



# FESTECH

## PRODUCT CATALOG v6.2

Total Solution Provider for  
Factory Automation & Training Systems

**FESTECH**

# Introduction

“Compliant with quality management principles while pursuing customer **confidence and satisfaction.**”

We manufacture training equipment related to factory automation systems. Pneumatics, hydraulics, and mechatronics are our main fields of expertise, and we have many engineers with extensive skill in these areas.

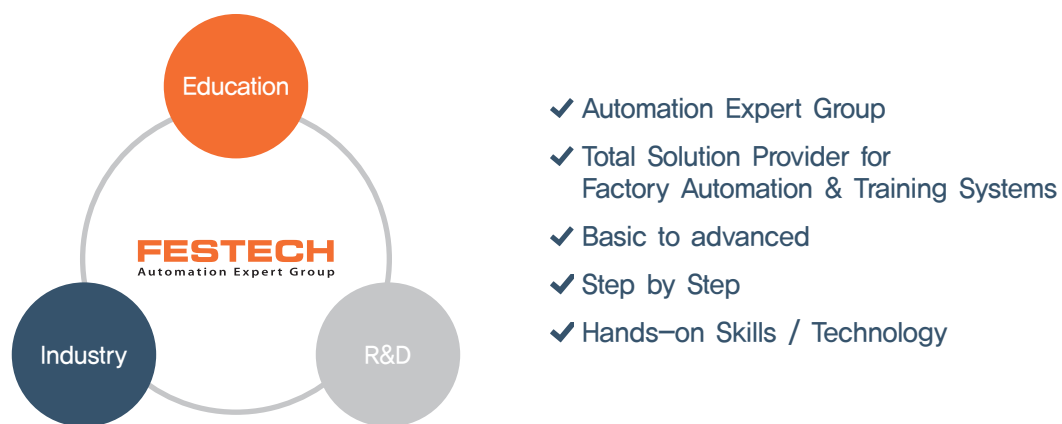
For years we have provided our equipment to high schools, colleges, and vocational training institutes around the world. Here in Korea, well known companies such as HYUNDAI, KIA, and SAMSUNG, in addition to many technical high schools, use pneumatics and hydraulics textbooks written by our staff.

We will always try to tailor our equipment to meet our customer's needs. From basic designs to final products, we welcome customer ideas or suggestions. If you have any input, please feel free to contact us.

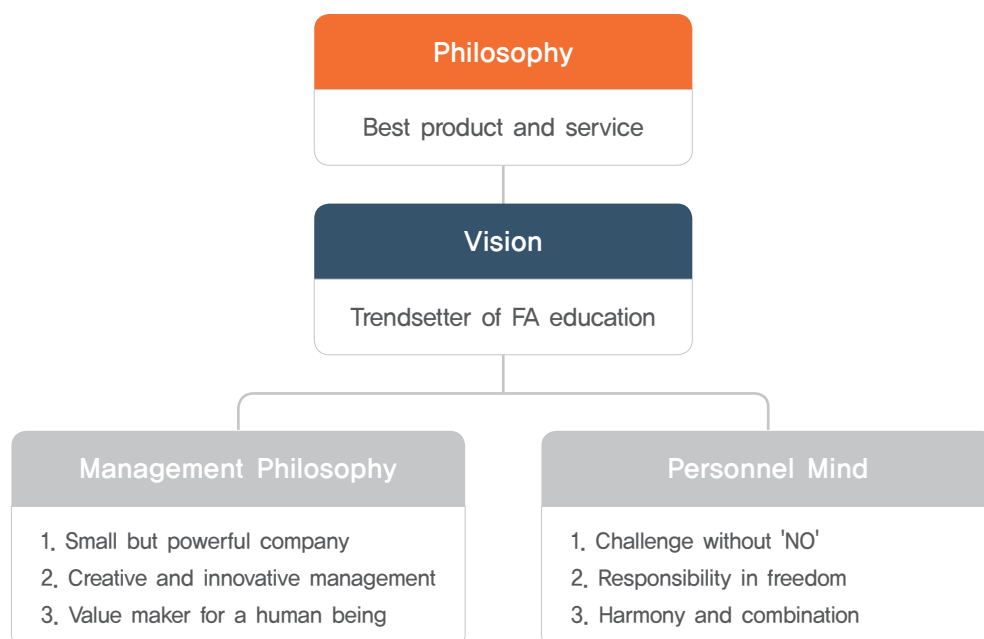
Thank you very much.

Jeong-ro Lee / President





## Culture of the Company



# Certification



Innovation SMEs (INNO-BIZ)  
confirmation (English/Korean)



Quality management system certificate  
(English/Korean)



Research Laboratory  
Certificate



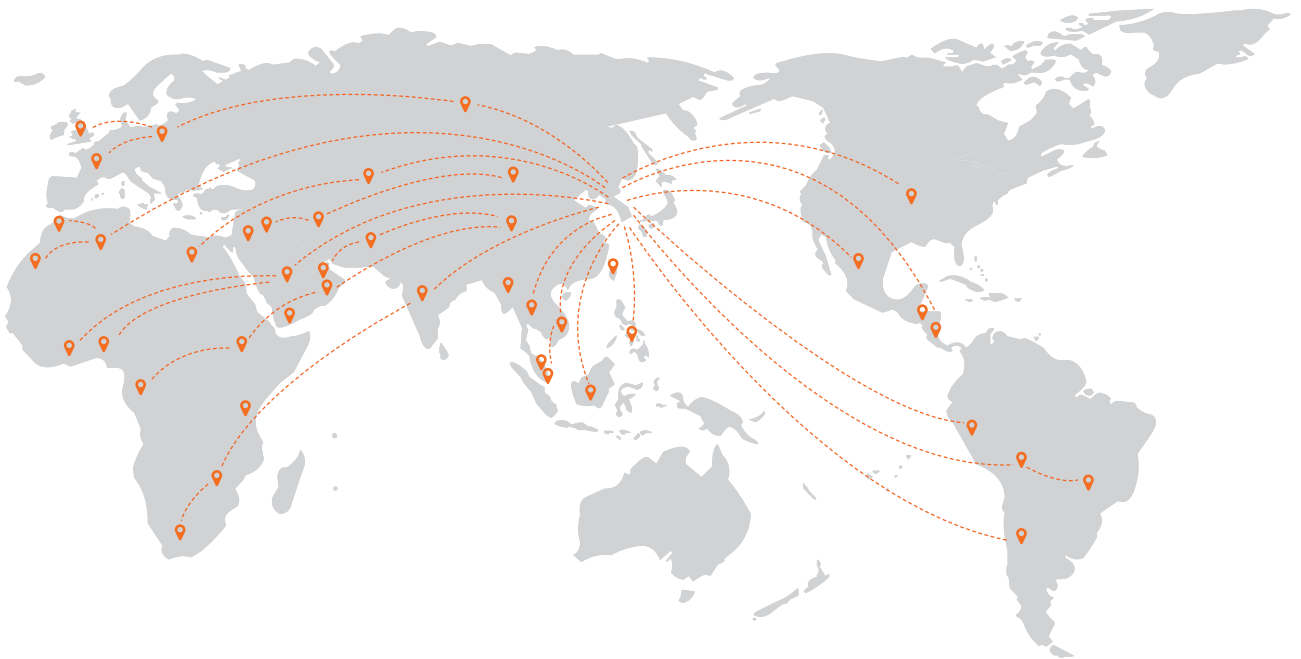
Patent, utility model, registration of design number

Domestic : Patent 2ea, Utility Model 10ea, Registration of design 27ea, Trademark 1ea, Program 1ea

Overseas : Utility Model 2ea, Registration of design 1ea



# Overseas Customers



## FESTECH Overseas Customers

Asia	Brunei, China, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Taiwan, Thailand, Vietnam
Middle East	Bahrain, India, Iran, Iraq, Jordan, Lebanon, Oman, Pakistan, Palestine, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen
Africa	Algeria, Botswana, Egypt, Ethiopia, Ghana, Kenya, Morocco, Mozambique, Namibia, Nigeria, South Africa, Sudan, Tunisia, Zambia
Europe	Belarus, France, Germany, Greece, Italy, Russia, UK
America	Bolivia, Brazil, Chile, Colombia, Guatemala, Honduras, Mexico, Nicaragua, Peru, USA

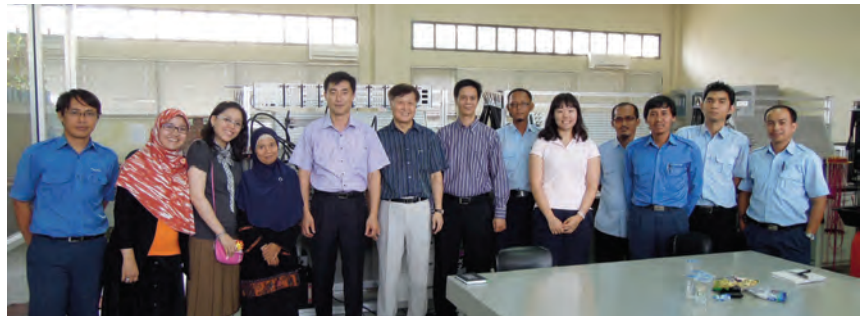
# History

- 2001**
  - 04 Established in Gasan-dong, Seoul
  - 04 Joined Korea Scientific Instruments Industry Cooperative
  - 07 Obtained KS A 9001:2001/ISO 9001:2000
  - 09 Registered 'Automation didactic table' as a utility model patent
  - 09 Registered 'One touch mounting device' as a utility model patent
  - 09 Registered 'Electric control box' as a utility model patent
  - 10 Registered 'Profile attaching device' as a utility model patent
- 2002**
  - 03 Registered 'cover device of AL-profile' as utility model patent
  - 04 Introduced ERP system
  - 06 Registered 'table device' as a utility model patent
- 2003**
  - 05 Trained representative player of Mechatronics in World skills International Competition
  - 07 Applied a patent of 'One-touch Clamp system'
  - 12 Nominated as a technological innovation company in small and medium-sized business (sensor training set)
- 2004**
  - 05 Applied a patent of learning system using microprocessor and registered as a utility model
- 2005**
  - 02 Launched Pneumatics/Hydraulics simulation software(TOPASS2.0)
  - 05 Nominated as a clean place of business
  - 07 Certified as a venture business in new technology business
  - 12 Obtained a certificate of transparent management
  - 12 Certified as INNO-BIZ business
  - 12 Nominated as a Superior new technology company
- 2006**
  - 02 Supplied Pneumatics, Hydraulics training equipment to SsangYong Motor Training Center
  - 04 Nominated as a company joining export-oriented business (Small and Medium business Administration)
  - 07 Supplied PLC training kit to POSCO human Resource Development Center
  - 08 Supplied Servomotor training kit to Hyundai Motor Resource Development Center
- 2007**
  - 02 Developed and Supplied Air Damper Cylinder for shipping industry
  - 04 Nominated as a company joining export-oriented business (Small and Medium business Administration)
  - 06 Opened Busan(Jinrye) branch
  - 08 Nominated as an official sponsor of Mechatronics in World skills Korea

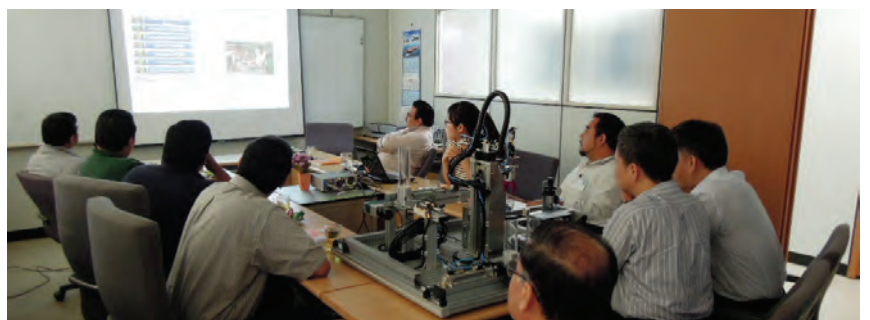
- 2008**
- 06 Nominated as a promising small and medium business in export
  - 08 Supplied 'Sprinkler head assembly line' to Asea Union Co., Ltd
  - 08 Supplied 'Flame testing machine' to Hyundai-rotem
- 2009**
- 09 Supplied 'VMS, Electro-Pneumatics/Sensor training kit' to Hyundai Motor Namyang Laboratory
  - 12 Supplied 'Servo valve Training kit' to POSCO Human Resource Development Center
- 2010**
- 06 Registered as a patent of 'Frame for structural Joint'
  - 08 Recertified ISO 9001:2000 (KQC-2205)
- 2011**
- 04 Climbing the Chungye Mountain for FESTECH 10th. anniversary
  - 08 Send an appreciation plaque to clients
- 2012**
- 09 Visit to POSCO Training Center in INDONESIA
  - 12 Award Million Export Prize from KITA
- 2013**
- 06 President Lee attends World Skills in Germany as Judge of Mechatronics
  - 07 Recertified ISO 9001:2000 (KQC-2205)
  - 08 Hold National Mechatronics competition sponsored by FESTECH
- 2014**
- 03 FESTECH workshop in Taiwan
  - 07 Hold National Mechatronics competition sponsored by FESTECH
- 2015**
- 03 FESTECH Building relocation
- 2016**
- 06 Supplied FMS, SMS, Pneumatics and hydraulics training system to South Africa and implemented a local training
- 2017**
- 09 Acquired CE certificate for electric components, pneumatics solenoid valves and sensors
- 2018**
- 07 Acquired CE certificate for electric components, power supply and hydraulics solenoid valves
  - 07 Recertified ISO 9001:2015 (KQC-2208)
  - 08 Launched Smart Factory 4.0 (SF 4.0) equipment

# FESTECH

## Education & Practice









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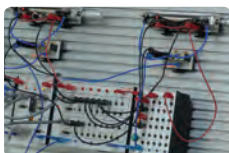
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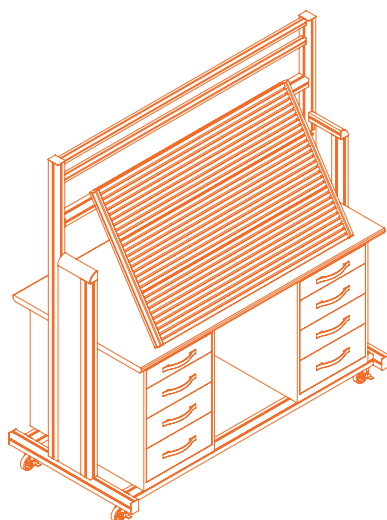
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## CHAPTER

## 00

## TRAINING SYSTEM

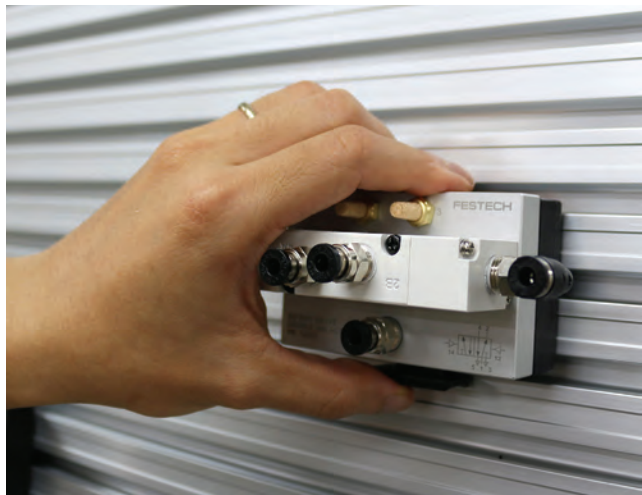
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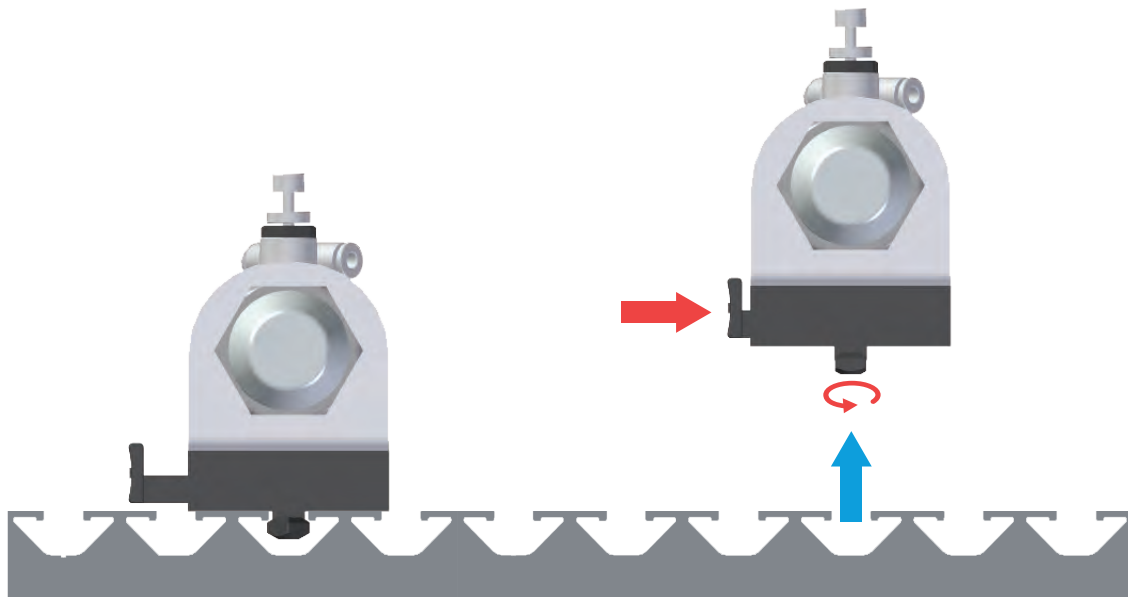
## One-touch clamp system

All parts of our training systems can be attached to the profile panel horizontally or vertically with a One-touch clamp system which was originally developed by FESTECH. It uses a spring and cam which provides easy operation and good durability.

All FESTECH training systems have the One-touch clamp system for convenient and effective practice of users.



The one-touch clamp system doesn't need any tools and you can easily attach and detach it by simple operation.



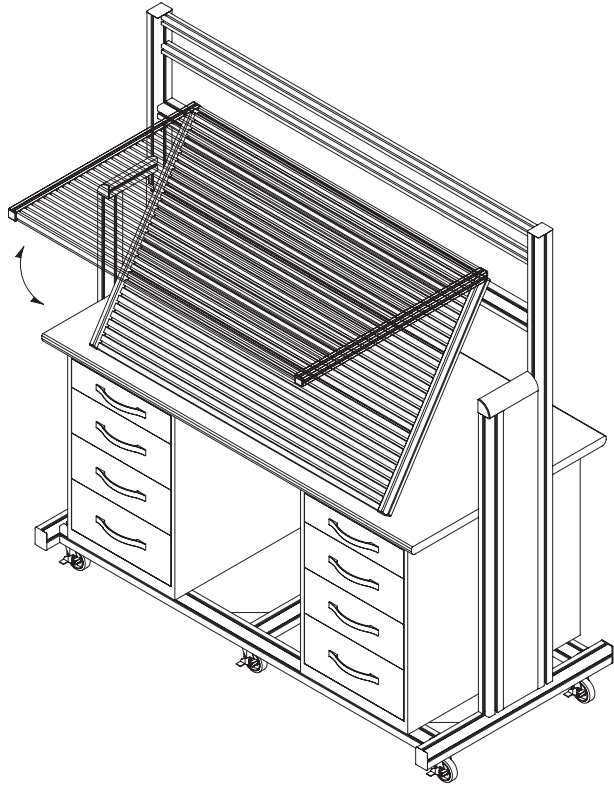
The one-touch clamp system applies to various components (i.e., pneumatic cylinder, valve, sensor etc.) as shown in diagram below.

Trainee can easily attach and detach the components to save the time.



## Variable Working Table

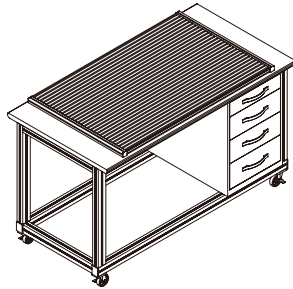
- The aluminum profile can be easily configured according to the circumstances.
- The metal cabinet is made of a special alloy, and has storage with a locking system for parts. It opens up to 120% of its length.
- Configuration of the Cabinet is changeable.
- It has 4 castors with brakes so that it is very easy to move and install.
- Height and angle of profile panel can be adjusted for more effective training.
- 25mm groove pitch of the profile panel enables parts to attach anywhere.
- Size of profile panel and table can be built to customer specification.
- All FESTECH's parts are compatible with the working table.



## Components

### Working table I (4 drawers)

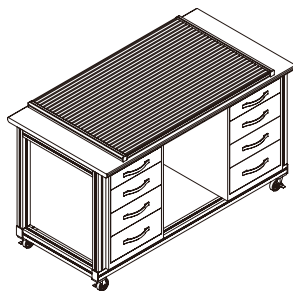
Order number : 11001



- Size : 1500(L)×800(W)×850(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea

### Working table II (8 drawers)

Order number : 11002



- Size : 1500(L)×800(W)×850(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 4ea

### Basic working table I (4 drawers)

Order number : 11003



- Size : 1500(L)×750(W)×800(H)mm
- Profile panel : 1500(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea

### Basic working table II (8 drawers)

Order number : 11014



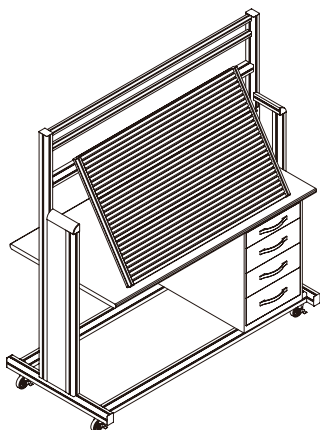
- Size : 1500(L)×750(W)×800(H)mm
- Profile panel : 1500(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 4ea



## Components

### Pneumatics basic working table (4 drawers)

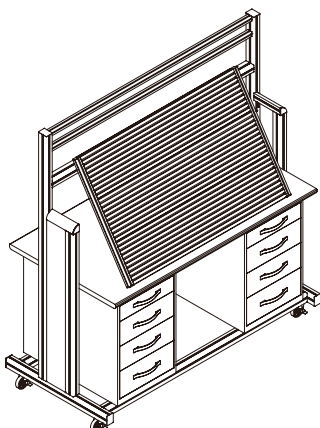
Order number : 11007



- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea

### Pneumatics basic working table (8 drawers)

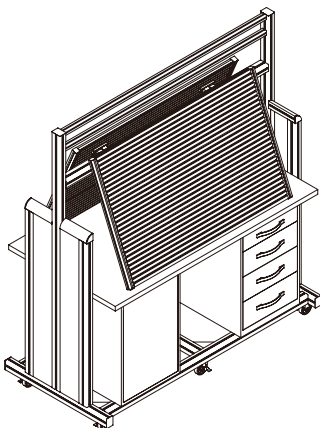
Order number : 11008



- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 4ea

### Pneumatics double side working table

Order number : 11010

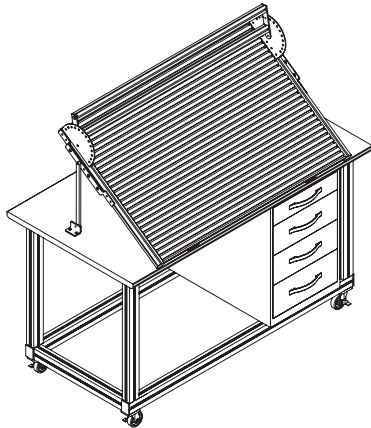


- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea  
Profile panel : 2ea

## Components

### Tilting type pneumatics working table (4 drawers)

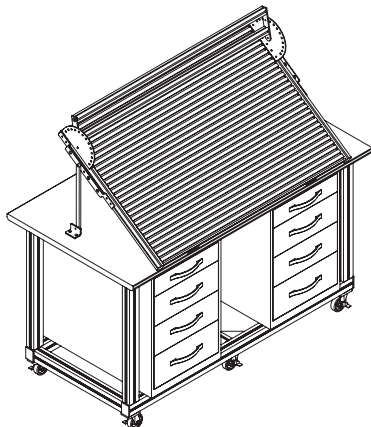
Order number : 11004



- Size : 1500(L)×800(W)×850(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea
- Angle-adjustable (tilting type)

### Tilting type pneumatics working table (8 drawers)

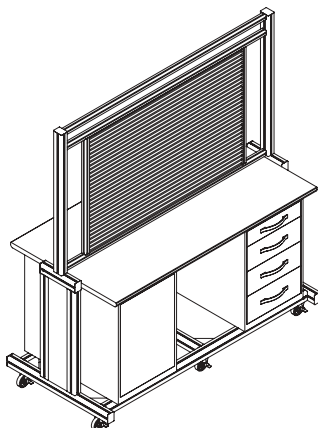
Order number : 11005



- Size : 1500(L)×800(W)×850(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea
- Angle-adjustable (tilting type)

### Pneumatics working table (Vertical type)

Order number : 11011

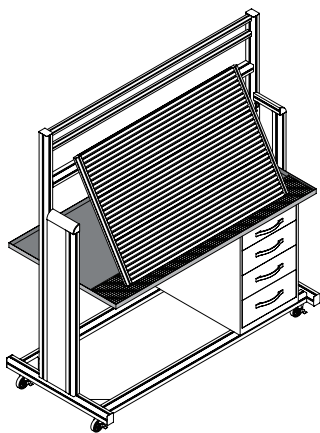


- Size : 1590(L)×790(W)×1800(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea

## Components

### Hydraulics basic working table (4 drawers)

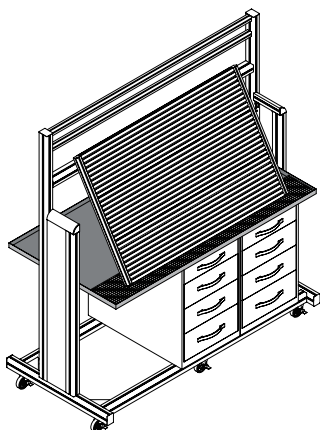
Order number : 14006



- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea
- Option : Oil tray

### Hydraulics basic working table (8 drawers)

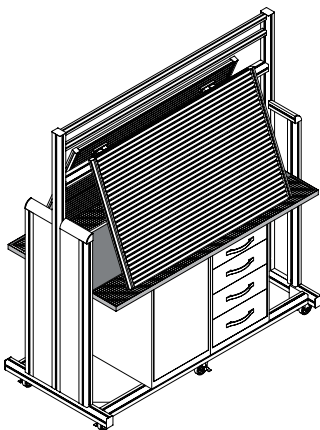
Order number : 14007



- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea
- Option : Oil tray

### Hydraulics double side working table

Order number : 14008

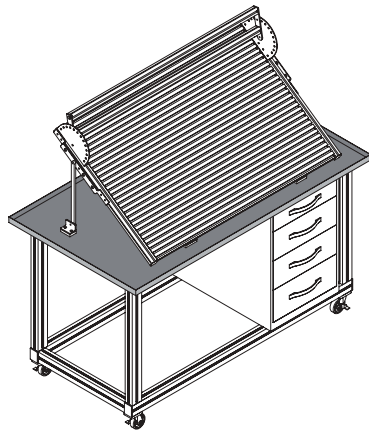


- Size : 1590(L)×800(W)×1700(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea  
Profile panel : 1ea
- Option : Oil tray : 2ea

## Components

### Tilting type hydraulics working table (4 drawers)

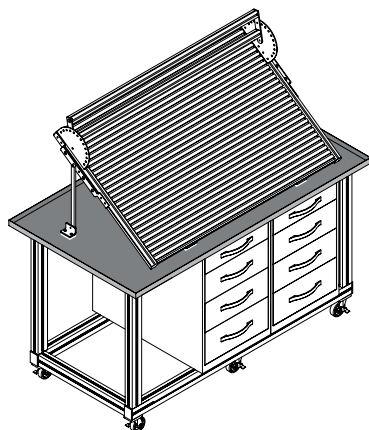
Order number : 14012



- Size : 1600(L)×820(W)×860(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 1ea  
Table structure : 1ea  
Castor with brake : 4ea
- Angle-adjustable (tilting type)

### Tilting type hydraulics working table (8 drawers)

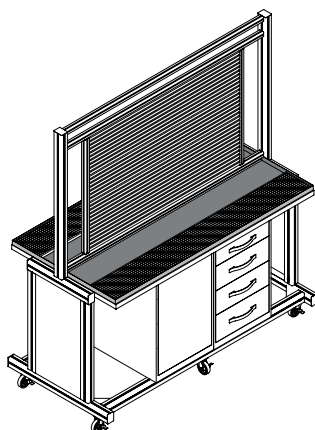
Order number : 14013



- Size : 1600(L)×820(W)×860(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea
- Angle-adjustable (tilting type)

### Hydraulics working table (Vertical type)

Order number : 14009

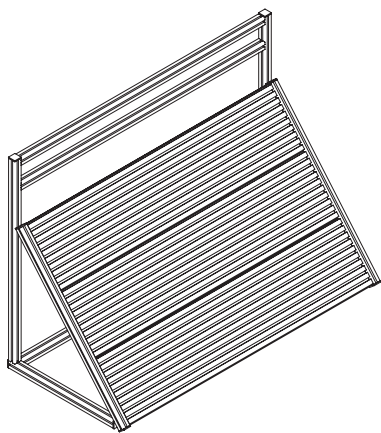


- Size : 1590(L)×790(W)×1800(H)mm
- Profile panel : 1200(W)×750(D)mm
- Groove pitch : 25 mm
- Contents : Cabinet (4drawers) : 2ea  
Table structure : 1ea  
Castor with brake : 6ea

## Components

### Basic profile frame

Order number : 11012

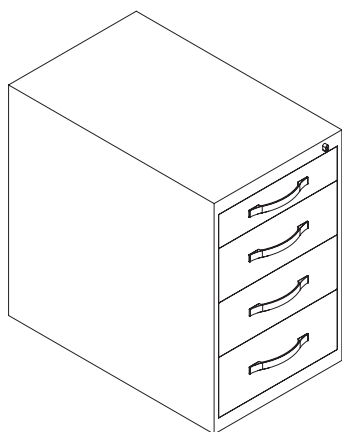


- Size : 1200(L)×750(W)×30(T)mm
- Contents : Aluminum panel
  - Groove pitch : 25mm
  - Sliding finishing

\*Can be made for user demand

### Cabinet

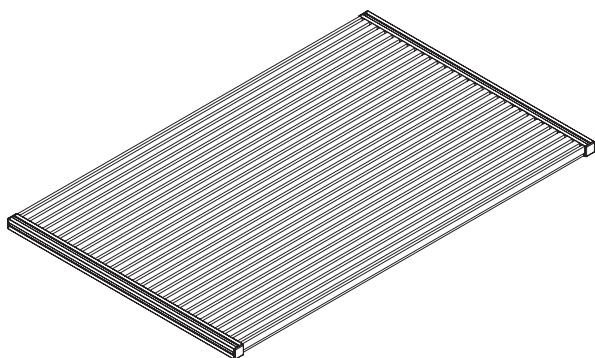
Order number : 20016



- Size : 430(W)×690(D)×680(H)mm
- Contents : 4drawers
  - Open up to 120%
  - High quality metal cabinet
  - Push lock system

### Profile working panel

Order number : 11103



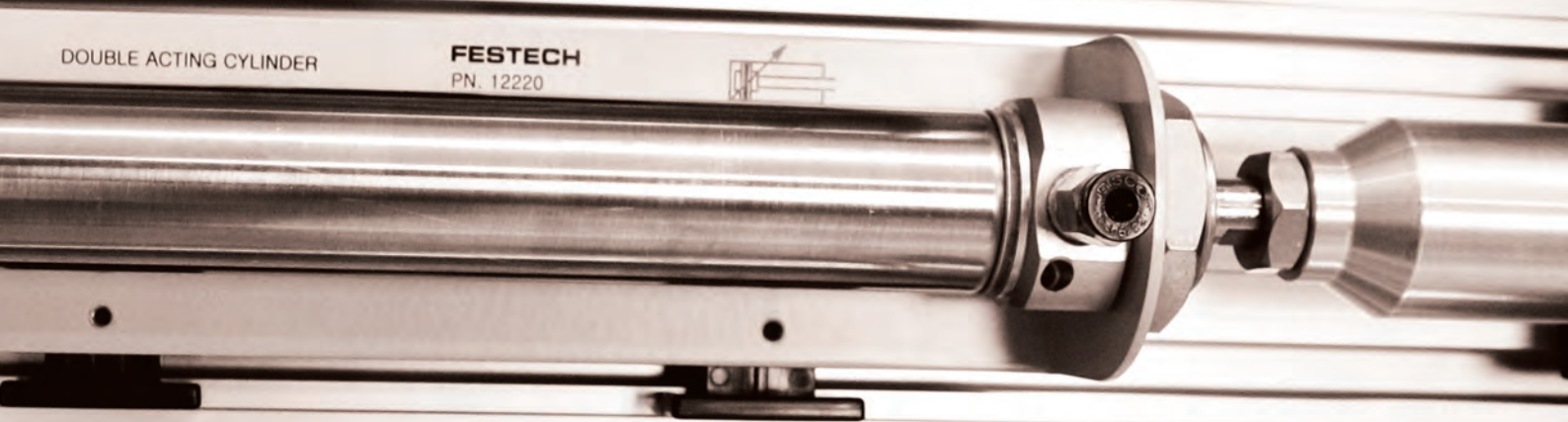
- Size : 1200(L)×750(W)×30(T)mm
- Contents : Aluminum panel
  - Groove pitch : 25mm
  - Variable size of length and width
- Type : 500(L)×500(W)mm (11131)
  - 750(L)×750(W) (11100)
  - 750(L)×1500(W)mm (11106)

\*Can be made for user demand



**Memo**

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CHAPTER

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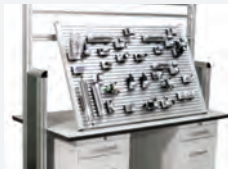
# PNEUMATICS TRAINING SET

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# PNEUMATICS TRAINING SET

FP-100



## Pneumatics

- Basic level (FP-101)
- Advanced level (FP-102)
- Additional components (FP-103)

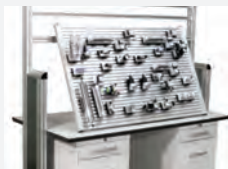
FP-200



## Electro-pneumatics

- Basic level (FP-201)
- Advanced level (FP-202)
- Additional components (FP-203)

FP-400



## Pneumatic K-HRD set

- Basic level (FP-401)
- Advanced level (FP-402)

FP-500

## Portable pneumatics







## Introduction

The FESTECH pneumatics training set is composed of actual pneumatic parts which are used in industry. We supply a basic training set for basic knowledge and control methods of pneumatics and an advanced training set for high-level control.

The FESTECH electro-pneumatics training set, which includes electric control for pneumatic sequence control, allows for an effective logical analysis of the electrical circuit, design, and wiring.

Expansion and integration of this system can be accomplished with a 4mm banana socket.

A short-circuit protector is integrated in FESTECH sensors for safety.

A standard aluminum profile panel is used for all of our training sets that enables components to be positioned horizontally or vertically and attached/detached without any tools.



## Pneumatics training set, basic level (FP-101)



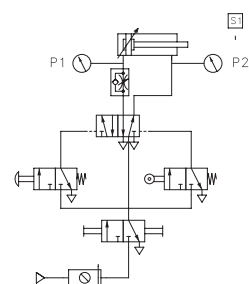
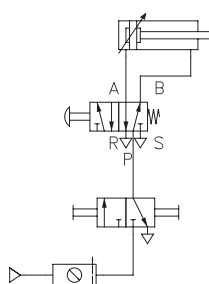
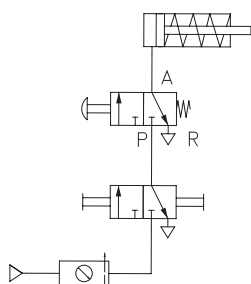
### Training contents

- Physical principles of pneumatic control system
- Production and distribution of compressed air
- Structure and characteristics of pneumatic cylinders
- Calculation of basic parameters
- Function and usage of pneumatic control valves
- Recognizing and drawing of pneumatic symbols
- Drawing of pneumatic circuit diagrams according to standard
- Regulation and measurement of pressure
- Direct and indirect actuation
- Speed control circuits : Meter-in, Meter-out
- Use of quick exhaust valves
- Pneumatic logic controls
- Representation of motion sequences and operating status
- Pneumatic sequence controls
- Pressure-dependent controls with pressure sequence valves
- Position-dependent controls with limit switch valves
- Time-dependent controls with time delay valves
- Trouble-shooting in pneumatic control system
- Safety regulations of the pneumatic system

### Recommended items

Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Pneumatics text book	42051
Pneumatics work book, basic level	42043

Component	Order number
Magnetic symbol (pneumatics and hydraulics)	13501
Pneumatic cut-away model	13503
Compressor	21310





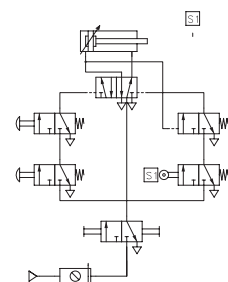
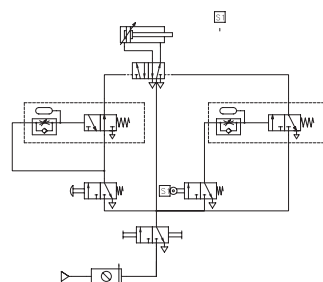
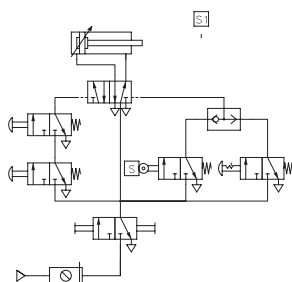
## Pneumatics training set, basic level (FP-101)

## Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder with cushion	12220	2
5	Pressure sequence valve	12300	1
6	Pressure regulating valve	12301	1
7	One-way flow control valve	12302	4
8	Quick exhaust valve	12303	1
9	Pressure gauge	12304	2
10	Time-delay valve (Normally closed)	12310	1
11	3/2-way push-button valve (Normally closed)	12320	2
12	3/2-way push-button valve (Normally open)	12321	1
13	5/2-way selector switch valve	12322	1

No.	Component	Order number	Qty
14	3/2-way selector switch valve	12323	1
15	3/2-way air-act, spring-return valve (Normally closed)	12329	1
16	5/2-way air-act, spring-return valve	12331	1
17	5/2-way air-act, spring-return valve	12332	4
18	5/2-way air-act, air-return valve	12340	4
19	3/2-way idle return limit switch valve	12341	2
20	AND valve	12350	2
21	OR valve	12351	2
22	Spare parts	12270	1
23	T-connector	12280	5
24	Plastic hose (1M)	12290	20
25	Hose cutter	12291	1

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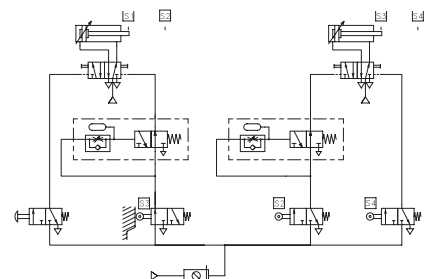
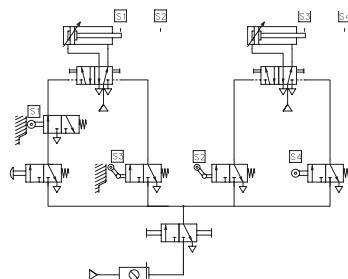
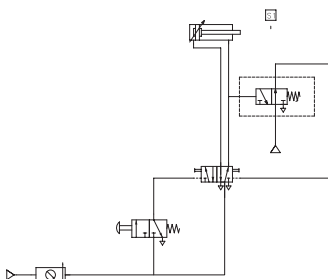


## Pneumatics training set, advanced level (FP-102)



### Training contents

- Physical principles of pneumatic control system
- Production and distribution of compressed air
- Structure and characteristics of pneumatic cylinders
- Calculation of basic and advanced parameters
- Function and use of pneumatic control valves
- Recognizing and drawing of pneumatic symbols
- Drawing of pneumatic circuit diagrams according to standard
- Regulation and measurement of pressure
- Direct and indirect actuation
- Speed control circuits : Meter-in, Meter-out
- Use of quick exhaust valves
- Pneumatic logic controls
- Representation of motion sequences and operating status
- Pneumatic sequence controls
- Pressure-dependent controls with pressure sequence valves
- Position-dependent controls with limit switch valves
- Time-dependent controls with time delay valves
- Trouble-shooting in pneumatic control system
- Safety regulations of the pneumatic system
- Use of pilot operated check valves to stop pneumatic drives in any position
- Displacement-step diagrams
- Design circuit by cascade control circuit
- Basic stepper control circuit
- Self-latching circuits
- Controls with peripheral conditions : single cycle/continuous cycle
- Controls with safety conditions : Emergency Stop
- Trouble-shooting in extensive pneumatic controls
- End positions without limit switch valves
- Back pressure signal generator



## Pneumatics training set, advanced level (FP-102)

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## Recommended items

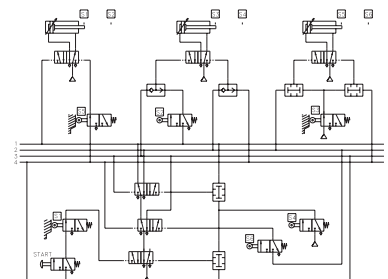
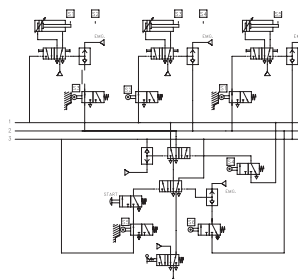
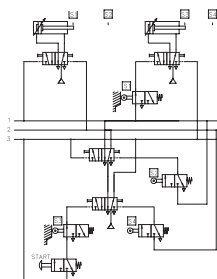
Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Pneumatics text book	42051
Pneumatics work book, basic level	42043

Component	Order number
Pneumatics work book, advanced level	42044
Magnetic symbol (pneumatics and hydraulics)	13501
Pneumatic cut-away model	13503
Compressor	21310

## Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder with cushion	12220	3
5	Pressure sequence valve	12300	1
6	Pressure regulating valve	12301	1
7	One-way flow control valve	12302	6
8	Quick exhaust valve	12303	1
9	Pressure gauge	12304	2
10	Time delay valve (Normally closed)	12310	1
11	Time delay valve (Normally open)	12311	1
12	3/2-way push-button valve (Normally closed)	12320	2
13	3/2-way push-button valve (Normally open)	12321	1
14	5/2-way selector switch valve	12322	1
15	3/2-way selector switch valve	12323	1
16	3/2-way emergency switch valve	12324	1
17	3/2-way air-act, spring-return valve (Normally closed)	12329	2

No.	Component	Order number	Qty
18	3/2-way air-act, spring-return valve (Normally open)	12330	2
19	5/2-way air-act, spring-return valve	12331	2
20	5/2-way air-act, air-return valve	12332	7
21	3/2-way limit switch valve	12340	6
22	3/2-way idle return limit switch valve	12341	2
23	AND valve	12350	8
24	OR valve	12351	8
25	Pilot operating check valve	12423	2
26	T-connector	2280	10
27	Plastic hose (1M)	12290	50
28	Hose cutter	12291	1
29	Spare parts	12270	1
30	Vacuum valve and suction cup	12406	1
31	Pneumatic preset counter	12305	1
32	5/3-way air-act valve(All block)	12333	1
33	5/3-way air-act valve(ABR)	12334	1



## Additional pneumatics control modules (FP-103)

							
Double-acting cylinder, cushion/flow control	12216	Rodless cylinder	12410	Weight control cylinder	12411	Rotary cylinder	12415
							
Back pressure signal generator	12306	3/2-way selector switch valve (Normally open)	12325	3/2-way air-act, spring return valve (Normally open)	12330	5/3-way air-act valve (PAB connected)	12335
							
Air check valve	12354	OR valve set (3-fold)	12401	AND valve set (3-fold)	12402	Stepper module	12403
							
Pneumatic proximity switch	12408	Low pressure regulating valve	12413	Air tank	12416	Command module	12420
							
Air pilot lamp	12421						

## Additional pneumatics control modules (FP-103)

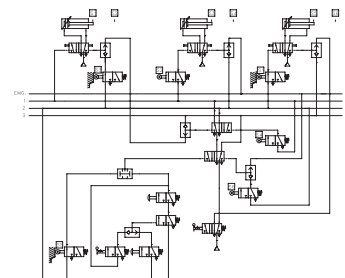
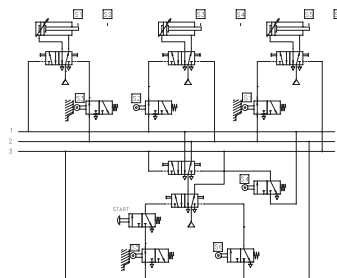
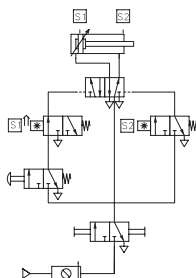
### Training contents

- Weight control cylinder 01
- Controls with vacuum components
- Handling with vacuum generating valves and suction cups
- Detecting of cylinder position with pneumatic proximity sensors
- Control circuit for stepper module
- Program controls with stepper modules
- Cycle repetition using a predetermining counter
- Maintenance
- Fault finding, analysis, documentation

### Component

No.	Component	Order number	Qty
1	Double-acting cylinder, cushion/flow control	12216	1
2	Rodless cylinder	12410	1
3	Weight control cylinder	12411	1
4	Rotary cylinder	12415	1
5	Back pressure signal generator	12306	1
6	3/2-way selector switch valve (Normally open)	12325	1
7	3/2-way air-act, spring return valve (Normally open)	12330	1
8	5/3-way air-act valve (PAB connected)	12335	1
9	Air check valve	12354	1

No.	Component	Order number	Qty
10	OR valve set (3-fold)	12401	1
11	AND valve set (3-fold)	12402	1
12	Stepper module	12403	1
13	Pneumatic proximity switch	12408	1
14	Low pressure regulating valve	12413	1
15	Air tank	12416	1
16	Command module	12420	1
17	Air pilot lamp	12421	1



## Electro-pneumatics training set, basic level (FP-201)



The electro-pneumatic training set includes basic pneumatic training components. The user can train on the basics of electro-pneumatic control as well as advanced training principles.

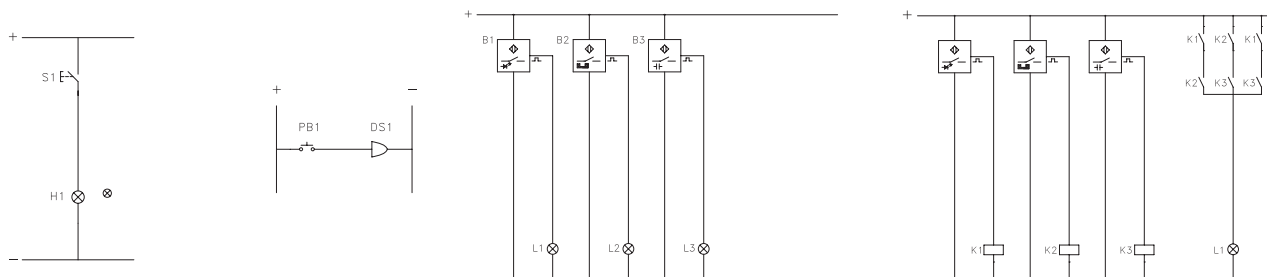
### Training contents

- Physical principles of electrical systems and pneumatics
- Function and use of electro-pneumatic components
- Recognizing and drawing of electro-pneumatic symbols
- Representation of motion sequences and operating status
- Drawing of pneumatic and electrical circuit diagrams
- Direct and indirect manual controls
- Direct and indirect position-dependent controls
- Logical AND/OR function of switch-on signals
- Representing motion sequences and switching states
- Constructing control systems using relays
- Electrical latching circuits
- Application and function of 3/2 and 5/2-way solenoid valves
- Analyzing circuits
- Function and application of limit switches
- End-position monitoring using electronic proximity sensors
- Realizing oscillating movement
- Time-dependent controls with timer relays
- Using pressure switches
- Troubleshooting simple electro-pneumatic circuits

### Recommended items

Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Electro-pneumatics text book	42052
Electro-pneumatics work book, basic level	42045
Magnetic symbol (pneumatics and hydraulics)	13501

Component	Order number
Magnetic symbol (electrics)	13502
Pneumatic cut-away model	13503
Compressor	21310
Cable hanger	13091





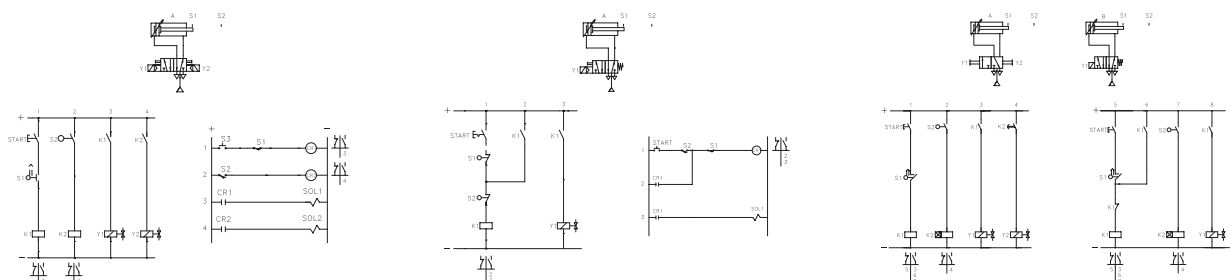
## Electro-pneumatics training set, basic level (FP-201)

## Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder with cushion	12220	2
5	T-connector	12280	10
6	One-way flow control valve	12302	4
7	3/2-way solenoid valve (Normally closed)	13010	1
8	5/2-way single solenoid valve	13012	2
9	5/2-way double solenoid valve	13013	2
10	Pressure switch	13020	1
11	Push-button switch set (3-fold)	13033	1
12	Relay unit (3-fold)	13030	2

No.	Component	Order number	Qty
13	Digital time relay	13031	1
14	Digital counter	13032	1
15	Pilot lamp & buzzer unit	13034	1
16	Inductive sensor	13040	1
17	Capacitive sensor	13041	1
18	Optical sensor	13042	1
19	Electrical limit switch (left)	13051	2
20	Electrical limit switch (right)	13052	2
21	Plastic hose (1M)	12290	10
22	Hose cutter	12291	1
23	Cable set	13080	1
24	Power supply	13090	1

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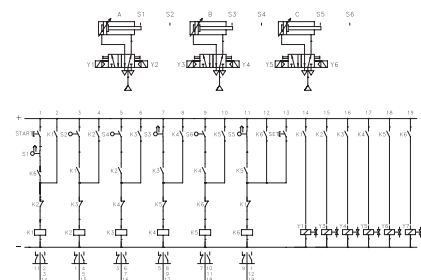
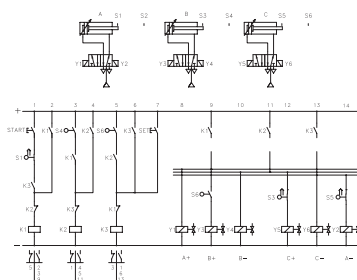
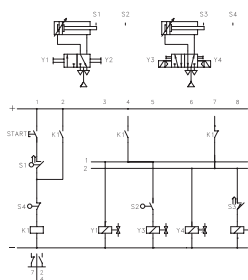


## Electro-pneumatics training set, advanced level (FP-202)



### Training contents

- Physical principles of electrical systems and pneumatics
- Function and use of electro-pneumatic components
- Recognizing and drawing of electro-pneumatic symbols
- Representation of motion sequences and operating status
- Drawing of pneumatic and electrical circuit diagrams
- Direct and indirect manual controls
- Direct and indirect position-dependent controls
- Logical AND/OR function of switch-on signals
- Representing motion sequences and switching states
- Constructing control systems using relays
- Electrical latching circuits
- Application and function of 3/2 and 5/2-way solenoid valves
- Analyzing circuits
- Function and application of limit switches
- End-position monitoring using electronic proximity sensors
- Realizing oscillating movement
- Time-dependent controls with timer relays
- Using pressure switches
- Troubleshooting simple electro-pneumatic circuits
- Function and usage to electro-pneumatic components
- Step diagrams/process-oriented sequence controls
- Using and adjusting different sensor types
- Realizing sequence controls with signal overlap
- Solution according to the group method, cascade circuit
- Sequence chain with spring-return valves and sequence chain with bistable valves
- Control with peripheral conditions (i.e. single/continuous cycle, Emergency Stop)
- Position-dependent control with predetermining counters
- Emergency stop conditions
- Explaining the function and application of a 5/3-way solenoid valve
- Troubleshooting in complex electro-pneumatic circuits



## Electro-pneumatics training set, advanced level (FP-202)

### Recommended items

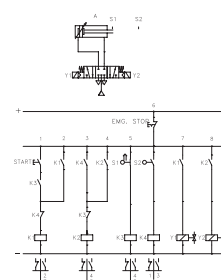
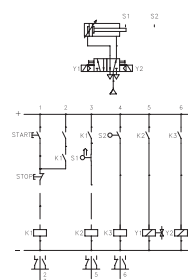
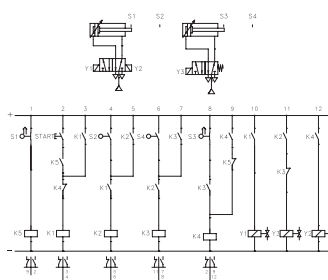
Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Electro-pneumatics text book	42052
Electro-pneumatics work book, basic level	42045
Electro-pneumatics work book, advanced level	42046

Component	Order number
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electrics)	13502
Pneumatic cut-away model	13503
Compressor	21310
Cable hanger	13091

### Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder, cushion/proximity switch	12215	1
5	Double-acting cylinder with cushion	12220	3
6	One-way flow control valve	12302	6
7	Quick exhaust valve	12303	1
8	3/2-way solenoid valve (Normally closed)	13010	1
9	3/2-way single solenoid valve (Normally open)	13011	1
10	5/2-way single solenoid valve	13012	3
11	5/2-way double solenoid valve	13013	3
12	5/3-way solenoid valve (All Block)	13014	1
13	Pressure switch	13020	1
14	Push-button switch set (3-fold)	13033	2
15	Relay unit (3-fold)	13030	3
16	Digital time relay	13031	1
17	Digital counter (electrical)	13032	1

No.	Component	Order number	Qty
18	Pilot lamp & buzzer unit	13034	1
19	Emergency switch	13035	1
20	Electrical proximity switch for cylinder	13050	2
21	Electrical limit switch (left)	13051	4
22	Electrical limit switch (right)	13052	4
23	Inductive sensor	13040	1
24	Capacitive sensor	13041	1
25	Optical sensor	13042	1
26	Spare parts	12270	1
27	T-connector	12280	10
28	Plastic hose (1M)	12290	50
29	Hose cutter	12291	1
30	Cable set	13080	1
31	Power supply	13090	1
32	5/3-way solenoid valve (ABR)	13015	1
33	Pilot operating check valve	12423	2



## Additional electro-pneumatic control module (FP-203)

							
Double-acting cylinder, cushion/flow valve/prox. switch	12217	5/3-way solenoid valve (PAB connected)	13016	Force sensor unit	12431	Flow sensor	12432
							
Flow Proportional pressure regulating valve	12433	Pneumatic rotary drive with encoder	12434	Rodless linear drive unit	12435	Push-button switch set (9-fold)	13036
							
PLC SIEMENS (S7-1200)	23151	PLC SIEMENS (S7-300)	23152				

## Additional electro–pneumatic control module (FP-203) |

### Training contents

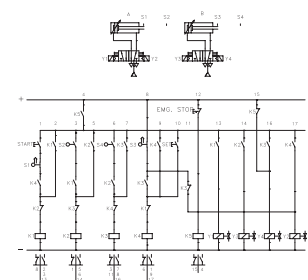
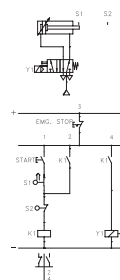
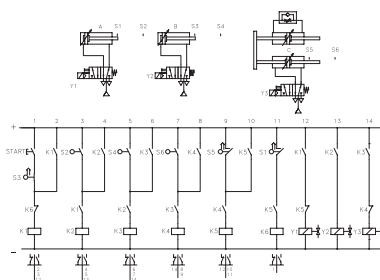
- Sort and structure of pneumatics parts
- Flow control
- Comparison between electro–pneumatic control and PLC control
- PLC basic training

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### Component

No.	Component	Order number	Qty
1	Double-acting cylinder, cushion/flow valve/prox. switch	12217	1
2	5/3-way solenoid valve (PAB connected)	13016	1
3	Force sensor unit	12431	1
4	Flow sensor	12432	1
5	Proportional pressure regulating valve	12433	1

No.	Component	Order number	Qty
6	Pneumatic rotary drive with encoder	12434	1
7	Rodless linear drive unit	12435	1
8	Push-button switch set (9-fold)	13036	1
9	PLC SIEMENS (S7-1200)	23151	1
10	PLC SIEMENS (S7-300)	23152	1





## Pneumatic K–HRD set, basic level (FP–401)

### Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder with cushion	12220	3
5	Pressure sequence valve	12300	1
6	Pressure regulating valve	12301	1
7	One-way flow control valve	12302	4
8	Quick exhaust valve	12303	1
9	Pressure gauge	12304	2
10	Time-delay valve (Normally closed)	12310	1
11	Time-delay valve (Normally open)	12311	1
12	3/2-way push-button valve (Normally closed)	12320	2
13	3/2-way push-button valve (Normally open)	12321	1
14	5/2-way selector switch valve	12322	1
15	3/2-way selector switch valve (Normally closed)	12323	1
16	3/2-way emergency switch valve	12324	1
17	3/2-way air-act, spring-return valve (Normally closed)	12329	1
18	5/2-way air-act, spring-return valve	12331	2
19	5/2-way air-act, air-return valve	12332	5
20	3/2-way limit switch valve	12340	6
21	3/2-way idle return limit switch valve	12341	2
22	AND valve	12350	4
23	OR valve	12351	4

No.	Component	Order number	Qty
24	Vacuum valve and suction cup	12406	1
25	T-connector	12280	10
26	Plastic hose	12290	50
27	Hose cutter	12291	1
28	Spare parts	12270	1
29	3/2-way single solenoid valve (Normally closed)	13010	1
30	5/2-way single solenoid valve	13012	3
31	5/2-way double solenoid valve	13013	3
32	Pressure switch	13020	1
33	Push-button switch set (3-fold)	13033	1
34	Relay unit (3-fold)	13030	3
35	Digital time relay	13031	1
36	Digital counter (electrical)	13032	1
37	Pilot lamp & buzzer unit	13034	1
38	Emergency switch	13035	1
39	Electrical proximity switch for cylinder	13050	2
40	Electrical limit switch (left)	13051	3
41	Electrical limit switch (right)	13052	3
42	Inductive sensor	13040	1
43	Capacitive sensor	13041	1
44	Optical sensor	13042	1
45	Cable set	13080	1
46	Power supply	13090	1

### Recommended items

Component	Order number
Pneumatic basic working table (single side)	11008
Pneumatic-Lab (simulation software)	40005
Pneumatics text book	42051
Pneumatics work book, basic level	42043
Electro-pneumatics text book	42052
Electro-pneumatics work book, basic level	42045

Component	Order number
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electrics)	13502
Pneumatic cut-away model	13503
Compressor	21310
Cable hanger	13091

## Pneumatic K-HRD set, advanced level (FP-402)

### Component

No.	Component	Order number	Qty
1	Service unit	12101	1
2	Air distributor	12201	1
3	Single-acting cylinder	12210	1
4	Double-acting cylinder with cushion	12220	3
5	Pressure sequence valve	12300	1
6	Pressure regulating valve	12301	1
7	One-way flow control valve	12302	6
8	Quick exhaust valve	12303	1
9	Pressure gauge	12304	2
10	Time-delay valve (Normally closed)	12310	1
11	Time-delay valve (Normally open)	12311	1
12	3/2-way push-button valve (Normally closed)	12320	2
13	3/2-way push-button valve (Normally open)	12321	1
14	5/2-way selector switch valve	12322	1
15	3/2-way selector switch valve (Normally closed)	12323	1
16	3/2-way emergency switch valve	12324	1
17	3/2-way air-act, spring-return valve (Normally closed)	12329	2
18	3/2-way air-act, spring return valve (Normally open)	12330	2
19	5/2-way air-act, spring-return valve	12331	3
20	5/2-way air-act, air-return valve	12332	7
21	5/3-way air-act valve (All blocked)	12333	1
22	5/3-way air-act valve (ABR connected)	12334	1
23	3/2-way limit switch valve	12340	6
24	3/2-way idle return limit switch valve	12341	2
25	AND valve	12350	8
26	OR valve	12351	8

No.	Component	Order number	Qty
27	Vacuum valve and suction cup	12406	1
28	Pilot operating check valve	12423	2
29	T-connector	12280	10
30	Plastic hose	12290	50
31	Hose cutter	12291	1
32	Spare parts	12270	1
33	3/2-way single solenoid valve (Normally closed)	13010	1
34	5/2-way single solenoid valve	13012	3
35	5/2-way double solenoid valve	13013	3
36	5/3-way solenoid valve (All blocked)	13014	1
37	Pressure switch	13020	1
38	Push-button switch set (3-fold)	13033	2
39	Relay unit (3-fold)	13030	6
40	Digital time relay	13031	1
41	Digital counter (electrical)	13032	1
42	Pilot lamp & buzzer unit	13034	1
43	Emergency switch	13035	1
44	Electrical proximity switch for cylinder	13050	2
45	Electrical limit switch (left)	13051	4
46	Electrical limit switch (right)	13052	4
47	Inductive sensor	13040	1
48	Capacitive sensor	13041	1
49	Optical sensor	13042	1
50	Cable set	13080	1
51	Power supply	13090	1

### Recommended items

Component	Order number
Pneumatic basic working table (single side)	11008
Pneumatic-Lab (simulation software)	40005
Pneumatics text book	42051
Pneumatics work book, basic level	42043
Pneumatics work book, advanced level	42044
Electro-pneumatics text book	42052
Electro-pneumatics work book, basic level	42045

Component	Order number
Electro-pneumatics work book, advanced level	42046
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electrics)	13502
Pneumatic cut-away model	13503
Compressor	21310
Cable hanger	13091

## Portable pneumatics training set (FP-501, 502)



Portable electro-pneumatics training set-basic  
Order number : 13111

### Component

No.	Component	Q'ty
1	Main frame	1
2	Service unit	1
3	Air distributor	1
4	Single-acting cylinder	1
5	Double-acting cylinder with cushion	2
6	Double-acting cylinder, cushion/flow control	1
7	One-way flow control valve	2
8	3/2-way single solenoid valve (Normally closed)	1
9	5/2-way single solenoid valve	2
10	5/2-way double solenoid valve	2
11	Pressure switch	1
12	Relay unit	2
13	Digital time relay (ONormally openFF)	1
14	Digital counter	1
15	Push-button switch set (3-fold)	2
16	Inductive sensor	1
17	Capacitive sensor	1
18	Optical sensor	1
19	Electrical proximity switch	2
20	Electrical limit switch (left)	2
21	Electrical limit switch (right)	2
22	Power supply	1
23	Cable set	1
24	Plastic hose (20m)	1



Portable electro-pneumatics training set-advanced  
Order number : 13112

### Component

No.	Component	Q'ty
1	Main frame	1
2	Service unit	1
3	Air distributor	1
4	Double-acting cylinder, cushion/flow control	3
5	5/2-way single solenoid valve	3
6	5/2-way double solenoid valve	3
7	Relay unit	2
8	Push-button switch	5
9	Selector switch	5
10	LED	10
11	Buzzer	1
12	Inductive sensor	1
13	Capacitive sensor	1
14	Optical sensor	1
15	Conveyor belt (DC motor)	1
16	DC motor with circle plate	1

## Portable pneumatics training set (FP-503, 504)



Portable electro-pneumatics training set  
Order number : 13113

### Component

No.	Component	Q'ty
1	Main frame	1
2	Air distributor	1
3	Double-acting cylinder with cushion	4
4	One-way flow control valve	4
5	5/2-way single solenoid valve	3
6	5/2-way double solenoid valve	1
7	Electrical proximity switch	2
8	Electrical limit switch	6
9	Motor control module	1
10	Clamp IO terminal	1
11	Relay unit	4
12	Digital time relay	1
13	Digital counter	1
14	Push-button switch	8
15	Motor control switch (CW)	1
16	Motor control switch (CCW)	1
17	Counter control switch (increase)	1
18	Counter control switch (decrease)	1
19	Rotary switch	1
20	Emergency switch	1
21	Plastic hose (5m)	1
22	Cable set	1
23	Power supply	1
24	Pilot lamp	4



