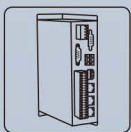
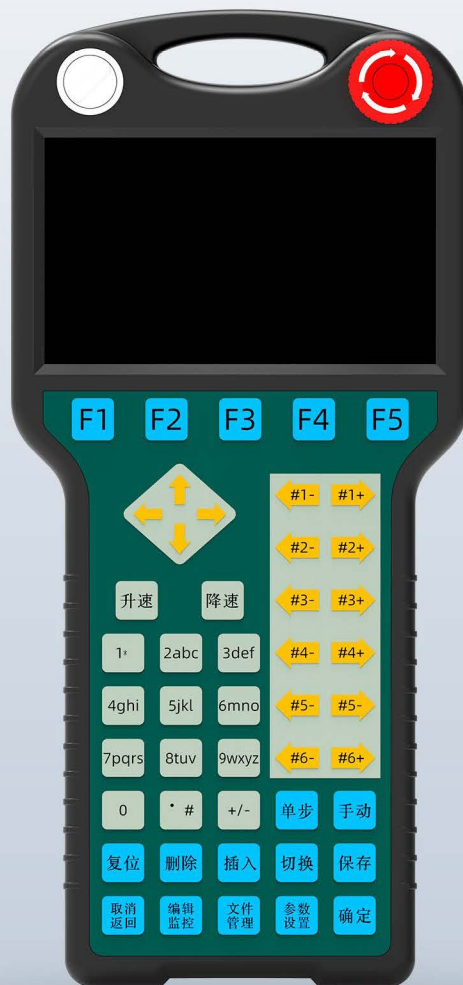
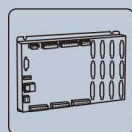


# Handheld Teach Pendant

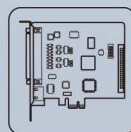
## ZHD300X



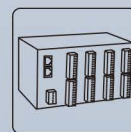
Vision Motion  
Controller



Motion  
Controller



Motion  
Control Card



IO Expansion  
Module



HMI

# Content

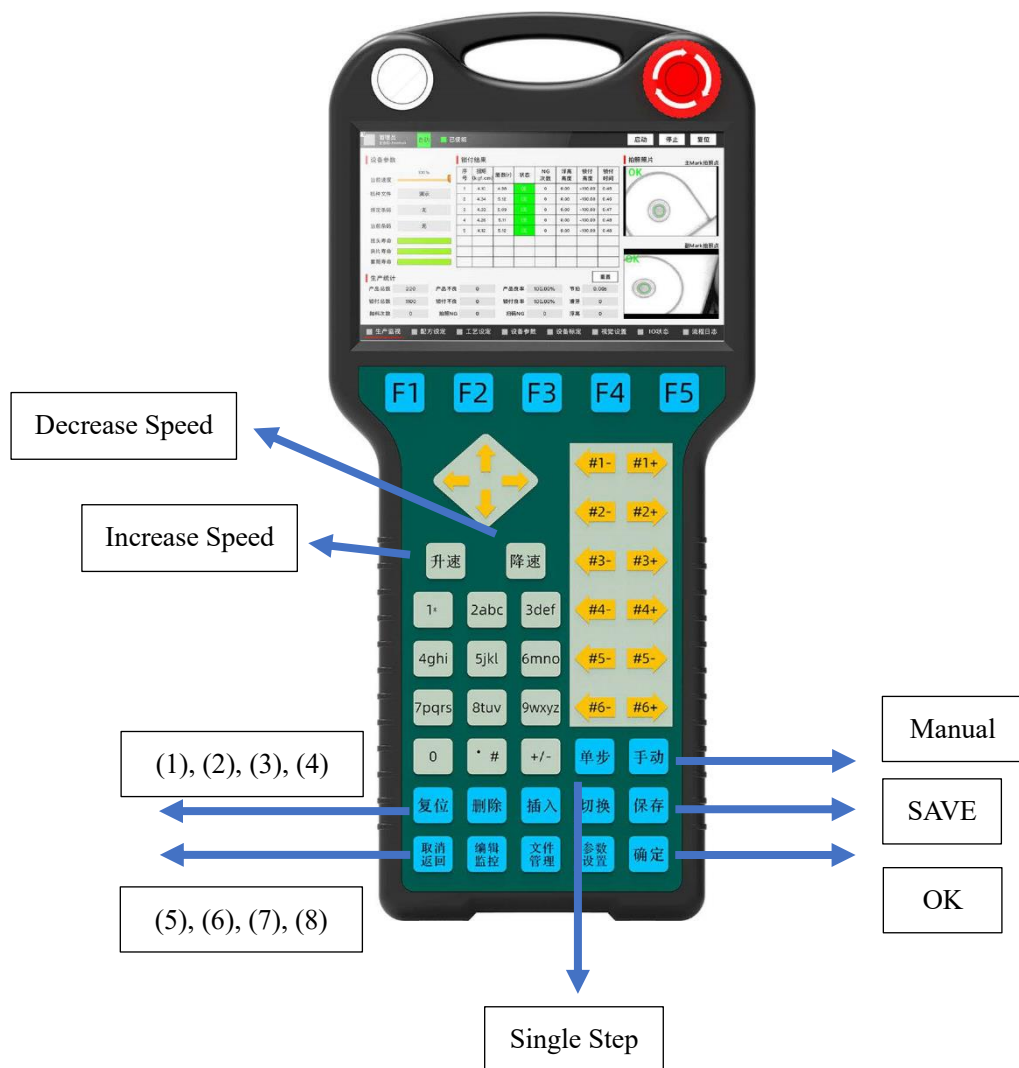
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# Chapter I Production Information

