



User Guide

2G Smart Hardware Product

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Overview

Thank you for purchasing the 2G smart hardware products developed and manufactured by Inovance (including IOT-WL210DB, IOT-WL210DBG, IOT-WL210DBW, IOT-WL210DK, and IOT-WL210DKG). This series of products can collect local equipment data including the running status and faults, and transmit the data over a wireless network to provide functions such as GPS and intercom. You can access a specified web server to monitor the running status and locate faults of the local equipment. Featuring high security, reliability, applicability, and stability, this series of products are widely used for elevators, air compressors, and cranes.

Before using this product, read this manual carefully to fully understand features of the product and ensure safe use. This manual describes the specifications, installation dimensions, ports, performance parameters, wiring, and typical application of the product.

The information in this manual is subject to change without notice. You can acquire the latest manual at www.inovance.com

1 Product Information

Model designation

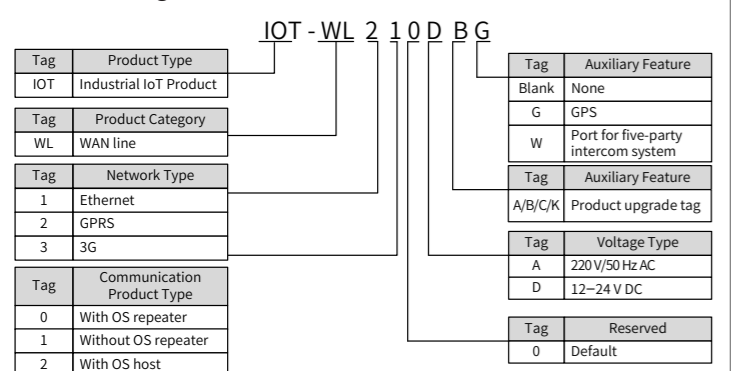


Figure 1 Product model designation

NOTE
Basic models: IOT-WL210DB, IOT-WL210DK
Models with the GPS function: IOT-WL210DBG, IOT-WL210DKG
Model with five-party intercom function: IOT-WL210DBW

Functional advantages

Functional Advantage	Function Description
Wireless data transmission	Connected to a local equipment controller using the RS485 or RS232 port, this product obtains data from the local equipment controller and uploads the data to the server over a GPRS network, or transmits control commands delivered by the server to the equipment controller.
GPS	The product can provide precise positioning in an environment with good GPS signals and provide base station-assistant positioning in an environment with poor GPS signals. You can determine whether to configure the GPS function as required. (Note: Only IOT-WL210DBG and IOT-WL210DKG provide the GPS function.)
Black box	The product monitors and records the real-time running status of the local equipment. The system automatically determines the types of faults and records all faults in the memory, including minor and instant faults of the elevator.
Communication and programmable logic	You can use the AutoShop software to modify settings of the module by programming through the USB port, including settings of the communication protocol and logic control. (To obtain the AutoShop software, visit http://www.inovance.cn/es , choose Download > Software , and enter the keyword AutoShop to find and download the software package.)
Power failure reporting	When the external power supply is interrupted, the product automatically reports the power failure event to the specified server and saves the event in the memory.
Voice	The product can be connected to the five-party intercom system of an elevator system to enable remote voice communication. (Note: Only IOT-WL210DBW provides this function.)
Other advantages	<ul style="list-style-type: none"> ◆ Transparent or encrypted wireless data transmission is supported. ◆ Industrial port terminals are adopted to meet industrial field application requirements. ◆ One DI port is provided as standard configuration, for connection with a digital signal cable. ◆ Remote upgrade and maintenance are supported. ◆ Inovance's special IoT card with low data costs is equipped as standard configuration. ◆ Using a special DIN rail, this product is small in volume, simplifying integration for users.

Port description



Figure 2 Port locations

Port	Pin	Description
10-pin socket	12V	DC power ports, with operating input voltage of 12 V to 24 V. 12V indicates the positive pole, and 0V indicates the negative pole. The maximum input current is 400 mA. Note: The input voltage for IOT-WL210DBW is 12 VDC.
	0V	
	R/A	Voice ports, used to connect to a Derin four-wire five-party intercom system with voice signal cables. (Only IOT-WL210DBW provides this function.)
	L/C	
	485+	Standard RS485 and RS232 serial ports, which share the internal port COM2 and reference ground GND. RS485 and RS232 cannot be used together.
	GND	Signals of the two ports are isolated inside the product.
Micro USB	TXD	
	RXD	
	X-0	Dry contact signal input port, with operating input voltage of 10 VDC to 30 VDC. It uses GND as the reference ground.
Micro USB	USB	USB communication port, used for burned software debugging by AutoShop and on-site software downloading.

