

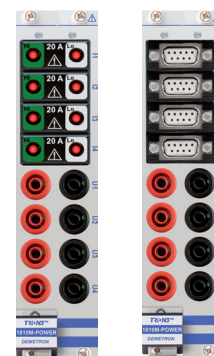


DEWETRON

TRION3-1810M-POWER-4

TRION3™ SERIES MODULE FOR 4-PHASE POWER ANALYSIS

- > Channels: 4 power channels
- > Sampling: up to 10 MS/s
- > Resolution: 18 bit
- > Voltage input: 1000 V_{RMS}
- > Current input: 20 A_{RMS} / 2 A_{RMS} / 0.2 A_{RMS} / 5 V_{RMS}



SPECIFICATIONS



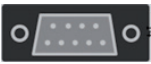

TRION3-1810M-POWER-4	
Input channels	4 power channels, each with one voltage and one current input
Resolution	18 bit
Sample rate	Up to 10 MS/s; 512 MByte onboard data buffer
The following conditions are all accuracy condition in this section. Temperature: 23±5°C, Humidity: 40 to 60 % RH, Input waveform: sine wave, Common mode voltage: 0 V, Line filter: Auto, Sample rate: 10 MS/s, Resolution: 24 bit, Power factor: 1, After warm-up. After zero level, 12-month Accuracy ±(Reading error + Range error), Accuracy: Frequency (f) in [kHz]	
Voltage input U1, U2, U3, U4	
Input range	1000 V (±2000 V _{PEAK}) CF=2
Accuracy ^{1), 2)}	DC: ±0.02 % of reading ±0.02 % of range 0.5 Hz to 1 kHz: ±0.03 % of reading 1 kHz to 5 kHz: ±0.15 % of reading 5 kHz to 10 kHz: ±0.35 % of reading 10 kHz to 50 kHz: ±0.6 % of reading 50 kHz to 300 kHz: ±(0.02 % * f) of reading
Gain drift	20 ppm / °C
Offset drift 5 mV / °C	5 mV / °C
Typical THD	-95 dB
CMRR	>85 dB @ 50 Hz; >60 dB @ 1 kHz; >40 dB @ 100 kHz
Bandwidth	5 MHz
Safety	CAT IV 600 V / CAT III 1000 V
Instantaneous maximum allowable input	4000 V _{PEAK} or 3000 V _{RMS} (1s)
Continuous maximum allowable input	2000 V _{RMS} or 2000 V _{DC}
Input resistance	5 MΩ; 2 pF
Isolation (earth) resistance	100 GΩ; 2.5 pF
Connector	Safety banana sockets
¹⁾ add 0.02 % of reading with filter settings OFF	
²⁾ below 1 % of range, add 10 ppm of range	
Current input I1, I2, I3, I4	
20 A module	TRION-POWER-SUB-CUR-20A-1B
Range	20 A (±40 A _{PEAK})
Accuracy ^{1), 2)}	DC: ±0.02 % of reading ±0.02 % of range ³⁾ 0.5 Hz to 1 kHz: ±0.03 % of reading 1 kHz to 5 kHz: ±0.15 % of reading 5 kHz to 10 kHz: ±0.35 % of reading 10 kHz to 50 kHz: ±(0.3 % + 0.05 % * f) of reading 50 kHz to 300 kHz: ±(0.10 % * f) of reading
Safety	CAT II 600 V, unfused
Bandwidth	300 kHz
Connector	Safety banana sockets (male)
Instantaneous maximum allowable input	50 A _{PEAK} or 40 A _{RMS} (1s)
Continuous maximum allowable input	20 A _{RMS}
Input resistance	2 mΩ
¹⁾ For self-generated heat caused by current input, add 0.00008 × I ² % of reading + 15 × I ² μA to the current accuracy. "I" is the current reading [A]. The influence from self-generated heat continues until the temperature of the shunt resistor inside the DEWE3-Chassis lowers even if the current input changes to a small value.	
²⁾ below 1 % of range, add 50 ppm of range	
³⁾ add 0.03 % of range with no zero level	



