



Operation **Manual**

ICA400-02/ICA413-02 Series **4G IoT Data Transmission Terminal**



SHENZHEN INVT ELECTRIC CO., LTD.

No.	Change description	Version	Release date
1	First release.	V1.0	December 2021
2	<ul style="list-style-type: none">● Added three function descriptions (antenna gain, power consumption and heat dissipation method) in section 1.2 Product specifications.● Added product weight data in section 2.3 Outline dimensions and weight.● Updated all operation descriptions and interface diagrams in chapter 3 Quick startup	V1.1	September 2024

Contents

1 Product overview	1
1.1 Product features.....	1
1.2 Product specifications.....	2
1.3 Model instruction.....	3
1.4 Port instruction.....	4
1.5 Indicator instruction.....	5
2 Installation	6
2.1 Overview.....	6
2.2 Unpacking inspection.....	6
2.3 Outline dimensions and weight.....	7
3 Quick startup	8
3.1 Operation description.....	8
3.2 Monitoring platform operation instructions.....	8
3.2.1 IWOSTUDIO monitoring equipment.....	8
3.2.2 Web monitoring device.....	15
3.2.3 Monitoring the device via APP.....	17
3.3 Monitoring platform account.....	18
3.3.1 Web registration.....	18
3.3.2 APP registration.....	19
3.4 FAQs.....	20

1 Product overview

INVT ICA400-02/ICA413-02 4G series IoT data transmission terminal is a kind of 4G wireless data terminal for Internet of Things (IoT). Aiming at the need for RS485 or Ethernet communication, the data transmission terminal collects the device data of the RS485 interface through the ModbusTCP protocol or the device data of the RJ45 interface through the ModbusTCP protocol and provides users with wireless long-distance data transmission function through the public operator network. Its stability and reliability meet the requirements of industrial application scenarios.

The product adopts a high-performance industrial-grade 32-bit communication processor and industrial-grade wireless module, with an embedded real-time operating system as the software support platform, and also provides RS485/ RJ45 Ethernet interfaces, thus enabling PLC and other devices to upload the data to the cloud.

1.1 Product features

1. Standard set-up for easy operation

- Provides standard RS485 interfaces for direct connection to serial devices for data acquisition.
- Provides standard RJ45 interfaces for direct connection to network devices for data acquisition (ICA413-02 model).
- With intelligent data terminal, able to enter the data transmission state once upon power-on.
- Adopts standard rail installation.
- With powerful center management software, facilitating device management (optional).
- Convenient system configuration and maintenance interface.

2. Powerful functions

- Supports remote wireless software upgrade and remote policy configuration through OTA.
- Supports cloud-platform management on devices, facilitating remote management and device intelligence.
- Embedded with standard TCP/IP protocol stacks, supporting multiple transmission protocols.
- Supports APN.

- Able to directly connect to serial devices, supporting up to 40 groups of Modbus register collection for terminal devices.
- Supports the configuration of Modbus query address and collection period to upload only changed data, achieving the traffic saving on data upload.
- Supports 4G base station positioning.
- Supports SIM cards (optional).
- Supports GPS positioning to obtain device positions accurately (optional).

1.2 Product specifications

Function	Description
Supported network	China(CN) version <ul style="list-style-type: none"> ● LTE FDD: Band 1/3/5/8 ● LTE TDD: Band 34/39/40/41 ● GSM: 900/1800MHz Europe(EU) version <ul style="list-style-type: none"> ● LTE FDD: Band 1/3/7/8/20/28 ● GSM: 900/1800MHz Latin America(LA) version <ul style="list-style-type: none"> ● LTE FDD: Band 1/2/3/4/5/7/8/28/66 ● GSM: 900/1800MHz
Supported interfaces	1 RS485 interface 1 standard RJ45 interface (ICA413-02 model) 1 SMA 4G antenna interface, an optional SMA GPS antenna 1 spring-loaded SIM card socket (medium card)
Indicator	Power indicator, network status indicator, running status indicator
Communication protocol	Modbus RTU/Modbus TCP protocol IoT MQTT communication protocol PPP dialing protocol FTP transfer protocol
Theoretical bandwidth	<ul style="list-style-type: none"> ● LTE FDD Rel.13: 10Mbps DL/5Mbps UL ● LTE TDD Rel.13 : 8.2Mbps DL/3.4Mbps UL ● GPRS: 85.6Kbps DL/85.6Kbps UL
Antenna gain	2.2dBi
Power supply	DC10–25V
Power consumption	ICA400-02 series: Average power: 40mA@24V, maximum power: 500mA@24V. ICA413-02 series: Average power: 50mA@24V, maximum power:

