INOVANCE

IT7000 Series HMI
User Guide

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PS00005849A00

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Preface

■ About this Guide

The IT7000 series HMI adopts high-performance processor featuring quick data processing and high response speed. With an Android style Linux system, the product provides users with user-friendly interactive experience. It features: Custom styles, VNC remote desktop, vector format icons, and scripting; Connection to a PC through USB or Ethernet; Automatic and efficient PLC communication with Modbus protocol; Firmware, screen program and recipe data update through a USB drive. To facilitate HMI program commissioning and system commissioning, online simulation and offline simulation are available in IT7150E HMIs.

This guide covers product specifications, installation dimensions, terminal definition and more.

■ Revision History

Date	Version	Description
May 2022	A00	First release.

■ How to Obtain

This guide is not delivered with the product. You can obtain the PDF version in the following ways:

Log in to Inovance's website (*www.inovance.com*), choose **Support** > **Download**, search by keyword, and then download the PDF file.

Safety Instructions

■ Safety Disclaimer

1. Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
2. To ensure the safety of humans and equipment, follow the signs on the equipment and all the safety instructions in this user guide.
3. "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
4. Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
5. Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

■ Safety Levels and Definitions

⚠ DANGER : Indicates that failure to comply with the notice will result in death or severe personal injuries.

⚠ WARNING: Indicates that failure to comply with the notice may result in death or severe personal injuries.

⚠ CAUTION : Indicates that failure to comply with the notice may result in minor or moderate personal injuries or damage to the equipment. Please keep this guide well so that it can be read when necessary and forward this guide to the end user.

Control System Design

⚠ WARNING

- Interlock circuits and other circuits such as emergency stop, conventional protection, forward and reverse rotation must be set outside the product; devices for preventing equipment damage (up, down and reciprocating movement limit) must be set outside the product.
- A fault protection circuit must be laid outside the to prevent unexpected mechanical movement caused by, for example, errors in the non-detectable I/O control area.
- A user program must be designed to inform users of faults concerning the display, control, communication, power supply and so on, ensuring safety of the user system.
- Make sure that measures have been taken to avoid malfunction caused by the communication faults between the product and the master controller. This is to prevent personal injury and equipment damage.
- Do not bring live parts into contact with the metal enclosure of the product.

⚠ CAUTION

- Do not create, on the touch screen of the HMI, switches that may result in personal injury of the operator or equipment damage . Use independent switches for performing critical operations. Failure to comply may result in accidents caused by wrong outputs or faults.
- Do not create switches that are used to control equipment safety operations on the touch screen, such as the emergency stop switch. Use independent hardware switches to perform safety-related operations. Failure to comply may result in series personal injury or equipment damage.
- Do not use this product as an alarm device to report critical alarms that may cause severe personal injury, equipment damage or system stop. Use an independent hardware and/or mechanical interlock to design a mechanism for reporting critical alarms and the related control/triggering devices.

Installation

⚠ WARNING

- This equipment must only be used indoor. Ensure that the environment meets the specified requirements;
- Install the product in a place free from strong magnetic field, direct sunlight, high temperature, inflammable gases, vapors, and dust. Failure to comply will result in the risk of explosion.
- Operate the product only in environments without drastic temperature changes or high humidity. Failure to comply may result in water condensation inside the product, leading to equipment damage.
- Ensure all the cable connectors are connected to the product securely. Loose connection may result in wrong I/O signals.

⚠ CAUTION

- Install the HMI in environments with temperatures within the recommended storage temperature range. Failure to comply may result in display faults of the LCD.

Wiring

⚠ DANGER

- Before wiring, cut off all power supplies. Failure to comply may result in electric shock or damage to the circuit.
- Connect the DC power supply to the dedicated terminals, as described in this guide.
- Avoid metal chippings or cable terminals from falling into the HMI during screw hole machining and wiring. This is to prevent faults, component damage, and fire accidents.
- Perform meticulous inspection after wiring to ensure the operating voltage and terminal positions are correct. Failure to comply may result in the risk of fire or accident.

