

Teach Pendant

TP-100-1 for OMRON TM Plug & Play

User's Manual



V1.06

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Revision History

Rev.	Description
1.06	Modify Page 18: Step 6: Installation check
1.05	Modify CH2.4 & Ch4.1
1.04	Update description and figures
1.03	Modify Ch2.2
1.02	Modify Ch2.4 & Ch4.1
1.01	Modify Ch4.1
1.00	First version release.
0.97	Sixth draft release.
0.96	Fifth draft release.
0.95	Fourth draft release.
0.92	Third draft release.
0.9	Second draft release.
0.8	Draft released.





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1 Product Description

TP-100-1 for OMRON TM Plug&Play is a 10" handheld teach pendant and well integrated with OMRON TM Robot. Users can use TP-100-1 to directly operate TM Robot from where they have the best view of the process. The handheld control unit is the greatest comfortable to use and also supports left-hander.



1.1. Overview of TP-100-1

The TP-100-1 is a handheld device that controls robot movements, teaches locations, 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 optional shoulder strap.



Front

Back

1.2. Handling of TP-100-1






The TP-100-1 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-100-1 for OMRON 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 Omron service team.

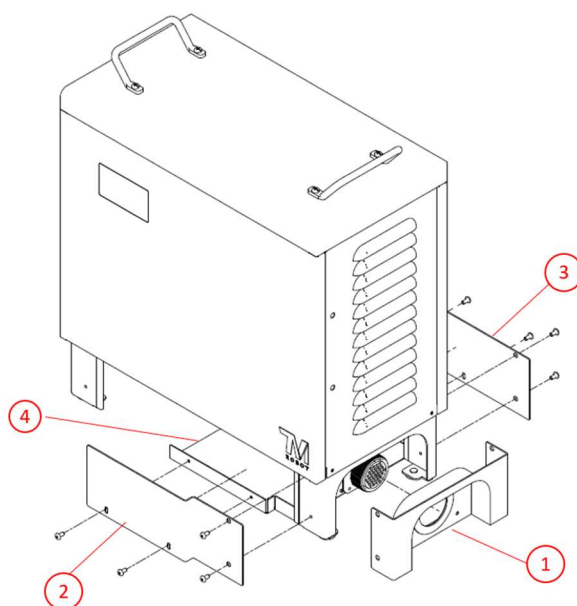
OMRON TM robot hardware version	OMRON TM robot software version
3.2 Series	TMflow 1.76.6300 and above

2.3. TP-100-1 plug & play package content

NO.	Items	Qty.	Figure	Note
1	TP-100-1	1		

2	EXTERNAL 3M CABLE WITH GROUNDING FOR TP-100-1	1	  	Content: (1) 3M Cable*1 (2) M3 12mm screw*1 (3) Seal Washers*1
3	TP-100 Holders	1		
4	TP-100-VGA-JB	1	 <p>Junction box</p>  <p>O-ring & Screws</p>  <p>Cap & Connectors</p>	Content: (1) Junction box*1 (2) O-ring *1 (3) M3 12mm screw*4 (4) Cap *1 (5) Connector 2P*1 (6) Connector 3P*1 (7) Connector 6P*2
5	TP-100-VGA TM Plug&Play Accessory	1	 <p>Metal sheet & Screws</p>  <p>Junction Wires</p>	Content: (1) Metal Sheet *1 (2) Junction Wires *1 (3) R632 8mm screws *8

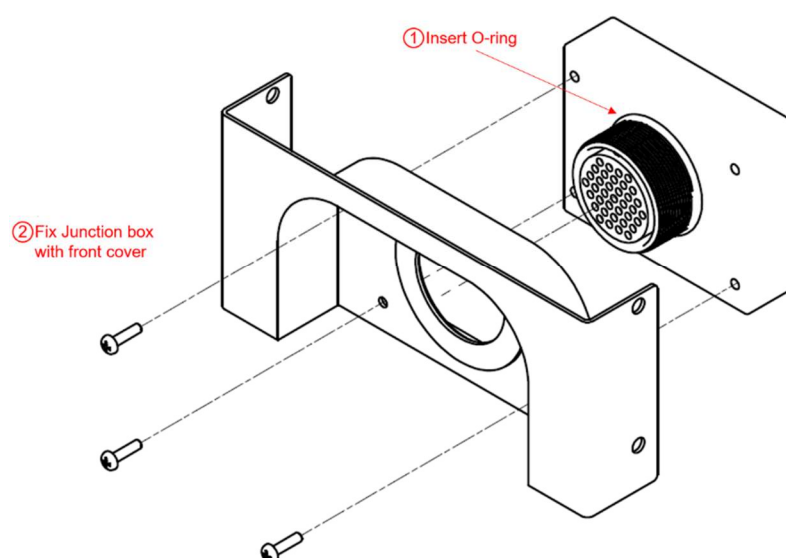
2.4. Installation



Content of metal sheet

NO.	Metal sheet item	Qty.
1	Front cover	1
2	Right side cover	1
3	Left side cover	1
4	Bottom cover	1
5	R6-32, 8mm screw	8

Step 1: Fix Junction box with front cover



Note: These 3 screws are in TP-100-VGA-JB

Step 2: Fix front cover with right side cover and left side cover to OMRON TM robot cabinet

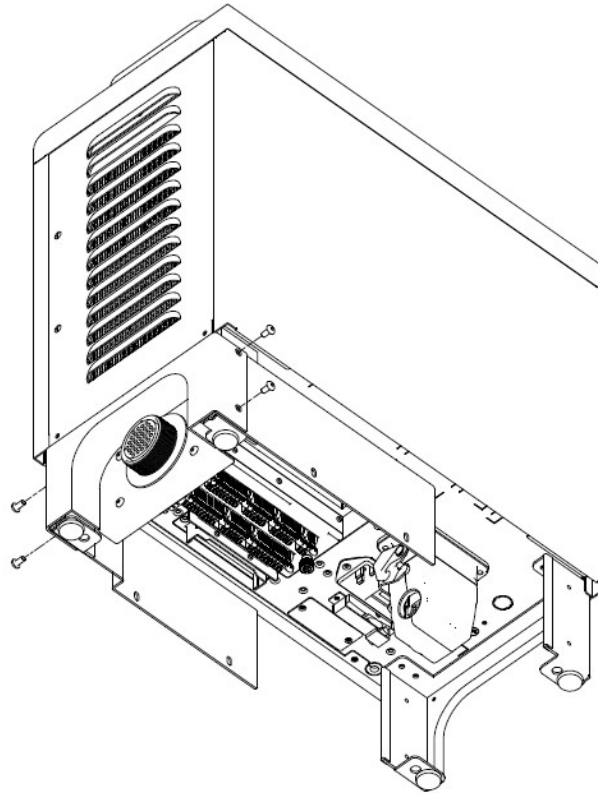
Remove the rubber from the controller cabinet



Before remove the rubber



After remove the rubber



Note: These 4 screws are in TP-100-VGA TM Plug&Play Accessory (M4x0.7,8mm)








