

TZ-TT18

Temperature&humidity Transmitter

User Guide V2.1



1. Product overview

The temperature and humidity transmitter (hereafter referred as TT18) is with built-in temperature & humidity sensor and GSM module which needs to inset SIM card use. There are three modes of TT18, turn on, turn off and flight mode. It only wakes up when it is time to send data or when the use operates it. Otherwise, it is in sleep status. So that it can be used for a longer time to bring you more convenience.

TT18 can collect the surrounding temperature and humidity with high precision quickly and transmit them to the server through GPRS. It is widely used in cold chain logistics, medicine, transportation and other industries.

When using, hang the wall, it can react the peripheral temperature very quickly.

2. Specification

Specification	Details
Dimension	90mm*64mm*27mm
Battery	Built-in 3.7V/3000mAh Lithium battery
GSM antenna	Built-in
Flash memory	Can save 4320 GPRS data
Temperature precision	$\pm 0.3^{\circ}\text{C}$
Detect temperature range	$-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
Operating temperature range	$-20^{\circ}\text{C} \sim +60^{\circ}\text{C}$
Humidity precision	$\pm 3\%$
Detect humidity range	0~100%
Power consumption	Active mode(avg.) < 100mA Sleep mode(avg.) < 2mA
Air pressure	860Kpa --1060Kpa
Humidity	Up to 75% non-condensing
GSM chip	SIMCOM GSM chip, 4 Frequency GSM 850/ 900/1800/1900mHz
LED	Device status/charge

3. Indicators and interface



Hardware	Function
A1. LED	Show the device's status (Green+Red)

A2. LED	Charge status (Red)
B. USB Port	Configure or charge the machine
C. SIM card slot	Insert the SIM card
D. Button	Turn on the unit or to know the machine's status with press

4. Device mode

Device mode	Instructions
Turn on mode	When pressing the button after 5 seconds left or set 005 command by serial port (in turn off /flight mode, note: need pressing the button for 15s in flight mode)
Turn off mode	Only set 005 command can let the device turn off (in turn on/flight mode,note:set 005 command only by serial port in Flight mode)
Flight mode	When pressing the Button for 15s or set 005 command,only save and not sending data in this mode (in turn on/turn off mode, note: set 005 command only by serial port in turn off mode)

5. Indicator status

Note: The A1 Red+Green LEDs of the device will blink at the same time when the machine is boot. If you'd like to know the device's status, you need to press the button after 0.5 seconds left, then the led will show to you which status in now and the LED only last 10s every time. If the device status led is off , the mean is the device is off, There is priority of the device's status, the greater number, the higher priority, flashing as follows:

A1.Green+Red LED - indicating the device status		
Device led status	Instructions	Priority
Green and Red led each on 0.1 seconds	Boot	
Green On for 0.1 seconds and off for 0.1 seconds	Working properly	1
Red On for 0.1 seconds and off for 0.1 seconds	Battery low voltage	2
Red always on	Device have problem (no signal and can't send data to server)	3
Green On for 1 seconds and off for 1 seconds	Flight	4

Off	The device is off	5
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A2.Red LED - Power status	
Power status	Instructions
Red on	charging
Red off	No charge or full charge

6. GPRS data format

TT18 GPRS data is in hex format.

The format of hex code:

Format: Start bits(2byte) + Packet length(2byte) + Protocol number(2byte) + Hardware type(2byte) + Firmware version(4byte) + IMEI(8byte) + RTC data time(6byte)+ LBS data length(2byte) + LAC(2byte) + CELLID(2byte) + MCC(2byte) + MNC(2byte) + Extension bits(A) + State data length(2byte) + Alarm type(1byte) + Terminal information(1byte) + GSM signal strength(1byte) +GSM state(1byte) +Battery voltage(2byte) + Temperature(2byte) + humidity(1byte) + Extension bits(B) + Extension bits(C) + packet index(2byte) + CRC(2byte) + Stop bits(2byte)

The data of the device send to the server:

54 5A 00 2F 24 24 04 03 01 07 00 00 08 66 10 40 27 00 34 28 09 01 01 05 03 0D 00 08 25 33 78
37 04 60 00 01 00 09 AA 00 17 37 01 95 09 DA 45 00 0A 57 0A 0D 0A

Below is a table tells more detail information about the protocol.