⚠ CAUTION

- To avoid electric shock, cut off the power supply before connecting the product to the power supply.
- The input power supply of the HMI should be 24 VDC. Power supplies outside 24 VDC ±20% will cause severe damage to the product. Therefore, check whether the DC power supply provided by the switching-mode power supply is stable at a regular interval.

Operation and Maintenance

⚠ CAUTION

- Touch the HMI panel with hands only during use. Do not use tools to touch the HMI panel. Inovance assumes no responsibility for panel damage caused by excessive external force.
- Retired lithium batteries, LCD screens, capacitors and any other matters that may contain ingredients that are hazardous to health and the environment must be disposed of as industrial wastes.

Safety Recommendations

- In the position where the operator directly touches the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, manually-operated devices or similar must be installed independently of the PLC to start or stop the automatic operation of the system.
- If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Battery

⚠ WARNING

- Do not replace the battery with an incorrect type of battery.
- Do not dispose of the battery in a fire or hot oven and do not mechanically crush or cut the battery.
- Do not expose the battery to extreme heat.
- Do not swallow batteries, risk of chemical burns.
- This product contains button batteries. If swallowed accidentally, button batteries may cause serious burns in as little as 2 hours and may even lead to death.

⚠ CAUTION

- Keep batteries away from children whether new or used.
- If the battery compartment is not closed, stop using the product and keep it away from children.
- If you think that batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

Disposal

⚠ CAUTION
● Dispose of retired batteries as industrial waste according to local laws and regulations.

1 Product Information

1.1 Appearance and Model Number

■ Appearance

Figure 1-1 IT7070S/IT7070S-BG1

Figure 1-2 IT7070T/IT7070E/IT7070EBG1/IT7100E-BG1

■ Model Number

$$\underset{①}{\underline{IT}}\ \underset{②}{\underline{7}}\ \underset{③}{\underline{070}}\ \underset{④}{\underline{T}}\ \text{-}\ \underset{⑤}{\underline{BG1}}$$

①	Family Touch screen	②	Product series 6: 6000 series 7: 7000 series	③	Screen size 043: 4.3-inch 070: 7-inch 100: 10-inch
④	Function configuration 1 S: Economical T: Standard E: High performance	⑤	Function configuration 2 Blank: Standard BG1: Custom	-	-

1.2 General Specifications

Type	IT7070S	IT7070S-BG1	IT7070T	IT7070E	IT7070E-BG1	IT7100E-BG1
Display Specifications						
Screen size	7''					10.1''
Resolution	800 x 480					1024 x 600
Brightness (cd/m2)	350					250
Display color	24-bit true color					
Backlight	LED					
Backlight life	35000 hrs					30000 hrs
System Specifications						
Processor	Cortex A8 600 MHz	Cortex A7 1.2 GHz	Cortex A8 600 MHz	Cortex A8 600 MHz	Cortex A7 1.2 GHz	Cortex A7 1.2 GHz
RTC	Supported					
DRAM	128M DDR3					256M DDR3
Flash	128M					256M

Type	IT7070S	IT7070S-BG1	IT7070T	IT7070E	IT7070E-BG1	IT7100E-BG1
Electrical Specifications						
Input voltage	24 VDC±20%					
Rated input current	250 mA					
Interface Specifications						
SD card interface	N/A				1x Micro SD interface Supports Micro SD card, push-push type SD card slot	
Serial port	COM1 (RS422/RS485)	COM1 (RS422/RS485)	COM1 (RS422/RS485) COM2 (RS232)	COM1 (RS422/RS485) COM2 (RS232) COM3 (RS485)		
Ethernet	N/A			1x RJ45 10M/100M self-adaptive Ethernet interface Cable length ≤ 100 m, Cat5/Cat5e		
Mini USB type-B port	1x USB type-B port					
USB type-A port	1x USB type-A port Note: The USB type-A port provides a maximum current of 200 mA.					
Structure Specifications						
Housing color	Black	Silver	Silver	Silver	Silver	Silver
Housing material	Engineering plastic					
Mounting-hole dimensions	193 mm x 139 mm	193 mm x 139 mm	193 mm x 139 mm	193 mm x 139 mm	193 mm x 139 mm	260 mm x 202 mm
Environment Specifications						

