

# 4G<sup>A</sup>B/MN4G<sup>A</sup>B Series

## Technical data 1) Pneumatics system selection guide

- (1) Average speed of cylinder is found according to combination of 4G series and piping system. Vertically installing a cylinder with rod top, the piston speed is found with dividing stroke length by time from beginning to end of piston rod movement. When load factor 50%, piston speed of cylinder should be half.
- (2) Average speed of cylinder mentioned on pneumatic components selection guide is the value when operating a cylinder solo.
- (3) Effective sectional area of solenoid valve, used for calculation according to the following table, is the value of 2-position.
- (4) This selection guide is just reference. Please check actual working conditions with our sizing program.

### Standard system table **4G (metal base)**

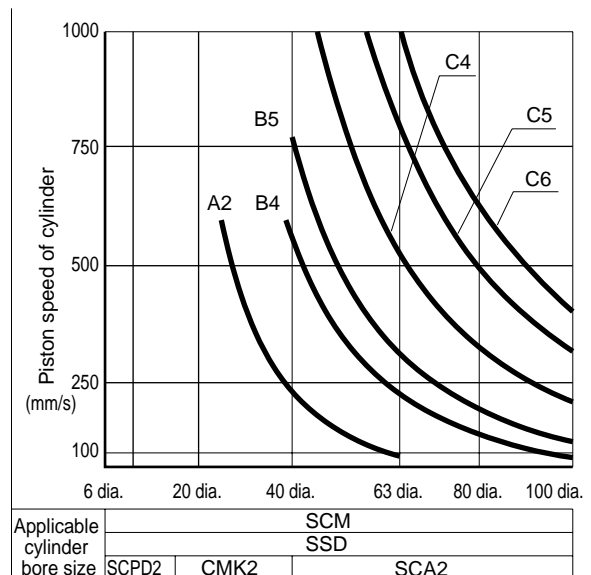
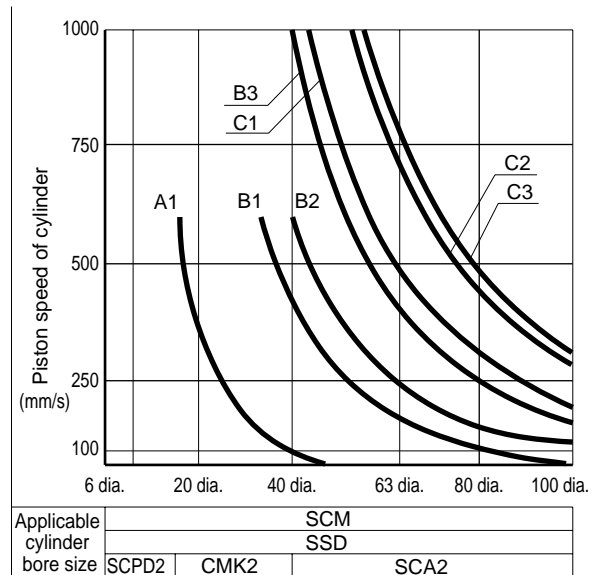
\* Please refer to Page 330 about MN4G (block manifold).

Series	Body porting type					
	Model No.	System No.	Speed controller	Silencer	Pipe	Composite effective sectional area (mm <sup>2</sup> ) pipe length 1m
4G1	4GA110-C4	A1	SC3W-M5-4	SLM-M5	4 dia. X 2.5 dia.	0.6
	4GA110-C6	B1	SC1-6	SLM-M5	6 dia. X 4 dia.	2.8
4G2	4GA210-C6	B2	SC1-6	SLW-6S	6 dia. X 4 dia.	3.9
	4GA210-C8	B3	SC1-8	SLW-6S	8 dia. X 5.7 dia.	6.5
4G3	4GA310-C8	C1	SC1-8	SLW-8S	8 dia. X 5.7 dia.	7.9
	4GA310-C10	C2	SC1-10	SLW-8S	10 dia. X 7.2 dia.	11.6
	4GA310-C10	C3	SC1-15	SLW-8S	10 dia. X 7.2 dia.	12.7

Series	Body porting type					
	Model No.	System No.	Speed controller	Silencer	Pipe	Composite effective sectional area (mm <sup>2</sup> ) pipe length 1m
4G1	4GB110-06	A2	SC3W-6-4	SLW-6S	4 dia. X 2.5 dia.	1.5
	4GB110-06	B4	SC1-6	SLW-6S	6 dia. X 4 dia.	3.7
4G2	4GB210-08	B5	SC1-8	SLW-8S	6 dia. X 4 dia.	5.1
	4GB210-08	C4	SC1-10	SLW-8S	8 dia. X 5.7 dia.	8.5
4G3	4GB310-10	C5	SC1-10	SLW-10L	10 dia. X 7.2 dia.	13.0
	4GB310-10	C6	SC1-15	SLW-10L	12 dia. X 8.9 dia.	16.4

\* System No. is indicated in the following graph.

