





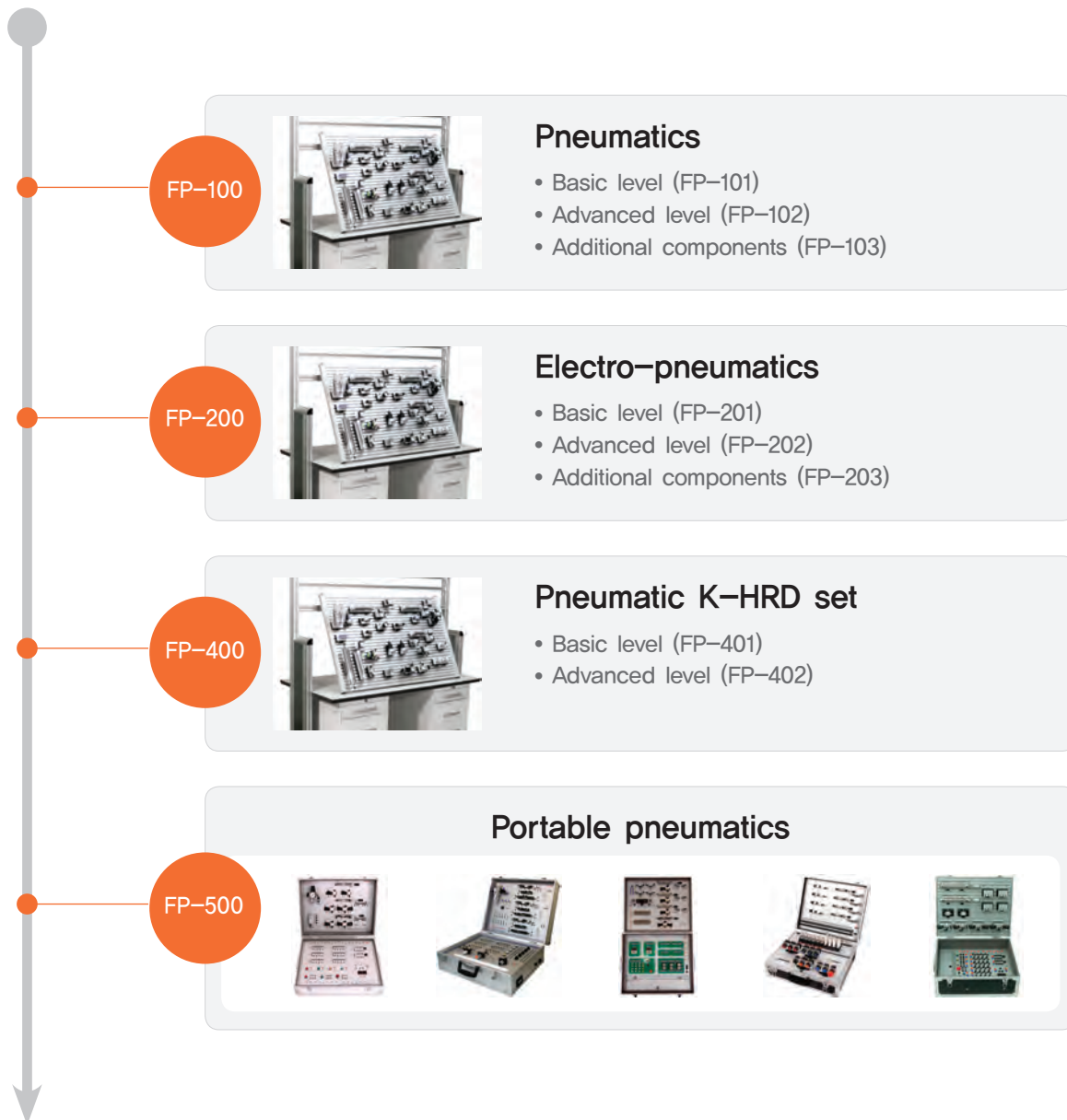
CHAPTER

01

PNEUMATICS TRAINING SET

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PNEUMATICS TRAINING SET





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)



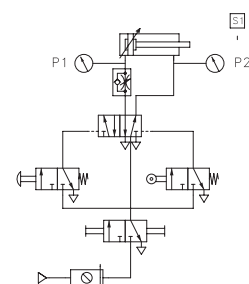
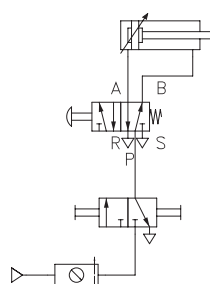
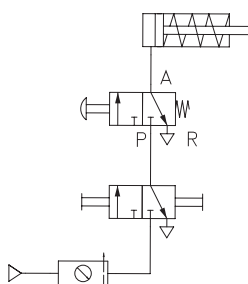
Training contents

