# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Page From P.33

F.R.L. unit

# Standard Series

## Combination

### F.R.L. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1000-W | 1/8,1/4 | Integrated filter, regulator and lubricator | 34 |
| C2000-W | 1/4,3/8 | | |
| C2500-W | 1/4,3/8 | | |
| C3000-W | 1/4,3/8 | | |
| C4000-W | 1/4,3/8,1/2 | | |
| C6500-W | 3/4,1 | | |
| C8000-W | 3/4,1 | | |

### W.L. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1010-W | 1/8,1/4 | Integrated filter, regulator and lubricator | 42 |
| C2010-W | 1/4,3/8 | | |
| C3010-W | 1/4,3/8 | | |
| C4010-W | 1/4,3/8,1/2 | | |
| C8010-W | 3/4,1 | | |

### F.R. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1020-W | 1/8,1/4 | Integrated filter and regulator | 48 |
| C2020-W | 1/4,3/8 | | |
| C2520-W | 1/4,3/8 | | |
| C3020-W | 1/4,3/8 | | |
| C4020-W | 1/4,3/8,1/2 | | |
| C6020-W | 3/4,1 | | |
| C8020-W | 3/4,1 | | |

### F.M.R. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1030-W | 1/8,1/4 | Integrated filter, oil mist filter and regulator | 54 |
| C2030-W | 1/4,3/8 | | |
| C2530-W | 1/4,3/8 | | |
| C3030-W | 1/4,3/8 | | |
| C4030-W | 1/4,3/8,1/2 | | |
| C6030-W | 3/4,1 | | |
| C8030-W | 3/4,1 | | |

### W.M. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1040-W | 1/8,1/4 | Integrated filter/regulator and oil mist filter | 60 |
| C2040-W | 1/4,3/8 | | |
| C3040-W | 1/4,3/8 | | |
| C4040-W | 1/4,3/8,1/2 | | |
| C8040-W | 3/4,1 | | |

### R.M. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1050-W | 1/8,1/4 | Integrated regulator and oil mist filter | 66 |
| C2050-W | 1/4,3/8 | | |
| C2550-W | 1/4,3/8 | | |
| C3050-W | 1/4,3/8 | | |
| C4050-W | 1/4,3/8,1/2 | | |
| C6050-W | 3/4,1 | | |
| C8050-W | 3/4,1 | | |

### F.M. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1060-W | 1/8,1/4 | Integrated filter and oil mist filter | 72 |
| C2060-W | 1/4,3/8 | | |
| C3060-W | 1/4,3/8 | | |
| C4060-W | 1/4,3/8,1/2 | | |
| C6060-W | 3/4,1 | | |
| C8060-W | 3/4,1 | | |

### F.F.M. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C3070-W | 1/4,3/8 | Integrated 5 µm filter, 0.3 µm filter and oil mist filter | 78 |
| C4070-W | 1/4,3/8,1/2 | | |
| C6070-W | 3/4,1 | | |
| C8070-W | 3/4,1 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Page From P.33

## Filter/regulator

### Filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W1000-W | 1/8,1/4 | New Series using 5µm elements for dust removal, and 0.3µm elements for tar removal | 90 |
| W2000-W | 1/4,3/8 | | |
| W3000-W | 1/4,3/8 | | |
| W4000-W | 1/4,3/8,1/2 | | |
| W8000-W | 3/4,1 | | |

### Reverse filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W1100-W | 1/8,1/4 | With reverse flow function built in | 98 |
| W2100-W | 1/4,3/8 | | |
| W3100-W | 1/4,3/8 | | |
| W4100-W | 1/4,3/8,1/2 | | |
| W8100-W | 3/4,1 | | |

F.R.L. unit

# Standard Series

## Air filter

### Air filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| F1000-W | 1/8,1/4 | New Series using 5µm elements for dust removal, and 0.3µm elements for tar removal | 106 |
| F2000-W | 1/4,3/8 | | |
| F3000-W | 1/4,3/8 | | |
| F4000-W | 1/4,3/8,1/2 | | |
| F6000-W | 3/4,1 | | |
| F8000-W | 3/4,1 | | |

### Oil mist filter

| Series | Processing flow rate L/min (ANR) | | | Features | Page |
|---|---|---|---|---|---|
| | M type | S type | X type | | |
| M1000-W | 150 | 150 | 150 | Ideal for circuits susceptible to oil, including measuring and instrumentation circuits | 116 |
| M2000-W | 250 | 310 | 310 | | |
| M3000-W | 360 | 450 | 450 | | |
| M4000-W | 825 | 1000 | 1000 | | |
| M6000-W | 1270 | 1400 | 1400 | | |
| M8000-W | 2600 | 2900 | 2900 | | |

### High-performance oil mist filter

| Series | Processing flow rate | Features | Page |
|---|---|---|---|
| MX1000-W | 75 L/min(ANR) | Secondary oil content 0.001 mg/m$^3$ Appropriate for optical devices, such as optical positioning devices and laser processing systems | 128 |
| MX3000-W | 180 L/min(ANR) | | |
| MX4000-W | 370 L/min(ANR) | | |
| MX6000-W | 670 L/min(ANR) | | |
| MX8000-W | 1480 L/min(ANR) | | |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1

Modular design
F.R.L.

● Contents/P.23
● Series variation/P.4

Page From P.33

F.R.L. unit

# Standard Series

## Regulator

■ Regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R1000-W | 1/8,1/4 | Compact, pressure gauge embedded. | 136 |
| R2000-W | 1/4,3/8 | | |
| R3000-W | 1/4,3/8 | | |
| R4000-W | 1/4,3/8,1/2 | | |
| R6000-W | 3/4,1 | | |
| R8000-W | 3/4,1 | | |

■ Reverse regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R1100-W | 1/8,1/4 | With reverse flow function built in | 144 |
| R2100-W | 1/4,3/8 | | |
| R3100-W | 1/4,3/8 | | |
| R4100-W | 1/4,3/8,1/2 | | |
| R6100-W | 3/4,1 | | |
| R8100-W | 3/4,1 | | |

## Lubricator

■ Lubricator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| L1000-W | 1/8,1/4 | Supplies fine oil mist | 152 |
| L3000-W | 1/4,3/8 | | |
| L4000-W | 1/4,3/8,1/2 | | |
| L8000-W | 3/4,1 | | |

NEW

## Drain separator

■ Drain separator

| Series | Port size (Rc,G,NPT) | Features | Page |
|---|---|---|---|
| FX1004 | 1/4,3/8 | With no need for element, 99% water separation efficiency is achieved | 160 |
| FX1011 | 1/4,3/8,1/2 | | |
| FX1037 | 3/4,1 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Page From P.33

F.R.L. unit

# Related products

## Mechanical pressure switch

■ Pressure switch

| Series | Port size | Features | Page |
|---|---|---|---|
| P4000-W | Rc1/4,3/8,1/2 | Wide pressure setting range covers 0.1 to 0.8 MPa | 166 |

■ Compact mechanical pressure switch with reed switch

| Series | Port size | Features | Page |
|---|---|---|---|
| P1100-W | Rc1/8,1/4 | Space-saving and can be set over a wide range of pressure | 168 |
| P4100-W | Rc1/4,3/8,1/2 | | |
| P8100-W | Rc3/4,1 | | |

■ Pressure switch

| Series | Port size | Features | Page |
|---|---|---|---|
| APE | Rc1/4 | Setting accuracy within 0.02 MPa<br>Setting range from 0.1 to 0.8 MPa | 172 |

■ Reed switch - compact mechanical contact pressure switch

| Series | Port size | Features | Page |
|---|---|---|---|
| APS-W | Rc1/8 flange | Space-saving and features a wide pressure setting range | 176 |

## Residual pressure exhaust valve

■ Residual pressure exhaust valve

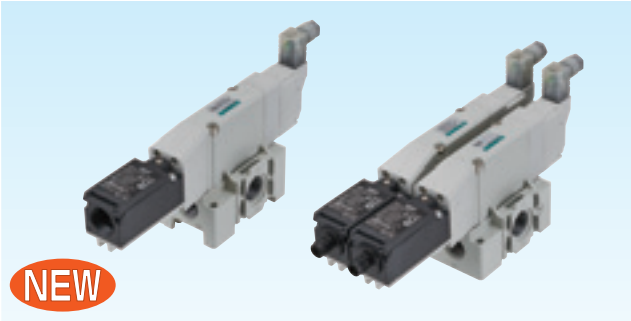
| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| V1000-W | 1/8,1/4 | Ideal for preventing residual pressure accidents | 182 |
| V3000-W | 1/4,3/8,1/2 | | |

■ With locking hole (OSHA compliant)

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| V3010-W | 1/4,3/8,1/2 | OSHA compliant | 185 |
| V6010-W | 3/4,1 | | |

■ With push-in fitting (Quick Valve)

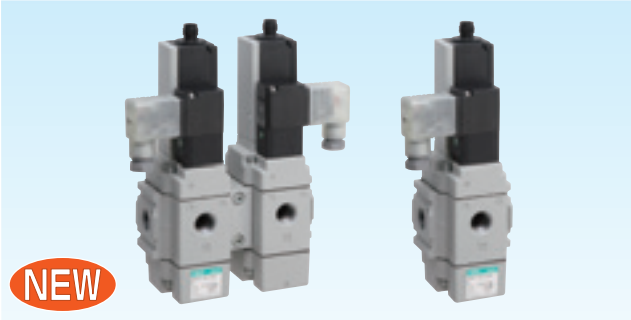
| Series | Compatible tube O.D. | Features | Page |
|---|---|---|---|
| 2QV | R1/8,1/4 | 2-way valve | 188 |
| 3QV | ø4,6,8,10,12 | 3-way valve | |




## Residual pressure exhaust valve with spool position detection

■ Residual pressure exhaust valve with spool position detection

| Series | Port size | Features | Page |
|---|---|---|---|
| SNS | 3/8,1/2 | Certified for safety standard ISO 13849-1 (Category 2, 3, 4 compliant) | 196 |




## 3-port solenoid valve with spool position detection

■ 3-port solenoid valve with spool position detection

| Series | Port size | Features | Page |
|---|---|---|---|
| SNP | Rc3/8,1/2,3/4 | Spool position detection for reliable open/close detection | 206 |

## Slow start valve

■ Slow start valve

| Series | Port size | Features | Page |
|---|---|---|---|
| V3301-W | Rc1/4,3/8,1/2 | Ensuring safety when starting and stopping | 214 |
| V3321-W | | | |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1

### Anti-bacterial/bacteria-removing filter

● Contents/P.217
● Series variation/P.222

Page From P.217

F.R.L. unit

## Anti-bacterial/bacteria-removing filter

■ Anti-bacterial/bacteria-removing filter combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC307 | 1/4,3/8 | Anti-bacterial pre-filter, anti-bacterial high performance filter and bacteria removing filter | 226 |
| SFC407 | 1/4,3/8,1/2 | | |

■ Anti-bacterial/bacteria-removing/odor removing filter combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC309 | 1/4,3/8 | Anti-bacterial pre-filter, anti-bacterial high performance filter, odor removing filter and bacteria removing filter | 228 |
| SFC409 | 1/4,3/8,1/2 | | |

■ Anti-bacterial filter combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC306 | 1/4,3/8 | Integrating anti-bacterial pre-filter and anti-bacterial high performance filter | 230 |
| SFC406 | 1/4,3/8,1/2 | | |
| SFC806 | 3/4,1 | | |

■ Anti-bacterial/odor removing filter combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC308 | 1/4,3/8 | Anti-bacterial pre-filter, Integrating anti-bacterial high performance filter and odor removing filter | 232 |
| SFC408 | 1/4,3/8,1/2 | | |
| SFC808 | 3/4,1 | | |

■ Anti-bacterial pre-filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC310 | 1/4,3/8 | Filtration 5 µm (removal efficiency 90% or more), anti-bacterial, compliant with the Food Sanitation Act and the FDA | 234 |
| SFC410 | 1/4,3/8,1/2 | | |
| SFC810 | 3/4,1 | | |

■ Anti-bacterial high performance filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC320 | 1/4,3/8 | Filtration 0.1 µm (removal efficiency 99% or more), anti-bacterial, compliant with the Food Sanitation Act and the FDA | 236 |
| SFC420 | 1/4,3/8,1/2 | | |
| SFC820 | 3/4,1 | | |

■ Bacteria removing filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC330 | 1/4,3/8 | Filtration 0.01 µm (removal efficiency 99.99% or more), materials compliant with the Food Sanitation Act and the FDA | 238 |
| SFC430 | 1/4,3/8,1/2 | | |

■ Odor removing filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| SFC340 | 1/4,3/8 | Deodorization performance, materials compliant with the Food Sanitation Act and the FDA | 240 |
| SFC440 | 1/4,3/8,1/2 | | |
| SFC840 | 3/4,1 | | |

■ Bacteria removing inline

| Series | Port size | Features | Page |
|---|---|---|---|
| SFS10 | Rc1/4,Rc3/8,ø8,ø10,ø12 | Materials compliant with the Food Sanitation Act and the FDA | 242 |

### Modular design F.R.L.

● Contents/P.23
● Series variation/P.4

Page From P.251

F.R.L. unit

## Flame-resistant Series

### Filter/regulator

■ Filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W3000-G4 | 1/4,3/8 | 5 µm dust removing element and 0.3 µm tar removing element New Series of Elements | 252 |
| W4000-G4 | 1/4,3/8,1/2 | | |
| W8000-G4 | 3/4,1 | | |

■ Reverse filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W3100-G4 | 1/4,3/8 | With reverse flow function built in | 258 |
| W4100-G4 | 1/4,3/8,1/2 | | |
| W8100-G4 | 3/4,1 | | |

### Air filter

■ Air filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| F3000-G4 | 1/4,3/8 | 5 µm dust removing element and 0.3 µm tar removing element New Series of Elements | 266 |
| F4000-G4 | 1/4,3/8,1/2 | | |
| F8000-G4 | 3/4,1 | | |

### Regulator

■ Regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R3000-G4 | 1/4,3/8 | Compact, pressure gauge embedded | 274 |
| R4000-G4 | 1/4,3/8,1/2 | | |
| R8000-G4 | 3/4,1 | | |

■ Reverse regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R3100-G4 | 1/4,3/8 | With reverse flow function built in | 280 |
| R4100-G4 | 1/4,3/8,1/2 | | |
| R8100-G4 | 3/4,1 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Page From P.287

F.R.L. unit

# Oil-prohibited Series

## Regulator

■ Regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| RN3000 | Rc1/4,Rc3/8 | Modular design regulator with oil-prohibited fluid passage | 288 |
| RN4000 | Rc1/4,Rc3/8,Rc1/2 | | |
| RN8000 | Rc3/4,Rc1 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Page From P.295

F.R.L. unit

# Medium pressure Series

## Air filter

■ Air filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| FM3000-W | 1/4,3/8 | Air filter F3000 to F8000 Series medium pressure specifications | 296 |
| FM4000-W | 1/4,3/8,1/2 | | |
| FM6000-W | 3/4,1 | | |
| FM8000-W | 3/4,1 | | |

## Oil mist

■ Oil mist filter

| Series | Processing flow rate L/min (ANR) | | | Features | Page |
|---|---|---|---|---|---|
| | M type | S type | X type | | |
| MM3000-W | 490 | 610 | 610 | Oil mist filter M3000 to M8000 Series medium pressure specifications | 302 |
| MM4000-W | 1130 | 1370 | 1370 | | |
| MM6000-W | 1740 | 1920 | 1920 | | |
| MM8000-W | 3560 | 3980 | 3980 | | |

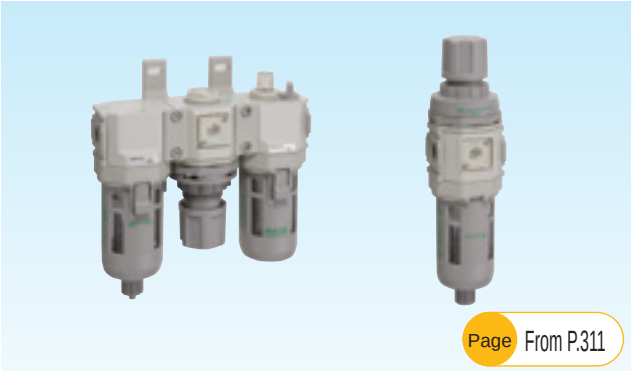
## Regulator

■ Regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| RM3000-W | 1/4,3/8 | Regulator R3000, R4000 Series medium pressure specifications | 308 |
| RM4000-W | 1/4,3/8,1/2 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4



Page From P.311

F.R.L. unit

# Copper and PTFE free Series

## Combination

■ F.R.L. combination

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| C1000 to 8000-W-P6 | 1/8 to 1 | Integrated filter, regulator and lubricator | 312 |

## Filter/regulator

■ Filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W1000 to 8000-W-P6 | 1/8 to 1 | New Series using 5μm elements for dust removal, and 0.3μm elements for tar removal | 313 |

■ Reverse filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| W1100 to 8100-W-P6 | 1/8 to 1 | With reverse flow function built in | 314 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1

Modular design
F.R.L.

● Contents/P.23
● Series variation/P.4

Page From P.311

F.R.L. unit

### Copper and PTFE free Series

#### Air filter

■ Air filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| F1000 to 8000-W | 1/8 to 1 | New Series using 5μm elements for dust removal, and 0.3μm elements for tar removal | 315 |

■ Oil mist filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| M1000 to 8000-W | 1/8 to 1 | Ideal for circuits susceptible to oil, including measuring and instrumentation circuits | 316 |

#### Regulator

■ Regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R1000 to 8000-W-P6 | 1/8 to 1 | Compact, pressure gauge embedded. | 317 |

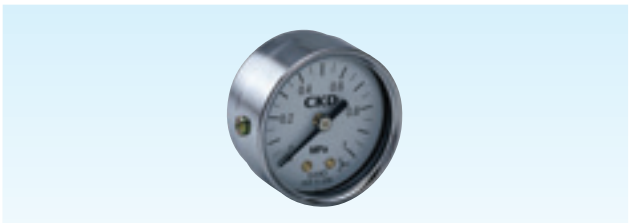
■ Reverse regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| R1100 to 8100-W-P6 | 1/8 to 1 | With reverse flow function built in | 318 |

#### Lubricator

■ Lubricator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| L1000 to 8000-W | 1/8 to 1 | Supplies fine oil mist | 319 |



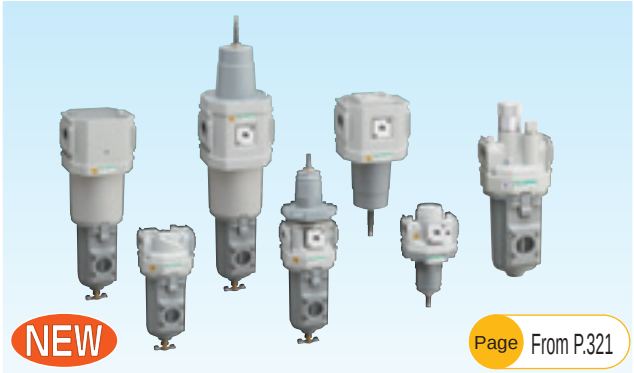
#### Pressure gauge

■ General purpose

| Series | Port size | Features | Page |
|---|---|---|---|
| G49D-P6<br>G59D-P6 | R1/8,1/4 | Glass lens is used | 320 |

Modular design
F.R.L.

● Contents/P.23
● Series variation/P.4



NEW

Page From P.321

F.R.L. unit

### Outdoor Series

#### Filter/regulator

■ Filter/regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| WW4000 | 1/4,3/8,1/2 | Filter/regulator W4000, W8000 Series outdoor specifications | 324 |
| WW8000 | 3/4,1 | | |
| BW7019 | Rc1/4 | Air filter/regulator integrated outdoor specifications | 328 |

#### Air filter

■ Air filter

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| FW4000 | 1/4,3/8,1/2 | Air filter F4000, F8000 Series outdoor specifications | 330 |
| FW8000 | 3/4,1 | | |

#### Oil mist filter

■ Oil mist filter

| Series | Processing flow rate L/min (ANR) | | Features | Page |
|---|---|---|---|---|
| | M type | S type | | |
| MW4000 | 825 | 1000 | Oil mist filter M4000, M8000 Series outdoor specifications | 334 |
| MW8000 | 2600 | 2900 | | |

#### Regulator

■ Regulator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| RW4000 | 1/4,3/8,1/2 | Regulator R4000, R8000 Series outdoor specifications | 338 |
| RW8000 | 3/4,1 | | |

#### Lubricator

■ Lubricator

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| LW4000 | 1/4,3/8,1/2 | Lubricator LW4000, LW8000 Series outdoor specifications | 342 |
| LW8000 | 3/4,1 | | |

Modular design
F.R.L.