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 3: Junction wires wiring

(1) Content of Junction Wires

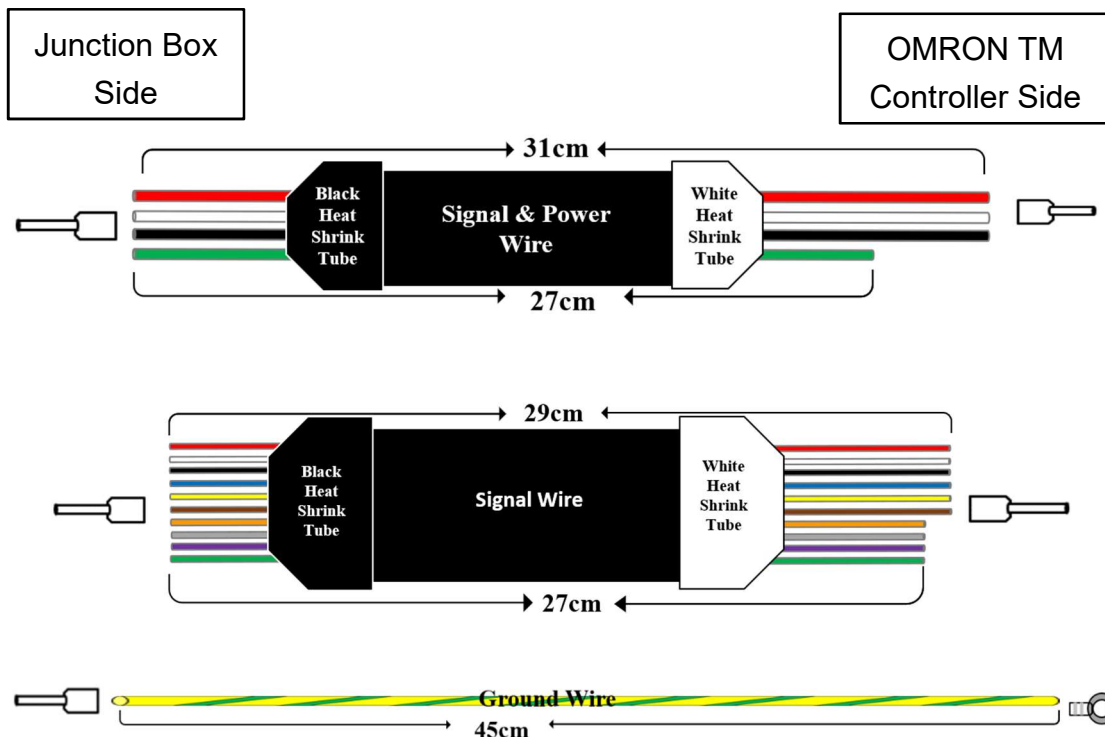
NO.	Junction Wires	Qty.	Figure
1	HDMI to VGA	1	
2	USB	1	
3	Signal & power wire	1	
4	Signal wire	1	
5	Ground wire	1	

(2) Pin definition of Junction Wires

Wire	Junction box side		OMRON TM controller side	
HDMI to VGA	VGA port		HDMI port	
USB	USB port		USB port	
Signal & power wire	+	red	24V	red
	ST+	white	DI13	white
	-	black	GND	black
	ST-	green	GND	green
Signal wire	ES2+	red	SAFE+	red
	ES2-	white	SI0-1	white
	ES1+	black	SAFE+	black
	ES1-	blue	SI0-2	blue

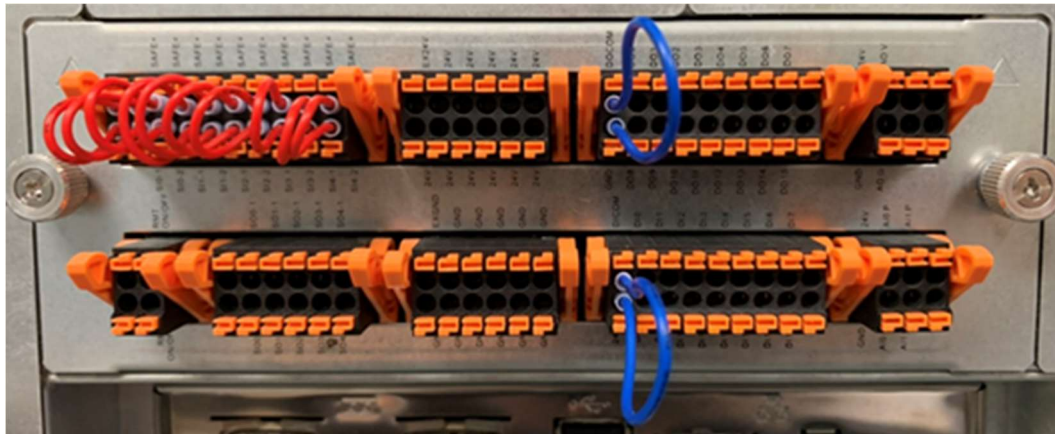
	SW2+	yellow	RMT ON/OFF	yellow
	SW2-	brown	RMT ON/OFF	brown
	EN2+	orange	SAFE+	orange
	EN2-	gray	SI3-1	gray
	EN1+	purple	SAFE+	purple
	EN1-	green	SI3-2	green
Ground wire		yellow/green		yellow/green

(3) Connector direction of Junction Wires



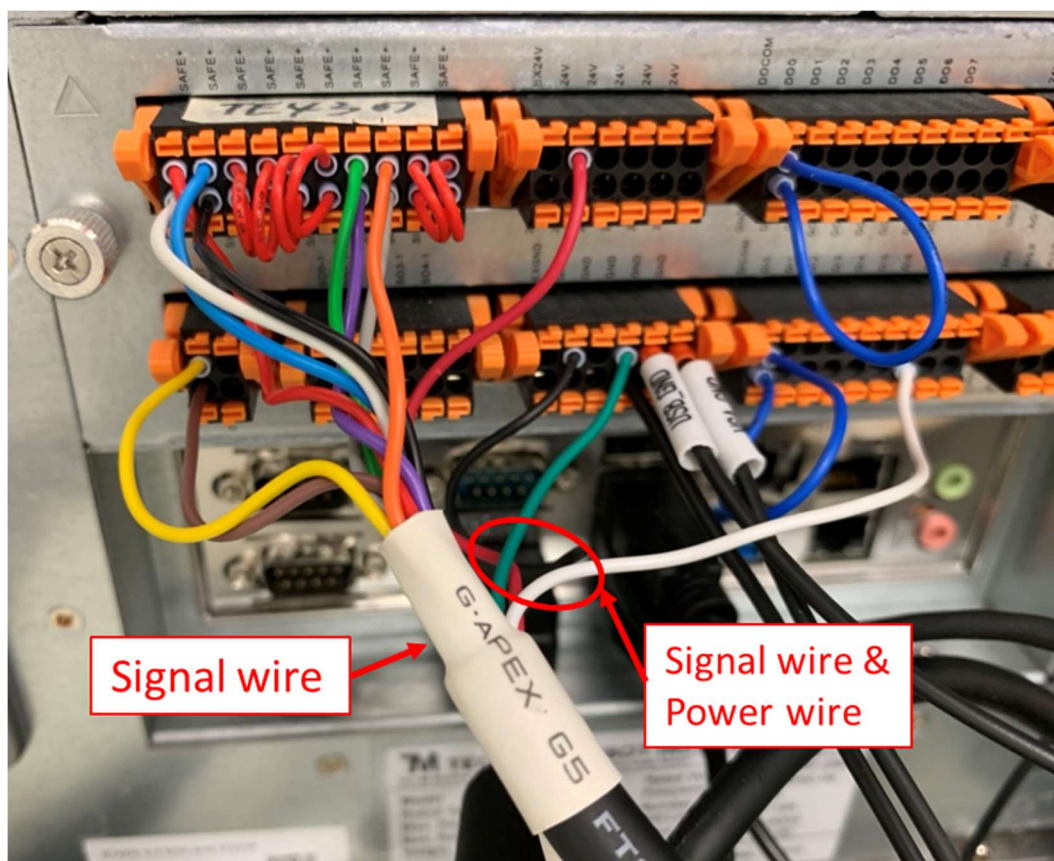
DANGER:

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 OMRON TM control box. Otherwise, the emergency stop button and/or enable switch WILL NOT work correctly.



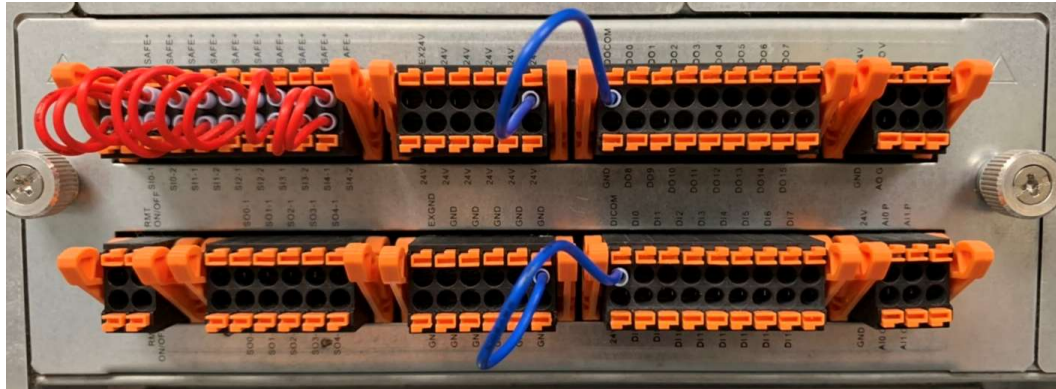
The above picture is OMRON TM Control Box I/O layout before connecting TP100-1 junction wires and control box's digital input, as default, is set to sink type (NPN). Please refer to OMRON TM hardware installation manual (Chapter 5.3. Control box).

Follow the pin definition of Junction wires, you can connect junction wires to OMRON TM control box as below picture.

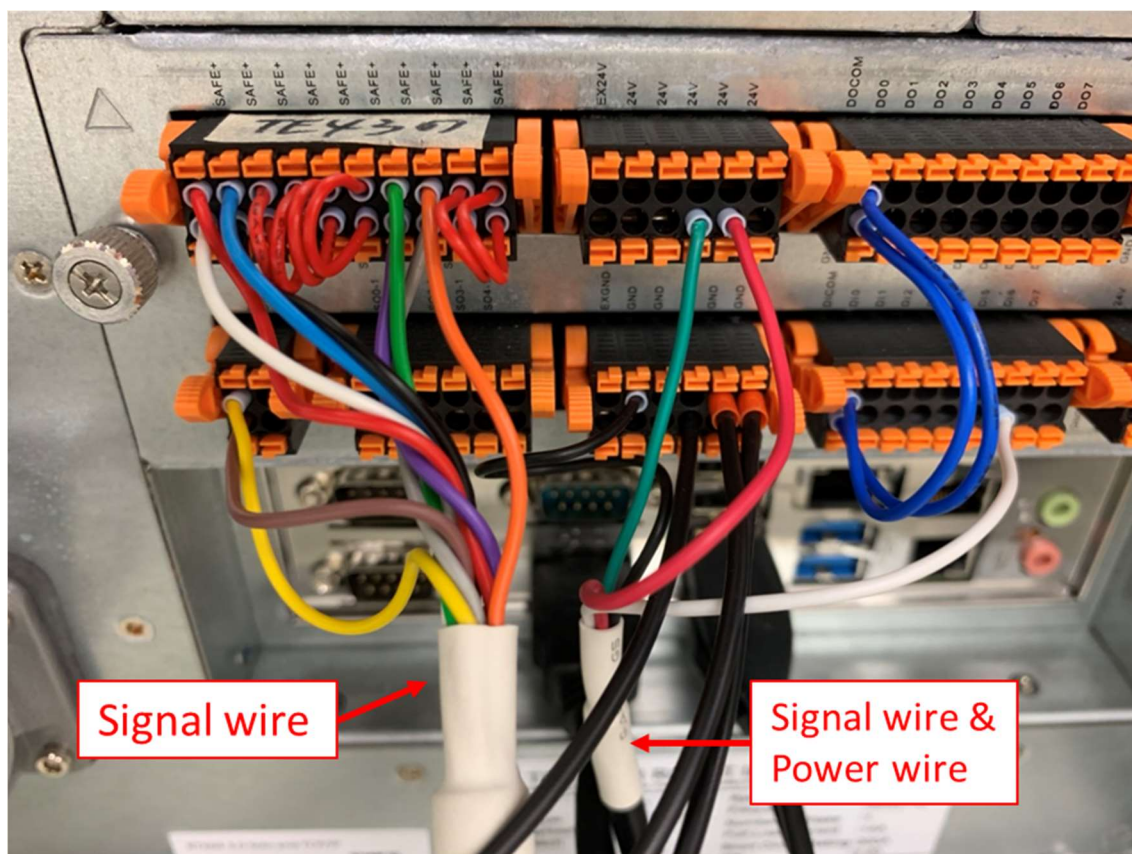


Connecting junction wires (NPN type) to OMRON TM control box

TP100-1 also support source input (PNP) type connection. The below picture is OMRON TM Control Box I/O layout (PNP) before connecting TP100-1 junction wires.




