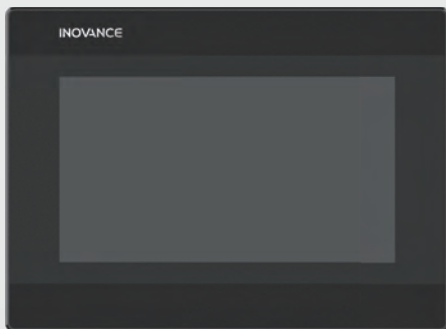




PS00010954A02

ITS7000 Series HMI

User Guide

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Preface

■ Introduction

This HMI is developed based on Linux architecture and adopts Android-style interfaces to provide users with friendly interactive experience. It features strong structural compatibility, supporting dimensions and installation of IT7000 and other popular HMIs. It carries Type-C interface and can be connected to USB printers. The front panel complies with IP66 requirements to withstand harsh environments.

This user guide describes mechanical design, electrical design, and standards of the product.

■ Standards Compliance

The following table lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification	Directive		Standard
CE	EMC Directive	2014/30/EU	24 VDC models: EN 61131-2 220 VAC models: EN 61131-2 EN 61000-3-2 EN 61000-3-3
	LVD	2014/35/EU	EN 61010-1 EN 61010-2-201
	RoHS Directive	2011/65/EU amended by (EU) 2015/863	EN IEC 63000
UL/cUL	-		UL 61010-1 UL 61010-2-201 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 NO. 61010-2-201
KC	-		-
EAC	-		-

Certification	Directive		Standard
UKCA	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC Regulations	Electromagnetic Compatibility Regulations 2016	24 VDC models: EN 61131-2 220 VAC models: EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulation	Directive (RoHS) Regulations 2012	EN IEC 63000

More Documents

Name	Data Code	Description
ITS7000 Series HMI User Guide	PS00010954	Presents the mechanical design, electrical design, and product standards.

Revision History

Date	Version	Description
June 2024	A02	- Modified "Brightness" in "1.3 Technical Data" on page 13. - Updated the Suzhou address on the cover page and added the My Inovance QR code on the cover page.
September 2023	A01	Modified the diagram and description for "DB9 male connector" in "3.2 DB9 Terminal and Communication Cables" on page 20 .
March 2023	A00	First release

Access to the guide

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

- Do keyword search under Service and Support at <http://www.inovance.com>.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install the app, where you can search for and download manuals.



■ Warranty Disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for faults or damage that occur during normal operation. Maintenance will be charged after the warranty expires.

Within the warranty period, maintenance will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

1. Read through the safety instructions before installing, operating, and servicing the equipment, and comply with these instructions.
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. "CAUTION", "WARNING", and "DANGER" in the user 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 injury or property damage caused by improper use.

■ Safety Levels and Definitions



"DANGER" indicates that failure to comply with the notice can result in severe personal injury or even death.



"WARNING" indicates that failure to comply with the notice may result in death or severe personal injury.



"CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage. Keep this user guide properly for future use and deliver it to the end user.

Control System Design



- 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 install, 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 specified in this guide.
- Prevent 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 $\pm 20\%$ of 24 VDC can 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, the on-site manual operating devices and any other alternative means must be carefully arranged and designed so that they are independent of the programmable controller and can start or terminate the automatic running 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



- The battery model must be correct.
- Do not throw the battery into a fire or heat oven. Do not crush or cut the battery.
- Do not expose the battery to extremely high temperatures.
- Do not swallow the battery to prevent the risk of chemical burns.
- This product contains the button battery. If the button battery is swallowed by accident, severe internal burns may occur within two hours, which may result in death.



- Keep new and used batteries away from children.
- If the battery compartment is not tight, stop using the device and keep it away from children.
- If you swallowed the battery, see a doctor immediately.

Disposal



- Dispose of retired batteries as industrial waste according to local laws and regulations.

