GPS-MB

User's Manual

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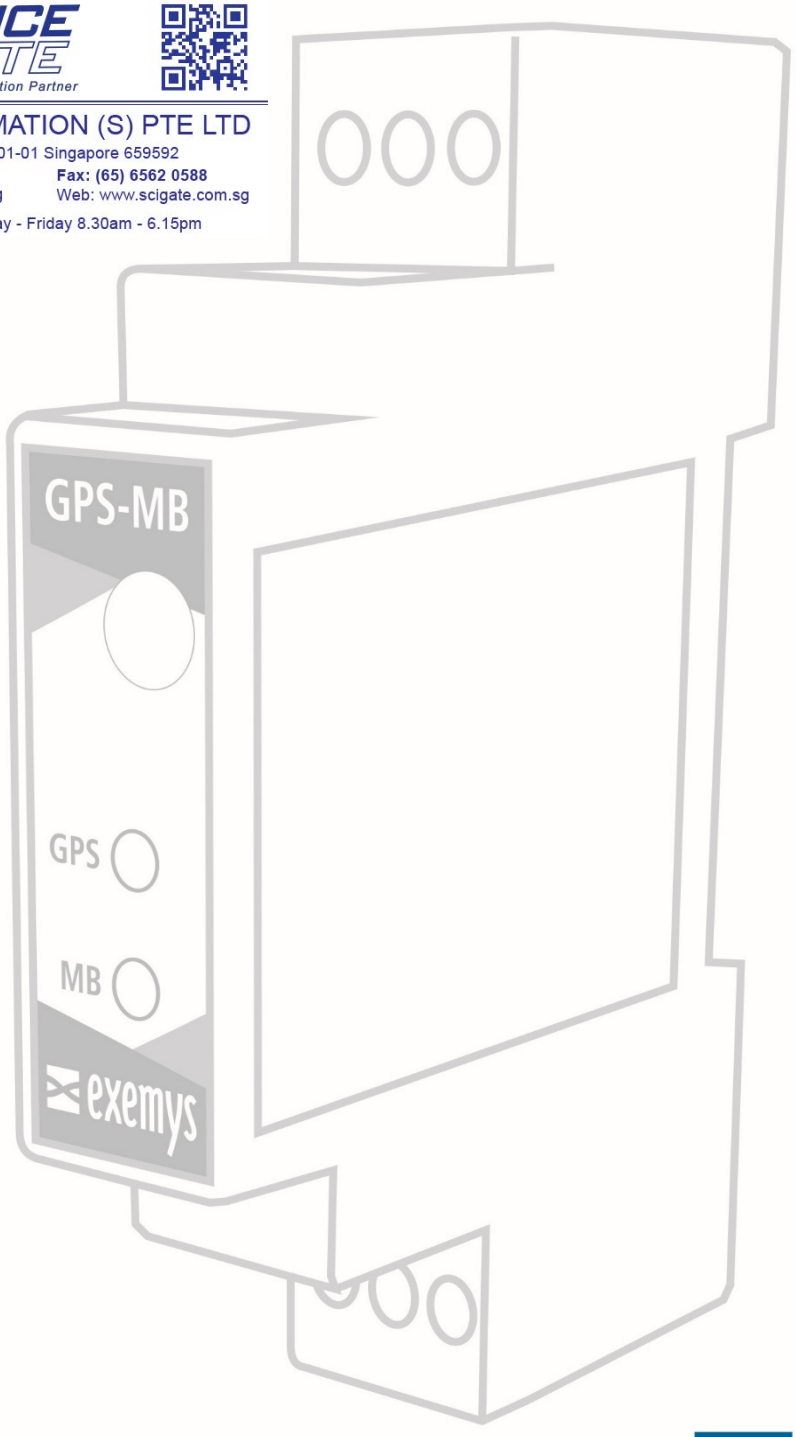

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For that reason, the specifications and capabilities are subject to change without prior notice.

