

Robustel GoRugged M1000 Pro

Serial to GPRS/EDGE Gateway

For GSM/GPRS/EDGE Networks

User Guide

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Robustel

www.robustel.com

About This Document

This document describes the hardware and software of the *Robustel M1000 Pro Serial to GPRS/EDGE Gateway*.

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Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the modem are used in a normal manner with a well-constructed network, the modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Robustel accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the modem, or for failure of the modem to transmit or receive such data.

Safety Precautions

General

- 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 modem 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 uses approved antenna with the modem. Please contact authorized distributor 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.

Note: *Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Modem may be used at this time.*

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.
- The driver or operator of any vehicle should not operate the modem while in control of a vehicle.
- Install the modem by qualified personnel. Consult your vehicle distributor 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 follow:
- 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 conditions.
- 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 void the warranty.
- In case of problem, please contact authorized distributor.

Regulatory and Type Approval Information

Table 1: Directives



2002/95/EC	Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)	
2002/96/EC	Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE)	
2003/108/EC	Directive of the European Parliament and of the Council of 8 December 2003 amending directive 2002/96/ec on waste electrical and electronic equipment (WEEE)	

Table 2: Standards of the Ministry of Information Industry of the People’s Republic of China


SJ/T 11363-2006	“Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products” (2006-06).	
SJ/T 11364-2006	<p>“Marking for Control of Pollution Caused by Electronic Information Products” (2006-06).</p> <p>According to the “Chinese Administration on the Control of Pollution caused by Electronic Information Products” (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Hardware Interface Description.</p> <p>Please see Table 3 for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006.</p>	

Table 3: Toxic or hazardous substances or elements with defined concentration limits

Name of the part	Hazardous substances					
	(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)
Metal Parts	o	o	o	o	o	o
Circuit Modules	x	o	o	o	o	o
Cables and Cable Assemblies	o	o	o	o	o	o
Plastic and Polymeric parts	o	o	o	o	o	o

O:
Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X:
Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials for this part *might exceed* the limit requirement in SJ/T11363-2006.

Revision History

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Release Date	Firmware Version	Details
2011-08-31	1.00	First Release
2011-12-27	1.01	Add DI, DO

Contents

Chapter 1.	Product Concept.....	8
1.1	Overview	8
1.2	Packing List.....	8
1.3	Features and Specifications.....	10
1.4	Dimensions.....	12
1.5	Selection and Ordering Data	12
Chapter 2.	Installation.....	13
2.1	Overview	13
2.2	LED Indicators.....	13
2.3	Mounting the Modem.....	14
2.4	Installation the SIM Card.....	15
2.5	Connect the External Antenna (SMA Type).....	16
2.6	Connect the Modem to External Device	16
2.7	Connecting the I/O Device and Sensors.....	17
2.8	Grounding the Modem	17
2.9	Power Supply	17
Chapter 3.	Operate the Modem	18
3.1	Working Mode Overview	18
3.2	Modem Configurator Pro Overview	18
3.2.1	Starting Modem Configurator Pro	19
3.2.2	Export and Import Profiles	21
3.2.3	Upgrade Modem Firmware	22
3.2.4	Basic.....	23
3.2.5	GPRS.....	24
3.2.6	Advanced 1	27
3.2.7	Advanced 2	29
3.2.8	Wakeup.....	30
3.2.9	Reboot	32
3.2.10	DI.....	33
3.2.11	DO.....	34
3.2.12	Phone Book.....	36
3.2.13	Phone Group.....	37
3.2.14	Networks.....	38
Chapter 4.	Typical Applications	40
4.1	Overview	40
4.2	GPRS General	41
4.2.1	IP Addresses/Accessibility.....	41
4.2.2	Date Rates.....	42
4.2.3	Delay	43
4.3	Typical Applications.....	43
4.3.1	TCP Client Mode	43
4.3.2	TCP Server Mode	44

- 4.3.3 UDP Mode 45
- 4.3.4 Virtual COM Mode 45
- Chapter 5. Appendix 46
 - 5.1 Factory Settings 46
 - 5.2 Restore to Factory Default 46
 - 5.3 SMS Commands for Remote Control 46
 - 5.4 Modbus Address Mapping 55
 - 5.5 Robustel DI and DO over TCP Protocol..... 56
 - 5.6 Troubleshooting 57
 - 5.6.1 The modem’s LED does not light: 57
 - 5.6.2 M1000 Pro keep rebooting all the time: 57
 - 5.6.3 No connection with modem through serial link..... 57
 - 5.6.4 GPRS connection cannot be established 57
 - 5.7 Terms and Abbreviations 57



- 2-pin pluggable terminal block for power connector x1



- CD with user guide and configuration utility x1

Note: Please notify your sales representative if any of the above items are missing or damaged.

Optional accessories (can be purchased separately):

- Serial cable for RS232 (DB9 Female to DB9 Male, 1 meter) x1



- 35mm Din-Rail mounting kit x2



- AC/DC Power Supply Adapter (12VDC, 1A) x1



- DB9 Male to 9-pin 5mm pluggable terminal block for serial port and DI/DO x1

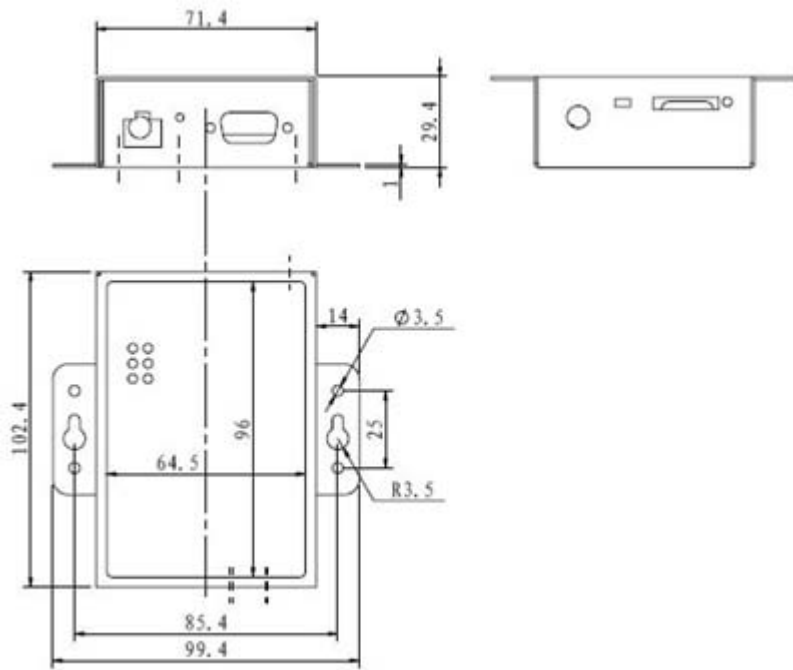
1.3 Features and Specifications

- **Configuration mode** and **Normal mode** selecting by switch
- Configurable by Robustel **ModemConfigurator Pro** GUI
- Auto GPRS connection (no AT commands required) and watchdog for reliable communications
- Transparent TCP client, TCP server and UDP socket connections
- Support Virtual COM (COM port redirector)
- Various dial-up policies
 - Always online: automatic GPRS connection while it powered on, automatic redial while the line dropped
 - Serial data wakeup
 - Wakeup on Caller ID or SMS
 - Wakeup at preset time of a day or periodically at preset interval
- Auto GPRS connect/reconnect, Keep Alive command to maintain socket connection
- Auto disconnect GPRS when idle, switch off wireless module to save power is optional
- Auto SMS of IP for dynamic IP SIM card
- Remote configuration via SMS
- Packetization methods: packet length / time interval / special end characters
- Auto Reboot
 - Auto reboot at preset time of a day
 - Auto reboot via Caller ID/SMS
- 1xDI and 1xDO with wireless communications via SMS and GPRS
- Firmware upgrade via serial interface

Cellular Interface	Standard	GSM and GPRS (* EDGE optional) GPRS: max. 86 kbps (DL and UL) EDGE: max. 236.8 kbps (DL and UL)
	Band Options	Quad-Band 850/900/1800/1900 MHz
	GPRS Multi-slot Class	Class 10 (* Class 12 optional)
	GPRS Coding Schemes	CS1 to CS4
	Output Power	1 watt GSM1800/1900, 2 watts EGSM 900/GSM 850
SIM Interface	Number of SIMs	1
	SIM Card Reader	3V, 1.8V
Antenna Interface	Antenna Interface	SMA Female, 50 ohms impedance
Serial Interface	Number of Ports	1
	Interface	DB9 Female
	Serial Standards	RS232 and RS485 selectable by software
	ESD Protection	15KV
Serial Communication Parameters	Parameters	8, None, 1
	Flow Control	RTS/CTS hardware flow control XON/XOFF software flow control
	Baudrate	Baud rates from 300bps to 115200bps
Serial Signals	RS-232	TxD, RxD, RTS, CTS, GND

	RS-485	Data+ (A), Data- (B), GND
Digital Input	Type	Dry Contact
	Mode	DI or event counter
	Dry Contact	On: short to GND
		Off: open
	Isolation	3K VDC or 2K Vrms
	Counter Frequency	900 Hz
	Digital Filtering Time Interval	Software selectable
Over-voltage Protection	36 VDC	
Digital Output	Type	Sink
	Mode	DO or pulse output
	Pulse Output Frequency	1 kHz
	Over-voltage Protection	40 VDC
	Over-current Protection	0.5 A
	Isolation	3K VDC or 2K Vrms
LED Indicators	LED Indicators	6 LED indicators, PWR, RUN, NET and 3 level RSSI
RTC	Real Time Clock	Built-in real time clock with button battery
Watchdog	Watchdog and Timer	Built-in watchdog and timer
Switch	Switch	Configuration mode and Normal mode selecting by switch
Power Supply Interface	Power Supply Interface	2-pin 5mm pluggable terminal block
Power Requirements	Input Voltage	9 to 36 VDC
	Power Consumption	Idle: 50-60 mA @ 12 V
		Data Link: 100 to 200 mA (peak) @ 12 V
Physical Characteristics	Housing	Metal
	Weight	300g
	Dimension	Without ears (L x W x H): 102.4 x 71.4 x 29.4 mm
		With ears (L x W x H): 102.4 x 99.4 x 29.4 mm
Installation Method	35mm Din-Rail or wall mounting or desktop	
Environmental Limits	Operating Temperature	-25 to 70°C
	Storage Temperature	-40 to 85°C
	Operating Humidity	5 to 95% RH
Regulatory and Type Approvals	Directives	RoHS and WEEE compliant
	CE and R&TTE Approval	Q1 2012
Warranty	Warranty Period	1 year

1.4 Dimensions

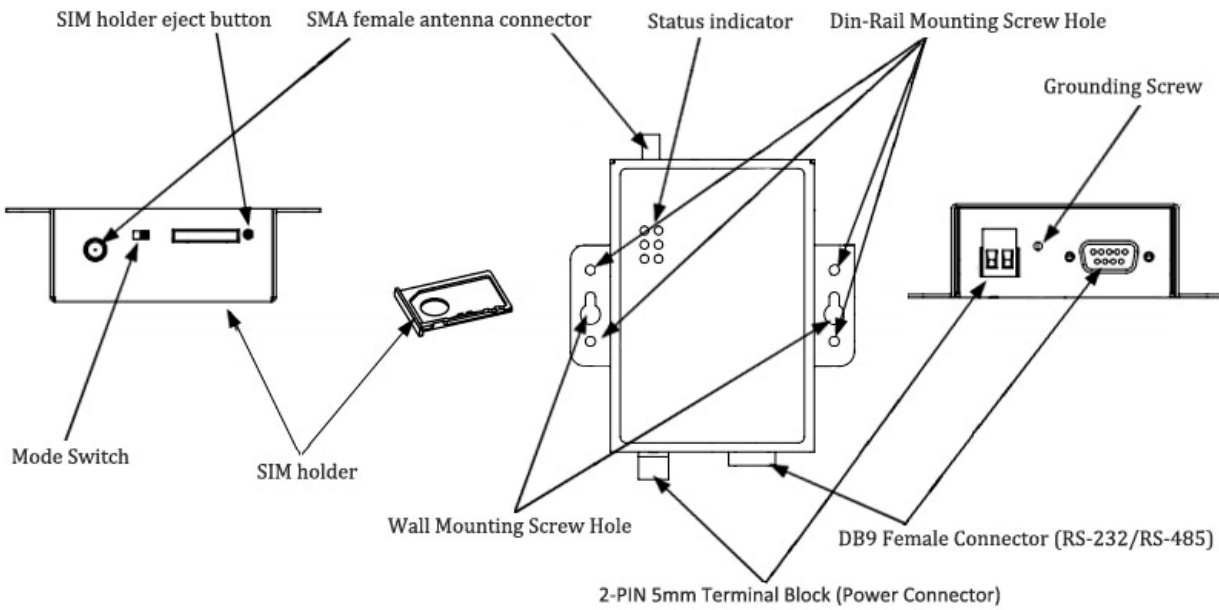


1.5 Selection and Ordering Data

Please refer to corresponding M1000 Pro datasheet.

