

GSM 3G IOT M2M Solution

GSM 3G M2M RTU



User Manual
 Ver 1.0
 S27x
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This handbook has been designed as a guide to the installation and operation of RTU S27x.

Statements contained in the handbook are general guidelines only and in no way are designed to supersede the instructions contained with other products.

We recommend that the advice of a registered electrician be sought before any Installation work commences.

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Model	GSM/3G	Precision	DIN	AIN	DO	Register	Record	Port
S270	V	12bit	2	2	2	X	1000	USB
S271	V	12bit	4	4	4	X	1000	
S272	V	12bit	8	6	4	X	TF Card	USB/RS232/RS485
S273	V	12bit	8	6	4	64	TF Card	
S275	V	16bit	8	6	4	64	TF Card	USB/RS232/RS485/RJ45
Notice	<ol style="list-style-type: none"> For 3G Version, the model should plus C or W, C stands for inbuilt module is CDMA2000. W stands for inbuilt module is WCDMA; All of them support 1 temperature and 1 humidity inputs for environment monitoring. The standard package: 1x RTU, 1x GSM Antenna, 1x AC/DC Adaptor, 1x Android APP, 1x PC Configuration Software, 1x USB cable, 1x User Manual, 1x Backup battery inside, 1x TF card inside, Terminals for Connection. The standard package not includes: SIMCard , Temperature+Humidity sensor TH100 							

Warning Tips:

This User manual is for S275, for other models please refer to this user

manual and note abovementioned differences.



1. Brief Introduction

The GSM 3G M2M RTU inbuilt ARM® Cortex™ 32 Bit RISC Core, 168 MHz inside, RTOS system. It is a multi I/O port remote terminal unit, through the RS232/485 port can extend up to 64 additional I/O or connect intelligent meters or PLC. It is special for BTS monitoring, remote data acquisition, telemetry, BTS monitoring, access control, ATM, generator monitoring, Pump station monitoring, weather satiation monitoring and other applications. It supports voice communication, SMS, GPRS, 3G and RJ45 LAN IP communications.

The GSM 3G M2M RTU can be used as remote access control. The authorized users can open the gate or turn on the machine with a free charge call at specified time.

The GSM 3G M2M RTU supports Modbus RTU, Modbus TCP, TCP/UDP protocol, transparent data transmission over GPRS/3G, RS232, RS485, RJ45, performs as Modbus Master or Modbus Slave. It can integrate into present SCADA or DCS or HMI directly.

The GSM 3G M2M RTU can be used as Modbus RTU SMS Alert Alarm, when the data acquisition from RS232/485 exceeds threshold value, it also can send pre-definition SMS to users.

The GSM 3G M2M RTU can be used as:

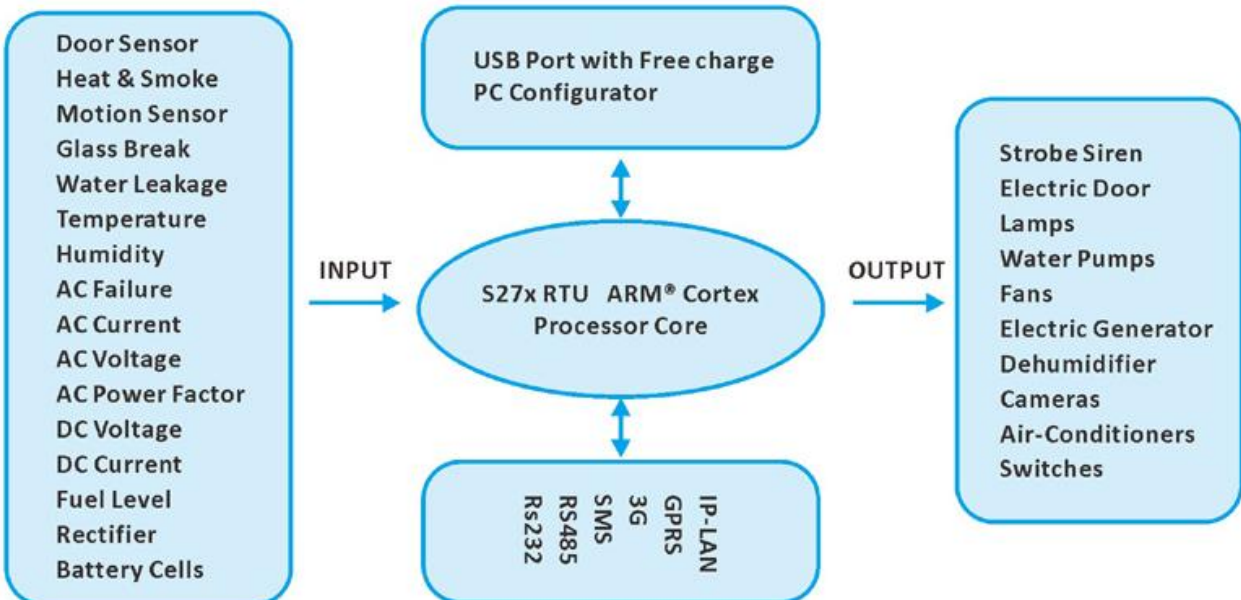
- **A Switch with SMS Remote Control.** SMS texts for switching particular terminals on/off are configurable.
- **A Modbus RTU SMS Alarm.** It can be used as Modbus RTU SMS Alarm, when the data/value acquisition from RS232/485 exceed the threshold, it can send SMS to alert the users immediately.
- **A Timer-Switch which can be activated automatically.** It can be used as preset time when the GSM 3G M2M RTU need work and when it needn't work.
- **An Access Control unit.** Up to 10 tel. numbers can be authorized for dial to access control and open the electricity door directly with free charge.
- **An automation system.** Each input can link to output actions, this is very useful when the temperature upto appointed value, need switch on the air-conditioning immediately, or when water overflow and need switch on the dryer, or when somebody broken into the door or windows need to start the CCTV and Siren.
- **A SMS reporter.** The GSM 3G M2M RTU can setup daily automatically report its current status to users.
- **A SMS Alarm Controller.** The IO activations or deactivations can be reported by SMS and optionally confirmed by phone calls. Each input can have its own message texts and the message can be programmed by users.
- **A Pulse Counter.** The digital inputs can be used as the pulse counter, the user can setup both of interval value activated alarm and total value activated alarm.
- **A Data Logger.** The unit can save the all of the acquisition data in internal memory storage and upload to internet by GPRS /3G/RJ45/RS232/RS485 network according to schedule, no distance limitation.
- **A Wireless Data Acquisition to SCADA or HMI or Monitoring Center.** The unit can acquisition the variety data(E.g.: Pressure, Level, Current, Voltage, digital input status, pulse counter, digital relay output status, temperature value, humidity value and other) and upload to the SCADA(Real time dynamic data) or HMI or Monitoring Center by SMS/GPRS/3G/RJ45/RS232/RS485, no distance limitation.
- **A Wireless Intelligent Meter Reader.** The GSM 3G M2M RTU can be used to read remotely intelligent meter data to SCADA or monitoring center by RS232 port or RS485 Port.

