

# GPS4000

## GPS Time Receiver System

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### User Manual

Version 1.1



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## TECHNICAL SUPPORT

To obtain help with the installation or operation of the GPS4000, please visit our web site at:

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# 1 - Introduction

The GPS4000 is a high precision time receiver system comprising of a GPS timing antenna and separate decoder module. The system is designed to synchronise to the GPS navigation network and provide time information to an MC Series master clock via a cable connection.

The GPS4000 incorporates advanced anti-jam technology, reducing the effects of interference in hostile RF environments. Cable delay compensation ensures timing accuracy is not degraded when using long lengths of cable. Please refer to section 2 for installation recommendations and section 3 for details of system operation.

## 1.1 - Package contents

The GPS4000 is supplied with the following component parts:

- GPS timing antenna
- Decoder module
- Stainless steel surface (or wall if ordered ) mount antenna bracket
- 8m TNC to TNC RG58CU antenna connection cable
- Cable for connection to an MC Series master clock (Cable length is dependent on the model ordered. See appendix A for details)
- 5 way connector for connection to an MC Series master clock
- A4 user manual

## 1.2 - GPS4000 front view

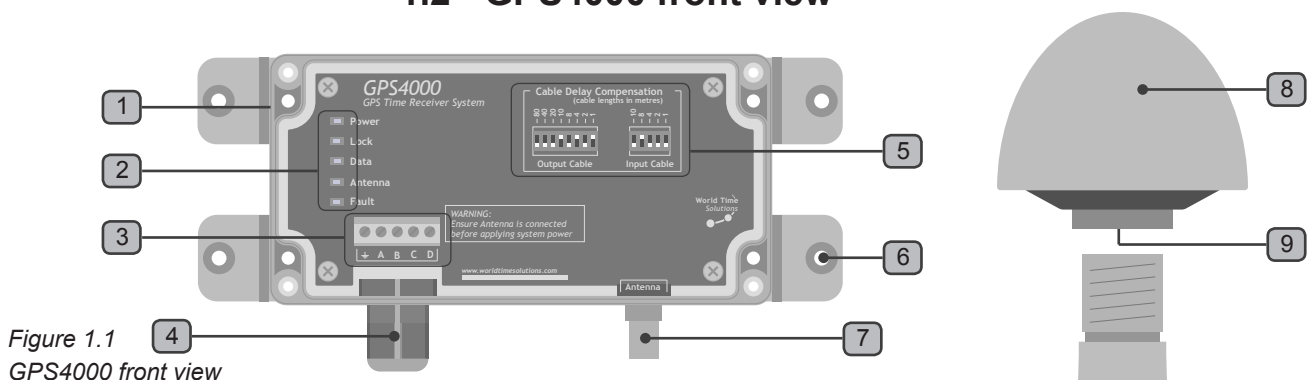


Figure 1.1  
GPS4000 front view

No.	Function	No.	Function
1	Decoder module	6	Case fixing points (x4)
2	Status LEDs	7	Antenna cable connection
3	Output cable connection	8	GPS timing antenna
4	Cable entry grommet	9	Antenna output
5	Cable delay compensation	10	Antenna mounting bracket

Table 1.1 - GPS4000 functions

## 2 - Installing the GPS4000

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The GPS4000 should be installed in a suitable location following the recommendations in sections 2.1 and 2.2 below. Both the antenna and the decoder module should be securely fixed in place and the interconnecting cable connected, before connecting the decoder module to the MC Series master clock.

### 2.1 - Positioning and installing the antenna

The GPS antenna is designed for external installation, either on the roof or side of a building (*special order wall mounting bracket required*). For maximum signal reception reliability, the antenna should be positioned with a clear unobstructed view of the sky.

For installations where an unobstructed view of the sky is not practical, the antenna should be installed with as large a view as possible of the sky towards the equator. Installing the antenna with a reduced view of the sky may result in increased synchronisation periods and slightly degraded timing accuracy.

The antenna should be mounted with the top of the dome facing directly upwards and secured using the stainless steel surface mount antenna bracket (*or wall mounting bracket if supplied*). Care should be taken to ensure the fixings used (*not supplied*) are suitable for the application.

If the antenna is to be installed in a location susceptible to a direct lightning strike, the installation of a surge protection device inline between the GPS antenna and the decoder module is recommended. The surge protection device should be installed internally at the point of cable entry, providing protection for the decoder module against flashover. Please refer to the instructions supplied with the surge protection device for further details.

### 2.2 - Installing the decoder module

The decoder module should be installed internally close to the point of antenna cable entry to the building. The enclosure should be secured in position using suitable fixings (*not supplied*) at the four 4.5mm (0.178") case fixing points (*see figure 1.1*).

**THE DECODER MODULE IS NOT SUITABLE FOR EXTERNAL INSTALLATION.**

### 2.3 - System connection

Cable connections are required between the GPS antenna and decoder module and between the decoder module and the MC Series master clock. It is important that the GPS antenna to decoder module connection is made prior to the master clock connection.

The system is supplied with a pre-terminated 8 metre TNC to TNC

RG58CU coaxial cable for connection between the antenna and the decoder module. If required, this cable may be substituted for an alternative length of identical cable type up to a maximum of 25 metres. The cable should be connected to the compatible threaded socket on the underside of the GPS antenna and the socket on the decoder module.

The connection between the decoder module and the Remote Synchronisation Input on the MC Series master clock should be made using the supplied length of four core cable. Please refer to figure 2.1 below and table 2.1 for details of cable connections.