Updated information can be found at www.exemys.com

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1 INTRODUCTION

1.1 Purpose of the manual

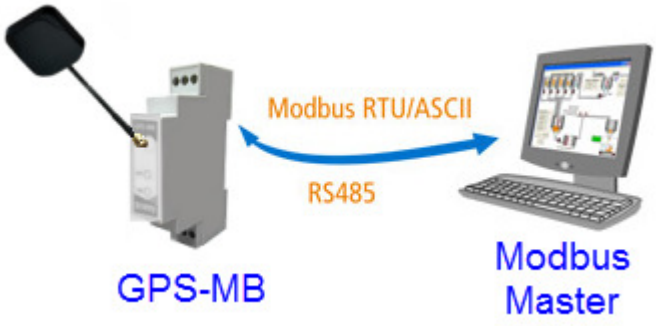
This manual provides the instructions for easy and quick installing and operating of the GPS-110-MB-PS. The manual starts with a general description of the product, following the instructions for the correct hardware installation. Configuration and operation of the device is detailed below.

1.2 Product Overview

GPS-110-MB-PS is a GPS with Modbus communication (slave).

GPS-110-MB-PS has two series ports, one RS232 for configuration and reading of NMEA sentences, and one RS485 to function as a Modbus slave.

All the data generated by the GPS (Latitude, Longitude, Speed, Time) are available in Modbus registers in its slave port.



1.3 Ordering Codes

The complete product ordering codes are:

Ordering Code	Description
GPS-110-MB-PS	(1) Serial Port RS-232 (1) Serial Port RS-485

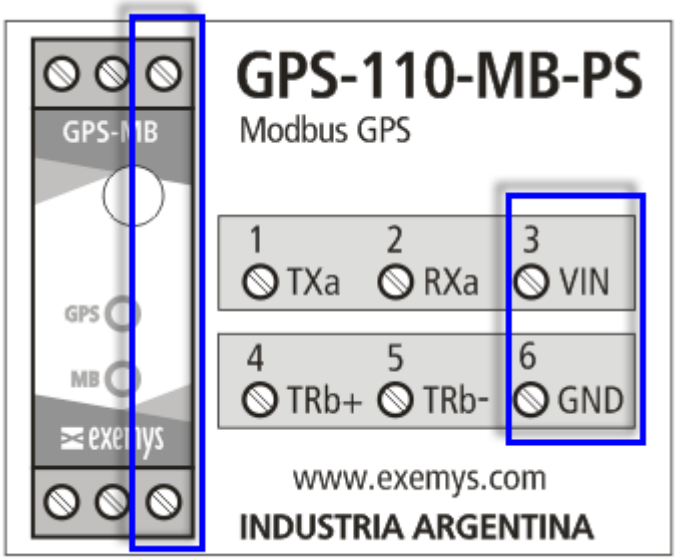
1.4 Technical Specifications

Technical Specification	
Communication Protocols	Modbus RTU, Modbus ASCII, NMEA 0183.
Serial Port	1 RS232+1RS485 on Terminal Block connection.
Device Management	RS-232 Serial Console.
LED Indicators	GPS data, Modbus data.
GPS Data	GPS, Galileo, Glonass Time for first cold data: 35 sec. typical Update speed: 1 second Accuracy: 3 ms for position, 0.1m / s for speed Sensitivity • Acquisition: -148dBm, cold start • Re-acquisition: -163dBm, warm start • Tracking: -165dBm SMA connector for active external antenna
GPS Antenna	Active with magnetic anchor SMA connector IP67 protection 3 meters of cable
Measurements	90 mm x 12,5 mm x 57 mm (Height x Width x Length) (without antenna connector)
Power Supply	10 to 30 V_{DC}
Consumption	12V_{DC} 26mA/ 24V_{DC} 18mA
Temperatures	Operation Temperature: -15°C to 65 °C Storage Temperature: -40°C to 75 °C
Warranty	1 Year Technical Support Included