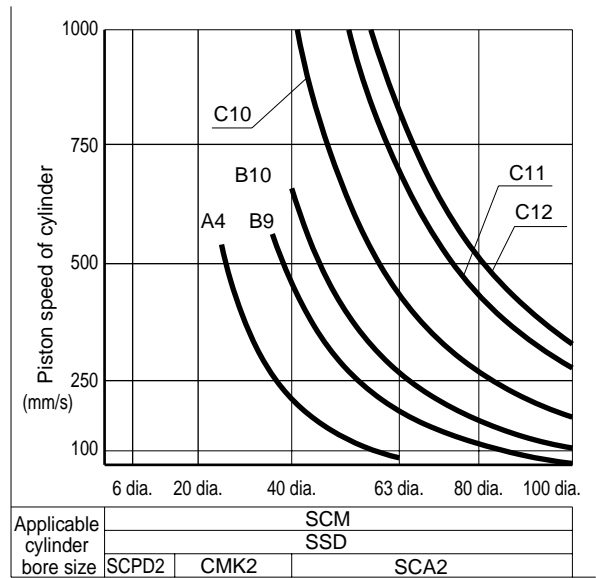
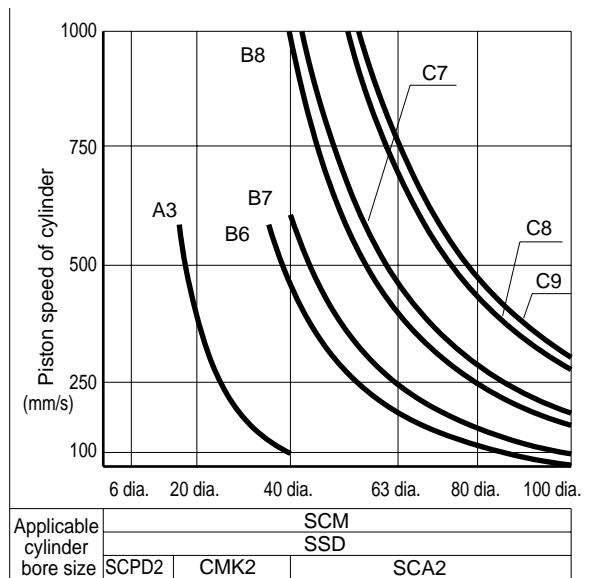


## Technical data 1) Pneumatics system selection guide

<Manifold> (When check valve incorporated)

Series	Body porting type					
	Model No.	System No.	Speed controller	Silencer	Pipe	Composite effective sectional area (mm <sup>2</sup> ) pipe length 1m
4G1	M4GA110-C4	A3	SC3W-M5-4	SLW-6S	4 dia. X 2.5 dia.	0.6
	M4GA110-C6	B6	SC1-6	SLW-6S	6 dia. X 4 dia.	3.0
4G2	M4GA210-C6	B7	SC1-6	SLW-8S	6 dia. X 4 dia.	4.0
	M4GA210-C8	B8	SC1-8	SLW-8S	8 dia. X 5.7 dia.	6.5
4G3	M4GA310-C8	C7	SC1-8	SLW-10L	8 dia. X 5.7 dia.	7.5
	M4GA310-C10	C8	SC1-10	SLW-10L	10 dia. X 7.2 dia.	11.3
	M4GA310-C10	C9	SC1-15	SLW-10L	10 dia. X 7.2 dia.	12.4
Series	Sub base porting type					
	Model No.	System No.	Speed controller	Silencer	Pipe	Composite effective sectional area (mm <sup>2</sup> ) pipe length 1m
4G1	M4GB110-C4	A4	SC3W-6-4	SLW-6S	4 dia. X 2.5 dia.	1.4
	M4GB110-C6	B9	SC1-6	SLW-6S	6 dia. X 4 dia.	3.0
4G2	M4GB210-C6	B10	SC1-8	SLW-8S	6 dia. X 4 dia.	4.3
	M4GB210-C8	C10	SC1-10	SLW-8S	8 dia. X 5.7 dia.	7.0
4G3	M4GB310-C10	C11	SC1-10	SLW-10L	10 dia. X 7.2 dia.	11.3
	M4GB310-C10	C12	SC1-15	SLW-10L	12 dia. X 8.9 dia.	13.4

\* System No. is indicated in the following graph.



