product data

GPS-12 & GPS-12R

GPS-Controlled Frequency Standards

- GPS-controlled OCXO or Rubidium clock for near-Cesium stability
- Internal battery option for transportation and mains-free field use
- Switchable 1.544 MHz (T1) or 2.048 MHz (E1) front-panel outputs for telecom
- 1-pps front-panel output
- 1, 5 & 10 MHz optional low-noise outputs for general lab use (rear panel)
- -48 VDC option for stationary use in telephone exchange stations
- GPS12-Monitor, Control and Monitoring SW

The Pendulum GPS-12 and GPS-12R Portable Reference clocks are ultra-stable, low-noise, GPS-disciplined OCXO / Rubidium referencences, and ideal reference sources and calibrators for both telecom instrumentation and general lab equipment. Thanks to the internal battery option, you can transport near-Cesium frequency stability to the field without losing accuracy.

Ideal for telecom applications

The GPS-12R is a very precise GPS-controlled Rubidium reference clock for various telecom applications. In its standard configuration, the two front-panel outputs can be set to either 1.544 MHz (T1) or 2.048 MHz (E1) reference clock outputs, for calibration or synchronization of test instruments and network elements.

The 1-pps front-panel output provides an ultra-stable timing reference, with excellent hold-over specifications (less than 1 µs after 24h hold-over). This is useful in applications where timing is critical, like synchronization of DAB, DVB or WCDMA transmitters or for synchronization of radar antenna array systems.

An internal battery option makes the GPS-12/12R an excellent portable reference, since the internal refrence oscillator is continuously powered during transports.

The optional -48 VDC operation makes the GPS-12/12R equally suited for permanent use as local frequency standard in telephone exchange stations, via this redundant power supply possibility.

GPS-12R can be used as a permanent reference input to SSUs, per PRC specifications, in GPS-lock, or hold-over mode during 24h.

Optional configurations

The GPS-12/12R comes as standard with two user selectable telecom outputs (1.544 MHz/T1 or 2.048 MHz/E1), plus a 1-pps (pulse-per-second) output.

The GPS-12/12R will accommodate two additional rear-panel output options out of six available. Each option has four BNC outputs.

- *Option 70B:* One 5 MHz and three 10 MHz low-noise outputs for test systems or metrology applications.
- *Option 71B:* Four sine wave outputs of 10 MHz, 5 MHz, 1 MHz and 0.1 MHz.
- *Option 72B:* Two 2.048 MHz plus two 2.048 Mbps (E1) for telecom applications
- *Option 73B:* Four 13 MHz outputs for GSM radio base station tests
- *Option 74B:* Two 1.544 MHz and two 1.544 Mbps (T1) outputs for telecom applications (SONET).
- *Option 79/01:* Two 10 MHz and one 1-pps outputs, together with an 1-pps input for external disciplining

Truly portable

The GPS-12/12R is compact, lightweight and has an internal battery option to maintain stability during transportation or to allow field use without access to AC mains. For the first time ever, it is now possible to transport an atomic frequency standard into the field and have instant access to the full stability, with zero warm-up time.

When ordered with 5/10 MHz outputs, the GPS-12/12R provides a portable reference clock for ALL kinds of instrumentation. It can also be used as a permanent ultra-stable in-house frequency reference for R&D, test systems, or manufacturing.

Its configurable alarm outputs give urgent or non-urgent alarms for hardware failures, loss of antenna connection, loss of GPS contact, and more.

User settings and display are selectable for six languages, and the optional *GPS12-Monitor* allows full remote control and monitoring of the instrument.

The GPS-12R is an excellent metrology reference for calibration of test equipment such as Wandermeters (WM-11 from Pendulum Instruments), SDH/SONET network analyzers, and general test and measurement equipment time bases.

GPS-12 and GPS-12R Technical Specifications

GPS-12/12R Frequency stability locked to GPS

Frequency stability

(Allan dev.), at 20° - 26° C:	*OCXO*	*Standard Rb*	*Option HS*
(τ = 24h)	$<5\times10^{-12}$	$<2\times10^{-12}$	$<1\times10^{-12}$
(τ = 100s)	$<1\times10^{-11}$	$<5\times10^{-12}$	$<3\times10^{-12}$
(τ = 10 s)	$<2\times10^{-11}$	$<1.7\times10^{-11}$	$<1\times10^{-11}$
(τ = 1 s)	$<2\times10^{-11}$	$<5\times10^{-11}$	$<2\times10^{-11}$
Phase noise dBc/Hz			
(offset): 1 Hz	*-85*	*-75*	*-90*
10 Hz	*-115*	*-95*	*-128*
100 Hz	*-130*	*-125*	*-137*
1kHz	*-140*	*-140*	*-145*
10 kHz	*-145*	*-140*	*-147*
Warm up (+25°C):	*15 min to* 5×10^{-8}	*12 min to* 1×10^{-9}	

Frequency stability - Hold-over

Aging/month:	$<1.5\times10^{-9}$	$<5\times10^{-11}$	$<5\times10^{-11}$
Temp. (0°C - 50°C):	$<5\times10^{-10}$	$<1\times10^{-10}$	$<1\times10^{-10}$

Standard Outputs

1.544 MHz or 2.048 MHz (2 front-panel outputs, user selectable):

Connectors: *BNC female (2)*

Frequency: *1.544 MHz (T1) or 2.048 MHz (E1) square wave, 20% duty cycle, user selectable on the front panel*

Output level: *-1.2V to + 1.2V ±10% in 75 Ω (G.703:10)*

1 pps or 10 MHz pulse (1 front-panel output):