Pneumatics / sequence training set  
Order number : 13056

### Component

No.	Component	Q'ty
1	Main frame	1
2	Double-acting cylinder with cushion	4
3	5/2-way single solenoid valve	4
4	5/2-way double solenoid valve	4
5	Electrical limit switch	8
6	Relay unit	10
7	Digital time relay	4
8	Push-button switch	5
9	Emergency switch	1
10	Lamp	8
11	Select switch	1
12	Din Rail	1
13	Plastic hose (10m)	1
14	Cable (50m)	1
15	Power supply (SMPS)	1

## Portable pneumatics training set (FP-505)



Order number : 13055

### Component

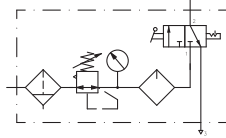
No.	Component	Q'ty
1	Main frame	1
2	Service unit	1
3	Air distributor	1
4	Double-acting cylinder with cushion	2
5	One-way flow control valve	2
6	5/2-way single solenoid valve	2
7	5/2-way double solenoid valve	2
8	Pressure switch	1
9	Relay unit (4C type)	2
10	Digital time relay	1
11	Digital counter	1
12	Push-button switch set (3-fold)	1
13	Electrical proximity switch	2
14	Electrical limit switch (left)	2
15	Electrical limit switch (right)	2
16	Power supply	1
17	Cable set	1
18	Plastic hose (1m)	20



## Components

### Service unit

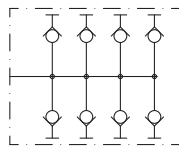
Order number : 12101



- Pressure range : 0.5~12 bar
- Air filter, pressure regulator, lubricator
- Shut off valve
- Filter degree : 40μm
- Connection plastic hose : Outside diameter 6 mm
- Flow rate : 750 LPM

### Air distributor

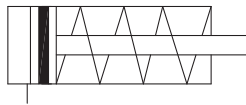
Order number : 12201



- Pressure range : 0~10 bar
- Input : 1 ea (6 mm)
- Output : 8 ea, check connector included (4 mm)
- One-touch connector

### Single-acting cylinder

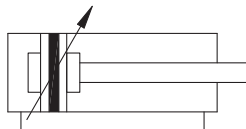
Order number : 12210



- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Piston diameter : 25 mm
- Stroke : 50mm
- Magnetic for sensor detection

### Double-acting cylinder with cushion

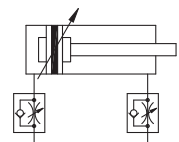
Order number : 12220



- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Piston diameter : 25 mm
- Stroke : 125mm
- Magnetic for sensor detection
- Adjustable cushion included

### Double-acting cylinder, cushion/flow control

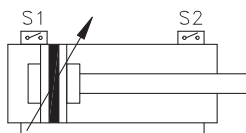
Order number : 12216



- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Piston diameter : 25 mm
- Stroke : 125mm
- Magnetic for sensor detection
- Adjustable cushion included
- Flow control valve included

### Double-acting cylinder, cushion/proximity switch

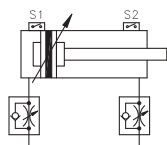
Order number : 12215



- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Electric proximity switch : 2 ea
- Piston diameter : 25 mm
- Stroke : 125mm
- Magnetic for sensor detection
- Adjustable cushion included
- Electric proximity switch : 2 ea

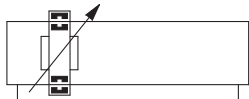
## Components

Double-acting cylinder, cushion/flow valve/prox. switch      Order number : 12217



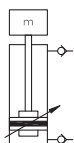
- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Piston diameter : 25 mm
- Stroke : 125mm
- Magnetic for sensor detection
- Adjustable cushion included
- Electric proximity switch : 2 ea
- Flow control valve included

Rodless cylinder and mounting      Order number : 12410



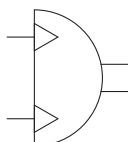
- Pressure range : 0~10 bar
- Rodless cylinder (band type)
- Stroke : 200 mm
- Magnetic for sensor detection

Weight control cylinder      Order number : 12411



- Pressure range : 0~10 bar
- Piston diameter : 25 mm
- Stroke : 100mm
- Weight : 6 kgf

Rotary cylinder      Order number : 12415



- Pressure range : 0~10 bar
- Rotary angle : 180°
- Proximity switch (Optional)
- Degree adjusting

Spare parts      Order number : 12270



- I type : M5-Ø4 (5ea), 1/8-Ø4 (5ea)
- L type : 1/8-Ø4 (5ea)
- Silencer : M5 (5ea), 1/8 (2ea)

T-connector      Order number : 12280



- Pressure range : 0~10 bar
- Hose size : outside diameter 4 mm

## Components

Plastic hose (1M)

Order number : 12290



- Operating temperature :  $-40^{\circ}\text{C} \sim 60^{\circ}\text{C}$
- Color : blue
- Size : outside diameter 4 mm

Plastic hose (1M)

Order number : 12292



- Operating temperature :  $-40^{\circ}\text{C} \sim 60^{\circ}\text{C}$
- Color : blue
- Size : outside diameter 6 mm

Hose cutter

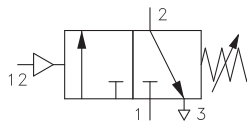
Order number : 12291



- PVC Grip
- Multi-purpose cutter
- Type : 190mm
- Cutting material : Air Hose (0~16mm)

Pressure sequence valve

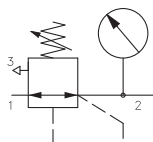
Order number : 12300



- Pressure range : 1.5~8 bar
- Slide type
- Spring return

Pressure regulating valve

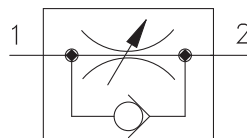
Order number : 12301



- Pressure range : 0~12 bar
- Max. pressure : 16 bar
- Pressure gauge attached
- Flow rate : 800 LPM

One-way flow control valve

Order number : 12302

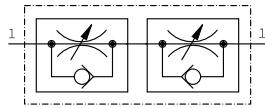


- Pressure range : 0~10 bar
- 1(A)→2(B) : 0~150 LPM
- 2(B)→1(A) : 160/130 LPM

## Components

### One way flow control valveX2

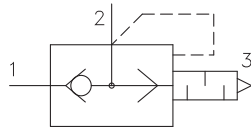
Order number : 12302-2



- Pressure range : 0~10 bar
- Two one-way flow control valve
- 1(A)→2(B) : 0~150 LPM
- 2(B)→1(A) : 0~150 LPM

### Quick exhaust valve

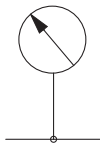
Order number : 12303



- Pressure range : 0~10 bar
- 1(P)→2(A) : 300 LPM
- 2(A)→3(R) : 550 LPM

### Pressure gauge

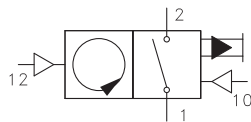
Order number : 12304



- Pressure range : 0~12 bar
- Bourdon tube
- Gauge diameter : 40 mm

### Pneumatic counter

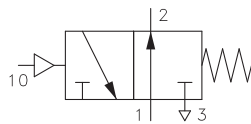
Order number : 12305



- Pressure range : 0~8,5 bar
- Mechanical counter with air drive
- Display : 5 digit
- Reset : manual or pilot
- Min. counting period : 10ms
- Min. reset period : 180ms
- Continuous counting frequency : 2Hz

### Back pressure signal generator

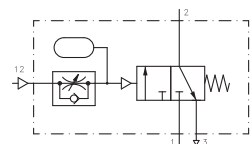
Order number : 12306



- Pressure range : 0~8,5 bar
- Normally open type valve
- Operating pressure : 1,25 bar
- Spring return
- direct piping type

### Time-delay valve (Normally closed)

Order number : 12310

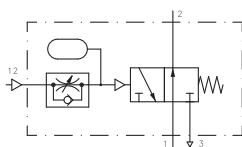


- Pressure range : 0~8,5 bar
- Normally closed type valve
- Delay time : 0,1~30 sec
- Signal pressure : 1,5~8 bar

## Components

Time-delay valve (Normally open)

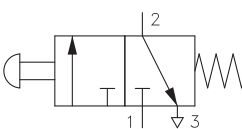
Order number : 12311



- Pressure range : 0~8,5 bar
- Normally open type valve
- Delay time : 0,1~30 sec
- Signal pressure : 1,5~8 bar

3/2-way push-button valve (Normally closed)

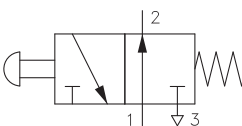
Order number : 12320



- Pressure range : 0~10 bar
- Push-button type
- Normally closed type valve
- Spring return
- Direct acting type

3/2-way push-button valve (Normally open)

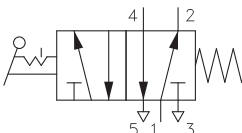
Order number : 12321



- Pressure range : 0~10 bar
- Push-button type
- Normally open type valve
- Spring return
- Direct acting type

5/2-way selector switch valve

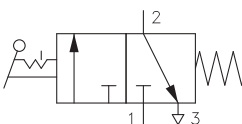
Order number : 12322



- Pressure range : 0~10 bar
- Select switch (manual override)
- Spring return
- Direct acting type

3/2-way selector switch valve (Normally closed)

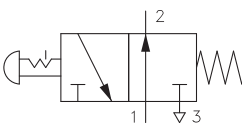
Order number : 12323



- Pressure range : 0~10 bar
- Normally closed type valve
- Spring return
- Direct acting valve

3/2-way emergency switch valve

Order number : 12324

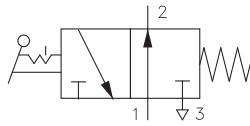


- Pressure range : 0~10 bar
- Normally open type valve
- Spring return
- Direct acting valve
- Push-locking type

## Components

### 3/2-way selector switch valve (Normally open)

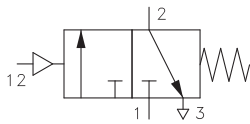
Order number : 12325



- Pressure range : 0~10 bar
- Normally open type valve
- Spring return
- Direct acting valve

### 3/2-way air-act, spring-return valve (Normally closed)

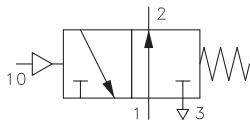
Order number : 12329



- Pressure range : 0~10 bar
- Normally close type valve
- Return type : spring and pilot
- Spool valve

### 3/2-way air-act, spring return valve (Normally open)

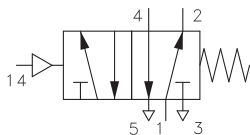
Order number : 12330



- Pressure range : 0~10 bar
- Normally open type valve
- Return type : spring and pilot
- Spool valve

### 5/2-way air-act, spring-return valve

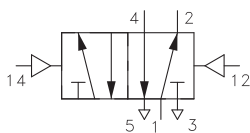
Order number : 12331



- pressure : 0~10 bar
- Return type : spring and pilot
- Spool valve

### 5/2-way air-act, air-return valve

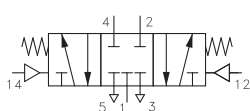
Order number : 12332



- Pressure range : 0~10 bar
- Return type : pilot
- Spool valve
- Self-holding valve

### 5/3-way air-act valve (All blocked)

Order number : 12333



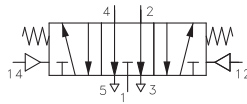
- Pressure range : 0~10 bar
- Return type : spring and pilot
- Spool valve



## Components

### 5/3-way air-act valve (ABR connected)

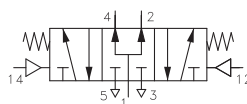
Order number : 12334



- Pressure range : 0~10 bar
- Return type : spring and pilot
- Manual override
- Spool valve

### 5/3-way air-act valve (PAB connected)

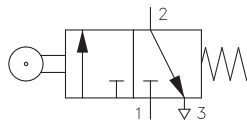
Order number : 12335



- Pressure range : 0~10 bar
- Return type : spring and pilot
- Manual override
- Spool valve

### 3/2-way limit switch valve

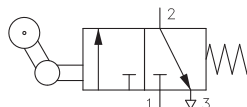
Order number : 12340



- Pressure range : 0~10 bar
- Roller lever
- Normally close type valve
- Spring return

### 3/2-way idle return limit switch valve

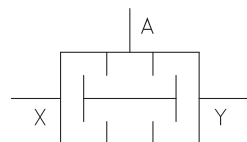
Order number : 12341



- Pressure range : 1~10 bar
- Roller lever with idle return
- Normally close type valve
- Spring return

### AND valve

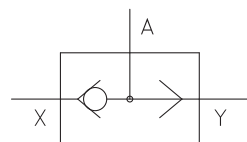
Order number : 12350



- Pressure range : 1~10 bar
- Flow rate X/Y→A : 857 LPM

### OR valve

Order number : 12351

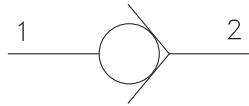


- Pressure range : 0~10 bar
- Open pressure (2→1) : 0,5 bar

## Components

### Air check valve

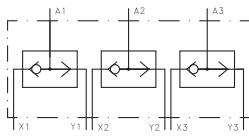
Order number : 12354



- Pressure range : 0~10 bar
- Open pressure (2→1) : 0,5 bar

### OR valve set (3-fold)

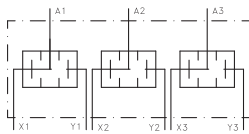
Order number : 12401



- Pressure range : 1~10 bar
- Flow rate X, Y→A : 550 LPM
- OR valves 3 fold

### AND valve set (3-fold)

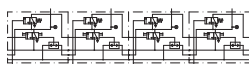
Order number : 12402



- Pressure range : 1~10 bar
- Flow rate X, Y→A : 550 LPM
- AND valves 3 fold

### Stepper module, expansion

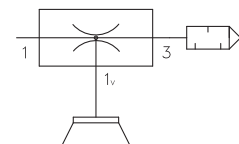
Order number : 12403



- Pressure range : 2~8 bar
- Poppet valve
- AND/OR gate integrated
- Flow rate : 60 LPM
- A-A-A-A type

### Vacuum valve and suction cup

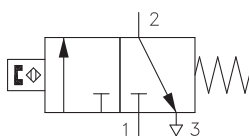
Order number : 12406



- Pressure range : 0~10 bar
- Venturi tube and nozzle type
- Vacuum pressure : min. 0,85 bar
- Air consumption : 15 LPM
- Max. switching frequency : 10Hz

### Pneumatic proximity switch

Order number : 12408

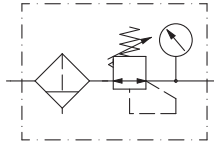


- Pressure range : 2~8 bar
- Noncontact pneumatic sensor, magnet included
- Display

## Components

### Low pressure regulating valve

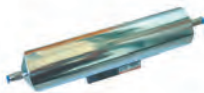
Order number : 12413



- Input pressure range : 1,0 ~ 10bar
- Output pressure range : 0,1~1,6 bar
- Filter degree : 40  $\mu\text{m}$
- Condensate capacity : 14cm<sup>3</sup>

### Air tank

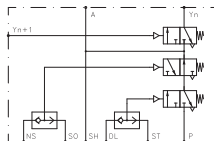
Order number : 12416



- One touch clamp
- Capacity : 400 ml

### Command module

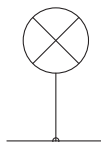
Order number : 12420



- Various input/output function
- Auto/manual
- Cycle selection
- Start/stop signal
- Reset signal
- Detect work piece

### Air pilot lamp

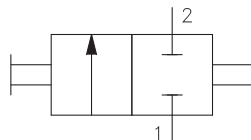
Order number : 12421



- Pressure indicate lamp
- Pressure range : 0~10 bar
- Lamp on pressure : Prox, 2bar

### 2/2-way slide valve

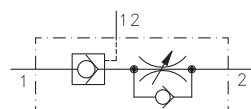
Order number : 12422



- Slide type

### Pilot operating check valve

Order number : 12423

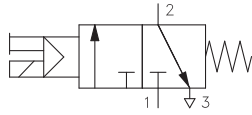


- Pressure range : 0~10 bar
- Pilot actuated pressure : 0,1bar
- Pilot check valve
- Speed controller
- Pressure range : 0~1 bar

## Components

### 3/2-way single solenoid valve (Normally close)

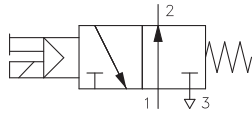
Order number : 13010



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Normally closed type valve
- Spring return
- LED and protection circuit included
- Manual override

### 3/2-way single solenoid valve (Normally open)

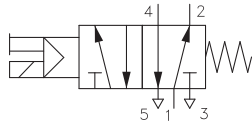
Order number : 13011



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Normally open type valve
- Spring return
- LED and protection circuit included
- Manual override

### 5/2-way single solenoid valve

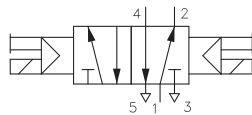
Order number : 13012



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Return : spring and pilot
- Manual override

### 5/2-way double solenoid valve

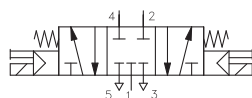
Order number : 13013



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Manual override

### 5/3-way solenoid valve (All blocked)

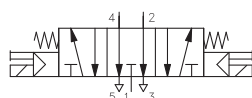
Order number : 13014



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Operating voltage : DC 24V
- LED and protection circuit included
- Manual override

### 5/3-way solenoid valve (ABR connected)

Order number : 13015

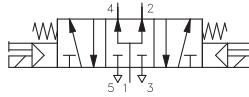


- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Operating voltage : DC 24V
- LED and protection circuit included
- Manual override

## Components

### 5/3-way solenoid valve (PAB connected)

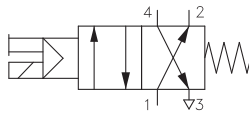
Order number : 13016



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Operating voltage : DC 24V
- LED and protection circuit included
- Manual override

### 4/2-way single solenoid valve

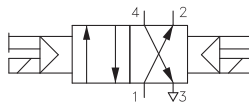
Order number : 13017



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Return : spring and pilot
- Manual override

### 4/2-way double solenoid valve

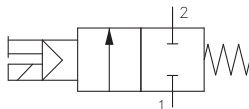
Order number : 13018



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Manual override

### 2/2-way single solenoid valve

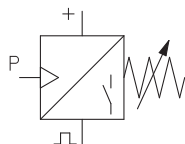
Order number : 13019



- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Return : spring and pilot
- Manual override

### Pressure switch

Order number : 13020



- Pressure range : 0,5~10 bar
- Control setting pressure
- Pressure display

## Components

### Force sensor unit

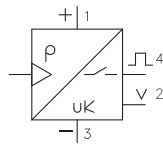
Order number : 12431



- Max. capacity : 0 ~ 100kgf
- Output voltage : DC 0~10V
- Operating voltage : DC24V
- Force range : DC 0~10V

### Flow sensor

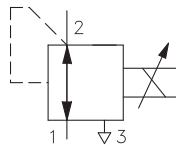
Order number : 12432



- Flow range : 1~50 LPM
- Operating voltage : DC24 V
- Analog output : DC 1~5 V
- Operating range : -1bar~7.5 bar

### Proportional pressure regulating valve

Order number : 12433



- Max. pressure : 10 bar
- Operating voltage : DC 24V
- Input signal voltage : DC 0~10 V
- Monitor output signal : DC 1~5 V

### Pneumatic rotary drive with encoder

Order number : 12434



- Pneumatic rotary cylinder
- Rotary angle : 180°
- Proximity sensor
- Encoder output : A,B,Z

### Rodless linear drive unit

Order number : 12435



- Linear potentiometer
- Reed switch : 2ea
- Stroke : 300mm
- Scale attached
- Shock absorber : 2ea
- Encoder : A,B,Z (Option)

### Pressure sensor with digital display

Order number : 12437



- Pressure range : 0 ~ 10 bar
- Max. allowed pressure : 14 bar
- Power : 24 V DC
- Output voltage : 0 ~ 10 V
- Output 1, 2 : relay contact
- Measurement tolerance :  $\pm 1\%$
- Max. measurement frequency : 100 Hz



## Components

### Relay unit (3-fold)

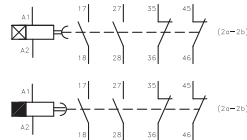
Order number : 13030



- Power : DC 24V
- Contact : 4C(Changeover)
- Contact load : Max, 5A
- Allowable : Max, 120W
- Operating time : < 20 ms
- Block time : < 20 ms

### Digital time relay

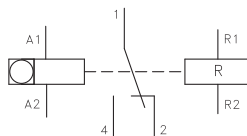
Order number : 13031



- Power : DC 24V
- Contact : 2a-2b
- Contact load : Max, 5A
- Allowable : Max, 100W
- Delay time : 1~99 sec
- On-delay / Off-delay

### Digital counter

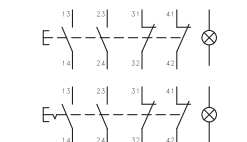
Order number : 13032



- Power : DC 24V
- Contact : 1C(Changeover)
- Contact load : Max, 5A
- Power consumption : 2,4W
- Counter pulse : 20 ms
- Display : 4 digits

### Push-button switch set (3-fold)

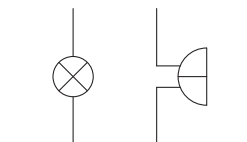
Order number : 13033



- Power : DC 24V
- Consist of : 2 momentary push-buttons, 1 locking push-button
- Contact : 2 a-contact, 2 b-contact
- Contact allowable : Max, 1A
- Power consumption : 0,48W

### Pilot lamp & buzzer unit

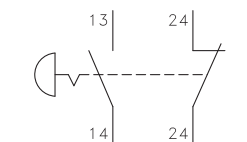
Order number : 13034



- Power : DC 24V
- Lamp Power consumption : 1,2W
- Buzzer Power consumption : 0,04W
- Buzzer frequency : 420Hz

### Emergency switch

Order number : 13035

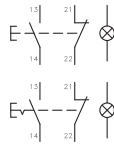


- Power : DC 24V
- Type : mushroom locking button
- Contact : 1a, 1b
- Contact load : Max, 8A

## Components

### Push-button switch set (9-fold)

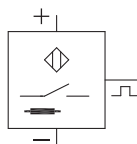
Order number : 13036



- Power : DC 24V
- Consist of : 9 push-buttons
- Contact allowed load : Max, 1A
- Power consumption : 0.48W
- Contact : 1A1B
- Lamp included

### Inductive sensor

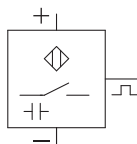
Order number : 13040



- Operating voltage : DC10~30V
- Sensing distance : 5mm
- Switching frequency : Max, 500Hz
- Output : Normally open , PNP
- Output Current : Max, 200mA
- Short-circuit protection included

### Capacitive sensor

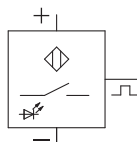
Order number : 13041



- Switching Power : DC10~30V
- Sensing distance : 8mm
- Switching frequency : Max, 50Hz
- Output : Normally open , PNP
- Output Current : Max, 200mA
- Short-circuit protection included

### Optical sensor

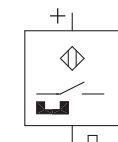
Order number : 13042



- Switching Power : DC10~30V
- Switching distance : 100mm
- Response time : 1ms
- Output : Normally open , PNP
- Output Current : Max, 200mA
- Short-circuit protection included

### Electrical proximity switch for cylinder

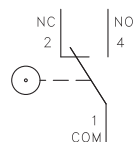
Order number : 13050



- Power : DC 24V
- Switching capacity : Max, 10W
- Operating current : 50 mA
- Switching frequency : Max, 800Hz
- Protection circuit included

### Electrical limit switch (left)

Order number : 13051

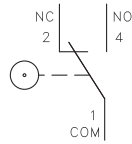


- Contact : DC 24V, 5A
- Contact : 1 c
- Switching frequency : Max, 200Hz
- Roller lever electric switch

## Components

Electrical limit switch (right)

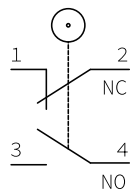
Order number : 13052



- Contact : DC 24V, 5A
- Contact : 1 c
- Switching frequency : Max, 200Hz
- Roller lever electric switch

Electrical limit switch (Contact separation)

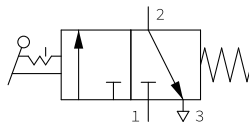
Order number : 13157



- Contact : DC 24V, 5A
- Contact : 1a1b
- Roller lever electric switch

Main pressure valve with lockable key

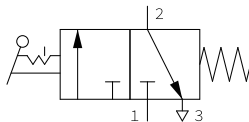
Order number : 12202



- Pressure range : 0~10 bar
- Normally closed type valve
- Main pressure valve
- Lockable key type

3/2-way valve with safety key

Order number : 12203



- Pressure range : 0~10 bar
- Normally closed type valve
- Direct acting valve
- Safety key type

Cable set

Order number : 13080



- Color : red, blue, black
- Length : 1500mm, 1000mm, 500mm, 300mm, 100mm
- High elasticity and special coating

Cable set (safety socket)

Order number : 113080

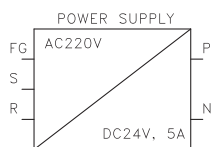


- Color : red, blue, black
- Length : 1500mm, 1000mm, 500mm, 300mm, 100mm
- High elasticity and special coating
- Safety socket type

## Components

### Power supply

Order number : 13090



- Power : AC 220 V, 50/60Hz
- Output power : DC 24V
- Output current : 5A

### Cable hanger

Order number : 13091



- Round plate diameter : 400mm
- Height : 1100 ~ 1800mm adjustable type
- Cable hanger : 16 holes
- Castor : 5 ea

### Cable hanger (on the desk)

Order number : 13096



- Round plate diameter : 400mm
- Height : 500 ~ 800mm adjustable type
- Cable hanger : 16 holes

### Cable hanger (table type II)

Order number : 13097



- Table attached type
- L type
- Size : 150×150×150mm
- Groove : 8 ea (groove length : 70mm)
- Material : steel

### Compressor

Order number : 21310



- Motor : 220V AC, 50/60Hz, 2/3HP
- Pressure : Max, 8 bar
- Oil less type
- Tank size : 10L
- Flow rate : 130LPM

### Compressor (silence)

Order number : 21314

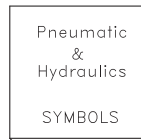


- Motor : 220V AC, 50/60Hz, 0.5HP
- Pressure : Max, 8 bar
- Noise level : 40db/A
- Tank size : 24L
- Weight : 30kg
- Flow rate : 50LPM

## Components

### Magnetic symbol (pneumatics and hydraulics)

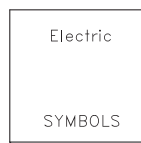
Order number : 13501



- Pneumatics and hydraulics symbols based on ISO
- Cylinders, valves and other symbols
- Attachable to magnetic board

### Magnetic symbol (electronics)

Order number : 13502



- Electric symbols based on ISO
- Switches, sensors, and relay contacts
- Attachable to magnetic board

### Pneumatic cut-away model

Order number : 13503



### Universal mounting

Order number : 19010



- One-touch clamp system
- Attached to profile panel with vertically and horizontally

### Pneumatic Textbook

Order number : 42051



- Outline of Pneumatic Devices
- Pneumatic Actuator
- Pneumatic Valves
- Basic Pneumatic Circuit





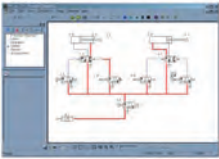
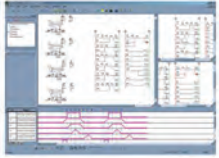
### Electro-pneumatics textbook

Order number : 42052



- Fundamentals of electrical technology
- Components in the electrical signal control section
- Electrically actuated directional control valves

## Components

Pneumatics workbook (Basic Level)	Order number : 42043
	<ul style="list-style-type: none"> <li>● Initial setting procedure</li> <li>● Cylinders and sequence control</li> </ul>
Pneumatics workbook (Advanced Level)	Order number : 42044
	
Electro-pneumatics workbook (Basic Level)	Order number : 42045
	
Electro-pneumatics workbook (Advanced Level)	Order number : 42046
	
PH-Lab simulation software	Order number : 40003
	<ul style="list-style-type: none"> <li>● Pneumatics and Hydraulics software</li> </ul>
P-Lab simulation software	Order number : 40005
	<ul style="list-style-type: none"> <li>● Pneumatics software</li> </ul>



## Components

Block type (14DI / 10DO)

Order number : 23151



- Digital input : 14 channel
- Digital output : 10 channel (Relay)
- Analog input : 2 channel
- Analog output : 2 channel
- HSC included (1 channel)
- EtherNet communication
- 4mm socket
- Power supply included

Module type (16DI / 16DO)

Order number : 23152



- Digital input : 16 channel
- Digital output : 16 channel (relay or TR)
- 4mm socket
- Power supply included
- PROFIBUS-DP communication (Optional)
- PC-Adapter, software not included

Block type (16DI / 16DO)

Order number : 23161



- Digital input : 16 channel
- Digital output : 16 channel (Relay)
- 4mm socket
- Power supply included
- Communication(option) : RS-232, RS-422, RS-485
- Communication cable sold separately

Block type (18DI / 12DO)

Order number : 23001



- Digital input : 18 channel
- Digital output : 12 channel (Relay)
- HSC included
- 2axes position control
- 4mm socket
- Power supply included

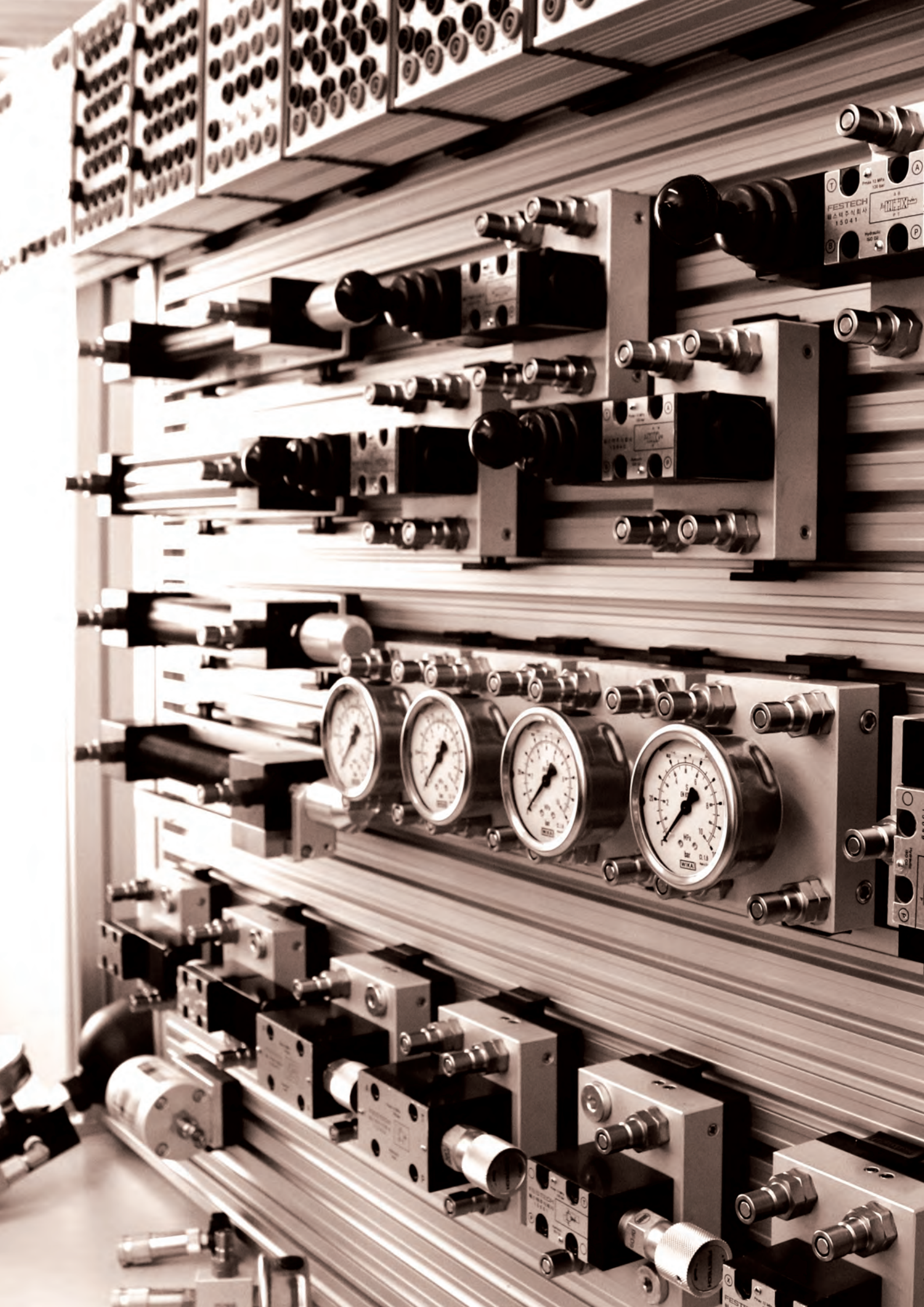
Block type (16DI / 16DO)

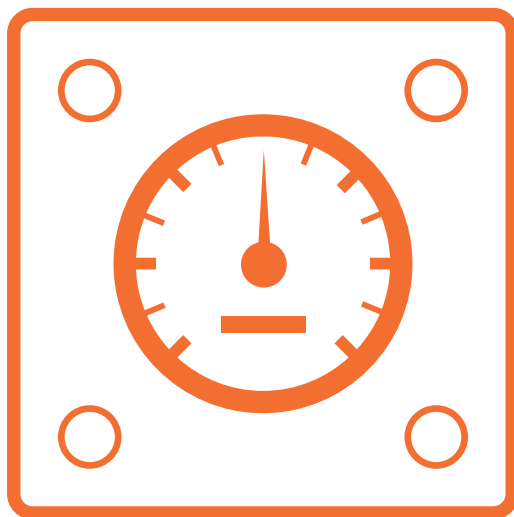
Order number : 23171



- Digital input : 16 channel
- Digital output : 16 channel (Relay)
- 4mm socket
- Power supply included







CHAPTER

02-1

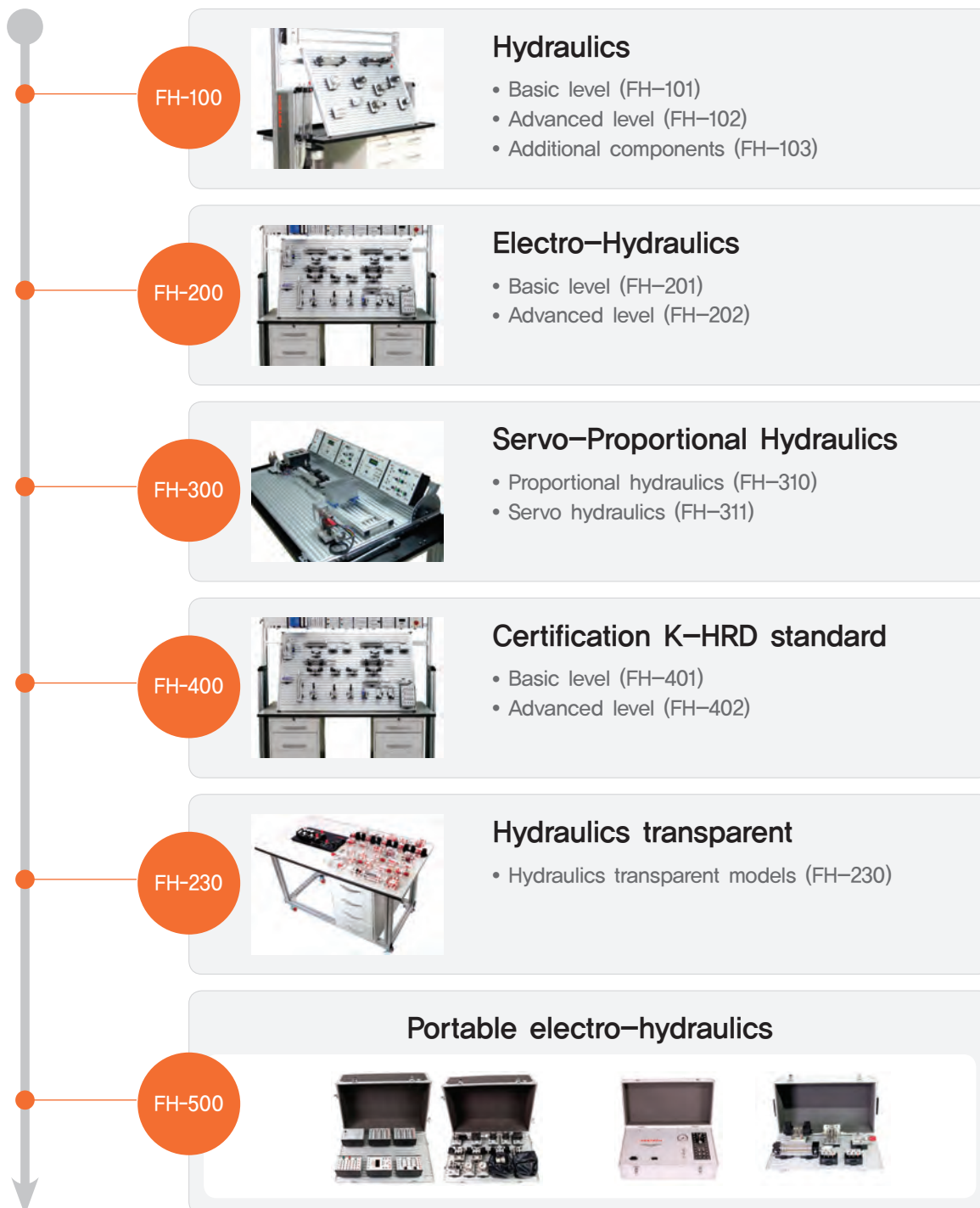
## HYDRAULICS TRAINING SET

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# HYDRAULICS TRAINING SET



## Introduction

Hydraulics are often used in the machine tools of heavy industry for the high power generated and the ability to realize high precision position control with non-compressed fluid.

The FESTECH hydraulics training set is composed of industrial parts which are used in real applications. They are specially developed to prevent leakage of oil with Non-Leakage Quick Coupling connector and can be used in both basic and advanced hydraulics training courses.

Proportional hydraulic control and servo hydraulic control are also supported.



# Hydraulics training set, basic level (FH-101)



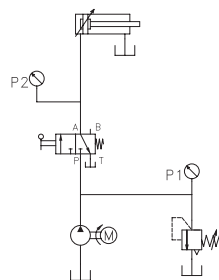
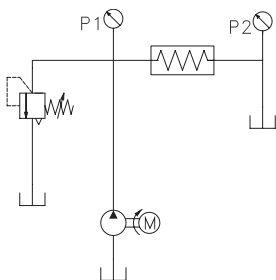
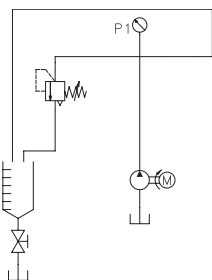
## Training content

- Application of hydraulics
- Physical principles of hydraulics
- Hydraulic symbols and standards
- Types and properties of hydraulics fluids
- Measurement and calculation the characteristic curve of a hydraulic pump
- Measurement of the characteristic curve of a pressure relief valve
- Characteristic curve of a flow control valve
- Flow control valves, directional control valves, non-return valve
- Measurement of times and pressures during advancing and retracting of a cylinder
- Calculations of force and speed
- Basic circuits with single and double acting cylinders
- Difference between pressure relief valves and pressure regulators
- Using 4/3-way valves with different mid-positions
- Using the flow control valve in adjusting the speed
- Design and operation of a differential circuit
- Usage of pilot operated non-return valves
- Commissioning and maintenance of hydraulic system

## Recommended items

Component	Order number
Hydraulic basic working table (single side)	14006
H-Lab simulation software	40006
Hydraulics text book	42053

Component	Order number
Hydraulics work book, basic level	42047
Magnetic symbol (pneumatics and hydraulics)	13501





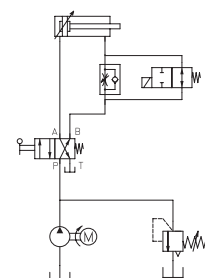
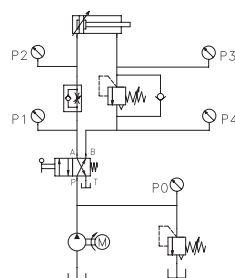
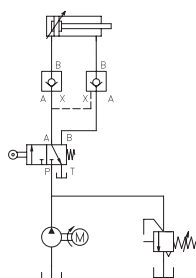
## Hydraulics training set, basic level (FH-101)

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	Power unit 1 Pump	15010	1
3	Power unit overload protector	15019	1
4	Flow measuring unit	15020	1
5	Weight	15022	1
6	Double-acting cylinder	15031	1
7	Hydraulic motor	15035	1
8	Transparent double-acting cylinder	15039	1
9	4/2-way hand lever valve	15040	1
10	4/3-way hand lever valve (ABT connecte)	15042	1
11	4/3-way hand lever valve (PT connected)	15043	1
12	Pressure relief valve (directly actuated)	15050	2
13	Pressure relief valve (pilot actuated)	15051	1
14	Counter balancing valve	15056	1
15	3-way pressure reducing valve	15052	1

No.	Component	Order number	Qty
16	Shut-off valve	15063	1
17	Flow control valve	15060	1
18	One-way flow control valve	15061	1
19	Flow control valve (pressure compensative)	15053	1
20	Check valve (1bar)	15064	3
21	Pilot actuated check valve	15062	1
22	Pressure gauge	15070	3
23	Pressure gauge with distributor	15071	2
24	T connector	15066	2
25	Accumulator	15080	1
26	Hose 1500mm	15090	2
27	Hose 1000mm	15091	6
28	Hose 600mm	15092	10
29	Hydraulic hose hanger	15093	1
30	Pressure remover	15099	1

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## Hydraulics training set, advanced level (FH-102)

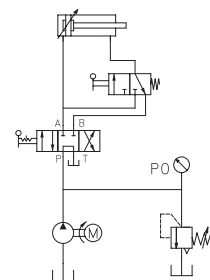
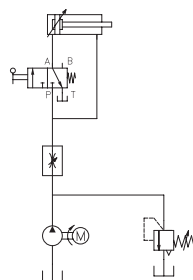
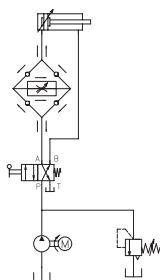


### Training contents

- Application of hydraulics
- Physical principles of hydraulics
- Hydraulic symbols and standards
- Types and properties of hydraulics fluids
- Measurement and calculation of the characteristic curve of a hydraulic pump
- Measurement of the characteristic curve of a pressure relief valve
- Characteristic curve of a flow control valve
- Flow control valves, directional control valves, non-return valve
- Measurement of times and pressures during advancing and retracting of a cylinder
- Calculations for force and speed
- Basic circuits with single and double acting cylinders
- Difference between pressure relief valves and pressure regulators
- Using 4/3-way valves with different mid-positions
- Using the flow control valve in adjusting the speed
- Design and operation of a differential circuit
- Usage of pilot operated non-return valves
- Commissioning and maintenance of hydraulic system
- Pressure sequence control
- Counter balance circuit for tractive loads
- Usage of hydraulic motors
- Rapid feed with various directional valves, flow control valves
- Synchronous control of forward and return strokes
- Bypass flow control
- Function and usage of a flow dividing valve
- Synchronous control of two cylinders with flow dividing valve
- Design and use the rectifier circuit
- Configuration and description of a sequence control with two cylinders
- Circuits with hydraulic accumulator

### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14006
H-Lab simulation software	40006
Hydraulics text book	42053
Hydraulics work book, basic level	42047
Hydraulics work book, advanced level	42048
Magnetic symbol (pneumatics and hydraulics)	13501



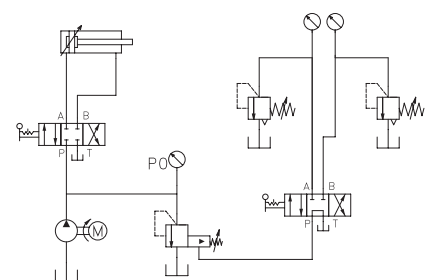
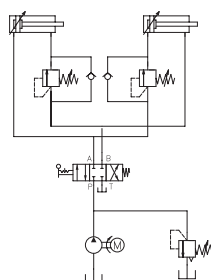
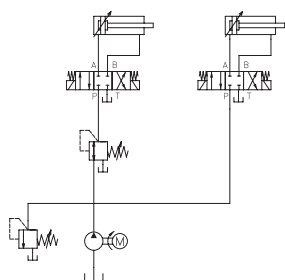
# Hydraulics training set, advanced level (FH-102)

## Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Transparent double-acting cylinder	15039	1
6	Double-acting cylinder	15031	1
7	Weight	15022	1
8	Hydraulic motor	15035	1
9	Flow meter	18021	1
10	Measuring display unit	18018	1
11	3/2-way hand lever valve	15037	1
12	4/2-way hand lever valve	15040	1
13	4/3-way hand lever valve (PABT blocked)	15041	1
14	4/3-way hand lever valve (ABT connected)	15042	1
15	4/3-way hand lever valve (PT connected)	15043	1
16	2/2-way limit valve	15049	1
17	Cylinder guide	15024	1
18	Pressure relief valve (directly actuated)	15050	2
19	Pressure relief valve (pilot actuated)	15051	1
20	3-way pressure reducing valve	15052	1

No.	Component	Order number	Qty
21	Counter balancing valve	15056	1
22	Shut-off valve	15063	1
23	Flow control valve	15060	1
24	One-way flow control valve	15061	2
25	Flow control valve (pressure compensative)	15053	1
26	Flow dividing valve	15054	1
27	Check valve (1bar)	15064	3
28	Check valve (5bar)	15065	1
29	Pilot actuated check valve	15062	1
30	Pressure gauge	15070	3
31	Pressure gauge with distributor	15071	3
32	T connector	15066	4
33	Accumulator	15080	1
34	Hose 1500mm	15090	2
35	Hose 1000mm	15091	6
36	Hose 600mm	15092	12
37	Hydraulic hose hanger	15093	1
38	Pressure remover	15099	1
39	Pressure sequence valve	15101	1

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## Additional hydraulics control module (FH-103)

							
Double-acting cylinder with brake	15032	Double-acting cylinder(16-10-200)	15033	Double-acting cylinder(16-10-300)	15034	Cylinder cover	15100
							
2/2-way hand lever valve	15036	3/2-way hand lever valve	15037	Pressure relief valve (externally actuated)	15055	Pressure sequence valve	15101
							
Inline flow meter	15072	Pipe resistor 1	15201	Pipe resistor 2	15202	Pipe resistor 3	15203
							
2-way pressure reducing valve	15102	Flow control valve (cam operated)	16021	Cross axial transparent block	15081	Orifice transparent block	15082
							
Transparent pump (manually operated)	15083	Measurement display unit	18018	Flow meter	18021		

## Additional hydraulics control module (FH-103)

### Component

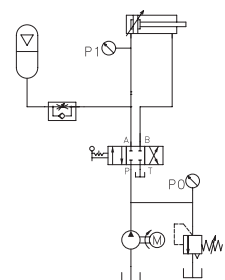
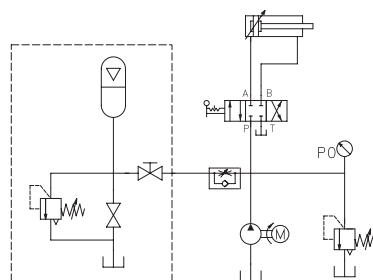
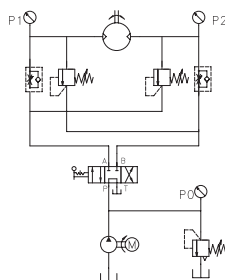
No.	Component	Order number	Qty
1	Double-acting cylinder with brake	15032	1
2	Double-acting cylinder	15033	1
3	Double-acting cylinder	15034	1
4	Cylinder cover	15100	1
5	2/2way valve	15036	1
6	3/2way valve	15037	1
7	Pressure relief valve (externally actuated)	15055	1
8	Pressure sequence valve	15101	1
9	Inline flow meter	15072	1
10	Pipe resister 1	15201	1

No.	Component	Order number	Qty
11	Pipe resister 2	15202	1
12	Pipe resister 3	15203	1
13	2-way pressure reducing valve	15102	1
14	Cam operating pressure reducing valve	16021	1
15	Cross axial transparent block	15081	1
16	Orifice transparent block	15082	1
17	Transparent pump (manually operated)	15083	1
18	Measuring display unit	18018	1
19	Flow meter	18021	1

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### Recommended items

Component	Order number
H-Lab simulation software	40006
Hydraulics text book	42053
Hydraulics work book, basic level	42047
Hydraulics work book, advanced level	42048



## Electro-hydraulics training set, basic level (FH-201)



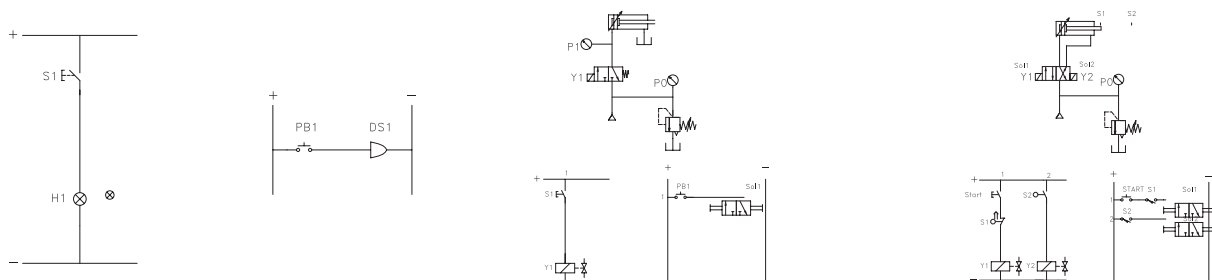
### Training contents

- Function of electrical push-button switches and limit switches
- Function and use of hydraulic solenoid valves
- Design and mode of operation of a relay
- Recognizing and reading of electrical and hydraulic diagrams
- Design, construction and operation of basic circuits
- Selecting solenoid valves according to the technical control requirements
- Using and designing of basic logic functions
- Direct and indirect control of actuators
- Explaining and designing an electric latching circuit
- Electrically a locking of signals in a relay control system
- Manual and automatic operation
- Interlocking circuits
- Rapid traverse circuits
- Use a pressure switch
- Fault finding in electro-hydraulic control system

### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
H-Lab simulation software	40006
Electro-hydraulics text book	42054
Electro-hydraulics work book, basic level	42049

Component	Order number
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electrics)	13502
Cable hanger	13091





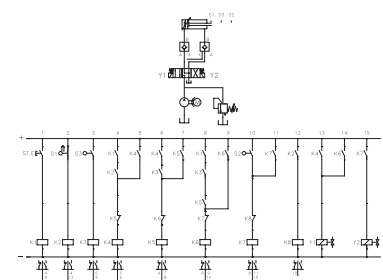
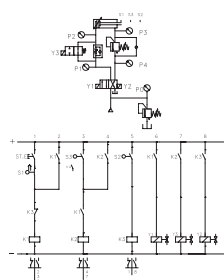
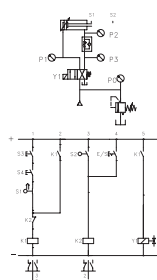
## Electro-hydraulics training set, basic level (FH-201)

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Transparent double-acting cylinder	15039	1
6	Double-acting cylinder	15031	1
7	Weight	15022	1
8	Hydraulic motor	15035	1
9	Pressure relief valve (directly actuated)	15050	2
10	One-way flow control valve	15061	2
11	Flow control valve (pressure compensative)	15053	1
12	Check valve (1bar)	15064	1
13	Pilot actuated check valve	15062	1
14	Pressure gauge	15070	3
15	Pressure gauge with distributor	15071	2
16	T connector	15066	2
17	Hose 1500mm	15090	2
18	Hose 1000mm	15091	4
19	Hose 600mm	15092	8

No.	Component	Order number	Qty
20	Hydraulic hose hanger	15093	1
21	Pressure remover	15099	1
22	3/2-way solenoid valve	16011	1
23	4/2-way solenoid valve	16012	1
24	4/2-way double solenoid valve	16013	1
25	4/3-way double solenoid valve (PABT blocked)	16014	1
26	4/3-way double solenoid valve (PT connected)	16016	1
27	Power supply	13090	1
28	Pressure switch	16020	1
29	Push-button switch set (3-fold)	13033	1
30	Pilot lamp & buzzer unit	13034	1
31	Relay unit (3-fold)	13030	2
32	Digital time relay	13031	1
33	Electric limit switch (left)	13051	2
34	Electric limit switch (right)	13052	2
35	Inductive sensor	13040	1
36	Capacitive sensor	13041	1
37	Optical sensor	13042	1
38	Cable set	13080	1

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## Electro-hydraulics training set, advanced level (FH-202)

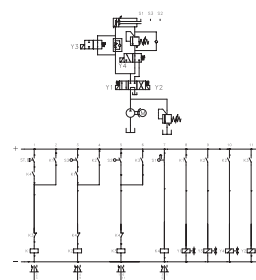
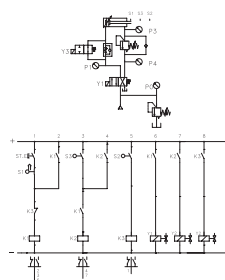
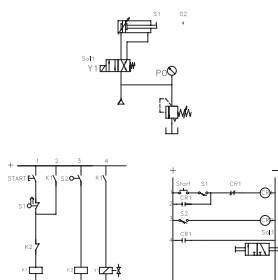


### Training contents

- Function of electrical pushbuttons switches and limit switches
- Function and use of hydraulic solenoid valves
- Design and mode of operation of a relay
- Recognizing and reading of electrical and hydraulic diagrams
- Design, construction and operation of basic circuits
- Selecting solenoid valves according to the technical control requirements
- Using and designing of basic logic functions
- Direct and indirect control of actuators
- Explaining and designing of an electric latching circuit
- Electrically a locking of signals in a relay control system
- Manual and automatic operation
- Interlocking circuits
- Rapid traverse circuits
- Using of a pressure switch
- Fault finding in electro-hydraulic control system
- Function and use of electric sensors
- Comprehensive sequence controls
- Combined position and pressure-dependent controls
- Electrical controls with several actuators
- Sequence controls with peripheral conditions
- Controls with on-delay and off-delay time relays
- Creating sequence control as a displacement-step diagram
- Single cycle and continuous cycle
- Counter control with preset counter
- Manual/automatic, Emergency Stop
- Using of different proximity sensors
- Identifying signal overlaps in a sequence control and taking the appropriate action

### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
H-Lab simulation software	40006
Electro-hydraulics text book	42054
Electro-hydraulics work book, basic level	42049
Electro-hydraulics work book, advanced level	42050
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electronics)	13502
Cable hanger	13091

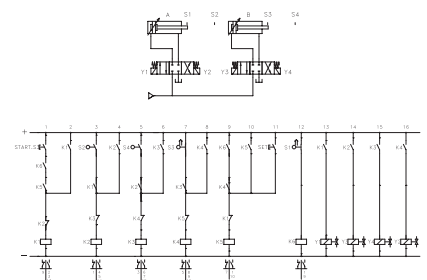
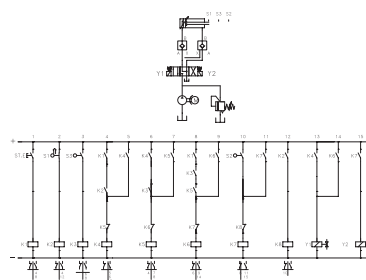
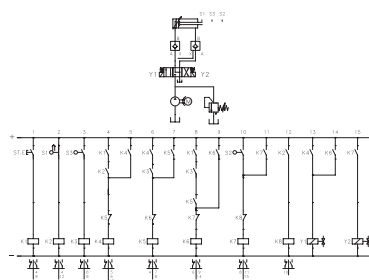


## Electro-hydraulics training set, advanced level (FH-202)

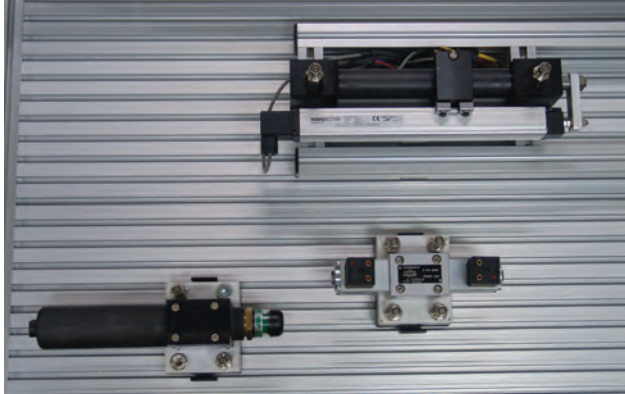
## Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Transparent double-acting cylinder	15039	1
6	Double-acting cylinder	15031	2
7	Weight	15022	1
8	Hydraulic motor	15035	1
9	Pressure relief valve (directly actuated)	15050	2
10	Pressure relief valve (pilot actuated)	15051	1
11	3-way pressure reducing valve	15052	1
12	Counter balancing valve	15056	1
13	Flow control valve	15060	1
14	One-way flow control valve	15061	2
15	Flow control valve (pressure compensative)	15053	1
16	Flow dividing valve	15054	1
17	Check valve (1bar)	15064	1
18	Check valve (5bar)	15065	1
19	Pilot actuated check valve	15062	2
20	Pressure gauge	15070	3
21	Pressure gauge with distributor	15071	3
22	T connector	15066	4
23	Accumulator	15080	1
24	Hose 1500mm	15090	2
25	Hose 1000mm	15091	8

No.	Component	Order number	Qty
26	Hose 600mm	15092	10
27	Hydraulic hose hanger	15093	1
28	Pressure remover	15099	1
29	2/2-way solenoid valve (Normally closed)	16010	1
30	3/2-way solenoid valve	16011	1
31	4/2-way solenoid valve	16012	2
32	4/2-way double solenoid valve	16013	1
33	4/3-way double solenoid valve (PABT blocked)	16014	1
34	4/3-way double solenoid valve (ABT connected)	16015	1
35	4/3-way double solenoid valve (PT bypassed)	16016	1
36	Power supply	13090	1
37	Pressure switch	16020	1
38	Push-button switch set (3-fold)	13033	1
39	Pilot lamp & buzzer unit	13034	1
40	Relay unit (3-fold)	13030	3
41	Digital time relay	13031	1
42	Digital counter	13032	1
43	Emergency switch	13035	1
44	Electric limit switch (left)	13051	2
45	Electric limit switch (right)	13052	2
46	Inductive sensor	13040	1
47	Capacitive sensor	13041	1
48	Optical sensor	13042	1
49	Cable set	13080	1



## Proportional hydraulics training set (FH-310)



### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
Cable hanger	13091
H-Lab simulation software	40006

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Hydraulic distributor	15023	1
6	Double-acting cylinder	15031	1
7	Hydraulic motor	15035	1
8	Pressure relief valve (directly actuated)	15050	1
9	Flow control valve	15060	1
10	One-way flow control valve	15061	1
11	T connector	15066	2
12	Pressure gauge	15070	2
13	Pressure gauge with distributor	15071	2
14	Hose 1500mm	15090	2
15	Hose 1000mm	15091	4
16	Hose 600mm	15092	10
17	Hydraulic hose hanger	15093	1
18	Pressure remover	15099	1
19	4/2-way solenoid valve	16012	1
20	Relay unit (3-fold)	13030	1
21	Digital time relay	13031	1
22	Push-button switch set (3-fold)	13033	1
23	Pilot lamp & buzzer unit	13034	1

### Training contents

- Function and characteristics of proportional solenoid,
- Characteristics of the proportional pressure relief valve
- Characteristics of the 4/3-way proportional valve
- Characteristics and function of the proportional amplifier
- Basic circuits with proportional directional control and pressure valves
- Setting the basic current, step current and maximum current
- Setting ramp times
- Measurements and calculations:
- Measuring of pressure, volumetric flow and time
- Designing and commissioning control systems
- Controlling pressure and speed
- Getting to know the various pressure control system
- Calculating the flow for proportional directional control valves
- Load-independent feed speed
- Fault finding of the proportional hydraulic control system
- If you already have electro-hydraulics training set, we recommend you to purchase only the component No. 32~46 from the list below.

No.	Component	Order number	Qty
24	Inductive sensor	13040	1
25	Capacitive sensor	13041	1
26	Optical sensor	13042	1
27	Electric limit switch (left)	13051	1
28	Electric limit switch (right)	13052	1
29	Cable set	13080	1
30	Power supply	13090	1
31	Double-acting cylinder	15033	1
32	Set point control module	18001	1
33	Proportional amplifier	18002	1
34	Comparator module	18003	1
35	Linear potentiometer	18004	1
36	Linear potentiometer guide	18005	1
37	Proportional pressure relief valve	18006	1
38	4/3-way proportional control valve	18007	1
39	Pressure filter	18008	1
40	Pressure compensation valve	18009	1
41	PID module	18010	1
42	Measurement display unit	18018	1
43	Pressure sensor	18019	1
44	Temperature sensor	18020	1
45	Flow meter	18021	1
46	Digital multimeter	21012	1

## Servo-hydraulics training set (FH-311)



### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
Cable hanger	13091

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Hydraulic distributor	15023	1
6	Double-acting cylinder	15031	1
7	Hydraulic motor	15035	1
8	Pressure relief valve (directly actuated)	15050	1
9	Shut-off valve	15063	1
10	T connector	15066	2
11	Pressure gauge	15070	2
12	Pressure gauge with distributor	15071	2
13	Hose 1500mm	15090	2
14	Hose 1000mm	15091	4
15	Hose 600mm	15092	10
16	Hydraulic hose hanger	15093	1
17	Pressure remover	15099	1
18	Push-button switch set (3-fold)	13033	1

### Training contents

- Determining the necessary signal transmitters
- Designing the electric signal control system
- Structuring and commissioning the proportional hydraulic control system
- Construction and function of hydraulic components for load compensation
- Function of electronic modules for the adaption of sensor signals
- Time-dependent control system with hydraulic motor
- Speed control of cylinders without limit switch
- Determining characteristics curves and characteristics of different sensors
- Creating characteristic curves for displacement, pressure and temperature sensors
- Measuring displacement, time, pressure and temperature
- Further signal processing of analogue signals
- Controlling pressure, speed, acceleration, delay and position
- Designing and commissioning proportional hydraulic control systems
- Implementing oscillating movements for a cylinder
- If you already have electro-hydraulics training set, we recommend you to purchase only the component No. 22~36 from the list below.

