



T200, *PTP/IEEE 1588 Grandmaster Clock and NTP Time Server with high accuracy GPS/GNSS receiver.*



HEOL-T200 : PERFORMANCE and EASY INTEGRATION

The HEOL-T200 PTP IEEE-1588 Grandmaster Clock / NTP Time server with GPS Clock has been designed to provide accurate timing information through an Ethernet link (using Precision Time Protocol), for Network synchronization and measurement applications, without the need to be connected to external Network, hence preserving your Network insulation.

Based on a high performance 36 channels GPS chipset with very high accuracy, and TRAIM algorithm. GALILEO, GLONASS and BEIDOU constellations are also available as an option.

It enables also fast start-up times in very hard environmental conditions, as only one satellite is enough at power-up to generate a precise Time-stamp (static applications).



Precision Time Protocol (IEEE1588) has been implemented, for applications that need **microsecond synchronization** (Grand Master Clock).

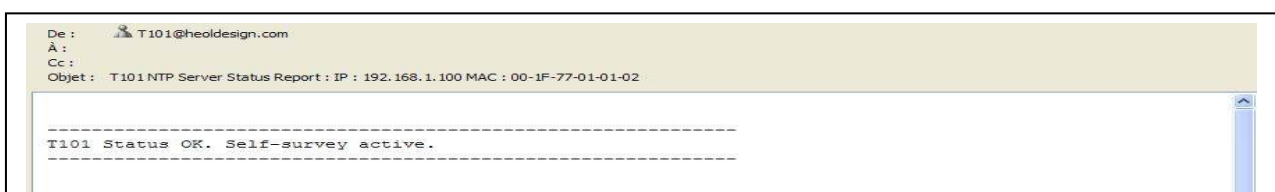
The PTP V2 implementation of the HEOL-T200 is fully compliant to the IEEE 1588-2008 standard (two steps clock) and provides PTP management messages for monitoring and configuration (also available on HTTP server).

The antenna (protected against short-circuit) does not need to be located up a mast or on the rooftop as is the norm, which considerably **reduces the cost and complexity** of deployment in terms of antenna cabling and lightning strike protection and reduces the cost of maintenance.

If the satellites signals are completely lost, the **hold-over mode** enables the module to keep sending accurate Ethernet frames, with very low drift, thanks to the **OCXO**, or **Rubidium** oscillator.

A **web server** with secure access allows you to configure the HEOL-T200, and monitor its status at a glance (GPS satellites strength signals, Ethernet connections, alarms, input/outputs...).

Automatic **E-mails** can be sent by the HEOL-T200, periodically or when alarms appear. This function is fully configurable via the http server.



An isolated event input allows you to **time-stamp events from external systems**, with very high accuracy.

The TimeStamp information is reported through RS232, SNMP trap, E-mail or Broadcast frame.

Alarm relay is available, for driving your external systems in case of failure of the T200.

Alarms are displayed through **SNMP** traps (Ethernet interface) or through RS232. SNMP can also be used to configure T200 parameters (instead of http web server).

A highly accurate **pps (TOP)** signal is available on SUB-D9 or I/O connector (polarity, period, length, and delay compensation are configurable by user). It is also available with optional 1500V isolated static relay.

IRIG-B003 and A003 output available in RS422 or TTL level. For IRIG-B123 (modulated), you should choose the T116 unit.

A RS232 or RS422 serial port can be accessed for remote control and monitoring (with NMEA protocol output).