2 INSTALLATION

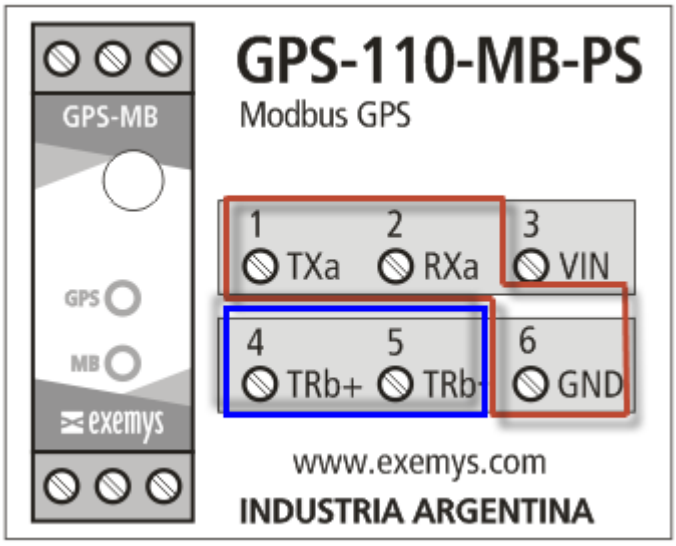
2.1 Connecting the power supply

GPS-110-MB-PS allows a power supply from +10 to 30 V_{DC}. Positive power supply must be connected to terminal N° 3 and negative power supply to terminal No. 6 as shown in the following figure:



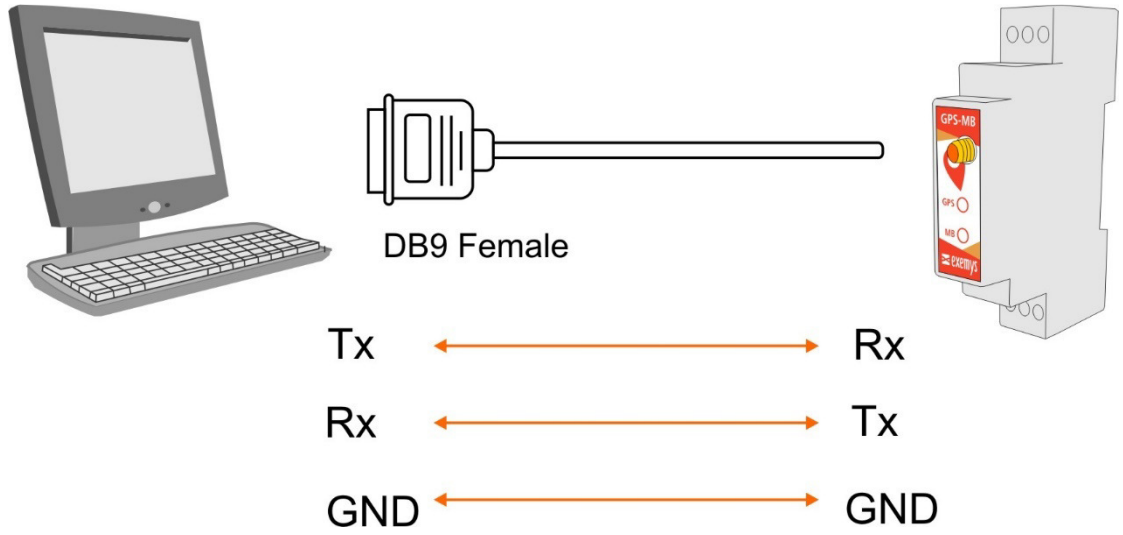
2.2 Serial Port Wirings

GPS-110-MB-PShas twoserial ports; one of them is RS232 (Port A), used for configuration and monitoring, and other one RS485 (Port B) for MODBUS.