Chapter 2. Installation

2.1 Overview



2.2 LED Indicators



Name	Color	Function
RSSI (3 LEDs)	Green	Cellular signal strength level
NET	Red	Please refer to Table ME Functions
SYS	Green	Indicating the TCP connection status. TCP connection established: blinking every 0.3s No TCP connection: blinking every 1.5s
PWR	Green	On when DC power connection

RSSI LEDs	Function
None	No signal or SIM card not installed properly
1 bar	Weak or insufficient signal (SMS only)

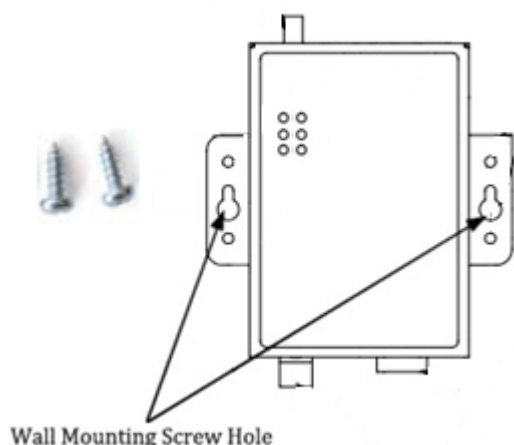
2 bars	Average signal (GSM and GPRS connections)
3 bars	Exceptional signal (GSM and GPRS connections)

ME Functions

NET LED	Function
Off	ME is in one of the following modes: - POWER DOWN mode - ALARM mode - CHARGE ONLY mode - NON-CYCLIC SLEEP mode - CYCLIC SLEEP mode with no temporary wake-up event in progress
600 ms on / 600ms off	Limited Network Service: No SIM card inserted or no PIN entered, or network search in progress, or ongoing user authentication, or network login in progress.
75 ms on / 3 s off	IDLE mode: The mobile is registered to the GSM network (monitoring control channels and user interactions). No call is in progress.
75 ms on / 75 ms off / 75 ms on / 3 s off	One or more GPRS PDP contexts activated.
500 ms on / 25 ms off	Packet switched data transfer is in progress.
On	Depending on type of call: Voice call: Connected to remote party. Data call: Connected to remote party or exchange of parameters while setting up or disconnecting a call.

2.3 Mounting the Modem

Use 2 pcs of M3 screw to mount the modem on the wall.



Or to mount the modem on a DIN rail, you need two DIN rail mount adapters, and 4 thread form M3 screws.



2.4 Installation the SIM Card

Be sure to insert a SIM card before you use the modem.

Note: A SIM card set with PIN code cannot be used normally in the modem. You need to use Modem Configurator to unlock the PIN code of the SIM card before using it in the modem.

Make sure to disconnect the charger and switch off your modem before inserting or removing your SIM/USIM card.

■ Inserting SIM Card

1. Make sure your charger is disconnected.
2. 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.
3. Insert the SIM card, with the metal surface facing downward, make sure it has completely sit on the tray. Put the tray back into the slot, until you hear “a cracking sound”.

■ Removing SIM card

1. Make sure your charger is disconnected, and then press and hold down the power key until the *modem* is powered off.
2. Press the SIM card until you hear “a cracking sound”, when the SIM card will pop up to be pulled out.

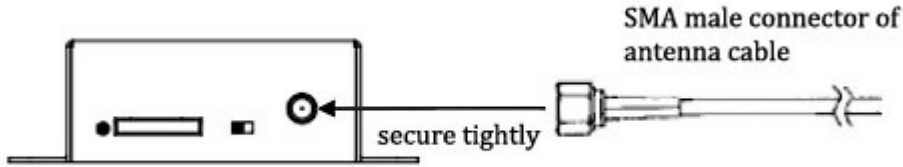
Note:

1. Don't pull out the SIM holder without pushing the eject button.
2. Don't touch the metal surface of the SIM card in case information in the card is lost or destroyed.
3. Don't bend or scratch your SIM card. Keep the card away from electricity and magnetism.
4. Make sure to disconnect the power source from your modem before inserting and removing your SIM card.



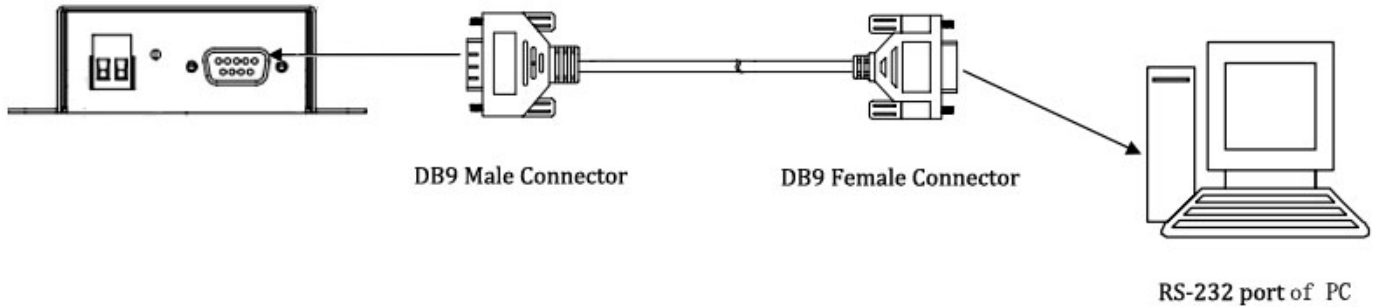
2.5 Connect the External Antenna (SMA Type)

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

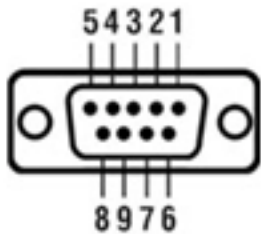


2.6 Connect the Modem to External Device

User can use the serial cable to connect the modem's DB9 female connector to external controller / computer.



PIN assignment for modem's DB9 female connector



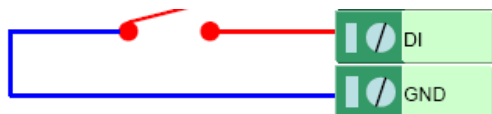
PIN Assignment

DB9 Female Connector

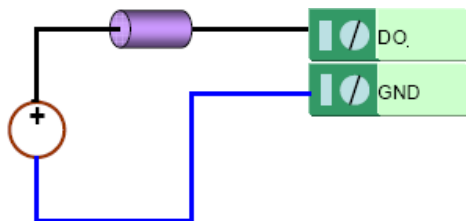
PIN	RS232	RS485 (2-wire)	I/O
1		Data- (B)	
2	RXD ->	Data+ (A)	
3	TXD <-		
4			DO
5	GND	GND	
6			DI
7	RTS <-		
8	CTS ->		
9			IO GND

2.7 Connecting the I/O Device and Sensors

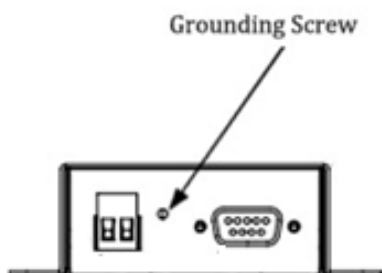
Digital Input Dry Contact:



Digital Output (Sink Type)



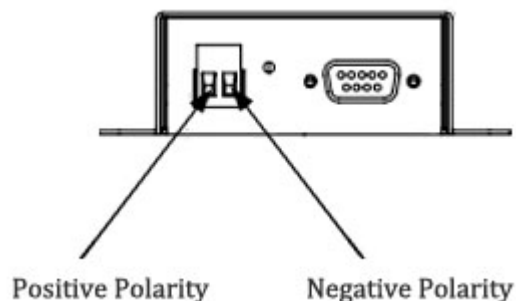
2.8 Grounding the Modem



Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

Note: This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

2.9 Power Supply



The power supply range is 9 to 36VDC.

Note: Please take care about the polarity, and do not make reverse connection.

Chapter 3. Operate the Modem

3.1 Working Mode Overview

There are two working modes available in the modem, please read carefully operate the Modem Configurator software:

Mode	Description
Config Mode	<p>When DIP switches to Config Mode, user could use follow functions:</p> <ol style="list-style-type: none"> 1. Configure modem via Modem Configurator Pro; 2. Upgrade firmware. <p>Serial port default parameters: 115200, 8, None, 1</p>
Normal Mode	<p>When DIP switches to Normal Mode, user could use follow functions:</p> <ol style="list-style-type: none"> 1. Automatic GPRS connection (no AT commands required); 2. Auto-reboot. <p>Serial port default parameters: 115200, 8, None, 1</p>

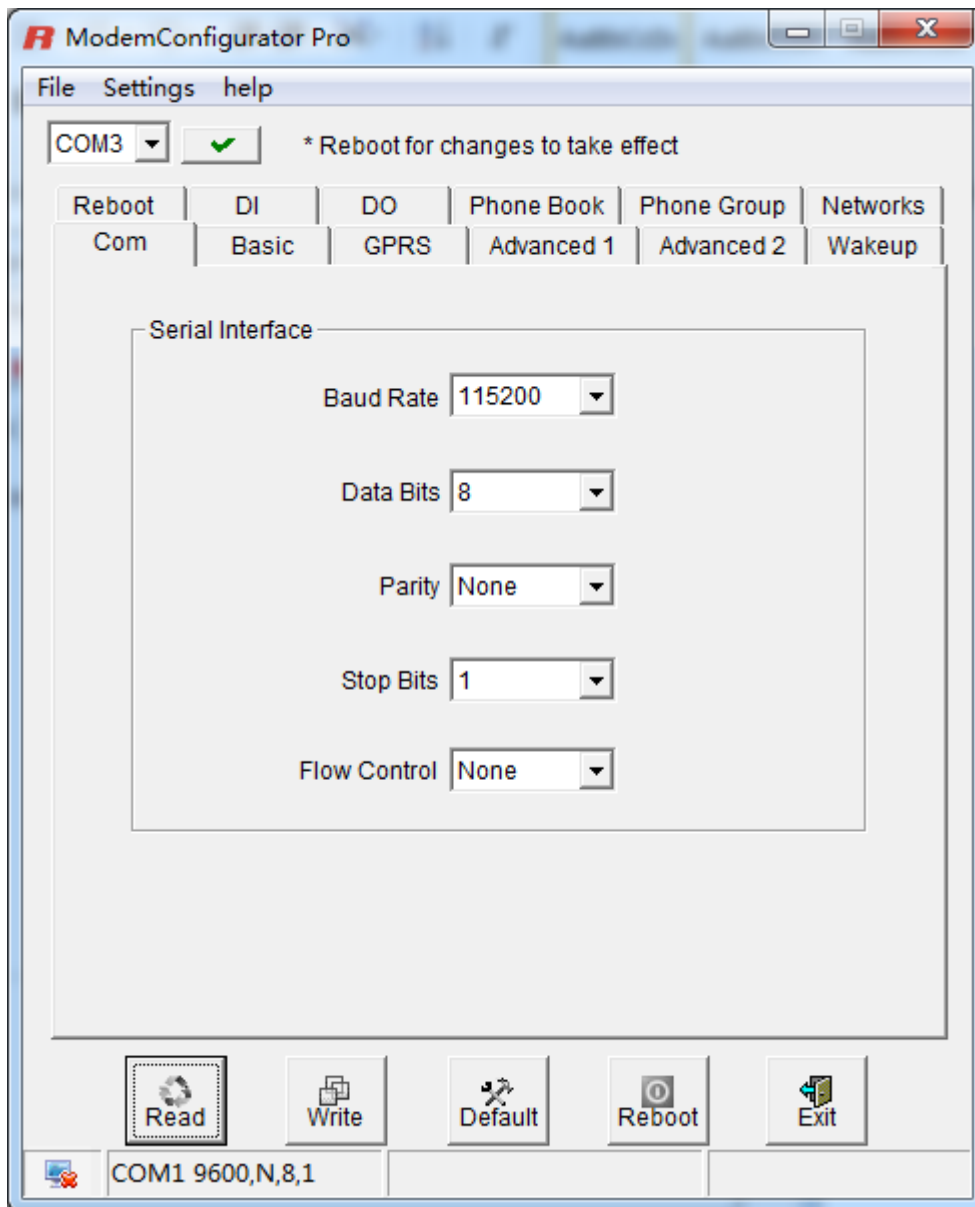
3.2 Modem Configurator Pro Overview

Modem Configurator Pro is a PC-based configuration software tool for managing and configuring Robustel M1000 Pro modems. With a full graphics mode and Windows-based environment, even first time users will find it easy to learn how to use this new software tool.

Modem Configurator Pro not only makes configuration easier, but also makes it convenient to carry out “mass deployment” and “pre-configuration”. The most important benefits of using the “Modem Configurator Pro” utility are:

1. Green software, no need installation;
2. Full graphics mode, easy to learn how to configure the M1000 Pro modems;
3. The configuration profile can be easily stored, and then replicated to other modems;
4. Easy to upgrade modem firmware.

Note: Modem Configurator Pro can be used with Windows 2000/XP/Vista/7 32/64-bit operation systems.



