# Teach Pendant

*For Controller USB and Controller USB-Pro*

# User Manual

*Catalog #200033 Rev.A*

**intelitek**▶▶

# Table of Contents

# 1. Part List

The contents of the Teach Pendant (TP) package are shown in the picture below and are described in the table that follows.



| # | Part Cat. No. | Description | Quantity |
|---|---------------|-------------|----------|
| 1 | 035094 | Teach Pendant | 1.0 |
| 2 | (Packed with 035094) | Hook Attachment | 1.0 |
| 3 | 301059 | Socket Head Cap Screw | 2.0 |
| 4 | 313007 | Washer Flat, Zinc Plate M4 | 2.0 |

| # | Part Cat. No. | Description | Quantity |
|---|---------------|-------------|----------|
| 5 | 312011 | T-Slot Nut 8 Zn M4 | 2.0 |
| 6 | 411861 | Telephone Cable TPB | 1.0 |
| 7 | 200033 | Teach Pendant User Manual (Not shown in image) | 1.0 |
| 8 | 103004 | Shipping Box (Not shown in image) | 1.0 |

# 2. Introduction

The Teach Pendant is an industrial quality teach pendant and has been tailored for use in an educational environment.

The Teach Pendant is a sophisticated portable terminal for operating and controlling the axes connected to the controller. This Teach Pendant is equipped with an EMERGENCY STOP push button, an AUTO/TEACH selector switch, a Dead Man switch and 24 keypad functions.

The Teach Pendant can be mounted onto the hook attachment provided, outside the robot's working envelope.

To install the Teach Pendant, follow the installation instructions for the Teach Pendant in the controller's user manual.

# 3. Operation

❖ *Make sure the Teach Pendant is properly connected to the controller before you power on the system.*

The Auto/Teach switch on the Teach Pendant must be in the TEACH position to assign the Teach Pendant full control of the axes.

The Dead Man switch and the EMERGENCY STOP button ensure operator safety.

The Dead Man switch must remain depressed at all times for Teach Pendant operation; if this button is released, the Teach Pendant will be inoperative. This restriction is for safety reasons.

# 3.1 AUTO/TEACH Switch

The AUTO/TEACH switch enables the user to choose between manipulating the robotic controller from the Teach Pendant or from the computer:
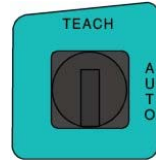


- ■ When this switch is in the TEACH position, the Teach Pendant has full control of the axes. SCORBASE commands and functions which affect axis movement (such as the Control On button, program execution, the Go to Position command, and the Manual Movement dialog box) cannot be activated from SCORBASE.

- ■ When the switch is in the AUTO position, the Teach Pendant is disabled, and SCORBASE has full control of all axes.

If the switch is moved from AUTO to TEACH while programs are running, execution is aborted.

# 3.2 Dead Man Switch

The Dead Man switch is an elongated button on the right side of the Teach Pendant, as shown in the image.

While the Teach Pendant is in TEACH mode, this button must remain depressed at all times to enable control of the axes from the Teach Pendant.

If the Dead Man switch is released while in TEACH mode, all axes will be stopped and the Teach Pendant will be inoperative. If released, the text EMERGENCY! is shown in the display screen to indicate an emergency stop has occurred.

# 3.3 EMERGENCY BUTTON

The EMERGENCY BUTTON is the red mushroom button on the face of the Teach Pendant, and functions in the same way as the EMERGENCY BUTTON on the controller.

The EMERGENCY BUTTON can be activated regardless of the Teach Pendant's status (i.e. in both TEACH and AUTO mode).

Press the button to activate; pull it out to release.

When the button is pressed, the system goes into the emergency state.

To cancel the emergency state from the Teach Pendant, release the EMERGENCY BUTTON (if it has been pressed). Press CONTROL ON/OFF in order to turn the control on.

# 4. Keypad Functions

The Teach Pendant's keypad has 24 color-coded buttons. Most of the buttons are multi-functional: for example, some buttons include both an axis drive command and a numeric function.

The controller recognizes the buttons by the order in which they are pressed. Thus, the numeric function will be active only if a function such as SPEED or MOVE has been keyed in first; otherwise, the axis drive command will be active.



