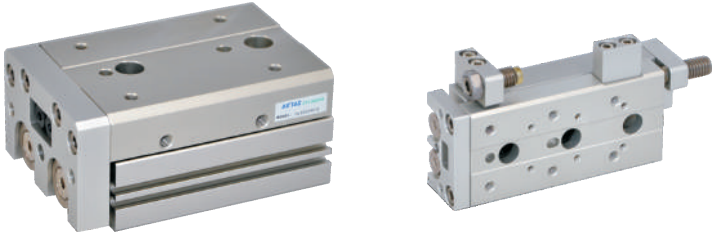




## Compact slide cylinder(Roller bearing)——HLS Series

### Product series

| Series name                                                                               | Acting type   | Bore size | Collocation of sensor switch |  |
|-------------------------------------------------------------------------------------------|---------------|-----------|------------------------------|--|
|                                                                                           |               |           | DS1-H                        |  |
| HLS<br> | Double acting | 6         | ●                            |  |
|                                                                                           |               | 8         | ●                            |  |
|                                                                                           |               | 12        | ●                            |  |
|                                                                                           |               | 16        | ●                            |  |
|                                                                                           |               | 20        | ●                            |  |
|                                                                                           |               | 25        | ●                            |  |
| Page                                                                                      | 334           |           | 403                          |  |

### Installation and application

1. Dirty substances in the pipe must be eliminated before cylinder is connected with pipeline to prevent the entrance of impurities into the cylinder.
2. The medium used by cylinder should be filtered to 40 μm or below.
3. Anti-freezing measure shall be adopted under low temperature environment to prevent moisture freezing.
4. If the cylinder is dismantled and stored for a long time, pay attention to conduct anti-rust treatment to the surface. Anti-dust caps shall be added in air inlet and outlet ports.

### Criteria for selection: Cylinder thrust

Unit: Newton(N)

| Bore size<br>(mm) | Rod size<br>(mm) | Acting type   |           | Pressure area<br>(mm <sup>2</sup> ) | Operating pressure(MPa) |     |     |     |     |     |
|-------------------|------------------|---------------|-----------|-------------------------------------|-------------------------|-----|-----|-----|-----|-----|
|                   |                  |               |           |                                     | 0.2                     | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| 6                 | 3                | Double acting | Push side | 42                                  | 8                       | 13  | 17  | 21  | 25  | 29  |
|                   |                  |               | Pull side | 57                                  | 11                      | 17  | 23  | 29  | 34  | 40  |
| 8                 | 4                | Double acting | Push side | 75                                  | 15                      | 23  | 30  | 38  | 45  | 53  |
|                   |                  |               | Pull side | 101                                 | 20                      | 30  | 40  | 51  | 61  | 71  |
| 12                | 6                | Double acting | Push side | 170                                 | 34                      | 51  | 68  | 85  | 102 | 119 |
|                   |                  |               | Pull side | 226                                 | 45                      | 68  | 90  | 113 | 136 | 158 |
| 16                | 8                | Double acting | Push side | 302                                 | 60                      | 91  | 121 | 151 | 181 | 211 |
|                   |                  |               | Pull side | 402                                 | 80                      | 121 | 161 | 201 | 241 | 281 |
| 20                | 10               | Double acting | Push side | 471                                 | 94                      | 141 | 188 | 236 | 283 | 330 |
|                   |                  |               | Pull side | 628                                 | 126                     | 188 | 251 | 314 | 377 | 440 |
| 25                | 12               | Double acting | Push side | 756                                 | 151                     | 227 | 302 | 378 | 454 | 529 |
|                   |                  |               | Pull side | 982                                 | 186                     | 295 | 393 | 491 | 589 | 687 |



HLS

# Compact slide cylinder(Roller bearing)

**AIRTAC**

## HLS Series



### Symbol



### Product feature

1. Roller bearing incorporating the cylinder, it achieves high precision, high rigidity, high load, excellent linearity and non-rotate tolerance. So it can be used in precision assemblage condition.

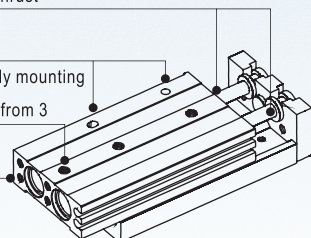
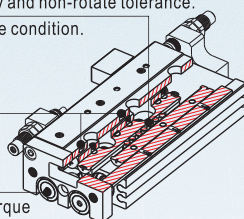
2. Pin holes for positioning improved repeatability of work mounting

3. Floating jointer design  
Piston rod needn't endure additional torque

4. Dual rod, doubles the output thrust

5. Pin holes for positioning  
Improved repeatability of body mounting

6. Body mounting tap Mounting from 3 direction available



**HLS**

### Ordering code

Model can be changed Ordering code. Example:

Production type: HLS

Bore size: 25mm

Stroke: 50mm

Magnet: With magnet

Adjuster option: Adjustable rubber stopper(Both ends)

Thread type: NPT

**Model: HLS25 × 50-S-A-T**

**Ordering code: HLS 25 S 0050 A T**

| Model                                                                                        | Thread type                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bore size</b><br>06: Φ6mm<br>08: Φ8mm<br>12: Φ12mm<br>16: Φ16mm<br>20: Φ20mm<br>25: Φ25mm | P: PT<br>T: NPT<br>G: G                                                                                                                                                                                                                               |
| <b>Magnet</b><br>S: With magnet                                                              | <b>Adjuster option</b><br>Blank: Without adjuster<br>A: Rubber stopper(Both ends)<br>AS: Rubber stopper(Extension)<br>AF: Rubber stopper(Retracton)<br>B: Shock absorber(Both ends)<br>BS: Shock absorber(Extension)<br>BF: Shock absorber(Retracton) |
| <b>Stroke</b><br>In 4 digits                                                                 |                                                                                                                                                                                                                                                       |

### Specification

| Bore size(mm)      | 6                                            | 8 | 12 | 16 | 20 | 25   |
|--------------------|----------------------------------------------|---|----|----|----|------|
| Acting type        | Double acting                                |   |    |    |    |      |
| Fluid              | Air(to be filtered by 40 μ m filter element) |   |    |    |    |      |
| Operating pressure | 0.15~0.7MPa(22~100psi)(1.5~7.0bar)           |   |    |    |    |      |
| Proof pressure     | 1.05MPa(150psi)(10.5bar)                     |   |    |    |    |      |
| Temperature °C     | -20~70                                       |   |    |    |    |      |
| Speed range mm/s   | 50~500                                       |   |    |    |    |      |
| Stroke tolerance   | +1.0<br>0                                    |   |    |    |    |      |
| Cushion type       | Bumper(Both ends), Shock absorber            |   |    |    |    |      |
| Sensor switches ①  | DS1-H□N、DS1-H□P                              |   |    |    |    |      |
| Port size          | M5 × 0.8                                     |   |    |    |    | 1/8" |

① Sensor switch should be ordered additionally, please refer to P403~426 for detail of sensor switch.

### Stroke

| Bore size (mm) | Standard stroke (mm)          | Max. stroke (mm) |
|----------------|-------------------------------|------------------|
| 6              | 10 20 30 40 50                | 50               |
| 8              | 10 20 30 40 50 75             | 75               |
| 12             | 10 20 30 40 50 75 100         | 100              |
| 16             | 10 20 30 40 50 75 100 125     | 125              |
| 20             | 10 20 30 40 50 75 100 125 150 | 150              |
| 25             | 10 20 30 40 50 75 100 125 150 | 150              |

Note) Consult us for non-standard stroke.

