Maestro 100 Series

GSM/GPRS Modems
Eco – Lite – 100M – Extended
USER MANUAL
Rev. 01

REVISION HISTORY

Rev.	Date	Details	Originated by
00	01 Mar 2007	First release	Wallace Lee
01	30 Jan 2008	Second release	Cecile Lin

This manual is written without any warranty.

Maestro Wireless Solution Ltd. reserves the right to modify or improve the product and its accessories which can also be withdrawn without prior notice.

Besides, our company stresses the fact that the performance of the product as well as accessories depends not only on the proper conditions of use, but also on the environment around the places of use.

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1

TABLE OF CONTENTS

SAFETY PRECAUTIONS

☐ The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.

☐ Do not use your phone in aircraft, hospitals, petrol stations or in places where using GSM products is prohibited.

☐ Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliance, etc.

☐ An external antenna must be connected to the modem for proper operation. Only used approved antennas with the modem. Please contact authorized dealer on finding an approved antenna.

☐ Always keep the antenna with minimum safety distance of 26.6 cm or more from human body. Do not put the antenna inside metallic box, containers, etc.

Using the modem in vehicle

☐ Check for any regulation or law authorizing the use of GSM in vehicle in your country before installing the modem

☐ Install the modem by qualified personnel. Consult your vehicle dealer for any possible interference of electronic parts by the modem.

☐ The modem should be connected to the vehicle's supply system by using a fuse-protected terminal in the vehicle's fuse box

☐ Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after extended period.

Protecting your modem

☐ To ensure error-free usage, please install and operate your modem with care. Do remember the following:

☐ Do not expose the modem to extreme conditions such as high humidity/rain, high temperatures, direct sunlight, caustic/harsh chemicals, dust, or water.

☐ Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.

☐ Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.

☐ Do not pull the antenna or power supply cable. Attach/ detach by holding the connector.

• Connect the modem only according to the instruction manual. Failure to do it will
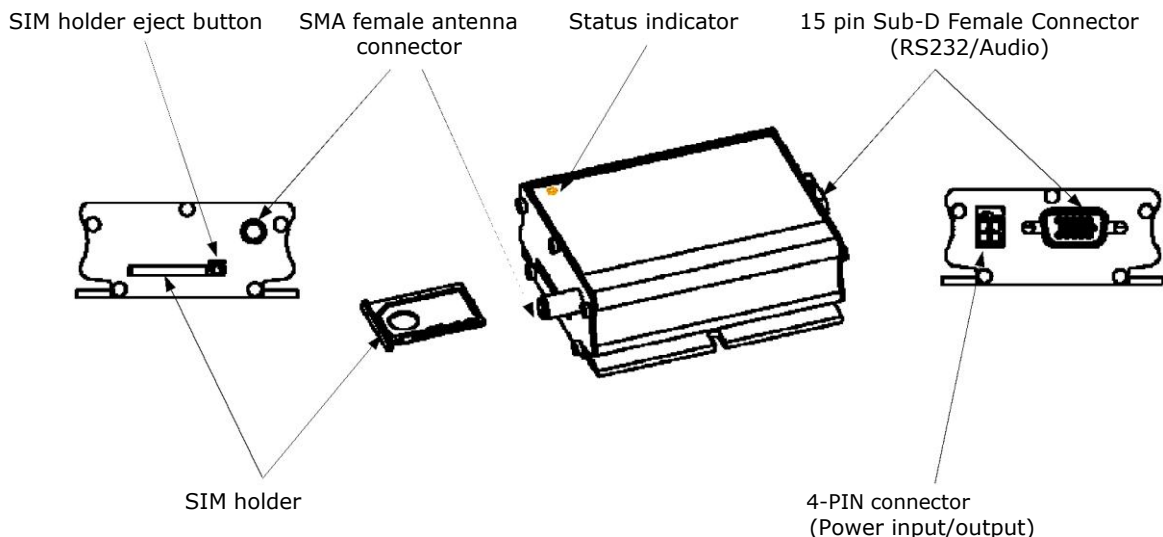
CHAPTER 1: Introduction

Maestro 100 is a ready-to-use GSM modem for voice, data, fax and SMS services. It also supports GPRS Class 10 for hi-speed data transfer (except Maestro 100 Eco). Maestro 100 can be easily controlled by using AT command for all kinds of operations. With standard 9-pin RS232 port and telephone-like audio plug (via optional cable) the Maestro 100 can be set up with minimal effort.

