

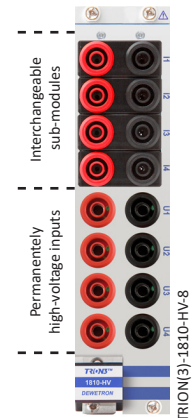


# TRION3-1810-HV-8



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<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> <ul style="list-style-type: none"> <li>– DC</li> <li>– 0.5 Hz to 1 kHz</li> <li>– 1 kHz to 5 kHz</li> <li>– 5 kHz to 10 kHz</li> <li>– 10 kHz to 50 kHz</li> <li>– 50 kHz to 300 kHz</li> </ul> | <ul style="list-style-type: none"> <li><math>\pm 0.02</math> % of reading <math>\pm 0.02</math> % of range</li> <li><math>\pm 0.03</math> % of reading</li> <li><math>\pm 0.15</math> % of reading</li> <li><math>\pm 0.35</math> % of reading</li> <li><math>\pm 0.6</math> % of reading</li> <li><math>\pm (0.02 \% * f)</math> of reading</li> </ul> <p style="text-align: right;">f: frequency in kHz</p> |
| 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 $\Omega$ ; 2.6 pF   |
| Isolation (earth) resistance  | 100 G $\Omega$ ; 5.6 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><br>(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/(PF <sup>2</sup> -1) f: frequency in Hz   |  |
| Typ. channel-to-channel phase mismatch<br>(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   | 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.