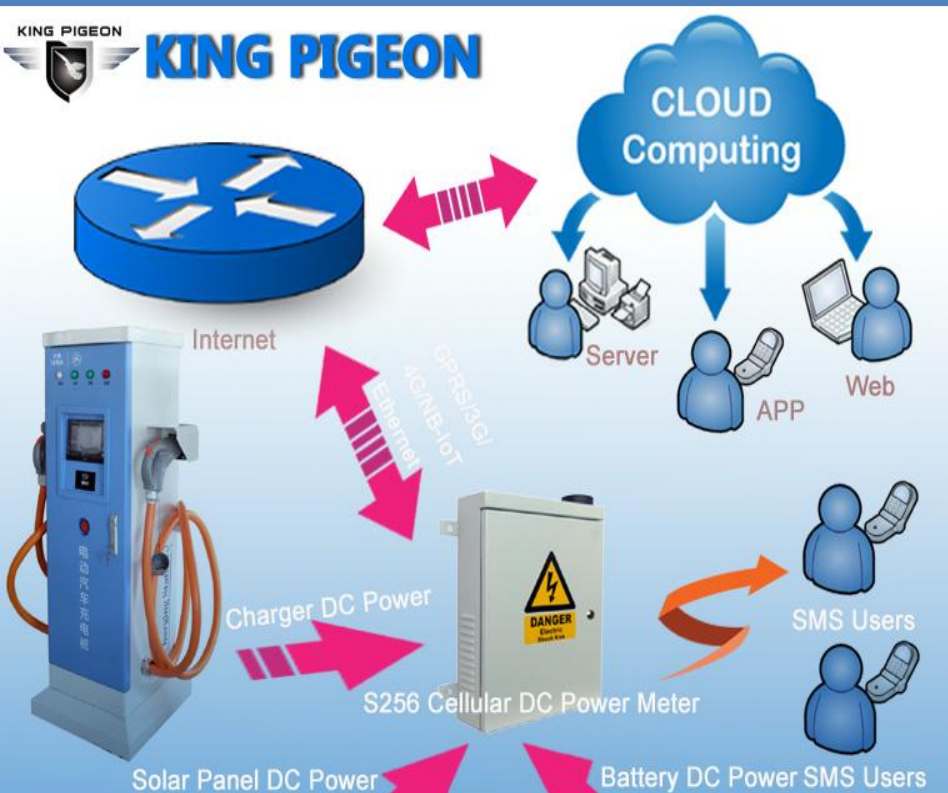DC Power Online Remote monitoring system

Overload alert by SMS.

Supports Modbus TCP, can integrate to SCADA, HMI, DSC directly

# GSM/SMS/GPRS/3G/4G/Ethernet Cellular DC Power Measuring RTU



Cellular Charger/Solar Panel/Battery DC Power Remote Monitoring Application

**S255/6**

**User Manual**

Ver 1.0

Date Issued: 2017-11-23

King Pigeon Hi-Tech. Co., Ltd.

www.4G-RTU.com

# Table of contents

This handbook has been designed as a guide to the installation and operation of S255/6 Cellular DC Power Measuring RTU.

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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【UPGRADE HISTORY】

| DATE | FIRMWARE VERSION | HARDWARE VERSION | DESCRIPTION |
|------|------------------|------------------|-------------|
|      |                  |                  |             |
|      |                  |                  |             |

## *Model List*

| Model | Description | DIN | AIN/PT100 | Relay | TH | Measure Range |
|---|---|---|---|---|---|---|
| S251 | Cellular Single Phase Electric Measuring RTU | 4 | × | 2 | 1 | Default: 260VAC, 5A; Optional: 100V, 450V, 1A, 20A, 50A, 100A. |
| S252 | Cellular Single Phase Electric Measuring RTU (LED Display) | 4 | × | 2 | 1 | Default: 260VAC, 5A; Optional:110V, 2.5A, 10A, 15A, 20A, 30A. |
| S253 | Cellular 3-Phase Electric Measuring RTU (3P3W,3P4W, for Transformer) | 4 | 4* | 2 | 1 | Default: 500VAC, 10A; Optional:5A |
| S254 | Cellular BTS Electric Measuring RTU(separately measure the diesel generator power and electricity power parameters) | 4 | × | 2 | 1 | Default: 260VAC, 5A; Optional:70V,120V,450V, 1A |
| S255 | Cellular 2-Channel DC Electric Measuring RTU (LED Display) | 4 | × | 2 | 1 | Default: 60VDC, 100A; Optional:100V,260V,450V,500V, 5A,20A,50A |
| S256 | Cellular 5-Channel DC Electric Measuring RTU (LED Display) | 4 | × | 2 | 1 | Default: 60VDC, 100A; Optional:100V,260V,450V,500V, 5A,20A,50A |
| Notice | 1. Default version is GSM/GPRS module and Ethernet Module inside.<br>2. For 3G WCDMA, 4G LTE, NB-IoT version, please tell our sales where would you like to use them.<br>3. The S25x are powerful to extend additional I/O or meters, please contact us if you have special requirements.<br>4. If the measurement ranges are exceed the default and optional range, then should plus PT and CT.<br>5. For S253, the 4AIN/PT100 inputs are optional Module for monitoring the oil temperature and level or other analog inputs, if required, please inform the sales to plus it. | | | | | |

# 1. Brief introduction

The Cellular (GSM/GPRS/3G/4G/Ethernet) DC Electric Measuring RTU is special designed for remote monitoring 2/5-channel DC electricity power. Measure each channel voltage, current, active power, active energy and re-active energy. When overload or exceed the pre-set value, then it will alert by SMS, Voice call, Cloud, APP, Wechat, Web Server, SCADA, HMI, DSC immediately.

The Cellular DC Electric Measuring RTU is an industrial class, high reliability, high stability, and programmable Remote Terminal Unit (RTU).   It embedded 32-Bit High Performance Microprocessor MCU, integrated special measurement chip and inbuilt industrial Cellular module. It provides 4 digital inputs, 2 relay outputs, 1 ambient sensor input for monitoring onsite temperature and humidity.

The Cellular DC Electric Measuring RTU can monitoring and operates the I/O ports by SMS, APP, Web Server, internet, timers and programmed inter-lock events automatically.

The Cellular DC Electric Measuring RTU inbuilt TCP/IP protocol stack over cellular network or Ethernet to make it suitable for internet of things (IoT) applications, it can be easily to operate by the provided cloud, app, and web server, or integrated to you IoT applications according to the TCP/UDP protocol, or integrated to SCADA systems by standard Modbus TCP protocol, too. This is very useful if you need remote control onsite devices with low cost solution.

The Cellular 3-Phase Electric Measuring RTU inbuilt TCP/IP protocol stack over cellular network or Ethernet to make it suitable for internet of things (IoT) applications, it can be easily to operate by the provided cloud, app, and web server, or integrated to you IoT applications according to the TCP/UDP protocol, or integrated to SCADA systems by standard Modbus TCP protocol, too. This is very useful if you need remote control onsite devices with low cost solution.

# 2.Safety Directions

**Safe Startup**
Do not use the unit when using GSM/3G/4G equipment is prohibited or might bring disturbance or danger.

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

# 3. Standard Packing List of S255/S256

Cellular IoT Gateway(S278 Special version) X1; GSM/3G/4G Antenna X1;User Manual X1; PC Configurator X1
DC Power Meter PMD200(or PMD500)x1, 240Vac to 24VDC power adaptor x1.
*Note: The package does not include any SIM card.*

# 4. Mainly Features

➢ Can be operated from anywhere, no distance limitation;
➢ Quad band 850/900/1800/1900Mhz GSM GPRS Module inside.
➢ 3G/4G Modules are optional;

- Modular design, can easily upgrade the cellular module if network upgrade;
- Embedded ARM® Cortex™-M4 32 Bit RISC Core, 168 MHz inside, RTOS system, reliable performance with in-built watchdog;
- Powered up by 85~264VAC,120~370VDC or 12~36VDC directly, with over voltage and phase-reversal protection;
- Measurement range: Default: 60VDC, 100A; Optional: 100V, 260V, 450V, 500V, 5A, 20A, 50A,1000A ;
- Measure each Channel DC power parameters: current, voltage, active power, active energy and re-active energy;
- 4 digital inputs, compatibles dry and wet contact;
- 2 relay output (5A/30VDC, 5A/250VAC), compatibles pulse outputs;
- 1 ambient sensor input for monitoring onsite temperature and humidity;
- Supports current, voltage, active power, active energy and re-active energy exceed threshold alarm;
- Inbuilt inter-lock logic programmer and powerful timer program function;
- Resend the data while communication failure and alert to users by SMS;
- Inbuilt TCP/IP protocol stack, supports cloud, APP and web server applications.
- Supports Modbus TCP protocol, can integrate to SCADA, HMI, DSC directly.
- Integrated 1 Industrial 10/100M adaptive Ethernet module inside, supports Modbus TCP;
- Supports SMS Alert when overload, I/O triggered or recovery, and external power lost or recovery;
- Provides 1 channel DC power source output for external device, saving wiring cost;
- Up to 10 SMS Alert and dial numbers, can program to receive specified alarm message.
- Inbuilt 4M internal memory to save historical data and events;
- Inbuilt large capacity automatically rechargeable backup battery;
- Industrial class design suitable for long time work applications;
- using metal shell, protection class IP67. Metal shell and system security isolation, especially suitable for industrial applications in the field;
- L395 * W240 * H80mm, weatherproof metal enclosure.

