I N D E X

User's Guide Intro 3

Selection guide 1 **Products variation** Intro 5

Select products according to appearance and features.

Master valve Intro 11
Serial transmission system Intro 12
Guide to model changeovers Intro 13

Icons Intro 14

- CKD Electronic Catalog guide (CAD DATA)
- CE marking
- CKD RoHs compliance RoHS

Selection guide 2 **Flow characteristics C** Intro 21

Selection guide 3 **Variation** Intro 33

Selection guide 4 **System** Intro 43

Select products according to "Cylinder bore size / operation speed" or "Load value / operation time."

Selection guide 5 **Model no.** Alphabetic order Index Ending 52

⚠ Safety precautions Intro 63

*Read precautions for each series for details.

Flow characteristics	Intro 62
Systems	Ending 1
Ozone proof component	Ending 5
International unit system (SI unit)	Ending 20
JIS symbol list	Ending 21
Acquisition of ISO9001 and ISO14001 Certification	Ending 38
Index (alphabetic order)	Ending 52

CATALOG EXPRESS

The latest catalogs and CAD data (2D/3D-CAD) can be downloaded from the CKD website.
http://catalog.ckd.co.jp/

3, 4, 5 port valve

2, 2, 3 port valve

Explosion proof

Manual switching valve

Related products

Products	Product name	Page
3, 4, 5 port valve	3, 4 port pilot operated valve MN3E0/MN4E0	1
	3, 5 port pilot operated valve 4GA/4GB/MN4GA/MN4GB (4G4 Ending 33)	71
	3, 5 port pilot operated valve (plug-in block manifold) W4GB2/MW4GA2/MW4GB2/MW4GZ2	391
	5 port pilot operated valve (plug-in manifold) W4GB4/W4GZ4/MW4GB4/MW4GZ4	523
	3, 4 port pilot operated valve (pneumatic valve) MN3SO/MN4S0	581
	4, 5 port pilot operated valve 4TB	621
	5 port pilot operated valve (pneumatic valve) 4L2-4/LMFO	687
	5 port pilot operated valve (small pneumatic valve) 4SA0/4SB0	703
	3, 5 port pilot operated valve (small pneumatic valve) 4SA1/4SB1	729
	3, 4, 5 port pilot operated valve (pneumatic valve) 4KA/4KB	775
	5 port pilot operated valve (pneumatic valve) 4F	881
	5 port pilot operated valve (ISO conformed valve) PV5G/PV5/CMF	973
2, 3 port valve	3 port direct acting valve (small pneumatic valve) 3MA0/3MB0	1047
	3 port direct acting valve (pneumatic valve) 3PA/3PB	1063
	2, 3, 5 port pilot operated valve (miniature pneumatic valve) P/M/B	1089
	3 port large flow rate valve NP/NAP/NVP	1129
Explosion proof	Explosion proof 5 port pilot operated valve (pneumatic valve) 4F**0E	1155
Manual switching valve	Manual switching valve HMV/HSV	1181
Related products	Quick exhaust valve 2QV/3QV	1187
	Shock absorbing valve SKH	1197
	3, 4, 5 port solenoid valve PCD/FS/FD	1219

Selection guide
Icons
Flow characteristics
Cautions

3, 4, 5 port valve
- MN3E0/MN4E0
- 4GA/B
- M4GA/B
- MN4GA/B
- 4GA/B (master)
- W4GA/B2
- W4GB4
- MN3S0/MN4S0
- 4TB
- 4L2-4/LMF0
- 4SA/B0
- 4SA/B1
- 4KA/B
- 4F
- PV5G/CMF
- PV5/CMF

2, 3 port valve
- 3MA/B0
- 3PA/B
- P/M/B
- NP/NAP/NVP

Explosion proof
- 4F*0E

Manual
- HMV/HSV

Related products
- 2QV/3QV
- SKH
- PCD/FS/FD

Ending

Systems
Ozone proof component
JIS symbol
New product 4G4
Index

User's Guide (Reading and Using the Catalog)

The required product can be selected and located with production selection (1) to (5).

Selection guide 1 According to products variation

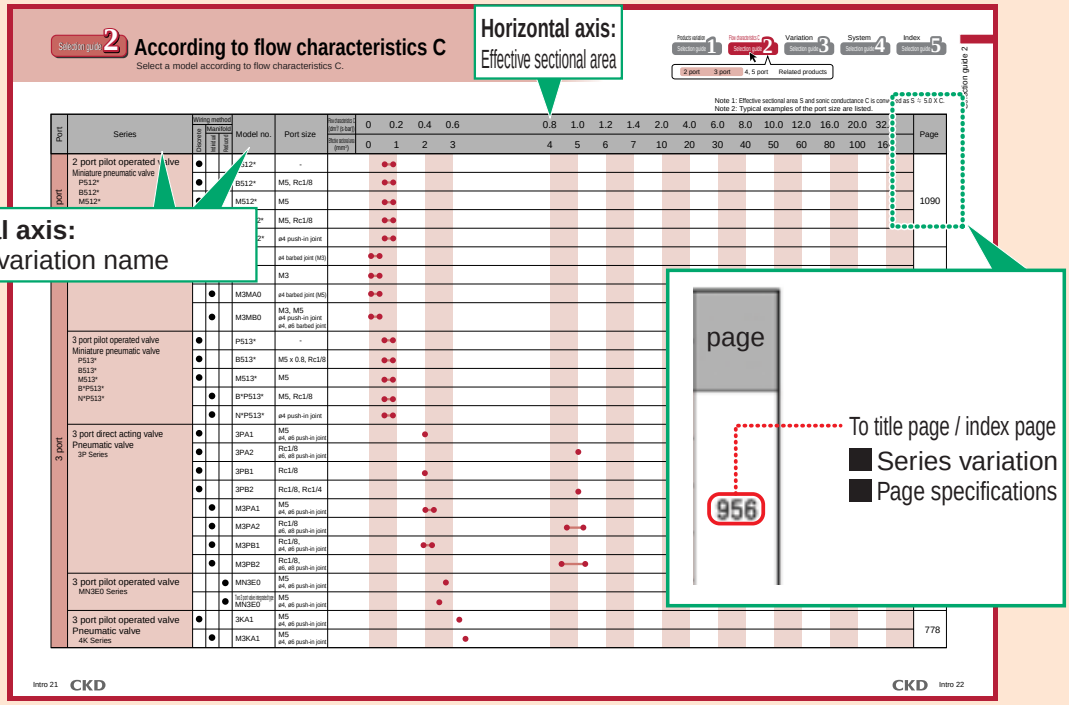
Intro 5 to 12

If you know the product series name, find the series page here.

Selection guide 2 According to flow characteristics C

Intro 21 to 32

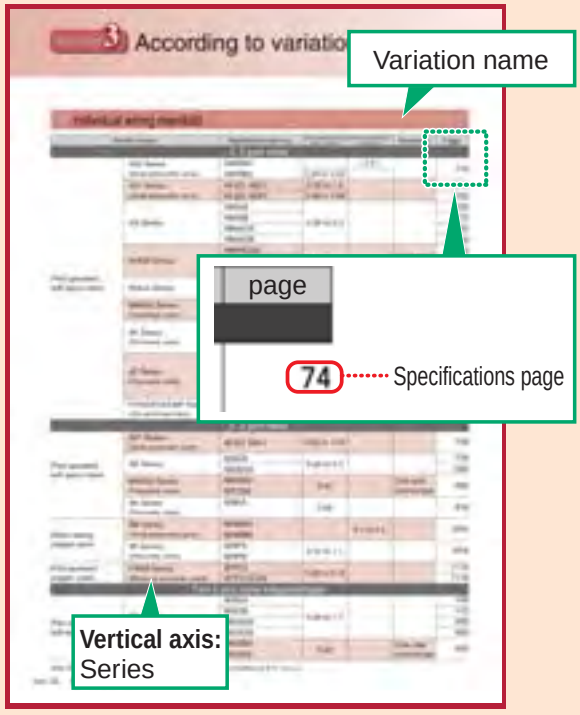
If you know flow characteristic C, find the series page here.



Selection guide 3 According to variation

Intro 33 to 42

If you know the variation type, find the product here.

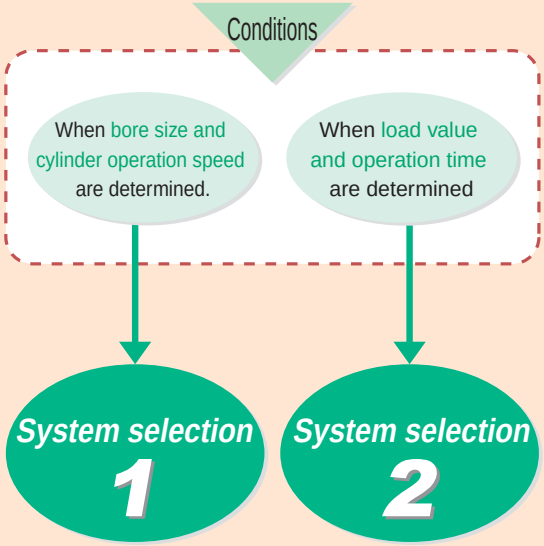


Selection guide 4 According to system

Intro 43 to 61

Conditions are set easily even by beginners.

Optimum model is selected from predetermined conditions.

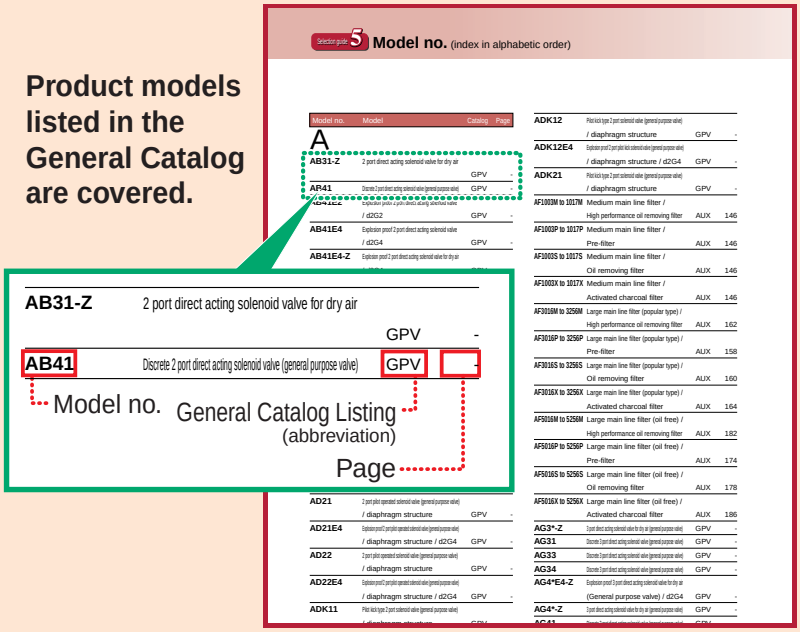


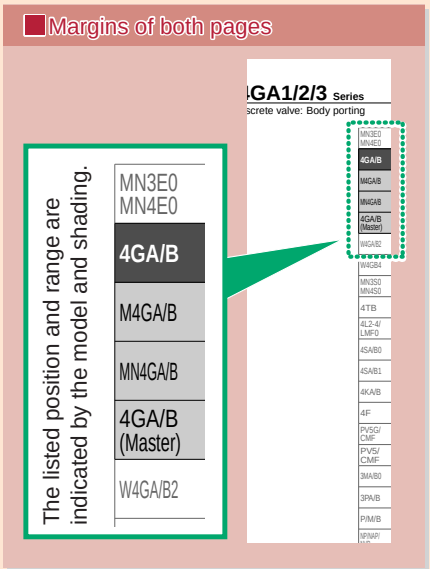
Selection guide 5 According to model no. Alphabetic order index

Ending 52 to 75

The general catalog name and page can be searched for using the product model.

Product models listed in the General Catalog are covered.





According to products variation

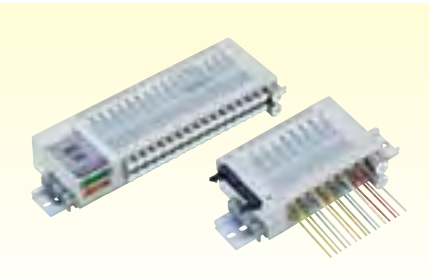
Select products according to appearance and features.

NEW indicates models added to the 7th Edition.

3, 4, 5 port valve (pilot operated) ▶▶▶ P. 1-

Small valve (10 mm)

Cylinder up to ø32 ■ Power consumption: 0.6 W



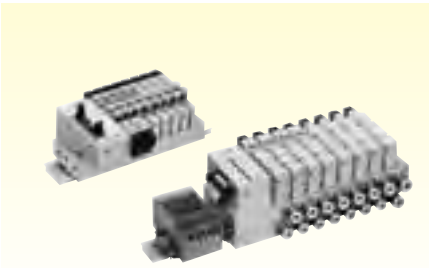
3, 4 port valve with 40 mm or lower valve height

MN3E0/MN4E0 Page P. 1-

Model no.	No. of port	Specifications / bore size	Page
Reduced wiring manifold			
MN3E0 MN4E0	3 4	M5 to ø6	14

Small/medium size valve (10, 15, 18 mm)

Cylinder up to ø100 ■ Power consumption: 0.6 W



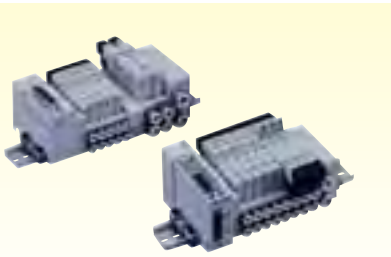
3, 5 port valve with safety function

4GA/4GB Page P.85-

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
3GA 4GA	3 5	Body porting ø4 to Rc1/4	90
3GB 4GB	3 5	Sub-base porting Rc1/8 to Rc3/8	130
Manifold / metal base			
M3GA M4GA	3 5	Body porting ø4 to Rc1/4	Individual 156 Reduced 192
M3GB M4GB	3 5	Sub-base porting ø4 to Rc1/4	Individual 172 Reduced 212

Small/medium size valve (10, 15, 18 mm)

Cylinder up to ø100 ■ Power consumption: 0.6 W



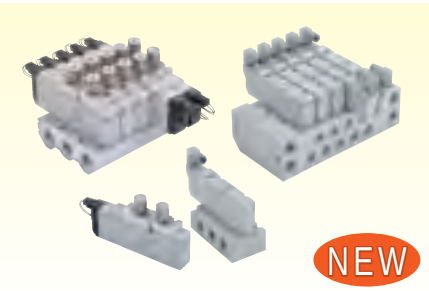
3, 5 port valve with safety function

MN4GA/MN4GB Page P.255-

Model no.	No. of port	Specifications / bore size	Page
Manifold / block type			
MN3GA MN4GA	3 5	Body porting ø4 to Rc1/8	Individual 260 Reduced 276
MN3GB MN4GB	3 5	Sub-base porting ø4 to ø8	Individual 268 Reduced 290

Large valve (24 mm)

Cylinder up to ø160 ■ Power consumption: 1.0 W



NEW

Large flow rate 5 port valve

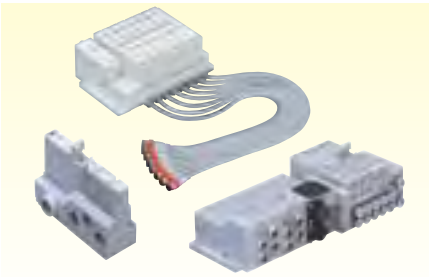
4GA4/4GB4 Page Ending 33

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
4GA4	5	Body porting ø8 to ø12, Rc3/8	Ending 33
4GB4	5	Sub-base porting Rc3/8, Rc1/2	
Manifold / metal base			
M4GA4	5	Body porting ø8 to ø12, Rc3/8	Ending 33
M4GB4	5	Sub-base porting ø8 to ø12, Rc1/4 to Rc1/2	

*G threads and NPT threads are also available.

Medium size valve (manifold pitch 16 mm)

Cylinder up to ø80 ■ Power consumption: 0.6 W



IP65 plug-in block manifold 3, 5 port valve

W4G2 Page P.391-

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
W4GB2	5	Sub-base porting Rc1/4	404
Individual wiring manifold			
MW3GA2-R1 MW4GA2-R1	3 5	Body porting Rc1/8, ø4 to ø8	408
MW4GB2-R1	5	Base side porting ø4 to ø8	412
MW4GZ2-R1	5	Base back porting ø4 to ø8	412
Reduced wiring manifold			
MW3GA2-T* MW4GA2-T*	3 5	Body porting Rc1/8, ø4 to ø8	418
MW4GB2-T*	5	Base side porting ø4 to ø8	438
MW4GZ2-T*	5	Base back porting ø4 to ø8	438

Large valve (manifold pitch 25 mm)

Cylinder up to ø125 ■ Power consumption: 1.0 W

NEW

IP65 plug-in manifold 5 port valve

W4G4 Page P.523-

Model no.	Specifications / bore size	Page
Discrete valve		
W4GB4	Sub-base porting Rc1/4, Rc3/8	532
W4GZ4	Sub-base porting Rc1/4, Rc3/8	532
Individual wiring manifold		
MW4GB4-R1	Base side porting ø8 to ø12, Rc1/4, Rc3/8	538
MW4GZ4-R1	Base back porting Rc1/4	538
Reduced wiring manifold		
MW4GB4-T*	Base side porting ø8 to ø12, Rc1/4, Rc3/8	542
MW4GZ4-T*	Base back porting Rc1/4	542

*G threads and NPT threads are also available.

One side solenoid type / reduced wiring valve

Cylinder up to ø40 ■ Power consumption: 0.6 W

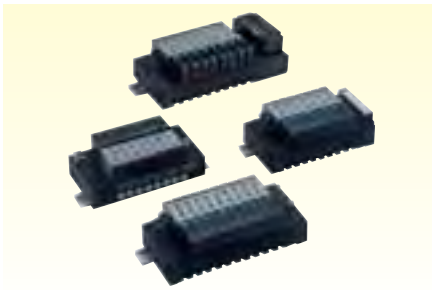
Block manifold 3, 4 port valve

MN3S0/MN4S0 (Pneumatic valve) Page P.581-

Model no.	No. of port	Specifications / bore size	Page
Reduced wiring manifold			
MN3S0 MN4S0	3 4	DIN rail method M5 to ø6	590
MT3S0 MT4S0	3 4	Direct mount type M5 to ø6	

One side solenoid type / reduced wiring valve

Cylinder up to ø180 ■ Power consumption: 1.9 W



Plug-in type block manifold 4, 5 port valve

4TB Page P.621-

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
4TB3 4TB4	5	Sub-plate porting Rc1/4 to Rc1/2	626
Reduced wiring manifold			
MN4TB1 MN4TB2	4	DIN rail method ø4 to ø10	632
M4TB3 M4TB4	5	Direct mount method Rc1/4 to Rc1/2	642

Reduced wiring valve

Cylinder up to ø80 ■ Power consumption: 1.8 W

Plug-in type 5 port valve

4L2-4/LMF0 (pneumatic valve) Page P.687-

Model no.	Specifications / bore size	Page
Discrete valve		
4L2-4	Sub-plate porting Rc1/4	690
Reduced wiring manifold		
LMF0	Sub-plate porting ø4 to Rc1/4	690

Miniature (valve width 10 mm)

Cylinder up to ø25 ■ Power consumption: 0.6 W

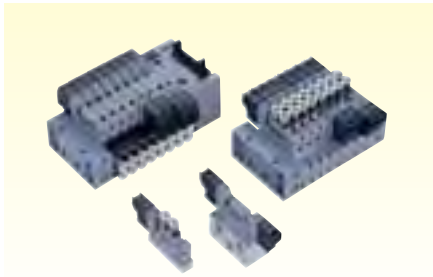
Miniature/space saving 5 port valve

4SA0/4SB0 (small pneumatic valve) Page P.703-

Model no.	Specifications / bore size	Page
Discrete valve		
4SA0	Body porting M3, ø4	708
4SB0	Sub-plate porting M5	
Manifold		
M4SA0	Body porting M3, ø4	Individual 716
M4SB0	Sub-plate porting M5, ø4 to ø6	Individual 716 Reduced 720

Small valve (valve width 10 mm)

Cylinder up to ø40 ■ Power consumption: 0.6 W



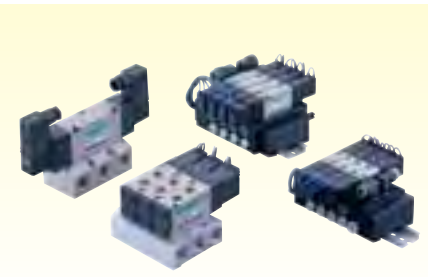
Compact 3, 5 port valve

4SA1/4SB1 (small pneumatic valve) Page P.729-

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
3SA1 4SA1	3 5	Body porting M5, ø4 to ø6	734
4SB1	5	Sub-plate porting Rc1/8	740
Manifold			
M3SA1 M4SA1	3 5	Body porting M5, ø4 to ø6	Individual 746 Reduced 754
M4SB1	5	Sub-plate porting M5, ø4 to ø6	Individual 750 Reduced 760

Small, medium, large valve (valve width 15, 18, 23, 29 mm)

Cylinder up to ø160 ■ Power consumption: 1.8 W



Compact 3, 4, 5 port valve

4KA/4KB (pneumatic valve) Page P.775-

Model no.	No. of port	Specifications / bore size	Page
Discrete valve			
3KA1 4KA	3 5	Body porting M5 to ø12	782
4KB	5	Sub-plate porting Rc1/8 to Rc1/2	800
Individual wiring manifold / metal base			
M3KA1 M4KA	3 5	Body porting M5 to ø12	816
M4KB	4 5	Sub-plate porting M5 to ø12	828
Individual wiring manifold / block type			847
MN4KB	5	Sub-block piping ø4 to ø10	848

Selection guide 1

According to products variation

Select products according to appearance and features.

NEW indicates models added to the 7th Edition.

3, 4, 5 port valve (pilot operated) P. 1-

Compact /medium/large valve

Cylinder up to ø250 ■ Power consumption: 1.8 to 6 W

8 series lineup / 5 port valve

4F (pneumatic valve) Page P.881-

Model no.	Specifications / bore size	Page
Discrete valve		
4F0 to 3	Body porting M5, Rp1/8 to Rp3/8	890
4F4 to 7	Sub-plate porting Rc1/4 to Rc1	904
Individual wiring manifold		
M4F0 to 3	Body porting M5, Rp1/8 to Rp3/8	918
M4F4 to 7	Sub-plate porting Rc1/4 to Rc3/4	946

* A4F0 ... Model for 4F0 single type.

ISO standards conformed valve

Cylinder up to ø160 ■ Power consumption: 1.0, 1.2 W

NEW

Valve width 38 to 50 mm / 5 port valve

PV5G/CMF (DIN terminal box type) Page P.981-

Model no.	Specifications / bore size	Page
Discrete valve (sub-plate porting)		
PV5G-6	ISO size 1 Rc1/4 to Rc3/8	982
PV5G-8	ISO size 2 Rc3/8 to Rc3/4	988
Individual wiring manifold		
CMF1	ISO size 1 Rc1/4, Rc3/8	994
CMF2	ISO size 2 Rc3/8, Rc1/2	1000
Mix manifold		
CMFZ	ISO size 1, 2 Mix manifold	1006

ISO standards conformed valve

Cylinder up to ø160 ■ Power consumption: 1.2 W

NEW

Valve width 38 to 50 mm / 5 port valve

PV5/CMF (I/O connector type) Page P.1015-

Model no.	Specifications / bore size	Page
Discrete valve (sub-plate porting)		
PV5-6R	ISO size 1 Rc1/4 to Rc3/8	1016
PV5-8R	ISO size 2 Rc3/8 to Rc3/4	1022
Individual wiring manifold		
CMF1	ISO size 1 Rc1/4, Rc3/8	1028
CMF2	ISO size 2 Rc3/8, Rc1/2	1034
Mix manifold		
CMFZ	ISO size 1, 2 Mix manifold	1038

3 port valve (direct acting) ▶▶▶ P.1047-

Miniature valve (valve width 10 mm)
Cylinder up to ø16 ■ Power consumption: 0.6 W

3 port poppet type valve

3MA0/3MB0 (small pneumatic valve) Page P.1047-

Model no.	Specifications / bore size	Page
Discrete valve		
3MA0	Body porting ø4	1052
3MB0	Sub-plate porting M3	
Individual wiring manifold		
M3MA0	Body porting ø4	1054
M3MB0	Sub-plate porting ø4, ø6, M3, M5	

Small valve (valve width 15, 22 mm)
Cylinder up to ø40 ■ Power consumption: 1.8 W

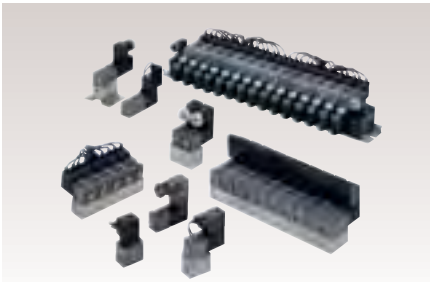
Pressure balance poppet valve

3PA/3PB (pneumatic valve) Page P.1063-

Model no.	Specifications / bore size	Page
Discrete valve		
3PA	Body porting M5 to Rc1/8	1068
3PB	Sub-plate porting Rc1/8 to Rc1/4	
Individual wiring manifold		
M3PA	Body porting M5 to Rc1/4	1076
M3PB	Sub-plate porting Rc1/8 to Rc1/4	

2, 3 port valve (pilot operated) ▶▶▶ P.1089-

Small valve (valve width 15 mm)
Port size M5, Rc1/8, ø4 ■ Power consumption: 1.8 W



Poppet type 2, 3, 5 port valve

P/M/B (miniature pneumatic valve) Page P.1089-

Model no.	Specifications / bore size	Page
W2P513	Two 3 port valve integrated M5	1096
P512*P513* P5142	Without sub-base	
M512* M513*	Sub-base type M5	
B512*B513* B5142	Sub-base type M5	
Individual wiring manifold		
B*P51**	Sub-base type M5, Rc1/8	1112
Block manifold		
N*P51**	Sub-block type ø4	1118

Large flow rate type
Port size Rc3/8 to Rc2 ■ Power consumption: 4 to 8 W/DC

3 port valve for pneumatics and low vacuum

NP/NAP/NVP Page P.1129-

Model no.	Specifications / bore size	Page
NP13/14	Internal pilot operated solenoid valve Rc3/8 to Rc2	1136
NAP11	Internal pilot operated air operated type Rc3/8 to Rc2	1142
NVP11	External pilot operated solenoid valve Rc3/8 to Rc2	1146

According to products variation

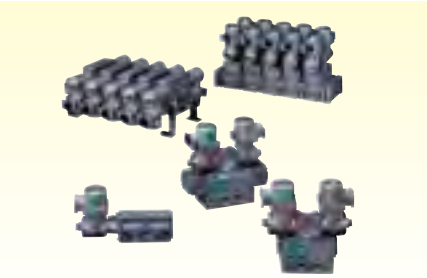
Select products according to appearance and features.