Port	Pin	Description
GSM antenna		The two antenna ports look the same. Identify them by the silkscreens. Only IOT-WL210DBG and IOT-WL210DKG have GPS antennas.
GPS antenna		
SIM card slot		Standard card
LED indicators		Cloud service state indicator
		Local serial communication indicator
		Fault indicator
		GSM signal strength indicator

The specific states indicated by the LED indicators are described as follows.

LED Indicator	State Description																																																																																																																																																																																																																																																																																																																																																																																																																																									
Cloud service state	Steady off: The GSM module does not work normally or has no signals. Slowly blinking (once per second): The product is logging in to the server. Steady on: The product is maintaining a valid connection with the server (after a successful login to the server). Quickly blinking (10 times per second): The product has connected to the server and is handling an upgrade or a call.																																																																																																																																																																																																																																																																																																																																																																																																																																									
Local serial communication	Steady off: No read-write operation is performed or communication times out on the serial port. Steady on: The product is exchanging data with the local equipment. Slowly blinking (once per second): The password is required for communication.																																																																																																																																																																																																																																																																																																																																																																																																																																									
Fault	Steady off: The equipment is functioning normally. Quickly blinking (10 times per second): No SIM card is available. Slowly blinking (once per second): A fault occurs during equipment operation. You can identify the fault cause by using AutoShop to read values of elements D1998 and D1999. Fault types identified by elements D1998 and D1999: <table border="1"> <thead> <tr> <th>D1998</th> <th>Bit15</th><th>Bit14</th><th>Bit13</th><th>Bit12</th><th>Bit11</th><th>Bit10</th><th>Bit9</th><th>Bit8</th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th> </tr> </thead> <tbody> <tr> <td>Bit0:</td> <td colspan="16">upgrade timeout</td> </tr> <tr> <td>Bit1:</td> <td colspan="16">real-time data overflow error</td> </tr> <tr> <td>Bit2:</td> <td colspan="16">black box data upload timeout</td> </tr> <tr> <td>Bit3:</td> <td colspan="16">no GPS signal</td> </tr> <tr> <td>Bit4 to bit13:</td> <td colspan="16">reserved</td> </tr> <tr> <td>Bit14:</td> <td colspan="16">outgoing calls disabled for elevator inspection and repair in five-party intercom mode when Bit14 is set to ON</td> </tr> <tr> <td>Bit15:</td> <td colspan="16">reserved</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>D1999</th> <th>Bit15</th><th>Bit14</th><th>Bit13</th><th>Bit12</th><th>Bit11</th><th>Bit10</th><th>Bit9</th><th>Bit8</th><th>Bit7</th><th>Bit6</th><th>Bit5</th><th>Bit4</th><th>Bit3</th><th>Bit2</th><th>Bit1</th><th>Bit0</th> </tr> </thead> <tbody> <tr> <td>Bit0:</td> <td colspan="16">no SIM card available</td> </tr> <tr> <td>Bit1:</td> <td colspan="16">system parameters not configured or error in reading system parameter settings</td> </tr> <tr> <td>Bit2:</td> <td colspan="16">building table not configured or error in reading the building table</td> </tr> <tr> <td>Bit3:</td> <td colspan="16">failure to log in to the server</td> </tr> <tr> <td>Bit4:</td> <td colspan="16">registration code not found</td> </tr> <tr> <td>Bit5:</td> <td colspan="16">duplicate registration codes</td> </tr> <tr> <td>Bit6:</td> <td colspan="16">no response to heartbeat packets</td> </tr> <tr> <td>Bit7:</td> <td colspan="16">MD5 error</td> </tr> <tr> <td>Bit8:</td> <td colspan="16">GPRS network connection error</td> </tr> <tr> <td>Bit 9:</td> <td colspan="16">communication failure of slave 1</td> </tr> <tr> <td>Bit10:</td> <td colspan="16">communication failure of slave 2</td> </tr> <tr> <td>Bit11:</td> <td colspan="16">communication failure of slave 3</td> </tr> <tr> <td>Bit12:</td> <td colspan="16">communication failure of slave 4</td> </tr> <tr> <td>Bit13:</td> <td colspan="16">GPS initialization error</td> </tr> <tr> <td>Bit14:</td> <td colspan="16">no GPS response</td> </tr> <tr> <td>Bit15:</td> <td colspan="16">no GSM response</td> </tr> </tbody> </table>	D1998	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Bit0:	upgrade timeout																Bit1:	real-time data overflow error																Bit2:	black box data upload timeout																Bit3:	no GPS signal																Bit4 to bit13:	reserved																Bit14:	outgoing calls disabled for elevator inspection and repair in five-party intercom mode when Bit14 is set to ON																Bit15:	reserved																D1999	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Bit0:	no SIM card available																Bit1:	system parameters not configured or error in reading system parameter settings																Bit2:	building table not configured or error in reading the building table																Bit3:	failure to log in to the server																Bit4:	registration code not found																Bit5:	duplicate registration codes																Bit6:	no response to heartbeat packets																Bit7:	MD5 error																Bit8:	GPRS network connection error																Bit 9:	communication failure of slave 1																Bit10:	communication failure of slave 2																Bit11:	communication failure of slave 3																Bit12:	communication failure of slave 4																Bit13:	GPS initialization error																Bit14:	no GPS response																Bit15:	no GSM response															
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GSM signal strength	The L, M, and H indicators are arranged from left to right. All indicators off: GSM signals are unavailable, and the product cannot connect to a GSM network or the network connectivity is poor. Indicators steady on: The indicators show the current signal strength. L indicator blinking slowly: The product is reading GSM module information. L indicator blinking quickly: The GSM module is dialing.																																																																																																																																																																																																																																																																																																																																																																																																																																									