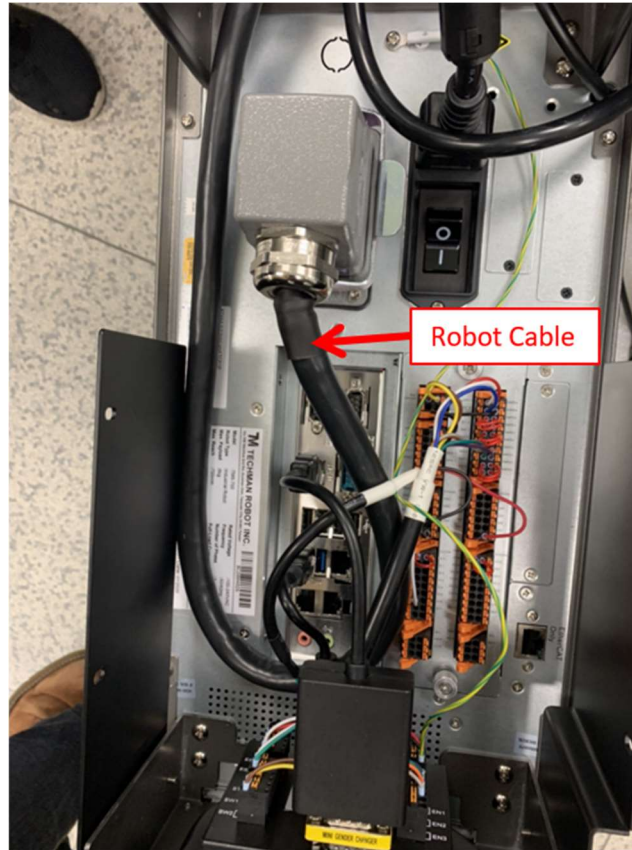
And, the below picture is OMRON TM Control I/O (PNP) after connecting junction wires.



Connecting junction wires (PNP type) to OMRON TM control box

(4) Physical Meaning of Pin

Function	Pin	Description
DC24V	+	DC power input (24V, 0V, Shielding)
	-	
		
VGA	VGA	VGA signal for display
USB	USB	USB 2.0 of TP-100-1
Enabling Switch	EN1 +	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.
	EN1 -	
	EN2 +	
	EN2 -	
	EN3 +	
	EN3 -	
Emergency Stop Button	ES1 +	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.
	ES1 -	
	ES2 +	
	ES2 -	
Switch Button	SW1 +	A general-purpose button which provide two-channel signal and can be used as power switch of system.
	SW1 -	
	SW2 +	
	SW2 -	
Membrane Stop Key	ST +	The stop key on membrane provides a hard-wired signal can be used as program stop function.
	ST -	



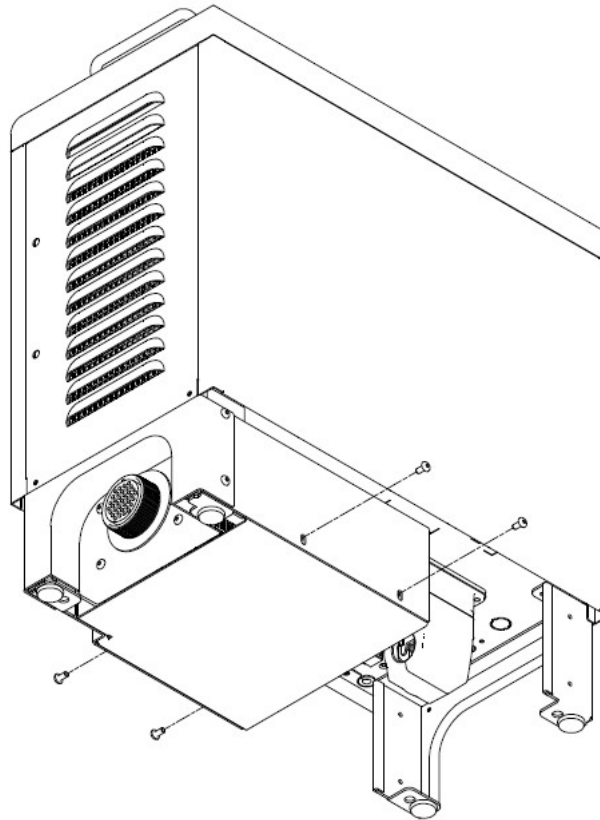
Please note that the Robot Cable should be connected first before Junction Wires to prevent potential interference.



CAUTION:

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

Step 4: Fix bottom cover with right side cover and left side cover

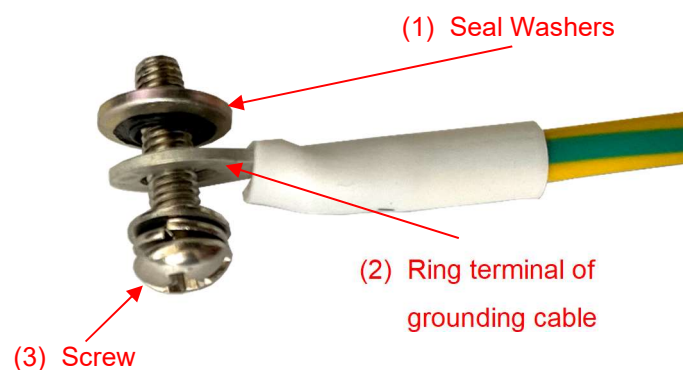


Note: These 4 screws are in TP-100-VGA TM Plug&Play Accessory (M4x0.7,8mm)

Step 5: Connecting extension cable to the Junction Box and TP-100-1

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) Fix the grounding cable with the metal sheet



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



- (2) Turn the “first green ring” on the plug clockwise until you cannot turn it anymore.
- (3) Push the “second green ring” toward the junction box and repeat steps 1 and 2 until the junction box and plug are tightly connected.

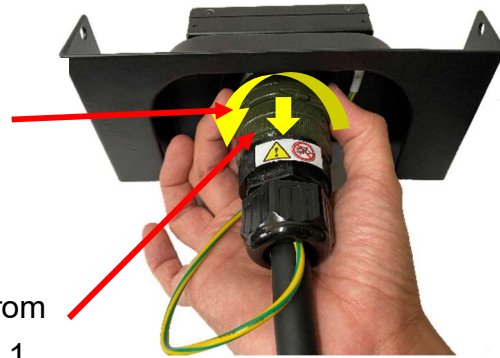


Note: DO NOT twist the “black ring” to tighten the connection.



For disconnecting the Junction Box

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



(2) Pull the “second green ring” opposite from the junction box once and repeat steps 1

Note1: DO NOT twist the “black ring” to disengage the connection.



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



The label on the cable is showing warning symbol to users, do not connect/disconnect the plug when the robot controller is powered on.

Connect extension wire to TP-100-1



Step 6: Installation check

Before booting up the robot system,

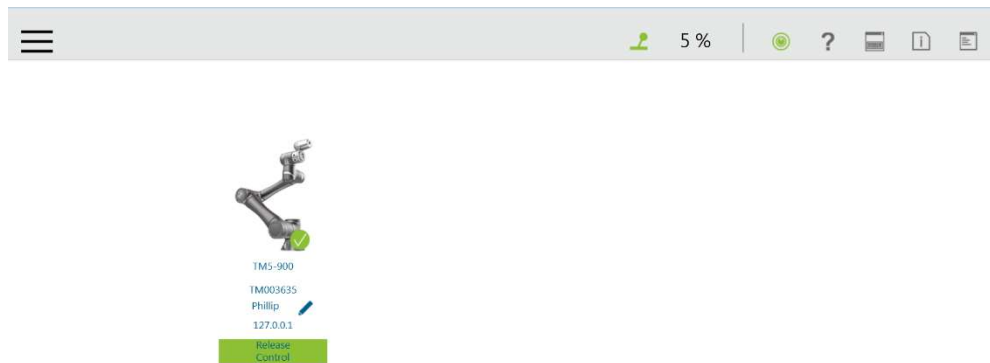
make sure that all of the parts with electrics like teach pendant or safeguard devices have been correctly connected and securely fastened.