## 4. 1 Specifications

| Item | Reference Scope |
|---|---|
| Power supply | Default: 47~63Hz, 85~264VAC,or 120~370VDC, Optional: 12-36VDC |
| Power consumption | Standby:100mA;    Working Max.: 300mA |
| GSM Frequency | 850/900/1800/1900Mhz |
| 3G/4G/NB-Iot | Optional: WCDMA/TDD-LTE/FDD-LTE/NB-IoT |
| TCP/IP stack | TCP,UDP |
| SIM interface | Supporting 3V SIM Card |
| External antenna | SMA Antenna interface, 50 Ohm, Gain: 3dB |
| USB | 1 USB Port can be used for configuring and export records. |
| Ethernet | 1 Industrial 10/100M adaptive Ethernet module inside, supports Modbus TCP. |
| RS485 | 1 RS485 port reserved supports Modbus RTU Master to extend I/O or Meters. |
| Protocols | SMS, GPRS UDP,TCP, Modbus RTU, Modbus TCP and more equipment protocols can be added according to requirements. |
| Measure Range | Default: 60VDC, 100A;Optional:100V,260V,450V,500V, 5A,20A,50A ; |
| Measure Parameters | 2/5-Channel DC power: current, voltage, active power, active energy, re-energy. |

| Precision | Current Voltage: ±0.2%FS, Power:±0.5%FS,Active Energy: Class 1, Re-Active Energy: Class 2. 24Bits resolution AD special measure chip with sampling frequency 0.1 S. |
| --- | --- |
| Digital Inputs | 4 Digital input, NC/NO type; |
| Temp.&Hum Inputs | Temperature range: -40 ℃ to +80 ℃, Humidity Range: 0~100%RH; |
| Relay Outputs | 2, Rated: 5A/30VDC,5A/250VAC |
| Memory Capacity | Internal 4M memory for saving historical data and events. |
| Backup Battery | 3.7V 1200mAH |
| Temperature range | -10-+70 ℃ |
| Humidity range | Relative humidity 95% (condensation free) |
| Exterior dimension | 395mm*240mm*80mm |
| Net Weight | 1500g |

## 5. Physical Layout and Installation Diagram

The S255/6 is a specialized solution for remotely online monitoring the DC power consumptions. It consists of below items:

1) Cellular IoT Gateway: Controller, for communication with the server, and manage the Smart Meters, processing data,etc. it is a specialized version of S278.
2) PMD200/PMD500 DC power meter with RS485 Serial port for communication with the S278.
3) Power Adapter: Converting the onsite power from 85~264VAC@47~63Hz, or 120~370VDC to 24VDC , to power on the Cellular IoT Gateway S278, Smart Power Meter, and other transducers or detectors.
4) Connectors: All of the above-mentioned items were wired corrected inside already, the users can connect the rest of wires from the connectors directly.
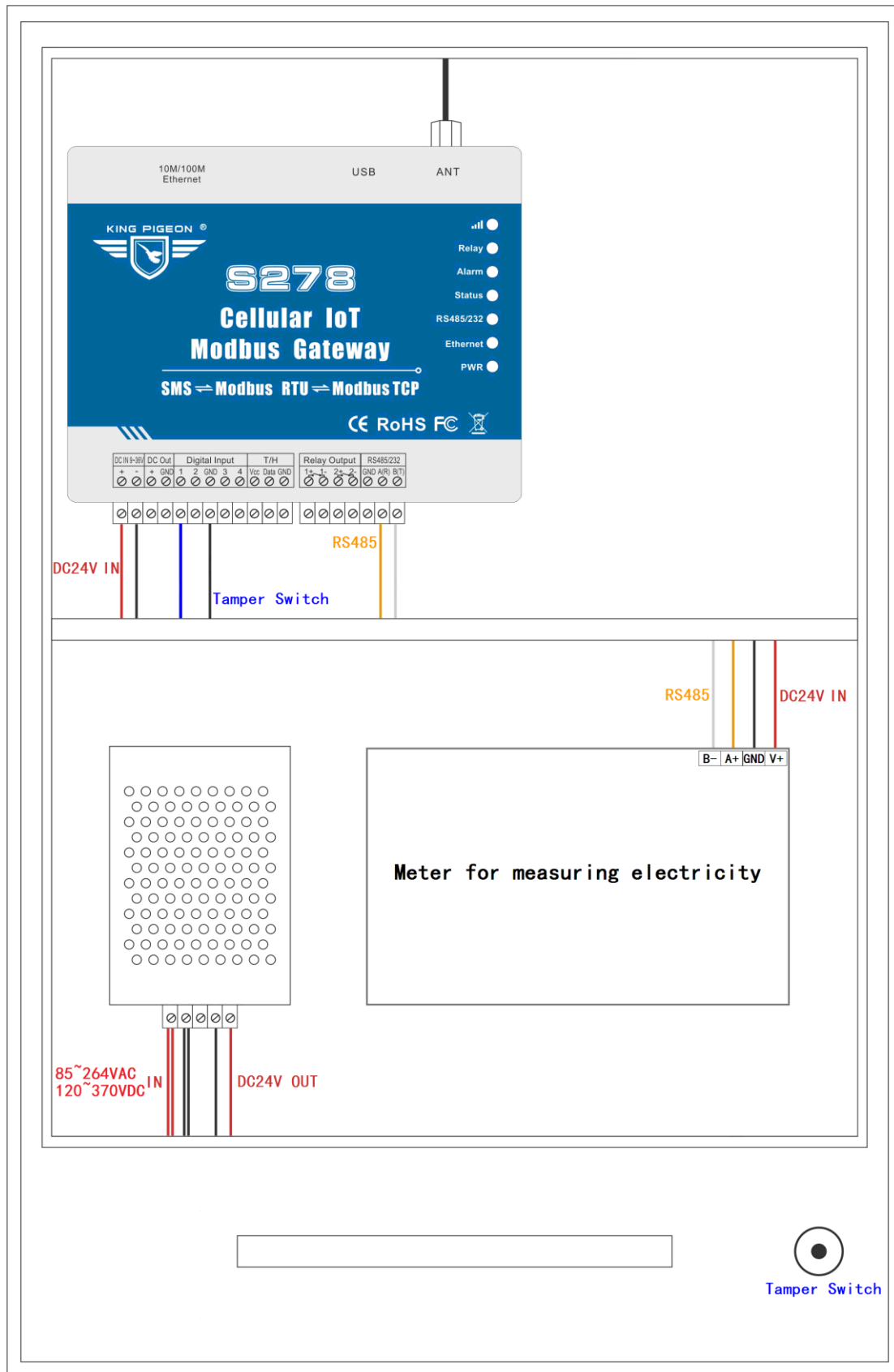
> **Tips:**
> (1) The internal connections with S278 Cellular IoT Gateway, Power Adapter, Power meter, Tamper Switch,   power supply, and RS485 communication cables are connected correctly already, the user no need to re-connect them again.
>
> (2) The user should connect below wires:
> External power supply to Power adapter,
> CT to PMD200/500,
> Additional Digital inputs or relay outputs or temperature & humidity sensor only.
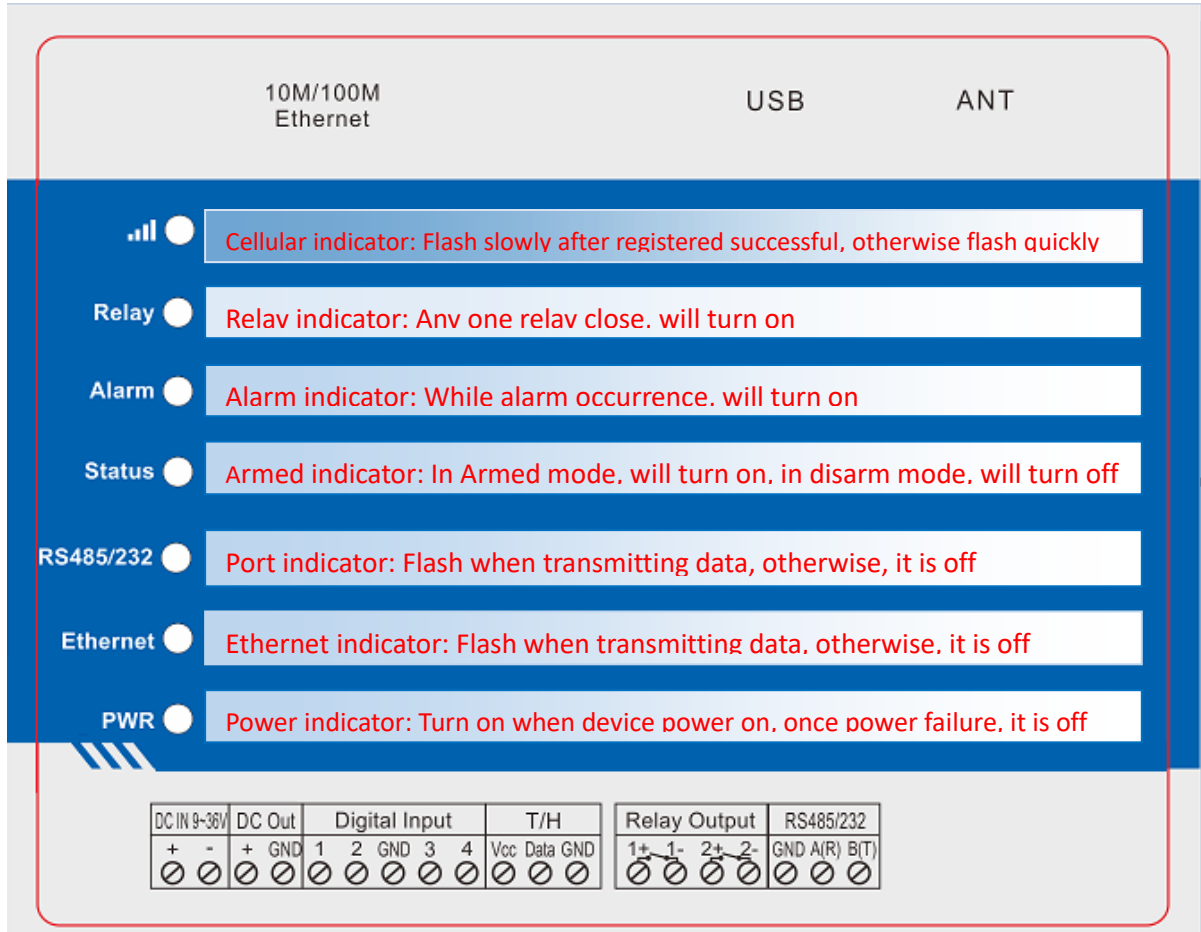> Install the cellular antenna.
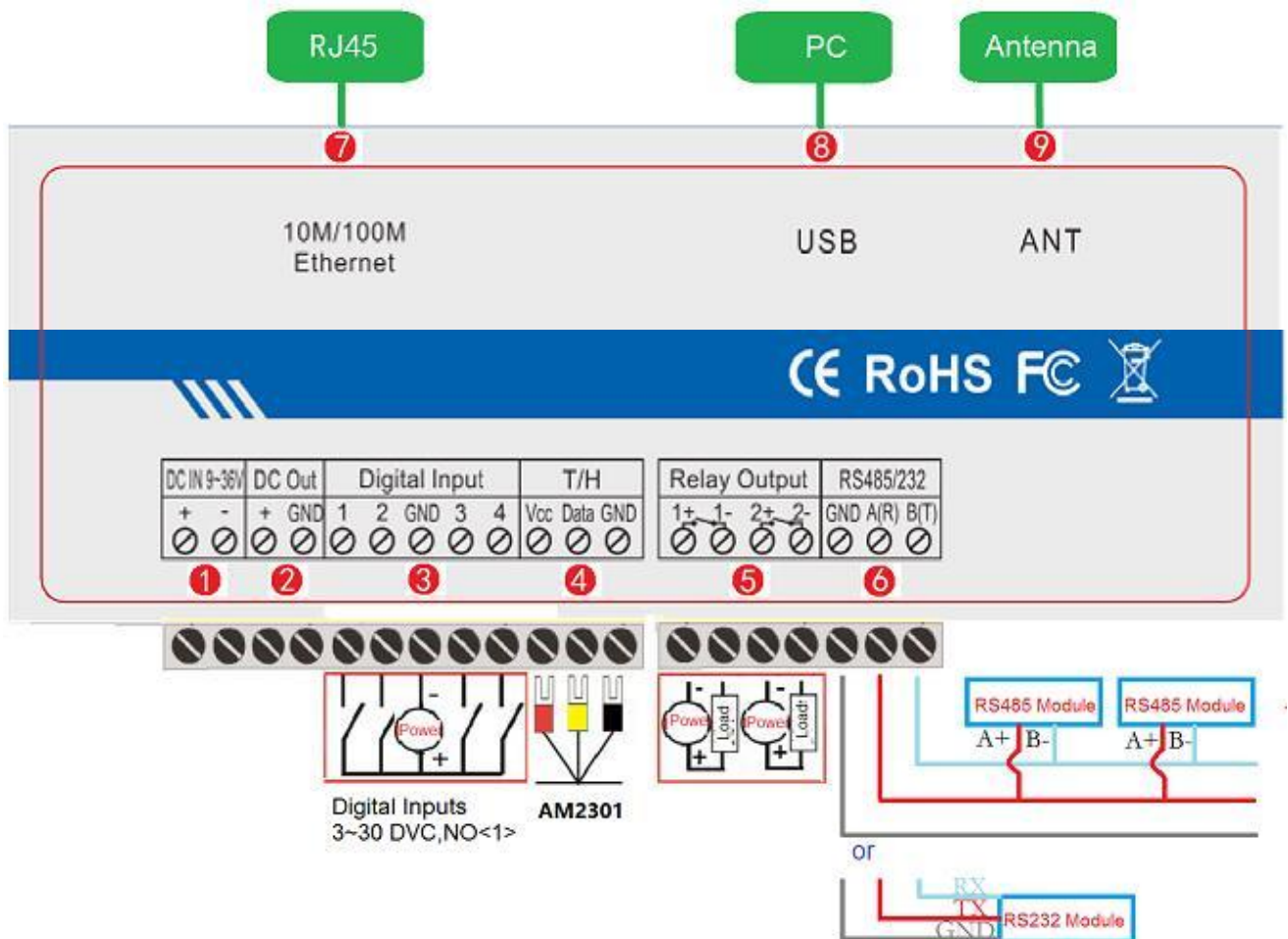
### 5.1 Control Unit basic combination and physical layout