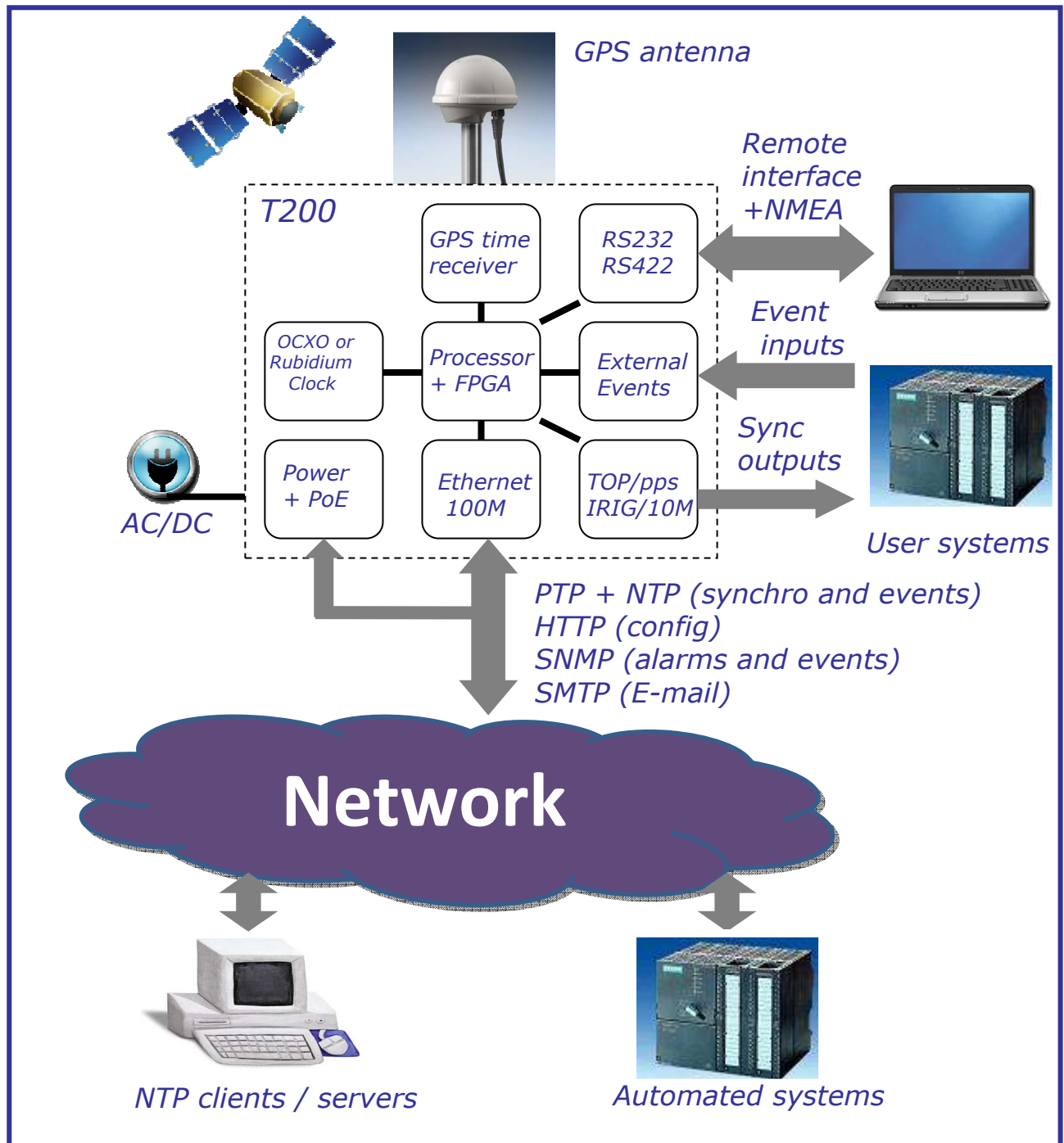
Historic data can be backed-up to an EEPROM (over 8000 status records).

The **Power On Ethernet** enables installation of the HEOL-T200x without the need for additional cables to provide power (except for Rubidium option).



The T200 is available in 3 different **metal housings**, either compact (except for Rubidium option), or 19" rack mounted form factor, or half-rack with DC power.

On the half-rack unit, the optional Rubidium oscillator is mounted on anti-vibration pads. This half-rack unit doesn't provide the 3.81mm I/O connector. The rack and half-rack units display on a LCD module the status and timing information.



T200 synoptic and external links

Note : Heol Design is not responsible for the operation or failure of operation of GPS satellites or the availability of GPS satellite signals.

SPECIFICATIONS

GPS Receiver	Type	36 channels
	Sensitivity	-160dBm (tracking)
	Overdetermined clock mode (self survey)	24 hours
	Time Accuracy (pps)	± 15 ns rms (1σ)
	Time to First Fix (cold start)	< 45 seconds (90%)
	Warm up time	< 15 minutes for full accuracy
	Active antenna voltage	5V or 3V
Timing Generator	Timing Ethernet protocol	SNTP V4, NTP Broadcast/Unicast (200 requests per second maximum), 200 000 NTP Clients @ 1024s
PTP Interface		PTP IEEE1588-2008 : - UDP/IPv4 - Addressing mode : Multicast & Unicast - Delay Mechanism : End-to-End - Operation : One step or Two Step Clock - Sync & Announce Intervals : 1, 2, 4, 8, 16, 32, 64 seconds - Priority 1&2 : 0 to 255 - Domain Number : 0 to 4 - Announce Receipt Timeout Multiplier : 2,3,4,5,6,7,8,9,10
		PTP Management Messages for monitoring and configuration PTP Signaling Messages for unicast addressing mode
TCXO Characteristics		Drift when GPS signal lost : $\pm 100\mu\text{s}$ / hour (constant temperature)
OCXO Characteristics		Drift when GPS signal lost : $\pm 500\mu\text{s}$ / day (constant temperature)
Rubidium Characteristics		Drift when GPS signal lost: $\pm 5\mu\text{s}$ / day (0 / +50°C)
Power supply	Input Voltage	Power On Ethernet : compliant with IEEE 802.3af. Compact/Half-Rack : 16/60VDC (-48V compliant) Rack: 85/250VAC, 110/250VDC
	Power consumption	7W (T200C/T200M), 9W (T200R), 25W (Rubidium)
Interfaces	Auxiliary DC Power Supply	2.54mm header, anti-extraction
	GPS Active antenna	T200C/T200M : SMA T200R : SMA or 'N'
	Ethernet link	RJ45, 10/100Mbps + POWER
	Remote RS232 / RS422	SUB-D9, 38400/8/No/1
	pps output	RS422, RS232, or fast static relay output. on SUB-D9 or I/O connector (3.81mm)
	Alarm Relay	2A/250V. 2500V isolation

