

INSTRUCTION MANUAL

SM811 T/C TRANSMITTER

The SM811 two wire mV/TC transmitter receives signals from thermocouples or other millivolt sources and provides a 4 to 20 mA output signal proportional to the input. Because the SM811 is a two wire device, a single pair of twisted copper wires are all that is required to provide power to the unit as well as to carry the output current.

The SM811 is field calibratable, accepting inputs from type J, K, E, R, S & T thermocouples, with millivolt spans ranging from 4 to 64 millivolts. Thermocouple types and ranges are selected using a 6 position DIP switch and final calibration is accomplished by means of multturn zero and span potentiometers. The zero pot provides an offset adjustment of $\pm 25\%$ of the span. The SM811 is provided with upscale thermocouple break indication. Four voltage input models are also available, accepting inputs ranging from 4 to 64 mV to 4 to 64 volts.

General Specifications

Power Requirements	7 to 35 VDC at Terminal Block
Accuracy	0.1% of Millivolt Span
Working Temperature	-25°C to 85°C
Storage Temperature	-65°C to 125°C
Thermal Zero Shift	0.01% /°C (span > 10 mV) 0.02% /°C (span < 10 mV)
Common Mode Rejection	115 dB at 60 Hz
3 dB Frequency	3 Hz
Weight	2.5 oz.

Input Specifications

Sensor	Thermocouples J, K, T, E, R & S
Voltage Inputs	Option - mV: 4 to 64 mV Option - V1: 0.04 to 0.64 VDC Option - V2: 0.4 to 6.4 VDC Option - V3: 4 to 64 VDC
Input Break Indication	Upscale
Input Offset Adjustment	$\pm 25\%$ of mV Span
Input Source Current	4 nA Typical
Input Resistance	$> 3 \times 10^7 \Omega$ (TC & mV Inputs) 226 K (Options V1, V2 & V3)

Output Specifications

Output Range	4 to 20 Milliamps
Output Limits	3 to 28 mA, Typical
Max. Load Resistance	$= (\text{supply voltage} - 7V) / 20 \text{ mA}$
Load Effect	$< 0.01\%$ of Span / 300 Ω Change
Power Supply Effect	$< 0.002\%$ of Span per Volt

Optional Hardware

Enclosures

Aluminum Mounting Head	Option -CHA
Nylon Mounting Head	Option -CHN
Explosion Proof Head	Option -CHX

Mounting Hardware

3 Inch Snap Track Mount	Option -M31S
DIN Rail Mount	Option -M31D

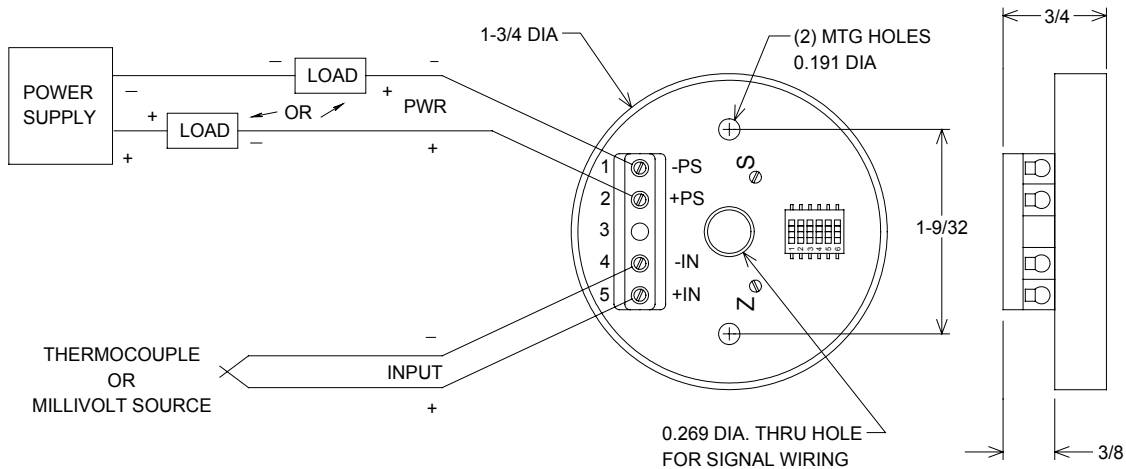


Figure 1. Field Wiring

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Calibration

The calibration of the SM811 is accomplished by first setting DIP switch positions to the proper thermocouple type and input range and then by calibrating the unit using the span and zero potentiometers.