- 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

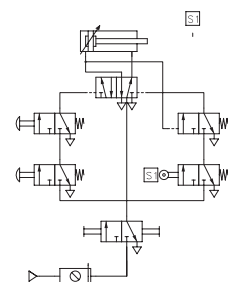
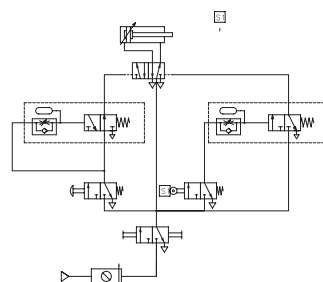
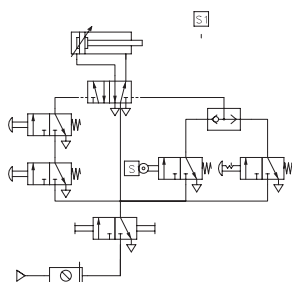


Pneumatics training set, basic level (FP-101)

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

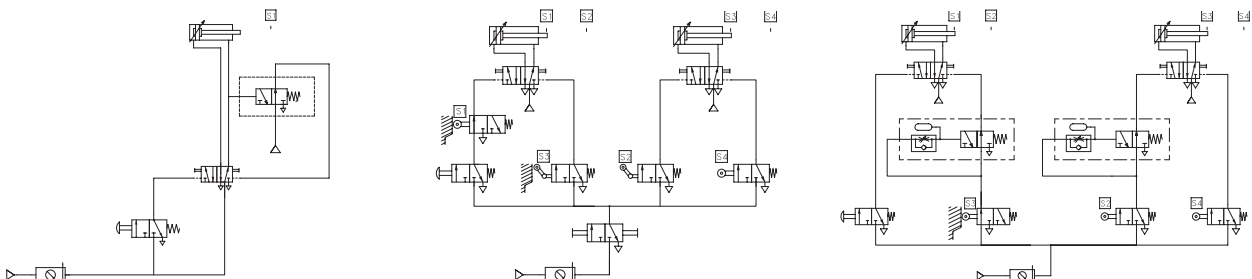


Pneumatics training set, advanced level (FP-102)



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)

Recommended items

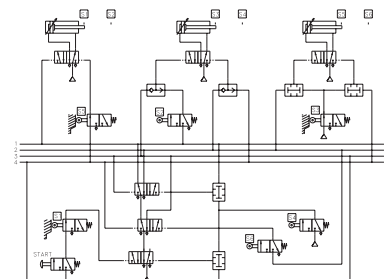
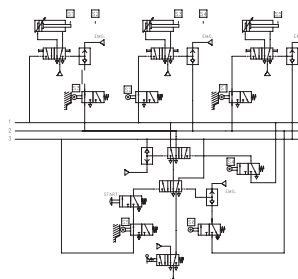
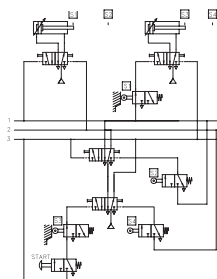
Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Pneumatics text book	42051
Pneumatics work book, basic level	42043

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)

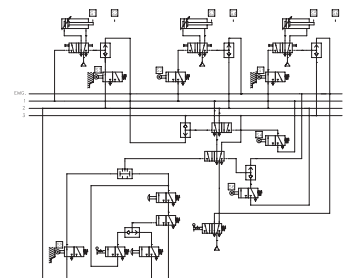
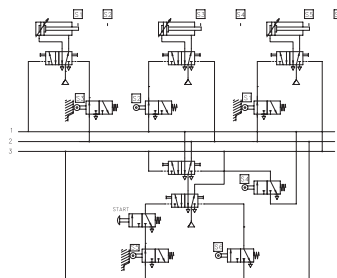
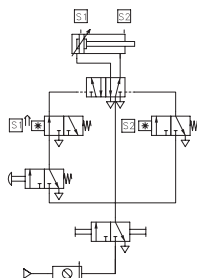
Training contents

- 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.