1 Product Information

1.1 Nameplate and Model

■ Nameplate



■ Naming rules

IT S 7 070 E H - DG - AC

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

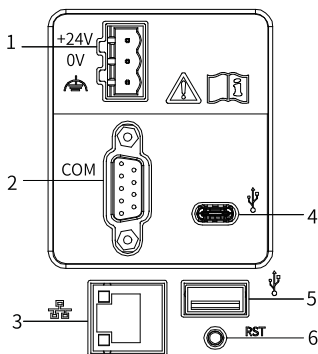
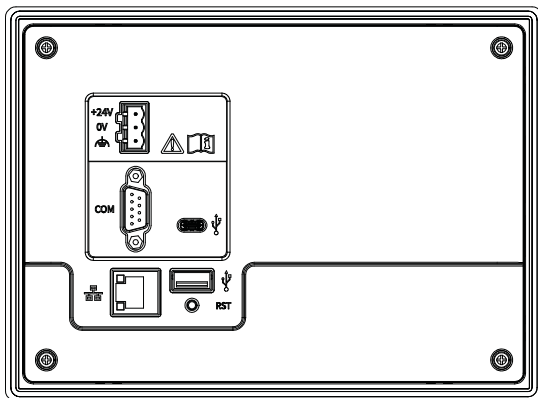
① Product family IT: Inovance HMI	④ Screen dimension 070: 7-inch 100: 10-inch	⑦ Function configuration 2 _: None D: With indicator (no indicator by default) N: Neutral panel G: Gray structure (black by default) Example: "DG" represents the indicator and gray structure.
② Product series 1 S: General-purpose HMI U: Display and controller integrated HMI M: IoT HMI I: Mobile HMI F: High protection HMI	⑤ Communication connection E: Ethernet S: Serial port W: Wi-Fi	⑧ Industry code _: None AC: Air compressor
③ Product series 2 7: 7000 series 8: 8000 series 9: 9000 series	⑥ Function configuration 1 _: Standard H: High performance	-

The data for ordering the product is shown below.

Model	Description	Product Code
ITS7100S	ITS7000 series 10-inch economical touch screen (standard-definition)	01450184
ITS7100E	ITS7000 series 10-inch touch screen (standard-definition, Ethernet)	01450176
ITS7070EH	ITS7000 series 7-inch touch screen (high-definition, Ethernet)	01450178
ITS7070E	ITS7000 series 7-inch touch screen (standard-definition, Ethernet)	01450177

Model	Description	Product Code
ITS7070SH	ITS7000 series 7-inch economical touch screen (high-definition)	01450183
ITS7070S	ITS7000 series 7-inch economical touch screen (standard-definition)	01450182
ITS7070E-G	ITS7000 series 7-inch touch screen (standard-definition, Ethernet, gray)	01450196
ITS7070S-G	ITS7000 series 7-inch economical touch screen (standard-definition, gray)	01450195
ITS7070SH-G	ITS7000 series 7-inch economical touch screen (high-definition, gray)	01450199
ITS7100S-G	ITS7000 series 10-inch economical touch screen (standard-definition, gray)	01450200
ITS7100E-G	ITS7000 series 10-inch touch screen (standard-definition, Ethernet, gray)	01450198
ITS7070EH-G	ITS7000 series 7-inch touch screen (high-definition, Ethernet, gray)	01450197

1.2 Components



No.	Name	Function
1	Power supply terminal	24 VDC input terminal of the power supply
2	DB male	COM1, COM2, and COM3 serial communication interfaces supported ● COM1: RS422/485 interface ● COM2: RS232 interface ● COM3: RS485 interface (not available in ITS7070SH, ITS7070S, and ITS7100S)
3	Ethernet	Ethernet communication port (RJ45) that used to access the PC or PLC with LAN port
4	USB type-C terminal	USB communication slave port that used to download or update HMI programs
5	USB type-A terminal	Main port for USB communication, which can be connected to a barcode scanner, USB drive, mouse, and keypad
6	RST	System reset button

1.3 Technical Data

Note

The only difference lies in models ITS7070SH (black by default) and ITS7070SH-G (gray) is the color.