Technical specifications

Port	Parameter	Specification
GSM/GPRS	RF bands	GSM850, GSM900, DCS1800, PCS1900 Automatic frequency band discovery Comply with GSM Phase 2/2+.
	Transmit power	Class 4 (2 W): GSM850, GSM900 Class 1 (1 W): DCS1800, PCS1900
	Data features	Downlink GPRS transmission rate: up to 85.6 kbit/s Uplink GPRS transmission rate: up to 85.6 kbit/s
	Receiver sensitivity	< -102 dBm
GPS	Precision	5 mCEP (in an open area)
	Sensitivity	Cold start: -147 dBm (in an open area) Hot start: -156 dBm (in an open area)
RS485	Transmission rate	Baud rate ≤ 115200
RS232	Transmission rate	Baud rate ≤ 115200
USB	Feature	Compatible with USB 2.0, full-speed transmission

2 Installation

Operating environment

Environment Parameters		Operating Environment	Transport Environment	Storage Environment
Category	Parameter	Unit		
Temperature	Lowest temperature	°C	-5	-40
	Highest temperature	°C	55	70
Humidity	Relative humidity	%	10-95	10-95
	Condensing	Yes/No	No	No
Air pressure	Lowest pressure	kPa	70	70
	Highest pressure	kPa	106	106
IP rating	IP20			

Mounting dimensions

The following figure shows the required mounting dimensions.

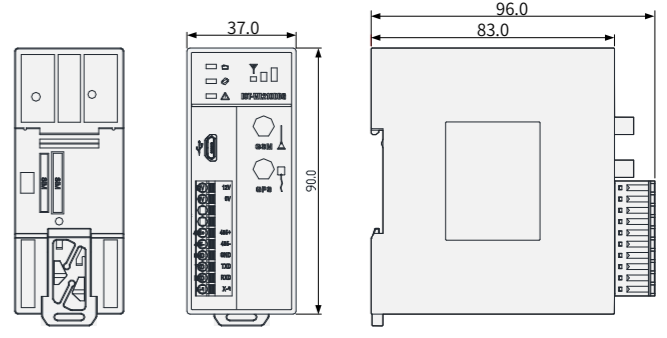


Figure 3 Mounting dimensions (mm)