NEW indicates models added to the 7th Edition.

Explosion proof P.1155-

5 port pilot operated valve

Cylinder up to ø250 ■ Power consumption: 4 to 4.5 W



Pressure and explosion proof structure d2G4 type

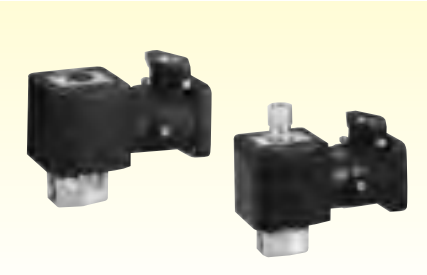
4F**0E (pneumatic valve) Page P.1155-

Model no.	Specifications / bore size	Page
Discrete valve		
4F3*0E	Body porting Rp1/4 to Rp3/8	1160
4F4 to 7 *0E	Sub-plate porting Rc1/4 to Rc1	1160
Manifold		
M4F3*0E	Body porting Rp1/4 to Rp3/8	1172
M4F4 to 7 *0E	Sub-plate porting Rc1/4 to Rc3/4	1172

Explosion proof 2, 3 port valve — General purpose valves

2, 3 port direct acting poppet valve

■ Power consumption 6.7 to 17 W (60Hz)



Pressure and explosion proof structure d2G4/d2G2 type

AB/AG (general purpose valve)

Model no.	Port size	Page
2 port valve		
AB4*E4	Rc1/4, Rc3/8	General purpose valves
AB41E2	Rc1/4, Rc3/8	
AB41E4-Z	Rc1/4, Rc3/8	
3 port valve		
AG4*E4	Rc1/4, Rc3/8	General purpose valves
AG4*E4-Z	Rc1/4, Rc3/8	

2 port pilot poppet valve

■ Power consumption 6.7 to 17 W (60Hz)

Pressure and explosion proof structure d2G4/d2G2 type

AD/AP (general purpose valve)

Model no.	Port size	Page
AP**E4	Rc1/2 to 50 flange	General purpose valves
AD**E4	Rc1/2 to 50 flange	
ADK**E4	Rc1/2 to Rc1	
AP**E2	Rc1/2 to 50 flange	

2 port poppet valve

■ Power consumption 7 W (60Hz)

Pressure and explosion proof structure d2G4 for air blow

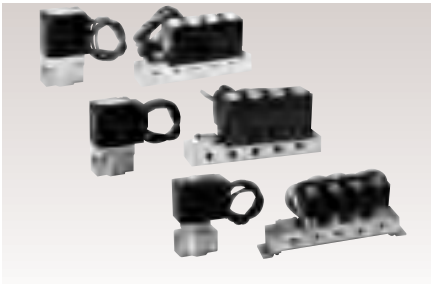
PDVE4 (dust collector valve)

Model no.	Port size	Page
PDVE4	Rc3/4 to Rc2	General purpose valves

2, 3 port valve (air blow)

General purpose valves

Compact poppet type
■ Power consumption 3 to 11.5 W/DC

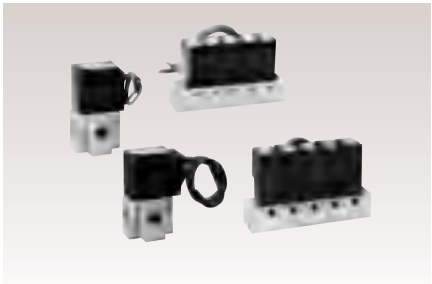


Special purpose 2 port direct acting valve

FA/FG/FV (special purpose valve)

Model no.	Working fluid and port size	Page
Discrete valve		
FAB	For compressed air M5 to Rc1/2	General purpose valves
FGB	For dry air Rc1/8 to 1/2	
FVB	For medium vacuum Rc1/8 to 1/2	
Manifold		
GFAB	For compressed air M5 to Rc3/8	General purpose valves
GFGB	For dry air M5 to Rc3/8	
GFVB	For medium vacuum M5 to Rc3/8	

Compact poppet type
■ Power consumption 3 to 11.5 W/DC

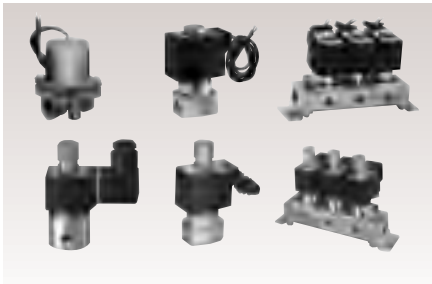


Special purpose 3 port direct acting valve

FA/FG (special purpose valve)

Model no.	Working fluid and port size	Page
Discrete valve		
FAG	For compressed air M5 to Rc3/8	General purpose valves
FGG	For dry air Rc1/8 to 3/8	
Manifold		
GFAG	For compressed air M5 to Rc1/4	General purpose valves
GFGG	For dry air Rc1/8 to 1/4	

Compact poppet type
■ Power consumption 3.8 to 11 W (60Hz)

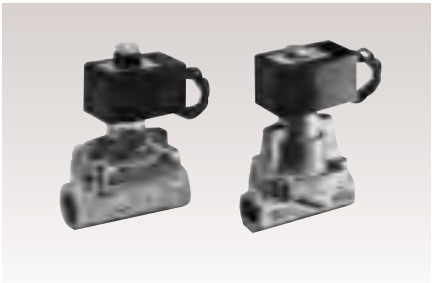


General purpose 2, 3 port direct acting valve

AB/AG (general purpose valve)

Model no.	Port size	Page
Discrete valve / 2 port valve		General purpose valves
AB	Rc1/8 to Rc1/2	
Manifold / 2 port valve		
GAB	Rc1/4	
Discrete valve / large bore size 2 port valve		
AB71	Rc1/2 to Rc1	
Discrete valve / 3 port valve		
AG	Rc1/8 to Rc3/8	
Manifold / 3 port valve		
GAG	Rc1/8 to Rc3/8	

Large poppet type
■ Power consumption 3.8 to 48 W (60Hz)

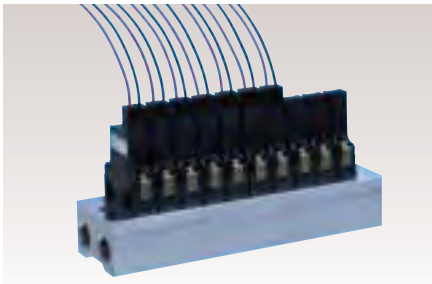


General purpose 2 port pilot operated valve

AD/AP (general purpose valve)

Model no.	Port size	Page
Piston structure		General purpose valves
AP11·12	8 A to 25 A	
AP21·22	Rc1 1/4 to 50 flange	
Diaphragm structure		
AD11·12	8 A to 25 A	
AD21·22	Rc1 1/4 to 50 flange	
Pilot kick type piston structure		
APK11·21	Rc1/4 to 50 flange	
Pilot kick type diaphragm structure		
ADK11·12·21	Rc1/4 to 50 flange	

Miniature poppet type
■ Power consumption 3.4 to 4 W (60Hz)

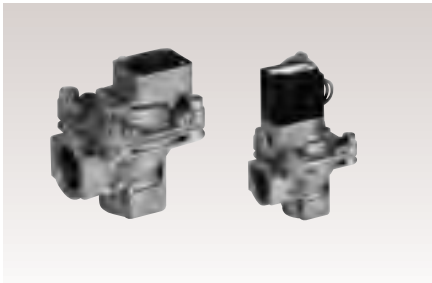


2 port valve for air blow

PJ/FAPB/FAD

Model no.	Port size	Page
Direct acting		General purpose valves
PJ, GPJ	ø6	
FAPB	ø8	
Pilot operated		
FAD	Rc1/4 to Rc1/2	General purpose valves

Medium size poppet type
■ Power consumption 3.4 to 10 W (60Hz)



2 port pilot operated valve for large flow rate air blow

PD/PDV (dust collector valve)

Model no.	Port size	Page
Air operated valve		General purpose valves
PD3	Rc3/4 to Rc1 1/2	
PD2	Rc2	
Solenoid valve		
PDV3	Rc3/4 to Rc1 1/2	
PDV2	Rc2	
Manifold solenoid valve for PD3 control (direct acting)		
PJVB	Rc1/8, Rc1/4	
Controller for dust collector valve		
OMC2	Output step number 6, 10	

Selection guide 1

According to products variation

Select products according to appearance and features.

NEW indicates models added to the 7th Edition.

Master valve

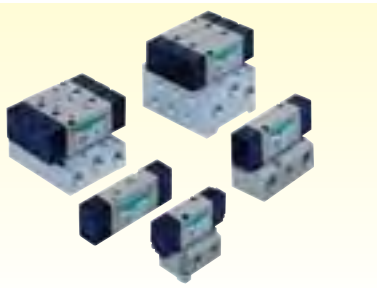
3, 5 port valve
ø20 to ø100 cylinder

4G

Page P.335-

Model no.	Specifications / bore size	Page
Discrete valve		
3GA 4GA	Body porting ø4 to Rc1/4	338
4GB	Sub-base porting Rc1/8 to Rc3/8	348
Manifold		
M3GA M4GA	Body porting ø4 to Rc1/4	338
M4GB	Sub-base porting ø4 to Rc1/4	348

3, 4, 5 port valve
ø20 to ø160 cylinder

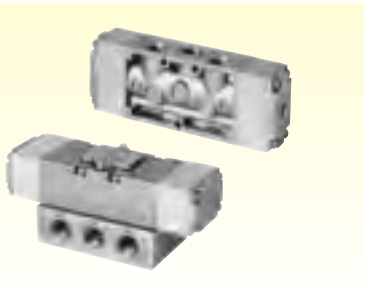


4K (pneumatic valve)

Page P.867-

Model no.	Specifications / bore size	Page
Discrete valve		
3KA1 4KA	Body porting M5 to ø12	868
4KB	Sub-plate porting Rc1/8 to Rc1/2	874
Manifold		
M3KA1 M4KA	Body porting M5 to ø12	868
M4KB	Sub-plate porting M5 to ø12	874

5 port valve
ø10 to ø250 cylinder



4F (pneumatic valve)

Page P.961-

Model no.	Specifications / bore size	Page
Discrete valve		
4F0 to 3	Body porting	962
4F4 to 7	Sub-plate porting	
Manifold		
(A) M4F0 to 3	Body porting	962
M4F4 to 7	Sub-plate porting	

Manual switching valve

Manual switchover 4 port valve
ø40 to ø160 cylinder

Slide valve method manual switching valve

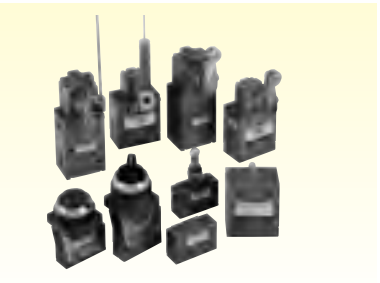
HMV/HSV

Page P.1181-

Model no.	Port size	Page
HMV	Miniature type Rc1/4	1184
HSV	Standard type Rc1/4 to 3/4	1184

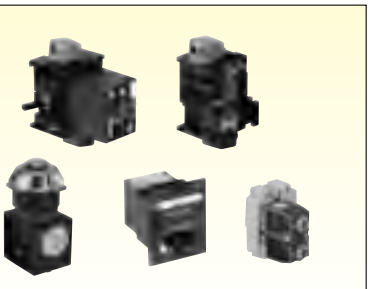
All pneumatic systems

Pneumatic, vacuum and auxiliary components



Total air system

Model no.	Specifications / bore size	Page
Detector (mechanical valve)		Pneumatic, vacuum and auxiliary components
MS	Small Rc1/8, ø4	
MM	Medium Rc1/8, ø4	
MAVL	Large Rc1/4	
Circuit device (logic valve)		
ø4		

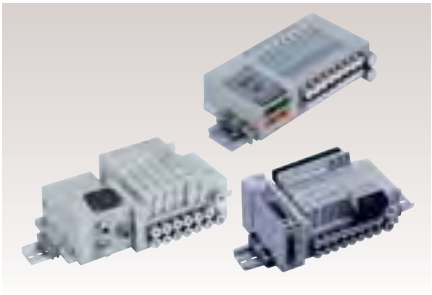


Gamma system

	Page
PLC circuit component	Pneumatic, vacuum and auxiliary components
Signal controllers	

* These products are available only in Japan.

Serial transmission system



Model no.	Specifications	Page
OPP2	Protective structure (IP64)	Intro 35
OPP3	Flat cable compatible slave unit	
OPP4	Thin shape	
OPP5	Protective structure (IP65) I/O block	
OPP6	Miniature 32 point	

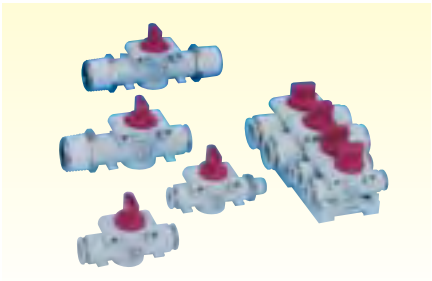
[Serial transmission system]

Model no.	Specifications	Page
UNIWIRE ® SYSTEM		CC-756 UNIWIRE SYSTEM *1
UW	Serial parallel transmission system	
SAVE NET		CC-604 SAVE NET *1
CSN	High speed transmission system	

*1. Separate catalog available

Related products P.1187-

Push-in joint



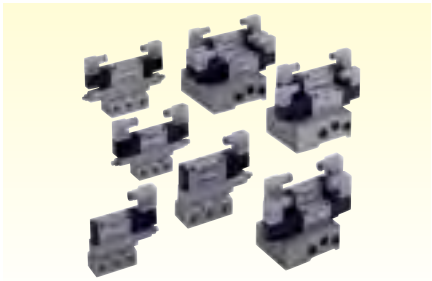
Quick exhaust valve

2QV/3QV

Page P.1187-

Model no.	Specifications	Page
2QV	2 way valve	1192
3QV	3 way valve	

ø25 to ø125 cylinder



Shock absorbing valve

SKH

Page P.1197-

Model no.	Specifications	Page
SKH	Speed variable unit	1202
SKH	Deceleration unit	
SKH	Single decelerating unit	

4, 5 port solenoid valve

PCD/FS/FD

Page P.1219-

Model no.	Specifications	Page
PCD	4, 5 port pilot type poppet valve	1220
FS	3, 5 port direct acting valve	
FD	5 port direct acting valve	

Guide to model changeovers

The series listed in this catalog have undergone a model changeover with this new series. Consider using the new series when making a selection.

■5 port pilot operated valve (ISO conformed valve)

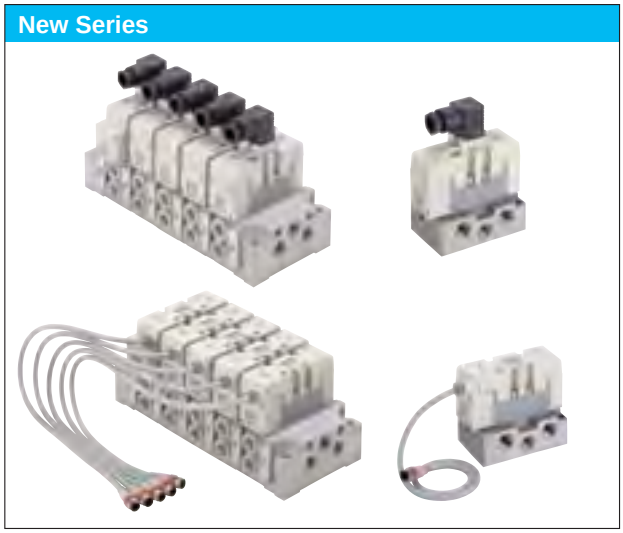
PV5/CMF

Old Series

■5 port pilot operated valve (ISO conformed valve)

PV5G/PV5/CMF

New Series



Icons

To simplify use of this catalog, we have prepared icons for each item, indicated in corresponding sections.

Mark	Meaning	Details
	A CAD mark in dimension drawings indicates that CAD data is available.	Intro 15
	EU Standards-compliant product.	Intro 17
	RoHS-compliant product.	Intro 19

CKD Electronic Catalog guide (CAD DATA)

Using and ordering the Electronic Catalog

The CKD Electronic Catalog is a collection of CAD drawings including dimensions drawings (CAD data) related to pneumatic components and control components. This data is provided on CD-ROM to aid in CAD design.
Please contact your CKD Sales person or your nearest sales office to order this CD.

Indicate the following information when placing your order:

1 CAD software name and version 2 OS name

There are three types of CD-ROM depending on the recorded CAD software and OS type. Be sure to indicate the name of the CAD software and OS you are using.

Compatible CAD types

1 DXF
2 MICRO CADAM Ver1.9
3 DMNDOS (MICRO CADAM DOS ver.)

Downloading from the internet

http://www.ckd.co.jp/

DXF data can be used from the

CKD website Component Products > **Catalog/CAD data**

CKD Electronic Catalog contents

The following data and software are recorded on CD-ROM "CAD DATA 2006."

- Pneumatic component and control component figure data (DXF, MICRO CADAM, DMNDOS)
- README.TXT (Use and precautions)
- Kensaku.exe (CAD drawing search program)
- List.xls (DXF CAD data list)
- List_mc.xls (MC CAD data list)

How to use Electronic Catalog

Operating the CAD

Contact the CAD maker for details on operating CAD -

- Reading files
- Creating graphics
- Usable data formats

etc.

Confirmation before use

Read the README.TXT file on the CD-ROM before starting use. Information on

- How to use the CKD Electronic Catalog
- Precautions
- For version information,

confirm "README.txt" contained in CD-ROM.

Electronic Catalog file list

Refer to

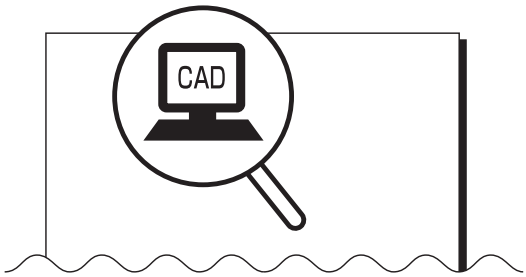
- List.xls
- List_mc.xls

on the CD-ROM for the latest files of Electronic Catalog files.

Searching the Electronic Catalog file name

1 Searching from this catalog

CAD data is available for items with a CAD mark in dimensions.



2 Searching from CD-ROM

When the CD-ROM is inserted in the drive, "CAD Data Search Software" starts and the search screen at right opens. (*1) Required CAD data is searched for and saved on the hard disk.

*1: If the automatic start function is not set, start up "Kensaku.exe" in the CD-ROM. This search software need not be installed.

CE marking

CKD supports our customer's machine products CE Marking with a wide range of EU Standard-compatible components.

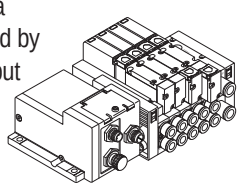
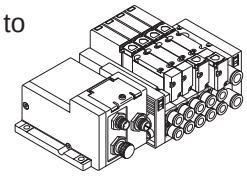
CE :Indicated on EU Standard-compatible products.

CE Marking

- The CE Marking attests that the product satisfies all EC Directive requirements to which it is subject.
- CE Marking is a passport for products to the EU. Products with the CE Marking can be freely distributed within the EU.
- Machines exported to the EU must comply with Machinery Directives, EMC Directives, and Low-Voltage Directives, etc. In principle, CE Marking must be indicated on the final product marketed and, basically, built-in components do not require CE Markings. If compliance of built-in parts (CKD products) with EU Standards can be verified, CE Marking of the final product (customer's machine product) can be easily obtained.

Details on EC Directives

CKD's main components, such as the solenoid valve, sensors, and direct drive actuator, must comply with the Directives below. Many models already comply with EU Standards.

Directive	Requirements	Application
Machinery directives (89/392/EEC)	Requirements for Machine Safety	■ Machine having a drive section Components such as solenoid valves are not subject to this compliance, but the user obtains CE Marking certification easier by complying with Standards. 
EMC directive (89/336/EEC)	Measures against electromagnetic interference emission (EMI emission) and electromagnetic interference elimination performance (EMS immunity).	■ Devices that generate electromagnetic interference or that are affected by electromagnetic interference Solenoid valves composed of a simple solenoid are not affected by electromagnetic interference, but the user can obtain CE Marking certification easier by complying with Standards. 
Low-Voltage Directive (73/23/EEC)	Safety regarding electricity, such as electrical shock	■ Machine operating at 50 to 1000VAC and 75 to 1500 VDC 
Simple Pressure Vessels Directive (87/404/EEC)	Safety regarding vessel leakage and explosions	■ Welded vessel having sum (PV/S) of maximum working pressure and volume exceeding 50 bar/liter The CKD air tank (AT type) does not comply with this directive, and cannot be exported to the EU. 

A total of 28 countries require CE Marking compliance, including 25 European Union (EU) countries and three European Free Trade Association (EFTA) countries.

EU members: U.K, Ireland, France, Belgium, Denmark, Netherlands, Italy, Germany, Luxembourg, Portugal, Spain, Greece, Sweden, Finland, Austria, Poland, Hungary, Czech, Slovakia, Lithuania, Latvia, Estonia, Slovenia, Malta, Cyprus (Only Southern Republic of Cyprus)

EFTA members: Norway, Iceland, Liechtenstein (Excluding Switzerland)

CKD EU Standard-Compliant Parts

Depending on specifications and detailed model combinations, certified parts may not be available. Contact your CKD Sales Representative for details. Certified part model: Indicated with -ST at the end of the model.

Refer to the CKD web site for the latest information.
Home Page Address http://www.ckd.co.jp/

CKD RoHs compliance

CKD's theme is to develop environmentally friendly products.

RoHS

RoHS is the abbreviation for Restriction Of the use of certain Hazardous Substances in electrical and electronic equipment. This is the directive prohibiting use of certain hazardous substances issued by the EU.

- CKD started compliance with RoHS Directives on July 1, 2006.
- RoHS-compliant products reduce the load on the environment and ensure distribution throughout the EU.

CKD's Environment Policy

Based on the CKD Environment Policy enacted in 2001, CKD has been promoting company-wide environment management activities to protect the global environment.

CKD's Environment Policy

1. Development and sales of environment load reducing products
2. Reduction of environment-polluting substances
3. Promotion of energy conservation and resource reduction
4. Waste reduction

CKD's Compliance with RoHS

Products subject to RoHS Directions fall within the Applicable scope in 1 , below. While CKD's components are not included in this applicable range, we have positioned the reduction of environment-polluting chemicals as high-priority. From July 1, 2006, we have sequentially enforced RoHS compliance of our key products. These products are indicated with the "RoHS-compliant" mark in this manual.

Note: Stock in distribution is being sequentially changed to RoHS compliance.

Technical data

Enactments of WEEE Directive and RoHS Directive

EU Directives related to Waste Electrical and Electronic Equipment (WEEE) and Restriction on Hazardous Substances Directive (RoHS) have been enacted by the EU.

WEEE directive

(Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment)

This directive eliminates waste electrical and electronic equipment and reduces waste through reuse and recycling, etc.

RoHS directive

(Directive 2002/95/EC of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment)

This directive assimilates laws related to limiting the use of hazardous substances in electrical and electronic devices set forth by each EU member state, contributes to the protection of human health, and provides sufficient means for processing and recycling waste electrical and electric products.

1 Applicable scope

1. Large household appliances
2. Small household appliances
3. IT and telecommunications equipment
4. Consumer equipment
5. Lighting equipment
6. Electric tools, excluding large fixed industrial tools
7. Toys, leisure and sporting goods
8. Vending machines

2 Details of Directive

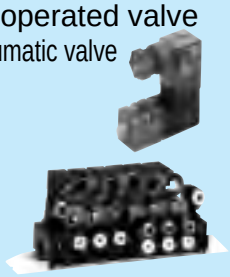
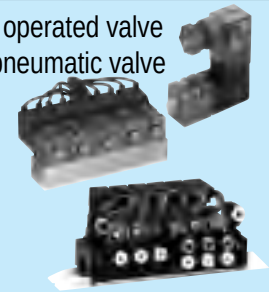
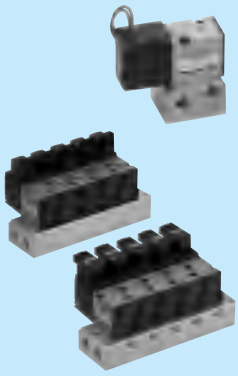
Restricted Substances

- Lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

Import of electrical and electronic equipment containing the above substances into the EU was prohibited as a rule from July 1, 2006.

According to flow characteristics C

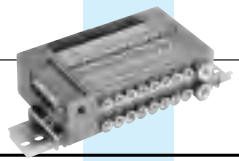
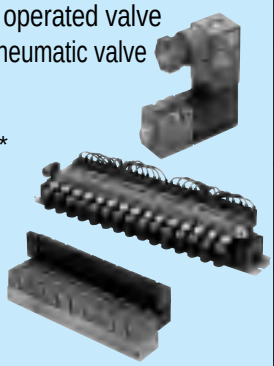
Select a model according to flow characteristics C.

