



TIME & FREQUENCY
SOLUTIONS

UNRIVALLED EXPERTISE & TECHNOLOGIES FOR A DEMANDING WORLD

TimeSpy Elite

Network Time Analyser with Precision Time Measurement

TimeSpy Elite precisely measures the accuracy of a wide range of classic and network timing inputs against an internal precision GPS-controlled oscillator. It has enhanced features over the standard TimeSpy: it has Gigabit Ethernet capability plus an SFP connection for use with alternative media such as fibre. TimeSpy Elite also optionally accommodates a laboratory standard input to use as a time reference.



Features

- Measures and displays the difference between input time signal and UTC
- Capable of measuring a wide variety of classic and network time signal inputs
- SFP connection for connection to alternative media (module not supplied)
- Gigabit Ethernet capability
- Laboratory standard 1pps & 10MHz inputs can be used as time reference
- Timing resolution of better than 1 nanosecond
- Absolute accuracy of up to 50 nanoseconds to UTC
- Automatic identification and analysis of Modulated Carrier Timecodes
- Full colour touch-screen with user-friendly Windows-based operating system
- USB port on front panel for easy access downloads for subsequent analysis of data
- Robust, portable design for all industrial applications
- Input available for measurement of relay opening/closure
- User-selectable threshold for alarm generation
- Robust, portable design for all industrial applications
- Choice of clock accuracy: see selector table overleaf

Applications

TimeSpy Elite is invaluable where time of day information is distributed from a central master clock to sub-master clocks or user systems over large distances via serial data links or packet networks.

Substantial delays can occur due to high levels of network traffic or even due to the long distance between the master clock and the user.

Some commercially available software algorithms can reduce these errors but, unless the errors are accurately and independently measured at the point of use, the user cannot be certain of the accuracy of his time source in this type of application.

Additionally, the high accuracy of the **TimeSpy Elite** means that it can also precisely measure the time error of free-running clocks and timing systems which are synchronised from untraceable sources, such as television and radio broadcasts, electrical power lines and via the internet.

Signal Inputs

Selectable via the front panel touch-screen:

- 1 Pulse per Second (1PPS)
- 1 Pulse every 2 Seconds (PP2S)
- 1 Pulse per Minute (1PPM)
- 1 Pulse per Hour (1PPH)
- Modulated timecode onto a 1kHz carrier
- Timecode DC level shift
- ASCII Serial time message at RS232, RS422 or RS485 levels
- NMEA message plus Pulse (1PPS & PP2S)
- Network Time Protocol (NTP) to RFC 1305
- Precise Time Protocol (PTP) IEEE 1588 v2
- SFP (1 GigE) - NTP / PTP
- DCF77 timecode
- Have Quick

Ease of Use

As the unit is portable and battery powered, it is simple to synchronise the unit to GPS outside by using the integral GPS antenna.

Alternatively, synchronisation can take place inside if connected to an external GPS antenna, with further flexibility to use AC mains power.

TimeSpy Elite can also use laboratory standard 1pps & 10MHz inputs as a time reference.



TimeSpy Elite Model Selector

Model	Oscillator	Frequency Reference Stability	Frequency Ageing without GPS	Loss of Time Accuracy without GPS
Elite-Q	Quartz OCXO	1x10 ⁻¹² over 100s	3x10 ⁻⁹ per month	±700ns per hour
Elite-R	Rubidium	3x10 ⁻¹² over 100s	3x10 ⁻¹¹ per month	±30ns per hour

TimeSpy Elite Specification

Measurement Reference Source

- Internal C/A Code GPS Receiver with case-mounted antenna
- Time Accuracy (1σ) 30ns over 24hrs with GPS reception
- Internal Time Interval Measurement: 0.2ns resolution with built-in self-calibration
- Optional connection to external GPS Antenna