	Event input	25V max peak voltage (add resistor if higher), 250 ns isolation, ± 100 ns accuracy
Environmental	Operating Temperature	From 0/50°C to -40/+85°C, depending Upon the option
	Storage Temperature	-40 / +85°C
	Humidity	90% non-condensing
	Dimensions (T200C)	201 x 95 x 26 (mm)
	Weight (T200C)	340 grams
	Dimensions (T200M)	1U - 233mm Depth 125 mm
	Weight (T200M)	1,24 kg
	Dimensions (T200R)	1U -482.6mm (19")
	-depth with SMA connector	130 mm 150 mm
	-depth with N connector	
	Weight (T200R)	1,85 kg

- According to  directive, the HEOL-T200 module has passed the following tests :
 - EN55022/55011 class B : conducted and radiated emissions.
 - EN61000-4-2: Immunity to electrostatic discharges.
 - EN61000-4-3: Immunity tests on electromagnetic fields radiated at radio-electrical frequencies, with 10V/m electromagnetic field.
 - EN61000-4-4: Immunity to rapid transients.
 - EN61000-4-5: Immunity to surge.
 - EN61000-4-6: Immunity tests on conducted interference, induced by radio-electrical fields.
 - EN61000-4-8: Immunity to Power frequency magnetic field (30 A/m)
 - EN61000-4-11: Voltage dips, short interruptions and voltage variations immunity tests.
- Compliance with the International Safety Standard for Information Technology (IEC/EN 60950).
- The HEOL-T200x module is RoHS (lead free) compliant.



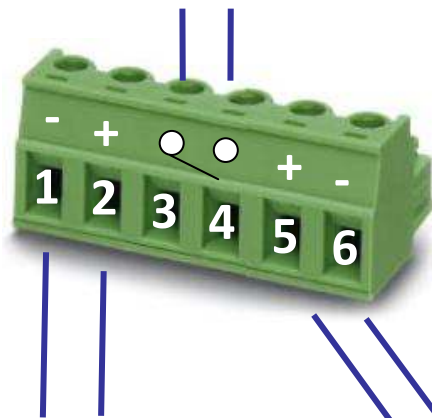


T200 19'' 1U Rack rear view (with 'N' antenna connector)

3&4 pins :

Alarm relay

or PPS/TOP output on Static relay (option PPSREL)



1&2 pins :
Event input #1

5&6 pins :
PPS/TOP RS422 output
or IRIG B003 output (option IRIG)
or Event input #2 (option EVENT2)

I/O connector details

ORDERING PART NUMBER**T200R-10 μ s-AC-I/O-OCXOSR**

- Housing R: 19" Rack
C: Compact
M: Half-Rack
- PTP accuracy 1 μ s
10 μ s
- Power DC : 14 to 60V
DC/POE: DC+Power Ethernet
AC : 110 to 250V (Rack only)
- I/O option I/O connector mounted
blank : not mounted (half-rack)
- Oscillator option
OCXOSR : standard (0 / +50°C)
OCXOMR : medium (-20 / +65°C)
OCXOHR : high (-40 / +70°C)
RUB : high stability Rubidium (Half-Rack or Rack) - 0 / +50°C
blank : standard TCXO

If other options are needed, just add the part number of these options at the end of the T200 part number :

- 422 for RS422 serial port instead of RS232
- EVENT2 for secondary Event input
- IRIG for IRIG-B003 output
- PPSREL for PPS/TOP output on fast static relay
- N or TNC connector option (N only for rack)
- GNSS for GPS+GLONASS/GALILEO/BEIDOU instead of GPS only