TIME/FREQUENCY COUNTER
MODEL MTC 108
High Performance Autonomous Multichannel Time Interval Counter

- Eight precise measurement channels
- Time interval measurement range: > 1 hour
- Precision (standard deviation) < 6.5 ps at time interval measured from 0 to 1 ms
- Frequency range up to 3.5 GHz
- Measurement rate $11 \cdot 10^6$ time stamps/s per channel
- Five time measurement modes that increase precision or measurement rate
- Measurement of Allan Deviation (ADEV), Time Interval Error (TIE), Maximum Time Interval Error (MTIE) and Time Deviation (TDEV)
- Selectable pulse edge and polarity
- Selectable input threshold level or automatic threshold search
- User friendly front panel interface
- Remote control with the use of USB/Ethernet/RS-232/RS-485 interfaces
- Easy export of data to USB stick
- Built-in automatic calibrator
- Build-in highly stable rubidium generator (optional)
- Dedicated inputs for external trigger and 10 MHz clock

MTC108 is a unique, state of the art, autonomous system for high-precision metrology of time and frequency. This system allows for: (1) fast and accurate registering of physical events on a common time scale; (2) measuring the time intervals between any registered events; (3) measuring the frequency within a wide range; (4) evaluating the stability of frequency sources, especially reference atomic clocks; (5) transferring the measurement data for further external processing. A user-friendly control of the system is provided either locally, through the built-in keyboard or/and color touch panel, or remotely, with the aid of USB or Ethernet interfaces. The successful combination of programmable devices technology and sophisticated measurement method results in the broad functionality and exceptional parameters that meet the virtually all fundamental needs of time/frequency laboratory or Automatic Test Equipment environment.
**Functions**

Time Interval (between pulses at up to eight inputs or pulses appearing consecutively at a single, common input)

Time Interval Error, Maximum Time Interval Error, Time Deviation Frequency, Allan Deviation

**Statistics**

Mean, Min and Max Values, Standard Deviation

**Time Interval**

- **Range**: 73 min
- **Resolution (LSB)**:
  - 1.9 ps in single-shot measurements, Independent, Common High Speed and Source Comparison modes
  - 0.95 ps in single-shot measurements, Averaging Mode
  - 0.67 ps in single-shot measurements, Common High Precision Mode
- **Precision (Standard Deviation)**:
  - < 6.5 ps at time interval measured from 0 to 500 ms (internal rubidium)
  - up to 4.5 ps in Common High Precision mode
- **Systematic Error**: 
  - < (1 ns max + (Timebase Error x Interval) + Trigger Level Timing Error)
- **Range Limit (Overflow)**: presettable: 1 s, 10 s, 100 s, 1000 s
- **Start Enable**: internal (controlled by software)
- **Dead Time**: < 90 ns
- **Measurement Rate**:
  - up to 11·10^6 time stamps/sec/channel
  - up to 50·10^6 time stamps/sec (Common High Speed, consecutive pulses delayed less than 10 ns to)
  - up to 90·10^6 time stamps/sec (Common High Speed, consecutive pulses delayed less than 10 ns to)
  - up to 250·10^6 time stamps/sec (Common High Speed, first 8 pulses)

**Frequency & Period**

- **Range**: Inputs 1 - 8: 1 mHz to 250 MHz
  - Sensitivity < 75 mV RMS typ. (0.01 to 250 MHz)
  - Minimum slew rate: 10 V/µs
- **Input F**: 100 MHz to 3.5 GHz
  - Sensitivity < -12 dBm (< 55 mV RMS) from 400 MHz to 3 GHz
  - Sensitivity < -3 dBm (< 160 mV RMS) from 100 MHz to 3.5 GHz
- **Gate Time**: selected from 1 µs to 10 s (reciprocal method)
- **Dead Time**: 0 ns between consecutive measurements
- **Measurement Rate**:
  - up to 10^6 measurements/sec (depends on selected gate)
  - Impedance: 50Ω, DC coupled; SMA sockets
  - Amplitude: within ±4 V
  - Pulse edge: selectable, rising or falling
  - Threshold: manually adjustable from -4 V to +4 V with 8 mV resolution, or set automatically

**Internal Clock Generator**

- 10 MHz TCXO, stability 5×10^-11 (-40° to +85° C), ageing 1×10^-7/year
- 10 MHz rubidium (optional), stability 2×10^-11 (-55° to +85° C), ageing 5×10^-7/year

**External Clock Generator**

- 10 MHz, min. 100 mV on 50Ω input impedance, DC coupled; SMA socket
- Capacity of on-board memory: 32 M time stamps

**Interfaces**

- **USB**: Type A and B, USB 2.0
- **Ethernet**: RJ-45
- Series: RS-232/RS-485

**Power Supply**

- 230 V, 50 Hz, 100W

**Software**

- example program and documentation (Programming Manual)

**Size**

- 444 (L) × 137 (W) × 330 (H) mm / Rack 19” 3U

**Weight**

- 8 kg (9.7 kg with build-in rubidium clock)