No.	Component	Order number	Qty
19	Cable set	13080	1
20	Power supply	13090	1
21	Double-acting cylinder	15033	1
22	Set point control module	18001	1
23	Linear potentiometer	18004	1
24	Linear potentiometer guide	18005	1
25	Pressure filter	18008	1
26	PID module	18010	1
27	Status controller	18011	1
28	4/3-way servo valve	18012	1
29	Weight test unit	18015	1
30	Weight, 5Kg (A)	18016	1
31	Weight, 5Kg (B)	18017	1
32	Measurement display unit	18018	1
33	Pressure sensor	18019	1
34	Temperature sensor	18020	1
35	Flow meter	18021	1
36	Digital multimeter	21012	1

## Hydraulic K–HRD set, basic level (FH–401)

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Transparent double-acting cylinder	15039	1
6	Double-acting cylinder	15031	1
7	Weight	15022	1
8	Hydraulic motor	15035	1
9	Flow meter	18021	1
10	Measurement display unit	18018	1
11	4/2-way hand lever valve	15040	1
12	4/3-way hand lever valve (PABT blocked)	15041	1
13	4/3-way hand lever valve (ABT connected)	15042	1
14	4/3-way hand lever valve (PT connected)	15043	1
15	2/2-way limit valve	15049	1
16	Cylinder guide	15024	1
17	Pressure relief valve (directly actuated)	15050	2
18	Pressure relief valve (directly actuated)	15051	1
19	Pressure relief valve (pilot actuated)	15052	1
20	Counter balancing valve	15056	1
21	Shut-off valve	15063	1
22	Flow control valve	15060	1
23	One-way flow control valve	15061	2
24	Flow control valve (pressure compensative)	15053	1
25	Flow dividing valve	15054	1
26	Check valve (1bar)	15064	3
27	Check valve (5bar)	15065	1
28	Pilot actuated check valve	15062	1
29	Pressure gauge	15070	3

No.	Component	Order number	Qty
30	Pressure gauge with distributor	15071	3
31	T connector	15066	4
32	Accumulator	15080	1
33	Hose 1500mm	15090	2
34	Hose 1000mm	15091	6
35	Hose 600mm	15092	12
36	Hydraulic hose hanger	15093	1
37	Pressure remover	15099	1
38	3/2-way solenoid valve	16011	1
39	4/2-way solenoid valve	16012	1
40	4/2-way double solenoid valve	16013	1
41	4/3-way double solenoid valve (PABT blocked)	16014	1
42	4/3-way double solenoid valve (ABT connected)	16015	1
43	4/3-way double solenoid valve (PT bypassed)	16016	1
44	Power supply	13090	1
45	Push-button switch set (3-fold)	13033	1
46	Pilot lamp & buzzer unit	13034	1
47	Relay unit (3-fold)	13030	3
48	Digital time relay	13031	1
49	Digital counter	13032	1
50	Emergency switch	13035	1
51	Electric limit switch (left)	13051	2
52	Electric limit switch (right)	13052	2
53	Pressure switch	16020	1
54	Inductive sensor	13040	1
55	Capacitive sensor	13041	1
56	Optical sensor	13042	1
57	Cable set	13080	1

### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
H–Lab simulation software	40006
Hydraulics text book	42053
Hydraulics work book, basic level	42047
Electro–hydraulics text book	42054

Component	Order number
Electro–hydraulics work book, basic level	42049
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electrics)	13502
Cable hanger	13091



## Hydraulic K-HRD set, advanced level (FH-402)

### Component

No.	Component	Order number	Qty
1	Oil tray	14011	1
2	POWER UNIT 1 PUMP	15010	1
3	POWER UNIT overload protector	15019	1
4	Flow measuring unit	15020	1
5	Hydraulic distributor	15023	1
6	Single-acting cylinder	15030	1
7	Transparent double-acting cylinder	15039	1
8	Double-acting cylinder	15031	2
9	Cylinder cover	15100	1
10	Weight	15022	1
11	Hydraulic motor	15035	1
12	Flow meter	18021	1
13	Measuring display unit	18018	1
14	3/2- way hand lever valve	15037	1
15	4/2-way hand lever valve	15040	1
16	4/3-way hand lever valve (PABT blocked)	15041	1
17	4/3-way valve (ABT connected)	15042	1
18	4/3-way valve (PT bypassed)	15043	1
19	2/2-way limit valve	15049	1
20	Cylinder guide	15024	1
21	Pressure relief valve (directly actuated)	15050	2
22	Pressure relief valve (pilot actuated)	15051	1
23	3-way pressure reducing valve	15052	1
24	Counter balancing valve	15056	1
25	Pressure sequence valve	15101	1
26	Pressure relief valve (externally actuated)	15055	1
27	Shut-off valve	15063	1
28	Flow control valve	15060	1
29	One-way flow control valve	15061	2
30	Flow control valve (pressure compensative)	15053	1
31	Flow dividing valve	15054	1
32	Check valve (1bar)	15064	3

No.	Component	Order number	Qty
33	Check valve (5bar)	15065	1
34	Pilot actuated check valve	15062	1
35	Pressure gauge	15070	3
36	Pressure gauge with distributor	15071	3
37	T connector	15066	4
38	Accumulator	15080	1
39	Hose 1500mm	15090	2
40	Hose 1000mm	15091	8
41	Hose 600mm	15092	12
42	Hydraulic hose hanger	15093	1
43	Pressure remover	15099	1
44	2/2-way solenoid valve (Normally closed)	16010	1
45	3/2-way solenoid valve	16011	1
46	4/2-way solenoid valve	16012	2
47	4/2-way double solenoid valve	16013	1
48	4/3-way double solenoid valve (PABT blocked)	16014	1
49	4/3-way double solenoid valve (ABT connected)	16015	1
50	4/3-way double solenoid valve (PT bypassed)	16016	1
51	Power supply	13090	1
52	Push-button switch set (3-fold)	13033	1
53	Pilot lamp & buzzer unit	13034	1
54	Relay unit (3-fold)	13030	4
55	Digital time relay	13031	1
56	Digital counter	13032	1
57	Emergency switch	13035	1
58	Electric limit switch (left)	13051	2
59	Electric limit switch (right)	13052	2
60	Pressure switch	16020	1
61	Inductive sensor	13040	1
62	Capacitive sensor	13041	1
63	Optical sensor	13042	1
64	Cable set	13080	1

### Recommended items

Component	Order number
Hydraulic basic working table (single side)	14007
H-Lab simulation software	40006
Hydraulics text book	42053
Hydraulics work book, basic level	42047
Hydraulics work book, advanced level	42048
Electro-hydraulics text book	42054

Component	Order number
Electro-hydraulics work book	42049
Electro-hydraulics work book, advanced level	42050
Magnetic symbol (pneumatics and hydraulics)	13501
Magnetic symbol (electronics)	13502
Cable hanger	13091

## Portable electro-hydraulics trainer (FH-500)



Order number : 16024



Order number : 16025

### Feature of the equipment

- Each case contains pump, electric modules, and hydraulics components so that user can carry and store them easily.
- All components can be attached in aluminum profile panel in case.

### Component

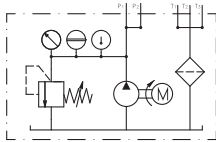
No.	Component	Qty
1	POWER UNIT 1 PUMP (Portable)	1
2	Aluminum case	2
3	Double-acting cylinder	1
4	Hydraulic motor	1
5	Pressure relief valve (pilot actuated)	1
6	Pressure relief valve (directly actuated)	1
7	One-way flow control valve	4
8	Flow control valve (pressure compensative)	1
9	Pilot actuated check valve	2
10	3-way pressure reducing valve	1
11	4/2-way solenoid valve	1
12	4/2-way double solenoid valve	1

No.	Component	Qty
13	4/3-way double solenoid valve	1
14	Pressure gauge with distributor	4
15	Hose 600mm	6
16	Hose 1000mm	4
17	Push-button switch set	1
18	Relay unit (3-fold)	2
19	Digital time relay	1
20	Digital counter	1
21	Electric limit switch (left)	1
22	Electric limit switch (right)	1
23	Cable set	1
24	Power supply	1

## Components

### POWER UNIT 1 PUMP

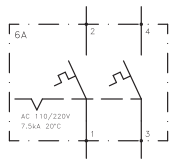
Order number : 15010



- Motor : AC 220, 1,5 KW, 12,3 A,
- Gear pump type
- Flow rate : 4 LPM
- Operating pressure : 5 ~ 60 bar
- Tank capacity : 30 ℓ
- Pressure gauge included
- Filter, level, temperature meter included

### POWER UNIT overload protector

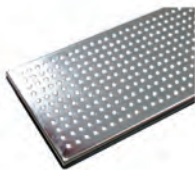
Order number : 15019



- POWER LED display
- One-touch clamp included
- Max. allowed current : 15A

### Oil tray

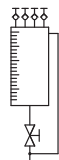
Order number : 14011



- Hydraulic table
- Material : Stainless Steel
- Press punching
- Size : 1500(L)x200(W)x20(H) mm

### Flow measuring unit

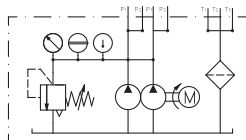
Order number : 15020



- Capacity : 2ℓ
- Hydraulics couplings : 4ea
- Inner pressure protector silencer : 1ea
- Flow limit sensor
- Hand lever valve attached

### POWER UNIT 2 PUMP

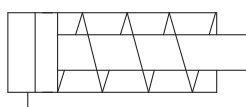
Order number : 15011



- Motor : 230V/50Hz 1,1kw, 7,2A
- Gear pump type : 2ea
- Operating pressure : 5 ~ 250 bar
- Tank capacity : 40 ℓ
- Pressure gauge : 2 ea
- Pressure relief valve : 2ea

### Single-acting cylinder

Order number : 15030



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Piston diameter : 25mm
- Piston rod diameter : 18mm
- Cylinder stroke : 200 mm

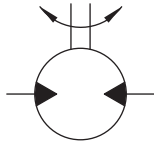
## Components

Double-acting cylinder(25-18-200)	Order number : 15031
	<ul style="list-style-type: none"> <li>● Pressure range : 0 ~ 120 bar</li> <li>● Operating pressure : 60 bar</li> <li>● Piston diameter : 25mm</li> <li>● Piston rod diameter : 18mm</li> <li>● Cylinder Stroke : 200 mm</li> <li>● Differential cylinder</li> <li>● Surface area ratio = 2,08 : 1</li> </ul>
Transparent double-acting cylinder	Order number : 15039
	<ul style="list-style-type: none"> <li>● Pressure range : 0 ~ 120 bar</li> <li>● Operating pressure : 40 bar</li> <li>● Piston diameter : 20mm</li> <li>● Piston rod diameter : 12mm</li> <li>● Cylinder Stroke : 200 mm</li> <li>● Surface area ratio = 1,56 : 1</li> </ul>
Double-acting cylinder(16-10-200)	Order number : 15033
	<ul style="list-style-type: none"> <li>● Pressure range : 0 ~ 120 bar</li> <li>● Operating pressure : 60 bar</li> <li>● Piston diameter : 16mm</li> <li>● Piston rod diameter : 10mm</li> <li>● Cylinder Stroke : 200 mm</li> <li>● Surface area ratio = 1,64 : 1</li> </ul>
Double-acting cylinder(16-10-300)	Order number : 15034
	<ul style="list-style-type: none"> <li>● Pressure range : 0 ~ 120 bar</li> <li>● Operating pressure : 60 bar</li> <li>● Piston diameter : 16mm</li> <li>● Piston rod diameter : 10mm</li> <li>● Cylinder Stroke : 300 mm</li> <li>● Surface area ratio = 1,64 : 1</li> </ul>
Double-acting cylinder with brake	Order number : 15032
	<ul style="list-style-type: none"> <li>● Pressure range : 0 ~ 120 bar</li> <li>● Operating pressure : 60 bar</li> <li>● Piston diameter : 25mm</li> <li>● Piston rod diameter : 18mm</li> <li>● Cylinder Stroke : 200 mm</li> <li>● Hand brake attached</li> </ul>
Cylinder cover	Order number : 15100
	<ul style="list-style-type: none"> <li>● Measuring scale : -300~250mm</li> <li>● Material : transparent polycarbonate</li> </ul>

## Components

### Hydraulic motor

Order number : 15035



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Operation : CW / CCW rotary
- Motor type : planetary gears(internal)
- Geometric displacement : 8,2 cc/rev
- Max. speed : 1950rpm

### Weight

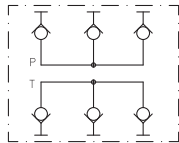
Order number : 15022



- Weight : 9 Kg
- diameter : 120mm
- Length : 120mm

### Hydraulic distributor

Order number : 15023

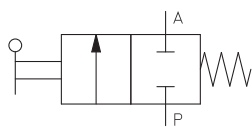


- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- 6 couplings for distribution

## Components

### 2/2-way hand lever valve

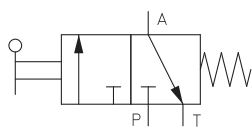
Order number : 15036



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### 3/2-way hand lever valve

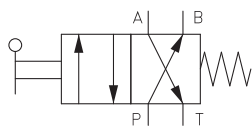
Order number : 15037



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### 4/2-way hand lever valve

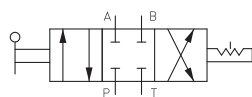
Order number : 15040



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### 4/3-way hand lever valve (PABT blocked)

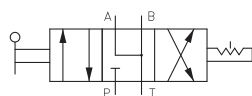
Order number : 15041



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- PABT blocked type

### 4/3-way hand lever valve (ABT connected)

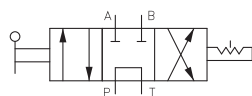
Order number : 15042



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- ABT connected type

### 4/3-way hand lever valve (PT connected)

Order number : 15043



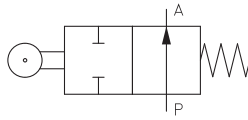
- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- PT bypassed type



## Components

### 2/2-way valve

Order number : 15049



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Stem operated valve
- Normally open valve
- Use with cylinder guide (ON, 15024)

### Cylinder guide

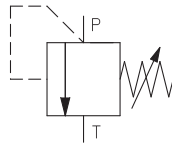
Order number : 15024



- Attached on hydraulic cylinder
- Use with 2/2-way limit valve (ON,15049)

### Pressure relief valve (directly actuated)

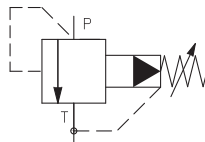
Order number : 15050



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### Pressure relief valve (pilot actuated)

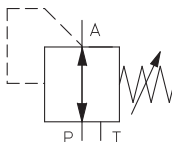
Order number : 15051



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### 3-way pressure reducing valve

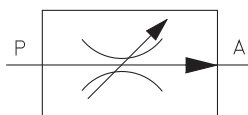
Order number : 15052



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### Flow control valve (pressure compensative)

Order number : 15053

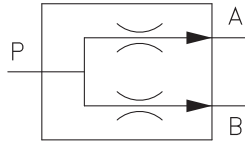


- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- 2-way flow control valve
- Pressure balance function

## Components

### Flow dividing valve

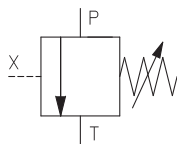
Order number : 15054



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Pressure balance function
- Dividing rate A : B = 50 : 50

### Pressure relief valve (externally actuated)

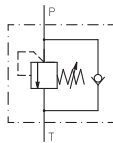
Order number : 15055



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- External pilot actuated

### Counter balancing valve

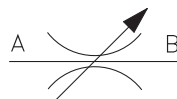
Order number : 15056



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- External pilot connection
- External drain

### Flow control valve

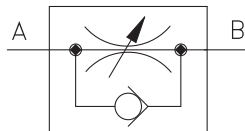
Order number : 15060



- Pressure range : 0 ~ 120 bar
- Flow rate : 10 LPM
- Operating pressure : 60 bar
- Manual override

### One-way flow control valve

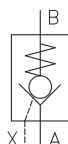
Order number : 15061



- Pressure range : 0 ~ 120 bar
- Flow rate : 10 LPM
- Check valve pressure : 1 bar
- Operating pressure : 60 bar
- Manual override

### Pilot actuated check valve

Order number : 15062

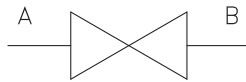


- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Pilot operation

## Components

### Shut-off valve

Order number : 15063



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### Check valve (1 Bar)

Order number : 15064



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Check pressure : 1 bar

### Check valve (5 Bar)

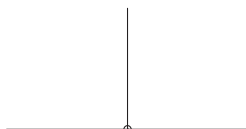
Order number : 15065



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Check pressure : 5 bar

### T connector

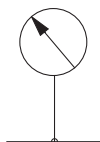
Order number : 15066



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar

### Pressure gauge

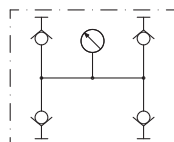
Order number : 15070



- Pressure range : 0 ~ 100 bar
- Precision : 1,6%
- Glycerin filling
- Operating fluid : hydraulic oil
- Gauge diameter : 60 mm

### Pressure gauge with distributor

Order number : 15071

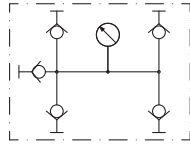


- Pressure range : 0 ~ 100 bar
- Precision : 1,6%
- Glycerin filling
- Operating fluid : hydraulic oil
- Gauge diameter : 60 mm
- Distribution connector : 4ea

## Components

### Pressure gauge with distributor (5Port)

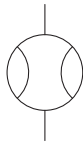
Order number : 15073



- Pressure range : 0 ~ 100 bar
- Precision : 1,6%
- Glycerin filling
- Operating fluid : hydraulic oil
- Gauge diameter : 60 mm
- Distribution connector : 5ea

### Inline flow meter

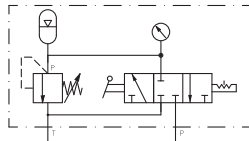
Order number : 15072



- Operating pressure : Max, 240 bar
- Flow range : 1 ~ 8 LPM
- Measuring accuracy : 25% over
- mid-scale : 4% FSD
- Repeatability :  $\pm 1\%$  of full scale
- Input connector : Female
- Output connector : Male

### Accumulator

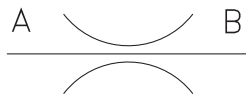
Order number : 15080



- Filling gas : nitrogen
- Gas filling pressure : 10 bar
- Volume : 0.5ℓ
- Manual override
- Max, pressure : 120 bar

### Choke axial transparent block

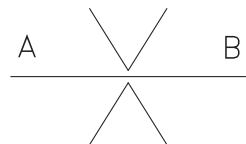
Order number : 15081



- Pressure range : 0 ~ 70 bar
- Operating pressure : 60 bar
- Diameter : 1mm
- Length : 15mm
- Transparent block

### Orifice transparent block

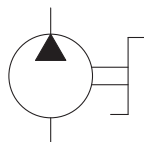
Order number : 15082



- Pressure range : 0 ~ 70 bar
- Operating pressure : 60 bar
- Diameter : 1mm
- Length : 2mm
- Transparent block

### Transparent pump (manually operated)

Order number : 15083



- Gear pump
- Manual override pumping type
- Transparent block

## Components

Hose 1500 mm

Order number : 15090



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Temperature : -40°C ~ 125°C
- Min. flexibility : 80mm

Hose 1000 mm

Order number : 15091



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Temperature : -40°C ~ 125°C
- Min. flexibility : 80mm

Hose 600 mm

Order number : 15092



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Temperature : -40°C ~ 125°C
- Min. flexibility : 80mm

Hydraulic hose hanger

Order number : 15093



- Capacity : 30 hoses
- Material : Steel

Pressure remover

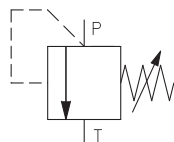
Order number : 15099



- Remove the remaining pressure
- Manual override

Pressure sequence valve

Order number : 15101

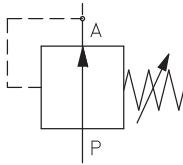


- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

## Components

### 2-way pressure reducing valve

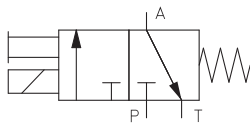
Order number : 15102



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override

### Shuttle valve

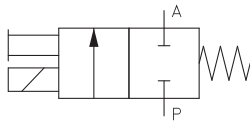
Order number : 15103



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- OR function

### Pressure compensative flow control valve (3-way)

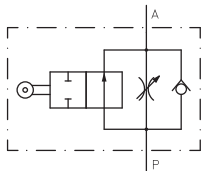
Order number : 15104



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Manual override
- 3-way flow control valve
- Pressure balance function

### Flow control valve (cam operated)

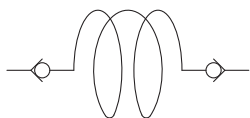
Order number : 16021



- Operating input range : 0~120bar
- Operating pressure : 60bar
- Cam operating

### Pipe resister 1

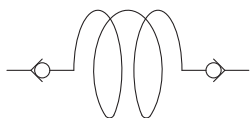
Order number : 15201



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- $\phi$  1,6-1700mm
- Material : steel pipe

### Pipe resister 2

Order number : 15202



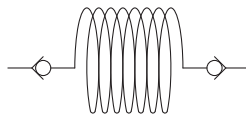
- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- $\phi$  3,2-1700mm
- Material : steel pipe



## Components

Pipe resister 3

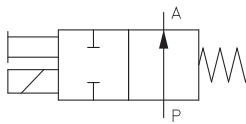
Order number : 15203



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- $\Phi$  1,6–3400mm
- Material : steel pipe

2/2–way solenoid valve (Normally open)

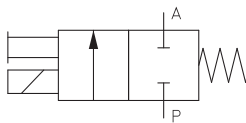
Order number : 16009



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- Power : DC 24V
- LED and protection circuit included

2/2–way solenoid valve (Normally close)

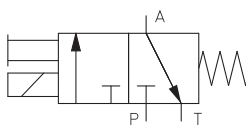
Order number : 16010



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- Power : DC 24V
- LED and protection circuit included

3/2–way solenoid valve

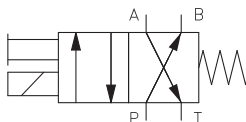
Order number : 16011



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- Power : DC 24V
- LED and protection circuit included

4/2–way solenoid valve

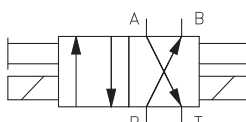
Order number : 16012



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- Power : DC 24V
- LED and protection circuit included

4/2–way double solenoid valve

Order number : 16013

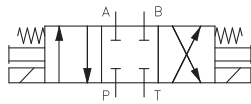


- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- Power : DC 24V
- LED and protection circuit included

## Components

### 4/3-way double solenoid valve (PABT blocked)

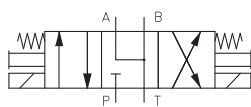
Order number : 16014



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- PABT blocked (All blocked)
- Power : DC 24V
- LED and protection circuit included

### 4/3-way double solenoid valve (ABT connected)

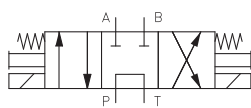
Order number : 16015



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- ABT connected
- Power : DC 24V
- LED and protection circuit included

### 4/3-way double solenoid valve (PT bypassed)

Order number : 16016



- Pressure range : 0 ~ 120 bar
- Operating pressure : 60 bar
- Power consumption : 27W
- PT bypassed type
- Power : DC 24V
- LED and protection circuit included

### Relay unit (3-fold)

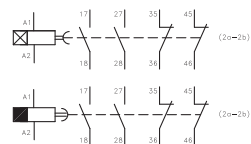
Order number : 13030



- Power : DC 24V
- Contact : 4 C – contact
- Contact load : Max, 5A
- Allowable : Max, 120W
- Operating time : < 20 ms
- Block time : < 20 ms

### Digital time relay

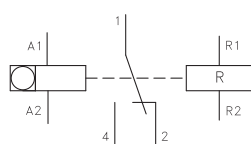
Order number : 13031



- Power : DC 24V
- Contact : 2a-2b
- Contact load : Max, 5A
- Allowable : Max, 100W
- Delay time : 1~99 sec
- On-delay / Off-delay

### Digital counter

Order number : 13032

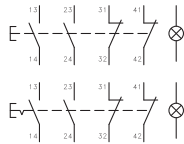


- Power : DC 24V
- Contact : 1 C – contact
- Contact load : Max, 5A
- Power consumption : 2.4W
- Counter pulse : 20 ms
- Display : 4 digit

## Components

### Push-button switch set

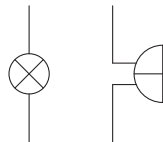
Order number : 13033



- Power : DC 24V
- Consist of : 2 push-buttons, 1 locking push-button
- Contact : 2 a-contact, 2 b-contact
- Contact allowable : Max, 1A
- Power consumption : 0.48W

### Pilot lamp & buzzer unit

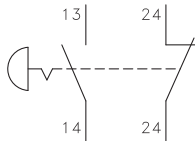
Order number : 13034



- Power : DC 24V
- Lamp power consumption : 1.2W
- Buzzer power consumption : 0.04W
- Buzzer frequency : 420W

### Emergency switch

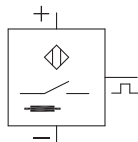
Order number : 13035



- Power : DC 24V
- Type : mushroom locking button
- Contact : 1a, 1b
- Contact load : Max, 8A

### Inductive sensor

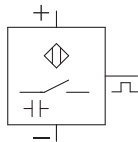
Order number : 13040



- Switching power : DC10~30V
- Switching distance : 5mm
- Switching frequency : Max, 500Hz
- Output contact : Normally open contact, PNP
- Output current : Max, 200mA
- Protection circuit included

### Capacitive sensor

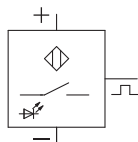
Order number : 13041



- Switching power : DC10~30V
- Switching distance : 8mm
- Switching frequency : Max, 50Hz
- Output contact : Normally open contact, PNP
- Output current : Max, 200mA
- Switching capacity : 4.8W
- Protection circuit included


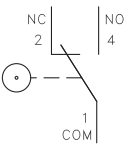

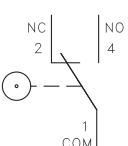



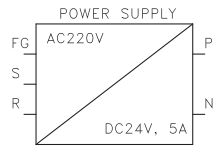

### Optical sensor

Order number : 13042



- Switching power : DC10~30V
- Switching distance : 100mm
- Response time : 1ms
- Output contact : Normally open contact, PNP
- Output current : Max, 200mA
- Protection circuit included

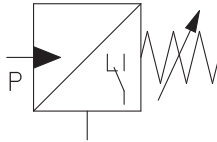
Components

Electric limit switch (left)		Order number : 13051
		<ul style="list-style-type: none"><li>● Contact : DC 24V, 5A</li><li>● Contact : 1C</li><li>● Switching frequency : Max. 200Hz</li><li>● Roller lever electric switch</li></ul>
Electric limit switch (right)		Order number : 13052
		<ul style="list-style-type: none"><li>● Contact : DC 24V, 5A</li><li>● Contact : 1C</li><li>● Switching frequency : Max. 200Hz</li><li>● Roller lever electric switch</li></ul>
Cable set		Order number : 13080
		<ul style="list-style-type: none"><li>● Color : red, blue, black</li><li>● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm</li><li>● High elasticity and special coating</li></ul>
Cable set (safety socket)		Order number : 113080
		<ul style="list-style-type: none"><li>● Color : red, blue, black</li><li>● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm</li><li>● High elasticity and special coating</li><li>● Safety socket type</li></ul>
Power supply		Order number : 13090
		<ul style="list-style-type: none"><li>● Power : AC 220 V, 50/60Hz</li><li>● Output power : DC 24V</li><li>● Output current : 5A</li></ul>
Cable hanger		Order number : 13091
		<ul style="list-style-type: none"><li>● Round plate diameter : 400mm</li><li>● Height : 1100 ~ 1800mm adjustable type</li><li>● Castor : 5 ea</li><li>● Cable hanger : 16 holes</li></ul>

## Components

### Pressure switch

Order number : 16020



- Diaphragm switch
- Operating pressure : 10 ~ 70 bar
- hysteresis : 15%
- contact capacity : 5A
- Manual override

### Current measurement unit

Order number : 16022



- Current measuring unit
- Power : DC24V

### Voltage measurement unit

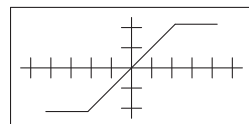
Order number : 16023



- Voltage measuring unit
- Power : DC24V

### Signal controller

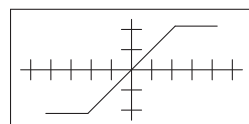
Order number : 26013



- Input range : 0~20mA, -10 ~ 10V
- Signal measuring function
  - Voltage : -10 ~ 10V
  - Current : 0~20mA
- Voltage control function
  - Selectable voltage controller
  - Voltage control (I) : 0 ~ DC10V
  - Voltage control (II) : -10 ~ DC10V
- Output signal : 0 ~ 10V, -10 ~ 10V
- Input, output select : toggle switch
- 4mm cable socket and terminal type
- Power : DC24V
- One-touch clamp
- Aluminum case

### Set point control module

Order number : 18001

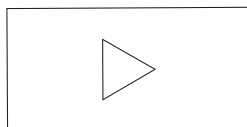


- Set point input : 3 (8 combination)
- Output : -10 V ~ +10 V
- Ramp time : 4 (0~10.0s/1V)
- Input operating voltage : Min. 15V
- Output frequency : 1 kHz

## Components

### Proportional amplifier

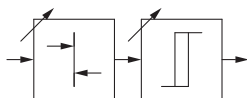
Order number : 18002



- Set point range :  $\pm 10$  V DC
- Switching signal range : 15~30V DC
- Output capacity : 0~1000mA
- Basic Current setting : 0~250mA
- Jump current setting : 0~250mA
- Max. current setting : 100~1000mA
- Dither frequency setting : 100~250Hz

### Comparator module

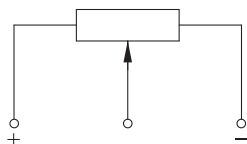
Order number : 18003



- 2 independent comparator
- Voltage range :  $-10\text{V} \sim +10\text{V}$
- Hysteresis range :  $0\text{V} \sim +5\text{V}$
- Input range :  $-10\text{V} \sim +10\text{V}$
- Input impedance range :  $>10 \text{ k Ohm}$
- Display precision :  $\pm 30\text{mV}$
- Contact load : 24V DC/2A

### Linear potentiometer

Order number : 18004



- Power :  $13 \sim 30 \text{ V DC}$
- Output voltage :  $0 \sim 10 \text{ V DC}$
- Range : 200mm
- Register :  $10\text{K}\Omega \pm 20\%$

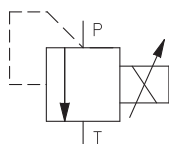
### Linear potentiometer guide

Order number : 18005



### Proportional pressure relief valve

Order number : 18006



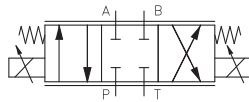
- Valve type : proportional pressure relief valve (directly operated)
- Operating type : proportional solenoid
- Pressure range : 100bar
- Min. flow rate : 0,1 LPM
- Max. flow rate : 20 LPM
- Resolution : 1mA
- Repeat precision :  $\leq 1\%$
- Hysteresis :  $\leq 2\%$



## Components

### 4/3-way proportional control valve

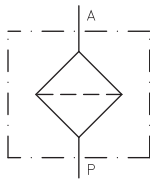
Order number : 18007



- Valve type : spool valve (directly actuated)
- Max. pressure : 250 bar
- Flow rate : 5 LPM
- Min. flow rate : 0.02 LPM
- Resolution : 1 mA
- Repeat precision :  $\leq 1\%$
- Hysteresis :  $\leq 2\%$

### Pressure filter

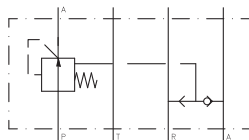
Order number : 18008



- Filter level :  $5 \mu\text{m}$
- Pressure range :  $0 \sim 120 \text{ bar}$
- Filter contamination indicator
- Cartridge pressure filter

### Pressure compensation valve

Order number : 18009



- Valve type : cartridge
- Flow rate : 8 LPM
- Pressure drop : 10bar
- Function : pressure balance (flow control)




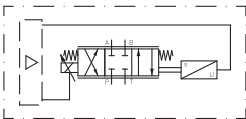



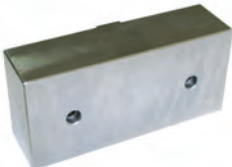

### PID module

Order number : 18010



- Indicating range :  $-10 \text{ V} \sim +10 \text{ V}$
- Input range voltage :  $-13\text{V} \sim +13\text{V}$
- Proportionality factor KP :  $0 \sim 1000$
- Integrating factor KI :  $0 \sim 1000 \text{ s}^{-1}$
- Integrating factor KD :  $0 \sim 1000\text{ms}$
- Output voltage :  $0 \sim +10\text{V}$ ,  $-10 \sim +10\text{V}$
- Offset range :  $5\text{V} \pm 3.5\text{V}(0 \sim 10\text{V})$   
 $0 \text{ V} \pm 7\text{V}(-10 \sim +10\text{V})$
- Component : power supply, differential input part, comparator, proportion controller, integration controller, differential controller, offset part, summer, limiter, output part

Components

Status controller		Order number : 18011
		<ul style="list-style-type: none"><li>● Indicating range : <math>-10\text{ V} \sim +10\text{ V}</math></li><li>● Position factor <math>K_x</math> : <math>0 \sim 10</math></li><li>● Speed factor <math>K_x</math> : <math>0 \sim 100\text{ms}</math></li><li>● Accelerometer coefficient <math>K_x</math> : <math>0 \sim 10\text{ s}^2</math></li><li>● Gain range : <math>0 \sim 1000</math></li><li>● Output voltage : <math>0 \sim +10\text{V}</math>, <math>-10 \sim +10\text{V}</math></li><li>● Offset range : <math>5\text{V} \pm 3.5\text{V}(0 \sim 10\text{V})</math> <math>0\text{ V} \pm 7\text{V}(-10 \sim +10\text{V})</math></li><li>● Component : power supply, differential input comparator, position controller, speed controller, accelerometer controller, gain setting part, offset part, summer, limiter, output part</li></ul>
4/3-way servo control valve		Order number : 18012
		<ul style="list-style-type: none"><li>● Valve type : single sleeve spool valve</li><li>● Operating type : directly, magnetic linear motor</li><li>● Flow rate : <math>5\text{ LPM}(\Delta P_n=35\text{bar}, \pm 10\%)</math></li><li>● <math>2\text{LPM}(\Delta P_n=5\text{bar}, \pm 10\%)</math></li><li>● Max. pressure : P,A,B port-120bar</li><li>● T port -50bar</li><li>● Power/ Max. current : <math>\text{DC}24\text{V}/1.2\text{A}</math></li><li>● Input/ operating voltage range : <math>\pm 10\text{V}</math></li><li>● Response time : <math>\leq 12\text{ms}</math></li></ul>
Weight test unit		Order number : 18015
		<ul style="list-style-type: none"><li>● Size : <math>800 \times 180\text{ mm}</math></li><li>● component : hydraulic double-acting cylinder 1ea, cylinder guide (AL Profile), flexible joint weight slide</li></ul>
Weight, 5 kg (A type)		Order number : 18016
		<ul style="list-style-type: none"><li>● Weight : 5 kg</li><li>● Size : <math>170 \times 80 \times 45\text{mm}</math></li><li>● Function : additional weight</li></ul>
Weight, 5 kg (B type)		Order number : 18017
		<ul style="list-style-type: none"><li>● Weight : 5 kg</li><li>● Size : <math>170 \times 80 \times 45\text{mm}</math></li><li>● Function : additional weight</li></ul>

## Components

### Measurement display unit

Order number : 18018

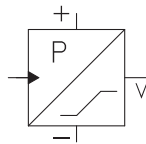


Temperature	°C
Pressure	bar
Flowrate	l/min

- Display : Voltage, current, flow rate
- Type : 7-segment digital display
- Temperature : input – current
- Pressure : input – voltage
- Flow rate : input – pulse
- Output : 0 ~ 10V DC

### Pressure sensor

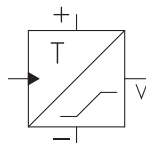
Order number : 18019



- Power : 24V DC
- Output voltage : 0 ~ 10 V DC
- Measuring range : 0 ~ 100bar
- Load Impedance :  $R_{x(min)} \geq 2 \text{ k}\Omega$

### Temperature sensor

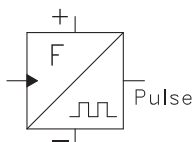
Order number : 18020



- Power : 12 ~ 24V DC
- Output Current : 4 ~ 20 mA
- Measuring range : 0 ~ 100 °C
- Load Impedance :  $R_L \leq 0,65 \text{ k}\Omega$

### Flow meter

Order number : 18021



- Use with hydraulic motor (ON.15035)
- Rotary encoder pulse output
- Display : 0 ~99 LPM

### Digital multimeter

Order number : 21012



- DC/AC voltage, current, register
- AC/DC current : 0,01 mA ~ 10 A
- AC/DC voltage : 0,1 mV ~ 1000 V
- Temperature : -40°C ~ +400°C (-40°F ~ +75°F)
- Diode test
- Frequency : 2 Hz ~ 100 kHz

### Function generator

Order number : 18013



- Signal type : sine wave, square wave, triangular wave, TTL
- Frequency range : 0,1 Hz~500 kHz
- Output voltage : DC
- Off set : -15...+15 V
- Output voltage range : 0...30 V

## Components

### Oscilloscope

Order number : 18014



- Trigger system 2 CH memory
- Width of band : 20 MHz
- Time setting range : 0,2  $\mu$  s...5 s
- Voltage setting range : 5 mV...5 V

### Hydraulic oil

Order number : 15105



- ISO VG32
- 20l

### Magnetic symbol set (pneumatics and hydraulics)

Order number : 13501



Pneumatic  
&  
Hydraulics  
SYMBOLS

- Pneumatics and hydraulics symbols based on ISO
- Cylinders, valves and other symbols
- Magnetic included

### Magnetic symbol set (electronics)

Order number : 13502



Electric  
SYMBOLS

- Electric symbols based on ISO
- Switches, sensors, and relay contacts
- Magnetic included

### Hydraulics Textbook

Order number : 42053



- Hydraulics textbook

### Electro-hydraulics textbook

Order number : 42054



- Electro-hydraulics textbook

## Components

Hydraulics workbook (Basic level)

Order number : 42047



- Hydraulics workbook (Basic level)

Hydraulics workbook (Advanced level)

Order number : 42048



- Hydraulics workbook (Advanced level)

Electro-hydraulics workbook (Basic level)

Order number : 42049



- Electro-hydraulics workbook (Basic level)

Electro-hydraulics workbook (Advanced level)

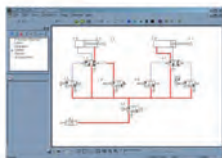
Order number : 42050



- Electro-hydraulics workbook (Advanced level)

PH-Lab simulation software

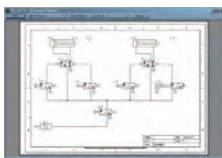
Order number : 40003



- Pneumatics and Hydraulics software

H-Lab simulation software

Order number : 40006



- Hydraulics software

## Components

### Easy Servo Interface

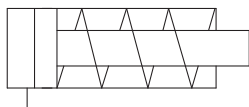
Order number : 40004



- Real time actuator control using servo control unit
- Digital signal processing
- Display : digital & analog
- Proportional control (open loop control)
- Servo control (Closed loop control)

### Single acting cylinder

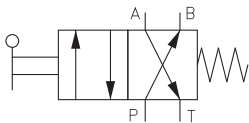
Order number : 17072



- Pressure range : 50bar
- Piston diameter : 20mm
- Piston rod diameter : 12mm
- Stroke : 100 mm
- Plate aluminum material : 6mm
- Weight tester included

### 4/2-way valve

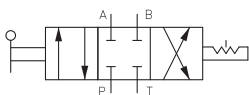
Order number : 17075



- Hand lever operated
- Spring return type
- Pressure range : 50bar

### 4/3-way valve (PABT blocked)

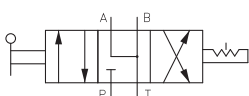
Order number : 17077



- Hand lever operated
- Spring return type
- Pressure range : 50bar

### 4/3-way valve (ABT connected)

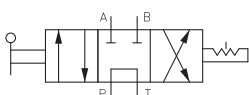
Order number : 17102



- Hand lever operated
- Spring return type
- Pressure range : 50bar

### 4/3-way valve (PT bypassed)

Order number : 17076



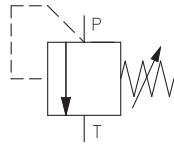
- Hand lever operated
- Spring return type
- Pressure range : 50bar



## Components

### Pressure relief valve (directly controlled)

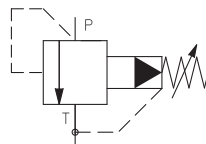
Order number : 17078



- Function : pressure relief valve, pressure sequence valve
- Pressure range : 50bar

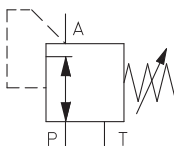
### Pressure relief valve (pilot controlled)

Order number : 17079



### 3-way pressure reducing valve

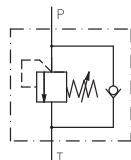
Order number : 17087



- 3 Port
- Spring adjusted
- Lever operated
- Flow control
- Flow rate : 9LPM
- Pressure range : 50bar
- Pressure control valve included

### Counter balancing valve

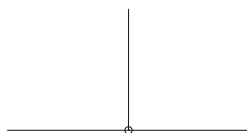
Order number : 17089



- Operating pressure range : 0~60bar
- Pressure range : 50bar
- Manual control
- External pilot connected
- External drain

### T connector

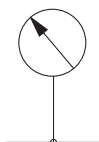
Order number : 17092



- Hose connector and flow control
- Check valve coupling socket / 2ea nipple

### Pressure gauge

Order number : 17088

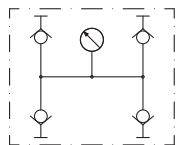


- Indicator : 0~50bar
- Gauge diameter : 60 ø
- Precision : 1,6%
- Check valve coupling socket / nipple
- Pressure range : 50bar

## Components

### Pressure gauge with distributor

Order number : 17129



- Indicator : 0~50bar
- Gauge diameter : 63φ
- Distribution connector : 4ea
- Pressure range : 50bar

### Transparent model hose

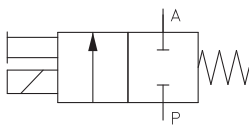
Order number : 17123, 17125



- Length : 600, 1200mm
- Hose diameter : 4mm
- Pressure range : 30bar

### 2/2-way solenoid valve

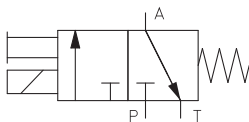
Order number : 17111



- Spring return type
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### 3/2-way solenoid valve

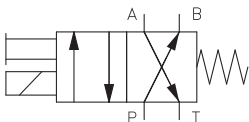
Order number : 17112



- Spring return type
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### 4/2-way solenoid valve

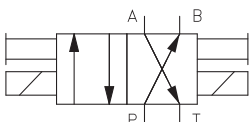
Order number : 17113



- Spring return type
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### 4/2-way double solenoid valve

Order number : 17117

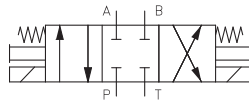


- Double solenoid operated
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

## Components

### 4/3-way double solenoid valve (PABT blocked)

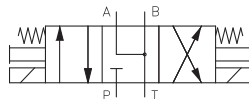
Order number : 17115



- P,A,B,T blocked
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### 4/3-way double solenoid valve (ABT connected)

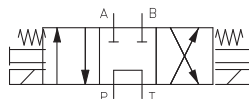
Order number : 17119



- A,B,T connected
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### 4/3-way double solenoid valve (PT bypassed)

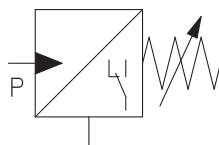
Order number : 17120



- P,T bypassed
- LED included
- Current consumption : 12W
- +, - integrated socket, 4mm cable socket 2ea included
- Pressure range : 50bar

### Pressure switch

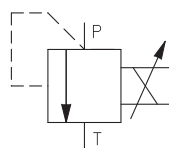
Order number : 17116



- Hysteresis : ~15%
- Load capacity : 2A
- Operating type : hydraulic oil
- 1ea C contact
- Type : diaphragm switch
- Pressure range : 50bar

### Proportional pressure relief valve

Order number : 17130

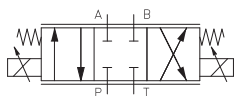


- Pressure range : 50bar
- Min. Flow rate : 0,1 LPM
- Max. Flow rate : 20 LPM
- Resolution : 1mA
- Hysteresis : 2%
- Precision : 1%
- Flow rate : 5 LPM

## Components

### 4/3-way proportional control valve

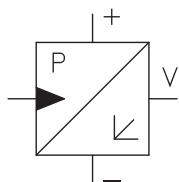
Order number : 17131



- Valve type : spool valve
- Filter level : 10 $\mu$ m
- Pressure range : 50bar
- Flow rate : 1.5 LPM
- Power : 24V DC
- Current : 680mA
- Setting Time : < 60ms
- Repetition accuracy : < 1%

### Pressure sensor

Order number : 17132



- Power : 24V DC
- Output voltage : 0~10V DC
- Measurement range : 0~100bar
- Load Impedance : Rx(min)  $\geq$  2 k $\Omega$

### Modular valve unit—Flow control circuit

Order number : 17133



- Throttle & Check Modular Valve
  - \* Pressure range : 50bar
- Pressure Reducing Modular Valve
  - \* Pressure range : 50bar
- 4/3-way Double Solenoid Valve(All blocked)
  - \* Pressure range : 50bar

### Modular valve unit—Break circuit

Order number : 17134



- Brake Modular Valve
  - \* Pressure range : 50bar
- Pilot Check Modular Valve
  - \* Pressure range : 50bar
- 4/3-way Double Solenoid Valve(ABT connected)
  - \* Pressure range : 50bar

### Modular valve unit—Counter balance circuit

Order number : 17135



- Counter Balance Modular Valve
  - \* Pressure range : 50bar
- Pressure Relief Modular Valve
  - \* Pressure range : 50bar
- 4/3-way Double Solenoid Valve(PT connected)
  - \* Pressure range : 50bar

## Components

### Modular valve unit–Sequence circuit

Order number : 17136



- Sequence Modular Valve
  - \* Pressure range : 50bar
- Pressure Reducing Modular Valve
  - \* Pressure range : 50bar
- 4/2–way Double Solenoid Valve
  - \* Pressure range : 50bar

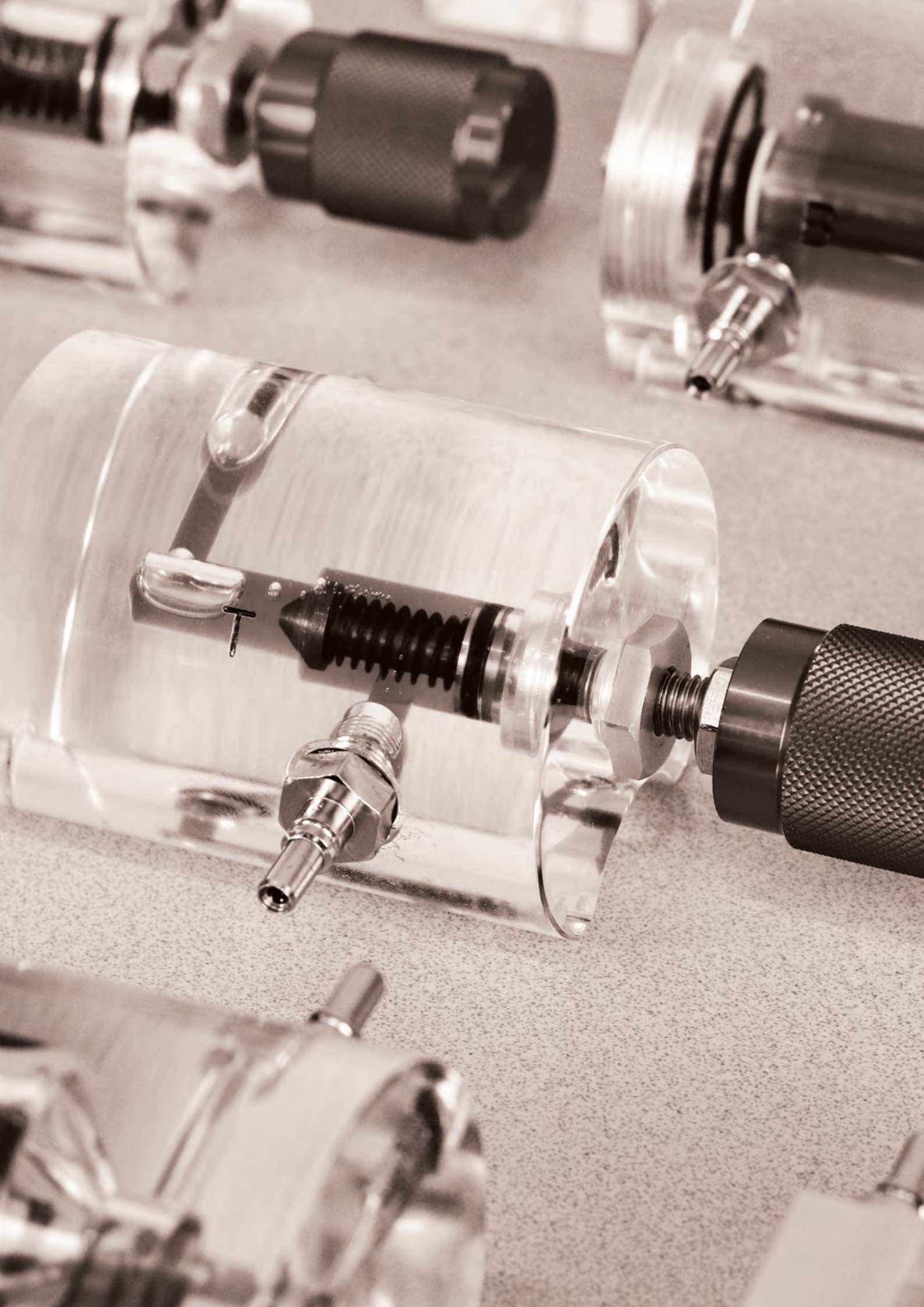
### Transparent logic valve

Order number : 17137

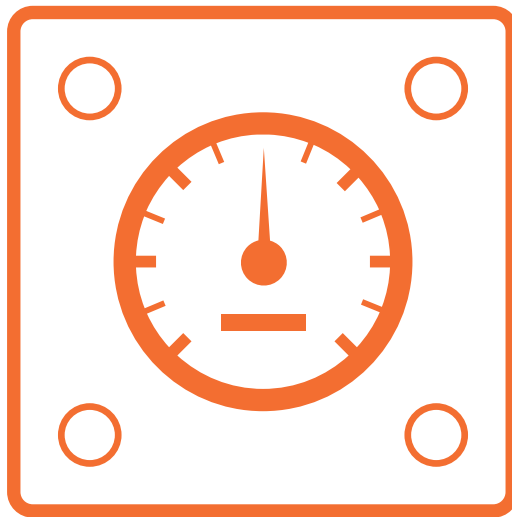


- ① Transparent logic valve unit valve unit
  - \* Block size : 245x245x100
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ② Logic Pressure Relief Valve
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ③ Logic One Way Flow Control Valve
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ④ Forward Logic Pilot Check valve(Power)
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ⑤ Forward Logic Pilot Check valve(Drain)
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ⑥ 4/3–way Double Solenoid valve(PAB)
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ⑦ Reverse Logic Pilot Check valve(power)
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM
- ⑧ Reverse Logic Pilot Check Valve(drain)
  - \* Pressure range (max) : 50bar
  - \* Max. flow : 5 LPM









CHAPTER  
**02-2**

# HYDRAULICS TRANSPARENT MODELS

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Hydraulics transparent models (FH-230)	115
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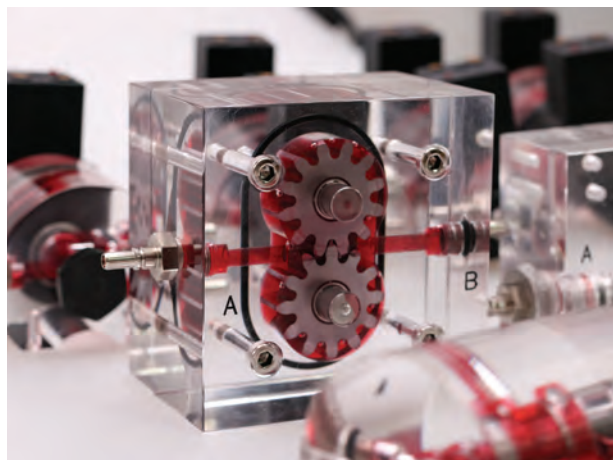
# HYDRAULICS TRANSPARENT MODELS

## Introduction

The hydraulics transparent models were designed and processed with a special material for effective training by seeing inside of the hydraulic components.

Transparent model power unit (14030) utilizes air injection to demonstrate the flow path and principles.

User can easily see the flow of fluid and understand the principles of hydraulic devices.



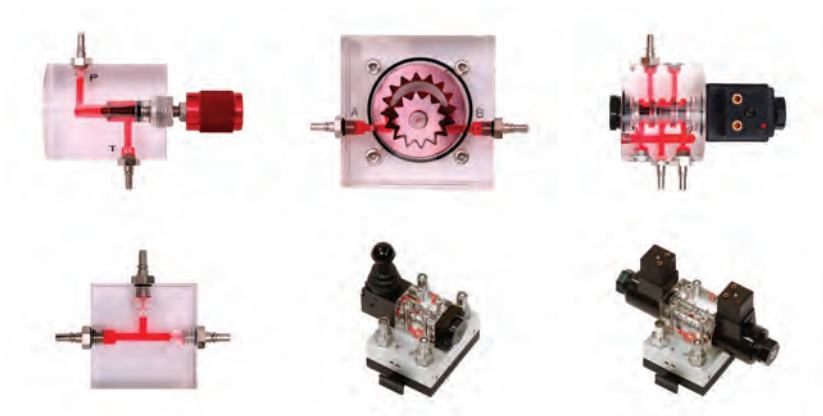
## Hydraulics transparent models (FH-230)



02-2

### Features

- Demonstrates basic principles of hydraulics and control systems.
- User can see operations inside of hydraulics valves and valve structures.
- User can put an air bubble in the FESTECH transparent hydraulics power unit to understand the operating principles of hydraulics in valves.
- Plumbing system is conveniently connected by quick coupling connector.



### Training contents

- Learning structure of hydraulics parts
- Understanding flow of fluid
- Feature of valves and cylinders
- Electro-hydraulic control circuit
- Safety of hydraulics system
- Structure of hydraulics motor
- Hydraulics control circuit
- Hydraulics cylinder mid-stop

## Hydraulics transparent models (FH-230)

### Component

No.	Component	Order number	Qty
1	Transparent model training table	14020	1
2	Transparent model power unit	14030	1
3	Hydraulic transparent model clamp	17050	1
4	Pressure relief valve, directly controlled	17001	1
5	Pressure relief valve, cushion, directly controlled	17002	1
6	Pressure reducing valve	17003	1
7	2-way flow control valve	17004	1
8	Orifice valve	17005	1
9	One-way flow control valve	17006	1
10	Pressure compensative flow control valve	17007	1
11	Hydraulic check valve	17008	1
12	Hydraulic check valve, pilot actuated	17009	1
13	2/2-way valve	17010	1
14	3/2-way valve	17011	1
15	4/2-way valve	17012	1
16	4/3-way valve	17013	1
17	Hydraulic double-acting cylinder	17014	1
18	5/2-way valve, pilot actuated	17015	1
19	Shut-off circuit	17016	1
20	Pressure relief valve, pilot actuated	17017	1
21	Pressure relief valve, externally actuated	17018	1
22	Double check valve, pilot actuated	17019	1
23	Flow dividing valve	17020	1
24	3-way pressure flow control valve	17021	1
25	Rectifier circuit	17022	1

No.	Component	Order number	Qty
26	Vane motor	17023	1
27	Internal gear motor	17024	1
28	External gear motor	17025	1
29	Linear motor	17026	1
30	Rotary vane motor	17027	1
31	Axial piston motor	17028	1
32	Pressure gauge	17029	1
33	Pressure switch	17030	1
34	Piston accumulator	17031	1
35	Diaphragm accumulator	17032	1
36	Bladder accumulator	17033	1
37	3/2-way single solenoid valve	17042	1
38	4/2-way single solenoid valve	17043	1
39	4/2-way double solenoid valve	17044	1
40	4/3-way solenoid valve(PT connected)	17045	1
41	4/3-way solenoid valve(ABT connected)	17046	1
42	4/3-way solenoid valve(PABT connected)	17047	1
43	T connector	17054	1
44	+ connector	17055	1
45	Transparent model hose	17056	5
46	Power supply	13090	1
47	Push-button switch set (3-fold)	13033	1
48	Cable(500mm red)	13085	7
49	Cable(500mm blue)	13085	5

## Components

### Transparent model training table

Order number : 14020



- Size : 1500×790×870 mm
- Cabinet (locking type)
  - 430(L)×700(W)×680(H)mm
  - Drawer : 360×620 mm
  - transparent model socket panel

### Transparent model power unit

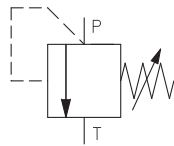
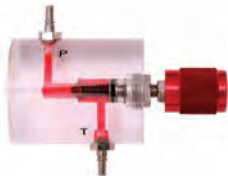
Order number : 14030



- Tank capacity : 7,5 L
- Hydraulic oil : ISO VG32
- Motor : AC 220 V, 60 Hz,
- Max. pressure : 18bar
- Size : 510×265×200 mm
- Weight : 17 kg, oil included
- Hydraulic pump

### Pressure relief valve, directly controlled

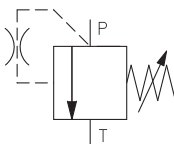
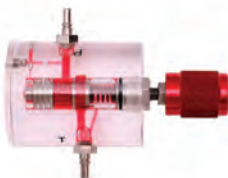
Order number : 17001



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Adjusting lever operated

### Pressure relief valve, cushion, directly controlled

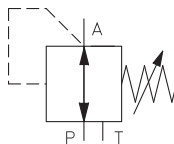
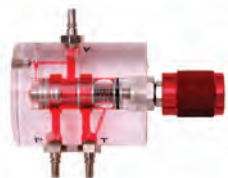
Order number : 17002



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Adjusting lever operated
- Cushion type

### Pressure reducing valve

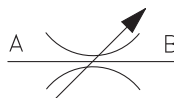
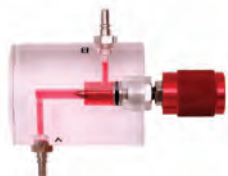
Order number : 17003



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port
- Spring adjustable
- Adjusting lever operated

### 2-way flow control valve

Order number : 17004

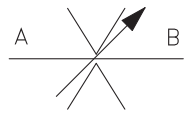
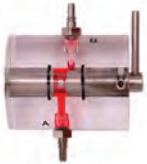


- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Adjusting lever operated

## Components

### Orifice valve

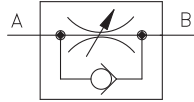
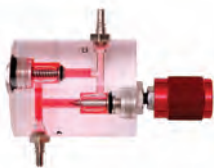
Order number : 17005



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Hand lever operated

### One-way flow control valve

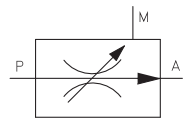
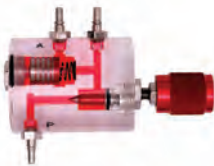
Order number : 17006



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Adjusting lever operated
- Spring check type

### Pressure compensative flow control valve

Order number : 17007



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port
- Adjusting lever operated
- Spring spool type
- Inside pressure measurement

### Hydraulic check valve

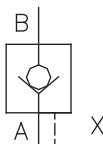
Order number : 17008



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Spring check type

### Hydraulic check valve, pilot actuated

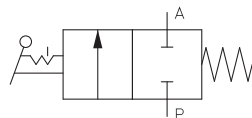
Order number : 17009



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port
- Adjusting lever operated
- Spring spool type
- Spring check type

### 2/2-way valve

Order number : 17010



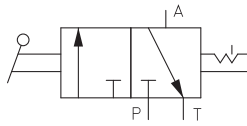
- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Hand lever operated



## Components

## 3/2-way valve

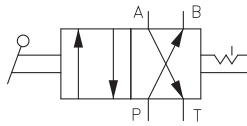
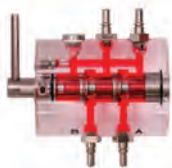
Order number : 17011



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port
- Hand lever operated

## 4/2-way valve

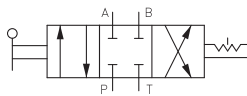
Order number : 17012



- Pressure range : 10bar
- Length : 80mm
- Width : 60mm
- 4 port
- Hand lever operated

## 4/3-way valve

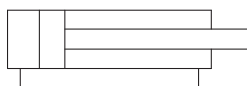
Order number : 17013



- Pressure range : 10bar
- Length : 80mm
- Width : 60mm
- 4 port
- Hand lever operated
- All port block

## Hydraulic double acting cylinder

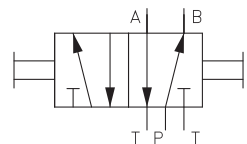
Order number : 17014



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 2 port
- Piston diameter : 15mm
- Stroke : 50mm

## 5/2-way valve, pilot actuated

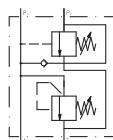
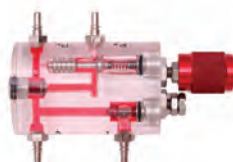
Order number : 17015



- Pressure range : 10bar
- Length : 95mm
- Width : 60mm
- 5 port
- Push lever operated

## Shut-off circuit

Order number : 17016

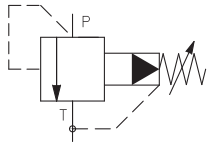
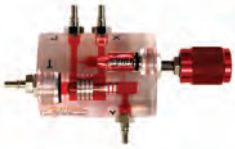


- Pressure range : 10bar
- Length : 95mm
- Width : 60mm
- 4 port
- Adjusting lever operated
- Spring check type

## Components

### Pressure relief valve, pilot actuated

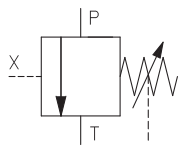
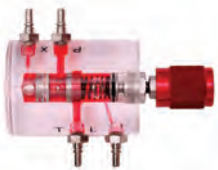
Order number : 17017



- Pressure range : 10bar
- Length : 80mm
- Width : 60mm
- 4 port
- Adjusting lever operated
- Spring spool type

### Pressure relief valve, externally actuated

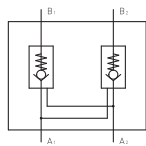
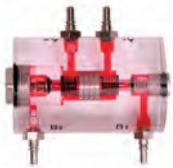
Order number : 17018



- Pressure range : 10bar
- Length : 80mm
- Width : 60mm
- 4 port
- Adjusting lever operated
- Spring spool type

### Double check valve, pilot actuated

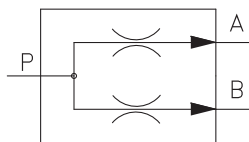
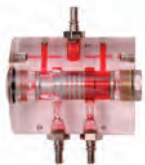
Order number : 17019



- Pressure range : 10bar
- Length : 95mm
- Width : 60mm
- 4 port
- Spring spool type

### Flow dividing valve

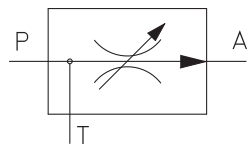
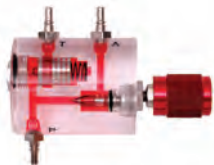
Order number : 17020



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 4 port
- Spring spool type

### 3-way pressure flow control valve

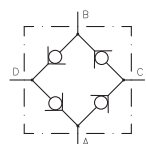
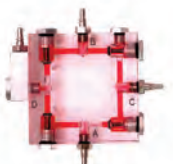
Order number : 17021



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port
- Adjusting lever operated
- Spring spool type

### Rectifier circuit

Order number : 17022

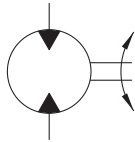


- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 4 port
- Spring check type
- 4 check valved

## Components

### Vane motor

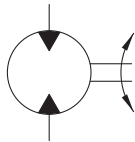
Order number : 17023



- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 2 port

### Internal gear motor

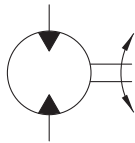
Order number : 17024



- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 2 port

### External gear motor

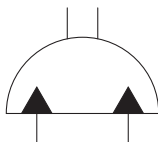
Order number : 17025



- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 2 port

### Linear motor

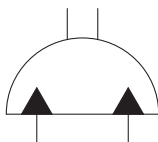
Order number : 17026



- Pressure range : 10bar
- Length : 90mm
- Width : 60mm
- 2 port

### Rotary vane motor

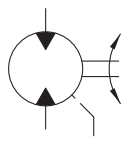
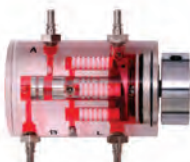
Order number : 17027



- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 2 port

### Axial piston motor

Order number : 17028

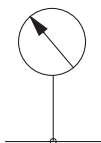


- Pressure range : 10bar
- Length : 110mm
- Width : 60mm
- 4 port

## Components

### Pressure gauge

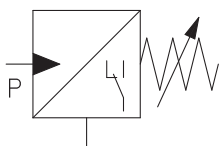
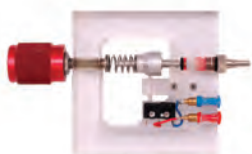
Order number : 17029



- Pressure range : 10bar
- Length : 50mm
- Width : 50mm
- 1 port

### Pressure switch

Order number : 17030



- Pressure range : 10bar
- Length : 90mm
- Width : 90mm
- 1 port
- 4mm socket included
- Adjusting lever operated

### Piston accumulator

Order number : 17031



- Pressure range : 2~4bar
- Length : 110mm
- Width : 60mm
- 2 port

### Diaphragm accumulator

Order number : 17032



- Pressure range : 2~4bar
- Length : 80mm
- Width : 60mm
- 2 port

### Bladder accumulator

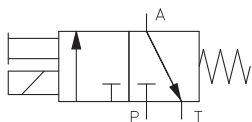
Order number : 17033



- Pressure range : 2~4bar
- Length : 120mm
- Width : 60mm
- 2 port

### 3/2-way solenoid valve

Order number : 17042

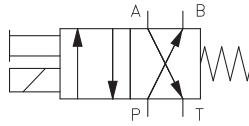


- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 3 port
- 4mm socket included
- Power : DC 24V

## Components

### 4/2-way single solenoid valve

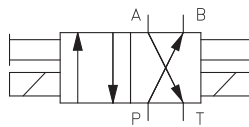
Order number : 17043



- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 4 port
- 4mm socket included
- Power : DC 24V

### 4/2-way double solenoid valve

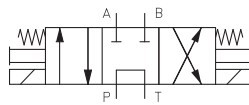
Order number : 17044



- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 4 port
- 4mm socket included
- Power : DC 24V

### 4/3-way solenoid valve (PT connected)

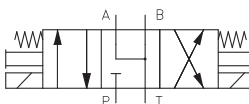
Order number : 17045



- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 4 port
- 4mm socket included
- Power : DC 24V

### 4/3-way solenoid valve (ABT connected)

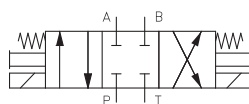
Order number : 17046



- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 4 port
- 4mm socket included
- Power : DC 24V

### 4/3-way solenoid valve (All block type)

Order number : 17047



- Pressure range : 10bar
- Length : 100mm
- Width : 60mm
- 4 port
- 4mm socket included
- Power : DC 24V

### Hydraulic transparent model clamp

Order number : 17050

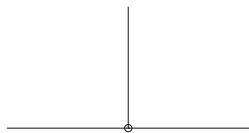


- Used for fixing components on the table.
- Material : plastic

## Components

### T connector

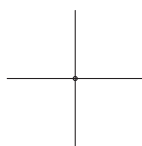
Order number : 17054



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 3 port

### + connector

Order number : 17055



- Pressure range : 10bar
- Length : 75mm
- Width : 60mm
- 4 port

### Transparent model hose

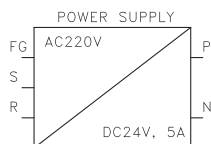
Order number : 17056



- Pressure range : 10bar
- Length : 1M
- Inner diameter : 4mm
- Quantity : 5ea

### Power supply

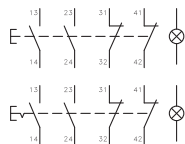
Order number : 13090



- Power : AC 220 V, 50/60Hz
- Output power : DC 24V
- Output current : 5A

### Push-button switch set (3-fold)

Order number : 13033



- Power : DC 24V
- Consist of : 2 momentary push-buttons, 1 locking push-button
- Contact : 2 a-contact, 2 b-contact
- Contact allowable : Max. 1A
- Power consumption : 0.48W

### Cable(500mm red)

Order number : 13085



- Color : red
- Length : 500mm
- High elasticity and special coating



## Components

Cable(500mm blue)

Order number : 13085



- Color : blue
- Length : 500mm
- High elasticity and special coating

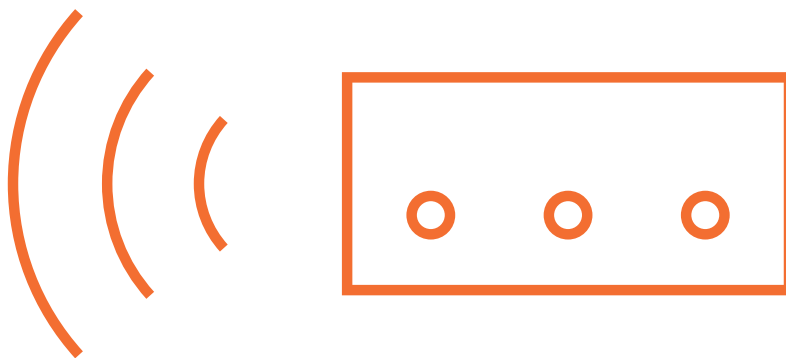
Hydraulic transparent model workbook

Order number : 17070



- Manual for orifice, flow control valve, pressure reducing valve, pressure relief valve, directional control valve, hydraulics check valve, double-acting cylinder, pilot operated flow control valve, various hydraulics motor, and various accumulators etc.





