Hygienic Design Cylinder

ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

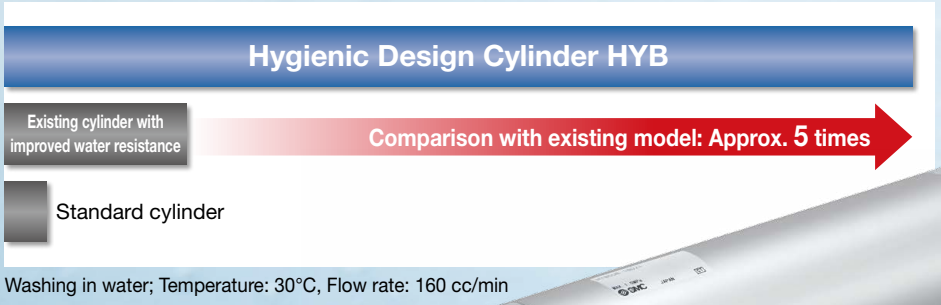
New

RoHS

A water resistant cylinder configured for easy cleaning

Approx. 5 times increase in service life compared to the existing model (SMC ratio)

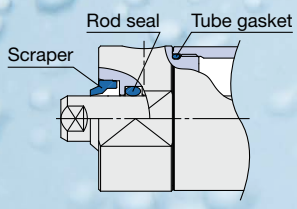
Water-proof examination result (Reference data)



Washing in water; Temperature: 30°C, Flow rate: 160 cc/min

Grease for food processing equipment (NSF-H1 certified) is available.

External seal material: Choice of NBR or FKM



Not applicable for use in a "Food zone." For details, refer to page 9 for the Specific Product Precautions.

Series	Bore size [mm]								External seal material	Body material	Optional parts	Mounting brackets*1
	20	25	32	40	50	63	80	100				
HYB 	●	●	●	●	●	●	●	●	NBR FKM	Aluminum	Plug bolt (Stainless steel)	Foot bracket Rod flange (Stainless steel)

*1 Only for ø32 to ø100

HYB Series

SMC

CAT.ES20-314A

Hygienic Design Cylinder
Round Type
HYB Series

RoHS

ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

How to Order

HYB **20** □ **R** – **50** **F** **Z1**

With auto switch **HYDB** **20** □ **R** – **50** **F** **Z1** – **H7BAL** □

With auto switch (Built-in magnet)

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread

Nil	M5 x 0.8	ø20, ø25
	Rc	ø32 to ø100
TN	NPT	
TF	G	

Sealant material

R	NBR
H	External FKM∗1

∗1 Scraper, tube gasket, and rod seal are made from FKM.

Cylinder stroke

Refer to page 2 for the standard stroke.

Grease

Nil	Standard grease (for non-food)
F	Grease for food processing equipment

∗ Select grease for food for use in a water dispersion environment or when washing a product with water. (Water resistance is insufficient with standard grease.)

Auto switch

Nil	Without auto switch (Built-in magnet)

Refer to table below for selection of applicable auto switch.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Option (To be ordered separately: Refer to page 6.)
· Mounting bracket (ø32 to ø100): Foot bracket, Rod flange
· Plug bolt

Applicable Auto Switches / Refer to the **Web Catalog** for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model			Lead wire length [m]				Pre-wired connector	Applicable load	
					DC		ø20 to ø63		ø80, ø100	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
							Perpendicular	In-line	In-line							
Solid state auto switch	Water resistant (2-color indicator)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	**M9NAV**	**M9NA**	–	○	○	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)			**M9PAV**	**M9PA**	–	○	○	●	○	○		
				2-wire		12 V	**M9BAV**	**M9BA**	–	○	○	●	○	○	–	
							–	**H7BA**	**G5BA**	–	–	●	○	○		

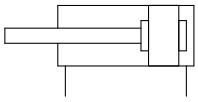
∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NA
1 m ····· M (Example) M9NAM
3 m ····· L (Example) M9NAL
5 m ····· Z (Example) M9NAZ

∗ Solid state auto switches marked with a "○" are produced upon receipt of order.

∗ For details on auto switches with pre-wired connectors ⇒ Refer to the **Web Catalog**.
∗ The D-A9□A□ auto switches are shipped together with the product but do not come assembled. (Only the auto switch mounting brackets are assembled before shipment.)