Measurement Interfaces		Connector	Input Measurement Accuracy Against GPS		Input Specifications
			Time (1σ)	Resolution	
Pulse (1pps / 1ppm / 1pph)	Fibre	ST	25ns	0.2ns	820nm -7.6dBm max (or 1300nm -11dBm max - to special order)
	Differential	Twin BNC	25ns	0.2ns	Common mode -7V+12V
					Differential threshold -0.3V min +0.3V max
TTL	50 Ohm BNC	25ns	0.2ns	Nominal Input 0V to 2.5V	
				Low: 0- 0.9V; High: Min 1.4V-5V	
Relay / optoisolator		Twin BNC	25ns	0.2ns	Isolated inputs. TimeAcc connects 1.2kohm from +5V to contacts from isolated suppl
1kHz AC Timecode*		50 Ohm BN	1 μ s	100ns	Nominal Input: 10Vpp
					Peak to Peak Min / Max: 2.5Vpp /12Vpp
					Input Impedance: 60kohm
DCLS/ Have Quick/ DCF77/ DC Timecodes*	Fibre	ST	25ns	0.2ns	820nm -7.6dBm max (or 1300nm -11dBm max - to special order)
	Differential	Twin BNC	25ns	0.2ns	Common mode -7V+12V
					Differential threshold -0.3V min +0.3V max
TTL	50 Ohm BNC	25ns	0.2ns	Nominal Input 0V to 2.5V	
				Low: 0- 0.9V; High: Min 1.4V-5V	
Network Conne- ctions	NTP / SNTP / PTP**	RJ-45	70ns	20ns	100Base-T Ethernet
		SFP	30ns	8ns	1000Base-T SFP
RS422/RS485 Serial Message Start and NMEA plus Pulse; China Mobile 1pps +TOD		9-pin D-type	100ns	0.2ns	Common mode -7V+12V
					Differential threshold -0.3V min +0.3V max.
					Input Impedance 22k min
RS232 Serial Message Start and NMEA plus Pulse		9-pin D-type	1 μ s	0.2ns	Input Voltage Range \pm 30V max
					Low threshold 0.8V max; High threshold 2.4V
					Input impedance 3kohm min 7kohm max

*TimeSpy Elite reads and identifies the following DCLS and AC timecodes:
IRIG-B (IEEE:1344), IRIG-B (200-04), IRIG B, AFNOR (NFS87-500), NASA 36,
2137, XR3

**IEEE1588 (PTP) supported: PTPv1 (multicast); PTPv2 Multicast UDP; PTPv2 Multicast L2 (Ethernet); PTPv2 Unicast UDP; PTPv2 Unicast L2 (Ethernet); PTPv2 Peer-delay

Optional Laboratory Reference Signal	Connector	Input Specification
1pps	50ohm BNC	Nominal Input 0V to 2.5V
		Low: 0- 0.9V; High: Min 1.4V-5V
		Input Impedance 1.2kohm
10MHz	50ohm BNC	Min 1.4V. Input Impedance 1.2kohm)

Output interface	Connector	Output Specification
Alarm relay output	9-pin D-type	NO/NC/COM Voltage Free Contacts 0.3A at 125VAC; 1A at 30VDC
RS232 User port	9-pin D-type	RS232 Port for diagnostics
1pps output	50 Ohm BNC	0V to 5V pulse from 50ohms
1pps output RS422	Twin BNC	0V to 5V RS422 pulse output
1ppm output	50 Ohm BNC	0V to 5V pulse from 50ohms
10MHz output	50 Ohm BNC	0V to 5V square wave from 50ohms
Timecode AC	50 Ohm BNC	1kHz modulated Timecode output; 6V peak to peak from 50ohms
Timecode DCLS; TTL	50 Ohm BNC	0V to 5V DCLS Timecode output from 50ohms

* 1ppm is set as default - pulse width and output interval (or output time of day) can be set by the user

Additional Service connections

- USB Port for printer /data logger/removable memory
- Internal and external antenna [BNC connector]

Power:	90V-264V AC; Internal rechargeable battery, nominal 3-hr battery life with 4-hr time to recharge; A Ground Stud is also provided
Mechanical:	Portable Instrument Case: Dimensions: 350mm(W) x 180(H) x 305(D) Weight: 9kg
Environmental (Operation & Storage):	Temperature: 0°C to +40°C Humidity: Up to 95% RH (non-condensing); EMC: CE Compliant

As we are always seeking to improve our products, the information in this document only provides general indications of product capability, suitability and performance, none of which shall form any part of any contract.

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