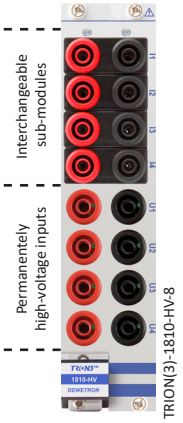
TRION(3)-1810-HV-8

DEWETRON

- 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[1].

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 (±2000 V_{PEAK}) CF = 2
Accuracy[1)2) 3)]	
– 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 f: frequency in kHz
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_{RMS}
Isolation voltage	3750 V_{RMS} (1 min), 35 kV/µs transient immunity
Overvoltage protection	4250 V_{PEAK} or 3000 V_{RMS} (1 min)
Input resistance	5 MΩ; 2.6 pF
Isolation (earth) resistance	100 GΩ; 5.6 pF
Connector	Safety banana sockets

Tab. 53: Fixed high-voltage inputs

Fixed high-voltage inputs				
	SNR	SFDR[4]	ENOB[5]	$Noise_{PP}$
Sample rate	[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. 53: 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 (8th 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[1) 3)] (f: frequency in kHz)	DC	±0.03 % of reading ±0.03% of range[2)]
	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 * √(1/PF²-1)	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	<250 ns (0.1° @ 1 kHz, 0.005° @ 50 Hz); same board type only	
Fundamental frequency – Range – Accuracy DEWE2 – Accuracy DEWE3	 0.1 Hz–200 kHz (>500 kS/s: >0.2 Hz) ±0.01 % of reading ± 1 mHz ±0.005 % of reading ± 1 mHz	
Low pass filter (-3 dB, digital and analog combined) – Filter order and characteristics	100 Hz to 300 kHz freely programmable or OFF 2nd, 4th, 6th, 8th Bessel or Butterworth	
Filter delay compensation	Up to 15 µs the group delay of the selected filter will be automatically compensated. This works for: – 2nd order filter 15 kHz to 300 kHz – 4th order filter 30 kHz to 300 kHz – 6th order filter 60 kHz to 300 kHz	
Onboard data buffer	512 MB	
Power consumption – With sensor supply	Typ. 13 W, max. 15 W Max. 21 W	

Tab. 54: 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 $1.5 \times 10^{-4} \times I^2$ %/A² of reading and additionally for DC only add $10^{-4} \times I^2$ %/A² 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.