**5.2 The S278 LED and Interface Instruction:**

Cellular indicator: Flash slowly after registered successful, otherwise flash quickly

Relay indicator: Any one relay close, will turn on

Alarm indicator: While alarm occurrence, will turn on

Armed indicator: In Armed mode, will turn on, in disarm mode, will turn off

Port indicator: Flash when transmitting data, otherwise, it is off

Ethernet indicator: Flash when transmitting data, otherwise, it is off

Power indicator: Turn on when device power on, once power failure, it is off

**5.3  The S278 Connection Diagram**

① **and** ②**, power Connector Definition (DC9~36V)**

| DC Out=DC In Voltage, DC Out have Reverse protection. | |
|---|---|
| **DCIN9~36V (+)** | Connect to DC power, positive electrode + |
| **DCIN9~36V (-)** | Connect to negative electrode |
| **DC Out (+)** | Power source output port, positive electrode. Provides power from RTU to external transducers or sensors or detectors. |
| **DC Out (-)** | Power source output port, Negative electrode |

③**, Digital Inputs Definition (4 Channel)**

| Dry contact or wet contact. Logic level: 0~1V or short circuit treated as close, +3~30V or open circuits treated as open. One of the input can be used as counter, sampling frequency is 1Khz. | |
|---|---|
| **DIN1~4** | Digital input, positive electrode |
| **GND** | GND for digital inputs, negative electrode. |

**Notice:** The DIN1 has been used as Tamper Switch, and wired already.

④**, Temperature Humidity Sensor Port Definition**

| **T/H** | | Temperature & Humidity sensor AM230x input. Measurement Range: Temperature: -40°C to +80°C, Humidity: 0~100%RH. |
|---|---|---|
| **Temperature & Humidity Input** | VCC | 3.3VDC Power Source output for sensors. Connect to AM230x Sensor VCC wire (Red wire). |
| | GND | GND , Connect to AM230x GND wire, (black wire). |
| | Data | Data port, connect to the AM230x Data wire, (Yellow/Green wire). |
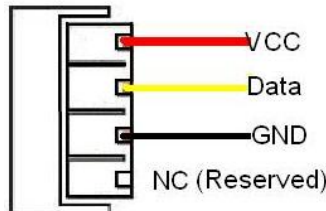


⑤**, Digital Solid Relay Output Connector Definition (Two Channel)**

| Solid Relay inside for outputs, Rated Capacity: 5A/30VDC,5A/250VAC. | |
|---|---|
| **1+/1-** | The 1st Channel Solid Relay Output. + stands for positive electrode, - stands for negative electrode. |
| **2+/2-** | The 2nd Channel Solid Relay Output. + stands for positive electrode, - stands for negative electrode. |

⑥**, RS232/RS485 Ports Definition (Default RS485, RS232 is optional)**

| **(T)TXD** | Data Transmit |
|---|---|
| **(R)RXD** | Data Receive |
| **GND** | Ground |
| **A/B** | RS485 A /B |

**Tips:** *Default RS485, support Modbus RTU Protocol, used as Modbus Master, support function code 01, 02, 03, 04,06 .*
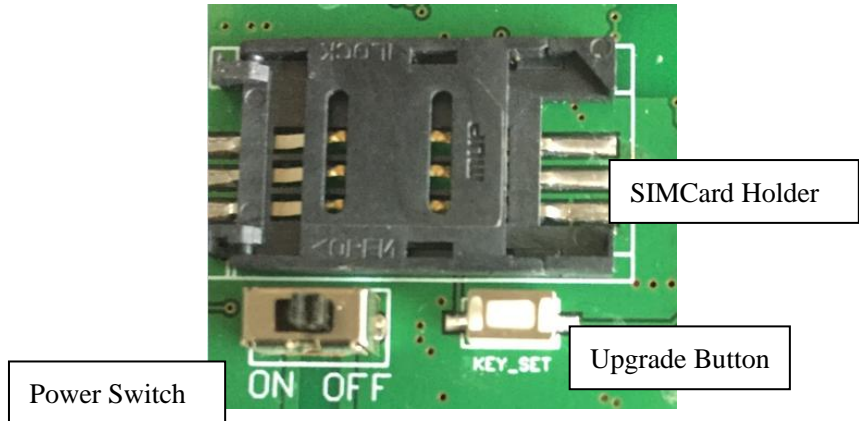
⑦**, Ethernet Port Definition**

| | |
|---|---|
| **Ethernet** | RJ45 port for connect internet, WAN or LAN. |

**⊗, USB Port Connector Definition**

| | |
|---|---|
| **USB** | USB port, for configuration and upgrading firmware and exporting historical data. |

**☻, ATN Port Connector Definition**

| | |
|---|---|
| **ATN** | GSM/3G/4G Antenna connector, 50Ohm, SMA female. |

SIMCard Holder

Upgrade Button

Power Switch

| **Backside Switch & Button Definition** ||
|---|---|
| **SIMCard Holder** | For SIMCard Installation, only supports 3V SIMCard, not supports 5V Simcard. |
| **Power Switch** | For switch ON or OFF the RTU. |
| **Upgrade Firmware Button** | For upgrade firmware purpose only. Only when upgrade new firmware version will use it. Refer the firmware upgrade manual. |