Teach Pendant commands can be executed only when the Teach Pendant is in the TEACH mode and the Dead Man switch is depressed.
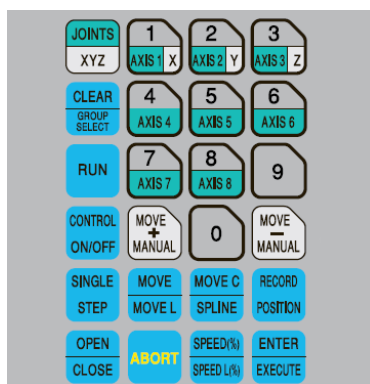
Following are descriptions of the Teach Pendant's buttons and instructions for activating them.

# 4.1 ENTER/EXECUTE

The ENTER/EXECUTE command accepts and/or executes the command that has been entered.

# 4.2 JOINTS/XYZ

The JOINT/XYZ command selects the coordinate system for command execution.

Successively press JOINT/XYZ to switch from Joints to Cartesian (XYZ), and again to Joints and so on.

Depending on the active coordinate system:

■ Manual movements of the axes are executed according to Joint or XYZ coordinates.

■ The Teach Pendant's RECORD POSITION command records positions in either Joint or XYZ coordinates.

# 4.3  CLEAR/GROUP SELECT

The CLEAR/GROUP SELECT command clears a partially entered command.

GROUP SELECT is not available in the Teach Pendant.

❖ *The axis groups A (robot axes), B (peripheral axes) and G (gripper) are automatically activated when an axis number is selected.*

# 4.4 MOVE + MANUAL

When in:

- Joint mode, MOVE + MANUAL moves the selected axis in the positive direction.

- XYZ mode, MOVE + MANUAL moves the TCP (tool center point) in the positive direction.

If axis 6/group G is selected, the gripper opens in small increments.

Regardless of the current mode, movement will occur as long as the MOVE + MANUAL button is depressed, or until the axis limit is reached.

# 4.5 MOVE - MANUAL

When in:

- Joint mode, MOVE - MANUAL moves the selected axis in the negative direction.

- XYZ mode, the MOVE - MANUAL moves the TCP (tool center point) in the negative direction.

If axis 6/group G is selected, the gripper closes in small increments.

Regardless of the current mode, movement will occur as long as the MOVE – MANUAL button is depressed, or until the axis limit is reached.

# 4.6 0

The 0 command displays the number 0.

## 4.7 1/AXIS 1/X

The 1/AXIS 1/X command displays the number 1.

In addition, if in:

- Joint mode, it also selects axis 1.
- XYZ mode, it selects axis X.

## 4.8 2/AXIS 2/Y

The 2/AXIS 2/Y command displays the number 2.

In addition, if in:

- Joint mode, it selects axis 2.
- XYZ mode, it selects axis Y.

## 4.9 3/AXIS 3/Z

The 3/AXIS 3/Z command displays the number 3.

In addition, if in:

- Joint mode, it selects axis 3.
- XYZ mode, it selects axis Z.

# 4.10 4/AXIS 4

The 4/AXIS 4 command displays the number 4.

If axis 4 is in Joint mode, this command is applicable for the following robots:

- SCORBOT-ER 4U
- SCORBOT-ER 9PRO

If the Pitch axis is in XYZ mode, this command is applicable for the following robots:

- SCORBOT-ER 4U
- SCORBOT-ER 9PRO

If the Rule axis is in XYZ mode, this command is applicable for the following robots:

- SCORA-ER 14PRO

## 4.11 5/AXIS 5

The 5/AXIS 5 command displays the number 5.

If the axis 5 is in Joint mode, this command is applicable for the following robots:

- SCORA-ER 14PRO (Pneumatic Gripper)
- SCORBOT-ER 4U
- SCORBOT-ER 9PRO

If the Roll axis is in XYZ mode, this command is applicable for the following robots:

- SCORBOT-ER 4U
- SCORBOT-ER 9PRO

If the Gripper is in Joint and XYZ modes, this command is applicable for the following robots:

- SCORA-ER 14PRO (Servo Gripper)

## 4.12 6/AXIS 6

The 6/AXIS 6 command displays the number 6.

If axis 6 is in Joint mode, this command is applicable for the following robots:

- SCORBOT-ER 9PRO (Pneumatic Gripper)
- SCORA-ER 14PRO

If the Gripper is in Joint and XYZ modes, this command is applicable for the following robots:

- SCORBOT-ER 4U
- SCORBOT-ER 9PRO (Server Gripper)

# 4.13 7/AXIS 7

The 7/AXIS 7 command displays the number 7.

Axis 7 functions in Joint mode (and only if the axis is installed and configured).

# 4.14 8/AXIS 8

The 8/AXIS 8 command displays the number 8.

