

Teach Pendant

TP-100-2 for TM Plug & Play

User's Manual



V1.05

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Revision History

Rev.	Description
1.00	First released
1.01	Modify Ch2.4
1.02	Modify Ch2.3
1.03	Modify Page 29 When pressing the switch SW2+ / SW2- : Contact: Close When releasing the switch SW2+ / SW2- : Contact: Open
1.04	Modify Page 9- Page 10 (1) Pin definition of Junction Wires –From SW1 +; SW1- to SW2 +; SW2 - (2) Connector direction of Junction Wires –From SW1 +; SW1- to SW2 +; SW2 – (3) 2 -Channel Switch Button
1.05	Page18 Step 11: Installation check





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1 Product Description

TP-100-2 for TM Plug & Play is a 10.1" handheld teach pendant and well integrated with TM Robot. Users can use TP-100-2 to directly operate TM Robot from where they have the best view of the process. The handheld control unit is comfortable to use and supports left-hander.



1.1. Overview of TP-100-2

The TP-100-2 is a handheld device that controls robot movements, teaches positions, and runs robot programs. It features an ergonomic housing with safety elements, a 10.1" WXGA resolution panel, and the Multi-Touch PCAP touchscreen technology. The control unit is comfortable to use and has an hand strap.



Front

Back

1.2. Handling of TP-100-2






The TP-100-2 teach pendant is designed to operate in a horizontal/landscape format. When operating the device, make sure to connect all necessary cables from the teach pendant to the host computer.

2 TP-100-2 for TM Plug & Play

2.1. Warning and Caution symbols

The Table below shows the definitions of warning and caution levels described in each paragraph of this Manual. Pay close attention to them when reading each paragraph, and observe them to avoid personal injuries or equipment damage.




	DANGER: Identifies an imminently hazardous situation which, if not avoided, is likely to result in serious injury, and might result in death or severe property damage.
	WARNING: Identifies a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, and might result serious injury, death or significant property damage.
	CAUTION: Identifies a potentially hazardous situation which, if not avoided, might result in minor injury, moderate injury, or property damage.

2.2. Compatibility

Please use robots shipped with Hardware/Software as table below. Note: If your robot comes with a software version older than TMflow 1.76.6300, there are additional installation steps required. In this case, please contact service team.

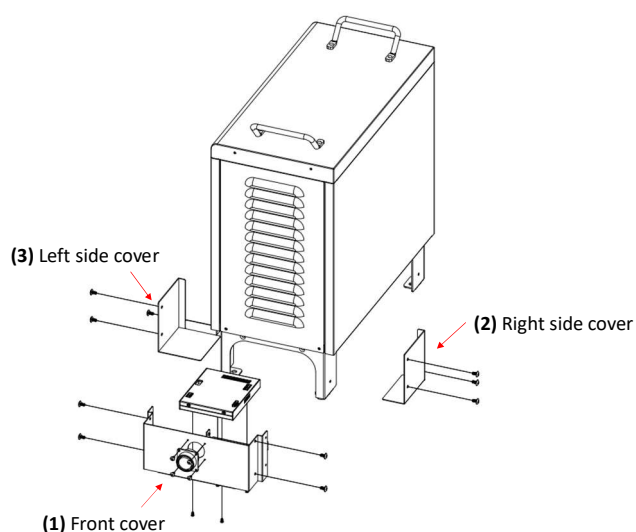
TM robot hardware version	TM robot software version
3.2 Series	TMflow 1.76.6300 and above

2.3. TP-100-2 plug & play package content

NO.	Items	Q'ty	Figure	Note
1	TP-100-2	1		
2	EXTERNAL 3M CABLE FOR TP-100-2	1		Content: 3M Cable*1 5M / 10M / 20M (option)
3	TP-100-HD-JB	1		Content: (1) Junction box*1 (2) M3*12mm screw*4 (3) Connector 12P*1 +4P*1+ 3P*1 (4) CAP*1 (Option)
4	TP-100-2 TM Plug & Play Accessory	1		Content: (1) Metal Sheet *1 - M4x8mm screws *10 - M3*L6 screws *4 (2) Cable package *1 -HDMI Cable -USB Cable -Signal wire - Power wire - Ground wire - Circular connector-24PIN- 0.17M Cable - External GND stand -M4*12mm for GND stand

5	Option accessory	1		(1) TP-100 Holders*1
6	Option accessory	1		(2) Cap of circular connector *1

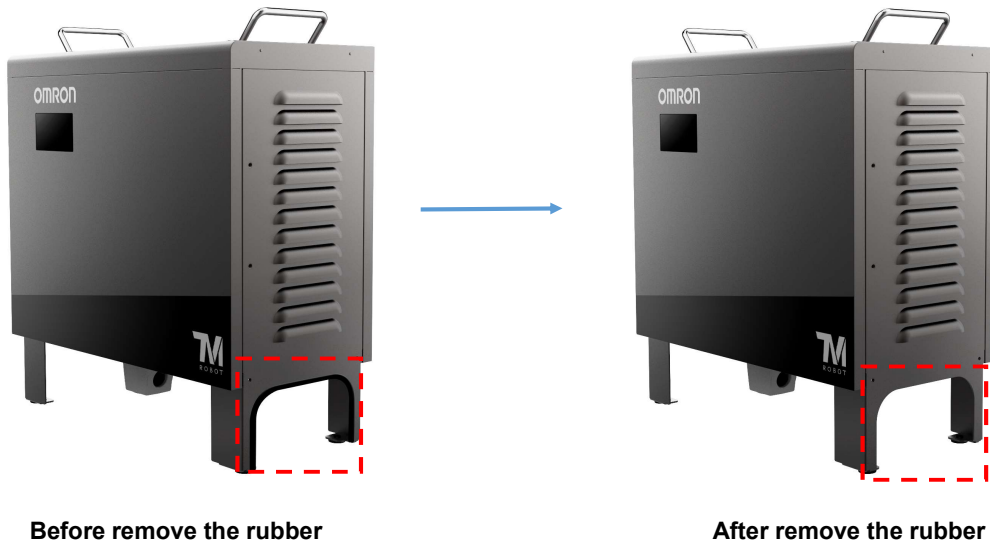
2.4. Installation



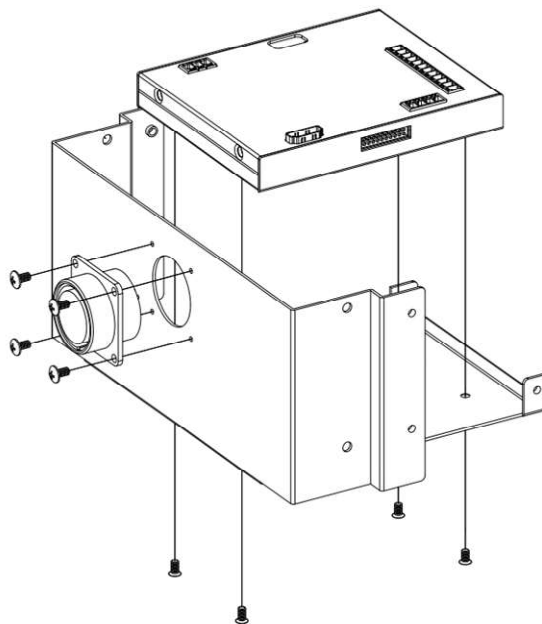
Content of metal sheet

NO.	Metal sheet item	Qty.
1	Front cover	1
2	Right side cover	1
3	Left side cover	1
4	M4*8mm screw	10
5	M3*L6 screws	4