## 1.1. What is ZHD300X

ZHD300X is one touch screen teach pendant that can show by network. Please note it must be used together with the controller that supports HMI function.

Teach pendant has DC24V power supply, and it is with 480\*272 resolution true color displayer, also there are 47 keys, one emergency stop.



- (1): Reset
- (2): Delete
- (3): Insert
- (4): Switch

- (5): Cancel & Return
  - (6): Edit & Watch (Monitor)
  - (7): File Management
  - (8): Parameters Configuration
- ✚ Programmable teach pendant, it can show all kinds of interfaces through script programs.
  - ✚ Support drawing: Chinese & English characters, line, arc, image.
  - ✚ With emergency stop button.
  - ✚ There are 47 key buttons, key functions can be customized.
  - ✚ Support RJ45 crystal head (for standard model, it has 2m connecting line), U disk interface.
  - ✚ Support HMI configuration protocol.
  - ✚ It can control all kinds of manipulator control
  - ✚ Support touch screen, key buttons are used together with touch screen.
  - ✚ Resolution: 480\*272

ZHD HMI is a kind of open programmable teach pendant that is with touch screen. It develops interface program by RTBasic, RTHmi, RTHmi languages in RTSys. And it can debug online.

## 1.2. ZHD300X Specification Parameters

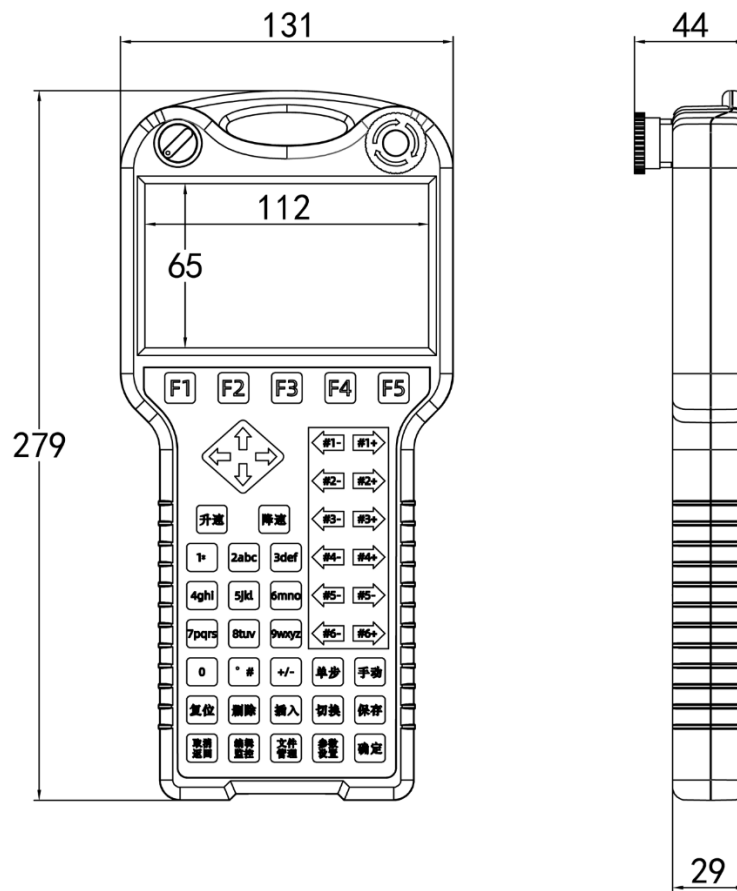
### --Product Parameters--

Item	Description
Resolution	480*272
Touch Screen Size	5" TFT LCD
Brightness	320 cd/m <sup>2</sup>
Color	24-bit
Touch Screen	Resistive touch screen
EtherNET	100 Base-T

--Other Parameters--

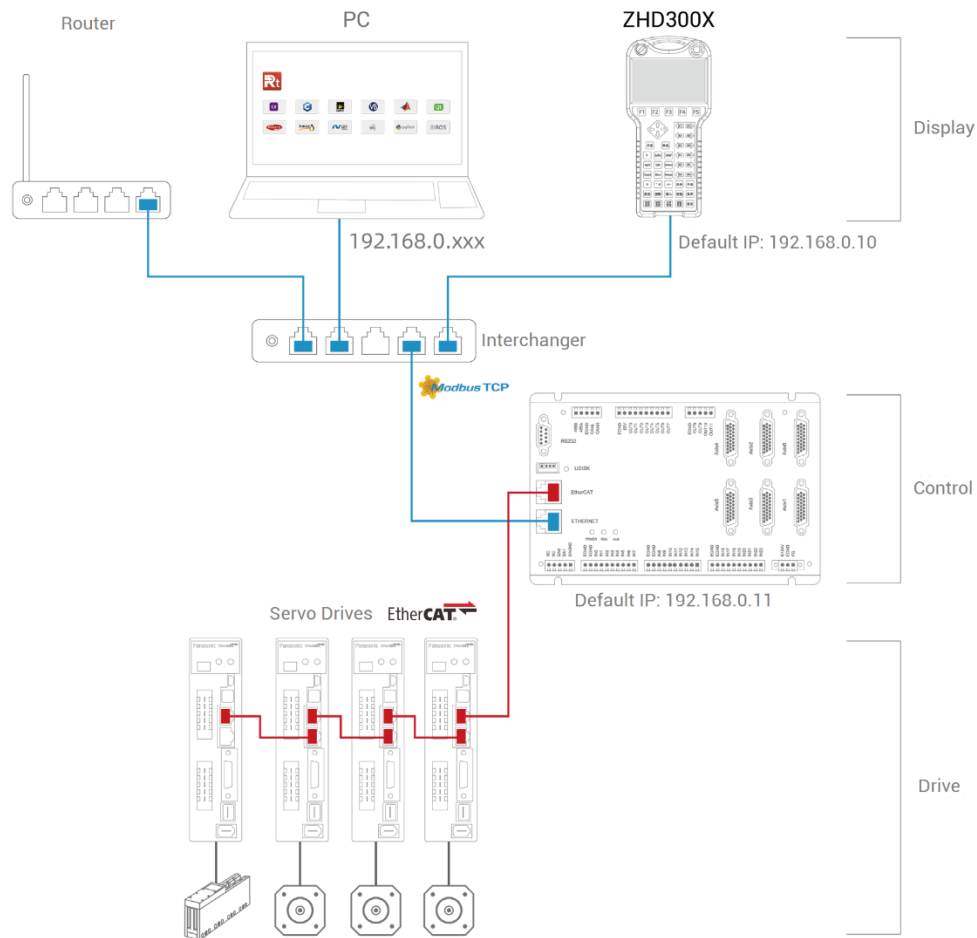
Item	Description
Power Supply	DC24V
Max Power Consumption	1.3W
Size	131mm*279mm*44mm
Weight	936.5g
Work Temperature	0 to 50°C
Storage Temperature	-20 to 60°C