### Explain of model

| HLS 20 × 30-S-AS-P                                                                |                                                                                                  |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Model</b><br>HLS: Compact slide cylinder (Double acting type) (Roller bearing) | <b>① Thread type</b><br>P: PT<br>T: NPT<br>G: G                                                  |
| <b>Bore size</b><br>6, 8, 12, 16, 20, 25                                          | <b>② Adjuster option</b><br>Blank: Without adjuster(Basic type)                                  |
| <b>Stroke</b><br>Refer to stroke table for details                                | Extension<br>Retraction<br>                                                                      |
| <b>Magnet</b><br>S: With magnet                                                   | <b>A: Adjustable rubber stopper(Both ends)</b><br>Rubber stopper<br>Extension<br>Retraction<br>  |
|                                                                                   | <b>B: Shock absorber(Both ends)</b><br>Shock absorber<br>Extension<br>Retraction<br>             |
|                                                                                   | <b>AS: Adjustable rubber stopper(Extension)</b><br>Rubber stopper<br>Extension<br>Retraction<br> |
|                                                                                   | <b>BS: Shock absorber(Extension)</b><br>Shock absorber<br>Extension<br>Retraction<br>            |
|                                                                                   | <b>AF: Adjustable rubber stopper(Retracton)</b><br>Rubber stopper<br>Extension<br>Retraction<br> |
|                                                                                   | <b>BF: Shock absorber(Retracton)</b><br>Shock absorber<br>Extension<br>Retraction<br>            |

① When the thread is standard, the code is blank.

② B type, BS type, BF type are unavailable for bore size of Φ6.



# Compact slide cylinder(Roller bearing)

AIRTAC

## HLS Series

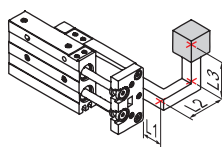
### Model Selection Method

Please select compact cylinder's type according to following procedure, and cross reference with data sheets.

#### 1) Operating conditions(According to mounting position and work form)

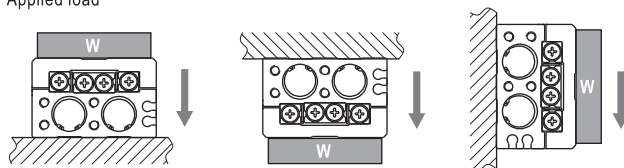
1. Model used(Bore size, Stroke)
2. Type of cushion(Bumper, Shock absorber)
3. Mounting position of work(Top, front)
4. Mounting direction(Axial, Vertical)
5. Average speed  $V_a$ (mm/s)
6. Applied load  $W$ (N)
7. Overhang  $L_1, L_2, L_3$ (mm)

Fig. 1



Explain:  $L_1$  is the distance of load's center beyond the end plank's plane. If load's center is not beyond the end plank's plane,  $L_1$  is negative.

Fig. 1: Applied load



#### 2) Kinetic energy check

##### Steps

1. Calculate kinetic energy of load  $E$ (J)

$$E = \frac{1}{2} \times \frac{W}{g} \times \left( \frac{1.4 \times V_a}{1000} \right)^2$$

2. Calculate allowable kinetic energy  $E_a$ (J)

$$E_a = K \times E_{max}$$

$K$ : Mounting work coefficient (Fig 2)

$E_{max}$ : Maximum allowable kinetic energy (Table 1)

3. Check that kinetic energy of load doesn't exceed allowable kinetic energy:

$$E \leq E_a$$

#### 3) Load check

##### Steps

1. Calculate allowable applied load  $W_a$ (N)

$$W_a = K \times \beta \times W_{max}$$

$K$ : Mounting work coefficient (Fig 2)

$W_{max}$ : Maximum allowable applied load (Table 1)

$\beta$ : Applied load coefficient (Fig 3)

2. Check that load( $W$ ) doesn't exceed allowable applied load( $W_a$ ):

$$W \leq W_a$$

Fig 2: Mounting work coefficient ( $K$ )

Top



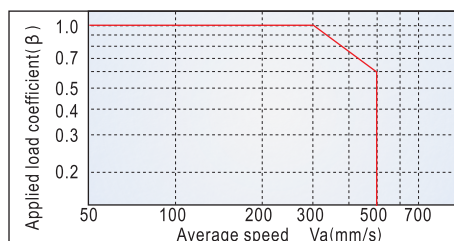
Mounting work coefficient  $K=1$

Front



Mounting work coefficient  $K=0.6$

Fig 3: Applied load coefficient ( $\beta$ )

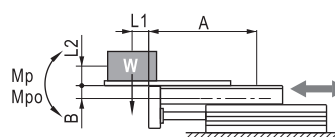


#### 4) Moment check

##### Steps

##### Horizontal

1. Calculate actual moment:  $M_p$ ,  $M_{po}$ ,  $M_y$ ,  $M_{yo}$ ,  $M_r$ ,  $M_{ro}$  (Nm)

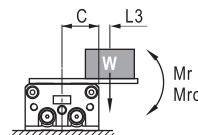


Dynamic moment:

$$M_p = W \times (L_1 + A) / 1000$$

Static moment:

$$M_{po} = \frac{W \times (L_1 + A)}{1000} + \frac{W \times a \times (L_2 + B)}{1000 \times g}$$

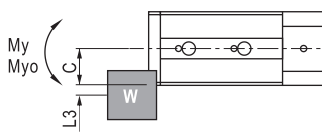


Dynamic moment:

$$M_r = W \times (C + L_3) / 1000$$

Static moment:

$$M_{ro} = (W \times a \times (C + L_3)) / 1000g$$



Dynamic moment:

$$M_y = 0$$

Static moment:

$$M_{yo} = (W \times a \times (C + L_3)) / 1000g$$

2. Check

|                 |                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------|
| Dynamic moment: | $\frac{M_p}{M_{p_{max}}} + \frac{M_y}{M_{y_{max}}} + \frac{M_r}{M_{r_{max}}} \leq 1$             |
| Static moment:  | $\frac{M_{po}}{M_{po_{max}}} + \frac{M_{yo}}{M_{yo_{max}}} + \frac{M_{ro}}{M_{ro_{max}}} \leq 1$ |

##### Vertical

1. Calculate actual moment:  $M_p$ ,  $M_{po}$ ,  $M_y$ ,  $M_{yo}$  (Nm)

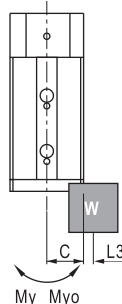


Dynamic moment:

$$M_p = W \times (L_2 + B) / 1000$$

Static moment:

$$M_{po} = \frac{W \times (L_2 + B)}{1000} + \frac{W \times a \times (L_2 + B)}{1000 \times g}$$



Dynamic moment:

$$M_y = W \times (C + L_3) / 1000$$

Static moment:

$$M_{yo} = \frac{W \times a \times (C + L_3)}{1000g} + \frac{W \times (C + L_3)}{1000}$$

2. Check

|                 |                                                                    |
|-----------------|--------------------------------------------------------------------|
| Dynamic moment: | $\frac{M_p}{M_{p_{max}}} + \frac{M_y}{M_{y_{max}}} \leq 1$         |
| Static moment:  | $\frac{M_{po}}{M_{po_{max}}} + \frac{M_{yo}}{M_{yo_{max}}} \leq 1$ |

Explain:

$L_1, L_2, L_3$ : The distance of load center to mount plane (Determined by actuality).

$A, B, C$ : Correction value for center position distance of moment (Refer to table 2).

$M_{p_{max}}, M_{y_{max}}, M_{r_{max}}, M_{po_{max}}, M_{yo_{max}}, M_{ro_{max}}$ : Maximum allowable moment (Refer to table 2).

$g$ : Acceleration of gravity ( $g=9.81m/s^2$ ).

$a$ : Acceleration of inertia

(Bumper:  $a=1600 \times (V_a/1000)^2$ , Shock absorber:  $a=400 \times (V_a/1000)^2$ )

$W$ : Load weight (Determined by actuality).