Step 1: Remove the rubber from the controller cabinet

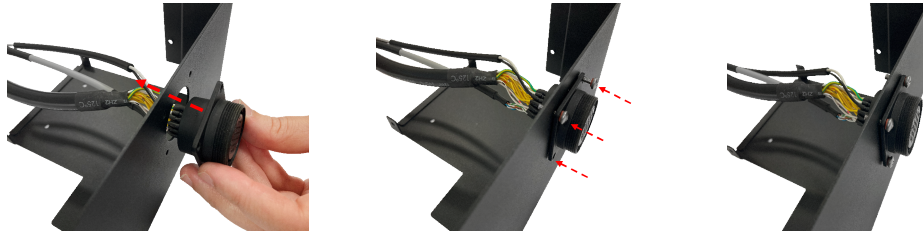


Step 2: Fix junction box with front cover with 4 pcs screws

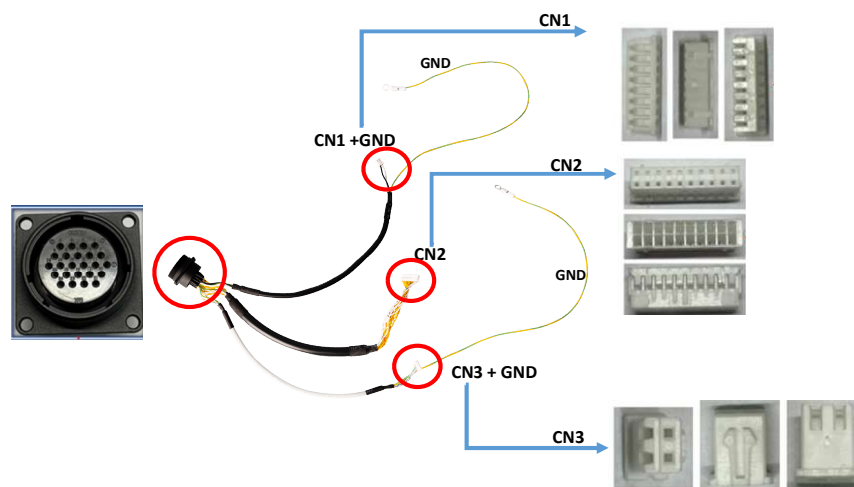
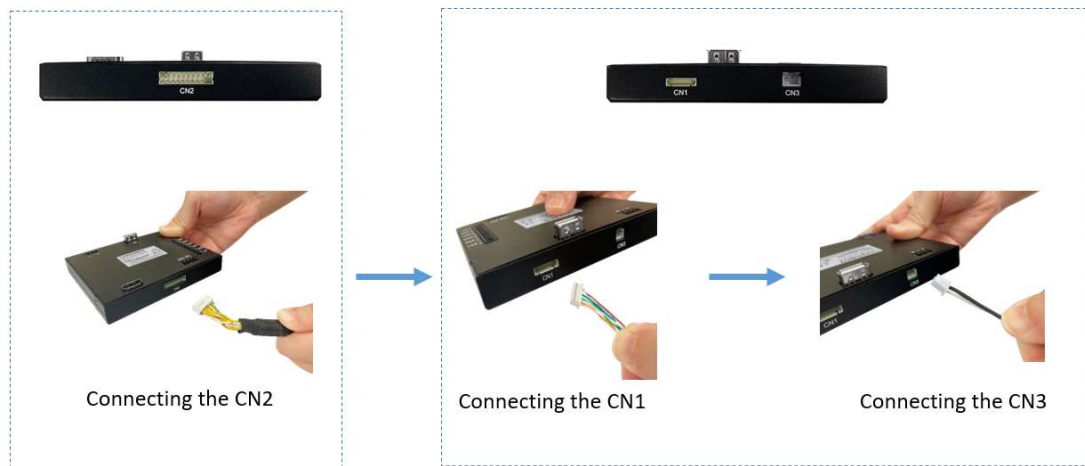


Step 3: Circular connector through Metal hole with 4 pcs screws

Note: These 4 screws are in TP-100-HD-JB

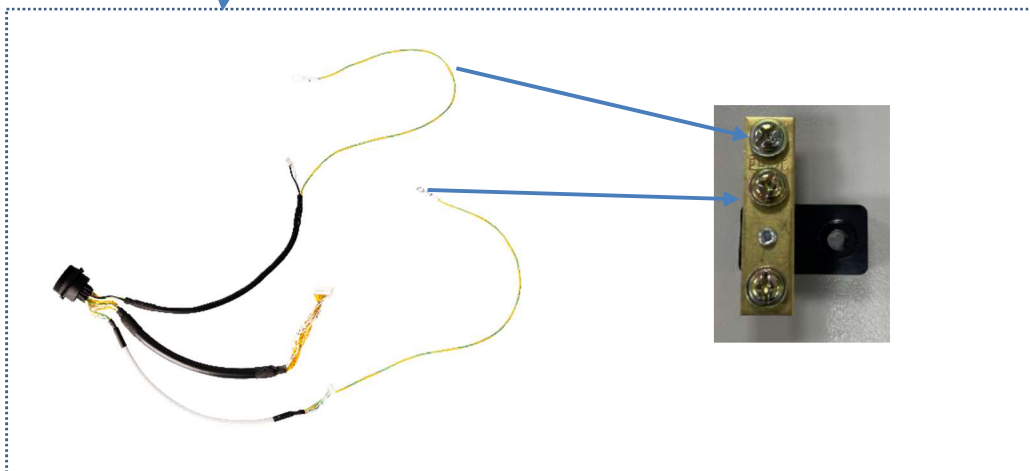


Step 4: Connecting the circular connector to Junction box








Step 5: Fix the external stand of Grounding to TM controller.

Step 6: Connect the ground cable of circular connector to external GND stand.