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

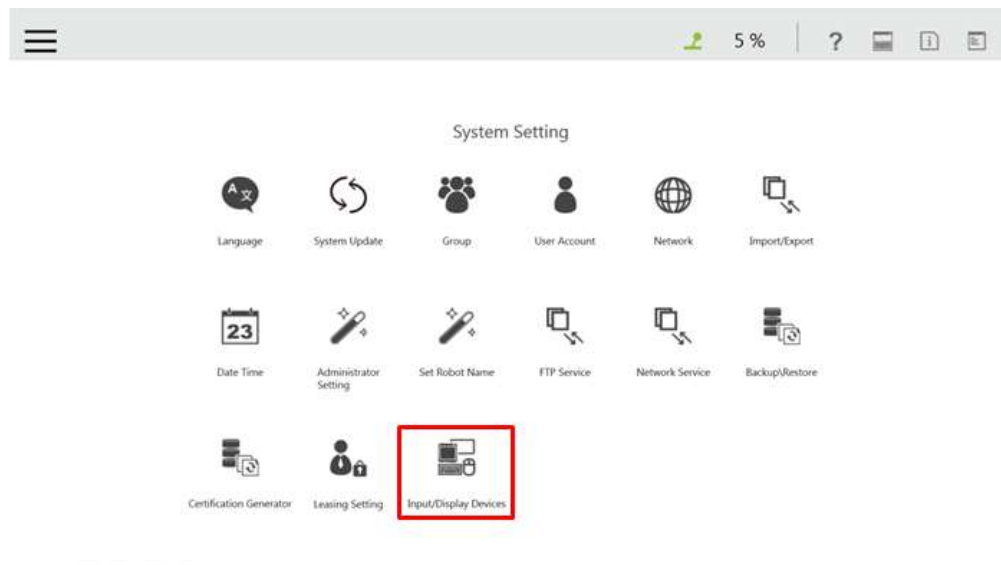
Step 7: Set-up with TMflow

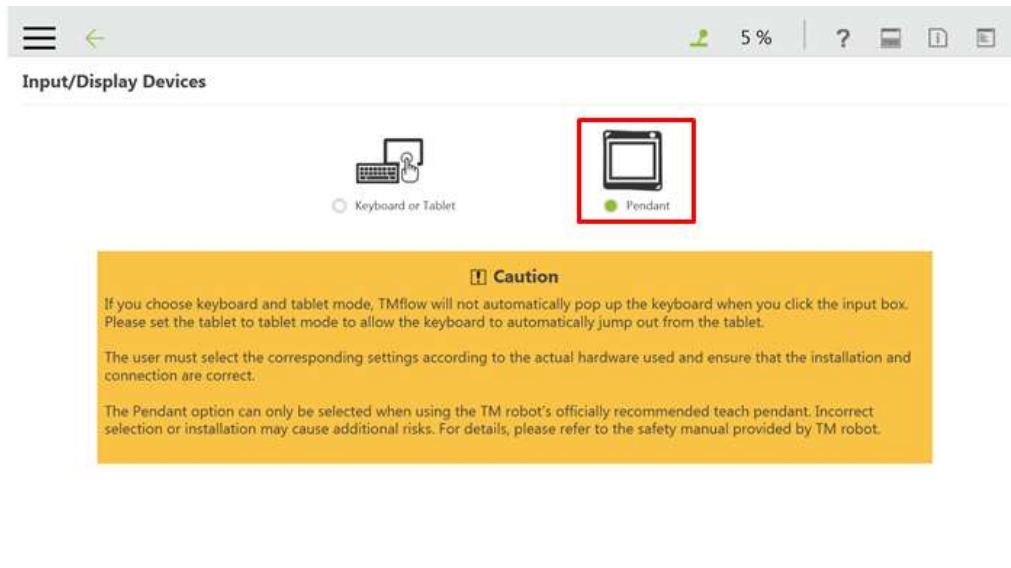
(1) User should first “log-in” and “Get Control” of the Robot.

Note: TP-100-1 is only available with HW3.2 control box. Check the sticker on the back side of your robot controller for hardware version.

