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10-inch touchscreen wireless temperature measurement master KL-MT89MP Manual

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Safety and precautions

❖ Danger and warning

This device can only be installed and maintained by professionals.

The manufacturer assumes no responsibility for any malfunctions caused by failure to comply with the instructions in this manual.

❖ Dangers of electric shock, fire and explosion

The equipment can only be installed and maintained by qualified personnel.

Before performing any operation on the equipment, the voltage input should be isolated and the operating power supply to the equipment should be disconnected.

A reliable voltage detection device is needed to confirm whether the voltage has been cut off.

Before powering on the equipment, all mechanical parts should be returned to their original positions.

The equipment should be supplied with the correct rated voltage during use.

Before powering on, carefully check that all wiring is correct.

Failure to take these precautions could lead to serious harm!

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I、Product Overview

Temperature monitoring points for high-voltage electrical equipment are typically located in environments with high voltage, high current, and strong magnetic fields. Due to the stringent conditions such as strong electromagnetic noise, high-voltage insulation, and space constraints, real-time temperature monitoring of high-voltage electrical equipment becomes extremely difficult.

Our company's independently developed wireless temperature monitoring system is a real-time temperature measurement system that uses radio waves for signal transmission. This system mounts a sensor on the device being measured, and the sensor is connected to the receiving host via a wireless network. This system fundamentally overcomes the challenge of real-time online monitoring of the operating temperature of high-voltage equipment contacts.

The KL-MT89MP touchscreen wireless temperature measurement host is an industrial-grade 10-inch touchscreen host equipped with a standard communication interface, supporting network operation and capable of receiving data from wireless temperature sensors. Simultaneously, with the help of host computer software, the host can record real-time operating temperature data of high-voltage equipment, enabling proactive maintenance of high-voltage equipment for thermal failures and providing historical data for high-voltage equipment repair.

The wireless temperature monitoring system boasts extremely high reliability and security . The temperature sensor employs ultra-low power wireless communication, transmitting the collected temperature data to the wireless

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temperature monitoring host via a wireless network. The wireless temperature sensor is directly installed at the temperature monitoring point of each high-voltage electrical device, such as industrial production equipment, high-power motors, high-voltage switches, busbar joints, outdoor disconnectors, transformers, and other electrical contacts prone to high temperatures.

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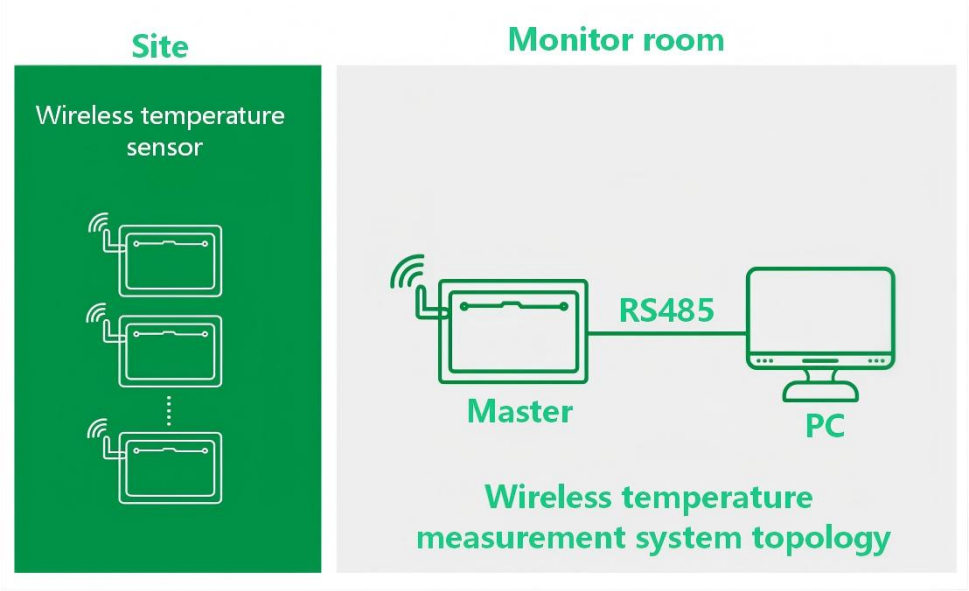
II、Wireless temperature measurement system structure