Symbol

Rubber bumper



Specifications

Bore size [mm]	20	25	32	40	50	63	80	100
Action	Double acting, Single rod							
Fluid	Air							
Minimum operating pressure	0.2 MPa		0.15 MPa				0.07 MPa	
Maximum operating pressure	1.0 MPa							
Proof pressure	1.5 MPa							
Ambient and fluid temperatures	Without auto switch: 0°C to 70°C							
	With auto switch: 0°C to 60°C							
Lubrication	Not required							
Piston speed	50 to 500 mm/s (With pressure at 1.0 MPa)*1							
Cushion	Rubber bumper							
Stroke length tolerance	$^{+1.4}_{0}$ mm							
Piston rod material	Stainless steel, Hard chrome plated							

*1 Use a cylinder below the allowable kinetic energy. Refer to page 3 for the allowable kinetic energy.

Standard Strokes

Bore size [mm]	Standard stroke [mm]
20	25, 50, 75, 100, 125, 150, 200
25 to 100	25, 50, 75, 100, 125, 150, 200, 250, 300

* Intermediate strokes of 1 mm each can be produced. (The spacer is not used.)

Weight

Without auto switch Unit: kg

Bore size [mm]	Stroke [mm]									
	25	50	75	100	125	150	175	200	250	300
20	0.15	0.17	0.18	0.20	0.22	0.24	0.26	0.27	—	—
25	0.20	0.22	0.24	0.27	0.29	0.31	0.34	0.36	0.40	0.45
32	0.26	0.29	0.32	0.35	0.38	0.41	0.44	0.47	0.53	0.59
40	0.50	0.55	0.59	0.64	0.68	0.73	0.78	0.82	0.91	1.01
50	0.88	0.95	1.02	1.09	1.15	1.22	1.29	1.35	1.49	1.62
63	1.21	1.29	1.38	1.47	1.55	1.64	1.72	1.81	1.98	2.15
80	2.01	2.13	2.24	2.35	2.47	2.58	2.69	2.81	3.03	3.26
100	3.52	3.68	3.84	3.99	4.15	4.31	4.47	4.63	4.95	5.27

With auto switch (Built-in magnet) Unit: kg

Bore size [mm]	Stroke [mm]									
	25	50	75	100	125	150	175	200	250	300
20	0.15	0.17	0.19	0.21	0.22	0.24	0.26	0.28	—	—
25	0.20	0.22	0.25	0.27	0.29	0.32	0.34	0.36	0.41	0.46
32	0.28	0.31	0.33	0.36	0.39	0.42	0.45	0.48	0.54	0.60
40	0.51	0.56	0.61	0.65	0.70	0.74	0.79	0.83	0.93	1.02
50	0.90	0.97	1.03	1.10	1.17	1.23	1.30	1.37	1.50	1.64
63	1.23	1.32	1.40	1.49	1.58	1.66	1.75	1.83	2.00	2.17
80	2.04	2.16	2.27	2.38	2.50	2.61	2.72	2.84	3.06	3.29
100	3.55	3.71	3.87	4.03	4.19	4.35	4.51	4.67	4.98	5.30