4SA/B0  
4SA/B1  
4GA/B  
MN4GA/B  
4GA/B (master)  
MN3S0/  
MN4S0  
4TB  
4L2-4/  
LMF0  
4KA/B  
4F  
PV5/  
CMF  
3MA/B0  
3PA/B  
P/M/B  
NP/NAP/  
NVP  
4F\*\*0E  
HMV/  
HSV  
Uniwire  
system  
SKH  
PCD/  
FS/FD  
3, 5 port pilot operated valve

## Technical data 1) Pneumatics system selection guide

Standard system table **MN4G (block manifold)** (When check valve incorporated)

### 1. Common exhaust

Series	Solenoid valve Port size	System No.	Speed controller	Silencer pipe pipe length 1m	Common exhaust pipe	Composite effective sectional area (mm <sup>2</sup> )
MN4G1	C4	A1	SC3W-M5-4	4 dia. X 2.5 dia.	6 dia. X 4 dia. X 3m	0.6
	C4	A2	SC3W-6-4	4 dia. X 2.5 dia.	6 dia. X 4 dia. X 3m	1.4
	C6	B1	SC1-6	6 dia. X 4 dia.	8 dia. X 5.7 dia. X 3m	3.0
MN4G2	C6	B2	SC1-6	6 dia. X 4 dia.	8 dia. X 5.7 dia. X 3m	4.0
	C8	B3	SC1-8	8 dia. X 5.7 dia.	10 dia. X 7.2 dia. X 3m	6.2

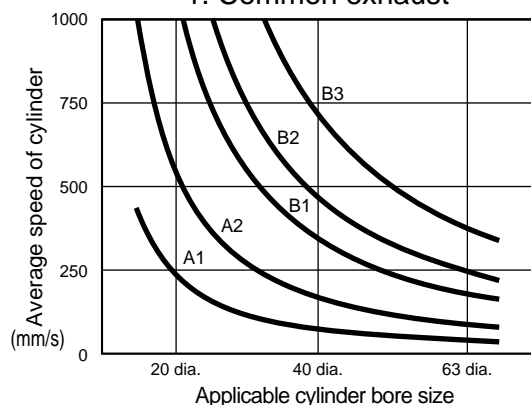
### 2. Atmospheric release exhaust (muffler incorporated)

Series	Solenoid valve Port size	System No.	Speed controller	Silencer pipe pipe length 1m	End block	Composite effective sectional area (mm <sup>2</sup> )
MN4G1	C4	A3	SC3W-M5-4	4 dia. X 2.5 dia.	N4G1-EX	0.6
	C4	A4	SC3W-6-4	4 dia. X 2.5 dia.		1.6
	C6	B4	SC1-6	6 dia. X 4 dia.		3.1
MN4G2	C6	B5	SC1-6	6 dia. X 4 dia.	N4G2-EX	4.4
	C8	B6	SC1-8	8 dia. X 5.7 dia.		6.5

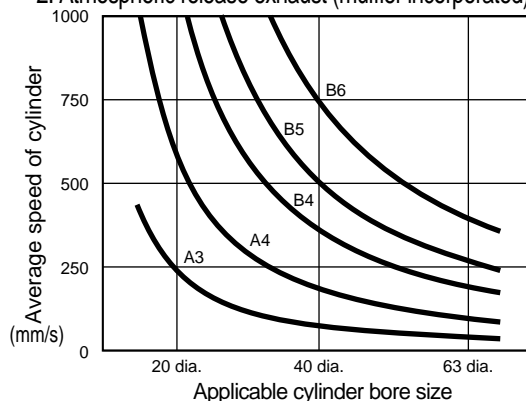
### 3. Silencer assembled exhaust port

Series	Model No.	System No.	Speed controller	Silencer pipe pipe length 1m	Silencer	Composite effective sectional area (mm <sup>2</sup> )
MN4G1	C4	A5	SC3W-M5-4	4 dia. X 2.5 dia.	SLW-H6	0.6
	C4	A6	SC3W-6-4	4 dia. X 2.5 dia.	SLW-H6	1.5
	C6	B7	SC1-6	6 dia. X 4 dia.	SLW-H8	2.9
MN4G2	C6	B8	SC1-6	6 dia. X 4 dia.	SLW-H8	4.3
	C8	B9	SC1-8	8 dia. X 5.7 dia.	SLW-H10	6.3