CHAPTER

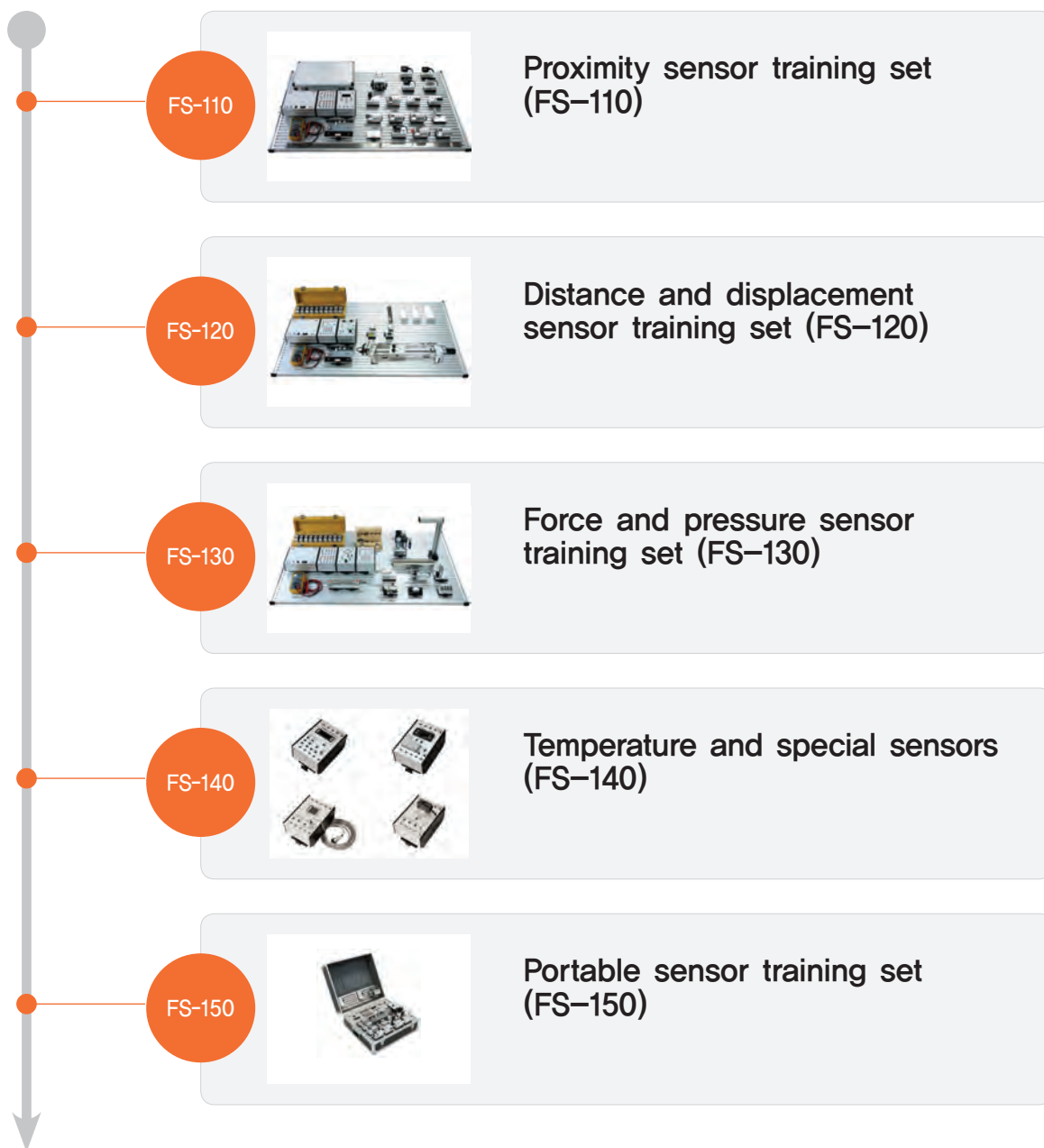
03

## SENSOR TRAINING SET

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Classification and application of sensor	130
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Distance and displacement sensor training set (FS-120)	132
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# SENSOR TRAINING SET





# SENSOR TRAINING SET

## Introduction

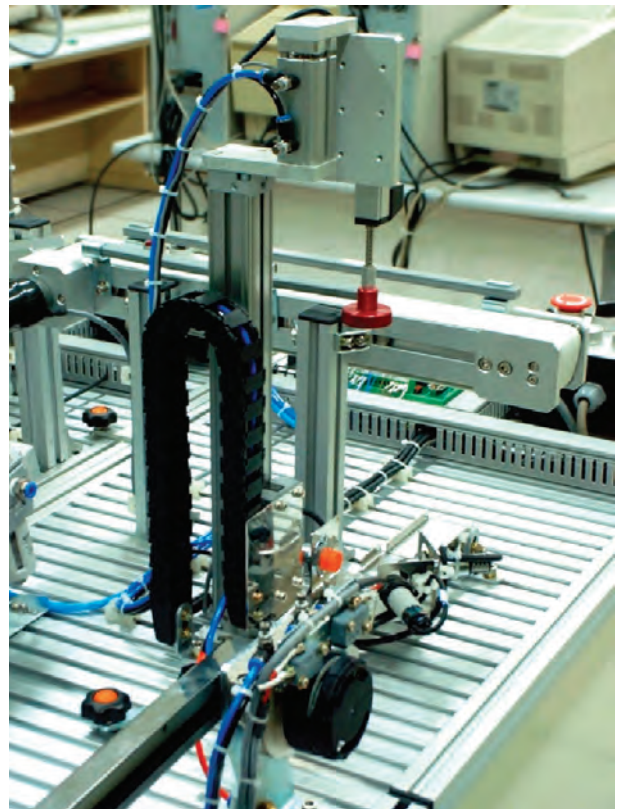
Sensors are crucial in improving productivity in an automatic production system.

The aim of this training set is recognizing the importance of sensor control technology in an automation system. Students must be able to identify and select the proper sensor in a system and becoming proficient in using it.

The FESTECH sensor training set was developed to teach the principles and usage methods of various sensors.

All of the sensors are module type. They can be used individually or with other training sets.

Connection, operation, and signal processing are all optimized for total sensor control training.



### Apprentices for sensor training set

- Electric/electronics expert
- Electric-mechanics expert
- Process control operator
- Mechanical engineer
- Data acquisition and control engineer
- Device and building control engineer

## Classification and application of sensor



### ON/OFF type sensor

- Limit switch
- Proximity sensor (inductive, capacitive, reed switch)
- Optical sensor(diffuse, through beam, reflect, fiber)
- Pressure switch

### Applications of ON/OFF type sensor

- Position detection
- Objects detection
- Sequence control in producing system
- Safety system
- Status alarm of machine
- Error detection
- Test and recognition of part
- Quality control



### Analog sensor

- Pressure sensor
- Color sensor
- Temperature sensor
- Level sensor
- Displacement sensor
- Weight sensor

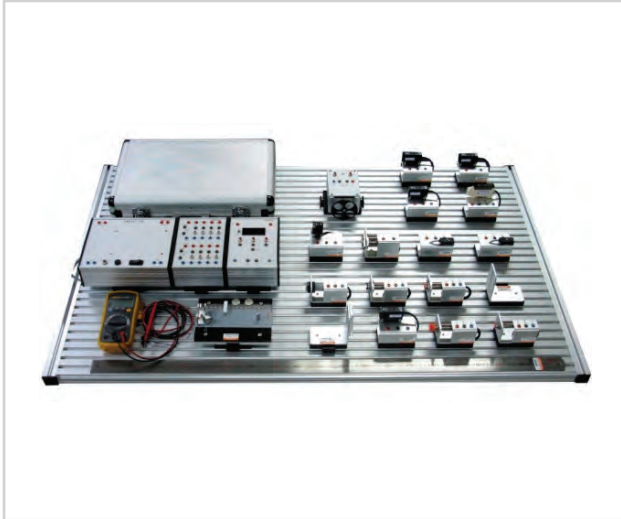
### Application of analog sensor

- Automatic control system
- Data acquisition
- Process control system
- Quality control
- Error detection
- Value measurement





## Proximity sensor training set (FS-110)



Order number : 21100

### Training contents

- Feature of proximity sensor and reed switch
- Response curve of inductive sensor
- Types and application of optical sensors
- Response feature of capacitive sensor
- Application of ultra sonic sensor
- Practice of rotary unit and counter unit
- Speed measuring with penetrative sensor
- Analysis of technology data
- Electrical wiring
- Composing control circuit
- Configuration and calibration of sensor
- Actual example in real field

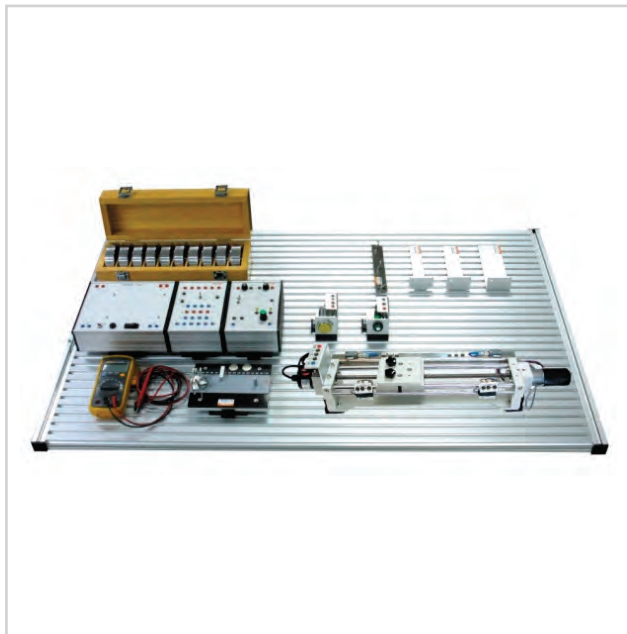
03

### Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of objects	21001	1
3	Graph paper pad	21002	1
4	Position slide	21003	1
5	Measuring scale	21004	1
6	Optic fiber with separated brackets	21102	2
7	Optic fiber with a bracket	21103	1
8	Lamp & buzzer unit	21106	1
9	Counter unit	21108	1
10	Magnetic proximity sensor	21110	1
11	Through-beam sensor, transmitter	21111	1
12	Optical fiber sensor	21112	2
13	Retro-reflective optical sensor	21113	1
14	Through-beam sensor, receiver	21114	1
15	Magnetic reed switch	21115	1

No.	Component	Order number	Qty
16	Rotary unit	21121	1
17	Diffuse optical sensor	21122	1
18	Diffuse optical sensor (M18)	21123	1
19	Reflector unit	21101	1
20	Inductive sensor (M12), flush type	21124	1
21	Inductive sensor (M18), flush type	21125	1
22	Inductive proximity sensor (M18), non-flush type	21126	1
23	Inductive sensor (M30), 2-wire type	21127	1
24	Capacitive sensor (M18)	21128	1
25	Cable set	13080	1
26	Cable hanger	13091	1
27	Power supply	13090	1
28	Digital multimeter	21012	1
29	Vernier caliper	21013	1

## Distance and displacement sensor training set (FS-120)



Order number : 21200

### Training contents

- Usage of distance and displacement sensor
- Distance measurement using inductive sensor, optical sensor and ultra sonic sensor
- Active and passive sensor
- Usage and feature of spindle drive
- Geared motor and displacement sensor control
- Usage of analog sensor
- Feature of analog ultra sonic sensor
- Material detection and position check using analog inductive sensor
- Speed and position detection using rotary encoder
- Motor control with position transducer
- Color separation with analog optical sensor
- Measurement reporting
- Analysis of sensor testing
- Practical measurement

### Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of weights	21000	1
3	Position slide	21003	1
4	Bending bar	21005	1
5	Spindle drive unit (ball screw)	21006	1
6	Mounting kit (vernier caliper)	21104	1
7	Analog terminal	21105	1
8	Motor control unit	21107	1
9	Analog optical sensor	21109	1
10	Linear potentiometer	21116	1
11	Analog ultrasonic sensor unit	21117	1
12	Analog inductive sensor unit	21118	1
13	Proximity sensor (magnetic)	21119	2
14	Vernier caliper for fixing	21201	1

No.	Component	Order number	Qty
15	Rotary encoder	21202	1
16	Middle plate	21203	1
17	High position adapter	21204	1
18	Base unit (spindle drive)	21205	1
19	Geared motor	21206	1
20	Reflector set	21207	1
21	Assembly profile—L	21208	1
22	Assembly profile—I	21209	1
23	Power supply	13090	1
24	Cable set	13080	1
25	Cable hanger	13091	1
26	Digital multimeter	21012	1
27	Vernier caliper	21013	1

## Force and pressure sensor training set (FS-130)



Order number : 21300

### Training contents

- Features of strain gauge, load cell, pressure, temperature sensor
- Force measurement with strain gauge
- Usage of industrial load cell
- Pneumatic and electrical wiring of pressure sensor
- Temperature measurement with temperature sensor and controller
- Measurement and signal converting with bridge circuit
- Understanding of amplifier circuit (OP AMP)
- Quarter, Half and Full Bridge circuit
- Friction force measurement with a pneumatic cylinder
- Pressure switch adjusting and hysteresis measurement
- Air tank leakage test
- Measurement technology and data recording
- Measurement initialization
- Measurement analysis

03

### Component

No.	Component	Order number	Qty
1	Working table I	11001	1
2	Set of weights	21000	1
3	Analog terminal	21105	1
4	Lamp & buzzer unit	21106	1
5	Assembly profile-L	21208	1
6	Set of weights (circular type)	21301	1
7	Strain gauge unit	21302	1
8	Load cell unit	21303	1
9	Bridge amplifier	21304	1
10	Double acting cylinder	21305	1
11	Service unit	12101	1
12	Air distributor	12201	1

No.	Component	Order number	Qty
13	3/2-way push-button valve (Normally close)	12320	1
14	One-way flow control valve	12302	1
15	Air tank	12416	1
16	Plastic hose (1M)	12290	30
17	Hose cutter	12291	1
18	Pressure switch	13020	1
19	Analog pressure sensor 1	21306	1
20	Power supply	13090	1
21	Cable set	13080	1
22	Cable hanger	13091	1
23	Digital multimeter	21012	1
24	Compressor (for sensor)	21313	1

## Temperature and special sensor training set (FS-140)



### COMPONENT

No.	Component	Order number	Qty
1	Temperature sensor & controller	21307	1
2	Humidity sensor and controller	21308	1
3	Vibration sensor and controller	21311	1
4	Color mark sensor	21312	1

## Portable sensor training set (FS-150)



Order number : 21400

### TRAINING CONTENTS

- Features of proximity switch and reed switch
- Types and response curve of inductive sensor
- Types and application of optical sensor
- Operating principle and response of capacitive sensor
- Usage of rotary unit and counter unit
- Speed measurement using through-beam sensor
- Monitor program usage of GUI controller
- Control training using GUI controller
- Measurement technology and date
- Electric wiring
- Circuit composition
- Adjustment and application limit of sensor
- Actual example in real fields

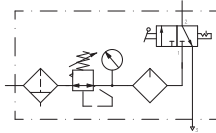
### COMPONENT

No.	Component	Qty
1	Main frame	1
2	Sensor GUI Controller (option)	1
3	Motor drive unit	1
4	Motor speed controller	1
5	Position slide	1
6	Set of objects	1
7	Magnetic reed switch	1
8	Inductive sensor (M12), flush type	1
9	Inductive sensor (M18), flush type	1
10	Inductive sensor (M18), non-flush type	1
11	Rotary unit	1
12	Capacitive sensor (M18)	1
13	Through-beam sensor, transmitter	1
14	Retro-reflective optical sensor	1
15	Through-beam sensor, receiver	1
16	Optical fiber sensor	1
17	Diffuse optical sensor	1
18	Pulse generator module	1
19	Vernier calipers	1

## Components

### Service unit

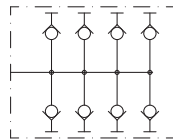
Order number : 12101



- Pressure range : 0,5~12 bar
- Air filter, pressure regulator, lubricator
- Shut off valve
- Filter degree : 40 $\mu$ m
- Connection plastic hose : Outside diameter 6 mm
- Flow rate : 750 LPM

### Air distributor

Order number : 12201



- Pressure range : 0~10 bar
- Input : 1 ea (6 mm)
- Output : 8 ea, check connector included (4 mm)
- One-touch connector

### Plastic hose (1M)

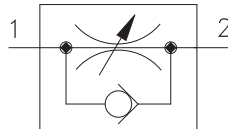
Order number : 23008



- Operating temperature : -40 $^{\circ}$ C~60 $^{\circ}$ C
- Color : blue
- Size : outside 4mm

### One-way flow control valve

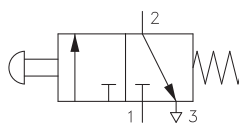
Order number : 12302



- Pressure range : 0~10 bar
- 1(A) $\rightarrow$ 2(B) : 0~150 LPM
- 2(B) $\rightarrow$ 1(A) : 160/130 LPM

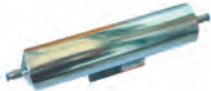


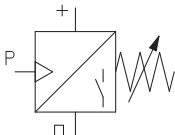



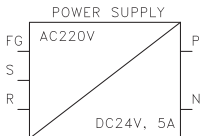
### 3/2-way push-button valve (Normally closed)

Order number : 12320



- Pressure range : 0~10 bar
- Push-button type
- Normally closed type valve
- Spring return
- Direct acting type

Components

Air tank		Order number : 12416
		<ul style="list-style-type: none"><li>● One touch clamp</li><li>● Capacity : 400 ml</li></ul>
Pressure switch		Order number : 13020
		<ul style="list-style-type: none"><li>● Pressure range : 0,5~10 bar</li><li>● Control setting pressure</li><li>● Pressure display</li></ul>
Cable set		Order number : 13080
		<ul style="list-style-type: none"><li>● Color : red, blue, black</li><li>● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm</li><li>● High elasticity and special coating</li></ul>
Cable set (safety socket)		Order number : 113080
		<ul style="list-style-type: none"><li>● Color : red, blue, black</li><li>● Length : 1500mm, 1000mm, 500mm, 300mm, 100mm</li><li>● High elasticity and special coating</li><li>● Safety socket type</li></ul>
Power supply		Order number : 13090
		<ul style="list-style-type: none"><li>● Power : AC 220 V, 50/60Hz</li><li>● Output Power : DC 24V</li><li>● Output Current : 5A</li></ul>



## Components

### Set of weights

Order number : 21000



- Contents: 20g, 50g, 100g, 200g, 500g / ea
- Case : wood

### Set of objects

Order number : 21001



- Various kinds of objects are contained in aluminum case
- Magnetic, steel, stainless steel, aluminum, copper, rubber, plastic, bolt, cardboard etc.

### Graph paper pad

Order number : 21002



- Response curve marking for sensor test

### Position slide

Order number : 21003



- Sliding range : 150 mm
- Scale : 1 mm
- Rotary angle :  $\pm 90^\circ$
- Rotary scale :  $2^\circ$
- Vernier scale : 0,2 mm
- Max. fixture width : 5 mm






### Measuring scale

Order number : 21004








- Length : 1000 mm
- Material : Stainless steel

## Components

Bending bar	Order number : 21005
	<ul style="list-style-type: none"> <li>● Weight load measurement</li> </ul>
Digital multimeter	Order number : 21012
	<ul style="list-style-type: none"> <li>● AC/DC current : 0,01 mA ~ 10 A</li> <li>● AC/DC voltage : 0,1 mV ~ 1000 V</li> <li>● Temperature : -40°C ~ +400°C (-40°F ~ +75°F)</li> <li>● Diode measurement</li> <li>● Frequency : 2 Hz ~ 100 kHz</li> </ul>
Vernier caliper	Order number : 21013
	<ul style="list-style-type: none"> <li>● Measuring distance : 150 mm</li> <li>● Scale : Digital display</li> </ul>
Analog sensor display module	Order number : 21015
	<ul style="list-style-type: none"> <li>● Size : 60mm × 40mm</li> <li>● Power : DC24V</li> <li>● Voltage measurement range : 0~10V</li> <li>● Current measurement range : 0~20mA</li> <li>● Voltage measurement Display : square LED</li> <li>● Current measurement Display : rotary LED</li> </ul>
Illuminance control unit	Order number : 21016
	<ul style="list-style-type: none"> <li>● Power : DC24V</li> <li>● High bright LED</li> <li>● Adjustable bright with knob</li> <li>● Color filter</li> </ul>

## Components

Reflector unit	Order number : 21101
	<ul style="list-style-type: none"> <li>● Size : 60mm × 40mm</li> <li>● Material : plastic reflect mirror</li> </ul>
Optic fiber with separated brackets	Order number : 21102
	<ul style="list-style-type: none"> <li>● Fiber cable diameter : 2,2 mm</li> <li>● Length : 2000 mm</li> <li>● Allowed flexibility : &gt;30mm</li> <li>● Min. detection distance : 1mm</li> <li>● Size : M4</li> </ul>
Optic fiber with a bracket	Order number : 21103
	<ul style="list-style-type: none"> <li>● Fiber cable diameter : 2,2 mm</li> <li>● Length : 2000 mm</li> <li>● Allowed flexibility : &gt;30mm</li> <li>● Min. detection distance : 0,03mm</li> <li>● Size : M6</li> </ul>
Analog terminal	Order number : 21105
	<ul style="list-style-type: none"> <li>● Analog input <ul style="list-style-type: none"> <li>– Voltage range : -10 ~ +10V (Max, ±30V)</li> <li>– Input Impedance : 200 kΩ</li> <li>– Current range : 0 ~ 20mA</li> </ul> </li> <li>● Analog output <ul style="list-style-type: none"> <li>– Voltage range : -10 ~ +10V (Max, ±30V)</li> <li>– Short protection circuit</li> <li>– Current : Max, 20mA</li> </ul> </li> </ul>
Lamp & buzzer unit	Order number : 21106
	<ul style="list-style-type: none"> <li>● Electrical distributor with lamp &amp; buzzer</li> <li>● Buzzer : 3 W</li> <li>● Lamp : 4 W</li> <li>● Power consumption : 1,2 W</li> </ul>

## Components

Motor control unit	Order number : 21107
	<ul style="list-style-type: none"> <li>● Geared motor controller</li> <li>● Motor output : <math>\pm 20\text{V DC}/300\text{ mA}</math></li> <li>● Remote control input : <math>\pm 10\text{V DC}</math></li> <li>● Position input : <math>0 \sim 10\text{V DC}</math></li> <li>● Proximity sensor input : <math>24\text{V DC} / 30\text{mA}</math></li> <li>● Precision : <math>\pm 5\%</math></li> </ul>
Counter unit	Order number : 21108
	<ul style="list-style-type: none"> <li>● Input voltage : Max, <math>\pm 30\text{V DC}</math></li> <li>● Input signal voltage : <math>+15 \sim +24\text{ V}</math></li> <li>● Power consumption : <math>1,2\text{W}</math></li> <li>● Pulse output 100 pulses/s : <math>\pm 6\%</math></li> <li>● Pulse output 1000 pulses/s : <math>\pm 3\%</math></li> <li>● Internal clock : <math>\pm 3\%</math></li> <li>● 4 digit indicator</li> <li>● Pulse count, Pulse frequency measurement</li> </ul>
Analog optical sensor unit	Order number : 21109
	<ul style="list-style-type: none"> <li>● Power : <math>12 \sim 24\text{V DC}</math></li> <li>● Response time : Max, <math>1\text{ ms}</math></li> <li>● Measurement range : <math>8 \sim 40\text{ mm}</math></li> <li>● Analog output : <math>4 \sim 20\text{ mA}</math></li> <li>● Impedance : <math>20\text{ M}\Omega</math></li> <li>● Fiber unit included</li> <li>● Reflective sensor with analog output</li> </ul>
Magnetic proximity sensor	Order number : 21110
	<ul style="list-style-type: none"> <li>● Switching output : PNP, Normally open</li> <li>● Precision : <math>\pm 0,1\text{ mm}</math></li> <li>● Deviation : <math>\pm 0,1\text{ mm}</math></li> <li>● Response range : <math>7 \sim 17\text{ mm}</math></li> <li>● Hysteresis : <math>0,1 \sim 1,5\text{ mm}</math></li> <li>● Max, switching current : <math>200\text{ mA}</math></li> <li>● Max, switching frequency : <math>1000\text{ Hz}</math></li> </ul>
Through-beam sensor, transmitter	Order number : 21111
	<ul style="list-style-type: none"> <li>● Optical : IR LED</li> <li>● Nominal length : <math>3\text{ m}</math></li> <li>● Response time : Max, <math>3\text{ ms}</math></li> <li>● Power : <math>12 \sim 24\text{V DC} \pm 10\%</math></li> <li>● Power consumption : Max, <math>45\text{ mA}</math></li> <li>● Impedance : Min, <math>20\text{M}\Omega</math> (<math>500\text{V DC}</math>)</li> </ul>

## Components

### Optical fiber sensor

Order number : 21112



- Optical : IR LED
- Power : 12 ~ 24V DC  $\pm 10\%$
- Output : PNP, Normally open / Normally closed
- Response time : Max, 1 ms
- Power consumption : Max, 40 mA
- Max, Current : 200 mA
- Operating temperature :  $-10 \sim +60\text{ }^{\circ}\text{C}$

### Retro-reflective optical sensor

Order number : 21113



- Optical : IR LED
- Power : 10 ~ 30V DC  $\pm 10\%$
- Output : PNP, Normally open / Normally closed
- Response time : Max, 1 ms
- Power consumption : Max, 40 mA
- Max, Current : 200 mA
- Operating temperature :  $-10 \sim +60\text{ }^{\circ}\text{C}$

### Through-beam sensor, receiver

Order number : 21114



- Optical : IR LED
- Power : 10 ~ 30V DC  $\pm 10\%$
- Output : PNP, Normally open / Normally closed
- Response time : Max, 1 ms
- Power consumption : Max, 40 mA
- Max, distance : 5 m
- Operating temperature :  $-10 \sim +60\text{ }^{\circ}\text{C}$

### Magnetic reed switch

Order number : 21115



- Power : 12 ~ 27V AC/DC
- Precision :  $\pm 0.1\text{ mm}$
- Impedance : 100  $\text{M}\Omega$
- Response time (bounce) :  $< 2\text{ ms}$
- Max, switching frequency : 500 Hz
- Max, load : 40 W

### Analog ultrasonic sensor unit

Order number : 21117



- Power : 24 V DC  $\pm 10\%$
- Detecting distance : 60 ~ 250 mm
- Output Current : 6 ~ 20 A
- Tolerance :  $\pm 5\%$  FS
- Output voltage : 0 ~ 10 V DC
- Resolution : 2 mm
- Current consumption : 25 mA
- Ultra sonic frequency : 360  $\pm 15\text{ kHz}$

## Components

Analog inductive sensor unit	Order number : 21118
	<ul style="list-style-type: none"> <li>● Voltage : 15 ~ 30 V DC <math>\pm 10\%</math></li> <li>● Measurement distance : 3 ~ 8 mm</li> <li>● Min. Precision : <math>\pm 1\%</math></li> <li>● Operating temperature : <math>-10 \sim +70\text{ }^{\circ}\text{C}</math></li> <li>● Output voltage : 0 ~ 10 V DC</li> <li>● Output Current : 0 ~ 20mA</li> </ul>
Rotary unit	Order number : 21121
	<ul style="list-style-type: none"> <li>● Power : 4 ~ 30V DC</li> <li>● Current consumption : 100 mA</li> <li>● Rotary speed range : 600 ~ 4900 rpm</li> <li>● Speed adjustable : 2 buttons (increase, decrease)</li> </ul>
Diffuse optical sensor	Order number : 21122
	<ul style="list-style-type: none"> <li>● Optical : IR LED</li> <li>● Power : 12 ~ 24V DC <math>\pm 10\%</math></li> <li>● Output : PNP, NO</li> <li>● Response time : Max, 1 ms</li> <li>● Current consumption : Max, 40 mA</li> <li>● Max, Current : 300 mA</li> <li>● Operating temperature : <math>-10 \sim +60\text{ }^{\circ}\text{C}</math></li> </ul>
Diffuse optical sensor (M18)	Order number : 21123
	<ul style="list-style-type: none"> <li>● Optical : IR LED</li> <li>● Power : 12 ~ 24V DC <math>\pm 10\%</math></li> <li>● Output : PNP, NO</li> <li>● Response time : Max, 1 ms</li> <li>● Current consumption : Max, 40 mA</li> <li>● Max, Current : 100 mA</li> <li>● Operating temperature : <math>-10 \sim +60\text{ }^{\circ}\text{C}</math></li> </ul>
Inductive sensor (M12), flush type	Order number : 21124
	<ul style="list-style-type: none"> <li>● Power : 10 ~ 30V DC <math>\pm 10\%</math></li> <li>● Output : PNP, NO</li> <li>● Detection distance : 2mm <math>\pm 10\%</math></li> <li>● Hysteresis : 10% of Max, detection distance</li> <li>● Power consumption : Max, 10 mA</li> <li>● Max, switching frequency : 800 Hz</li> <li>● Operating temperature : <math>-25 \sim +70\text{ }^{\circ}\text{C}</math></li> </ul>



## Components

Inductive sensor (M18), flush type

Order number : 21125



- Power : 10 ~ 30V DC  $\pm 10\%$
- Output : PNP, NO
- Detection distance : 5mm  $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, 10 mA
- Max, switching frequency : 350 Hz
- Operating temperature :  $-25 \sim +70\text{ }^{\circ}\text{C}$

Inductive sensor (M18), non-flush type

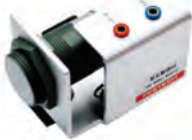
Order number : 21126



- Power : 10 ~ 30V DC  $\pm 10\%$
- Output : PNP, NO
- Detection distance : 8mm  $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, mA
- Max, switching frequency : 200 Hz
- Operating temperature :  $-25 \sim +70\text{ }^{\circ}\text{C}$

Inductive sensor (M30), 2-wire type

Order number : 21127



- Power : 20 ~ 30V DC  $\pm 10\%$
- Output : NO
- Detection distance : 10mm  $\pm 10\%$
- Hysteresis : 10% of Max, detection distance
- Power consumption : Max, 0.9 mA
- Max, switching frequency : 250 Hz
- Operating temperature :  $-25 \sim +70\text{ }^{\circ}\text{C}$

Capacitive sensor (M18)

Order number : 21128



- Power : 10 ~ 55V DC
- Detection distance : 8mm  $\pm 10\%$
- Hysteresis : 20% of Max, detection distance
- Power consumption : Max, 15 mA
- Max, switching frequency : 50 Hz






Spindle drive unit (ball screw)

Order number : 21006



- Size : 420×100×30mm
- Stroke : 280mm
- Spindle twin guide :  $\varnothing 12$
- Spindle : pitch 3mm,  $\varnothing 10$
- Type : ball screw
- Sensor guide attached
- Magnet attached

## Components

Mounting kit (vernier caliper)	Order number : 21104
	<ul style="list-style-type: none"> <li>● Mounting kit for vernier caliper (ON, 21201) on the spindle drive</li> </ul>
Linear potentiometer	Order number : 21116
	<ul style="list-style-type: none"> <li>● Power : 13 ~ 30 V DC</li> <li>● Potentiometer register : 5 k<math>\Omega</math></li> <li>● Measurement distance : 300 mm</li> <li>● Output voltage : 0 ~ 10 V DC</li> <li>● Max, allowed error : <math>\pm 0,07\%</math> of full scale</li> <li>● Resolution : 0,01 mm</li> <li>● Control speed : &lt; 10 ms</li> </ul>
Proximity sensor (magnetic)	Order number : 21119
	<ul style="list-style-type: none"> <li>● Output : PNP, NO type</li> <li>● Position Precision : <math>\pm 0,01</math> mm</li> <li>● Position Deviation : <math>\pm 0,1</math> mm</li> <li>● Response range : 7 ~ 17 mm</li> <li>● Hysteresis : 0,1 ~ 1,5 mm</li> <li>● Max, switching frequency : 1000 Hz</li> <li>● Max, switching current : 200 mA</li> <li>● 1 set : 2 ea</li> </ul>
Vernier caliper for fixing	Order number : 21201
	<ul style="list-style-type: none"> <li>● Measurement distance : 150 mm</li> <li>● Display : Digital display</li> </ul>
Rotary encoder	Order number : 21202
	<ul style="list-style-type: none"> <li>● Power : 12 ~ 24 V DC</li> <li>● Phase : A, B, Z</li> <li>● Pulse : 100 pulse/r</li> </ul>

## Components

Middle plate (for spindle drive)

Order number : 21203



- Size : 90×90mm
- Fix hole : 4ea

High position adapter (for spindle drive)

Order number : 21204



- Size : 90×40×20mm
- Hole : 2ea

Base unit (for spindle drive)

Order number : 21205



- Length : 425mm
- Mounting clamping : 2ea

Geared motor

Order number : 21206



- Operating voltage : DC 24V
- Gear ratio : 20
- Cable : safety socket 4mm






Reflector set

Order number : 21207



- Material : aluminum
- 1 set : 3 reflectors
- Size (1) : 60×180mm
- Size (2) : 40×180mm
- Size (3) : 30×180mm

## Components

Assembly profile-L	Order number : 21208
	<ul style="list-style-type: none"> <li>● L-shape aluminum profile</li> <li>● Size : 150×150mm</li> </ul>
Assembly profile-I	Order number : 21209
	<ul style="list-style-type: none"> <li>● I-shape aluminum profile</li> </ul>
Set of weights (circular type)	Order number : 21301
	<ul style="list-style-type: none"> <li>● Quantity : 10 ea (1,000g /ea)</li> <li>● Case : wood</li> </ul>
Strain gauge unit	Order number : 21302
	<ul style="list-style-type: none"> <li>● Measurement range : 0 ~ 5 N</li> <li>● Over load : 130% of measurement range</li> <li>● Type : Foil SG</li> <li>● Register : 350 Ω</li> <li>● Max. input allowed voltage : 10 V</li> </ul>
Load cell unit	Order number : 21303
	<ul style="list-style-type: none"> <li>● Measurement range : 0 ~200 N</li> <li>● Measurement tolerance : 1% of full-scale value</li> <li>● Sensitivity (nominal) : 1 mV</li> <li>● Allowed load : 130% of measurement range</li> <li>● Limit load : 200% of measurement range</li> <li>● Bridge register (Full bridge) : 350 Ω</li> <li>● Allowed input voltage : 3 ~ 10V AC/DC</li> </ul>

## Components

### Bridge amplifier

Order number : 21304



- Power consumption : 50 mA
- Register : 350 Ω
- Bridge input voltage : 5V DC
- Amplifying input range :  $\pm 10$  mV
- Amplifying output range :  $\pm 5$  V
- Amplifying rate : app. 500

### Double acting cylinder

Order number : 21305



- Pressure : Max, 10 bar
- Cylinder inner diameter : 25mm
- Stroke : 100 mm
- Advance force at 6 bar : 267 N
- Return force at 6 bar : 220 N

### Analog pressure sensor

Order number : 21306



- Pressure range : 0 ~ 10 bar
- Max, allowed pressure : 14 bar
- Power : 24 V DC
- Output voltage : 0 ~ 10 V
- Current : 0 ~ 20 mA
- Measurement tolerance :  $\pm 1\%$
- Max, measurement frequency : 100 Hz

### Temperature sensor & controller

Order number : 21307



- Controller Power : 220V AC, 60Hz
- Output Current : 4 ~ 20 mA
- Thermocouple : KC 0.0 ~ 400.0 °C
- PID control
- Heating button
- Heater included
- PT-100 Ω sensor included
- Output : 1C relay






### Humidity sensor and controller

Order number : 21308



- Power : 220V AC, 60Hz
- Relay output (1C)
- Measurement range : 20 ~ 99%RH
- Resolution :  $\pm 1\%$ rdg  $\pm 1$ digit

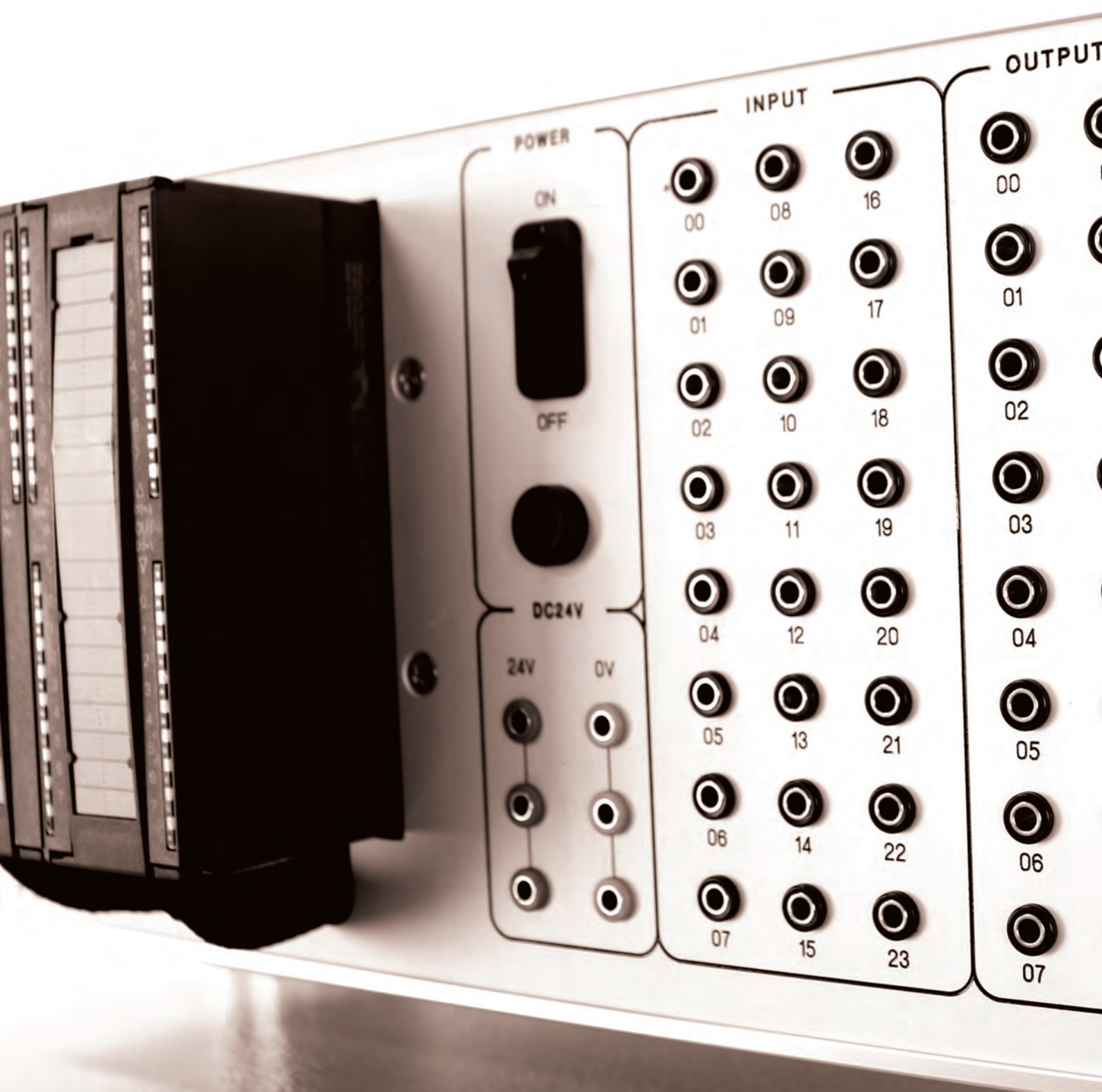
## Components

Vibration sensor and controller	Order number : 21311
	<ul style="list-style-type: none"> <li>● Power : DC24V</li> <li>● Vibration sensor               <ul style="list-style-type: none"> <li>– sensitivity : <math>5.1\text{mV}/(\text{m}/\text{s}^2) \pm 20\%</math></li> <li>– frequency range : 10 ~ 2000Hz</li> </ul> </li> <li>● Controller               <ul style="list-style-type: none"> <li>– Power : DC12 ~ 24V</li> <li>– Output : 4 ~ 20mA</li> </ul> </li> </ul>
Color mark sensor	Order number : 21312
	<ul style="list-style-type: none"> <li>● Power : DC 24V</li> <li>● Optical : halogen lamp</li> <li>● Response time : 1m/10ms switch selection</li> <li>● Output : NPN open collector</li> <li>● Protection circuit</li> </ul>
Cable hanger	Order number : 13091
	<ul style="list-style-type: none"> <li>● Round plate diameter : 400mm</li> <li>● Height : 1100 ~ 1800mm adjustable type</li> <li>● Castor : 5 ea</li> <li>● Cable hanger : 16 holes</li> </ul>
Compressor (for sensor)	Order number : 21313
	<ul style="list-style-type: none"> <li>● Motor : 220V AC, 60Hz, 0.2HP</li> <li>● Pressure : Max. 7bar</li> <li>● Type : oil-less</li> <li>● Tank Size : 3L</li> <li>● Weight : 8.5kg</li> </ul>
Sensor training set manual	Order number : 42041
	<ul style="list-style-type: none"> <li>● Exercise book</li> <li>● FS-110</li> <li>● FS-120</li> <li>● FS-130</li> </ul>



## **Memo**

03



POWER

ON

OFF

DC24V

24V

0V

INPUT

OUTPUT

00

08

16

00

01

09

17

01

02

10

18

02

03

11

19

03

04

12

20

04

05

13

21

05

06

14

22

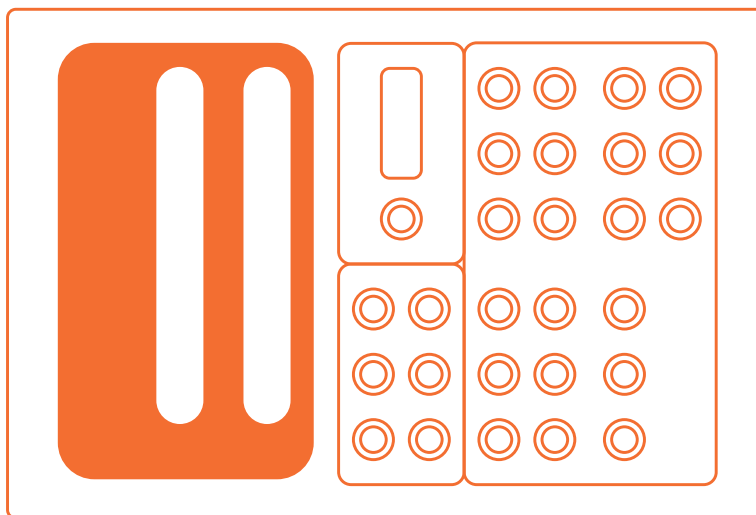
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07

15

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07



## CHAPTER

# 04

## PLC TRAINER

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# PLC TRAINER

SIEMENS



Allen-Bradley



OMRON



## Basic Level



23151



23152



23060



## Advanced Level



23155



23052



23003



41115



23167



23055



23021



23027

## Application Module



23028



23029



23030



23035



23019



23046



23047



23070



23071



23072



26013



Touch panel

## Introduction

The FESTECH PLC trainer is produced specifically to meet customer needs. All of the PLC trainers use 4mm sockets and can be wired easily.

The application modules can be selected and combined to meet training goals. (e.g.: analog module, position control module, PID control module etc.)

The trainer is compatible with all components (pneumatics, hydraulics, motor control, process control, etc.), and any type of PLC can be selected.



FPLC-T060

04



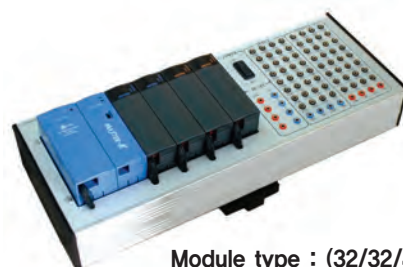
Block type PLC(A)



Module type (16/16)



Module type : (32/32)



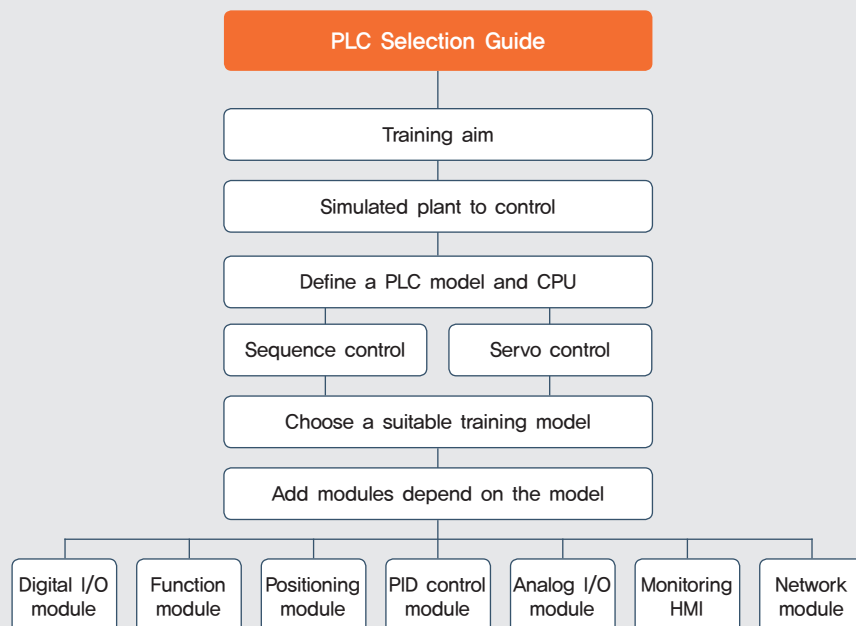
Module type : (32/32/4ch/2ch)



## Adaptable plc

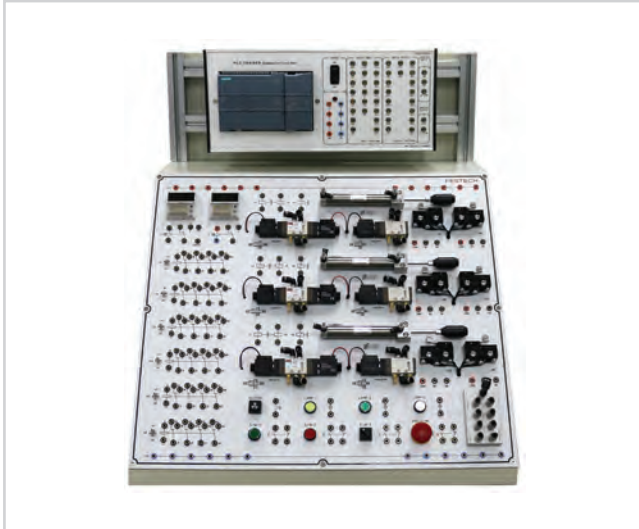


SIEMENS	LOGO, S7-200, S7-300, S7-400, S7-1200
mitsubishi	FX Series, Melsec-Q
LS	MK, GM, XGT
Allen-Bradley	Micro Logix, Compact Logix, Control Logix
ETC	OMRON





## PLC trainer (FPLC-T050)



Order number : 23050

### Features

- Electro-pneumatic control with PLC
- Possible to use a PLC standard trainer
- Availability in narrow space
- Various exercise work sheets
- Any kind of PLC is possible

### Training contents

- Basic pneumatic control
- Pneumatic sequence control circuit
- Various condition-auto/manual selection circuit, emergency circuit
- Error finding in pneumatic system
- Safety of pneumatic system
- Usage of an electro-pneumatic parts
- Relay control circuit
- Electric self-holding circuit
- Electric sequence control circuit
- Electro-pneumatic system
- PLC-pneumatic control
- PLC program control

04

### Component

No.	Component	Qty.
1	Service unit	1
2	Manifold	1
3	Double acting cylinder(flow control)	3
4	5/2-WAY single solenoid valve	3
5	5/2-WAY double solenoid valve	3
6	Electrical limit switch left	3
7	Electrical limit switch right	3
8	Time relay	1
9	Counter	1

No.	Component	Qty.
10	Push-button switch	2
11	Emergency switch	1
12	Buzzer	1
13	Lamp	3
14	Electric relay	6
15	PLC unit	1
16	Plastic hose(1m)	10
17	Select switch	1
18	Cable set	1

### Recommended PLC type



16DI / 16DO / 2AI / 1AO all brands of PLC are possible

# PLC trainer (FPLC-T051)



Order number : 23051

## Features

- User can save the training space.
- PLC and other modules are combined.
- 4mm socket wiring
- User can choose various PLC, IO, module specs

## Training contents

- PLC program control
- Digital input / output
- Counter / timer usage
- Special function usage
- Various condition
- Buzzer and lamp usage
- Principle and feature of sensors
- Sensor application
- DC geared motor control
- Motor speed check
- Principle and application of encoder
- AD/DA module exercise

## Component

No.	Component	Qty.
1	Push-button switch (lamp included)	5
2	Toggle switch	5
3	LED lamp	8
4	Buzzer	1
5	Digital counter relay	1
6	Volt meter	1
7	Volt generator	1

No.	Component	Qty.
8	Inductive sensor	1
9	Capacitive sensor	1
10	Optical sensor	1
11	Motor speed controller	1
12	Rotary plate	1
13	GM4 PLC (Optional)	

## Recommended PLC type



16DI / 16DO / 2AI / 1AO all brands of PLC are possible

PLC trainer (FPLC-T052)



Order number : 23052

Features

- User can save the training space.
- PLC and other modules are combined.
- 4mm socket wiring

Training contents

- PLC program control
- Digital input / output (switch, lamp module)
- Digital switch and 7-segment usage
- Analog input/output (A/D, D/A) control
- Special function usage
- Various condition
- Buzzer and lamp usage
- DC geared motor control
- Motor speed check
- Principle and application of encoder

Component

No.	Component	Qty.
1	Switch module	1
2	Lamp module	1
3	Digital module	1
4	Analog module	1

No.	Component	Qty.
5	Analog display module	1
6	DC motor module	1
7	Power supply module	1
8	SIEMENS PLC (Optional)	

Recommended PLC type



16DI / 16DO / 2AI / 1AO all brands of PLC are possible

# PLC trainer (FPLC-T053)



## Features

- User can save the training space.
- PLC and other modules are combined.
- 4mm socket wiring

## Training contents

- PLC program control
- Buzzer and lamp operating
- Digital counter
- Various condition
- DC geared motor control
- Motor speed check
- Principle and exercise of encoder
- Cylinder control using solenoid valve

Order number : 23053

## Component

No.	Component	Qty.
1	Push-button switch	6
2	Push-button switch (locking type)	2
3	Emergency switch	1
4	LED lamp	8
5	Buzzer	1
6	Digital counter relay	1
7	Double-acting cylinder	1
8	5/2-WAY single solenoid valve	1
9	5/2-WAY double solenoid valve	1

No.	Component	Qty.
10	Electric limit switch (left)	1
11	Electric limit switch (right)	1
12	Inductive sensor	1
13	Capacitive sensor	1
14	Optical sensor	1
15	Motor speed controller	1
16	Rotary plate	1
17	MASTER-K PLC (Optional)	
18	Toggle switch	4

## Recommended PLC type



DI16 / 16DO all brands of PLC are possible

PLC trainer (FPLC-T060)



Order number : 23060

Features

- User can have training in narrow space,
- PLC and other modules are combined,
- 4mm socket wiring
- User can choose various PLC, IO, module specs

Training contents

- Digital input/ output signal
- Special function usage
- Various conditions
- PLC program control

04

Component

No.	Component	Qty.
1	Input switch module	
1-1	Push-button switch	4
1-2	Select switch	2
1-3	Emergency switch	1
1-4	Toggle switch	8
1-5	Digital switch (25pin D-SUB connector)	1
2	Output display module	
2-1	Lamp	2
2-2	LED lamp	8
2-3	Buzzer	1
2-4	7 segment (25pin D-SUB connector)	1

No.	Component	Qty.
3	Motor control module	
3-1	DC motor	1
3-2	Rotary plate	1
3-3	Photo sensor	2
3-4	Stepping motor	1
3-5	CW/CCW rotary DC motor	1
3-6	Limit switch	4
3-7	GM4 PLC (Optional)	

Recommended PLC type



24DI / 16DO / 2AI / 1AO all brands of PLC are possible



# PLC trainer (FPLC-T070)



Order number : 23061

## Features

- User can have training in narrow space.
- PLC and other modules are combined.
- 4mm socket wiring
- User can choose various PLC, IO, module specs
- Need : interface IO module (20P connector type)

## Training contents

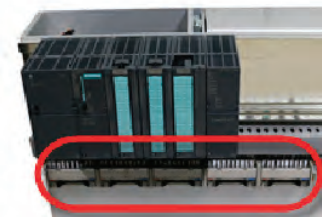
- PLC program control
- Digital input/ output (switch, lamp, buzzer etc)
- Digital switch and 7-segment usage
- Analog input/ output (A/D, D/A) control
- Special function usage
- Various conditions

## Component

No.	Component	Qty.
1	IO Module (16/16)	6
2	Digital & Analog module	2
2-1	Toggle switch	1
2-2	LED lamp	8
2-3	7 segment (4digits)	1

No.	Component	Qty.
2-4	Digital switch (4digits)	1
2-5	Analog input display	1
2-6	Analog output generator	1
3	Analog input/output module	1
4	Touch panel (7")	1

## Recommended PLC type



24DI / 16DO / 2AI / 1AO all brands of PLC (connector type) are possible



## Portable PLC trainer (FPLC-T501)



Order number : 23079

### Features

- Portable type equipment
- PLC input / output control exercise
- Various PLC training (basic to advanced)
- User can have training in narrow space
- PLC exercise
- 4mm safety socket
- User can choose various PLC, IO, module specs

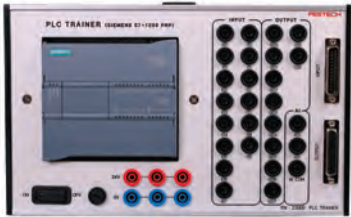
04

### Component

No.	Component	Qty.
1	PLC Unit	1
2	Double-acting cylinder (flow control valve attached)	3
3	5/2-WAY single solenoid valve	3
4	5/2-WAY double solenoid valve	3
5	Electric limit switch(left)	3
6	Electric limit switch(right)	3
7	Push-button switch	4

No.	Component	Qty.
8	Select switch	1
9	Emergency switch	1
10	Toggle switch	2
11	BUZZER	1
12	4 digit LED	1
13	Plastic hose	10
14	Cable set	1

### Recommended PLC type



14DI / 10DO all brands of block PLC are possible

## Portable PLC communication trainer (FPLC-T502)



### Features

- Portable type equipment
- PLC input / output control exercise
- Various PLC training (basic to advanced)
- User can have training in narrow space
- PLC exercise
- 4mm safety socket
- User can choose various PLC, IO, module specs

Order number : 23078

### Component

No.	Component	Qty.
1	PLC Unit	2
2	Touch panel (7" )	1
3	Conveyor module	2
4	Solenoid coil	3
5	Optical fiber sensor	3
6	Capacitive sensor	1
7	Optical sensor	1

No.	Component	Qty.
8	Inductive sensor	1
9	Push-button switch	2
10	Select switch	1
11	Emergency switch	1
12	Relay	2
13	Case	1
14	Cable set	1

### Recommended PLC type



16DI / 16DO all brands of PLC are possible

## SIEMENS PLC

Block type (14DI / 10DO)

Order number : 23151



- Digital input : 14 channel
  - Digital output : 10 channel (Relay)
  - Analog input : 2 channel
  - Analog output : 2 channel
  - HSC included (1 channel)
  - EtherNet communication
  - 4mm socket
  - Power supply included
- ※ PC-Adapter, software not included

Module type (16DI / 16DO)

Order number : 23152



- Digital input : 16 channel
- Digital output : 16 channel (relay or TR)
- 4mm socket
- Power supply included
- PROFIBUS-DP communication (Optional)

※ PC-Adapter, software not included

Module type (32DI / 32DO)

Order number : 23155



- Digital input : 32 channel
- Digital output : 32 channel (TR)
- 4mm socket
- Power supply included

※ PC-Adapter, software not included

Module type (24DI / 16DO / 4AI / 2AO)

Order number : 23157



- Digital input : 24 channel
  - Digital output : 16 channel (TR)
  - Analog input : 4 channel
  - Analog output : 2 channel
  - 4mm socket
  - Power supply included
- ※ PC-Adapter, software not included

Optional module

Order number : 23159



- Position control card (1axes, 2axes)
- Communication module
  - RS-232, RS-485, EtherNet, CC-Link
- Remote IO module
  - PROFIBUS
  - Modbus TCP

## Mitsubishi PLC

### Block type (16DI / 16DO)

Order number : 23161



- Digital input : 16 channel
- Digital output : 16 channel (Relay)
- 4mm socket
- Power supply included
- Communication(option) : RS-232, RS-422, RS-485

※ Communication cable sold separately

### Module type (16DI / 16DO)

Order number : 23162



- Digital input : 16 channel
- Digital output : 16 channel (Relay/TR selection)
- Communication : USB, RS-232
- 4mm socket
- Power supply included

### Module type (32DI / 32DO)

Order number : 23165



- Digital input : 32 channel
- Digital output : 32 channel (TR)
- 4mm socket
- Power supply included

### Module type (32DI / 32DO / 4AI / 2AO)

Order number : 23167



- Digital input : 32 channel
- Digital output : 32 channel (TR)
- Analog input : 4 channel
- Analog output : 2 channel
- 4mm socket
- Power supply included

### Optional module

Order number : 23169

- Position control card (1axes, 2axes)
- Communication module
  - RS-232, RS-485, EtherNet, CC-Link
- Remote IO module
  - PROFIBUS
  - Modbus TCP

## LS PLC

Block type (18DI / 12DO)

Order number : 23001



- Digital input : 18 channel
- Digital output : 12 channel (Relay)
- HSC included
- 2axes position control
- 4mm socket
- Power supply included

Module type (16DI / 16DO)

Order number : 23002



- Digital input : 16 channel
- Digital output : 16 channel (Relay or TR)
- 4mm socket
- Power supply included

Module type (32DI / 32DO)

Order number : 23005



- Digital input : 32 channel
- Digital output : 32 channel (Relay or TR)
- 4mm socket
- Power supply included

Module type (32DI / 32DO / 4AI / 2AO)

Order number : 23007



- Digital input : 32 channel
- Digital output : 32 channel (Relay or TR)
- Analog input : 4 channel
- Analog output : 2 channel
- 4mm socket
- Power supply included

Optional module

Order number : 23077

- Position control card (1axes, 2axes)
- Communication module
  - RS-232, RS-485, Ethernet, CC-Link
- Remote IO
  - PROFIBUS
  - DeviceNet
  - Modbus

## Allen-Bradley PLC

Block type (16DI / 16DO)

Order number : 23171



- Digital input : 16 channel
- Digital output : 16 channel (Relay)
- 4mm socket
- Power supply included

Module type (16DI / 16DO)

Order number : 23172



- Digital input : 16 channel
- Digital output : 16 channel (Relay or TR)
- 4mm socket
- Power supply included

※ Software is not included

Module type (32DI / 32DO)

Order number : 23175



- Digital input : 32 channel
- Digital output : 32 channel (TR)
- 4mm socket
- Power supply included

※ Software is not included

Module type (32DI / 32DO / 4AI / 2AO)

Order number : 23177



- Digital input : 24 channel
- Digital output : 16 channel (TR)
- Analog input : 4 channel
- Analog output : 2 channel
- 4mm socket
- Power supply included

※ Software is not included

Optional module

Order number : 23179

- Position control cart (1axes, 2axes)
- Communication module
  - RS-232, RS-485, Ethernet, CC-Link
- Remote IO
  - PROFIBUS
  - DeviceNet
  - Modbus



## PLC training modules

### Input switch module

Order number : 23028



- Push-button switch
- Select switch
- Emergency switch
- Toggle switch
- 4 Digits digital switch
- 4mm socket

### Output display module

Order number : 23029



- Lamp
- LED lamp
- Buzzer
- 4 Digits 7 FND
- 4mm socket

### Motor control module

Order number : 23030



- DC Geared Motor
- Stepping Motor
- Position control module with rack & pinion
- Photo interrupter sensor
- Limit switch (position control)
- 4mm socket

### Relay control module

Order number : 23034



- 4C relay : 3EA
- Relay pilot lamp
- 4mm socket

### Input / Output module

Order number : 23073



- Toggle switch
- Select switch
- Push-button switch
- Emergency switch
- Toggle switch
- Buzzer
- DC motor
- Relay
- 4mm socket

## PLC training modules

### Solenoid valve module 1

Order number : 23031



- 5/2-WAY single solenoid valve : 2ea
- 5/2-WAY double solenoid valve : 2ea
- Pressure gauge
- Regulator
- Shut-off valve
- 4mm socket

### Solenoid valve module 2

Order number : 23046



- 5/2-WAY single solenoid valve : 3ea
- 5/2-WAY double solenoid valve : 3ea
- Pneumatic symbol
- Shut-off valve
- Solenoid valve COM
- 4mm socket

### Cylinder control module 1

Order number : 23032



- Double-acting cylinder : 2ea
- Reed switch for detecting movement
- Pneumatic symbol
- Plastic cam
- 4mm socket

### Cylinder control module 2

Order number : 23047



- Double-acting cylinder : 3ea
- Reed switch for detecting movement
- Pneumatic symbol
- Plastic cam
- Reed switch COM
- 4mm socket