Model	ITS7070SH	ITS7070S	ITS7070EH	ITS7070E	ITS7100S	ITS7100E
Display specifications						
Dimension	7-inch				10-inch	
Resolution	1024x600	800x480	1024x600	800x480	1024x600	
Brightness	400 cd/m ²	350 cd/m ²	400 cd/m ²	350 cd/m ²	350 cd/m ²	
Display color	24-bit true color					
Backlight source	LED					

Model	ITS7070SH	ITS7070S	ITS7070EH	ITS7070E	ITS7100S	ITS7100E
Backlight lifetime	25000 h	35000 h	25000 h	35000H	30000 h	
Display type	Horizontal screen, vertical screen					
System specifications						
CPU	Dual-core Cortex-A7					
DRAM	128 MB					
Flash	128 MB					
RTC	Supported					
Touchscreen type	4-wire industrial resistor type					
Use InoTouchPad for configuration						
Number of frames	Recommended value: 50					
Number of variables	Recommended value: 1000					
Number of alarm entries	User data space in local disk, recommended value: 30 M; max. value: 60 M					
Recipe memory	User data space in local disk, recommended value: 30 M; max. value: 60 M					
Frame template	Supported					
Electrical specifications						
Rated input voltage	24 VDC (-15% to +20%)					
Rated input current	360 mA@24 VDC				450 mA@24 VDC	
Interface specifications						
Ethernet	/		1		/	1

Model	ITS7070SH	ITS7070S	ITS7070EH	ITS7070E	ITS7100S	ITS7100E
Serial port	COM1 (RS485/RS422) COM2 (RS232)		COM1 (RS485/RS422) COM2 (RS232) COM3 (RS485)		COM1 (RS485/RS422) COM2 (RS232) COM3 (RS485)	COM1 (RS485/RS422) COM2 (RS232) COM3 (RS485)
USB Type-C	1					
USB Type-A	1					
SD card	Not supported					
Structure specifications						
Enclosure color	Black, gray					
Enclosure material	Engineering plastics					
Cut-out dimensions	192x138 (mm)				260x202 (mm)	
Max. thickness of the mounting plate	6.5 mm					
Outline dimensions	203x149x33 (mm)				271x213x33 (mm)	
Weight	0.55 kg				1.1 kg	
Environmental specifications						
Ambient temperature	-10°C to +55°C					
Storage temperature	-20°C to +60°C					
Temperature	-40°C to +70°C					
Ambient humidity	< 95% RH (without condensation)					
Cooling mode	Natural ventilation					

Model	ITS7070SH	ITS7070S	ITS7070EH	ITS7070E	ITS7100S	ITS7100E
Altitude	< 2000 m					
IP rating of the panel	Front panel: IP66; Rear cover: IP20					
Certification						
CE	No					
UL	No					

Note

Transport at the extreme temperatures (-40°C/+70°C) may result in a slight bulge of the membrane. The bulge disappears automatically at room temperatures, which does not affect its function.

2 Mechanical Design

2.1 Installation Requirements

■ Precautions

Before installation, ensure that the product has been powered off.

- To avoid damage to the controller, do not drop or strike on the product enclosure, terminal block, or connector.
- Do not disassemble the controller. Otherwise the controller may be damaged.
- Do not fasten with excessive torque to avoid damage to the terminal.
- After installation and commissioning, remove the dust-proof label on the upper side of the product to clear the heat dissipation holes, ensuring operation reliability of the module under high temperatures.