Step 7: Junction wires wiring

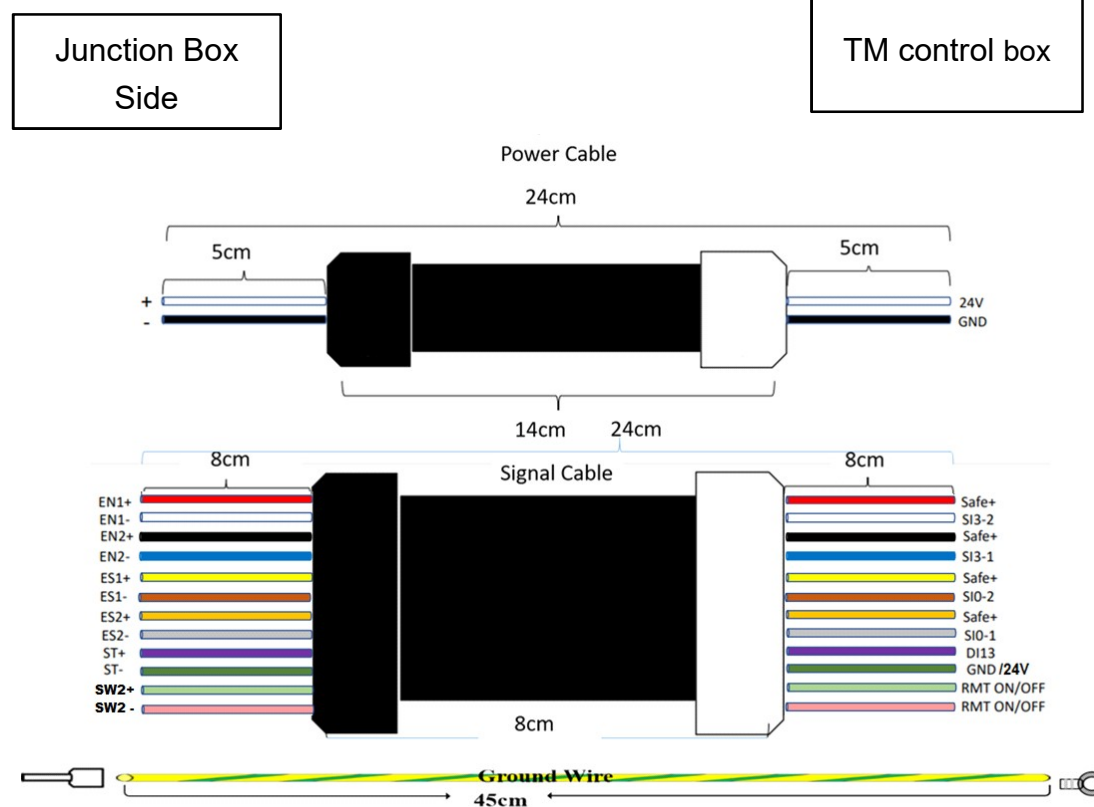
(4) Content of Junction Wires

NO.	Junction Wires	Qty.	Figure
1	HDMI	1	
2	USB	1	
3	power wire	1	
4	Signal wire	1	
5	Ground wire	1	

(5) Pin definition of Junction Wires

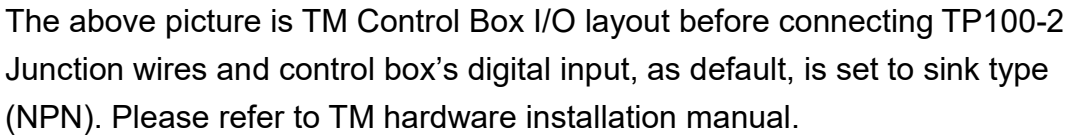
Wire	Junction box side		TM control box	
HDMI	HDMI port		HDMI port	
USB	USB port		USB port	
Signal & power wire	+	White	24V	White
	-	Black	GND	Black
Signal wire	EN1+	Red	SAFE+	Red
	EN1-	White	SI3-2	White
	EN2+	Black	SAFE+	Black
	EN2-	Blue	SI3-1	Blue
	ES1+	Yellow	SAFE+	Yellow
	ES1-	Brown	SI0-2	Brown
	ES2+	Orange	SAFE+	Orange
	ES2-	Gray	SI0-1	Gray
	ST+	Purple	DI13	Purple
	ST -	Green	Refer to following content	Green
	SW2+	Light Green	RMT ON/OFF	Light Green
	SW2-	Pink	RMT ON/OFF	Pink
Ground wire		Yellow/Green		Yellow/Green

(6) Connector direction of Junction Wires



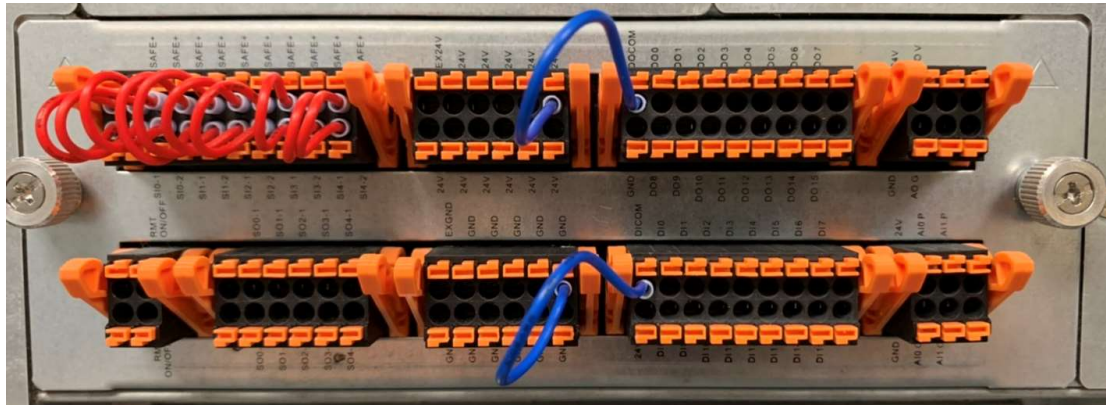
DANGER:

MAKE SURE the safety pins in the signal wire, such as ES2+, ES2-, are correctly connected to the safety input ports (SAFE+, SI0-1) on the TM control box. Otherwise, the emergency stop button and/or enable switch WILL NOT work correctly.



Connecting junction wires (NPN type) to TM control box.

TP100-2 also support source input (PNP) type connection. The below picture is TM control box I/O layout (PNP) before connecting TP-100-2 junction wires.



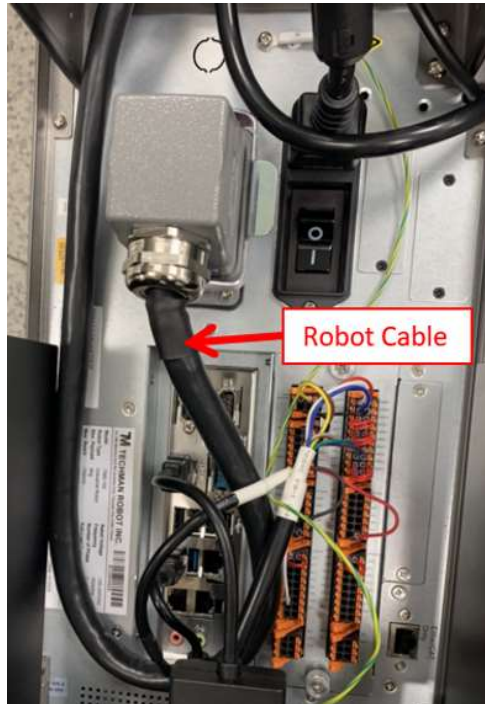
And, the below picture is TM control I/O (PNP) after connecting junction wires.