### A/D, D/A module

Order number : 23038



- Signal Generator : 0~10V
- Signal Display : 0~10V
- Digital Display Unit

## PLC training modules

## Regulated power supply

Order number : 23037



- Digital voltage display
- Range : DC 0~24V, 5A
- Power : AC 220V
- CV, CC

## AUTO DOOR module

Order number : 23070



- DOOR sensor
- LED
- Buzzer
- INPUT/OUTPUT : D-SUB connector terminal
- Auto / manual mode
- Manual switch

※ Interface I/O terminal or PLC connector is needed

## CONVEYOR &amp; SENSOR module

Order number : 23071



- Conveyor belt : DC 24V
- Capacitive sensor
- Optical sensor
- LED
- Buzzer
- Auto / manual mode
- Manual switch
- INPUT/OUTPUT terminal

※ Interface I/O terminal or PLC connector is needed

## Inverter module

Order number : 24011



- DC 24V power
- Push-button switch
- SIEMENS inverter
- AC 3phase motor
- Inverter magnet included
- 4mm, 2mm socket

## Traffic signal module

Order number : 23072



- High-brightness LED
- INPUT/OUTPUT terminal

※ Interface I/O terminal or PLC connector is needed

## PLC training modules

### Signal controller module

Order number : 26013



- Input : 0~20mA, -10 ~ 10V
- Output signal : 0 ~ 10V, -10 ~ 10V
- Setting Input, output using toggle switch
- Able to have training with 4mm socket or terminal block
- Power : DC24V

### Analog display module

Order number : 21015



- Power : DC24V
- Voltage measurement range : 0~10V
- Current measurement range : 0~20mA
- Voltage measurement display square LED
- Current measurement display rotary LED

### Electro-pneumatics and PLC training panel

Order number : 23106



- Power : DC24V
- Size : 740mm X 340mm
- Able to attach in profile panel
- Double-acting cylinder
- Limit switch
- Solenoid valve
- Pneumatic regulator
- DC motor
- CW/CCW rotary circuit training relay
- Photo sensor (PNP/NPN)
- Stepping motor

### REMOTE I/O

Order number : 23077



- Communication : PROFIBUS
- Input : 24 channel
- Output : 16 channel
- Input Connector : D-Sub 25p
- Output Connector : D-Sub 25p
- One-touch clamp type
- Need Profibus cable

## PLC training modules

Touch panel

Order number : 27456



- Display : 7" , LCD Color
- Power : DC24V
- Resolution : 600\*480
- Communication : USB, RS232, ETHERNET
- Aluminum case and one-touch mounting

Cable set

Order number : 13080



- Color : red, blue, black
- Length : 1500mm, 1000mm, 600mm, 300mm, 100mm
- High elasticity and special coating

Cable set (Safety socket)

Order number : 113080



- Color : red, blue, black
- Length : 1500mm, 1000mm, 600mm, 300mm, 100mm
- Safety socket type

Cable hanger

Order number : 13091



- Round plate diameter : 400mm
- Height : 1100 ~ 1800mm adjustable type
- Castor : 5 ea
- Cable hanger : 16 groove

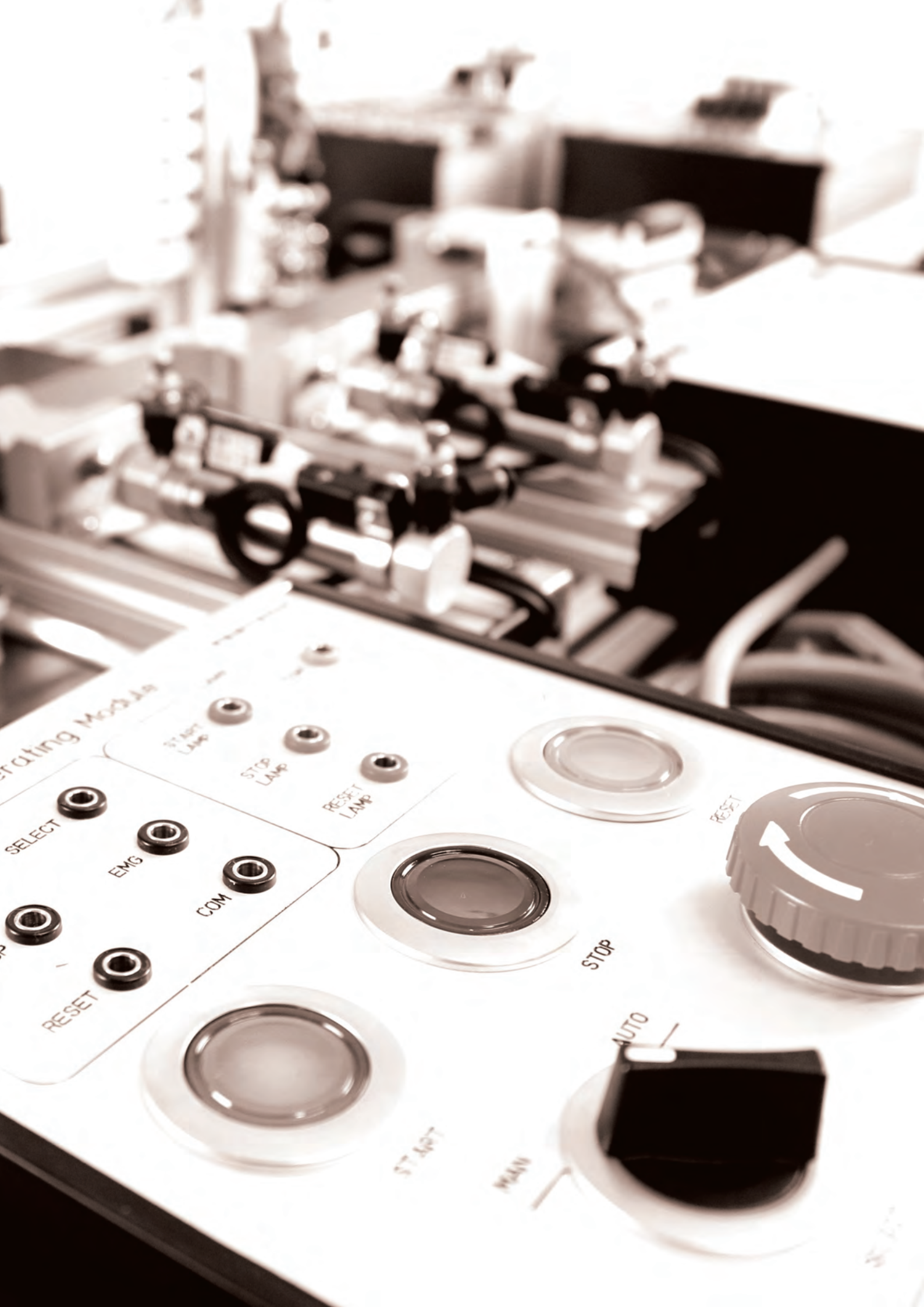
PLC trainer manual

Order number : 42040

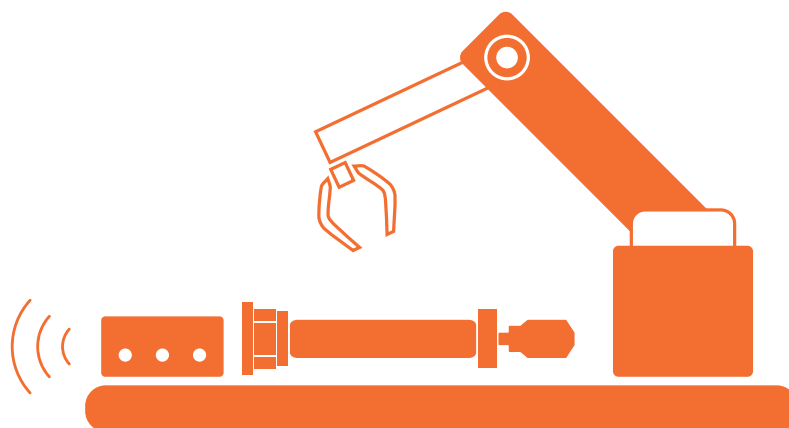


- PLC control manual
- PLC control exercise









## CHAPTER

# 05

## FA APPLICATION

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## FA APPLICATION

**01** Servo mechatronics trainer

**02** Mechatronics automation system trainer

**03** Mini MPS (mini mechatronics trainer)

**04** PTP Pneumatic robot trainer

**05** Conveyor belt trainer

**06** Palletizing control trainer

**07** Automatic warehouse trainer, Basic, Advanced

**08** Sorting conveyor trainer

**09** Coil feed and winder trainer

**10** Building automation system trainer

**11** Elevator trainer

**12** Parking management trainer

**13** Automatic door trainer

**14** Traffic signal control trainer

**15** Fortress game

**16** Pinball game

**17** Motor & cylinder control module

**18** Automation display models

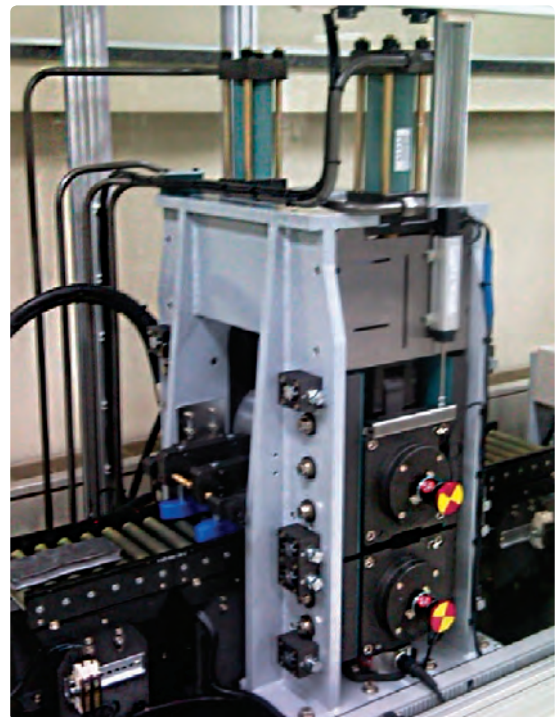
# FA APPLICATION

## Introduction

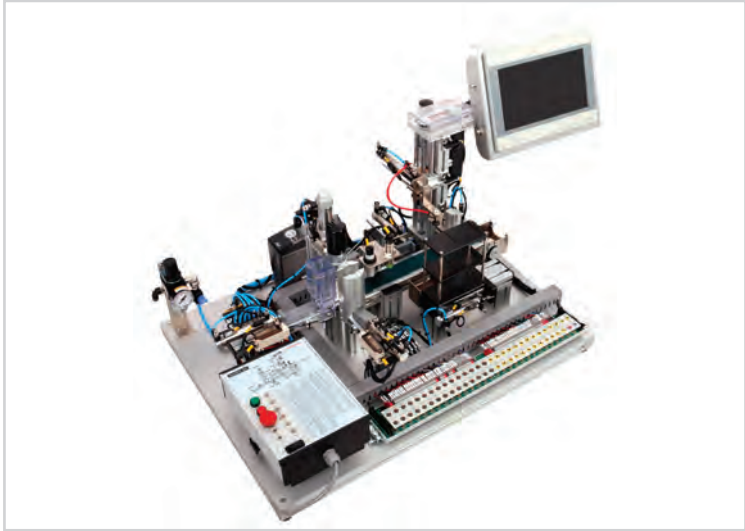
FA applications were developed to improve the level of understanding of apprentices through various applications. Overall knowledge of factory automation such as pneumatics, electric sequence, sensors, and networks could be mastered and a control programs could be designed for the corresponding PLC, microprocessor, and VLC.

FESTECH offers various solutions for industrial lines, including customization. Apprentices can better understand the trends of brand-new automation, and adapt to industry technology using a touch screen or monitoring system.

05



# Servo mechatronics trainer (FMCA-300-SERVO)



Order number : 25020

### Features

- DC geared motor and conveyor system
- Applied control with actuator and sensor
- 1 axes servo motor system
- Touch panel
- Linear spindle drive unit
- Easy connect I/O
- Training in narrow space
- Basic and advanced training
- Minimum required PLC IO : 25 DI / 22 DO / 1-axis position control module

### Training contents

- PLC digital input/ output signal
- Sensor principle, feature, and usage
- Counter/ timer usage
- Buzzer and lamp usage
- Conveyor module control
- 1-axis servo motor control
- Servo motor driver parameter setting
- Various PLC program control
- System defect tracking and maintenanc

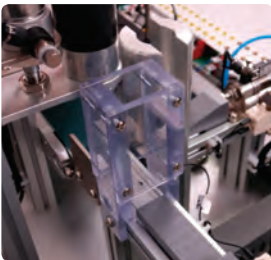
### Component

No.	Component	Qty.
1	Working table	1
2	Distribution module	1
3	Processing module	1
4	Transfer module	1
5	Conveyor and testing module	1
6	Stopper module	1
7	Ejecting module	1
8	Lift (spindle) module	1

No.	Component	Qty.
9	PTP handling module	1
10	Vacuum and suction cup module	1
11	Storage module (3 stacks)	1
12	Touch module	1
13	Power and operating module	1
14	Solenoid valve module	1
15	I/O interface terminal board	1



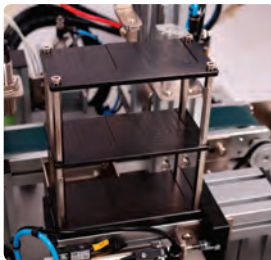
▲ Lift module



▲ Distribution and processing module

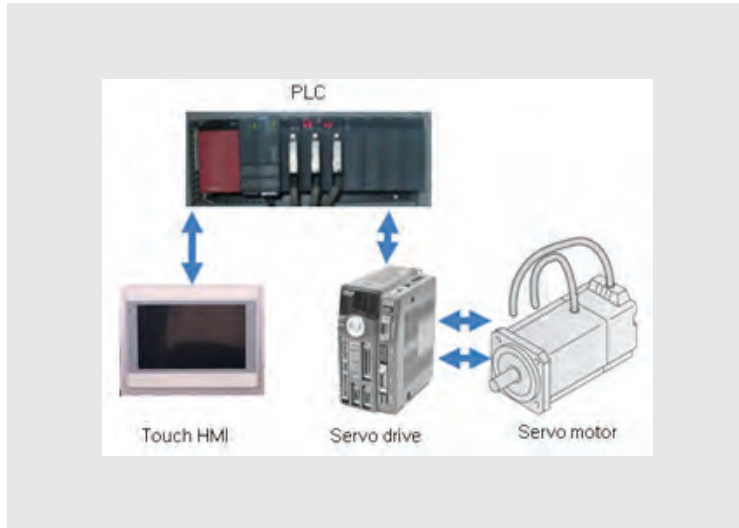


▲ Transfer module



▲ Storage module

## Servo mechatronics trainer (FMCA-300-SERVO) |



### Servo motor

- Output : 50W, 100W
- Rotary speed : 3000rpm
- Encoder : absolute position, incremental

### Servo motor drive

- AD converter : 16bit
- Encoder : absolute position : 11bit  
incremental : 2000 ~ 6000(p/rev)
- Communication : rs-232, rs-485
- Digital IO : 12/10
- JOG mode
- Sine wave PWM control, current control type

05



### Touch module & bracket

- Display : 7" wide
- Color : 800×480
- Communication : rs-232, 485, Ethernet, USB
- Controller : SIEMENS, Mitsubishi, LS, EasyView, M2I etc,



▲ Processing module



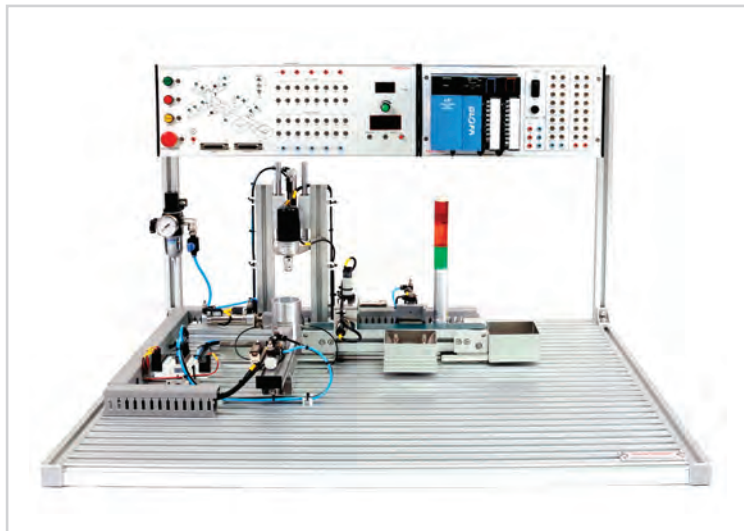
▲ Operating module



▲ PLC terminal board



## Mechatronics automation system trainer (standard type) (FMAT-110-S-PLC)



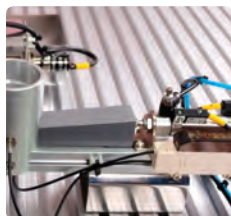
Order number : 25003

### Features

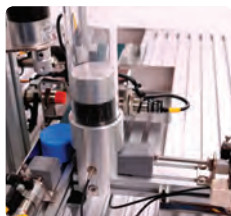
- Stable aluminum profile panel
- Training in narrow space
- Various PLC exercise sheets
- Completed wiring and tubing
- Easy addition I/O module

### Training contents

- PLC digital input/ output signal
- Usage of sensors
- Usage of counter and timer
- Usage of buzzer and lamp
- Conveyor module control
- Various PLC program control
- System defect tracking and maintenance



▲ Distribution module



▲ Transfer module



▲ Conveyor module

### Specification

- Size : 900(w)×750(d)×530(h)
- Weight : 23kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V
- Required PLC IO : 16 DI / 10 DO

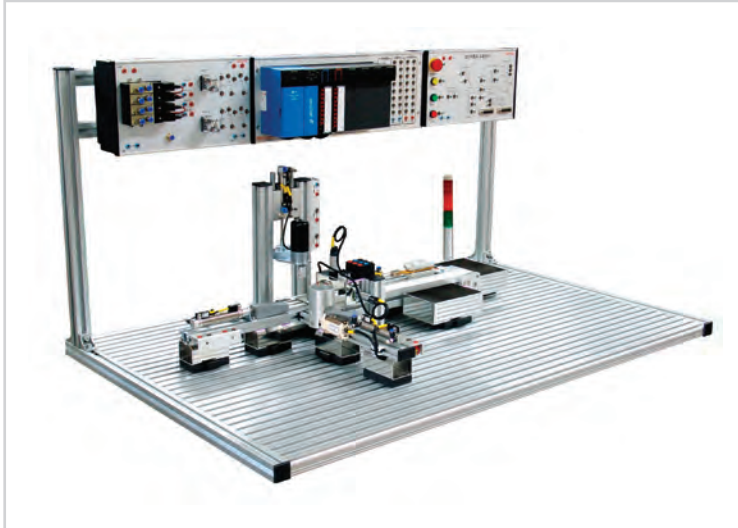
### Component

No.	Component	Qty.
1	Training plate (aluminum profile panel)	1
2	Distribution module cylinder (magnetic reed sensor attached)	1
3	Optical fiber sensor	1
4	Drill motor	1
5	Drill module cylinder (magnetic reed sensor attached)	1
6	Transfer module cylinder (magnetic reed sensor attached)	1
7	Inductive sensor	1
8	Capacitive sensor	1
9	Optical sensor	1
10	Ejecting cylinder (magnetic reed sensor attached)	1

No.	Component	Qty.
11	Conveyor module	1
12	Motor control unit	1
13	5/2-way single solenoid valve	4
14	5/2-way double solenoid valve	1
15	MAS display module	1
16	Input terminal board	1
17	Output terminal board	1
18	Tower lamp unit	1
19	PLC controller (Optional)	



## Mechatronics automation system trainer (module type) (FMAT-120-M-PLC)



Order number : 25005

### Features

- Stable aluminum profile panel
- Training in narrow space
- Various PLC exercise sheets
- Modular type components (mounting attached)
- Sensor protection circuit

### Training contents

- Electro-pneumatics system
- PLC digital input/ output signal
- Usage of sensors
- Usage of counter/ timer
- Composition of MAS
- Various conditions
- Usage of buzzer and lamp
- Conveyor module control
- Various PLC program control
- System defect tracking and maintenance
- Motion step diagram

### Specification

- Size : 1200(w)×750(d)×530(h) mm
- Weight : 28kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V
- Required PLC IO : 16 DI / 10 DO

### Component

No.	Component	Qty.
1	Training plate (aluminum profile panel)	1
2	Distribution cylinder (magnetic reed sensor attached)	1
3	Optical fiber sensor	1
4	Drill motor	1
5	Drill module cylinder (magnetic reed sensor attached)	1
6	Transfer module cylinder (magnetic reed sensor attached)	1
7	Inductive sensor	1
8	Capacitive sensor	1
9	Optical sensor	1
10	Ejecting cylinder (magnetic reed sensor attached)	1

No.	Component	Qty.
11	Conveyor module	1
12	Motor control unit	1
13	5/2-way single solenoid valve	4
14	5/2-way double solenoid valve	1
15	MAS display module	1
16	Input terminal board	1
17	Output terminal board	1
18	Tower lamp unit	1
19	PLC controller (Optional)	



▲ Distribution module



▲ Processing & transfer module

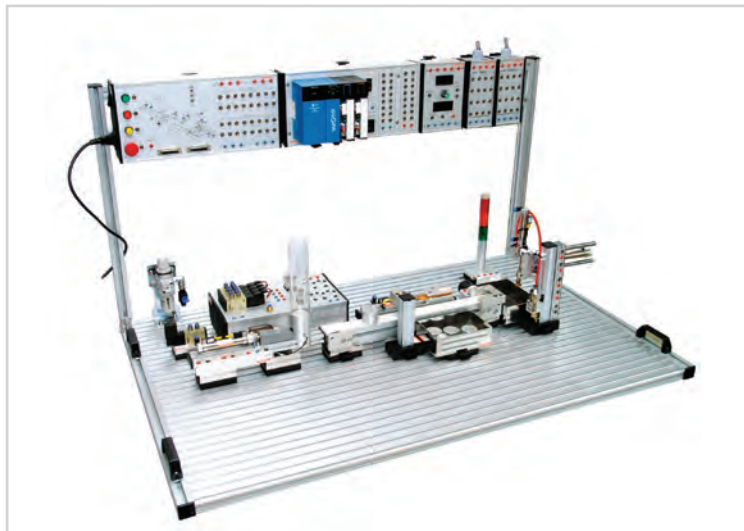


▲ Testing (sensor) module



▲ Conveyor & ejecting module

## Mechatronics automation system trainerII (module type) (FMAT-140-M-PLC)



Order number : 25034

### Features

- Stable aluminum profile panel
- Training in narrow space
- Various PLC exercise sheets
- Modular type components (mounting attached)
- Sensor protection circuit

### Training contents

- Electro-pneumatics system
- PLC digital input/ output signal
- Usage of sensors
- Usage of counter/ timer
- Composition of MAS
- Various conditions
- Usage of buzzer and lamp
- Conveyor module control
- Various PLC program control
- System defect tracking and maintenance
- Motion step diagram

### Specification

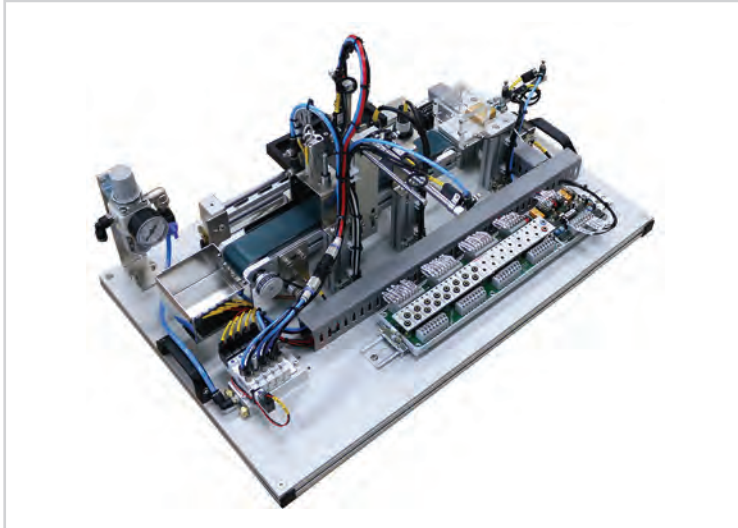
- Size : 1200(w)×750(d)×530(h) mm
- Weight : 30kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V
- Required PLC IO : 16 DI / 10 DO

### Component

No.	Component	Qty.
1	Training plate (aluminum profile panel)	1
2	Distribution cylinder (magnetic reed sensor attached)	1
3	Optical fiber sensor	1
4	Drill motor	1
5	Drill module cylinder (magnetic reed sensor attached)	1
6	Transfer module cylinder (magnetic reed sensor attached)	1
7	Inductive sensor	1
8	Capacitive sensor	1
9	Optical sensor	1
10	Ejecting cylinder (magnetic reed sensor attached)	1

No.	Component	Qty.
11	Conveyor module	1
12	Motor control unit	1
13	5/2-way single solenoid valve	4
14	5/2-way double solenoid valve	1
15	MAS display module	1
16	Input terminal board	1
17	Output terminal board	1
18	Tower lamp unit	1
19	PLC controller (Optional)	

## Mini MPS (mini mechatronics trainer) (FMCT-120)



Order number : 41115

### Features

- Stable aluminum profile
- Training in narrow space
- Completed wiring and tubing
- Easy addition an I/O module
- Conveyor speed with Encoder
- Linear spindle drive
- Fieldbus communication

### Specification

- Size : 660(w)×460(d)×440(h) mm
- Weight : 30kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V
- Minimum required PLC IO : 22 DI / 18 DO

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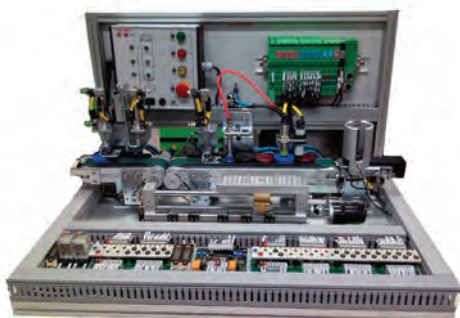


Order number : 25039

### Component

No.	Component	Qty.
1	Training plate (aluminum profile panel)	1
2	Distribution module	1
3	Conveyor belt module	1
4	Testing module	1
5	PTP handling module	1
6	Vacuum module	1

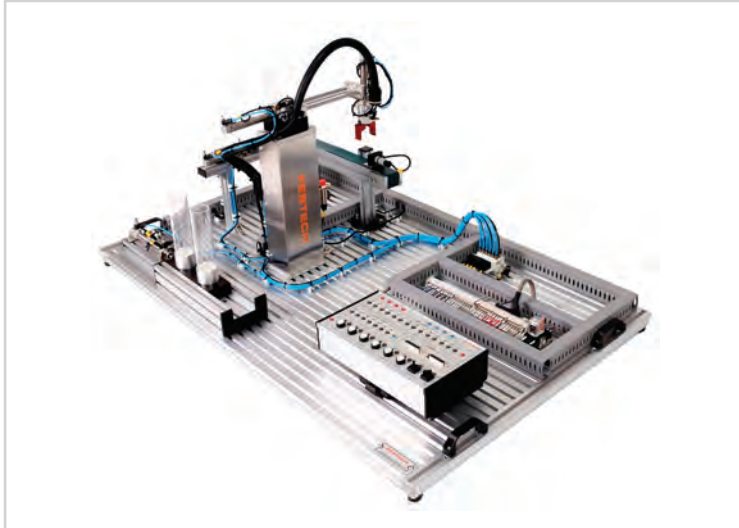
No.	Component	Qty.
7	Stepper module	1
8	Spindle drive module	1
9	Solenoid valve module	1
10	I/O interface terminal	1
11	Mechatronics control circuit	1
12	PLC controller (Optional)	



### Mini MPS Advanced features

- Stable aluminum profile
- Training in narrow space
- Completed wiring and tubing
- Easy addition an I/O module
- Conveyor speed with Encoder
- Linear spindle drive
- Fieldbus communication
- Double conveyor system
- Linear potentiometer for testing
- Analog input value
- Minimum Advanced require PLC IO : 29DI / 22 DO / 1AI

## PTP Pneumatic robot trainer (FPLC-PTP-ROB-TK)



Order number : 23021

### Features

- 3-axes robot with pneumatic cylinders
- Pneumatic chuck gripper
- Distribution of work pieces
- Conveyor motor control
- Work piece sorting with various sensors
- Storing process control
- Input / output module with a manual / auto selection
- Easy movement with four castors in table (Optional)

### Training contents

- Automation training such as motor, sensor, and pneumatics
- Work piece sorting by material : aluminum, plastic
- Various industrial sensors
- Features of sensors
- Conveyor motor control
- Various conditions
- System defect tracking and maintenance
- Control programming

### Specification

- Size : 1200(w)×750(d)×650(h) mm
- Weight : 40kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V
- Rotary cylinder, Gripper module
- Minimum required PLC IO : 22 DI / 13 DO



▲ Conveyor belt and Sensor



▲ Operation module



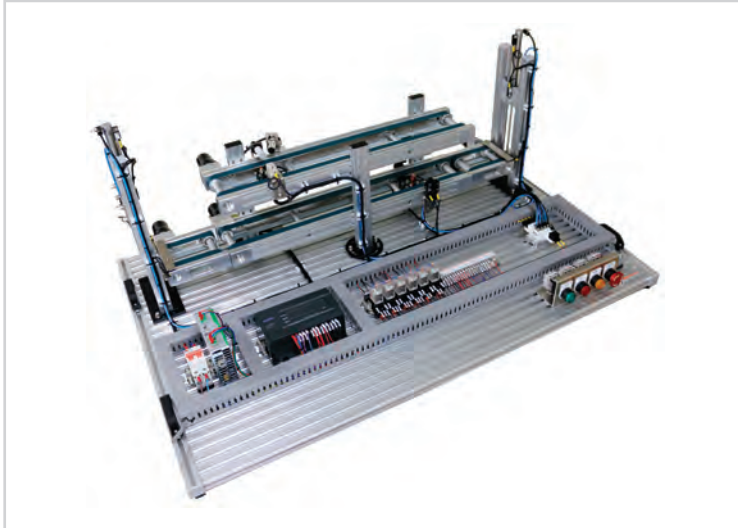
▲ Storing magazine

### Component

No.	Component	Qty.
1	Table	1
2	PTP pneumatic robot module	1
3	Pneumatic gripper	1
4	Solenoid pneumatic valve block	1
5	Operation module	1
6	Conveyor module	1
7	Power terminal	1
8	I/O terminal	1

No.	Component	Qty.
9	Distribution magazine	2
10	Magazine sliding module	1
11	Distribution module	1
12	Storing magazine	1
13	Work piece	6
14	Inductive sensor	1
15	Optical fiber sensor	2

## Conveyor belt trainer (FATK-BCT)



Order number : 23091

### Features

- 2-floor circulating conveyor system
- Maximize training efficiency with continuous mode
- Overall automation system with motor, sensor, pneumatics
- Pallet buffering and control with a stopper cylinder
- Various training with defect tracking simulation switch
- Various industrial sensors
- Elevator (lift) cylinder
- Aluminum work piece
- Touch panel operation

### Training contents

- Pneumatics, electro-pneumatics
- Logic circuit training
- Self-holding circuit training
- Directional control of DC motor
- Timer / counter circuit training
- Principle and usage of sensors
- Limit switch and position control
- Sensor and actuator control
- Conveyor control

### Specification

- Size : 1200(w)×750(d)×580(h) mm
- Weight : 47kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Minimum required PLC IO : 17 DI / 19 DO

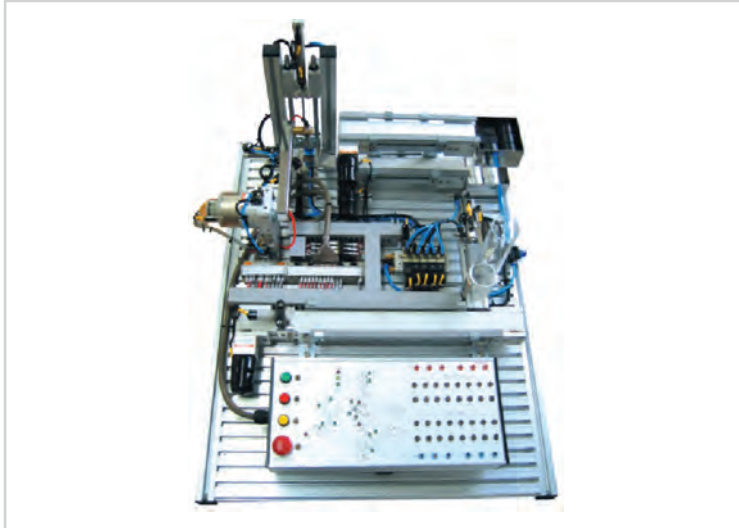
### Component

No.	Component	Qty.
1	Geared motor	4
2	Lifting cylinder(reed switch attached)	2
3	Solenoid valve block	6
4	Palette	6
5	Inductive sensor	1
6	Optical sensor	2
7	Capacitive sensor	3
8	Palette check module	2
9	Belt type conveyor	4

No.	Component	Qty.
10	Stopper cylinder	4
11	Rodless cylinder with reed switch	2
12	Work piece	6
13	Conveyor supporter	1
14	Table	1
15	PLC controller	1
16	Switch box	1
17	I/O terminal	1
18	Relay module	1



## Conveyor belt trainer (FATK-BCR)



Order number : 24014

### Features

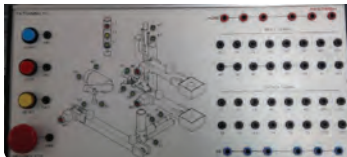
- 2-floor conveyor system
- Overall automation system with motor, sensor, pneumatics
- Rotary cylinder using 5/3-way valve
- Display module with switches
- Various training with defect tracking simulation switch
- Various industrial sensors
- Elevator (lift) cylinder
- Aluminum work piece

### Training contents

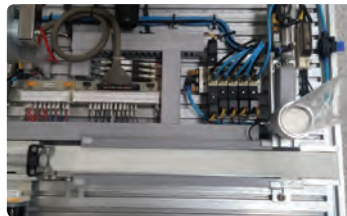
- Pneumatics, electro-pneumatics
- Logic circuit training
- Self-holding circuit training
- Directional control of DC motor
- Timer/ counter circuit training
- Principle and usage of sensors
- Limit switch and position control
- Sensor and actuator control
- Conveyor control

### Specification

- Size : 800(w)×500(d)×400(h) mm
- Weight : 24kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Rotary cylinder module
- Minimum required PLC IO : 17 DI / 12 DO



▲ Display module



▲ Belt type conveyor

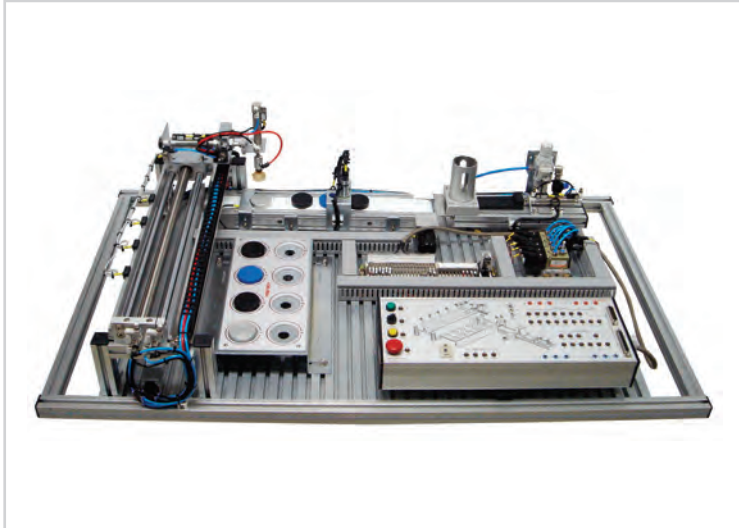
### Component

No.	Component	Qty.
1	Table	1
2	Belt type conveyor	1
3	Geared motor	1
4	Lifting cylinder (reed switch attached)	1
5	Solenoid valve block	1
6	Inductive sensor	1

No.	Component	Qty.
7	Optical sensor	1
8	Capacitive sensor	1
9	Switch and display module	1
10	Work piece	6
11	Relay module	2
12	PLC controller (Optional)	



## Palletizing control trainer (FPLC-EPR-TK)



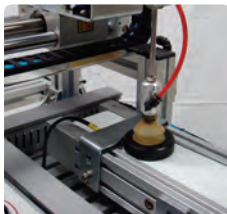
Order number : 23013

### Features

- 3-axes control system
- Pneumatic drive type
- 4mm socket wiring
- Aluminum work piece
- Sensor attached on pallet

### Training contents

- Conveyor control training
- Suction cup usage
- Linear drive control with rodless
- PLC connecting training with 4mm socket



▲ Handling cylinder unit



▲ Pallet and work piece



▲ Conveyor and sensor unit

### Specification

- Size : 1200(w)×750(d)×280(h) mm
- Weight : 45kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Spindle drive
- Minimum required PLC IO : 18 DI / 18 DO

### Component

No.	Component	Qty.
1	Distribution module	1
2	Conveyor module	1
3	Sensor module	1
4	Linear drive	1
5	Handling cylinder	1

No.	Component	Qty.
6	Pallet	1
7	I/O Control module	1
8	Service unit	1
9	Solenoid valve block	1

## Automatic warehouse trainer, Basic (FPLC-AS/RS-TK)



Order number : 23027

### Training contents

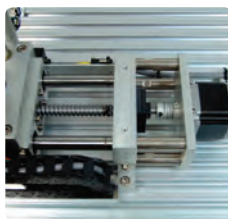
- Composition of the AS/RS
- 3-axes control and spindle drive control
- Position control system training
- Digital input and output signal
- Directional control of DC geared motor
- Additional conditions
- Principle and usage of various sensors
- Control programming
- PLC connection training with 4mm socket



▲ Conveyor belt and Sensor



▲ Operation module



▲ Storing magazine

### Specification

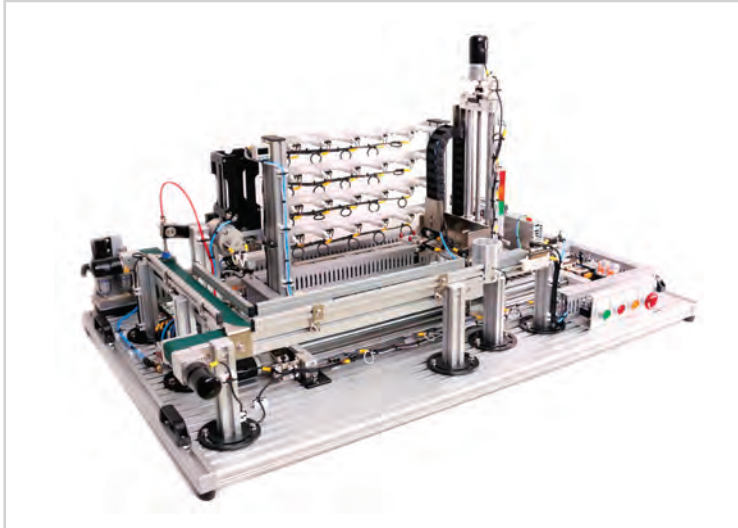
- Size : 1200(w)×750(d)×650(h) mm
- Weight : 43kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Spindle drive
- 3 rows, 3 columns
- Minimum required PLC IO : 12 DI / 6 DO

### Component

No.	Component	Qty.
1	Profile panel	1
2	Spindle drive	2
3	Rack frame	1
4	Magnetic sensor	7
5	End limit switch	6

No.	Component	Qty.
6	Photo-interrupter sensor	3
7	DC motor	3
8	Control console	1
9	Motor controller	2
10	Work piece & Palette	4

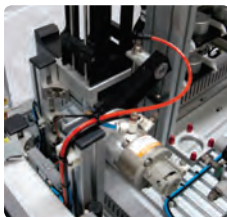
## Automatic warehouse trainer, Advanced (FATK-AS/RS-A)



Order number : 23076

### Training contents

- Composition of the AS/RS
- 3-axes and spindle drive control
- Usage of position control system
- Digital input and output signal
- Directional control of DC geared motor
- Storing practice with pallet
- Unloading system usage
- Principle and usage of various sensors
- Control programming
- PLC connection training with 4mm socket



▲ Rotary cylinder and magazine



▲ Solenoid valve block



▲ Multi function motor controller

### Specification

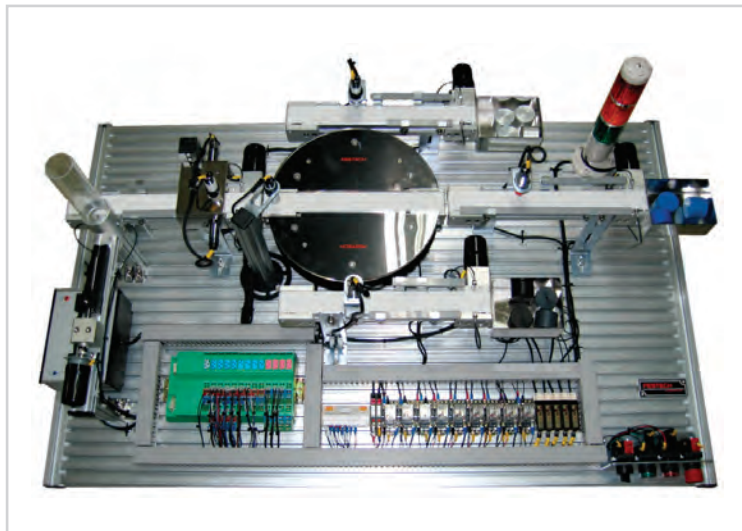
- Size : 1200(w)×750(d)×650(h) mm
- Weight : 60kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Spindle drive
- 4 rows, 5 columns
- Rotary cylinder module
- Minimum required PLC IO : 50 DI / 24 DO

### Component

No.	Component	Qty.
1	Profile panel	1
2	Spindle drive	2
3	Rack frame	1
4	Magnetic sensor	14
5	DC motor	4
6	Operating switch module	1
7	2axes motor controller	1

No.	Component	Qty.
8	Work piece & pallet	1
9	Limit switches for storage	1
10	Unloading module	1
11	Pallet distribution module	1
12	Rotary transfer module	1
13	Conveyor module	1

## Sorting conveyor trainer (FVLC-RS-TK)



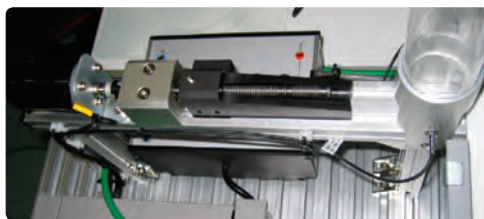
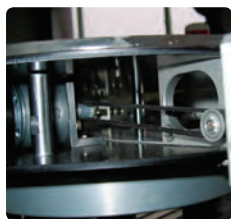
Order number : 23081

### Features

- Only electric powered system
- 4 belts conveyor
- Rotary conveyor
- Proximity sensors
- Photo-electric sensors
- Various controller(PLC, PC-based etc.)

### Training contents

- Composition of product sorting system
- Structure and training of Indexing table
- Digital input and output signal
- Directional control of DC geared motor
- Various conditions
- Features and usage of various sensors
- Control programming



### Specification

- Size : 1200(w)×750(d)×450(h) mm
- Weight : 47kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Indexing table module (conveyor attached)
- Optical fiber sensor module
- Minimum required PLC IO : 15 DI / 16 DO

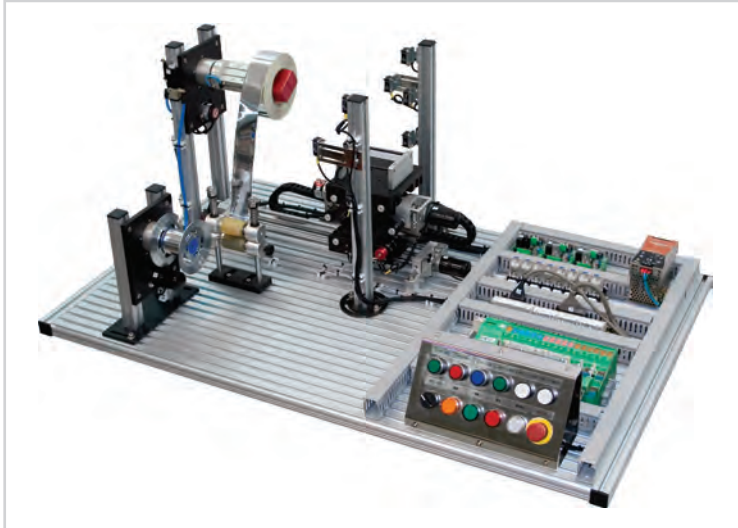
### Component

No.	Component	Qty.
1	4 Belt conveyor	1
2	Rotary conveyor	1
3	Proximity sensor	1

No.	Component	Qty.
4	Optical sensor	1
5	Power supply (DC 24V)	1
6	VLC remote I/O	1



## Coil feed and winder trainer (FVLC-COIL-TK)



Order number : 23095

### Features

- Simulator for coil winder of steel industry
- Feedback control with motor and encoder
- Position control of spindle drive unit
- Various industrial sensors
- Aluminum foil tape for steel coil simulation
- Start slow / end slow function
- DC geared motor
- Measure thickness and length of coil

### Training contents

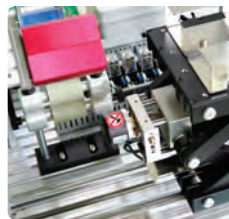
- Principle and algorithm of coil winder
- Multi axes position control
- Principle and usage of an encoder
- Usage and principle of proximity sensor
- PLC or VLC program
- Remote control with FieldBUS

### Specification

- Size : 1200(w)×750(d)×600(h) mm
- Weight : 26kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- Encoder module
- Optical fiber sensor module
- Required PLC IO : 24 DI / 20 DO / 3 HSC



▲ Coil feed and winder



▲ Lifter



▲ Gripper



### Component

No.	Component	Qty.
1	DC geared motor	3
2	Encoder	3
3	Spindle drive	2
4	Cross link lifter	1
5	Single acting pneumatic gripper	1
6	Optical	4

No.	Component	Qty.
7	Relay	13
8	Operating switch module	1
9	Power supply module	1
10	Training plate (aluminum profile panel)	1
11	Limit switch	6
12	Cable chain	1

# Building automation system trainer (FVLC-BAS-TK)



Order number : 23084

### Features

- Fire and Gas alarm
- Security alarm
- Temperature and humidity
- Room light and boiler control
- Gate control and door camera
- Light and curtain control
- Miniature house
- DC power supply
- External I/O block

### Training contents

- Usage and principle various sensor
- Usage and principle of proximity sensor
- PLC program
- HMI
- Operation and program of system

### Specification

- Size : 2000(w)×1000(d)×850(h) mm
- Power : AC 220V, DC24V
- Door controller and camera
- Light control switch
- Blind control
- Temperature control
- Gas detector and controller
- Various fire sensor
- Various security sensor
- Required PLC IO : 16 DI / 16 DO / 2 AI / 1 AO

### Component

No.	Component	Qty.
1	Video phone	1
2	Motion sensor and gas controller	1
3	Temperature controller	1
4	Camera, switch, VLC controller	1
5	Gas/fire, invasion alarm	1
6	Boiler control	1

No.	Component	Qty.
7	Door control	1
8	Light control	1
9	Curtain control	1
10	PLC controller (Optional)	1
11	External IO module	1





## Elevator trainer (FPLC-EP-ELE-TK)



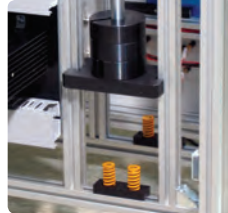
Order number : 23019

### Features

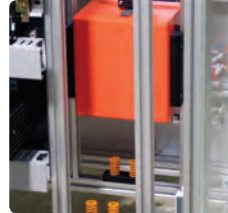
- Mechanical construction similar to the real elevator
- Geared motor, chain system, and wire rope
- Simulating 3 elevator floors
- Floor indicating lamp, up/down button
- Transparent poly-carbonate glass at side and back
- Graphically symbolized limit switch and motor
- 4mm socket and plug wiring
- Easy movement with four castors



▲ Poly-carbonate glass cover



▲ Balance unit



▲ Case and safety spring

### Specification

- Size : 550(w)×400(d)×1064(h) mm
- Weight : 42kg
- Power : AC 220V, DC24V
- Up/ down control with DC geared motor
- Door open control with DC geared motor
- Required PLC IO : 20 DI / 16 DO

### Component

No.	Component	Qty.
1	Geared motor	4
2	Relay : 2a 2b	12
3	Lift	1
4	Weight balance unit	1
5	Safety spring	2
6	Limit switch	20

No.	Component	Qty.
7	Buzzer	1
8	Floor call lamp	4
9	Push-button (1a 1b)	4
10	Emergency switch (1a 1b)	1
11	FND	3

## Parking management trainer (FPLC-EP-PARKING TOWER-TK)



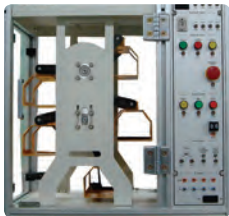
Order number : 23039

### Features

- Circulation type
- Reality simulation
- Stable aluminum profile frame
- Various controllers
- Sensor protection circuit
- Wiring with 4mm cables

### Training contents

- Mechanical principle of parking tower
- Electric sequence control
- DC motor control
- Various conditions (auto/ manual select circuit, emergency stop circuit and etc.)
- Usage of rotary switch
- Usage of 7-segment display
- Electric self-holding circuit
- Concept and application of proximity sensor
- Control programming



▲ Front image



▲ Parking area



▲ Electric terminal

### Specification

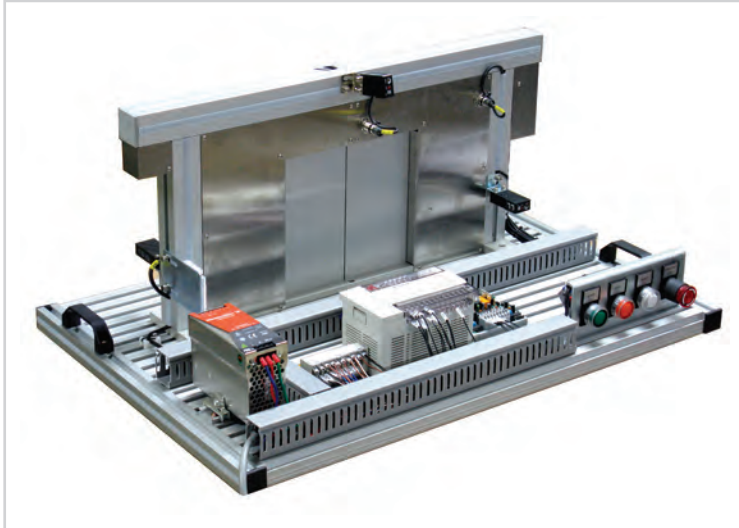
- Size : 530(w)×330(d)×620(h) mm
- Weight : 28kg
- Power : AC 220V, DC24V
- Storage control with DC geared motor
- Required PLC IO : 16 DI / 16 DO

### Component

No.	Component	Qty.
1	Terminal	2
2	Inductive sensor module	1
3	Optical sensor module	1
4	Relay module	2
5	Geared motor module	1
6	Input switch module	1
7	Base frame	1

No.	Component	Qty.
8	Chain	3
9	Distribution board	1
10	PLC module	1
11	Roller chain sprocket kit	2
12	Power supply	1
13	1 digit digital switch	1
14	1 digit FND	1

## Automatic door trainer (DC motor type) (FPLC-PD-PEM)



Order number : 23012

### Features

- PLC controller
- VLC controller
- Microprocessor controller
- Relay controller
- 4mm socket (external controller)
- Terminal (external controller)

### Training contents

- Auto door control using pneumatic (cylinder) or electric (DC motor)
- Directional control of modules and double solenoid valve control
- Limit switches for up and down
- Usage and principle of proximity switch

### Specification

- Size : 600(w)×400(d)×350(h) mm
- Weight : 20kg
- Power : AC 220V, DC24V
- Storage control with DC geared motor
- Minimum required PLC IO : 10 DI / 6 DO

### Component

No.	Component	Qty.
1	Switch	4
2	Direct-reflection sensor	2
3	Mirror-reflect sensor	1
4	Optical sensor	1

No.	Component	Qty.
5	Inductive sensor	1
6	DC motor	1
7	Power supply	1

## Automatic door trainer (Pneumatic type) (FPLC-PD-PE)



Order number : 23094

### Component

No.	Component	Qty.
1	Switch	3
2	Optical sensor	2
3	Double-acting cylinder	2
4	Double solenoid valve	1
5	Power supply	1

## Traffic signal control trainer (FPLC-TRF)



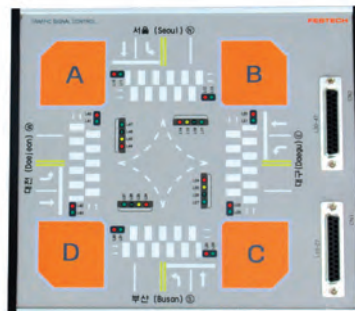
Order number : 23093

### Features

- Traffic control system
- Manual and remote mode
- High bright LED lamps
- Sequence control circuit and various conditions
- Standard profile case and clamp
- Precise graphic board
- Wiring with 4mm cables

### Training contents

- Understanding of traffic signal system
- Usage of time programming control
- Programming for cross-walk signal
- Usage of relay sequence circuit
- Various PLC programming



D-SUB connector type  
Order number : 23072

### Specification

- Power : DC24V
- Signal lamp : right, left, straight, stop – 4EA
- 3 Push-button and 1 select switch
- Minimum required PLC IO : 12 DI / 32 DO

## Fortress game (FATK-FT)



Order number : 23097

### Features

- Relay control or PLC control type
- Air tank
- Sequence control circuit and various conditions
- Adjustable angle
- Adjustable pressure
- Quick exhaust valve

### Training contents

- Automation training such as pneumatics, electro-pneumatics, PLC and etc
- Advanced control programming

05

### Component

No.	Component	Qty.
1	Aluminum profile panel	8
2	Pneumatic tank	1
3	Power supply	1
4	Electric relay	2
5	Single solenoid valve	2
6	Start switch unit	1
7	Shut off valve	1
8	Quick exhaust valve	1
9	Double-acting cylinder	1
10	Reed switch	2
11	Flow control valve	2
12	Acrylic round bar	1
13	Silencer	4
14	Capacitive sensor	1
15	PLC	1

### Specification

- Size : 500(w)×650(d) mm
- Power : DC24V
- Capacitive sensor
- Transparent acrylic pipe
- Air tank : more than 2ℓ
- Minimum required PLC IO : 8 DI / 7 DO

## Pinball game (FPLC-PIN-TK)



Order number : 23038

### Features

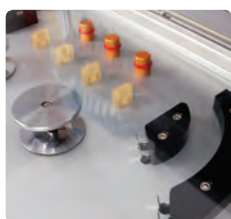
- Various actuators
- Inductive sensor and limit switch,
- 7-segments
- PLC programming
- Interested in electric pneumatic and controller

### Training contents

- Automation training such as pneumatics, electro-pneumatics, PLC and etc,
- Cylinder usage and structure understanding
- Usage and principle of various sensors
- Advanced control programming



▲ Punching cylinder



▲ Ball detecting sensors



▲ Operating switches

### Specification

- Size : 850(w)×600(d)×560(h) mm
- Weight : 32kg
- Power : AC 220V, DC24V
- Operating pressure : 4 ~ 6 bar
- Punching with rotary module
- Score display : 3-digits FND
- Required PLC IO : 25 DI / 21 DO

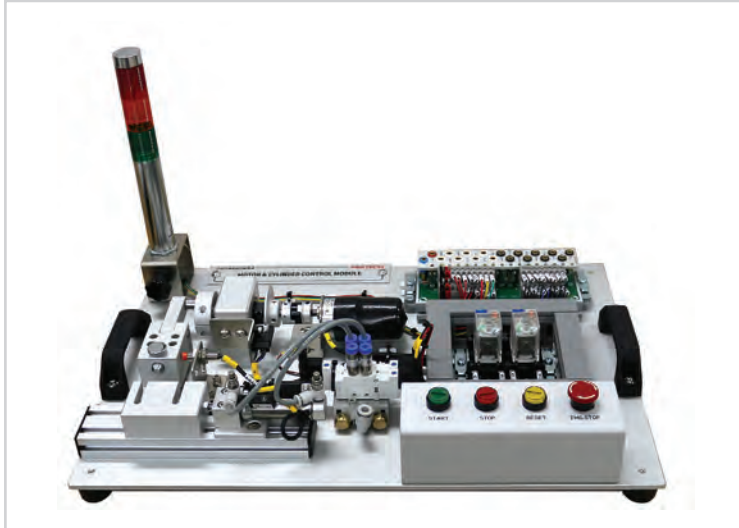
### Component

No.	Component	Qty.
1	Rotary cylinder	2
2	Double acting cylinder	3
3	Single acting cylinder	2
4	5/2-way single solenoid valve	5
5	3/2-way solenoid valve	3
6	Inductive sensor	12

No.	Component	Qty.
7	Limit switch	8
8	4/2-way select switch	1
9	5/2-way push button switch	2
10	3/2-way push-button switch	1
11	7-segment	3
12	PLC	1



## Motor & cylinder control module (FPLC-M/CYL-C)



Order number : 23212

### Features

- DC Motor CD/CCW control
- Detecting motor revolutions
- Slide crank structure
- Bearing unit
- Slide position sensor
- Solenoid valve control
- Air cylinder position control
- Compact size

### Training contents

- DC Motor CW/CCW electric diagram
- Sequence control
- Basic elector-pneumatics control

### Component

No.	Component	Qty.
1	DC geared motor	1
2	Pneumatic cylinder	1
3	Single solenoid valve	1
4	Double solenoid valve	1
5	Proximity sensor	1

No.	Component	Qty.
6	Inductive sensor	1
7	Tower lamp module	1
8	Relay module	2
9	Operating console	1
10	Socket terminal module	1

## Automation display models



These models display the basic processes of automation. They are a great demonstration for students or guests interested in automation, featuring a variety of devices used in the field and a very clean design.

### Air blowing transfer system

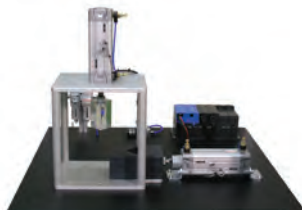
Order number : 23022



- Blowing pressure control with a pressure regulating valve
- Transfer system with a rodless cylinder
- Work piece separation and transfer with a vibrating valve
- Usage of a rotary cylinder
- Usage and principle of a stopper cylinder
- Application and design of an air blower

### Punch & dies system

Order number : 23023



- Punching and dies simulation
- Completion check with high bright LEDs
- Press and punching application with a pneumatic cylinder
- Applied model of a non-rotating cylinder

### High speed position control system

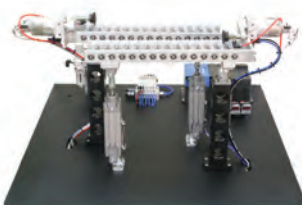
Order number : 23024



- 4 positions control with 2 rotary cylinders
- High speed position control with link system
- Work piece detection with an optical sensor
- Mechanical applied model of rotary cylinder
- Pneumatic rotary devices and applications

### Roller conveyor system

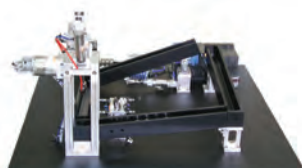
Order number : 23025



- Continuous transfer system with various pneumatic cylinder
- Horizontal transfer with a suction cup
- Cylinder angle control
- Work piece position control of rotary cylinder
- Transferring system using position energy

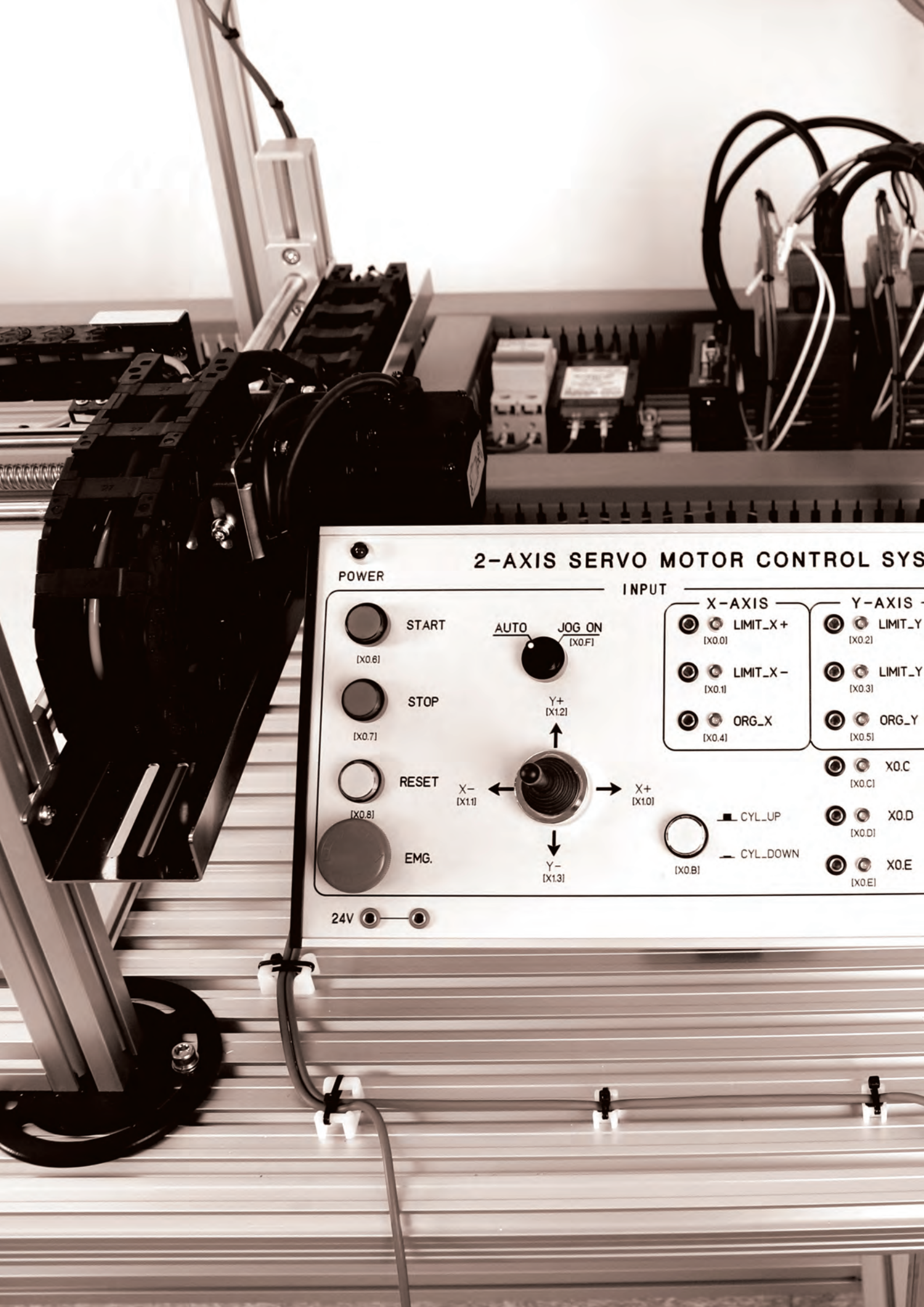
### Steel ball circulation system

Order number : 23026



- Continuous steel ball circulating system
- Mechanical combination of suction cup and cylinder
- Various cylinder application
- Transferring system using position energy





## 2-AXIS SERVO MOTOR CONTROL SYS

POWER

INPUT



START

[X0.6]



STOP

[X0.7]



RESET

[X0.8]



EMG.