HLS

Compact slide cylinder(Roller bearing)



HLS Series

Note: Symbol and unit

| Symbol                                                       | Item                                                    | Unit             |
|--------------------------------------------------------------|---------------------------------------------------------|------------------|
| A, B, C                                                      | Correction value for center position distance of moment | mm               |
| a                                                            | Acceleration of inertia                                 | —                |
| E                                                            | Kinetic energy                                          | J                |
| Ea                                                           | Allowable kinetic energy                                | J                |
| E <sub>max</sub>                                             | Maximum allowable kinetic energy                        | J                |
| g                                                            | Acceleration of gravity g=9.81                          | m/s <sup>2</sup> |
| K                                                            | Mounting work coefficient                               | —                |
| L1, L2, L3                                                   | Overhang                                                | mm               |
| Mp, My, Mr                                                   | Dynamic moment(Pitch、Yaw、Roll)                          | Nm               |
| Mp <sub>max</sub> , My <sub>max</sub> , Mr <sub>max</sub>    | Maximum allowable dynamic moment(Pitch、Yaw、Roll)        | Nm               |
| Mpo, Myo, Mro                                                | Static moment(Pitch、Yaw、Roll)                           | Nm               |
| Mpo <sub>max</sub> , Myo <sub>max</sub> , Mro <sub>max</sub> | Maximum allowable static moment(Pitch、Yaw、Roll)         | Nm               |
| Va                                                           | Average speed                                           | mm/s             |
| W                                                            | Applied load                                            | N                |
| W <sub>max</sub>                                             | Maximum allowable applied load                          | N                |
| β                                                            | Applied load coefficient                                | -                |

Table 1: Maximum allowable kinetic energy(E<sub>max</sub>), Maximum allowable applied load(W<sub>max</sub>)

| Model | Max. allowable kinetic energy |                     | E <sub>max</sub> (J)<br>Shock absorber type | Max. allowable<br>applied load W <sub>max</sub> (N) |
|-------|-------------------------------|---------------------|---------------------------------------------|-----------------------------------------------------|
|       | Basic type                    | Robber stopper type |                                             |                                                     |
| HLS6  | 0.01                          | 0.01                | —                                           | 5                                                   |
| HLS8  | 0.024                         | 0.024               | 0.048                                       | 10                                                  |
| HLS12 | 0.05                          | 0.05                | 0.1                                         | 20                                                  |
| HLS16 | 0.1                           | 0.1                 | 0.2                                         | 35                                                  |
| HLS20 | 0.13                          | 0.13                | 0.26                                        | 55                                                  |
| HLS25 | 0.22                          | 0.22                | 0.44                                        | 70                                                  |

Table 2: Maximum allowable moment(Nm), Correction value for center position distance of moment(mm)

| Bore size | Stroke | Static moment      |                    |                    | Dynamic moment    |                   |                   | Correction value |      |    |
|-----------|--------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|------------------|------|----|
|           |        | Mpo <sub>max</sub> | Myo <sub>max</sub> | Mro <sub>max</sub> | Mp <sub>max</sub> | My <sub>max</sub> | Mr <sub>max</sub> | A                | B    | C  |
| 6         | 10     | 3.3                | 3.8                | 2.6                | 0.7               | 0.7               | 0.6               | 27               | 7.3  | 16 |
|           | 20     | 3.3                | 3.8                | 2.6                | 0.7               | 0.8               | 0.6               | 42               |      |    |
|           | 30     | 3.3                | 3.8                | 2.6                | 0.7               | 0.8               | 0.6               | 52               |      |    |
|           | 40     | 7.2                | 7.9                | 3.6                | 1.3               | 1.3               | 0.6               | 72               |      |    |
|           | 50     | 12.4               | 12.7               | 4.7                | 1.8               | 1.8               | 0.6               | 87               |      |    |
| 8         | 10     | 10.1               | 9.1                | 8.8                | 2.5               | 2.5               | 2.0               | 32               | 8.5  | 20 |
|           | 20     | 10.1               | 9.1                | 8.8                | 2.6               | 2.6               | 2.0               | 42               |      |    |
|           | 30     | 10.1               | 9.1                | 8.8                | 2.8               | 2.8               | 2.0               | 57               |      |    |
|           | 40     | 12.4               | 10.8               | 10.1               | 3.4               | 3.4               | 2.3               | 72               |      |    |
|           | 50     | 23.6               | 24.8               | 13.9               | 4.4               | 4.4               | 2.1               | 92               |      |    |
| 12        | 75     | 32.8               | 35.3               | 16.4               | 4.6               | 4.6               | 1.8               | 132              | 10   | 25 |
|           | 10     | 33.0               | 34.3               | 30.9               | 7.3               | 7.3               | 5.8               | 48               |      |    |
|           | 20     | 33.0               | 34.3               | 30.9               | 7.6               | 7.6               | 5.8               | 58               |      |    |
|           | 30     | 33.0               | 34.3               | 30.9               | 7.8               | 7.8               | 5.8               | 68               |      |    |
|           | 40     | 33.0               | 34.3               | 30.9               | 8.0               | 8.0               | 5.8               | 78               |      |    |
| 16        | 50     | 53.4               | 49.6               | 39.7               | 9.8               | 9.8               | 5.8               | 88               | 11   | 30 |
|           | 75     | 78.8               | 71.9               | 48.6               | 14.2              | 14.2              | 6.8               | 125              |      |    |
|           | 100    | 78.8               | 71.9               | 48.6               | 14.7              | 14.7              | 6.8               | 160              |      |    |
|           | 10     | 33.0               | 34.3               | 30.9               | 8.8               | 8.8               | 7.6               | 43               |      |    |
|           | 20     | 33.0               | 34.3               | 30.9               | 9.2               | 9.2               | 7.6               | 53               |      |    |
| 20        | 30     | 33.0               | 34.3               | 30.9               | 9.5               | 9.5               | 7.6               | 63               | 16.5 | 35 |
|           | 40     | 33.0               | 34.3               | 30.9               | 10.0              | 10.0              | 7.6               | 78               |      |    |
|           | 50     | 53.4               | 49.6               | 39.7               | 12.2              | 12.2              | 7.6               | 93               |      |    |
|           | 75     | 78.8               | 71.9               | 48.6               | 17.6              | 17.6              | 8.9               | 130              |      |    |
|           | 100    | 78.8               | 71.9               | 48.6               | 18.2              | 18.2              | 8.9               | 165              |      |    |
| 25        | 125    | 143.7              | 144.5              | 53.3               | 24.8              | 24.8              | 7.8               | 204              | 20.3 | 42 |
|           | 10     | 60.1               | 50.5               | 72.8               | 14.5              | 14.5              | 15.2              | 47               |      |    |
|           | 20     | 60.1               | 50.5               | 72.8               | 15.2              | 15.2              | 15.2              | 57               |      |    |
|           | 30     | 60.1               | 50.5               | 72.8               | 15.7              | 15.7              | 15.2              | 67               |      |    |
|           | 40     | 60.1               | 50.5               | 72.8               | 16.3              | 16.3              | 15.2              | 82               |      |    |
| 25        | 50     | 60.1               | 50.5               | 72.8               | 16.6              | 16.6              | 15.2              | 92               | 20.3 | 42 |
|           | 75     | 169.3              | 154.3              | 114.4              | 41.2              | 41.2              | 22.0              | 136              |      |    |
|           | 100    | 169.3              | 154.3              | 114.4              | 42.8              | 42.8              | 22.0              | 176              |      |    |
|           | 125    | 169.3              | 154.3              | 114.4              | 43.6              | 43.6              | 22.0              | 205              |      |    |
|           | 150    | 267.5              | 286.6              | 145.6              | 49.0              | 49.0              | 20.5              | 249              |      |    |
| 25        | 10     | 60.1               | 50.5               | 72.8               | 16.3              | 16.3              | 17.6              | 52               | 20.3 | 42 |
|           | 20     | 60.1               | 50.5               | 72.8               | 17.0              | 17.0              | 17.6              | 62               |      |    |
|           | 30     | 60.1               | 50.5               | 72.8               | 17.4              | 17.4              | 17.6              | 72               |      |    |
|           | 40     | 60.1               | 50.5               | 72.8               | 17.8              | 17.8              | 17.6              | 82               |      |    |
|           | 50     | 60.1               | 50.5               | 72.8               | 18.2              | 18.2              | 17.6              | 96               |      |    |
| 25        | 75     | 169.3              | 154.3              | 114.4              | 45.2              | 45.2              | 25.3              | 141              | 20.3 | 42 |
|           | 100    | 169.3              | 154.3              | 114.4              | 46.2              | 46.2              | 25.3              | 165              |      |    |
|           | 125    | 169.3              | 154.3              | 114.4              | 48.0              | 48.0              | 25.3              | 210              |      |    |
|           | 150    | 267.5              | 286.6              | 145.6              | 65.0              | 65.0              | 28.3              | 254              |      |    |