Function	Description
	500mA@24V.
Temperature range	-25~+60°C
Shell	With shell, ingress protection (IP) rating IP20
Installation method	Rail-mounted
Heat dissipation method	Natural heat dissipation

1.3 Model instruction

Model name illustration of INVT ICA series data transmission terminal:

ICA* - *** - ****
 ① ②③④ ⑤⑥⑦ ⑧⑨

Symbol	Description	Contents
①	Product series abbreviation	ICA: Internet Communication Adapter
②	Wireless communication mode	0: Do not support wireless communication 1: WIFI 2: GPRS 3: 3G 4: 4G 5: 5G
③	Wire communication mode	0: Do not support wire communication 1: Ethernet
④	Local data collection mode	0: RS485 1: Ethernet 2: CAN 3: RS485+Ethernet 4: RS485+CAN 5: Ethernet+CAN 6: RS485+Ethernet+CAN 7: RS485+Ethernet+VPN

Symbol	Description	Contents
⑤	SIM card type	0: Plug-in card (Standard, default) 1: Embedded SIM card
⑥	IP rating	0: IP00 (without shell) 1: IP20 (wall-mounted shell) 2: IP20 (rail-mounted shell) 6: IP65 (direct-insert shell)
⑦	Special function	G: with GPS U: with USB flash disk A: supports audio V: supports video This bit is omitted for standard configuration since it does not carry additional functions.
⑧	Voltage type	5: 4.5–6V. The voltage for standard configuration is 10V–30V, so this bit is omitted for standard configuration.
⑨	International version	CN: China version EU: Europe version LA: Americas version This bit is omitted for WIFI products.

1.4 Port instruction

Port identifier	Port description
24V	Power supply +
GND	Power supply -
485+	485A
485-	485B
4G	GPRS antenna
GPS	GPS antenna (optional)
Ethernet	RJ45 interface (applicable to ICA413-02 only)
SIM	SIM card
WAN↔LAN	<p>Function selection switch. The selection before power-up is valid.</p> <ul style="list-style-type: none"> When WAN is selected, the network port is upstream and is used to connect to the network for data upload. When LAN is selected, the network port is downstream and is used to connect to the device for ModbusTCP data acquisition (only for ICA413-02 models).

1.5 Indicator instruction

Indicator identifier	Description
NET	4G network indicator Flash slowly (ON: 600ms; OFF: 600ms): No SIM card/Network registration in progress/Registration failed. Flash quickly (ON: 75ms; OFF: 75ms): Data link established
RUN	Run indicator Flash slowly (ON: 1s; OFF: 1s): RS485 communication is abnormal Flash quickly (ON: 100ms; OFF: 100ms): RS485 communication is normal ON or OFF: System exceptions
POWER	Power supply indicator

2 Installation

2.1 Overview

ICA series 4G IoT data transmission terminal must be installed properly to achieve the designed function. Generally, the installation must be done under the guidance of our certified and qualified engineers.

Note: Do not conduct installation with the power on.

2.2 Unpacking inspection

Before unpacking, check whether the package is in good condition and its product information is the same as on the order. The packing materials should be well maintained during inspection for future transshipment. If any question, please contact the supplier.

Table 2-1 Product deliverables

Deliverables	Qty	Remark
4G data transmission terminal	1	
4G antenna	1	Applicable only to models using an external antenna
GPS antenna	1	Optional
SIM card	1	Applicable to models of China(CN) version
PIN terminal	1	4PIN terminal

2.3 Outline dimensions and weight

The outline dimension of the IP20 model is as follows (unit: mm)

The net weight of the ICA413 product is 97.1g, and the gross weight is 264g. The net weight of the ICA400 product is 90.7g, and the gross weight is 258.7g.

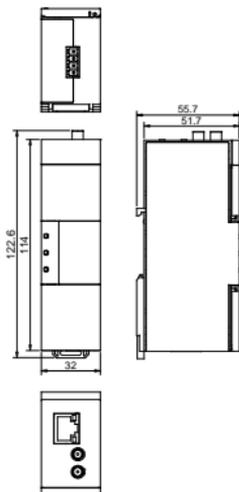


Figure 2-1 ICA413-02 product dimensions

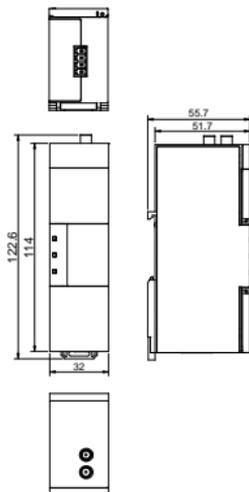


Figure 2-2 ICA400-02 product dimensions

3 Quick startup

3.1 Operation description

Equipment required: Networked computer, 4G data transmission terminal, IoT SIM card.