1. Package

The Maestro 100 package should include the following:

- Maestro 100/Ext/Eco/Lite x 1

- Power cord with fuse x 1

- Safety note x 1

2. Interfaces

SIM holder eject button   SMA female antenna connector   Status indicator   15 pin Sub-D Female Connector (RS232/Audio)

SIM holder   4-PIN connector (Power input/output)

a. Status indicator

The LED will indicate different status of the modem:

☐   OFF   Modem is switched off

☐   ON   Modem is connecting to the network

☐   Flashing slowly Modem is in idle mode

☐   Flashing rapidly Modem is in transmission/communication (GSM only)

b. SMA female antenna connector

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the correct GSM frequency with impedance of 50ohm, and also

c. 15-Pin D-Sub Female connector (RS232/Audio)

The connector provides serial link and audio link to the modem
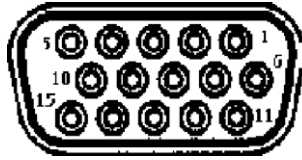
Pin number	Name	EIA designation	Type	Note
1	DCD	Data Carrier Detect	Output	
2	TX	Transmit Data	Input	
3	BOOT		Input	Not used
4	MICROPHONE (+)		Input	With 2VDC bias
5	MICROPHONE (-)		Input	output
6	RX	Receive Data	Output	
7	DSR	Data Set Ready	Output	
8	DTR	Data Terminal Ready	Input	
9	GND	Ground	Ground	
10	SPEAKER (+)		Output	
11	CTS	Clear To Send	Output	
12	RTS	Request To Send	Input	
13	RI	Ring Indicator	Output	
14	RESET		Input	Pull low to reset
15	SPEAKER (-)		Output	

Specification of microphone and speaker to be connected:

Parameters	Min	Typical	Max	Remark
Microphone current @2V/2K Ohm		0.5mA		
Microphone input level			100 mVpp	
Speaker output current 150 Ohm/1nF		16mA		
Speaker impedance	32ohm	50Ohm		

Please refer to the document "Application notes - Power supply & Audio" for more information about audio connection.

### d. 4-Pin connector (Power input/output)

A cable, included in the package shall be used for power supply connection:
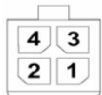
Pin assignment of 4-Pin connector

| Pin number	Name	Functions
1	I/O	Input/Output port
2	~INTR	Interrupt function triggered by pulling this pin to ground or LOW level; reserved for additional functions with new firmware
3	POWER -	DC power negative input
4	POWER +	DC power positive input

A cable, included in the package shall be used for power supply connection:

Connector Micro-Fit 3.0

Fuse holder
Fuse rating:
250V – 2.5A

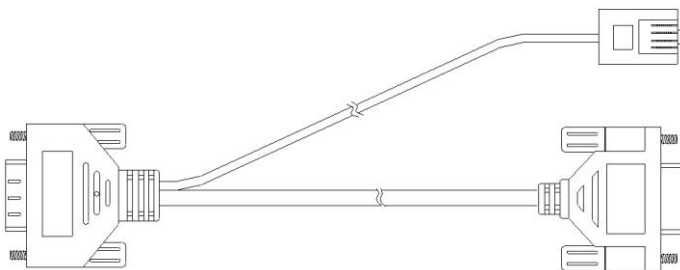Stripped wire

5-32V DC Supply
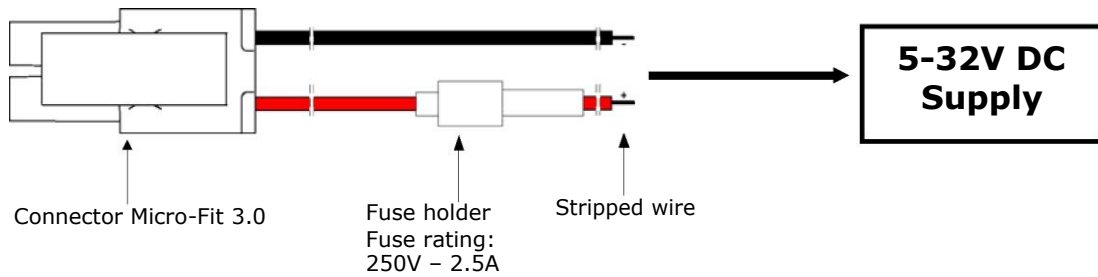
3. Optional accessories

You may contact your sales agent for the following optional accessories:
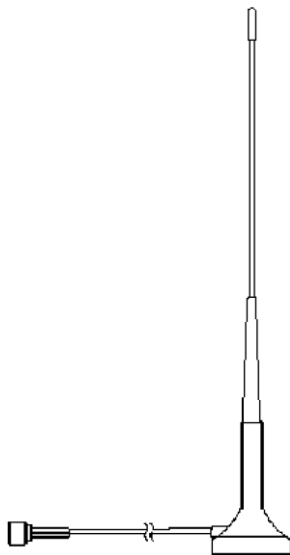
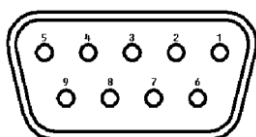**External antenna**

- Magnetic mount type
- Frequency GSM 900/1800 band
- Gain 3db
- VSWR < 1.5:1
- Height ~ 236 mm (including magnetic base)
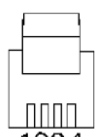- Cable: Type RG-174U length 2.5m

'Y' cable

- Direct connection with standard 9-pin RS-232 port (DTE)
- Direct connection with common handset of telephone for voice call
- Shielded cable
- Cable length 1.1m (w/connector)

Sub-D 9 pin

1234
4p4c plug

Pin assignment

| Sub-D 15 (male)	Sub-D 9 (female)	Plug 4P4C
1	1	
2	3	
3		
4		1
5		4
6	2	
7	6	
8	4	
9	5	
10		2
11	8	
12	7	
13	9	
14		
15		3
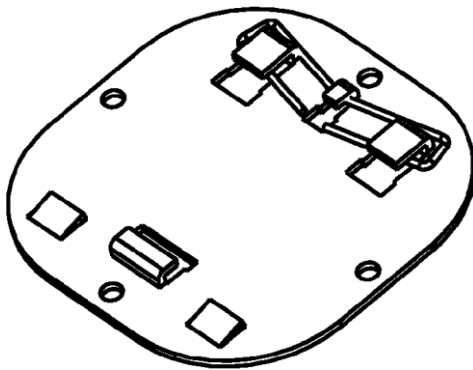
DIN rail mount

☐ Quick attachment / detachment to standard DIN rail

☐ Zinc plated Steel

CHAPTER 2: INSTALLATION

1. Mounting the modem

Use 2 pieces of M3 screw to mount the modem. When using optional DIN rail mount, please refer to document "Installation of DIN rail mount".

Screw mounting slot

Bottom view
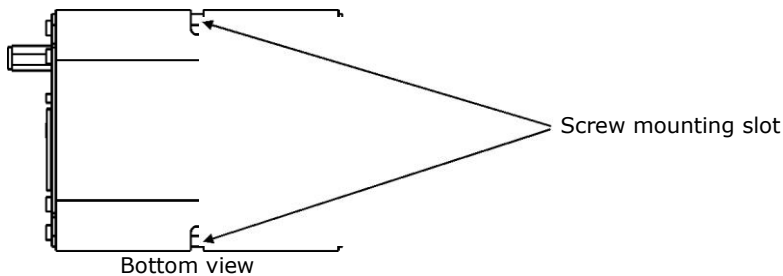
2. Install the SIM card

Use a ball pen or paper clip to press the SIM holder eject button. The SIM holder will come out a little. Then take out the SIM holder.

