

PRC SERIES

7" Teach Pendant Manual

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1 Introduction

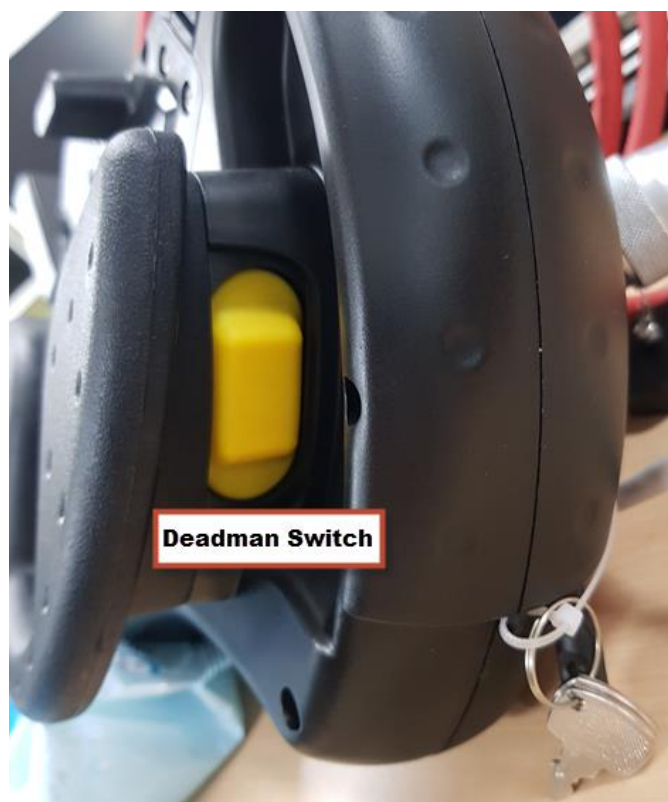
1.1 Hardware Specification

Item	Description
Processor	TI AM335x, 800 MHz RAM 512 MB
LCD	800x480
Touch	Resistive
USB (Keyboard, Mouse)	1
Communication	Ethernet, RS232
Power	24V DC
Protection Grade	IP40~IP65
Case	Black
Operating Environment	0°C~45°C
Storage temperature	-20°C~70°C



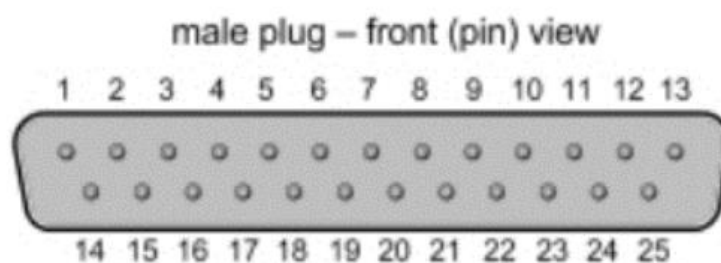
1.2 Key and LED functions

Number	Function
1.	LED
2.	Home window
3.	System Config
4.	Command terminal
5.	Program manager
6.	User Log
7.	Position Monitoring
8.	Error Log
9.	Show keypad for IP
10.	Hide keypad / Stop Scope
11.	
12.	Robot Select
13.	Jog
14.	
15.	Jog Step
16.	Velocity Increase for Jogging
17.	Velocity decrease for Jogging
18.	Using when the number of Axes is greater than 6
19.	Jogging for each axis (index 0~5)
20.	Start Program / Robot ON
21.	Stop Program / Stop motion when jogging



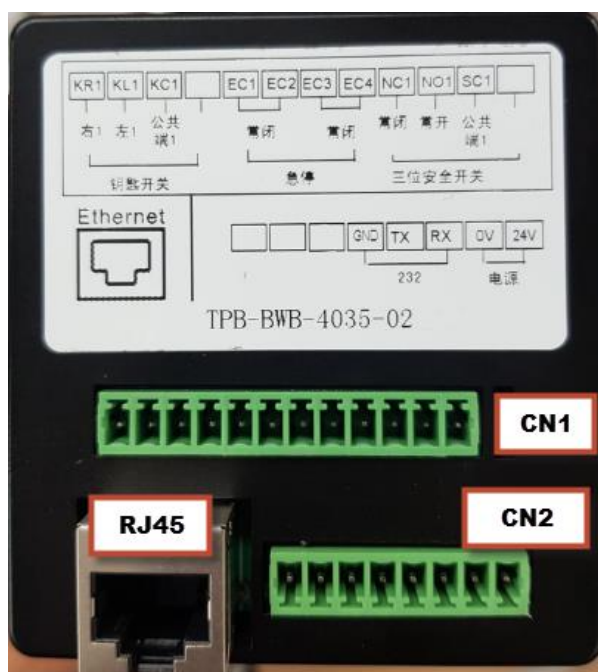
1.3 Connection

- Robot Controller Pin Map



Pin#	Name	Description
System I/O		
2	EMTP1+	Emergency Switch 1pin signal(+)
15	EMTP1-	Emergency Switch 1pin signal(-)
3	EMTP2+	Emergency Switch 2pin signal(+)
16	EMTP2-	Emergency Switch 2pin signal(-)
4	SWEN1+	Enable Switch 1pin signal(+)
17	SWEN1-	Enable Switch 1pin signal(-)
6	SELCOM1+	Select Switch 1pin signal(+)
19	SELCOM1-	Select Switch 1pin signal(-)
7	SELCOM2+	Select Switch 2pin signal(+)
20	SELCOM2-	Select Switch 2pin signal(-)
Power		
1	VCC	Input power 12 ~ 24V DC
14	GND	Ground
접지	Shield	Case(Ground)
RS232		
25	GND	Ground
12	TX	Send data
13	RX	Receive data

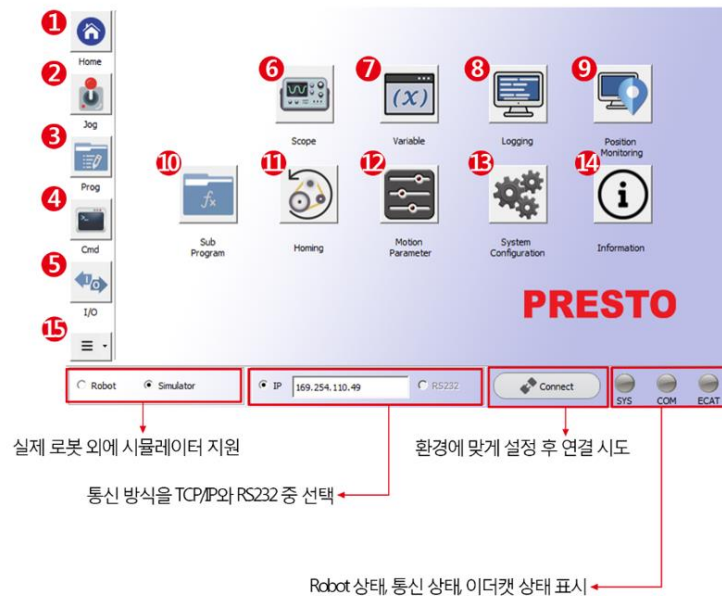
- TP Pin Map



- Connection between Robot Controller and TP

Part	[Robot Controller]		[TP]	
Emergency Switch	2	EMTP1+	EC1	CN1
	15	EMTP1-	EC2	
	3	EMTP2+	EC3	
	16	EMTP2-	EC4	
Dead-man Switch	4	SWEN1+	NO1	
	17	SWEN1-	SC1	
Select Switch	6	SELCOM1+	KL1	
	7	SELCOM2+	KR1	
	20	SELCOM2-	KC1	
RS232	12	TX	RX	CN2
	13	RX	TX	
	25	GND	GND	
POWER	1	VCC	24V	
	14	GND	0	
Ethernet	RJ45		RJ45	

1.4 Applications



1. Home

- 초기화면으로 이동

2. Jog

- Servo On, Off
- Joint 좌표계 혹은 Work 좌표계로 조깅
- 3D Viewer

3. Program

- 10개의 Program Task 지원
- 프로그램 별 Auto Run Set 가능
- Running Line Tracing 가능

4. Command

- Single Line Command
- Program 없이 간단한 명령을 실행할 수 있음

5. I/O

- 연결된 Digital 및 Analog I/O의 상태를 확인하고 변경 가능
- Digital Output 상태 On, Off
- Analog Output 값 변경

