

# User Operation Manual

## TP2 Teach Pendant



## Publication List

| Product model | Company                                 |
|---------------|-----------------------------------------|
| TP2           | Shanghai Panelmate Electronics Co., LTD |

## Review/Approval

|           | Name/function/Company                               | Signature                                                                            |
|-----------|-----------------------------------------------------|--------------------------------------------------------------------------------------|
| Draw Up   | FZJ/Document control engineer/Panelmate electronics |   |
| Approval  | ZJC/Design engineer/Panelmate electronics           |   |
| Authorize | JJY/General manager/Panelmate electronics           |  |

## other

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## Declaration Of Conformity

These restrictions are for system operation in a commercial environment from harmful interference in the operation of the system in a commercial environment. This device generates, uses and transmits radio frequency energy. If not properly installed and used correctly to the manual instructions, it may cause harmful interference to radio communications. However, even if the installation and use of the manual instructions are followed, there is no guarantee that there will be no interference. If this device will cause harmful interference with radio or television signal reception, the user can confirm by turning the device on and off. When the device produces harmful interference, the user can take the following measures to solve the interference problem:

1. Adjust the direction or position of the receiving antenna.
2. Increase the distance between this device and the receiver.
3. Plug the power connector of this device into a power socket with different circuit from the receiver.
4. For technical support, consult your dealer or an experienced radio technician.

## Technical Support And Service

1. For the latest information and documentation of this product, please visit our official website [www.panelmate.cn](http://www.panelmate.cn)
2. If you need technical support, please contact your local distributor, sales representative customer service center. Before technical consultation, the user must collect the following product information:
  - Product name and serial number
  - Description of peripheral additional devices
  - Description of the user software (operating system, version, application software, etc.)
  - A complete description of the problem with the product
  - The full content of each error message

## Safety Instruction

1. Before installing, wiring, operating, and checking the product, it is necessary to carefully read this manual and related manuals introduced in the manual, and operate the product correctly with full attention to safety.
2. Please keep this user manual for future reference.
3. Please unplug the power cord from the socket before cleaning the device with a damp rag. Do not use liquid or decontamination sprays to clean the equipment.
4. For devices that use power cords, there must be an easily accessible power socket around the device.
5. Ensure that the device is placed on a reliable surface before installation. An unexpected fall may damage the device.
6. Before you connect the device to the power socket, make sure that the power socket voltage meets the requirements.
7. Please place the power cord in a position where people cannot easily trip, and do not cover any debris in the power line.
8. Please pay attention to all warnings and attention signs on the device.
9. If you do not use the device for a long time, please disconnect it from the power socket to avoid the device being damaged by excessive voltage fluctuations.
10. Do not allow any liquid to flow into the equipment, you must disconnect to avoid fire or short circuit.
11. Please do not turn on the device by yourself. To ensure your safety, disconnect all external power supplies used by the system before turning on the device. Turn on the device by a certified professional engineer with sufficient electrical knowledge.

In case of the following situations, please be repaired by professional personnel:

- The power cord or plug is damaged
- There is liquid flowing into the equipment
- The device does not work properly, or you cannot make it work properly through the user manual
- Equipment falls or is damaged
- The equipment has obvious appearance damage

Please do not store the device in an environment beyond our recommended temperature range, that is, not lower than -30 ° C or higher than 70 ° C, otherwise it may damage the device.

## Disclaimer

All components are provided with specific hardware and software configurations are suitable for application software. Unauthorized modification and alteration of hardware or software configuration beyond the scope of the document is prohibited, otherwise Shanghai Panelmate Electronics Co., Ltd. shall not be liable for any resulting liability arising therefrom.

The following actions are not within the scope of responsibility of the Company:

- Failure to comply with the provisions of this document
- Improper use
- Operated by untrained personnel
- Unauthorized replacement of parts

## Employee Qualifications and Responsibilities

All operations involving software and hardware should only be performed by qualified personnel with knowledge of control and automation engineering. Qualified personnel must understand the management of control teams and related networks.

All interventions must have knowledge of control planning, and qualified personnel must be familiar with existing standards and guidelines for automated environments.