2.1 Wireless Temperature Measurement System Structure Diagram



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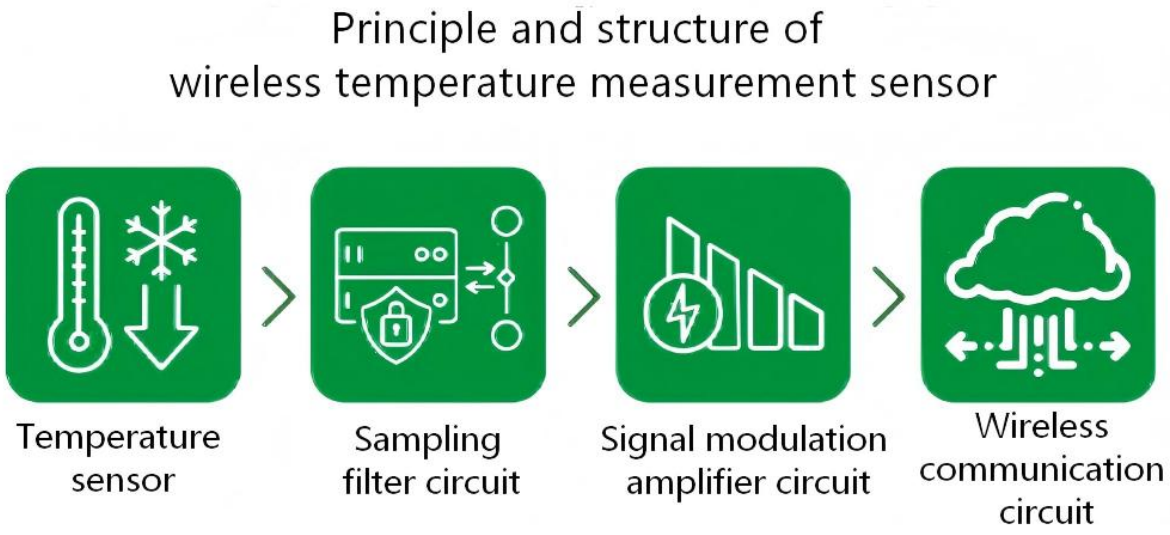
2.2 Wireless Temperature Sensor

The wireless temperature sensor consists of a temperature sensor, signal modulation and amplification, logic control circuit, wireless communication circuit, antenna, and other components. It collects temperature data and sends it to the wireless temperature measurement host via a wireless network.

Temperature sensors can be used to measure the temperature of the surface or contact points of high-voltage energized objects, such as the operating temperature of industrial production equipment, high-power motors, exposed contacts in high-voltage switchgear, busbar connections, outdoor disconnectors, and transformers.

The schematic diagram of the wireless temperature sensor is shown below.



III、Product Introduction

The KL-MT89MP touchscreen wireless temperature measurement host is a monitoring instrument that integrates temperature sensor working status monitoring, temperature display, alarm prompts and outputs, event logging and data logging. The host can modify parameters such as address, and the interface is

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intuitive and clear, making later viewing and management clear and convenient.

3.1 Introduction to Main Functions

Main functions		Function Introduction
Basic function	Receive data	Receive temperature and sensor operating voltage uploaded by wireless temperature sensor
	Display data	The received data is displayed in color, providing a more intuitive viewing experience. The backlight is controllable and suitable for a variety of applications.
	Clock display	A real-time clock is displayed and serves as the time reference for event logging.
	Parameter settings	All parameters are flexibly adjustable, easy to operate, and data is not lost even when power is off.
	Alarm output	When an alarm event occurs, the relay dry contact outputs a signal and emits a buzzer alarm sound.
	Temperature alarm record	Record the temperature at the temperature measurement location where an alarm has occurred.
	Password Management	Password management is used; a password is required to set parameters. There are two types of passwords: user password and system password. Entering the system password allows access to more advanced settings.

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3.2 Technical Specifications

Technical parameters		Technical indicators
Wireless parameters	wireless frequency	2.4GHz/433MHz/470~510MHz
	Managing the	≥240
Communication parameters	Communication	RS485, Ethernet, and fiber optic communication are
	Number of hosts in	≤128 units
	Communication	Modbus Protocol
	baud rate	1200, 2400, 4800, and 9600 bps are available.
Alarm Default parameter	Temperature alarm	Upper limit: +90℃, lower limit: -20℃
	Temperature alarm	Upper limit: +60℃, lower limit: -10℃
	alarm voltage value	2700mV
Relay dry contact parameters		AC220V/5A Passive Normally Open (Optional
Operating voltage		AC220V
Overall power consumption		≤5VA
Operating temperature		-10℃ to +70℃
Operating humidity		≤90%RH, non-condensing, non-corrosive
altitude		≤2500 meters
Insulation resistance		≥100MΩ (temperature between 10~30℃, relative
Installation method		Wall-mounted installation, recessed installation

IV、Display and parameter settings

4.1 Main Display Interface

Displays the location name and temperature data of each temperature measuring point, with each location divided into three phases (A, B, and C) displayed in yellow, green, and red respectively. When a temperature measuring point is offline, it displays "---".

The information bar at the bottom left displays: the number of temperature control points configured in the system, the number of current warning messages, and the number of current alarm messages;

When a warning or alarm occurs, the information bar below will display the current number of warnings and alarms. Click to view.

