# Selection guide

When using a high speed cylinder, take into account the cylinder speed and kinetic energy in particular.

## Step 1 High speed cylinder selection guide

For pneumatic cylinders, average speed is different from maximum speed rush into cushion because of compressibility fluid.
When operating load W with average speed V1, find the required composite effective sectional area S and the maximum speed V according to the following table.
This table is for reference only. Some values may vary depending on load direction and pipe length, etc.

### Average speed and max. speed at load factor of high speed cylinder (when air pressure = 0.5 MPa)

| Bore size (mm) \ Average speed / Load factor | | V1=500 mm/s | | | V1=1,000 mm/s | | | V1=2,000 mm/s | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 10% | 20% | 30% | 10% | 20% | 30% | 10% | 20% | 30% |
| ø20 (A2=2.356) | W | 1.57 | 3.14 | 4.71 | 1.57 | 3.14 | 4.71 | 1.57 | 3.14 | 4.71 |
| | S | 0.80 | 0.89 | 0.98 | 1.60 | 1.78 | 1.96 | 3.19 | 3.56 | 3.93 |
| | V | 630 | 689 | 714 | 1,260 | 1,378 | 1,482 | 2,512 | 2,756 | 2,971 |
| ø25 (A2=3.778) | W | 2.45 | 4.91 | 7.36 | 2.45 | 4.91 | 7.36 | 2.45 | 4.91 | 7.36 |
| | S | 1.28 | 1.43 | 1.57 | 2.56 | 2.85 | 3.15 | 5.12 | 5.71 | 6.30 |
| | V | 628 | 690 | 740 | 1,257 | 1,376 | 1,485 | 2,514 | 2,757 | 2,970 |
| ø32 (A2=6.912) | W | 4.02 | 8.04 | 12.1 | 4.02 | 8.04 | 12.1 | 4.02 | 8.04 | 12.1 |
| | S | 2.34 | 2.61 | 2.88 | 4.68 | 5.22 | 5.76 | 9.36 | 12.4 | 11.5 |
| | V | 630 | 692 | 747 | 1,261 | 1,383 | 1,494 | 2,521 | 2,758 | 2,983 |
| ø40 (A2=10.56) | W | 6.28 | 12.6 | 18.8 | 6.28 | 12.6 | 18.8 | 6.28 | 12.6 | 18.8 |
| | S | 3.57 | 3.99 | 4.40 | 7.15 | 7.97 | 8.80 | 14.3 | 15.9 | 17.6 |
| | V | 630 | 693 | 747 | 1,261 | 1,383 | 1,494 | 2,521 | 2,765 | 2,988 |
| ø50 (A2=16.49) | W | 9.82 | 19.6 | 29.5 | 9.82 | 19.6 | 29.5 | 9.82 | 19.6 | 29.5 |
| | S | 5.58 | 6.23 | 6.87 | 11.2 | 12.5 | 13.7 | 22.3 | 24.9 | 27.5 |
| | V | 630 | 693 | 747 | 1,265 | 1,389 | 1,490 | 2,518 | 2,768 | 2,990 |
| ø63 (A2=28.03) | W | 15.6 | 31.2 | 46.8 | 15.6 | 31.2 | 46.8 | 15.6 | 31.2 | 46.8 |
| | S | 9.49 | 10.6 | 11.7 | 19.0 | 21.2 | 23.4 | 38.0 | 42.3 | 46.7 |
| | V | 632 | 694 | 749 | 1,266 | 1,389 | 1,498 | 2,531 | 2,771 | 2,989 |
| ø80 (A2=45.36) | W | 25.1 | 50.3 | 75.4 | 25.1 | 50.3 | 75.4 | 25.1 | 50.3 | 75.4 |
| | S | 15.4 | 17.1 | 18.9 | 30.7 | 34.3 | 37.8 | 61.4 | 68.5 | 75.6 |
| | V | 634 | 692 | 744 | 1,264 | 1,388 | 1,495 | 2,527 | 2,773 | 2,990 |
| ø100 (A2=71.47) | W | 39.3 | 78.5 | 118 | 39.3 | 78.5 | 118 | 39.3 | 78.5 | 118 |
| | S | 24.2 | 27.0 | 29.8 | 48.4 | 54.0 | 59.6 | 96.8 | 108 | 119 |
| | V | 632 | 694 | 748 | 1,264 | 1,387 | 1,496 | 2,529 | 2,774 | 2,987 |

