



Operation Manual

ICA series **communication adaptor**



SHENZHEN INVT ELECTRIC CO., LTD.

-1. Product Overview

INVT ICA series GPRS communication adaptor is wireless data terminal for Internet of Things (IOT) with remote data transmission achieved via public operator network.

This adaptor, which is equipped with industrial-level 16/32-bit communication processor and wireless module, adopts embedded real-time operation system as software supporting platform and carries RS232, RS485 interfaces for direct connection with serial device to realize transparent data transmission.

• 1.1 Product Features

Reliable design

- WDT watchdog design to guarantee system stability;
- Adopt anti-offline mechanism to ensure data terminal is always online;
- RS232/RS485 interface with built-in 15kV ESD protection;
- SIM/UIM card interface with built-in 15kV ESD protection;
- Power port with built-in phase reversal and over-voltage protection;

Standard set-up for easy operation

- With standard RS485 interface for direct connection with serial device;
- Intelligent data terminal which enters data transmission status at power-on;
- Powerful central management software for easy device management (optional);
- Convenient system configuration and maintenance interface;

Powerful function

- With Standard RS232 interface and support local serial software update;
- Support remote wireless update and policy configuration;
- Built-in TCP/IP protocol station to support transparent data transmission;
- Support APN;
- Can be directly connected with serial device; support 1-to-8 terminal devices collection with each device supporting 40 groups of Modbus register collection; set with terminal resistor switch, which is safe and reliable against interference;

- Convenient system set-up and maintenance interface for flexible set-up of remote server IP, port number, etc.;
- Inquiry address and collection cycle of Modbus is configurable, only changed data will be transmitted to save traffic in data upload;
- Support GPRS station positioning;
- GPS satellite positioning for acquiring accurate device location in real-time (optional);

• 1.2 Product Specification

Category	Name	Detailed instruction
Basic functions	Network status detection	Detect online status automatically and re-connect at offline.
	Device working status indicator	Indicate device working status by power and network status indicator 1: Network Indicator turns off every 3s if network is registered and 800ms (flashes slowly) if not; 2: Network Indicator turns off every 300ms (flashes quickly) if GPRS is connected.
	Communication protocol	IOT communication protocol; PPP dial protocol; FTP transmission protocol; Embedded TCP/UDP protocol
	Remote update	Auto remote update on system programs via GPRS
	Communication interface	Support RS232 commission output; RS485 one-to-multi front device collection; GPRS wireless transmission
	Parameter set-up	Serial baudrate, digital bit, stop bit and checkout bits of Modbus device are configurable;
	Software watchdog	Monitor system running status in real-time
	GPRS heartbeat mechanism	Monitor server connection in real-time
	GPRS communication command	Enhance AT command set

Category	Name	Detailed instruction
System resources	Operation system	Preemptive multi-tasking real-time kernel
	CPU	ARM 32-bit Cortex™-M3 CPU
	FLASH	512KB flash
	SRAM	64KB
	Peripheral interface	RS232; RS485; GPRS; GPS
Wireless parameter	Wireless module	Industrial-level wireless module
	Standards and frequency bands	GSM850/900/1800/1900MHz •GPRS multi-slot class 12/10 •GPRS mobile station class B •Comply with GSM 2/2+ standard – Class 4 (2 W @850/900 MHz) – Class 1 (1 W @1800/1900MHz)
	Theoretical band width	GPRS class 12: Max.: 85.6 kbps (downstream rate)
	Emission power	<28dBm
	Receipt sensitivity	<-107dBm
Interface type	Serial port	RS232 and RS485 port with built-in 15kV ESD protection, the serial parameters are as below: Digital bit: 8 ; Stop bit: 1 checkout: no checkout, parity checkout, SPACE and MARK checkout; Serial speed: 110~115200bits/s
	Indicator	Power indicator; Network status indicator;
	Antenna port	Standard SMA female antenna port with 50Ω characteristic resistance
	SIM/UM card port	Standard slide-in SIM card port (IP20), clamshell Micro SIM card port (PI00) for 1.8V/3V SIM/UM with 15kV ESD protection
Power supply	Standard power	DC 24V/ 0.3A
	Supply range	DC 24V (-10%~+10%)

Category	Name	Detailed instruction
Power dissipation	Communication status	100mA@24VDC
	Transient peak current	400mA@24VDC 800mA@12VDC 2000mA@5VDC
Protection degree	Housing	IP20 (Metal) IP00 (no housing)
Other parameter	Operating temp.	-25~+60°C (-13~+140°F)
	Storage temp.	-40~+85°C (-40~+185°F)
	RH	93% (No condensation)