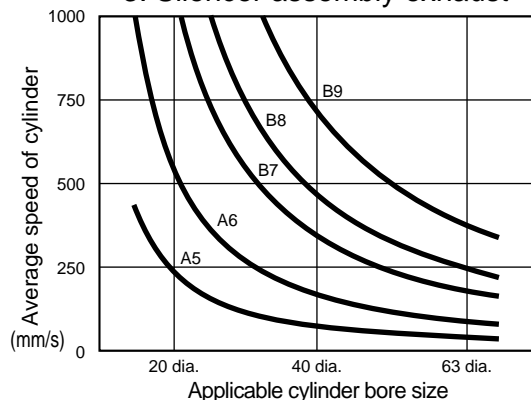
#### 1. Common exhaust



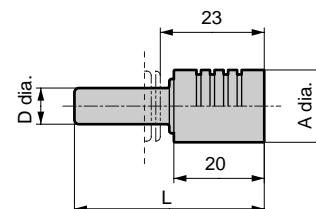
#### 2. Atmospheric release exhaust (muffler incorporated)



#### 3. Silencer assembly exhaust



#### • Silencer



Model No.	D	L	A
SLW-H6	5 dia.	41	16
SLW-H8	8 dia.	42	16
SLW-H10	10 dia.	53	20

### How to use guide

Please use this guide to select the proper model according to your requirements.

• Selection of fluid control components

As conditions, the cylinder speed, either high or low, is already decided. Find theoretical reference speed of cylinder according to the following table.

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

Refer to table of Component selection guide-1 (Page 332, 333) to select proper standard system No. according to cylinder bore and theoretical reference speed.

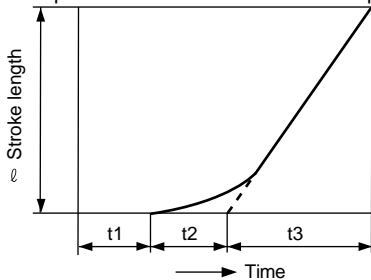
### Explanation of technical terms

- Theoretical reference speed: Indicating degree of cylinder speed. Refer to the following table. (This value almost coincides with speed when loadless. Applied load decreases the speed considerably).

$$v_0 = 1920 \times \frac{S}{A} = 2445 \times \frac{S}{D^2} \quad (1)$$

- $v_0$  : Theoretical reference speed (mm/s)
- A : Cylinder cross-section areas (cm<sup>2</sup>)
- S : Composite effective sectional area of circuit (exhaust air side) (mm<sup>2</sup>)
- D : Cylinder bore size (cm)

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



$$v_0 = \frac{l}{t_3} \text{ (mm/s)}$$

- t1 : Time until beginning of movement.
- t2 : Primary delay time
- t3 : Operation time at constant velocity
- l : Stroke length

• Note: t1 and t2 vary according to load. When no load, neglect the value.

- Required flow: Instantaneous flow rate when operating cylinder with Velocity  $v_0$ . Refer to the following table. Table shows the value when of P=0.5MPa. Required flow rate is the necessary value to select clean air system components.

$$Q = \frac{A_{v0} (P+0.101) \times 60}{0.101 \times 10^4} = \left[ \frac{A_{v0} (P+1.03) \times 60}{1.03 \times 10^4} \right] \quad (2)$$

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

- Required effective sectional area: Composite effective sectional area of required exhaust air side circuit to drive cylinder with Velocity  $v_0$ . (Composite effective sectional area of solenoid valve, flow control valve, silencer and pipe)
- Proper standard system means: The best combination of solenoid valve, flow control valve, silencer and pipe diameter to drive cylinder with Velocity  $v_0$ . Table shows the value when pipe length is 1m.

### How to find flow rate

Find flow rate according to the following formula.