6. Scope

- 8개의 채널을 통해 다양한 데이터를 한 눈에 측정
- 모터 데이터, I/O 데이터 등을 측

7. Variable

- Integer, Double, Position Variables
- 각 변수마다 Save, Add, Edit 가능
- 마지막 변수부터 순차적 삭제 가능

8. Logging

- Error, System, Maintenance, User Log 확인 가능

9. Position Monitoring

- 각 로봇의 포지션 확인 가능

10. Sub Program

- 최대 100개의 Sub Program 지원
- 함수를 만들어 Main Program에서 호출하여 사용 가능
- Functional Programming

11. Homing

- 축 별 Homing Parameter 설정
- Homing 동작을 시작하거나 멈춤
- Homing State, Mode 등을 확인할 수 있음

12. Motion Parameter

- 로봇 축마다 Motion과 관련된 설정을 변경할 수 있음
- Ready, Jog Program, Motion Parameters

13. System Configuration

- 시스템 설정 변경(로봇명, 변수의 수, 모션 속도 등)
- 로봇 모터 설정 변경(Pulse, Pitch, Gear Ratio, Direction 등)
- 로봇 구성 변경

14. Information

- TP 펌웨어 버전 정보
- Presto Robot Controller 버전 정보

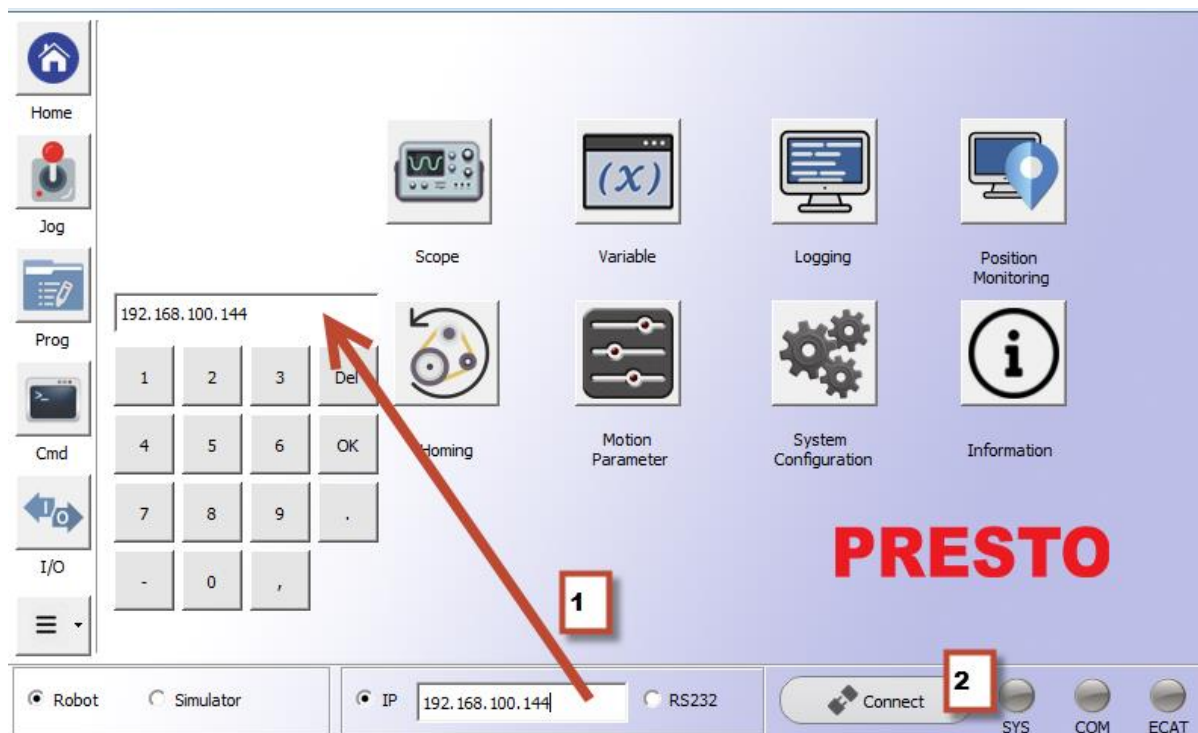
15. Quick Menu

- 자주 사용하는 메뉴들로 구성
- Home으로 이동할 필요 없이 어디서나 이동할 때 필요한 메뉴

2 Login

In order to control system, first we need to login to system.

Input IP



Press Connect

If IP of Robot Controller is online, next step is choosing Login Level

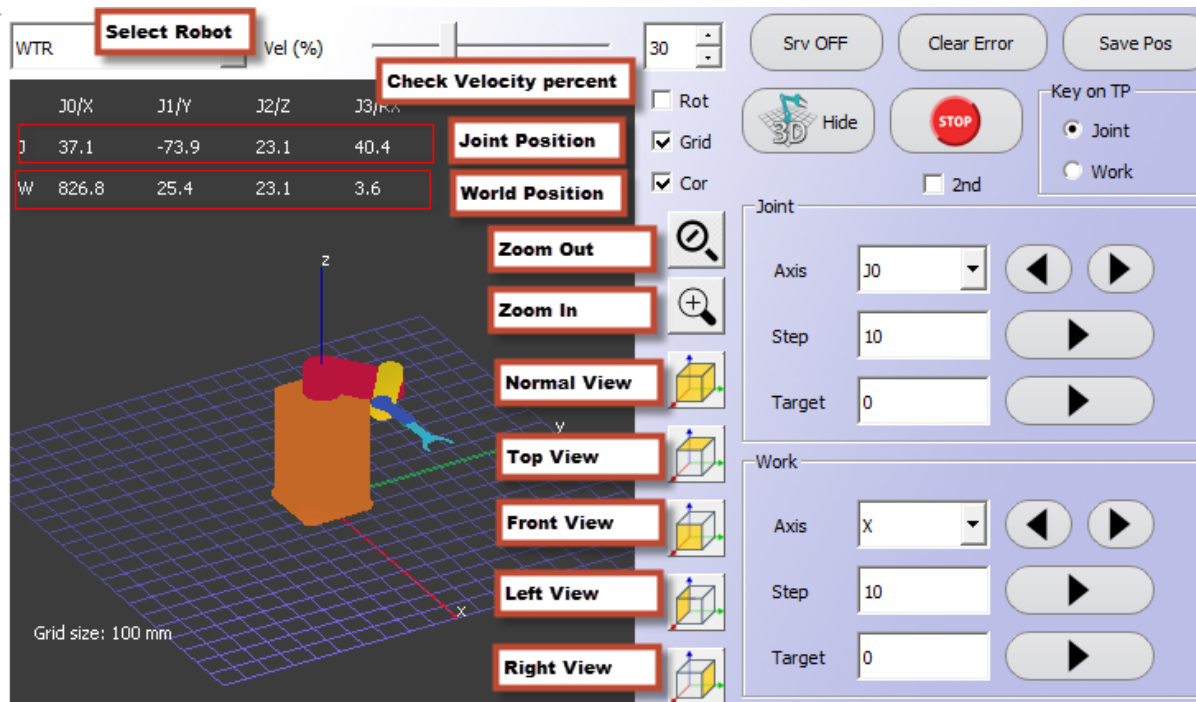


Operator does not require password. Otherwise, it requires password to login to system.