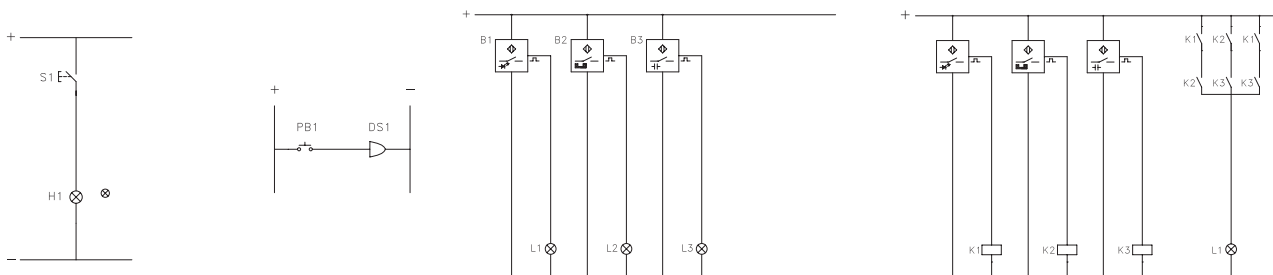
Training contents

- 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



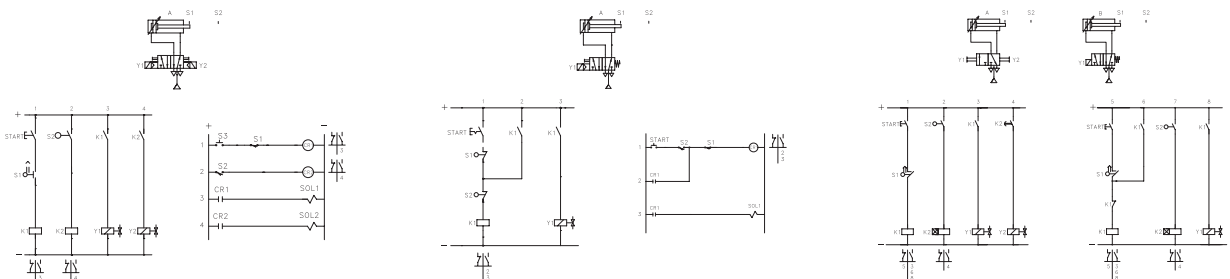
Electro-pneumatics training set, basic level (FP-201)

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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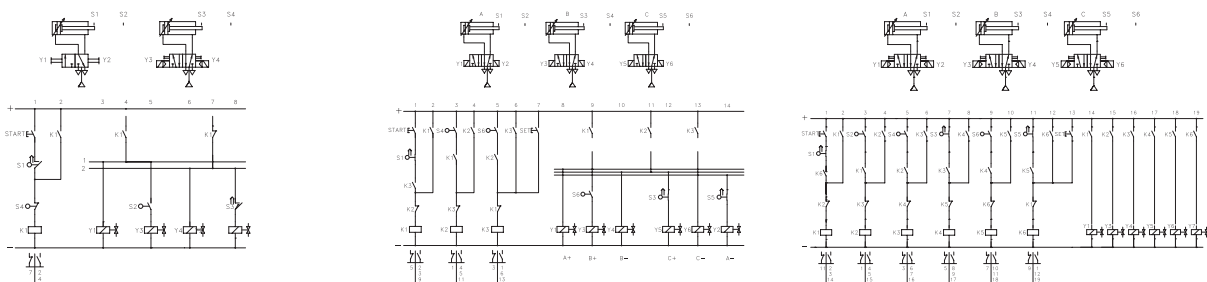


Electro–pneumatics training set, advanced level (FP–202)



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

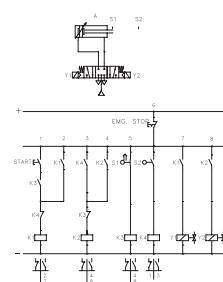
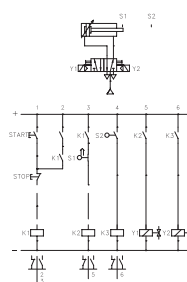
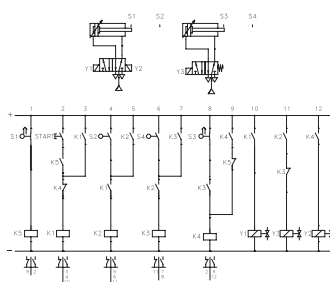
Component	Order number
Pneumatic basic working table (single side)	11007
Pneumatic-Lab (simulation software)	40005
Electro-pneumatics text book	42052
Electro-pneumatics work book, basic level	42045
Electro-pneumatics work book, advanced level	42046

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)

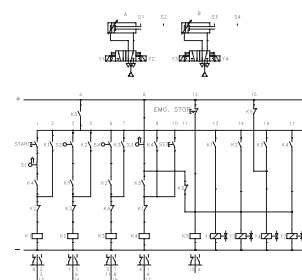
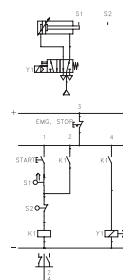
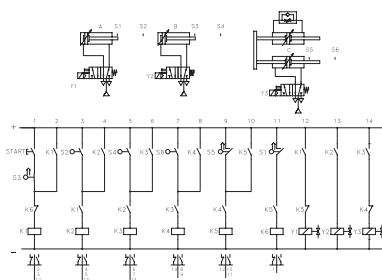
Training contents

