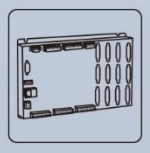
Zmotion®
正运动技术

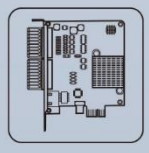
做更好用的运动控制，智造美好生活
Better Motion Control, Smarter Life

Teach Pendant ZHD301X

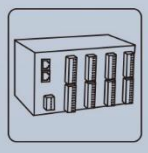
Vision Motion Controller



Motion Controller



Motion Control Card



IO Expansion Module

Teach Pendant

Statement

Thank you for choosing our Zmotion products. Please be sure to read this manual carefully before use so that you can use this product correctly and safely. Zmotion is not responsible for any direct or indirect losses caused by the use of this product.

The information in this manual is for reference only. Due to design improvements and other reasons, Zmotion reserves the right of final interpretation of this information! Contents are subject to change without prior notice!

➢ Notes

In order to prevent possible harm and damage caused by incorrect use of this product, the following instructions are given on matters that must be observed.

■ Danger

Do not use it in places with water, corrosive or flammable gases, or near flammable substances.	May cause electric shock, fire, damage, etc.
When installing or disassembling, make sure the product is powered off.	
Cables should be connected securely, and exposed parts that are energized must be insulated by insulators.	
Wiring work must be performed by professionals.	

■ Notes

It should be installed within the specified environmental range.	May cause damage, mis-operation, etc.
Make sure there are no foreign objects on the product hardware circuit board.	
After installation, the product and the mounting bracket should be tight and firm.	
After installation, at least 2-3cm should be left between the product and surrounding components for ventilation and replacement.	
Never disassemble, modify, or repair it by yourself.	

Content

Chapter I Production Information

1.1. What is ZHD301X

ZHD301X is one touch screen teach pendant that can show interface by network. Please note it must be used together with the controller that supports HMI function.

Teach pendant has the DC24V power supply, and it is with 480*272 resolution true color displayer, also there are 28 keys.

- Through communicating with controller scripts, show and operate all kinds of interfaces.
- Support drawing: you can enter Chinese & English characters, line, arc, image.
- There are 28 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 manipulators.
- Support touch screen, key buttons are used together with touch screen.
- Resolution: 480*272