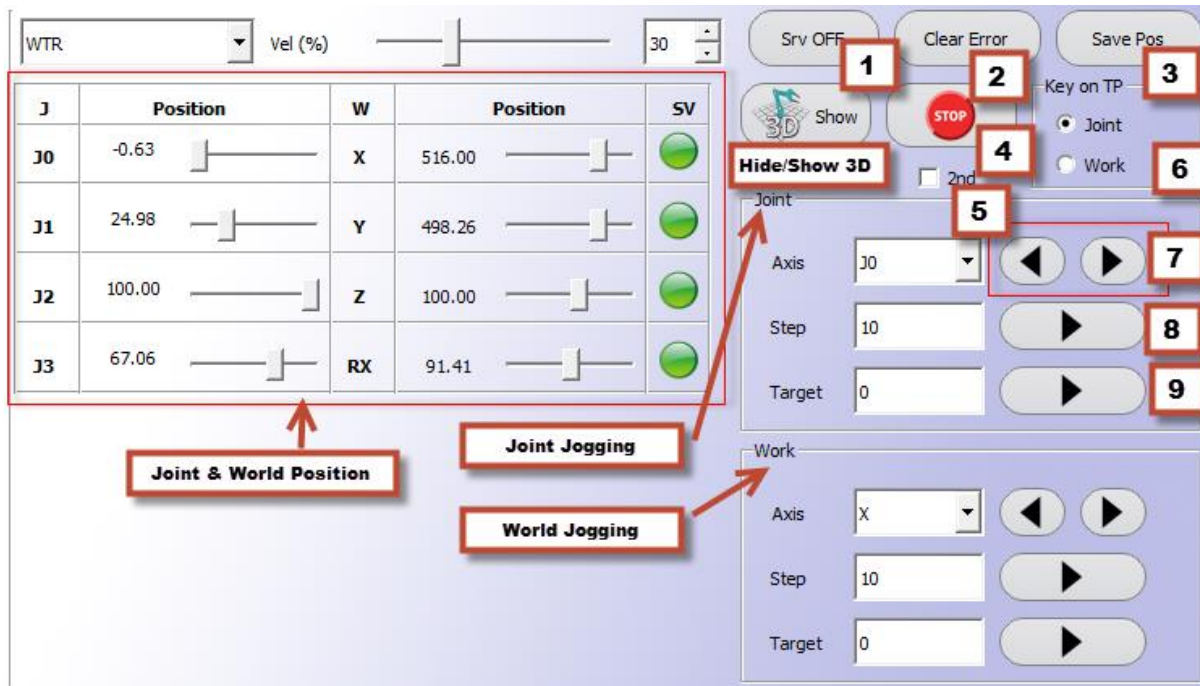
3 Applications

3.1 Jogging

With 3D View



When Press Button **Hide** [3D] we change to mode without 3D.



1. **Srv ON / Srv OFF:** Turn selected robot ON / OFF.
2. **Clear Error:** Clear Drive Error of the selected robot.
3. **Save Pos:** Open Save Position Dialog to Save position to expected position variable.
4. **Stop:** Stop Jogging Motion
5. **2nd:** Show 2nd axis whether is selected.
6. **Key on TP:** Use Keypad on TP as Joint Jogging or World Jogging.
7. **Jogging** Left and right for selected Axis
8. **Step:** Jogging step with value on the left
9. **Move** selected Axis with value on the left

Variable Index 1 **1** View All **2**

Description

J	Position	W	Position
J0	5.89	X	512.23
J1	19.60	Y	534.45
J2	100.00	Z	100.00
J3	65.92	Rx	91.41

Get Current Pos **3**

Get Variable **4**

Save **5**

Close

1. Select variable index
2. View all available variables
3. View current position of selected robot
4. Get current value of selected variable
5. Save value from table to current variable

3.2 Program & Sub-program manager

Program editor with Syntax Highlight and Auto-completion code support.

The screenshot shows the 'Program Manager' window. On the left, there is a table listing programs. The 'Program' radio button is selected (labeled 1), and the 'Sub-program' radio button is unselected (labeled 2). A 'STOP ALL' button is visible. The selected program is 'WTR' (labeled 3). On the right, there is a code editor showing a sequence of movement commands. A dropdown menu is open, showing options like 'Move', 'MoveArch', 'MoveC', etc. (labeled 9). Various icons for file operations and execution are also present (labeled 4, 5, 6, 7, 8).

A	No	Name	Lines	Exe	STT
<input type="checkbox"/>	0	MotionTest	13		C
<input type="checkbox"/>	1	IOTestWithBatch	11		C
<input type="checkbox"/>	2	TestIOWithoutBatch	11		C
<input type="checkbox"/>	3	TestAll	1		C
<input type="checkbox"/>	4	WTR	12		C
<input type="checkbox"/>	5	Math	44		C
<input type="checkbox"/>	6	Melsec	143		C
<input type="checkbox"/>	7	Puma	46		C
<input type="checkbox"/>	8	Scara	56		C
<input type="checkbox"/>	9	Delta	27		C

Program Manager

```

1 On0;
2 //MoveJW(-14.9, 36.3, 100
3 while (true){
4   MoveJW(JtPos[3]); // Reach 1
5   MoveJW(JtPos[4]); //Grasp
6   MoveJW(JtPos[5]); //Up
7   MoveJW(JtPos[3]); // Reach 1
8   MoveJW(JtPos[0]); // Reach 2
9   MoveJW(JtPos[1]); //Put
10  MoveJW(JtPos[2]); //Down
11  MoveJW(JtPos[0]); //Reach 2
12  Mnl
13 }
  
```

Move
MoveArch
MoveC
MoveEStop
MoveJ
MoveJRel
MoveJRelW

The screenshot shows the 'Sub-program Manager' window. The 'Sub-program' radio button is selected. A 'STOP ALL' button is visible. The selected sub-program is 'AllPrgCtl'. On the right, there is a code editor showing a sub-program definition.

No	Name	Lines	STT
0	11pp	1	E
1	123	3	E
2	AllPrgCtl	13	C
3	asd	3	C
4	PrintTest	5	C
5	ServoCtrl	37	C
6	ShowRbStatus	29	C
7	StartAllPrg	5	C
8	StopAllPrg	5	C
9	test	3	C
10	test2	3	E
11	test3	1	E

```

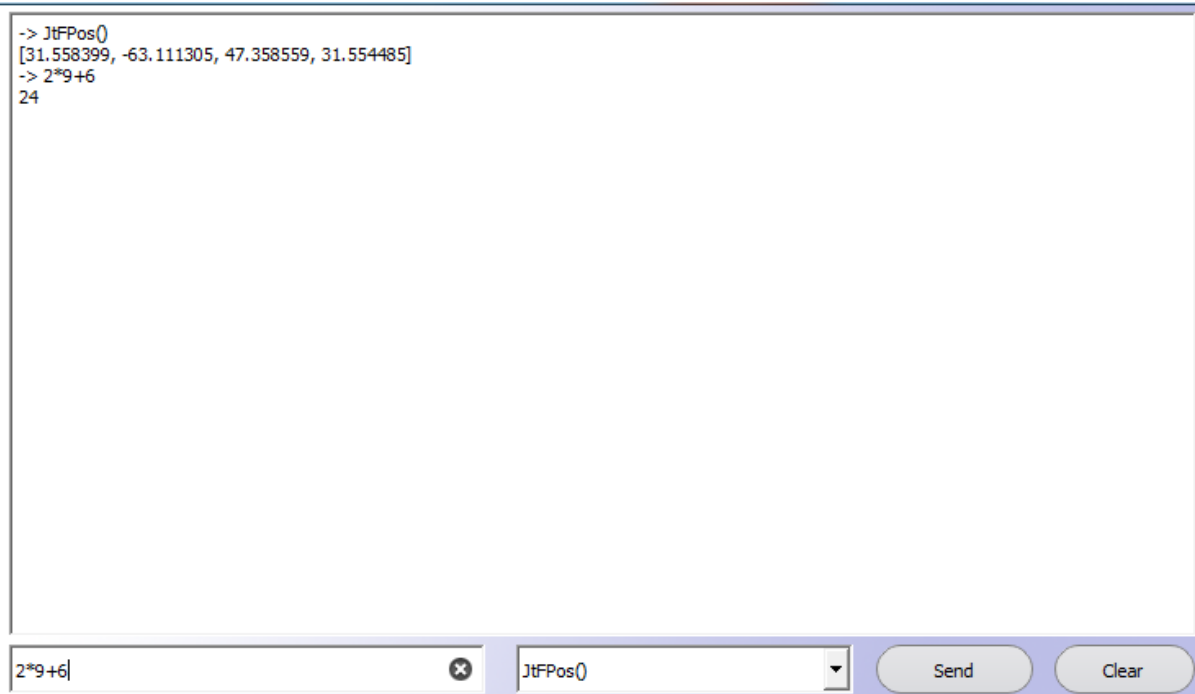
1 sub AllPrgCtl(prgFrom, PrgTo, state){
2   if (state == 0){
3     for(local i = prgFrom; i <= PrgTo; i = i + 1){
4       PrgStop();
5     }
6   }
7   else {
8     for(local i = prgFrom; i <= PrgTo; i = i + 1){
9       PrgStart();
10    }
11  }
12  return 0;
13 }
  
```

1. Program select
2. Sub-program select
3. Program/sub-program name
4. Compile program/sub-program
5. Start/Stop opened program
6. Pause/Resume opened program
7. Save the opened program to TP
8. Open program from TP and load to current program
9. Auto-complete code support

Program Manager:

1. Auto Run at Startup Robot Controller
2. Program status with Compiled (C), Running (R), Paused (P), Error (E)
3. 10 program can run at the same time
4. Extra program can load from TP by press button at 8.

