Digital I/Os

The digital I/O are constructed in compliance with IEC 61131-2. The electrical specifications are shown below.

Terminals	Parameter	Min	Typ	Max	Unit
Digital Outputs					
[COx / DOx]	Current*	0	-	1	A
[COx / DOx]	Voltage drop	0	-	0.5	V
[COx / DOx]	Leakage current	0	-	0.1	mA
[COx / DOx]	Function	-	PNP	-	Type
[COx / DOx]	IEC 61131-2	-	1A	-	Type
Digital Inputs					
[EIx/SIx/CIx/DIx]	Voltage	-3	-	30	V
[EIx/SIx/CIx/DIx]	OFF region	-3	-	5	V
[EIx/SIx/CIx/DIx]	ON region	11	-	30	V
[EIx/SIx/CIx/DIx]	Current (11-30V)	2	-	15	mA
[EIx/SIx/CIx/DIx]	Function	-	PNP +	-	Type
[EIx/SIx/CIx/DIx]	IEC 61131-2	-	3	-	Type

*For resistive loads or inductive loads of maximum 1H.

8.5. Teach Pendant with 3-Position Enabling Device

Description

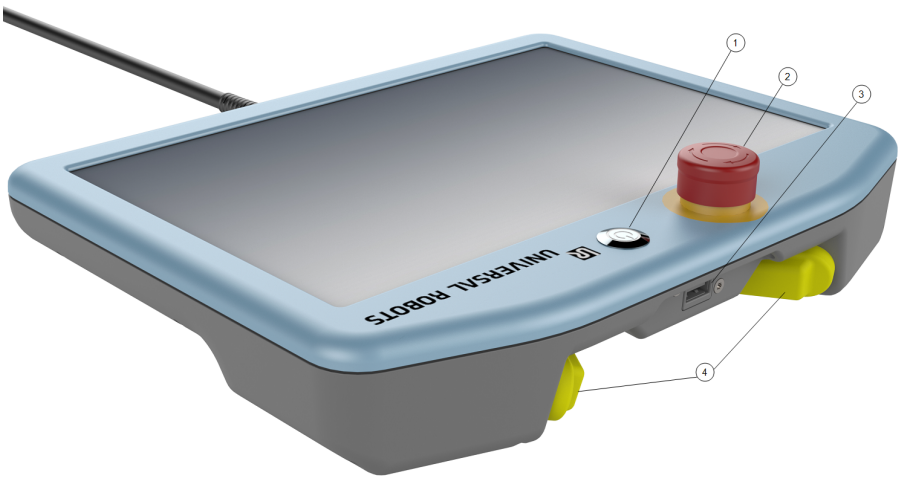
Depending on the robot generation, your Teach Pendant can be with or without a 3-Position Enabling device (3PE).
UR20 and UR30 robots have the built-in 3PE called a 3-Position Enabling Teach Pendant (3PE TP). The Teach Pendant without the 3PE will not work with the UR20 and UR30.
The enabling buttons are on the underside of the Teach Pendant, as illustrated below. You can use either button, according to your preference. If the Teach Pendant is disconnected, an external 3PE device must be connected and configured. The 3PE TP functionality extends to the PolyScope interface, where there are additional functions in the Header.

NOTICE

The 3PE Teach Pendant is not included with the purchase of the OEM Control Box, so enabling device functionality is not provided. Using a UR20, or a UR30, requires an external enabling device or a 3PE Teach Pendant when programming, or teaching, within the reach of the robot application. See ISO 10218-2.

Overview of TP

1. Power button
2. Emergency Stop button
3. USB port (comes with a dust cover)
4. 3PE buttons



Freedrive

A Freedrive robot symbol is located under each 3PE button, as illustrated below.

