



## IT7150E HMI

## User Guide



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Thank for purchasing the IT7000 series human machine interface (hereinafter referred to as HMI) developed and manufactured by Inovance. The IT7150E HMI, which is developed based on Linux system, adopts Android-style display featuring high resolution and high-performance processor featuring quick data processing and high response speed, providing users with excellent interactive experience.

The IT7150E HMI supports: 1) customized styles, VNC remote desktop, vector icons, and script programming; 2) connection to PC through USB or Ethernet; 3) monitoring on PLC and PLC program upload/download for easy commissioning; 4) Modbus protocol and efficient communication with PLC; and 5) update of the HMI firmware, interface program, and recipe data through U-disk. When it is used with an Inovance PLC, you can update the PLC program for easy download of programs in the manufacturing devices on site. To facilitate HMI program and system commissioning, online simulation and offline simulation are available in IT7150E HMIs.

This user guide describes the specifications, features, and usage of IT7150E HMIs. Read through this user guide before use to ensure a good understanding of product features and a safe use. For details on use of user program development environment and user program design methods, see the help file in the software tool "InoTouchPad". The latest version of InoTouchPad is released on [www.inovance.com](http://www.inovance.com).

## Safety Instructions

### Safety Precautions

- 1) Read through the safety instructions before installing, operating, and servicing the product.
- 2) To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
- 3) The "CAUTION", "WARNING", and "DANGER" signs are only supplements to the safety instructions.
- 4) Operate the product only in environments compliant with design specifications. Failure to comply may result in faults. Damage caused by improper usage is not covered by warranty.
- 5) Inovance shall take no responsibility of any personal injuries or property damages caused by improper usage.

### Safety Levels and Definitions

- DANGER** Indicates that failure to comply with the notice will result in severe personal injuries or even death.
- WARNING** Indicates that failure to comply with the notice may result in severe personal injuries or even death.
- CAUTION** Indicates that failure to comply with the notice may result in minor or moderate personal injury or damage to the equipment.

Keep this user guide in a proper place for future reference. Deliver this user guide to the end user.

### Design

- DANGER**
  - The interlock circuit and other circuits such as emergency stop, regular protection, and forward/reverse rotation circuits must be set independent of the product. Devices used to prevent equipment damage, such as up/down limit switches and reciprocating motion limit switches, must also be set independent of the product.
  - A fault protection circuit must be set independent of the product 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 ensure safety of the user system in case of faults, including the display, control, communication, and power supply faults.
  - Measures must be taken to avoid malfunction caused by communication faults between the product and the host controller, preventing personal injuries and equipment damage.
  - Do not bring live parts into contact with the metal enclosure of the product.

- CAUTION**
  - Do not create switches that may result in personal injury or equipment damage on the touch screen. Use independent switches for critical operations. Failure to comply may result in accidents caused by wrong outputs or faults.
  - Do not create switches used to control equipment safety operations on the touch screen, such as the emergency stop switch. Use independent hardware switches for safety-related operations. Failure to comply may result in severe personal injury or equipment damage.
  - Do not use the product to alarm critical warnings that may cause severe personal injury, equipment damage or system stop. Use independent hardware/mechanical interlocks to design mechanisms used to alarm critical warnings and devices used to control/trigger such mechanisms.

## Installation

- DANGER**
  - Install the product indoors and ensure the operating environment complies with the requirements described in the user guide.
  - Install the product in a place free from strong magnetic field, direct sunlight, high temperature, inflammable gas, vapor, 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 damage to the product due to formation of condensated water inside the product.
  - Ensure all the cable connectors are connected securely to the product. Loose connections may result in I/O signal errors.

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

## Wiring

- DANGER**
  - Cut off all the power supplies before installation, wiring, and plug-in/plug-out of cable connectors. Failure to comply will cause electric shock or circuit damage.
  - Wire the DC power supply to the dedicated terminals as described in the user guide.
  - Avoid metal chippings or cable terminals from falling into the product during screw hole machining and wiring. This is to prevent faults, component damage, and fire accidents.
  - Perform meticulous inspections 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 power supply of the product.
  - The product is powered up by a 24 VDC power supply. Power supplies outside  $\pm 20\%$  of 24 VDC will result in severe damage to the product. Therefore, check whether the DC power supply provided by the switched-mode power supply is stable at a regular interval.