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

1.2. ZHD301X Specification Parameters

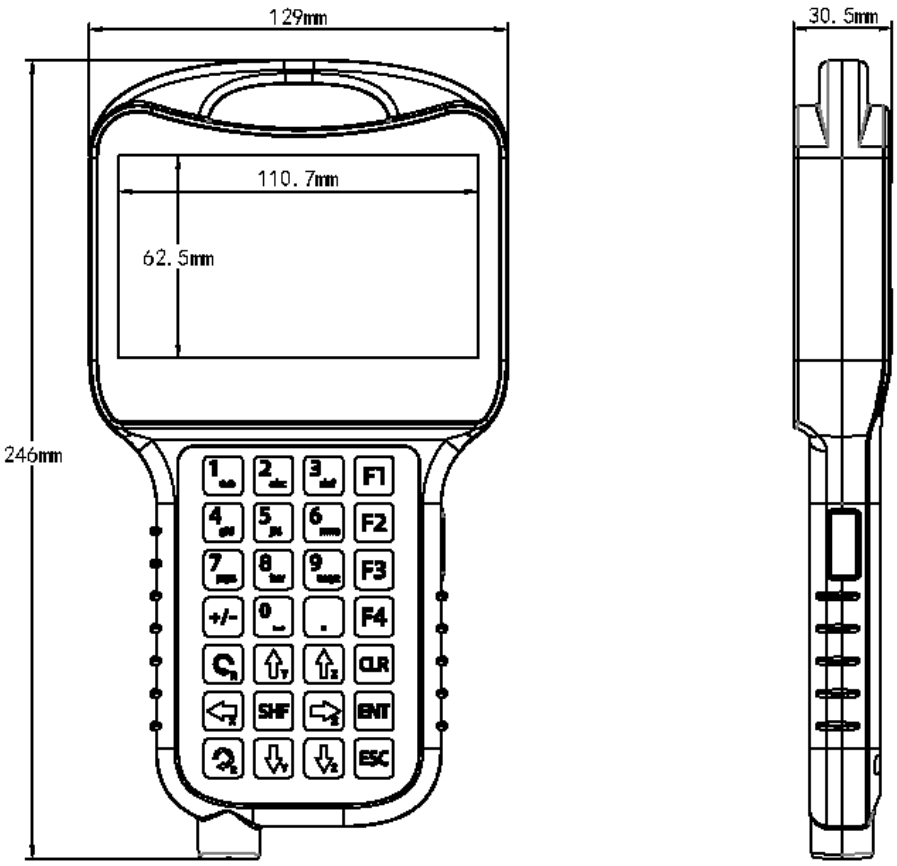
--Product Parameters--

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

--Other Parameters--

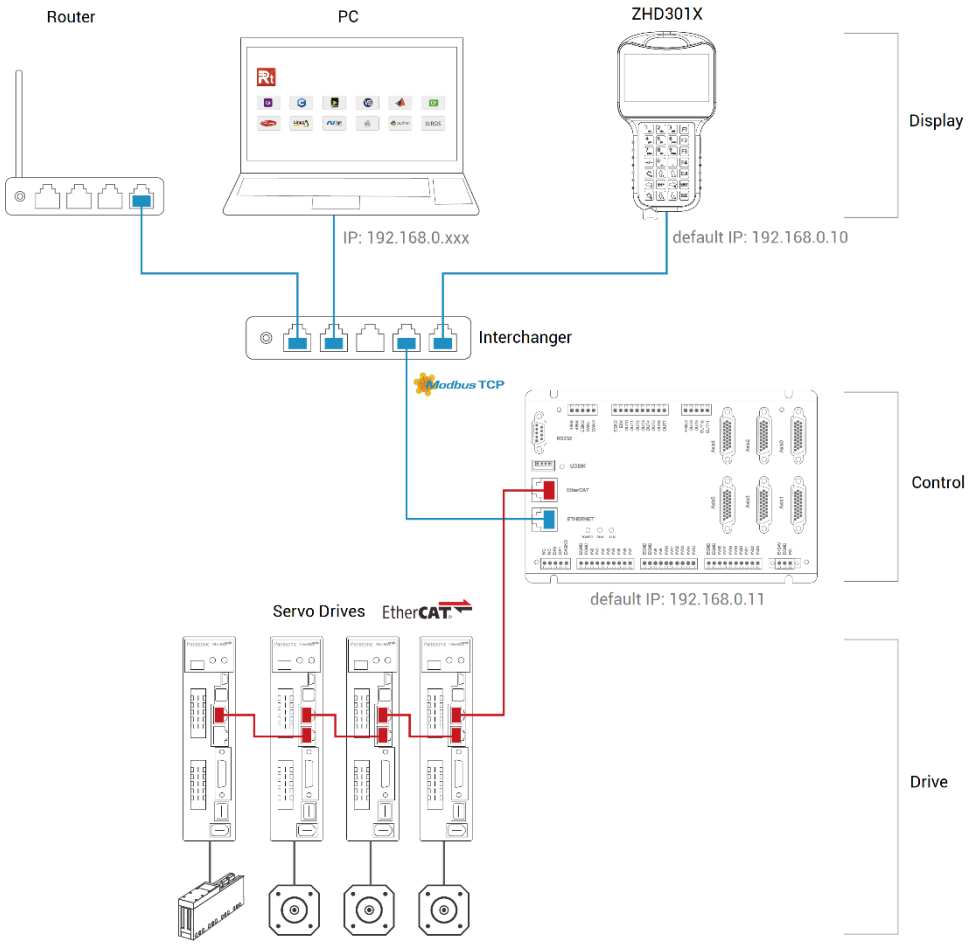
Item	Description
Power Supply	DC24V
Max Power Consumption	1.3W
Size	129mm*246mm*30.5mm
Weight	463.3g
Work Temperature	0 to 50°C
Storage Temperature	-20 to 60°C

