PIK TIME SYSTEMS®

# Time interval and frequency analyzer TIA V110

## Introdution and key features

The TIA V110 Time Interval and frequency Analyzer is a technologically advanced, multi-channel measurement instrument, dedicated to demanding applications related to precise time metrology. The analyzer enables continuous registration of physical events (represented at the instrument's inputs as edges of electrical pulses) in the form of time stamps appearing in up to 10 independent measurement channels. Measurement channels use a common time scale, which makes it possible to determine time relationships between any time markers. Measurement data obtained as a result of the recording process allow for accurate and precise determination of input signal parameters, such as: duration of time intervals (delay) and frequency, and can also be used to calculate selected measures such as Allan variance (ADEV), time interval errors (TIE, MTIE) and time deviation (TDEV). High accuracy of long measurement sessions is ensured by a built-in, high-stability reference clock (OCXO, 50 PPB) and the ability to connect a signal from an external reference clock (e.g. an atomic standard).


## Specifications

- **Measurement modes:**
  - Measurement of time interval and frequency (up to 6 GHz)
  - Measurement of Allan variance (ADEV) and time interval errors (TIE, MTIE, TDEV)
  - Using linear regression to improve the precision of frequency measurement
- **Number of measurement channels** — 6 (max. 10)
- **Resolution (LSB)** — 2 ps
- **Time interval measurement precision*** — < 7 ps for time intervals up to 1 ms
- **Frequency measurement precision** — Up to 12 significant digits
- **Measurement range** — quasi unlimited (continuous time scale, overflow approximately every 9h)
- **Dead time** — < 50 ns
- **Measurement repetition rate**
  - 20 MSa/s/ channel
  - 50 kSa/s to computer
- **Measurement results memory** — 32 MSa

* precision defined as the standard deviation from a series of measurements of the time interval between any two measurement channels

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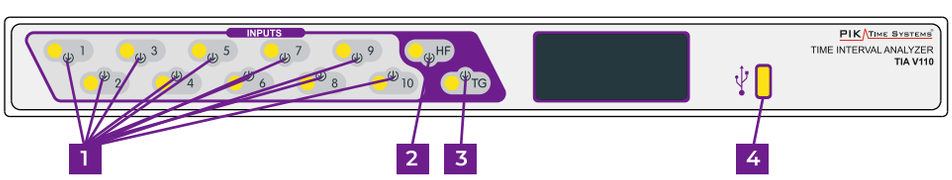
|---|---|---|
| **Inputs IN1 - IN10** | Impedance: | 50 Ω, DC coupled; SMA sockets |
| | Amplitude: | ±5 V |
| | Active edge: | selectable (rising or falling) |
| | Threshold: | Selectable in range ±5 V |
| **Input TG** | Impedance: | 1 kΩ |
| | Amplitude: | TTL, threshold 1,4 V |
| | Active edge: | selectable (rising or falling) |
| **Input HF** | Impedance: | 50 Ω |
| | Input signal power: | -10 dBm ÷ +10 dBm |
| | Input frequency: | 200 MHz ÷ 6 GHz |
| **Input 10 MHz (external reference clock)** | Impedance: | 50 Ω |
| | Input signal power: | -10 dBm ÷ +10 dBm |
| | Input frequency: | 200 MHz ÷ 6 GHz |
| **Output 10 MHz** | Impedance: | 50 Ω |
| | Input signal power: | -10 dBm ÷ +10 dBm |
| | Input 10 MHz external signal copy: | max. +10 dBm |

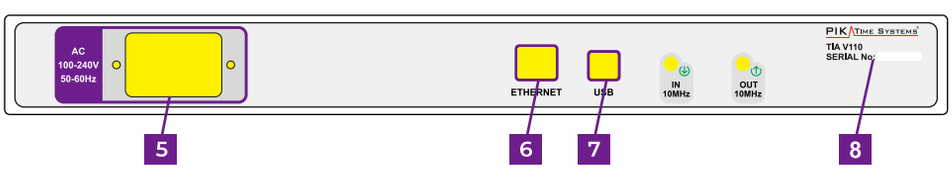
- **Built-in reference clock** — 10 MHz, OCXO; Stability $5\times10^{-8}$ (-40° to +85° C); Aging $1\times10^{-7}$/year
- **Interfaces** — USB 2.0, typ A / Ethernet RJ-45
- **Control** — Text commands (description in the Programmer's Guide)
- **Power Supply** — 230 V, 50 Hz, 100 W
- **Size** — 395 (W) × 45 (H) × 330 (L) mm / Rack 19” 1U
- **Weight** — 6 kg

## Front panel description




**1. Inputs 1 ÷ 10 –** SMA sockets for connecting input signals for time relation evaluation.
**2. HF –** SMA socket for connecting high frequency input signals.
**3. TG –** SMA socket enabling connection of an optional trigger signal.
**4. USB –** USB communication connector.

## Rear panel description




**5. 230 V / 50 Hz –** AC power socket.
**6. Ethernet, USB –** Communication interface connectors.
**7. 10 MHz In/Out –** Input and output of 10 MHz external reference clock signal.
**8. Serial No –** Individual analyzer identification number.

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