Note: DO NOT pull out the SIM holder without pushing the ejector button.

Put the SIM card to the tray; make sure it has completely sat on the tray. Put the tray back into the slot.

3. Connect the external antenna (SMA type)

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM frequency with impedance of 50ohm, and also connector is secured tightly.

Note: Please use antenna designed for GSM device operation. Incorrect antenna will affect communication and even damage the modem.

SMA male connector
of antenna cable

Secure tightly
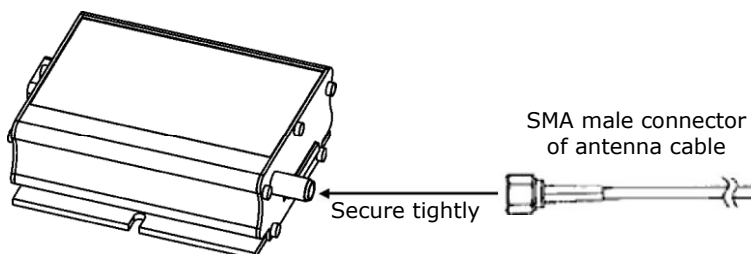
4. Connect the modem to external device

You can use the optional 'Y' cable to connect the modem's Sub-D connector to external controller/computer. Note: The modem CANNOT be directly connected to the 'LINE' jack of a landline telephone.
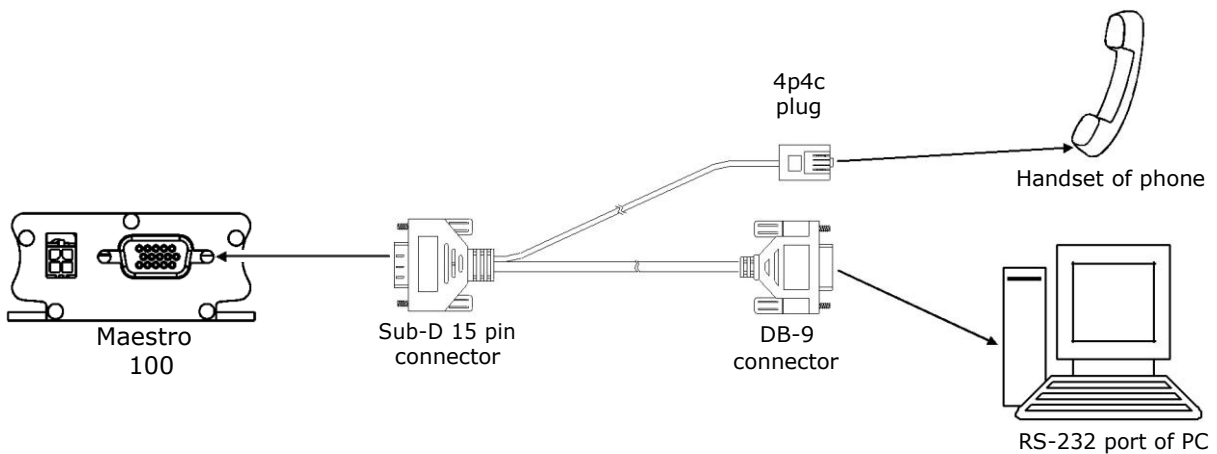
Connection example using optional 'Y' cable:

5. Connect the DC power supply

Connect the open ending of the inducted power cord to a DC supply. Refer to the following for power supply requirement.

Input voltage range	5V – 32V
Rated current	650 mA
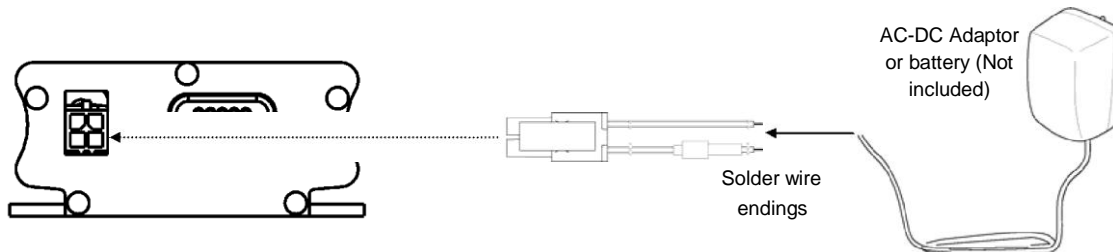
Connect the connector to the modem. The modem will turn on automatically.