3.3 Command Terminal

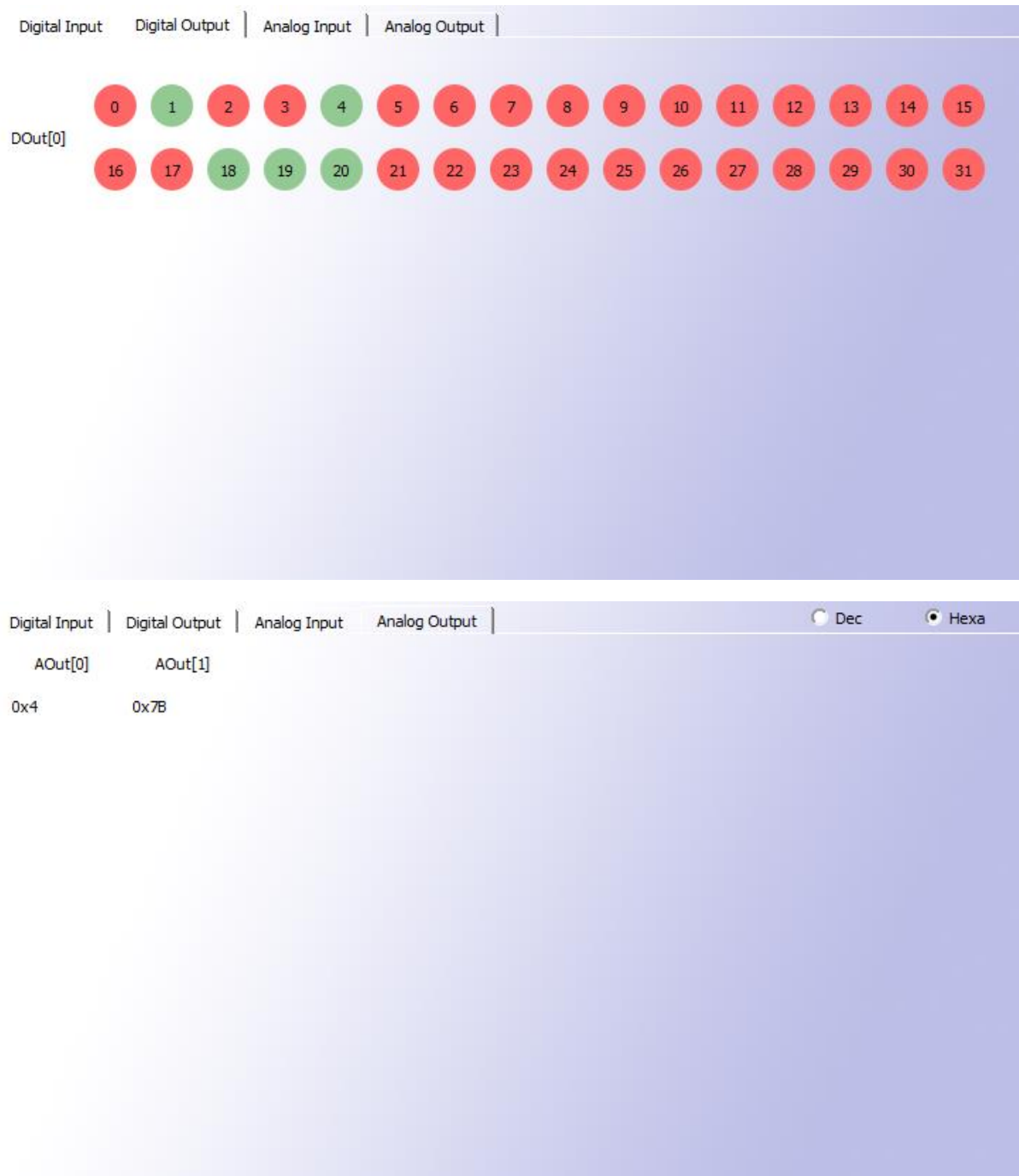


Execute single command and return result.

Support motion command, Math.

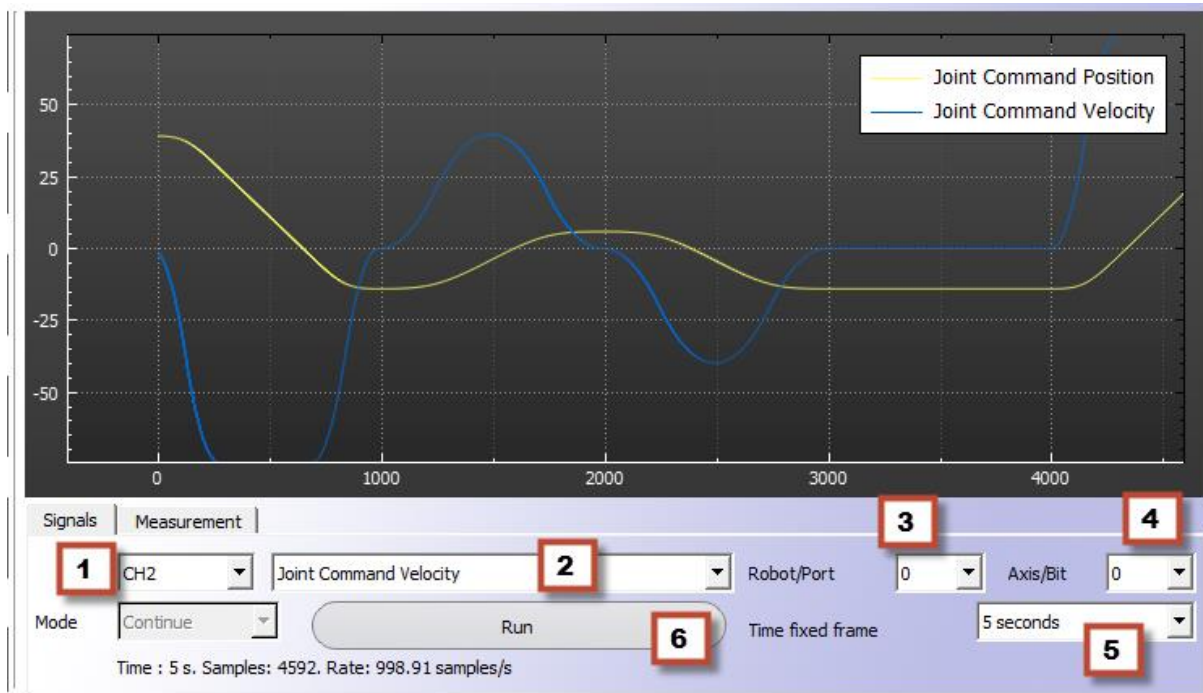
3.4 IO Manager

Easy to control Input/output of Digital/Analog signals by press the buttons or enter value.