W: Load weight (kg) S: Composite effective sectional area ($mm^2$) V: Max. speed (mm/s) V1: Average speed (mm/s) A2: Piston rod side cross-section areas ($cm^2$)

For example, when using HCA-40 with load 6.28 kgf (load factor 10%, 0.5 MPa) and average speed V1 = 2000 mm/s, the maximum speed is 2,521 mm/s (1.26 times higher). In this case, the required composite effective sectional area is 14.3 $mm^2$.

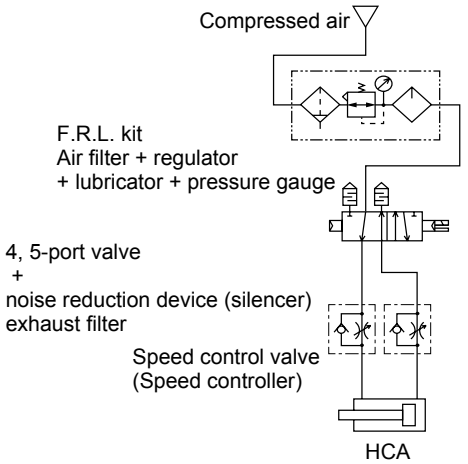
Select system components matched to composite effective sectional area from the table on the following page.

## System selection guide table

Appropriate system matched to the required cylinder speed according to bore size can be selected.

