KV)

### Common Mode Rejection:

- DC - 60Hz: 120dB

### LED Indicators:

- TROUBLE LED: Yellow - off during normal device operation
- INPUT LED: Green - continuously on if input is within selected range, flashes otherwise
- CAL OK LED: Yellow - continuously on in normal device operation

### Thermocouple Burnout Detect:

- Field-configurable Up or Downscale, or disabled

### Humidity (Non-Condensing):

- Operating: 25 to 95% (@ 45°C)
- Soak: 90% for 24 Hrs. (@65°C)

### Temperature Range:

- Operating: 0 to 60°C (32 to 140°F)
- Storage: -15 to 75°C (5 to 167°F)

### Power:

- Consumption: 3W typical, 5W max
- Standard: 120VAC ±10%, 50 - 60Hz
- Optional: 240VAC

### Weight:

- 0.62lbs

### Approvals:

- UL recognized per standard UL508. (File No. E99775).



## SMSC-TC

### Thermocouple Input, Field Configurable Signal Conditioner

INSTRUCTION SHEET

M5483/0715

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Provides Isolated, Linearized DC Output in Proportion to Thermocouple Input

- Field Configurable Thermocouple Types
- Linearized Outputs
- Wide-Ranging Zero and Span Adjustability (50%)
- Eliminates Ground Loops
- Thermocouple Burnout Detection
- ASIC Technology for Enhanced Reliability

### Description

The SMSC-TC isolating thermocouple conditioner offers wide ranging input and output capability. The SMSC-TC can be field configured by the user to accept input from thermocouple types J, K, T, R, S, E, and B and to provide current or voltage output. The output is linearized to temperature according to the particular thermocouple type.

The SMSC-TC is a three-port industrial isolator — the output is optically isolated from the input up to 1500V, and both input and output are transformer isolated from the line power. Isolation allows the noise reduction benefits of grounded thermocouples to be realized without creating ground loop problems and it provides faster response. The SMSC-TC utilizes the latest in advanced analog/digital signal processing technology. In addition to its multiple microprocessors, it employs special ASIC circuitry for high accuracy and reliability.

The SMSC-TC is equipped with cold-junction compensation (CJC) circuitry to provide ice-point reference. Upscale, downscale or disabled thermocouple burnout detection is switch selectable.

### Application

The AP4351 is useful in any application requiring an isolated DC output from a thermocouple input. Typical applications include energy management and data acquisition of process temperatures. The output of the SMSC-TC can drive a digital meter for direct display or interface with a computer for monitoring and control applications.

### Status LEDs

Model SMSC-TC is equipped with top-mounted LEDs for INPUT (green), TROUBLE (yellow) and CAL OK (yellow). At start-up, both the INPUT and the CAL OK LEDs light up momentarily for 1 second. Afterwards, these LEDs flash alternately for 10 seconds while start-up takes place.

### Input LED

This input LED is a diagnostic tool. It remains continuously lit if the measured temperature is within the selected range of the thermocouple. However, if the measured temperature is

outside the full range of the thermocouple (for example, for a type J - below minus 200°C or above 750°C), the LED will flash at a rate of 4 or 8Hz for under/over range, respectively. If the thermocouple is within the full temperature range, but outside the selected sub-range (for example, if a type J thermocouple is set for range 13 and the temperature is either below 375°C or above 500°C) the LED will flash at 0.5 or 1Hz respectively.

### Cal OK LED

This LED is continuously on when the device is properly storing the factory calibration reference voltage.

### Trouble LED

This LED is off during normal operation of the device. If this LED is on contact Action's Technical Services Group.

### Options

- U Urethane coating of internal circuitry for protection from corrosive atmospheres.

**C620** Factory calibration (specify input thermocouple type, temperature range and output).

### Configuration

A major advantage of the SMSC-TC is its wide ranging capabilities and ease of configuration. The SMSC-TC enables 50% input zero and span adjustability within the selected sub-range.

For example, range #5 for an E-Type thermocouple in Table 6 specifies -18°C to 125°C. Since the span can be contracted by 50%, this enables an input span as narrow as 50% of 143°C, or 72°C. This span can then be positioned anywhere within the temperature range and can have a zero step-up as large as 50% of the full scale range (e.g. span can start as high as 53°C).

Unless otherwise specified, the factory pre-sets the Model SMSC-TC as follows:

Input:	J-type
Range:	0-500°C
Output:	4-20mA
Burn Out:	Upscale



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### WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC., warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY RETURNS**, please have the following information available BEFORE contacting OMEGA.

1. Purchase order number which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY RETURNS**, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA.