The operator must ensure that:

- Products are used only as intended
- The product runs in good condition and works normally
- Products are operated, maintained and repaired only by qualified and authorized personnel
- Regularly receive guidance from personnel on safety and be familiar with the operating manual, especially the safety instructions contained in this document
- The operating manual is in good condition, complete and always available for reference at the product location

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# Chapter 1 Overview

## 1.1 File Content

This document contains the information you need to use the product during the applicable phase of the product's life cycle, as follows:

- Specification and model
- Product size
- Interface definition
- Mounting method
- Safety instruction

## 1.2 Safety Notes

For safety, the following icons are used in this document to provide you with more security information tips:

| Icon                                                                                | Description                                                                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Warning: Indicates a potentially hazardous situation that, if not avoided, will result in death, serious injury, or significant property damage |
|  | Danger: indicates an imminent hazardous situation that, if not avoided, will result in death, serious injury, or significant property damage    |
|  | Tip: Indicates important information                                                                                                            |



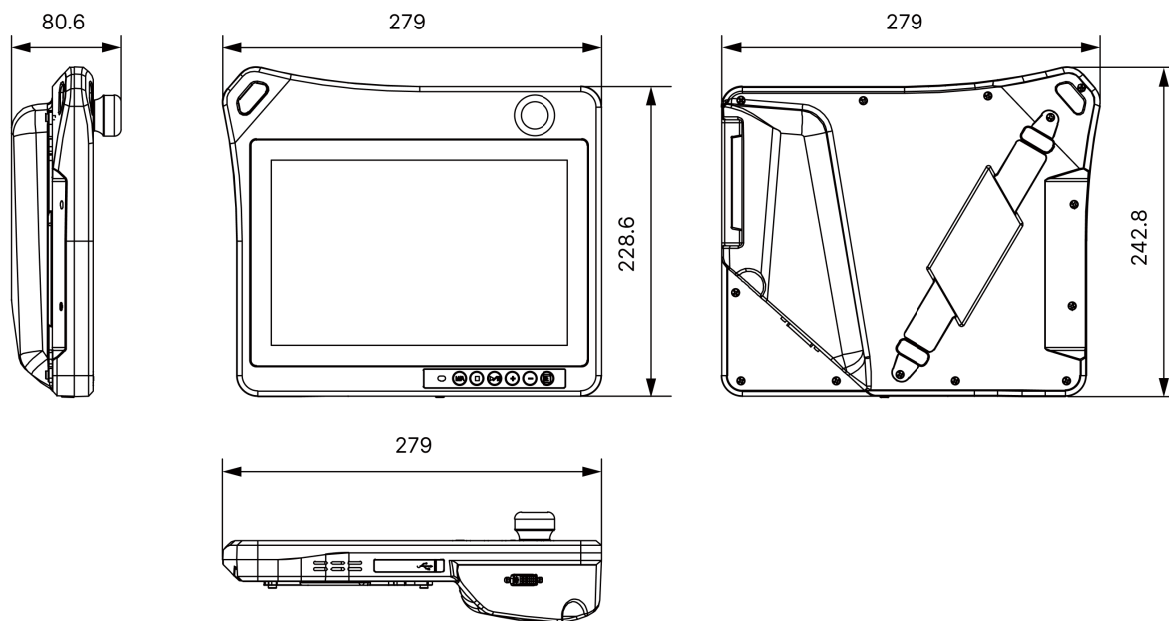
## 2.4 Product Specification

| Description | TP2 Teach Pendant  |                                                                                          |
|-------------|--------------------|------------------------------------------------------------------------------------------|
| Routine     | Housing            | Front panel: aluminium magnesium alloy ; Rear cover: ABS+PC                              |
|             | Interface          | Emergency stop+24V+3-digit Enable button+IDD-LINK4 signal+18P button signal              |
| Power       | Input Voltage      | DC 24V                                                                                   |
|             | Power              | 5W                                                                                       |
| Physical    | Dimension (WxHxD)  | 279mm x 228.6mm x 80.6mm ( 10.98" x 9" x 3.17" )                                         |
|             | NetWeight          | 1.4kg                                                                                    |
| LCD         | Display Type       | 10.1" WXGA TFT                                                                           |
|             | Resolution         | 1280 x 800                                                                               |
|             | Colors             | 16.7M                                                                                    |
|             | Active Area (WxH)  | 216.96mm x 135.60mm ( 8.54" x 5.34" )                                                    |
|             | Backlight          | LED                                                                                      |
|             | MTBF (hour)        | 30000hrs                                                                                 |