1.3. ZHD300X Size



Unit: mm

## 1.4. System Configuration

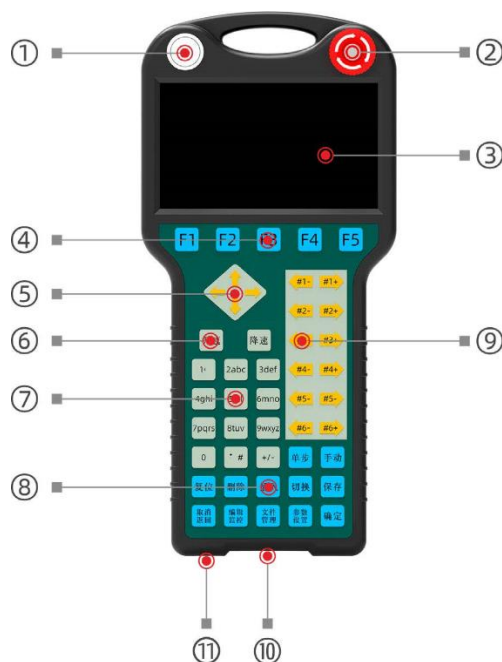


## 1.5. Order Information

Item	Model	Specification Description
Teach Pendant	ZHD300X	2-meter connecting line (standard)
Teach Pendant	ZHD300X-L30	3-meter connecting line (special)
Teach Pendant	ZHD300X-L50	5-meter connecting line (special)
Teach Pendant	ZHD300X-L100	10-meter connecting line (special)

## Chapter II ZHD300X Appearance

### 2.1. Whole Layout



No.	Interface	Description
①	"Start" Button	Press it to start program, which can be customized.
②	Emergency stop	Press it, axis will stop, if you want to cancel "emergency stop" state, rotate the button clockwise.
③	Display screen (touch screen)	Touch screen of 480*272 resolution.
④	Function button	Button on board, used together with physical key encodes.
⑤	Cursor button	
⑥	Speed button	
⑦	3*4 Character button	
⑧	Operation button	
⑨	Axis shift button	
⑩	DB15	Connect to controller and power supply
⑪	USB	Controller USB expansion interface

## 2.2. Touch Screen Points Coordinates

It is 480\*272, the coordinate origin is at upper left corner.

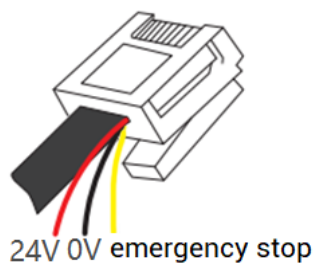


## 2.3. Hardware Interfaces

### --Power Interface--

ZHD300X uses 24V DC power. The wiring should be connecting cable that converts DB15 interface to Ethernet, one side is DB15 male, another side is ethernet crystal head.

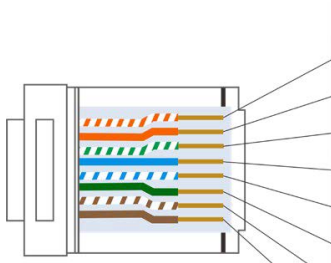
There are 3 cables on the network crystal head, HMI power cable, and emergency stop signal cable. Red one is 24V power +, black one is 24V power -, yellow is the emergency stop cable.