■ Environmental requirements

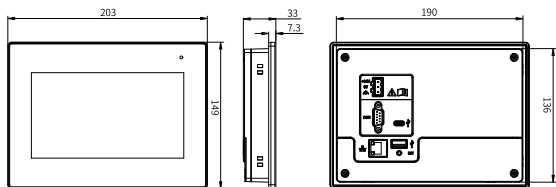
This product is designed to operate in a temperature range between -10°C to +55°C, exceeding of which may result in damage to the HMI components, malfunction, or performance degradation. For use in special environments, contact Inovance.

- Do not install the HMI in environments with strong mechanical vibration.
- Install the HMI in the panel with a depth of over 100 mm and reserve a surrounding clearance of at least 25 mm.
- 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 as I/O cables and ground the shielded cable properly.
- The front panel of the HMI complies with the requirements of IP66. Install the product properly in a cabinet that complies with the IP66 requirements.

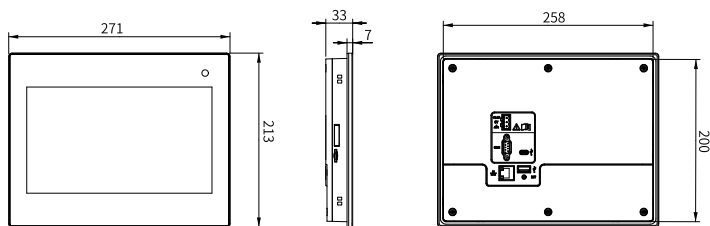
2.2 Mounting Dimensions

The dimensions are shown below.

- 7-inch HMIs



- 10-inch HMIs



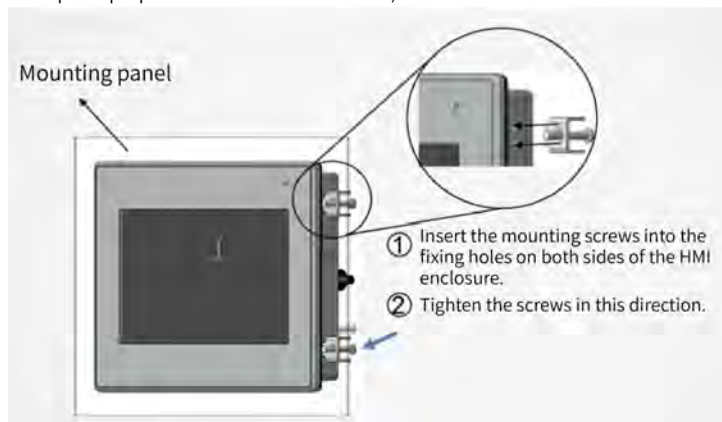
Model	Display dimensions	Outline dimensions WxHxD (mm)	Installation AxB (mm)	Recommended cut-out dimensions	
				A+2 (mm)	B+2 (mm)
ITS7070SH	7-inch	203x149x33	190x136	192	138
ITS7070S					
ITS7070EH					
ITS7070E					
ITS7100S	10-inch	271x213x33	258x200	260	202
ITS7100E					

2.3 Installation Mode

NEMA-4 installation is supported, as shown below.

1. Put the HMI into the pre-drilled mounting holes in the panel.
2. Put the mounting accessories (delivered by default) into the mounting holes around the HMI enclosure from the back of the panel (as shown by ①).

3. Tighten all the screws one by one (as shown by ②). The recommended tightening torque is $6.0 \pm 0.5 \text{ kgf} \cdot \text{cm}$ (A tightening torque within this range achieves the waterproof purpose and avoids deformation).



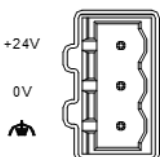
Caution

To satisfy the NEMA-4 sealing regulation, tighten all the mounting accessories delivered (Inovance accessory code: 20140061) with the recommended tightening torque. The bending degree of the panel not exceeding 0.010".

3 Electrical Design

3.1 Power Supply Terminal

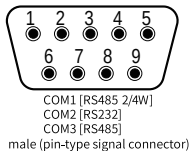
The following figure shows connection of the power supply terminal.