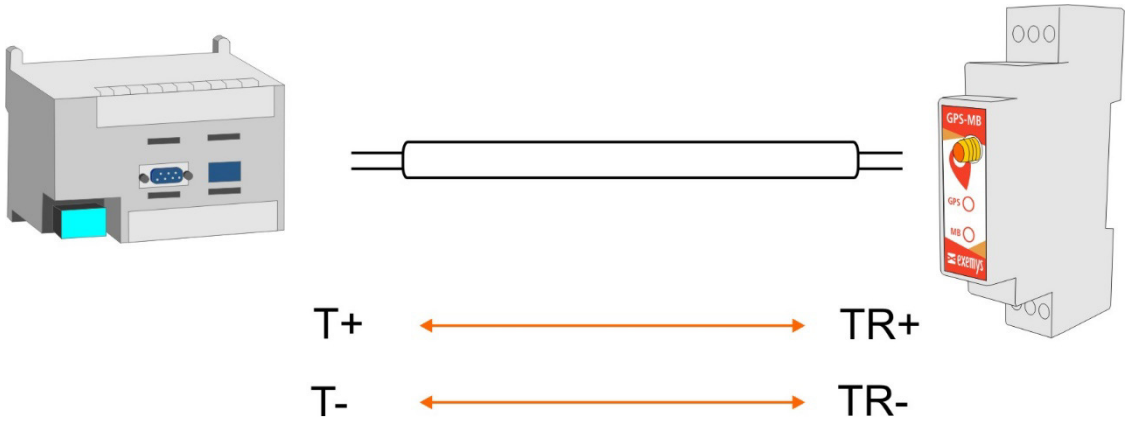
2.2.1 RS232 port wiring

To connect the device RS232 serial port to PC serial port or any other serial device to set and monitor, it must be connected as can be shown in the following figure. You should consider GPS-110-MB-PS is a DTE device, that means it must cross wire with those of the PC.



2.2.2 RS485 port wiring

To connect the device RS485 serial port to any serial device, it must be connected as can be shown in the following figure.



2.3 LEDs indicators

GPS-110-MB-PShas two LEDS indicators.

LED"GPS"

Permanently ON if there is no GPS signal.
Flashes when there is a GPS signal.
It also indicates the first seconds to send a configuration.

LED "MB"

Permanently ON if there are no Modbus queries.
Flashes every time you receive a valid Modbus query.

2.4 Antenna Connector

Device has an SMA connector on the front to connect an active external GPS antenna.

An active antenna with magnetic mounting and 3 meters of cable with SMA connector is provided with the device.

3 CONFIGURATION

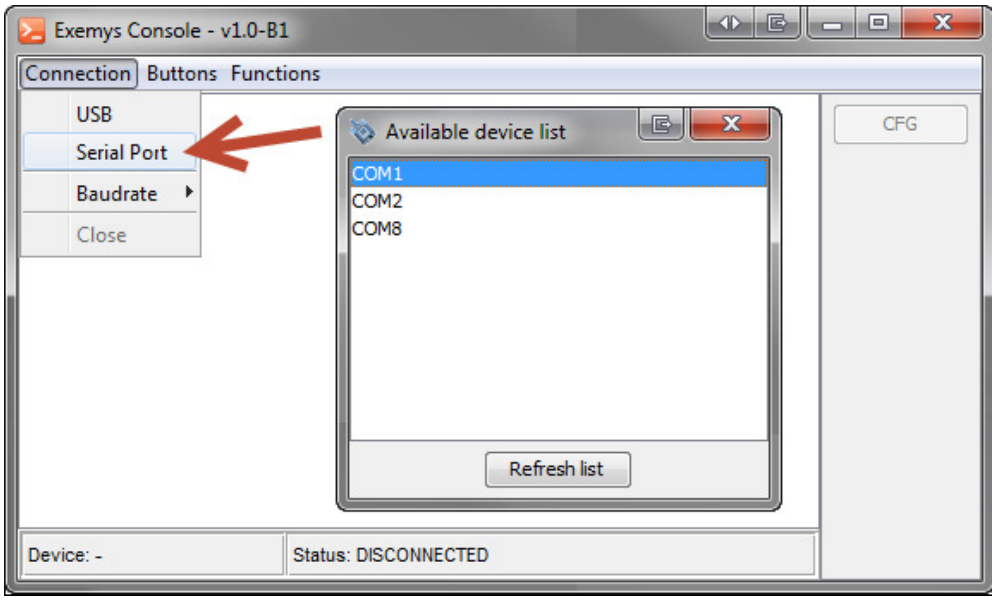
GPS-110-MB-PS configuration is done through a command console connecting the device to a RS232 port on the PC.