|             | Pixel Pitch (HxV)  | 0.1695 x 0.1695                                                                          |
|             | Luminance(cd/m2)   | 400cd/m2                                                                                 |
|             | Contrast Ratio     | 800: 1                                                                                   |
|             | Viewing Angle      | ( L ) 85 / ( R ) 85 / ( U ) 85 / ( D ) 85                                                |
| Touchscreen | Touch Type         | Single point resistive touchscreen & Multi-point capacitive touchscreen                  |
|             | Light Transmission | >85%                                                                                     |
|             | Controller         | USB interface                                                                            |
|             | Driver Support     | Win7, Win8, Win10, Win11, Linux, etc                                                     |
|             | Multi-touch        | 10 points                                                                                |
|             | Surface Hardness   | Resistive touchscreen: Mohs' Number $\geq$ 3H<br>Capacitive touchscreen: Mohs' Number 7H |

|                    |                       |                                                                                               |
|--------------------|-----------------------|-----------------------------------------------------------------------------------------------|
| <b>Environment</b> | Operating Temperature | -20~70℃                                                                                       |
|                    | Storage Temperature   | -30~70℃                                                                                       |
|                    | Relative Humidity     | 5~95% (Non condensation)                                                                      |
|                    | Shock                 | Operating 10G peak acceleration(11 ms duration), follow IEC 60068-2-27                        |
|                    | Vibration             | Operating Random Vibration Test 5~500Hz, 1Grms@with HDD;2Grms@with SSD, follow IEC 60068-2-64 |
|                    | EMC                   | CE/FCC Class A                                                                                |
|                    | Protection level      | IP54                                                                                          |

## 2.5 Product Size

Size diagram of 10.1" TP2 demonstrator:



## 2.6 Product Interface Definition

Interface definition is shown in Figure 2-6-1,2-6-2:



Figure 2-6-1

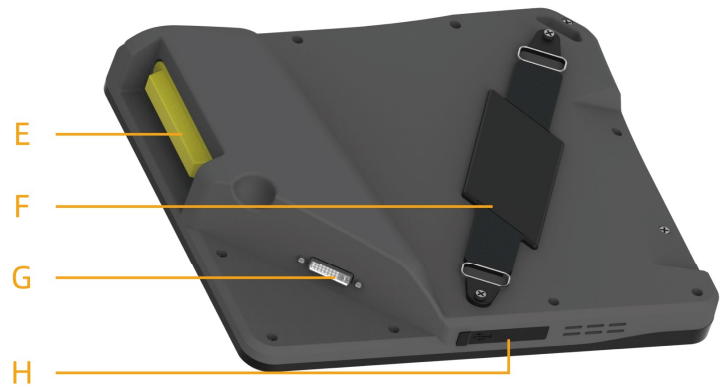


Figure 2-6-2

A: Optional shoulder strap holes

B: Emergency stop

C: 10.1" Display screen

D: Shortcut key

E: 3-digit enable button

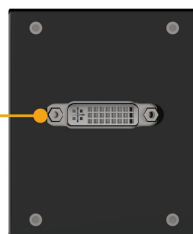
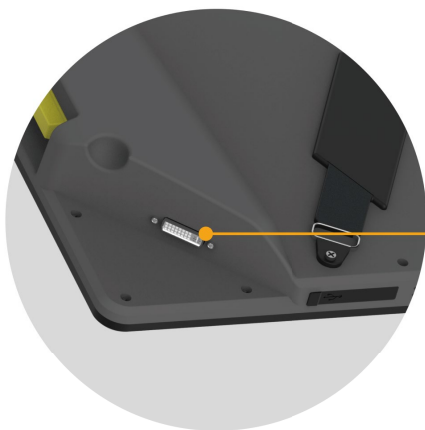
F: Auxiliary hand strap

G: DVI port Used for wiring box connection

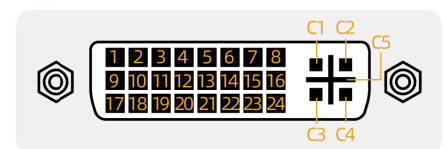
H: USB interface

### 2.6.1 DVI-D In Input Port

The TP2 teach pendant provides a DVI-D In input interface for connection to the TP2-JB external junction box. (For specific connection between wiring box and teach pendant interface definition, see Chapter 3 Connection and wiring.)