AUTO



JOG ON

[X0.F]

Y+

[X12]

X-

[X11]

X+

[X10]

Y-

[X13]

X-AXIS



LIMIT\_X+

[X0.0]



LIMIT\_X-

[X0.1]



ORG\_X

[X0.4]



LIMIT\_Y+

[X0.2]



LIMIT\_Y-

[X0.3]



ORG\_Y

[X0.5]



X0.C

[X0.C]



X0.D

[X0.D]



X0.E

[X0.E]



CYL\_UP



CYL\_DOWN

[X0.B]

24V





CHAPTER

06

## MOTOR TRAINER

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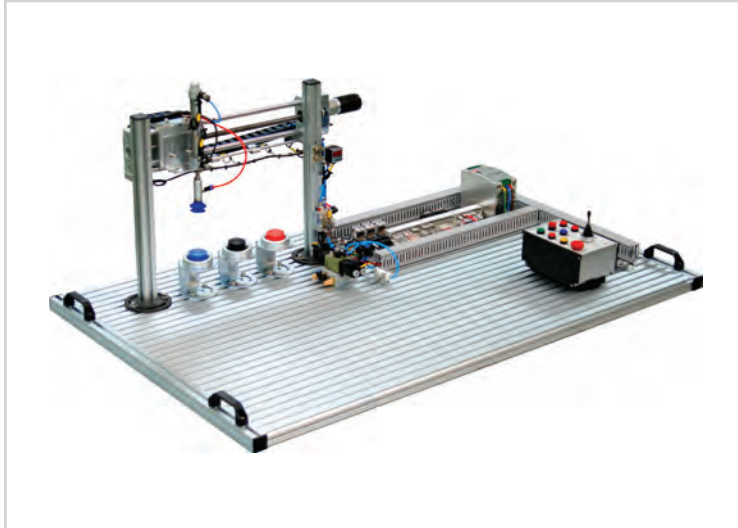
Position control trainer – 1 axis (FATK-PCT 1)	203
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# MOTOR TRAINER

- 01 Position control trainer – 1 axis
- 02 Position control trainer – 2 axes
- 03 Servo motor trainer 1
- 04 Servo motor trainer 2
- 05 Stepping motor trainer – 1 axis
- 06 Stepping motor trainer – 2 axes
- 07 Inverter trainer
- 08 Inverter trainer 2 dual motor
- 09 MOV(Motor Operated Valve Actuator) trainer



## Position control trainer – 1 axis (FATK-PCT 1)



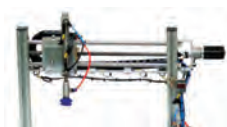
Order number : 24008

### Features

- Simple structure and function
- Position control with DC geared motor
- Structure and principle of spindle drive
- Automatic storage system
- Customizing for users
- Manual operation is possible

### Training contents

- Composition of automation system
- Basic electro-pneumatics control
- Fault finding in automation system
- Understanding of automatic storage system
- Spindle drive motor control



Spindle drive and frame



Relay and solenoid valve control part



Joystick operating console

### Specification

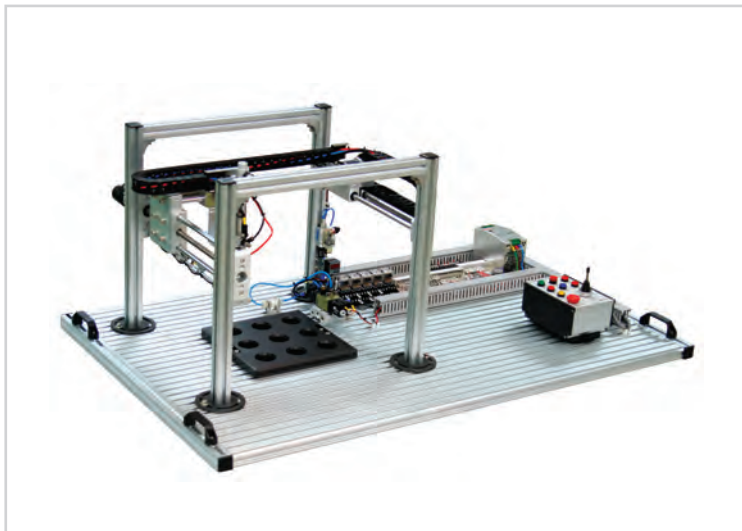
- Size : 1200(w)×750(d)×540(h) mm
- Weight : 23kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- X-axis : DC geared motor drive
- Z-axis : Double-acting cylinder & vacuum suction module
- PLC IO : 18DI / 12DO

### Component

No.	Component	Qty.
1	Profile structure	1
2	Double-acting cylinder (cushion/flow control attached)	1
3	Spindle drive	1
4	Cableveyor	1
5	Geared motor	1
6	5/2-WAY single solenoid valve	1
7	Pneumatic suction module	1
8	Vacuum generator	1

No.	Component	Qty.
9	Proximity sensor	3
10	Operating console module	1
11	Relay module	4
12	Power supply	1
13	Electrical relay	2
14	Work piece	3
15	PLC unit	

## Position control trainer – 2 axes (FATK-PCT 2)



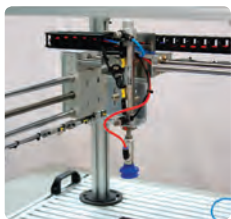
Order number : 23018

### Features

- Position control with spindle drive
- Motor CW/CCW
- Position control of motor with proximity sensor
- Using stable aluminum profile
- Customizing for users

### Training contents

- Composition of suction system
- Structure of 2 axes controller
- Training of position control system
- Motor CW/CCW electric diagram
- Principle, characteristic and usage of sensors



Spindle drive and frame



Digital vacuum switch



Joystick operating console

### Specification

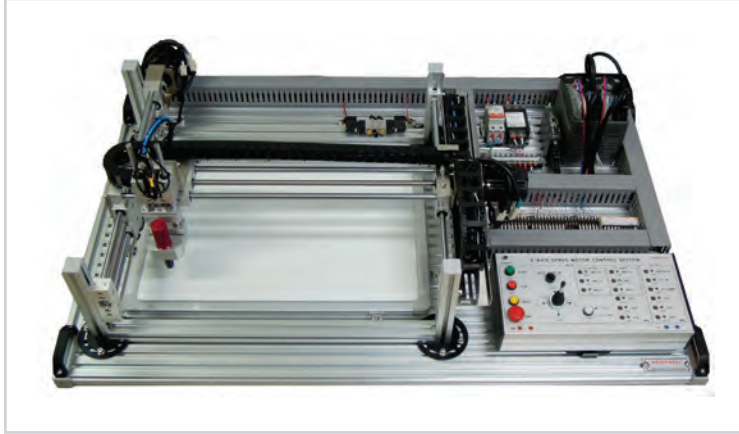
- Size : 1200(w)×750(d)×540(h) mm
- Weight : 27kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- X, Y-axis : DC geared motor drive
- Z-axis : Double-acting cylinder & Vacuum suction module
- PLC IO : 21DI / 13DO

### Component

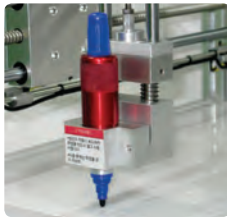
No.	Component	Qty.
1	Spindle drive	2
2	Profile structure	1
3	Cable veyor	2
4	Double-acting cylinder	1
5	Pneumatic suction module	1
6	Vacuum generator	1
7	Pressure sensor	1
8	Proximity sensor	8

No.	Component	Qty.
9	Limit switch	4
10	Operating console module	1
11	Relay module	4
12	DC geared motor	2
13	Solenoid valve	2
14	Work piece (blue, yellow, red)	9
15	Work piece & pallet	1
16	PLC unit	

## Servo motor trainer 1 (FATK-MCT110)



Order number : 24001



Marking pen module



PLC & Drives



Servo motor

### Features

- Free movement in narrow space with 2 axes
- Adaptable by PLC or controller type
- Customizing for users
- Generate interest by drawing

### Training contents

- Position/speed/torque control operation
- Absolute/relative coordinate positioning
- Sequential positioning
- Designated sequential position control maximum
- 31 points
- Original function
- Jog mode

### Specification

- Size : 1200(w)×750(d)×450(h) mm
- Weight : 60kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- X, Y-axis : AC Servo motor, 100W, 3000rpm
- Z-axis : Double-acting cylinder & Marking pen
- MCU 2 axes controller

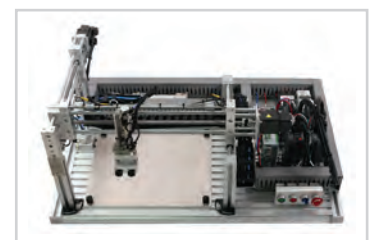
### Component

No.	Component	Qty.
1	Servo motor	2
2	Linear spindle drive	2
3	Safety limit switch	4
4	Magnet proximity switch	2
5	Pneumatic cylinder	1
6	5/2-way solenoid valve	1
7	Marking clamping device	1
8	Servo motor controller	1
9	Push button : DC24V (1a 1b)	2
10	Emergency switch : DC24V (1a 1b)	1

No.	Component	Qty.
11	Profile structure	1
12	Proximity sensor	2
13	Limit switch	4
14	Operating console module	1
15	Rail for moving	1
16	Magnetic board	1
17	DC24V power supply (included)	1
18	Cable veyor	2
19	PLC controller (Optional)	
20	Touch panel (Optional)	

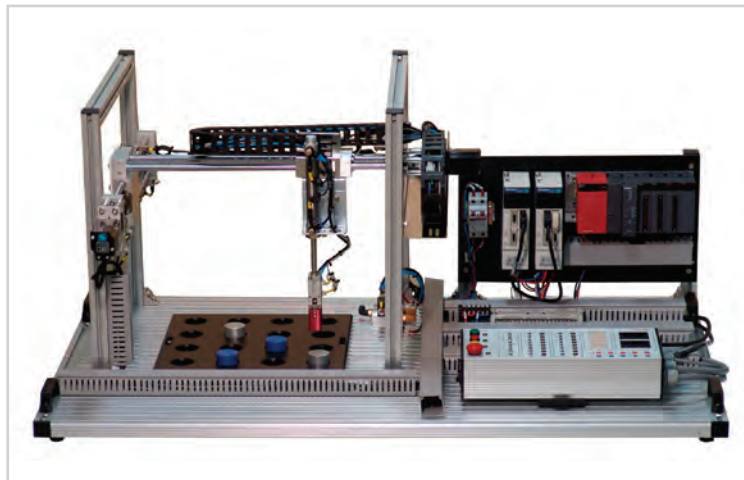
## Servo motor trainer 1 compact type (FATK-MCT110-MINI)

- Compact type
- Size : 750(w) x 500(d) x 330(h) mm



Order number : 24017

## Servo motor trainer 2 (FATK-MCT120)



Order number : 24009



Marking pen module



Operating console



Servo drive

### Features

- Free movement in narrow space with 2 axes
- Adaptable by PLC or controller type
- Open structure for practical training
- Concept of pneumatic cylinder and solenoid

### Training contents

- Position/speed/torque control operation
- Absolute/relative coordinate positioning
- Sequential positioning
- Designated sequential position control maximum
- Original function
- Jog mode

### Specification

- Size : 1200(w)×750(d)×540(h)
- Weight : 48kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- X, Y-axis : AC Servo motor, 100W, 3000rpm
- 2 axes servo drive
- Z-axis : Double-acting cylinder & gripper module
- PLC & position control module
- PLC IO : 16DI / 16DO / 2axes position control module

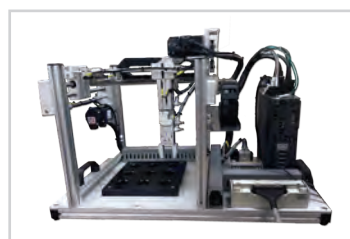
### Component

No.	Component	Qty.
1	Servo motor	2
2	Linear spindle drive	2
3	Safety limit switch	4
4	Magnet proximity switch	3
5	Pneumatic cylinder	1
6	Pneumatic gripper	1
7	5/2-WAY solenoid valve	2
8	Work piece pallet	1
9	Control console	1
10	DC24V power supply (included)	1

No.	Component	Qty.
11	Servo drive	2
12	Aluminum profile panel	1
13	PLC unit	1
14	Position control module	1
15	Work piece	8
16	Proximity sensor	2
17	Operating console module	1
18	PLC controller	
19	Touch panel (Optional)	

## Servo motor trainer 2 compact type (FATK-MCT120-MINI)

- Compact type
- Size : 580(w) x300(d) x 370(h) mm



Order number : 24016

## Stepping motor trainer – 1 axis (FSPM-110)



Order number : 24002

### Features

- Position/speed control
- CW/CCW control
- Open structure for practical training
- Data entry using software package on PC
- Absolute method, relative method possible
- Original function
- JOG mod

### Training contents

- Principle of Stepping Motor
- Position control by configuration pulse number
- Training with driving pulse
- Position control by positioning
- Positioning sequence control
- 1 axis control and 2 axes control training



Stepping motor drive



Motion controller



Control module

### Specification

- Size : 750(w)×500(d)×130(h) mm
- Weight : 25kg
- Operating pressure : 4 ~ 6 bar
- Power : AC 220V, DC24V
- 1 axis : Step motor
- Motion controller : 1 axis
- Step motor drive
- Switch lamp module
- Encoder module (A, B, Z) : Linear drive

### Component

No.	Component	Qty.
1	Stepping motor	1
2	Stepping drive module	1
3	Spindle drive (encoder, limit, Original)	1
4	Safety limit switch	2

No.	Component	Qty.
5	Magnet proximity switch	1
6	MCU controller module	1
7	Switch & module	1
8	DC24V power supply	1



## Stepping motor trainer – 2 axes (FSPM-120)



Order number : 24010

### Features

- Using actual parts which are used in industrial field
- Position/speed control
- CW/CCW control
- Absolute method, relative method possible
- Open structure for practical training
- Original function
- JOG mode
- Linear interpolation/Circular interpolation method

### Training contents

- Principle of Stepping Motor
- Position control by configuration pulse number
- Training with driving pulse
- Table positioning with set up of pulse number
- Positioning sequence control
- 2axes control training

### Specification

- Power : AC 220V, DC24V
- 2 axes Step motor
- 2 axes Step motor controller
- Step motor drive : 2ea



Stepping motor



Motor drive



IO module

### Component

No.	Component	Qty.
1	Stepping motor	2
2	Stepping drive module	2
3	Spindle drive	2
4	Safety limit switch	4

No.	Component	Qty.
5	Magnet proximity switch	2
6	MCU controller module	1
7	IO module	1
8	DC24V Power supply	1



Inverter trainer (FIVT-110)



Order number : 24007

Features

- Motor speed and direction control with an industrial inverter
- Inverter setting training with a motor load regulator
- Multi step speed and timing configuration
- PID control function
- Multi functional input and output
- Communication terminal

Training contents

- Principle of an inverter
- Structure and principle of AC motor
- Usage of an inverter
- Starting and control method of 3-phase induction motor
- Remote control with PLC

Component

No.	Component	Qty.
1	Inverter	1
2	Motor (1/4 HPS, AC 220V)	1
3	Motor drive panel	1
4	Load test nob	1
5	Toggle switches for external signal	8
6	Speed control VR	1
7	Remote/Local selector switch	1

No.	Component	Qty.
8	Communication connector	1
9	Ampere meter	1
10	Voltage meter	1
11	Output signal meter	1
12	Aluminum case	1
13	Overload protector	1
14	Input/output signal LED	8

06

Inverter trainer module



Order number : 24019



Order number : 24011

# Inverter trainer 2 dual motor (FIVT-130)



Order number : 24018

### Features

- Motor speed and direction control with an industrial inverter
- Inverter setting training with a motor load belt type
- Multi step speed and timing configuration
- PID control function
- Belt load tension unit
- Load cell analog signal terminal
- Communication socket terminal
- Multi functional input and output

### Training contents

- Principle of an inverter
- Structure and principle of AC motors
- Usage of an inverter
- Starting and control method of 3-phase induction motor
- Remote control with PLC

### Component

No.	Component	Qty.
1	Motor (1/4 HPS, AC220V, 3-phase)	2
2	Inverter	2
3	Main control panel with MC	1
4	Motor drive panel	2
5	Tension signal panel	1

No.	Component	Qty.
6	Belt load measuring unit	1
7	Belt tension adjustable base unit	2
8	Bearing unit	2
9	Communication socket	1
10	Safety cover	2

## MOV(Motor Operated Valve Actuator) Trainer (FMOV-110)



Order number : 24012

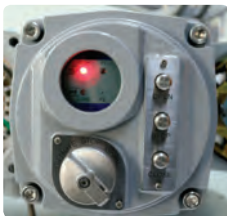
### Features

MOV(Motor Operated Valve actuator) is an equipment to control flow quantity in the pipe. Flow quantity is depends on open rate of gate. It helps to understand principle of motor operated.

MOV is mainly used in petrochemical plant and water treatment system at industrial

### Training contents

- Basic electrical skill
- Usage and function training of MOV
- Local manual and remote operation of MOV
- Digital IO condition check and analog figure measurement
- MOV installation and test
- Troubleshooting and maintenance
- Adjustable limit switch position
- Adjustable torque



Local controller



Valve OPEN/CLOSE



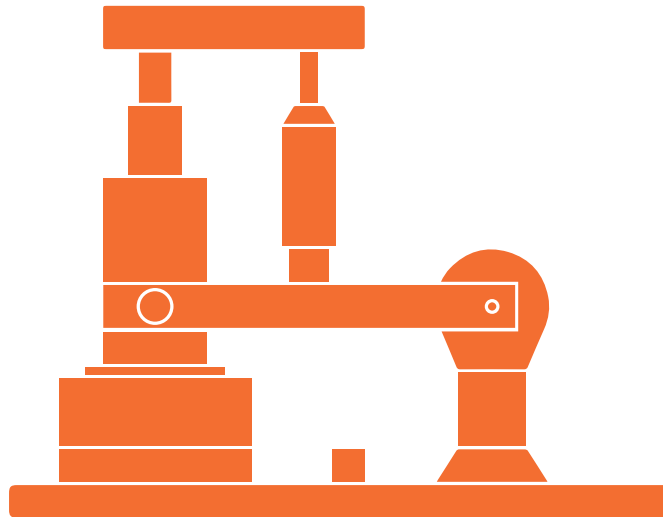
Control panel

### Specification

- Size : 750(L)×750(W)×1250(H) mm
- Weight : 88Kg
- Power : AC220V, 60Hz
- Motor : 0,2(kw)
- Motor speed : 60rpm
- Motor torque : 3,7Kgf·m (setting torque: 1,0Kgf·m)
- Operation : 4 ~ 20mA(Tolerance ±0,02)
- Condition monitoring by indicator
- Direct mounting (Thrust unit type)
- Local manual control and remote control
- Easy movement with castor







CHAPTER

07

## SMART MODULE SYSTEM (SMS)

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Handling station (FME-SMS-HAND)	220
Buffer station (FME-SMS-BUFF)	221
Assembly station (FME-SMS-ASSEM)	222
Automated warehouse station (FME-SMS-WARE)	223
Sorting station (FME-SMS-SORT)	224
Additional components	225

# Smart Module System (SMS)

**01** Distribution station

**02** Testing station

**03** Processing station

**04** Indexing station

**05** Handling station

**06** Buffer station

**07** Assembly station

**08** Automated warehouse station

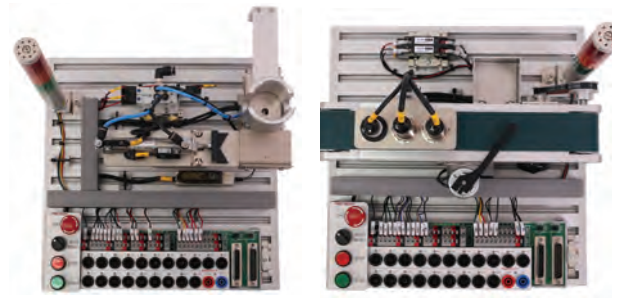
**09** Sorting station



## Introduction

The SMS (Smart Module System) teaches many automation technologies as well as system design, assembly, installation, commissioning, and maintenance,. There is a focus on easy learning, easy training, and easy application to industry. SMS includes modules for Distribution, Testing, Processing, Indexing, Handling, Buffer, Assembly, Automated Warehouse, and Sorting Station. Each station can be used independently.

Each SMS module can be controlled by any type of PLC, and the PLC's do not have to be the same. To connect the PLC with each module, a one-touch IO-Link cable or direct wired 4mm socket can be used. SMS modules come delivered in storage boxes.



Compact size : 300(W) x 300(D) mm

## Easy installation



Storage case



Put out the SMS module



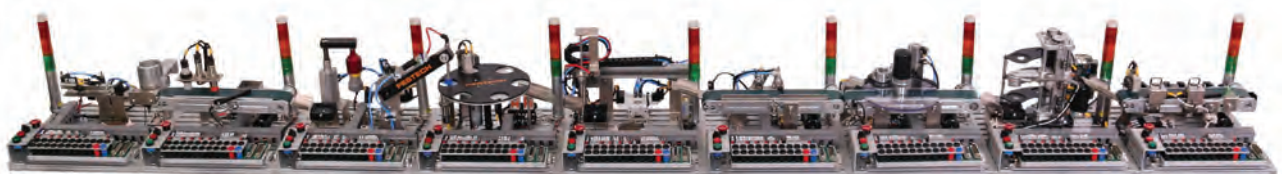
SMS module installation



PLC installation

## Easy combination, Any combination

### Flexible combination



Distribution

Testing

Processing

Indexing

Handling

Buffer

Assembly

AS/RS

Sorting



## Distribution station (FME–SMS–DIST)



Order number : 31012

### Function

- Distribution station stores and distributes work piece one by one,
- Workpieces are stored in the stack magazine and monitored by optical sensor,
- The distribution cylinder separates workpieces to feeding position,
- The feeding cylinder pushes workpieces to next station,
- Status of station can be displayed with tower lamp module,

### Training contents

- Pneumatic cylinder function
- Cylinder speed control
- Solenoid valve control
- Magnetic proximity sensor technology
- Optical sensor application
- System composition and assembling / disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"><li>• Stack magazine</li><li>• Distributing unit</li><li>• Feeding unit</li><li>• Magnetic proximity sensor</li><li>• One-way flow control valve</li><li>• Solenoid valve unit<ul style="list-style-type: none"><li>– 5/2-Way single solenoid valve</li><li>– 5/2-Way double solenoid valve</li></ul></li><li>• Optical fiber sensor</li><li>• Aluminum profile panel : 300×300×15 mm</li><li>• SMS Input /Output Terminal unit (4mm &amp; sys link)<ul style="list-style-type: none"><li>– Input : 11, Output : 9 points with LED</li><li>– D-sub connector : Input 25 pin, Output 25 pin</li><li>– Sensor protection : short circuit proof type</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Control switch module<ul style="list-style-type: none"><li>– START, STOP, AUTO(RESET), Emergency</li></ul></li><li>• Tower lamp module<ul style="list-style-type: none"><li>– Green / Yellow / Red</li></ul></li><li>• Size &amp; weight<ul style="list-style-type: none"><li>– 300×300×260 mm, 3,8kg</li></ul></li><li>• IO-Link cable<ul style="list-style-type: none"><li>– Input cable, Output cable : D-sub 25 pin</li></ul></li><li>• Connector between stations</li><li>• SMS module storage case<ul style="list-style-type: none"><li>– Size : 350×340×270 mm</li><li>– Aluminum profile panel for PLC installation</li></ul></li></ul>

## Testing station (FME–SMS–TEST)



Order number : 31013

### Function

- Testing station detects material of work piece. It ejects with solenoid actuator or transferred to next station.

### Training contents

- Conveyor belt composition
- DC motor
- Motor control with relay
- Solenoid actuator application
- Sensor application : capacitive sensor, inductive sensor
- System composition and assembling/ disassembling
- Electric wiring and pneumatic piping
- PLC program
- FieldBus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"> <li>● Conveyor belt unit               <ul style="list-style-type: none"> <li>– Size : 60×300 mm</li> <li>– Motor : DC24V geared motor</li> <li>– Timing belt drive</li> </ul> </li> <li>● Capacitive sensor</li> <li>● Inductive sensor</li> <li>● Optical sensor</li> <li>● Sensor bracket for 3 sensors</li> <li>● Ejector unit               <ul style="list-style-type: none"> <li>– Rotary solenoid actuator</li> <li>– Work piece ejector</li> </ul> </li> <li>● Ejecting case</li> <li>● Control relay : 2ea</li> <li>● Aluminum profile panel : 300×300×15 mm</li> </ul>	<ul style="list-style-type: none"> <li>● SMS Input /Output Terminal unit (4mm &amp; sys link)               <ul style="list-style-type: none"> <li>– Input : 11, Output : 9 points with LED</li> <li>– D-sub connector : Input 25 pin, Output 25 pin</li> <li>– Sensor protection : short circuit proof type</li> </ul> </li> <li>● Control switch module               <ul style="list-style-type: none"> <li>– START, STOP, AUTO(RESET), Emergency</li> </ul> </li> <li>● Tower lamp module               <ul style="list-style-type: none"> <li>– Green / Yellow / Red</li> </ul> </li> <li>● Size &amp; weight               <ul style="list-style-type: none"> <li>– 300×300×260 mm, 4.4kg</li> </ul> </li> <li>● IO-Link cable : 2ea               <ul style="list-style-type: none"> <li>– Input cable, Output cable : D-sub 25 pin</li> </ul> </li> <li>● Connector between stations</li> <li>● SMS module storage case               <ul style="list-style-type: none"> <li>– Size : 350×340×270 mm</li> <li>– Aluminum profile panel for PLC installation</li> </ul> </li> </ul>

## Processing station (FME–SMS–PROCE)



Order number : 31014

### Function

- Stamping station stamps on the work piece. It transfers next station using rotary cylinder and vacuum suction unit.

### Training contents

- Characteristic or orthogonal rotary cylinder
- Rotary cylinder control
- Application of vacuum generator
- Solenoid valve control
- Magnetic proximity sensor technology
- Optical sensor application
- System composition and assembling/ disassembling
- Electric wiring and pneumatic piping
- PLC program
- FieldBus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"><li>● Work piece holding unit<ul style="list-style-type: none"><li>– Holding block</li><li>– Slider : stainless steel</li></ul></li><li>● Optical sensor</li><li>● Stamping unit<ul style="list-style-type: none"><li>– Stamping cylinder</li><li>– Swivel angle : 90°</li></ul></li><li>● Rotary handling unit<ul style="list-style-type: none"><li>– Rotary cylinder (user can change angle)</li><li>– Timing belt drive</li></ul></li><li>● Vacuum generator and suction unit</li><li>● Magnetic proximity sensor</li><li>● One-way flow control valve</li><li>● Solenoid valve unit<ul style="list-style-type: none"><li>– 5/2-Way single solenoid valve</li><li>– 5/2-Way double solenoid valve</li><li>– 5/3-Way double solenoid valve</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Aluminum profile panel : 300×300×15 mm</li><li>● SMS Input /Output Terminal unit (4mm &amp; sys link)<ul style="list-style-type: none"><li>– Input : 11, Output : 9 points with LED</li><li>– D-sub connector : Input 25 pin, Output 25 pin</li><li>– Sensor protection : short circuit proof type</li></ul></li><li>● Control switch module<ul style="list-style-type: none"><li>– START, STOP, AUTO(RESET), Emergency</li></ul></li><li>● Tower lamp module<ul style="list-style-type: none"><li>– Green / Yellow / Red</li></ul></li><li>● Size &amp; weight<ul style="list-style-type: none"><li>– 300×300×260 mm, 4.6kg</li></ul></li><li>● IO-Link cable : 2ea<ul style="list-style-type: none"><li>– Input cable, Output cable : D-sub 25 pin</li></ul></li><li>● Connector between stations</li><li>● SMS module storage case<ul style="list-style-type: none"><li>– Size : 350×340×270 mm</li><li>– Aluminum profile panel for PLC installation</li></ul></li></ul>

## Indexing station (FME–SMS–INDEX)



Order number : 31015

### Function

- When work piece is arrived, indexing station can store maximum 6 work pieces.

### Training contents

- Rotary index table control
- DC motor control
- Relay
- Rotary position detecting sensor
- Work piece detecting using inductive sensor
- Optical sensor application
- System composition and assembling/ disassembling
- Electric wiring and pneumatic piping
- PLC program
- FieldBus communication technology
- Commissioning and fault tracking
- System maintenance

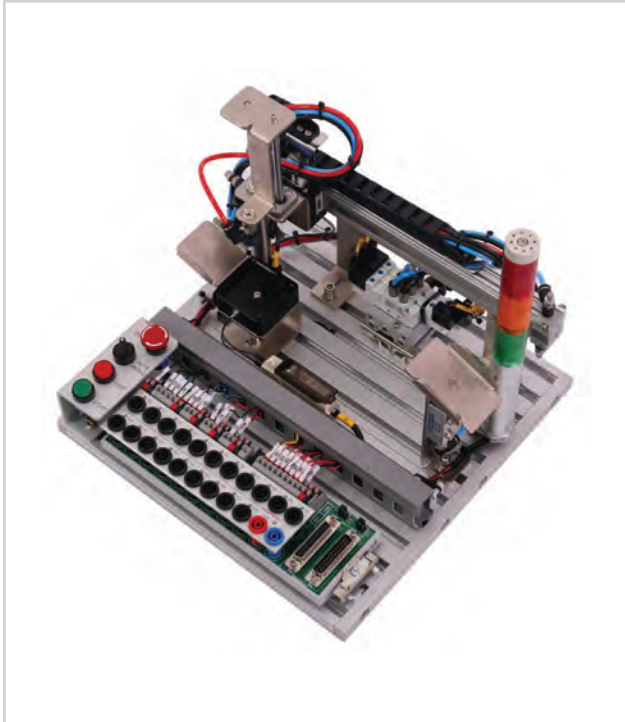
07

### Components

Component	Component
<ul style="list-style-type: none"> <li>• Index table module               <ul style="list-style-type: none"> <li>– Indexing: 6 positions</li> <li>– DC24V geared motor</li> </ul> </li> <li>• Position detection sensor</li> <li>• Work piece detector               <ul style="list-style-type: none"> <li>– Optical sensor</li> </ul> </li> <li>• Inspection unit               <ul style="list-style-type: none"> <li>– Inductive sensor : metal / non-metal</li> <li>– Photo electric sensor : (color) stamping quality</li> </ul> </li> <li>• Control relay               <ul style="list-style-type: none"> <li>– DC motor control for CW/CCW</li> </ul> </li> <li>• Slider unit</li> <li>• Aluminum profile panel : 300×300×15 mm</li> <li>• SMS Input /Output Terminal unit (4mm &amp; sys link)               <ul style="list-style-type: none"> <li>– Input : 11, Output : 9 points with LED</li> <li>– D-sub connector : Input 25 pin, Output 25 pin</li> <li>– Sensor protection : short circuit proof type</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Control switch module               <ul style="list-style-type: none"> <li>– START, STOP, AUTO(RESET), Emergency</li> </ul> </li> <li>• Tower lamp module               <ul style="list-style-type: none"> <li>– Green / Yellow / Red</li> </ul> </li> <li>• Size &amp; weight               <ul style="list-style-type: none"> <li>– 300×300×260 mm, 3,8kg</li> </ul> </li> <li>• IO-Link cable : 2ea               <ul style="list-style-type: none"> <li>– Input cable, Output cable :D-sub 25 pin</li> </ul> </li> <li>• Connector between stations</li> <li>• SMS module storage case               <ul style="list-style-type: none"> <li>– Size : 350×340×270 mm</li> <li>– Aluminum profile panel for PLC installation</li> </ul> </li> </ul>



## Handling station (FME–SMS–HAND)



Order number : 31016

### Function

- Carry work piece using pneumatic rodless cylinder and vacuum suction handling unit,

### Training contents

- Pneumatic cylinder characteristic
- Pneumatic rodless cylinder control
- Vacuum generator application
- Magnetic proximity sensor technology
- System composition and assembling/ disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"><li>● Work piece holding unit<ul style="list-style-type: none"><li>– Holding block</li><li>– Slider : Stainless steel</li></ul></li><li>● Optical fiber sensor</li><li>● Handling unit (X-axis)<ul style="list-style-type: none"><li>– Rodless cylinder</li></ul></li><li>● Magnetic proximity sensor</li><li>● One-way flow control valve</li><li>● Handling unit (Z-axis)<ul style="list-style-type: none"><li>– Double-acting cylinder</li></ul></li><li>● Vacuum generator and pad</li><li>● Solenoid valve unit<ul style="list-style-type: none"><li>– 5/2-Way single solenoid valve</li><li>– 5/2-Way double solenoid valve</li><li>– 5/3-way double solenoid valve</li></ul></li><li>● Slider unit</li><li>● Aluminum profile panel : 300×300×15 mm</li></ul>	<ul style="list-style-type: none"><li>● SMS Input /Output Terminal unit (4mm &amp; sys link)<ul style="list-style-type: none"><li>– Input : 11, Output : 9 points with LED</li><li>– D-sub connector : Input 25 pin, Output 25 pin</li><li>– Sensor protection : short circuit proof type</li></ul></li><li>● Control switch module<ul style="list-style-type: none"><li>– START, STOP, AUTO(RESET), Emergency</li></ul></li><li>● Tower lamp module<ul style="list-style-type: none"><li>– Green / Yellow / Red</li></ul></li><li>● Size &amp; weight<ul style="list-style-type: none"><li>– 300×300×260 mm, 3.8kg</li></ul></li><li>● IO-Link cable : 2ea<ul style="list-style-type: none"><li>– Input cable, Output cable : D-sub 25 pin</li></ul></li><li>● Connector between stations</li><li>● SMS module storage case<ul style="list-style-type: none"><li>– Size : 350×340×270 mm</li><li>– Aluminum profile panel for PLC installation</li></ul></li></ul>



## Buffer station (FME–SMS–BUFF)



Order number : 31017

### Function

- Buffer station can be used to combine intermediate stations.
- The work piece is transferred to next station after finish.

### Training contents

- Usage of Conveyor belt unit
- DC motor control with relay
- Pneumatic cylinder control
- Optical sensor application
- System composition and assembling / disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"> <li>● Conveyor belt unit               <ul style="list-style-type: none"> <li>– Size : 60×300 mm</li> <li>– Motor : DC24V geared motor</li> <li>– Timing belt drive</li> </ul> </li> <li>● Control relay               <ul style="list-style-type: none"> <li>– DC motor control for conveyor belt</li> </ul> </li> <li>● Buffer unit 1, 2               <ul style="list-style-type: none"> <li>– Buffer cylinder</li> </ul> </li> <li>● Magnetic proximity sensor</li> <li>● Optical fiber sensor 1, 2               <ul style="list-style-type: none"> <li>– Work piece detect</li> <li>– Buffer position</li> </ul> </li> <li>● Conveyor belt guide</li> <li>● Solenoid valve unit               <ul style="list-style-type: none"> <li>– 5/2-Way single solenoid valve</li> </ul> </li> <li>● Aluminum profile panel : 300×300×15 mm</li> </ul>	<ul style="list-style-type: none"> <li>● SMS Input /Output Terminal unit (4mm &amp; sys link)               <ul style="list-style-type: none"> <li>– Input : 11, Output : 9 points with LED</li> <li>– D-sub connector : Input 25 pin, Output 25 pin</li> <li>– Sensor protection : short circuit proof type</li> </ul> </li> <li>● Control switch module               <ul style="list-style-type: none"> <li>– START, STOP, AUTO(RESET), Emergency</li> </ul> </li> <li>● Tower lamp module               <ul style="list-style-type: none"> <li>– Green / Yellow / Red</li> </ul> </li> <li>● Size &amp; weight               <ul style="list-style-type: none"> <li>– 300×300×260 mm, 3.8kg</li> </ul> </li> <li>● IO-Link cable : 2ea               <ul style="list-style-type: none"> <li>– Input cable, Output cable : D-sub 25 pin</li> </ul> </li> <li>● Connector between stations</li> <li>● SMS module storage case               <ul style="list-style-type: none"> <li>– Size : 350×340×270 mm</li> <li>– Aluminum profile panel for PLC installation</li> </ul> </li> </ul>

## Assembly station (FME–SMS–ASSEM)



Order number : 31018

### Function

- Assembly station is provided work piece by a rotation disc unit and assemble the work piece using a press unit, Assembled work piece is transferred to next station by a conveyor belt,

### Training contents

- Usage of conveyor belt unit
- DC Motor control with relay
- Positioning with Rotation Disc unit
- Assembling with Press unit
- System composition and assembling / disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"><li>● Conveyor belt unit<ul style="list-style-type: none"><li>– Size : 60×300 mm</li><li>– Motor : DC24V geared motor</li><li>– Timing belt drive</li></ul></li><li>● Assembling table</li><li>● Press unit<ul style="list-style-type: none"><li>– Press cylinder</li></ul></li><li>● Magnetic proximity sensor</li><li>● One-way flow control valve</li><li>● Stack magazine unit for assembling work piece</li><li>● Optical fiber sensor : detecting input work piece</li><li>● Origin position sensor</li><li>● Rotation disc unit<ul style="list-style-type: none"><li>– 6 positions</li><li>– Motor : DC24V geared motor</li></ul></li><li>● Control relay : 2ea<ul style="list-style-type: none"><li>– DC motor control for conveyor belt</li><li>– DC motor control for rotation disc unit</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Solenoid valve unit<ul style="list-style-type: none"><li>– 5/2-Way single solenoid valve</li></ul></li><li>● Aluminum profile panel : 300×300×15 mm</li><li>● SMS Input /Output Terminal unit (4mm &amp; sys link)<ul style="list-style-type: none"><li>– Input : 11, Output : 9 points with LED</li><li>– D-sub connector : Input 25 pin, Output 25 pin</li><li>– Sensor protection : short circuit proof type</li></ul></li><li>● Control switch module<ul style="list-style-type: none"><li>– START, STOP, AUTO(RESET), Emergency</li></ul></li><li>● Tower lamp module<ul style="list-style-type: none"><li>– Green / Yellow / Red</li></ul></li><li>● Size &amp; weight<ul style="list-style-type: none"><li>– 300×300×260 mm, 3,8kg</li></ul></li><li>● IO-Link cable : 2ea<ul style="list-style-type: none"><li>– Input cable, Output cable : D-sub 25 pin</li></ul></li><li>● Connector between stations</li><li>● SMS module storage case<ul style="list-style-type: none"><li>– Size : 350×340×270 mm</li><li>– Aluminum profile panel for PLC installation</li></ul></li></ul>

## Automated warehouse station (FME–SMS–WARE)



Order number : 31019

### Function

- Automated warehouse station can store and release a work piece.  
It is composed of 3 floors warehouse and stacker crane.

### Training contents

- Understanding of Automated warehouse
- Control of motor with motor drive
- Orientation of AS/RS
- Spindle drive unit
- System composition and assembling / disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"> <li>● Work piece holding unit <ul style="list-style-type: none"> <li>– Holding block</li> <li>– Slider : Stainless steel</li> </ul> </li> <li>● Optical sensor</li> <li>● Geneva gear drive unit <ul style="list-style-type: none"> <li>– DC Motor : DC24V geared motor</li> <li>– 8 positions</li> </ul> </li> <li>● Photo coupler</li> <li>● Spindle drive unit <ul style="list-style-type: none"> <li>– Z-axis drive : up &amp; down</li> </ul> </li> <li>● Origin position detector</li> <li>● Pulse encoder</li> <li>● Safety limit sensor</li> <li>● Electro magnet holding unit</li> <li>● Motor controller 2CH <ul style="list-style-type: none"> <li>– Safety limit protection</li> <li>– CW, CCW function</li> </ul> </li> <li>● Slider unit</li> <li>● Warehouse unit <ul style="list-style-type: none"> <li>– 3 floors and 2 rows</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Aluminum profile panel : 300×300×15 mm</li> <li>● SMS Input /Output Terminal unit (4mm &amp; sys link) <ul style="list-style-type: none"> <li>– Input : 11, Output : 9 points with LED</li> <li>– D-sub connector : Input 25 pin, Output 25 pin</li> <li>– Sensor protection : short circuit proof type</li> </ul> </li> <li>● Control switch module <ul style="list-style-type: none"> <li>– START, STOP, AUTO(RESET), Emergency</li> </ul> </li> <li>● Tower lamp module <ul style="list-style-type: none"> <li>– Green / Yellow / Red</li> </ul> </li> <li>● Size &amp; weight <ul style="list-style-type: none"> <li>– 300×300×260 mm, 3.8kg</li> </ul> </li> <li>● IO-Link cable : 2ea <ul style="list-style-type: none"> <li>– Input cable, Output cable : D-sub 25 pin</li> </ul> </li> <li>● Connector between stations</li> <li>● SMS module storage case <ul style="list-style-type: none"> <li>– Size : 350×340×270 mm</li> <li>– Aluminum profile panel for PLC installation</li> </ul> </li> </ul>

## Sorting station (FME–SMS–SORT)



Order number : 31020

### Function

- Classify work piece as 3 types according to sort of work piece.  
The work piece on a conveyor belt is stacked on work piece storage through a sorting slider by a sorting actuator unit.

### Training contents

- Usage of conveyor belt unit
- DC Motor control with relay
- Solenoid actuator application
- Sorting slide
- System composition and assembling / disassembling
- Electric wiring and pneumatic piping
- PLC program
- Fieldbus communication technology
- Commissioning and fault tracking
- System maintenance

### Components

Component	Component
<ul style="list-style-type: none"><li>• Conveyor belt unit<ul style="list-style-type: none"><li>– Size : 60×300 mm</li><li>– Motor : DC24V geared motor</li><li>– Timing belt drive</li></ul></li><li>• Inductive sensor</li><li>• Optical sensor</li><li>• Sorting actuator unit<ul style="list-style-type: none"><li>– Rotary solenoid actuator</li><li>– Rotation angle : 45°</li></ul></li><li>• Sorting slider &amp; work piece storage</li><li>• Control relay<ul style="list-style-type: none"><li>– DC motor control for conveyor belt</li><li>– DC solenoid control for sorting actuator</li></ul></li><li>• Sorting end bracket</li><li>• Aluminum profile panel : 300×300×15 mm</li></ul>	<ul style="list-style-type: none"><li>• SMS Input /Output Terminal unit (4mm &amp; sys link)<ul style="list-style-type: none"><li>– Input : 11, Output : 9 points with LED</li><li>– D-sub connector : Input 25 pin, Output 25 pin</li><li>– Sensor protection : short circuit proof type</li></ul></li><li>• Control switch module<ul style="list-style-type: none"><li>– START, STOP, AUTO(RESET), Emergency</li></ul></li><li>• Tower lamp module<ul style="list-style-type: none"><li>– Green / Yellow / Red</li></ul></li><li>• Size &amp; weight<ul style="list-style-type: none"><li>– 300×300×260 mm, 3.8kg</li></ul></li><li>• IO-Link cable : 2ea<ul style="list-style-type: none"><li>– Input cable, Output cable : D-sub 25 pin</li></ul></li><li>• Connector between stations</li><li>• SMS module storage case<ul style="list-style-type: none"><li>– Size : 350×340×270 mm</li><li>– Aluminum profile panel for PLC installation</li></ul></li></ul>

## Additional components

## Controller (option)

Order number : 23151



- SIEMENS PLC : STEP 7-1200
- Digital input : 14
- Digital output : 10
- Socket type IO terminal required
- Software excluded
- Analog input : 2
- Analog output : 1

## Teachware

Order number : 42042



- Manual and work book

## Work piece (basic)

Order number : 31031



- Round work piece
- Material : metal, plastic
- 3 color

## Work piece (Assembly)

Order number : 31032

- Round work piece
- Material : metal, plastic
- 3 color

## Touch panel (Optional)

Order number : 27456



- Display : 7" , LCD Color
- Power : DC24V
- Resolution : 600\*480
- Communication : USB, RS-232, Ethernet
- Aluminum case and one-touch mounting

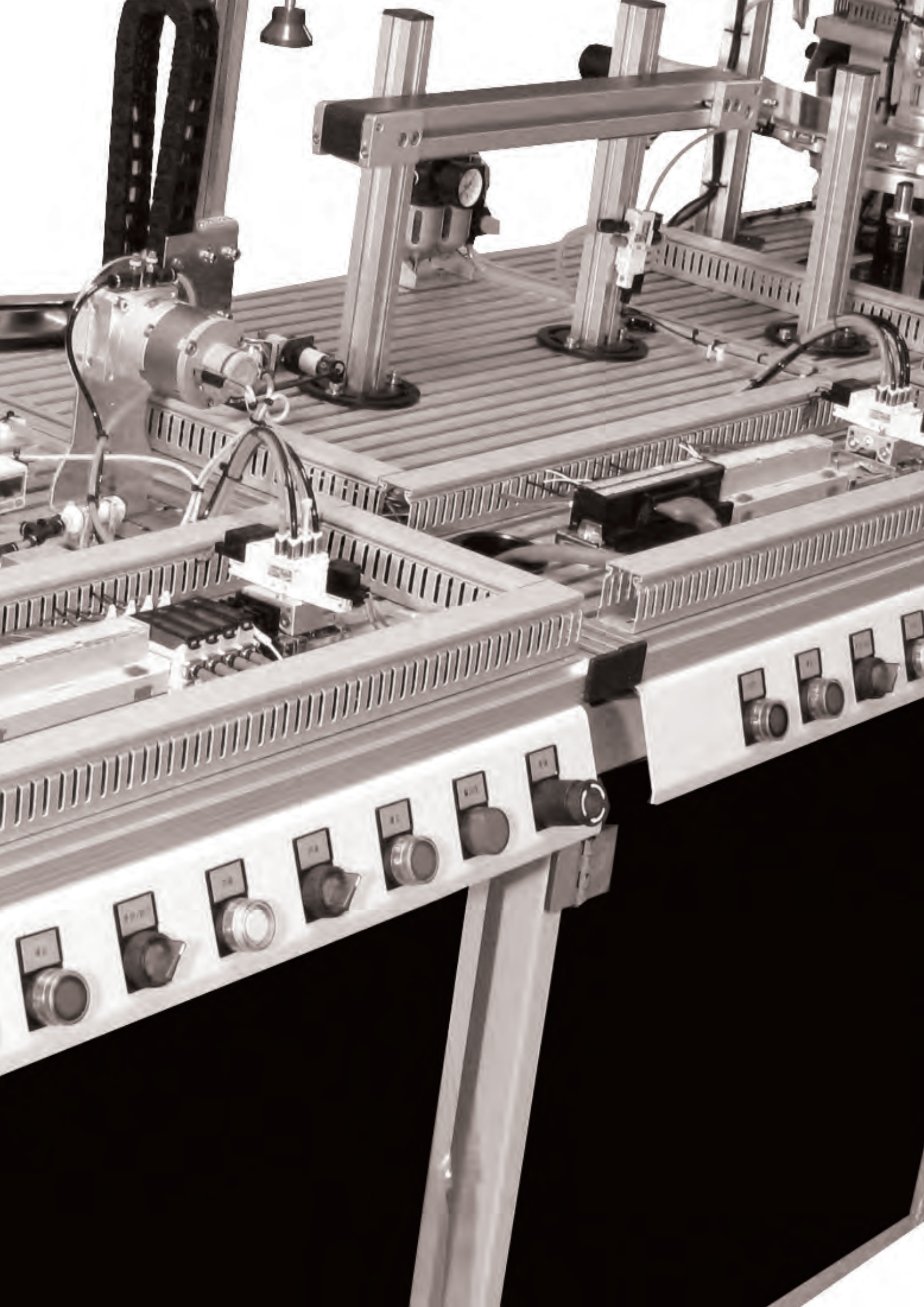
## Smart I/O (Profibus)

Order number : 13090

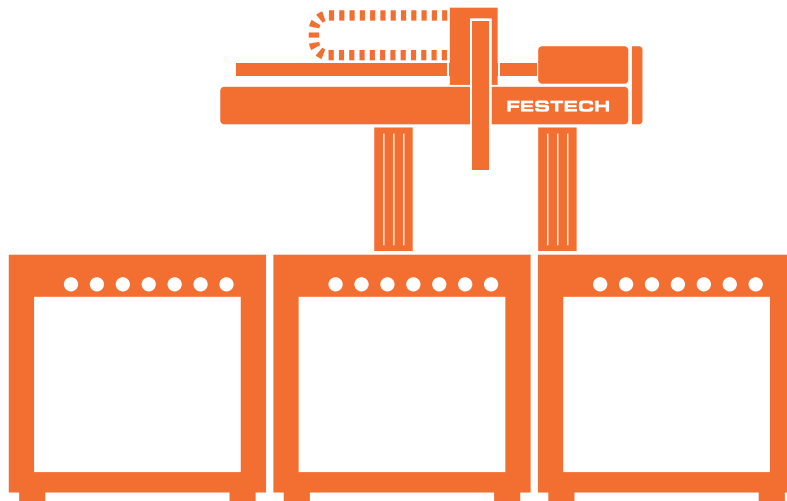


- Fieldbus option: Devicenet, InterBus, CC-Link, Ethernet
- 4mm socket terminal (option)









CHAPTER

08

## MODULE PRODUCT SYSTEM (MPS)

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# Module Production System (MPS)

**01** Distribution station

**02** Testing station

**03** Processing station

**04** Handling station

**05** Buffer station

**06** Robot station

**07** Sorting and storing station

**08** Pressing station

**09** AS/RS station

# Module Production System (MPS)



08

## Introduction

- Developed for actual training of production technology and automation systems.
- Provides theoretical practice as well as practical application of system design, building, commissioning, and operation.
- Composed of various modules for easy operation, assembly, and maintenance.
- Provides overall knowledge of pneumatics, electro-pneumatics, control engineering, sensors, and electronics for mechatronics.
- All parts and modules are detachable and can be reconfigured for maximum efficiency of training. The system encourages creative construction.
- All wiring and piping is safely protected, yet viewable for easy understanding.
- Each station is easy to add and change, and may constitute a variety of systems.

## MPS

All parts are completely fixed and electrically wired.  
Customer specifies a controller (e.g. PLC model).  
Please refer to quotation and ask our sales partner before ordering.

### COMBINATION OF STATIONS

- D + T + P
- D + T + S
- D + T + P + H
- D + T + P + H + B
- D + T + P + H + B + R
- D + T + P + H + B + R + S
- D + T + P + H + B + R + S + Pr + A

D

Distribution station (1)  
Order number : 81424



D

Distribution station (2)  
Order number : 81401



T

Testing station  
Order number : 81402



P

Processing station  
Order number : 81403



H

Handling station (1)  
Order number : 81404



H

Handling station (2)  
Order number : 81427



**B**

**Buffer station (1)**  
Order number : 81428



**B**

**Buffer station (2)**  
Order number : 81405



**R**

**Robot station**  
Order number : 81409



**S**

**Sorting and storing station**  
Order number : 81408



**Pr**

**Pressing station**  
Order number : 81406



**A**

**AS/RS**  
Order number : 81407



08

**1. Distribution**

Distribute work piece from the magazine

**2. Testing**

Test work piece and status of work piece with sensors

**3. Processing**

Process the work piece and test it on index table

**4. Handling**

Transfer the work piece with a rotary cylinder

**5. Buffer**

Buffer process for reducing dead time

**6. Robot**

Assemble and handle work piece with multi-axis robot

**7. Sorting and storing**

Storing in slide according to product information

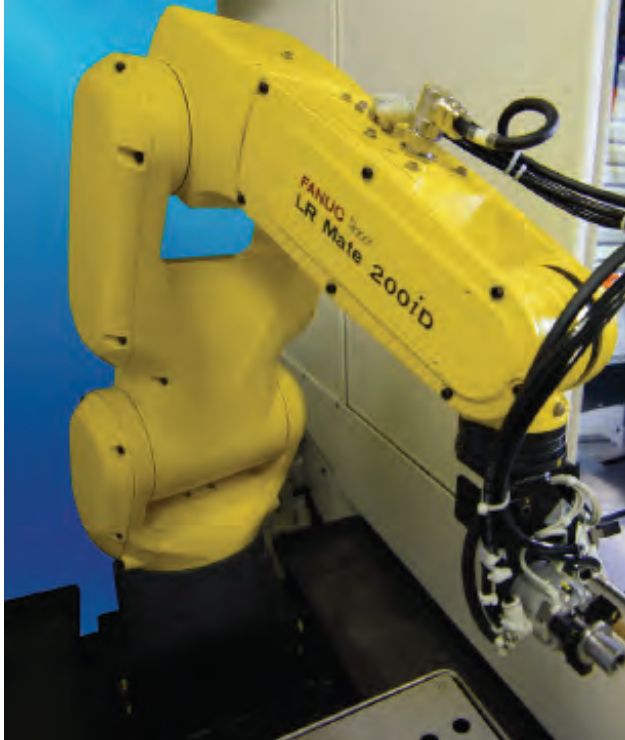
**8. Pressing**

Transfer the product to warehouse after punching and assembling a lid

**9. AS/RS**

Store the product into automatic warehouse

## Module Production System (MPS)



### Characteristics

- Equipment
- Mechanical assembly and disassembly
- Trouble shooting of system.
- Preparation and analysis of pneumatic circuits
- Vacuum control technology
- Tubing and electrical wiring of the electro-pneumatic circuit
- Configuration and analysis of the electrical circuit
- Trouble shooting of an electric circuit
- Electrical interface configuration and understanding
- Configuration and understanding of the sensor
- Installation and utilization of the PLC
- Added application control the PLC basic programming and additional conditions
- Construction and use of monitoring systems
- Combined feature of each unit process module
- Selectable module combination by customer's order
- Various controller and any kind of PLCs adaptable
- It is possible to tailor-made solution

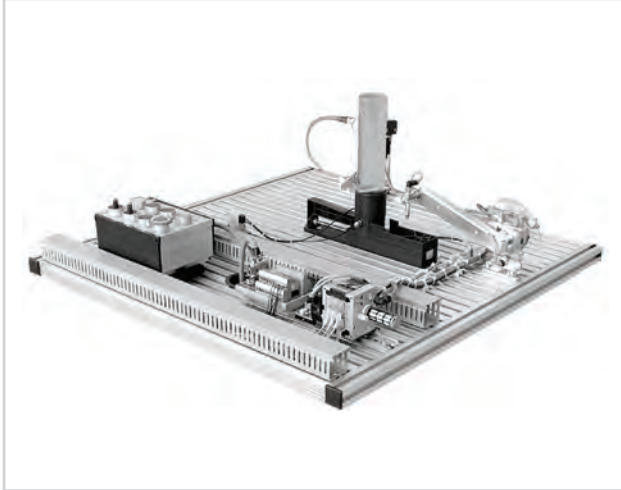


### Training contents

- Understanding and application of mechanical element and pneumatics
- Assemble and disassemble of mechanical structure
- Systemic fault finding on a production system
- Drawing and analysis of pneumatics circuit
- Vacuum control technology
- Pneumatic circuit wiring and electric wiring
- Composition of electric circuit
- Fault finding and measure of electric circuit
- Understanding and composition of electrical interface
- Understanding and composition of sensors
- Installation and application of PLC
- Basic to advanced PLC
- Establish and application of monitoring system

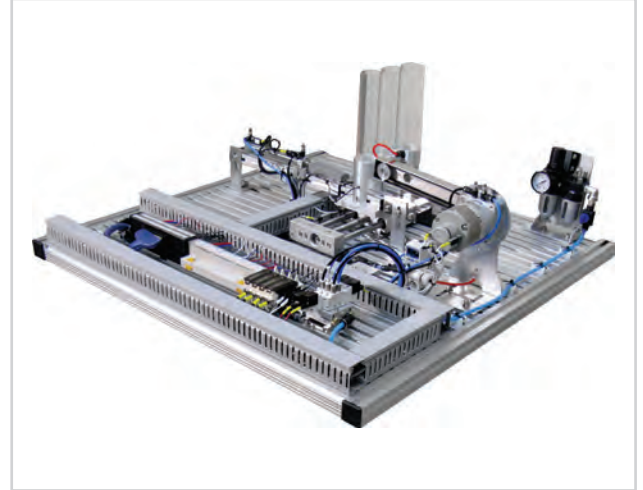


## Distribution station (FMPS-D) (1)



Order number : 81424

## Distribution station (FMPS-D) (2)



Order number : 81401

### Composition

- Magazine module for distribution of 3 kinds work piece
- Distribution with a pneumatic cylinder
- Material handling by vacuum and rotary cylinder

- Size : 750(W)×750(D)×1000(H)mm
- Weight : 67kg
- Input Power : AC 220V, 60Hz
- Output Power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	D1 Qty	D2 Qty
1	Working table	1	1
2	Service unit	1	1
3	Distribution module	1	1
4	Source material module	1	3
5	DC motor	0	1
6	Rotary cylinder	1	1
7	Vacuum valve	1	1
8	Pressure sensor	1	1
9	Solenoid valve block	1	1
10	I/O terminal	1	1
11	Control panel	1	1
12	Cable duct	1	1
13	Power supply	1	1
14	PLC unit	1	1
15	Signal transmission cable set	1	1

## Testing station (FMPS-T)



Order number : 81402

### Composition

- Material testing module with sensors
- Lift module with rodless cylinder
- Slide module for transfer
- Height measurement module
- Able to choose analog type for height measurement module
- Conveyor module

- Size : 750(W)×750(D)×1000(H)mm
- Weight : 65Kg
- Input Power : AC 220V, 60Hz
- Output Power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Sensor module	1
4	Lift module	1
5	Height measurement module	1
6	Cylinder transfer module	1
7	Inferior work piece ejecting slide	1
8	Work piece transferring slide	1

No.	Component	Qty
9	Conveyor transfer module	1
10	Solenoid valve block	1
11	I/O terminal	1
12	Control panel	1
13	Cable duct	1
14	Power supply	1
15	PLC unit	1
16	Signal transmission cable set	1

## Processing station (FMPS-P)



Order number : 81403

### Composition

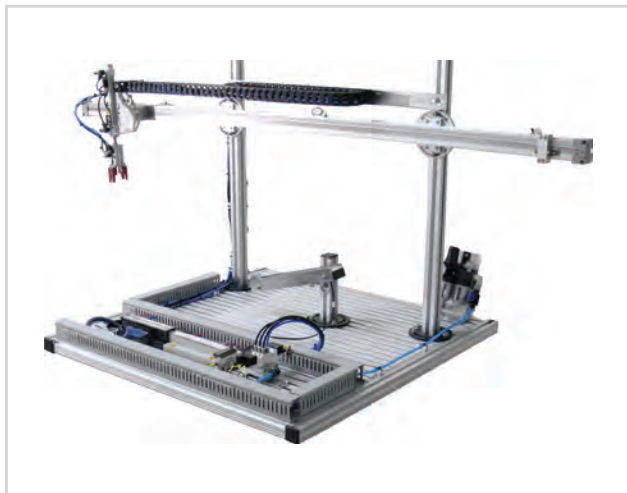
- Index table
  - Drilling, Clamping module
  - Hole process check module using cylinder
- Size : 750(W)×750(D)×1000(H)mm
  - Weight : 67Kg
  - Input power : AC 220V, 60Hz
  - Output power : DC 24V, 3A
  - Operating pressure : 5 ~ 6 bar
  - Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Drill module	1
4	Test module	1
5	Clamp cylinder module	1
6	Index table geared motor	1
7	Pressure regulator	1
8	Index module	1
9	Relay module	1
10	Optical fiber sensor	4

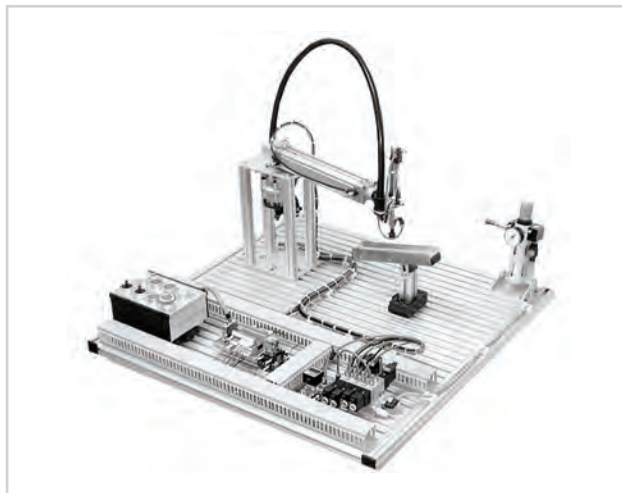
No.	Component	Qty
11	Optical cable	4
12	Proximity sensor	7
13	Solenoid valve block	1
14	I/O terminal	1
15	Control panel	1
16	Cable duct	1
17	Power supply	1
18	PLC unit	1
19	Signal transmission cable set	1

## Handling station (FMPS-H) (1)



Order number : 81404

## Handling station (FMPS-H) (2)



Order number : 81427

### Composition

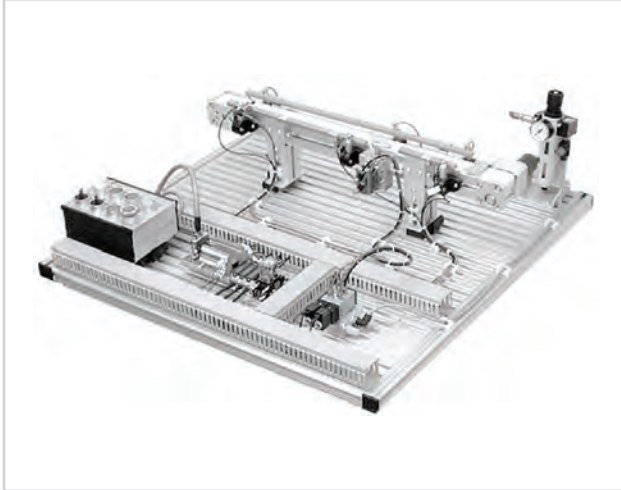
- Transfer the work piece using pneumatic gripper
- Faulty product is assorted by slide

- Size : 750(W)×750(D)×1000(H)mm
- Weight : 67Kg
- Input Power : AC 220V, 60Hz
- Output Power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

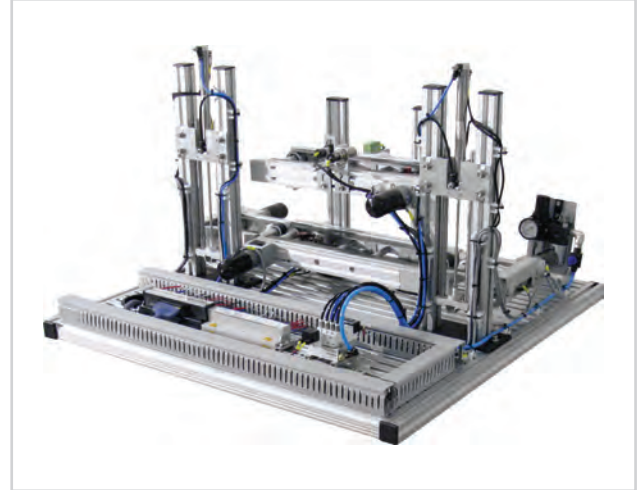
No.	Component	H1 Qty	H2 Qty
1	Working table	1	1
2	Service unit	1	1
3	Rodless transfer cylinder	1	0
4	Rotary PTP module	0	1
5	Z axis cylinder	1	1
6	Pneumatic gripper	1	1
7	Slider module	1	1
8	Solenoid valve block	1	1
9	I/O terminal	1	1
10	Control panel	1	1
11	Cable duct	1	1
12	Power supply	1	1
13	PLC unit	1	1
14	Signal transmission cable set	1	1

## Buffer station (FMPS-B) (1)



Order number : 81428

## Buffer station (FMPS-B) (2)



Order number : 81405

### Composition

- Conveyor transfer module using DC geared motor
- Stopper module
- Optical fiber sensor module

- Size : 750(W)×750(D)×1000(H)mm
- Weight : 73Kg
- Input Power : AC 220V, 60Hz
- Output Power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	B1 Qty	B2 Qty
1	Working table	1	1
2	Service unit	1	1
3	Belt conveyor module	1	4
4	Lift cylinder	0	2
5	Optical sensor	2	1
6	Capacitive sensor	0	1
7	Stopper cylinder	1	2
8	Inductive sensor	0	3
9	Relay module	1	1
10	Solenoid valve block	1	1
11	I/O terminal	1	1
12	Control panel	1	1
13	Cable duct	1	1
14	Power supply	1	1
15	PLC unit	1	1
16	Signal transmission cable set	1	1

## Robot station (FMPS-R)



Order number : 81409

### Composition

- 5-axis robot
- Pneumatic gripper module : according to work piece, gripper can be replaced as vacuum module
- Distribution module
- Assembly module

- Size : 750(W)×750(D)×1000(H)mm
- Weight : 73Kg
- Input Power : AC 220V, 60Hz
- Output Power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

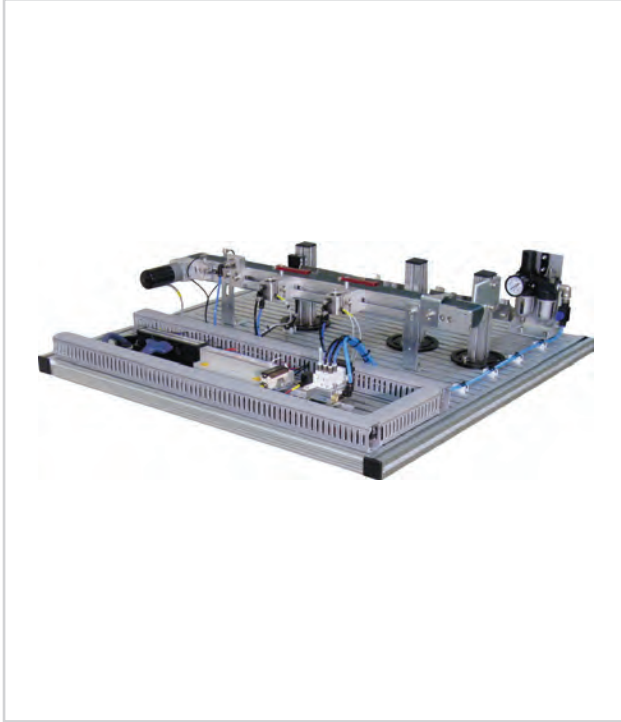
### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Test sensor module	1
4	5-axis robot	1
5	Optical sensor	1
6	Pneumatic gripper module	1
7	Inferior work piece ejecting slide	1
8	Work piece transfer slide	1