Contents/P.23
Series variation/P.4

Listed page From P.345

F.R.L. unit

# Attachment

## Bracket/joiner

### Bracket

| Series | Application | Features | page |
|---|---|---|---|
| B***-W | Modular design mounting bracket | T, C, L types | 346 |

### Joiner

| Series | Application | page |
|---|---|---|
| J***-W | Modular design fittings | 346 |

## Distributor

### Distributor

| Series | Application | Features | page |
|---|---|---|---|
| D*01-00-W | Modular design<br>Piping branch bracket | For piping port branch | 348 |

## Pipe adaptor

### Pipe adaptor

| Series | Application | Features | page |
|---|---|---|---|
| A***-W | Modular design pipe adaptor | Pipe adaptor set | 350 |

Contents/P.1
Series variation/P.4

Listed page From P.363

F.R.L. unit

# Related products (Pressure gauge/display)

## Pressure gauge

### Pressure gauge assembly

| Series | Connection method | Features | page |
|---|---|---|---|
| G401 | O-ring sealant | Low-profile type ideal for embedding in devices | 364 |

### With safety marker / limit marker

| Series | Connection method | Features | page |
|---|---|---|---|
| G40D | R1/8, 1/4 | Easy visual inspection control due to green and red zone display | 365 |
| G45D | | Easy visual inspection control thanks to the green arrow. | 366 |

### General purpose

| Series | Connection method | Features | page |
|---|---|---|---|
| G49D, G59D | R1/8, 1/4 | Glass lens is used | 367 |

### NEW Outdoor Series

| Series | Port size | Features | page |
|---|---|---|---|
| GW49D | R1/8, 1/4 | Glass lens is used | 369 |

### Pressure gauge for panel mounting/pressure gauge with switch

| Series | Connection method | Features | page |
|---|---|---|---|
| G53D | R1/8, 1/4 | With panel mounting added | 370 |
| G52D | R 1/4 | With pressure switch function added | 372 |

### Miniature/round

| Series | Connection method | Features | page |
|---|---|---|---|
| G29D | R1/16, 1/8 | Pressure display unit ø21 *Made-to-order product | 374 |
| G39D | R 1/8 | For practical use *Made-to-order product | 375 |

### Vacuum pressure gauge

| Series | Differential pressure measured range | Features | page |
|---|---|---|---|
| VG41D | R 1/8 | Green arrow | 376 |

### Differential pressure gauge

| Series | Differential pressure measured range | Features | page |
|---|---|---|---|
| GA400-8-P02 | 0 to 0.2 MPa | For controlling air filter service life | 378 |

Contents/P.1
Series variation/P.4

Listed page From P.379

F.R.L. unit

# Indicator

### Moisture indicator

| Series | Port size | Features | page |
|---|---|---|---|
| 6119 | Rc1/4 | For dew point monitor of desiccant air dryer | 379 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1

● Contents/P.1
● Series variation/P.4


F.R.L. unit

## Compact regulator, Filter/regulator

### Regulator

■ Compact piston

| Series | Port size | Features | Page |
|---|---|---|---|
| RA800 | Rc1/8,1/4 | Simplified regulator with small size, light weight and improved operation | 382 |

■ Compact regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| RB500 | Push-in fitting ø4/6 | Compact and space saving design | 386 |

### Filter/regulator

■ Compact filter/regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| WB500 | Push-in fitting ø4/6 | Compact and space saving design | 388 |

### Block manifold regulator

■ Block manifold regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| MNRB500A | Push-in fitting ø6/8 | The block manifold allows the number of stations to be increased and decreased as desired. | 392 |
| MNRB500B | Push-in fitting ø4/6 | | |

### Inline filter

■ Inline filter

| Series | Port size | Features | Page |
|---|---|---|---|
| FSL100 | Push-in fitting ø4/6 | Compact, lightweight and space saving inline allowing use with both positive and negative pressure. | 406 |
| FSL200 | Push-in fitting ø4/6 | | |
| FSL500 | Push-in fitting ø6/8/10 | | |

### Separated

■ F.R.L kit

| Series | Port size | Features | Page |
|---|---|---|---|
| K60570 | Rc1/8,1/4 | Set of filter/regulator/ lubricator | 410 |

■ F.R. unit

| Series | Port size | Features | Page |
|---|---|---|---|
| B7019 | Rc1/8,1/4 | Integrated air filter and regulator | 412 |

■ Filter

| Series | Port size | Features | Page |
|---|---|---|---|
| A1019 (air filter) | Rc1/8,1/4 | Filtration 5 µm | 414 |
| 1219 (micro alescer micro naught) | Rc1/8,1/4 | Filtration 5 µm | 416 |

■ Regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| B2019 (regulator) | Rc1/8,1/4 | Relief mechanism integrated | 418 |
| 2419 (reverse regulator) | Rc1/8,1/4 | Check valve mechanism integrated | 420 |

■ Relief valve

| Series | Port size | Features | Page |
|---|---|---|---|
| B6061 | Rc1/8,1/4 | If press increases, compress air released into atm to maintain set press | 422 |

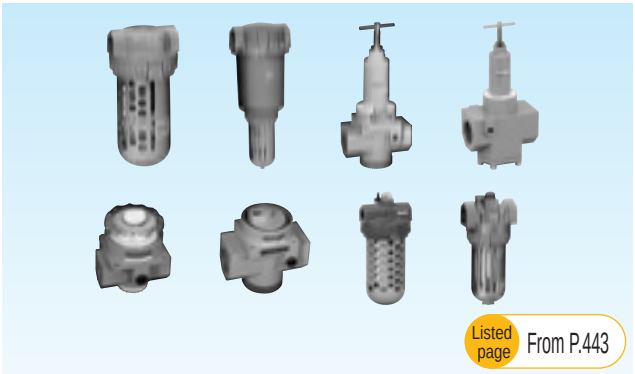
■ Lubricator

| Series | Port size | Features | Page |
|---|---|---|---|
| A3019 (Econo-mist) | Rc1/8,1/4 | Supplying fine oil mist (oil fog) | 424 |

### Regulator for water

| Series | Port size | Features | Page |
|---|---|---|---|
| WR1 | Rc1/8,1/4 | Easy-to-use compact regulator for water | 430 |
| WR2 | Rc3/8,1/2 | | |

Contents/P.1
Series variation/P.4



Listed page From P.443

F.R.L. unit

# Large bore size filter, regulator

## Air filter

### Filter

| Series | Port size | Features | page |
|---|---|---|---|
| 1138 (Air filter) | Rc3/4, 1 | Filtration 5 µm | 444 |
| 1126 (Air filter) | Rc1¼, 1½, 2 | | |
| 1138, A1338 (Submicron air filter) | Rc3/4, 1 | 99% of up to 0.3 µ solid substances such as tar and carbon are removed. | 448 |
| 1126, 1326 (Submicron air filter) | Rc1¼, 1½, 2 | | |
| 1238 (Micro alescer micro naught) | Rc3/4 | Oil content to be 0.1 PPM w/w or less | 450 |
| 1226 (Micro alescer micro naught) | Rc1 | | |
| 1226J (Micro alescer micro naught) | Rc1¼, 1½, 2 | | |
| 1226 (Micro alescer odor naught) | Rc1 | Absorbs odor particles, Deodorizes compressed air | 454 |
| 1226J (Micro alescer odor naught) | Rc1¼, 1½, 2 | | |

### Regulator

| Series | Port size | Features | page |
|---|---|---|---|
| 2215 | Rc¾, 1, 1¼ | Relief mechanism integrated | 458 |
| 2216 | Rc1½, 2 | | |
| 2415 (reverse regulator) | Rc¾, 1, 1¼ | Check valve mechanism integrated | 462 |

### Dial air regulator

| Series | Port size | Features | page |
|---|---|---|---|
| 2302-*C | Rc1/4, 3/8, 1/2, 3/4 | Dial provided to enable easy pressure adjustment | 464 |
| 2303-*C | Rc3/4, 1, 1¼ | | |
| 2304-*C | Rc1½, 2 | | |

### Remote dial air regulator

| Series | Port size | Features | page |
|---|---|---|---|
| 2302-*C | Rc1/4, 3/8, 1/2, 3/4 | With pilot port to enable pressure setting/remote control | 467 |
| 2303-*C | Rc3/4, 1, 1¼ | | |
| 2304-*C | Rc1½, 2 | | |

### Lubricator

| Series | Port size | Features | page |
|---|---|---|---|
| 3003E to 3005E (Econo-mist) | Rc3/4 to 2 | Fine oil mist Supplying (oil fog) | 470 |
| 3003E (Auto-fill) | Rc3/4, 1 | Automatic lubrication to multiple lubricators is possible just by installing an oil tank | 474 |

Listed page From P.487

F.R.L. unit

# Precision regulator

## Regulator

### Compact direct acting precision regulator

| Series | Port size | Features | page |
|---|---|---|---|
| RJB500 | Push-in fitting ø4/6 | Compact with 25 mm interface dimension Min. set pressure 0.01 MPa. | 490 |

## Block manifold regulator

### Block manifold regulator

| Series | Port size | Features | page |
|---|---|---|---|
| MNRJB500A | Push-in fitting ø6/ø8 | The block manifold allows the number of stations to be increased and decreased as desired. | 492 |
| MNRJB500B | Push-in fitting ø4/6 | | |


## Regulator

### Precision regulator (module design)

| Series | Port size(Rc,G,NPT) | Features | page |
|---|---|---|---|
| NEW RPE1000 | 1/4 | 70% less air consumption Ideal for precise tension controller, etc. | 512 |
| RP1000 | 1/4 | From 0.003MPa Excellent performance with very low pressure/low pressure | 518 |
| RP2000 | 1/4, 3/8 | Ideal for balancer Large exhaust flow rate | 522 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## F.R.L. unit ▶▶▶ P.1


● Contents/P.1
● Series variation/P.4


Page From P.529

## Vacuum filter

■ Vacuum filter

| Series | Port size | Features | Page |
|---|---|---|---|
| VFA1000 | Rc1/8,1/4 | Long service life, moisture removable | 530 |
| VFA3000 | Rc1/4,3/8 | | |
| VFA4000 | Rc3/8,1/2 | | |

Page From P.535

## Vacuum regulator

■ Vacuum regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| VRA2000 | 1/4,3/8 | Compact/large flow rate (200 L/min (ANR)) | 536 |

Contents/P.1
Series variation/P.4

Page From P.541

F.R.L. unit

# Clean filter/regulator

## Filter

### Inline clean filter

| Series | Port size | Features | Page |
|---|---|---|---|
| FCS500 | ø4,ø6,ø8<br>R1/8,R1/4 | High filtration rating precision 0.01µm and removal ratio 99.99% | 544 |
| FCS1000 | ø8,ø10,ø12<br>R1/4,R3/8,Rc1/4,Rc3/8 | | 548 |

### Clean exhaust filter

| Series | Port size | Features | Page |
|---|---|---|---|
| FAC10 | ø4,ø6,ø8,ø10 | High filtration degree of 0.01µm, removal efficiency of 99.99%<br>Provides direct exhaust within a clean room | 554 |
| FAC100 | R1/8,R1/4 | | |
| FAC200 | R3/8,R1/2 | | |
| FAC3000 | Rc3/8,Rc1/2 | | |

## Regulator

### Clean regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| RC2000 | Rc1/4,Rc3/8,Rc1/2 | Oil-prohibited specifications/ stainless steel body | 566 |

### Regulator

| Series | Port size | Features | Page |
|---|---|---|---|
| 2619 | Rc1/8,Rc1/4 | Oil-prohibited specifications | 570 |

Contents/P.1
Series variation/P.580

Page From P.577

F.R.L. unit

# Electro pneumatic regulator

### Digital electro pneumatic regulator

| Series | Max. flow rate | Features | Page |
|---|---|---|---|
| EVD-1100 | 60 L/min(ANR) | Compact/high-performance digital control | 586 |
| EVD-1500 | 400 L/min(ANR) | | |
| EVD-1900 | | | |
| EVD-3100 | 700 L/min(ANR) | | 590 |
| EVD-3500 | 1500 L/min(ANR) | | |
| EVD-3900 | | | |

### Electro pneumatic regulator

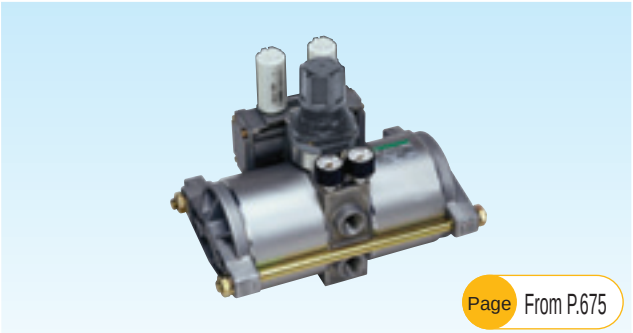
| Series | Max. flow rate | Features | Page |
|---|---|---|---|
| EVR-2500 | 800 L/min(ANR) | Medium flow rate | 610 |
| EVR-2509 | 800 L/min(ANR) | | |
| EVS2100 | 2 L/min(ANR) | Compact | 622 |
| EVS2500 | 6 L/min(ANR) | | |
| EV2100V | 150 L/min(ANR) | Vacuum | 625 |
| EV2109V | 120 L/min(ANR) | | |

### Low pressure electro pneumatic regulator

| Series | Max. flow rate | Features | Page |
|---|---|---|---|
| EVL | 100 L/min(ANR) | Compact for low pressure | 630 |

### Thin electro pneumatic regulator

| Series | Max. flow rate | Features | Page |
|---|---|---|---|
| MEVT | 2 to 6 L/min(ANR) | Thin | 638 |



Page From P.675

# Air booster

| Series | Applicable | Page |
|---|---|---|
| ABP | Air booster | 678 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## Pneumatic auxiliary components P.687


## Speed controller

### With dial

NEW

| Series | Port size | Features | Page |
|---|---|---|---|
| DSC | M5,R1/8,1/4,3/8,1/2 | Enables easy control of cylinder speed values | 694 |

### Needle valve with adjusting dial

| Series | Port size | Features | Page |
|---|---|---|---|
| DVL | R1/8,1/4,3/8 | Linear flow characteristics of rotating needle valve adopted | 708 |

### Elbow, push-in fitting

| Series | Port size | Features | Page |
|---|---|---|---|
| SC3W | M3,M5,R1/8,1/4,3/8,1/2 | Push-in fitting ø3.2 to ø12 | 716 |

### Universal/push-in fitting

| Series | Port size | Features | Page |
|---|---|---|---|
| SC3U | M3,M5,R1/8,1/4,3/8,1/2 | Push-in fitting ø3.2 to ø12 | 720 |

### Line type/with push-in fitting

| Series | Port size | Features | Page |
|---|---|---|---|
| SCL2 | ø1.8,ø4,ø6,ø8,ø10, ø12 | Applicable to the remote centralized control of actuators | 726 |

### In/out line type/with push-in fitting

| Series | Port size | Features | Page |
|---|---|---|---|
| SCD2 | ø1.8,ø4,ø6,ø8,ø10, ø12 | Enables flow control for both air supply and exhaust | 726 |

### Needle valve/line type with push-in fitting

| Series | Port size | Features | Page |
|---|---|---|---|
| SCL2-N | ø4,ø6,ø8 | Flow rate adjustm needle v Val - non-scatter grease. Clean-room/oil-prohibited specs. | 730 |

### Stainless steel anti-corrosion

| Series | Port size | Features | Page |
|---|---|---|---|
| SC3P | M5,R1/8,R1/4,R3/8,R1/2 | Speed control valve with anti-corrosive stainless steel body | 736 |

### Direct piping/elbow

| Series | Port size | Features | Page |
|---|---|---|---|
| SC3R | M5,Rc1/8,1/4,3/8,1/2 | Direct piping, L-shape rotation M5 to Rc1/2 | 740 |

### Miniature

| Series | Port size | Features | Page |
|---|---|---|---|
| SC | M3,M5 | Compact, lightweight, and space saving | 742 |

### Miniature fine speed

| Series | Port size | Features | Page |
|---|---|---|---|
| SC-M5-*-F | M5 | Speed adjustm of fine speed Cyl/air valve | 742 |

### Miniature in/out

| Series | Port size | Features | Page |
|---|---|---|---|
| SCD | M3,M5 | Enables flow control for both air intake / exhaust | 744 |

### Medium bore size

| Series | Port size | Features | Page |
|---|---|---|---|
| SC1 | Rc1/8,1/4,3/8,1/2 | Applicable to general medium bore sizes | 748 |

### Large bore size

| Series | Port size | Features | Page |
|---|---|---|---|
| SC | Rc3/4,1,1 1/4,1 1/2,2 | Applicable to general large bore sizes | 750 |

### Outdoor Series

| Series | Port size | Features | Page |
|---|---|---|---|
| NEW SC1-W | Rc1/4,3/8,1/2 | Applicable for outdoor use | 752 |

Page From P.757

# Silencer

## Metering valve with silencer

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SMW2 | R1/8,1/4 | With speed controller and silencer function | 760 |
| FMS | M5 | | 762 |
| SMW | R3/8,1/2 | | |

## Small bore size

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SL | M5 | Compact with M5 screw | 764 |

## Resin body

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SLW | R1/8,1/4,3/8,1/2 | Noise reduction effect of 30 dB [A] or more | 764 |
| SLW-*A-H | R1/4,3/8,1/2 | High noise reduction small bore size | 766 |

## Large flow rate/small bore size/resin body

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SLW-*L | R1/4,3/8 | Noise reduction effect of 30 dB [A] or more | 767 |

## High noise reduction/compact

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SLW-*S | R1/8,1/4 | Noise reduction effect 25 to 30 dB [A] or more | 768 |
| | R3/4 | | 769 |

## Push-in

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SLW-H | R1/4,3/8,1/2 | Noise reduction effect of 40 dB [A] or more | 770 |

## Miniature

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SLM | M3,M5 | Noise reduction effect of 20 dB [A] or more | 771 |

## Aluminum body

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SL | R1/4 to 2 | Noise reduction effect of 20 dB [A] or more | 772 |

## Outdoor Series

| Series | Port size | Features | Page |
|---|---|---|---|
| NEW SL-W | Rc1/4,3/8,1/2 | Noise reduction effect of 20 dB [A] or more | 774 |

## Exhaust cleaner

| Series | Port size | Features | Page |
|---|---|---|---|
| FA*31 | Rc3/8 to 2 | Exhaust noise and oil mist are 99.9% removed | 778 |

NEW Page From P.781

# Auxiliary valve

## Quick manual valve

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| QEL | ø4,ø6 | Compact/space saving inline and plug | 786 |
| QEV2 | Rc1/8 to 1 | Speeds up cylinder exhaust | 790 |

## Shuttle valve

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| SHV2 | Rc1/8 to 1 | Multiple air pressure signals are selected to configure the circuit. | 794 |

## Compact check valve with push-in fitting

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| CHL | M5,ø4,ø6 | Compact/space saving inline | 798 |

## Check valve

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| CHV2 | Rc1/8 to 1 1/2 | Completely prevents reverse flow of compressed air | 800 |

## Block valve

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| FPV | M5,R1/8,1/4,3/8,1/2 | The cylinder can be stopped at any position and mounted as desired | 802 |

## Threshold sensor

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| PWS | M5,R(Rc)1/8,1/4,3/8,1/2 | Detects exhaust pressure near the stroke end accurately | 806 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## Pneumatic auxiliary components P.687


### Fittings/tubes

■ Miniature fitting

| Series | Port size | Features | page |
|---|---|---|---|
| F | M3 to R(Rc)1/8 | For bore sizes ø3.2, 4, 6 | 816 |

■ Fitting

| Series | Port size | Features | page |
|---|---|---|---|
| GW | M3 to R(Rc)1/2 | For ø3.2 to 16 push-in fitting | 824 |

■ Fitting/small size

| Series | Port size | Features | page |
|---|---|---|---|
| GWJ | M3 to R(Rc)1/8 | For ø3.2 to 6 compact push-in fitting | 838 |

■ Fitting (stainless steel)

| Series | Port size | Features | page |
|---|---|---|---|
| ZW | M5 to R1/2 | Push-in fitting for flame-resistant resin and stainless steel | 844 |

■ Fitting (stainless steel)

| Series | Port size | Features | page |
|---|---|---|---|
| ZSP | M5 to R1/2 | Stainless steel for metal body, Uses push-in fittings SUS303 or equivalent | 848 |

■ Tightening fitting (stainless steel)

| Series | Port size | Features | page |
|---|---|---|---|
| ZJ | R1/8 to R1/2 | Stainless steel tightening fitting | 857 |