3.2.1 Starting Modem Configurator Pro

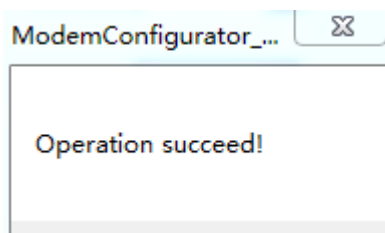
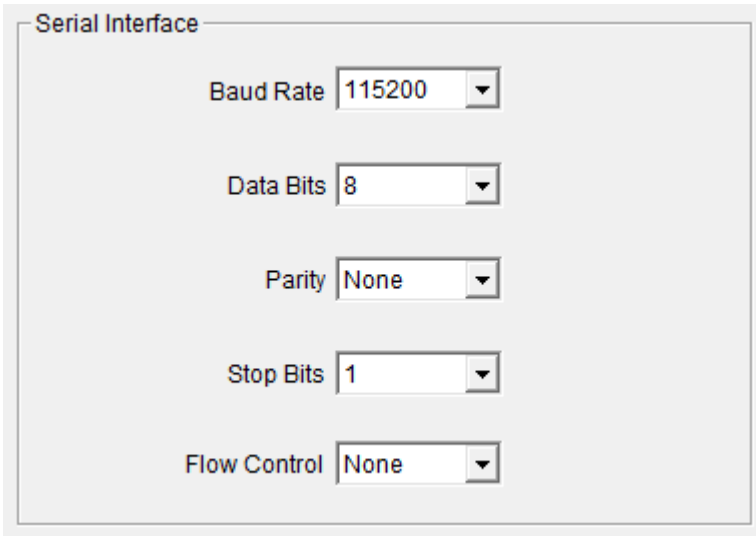
1. Switch the modem to “Config Mode”, connect the RS-232 port of the modem to a host PC, then power on the modem.
2. Double click “Modem Configurator Pro.exe” to start the software.



3. Select the correct serial port which is connecting to the modem, then click  button.








After that you can see the popup windows "Operation Succeed".

Note: The RS-232 connector uses the standard PINOUT. A direct male DB9 to female DB9 cable can be used to connect to a PC's serial port. If you use a USB-to-serial product to configure the modem may cause unexpected errors when configuring the modem.



Operation Area Introduction

Menu	Icon	Description
File->Exit		Exit the Modem Configurator.
Settings->Export		Export the modem's currently configuration file to your local PC.
Settings->Import		Import the modem's configuration file from local PC to the modem.
About->About		Manufacturer's information and Modem Configurator version.
Port No.		Select the local RS-232 port to communicate with the modem.
Connect		Connect the Modem Configurator to the modem, which will use the PC's local RS-232 port.
Disconnect		Disconnect the Modem Configurator to the modem and release the PC's RS-232 port.

Read		Read modem's currently settings.
Write		Save changes into modem. Note: <i>Reboot for changes to take effect.</i>
Default		Set modem to default factory settings, which will take effect after clicking "Write" button. Note: <i>PIN setting, Phone Book settings and COM settings will not be restored to factory default.</i>
Reboot		Reboot the modem. After rebooting, user should disconnect and re-connect to the RS-232 port again.
Exit		Exit the Modem Configurator.
Disconnecting		Modem is not communicating with Modem Configurator.
Connecting		Modem is communicating with Modem Configurator.
Serial Port Settings	COM7 115200,N,8,1	Show the current RS-232 communication parameter.
Versions	sw:1.3.4, hw:1.2.0	Show the modem's current firmware and hardware version.

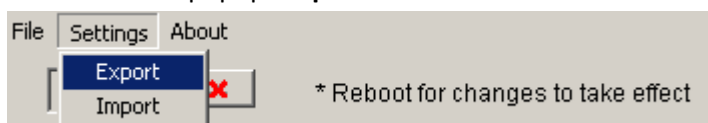
Important Notice

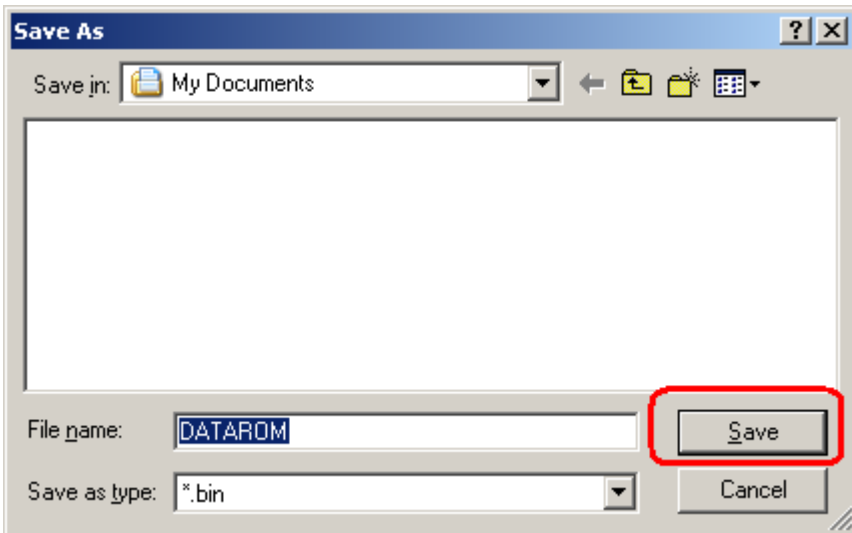
You must save your parameter changes by clicking "Write" button and then reboot your M1000 by clicking "Reboot" button to take effect for the parameter changes.

3.2.2 Export and Import Profiles

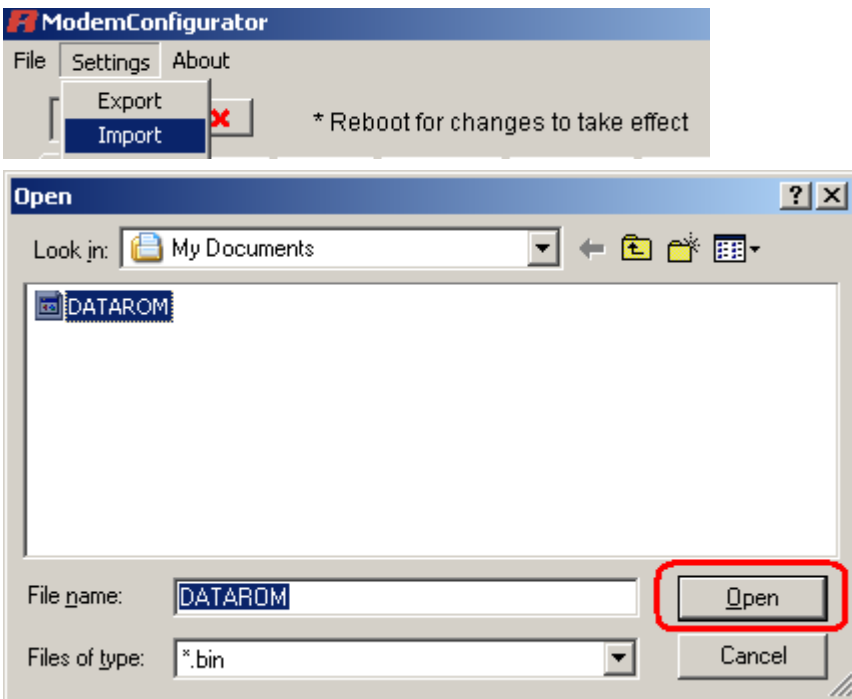
Users could export modem settings from one modem, then import the same settings to other modems, which makes it convenient to carry out "mass deployment" and "pre-configuration".

1. Select **Export** from the **Settings** menu. Then select a folder and enter the file name for the profile. Click on **Save**, then it will popup "**Export Succeed**" windows.





2. Select **Import** from the **Settings** menu. Then select a profile. Click on **Open**.

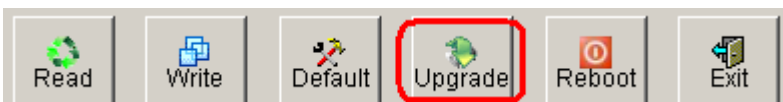


3. Click **Write** button then it will popup **Import Succeed** windows.

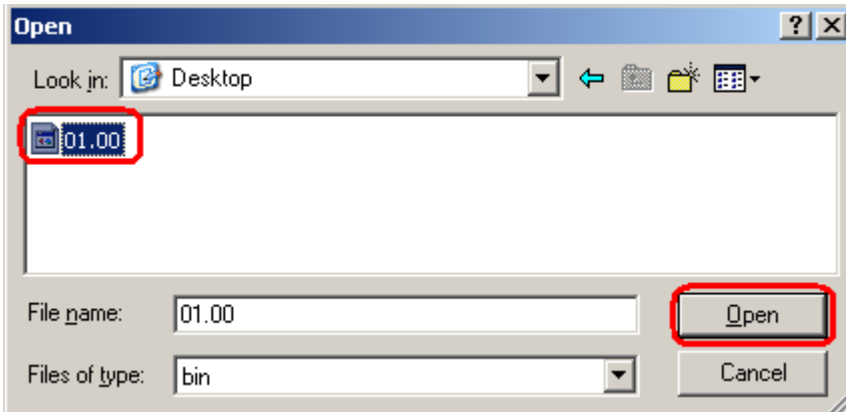
3.2.3 Upgrade Modem Firmware

The following instructions illustrate how to use Modem Configurator to upgrade the firmware of a modem.

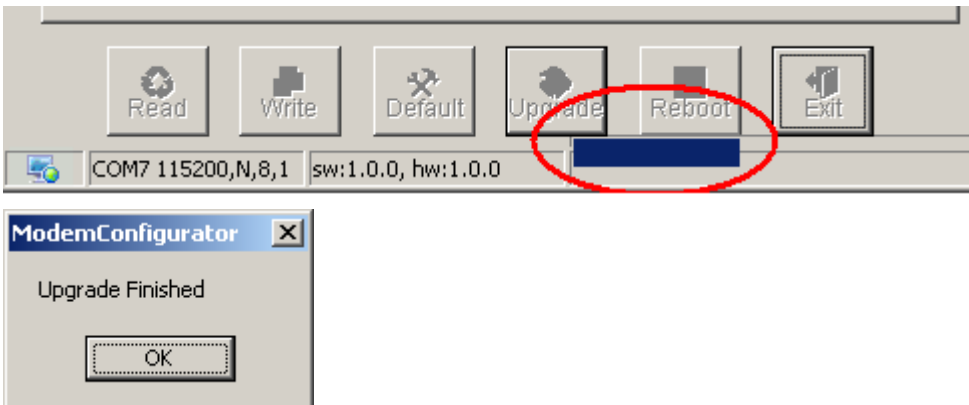
1. Click **Upgrade** button;



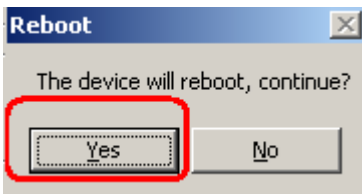
2. Select the firmware from the local PC, then click **Open**;



3. During upgrading, you can see the progress bar. After upgrading, you can see “Upgrade Finished” popup windows.



4. Reboot the modem manually after upgrading.



3.2.4 Basic

This tab allows user to set follow items:

Basic		
Item	Description	Default
Device Name	Write down the description name of the modem, such as write down the modem installation site name in order to identify each modem.	Modem
Com Type Selection	Select from “RS232” and “RS485”. Note: Please refer to your part number and check whether your model supports RS485 or not.	RS232
ME Type	Cellular module information, vary to each part number.	E.g. Cinterion MC55i, which is Cinterion MC55i

		GSM / GPRS module
IMEI	Cellular module's IMEI number.	Vary to different cellular module
Password	Password for SMS control, including remote configuration and remote reading modem status. The password can be left as null, maximum 20 ASCII characters.	Null
Init. String	User could enter the initial string in the text input box. Note: Maximum 39 characters for each initial string.	Null
SIM Card PIN Setup	Select from "Disable PIN Lock" and "Enable PIN Lock". After enable PIN lock, user could input your SIM's PIN and store the current PIN in its memory, and then enter the PIN automatically each time the system boots up. Note: Please ask your local GSM ISP to see whether your SIM card requiring PIN or not. If user wants to change the SIM PIN, please tick the "Change PIN Code" checkbox to enable it, and then input the new PIN at "Input New Code".	Disable
Synchronize with PC	Synchronize modem's RTC to PC's clock. The modem's current RTC will be showed at left side of this function.	Modem factory RTC

The screenshot displays a configuration window with the following elements:

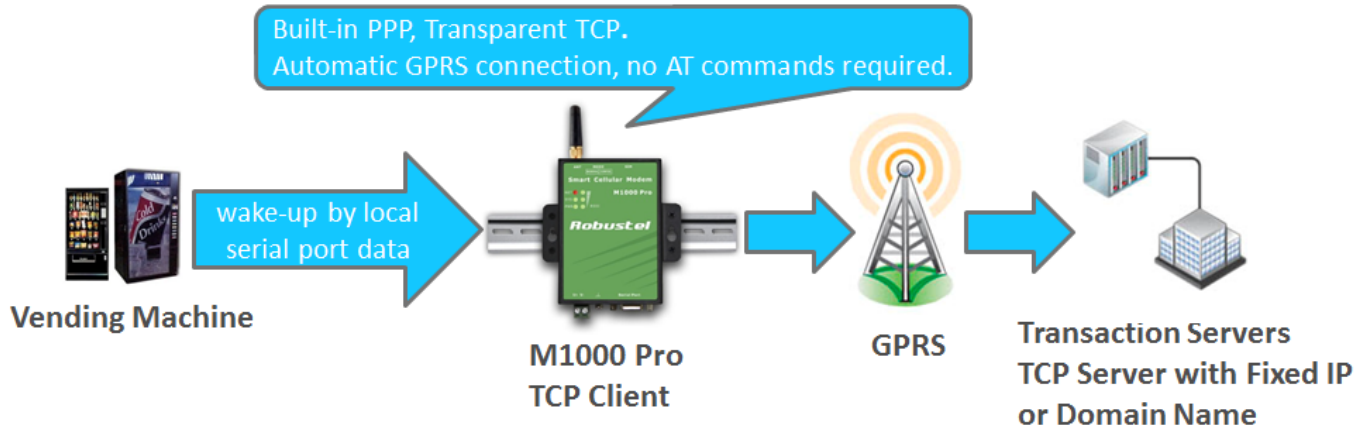
- Device Name:** A text input field.
- Com Type Selection:** A dropdown menu.
- ME Type:** A text input field.
- IMEI:** A text input field.
- SMS Control:** A section containing a **Password** text input field.
- Init. String:** A section containing a **Command** text input field.
- SIM Card PIN Setup:** A section containing:
 - A dropdown menu for PIN lock status.
 - An **Input PIN Code** text input field.
 - An **Input New Code** text input field.
 - A checkbox labeled **Change PIN Code**.
- Synchronize with PC:** A checkbox at the bottom of the window.

3.2.5 GPRS

The major difference between M1000 Pro serial to GPRS gateway and traditional GPRS modem such as M1000/M1000 Lite is that M1000 Pro built-in PPP and TCP/IP protocols, supports automatic GPRS connection, no AT commands required, which can enable transparent TCP/UDP transmission.

Traditional GPRS modem can only dialup to internet via external PPP enabled host device such as PC, PLC with built-in

PPP protocol.



This tab allows user to set GPRS and related items for automatic GPRS connection:

GPRS		
Item	Description	Default
APN	Access Point Name for cellular dial-up connection, provided by local ISP.	Null
User Name	User Name for cellular dial-up connection, provided by local ISP.	Null
Password	Password for cellular dial-up connection, provided by local ISP.	Null
DNS	Selected from "Use Peer DNS" and "Manual". Use Peer DNS: to automatically have DNS server assigned from local ISP. Manual: input DNS server's IP address manually in DNS 1 and DNS 2 field.	Use Peer DNS
DNS 1	Input DNS server's IP address after enable DNS->Manual.	Disable
DNS 2	Input secondary DNS server's IP address after enable DNS->Manual.	Disable
Mode @ Socket Application	Selected from "TCP Client", "TCP Server" and "UDP". TCP Client: M1000 Pro works as TCP client, initiate TCP connection to TCP server, the server address supports both IP and domain name. TCP Server: M1000 Pro works as TCP server, listening for connection request from TCP client. UDP: M1000 Pro works as UDP client.	TCP Client
Modbus RTU Slave over TCP	Tick to enable Modbus RTU Slave over TCP.	Disable
IP/URL	When M1000 Pro works as TCP client, user should input peer TCP server's IP or domain in this item. When M1000 Pro works as TCP server, this item is unavailable. When M1000 Pro works as UDP client, user should input peer UDP server's IP or domain in this item.	Null
Port	When M1000 Pro works as TCP client, user should input peer TCP server's port in this item. When M1000 Pro works as TCP server, user should input TCP server's listening port in this item. When M1000 Pro works as UDP client, user should input peer UDP server's port in this item.	Null

Mode @ Connection Control	Select from "Always Online" and "Connect On Demand". Always Online: M1000 Pro will automatically a GPRS connection after power on and each restarts, this will remain and will be re-established after an interruption. Connect On Demand: After selection this option, user could configure wakeup at preset time, wakeup by Call, wakeup by SMS, wakeup by local serial port data at Wakeup Tab.	Always Online
Shut Down Module When Idle	Tick to enable. Enable: only available when enable "Inactivity Time" under "Connect On Demand" mode. When M1000 Pro auto disconnect GPRS, the module will enter "shut down" mode to save power. Disable: M1000 Pro will not "shut down" module when auto disconnect GPRS. Note: <i>M1000 Pro can only be wakeup by serial data/preset time/periodically when enable shut down module, also SMS control is not available under this mode.</i> <i>M1000 Pro can be wakeup by serial data/preset time/periodically/SMS/Caller ID when disable shutdown module.</i>	Disable
Interactivity Time	User could configure this field after setting M1000 Pro under Connect On Demand mode, input from 5 to 1200 seconds. This field specifies the idle time setting for GPRS auto-disconnection.	120 seconds
Max Retries	The maximum retries times for automatically re-connect when M1000 Pro fails communicating to peer via TCP or UDP, input from 1 to 60. After maximum retries, M1000 Pro will restart the built-in wireless module, such as Cinterion MC55i. Then M1000 Pro will re-connect again with maximum retries. When connecting successful, the Max Retries counter will set to 0.	5
Connect Interval	M1000 Pro will automatically re-connect with this interval when it fails communicating to peer via TCP or UDP, input from 10 to 1200 seconds.	60 seconds

ISP

APN DNS

User Name DNS 1

Password DNS 2

Socket Application

Mode Modbus RTU Slave Over TCP

IP/URL Port

Connection Control

Mode Shut Down Module When Idle

Inactivity Time (s) (5 - 1200)

Max Retries (1 - 60)

Connect Interval (10 - 1200)

**Set wakeup policy at "Wakeup" Tab for "Connect On Demand" .*

3.2.6 Advanced 1

Advanced settings part 1 for GPRS and IP communications.

Advanced 1		
Item	Description	Default
Interval Timeout	<p>The serial port will queue the data in the buffer and send the data to the Cellular port when it reaches the Interval Timeout in the field.</p> <p>The units of the timeout is 100ms, default value is 2, which mean the default packet timeout is 200ms.</p> <p>Note: Data will also be sent as specified by the packet length or delimiter settings even when data is not reaching the interval timeout in the field.</p>	2
Packet Length	<p>The Packet length setting refers to the maximum amount of data that is allowed to accumulate in the serial port buffer before sending. At the default of 0 for packet length, no maximum amount is specified and data in the buffer will be sent as specified by the interval timeout or delimiter settings or when the buffer is full. When a packet length between 1 and 1024 bytes is specified, data in the buffer will be sent as soon it reaches the specified length.</p> <p>0 is no limitation.</p> <p>Note: Data will also be sent as specified by the interval timeout or delimiter settings even when data is not reaching the preset packet length.</p>	0
Delimiter 1 and Delimiter 2	<p>When Delimiter 1 is enabled, the serial port will queue the data in the buffer and send the data to the Cellular port when a specific character, entered in hex format, is received. A second delimiter character may be enabled and specified in the Delimiter 2 field, so that both characters act as the delimiter to control when data should be sent.</p>	Disable
Delimiter Process	<p>Delimiter process (default=Do Nothing): The Delimiter process field determines how the data is handled when a delimiter is received. Delimiter 1 must be enabled for this field to have effect. If Delimiters 1 and 2 are both enabled, both characters must be received for the delimiter process to take place.</p> <p>Do Nothing: Data in the buffer will be transmitted when the delimiter is received, the data also includes the delimiter characters.</p> <p>Delimiter + 1: Data in the buffer will be transmitted after 1 additional byte is received following the delimiter.</p> <p>Delimiter + 2: Data in the buffer will be transmitted after 2 additional bytes are received following the delimiter.</p> <p>Strip Delimiter: Data in the buffer is first stripped of the delimiter before being transmitted.</p> <p>Note: Data will also be sent as specified by the interval timeout or packet length settings even when Delimiters are disabled.</p>	Do Nothing
Tx Delay	<p>A short delay of around X ms has been added to the serial port data transmission. Select from 1 to 50, and unit is 100ms.</p>	600ms
Online SMS Notification	<p>Click to enable Online SMS Notification function, which will send SMS to preset phone numbers in Phonebook->SMS Control.</p>	Disable

	<p>Online SMS Notification includes follow information:</p> <p>Name: Reg: Operator: RSSI: Local IP: RTC: COM:</p> <p>Note: Local IP is the M1000 Pro's IP address assigned by ISP when dial-up to cellular network successful.</p>	
International Roaming	<p>Tick to enable. Selected from "enable" and "disable." Enable: international roaming is enabled; Disable: international roaming is disabled. After disable international roaming, user could set "PLMN in SIM" or "Manual" from the combo box drop-down list. PLMN in SIM: modem will only register to the PLMN according to PLMN in SIM. Manual: modem will only register to the PLMN according to Preferred PLMN. Note: PLMN consists of MCC and MNC, MCC=Mobile Country Code, MNC=Mobile Network Code. After disable international roaming, modem will register to different MNC from MNC in SIM card in some countries, in this situation, please set the MNC in Preferred PLMN, or modem can't register to the network.</p>	Enable
PLMN in SIM	Read PLMN from SIM card.	Read only parameter
Preferred PLMN	<p>Input MCC+MNC in this field. After disable international roaming, modem will register to different MNC from MNC in SIM card in some countries, in this situation, please set the MNC in Preferred PLMN, or modem can't register to the network.</p>	Null

Data Packing

Interval Timeout (1*100ms) (2 - 100)

Packet Length (0 - 1024)

Delimiter 1 (Hex) Enable

Delimiter 2 (Hex) Enable

Delimiter Process

Tx Delay(1*100ms) (1 - 50)

Online SMS Notification

Enable *Set phone NO. in Phone Book->SMS Control

International Roaming

Enable PLMN in SIM:

Preferred PLMN

3.2.7 Advanced 2

Advanced settings part 2 for GPRS and IP communications.

Advanced 2		
Item	Description	Default
Custom Login	<p>Tick to enable.</p> <p>Some TCP servers required Login Request Packet with follow flow: A TCP connection begins with the client opening a TCP/IP socket to the server and sending a Login Request Packet. If the login request is valid, the server responds with a Login Acknowledge Packet and begins sending Sequenced Data Packets. The connection continues until the TCP/IP socket is broken. Login Acknowledge Packet is optional.</p>	Disable
Max Retries	<p>Login Request Packet</p> <p>The maximum retries times for sending Login Request Packet to the server with preset time interval, selecting from 0 to 60.</p> <p>After maximum retries, M1000 Pro will not retry again, and image login successfully.</p>	0
Interval	Time interval between two retries, selecting from 5 to 120 seconds.	60 seconds
REQ Packet	Login Request Packet, written in Hex format, maximum 64 bytes.	Null
ACK Packet	<p>Login Acknowledge Packet, written in Hex format, maximum 32 bytes.</p> <p>Login Acknowledge Packet is optional.</p>	Null
Custom Keep Alive	<p>When using GPRS with a session running most ISPs will monitor the traffic flow, if there is none for a predetermined period of time then it will shut the connection down at either the DHCP server or the APN, this is performed so that system resources are not taken up unnecessarily.</p> <p>To stop this happening you will need to send periodic Keep Alive bytes to keep the modem</p>	Disable

	always online.	
Interval	Time interval between two Keep Alive packets, selecting from 5 to 1200 seconds.	40 seconds
REQ Packet	Keep Alive Request Packet, written in Hex format, maximum 64 bytes.	Null
ACK Packet	Keep Alive Acknowledge Packet, written in Hex format, maximum 32 bytes. Keep Alive Acknowledge Packet is optional.	Null
Custom Logout	Tick to enable. Some TCP servers required Logout Request Packet with follow flow: A TCP connection ends with the client sending a Logout Request Packet. If the logout request is valid, the server responds with a Logout Acknowledge Packet and ends the connection. Logout Acknowledge Packet is optional.	Disable
REQ Packet	Logout Request Packet, written in Hex format, maximum 64 bytes.	Null
ACK Packet	Logout Acknowledge Packet, written in Hex format, maximum 32 bytes. Logout Acknowledge Packet is optional.	Null

Custom Login

Enable

Max Retries (0 - 60) Interval (s) (5 - 120)

REQ Packet (0x)

ACK Packet (0x)

Custom Keep Alive

Enable Interval (s) (5 - 1200)

REQ Packet (0x)

ACK Packet (0x)

Custom Logout

Enable

REQ Packet (0x)

ACK Packet (0x)

3.2.8 Wakeup

M1000 Pro supports various dial-up policies, for example serial data wakeup, wakeup on caller ID, wakeup on SMS and wakeup on preset time of a day.

In this page, we can set up different wakeup policies.