1.3. ZHD301X Size



Unit: mm

1.4. System Configuration



1.5. Order Information

Item	Model	Specification Description
Teach Pendant	ZHD301X	2-meter connecting line (standard)

Chapter II ZHD301X Appearance

2.1. Whole Layout

No.	Interface	Description
①	Display screen (touch screen)	Touch screen of 480*272 resolution.
②	Function button	Button on board, used together with physical key encodes.
③	3*4 Character button	
④	Operation button	
⑤	Axis shift button	
⑥	USB	Controller USB expansion interface

2.2. Touch Screen Points Coordinates

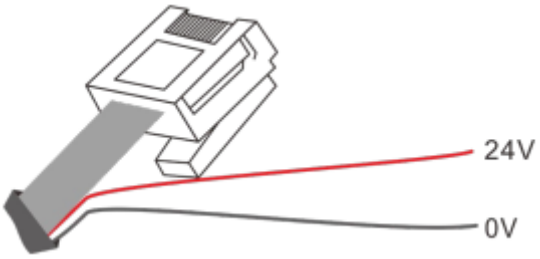
It is 480*272, the coordinate origin is at upper left corner.

2.3. Hardware Interfaces

--Power Interface--

ZHD301X uses 24V DC power.

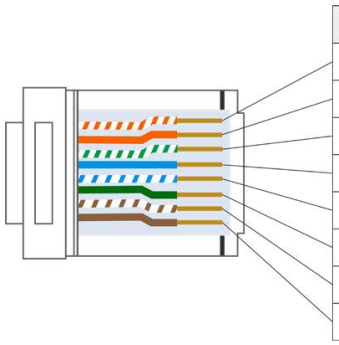
There are 2 cables on the network crystal head, they represent the HMI power cable, red one is 24V power +, black one is 24V power -.



--RJ45 Crystal Head--

A. Specification

PIN Definition	Item	Description
	Communication protocol	MODBUS_TCP

<table>
<tr>
<td> 
<table>
<tr><th>PIN</th><th>Signal</th><th>Description</th></tr>
<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>
</table>
</td>
<td>Communication velocity</td>
<td>100Mbps</td>
</tr>
<tr>
<td rowspan="2"></td>
<td>Default IP</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td>Communication cable</td>
<td>Category 5e STP</td>
</tr>
</table>

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.

--U Disk Interface--

ZHD301X provides one USB communication interface, which can connect U disk device for ZAR program updating, controller data importing and exporting, file 3 (Z3P) execution.

Please note it needs the firmware support.

2.4. Physical Key Buttons

ZHD301X has 28 buttons, which are used together with physical button encoded. And functions can be customized. You can view “Chapter III” or HMI Programming manual.

The buttons are located on the front, they are functional keys, 3*4 character string keys, operation keys and axis shift keys.

[Function Buttons]

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

[3*4 Character Buttons]

You can enter values and symbols of the key, “.” is the decimal part, “+/-” are positive / negative symbols.

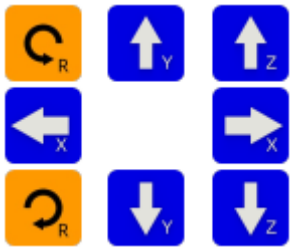
[Operation Buttons]

It can achieve some operations for the program, like, switch, confirm, clear, exit / back.

- SHF: switch

- ENT: enter, confirm
- CLR: clear
- ESC: exit / back

[Axis Shift Buttons]



It can move each axis of industrial robot. Under the 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 301X button transformation list.