Mounting on a DIN rail

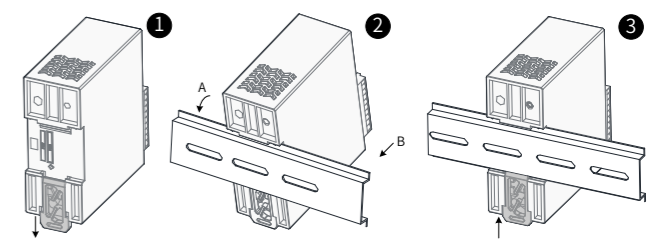


Figure 4 Mounting on a DIN rail

- 1 Pull down the DIN rail mounting hook at the back of the module.
- 2 Hook the upper fixing jaw on the module to the top edge of the DIN rail along direction A, and press the module along direction B, until the module is completely embedded in the DIN rail.
- 3 Push up the DIN rail mounting hook until you hear a click. If the DIN rail mounting hook is out of the reach of your fingers, use a tool, such as a screwdriver.

Antenna installation

This product is a wireless communication device, and the position of its antenna is crucial to the signal strength. Therefore, install the antenna in an open environment.

Caution

- Keep the sides and top of the antenna away from metal objects.
- Do not install the antenna in a metal cabinet or any other environment that shields wireless signals.
- Keep the antenna and its feeder away from power cables and signal cables to prevent interference between the antenna and cables.

3 Wiring

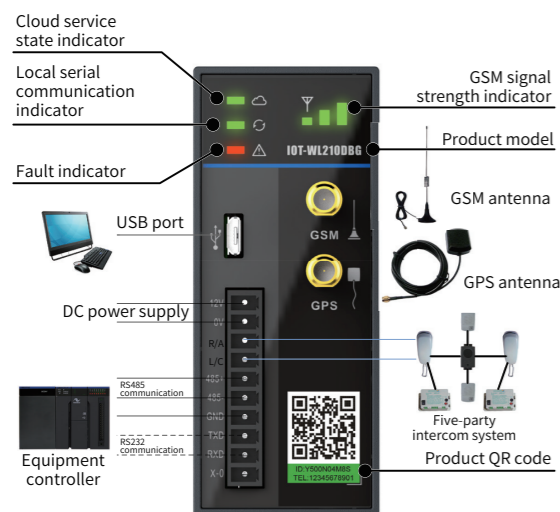


Figure 5 Wiring diagram

NOTE Only the IOT-WL210DBW model can be connected to a five-party intercom system. The applicable five-party intercom system is a Derin four-wire intercom system of the NKT12(1-1)A model.

4 Typical Application

The following figure shows a typical application of IOT-WL210DBW in the elevator IoT industry.

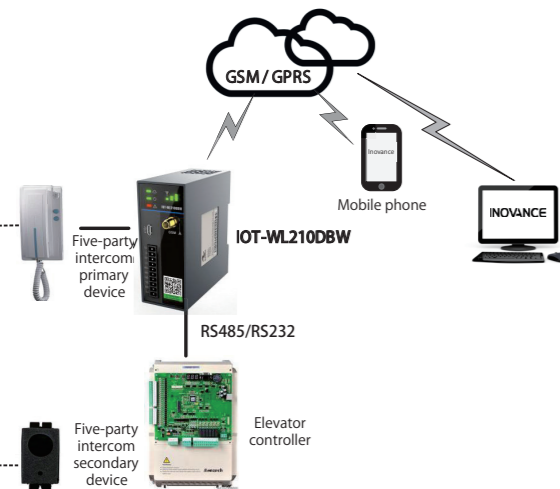


Figure 6 Typical application in the elevator IoT industry

The 2G smart hardware product reads the running status information from the elevator controller through the RS232 or RS485 port, and sends the information to the Inovance server or a specified server for further analysis and storage over a GPRS network. You can log in to this server to check the elevator running status. The server analyzes the status data and sends SMS messages to specified mobile numbers if any emergency is found.

If someone is trapped in the elevator or other emergencies occur, the person in the elevator can press the call button of the five-party intercom system to dial a specified telephone number. A call can also be made from a specified telephone number, and the IOT-WL210DBW module

automatically answers the call to enable conversation with the person in the elevator. For details on how to set the telephone numbers for making and receiving calls, see Chapter 5 "Wireless Communication Configuration."

