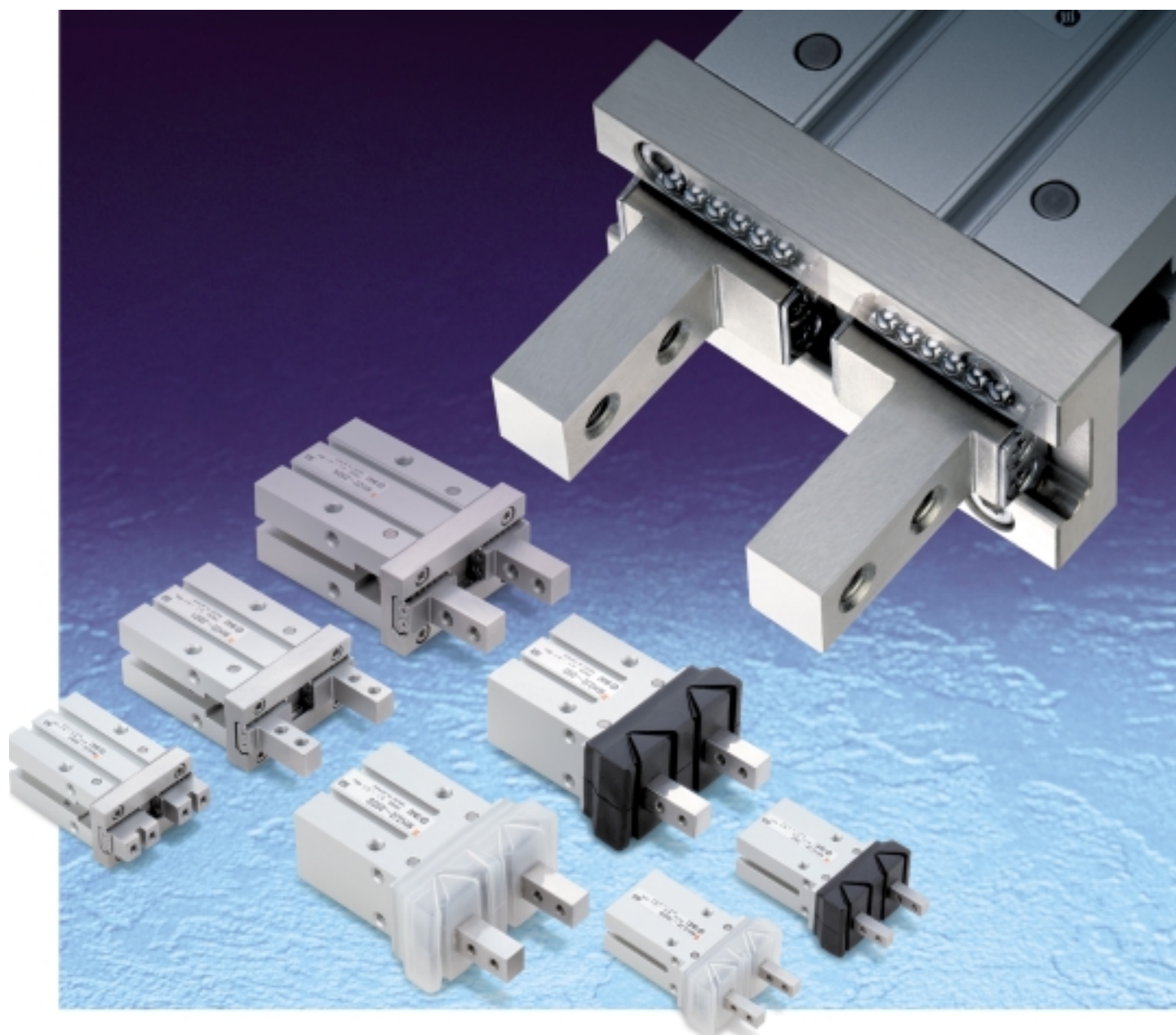


Parallel Type
Air Gripper

Standard Type

With Dust Cover

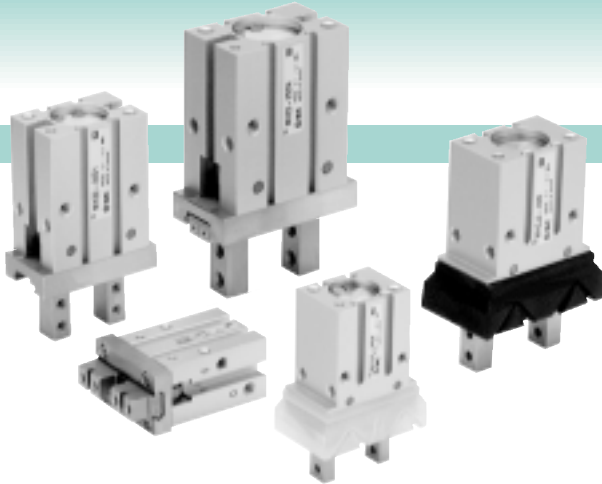
Series **MHZ2/MHZJ2**



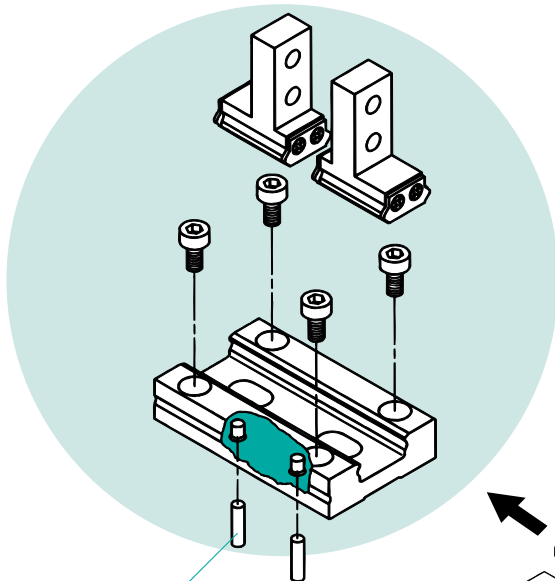
Series MHZJ2 with dust cover introduced!
New finger options added to Series MHZ2 standard type.

Integrated linear guide provide

Series **MHZ** 2

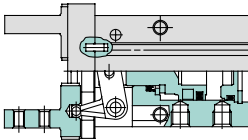


Integral guide rail construction