Axis 8 functions in Joint mode (and only if the axis is installed and configured).

# 4.15 9

The 9 command displays the number 9.

# 4.16 CONTROL ON/OFF

The CONTROL ON/OFF command enables (Con all) and disables (Coff all) all axes.

To change the control status:

1. Press CONTROL ON/OFF.

2. Select the appropriate mode (i.e. Con all or Coff all).

3. Press ENTER/EXECUTE.
   The control status is changed.

# 4.17 RECORD POSITION

The RECORD POSITION command defines and records absolute positions. Positions are attached to an array which is associated with either the robot axes (SCORA) or the peripheral axes (SCORB).

Up to 5000 SCORBASE positions can be recorded from the Teach Pendant for the controller USB-PRO from version 6.1.

Up to 1000 SCORBASE position can be recorded from the Teach Pendant for the Controller USB from version 5.3.3.2.

To record a position:

1. Press RECORD POSITION.
   A position array name is displayed. Depending on the active control group, the position array name is either SCORA or SCORB.

   ❖ *If Group G is active, the position will be recorded in the SCORA array.*

2. Enter a number from 1 to 5000, and press ENTER/EXECUTE.
   The position is recorded.

When recorded, a position receives the current coordinates of the axes in the selected group. The coordinates are recorded in the Joint coordinate system.

If you enter the number of a position which has already been recorded, new coordinates will overwrite the existing ones.

The same number can be used for positions in both the SCORA and the SCORBA arrays (e.g. SCORA10 and SCORB10).

# 4.18 SPEED(%)/SPEED L(%)

The SPEED(%)/SPEED L(%) command sets the speed of manual axis movement, as a percentage of maximum speed.

To accept the displayed default speed, press ENTER/EXECUTE or use the numerical buttons to enter a different speed, and then press ENTER/EXECUTE.

# 4.19 OPEN/CLOSE

The OPEN/CLOSE command completely opens and completely closes the gripper.

# 4.20 MOVE/MOVE L

The Move/Move L command moves the robot from the current position to a target position:

- ■ The Move command sends the robot from the current position to the selected "target" position along no particular path.

- ■ The Move L command sends the robot from the current postion to the selected "target" position in a linear (straight line) path.

  - ❖ *MOVE L is applicable to the robot axes only.*

  - ❖ *Do not attempt to use MOVE L when Group B (peripheral axis) is selected.*

To move the robot from the current position to another selected position:

1. Press MOVE/MOVE L.

2. Use the numerical buttons to enter the position number.

3. Press and hold ENTER/EXECUTE.
   Continue holding ENTER/EXECUTE until the axes reach the target position. If ENTER/EXECUTE is released, the movement is stopped immediately and the command is aborted.

# 4.21 MOVE C/SPLINE

The MOVE C command moves the robot axes to a target position through an intermediate position along a circular path.

MOVE C is applicable to the robot axes only.

❖ *Do not attempt to use this button when Group B is selected.*

The SPLINE command is not available.

To move the robot from the current position to another selected position:

1. Press MOVE C.

2. Use the numerical buttons to enter the "target" position.

3. Press ENTER/EXECUTE.

4. Use the numerical buttons to enter the intermidiate position.

5. Press and hold ENTER/EXECUTE.
   Continue pressing ENTER/EXECUTE until the axes reach the target position. If ENTER/EXECUTE is released, the movement is stopped immediately, and the command is aborted.

# 4.22 RUN

The RUN command activates the homing of all axes.

❖ *SCORBASE programs cannot be executed from the Teach Pendant.*

To home all axes:

1. Press Run.

2. Select 0/SELECT AXIS in the display screen

3. Press ENTER/EXECUTE.
   The homing process is started.

# 4.23 SINGLE STEP

The SINGLE STEP command is not available.

# 4.24 ABORT

The ABORT command immediately stops movement on all axes.

❖ *For operator safety reasons, other ways to stop motion along all axes include:*

■ Pressing EMERGENCY STOP.

■ Releasing ENTER/EXECUTE.

■ Releasing MOVE/+/MANUAL.

■ Releasing MOVE/–/MANUAL.

■ Releasing the Dead Man switch.

# 5. Display Panel

The Teach Pendant has a four-line liquid crystal panel, that is lit when the teach pendant is activated.. Each line displays a specific type of message or text.

## 5.1 Messages

When the Teach Pendant is in either the TEACH mode or AUTO mode, line 1 displays system and error messages. The current display is erased when a new message appears.