3.5 Scope

3.5.1 Capture signal

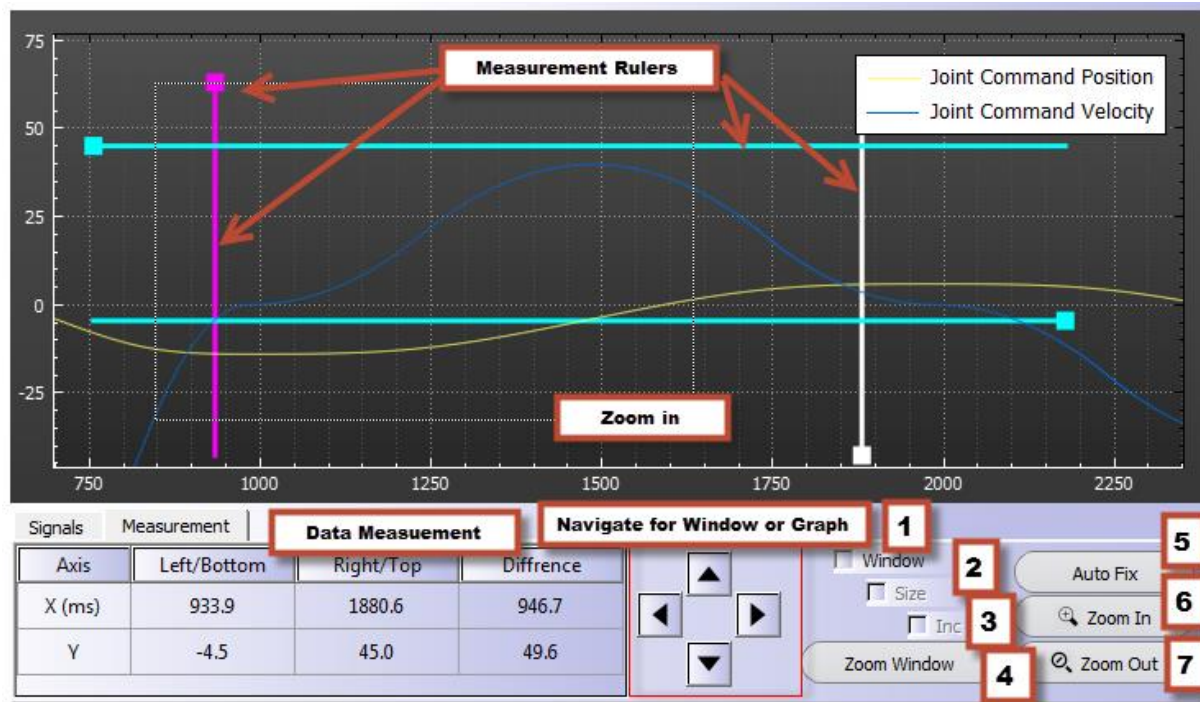


1. Select Channel (8 channel)
2. Select Signal
3. Select Robot Index (in case of multiple robots are used) or Port of Digital/Analog IO
4. Select Axis Number (in case of multiple robots are used) or Bit Index (in case of Digital IO are used)
5. Select how long to be fixed within scope window.
6. Run/Stop scope

3.5.2 Measure signal

By right click and drag the mouse to produce a rectangle, we can zoom in graph within the rectangle.

By moving the ruler, we can get data measurement in the table.



1. Choose using window to zoom
2. Change size by navigation tool (default decreased in size)
3. Increased in size when using navigation tool
4. Zoom within the zoom window
5. Fix all data of scope into the scope window
6. Zoom in
7. Zoom out

3.6 Variable Manager

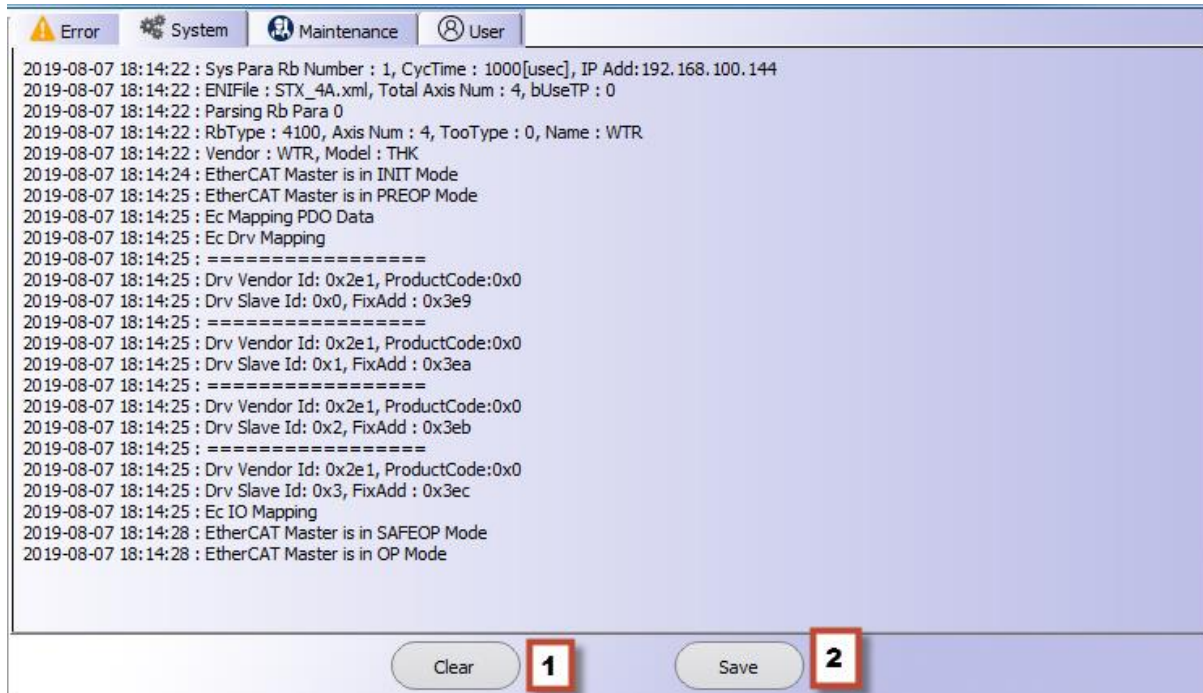
Support managing Integer, Double and Position variable for adding, editing, and deleting each type of variable.

Idx	Description		J0/X	J1/Y	J2/Z	J3/RX
0	Start Position	J	-14.00	36.01	100.00	69.39
		W	512.31	424.42	100.00	91.40
1		J	5.89	19.60	100.00	65.92
		W	512.23	534.45	100.00	91.41
2		J	-14.00	36.01	20.00	69.39
		W	512.31	424.42	20.00	91.40
3		J	39.18	-78.37	20.00	39.18
		W	814.31	-0.10	20.00	-0.01
4		J	16.88	-33.75	20.00	16.88
		W	914.32	0.11	20.00	0.01
5		J	16.88	-33.75	100.00	16.88

1. Select Robot
2. Refresh robot variable data
3. Add new variable
4. Remove the last variable

3.7 Logging

Support log for error, system, maintenance, and user log.



1. Clear log on TP and Robot Controller
2. Save current log to file on TP.

3.8 Position Monitoring

User can monitor position of all robot (joint and world) within a window.

No	Robot Name		J0/X	J1/Y	J2/Z	J3/RX	J4/RY	J5/RZ
0	WTR	J	0.00	0.00	0.00	0.00		
		W	938.00	0.00	0.00	0.00		
1	RS_PUMA	J	0.00	0.00	0.00	0.00	0.00	0.00
		W	396.10	-0.00	707.00	-0.00	90.00	0.00
2	LPK_SCARA	J	0.00	0.00	0.00	0.00		
		W	500.00	0.00	0.00	0.00		
3	PS_DELTA	J	0.00	0.00	0.00			
		W	0.00	-0.00	139.28			

3.9 Homing

WTR

Select All

Save To Flash

	Srv	Axis	JPos	State	Mode
<input type="checkbox"/>		J0	5.89	ERROR	NONE
<input type="checkbox"/>		J1	19.60	NONE	CSP
<input type="checkbox"/>		J2	100.00	NONE	CSP
<input type="checkbox"/>		J3	65.92	NONE	CSP

Homing parameters

Axis No: J0
Method: 1
Velocity: 20.00
Return Vel: 5.00
Acceleration: 100.00
Offset: 0.00

*Method: -128~127

This number depends on the drive

Set Homing Parameters

Set All Axes

* Please select robot from Jogging window

Start

Stop

First, we set homing parameters then we can **Start** or **Stop** the homing process.

3.10 Motion Parameter

The screenshot shows the Motion Parameter interface. At the top, there are dropdown menus for Robot (WTR, 1), Profile (Time Base), and Motion Type (Manual, 2). The Motion Type dropdown is open, showing options: Manual, Program, and Ready. To the right of these are buttons: Save to Flash (3), Refresh (4), Set Joint (5), and Set Work (6). Below the dropdowns are two tables. The first table is titled 'Joint Motion Parameters' and has columns: Axis, Vel, AccTime, DecTime, AccJerk, DecJerk, and KillTime. The second table is titled 'Work Motion Parameters' and has columns: Axis, Vel, AccTime, DecTime, AccJerk, DecJerk, and KillTime. Both tables have data rows for J0, J1, J2, J3 and X, Y, Z, RX respectively.

