KOGANEI CLEAN SYSTEM

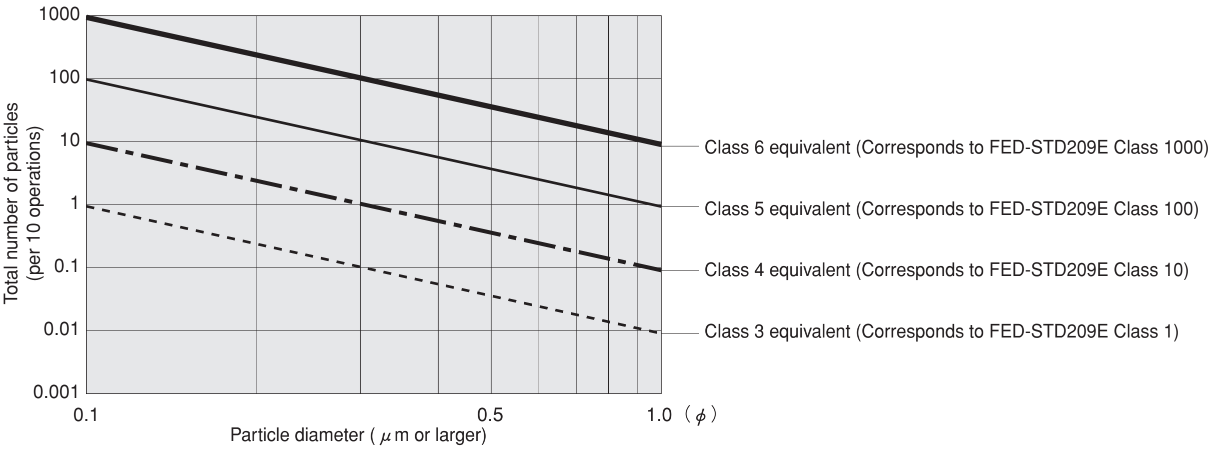
Koganei Clean System products provide complete support for the maintenance of a clean environment inside the cleanroom.

Koganei Clean System products meet the needs of the ultra-clean production environment. In everything from actuators and valves to air preparation and auxiliary equipment, anti-corrosion materials processing and other Koganei-developed design concepts serve to prevent particle contamination within the cleanroom. These perfectly designed mechanisms, which resolve even the slightest leaks to the outside during operations, have already won a high level of reliability.

Koganei Cleanliness

There is currently no standard in JIS or elsewhere for methods of evaluating cleanliness for pneumatic equipment in the cleanroom specifications. Therefore, to measure the effects of cleanroom contamination by pneumatic equipment, Koganei has decided to use "number of particles generated per 10 operations," rather than particle density. Koganei has also developed classifications for application classes in cleanroom, based on JIS and other upper limit density tables, and on the company's own experience.

Particle generation classification of Koganei pneumatic equipment



Remarks:
1. In the above table, product performance in terms of the number of particles generated per 10 operations is expressed as the upper limit of particles corresponding to the equivalent JIS or ISO class.
2. In the above table, values in the JIS, ISO, and FED-STD upper limit density tables are calculated as upper density per liter.
3. The classes shown are clean levels as classified in JIS and ISO.

From the above definitions, the Koganei clean level classes can be viewed as the level of average contamination per liter of surrounding air over a period of 10 operations in cleanroom. Air ventilation in cleanrooms is usually faster than 1 cycle per minute, and clean volumetric capacity is usually larger than 1 liter, which should provide a sufficient safety margin in practice.

Caution: The above conclusions are based on an ideal situation in which air ventilation is being implemented. For specific cases where air ventilation is not ensured, caution is needed since the clean classes cannot be maintained.

The clean system diagrams shown here are for Class 5 equivalent products.
For Class 4 or Class 3 equivalent products, consult us.

Evaluations of Cleanliness

Koganei has therefore specified its in-house measurement methods, to conduct evaluations on the cleanroom rating.

The number of particles of the Air Cylinder Cleanroom Specification is measured as shown in the method below.

1. Measurement conditions

1-1 Test circuit: Figure 1 (no suction), Figure 2 (with suction)

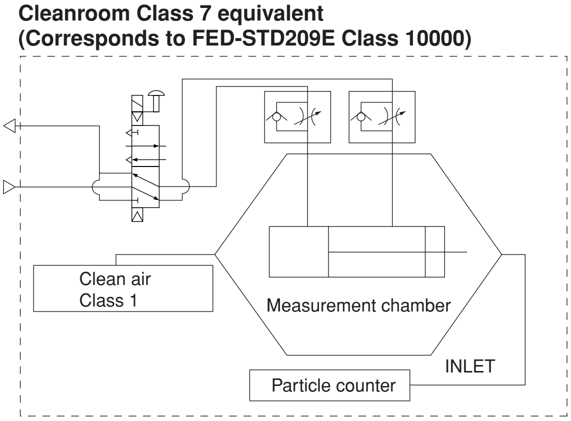


Figure 1 (no suction from dust collection port)