Procedure:

- Step 1 Open the flip cover at the front and insert the SIM card into the slot.
- Step 2 Record the device ID and 6-digit key from the label and add them to the IoT monitoring system.
- Step 3 Wire the product based on the port description (ICA413 models have the option to connect to a network cable).
- Step 4 Connect to the 4G antenna and GPS antenna (optional).
- Step 5 Power on and start the 4G data transmission terminal.
- Step 6 If the yellow NET indicator flashes with an interval of 75ms, the expansion card is network ready and the data transmission starts.
- Step 7 Go to real-time monitoring interface to review relevant information in IoT monitoring system.

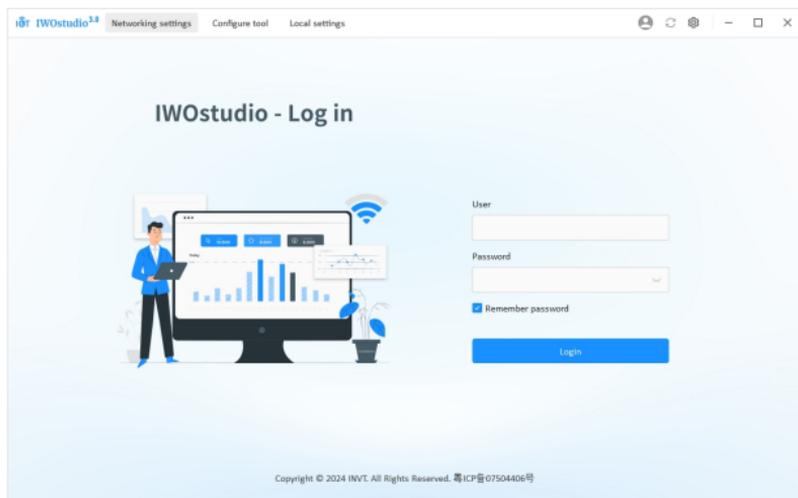
3.2 Monitoring platform operation instructions

You can monitor relevant devices through the following three methods. For information on how to obtain the account and password, please refer to section 3.3 Monitoring platform account.