The status indicator on the modem will be lit when power on. After a few seconds it will go flashing slowly (registered to the network successfully refer 1.2.1).

CHAPTER 3: WORKING WITH MAESTRO 100

1. Checking the modem (using Microsoft Windows XP HyperTerminal as example)

a. On the first time power-up you can use terminal software to communicate with the modem through an RS232 serial port. Following example is using the HyperTerminal in Windows XP.
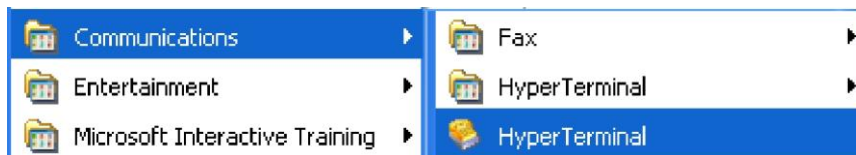
b. On Windows XP, start the HyperTerminal program. Assign a name for a new session.

c. Choose the correct Com port and baud rate settings (9600bps for Eco; 115200bps for others, 8bits, no parity bit, 1 stop bit)
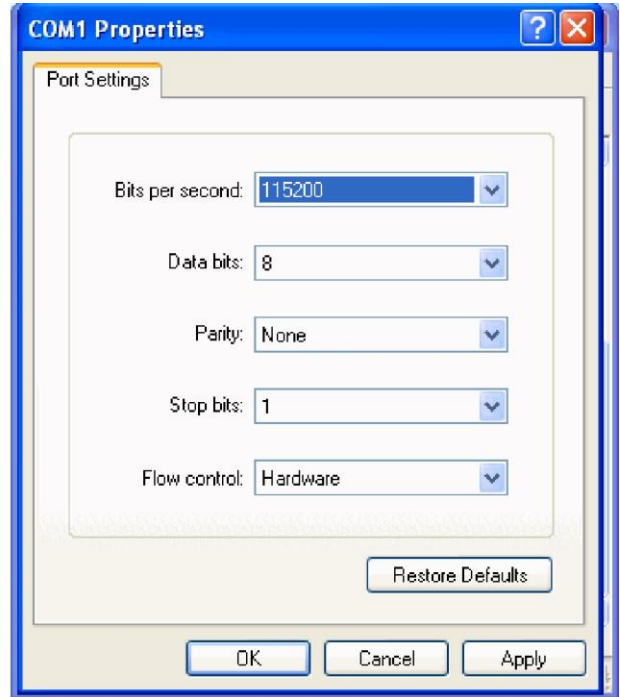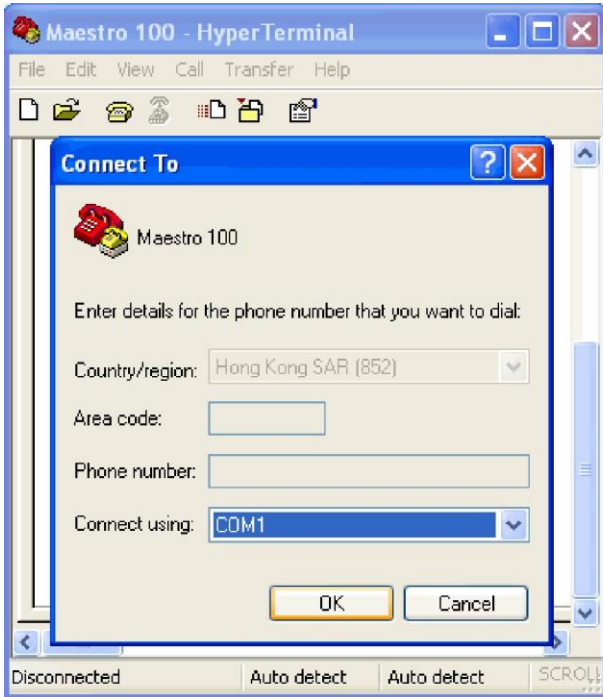
d. On the terminal screen, type "AT" to check the "OK" response from the modem

2. Basic operation

Followings are examples of some AT commands. Please refer to the AT command document for a full description.