Type	IT7070S	IT7070S-BG1	IT7070T	IT7070E	IT7070E-BG1	IT7100E-BG1
Operating temperature	0°C to 50°C	-10°C to +55°C	-10°C to +55°C	-10°C to +55°C	-10°C to +55°C	-10°C to +55°C
Storage temperature	-20°C to +70°C					
Operating humidity	10% to 90% RH (without condensation)					
Cooling method	Natural cooling					
Panel IP rating	Front panel: IP65; Rear cover: IP20					
Model code	01450038	01100170	01450030	01450039	01100172	01100169

Note

The design life of the built-in button battery is 5 years, and the actual service life varies according to the working conditions (temperature and humidity).

2　Mechanical Design

2.1　Installation Requirements

■　Installation precautions

Before installation, make sure the HMI is powered off.

- Prevent the enclosure or terminals or connectors of the HMI from dropping or suffering from impact or shock.
- Do not disassemble the HMI to avoid damage to it.
- Do not fasten with excessive torque to avoid damage to the HMI.
- After installation and commissioning, remove the dustproof label on the upper side of the HMI to keep the vents open to ensure reliable operation at high temperatures.

■　Installation environment requirements

The HMI is designed to operate in a temperature range between -10°C to 55°C (0°C to 50°C for IT7070S), exceeding of which may cause damage to the HMI components, malfunction, or function deterioration. For use in special environments, contact Inovance.

- Do not install the HMI in environments suffering from strong mechanical vibration.
- Install the HMI in a cabinet with a depth of over 100 mm and keep a space of at least 25 mm around the equipment.
- Install the HMI away from cables and devices that generate strong interference, such as AC power supply cables, PLC output modules, AC drives, and relays. Use shielded cables for I/O cables and ground the shielded cable properly.
- The front panel of the HMI meets IP65. When the HMI is installed in a IP65-rated cabinet, the cabinet must retain its IP rating, which means liquid sprayed on the cabinet cannot get into it.
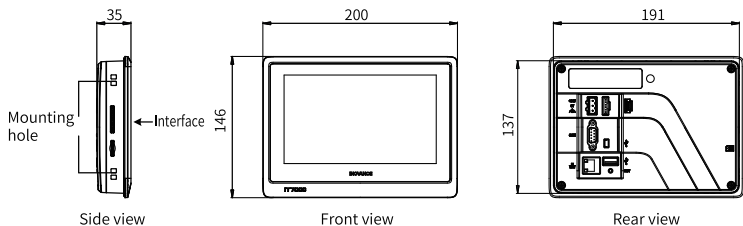
2.2 Mounting Dimensions
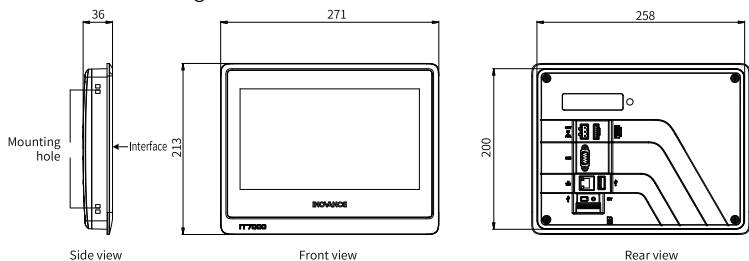