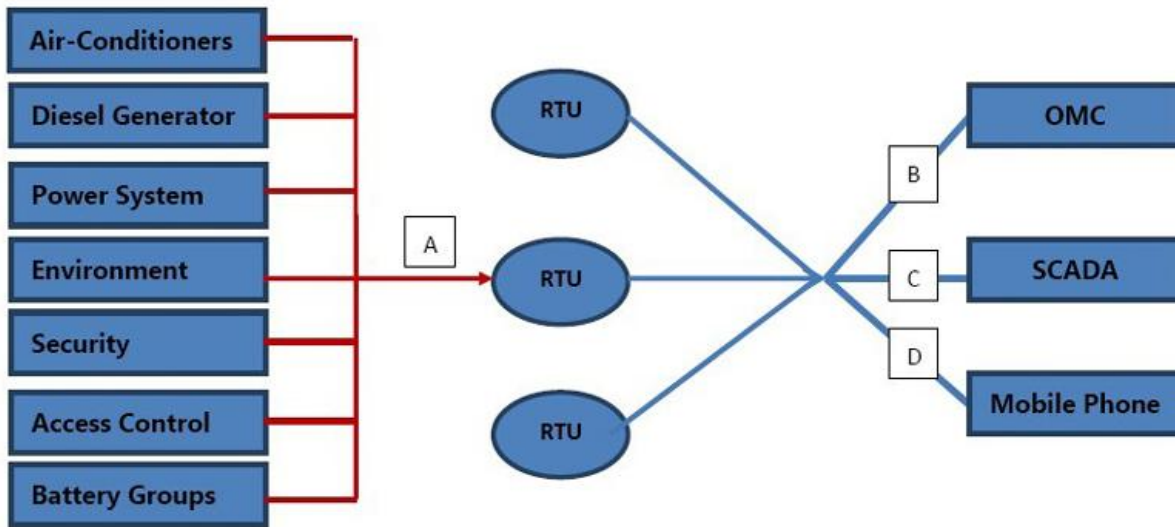
- A **GSM 3G DTU(GPRS 3G Data Transfer Unit)**. It can work with the supervising center, in the supervising center, the own can remote monitoring and control the remotely terminals by GPRS/3G/RJ45 LAN Network. This is very useful to Fuel tank monitoring, Oxygen in hospital, Flood level, street light control, wellhead control, BTS environment monitoring, power transmission system monitoring and other applications.

1.1 Typically Applications



Typically BTS Solution Diagram:





- A:** I/O port connections, RS232/RS485 extend I/O ports, RS232/RS485 connects Air-Conditioners, intelligent meters, Diesel Generator, Power System, and Battery Groups via transparent protocol or Modbus RTU protocol. Under this condition, the RTU performs Modbus RTU Master;
- B:** Through RJ45 LAN cable or GPRS or 3G to HMI, OMC, the protocol is defined by user of personal.
- C:** Through RJ45 LAN cable or GPRS or 3G to SCADA, HMI, DCS, OPC Server, Under this condition, the RTU performs Modbus Slave.
Through RS232 or RS485 to SCADA, HMI, DCS, OPC Server, under this condition, the RTU performs Modbus Slave.
- D:** Through SMS to control RTU, or receive SMS alarm alert, or through voice communication to open the door or receive alarm calling.