# Compact slide cylinder(Roller bearing)

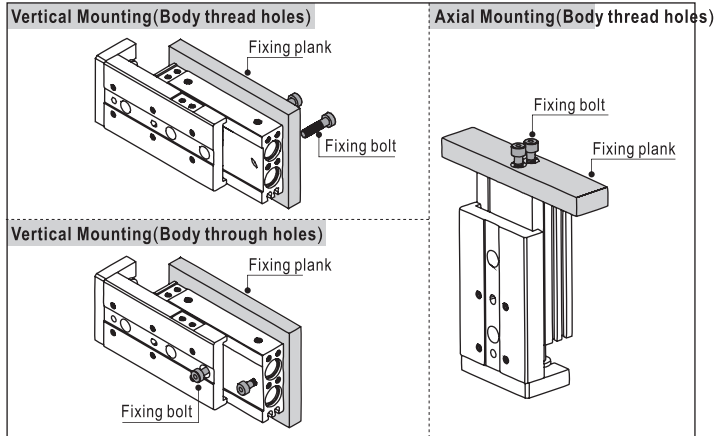
**AIRTAC**

## HLS Series

### ■ Installation and application

1. How to mount cylinder :

1.1) Cylinder can to be mounted from 3 directions



1.2) When mounting an compact slide cylinder, screws of appropriate length should be used and tightened properly within the maximum tightening torque. If screws are tightened beyond designed limits, malfunction may occur. If they are tightened insufficiently, it may result in sliding or falling off from its position.

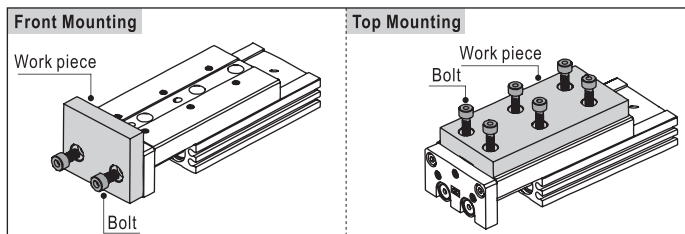
| Vertical Mounting(Body thread holes) |           |                             |                         |  |
|--------------------------------------|-----------|-----------------------------|-------------------------|--|
| Model                                | Bolt used | Max. tightening torque (Nm) | Max. screw-in depth(mm) |  |
| HLS6                                 | M4 × 0.7  | 2.1                         | 8.0                     |  |
| HLS8                                 | M4 × 0.7  | 2.1                         | 8.0                     |  |
| HLS12                                | M5 × 0.8  | 4.4                         | 10.0                    |  |
| HLS16                                | M6 × 1.0  | 4.4                         | 10.0                    |  |
| HLS20                                | M6 × 1.0  | 7.4                         | 12.0                    |  |
| HLS25                                | M8 × 1.25 | 18.0                        | 16.0                    |  |

| Vertical Mounting(Body through holes) |           |                             |                   |  |
|---------------------------------------|-----------|-----------------------------|-------------------|--|
| Model                                 | Bolt used | Max. tightening torque (Nm) | Body depth L (mm) |  |
| HLS6                                  | M3 × 0.5  | 1.2                         | 11.0              |  |
| HLS8                                  | M3 × 0.5  | 1.2                         | 12.5              |  |
| HLS12                                 | M4 × 0.7  | 2.8                         | 18.0              |  |
| HLS16                                 | M5 × 0.8  | 5.7                         | 25.0              |  |
| HLS20                                 | M5 × 0.8  | 5.7                         | 28.0              |  |
| HLS25                                 | M6 × 1.0  | 10.0                        | 36.2              |  |

| Axial Mounting(Body thread holes) |             |                             |                         |  |
|-----------------------------------|-------------|-----------------------------|-------------------------|--|
| Model                             | Bolt used   | Max. tightening torque (Nm) | Max. screw-in depth(mm) |  |
| HLS6                              | M2.5 × 0.45 | 0.5                         | 3.5                     |  |
| HLS8                              | M3 × 0.5    | 0.9                         | 4.0                     |  |
| HLS12                             | M4 × 0.7    | 2.1                         | 6.0                     |  |
| HLS16                             | M5 × 0.8    | 4.4                         | 7.0                     |  |
| HLS20                             | M5 × 0.8    | 4.4                         | 8.0                     |  |
| HLS25                             | M6 × 1.0    | 7.4                         | 10.0                    |  |

2. Work Piece Mounting:

2.1) Work pieces can be mounted on 2 surfaces of the compact slide.



2.2) When mounting a work piece, tighten the bolts properly at a torque value within the limiting range. Use bolts at least 0.5mm shorter than maximum thread depth to prevent bolts from contacting the guide block. If the bolts are too long, they hit the guide block and cause damage.

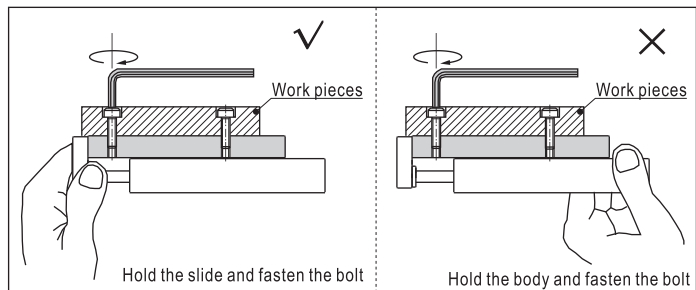
| Front Mounting |           |                             |                         |  |
|----------------|-----------|-----------------------------|-------------------------|--|
| Model          | Bolt used | Max. tightening torque (Nm) | Max. screw-in depth(mm) |  |
| HLQS           | M3 × 0.4  | 0.9                         | 5.0                     |  |
| HLS8           | M4 × 0.7  | 2.1                         | 6.0                     |  |
| HLS12          | M5 × 0.8  | 4.4                         | 8.0                     |  |
| HLS16          | M6 × 1.0  | 7.4                         | 10.0                    |  |
| HLS20          | M6 × 1.0  | 7.4                         | 13.0                    |  |
| HLS25          | M8 × 1.25 | 18.0                        | 15.0                    |  |

| Top Mounting |           |                             |                         |  |
|--------------|-----------|-----------------------------|-------------------------|--|
| Model        | Bolt used | Max. tightening torque (Nm) | Max. screw-in depth(mm) |  |
| HLS6         | M3 × 0.5  | 0.9                         | 4.0                     |  |
| HLS8         | M3 × 0.5  | 0.9                         | 5.0                     |  |
| HLS12        | M4 × 0.7  | 2.1                         | 5.5                     |  |
| HLS16        | M5 × 0.8  | 4.4                         | 6.0                     |  |
| HLS20        | M5 × 0.8  | 4.4                         | 10.0                    |  |
| HLS25        | M6 × 1.0  | 7.4                         | 13.0                    |  |

2.3) Since the table is supported by the linear guide, take care not to apply strong impact or large moment to the guide section.