TP2-JB Wiring Box



DVI-D In

## Pin Assignment Introduction

| DVI-D In Interface pin definition |           |       |         |
|-----------------------------------|-----------|-------|---------|
| Pin                               | Signal    | Pin   | Signal  |
| Pin1                              | D0 D2 N   | Pin16 | D0 HPD  |
| Pin2                              | D0 D2 P   | Pin17 | D0 D0 N |
| Pin3                              | GND       | Pin18 | D0 D0 P |
| Pin4                              | EMG1      | Pin19 | GND     |
| Pin5                              | EMG2      | Pin20 | USBH N  |
| Pin6                              | D0 SCL    | Pin21 | USBH P  |
| Pin7                              | D0 SDA    | Pin22 | GND     |
| Pin8                              | USBH VBUS | Pin23 | D0 CK P |
| Pin9                              | D0 D1 N   | Pin24 | D0 CK N |
| Pin10                             | D0 D1 P   | C1    | EN1     |
| Pin11                             | GND       | C2    | 24V IN+ |
| Pin12                             | EMG3      | C3    | EN2     |
| Pin13                             | EMG4      | C4    | 24V IN+ |
| Pin14                             | D0 5V     | C5    | 24V IN- |

### 2.6.2 Shortcut key

The TP2 teach pendant provides a row of thin-film shortcut keys located below the front right side of the educator.



| Key definition | Defined keyboard shortcuts |
|----------------|----------------------------|
| M/A            | [Ctrl] + [Shift] + [M]     |
| Stop           | [Ctrl] + [Shift] + [S]     |
| Play/pause     | [Ctrl] + [Shift] + [P]     |
| +              | [Ctrl] + [Shift] + [ ] ]。  |
| -              | [Ctrl] + [Shift] + [ [ ]   |
| Error log      | [Ctrl] + [Shift] + [E]     |



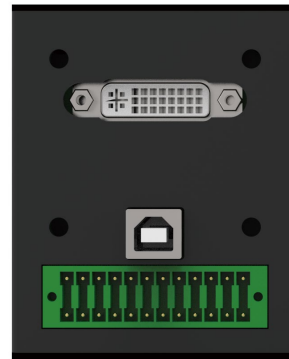
## Chapter 3 Connection And Wiring

### 3.1 Wiring Box Overview

TP2-JB wiring box is an external junction box designed for easy connection with external cables.



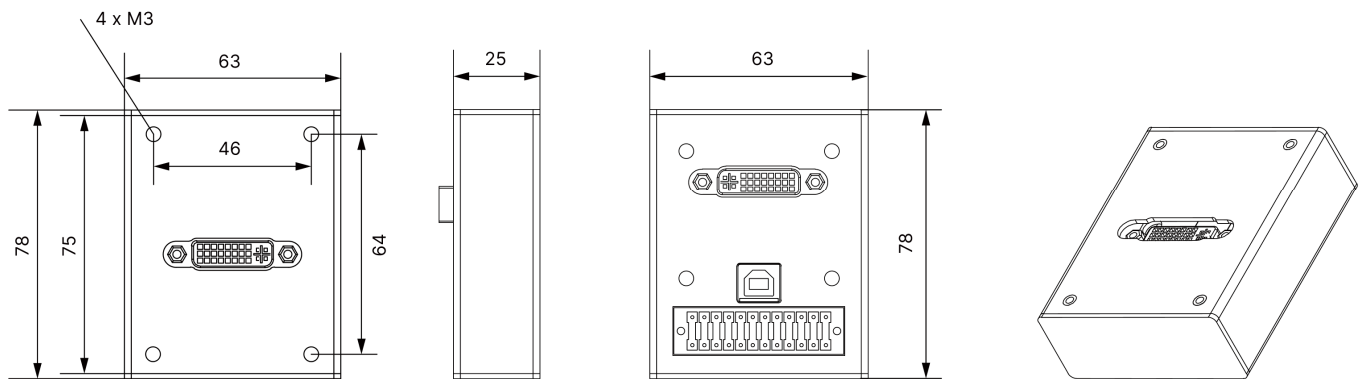
TP2-JB Front View



TP2-JB Rear View

### 3.2 Wiring Box Size

TP2-JB teach pendant wiring box size diagram:



### 3.3 Wiring Box Interface Definition

The interface definition is shown in Figure 3-3-1,3-3-2:

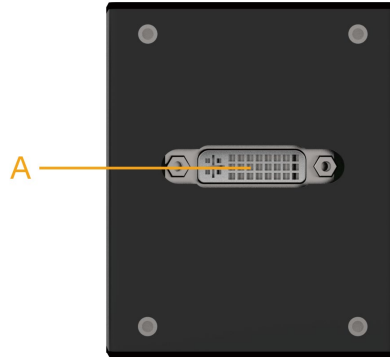


Figure 3-3-1

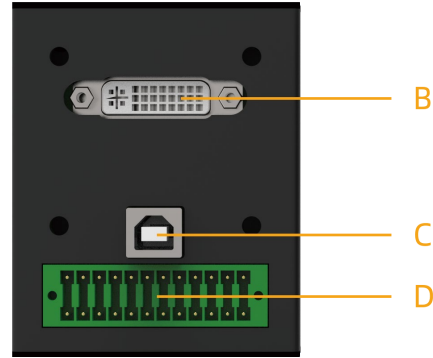
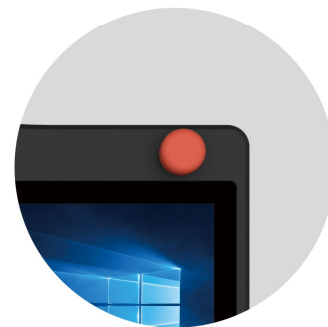
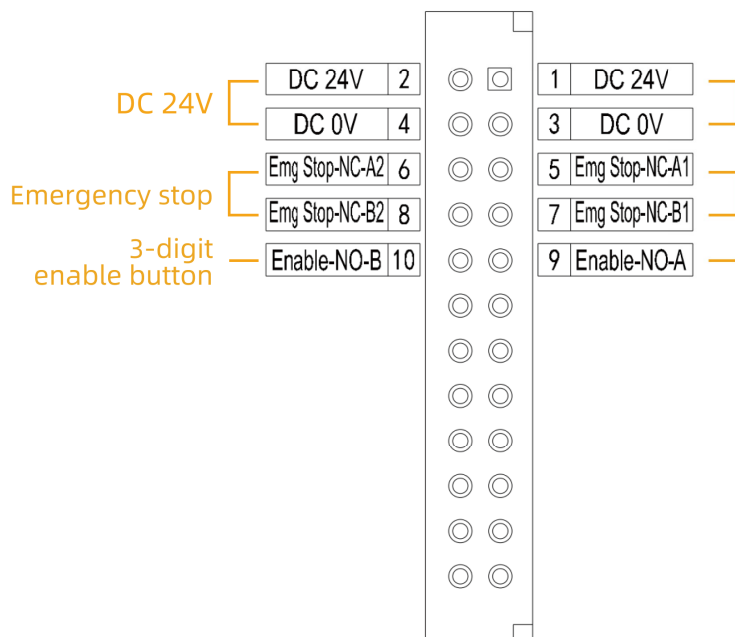
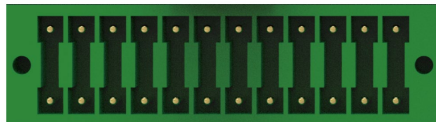


Figure 3-3-2

A: DVI Out    B: DVI-D In    C: USB In    D: 24Pin DIO

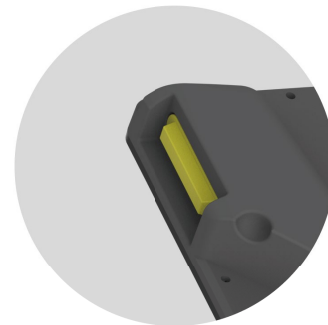
#### 3.3.1 24pin DIO Pin Definition

TP2-JB wiring box provides a 24-pin terminal defined as follows:



#### Emergency stop

Located in the upper left corner of the front of TP2, in case of emergency, press the emergency stop button to stop all actions. To reset the button, restore the default.