Terminal	Name	Description
	+24V	Connect power supply terminal (+) to 24 V.
	0V	Connect power supply terminal (-) to 0 V.
		Grounding

3.2 DB9 Terminal and Communication Cables

■ DB9 male interface

This equipment provides one DB9 communication terminal (DB9 male) and one to three built-in 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 terminal structure and silk printing.



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

Pin No.	Signal			
	COM1 [RS485] 2 Wires	COM1 [RS485] 4 Wires	COM2 [RS232]	COM3 [RS485]
1	—	—	—	RS485-
2	—	—	RS232 RXD (Receive data)	—
3	—	—	RS232 TXD (Transmit data)	—

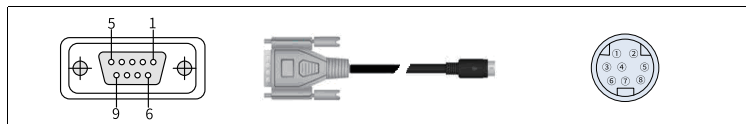
Pin No.	Signal			
	COM1 [RS485] 2 Wires	COM1 [RS485] 4 Wires	COM2 [RS232]	COM3 [RS485]
4	–	TX+ (Transmit+)	–	–
5	GND (Signal ground)			
6	–	–	–	RS485+
7	RS485-	RX- (Receive-)	–	–
8	RS485+	RX+ (Receive+)	–	–
9	–	TX- (Transmit-)	–	–

Note

“COM1 [RS485] 4 wires” is COM1 [RS422].

■ Communication cable for DB9 male connector

Inovance provides prefabricated communication cable options for the DB9 male connector on this equipment (part number: IT7-H3U-CAB, ordering number: 1504AX53):



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

Note

1. Cable requirements: Different cables are required for connection of different external devices. Do not lay the communication cables together with the AC power cables or near electrical noise source. Do not plug/remove the communication cables during communication.
2. To avoid communication problems, ensure that the communication cable does not exceed 150 m when connecting RS485/422 devices.
3. In case of communication failure, the screen keeps displaying "Connection failed: connection_1, station 1. Err: 10001" until communication is normal.
4. If the communication cable is long or passes through an environment with electrical noise, use a shielded cable.

3.3 Ethernet Terminal

Item	Specification
Applicable model	E series HMI
Output channel	1
Output connection mode	Standard Ethernet interface (no indicator for RJ45)
Output type	Ethernet
Output speed	10/100 Mbps adaptive
Communication distance	Network cables of Cat 5e or higher, 100 m
Master/Slave	Master/Slave supported

3.4 USB Terminal

■ USB type-A terminal

Item	Specification
Applicable model	HMI series
Output channel	1
Purpose	USB type-A, used to connect barcode scanner, USB drive, mouse, and keypad
Communication rate	USB 2.0 full speed
Communication distance	1.5 m
Power supply to outside	5 V/500 mA
Short circuit protection	Supported
Master/Slave supported	Master

■ USB type-C terminal

Item	Specification
Applicable model	HMI series
Output channel	1
Purpose	USB Type-C, used to download or update HMI programs

Item	Specification
Communication rate	USB 2.0 full speed
Communication distance	1.5 m
Short circuit protection	Not supported
Master/Slave supported	Slave

4 Touch Screen Calibration

If the touch screen does not respond or respond slowly, use the calibration program to calibrate the touch screen.

■ Entering the 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" tab.

■ Detailed steps

1. After entering the calibration mode, "⛶" is shown in the upper left corner of the screen (as shown below).
2. Use the stylus or your finger to tap the center of "⛶". After tapping, "⛶" moves in the direction indicated by the arrows below. Tap each point where "⛶" moves.
3. After calibrating the preceding five points, "⛶" disappears. In this case, tap the blank space on the screen to exit. If calibration fails, the cursor returns to the upper left corner of the screen. In this case, calibrate the preceding five points again.

The calibration process is shown below.