### 5.4 The Power Meter Connection Diagram
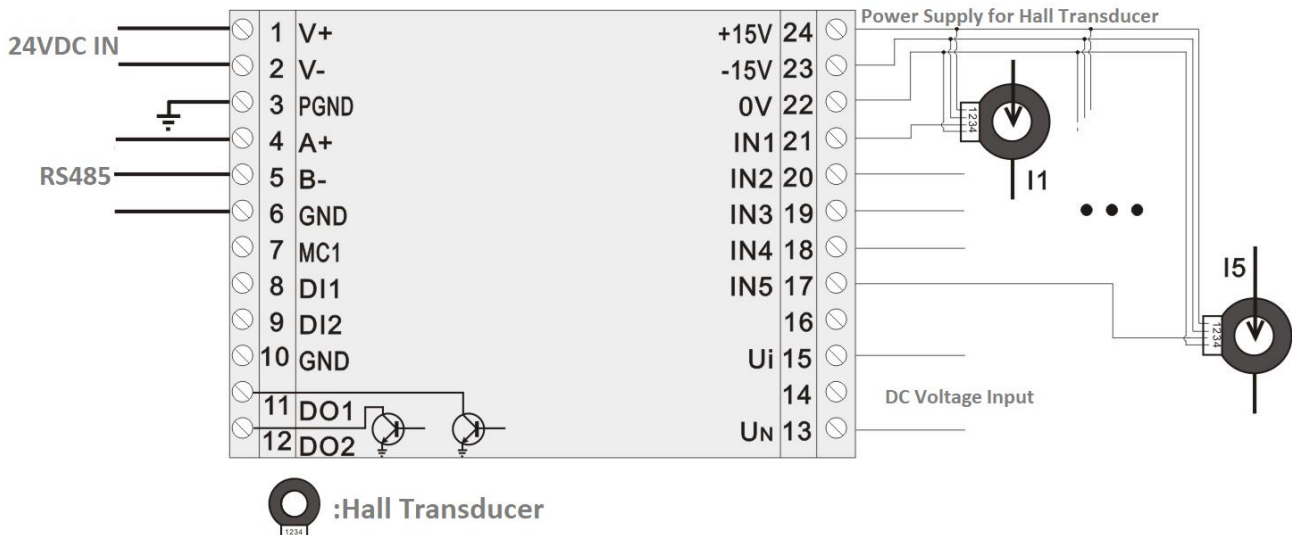


*Definition*

| SN | Name | Definition | SN | Name | Definition |
|---|---|---|---|---|---|
| 1 | V+ | 10~30VDC Power Input Positive | 24 | +15V | Output +15VDC Power for Hall Transducer |
| 2 | V- | Power Input Negative | 23 | -15V | Output -15V Power for Hall Transducer |
| 3 | PGND | Grounding protection | 22 | 0V | Output Power GND |
| 4 | A+ | RS485 A | 21 | IN1 | The 1st Channel Hall Transducer input |
| 5 | B- | RS485 B | 20 | IN2 | The 2nd Channel Hall Transducer input |

| 6 | GND | RS485 GND | 19 | IN3 | The 3$^{rd}$ Channel Hall Transducer input |
|---|---|---|---|---|---|
| 7 | MC1 | -Not Used- | 18 | IN4 | The 4$^{th}$ Channel Hall Transducer input |
| 8 | DI1 | -Not Used- | 17 | IN5 | The 5$^{th}$ Channel Hall Transducer input |
| 9 | DI2 | -Not Used- | 16 | | -Not Used- |
| 10 | GND | -Not Used- | 15 | Ui | DC Voltage Positive |
| 11 | DO1 | -Not Used- | 14 | | -Not Used- |
| 12 | DO2 | -Not Used- | 13 | UN | DC Voltage GND |

## 6. Initialize/Reset the unit

The Unit can be reset to factory default once mistake programmed. Please follow below steps to initialize it. After initialized, the parameters will set as factory default.

1) Switch the unit on, connect it to PC configure software, click "Reset System" button to reset the panel.
2) Or remote reset via SMS Command.
3) After reset successfully, switch the unit off and restart it, then enter into working mode of factory default.

## 7. Settings&Operation

The S255/6 is user-friendly design. Only need to configure the Cellular IoT Gateway, the meters no need to configure any more. The user can setup it or export historic data by the PC Configuration through USB cable, and upgrade firmware by USB port. The S255/6 also can be configured some basically parameters by SMS Commands, please refer to **Command List chapter.**

All of the settings are in the Cellular IoT Gateway.

*Tips!*
1) *Please insert the SIM Card firstly, and install the GSM/3G/4G Antenna, please power on to check the LEDs status according to above mentioned LED Definitions, keep switch on it during the programming.*
2) *The PC Configuration in the CD, please click it to run it. Also can download from www.GPRS-M2M.com under S255/6 page directly.*
   Below are the steps to setup the parameters by PC Configuration, please follow it step by step.

   **Start to Configure:**

Step1: **Install the Configurator**
   The Configurator in the CD or download from www.GPRS-M2M.com, then installs it on the computer.

Step2: **Connection**
   Please insert the SIM Card, and install the GSM/3G/4G Antenna.

Step3: **Connect the Gateway to the PC by USB Cable, and switch on the S278, see below:**
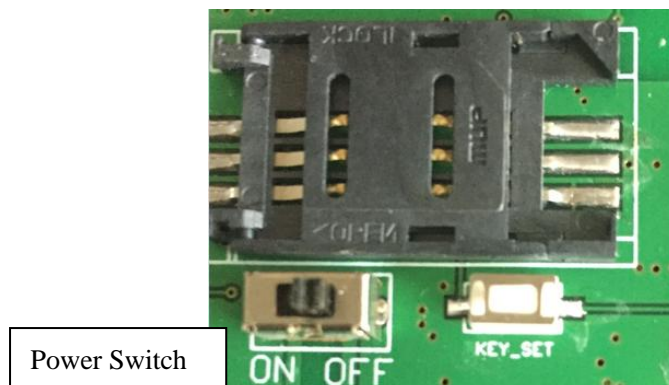


Power Switch

**Step4:** Install USB Drvier

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 or Win8/Win10, 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.
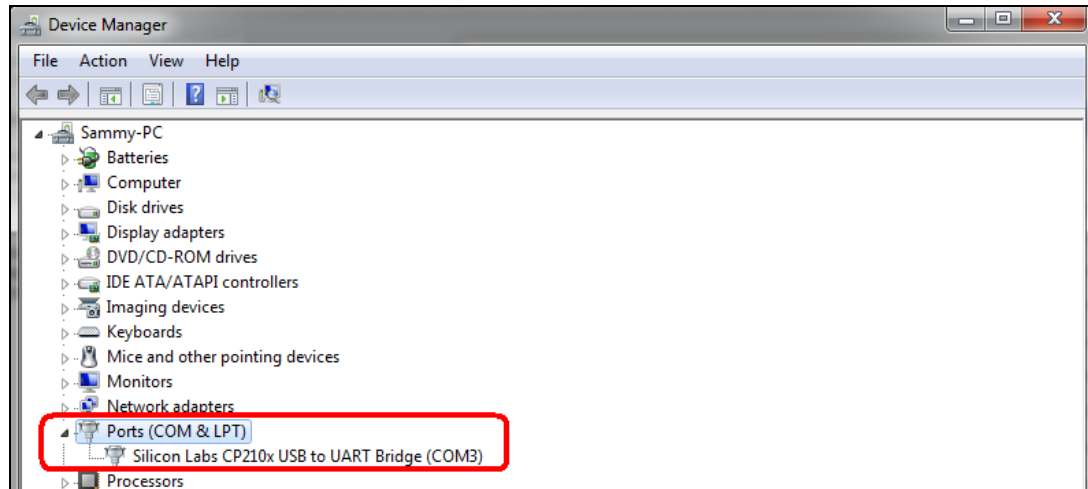


**Step5:**   **Run the Configurator** (Compatible with Windows XP/7/8/10)

   **Tips:** *In some computer, it required download net framework 4.0 while installation, then please click "Yes" to go to Microsoft website to download this service pack.*

**Step6:**   **Choose the correct "COM port" in device manager above, enter the password(default is 1234),click the "Login" to connect and start to program**

Details please check the picture as below:



   **Tips:** *If not connect successfully, will not enter into next step. Pls check if USB connect well, or COM port and password correct or not.*

## ⚙ Basic Settings

**Reminder:**

**_Please click the "Read setting" to read out the default parameter before starting to set.this is very important to save you configure time._**

*The default values are preset in the Cellular IoT Gateway already, so please remember to read out it before you change any other settings. Click Read Settings---Read Setting to read out the default values. Then you can start to change the settings and start to configure the other parameters.*

**Reminder:**
*Please remember that click "Save Setting" -" Save" button to save it after parameter be written, below is the same.*



**Device ID:** (0~65535) non-necessary. This is mainly for monitoring center to identify the gateway; If communicate via Modbus protocol, device ID only can be 1~255.

**Device description:** This is the description of the gateway, e.g.: installation address, usage instructions and so on;(Max: 60 Characters)

**Time to ensure power supply fail alarm:** Power failure alert (0~999 min), default 0, means SMS alert immediately once power off; 999 means not alert.

**Periodically to save historical data record:** (0~65535 s), how many seconds interval to save record, default 0, means

not save.

**Interval time to send SMS report:** (0~65535 min), how many minutes interval to SMS report current status, default 0, means not report.

**Device SIMcard Phone no.:** The gateway can mobile operator's date & time for the timer function, according to the device phone no.; Pls payment attention to the country code when setting. Eg: "No country code","+86" or "0086" in China.

**Time Auto Arm after Disarmed:** Fill the timeout to enter into Armed Mode automatically after disarmed operation. (0~9999 min), default 0 minute, means it will delay 30 seconds to auto Arm after Disarmed.

**Device Time Setting:**

Save: Click it to save the time into the device after adjust the time.

Read: Read device current time.

Sync PC Time: Read PC current time.

**Arm automatically when power on:** Tick it stands for once the gateway powered up, the gateway will enter into Arm Mode automatically.

**Tips:**

**Arm:** *Under this mode, any alarm occurrence will send SMS and dial the authorized numbers immediately. And execute the programmed I/O outputs.*

**Disarmed**: *Under this mode, alarm occurrence will not send SMS & dial the authorized numbers.*

**Add timestamp to alarm SMS:** Tick it stands for while alarm occurrence, the Alarm SMS will include the gateway's current time information at the SMS Content.

**Disable Communication Monitoring:** Tick it stands for no monitor function; Otherwise, once communication between Master and Slave failed, the Master will send SMS to inform the communication failed, used for port monitoring between Master and its Slave.