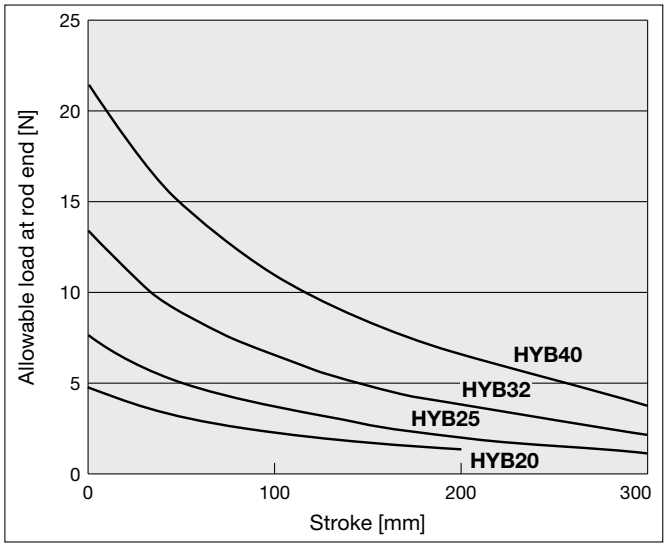
Theoretical Output

Unit: N

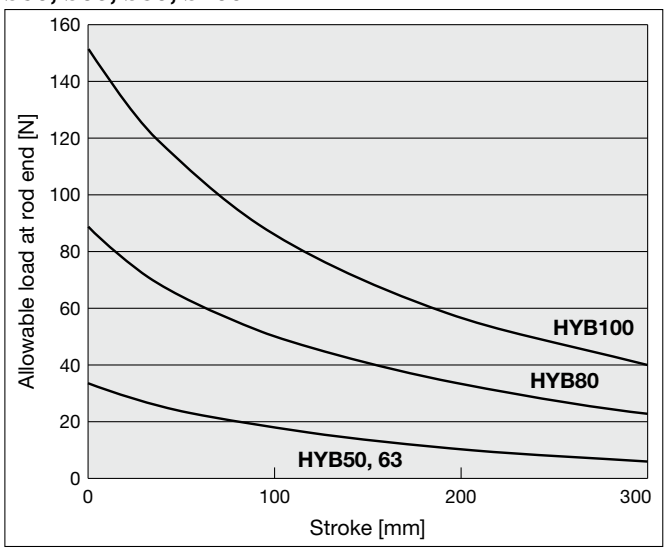
Bore size [mm]	Operating direction	Operating pressure [MPa]		
		0.3	0.5	0.7
20	OUT	94.2	157	220
	IN	79.2	132	185
25	OUT	147	246	344
	IN	124	206	288
32	OUT	241	402	563
	IN	207	346	484
40	OUT	378	630	882
	IN	318	530	742
50	OUT	588	980	1370
	IN	495	825	1160
63	OUT	936	1560	2180
	IN	840	1400	1960
80	OUT	1510	2520	3520
	IN	1360	2270	3180
100	OUT	2360	3930	5500
	IN	2150	3580	5010

Allowable Load at Rod End

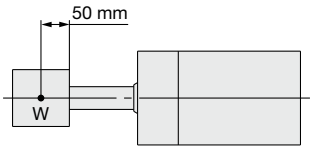
ø20, ø25, ø32, ø40



ø50, ø63, ø80, ø100

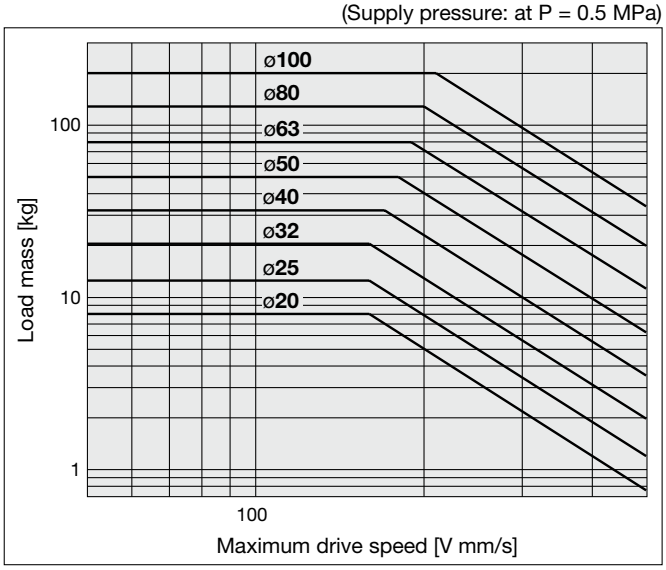


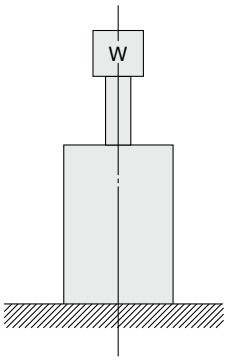
• A case where the center of gravity of the load rests 50 mm from the rod end.