## --RJ45 Crystal Head--

### A. Specification

PIN Definition		Item	Description																										
 <table border="1" data-bbox="587 465 901 797"> <thead> <tr> <th>PIN</th> <th>Signal</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>RT+</td> <td>Receive Signal (+)</td> </tr> <tr> <td>2</td> <td>RX-</td> <td>Receive Signal (-)</td> </tr> <tr> <td>3</td> <td>TX+</td> <td>Send Signal (+)</td> </tr> <tr> <td>4</td> <td>NC</td> <td>Reserved</td> </tr> <tr> <td>5</td> <td>NC</td> <td>Reserved</td> </tr> <tr> <td>6</td> <td>TX-</td> <td>Send Signal (-)</td> </tr> <tr> <td>7</td> <td>NC</td> <td>Reserved</td> </tr> <tr> <td>8</td> <td>NC</td> <td>Reserved</td> </tr> </tbody> </table>	PIN	Signal	Description	1	RT+	Receive Signal (+)	2	RX-	Receive Signal (-)	3	TX+	Send Signal (+)	4	NC	Reserved	5	NC	Reserved	6	TX-	Send Signal (-)	7	NC	Reserved	8	NC	Reserved	Communication protocol	MODBUS_TCP
	PIN	Signal	Description																										
	1	RT+	Receive Signal (+)																										
	2	RX-	Receive Signal (-)																										
	3	TX+	Send Signal (+)																										
	4	NC	Reserved																										
	5	NC	Reserved																										
	6	TX-	Send Signal (-)																										
7	NC	Reserved																											
8	NC	Reserved																											
Communication velocity	100Mbps																												
Default IP	192.168.0.10																												
Communication cable	Category 5e STP																												
Cable length	Best <10m																												

### B. How to do Wiring

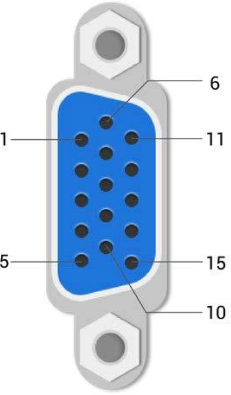
- HMI can be connected to controller (point to point) by one category 5e STP (shielded twist-pair) cable.
- HMI also can be connected to interchanger. That is, expand ethernet channels to connect to other devices by interchanger, then achieve one-multiple connection.

### C. How to Use

- 1) After wiring and power on, connect HMI to controller / RTSys through ethernet.
- 2) Check HMI IP. HMI IP, controller IP, and PC IP should in same network segment, you can modify it through IP\_ADDRESS command.
- 3) Details of above command and other commands, please refer to Basic Programming Manual.

## --DB15 Interface--

Interface	PIN No.	Signal	Description
	1	UDISK 5V	USB signal
	2	UDISK-	USB signal

	3	UDISK+	USB signal
	4	UDISK GND	USB signal
	5	EGND	External power ground
	6	NC	Reserved
	7	EMG	Always-OFF Emergency Stop Model OUT
	8	NC	Reserved
	9	DC24V	Power IN, for supply power
	10	EGND	External power ground
	11	NC	Reserved
	12	TX-	ETH Orange, PIN 2 of RJ45
	13	TX+	ETH Gray & Orange, PIN 1 of RJ45
	14	RX-	ETH Green, PIN 2 of RJ45
	15	RX+	ETH Gray & Green, PIN 2 of RJ45

## --U Disk Interface--

Connect to DB15 U disk signal, that is, expand the controller U disk interface function in the HMI, then, it can achieve interface signal's remote connection and operation.

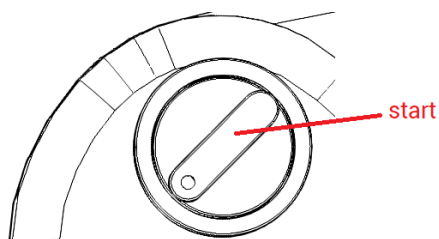
## 2.4. Physical Key Buttons

ZHD300X has 47 buttons, which are used together with physical button encoded. And functions can be customized. You can view "Chapter III" or HMI Programming manual.

