

TEMPO

TURNKEY RESILIENT TIMING

A self-contained optical frequency and timing reference for synchronisation and resilience, in a single rack unit.

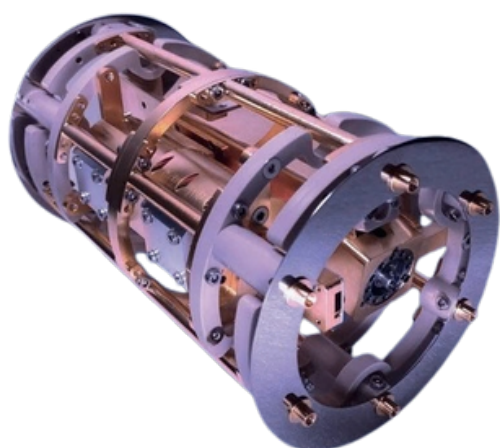


OVERVIEW

TEMPO is a compact, rack-mount frequency standard that delivers hydrogen maser grade performance, with highly stable RF and optical outputs for applications that require exceptional frequency stability and precise timing.

At its core is a patented optical interrogation technique. Where conventional standards interrogate an atomic transition at microwave frequencies, TEMPO does it optically, using integrated ultra-low-noise lasers.

The result is a step change in stability for defence, telecommunications, space and precision measurement, with a low phase noise (LPN) option for the most demanding applications.



KEY FEATURES AND BENEFITS

Defence and Resilient PNT	Assured timing and holdover for secure communications, radar and electronic warfare in GNSS denied environments
Precision Measurement	Stable RF and optical references for metrology, calibration laboratories and scientific research
Telecommunications and Critical Infrastructure	GNSS-independent timing for 5G and next-generation networks, power grids and financial systems.
Space and Radio Astronomy	Low phase noise, high stability references for deep space tracking, satellite ground stations and VLBI

AT A GLANCE

 7×10^{-14}

FREQUENCY STABILITY
(1-second average)

 $\leq 1.0 \times 10^{-14}$

LONG-TERM STABILITY
(5-day average)

10 MHz and 100 MHz

STANDARD RF OUTPUT

1 PPS

TIMING OUTPUT
(3.3 V LVCMOS)



TEMPO PILOT

*All specifications below are design targets for TEMPO PILOT

FRACTIONAL FREQUENCY STABILITY

(Allan Deviation)

Averaging Time (s)	Nominal Performance
1	7×10^{-14}
10	2×10^{-14}
100	9×10^{-15}
1,000	7×10^{-15}
10,000	7×10^{-15}
100,000	7×10^{-15}

Achieved after continuous operation with temperature variation $< \pm 0.25^\circ\text{C}$ and relative humidity $< \pm 10\%$

SSB PHASE NOISE

(100 MHz Carrier)

Offset (Hz)	Standard (dBc/Hz)	LPN Option (dBc/Hz)
1	-100	-100
10	-120	-120
100	-130	-130
1,000	-133	-160
10,000	-133	-180
100,000	-133	-184

ENVIRONMENTAL SENSITIVITIES

Operational temperature range	5°C to 40°C
Temperature coefficient	$5 \times 10^{-14} / ^\circ\text{C}$
Voltage range	100 - 240 VAC
Warm-up time	15 min from standby
Retrace**	5×10^{-14}
Fractional frequency tuning	10^{-10} range, 10^{-14} steps
Communication	Ethernet
Monitoring and control options	Web application, REST API, SCPI

** Insensitive to both tilt and alignment

SWaP

Size	4U 19" rack-mount
Height/ Width/ Depth	178 mm/ 483 mm/ 614 mm
Weight	< 35 kg
Max Power Consumption	120 W*

* Under standard operating and environmental conditions

INPUTS

1 PPS Steering	
Amplitude	0.2 V to 1.5 V
Connector	SMA
Impedance	50Ω

OUTPUTS

RF Outputs	
Fixed outputs Variable (optional)	10 MHz and 100 MHz 1 MHz to 1 GHz***
Power	13 dBm
Impedance	50Ω
Connector	SMA

1PPS Output	
Rise time	< 1 ns
Synchronisation	< 5 ns to ext. 1PPS
Impedance	50Ω
Connector	SMA

Optical Output	
Wavelength	Comb output centred at 1560 nm
Optical power	0.5 mW
Repetition rate	200 MHz

*** Timing performance is typically reduced over the full variable RF range. Variable RF output unavailable for LPN Option. Contact sales for more information