**Daily SMS Report:** Set it stands for when send SMS to report current status everyday.

**New Password:** Change a new password. (4 digits, default is 1234, Arabic numerals only)

## ⚙ Number Settings

**Reminder:**

*Please remember that click "Save Setting" -" Save" button to save it after parameter be written, below is the same.*



**Alarm Tel Number:** Set the alarm receiver numbers, please includes the country code, e.g. in China is 0086, input 008613570810254, if cannot received the SMS or dial, then try to set as +8613570810254, but cannot be

8613570810254. Also, some GSM/3G Operators not required input country code, so please remove country code, e.g. in China is 0086, and China Mobile not required country code, so can set as 13570810254. (Max 10 authorize users no. and Max 21 digits for users no.).

**Dial:** Tick it stands for enable while alarm, Dial to the authorized numbers. When someone answer, then calling stop; If not, continue to call next number, total calling one round. If slave alarm when polling, gateway only send SMS, not calling.

**Timer-Report:** Tick it stands for enable to SMS report to this authorized numbers.

**Arm/Disarm SMS:** Tick it stands for enable the SMS notification when Arm/Disarm.

**Alarm:** Tick it stands for enable while alarm, send SMS to the authorized numbers.

**Alarm Recovery:** Tick it stands for enable the SMS notification when the alarm recovery to normal value.

**External Power ON/OFF:** Tick it stands for enable the SMS notification when external power on/off.

**GPRS Failure:** Tick it stands for enable the SMS notification when the GPRS connection failure.

**Low GSM Signal:** Tick it stands for enable the SMS notification when the GSM signal is weakness.(Well signal value:14~31).

**Relay ON/OFF(close or open):** Tick it stands for enable the SMS notification when the relay ON/OFF.

**All:** Tick it stands for enable all of options in this line, from "Dial ~ Relay ON/OFF".

**Reminder:** *Also can set these parameters via SMS Command, details refer to SMS Command List file, below is similar.*

## ⚙ DI Settings



**Tips:** *Click the left "DI/DO/TH Setting button" to set the parameter, below is similar.*

**Channel Name:** To setup the channel name, default "Input + Serial number ",max 40 digits.

**Input Type:** Disable means: Not use this channel;
Normal Open means: For connecting normal open type detector, close will alarm;
Normal Close means: For connecting normal close type detector, open will alarm.
The inputs compatibles dry and wet contact: 0~1DVC, NC (0) ; 3~30DVC, NO (1).

**Current Status:** Right click the DIN display, then we can choose to read the current status or refresh the value of the sensors, used for testing.

**Alarm Verify Time:** Stands for when the digital input Close or Open last time more than this value, will be treated as a true alarm, if less than this value, then will not alarm. (Range: 0~65535s), default 2 seconds.
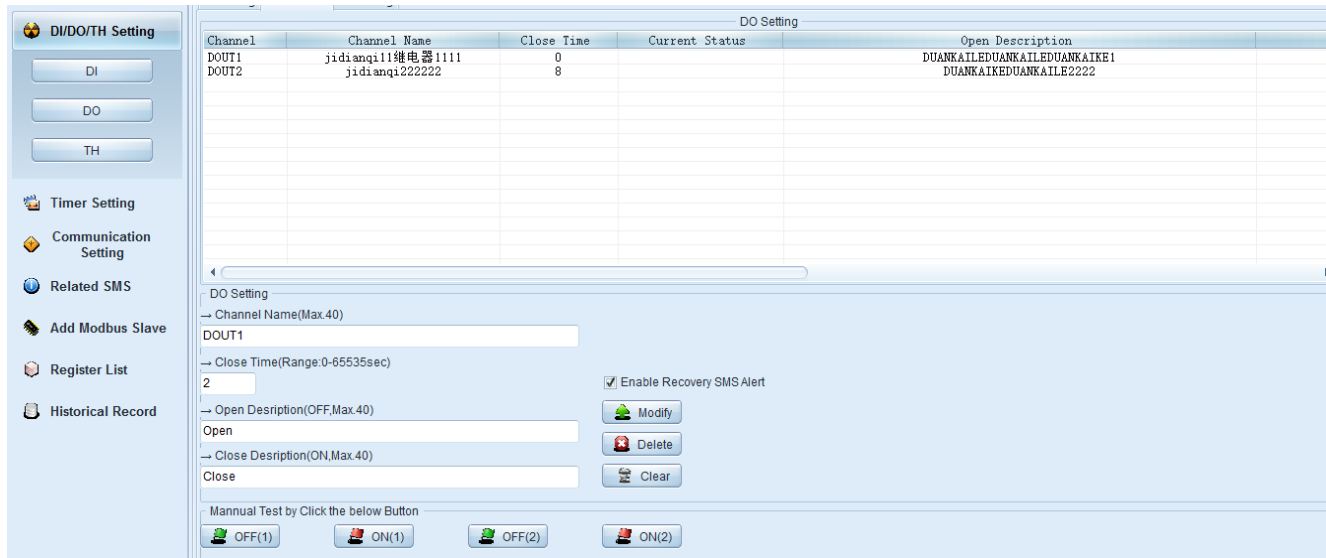
**Alarm SMS Content:** To setup the SMS Content when alarm, max 40 digits.

**Recovery SMS Content:** Stands for when the digital input recovery, will send SMS to the authorized numbers, max

40 digits.

**Enable Recovery Send SMS:** Tick it for sending Alarm/Recovery SMS to the authorized numbers.

## DO Settings



**Channel Name:** To setup the channel name, default "Relay + Serial number ",max 40 digits.
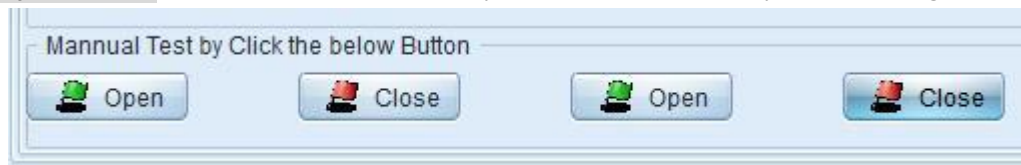
**Close Time:** Stands for the relay close and last time. (0~65535s) ,default 0 second, means always close.

**Open Description:** SMS content when relay open, max 40 digits, default open.

**Close Description:** SMS content when relay close, max 40 digits, default open.

**Current Status:** Relay current status: Open or Close. Right click the DO display, then we can choose to read the current status or refresh the value of the sensors, used for testing.

**Enable Recovery SMS Alert:** Tick it to enable the recovery SMS function after relay finish working.
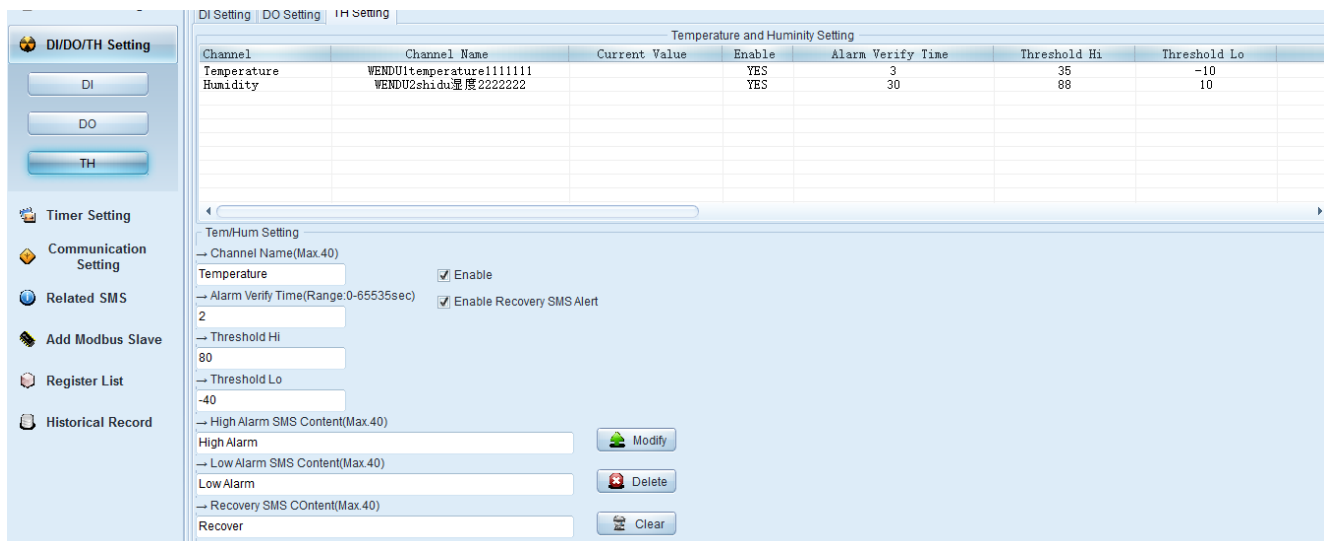


**Manual Switch:** Close or Open the relay (DO1 and DO2) immediately, used for on-site testing.

## TH Settings



**Enable:** Tick it to enable this Channel.

**Channel Name:** Default "Temperature or Humidity + Serial number ",max 40 digits.

**Alarm Verify Time:** Tick it Stands for when the temperature or humidity input exceed the threshold value and last time more than this value, will be treated as a true alarm, if less than this value, then will not alarm to avoid fault alarm. (0~65535s), default 2 seconds.

**Threshold High:** The high value(reached) need to alarm; Example: set 50Celsius degree to alert.

**Threshold Low:** The low value(reached) need to alarm; Example: set -30Celsius degree to alert.

Temperature & Humidity range : -40℃~80℃ / 0~99%, RH%

Default Threshold High/Low: Temperature 80℃ / -40℃ and Humidity 100 RH% / 0 RH% .

