

## PS-1000

### Pneumatic Training System



It is well known that “Factory Automation” is an indispensable measure to reduce labor cost, improve production efficiency and achieve higher product quality, which is widely adopted by electronic, semiconductor, LCD and mechanical factories. In factory automation, “air pressuring” plays a very essential and critical role.

The “PS-1000” is launched to offer enriched knowledge from basic air pressure components, advanced air-pressure loop design to PLC-based electrical control system. The trainee can be upgraded to high-level automation engineer with the help of the “PS-1000” trainer system.

#### ● Features

1. Trainees get familiar with the principles and applications of various air pressure components.
2. Trainees learn air-pressure loop design.
3. Trainees learn PLC programming, including architecture, instructions and ladder diagram.

#### UP-001

##### Pneumatic Workbench

The workbench is flexible in design to meet customer's needs. A complete workbench mainly consists of 3 parts :

- Electro-Modules Frame UE-001
- Working Board UP-001-1 (double side)
- Working Table UP-001-2 (single or double side)

Customer can decide which combinations of the workbench is the best for lab requirement.

A complete workbench allows customers to carry out all listed pneumatic experiments. In PART I and PART II, pneumatic components are powered by Air Supply Unit and operated on Working Board area through connected Air Hose (UP-801).

In PART III, the electrical components mounted on Electro-Modules Frame are linked to the pneumatic system through Connecting Lead (UE-501) and powered by Air Supply Unit.

End user are also welcome to adopt Programmable Logic Controller (PLC) for implementation of PART III. That means trainer PLC-200 is an alternative to Electro-Modules Frame and corresponding electrical devices.

#### PLC-200

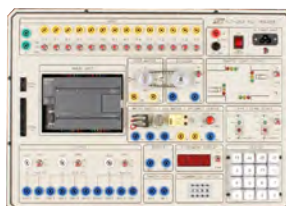
##### PLC Trainer (Optional)

##### Specifications :

- PLC main unit : SIEMENS SIMATIC S7-224
- Digital input : 14
- Digital output : 10

##### Accessories :

- Power cord
- Experiment manual
- Connecting leads set



##### PLC Trainer Requirements

- PC with Pentium II or better CPU
- Windows 98/2000/XP/VISTA/7
- USB/PPI Multi-Master cable (optional but necessary)
- STEP 7-Micro/WIN software CD (optional but necessary)

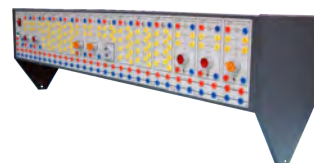
#### UE-001

##### Electro-Modules Frame (Excluding Electrical Components)

A cabinet frame is available for mounting electrical components on either side.

This steel frame can accommodate up to 15 electro-modules at least.

Size : 1260 mm(W) x 250 mm(D) x 360 mm(H)  $\pm 10\%$



## UP-001-1

### Working Board

Double-side aluminum grooved panel – 1260 x 750 mm and a working surface up to 1200 x 700 mm.



## UP-001-2

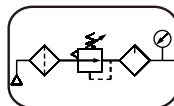
### Working Table

- Single-side worktable in size 1300 mm(W) x 700 mm(D) x 850mm(H)  $\pm 10\%$   
Drawer units in steel with one flat drawer and four large drawers, load up to 20 kgs per drawer.
- Double-side worktable with 1300 mm(W) x 800 mm(D) x 850mm(H)  $\pm 10\%$   
Two drawer units in steel with one flat drawer and four large drawers, load up to 20 kgs per drawer.
- The drawers feature an easy-gliding system with differential rollers for smooth running and additional breaking system.



## ● Pneumatic Components

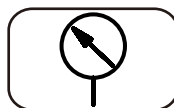
### UP-101



### Air Service Unit

Filter-Regulator-Lubricator (FRL) assembly  
Adjustable pressure : 0 - 9.9 kg/cm<sup>2</sup>  
Sliding exhaust valve mounted  
Filtration : 40  $\mu$ m

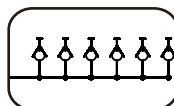
### UP-105



### Pressure Gauge

Operating pressure : 0 - 10 kg/cm<sup>2</sup>  
Gauge size : 1.5"

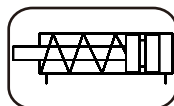
### UP-111



### Air Manifold

Check connector for Ø4 plastic tubing 6ea  
Connector size : 1/4"  
Operating pressure : 0 - 12 kg/cm<sup>2</sup>