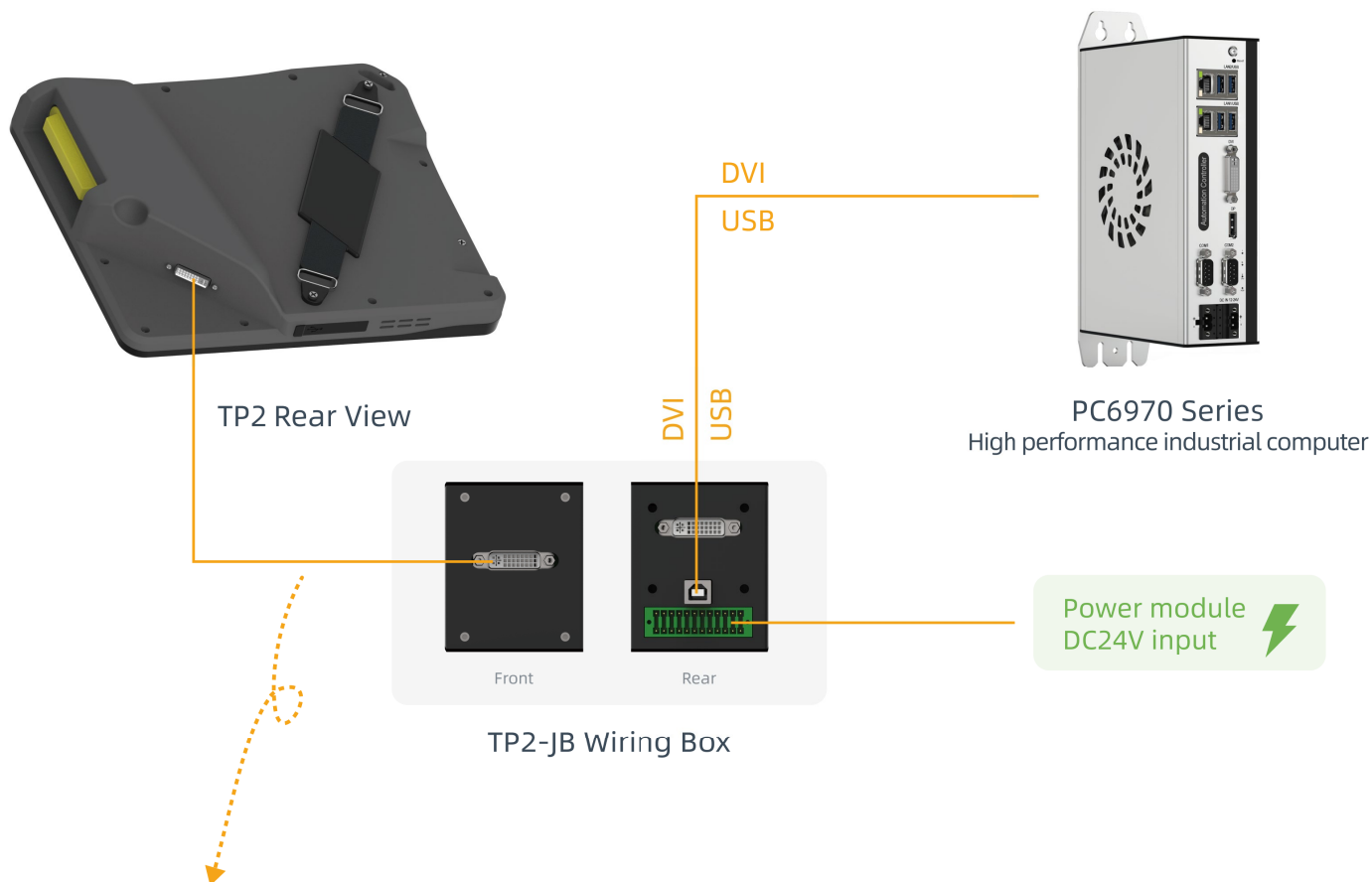


#### 3-digit enable button

It turns the robot on or off. Make sure the two circuits are synchronized with the two outputs of the teach pendant.