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4.2 Menu Bar Information

The menu is as follows:

- Real-time data: Click this menu to enter the temperature display interface of the temperature measurement point.
- Alarm Logs: Click this menu to access the alarm, warning, and disconnection log query interface.
- Parameter settings: Click this menu to enter the device parameter query and configuration interface.
- System Parameters: Click this menu to enter the system parameter query and configuration interface.
- Administrator Mode: Click this menu to enter the administrator mode settings interface.

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4.3 Alarm Query Records

Clicking on the alarm information on the main interface will display detailed records of abnormal alarms and warnings, including description, temperature, abnormal registration, start time, and end time.

4.4 Parameter Settings

After clicking the Device Parameter Settings menu, you will enter the following interface. Click the corresponding menu item to view and modify the device parameters.

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4.4.1 Communication Parameters

The system's default device communication address is 1 (address range 1~254), and the baud rate is 9600 (optional 1200, 2400, 4800, 9600).

4.4.2 Wireless Parameters

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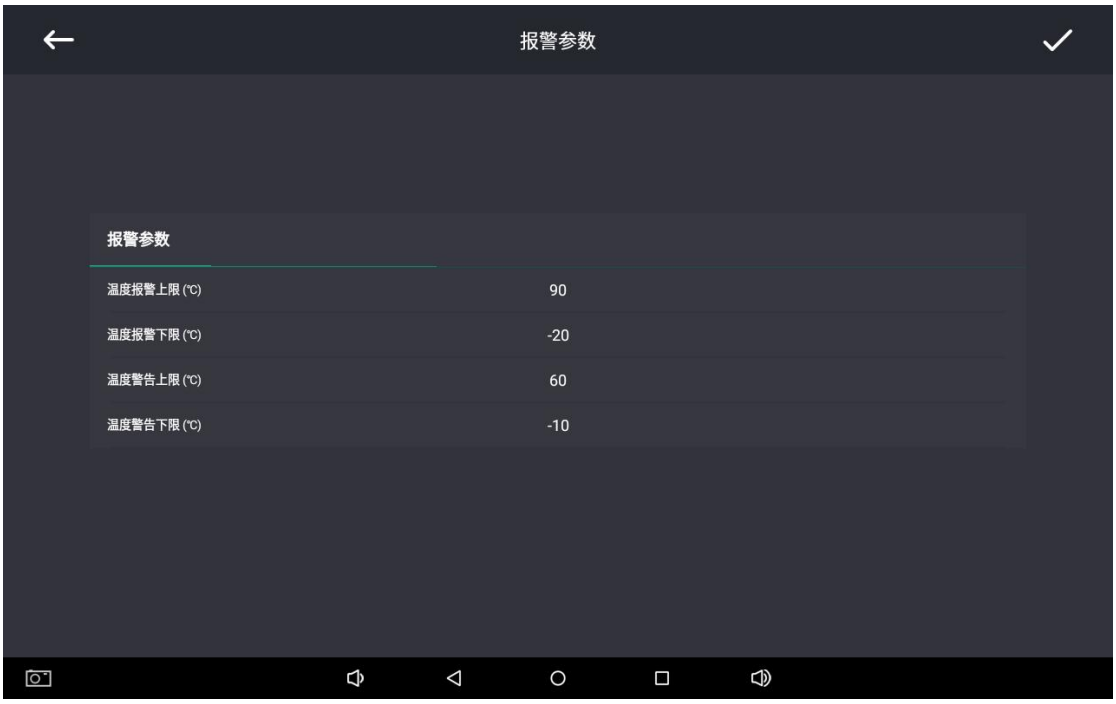
The system supports three receiving modules, with channels 1, 2, and 3 by default. The maximum receiving capacity depends on the hardware attributes of the wireless receiving module and can be left unconfigured. When purchasing the equipment, specify the number of temperature measurement points each host unit should support. Engineers will be responsible for selecting the appropriate model. Communication protocol compatibility will also be configured by engineering service personnel based on the receiving module's attributes. The configured capacity displays the number of temperature control points corresponding to that receiving module.

4.4.3 Alarm Parameters



Temperature alarm parameters are divided into two levels (warning and alarm), and the default parameters are shown in the table above. The default temperature hysteresis is 3 degrees Celsius. When the alarm or warning temperature threshold is

exceeded, the temperature must be 3 degrees lower or higher than the threshold before it is considered to have returned to the previous state. Setting the temperature hysteresis can prevent frequent alarm or warning events from occurring when the temperature fluctuates around the threshold temperature.

4.4.4 Alarm Switch

Users can turn the alarm sound on or off as needed.

4.5 System Parameters

After clicking the System Parameters menu, you will enter the following interface, where you can view and set various system parameters.

The "Clear Data" function erases all recorded events. The "Restore Factory Settings" function will erase all configured parameters and requires an administrator password. The default factory password is "123456," which users can change as needed.

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4.5.1 Data Recording

Click the "Data Records" submenu to enter the following interface:

Interval time: Set the interval time for recording data. The minimum recording time is 5 minutes.

Save time: Set the maximum save time for records. After the start of recording, the system will automatically save the records to the specified save directory after the save time is reached. The save format is .exe.