Refer to the table on the following page about acoustic velocity zone.

(1)  $PH \leq 1.89PL$  (subsonic zone)

$$Q = 227 \times S \times \sqrt{PL \times (PH - PL)} \times \sqrt{\frac{273}{T_H}}$$

$$[Q = 22.2 \times S \times \sqrt{PL \times (PH - PL)} \times \sqrt{\frac{273}{T_H}} ]$$

①  $PH \geq 1.89PL$  (acoustic velocity zone)

$$Q = 113 \times S \times PH \times \sqrt{\frac{273}{T_H}}$$

$$[Q = 11.1 \times S \times PH \times \sqrt{\frac{273}{T_H}} ]$$

- Q : Flow rate ℓ / min(ANR)
  - S : Effective sectional area of aperture mm<sup>2</sup>
  - PH : Primary pressure MPa abs
  - PL : Secondary pressure MPa abs
  - TH : Primary side absolute temperature K
- Note) Absolute pressure (MPa) = Working pressure + 0.101 (MPa)

4SA/B0

4SA/B1

4GA/B

MN4GA/B

4GA/B (master)

MN3S0/ MN4S0

4TB

4L2-4/ LMF0

4KA/B

4F

PV5/ CMF

3MA/B0

3PA/B

P/M/B

NP/NAP/ NVP

4F\*\*0E

HMV/ HSV

Uniwire system

SKH

PCD/ FS/FD

3, 5 port pilot operated valve

## Technical data 1) Pneumatics system selection guide

4G series <Components selection guide 1>

Cylinder bore size (mm)	Theoretical reference speed (mm/S)	Required flow (ℓ/min) (ANR)	Required effective sectional area (mm <sup>2</sup> )	Proper standard system NO.			
				Discrete		Manifold	
				Body porting	Sub base	Body porting	Sub base
6 dia.	(500)	-	(0.1)	A 1	A 2	A 3	A 4
10 dia.	(500)	-	(0.2)	A 1	A 2	A 3	A 4
16 dia.	(500)	-	(0.5)	A 1	A 2	A 3	A 4
20 dia.	250	29	0.5	A 1	A 2	A 3	A 4
	400	46	1.6	B 1	A 2	B 6	A 4
25 dia.	250	44	0.8	B 1	A 2	A 3	A 4
	400	70	1.9	B 1	B 4	B 6	B 9
30 dia.	250	64	1.1	B 1	A 2	B 6	A 4
	400	100	2.8	B 1	B 4	B 6	B 9
32 dia.	250	73	1.3	B 1	A 2	B 6	A 4
	400	120	3.1	B 1	B 4	B 6	B 9
40 dia.	250	110	2.0	B 1	B 4	B 6	B 9
	400	180	4.9	B 2	B 4	B 7	B 9
40 dia.	250	110	1.7	B 1	B 4	B 6	B 9
	500	230	3.3	B 2	B 4	B 7	B 10
	750	340	5.0	B 3	B 5	B 8	C 10
	1000	450	6.6	C 1	C 4	C 7	C 10
50 dia.	250	180	2.6	B 2	B 4	B 7	B 10
	500	350	5.2	B 3	C 4	B 8	C 10
	750	530	7.7	C 1	C 5	C 7	C 11
	1000	710	10.4	C 2	C 5	C 8	C 12
63 dia.	250	280	4.1	B 3	B 5	B 8	B 10
	500	560	8.2	C 2	C 4	C 8	C 11
	750	840	12.3	C 3	C 5	C 9	C 12
75 dia.	1000	1,100	16.4	-	C 6	-	-
	250	400	5.8	C 1	C 4	C 7	C 10
	500	800	11.6	C 3	C 5	C 9	C 11
	750	1,200	17.4	-	-	-	-
80 dia.	1000	1,600	23.2	-	-	-	-
	250	450	6.6	C 1	C 4	C 7	C 10
	500	910	13.2	C 3	C 6	-	C 12
	750	1,400	19.8	-	-	-	-
100 dia.	1000	1,800	25.4	-	-	-	-
	250	710	10.3	C 2	C 5	C 8	C 11
	500	1,400	20.6	-	-	-	-
	750	2,100	30.9	-	-	-	-
	1,000	2,800	41.2	-	-	-	-

\* Please refer to Page 328, 329 about system No.