To access the command console, you must connect the GPS-110-MB-PS to a RS232 port on a PC and you must install an Exemys serial terminal program, named *Exemys Console.*

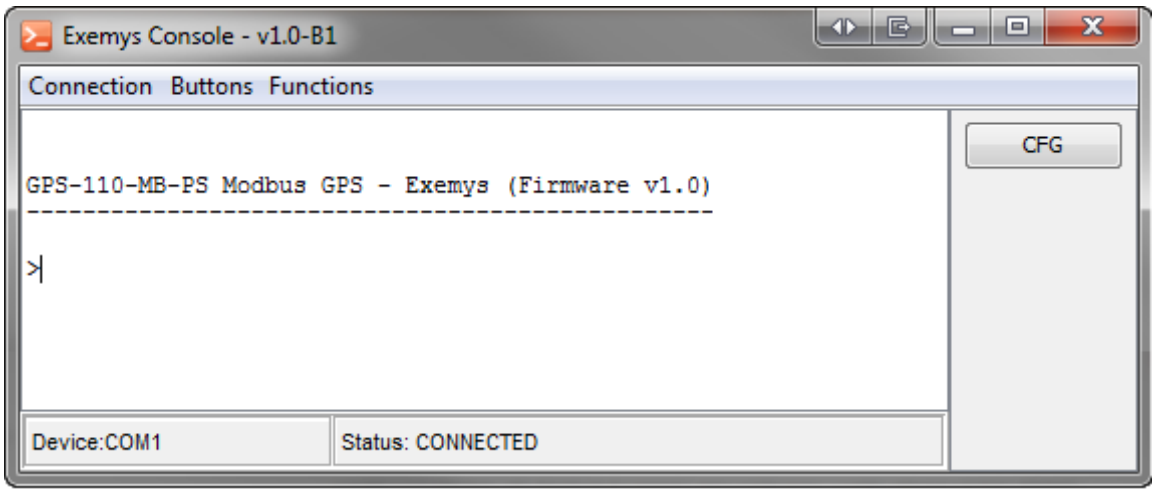
Download the Exemys Console:
http://www.exemys.com/console

Once the serial terminal program is installed, connect the GPS-110-MB-PS to a RS232 port on the PC and execute the *Exemys Console*.

1. Click on Connection -> Serial Port, it will open a window with name of all COM Serial port. Select with double click the port where device is connected. Verify Baud rate in the serial port is 9600.



2. Turn on the GPS-110-MB-PS and in the first 7 seconds type CFG and press ENTER or press the CFG button. GPS-110-MB-PS will display a welcome message on the configuration command console.



3. Type the commands which you want to edit its parameters with the proposed values.
4. To finish and save all the changes, type the command **5** (END), after which device will restart and return to normal operation.

3.1 Port A Configuration- NMEA.

Port A (RS232) can be used to monitor the internal GPS operation by seeing the NMEA sentences that the GPS sends. You can ignore this section if you are not going to use port A NMEA (RS 232).

Command	Description
(1)-> 1 Baud Rate (1200|…|115200)	Setting the baud rate of the Serial Port A. • Values: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 or 115200. Example of use: `1->1->8: 115200 bps`
(1)-> 2 Data Bits (7|8)	Setting the data bits of the Serial Port A. • Values: 7 or 8. Example of use:`1->2->1: 7 Data bits`
(1)-> 3 Parity (N|E|O)	Setting the parity of the port A • Values: None, Even, Odd Example of use:`1->3->2: Even parity`
(1)-> 4 Parse (E|D)	Enables the interpretation of the sentences in port A. • Disabled: The NMEA frames are displayed as they come from the GPS. • Enabled: The NMEA sentences are decoded for a simple reading of the user. Example of use: `1->4->1: Interpretation Enable`