Save directory: You can set a specified directory as the save directory for Excel documents.

After clicking the "Start Recording" button, select either "Auto Save" or "Manual Save" mode. Once the recording mode is selected, the system will start recording temperature data at 240 points at intervals.

In both automatic and manual save modes, you can exit the recording by clicking the "Stop Recording" button. In manual mode, clicking "Stop Recording" will bring up a file directory selection dialog box, where you can select the specified save directory.

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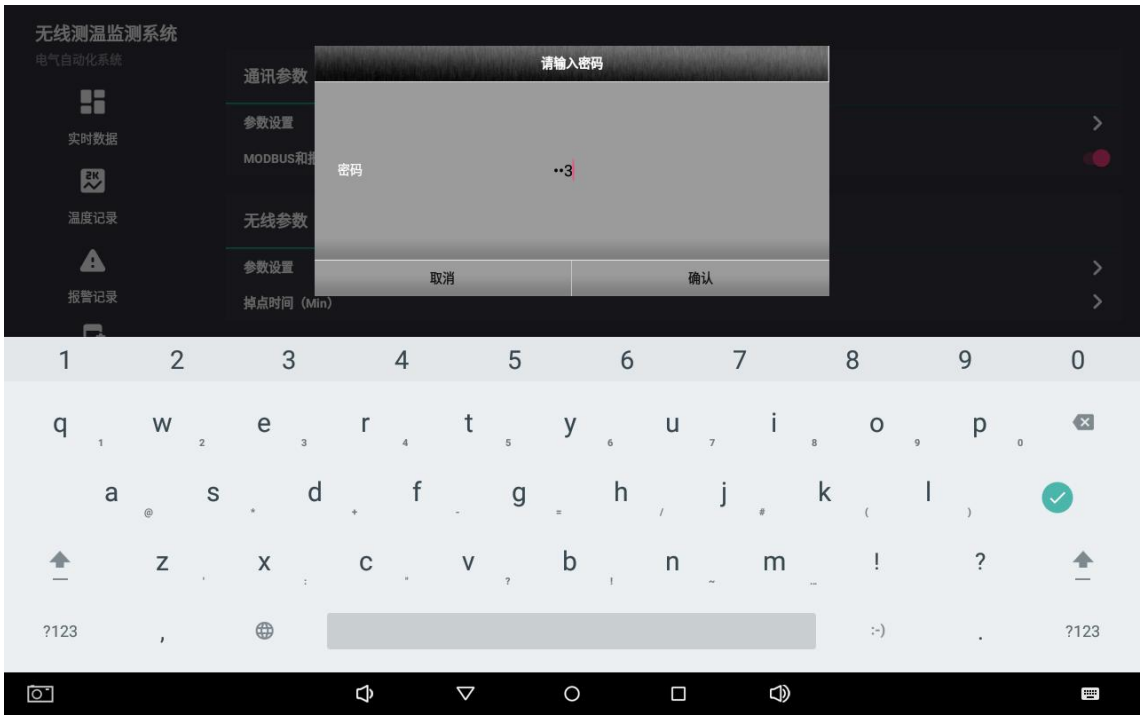
4.6 Temperature control point configuration

To configure the temperature control point, the user needs to enter administrator mode. Click the administrator mode menu, enter the password, and enter the management mode. The default factory password is: 123456.



After entering management mode and returning to the main interface, you will see three buttons in the lower right corner of the screen: "Import," "Delete," and "Add." These buttons allow you to perform the corresponding temperature control point configuration operations. To modify or view the temperature control point parameters, simply click on the corresponding temperature control point on the interface.

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4.6.1 Adding Temperature Control Points

Users can enter the corresponding temperature measurement point name in detail, which will be displayed intuitively on the interface. The channel is filled in as 1 by default (unless there are special requirements). The group number and point number should be entered one by one according to the group number and point number indicated on the corresponding temperature measurement point label. After confirming that the parameters are correct, save the settings.

The newly added temperature measurement node serial numbers are sequentially increased based on the maximum serial number, and the serial numbers correspond one-to-one with the temperature point numbers in the communication protocol .

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4.6.2 Deletion of Temperature Measurement Nodes

Temperature measurement node configuration information can only be deleted by deleting it sequentially from the last node.

4.6.3 Temperature Measurement Node Modification

Temperature measurement nodes can be modified directly on the interface: the name, channel, group number, point number, and transmission distance of the temperature measurement node. After modification, click Save. If no modifications are needed, you can click the Exit button.

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4.7 Precautions

1. When modifying the group number or point number, it must not be the same as the group number or point number of other temperature measurement points;

2. The transmission distance configuration is only valid for certain active temperature measurement modules. Please consult our customer service for details on which temperature measurement modules are applicable.

3. The CT passive temperature measurement module has a pre-set device ID at the factory, so no on-site configuration is required. Simply enter the group number and point number. The input method is as follows:

Device ID: The last 5 digits of the device ID. Taking the module above as an example, enter "14905".