Connecting junction wires (PNP type) to TM control box

(7) Physical Meaning of Pin

Wire	Function	Description
HDMI	HDMI	HDMI signal for display
USB	USB 2.0	USB 2.0
Signal & power wire	DC 24V	DC power input (24V, 0V, Shielding)
Ground wire	Ground	Ground
Signal wire	Enabling Switch	An enabling switch is a 3-position (OFF-ON-OFF) switch to allow a machine operation only when the switch is lightly pressed and held in the middle position.
	Emergency Stop Button	Emergency stop button are switches that quickly and reliably provide two-channel signal for switching machines and systems to a safe state in an emergency.
	Membrane Stop Key	The stop key on membrane provides a hard-wired signal can be used as program stop function
	Switch Button	A general-purpose button which provide two-channel signal and can be used as power switch of system.



Please note that the Robot Cable should be connected first before Junction Wires to prevent potential interference.

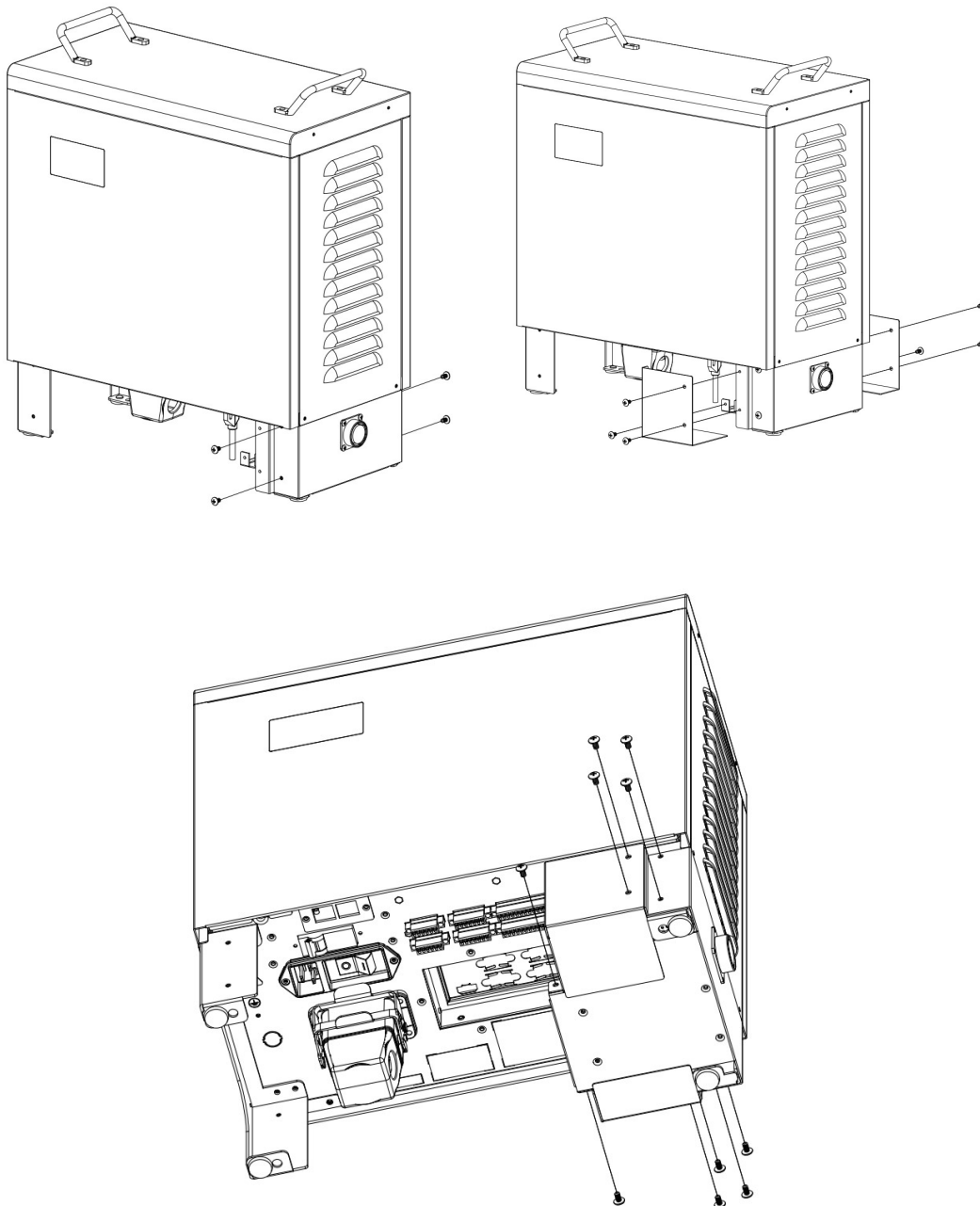


CAUTION:

If the wiring does not follow this approach, the radius of curvature will be too small which may damage the robot cable.

Step 8: Fix the front metal cover with 4 pcs screws

Step 9: Fix the Right side & Left side metal cover to TM control box with 6 pcs screws



Note: These 10 screws are in TP-100-2 TM Plug & Play Accessory (M4x8mm)



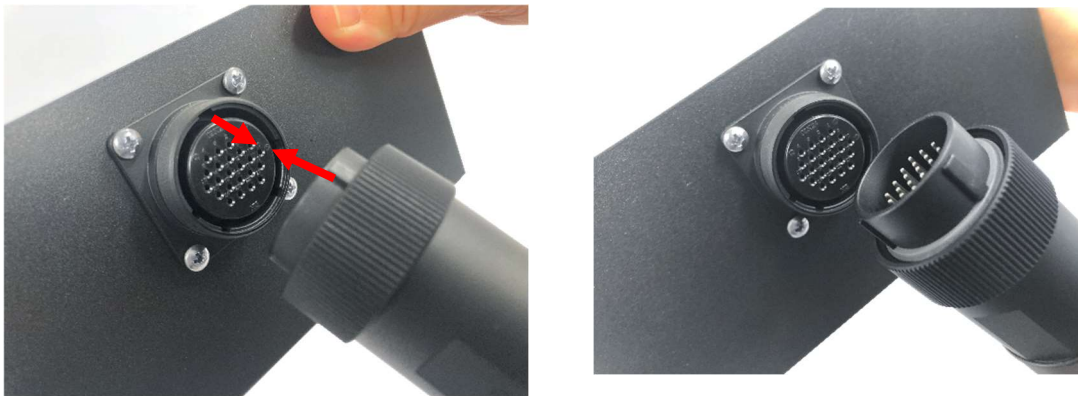
CAUTION:

DO NOT power on the system before finishing the installation and wiring. DO NOT remove the wiring during power on, which may result in damage to the system.

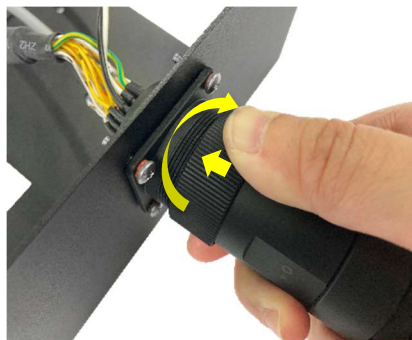
Step 10: Connecting extension cable to the Junction Box and TP-100-2

Circular connectors that meet military specifications are used to connect with the junction box. The connector consists of a plug (male, pin) and a receptacle (female, socket). Follow the steps below to connect the junction box with the teach pendent.