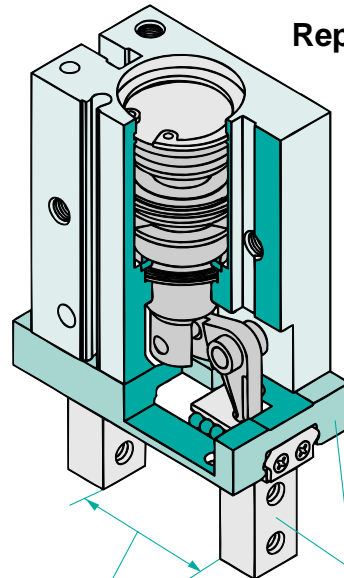
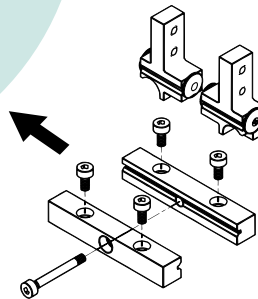


Linear guide slippage prevention

Guide slippage is prevented by 2 positioning pins.



Conventional



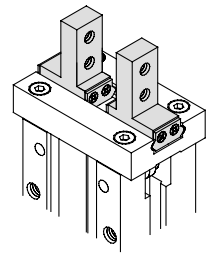
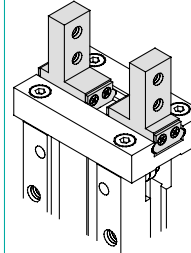
Repeatability: $\pm 0.01\text{mm}$

Martensitic stainless steel

Finger positions can be selected

Standard type
(MHQG2 compatible width)