■ Tightening fitting

| Series | Port size | Features | page |
|---|---|---|---|
| MJ | R(Rc)1/8 to 1/2 | Tightening fitting | 863 |
| JL | Rc1/8, 1/4, 3/8, 1/2 | Fitting | |

■ Rotary fitting

| Series | Port size | Features | page |
|---|---|---|---|
| RJF | M5, Rc1/8 | Built-in bearing, High rigidity/ low sliding resistance, Number of circuits: 4/6/8/12/16 | 870 |

■ Fiber tube

● Antistatic (for push-in fitting)

| Series | Bore size | Features | page |
|---|---|---|---|
| UP-9402-20-F1 | ø1.8 x ø1.2 | Extra-fine air tube with increased flow rate | 884 |
| PG | M3, M5, 1/8 | Special push-in fitting | 886 |

● Clean-room (for push-in fitting)

| Series | Bore size | Features | page |
|---|---|---|---|
| EH-5802-20 | ø1.8 x ø1.2 | Clean-room specifications with highly corrosion-resistant material | 884 |
| CG | M3, M5, 1/8 | Special push-in fitting for clean-room | 890 |

● Flame resistance (for push-in fitting)

| Series | Bore size | Features | page |
|---|---|---|---|
| UP-9102-20-*-SR | ø1.8 x ø1.0 | Flame-resistant resin used | 898 |
| RG | M5, 1/8 | Flame-resistant dedicated push-in fitting | 899 |

● Antistatic

| Series | Bore size | Features | page |
|---|---|---|---|
| UP-9102-20-F1 | ø1.8 x ø1.0 | Fitting dedicated for extra-fine air tube | 877 |
| PTN2 | M3, M5, 1/8, ø3.2, ø4, ø6 | Dedicated fitting | |


### Fittings/tubes

■ Antistatic tube

| Series | Bore size | Features | page |
|---|---|---|---|
| UP-9***-F1/F2 | 3.2, 4, 6,8, 10, 12 | Antistatic and dust-proof tube | 903 |

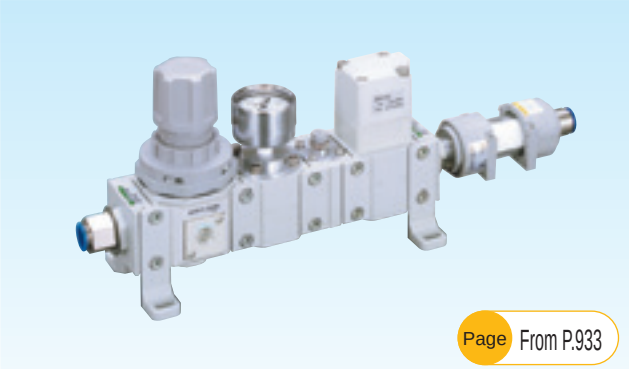
■ Tube (F.U.KX.SR)

| Series | Bore size | Features | page |
|---|---|---|---|
| F,U,NU,KX,SR | ø3.2 to ø15 | Soft nylon, Urethane tube | 906 |


### Air blow nozzles

| Series | Port size | page |
|---|---|---|
| BNE-F (flat type) | R 1/4 | 924 |
| BNE-R (round type) | | |
| BN (general) | R1/8, R1/4 | 926 |
| BNB (Blower specification) | R1/8, R1/4 | 927 |

# Air unit components P.931


Page From P.933

## Clean air unit

| Series | Piping bore size | Features | Page |
|---|---|---|---|
| CAU30 | ø10,ø12 | Whole clean blow system in one unit | 936 |


Page From P.947

## Air unit

### Customized air unit (Customized combinations)

| Series | Features | Page |
|---|---|---|
| CXU10-UN- | Piping is not necessary. Layout is not limited. Reduces design processes. | 956 |
| CXU13-UN- | | 962 |
| CXU30-UN- | | 958 |

### Air unit custom-made products

| Series | Features | Page |
|---|---|---|
| CXUZ-FL | Any air unit combination is possible as desired. | 1005 |

### Valve air unit

| Series | Features | Page |
|---|---|---|
| CXU10-GEXA | A solenoid valve and regulator, etc., are connected and integrated into a unit. Piping work is reduced. | 1008 |
| CXU30-M4G2 | | 1012 |

### Single air unit

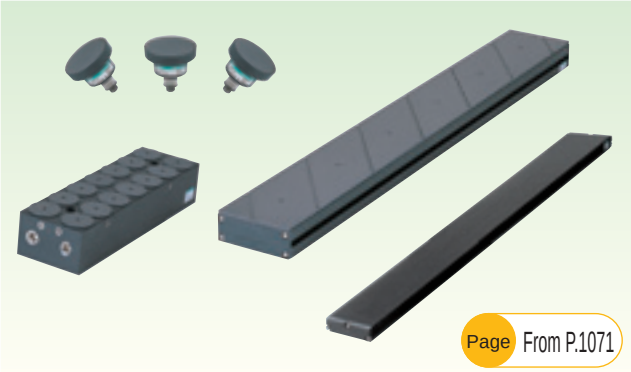
| Series | Main applications | Page |
|---|---|---|
| NEW CXU30-VE | For air blow | 1020 |
| CXU10-EXA | | 1026 |
| CXU10-FAB3 | | 1028 |
| CXU30-FAB4U | | 1030 |
| CXU30-ADK | Main ON/OFF | 1032 |
| CXU30-4G2R | For driving cylinder | 1034 |
| CXU10-CHV | Reverse flow prevention | 1040 |
| CXU10-D4 | 4-way branch | 1042 |
| CXU30-D4 | | |
| CXU10-TA | Turning the module 90° | 1044 |
| CXU30-TA | | |
| CXU10-MA | Masking the module | 1045 |
| CXU13-CA | Combination of 1000 Series and 3000 Series | 1046 |
| NEW CXU48-CA | Connecting 2000/3000/4000 Series and 6000/8000 Series | |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

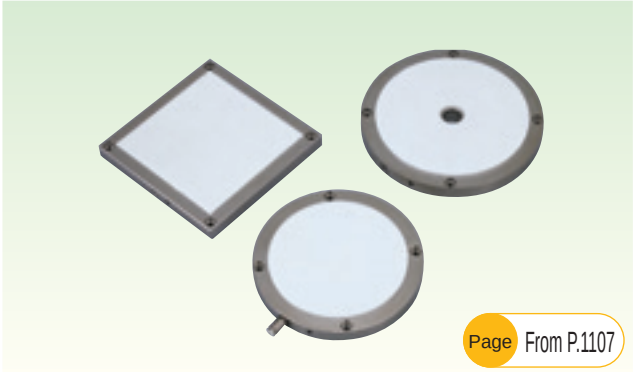
## Precision components P.1069



Page From P.1071

### Glass float module GFM

| Series | Features | Page |
|---|---|---|
| GFM-A (floating alignment pad) | Floating system for contactless, clean and damage-prevention transportation. | 1074 |
| NEW GFM-T (high floating rail) | | 1080 |
| GFM-R (floating rail) | | 1084 |
| GFM-P (precision floating stage) | | 1092 |



Page From P.1107

### Precise suction plate

| Series | Features | Page |
|---|---|---|
| PVP-R (donut shaped) | Precise suction plate with 40% porosity made from sintered fluorine resin porous body | 1110 |
| PVP-C (round) | | |
| PVP-S (square) | | |

Page From P.1121

### Magnetic spring buffer

■ Magnetic spring buffer

| Series | Features | Page |
|---|---|---|
| FBU2-7D (spigot) | Magnetic springs with original cushioning mechanism used to achieve stable pressing force, low dust generation and long service life | 1124 |
| FBU2-8M (full thread) | | |
| FBU2-12D (spigot) | | |
| FBU2-12M (full thread) | | |
| FBU2-SU (general purpose) | | 1130 |

# Pressure sensors P.1141

## Pressure sensor for air/coolant


Pressure sensor for air/coolant

### Electronic pressure switch

■ Pressure switch

| Series | Pressure range | Features | Page |
|---|---|---|---|
| PPX | -100 kPa to 1,000 kPa | Standard and high-function types are available. Twin display of present and set pressure values. 3-digit digital display | 1148 |
| PPD3-S | -100 kPa to 980 kPa | Stainless steel diaphragm sensor | 1178 |
| NEW PPG-D | -100 kPa to 100.0 kPa | Size □31 mm digital pressure sensor | 1192 |
| PPE | -100 kPa to 980 kPa | Sensor-amplifier integrated without display. Easy-to-install miniature body | 1202 |
| NEW PPEV | -100 kPa to 1.0 MPa | Compact shape 10 mm wide, high precision, high reliability | 1208 |
| PSW | -100 kPa to 980 kPa | Sensor/amplifier integrated without display | 1212 |
| NEW PPR | -100 kPa to 1.000 MPa | Modular F.R.L. dedicated for regulator mounting | 1214 |

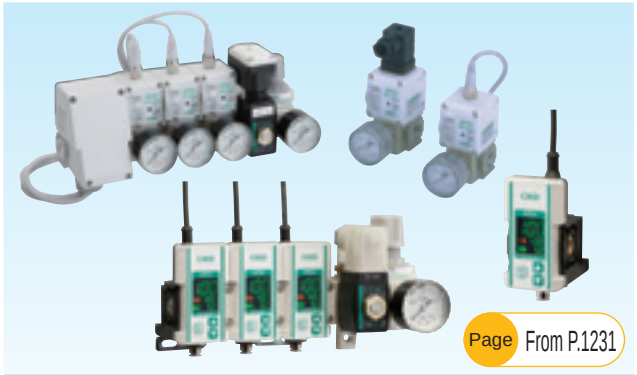
■ Mechanical pressure switch for coolant

| Series | Port size | Features | Page |
|---|---|---|---|
| CPE | Rc1/4 | Enables a wide pressure setting range of 0.05 to 0.8 MPa for coolant liquid through air | 1340 |

■ Electronic pressure switch for coolant

| Series | Pressure range | Features | Page |
|---|---|---|---|
| CPD | 0 to 7 MPa | With sensor amplifier integrated display for coolants and other liquids | 1342 |

## Pneumatic pressure sensor




Pneumatic pressure sensor

### Contact/close contact/cutting tool breakage detection switch

■ Contact confirmation switch (digital gap switch) NEW

| Series | Detection range | Features | Page |
|---|---|---|---|
| GPS3 | 0.03 to 0.4 mm | Single unit | 1240 |
| MGPS3 | 0.03 to 0.4 mm | Manifold (2 to 6 stations) | 1242 |
| UGPS3 | 0.02 to 0.15 mm | Solenoid valve with needle, regulator integrated general purpose unit | 1243 |

■ Contact confirmation switch (gap switch)

| Series | Orifice size | Features | Page |
|---|---|---|---|
| GPS2 | ø0.5,0.7 | Single unit | 1261 |
| MGPS2 | ø0.5,0.7 | Manifold (2 to 5 stations) | 1266 |
| UGPS2 | ø0.5,0.7 | Solenoid valve with needle, regulator integrated general purpose unit | 1270 |

■ Close contact confirmation switch

| Series | Orifice size | Features | Page |
|---|---|---|---|
| HPS | ø0.5,0.7,1.0 | Single unit | 1276 |
| MHPS | ø0.5,0.7,1.0 | Manifold (2 to 5 stations) | 1280 |
| UHPS | ø0.5,0.7,1.0 | Solenoid valve with needle, regulator integrated general purpose unit | 1284 |

■ Cutting tool breakage detection switch

| Series | Orifice size | Features | Page |
|---|---|---|---|
| TLPS | ø0.3 | Single unit | 1290 |
| MTLPS | ø0.3 | Manifold (2 to 5 stations) | 1294 |
| UTLPS | ø0.3 | Solenoid valve with needle, regulator integrated general purpose unit | 1298 |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## Pressure sensors P.1141

### Pneumatic pressure sensor

Page From P.1317

Pneumatic pressure sensor

#### Air sensor (PEL system)

■ Switching element

| Series | Fixed orifice size | Features | Page |
|---|---|---|---|
| APA1 | None to 1.4 mm | Stable detection with ultra-fine pressure | 1318 |

■ Switching element/manifold

| Series | Number of elements | Features | Page |
|---|---|---|---|
| APA3 | 2,3,4,5 | Compact system thanks to manifold | 1318 |

■ Detection nozzle

| Series | Nozzle port size | Features | Page |
|---|---|---|---|
| APA4-BA | 0.3 to 2.0 mm | For gauge | 1321 |
| APA4-DA | 1,2 mm | Back pressure | |
| APA4-VS | 1 mm | Reflection | |
| APA4-GA | 1,2,3.2 mm | Detecting | |

■ PL switch

| Series | Features | Page |
|---|---|---|
| PL | PEL switching element and electric wire connection terminal, pneumatic pipe connection terminal or power circuit are stored in a box. | 1324 |

■ SEPEL switch

| Series | Differential pressure | Features | Page |
|---|---|---|---|
| DPS | 5 kPa | Fine differential pressure switch that combines a pneumatic bridge and electrical comparator circuits | 1330 |

■ Related products (filter)

| Series | Features | Page |
|---|---|---|
| K-005 | Related products when air sensor is used | 1332 |

■ Related products (piping fixture)

| Series | Features | Page |
|---|---|---|
| APA6 | Related products when air sensor is used | 1334 |

Page From P.1353

#### Multi-monitor

■ Multi-monitor

| Series | Flow rate/pressure range | Unit | Page |
|---|---|---|---|
| MD | −100 to 980 | MPa,KPa, mL/min,L/min $m^3$/min | 1354 |

# Sensor/Controller components P.1359

## Flow rate sensor for air

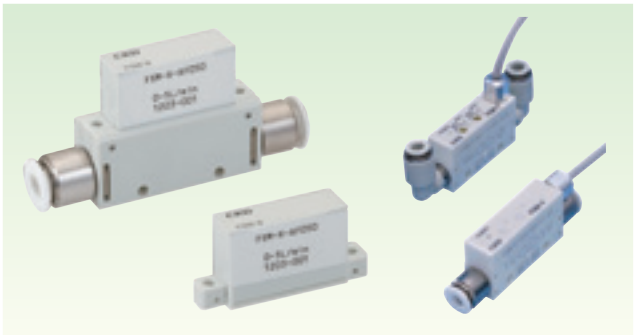
Page From P.1361

Flow rate sensor for air

### Small size flow rate sensor RAPIFLOW FSM3, FSM

■ High-precision/high-speed response, integrated display/separated display FSM3

| Series | Flow range uni-direction/bi-direction | Features | Page |
|---|---|---|---|
| FSM3-□005 | 0 to 500/-500 to 500 mL/min | High precision. | 1367 |
| FSM3-□010 | 0 to 1000/-1000 to 1000 mL/min | High-speed response. | |
| FSM3-□020 | 0 to 2.00/-2.00 to 2.00 L/min | Integrated needle valve. | |
| FSM3-□050 | 0 to 5.00/-5.00 to 5.00 L/min | Display separated is | |
| FSM3-□100 | 0 to 10.00/-10.00 to 10.00 L/min | available. | |
| FSM3-□200 | 0 to 20.0/-20.0 to 20.0 L/min | Rotatable LCD display. | |
| FSM3-□500 | 0 to 50.0/-50.0 to 50.0 L/min | Panel mounting is | |
| FSM3-□101 | 0 to 100.0/-100.0 to 100.0 L/min | supported. | |
| FSM3-□201 | 0 to 200/-200 to 200 L/min | Unrestricted mounting | |
| FSM3-□501 | 0 to 500/-500 to 500 L/min | orientation. | |
| FSM3-□102 | 0 to 1000/-1000 to 1000 L/min | Variety of fitting variations. | |



■ Miniature/ultra-high-speed response Analog output FSM-X

| Series | Flow range uni-direction/bi-direction | Features | Page |
|---|---|---|---|
| FSM-X-A□005 | 0 to 0.5/-0.5 to 0.5 L/min | Compact body enabled by separating the sensor head. | 1454 |
| FSM-X-A□010 | 0 to 1/-1 to 1 L/min | | |
| FSM-X-A□050 | 0 to 5/-5 to 5 L/min | | |
| FSM-X-A□100 | 0 to 10/-10 to 10 L/min | | |

■ Miniature analog output/switch output FSM-V

| Series | Flow rate range | Features | Page |
|---|---|---|---|
| FSM-V-□-R0005 | -0.05 to +0.05 L/min | Easy measurement of forward and reverse flow. Ideal for detection control of vacuum suction and vacuum burst. | 1460 |
| FSM-V-□-R0010 | -0.1 to 0.1 L/min | | |
| FSM-V-□-R0050 | -0.5 to 0.5 L/min | | |
| FSM-V-□-R0100 | -1 to 1 L/min | | |
| FSM-V-□-R0500 | -5 to 5 L/min | | |
| FSM-V-□-R1000 | -10 to 10 L/min | | |

■ Miniature inline filter FSM-VFM

| Series | Port size | Features | Page |
|---|---|---|---|
| FSM-VFM | ø1.8,ø4,M5 | Inline filter dedicated for miniature and space saving FSM Series | 1482 |

## Flow rate controller for air

Page From P.1491

Flow rate controller for air

### Compact flow rate controller RAPIFLOW FCM

■ Standard model

| Series | Flow rate range | Features | Page |
|---|---|---|---|
| FCM-9500 | 0 to 0.5 L/min | Compact, high-speed and multifunctional flow rate controller. Applicable fluids are air, nitrogen, argon, oxygen, city gas, methane, propane, hydrogen and helium. | 1496 |
| FCM-0001 | 0 to 1 L/min | | |
| FCM-0002 | 0 to 2 L/min | | |
| FCM-0005 | 0 to 5 L/min | | |
| FCM-0010 | 0 to 10 L/min | | |
| FCM-0020 | 0 to 20 L/min | | |
| FCM-0050 | 0 to 50 L/min | | |
| FCM-0100 | 0 to 100 L/min | | |

■ Low differential pressure model

| Series | Flow rate range | Features | Page |
|---|---|---|---|
| FCM-L9500 | 0 to 0.5 L/min | Suitable for controlling burner flame or other combustion gases with low supply pressure. | 1496 |
| FCM-L0001 | 0 to 1 L/min | | |
| FCM-L0002 | 0 to 2 L/min | | |
| FCM-L0005 | 0 to 5 L/min | | |
| FCM-L0010 | 0 to 10 L/min | | |

## Flow rate sensor for air

Page From P.1529

Flow rate sensor for air

### Pneumatic flow rate sensor (FLUEREX)

■ Separated display PFD

| Series | Flow rate range | Features | Page |
|---|---|---|---|
| PFD-501 | 25 to 500 L/min (normal) | Flow rate detection of compressed air with total accuracy ±4% F.S. | 1534 |
| PFD-102 | 50 to 1000 L/min (normal) | | |
| PFD-202 | 100 to 2000 L/min (normal) | | |
| PFD-402 | 200 to 4000 L/min (normal) | | |
| PFD-802 | 400 to 8000 L/min (normal) | | |
| PFD-163 | 800 to 16000 L/min (normal) | | |

■ Separated display tester kit PFK

| Series | Flow rate range | Features | Page |
|---|---|---|---|
| PFK-501 | 25 to 500 L/min (normal) | Equipment for measuring the air flow rate is provided in a kit, which enables immediate measurements on site. | 1540 |
| PFK-102 | 50 to 1000 L/min (normal) | | |
| PFK-202 | 100 to 2000 L/min (normal) | | |
| PFK-402 | 200 to 4000 L/min (normal) | | |
| PFK-802 | 400 to 8000 L/min (normal) | | |

# 2 Searching by product series

Select from external appearance and product description of each series.

NEW indicates models added to the 9th edition.