Axis	Vel	AccTime	DecTime	AccJerk	DecJerk	KillTime
J0	20	100	100	100	100	100
J1	20	100	100	100	100	100
J2	20	100	100	100	100	100
J3	100	100	100	100	100	100

Joint Motion Parameters

Axis	Vel	AccTime	DecTime	AccJerk	DecJerk	KillTime
X	10	100	100	100	100	100
Y	10	100	100	100	100	100
Z	10	100	100	100	100	100
RX	100	100	100	100	100	100

Work Motion Parameters

1. Select robot for setting motion parameters
2. Select Motion type: Manual, Program and Ready
3. Save to Flash: Save current motion parameters to flash, then next restart robot controller can re-use them.
4. Get current motion parameter from Robot Controller
5. Set joint motion parameter from left table to Robot Controller
6. Set work motion parameter from left table to Robot Controller

3.11 System Configuration

3.11.1 General Settings

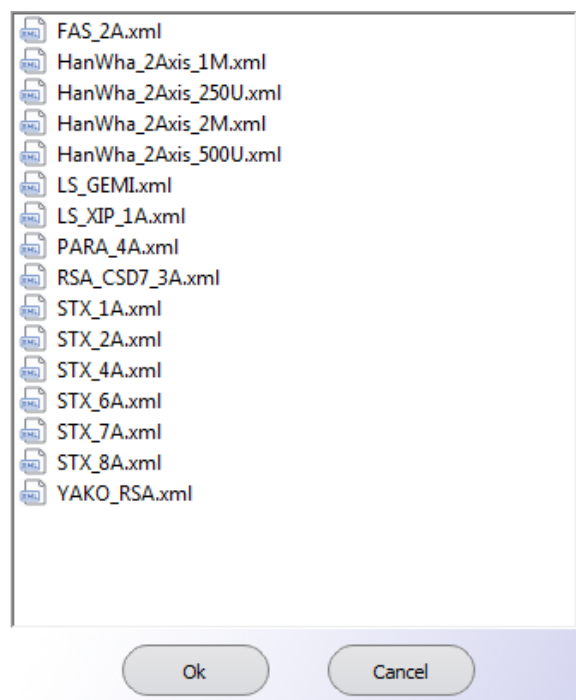
1. Select COM (Serial Port) on TP that will connect to Robot Controller
2. Refresh to get new status of serial ports
3. Change the password if login as Programmer or Administrator
4. Update license code long-run of Robot Controller

3.11.2 Robot Controller Settings

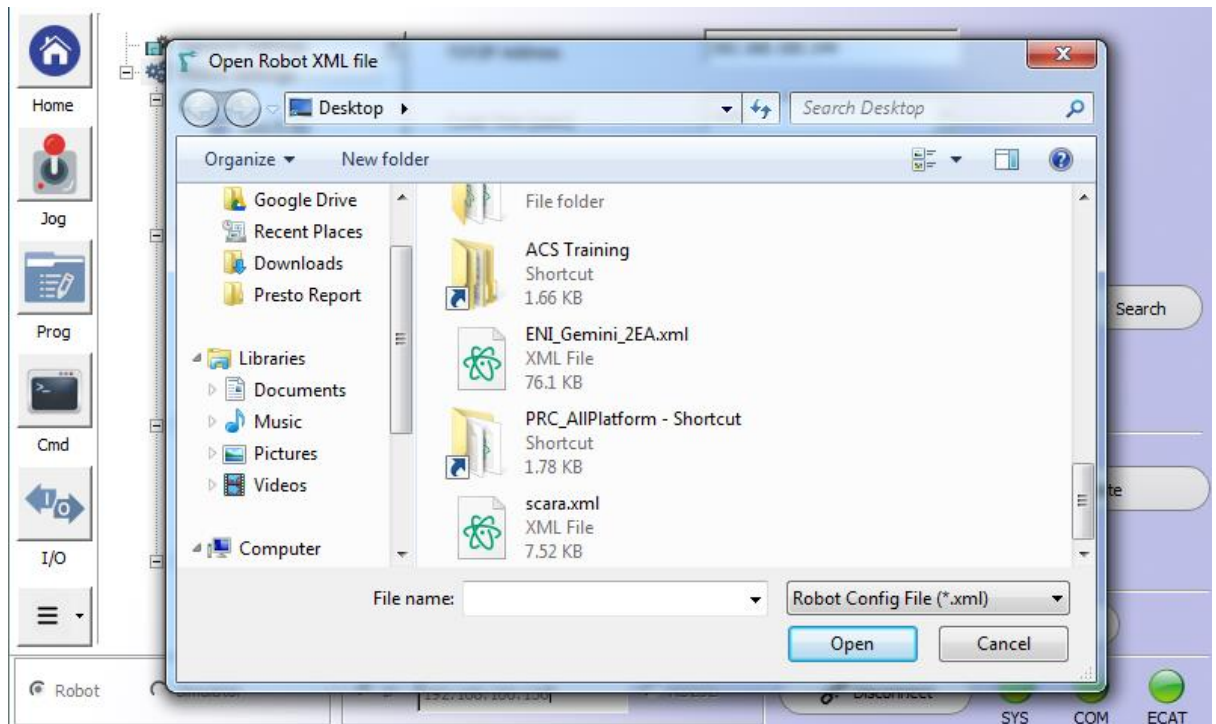
The screenshot shows the 'Robot Settings' window. On the left, a tree view lists robot configurations: WTR (Axis 0-3), RS_PUMA (Axis 0-9), and LPK_SCARA (Axis 0-13). The main panel displays settings for a selected robot: TCP/IP Address is 192.168.100.144, Cycle Time [usec] is 1000, Robot Number is 4, Total Axis Number is 17, ENI File is IO_TEST.xml, and Teaching Pendant is set to 'Use'. At the bottom, there are two buttons: 'Add Robot From File' and 'Add Robot From Template'.

Change some information about Robot Controller

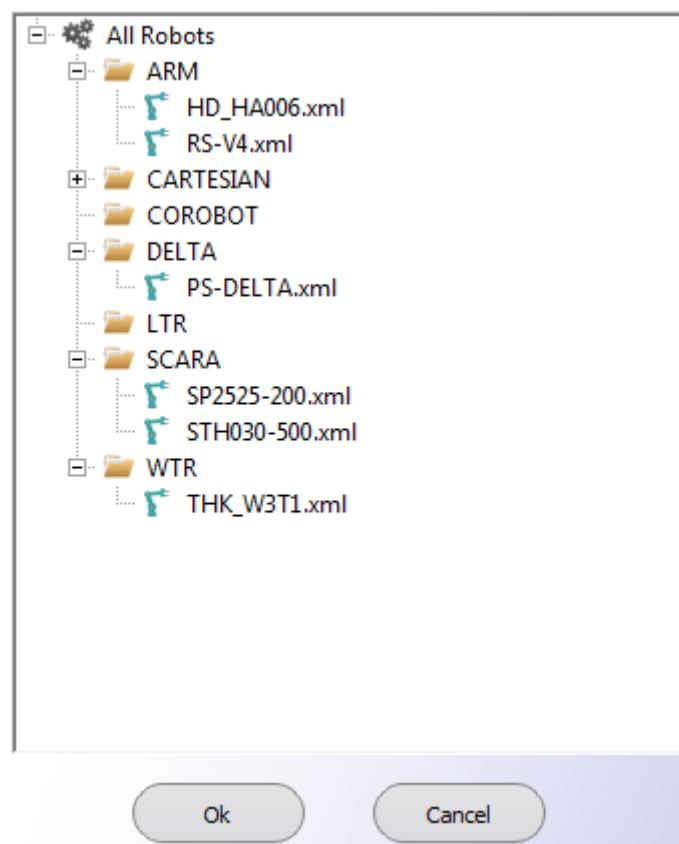
1. IP address
2. Cycle time: 4000ms, 2000ms, 1000ms, 500ms, 250ms
3. Robot Number: Automatically Counted when adding/removing robot
4. Toto Axis Number: Automatically Counted when adding/removing robot
5. ENI File: Choose ENI on Robot Controller by click **Search** button



6. **Add Robot From File:** Add robot by file from TP.



7. **Add Robot From Template:** Add robot by file from Robot Controller.



