

# TIMESPY ELITE - PORTABLE PRECISION TIME MEASUREMENT



## GPS Referenced Portable Precision Time Measurement, Analysis and Logging Instrument



AS9100D Certificate Number : C0210021-AS3



# TIMESPY ELITE - PORTABLE PRECISION TIME MEASUREMENT

## Product Overview

The TimeSpy Elite is a highly flexible, mains and rechargeable battery based portable precision time measurement and signal generation unit, designed for use in a broad range of timing application. The unit derives an accurate time reference through an internal or external C/A Code GPS antenna synchronisation which is then maintained by an internally disciplined oscillator (Quartz or Rubidium).



Once synchronised, with an absolute accuracy of < 30ns to UTC, the unit becomes a local portable time reference unit able to measure relative timing to UTC with <1 ns resolution on a wide range of standard time interfaces and time codes including : PTP (IEEE 1588v2) , NTP (RFC 1305), 1PPS, IRIG (DCLS or AC), DCF77, NMEA, ASCII : RS232/422/485 and HaveQuick.

The unit is especially useful 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. Such systems often exhibit substantial time delays due to high levels of network traffic or long physical distances between the master clock and the user; hence to quantify and/or qualify such systems, a local UTC reference and comparison instrument is highly advantageous.

In network applications, commercial software algorithms aim at reducing timing errors but unless such errors are accurately and independently measured at the point of use, the user cannot be certain of the accuracy and/or variance of the system time source in the application.

The TimeSpy seamlessly combines high accuracy time measurement circuitry with data analysis and logging functionality to deliver a full statistical breakdown measurement of the UTC time error of the measured signal or signals. This is perfect for network analysis (PTP, NTP) or for free running clocks and timing systems which are synchronised from untraceable sources, such as television, radio broadcasts, electrical power lines and the Internet.

Measurement result logs are easily stored and retrieved locally via the front panel USB port or maybe collected over Ethernet via the built in web server facility.

In addition to measurement, the unit also provides reference signal outputs as 1PPS and 10MHz sine wave for synchronising external equipment to the internal reference.

The TimeSpy Elite can optionally interface to Portable Expansion Modules (PEM), expanding the input signal analysis and measurement capability while also facilitating multi-output, multi-format signal generation based on the TimeSpy reference. PEM units are generally produced and configured to customer specific requirements which can be discussed with the sales department.

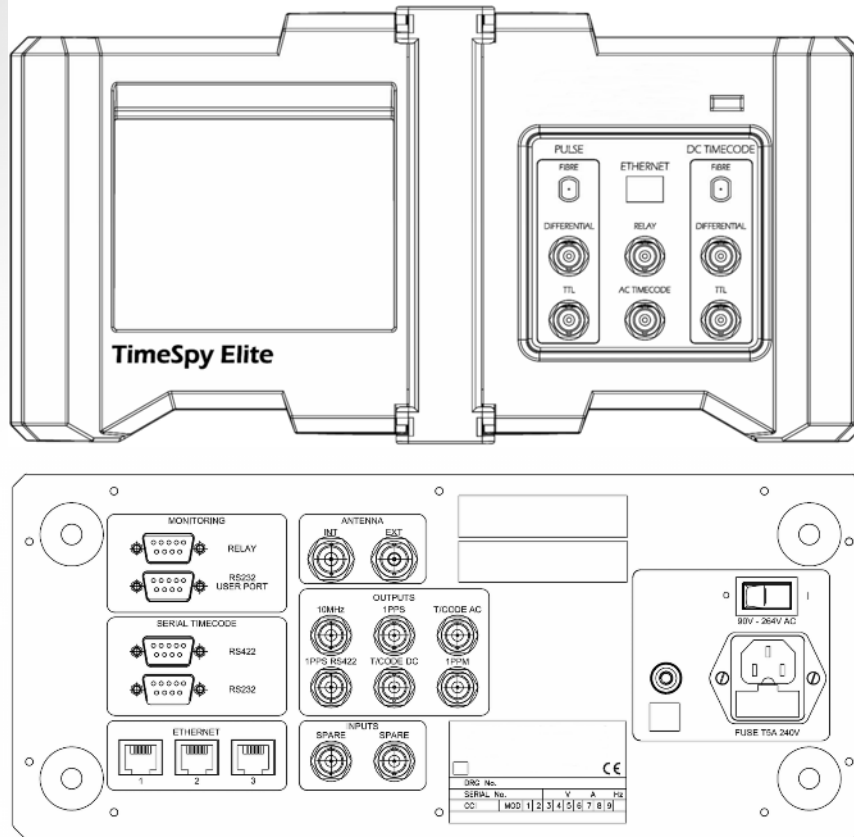
## Key Feature Summary

- Graphical display of the difference between input time signal and UTC
- Measurement of a wide variety of classic and network time signal inputs
- SFP connection to alternative media (SFP module not supplied)
- Gigabit Ethernet connection for analysis and logging
- Laboratory standard 1PPS & 10MHz outputs can be used as a time reference.
- Timing resolution of better than 1 ns and absolute accuracy of up to 30ns to UTC
- Automatic identification and analysis of Modulated Carrier Timecodes
- Frequency measurement range 40Hz to 50MHz
- GOOSE and Sampled Values measurement capability for IEC61850
- Full colour touch-screen with user-friendly Window operating system
- Front panel USB port for easy access downloads for subsequent data analysis
- Robust, portable design with internal rechargeable battery in addition to mains operation
- Choice of time reference performance accuracy - Quartz or Rubidium