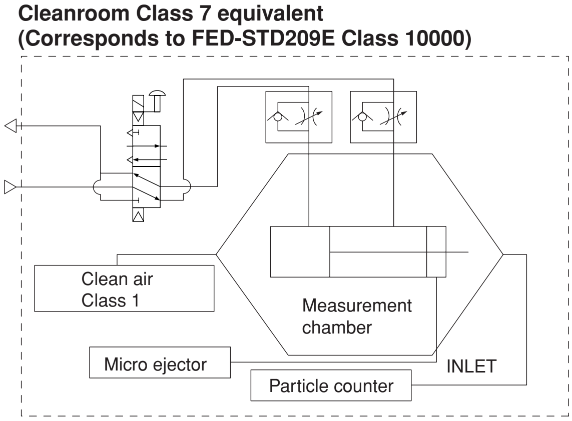


Figure 2 (with suction from dust collection port)

1-2 Operating conditions of tested cylinder

Operating frequency: 1Hz

Average speed: 500mm/s [20in./sec.]

Applied pressure: 0.5MPa [73psi.]

Suction condition: Microejector ME05, Primary side: 0.5MPa [73psi.] applied, Tube: ϕ6 [0.236in.]

Mounting direction: Vertical

Chamber volume: 8.3 ℓ [0.293ft^3]

2. Particle counter

Manufacturer/model: RION/KM20

Suction flow rate: 28.3 ℓ /min [1ft^3/min.]

Particle diameter: 0.1 μm, 0.2 μm, 0.3 μm, 0.5 μm, 0.7 μm, 1.0 μm

3. Measurement method

3-1 Confirmation of number of particles in the measurement system

Under the conditions in the above 1 and 2, using a particle counter to measure the sample for 9 minutes without operating the measurement sample, and confirmed the measured number of particle is 1 piece or less.

3-2 Measurement under operation

Under the conditions in the above1 and 2, operating the measurement sample for 36 minutes, and measured the total values in the latter half of 18 minutes test.

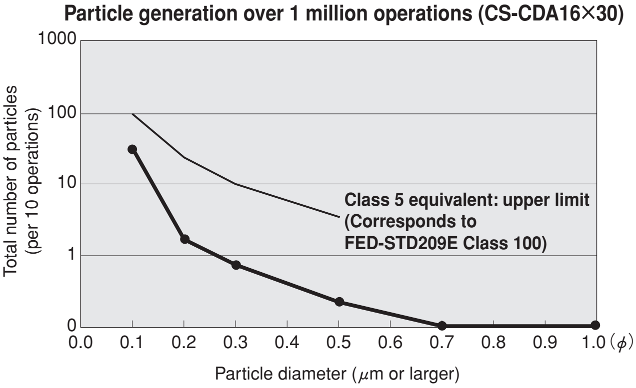
3-3 Reconfirmation

Performed the measurement in 3-1 again, to reconfirm the number of particles in the measurement system.

4. Measurement results

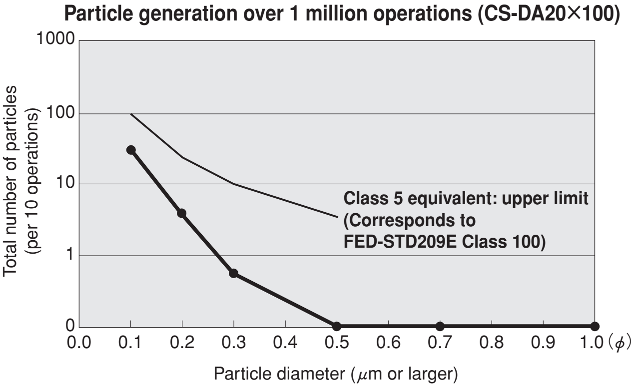
● **Cleanroom specification**
Jig Cylinder (no suction from dust collection port)

Particle generation over 1 million operations (CS-CDA16×30)



● **Cleanroom specification**
Slim Cylinder (with suction from dust collection port)

Particle generation over 1 million operations (CS-DA20×100)



For “safety precautions” listed in the Clean System Product Drawings, see the materials below.

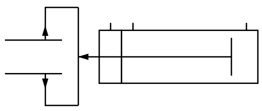
- For actuators, see “Safety Precautions” on p. 45 of the Actuators General Catalog .
- For valves, see “Safety Precautions” on p. 31 of the Valves General Catalog.
- For air treatment and auxiliary equipment, see “Safety Precautions” on p.31 of the General Catalog of Air Treatment, Auxiliary, Vacuum.