1.2 Mainly Features

- 1) ARM® Cortex™-M4 32 Bit RISC Core, 168 MHz inside, RTOS system;
- 2) Widely Rated voltage range, 9~36VDC, Inbuilt large capacity rechargeable backup battery;
- 3) 2G TF card for save historical data, USB port for configuration and upgrade firmware;
- 4) 6 analog inputs, 16bits, supports 0-5V, 0-20mA, 4-20mA;
- 5) 4 Relay outputs, 5A/30VDC, 5A/250VAC;
- 6) 8 digital inputs, dry contact or level input. One of the input can be used as counter;
- 7) 1 temperature probe input, 1 humidity transducer input;
- 8) I/O ports with opto-isolated, RS232/485 with 15KV ESD protection;
- 9) 2 IP data centers, supports Modbus TCP, TCP/IP protocol over GPRS/3G/RJ45 LAN network;
- 10) RS232/RS485 can performs Modbus RTU Master, Modbus RTU Slave, supports 01,02,03,04,05 code, up to 64 registers, the register arise alarm also can send SMS to alert;
- 11) RS232/485 can be used as data transparent transmission for different intelligent meters or PLC;
- 12) Automatically resend the data while communication failure, GPRS failure will alert by SMS text;
- 13) Supports remotely restart the RTU, and configure it by SMS commands remotely;
- 14) Supports over voltage protection and phase-reversal protection;
- 15) 10 SMS Alert and auto dial numbers, can program to receive specified alarm message.
- 16) 10 access control authorized numbers, can open the BTS door or turn on/off machine with a free charge call at the specified time.

1.3 Specifications

Item	Reference Scope
DC Power supply	Standard adapter: DC 12V/1.5A Range 9-36VDC
Power consumption	Standby: 12V/70mA; Working Max.: 12V/300mA
GSM/3G Frequency	850/900/1800/1900Mhz/3G(WCDMA or CDMA2000)

Transmit power	Class 4 (2W) at EGSM 900 and EGSM 850 Class 1 (1W) at GSM 1800 and GSM 1900
GPRS connectivity	GPRS multi-slot class 10
GPRS Data Transmission	GPRS data downlink transfer: max. 85.6 kbps GPRS data uplink transfer: max. 42.8 kbps Coding scheme: CS-1, CS-2, CS-3 and CS-4
TCP/IP stack	TCP,UDP
SIM interface	Supporting 3V /5V SIM Card
External antenna	SMA Antenna interface, 50 Ohm
Serial Interfaces	1 USB Port;
Protocols	SMS, GPRS UDP,TCP, Modbus RTU, Modbus TCP and more equipment protocols can be added according to requirements.
RS232/485	1 RS232 and 1 RS485, Support Transparent transmission and Modbus RTU Master, Modbus RTU Slave.
RJ45 Port	1 Port, for LAN IP communication
Wireless Module	433Mhz, DSSS, 3-5Km or 6-10Km.(Only Special Model support it)
Digital Inputs	8 Digital input, NC/NO/Edge/Level type, Can be used as Pulse Counters;
Analog Inputs	6 Analog Inputs. 12 bit resolution, 0-5V or 0-20mA or 4-20mA;
Temp.&Hum Inputs	TH100, Range: Temperature: -40 °C to +80 °C, Humidity: 0~100%RH;
Relay Outputs	4, Rated: 5A/30VDC,5A/250VAC
Power Outputs	2 Port, for external device.
Memory Capacity	Internal Memory inside, can save the data for 1000events.
Backup Battery	3.7V 1200mAH
Temperature range	-10-+70 °C
Humidity range	Relative humidity 95% (condensation free)
Exterior dimension	168mm*113mm*32.3mm
Net Weight	1000 g

2.Safety Directions



Safe Startup

Do not use unit when using GSM/3G equipment is prohibited or might bring disturbance or danger.



Interference

All wireless equipment might interfere network signals of unit and influence its performance.



Avoid Use at Gas Station

Do not use unit at a gas station. Power off Gate Opener when it near fuels or chemicals.



Power it off near Blasting Places

Please follow relevant restrictive regulations. Avoid using the device in blasting places.



Reasonable Use

Please install the product at suitable places as described in the product documentation. Avoid signal shielded by covering the mainframe.

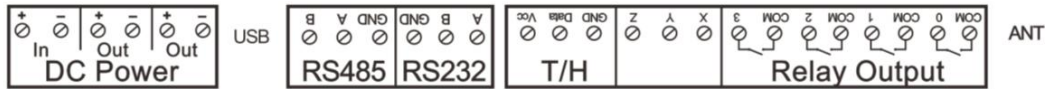


Use Qualified Maintenance Service

Maintenance can be carried out only by qualified maintainer.



3. Physical Layout



KING PIGEON® S275 GPRS RTU

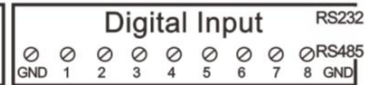
6AI/8DI/4DO/RS232/RS485 Modbus/RJ45/TCP

Power
Signal
Alarm
Arm
Run

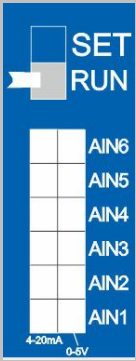


Ethernet

BAT Mode	Analog Input Type				
OFF	Set	V	V	V	V
ON	Run	mA	mA	mA	mA



LED Indicator	
Power	The Power status indicator, when power on the LED will turn normally on.
Signal	GSM/3G signal indicator, GPRS Connective successful will slowly flick.
Alarm	Alarm Indicator, on is alarming, off is normally;
Arm	GPRS Receiving data is on, otherwise is off.
Run	
RS232	RS232 Port communication indicator, normally is off;
RS485	RS485 Port communication indicator, normally is off;
T/H	Temperature & Humidity sensor TH100 inputs.
Power Connector Definition	
<p>Notice: Output voltage = Input voltage</p>	
DC IN+	External Power Connector, Connect to 1.5A@9~36V DC power through AC/DC Adaptor, positive electrode.
DC IN-	External Power Connector, negative electrode.
DC Out	See above mentioned photo.
Digital Relay Output Connector Definition	
DO +	Digital Relay Output 4+, positive electrode, NO;
GND	Digital Relay Output 4-, negative electrode.
COM Port Connector Definition	
485A	485A
485B	485B
RST	RST (RS232 CONTROL)
TXD	TXD(RS232)
RXT	RXD(RS232)
GND	GND
USB Port Connector Definition	
USB	USB port, for configuration and upgrade firmware and output historical data;
ATN Port Connector Definition	