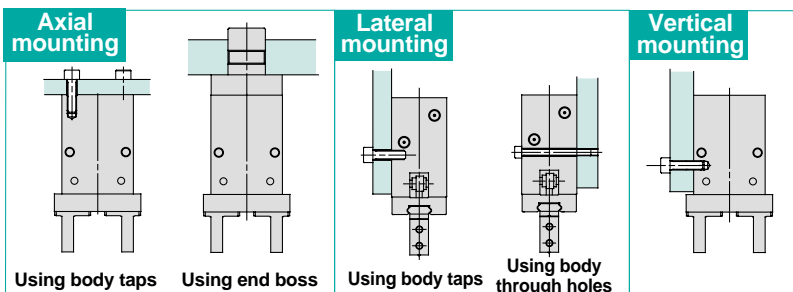
Narrow type
(MHQ2 compatible width)



MHZJ2 with dust cover is standard type only

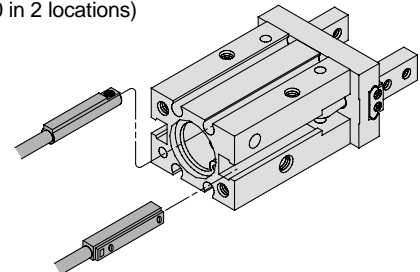
High degree of mounting flexibility

Can be mounted 5 ways from 3 directions.



Auto switch capable

Mounting grooves in 6 locations on 4 sides make it possible to select locations that are easy to see and adjust regardless of mounting orientation. ($\phi 10$ in 2 locations)



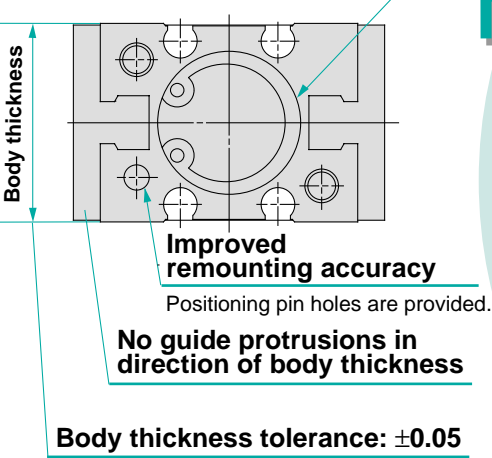
MHZJ2 with dust cover is 2 sides, 4 locations

high rigidity & high accuracy.

Mounting accuracy improved

Top mounting centering location

Mounting is more secure with a depth 0.5 to 2mm greater than conventional types.



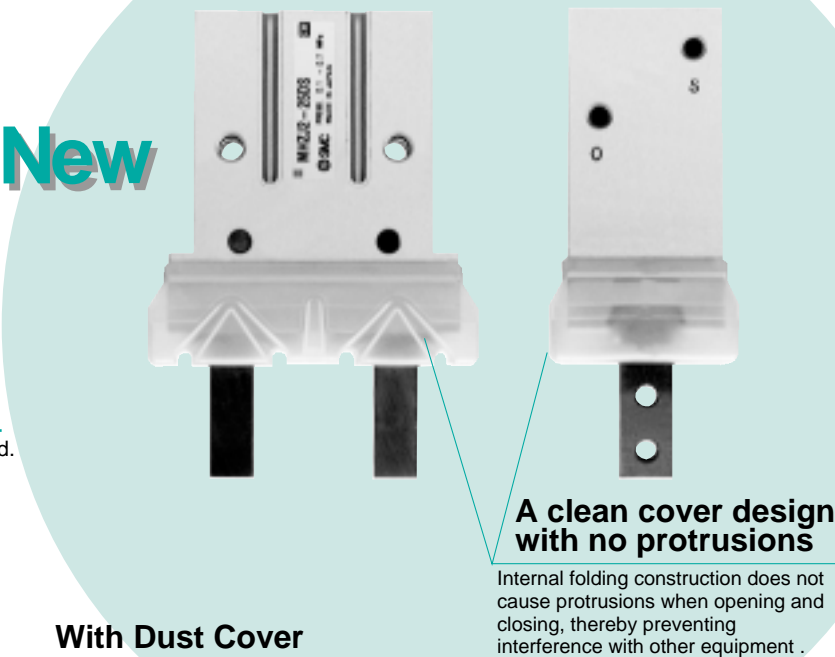
Improved environmental resistance

Sealed construction dust cover

- Prevents entry of chips, dust, water, etc.
- Prevents dispersion of grease and external leakage of dust