| Bore size | Port size | Required effective cross-sectional area ($mm^2$) | 4.5 port valve for pneumatic control | | Pneumatic auxiliary components | | Piping |
|---|---|---|---|---|---|---|---|
| | | | Single solenoid | Double solenoid | Speed controller | Silencer | Piping (/m) (between valve&cylinder) |
| ø20 | Rc1/8 | 1.3 | 4KA110-M5/4KB110-06<br>4GA110R-M5/4GB110R-06 | 4KA120-M5/4KB120-06<br>4GA120R-M5/4GB120R-06 | SC3W-6/SC3R-6 | SLW-6A | ø4×2.5NT |
| | | 2.0 | 4KA110-M5/4KB110-06<br>4GA110R-M5/4GB110R-06 | 4KA120-M5/4KB120-06<br>4GA120R-M5/4GB120R-06 | SC3R-6 | SLW-6A | ø6×ø4NT |
| | | 2.8 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC3R-6 | SLW-6A | ø8×ø5.7NT |
| | | 3.6 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC1-6 | SLW-6A | ø6×ø4NT |
| | | 4.3 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC1-6 | SLW-6A | ø8×ø5.7NT |
| ø25 | Rc1/8 | 1.4 | 4KA110-M5/4KB110-06<br>4GA110R-M5/4GB110R-06 | 4KA120-M5/4KB120-06<br>4GA120R-M5/4GB120R-06 | SC3W-6 | SLW-6A | ø4×ø2.5NT |
| | | 2.4 | 4KA110-M5/4KB110-06<br>4GA110R-M5/4GB110R-06 | 4KA120-M5/4KB120-06<br>4GA120R-M5/4GB120R-06 | SC3W-6 | SLW-6A | ø6×ø4NT |
| | | 4.4 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC1-6 | SLW-6A | ø6×ø4NT |
| | | 5.8 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC1-6 | SLW-6A | ø8×ø5.7NT |
| | | 6.6 | 4KA210-06/4KB210-06<br>4GA210R-06/4GB210R-08 | 4KA220-06/4KB220-06<br>4GA220R-06/4GB220R-08 | SC1-8 | SLW-6A | ø10×ø7.2NT |
| ø32 | Rc1/4 | 3.6 | 4KB210-08/4GB210R-08 | 4KB220-08/4GB220R-08 | SC3W-8/SC3R-8 | SLW-8A | ø6×ø4NT |
| | | 5.9 | 4KB210-08/4GB210R-08 | 4KB220-08/4GB220R-08 | SC1-8 | SLW-8A | ø8×ø5.7NT |
| | | 8.4 | 4F210-08/4KB310-08<br>4GB310R-08 | 4F220-08/4KB320-08<br>4GB320R-08 | SC1-8 | SLW-8A | ø10×ø7.2NT |
| | | 9.5 | 4KB310-08/4F310-08<br>4GB310R-08 | 4KB320-08/4F320-08<br>4GB320R-08 | SC1-8 | SLW-8A | ø10×ø7.2NT |
| | | 11.6 | 4F310-08/4F410-08<br>4GB310R-08 | 4F320-08/4F420-08<br>4GB320R-08 | SC3W-10/SC3R-10 | SLW-8A | ø12×ø8.9NT |
| ø40 | Rc1/4 | 3.6 | 4KB210-08/4GB310R-08 | 4KB220-08/4GB320R-08 | SC3W-8/SC3R-8 | SLW-8A | ø6×ø4NT |
| | | 8.5 | 4F210-08/4KB310-08<br>4GB310R-08 | 4F220-08/4KB320-08<br>4GB320R-08 | SC1-8 | SLW-8A | ø10×ø7.2NT |
| | | 12.0 | 4F310-08/4F410-08<br>4GB310R-08 | 4F320-08/4F420-08<br>4GB320R-08 | SC3W-10/SC3R-10 | SLW-8A | ø12×ø8.9NT |
| | | 15.2 | 4F410-08 | 4F420-08 | SC-1-10 | SLW-8A | ø12×ø8.9NT |
| | | 18.4 | 4F510-10 | 4F520-10 | SC-1-10 | SLW-10A | ø15×ø11.5NT |
| ø50 | Rc3/8 | 5.5 | 4KB310-10/4F310-10 | 4KB320-10/4F320-10 | SC3W-10/SC3R-10 | SLW-10A | ø6×ø4NT |
| | | 12.0 | 4K310-10/4F310-10 | 4K320-10/4F320-10 | SC3W-10/SC3R-10 | SLW-10A | ø12×ø8.9NT |
| | | 18.1 | 4F510-10 | 4F520-10 | SC1-10 | SLW-10A | ø12×ø8.9NT |
| | | 23.5 | 4F510-10 | 4F520-10 | SC1-15 | SLW-10A | ø15×ø11.5NT |
| | | 26.9 | 4F610-15 | 4F620-15 | SC1-15 | SLW-15A | ø15×ø11.5NT |
| ø63 | Rc3/8 | 11.0 | 4K310-10/4F310-10 | 4K320-10/4F320-10 | SC3W-10/SC3R-10 | SLW-10A | ø10×ø7.2NT |
| | | 18.0 | 4K410-10/4F510-10 | 4K420-10/4F520-10 | SC1-10 | SL-10A | ø10×ø7.2NT |
| | | 26.9 | 4F610-15 | 4F620-15 | SC1-15 | SLW-15A | ø10×ø8.9NT |
| | | 43.1 | 4F610-15 | 4F620-15 | SC-20A | SLW-15A | ø15×ø11.5NT |
| | | 62.8 | 4F610-20 | 4F620-20 | SC-20A | SL-20A | Rc1/2 steel pipe |
| ø80 | Rc1/2 | 19.5 | 4F610-15 | 4F620-15 | SC3W-15/SC3R-15 | SLW-15A | ø12×ø8.9NT |
| | | 31.3 | 4F610-15 | 4F620-15 | SC1-15 | SLW-15A | ø15×ø11.5NT |
| | | 67.4 | 4F610-20 | 4F620-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | | 85.9 | 4F710-20 | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | | 95.9 | 4F710-20 | 4F720-20 | SC-25A | SL-20A | Rc3/4 steel pipe |
| ø100 | Rc1/2 | 31.8 | 4F610-15 | 4F620-15 | SC1-15 | SLW-15A | ø15×ø11.5NT |
| | | 67.4 | 4F610-20 | 4F620-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | | 85.9 | 4F710-20 | 4F720-20 | SC-20A | SL-20A | Rc3/4 steel pipe |
| | | 95.9 | 4F710-20 | 4F720-20 | SC-25A | SL-20A | Rc3/4 steel pipe |
| | | 109.9 | 4F710-25 | 4F720-25 | SC-25A | SL-25A | Rc3/4 steel pipe |