8.5.1. 3PE Teach Pendant Installation

Hardware Installation

To remove a Teach Pendant

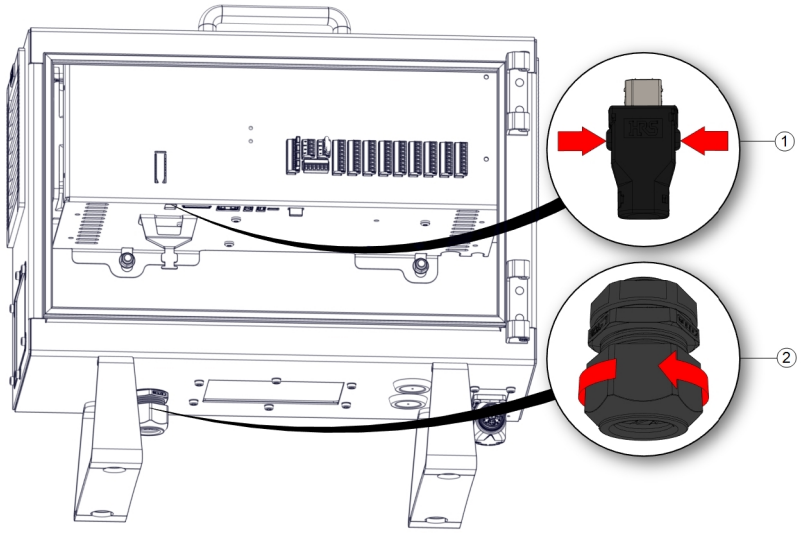
NOTICE

Replacing the Teach Pendant can result in the system reporting a fault on start-up.

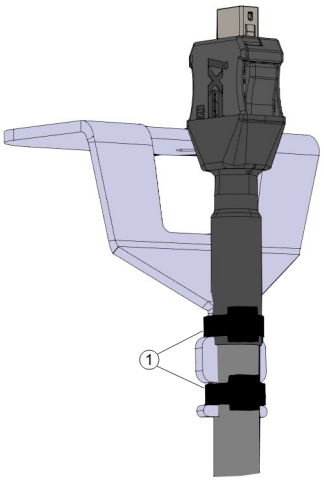
- Always select the correct configuration for the type of Teach Pendant.

To remove the standard Teach Pendant:

1. Power down the control box and disconnect the main power cable from the power source.
2. Remove and discard the two cable ties used for mounting the Teach Pendant cables.
3. Press in the clips on both sides of the Teach Pendant plug as illustrated, and pull down to disconnect from the Teach Pendant port.
4. Fully open/loosen the plastic grommet at the bottom of the control box and remove the Teach Pendant plug and cable.
5. Gently remove the Teach Pendant cable and Teach Pendant.



1	Clips	2	Plastic grommet



1	Cable ties

To install a 3PE Teach Pendant

1. Place the Teach Pendant plug and cable in through the bottom of the control box and fully close/tighten the plastic grommet.
2. Push the Teach Pendant plug into the Teach Pendant port to connect.
3. Use two new cable ties to mount the Teach Pendant cables.
4. Connect the main power cable to the power source and power on the control box.

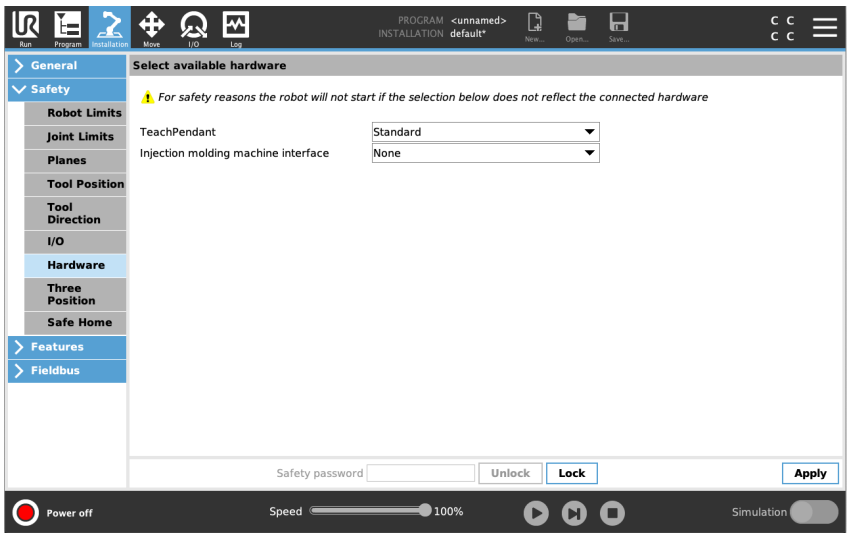
There is always a length of cable with the Teach Pendant that can present a tripping hazard if it is not stored properly.

- Always store the Teach Pendant and the cable properly to avoid tripping hazards.