No.	Component	Qty
9	Solenoid valve block	1
10	I/O terminal	1
11	Control panel	1
12	Cable duct	1
13	Power supply	1
14	PLC unit	1
15	Signal transmission cable set	1



## Sorting and storing station (FMPS-S)



Order number : 81408

### Composition

- Conveyor transfer module
  - Slider module for storing work pieces
  - Switching cylinder module
- 
- Size : 750(W)×750(D)×1000(H)mm
  - Weight : 65Kg
  - Input Power : AC 220V, 60Hz
  - Output Power : DC 24V, 3A
  - Operating pressure : 5 ~ 6 bar
  - Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Belt conveyor module	1
4	Sorting and storing slide	3
5	Ejecting cylinder	2
6	Optical fiber sensor	1
7	Stopper cylinder module	1
8	Proximity sensor	4

No.	Component	Qty
9	Retro-reflective optical sensor	1
10	Solenoid valve block	1
11	I/O terminal	1
12	Control panel	1
13	Cable duct	1
14	Power supply	1
15	PLC unit	1
16	Signal transmission cable set	1

## Pressing station (FMPS-PR)



Order number : 81406

### Composition

- Cylinder cap distribution module
- Press module
- Hydro-Converter module

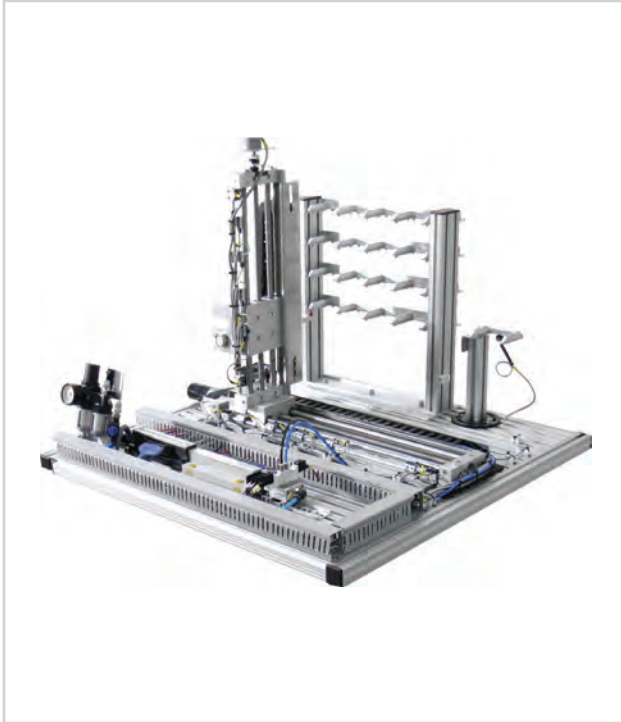
- Size : 750(W)×750(D)×1000(H)mm
- Weight : 65Kg
- Input power : AC 220V, 60Hz
- Output power : DC 24V, 3A
- Operating pressure : 5 ~ 6 bar
- Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Cap distribution module	1
4	Extracting module	1
5	Press module	1
6	Hydro-converter module	1
7	Optical fiber sensor	2
8	Proximity sensor	6

No.	Component	Qty
9	Solenoid valve block	1
10	I/O terminal	1
11	Control panel	1
12	Cable duct	1
13	Power supply	1
14	PLC unit	1
15	Signal transmission cable set	1

## AS/RS station (FMPS-AS/RS)



Order number : 81407

### Composition

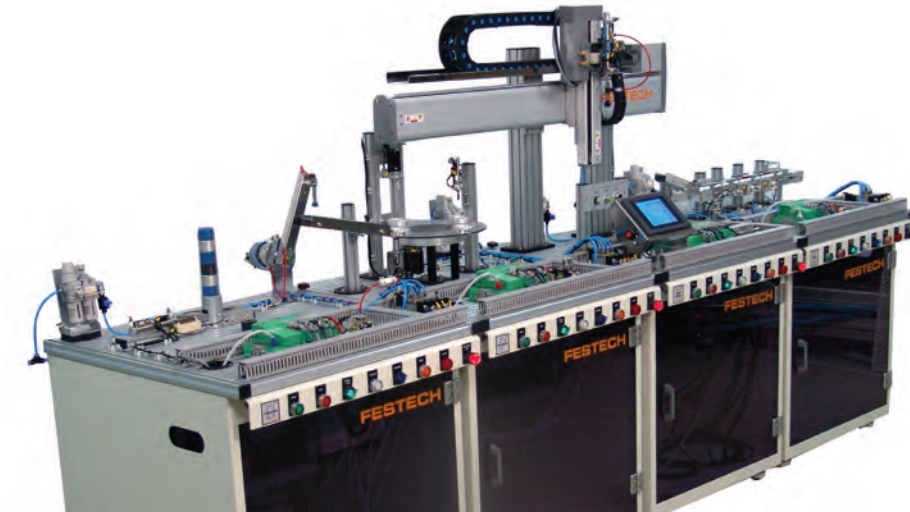
- Conveyor transfer module
  - Slider module for work piece storing
  - Switching cylinder module
- Size : 750(W)×750(D)×1000(H)mm
  - Weight : 73Kg
  - Input power : AC 220V, 60Hz
  - Output power : DC 24V, 3A
  - Operating pressure : 5 ~ 6 bar
  - Interface : 1) Digital Input/Output (default)  
2) Fieldbus : Profibus

### Components

No.	Component	Qty
1	Working table	1
2	Service unit	1
3	Spindle module with DC geared motor	2
4	Double-acting cylinder	1
5	2-axis motor control unit	1
6	Storing rack	1
7	Safety limit switch	5
8	Proximity sensor	9

No.	Component	Qty
9	Capacitive sensor	1
10	Solenoid valve block	1
11	I/O terminal	1
12	Control panel	1
13	Cable duct	1
14	Power supply	1
15	PLC unit	1
16	Signal transmission cable set	1

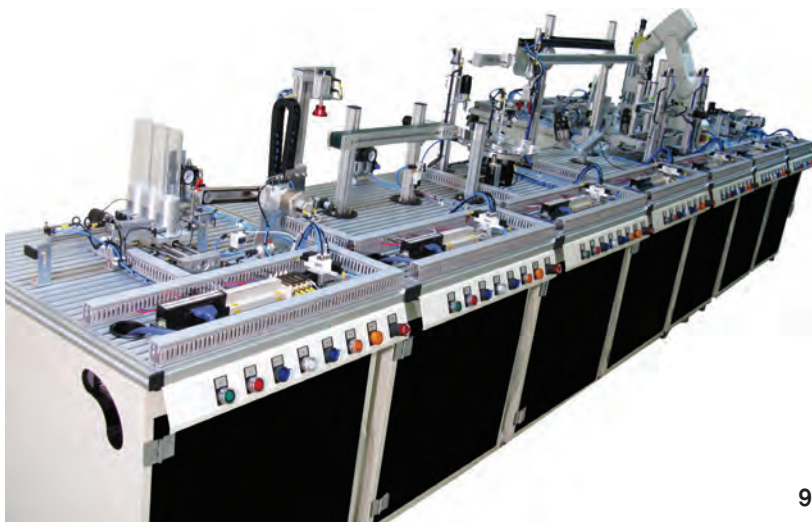
## Various combinations of MPS stations



4 Station : D / P / R / S

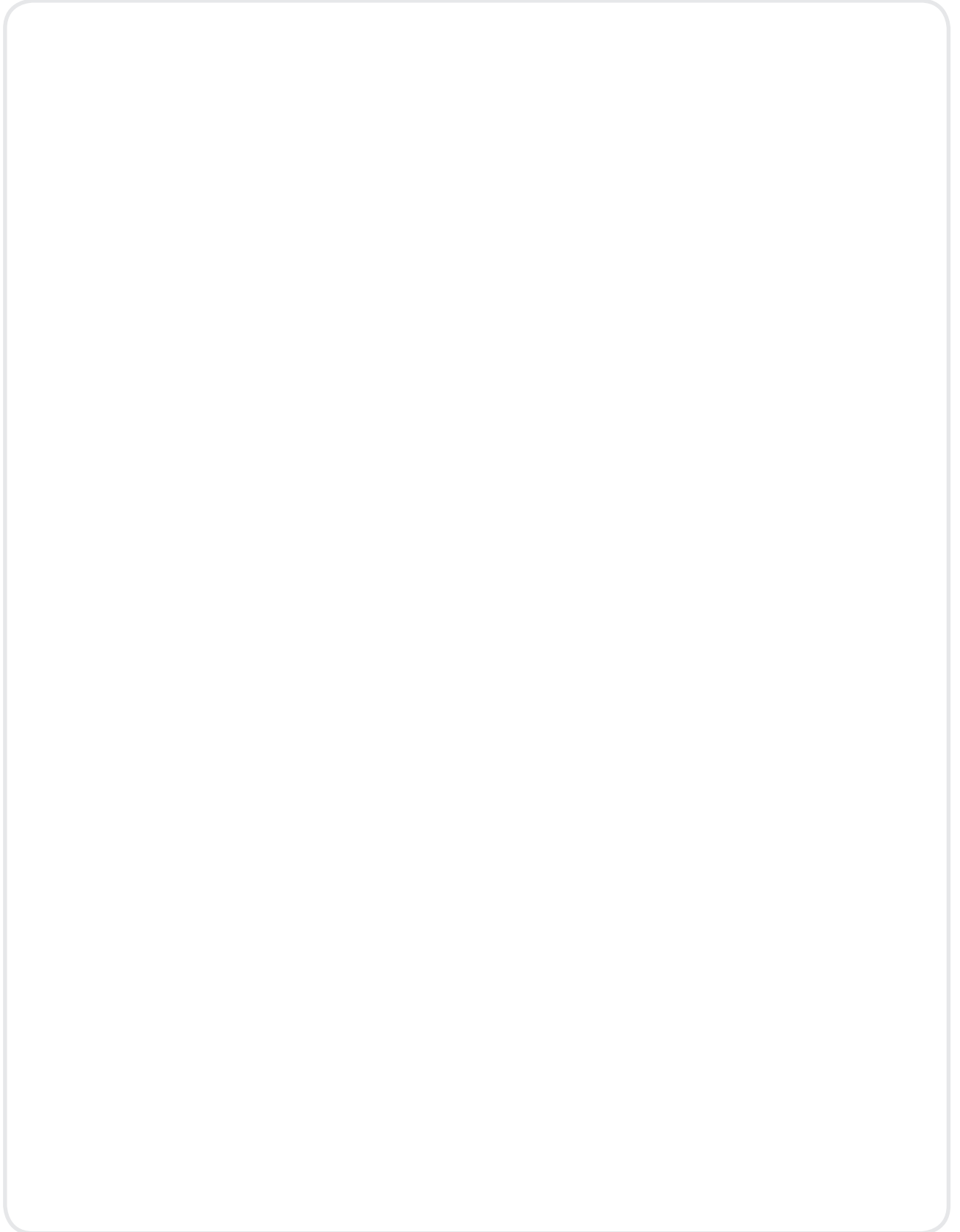


5 Station : D / T / P / R / S

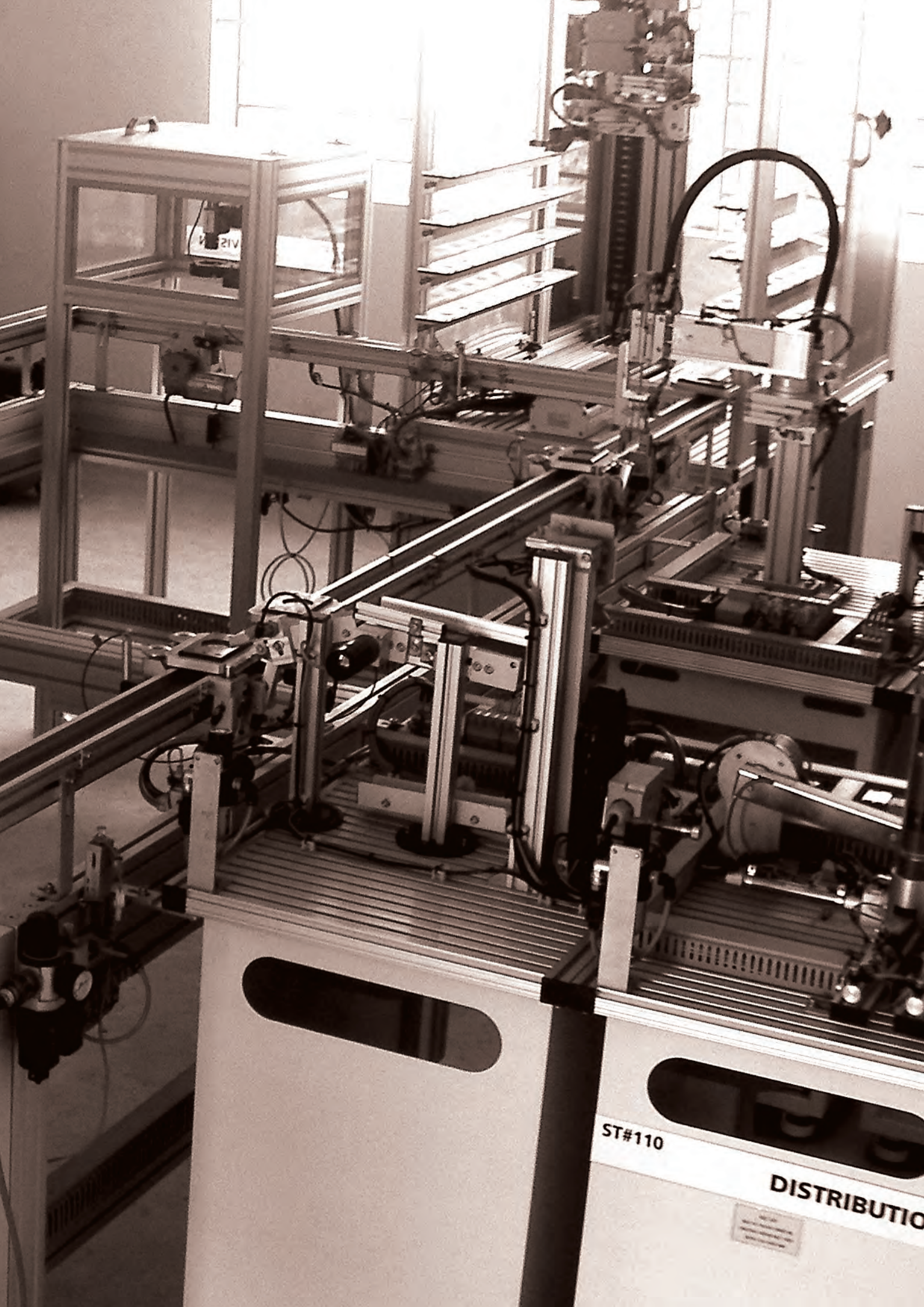


9 Station : D / T / P / H / B / R / S / Pr / A

## Memo



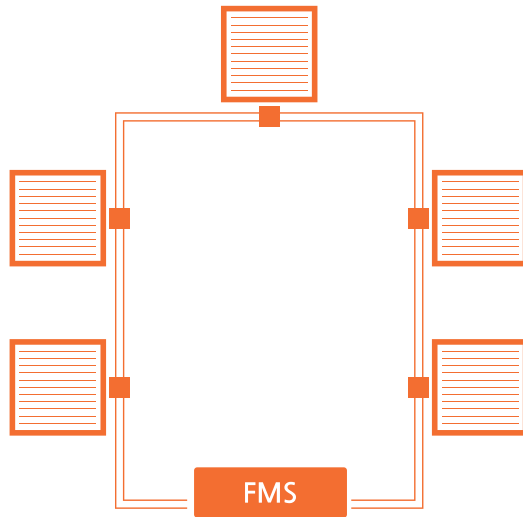




ST#110

DISTRIBUTION





CHAPTER

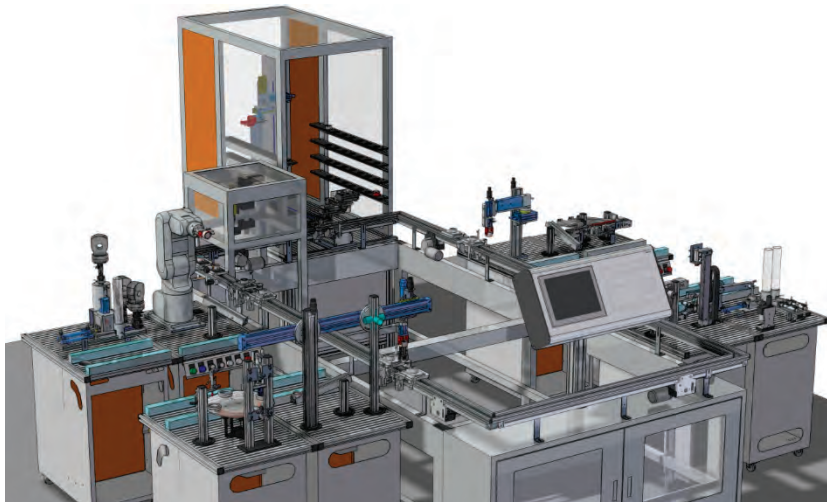
09

## FLEXIBLE MANUFACTURING SYSTEM (FMS)

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# Flexible Manufacturing System (FMS)



## Introduction

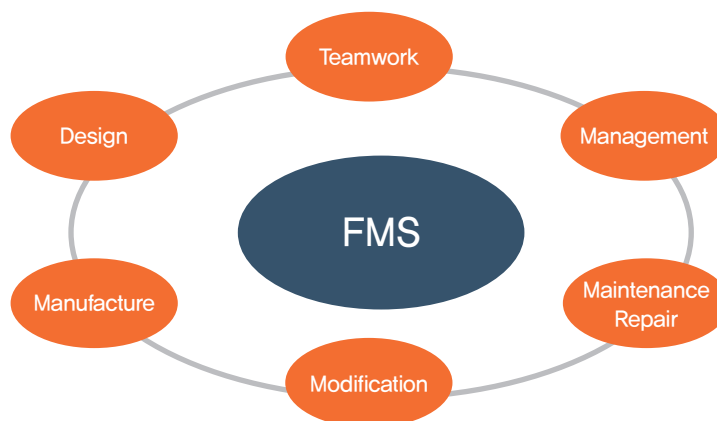
The Flexible Manufacturing System (FMS) training set is composed of various automation technologies intended for integration. It is possible to develop a teaching plan for adapting to diverse industrial equipment.

The aim of this training set is analysis and application of the FMS with manufacturing technologies such as CAD, CAPP, CAM, CAQ and MRP through the Ethernet.

This equipment is designed for the effective education of an automated industrial production system.

Theoretical knowledge and system design is required to implement the production process.

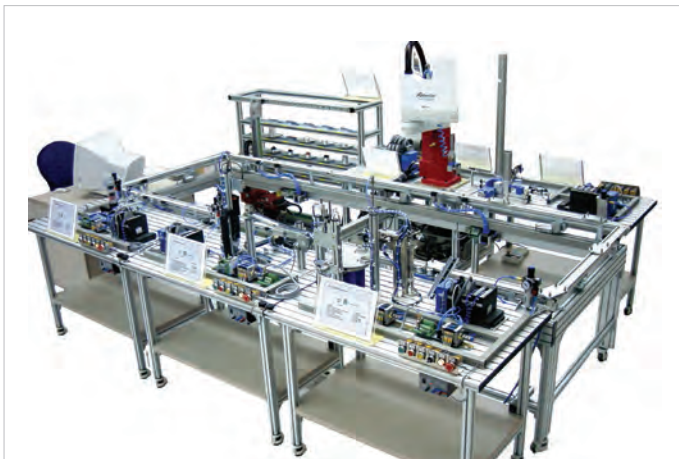
This equipment includes modules for Distribution, Testing, Processing, Robot, Handling, Packing, and Automated Warehouse Storage.



## Factory Automation Training System (FMS-130)



FMS training set implements a Plan-Do-Check-Action training procedure to master the following subjects:



- Understanding the mechanical construction and parts,
- Pneumatics, electric system
- PLC system
- Network system with PLCs
- Electric control system and installation
- Analog and digital signal processing
- Conveyor system
- Material processing and testing
- Robot system
- Process control system

## Changeable FMS with customer's order



- Different order, different specification.
- Any kind of robot, PLC, motor and electric devices
- Compatible system expansion with MPS training set
- New design possibility with industrial CNC equipment
- Control system interface (AS-i, Ethernet, Interbus, Profibus)

### APPLICATIONS

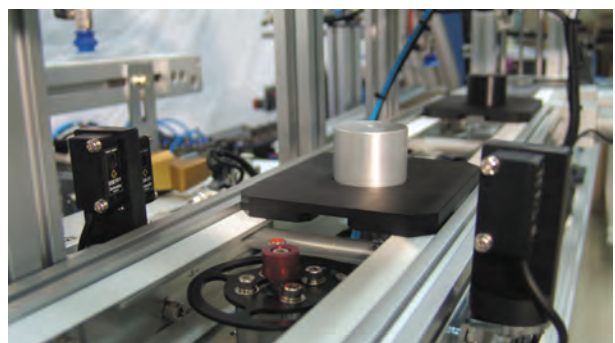
Unmanned automated warehouse system

Physical Distribution control system

Manufacturing and Processing  
Integrated System

Robot Application Control Systems

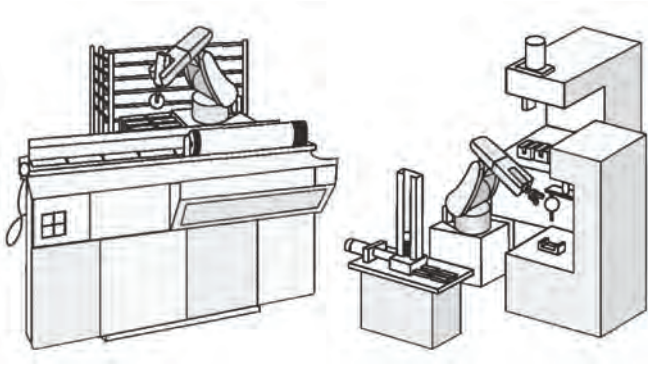
Servo Control Systems



## Integrated technologies (FMS)

technology		contents
M E C H A T R O N I C S	Mechanics	Understanding mechanical parts
		Assembly and disassembly
		Planning and designing mechanism
		Understanding and utilizing pneumatics
		Structures of robot system
	Electrics	Electric composition and drawing circuit
		Understanding electric devices
		Electric interface
		Communication methods and measurement Operating
	Electronics	Principle of sensors
		Structure and usage of PLC
		Special functions in PLC
		Robot control technology and PLC system
		PLC system with process control system
	Cooperation	Maintenance and quality control for system optimizing
		Planning and organization of work process
		Sharing opinions and cooperation on a project.

## HMI and Monitoring and Simulation



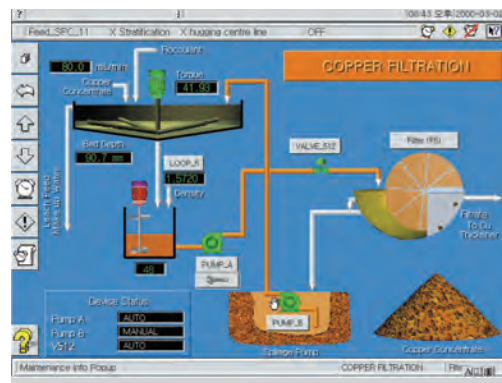
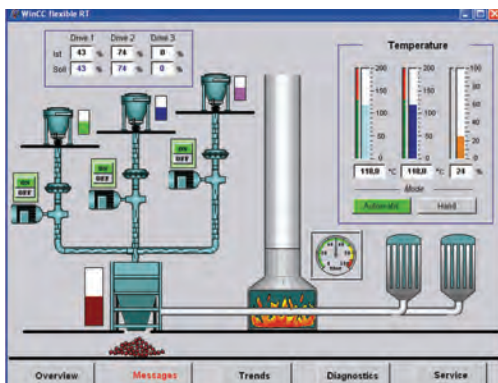
Monitoring system in unit process and overall process

Embodiment of a real-time control

Simulation with a virtual program tool

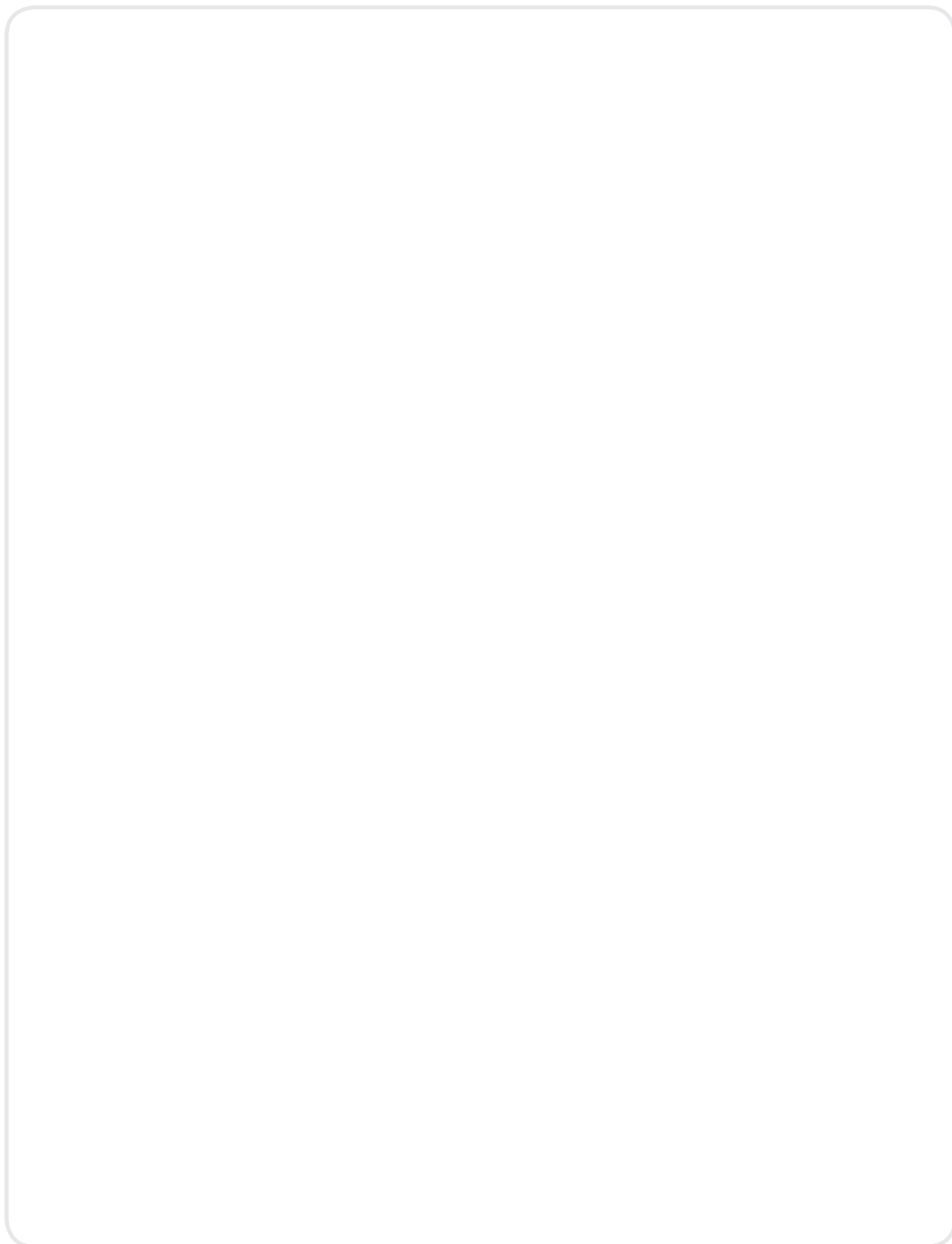
Learning programming language of PLC, PC-Based

Controller

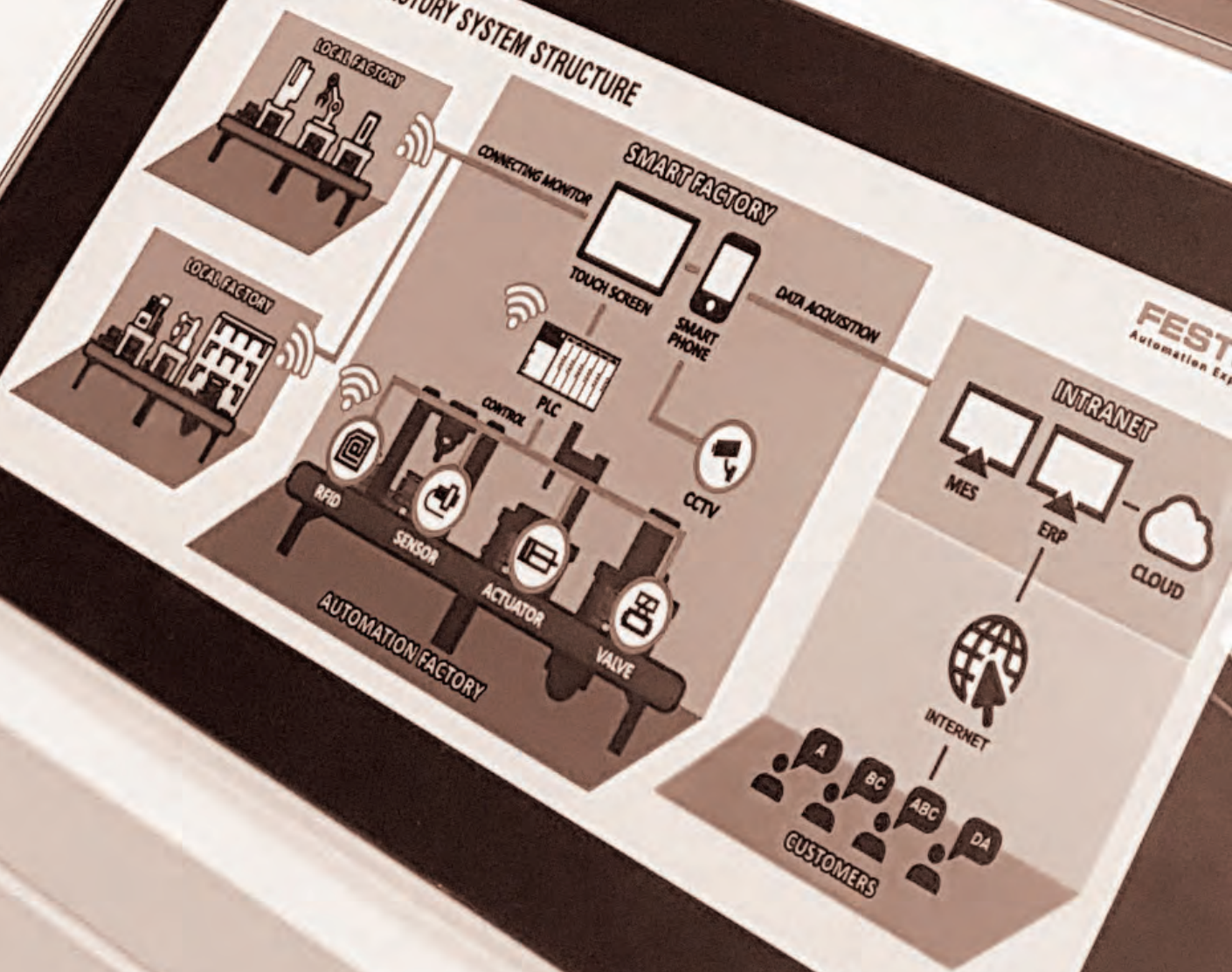




## **Memo**



# SMART FACTORY SYSTEM STRUCTURE





CHAPTER

10

## SMART FACTORY 4.0 (SF4.0)

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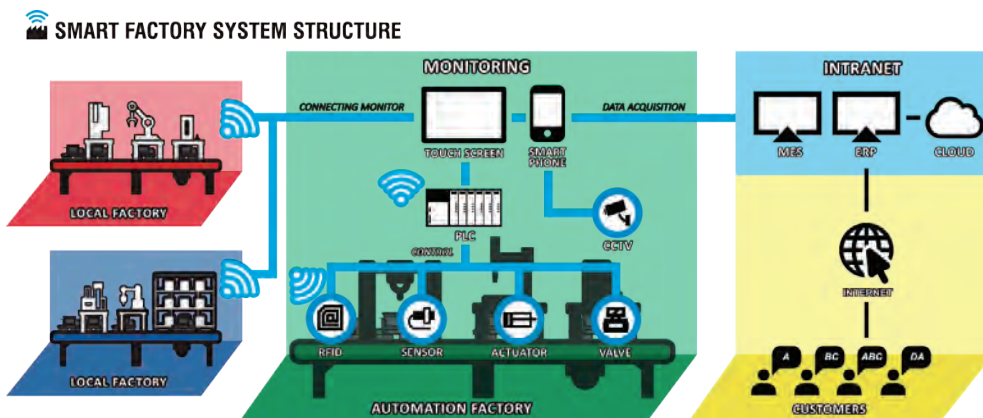


# Smart Factory 4.0 (SF4.0)

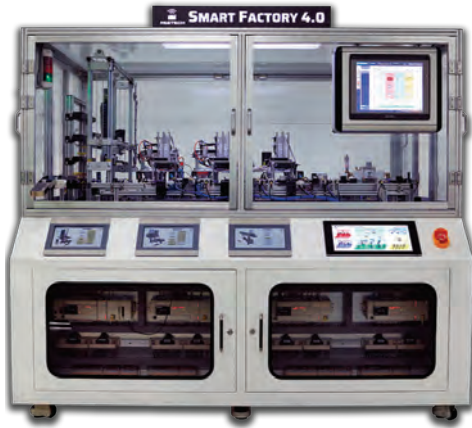


## Introduction

Each station of Smart Factory system is applied technologies of smart factory. Also, users can understand technologies those are used in real industry field. Data from each station of smart factory is stores in main system through PLC operation processing. Then the data is visualized and reported to increase productivity.



## Smart Factory 4.0 (SF4.0)



### Specifications

Production factory	3 factory lines(Steel ball, Marble candy, Coin plate)
Pallet transfer	8 conveyor belt modules
Distribuion unit	3 case distribution modules
Production unit	3 production modules
Pakaging unit	3 Cover packaging modules
Automatic warehouse	ASRS by 2 axes servo motion with handling drive unit
RFID controller	15 RFID readers, 8 RFID tags
Control system	4 PLCs (1 Master and 3 Slaves)
Communication	Ethernet network system
Intergrated HMI	3 touch panels for station monitoring
MES HMI	1 HMI for Manufacturing Execution System with SCADA
CCTV monitoring	CCTVs with IoT system
IoT system	Mobile device control & monitoring with clouds network



RFID



SCADA



MES



CLOUD



IoT

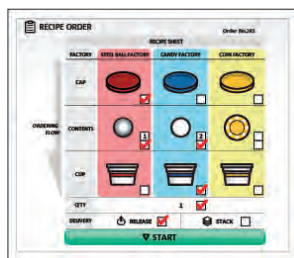


REPORTING

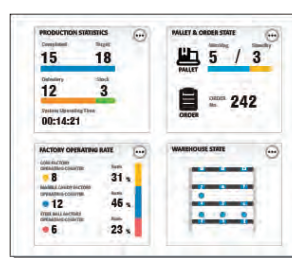
## Function

### MES & SCADA SYSTEM

Smart Factory 4.0 can monitor and data various manufacturing information made from a factory via intergrated monitoring system. Customers can order customized products with various recipes. The information can be monitored and controlled by smartphone, tablet PC.



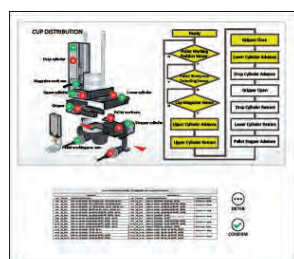
Production



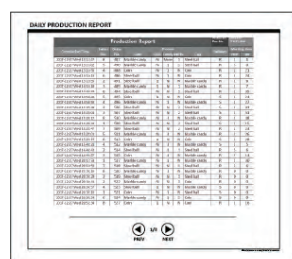
System monitoring



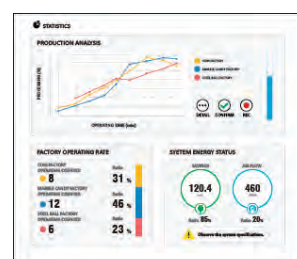
Network monitoring



Module process monitoring



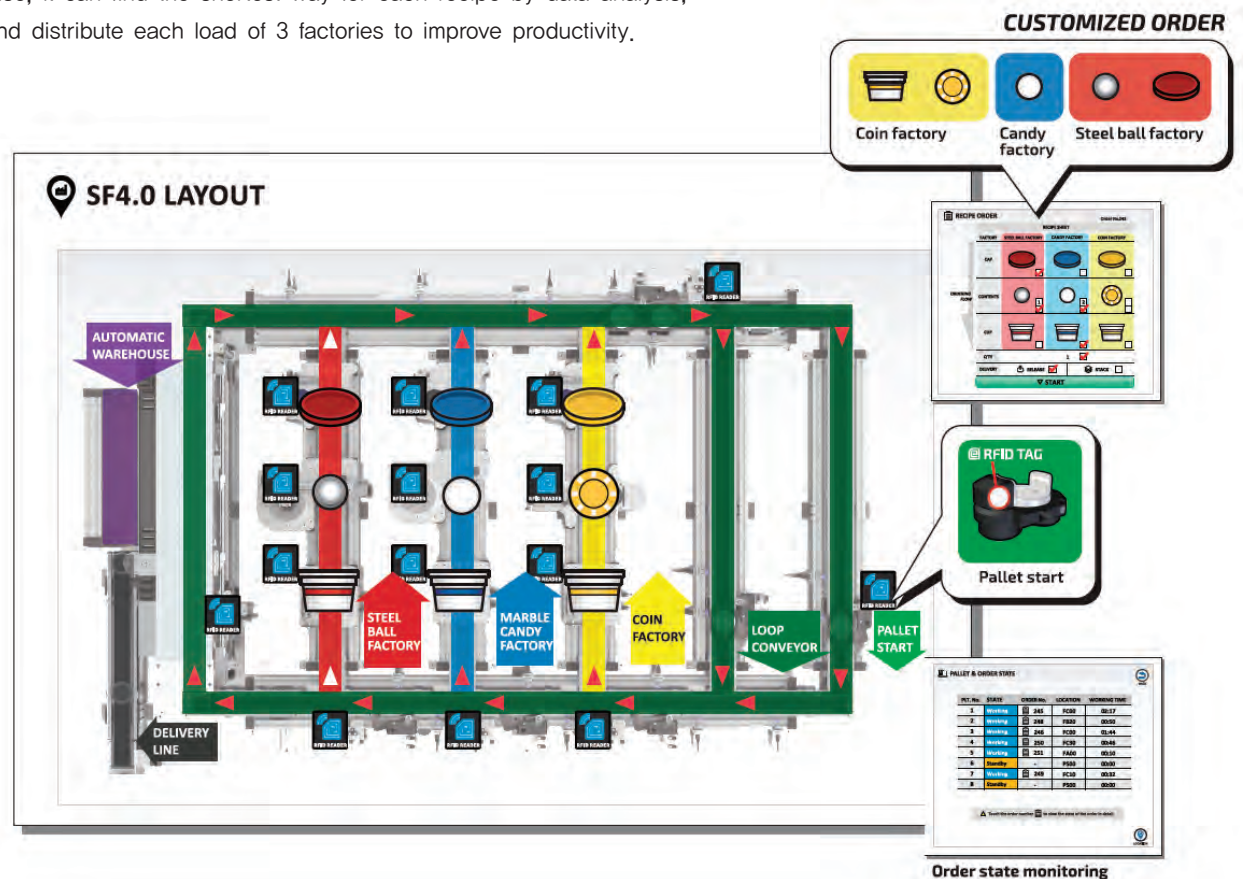
Production report



Data analysis

# Features

3 production factories cooperated each other to carry out various orders from customers. Production information is written as production report in real time. Also, it can find the shortest way for each recipe by data analysis, and distribute each load of 3 factories to improve productivity.



RFID system



SF4.0 products



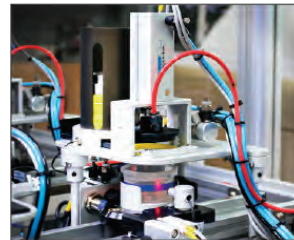
Automatic warehouse



Case distribution module



Production module

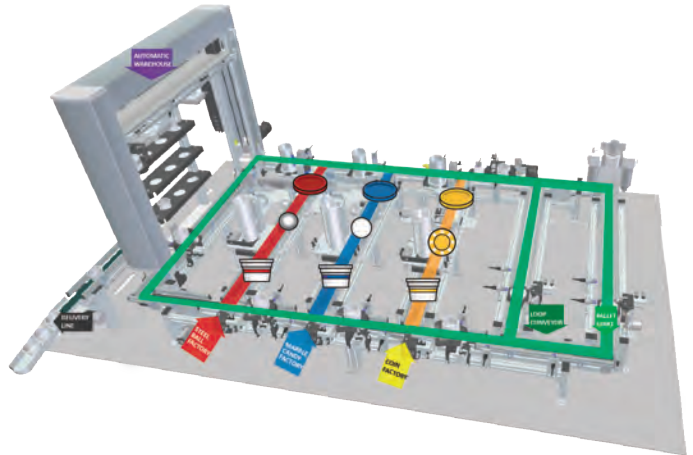


Cover packaging module



## Applications

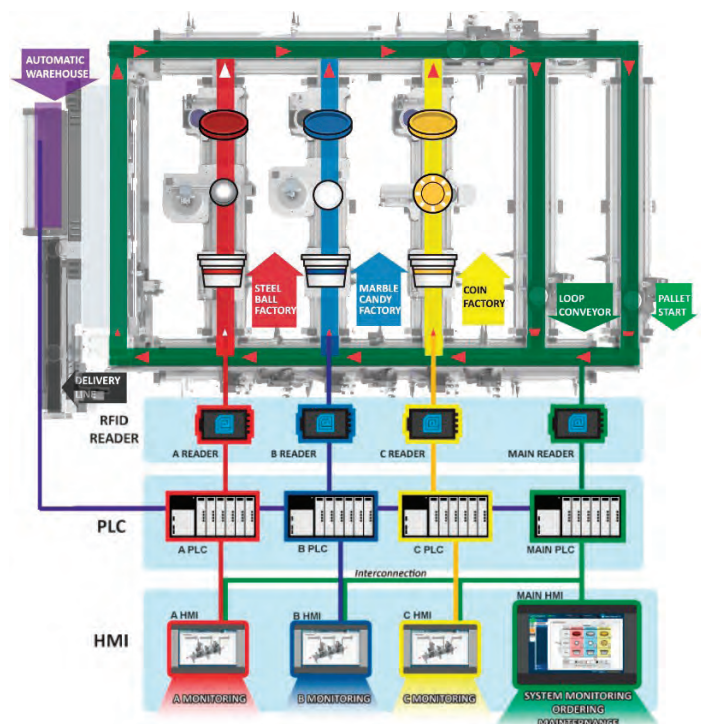
- Understanding of smart factory
- Manufacturing and processing insgrated system
- Integrated monitoring system
- Process control tracking via RFID
- Realtime data control
- DB acquisition and analysis
- Mobile & tablet connection

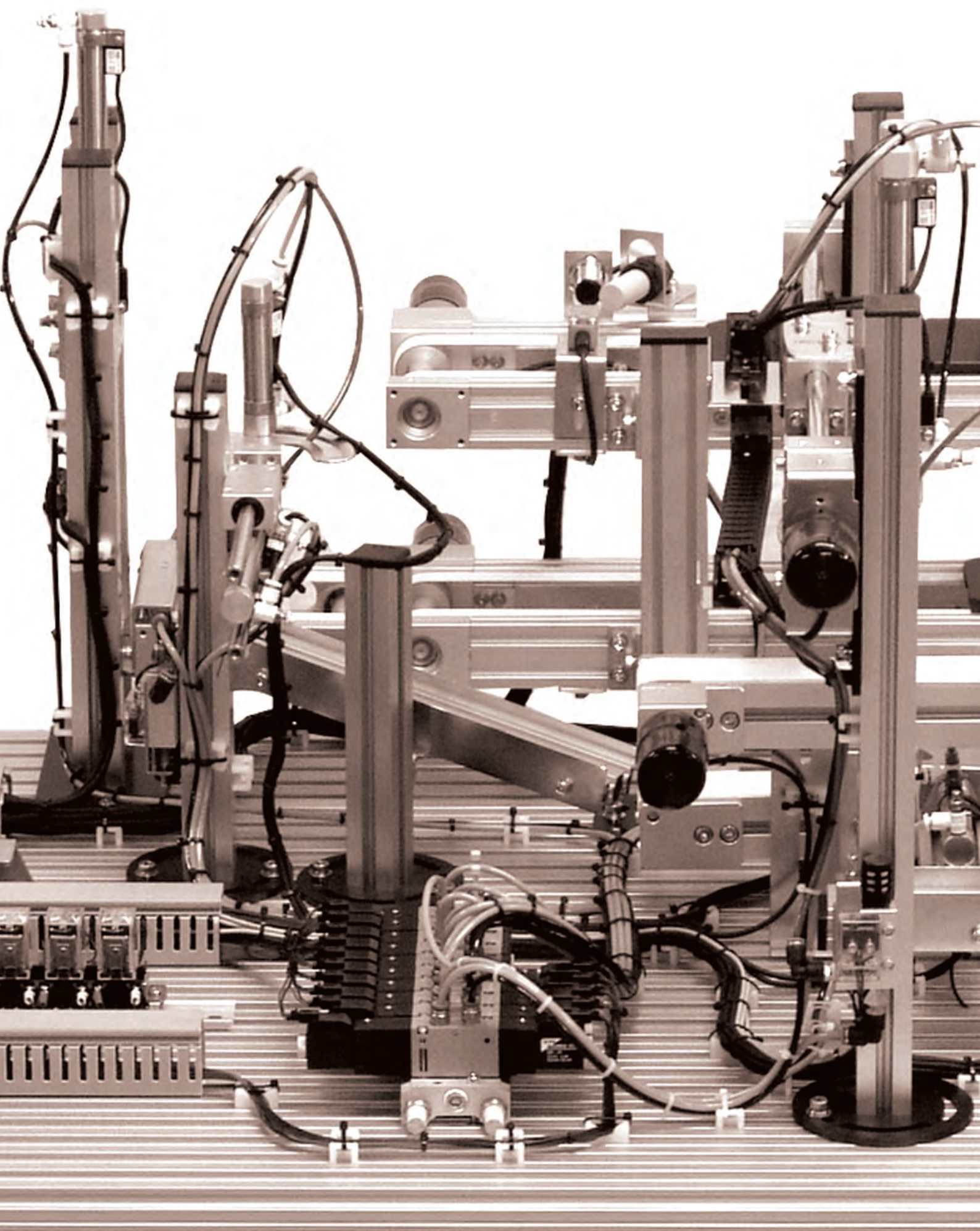


**SF4.0**  
SMART FACTORY 4.0

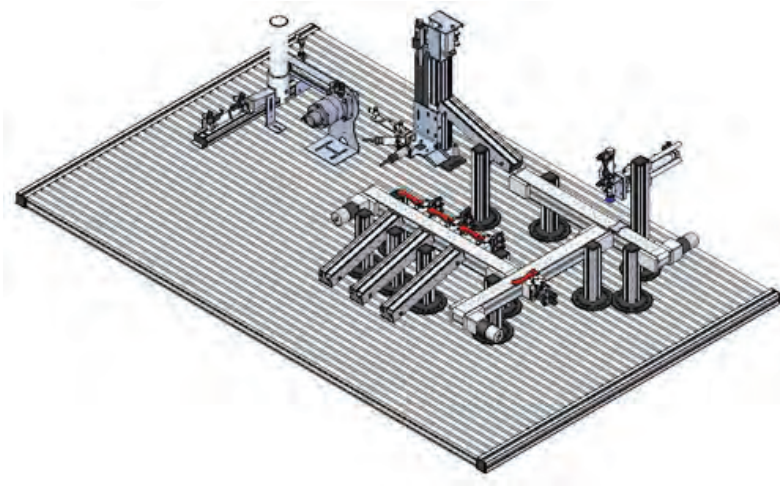


More Information !









CHAPTER

11

# VARIABLE MECHATRONICS SYSTEM (VMS)

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# Variable Mechatronics System (VMS)

## What does VMS stand for?

Variable Mechatronics System

VMS is a training system designed to teach the advanced technologies of the FMS and to further develop mechatronics experts. VMS consists of modules for easy assembly/disassembly.

The system is expandable, and allows trainees to realistically simulate situations in an increasingly complicated industry.

VMS allows a simple or complicated configuration of process and system to suit the ability of the trainees. A variety of workplace practices including design, assembly, programming, operation, maintenance, and repair, are available in VMS. In addition to teaching mechatronics, VMS provides an environment which integrates and develops project-based personal skills such as teamwork, cooperation, unique design and comprehensive analysis.

## Training purpose

- Work Plan
- Assembling Machines and Systems
- Programming
- Control and Operation
- Maintenance
- Troubleshooting

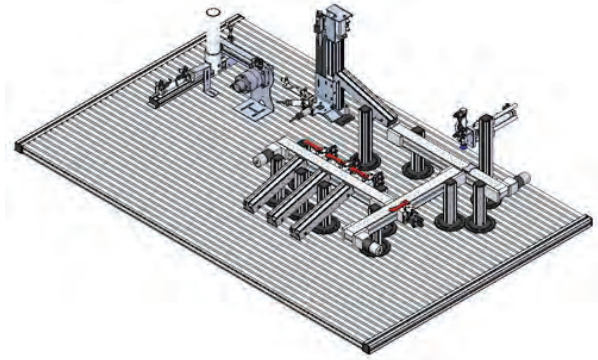
## Training purpose

VMS includes processes with different operating conditions and scenarios. A variety of configurations and combinations of processes are available to meet the user's needs. It is possible to customize the practice equipment from module and a single process to the integrated processes.

Distribution process	Sequentially distributes the workpieces stored in a magazine.
Testing process	Determines the material, color and height of workpieces.
Processing process	Uses a rotary index table to process the workpieces, and test the processing condition.
Handling process	Pneumatic actuators arranged on orthogonal axis delivers the workpieces to the next process.
Buffer process	Controls the flow of workpieces for a flexible operation between the stations based on the waiting time and operating time.
Sorting and storing process	Sorts and stores the workpieces into slider or warehouse based on the information of workpieces.

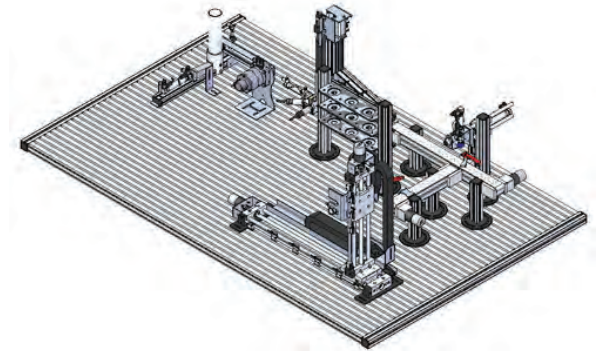
## VMS Scenario 1

Distribute work piece → Rotary cylinder  
transfer → Test lifter → Slider → Conveyor →  
PTP → Conveyor → Sorting (3 type)



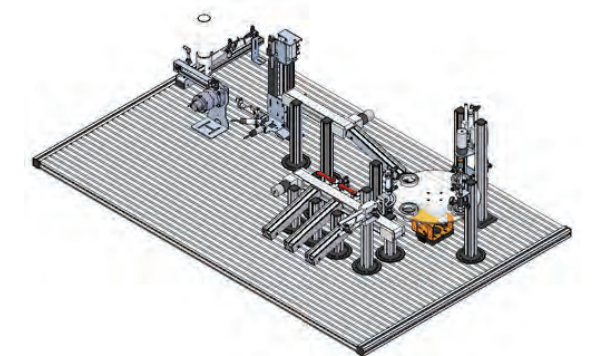
## VMS Scenario 2

Distribute work piece → Rotary cylinder  
transfer → Test lifter → Slider → PTP →  
Conveyor → Stacker crane → AS/RS (3 type)



## VMS Scenario 3

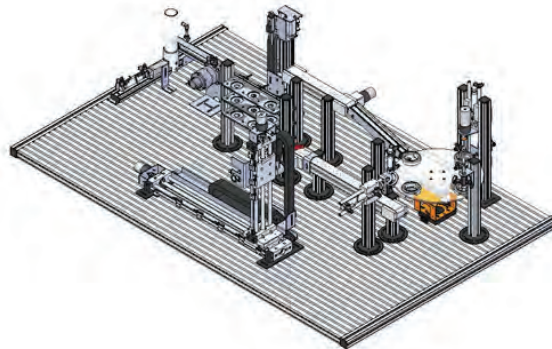
Distribute work piece → Rotary cylinder  
transfer → Test lifter → Conveyor → Slider  
→ Indexing (Drilling + hole testing) → PTP  
→ Storing (3 type)





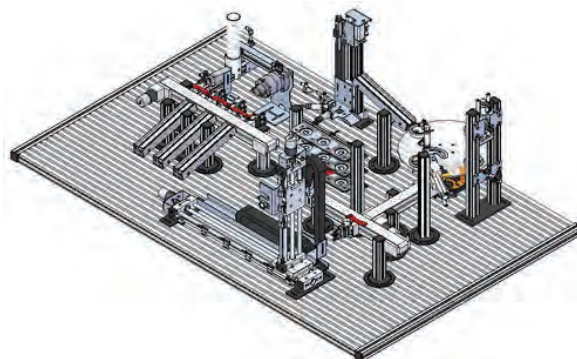
## VMS Scenario 4

Distribute work piece → Rotary cylinder transfer → Test lifter → Conveyor → Slider → Indexing (Drilling + hole testing) → PTP → Conveyor → Stacker crane → AS/RS



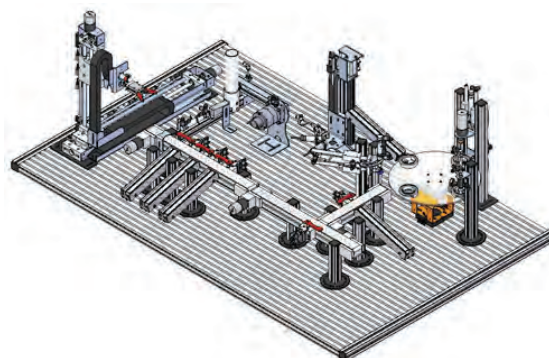
## VMS Scenario 5

Distribute work piece → Rotary cylinder transfer → Test lifter → Slider → Indexing (Drilling + hole testing) → PTP → Conveyor → Stacker crane → AS/RS (storing) → Sorting conveyor (unstoring)



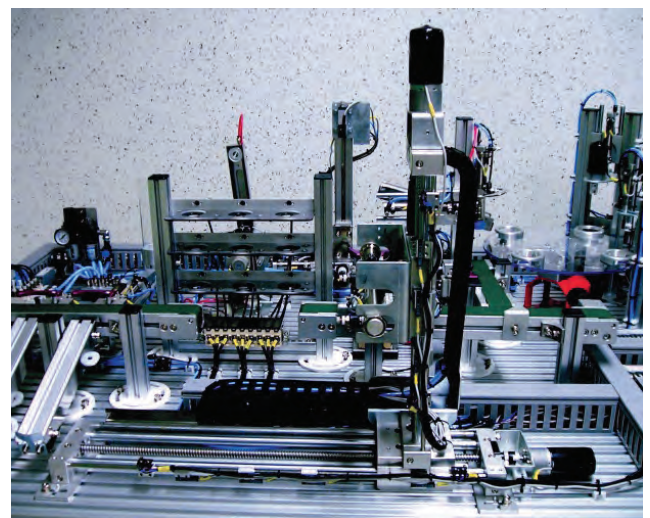
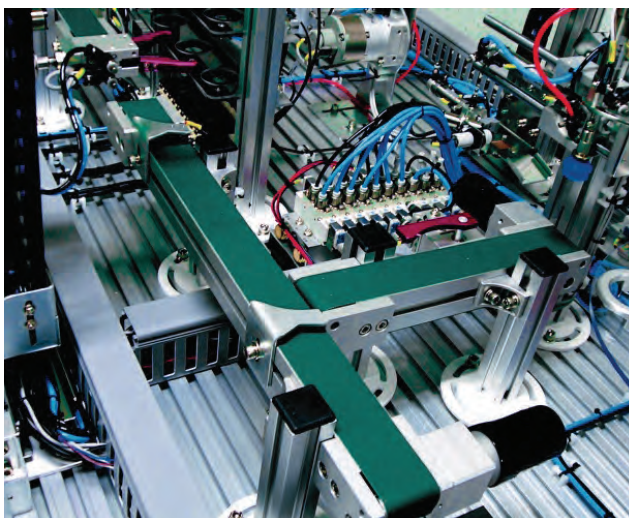
## VMS Scenario 6

Distribute work piece → Rotary cylinder transfer → Test lifter → Conveyor → Slider → Indexing → PTP → Conveyor → Storage → Stacker crane → Distribute work piece





## VMS training room in HYUNDAI and KIA Motors



## Components

### Working table

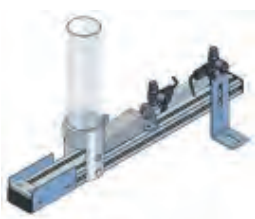
Order number : 11003



- Table Size : 1500(L)×750(W)×800(H)mm
- Profile panel Size : 1500(W)×750(D) mm
- Groove : 25 mm
- Composition : Table frame : 1EA  
cabinet(4 drawers) : 1EA  
Caster with brake : 4EA

### Distribution module

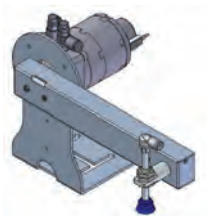
Order number : 32001



- Work piece magazine : tower type, transparent
- Double-acting cylinder (flow control valve, reed switch attached)
- Optical fiber sensor
- Module fix bracket

### Rotary transfer module

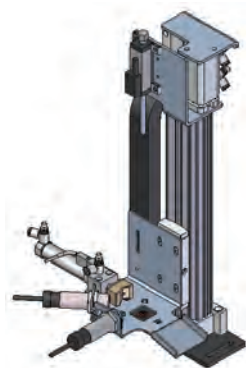
Order number : 32002



- Distribution/ take work piece with 180 ° rotary transferring
- Magnetic reed switch for cylinder attachment
- Level spring (vacuum pad attached)
- Vacuum valve
- Moving angle : 180 °

### Testing module

Order number : 32003



- Height of work piece
- Extraction cylinder (Φ16-60) : reed switch attached
- Rodless cylinder (Φ10) : twin-rod type (rotary protection)
- Leaner potentiometer (inductive sensor)
- Photo sensor : M18
- Capacitive sensor : M18

## Components

### Conveyor module 1

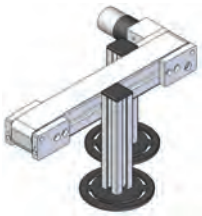
Order number : 32008



- DC geared Motor : DC 24V/ 2000 RPM
- Belt type conveyor : width 50mm
- Profile frame

### Conveyor module 2

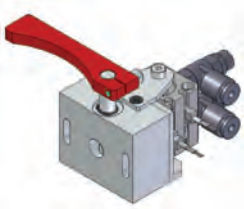
Order number : 32009



- DC geared Motor : DC 24V/ 2000 RPM
- Belt conveyor : width 50mm
- Profile frame

### Branch cylinder module

Order number : 32011



- Double-acting cylinder with flow control valve
- Magnetic reed switch
- Linear to rotate switching device

### Slider module






Order number : 32010



- Aluminum profile : END CAP included
- Profile fixer :  $\Phi 100 \times 5t$
- L-bracket for position control
- Slider : Aluminum,  $30 \times 30 \times 200$  mm
- Slider cover



## Components

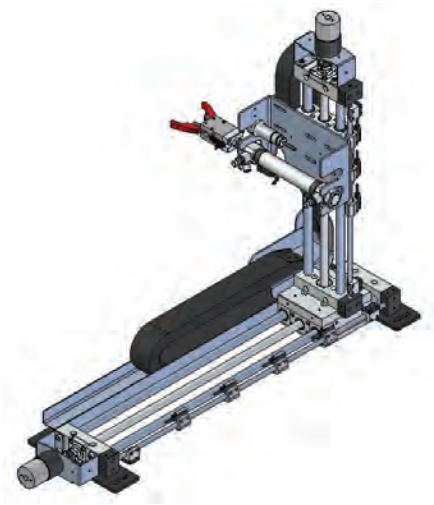
Indexing module	Order number : 32004
	<ul style="list-style-type: none"> <li>● Indexing table motor : DC24V geared motor</li> <li>● Motor protection circuit included</li> <li>● Index : 4 divided gear</li> <li>● Type : Geneva gear</li> <li>● Inductive sensor, photo sensor</li> </ul>
Drilling module	Order number : 32005
	<ul style="list-style-type: none"> <li>● Drill Motor : DC24V motor</li> <li>● Clamping cylinder : <math>\Phi 10 \times 20</math>, reed switch (2ea)</li> <li>● Up-down cylinder : rotate protection type</li> <li>● Frame : 30×30mm Aluminum profile</li> </ul>
Hole testing module	Order number : 32006
	<ul style="list-style-type: none"> <li>● Double-acting cylinder : <math>\Phi 10 \times 30</math></li> <li>● Sliding type (height adjustable)</li> <li>● Detecting drilled work piece</li> <li>● Frame : 30×30mm Aluminum profile</li> </ul>
PTP handling module	Order number : 32007
	<ul style="list-style-type: none"> <li>● Horizontal transfer cylinder : twin rod <math>\Phi 10 \times 75</math></li> <li>● Vertical transfer cylinder : <math>\Phi 16 \times 50</math></li> <li>● Reed switch attached (movement detecting)</li> <li>● Level spring (vacuum pad attached)</li> </ul>
Conveyor sorting module (3 type)	Order number : 32106
	<ul style="list-style-type: none"> <li>● Belt conveyor included</li> <li>● Cylinder : <math>\Phi 16 \times 10</math></li> <li>● Aluminum profile : END CAP included</li> <li>● Profile fixer : <math>\Phi 100 \times 5t</math></li> <li>● L-bracket : for position control</li> <li>● Slider : Aluminum, 30×30×200 mm</li> <li>● Slider cover</li> </ul>



## Components

### Stacker crane module

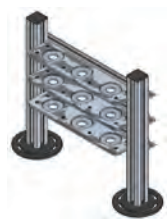
Order number : 32012



- X-axis
  - Type : ball screw type
  - Movement : 600mm, speed : 1200 mm
  - Position detection sensor : 7 ea
  - Photo sensor : DC24V, 30 mA
  - T type detection distance : 5 mm, detection type : transmission
  - Motor : DC24V 15W, 3000 rpm
- Y-axis
  - Type : ball screw type
  - Movement : 250 mm, speed : 600 mm
  - Position detection sensor : 6 ea
  - Photo sensor : DC 24V 30 mA
  - T type detection distance : 5 mm, detection type : transmission
  - Motor : DC 24V 15W, 3000 rpm
- Z-axis
  - Type : pneumatic type
  - Double rod cylinder :  $\Phi 10 \times 50$
  - Flow control valve : M5  $\times$   $\Phi 4$
  - Air chuck : parallel open type, auto switch ( $\Phi 4$ ) 2ea
  - Gripper : Aluminum 6061, white anodized

### AS/RS module (3 type)

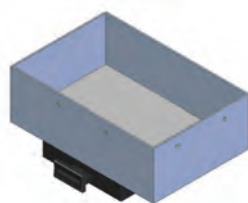
Order number : 32014



- 3x3 cell aluminum profile (20×20)
- Photo sensor : DC 24V 9 ea (checking storing)
- Storage cover : blue-black smog transparent acrylic
- Panel : transparent acrylic 9 ea


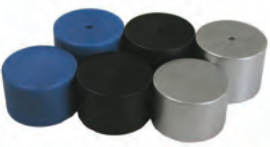

### Work piece storage box

Order number : 32110



- Storage box
- Size : 150×100×50mm

## Components

Tower lamp module	Order number : 32016
	<ul style="list-style-type: none"> <li>● Red, yellow, green lamp</li> <li>● DC 24V</li> </ul>
Switch module	Order number : 32015
	<ul style="list-style-type: none"> <li>● Push button switch</li> <li>● Select switch</li> <li>● Emergency switch</li> </ul>
Solenoid valve block	Order number : 32018
	<ul style="list-style-type: none"> <li>● 5/2-way single solenoid valve</li> <li>● 5/2-way double solenoid valve</li> <li>● Power : DC24V</li> </ul>
Work piece set	Order number : 32112
	<ul style="list-style-type: none"> <li>● Good work piece : aluminum, blue, black</li> <li>● Faulty work piece : aluminum, blue, black</li> </ul>
Simulation box	Order number : 32017
	<ul style="list-style-type: none"> <li>● Toggle switch : 16 ea</li> <li>● Mounting clamp attached</li> </ul>

## Components

Motor controller (2 channel)

Order number :



- DC motor driven function
- Motor protection circuit current
- Speed control function
- Lowest voltage control function

REMOTE I/O

Order number : 32019



- DeviceNet
- Profibus
- Ethernet
- Digital Input
- Digital output

etc

Order number :

- NFB : AC22V, 2 pole
- Power supply : DC24V, 5A
- Relay module(6-fold) : DC24V, 4C
- Air service unit
- Air distributor
- Air pressure sensor
- Cable duct
- I/O Terminal module
- PLC(option)

**생산자동화 시스템**  
VARIABLE MECHATRONICS SYSTEM

조기화면 | 공구공정 | 검사공정 | 가공공정 | PTP 공정 | 입출고공정 | 실행화면

▶MANUAL 출력◀

주행모터 전진  
주행모터 후진  
승강모터 상승  
승강모터 하강  
포크전진  
포크후진  
포크클램프  
포크언클램프


**KIA MOTORS**  
생 산 고 령

20yy/mm/dd: HMM/MS

운전모드 **자동**

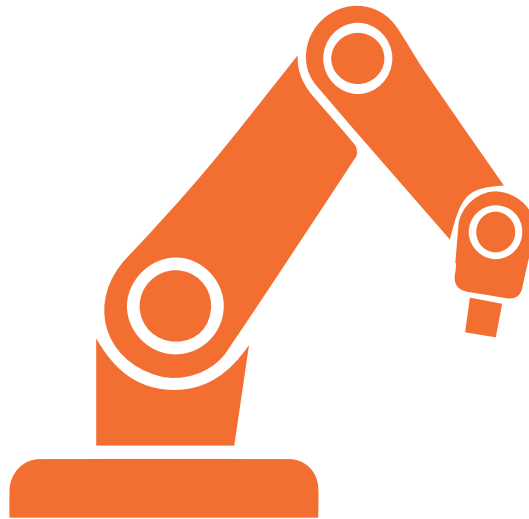
◆ 입고 공정(스테커 크레인)

**입고 제품**

A white Robostar RSA60-4A robotic arm is shown in a factory setting. The arm is mounted on a base and has a gripper at the end. It is surrounded by various cables and hoses. The background shows a window and some industrial equipment.

