

## NFS 220 Network Ready GPS Time And Frequency Standard



*NFS-220 Networked Frequency Standard*

The NFS220 is a precision time and frequency standard that uses the Global Positioning System (GPS).

It is designed for use in Wi-Fi, Wi-Max, satellite communications, telecommunications and military communication applications.

The NFS220 utilizes a high performance 16 channel GPS receiver. An automatic position-averaging feature enables the best use of GPS when operating in a fixed location.

The NFS220 is fitted with an internal back up oscillator that is continuously calibrated to GPS using an advanced algorithm, providing optimal frequency control of the oscillator. This ensures that the highest time and frequency accuracy is maintained if no satellites can be tracked, and ensures an ultra stable, low noise frequency reference

The basic NFS220 includes a precision OCXO frequency standard, while TCXO and Rubidium oscillators are optionally available to giving a variety of price and performance options. An option with a low noise OCXO phase locked to a rubidium is also available, combining the low noise characteristic with the OCXO with the long-term stability of a rubidium.

The NFS220 provides "at a glance" status indication via front panel LED's and can be integrated with other management systems using Ethernet and serial ports.

The NFS220 provides simple integration into military platforms by allowing synchronization from Have Quick time code, which is available on military SA-ASM GPS receivers such as the DAGR or PLGR. The NFS220 also generates Have Quick and 1PPS signals compatible with ICD-GPS-060.

The integrated Ethernet interface provides Network Time Protocol (NTP) synchronization of other connected computers.

In addition to NTP, the NFS220 Ethernet interface contains a built in web server that allows the NFS220 to be controlled using a standard web browser such as Internet Explorer. Simple Network Management Protocol (SNMP) allows easy integration of the NFS220 with industry standard network management systems.

The NFS220 provides three 1PPS time mark outputs. A unique feature allows precisely controlled delays to be inserted into these outputs to compensate for cable and other propagation delays. Compensation delay is independent for each output and has <1ns resolution.

### FEATURES

- **ICD-GPS-060 Have Quick/1PPS input references**
- **Choice of Disciplined Oscillator**
- **High Stability Time and Frequency outputs. 1U 19" rack mount**
- **Network Interface for remote management and NTP server**
- **Three 1PPS outputs with propagation delay compensation**
- **Multiple time code outputs (IRIG B, A, E, G) Four 10 MHz Sine wave outputs**
- **Have Quick time code**
- **Advanced Oscillator Control Algorithm**

Serial time code outputs are provided to allow time synchronization to be distributed to computers, displays, and other equipment requiring precision time. Two outputs are dedicated to Have Quick time code. Two outputs (one modulated, one DC level shift) may be user selected from IRIG A, IRIG B, IRIG E, IRIG G.

Four low phase noise 10 MHz sine wave outputs from the disciplined oscillator are provided. Signal amplitude is software settable.

All outputs are provided with activity detectors. Loss of any output is indicated by means of a individual front panel alarm LED as well as through the network interface or a discrete alarm output.

## NFS 220 Specifications

Satellite Signal GPS L1 1575.42 MHz  
 Satellite Code C/A 1.023 MHz  
 Receiver Type Parallel 16 Channel. All-in-view satellites tracked continuously and simultaneously  
 Warm Start <10 sec (Open Sky)  
 Autonomous Start <60 seconds Cold Start (Open Sky)  
 Cold Start Requirement Automatic: No input of time or position required  
 Position Accuracy 2.4 m horizontal, 5 m altitude with respect to WGS84 after 24 hour position averaging  
 Timing Accuracy (tracking satellites)  $\pm 100$  ns. Absolute UTC Std Deviation 15ns (OCXO)  
 Timing Accuracy (holdover mode,  $\pm 5^\circ\text{C}$ ) < 15  $\mu\text{sec/day}$  (OCXO)  
 Frequency stability tracking satellites <1  $\mu\text{sec/day}$  (Rb2)  
 See tables below