## Operation and Maintenance

- CAUTION**
  - Touch the HMI panel with hands or professional tools (such as a stylus) only during use. Inovance assumes no responsibility for panel damage caused by excessive external force.
  - The lithium battery may contain elements that are harmful to personal health and the environment. Dispose of the battery according to local laws and regulations.

### Safety recommendations

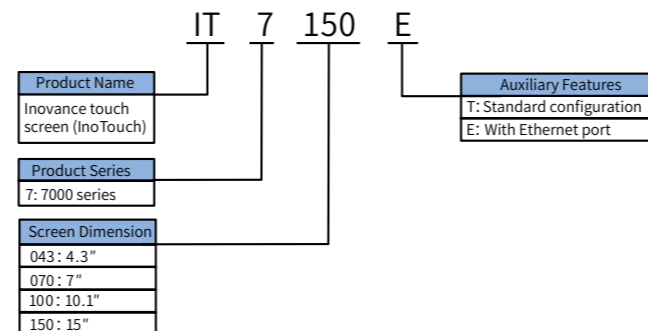
- In positions where the operator touches the mechanical parts directly, such as positions for loading and unloading machinery tools, or positions where the machine operates automatically, manually-operated devices or other backup measures used to start or stop system operations must be available on site. Such devices or backup measures must be set independent of the programmable controller.
- In cases where the program needs to be modified during system operation, use an encryption lock or other protective measures to allow the program to be modified by authorized operators only.

## Disposal

- CAUTION**
  - Dispose of the product as an industrial waste.

## 1 Product Information

### 1.1 Designation Rules



### 1.2 Basic Parameters

Model	Description		
IT7150E	Inovance IT7000 series 15" touch screen		
Item	Specifications	Item	Specifications
Display dimension	15"	CPU	Cortex A8 (1 GHz)
Resolution	1024x768	DRAM	256 MB DDR3
Brightness (cd/m <sup>2</sup> )	300	Flash	256 MB
Display color	24-bit true color	RTC	✓
Backlight source	LED	Serial port	COM1 (RS422/RS485); COM2 (RS232); COM3 (RS485)
Backlight service life	50000 hrs	Ethernet port	One 10 M/100 M adaptive RJ45 Ethernet port with LED indicator Cable length within 100 m, CAT5/CAT5E
Cut-out dimensions	352x279	Mini USB type-B port	One USB type-B port
Enclosure color	Silver	USB type-A port	One USB type-A port Note: The USB type-A port provides current within 200 mA only.

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Model	Description		
Enclosure material	Front housing: aluminum alloy; Rear cover: sheet metal	SD card interface	One Micro SD card interface Micro SD card supported, push-push type SD card slot
Operating temperature	0°C to 50°C	DI/DO	8 DIs/4 DOs (reserved for customized needs) 8-channel DI detection, 4-channel transistor output
Storage temperature	-20°C to +70°C	Input voltage	24 VDC $\pm 20\%$
Working humidity	10%~90% RH (no condensation)	Rated current	800 mA
Cooling mode	Natural ventilation	IP rating of the panel	Front panel: IP65; Rear cover: IP20

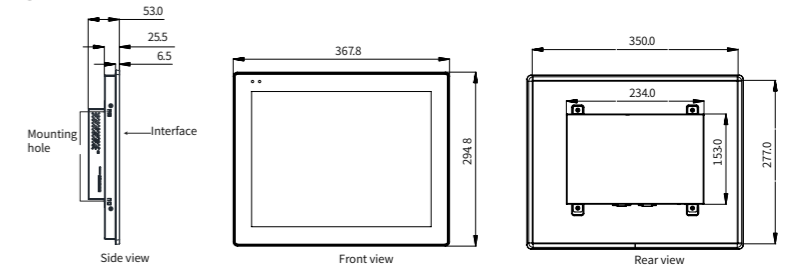
- NOTE**
  - The design service life of the built-in button battery is five years. The actual service life of the battery varies with the operating conditions (temperature and humidity).