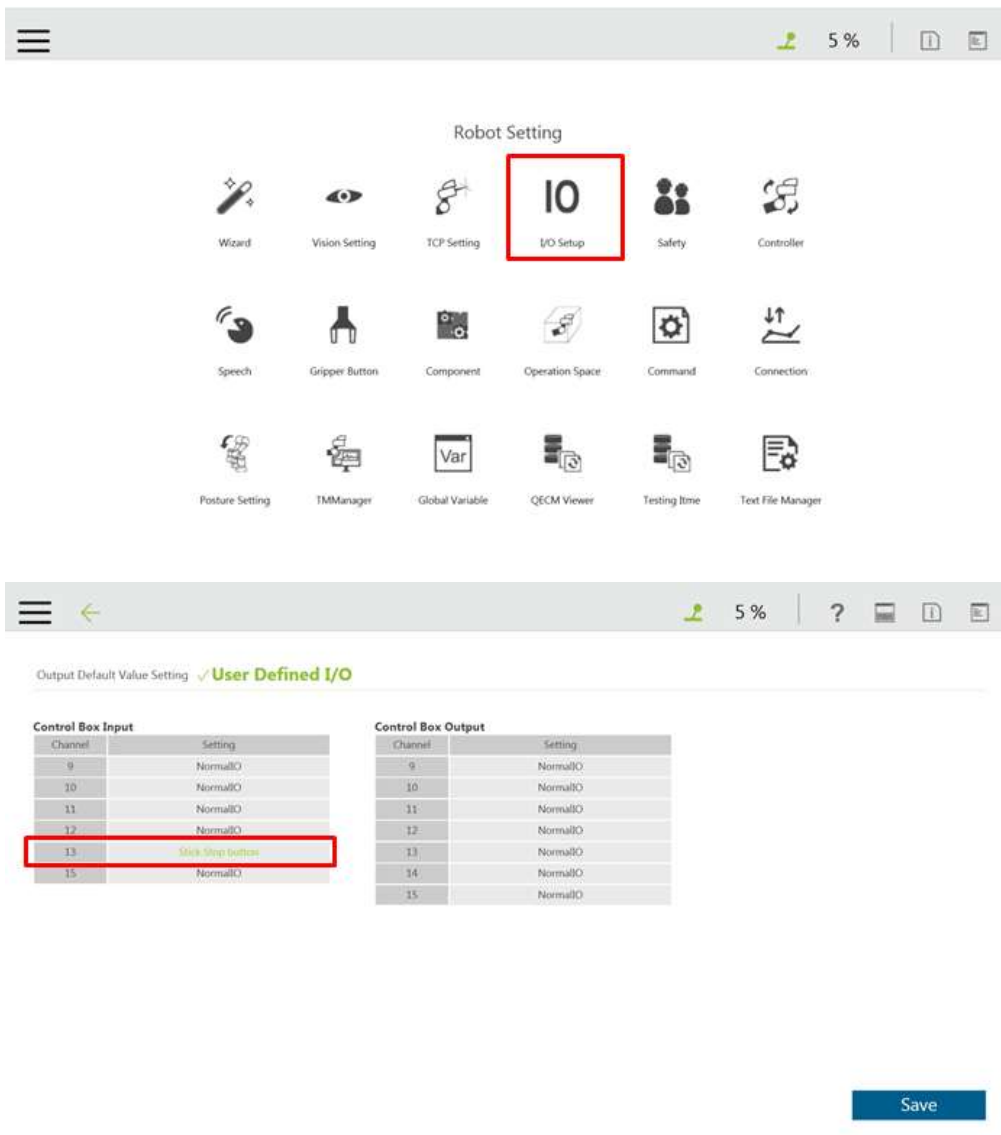


(2) Click “Input/Display Device” in the “System” page and select “Pendant”.

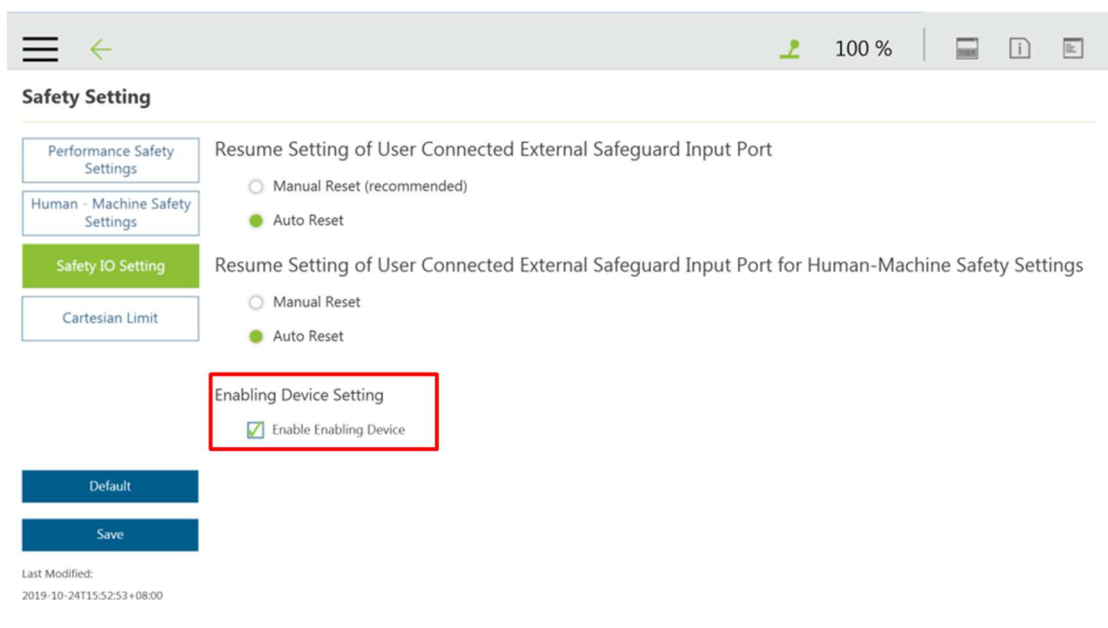
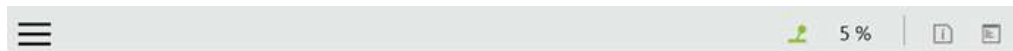




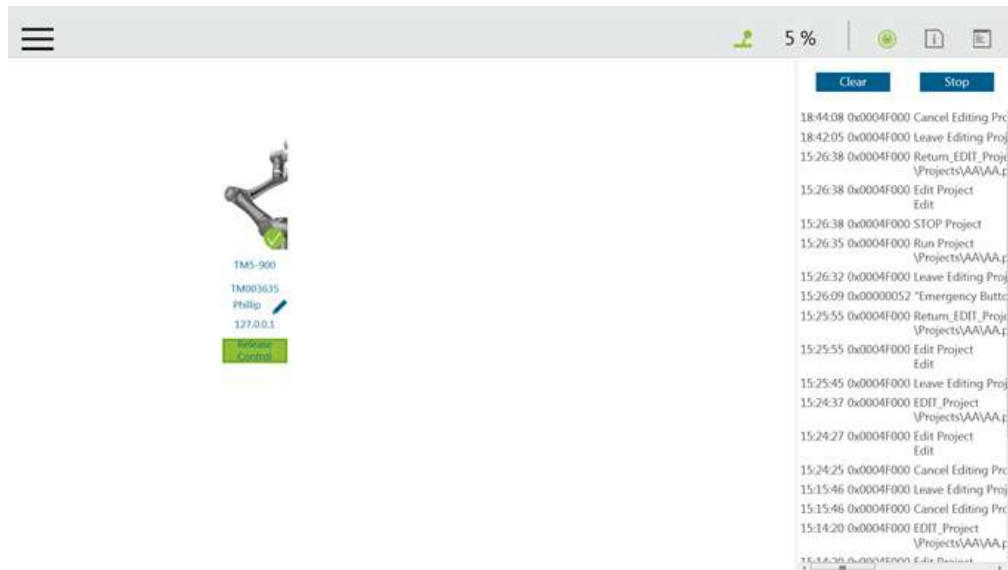
(3) Click “I/O Setup” in the “Setting” page, “User Defined I/O” input 13 “Stick Stop Button” and “Save”.