### --Start Button--

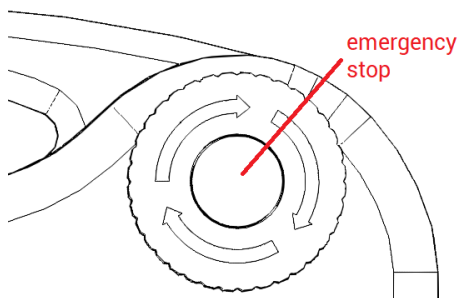
This button locates on the upper front of the teaching box, it is used to open the program.

Button	Description
Start	Rotate it clockwise to run the program.



## --Emergency Stop--

This button is located at upper right corner of HMI. When some emergency situations happen, you can press it to protect the program, axis will stop immediately. When all is normal, you can rotate the button clockwise to cancel it, the emergency stop button will pop up, resume normal state.



**Note:** please consider the "Circuit Design", which must be safe and reliable, otherwise, hard to achieve emergency stop.

## --Board Buttons--

The panel buttons are located on the front of the teaching box, and are divided into function buttons, cursor movement buttons, speed buttons, 3\*4 character buttons, operation buttons, and axis movement buttons. They are introduced as follows:

### [Function Buttons]



F1, F2, F3, F4, F5 are shortcut function keys, which can customize functions.

### [Cursor Motion Buttons]



When you press this key, the cursor moves in the direction of the arrow. The size of the cursor, the range and area of movement vary depending on the screen. In the screen showing the program content, when the cursor is on the first line, press the up key to jump to the last line of the program. When the cursor is on the last line, press the down key to jump to the first line of the program. You can also realize the functions of turning pages up and down, returning to the first line, and returning to the last line.

### [Speed Configuration Buttons]



You can manually set the speed through "speed" buttons. Left is to decrease the speed, right is to increase the speed. The speed can be set as "low speed – middle speed – high speed" in cycle.

### [3\*4 Character Buttons]



You can enter values and symbols of the key, "." is the decimal part.

### [Operation Buttons]



It can achieve corresponding operations, they are: single-step, manual motion, reset, delete, insert, switch, save, cancel & return, edit & watch, file management, parameter configuration, OK.

### [Axis Shift Buttons]



It can move each axis of industrial robot. Under teaching mode, only axis shift button is pressed, the industrial robot will move according to set coordinate system and manual speed. Before moving, please make sure the coordinates and manual speed are correct.

## Chapter III Usage & Operations

### 3.1. Physical Key Codes

Encodes of button consist of row and column combination. Key value = row No. (1-10) x 10 + column No. (1-5).

When the button is pressed, HMI will automatically send the physical button to the controller, then controller can detect the physical button. If you need to use virtual keys, there is one Key transformation list in RTSys – HMI (RTSys / ZDevelop has standard 300X button transformation list.

**Note:**

For customized one or others, please contact us, because different positions are with different values.

#### --ON / Pause / Emergency Stop--


Button	Button Encode
ON	1
Emergency Stop	5

#### --Board Buttons--

**[Function Buttons]**

Button	Button Encode
F1	11
F2	12
F3	13
F4	14
F5	15

**[Cursor Buttons]**

Cursor Button	Direction	Button Encode
	Up	22
	Down	32
	Left	21
	Right	23













**[Speed Config Buttons]**

Speed Config Button	Button Encode
Increase Speed	41
Decrease Speed	43


**[3\*4 Character Buttons]**

3*4 Character Keys	Button Encode
1,	51
2abc	52
3def	53
4ghi	61
5jkl	62
6mno	63
7pqrs	71
8tuv	72
9wxyz	73
0	81
* #	82
+/-	83

**[Operation Buttons]**

3*4 Character Keys	Button Encode
	84
	85
	91
	92
	93
	94
	95
	101
	102
	103
	104
	105