Group number: The first 5 digits of the device ID. Taking the module above as an example, enter "37796".

4. The send button is used when replacing certain active temperature measurement modules. Temperature measurement modules with switches can write configuration information to the corresponding wireless temperature measurement module within 5 seconds of powering on (it is recommended to place the wireless temperature measurement module close to the host, firstly because it is easier to configure successfully, and secondly because it is easier to observe the configuration results).

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V、Hardware Interface Description

5.1 Serial port (232/485)

UART1, UART2, UART3, and UART4 have all undergone RS232 level conversion and have been treated with anti-static measures.

Theoretically, an RS485 bus can support a maximum of 256 transceivers, with no 120R terminating resistors soldered on. Users are advised to test based on their actual environment to ensure normal communication. Note: The theoretical limit is limited by the usage environment and communication cable.

The 485 serial port definition is shown in the table below:

silkscreen	serial port	pin	Level	Function Description
3A	UART3	1	RS485	Alarm output/MODBUS multiplexing
3B		2		
4A	UART4	3	RS485	MODBUS
4B		4		

5.2 USB-HOST interface (USB1, USB2/T, USB0/C, USB3)

The host unit integrates 4 USB-HOST ports, which can connect to various USB peripherals, such as USB receiver modules, USB keyboards and mice, USB flash drives, and USB drives.

5.3 Audio Interface (SPK)

SPK is the speaker interface. The SPK interface is a dual-channel 4R/3W power amplifier circuit that can be connected to an external alarm horn.

interface	pin	silkscreen	Pin Definitions
SPK	1	L+	+OUT_L
	2	L-	-OUT_L
	3	R+	+OUT_R
	4	R-	-OUT_R

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5.4 Ethernet Interface (ETH)

The RJ45 port provides one 100Mbps auto-sensing Ethernet port. To use the host's Ethernet function, the user needs to plug the network cable into the Ethernet port and then enable Ethernet through the settings. The default Ethernet IP address assignment method is DHCP; to manually configure the IP address, you can do so in the advanced settings.

The Ethernet port can be equipped with MODBUS-TCP protocol functionality.

5.5 GPIO Interface (GND, IO1, IO2, IO3, IO4)

The GPIO interface can be connected to external indicator lights.

pin	silkscreen	Pin Definitions	pin	silkscreen	Pin Definitions
1	GND	GND	2	IO1	GPIO3_D3_U
3	IO2	GPIO3_D1_U	4	IO3	GPIO4_B1_U
5	IO4	GPIO3_D0_U			

5.6 SIM Card Slot Interface (SIM)

Insert the SIM card into the card slot. Note that the SIM card does not support hot-swapping; a power cycle must be performed after each insertion or removal. Then you can use the 4G function. The SIM card slot is on the top layer of the board; refer to the SIM card tray for orientation.

The base card slot is a SIM card slot with a card tray. We use a Quectel 4G module, which supports all network types, as detailed in the table below

Quectel EC20	7 models
Mobile 2G 3G 4G IoT	support
China Unicom 2G 3G 4G IoT	support
Telecom 2G 3G 4G IoT	support

With the optional mobile network access function, users can directly access the operator's network.

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5.7 4G Antenna Interface (4G)

If 4G functionality is required, the K10G20 can be equipped with an optional 4G module, which can be used with a SIM card. By correctly matching the corresponding antenna for different interfaces, the signal strength and range can be increased.

2.9 WIFI and Bluetooth Antenna Interface (WIFI/BT)

The main unit is equipped with an AP6212 module that combines Bluetooth and Wi-Fi. The module supports both Bluetooth 4.2 and 2.4GHz Wi-Fi, and after pairing, it supports file transfer with devices such as mobile phones.

5.8 TF Card Holder (TF)

The board has an onboard 4-pin data cable for connecting to a TF card slot, supporting large-capacity storage. It features hot-swap detection, so inserting or removing a TF card during startup and use will not affect operation. It supports eMMC protocol 4.3 and SD Memory Card protocol v2.0.

Optional external data recording memory card.

5.9 Mounting Hole Installation Method

Mounting holes: One set has four mounting holes, secured with the following screws.

Standard: 75*75 on the back of the fixing hole, M4 fixing thread.

Standard installation method: Simply place the fixing threads according to the location of the fixing holes.

Optional accessory: Clip-on bracket (including M4*25 screws)

Screw accessories: 4 x 3*5mm silver round head screws, 4 x 4*6mm black galvanized round head screws

Optional installation method: A hole needs to be drilled on the screen mounting surface, slightly larger than the back cover dimensions of 160*153mm. Leave sufficient clearance and allow space to avoid the antenna mount (antenna length 10mm). When installing, tighten the screws with a screwdriver until they are fully engaged with the mounting surface.