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

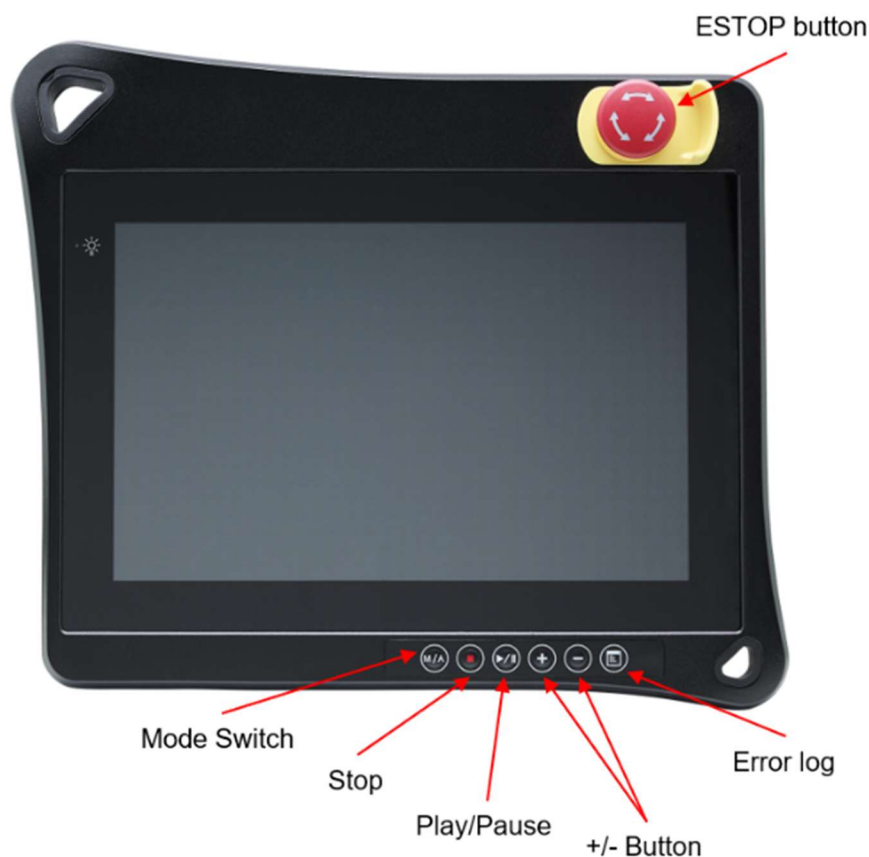


- (5) TP-100-1 with TMflow is fully set up! Now you can test the pendant with the six buttons on it. Test with error log button is shown below.



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 8: Start to use

Please follow the instruction of OMRON TM Robot related Manual to use

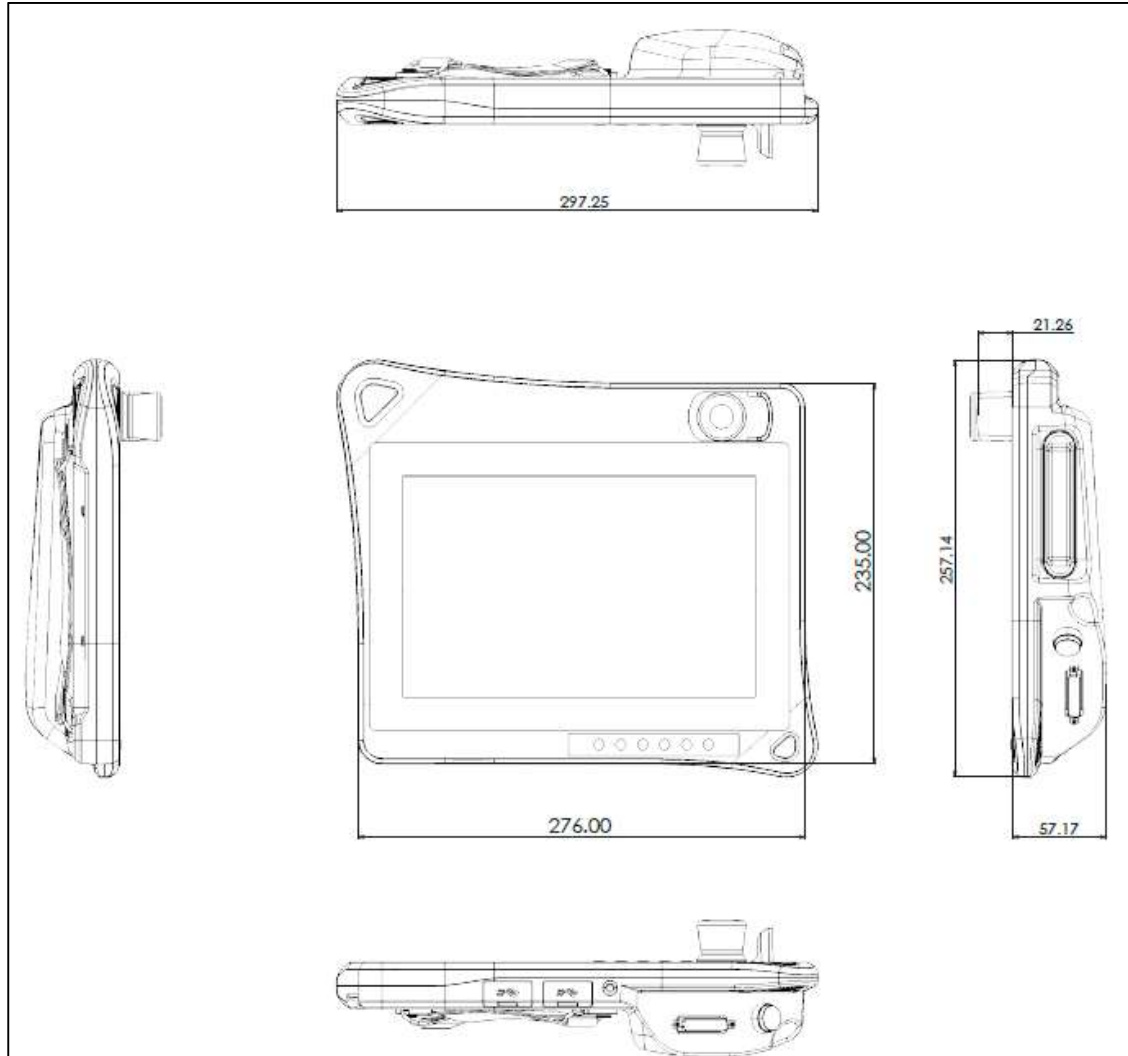
Buttons	Basic Function
ESTOP Button	Emergency Stop button <ul style="list-style-type: none"> For details, refer to Section 3.3.1 regarding Pendant Emergency Stop
Robot Power Button	The power switch of the robot <ul style="list-style-type: none"> Power on: single press Shutdown: long press
M/A Mode Switch Button	Toggle Manual/Auto Mode Switch <ul style="list-style-type: none"> For details, refer to our TMflow User Manual
Enabling Device	The 3-position enabling switch <ul style="list-style-type: none"> For details, refer to Section 3.3.3 SF5 Pendant Enabling Device
Play/Pause Button	Play/Pause Project (single press)
Stop Button	Press this button to stop any project.
+/- Button	Adjust project speed (single press) under Manual Trial Run Mode. In Vision Job under TMflow, use these buttons to adjust robot positions.
Error Log	Displays error logs