- (1) Align the notch of the plug with the latch of the receptacle.



- (2) Turn the “first ring” on the plug clockwise until you cannot turn it anymore until the junction box and plug are tightly connected.



Note: DO NOT twist the “black ring” to tighten the connection.

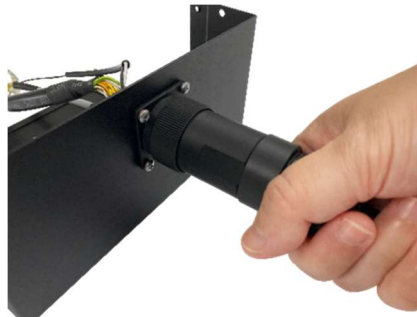


For disconnecting the Junction Box

- (1) Turn the “first ring” on the plug counterclockwise to disconnect the junction box



Note1: DO NOT pull the “black ring” to disconnect the connection



Note2: DO NOT CONNECT/DISCONNECT the plug when the Robot Controller is power on

- (2) Connect extension wire to TP-100-2



Step 11: Installation check

Before booting up the robot system,

make sure that all of the parts with electrics like teach pendant or safeguard devices have been correctly connected and securely fastened.

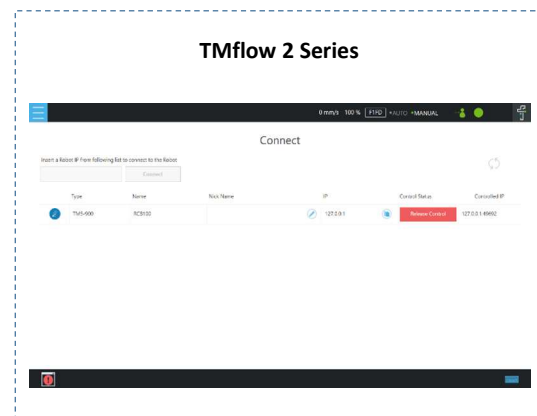
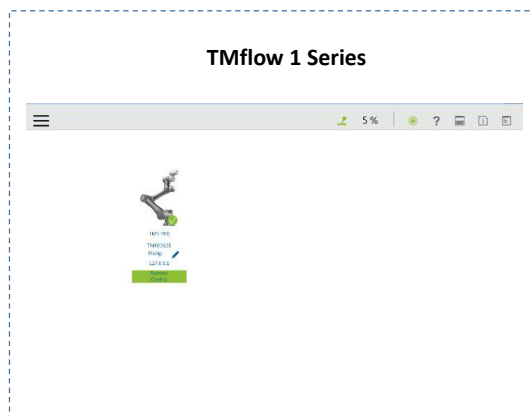
Make sure all step is ready and then power on the TM controller.

Step 12: Set-up with TMflow

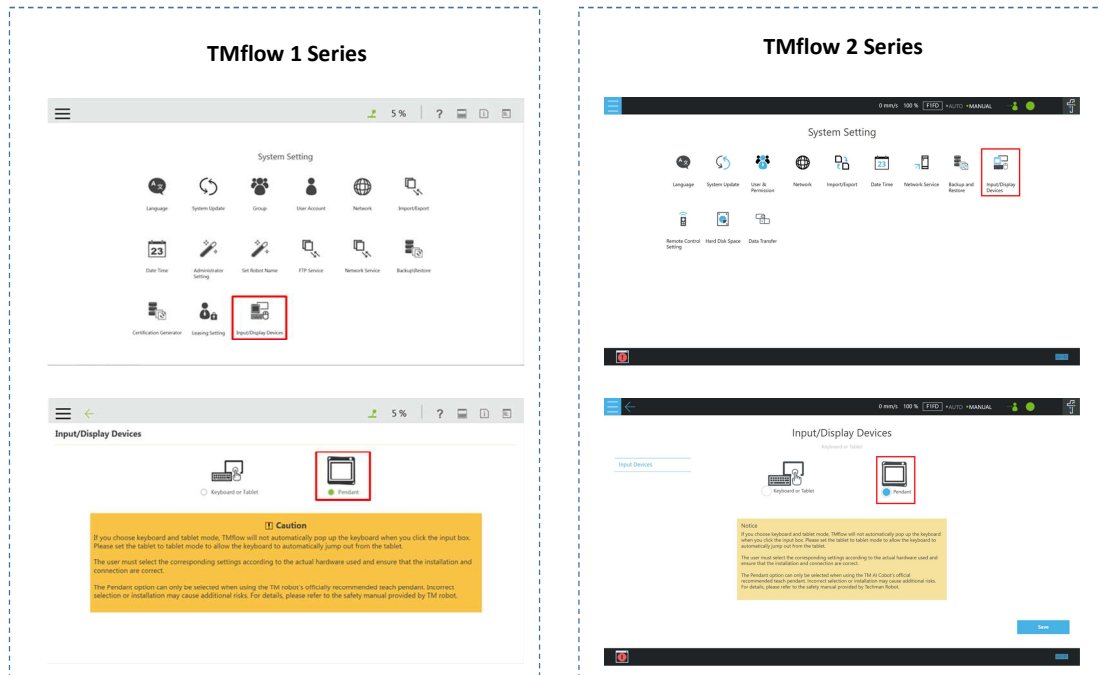
Note:

1. TP-100-2 is only available with HW3.2 control box. Check the hardware version before use.
2. For HW3.2 control box with different version of TMflow, the set-ups are shown individually.

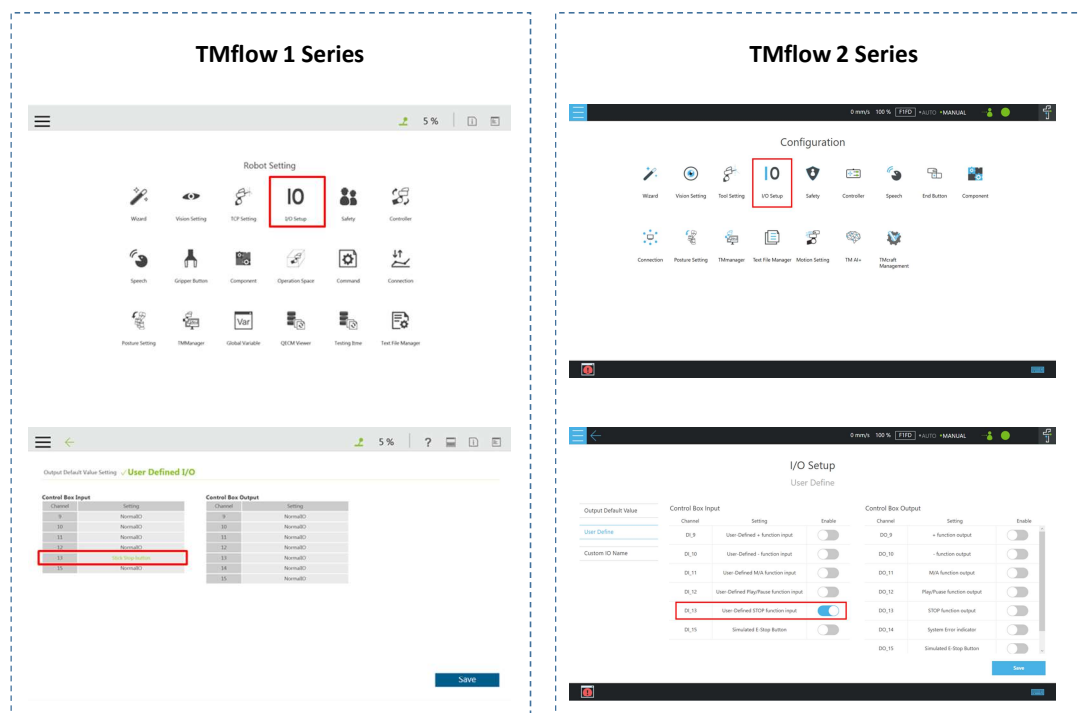
(1) User should first “log-in” and “Get Control” of the Robot.