3.11.3 Each Robot Settings

General Settings

Robot Settings

- WTR
 - Axis 0 (0)
 - Axis 1 (1)
 - Axis 2 (2)
 - Axis 3 (3)
- RS_PUMA
 - Axis 0 (4)
 - Axis 1 (5)
 - Axis 2 (6)
 - Axis 3 (7)
 - Axis 4 (8)
 - Axis 5 (9)
- LPK_SCARA
 - Axis 0 (10)
 - Axis 1 (11)
 - Axis 2 (12)
 - Axis 3 (13)
- PS_DELTA

Robot Information

Name: WTR Type: 4100

Vendor: THK Model: THK_W3T1

Tool Type: 0

Default Velocity (%)

General Motion: 50.0 Jog: 30.0

Work Area

Coordinate: Cartesian

Coordinate	X	Y	Z
X	-1000.00	1000.00	
Y	-1000.00	1000.00	
Z	-10.00	180.00	

Save robot [WTR] to File Remove robot [WTR]

3.11.4 Motor/Drive Settings

The interface shows a tree view on the left with the following structure:

- General Settings
 - Robot Settings
 - WTR
 - Axis 0 (0)
 - Axis 1 (1)
 - Axis 2 (2)
 - Axis 3 (3)
 - RS_PUMA
 - Axis 0 (4)
 - Axis 1 (5)
 - Axis 2 (6)
 - Axis 3 (7)
 - Axis 4 (8)
 - Axis 5 (9)
 - LPK_SCARA
 - Axis 0 (10)
 - Axis 1 (11)
 - Axis 2 (12)
 - Axis 3 (13)
 - PS_DELTA
 - Axis 0 (14)
 - Axis 1 (15)
 - Axis 2 (16)
 - Axis 3 (17)

The main panel displays the following settings:

Axis Setting

Mapped Axis No: *Assigned by EtherCat Network

Motor Feedback

Pulse Per Rev: Distance Per Rev:
 Gear Ratio: Motion Direction: ☒ Inverse

Motion Completion

In-Position Range: Setting Time [ms]:

Safety And Protection

Velocity Limit: Brake Rls Time [ms]:
 Current Limit: Neg SW Limit:
 Max. Pos Err: Pos SW Limit:

Homing Parameters

Method: *Method depends on drive manufacturer
 Velocity: Return Velocity:
 Acceleration: Offsets:

Ready Motion Parameters

Velocity:
 Acc Time [ms]: Acc Jerk [%]:
 Dec Time [ms]: Dec Jerk [%]:
 Kill Time [ms]: Ready Position:

Manual Motion Parameters

Joint: Work:

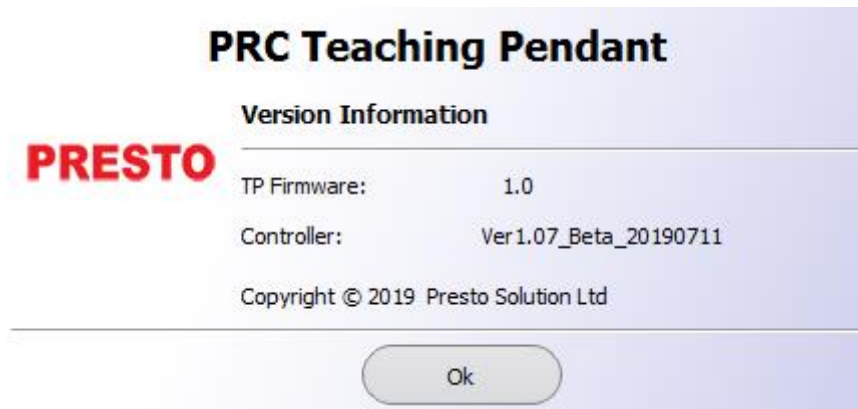
Program Motion Parameters

Parameter	Joint	Work
Velocity	<input type="text" value="176.47"/>	<input type="text" value="1231.21"/>
Acc Time [ms]	<input type="text" value="300.00"/>	<input type="text" value="300.00"/>
Dec Time [ms]	<input type="text" value="300.00"/>	<input type="text" value="300.00"/>
Acc Jerk [%]	<input type="text" value="100.00"/>	<input type="text" value="100.00"/>
Dec Jerk [%]	<input type="text" value="100.00"/>	<input type="text" value="100.00"/>
Kill Time [ms]	<input type="text" value="100.00"/>	<input type="text" value="100.00"/>

Save all Parameters to RC and Reboot

After setting, we can press button **Save all Parameter to RC and Reboot** to start with new settings.

3.12 Software information



4 Virtual Keyboard and keypad

4.1 Virtual Keyboard

Normal mode



Upper Case with **Shift**



Special key with **"!#1"** button

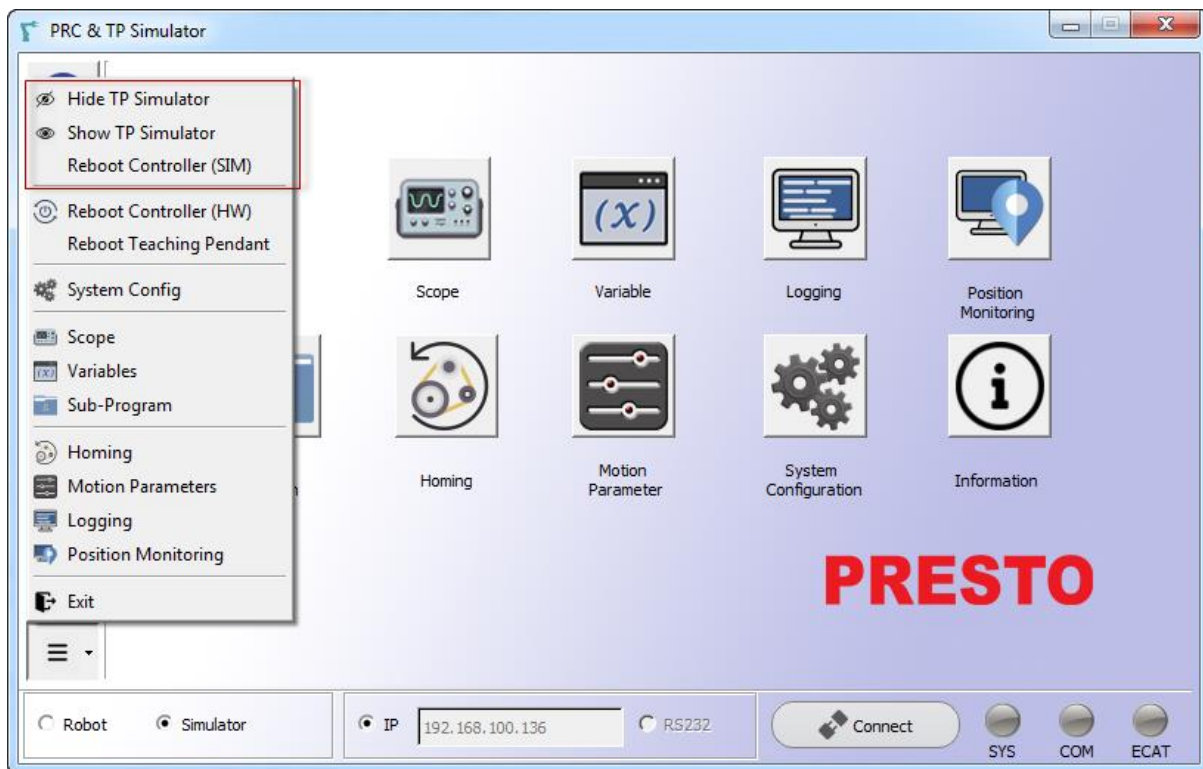


4.2 Virtual Keypad



5 Teaching Pendant Simulator

When using with PCs, Teaching Pendant Simulator can support both **Robot Controller Simulator** and **Teaching Pendant Simulator**.



Simulator menu will be showed when we click more button.