3 Technical Data

3.1. Dimensions

TP-100-1



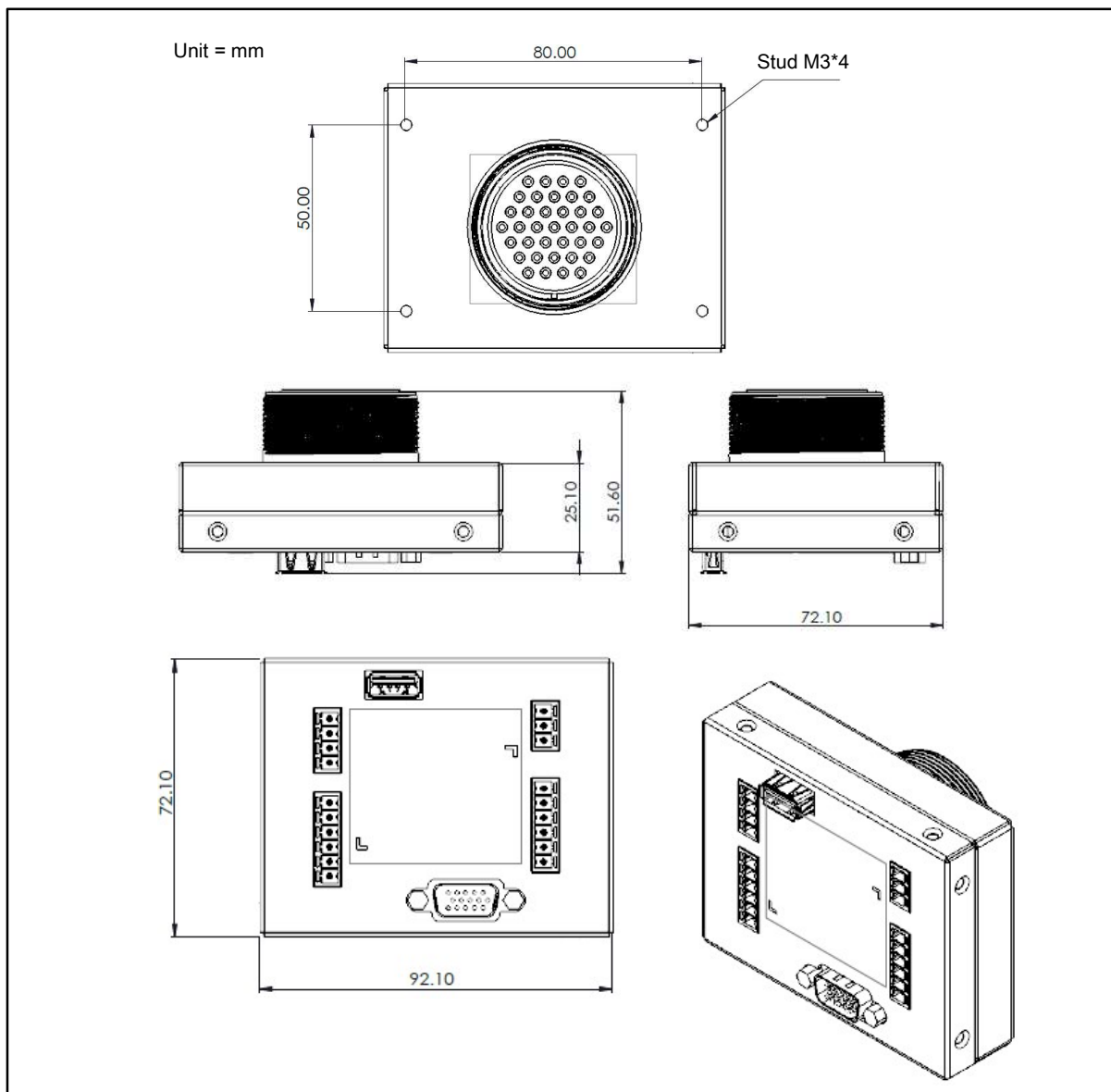
TP-100-VGA-JB



Front



Back



3.2. Specification

Technical Data	TP-100-1	Technical Data	TP-100-1
Panel	<ul style="list-style-type: none"> - 10.1", 16:10, WXGA, 1280 x 800 - Luminance: 500 cd/m2 - Contrast ratio: 800:1 - LCD color: 16.7M - Viewing angle: 85 (U), 85 (D), 85 (L), 85 (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, including power signal, E-stop button signal, Enabling switch signal, Switch button signal, STOP signal, USB 2.0 and VGA signals
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-VGA 0.625A at 24Vdc (max.)
Safety Elements	<ul style="list-style-type: none"> - Emergency stop button (2 NC channels, B10d=130,000) <ul style="list-style-type: none"> > Contact function: latching > Reset: by rotating - 3-position Deadman switch (3 channels 2 NO & 1 NC, B10d=100,000) 	Mechanical	<ul style="list-style-type: none"> - Dimension: 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"> > TP-100-1 1.5Kg - TP-100-1 IP protection class: Full IP65 - Junction Box module and "install on OMRON TM control box" IP protection class: Full IP 32 - Teach Pendant cable length: 3m
Operating Elements	<ul style="list-style-type: none"> Switch button switch (1 NO, 1 NC) 6 membrane key 	Environment	<ul style="list-style-type: none"> - Operating temperature: 0°C to 50°C - Storage temperature: -20°C to 75°C - Operating humidity: 5%~90% relative humidity, non-condensing - Vibration resistance/shock-proof/free-fall according to EN 61131-2
System	<ul style="list-style-type: none"> - TP-100-1: VGA input - USB 2.0 upstream 	Certifications	<ul style="list-style-type: none"> - CE (Emission EN61000-6-4; Immunity EN61000-6-2 for installation in industrial environments) - FCC Class A

4 Operation Behaviors



4.1. Membrane Keys



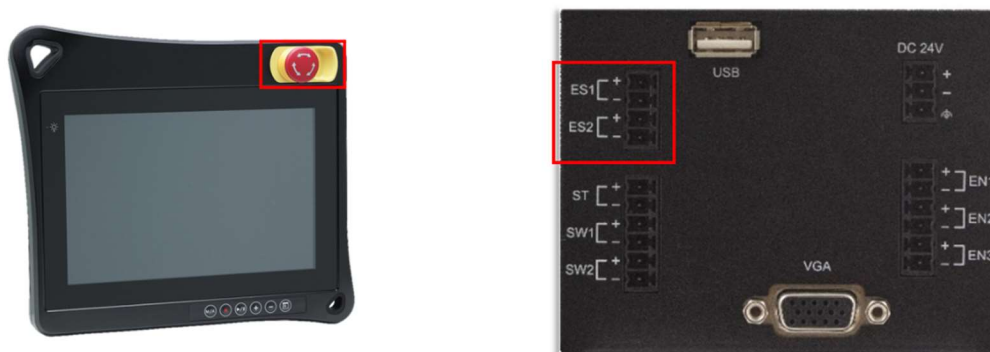
The TP-100-1's membrane keys are located at the lower-right of the teach pendant. Please note that the M/A key is only functioning after users log in TMflow.

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-100-1 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.

	6.0 Travel (mm) 3.0 0				
	<div>Position Pin</div>	Position 1	Position 2	Position 3	
When pressing the switch	EN1 +	Open	Close	Open	
	EN1 -				
	EN2 +	Open	Close	Open	
	EN2 -				
	EN3 +	Close	Close	Open	
	EN3 -				
When releasing the switch	EN1 +	Open	Open	Open	
	EN1 -				
	EN2 +	Open	Open	Open	
	EN2 -				
	EN3 +	Close	Close	Open	
	EN3 -				

4.4. Switch Button



The switch button connects to SW1 and SW2 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), and SW2 status will change from Normal Open (NO) to Normal Close (NC).

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