**[Axis Shift Buttons]**

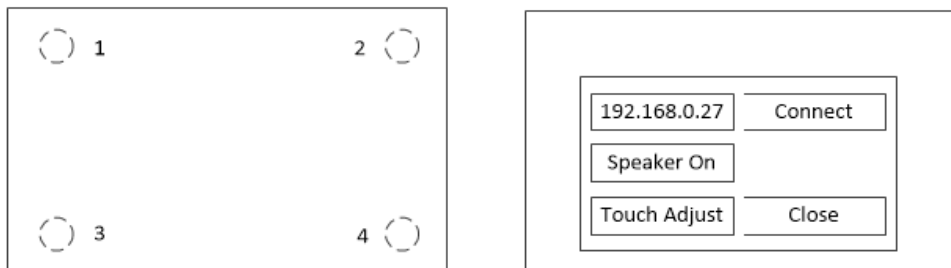
Button Encode	Operation Buttons	Button Encode
24		25
34		35
44		45
54		55
64		65
74		75



## 3.2. Touch Correction

### ➤ Method 1

Click continuously in a "Z-shaped" manner (upper left, upper right, lower left, lower right, upper left, upper right, lower left, lower right) until the settings window pops up to wake up the screen. You can perform touch calibration (Touch Adjust), controller IP modification, speaker (Speaker On) operations, etc.



### ➤ Method 2

After connected RTSys/ ZDevelop, trigger correction by TOUCH\_ADJUST command.

### ➤ Method 3

When RTSys / ZDevelop is not connected, press 16 (F6) key, and then press 11 (F11) button at the same time.

Follow the English instructions on the display (Touch crosshair to calibrate), trace the "cross" icon on the screen and click on it one by one.

## 3.3. Operation Steps

### --Connect to Power--

Please refer to above [power interface](#), red & DC24V +, black & DC24V -. DB15 male is connected to teach pendant DB15 female.

## --Touch Calibration--

Please refer to above ["Touch Correction"](#).

## --Connect to Controller--

➤ **Method 1: connect HMI and controller directly, then HMI identifies controller IP.**

- 1) Connect controller and PC by serial / ethernet. And connect controller to RTSys / ZDevelop, then download the program into ROM. After that, disconnect controller and PC.
- 2) Use network cable to connect HMI and controller. When communicating by ethernet, please make sure HMI IP and controller IP are in same network segment. If not, you need to modify controller IP (controller default is 192.168.0.11, HMI default IP is 192.168.0.10)
- 3) Do touch calibration: after powering on, you can click the four corners of the screen of the teaching box in a Z-shaped order twice in a row to wake up the screen and pop up the setting window.
- 4) In popped window, it will automatically obtain connected controller IP address, select needed correct IP, then click "Connect".

**Note: if HMI doesn't scan controller IP by method 1, please refer to method 2.**

➤ **Method 2: connect HMI to PC at first, then do connection of HMI and controller.**

- 1) Use interchanger to connect HMI, controller, and PC (you can view "[system configuration](#)", make sure their IP addresses are in same segment.
- 2) Connect controller to RTSys / ZDevelop, then download the program into ROM. After that, disconnect.
- 3) Do touch calibration: after powering on, you can click the four corners of the screen of the teaching box in a Z-shaped order twice in a row to wake up the screen and pop up the setting window.
- 4) Connect HMI and RTSys / ZDevelop (HMI IP and PC IP are in same network segment).
- 5) In RTSys / ZDevelop "output" window, send IP\_CONNECT = controller IP command.

Then, HMI will show HMI interface content, which means HMI and controller are connected successfully.

- 6) If you want HMI program to update in real-time. After step 5, disconnect HMI with RTSys / ZDevelop, then connect controller to RTSys / ZDevelop, at this time, connect them (controller & PC & HMI) through interchanger. When the program changed, download the program into controller, in this way, real-time can be achieved.

For RTSys/ ZDevelop, it also can simulate this HMI.

### 3.4. How to Use Physical Encodes

By binding this component to the physical buttons of the HMI, customized physical button actions can be achieved.