1. Host controller software: IWOSTUDIO
2. Web: IWOScene industrial IoT application platform
3. Mobile: INVT Cloud APP

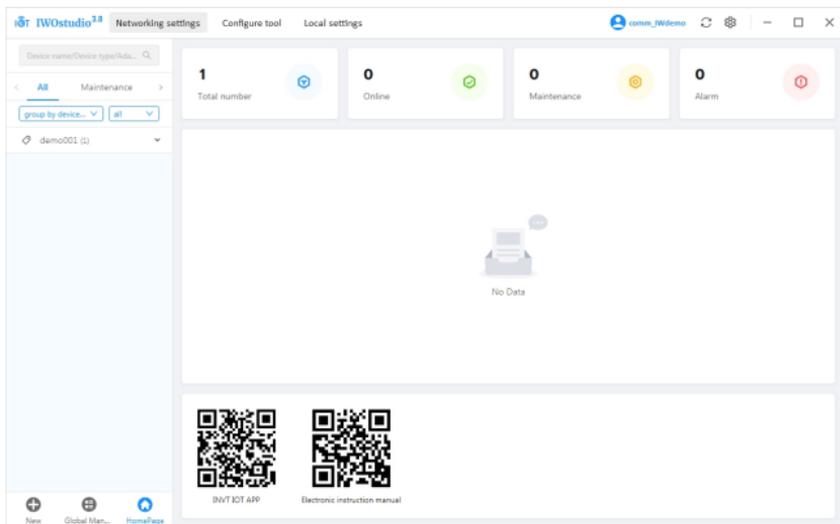
3.2.1 IWOSTUDIO monitoring equipment

1. Download IWOSTUDIO from the official website (www.invt.com), install, and then open it.

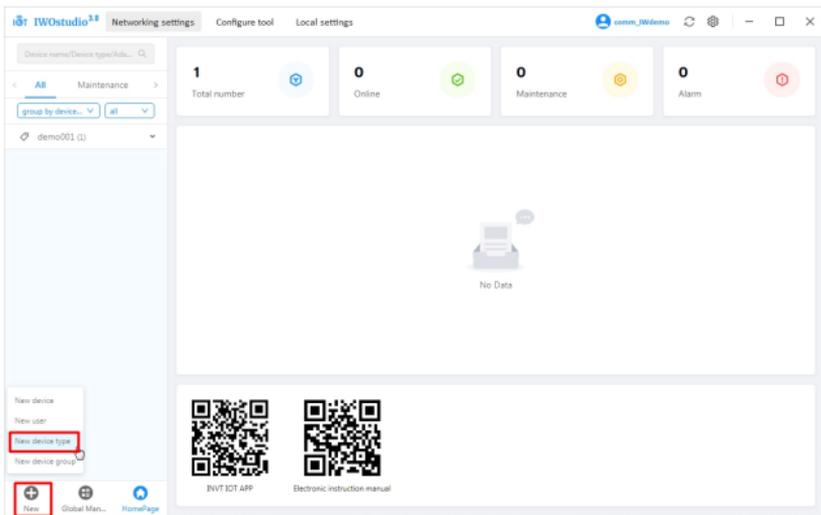


2. Enter the account and password to log in and enter the network configuration interface.

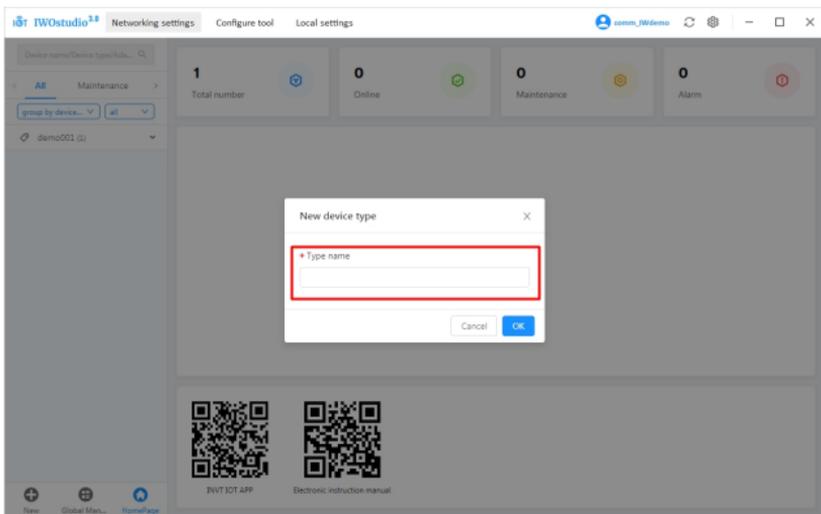
Note: For account information, refer to section 3.3 Monitoring platform account.



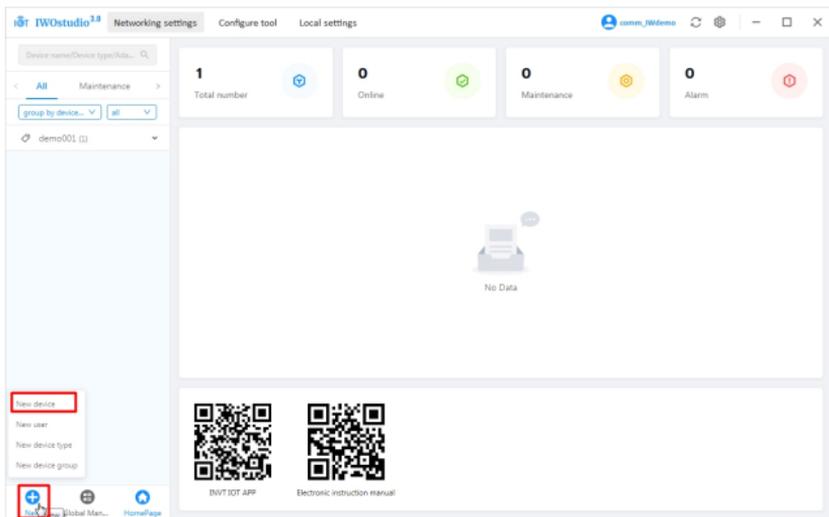
3. If it is your first time using the software, you need to add a device type. Click **New > New device type** in the lower left corner. If it is not your first time adding a device type, proceed to step 5.



4. Enter the type name of the input device, and click **OK**. When a prompt of **Successfully created** appears, the creation of the device type is complete.