## Sensor/Controller components P.1359

Flow rate sensor for water

NEW

Listed page From P.1553

### Flow rate sensor for water (FLUEREX flow sensor)

■ Karman's vortex

| Series | Flow rate measured range | Features | page |
|---|---|---|---|
| WFK2-005 | 0.4 to 5 L/min | Wide flow rate measured range<br>IO-Link Configuration<br>Various settings available<br>Equipped with multiple functions | 1556 |
| WFK2-020 | 1.6 to 20 L/min | | |
| WFK2-050 | 4.0 to 50 L/min | | |
| WFK2-100 | 8.0 to 100 L/min | | |
| WFK2-250 | 20 to 250 L/min | | |

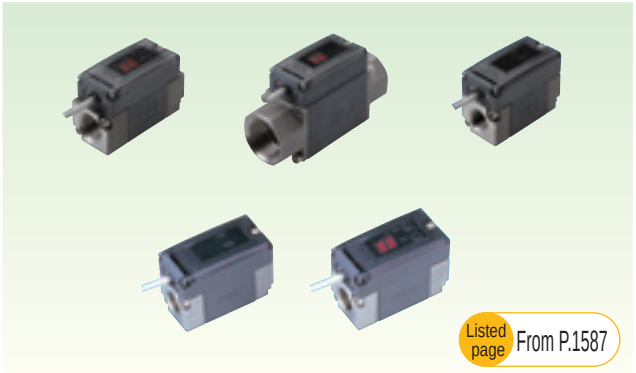
NEW

Listed page From P.1571

### Capacitance electromagnetic flow sensor

■ Capacitance

| Series | Flow rate measured range | Features | page |
|---|---|---|---|
| WFC-150 | 0.5 to 15L/min | Water flow sensor optimized for FA applications | 1574 |
| WFC-600 | 2.0 to 60L/min | | |



Listed page From P.1587

### Flow rate sensor for water

■ Karman's vortex

| Series | Flow rate measured range | Features | page |
|---|---|---|---|
| WFK3000 | 0.5 to 40,<br>1.5 to 12 L/min | Compact/device built-in | 1592 |

# Total air systems P.1605

## Total air control systems (Total Air system)

Page From P.1607

Total air control systems (Total Air system)

## Detector

■ Compact mechanical valve

| Series | Port size | Features | Page |
|---|---|---|---|
| MS | ø4,Rc1/8 | Compact, large flow | 1612 |

■ Medium mechanical valve

| Series | Port size | Features | Page |
|---|---|---|---|
| MM | ø4,Rc1/8 | Without intermediate bleeding | 1626 |

■ Large mechanical valve

| Series | Port size | Features | Page |
|---|---|---|---|
| MAVL | Rc1/4 | Pressurized from 3 directions, and used as NO, NC, or distributor | 1638 |

Total air control systems (Total Air system)

## Circuit device

Page From P.1643

■ Air timer

| Series | Working pressure range | Features | Page |
|---|---|---|---|
| RTD-3A | 0.25 to 0.8 MPa | Delay time max. 30 sec. | 1644 |

■ Pressure switch

| Series | Working pressure range | Features | Page |
|---|---|---|---|
| PE-1 | 0.2 to 0.7 MPa | ø4 nylon tube used for piping | 1645 |

■ Air lamp

| Series | Working pressure range | Features | Page |
|---|---|---|---|
| AL-* | 0.05 to 0.8 MPa | ø4 nylon tube used for piping | 1645 |

■ Compact air lamp

| Series | Working pressure range | Features | Page |
|---|---|---|---|
| SAL-* | 0.25 to 0.8 MPa | Insert into ø4 push-in fitting | 1646 |

## Total air control systems (Gamma system)

Page From P.1649

Total air control systems (Gamma system)

## PLC components

| Series | Type | Page |
|---|---|---|
| PS* | Sequencer | 1652 |
| PR*,PL* | Relay | 1653 |
| PZU | Relay sub-base | 1654 |
| PL* | Integrated (logic element) | 1656 |
| PL*,PZM | Line type (logic element) | 1657 |

Total air control systems (Gamma system)

## Signal control components

Page From P.1658

| Series | Type | Page |
|---|---|---|
| PXV | Air lamp | 1658 |
| PR*,PX* | Element and sensor | 1659 |
| PXB-B | Push button switch and switch body (separated) | 1660 |
| ZB4 | Switch head | 1661 |
| PXC | Miniature limit switch | 1662 |
| PXC | Compact limit switch | 1663 |
| PXC | Limit switch | 1666 |
| ZCK | Rotary head lever actuator | 1667 |

## Gas generator P.1673


Gas generator

### Nitrogen gas extraction unit

■ System

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| NSU | 3/8 | Easily and stably supplying nitrogen gas | 1682 |

■ Unit

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| NS | 3/8,3/4,1 | Extracts nitrogen gas just by supplying compressed air | 1688 |


Gas generator

### Inline oxygen monitor

■ Inline oxygen monitor

| Series | Port size (Rc, G, NPT) | Features | Page |
|---|---|---|---|
| PNA | 3/8 | Measures oxygen concentrations while pressurized | 1702 |

# Main line unit P.1707

Contents/P.1707
Series variation/P.1712

Page From P.1721

Main line unit

## Refrigeration air dryer

### Xeroaqua dryer

■ Xeroaqua dryer GX Series ● Index/P.1731

| Series | Applicable air compressor | Features | Page |
|---|---|---|---|
| GX3200D | 2.2 kW to 55 kW | For assembling device, standard inlet air (35°C) | 1738 |
| GX5200D | 2.2 kW to 55 kW | For direct compressor connection, high temperature inlet air (55°C) | 1742 |

■ Xeroaqua dryer GT9000 Series ● Index/P.1753

| Series | Applicable air compressor | Features | Page |
|---|---|---|---|
| GT9000 (D) | 90 kW to 450 kW | Standard inlet air (40°C), air-cooling | 1760 |
| GT9000W (D) | 90 kW to 450 kW | Standard inlet air (40°C), water-cooling | 1768 |
| GT9000WV2 | 710 kW/960 kW | Standard inlet air (40°C), inverter-controlled water cooling | 1776 |

Contents/P.1707
Series variation/P.1788

Page From P.1785

Main line unit

## Desiccant air dryer

### Heatless dryer

■ Compact heatless dryer

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| HD-** | 75 to 1235 L/min(ANR) | Stable supply of ultra dry air with atmospheric dew point -72°C. | 1792 |

■ Super heatless dryer

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| SHD | 2.5 to 24 $m^3$/min | Purge flow rate is minimized with the energy-saving dew point monitor. | 1796 |

### Manual air dryer

■ Manual air dryer

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| 4001<br>4002 | 280 L/min (ANR) or less | Disposable desiccant, supporting low pressure | 1803 |

# Main line unit P.1707

Contents/P.1707
Series variation/P.1712


Main line unit

## High polymer membrane air dryer

### Super dryer (High polymer membrane air dryer)

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| Super dryer (High polymer membrane air dryer) | | | |
| SD300E-W | 75 to 450 L/min(ANR) | A high capacity dryer that can be used like a filter, producing ultra-dry air easily and stably. Filter/regulator unit is available. | 1814 |
| SD400E-W | | | |
| SD300D-W | 125 to 750 L/min(ANR) | | 1818 |
| SD400D-W | | | |
| SD3000 | 35 to 890 L/min(ANR) | | 1825 |
| SD4000 | | | |
| Super dryer conbimation | | | |
| SU300E-W | 75 to 450 L/min(ANR) | A high capacity dryer that can be used like a filter, producing ultra-dry air easily and stably. Filter/regulator unit is available. | 1814 |
| SU400E-W | | | |
| SU300D-W | 125 to 750 L/min(ANR) | | 1818 |
| SU400D-W | | | |
| SU3000-W | 35 to 890 L/min(ANR) | | 1822 |
| SU4000-W | | | |
| SDM4000 | 1.36 to 12.4 $m^3$/min(ANR) | Large flow rate achieved with polymer separation membrane | 1828 |

Contents/P.1707
Series variation/P.1836


Main line unit

## Main line filter

### Medium main line filter

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| Regular | | | NEW |
| AF2-□P | 4.95 to 24.1 $m^3$/min (ANR) | Solids/oil removing filter | 1845 |
| AF2-□M | | High-perf. solids/oil removing filter | |
| AF2-□X | | Odor removing filter | |
| For oil-prohibited | | | |
| AF4000P | 3.7 to 18.8 $m^3$/min(ANR) | Pre-filter | 1855 |
| AF4000S | | Solid removing filter | |
| AF4000M | | Oil mist removing filter | |
| AF4000X | | Deodorizing filter | |

### Large main line filter

| Series | Processing air flow rate | Features | Page |
|---|---|---|---|
| Regular | | | |
| AF3000P | 16 to 256 $m^3$/min(ANR) | Pre-filter | 1870 |
| AF3000S | | Oil removing filter | 1872 |
| AF3000M | | High-performance oil removing filter | 1874 |
| AF3000X | | Deodorization (activated carbon) filter | 1876 |
| For oil-prohibited | | | |
| AF5000P | 16 to 256 $m^3$/min(ANR) | Pre-filter, stainless steel vessel used | 1884 |
| AF5000S | | Oil removal filter, stainless steel vessel used | 1888 |
| AF5000M | | High-performance oil removal filter, stainless steel vessel used | 1892 |
| AF5000X | | Deodorization (activated carbon) filter, stainless steel vessel used | 1896 |

Contents/P.1707
Series variation/P.1904


Main line unit

## Drain discharger

### Automatic drain

| Series | Compatible compressor | Features | Page |
|---|---|---|---|
| DT3000-W | 0.75 to 15 kW | Lightweight and compact automatic drain discharger | 1908 |
| DT4000-W | 0.75 to 75 kW | | |
| DT3010-W | 15 kW or less | | |
| DT4010-W | 75 kW or less | | |

### Heavy duty drain

| Series | Port size | Features | Page |
|---|---|---|---|
| 5100 | Rc1/2 | Ideal for circuits generating a lot of moisture | 1922 |

### Automatic drain

| Series | Port size | Features | Page |
|---|---|---|---|
| DB1000 | G1/2" | Highly reliable liquid level sensor with compressor discharge flow rate of 1.5 to 1000 $m^3$/min (ANR) is used | 1916 |
| DB3000 | | | |
| DBS1006 | G1/2" | High-reliability level sensor detects the entry of drainage into the pneumatic circuit. | 1919 |

# Guide to model changes

The series listed in this catalog has undergone a model changeover with this new series. Consider this new series when making selections.

■ Electronic pressure switch

## PPD, PPD-A

**Old series**

■ Electronic pressure sensor with digital display

## PPG-D

**New series**

■ Electronic pressure switch/stainless steel diaphragm sensor

## PPD-S

**Old series**

■ Electronic pressure switch with digital display

## PPD3-S

**New series**

■ Medium main line filter

## AF2000

**Old series**

■ Medium main line filter

## AF2

**New series**

# Recommended alternative products

Production and catalog listing of the series below have been discontinued. Select recommended alternative products instead.

| Discontinued | Recommended alternative product | Page |
|---|---|---|
| Refrigeration air dryer<br>GX5200 | **Refrigeration air dryer**<br>**GX5200D Series / GX5255 / GX5275** | **1742** |
| Refrigeration air dryer<br>GK3100 | **Refrigeration air dryer**<br>**GX3200D Series** | **1738** |
| Refrigeration air dryer<br>GX3200 | **Refrigeration air dryer**<br>**GX3200D Series** | **1738** |
| Refrigeration air dryer<br>GX5100 | **Refrigeration air dryer**<br>**GX5200D Series / GX5255 / GX5275** | **1742** |
| Refrigeration air dryer<br>GX5200 | **Refrigeration air dryer**<br>**GX5200D Series / GX5255 / GX5275** | **1742** |
| Refrigeration air dryer<br>GX5200 | **Refrigeration air dryer**<br>**GX5200D Series / GX5255 / GX5275** | **1742** |
| Desiccant air dryer<br>4112 to 4132*C | **Desiccant air dryer**<br>**SHD Series** | **1796** |
| Automatic drain<br>DB3002E | **Automatic drain**<br>**DB3003-D** | **1916** |
| Drain discharger<br>B5102 | **Drain discharger**<br>**DT3000** | **1906** |
| Medium main line filter (1 µm or equivalent class)<br>AF2000P Series | **Medium main line filter (1 µm or equivalent class)**<br>**AF2-□P** | **1845** |
| Medium main lineFilter (class equivalent to 0.01 µ)<br>AF2000M Series | **Medium main line filter (0.01 µm equivalent class)**<br>**AF2- □ M** | **1845** |
| Medium main line filter (deodorizing or equivalent class)<br>AF2000X Series | **Medium main line filter (deodorizing or equivalent class)**<br>**AF2- □ X** | **1845** |
| Large main line filter (3 µm or equivalent class)<br>1113-MD,1114-MD,1123-MD,1128-MD | **Large main line filter (3 µm or equivalent class)**<br>**AF3000P Series** | **1870** |
| Large main line filter (0.3 µm or equivalent class)<br>1113-MD,1151 to 1158-MD | **Large main line filter (0.3 µm or equivalent class)**<br>**AF3000 Series** | **1872** |
| Large main line filter (0.01 µm or equivalent class)<br>1251 to 1258MD | **Large main line filter (0.01 µm or equivalent class)**<br>**AF3000M Series** | **1874** |
| Large main line filter (deodorizing or equivalent class)<br>1251-MX to 1258-MX | **Large main line filter (deodorizing or equivalent class)**<br>**AF3000X Series** | **1876** |

# Recommended alternative products

Model No. change table

| Discontinued | | Recommended alternative product | Page |
|---|---|---|---|
| F.R.L separated (filter 5 µm, 0.3 µm class) | | **F.R.L. modular design (filter 5 µm, 0.3 µm class)** | **106** |
| 1144 | → | **F2000<br>F3000** | |
| 1137 | | **F4000<br>F6000** | |
| F.R.L separated (oil mist filter 0.01 µm class) | | **F.R.L. modular design (oil mist filter 0.01 µm class)** | **116** |
| 1244 | | **M2000** | |
| 1237 | | **M3000<br>M4000** | |
| F.R.L separated (regulator) standard | | **F.R.L. modular design (regulator) standard** | **136** |
| A2000 | | **R2000** | |
| 2001 | | **R4000<br>R6000** | |
| F.R.L separated (regulator) reverse | | **F.R.L. modular design (regulator) reverse** | **144** |
| 2400 | | **R2100** | |
| 2401 | | **R4100<br>R6100** | |
| F.R.L separated (precision regulator) | | **F.R.L. modular design (precision regulator)** | **512** |
| 2100 | | **RPE1000** | |
| F.R.L separated (lubricator, econo-mist) | | **F.R.L. modular design (lubricator)** | **152** |
| 3000E | | **L3000<br>L4000** | |
| 3002E | | **L4000<br>L8000** | |
| F.R.L separated (F.R.L. combination) | | **F.R.L. modular design (F.R.L. combination)** | **34** |
| K61440E | | **C2000** | |
| K61400E | | **C3000<br>C4000<br>C6500** | |
| F.R.L separated (filter/regulator) | | **F.R.L. modular design (filter/regulator)** | **90** |
| A7070 | | **W2000<br>W3000** | |
| 7080 | | **W4000<br>W8000** | |
| 7170-2C<br>7170-2C-J | | **F1000-8-W,RP1000-8,J100-W** | **106,518,347** |
| 7170-3C<br>7170-3C-J | | **F1000-8-W,RP1000-8,J100-W,A100-10-W** | **106,518,350** |
| Drain discharger | | **Drain discharger** | **1906** |
| B5102 | | **DT3000** | |
| Regulator for water | | **Regulator for water** | **430** |
| B2519 | | **WR** | |
| F.R.L separated (lubricator, atomist) | | **We regret that no alternative product is available.** | **-** |
| 3500/3502/3503 | | | |
| F.R.L separated (lubricator, auto-fill) | | | |
| 3002E-V | | | |
| F.R.L separated (lubricator with check valve) | | | |
| 3202 | | | |
| Recycle lube | | | |
| 1644/1637 | | | |
| Posi-Lube | | | |
| 3611 | | | |
| Oil recovery pump | | | |
| 6520 | | | |

# Guide to CKD's CAD data

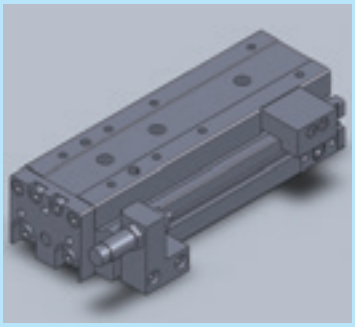
## How to use CKD's CAD data

CKD's CAD data is provided as follows for your use in CAD design.

### 2D CAD data

Types of compatible CAD
· DXF
· Dedicated CAD

### 3D CAD data



Types of compatible CAD
· DXF
· IGES
· SAT
· Parasolid
· Dedicated CAD

## Homepage

Catalog PDFs and CAD data of CKD products are available for download.

https://www.ckd.co.jp/en/

**For PDF and DXF data of the general catalogs**

CKD Website Component Products > Materials: Download digital catalogs/catalog PDFs

**For PDF and DXF data of new products**

CKD Website Component Products > Search for a product from the product list

**For 2D/3D CAD data**

CKD Website Component Products > Materials: Download 2D CAD data/3D CAD data

# Guide to the model selection system

## How to use the model selection system

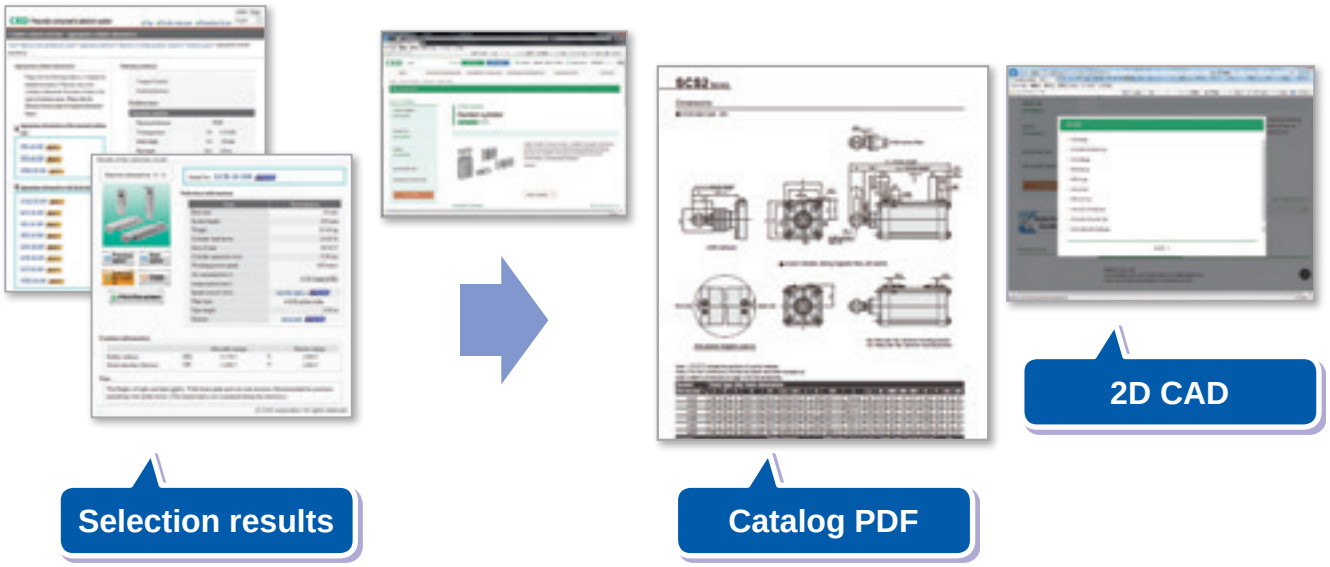
The CKD system supports selection of the following items.
For your use during model selection and design.

### Available on our website

This system is used to select products according to your application and working conditions.


*Downloading Software may not be possible due to your security settings. If that is the case, contact CKD.