Data block	Number of bytes	Data Content	Meaning
Start bits	2	'T' 'Z'	TZone company identifier, this is the header of every packet
Packet length	2	Variable	The bytes length from the start at protocol number to the end at the CRC.
Protocol number	2	'\$\$'	Normal data
Hardware type	2	0x04 0x03	The hardware is TT18
Firmware version	4	Variable	0xFF 0xFF0xFF0xFF = 255.255.255.255
IMEI	8	Variable	BCD format, i.e. 0x08 0x66 0x10 0x40 0x27 0x00 0x34 0x28 = 866104027003428

RCT time date	6	Variable	The time and date when packet the data. The sequence is Year Month Day Hour Minute Second
LBS data length	2	Variable	GSM LBS's data length excludes LBS data length part, if the value is 0, means there is no LBS data.
LAC	2	Variable	GSM's location area code 0x25 0x33 means LAC is 2533
CELL ID	2	Variable	GSM's serving CELL ID 0x78 0x37 means CELL ID is 7837
MCC	2	Variable	Mobile Country Code, ignore the first digital, only 3 digital, 04 60 mean MCC is 460.
MNC	2	Variable	Mobile Network Code, 2 or 3 digital, if the first digital is 8 , means MNC is 3 digital, if the first digital is 0, mean MNC is 2 digital, 87 56 means MNC is 756, 00 56 means 56.
Extension bits	A=0		For future extending the protocol use, currently, has nothing, does not possess any byte
Status data length	2	Variable	The status data length excluding "Status data length" itself, if this part is 0, means no status data.
Alarm type	1	Variable	The value of this part has four possibility, Temperature/humidity included in all the GPRS data. 0xAA Interval GPRS data 0x10 Low battery Alarm 0xA0 Temperature/Humidity over threshold alarm 0xA1 Temperature/Humidity sensor abnormal alarm
Terminal information	1	Variable	Bit 7 to bit 5 are reserved for future use. Bit4: 1 RTC time is abnormal 0 RTCtime is normal Bit3: 1 The temperature/Humidity sensor is abnormal 0 The temperature/Humidity sensor is normal Bit2: 1 The temperature/Humidity is over threshold 0 The temperature/Humidity is normal Bit1: 1 The battery low vlotage 0 The battery is normal Bit0: 1 The machine is charging 0 The machine is not charging
GMS signal strength	1	Variable	CSQ value , Hex code

GSM status	1	Variable	Bit 7 to bit 6 are reserved for future use. Bit 5: 1 Internet connection is established 0 Internet connection is not established Bit4: 1 GPRS is registered successfully 0 GPRS is not registered Bit3: 1 The GSM is in roaming mode 0 The GSM is in home network mode Bit2: 1 GSM is registered successfully 0 GSM is not registered yet Bit1: 1 Detected SIM card 0 Not detected SIM card Bit0: 1 The GSM module is started 0 The GSM module is not started yet
Battery voltage	2	0	Unit:10mv, for example: 0195H=405(DEC), 405*10mV=4.05V.
Temperature	2	0	Unit:0.01℃ , convert to binary first, mark in the highest bit , 1-disconnect 0-connect , negative/positive mark 1-mean the temperature is negative 0-mean the temperature is positive. Remaining is the temperature value, convert to HEX first , and multiply 0.01℃. for example:09 DA=25.22℃ , 49 DA= - 25.22℃ 80 00= not connect temperature/humidity sensor
humidity	1	0	Unit:100%, Hex code, for example: 45=69%, FF = not connect temperature /humidity sensor
Extension bits	B=0		For future use, currently, this part has nothing, does not have any byte
Extension bits	C=0		For future use, currently, this part has nothing, does not have any byte
Packet index	2	Variable	The value range of this part is between 1 and 9999
CRC	2	Variable	The checked content is from the “protocol number” to the end at “CRC”, including “protocol number”, excluding “CRC”.
Stop bits	2	0x0D 0x0A	Indicate this packet is finished

7. Use the GPRS function

You can through the following way to configure the machine :

1. The configuration software
2. SMS
3. The server (the machine must enable ACK function and the server response ACK before sending you need to set up instructions, otherwise the machine will immediately into sleep. The default machine already have opened the ACK function, the machine once every send GPRS data to the server, the server must respond **@ACK, Packet index#** to the machine, then the machine will continue to send next GPRS data to the server).