**Robostar**  
RSA60-4A

± B ±



CHAPTER

12

## ROBOT TRAINING SET

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Introduction	272
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SCARA robot training set (SRTS-110-A)	274
Vision robot training set (VRTS-110)	275



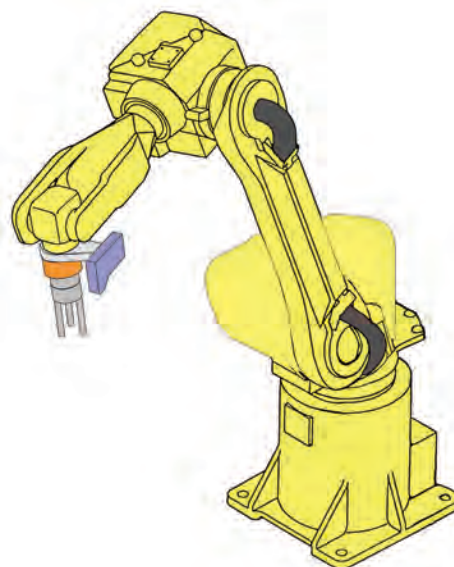
# ROBOT TRAINING SET

## Introduction

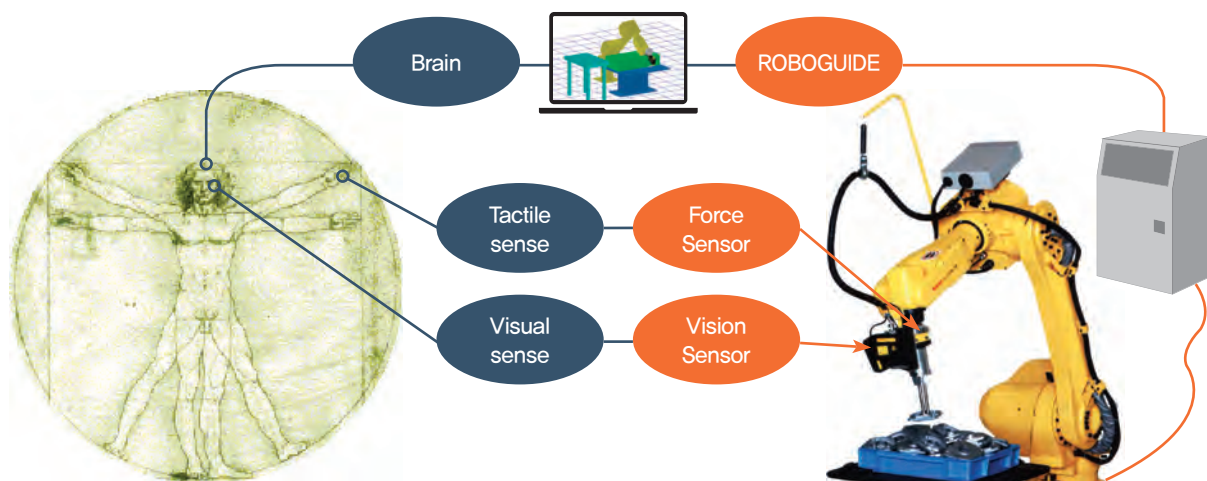
The robot plays an important role in automation.

An automatic robot moves only as instructed by the programmer/operator, whereas an intelligent robot can exercise basic self-control and move depending on conditions and circumstances.

The robot training set from FESTECH maximizes educational efficiency and integrates with exciting ideas and applications.



## Intelligent Robot



## SCARA robot training set (SRTS-110)



Order number : 27001

### Equipment consist

- 4-axis SCARA robot
- Distribution module
- Testing module
- Sorting and storing module

### Training contents

- Robot operating technology
- Robot teaching program
- Interface with robot and extra devices
- Pneumatic cylinder control by robot
- Electrical interface

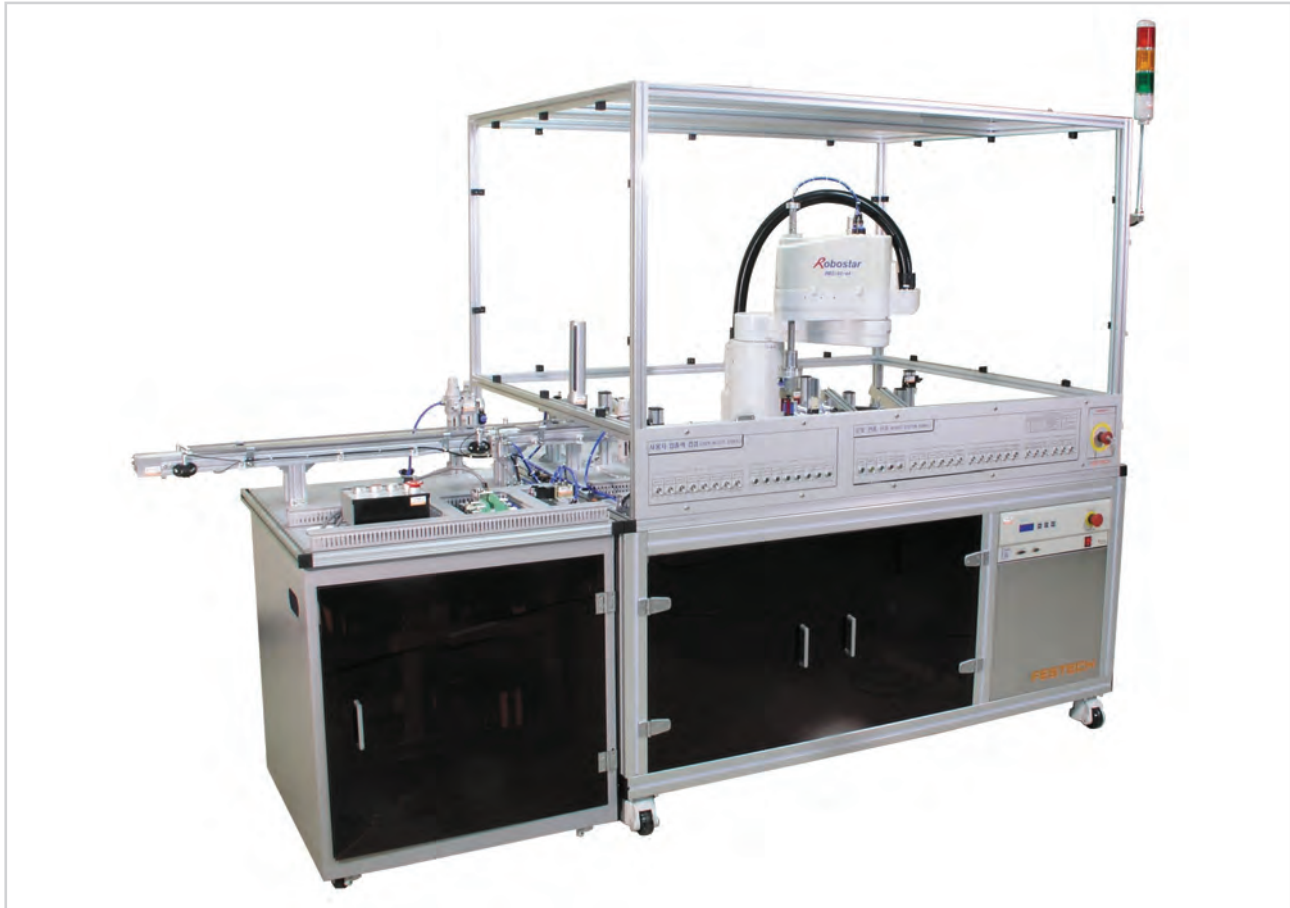
### Components

No.	Component	Qty
1	Working table	1
2	SCARA robot	1
3	Robot controller	1
4	Teach pendent (teaching terminals)	1
5	Robot interface cable set	1
6	Pneumatic gripper module	1
7	I/O connect cable	1
8	I/O terminal	1
9	Input/ output simulation module	1
10	Work piece	1
11	Distribution module	1
12	Testing module	1
13	Storing module	1
14	Cable duct	1
15	RS-232C cable	1
16	Tower lamp	1



OPTION-CONVEYOR STATION

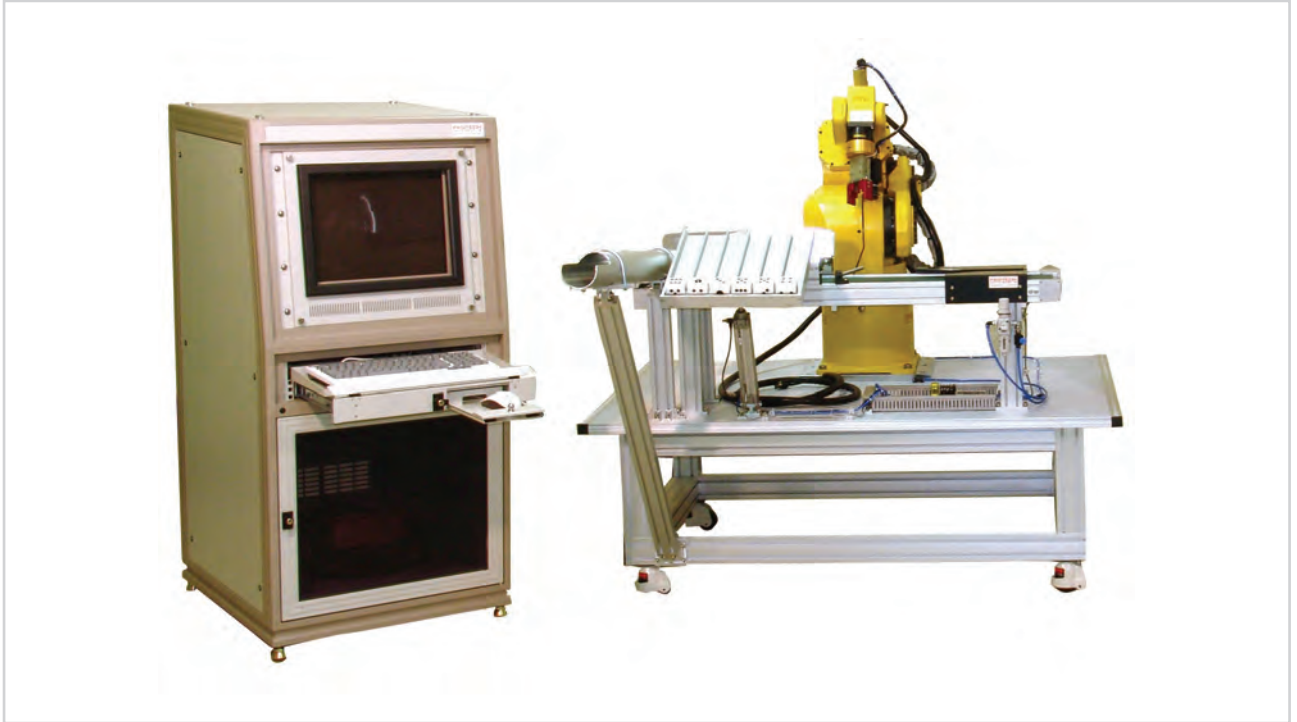
## SCARA robot training set (SRTS-110-A)



- Designed for the complex control technology of a SCARA robot, which is mainly used in the semiconductor manufacturing industry.
- Includes pneumatic component and various sensors.
- Easily understand the robot control signal with an input/output simulation panel.
- The robot and extra control modules are fixed on an aluminum profile panel for easy custom configuration.
- Modules can be added or modified to suit customer needs.



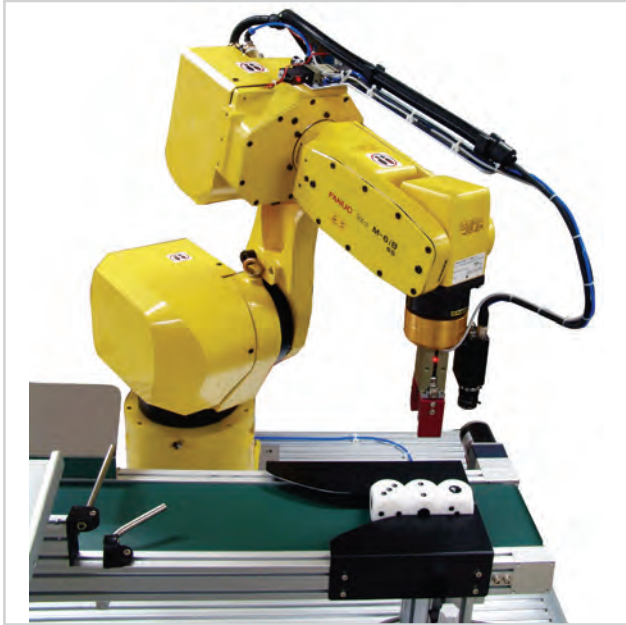
## Vision robot training set (VRTS-110)



- Designed with complex control technology of a 6-axis vision robot to simulate human vision.
- Combines vision system and robot to control position compensation, movement interpolation, and measuring status.
- Easily understand the robot control signal with an input/output simulation panel.
- The robot and extra control modules are fixed on an aluminum profile panel for easy custom configuration.
- Modules can be added or modified to suit customer needs.



# Vision robot training set (VRTS-110)



Order number : 27000

### Equipment consist

- 6-axis multi-joint robot
- Machine vision system
- Conveyor module
- Robot input/ output simulation module
- Distribution module
- Image processing computer

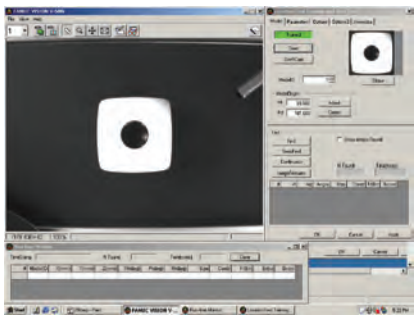
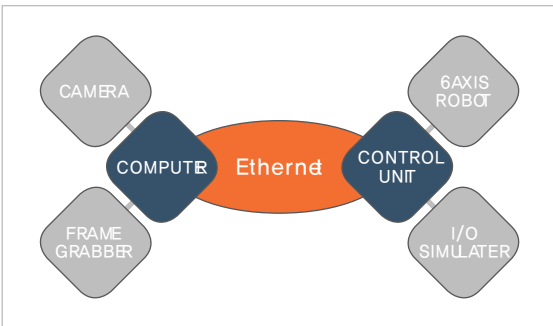
### Training contents

- Robot operating technology
- Robot teaching program
- Interface with robot and extra devices
- Vision system
- Examining with vision system
- Robot position compensation with vision system
- Electrical interface

### Components

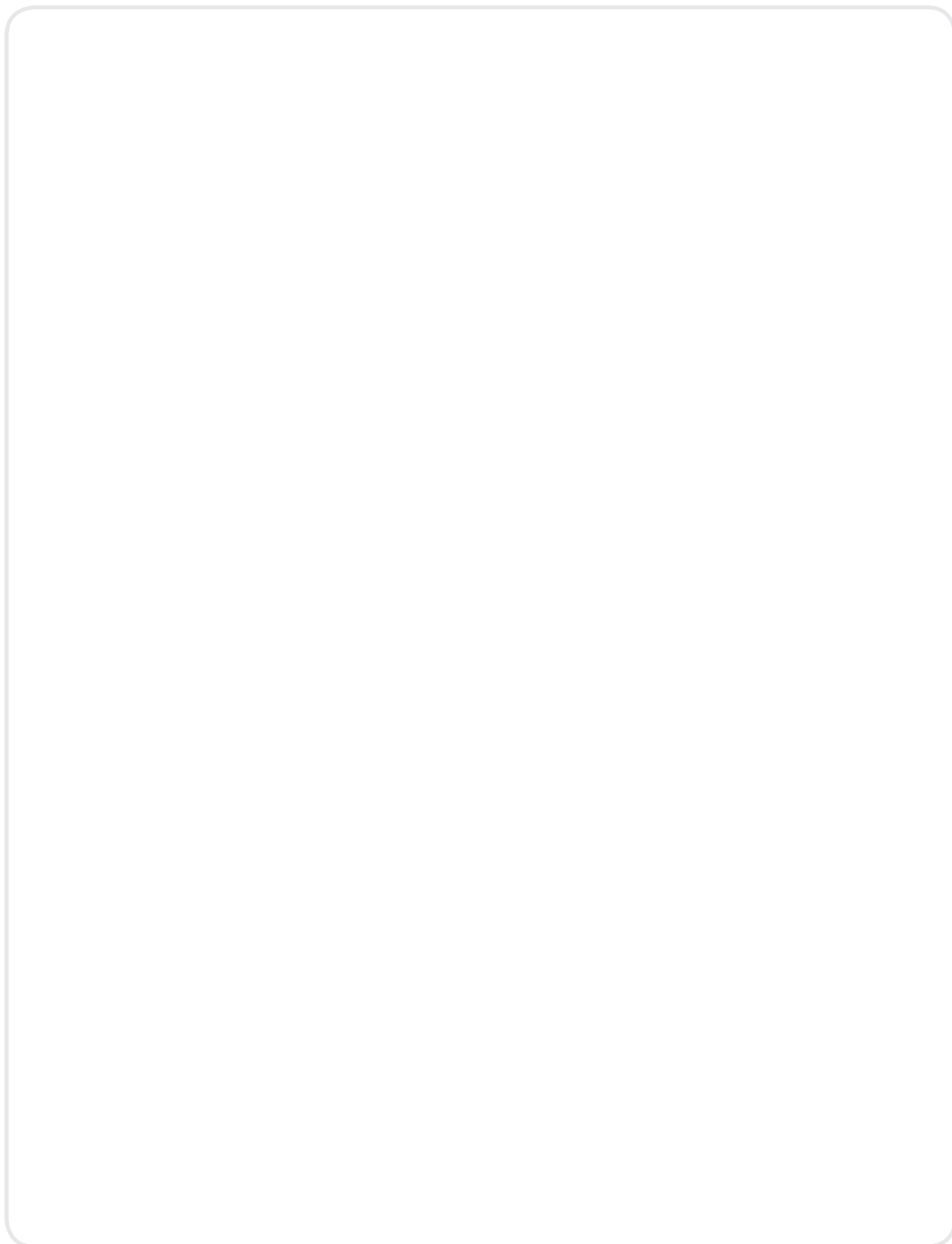
No.	Component	Qty
1	Working table	1
2	6-axis multi-joint robot	1
3	Robot controller	1
4	Teach pendent (teaching terminals)	1
5	Input/ output simulation module	1
6	Computer	1
7	Monitor	1
8	Vision board (frame grabber)	1
9	Camera	1
10	Lens	1

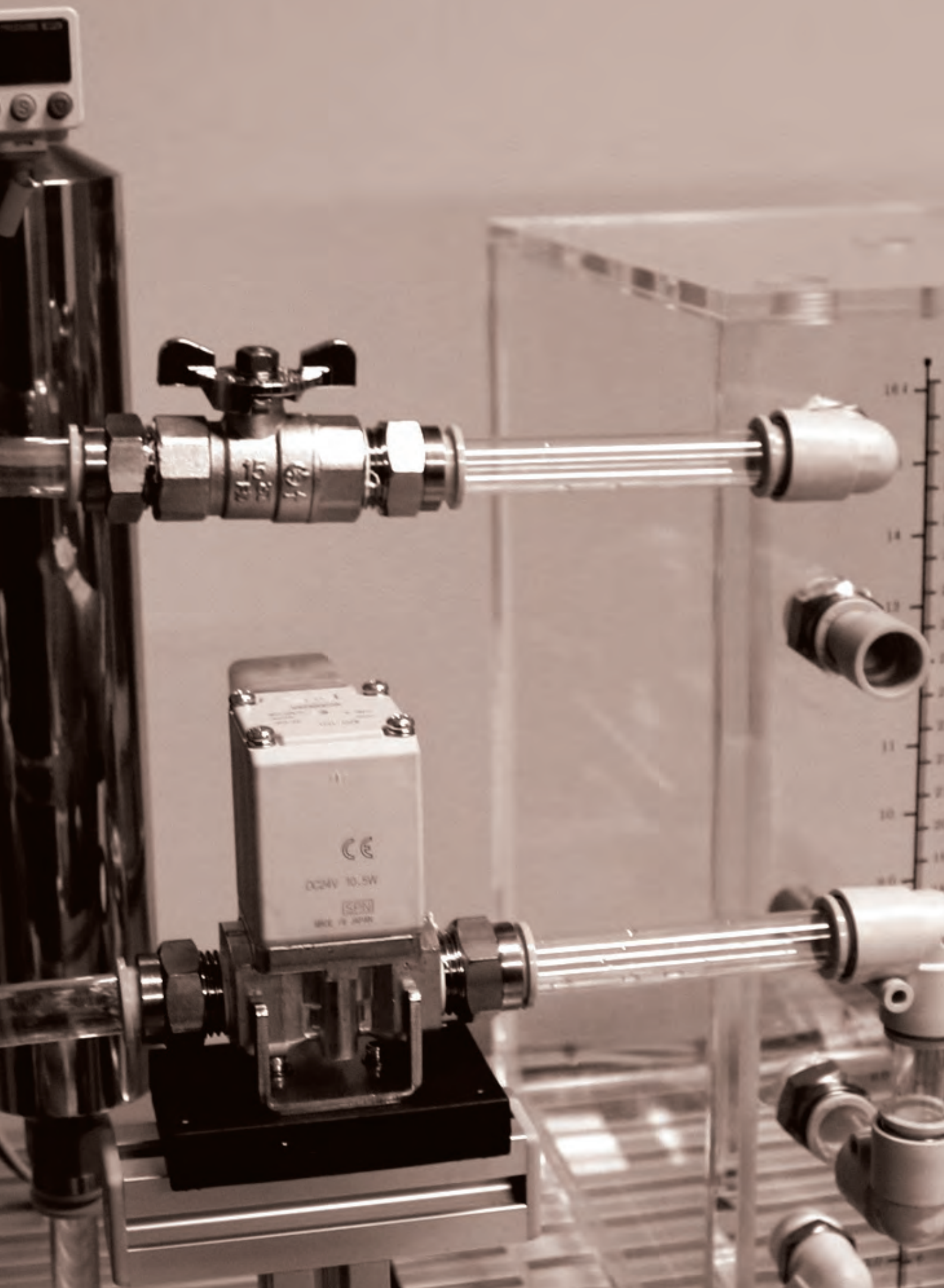
No.	Component	Qty
11	Distribution module	1
12	Valve block	1
13	DC24V power supply	1
14	Double-acting cylinder	1
15	Belt conveyor module	1
16	I/O connection cable	3
17	I/O terminal	1
18	Work piece	12
19	Ethernet Card	1
20	Image processing software	1

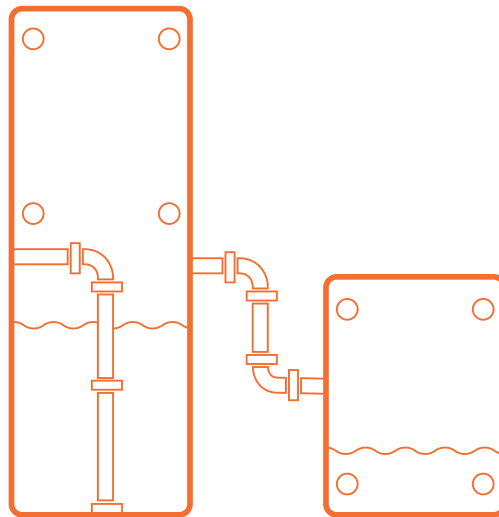




## **Memo**







CHAPTER

13

## PROCESS CONTROL SYSTEM (PCS)

---

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Level control system (FPCS-LEVEL)	283
Industrial PCS trainer (FPCS-IPC-3TANK, FPCS-IPC-LEVEL)	284
Industrial PCS trainer (FPCS-IPC-TOTAL)	285

# Process Control System (PCS)

- 01 Level control system
- 02 Flow control system
- 03 Pressure control
- 04 Temperature control
- 05 PCS 4ALL (Integrated system)

# Process Control System (PCS)



## Introduction

Process control system is an automatic control system that supervises a plant and related equipment using a computer system, and controls the flow of the process to maintain continuous operation. It is composed of a computer system, process control device, and process interface system.

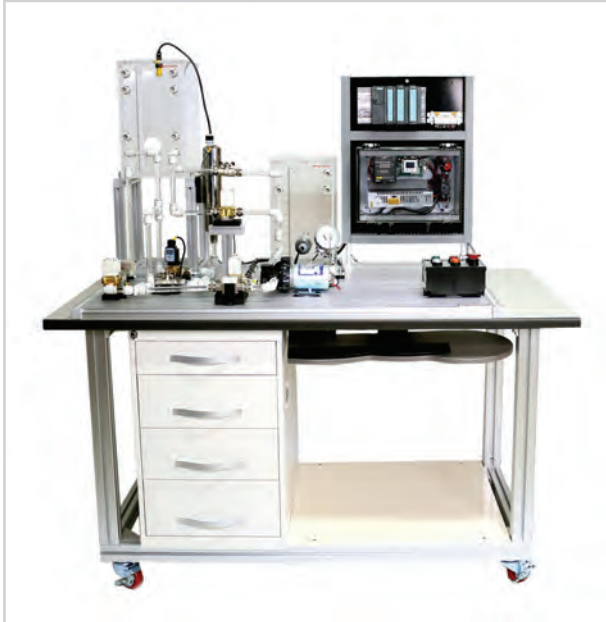
- Process control device: measures process variables and exercises control through computer signal. (i.e., actuator, sensor etc)
- Process interface system: functional unit system connecting process control device and computer system

The HMI (Human Machine Interface) system used in process control offers a monitoring screen in a central control room to help increase efficiency.





## Integrated process control (FPCS-4ALL)



Order number : 28000

### PCS Training Equipment

This PCS training equipment teaches how to measure and convert analog signals, and how to use the information in industry applications. Water level, flow rate, pressure, and temperature are the main variables of the process control system in actual practice.

### Training contents

- Structure and function of level, flow, pressure, and temperature control
- Feature and characteristic of analog sensor's value
- Process control sequence control circuit
- Fault tracking and monitoring system of process control
- P, I, D, PI, PID control
- System Wiring, piping, programming, and related training
- Analog and digital signal usage of various industrial measurer
- PLC with Touch HMI or PC-based control using LabVIEW, VLC
- Concept of disturbance in the process control



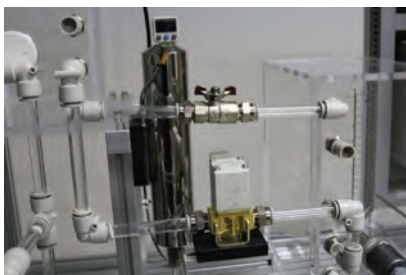
▲ Motor pump



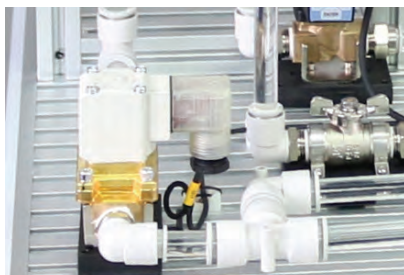
▲ Flow rate sensor, Proportional control valve



▲ Heater, Temperature sensor



▲ Pressure sensor, pressure tank

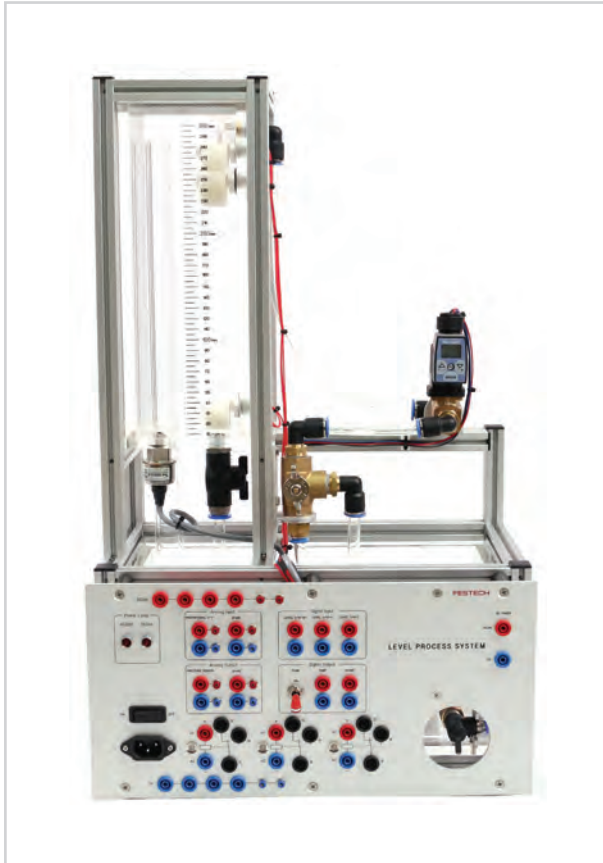


▲ Solenoid valve



▲ Ultrasonic sensor

## Level control system (FPCS-LEVEL)



Order number : 28005

### Features

- Compact size
  - 450(W)×220(D)×670(H) mm
- 4mm cable wiring
- Level control using proportional control valve
- Level measurement using ultrasonic sensor
- Safety level switch
- Manual valve for drain
- Customized with various process
  - Flow, Level, Pressure, Temperature

### Training contents

- Structure and principle of motor pump
- Measurement : tank volume and pump flow rate
- Proportional valve structure
- Pressure sensor setting and relation with water level
- System wiring, piping, programming and other related training
- Analog and digital usage of various industrial measurer
- P, I, D, PI, PID control

## Industrial PCS trainer (FPCS-IPC-3TANK, FPCS-IPC-LEVEL)

This process control equipment is specially customized to learn process control technology as plant design, manufacturing, control, maintenance.

It is designed on the basis of level control plant that is the most important in industry. It is installed and used in engineer training of POSCO company.

3 tanks control trainer is composed of 3 control tanks and reservoir. It has level sensor for measuring water level, flow sensor for measuring control flow and proportional flow control valve.

Also, it is possible to practice various control program with supply pump and disturbance pump.

**3 tanks control trainer**  
1600(w)×1000(d)×2250(h) mm



Order number : 28007

### Components

No.	Component	Qty
1	Water tank	4
2	Motor pump	1
3	Disturbance pump	1
4	Control box	1
5	Flow rate sensor	1
6	Level sensor	3
7	Proportional control valve	1
8	Manual override valve	2
9	Lamp inside the tank	3
10	Connectors and pipes	1

### Option

1. Controller(PLC, LabVIEW etc.)
2. HMI(touch, SCADA, LabVIEW etc.)

**Level control trainer**  
1400(w)×1000(d)×1700(h) mm



Order number : 28008

### Components

No.	Component	Qty
1	Water tank	2
2	Motor pump	1
3	Control box	1
4	Flow rate sensor	1
5	Level sensor	3
6	Pressure sensor	1
7	Proportional control valve	1
8	Manual override valve	2
9	Lamp inside the tank	1
10	Connectors and pipes	1

### Option

1. Controller(PLC, LabVIEW etc.)
2. HMI(touch, SCADA, LabVIEW etc.)

## Industrial PCS trainer (FPCS-IPC-TOTAL)

This process control equipment is specially customized to learn process control technology as plant design, manufacturing, control, maintenance.

It is designed on the basis of level control plant that is the most important in industry. It is installed and used in engineer training of POSCO company.

Total process control system is constructed to have experiment of control characteristics according to various disturbances.

It can be used to learn about process control technology like control programming, HMI monitoring, SCADA system with industrial controller PLC, industrial control computer, and touch panel.

**Total Process control system**

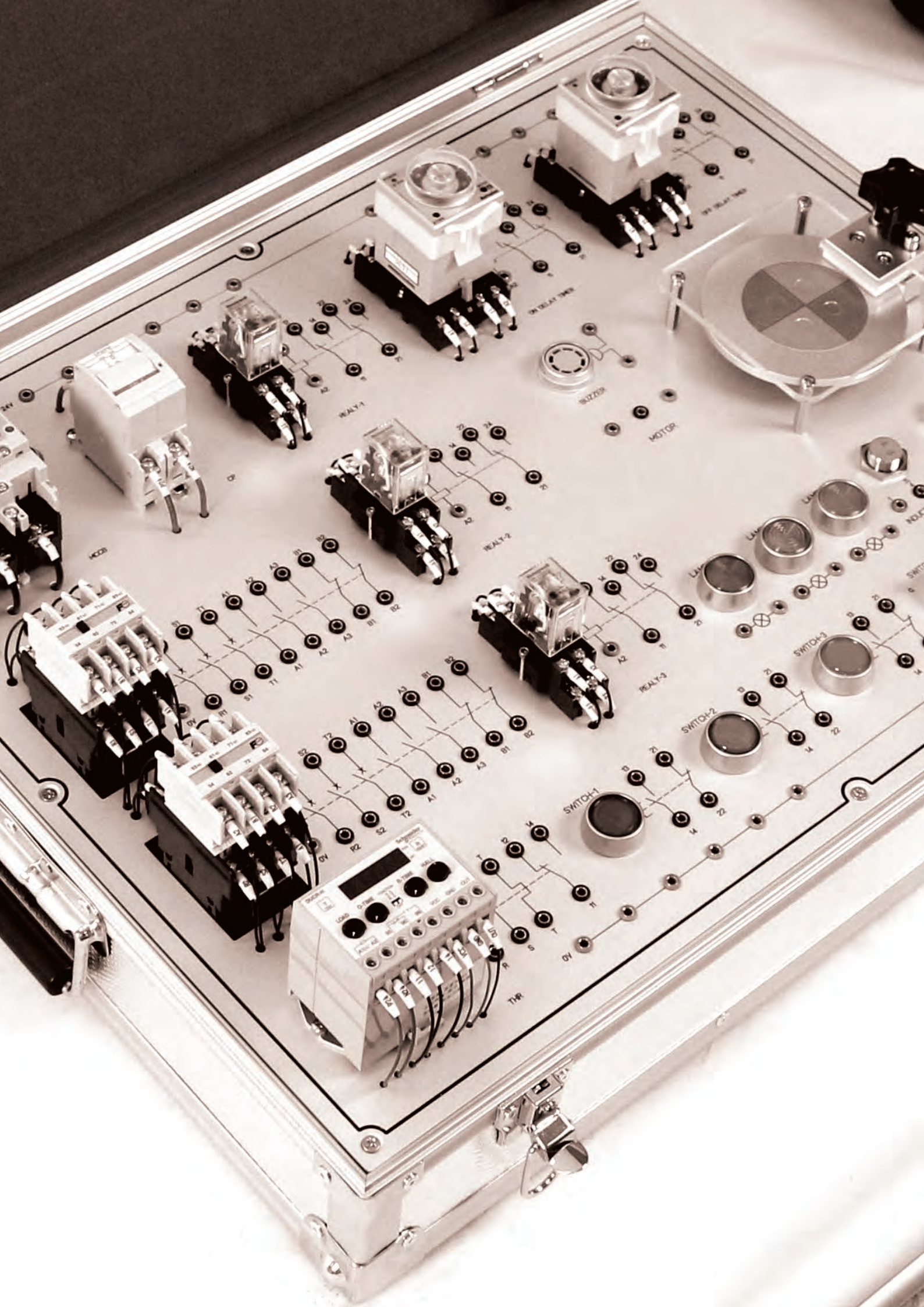


**Order number : 28009**

### Components

No.	Component	Qty
1	Water tank	4
2	Motor pump	1
3	Disturbance pump	1
4	Control box	1
5	Flow rate sensor	1
6	Level sensor	3
7	Proportional control valve	1
8	Manual override valve	2
9	Lamp inside the tank	3
10	Connectors and pipes	1
<b>Option</b>		
1. Controller(PLC, LabVIEW etc.)		
2. HMI(touch, SCADA, LabVIEW etc.)		









CHAPTER

14

## ELECTRIC TRAINING SET

---

Electric training set (module type) (FSQ-110)	288
Portable sequence training set (FSQ-150)	289
Sequence training set (FSQ-120)	290
Components	291

## Electric training set (module type) (FSQ-110)



### Features

- Sequence basic circuit and induction Motor Y- $\Delta$  basic experiment
- Electrical components are produced by the components used in the industry
- Motor experiments provided
- Signs and symbols printed on the name plate, it is convenient for experiments
- Available motor tests in connection with a PLC trainer

### Training contents

- Electric basic circuits, logic circuits, first circuit practice
- A self-holding circuit, a timer circuit, a detection circuit, the relay circuit practice
- Emergency alarm, delayed start-up circuit, the time delay circuit operation
- Y- $\Delta$  operating circuit practice

### Components

No.	Component	Order number	Qty
1	Push Button switch (Independence)	27400	2
2	Push Button switch (Combination)	27401	2
3	Push Button switch (Independence), detent	27402	2
4	Push Button switch(Combination), detent	27403	2
5	Lamp Unit (Independence)	27404	2
6	Lamp Unit (Combination)	27405	2
7	NFB(Brakers) Unit	27410	1
8	Relay Unit	27412	3
9	Relay	27413	2
10	Buzzer Unit	27417	1
11	Timer Unit A	27420	1
12	Timer Unit B	27421	1
13	Timer Unit C	27422	1
14	Motor unit	27430	1
15	Magnetic contactor Unit	27432	2
16	Control Unit	27433	1
17	PLC unit	27434	1

No.	Component	Order number	Qty
18	DIN rail	27435	5
19	Electric distributor	27436	1
20	5/2-Way single solenoid valve	27440	2
21	5/2-Way double solenoid valve	27441	2
22	Photo sensor	27443	1
23	Inductive proximity sensor (NPN)	27445	1
24	Inductive proximity sensor (PNP)	27446	1
25	Electric Limit switch (left)	27447	1
26	Electric Limit switch (right)	27448	1
27	Power supply	27450	1
28	Service unit	12101	1
29	Air distributor	12201	1
30	Double acting cylinder, cushion/proximity switch	12215	2
31	Plastic hose (1m)	12290	10
32	Pilot lamp & buzzer unit	13034	1
33	Control box	27451	1

## Portable sequence training set (FSQ-150)



Order number : 24000

### Features

- Sequence basic circuit and induction Motor experiment
- Signs and symbols printed on the name plate, it is convenient for experiments
- Available motor tests in connection with trainer
- It is easy to use the 4mm banana socket while Practicing

### Training contents

- Basic electric components and circuit
- Logic circuit and dominant circuit
- Self-holding circuit and control
- Motor practice circuit (CW,CCW)
- Time delay circuit
- Sensor circuit training
- Principle of button operation
- Principle of buzzer operation

### Components

No.	Component	Qty
1	CP (single phase)	1
2	MCCV (3 phases)	1
3	MC(Magnetic contactor)	2
4	Motor trip units (DOCR)	1
5	Relay, 3-fold	3
6	Time relay	1
7	Motor	1
8	Inductive sensor	1
9	Optical sensor	1

No.	Component	Qty
10	Capacitive sensor	1
11	Buzzer	1
12	Lamp	3
13	Push button	3
14	Emergency switch	1
15	Select switch	1
16	Aluminum case	1
17	Electric cable set	1


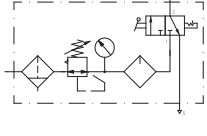

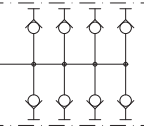

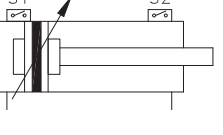


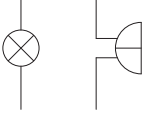
## Sequence training set (FSQ-120)



### Components

No.	Contents	Qty.
1	NFB DC24 type	1
2	MC(Magnetic contactor)	2
3	Relay (1a1b)	1
4	Relay (2a2b)	2
5	Timer	1
6	Motor	1
7	Inductive sensor	1
8	Limit switch	2
9	Buzzer	1
10	Lamp	2
11	Push button	1
12	Emergency switch	1
13	Select switch	1

## Components

Service unit	Order No : 12101
	 <ul style="list-style-type: none"> <li>● Pressure range : 0,5~12 bar</li> <li>● Air filter, pressure regulator, lubricator</li> <li>● Shut off valve</li> <li>● Filter degree : 40<math>\mu</math>m</li> <li>● Connection plastic hose : Outside diameter 6 mm</li> <li>● Flow rate : 750 LPM</li> </ul>
Air distributor	Order No : 12201
	 <ul style="list-style-type: none"> <li>● Pressure range : 0~10 bar</li> <li>● Input : 1 ea (6 mm)</li> <li>● Output : 8 ea, check connector included (4 mm)</li> <li>● One-touch connector</li> </ul>
Double-acting cylinder, cushion/proximity switch	Order No : 12215
	 <ul style="list-style-type: none"> <li>● Pressure range : 0,5~10 bar</li> <li>● Max. pressure : 15 bar</li> <li>● Electric proximity switch : 2 ea</li> <li>● Piston diameter : 25 mm</li> <li>● Stroke : 125mm</li> <li>● Magnetic for sensor detection</li> </ul>
Plastic hose (1M)	Order No : 12290
	<ul style="list-style-type: none"> <li>● Operating temperature : -40<math>^{\circ}</math>C~60<math>^{\circ}</math>C</li> <li>● Color : blue</li> <li>● Size : outside diameter 4 mm</li> </ul>
Pilot lamp & buzzer unit	Order No : 13034
	 <ul style="list-style-type: none"> <li>● Power : DC 24V</li> <li>● Lamp power consumption : 1,2W</li> <li>● Buzzer power consumption : 0,04W</li> <li>● Buzzer frequency : 420Hz</li> </ul>



## Components

Push Button Unit (Independence)	Order No : 27400
	<ul style="list-style-type: none"> <li>● Push Button (Momentary type)</li> <li>● Contact : 1a-1b</li> <li>● Capacity : AC220V, DC24V</li> <li>● Name tag socket</li> <li>● One-touch mounting clamp</li> </ul>
Push Button Unit (Combination)	Order No : 27401
	<ul style="list-style-type: none"> <li>● Push Button (Momentary type) 2ea</li> <li>● Contact : 1a-1b</li> <li>● Capacity : AC220V, DC24V</li> <li>● Name tag socket</li> <li>● One-touch mounting clamp</li> </ul>
Push Button Unit (Independence), detent	Order No : 27402
	<ul style="list-style-type: none"> <li>● Push Button (Detent type)</li> <li>● Contact : 1a-1b</li> <li>● Capacity : AC220V, DC24V</li> <li>● Name tag socket</li> <li>● One-touch mounting clamp</li> </ul>
Push Button Unit (Combination), detent	Order No : 27403
	<ul style="list-style-type: none"> <li>● Push Button (Detent type) 2ea</li> <li>● Contact : 1a-1b</li> <li>● Capacity : AC220V, DC24V</li> <li>● Name tag socket</li> <li>● One-touch mounting clamp</li> </ul>
Lamp Unit	Order No : 27404
	<ul style="list-style-type: none"> <li>● Rated voltage : DC24V, 40mA</li> <li>● Name tag socket</li> <li>● Direct wiring to switch</li> <li>● One-touch mounting clamp</li> </ul>

## Components

### Lamp Unit (Combination)

Order No : 27405



- Lamp : Blue, Green
- 24 mm, circle type
- Power : AC220V
- Name tag socket
- Direct wiring to switch

### NFB Unit

Order No : 27410



- AC220V, 10A, 2P
- Aluminum plate with DIN rail
- One-touch mounting clamp

### Relay Unit (DC)

Order No : 27412



- Rated voltage : DC24V, 40mA
- Aluminum plate with DIN rail
- One-touch mounting clamp

### Relay Unit (AC)

Order No : 27413



- AC220V
- 14Pin sequence relay 14 Pin Base included
- Aluminum plate with DIN rail
- One-touch mounting clamp

### Buzzer Unit

Order No : 27417



- AC220V
- Circle Type
- Aluminum plate with DIN rail
- One-touch mounting clamp

## Components

Timer Unit A	Order No : 27420
	<ul style="list-style-type: none"> <li>● AC220V/60Hz/2,5VA</li> <li>● On Delay</li> <li>● Aluminum plate with DIN rail</li> <li>● One-touch mounting clamp</li> </ul>
Timer Unit B	Order No : 27421
	<ul style="list-style-type: none"> <li>● AC220V/60Hz/2,5VA</li> <li>● Off Delay</li> <li>● Aluminum plate with DIN rail</li> <li>● One-touch mounting clamp</li> </ul>
Timer Unit C	Order No : 27422
	<ul style="list-style-type: none"> <li>● AC220V/60Hz/2,5VA</li> <li>● On Start (Filker)</li> <li>● Aluminum plate with DIN rail</li> <li>● One-touch mounting clamp</li> </ul>
Motor Unit	Order No : 27430
	<ul style="list-style-type: none"> <li>● AC 220V, 3 phase</li> <li>● AC 220V</li> <li>● 1/4Hp</li> <li>● Aluminum plate with handle</li> <li>● One-touch mounting clamp</li> </ul>
Magnetic contactor Unit	Order No : 27432
	<ul style="list-style-type: none"> <li>● AC220V, 3 phase</li> <li>● AC 220V</li> <li>● Aluminum plate with DIN rail</li> <li>● One-touch mounting clamp</li> </ul>

## Components

Control Unit	Order No : 27433
	<ul style="list-style-type: none"> <li>● Circuit protector : 2 pole, 3A, Plug Type</li> <li>● Lamp : DC24V, 16 mm</li> <li>● Push Button : 1a1b1c, 16 mm</li> <li>● EMG Switch : 1a1b1c, 16 mm</li> <li>● One-touch mounting clamp</li> </ul>
PLC unit	Order No : 27434
	<ul style="list-style-type: none"> <li>● Compact type</li> <li>● Digital input : 8</li> <li>● Digital output : 4</li> <li>● One-touch mounting clamp</li> </ul>
DIN rail	Order No : 27435
	<ul style="list-style-type: none"> <li>● Size : 30 x 15 mm</li> <li>● Length : 150mm</li> <li>● Aluminum plate</li> <li>● One-touch mounting clamp</li> </ul>
Electric distributor	Order No : 27436
	<ul style="list-style-type: none"> <li>● DC +, - contact array</li> <li>● LED : 8ea</li> <li>● Power : DC 24V, 5A</li> <li>● Insulation box included</li> <li>● One-touch mounting clamp</li> </ul>
5/2-Way solenoid valve	Order No : 27440
	<ul style="list-style-type: none"> <li>● Pressure range : 0,5~9,8 bar</li> <li>● Power : DC24V, 41mA</li> <li>● Fitting size : 4mm</li> <li>● Lamp and Surge protection circuit</li> <li>● One-touch mounting clamp</li> </ul>

## Components

### 5/2-Way double-solenoid valve

Order No : 27441



- Pressure range : 0,5~9,8 bar
- Power : DC24V, 41mA
- Fitting size : 4mm
- Lamp and Surge protection circuit
- Able to manual operation (Non-Lock Push type)
- One-touch mounting clamp

### Photo sensor

Order No : 27443



- Switching distance : 100mm
- Power : DC10~30V
- Output Contact : Normally open, NPN
- Output Current : Max ,400mA
- One-touch mounting clamp

### Capacitive proximity sensor

Order No : 27444



- Switching distance : 15mm
- Power : DC10~30V
- Output Contact : Normally open, NPN
- Output Current : Max, 200mA
- One-touch mounting clamp

### Inductive proximity sensor (NPN)

Order No : 27445



- Switching distance : 15mm
- Power : DC10~30V
- Output Contact : Normally open, NPN
- Output Current : Max, 200mA
- One-touch mounting clamp

### Inductive proximity sensor (PNP)

Order No : 27446



- Switching distance : 15mm
- Power : DC10~30V
- Output Contact : Normally open, PNP
- Output Current : Max, 200mA
- One-touch mounting clamp



## Components

Limit switch (left)

Order No : 27447



- Contact : DC 24V, 5A
- Contact : 1a1b(1c)
- Spring return
- Roller lever electric switch
- One-touch mounting clamp

Limit switch (right)

Order No : 27448



- Contact : DC 24V, 5A
- Contact : 1a1b(1c)
- Spring return
- Roller lever electric switch
- One-touch mounting clamp

Power supply

Order No : 27450



- Power : AC220V/50~60Hz
- Output : DC 24V, 5A
- Short protection circuit
- One-touch mounting clamp

control box

Order No : 27451



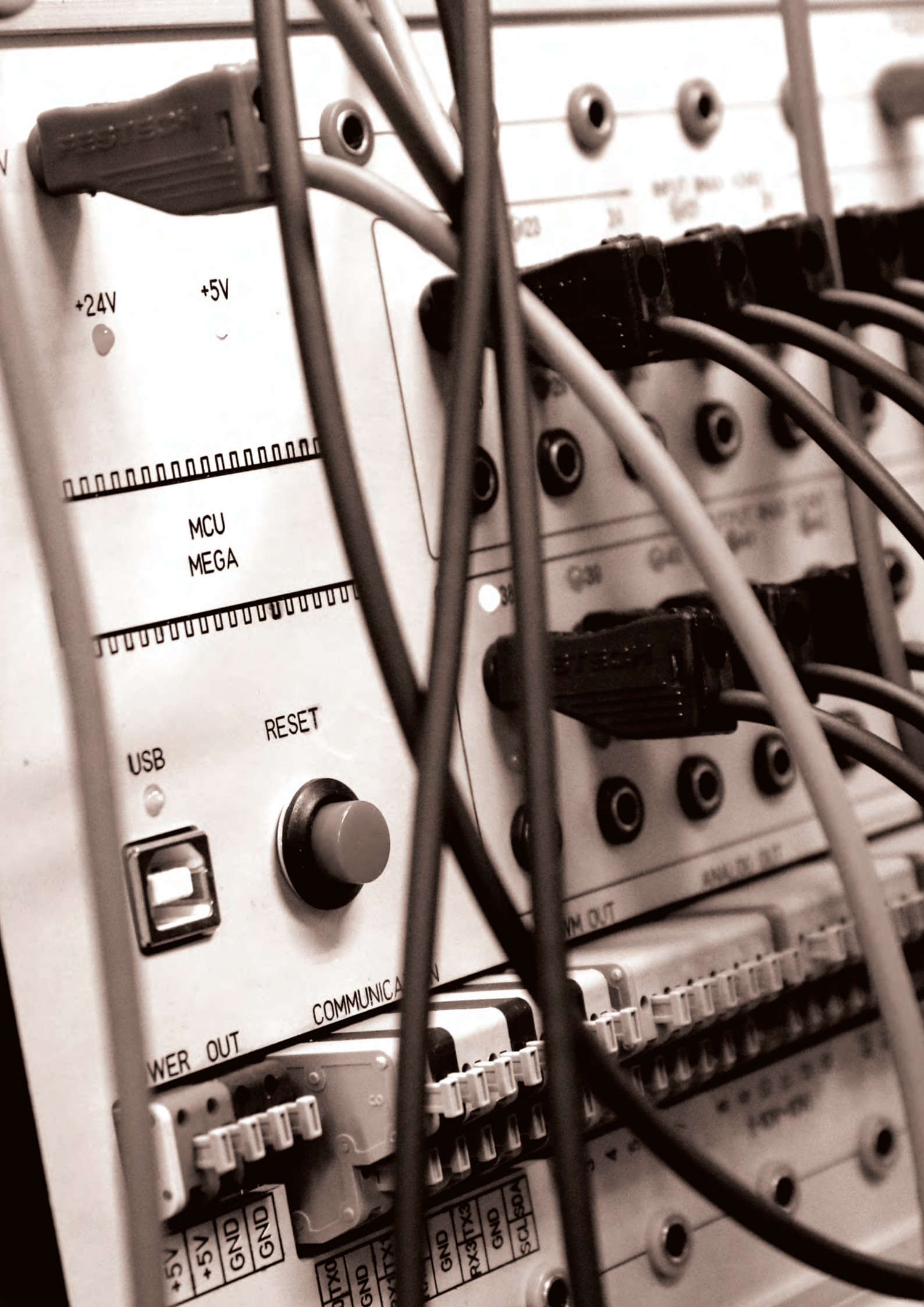
- OpenNormally closeclose available (Easy wiring)
- Control bracket : EGI 2t, AC Inlet, terminal 10P×2 integrated
- Circuit protector : 2 pole, 3A, Plug Type
- Lamp : DC24V
- Push Button : 1a1b1c
- EMG Switch : 1a1b1c

MCCB Unit

Order No : 27457



- Power : AC220VAC
- Rated current : 30A
- Pole : 3



+24V

+5V

MCU  
MEGA

USB

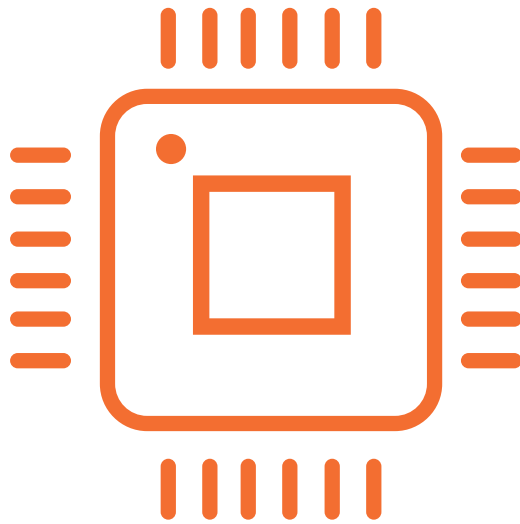
RESET

COMMUNICATION

POWER OUT

+5V  
+5V  
GND  
GND

TX0  
GND  
RX3TX3  
GND  
SCLSDA



CHAPTER  
**15**

# MICROPROCESSOR TRAINING SET

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Introduction	300
Components	301



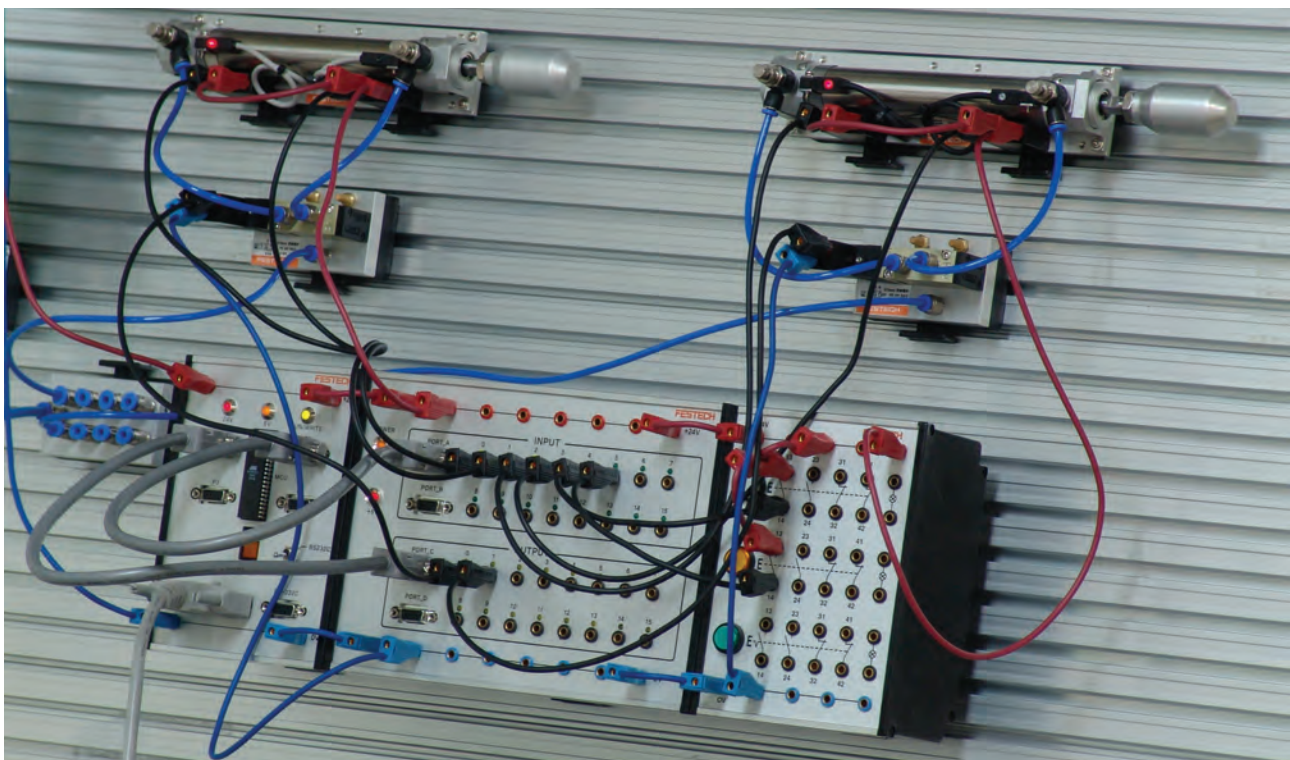
## Microprocessor training set

A microprocessor is a processor that combines logic and control in a small silicon chip. Components can include arithmetic logic operators, registers, program counters, and command decoders.

Semiconductor technology has evolved so that more than five million transistors can be contained on a small silicon chip.

This development results in a system of smaller physical size, significantly improved reliability and operational speed, and reduced power consumption.

Microprocessors are now widely used in computers, automation, and process control.



▲ Apply with electro–pneumatics

## Components

### GUI base embedded controller

Order number : 26014



- Operating Voltage : 5V
- Digital Input : 12points (24V)
- Digital output : 12points (24V)
- Digital I/O (Optional) : 8points (5V)
- PWM : 6points
- Analog input (0 ~ 5V) : 6points
- Analog input (0 ~ 10V) : 6points
- Analog output (-10 ~ 10V) : 6points
- Flash memory : 256KB
- Clock speed 16MHz
- 4mm banana socket and plug
- Easy to connect with existing modular equipment
- One-touch clamp for fixing on profile panel
- Aluminum case

### Switch & lamp module

Order number : 26016



- Push button switch : 4ea
- Select switch : 2ea
- Toggle switch : 2ea
- LED lamp : 4ea
- PNP, NPN
- 4mm banana socket and plug
- Easy to connect with existing modular equipment
- One-touch clamp for fixing on profile panel
- Aluminum case

### 7-segment & digital switch module

Order number : 26015



- 2 digits FND (7-Segment)
- 2 digits digital switch
- PNP, NPN
- 4mm banana socket and plug
- Power : DC24V
- One-touch clamp for fixing on profile panel
- Aluminum case

### Stepping motor module

Order number : 26017



- Position and direction control of stepping motor
- Stepping motor driver IC included
- Circle board with angle mark
- Photo-interrupt sensor
- 4mm banana socket and plug
- Power : DC24V (DC5V power included)
- One-touch clamp for fixing on profile panel
- Aluminum case



## Components

### DC motor control module

Order number : 26018



- DC motor direction(direction status LED)
- Motor driver IC included
- Rotation plate
- Photo-interrupt sensor
- PWM control
- 4mm banana socket or a general push-terminal apply
- Power : DC24V
- One-touch clamp for fixing on profile panel
- Aluminum case

### Signal controller module

Order number : 26013



- Input signal : 0~20mA, -10 ~ 10V
- Output signal : 0 ~ 10V, -10 ~ 10V
- Input, output range : select using toggle switch
- 4mm banana socket or a general push-terminal apply
- Power : DC24V
- One-touch clamp for fixing on profile panel
- Aluminum case

### MCU module(8051)

Order number : 26001



- IDE program for Windows (IDE program for 8051 experiment)  
Source file edit/assemble/compile/down/program operation
- Input power : DC 24V
- Output power : DC 5V (1A)
- I/O port : 8 bit I/O Port
- Program download : Using printer port
- Using Port I/O composition
- Easy to connect with existing modular equipment
- One-touch clamp for fixing on profile panel
- Aluminum case

## Components

### Converter module

Order number : 26002



- INPUT (16) : Photo-coupler or OP AMP
- OUTPUT (16) : Relay or TR output Power : DC 5V/24V (using data cable)
- 4mm banana socket and plug
- 32 input/output status LED
- Possible to use 24V actuator and sensor by connecting with MCU module
- One-touch clamp for fixing on profile panel
- Aluminum case

### DC motor module

Order number : 26004



- DC motor direction(direction status LED)
- Motor driver IC included
- 4bit (16step) speed control function
- Rotating plate
- Photo interrupter sensor
- Push button switches
- MCU module interface
- Power : DC24V (DC5V power included)
- One-touch clamp for fixing on profile panel
- Aluminum case

### Stepping motor module

Order number : 26005



- Position and direction control of stepping motor
- Motor driver IC included
- Graphic board with angle mark Pulse status LED
- Photo interrupter sensor
- Push button switches
- MCU module interface
- Power : DC24V (DC5V power)
- One-touch clamp for fixing on profile panel
- Aluminum case

### MCU & Converter integrated module

Order number : 26008



- Input : Photocoupler or OP-AMP, 2Port-16line
- Output : Relay or TR, 2Port-16line
- Input/Output type : PNP
- Power : – DC 5V/24V (using data cable)  
– Aluminum case

## Components

### MCU module(AVR)

Order number : 26009



- MICRO CONTROLLER : ATmega16 (8bit RISC processor)
- AVR Studio (IDE program for Windows) : edit/compile/download
- Input power : DC 24V
- Output power : DC 5V (1A)
- I/O port : 8 bit I/O Port
- Port A~D interface : 15Pin D-SUB connector
- Compatible with USB 2.0 (12Mbps)
- Fuse bit, Lock bit programming
- Auto firmware update Power and status LED
- One-touch clamp for fixing on profile panel
- Aluminum case

### FND & Switch module

Order number : 26010



- 4 digits FND (7-Segment)
- Static & Dynamic experiment
- Control mode selection switch
- LED Array (8bit)
- Push button switches
- Power : DC24V (DC5V )
- One-touch clamp for fixing on profile panel
- Aluminum case

### LCD & Analog module

Order number : 26011



- 16x2 character LCD
- 4bit or 8bit control mode
- Backlight regulating knob included Graphical LED array
- Push button switches
- MCU module interface
- Power : DC24V (DC5V power included)
- One-touch clamp for fixing on profile panel
- Aluminum case

※ Modular microprocessor training series can be connected with MCU module to have easy and interesting microprocessor experiment. Able to approach to electronic circuit without prior knowledge and use variously by connecting with existing electro-pneumatic training set, FA equipment.