

# TimeAcc

## Precision Time Measurement Instrument



Introducing the latest addition to the Time & Frequency Solutions' range of precision timing instruments.

*TimeAcc* precisely measures the time accuracy of a wide range of inputs against an internal precision GPS-controlled oscillator.

The difference is clearly displayed on the large, full colour Windows-based touch-screen.

### Applications

*TimeAcc* 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 *TimeAcc* 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.



### Features

- Measures and displays the difference between input time signal and UTC
- Capable of measuring a wide variety of time signal inputs
- Full colour touch-screen with user-friendly Windows-based operating system
- Timing resolution of better than 1 nanosecond
- Absolute accuracy of up to 50 nanoseconds to UTC
- Automatic identification and analysis of Modulated Carrier Timecodes
- USB port situated on the front of the instrument for easy access for downloading data to printer and/or removable memory for subsequent analysis.
- Robust, portable design for all industrial applications.

### Signal Inputs

Selectable via the front panel touch-screen:

- 1 Pulse per Second (1PPS)
- 1 Pulse per Minute (1PPM)
- 1 Pulse per Hour (1PPH)
- IRIG-B modulated onto a 1kHz carrier
- IRIG-B DC level shift
- ASCII Serial time message at RS232, RS422 or RS485 levels
- Network Time Protocol (NTP) to RFC 1305
- Precise Time Protocol (PTP) to IEEE-1588
- DCF-77 timecode

### 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 the additional flexibility to use AC mains power.

## Specification



### Measurement Reference Source

- Internal C/A Code GPS Receiver with case-mounted antenna
- Time Accuracy ( $1\sigma$ ) 30ns over 24hrs
- Internal Time Interval Measurement: 0.2ns resolution with built-in self-calibration
- Optional connection to external GPS Antenna
- Ovened Quartz Oscillator
- Frequency Reference stability:  $1 \times 10^{-12}$  over 100s
- Frequency aging without GPS:  $3 \times 10^{-9}$  per month
- Loss of Time accuracy without GPS:  $\pm 700$ ns per hour

### Interfaces & Outputs

- 2 x USB Ports for printer / data logger / removable memory
- Network Connection 100Base-T Ethernet (RJ-45 connector)
- 1pps 0V to 5V pulse from 50ohms (BNC connector)
- 10MHz 0V to 5V square wave from 50ohms (BNC connector)

### Measurement Accuracy Against GPS

	Time	Resolution
1pps (TTL;Differential(RS422);relay input):	$\pm 50$ ns	0.2ns
1ppm(TTL;Differential(RS422);relay input)	$\pm 50$ ns	0.2ns
1pph (TTL;Differential(RS422);relay input):	$\pm 50$ ns	0.2ns
IRIG-B AC & 1kHz carrier based codes(TTL;Diff):	$\pm 1$ $\mu$ s	100ns
IRIG B & DC Timecodes:	$\pm 50$ ns	0.2ns
ASCII Serial time message RS232:	$\pm 1$ $\mu$ s	0.2ns
ASCII Serial time message RS422:	$\pm 100$ ns	0.2ns
ASCII Serial time message RS485	$\pm 100$ ns	0.2ns
NTP / SNTP:	$\pm 70$ ns	20ns
PTP V1/V2:	$\pm 50$ ns	1ns
DCF-77 timecode (TTL):	$\pm 50$ ns	0.2ns

### Input Specifications

<b>AC Timecodes:</b>	Nominal Input:	10Vpp		
	Peak to Peak Min / Max:	2.5Vpp / 12Vpp		
	Input Impedance:	60kohm		
<b>Pulse Input:</b>	Nominal Input:	<b>Pulse</b>	<b>DC Level Shift</b>	<b>RS232</b>
	Input Low Max:	0V to 2.5V	0V to 2.5V	+/-9V
	Input High Min:	0.9V	0.9V	+0.8V
	Input Impedance:	1.4V	1.4V	+2.4V
		1.2kohm	1.2kohm	5kohm
<b>RS422 Input:</b>	Common Mode:	-7V to +12V		
	Differential Threshold Min / Max:	-0.2V / +0.2V		
	Input Impedance:	12kohm		

**Power:** 110/230V AC +6% -10% 48-62 Hz Load 50VA  
Internal rechargeable battery, nominal 3-hr battery life with 4-hr time to recharge

**Mechanical:** Portable Instrument Case

**Dimensions W x H x D** 350mm x 150mm x 260mm

**Weight** 9kg

### Environmental (Operation & Storage)

Temperature: 0°C to +40°C  
Humidity: Up to 95% RH (non-condensing)  
EMC: CE Compliant



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