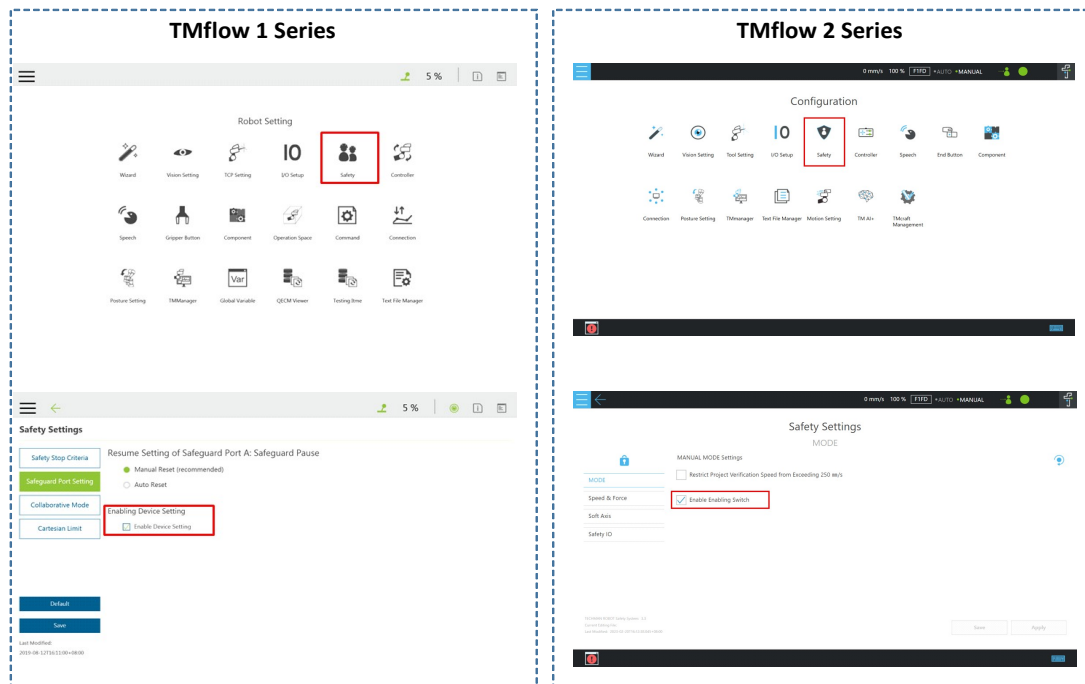
(2) Click “Input/Display Device” in the “System” page and select “Pendant”.



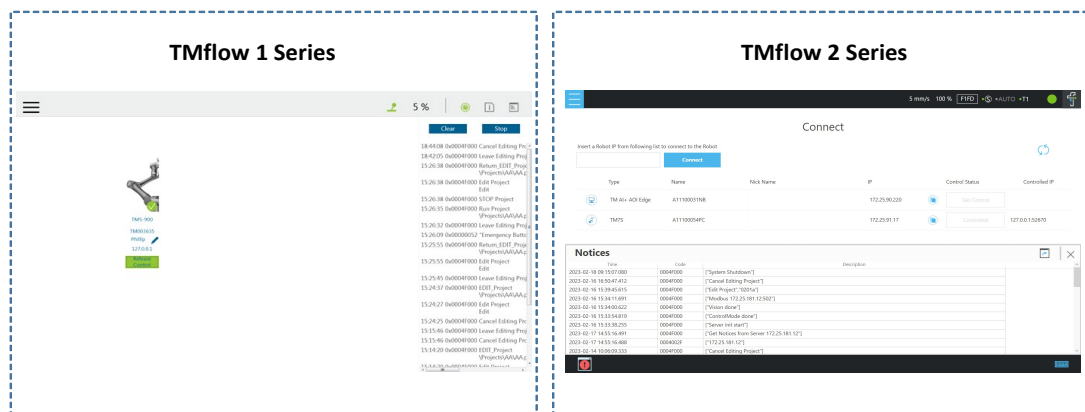
(3) Click “I/O Setup” in the “Setting” page, “User Defined I/O” input 13 “Stick Stop Button” and “Save”.



- (4) Click “Safety” in the “Setting” page, select “Enable Enabling Device” in the “Safety IO Setting” and “Save”.



- (5) TP-100-2 with TMflow is fully set up! Now you can test the pendant with the six buttons on it. Test with error log button is shown below.



DANGER:

Make sure the pendant settings are properly set, then start to use, otherwise the system may be malfunction or lose of function and cause dangerous risks.