Port	Series	Wiring method: Discrete	Wiring method: Manifold: Individual	Wiring method: Manifold: Reduced	Model no.	Port size	Flow characteristics C ($dm^3/(s \cdot bar)$) 0 – 0.2 – 0.4 – 0.6 / Effective sectional area (mm^2) 0 – 1 – 2 – 3
2 port	2 port pilot operated valve Miniature pneumatic valve P512* B512* M512* B*P512* N*P512* 	●			P512*	-	
		●			B512*	M5, Rc1/8	
		●			M512*	M5	
			●		B*P512*	M5, Rc1/8	
			●		N*P512*	ø4 push-in joint	
3 port	3 port direct acting valve Small pneumatic valve 3M Series 	●			3MA0	ø4 barbed joint (M3)	
		●			3MB0	M3	
			●		M3MA0	ø4 barbed joint (M5)	
			●		M3MB0	M3, M5 ø4 push-in joint ø4, ø6 barbed joint	
	3 port pilot operated valve Miniature pneumatic valve P513* B513* M513* B*P513* N*P513* 	●			P513*	-	
		●			B513*	M5 x 0.8, Rc1/8	
		●			M513*	M5	
			●		B*P513*	M5, Rc1/8	
			●		N*P513*	ø4 push-in joint	
	3 port direct acting valve Pneumatic valve 3P Series 	●			3PA1	M5 ø4, ø6 push-in joint	
		●			3PA2	Rc1/8 ø6, ø8 push-in joint	
		●			3PB1	Rc1/8	
		●			3PB2	Rc1/8, Rc1/4	
			●		M3PA1	M5 ø4, ø6 push-in joint	
			●		M3PA2	Rc1/8 ø6, ø8 push-in joint	
			●		M3PB1	Rc1/8, ø4, ø6 push-in joint	
			●		M3PB2	Rc1/8, ø6, ø8 push-in joint	
	3 port pilot operated valve MN3E0 Series			●	MN3E0	M5 ø4, ø6 push-in joint	
				●	Two 3 port valve integrated MN3E0	M5 ø4, ø6 push-in joint	
	3 port pilot operated valve Pneumatic valve 4K Series	●			3KA1	M5 ø4, ø6 push-in joint	
			●		M3KA1	M5 ø4, ø6 push-in joint	

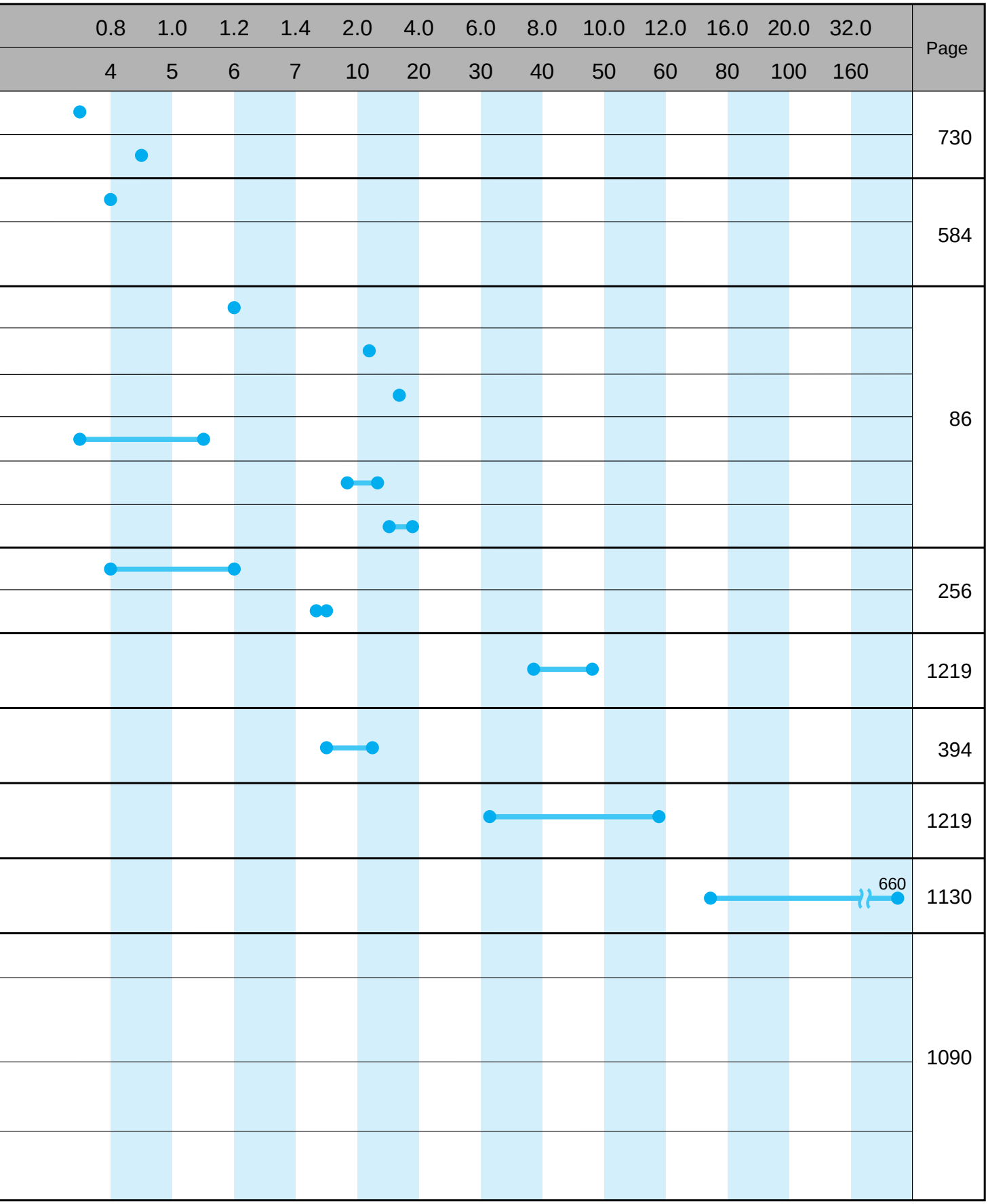
Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.

0.8	1.0	1.2	1.4	2.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	32.0	Page
4	5	6	7	10	20	30	40	50	60	80	100	160	
													1090
													1048
													1090
													1064
													6
													778

According to flow characteristics C

Port	Series	Wiring method: Discrete	Wiring method: Manifold Individual	Wiring method: Manifold Reduced	Model no.	Port size	Flow characteristics C ($dm^3/(s \cdot bar)$) 0 – 0.2 – 0.4 – 0.6 / Effective sectional area (mm^2) 0 – 1 – 2 – 3
3 port	3 port pilot operated valve Small pneumatic valve 4S1 Series	●			3SA1	M5 ø4, ø6 push-in joint	
			●	●	M3SA1	M5 ø4, ø6 push-in joint	
	3 port pilot operated valve Pneumatic valve MN4S0 Series			●	MN3S0 MT3S0	M5 ø4, ø6 push-in joint	
				●	Two 3 port valve integrated MN3S0 MT3S0	M5 ø4, ø6 push-in joint	●
	3 port pilot operated valve 4G Series 	●			3GA1	M5 ø4, ø6 push-in joint	
		●			3GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
		●			3GA3	Rc1/4 ø6, ø8, ø10 push-in joint	
			●	●	M3GA1	M5 ø4, ø6 push-in joint	
			●	●	M3GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
			●	●	M3GA3	Rc1/4 ø6, ø8, ø10 push-in joint	
			●	●	MN3GA1	M5 ø4, ø6 push-in joint	
			●	●	MN3GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
	General purpose 3 port valve FS1 Series 	●			FS-1	Rc1/4 to Rc1/2	
	3 port pilot operated valve W4G2 Series			●	MW3GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
	3 port poppet type valve PCD Series 	●			PCD	Rc1/4 to Rc1/2	
	3 port large flow rate valve NP Series 	●			NP13 NP14 NAP11 NVP11	Rc3/8 to Rc2	
4, 5 port	5 port pilot operated valve Miniature pneumatic valve P514* B514* W2P513* B*P514* N*P514* 	●			W2P513*	M5	●●
		●			P5142	–	
		●			B5142	M5	●●
			●		B*P5142	M5 Rc1/8	●●
			●		N*P5142	ø4 push-in joint	●●

Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.



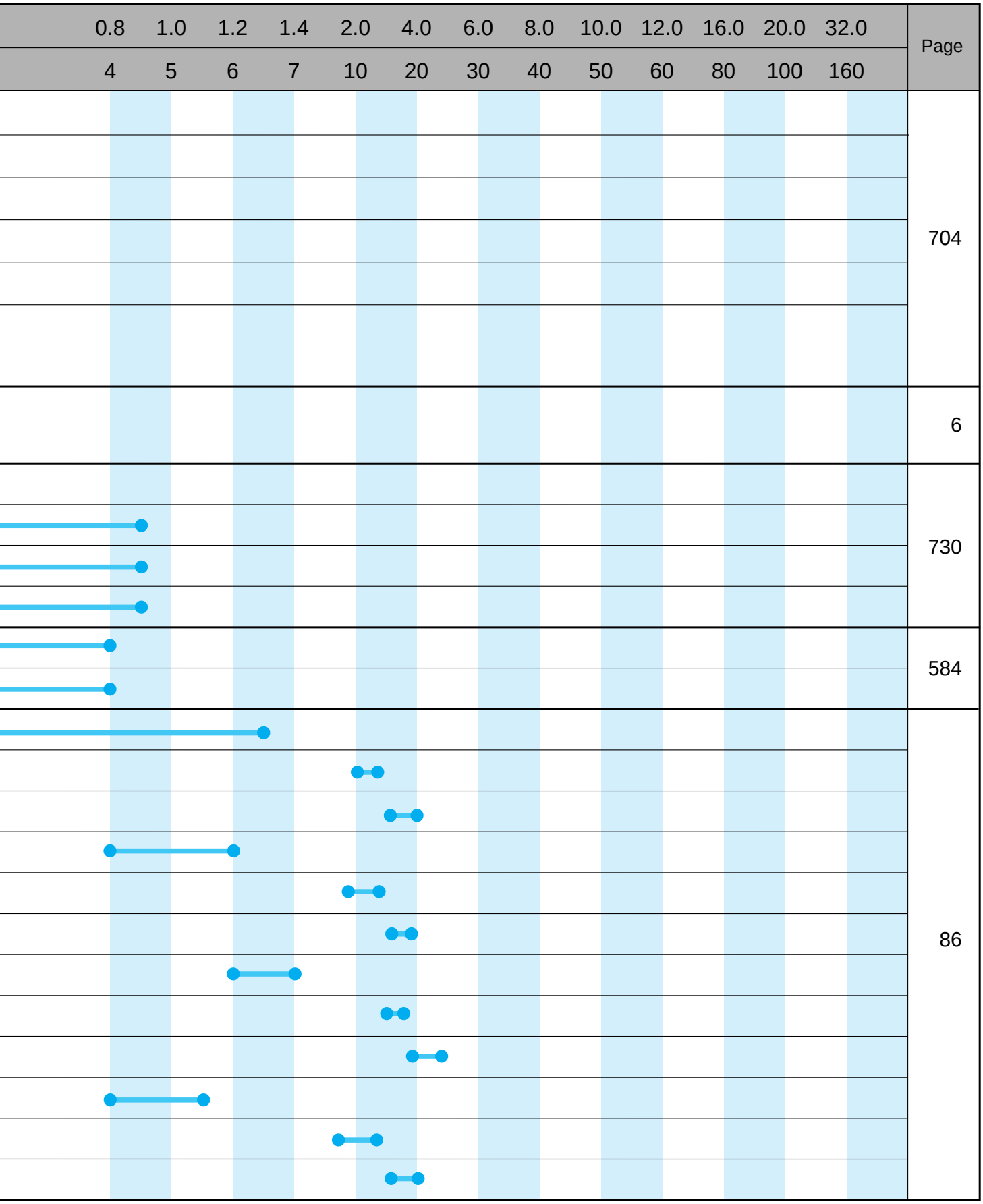
According to flow characteristics C

Port	Series	Wiring method: Discrete	Wiring method: Manifold: Individual	Wiring method: Manifold: Reduced	Model no.	Port size
4, 5 port	5 port pilot operated valve Small pneumatic valve 4S0 Series	●			4SA0	M3
						ø4 barbed joint
		●			4SB0	M5
			●		M4SA0	M3
						ø4 barbed joint
			●	●	M4SB0	M5 ø4 push-in joint ø4, ø6 barbed joint
	4 port pilot operated valve MN4E0 Series			●	MN4E0	M5 ø4, ø6 push-in joint
	5 port pilot operated valve Small pneumatic valve 4S1 Series	●			4SA1	M5 ø4, ø6 push-in joint
		●			4SB1	Rc1/8
			●	●	M4SA1	M5 ø4, ø6 push-in joint
			●	●	M4SB1	
	4 port pilot operated valve Pneumatic valve MN4S0 Series		●	●	MN4S0	M5 ø4, ø6 push-in joint
			●	●	MT4S0	
	5 port pilot operated valve 4G Series	●			4GA1	M5 ø4, ø6 push-in joint
		●			4GA2	Rc1/8 ø4, ø6, ø8 push-in joint
		●			4GA3	Rc1/4 ø6, ø8, ø10 push-in joint
			●	●	M4GA1	M5 ø4, ø6 push-in joint
			●	●	M4GA2	Rc1/8 ø4, ø6, ø8 push-in joint
			●	●	M4GA3	Rc1/4 ø6, ø8, ø10 push-in joint
		●			4GB1	Rc1/8
		●			4GB2	Rc1/4
		●			4GB3	Rc1/4, Rc3/8
			●	●	M4GB1	M5 ø4, ø6 push-in joint
			●	●	M4GB2	Rc1/8 ø4, ø6, ø8 push-in joint
			●	●	M4GB3	Rc1/4 ø6, ø8, ø10 push-in joint

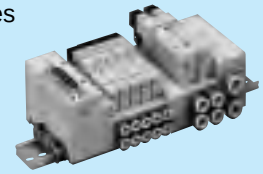
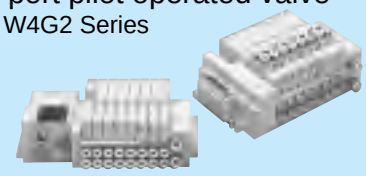
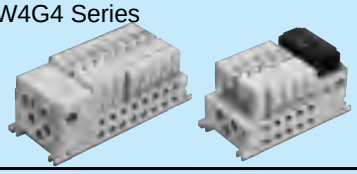
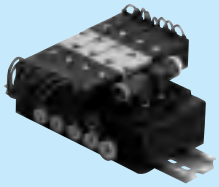
Flow characteristics C ($dm^3/(s \cdot bar)$): 0 | 0.2 | 0.4 | 0.6

Effective sectional area (mm^2): 0 | 1 | 2 | 3

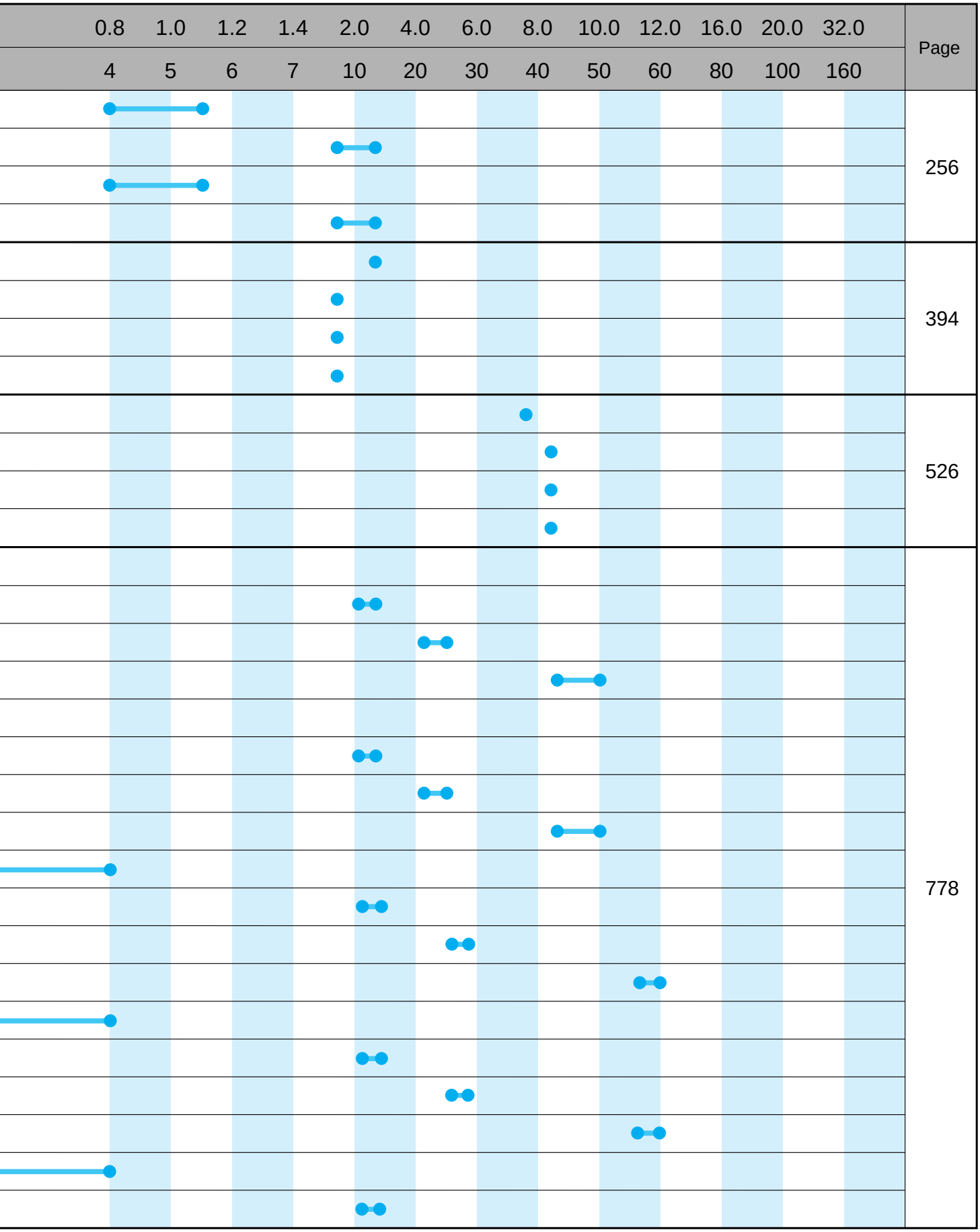
Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.



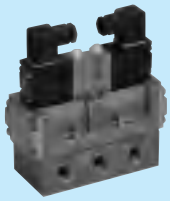
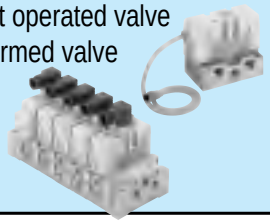
According to flow characteristics C

Port	Series	Wiring method: Discrete	Wiring method: Manifold Individual	Wiring method: Manifold Reduced	Model no.	Port size	Flow characteristics C ($dm^3/(s \cdot bar)$) 0 – 0.2 – 0.4 – 0.6 / Effective sectional area (mm^2) 0 – 1 – 2 – 3
4, 5 port	5 port pilot operated valve 4G Series 		●	●	MN4GA1	M5 ø4, ø6 push-in joint	
			●	●	MN4GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
			●	●	MN4GB1	ø4, ø6 push-in joint	
			●	●	MN4GB2	ø4, ø6, ø8 push-in joint	
	5 port pilot operated valve W4G2 Series 	●			W4GB2	Rc1/4	
			●	●	MW4GA2	Rc1/8 ø4, ø6, ø8 push-in joint	
			●	●	MW4GB2	ø4, ø6, ø8 push-in joint	
			●	●	MW4GZ2	ø4, ø6, ø8 push-in joint	
	5 port pilot operated valve W4G4 Series 	●			W4GB4	Rc1/4, Rc3/8 Note 3	
		●			W4GZ4	Rc1/4, Rc3/8 Note 3	
			●	●	MW4GB4	Rc1/4, Rc3/8 ø8, ø10, ø12 push-in joint Note 3	
			●	●	MW4GZ4	Rc1/4 Note 3	
	5 port pilot operated valve Pneumatic valve 4K Series   	●			4KA1	M5 ø4, ø6 push-in joint	
		●			4KA2	Rc1/8 ø6, ø8 push-in joint	
		●			4KA3	Rc1/4 ø8, ø10 push-in joint	
		●			4KA4	Rc3/8 ø10, ø12 push-in joint	
			●		M4KA1	M5 ø4, ø6 push-in joint	
			●		M4KA2	Rc1/8 ø6, ø8 push-in joint	
			●		M4KA3	Rc1/4 ø8, ø10 push-in joint	
			●		M4KA4	Rc3/8 ø10, ø12 push-in joint	
		●			4KB1	Rc1/8	
		●			4KB2	Rc1/8, Rc1/4	
		●			4KB3	Rc1/4, Rc3/8	
		●			4KB4	Rc3/8, Rc1/2	
			●		M4KB1	M5, Rc1/8 ø6 push-in joint	
			●		M4KB2	Rc1/8, Rc1/4 ø6, ø8 push-in joint	
			●		M4KB3	Rc1/4, Rc3/8 ø8, ø10 push-in joint	
			●		M4KB4	Rc3/8, Rc1/2 ø10, ø12 push-in joint	
			●		MN4KB1	ø4, ø6, ø8 push-in joint	
			●		MN4KB2	ø6, ø8, ø10 push-in joint	

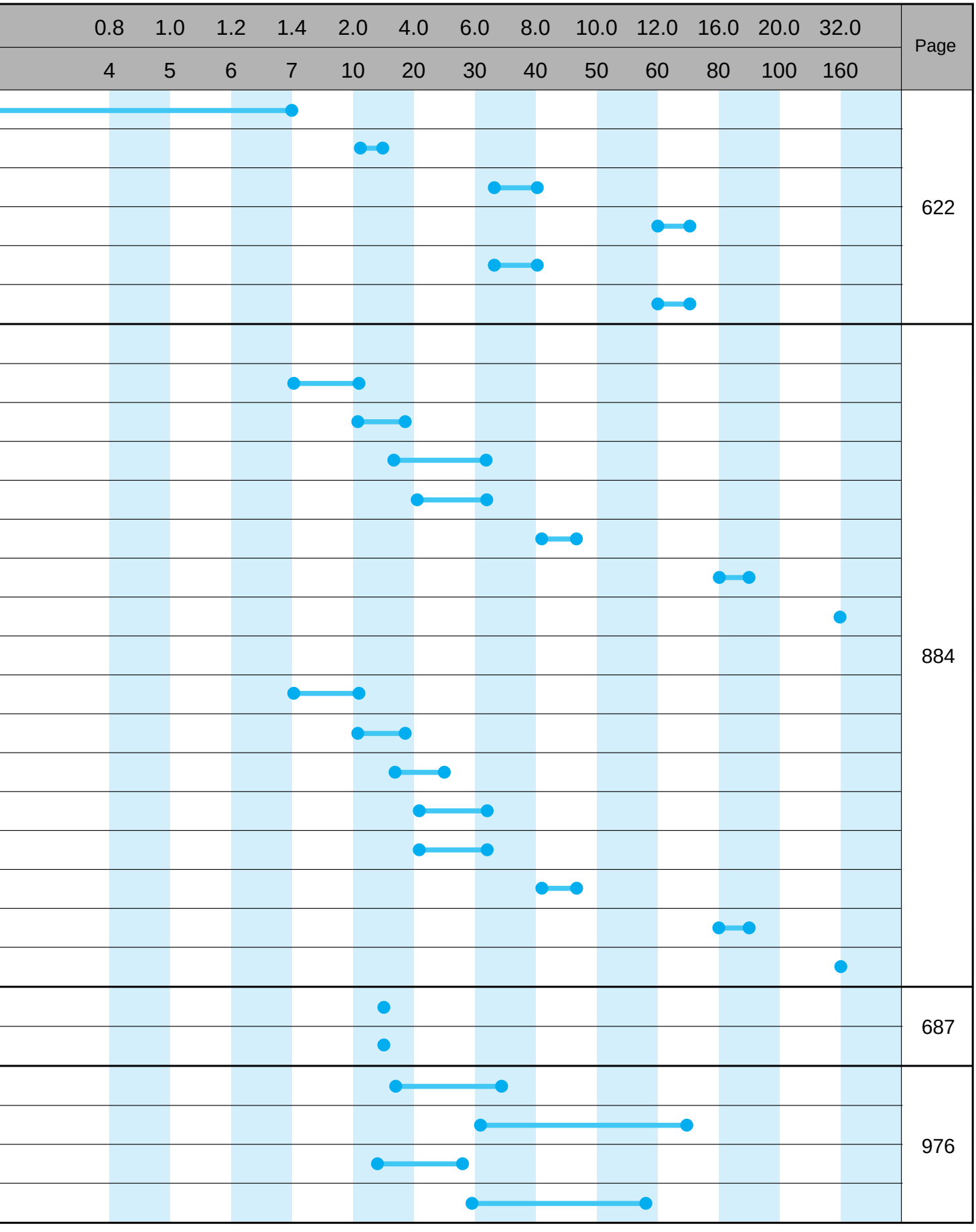
Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.
Note 3: G threads and NPT threads are also available.