2.4) Hold the slide when fastening work pieces to it with bolts, If the body is held while tightening bolts, excessive moment may damage guide section.



3. About shock absorber:

3.1) Shock absorbers are expendable parts. Promptly replace them when energy absorbing capacity decreases.

3.2) Never turn or adjust the screws on bottom of the shock absorber body. The screws are not for adjusting. Otherwise would cause oil leakage.

3.3) Follow the table for tightening torque of shock absorber to lock nuts.

| Shock absorber lock nut |                        |                   |  |
|-------------------------|------------------------|-------------------|--|
| Model                   | Shock absorber         | Tightening torque |  |
| HLS6                    | Without shock absorber |                   |  |
| HLS8                    | ACA0806-1N             | 1.67(Nm)          |  |
| HLS12                   | ACA0806-1N             | 1.67(Nm)          |  |
| HLS16                   | ACA1007-1N             | 3.14(Nm)          |  |
| HLS20                   | ACA1210-1N             | 3.14(Nm)          |  |
| HLS25                   | ACA1412-1N             | 10.8(Nm)          |  |

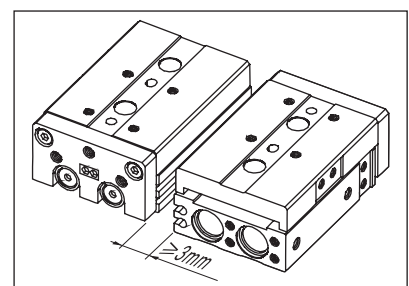
4. How to mount sensor switch:

4.1) HLS Series are all with magnet.

The matching sensor switches are DS1-H, DS1-HL series.

Please refer to page 401~424 for details.

4.2) Maintain a minimum spacing of at least 3mm if two compact cylinders are used side by side in order to avoid malfunction.



5. Make sure to connect the compact cylinder to speed controller at the meter-out side, and the speed of compact cylinder must below 500mm/s.

6. Don't apply a load beyond the range of the operation limits. Different load or torque will cause different deflection to table, please see below for details.

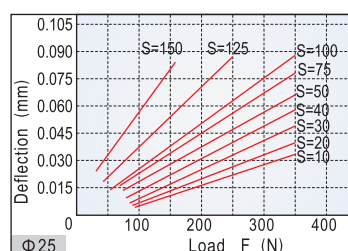
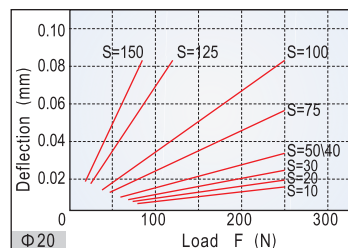
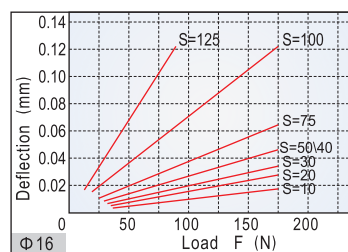
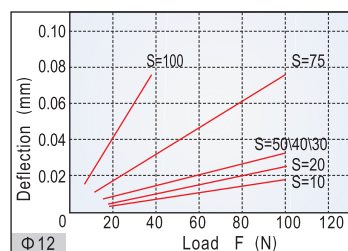
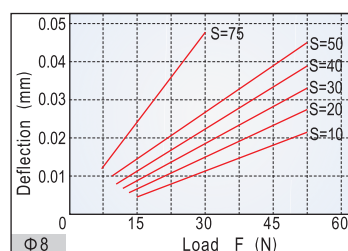
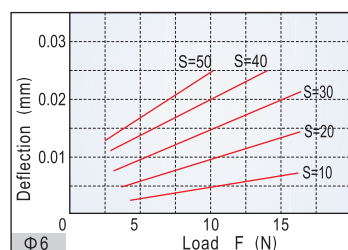
# Compact slide cylinder(Roller bearing)

**AIRTAC**

## HLS Series

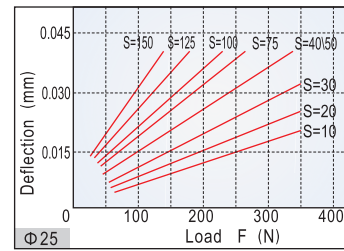
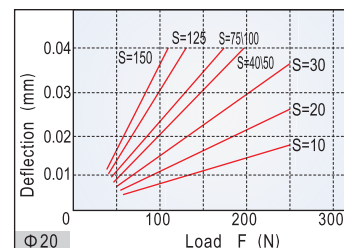
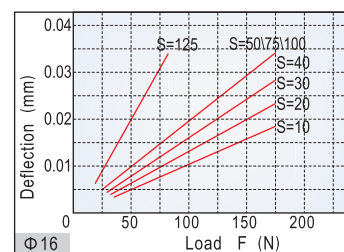
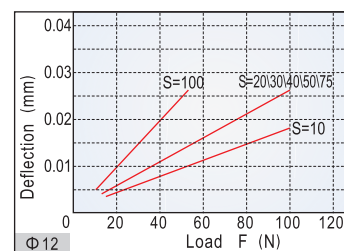
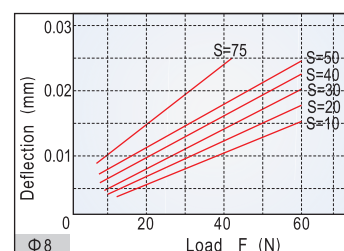
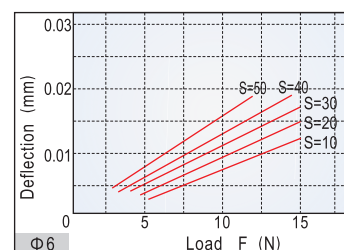
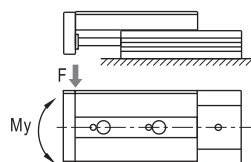
### 6.1) Table deflection due to pitch moment:

Table deflection (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide.



### 6.2) Table deflection due to yaw moment:

Table deflection (arrow) when a load acts upon the section marked with the arrow at the full stroke of the compact slide.



HLS



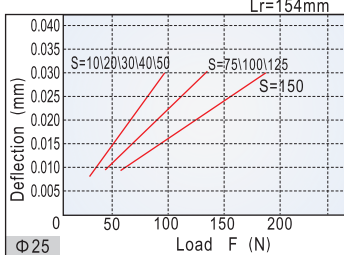
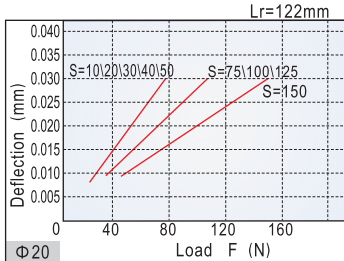
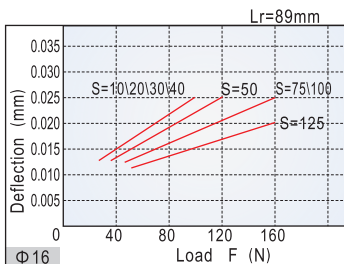
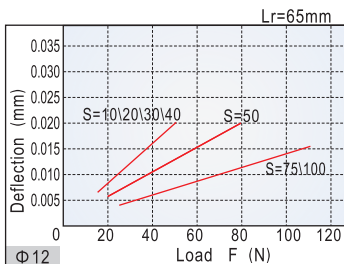
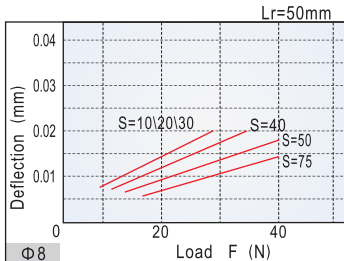
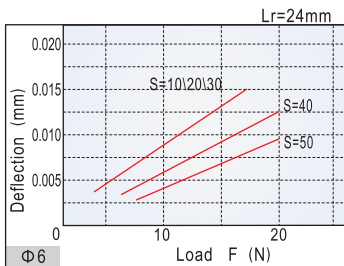
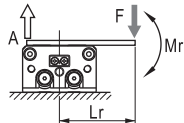
Compact slide cylinder(Roller bearing)



