Instituto Português da Qualidade
PORTUGUESE INSTITUTE FOR QUALITY

LNM

Laboratory TIME and FREQUENCY

FIELD OF ACTIVITY

Cesium clock's


Control unit

The Time and Frequency Laboratory realizes the national atomic time scale Universal Coordinate Time (UTC-IPQ) by means of three cesium clocks and contribute to the International Atomic Time (TAI).

SI UNIT

International System Base Unit of Time:

second (s) defined as:

> The duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom.

Derived unit of the International System (SI) of the quantity frequency (*f*):

hertz (Hz) defined as:

The inverse of the second (s^{-1})

TRACEABILITY

The international time frequency scale is the UTC time scale, maintained by the BIPM (Bureau International des Poids et Mesures).

The time scale TAI is established by the BIPM based on the data collected from several atomic oscillators of various institutions that realize the primary standard of time. Data from each of these oscillators is subjected to BIPM through observations in common view mode, from the satellites of GNSS (Global Navigation Satellite System). The results of these contributions are published monthly in the "Circular T" of the BIPM.

The BIPM is responsible for maintaining the UTC time scale and ensuring traceability to the second (SI) of the local timescales UTC (IPQ), through key comparison CCTF-K001.UTC.

The definition of UTC is established through cooperation between BIPM and the International Telecommunication Union (ITU). UTC is kept in sync with the time of Earth's rotation, taking into account the values provided by the International Earth Rotation Service (IERS), which establishes the dates for the introduction of leap seconds as well as relevant information to realize UTC . The variation rate between UTC and TAI is exactly the same but they diverge by an integer number of seconds, the leap seconds.

AVALABLE SERVICES

Calibration

EQUIPMENT	UNCERTAINTY
Compute real time clock - synchronization	10 ms
High performance clocks: cesium (Cs), rubidium (Rb)	$(\Delta f / f) \approx 2 \times 10^{-14}$ 24 hours

Note: f frequency in Hz

CONTACTs

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