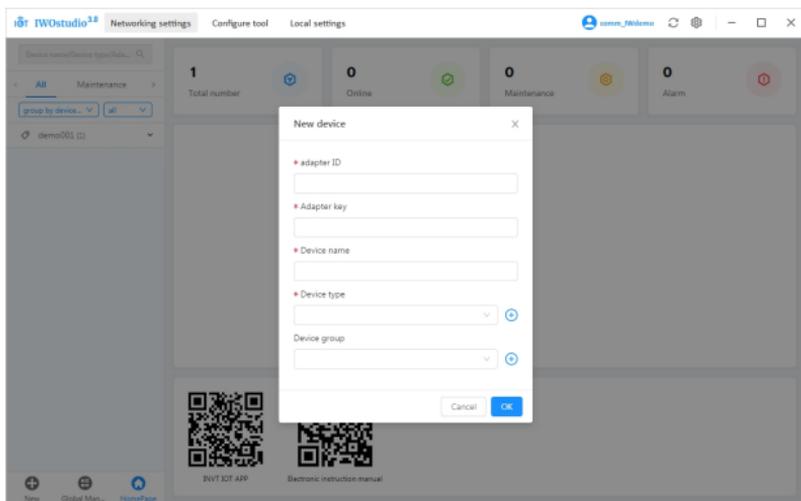


5. Click **New** > **New device** in the lower left corner.

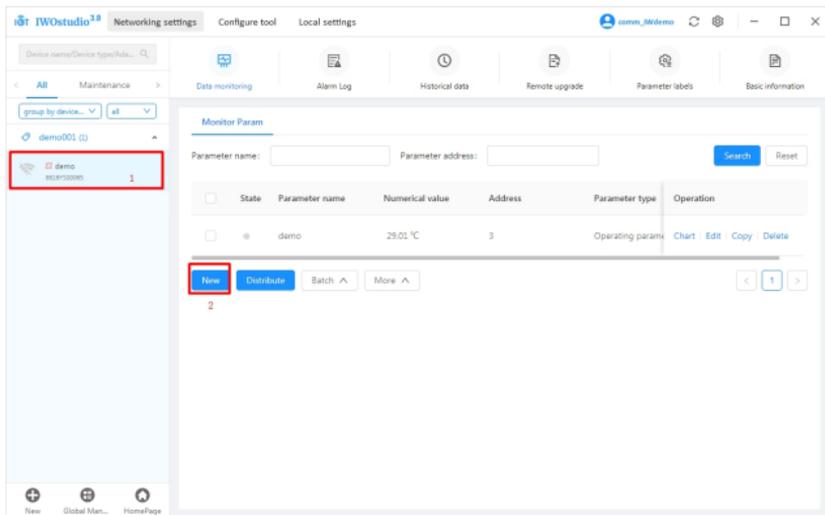


6. Enter **Adapter ID**, **Adapter key**, **Device name**, select **Device type**, and click **OK** to complete the process.

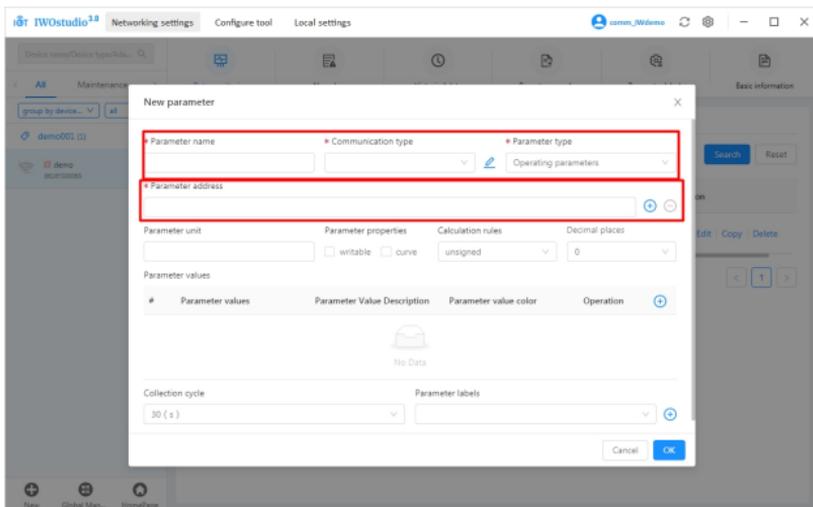
Note: **Adapter ID** is the S/N code of the IoT terminal, and **Adapter key** is the six-digit number under the QR code next to the S/N code.