## Selection results are linked with catalog PDFs and CAD data!




## Registration not required - available at any time!

A variety of services such as CKD product catalogs, PDFs, CAD data, and model selection are available. Feel free to try them.

https://www.ckd.co.jp/en/

# 3 Search by specifications and variation

## Copper and PTFE free

Pneumatic components for cathode ray tube manufacturing lines.

| Series/model series name | | | Port size | Remarks | Page |
|---|---|---|---|---|---|
| F.R.L. unit | C**00-W -TP6 | F.R.L. combination | Rc1/8 to Rc1 | | 312 |
| | C**10-W -TP6 | W.L. combination | Rc1/8 to Rc1 | | 312 |
| | C**20-W -TP6 | F.R. combination | Rc1/8 to Rc1 | | 312 |
| | C**30-W -TP6 | F.M.R. combination | Rc1/8 to Rc1 | | 312 |
| | C**40-W -TP6 | W.M. combination | Rc1/8 to Rc1 | | 312 |
| | C**50-W -TP6 | R.M. combination | Rc1/8 to Rc1 | | 312 |
| | C*060-W | F.M. combination | Rc1/8 to Rc1 | Copper and PTFE free as standard | 72 |
| | C*070-W | F.F.M. combination | Rc1/4 to Rc1 | Copper and PTFE free as standard | 78 |
| | W*000-W -TP6 | Filter/regulator | Rc1/8 to Rc1 | | 313 |
| | W*100-W -TP6 | Reverse filter/regulator | Rc1/8 to Rc1 | | 314 |
| | F*000-W | Air filter | Rc1/8 to Rc1 | Copper and PTFE free as standard (Refer to model No.) | 315 |
| | M*000-W | Oil mist filter | Rc1/8 to Rc1 | Copper and PTFE free as standard (Refer to model No.) | 316 |
| | R*000-W -TP6 | Regulator | Rc1/8 to Rc1 | | 317 |
| | R*100-W -TP6 | Reverse regulator | Rc1/8 to Rc1 | | 318 |
| | L*000-W | Lubricator | Rc1/8 to Rc1 | Copper and PTFE free as standard | 319 |
| | V*000-W | Residual pressure exhaust valve | Rc1/8 to Rc1/2 | Copper and PTFE free as standard | 182 |
| | P*100-W -P6 | Mechanical pressure switch (reed compact pressure switch) | Rc1/8 to Rc1 | | 168 |
| Pneumatic auxiliary components | G49D -P6 | General-use pressure gauge | R1/8 | | 320 |
| | G59D -P6 | General-use pressure gauge | R1/4 | | 320 |
| | FA*31 | Exhaust cleaner | Rc3/8 to Rc2 | Copper and PTFE free as standard | 778 |
| | SC -* | Miniature speed controller | M3,M5 | Copper and PTFE free as standard | 742 |
| | SC3W -P6 | Speed controller, elbow | M3 to R1/2 | | 716 |
| | SC3U -P6 | Speed controller, universal | M3 to R1/2 | | 720 |
| | SC1 -P6 | Speed controller | Rc1/8 to Rc1/2 | | 748 |
| | SLW | Silencer | R1/8 to R1/2 | Copper and PTFE free as standard | 764 |
| | SL | Silencer | R1/4 to R1 | Copper and PTFE free as standard | 764 |
| | F | Miniature fitting | M3 to Rc(R)1/8 | Copper and PTFE free as standard | 816 |
| | GW -P6 | Fitting | M3 to R1/2 | | 824 |
| | F.U.NU.KX.SR | Tube | ø3.2 to ø15 | Copper and PTFE free as standard | 906 |

# Ozone-proof specification product

| | Series/model series name | | Port size | Remarks | Page |
|---|---|---|---|---|---|
| F.R.L. unit | W*000-W -P11 | Filter/regulator | Rc1/8 to Rc1/2 | | Ending Page 10 |
| | W*100-W -P11 | Reverse filter/regulator | Rc1/8 to Rc1/2 | | Ending Page 11 |
| | F*000-W | Air filter | Rc1/8 to Rc1 | Supported as standard | 106 |
| | R*000-W -P11 | Regulator | Rc1/8 to Rc1/2 | | Ending Page 12 |
| | R*100-W -P11 | Reverse regulator | Rc1/8 to Rc1 | | Ending Page 13 |
| | RB500 -P11 | Compact regulator | Push-in fitting ø4, ø6 | | Ending Page 14 |
| | MNRB500 | Block manifold regulator | Push-in fitting ø4, ø6, ø8 | | Ending Page 15 |
| | V*000-W | Residual pressure exhaust valve | Rc1/8 to Rc1/2 | Supported as standard | 182 |
| | VFA | Vacuum filter and regulator | Rc1/8 to Rc1/2 | Supported as standard | 530 |
| | B2019 -P11 | Regulator | Rc1/8,Rc1/4 | | Ending Page 16 |
| | 2415 -P11 | Reverse regulator | Rc3/4,1,1 1/2 | | Ending Page 17 |
| | ABP-P11 | Air booster | Rc1/2 | Made-to-order product | 678 |
| | P*100-W | Mechanical pressure switch<br>(reed compact pressure switch) | Rc1/8 to Rc1/2<br>Rc1/8 to Rc1/2 | Supported as standard | 168 |
| | P4000-W | Pressure switch | | Supported as standard | 166 |
| Pneumatic auxiliary components | SC3W-P11 | Speed controller, elbow | M3 to R1/2 | | 716 |
| | SC1-X1 | Speed controller, medium bore size | Rc1/8 to Rc1/2 | | 748 |
| | SC3R -P11 | Speed controller direct piping/elbow | M5 to Rc1/2 | | 740 |
| | SLM | Miniature silencer | M3,M5 | Supported as standard | 771 |
| | SLW | Silencer | Rc1/8 to Rc1/2 | Supported as standard | 764 |
| | F -P11 | Miniature fitting | M3 to Rc1/8 | | 816 |
| | GW -P11 | Fitting | M3 to R1/2 | | 824 |
| | ZW -P11 | Fitting (stainless steel) | M5 to R1/2 | | 838 |
| | ZJ | Tightening fitting stainless steel series | Rc1/8 to Rc1/2 | Supported as standard | 857 |
| | F.U.KX | Tube | ø3.2 to ø15 | Supported as standard | 906 |

Note: For details, refer to “Ozone-proof” on Ending Page 5.

# 3 Search by specifications and variation

## Specifications for rechargeable battery

NEW Pneumatic components exclusively for materials which can be used in the rechargeable battery manufacturing process.

| | Series/model series name | | Port size | Remarks | Catalog No./page |
|---|---|---|---|---|---|
| F.R.L. unit | 2QV | Quick valve | ø4 to ø12 | | CC-1226A<br>Refer to "Components for rechargeable battery production P4* Series" catalog. |
| | APS -P4 | Compact mechanical pressure switch | Rc1/8 | | |
| | EVD -P4 | Electro pneumatic regulator | Rc1/4,Rc3/8 | | |
| | F*000 -W -P4 | Filter | Rc1/8 to Rc1 | | |
| | G40D -P4 | Pressure gauge with safety marker | R1/8 | | |
| | G41D -P4 | Pressure gauge with limit marker | R1/8,R1/4 | | |
| | G49D -P4 | General-use pressure gauge | R1/8 | | |
| | G59D -P4 | General-use pressure gauge | R1/4 | | |
| | M*000 -W -P4 | Oil mist filter | Rc1/8 to Rc1 | | |
| | P4100 -P4 | Pressure switch | R1/4 to Rc1/2 | | |
| | R*000 -W -P4 | Regulator | Rc1/8 to Rc1 | | |
| | R*100 -W -P4 | Reverse regulator | Rc1/8 to Rc1 | | |
| | RB500 -P4 | Compact regulator | ø4/ø6 | | |
| | RP*000 -P4 | Precision regulator | Rc1/4,Rc3/8 | | |
| | V30*0 -P4 | Residual pressure exhaust valve | Rc1/4 to Rc1/2 | | |
| | V6010 -P4 | Residual pressure exhaust valve | Rc3/4,Rc1 | | |
| | VFA*000 -P4 | Vacuum filter and regulator | Rc1/8 to Rc1/2 | | |
| | VRA2000 -P4 | Vacuum regulator | Rc1/4,Rc3/8 | | |
| | W*000 -W -P4 | Filter/regulator | Rc1/8 to Rc1 | | |
| | W*100 -W -P4 | Reverse filter/regulator | Rc1/8 to Rc1 | | |
| Pneumatic auxiliary components | DSC -P4 | Speed controller with adjusting dial | M5,R1/8 to R1/2 | | |
| | ET | Fluoro resin tube | O.D.: 4, 6, 8, 10, 12 mm | | |
| | PFH,PFS -P4 | Polyolefin tube | O.D.: 4, 6, 8, 10, 12 mm | | |
| | SC3W -P4 | Speed controller, elbow | M3,M5,R1/8 to R1/2 | | |
| | SC3F -P4 | Speed controller, elbow | M3,M5,R1/8 to R1/2 | | |
| | SCL2 -P4 | Speed controller Line type | ø4 to ø10 | | |
| | SCD2 -P4 | In/out speed controller Inline | ø4 to ø10 | | |
| | SCLF -P4 | PP type Speed controller Line type | ø4 to ø12 | | |
| | ZSF -P4 | Fitting (polyprene resin) | ø4 to ø12 | | |
| | ZW -P4 | Fitting (stainless steel) | ø4 to ø12 | | |
| Press sensor Device | PPX -P40 | Digital pressure sensor | Rc1/8,M5 | | |
| Main line unit | SD*00D/E -W -P4 | Super dryer (High polymer membrane air dryer) | Rc3/8 | | |
| | SD*000 -W -P4 | Super dryer (High polymer membrane air dryer) | Rc3/8,Rc1/2 | | |
| | SU*00D/E -W -P4 | Super dryer (High polymer membrane air dryer) | Rc3/8 | | |
| | SU*000 -W -P4 | Super dryer (High polymer membrane air dryer) | Rc3/8,Rc1/2 | | |

# Clean-room specifications

Anti-dust generation pneumatic components usable in clean rooms.

| | Series/model series name | | Port size | Remarks | Catalog No./page |
|---|---|---|---|---|---|
| F.R.L. unit | W*000-W -P7* | Filter/regulator | Rc1/8 to Rc1/2 | | CB-033SA* |
| | W*100-W -P7* | Reverse filter/regulator | Rc1/8 to Rc1/2 | | |
| | F *000-W -P7* | Air filter | Rc1/8 to Rc1 | | |
| | M*000-W -P7* | Oil mist filter | Rc1/8 to Rc1 | | |
| | R *000-W -P7* | Regulator | Rc1/8 to Rc1 | | |
| | R *100-W -P7* | Reverse regulator | Rc1/8 to Rc1 | | |
| | FCS500 -P9* | Inline clean filter | ø4 to ø8,Rc1/8,Rc1/4 | | |
| | FCS1000-P9* | Inline clean filter | ø8 to ø12,Rc1/4,Rc3/8,Rc1/4,Rc3/8 | | |
| | FAC | Clean exhaust filter | ø4 to ø10,R1/8 to R1/2,Rc3/8,Rc1/2 | | |
| | RC2000 -P90 | Clean regulator | Rc1/4 to Rc1/2 | | |
| | 2619 -P80/P9* | Regulator | Rc1/8,Rc1/4 | | |
| | RP*000 -P70 | Precision regulator | Rc1/4,Rc3/8 | | |
| | G49D-6 -P70/P9* | General-use pressure gauge | R1/8 | | |
| | G59D-8 -P70/P9* | General-use pressure gauge | R1/4 | | |
| | GA400-8 -P90 | Differential pressure gauge | Rc1/4 | | |
| Pneumatic auxiliary components | F -P80 | Miniature fitting | M3 to Rc1/8 | | CB-033SA* |
| | GW -P7*/P80 | Fitting | M3 to R1/2 | | |
| | GWJ -P7*/P80 | Fitting small size | M3 to Rc(R)1/8 | | |
| | ZW -P80 | Fitting (stainless steel) | M5 to R1/2 | | |
| | ZJ -P90 | Fitting (stainless steel) series | R1/8 to R1/2 | | |
| | SC3R -P7* | Speed controller direct piping/elbow | M5 to Rc1/2 | | |
| | SC3W -P7* | Speed controller, elbow | M3 to R1/2 | | |
| | SC1 -P7* | Speed controller, medium bore size | Rc1/8 to Rc1/2 | | |
| | SCL2 -P7* | Speed controller Line type (with push-in fitting) | ø1.8 to ø12 | | |
| | SCD2 -P7* | In/out speed controller Inline (with push-in fitting) | ø1.8 to ø12 | | |
| | SCL2 -N -P7*/P80 | Needle valve (with push-in fitting) | ø4 to ø8 | | |
| | CHL -P7* | Compact check valve with push-in fitting | M5,ø4,ø6 | | |
| | CHV2 -P7*/P80 | Check valve | Rc1/8 to Rc1 1/2 | | |
| | 2QV -P70 | Quick valve | ø4 to ø12,R1/8 to R1/2 | | |
| | UP -9102 -P80 | Fiber tube | ø1.8 | | |
| | UP -9*** -P80 | Antistatic tube | ø3.2 to ø12 | | |
| | NU -P80 | New urethane tube | ø3.2 to ø12 | | |

* Refer to “Components for clean room specifications” in catalog No. CB-033SA.

# 3 Search by specifications and variation

## Clean-room specifications

Anti-dust generation pneumatic components usable in clean rooms.

| Series/model series name | | | Port size | Remarks | Catalog No./page |
|---|---|---|---|---|---|
| Press sensors | PPD3 -P7*/P8* | Electronic pressure switch | Rc1/8, ø6 push-in fitting | | CB-033SA* |
| | PPD3 -S -P7*/P8*/P9* | | | | |
| | PPE -P70/P80 | Compact electronic pressure switch | R1/8, ø6 push-in fitting | | |
| Sensor/ Controller | FSM3 -P70/P80 | Small size flow rate sensor RAPIFLOW | ø1.8,ø4,ø6,Rc1/8, Rc1/4,M5 | | |
| Electro pneumatic regulator | EV2000 -P7*/P8* | Electro pneumatic regulator | Rc1/4 | | |
| | EV0000 -P7*/P8* | | M5 | | |
| | EVS -P7*/P8* | | M5 | | |
| | EV2100V-P70 | Electro pneumatic regulator | Rc1/4 | | |
| | MEVT -P7*/P8* | Thin electro pneumatic regulator | ø4, ø6 push-in fitting | | |

* Refer to “Components for clean room specifications” in catalog No. CB-033SA.

## Electronic pneumatic components (proportional pressure control)

Proportional pressure control is the generic name for electronic pneumatic pressure application components.

| Series/model series name | | | Properties | Remarks | Page |
|---|---|---|---|---|---|
| Pressure control | EVD-1*00 | Digital electro pneumatic regulator | Max. flow rate 400 ( ℓ /min) | Pressure control | 586 |
| | EVD-3*00 | Digital electro pneumatic regulator | Max. flow rate 1500 ( ℓ /min) | Pressure control | 590 |
| | EVR | Electro pneumatic regulator | Max. flow rate 800 ( ℓ /min) | Pressure control | 610 |
| | EV2100V | Electro pneumatic regulator | Max. flow rate 120/150 ( ℓ /min) | Pressure control (vacuum) | 625 |
| | EVS2 | Electro pneumatic regulator | Max. flow rate 2/6 ( ℓ /min) | Pressure control | 622 |
| | MEVT | Thin electro pneumatic regulator | Max. flow rate 2/6 ( ℓ /min) | Pressure control | 638 |
| Pressure detection | PPX | Electronic pressure switch (pressure switch) | Pneumatics/vacuum pressure | With sensor, amp, display integr. | 1148 |
| | PPG-D | | Pneumatics/vacuum pressure | With sensor, amp, display integr. | 1192 |
| | PSW | | Pneumatics/vacuum pressure | With sensor, amp, display non-integr. | 1212 |
| | PPE | | Pneumatics/vacuum pressure | With sensor, amp, display non-integr. | 1202 |
| | PPD3 | | Pneumatics/vacuum pressure | With sensor, amp, display non-integr | 1178 |

# Vacuum components

These are pneumatic components for vacuum equipment.

| | Series/model series name | | Port size/properties | Remarks | Catalog No./page |
|---|---|---|---|---|---|
| Filter/regulator | VFA1000,3000,4000 | Vacuum filter and regulator | Rc1/8 to Rc1/2 | | 530 |
| | K-005 | Vacuum filter | | | 1332 |
| | VRA2000 | Vacuum regulator | Rc1/4,3/8 | | 536 |
| | EV2100V | Electro pneumatic regulator | Max. flow rate 120/150 ($mm^2$) | Pressure control (vacuum) | 625 |
| For vacuum ejector/vacuum unit, vacuum pad and related components for vacuum, refer to “Vacuum system components SELVACS” in catalog (No.CC-796A). | | | | | CC-796A |
| Pressure sensors | APA1 | Air sensor | | | 1318 |
| | DPS | SEPEL switch | | | 1330 |
| | PPX | Electronic pressure switch (pressure switch) | Pneumatics/vacuum pressure | With sensor, amp, display integr. | 1148 |
| | PPG-D | | Pneumatics/vacuum pressure | With sensor, amp, display integr. | 1192 |
| | PSW | Electronic pressure switch (pressure switch) | Pneumatics/vacuum pressure | With sensor, amp, display non-integr. | 1212 |
| | PPE | | Pneumatics/vacuum pressure | With sensor, amp, display non-integr. | 1202 |
| | PPD3 | | Pneumatics/vacuum pressure | With sensor, amp, display non-integr | 1178 |

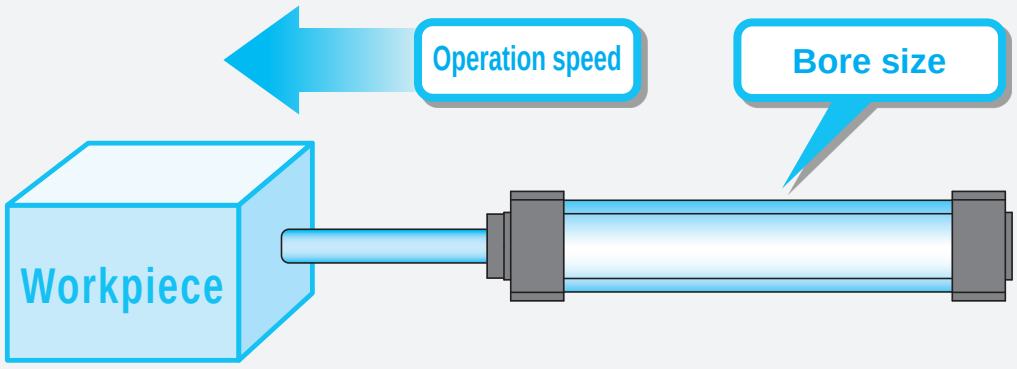
# System selection

Even beginners can easily make a model selection.

## How to make a system selection

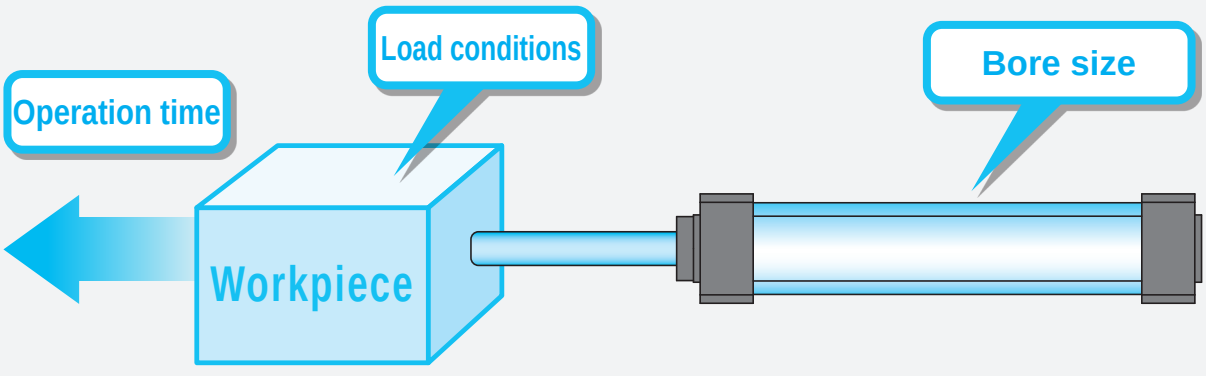
An overview of the selection is available
with the following two conditions.

**1** When selecting peripheral pneumatic components, having determined cylinder bore size and operation speed




To Intro Page 42

**2** When selecting peripheral pneumatic components, having determined bore size from cylinder load and operating time




To Intro Page 53

# 1 Selecting from cylinder bore size and operation speed

**STEP 1**

[Confirming conditions]
Check cylinder tube bore size and cylinder operation speed

Select the theoretical reference speed

From Table 1

Whether the cylinder bore size and cylinder being used are driven with relative high or low speed is determined as a condition.

Using Table 1 as a reference, select the theoretical reference speed of the cylinder.

(1) Bore size ø□
(2) Operation speed Low speed/medium speed/ high speed/ultra-high speed

↓

**STEP 2**

Select appropriate fluid control components from bore size and theoretical reference speed, and select [required flow rate]

From Table 2

Refer to Table 2 and select appropriate fluid control components (valve, speed controller, silencer, piping) and [required flow rate] for corresponding cylinder bore size and theoretical reference speed.

↓

**STEP 3**

Select the clean air system components

From Table 3

Refer to Table 3, and select a component with a [max. flow rate] higher than the [Required flow rate] value.
When controlling multiple cylinders with a set of clean air system components, select the clean air system component having a [max. flow rate] higher than the [total of required flow rates].

* The relationship of the cylinder bore size and speed for the valve (4G Series/4K Series) is shown in a graph.
"A combination of the valve and the cylinder's standard system" (Example) Intro Pages 51 to 52

(1) The cylinder average speed is obtained from the combination of the valve and piping system. It is expressed as the cylinder's piston speed calculated by dividing the stroke length by the time that the piston rod takes from start to end of movement with the cylinder rod installed facing upward. When the load factor is 50%, the average speed should be approximately the cylinder's piston speed multiplied by 0.5. (Refer to Intro Page 55 for the relation of load factor and theoretical reference speed. )
(2) The cylinder theoretical reference speed is the value of when one cylinder moves independently.
(3) The valve's effective cross-sectional area used in the calculation for Table 2 is the 2-position value.
(4) This selection guide is for reference. With the CKD sizing program, confirm conditions to be actually used.