### UP-202



### Single-Acting Air Cylinder

Cylinder internal diameter : 32 mm  
Stroke length : 150 mm  
Operating pressure : 1.6 - 9.0 kg/cm<sup>2</sup>

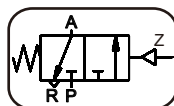
### UP-206



### Double-Acting Air Cylinder

Cylinder internal diameter : 32 mm  
Stroke length : 150 mm  
Operating pressure : 0.4 - 9.0 kg/cm<sup>2</sup>  
Air cushion

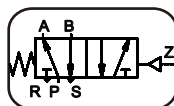
### UP-302



### 3/2-Way Directional Control Valve

Single air operated, spring return  
NC type  
Flow rate : 200 l/min  
Operating pressure : 1.5 - 8.0 kg/cm<sup>2</sup>  
Max. pressure : 10.5 kg/cm<sup>2</sup>

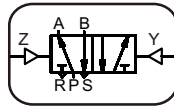
### UP-308



### 5/2-Way Directional Control Valve

Single air operated, spring return  
Flow rate : 200 l/min  
Operating pressure : 1.5 - 8.0 kg/cm<sup>2</sup>  
Max. pressure : 10.5 kg/cm<sup>2</sup>

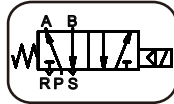
UP-309



## 5/2-Way Directional Control Valve

Double air operated, air return  
Flow rate : 200 l/min  
Operating pressure : 1.5 - 8.0 kg/cm<sup>2</sup>  
Max. pressure : 10.5 kg/cm<sup>2</sup>

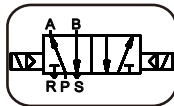
UP-408



## 5/2-Way Single-Solenoid Valve

Solenoid voltage : 24 VDC  
Single solenoid operated, spring return, with LED  
Operating pressure : 1.5 - 8.0 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

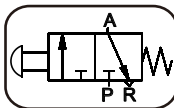
UP-409



## 5/2-Way Double-Solenoid Valve

Solenoid voltage : 24 VDC  
Double solenoid operated, with LED  
Operating pressure : 1.5 - 8.0 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

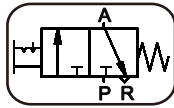
UP-503



## 3/2-Way Pushbutton Valve

Spring return, flat type, NC type  
Operating pressure : 0 - 8 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

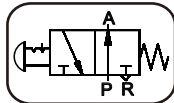
UP-505



## 3/2-Way Manual Valve

Spring return, 2-position selector  
Operating pressure : 0 - 8 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

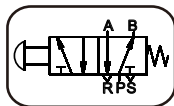
UP-506



## 3/2-Way Manual Valve

Spring return, push & lock, NO type  
Operating pressure : 0 - 8 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

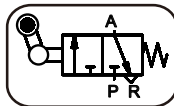
UP-507



## 5/2-Way Pushbutton Valve

Spring return, flat type  
Operating pressure : 1.5 - 8.5 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

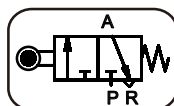
UP-511



## 3/2-Way Roller Valve

Unidirectional  
Operating pressure : 0 - 8 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

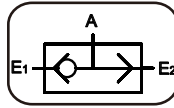
UP-512



## 3/2-Way Roller Valve

Bi-directional  
Operating pressure : 0 - 8 kg/cm<sup>2</sup>  
Max. pressure : 10 kg/cm<sup>2</sup>