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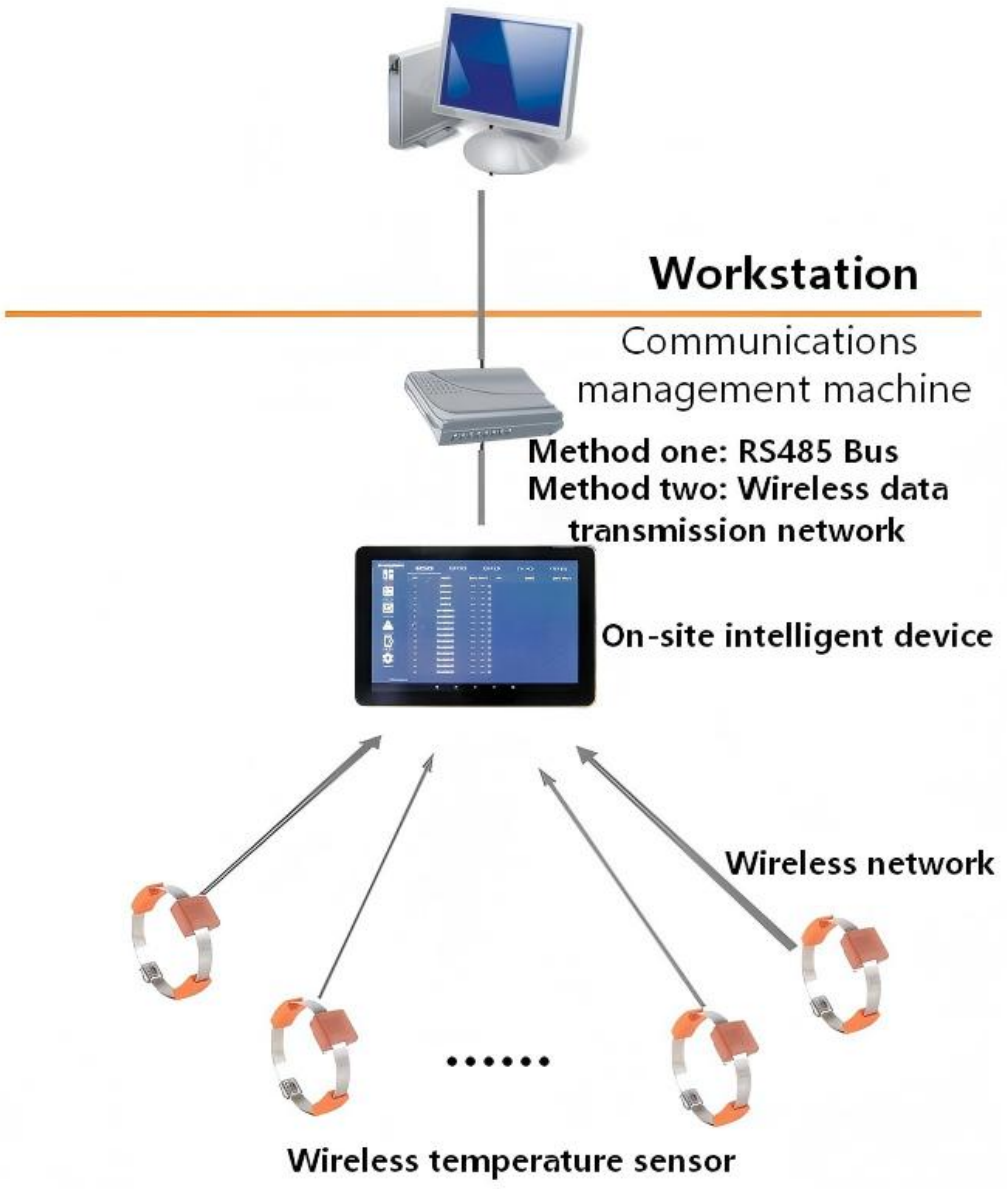
VI、Typical networking methods for wireless temperature measurement systems



Note: This diagram shows a typical network topology, which may vary depending on the project requirements in actual applications.