Figure 2-1 Overall dimensions of 7-inch HMI

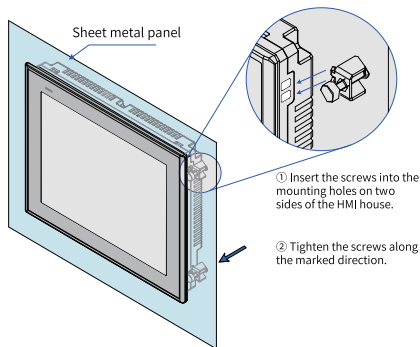Figure 2-2 Overall dimensions of 10-inch HMI

Model	Display Screen Size (in inch)	Outline Dimensions W x H x D (mm)	Through-Hole Mounting Dimensions W × H (mm)	Mounting-Hole Dimensions (W+2) (mm)	Mounting-Hole Dimensions (H+2) (mm)
IT7070S	7	200 x 146 x 35	191 x 137	193	139
IT7070S-BG1	7	200 x 146 x 35	191 x 137	193	139
IT7070T	7	200 x 146 x 35	191 x 137	193	139
IT7070E	7	200 x 146 x 35	191 x 137	193	139

Model	Display Screen Size (in inch)	Outline Dimensions W x H x D (mm)	Through-Hole Mounting Dimensions W × H (mm)	Mounting-Hole Dimensions (W+2) (mm)	Mounting-Hole Dimensions (H+2) (mm)
IT7070E-BG1	7	200 x 146 x 35	191 x 137	193	139
IT7100E-BG1	10.1	271 x 213 x 36	258 x 200	260	202

2.3 Installation Mode

When the through hole mounting mode is adopted, install the HMI according to the following steps.

1. Put the HMI into the pre-drilled mounting hole in the panel.

2. Snap the four mounting screws (delivered by default) from the back of the panel into the four mounting holes on both sides of the enclosure (step ① in figure below).

Sheet metal panel

① Insert the screws into the mounting holes on two sides of the HMI house.

② Tighten the screws along the marked direction.

3. Tighten the mounting screws one by one until the HMI is secured to the panel (step ② in the figure). Recommended torque: 6.0±0.5 kgfcm (to ensure water resistance and prevent deformation).

⚠ **Caution**

To comply with IP65 sealing specifications, ensure all the mounting screws delivered are used and the curvature of the panel is no greater than 0.010°.
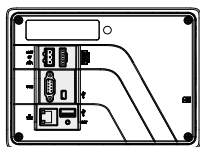
⚠ **Warning**

Do not over tighten the screws. If you have any question, contact the supplier.
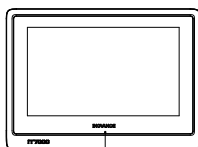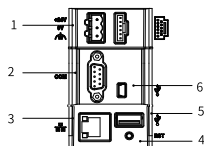
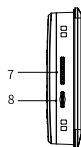# 3 Electrical Installation

3.1 Terminal Description



Rear view

Front view

Partially enlarged view

Side view

No.	Name	Function Description	No.	Name	Function Description
1	Power port	24 VDC power input (delivered together with a power terminal used to connect to this power port)	6	Mini USB port	Slave port of USB communication used for user program downloading and commissioning through PC
2	DB9 male	Communication port between HMI and peripherals Built-in COM1, COM2 and COM3 serial communication ports COM1: RS422 or RS485 COM2: RS232 COM3: RS232 Note: 1. IT7070T only includes built-in COM1 and COM2. 2: IT7070S only includes built-in COM1.	7	Firmware upgrade port	For firmware upgrade Note: Firmware upgrade port is not available in -BG1 model.
3	Ethernet port	Ethernet communication port (RJ45) used to access the PLC with LAN port Note: Ethernet port is not available in IT7070S/ IT7070T.	8	Micro SD card interface	Mounts a Micro SD card for data read/write and project file download Note: Micro SD card interface is not available in IT7070S/IT7070T.