UP-601

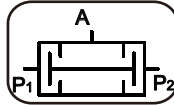


### OR Valve (Shuttle)

OR logic

Operating pressure : 0.2 - 9.9 kg/cm<sup>2</sup>

UP-602

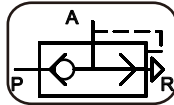


### AND Valve (Dual-Pressure)

AND logic

Operating pressure : 0.2 - 9.9 kg/cm<sup>2</sup>

UP-603



### Quick-Exhaust Valve

Pilot type

Operating pressure : 0 - 9.9 kg/cm<sup>2</sup>

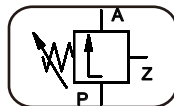
UP-611



### One-Way Flow-Control Valve

Adjust : 10-turn, with speed controller

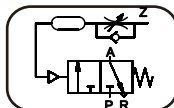
UP-621



### Sequence Valve

Operating pressure : 1.5 - 8 kg/cm<sup>2</sup>

UP-701



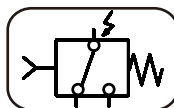
### Time Delay Valve

Operating pressure : 2 - 8 kg/cm<sup>2</sup>

Time delay : 0.1 - 30sec

Min. reset time < 0.1 sec

UP-711



### Pressure Switch

Operating pressure : 1.5 kg/cm<sup>2</sup>

Max. voltage/current : 250 VDC/0.25A

125 VDC/0.5A

UP-801



### Air Hose

Inner/outer diameter : 2mm/4mm

Length : 25M

UE-501



### Connecting Lead

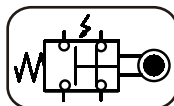
Lead diameter : 4mm

Length : 0.25M, 0.5M, 1M

Color : red, yellow, blue

1set : 60 pcs

UE-907



### Limit Switch

Roller lever type

Contacts : NO, NC.

UP-TC4



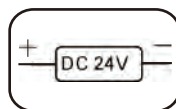
### 3-Way Distributor

Connector for Ø4 plastic tubing 6ea

Connector size : 1/4"

## ●Electrical Components

UE-101



### DC Power Supply

Input voltage : 100 - 240VAC/1.7 A  
Output voltage : 24 VDC/4.2 A  
Terminal : 2 sets for  $\pm$  DC output  
with power I/O indicator  
2 terminal sets for power output

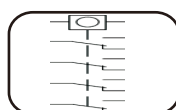
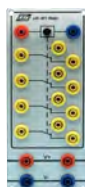
UE-201



### Pushbutton Switch

Spring return  
Pushbutton switch with illuminated indicator  
Including NC, NO contacts  
Operation voltage : 24 VDC  
Max. current : 3 A

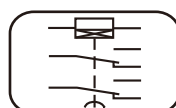
UE-401



### Relay

4 sets of NC, NO, COM contacts  
With LED indicator  
Operation voltage : 24 VDC  
Max. current : 5 A

UE-404

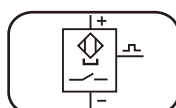


### Timing Relay

ON-Delay type  
Operation voltage : 24 VDC  
Max. current : 5 A  
Time delay : 0.05sec - 300hour multi switch  
2 sets of NC, NO, COM contacts  
With LED indicator

## ●Optional Components

UE-912



### Reed Switch (Optional)

Operating voltage : 24 VDC  
Max. current : 100 mA  
Frequency range : 3 - 250 Hz

EM-3390-1A



### Connecting Lead Holder (Optional)

Mobile type, with 5-foot tubular and 5 casters  
Height : 1400mm, iron plate suitable  
with 20 connecting leads slots

**Air Supply Unit  
(Necessary but Optional)**

1HP 1 $\varnothing$  220VAC, with 88L  $\pm$ 10% air tank  
Flow rate : 185 L/min  $\pm$ 10%  
Max. pressure : 10 kg/cm<sup>2</sup>  
Include air hose diameter 5x8mm connect to  
Air Service Unit (UP-101)

## ● Experiments

### PART I : Basic Pneumatic Components

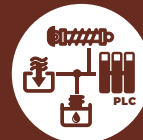
1. Single-Acting Air Cylinder
2. Double-Acting Air Cylinder
3. OR Valve
4. Flow Control Valve
5. Quick-Exhaust Valve
6. AND Valve
7. Directional Control Valves
8. Sequence Valve
9. Time-Delay Valve

### PART II : Basic Pneumatic Control Circuits

1. Two-Hand Safety Circuit
2. Single-Acting Air Cylinder Remote Control
3. Double-Acting Air Cylinder Remote Control
4. Air Cylinder Manual Control Advance and Pressure Control Reverse
5. Air Cylinder Manual Control Advance and Delayed Reverse
6. Air Cylinder Two-Hand Control Advance and Automatic Reverse
7. Air Cylinder Slow Advance and Rapid Reverse
8. One-Cycle Reciprocation of Double-Acting Air Cylinder
9. Emergency Stop Circuit
10. Interlocking Start Switch Circuit
11. Two Air Cylinders used in Parts Bending Process
12. Sequence Control of Two Air Cylinders
13. Air Cylinder used in Machining Process
14. Three Air Cylinders used in Material Loading and Drilling
15. Sequence Control of Three Air Cylinders

