TRION3-1802-MULTI

DEWETRON

- Universal input module
- Sampling: 200 kS/s per channel
- Input types: Voltage, bridge, resistance, RTD, IEPE® current and counter
- Isolated
- CAN: High-speed CAN2.0 port
- Bandwidth: 2 MHz

Module specifications

General specifications

TRION3-1802-MULTI			
Input types		Ranges	Supported sensors
	Voltage	±2 mV to ±100 V freely programmable	-
	IEPE	±100 mV to ±10 V freely programmable	IEPE® sensors
	Bridge	±1 to 1000 mV/V	4-, 5-, 6-wire full bridge 3-, 4-, 5-wire ½ bridge 2-, 3-, 4-wire ¼ bridge 120/350/1000 Ω internal ¼ bridge completion
	Resistance	10 Ω to 30 kΩ	Potentiometer, resistance temperature detection: Pt100, Pt200, Pt300, Pt500, Pt2000 (2-, 3-, 4-wire)
	Current	±30 mA	4 to 20 mA sensors; loop-powered sensors
Input channels / connectors		8 channels 0B LEMO	CH1 Analog CAN, CH2 Analog, CH3 Analog, CH4 Analog, CH5 Analog, CH6 Analog, CH7 Analog CNT, CH8 Analog CNT
Sampling rate / resolution		100 S/s to 200 kS/s / 24-bit	
Onboard data buffer		512 MB	
Rated input voltage to earth according to EN 61010-2-30		33 V_{RMS}, 46.7 V_{PEAK}, 70 V_{DC}	
Isolation voltage (channel-to-channel and channel-to-chassis)		±350 V_{DC}	
REF connector		SMB connector to apply external calibration signal	
Input connector		9-pin LEMO EPG.0B.309	
Environmental specifications	Operating temperature	0 to +45 °C (32 to 113 °F)	
	Storage temperature	-20 to +70 °C (-4 to 158 °F)	
	Humidity	10 to 80 % non cond., 5 to 95 % rel. humidity	
MTBF[2] (MIL HDBK 217 F, GB)		93,843 hours	

Tab. 18: General specifications

TRION3-1802-MULTI		
Power consumption	Typ. 18 W, max. 25 W	
	Voltage mode, no excitation	15 W
	IEPE® mode (4 mA / 20 mA)	15 W / 19 W
	Loop powered sensor (24 V, 20 mA)	20 W
	350 Ω full bridge (5 V / 10 V)	18 W / 21 W
	PT100, PT1000	15 W

Tab. 18: General specifications

1) Occupies 2 module slots.

2) Mean time between failures

Input amplifier

Input amplifier				
Voltage input accuracy [1) 2)]	≤10 V	DC 0.1 Hz to 10 kHz 10 kHz to 100 kHz	±0.02 % of reading ±0.02 % of range ±20 µV ±0.02 % of reading ±0.02 % of range ±20 µV ±(0.005 % * f) of reading ±0.02 % of range ±20 µV	f: frequency in kHz
	>10 V input divider on	DC 0.1 Hz to 5 kHz 5 kHz to 100 kHz	±0.02 % of reading ±0.02 % of range ±0.02 % of reading ±0.02 % of range ±(0.015 % * f) of reading ±0.02 % of range	f: frequency in kHz
Amplifier drift		Gain drift Offset drift	Typical 10 ppm/°C max. 20 ppm/°C Typical 0.3 µV/°C + 10 ppm of range/°C, max 2 µV/°C + 20 ppm of range/°C	
Linearity			Typical <25 ppm	
Current input accuracy [1) 2)]			Direct input	0.1 % of reading ±10 µA
			Loop-powered sensor	0.1 % of reading ±30 µA
Current input impedance			Direct input (IN- to GNDi)	75 Ω ±25 Ω
			Loop-powered sensor	120 Ω ±1 Ω
Input impedance			**Differential**	**Input (single-ended)**
		≤100 mV range	20 MΩ or 1 MΩ (prog.) // 35 pF	10 MΩ or 1 MΩ (prog.) // 130 pF
		>100 mV to 10 V range	200 MΩ or 1 MΩ (prog.) // 35 pF	100 MΩ or 1 MΩ (prog.) // 120 pF
		>10 V to 100 V	2 MΩ // 20 pF	1 MΩ // 90 pF
Input configuration			Single-ended or differential (programmable)	
Input coupling			2nd order Bessel filter:	DC … 100 Hz freely programmable
			0.15 Hz:	Analog highpass filter
			0.16…100 Hz:	Digital highpass filter, freely programmable
Common mode voltage to $GND_{isolated}$		0 to 10 V range	±10 V_{DC}	
		>10 to 100 V range	±100 V_{DC}	
Overvoltage protection		0 to 10 V range	±50 V_{DC}, 100 V_{PEAK} (1 min)	
		>10 to 100 V range	±200 V_{DC}	
Low pass filter (-3 dB, digital)			1 Hz to 1.5 MHz freely programmable or OFF	
– Characteristic			Bessel or Butterworth	
– Filter order			2nd, 4th, 6th, 8th, 10th	
– Filter setting AUTO			30 % of sample rate with 10th order Bessel	
Analog anti-aliasing filter			2nd order Bessel, automatically selected	
			100 kHz, 500 kHz, 2 MHz, (≤1 V range bandwidth is limited to 1.8 MHz)	
Typ. channel-to-channel phase mismatch			<10 ns between channels using the same range	

