

GNSS-HQ

GNSS Time & Frequency Standard with HaveQuick

The GNSS-HQ is a precision time & frequency standard that uses Global Navigation Satellite System (GNSS) time signals (or alternatively IRIG-B timecode input) as a reference to provide a suite of reliable output and interface options.



The GNSS-HQ includes 2 x HaveQuick outputs as standard plus the flexibility to include 4 x frequency outputs in place of IRIG-B outputs.

Features

- Choice of GNSS synchronisation source (GPS, Glonass or Beidou)
- Backup synchronisation source from IRIG-B Timecode
- Oven Controlled Crystal Oscillator for high frequency stability
- Dual Redundant Power Supply
- 6 x IRIG-B outputs or 2 x IRIG-B plus 4 x frequency outputs
- 1 x pulse output
- 2 x HaveQuick outputs
- 1 x NTP/SNMP network interface
- 2 U high standard 19" rack mount

Key Benefits

GNSS Synchronisation

The unit includes an integral GNSS receiver (GPS, GPS/Glonass or GPS/Beidou by customer choice) and automatically synchronises to the GNSS signal if at least one satellite is in view.

When synchronised to GNSS, the GNSS-HQ functions as a STRATUM 1 time reference, and has an accuracy of better than 100 nanoseconds to GNSS Time.

The unit is also capable of providing precise position in the event that at least four satellites are in view.

The GNSS signal disciplines the internal oscillator to ensure continued operation during periods where the GNSS signal is unavailable.

IRIG-B Synchronisation

The instrument may alternatively be synchronised to an IRIG-B timecode input, with a choice of either modulated or DC Level Shift.

Accuracy is to better than 100 nanoseconds (DCLS) or 5 microseconds (modulated).

The IRIG-B signal disciplines the internal oscillator ensuring continued operation in case of interruption to the signal input.

Outputs - Customer Selectable

6 x IRIG-B (hardwire; modulated or DCLS)

or

2 x IRIG-B (hardwire; modulated or DCLS, plus 4 x 1MHz, 5MHz or 10MHz

Outputs - Included as Standard

2 x HaveQuick Time of Day

2 x 800kHz Clock Signal for HaveQuick Radios

1 x 1PPS output

1 x NTP/SNMP network interface

Front Panel & Internal Power

The unit is programmable via its front panel alphanumeric keypad. Status and position information is displayed on the front panel LCD.

Dual internal power supplies operate redundantly, and in the event of a total power failure the programmed information is maintained.



GNSS-HQ Specifications

Synchronisation

Synchronisation is automatic once the unit is switched on.

Accuracy

GNSS (after 30 minutes): <100 ns correlation to GNSS Time with satellite signals present and better than 5 μ s correlation during periods of signal absence.

IRIG-B: better than 500 ns (DCLS) or 5 μ s (modulated).

NB In the event that the GNSS signal is unavailable the unit will automatically switch to DCLS input. If both inputs are lost, the unit automatically switches to modulated input.

IRIG-B Serial Time Code Input

Modulated or DC Level Shift form, input via BNC connector.

Modulated:

Amplitude: 2 to 12 volts peak to peak
Modulation Ratio: 2:1 to 6:1
Input Impedance: 600 ohms

DC Level Shift:

Single Ended Amplitude: Positive going pulses from a +0.5 volt maximum baseline to +2.4 volts, minimum
Input Impedance: 1Kohm
Differential Amplitude: +/-0.2 to +/-7 volts
Differential Input impedance: 120 ohms

Frequency Standard

The integral crystal oscillator provides a highly stable frequency standard, disciplined by the synchronisation source to keep it locked in phase to GNSS Time (see table on next page for options and performance).

Outputs

IRIG-B Serial Time Code

Total of 13 x IRIG B outputs:

2 x (with 4 x frequency outputs-see below) or 6 x outputs (each jumper selectable to be modulated or DC level shift). BNC connectors.

Modulated:

Amplitude: Adjustable from 0 to 15 volts peak to peak from 50 ohms
Modulation Ratio: 3:1
Max. External Load: 50 ohms

Timing Accuracy: <5 μ s when GPS locked,
<15 μ s to GPS for 24 hours after loss of GPS

DC Level Shift:

Amplitude: Positive going pulses from a +0.5 volt max baseline to +4.5 volts, minimum
Source Impedance: 50 ohms
Fibre Optic:
Transmission Dist: up to 2km
Timing Accuracy: <200ns (GPS locked)
<10 μ s to GPS for 24 hours after loss of GPS

Frequency

4 x frequency outputs (where only 2 x IRIG-B outputs selected as above). BNC Connector. Frequency stability as per oscillator (see table on next page)

Output options: 1MHz, 5MHz, 10MHz

Each of the four frequency outputs are individually selectable for 1, 5, or 10MHz frequency. Squarewave output is standard. Sinewave output to be defined at time of customer order. All outputs are 50 Ohm via BNC Connectors.