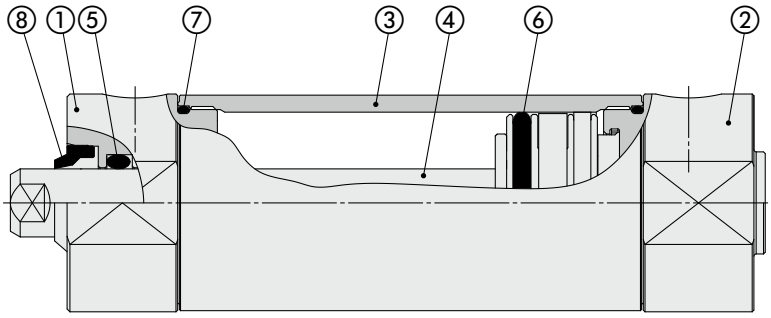
Allowable Kinetic Energy

(Supply pressure: at P = 0.5 MPa)





Replacement Parts



Component Parts

No.	Description
1	**Rod cover**
2	**Head cover**
3	**Cylinder tube**
4	**Piston rod assembly**
5	**Rod seal**
6	**Piston seal**
7	**Tube gasket**
8	**Scraper**

Replacement Parts: Seal Kit

Bore size [mm]	Part no.	Contents
20	HYB20□Z1-PS	Set of nos. ⑤, ⑥, ⑦
25	HYB25□Z1-PS	
32	HYB32□Z1-PS	
40	HYB40□Z1-PS	

∗ Place the seal material symbol in □.