Note:

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

[Function Buttons]

Button	Button Encode
F1	11
F2	12
F3	13
F4	14

[3*4 Character Buttons]

3*4 Character Keys	Button Encode	3*4 Character Keys	Button Encode	3*4 Character Keys	Button Encode
1 ۹۵	41	2 abc	31	3 def	21
4 ghi	42	5 jkl	32	6 mno	22
7 pqrs	43	8 tuv	33	9 wxyz	23
+/-	44	0 ␣	34	.	24

[Operation Buttons]

3*4 Character Keys	Button Encode	3*4 Character Keys	Button Encode
	36		16
	15		17

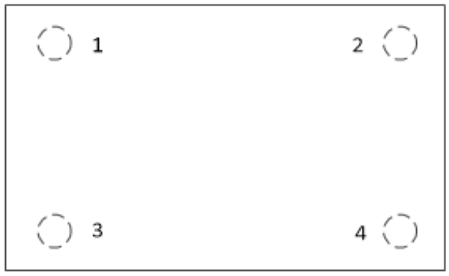
[Axis Shift Buttons]

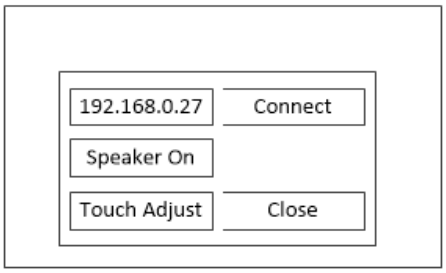
Operation Keys	Button Encode	Operation Keys	Button Encode
	46		26
	35		37
	25		27
	45		47

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 wired with the controller and connected to RTSys, trigger the correction by TOUCH_ADJUST command.

Then 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.

RTSys is one Zmotion development software, which can program motion control and machine vision codes, and can design HMI interface.

3.3. Operation Steps

--Connect to Power--

Please refer to above power interface, red & DC24V +, black & DC24V -.

--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 with method 1, please refer to method 2.

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

1) Connect controller to RTSys, then download the HMI program into ROM. After that, disconnect the controller with RTSys.

2) Connect HMI to RTSys, while connecting, controller IP, HMI IP, and the PC IP should be in same network segment.

3) In RTSys “output” window, send IP_CONNECT = controller IP command.

4) Wire the HMI with the controller by one cable, at this time, the interface will appear in ZHD301X HMI.

5) If you want HMI program to update in real-time, you can wire them (HMI, controller, PC) by one interchanger, which can be referred from 1.4 system configuration). In this way, when the program changed, download the program into controller again, corresponding new contents will be shown in HMI also.

RTSys also supports simulation, that is, you could use RTSys software to simulate ZHD301X teach pendant.

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 “Control Box” – “Control” – “Key button”, then put this component at 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 “F1” physical button. In HMI file, click “run” control, then in its property window, bind it with “11” (11 means the key value of ZHD301X F1).

2) Redownload the program to run it. Set “custom parameter”, and after selecting the axis, you can press ZHD301X board F1 key to control the selected axis's motion, then in the screen “motion state” window, you can view current axis' position and speed.

➢ **Example 2**

1) Bind "+" control with "" physical button. Click screen "+", then in its property window, bind it with "26" (26 is the key value of ZHD301X "" button).

Bind "-" control with "" physical button. Click screen "-", then in its property window, bind it with "46" (46 is the key value of ZHD301X "" button).

2) Redownload the program to run it. Set “custom parameter”, and after selecting the axis, you can operate ZHD301X keys “ ” “ ” to control selected axis' forward and reverse motions. 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.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自定义参数
脉冲当量 10
起始速度 10
运行速度 100
加速度 1000
减速度 1000
s曲线时间 10
运动特性设置
当前轴 X轴
轴选择 X Y
运动模式 持续
当前状态 运动
运动方向 正向
寸动距离 0.000
运动控制
手动运动 + -
运行 暂停 位置清零
运动状态
当前位置 151.600
当前速度 100
1 2 abc 3 def F1
4 ghi 5 jkl 6 mno F2
7 pqrs 8 tuv 9 wxyz F3
+/- 0 . F4
CLR
SHF
ENT

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 - 50°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 error code, and check application program.