# System selection

## STEP1 Conditions confirmation/theoretical reference speed selection

As a condition, it is predetermined whether bore size and cylinder are to be operated at a relatively high speed or at a relatively low speed.

Table 1

| Degree of cylinder speed | Low speed | Medium speed | High speed | Ultra high speed |
|---|---|---|---|---|
| Theoretical reference speed (mm/s) | 250 | 500 | 750 | 1,000 |

## STEP2 Fluid control components selection

Select appropriate fluid control components (valve, speed controller, silencer, piping) and [required flow rate] for bore size and theoretical reference speed selected from Table 1.

Table 2

| Bore size (mm) | Theoretical reference speed (mm/s) Note) | Required flow rate (ℓ/min) (ANR) | Required composite effective cross-sectional area ($mm^2$) | Valve |
|---|---|---|---|---|
| | | | | Single solenoid |
| ø6 | 500 | 5 | 0.1 | MN4E010<br>4SA010/4SB010 |
| ø10 | 500 | 14 | 0.2 | MN4E010<br>4SA010/4SB010 |
| ø16 | 500 | 36 | 0.5 | MN4E010<br>4SA010/4SB010 |
| ø20 | 250 | 29 | 0.5 | 4KA110/4KB110<br>4GA110R/4GB110R |
| | 500 | 56 | 0.9 | 4KA110/4KB110 |
| | 750 | 84 | 1.4 | 4GA110R/4GB110R |
| | 1,000 | 112 | 1.8 | |
| ø25 | 250 | 44 | 0.8 | 4KA110/4KB110 |
| | 500 | 88 | 1.4 | 4GA110R/4GB110R |
| | 750 | 132 | 2.1 | 4KB110/4GB110R |
| | 1,000 | 175 | 2.8 | 4KB210/4GB210R |
| ø32 | 250 | 73 | 1.3 | 4KA110/4KB110<br>4GA110R/4GB110R |
| | 500 | 143 | 2.9 | 4KA210/4KB210 |
| | 750 | 215 | 3.5 | 4GA210R/4GB210R |
| | 1,000 | 286 | 4.6 | |

Note) The above table indicates theoretical reference speed at cylinder bore size.
Refer to the individual specifications of each model for the working piston speed range.

*1: Refer to Intro Page 59 for piping specifications.

| Suitable control components | | | | |
|---|---|---|---|---|
| | | Pneumatic auxiliary components | | Piping *1 |
| | Double solenoid | Speed controller | Silencer | Piping (between valve and cylinder) |
| | MN4E020<br>4SA020/4SB020 | SC3W-M5-4<br>DSC-C-M5-4 | SLM-M5,SLM-M3 | ø4 x ø2.5 nylon tube |
| | MN4E020<br>4SA020/4SB020 | SC3W-M5-4<br>DSC-C-M5-4 | SLM-M5,SLM-M3 | ø4 x ø2.5 nylon tube |
| | MN4E020<br>4SA020/4SB020 | SC3W-M5-4<br>DSC-C-M5-4 | SLM-M5,SLM-M3 | ø4 x ø2.5 nylon tube |
| | 4KA120/4KB120<br>4GA120R/4GB120R | SC3W-6-6/SCL2-06-H66<br>DSC-(C)-6-6/DSC-S1-06-H66 | SLM-M5,SLW-6A | ø6 x ø4 nylon tube |
| | 4KA120/4KB120<br>4GA120R/4GB120R | SC3W-6-6<br>DSC-(C)-6-6<br>SCL2-06-H66<br>DSC-S1-06-H66 | SLM-M5,SLW-6A | ø6 x ø4 nylon tube |
| | 4KA120/4KB120<br>4GA120R/4GB120R | SC3W-6-6<br>DSC-(C)-6-6<br>SCL2-06-H66<br>DSC-S1-06-H66 | SLM-M5,SLW-6A | ø6 x ø4 nylon tube |
| | 4KB120/4GB120R | SC1-6<br>SCL2-08-H88 | SLW-6A,SL-M5 | ø8 x ø5.7 nylon tube |
| | 4KB220/4GB220R | DSC-S1-08-H88 | SLW-6S,SLW-6A | ø8 x ø5.7 nylon tube |
| | 4KA120/4KB120<br>4GA120R/4GB120R | SC3W-6-6/SCL2-06-H66<br>DSC-(C)-6-6/DSC-S1-06-H66 | SLM-M5,SLW-6A | ø6 x ø4 nylon tube |
| | 4KA220/4KB220<br>4GA220R/4GB220R | SC1-6<br>SCL2-08-H88<br>DSC-S1-08-H88 | SLW-6S,SLW-6A | ø8 x ø5.7 nylon tube |

# System selection

| Bore size (mm) | Theoretical reference speed (mm/s) Note) | Required flow rate (ℓ/min) (ANR) | Required composite effective cross-sectional area ($mm^2$) | Valve<br>Single solenoid |
|---|---|---|---|---|
| ø40 | 250 | 110 | 1.7 | |
| | 500 | 230 | 3.3 | 4KA210/4KB210<br>4GA210R/4GB210R |
| | 750 | 340 | 5.0 | |
| | 1,000 | 450 | 6.6 | |
| ø50 | 250 | 180 | 2.6 | 4KA210/4KB210<br>4GA210R/4GB210R |
| | 500 | 350 | 5.2 | |
| | 750 | 530 | 7.7 | 4GA310R/4GB310R |
| | 1,000 | 710 | 10.4 | 4GA310R/4GB310R<br>4F310/4F410 |
| ø63 | 250 | 280 | 4.1 | 4KA210/4KB210<br>4GA310R/4GB310R |
| | 500 | 560 | 8.2 | 4GA310R/4GB310R |
| | 750 | 840 | 12.3 | 4KA310/4KB310<br>4F310/4F410 |
| | 1,000 | 1,100 | 16.4 | 4F510 |
| ø80 | 250 | 450 | 6.6 | 4KB210/4F210-08 |
| | 500 | 910 | 13.2 | 4F410-10/4F310-10<br>4KB310-10 |
| | 750 | 1,400 | 19.8 | 4KB410-15 |
| | 1,000 | 1,800 | 26.4 | 4F510-15 |
| ø100 | 250 | 710 | 10.3 | 4GA410-10/4GB410-10<br>4F410-10/4F310-10<br>4KB310-10 |
| | 500 | 1,400 | 20.6 | 4GB410-15 |
| | 750 | 2,100 | 30.9 | 4KB410-15/4F510-15 |
| | 1,000 | 2,800 | 41.2 | 4F610-20 |

Note) The above table indicates theoretical reference speed at cylinder bore size.
Refer to the individual specifications of each model for the working piston speed range.

*1: Refer to Intro Page 59 for piping specifications.

| Suitable control components | | | | |
|---|---|---|---|---|
| | | Pneumatic auxiliary components | | Piping *1 |
| | Double solenoid | Speed controller | Silencer | Piping (between valve and cylinder) |
| | | SC3W-6-6<br>SCL2-06-H66<br>DSC-(C)-6-6<br>DSC-S1-06-H66 | SLM-M5,SLW-6A | ø6 x ø4 nylon tube |
| | 4KA220/4KB220<br>4GA220R/4GB220R | SC1-6<br>SCL2-08-H88<br>DSC-8-8<br>DSC-S1-08-H88 | SLW-6S,SLW-6A | ø8 x ø5.7 nylon tube |
| | | SC1-8 | SLW-8A,SLW-6A | ø10 x ø7.2 nylon tube |
| | | SC1-8 | SLW-8A,SLW-8S | ø10 x ø7.2 nylon tube |
| | 4KA220/4KB220<br>4GA220R/4GB220R | SC1-6<br>SCL2-08-H88<br>DSC-S1-08-H88 | SLW-6A,SLW-6S | ø8 x ø5.7 nylon tube |
| | | SC1-8<br>SCL2-10-H1010<br>DSC-S1-10-H1010 | SLW-8A,SLW-6A | ø10 x ø7.2 nylon tube |
| | 4GA320R/4GB320R | | SLW-8A,SLW-8S | ø10 x ø7.2 nylon tube |
| | 4GA320R/4GB320R<br>4F320/4F420 | SC1-10 | SLW-10A | ø15×ø11.5 nylon tube<br>or Rc3/8 steel pipe |
| | 4KA220/4KB220<br>4GA320R/4GB320R | SC1-6<br>SCL2-08-H88<br>DSC-S1-08-H88 | SLW-6S,SLW-6A | ø8 x ø5.7 nylon tube |
| | 4GA320R/4GB320R | SC1-8<br>SCL2-10-H1010<br>DSC-S1-10-H1010 | SLW-8A,SLW-8S | ø10 x ø7.2 nylon tube |
| | 4KA320/4KB320<br>4F320/4F420 | SC1-10 | SLW-10A | ø15×ø11.5 nylon tube<br>or, Rc3/8 steel pipe |
| | 4F520 | SC1-15 | SLW-15A | Rc1/2 steel pipe |
| | 4KB220/4F220-08 | SC1-8<br>SCL2-10-H1010<br>DSC-S1-10-H1010 | SLW-8A,SLW-8S | ø10 x ø7.2 nylon tube |
| | 4F420-10/4F320-10<br>4KB320-10 | SC1-10 | SLW-10A | ø15×ø11.5 nylon tube<br>or, Rc3/8 steel pipe |
| | 4KB420-15<br>4F520-15 | SC1-15 | SLW-15A | Rc1/2 steel pipe |
| | | SC-20A | SLW-15A | Rc1/2 steel pipe |
| | 4GA420-10/4GB420-10<br>4F420-10/4F320-10<br>4KB320-10 | SC1-10 | SLW-10A | ø15 x ø11.5 nylon tube<br>or Rc3/8 steel pipe |
| | 4GB420-15<br>4KB420-15/4F520-15 | SC1-15 | SLW-15A | Rc1/2 steel pipe |
| | | SC-20A | SLW-15A | Rc1/2 steel pipe |
| | 4F620-20 | SC-20A | SL-20A,SLW-20S | Rc3/4 steel pipe |

# System selection

| Bore size (mm) | Theoretical reference speed (mm/s) Note) | Required flow rate (ℓ/min) (ANR) | Required composite effective cross-sectional area ($mm^2$) | Valve |
|---|---|---|---|---|
| | | | | Single solenoid |
| ø125 | 250 | 1,100 | 16.1 | 4GB410-15<br>4KB410-15/4F510-15 |
| | 500 | 2,200 | 32.2 | |
| | 750 | 3,300 | 48.2 | 4F610-20 |
| | 1,000 | 4,400 | 64.4 | |
| ø140 | 250 | 1,400 | 20.2 | 4GB410-15<br>4KB410-15/4F510-15 |
| | 500 | 2,800 | 40.4 | 4F610-20 |
| | 750 | 4,200 | 60.5 | |
| | 1,000 | 5,500 | 80.8 | 4F710-25 |
| ø160 | 250 | 1,800 | 26.3 | 4GB410-15<br>4KB410-15/4F510-15 |
| | 500 | 3,600 | 52.6 | 4F610-20 |
| | 750 | 5,400 | 79.0 | 4F710-20 |
| | 1,000 | 7,200 | 104.7 | - |
| ø180 | 250 | 2,300 | 33.3 | 4KB410-15<br>4F510-15 |
| | 500 | 4,600 | 66.6 | 4F710-20 |
| | 750 | 6,900 | 100.0 | 4F710-25 |
| | 1,000 | 9,200 | 132.5 | - |
| ø200 | 250 | 2,800 | 41.2 | 4F610-20 |
| | 500 | 5,600 | 82.4 | 4F710-25 |
| | 750 | 8,400 | 122.7 | - |
| | 1,000 | 11,200 | 163.6 | - |
| ø250 | 250 | 4,400 | 64.3 | 4F710-20 |
| | 400 | 7,000 | 103.0 | 4F710-25 |
| | 750 | 13,200 | 191.7 | - |
| | 1,000 | 17,600 | 255.6 | - |

*1: Refer to Intro Page 59 for piping specifications.

| Suitable control components | | | | |
|---|---|---|---|---|
| | | Pneumatic auxiliary components | | Piping *1 |
| | Double solenoid | Speed controller | Silencer | Piping (between valve and cylinder) |
| | 4GB420-15<br>4KB420-15/4F520-15 | SC1-15 | SLW-15A | Rc1/2 steel pipe |
| | | SC-20A | SLW-15A | Rc1/2 steel pipe |
| | 4F620-20 | SC-20A | SL-20A,SLW-20S | Rc3/4 steel pipe |
| | | SC-20A | SL-20A | Rc3/4 steel pipe |
| | 4GB420-15<br>4KB420-15/4F520-15 | SC1-15 | SLW-15A | Rc1/2 steel pipe |
| | 4F620-20 | SC-20A | SL-20A,SLW-20S | Rc3/4 steel pipe |
| | | | SL-20A | Rc3/4 steel pipe |
| | 4F720-25 | SC-20A | SL-25A | Rc1 steel pipe |
| | 4GB420-15<br>4KB420-15/4F520-15 | SC-20A | SLW-15A | Rc1/2 steel pipe |
| | 4F620-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | - | - | - | - |
| | 4KB420-15<br>4F520-15 | SC-20A | SLW-15A | Rc1/2 steel pipe |
| | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | 4F720-25 | SC-25A | SL-25A | Rc1 steel pipe |
| | - | - | - | - |
| | 4F620-20 | SC-20A | SL-20A,SLW-20S | Rc3/4 steel pipe |
| | 4F720-25 | SC-25A | SL-25A | Rc1 steel pipe |
| | - | - | - | - |
| | - | - | - | - |
| | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | 4F720-25 | SC-25A | SL-25A | Rc1 steel pipe |
| | - | - | - | - |
| | - | - | - | - |

# System selection

## STEP 3 Clean air system components selection

Select a component with a max. flow rate equal to or higher than the [required flow rate] value in Table 2.
When controlling multiple cylinders with a single set of clean air system components, select the clean air system component with [max. flow rate] higher than [total required flow rates].

Table 3

| F.R.L kit | | | F.R. unit | | |
|---|---|---|---|---|---|
| Model No. | Port size | Max flow ℓ/min (Atm press conv value) | Model No. | Port size | Max flow ℓ/min (Atm press conv value) |
| C1000-6-W | Rc1/8 | 450 | W1000-6-W | Rc1/8 | 800 |
| C1000-8-W | Rc1/4 | 630 | W1000-8-W | Rc1/4 | 1,150 |
| C2000-8-W | Rc1/4 | 1,200 | W2000-8-W | Rc1/4 | 1,500 |
| C2000-10-W | Rc3/8 | 1,700 | W2000-10-W | Rc3/8 | 2,000 |
| C2500-8-W | Rc1/4 | 1,200 | W3000-8-W | Rc1/4 | 2,150 |
| C2500-10-W | Rc3/8 | 1,700 | W3000-10-W | Rc3/8 | 2,430 |
| C3000-8-W | Rc1/4 | 1,280 | W4000-8-W | Rc1/4 | 2,500 |
| C3000-10-W | Rc3/8 | 1,750 | W4000-10-W | Rc3/8 | 4,350 |
| C4000-8-W | Rc1/4 | 1,430 | W4000-15-W | Rc1/2 | 4,750 |
| C4000-10-W | Rc3/8 | 2,400 | W8000-20-W | Rc3/4 | 10,000 |
| C4000-15-W | Rc1/2 | 3,000 | W8000-25-W | Rc1 | 10,000 |
| C6500-20-W | Rc3/4 | 4,500 | B7019-1C | Rc1/8 | 500 |
| C6500-25-W | Rc1 | 5,000 | B7019-2C | Rc1/4 | 900 |
| C8000-20-W | Rc3/4 | 7,000 | | | |
| C8000-25-W | Rc1 | 7,500 | | | |
| K60570-1C-GB | Rc1/8 | 200 | | | |
| K60570-2C-GB | Rc1/4 | 300 | | | |

### Explanation of technical terms

[Theoretical reference speed]: indicates degree of cylinder speed, expressed as the following formula.
(This value coincides with speed at no load. When load is applied, speed drops considerably.)

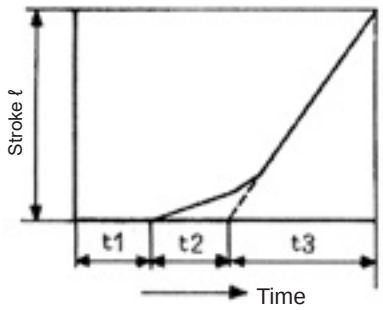
$$VO=1920\times\frac{S}{A}=2445\times\frac{S}{D^2} \quad (1)$$

*VO*: Theoretical reference speed (mm/s)
A: Cylinder sectional area ($cm^2$)
S: Composite effective cross-sectional area of circuit (exhaust air side) ($mm^2$)
D: Cylinder bore size (cm)

When expressed as a graph, the theoretical reference speed is the speed within the range where the cylinder moves at a uniform speed

$$VO=\frac{\ell}{t3}\ (mm/s)$$

t1: Time until movement starts
t2: Time of primary delay
t3: Operating time with constant velocity
ℓ: Stroke




* Note/t1 and t2 differ depending on load. At no load, this can be ignored to no ill effect.

■ F.R.L. kit, unit, regulator
Primary pressure 0.7 MPa, set pressure 0.5 MPa, pressure drop 0.1 MPa

■ Air filter
Primary pressure 0.7 MPa, pressure drop 0.02 MPa

■ Lubricator
Primary pressure 0.5 MPa, pressure drop 0.03 MPa

| Air filter (F) | | | Regulator (R) | | | Lubricator (L) | | |
|---|---|---|---|---|---|---|---|---|
| Model No. | Port size | Max flow ℓ/min (Atm press conv) | Model No. | Port size | Max flow ℓ/min (Atm press conv) | Model No. | Port size | Max flow ℓ/min (Atm press conv) |
| F1000-6-W | Rc1/8 | 460 | R1000-6-W | Rc1/8 | 770 | L1000-6-W | Rc1/8 | 550 |
| F1000-8-W | Rc1/4 | 610 | R1000-8-W | Rc1/4 | 1,350 | L1000-8-W | Rc1/4 | 700 |
| F2000-8-W | Rc1/4 | 1,300 | R2000-8-W | Rc1/4 | 1,750 | L3000-8-W | Rc1/4 | 1,100 |
| F2000-10-W | Rc3/8 | 1,700 | R2000-10-W | Rc3/8 | 2,500 | L3000-10-W | Rc3/8 | 2,250 |
| F3000-8-W | Rc1/4 | 1,230 | R3000-8-W | Rc1/4 | 2,000 | L4000-8-W | Rc1/4 | 1,000 |
| F3000-10-W | Rc3/8 | 1,500 | R3000-10-W | Rc3/8 | 2,600 | L4000-10-W | Rc3/8 | 1,700 |
| F4000-8-W | Rc1/4 | 1,320 | R4000-8-W | Rc1/4 | 2,500 | L4000-15-W | Rc1/2 | 2,700 |
| F4000-10-W | Rc3/8 | 2,140 | R4000-10-W | Rc3/8 | 4,400 | L8000-20-W | Rc3/4 | 6,300 |
| F4000-15-W | Rc1/2 | 3,000 | R4000-15-W | Rc1/2 | 5,000 | L8000-25-W | Rc1 | 10,000 |
| F6000-20-W | Rc3/4 | 5,600 | R6000-20-W | Rc3/4 | 7,000 | A3019-1C | Rc1/8 | 100 |
| F6000-25-W | Rc1 | 6,200 | R6000-25-W | Rc1 | 7,700 | A3019-2C | Rc1/4 | 400 |
| F8000-20-W | Rc3/4 | 6,400 | R8000-20-W | Rc3/4 | 14,000 | 3003E-6C | Rc3/4 | 3,500 |
| F8000-25-W | Rc1 | 6,800 | R8000-25-W | Rc1 | 11,000 | 3003E-8C | Rc1 | 4,000 |
| A1019-1C | Rc1/8 | 550 | B2019-1C | Rc1/8 | 500 | | | |
| A1019-2C | Rc1/4 | 700 | B2019-2C | Rc1/4 | 500 | | | |
| 1138-6C-E | Rc3/8 | 5,500 | 2215-6C | Rc3/4 | 14,000 | | | |
| 1138-8C-E | Rc1 | 7,000 | 2215-8C | Rc1 | 14,000 | | | |
| | | | 2215-10C | Rc1 1/4 | 14,000 | | | |

[Required flow rate]: indicates instantaneous flow rate for operating a cylinder with velocity *vo*, expressed with the following formula. Values in the table are when P = 0.5 MPa. The required flow rate is a value necessary to select clean air system components.

$$Q \approx \frac{Avo(P+0.101)\times 60}{0.101\times 10^4} \quad -(2)$$

Q: Required flow rate (ℓ/min) (ANR)
P: Supply pressure (MPa)

[Required effective sectional area]: indicates composite effective cross-sectional area for the exhaust circuit required for moving the cylinder at speed *vo*.
(Composite effective cross-sectional area of valve, speed controller, silencer or piping)

[Proper standard system]: indicates the most appropriate combination of valve, speed controller, silencer and bore size for operating a cylinder with velocity *vo*. The combination in the table is for a pipe length of 1 m.