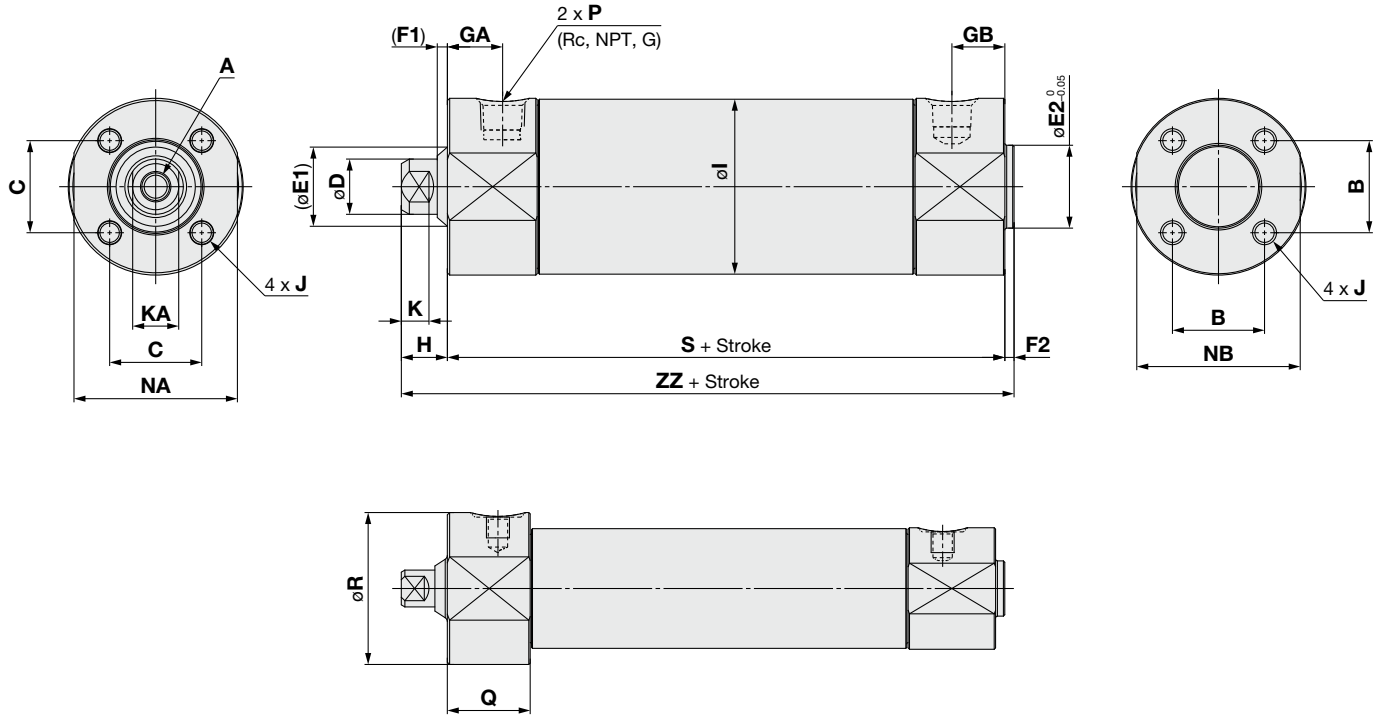
Seal material symbol

Symbol	Material
R	NBR
H	External FKM∗1

∗1 External seal: Rod seal and the tube gasket are made from FKM.
∗ Since the seal kit does not include a grease pack, order it separately.
Grease for food processing equipment part no.: GR-H-010 (10 g)
Standard grease part no.: GR-S-010 (10 g)

Dimensions

HY□B20 to 100-Z1



ø20, ø25

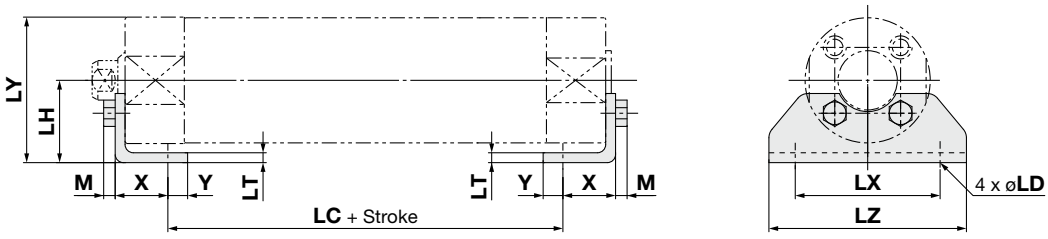
[mm]

Bore size	A	B	C	D	E_1	E_2	F_1	F_2	GA			GB			H	I	J
									Rc	NPT	G	Rc	NPT	G			
20	M4 x 0.7 depth 8	14	18.5	8	15	12	3	2	11	—	—	11.5	—	—	10	26	M4 x 0.7 depth 7
25	M5 x 0.8 depth 10	16.5	18.5	10	17	14	3	2	11	—	—	12	—	—	10	31	M5 x 0.8 depth 7.5
32	M6 x 1.0 depth 12	20	20	12	19	18	3	2	12		11	11.5		10.5	10	38	M5 x 0.8 depth 8
40	M8 x 1.25 depth 13	26	26	16	23	25	3	2	13			13			15	47	M6 x 1.0 depth 12
50	M10 x 1.5 depth 15	32	32	20	28	30	3	2	14			14			15	58	M8 x 1.25 depth 16
63	M10 x 1.5 depth 15	38	38	20	28	32	3	2	14			14			15	72	M10 x 1.5 depth 16
80	M16 x 2.0 depth 21	50	50	25	33	40	3	3	18			16			20	89	M10 x 1.5 depth 22
100	M20 x 2.5 depth 27	60	60	30	38	50	3	3	17.5		16	16			20	110	M12 x 1.75 depth 22

Bore size	K	KA	NA	NB	P			Q	R	S	ZZ
					Rc	NPT	G				
20	5	6	30	24	M5 x 0.8	—	—	18	33	69	81
25	5	8	30	29	M5 x 0.8	—	—	18.3	33	69	81
32	6	10	35.5	35.5	1/8			—	—	71	83
40	6.5	13	44	44	1/8			—	—	78	95
50	8	16	55	55	1/4			—	—	90	107
63	8	16	69	69	1/4			—	—	90	107
80	9.5	22	86	86	3/8			—	—	108	131
100	11.5	27	106	106	1/2			—	—	108	131

HYB Series
Options

Foot Bracket

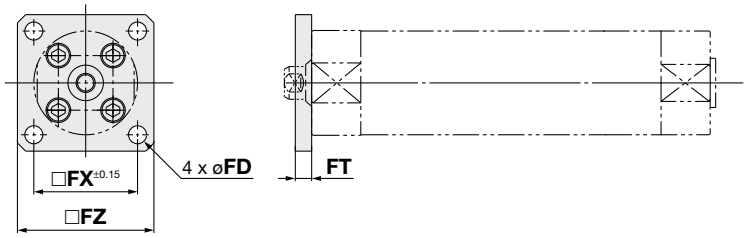


Foot bracket material: Stainless steel
Mounting bolt material: Stainless steel
[mm]