5 Wireless Communication Configuration

Step 1: Connect the module to a computer correctly.

Use a USB cable to connect the module to a computer.

Start AutoShop (2.09 or a later version). Click **New Project** and choose **Tools > Communication Setting**, and select **USB** from the drop-down list box, as shown in Figure 7.

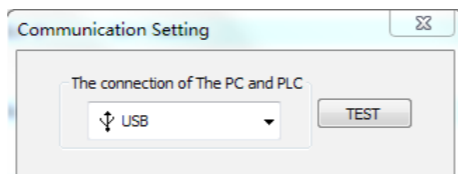
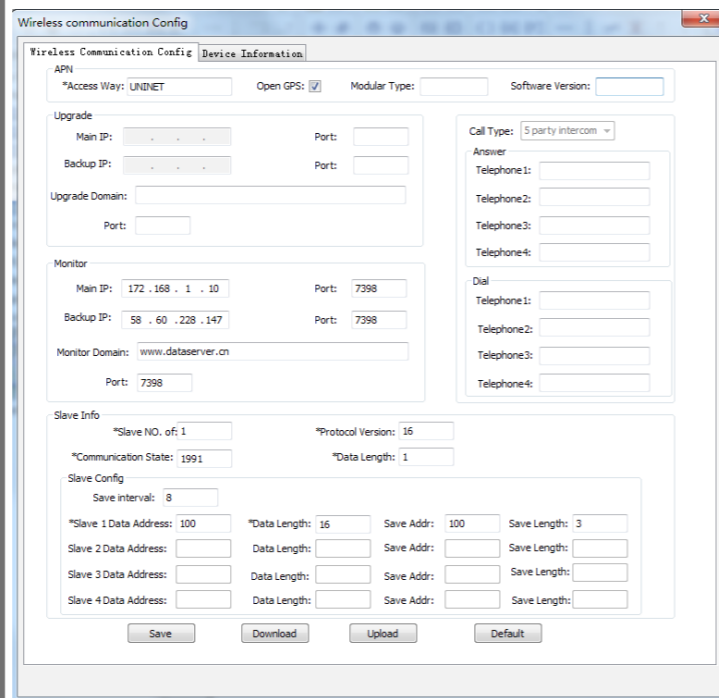


Figure 7 Communication configuration example

Click **TEST** to check whether the module is connected to the computer properly.

Step 2: Open the **Wireless Communication Config** window.

Choose **Tools > Wireless Communication Config** to open the parameter setting window, as shown in the following figure.



Step 3: Modify parameter settings.

Click **Upload**, modify related parameters as required, and click **Download** to download the parameter settings to the module.

NOTE To stop parameter modification, click **Save** to save the modified parameter settings to the computer. To cancel the modification, click **X** at the upper right corner of the page. **Default** is used to restore the factory settings. The configuration takes effect after being downloaded to the module.

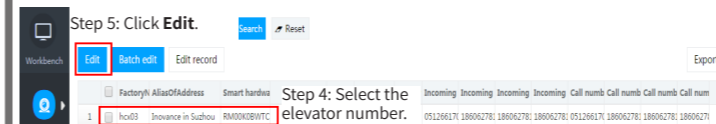
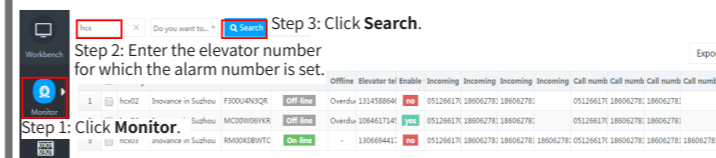
The following table describes the configuration parameters.

Configuration Parameter Description		
APN	APN	Enter the access point name. Enter UNINET for a China Unicom SIM card or CMNET for a China Mobile SIM card.
	Enable GPS.	Enable the GPS function (only provided by IOT-WL210DBG).
	Module model	Obtain the information after uploading the configuration.
	Software version	Obtain the information after uploading the configuration.