HLS Series

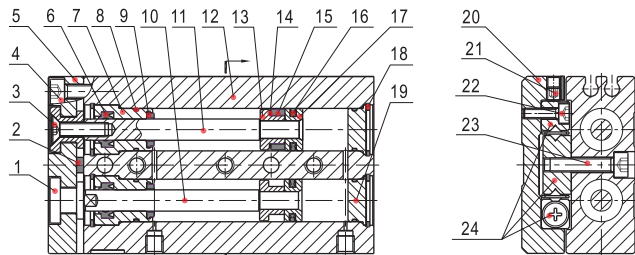
6.3) Table deflection due to roll moment:

Table deflect at A when a load acts upon section F at the full stroke of the compact slide.



Inner structure

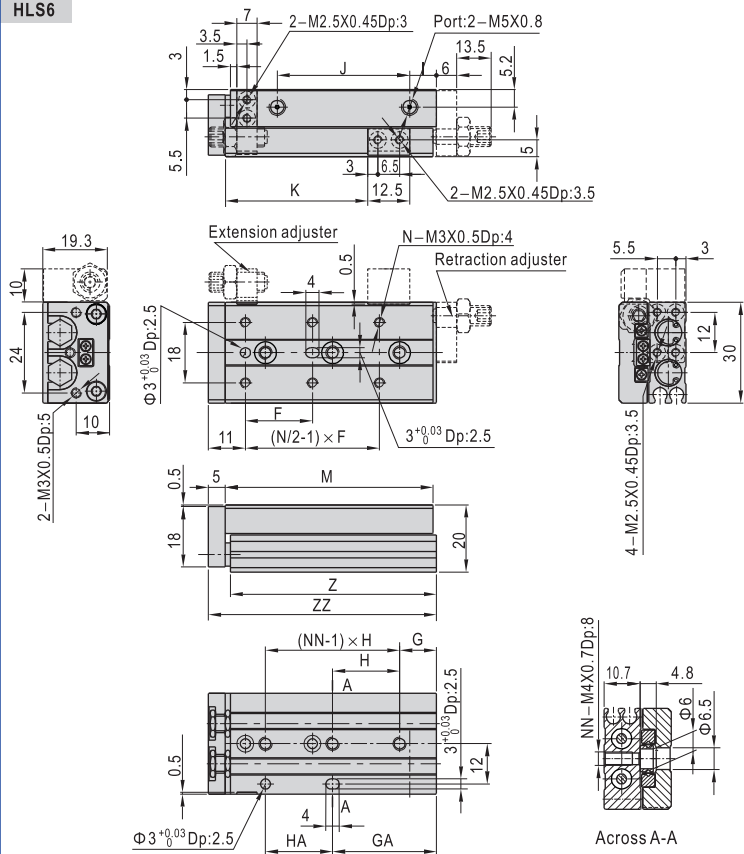
Basic type



| NO. | Item             | Material        | NO. | Item                    | Material                             |
|-----|------------------|-----------------|-----|-------------------------|--------------------------------------|
| 1   | Floating jointer | Carbon steel    | 13  | Magnet holder           | Brass                                |
| 2   | Bumper           | TPU             | 14  | Magnet washer           | NBR                                  |
| 3   | Screw            | Carbon steel    | 15  | Magnet                  | Sintered metal(Neodymium-iron-boron) |
| 4   | Screw            | Carbon steel    | 16  | Piston seal             | NBR                                  |
| 5   | Fixing plate     | Aluminum alloy  | 17  | Piston                  | Brass                                |
| 6   | Rod seal         | NBR             | 18  | C clip                  | Spring steel                         |
| 7   | Front cover      | Aluminum alloy  | 19  | Back cover              | Aluminum alloy                       |
| 8   | O-ring           | NBR             | 20  | Slide table             | Aluminum alloy                       |
| 9   | Bumper           | TPU             | 21  | Nut                     | Carbon steel                         |
| 10  | Piston rod A     | Carbon steel    | 22  | Screw                   | Carbon steel                         |
| 11  | Piston rod B     | Stainless steel | 23  | Screw                   | Carbon steel                         |
| 12  | Body             | Aluminum alloy  | 24  | Slide guide combination | subassembly                          |

Dimensions

HLS6



| Stroke\Item | F  | N | G  | H  | NN | GA | HA | I  | J    | K    | M   | Z    | ZZ  |
|-------------|----|---|----|----|----|----|----|----|------|------|-----|------|-----|
| 10          | 20 | 4 | 6  | 25 | 2  | 11 | 20 | 9  | 18.5 | 21.5 | 42  | 41.5 | 48  |
| 20          | 30 | 4 | 6  | 35 | 2  | 21 | 20 | 9  | 28.5 | 31.5 | 52  | 51.5 | 58  |
| 30          | 20 | 6 | 11 | 20 | 3  | 31 | 20 | 8  | 39.5 | 41.5 | 62  | 61.5 | 68  |
| 40          | 28 | 6 | 13 | 30 | 3  | 43 | 30 | 18 | 51.5 | 51.5 | 84  | 83.5 | 90  |
| 50          | 38 | 6 | 17 | 24 | 4  | 41 | 48 | 24 | 61.5 | 61.5 | 100 | 99.5 | 106 |