Wakeup		
Item	Description	Default
Time	Tick the Time checkbox to allow modem automatic connects to GPRS	Disable

	with preset time schedule every day, support maximum 3 time schedule/day (e.g. 07:00, 11:00 and 23:30 every day).	
Periodically Connect Interval	Tick the Periodically Connect Interval checkbox to allow modem automatic connects to GPRS with preset interval, select from 1 to 1800 minutes. The interval is defined as time interval between two GPRS connections.	Disable
Call	Tick the Call checkbox to allow modem automatic connects to GPRS with incoming call from specified Caller ID (phone number). The Caller ID (phone number) should be specified in “ Phone Book ” tab by inputting the phone number and tick “ Call Wakeup ” checkbox.	Disable
Enable SMS Reply	Tick the Enable SMS Reply checkbox to allow modem send reply short message after automatic connects to GPRS by Call Wakeup from specified Caller ID (e.g. GPRS on ok!). Note: Only support text format SMS.	Disable
SMS	Tick the SMS checkbox to allow modem automatic connects to GPRS with incoming specified short message from specified Caller ID (phone number). Specified short message is set at Password item. (e.g. GPRS on) The Caller ID (phone number) should be specified in “ Phone Book ” tab by inputting the phone number and tick “ SMS Wakeup ” checkbox.	Disable
Enable SMS Reply	Tick the Enable SMS Reply checkbox to allow modem send reply short message after automatic connects to GPRS by SMS Wakeup from specified Caller ID (e.g. GPRS on ok!). Note: Only support text format SMS.	Disable
Serial Data Wakeup	Tick the Serial Data Wakeup checkbox to allow modem automatic connects to GPRS from idle mode when there is data come out from serial port.	Disable
Output (0x) to COM port after online	After input the value in the field, modem will output a command with hex format to modem serial port when it has been wakeup from idle mode. Maximum 30 bytes. Note: supports all the wakeup mode.	Disable
Note:		
<ol style="list-style-type: none"> 1. Time format for Time reboot is 24-hours. 2. The phone numbers for Call and SMS function can be set in Phone Book tab. 3. The Caller ID must be written in international format, starting with “+” followed by the country code. 4. If you leave Caller ID blank, the modem will reboot with any incoming call, which may cause unexpected issue. It is highly recommend setting the Call ID. 		

***Set phone NO. in Phone Book->Call Wakeup, SMS Wakeup**

Wakeup

Time (hh:mm)

Periodically Connect Interval (min) (1 - 1800)

Call
 Enable SMS Reply
 SMS

SMS Password:
 Enable SMS Reply
 SMS

Serial Data Wakeup

Output (0x) to COM After Online

3.2.9 Reboot

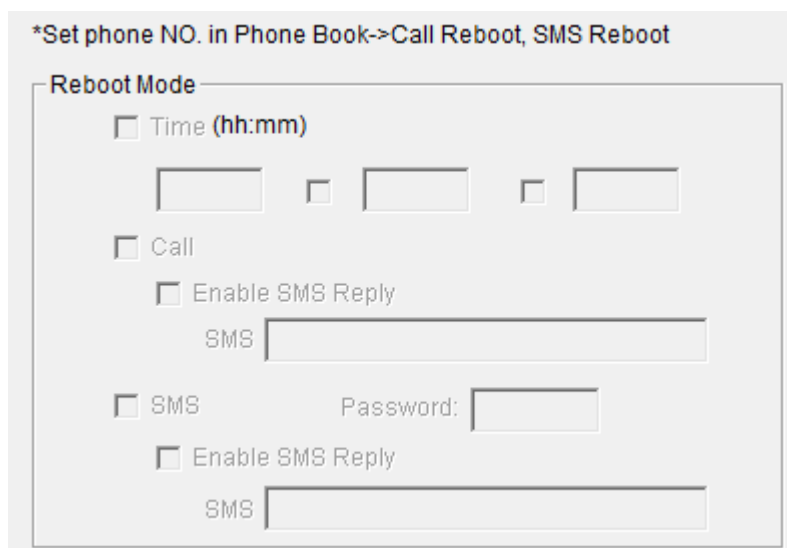
Since cellular network is not as stable as fixed line, M1000 Pro supports various auto reboot function to keep modem working 24x7 without hang up.

Reboot

Note: This function is available under both "Config Mode" and "Normal Mode".

Item	Description	Default
Time	Tick the Time checkbox to allow modem auto reboot with preset time schedule every day, support maximum 3 time schedule/day (e.g. 07:00, 11:00 and 23:30 every day).	Disable
Call	Tick the Call checkbox to allow modem auto reboot with incoming call from specified Caller ID (phone number). The Caller ID (phone number) should be specified in " Phone Book " tab by inputting the phone number and tick " Call Reboot " checkbox.	Disable
Enable SMS Reply	Tick the Enable SMS Reply checkbox to allow modem send reply short message after auto reboot by Call Reboot from specified Caller ID (e.g. Reboot ok!). Note: Only support text format SMS.	Disable
SMS	Tick the SMS checkbox to allow modem auto reboot with incoming specified short message from specified Caller ID (phone number). Specified short message is set at Password item. (e.g. reboot) The Caller ID (phone number) should be specified in " Phone Book " tab by inputting the phone number and tick " SMS Reboot " checkbox.	Disable
Enable SMS Reply	Tick the Enable SMS Reply checkbox to allow modem send reply short message after auto reboot by SMS Reboot from specified Caller ID	Disable

	(e.g. Reboot ok!). Note: Only support text format SMS.	
<p>Note:</p> <ol style="list-style-type: none"> 1. Time format for Time reboot is 24-hours. 2. The phone numbers for Call and SMS function can be set in Phone Book tab. 3. The Caller ID must be written in international format, starting with “+” followed by the country code. 4. If you leave Caller ID blank, the modem will reboot with any incoming call, which may cause unexpected issue. It is highly recommend setting the Call ID. 		



3.2.10 DI

Type	Logic 0 (OFF)	Logic 1 (ON)
Dry contact	Close to GND	open

This tab describes the Digital Input settings.

Networks		
Item	Description	Default
Mode	<p>Mode refers to the status of a digital input channel.</p> <p>Selected from OFF, ON, OnChange, Event Counter and Null.</p> <p>OFF: is satisfied for as long as DI remains off</p> <p>ON: is satisfied for as long as DI remains on</p> <p>OnChange: triggering alarm when DI trigger the related action whether it is ON or OFF</p> <p>Event Counter: under event counter mode</p> <p>Null: DI disabled</p>	Null
Filtering	<p>Software filtering is used to control switch bounces.</p> <p>Input from 0 to 10000ms.</p>	0
Count Trigger	<p>Available when DI under Event Counter mode.</p> <p>Input from 0 to 30000. (0=will not trigger alarm)</p>	0

	It will trigger alarm when counter reaching this figure. After triggering alarm, DI keeps counting but will not trigger alarm again. To clear the counter, use SMS command or Modbus polling command. SMS command: please refer to 5.3 SMS Commands for Remote Control->Clear Event Counter Modbus address: please refer to 5.4 Modbus Address Mapping	
Counter Active	Available when DI under Event Counter mode. In Event Counter mode, the channel accepts limit or proximity switches and counts events according to the ON/OFF status. When “Lo to Hi” is selected, the counter value increases when the attached switch is pushed. When “Hi to Lo” is selected, the counter value increases when the switch is pushed and released.	Lo to Hi
Counter Start When Power On	Available when DI under Event Counter mode. Start counting as soon as power on the modem when enable this option. If “Counter Start When Power On” is disabled, it will also start counting when receiving SMS command or Modbus polling command. SMS command: please refer to 5.3 SMS Commands for Remote Control->Start Event Counter Modbus address: please refer to 5.4 Modbus Address Mapping	Disable
Triggering Alarm	The SMS to receive upon triggering alarm. (70 ASCII char max)	Null
Recovering Alarm	The SMS to receive upon recovering alarm. (70 ASCII char max)	Null
Phone Group	The alarm SMS will send to specified phone group. Each phone group include up to 10 phone numbers.	Null
DI over TCP	Tick to enable DI over TCP. Protocol: please refer to 5.5 Robustel DI and DO over TCP Protocol	Disable

Note: the Event Counter value will be reset to zero if power is disconnected.

The screenshot shows the 'DI_0 Config' window with the following settings:

- Mode: Null
- Filtering: 0 (0 - 10000) ms
- Counter Active: Lo to Hi
- Count Trigger: 1 (0 - 30000)
- Counter Start When Power On
- Triggering Alarm: (empty text box) (70 ASCII char max)
- Recovering Alarm: (empty text box) (70 ASCII char max)
- Phone Group: 1
- DI over TCP

3.2.11 DO

Type	Logic 0 (OFF)	Logic 1 (ON)
DO	open	short

This tab describes Digital Output settings.

Networks		
Item	Description	Default
Alarm Source	Digital Output acts according to different alarm source. Selected from DI Alarm, SMS Control, Call Control, selection can be one or more. DI Alarm: Digital Output triggers the related action when there is alarm from Digital Input. SMS Control: Digital Output triggers the related action when receiving SMS from the number in the phone book. Call Control: Digital Output triggers the related action when receiving phone call from the number in the phone book.	Null
Alarm On Action	Digital Output acts when there is an alarm. Selected from OFF, ON, Pulse, Null. OFF: Open when triggered. ON: Short contact when triggered. Pulse: Generates a square wave as specified in the pulse mode parameters when triggered. Null: Do nothing.	Null
Alarm Off Action	Digital Output acts when alarm recovered. Selected from OFF, ON, Pulse, Null. OFF: Open when triggered. ON: Short contact when triggered. Pulse: Generates a square wave as specified in the pulse mode parameters when triggered. Null: Do nothing.	Null
Status When Power On	Specify the Digital Output status when power on. Selected from OFF, ON. OFF: Open. ON: Short contact.	Null
Keep On	Available when digital output Alarm On Action/Alarm Off Action status is ON, input the Digital Output keep on status time. Input from 0 to 255 seconds. (0=keep on until the next action)	0
Triggering Alarm	Available when enable SMS Control in Alarm Source. Input the SMS content to enable "Alarm On Action" by SMS. (70 ASCII char max)	Null
Recovering Alarm	Available when enable SMS Control in Alarm Source. Input the SMS content to enable "Alarm Off Action" by SMS. (70 ASCII char max)	Null
Phone Group	The alarm SMS will send to specified phone group. Each phone group include up to 10 phone numbers.	Null
Low	Available when enable Pulse in Alarm On Action/Alarm Off Action. In Pulse Output mode, the selected digital output channel will	1

	generate a square wave as specified in the pulse mode parameters. The low level widths are specified here. Input from 1 to 30000 ms.	
High	Available when enable Pulse in Alarm On Action/Alarm Off Action. In Pulse Output mode, the selected digital output channel will generate a square wave as specified in the pulse mode parameters. The high level widths are specified here. Input from 1 to 30000 ms.	1
Output	Available when enable Pulse in Alarm On Action/Alarm Off Action. The number of pulses, input from 0 to 30000. (0 for continuous pulse output)	1
Delay	Available when enable Pulse in Alarm On Action/Alarm Off Action. The first pulse will be generated after a "Delay". Input from 0 to 30000ms. (0=generate pulse without delay)	0
DO over TCP	Tick to enable DO over TCP. Protocol: please refer to 5.5 Robustel DI and DO over TCP Protocol	Disable

DO Config

Alarm Source: DIAlarm SMS Control Phone Control

Alarm On Action

Alarm Off Action

Status When Power On

Keep On (0 - 255) sec

SMS Control:

Triggering Alarm (70 ASCII char max)

Recovering Alarm (70 ASCII char max)

Phone Group

Pulse Mode:

Low (1 - 30000) ms

High (1 - 30000) ms

Output (0 - 30000) pulses

Delay (0 - 30000) ms

DO over TCP

3.2.12 Phone Book

Networks		
Item	Description	Default
Phone NO.	Input the telephone number.	N/A
Call Reboot	Tick the Call Reboot checkbox to allow modem auto reboot with incoming call from this number.	Disable

SMS Reboot	Tick the SMS Reboot checkbox to allow modem auto reboot with incoming specified short message from this number.	Disable
Call Wakeup	Tick the Call Wakeup checkbox to allow modem automatic connects to GPRS with incoming call from this number.	Disable
SMS Wakeup	Tick the SMS Wakeup checkbox to allow modem automatic connects to GPRS with incoming specified short message from this number.	Disable
SMS Control	Tick the SMS Control checkbox to allow this number the following privileges: 1. SMS commands for remote configuration 2. SMS commands for remote reading modem status	Disable
Note: The Phone NO. must be written in international format, starting with "+" followed by the country code.		

Note: The Phone NO. must be written in international format, starting with "+" followed by the country code.

e.g.: +156789, in which +1 is the USA country code, 56789 is the phone No.

Item	Phone NO.	Call		SMS		
		Reboot	Wakeup	Reboot	Wakeup	Control
1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2.13 Phone Group

Phone Group is only available for DI, DO tabs.

Select different phone numbers to include them in the same phone group.