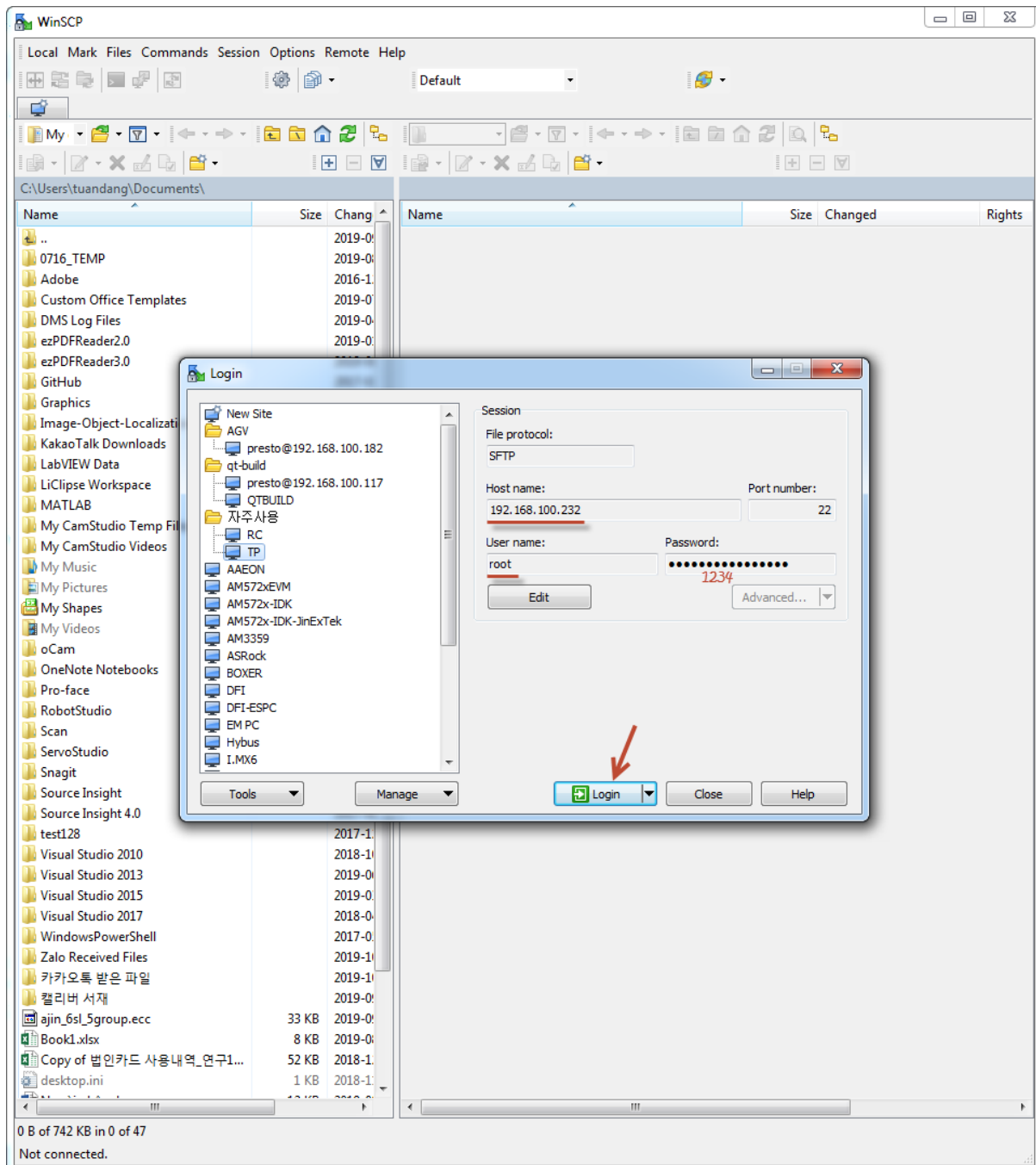
We can start Robot Controller Simulator by choosing **Reboot Controller (SIM)** menu.

We can use Teaching Pedant Simulator by choosing **Show TP Simulator** menu.



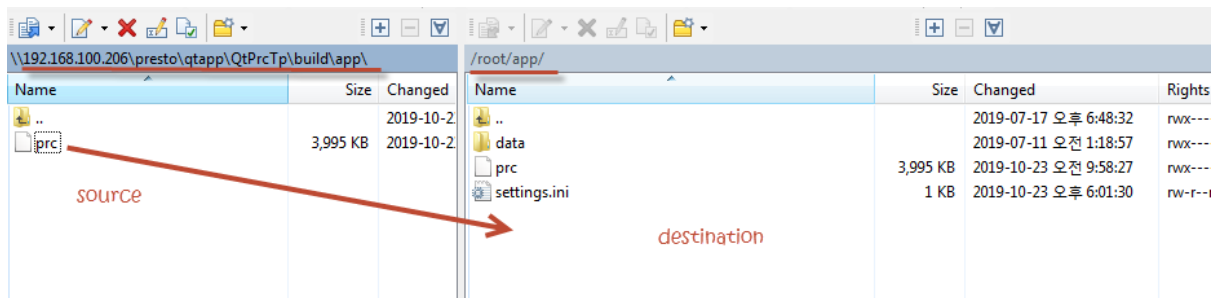
6 Upgrade TP Firmware

6.1 Upload file using WinSCP (<https://winscp.net/eng/download.php>)



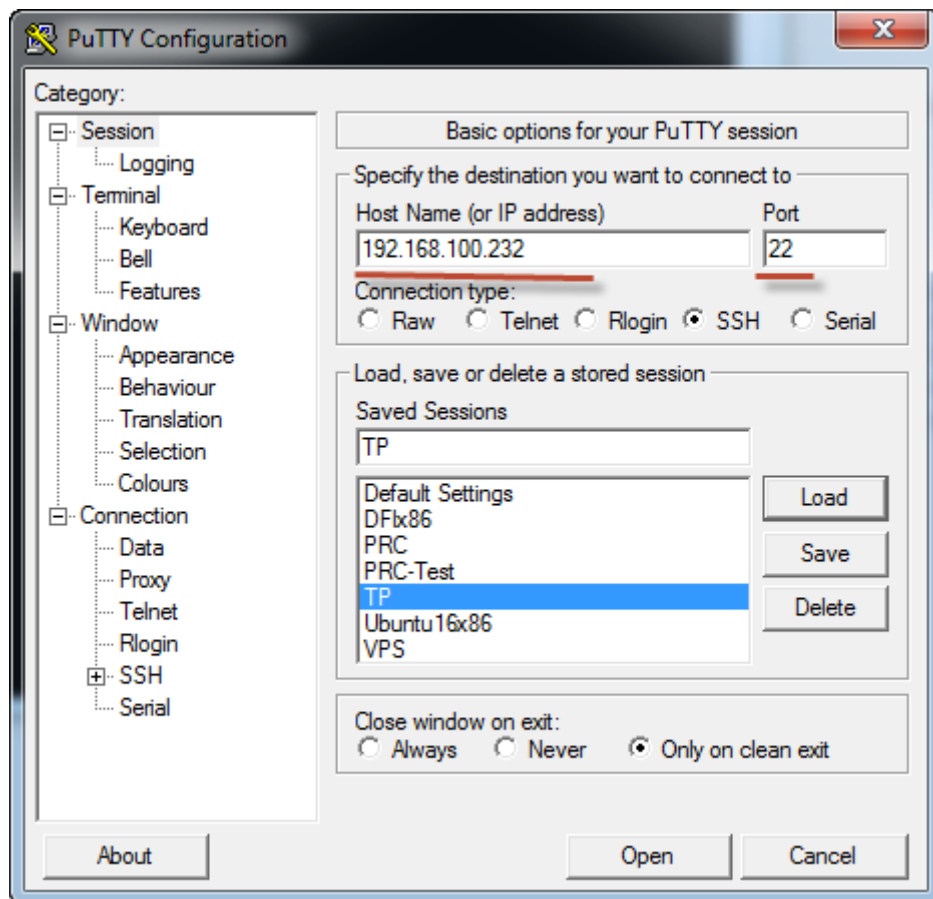
Fill information: **Hostname**, **Username**, and **Password** as picture above and click login

After login, navigate to firmware file (name **prc**), then drag firmware file from source (PC) to destination (TP) to upload file.



6.2 Change permission to run application

Login to TP system using Putty (<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>)



Fill hostname or IP and port as picture above.

```
login as: root
root@192.168.100.232's password: 1234
root@AM335X_TP ~# cd app/
root@AM335X_TP app# ls
data      prc      settings.ini
root@AM335X_TP app# chmod +x prc
root@AM335X_TP app#
```

- Fill username and password as picture above
- Navigate to **app** director by **cd app**
- Change permission by **chmod +x prc**
- Reboot TP

PRESTO

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