### <Clean air system components>

### <Effective sectional area>



Effective sectional area mm<sup>2</sup>  
 (When the value of effective sectional area is X 10<sup>-1</sup>  
 or X 10<sup>0</sup>, multiply the flow rate by the same multiplier.)

### Clean air system components

Part name	Model No.	Port size	Max. flow rate (ℓ/min atmospheric pressure conversion)
F/R/L kit	C1000-6	Rc1/8	450
	C1000-8	Rc1/4	630
	C3000-8	Rc1/4	1280
	C3000-10	Rc3/8	1750
	C4000-8	Rc1/4	1430
F/R Unit	C4000-10	Rc3/8	2400
	C4000-15	Rc1/2	3000
	W1000-6	Rc1/8	830
	W1000-8	Rc1/4	1150
	W3000-8	Rc1/4	2150
Air filter (F)	W3000-10	Rc3/8	2430
	W4000-8	Rc1/4	2500
	W4000-10	Rc3/8	4350
	W4000-15	Rc1/2	4750
	F1000-6	Rc1/8	460
Regulator (R)	F1000-8	Rc1/4	610
	F3000-8	Rc1/4	1230
	F3000-10	Rc3/8	1500
	F4000-8	Rc1/4	1320
	F4000-10	Rc3/8	2140
Lubricator (L)	F4000-15	Rc1/2	3000
	R1000-6	Rc1/8	770
	R1000-8	Rc1/4	1350
	R3000-8	Rc1/4	2000
	R3000-10	Rc3/8	2600
	R4000-8	Rc1/4	2500
	R4000-10	Rc3/8	4400
	R4000-15	Rc1/2	5000
	L1000-6	Rc1/8	550
	L1000-8	Rc1/4	700
	L3000-8	Rc1/4	1100
	L3000-10	Rc3/8	2250
	L4000-8	Rc1/4	1000
	L4000-10	Rc3/8	1700
	L4000-15	Rc1/2	2700

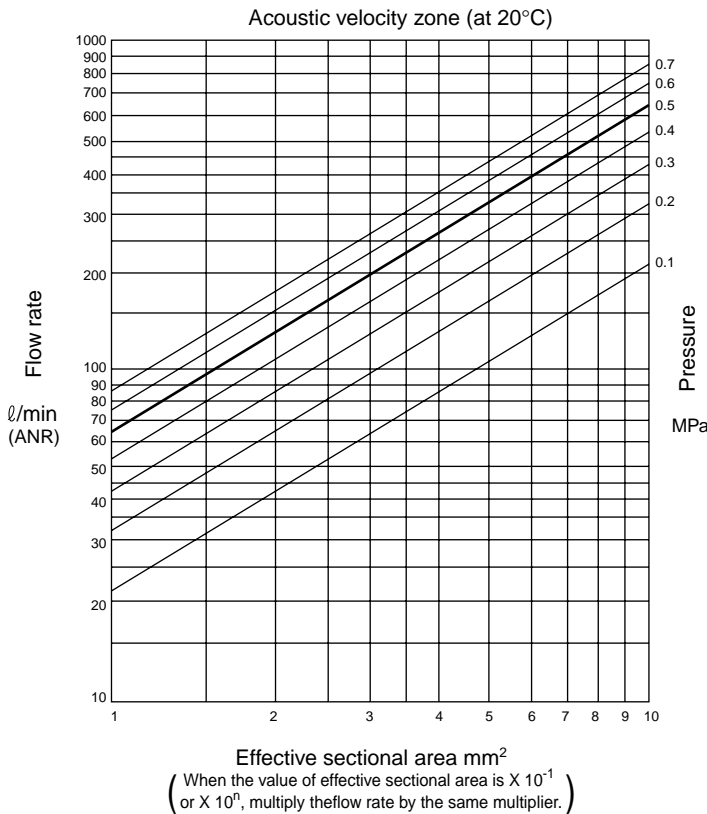
Note) Maximum flow rate: FRL, FR, R primary pressure 0.7MPa, set pressure 0.5MPa, pressure drop 0.1MPa. For air filter, the flow rate is estimated when primary pressure of air filter 0.7MPa, pressure drop 0.02MPa, while for lubricator, primary pressure of lubricator 0.5MPa and pressure drop 0.03MPa.

