



GPS-G5
User's Manual

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Using the GPS

Description

The GPS-G5 is a 5Hz GPS that is suitable for the high dynamics of motor sport applications and is compatible with MoTeC ADL3, ADL2, SDL & ACL logging devices. The G5 low supply current makes it suitable for use with all MoTeC 5V sensor supplies.

The G5 consists of a GPS unit with a built in antenna.

Global Positioning System (GPS) units provide speed and position information, as well as altitude, heading, date, time and GPS statistics.

Speed

The speed information can be used for display and logging purposes, eliminating the need for wheel speed sensors. This is particularly useful in boat and drag racing applications. These applications usually encounter difficulties in obtaining true speed measurements.

Position

GPS position information can be used in MoTeC i2 data analysis software to show and compare the driven lines and to create track maps. The driven lines can also be plotted over a Google Earth image, allowing circuit racers and off-road drivers to see the path travelled in a real life context.

Lap timing

In circuit racing, a GPS unit can be a cost effective alternative to the traditional lap timing system. The position of the start/finish line can be marked either by a push button operated by the driver when passing the line or by entering the coordinates directly into the data acquisition system. This position can then be used by the logger or display as a beacon to calculate the lap time and by the data analysis software to indicate the start of each lap.

Electrical Connections

The G5 unit sends data (Standard NMEA RMC GGA) to the MoTeC logging device via an RS232 serial connection.

The following tables show the pin-out of the two available G5 connectors and how to wire them to MoTeC logging devices.

DTM06-4P



GPS Pin	GPS Name	Logging Device Name	ADL3 ADL2	SDL	ACL
1	Bat -	Bat -	7	4	Bat- from VIM
2	TX	RX	79	34	15
3	RX	Not Used			
4	5V	5V	18 etc	14	5V from VIM

ASL606-PN



GPS Pin	GPS Name	Logging Device Name	ADL3 ADL2	SDL	ACL
1	Bat -	Bat -	7	4	Bat- from VIM
2	TX	RX	79	34	15
3	RX	Not Used			
4	5V	5V	18 etc	14	5V from VIM
5	N/C	N/C	N/C	N/C	N/C

Note: The ADL3, ADL2 and SDL logging devices only have one serial connection. MoTeC Serial To CAN (STC) can be used to add a G5 to the system via CAN bus in event that the serial port is already in use.

Mounting

The G5 has an integrated antenna and should be mounted on an external horizontal surface that has a clear view of the sky.

The G5 should be mounted away from sources of interference. Voice radios, data telemetry and TV broadcasting antennas are forms of interference.

If mounting on a non-metallic surface it may be necessary to add a metallic ground plane under the unit to improve the signal level. The ground plane should be at least 150mm (6in) square and may be made of aluminium or steel.

The unit has a magnetic mounting base and includes an M3 thread in the center.

GPS Configuration

The G5 comes pre-configured from MoTeC USA to suit MoTeC logging devices. G5s operating outside of North America need additional programming.

GPS Operation

In normal use the G5 unit should start operating within 1 to 45 seconds of power up, however during first start-up or if the G5 has been moved to a new location it may take up to 45 seconds before it gains satellite lock and starts transmitting data.

To check that the G5 is operating correctly check the number of satellites being received using the device “Manager” software.

The G5 requires at least 4 satellites to function however normally the G5 should see at least 7 satellites, more satellites improves accuracy and minimises satellite drop out.

Loss of signal may occur when trees, buildings or a bridge obscures the satellites. The G5 will take a second or two to recover from this situation.

Logging Device Configuration

Software Version

The logging device must be running the following software version (or higher)

SDL	Version 1.3 or higher
ADL2	Version 4.4 or higher
ADL3	Version 5.0 or higher
ACL	Version 1.1 or higher

Set up Requirements

Communications Set Up:

Select Inputs | Communications Set Up | RS232 | Select the "GPS - Standard RMC GGA" template. Change the baud rate to 19200

Logging Set Up:

Select Functions | Logging Set Up and the following GPS Latitude, GPS Longitude, GPS Speed must be logged. The other GPS channels are optional.

The Logging Rate for all GPS channels should be set to 20Hz (even though the GPS is 5Hz)

Optional GPS Beacon Set Up

Beacon Set Up:

Select Calculations | Lap Time and Number Set Up | Beacon Tab | Beacon Type set to GPS.

Set the Detection radius. The default 16' (5m) radius is sufficient but can be changed if needed.

Set GPS beacon trigger type, Coordinates or Push Button.

Coordinates

The start, stop and split beacon points are marked, by entering the coordinates directly into the GPS Coordinates Editor. Details Editor | Venue type determines the function of the coordinates entered.

Loop and Cross Over venues: 1st coordinates entered are start/stop beacon point. Any additional coordinates will define the split beacon points.

Open venues: 1st coordinate defines the start beacon point 2nd coordinate defines the finish beacon point. Any additional coordinates will define the split beacon points.

Push Button

The start, stop and split beacon points are marked by a push button operated by the driver. A double press (within 1 second) will define a split beacon for a loop or crossover venue, or a finish beacon for an open venue.

Data Analysis

GPS data analysis requires i2 version 1.02 or higher.

All GPS channels (speed, heading, altitude etc) can be used in the usual way including plotting on a graph etc.

The GPS position data (latitude and longitude) can also be used for the following:

1. Plot the actual path travelled on a GPS Track component.
Select Add | GPS Track.
2. Generate the conventional track map.
Select Tools | Track Editor, then click Generate Track and select the GPS method.
3. Plot the path travelled over a Google Earth image.
Select File | Google Earth Export. Requires Google earth to be installed on the analysis PC. An Internet connection or a previously saved cache is needed to clearly plot the path travelled.

Specifications

Electrical

Power Supply Voltage 4.0 to 5.5 Vdc
Power Supply Current 100mA @ 5.0 Vdc

Connections

Connectors Deutsch DTM06-4P
 Deutsch ASL 606-05 PN

Cable length 7ft (2.13m)

Data

Output Type RS232
Output Levels 0V / 5Vdc (nominal)
Baud Rate 19200 (Motec default)
NMEA Sentences RMC, GGA (Motec default)

Physical

Antenna Built into GPS unit. RX Sensitivity -185 dBW minimum
Size 2.4in diam x 0.77in (61 diam x 19.5mm)
Weight 0.36lb (165g)
Operating Temp -22F to 176F (-30C to +80C)
Mounting Magnetic base + M3 centre thread

GPS Performance

Update Rate 5Hz
Satellite Channels 12
Reacquisition Time < 2secs
Hot Start Time 1 seconds
Warm Start Time 38 seconds
Cold Start Time 45 seconds
Dynamics >4G