HLS

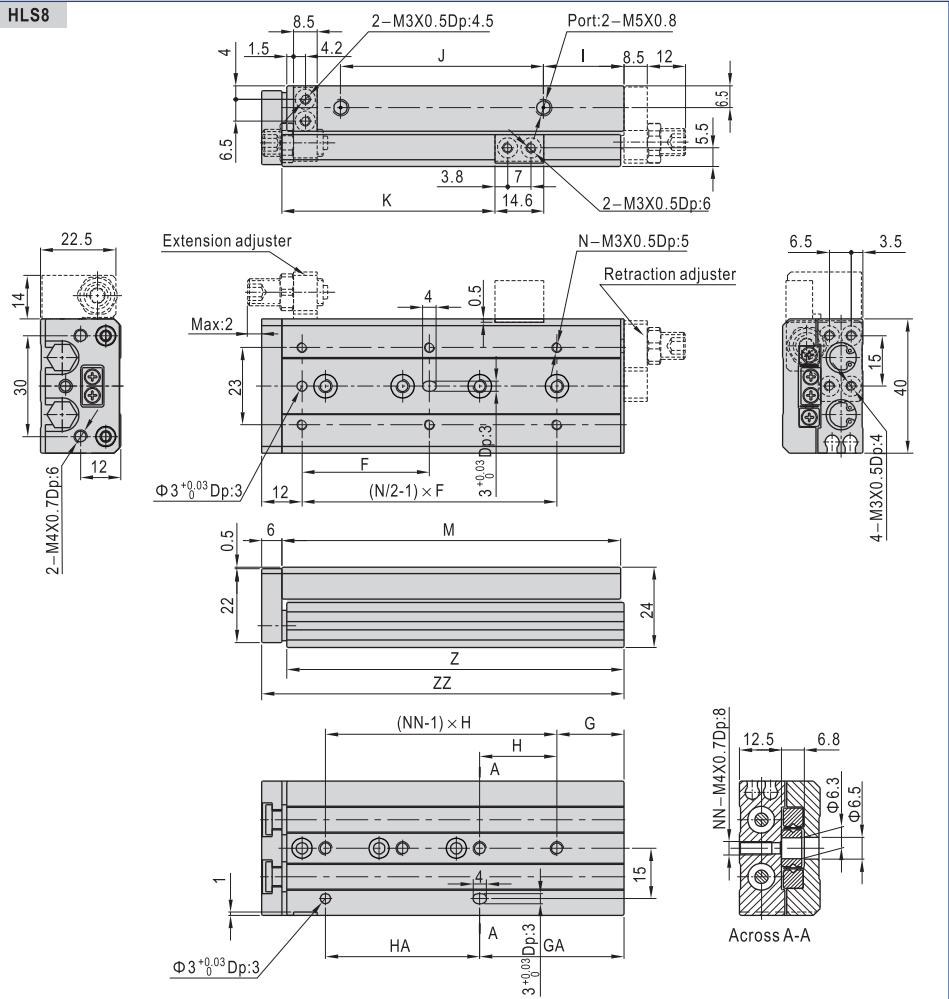


Compact slide cylinder(Roller bearing)

AIRTAC

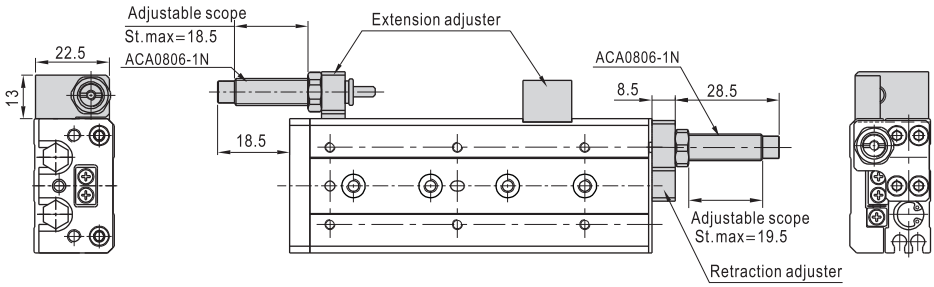
HLS Series

HLS8



| Stroke\Item | F  | N | G  | H  | NN | GA | HA | I  | J    | K    | M   | Z     | ZZ  |
|-------------|----|---|----|----|----|----|----|----|------|------|-----|-------|-----|
| 10          | 25 | 4 | 9  | 28 | 2  | 17 | 20 | 12 | 20.5 | 23.5 | 49  | 48.5  | 56  |
| 20          | 25 | 4 | 12 | 30 | 2  | 12 | 30 | 7  | 30.5 | 33.5 | 54  | 53.5  | 61  |
| 30          | 40 | 4 | 13 | 20 | 3  | 33 | 20 | 7  | 41.5 | 43.5 | 65  | 64.5  | 72  |
| 40          | 50 | 4 | 15 | 28 | 3  | 43 | 28 | 10 | 56.5 | 53.5 | 83  | 82.5  | 90  |
| 50          | 38 | 6 | 20 | 23 | 4  | 43 | 46 | 23 | 61.5 | 63.5 | 101 | 100.5 | 108 |
| 75          | 50 | 6 | 27 | 28 | 5  | 83 | 56 | 40 | 94.5 | 88.5 | 151 | 150.5 | 158 |

HLS8(With shock absorber)



## HLS Series

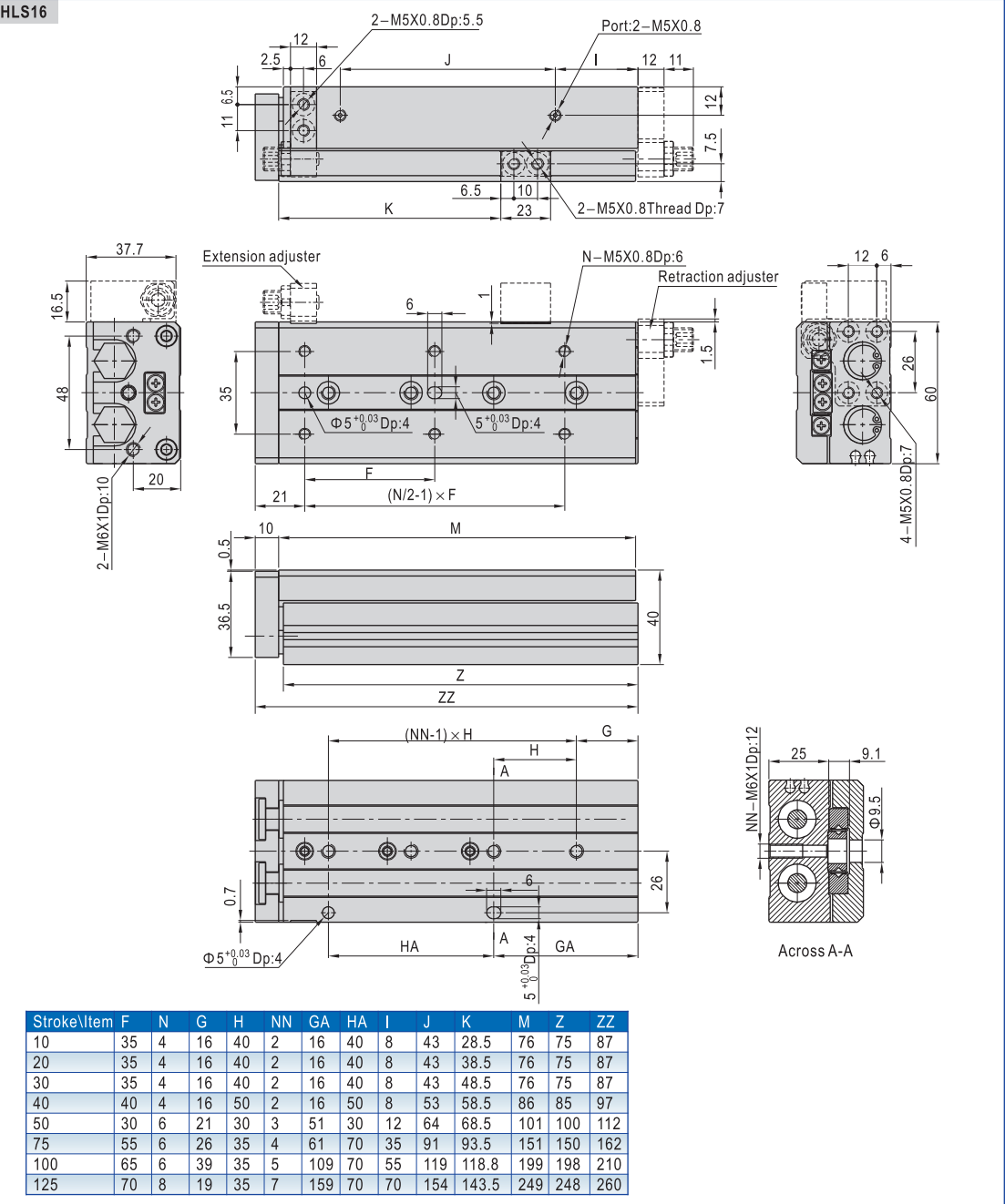
**AirTAC**

Compact slide cylinder(Roller bearing)