## 2 Mechanical Design Reference

### 2.1 Installation Environment

- 1) The HMI is designed to operate in a temperature range between 0°C to 50°C (32°F to 122°F), exceeding of which may cause component damage, malfunction, or function degradation. For use in special environments, contact the supplier.
- 2) Do not install the HMI in environments suffering from strong mechanical vibration.
- 3) Install the HMI into a cabinet with a depth of over 105 mm and reserve a surrounding clearance of at least 25 mm.
- 4) Install the HMI away from cables and devices generating strong interference, such as AC power supply cables, PLC output modules, AC drives, and relays. Use shielded cables for I/Os and ground the shielded cable properly.
- 5) The front panel of the HMI complies with IP65 requirements. The cabinet in which the HMI is installed must also comply with IP65 requirements, which means liquid sprayed to the surface of the cabinet will not penetrate into the cabinet.

### 2.2 Mounting Dimensions



Model	Display Dimension	Outline Dimensions Width x Height x Depth (mm)	Through-hole Mounting Dimensions (W x H) (mm)	Recommended Cut-out Dimensions (mm)	
				W+2	H+2
IT7150E	15"	367.8 x 294.8 x 53	350x277	352	279

### 2.3 Mounting Mode

See the following steps for through-hole mounting:

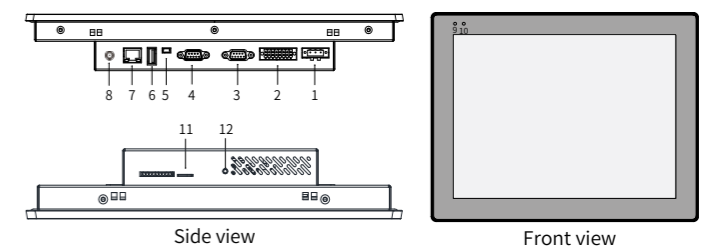
- 1) Put the HMI into the pre-drilled mounting holes in the cabinet panel.
- 2) Snap the eight metal clips (delivered by default) from the back of the cabinet panel into the eight mounting holes on both sides of the HMI enclosure (step ① in the figure).
- 3) Tighten the mounting screws one by one until the HMI is secured to the cabinet panel (step ② in the figure). The recommended tightening torque is  $6.0 \pm 0.5$  kgf/cm (a tightening torque within this range achieves the waterproof purpose and avoids deformation).

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

- DANGER** Do not apply excessive force when tightening the mounting screws. If you have any question, contact the supplier.

## 3 Electrical Design reference

### 3.1 Terminal Descriptions



No.	Name	Function	No.	Name	Function
1	Power supply ports	24 VDC power input ports of HMI, which are +24V and GND (The power supply terminal used to connect power supply ports is delivered by default.)	7	Ethernet port	Ethernet communication port (RJ45) used to access a PC or PLC with LAN port

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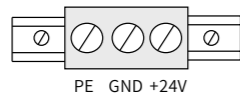
No.	Name	Function	No.	Name	Function
2 <sup>[1]</sup>	DI/DOs	8-channel DI detection, 4-channel transistor output	8 <sup>[1]</sup>	4G antenna interface	Connected to external 4G antenna
3	DB9 female	Communication port between HMI and PLC, built-in with serial communication ports COM1 (RS485/RS422) and COM3 (RS485)	9	Power supply indicator	Solid ON: power supply ON Blinking: power supply unstable Solid OFF: power supply OFF
4	DB9 male	Communication port between HMI and PLC, equipped with serial communication port COM2 (RS232)	10	Network status indicator	Blinking: communicating Solid OFF: no communication
5	Mini USB port	Slave port of USB communication used for user program downloading/commissioning through PC	11	SD card interface	Connected to Micro SD card, used for upgrading the firmware or kernel
(6)	USB type-A port	Main port of USB communication used to read and write the data in the U-disk, which can be connected to devices such as a mouse and printer	(12)	RESET key	Used to restore to default settings

[1]: DI/DOs and 4G antenna interface are reserved for customized needs.

### 3.2 Wiring

#### Power supply

The HMI is powered up by a 24 VDC power supply. Connect the positive and negative poles of the external power supply to terminals +24V and GND respectively. The PE terminal is the grounding terminal used to connect the grounding cable of the HMI, as shown below:



- ◆ Requirement: The HMI can be powered up by a DC power supply only (24 V±20%). The capacity of the power supply must be higher than or equal to that required by the model specifications.
- ◆ Isolate the DC power supply from the main AC power supply properly. Do not use the same power supply for the HMI and the inductive load circuit (such as a solenoid valve). Failure to comply may result in electromagnetic interference.
- ◆ Do not route the 24 V power supply cable or the communication cable in parallel with disturbing cables such as AC power supply cables and motor drive cables and leave a clearance of at least 30 cm between them.
- ◆ It is recommended to use independent AWG14 lead wires (as short as possible) as the conductor of the grounding cable. Connect the grounding conductor to the system grounding point directly without passing through the enclosures of other electrical devices or grounding terminals. This is to prevent the grounding conductor from bearing the current of other branch circuits.