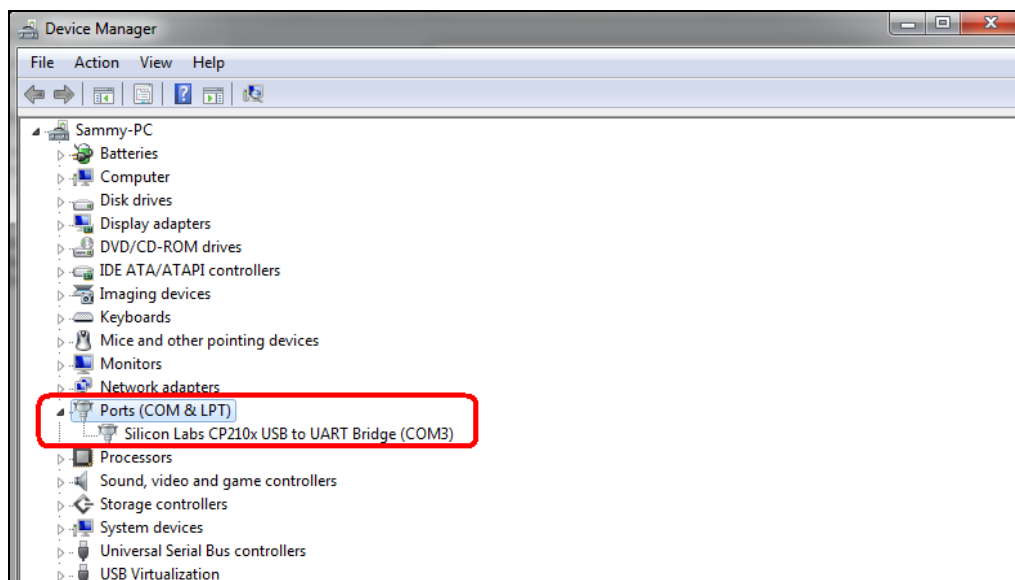
ATN	GSM/3G Antenna connector, 50Ohm, SMA female.
Analog Input Connector Definition	
GND	GND, Analog negative electrode
AIN+	Analog input, positive electrode.
	
<p>Mode switch:</p> <p>SET: for configuration by PC software</p> <p>RUN: for regular working status</p> <p>Analog Input Type switch</p> <p>mA: Stands for 4-20mA transducers;</p> <p>V: stands for 0-5V transducers.</p>	
Digital Input Connector Definition	
GND	Opto-isolated digital input, negative electrode.
DIN+	Opto-isolated digital input, positive electrode.(Level >3.3V as Close, <=3.3V as Open)

4. Setting

The GSM 3G M2M RTU is user-friendly design. The user can setup it or export historic data by the PC Configurator through USB cable, and upgrade firmware by USB port. The GSM 3G M2M RTU also can be configured some parameters by SMS Commands or Android APPs.

Step1: Install USB Driever

Please Contact the unit to the PC by USB Cable, and then install the USB Driver to the computer from the CD firstly. When successful, it can be found out at the device manager of the XP or Windows 7, please see the below photo. Also, the driver for different OS can be downloaded from Silicon Laboratories, Inc. <http://www.silabs.com> , the model is CP210x.




Step2: Connection

Please insert the SIMCard, and install the GSM/3G Antenna, then contact the additional detectors or transducers or meters to the units, and final connect the power to the GSM 3G M2M RTU and power on it.(For Analog input, please reference the interface part to choose the correct input type for 0-5V and 0-20mA or 4-20mA).

Step3: Install the GSM 3G M2M RTU Configurator

The GSM 3G M2M RTU Configurator in the CD or download from www.GSM-M2M.com, then install it on the computer.