KOGANEI CLEAN SYSTEM

AIR HANDS NHB SERIES PARALLEL TYPE

Linear Guide Specification Double Acting Type

Symbol



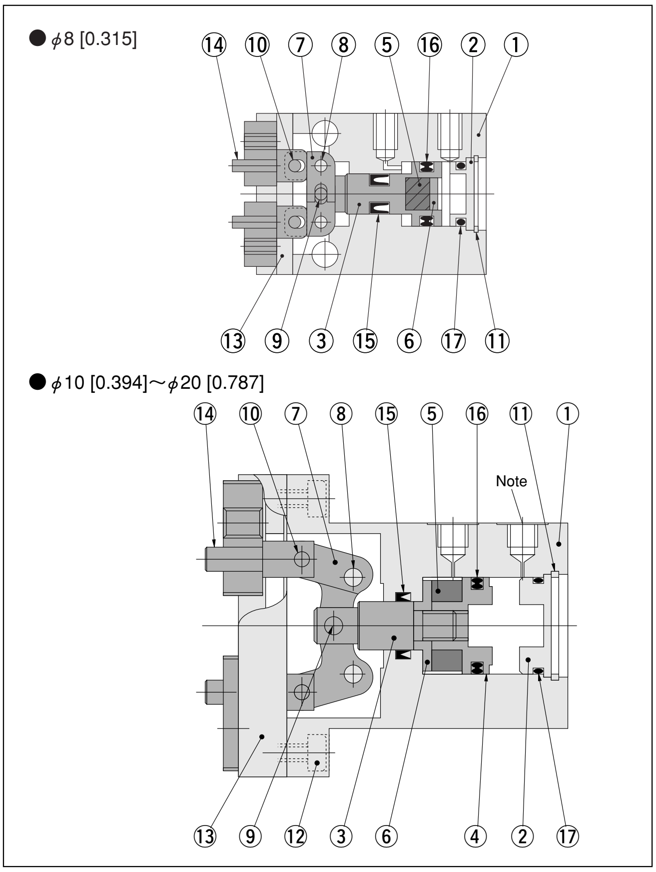
Specifications

Item / Basic model		CS-NHBDPG-8	CS-NHBDPG-10	CS-NHBDPG-16	CS-NHBDPG-20
Cylinder bore size mm [in.]		8 [0.315]	10 [0.394]	16 [0.630]	20 [0.787]
Operating type		Double acting type			
Media		Air			
Operating pressure range MPa [psi.]		0.22～0.7 [32～102]	0.2～0.7 [29～102]	0.12～0.7 [17～102]	0.1～0.7 [15～102]
Proof pressure MPa [psi.]		1.05 [152]			
Operating temperature range °C [°F]		0～60 [32～140]			
Maximum operating frequency cycle/min		120			
Lubrication		Not required			
Effective gripping force (F)Note 1 N [lbf.]	Closed side	5.8 [1.30]	9.4 [2.11]	26.4 [5.93]	45.0 [10.12]
	Open side	9.9 [2.23]	14.7 [3.30]	39.2 [8.81]	59.8 [13.44]
Lever open/closed stroke mm [in.]		4 [0.157]	6.5 [0.256]	10 [0.394]	14 [0.551]
Repeatability mm [in.]		±0.01 [±0.0004]			
Port size		M3×0.5		M5×0.8	
MassNote 2 g [oz.]		24 [0.85] (29 [1.02])	80 [2.82] (91 [3.21])	159 [5.61] (178 [6.28])	329 [11.60] (355 [12.52])

Notes: 1. Values are obtained when gripping point distance is 30mm [1.18in.] under operating pressure 0.5 MPa [73psi.]. For details of the effective gripping force, see the graphs on p.106.

2. ( ) mean the mass with the mounting bracket: **-M**.

Inner Construction



Note: The plug is attached to the extra connection port on the side surface.
(Except φ 8 [0.315in.])

Major Parts and Materials

No.	Parts	Materials	Remarks
①	Body	Aluminum alloy	
②	Head cover	Aluminum alloy	
③	Piston rod	Stainless steel	
④	Piston	Aluminum alloy	Except φ 8 [0.315in.]
⑤	Magnet	Plastic magnet	
⑥	Magnet holder	Aluminum alloy	
⑦	Action lever	Steel	
⑧	Fulcrum pin	Steel	
⑨	Press fit pin	Steel	
⑩	Press fit pin	Steel	
⑪	Internal snap ring	Steel	
⑫	Hexagon socket head bolt	Steel	
⑬	Bearing	Stainless steel	
⑭	Knuckle	Stainless steel	
⑮	Seal	Synthetic rubber (NBR)	
⑯	Seal	Synthetic rubber (NBR)	
⑰	O-ring	Synthetic rubber (NBR)	