### PART III : Electro-Pneumatic Sequence Control Circuits

1. One-Cycle Cylinder Reciprocation using a Pushbutton and Single-Solenoid Valve
2. One-Cycle Cylinder Reciprocation using Pushbuttons and Single-Solenoid Valve
3. One-Cycle Cylinder Reciprocation using Limit Switch and Single-Solenoid Valve
4. Continuous Cylinder Reciprocation using Limit Switches and Single-Solenoid Valve
5. One-Cycle Cylinder Reciprocation using Timer and Single-Solenoid Valve
6. Continuous Cylinder Reciprocation using Timer and Single-Solenoid Valve
7. Cylinder Advance/Reverse Control using a Pushbutton and Single-Solenoid Valve
8. One-Cycle Cylinder Reciprocation using Pushbuttons and Double-Solenoid Valve
9. One-Cycle Cylinder Reciprocation using Limit Switch and Double-Solenoid Valve
10. Continuous Cylinder Reciprocation using Limit Switches and Double-Solenoid Valve
11. One-Cycle Cylinder Reciprocation using Timer and Double-Solenoid Valve
12. One-Cycle Cylinder Reciprocation using Timer, Limit Switch and Double-Solenoid Valve
13. Continuous Cylinder Reciprocation using Timer, Limit Switches and Double-Solenoid Valve
14. Cylinder Advance/Reverse Control using a Pushbutton and Double-Solenoid Valve
15. Two-Cylinder Sequencing (A+B+B-A-) using Single-Solenoid Valves
16. Two-Cylinder Sequencing (A+A-B+B-) using Single-Solenoid Valves
17. Two-Cylinder Sequencing (A+A-B+B-) using Double-Solenoid Valves
18. Two-Cylinder Sequencing (A+B+/Timing/A-B-) using Single-Solenoid Valves
19. Two-Cylinder Sequencing (A+B+/Timing/A-B-) using Double-Solenoid Valves
20. Three-Cylinder Sequencing (A+B+C+C-B-A-) using Single-Solenoid Valves
21. Three-Cylinder Sequencing (A+A-B+C+B-C-) using Single-Solenoid Valves
22. Pressure Switch Uses



## PART I Basic Pneumatic Components

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	Q'ty
UP-001	Pneumatic Workbench	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge	1			2				1	1	2
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1
UP-202	Single-Acting Air Cylinder	1		1	1	1	1				1
UP-206	Double-Acting Air Cylinder		1					1	2	1	2
UP-308	5/2-Way Directional Control Valve								1		1
UP-309	5/2-Way Directional Control Valve							1		1	1
UP-503	3/2-Way Pushbutton Valve	1		2	1	1	2	1		1	2
UP-507	5/2-Way Pushbutton Valve		1						1		1
UP-512	3/2-Way Roller Valve							1			1
UP-601	OR Valve (Shuttle)			1							1
UP-602	AND Valve (Dual-Pressure)						1				1
UP-603	Quick-Exhaust Valve					1			1		1
UP-611	One-Way Flow-Control Valve				1	1			1	1	1
UP-621	Sequence Valve								1		1
UP-701	Time Delay Valve									1	1
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1
UP-TC4	3-Way Distributor	1			2				2	2	2
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1

## PART II Basic Pneumatic Control Circuits

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12	EX.13	EX.14	EX.15	Q'ty
UP-001	Pneumatic Workbench	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge				1												1
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UP-202	Single-Acting Air Cylinder	1	1												1		1
UP-206	Double-Acting Air Cylinder			1	1	1	1	1	1	2	2	2	1	2	3	3	3
UP-302	3/2-Way Directional Control Valve		1												1		1
UP-309	5/2-Way Directional Control Valve			1	1	1	1	1	1	2	2	3	1	3	5	5	5
UP-503	3/2-Way Pushbutton Valve	2	1	1	1	1	2	1		2	1	1		1	1	1	2
UP-505	3/2-Way Manual Valve								1				1	1	1	1	1
UP-506	3/2-Way Manual Valve									1							1
UP-511	3/2-Way Roller Valve										2	1		1	4		4
UP-512	3/2-Way Roller Valve			1	1	1	1	1	2	1	1	2	4	1	5	6	6
UP-601	OR Valve (Shuttle)						1							1	1	1	1
UP-602	AND Valve (Dual-Pressure)						1			1							1
UP-603	Quick-Exhaust Valve							1		1				1			1
UP-611	One-Way Flow-Control Valve						1	1		1				1	5		5
UP-621	Sequence Valve				1												1
UP-701	Time Delay Valve					1	1										1
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
UP-TC4	3-Way Distributor												6		8	6	8
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