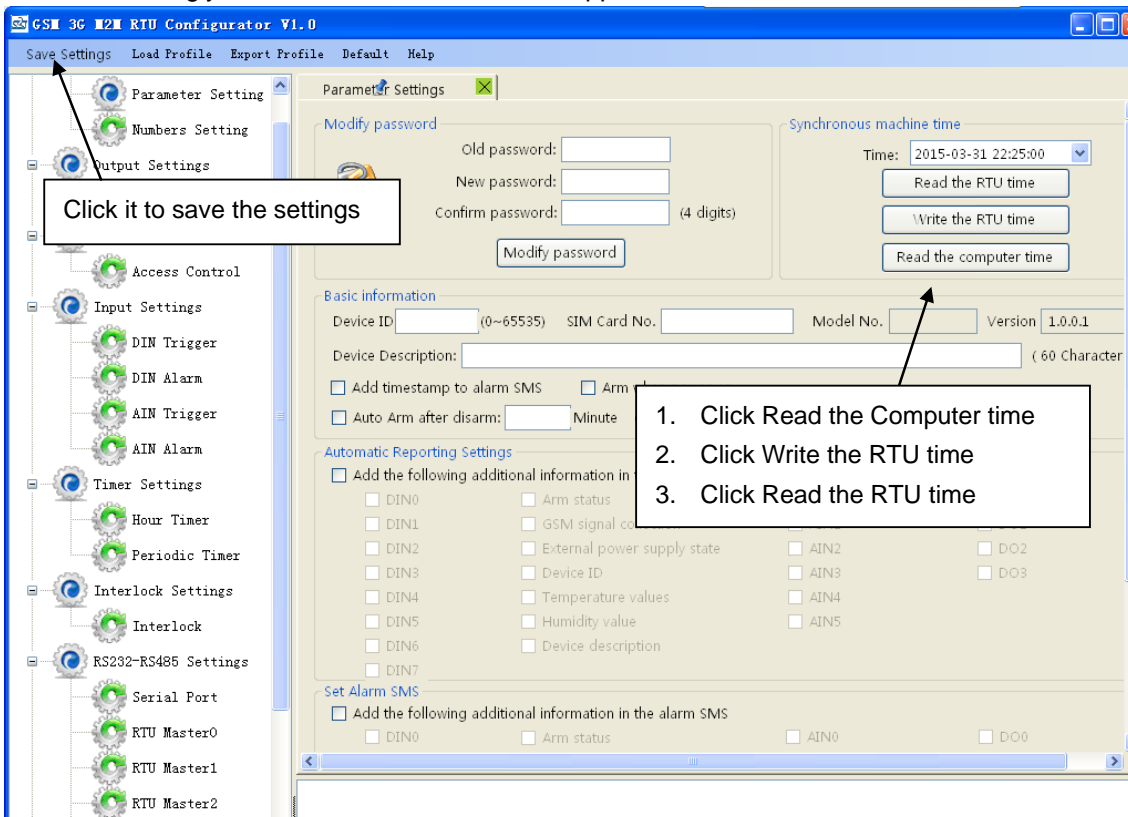
Step3: Run the GSM 3G M2M RTU Configurator

Connect the PC and GSM 3G M2M RTU by USB Cable, then click  to run it. Enter the password, default is 1234. Then you can enter the configuration page as below:



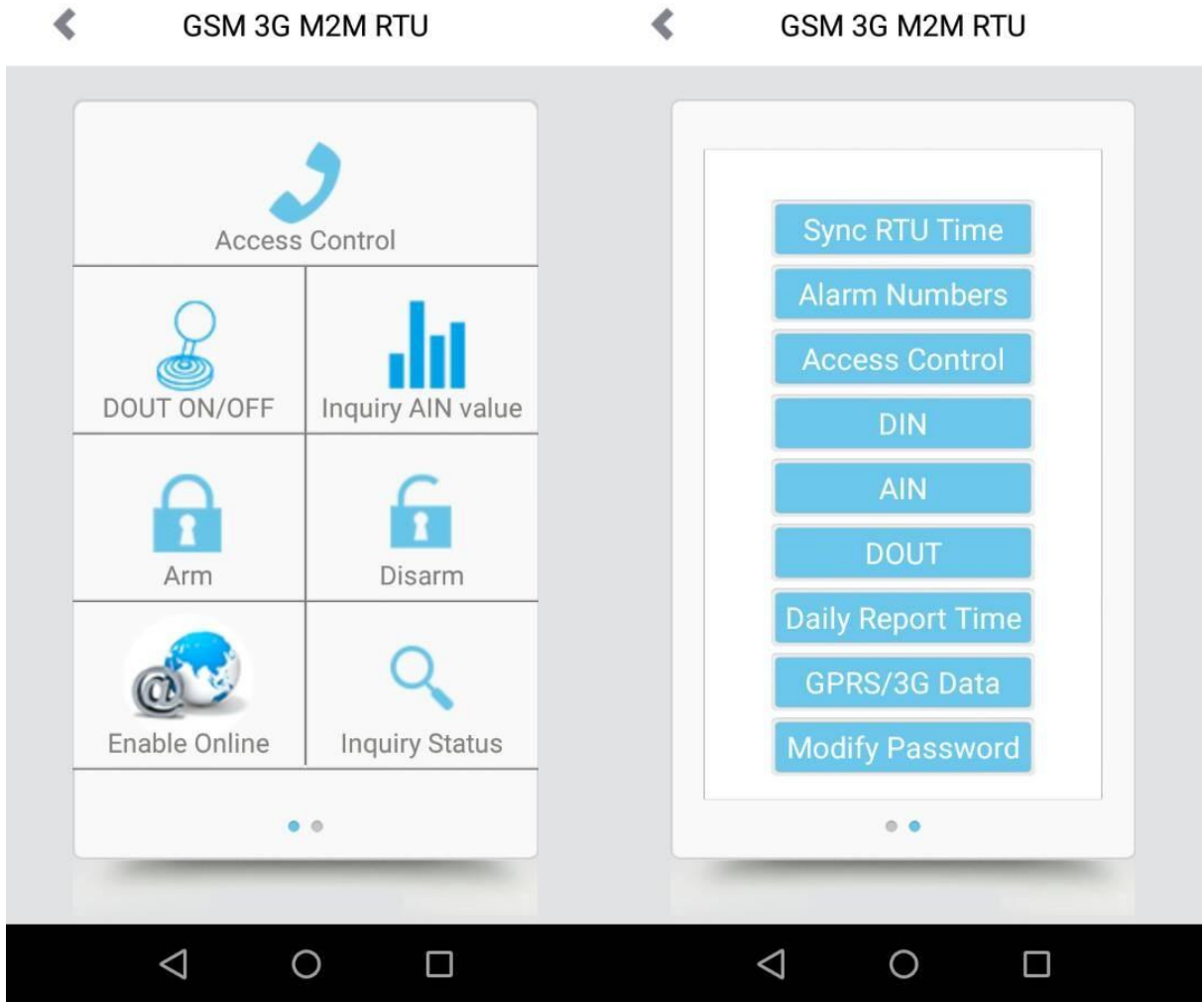
Step4: Configuration Parameters

The GSM 3G M2M RTU configurator is a user friendly design software, all of the parameters and ranges are describe clearly, please read the notices carefully to save you configuration time. Also for daily operate, we are strongly recommend the user use the App.



5. SMS commands & APP

The user can send SMS commands to setup or operate the GSM 3G M2M RTU, also can use the APP to control it easier.



The SMS commands are below:

- 1) Commands error return SMS

Event	Return SMS Content
Any incorrect Command	SMS Format Error, Please check Caps Lock in Command!

- 2) External DC Status

Event	Return SMS Content
External DC goes off	External DC Power Goes OFF
External DC Power Goes ON	External DC Power Goes ON

- 3) Modify Password, 4digits, default is 1234

SMS Command	Return SMS Content
Old Password+P+New Password	This is the New Password, please remember it carefully.

- 4) Arm/Disarm SMS Command

SMS Command	Return SMS Content	
Arm	password+AA	Armed
Disarm	password+BB	Disarmed

- 5) Set RTU time, format is 2015-05-22 15:20:30W01, the W01 stands for Monday, W07 stands for Sunday.

SMS Command	Return SMS Content
password+DxxxxxxxTxxxxxWxx	xxx(Y)XX(M)XX(D)xx(H)X(M)xx(W)



6) Inquiry Current Status SMS Command

SMS Command		Return SMS Content
password+EE		Armed/Disarmed Model: Version: IMEI: GSM Signal Value: External DC Power Goes OFF/ON

7) Setup 10 User number(Alarm Number&Access Control Number), max 21digits. (Return 0~4 or 5~9 separately while setting.)

SMS Command		Return SMS Content
Setup	password+A+series number+T+tel number Notice: Series number = 0~9	Tel1: --- Tel2: --- Tel3: 13570810254 Tel4: --- Tel5: ---
Inquiry	password+A	Return all numbers
Delete	password+A+series number	Return 0~4 or 5~9 numbers.

8) Authority User Number to access control: authorized number can dial to disarm and open the door.

SMS Command		Return SMS Content
Setup	Specified access control time: password+B+series number+S+start time+E+endtime Always can access control: password+B+series number+P Notice: Time format is 201505231230, stands for year, month, date, hour, minute.	Tel1: --- Tel2: --- Tel3: 13570810254 Tel4: --- Tel5: ---
Inquiry	password+B	Return all authorized user numbers
Delete	password+B+series number	Return all authorized user numbers

9) Setup Daily Report time

SMS Command		Return SMS Content
Setup	password+DR+series number+T+time Notice: Series number =0~9, e.g.: 1234DR1T12:30	Daily SMS Report at: xx:xx
Inquiry	password+DR	
Delete	password+DRDEL	

10) Setup DIN Name(For recovery alert then the SMS will plus "Recovery")

SMS Command		Return SMS Content
Set DIN Name	password+DIN+channel number+T+ DIN Name Notice: channel number= 0~7, DIN Name max 40 characters; E.g.: 1234DIN0TDoor alarm	DINx:
Inquiry DIN Name	password+DIN+series number<nnnnnnnn> Notice: nnnnnnnn stands for channel number	
Delete DIN Name	password+DIN+series number+DEL	
Inquiry Status	password+DINE	DIN1:Open/Close DIN2: Open/Close -----



11) Setup AIN Name(For recovery alert then the SMS will plus "Recovery")

SMS Command		Return SMS Content
Set AIN Name	password+AIN+channel number+T+AIN Name Notice: channel number= 0~5, AIN Name max 40 characters; E.g.: 1234AIN0TDoor alarm	AINx:xxxx
Inquiry AIN Name	password+AIN+ channel number<nnnnnnnn>	
Delete AIN Name	password+AIN+ channel number+DEL	
Set Threshold	password+AINR+channel number+Lxxx+Hxxx	AINx: Low:xxx,High:xxx.
Inquiry Threshold	password+AINR+ channel number<nnnnnnnn>	AINx: Low:xxx, High:xxx. AINy: Low:xxx, High:xxx.
Delete Threshold	password+AINR+ channel number+DEL	
Set AIN measurement range	password+AINM+ channel number+Lxxx+Hxxx	AINx: Min:xxx,Max:xxx
Inquiry measurement range	password+AINM+ channel number<nnnnnnnn>	AINx: Min:xxx, Max:xxx. AINy: Min:xxx, Max:xxx.
Delete measurement range	password+AINM+channel number+DEL	
Inquiry AIN Current Value	password+AINE+channel number<nnnnnnnn>	AINx: xxxx ,+【 Normal/Higher/Lower 】
Inquiry All AIN Current Value	password+AINE	AIN0: xxxx ,+【 Normal/Higher/Lower 】 AIN1: xxxx ,+【 Normal/Higher/Lower 】 ----