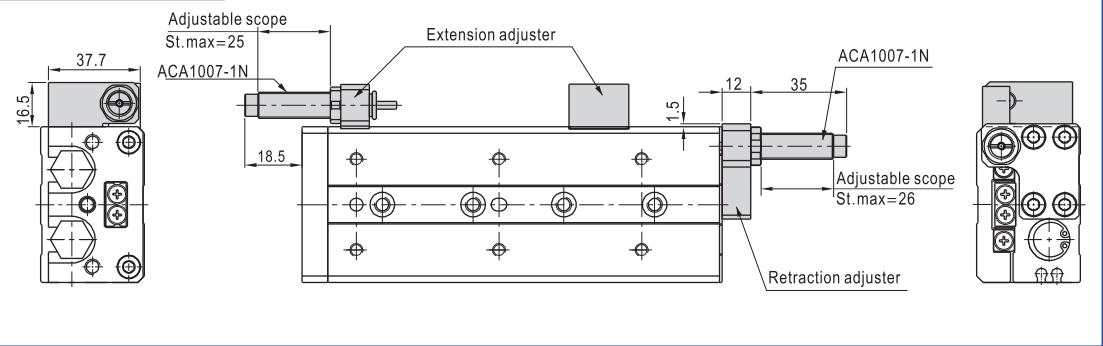


HLS Series

HLS16



HLS16(With shock absorber)



**AirTAC**

HLS20

Technical drawing of the HLS20 hydraulic cylinder. The drawing includes the following views and dimensions:

- Front View:** Shows the main body with dimensions 15, 2.5, 7.5, J, I, 15, 12, 13.5, 8, 12, 6.5, 12, 25, K, 2-M6X1Dp:6, Port:2-1/8", 2-M6X1Dp:6.5, and 15.
- Side View:** Shows the side profile with dimensions 46.5, 21, 58, 25, 2-M6X1Dp:13, and 2-M6X1Dp:6.
- End View:** Shows the end face with dimensions 18, 6, 30, 70, 30, 6-M5X0.8Dp:8, and 1.
- Extension adjuster:** Shows the extension adjuster with dimensions 46, 6, 1.5, N-M5X0.8Dp:10, Retraction adjuster, 1, 27, F, (N/2-1) x F, M, 13, 0.5, 45.5, 50, Z, and ZZ.
- Retraction adjuster:** Shows the retraction adjuster with dimensions 18, 6, 30, 70, 30, 6-M5X0.8Dp:8, and 1.
- Cross-section A-A:** Shows the cross-section with dimensions 28, 12.1, 9.5, and NN-M6X1Dp:12.

| Stroke\Item | F  | FF | N | G  | H  | NN | GA  | HA | I  | J   | K     | M   | Z     | ZZ  |
|-------------|----|----|---|----|----|----|-----|----|----|-----|-------|-----|-------|-----|
| 10          | 50 | 40 | 4 | 15 | 45 | 2  | 25  | 35 | 10 | 44  | 32.5  | 83  | 81.5  | 97  |
| 20          | 50 | 40 | 4 | 15 | 45 | 2  | 25  | 35 | 10 | 44  | 42.5  | 83  | 81.5  | 97  |
| 30          | 50 | 40 | 4 | 15 | 45 | 2  | 25  | 35 | 10 | 44  | 52.5  | 83  | 81.5  | 97  |
| 40          | 60 | 50 | 4 | 15 | 55 | 2  | 35  | 35 | 10 | 54  | 62.5  | 93  | 91.5  | 107 |
| 50          | 35 | 35 | 6 | 15 | 35 | 3  | 50  | 35 | 10 | 69  | 72.5  | 108 | 106.5 | 122 |
| 75          | 60 | 60 | 6 | 19 | 35 | 4  | 54  | 70 | 10 | 108 | 97.5  | 147 | 145.5 | 161 |
| 100         | 70 | 70 | 6 | 37 | 35 | 5  | 107 | 70 | 55 | 116 | 122.5 | 200 | 198.5 | 214 |
| 125         | 70 | 70 | 8 | 41 | 38 | 6  | 155 | 76 | 70 | 155 | 147.5 | 254 | 252.5 | 268 |
| 150         | 80 | 80 | 8 | 19 | 44 | 7  | 195 | 88 | 90 | 187 | 172.5 | 306 | 304.5 | 320 |

HLS20(With shock absorber)

Technical drawing of the HLS20 hydraulic cylinder with shock absorber. The drawing includes the following views and dimensions:

- Front View:** Shows the main body with dimensions 46.5, 21, 14.5, 0.5, 15, 34, and 15.
- Side View:** Shows the side profile with dimensions 46.5, 21, 14.5, 0.5, 15, 34, and 15.
- End View:** Shows the end face with dimensions 18, 6, 30, 70, 30, 6-M5X0.8Dp:8, and 1.
- Extension adjuster:** Shows the extension adjuster with dimensions 46, 6, 1.5, N-M5X0.8Dp:10, Retraction adjuster, 1, 27, F, (N/2-1) x F, M, 13, 0.5, 45.5, 50, Z, and ZZ.
- Retraction adjuster:** Shows the retraction adjuster with dimensions 18, 6, 30, 70, 30, 6-M5X0.8Dp:8, and 1.
- Cross-section A-A:** Shows the cross-section with dimensions 28, 12.1, 9.5, and NN-M6X1Dp:12.



HLS

**AirTAC**

HLS25



HLS

| Stroke\Item | F  | FF | N | G  | H  | NN | GA  | HA | I  | J   | K   | M   | Z     | ZZ  |
|-------------|----|----|---|----|----|----|-----|----|----|-----|-----|-----|-------|-----|
| 10          | 50 | 40 | 4 | 22 | 45 | 2  | 22  | 45 | 12 | 47  | 35  | 92  | 90.5  | 108 |
| 20          | 50 | 40 | 4 | 22 | 45 | 2  | 22  | 45 | 12 | 47  | 45  | 92  | 90.5  | 108 |
| 30          | 50 | 40 | 4 | 22 | 45 | 2  | 22  | 45 | 12 | 47  | 55  | 92  | 90.5  | 108 |
| 40          | 60 | 50 | 4 | 22 | 55 | 2  | 22  | 55 | 12 | 57  | 65  | 102 | 100.5 | 118 |
| 50          | 35 | 35 | 6 | 20 | 35 | 3  | 55  | 35 | 12 | 70  | 75  | 115 | 113.5 | 131 |
| 75          | 60 | 60 | 6 | 26 | 35 | 4  | 61  | 70 | 33 | 90  | 100 | 156 | 154.5 | 172 |
| 100         | 70 | 70 | 6 | 32 | 35 | 5  | 102 | 70 | 45 | 119 | 125 | 197 | 195.5 | 213 |
| 125         | 75 | 75 | 8 | 40 | 38 | 6  | 154 | 76 | 67 | 155 | 150 | 255 | 253.5 | 271 |
| 150         | 80 | 80 | 8 | 30 | 40 | 7  | 190 | 80 | 82 | 180 | 175 | 295 | 293.5 | 311 |

**ACA1412-1N (With shock absorber)**

Technical drawing showing the front, side, and rear views of the ACA1412-1N shock absorber assembly. The drawing includes the following dimensions and labels:

- Front View (Left):**
  - Width: 56.5
  - Height: 23
- Side View (Middle):**
  - Adjustable scope: St. max=37.5
  - Extension adjuster
  - ACA1412-1N
  - Distance from front face to extension adjuster: 26
  - Distance from extension adjuster to retraction adjuster: 8
  - Retraction adjuster
  - Adjustable scope: St. max=38
  - ACA1412-1N
  - Distance from retraction adjuster to rear face: 16
  - Distance from retraction adjuster to rear face (total): 49
- Rear View (Right):**
  - Width: 56.5
  - Height: 23