# System selection

## A combination of the valve and the cylinder's standard system (example)

(1) The cylinder average speed is obtained from the combination of the valve and piping system.It is expressed as the cylinder's piston speed calculated by dividing the stroke length by the time that the piston rod takes from start to end of movement with the cylinder rod installed facing upward. When the load factor is 50%, the cylinder piston speed should be approximately ×0.5. (Refer to Intro Page 55 for the relation of load factor and theoretical reference speed. )

(2) The cylinder's average speed is that when one cylinder is operated independently.

(3) The effective cross-sectional area of the solenoid valve used for the calculation below is the 2-position value.

(4) This selection guide is for reference. Check the selection with actual conditions using a sizing program.

(5) The graph for the valve 4G/4K Series (2-position single, base piping) is shown as an example.

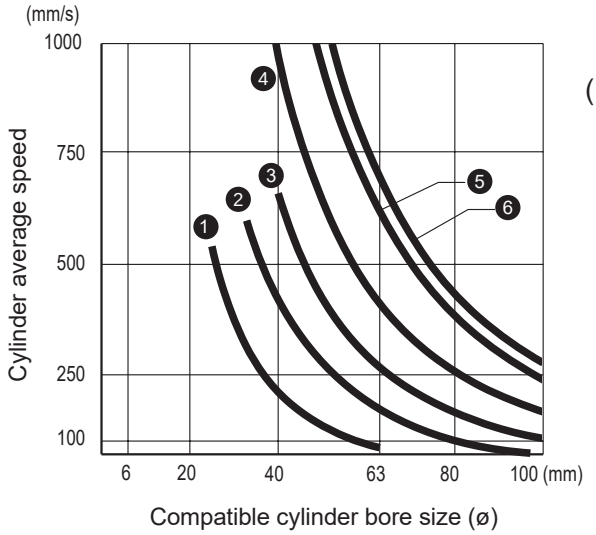
### 4G Series

(With internal exhaust check valve)

(Example) The connection component system No. is ❷ for the 4G1 with a C6 port size.

| Series | Base piping | | | | | | System No. |
|---|---|---|---|---|---|---|---|
| | Model No. | Solenoid valve port size | Speed Controller | Silencer | Piping(1m) | Composite effective cross-sectional area ($mm^2$) Pipe length (1 m) | |
| 4G1 | M4GB110R | C4 | SC3W-6-4 | SLW-6S | ø4 x ø2.5 | 1.4 | ❶ |
| | M4GB110R | C6 | SC1-6 | SLW-6S | ø6 x ø4 | 2.8 | ❷ |
| 4G2 | M4GB210R | C6 | SC1-8 | SLW-8S | ø6 x ø4 | 4.5 | ❸ |
| | M4GB210R | C8 | SC1-10 | SLW-8S | ø8 x ø5.7 | 6.7 | ❹ |
| 4G3 | M4GB310R | C10 | SC1-10 | SLW-10L | ø10 x ø7.2 | 10.1 | ❺ |
| | M4GB310R | C10 | SC1-15 | SLW-10L | ø12 x ø8.9 | 11.5 | ❻ |

* The system No. is indicated in the following graph.



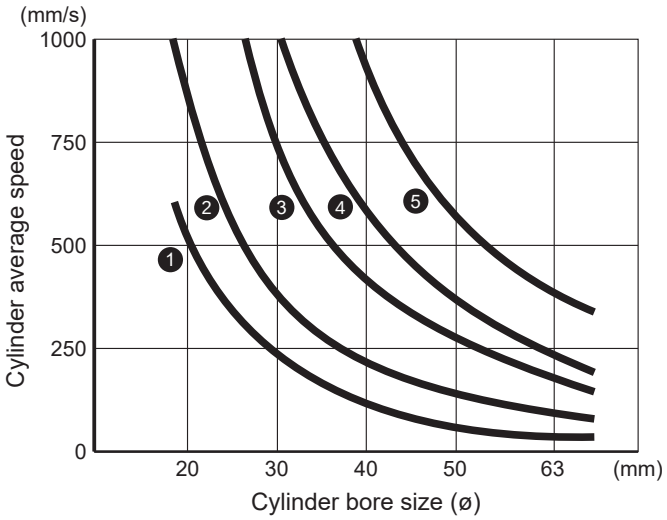

(Example) When using system ❷ with ø40 cylinder diameter, the cylinder's average speed is about 450 mm/s. (Note that this differs with working conditions.)

## MN4G Series

(With internal exhaust check valve)

| Series | Solenoid valve port size | Speed controller | Piping (1 m) | Common exhaust piping | Composite effective X-sectional area (mm²) | System No. |
|---|---|---|---|---|---|---|
| MN4G1 | C4 | SC3W-M5-4 | ø4×ø2.5 | ø6×ø4×3 m | 0.9 | ❶ |
| | C4 | SC3W-6-4 | ø4×ø2.5 | ø6×ø4×3 m | 1.4 | ❷ |
| | C6 | SC1-6 | ø6×ø4 | ø8×ø5.7×3 m | 2.8 | ❸ |
| MN4G2 | C6 | SC1-6 | ø6×ø4 | ø8×ø5.7×3 m | 3.8 | ❹ |
| | C8 | SC1-8 | ø8×ø5.7 | ø10×ø7.2×3 m | 6.0 | ❺ |

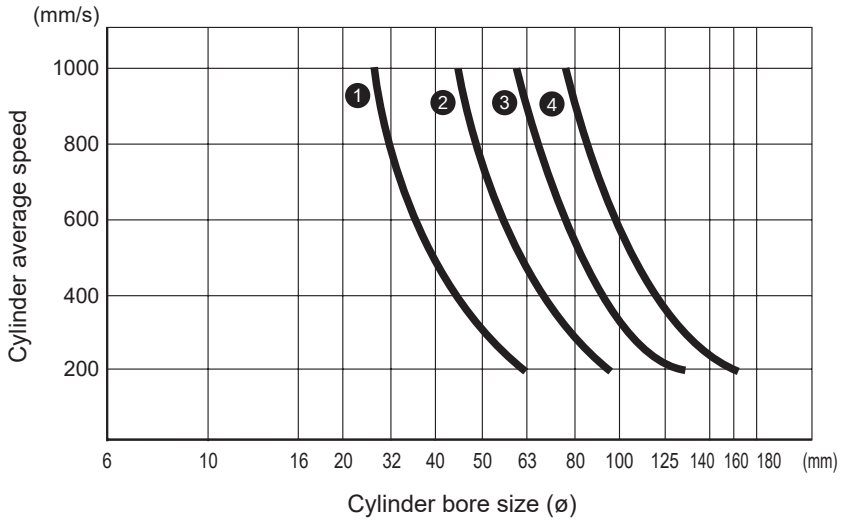
* The system No. is indicated in the following graph.
* This graph applies to common exhaust.




## 4K Series

| Series | Solenoid valve port size | Speed controller | Silencer | Piping (1 m) | Composite effective X-sectional area (mm²) | System No. |
|---|---|---|---|---|---|---|
| 4KB110 | C6 | SC1-6 | SLW-6S | ø6×ø4 | 3.2 | ❶ |
| 4KB210 | C8 | SC1-8 | SLW-8S | ø8×ø5.7 | 7.7 | ❷ |
| 4KB310 | C10 | SC1-10 | SLW-10L | ø10×ø7.2 | 14.1 | ❸ |
| 4KB410 | C15 | SC1-15 | SLW-15A | ø12×ø8.9 | 23.6 | ❹ |

* The system No. is indicated in the following graph.



# System selection

## 2 Selecting from the load value and operation time

### How to select

When load (N) and cylinder required operation time (S) are already decided, use [System selection 2] to select an appropriate model. Follow the following procedures.

**STEP 1**
[Confirming conditions]
Load value (N),
Required operation time (S)

↓

**STEP 2**
Selecting cylinder bore size
From Graph 1

↓

**STEP 3**
Selecting theoretical reference speed
From Graph 2

↓

**STEP 4**
Selecting a suitable system
From Graph 3

↓

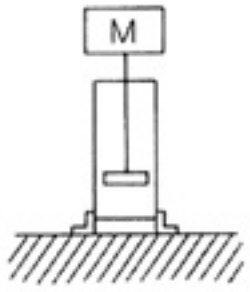
**STEP 5**
Selecting suitable components
From Table 1

### STEP 1 Confirming conditions

(1) Load F= ☐ (N)
(2) Required operation time t = ☐ (s)
(3) Stroke L= ☐ (mm)
(4) Pressure P= ☐ (MPa)

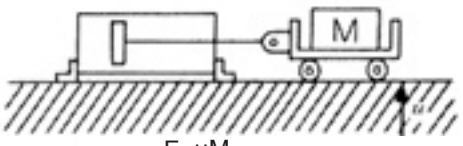
M: Weight of body (kg)
μ : Friction coefficient (normally μ≈ 0.3)
F : Load (N)
g : 9.8 m/s²

● Vertical




F=Mg

● Horizontal




F=μMg

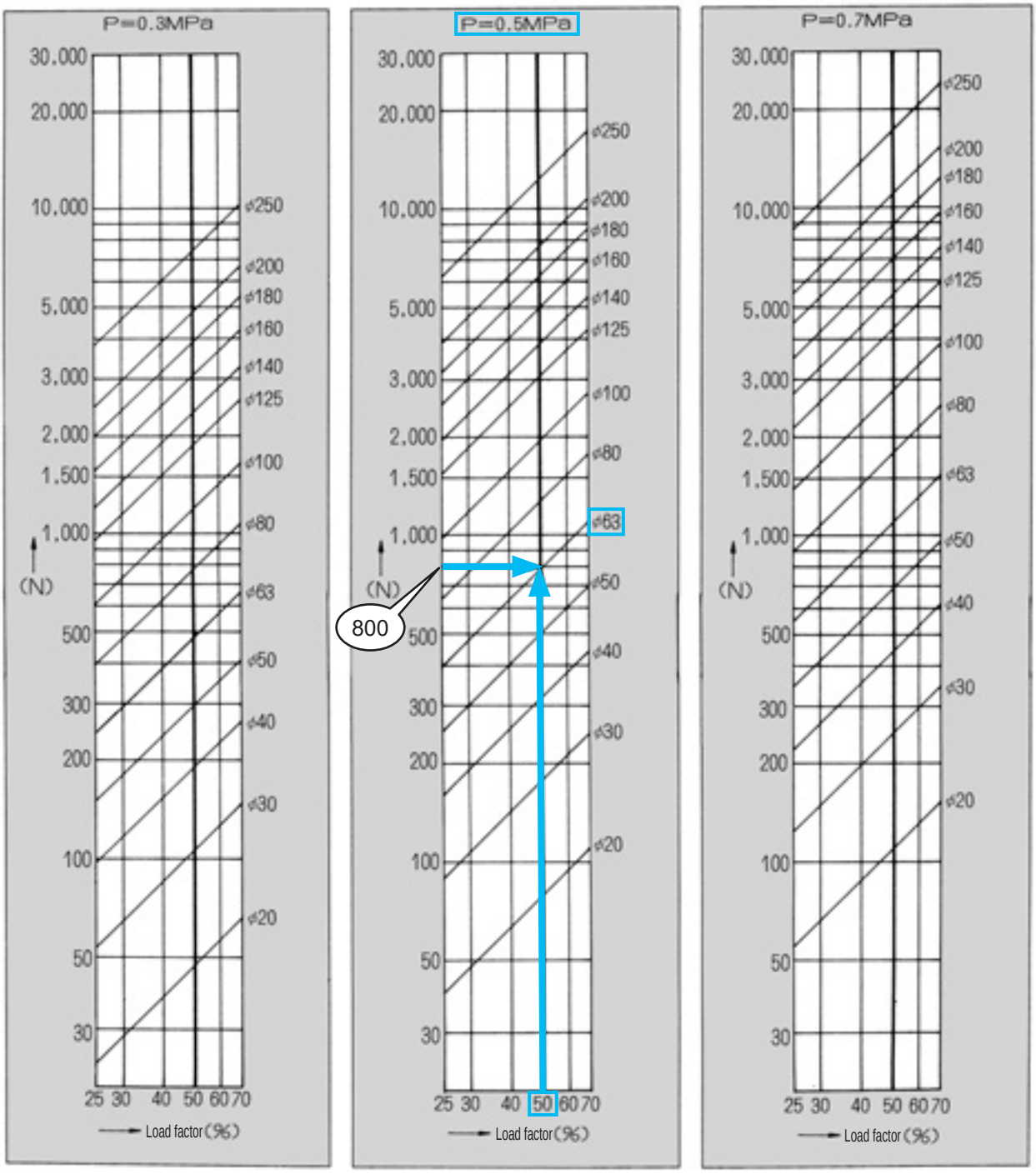
# STEP 2 Selecting cylinder bore size

According to the nomogram for cylinder bore size, select the cylinder bore size and read the load factor at the same time. (Normally, for value F of “Step 1 Confirming conditions”, read the cylinder bore size whose load factor is close to 50% )

Cylinder bore size D = ø ☐

(Example) When F = 800N, P = 0.5 MPa, cylinder bore size is ø63 at Load factor 50% .

Graph 1 Nomogram to find cylinder bore size



## STEP 3 Selecting theoretical reference speed

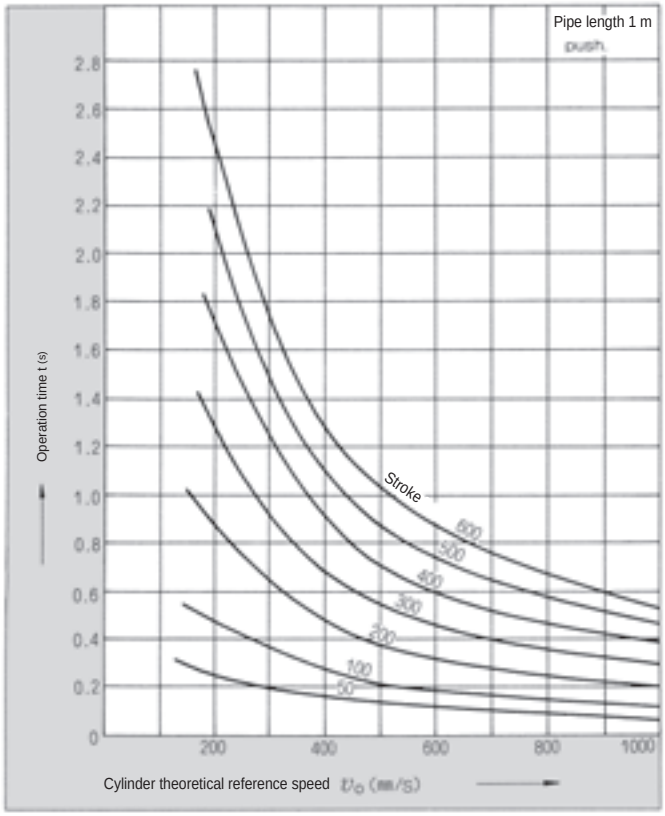
According to t-*vo* graph, read *vo* value to obtain the required operation time t (sec).

*vo*= ☐

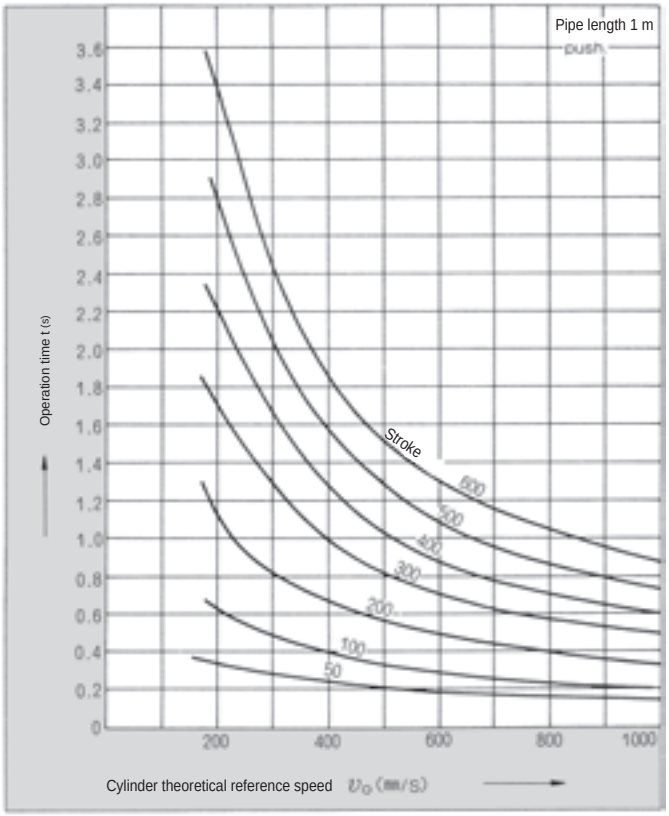
(Example) When Load factor 50% and Stroke of 200mm cylinder operate with 1.0sec,
theoretical reference speed is 450 mm/s.

