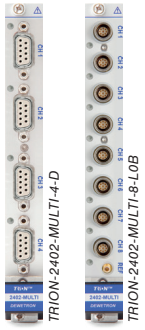
Universal analog input module

- Sampling: 24 bit; 204.8 kS/s per channel
- Input types: Voltage, bridge, resistance, RTD and IEPE®
- Isolation: 350 V_{DC} channel to channel and channel to chassis
- CAN: High-speed CAN2.0 port



Module specifications

TRION-2402-MULTI specifications		
Input channels	TRION-2402-MULTI-4-D TRION-2402-MULTI-8-L0B	4 channels SUB-D connector (CH1 can be used as CAN port) 8 channels 0B LEMO connector (CH1 can be used as CAN port)
ADC		
Resolution	24 bit	
Sampling rate	1 kS/s to 204.8 kS/s per channel	
Isolation[1)]	Channel to channel Channel to chassis	350 V_{DC}[1)] 350 V_{DC}[1)]
Input ranges		
Voltage	±5 mV to ±100 V[1)] freely programmable	
IEPE®	±100 mV to ±10 V freely programmable	
Bridge	1 to 1000 mV/V	
Resistance	10, 30, 100, 300 Ω, 1, 3, 10, 30 kΩ	
Accuracy[2)]	±0.02 % of reading ± 0.02 % of range ±20 µV	
Gain drift	typical 10 ppm/°C max. 20 ppm/°C	
Offset drift	typical 0.3 µV/°C+ 10 ppm of range, max 2 µV/°C + 20 ppm of range/°C	
Linearity	typical ±0.01 %	
Input impedance	0 to 10 V range 10 to 100 V range	100 MΩ 2 MΩ
Input bias current	<5 nA	
Input configuration	Single ended or differential (programmable)	
Input coupling	DC / AC (high pass filter 0.16 Hz)	
Common mode voltage	±350 V_{DC}[1)]	
Over voltage protection	0 to 10 V range 10 to 100 V range	50 V continuous, 100 V for 60 seconds 250 V
Excitation voltage range	0 to 24 V_{DC} freely programmable; separately for each channel	
Resolution	1 mV	
1 year Accuracy	±0.03 % ±1.5 mV	
Drift	±10 ppm/°C ±50 µV/°C	
Current limit	0.1 to 5 V: 100 mA >5 V to 24 V: limited to 0.5 W	
Protection	Continuous short	
Load and line regulation error	±0.002 % with sense line connected	
Excitation current	0.1 to 60 mA_{DC} (programmable, 16 bit DAC)	
Resolution	1 uA	
1 year Accuracy	0.1 to 5 mA: 0.05 % ±2 µA	>5 to 60 mA: 2% ±5 µA
Drift	15 ppm/°C	
Compliance voltage	0.1 to 20 mA: 24 V >20 mA: 10 V	
Output impedance	>10 MΩ	

continued on next page ...

TRION-2402-MULTI

Supported sensors	4- 6-wire full bridge 3- 5-wire ½ bridge with internal completion (software programmable) 3- or 4-wire ¼ bridge with internal resistor for 120 Ω and 350 Ω (software programmable) 4-wire full bridge with constant current excitation (piezoresistive bridge sensors) Potentiometer Resistance Resistance temperature detection: Pt100, Pt200, Pt300, Pt500, Pt1000, Pt2000 (2-, 3-, 4-wire) IEPE®															
Bridge resistance	80 Ω to 10 kΩ @ ≤ 5 V_{DC} excitation															
Shunt calibration	Two internal shunt resistors 50 kΩ and 100 kΩ															
Shunt and completion resistor accuracy	0.05 % ±15 ppm/K															
Automatic bridge balance	±400 % of Range															
Typical Signal-to-noise ratio, Spurious free	10 mV range				100 mV range				1 V range				10 V range			
SNR, Effective number of Bits[3], Noise V_{PP}	SNR	SFDR[4]	ENOB[5]	Noise	SNR	SFDR[4]	ENOB[5]	Noise	SNR	SFDR[4]	ENOB[5]	Noise	SNR	SFDR[4]	ENOB[5]	Noise
Sample rate	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]
1 kS/s	82	108	13.3	0.002	101	128	16.5	0.002	111	141	18.1	0.025	112	141	18.3	0.100
10 kS/s	82	108	13.3	0.005	101	123	16.5	0.005	106	134	17.3	0.030	112	140	18.3	0.120
100 kS/s	72	103	11.7	0.015	92	123	15.0	0.016	104	134	17.0	0.058	104	136	17.0	0.210
200 kS/s	69	99	11.2	0.022	88	120	14.3	0.025	88	133	14.3	0.230	96	135	15.7	0.950
200 kS/s; Filter = OFF	69	99	11.2	0.059	80	106	13.0	0.061	81	106	13.2	1.300	81	106	13.2	5.400
Typical THD	-100 dB															
Typical CMRR	110 dB @ 50 Hz, 90 dB @ 1 kHz, 80 dB @ 10 kHz															
Self test (self calibration)	Each channel is able to perform a complex self test by using internal high precision references															
Low pass filter (-3 dB, digital)	1 Hz to 40 % of sample rate freely programmable or OFF															
Characteristic	Bessel or Butterworth															
Filter order	2^{nd} , 4^{th}, 6^{th}, 8^{th}															
Filter setting AUTO	30 % of sample rate with 8^{th} order Bessel															
Analog anti-aliasing filter	2^{nd} order Bessel,															
Sample rate > 10 kS/s	250 kHz (-3 dB), 150 kHz (-1 dB)															
ADC anti-aliasing filter	-3 dB @ Filter = OFF															
1 kS/s ≤ fs ≤ 51.2 kS/s	0.494 fs															
51.2 kS/s < fs ≤ 102.4 kS/s	0.49 fs															
102.4 kS/s < fs ≤ 204.8 kS/s	0.38 fs fs = sample frequency															
Channel to channel phase mismatch	typically <60 nsec between channels using the same range															
CAN specification	CAN 2.0															
CAN Physical Layer	High Speed															
CAN Termination	Programmable: High Impedance or 120 Ω															
CAN bus protection	±36 V															
Input connector	9-pin LEMO EPG.0B.309, 9-pin SUB-D connector															
REF connector	SMB															
Supported MSI	MSI-BR-TH-x, MSI-BR-CH-x															
Environmental specifications																
Operating temperature	32 to 113 °F (0 to +45 °C)															
Storage temperature	-4 to 158 °F (-20 to +70 °C)															
Humidity	10 to 80 % non cond., 5 to 95 % rel. humidity															

[1] for safety reasons it is not allowed to apply more than 47.2 V_{PEAK} or 70 V_{DC}
[2] 1 year accuracy 23 °C ±5 °C
[3] LP Filter in auto mode
[4] SFDR excluding harmonics
[5] ENOB calculated from SNR