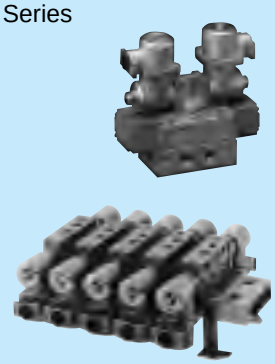
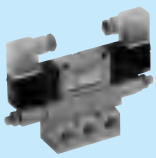
According to flow characteristics C

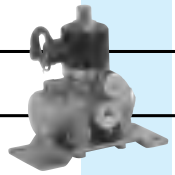
Port	Series	Wiring method: Discrete	Wiring method: Manifold Individual	Wiring method: Manifold Reduced	Model no.	Port size	Flow characteristics C ($dm^3/(s \cdot bar)$) 0 0.2 0.4 0.6 / Effective sectional area (mm^2) 0 1 2 3
4, 5 port	4, 5 port pilot operated valve 4T Series (Plug-in type) 			●	MN4TB1	ø4, ø6, ø8 push-in joint	
				●	MN4TB2	ø6, ø8, ø10 push-in joint	
		●			4TB3	Rc1/4, Rc3/8	
		●			4TB4	Rc3/8, Rc1/2	
				●	M4TB3	Rc1/4, Rc3/8	
				●	M4TB4	Rc3/8, Rc1/2	
	5 port pilot operated valve Pneumatic valve 4F Series  	●			4F0	M5, Rp1/8	
		●			4F1	Rp1/8, Rp1/4	
		●			4F2	Rp1/4	
		●			4F3	Rp1/4, Rp3/8	
		●			4F4	Rc1/4, Rc3/8	
		●			4F5	Rc3/8, Rc1/2	
		●			4F6	Rc1/2, Rc3/4	
		●			4F7	Rc3/4, Rc1	
			●		M4F0	M5, Rp1/8	
			●		M4F1	Rp1/8, Rp1/4	
			●		M4F2	Rp1/4	
			●		M4F3	Rp1/4	
						Rp3/8	
			●		M4F4	Rc1/4	
			●		M4F5	Rc3/8	
			●		M4F6	Rc1/2	
			●		M4F7	Rc3/4	
	5 port pilot operated valve Pneumatic valve 4L2-4/LMF0 Series (Plug-in type)	●			4L2-4	Rc1/4	
				●	LMF0	Rc1/8, Rc1/4 ø4, ø6 push-in joint	
	5 port pilot operated valve ISO conformed valve PV5G/ PV5/ CMF Series 	●			PV5G-6, PV5-6	Rc1/4, Rc3/8	
		●			PV5G-8, PV5-8	Rc3/8 to Rc3/4	
			●		CMF1	Rc1/4, Rc3/8	
			●		CMF2	Rc3/8, Rc1/2	

Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.

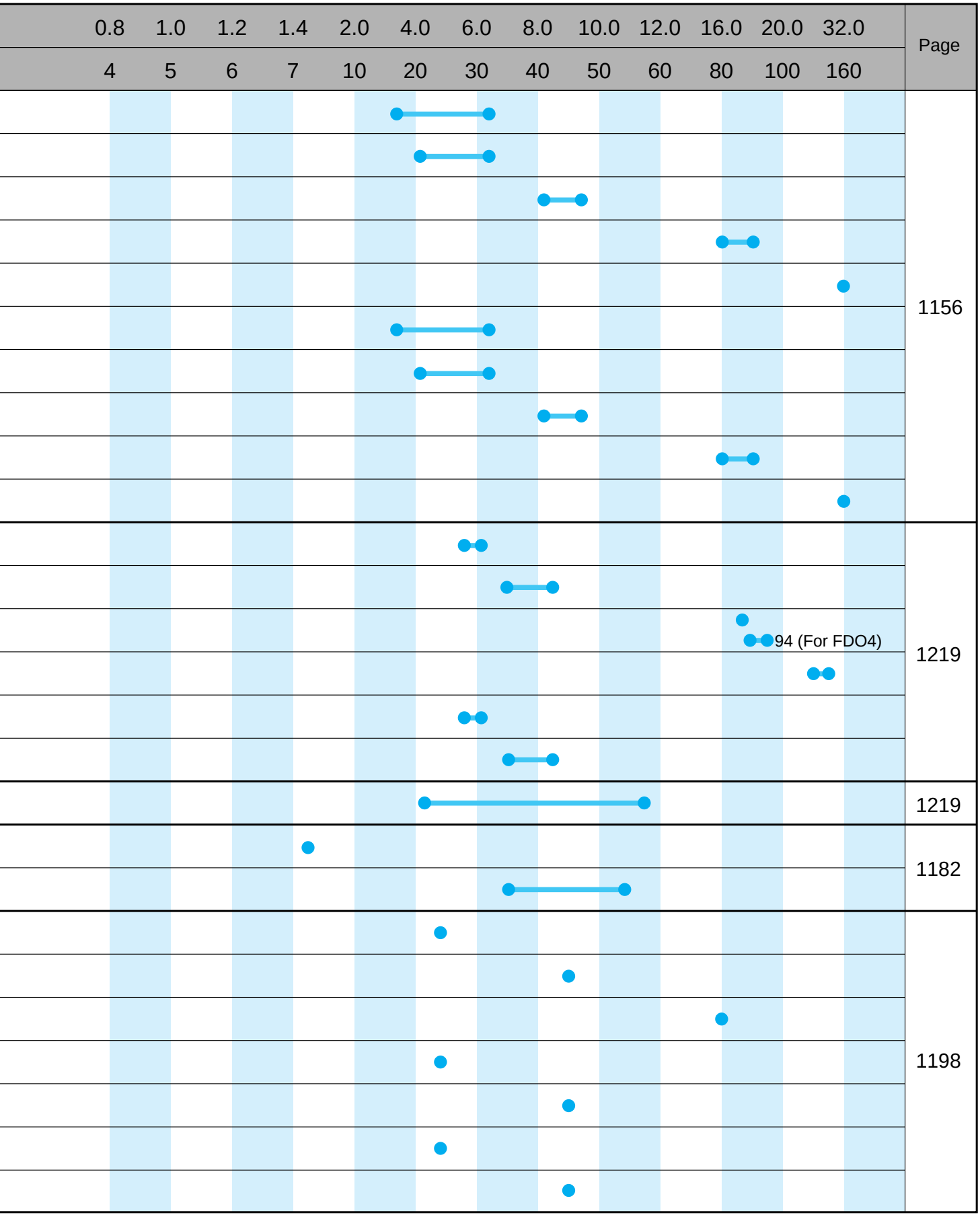


According to flow characteristics C

Port	Series	Wiring method: Discrete	Wiring method: Manifold Individual	Wiring method: Manifold Reduced	Model no.	Port size	Flow characteristics C ($dm^3/(s \cdot bar)$) 0 – 0.2 – 0.4 – 0.6 / Effective sectional area (mm^2) 0 – 1 – 2 – 3
4, 5 port	Explosion proof 5 port valve Pneumatic valve 4F**0E Series 	●			4F3*0E	Rp1/4, Rp3/8	
		●			4F4*0E	Rc1/4, Rc2/8	
		●			4F5*0E	Rc3/8, Rc1/2	
		●			4F6*0E	Rc1/2, Rc3/4	
		●			4F7*0E	Rc3/4, Rc1	
			●		M4F3*0E	Rp1/4, Rp3/8	
			●		M4F4*0E	Rc1/4	
			●		M4F5*0E	Rc3/8	
			●		M4F6*0E	Rc1/2	
			●		M4F7*0E	Rc3/4	
	4, 5 port metal spool type valve FS Series FD Series 	●			$F^{S}_{D}2$	Rc1/4, Rc3/8	
		●			F^{S}_{D}(*) 3	Rc1/4 to Rc1/2	
		●			F^{S}_{D}(*) 4	Rc1/2, Rc3/4	
		●			$F^{S}_{D}5$	Rc3/4, Rc1	
			●		$MF^{S}_{D}2$	Rc1/4, Rc3/8	
			●		$MF^{S}_{D}3$	Rc1/4 to Rc1/2	
	4 port poppet valve PCD Series	●			PCD	Rc1/4, Rc3/8, Rc1/2	
	Manual switchover 4 port valve HMV/HSV Series 	●			HMV	Rc1/4	
		●			HSV	Rc1/4 to Rc3/4	
Related products	Shock absorbing valve SKH Series 	●			$SKH3^{2}_{3}{}^{0}_{5}$	Rc3/8, Rc1/2	
		●			$SKH4^{2}_{3}{}^{0}_{5}$	Rc3/8, Rc1/2	
		●			$SKH5^{2}_{3}{}^{0}_{5}$	Rc3/8, Rc1/2	
		●			$SKH3^{2}_{3}{}^{8}_{5}$	Rc1/4, Rc3/8, Rc1/2	
		●			$SKH4^{2}_{3}{}^{8}_{5}$	Rc1/4, Rc3/8, Rc1/2	
		●			SKH318	Rc1/4, Rc3/8, Rc1/2	
		●			SKH418	Rc1/4, Rc3/8, Rc1/2	



Note 1: Effective sectional area S and sonic conductance C is converted as S ≒ 5.0 X C.
Note 2: Typical examples of the port size are listed.



According to variation

Individual wiring manifold

Series name		Manifold model no.	Flow characteristics C (dm³/ (s·bar))	Effective sectional area (mm²)	Remarks	Page
4, 5 port valve						
Pilot operated soft spool valve	4S0 Series (Small pneumatic valve)	M4SA0	-	0.9		716
		M4SB0	0.29 to 0.32	-		
	4S1 Series (Small pneumatic valve)	M (D) 4SA1	0.50 to 1.0	-		746
		M (D) 4SB1	0.48 to 0.95			750
	4G Series	M4GA	0.66 to 3.3	-		156
		M4GB				172
		MN4GA				260
		MN4GB				268
	W4G2 Series	MW4GA2	1.7 to 2.3	-	One side solenoid/ plug-in type	418
		MW4GB2				438
		MW4GZ2				438
	W4G4 Series	MW4GB4	6.4 to 8.3	-	Plug-in type	538
		MW4GZ4				
	MN4S0 Series (Pneumatic valve)	MN4S0	0.57 to 0.80	-	One side solenoid type	590
		MT4S0				
	4K Series (Pneumatic valve)	M4KA	0.60 to 11	-		816
		M4KB				828
		MN4KB				848
	4F Series (Pneumatic valve)	(A) M4F0 M4F1 to M4F3	0.6 to 18	160 (4F7)		918
		M4F4 to 7				946
		M4F**E			Explosion proof	1172
	PV5G/PV5/CMF Series (ISO conformed valve)	CMF1	2.8 to 11.6	-		1028
		CMF2				1034
2, 3 port valve						
Pilot operated soft spool valve	3S1 Series (Small pneumatic valve)	M (D) 3SA1	0.83 to 1.04	-		746
	3G Series	M3GA	0.66 to 3.3	-		156
		MN3GA				260
	MN3S0 Series (Pneumatic valve)	MN3S0	0.80	-	One side solenoid type	590
		MT3S0				
	3K Series (Pneumatic valve)	M3KA	0.69	-		816
Direct acting poppet valve	3M Series (Small pneumatic valve)	M3MA0	-	0.1 to 0.5		1054
		M3MB0				
	3P Series (Pneumatic valve)	M3PA	0.31 to 1.1	-		1076
		M3PB				
Pilot operated poppet valve	P/M/B Series (Miniature pneumatic valve)	B*P51	0.09 to 0.15	-		1112
		N*P512/3/4				1118
Two 3 port valve integrated type						
Pilot operated soft spool valve	3G Series	M3GA	0.66 to 1.7	-		156
		M3GB				172
		MN3GA				260
		MN3GB				268
	MN3S0 Series (Pneumatic valve)	MN3S0	0.50	-	One side solenoid type	590
		MT3S0				

Note: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Reduced wiring manifold

Series name		Manifold model no.	Flow characteristics C (dm³/ (s·bar))	Remarks	Page
4, 5 port valve					
Pilot operated soft spool valve	MN4E0 Series	MN4E0	0.50 to 0.54	One side solenoid type	14
	4S0 Series (Small pneumatic valve)	M4SB0	0.29 to 0.32		720
	4S1 Series (Small pneumatic valve)	M (D) 4SA1	0.50 to 1.0		754
		M (D) 4SB1	0.48 to 0.95		760
	4G Series	M4GA	0.66 to 3.3		192
		M4GB			212
		MN4GA			276
		MN4GB			290
	W4G2 Series	MW4GA2	1.7 to 2.3	One side solenoid/ plug-in type	418
		MW4GB2			438
		MW4GZ2			438
	W4G4 Series	MW4GB4	6.4 to 8.3	Plug-in type	538
		MW4GZ4			
	MN4S0 Series (Pneumatic valve)	MN4S0 MT4S0	0.57 to 0.80	One side solenoid type	590
	4TB Series	MN4TB1	0.51 to 1.6	One side solenoid/ plug-in type	632
		MN4TB2	2.1 to 2.8		
		M4TB3	4.9 to 8.8		642
		M4TB4	9.6 to 13.8		
	4L2-4/LMF0 Series (Pneumatic valve)	LMF0	1.8 to 2.9	Plug-in type	690
3 port valve					
Pilot operated soft spool valve	MN3E0 Series	MN3E0	0.54	One side solenoid type	14
	3S1 Series (Small pneumatic valve)	M(D)3SA1	0.83 to 1.04		754
	3G Series	M3GA	0.66 to 3.3		192
		MN3GA			276
	W3G2 Series	MW3GA2	1.7 to 2.3	One side solenoid type	418
	MN3S0 Series (Pneumatic valve)	MN3S0 MT3S0	0.80	One side solenoid type	590
Two 3 port valve integrated type					
Pilot operated soft spool valve	MN3E0 Series	MN3E0	0.50	One side solenoid type	14
	3G Series	M3GA	0.66 to 1.7		192
		M3GB			212
		MN3GA			276
		MN3GB			290
	MN3S0 Series (Pneumatic valve)	MN3S0 MT3S0	0.50	One side solenoid type	590

Note: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

According to variation

Reduced wiring slave unit

Maker (Recommended body)	System name	Slave unit		Incorporated valve model no.	Remarks	Page
		Wiring block model no.*1	Shape *2			
CC-Link institution (CLPA) MITSUBISHI	CC-Link	T8G1/T8G2 T8G7	OPP5	MW4G2	Consult with CKD for compatible version.	391
		T7G1/T7G2	OPP6	MN4E0		1
		T7G1	OPP4	MN4G		71
		T6G1	OPP3	MN4E0		*1
				MN4G, M4G		71
				MN4S0		581
				M (D) 4SA/B1		729
		T6G1	OPP2	MW4G4		523
				MN4TB and M4TB		621
				LMF0		687
ODVA	DeviceNet	T8D1/T8D2 T8D7	OPP5	MW4G2	The flat cable connector T5* and DR-T1-OD16X (OMRON) combination may be available in addition to valves on the left. (Custom order)	391
		T7D1/T7D2	OPP6	MN4E0		1
		T7D1	OPP4	MN4G		71
		T6D1	OPP2	MN4TB and M4TB		621
				LMF0		687
OMRON	CompoBus/S	T8C1/T8C6	OPP5	MW4G2	T6C0, T6C1 is not compatible with long distance communication mode. Consult with CKD for details.	391
		T7C1/T7C0	OPP4	MN4G		71
		T6C1/T6C0	OPP3	MN4G, M4G		71
				MN4E0/MN4S0		1/581
				M (D) 4SA/B1		729
		T6C1/T6C0	OPP2	MN4TB and M4TB		621
		T6C1	OPP2	MW4G4		523
	DeviceNet	T8D1/T8D2 T8D7	OPP5	MW4G2	The flat cable connector T5* and DR-T1-OD16X (OMRON) combination may be available in addition to valves on the left. (Custom order)	391
		T7D1	OPP4	MN4G		71
		T6D1	OPP2	MW4G4		523
				MN4TB and M4TB		621
				LMF0		687
Japan AS-i institution	AS-i	T8MA T8M6	OPP5	MW4G2		391
CKD Corporation KURODA	UNIWIRE SYSTEM	T6A1/T6A0	OPP3	MN4G, M4G	Transmission point: 128 points, Transmission distance: 200 m Consult with CKD for other specifications.	71
				MN4E0		1
				MN4S0		581
				M (D) 4SA/B1		729
		T6A1/T6A0	OPP2	MW4G4		523
				MN4TB and M4TB		621
				LMF0		687
	UNIWIRE H SYSTEM	T6J1/T6J0	OPP3	MN4G, M4G	Transmission point: 128 points, Transmission distance: 200 m Consult with CKD for other specifications.	71
				MN4E0		581
				MN4S0		1
				M (D) 4SA/B1		729
		T6J1/T6J0	OPP2	MW4G4		523
				MN4TB and M4TB		621
				LMF0		687
CKD Corporation ONE	SAVENET	T7L1	OPP4	MN4G	The flat cable connector T5* and CSN-4016-SRCM combination may be available in addition to valves on the left. (Custom order)	71

Maker (Recommended body)	System name	Slave unit: Wiring block model no.*1	Slave unit: Shape *2	Incorporated valve model no.	Remarks	Page
SUNX	S-LINK	T7E1/T7E0	OPP4	MN4G		71
		T6E1/T6E0	OPP3	MN4G, M4G		71
				MN4E0		1
				MN4S0		581
				M (D) 4SA/B1		729
		T6E1/T6E0	OPP2	MN4TB and M4TB		621
				LMF0		687
SHARP Manufacturing System	Satellite I/O Link system	T64	OPP	MN4TB and M4TB	Only transmission speed 172.8kbps is available. Consult with CKD for other transmission speed.	621
FUJI ELECTRIC	T link-min.	T651	OPP2	MN4TB and M4TB		621
JTEKT	DLNK (DeviceNet)	T8D1/T8D2 T8D7	OPP5	MW4G2	The flat cable connector T5* and DR-T1-OD16X (OMRON) combination may be available in addition to valves on the left. (Custom order)	391
		T7D1	OPP4	MN4G		71
		T6D1	OPP2	MN4TB and M4TB		621
				LMF0		687

● Consult with CKD for other networks.

*1: Wiring block No. is as follows when placing an order of reduced wiring manifold.

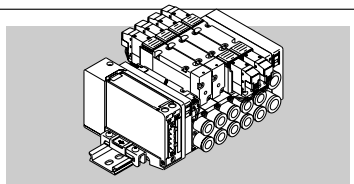
(Example) MN4GA210 - Port size - T7D1 Option - Station number - Voltage

- MN4GA210: M: manifold, MN: block manifold
- T7D1: Wiring block model no.

*2: Shape of slave unit is as follows.

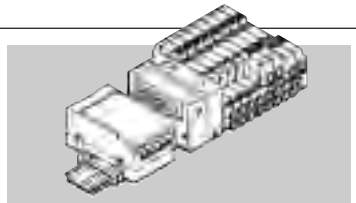
OPP	Stationary body	OPP3	Flat cable compatible slave unit	OPP5	Protective structure (IP65), connector connection
OPP2	Protective structure (IP64)	OPP4	Thin shape	OPP6	Miniature 32 point

Reduced wiring slave unit (Serial transmission)



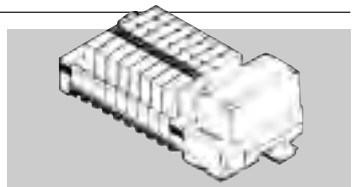
Serial transmission (OPP4)

- Thin slave unit
- Slot-in type enables easy valve connection, mount and dismount.



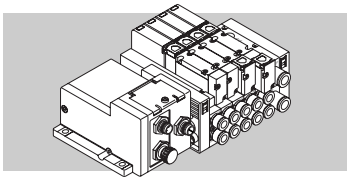
Serial transmission (OPP3)

- Valve and slave unit can be easily connected by connector.
- The lowest height slave unit. (When mounted)



Serial transmission (OPP2/OPP)

- Protective structure equivalent to IP64 available.
- Valve operation status displayed on slave unit.



Serial transmission (OPP5)

- Dust-resistant and jet-proof (IP65) structure.
- Power and communication lines can be easily connected with connectors.

Serial transmission (OPP6)

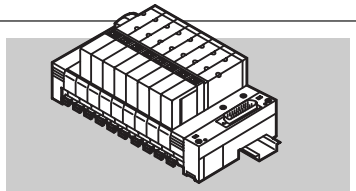
- Close contact, compact type
- This low height slave unit with the lowest height in the series is compatible with up to 32 points.

According to variation

Reduced wiring block

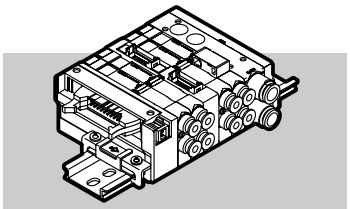
Wiring methods	Wiring block model no.	Incorporated valve model no.	Remarks	Page
D sub-connector	T30/R	MN4E0	Note 1: MW4G2 is not compatible with T50, T52. Note 2: MN4S0, M(D)4SA/B1, MN4TB is not compatible with T51, T52.	1
Flat cable connector	T50/R T51/R T52/R T53/R	MN4G, M4G MW4G2 (Note 1) MN4S0 (Note 2) M(D)4SA/B1 (Note 2) MN4TB (Note 2)		71 391 581 729 621
	T50A	MN4TB	Amplification circuit integrated type	621
Multi-connector	T20	MW4G2		391
Common terminal	T10/R T11/R	MN4G, M4G MW4G2 (Note 2) W4G4 (Note 2) MN4S0 MN4TB (Note 2) M4TB (Note 2)	Note 2: W4G2, W4G4, MN4TB, M4TB is not compatible with T11.	71 391 523 581 621 621
Intermediate wiring block	TM1A TM1C TM52	MN4E0		1

Reduced wiring block



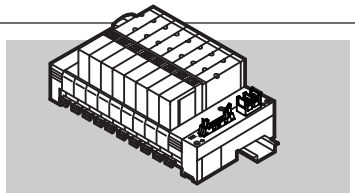
D sub-connector type (T3*)

- Push-in connection with connector cable.
- Treatment of relay gland and common wiring is not required.



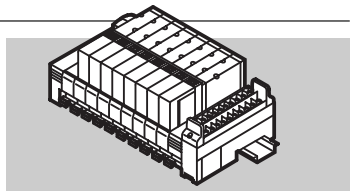
Intermediate wiring block (TM*)

- Reduced wiring connection to middle of manifold is possible.
- Flat cable connector 10P and RITS connector 6P are available.
- Resolve problems of insufficient control points.



Flat cable connector type (T5*)

- Push-in connection with connector cable.
- Treatment of relay gland and common wiring is not required.
- An amplification circuit integrated type is also available.



Common gland type (T1*)

- Valve can be wired with one signal line and common line.
- Relay gland is not required.

Copper and PTFE free

Pneumatic components for Braun tube manufacturing lines

Series name		Series	Flow characteristics C ($dm^3/(s \cdot bar)$)	Effective sectional area (mm^2)	Remarks	Page
4, 5 port valve						
Pilot operated poppet valve	P/M/B Series (Miniature pneumatic valve)	W2P513*-*-P6	0.12 to 0.15	-		1089
		P5142-*-P6	0.09			
		B5142-*-P6	0.09			
		B*P5142-*-P6	0.09			
		N*P5142-*-P6	0.09			
Pilot operated soft spool valve	4TB Series	4TB3*-*-P6	4.9 to 7.8	-	One side solenoid/ plug-in type Note: Standard specifications apply when DC is selected for 4T3 and 4T4. (Model no. P6 is not required.)	621
		4TB4*-*-P6	9.8 to 14.6			
		M4TB3*-*-P6	4.9 to 8.8			
		M4TB4*-*-P6	9.6 to 13.8			
		MN4TB1*-*-P6	0.51 to 1.6			
		MN4TB2*-*-P6	2.1 to 2.8			
	4K Series (Pneumatic valve)	4KA*-*-P6	0.60 to 11	-		775
		4KB*-*-P6	063 to 13			
		M4KA*-*-P6	0.69 to 11			
		M4KB*-*-P6	0.60 to 9.4			
		MN4KB*-*-P6	0.60 to 3.1			
	4F Series (Pneumatic valve)	4F*-*-P6	1.5 to 18	160 (4F7)	(M) 4F0 not compatible.	881
		M4F*-*-P6				
Shock absorbing valve		SKH*-*-P6	4.1 to 16.3	-		1197
2, 3 port valve						
Pilot operated soft spool valve	3K Series (Pneumatic valve)	3KA1*-*-P6	0.65	-		775
		M3KA1*-*-P6	0.69			
Pilot operated poppet valve	P/M/B Series (Miniature pneumatic valve)	P512/3*-*-P6	0.1	-		1089
		M512/3*-*-P6	0.1			
		B512/3*-*-P6	0.1			
		B*P512/3*-*-P6	0.11 to 0.15			
		N*P512/3-*-P6	0.11 to 0.15			

Note: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Ozone proof specifications

Series name		Series	Flow characteristics C (dm³/ (s·bar))	Effective sectional area (mm²)	Remarks	Page
4, 5 port valve						
Pilot operated soft spool valve	MN4E0 Series	MN4E0*-*-A-*	0.50 to 0.54	-	One side solenoid type	703
	4S0 Series (Small pneumatic valve)	4SA0*-*-P11	-	0.90		
		4SB0*-*-P11	0.29 to 0.33	-		
		M4SA0*-*-P11	-	0.90		
		M4SB0*-*-P11	0.29 to 0.32	-		
	4S1 Series (Small pneumatic valve)	4SA1*-*-P11	0.51 to 0.95	-		729
		4SB1*-*-P11	0.49 to 1.03			
		M (D) 4SA1*-*-P11	0.50 to 1.0			
		M (D) 4SB1*-*-P11	0.48 to 0.95			
	4G Series	4GA*-*-A-*	0.66 to 4.0	-		71
		4GB*-*-A-*	1.0 to 4.2			
		M4GA*-*-A-*	0.66 to 3.3			
		M4GB*-*-A-*	0.67 to 3.3			
		MN4GA*-*-A-*	0.68 to 2.3			
		MN4GB*-*-A-*	0.66 to 2.2			
	W4G2 Series	W4GB2*-*-A-*	2.1 to 2.5	-	One side solenoid type	391
		MW4GA2*-*-A-*	1.7 to 2.3			
		MW4GB2*-*-A-*	1.7 to 2.3			
		MW4GZ2*-*-A-*	1.7 to 2.3			
	MN4S0 Series (Pneumatic valve)	MN4S0*-*-P11 MT4S0*-*-P11	0.57 to 0.80	-	One side solenoid type	581
	4K Series (Pneumatic valve)	4KA*-*-P11	0.60 to 11	-		775
		4KB*-*-P11	0.63 to 13			
		M4KA*-*-P11	0.69 to 11			
		M4KB*-*-P11	0.60 to 9.4			
		MN4KB*-*-P11	0.60 to 3.1			

● Ozone proof components are custom order. (Note: These are available as options for the MN4E0, 4G, and W4G2 Series.)