Index	Phone Book Index									
	1	2	3	4	5	6	7	8	9	10
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2.14 Networks

Networks		
Item	Description	Default
SMS Service Center	Read the Short Message service center.	Read SMS Service Center from SIM card
Registration	Show the modem current registration status. There are 3 status: 1. Not registered 2. Registered, home network 3. Registered, roaming	N/A
GSM Operator	Show the modem current registered GSM operator name.	N/A
Cell ID	Show the modem current register base station cell ID.	N/A
RSSI	Show the modem current RSSI from 0 to 31 and corresponding DB.	N/A
Update Frequency	The modem's 3 levels RSSI indicators will vary according to network status by preset interval.	30 seconds
Local IP	After connecting to GPRS, M1000 Pro will be auto assigned IP by ISP.	Null
GPRS Status	GPRS status: "GPRS on" or "GPRS off".	Null
TCP Status	TCP status: "TCP on" or "TCP off".	Null
Tx	Tx packets for TCP/UDP communications (bytes).	Null
Rx	Rx packets for TCP/UDP communications (bytes).	Null
Note:		
1. Usually modem can read the SMS Service Center from SIM Card , no need to modify or set a new SMS Service Center unless it the modem cannot read it from the SIM Card.		

2. Click "Read" to refresh the "Network" and "Rx Level" status.

*Click "Read" to refresh the status

SMS Service Center


Network

Registration:

GSM Operator:

Cell ID:

Rx Level

RSSI: 0  -113DB

Update Frequency Sec (recommand 30 seconds)

GPRS Status

Local IP:

GPRS Status: TCP Status:

Tx (byte): Rx (byte):

Values of received signal strength (RSSI)

Value of received signal strength indication (RSSI)	Interpretation of the received signal strength
0 to 12	Insufficient or weak
13 to 19	Average
20 to 31	Good
99	No signal

Note: RSSI should remain higher than 12 to create/accept GSM CSD data calls or establish a GPRS connection. Users can only transmit/receive by SMS (short message) if the RSSI is less than or equal to 11.

A better way of verifying the RSSI signal (instead of using the Modem Configuration) is to check the "SIGNAL" LEDs on the front panel directly. See [2.2 LED Indicators](#) for more information.

Antenna selection guide

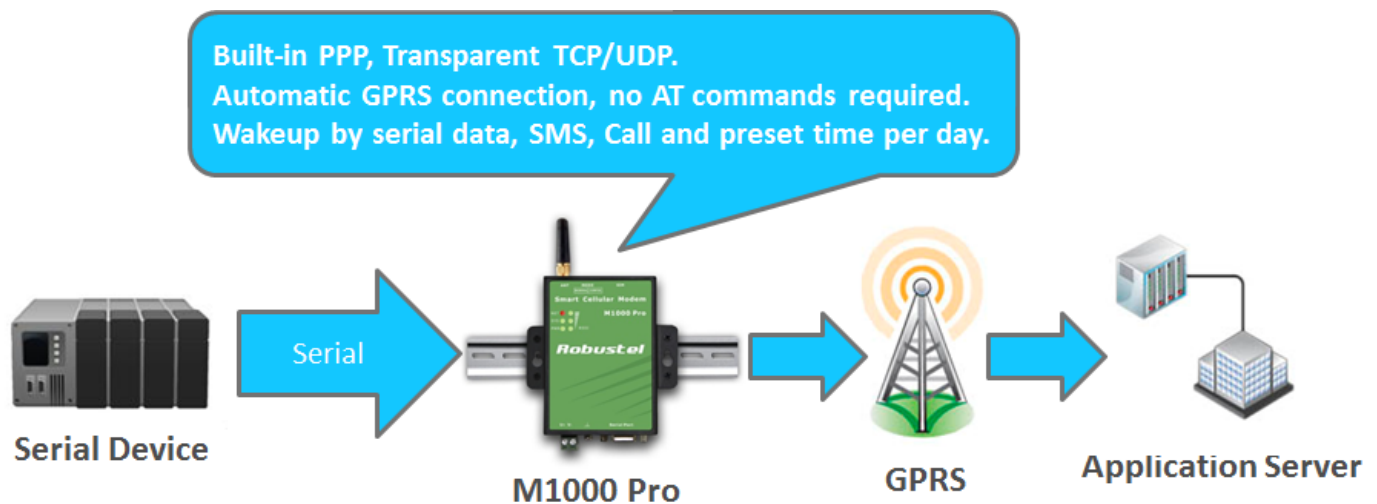
Value of received signal strength indication (RSSI)	Antenna selection
0 or 1	GSM/GPRS is not good solution in the area
1 < RSSI ≤ 12	Select antenna gain > 10 dBi
12 < RSSI < 20	Select antenna gain > 3 to 5 dBi
≥ 21	Select antenna gain > 0 to 3 dBi

Chapter 4. Typical Applications

4.1 Overview

Cellular data transmission is an increasingly attractive mechanism for communication with remote, non-permanent or mobile devices. Being able to collect and distribute data virtually anywhere without requiring the limitation of working within specific fixed line networks is a powerful force for efficiency and reliability. However, the fact that cellular data is metered means that the frequency of transmission and amount of data sent in each exchange can have significant cost and performance impact.

In order to understand this impact, let us start with a fairly typical example, where there is a device in the field and an application on a server at a central site location that collects information from that device.



In general, the purpose of communication with the device will be for one of two reasons:

- **Monitoring** - Status monitoring data, such as the level or temperature of a storage tank, the velocity and pressure of a pipeline, the condition of a controller or the status of a register.
- **Transaction data** – Discrete event data, such as cash or credit transactions, PBX call records or mission-critical and safety related alarms.

Status monitoring data is often “polled.” The application sends out periodic queries and gets responses to those queries. The application can usually retry if it does not get an answer, and determine that a problem exists if it does not get a response after a certain amount of retries.

Discrete event data is usually “unsolicited.” The application does not expect to get information on any regular basis, and therefore the failure to hear from the device is the normal case (though some sort of “all is well” message may be sent at a longer interval).

Most applications will likely involve one or both of these methods and data is transmitted in TCP or UDP packets.

4.2 GPRS General

When using data services via GPRS, GPRS ISPs offer various contract options, especially regarding the pricing (basic price, basic data volume, billing unit). Please contact the according providers for further information.

In general, GPRS ISPs bill every time a connection is terminated and daily at midnight (the ISP will terminate the connection at this time), and all accumulated data are rounded to the billing unit.

We therefore recommend to select a rate which offers the smallest possible billing unit.

Many GSM/GPRS providers offer so-called M2M rates, which have an exact 1 kb billing matrix.

Note:

The transmitted amounts of data not only consist of the sum of the application user data. They are rather packed into TCP/IP or UDP/IP packets, which also generate network loads and therefore add to the total costs.

In general, a TCP/IP header has 40 bytes, and each TCP/IP packet sent will generate a reply acknowledgement (ACK) packet of 40 bytes with no data inside of it. If a packet is not acknowledged, the TCP/IP packet containing the data will be resent. The rate of retransmission of packets depends on the reliability of the underlying network and the configuration of the TCP stack.

Additionally, the application itself may attempt to resend the data, so even if the TCP/IP stack discards the packet due to a network timeout condition, the application itself may send the data again, causing a new packet to attempt to propagate across the network.

In general a UDP/IP packet will have 28 bytes of header data, however UDP packets are only sent one time, and there is no ACK. UDP therefore has at least a 50% advantage in overhead on a highly reliable network. If the application or data device will resend or re-query for data, UDP can offer significant savings in terms of network efficiency.

EDGE is only an extension of GPRS (EGPRS). The following descriptions (except the data rates) also apply to EDGE.

4.2.1 IP Addresses/Accessibility

The IP address of the GPRS terminal device is dynamically assigned by the provider and is temporary, i.e. during the next dial-in at the provider another IP address will be assigned.

In many GPRS networks the IP address cannot be accessed from outside (**private IP, routing enabled**), as the providers perform the addressing for the switch from GPRS networks to the "normal Internet" via a NAT table (Network Address Translation).

This also provides a security aspect, as the GPRS device is not accessible by so called "scanners" because the IP address cannot be accessed. As GPRS is billed by the amount of data, this prevents unwanted and costly data traffic.

This also means that the following functions may not be possible:

- Pinging the GPRS device from outside
- Establishing TCP/IP connections to the GPRS device from outside
- Sending UDP/IP packets to the GPRS device from outside

All connections (channels) must be opened starting with the GPRS device. This means that the GPRS device or the Ethernet device behind it can only react as Client.

Exceptions to this restriction will be provided by the according provider, if available. Please also contact your provider to clarify if it is possible to use a **public IP or Operator VPN** (Virtual Private Network) for possibly required server functionality.

4.2.2 Date Rates

The modem has the following features:

- GPRS Multislot class 10 (M1000-PC551A/B, M1000-PC521A/B), GPRS/EDGE Multislot class 12 (M1000-PC751A/B)
- GPRS End device class B
- Support of coding scheme 1 to 4
- PBCCH Support

GPRS has several classes (multislot classes) which are relevant for the transmission speed. The classes provide the maximum transmission speed for uplink and downlink.

The table below shows the number of time slots for the classes, which can be used for uplink, downlink, and for the device altogether.

GPRS devices support all variants up to their own multislots.

Multislot class	Downlink slots	Uplink slots	Active slots
8	4 TS	1 TS	5 TS
9	4 TS	2 TS	5 TS
10	4 TS	2 TS	5 TS
11	4 TS	3 TS	5 TS
12	4 TS	4 TS	5 TS

The maximum possible data rate therefore depends on the multislot class of the device. The above table shows the available time slots (TS) of a device; the table below shows the maximum data rate. The data rate, on the other hand, depends on the used coding scheme (CS). This information is unfortunately not available for the user. The network providers use different coding schemes according to the reception situation.

	1 TS	2 TS	3 TS	4 TS
CS 1	9.05 kbps	18.1 kbps	27.15 kbps	36.2 kbps
CS 2	13.4 kbps	26.8 kbps	40.2 kbps	53.6 kbps
CS 3	15.6 kbps	31.2 kbps	46.8 kbps	62.4 kbps
CS 4	21.4 kbps	42.8 kbps	64.2 kbps	85.6 kbps

Data rates of PC data including GPRS control data

	1 TS	2 TS	3 TS	4 TS
CS 1	8 kbps	16 kbps	24 kbps	32 kbps
CS 2	12 kbps	24 kbps	36 kbps	48 kbps
CS 3	14.4 kbps	28.8 kbps	43.2 kbps	57.6 kbps
CS 4	20 kbps	40 kbps	60 kbps	80 kbps

Data rates of PC data only (without GPRS control data)

Note:

The above mentioned values represent the theoretically maximum possible values for a GPRS device. For an EDGE device, values four times as large may be assumed.

In practice, the following applies:

GPRS will not provide guaranteed data rates or bandwidths for the application. The values allocated by the network provider (coding scheme and time slots to be used) can change dynamically during a connection and depend, among other things, on the current amount of connections in the GSM cell.

4.2.3 Delay

Usually, there will be marginally higher delays than with a "normal" connection via GPRS.

The delays will mostly be below one second. The average delay times are stated with 700 ms. Basically, delays of several seconds are possible; the applications at the GPRS end devices should therefore be set to maximum delay times, if possible.

4.3 Typical Applications

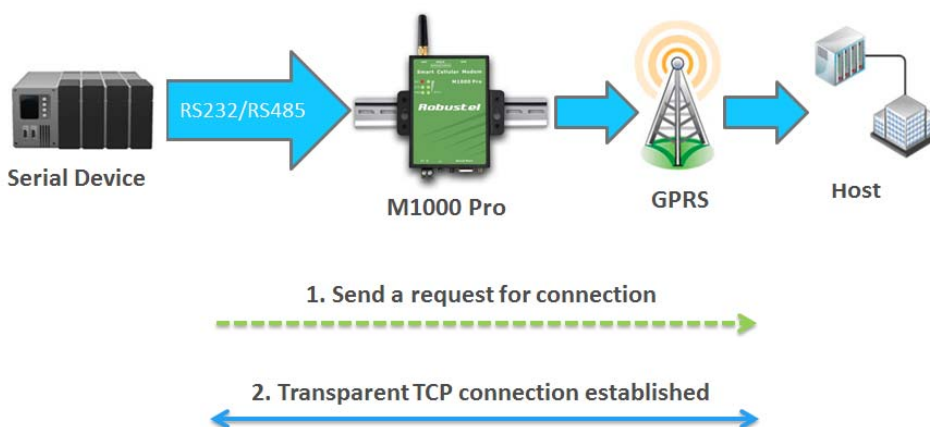
4.3.1 TCP Client Mode

In TCP Client mode, the M1000 Pro can actively establish a TCP connection to a pre-defined host computer when serial data arrives. After the data has been transferred, the M1000 Pro can automatically disconnect from the host computer by using the Inactivity time settings.

As illustrated in the figure below, data transmission proceeds as follows:

(1) The M1000 Pro, configured for TCP Client mode, requests a connection to the host.