#### --How to Use--

Click RTSys / ZDevelop "Control Class" – "Control" – "Key button", then put this component to suitable position, open the component's property window, find "Bind PhyKey", and select needed one. Then in "action", choose needed actions. In this way, you can achieve corresponding actions by real hardware button, that is, you bind it with one button of physical key, actions selects "call sub", when you pressed the HMI button, it will call corresponding sub function.

#### ➤ Example 1

- 1) Bind "run" control with "ON" physical button. In HMI file, click "run" control, then in its property window, bind it with "1" (1 is HMI "ON" button).



- 2) Download the program again to run it. Set "custom parameter", and after selecting the axis, you can use "ON" "pause" buttons on HMI to replace touch screen button, that is, control selected axis' motion. In touch screen "motion state" window, you can view current axis' position and speed.



## ➤ Example 2

1) Bind "+" control with "X+" physical button. Click "motion control" window "+" of manual, then in its property window, bind it with "25" (25 is HMI "X+" button).

Bind "-" control with "X-" physical button. Click "motion control" window "-" of manual, then in its property window, bind it with "24" (24 is HMI "X-" button).



2) Download the program again to run it. Set "custom parameter", and after selecting the axis, you can use "X+" "X-" buttons on HMI to replace touch screen X+ & X- buttons, that is, control selected axis' forward and reverse motion. In programming design, this movement is a triggered movement, that is, when an external force is applied (such as pressing a button), the movement will be started, and when the external force is removed (such as releasing the button), the movement will stop. In touch screen "motion state" window, you can view current axis' position and speed.



## Chapter IV Maintain

The correct operation and maintenance of the device can not only guarantee and extend the life cycle of the equipment itself, but also take technical management measures according to the pre-specified plan or the corresponding technical conditions to prevent equipment performance degradation or reduce equipment failure.

### 4.1. Regular Inspection and Maintenance

The working environment has an impact on the device. Therefore, it is usually inspected regularly based on the inspection cycle of 6 months to 1 year. The inspection cycle of the device can be appropriately adjusted according to the surrounding environment to make it work within the specified standard environment.

Check item	Check content	Inspection standards
power supply	Check whether the voltage is rated	DC 24V ( -5%~5% )
surroundings	Whether the ambient temperature is within the specified range (when installed in the cabinet, the temperature inside the cabinet is the ambient temperature)	0°C - 55°C
	Whether the ambient humidity is within the specified range (when installed in the cabinet, the humidity in the cabinet is the ambient humidity)	10%-95% non-condensing
	Is there direct sunlight	No
	With or without droplets of water, oil, chemicals, etc.	No
	Whether there is dust, salt, iron filings, dirt	No
	Whether there is corrosive gas	No
	Whether there are flammable and explosive gases or articles	No
	Whether the device is subjected to	Should be within the range of

	vibration or shock	vibration resistance and impact resistance
	Is the heat dissipation good	Keep good ventilation and heat dissipation
Installation and Wiring Status	Whether the basic unit and the expansion unit are installed firmly	The mounting screws should be tightened without loosening
	Whether the connecting cables of the basic unit and the expansion unit are fully inserted	The connection cable cannot be loosened
	Are the screws of the external wiring loose	Screws should be tightened without loosening
	Whether the cable is damaged, aged, cracked	The cable must not have any abnormal appearance

## 4.2. Common Problems

Problems	Suggestions
It can't show HMI interface normally.	1. Resolution is set incorrectly, please set it according to hardware requirements.
The screen is not bright, the brightness is not enough.	1. Check HMI power, it should be powered enough.
It can't communicate	1. Check the network cable.
Click one, but wrong position	1. Please do HMI calibration again.
POWER led is ON, RUN led is OFF.	1. Check whether the power of the power supply is sufficient. At this time, it is best to supply power to the HMI alone, and restart it after adjustment. 2. Check whether the ALM light flickers regularly (hardware problem).
RUN led is ON, ALM led is ON.	1. Program running error, please check RTSys / ZDevelop error code, and check application program.