Note: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Ozone proof specifications

Series name		Series	Flow characteristics C (dm³/ (s·bar))	Effective sectional area (mm²)	Remarks	Page
3 port valve						
Pilot operated soft spool valve	MN3E0 Series	MN3E0*-*-A-*	0.54		One side solenoid type	1
	3S1 Series (Small pneumatic valve)	3SA1*-*-P11	0.70 to 0.90	-		729
		M3SA1*-*-P11	0.83 to 1.04	-		
	3G Series	3GA*-*-A-*	0.70 to 3.9	-		71
		M3GA*-*-A-*	0.66 to 3.3			
		MN3GA*-*-A-*	0.68 to 2.3			
	W3G2 Series	MW3GA2*-*-A-*	1.7 to 2.3	-	One side solenoid type	391
	MN3S0 Series (Pneumatic valve)	MN3S0-*-*-P11	0.80	-	One side solenoid type	581
		MT3S0-*-*-P11				
	3K Series (Pneumatic valve)	3KA*-*-P11	0.65	-		775
		M3KA*-*-P11	0.69			
Direct acting poppet valve	3M Series (Small pneumatic valve)	3MA0*-*-P11	-	0.1 to 0.15		1047
		3MB0*-*-P11				
		M3MA0*-*-P11				
		M3MB0*-*-P11				
	3P Series (Pneumatic valve)	3PA*-*-P11	0.34 to 1.1	-		1063
		3PB*-*-P11	0.33 to 1.0			
		M3PA*-*-P11	0.37 to 1.1			
		M3PB*-*-P11	0.32 to 0.93			
Two 3 port valve integrated type						
Pilot operated soft spool valve	MN3E0 Series	MN3E0*-*-A-*	0.50	-	One side solenoid type	1
	3G Series	3GA*-*-A-*	0.66 to 2.2	-		71
		3GB*-*-A-*	1.0 to 2.1			
		M3GA*-*-A-*	0.66 to 1.7			
		M3GB*-*-A-*	0.67 to 1.6			
		MN3GA*-*-A-*	0.68 to 1.6			
		MN3GB*-*-A-*	0.68 to 1.6			

● Ozone proof components are custom order. (Note: These are available as options for the MN4E0, 4G, and W4G2 Series.)
Note: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Clean room specifications

Particle occurrence preventing pneumatic components usable in clean rooms

Series name		Series	Flow characteristics C ($dm^3/(s \cdot bar)$)	Remarks	Page
4, 5 port valve					
Pilot operated soft spool valve	MN4E0 Series	MN4E0*-*-P70	0.50 to 0.54		1
	4G Series	4GA*-*-P7*	0.66 to 4.0		71
		M4GA*-*-P7*	0.66 to 3.3		
		4GB*-*-P7*	1.0 to 4.2		
		M4GB*-*-P7*	0.67 to 3.3		
3 port valve					
Pilot operated soft spool valve	MN3E0 Series	MN3E0*-*-P70	0.54		1
	3G Series	3GA*-*-P7*	0.70 to 3.9		71
		M3GA*-*-P7*	0.66 to 3.3		
Two 3 port valve integrated type					
Pilot operated soft spool valve	MN3E0 Series	MN3E0*-*-P70	0.50	One side solenoid type	1
	3G Series	3GA*-*-P7*	0.66 to 2.2		71
		3GB*-*-P7*	1.0 to 2.1		
		M3GA*-*-P7*	0.66 to 1.7		
		M3GB*-*-P7*	0.67 to 1.6		
		MN3GA*-*-P7*	0.68 to 1.6		
		MN3GB*-*-P7*	0.66 to 1.6		

Note 1: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Note 2: Refer to catalog No. CB-033SA "Pneumatic components for clean room specifications".

Coolant proof

Special structure pneumatic contents with outstanding oil- and water-proofing properties

Series name		Series	Flow characteristics C ($dm^3/(s \cdot bar)$)	Remarks	Page
4, 5 port valve					
Pilot operated soft spool valve	4G Series	4GA*-*-A-*	0.66 to 4.0		71
		4GB*-*-A-*	1.0 to 4.2		
		M4GA*-*-A-*	0.66 to 3.3		
		M4GB*-*-A-*	0.67 to 3.3		
		MN4GA*-*-A-*	0.68 to 2.3		
		MN4GB*-*-A-*	0.66 to 2.2		
	W4G2 Series	W4GB2*-*-A-*	2.1 to 2.5	One side solenoid/ plug-in type	391
		MW4GA2*-*-A-*	1.7 to 2.3		
		MW4GB2*-*-A-*	1.7 to 2.3		
		MW4GZ2*-*-A-*	1.7 to 2.3		
	W4G4 Series	W4GB4*-*-A-*	6.4 to 7.7	Plug-in type	523
		MW4GB4*-*-A-*	6.4 to 8.3		
		MW4GZ4*-*-A-*	6.4 to 8.3		
	4TB Series	MN4TB1*-*-A-*	0.51 to 1.6	One side solenoid/ plug-in type	Note 2 CC-N-375 Coolant proof Pneumatic components guide
		MN4TB2*-*-A-*	2.1 to 2.8		
		M4TB3*-*-A-*	4.9 to 8.8		
		M4TB4*-*-A-*	9.6 to 13.8		
	4K Series (Pneumatic valve)	4KA*-*-A	0.60 to 11		
		4KB*-*-A	0.63 to 13		
	PV5G/PV5 Series (ISO conformed valve)	PV5G-*-*-*-A-*	2.8 to 6.9		973
		PV5-*-*-A-*-TC			
3 port valve					
Pilot operated soft spool valve	3G Series	3GA*-*-A-*	0.70 to 3.9		71
		M3GA*-*-A-*	0.66 to 3.3		
		MN3GA*-*-A-*	0.68 to 2.3		
	W3G2 Series	MW3GA2*-*-A-*	1.7	One side solenoid type	391
	3K Series (Pneumatic valve)	3KA1*-*-A	0.65		Note 2 CC-N-375 Coolant proof Pneumatic components guide
Two 3 port valve integrated type					
Pilot operated soft spool valve	3G Series	3GA*-*-A-*	0.66 to 2.2		71
		3GB*-*-A-*	1.0 to 2.1		
		M3GA*-*-A-*	0.66 to 1.7		
		M3GB*-*-A-*	0.67 to 1.6		
		MN3GA*-*-A-*	0.68 to 1.6		
		MN3GB*-*-A-*	0.66 to 1.6		

Note 1: Effective sectional area S and sonic conductance C are converted as S ≒ 5.0 x C.

Manual switching valve

Series name	Model no.	Flow characteristics C ($dm^3/(s \cdot bar)$)	Effective sectional area (mm^2)	Remarks	Page
4 port valve					
Miniature type	HMV	1.5 to 1.6	-		1181
Standard type	HSV	7.2 to 10.3	-		
3 port valve					
Small mechanical valve	MS	-	1.6 to 2.5	Detector Total air system	Pneumatic, vacuum and auxiliary components
Medium mechanical valve	MM	-	1.6 to 2.5		
Large mechanical valve	MAVL	-	31		

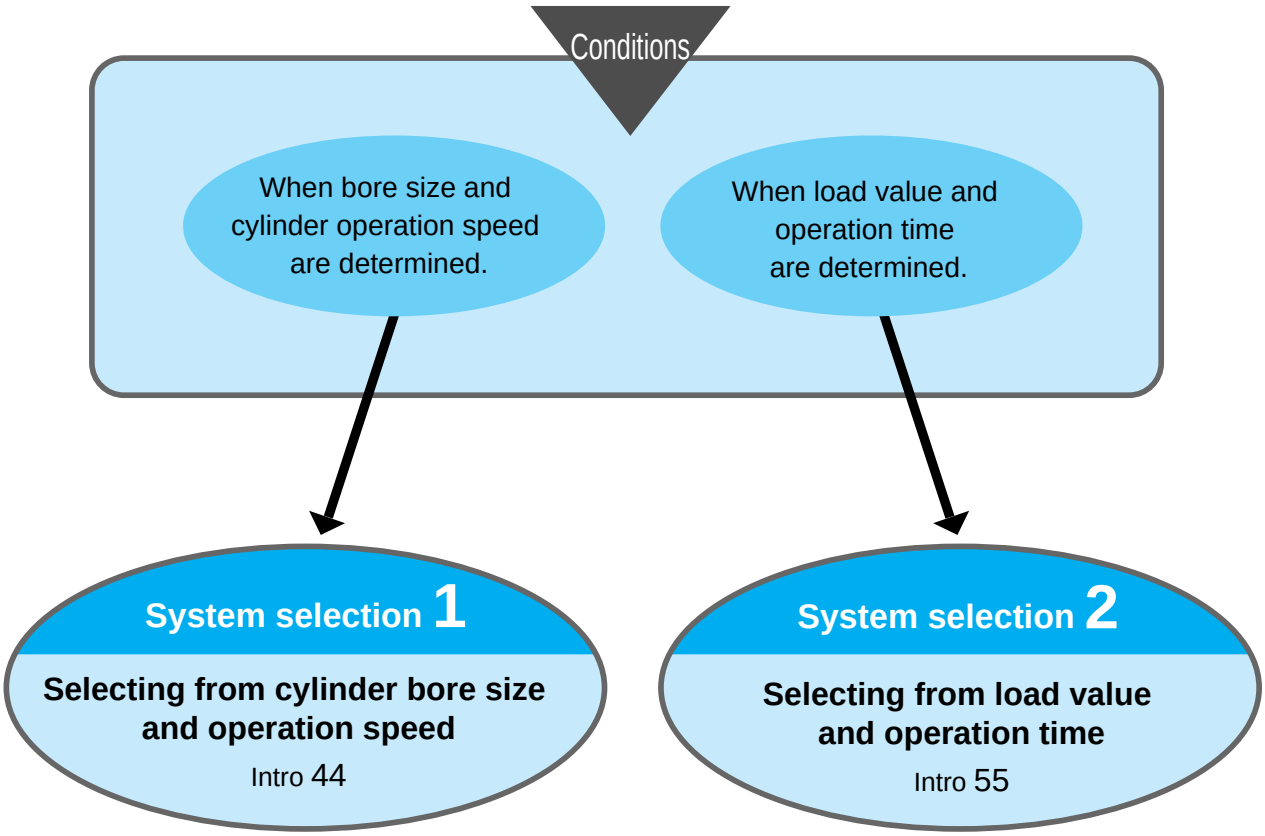
Selection guide 4

According to system

Conditions are set easily even by beginners.

Selecting the selection method

In this section "Selection 4", the optimum model is selected from predetermined conditions.



System selection 1 Selecting from cylinder bore size and operation speed

■ Making a selection

<System selection 1> is used to select the optimum model at a glance.

STEP 1

<Checking conditions>
Check cylinder tube bore size and cylinder operation speed.

Refer to Table-1

Select the theoretical reference speed.

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

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

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

↓

STEP 2

Refer to Table-2

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

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

↓

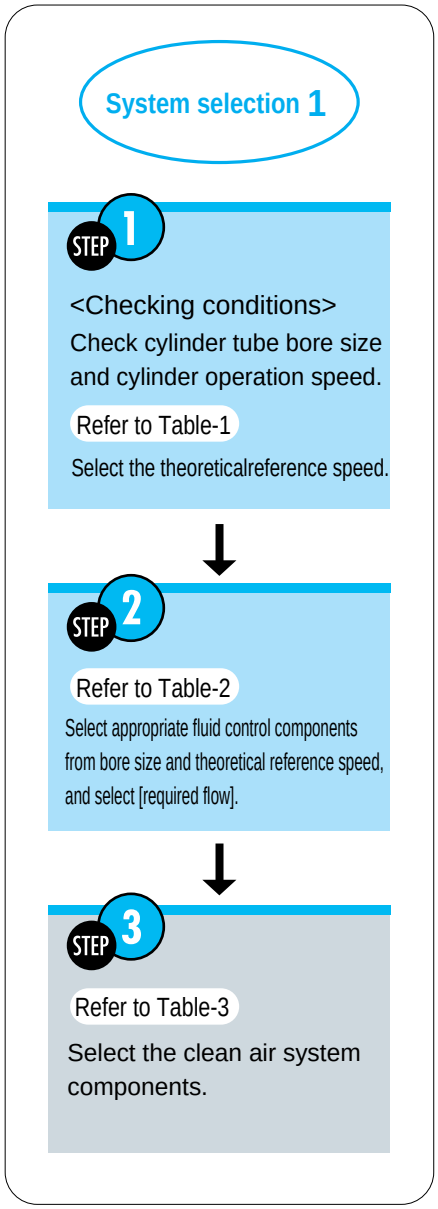
STEP 3

Refer to Table-3

Select the clean air system components.

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

* The relationship of the cylinder tube's inner diameter and speed for the valve (4G Series, 4K Series) is shown with a graph.
Standard system combination for valve and cylinder (Example): (Intro 53 to 54)



(1) The cylinder average speed is obtained from the combination of the valve and piping system. This speed is expressed as the cylinder piston speed obtained by installing the cylinder rod facing upward, and dividing the time from when the piston starts moving the stroke by the time the rod moved. When the load ratio is 50%, the average speed should be the cylinder piston speed X0.5. (Refer to Intro 57 for the relation of load ratio and theoretical reference speed.)
(2) The cylinder theoretical reference speed is the value for when one cylinder moves independently.
(3) The valve's effective sectional area used in the calculations for Table-2 is the 2-position value.
(4) This selection guide is for reference. Check the selection with actual conditions using the CKD sizing program.

STEP 1 Checking conditions and selecting the theoretical reference value

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

STEP2 Selecting fluid control components

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

Table-2

Bore size (mm)	Theoretical reference speed (mm/s)	Required flow (ℓ/min.) (ANR)	Required composite effective sectional area (mm^2)	
ø6	500	5	0.1	
ø10	500	14	0.2	
ø16	500	36	0.5	
ø20	250	29	0.5	
	500	56	0.9	
	750	84	1.4	
	1,000	112	1.8	
ø25	250	44	0.8	
	500	88	1.4	
	750	132	2.1	
	1,000	175	2.8	
ø32	250	73	1.3	
	500	143	2.9	
	750	215	3.5	
	1,000	286	4.6	
ø40	250	110	1.7	
	500	230	3.3	
	750	340	5.0	
	1,000	450	6.6	
ø50	250	180	2.6	
	500	350	5.2	
	750	530	7.7	
	1,000	710	10.4	

Note: The above table shows the theoretical reference speed for cylinder inner diameters.
Refer to individual specifications for each model for details on the working piston speed range of each product.

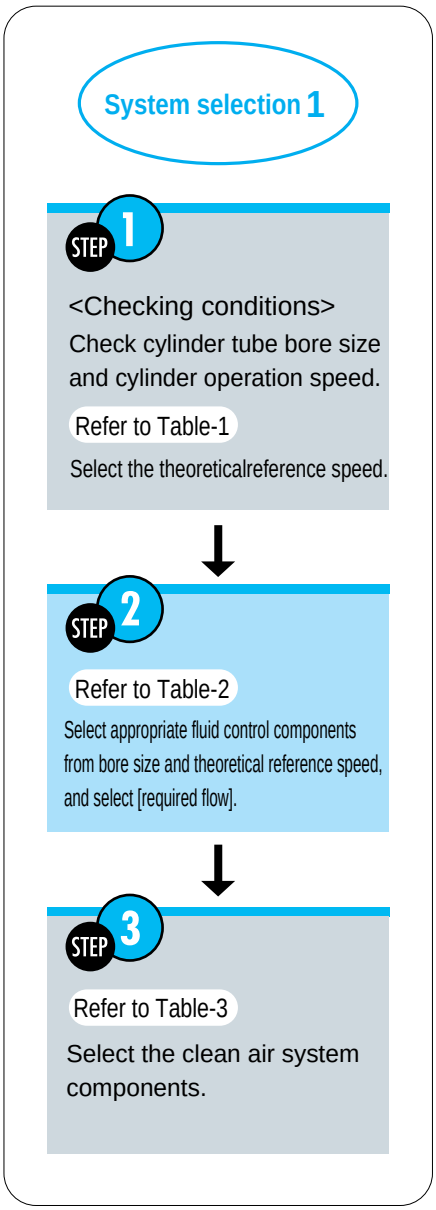
Table-1

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

Note 1: Refer to Intro 61 for piping specifications.

Applicable fluid control system				
Valve		Pneumatic auxiliary components		Piping *Note 1
Single solenoid	Double solenoid	Speed control valve	Silencer	Piping (between valve and cylinder)
MN4E010 4SA010·4SB010	MN4E020 4SA020·4SB020	SC3W-M5-4	SLM-M5,SLM-M3	ø4 x ø2.5 nylon tube
MN4E010 4SA010·4SB010	MN4E020 4SA020·4SB020	SC3W-M5-4	SLM-M5,SLM-M3	ø4 x ø2.5 nylon tube
MN4E010 4SA010·4SB010	MN4E020 4SA020·4SB020	SC3W-M5-4	SLM-M5,SLM-M3	ø4 x ø2.5 nylon tube
4KA110·4KB110 4GA110·4GB110	4KA120·4KB120 4GA120·4GB120	SC3W-6-6 SCL2-06-H66	SLM-M5,SLW-6A	ø6 x ø4 nylon tube
4KA110·4KB110 4GA110·4GB110	4KA120·4KB120 4GA120·4GB120	SC3W-6-6 SCL2-06-H66	SLM-M5,SLW-6A	ø6 x ø4 nylon tube
4KA110·4KB110 4GA110·4GB110	4KA120·4KB120 4GA120·4GB120	SC3W-6-6 SCL2-06-H66	SLM-M5,SLW-6A	ø6 x ø4 nylon tube
4KB110·4GB110	4KB120·4GB120	SC1-6	SLW-6A,SL-M5	ø8 x ø5.7 nylon tube
4KB210·4GB210	4KB220·4GB220	SCL2-08-H88	SLW-6S,SLW-6A	ø8 x ø5.7 nylon tube
4KA110·4KB110 4GA110·4GB110	4KA120·4KB120 4GA120·4GB120	SC3W-6-6 SCL2-06-H66	SLM-M5,SLW-6A	ø6 x ø4 nylon tube
4KA210·4KB210 4GA210·4GB210	4KA220·4KB220 4GA220·4GB220	SC1-6 SCL2-08-H88	SLW-6S,SLW-6A	ø8 x ø5.7 nylon tube
4KA210·4KB210 4GA210·4GB210	4KA220·4KB220 4GA220·4GB220	SC3W-6-6 SCL2-06-H66	SLM-M5,SLW-6A	ø6 x ø4 nylon tube
		SC1-6 SCL2-08-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
4KA210·4KB210 4GA210·4GB210	4KA220·4KB220 4GA220·4GB220	SC1-6 SCL2-08-H88	SLW-6A,SLW-6S	ø8 x ø5.7 nylon tube
		SC1-8	SLW-8A,SLW-6A	ø10 x ø7.2 nylon tube
4GA310·4GB310	4GA320·4GB320	SCL-10-H1010	SLW-8A,SLW-8S	ø10 x ø7.2 nylon tube
4GA310·4GB310 4F310·4F410	4GA320·4GB320 4F320·4F420	SC1-10	SLW-10A	ø15 x ø11.5 nylon tube or Rc3/8 steel pipe

According to system



(1) The cylinder average speed is obtained from the combination of the valve and piping system. This speed is expressed as the cylinder piston speed obtained by installing the cylinder rod facing upward, and dividing the time from when the piston starts moving the stroke by the time the rod moved. When the load ratio is 50%, the average speed should be the cylinder piston speed X0.5. (Refer to Intro 57 for the relation of load ratio and theoretical reference speed.)

(2) The cylinder theoretical reference speed is the value for when one cylinder moves independently.

(3) The valve's effective sectional area used in the calculations for Table-2 is the 2-position value.

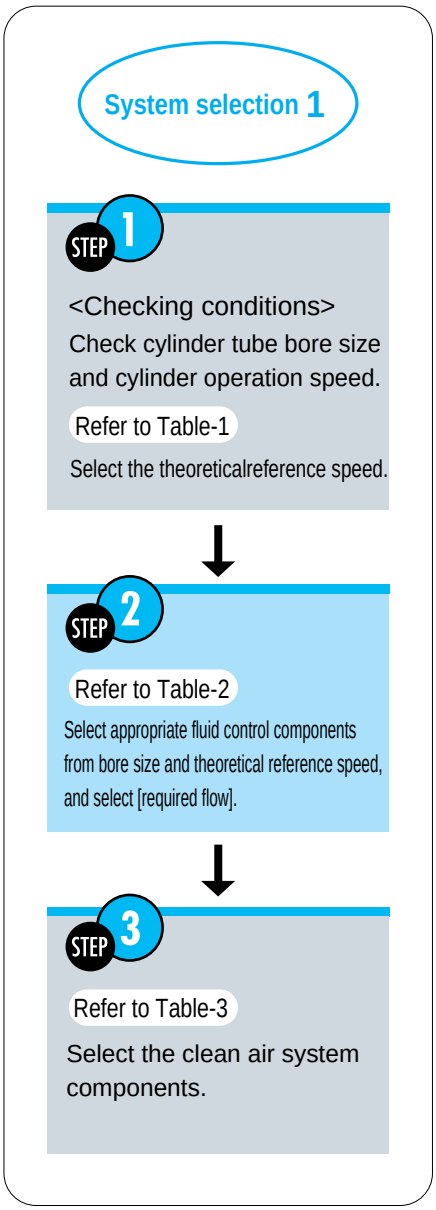
(4) This selection guide is for reference. Check the selection with actual conditions using the CKD sizing program.

Bore size (mm)	Theoretical reference speed (mm/s)	Required flow (ℓ /min.) (ANR)	Required composite effective sectional area (mm^2)
ø63	250	280	4.1
	500	560	8.2
	750	840	12.3
	1,000	1,100	16.4
ø80	250	450	6.6
	500	910	13.2
	750	1,400	19.8
	1,000	1,800	26.4
ø100	250	710	10.3
	500	1,400	20.6
	750	2,100	30.9
	1,000	2,800	41.2
ø125	250	1,100	16.1
	500	2,200	32.2
	750	3,300	48.2
	1,000	4,400	64.4
ø140	250	1,400	20.2
	500	2,800	40.4
	750	4,200	60.5
	1,000	5,500	80.8
ø160	250	1,800	26.3
	500	3,600	52.6
	750	5,400	79.0
	1,000	7,200	104.7

Applicable fluid control system					
Valve		Pneumatic auxiliary components		Piping *Note 1	
Single solenoid	Double solenoid	Speed control valve	Silencer	Piping (between valve and cylinder)	
4KA210·4KB210 4GA310·4GB310	4KA220·4KB220 4GA320·4GB320	SC1-6 SCL2-08-H88	SLW-6S,SLW-6A	ø8 x ø5.7 nylon tube	
4GA310·4GB310	4GA320·4GB320	SC1-8 SCL-10-H1010	SLW-8A,SLW-8S	ø10 x ø7.2 nylon tube	
4KA310·4KB310 4F310·4F410	4KA320·4KB320 4F320·4F420	SC1-10	SLW-10A	ø15 x ø11.5 nylon tube or Rc3/8 steel pipe	
4F510	4F520	SC1-15	SLW-15A	Rc1/2 steel pipe	
4KB210·4F210-08	4KB220·4F220-08	SC1-8 SCL-10-H1010	SLW-8A,SLW-8S	ø10 x ø7.2 nylon tube	
4F410-10·4F310-10 4KB310-10	4F420-10·4F320-10 4KB320-10	SC1-10	SLW-10A	ø15 x ø11.5 nylon tube or Rc3/8 steel pipe	
4KB410-15·4F510-15	4KB420-15·4F520-15	SC1-15	SLW-15A	Rc1/2 steel pipe	
		SC-20A	SLW-15A	Rc1/2 steel pipe	
4F410-10·4F310-10 4KB310-10	4F420-10·4F320-10 4KB320-10	SC1-10	SLW-10A	ø15 x ø11.5 nylon tube or Rc3/8 steel pipe	
4KB410-15·4F510-15	4KB420-15·4F520-15	SC1-15	SLW-15A	Rc1/2 steel pipe	
		SC-20A	SLW-15A	Rc1/2 steel pipe	
4F610-20	4F620-20	SC-20A	SL-20A,SLW-20S	Rc3/4 steel pipe	
4KB410-15·4F510-15	4KB420-15·4F520-15	SC1-15	SLW-15A	Rc1/2 steel pipe	
		SC-20A	SLW-15A	Rc1/2 steel pipe	
4F610-20	4F620-20	SC-20A	SL-20A,SLW-20S	Rc3/4 steel pipe	
		SC-20A	SL-20A	Rc3/4 steel pipe	
4KB410-15·4F510-15	4KB420-15·4F520-15	SC1-15	SLW-15A	Rc1/2 steel pipe	
4F610-20	4F620-20	SC-20A	SL-20A,SLW-20S	Rc3/4 steel pipe	
			SL-20A	Rc3/4 steel pipe	
4F710-25	4F720-25	SC-20A	SL-25A	Rc1 steel pipe	
4KB410-15·4F510-15	4KB420-15·4F520-15	SC-20A	SLW-15A	Rc1/2 steel pipe	
4F610-20	4F620-20	SC-20A	SL-20A	Rc3/4 steel pipe	
4F710-20	4F720-20	SC-20A	SL-20A	Rc3/4 steel pipe	
-	-	-	-	-	

Note 1: Refer to Intro 61 for piping specifications.

According to system



Bore size (mm)	Theoretical reference speed (mm/s)	Required flow (ℓ /min.) (ANR)	Required composite effective sectional area (mm^2)	
ø180	250	2,300	33.3	
	500	4,600	66.6	
	750	6,900	100.0	
	1,000	9,200	132.5	
ø200	250	2,800	41.2	
	500	5,600	82.4	
	750	8,400	122.7	
	1,000	11,200	163.6	
ø250	250	4,400	64.3	
	400	7,000	103.0	
	750	13,200	191.7	
	1,000	17,600	255.6	

(1) The cylinder average speed is obtained from the combination of the valve and piping system. This speed is expressed as the cylinder piston speed obtained by installing the cylinder rod facing upward, and dividing the time from when the piston starts moving the stroke by the time the rod moved. When the load ratio is 50%, the average speed should be the cylinder piston speed X0.5. (Refer to Intro 57 for the relation of load ratio and theoretical reference speed.)

(2) The cylinder theoretical reference speed is the value for when one cylinder moves independently.

(3) The valve's effective sectional area used in the calculations for Table-2 is the 2-position value.