Oscillator Option	Stability -10-60 °C	Allan Variance					
		1s	10s	100s	1000s	10000s	1 day
TCXO	2.5x10 <sup>-6</sup>	1x10 <sup>-7</sup>	1x10 <sup>-7</sup>	1x10 <sup>-7</sup>	5x10 <sup>-8</sup>	2x10 <sup>-9</sup>	1x10 <sup>-11</sup>
OCXO*	3x10 <sup>-9</sup>	3x10 <sup>-12</sup>	2x10 <sup>-11</sup>	2.5x10 <sup>-11</sup>	5x10 <sup>-12</sup>	2x10 <sup>-12</sup>	1x10 <sup>-13</sup>
Rb1	7x10 <sup>-10</sup>	3x10 <sup>-11</sup>	1.6x10 <sup>-11</sup>	8x10 <sup>-12</sup>			<5x10 <sup>-12</sup>
Rb2	4x10 <sup>-10</sup>	1x10 <sup>-11</sup>	3x10 <sup>-12</sup>	1x10 <sup>-12</sup>			<5x10 <sup>-12</sup>
Rb/OCXO	4x10 <sup>-10</sup>	5x10 <sup>-12</sup>	1x10 <sup>-11</sup>	3x10 <sup>-12</sup>			<1x10 <sup>-13</sup>

Oscillator Option	10 MHz Phase Noise dBc					
	1Hz	10Hz	100Hz	1kHz	10kHz	100kHz
OCXO*	-90	-120	-140	-150	-150	-155
Rb1	-67	-85	-114	-130	-140	-140
Rb2	-80	-100	-130	-140	-150	-150
Rb/OCXO	-90	-120	-140	-150	-150	-155

1PPS Output  
 Connector BNC (2) DB9 (1)  
 Level 0-5V or 0-10V into 50 $\Omega$  link selectable by user  
 On Time Rising Edge  
 Network Interface  
 Interface Type 10BaseT  
 Protocols TCP/IP, UDP, NTPv3, HTTP, SNMP v1  
 Serial Interface  
 Type RS232 and RS422  
 Baud rate 9600, N,8,1  
 Sine Wave Outputs  
 No of Outputs 4  
 Connector BNC  
 Frequency 10MHz  
 Level 0 -13dBm into 50 ohm  
 Software settable  
 Time Code 1 Output (Modulated)  
 Connector BNC  
 Code Type IRIG A135, B125, E115, G145 software selected  
 Control Functions IEEE 1344  
 Level 3 V p-p into 600 ohm  
 (DCL)  
 Time Code 2 Output  
 Connector DB9  
 Code Type IRIG A005, B005, E005, G005  
 Selection same as modulated code  
 Levels DC level Shift (0-5V)  
 Time Code 3,4 Output  
 Connector BNC (1) DB9 (1)  
 Code Type Have Quick per ICD-GPS-060  
 Levels 0-5V

Alarm Status Voltage free relay  
 Changeover contacts  
 Status Indicator LED's Power  
 Tracking Satellites Valid Time  
 Holdover/12hr Holdover alarm Output Good/Fail ( 8 leds)  
 Environmental  
 Temperature Instrument: -10 to +50 °C  
 Antenna: -40 to +85 °C  
 Humidity 95% non condensing  
 Power 85-265VAC 50/60Hz  
 Optional 12VDC, 24VDC, -48VDC, 125VDC  
 Dimensions 19" rack mount  
 1.75" (1U) height, 7<sup>1/2</sup>" depth  
 17" Width, 3<sup>1/2</sup>"b Nom.  
 Weight 11 lb. typical  
 EMC Emission To EN55022 as EN55024  
 FCC Part 15B, Class A  
 EMC Immunity To EN 50082-1 as  
 EN61000-4-2 ESD, IEC  
 801-3 HF Field, IEC 801-4  
 Burst  
 Safety EN 60950-1/A12:2011

Ordering Information  
 P/N: 091000001 – NFS220 Standard  
 P/N: 091000002 – NFS220 PLUS  
 Oscillator options available

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