#### Communication ports

The HMI provides two DB9 communication ports (DB9 female and DB9 male) and three independent serial communication ports used to connect 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.

#### Connection between DB9 female and external devices

The DB9 female is built-in with two serial communication ports, COM1 and COM3. The pin assignment is as follows.

Pin No.	Signal			Pin Layout of DB9 Female
	COM1[RS485] 2 Wires	COM1 [RS422]	COM3 [RS485]	
1	RS485-	RX- (Receive-)		
2	RS485+	RX+ (Receive+)		
3		TX- (Transmit-)		
4		TX+ (Transmit+)		
5	GND (Signal ground)			
6			RS485-	
7/8				
9			RS485+	

#### Communication cable for DB9 female

Inovance provides preformed communication cable options (model: IT5-H2U-CAB\*, ordering No.: 15041140) for DB9 female.

Cable connector and pins		DB9 Male	8-pin DIN Round Connector	
Signal interface		RS422		
Pin assignment	Pin No.	Signal	Pin No.	Signal
	1	RX-	4	TX-
	2	RX+	7	TX+
	3	TX-	1	RX-
	4	TX+	2	RX+
5	GND	3	GND	
Applicable models and ports		IT7*** HMI COM1 [RS485] 4w		Inovance H1U/H2U/H3U RS422 communication port Mitsubishi FX1N/2N/3U/3G RS422 communication port
HMI user program setting for use of the cable		Set COM1 port to "RS422" in the HMI user program. Select the same communication protocol and data format for the HMI and PLC.		

#### Connection between DB9 male and external devices

The DB9 male is built-in with COM2 communication port (RS232) to connect the controller with RS232 communication port. The pin assignment is as follows.

Pin No.	COM2 [RS232]	Pin Assignment of DB9 Male
1	/	
2	RXD (receiving)	
3	TXD (transmitting)	
4	/	
5	GND (signal ground)	
6 to 9	/	

#### Communication cable for DB9 male

Inovance provides preformed communication cable options (model: H2U-232-CAB, ordering No.: 15042148) for the DB9 male.

Cable connector and pins		DB9 Female	8-pin DIN Round Connector	
Signal interface		RS422		
Pin assignment	Pin No.	Signal	Pin No.	Signal
	1		4	TX-
	2	RXD	7	TX+
	3	TXD	1	RX-
	4		2	RX+
5	GND	3	GND	
Applicable models and ports		IT5*** HMI COM2[RS232] IT6***E HMI COM2[RS232] IT7***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		Set COM2 port to "RS232" in the HMI user program. Select the same communication protocol and data format for the HMI and PLC.		

#### Precautions for communication connection

- ※ Requirement: Use different communication cables to connect different external devices. Do not route communication cables in parallel with AC power supply cables or route communication cables near an electrical noise source. Do not connect/disconnect communication cables during communication.
- ※ To prevent communication errors, ensure the length of the communication cables used to connect RS485/RS422 device and RS232 device do not exceed 150 m and 15 m respectively.
- ※ If a communication error occurs, "Communication timeout" will be displayed until the communication is back to normal.
- ※ Use shielded communication cables in case of long communication cables or where communication cables need to pass through environments suffering from electrical noise.

#### USB interface

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 connection

The 10 M/100 M adaptive Ethernet port on the back of the HMI can be used to:

- download/upload HMI configurations, set system parameters, and perform online simulation of configurations.
- connect multiple HMIs through Ethernet to form a networked communication.
- communicate with PLC through Ethernet.
- connect HUB or Ethernet switch through a standard Ethernet cable to access the LAN, or connect the Ethernet port of the PC directly through a dual interconnect network cable. Note: To ensure communication stability, use shielded cables for Ethernet.

#### DI/DO (reserved for customized needs)

8-channel DI detection and 4-channel transistor output (See the following table for terminal assignment.)