### MN4G series <Components selection guide 1>

Cylinder bore size (mm)	Theoretical reference speed (mm/S)	Required flow (ℓ/min) (ANR)	Required effective sectional area (mm <sup>2</sup> )	Proper standard system NO.		
				1. Common exhaust	2. Atmospheric	3. Silencer assembled exhaust port air
6 dia.	(500)	-	(0.1)	A 1	A 3	A 5
10 dia.	(500)	-	(0.2)	A 1	A 3	A 5
16 dia.	(500)	-	(0.5)	A 1	A 3	A 5
20 dia.	250	29	0.5	A 1	A 3	A 5
	400	46	1.6	B 1	B 4	B 7
25 dia.	250	44	0.8	A 2	A 4	A 6
	400	70	1.9	B 1	B 4	B 7
30 dia.	250	64	1.1	A 2	A 4	A 6
	400	100	2.8	B 1	B 4	B 7
32 dia.	250	73	1.3	A 2	A 4	A 6
	400	120	3.1	B 2	B 4	B 8
40 dia.	250	110	2.0	B 1	B 4	B 7
	400	180	4.9	B 3	B 6	B 9
40 dia.	250	110	1.7	B 1	B 4	B 7
	500	230	3.3	B 2	B 5	B 8
	750	340	5.0	B 3	B 6	B 9
	1000	450	6.6	-	-	-
50 dia.	250	180	2.6	B 1	B 1	B 7
	500	350	5.2	B 3	B 6	B 9
	750	530	7.7	-	-	-
	1000	710	10.4	-	-	-
63 dia.	250	280	4.1	B 2	B 5	B 8
	500	560	8.2	-	-	-
	750	840	12.3	-	-	-
	1000	1,100	16.4	-	-	-
80 dia.	250	450	6.6	-	B 6	-
	500	910	13.2	-	-	-
	750	1,400	19.8	-	-	-
	1000	1,800	25.4	-	-	-

\* Please refer to Page 330 about system No.

### <Effective sectional area>



### <Clean air system components>

#### Clean air system components

Part name	Model No.	Port size	Max. flow rate (ℓ/min atmospheric pressure conversion)
F/R/L kit	C1000-6	Rc1/8	450
	C1000-8	Rc1/4	630
	C3000-8	Rc1/4	1280
	C3000-10	Rc3/8	1750
	C4000-8	Rc1/4	1430
	C4000-10	Rc3/8	2400
F/R Unit	C4000-15	Rc1/2	3000
	W1000-6	Rc1/8	830
	W1000-8	Rc1/4	1150
	W3000-8	Rc1/4	2150
	W3000-10	Rc3/8	2430
	W4000-8	Rc1/4	2500
Air filter (F)	W4000-10	Rc3/8	4350
	W4000-15	Rc1/2	4750
	F1000-6	Rc1/8	460
	F1000-8	Rc1/4	610
	F3000-8	Rc1/4	1230
	F3000-10	Rc3/8	1500
Regulator (R)	F4000-8	Rc1/4	1320
	F4000-10	Rc3/8	2140
	F4000-15	Rc1/2	3000
	R1000-6	Rc1/8	770
	R1000-8	Rc1/4	1350
	R3000-8	Rc1/4	2000
Lubricator (L)	R3000-10	Rc3/8	2600
	R4000-8	Rc1/4	2500
	R4000-10	Rc3/8	4400
	R4000-15	Rc1/2	5000
	L1000-6	Rc1/8	550
	L1000-8	Rc1/4	700
	L3000-8	Rc1/4	1100
	L3000-10	Rc3/8	2250
	L4000-8	Rc1/4	1000
	L4000-10	Rc3/8	1700
	L4000-15	Rc1/2	2700

Note) Maximum flow rate: FRL, FR, R primary pressure 0.7MPa, set pressure 0.5MPa, pressure drop 0.1MPa. For air filter, the flow rate is estimated when primary pressure of air filter 0.7MPa, pressure drop 0.02MPa, while for lubricator, primary pressure of lubricator 0.5MPa and pressure drop 0.03MPa.

4SA/B0

4SA/B1

4GA/B

MN4GA/B

4GA/B (master)

MN3S0/  
MN4S0

4TB

4L2-4/  
LMF0

4KA/B

4F

PV5/  
CMF

3MA/B0

3PA/B

P/M/B

NP/NAP/  
NVP

4F\*\*0E

HMV/  
HSV

Uniwire  
system

SKH

PCD/  
FS/FD

3, 5 port pilot operated valve