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

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	No.	Component	Order number	Qty
1	Service unit	12101	1	24	Vacuum valve and suction cup	12406	1
2	Air distributor	12201	1	25	T–connector	12280	10
3	Single–acting cylinder	12210	1	26	Plastic hose	12290	50
4	Double–acting cylinder with cushion	12220	3	27	Hose cutter	12291	1
5	Pressure sequence valve	12300	1	28	Spare parts	12270	1
6	Pressure regulating valve	12301	1	29	3/2–way single solenoid valve (Normally closed)	13010	1
7	One–way flow control valve	12302	4	30	5/2–way single solenoid valve	13012	3
8	Quick exhaust valve	12303	1	31	5/2–way double solenoid valve	13013	3
9	Pressure gauge	12304	2	32	Pressure switch	13020	1
10	Time–delay valve (Normally closed)	12310	1	33	Push–button switch set (3–fold)	13033	1
11	Time–delay valve (Normally open)	12311	1	34	Relay unit (3–fold)	13030	3
12	3/2–way push–button valve (Normally closed)	12320	2	35	Digital time relay	13031	1
13	3/2–way push–button valve (Normally open)	12321	1	36	Digital counter (electrical)	13032	1
14	5/2–way selector switch valve	12322	1	37	Pilot lamp & buzzer unit	13034	1
15	3/2–way selector switch valve (Normally closed)	12323	1	38	Emergency switch	13035	1
16	3/2–way emergency switch valve	12324	1	39	Electrical proximity switch for cylinder	13050	2
17	3/2–way air–act, spring–return valve (Normally closed)	12329	1	40	Electrical limit switch (left)	13051	3
18	5/2–way air–act, spring–return valve	12331	2	41	Electrical limit switch (right)	13052	3
19	5/2–way air–act, air–return valve	12332	5	42	Inductive sensor	13040	1
20	3/2–way limit switch valve	12340	6	43	Capacitive sensor	13041	1
21	3/2–way idle return limit switch valve	12341	2	44	Optical sensor	13042	1
22	AND valve	12350	4	45	Cable set	13080	1
23	OR valve	12351	4	46	Power supply	13090	1

Recommended items

Component	Order number	Component	Order number
Pneumatic basic working table (single side)	11008	Magnetic symbol (pneumatics and hydraulics)	13501
Pneumatic–Lab (simulation software)	40005	Magnetic symbol (electrics)	13502
Pneumatics text book	42051	Pneumatic cut–away model	13503
Pneumatics work book, basic level	42043	Compressor	21310
Electro–pneumatics text book	42052	Cable hanger	13091
Electro–pneumatics work book, basic level	42045		

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)



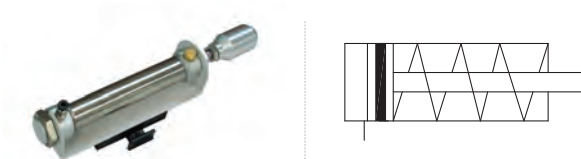


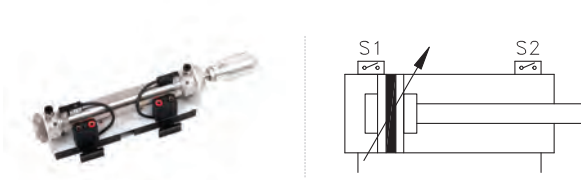


Order number : 13055

Component

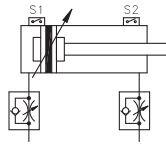
No.	Component	Q'ty
1	Main frame	1
2	Service unit	1
3	Air distributor	1
4	Double-acting cylinder with cushion	2
5	One-way flow control valve	2
6	5/2-way single solenoid valve	2
7	5/2-way double solenoid valve	2
8	Pressure switch	1
9	Relay unit (4C type)	2
10	Digital time relay	1
11	Digital counter	1
12	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

<p>Service unit</p>	<p>Order number : 12101</p>
	<ul style="list-style-type: none"> ● 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
<p>Air distributor</p>	<p>Order number : 12201</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Input : 1 ea (6 mm) ● Output : 8 ea, check connector included (4 mm) ● One-touch connector
<p>Single-acting cylinder</p>	<p>Order number : 12210</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Max, pressure : 15 bar ● Piston diameter : 25 mm ● Stroke : 50mm ● Magnetic for sensor detection
<p>Double-acting cylinder with cushion</p>	<p>Order number : 12220</p>
	<ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Max, pressure : 15 bar ● Piston diameter : 25 mm ● Stroke : 125mm ● Magnetic for sensor detection ● Adjustable cushion included
<p>Double-acting cylinder, cushion/flow control</p>	<p>Order number : 12216</p>
	<ul style="list-style-type: none"> ● 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
<p>Double-acting cylinder, cushion/proximity switch</p>	<p>Order number : 12215</p>
	<ul style="list-style-type: none"> ● 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

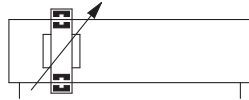
Components

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



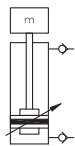
- Pressure range : 0~10 bar
- Max. pressure : 15 bar
- Piston diameter : 25 mm
- Stroke : 125mm
- Magnetic for sensor detection
- Adjustable cushion included
- Electric proximity switch : 2 ea
- Flow control valve included

Rodless cylinder and mounting Order number : 12410



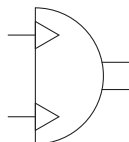
- Pressure range : 0~10 bar
- Rodless cylinder (band type)
- Stroke : 200 mm
- Magnetic for sensor detection

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

Plastic hose (1M)	Order number : 12292
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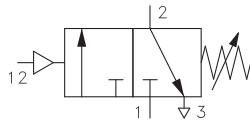
- Operating temperature : $-40^{\circ}\text{C}\sim 60^{\circ}\text{C}$
- Color : blue
- Size : outside diameter 6 mm