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

	Applicable fluid control system				
	Valve		Pneumatic auxiliary components		Piping *Note 1
	Single solenoid	Double solenoid	Speed control valve	Silencer	Piping (between valve and cylinder)
	4KB410-15·4F510-15	4KB420-15·4F520-15	SC-20A	SLW-15A	Rc1/2 steel pipe
	4F710-20	4F720-20	SC-20A	SL-20A	Rc3/4 steel pipe
	4F710-25	4F720-25	SC-25A	SL-25A	Rc1 steel pipe
	-	-	-	-	-
	4F610-20	4F620-20	SC-20A	SL-20A,SLW-20S	Rc3/4 steel pipe
	4F710-25	4F720-25	SC-25A	SL-25A	Rc1 steel pipe
	-	-	-	-	-
	-	-	-	-	-
	4F710-20	4F720-20	SC-20A	SL-20A	Rc3/4 steel pipe
	4F710-25	4F720-25	SC-25A	SL-25A	Rc1 steel pipe
	-	-	-	-	-
	-	-	-	-	-

Note 1: Refer to Intro 61 for piping specifications.

System selection 1

STEP 1

<Checking conditions>
Check cylinder tube bore size and cylinder operation speed.

Refer to Table-1

Select the theoreticalreference speed.

STEP 2

Refer to Table-2

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

STEP 3

Refer to Table-3

Select the clean air system components.

(1) The cylinder average speed is obtained from the combination of the valve and piping system. This speed is expressed as the cylinder piston speed obtained by installing the cylinder rod facing upward, and dividing the time from when the piston starts moving the stroke by the time the rod moved. When the load ratio is 50%, the average speed should be the cylinder piston speed X0.5. (Refer to Intro 57 for the relation of load ratio and theoretical reference speed.)
(2) The cylinder theoretical reference speed is the value for when one cylinder moves independently.
(3) The valve's effective sectional area used in the calculations for Table-2 is the 2-position value.
(4) This selection guide is for reference. Check the selection with actual conditions using the CKD sizing program.

STEP 3 Selecting clean air system components

Select the components whose maximum flow rate is more than [required flow] on Table-2. When operating cylinders with one set of clean air system components, select the components whose max. flow rate is more than total of required flow.

Table-3

F.R.L kit			F.R unit		
Model no.	Port size	Max. flow rate (ℓ/min *)	Model no.	Port size	Max. flow rate (ℓ/min *)
C1000-6	Rc1/8	450	W1000-6	Rc1/8	800
C1000-8	Rc1/4	630	W1000-8	Rc1/4	1,150
C2500-8	Rc1/4	1,200	W3000-8	Rc1/4	2,150
C2500-10	Rc3/8	1,700	W3000-10	Rc3/8	2,430
C3000-8	Rc1/4	1,280	W4000-8	Rc1/4	2,500
C3000-10	Rc3/8	1,750	W4000-10	Rc3/8	4,350
C4000-8	Rc1/4	1,430	W4000-15	Rc1/2	4,750
C4000-10	Rc3/8	2,400	W8000-20	Rc3/4	10,000
C4000-15	Rc1/2	3,000	W8000-25	Rc1	10,000
C6500-20	Rc3/4	4,500	A7019-1C	Rc1/8	500
C6500-25	Rc1	5,000	A7019-2C	Rc1/4	900
C8000-20	Rc3/4	7,000	A7070-2C	Rc1/4	1,500
C8000-25	Rc1	7,500	A7070-3C	Rc3/8	2,100
K60570-1C-GB	Rc1/8	200	A7080-3C	Rc3/8	4,500
K60570-2C-GB	Rc1/4	300	A7080-4C	Rc1/2	5,000
K61440E-2C-EGB	Rc1/4	1,300	A7080-6C	Rc3/4	5,000
K61440E-3C-EGB	Rc3/8	1,500			
K61400E-2C-EGB	Rc1/4	1,000			
K61400E-3C-EGB	Rc3/8	2,200			
K61400E-4C-EGB	Rc1/2	3,700			
K61400E-6C-EGB	Rc3/4	3,700			

Explanation of technical terms

[Theoretical reference speed]: means degree of cylinder speed, and expressed as the following formula. (This value coincides with speed of no load. Applied load quite decreases speed.)

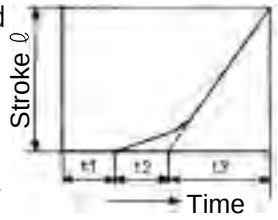
$$Vo = 1920 \times \frac{S}{A} = 2445 \times \frac{S}{D^2} \cdots (1)$$

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

Graph shows the theoretical reference speed within the range of constant velocity,

$$Vo = \frac{S}{t3} \text{ (mm/s)}$$

t1 : Time until beginning of movement
t2 : Primary delay time
t3 : Operating time with constant velocity
ℓ : Stroke length



*Note: t1 and t2 differ depending on load. When no load, neglect the value.

■ 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)

Model no.	Port size	Maximum flow rate (ℓ/min *)
F1000-6	Rc1/8	460
F1000-8	Rc1/4	610
F3000-8	Rc1/4	1,230
F3000-10	Rc3/8	1,500
F4000-8	Rc1/4	1,320
F4000-10	Rc3/8	2,140
F4000-15	Rc1/2	3,000
F6000-20	Rc3/4	5,600
F6000-25	Rc1	6,200
F8000-20	Rc3/4	6,400
F8000-25	Rc1	6,800
A1019-1C	Rc1/8	550
A1019-2C	Rc1/4	700
1144-2C-E	Rc1/4	950
1144-3C-E	Rc3/8	1,250
1137-2C-E	Rc1/4	1,300
1137-3C-E	Rc3/8	1,800
1137-4C-E	Rc1/2	2,300
1137-6C-E	Rc3/4	2,300
1138-6C-E	Rc3/8	5,500
1138-8C-E	Rc1	7,000

Regulator (R)

Model no.	Port size	Maximum flow rate (ℓ/min *)
R1000-6	Rc1/8	770
R1000-8	Rc1/4	1,350
R2000-8	Rc1/4	1,750
R2000-10	Rc3/8	2,500
R3000-8	Rc1/4	2,000
R3000-10	Rc3/8	2,600
R4000-8	Rc1/4	2,500
R4000-10	Rc3/8	4,400
R4000-15	Rc1/2	5,000
R6000-20	Rc3/4	7,000
R6000-25	Rc1	7,700
R8000-20	Rc3/4	14,000
R8000-25	Rc1	11,000
B2019-1C	Rc1/8	500
B2019-2C	Rc1/4	500
A2000-2C	Rc1/4	1,800
A2000-3C	Rc3/8	2,200
2001-2C	Rc1/4	5,000
2001-3C	Rc3/8	5,000
2001-4C	Rc1/2	6,000
2001-6C	Rc3/4	6,000
2215-6C	Rc3/4	14,000
2215-8C	Rc1	14,000
2215-10C	Rc1 1/4	14,000

Lubricator (L)

Model no.	Port size	Maximum flow rate (ℓ/min *)
L1000-6	Rc1/8	550
L1000-8	Rc1/4	700
L3000-8	Rc1/4	1,100
L3000-10	Rc3/8	2,250
L4000-8	Rc1/4	1000
L4000-10	Rc3/8	1,700
L4000-15	Rc1/2	2,700
L8000-20	Rc3/4	6,300
L8000-25	Rc1	10,000
A3019-1C	Rc1/8	100
A3019-2C	Rc1/4	400
3000E-2C	Rc1/4	450
3000E-3C	Rc3/8	900
3002E-2C	Rc1/4	700
3002E-3C	Rc3/8	900
3002E-4C	Rc1/2	1,700
3002E-6C	Rc3/4	1,700
3003E-6C	Rc3/4	3,500
3003E-8C	Rc1	4,000

* : Atmospheric pressure conversion

[Required flow]: For operating a cylinder with Velocity *vo*, this indicates instantaneous flow rate expressed with the following formula.
Table shows the value when P =0.5MPa. Required flow is the necessary value to select clean air system components.

$$Q \fallingdotseq \frac{A\ vo\ (P + 0.101) \times 60}{0.101 \times 10^4} \text{ - (2)}$$

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

[The required effective sectional area]: For operating a cylinder with Velocity *vo*, this indicates the necessary composite effective sectional area of exhaust air side circuit.
(Composite effective sectional area of valve, flow control valve, silencer and piping)
[Proper standard system]: For operating a cylinder with Velocity *vo*, this means the best combination of valve, flow control valve, silencer and pipe diameter. Table shows the value when pipe length is 1 m.

Standard system combination for valve and cylinder (example)

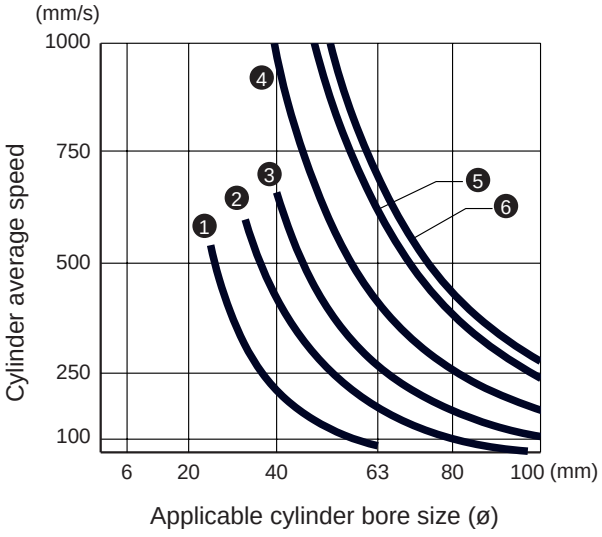
(1) The cylinder's average speed is calculated by the combined valve and piping system. To calculate, the cylinder's piston rod is mounted facing upward, and the time that the piston rod starts to move the stroke is divided by the time that it moved. At a 50% load factor, multiply the cylinder piston speed by 0.5. (Refer to page 57 for the relationship of the load factor and theoretical reference speed.)
(2) The cylinder's average speed is the value when one cylinder is operated discretely.
(3) The effective 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 4G and 4K series valve (2 position single, base piping) is shown as an example.

4G Series (Check valve integrated)

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

Series	Sub-base porting type						System No.
	Model no.	Solenoid valve Port size	Speed control valve	Silencer	Piping (1 m)	Composite effective sectional area (mm^2) Pipe length (1 m)	
4G1	M4GB110	C4	SC3W-6-4	SLW-6S	ø4 x ø2.5	1.4	❶
	M4GB110	C6	SC1-6	SLW-6S	ø6 x ø4	2.8	❷
4G2	M4GB210	C6	SC1-8	SLW-8S	ø6 x ø4	4.5	❸
	M4GB210	C8	SC1-10	SLW-8S	ø8 x ø5.7	6.7	❹
4G3	M4GB310	C10	SC1-10	SLW-10L	ø10 x ø7.2	10.1	❺
	M4GB310	C10	SC1-15	SLW-10L	ø12 x ø8.9	11.5	❻

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



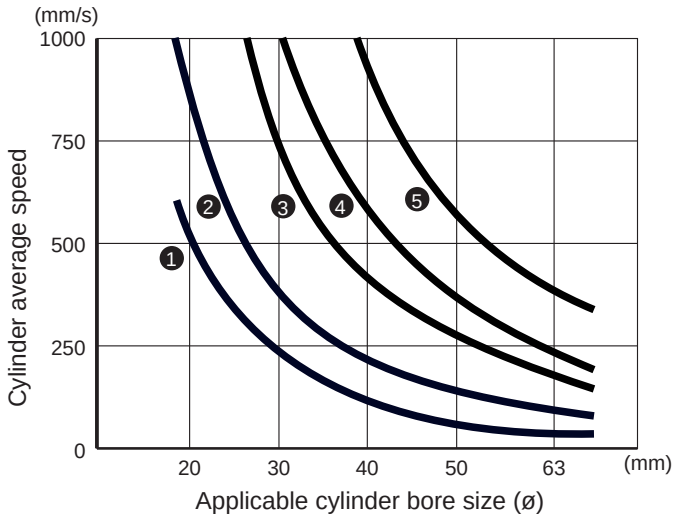
(Example) When using system ❷ with a ø40 cylinder diameter, the cylinder's average speed is 450 mm/s.
(Note that this differs with working conditions.)

MN4G Series

(Check valve integrated)

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

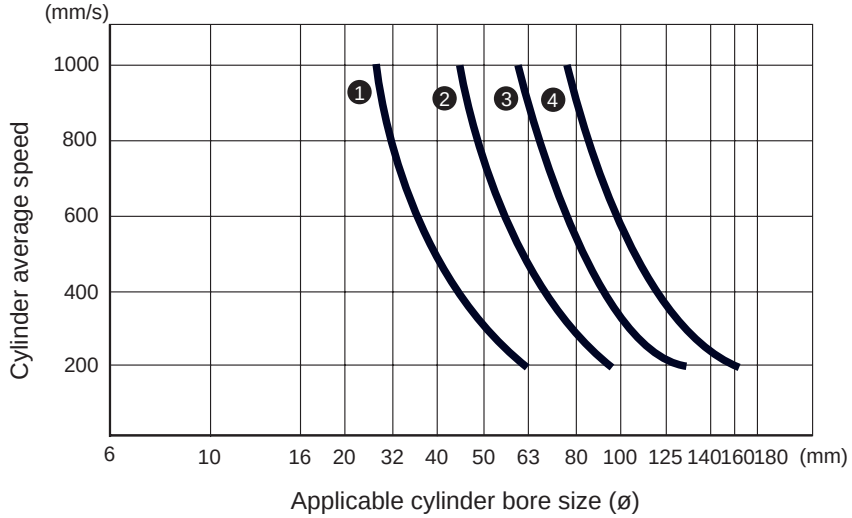
* The system No. is indicated in the graph below.
* This graph applies to the common exhaust type.



4K Series

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

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



System selection 2 Selecting from load value and operation time

Making a selection

When Load (N) and cylinder operation time (S) are already decided, use ≪System selection 2≫ to select appropriate model. Follow the following procedures.

STEP 1
<Checking conditions>
Load (N),
Required operation time (S)

↓

STEP 2
Refer to Graph-1
Selecting cylinder bore size

↓

STEP 3
Refer to Graph-2
Selecting theoretical reference speed

↓

STEP 4
Refer to Graph-3
Selecting proper system

↓

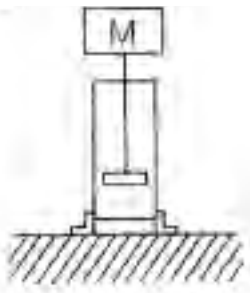
STEP 5
Refer to Table-1
Selecting proper component

STEP 1 Confirming conditions

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

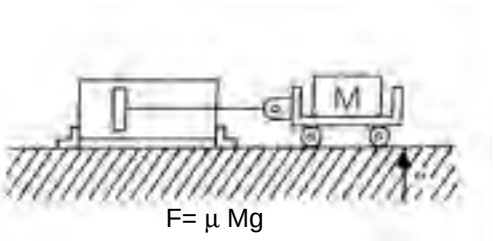
M: Weight of body (kg)
μ : Friction coefficient (normally μ ≒ 0.3)
F : Load (N)
g : 9.8m/s²

● Vertical



F=Mg

● Horizontal

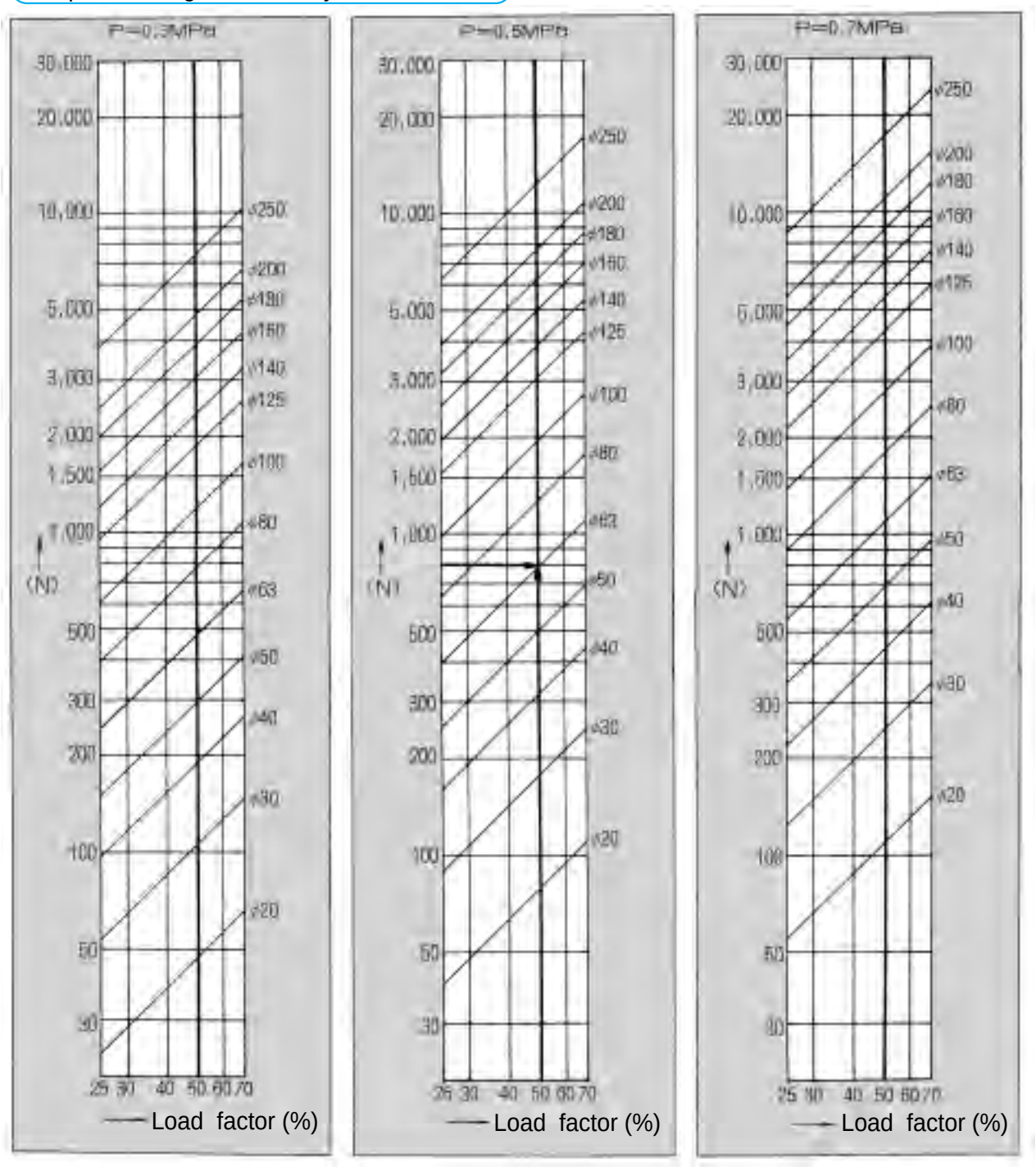


F= μ Mg

STEP 2 Selecting cylinder bore size

According to monogram, 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□
(E.g.) When F=800N, P=0.5MPa and load factor 50%, 63 mm of cylinder bore size is read.

Graph-1 Nomogram to find cylinder bore size



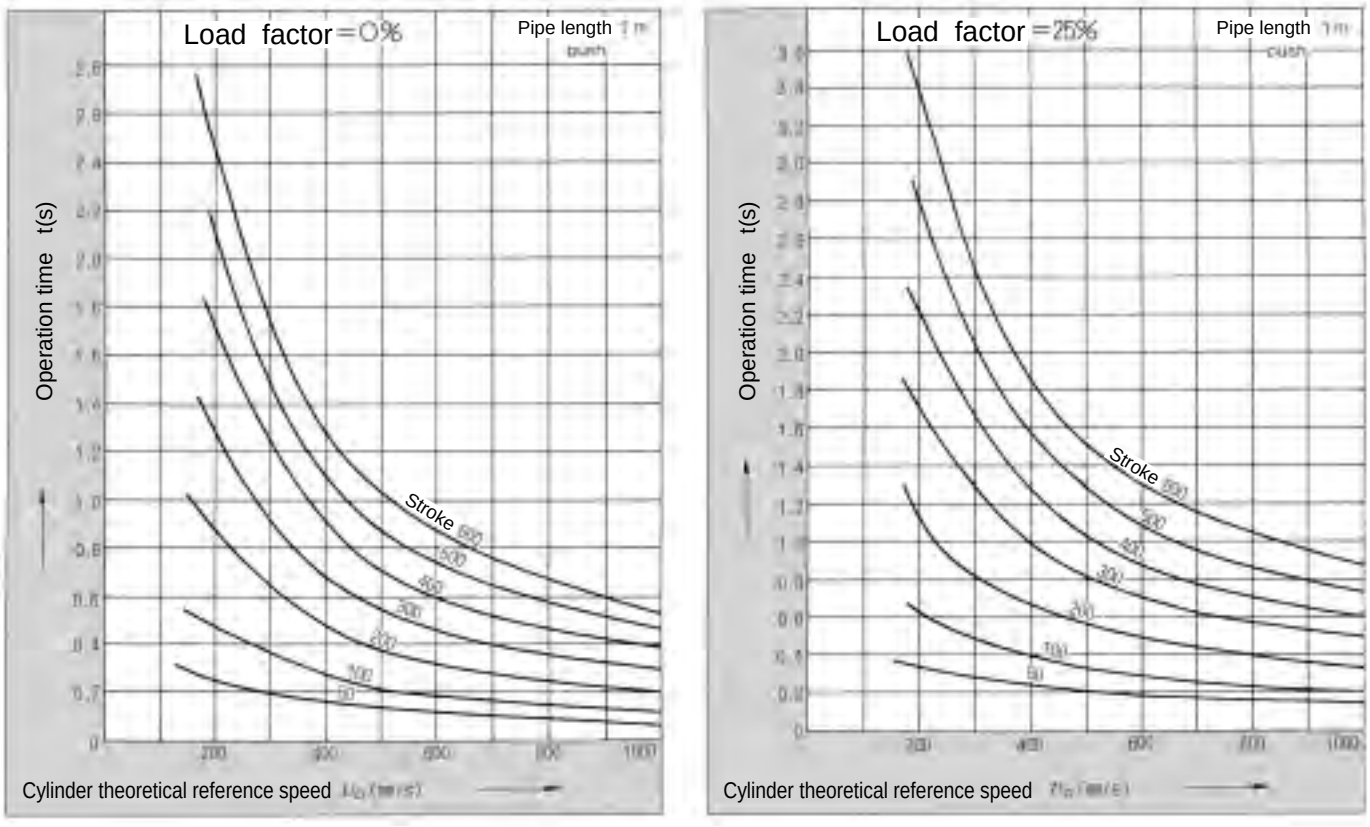
STEP 3 Selecting theoretical reference speed

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

Vo = □

(E.g.) When load factor 50% and 200 mm stroke cylinder with operating 1.0 sec, theoretical reference speed is 450 mm/s.