3.2 Port B Configuration-Modbus.

Command	Description
(2)-> 1 Baud Rate (1200|…|115200)	Setting the baud rate of the Serial Port B. • Values: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 or 115200. Example of use: `2->1->4: 9600 bps`
(2)-> 2 Data Bits (7|8)	Setting the data bits of the Serial Port B. • Values: 7 or 8. Example of use: `2->2->2: 8 Data bits`
(2)-> 3 Parity (N|E|O)	Setting the parity of the port B • Values: None, Even, Odd Example of use: `2->3->3: Odd parity`
(2)-> 4 Protocol (R|A)	Setting the protocol communication of the port B • Values: RTU orASCII. Example of use: `2->4->1: Modbus RTU`
(2)->5 RTU PacketTimeOut (3..50)	Modbus RTU packet time out for the port B • Values: 3 to 50 [Bytes Time]. Example of use:`2->4->10: Time Out 10`
(2)-> 6 Exceptions (E|D)	Enable or Disable the exceptions for the port B. • Values:Enable, Disable. Example of use:`2->6->1: Exceptions Enable`
(2)-> 7 Modbus Slave ID (1...254)	Setting the slave ID to access the Modbus register memory. • Values: 1 to 254. Example of use:`2->7->88:Modbus Slave ID 88`

RTU PACKETTIME OUT- Modbus RTU packet time out: Modbus RTU packets are separated from each other by a time interval. This parameter allows you to change the maximum time to count after the last byte of the packet is received, during which the GPS-110-MB-PS will assume that the packet has not yet been terminated. After this maximum time, the GPS-110-MB-PS will assume that the packet has finished arriving. The time is entered in one-byte time units, with a minimum of 3 units.

EXCEPTIONS- Enables or disables exceptions for the Modbus Port. If the option is disabled the GPS-110-MB-PS will respond to errors with silence, otherwise it will return an exception code.

NOTE: Stop bits are fixed at 1 in both ports

3.3 Other configuration settings.

Command	Description
3 Show Configuration	Request the current device configuration.
4 Factory Reset	Reset to the factory settings. This command must be entered 2 times for this to begin working.
5 END	It saves the changes made and it ends the command console.

4 MODBUS REGISTERS

If there is no GPS signal some registers will get value 0.

	Main Registers		
40001:2	Latitude	x10.000.000 signed	º
40003:4	Longitude	x10.000.000 signed	º
40005:6	Altitude	x10	meters
40007	Geoidal separation	x10	meters
40008	True course	x10	º
40010	Magnetic variation	x10	º
40011	Speed	x10	kph
40012	Speed over ground	x10	kph
40013	GPS Quality	-	-
40014	Number of satellites in view	-	-
40015	Age of differential GPS data	x10	seconds
40016	Horizontal Dilution of precision	x10	-
40017:18	UTC Date	ddmmyyyy	-
40019:20	UTC Time	hhmmss	-
40021	State (A: active / V: no signal)	ASCII	-
40022	Mode [A: Autonomous / D: Differential/ E: Estimated]	ASCII	-

	Alternative Registers		
40050	Latitude–Degrees	-	-
40051	Latitude– Minutes	-	-
40052:53	Latitude–Minutes fraction	7 digits	-
40054	Longitude–Degrees	-	-
40055	Longitude–Minutes	-	-
40056:57	Longitude - Minutes fraction	7 digits	-
40058:59	Altitude	x10	feet
40060	Geoidal separation	x10	feet
40061	Speed	x10	knot
40062	Speed over ground	x10	knot
40063:64	UTC Date + UTC Time	Seconds since 1970	seconds
40065:66	UTC Time	Seconds since12:00 AM	seconds
40067	Time	hh	-
40068	Minutes	mm	-
40069	Seconds	ss	-
40070	Day	dd	-
40071	Month	mm	-
40072	Year	yyyy	-
40073	State [active / no signal]	1 o 0	-
40074	Mode [A: Autonomous / D: Differential/ E: Estimated]	0 o 1 o 2	-

Clarification:

•Where there are two Modbus registers is to represent a 32-bit signed integer value, the first register contains the lower part and the second the upper part of the value.

• Where "x10" is specified, it means that the value obtained from the GPS is multiplied by the corresponding factor to achieve a higher degree of resolution in the indicated value.