## 3.4 Wiring And Connection

The wiring and connection of the TP2 teach pendant are as follows:



- DVI to DVI full-pin external cable: used to connect the teach pendant to the wiring box, provide signals and power for the teach pendant.



| External cable | Optional length |
|----------------|-----------------|
| TP2-CB-3       | 3m              |
| TP2-CB-5       | 5m              |
| TP2-CB-10      | 10m             |

## Chapter 4 Installation instructions

Follow these installation instructions when installing and using the network and software.

### 4.1 Install

This product is TP2 teach pendant , before installation should pay attention to:

- Do not work on live equipment. Power off the device before installation, troubleshooting, or maintenance. Protect the device from accidental opening.
- Comply with the relevant accident prevention regulations for your machine (e.g. BGVA3, electrical systems and equipment).
- Ensure that connections comply with standard to avoid risks to personnel. Ensure that data and power cables are layout in a standard manner and that pins are properly distributed.
- Follow the relevant EMC guidelines for your application.
- Avoid polarity reversal of data and power cables, which may damage the device.
- Devices, including electronic components, may be damaged by electrostatic discharge upon contact. Comply with DIN EN61340-5-1/-3 safety measures to prevent electrostatic emissions.

#### 4.1.1 Installation and Operation

The TP2 teach pendant is designed to operate in a horizontal / landscape format ,as shown in Figure 4-1-1. When operating the equipment, connect the external cable between the teach pendant and the wiring box; The wiring box and the host are also connected to the corresponding signal interface, and the power input port is connected to the 24V DC power supply (pay attention to the positive and negative polarity). ( For details, see Chapter 3 Connection and wiring )



Figure 4-1-1

## Installation instructions

- Ensure that the power supply is cut off before installation.
- Please try to avoid direct sunlight to extend the service life of the machine.
- Connect the device according to the device connection port and pay attention to the bending radius of the cable during installation to avoid a small radius.
- Ensure that the device is properly connected before switching on the power supply.

## Install

① After unpacking the box, place the teach pendant and wiring box on the table. Prepare for pre-connection.

② The TP2-CB cable is used to connect the TP2 teach pendant to the TP2-JB wiring box to provide signals and power supply for the teach pendant, as shown in Figure 4-1-2.

**Note:** For standard cable operation, the DVI cable produced by PANELMATE should be used. The cable can be selected when purchasing the teach pendant.



Figure 4-1-2

③ Connect the corresponding interfaces of the TP2-JB external wiring box externally. For details, see Chapter 3 Connection and Wiring. The connections are shown in Figure 4-1-3, 4-1-4.

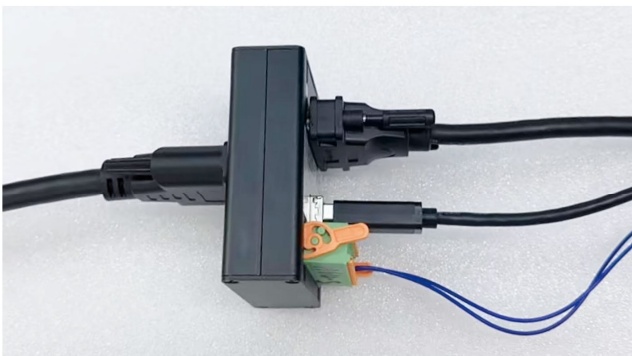


Figure 4-1-3



Figure 4-1-4

### **Matters needing attention**

- If the teach pendant is not fixed, please keep it properly after disassembly to avoid users' misoperation.
- Do not use tape or ropes to secure the enable switch.
- Keep the teach pendant out of the sun!
- Avoid extreme environments and protect the control panel from dust, moisture and heat.
- Check all switches periodically to ensure that they work properly before use.
- In the event of a drop, make sure that the functions are safe and functioning properly without damage or load.

## **4.2 Transportation and storage**

### **Transport**

Despite the robust design of this product, however these components are sensitive to strong vibrations and shocks. The display must be protected from excessive mechanical stress during transport and the original packaging should be used.

### **Storage**

The teach pendant needs to be stored in a dry environment in its original packaging at a temperature between -30°C and 70°C.

### **Package**

Follow these steps as below and disassemble the device.