Graph-2 t-*vo* graph

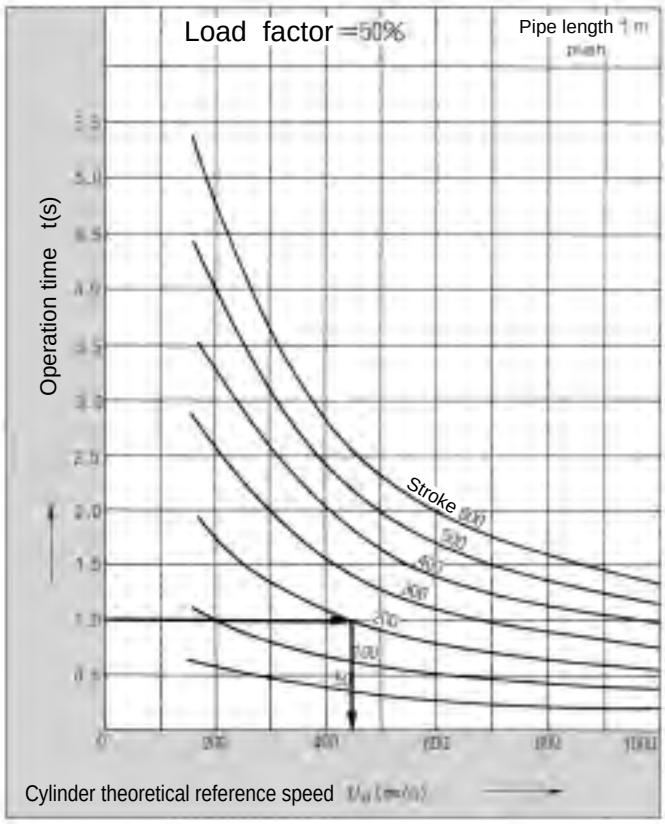


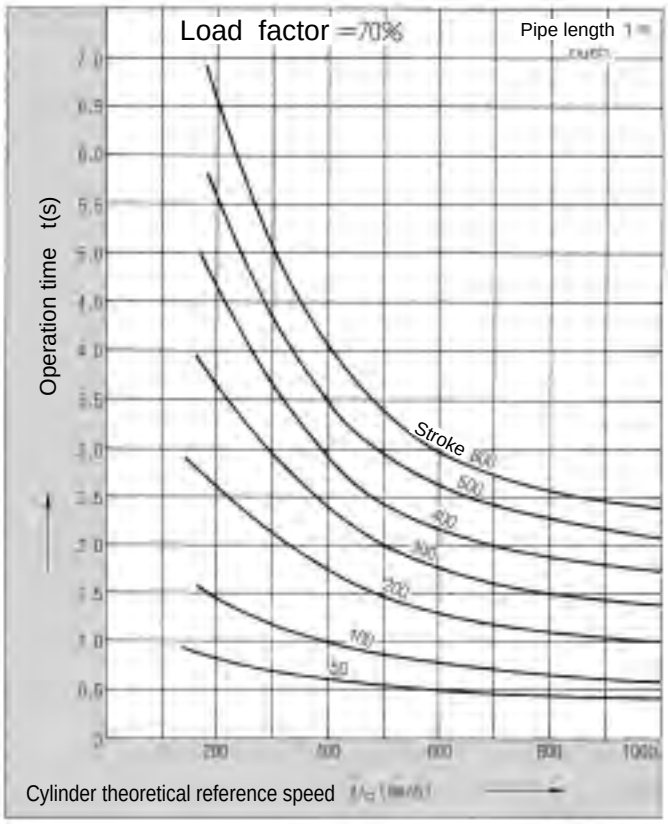
System selection 2

STEP 1
<Checking conditions>
Load (N),
Required operation time (S)

STEP 2
Refer to Graph-1
Selecting cylinder bore size

STEP 3
Refer to Graph-2
Selecting theoretical reference speed





STEP 4
Refer to Graph-3
Selecting proper system

STEP 5
Refer to Table-1
Selecting proper component

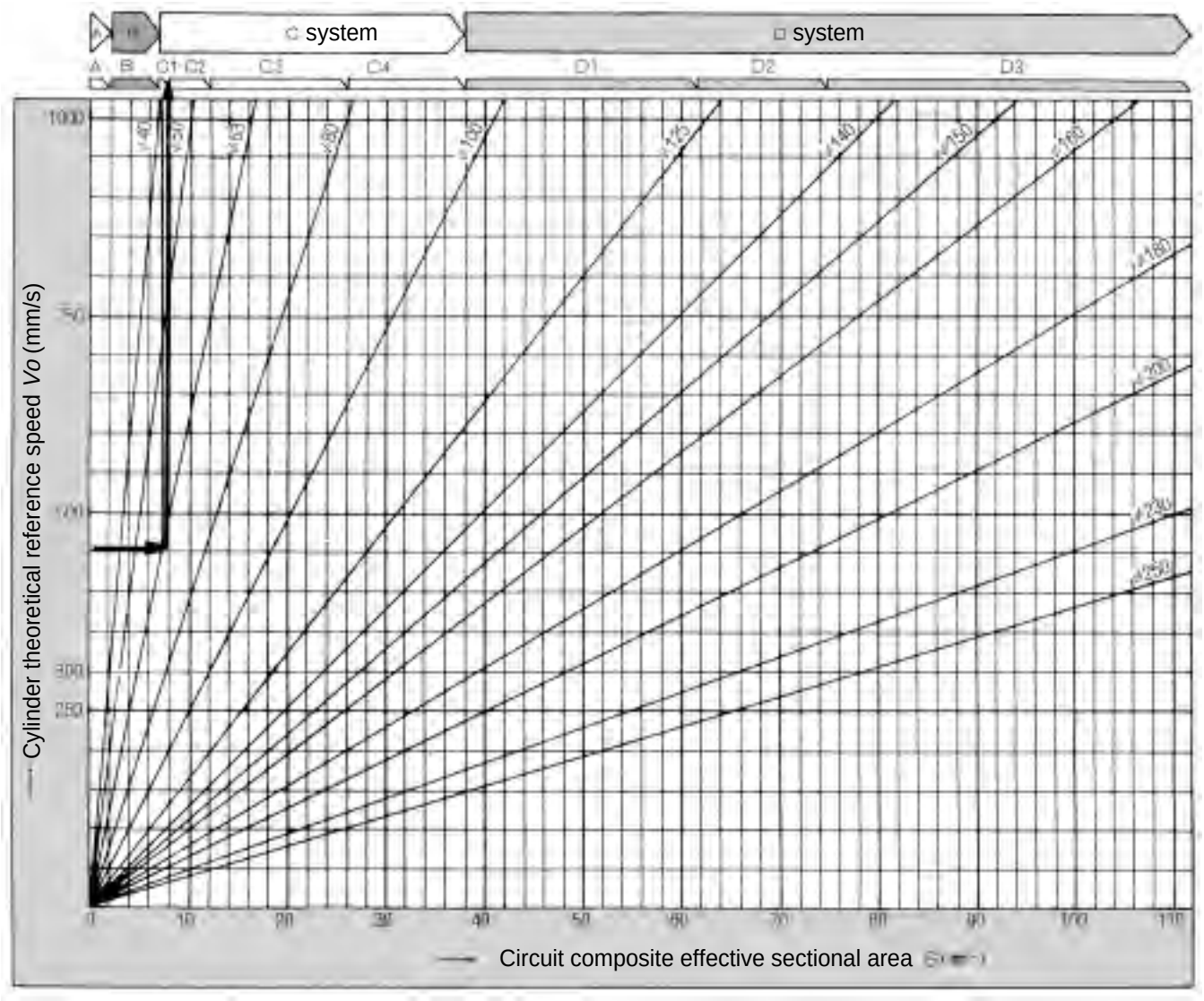
STEP 4 Selecting proper system

According to the system selection table, read system symbol with tracing the cross point between *vo* found by [STEP 3 Selecting theoretical reference speed] and øD found by [STEP 2 Selecting cylinder bore size] upward.

System symbol ☐

(E.g.) In order to operate 63 mm bore cylinder with theoretical reference speed 450 mm/s, C1 system is the optimum.

Graph-3 System selection table



System selection 2

STEP 1 <Checking conditions>
Load (N),
Required operation time (S)

→

STEP 2 Refer to Graph-1
Selecting cylinder bore size

→

STEP 3 Refer to Graph-2
Selecting theoretical reference speed

STEP 5 Selecting proper component

According to the standard system table, confirm the model No, of proper system components found by [STEP 4 Selecting proper system].

	(Example) CI system
Valve ☐	Valve: Single 4KB210-08 or 4GB310-08 Double 4KB220-08 or 4GB320-08
Speed control valve ☐	Speed control valve: SCI-8
Silencer ☐	Silencer: SLW-8A
Piping ☐	Piping: ø10 x ø7.2 nylon tube 1 m

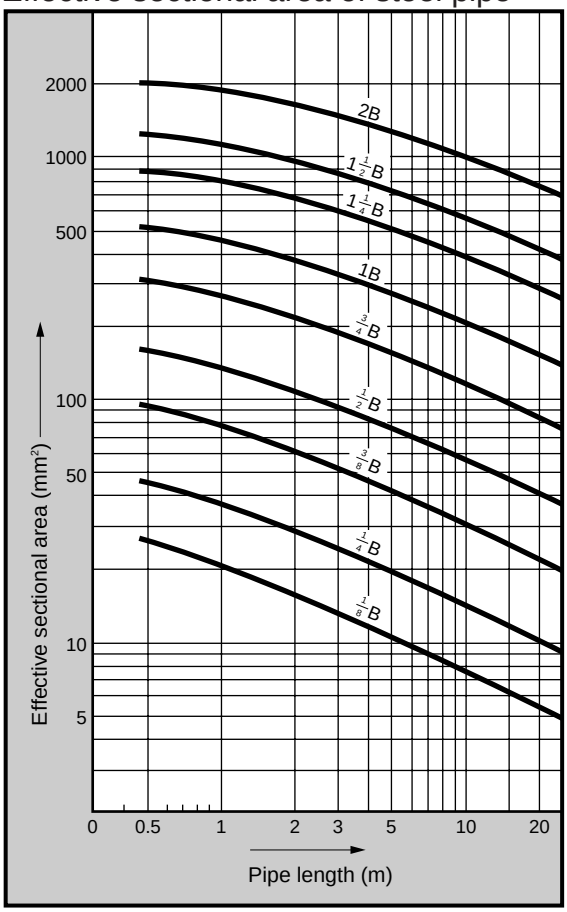
Table-1 Standard system table

Standard system No.	Valve		Speed control valve	Silencer	Piping	Composite effective sectional area (mm^2) Pipe length 1 m
	Single solenoid	Double solenoid				
A	4SB010-M5 4KA110-GS4	4SB020-M5 4KA120-GS4	SC3W-M5-4 (SC-M5)	SLM-M5	ø4 x ø2.5 nylon tube	0.9
B1	4KA110-GS6 4KB110-06	4KA120-GS6 4KB120-06	SC3W-6-6 SCL2-06-H66	SLM-M5 SLW-6A	ø6 x ø4 nylon tube	2.0
B2	4KB110-06 4GB110-06	4KB120-06 4GB220-06	SC1-6 SCL2-08-H88	SL-M5 SLW-6A	ø8 x ø5.7 nylon tube	3.0
B3	4GB210-06 4KB210-06	4GB220-06 4KB220-06	SC1-6 SCL2-08-H88	SLW-6A SLW-6S	ø8 x ø5.7 nylon tube	5.2
B4	4GB210-08 4KB210-08	4GB220-08 4KB220-08	SC1-8 SCL2-10-H1010	SLW-6A SLW-8A	ø10 x ø7.2 nylon tube	6.4
C1	4GB210-08 4KB210-08 4F210-08	4GB220-08 4KB220-08 4F220-08	SC1-8 SCL2-10-H1010	SLW-8A SLW-8S	ø10 x ø7.2 nylon tube	7.8
C2	4GB310-10 4F310-10 4KB310-10	4GB320-10 4F320-10 4KB320-10	SC1-10	SLW-10A	ø10 x ø7.2 nylon tube or Rc3/8 steel pipe	12
C3	4F510-15 4KB410-15	4F520-15 4KB420-15	SC1-15	SLW-15A	Rc1/2 steel pipe	27
C4	4F510-15 4KB410-15	4F520-15 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

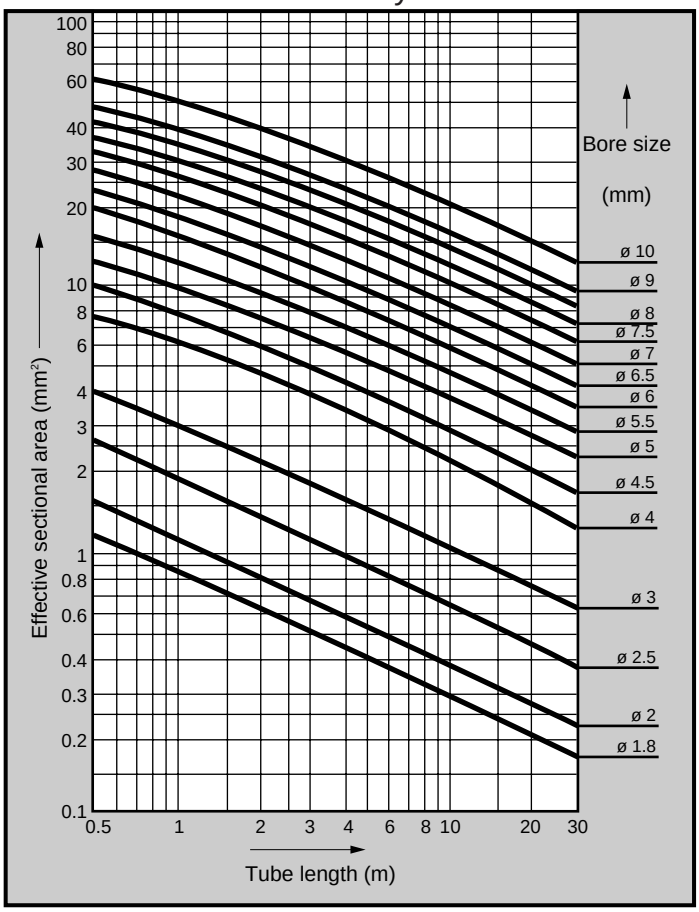
STEP 4 Refer to Graph-3 Selecting proper system
STEP 5 Refer to Table-1 Selecting proper component

Effective sectional area of steel pipe/nylon tube and recommended maximum flow rate for gas pipes

Effective sectional area of steel pipe



Effective sectional area of nylon tube



Recommended maximum flow rate for gas pipes

Nominal size	1/8 B	1/4 B	3/8 B	1/2 B	3/4 B	1 B	1 1/4 B	1 1/2 B
Pressure drop MPa (Note 1)	0.124	0.0707	0.0576	0.0425	0.0276	0.0209	0.0133	0.0105
Inlet pressure MPa	Recommended maximum flow (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

(Note 1: Inlet pressure = 0.5 MPa
Gas tube length: 10 m)

(Remarks)

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

The recommended maximum flow rate refers to the maximum flow rate that can be recommended in the range that the pressure drop is allowable for the piping length, and is determined based on actual use.

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

Flow characteristics

1. Indicating flow properties

The flow rate in catalog specifications is indicated as follows:

Components	Indication	Unit	Standards
Pneumatic components	New JIS compliant indication	C/b	ISO 6358: 1989 Pneumatic fluid power - Components using compressible fluids - Determination of flow rate properties JIS B8390: 2000 (ISO 6358 translation)
	Conventional indication	S	JIS B8373: 1993 "pneumatic 2 port solenoid valve" JIS B8374: 1993 "pneumatic 3 port solenoid valve" JIS B8375: 1993 "pneumatic 4, 5 port solenoid valve" JIS B8379: 1995 "pneumatics noise reduction device"
		Cv	ANSI (NFPA) T3.21.3: 1990

2. Explanation

The flow characteristics of the pneumatic components were conventionally indicated with the effective 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.

- The sonic conductance C: Value obtained by dividing the passage mass flow of the component in the choke flow by the sum of upstream absolute pressure and standard state density. (sonic conductance)
  $S \fallingdotseq 5.0C$ (C is sized conventionally.)
- Critical pressure ratio b: Pressure at which choke flow results if smaller than this value (downstream pressure/upstream pressure) (critical pressure ratio).
- Effective sectional area S (mm^2): Value calculated from changes in pneumatic tank pressure indicating the ideal restriction effective section at which friction or restricted flow does not occur when flowing in the choke flow from the component on the pneumatic tank.

* Choke flow: Flow at which upstream pressure is higher than downstream pressure, and speed at certain sections of components reach sonic levels. The gas mass flow is proportional to upstream pressure, and does not rely on downstream pressure. (Choked flow)

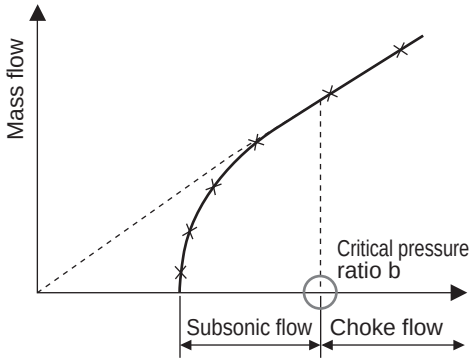


Fig. 1 Mass flow characteristics in respect to upstream pressure

Flow rate calculation formula

The flow rate is expressed as follows with practical units.

$\frac{P_2 + 0.1}{P_1 + 0.1} \leqq b$: Choke flow

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

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

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

Q : Flow rate [dm^3/min. (ANR)], SI unit dm^3 (digital cubic meter) expressed as ℓ (liters). $1dm^3 = 1\ell$
C : Sonic conductance [$dm^3/(s \cdot bar)$]
b : Critical pressure ratio (-)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
t : Temperature (°C)

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

Safety precautions

Always read this section before starting use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.
It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

WARNING

1 This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience in handling.

2 Use this product in accordance of specifications.

This product must be used within its stated specifications. It must not be modified or machined.
This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.
(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)

❶ Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
❷ Use for applications where life or assets could be adversely affected, and special safety measures are required.

3 Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B8370 (pneumatic system rules)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, body standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of the entire system related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Discharge any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
❹ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe warnings and cautions on the pages below to prevent accidents.

■ The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

DANGER : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

WARNING : When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

CAUTION : When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.
In any case, important information that must be observed is explained.

Disclaimer

1. CKD cannot be held liable for any business interruption, loss of profit, personal injury, delay cost, or any other ancillary or indirect loss, cost, or damage resulting from the use of or faults in the use of CKD products.
2. CKD cannot be held responsible for the following damage.
   (1) Damage resulting from disaster or failure of CKD parts due to fire from reasons not attributable to CKD, or by intent or negligence of a third party or customer.
   (2) When a CKD product is assembled into customer equipment, damage that could have been avoided if customer equipment were provided with functions and structure, etc., generally accepted in the industry.
   (3) Damage resulting from use exceeding the scope of specifications provided in CKD catalogs or instruction manuals, etc., or from actions not following precautions for installation, adjustment, or maintenance, etc..
   (4) Damage resulting from product modifications not approved by CKD, or from faults due to combination with other software or other connected devices.

Information on Export

Security Trade Control

The products listed in this catalog and their related technology may require approval before export or provision. To contribute to world peace, cases may arise when approval under the Foreign Exchange Order is required depending on the country to where the product or related technology is being exported or provided.
The scope of products and related technology requiring approval are listed in the Export Trade Control Order Appendix Table 1 or Foreign Exchange Order Appendix Table.
The Export Trade Control Order Appendix Table 1 and Foreign Exchange Order Appendix Table consist of the following two types of information:

- List Provisions indicating items 1 to 15 for each section
- Catch-all Provisions, which do not specify specifications based on each item, but restrict based on application (Item 16)

Application for Approval is received by the Ministry of Economy, Trade and Industry, Security Trade Control Review Section or each local bureau of Economy, Trade, and Industry.

Products and related technology listed in this catalog

Products and related technology listed in this catalog are subject to the Catch-all Provisions of the Foreign Exchange and Foreign Trade Act.
When export or providing products or related technology listed in this catalog, pay sufficient attention to ensure that they are not used for arms or weapons.

Contact

Contact your local CKD Sales Office for more information on the Security Trade Control of the products and related technology listed in this technology.

Design & Selection

1. Confirmation of Specifications

⚠ WARNING

■ Use within the product's specific specification range.
Products described in this catalog are designed only for use in a compressed air system. Use with pressure or temperature exceeding the specification range may result in damage or operation faults. Refer to specifications.
Contact CKD when using for fluids other than compressed air.

2. Design for Safety

⚠ WARNING

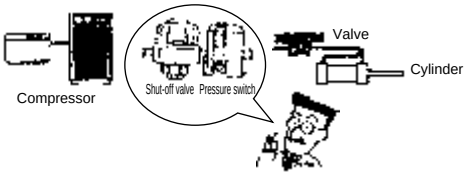
■ Thoroughly understand the characteristics of compressed air before designing the pneumatic circuit.
- The same functions as mechanical, hydraulic or electrical methods cannot be anticipated if instantaneous stop holding is required during an emergency stop.
- Pop-out, air discharge, and leakage are caused by compression and expansion of air characteristics.
- Air must be supplied to and exhausted from the valve simultaneously. If air is supplied first, the actuator switch over may be delayed. If air is exhausted first, it is not possible to control actuator speed and the pop-out may occur.

■ Make sure that switch signals for the 2-position and 3-position double solenoid do not turn ON simultaneously.

■ When using the 3-position valve all port block as a brake, operation will not stop at an accurate position because of air compression features.
This product cannot be used for pressure holding applications, since devices such as valves and cylinders tolerate an air leak, and may cause the brake position to change or the pressure to drop.

■ Take care of electrical circuits during emergency stops and cylinder operation during a service interruption.
- If the 2-posltion double solenoid is operated once and changed, that state will be held until a reverse operation electrical signal is input.

■ Install a "pressure switch" and "shut-off valve" on the device's compressed air inlet.
- The pressure switch will disable operation unless set pressure is reached. The shut-off valve will exhaust compressed air in the pneumatic pressure circuit, and will prevent accidents caused by operation of pneumatic components by residual pressure.



■ Take measures to prevent harm to operators or objects should this product fail.

⚠ CAUTION

■ Check leakage current to prevent other fluid control components from malfunctioning due to leakage current.
- When using a programmable controller, etc , leakage current could cause the solenoid valve to malfunction. The level at which the solenoid valve is affected by the leakage current differs with the solenoid valve.

Programmable controller

100VAC	3.0mA or less (Note1)
200VAC	1.5mA or less
12VDC	1.5mA or less (Note2)
24VDC	1.8mA or less (Note2)

Note 1: 2.0mA or less for 4G Series.
Note 2: 1.0mA or less for MN4S0, 4S0, 4S1, and 3M0 Series.

■ Pay attention to the following when using nylon or urethane tubing for piping:
- Use flame-resistant tubing or metal piping if spatter is a problem.
- Use hydraulic hose for piping for both hydraulic and pneumatic specifications.
- When using the standard push-in joint for spiral tubing, fix the base of tubing with a hose band. The holding force will drop if the tube rotates.
- When using in a hot environment, use a soldered screw tightened joint. The push-in joint cannot be used.

3. Working environment

⚠ WARNING

■ Confirm that the product will withstand the working environment.
- This product cannot be used in an environment containing corrosive gas, chemical liquids, solvents, water, vapor, or ozone. If water drip, oil or metal chips (spatter or cutting chips, etc.) could come in contact with the product, provide appropriate guarding.
- Consult with CKD if ozone is generated in the air supply. (An ozone resistant series is available.)
- Only an explosion proof solenoid valve can be used in a flammable atmosphere.

■ Avoid installing this product where it will be subject to rain, water, direct sunlight, or high humidity.
(The explosion proof 4F** OE Series can be used outdoors.)

■ Do not use this product in a corrosive environment.
Use in this type of environment could cause damage or malfunction.

⚠ CAUTION

■ Use clean air.
- The product could break or malfunction if used with compressed air containing chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc.

4. Durability

⚠ WARNING

■ Decide the method of lubricating pneumatic components, and provide correct maintenance.
- Decide whether to use lubrication or prelubrication, and provide proper lubricant control.

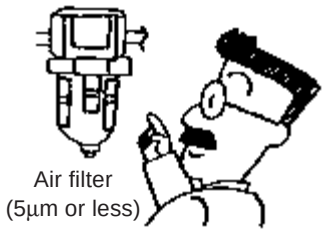
■ Ultra dry air is not suitable for compressed air devices.
- Extra dry compressed air will shorten the life of pneumatic components.
  When using this type of compressed air, use a solenoid valve for DC voltage drive.

■ Use in continuous energizing could deteriorate the solenoid valve's performance. Contact CKD for such applications.
- Use the DC voltage specifications or fluorine rubber specification product when using in a continuous energizing state.

5. Air pressure source

⚠ CAUTION

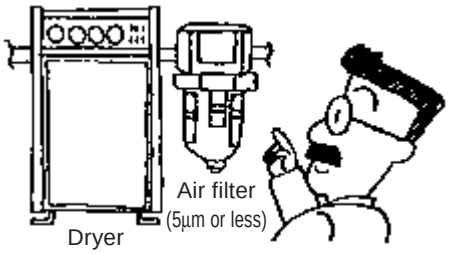
■ Install the air filter just before the circuit using the pneumatic component.



■ Do not supply other than compressed air.

■ Use clean compressed air that does not contain corrosive gases.

■ Use dry compressed air so that water drops do not form in pipes.



- Drainage will form if the temperature drops in the pneumatic piping or pneumatic component.
- Operation faults could occur if the drainage enters the air passage in the pneumatic component or if it temporarily blocks the passage.
- Drainage could cause rust to form and lead to pneumatic component faults.
- Drainage will remove lubricant, and cause lubrication faults.

■ Use clean compressed air that does not contain oxidized oil, tar, carbon, etc., from the air compressor.
- If oxidized oil, tar, or carbon enter the air compressor and solidify, resistance at the sliding section will increase, and could lead to operation faults.
- If the supplied lubricant mixes in with oxidized oil, tar, carbon, etc., the sliding section of the air compressor could be worn.

■ Use compressed air that does not contain solid foreign matter.
- Solid foreign matter in compressed air could enter the air compressor and cause wear at the sliding section or could cause sticking.

6. Use

⚠ WARNING

■ Do not restrict the manifold valve's exhaust port.

● Other cylinders could malfunction due to back pressure generated by the switch valve's exhaust. In this case, exhaust from both sides of the manifold or use a discrete exhaust valve with a spacer or discrete valve for the problematic valve.

⚠ CAUTION

■ Keep the momentary power on and manual operation time of the double-solenoid type 2-position valve at 0.1 seconds or more.
Note that the cylinder could malfunction depending on the secondary load conditions, so the power on and manual operations should be continued until the cylinder reaches the stroke end position.

■ Avoid restricting the air supply port or using the valve released to air.

Do not restrict the air supply port!

● When using the internal pilot operated type, supply pressure could drop below the working range and malfunction. Use the external pilot operated type in this case.

■ Use in the continuous energizing state could promote a drop in the solenoid valve's performance. The following uses are the same as continuous energizing:

· During intermittent operation, when energizing is longer than nonenergizing.
· During intermittent operation, when each energizing exceeds 30 minutes.

Consider heat dissipating measures at installation. Consult with CKD when using this device in continuous energizing.

7. Securing space

⚠ CAUTION

■ Provide sufficient space around the solenoid valve for installation, removal, wiring, and piping.

8. Instruction manual

⚠ CAUTION

■ Indicate maintenance conditions in the device's instruction manual.

● The product's function can drop markedly based on the working state, working environment, and maintenance, and can prevent safety from being attained. If maintenance is correct, product functions can maximized.

Installation & Adjustment

1. Installation

⚠ WARNING

■ Do not support valves with piping when installing valves.
- Install and fix the valve body.

■ Avoid washing with water or solvents or painting after installation.
- Resin parts could be damaged.
- The paint could block the pilot exhaust port and cause malfunction.

■ Do not restrict the valve's exhaust port (including pilot exhaust port) to less than the piping connection port size.
A breathing action is generated by valve operation at the valve's exhaust port, and foreign matter from around the exhaust port could be sucked in. If the exhaust port is installed facing upward, foreign matter could enter.
Install a silencer or pipe the exhaust port so it faces downward.
- The actuator will not operate correctly if exhaust is not smooth. When using a manifold, exhaust could prevent other solenoid valves from operating correctly.

■ Do not remove the solenoid valve's packaging or the piping port's dust-proof seal until just before piping.
- If the dust-proof seal is removed from the piping port before pipes are connected, foreign matter could enter the solenoid valve from the piping port and could lead to faults or malfunctions.

■ Check that joints and tubing are not twisted or pulled, and that moment load is not applied.

■ Check that tubing is not worn or damaged.
- Tubing could be crushed, ruptured, or dislocated.

2. Confirmation before Operation

⚠ CAUTION

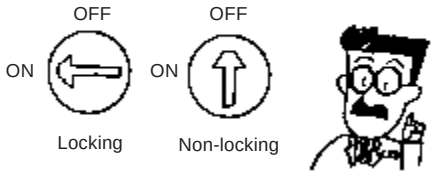
■ When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.
- The piping connection could dislocate or piping fly off, causing accidents.
- Caution: If compressed air is supplied too slowly, sealing pressure may not be generated by the sealing agent in the solenoid valve, leading to air leaks.

■ When supplying compressed air for the first time after connecting piping, confirm that no air is leaking from any pipe connections.
- Apply a leakage detection agent to pipe connections and check for air leaks.

3. Adjustment

⚠ WARNING

■ After operating the solenoid valve's manual operation device, return it to the origin (initial position) before operating the device.
When using a non-locking type, check the automatic return, and when using a locking type, release the lock (OFF state).
[Example]



Note: Operation methods differ based on the model. Refer to the page for each model.