**Current Value:** Right click the Temperature / Humidity display, then we can choose to read the current status or refresh the value of the sensors, used for testing.
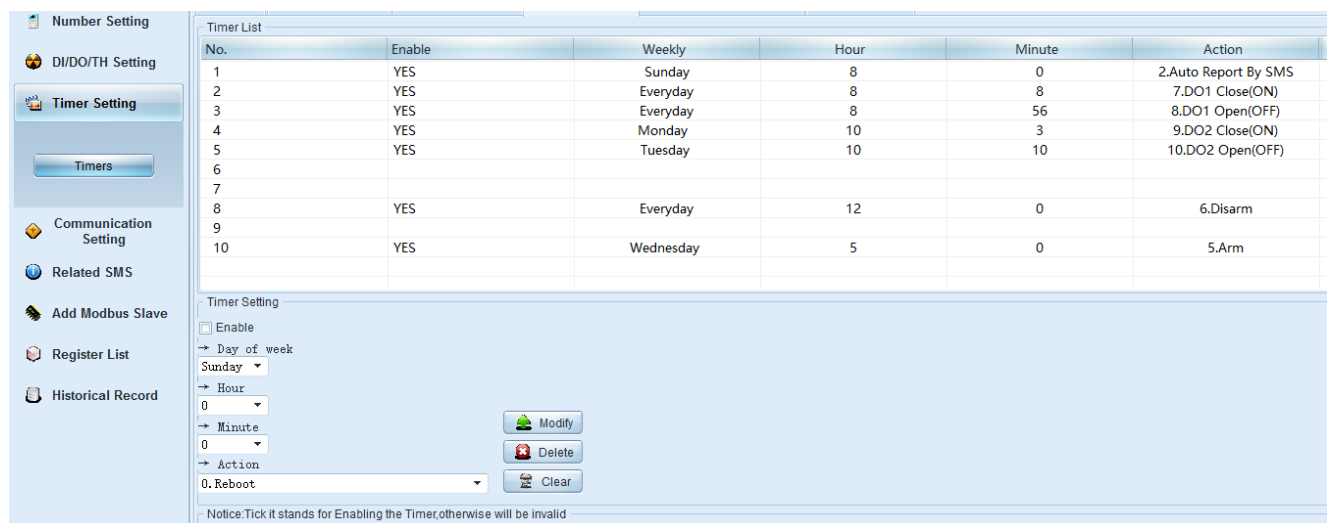
**High Alarm SMS Content:** To setup the SMS Content when high alarm, max 40 digits.

**Low Alarm SMS Content:** To setup the SMS Content when low alarm, max 40 digits.

**Recovery SMS Content:** Setup SMS Content when value back to normal from alarm, max 40 digits.

**Enable Recovery SMS Alert:** Tick it to enable the Temperature & Humidity value Recovery SMS notification function.

## Timer Settings



**Tips:** *Pls remember to choose "Enable" when setting, otherwise the setting will be invalid. And timer function need the gateway have set the correct time first.*

This page is for setup daily timer, it is useful for scheduling when to execute what action automatically. Total can program 11 scheduling events. Tick Enabled stands for enable this timer event:

**Weekly(Everyday) + Hour + Minute:** Stands for what day and at what time does the gateway should execute the action.

**Action:** Stands for what action does the gateway should to execute at the specified time.

**E.g.:** as above mentioned,

Every Sunday 01:20, Gateway automatically Reboot.

Every Monday 03:10, Gateway upload data by GPRS to server.

Every Tuesday 04:19, Gateway send SMS reports to authorized numbers automatically.

Everyday 19:23, Gateway will close the relay 1 automatically.(Relay close time is according to the **Close Time (Range 0~65535S)**)

## GPRS Settings

**Tips:** *Click the left "Communication Setting button" to set the parameter, below is similar.*

This Page is for setup the GPRS online parameters, GPRS Transport data protocol and Server information. Only when you have Server or need to use GPRS to transmit data then need to setup these parameters. The GPRS Protocol only supports Modbus TCP Protocol now. includes both of Modbus TCP and Modbus RTU over TCP.

**GPRS Communication Protocol:** Stands for setup the Communication type.( 0.Disable /1.Modbus TCP Protocol / 2.Modbus RTU Over TCP/ 3.Definition Protocol, invalid now)

**GPRS Protocol:** Stands for the GPRS transmission using TCP or UDP protocol; Default TCP.

**Heartbeat Content:** GPRS heartbeat content to avoid GPRS failure.(Max 20 digits, default ACK).

**Heartbeat Interval Time:** GPRS keep online heartbeat interval time.(0~65535s), default 60 seconds, recommend setting to 30~60s.

**Reconnection Interval Time:** Stands for setup the GPRS reconnection interval time after the GPRS connection failure, till reconnect. (0~65535s), default 60 seconds.

**Upload Data Interval Time:** Reserved, not used in current.

**IP and Server address:** Server IP address or server domain name.

**Server Port:** Stands for Server Virtual Port. (Max 40 digits).

**Access Point Name:** GPRS Access Point Name, provided by local GSM/3G/4g Operator(Max 40 digits).

**GPRS User Name:** GPRS User Name, provided by local GSM/3G /4G Operator (Max 40 digits).

**GPRS Password:** GPRS Password, provided by local GSM/3G Operator (Max 40 digits).

## ⚙Ethernet Settings



This page is for setup the Ethernet parameters. Over the RJ45 port, the Modbus gateway can be used as slave to communication with the Modbus TCP server, only support one TCP client to visit.

**Ethernet Communication Protocol:** Stands for setup the Communication type.( 0.Disable / 1.Modbus TCP Protocol / 2.Transparent transmission, invalid now / 3.Definition Protocol, invalid now).
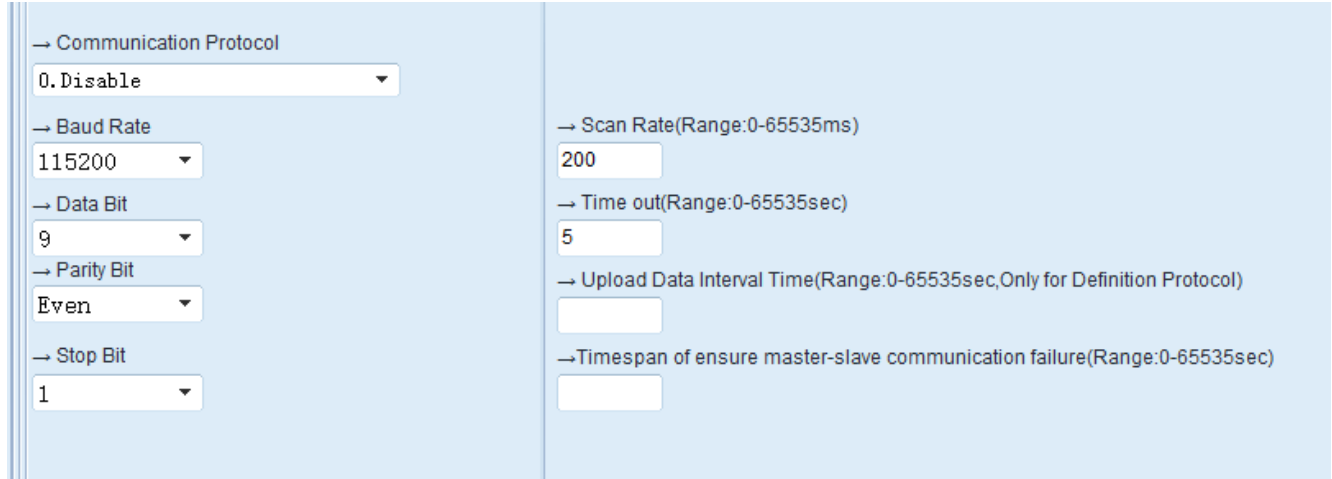
**Local IP and Port:** Port range: 0~65535, only supports Ethernet LAN in current.

**Upload Data Interval Time:** Reserved, not used in current.

## ⚙ RS485/232 Serial Port Settings

Notice:

Please don't change and Modify the RS485/232 Serial Port settings, these parameters were defaults correctly already, once you modify or change them, the Cellular IoT Gateway will cannot communicate correctly with the power meters.
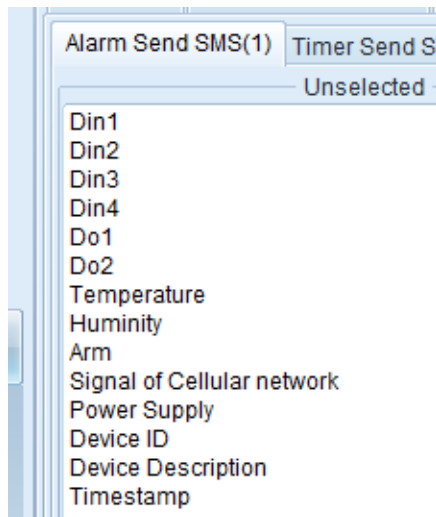


This Page is for setup the serial port parameters, over the RS485/232, the setting need to match with slave device.