Hose cutter	Order number : 12291
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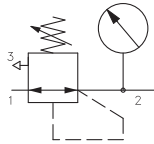
- PVC Grip
- Multi-purpose cutter
- Type : 190mm
- Cutting material : Air Hose (0~16mm)

Pressure sequence valve	Order number : 12300
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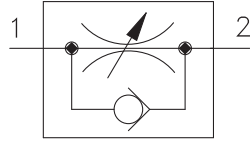
- Pressure range : 1.5~8 bar
- Slide type
- Spring return

Pressure regulating valve	Order number : 12301
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- Pressure range : 0~12 bar
- Max. pressure : 16 bar
- Pressure gauge attached
- Flow rate : 800 LPM

One-way flow control valve	Order number : 12302
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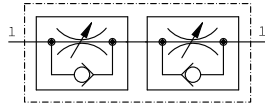


- Pressure range : 0~10 bar
- 1(A)→2(B) : 0~150 LPM
- 2(B)→1(A) : 160/130 LPM

Components

One way flow control valveX2

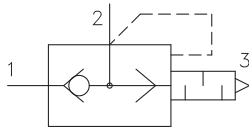
Order number : 12302-2



- 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

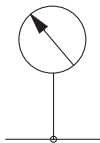
Order number : 12303



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

Pressure gauge

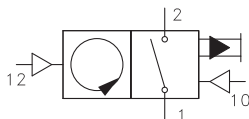
Order number : 12304



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

Pneumatic counter

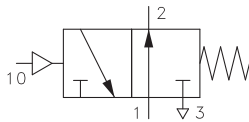
Order number : 12305



- 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

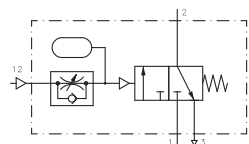
Order number : 12306



- 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)

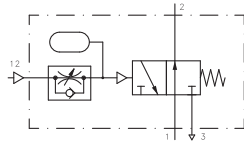
Order number : 12310



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

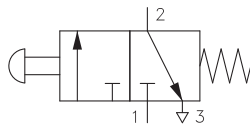
Components

Time-delay valve (Normally open) Order number : 12311



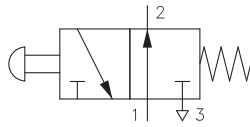
- Pressure range : 0~8,5 bar
- Normally open type valve
- Delay time : 0,1~30 sec
- Signal pressure : 1,5~8 bar

3/2-way push-button valve (Normally closed) Order number : 12320



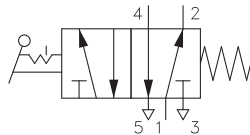
- Pressure range : 0~10 bar
- Push-button type
- Normally closed type valve
- Spring return
- Direct acting type

3/2-way push-button valve (Normally open) Order number : 12321



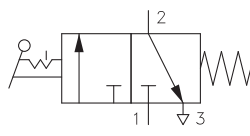
- Pressure range : 0~10 bar
- Push-button type
- Normally open type valve
- Spring return
- Direct acting type

5/2-way selector switch valve Order number : 12322



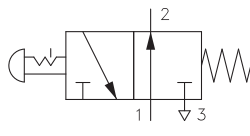
- Pressure range : 0~10 bar
- Select switch (manual override)
- Spring return
- Direct acting type

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

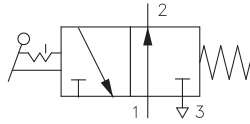


- Pressure range : 0~10 bar
- Normally open type valve
- Spring return
- Direct acting valve
- Push-locking type

Components

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

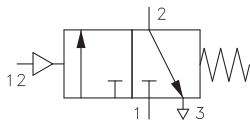
Order number : 12325



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

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

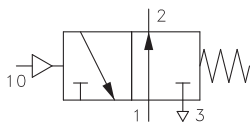
Order number : 12329



- 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)

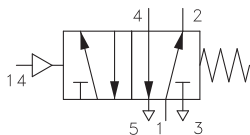
Order number : 12330



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

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

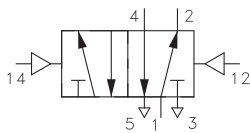
Order number : 12331



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

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

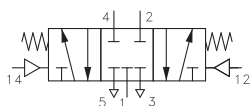
Order number : 12332



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

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

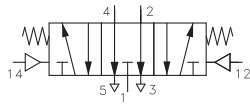
Order number : 12333



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

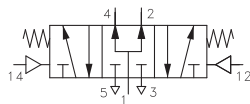
Components

5/3-way air-act valve (ABR connected) Order number : 12334



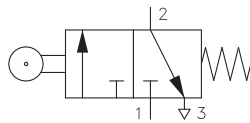
- Pressure range : 0~10 bar
- Return type : spring and pilot
- Manual override
- Spool valve

5/3-way air-act valve (PAB connected) Order number : 12335



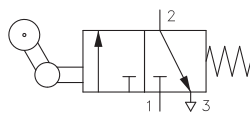
- Pressure range : 0~10 bar
- Return type : spring and pilot
- Manual override
- Spool valve