1.3 Model Instruction

Model name illustration of INVT communication adapters for the IOT:

ICA 2 0 0-0 0 G-5

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Field	Symbol	Illustration	Content
Abbreviation for product series	①	Abbreviation for product series	ICA is the abbreviation for Internet Communication Adapter
Wireless communication	②	Communication	2: GPRS
Wired communication	③	Communication	0: Does not support wired communication
Local data collection mode	④	Collection communication mode	0: RS485
Monitoring object	⑤	Max. number of access points	0: Single 2: 4 units 3: 8 units
Protection level	⑥	Protection level	0: IP00 (No housing) 1: IP20 (wall-mounted housing) 2: IP20 (rail-mounted housing) 6: IP65 (direct-insert housing)
Special function	⑦	Special function	G: with GPS Standard configuration does not carry GPS function, this bit is omitted
Voltage type	⑧	Supply voltage	5: 4.5V~6V Standard configuration is 10~30V, this field is omitted

• 2. Installation

• 2.1 Overview

Only properly installed adapter can achieve designed functions. The adapter must be installed by qualified electricians recognized by our company.

Note: The adapter must be installed with power off.

• 2.2 Open Package Inspection

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

Table 2-1 Deliverables for GPRS adapter

Deliverables	Qty	Remark
Adapter	1	
Instruction manual	1	
GPRS antenna	1	
GPS antenna	1	Optional
Connection terminal	2	One 6PIN connection terminal and one 2PIN connection terminal

• 2.3 Structure

External dimension:

1) Below is the outline dimension for IP00 model (no housing): (unit: mm).

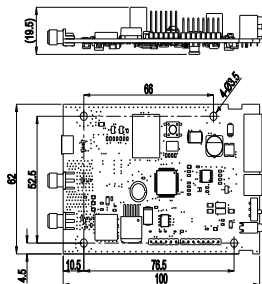


Fig 1 Outline dimension for IP00 model

2) Below is the outline dimension for IP20 model (wall-mounted housing) (unit: mm)

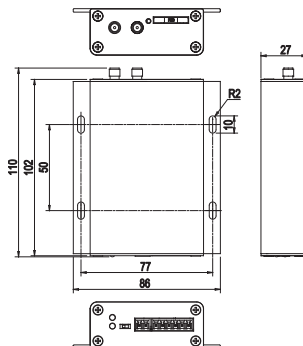
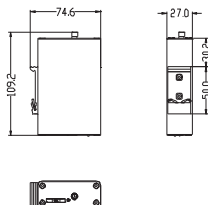


Fig 2 Outline dimension for IP20 model (wall-mounted housing)

3) Below is the outline dimension for IP20 model (rail-mounted housing) (unit: mm)



Outline dimension and installation
dimension of snap-fit joints of the rail

Fig 3 Outline dimension for IP20 model (rail-mounted housing)

- **2.5 Power instruction**

The adaptor is usually applied in complicated environment. To cope with the complex application conditions and ensure system stability, this adaptor adopts advanced power technology to be supplied via standard configured 24VDC power. If external power source is applied on the adaptor, the power must be above 3W and in stable status (the ripple is under 100mV).

3. Operational guide

3.1 Operational instruction

Devices needed: networked PC, GPRS/GPS adaptor

Operational procedures:

1. For IP00 model, open the card slot (marked in the below circle) by sliding it upward, then insert the Micro SIM card; for IP20 model, insert either end of the clip into the hole in SIM card tray, press and push until the tray is popped out, then draw out SIM card tray and place SIM card into the tray as shown in below fig 4, make sure the SIM card is in parallel with the tray and carefully push the tray back.

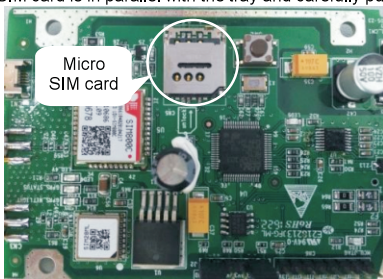


Fig 3 SIM card diagram for IP00 model



Fig 4 SIM card diagram for IP20 model

- Note down the device client ID and encryption key on the label for device addition on client side;
- The adaptor is equipped with a 2PIN and a 6Pin connector, they are (from left to right): 485A, 485B, (2PIN); 232(TX), 232(RX), GND, GND, GND, Vin. The input voltage is 5V/24V DC voltage. 485A, 485B are connected with 485+ , 485- of Modbus device, 232(TX), 232(RX) is connected to PC for out-of-factory parameter set-up as well as log running log information set-up and inquiry of GPRS module;