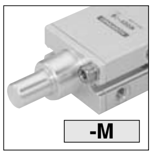
Order Codes

■Clean system product

■Mounting bracket

Without mounting bracket

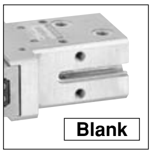
With mounting bracket



★ Included at shipping

■Sensor switch

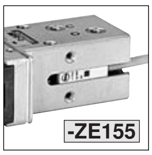
Without sensor switch



With **ZE135**

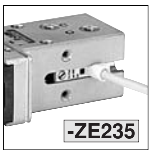
- Solid state type
- With indicator lamp
- DC10～28V
- 2-lead wire
- Horizontal lead wire

With **ZE155**



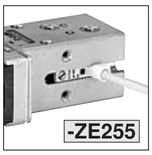
- Solid state type
- With indicator lamp
- DC4.5～28V
- 3-lead wire
- Horizontal lead wire

With **ZE235**



- Solid state type
- With indicator lamp
- DC10～28V
- 2-lead wire
- Vertical lead wire

With **ZE255**



- Solid state type
- With indicator lamp
- DC4.5～28V
- 3-lead wire
- Vertical lead wire

■Lead wire length

A : 1000mm [39in.]
B : 3000mm [118in.]

■Number of sensor switches
(Applied to air hands with sensor switches)

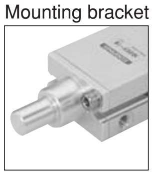
1 : With 1 sensor switch
2 : With 2 sensor switches

★Included at shipping

		Basic model	Cylinder bore size				
Double acting type	**CS**	**-NHBDPG**	**-8** **-10** **-16** **-20**	**-M**	**-ZE135** **-ZE155** **-ZE235** **-ZE255**	**A** **B**	**1** **2**

Additional Parts (To be ordered separately)

Mounting bracket

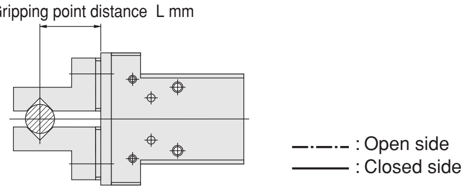


- For φ 8 [0.315in.] **NHB-M8**
- For φ 10 [0.394in.] **NHB-M10**
- For φ 16 [0.630in.] **NHB-M16**
- For φ 20 [0.787in.] **NHB-M20**

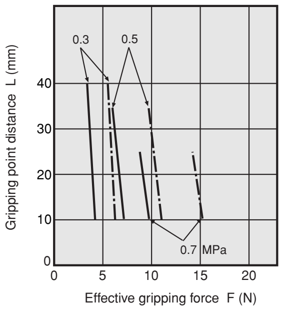
Handling Instructions and Precautions

Selection

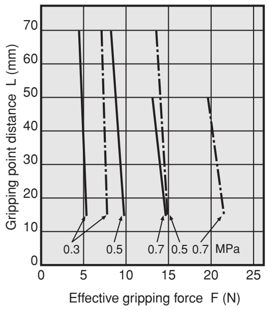
Effective gripping force



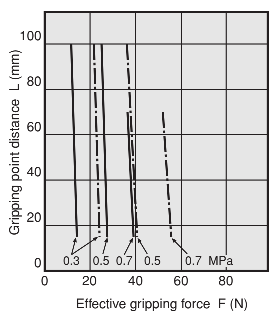
CS-NHBDPG-8



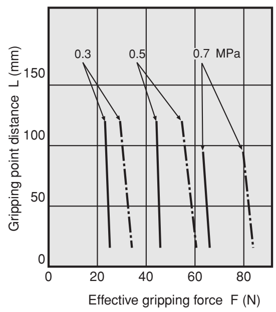
CS-NHBDPG-10



CS-NHBDPG-16

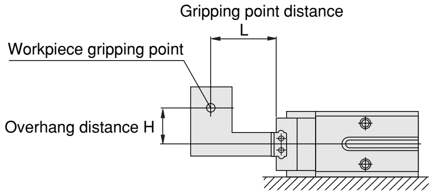


CS-NHBDPG-20

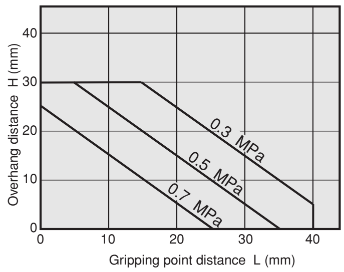


1N=0.2248 lbf. 1mm=0.039 in.
1MPa=145psi.