## ⚙Related SMS

**Tips:** *The "Alarm Send SMS" is only for Slave, not for Master parameter alarm.*
*Timer Send SMS means: Everyday and Periodically timer auto report.*
*Click the left "Alarm, Timer and Alarm(1) button" to set the parameter, below is similar.*



This Page used for: when slave alarm, the alarm SMS content include what status for authorize users. Users can choose the status for alarm SMS content from the list.
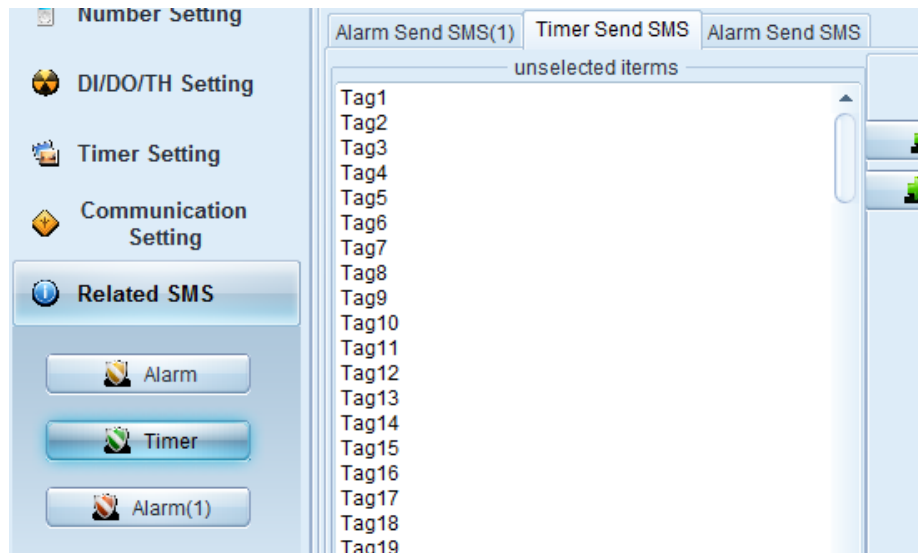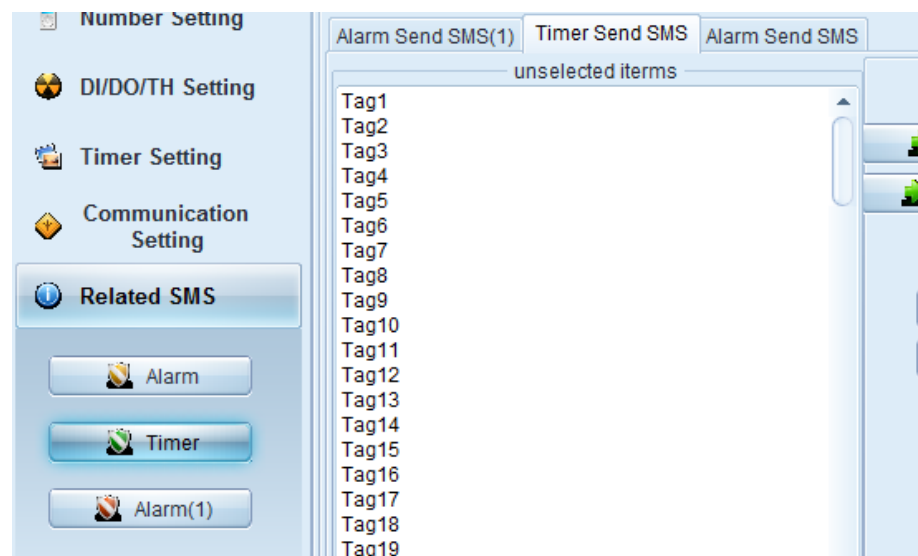
Timer means: device timer to send working status report to users everyday via SMS.

**Tag 1~64:** Current status of Boolean Slave; (Not Used in S253)
**Int1~128:** Current status of 16Bit Slave; (Not Used in S253)
**Dint1~64:** Current status of 32Bit Slave; (Specialized used in S253)
**Double1~64:** Current status of 64Bit Slave; (Not Used in S253)



This Page used for: when slave alarm, the alarm SMS content include where status for authorize users. Users can choose the status for alarm SMS content from below.

**Tag 1~64:** Current status of Boolean Slave; (Not Used)
**Int1~128:** Current status of 16Bit Slave; (Not Used)
**Dint1~64:** Current status of 32Bit Slave; (Specialized used in S255/6)
**Double1~64:** Current status of 64Bit Slave; (Not Used)

## ⚙Add Modbus Slave(Power Meter&DAM Settings)

This part was preset already, after click Reading Setting then will display the channel and default values.

**Working Principle:**
The Meter Registers were assigned to the Cellular IoT Gateway already according to the below correspondence table. While powered on both of the Meter and Gateway, the Gateway will poll the meters by Modbus RTU

Protocol over the RS485 serial port, the Gateway performs as Modbus Master, and the Meter performs as the Modbus Slave. The Gateway will save the meters value in Gateway's internal memory, the Server (Monitoring Center) can read these registers to get the meter's value, and these values haven't been converted. At the meanwhile, the Gateway will convert the read out value to actually value according to the Conversion Relationship, but not save the converted actually value, just converting them and use to compare the actually value with the threshold high or low value, if exceed, will send SMS Alarm according to you settings.

So, please don't change the registers corresponding relationship with the Meters and DAM module in the Gateway, but you can change the settings, includes: Channel Name, Alarm SMS Content, Recovery SMS Content, Alarm Verify Time, Threshold High and Threshold Low value.



## ⚙Register List(Power meter current Value)



**Tips:** *This page can check Slave current value online, used for testing.*
*Choose the register type, right click and refresh to read the current value.*

## ⚙Historical Record
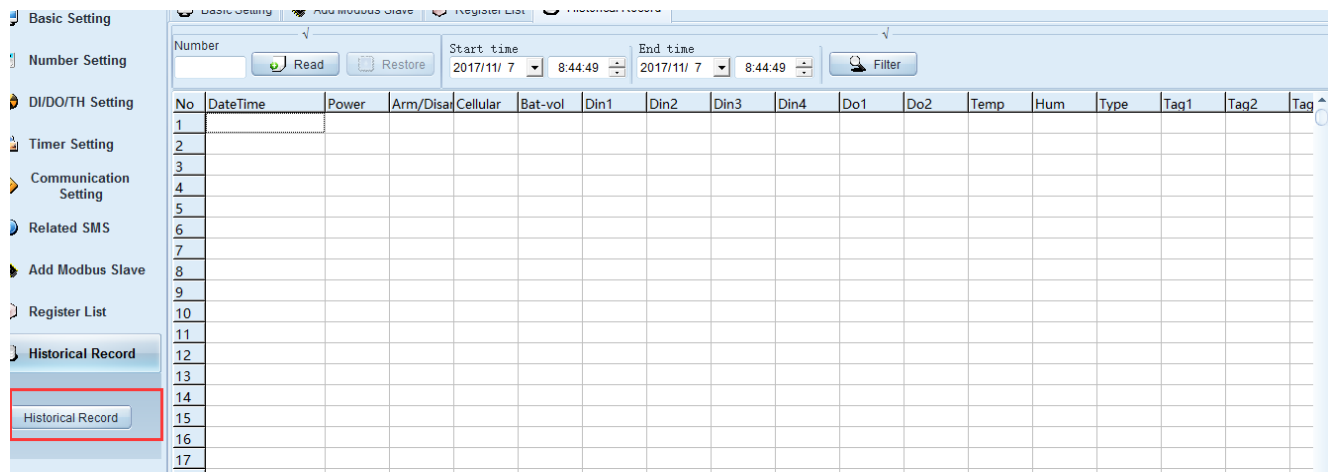
This page is for manage and read out the historical record from the gateway, and can save as CS format for other purpose usage. For historical record, the Data Logger total can save 1800 records.

**Read:** Set the quantity which need to read, max 1800 historical records.
**Refresh:** Refresh the records to read.
**Clear Data:** Clear device records online.
**Filter:** After setting the time period, click the button to search historical records in this time.



　　　　Choose the time to search the historical records.
**Export CSV:** Export current display historical records to CSV format file.
**Import CSV:** Import the historical record file to current page.

## 7. SMS Command List and Communication Protocol

Pls refer to SMS Command List is the same as S278, please refer to *S276/8 Cellular IoT Modbus Gateway SMS Command List V1.0* except the Boolean and 16Bit type parts.

## 8. Register Table List and Communication Protocol

The S255/6 supports Modbus TCP protocol over cellular network, and supports Modbus TCP protocol over Ethernet Port.
The registers of the S255/256 please refer to read the Register Tables. Includes S278 Cellular IoT Gateway Register , and the Mapped Register List of the meters.

| S278 Cellular IoT Gateway Register Table | | | | |
|---|---|---|---|---|
| Definition | Register(Decimal) | Data Type | Function Code | Description |
| Temperature | 40000 | signed int AB | 3 / 4 | Real=Register/10 |
| Humidity | 40001 | signed int AB | 3 / 4 | Real=Register/10 |
| DIN 1 | 40002 bit0 | signed int AB | 3 / 4 | 0=Open,1=Close |
| DIN 2 | 40002 bit1 | | 3 / 4 | |

| | | | | | |
|---|---|---|---|---|---|
| DIN 3 | 40002 bit2 | | | 3 / 4 | |
| DIN 4 | 40002 bit3 | | | 3 / 4 | |
| Power Supply Status | 40002 bit4 | | | 3 / 4 | 0=ON, 1= OFF |
| Arm/Disarmed Status | 40002 bit5 | | | 3 / 4 | 0=Arm, 1=Disarmed |
| Relay 1 | 40003 bit0 | signed int AB | | 3 / 4 | 0=Open,1=Close |
| Relay 2 | 40003 bit1 | | | 3 / 4 | |
| Close/Open Relay | 40003 | signed int AB | | 6 | |

## S255 Mapped Register List of the meters

| SN | Channel Name (SMS Content) | Register(Decimal) | Data Type | Function Code | Description |
|---|---|---|---|---|---|
| 1 | Channel 1 DC Volt | 41128 41129 | Float ABCD 32Bit Dint | 4 | Real Value |
| 2 | Channel 1 DC Current | 41130 41131 | | 4 | |
| 3 | Channel 1 Active Power | 41132 41133 | | 4 | |
| 4 | Channel 2 DC Volt | 41134 41135 | | 4 | |
| 5 | Channel 2 DC Current | 41136 41137 | | 4 | |
| 6 | Channel 2 Active Power | 41138 41139 | | 4 | |
| 7 | Channel 1 Total Active Energy | 41140 41141 | | 3 | |
| 8 | Channel 1 Re-active Energy | 41142 41143 | | 3 | |
| 9 | Channel 2 Total Active Energy | 41144 41145 | | 3 | |
| 10 | Channel 2 Total Re-active Energy | 41146 41147 | | 3 | |