Notes:

1. We have set up all the default command, you only need to insert a GPRS network SIM card, then the device will send data to our server. (Please kindly refer to the common list below if you'd like to know the default settings)
2. If you want change the setting, you can set it via SMS or use the same command via serial port tool.

Step1: Set the APN (Access Point Name)

Different network of provider have the different APN at every country, if you don't know, please refer to the attachment.

Format: *\$\$\$\$\$,011,APN, Username,Password#

Notes: The username and password could to be null.

For example: *000000,011,cmnet,,#

Explication: The China Mobile's APN is "cmnet", and the username and password are empty.

After you send the command of SMS to device, it will reply to your mobile phone:

Receive: '011'OK

***000000,011,cmnet,,#**

If you send the command of USB to device, the serial port tool will shows:

CMD bytes: 14

***000000,011,cmnet,,#**

ComdType:011(SETAPN)

APNnumber:cmnet

Username:

Password:

Step2: Set the server's IP & PORT

Format: *\$\$\$\$\$,015,1,IP,PORT#

For example: *000000,015,1,gateway.gotracking.net,18801#

gateway.gotracking.net is our server's domain name,18801 is the port.

If client have the server by himself, please make sure the IP and port is correct.

After you send the command of SMS to device, it will reply to your mobile phone

Receive:'015'OK

000000,015,1,gateway.gotracking.net,18801#

If you send the command by USB to device, the serial port tool will shows:

CMD bytes: 2B

***000000,015,1,gateway.gotracking.net,18801#**

ComdType:015(SETIPANDPORT)

Mode:01

IP/Domain Name:gateway.gotracking.net

Port:18801

Step3: Set GPRS time interval

Format: *\$\$\$\$\$,018,X#

X: the time interval (unit is min),

For example:*000000,018,1#

The device will send GPRS every1 minute and no times limit.

After you send the command of SMS to device, it will reply to your mobile phone:

Receive:'018'OK

***000000,018,1#**

If you send the command of USB to device, the serial port tool will shows:

CMD bytes: 0E

***000000,018,1#**

ComdType:018(SetGpreInternal)

Interval:1

8. Command list

If you want to know more about the TT18 and configure it, you can refer to the command list.

***** is user's password, and initial password is 000000

	SMS Instruction	Format	Note
1	Request one current machine information	******,000#	The machine will reply in the form of SMS(the data will contain IMEI、FW version、CCID、Temp、RH、CSQ、Battery、RTC)
2	Modify user password	******,001,@@@@#@#	***** is old password @@@@@ is new Password
3	Set the high/low temperature and humidity alarm function When the TT11 high/low temperature and humidity, TT11 will always send high/low temperature and humidity alarm GPRS data to the Preset Server. the machine can send data according to the time interval you have set(003 has priority to 004)	******,003,A,B,C,D,X#	A=[-40~125],high-temperature threshold(unit:min,default:100) B=[-40~125],low-temperature threshold(unit:min,default:-20) A must be bigger than B if Temperatures exceed [A, B],it will send alarm data C=[0~100],high-humidity threshold(unit:%,default:80) D=[0~100],low-humidity threshold(unit:%,default:20) C must be bigger than D if Humidity exceed [A, B],it will send alarm data X=[1,60],TT18 more than threshold change into X min send a GPRS data(unit:min,default:1)
4	Set low power alarm When the TT18 voltage is lower than the preset value, TT18 will send one lower power alarm GPRS data to the Preset Server. the machine can send data according to the time interval you have set(004 has priority to 018)	******,004,X,Y#	X is the low power alarm voltage, [360,430]unit:10mv0(default:360) Y=[1~60] Y is the Low power to send data interval time(unit:min, default:60, 0 is don't send data) For example: *****,004,380,10# When the battery voltage is lower than 3.8 V, 10 minutes to send a GPRS data
5	Set working model	******,005,X#	X=0, Turn off (default); X=1, Turn on;