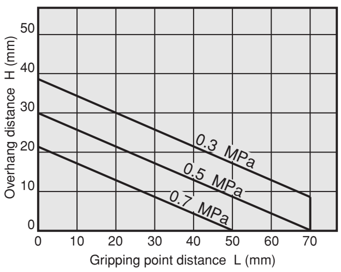
Gripping point limit range



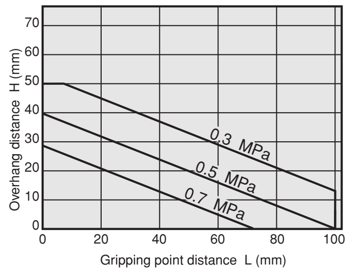
CS-NHBDPG-8



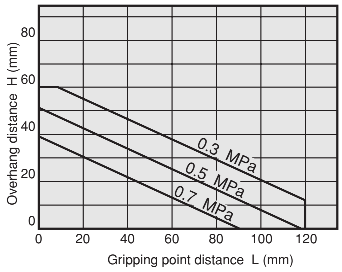
CS-NHBDPG-10



CS-NHBDPG-16



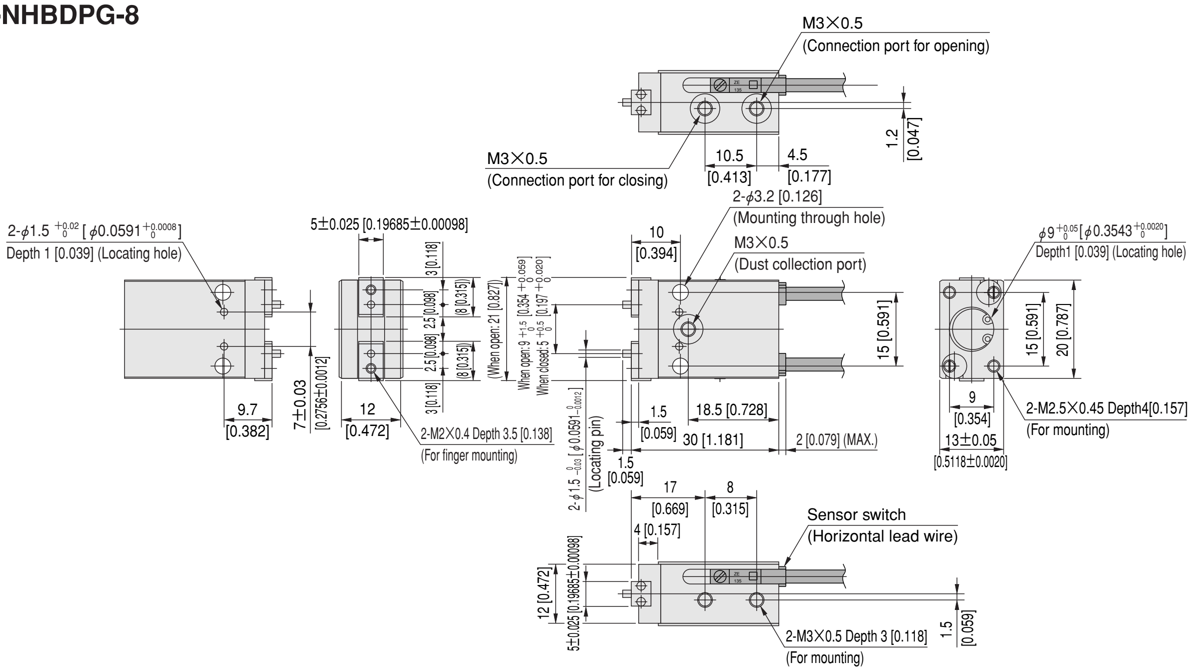
CS-NHBDPG-20



1mm=0.039 in.
1MPa=145psi.

Dimensions mm [in.]