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product and
3. Repair instructions and/or specific problems relative to the product.

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For other settings, remove the four base screws and polycarbonate case to access the configuration switches.

2. Set the calibrator to the desired minimum input and adjust the zero potentiometer for the desired minimum output.

Refer to Tables 1 through 6 and Figures 1 through 3 for the proper switch locations and settings. Using the switch on the input board select thermocouple type, temperature range, and thermocouple burnout detection. Using the switch on the output board, select desired type of output. Replace the case prior to applying power to the unit.

3. Set the calibrator to the desired maximum input and adjust the span potentiometer for the desired maximum output.

4. Repeat steps 2 and 3, as necessary, for best accuracy.

**Calibration**

1. Connect the input to a calibrated thermocouple source and apply power. Wait 1-2 hours for thermal stability before monitoring the voltage/current output. Refer to PIN CONNECTIONS.

TC Type	8	9	10
B	ON	ON	ON
E	ON	ON	OFF
J	ON	OFF	ON
K	ON	OFF	OFF
R	OFF	ON	ON
S	OFF	ON	OFF
T	OFF	OFF	ON
Not Used	OFF	OFF	OFF

Input Sub-Range	SW1-7	SW1-6	SW1-5	SW1-4
1	OFF	ON	OFF	ON
2	OFF	ON	ON	ON
3	ON	OFF	ON	OFF
4	OFF	OFF	ON	ON
5	ON	ON	OFF	ON
6	ON	ON	ON	ON
7	ON	OFF	OFF	ON
8	OFF	OFF	OFF	ON
9	ON	ON	ON	OFF
10	OFF	ON	ON	OFF
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	OFF
13	ON	ON	OFF	OFF
14	ON	OFF	ON	ON
15	ON	OFF	OFF	OFF
16	OFF	OFF	OFF	OFF

Table 4: Output switch settings (SW 1 on Output Board)

Output	SW1-2	SW1-1
0 - 5V	ON	ON
0 - 10V	OFF	ON
0 - 1mA	ON	OFF
4 - 20mA	OFF	OFF

Table 5: SMSC-TC Accuracy

TC Type	Temp. Range °C (°F)	Accuracy
J	-200 to 750°C (-328 to 1382°F)	±2.0 °C (±3.6°F)
K	-200 to -140°C (-328 to -220°F)	±5.0 °C (±9.0°F)
	-140 to 1250°C (-220 to 2282°F)	±2.0 °C (±3.6°F)
	1250 to 1370°C (2282 to 2498°F)	±4.0 °C (±7.2°F)
E	-150 to 1000°C (-238 to 1832°F)	±2.5 °C (±4.5°F)
T	-150 to 400°C (-238 to 752°F)	±3.0 °C (±5.4°F)
R	50 to 1760°C (122 to 3200°F)	±6.0 °C (±10.8°F)
S	50 to 1760°C (122 to 3200°F)	±6.0 °C (±10.8°F)
B	500 to 1820°C (932 to 3308°F)	±5.0 °C (±9.0°F)

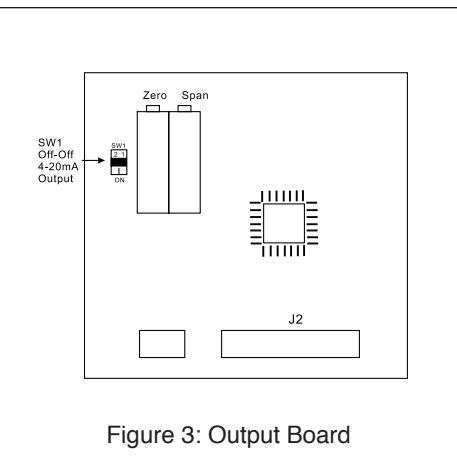
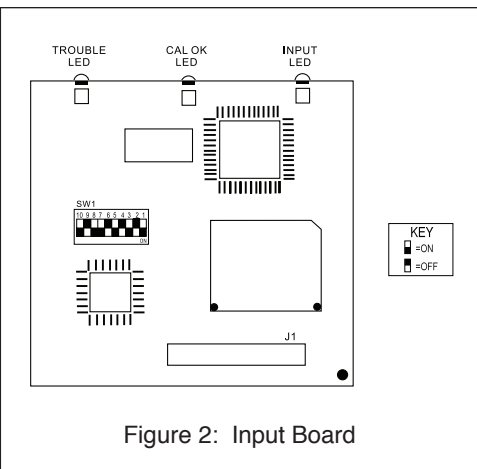
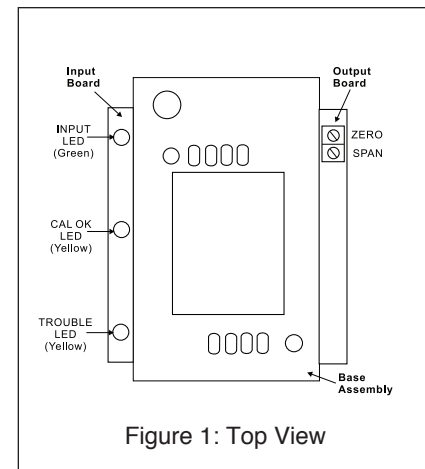
Table 2: Thermocouple burnout detection switch settings (SW 1 on Input Board)

