



Thermocouple Introduction

A thermocouple is a temperature sensor which consists of two wires of different conductors.

Based on the Seebeck effect in thermoelectricity, the temperature difference results voltage difference on the two wires.

Thermocouples are widely used in scientific and industrial applications because they're generally accurate and can operate over wide range of temperature.



Applications



Thermocouple, Voltage & Current Input Module (General Grade)					
Model Name		I-7011(D)		I-7018	
				M-7018	
Pictures				 	
Channel		1		8	
Wiring		Differential			
Sensor Type	Thermocouple	J, K, T, E, R, S, B, N, C			
	Voltage	+/-1.5 mV, +/-50 mV, +/-100 mV, +/-500 mV, +/-1 V, +/-2.5 V			
	Current	+/-20 mA (requires optional external 125 Ω resistor)		+/-20 mA, 0 ~ 20 mA, 4 ~ 20 mA (requires optional external 125 Ω resistor)	
Resolution		16-bit			
Accuracy		0.1%			
Sampling Rate		10 Hz			
Input Impedance		> 400 kΩ			
Common Voltage Protection		+/-5 V _{oc}		+/-15 V _{oc}	
Individual Channel Configuration		-			
Overvoltage Protection		+/-5 V _{oc}		+/-35 V _{oc}	
Open Wire Detection (for thermocouple only)		Yes		-	
Temperature outputs consistency		-			
Stable temperature output in the field		-			
System					
Dual Watchdog		Yes			
ESD (IEC 61000-4-2)		-			
EFT (IEC 61000-4-4)		-			
Intra-Module Isolation, Field-to-Logic		3000 V _{oc}			
Power Input		10 ~ 30 V _{oc}			
Power Consumption		0.9 W; 1.5 W for (D) version		1.0 W	
Note1: I-7011(D) and I-7011P(D) both include 1 DI and 2 DO channels. The specification is as following					
Digital Input		Digital Output		Thermocouple Type	
Channel	1	Channel	2		
Contact	Dry	Type	Open Collector	Type	Range (°C)
Sink/Source (NPN/PNP)	Source	Sink/Source (NPN/PNP)	Sink	B	0 ~ +1820
On Voltage Level	Close to GND	Load Voltage	3.5 ~ 30 V _{oc}	N	-270 ~ 1300
Off Voltage Level	Open	Max. Load Current	30 mA/Channel	C	0 ~ 2320
Counter (50 Hz, 16-bit)	Yes	Power-on Value	Yes	L	-200 ~ +800
Input Impedance	3 kΩ	Safe Value	Yes	M	-200 ~ +100
Overvoltage Protection	+/-30 V _{oc}			L (DIN43710)	-200 ~ +900
				S	0 ~ +1768
					0 ~ +1768

Thermocouple, Voltage & Current Input Module (Industrial Grade)					
Model Name		I-7018R	I-7018Z	I-7019R	M-7019Z
		M-7018R	M-7018Z	M-7019R	
Pictures					
Channel		8	10	8	10
Wiring		J, K, T, E, R, S, B, N, C, L, M, LDIN43710			
Sensor Type	Thermocouple				
	Voltage	+/-1.5 mV, +/-50 mV, +/-100 mV, +/-500 mV, +/-1 V, +/-2.5 V		+/-15 mV, +/-50 mV, +/-100 mV, +/-150 mV, +/-500 mV, +/-1 V, +/-2.5 V, +/-5 V, +/-10 V	
	Current	+/-20 mA (requires optional external 125 Ω resistor)		+/-20 mA, 0 ~ 20 mA, 4 ~ 20 mA (Jumper selectable)	
Resolution		16-bit			
Accuracy		0.1%			
Sampling Rate		10 Hz		8 Hz	10 Hz
Input Impedance					
Common Voltage Protection		+/-200 V _{DC}		+/-200 V _{DC}	
Individual Channel Configuration			Yes	Yes	
Overvoltage Protection		240 V _{rms}		240 V _{rms}	
Open Wire Detection (for thermocouple only)		Yes		Yes	
Temperature outputs consistency		-	Yes	-	Yes
Stable temperature output in the field		-	Yes	-	Yes
System					
Dual Watchdog		Yes			
ESD (IEC 61000-4-2)		+/-4 kV			
EFT (IEC 61000-4-4)		+/-4 kV			
Intra-Module Isolation, Field-to-Logic		3000 V _{DC}			
Power Input		10 ~ 30 V _{DC}			
Power Consumption		1.0 W	1.1 W	1.2 W	1.8 W
Note1: We recommend to choose I-7018Z/M-7018Z and M-7019Z for accurate thermocouple measurement.					
Thermocouple Type					
Type	Range (°C)	Type	Range (°C)		
J	-210 ~ +760	B	0 ~ +1820		
K	-270 ~ +1372	N	-270 ~ 1300		
T	-270 ~ +400	C	0 ~ 2320		
E	-270 ~ +1000	L	-200 ~ +800		
R	0 ~ +1768	M	-200 ~ +100		
S	0 ~ +1768	L (DIN43710)	-200 ~ +900		

Accessories for I-7018Z, M-7018Z and M-7019Z

 I-7018Z-G/S = I-7018Z-G Connects DB-1820 Directly	 I-7018Z-G/2S = I-7018Z-G Connect DN-1822 Directly +1.8 m Cable	 I-7018Z-G/S + CD-2518D	 CD-2518D = 1.8 m Cable + DB-1820	 I-7018Z-G/S + CD-25015 + 4PAPP-006-G	 CD-25015 = 15 cm Cable + DB-1820  4PAPP-006-G
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