## PART III Electro-Pneumatic Sequence Control Circuits with Electro-Modules Frame

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12
UP-001	Pneumatic Workbench	1	1	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge												
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1	1	1
UP-206	Double-Acting Air Cylinder	1	1	1	1	1	1	1	1	1	1	1	1
UP-408	5/2-Way Single-Solenoid Valve	1	1	1	1	1	1	1					
UP-409	5/2-Way Double-Solenoid Valve								1	1	1	1	1
UP-711	Pressure Switch												
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1	1	1
UE-101	DC Power Supply Module	1	1	1	1	1	1	1	1	1	1	1	1
UE-201	Pushbutton Switch Module	1	2	1	2	1	2	1	2	1	2	1	1
UE-401	Relay Module	1	1	1	2	1	2	3	2	2	1	1	1
UE-404	Timing Relay Module					1	1					1	1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch			1	2	1	2			1	2		1
UP-TC4	3-Way Distributor												
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1	1	1

## PART III Electro-Pneumatic Sequence Control Circuits with Electro-Modules Frame

Equipment		EX.13	EX.14	EX.15	EX.16	EX.17	EX.18	EX.19	EX.20	EX.21	EX.22	Q'ty
UP-001	Pneumatic Workbench	1	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge										1	1
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1	1
UP-206	Double-Acting Air Cylinder	1	1	2	2	2	2	2	3	3	1	3
UP-408	5/2-Way Single-Solenoid Valve			2	2		2		3	3	1	3
UP-409	5/2-Way Double-Solenoid Valve	1	1			2		2			1	2
UP-711	Pressure Switch										1	1
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1	1
UE-101	DC Power Supply Module	1	1	1	1	1	1	1	1	1	1	1
UE-201	Pushbutton Switch Module	2	1	1	1	1	2	1	1	1	2	2
UE-401	Relay Module	1	3	4	2	4	2	2	2	6	2	6
UE-404	Timing Relay Module	1					1	1				1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch	2		4	4	4	2	3	6	6		6
UP-TC4	3-Way Distributor										2	2
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1	1



## PART III Electro-Pneumatic Sequence Control Circuits with PLC-200

Equipment		EX.1	EX.2	EX.3	EX.4	EX.5	EX.6	EX.7	EX.8	EX.9	EX.10	EX.11	EX.12
UP-001-1	Working Board	1	1	1	1	1	1	1	1	1	1	1	1
UP-001-2	Working Table	1	1	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge												
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1	1	1
UP-206	Double-Acting Air Cylinder	1	1	1	1	1	1	1	1	1	1	1	1
UP-408	5/2-Way Single-Solenoid Valve	1	1	1	1	1	1	1					
UP-409	5/2-Way Double-Solenoid Valve								1	1	1	1	1
UP-711	Pressure Switch												
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1	1	1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch			1	2	1	2			1	2		1
UP-TC4	3-Way Distributor												
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1	1	1
PLC-200	PLC Trainer	1	1	1	1	1	1	1	1	1	1	1	1

## PART III Electro-Pneumatic Sequence Control Circuits with PLC-200

Equipment		EX.13	EX.14	EX.15	EX.16	EX.17	EX.18	EX.19	EX.20	EX.21	EX.22	Q'ty
UP-001-1	Working Board	1	1	1	1	1	1	1	1	1	1	1
UP-001-2	Working Table	1	1	1	1	1	1	1	1	1	1	1
UP-101	Air Service Unit	1	1	1	1	1	1	1	1	1	1	1
UP-105	Pressure Gauge										1	1
UP-111	Air Manifold	1	1	1	1	1	1	1	1	1	1	1
UP-206	Double-Acting Air Cylinder	1	1	2	2	2	2	2	3	3	1	3
UP-408	5/2-Way Single-Solenoid Valve			2	2		2		3	3	1	3
UP-409	5/2-Way Double-Solenoid Valve	1	1			2		2			1	2
UP-711	Pressure Switch										1	1
UP-801	Air Hose	1	1	1	1	1	1	1	1	1	1	1
UE-501	Connecting Lead	1	1	1	1	1	1	1	1	1	1	1
UE-907	Limit Switch	2		4	4	4	2	3	6	6		6
UP-TC4	3-Way Distributor										2	2
	Air Supply Unit (Necessary but Optional)	1	1	1	1	1	1	1	1	1	1	1
PLC-200	PLC Trainer	1	1	1	1	1	1	1	1	1	1	1