Step 13: Start to use

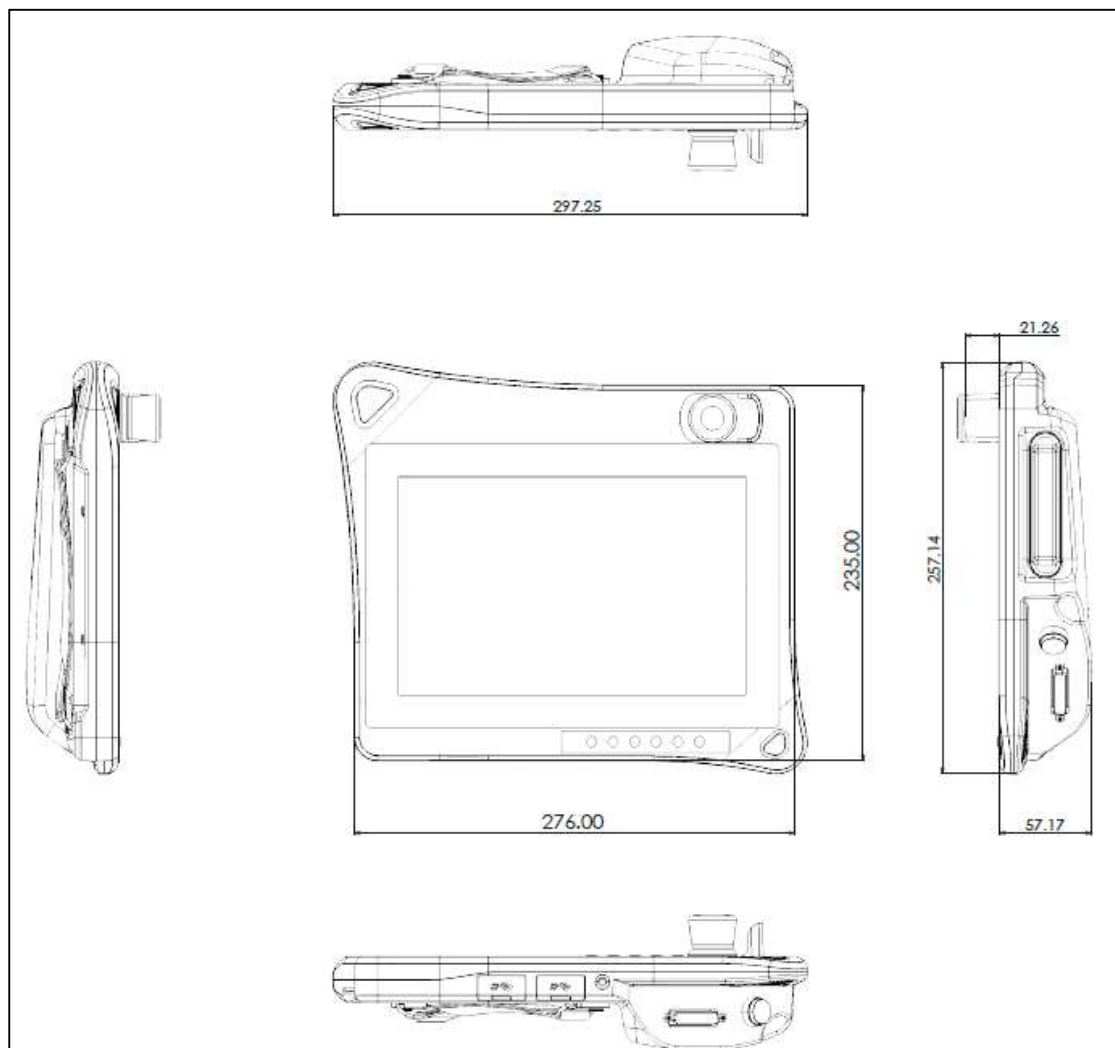
Please follow the instruction of TM Robot related Manual to use

Buttons	Basic Function
Emergency Stop Button	Emergency Stop button <ul style="list-style-type: none"> For details, refer to Physical Meaning of Pin
2 -Channel Switch Button	The power switch of the robot <ul style="list-style-type: none"> Power on: single press Shutdown: long press
Enabling Device	The 3-position Enabling Device <ul style="list-style-type: none"> For details, Refer to Physical Meaning of Pin
M/A Mode Switch Button	Toggle Manual/Auto Mode Switch <p>For details, refer to our TMflow User Manual</p>
Stop Button	Single press this button to stop any project.
Play/Pause Button	Single press to play/pause project
+/- Button	Adjust project speed (single press) under Manual Trial Run Mode. In Vision Job under TMflow, use these buttons (long press) to adjust robot positions.
Error Log	Displays error logs