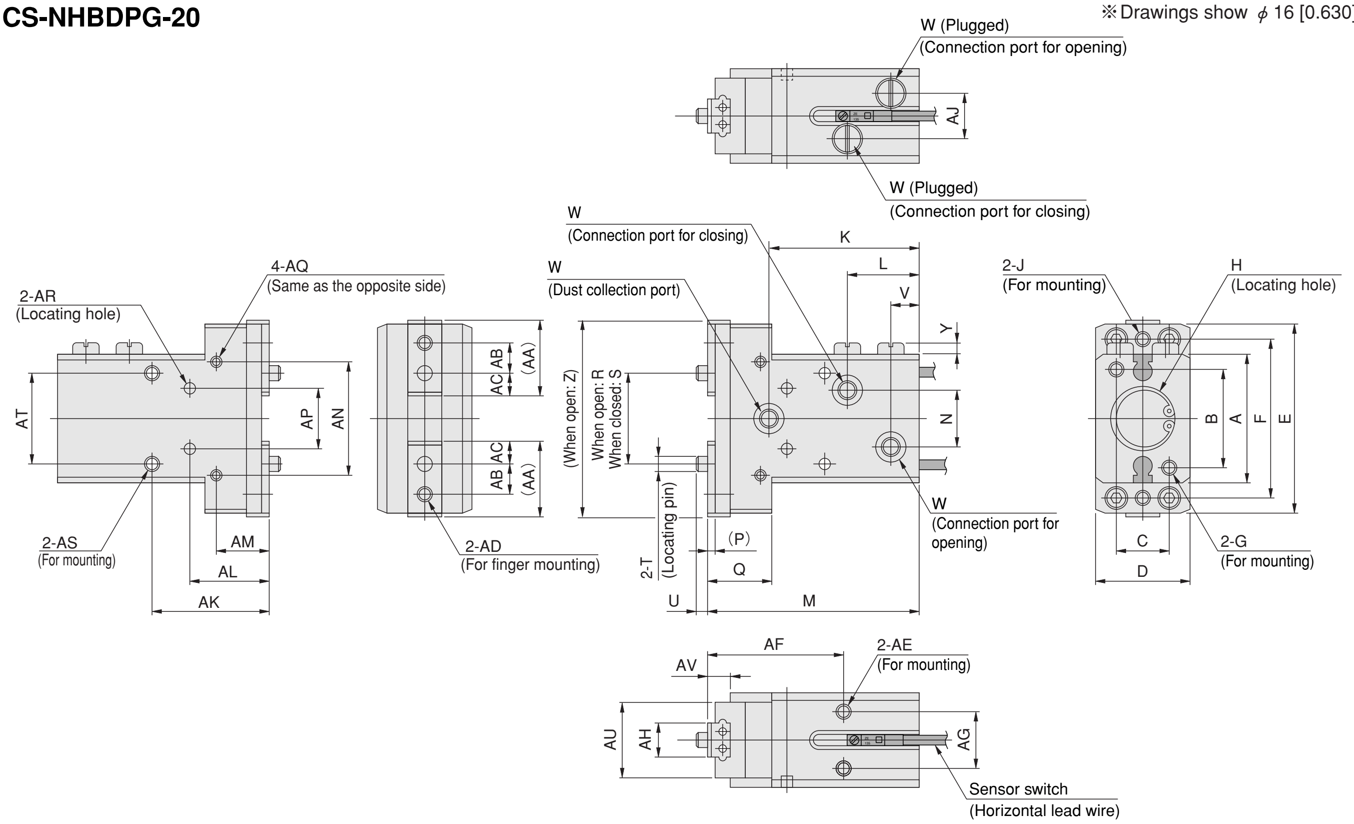
CS-NHBDPG-8



Dimensions mm [in.]

CS-NHBDPG-10
CS-NHBDPG-16
CS-NHBDPG-20

※Drawings show ϕ 16 [0.630].



Model \ Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P
CS-NHBDPG-10	23 [0.906]	17 [0.669]	10 [0.394]	20±0.05 [0.7874±0.0020]	36 [1.417]	30 [1.181]	M3×0.5 Depth 6 [0.236]	$\phi 11^{+0.05}_{0}$ [$\phi 0.4331^{+0.0020}_{0}$] Depth 1.5 [0.059]	M3×0.5 Depth 4.5 [0.177]	35 [1.378]	17 [0.669]	49 [1.929]	7 [0.276]	1.5 [0.059]
CS-NHBDPG-16	34 [1.339]	26 [1.024]	14 [0.551]	25±0.05 [0.9843±0.0020]	50 [1.969]	42 [1.654]	M4×0.7 Depth 7 [0.276]	$\phi 17^{+0.05}_{0}$ [$\phi 0.6693^{+0.0020}_{0}$] Depth 1.5 [0.059]	M4×0.7 Depth 5 [0.197]	40 [1.575]	19 [0.748]	56 [2.205]	15 [0.591]	2 [0.079]
CS-NHBDPG-20	45 [1.772]	35 [1.378]	16 [0.630]	32±0.05 [1.2598±0.0020]	62 [2.441]	54 [2.126]	M5×0.8 Depth 9 [0.354]	$\phi 21^{+0.05}_{0}$ [$\phi 0.8268^{+0.0020}_{0}$] Depth 1.5 [0.059]	M4×0.7 Depth 7 [0.276]	45 [1.772]	21 [0.827]	67 [2.638]	17 [0.669]	3 [1.181]