12) SMS Control Digital Output

SMS Command		Return SMS Content
Set DO Name	password+DO+channel number+T	DOx:xxxx
Inquiry DO Name	password+DO+ channel number<nnnn>	
Delete DO Name	password+DO+ channel number+DEL	
Switch ON(Close)	password+DOC+ channel number<nnnn>	DOx: ON DOy:ON
Switch OFF(Open)	password+DOO+ channel number<nnnn>	DOx: OFF DOy:OFF
Inquiry DO Current Status	password+DOE+ channel number<nnnn>	DOx: ON/OFF DOy:ON/OFF
Inquiry all DO Current Status	password+DOE	DO1: ON/OFF DO2:ON/OFF ---
Set Pulse Output time	password+DOT+xxx (3 digital, unit is seconds)	Pulse Output Time:xxxS
Inquiry pulse output time	password+DOT	Pulse Output Time:xxxS
Pulse Ouput	password+DOP+channel number<nnnn>	No SMS Return

13) Set Server Parameter

SMS Command		Return SMS Content
Set Server IP	password+IP+ IPaddress+P+Com port	Server: Port:
Inquiry	password+IP	
Delete	password+IPDEL	



14) Set GPRS APN/USER NAME/PASSWORD

SMS Command		Return SMS Content
Set	password+AP+apn+#+username+#+userpassword	APN:
Inquiry	password+AP	User Name:
Delete	password+APDEL	Password:

15) Wakeup GPRS Online

SMS Command	Return SMS Content
password+GPRSONline	No SMS Return

16) Remote upload historic data via GPRS: Send this command, the unit will upload historic data via GPRS.

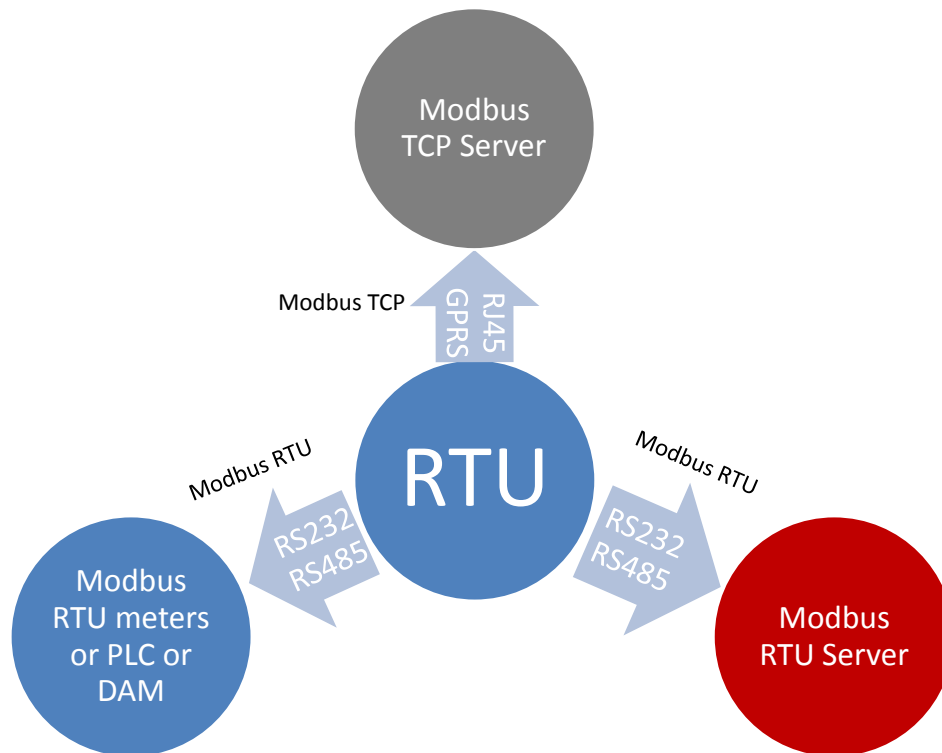
SMS Command	Return SMS Content
password+HIS	Automatically upload all historic data to server via GPRS.

6. Communication Protocol

The GSM 3G M2M RTU supports TCP/IP communication via GPRS/3G or RJ45 LAN, and RS232,RS485 serial ports for local communications. It is very useful for users to create remotely or local monitoring server. It inbuilt standard Modbus RTU, Modbus TCP, transparent data transmission protocol and definition protocol, the user can connect the GSM 3G M2M RTU to the present HMI, OPC Server, SCADA directly.