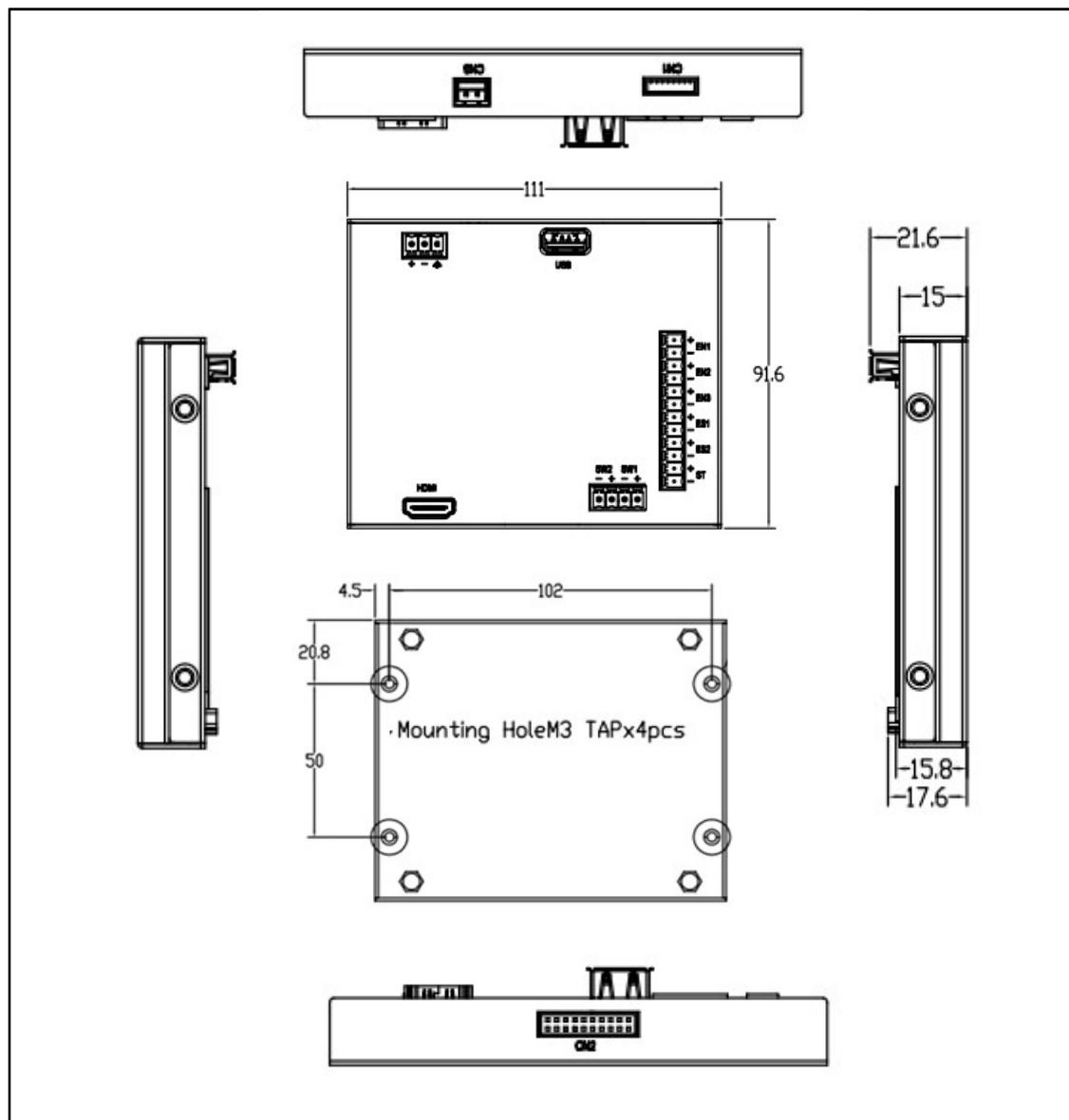


3 Technical Data

3.1. Dimensions of TP-100-2



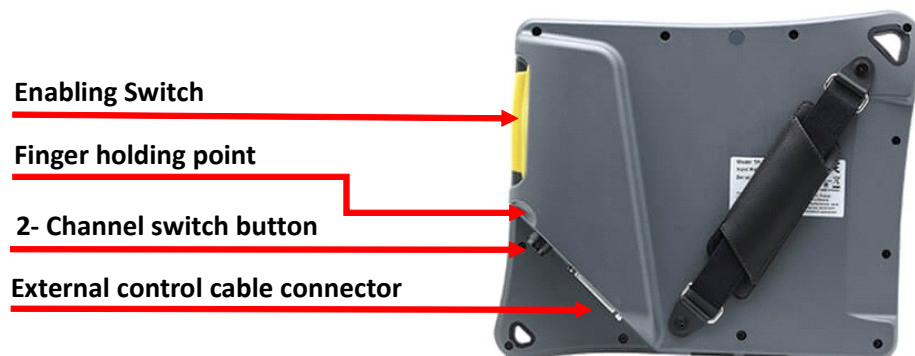
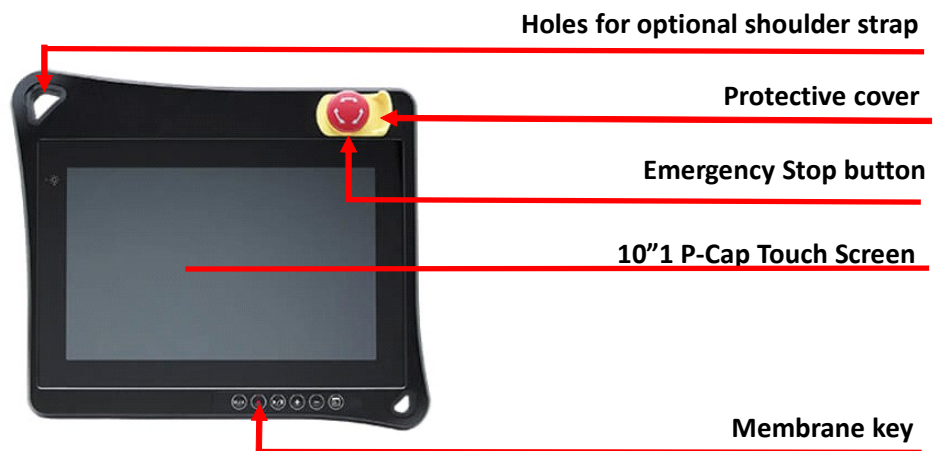
Dimensions of TP-100-HD-JB



3.2. Specification

Technical Data	TP-100-2	Technical Data	TP-100-2
Panel	<ul style="list-style-type: none"> - 10.1", 16:10, WXGA, 1280 x 800 - Luminance: 400 cd/m2 - Contrast ratio: 800:1 - LCD color: 16.7M - Viewing angle: 89 (U), 89 (D), 89 (L), 89 (R) - Backlight: LED 	Interface	<ul style="list-style-type: none"> - Data back-up: 2 x USB 2.0 - Control connector: HDB-44 female Removable HDB-44 control cable that cable length: 3M / 5M / 10M / 20M (Optional) > including power, E-stop button, 3-Position Enabling switch, Buttons Switch, USB 2.0 and HDMI - Teach Pendant cable length: 3M / 5M / 10M / 20M (optional)
Touch	<ul style="list-style-type: none"> - Touch: 5 points P-Cap - Touch light transmission: 87% - Touch interface: USB - Anti-scratch surface: 7H hardness 	Ratings	<ul style="list-style-type: none"> - Power supply voltage: 24 Vdc (19.2 to 28.8 Vdc) - Current consumption: <ul style="list-style-type: none"> > TP-100-2 0.625A at 24Vdc (max.)
Safety Elements	<ul style="list-style-type: none"> - Emergency Stop Button > 2 NC channels, B10d=130,000 > Contact function: latching > Reset: by rotating - 3-Position Enabling Switch > 3 channels 2NO & 1 NC, B10d=100,000 	Mechanical	<ul style="list-style-type: none"> - Dimension: <ul style="list-style-type: none"> > 297.3 x 257.2 x 57.2 mm (78.5mm including E-stop button) - Weight (without external control cable): <ul style="list-style-type: none"> > 1.5Kg - IP protection class: Full IP65 - Color: <ul style="list-style-type: none"> > Front bezel: aluminum magnesium alloy; color: Black > Back cover: ABS+PC; color: Pantone 432C
Operating Elements	<ul style="list-style-type: none"> - 2-Position button switch (1 NO & 1 NC) - 6 membrane keys 	Environment	<ul style="list-style-type: none"> - Operating temperature: 0°C to 50°C - Storage temperature: -20°C to 75°C - Operating humidity: 10%~90% relative humidity, non-condensing - Vibration resistance/shock-proof/free-fall according to EN 61131-2
System	<ul style="list-style-type: none"> - TP-100-2: HDMI input - USB 2.0 upstream 	Certifications	<ul style="list-style-type: none"> - CE (EN 61000-6-2; EN61000-6-4) for installation in industrial environments - FCC Class A

4 Operation Behaviors



4.1. Membrane Keys



The TP-100-2's membrane keys are located at the lower-right of the teach pendant. Please note that the Membrane key is only functioning after user's log in TMflow.

The stop key on membrane provides a hard-wired signal and connects to ST+ and ST- at the back of junction box. When the stop button is pressed, the ST+ and ST- status will then change from Normal Open (NO) to Normal Close (NC).



4.2. Emergency Stop Button

The Emergency Stop button locates at the upper-right corner of the TP-100-2 and connects to ES1 and ES2 at the back of the junction box. When an emergency occurs, the Emergency Stop button is pressed to stop all activities, the ES1 and ES2's status will then change from Normal Close (NC) to Normal Open (NO). To reset the button, turn it clockwise or counterclockwise to raise the button.



4.3. Enabling Switch

The Enabling Switch checks the two-channel mechanical switching elements and filter out any asynchronous output signals. It ensures the approval control (circuit 1 and circuit 2) and both outputs of the teach pendant are synchronized at all time.



	Position Pin	Position 1	Position 2	Position 3
	Position travel (mm)	0.0	3.0	6.0
When pressing the switch	EN1 +	Open	Close	Open
	EN1 -			
	EN2 +	Open	Close	Open
	EN2 -			
	EN3 +	NA	NA	NA
	EN3 -			
When releasing the switch	EN1 +	Open	Open	Open
	EN1 -			
	EN2 +	Open	Open	Open
	EN2 -			
	EN3 +	NA	NA	NA
	EN3 -			

4.4. 2 -Channel Switch Button

The Switch Button connects to SW1 at the back of the junction box. When the switch button is pressed, the SW1 status will change from Normal Close (NC) to Normal Open (NO).



	Pin	Contact
When pressing the switch	SW1 +	Open
	SW1 -	
	SW2 +	Close
	SW2 -	
When releasing the switch	SW1 +	Close
	SW1 -	
	SW2 +	Open
	SW2 -	