No.	Name	Function Description	No.	Name	Function Description
4	RESET key	Used to restore to default settings	9	Power supply indicator	ON: Power supply is normal. Blinking: Power supply is not stable. OFF: Power is off. Note: Power indicators are not available in IT7070S
5	USB type-A port	Communication port for read and write of USB flash drive, connected to devices such as mouse and printer	-	-	-

3.2   Wiring

■   Power Connection

This equipment is powered by a 24 VDC power supply. Connect the positive pole of the external power supply to the +24V terminal, the negative pole to the 0V terminal, and the grounding wire to the terminal marked with ⏚, as shown below.
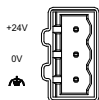
- Requirement: The HMI can be powered up by a DC power supply only (24 VDC ±20%). The capacity of the power supply must be higher than or equal to that required by the HMI specifications.

- Isolate the DC power supply from the main AC power supply properly. Do not use the same power supply for the HMI and inductive load circuit (such as solenoid valve). Failure to comply may result in electromagnetic interference.

- The 24 V power supply cable and communication cables must not be close to cables with strong interference, such as AC power cables and motor drive cables. A minimum spacing of 30 cm is required.

- It is recommended to use a separate #14AWG conductor as the conductor of the grounding wire. Directly connect the grounding wire to the system grounding point without passing any housing or terminal of other electrical equipment. This ensures that the grounding conductor will not carry the current of other circuit branches. Keep the conductor as short as possible.

Inovance provides a complete set of accessories (Model No.: Complete Set of Accessories (Sales)-IT7000-Metal Clip and Terminal Block, Ordering No.: 98050285) including power supply terminals for this product, as shown in the table below.

Accessory	Quantity
Power supply terminal	1
Metal clip	4
Packing bag	1

■ Communication port

This product provides one DB9 communication port (DB9 male connector) including one to three built-in independent serial communication ports for connecting the PLC, AC drive, printer or other intelligent devices. The HMI is built-in with multiple communication protocols and usually acts as the communication master to access the data in external devices. The following figure shows the DB9 male connector:
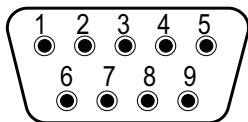
COM1 [RS485 2/4W]
COM2 [RS232]
COM3 [RS485]
DB9 male pogo pin connector
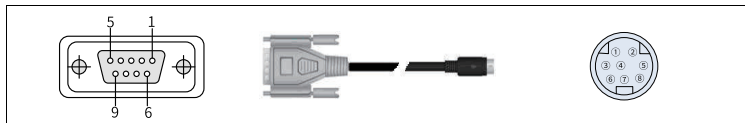
■ DB9 male connector

The DB9 male connector includes three built-in serial communication ports COM1, COM2 and COM3. The connector pins are described in the following table.

Pin No.	Signal			
	COM1[RS485] 2 Wires	COM1[RS422] 4 Wires	COM2[RS232]	COM3[RS485]
1	—	—	—	RS485–
2	—	—	RS232 RXD	—
3	—	—	RS232 TXD	—
4	—	TX+		—
5	GND			
6	—	—	—	RS485+
7	RS485-	RX-	—	—
8	RS485+	RX+	—	—
9	—	TX-	—	—

## ■ Communication cable for DB9 male connector and settings

Inovance provides two types of preformed communication cable options for the DB9 female.

1. Cable Type 1 Model: IT7-H3U-CAB; Ordering No.: 1504AX53

Cable connector and pin	DB9 (female)		8-pin DIN round connector	
Signal level	RS422		RS422	
—	Pin No.	Signal	Pin No.	Signal
Cable connection	7	RX-	4	TX-
	8	RX+	7	TX+
	9	TX-	1	RX-
	4	TX+	2	RX+
	5	GND	3	GND
Compatible HMI and port	IT7070/IT7100 HMI COM1 [RS422] Note: This cable is not suitable for IT7150E.		Inovance H1U/H2U/H3U RS422 communication port Mitsubishi FX1N/2N/3U/3G RS422 communication port	
HMI user program setting for use of the cable	In the HMI user project, set the COM1 port as "RS422/RS485"; The HMI and PLC must have the same communication protocol and data format settings.			

