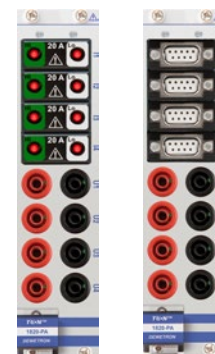






# TRION-1820-POWER-4

## TRION MODULE FOR 4-PHASE POWER ANALYSIS

- > Channels: 4 power channels
- > Sampling: up to 2 MS/s
- > Resolution: 18 bit
- > Voltage input: 1000 V<sub>RMS</sub>
- > Current input: 20 A<sub>RMS</sub> / 2 A<sub>RMS</sub> / 0.2 A<sub>RMS</sub> / 5 V<sub>RMS</sub>




## SPECIFICATIONS

TRION-1820-POWER-4		
Input channels	4 power channels, each with one voltage and one current input	
Resolution	18 bit	
Sample rate	Up to 2 MS/s	
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: 2 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 <sub>PEAK</sub> ) CF=2
	Accuracy <sup>1), 2)</sup>	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
	CMRR	>85 dB @ 50 Hz
	Bandwidth	5 MHz
	Safety	CAT IV 600 V / CAT III 1000 V
	Instantaneous maximum allowable input	4000 V <sub>PEAK</sub> or 3000 V <sub>RMS</sub> (1s)
	Continuous maximum allowable input	2000 V <sub>RMS</sub>
	Input resistance	5 MΩ; 2 pF
	Isolation (earth) resistance	100 GΩ; 2.5 pF
	Connector	Safety banana sockets
	<sup>1)</sup> add 0.02 % of reading with filter settings OFF <sup>2)</sup> 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 <sub>PEAK</sub> )
	Accuracy <sup>1), 2)</sup>	DC: ±0.02 % of reading ±0.02 % of range <sup>3)</sup> 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 <sub>PEAK</sub> or 40 A <sub>RMS</sub> (1s)
	Continuous maximum allowable input	20 A <sub>RMS</sub>
	Input resistance	2 mΩ
	<sup>1)</sup> For self-generated heat caused by current input, add 0.00008 × I <sup>2</sup> % of reading + 15 × I <sup>2</sup> 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 DEWE2-Chassis lowers even if the current input changes to a small value. <sup>2)</sup> below 1 % of range, add 50 ppm of range <sup>3)</sup> 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 <sup>1)</sup>	DC:	$\pm 0.02$ % of reading $\pm 0.02$ % of range <sup>2)</sup>
		0.5 Hz to 1 kHz:	$\pm 0.03$ % of reading
		1 kHz to 5 kHz:	$\pm 0.15$ % of reading
		5 kHz to 10 kHz:	$\pm 0.35$ % 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 $\Omega$		



<sup>1)</sup> below 1 % of range, add 25 ppm of range

<sup>2)</sup> 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 <sup>1)</sup>	DC:	$\pm 0.02$ % of reading $\pm 0.02$ % of range <sup>2)</sup>
		0.5 Hz to 1 kHz:	$\pm 0.03$ % of reading
		1 kHz to 5 kHz:	$\pm 0.15$ % of reading
		5 kHz to 10 kHz:	$\pm 0.35$ % 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 $\Omega$		

<sup>1)</sup> below 1 % of range, add 25 ppm of range

<sup>2)</sup> add 0.03 % of range with no zero level

Clamp input module		TRION-POWER-SUB-CUR-dLV	
 	Range	5 V ( $\pm 10 V_{PEAK}$ ) <b>NOT ISOLATED</b> ⚠	
	Accuracy <sup>1)</sup>	DC:	$\pm 0.02$ % of reading $\pm 0.02$ % of range
		0.5 Hz to 1 kHz:	$\pm 0.03$ % of reading
		1 kHz to 3 kHz:	$\pm 0.15$ % 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
	Safety	Depending on connected clamp	
	Bandwidth	150 kHz	
	Connector	DSUB-9	
	Input resistance	1 M $\Omega$	
Sensor supply (+9 V) max.	25 mA		

<sup>1)</sup> below 1 % of range, add 10 ppm of range

Power specifications			
Accuracy <sup>1)</sup> with PF=1	DC:	$\pm 0.03$ % of reading $\pm 0.03$ % of range <sup>2)</sup>	
	0.5 Hz to 1 kHz:	$\pm 0.04$ % of reading	
	1 kHz to 5 kHz:	$\pm 0.2$ % of reading	
	5 kHz to 10 kHz:	$\pm 0.5$ % of reading	
	10 kHz to 50 kHz:	$\pm (0.5 \% + 0.05 \% * f)$ of reading	
Influence of power factor	Add $0.01 \% * f/50 * \sqrt{(1/PF^2-1)}$		

<sup>1)</sup> voltage and current channel have a minimum input of 1 % of range, otherwise individual uncertainty have to be calculated

<sup>2)</sup> add 0.03 % of range with no zero level



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)	100 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz
Filter Order & Characteristics	2 <sup>nd</sup> , 4 <sup>th</sup> , 6 <sup>th</sup> , 8 <sup>th</sup> ; Bessel or Butterworth