New Software Installation

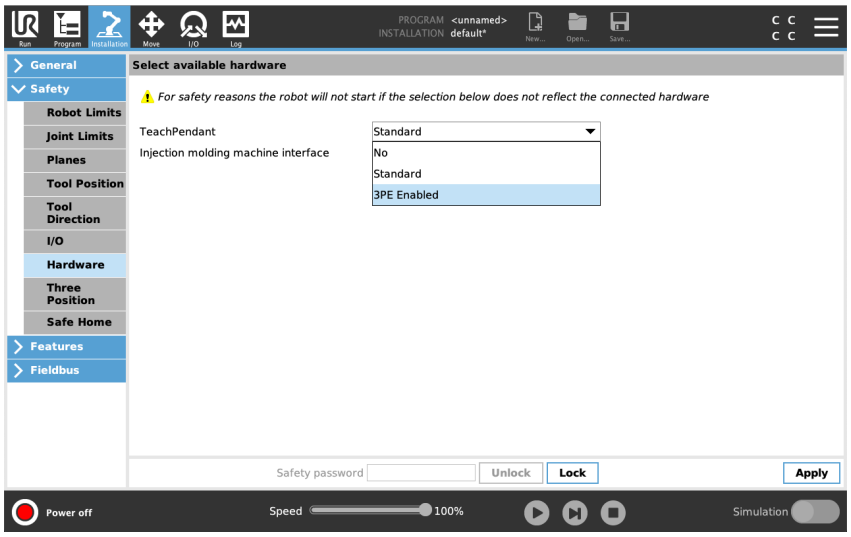
To configure the 3PE TP software

1. On PolyScope, in the Header, tap Installation and select **Safety**.



2. Tap Hardware and unlock the options on the **Select available hardware** screen.

   A password is required to unlock this screen.



3. In the **Teach Pendant** drop-down list, select **3PE Enabled**.
4. Tap **Apply** to restart the system. PolyScope continues to run.
5. Tap **Confirm Safety Configuration** to complete the 3PE Teach Pendant software installation.
6. As the robot restarts and initializes, light-press the 3PE button and tap **Start** on PolyScope.

8.5.2. 3PE Teach Pendant Button Functions

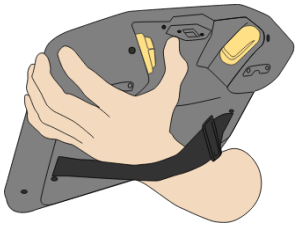
Description

NOTICE

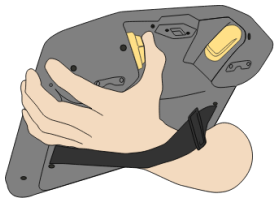
The 3PE buttons are only active in Manual mode. In Automatic mode, robot movement does not require 3PE button action.

The table below describes the functions of the 3PE buttons.

Position		Description	Action
1	Release	There is no pressure on the 3PE button. It is not pressed.	Robot movement is stopped in Manual mode. Power is not removed from the robot arm and the brakes remain released.
2	Light-press (Grip lightly)	There is some pressure on the 3PE button. It is pressed to a middle point.	Allows your program to play when the robot is in Manual mode.
3	Tight-press (Grip tightly)	There is full pressure on the 3PE button. It is pressed all the way down.	Robot movement is stopped in Manual mode. Robot is in 3PE Stop.



1 Button release



2 Button press

8.5.3. Using the 3PE Buttons

Using the 3PE

To play a program

1. On PolyScope, ensure the robot is set to **Manual mode**, or switch to **Manual mode**.
2. Maintain a light-press on the 3PE button.
3. On PolyScope, tap **Play** to run the program.

   The program runs if the robot arm is in the first position of the program.
   If the robot is not in the first position of the program, the **Move Robot into Position screen** appears.

To stop a program

1. Release the 3PE button or, on PolyScope, tap **Stop**.

To pause a program

1. Release the 3PE button, or, in PolyScope, tap **Pause**.

   To continue the program execution, keep the 3PE button light pressed and tap **Resume** in PolyScope.

Freedrive with 3PE Buttons

Description

Freedrive allows the robot arm to be manually pulled into desired positions and/or poses.

To use the 3PE button to freedrive the robot arm

1. Rapidly light-press, release, light-press again and keep holding the 3PE button in this position.

   Now you can pull the robot arm into a desired position, while the light-press is maintained.

Using Move Robot into Position

Description

Move Robot into Position allows the robot arm to move to that start position, after you complete a program. The robot arm must be in the start position before you can run the program.

Move into position

To use the 3PE button to move the robot arm into position:

1. When your program is complete, press **Play**.
2. Select **Play from beginning**.

   On PolyScope, the **Move Robot into Position** screen appears displaying robot arm movement.
3. Light-press and hold the 3PE button.
4. Now, on PolyScope, press and hold **Automove** for the robot arm to move to the start position.

   The Play Program screen appears.
5. Maintain a light-press on the 3PE button to run your program.

   Release the 3PE button to stop your program.

8.5.4. Teach Pendant Storage

Description

The operator needs to have a clear understanding about what the e-Stop on the Teach Pendant affects when pressed. For example there can be confusion with a multi-robot installation. It should be made clear if the e-Stop on the Teach Pendant stops the whole installation or only its connected robot.
If there could be confusion, store the Teach Pendant such that the e-Stop button is not visible or usable.