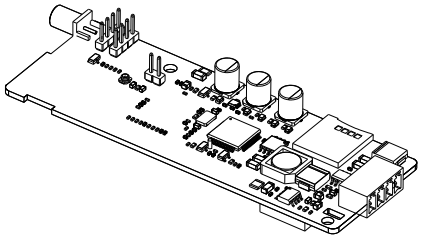
Operation Manual

EC Series
4G Expansion Card



SHENZHEN INVT ELECTRIC CO., LTD.

No.	Change description	Version	Release date
1	First release.	V1.0	December 2021
2	● Added safety precautions. ● Added three function descriptions (antenna gain, power consumption and heat dissipation method) in section 1.2 Product specifications. ● Added the J3 port description in section 1.4 Port instruction. ● Added product weight data in section 2.3 Outline dimensions and weight. ● Updated all operation descriptions and interface diagrams in chapter 3 Operation guide.	V1.1	September 2024

Contents

Safety precautions

Read the safety precautions to ensure safe operation before operating the IoT data transmission terminal.

- The account and password are the authentication credentials of INVT industrial Internet platform and can be used for device management after login. You shall keep you account and password properly and take sufficient precautions to prevent others from stealing them. If the user name and password are stolen, significant losses may be caused.
- You shall communicate with the field personnel to ensure safety before using the device for remote operation, otherwise significant losses may be caused.
- The IoT SIM card is forced to be machine-card binding, SIM card can only be used in the device which is first powered on and networked. You shall not insert the IoT SIM card into other devices, otherwise the SIM card will be locked.
- This product is an industrial IoT product, we have taken necessary technical means to ensure data security, but there may be hacker invasion and other network security risks that are not under our control or responsibility. If the harm is not caused by the quality defects of our products, we shall not be liable for related losses.

1 Product overview

INVT EC series 4G expansion card is an IoT 4G wireless data terminal designed for wireless monitoring with the function of data uploading to the cloud by utilizing the mobile operator network. It is applicable to GD350 and its special machine series, GD270 series VFD and used as a plug-in communication expansion card.

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, achieving the data uploading to the cloud.

1.1 Product features

1. Used as a plug-in communication expansion card in GD350 and its special machines series VFDs;
2. Applicable to PLC, VFD and other RS485 devices through external terminal wiring;
3. Supports APN, remote wireless upgrade, and remote policy configuration;
4. Supports RS485 remote online upgrade of control board programs in GD350 and its special machines series VFDs;
5. Able to upload only the data with changes, achieving the traffic saving mechanism.
6. Supports 4G base station positioning;
7. Supports SIM cards (optional).

1.2 Product specifications

Function	Description
Supported network	China(CN) version ● LTE FDD: Band 1/3/5/8 ● LTE TDD: Band 34/39/40/41 ● GSM: 900/1800MHz Europe(EU) version ● LTE FDD: Band 1/3/7/8/20/28 ● GSM: 900/1800MHz Latin America(LA) version ● LTE FDD: Band 1/2/3/4/5/7/8/28/66 ● GSM: 900/1800MHz
Supported interfaces	Expansion card interfaces of GD350 and its special machines series VFDs 1 RS485 interface 1 TTL debugging interface

Function	Description
	1 SMA antenna interface 1 spring-loaded SIM card socket (medium card)
Indicator	Power indicator, network status indicator, running status indicator, handshake indicator
Communication protocol	Modbus protocol IoT MQTT communication protocol PPP dialing protocol FTP transfer protocol
Theoretical bandwidth	● 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
Charging method	Supports 5V power supply from the expansion card interface (14PIN female header) of the GD350 and its special machines series VFDs Supports DC10–25V power supply from external terminals
Power consumption	Starting power: 20mA@24V, running power: 40mA@24V.
Temperature range	-25–+60ºC
Shell	Without shell, protection level IP00
Installation method	Bolted
Heat dissipation method	Natural heat dissipation

1.3 Model instruction

Model name illustration of INVT EC series 4G extension card:

EC – IC 5 02 - 2 1 G - CN

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Symbol	Description	Content
①	Product category	EC: Expansion card
②	Board card category	TX: communication expansion card PG: PG card PC: PLC programmable card

Symbol	Description	Content
		IO: IO expansion card IC: IoT card
③	Technology version	Indicates the generation of a technical version by using odd numbers, for example, 1, 3, 5, and 7 indicate the 1st, 2nd, 3rd and 4th generations of the technical version.
④	Product code (IoT card)	01: GPRS card 02: 4G card 03: Reserved
⑤	Antenna types for wireless communication cards	1: Built in 2: External
⑥	SIM card type	0: Plug-in card (Standard, default) 1: Embedded SIM card
⑦	Special function	G: With GPS This bit is omitted for standard models since special functions are not available for them.
⑧	International version	CN: China version EU: Europe version LA: Latin America version