7. After adding the device, you need to add parameters for the first time. Click the device and then click **New**.

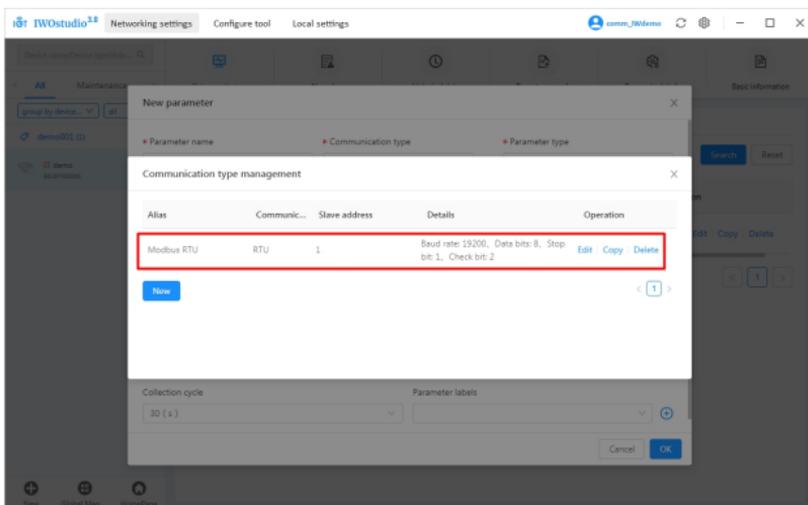
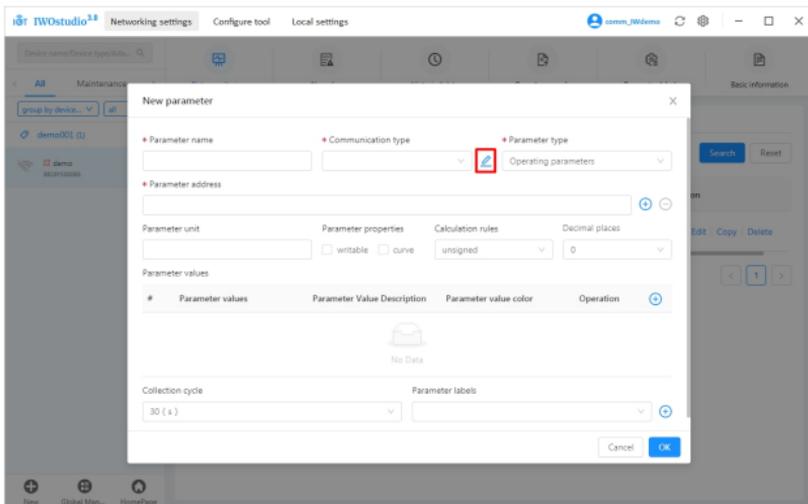


8. Enter **Parameter name**, select **Communication type**, select **Parameter type**, enter **Parameter address** (Modbus address of the register), fill in other information as needed, and click **OK**. When the prompt **Successfully created** appears, the process is complete.



Communication type: Click  to view, modify or create new settings. The default is 485 communication, with a slave address of 1, a baud rate of 19200, 8 data bits, 1 stop bit, and even parity. Click **Edit** to modify. If additional communication parameters are required, you can perform create operations.

 **Note:** This parameter determines whether the terminal can successfully communicate with the device. Ensure that it corresponds to the device before sending the parameters.



9. After creating the parameters, click **Distribute**.

The screenshot shows the IWostudio 3.0 interface. On the left, a device named 'demo' with ID '863F550085' is selected. The main area is titled 'Monitor Param' and contains a table of parameters. The 'Distribute' button is highlighted with a red box.

State	Parameter name	Numerical value	Address	Parameter type	Operation
<input type="checkbox"/>	demo	29.01 °C	3	Operating param	Chart Edit Copy Delete

10. Once successfully distributed, you can proceed with online monitoring.

The screenshot shows the IWostudio 3.0 interface. The 'Historical data' button is highlighted with a red box and contains a green checkmark and the text 'Successfully issued'. The table below shows the parameter 'demo' with a numerical value of 32.21 °C.

State	Parameter name	Numerical value	Address	Parameter type	Operation
<input checked="" type="checkbox"/>	demo	32.21 °C	3	Operating param	Chart Edit Copy Delete