(2) Once the connection is established, data can be transmitted in both directions between the host and the M1000 Pro bidirectional.



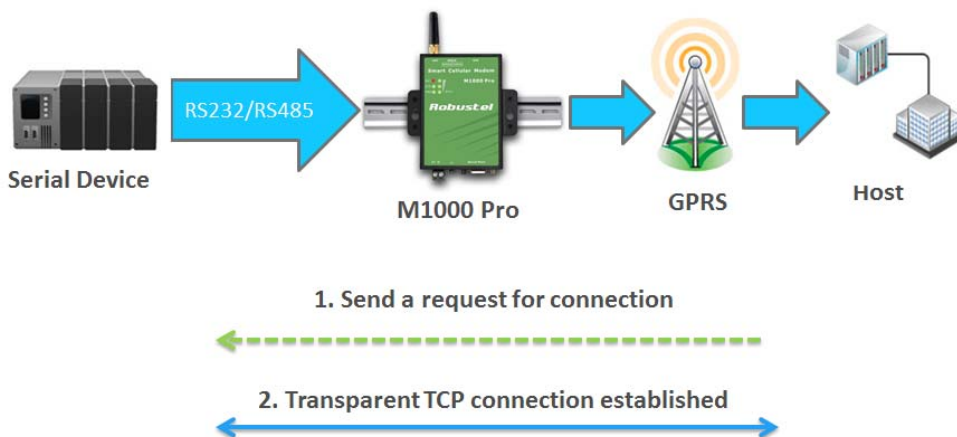
Types of TCP Client Connection:

1. Fixed Public IP (or dynamic public IP with domain name) for the host PC
The M1000 Pro will only be able to connect to a host PC if the PC is using a fixed public IP address (or dynamic public IP with domain name), M1000 Pro can be any IP (either a private IP or public IP).
2. Connecting TCP client and TCP server within the same cellular service provider.
In order to connect properly, the IP addresses of the two M1000 Pro devices must belong to the same subnetwork. To ensure that this is the case, use the same cellular ISP to connect the devices to the network. In addition, you will need to request that the cellular ISP provide you with two private fixed IP addresses (e.g., 192.168.1.1 and 192.168.1.2).

4.3.2 TCP Server Mode

In TCP Server mode, the serial port on the M1000 Pro is assigned a port number. The host computer initiates contact with the M1000 Pro, establishes the connection, and receives data from the serial device.

As illustrated in the figure, data transmission proceeds as follows: The host requests a connection from the M1000 Pro, which is configured for TCP Server mode. Once the connection is established, data can be transmitted between the host and the M1000 Pro bidirectional.

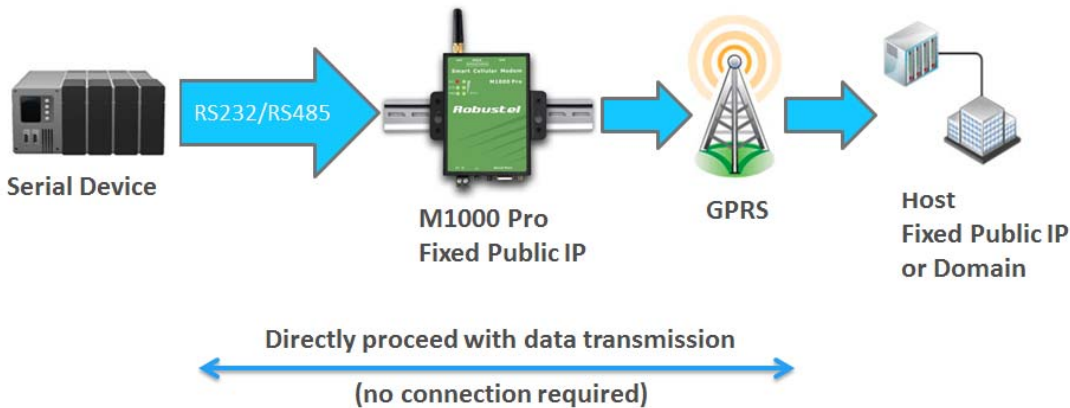
**Types of TCP Server Connection:**

1. Fixed Public IP for the M1000 Pro.
If your cellular service provider offers a fixed public IP address after you connect to the cellular network, you can access the M1000 Pro from a host PC using either a private IP or public IP.
2. Using Online SMS Notification.
If your cellular service provider offers a dynamic public IP address after you connect to the cellular network, you can access the M1000 Pro from a host PC using a fixed public IP.
Since the IP address of the M1000 Pro is changed every time it is connected to the cellular network, you can be aware of the change by the Online SMS Notification message sent from the M1000 Pro via SMS.
3. Connecting TCP client and TCP server within the same cellular service provider.
In order to connect properly, the IP addresses of the two M1000 Pro devices must belong to the same subnetwork. To ensure that this is the case, use the same cellular ISP to connect the devices to the network. In addition, you will need to request that the cellular ISP provide you with two private fixed IP addresses (e.g., 192.168.1.1 and 192.168.1.2).

4.3.3 UDP Mode

The main difference between the TCP and UDP protocols is that TCP guarantees delivery of data by requiring the recipient to send an acknowledgement to the sender. UDP does not require this type of verification, making it possible to offer faster delivery. UDP also allows you to unicast data to one IP, or multicast the data to a group of IP addresses.

These traits make UDP mode especially well suited for message display applications.



If your cellular ISP offers a fixed public IP address after you connect to the cellular network, you can access the M1000 Pro from a host PC that has a fixed public IP bidirectional.

If M1000 Pro has no fixed public IP, then it can unicast data to one host unidirectional.

Note: M1000 Pro supports unicast only.

4.3.4 Virtual COM Mode

One of the major conveniences of using Virtual COM mode is that it allows you to use Virtual COM software that was written for pure serial communication applications. The Virtual COM driver intercepts data sent to the host's COM port, packs it into a TCP/IP packet, and then redirects it through the host's Ethernet to the Internet. At the other end of the connection, the M1000 Pro accepts the IP frame from the cellular network, unpacks the TCP/IP packet, and then transparently sends the data through the serial port to the attached serial device.

We provide application notes to introduce how to work with 3rd parties' popular virtual com software, please contact us to get more information.

Note:

Virtual COM software (COM port redirector) is a specialized software (often including device driver and user application) that includes the underlying network software necessary to access networked device servers that provide remote serial devices or modems.

The purpose of the redirector is to make the virtual COM port exhibit behavior that closely resembles that of a "real" COM port, i.e., a COM port driver for local serial port hardware. A virtual COM port itself is a relatively simple software mechanism that can be implemented by driver software similar to that of a conventional COM port driver. The main challenges arise in two other areas: the network connection to the device server and the behavior of the device server. These issues are described in the Technology section below.

Chapter 5. Appendix

5.1 Factory Settings

Factory setting of the modem COM port under **Config Mode and Normal Mode** is:

Data bits = 8

Parity = none

Stop bits = 1

Baud = 115200 bps

Flow control = none

5.2 Restore to Factory Default

The modem could be restored to factory default by Modem Configurator Pro, SMS or hardware operation.

Following steps indicate how to restore to factory default by hardware operation:

1. Set the modem under Config Mode, power on the modem;
2. Change the modem to Normal Mode, within 2 seconds, change the modem from Normal Mode to Config Mode;
3. Restore successfully.

Note: PIN setting, Phone Book settings and COM settings will not be restored to factory default.

5.3 SMS Commands for Remote Control

M1000 Pro supports remote configuration and remote modem status reading via SMS.

An SMS command has following structure:

Password:cmd1,a,b,c;cmd2,d,e,f;cmd3,g,h,i;...;cmdn,j,k,n

Note:

1. Password: SMS control password is configured at **Basic->SMS Control->Password**, which is an optional parameter.
When there is no password, SMS command has following structure: **cmd1;cmd2;cmd3;...;cmdn**
When there is a password, SMS command has following structure: **Password:cmd1;cmd2;cmd3;...;cmdn**
2. Cmd1, cmd2, cmd3 to Cmdn, which are command identification number 0000 – 9999
3. A, b, c to n, which are command parameters
4. The semicolon character (;) is used to separate more than one commands packed in a single SMS.
5. After setting new parameters for M1000 Pro, please use 0004 command to save parameters and reset the modem, then the new parameters will take effect.
6. E.g., 1234:1001,M1000 Pro;0004
In this command, password is 1234, and we set device name as "M1000 Pro", then save parameters and reset the

modem to take effect with command 0004.

Cmd	Description	Syntax	Comments
Control Commands			
0000	Set Factory Defaults	password:cmd or cmd	if no password, please use command "cmd", or use command "password:cmd" if there is a password. Following commands are the same.
0001	Reset Device	cmd	
0002	Save Parameters	cmd	
0003	Get Device Status	cmd	
0004	Save Parameters and Reset Device	cmd	
0005	Clear Event Count	cmd	
0006	Start Event Counter	cmd	
Set Commands			
1000	Set Comm Parameters	cmd,baud rate,parity,data bits,stop bits,flag	baud rate: 1200 - 115200 parity: n,o,e,m,s data bits: 7,8 stop bits: 1,2 *flag: (can be null) 0 - RS232 1 - RS485
1001	Set Device Name	cmd,name	name(max 20 bytes)
1002	Set Init. String	cmd,string	string(max 40 bytes)
1003	Set SIM Card Pin	cmd,flag1,pin,flag2,newPin	flag1: 0 - disable pin lock 1 - enable pin lock pin(4 - 8 bytes) flag2: 0 - disable change pin 1 - enable change pin *newPin(4 - 8 bytes and can be null)
1004	Set SMS Control Passwd	cmd,passwd	*passwd(max 20 bytes and can be null)
1005	Set APN	cmd,apn	apn(max 20 bytes)
1006	Set User Name	cmd,user name	user name(max 20 bytes)
1007	Set Passwd	cmd,passwd	passwd(max 20 bytes)
1008	Set Dns	cmd,mode,dns1,dns2	mode: 0 - use peer dns 1 - manual

			dns1(ip address, such as: 192.168.0.1) dns2(ip address, such as: 192.168.0.2)
1009	Set Socket Application Mode	cmd,mode	mode: 0 - tcp client 1 - tcp server 2 - udp
1010	Set Center IP	cmd,ip	ip(ip address or domain name)
1011	Set Center Port	cmd,port	port(1024 - 65535)
1012	Set Connection Mode	cmd,mode,flag	mode: 0 - always on line 1 - connect on demand flag:(only available in "connect on demand" mode) 0 - put the module in sleep mode when idle 1 - shut down the module when idle
1013	Set Inactivity Time	cmd,time	time: 5 - 1200s
1014	Set Connection Max Retries	cmd,retries	retries: 1 - 60
1015	Set Connection Interval	cmd,interval	interval: 10 - 1200s
1016	Set Data Packing Interval Timeout	cmd,timeout	timeout: (2 - 100)* 100ms
1017	Set Packet Length	cmd,length	length: 0 - 1024
1018	Set Packet Delimiter 1	cmd,flag,delimiter	flag: 0 - disable 1 - enable delimiter: 00 - ff (hex format)
1019	Set Packet Delimiter 2	cmd,flag,delimiter	flag: 0 - disable 1 - enable delimiter: 00 - ff (hex format)
1020	Set Packet Delimiter Process	cmd,process	process: 0 - do nothing 1 - delimiter +1 2 - delimiter +2 3 - strip delimiter
1021	Set Tx Delay	cmd,delay	delay: (1 - 50)*100ms
1022	Enable Online SMS Notification	cmd,flag	flag: 0 - disable 1 - enable
1023	Enable Internal Roaming	cmd,flag,mode,plmn	flag:

			0 - disable 1 - enable *mode:(can be null) 0 - PLMN in SIM 1 - manual plmn(max 6 bytes)
1024	Set Custom Login	cmd,flag,retries,interval,request,acknowledge	flag: 0 - disable 1 - enable retries: 0 - 60 interval: 5 - 120 request(max 64 bytes): hex *acknowledge(max 32 bytes and can be null): hex
1025	Set Custom Keep Alive	cmd,flag,interval,request,acknowledge	flag: 0 - disable 1 - enable interval: 5 - 1200 request(max 64 bytes): hex *acknowledge(max 32 bytes and can be null): hex
1026	Set Custom Logout	cmd,flag,request,acknowledge	flag: 0 - disable 1 - enable request(max 64 bytes): hex *acknowledge(max 32 bytes and can be null): hex
1027	Set Time Wakeup	cmd,flag,time1,time2,time3	flag: 0 - disable time wakeup 1 - enable time wakeup *time1: 00:00 - 23:59(can be null) *time2: 00:00 - 23:59 (can be null) *time3: 00:00 - 23:59 (can be null)
1028	Set Periodically Connect	cmd,flag,interval	flag: 0 - disable 1 - enable interval: 1 - 1800min
1029	Set Call Wakeup	cmd,flag1,flag2,content	flag1: 0 - disable call wakeup 1 - enable call wakeup *flag2:(can be null) 0 - disable sms reply 1 - enable sms reply