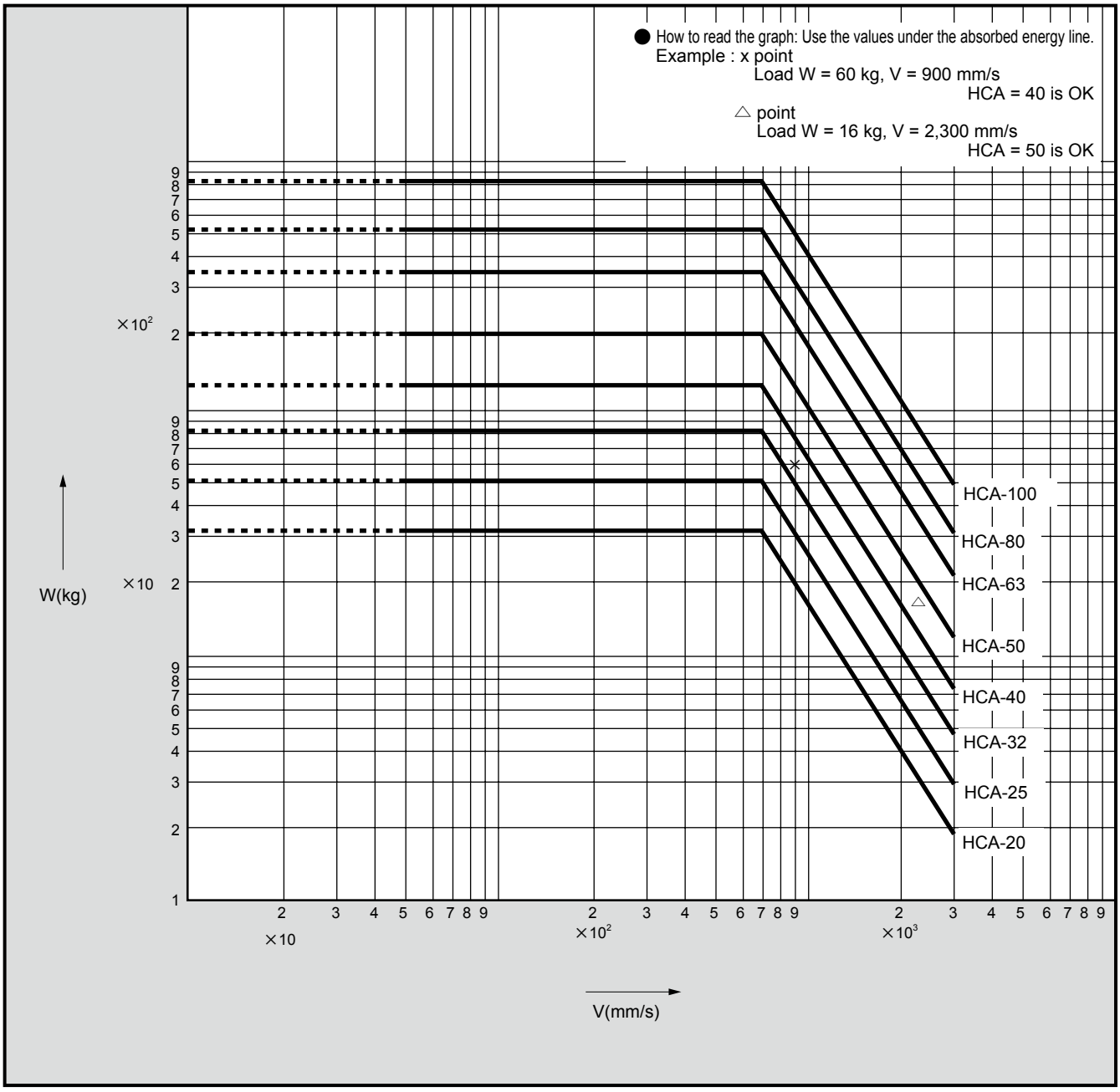
● Pneumatics basic circuit diagram



## Step 2 High speed cylinder selection guide

Use the following table to determine the model according to the relation between load W and maximum speed V.

### High speed cylinder energy absorption graph




Note : This is a log-log graph.

For example, when load W = 16kg, and maximum speed 2,300 mm/s, △ shows that HCA-40 does not meet the conditions, but HCA-50 does.