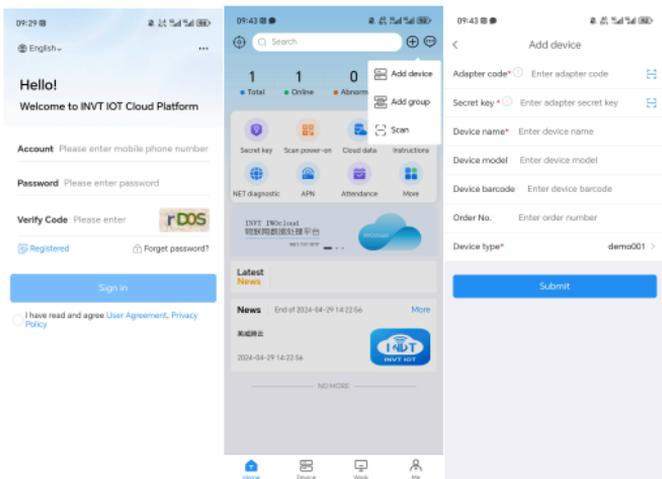
3.2.3 Monitoring the device via APP

1. Download and install the INVT Cloud APP on your mobile device.

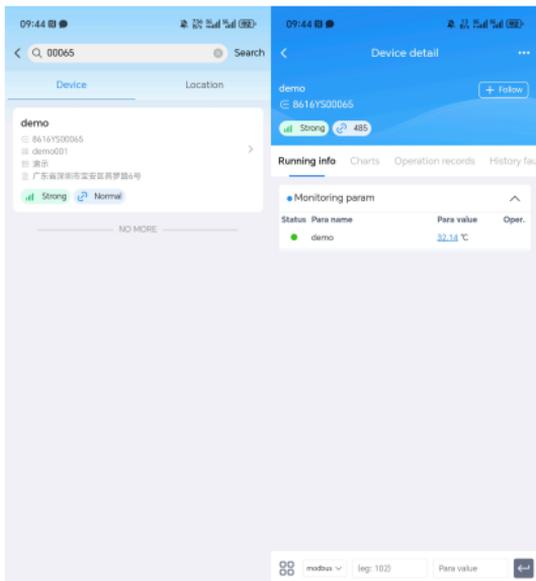
Note: You can download it by searching for **INVT** in Tencent MyApp Store or Google Play (for iOS system, you can search for **INVT** in the APP Store).

2. Open the INVT Cloud APP, enter the account and password to log in. On the homepage, click the **+** icon in the upper-right corner, enter **Adapter code**, **Secret key** and **Device name**, select **Device type**, and click **Submit** to complete the device addition.

Note: For account information, refer to section 3.3 Monitoring platform account.



3. In the search bar, enter the adapter code to search. Click the device to enter the monitoring page and monitor the device.



3.3 Monitoring platform account

You can register a monitoring platform account through the Web or APP, and the same account and password can be used on all three monitoring platforms.

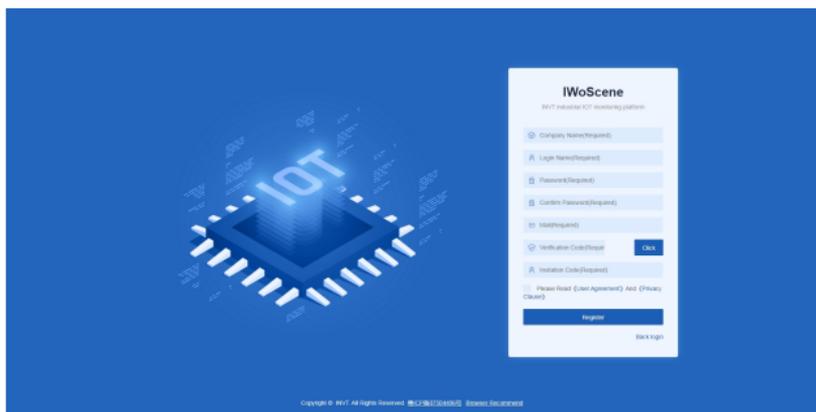
3.3.1 Web registration

Step 1 Enter: iot.invt.com in the address bar of Google Browser and press Enter to visit the login page of the industrial IoT application platform.

Step 2 Click **Registered**.



Step 3 Fill in the **Company name**, **User name**, **Password**, then confirm the password again. Enter your **Mobile number**, click **Verification code**, fill in the verification code received via SMS, and enter the invitation code. Invitation code: You can obtain it through the higher-level user account. If there is no higher-level one, you can fill in dbf20a (INVT administrator invitation code). Review and check the User Privacy Agreement, click **Register**, and wait for review. You will receive a notification via SMS once approved.