3/2-way limit switch valve Order number : 12340



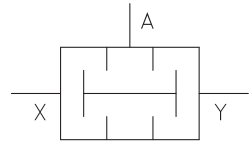
- Pressure range : 0~10 bar
- Roller lever
- Normally close type valve
- Spring return

3/2-way idle return limit switch valve Order number : 12341



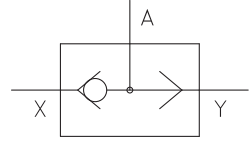
- Pressure range : 1~10 bar
- Roller lever with idle return
- Normally close type valve
- Spring return

AND valve Order number : 12350




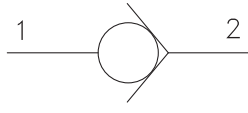

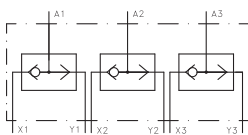

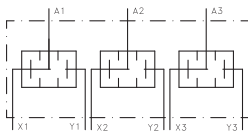

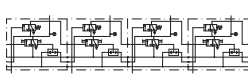

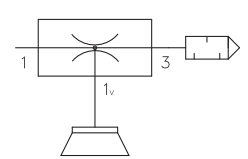

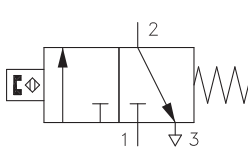
- Pressure range : 1~10 bar
- Flow rate X/Y→A : 857 LPM

OR valve Order number : 12351



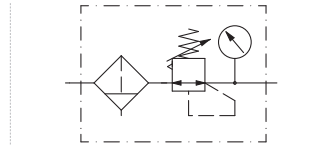
- Pressure range : 0~10 bar
- Open pressure (2→1) : 0.5 bar

Components

<p>Air check valve</p>	<p>Order number : 12354</p>
	 <ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Open pressure (2→1) : 0,5 bar
<p>OR valve set (3-fold)</p>	<p>Order number : 12401</p>
	 <ul style="list-style-type: none"> ● Pressure range : 1~10 bar ● Flow rate X, Y→A : 550 LPM ● OR valves 3 fold
<p>AND valve set (3-fold)</p>	<p>Order number : 12402</p>
	 <ul style="list-style-type: none"> ● Pressure range : 1~10 bar ● Flow rate X, Y→A : 550 LPM ● AND valves 3 fold
<p>Stepper module, expansion</p>	<p>Order number : 12403</p>
	 <ul style="list-style-type: none"> ● Pressure range : 2~8 bar ● Poppet valve ● AND/OR gate integrated ● Flow rate : 60 LPM ● A-A-A-A type
<p>Vacuum valve and suction cup</p>	<p>Order number : 12406</p>
	 <ul style="list-style-type: none"> ● Pressure range : 0~10 bar ● Venturi tube and nozzle type ● Vacuum pressure : min. 0,85 bar ● Air consumption : 15 LPM ● Max. switching frequency : 10Hz
<p>Pneumatic proximity switch</p>	<p>Order number : 12408</p>
	 <ul style="list-style-type: none"> ● Pressure range : 2~8 bar ● Noncontact pneumatic sensor, magnet included ● Display

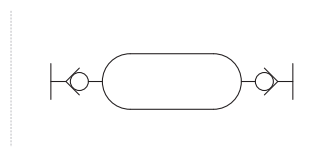
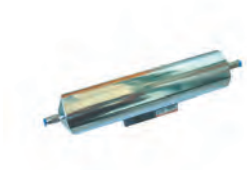
Components

Low pressure regulating valve Order number : 12413



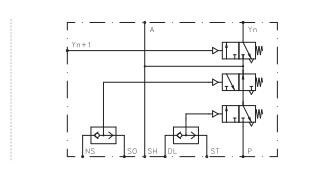
- Input pressure range : 1,0 ~ 10bar
- Output pressure range : 0,1~1,6 bar
- Filter degree : 40 μm
- Condensate capacity : 14cm³

Air tank Order number : 12416



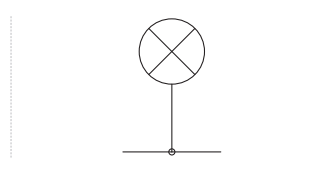
- One touch clamp
- Capacity : 400 ml

Command module Order number : 12420



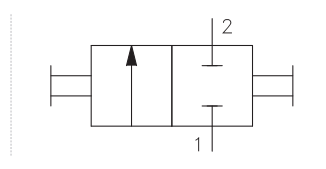
- Various input/output function
- Auto/manual
- Cycle selection
- Start/stop signal
- Reset signal
- Detect work piece

Air pilot lamp Order number : 12421



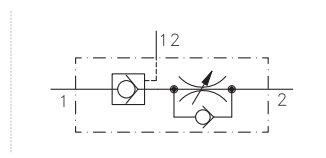
- Pressure indicate lamp
- Pressure range : 0~10 bar
- Lamp on pressure : Prox, 2bar