1.4 Port instruction

Port identifier	Port description
24V	Power supply +
GND	Power supply -
485+	485A
485-	485B
4G	4G antenna
CN3	SIM card socket
J3	TTL commissioning interface

1.5 Indicator instruction

Indicator identifier	Description
NET	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

Indicator identifier	Description
RUN	Run indicator Flash slowly (ON: 1s; OFF: 1s): System runs properly ON or OFF: System exceptions
SPI	Handshake indicator Flash slowly (ON: 1s; OFF: 1s): Handshake between the expansion card and the VFD control board succeed ON: Handshake between the expansion card and the VFD control board failed or there is no handshake
POWER	Power supply indicator

2 Installation

2.1 Overview

EC series 4G expansion cards 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

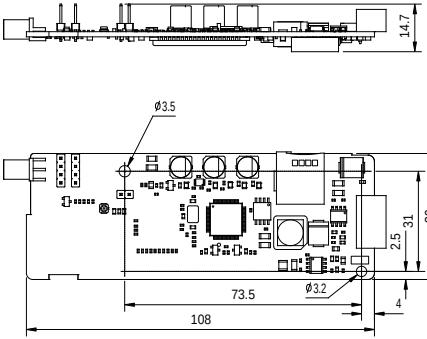
Before unpacking, check whether the package is in good condition and its product information is the same as on the order. The packing materials should be well maintained during inspection for future transshipment. If any question, please contact the supplier.

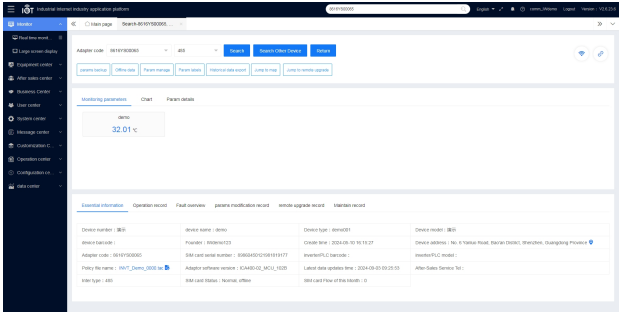
Table 2-1 Product deliverables

Deliverables	Qty	Remark
4G expansion card	1	
4G antenna	1	Applicable to models using an external antenna
SIM card	1	Applicable to models of China(CN) version
PIN terminal	1	4PIN terminal
M3 screw	1	

2.3 Outline dimensions and weight

The outline dimension of the IP00 (Without shell) model is as follows (unit: mm). The net weight of the product is 32g, and the gross weight is 166.4g.





3.2.3 Monitoring the device via APP

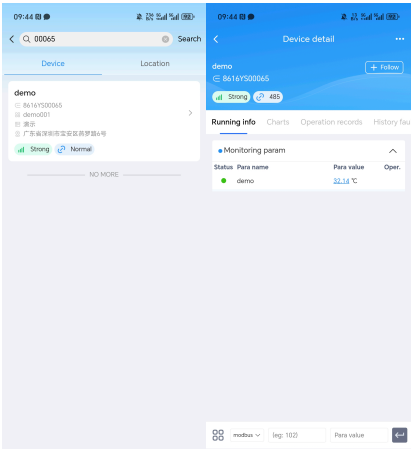
1. Download and install the INVT Cloud APP on your mobile device.

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.

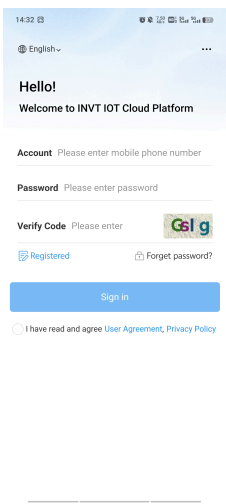
3.3.2 APP registration

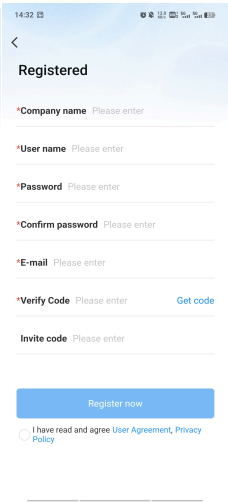
Step 1 Download and install the INVT Cloud APP on your mobile device.

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 expansion card is installed correctly.

2. After power on for three minutes, the network status indicator flashes quickly at a frequency of 75ms, but 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 4G antenna 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. In the web system, only data content can be displayed, and commands cannot be issued.

Answer: Check the VFD function codes to ensure that the remote mode is enabled.

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, PLC, VFD, Servo System, Elevator Intelligent Control 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

66001-00929

202409 (V1.1)