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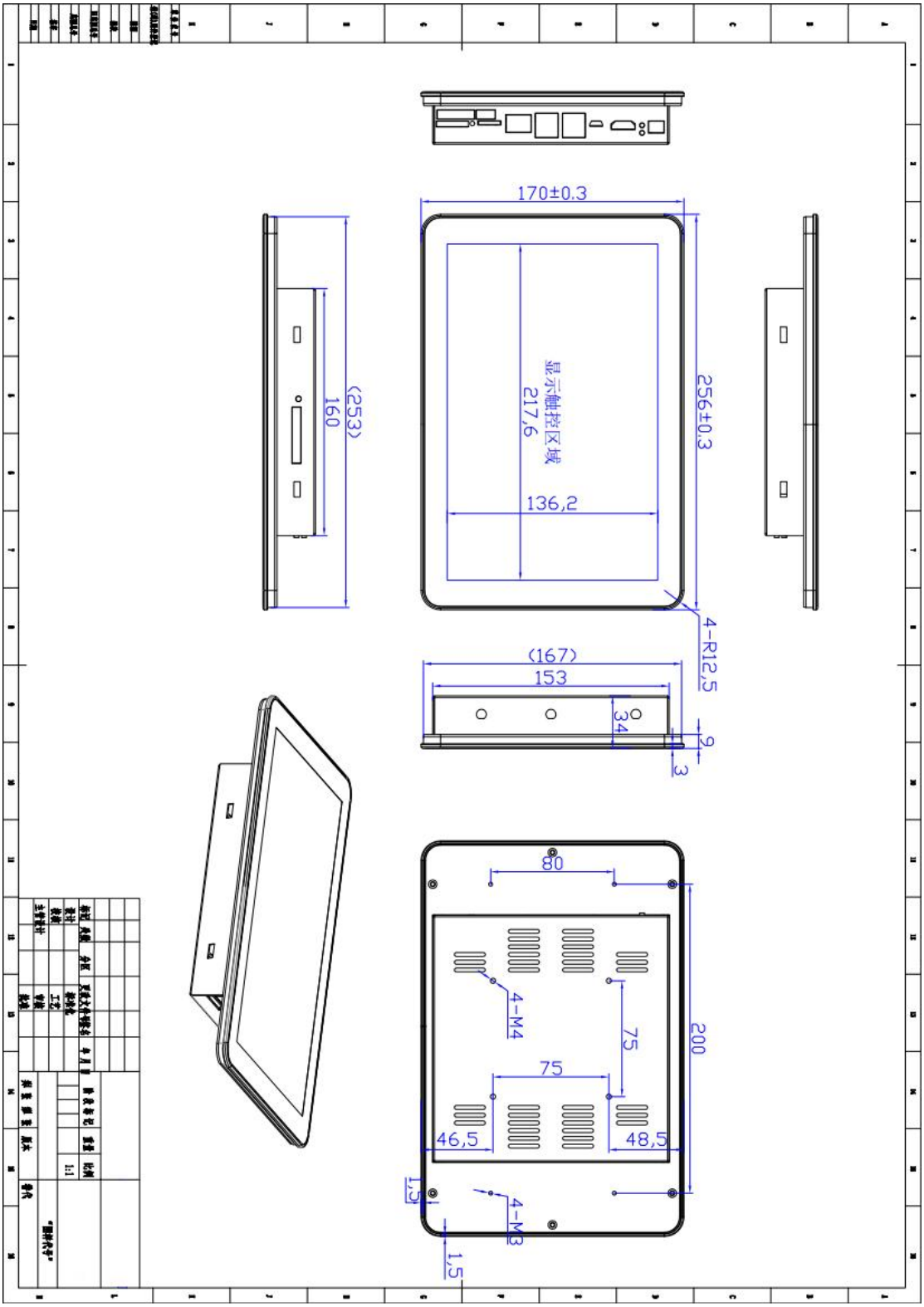
VII、External dimensions

7.1 Product Dimensions

Dimensions (L*W*H): 256*170*33 mm; Weight: 1.2KG.