Bore size	Bracket part no.	Weight [kg]	X	Y	LD	LH	LC	LT	LX	LY	LZ	M	Mounting bolt
32	**CG-L032SUS**	0.06	16	6	7.2	25	45	3	44	44	60	3.5	M5 x 0.8
40	**CG-L040SUS**	0.08	16.5	6.5	7.2	30	51	3	54	53.5	75	4	M6 x 1.0
50	**CG-L050SUS**	0.17	21.5	11.5	10	40	55	4	66	69	90	5.5	M8 x 1.25
63	**CG-L063SUS**	0.23	21.5	11.5	12	45	55	4	82	81	110	7	M10 x 1.5
80	**CG-L080SUS**	0.36	28	17	12	55	60	4	100	99.5	130	7	M10 x 1.5
100	**CG-L100SUS**	0.69	30	15	14	70	60	6	120	125	160	8	M12 x 1.75

∗ Order two foot brackets per cylinder. One mounting bracket is attached with two foot brackets and four mounting bolts.

Rod End Flange Bracket



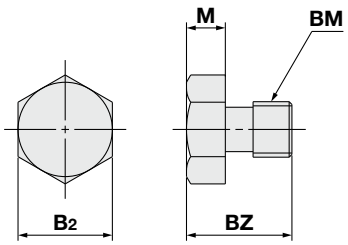
Flange bracket material: Stainless steel
Mounting bolt material: Stainless steel
[mm]

Bore size	Bracket part no.	Weight [kg]	FT	FX	FZ	FD
32	**CG-F032SUS**	0.10	6	38	50	6.6
40	**CG-F040SUS**	0.15	6	46	60	6.6
50	**CG-F050SUS**	0.26	9	58	75	9
63	**CG-F063SUS**	0.52	9	70	90	11
80	**CG-F080SUS**	0.66	9	82	100	11
100	**CG-F100SUS**	1.16	10	100	125	14

∗ One mounting bracket is attached with one flange bracket and four mounting bolts.

Plug Bolt

Plug bolts are used to close the mounting hole not used.

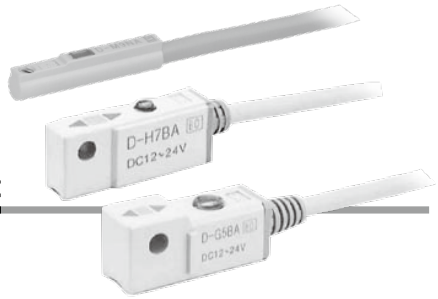


Material: Stainless steel
[mm]

Part no.	Applicable bore size	B2	BM	BZ	M
HYB-H020SUS	**20**	7	M4 x 0.7	9	3
HYB-H025SUS	**25**	8	M5 x 0.8	9.5	3.5
	32	8	M5 x 0.8	9.5	3.5
HYB-H040SUS	**40**	10	M6 x 1.0	12	4
HYB-H050SUS	**50**	13	M8 x 1.25	15.5	5.5
HYB-H063SUS	**63**	17	M10 x 1.5	19	7
	80	17	M10 x 1.5	19	7
HYB-H100SUS	**100**	19	M12 x 1.75	24	8

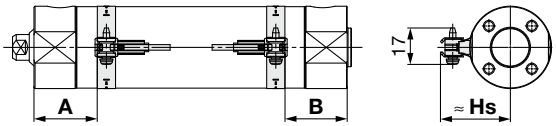
∗ The above part number is attached with 4 bolts.

Auto Switch Mounting



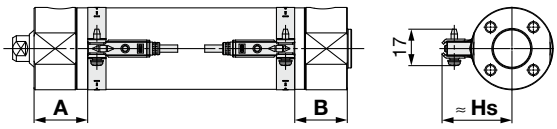
Auto Switch Proper Mounting Position (Detection at stroke end) and Mounting Height

D-M9□A/D-M9□AV
ø20 to ø63

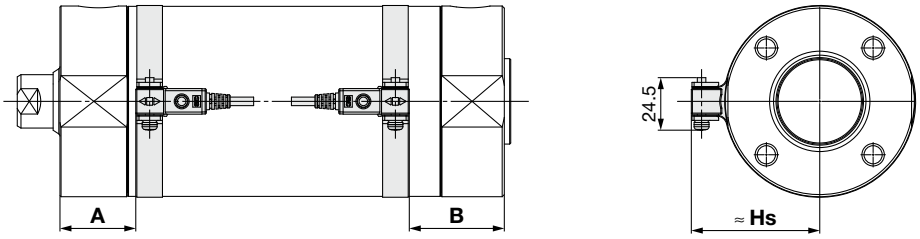


A and B are the dimensions from the end of the head cover/rod cover to the end of the auto switch.