			*content(max 20 bytes and can be null)
1030	Set SMS Wakeup	cmd,flag1,flag2,passwd,content	flag1: 0 - disable sms wakeup 1 - enable sms wakeup flag2: 0 - disable sms reply 1 - enable sms reply passwd(max 20 bytes and can be null) content(max 20 bytes and can be null)
1031	Set Serial Data Wakeup	cmd,flag	flag: 0 - disable 1 - enable
1032	Set Data To Com After Online	cmd,content	content(max 30 bytes)
1033	Set Time Reboot	cmd,flag,time1,time2,time3	flag: 0 - disable time reboot 1 - enable time reboot *time1: 00:00 - 23:59(can be null) *time2: 00:00 - 23:59 (can be null) *time3: 00:00 - 23:59 (can be null)
1034	Set Call Reboot	cmd,flag1,flag2,content	flag1: 0 - disable call wakeup 1 - enable call wakeup flag2: 0 - disable sms reply 1 - enable sms reply content(max 20 bytes)
1035	Set SMS Reboot	cmd,flag1,flag2,passwd,content	flag1: 0 - disable sms wakeup 1 - enable sms wakeup *flag2:(can be null) 0 - disable sms reply 1 - enable sms reply *passwd(max 20 bytes and can be null) *content(max 20 bytes and can be null)
1036	Set Singal Update Frequency	cmd,value	value: 5 - 1200s
1037	Set Phone Number	cmd,index,number,flag	index: 0 - 10(0 - M1000 will auto generate a index when the phone

			<p>book isn't full) number(max 20 bytes) flag: xxxxx (binary format: 00000 - 11111) flag.1: 0 - disable call reboot 1 - enable call reboot flag.2: 0 - disable call wakeup 1 - enable call wakeup flag.3: 0 - disable sms reboot 1 - enable sms reboot flag.4: 0 - disable sms wakeup 1 - enable sms wakeup flag.5: 0 - disable sms control 1 - enable sms control</p>
1038	Set Phone Group	cmd,index,flag	<p>index: 1 - 10(phone group index) flag: xxxxxxxxxx (binary format: 0000000000 - 1111111111) flag.0 ~ flag.9: (phone number index) 0 - exclude in this phone group 1 - include in this phone group</p>
1039	Set DI Parameters	cmd,mode,filtering,trigger,active,flag,message1,message2,group,DIOverTcp	<p>mode: 1 - OFF 2 - ON 3 - ONChange 4 - Event Counter 5 - Null filtering: (0 - 10000) *trigger: (0 - 30000) *active: 0 - Lo to Hi 1 - Hi to Lo *flag 0 - disable counter start when power on 1 - enable counter start when power on *message1: alarm on message</p>

			<p>(max 70 bytes) *message2: alarm off message (max 70 bytes) *group: 1 - 10 (phone group) *DIOverTcp: 0 - disable 1 - enable</p>
1040	Set DO Parameters	cmd,flag,onAction,offAction,flag1,keepOn,DOOverTcp	<p>flag: xxxx (binary format: 000 - 111) flag.0 : 0 - disable DI alarm control DO output 1 - enable DI alarm control DO output flag.1: 0 - disable SMS control DO output 1 - enable SMS control DO output flag.2 : 0 - disable phone control DO output 1 - enable phone control DO output onAction: alarm on action 1 - OFF 2 - ON 3 - Pulse 4 - Null offAction : alarm off action 1 - OFF 2 - ON 3 - Pulse 4 - Null flag1: 0 - DO open when power on 1 - DO close when power on *keepOn: how many times the DO keeps close (0 - 255) *DOOverTcp: 0 - disable 1 - enable</p>
1041	Set Pulse Parameters	cmd,low,high,output,delay	low: 1 - 30000

			high: 1 - 30000 output: 0 - 30000 delay: 0 - 30000
1042	Set DO SMS Control Parameters	cmd,onContent,offContent,group	*onContent: max 70 bytes *offContent: max 70 bytes group: 1 - 10 (phone group)
Get Commands			
2000	Get Base Parameters	cmd	return: 1 - comm 2 - comm type 3 - device name 4 - ME Type 5 - IMEI 6 - sms control password 7 - SIM card pin setup 8 - init. String
2001	Get GPRS Parameters	cmd	return: 1 - apn 2 - user name 3 - password 4 - dns 5 - socket application mode 6 - center IP and port 7 - connection mode 8 - inactivity time 9 - connection max retries and interval
2002	Get Data Packing Parameters	cmd	return: 1 - data packing interval timeout 2 - packet length 3 - delimiter1 and enable 4 - delimiter and enable 5 - delimiter process 6 - Tx delay 7 - enable online sms notification 8 - internal roaming
2003	Get Login Parameters	cmd	return: 1 - login 2 - keep alive 3 - logout

2004	Get Wakeup Parameters	cmd	return: 1 - time wakeup 2 - call wakeup 3 - sms wakeup 4 - data wakeup
2005	Get Reboot Parameters	cmd	return: 1 - time reboot 2 - call reboot 3 - sms reboot
2006	Get Phone Number Parameters	cmd	return: index,number,call reboot,call wakeup,sms reboot,sms wakeup,sms control
2007	Get Firmware Version	cmd	return: firmware version
2008	Get Phone Group Parameters	cmd	return: index: phone group index flag: xxxxxxxxxx (binary format: 0000000000 - 1111111111) flag.0 ~ flag.9: (phone number index) 0 - exclude in this phone group 1 - include in this phone group
2009	Get DI Parameters	cmd	return: DI parameters
2010	Get DO Parameters	cmd	return: DO parameters

Note:

1. All the phone number stored in Phone Book has the right to control the modem via SMS.
2. PIN setting, Phone Book settings and COM settings will not be restored to factory default.

SMS Control Examples:

1. Set Comm Parameters

- a. do not modify serial type, serial port parameters are 9600-none-8-1, corresponding command is: **1000,9600,n,8,1**
- b. set serial port type as RS485, serial port parameters are 9600-none-8-1, corresponding command is: **1000,9600,n,8,1,1**

2. Set Dns

- a. Dns setting is use peer dns, corresponding command is: 1008,0
- b. Dns setting is manual , Dns1 = 192.168.0.1, Dns2 = 192.168.0.2, corresponding command is: 1008,1,192.168.0.1,192.168.0.2

3. Set Packet Delimiter 1

- a. Enable Delimiter 1, Delimiter 1 is 0x31, corresponding command is: 1018,1,31
- b. Disable Delimiter 1, corresponding command is: 1018,0

4. Enable International Roaming

- a. Enable International Roaming, corresponding command is: 1023,1
- b. Disable International Roaming, use PLMN in SIM, corresponding command is: 1023,0,0 or 1023,0
- c. Disable International Roaming, manual, plmn = 46002, corresponding command is: 1023,0,1,46002

5. Set Custom Login

- a. Enable Custom Login, retries = 5, interval = 60, request content: 0x313233343536373839, no acknowledge, corresponding command is: 1024,1,5,60,313233343536373839
- b. Enable Custom Login, retries = 5, interval = 60, request content: 0x313233343536373839, acknowledge content: 0xafdecb, corresponding command is: 1024,1,5,60,313233343536373839,afdecb
- c. Disable Custom Login, corresponding command is: 1024,0

6. Set Time Wakeup

- a. Enable Time Wakeup, time1 = 00:00, time2 = 23:59, corresponding command is: 1027,1,00:00,23:59
- b. Disable Time Wakeup, corresponding command is: 1027,0

7. Set Phone Number

- a. Add a phone number +8613711210511, index is random, enable call reboot and SMS reboot, disable call wakeup and SMS wakeup, enable SMS control, corresponding command is: 1036,0,+8613711210511,10101
- b. Add a phone number +8613711210511 in index 2, disable call reboot, enable call wakeup, disable SMS reboot, enable SMS wakeup, disable SMS control, corresponding command is: 1036,2,+8613711210511,01010
- c. Delete a phone number at index 3, corresponding command is: 1036,3

5.4 Modbus Address Mapping

DI and DO:

Address	Description	Value
0x3000 Read/Write Coils		
0x3000	DI_0 Status	1: On 0: Off
0x3001	DI_1 Status	1: On 0: Off
0x3002	DO_0 Status	1: On 0: Off
0x3003	DI_0 Clear Count Value	1: Clear Counter Value 0: Return Illegal Data Value
0x3005	DI_0 Start Event Counter	1: Start Event Counter 0: Return Illegal Data Value
0x4000 Read/Write Registers		
0x4000	DI_0 Count Value	

5.5 Robustel DI and DO over TCP Protocol

DI over TCP and DO over TCP are using private protocol.

User can easily integrate Robustel DI and DO over TCP Protocol into their SCADA or system.

Data format:

Start	Device Name	Data Type		Time Stamp	I/O Channel	Data	End
		Part 1	Part 2				
\$	8 bytes	2 byte	2 byte	12 bytes	2 bytes	N bytes	#

Start: 1 byte starts with \$

End: 1 byte ends with #

Device Name: 8 bytes, such as 00000001, indicates "Device Name" from ModemConfigurator (maximum 8 characters)

Part 1: Can be "DI" or "DO"

Part 2: Can be "00" and "01", 00=Single DI/DO channel, 01=Multi DI/DO channel from the 1st channel (M1000 just has 1 DI and 1 DO)

Time Stamp: 12 bytes, format is yyMMddHHmmSS, such as 111028174532=28th Oct. 2011, 17:45:32

I/O Channel: When Part 2=00, indicates the specify DI/DO channel, such as 00=1st DI/DO, 01=2nd DI/DO; When Part 2=01, indicates continuous multi DI/DO channel, such as 01=1st DI/DO, 02=1st to 2nd DI/DO, 03=1st to 3rd DI/DO

Data: Each DI or DO occupies one byte. When Part 1=DI, it can be 0 or 1, 0=recovering alarm, 1=triggering alarm; When Part 1=DO, it can be 0, 1 or 2, 0=recovering alarm, 1=triggering alarm, 2=output pulse.

For example:

Start	Device Name	Data Type				Time Stamp	I/O Channel		Data	End
\$	10000001	D	O	0	1	11-06-18 17:28:48	0	2	21	#

Data: \$10000001DO011106181728480221#

\$: Start byte

10000001: Device Name

DO01: multi-channel DO

110618172848: time is 18th Jun. 2011, 17:28:48

02: 2 continuous DO from the first channel

21: DO_0=output pulse, DO_1=recovering alarm

#: End byte

5.6 Troubleshooting

This section of the document describes possible problems encountered when using the Robustel M1000 Pro modem and their solutions.

5.6.1 The modem's LED does not light:

- Check if modem has connected to a 9 to 36VDC power supply properly.
- Check if the power connector is properly inserted.

5.6.2 M1000 Pro keep rebooting all the time:

Please make sure you have inserted the SIM card.

5.6.3 No connection with modem through serial link

- Check if the serial cable has been connected properly.
- Check if the serial cable has been made by following pin assignment given in table [PIN Assignment](#) for RS232 and RS485.
- Check if your program has proper setting. Factory setting of the modem under **Normal Mode** is listed at [5.1](#).
- Check if there is another program interfering with the communication program, such as conflict on communication port access.

5.6.4 GPRS connection cannot be established

- Check if the APN, User Name and Password have been input correctly.
- Check if the SIM card balance is enough or not.

5.7 Terms and Abbreviations

Abbreviations	Description
AC	Alternating Current
APN	Access Point Name of GPRS Service Provider Network
CE	Conformité Européene (European Conformity)

CHAP	Challenge Handshake Authentication Protocol
CSD	Circuit Switched Data
CTS	Clear to Send
dB	Decibel
dBi	Decibel Relative to an Isotropic radiator
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment (typically modems)
DCS 1800	Digital Cellular System, also referred to as PCN
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-frequency
DTR	Data Terminal Ready
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ESD	Electrostatic Discharges
ETSI	European Telecommunications Standards Institute
GND	Ground
GPRS	General Package Radio Service
GSM	Global Standard for Mobile Communications
IMEI	International Mobile Equipment Identification
kbps	kbits per second
LED	Light Emitting Diode
MAX	Maximum
Min	Minimum
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
PAP	Password Authentication Protocol
PC	Personal Computer
PCN	Personal Communications Network, also referred to as DCS 1800
PCS	Personal Communication System, also referred to as GSM 1900
PDU	Protocol Data Unit
PPP	Point-to-point Protocol
PIN	Personal Identity Number
PSU	Power Supply Unit
PUK	Personal Unblocking Key
R&TTE	Radio and Telecommunication Terminal Equipment
RF	Radio Frequency
RTC	Real Time Clock
RTS	Request to Send
Rx	Receive Direction

SIM	Subscriber Identification Module
SMA	Subminiature Version A RF Connector
SMS	Short Message Service
TCP/IP	Transmission Control Protocol / Internet Protocol
TE	Terminal Equipment, also referred to as DTE
Tx	Transmit Direction
UART	Universal Asynchronous Receiver-transmitter
UDP	User Datagram Protocol
USSD	Unstructured Supplementary Service Data
VSWR	Voltage Stationary Wave Ratio