Graph 2 t-*vo* graph

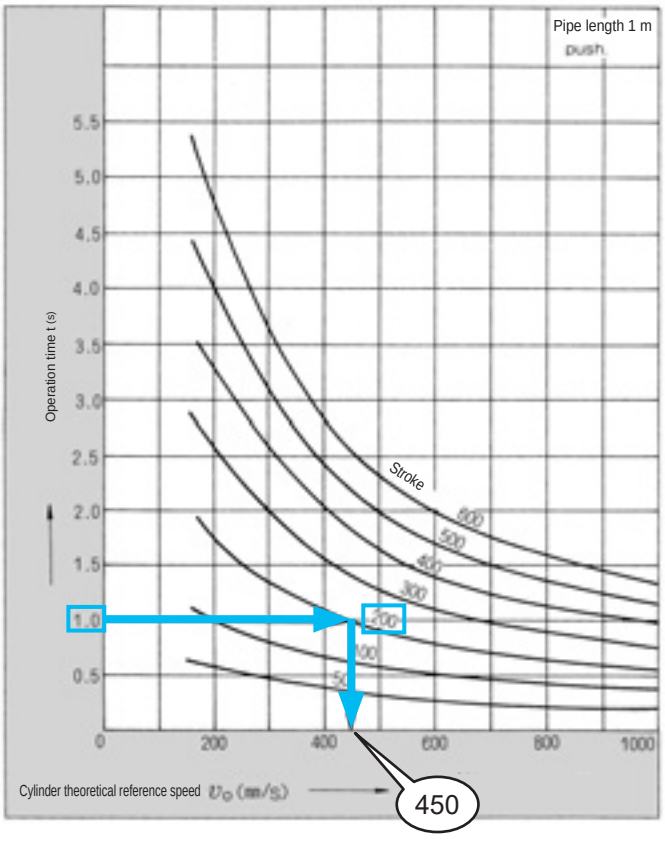
Load factor 0%



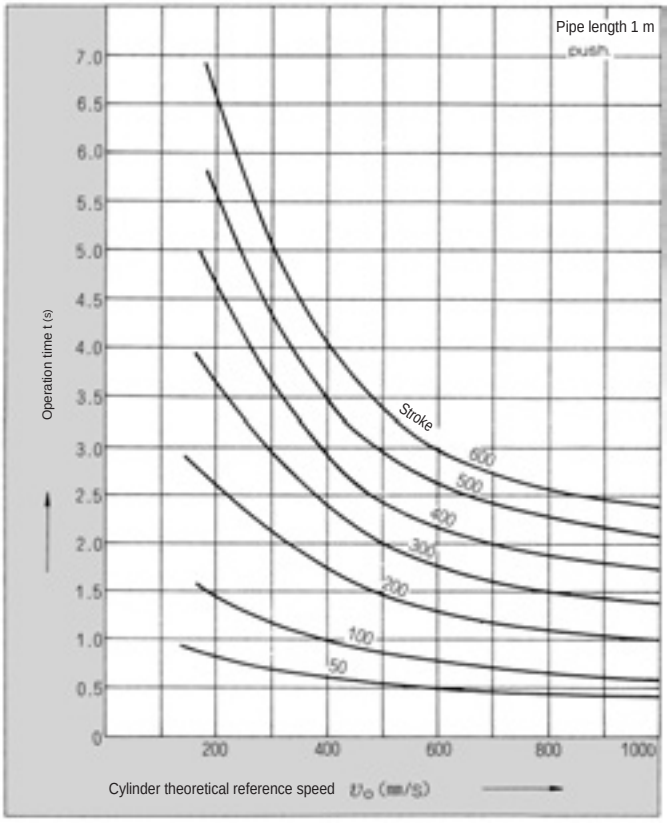

Load factor 25%



## Load factor 50%




## Load factor 70%



# System selection

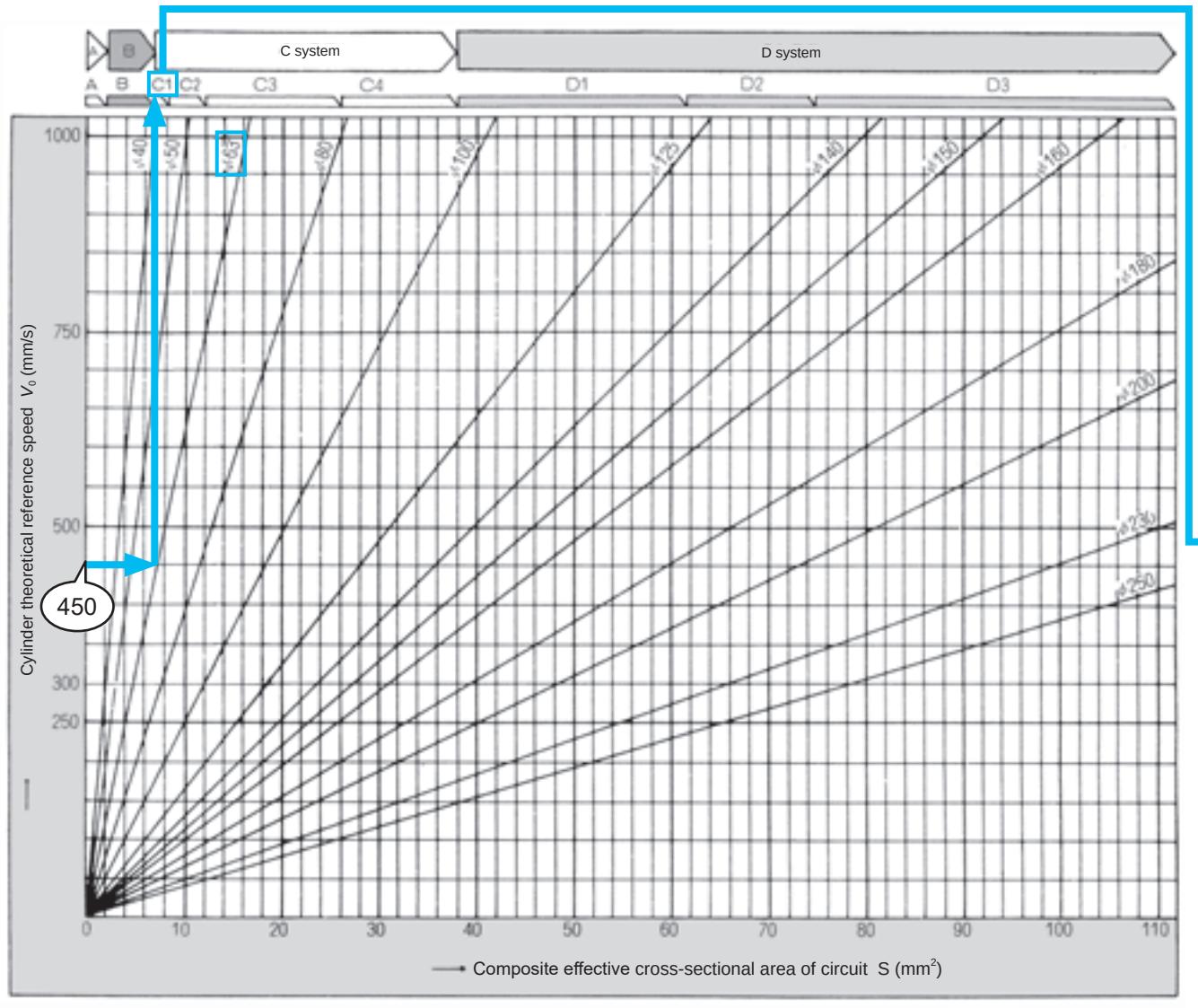
## STEP 4 Selecting a suitable system

In the system selection table, find the cross point of *VO* obtained in [STEP 3 Selecting theoretical reference speed] and øD obtained in [STEP 2 Selecting cylinder bore size], and from the cross point, trace a line extended straight up to read the system code.

System code ☐

(Example) In order to operate ø63 cylinder at theoretical reference speed 450 mm/s, C1 system is ideal.

Graph 3 System selection table



# STEP 5 Selecting suitable components

According to the standard system table, confirm the model No. of proper system components with the code found in [STEP 4 Selecting a suitable system].

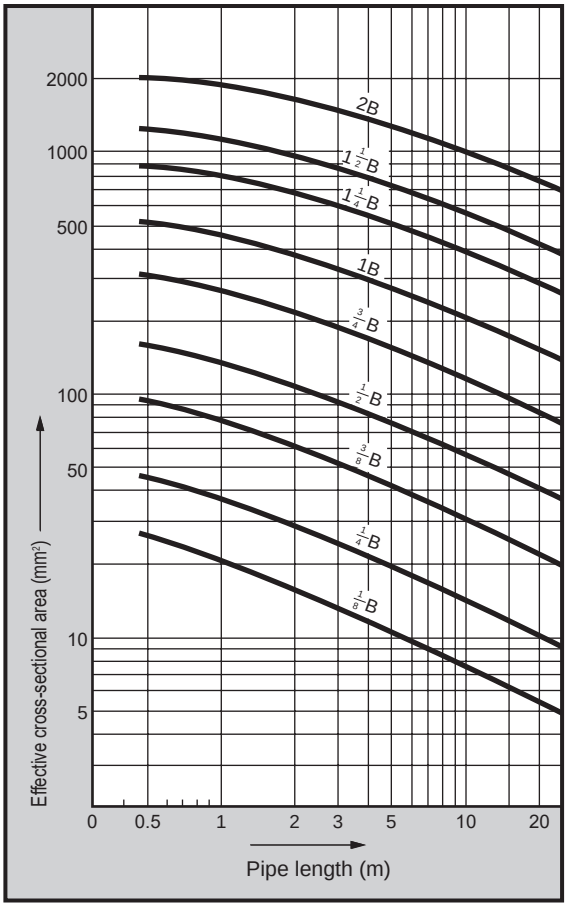
| | (Example) CI system |
|---|---|
| Valve ☐ | Valve: Single 4KB210-08 or 4GB310R-08<br>Double 4KB220-08 or 4GB320R-08 |
| Speed controller ☐ | Speed controller: SCI-8 |
| Silencer ☐ | Silencer: SLW-8A |
| Piping ☐ | Piping: ø10 x ø7.2 nylon tube 1 m |

Table 1 Standard system table

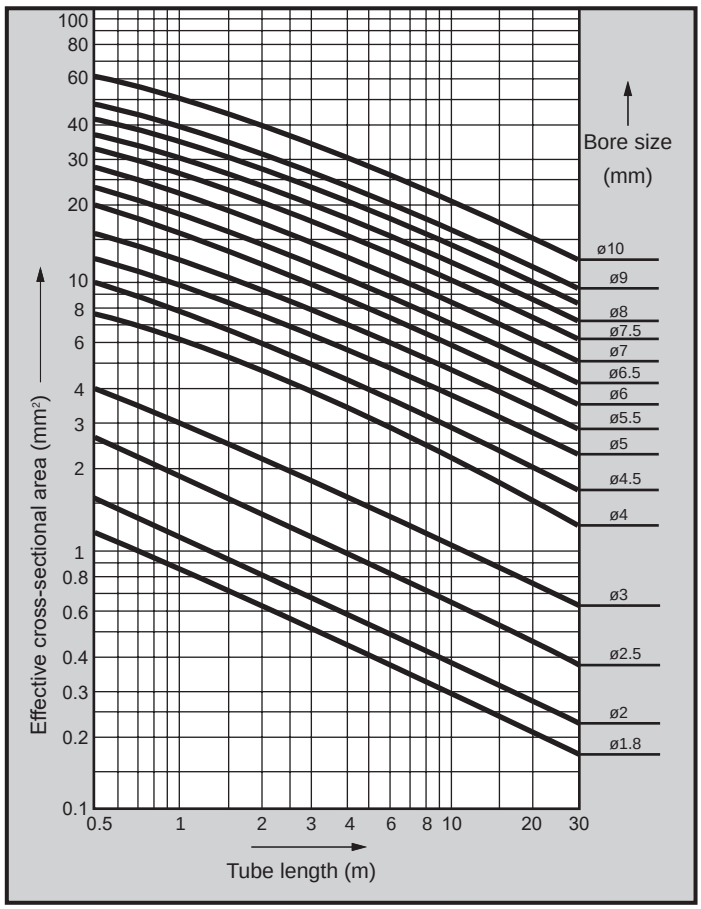
| Standard system No. | Valve | | Speed controller | Silencer | Piping | Composite eff X-sect area ($mm^2$) pipe 1 m |
|---|---|---|---|---|---|---|
| | Single solenoid | Double solenoid | | | | |
| A | 4SB010-M5<br>4KA110-GS4 | 4SB020-M5<br>4KA120-GS4 | SC3W-M5-4<br>(SC-M5) | SLM-M5 | ø4×ø2.5<br>Nylon tube | 0.9 |
| B1 | 4KA110-GS6<br>4KB110-06 | 4KA120-GS6<br>4KB120-06 | SC3W-6-6<br>SCL2-06-H66 | SLM-M5<br>SLW-6A | ø6×ø4<br>Nylon tube | 2.0 |
| B2 | 4KB110-06<br>4GB110R-06 | 4KB120-06 | SC1-6<br>SCL2-08-H88 | SL-M5<br>SLW-6A | ø8×ø5.7<br>Nylon tube | 3.0 |
| B3 | 4GB210R-06<br>4KB210-06 | 4KB220-06 | SC1-6<br>SCL2-08-H88 | SLW-6A<br>SLW-6S | ø8×ø5.7<br>Nylon tube | 5.2 |
| B4 | 4GB210R-08<br>4KB210-08 | 4GB220R-08<br>4KB220-08 | SC1-8<br>SCL2-10-H1010 | SLW-6A<br>SLW-8A | ø10×ø7.2<br>Nylon tube | 6.4 |
| C1 | 4GB210R-08<br>4KB210-08<br>4F210-08 | 4GB220R-08<br>4KB220-08<br>4F220-08 | SC1-8<br>SCL2-10-H1010 | SLW-8A<br>SLW-8S | ø10×ø7.2<br>Nylon tube | 7.8 |
| C2 | 4GB310R-10<br>4F310-10<br>4KB310-10 | 4GB320R-10<br>4F320-10<br>4KB320-10 | SC1-10 | SLW-10A | ø10×ø7.2<br>Nylon tube or Rc3/8<br>steel pipe | 12 |
| C3 | 4GB410-15<br>4F510-15<br>4KB410-15 | 4GB420-15<br>4F520-15<br>4KB420-15 | SC1-15 | SLW-15A | Rc1/2 steel pipe | 27 |
| C4 | 4GB410-15<br>4F510-15<br>4KB410-15 | 4GB420-15<br>4F520-15<br>4KB420-15 | SC-20A | SLW-15A | Rc1/2 steel pipe | 38 |
| D1 | 4F610-20 | 4F620-20 | SC-20A | SL-20A | Rc3/4 steel pipe | 64 |
| D2 | 4F710-20 | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe | 80 |
| D3 | 4F710-25 | 4F720-25 | SC-25A | SL-25A | Rc1 steel pipe | 112 |

## Effective cross-sectional area for steel pipes and nylon tubes, and recommended max. flow rate for gas pipes

### Effective cross-sectional area of steel pipe




### Effective cross-sectional area of nylon tube




### Recommended max. flow rate table of gas tube

| Nominal size | 1/8B | 1/4B | 3/8B | 1/2B | 3/4B | 1B | 1 1/4B | 1 1/2B |
|---|---|---|---|---|---|---|---|---|
| Pressure drop MPa (*1) | 0.124 | 0.0707 | 0.0576 | 0.0425 | 0.0276 | 0.0209 | 0.0133 | 0.0105 |
| Inlet pressure MPa | Recommended max. flow rate (ℓ/min) | | | | | | | |
| 0.05 | 127 | 244 | 518 | 838 | 1,465 | 2,460 | 3,870 | 5,150 |
| 0.1 | 146 | 282 | 598 | 965 | 1,690 | 2,828 | 4,460 | 5,950 |
| 0.15 | 163 | 314 | 668 | 1,076 | 1,885 | 3,150 | 4,960 | 6,630 |
| 0.2 | 179 | 344 | 730 | 1,180 | 2,060 | 3,450 | 5,430 | 7,280 |
| 0.3 | 206 | 395 | 840 | 1,360 | 2,375 | 3,900 | 6,300 | 8,400 |
| 0.4 | 230 | 442 | 940 | 1,520 | 2,660 | 4,450 | 7,000 | 9,360 |
| 0.5 | 252 | 485 | 1,030 | 1,660 | 2,920 | 4,875 | 7,700 | 10,250 |
| 0.6 | 272 | 523 | 1,110 | 1,800 | 3,140 | 5,250 | 8,300 | 11,050 |
| 0.7 | 292 | 558 | 1,185 | 1,920 | 3,350 | 5,620 | 8,870 | 11,800 |
| 0.8 | 308 | 592 | 1,260 | 2,035 | 3,560 | 5,970 | 9,430 | 12,570 |
| 0.9 | 324 | 623 | 1,325 | 2,140 | 3,745 | 6,290 | 9,900 | 13,220 |
| 1.0 | 340 | 654 | 1,395 | 2,250 | 3,930 | 6,600 | 10,400 | 13,880 |
| 1.2 | 370 | 717 | 1,510 | 2,450 | 4,280 | 7,150 | 11,250 | 15,040 |
| 1.4 | 398 | 763 | 1,625 | 2,624 | 4,590 | 7,700 | 12,100 | 16,200 |
| 1.5 | 410 | 790 | 1,680 | 2,710 | 4,740 | 7,930 | 12,550 | 16,780 |

(*1: Inlet pressure = 0.5 MPa
Gas pipe length: 10 m)

(Remarks)

In the main line where the piping distance tends to increase, it is necessary to consider a pressure drop occurring at the end of the main line when air passes.

The recommended max. flow rate refers to the max. flow rate that can be recommended in the range of allowable pressure drop with respect to piping length, determined from actual use.

This does not mean that a higher flow is not possible, but rather that the pressure will further decrease if the flow exceeds this value.

# Flow characteristics display method



## 1. Flow characteristics display

The catalog specifications indicate the flow rate as follows.

| Applicable components | Display | Unit | Standards |
|---|---|---|---|
| Pneumatic components | New JIS compliant indication | C, b | ISO 6358:1989 "Pneumatic fluid Components -Flow characteristics test method"JIS B 8390:2000 (ISO 6358 translation) |
| | Conventional indication | S | JIS B 8373:1993 "Pneumatic 2-port solenoid valves"<br>JIS B 8374:1993 "Pneumatic 3-port solenoid valves"<br>JIS B 8375:1993 "Pneumatic 4, 5-port solenoid valve"<br>JIS B 8379:1995 "Pneumatic noise reduction device" |
| | | Cv | ANSI(NFPA)T3. 21. 3:1990 |

## 2. Explanation

The flow characteristics of the solenoid valves were conventionally indicated with the effective cross-sectional area S. However, JIS was revised (JIS B 8390:2000), and these are now indicated with the sonic conductance C and critical pressure ratio b.

- Sonic conductance C: Value obtained by dividing the passage weight flow of the component in the choke flow by the sum of the upstream absolute pressure and standard state density. (sonic conductance) S ≈ 5.0 C (Conventional sizing is possible with C.)
- Critical pressure ratio b: Pressure ratio at which choked flow results if smaller than this value (downstream pressure/upstream pressure) (critical pressure ratio)
- Effective cross-sectional area S ($mm^2$): The value of the ideal restricted cross-sectional area without friction or compressed flow, calculated from the pressure changes inside the air tank when the choke flow is released from the components mounted on the air tank.

* Choke flow: Flow at which upstream pressure is higher than downstream pressure, and speeds at certain sections of components reach acoustic velocity. The fluid's mass flow rate is proportional to the upstream pressure, and is not dependent on downstream pressure. (Choked flow)

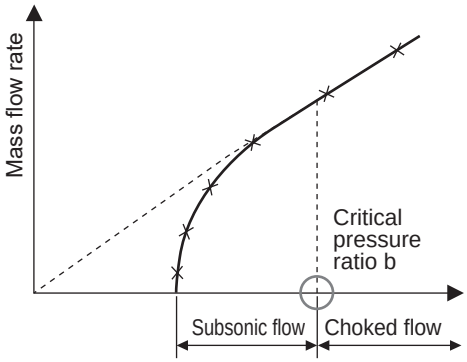



Fig. 1 Mass flow characteristics for upstream pressure

### Flow rate formula

Depending on the actual unit, they are shown as follows.

$\frac{P_2+0.1}{P_1+0.1}$ Choked flow when ≤ b

$$Q=600\times C\,(P_1+0.1)\sqrt{\frac{293}{273+t}} \quad \text{.....(1)}$$

$\frac{P_2+0.1}{P_1+0.1}$ Subsonic flow when >b

$$Q=600\times C(P_1+0.1)\sqrt{1-\left[\frac{\frac{P_2+0.1}{P_1+0.1}-b}{1-b}\right]^2}\sqrt{\frac{293}{273+t}} \quad \text{.....(2)}$$

Q : Air flow rate [$dm^3$/min(ANR)], SI unit $dm^3$ (cubic decimeter) can also be expressed with ℓ (liter). $1dm^3 = 1\ell$
C : Sonic conductance [$dm^3$/(s·bar)]
b : Critical pressure ratio [-]
$P_1$ : Upstream pressure [MPa]
$P_2$ : Downstream pressure [MPa]
t : Temperature (°C)

To calculate effective cross-sectional area S, substitute the value C obtained with C = S/5 above in the above formula.
For subsonic flow, substitute b = 0.5 in formula (2).

# Degree of protection

● Degree of protection

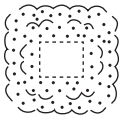
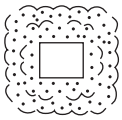
■ IEC (International Electrotechnical Commission) standards (IEC60529)

■ JIS C 0920 : 2003

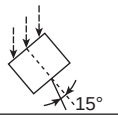
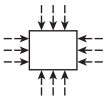
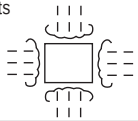
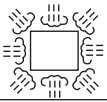
IP-□ □

Degree of protection (International Protection)

1st characteristic No. (degree of protection for foreign solid matter)

| 1st character No. | Degree of protection | |
|---|---|---|
| 0 | No protection | Without protection |
| 1 | ø50 mm | Protection against inflow of solids 50 mm and over in diameter |
| 2 | ø12.5 mm | Protection against inflow of solids 12.5 mm and over in diameter |
| 3 | 2.5 mm | Protection against inflow of solids 2.5 mm and over in diameter |
| 4 | 1 mm | Protection against inflow of solids 1.0 mm and over in diameter |
| 5 | Dust-proof  | No inflow of dust at levels adversely affecting normal device operation or safety |
| 6 | Dust proof  | No inflow of dust |

2nd characteristic No. (degree of protection for water entry)

| 2nd character No. | Degree of protection | |
|---|---|---|
| 0 | No protection | |
| 1 | Protection against water dripping  | No harmful effects from water dripping vertically. |
| 2 | Protection against dripping water tilted at an angle of up to 15°   | Water dripping vertically has no adverse effect when the product is tilted at an angle of up to 15° from its normal position. |
| 3 | Protection for watering  | Water falling as a spray at any angle up to 60° from the vertical has no adverse effect. |
| 4 | Protection against splashing water  | Water splashing against the product from any direction has no adverse effect. |
| 5 | Protection against water jets  | No harmful effects occur even when water is sprayed with nozzles from all directions. |
| 6 | Protection against powerful jets  | Water projected in powerful jets against the product from any direction has no adverse effect. |
| 7 | Protection against immersion  | Water will not enter the product even when it is immersed in water under defined conditions. |
| 8 | Protection against immersion  | The product can be used for continuous immersion in water. |