When the Teach Pendant is in the AUTO mode, lines 2, 3 and 4 will display: TP IN AUTO MODE

A list and brief descriptions of Teach Pendant messages appear in the next section.

## 5.2 Commands

When the Teach Pendant is in the TEACH mode, lines 2 and 3 display commands.

As you press the Teach Pendant buttons, Line 3 displays the command you are entering. Once a command has been entered, it is displayed in Line 2 and Line 3 is cleared, ready for another command to be keyed in.

# 5.3 Status Report

When the Teach Pendant is in the TEACH mode, line 4 displays the current status of the axes, in the following format:

Group:*N* Ax: *xx cccccc*

- ■ The italicized components are variables that must be substitued for actual values as explained in the table below.

- ■ When the text in line 4 is displayed normally (black on white), it indicates that control is on (Con all) for the group displayed.

- ■ When the text in line 4 is displayed inversely (white on black), it indicates control is off (Coff all) for the group displayed.

The meaning of each term in the status report is explained in the table below.

| Term | Meaning |
|------|---------|
| N | "N" indicates which grouping of the 8 axes is selected. The 3 axis groups are: A: Robotic Related G: Gripper B: Peripherals For example, with a Scorbot SCORBOT-ER 4U: A: Axes 1-5 of the robot. G: Axis 6 which is the gripper. B: Axis 7 or 8 which are the peripherals. |
| xx | If in Joint coordinate mode, the term "xx" defines which axis |

| Term | Meaning |
|---|---|
|  | number (1-8) is selected. If in XYZ mode, the term "xx" defines which Cartesian coordinate is selected: X: X axis Y: Y axis Z: Z axis P: Pitch axis R: Roll axis |
| cccccc | The "cccccc" defines which coordinate system is selected for manual movement. The two possible values are: Joint Cartesian XYZ |

# 5.3.1 Status Report Examples

Following are some examples of display screen status messages:

Group:B Ax: 7 JOINT - Group B axes are active, Axis 7 is active, Joint Mode is active and control is off.

Group:A Ax: P XYZ - Group A axes are active, Pitch axis is active, XYZ Mode is active and control is on.

# 6. Teach Pendant Messages

The following are system messages which may appear on line 1 of the Teach Pendant display during manual operation and program execution. Comparable messages may also appear on the SCORBASE screen.

| Display Message | Meaning |
|---|---|
| COMMAND NOT ALLOWED | The command is invalid for the current axis configuration. |
| CONFIGURATION CHANGE | The movement cannot be executed from the robot's current location. |
| CONTROL DISABLED | Motors have been disconnected from servo control (COFF). |
| EMERGENCY | The emergency button has been pressed. |
| HOME NOT DONE | You attempted to move the arm to a recorded position, or to record a position, before homing was performed on the group or axis. |
| HOMING AXIS *n* . . . | Displayed while homing routine is being performed. *n* indicates the specific axis which is being homed at the moment. |

| Display Message | Meaning |
|---|---|
| HOMING COMPLETE | Displayed very briefly when homing routine is completed. |
| IMPACT | The system has detected a position error which is too large. The system aborted all movements and disabled the axes.<br><br>This message may appear if you attempt to move an axis which is configured but not physically present. |
| INVALID AXIS | The selected axis is not configured (e.g., axis 9). |
| JOINT WORKSPACE | The robot is at a position at which the Joints coordinate system is not supported because the position is outside of the Joints work envelope. |
| MOTION ABORTED | Axis movement has stopped. This happens when you stop pressing ENTER/EXECUTE or MOVE + MANUAL/MOVE – MANUAL, or release the Dead Man switch during a movement. To complete the command, it must be entered again. |
| MOTION COMPLETED | The movement was successfully completed. |

| Display Message | Meaning |
|---|---|
| NO AXIS SELECTED | The command could not be executed because an axis has not been specified (selected). |
| NOT ACTIVE | The function or command is not available on the Teach Pendant. |
| THERMIC OVERLOAD | The system has detected a dangerous motor condition. The system aborted all movements and disabled the axes. |
| TP IN AUTO MODE | The Teach Pendant's switch is set to AUTO. SCORBASE has control of the axes. |
| TP IN TEACH MODE | The Teach Pendant's switch is set to TEACH. The Teach Pendant has control of the axes. |
| UNASSIGNED POINT | The specified position has not been recorded, or it has not been recorded for the currently selected axis group. |
| XYZ WORKSPACE | The robot is at a position at which the XYZ coordinate system is not supported because the position is outside of the XYZ work envelope. |