2/2-way slide valve Order number : 12422



- Slide type

Pilot operating check valve Order number : 12423

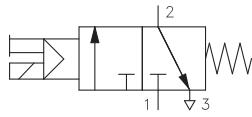


- Pressure range : 0~10 bar
- Pilot actuated pressure : 0,1bar
- Pilot check valve
- Speed controller
- Pressure range : 0~1 bar

Components

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

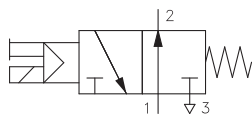
Order number : 13010



- 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)

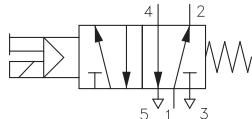
Order number : 13011



- 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

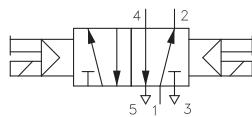
Order number : 13012



- 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

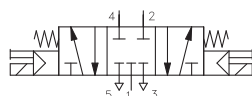
Order number : 13013



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

5/3-way solenoid valve (All blocked)

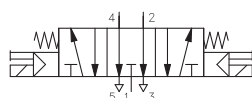
Order number : 13014



- 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)

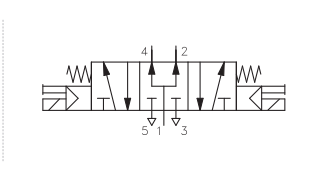
Order number : 13015



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

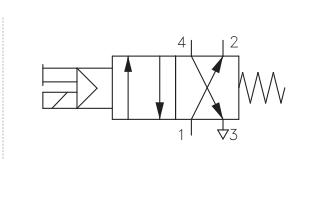
Components

5/3-way solenoid valve (PAB connected) Order number : 13016



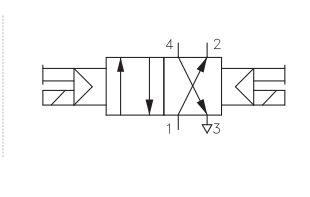
- Pressure range : 0,5~10 bar
- Response time : 20 ms
- Operating voltage : DC 24V
- LED and protection circuit included
- Manual override

4/2-way single solenoid valve Order number : 13017



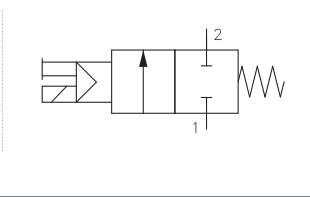
- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Return : spring and pilot
- Manual override

4/2-way double solenoid valve Order number : 13018



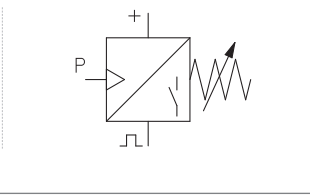
- Pressure range : 0,5~10 bar
- Response time : 20 ms
- LED and protection circuit included
- Manual override

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

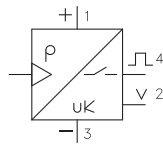
Order number : 12431



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

Flow sensor

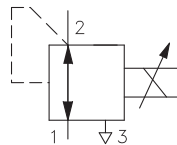
Order number : 12432



- 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

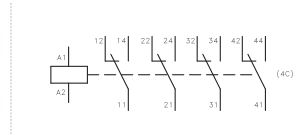
Order number : 12437



- 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 : ±1%
- Max. measurement frequency : 100 Hz

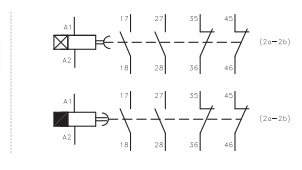
Components

Relay unit (3-fold) **Order number : 13030**



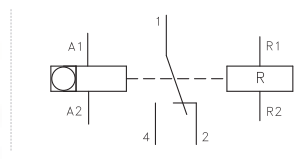
- Power : DC 24V
- Contact : 4C(Changeover)
- Contact load : Max. 5A
- Allowable : Max. 120W
- Operating time : < 20 ms
- Block time : < 20 ms

Digital time relay **Order number : 13031**



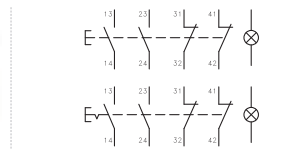
- Power : DC 24V
- Contact : 2a-2b
- Contact load : Max. 5A
- Allowable : Max. 100W
- Delay time : 1~99 sec
- On-delay / Off-delay

Digital counter **Order number : 13032**



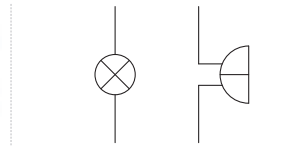
- Power : DC 24V
- Contact : 1C(Changeover)
- Contact load : Max. 5A
- Power consumption : 2,4W
- Counter pulse : 20 ms
- Display : 4 digits

Push-button switch set (3-fold) **Order number : 13033**



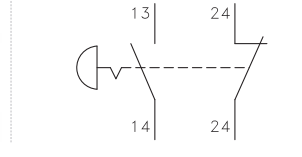
- Power : DC 24V
- Consist of : 2 momentary push-buttons, 1 locking push-button
- Contact : 2 a-contact, 2 b-contact
- Contact allowable : Max. 1A
- Power consumption : 0,48W