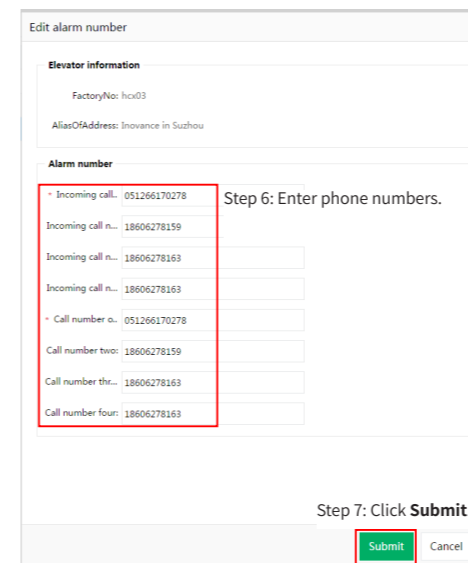
Configuration Parameter Description		
Upgrade	Primary IP address and port	Retain the default value.
	Backup IP address and port	Retain the default value.
	Upgrade domain name and port	Retain the default value.
Monitoring	Primary IP address and port	Enter the IP address and port number of the server used for equipment monitoring (normal operation).
	Backup IP address and port	Enter the IP address and port number of the backup server used for equipment monitoring (normal operation).
	Upgrade domain name and port	Enter the domain name and port number of the server used for equipment monitoring (normal operation). If the server has a domain name, the system accesses the server using the domain name. If not, the system accesses the server using its IP address.
Call	Dialing	Enter four numbers in telephone number fields 1 to 4. After the dialing function is enabled, the system dials the four numbers in sequence.
	Call answering	Enter four receiver numbers in telephone number fields 1 to 4. The system only answers the calls from these four numbers and rejects all the calls from other numbers.
Communication	Number of slaves	Retain the default value.
	Protocol version	Retain the default value.
	Communication status and length	Retain the default value.
	Slave data address and length	Retain the default value.

You can also perform the following steps to set the telephone numbers used to make and receive calls on the network platform.

1) Choose **Monitor > Alarm number set**, as shown in the following figure.



2) Enter the call-in and call-out numbers and submit the setting. (You can set a maximum of four call-in/call-out numbers.)



6 Special Resources for PLC Programming

The PLC programming resources of IOT-WL210DB are based on a simplified version of the H1U-XP platform. Therefore, the resources listed in the following table are different from PLC programming resources of the H1U-XP series, and the following information prevails. For other resources, see the H1U Series Programmable Controller User Manual.

Name	Value
Available flash range	0x1000 to 0x1FFF 4k
	0x8000 to 0xFFFF 40k
	0x10000 to 0x17FFF 32k
	0x18000 to 0x1FFFF 32k
Available RAM range	0x10006A00 to 0x10007FFF
	0x20080000 to 0x200813FF
User program steps	8k steps
Range of D elements	D0 to D1999, D8000 to D8511
Range of M elements	M0 to M1024, M8000 to M8255
Range of S elements	S0 to S512
Range of timer T	T0 to T255
Range of counter C	C0 to C255
Range of pointer P	P0 to P127
	100x to I50x
Range of pointer I	I600, I700, I800
User instructions	High-speed input/output, 1:1, N:N, and computer link communication protocol not supported

7 Special Notes

- You can use AutoShop to modify application software as required.
- The telephone numbers used to make and receive calls must be set on the product using AutoShop.
- The product directly uploads the collected data to Inovance's elevator IoT server. You can access the server using the domain name and account obtained from Inovance's marketing personnel.
- The module adapts to all GSM networks in the world. You can buy a GSM-capable SIM card with GPRS traffic from another vendor or buy the dedicated SIM card from Inovance.

INOVANCE Warranty Agreement

The warranty period of the product is 18 months (subject to information indicated by the barcode on the product). During the warranty period, Inovance will be responsible for free maintenance if the product fails or is damaged under normal use in accordance with the user manual. Within the warranty period, maintenance will be charged for the damages due to the following causes:

- Improper use or unauthorized disassembly, repair, or modification
- Fire, flood, abnormal voltage, or other natural disasters and secondary disasters
- Drop or lack of protection during transportation
- Failure to use the product following the user manual provided by Inovance
- Problems outside the product (such as faults of peripheral devices)

The maintenance fee is charged according to the latest Maintenance Price List of Inovance.

If there is any problem during the service, contact us or our agent directly.

You are assumed to agree on terms and conditions of this warranty agreement by purchase of the product. This agreement shall be interpreted by Suzhou Inovance Technology Co., Ltd.