			X=3, Flight;
6	Set RTC time	*\$,\$,\$,\$,\$,\$,006,year,month,day,hour,minute,second#	Set the device RTC time . For example: *000000,006,16,01,11,10,46,30# Year:16 Month:1 Day:11 Hour:10 Minute:46 Second:30
7	Extend setting	*\$,\$,\$,\$,\$,\$,008,ABCDEFGH#	A=0, Disable machine information report function which get machine information SMS by Calling A=1, Enable machine information report function which get machine information SMS by Calling (default) B=0,disable GPRS ACK function; B=1,enable GPRS ACK function(default); Note: the machine once every send GPRS data to the server, the server must respond @ACK,Packet index# to the machine, then the machine will continue to send next GPRS data to the server. C/D/E/FG=0
8	Set APN,Username,Password	*\$,\$,\$,\$,\$,\$,011,APN,Username,Password#	APN : APN string (must < 28 chars) User name: Your username (must < 28 chars) Password: Your password (must < 28 chars) * If haven't username or password, then left it blank. For example: *000000,011,CMNET,,# (It haven't username and password)
9	Set IP Address & port number	*\$,\$,\$,\$,\$,\$,015,X,IP,PORT#	X=0 use IP connect the server X=1 use DN connect the server IP : xxx.xxx.xxx.xxx DN:(domain name) www.xxx.com PORT : [1,65535]

10	Set the time intervals of GPRS Data in turn on and flight mode	*\$018,X#	X (3 Digital) [1,60] Time interval (Unit: min,default:5)
11	Set the GPRS mode	*\$019,X#	X=0, Use the UDP mode X=1, Use the TCP mode(default)
12	Set the temperature&humidity SMS alarm function	*\$020,X,Y#	X=0, disable this function(default) X=1,enable this function Y, SMS number Note: only send a sms alarm when over or below the threshold, so please the first set 020 command, then set 003 command.
13	When bad condition only save data	*\$021,A,B,C,D,E#	A=[-40~125],high-temperature threshold(unit:min,default:100) B=[-40~125],low-temperature threshold(unit:min,default:-40) A must be bigger than B if Temperatures exceed [A, B],it will save data C=[0~100],high-humidity threshold(unit:%,default:100) D=[0~100],low-humidity threshold(unit:%,default:0) C must be bigger than D if Humidity exceed [A, B],it will save data E=[350,430], low power threshold (unit:10mv,default:350)
14	The query command	*\$040,X#	X: need to query the instructions
15	Clear data flash	*\$500#	Clear history in the flash memory
16	Initialization	*\$990,099#	It will set all parameter to factory default value (Excluding the Password).
17	Reboot by SMS command	*\$991#	It will reboot the TT18 by this SMS command.
18	Read the machine records of Flash	*\$999#	Through the USB configure cable, read the machine records in the Flash to the computer, then all data records will be empty
19	Query all instructions	#DE	Only used to configure software
20	Query one instructions	#D5X	X: command, For example: #D5005, Only used to configure software

21	Query the time machine has worked	#DB	Only used to configure software (including turn on)
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9. Instruction

With the battery in TT18, press the button for 5s, machine running, when TT18 completes initialization, it will go to sleep. Most of the time TT18 is in sleep mode, with only interval time data. Only when connected with serial port tool for configuration, or it is called / receives SMS command, will it wake up. After this, it goes into sleep mode again, thus it can work for longer time.

Note:

1. Please don't connect the USB cable when the device is sending data to server, because maybe will affect the data sending and the temperature higher than the actual temperature

2. Please set the RTC time when turn on the device, otherwise the machine for the initial time. If sending the data to our server, when our server get yours device data, the RTC time will auto update. If you have your own server, you can make the following settings can change the device RTC time .

The server send to device format:

UTC time:2016-08-02 01:19:48

§ 15.19 Labelling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

§ 15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

RF warning for Mobile device:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

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