• Where "ASCII" is specified, it means that the value read is the numeric representation according to the ASCII coding of the letter obtained from the GPS

• Where "ddmmyyyy" is specified, it means that in the value, 2 digits represent the day, 2 the month and 4 the year. Thus, the number 15112019, refers to the date November 15, 2019.

• Where "hhmmss" is specified, it means that in the value, 2 digits represent the hour, 2 the minutes and 2 the seconds. Thus, the decimal number 123045, refers to the time 12:30:45.

• In the registers where the Latitude and Longitude are expressed, the value is presented in degrees multiplied by 10,000,000.

For example, if the register value is **-346.054.585**, you must divide it by 10.000.000 to take the **format degrees**.

Then it becomes**-34,6054585°**

To take it to the **degrees + minutes format**, you must multiply the decimal part of the degrees by 60'. In this case 0.6054585 x 60 'equals 36.32751'.

Then it becomes**-34° 36,32751'**

To take it to the **degrees + minutes + seconds format**, you must multiply the decimal part of the minutes by 60''. In this case 0.32751 x 60 "equals 19.6506".

Then it becomes**-34° 36'19,6506 "**

• In the alternative Latitude and Longitude format, grade and minutes are represented in two registers and the decimal part of the minutes in another register with 7 digits.

For the previous example with **-34° 36,32751'**it is represented in 3 registers

-34 (with grades)
36 (with the minutes)
3275100 (the decimal part of the minutes with 7 digits)

Easy online calculation is available at www.exemys.com/gpsconverter

Appendix A

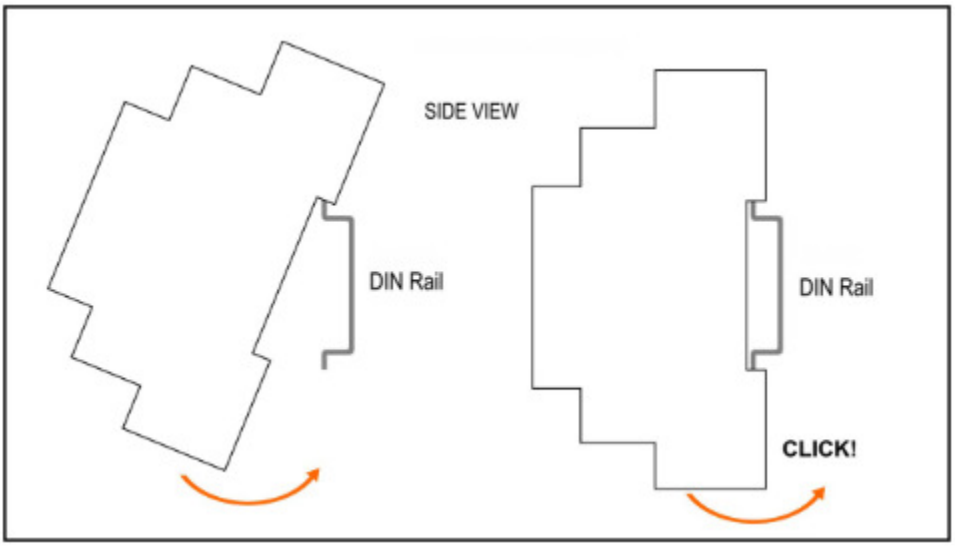
A.FACTORY SETTINGS

Parameter	Value
Port A - NMEA - RS232	
Baud Rate	9600 bps
Data Bits	8
Parity	NONE
Interpretation NMEA	Disable
Port B – MODBUS – RS485	
Baud Rate	9600 bps
Data Bits	8
Parity	NO
Protocol	Modbus RTU
Modbus RTU packet time	3 [bytes Time]
Exceptions	Disable
Modbus Slave ID	240

Appendix B

B.DIN RAIL MOUNTING

Device can be mounted on a DIN rail. To assembly the module to the rail, make the upper side of the device fit the DIN rail and then push gently until you hear a Click! As shown in the figure.



To disassemble the device of the rail DIN, pull down the metallic clip and then remove it as shown in the figure.