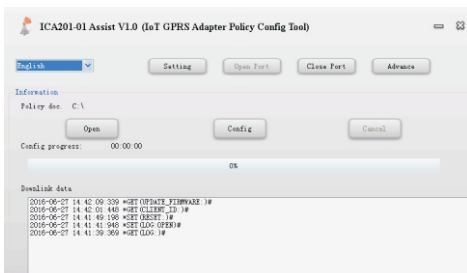


- Connect GPRS interface antenna and GPS interface antenna in the rear part of the cover;
- Power on to start the module;
- If the POWER LED flashes at 3s frequency and NET LED flashes at 0.3s, it means the module is ready for operation; data transmission is in progress;
- Go to real-time monitoring interface to review relevant information in IOT system.

Note: Toggle switch in above pic. is the terminal matched resistor for 485 communication. If the distance between the adaptor and device exceeds 100m, push the toggle switch of GPRS adaptor to ON position and ensure the device on the furthest end is also installed with 120 Ω matched resistor.

• 3.2 Policy configuration for IOT

This adaptor is equipped with powerful parameter configuration tool which carries user-friendly interface and supports one-key configuration and firmware update:



1. Create a new txt file with suffix set as `viewable` in attribute, and write the policy configuration command into the file one by one per below formate:

```
ICA201_CL01_NCU_V100.tac - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

*SET (AFN:CPNET, USERNAME, :PASSWORD:)#
*SET (H:0)#
*SET (H:1,M:2,B:3,ADDR:1,B:192.0.0.8,S:1,P:2,I,K:0,C:9,B:16:0:30,16:16:30,16:32:30,16:48:30,16:64:30,16:80:30,16:96:30,16:112:30,5:128:30)#
*SET (LOG:CLOSE)#
*SET (TACHNAME:ICA201_CL01_NCU_V100.tac)#
TACHNO.
```

The first line is commands for setting up APN network, user name and password;
The second line is commands for Modbus address clearance;
The third line is commands for setting up Modbus address of the device; M(device qty 1), W(5s waiting time), R(rewrite times), ADDR(address 1), B(Baud rate), D(digital bit), S(stop bit), P(parity bit NONE:0, ODD:1, EVEN:2), T(J: construction machinery), G:(number of register groups), group 1(register number: initial address of register: data-rewrite interval), group 2(register number: initial address of register: data-rewrite interval)

The forth line is commands for turning off the commission information:

The fifth line is commands for policy name which is the same as the file name:

The sixth line is the end line commands:

Change the suffix of the file name to tac and click save. Then, re-open the file route and click one-key configuration to finish. Click corresponding policy inquiry button in the advanced function and check in feedback information box whether the policy is the same with the setting.

2. All configured policies, commission information and APN set-up can be viewed in advanced function where the reset and firmware update functions can be achieved:



• 3.3 General questions and Answers

1. The indicator doesn't blink or light up after powering-on.

ANS: Check if input voltage Vin and GND are consistent with the silkprint on the casing;

2. After powering-on for 3 minutes, the data indicator next to 485 communication cable flashes slowly at 3s interval and the web page displays no data.

ANS: (1) The adapter SIM card is installed improperly; re-install and ensure good connection.

(2) Move adapter antenna to a place with good signal;

(3) Ensure that the SIM card is activated and has remaining balance;

(4) Contact the factory to check whether the device NO. is registered.

3. Data uploading doesn't match the web page display.

ANS: (1) Re-power on and upload data again;

(2) Check whether the order and device type is matching, if not, please contact the factory.

4. The adapter indicator flashes normally but the web system displays no data.

ANS: Check whether the connection between Modbus terminal device and adapter 485 communication cable A/ B is reversed or offline occurs.

5. The web system only displays data content but can't send command.

ANS: Check that enable signal switch on Modbus terminal device is turned on.



Service line: 86-755-86312859

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.)

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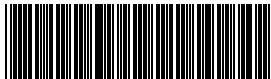
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Industrial Automation: ■ Frequency Inverter ■ Servo & Motion Control ■ Motor & Electric Spindle ■ PLC

■ HMI ■ Intelligent Elevator Control System ■ Traction Drive

Electric Power: ■ SVG ■ Solar Inverter ■ UPS ■ Online Energy Management System



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