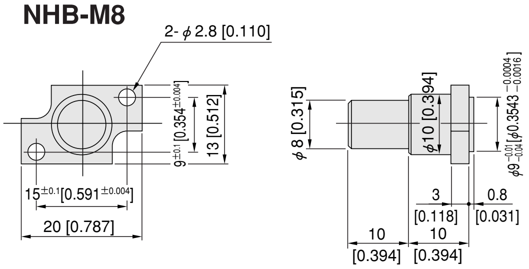
Q	R	S	T	U	V	W	Y	Z	AA	AB	AC	AD	AE	AF	AG
14	$15.5^{+0.8}_{0}$ [$0.610^{+0.031}_{0}$]	$9^{+0.5}_{0}$ [$0.354^{+0.020}_{0}$]	$\phi 3^{0}_{-0.03}$ [$\phi 0.1181^{0}_{-0.0012}$]	2 [0.079]	7.5 [0.295]	M3×0.5	2 [0.079]	37 [1.457]	14.7 [0.579]	5 [0.197]	4.5 [0.177]	M3×0.5 Depth 4 [0.157]	M3×0.5 Depth 5 [0.197]	29 [1.142]	12 [0.472]
17	$22^{+1.8}_{0}$ [$0.866^{+0.071}_{0}$]	$12^{+1.3}_{0}$ [$0.472^{+0.051}_{0}$]	$\phi 4^{0}_{-0.03}$ [$\phi 0.1575^{0}_{-0.0012}$]	3 [0.118]	7.5 [0.295]	M5×0.8	3 [0.118]	52 [2.047]	20 [0.787]	8 [0.315]	6 [0.236]	M4×0.7 Depth 5 [0.197]	M4×0.7 Depth 6 [0.236]	36 [1.417]	15 [0.591]
23	$30^{+2.9}_{0}$ [$1.181^{+0.114}_{0}$]	$16^{+1.4}_{0}$ [$0.630^{+0.055}_{0}$]	$\phi 5^{0}_{-0.03}$ [$\phi 0.1969^{0}_{-0.0012}$]	3 [0.118]	7.5 [0.295]	M5×0.8	3 [0.118]	64 [2.520]	24 [0.945]	8 [0.315]	8 [0.315]	M5×0.8 Depth 7 [0.276]	M5×0.8 Depth 8 [0.315]	43 [1.693]	18 [0.709]

AH	AJ	AK	AL	AM	AN	AP	AQ	AR	AS	AT	AU	AV
7±0.025 [0.27559±0.00098]	9 [0.354]	24 [0.945]	16 [0.630]	11 [0.433]	20 [0.787]	12±0.03 [0.4724±0.0012]	M3×0.5 Depth 5 [0.197]	$\phi 2.5^{+0.02}_{0}$ [$\phi 0.0984^{+0.0008}_{0}$] Depth 2.5 [0.098]	M4×0.7 Depth 6 [0.236], Drilled hole diameter ϕ 3.4 [0.134] thru hole	17 [0.669]	17 [0.669]	6 [0.236]
9±0.025 [0.35433±0.00098]	12 [0.472]	31 [1.220]	21 [0.827]	14 [0.551]	30 [1.181]	16±0.03 [0.6299±0.0012]	M3×0.5 Depth 5 [0.197]	$\phi 3^{+0.02}_{0}$ [$\phi 0.1181^{+0.0008}_{0}$] Depth 3 [0.118]	M4×0.7 Depth 7 [0.276], Drilled hole diameter ϕ 3.4 [0.134] thru hole	24 [0.945]	20 [0.787]	8 [0.315]
12±0.025 [0.47244±0.00098]	16 [0.630]	37 [1.457]	27.3 [1.075]	17 [0.669]	40 [1.575]	22±0.03 [0.8661±0.0012]	M4×0.7 Depth 6 [0.236]	$\phi 4^{+0.02}_{0}$ [$\phi 0.1575^{+0.0008}_{0}$] Depth 3.5 [0.1378]	M4×0.8 Depth 8 [0.315], Drilled hole diameter ϕ 4.2 [0.165] thru hole	30 [1.181]	27 [1.063]	10 [0.394]

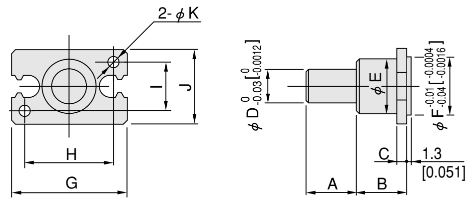
Options

● Mounting bracket: **-M**

NHB-M8



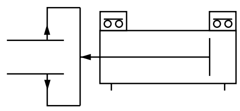
NHB-M10, M16, M20



Model \ Code	A	B	C	D	E	F	G	H	I	J	K
NHB-M10	15 [0.591]	15 [0.591]	3 [0.118]	10 [0.394]	11 [0.433]	11 [0.433]	23 [0.906]	17 [0.669]	10 [0.394]	16 [0.630]	3.4 [0.134]
NHB-M16	15 [0.591]	15 [0.591]	3 [0.118]	10 [0.394]	16 [0.630]	17 [0.669]	34 [1.339]	26 [1.024]	14 [0.551]	22 [0.866]	4.5 [0.177]
NHB-M20	15 [0.591]	15 [0.591]	3 [0.118]	10 [0.394]	18 [0.709]	21 [0.827]	45 [1.772]	35 [1.378]	16 [0.630]	26 [1.024]	5.5 [0.217]

Sensor Switches

Symbol



Order Codes

● **Sensor switch only**

CS — ☐ ☐ — **NHB**

Clean system product

Sensor switch

ZE135 — Solid state type 2-lead wire with indicator lamp DC10～28V, Horizontal lead wire
ZE235 — Solid state type 2-lead wire with indicator lamp DC10～28V, Vertical lead wire
ZE155 — Solid state type 3-lead wire with indicator lamp DC4.5～28V, Horizontal lead wire
ZE255 — Solid state type 3-lead wire with indicator lamp DC4.5～28V, Vertical lead wire
●For details of sensor switches, see p.111～121.