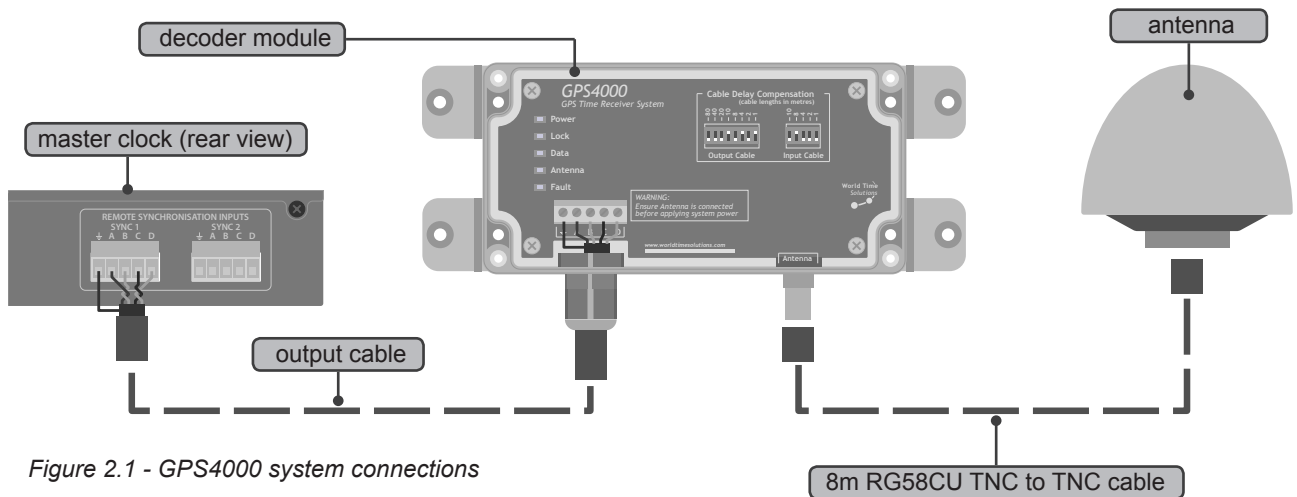


Figure 2.1 - GPS4000 system connections

Terminal ID	Cable colour code
GND	Cable screen drain wire
A	Black / Red
B	Red
C	Black / White
D	White

Table 2.1 - Output cable connection detail

If required, the decoder module to master clock cable may be extended using Belden 9502 cable up to a maximum total length of 150m (500ft). For low smoke/plenum applications, the supplied cable should be substituted for a Belden 82502 (or equivalent) type cable.

## 2.4 - Cable delay compensation

The cable delay compensation significantly reduces the effect of cable propagation delays degrading timing accuracy at the master clock. The installer should set the cable delay compensation switch banks for both the input (antenna) and output (master clock) cables (see fig 1.1) so as to match the actual cable lengths installed.

Switches set to 'ON' are summed to indicate the total cable length. For example, to set a length of 5 metres for the antenna cable, switches '1' and '4' only should be set on the 'Input Cable' switch bank.

# 3 - System operation

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Following correct installation (*see section 2*), and upon powering the MC Series master clock, the GPS4000 will automatically search for GPS signals. The GPS4000 also begins to send setup information to the master clock.

For a typical installation, system lock from a cold start should take under 10 minutes. Once the GPS4000 has synchronised to the GPS satellites, time and date information is automatically sent to the master clock.

## 3.1 - GPS4000 status information

The operational status of the GPS4000 may be visually confirmed via the status LEDs (*see figure 1.1*). The table below lists the function of the different LEDs.

LED	Status
Power	Green LED illuminates continuously when power is applied to the GPS4000 and the system is running
Lock	Green LED illuminates continuously when the GPS4000 is synchronised to the GPS satellites
Data	Green LED flashes to indicate communication between the GPS engine and the main processor
Antenna	Green LED illuminates continuously when the antenna is connected and functioning correctly. Red LED illuminates when the antenna is not detected or an antenna over voltage condition occurs. Details of fault condition can be viewed at the MC Series master clock.
Fault	Red LED illuminates upon detection of a decoder module fault condition

Table 3.1 - Status LEDs

The synchronisation status may also be confirmed via the MC Series master clock. Please refer to the user manual supplied with the master clock for further details.

# A - Specifications

Typical Performance Specifications:	
PPS accuracy:	50 nsec RMS

GPS Antenna Specifications:	
Gain:	30 dB @ 25 °C
Noise:	3.3 dB max (25 °C +/-5 °C)

GPS Module Specifications:	
GPS engine:	50 channel GPS L1 C/A
RF Reception Sensitivity:	-160 dBm (tracking) -160 dBm (reacquisition) -147 dBm (cold start) -156 dBm (hot start)

I/O Connections:	
I/O connection:	Single 1000 Series communication port for connection to a MC Series master clock

Mechanical & Electrical Specifications:	
Antenna dimensions:	77.5 x 66.2 mm (3.05" x 2.61")
Decoder module dimensions:	202 x 80 x 55 mm (7.95" x 3.15" x 2.17") (including removable wall brackets, excluding cable grommet and TNC)
Decoder module enclosure:	Light grey polycarbonate body with clear cover.
System weight:	1.5 kg (excluding output cable)
Antenna cable:	8m (25ft) RG58CU TNC to TNC
Output cable:	Two pair plus drain 7x32 (24 AWG) stranded cable with 100% foil shield and semi-rigid, sunlight resistant, Polyvinyl Chloride (PVC) jacket.
Output cable length supplied:	GPS4000-05: 5m (15ft) GPS4000-15: 15m (50ft) GPS4000-50: 50m (150ft)

Environmental Specifications:	
Operating temperature:	-30 to +50 °C
Relative humidity:	0% - 95%, noncondensing

Standards Compliance:	
Electrical Safety:	BS EN 60950-1:2006
Radio Disturbance:	BS EN 55022:2006
Immunity Characteristics:	BS EN 55024:2003

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