TC Burnout Detect	SW1-2	SW1-1
Upscale	OFF	ON
Downscale	ON	OFF
Disable	OFF	OFF
Not Allowed	ON	ON

Table 6: Thermocouple Range Settings

TC Type	Range Number	Temperature Range	
B	6	500 to 1820°C (932 to 3308°F)	
	7	1000 to 1820°C (1832 to 3308°F)	
	8	500 to 1000°C (932 to 1832°F)	
	11	1500 to 1820°C (2732 to 3308°F)	
	12	750 to 1000°C (1382 to 1832°F)	
K	1	-18 to 1370°C (0 to 2498°F)	
	2	-18 to 1000°C (0 to 1832°F)	
	3	-18 to 500°C (0 to 932°F)	
	4	-18 to 250°C (0 to 482°F)	
	5	-18 to 125°C (0 to 257°F)	
	7	1000 to 1370°C (1832 to 2498°F)	
	8	500 to 1000°C (932 to 1832°F)	
	9	250 to 500°C (482 to 932°F)	
	10	125 to 250°C (257 to 482°F)	
	12	750 to 1000°C (1382 to 1832°F)	
	13	375 to 500°C (707 to 932°F)	
	14	-200 to 750°C (-328 to 1382°F)	
	15	-200 to 250°C (-328 to 482°F)	
	16	-200 to 0°C (-328 to 32°F)	
	E	2	-18 to 750°C (0 to 1382°F)
		3	-18 to 500°C (0 to 932°F)
4		-18 to 250°C (0 to 482°F)	
5		-18 to 125°C (0 to 257°F)	
8		500 to 750°C (932 to 1382°F)	
9		250 to 500°C (482 to 932°F)	
10		125 to 250°C (257 to 482°F)	
13		375 to 500°C (707 to 932°F)	
14		-200 to 750°C (-328 to 1382°F)	
15		-200 to 250°C (-328 to 482°F)	
16		-200 to 0°C (-328 to 32°F)	
J		2	-18 to 750°C (0 to 1382°F)
		3	-18 to 500°C (0 to 932°F)
		4	-18 to 250°C (0 to 482°F)
		5	-18 to 125°C (0 to 257°F)
		8	500 to 750°C (932 to 1382°F)
	9	250 to 500°C (482 to 932°F)	
	10	125 to 250°C (257 to 482°F)	
	13	375 to 500°C (707 to 932°F)	
	14	-200 to 750°C (-328 to 1382°F)	
	15	-200 to 250°C (-328 to 482°F)	
	16	-200 to 0°C (-328 to 32°F)	

TC Type	Range Number	Temperature Range
R, S	1	50 to 1760°C (122 to 3200°F)
	2	50 to 1000°C (122 to 1832°F)
	3	50 to 500°C (122 to 932°F)
	4	50 to 250°C (122 to 482°F)
	7	1000 to 1760°C (1832 to 3200°F)
	8	500 to 1000°C (932 to 1832°F)
	9	250 to 500°C (482 to 932°F)
	10	125 to 250°C (257 to 482°F)
	11	1500 to 1760°C (2732 to 3200°F)
	12	750 to 1000°C (1382 to 1832°F)
	13	375 to 500°C (707 to 932°F)
	T	3
4		-18 to 250°C (0 to 482°F)
5		-18 to 125°C (0 to 257°F)
9		250 to 400°C (482 to 752°F)
10		125 to 250°C (257 to 482°F)
13		375 to 400°C (707 to 752°F)
14		-150 to 400°C (-238 to 752°F)
15		-150 to 250°C (-238 to 482°F)



**Mounting**  
All modules feature plug-in installation. Model SMSC-TC uses an 8-pin base and molded-sockets SKT-SM-8P, or DIN-socket SKT-DR-8P.

**Dimensions**  
Dimensions are in millimeters (inches)

**Mark III**