Lead wire length

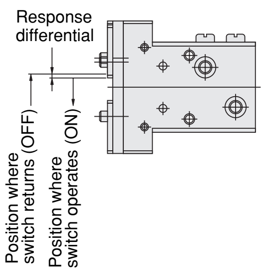
A — 1000mm [39in.]
B — 3000mm [118in.]

Sensor Switch Operating Range and Response Differential

● **Open/closed stroke differential (Open/closed angle differential)**
The stroke differential (angle differential) between the point where the lever on one side moves and turns the switch ON and the point where the switch is turned OFF as the lever travels in the opposite direction.

● **Operating position repeatability**
When the lever on one side moves in the same direction, operating position repeatability is defined as the range of the deviation of the position where the switch is turned ON or turned OFF.

Parallel type linear guide specification



● **Parallel type linear guide specification**

mm [in.]

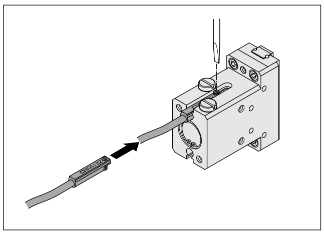
Model	Open/closed stroke differential	Operating position repeatability
(CS-)NHB☐PG(L,Y)-8	0.5 [0.020]	0.2 [0.008]
(CS-)NHB☐PG(L,Y)-10	0.5 [0.020]	0.2 [0.008]
(CS-)NHB☐PG(L,Y)-16	0.8 [0.031]	0.2 [0.008]
(CS-)NHB☐PG(L,Y)-20	0.8 [0.031]	0.2 [0.008]

Remark: The above table shows reference values.

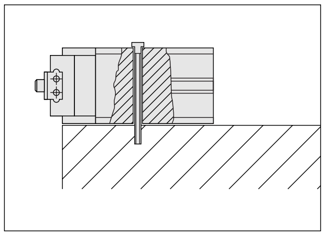
Precautions for Sensor Switch Mounting

Tighten the mounting screw after the sensor switch is inserted in the switch mounting groove in the direction of the arrow in the diagram and move to the proper location. Tightening torque of the mounting screw is 0.1～0.2N･m [0.9～1.8in･lbf].

Caution: Care must be exercised that the sensor switch cannot be inserted into the switch mounting groove from the diagram's top direction.

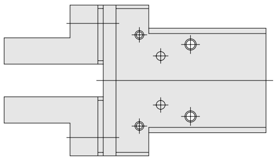


Caution: Care must be exercised that a sensor switch cannot be mounted when the body is installed by using thru holes, as shown in the diagram to the right.

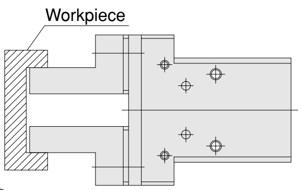


●Adjusting Sensor Switch Mounting Position (Mount the sensor switch so that the surface showing the model marking faces up.)

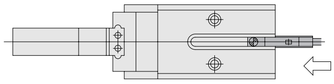
《For internal gripping》



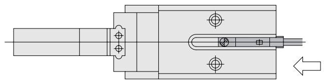
① Confirm the levers are completely open.



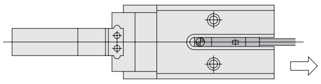
① Confirm workpiece is internally gripped.



② Push the switch into the groove on the body in the direction of the arrow.

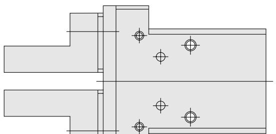


③ By moving the sensor switch in the direction of the arrow, the lamp turns ON, and by moving it further, the lamp turns OFF.

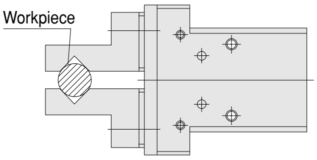


④ By moving back the sensor switch in the direction of the arrow (opposite direction), the lamp turns ON, and it should be secured by the sensor switch mounting screw after moving it about 0.3 mm [0.012in.] further.

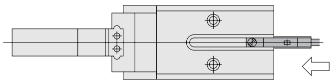
《For external gripping》



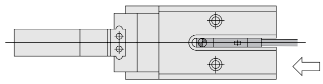
① Confirm the levers are completely closed.



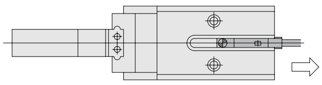
① Confirm workpiece is externally gripped.



② Push the switch into the groove on the body in the direction of the arrow.



③ By moving the switch in the direction of the arrow, the lamp turns ON.



④ Secure the sensor switch by the mounting screw after moving it about 0.3 mm [0.012in.] further in the direction of the arrow from where the lamp turned ON in ③.

Remark: ① shows the desired location for the switch to turn ON. Install and adjust it in accordance with ① ～ ④ above.