Choice of 1-pps (default) or 10 MHz on the output is made in front panel menu

Connector: BNC female

Output level: approx. 0 V to +2.0V in 50 Ω load

Duty cycle: 1 pps: approx. 20 ppm; 10 MHz: approx. 50%

Jitter (1-pps): <1 ns rms

Hold-over acc.: approx. 1 µs drift after 1 day of Hold-over (1-pps)

1-pps out steps: 1 ns steps (option HS only)

Alarm output (rear):

Signal coding: *relay open: alarm mode;*
relay closed: normal mode
1 urgent output
1 non-urgent output

Max switching voltage: 60 Vdc

Max switching current: 200 mA

GPS Antenna Input (rear):

Connector: *Type 'N', female*

DC Antenna Supply: *+5 VDC, center-pin positive, through 'N' connector*

Options Available

Option 70B outputs

Frequency: *3x 10 MHz, 1x 5 MHz*

Output level: *Sine wave, >1V rms in 50 Ω*

Option 71B outputs

Frequency: *0.1, 1, 5, 10 MHz*

Output level: *Sine wave, >1V rms in 50 Ω*

Option 72B

2x 2.048 MHz and 2x 2.048 Mbps outputs (G.703)

Option 73B

Frequency: *4x 13 MHz*

Output level: *square wave, approx. 0 V to +2.0V in 50 Ω load*

Option 74B

2x 1.544 MHz and 2x 1.544 Mbps outputs (G.703)

Option 77

-48 VDC supply for external power source

Option 78

Internal battery (2h) and an inlet for +12 VDC external power supply/charging

Option 79/01

1x External 1-pps disciplining input (TTL-levels in 50 Ω)
1x 1-pps output (TTL-levels in 50 Ω)
2x 10 MHz outputs (1Vrms sine)

Antenna (option 01)

Type: active L1
Height: 81 mm (3.2")
Weight: 230 g (8 oz.)
Gain: >30 dB

Environmental

Temperature: 0°C to +50°C (operating)
-40°C to +70°C (storage)
Internal temperature controlled fan

Safety: Compliant to CE: EN 61010-1 2:nd edition, Cat II, Pollution degree 2

EMI: Compliant to CE: EN61326-1 (1997)

Power supply

Line voltage: 100V to 240Vrms (±10%); 50 Hz to 400 Hz (±10%)
GPS-12: <40W during warm-up, <30W during normal operation
GPS-12R: <60W during warm-up, <35W during normal operation

Optional external DC supply:
-48 V_{DC} (option 77)
+12V nominal (+10.5 to +18 V), 5A (option 78)

Internal Battery: Via internal NiMH battery, capacity 45 Wh, 12 V_{DC} connector for charging and continuous operation (option 78)

Freq. Stability: $<2\times10^{-12}$ when switching between any power source; AC MAINS, internal battery, or external +12 VDC.

Mechanical Data

WxHxD: 210 x 108 x 395 mm (8.25" x 3.6" x 15.6")

Weight: Net 3,1 kg (6.6 lbs); excl batteries
Shipping 4.1 kg (8.8 lbs); excl batteries

Ordering information

GPS-12 GPS-controlled OCXO Frequency Standard with 2x 1.544 MHz or 2.048 MHz outputs (user selectable) and 1x 1 pps output

GPS-12R: GPS-controlled Rubidium Frequency Standard with 2x 1.544 MHz or 2.048 MHz outputs (user selectable) and 1x 1 pps output

Included with shipment

User manual on CD
Calibration certificate
18 months warranty

Built-in options

Option HS:	High Stability Rubidium optional oscillator, *incl. option 70B*
Option 70B:	3x 10MHz plus 1x 5MHz extra outputs, sine, 1Vrms
Option 71B:	Multiple reference outputs 0.1/1/5/10 MHz, sine, 1Vrms
Option 72B:	2x 2.048 MHz outputs plus 2 x 2.048 Mbps outputs
Option 73B:	4x 13 MHz outputs, square 0V to +2V
Option 74B:	2x 1.544 MHz outputs plus 2 x 1.544 Mbps outputs
Option 77:	-48 VDC supply (for external power source)
Option 78:	Internal Battery + inlet for +12 VDC external power supply
Option 79/01:	1x ext. 1-pps disciplining input, 1x 1-pps out, 2x 10 MHz sine out

Optional accessories

Option 22/90:	19" rack mount kit
Option 27:	Soft carrying case
Option 27H:	Heavy-duty transport case
Option 01:	GPS Antenna
Option 01/50	GPS Antenna Mounting Kit
Option 02:	Antenna cable, 20m
Option 02/50	Antenna cable, 50 m
Option 02/130	Antenna cable, 130 m
Option 90/10	Calibration certificate with protocol
Option 90/00	Calibration certificate hold-over ageing/week
Option 95/03	Extended warranty to 3 years
Option 95/05	Extended warranty to 5 years
Option 29/12	GPS12-Monitor, Control and Monitoring SW (via USB)
OM-12	Printed Users Manual (PDF-file is included as standard)

Specifications subject to change without notice

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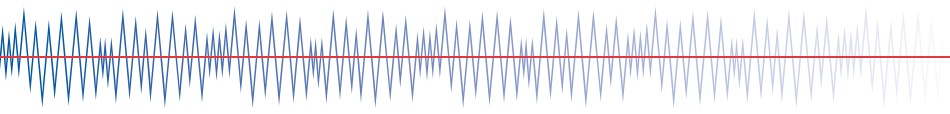
- Experts in time & frequency calibration, measurement and analysis

Pendulum Instruments is a company of the Orolia Group



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