2. Cable Type 2 Model: H2U-232-CAB; Ordering No.: 15042148
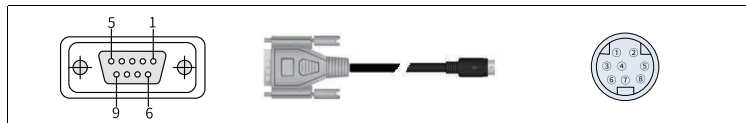
Cable Connector and pin	DB9 (female)		8-pin DIN round connector	
Signal level	RS232, built-in RS232-RS422 converter circuit		RS422	
—	Pin No.	Signal	Pin No.	Signal
Cable connection	1	—	4	TX-
	2	RXD	7	TX+
	3	TXD	1	RX-
	4	—	2	RX+
	5	GND	3	GND
Compatible HMI and Port	IT5xxx HMI COM2[RS232] IT6xxxE HMI COM2[RS232] IT7xxxT/E HMI COM2[RS232]		Inovance H1U/H2U/H3U RS422 communication port Mitsubishi FX1N/2N/3U/3G RS422 communication port	
HMI user program setting for use of the cable	In the HMI user project, set the COM2 port as "RS232"; The HMI and PLC must have the same communication protocol and data format settings.			

■ Precautions on Communication Connection

1. Cable requirements: Different cables are required for the connection of different external devices. Do not lay the communication cables together with the AC power cables or near electrical noise sources. Do not plug/remove the communication cables during communication.

2. To prevent communication faults, ensure that the communication cables for connecting the RS485/RS422 device and RS232 device do not exceed 150 m and 15 m respectively.

3. In case of communication failure, the screen displays "Connection failed: connection_1, station 1. err:10001" until the communication is established.

4. If the communication cable is long or passes through an environment with electrical noise, use a shielded cable.

■ USB terminal

Name	Specification
Interface type	USB type-A for external USB drive
Interface standard	USB 2.0
Communication rate	Meets USB 2.0 protocol
Load capacity	≤300 mA
Short circuit protection	Supported
Function	USB mini interface: Used to connect to PC through a general USB communication cable for downloading/uploading user configuration programs and setting HMI system parameters. USB type-A interface: Used to connect to the U-disk, USB mouse and USB keypad.

Name	Description
USB mini interface	Used to connect to PC through a general USB communication cable for downloading/uploading user configuration programs and setting HMI system parameters.
USB type-A interface	Used to connect to the U-disk, USB mouse and USB keypad.

■ Ethernet communication

Name	Specification
Number of output channels	1
Output connection mode	Standard Ethernet port (RJ45)
Output type	Ethernet
Output rate	100M
Function	Supports HMI program download, system parameter setting, online configuration simulation, and program download

Touchscreen Calibration

If the touch screen is unresponsive randomly or completely, use touch calibration program to fix the problem.

■ Entering touch calibration program

Access the program through the system setup menu: After the HMI is powered on and the screen displays "Long press to enter the Setup screen", gently press the screen with your finger until the screen displays "Release to enter the Setup screen". After you enter the system setup password, the system setup menu pops up. Tap the Calibrate menu item.

■ Detailed steps

1. After entering the calibration mode, you will see "✛" in the upper left corner of the screen (as shown below).
2. Use the stylus or your finger to tap the center of "✛". "✛" will move in the route as shown by the arrows below. Tap each point where "✛" stops.
3. After the 5-point calibration is completed, "✛" will disappear. Tap the blank space of the screen to exit; if the calibration fails, the crosshair will return to the upper left corner of the screen and you must repeat the calibration.

The calibration operation process is shown below.