1. Remove the package.
2. Keep the original packaging for future relocation.
3. Compare with your order to check that the delivery goods are complete.
4. Keep relevant documents. It contains important information used to process the product.
5. Check the device if there is visible damage during the transportation.

\* If you notice any shipping damage or inconsistencies between the goods with your order, please notify Shanghai Panelmate Electronics Co., Ltd. for after-sales service.

# Chapter 5 Safety prevention and maintenance

## 5.1 Safety Precautions

Please follow the following safety precautions.

### 5.1.1 General safety precautions

- Always follow the electrostatic precautions outlined below when turning on the TP2 teach pendant product.
- Whenever a TP2 teach pendant needs to be installed, moved or modified, ensure that the power is turned off and the power cord is disconnected.
- Do not apply voltage levels that exceed the specified voltage range. Failure to do so may result in fire or electric shock.
- When the TP2 teach pendant product is in operation, an electric shock may occur once the inside of the TP2 teach pendant product is opened.
- Do not drop or insert any object into the external interface of the TP2 teach pendant product.
- Once a large amount of dust, water or liquid enters the TP2 teach pendant product, the power should be turned off immediately, unplug the power cord, and then contact Panelmate.
- The following activities are prohibited:
  - Do not drop the device onto hard ground.
  - Do not tap or exert excessive force on the LCD panel.
  - Do not touch any part of the LCD panel with sharp objects.
  - It is forbidden to use TP2 teach pendant products in places where the ambient temperature exceeds the rated temperature.

### 5.1.2 ESD Preventive Measures

**Warning:** Failure to take ESD precautions during installation of the TP2 teach pendant product may result in permanent damage to the product and serious injury to the user.

Electrostatic discharge (ESD) may cause serious damage to the electrical components of this product. Dry climates are more likely to produce ESD. Therefore, once this product is opened and any electrical parts need to be handled, the following anti-static precautions must be strictly followed:

- Wear an ESD wrist strap: Wear a simple ESD wrist strap to prevent ESD damage to electrical components.
- Self-grounding: Any grounding conductive material should be touched before handling any electrical parts. During handling of electrical parts, any conductive substance that is grounded should always be touched.

- Use an ESD mat: When you configure electrical components or perform related operations, place them on an ESD mat. This reduces the possibility of ESD damage.
- Only touch the edge of the electrical parts: In the case of handling electrical parts, hold the electrical parts by holding the edge.

### 5.1.3 The scope of the product is not applicable

The product is not suitable for operation in the following areas:

- areas with aggressive environments, e.g. aggressive gases or chemicals

## 5.2 Maintenance and Cleaning

Please maintain and clean the product as follows.

### 5.2.1 Maintenance and Cleaning

Please read the following details before cleaning any parts or components of the product. Do not spray or spray the liquid directly on any other parts.

- No need to clean the inside to avoid liquids from getting inside.
- Be careful not to damage the internal small, removable parts.
- Please turn off the power before cleaning.
- Do not drop any object or allow any liquid to enter the product through the opening.
- When cleaning, be careful of any allergic reactions your body may have to solvents or chemicals.
- Avoid eating, drinking and smoking near work areas.

### 5.2.2 Cleaning Tool

Only specially designed products can be used to clean certain parts. In such cases, such products are clearly noted in the cleaning instructions. Here is a list of items that can be used for cleaning:

- Cloth - Although paper towels or tissue paper can be used, soft, clean cloths are recommended.
- Water or external alcohol - Cloths with water or external alcohol should be used.
- Use solvents - It is recommended not to use solvents as they may cause damage to plastic parts.
- Vacuum cleaners - Using vacuum cleaners designed for computers is one of the best cleaning methods. Dust and dirt can restrict airflow and cause corrosion of the circuit.
- Cotton swabs with external alcohol or water are an excellent tool for wiping hard-to-reach product areas.
- Foam swabs - If possible, it is best to use foam swabs and other non-lint labels for cleaning.

## Chapter 6 FAQ

### 6.1 Technical Support And Service

Please visit the official website of Shanghai Yiyao Electronics [www.panelmate.cn](http://www.panelmate.cn) and wechat official account “亿耀电子” to download the documents and related driver software, or contact the company directly for support and service.

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