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**

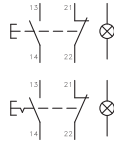


- Power : DC 24V
- Type : mushroom locking button
- Contact : 1a, 1b
- Contact load : Max. 8A

Components

Push-button switch set (9-fold)

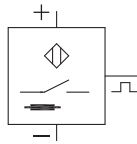
Order number : 13036



- Power : DC 24V
- Consist of : 9 push-buttons
- Contact allowed load : Max, 1A
- Power consumption : 0,48W
- Contact : 1A1B
- Lamp included

Inductive sensor

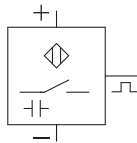
Order number : 13040



- 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

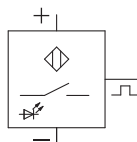
Order number : 13041



- 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

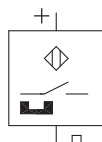
Order number : 13042



- 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

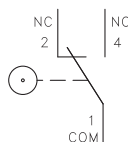
Order number : 13050



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

Electrical limit switch (left)

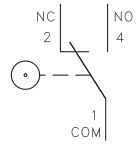
Order number : 13051



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

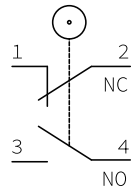
Components

Electrical limit switch (right) Order number : 13052



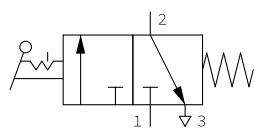
- Contact : DC 24V, 5A
- Contact : 1 c
- Switching frequency : Max, 200Hz
- Roller lever electric switch

Electrical limit switch (Contact separation) Order number : 13157



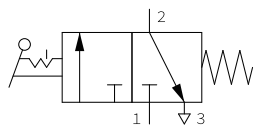
- Contact : DC 24V, 5A
- Contact : 1a1b
- Roller lever electric switch

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

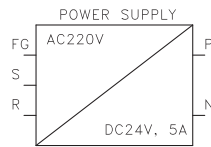


- Color : red, blue, black
- Length : 1500mm, 1000mm, 500mm, 300mm, 100mm
- High elasticity and special coating
- Safety socket type

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

<p>Magnetic symbol (pneumatics and hydraulics)</p>	<p>Order number : 13501</p>	
		<ul style="list-style-type: none"> ● Pneumatics and hydraulics symbols based on ISO ● Cylinders, valves and other symbols ● Attachable to magnetic board
<p>Magnetic symbol (electrics)</p>	<p>Order number : 13502</p>	
		<ul style="list-style-type: none"> ● Electric symbols based on ISO ● Switches, sensors, and relay contacts ● Attachable to magnetic board
<p>Pneumatic cut-away model</p>	<p>Order number : 13503</p>	
		
<p>Universal mounting</p>	<p>Order number : 19010</p>	
	<ul style="list-style-type: none"> ● One-touch clamp system ● Attached to profile panel with vertically and horizontally 	
<p>Pneumatic Textbook</p>	<p>Order number : 42051</p>	
	<ul style="list-style-type: none"> ● Outline of Pneumatic Devices ● Pneumatic Actuator ● Pneumatic Valves ● Basic Pneumatic Circuit 	
<p>Electro-pneumatics textbook</p>	<p>Order number : 42052</p>	
	<ul style="list-style-type: none"> ● Fundamentals of electrical technology ● Components in the electrical signal control section ● Electrically actuated directional control valves 	

Components

Pneumatics workbook (Basic Level)

Order number : 42043



- Initial setting procedure
- Cylinders and sequence control

Pneumatics workbook (Advanced Level)

Order number : 42044



Electro-pneumatics workbook (Basic Level)

Order number : 42045



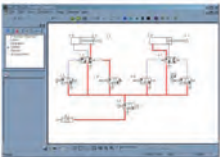
Electro-pneumatics workbook (Advanced Level)

Order number : 42046



PH-Lab simulation software

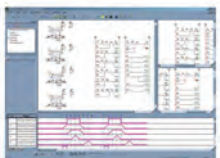
Order number : 40003



- Pneumatics and Hydraulics software






P-Lab simulation software

Order number : 40005



- Pneumatics software

Components

<p>Block type (14DI / 10DO)</p>	<p>Order number : 23151</p>
	<ul style="list-style-type: none"> ● 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
<p>Module type (16DI / 16DO)</p>	<p>Order number : 23152</p>
	<ul style="list-style-type: none"> ● 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
<p>Block type (16DI / 16DO)</p>	<p>Order number : 23161</p>
	<ul style="list-style-type: none"> ● 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
<p>Block type (18DI / 12DO)</p>	<p>Order number : 23001</p>
	<ul style="list-style-type: none"> ● Digital input : 18 channel ● Digital output : 12 channel (Relay) ● HSC included ● 2axes position control ● 4mm socket ● Power supply included
<p>Block type (16DI / 16DO)</p>	<p>Order number : 23171</p>
	<ul style="list-style-type: none"> ● Digital input : 16 channel ● Digital output : 16 channel (Relay) ● 4mm socket ● Power supply included