To calibrate the SM811 follow the procedure below:

- 1) Select the temperature range and thermocouple type. NOTE that the top of the range can be from 4 to 64 mV above the bottom of the range. The bottom of the range is always 0 mV (or °C) $\pm 25\%$ of the millivolt span.
- 2) If you are calibrating using an ice bath and millivolt source, find the millivolt values in a thermocouple table corresponding to the top and bottom of your temperature range. For example, for type J, 60 to 200°F, the millivolt input will be 0.791 to 4.906 mV. If you are calibrating using a thermocouple calibrator/simulator the above step is not necessary.

This is because the output of the calibrator is given directly in units of temperature rather than in millivolts. NOTE that the output of the SM811 is linear with respect to the millivolt input and does not correct for the non-linearity of the thermocouple wire.

- 3) Reference table 1 and set the DIP switch positions for the required thermocouple type and input span. Reference table 3 for voltage inputs.
- 4) Set the calibration source to the bottom of the input range and adjust the zero pot for an output of 4 mA.
- 5) Set the calibration source to the top of the input range and adjust the span pot for an output of 20 mA.
- 6) Repeat steps 4 and 5 until the output readings are exactly 4 and 20 milliamps

Table 1. Switch settings for millivolt and temperature spans (see notes)

MILLIVOLT SPAN									
		4 TO 8	8 TO 16	12 TO 24	16 TO 32	20 TO 40	24 TO 48	28 TO 56	32 TO 64
SWITCH 4		ON	OFF	ON	OFF	ON	OFF	ON	OFF
SWITCH 5		ON	ON	OFF	OFF	ON	ON	OFF	OFF
SWITCH 6		ON	ON	ON	ON	OFF	OFF	OFF	OFF
TEMPERATURE SPAN									
TYPE J	°C	80-150	150-290	220-420	290-600	370-710	420-760		
	°F	140-270	270-530	400-790	530-1050	560-1320	790-1390		
TYPE K	°C	100-200	200-390	290-580	390-770	480-970	580-1180	670-1370	
	°F	175-355	355-705	530-1045	705-1385	875-1740	1045-2115	1210-2500	
TYPE T	°C	95-175	175-320	250-400					
	°F	175-320	320-585	460-750					
TYPE E	°C	65-125	125-235	180-325	235-440	285-535	325-635	385-735	435-835
	°F	120-230	230-430	335-615	430-795	525-975	615-1155	705-1330	795-1515
TYPE R	°C	450-800	800-1400	1115-1700					
	°F	840-1470	1470-2540	2025-3100					
TYPE S	°C	480-860	860-1535	1200-1760					
	°F	875-1565	1565-2785	2190-3210					

Table 2. Switch settings for thermocouple type selection

	TYPE J	TYPE K	TYPE T	TYPE E	TYPE R	TYPE S
SWITCH 1	ON	OFF	OFF	OFF	OFF	OFF
SWITCH 2	OFF	ON	ON	OFF	OFF	OFF
SWITCH 3	OFF	OFF	OFF	OFF	ON	ON

Table 3. Input spans for voltage input models

SM811-mV	4-8 mV	8-16 mV	12-24 mV	16-32 mV	20-40 mV	24-48 mV	28-56 mV	32-64 mV
SM811-V1	0.04-0.08 V	0.08-0.16 V	0.12-0.24 V	0.16-0.32 V	0.20-0.40 V	0.24-0.48 V	0.28-0.56V	.32-0.64 V
SM811-V2	0.4-0.8 V	0.8-1.6 V	1.2-2.4 V	1.6-3.2 V	2-4 V	2.4- 4.8 V	2.8-5.6 V	3.2-6.4 V
SM811-V3	4-8 V	8-16 V	12-24 V	16-32 V	20-40 V	24-48 V	28-56 V	32-64 V

NOTES

1. All input ranges start at 0 millivolts (or 0°C) with an offset adjustment of approximately $\pm 25\%$ of the millivolt span using the zero potentiometer.
2. Table 1 lists maximum and minimum spans for each switch setting. FOR EXAMPLE with switches 4, 5 & 6 in the ON position, the input range can be set from 0 to 4 mV up to 0 to 8 mV using the span potentiometer.