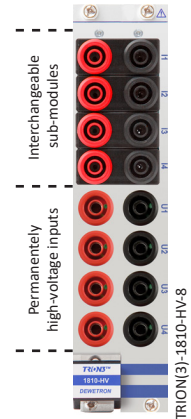


# TRION3-1810-HV-8



- ▶ Isolated TRION(3) module for high-voltage inputs
- ▶ Channels: 4 to 8 voltage channels
  - 4 permanently installed high-voltage channels
  - 4 interchangeable sub-modules
- ▶ Sampling: Up to 1 MS/s
- ▶ Resolution: 24-bit
- ▶ Input types
  - Permanently installed channels: 1000 V
  - Interchangeable sub-modules: Different inputs for low-voltage, high-voltage or direct current measurement



## Basic module with fixed high-voltage inputs

The following section provides detailed information on the fixed high-voltage inputs. The values given below were determined in a standardized test setting<sup>1)</sup>.

### General specifications

Fixed high-voltage inputs	
Input channels	Up to 8 (high) voltage channels with interchangeable inserts
Sampling rate	Up to 1 MS/s
Resolution	24-bit
Input range	1000 V ( $\pm 2000 V_{PEAK}$ ) CF = 2
Accuracy <sup>1)2) 3)</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 5 kHz	$\pm 0.15\%$ of reading
– 5 kHz to 10 kHz	$\pm 0.35\%$ of reading
– 10 kHz to 50 kHz	$\pm 0.6\%$ of reading
– 50 kHz to 300 kHz	$\pm (0.02\% * f)$ of reading <span style="float: right;">f: frequency in kHz</span>
Gain drift	20 ppm/°C
Offset drift	5 mV/°C
Typical THD	-95 dB
CMRR	>85 dB @ 50 Hz; >60 dB @ 1 kHz; >40 dB @ 100 kHz
Bandwidth	5 MHz
Rated input voltage to earth according to EN 61010-2-30	600 V CAT IV / 1000 V CAT III
Common mode voltage	1000 V <sub>RMS</sub>
Isolation voltage	3750 V <sub>RMS</sub> (1 min), 35 kV/ $\mu$ s transient immunity
Overvoltage protection	4250 V <sub>PEAK</sub> or 3000 V <sub>RMS</sub> (1 min)
Input resistance	5 M $\Omega$ ; 2 pF
Isolation (earth) resistance	100 G $\Omega$ ; 2.5 pF
Connector	Safety banana sockets

Tab. 45: Fixed high-voltage inputs

Fixed high-voltage inputs				
Sample rate	SNR	SFDR <sup>4)</sup>	ENOB <sup>5)</sup>	Noise <sub>pp</sub>
	[dB]	[dB]	[Bit]	[mV]
0.1 kS/s	126	144	20.6	2.6
1 kS/s	123	140	20.1	4.5
10 kS/s	118	137	19.3	9.5
100 kS/s	110	134	18.0	27.2
1000 kS/s	100	134	16.3	92.5

Tab. 45: Fixed high-voltage inputs

- 1) The following accuracy conditions were applied: Temperature: 23 ±5 °C; humidity: 40 to 60 % rel. humidity; input waveform: sine wave; common mode voltage: 0 V; line filter: Auto (8<sup>th</sup> or Butterworth); sample rate: 1 MS/s; resolution: 24-bit; power factor: 1; after warm-up; after zero level, accuracy: Frequency (f) in [kHz] (12-month accuracy ± reading error and range error)
- 2) Add 0.02 % of reading with filter settings OFF
- 3) Below 1 % of range, add 10 ppm of range.
- 4) SFDR excluding harmonics
- 5) ENOB calculated from SNR

### Power specifications

Power specifications		
Active power accuracy with PF=1 <sup>1) 3)</sup> (f: frequency in kHz)	DC	±0.03 % of reading ±0.03% of range <sup>2)</sup>
	0.5 Hz–1 kHz	±0.04 % of reading
	1 kHz–5 kHz	±0.2 % of reading
	5 kHz–10 kHz	±0.5 % of reading
	10 kHz–50 kHz	±(0.5 % + 0.05 % * f) of reading
Influence of power factor	Add 0.01 % * f/50 * v(1/PF <sup>2</sup> -1) f: frequency in Hz	
Typ. 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)	
Fundamental frequency		
– Range	0.1 Hz–200 kHz (>500 kS/s: >0.2 Hz)	
– Accuracy DEWE2	±0.01 % of reading ± 1 mHz	
– Accuracy DEWE3	±0.005 % of reading ± 1 mHz	
Low pass filter (-3 dB, digital and analog combined)	100 Hz to 300 kHz freely programmable or OFF	
– Filter order and characteristics	2 <sup>nd</sup> , 4 <sup>th</sup> , 6 <sup>th</sup> , 8 <sup>th</sup> Bessel or Butterworth	
Filter delay compensation	Up to 15 μs the group delay of the selected filter will be automatically compensated. This works for:	
	– 2 <sup>nd</sup> order filter 15 kHz to 300 kHz	
	– 4 <sup>th</sup> order filter 30 kHz to 300 kHz	
	– 6 <sup>th</sup> order filter 60 kHz to 300 kHz	
Onboard data buffer	512 MB	
Power consumption	Typ. 13 W, max. 15 W	
– With sensor supply	Max. 21 W	

Tab. 46: Power specifications

- 1) Voltage and current channel have a minimum input of 1 % range, otherwise individual uncertainty has to be calculated.
- 2) Add 0.03 % of range with no zero level.
- 3) When using the TRION-POWER-SUB-CUR-20A-1B sub-module: For self-generated heat caused by current input, add  $1.5 \times 10^{-4} \times I^2 \text{ %/A}^2$  of reading and additionally for DC only add  $10^{-4} \times I^2 \text{ %/A}^2$  of range to the active power accuracy. I is the current reading [A]. The influence from self-generated heat continues until the temperature of the shunt resistor inside the chassis lowers, even if the current input changes to a small value.