Note: Issue AT+CMEE=1 to have extended error code (+CME ERROR)

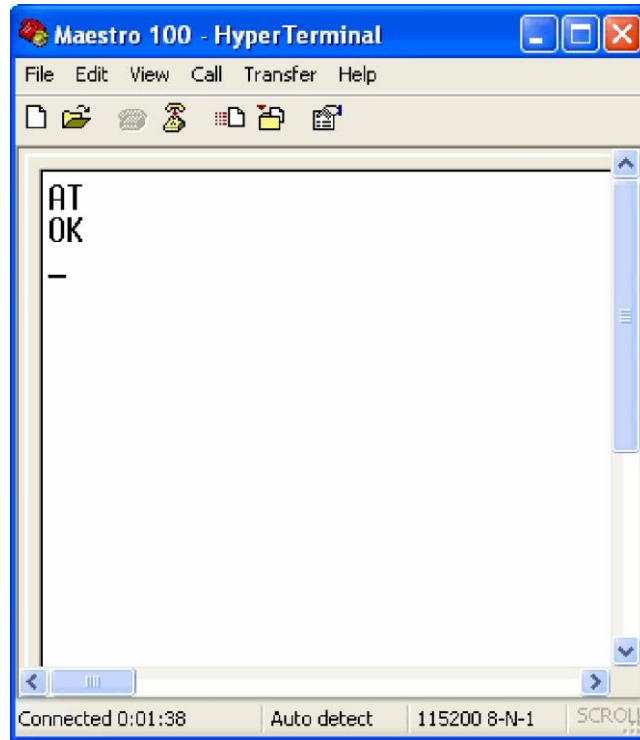| Description	AT commands	Modem response	Comments
Network registration checking	AT+CREG?	CREG=<mode>,1	Modem registered to the network
		CREG=<mode>,2	Registration lost, re-registration attempt
		CREG=<mode>,0	Modem not registered on the network, no registration attempt
Receiving signal strength	AT+CSQ	+CSQ:20,0	The first parameter has to be at least 15 for normal communication
Receiving an incoming call		RING	An incoming call is waiting
	ATA		Answer the call
		OK	
Make a call	ATD1234567;		Don't forget the ";" at the end for "voice" call
		OK	Communication established
		CME ERROR : 11	PIN code not entered (with + CME = 1 mode)
		CME ERROR : 3	AOC credit exceeded or a communication is already established
Make an emergency call	ATD 112;		Don't forget the ";" at the end for "voice" call
		OK	
Communication loss		NO CARRIER	
Hang up	ATH		
		OK	
Enter PIN code	AT+CPIN=1234		
		OK	PIN Code accepted
		+CME ERROR : 16	Incorrect PIN code (with +CME = 1 mode)
		+CME ERROR : 3	PIN already entered (with +CME = 1 mode)
Saves parameters in non-volatile memory	AT&W		
		OK	The configuration settings are stored

CHAPTER 4: SPECIFICATIONS

- ☐ Quad Band GSM 850 / 900 / 1800 /1900 MHz
- ☐ Support Data, SMS, Voice and Fax
- ☐ Max power output: 2W(900MHz), 1W(1800MHz)
- ☐ Group 3 FAX support (Class 1 and 2)
- ☐ GPRS Class B class 10 (4Rx+1Tx or 3Rx+2Tx) at maximum speed* (not applicable for Maestro 100 Eco)
- ☐ SIM Tool Kit Class 2
- ☐ AT command set (GSM 07.05, GSM 07.07 and WAVECOM proprietary)

*Note: available slot for GPRS connection is network dependent.