## S256 Mapped Register List of the meters

| SN | Channel Name (SMS Content) | Register(Decimal) | Data Type | Function Code | Description |
|---|---|---|---|---|---|
| 1 | Channel 1 DC Volt | 41128 41129 | Float ABCD 32Bit Dint | 4 | Real Value |
| 2 | Channel 1 DC Current | 41130 41131 | | 4 | |
| 3 | Channel 1 Active Power | 41132 41133 | | 4 | |
| 4 | Channel 2 DC Volt | 41134 41135 | | 4 | |
| 5 | Channel 2 DC Current | 41136 41137 | | 4 | |
| 6 | Channel 2 Active Power | 41138 | | 4 | |

| | | 41139 | | | |
|---|---|---|---|---|---|
| 7 | Channel 3 DC Volt | 41140 41141 | | 4 | |
| 8 | Channel 3 DC Current | 41142 41143 | | 4 | |
| 9 | Channel 3 Active Power | 41144 41145 | | 4 | |
| 10 | Channel 4 DC Volt | 41146 41147 | | 4 | |
| 11 | Channel 4 DC Current | 41148 41149 | | 4 | |
| 12 | Channel 4 Active Power | 41150 41151 | | 4 | |
| 13 | Channel 5 DC Volt | 41152 41153 | | 4 | |
| 14 | Channel 5 DC Current | 41154 41155 | | 4 | |
| 15 | Channel 5 Active Power | 41156 41157 | | 4 | |
| 16 | Channel 1 Total Active Energy | 41158 41159 | | 3 | |
| 17 | Channel 1 Re-active Energy | 41160 41161 | | 3 | |
| 18 | Channel 2 Total Active Energy | 41162 41163 | | 3 | |
| 19 | Channel 2 Total Re-active Energy | 41164 41165 | | 3 | |
| 20 | Channel 3 Total Active Energy | 41166 41167 | | 3 | |
| 21 | Channel 3 Total Re-active Energy | 41168 41169 | | 3 | |
| 22 | Channel 4 Total Active Energy | 41170 41171 | | 3 | |
| 23 | Channel 4 Total Re-active Energy | 41172 41173 | | 3 | |
| 24 | Channel 5 Total Active Energy | 41174 41175 | | 3 | |
| 25 | Channel 5 Total Re-active Energy | 41176 41177 | | 3 | |

## 9. Upgrade Firmware

The gateway supports upgrade firmware via USB port directly. If we upgraded the firmware functions of the gateway, we will inform you to upgrade the firmware if you required. If there any new requirements of the present functions caused it 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.

## 10.Warranty

1) This system is warranted to be free of defects in material and workmanship for one year.
2) This warranty does not extend to any defect, malfunction or failure caused by abuse or misuse by the Operating Instructions. In no event shall the manufacturer be liable for any alarm system altered by purchasers

## Appendix 1: Modbus TCP Protocol Communication Examples

## 1)Register Assignment Table

The register address, Modbus function code, data type, usage, and precautions for this module are described in the following table. It used for communication with Modbus TCP Master.

1).The gateway (Modbus Master) register address, used for saving slave(Meter) data, can't overlap.
  The gateway (Modbus Master) register address range (Decimal):
  01-COIL STATUS: 00001-00064
  02-INPUT STATUS: 00001-00064
  03-HOLD REGISTER: 40000-40003 and 41000-41511
  04-INPUT REGISTER: 40000-40003 and 41000-41511
**Tips:** *40000-40003 register address reserved only module itself using.*

2).Mapping Register Address

| The relative between mapping serial no. and register address | | |
|---|---|---|
| Data Type | Mapping(Decimal) | Register Address(Decimal) |
| Boolean | 000-063 | 00001-00064 |
| 16 Bit(Word,Short) | 064-191 | 41000-41127 |
| 32 Bit (Dword,Long,Float) | 192-255 | 41128-41255 |
| 64 Bit (Double) | 256-319 | 41256-41511 |

**Tips:** *One Boolean mapping one register address;*
*One 16 Bit mapping one register address;*
*One 32 Bit mapping two register address;*
*One 64 Bit mapping four register address.*

*For this protocol, the S276,S278 ID range is 1~247;*
*When the device acquisition data from slave, then mapping to S278 master's register address, the data type will not change by S278, but the data level will be as below:*
*Signed AB（2Byte）*
*Unsigned AB（2Byte）*
*Long ABCD（4Byte）*

*Unsigned ABCD（4Byte）*

*Float ABCD（4Byte）*

| Gateway Parameter(Support Function Code 3 and 4) | | | |
|---|---|---|---|
| **Register Address** | **Definition** | **Data Type** | **Description** |
| 9C40H | Temperature | Signed AB | Current Value=True Value*10 ; Low Level Data Beginning |
| 9C41H | Humidity | Signed AB | Current Value=True Value*10 ; Low Level Data Beginning |
| 9C42H | DI, Arm/Disarm, External power status | Signed AB | Bit(0-3): DI(1-4),0=Open,1=Short ; Bit4 : 0= External Power,1=Power Failure ; Bit5 : 1=Arm, 0=Disarm |
| 9043H | Relay Output | Signed AB | Bit0:Ralay 1 Status,Bit1:Relay 2 Status, 0=Open, 1=Close |
| **Function Code 6 (Relay Output Parameter)** | | | |
| 9C43H | Switch Relay 1 and 2 | Signed AB | Bit0:Relay 1, Bit1:Relay 2, Write 1=Close, Write 0=Open |

*Double ABCDEFGH（8Byte）*

*The A,C,E,G stands for high data level, the B,D,F,H stands for low data level.*


## 2)Gateway IO Register Assignment Table

Example 1: Read gateway parameter, if the device ID address=1

Modbus TCP : Hexadecimal

Function code : 03H or 04H

Master downstream : 00 00 00 00 00 06 01 03 9C 40 00 04

Slave answer : 00 00 00 00 00 0B 01 03 06 01 26 02 4D 00 00 00 01


**Master Send Data Format:**

| Content | Bytes | Data | Description |
|---|---|---|---|
| Counter Command | 1 | 00 00H Start | When one data package sent, the counter value add 1 |
| Counter Command | 1 | | |
| Fix Character | 1 | 00H | Fix format and characters |
| Fix Character | 1 | 00H | Fix format and characters |
| Content Length | 1 | 00 06H | According to behind content bytes |
| Content Length | 1 | | |
| Device ID | 1 | 01H | 01 device, Range:1-247,according to setting address |
| Function Code | 1 | 03 or 04H | Read Input or Holding Register |
| Origin Register Address | 2 | 9C 40H | Range:9C40H-9C43(40000-40003),the address refer to above. Data sent sequence: high byte in font, eg: |

| Content | Bytes | Data | Description |
|---|---|---|---|
| | | | 0010,then sequence: 00 10. |
| Read Register Qty | 2 | 00 04H | Range: 0000H-0004H,read gateway parameter, Data sent sequence: high byte in font, eg:0008, then sequence:00 08. |

**Receiver Return Data Format:**

| Content | Bytes | Data | Description |
|---|---|---|---|
| Counter Command | 1 | 00 00H Start | According to data that gateway sent |
| Counter Command | 1 | | |
| Fix Character | 1 | 00H | Fix format and characters |
| Fix Character | 1 | 00H | Fix format and characters |
| Content Length | 1 | 00 0BH | According to behind content bytes change |
| Content Length | 1 | | |
| Device ID | 1 | 01H | 01 device, according to data that gateway sent |
| Function Code | 1 | 03 or 04 | Read Input or Holding Register |
| Return Byte length | 1 | 06H | Data:2N, N stands for register qty. |
| Returning Data | 6 | 0126H024DH 0000H0001H | From left to right, two bytes stands for a master register parameter, refer to above, Data sent sequence: low byte in font, eg: 00 01H, then sequence: 01 00H.Details as below: 0126H:294,Temperature: 29.4C 024DH:589, Humidity: 58.9%RH 0000H: Power failure,Disarm,DIN1-4 Open 0001H: Relay 1 close, Relay 2 Open |

Example 2: Relay output control, if the device ID address=1

Modbus TCP : Hexadecimal

Function code : 06H

Master downstream : 00 00 00 00 00 06 05 06 9C 43 00 01

Slave answer : 00 00 00 00 00 0B 05 06 9C 43 00 01

**Master Send Data Format:**

| Content | Bytes | Data | Description |
|---|---|---|---|
| Counter Command | 1 | 00 00H Start | When one data package sent, the counter value add 1 |
| Counter Command | 1 | | |
| Fix Character | 1 | 00H | Fix format and characters |
| Fix Character | 1 | 00H | Fix format and characters |
| Content Length | 1 | 00 06H | According to behind content bytes |

| Content Length | 1 | | |
|---|---|---|---|
| Device ID | 1 | 01H | 01 device, Range:1-247,according to setting address |
| Function Code | 1 | 06H | Write single register |
| Register Address | 2 | 9C 43H | Range: 9C43, the address refer to above.    Data sent sequence: high byte in font, eg: 0001, then sequence: 00 01. |
| Register Value | 2 | 00 01H | Range: 0000H-0003H, 0=All Relays Open,0001=Relay 1 Close,0002=Relay 2 Close,0003=All Relays Close. Data sent sequence: high byte in font, eg: 0001, then sequence: 00 01. |

**Receiver Return Data Format:**

| Content | Bytes | Data | Description |
|---|---|---|---|
| Counter Command | 1 | 00 00H Start | According to data that gateway sent |
| Counter Command | 1 | | |
| Fix Character | 1 | 00H | Fix format and characters |
| Fix Character | 1 | 00H | Fix format and characters |
| Content Length | 1 | 00 0BH | According to behind content bytes change |
| Content Length | 1 | | |
| Device ID | 1 | 01H | 01 device, according to data that gateway sent |
| Function Code | 1 | 06H | Write single register |
| Register Address | 1 | 9C43H | Address:9C43H, according to data that gateway sent |
| Register Value | 8 | 0001H | According to data that gateway sent |

The End!
Any questions please help to contact us feel free.
Http://www.GPRS-M2M.com