D-H7BA
ø20 to ø63



D-G5BA
ø80, ø100



[mm]

Bore size	D-M9BA			D-H7BA			D-G5BA		
	A	B	Hs	A	B	Hs	A	B	Hs
20	29.5	27.5	26.5	25	23	26.5	—	—	—
25	29	27.5	29	24.5	23	29	—	—	—
32	29.5	29	32.5	25	24.5	32.5	—	—	—
40	33	32.5	37	28.5	28	37	—	—	—
50	39.5	38.5	42.5	35	34	42.5	—	—	—
63	39.5	38.5	49.5	35	34	49.5	—	—	—
80	—	—	—	—	—	—	35.5	44.5	59
100	—	—	—	—	—	—	41	39	69.5

∗ The above values are a guide in the stroke end detection of the mounting position of the auto switch. Please adjust in an actual setting after confirming the operating state of the auto switch.

Operating Range

Auto switch model	Bore size							
	20	**25**	**32**	**40**	**50**	**63**	**80**	**100**
D-M9□A(V)	4.5	5	4.5	5.5	5	5.5	—	—
D-H7BA	4	4	4.5	5	6	6.5	—	—
D-G5BA	—	—	—	—	—	—	6.5	7

∗ Since this is a guideline including hysteresis, it is not meant to be guaranteed.
There may be substantial variation depending on the surrounding environment (assuming approx. ±30% dispersion).

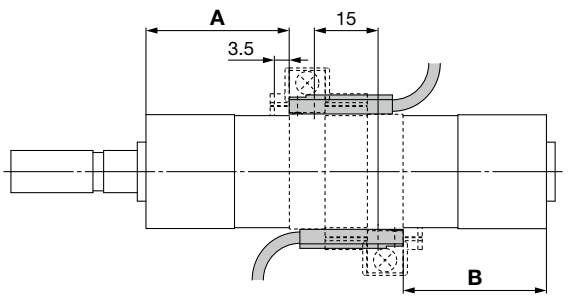
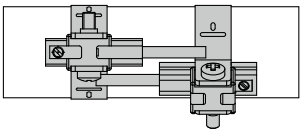
Minimum Stroke for Auto Switch Mounting

n: Number of auto switches [mm]

Auto switch model	Number of auto switches				
	With 1 pc.	With 2 pcs.		With n pcs.	
		Different surfaces	Same surface	Different surfaces	Same surface
D-M9□A	10	25	40∗1	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···)∗1	60 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-M9□AV	10	20	35	$20 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···)∗1	35 + 35 (n – 2) (n = 2, 3, 4, 5···)
D-H7BA	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)∗1	60 + 45 (n – 2) (n = 2, 3, 4, 5···)
D-G5BA	10	20	75	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)∗1	75 + 55 (n – 2) (n = 2, 3, 4, 5···)

∗1 When “n” is an odd number, an even number that is one larger than the odd number is to be used for the calculation.

∗2 Auto switch mounting

Auto switch model	With 2 auto switches	
	Different surfaces∗2	Same surface∗2
	 Correct auto switch mounting position is 3.5 mm from the back face of the switch holder.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-M9□ **D-M9□W**	Less than 20 mm stroke∗3	Less than 55 mm stroke∗3
D-M9□A	Less than 20 mm stroke∗3	Less than 60 mm stroke∗3
D-A9□	–	Less than 50 mm stroke∗3

∗3 Minimum stroke for auto switch mounting in types other than those mentioned in ∗2

Auto Switch Mounting Bracket/Part Nos.