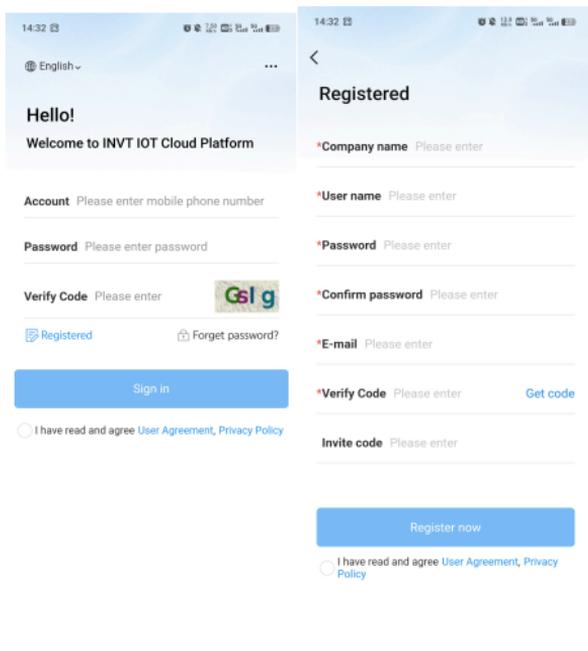
3.3.2 APP registration

Step 1 Download and install the INVT Cloud APP on your mobile device.

Note: You can download it by searching for **INVT** in Tencent MyApp Store or Google Play (for iOS system, you can search for **INVT** in the APP Store).

Step 2 Open the INVT Cloud APP, and click **Registered**.

Step 3 Fill in the **Company name**, **User name**, **Password**, then confirm the password again. Enter your **Mobile number**, click **Verification code**, fill in the verification code received via SMS, and enter the invitation code. Invitation code: You can obtain it through the higher-level user account. If there is no higher-level one, you can fill in dbf20a (INVT administrator invitation code), review and check the User Privacy Agreement, click **Register**, and wait for review. You will receive a notification via SMS once approved.



3.4 FAQs

1. After powering on, the power indicator does not flash or light up.

Answer: Check whether the power supply voltage polarity is reversed, and whether the input voltage 24V and GND are in consistent with the silkprint on the casing.

2. After power on for three minutes, the network status indicator flashes quickly at a frequency of 75ms, and no data is displayed on the web page.

Answer:

- 1) The expansion card with a SIM card is not installed properly. Power off and re-install it for ensuring good connection.
- 2) Move the antenna of the IoT transmission terminal to a place with good signal.
- 3) Ensure that the SIM card is activated and has remaining balance.
- 4) Contact the manufacturer to check whether the device ID is registered.
3. Data uploading doesn't match the web page display.

Answer:

- 1) Re-power on and upload all data again.
- 2) Check whether the order and device type is matching, if not, please contact the manufacturer.
4. The indicator flashes normally but the web system displays no data.

Answer: Check the communication cable between the Modbus terminal device and IoT transmission terminal is well connected.

5. In the web system, only data content can be displayed, and commands cannot be issued.

Answer: Check whether the signal enabling switch of the Modbus terminal device is turned on.

6. The network status light stays off after the ICA413-02 model is powered on.

Answer: Check the WAN↔LAN switch. 4G network is only available when the switch is turned to LAN.

7. How to use the function selection switch on the ICA413-02 model.

Answer: The ICA413-02 model provides a function selection switch. When the switch is turned to WAN, the network port is used to connect a well-networked router with a network cable and the PLC and other devices are connected through the RS485 port. When the switch is turned to LAN, the IoT data transmission terminal connects to network through 4G network and connect PLC and other devices through RS485 or network cable.

8. What happens if two devices are connected to the ICA413-02 model at the same time when the network port is downstream?

Answer: When there are devices connected to both RS485 and network ports, only data from the network port will be collected.



Service line: 86-755-23535967 E-mail: overseas@invt.com.cn Website: www.invt.com

The products are owned by **Shenzhen INVT Electric Co.,Ltd.**

Two companies are commissioned to manufacture: (For product code, refer to the 2nd/3rd place of S/N on the name plate.)

Shenzhen INVT Electric Co.,Ltd. (origin code: 01)

Address: INVT Guangming Technology Building, Songbai Road,
Matian, Guangming District, Shenzhen, China

INVT Power Electronics (Suzhou) Co.,Ltd. (origin code: 06)

Address: No. 1 Kunlun Mountain Road, Science & Technology
Town, Gaoxin District, Suzhou, Jiangsu, China

Industrial Automation: ■ HMI

■ Elevator Intelligent Control System

■ PLC

■ VFD

■ Servo System

■ Rail Transit Traction System

Energy & Power:

■ UPS

■ DCIM

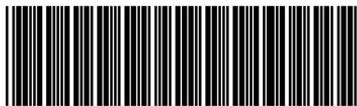
■ Solar Inverter

■ SVG

■ New Energy Vehicle Powertrain System

■ New Energy Vehicle Charging System

■ New Energy Vehicle Motor



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