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## Oscillator Options

Oscillator	Frequency Reference Stability	Frequency Aging without GPS	Loss of Time Accuracy without GPS
OCXO	$1 \times 10^{-12}$ over 100s	$3 \times 10^{-9}$ per month	$\pm 700$ ns per hour
Rubidium	$3 \times 10^{-12}$ over 100s	$3 \times 10^{-11}$ per month	$\pm 30$ ns per hour



## Interface Specifications

TimeSpy Elite Specifications		
Output Interface	Connector	Details
Alarm Relay Output	9 way D-Type	NO/NC/COM Volt free contacts - 0.3A at 25VAC ; 1A 30VDC
RS232 User port	9 way D-Type	RS232 port for diagnostics
1 PPS Output	50 Ohm BNC	0V to 5V pulse from 50 Ohms
1 PPS Output RS-422	Twin BNC	0V to 5V RS422 pulse output
1 PPM Output*	50 Ohm BNC	0V to 5V pulse from 50 Ohms
10MHz Output	50 Ohm BNC	0V to 5V square wave from 50 Ohms
Time Code AC	50 Ohm BNC	1 KHz modulated Timecode output : 6V pk-pk frkom 50 Ohms
Time Code DCLS : TTL	50 Ohm BNC	0V to 5V DCLS Timecode output from 50 Ohms
1 PPS Ref Signal	50 Ohm BNC	Nominal Input : 0V to 2.5V
	50 Ohm BNC	Low 0 - 0.9V / High 1.4V - 5.0V Input Impedance - 1.2K Ohms
10 MHz Ref Signal	50 Ohm BNC	Min 1.4V : Input Impedance - 1.2K Ohms
<b>Environmental</b>		
Temperature	Instrument : -10°C + 50°C	
Humidity	95 % non condensing	
Power	85VAC - 265VAC 50/60Hz	Internal rechargeable battery with 3 hour battery life with 4 hour recharge time - A Ground stud is also provided
Physical	350mm(W) X 180(H) x 305(D) Weight : 9 Kg	
Compliance	CE Approved	

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

# TIMESPY ELITE - PORTABLE PRECISION TIME MEASUREMENT

## Measurement Specifications

### Reference Source

Internal C/A Code GPS receiver with case mount antenna - accuracy (1 $\sigma$ ) 30ns over 24hrs with GPS  
 Optional connection to external GPS antenna  
 Internal time interval measurement : 0.2ns resolution with built in self calibration

**TimeSpy Elite Measurement Specifications**

Measurement Interfaces		Connector	Input measurement Accuracy versus GPS		Input Specifications
			Time (1 $\sigma$ )	Resolution	
PULSE : 1 PPS / 1 PPM / 1 PPH	Fibre	ST	25ns	0.2ns	820nm -7.6dBm max (or 1300nm - 11dBm - to special order)
	Differential	Twin BNC	25ns	0.2ns	Common Mode -7V - +12V Differential threshold -0.3V - +0.3V Input Impedance - 22 K Ohms
	TTL	50 Ohm BNC	25ns	0.2ns	Nominal Input 0V - 2.5V Low : 0 - 0.9V; High 1.4V - 5V Input Impedance : 1.2 K Ohm
Relay / Opto-Isolator		Twin BNC	25ns	0.2ns	
	Fibre	ST	25ns	0.2ns	820nm -7.6dBm max (or 1300nm - 11dBm - to special order)
1 KHz AC Timecode		50 Ohm BNC	1 $\mu$ s	100ns	Nominal Input : 10V pk-pk Input range : 2.5V pk-pk through to 12V pk-pk Input Impedance : 60K Ohms
DCLS Have Quick DCF77 DC Timecodes*	Fibre	ST	25ns	0.2ns	820nm -7.6dBm max (or 1300nm - 11dBm - to special order)
	Differential	Twin BNC	25ns	0.2ns	Common Mode -7V - +12V Differential threshold -0.3V - +0.3V Input Impedance - 22 K Ohms
	TTL	50 Ohm BNC	25ns	0.2ns	Nominal Input 0V - 2.5V Low : 0.0.9V; High 1.4V - 5V Input Impedance : 1.2 K Ohm
Network Connections	NTP / SNTP / PTP**	RJ-45	70ns	20ns	1000Base-T SFP
		SFP	30ns	8ns	1000Base-T SFP
RS422/RS485 Serial Message Start & NMEA plus Pulse : China Mobile 1PPP + TOD		9 Pin D type Socket	100ns	0.2ns	Common Mode -7V - +12V Differential threshold -0.3V - +0.3V Input Impedance - 22 K Ohms
RS422/RS485 Serial Message Start & NMEA plus Pulse		9 Pin D type Socket	1 $\mu$ s	0.2ns	Common Mode -7V - +12V Differential threshold -0.3V - +0.3V Input Impedance - 22 K Ohms
Frequency measurement	Range	Connector			Input Specifications
TTL Input	40Hz - 50MHz	50 Ohm BNC			Nominal Input 0V - 2.5V Low : 0 - 0.9V; High 1.4V - 5V Input Impedance : 1.2 K Ohm
Differential Input	40Hz - 25MHz	Twin BNC			Common Mode -7V - +12V Differential threshold -0.3V - +0.3V Input Impedance - 22 K Ohms
Rear 10MHz Input	40Hz - 50MHz	50 Ohm BNC			100mV RMS min
Fibre Input		ST			820nm -7.6dBm max (or 1300nm - 11dBm - to special order)

\* TimeSpy reads and identifies the following DCLS & 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 Unicast UDP,  
 PTPv2 Unicast L2 (Ethernet); PTPv2 Peer-delay

# Satisfied customers include..

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BBC

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CMC Engineering Malaysia

EDF Energy

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Indian Navy

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Qinetiq Ltd

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