HaveQuick

2 x HaveQuick Outputs (Time of Day and 800kHz frequency output) are provided.
The data interfaces conform to HaveQuick I, HaveQuick II, HaveQuick IIa, Quickfox and SATURN Standards.
The 800kHz frequency output provides a highly stable clock signal for the radio subsystem. These interfaces are capable of driving up to 20 radios. Connection is provided by means of a 25 way D type socket

1PPS Pulse Rate

Provided via rear panel BNC connector.

On Time Point: Positive going edge
Duty Cycle: 20 percent
Amplitude: Positive going pulses from a maximum 0.5 volt baseline to +4.5 volts, minimum
Rise and Fall Times: <10 nanoseconds
Source Impedance: 50ohms
Timing Accuracy: <10 μ s to GPS for 24 hours when input lost



GNSS-HQ Specifications

Outputs (continued)

Alarm

An alarm output is provided via a rear panel BNC connector and a J type socket (activates when unit not locked to either GPS or IRIG B).

BNC connector: TTL levels from 50 ohms

J Type Socket: SPST relay, Contact Rating: 240 VAC 10 amps, 24 VDC at 8 amps non-inductive.

Network Interface

Distributes time via a 10/100Base-T network interface (RJ45 connector). The interface supports Network Time Protocol (NTPv3), Time and Daytime protocols. RFC1305, 868 & RFC867 together with SNMP Network Management Protocol and IEEE 802.3/802.2 Frame formats.

Remote Control

All parameters programmable through the front panel keypad are also programmable remotely via the Network Interface. The unit supports the TELNET and SNMP protocols

Programmable Functions

The following functions are programmable or readable via a front panel keypad in conjunction with an alphanumeric LCD display.

1. Set/read mode of operation
2. Read Elevation Angle Mask
3. Set/read time offset
4. Set/read antenna cable delay
5. Set/read IRIG delay
6. Read time
7. Read Position

Oscillator Options

Frequency Stability at 25°C

Oscillator		Holdover Stability Per °C	Locked frequency stability over averaging times						Holdover stability for 1 day
Option	Description		1s	10s	100s	1000s	10000s	1 day	
1	TCXO	1.7x10 ⁻⁸	2x10 ⁻⁹	5x10 ⁻¹⁰	5x10 ⁻¹⁰	5x10 ⁻¹⁰	6x10 ⁻¹¹	1x10 ⁻¹²	30ms
2	OCXO	1.0x10 ⁻⁹	1x10 ⁻¹⁰	4 x10 ⁻¹¹	6x10 ⁻¹¹	4 x10 ⁻¹¹	4 x10 ⁻¹²	1x10 ⁻¹²	60µs
3	Precision OCXO	1x10 ⁻¹¹	5x10 ⁻¹²	3x10 ⁻¹²	1x10 ⁻¹¹	4 x10 ⁻¹¹	3x10 ⁻¹²	1x10 ⁻¹²	8µs
4	Rubidium	7x10 ⁻¹²	3x10 ⁻¹¹	8x10 ⁻¹²	3x10 ⁻¹²	3x10 ⁻¹²	2x10 ⁻¹²	8x10 ⁻¹³	3µs
5	Precision Rubidium	3x10 ⁻¹²	2x10 ⁻¹¹	3x10 ⁻¹²	3x10 ⁻¹²	1x10 ⁻¹²	1x10 ⁻¹²	8x10 ⁻¹³	1µs

8. Read Receiver Status
9. Read Satellite Status
10. Read GPS/UTC time difference
11. Read oscillator control voltage
12. Set/read Ethernet parameters

Power Requirements

- Primary power source of 85 to 264 VAC, 47 to 66 Hz, 120 to 300 VDC.

- Consumes less than 30 watts of power.

- Two internal power supplies operate redundantly, each capable of powering the entire unit.

- In the event of primary power failure, keypad programmed functions and GPS Receiver acquired information are maintained.

Environmental Characteristics

Instrument

Temperature: -10°C to +50°C

Humidity: Up to 95% RH (non-condensing)

Antenna

Temperature: -20°C to +95°C

Humidity: 0 to 100% RH (non-condensing)

Physical Characteristics

The unit is designed for rack mounting.

Height: 3.5 inches (8.9 cm)

Width: Chassis: 17 inches (43.2 cm)
Front Panel: 19 inches (48.3 cm)

Depth: 16 inches (41cm), not incl. rear panel connectors

Weight: 14 pounds (6.4 kg), nominal

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