Power requirements:

Input voltage range	5V - 32V
Rated current	650 mA

Typical current consumption:

	@5V	@12V	@32V
GSM850 communication mode PCL5	310mA	130mA	50mA
EGSM900 communication mode PCL5	310mA	130mA	50mA
DCS1800 communication mode PCL0	240mA	100mA	40mA
PCS1900 communication mode PCL0	240mA	100mA	40mA
GPRS 850 Class 10^	520mA	220mA	80mA
GPRS900 class 10^	520mA	220mA	80mA
GPRS1800 class 10^	390mA	160mA	70mA
GPRS1900 Class 10^	390mA	160mA	70mA
Idle mode	35mA	16mA	8mA
Idle mode with power saving	12mA	11mA	5mA

^Note: Not applicable to Maestro 100 Eco

Interfaces:

- ☐ SIM Holder
- ☐ 15 pin sub-D connector
- ☐ 4 pin power supply connector
- ☐ SMA antenna connector (50 Ohm)

Dimensions

- ☐ Overall size: 88mm x 60mm x 26mm
- ☐ Weight: 100g
- ☐ Temperature range: Operating: -30°C to +75°C (Ext model)
                                        -20°C to +55°C (Other models)
                         Storage: -40°C to +85°C (Ext model)
                                        -25°C to +70°C (Other model)

CHAPTER 5: APPENDIX

1. Factory settings

The modem has the following factory settings. Please refer to the AT command document for the meaning of each setting.

Related AT commands	Factory settings	Description
AT+IPR	115200 (9600 for Eco)	DTE-DCE data rate
AT+IFC	2,2	DTE-DCE flow control
AT+ICF	3,4	DTE-DCE character framing
ATE	1	ECHO
AT&C	1	DCD signal
AT&D	2	DTR signal
ATQ	0	Result code suppression
ATV	1	Response format
AT&S	1	DSR signal
ATS0	0	Auto answer
AT+CLIP	0	Calling line ID presentation
AT+CRLP		Calling line ID restriction
AT+CSCS	"PCCP437"	Character Set
AT+CMGF	1	Short message format
AT+CSMP	1,67,0,0	Test mode parameters*
AT+CNMI	0,1,0,0	New message indication*

*Note: settings stored in SIM, not in modem

2. Input/Output port

This port can be configured as either an input one or an output one.

To configure it as an input port, first issue AT+WIOW=2, 0 to disable the output port. Use AT+WIOR=3 to read the status of this input port. Response +WIOR: 0 represent Logic HIGH (>3V); Response +WIOR: 1 represent Logic LOW (<0.5). To use it as an output port, issue AT+WIOW=2,1 will turn it on and it will drain current to ground. The current is recommended not to exceed 5mA. Issue AT+WIOW=2,0 will turn it off.

3. RS232 Auto-online mode (power saving)

When being in the auto-online, the RS232 transceiver will shut down most of its hardware to save power is it does not detect a valid input for more than 100uS. The RS232 transceiver will wake up when valid input is detected again.

By default, the RS232 transceiver is put in auto-online. This mode can be turned off by issuing AT+WIOM=,16.

CHAPTER 6: TROUBLESHOOTING

1. The modem's LED does not light

Check if the modem has been properly connected to a 5 - 32V power

supply Check if the power connector is properly inserted

Check the fuse on the power cord

2. The modem's LED lights but does not blink long time after power up

Check if a valid SIM card has been properly inserted

Check if the SIM card has been locked (refer to AT+CPIN command in AT command guide)

Check if the external has been properly connected to the

modem Check if the network coverage is available

3. The modem does not respond to the terminal program

Check if the RS232 cable has been properly connected

Check if your program has proper settings. Factory setting of the modem is:

```
115200  (9600bps  for  Maestro  100
Eco) 8 data bits
No parity bit
1 stop bit
```

4. No voice could be heard for the modem's speaker output when a call is answered

Make sure a voice call has been made (refer to AT command guide)

Enter the AR+SPEAKER=1 command