Auto switch model	Bore size [mm]							
	20	**25**	**32**	**40**	**50**	**63**	**80**	**100**
D-M9□A(V)	BMA3-020S	BMA3-025S	BMA3-032S	BMA3-040S	BMA3-050S	BMA3-063S	–	–
D-H7BA	BMA2-020AS	BMA2-025AS	BMA2-032AS	BMA2-040AS	BMA2-050AS	BMA2-063AS	–	–
D-G5BA	–	–	–	–	–	–	BA-08 (∗4, ∗5, ∗6)	BA-10 (∗4, ∗5, ∗6)

∗4 When these mounting brackets are ordered separately, they come with iron screws, so be sure to order the following stainless steel screws separately.
Stainless steel mounting screw kit: BBA3

∗5 When a D-G5BA auto switch is ordered separately, a BBA3 stainless steel mounting screw kit is included.

∗6 When a cylinder with a D-G5BA auto switch is ordered separately, it will be shipped with the auto switch already mounted using the BBA3 stainless steel mounting screw kit.

∗ The stainless steel screws supplied with the D-H7BA auto switch cannot be used for the D-G5BA.

∗ For details on the BBA3 stainless steel mounting screw kit and auto switch mounting procedures, refer to the **Web Catalog**.

HYB Series
Specific Product Precautions

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For actuator and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website.

Operating Environment

⚠ Caution

1. Avoid installing and using a cylinder inside a food zone.

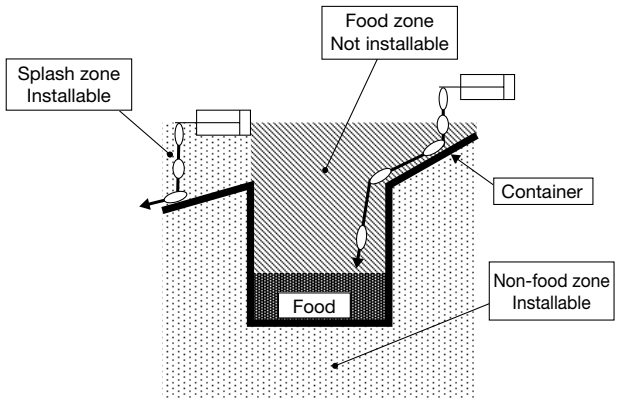
<Not installable>

Food zone ····· An environment where food which will be sold as merchandize, directly touches the cylinder's components.

<Installable>

Splash zone····· An environment where food which will not be sold as merchandize, directly touches the cylinder's components.

Non-food zone ····· An environment where there is no contact with food.



Lubrication

⚠ Caution

1. Lubrication to the Hygienic Design Cylinder (with standard grease applied)

The cylinder can be operated without lubrication because of grease initially applied. If lubricating the cylinder, add a lubricator in the circuit and use turbine oil class 1 (with no additives) ISO VG-32. If lubrication is stopped halfway through, a malfunction will occur due to the disappearance of grease initially applied. Keep lubricating the cylinder.

2. Lubrication to the Hygienic Design Cylinder (with grease for food processing equipment applied)

Lubricating the cylinder and the use of unspecified grease may result in malfunction.

- Place a purchase order with the following model number when only the grease for maintenance is necessary.

Standard grease (for non-food)	GR-S-010 (10 g)
Grease for food processing equipment	GR-H-010 (10 g)

3. Do not wipe off the grease adhering to the sliding part of the air cylinder.

It might cause the malfunction when compulsorily peeling off the adhering grease to the sliding parts. If the cylinder operates the long distance, the sliding parts might become black. In that case, the actuation becomes possible for a long term when the grease of the sliding parts is wiped off once, and it greases it again.

(Wipe off by water. If alcohol and a special solvent are used, the seal might be damaged.)

Handling

⚠ Caution

1. If the sliding parts is washed, the grease will wash out and the service life will be shorten, keep washing at a minimum.

2. Plug up unnecessary mounting holes with plug bolts or external cover (option), etc., bacteria might grow if water gets in these holes.

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

⚠ Danger : **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ Caution: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) **Suction cups (Vacuum pads) are excluded from this 1 year warranty.**
A suction cup (vacuum pad) is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the suction cup (vacuum pad) or failure due to the deterioration of rubber material are not allowed by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Safety Instructions	Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

SMC Corporation