- The solenoid valve could activate when power is turned ON, causing a hazard.
- When operating in the operation position using the manual operation device, abnormal operation could occur, causing a hazard.

4. Piping

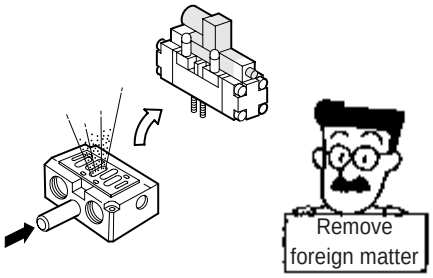
⚠ CAUTION

■ When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm margin from the end of piping threads.

- If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the solenoid valve and lead to faults.

■ Always flush just before piping pneumatic component.

- Any foreign matter that has entered during piping must be removed so it does not enter the pneumatic component.



■ Tighten pipes with the appropriate torque.

- Pipes must be connected with the appropriate torque to prevent air leakages and screw damage. First tighten the screw by hand to prevent damage to screw threads, then use a tool.

Thread size	Tightening torque N·m
M3	0.3 to 0.6
M5	1.0 to 1.5
Rc 1/8	3 to 5
Rc 1/4	6 to 8
Rc 3/8	13 to 15
Rc 1/2	16 to 18
Rc 3/4	19 to 40
Rc 1	41 to 70

■ Pipe so that piping connection does not deviate by the device's movement, vibration, tension, etc.

- Control of actuator speed will be disabled if piping on the exhaust side of the pneumatic circuit is disengaged.
- When using the chuck holding mechanism, the chuck will be released creating a hazardous state.
- When using the push in joint, cut the tube at right angles using a dedicated tool.
- Confirm that the tube has been inserted properly, and make sure that there is no tension during use. The tube could be dislocated or damaged if there is any tension.

■ Make sure that the joint and tube are not twisted or pulled, and that moment load is not applied.

■ Use the designated tube.

- Mount an insert sleeve especially when using extremely flexible urethane tubing.

■ Securely insert the tube to the tube end, and make sure that the tube cannot be pulled off.

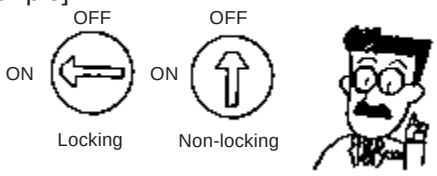
■ Cut the tube at right angles using a dedicated cutting tool.

During use & Maintenance

1. Maintenance

⚠ WARNING

■ After operating the solenoid valve's manual operation device, return it to the origin (initial position) before operating the device.
When using a non-locking type, check the automatic return, and when using a locking type, release the lock (OFF state).
[Example]

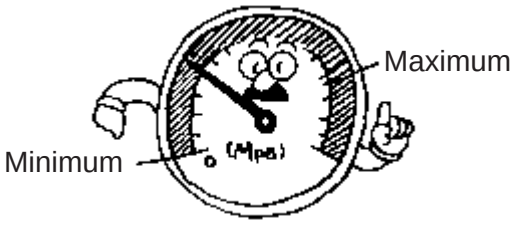


Note: Operation methods differ based on the model. Refer to the page for each model.

- The solenoid valve could activate when power is turned ON, causing a hazard.
- When operating in the operation position using the manual operation device, abnormal operation could occur, causing a hazard.

■ Plan daily inspections and periodic inspections to ensure that maintenance is correctly controlled.
- If maintenance is not correctly controlled, the product's functions could drop markedly and lead to a shortened life, damage, malfunctions, faults, and accidents.

1. Control of supplied compressed air pressure
- Is the set pressure supplied? Does the pressure gauge indicate the set pressure during operation of the device?



2. Control of pneumatics filter
- Is the drain correctly discharged? Is the bowl or element dirty?

3. Control of compressed air leaks from piping connections
- Is the state of the connection, especially at movable sections, normal?

4. Control of solenoid valve's operation
- Are any operations delayed? Is exhaust normal?

5. Control of pneumatic actuator operation
- Is operation smooth? Is end stop normal? Is coupling with the load normal?

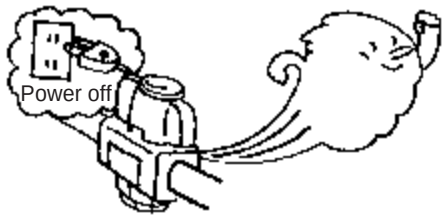
6. Control of lubricator
- Is the oil rate correctly adjusted?

7. Control of lubricant
- Is the regular lubricant supplied?

2. Removal

⚠ WARNING

■ Before servicing the product, turn power OFF, stop the compressed air supply, and check that there is no residual pressure.
- This is a requirement for ensuring safety.



3. Disassembly and Assembly

⚠ WARNING

■ Read the instruction manual enclosed with the product before disassembling or assembling the solenoid valve.
- Thoroughly understand the solenoid valve's structure and principle of operation to ensure safety.
- Personnel involved in this step must have passed the Pneumatic Pressure Skill Test Class 2 or higher.

4. Air Pressure Source

⚠ CAUTION

■ Once oil has been supplied to an oilless valve, oilless functions cannot be maintained.
Once oil is supplied, continue oiling.
- Decide whether the pneumatic component is used oilless or lubricated, and make sure that the decided method is accurate and controlled.
- When using lubrication, do not use lubrication other than ISO VG32 (with no additives) turbine oil.

Precautions for reduced wiring valves (MN4E0/M(N)4G$^{A}_{B}$ / W4G$^{A}_{B}$ 2/MN4S0/M4S$^{A}_{B}$1/M(N)4TB Series)

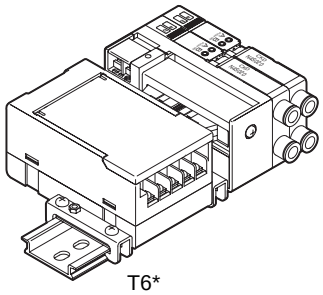
⚠ CAUTION

Carefully check polarity, voltage, and terminal number before wiring.

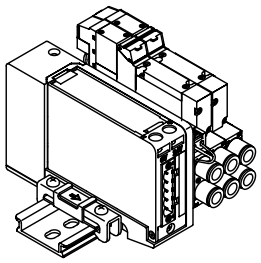
- Voltage could drop due to cable length if power is ON simultaneously.
  Make sure that the voltage drop in respect to the solenoid is within 10% of the rated voltage.

1. Serial transmission type (T6*, T7*, T8*)

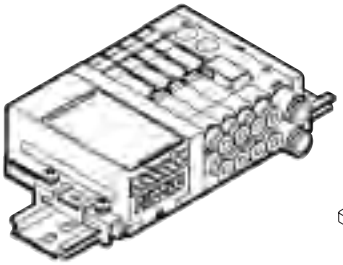
- The working voltage is 24 VDC.
- If noise may have an effect, prepare a power supply for each manifold solenoid valve and wire independently when possible.
- Keep the power wire as short as possible.
- Do not use the same power supply for devices that generate noise, such as inverters or motors.
- Do not lay the power wire, signal wire, and other power cables in parallel.
- The slave unit is dedicated for each maker and is not compatible.
- Follow PLC maker instructions when connecting the slave unit.
  The slave unit's terminal numbers are indicated on the slave unit's installation surface.
- Contact each PLC maker for details on the PLC.
  Contact CKD for details on the UNIWIRE SYSTEM and SAVE NET.
- When installing the manifold solenoid valve vertically, install the slave unit at the upper end.
- When using the T8* Series, attach a waterproof cap or waterproof plug onto input/output slave station connectors not being used.



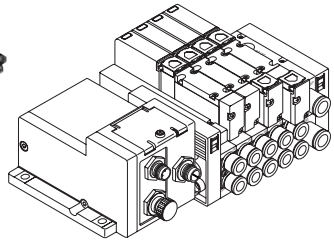
T6*



T7* (4G Series)



T7* (MN4E0 Series)

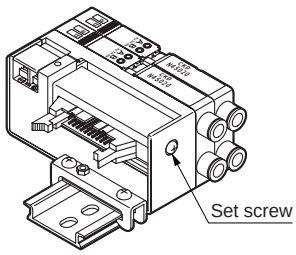


T8* (W4G2 Series)

2. Connector type (T50, T50A)

- The PLC output unit's signal arrays and valve side signal arrays must match. In the current state, the direct connection with the PLC is limited. Refer to the following pages for examples of the wiring connections (M4G$^{A}_{B}$, MN4G$^{A}_{B}$; Series: page 371, MN4SO Series: page 613, M4TB, MN4TB Series: page 670). Use dedicated cables specified by each PLC maker.
- The working voltage is 24 VDC or 12 VDC
- When connecting T50 or T50A to a common output unit, use the 20P connector's + terminal (20, 10) as the + side common, and use the NPN transistor output open collector type for the drive circuit.
  Consult with CKD when using the PNP transistor output.
- When referring to examples of wiring connections (M4TB,MN4TB Series: page 670) and wiring T50 or T50A, supply the power from the enclosed terminal.
  Do not change polarity. Incorrect polarity will cause to short circuits. (The internal fuse will blow.)
- Do not connect this solenoid valve to the input unit as major faults could occur in this component and in peripheral components.
  Connect this solenoid valve to the output unit.
  OMRON and Matsushita Electric Works relay terminal series input unit and output unit have a common connector, but polarity of the power supply in the pin layout differs.
  The pin layout for the T50 type solenoid valve is the same as the above output unit.

Note: Connectors rotate radially and axially.
After installing the solenoid valve, tighten the set screw to fix the connector in place.
The set screw could loosen if force is applied on the connector section.
Install so that force is not applied on the connector section.
(The set screw tightening torque is 0.3 to 0.35 N·m.)



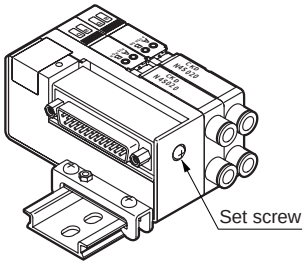
Precautions for reduced wiring valves (M(N)4G A/B , MN4S0, M4S A/B 1, M(N)4TB Series)

⚠ CAUTION

3. Connector type (T30, T31, T51, T52, T53, TM*)

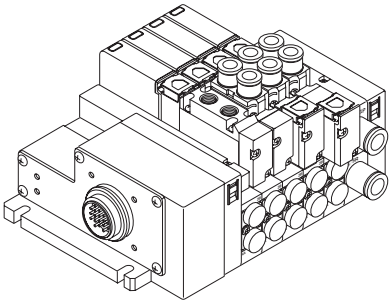
- The working voltage is 24VDC and 12VDC.
- Use with the + common for the 4S0 Series and 4S1 Series.

Note: Connectors rotate radially and axially.
After installing the solenoid valve, tighten the set screw to fix the connector in place.
The set screw could loosen if force is applied on the connector section.
Install so that force is not applied on the connector section.
(The set screw tightening torque is 0.3 to 0.35 N·m.)



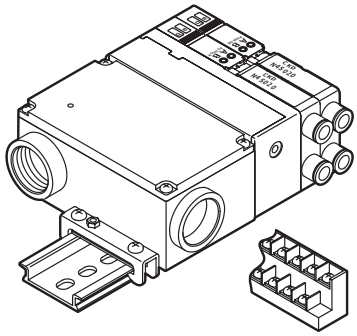
5. Multiconnector (T20)

- Turn power off before connecting or disconnecting the connector.
- Insert the connector to the back, and securely lock it.



4. Terminal box type (T10,11)

- Install the gland where it cannot be reached by hand, or provide a cover.
(4TB1.2-T10)



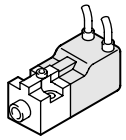
Variation of electric connection (discrete valve / individual wiring type manifold)

*Refer to Intro 34 to 37 for reduced wiring manifold.

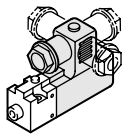
● Electric connection, manual override and option selection ☐ : Available

	Series	Page	Voltage (V) (power consumption W)	Electric connection
2, 3 port valve	**3M** Series	1048	Standard 24 VDC (0.6 W) Option 12 VDC (0.6 W) 6 VDC (0.9 W) 5 VDC (0.9 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	Miniature pneumatic valve series **P/M/B51$^{2}_{3}$**	1090	Standard 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50, 60Hz) 12 VDC (1.8 W) 24 VDC (1.8 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 *1 28 29 30
	*1: The A-type connector is available only for the manifold.			
	3P Series	1064	Standard *1 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50, 60Hz) 24 VDC (1.8 W) Option 110 VAC (50, 60Hz) 220 VAC (50, 60Hz) 12 VDC	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	*1: Some models differ for the 3P Series.			
	4S1 Series **(3SA1)**	730	Standard 12 VDC (0.6 W) 24 VDC (0.6 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4K Series **(3KA1)**	778	Standard 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50/60Hz) 24 VDC (1.8 W) Option 110 VAC (50, 60Hz) 220 VAC (50, 60Hz) 12 VDC	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
4, 5 port valve	Miniature pneumatic valve Series Discrete valve **W2P51* P/B5142** Individual wiring manifold **B*5142 N*5142**	1090	Standard 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50, 60Hz) 12 VDC (1.8 W) 24 VDC (1.8 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4S0 Series	704	Standard 24 VDC (0.6 W) Option 12 VDC (0.6 W) 6 VDC (0.9 W) 5 VDC (0.9 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4S1 Series	730	Standard 12 VDC (0.6 W) 24 VDC (0.6 W)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4K Series	778	Standard 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50, 60Hz) 24 VDC (1.8 W) Option 110 VAC (50, 60Hz) 220 VAC (50, 60Hz) 12 VDC	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
	4F Series	884	Standard 100 VAC (1.8, 1.4 W) 200 VAC (1.8, 1.4 W) (50, 60Hz) 24 VDC (1.8 W) Option 110 VAC (50, 60Hz) 220 VAC (50, 60Hz) 12VDC (4F0/4F1 standard)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

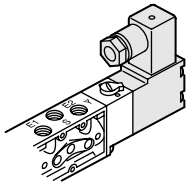
1 Grommet lead wire
Circuit diagram ⓐ



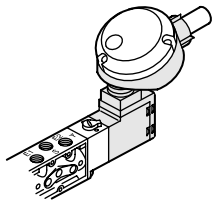
6 Small terminal box
Ⓑ Ⓢ
Circuit diagram ⓑ



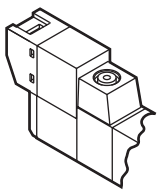
11 DIN terminal box
Ⓑ
Circuit diagram ⓐ



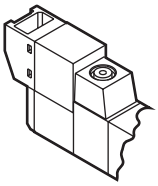
16 Round terminal box with light, + gland (A-15a)
Circuit diagram ⓕ



21 C-connector
Ⓑ Ⓝ Ⓢ Ⓘ
Circuit diagram ⓖ

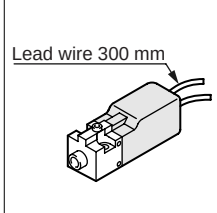
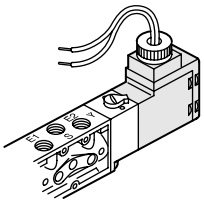
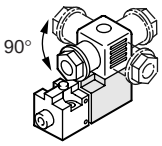
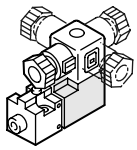
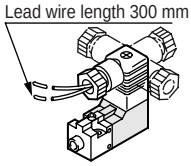
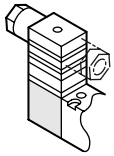
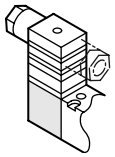
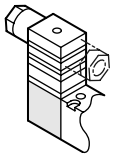
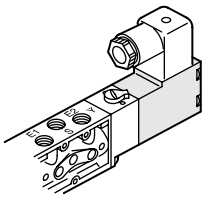
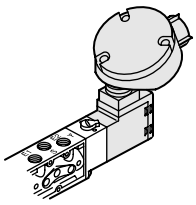
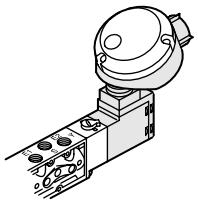
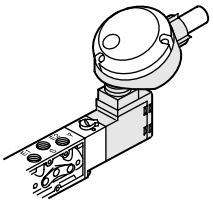
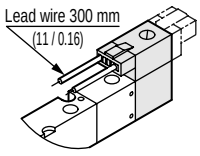
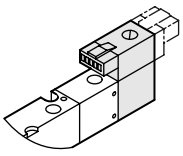
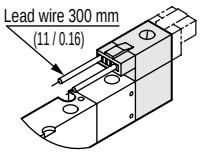
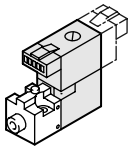
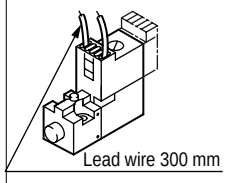
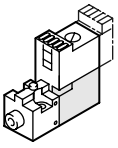
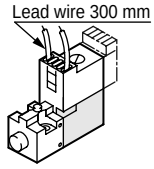
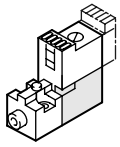
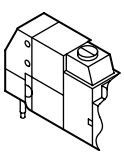
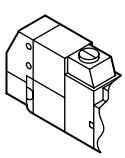
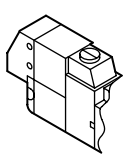


26 D-connector
Ⓑ Ⓝ Ⓢ Ⓘ
Circuit diagram ⓖ



Refer to the following page for the circuit diagram ⓐ to ⓗ.

Electric connection (wiring method) Ⓑ: No lead wire Ⓦ: Lead wire Ⓢ: Surge suppressor Ⓛ: Indicator light Ⓝ: No socket

	2 Grommet lead wire Ⓢ Circuit diagram ⓑ	**3** Conduit lead wire Circuit diagram ⓐ	**4** Small terminal box (G1/4) Ⓑ Circuit diagram ⓐ	**5** Small terminal box ⒷⓁ Circuit diagram ⓓ
				
	7 Small terminal box ⓌⓁ Circuit diagram ⓓ	**8** Terminal box Ⓑ Circuit diagram ⓐ	**9** Terminal box ⒷⓁ Circuit diagram ⓒ	**10** Terminal box ⒷⓁⓈ Circuit diagram ⓒ
				
	12 DIN terminal box ⒷⓁ Circuit diagram ⓒ	**13** Round terminal box (G1/2, G3/4) Circuit diagram ⓔ	**14** Round terminal box Ⓛ Circuit diagram ⓕ	**15** Round terminal box with + gland (A-15a) Circuit diagram ⓔ
				
	17 C-connector Ⓦ Circuit diagram ⓐ	**18** C-connector Ⓑ Circuit diagram ⓐ	**19** C-connector ⓌⓈⓘ Circuit diagram ⓖ	**20** C-connector ⒷⓈⓘ Circuit diagram ⓖ
				
	22 D-connector Ⓦ Circuit diagram ⓐ	**23** D-connector Ⓑ Circuit diagram ⓐ	**24** D-connector ⓌⓈⓘ Circuit diagram ⓖ	**25** D-connector ⒷⓈⓘ Circuit diagram ⓖ
				
	27 A-connector ⓌⓈⓘ Circuit diagram ⓖ	**28** A-connector Ⓢⓘ Circuit diagram ⓖ	**29** A-connector ⓃⓈⓘ Circuit diagram ⓖ	**30** Gland VA connector
				Only 4T *1 

*2: The 4T Series voltage is the same as 4K. The wire connection is No. 30.

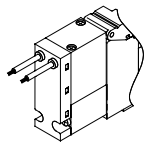
Please refer to the following page about electric connection circuit diagram.

Variation of electric connection (discrete valve / individual wiring type manifold)

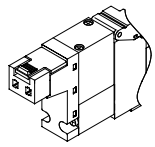
● Electric connection, manual override and option selection ■ : Available

	Series	Page	Voltage (V) (power consumption W)	31	32	33	34	35	36
3·5 port valve	**4G** Series	86	100 VAC 24 VDC (0.6 W) 12 VDC (0.6 W)	37	38	39	40	41	42
	MN4G Series	256		43					
	W4G2 Series	394	100 VAC 24 VDC (0.6 W) 12 VDC (0.6 W)	31	32	33	34	35	36
				37	38	39	40	41	42
				43					
5 port valve	**W4G4** Series	523	100 VAC 110 VAC 24 VDC (1.2 W) 12 VDC (1.2 W)	31	32	33	34	35	36
				37	38	39	40	41	42
				43					

31 Grommet lead wire Ⓦ Circuit diagram ⓐ

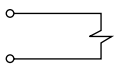


37 E-connector socket terminal attached Ⓢ Ⓛ Circuit diagram ⓖ

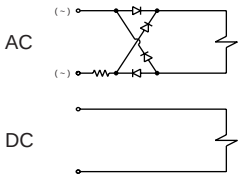


Circuit diagram

a Basic type

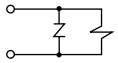


*For 4G Series

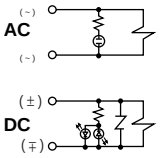


* The grommet lead is available only for DC.

b With surge suppressor

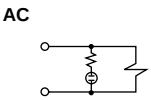


c With indicator light

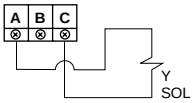


For DC, surge suppressor is provided.

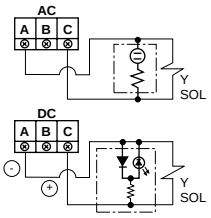
d Small terminal box with light



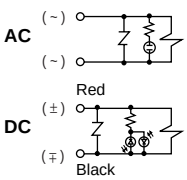
e Round terminal box, basic type



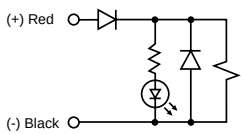
f Round terminal box with light



g With surge suppressor and light



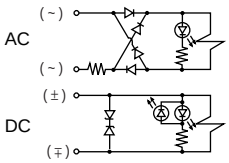
*For 4S0/4S1



* Surge suppressor with indicator light type is polarized.
* Diode is used for surge suppressor.

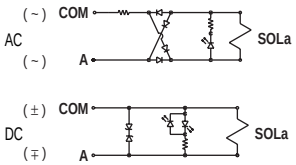
g Cont. of surge suppressor with light

*For 4G Series

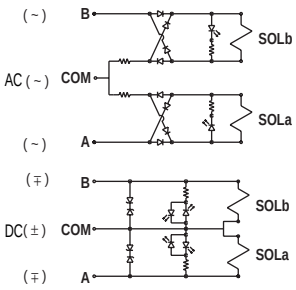


* The A-type connector is available only for DC.

*For W4G2 Series
(Single solenoid)



(Double solenoid)



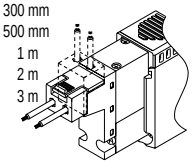
Please refer to the following circuit diagram about circuit diagram (a), (g) and (h).

Electric connection (wiring method)

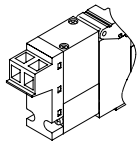
Ⓑ : No lead wire Ⓦ : Lead wire Ⓘ : Indicator light
Ⓢ : Surge suppressor Ⓝ : No socket

32 E-connector Ⓦ Circuit diagram ⓐ

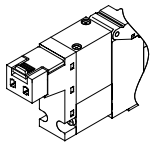
● Lead wire length
300 mm
500 mm
1 m
2 m
3 m



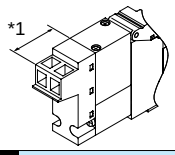
33 E-connector Ⓝ Circuit diagram ⓐ



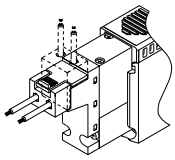
34 E-connector socket terminal attached



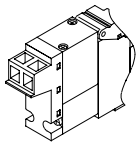
● For 100 VAC, dimension * 1 is 3.5 mm longer than 12, 24 VDC.



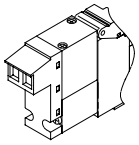
35 E-connector Ⓦ Ⓢ Ⓛ Circuit diagram ⓖ



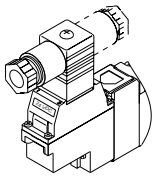
36 E-connector Ⓝ Ⓛ Ⓢ Circuit diagram ⓖ



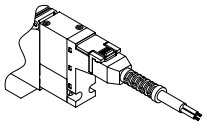
38 A-connector downward Ⓝ Circuit diagram ⓖ



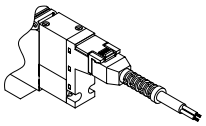
39 DIN terminal box Ⓢ Ⓘ Circuit diagram ⓗ



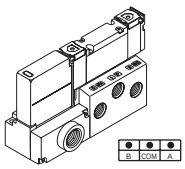
40 Connector w/ EJ type cover Ⓦ Circuit diagram ⓐ



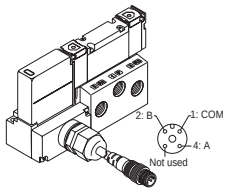
41 Connector w/ EJ type cover Ⓦ Ⓢ Ⓘ Circuit diagram ⓗ



42 Gland Ⓘ Ⓢ Circuit diagram ⓖ

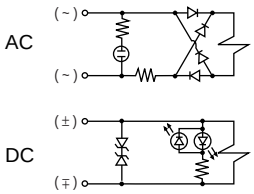


43 I/O connector Ⓦ Ⓢ Ⓛ Circuit diagram ⓖ

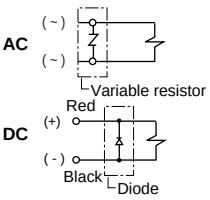


h DIN terminal box with surge suppressor and light

*For 4G Series

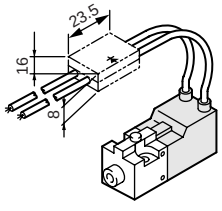


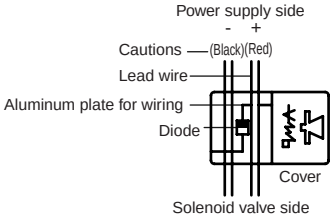
i Option surge suppressor attached (AC/DC)



Diode is polarized.

Surge suppressor attached : When controlled by semiconductors, use surge suppressors.
For lead wire, use 20 / 0.18.
In DC, the suppression on the following diagram is provided only for grommet lead wire.





For AC and B type of DC, variable resistor is provided. (not polarized)