Tab. 19: Input amplifier

Input amplifier																
Typ. CMRR					135 dB @ 50 Hz; 110 dB @ 1 kHz; 90 dB @ 10 kHz; 90 dB @ 100 kHz											
Typical crosstalk					-134 dB (10 V range; 0 to 100 kHz)											
Input noise (100 mV range)	0 to 10 Hz				0.3 μV_{PP}											
	Noise density				6.9 nV/SQRT(Hz)											
Typical THD	10 V range				-108 dB				for 1 kHz fundamental frequency							
	1 V range				-102 dB											
Typ. signal to noise ratio; Spurious free SNR;	**100 mV range**				**1 V range**				**10 V range**				**100 V range**			
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	113.5	130	18.6	0.001	112.4	135	18.4	0.010	127.2	140	20.8	0.018	120.1	140	19.7	0.400
10 kS/s	103.0	130	16.8	0.003	109.0	135	17.8	0.017	119.5	140	19.6	0.055	114.7	140	18.8	0.950
100 kS/s	94.7	130	15.4	0.011	103.9	130	17.0	0.038	109.8	140	17.9	0.190	106.6	140	17.4	2.700
200 kS/s	91.4	130	14.9	0.016	101.4	130	16.6	0.051	107.4	140	17.6	0.260	104.1	140	17.0	3.800
1000 kS/s	84.7	125	13.8	0.038	95.0	130	15.5	0.116	99.8	139	16.3	0.650	97.7	135	15.9	8.300
2000 kS/s	81.4	120	13.2	0.058	91.0	128	14.8	0.170	95.4	132	15.6	1.100	94.1	132	15.3	14.000
5000 kS/s	78.7	110	12.8	0.080	88.7	125	14.4	0.270	93.1	130	15.2	1.600	91.4	130	14.9	19.000
Filter = OFF	76.2	105	12.4	0.110	86.5	120	14.1	0.330	90.5	130	14.7	2.000	89.0	130	14.5	23.000

Tab. 19: Input amplifier

1) 1 year accuracy 23 °C ±5 °C.

2) Add 0.02 % of reading with filter settings OFF.

3) LP Filter in auto mode.

4) SFDR excluding harmonics.

5) ENOB calculated from SNR.

Excitation

Excitation			
Excitation voltage	0 to 24 V_{DC}; freely programmable separately for each channel, 1 mV resolution, balanced around GNDi, remote sense support		
	1 year accuracy (23 °C ±5 °C)	±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 0.6 W
		24 V:	limited to 1 W; >0.6 W accuracy: ±5 %
	Protection	Continuous short	
	Load and line regulation error	±0.002 % with sense line connected	
	Voltage regulation reserve	0.1 to 10 V:	>2 V
		>10 to 24 V:	>1 V

Tab. 20: Excitation

Excitation			
Excitation current	0.1 to 60 mADC (programmable, 16-bit DAC) 1 µA; balanced around GNDi		
	1 year accuracy (23 °C ±5 °C)	0.1 to 5 mA:	0.05 % ±2 µA
		>5 to 60 mA:	0.5 % ±5 µA
	Drift	15 ppm/°C	
	Compliance voltage	0.1 to 20 mA	24 V
		>20 mA	10 V
	Output impedance	>10 MΩ	
	Load regulation bandwidth	100 kHz	
IEPE® excitation		2 to 20 mA; 10 %; >21 V compliance voltage	

Tab. 20: Excitation

Bridge functions

Bridge functions			
Supported bridge types	Full bridge	4-, 5- or 6-wire full bridge	
		4-wire full bridge with constant current excitation (piezoresistive bridge sensors), potentiometer	
	Half bridge	3-, 4- or 5-wire ½ bridge with internal completion (software programmable)	
	Quarter bridge	2-, 3- or 4-wire ¼ bridge with internal completion resistor for 120 Ω, 350 Ω and 1000 Ω (software programmable)	
		2-wire ¼ with constant current excitation for dynamic measurement (AC coupled)	
Internal quarter bridge completion		120 Ω, 350 Ω, 1000 Ω	±0.05 %
Bridge resistance	80 Ω to 10 kΩ @ ≤ 5 V_{DC} excitation		the lower limit is caused by the maximum power supply
Bridge excitation volage	Max. 10 V		
Shunt calibration	4000 steps programmable shunt; shunt target can be programmed in mV/V		
Completion resistor accuracy	0.05 % ±15 ppm/K		
Automatic bridge balance	±400 % of range		
Bridge features	Bridge balance, line-resistance compensation		

Tab. 21: Bridge functions

CAN functions

CAN functions	
CAN specification	CAN 2.0
CAN physical layer	High-speed
CAN termination	Programmable: high impedance or 120 Ω
Bus pin fault protection	±36 V_{DC}

Tab. 22: CAN functions

Counter functions

Counter functions	
Counter	2x counter channels linked to the last two analog channels; trigger level is adjustable within the input range
Counter modes*)	Simple event counting, period measurement, pulse width measurement, frequency, duty cycle
Timebase / resolution	5 MHz (200 ns)
Filter	0.1 µs to 100 µs

Tab. 23: Counter functions

*) The available counter functions depend on the application software used and may differ from this list.