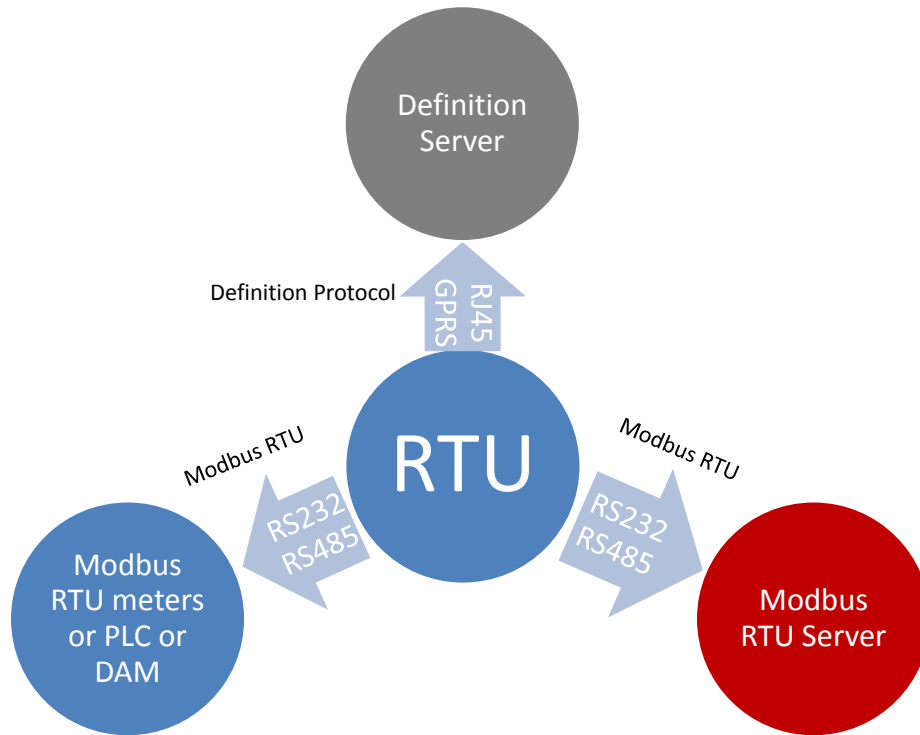
6.1 Modbus RTU/Modbus TCP Protocol

The GSM 3G M2M RTU supports standard Modbus RTU and Modbus TCP protocol, the user can use the standard Modbus RTU Server or Modbus TCP Server, e.g.: SCADA. The topological graphs please see below:



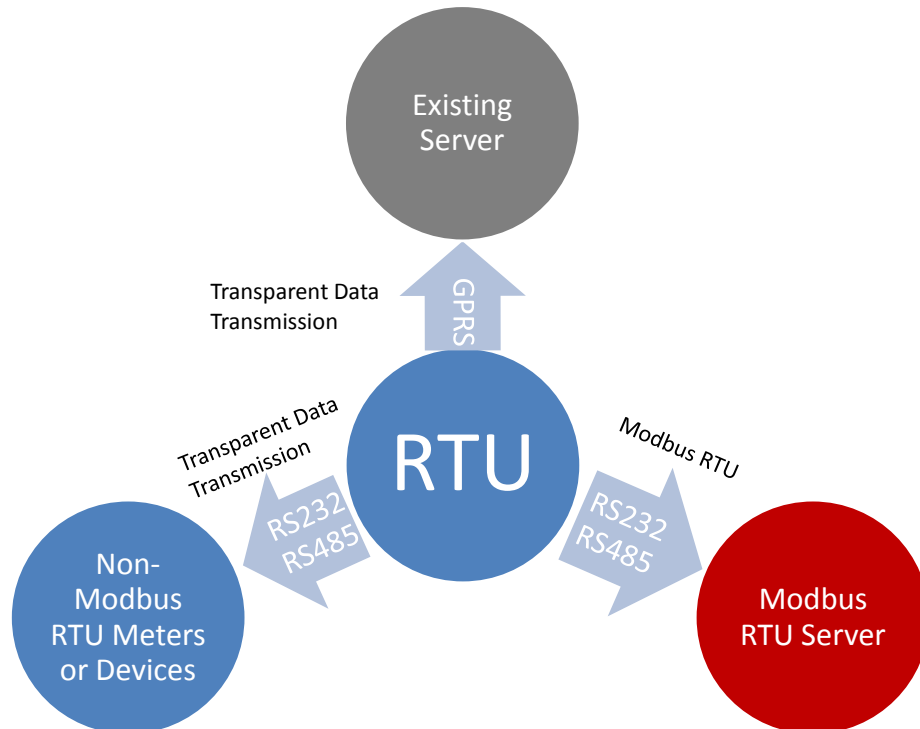
6.2 Definition Protocol

The GSM 3G M2M RTU supports definition protocol to specified server. Usually the user should create its own server according to the definition protocol. The definition protocol please refer to <GSM 3G M2M RTU GPRS Definition Protocol> document. The topological graphs please see below:



6.3 Transparent Data Transmission

The GSM 3G M2M RTU supports transparent data transmission via GPRS or 3G or RJ45 or RS232 or RS485 for non-standard meters or devices, e.g.: ATM device, air conditioner, generator, meters, instruments, transducers, sensors, PLC and so on. The user no need to create or change its present server protocol, and can use it directly. At this condition, the GSM 3G M2M RTU performs a SMS Alarm and SMS Controller and DTU and Modbus RTU Slave. The topological graphs please see below:



7. Registers Assignment Table

The registers assignment of the RTU and its IO will definite in the <GSM 3G M2M RTU Register Assignment Table>, please refer to it.



8. Upgrade Firmware

The GSM 3G M2M RTU supports upgrade firmware via USB port directly. If there any new requirements should update the firmware, the user can upgrade them directly by USB port. if you required upgrade, please contact us to modify the firmware according to you requirements, and we will provide the upgraded firmware to you to upgrade them.

9. Warranty

- 1) The RTU is warranted to be free of defects in material and workmanship for one year from the date of purchase.
- 2) This warranty does not extend to any defect, malfunction or failure caused by abuse or misuse by the Operating Instructions.