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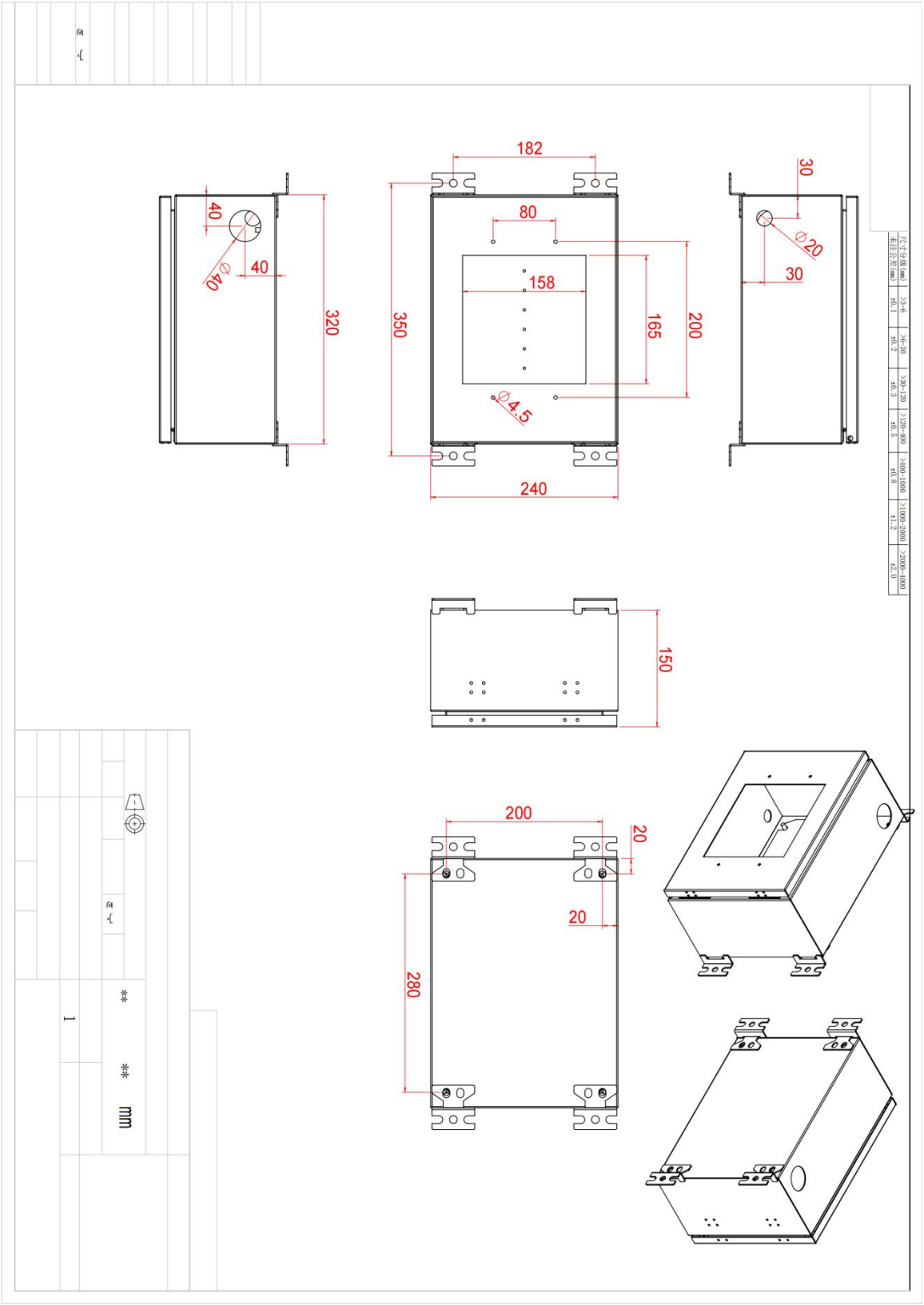
7.2 External Dimensions



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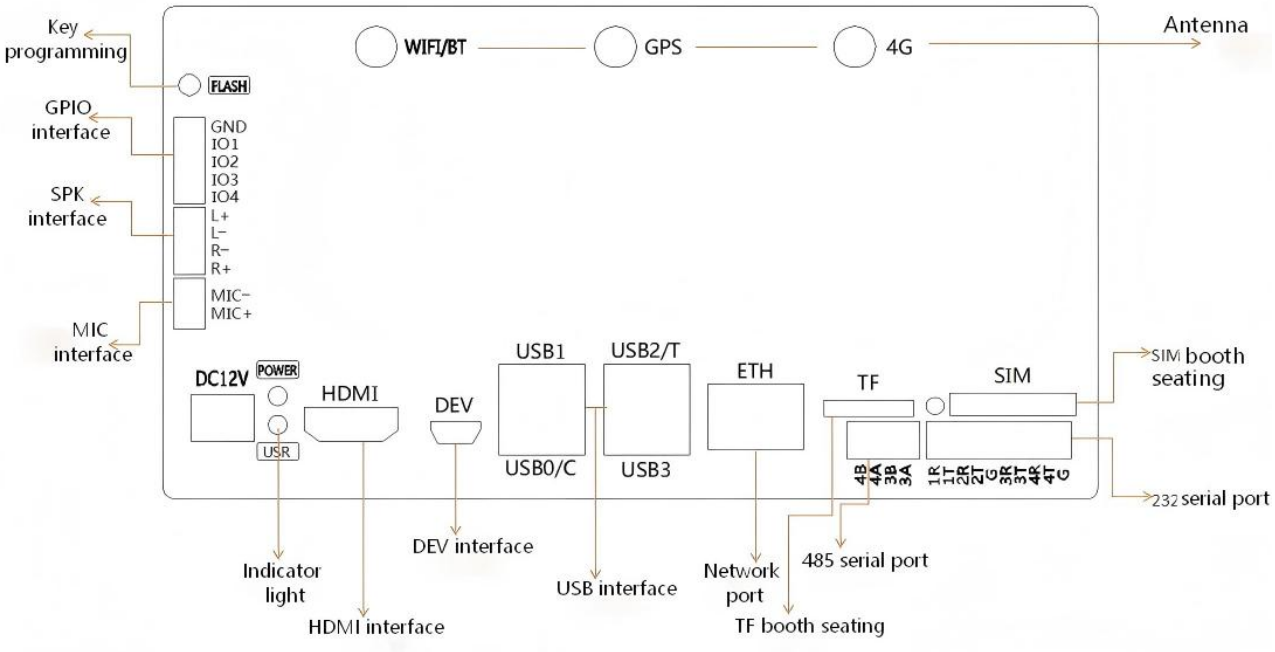
7.3 Back view illustration



VIII、Contact Us

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