Terminals	No.	Name	Description	No.	Name	Description
	1	24V	Power supply	9	0V	Ground
	2	X0		10	X6	
	3	X1	11	X7		
	4	X2	12	Y0	Y0 to Y3 transistor output	
	5	X3	13	Y1		
	6	X4	14	Y2		
	7	X5	15	Y3		
	8	S/S	16	COM	Common output terminal	

DI/DO specifications are shown in the following table:

Item	DI Specifications	Item	DO Specifications
Input channels	8	Output channels	4
Input connection mode	Pluggable terminal block	Output connection mode	Pluggable terminal block
Input mode	SINK/SOURCE	Output mode	SINK
Input voltage class	24 VDC (max.: 30 V)	Output type	Transistor output
Input current (typical)	5.3 mA	ON/OFF response time	0.5 ms
ON voltage	> 15 VDC	Maximum resistor load	0.5 A/point
OFF voltage	< 5 VDC	Maximum inductive load	12 W/24 VDC
Port filter time	Hardware RC filter, about 10 ms	Maximum lamp load	1.5 W/24 VDC
Input impedance	4.3 KΩ	Isolation method	Optocoupler isolation
Isolation method	Optocoupler isolation	Common output terminal	Four DOs sharing a common terminal COM
Common input terminal	Eight DIs sharing a common terminal S/S	-	-

## Programming Reference

Tools needed before programming the HMI: a PC installed with InoTouchPAD and a programming cable

#### Software acquisition

For the latest version of InoTouchPAD developed by Inovance, contact your supplier or download from <http://www.inovance.com/support/download.html>.

#### Recommended PC configurations

- CPU: Intel or AMD CPU with a base frequency of above 2 GHz
- Memory: 1 GB or above
- Hardware: Free disk space of at least 1 GB
- Display: Color display that supports a resolution of 1024x768 and above
- Ethernet port or USB port: Used for downloading/uploading interface programs
- Operating system: Windows 7/Windows 10

#### Programming cable (connecting to Inovance PLC)

The mini USB communication cable (optional) is used as the programming cable, which is available from Inovance with an ordering No. of 15041200.

## Touch Calibration

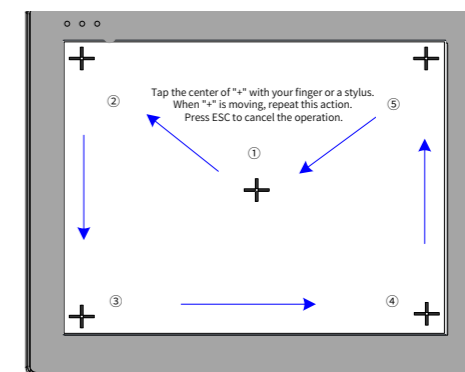
If the touch screen is unresponsive randomly or completely, use touch calibration program to fix the problem.

#### Entering touch calibration program

- ◆ Through system setting menu: Press and hold on the touch screen until a password box for entering the system setting interface appears. The password box comes at a count-down of 20s, which means the system enters the calibration program automatically if the password box is not clicked on within 20s. You can also input the password directly and click "Touch calibration" on the system setting menu displayed.

#### Calibrating:

- ◆ After entering the calibration mode, "+" will be displayed in the middle of the screen (as shown in the following figure).
- ◆ Use a stylus or your finger to tap the center of "+". After being tapped, "+" moves in the direction indicated by the arrow (tap the center of "+" accurately and repeat this action when "+" is moving.)
- ◆ After touch calibrations on the five points shown in the following figure are done, "+" disappears. In this case, you can tap any empty space on the touch screen to exit. If calibration fails, "+" appears again in the middle of the screen, in this case, just repeat the preceding operation.



Touch calibration

## INOVANCE Warranty Agreement

- Inovance provides an 18-month free warranty to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions.
- Within the warranty period, maintenance will be charged for the damage caused by the following reasons:
  - Improper use or repair/modification without prior permission
  - Fire, flood, abnormal voltage, natural disasters and secondary disasters
  - Hardware damage caused by dropping or transportation after procurement
  - Operations not following the user instructions
  - Damage out of the equipment (for example, external device factors)
- The maintenance fee is charged according to the latest Maintenance Price List of Inovance.
- If there is any problem during the service, contact Inovance's agent or Inovance directly.
- Inovance reserves the rights for explanation of this agreement.

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