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2 A module		TRION-POWER-SUB-CUR-2A-1B	
	Range	2 A ($\pm 4 A_{PEAK}$)	
	Accuracy ¹⁾	DC:	± 0.02 % of reading ± 0.02 % of range ²⁾
		0.5 Hz to 1 kHz:	± 0.03 % of reading
		1 kHz to 5 kHz:	± 0.15 % of reading
		5 kHz to 10 kHz:	± 0.35 % of reading
		10 kHz to 50 kHz:	$\pm (0.3 \% + 0.05 \% * f)$ of reading
		50 kHz to 300 kHz:	$\pm (0.10 \% * f)$ of reading
	Safety	CAT II 600 V, unfused	
	Bandwidth	300 kHz	
	Connector	Safety banana sockets (male)	
Instantaneous maximum allowable input	10 A _{PEAK} or 5 A _{RMS} (1s)		
Continuous maximum allowable input	3 A _{RMS}		
Input resistance	50 m Ω		
¹⁾ below 1 % of range, add 25 ppm of range ²⁾ add 0.03 % of range with no zero level			
0.2 A module		TRION-POWER-SUB-CUR-02A-1B	
	Range	0.2 A ($\pm 0.4 A_{PEAK}$)	
	Accuracy ¹⁾	DC:	± 0.02 % of reading ± 0.02 % of range ²⁾
		0.5 Hz to 1 kHz:	± 0.03 % of reading
		1 kHz to 5 kHz:	± 0.15 % of reading
		5 kHz to 10 kHz:	± 0.35 % of reading
		10 kHz to 50 kHz:	$\pm (0.3 \% + 0.05 \% * f)$ of reading
		50 kHz to 300 kHz:	$\pm (0.10 \% * f)$ of reading
	Safety	CAT II 600 V, unfused	
	Bandwidth	300 kHz	
	Connector	Safety banana sockets (male)	
Instantaneous maximum allowable input	2 A _{PEAK} or 1 A _{RMS} (1s)		
Continuous maximum allowable input	0.4 A _{RMS}		
Input resistance	500 m Ω		
¹⁾ below 1 % of range, add 25 ppm of range ²⁾ add 0.03 % of range with no zero level			
Clamp input module		TRION-POWER-SUB-CUR-dLV	
 	Range	5 V ($\pm 10 V_{PEAK}$) NOT ISOLATED ⚠	
	Accuracy ¹⁾	DC:	± 0.02 % of reading ± 0.02 % of range
		0.5 Hz to 1 kHz:	± 0.03 % of reading
		1 kHz to 3 kHz:	± 0.15 % of reading
		3 kHz to 10 kHz:	$\pm (0.1 \% + 0.1 \% * f)$ of reading
		10 kHz to 50 kHz:	$\pm (0.3 \% * f)$ of reading
	Typical THD	-95 dB	
	CMRR	105 dB @ 50 Hz; 85 dB @ 1 kHz; 45 dB @ 100 kHz	
	Safety	Depending on connected clamp	
	Absolute maximum voltage	± 30 V	
Bandwidth	100 kHz		
Connector	DSUB-9		
Input resistance	1 M Ω		
Sensor supply [+9 V]	max. 40 mA		
¹⁾ below 1 % of range, add 10 ppm of range			
Power specifications			
	Accuracy ¹⁾ with PF=1	DC:	± 0.03 % of reading ± 0.03 % of range ²⁾
		0.5 Hz to 1 kHz:	± 0.04 % of reading
		1 kHz to 5 kHz:	± 0.2 % of reading
		5 kHz to 10 kHz:	± 0.5 % of reading
		10 kHz to 50 kHz:	$\pm (0.5 \% + 0.05 \% * f)$ of reading
	Influence of power factor	Add $0.01 \% * f/50 * \sqrt{1/PF^2-1}$	



¹⁾ voltage and current channel have a minimum input of 1 % of range, otherwise individual uncertainty have to be calculated
²⁾ add 0.03 % of range with no zero level

Typical Signal-to-noise ratio, Spurious free SNR, Effective number of Bits ¹⁾															
	Voltage input 2000 V			20 A module			2 A module			0.2 A module			Clamp input module 10 V		
	SNR	SFDR ²⁾	ENOB ³⁾	SNR	SFDR ²⁾	ENOB ³⁾	SNR	SFDR ²⁾	ENOB ³⁾	SNR	SFDR ²⁾	ENOB ³⁾	SNR	SFDR ²⁾	ENOB ³⁾
Sample rate	[dB]	[dB]	[Bit]	[dB]	[dB]	[Bit]	[dB]	[dB]	[Bit]	[dB]	[dB]	[Bit]	[dB]	[dB]	[Bit]
0.1 kS/s	129	142	21.1	105	137	17.2	110	128	18.1	106	124	17.3	129	146	21.1
1 kS/s	126	139	20.6	100	130	16.3	94	118	15.4	90	115	14.7	119	131	19.5
10 kS/s	121	136	19.8	99	127	16.1	93	117	15.1	89	112	14.4	109	124	17.8
100 kS/s	113	135	18.5	94	123	15.4	93	116	15.1	88	112	14.3	99	119	16.2
1000 kS/s	103	128	16.9	88	112	14.3	92	116	15.0	86	109	13.9	94	115	15.3
2000 kS/s	85	106	13.8	87	110	14.2	92	116	15.0	86	109	13.9	92	114	15.0

¹⁾ LP Filter in auto mode
²⁾ SFDR excluding harmonics
³⁾ ENOB calculated from SNR

Additional specifications	
Typical channel to channel phase mismatch (Voltage-Voltage, Current-Current, Voltage-Current)	<250 ns (0.1° @ 1 kHz, 0.005° @ 50 Hz)
Typical board-to-board phase mismatch	same board type <250 ns (0.1° @ 1 kHz, 0.005° @ 50 Hz) different board type ±1 Sample or 0.2° @ 1 kHz (whichever is higher)
Low pass filter (-3 dB, digital and analog combined) Filter Order & Characteristics	100 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz 2 nd , 4 th , 6 th , 8 th ; Bessel or Butterworth