3 types of cover material

- Chloroprene rubber (black): Standard
- Fluoro rubber (black): Optional
- Silicon rubber (milk white): Optional



With Dust Cover

Series MHZJ2

Series Variations

Additional finger options (MHZ2)

				Body options					Finger options			
Series	Cylinder bore (mm)	Finger position	Action	Basic type	End boss type				Basic type (tapped in open/close direction)	Side tapped	Through holes in open/close direction	Flat type fingers
				Side ported	Side ported	With One-touch fitting for coaxial tube	With One-touch fitting	With M5 port				
Standard type MHZ2	10 16 20 25	Standard type Narrow type	Double acting									
			Single acting (normally open)									
			Single acting (normally closed)									
With dust cover MHZJ2	10 16 20 25	Standard type	Double acting									
			Single acting (normally open)									
			Single acting (normally closed)									

Parallel Type Air Gripper

Standard Type

Series MHZ2

How to Order

MHZ2—16 D **F9PV**

Number of fingers
2 2 fingers

Cylinder bore
10 10mm
16 16mm
20 20mm
25 25mm

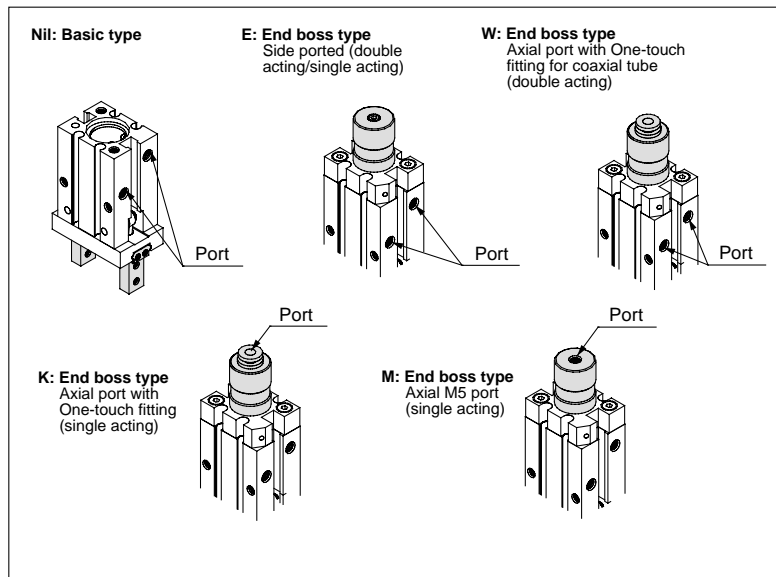
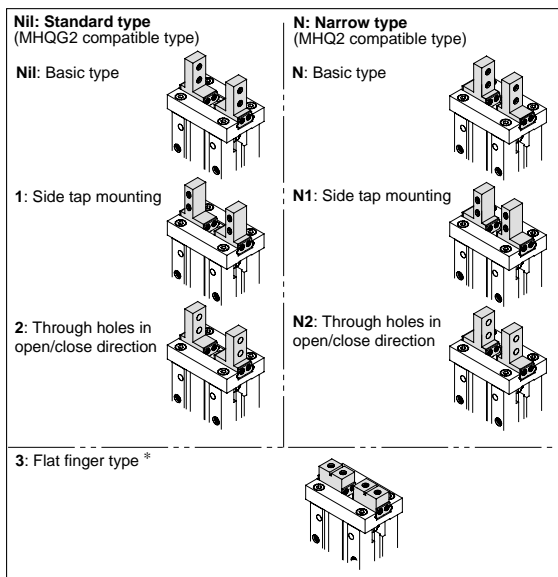
Action
D Double acting
S Single acting (normally open)
C Single acting (normally closed)

Number of auto switches
Nil 2 pcs.
S 1 pc.

Auto switch type
Nil Without auto switch (built-in magnet)
* Select an applicable auto switch model from the table below.

Finger position/option

Body option



* The flat finger type does not have standard and narrow type options.
In case MHQG2/MHQ2 compatible types are required, see the -X51 order made specifications on page 32.

Applicable auto switch models/ * Refer to pages 20 through 30 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch part no.		Lead wire length * (m)		Applicable load	Applicable model				
					DC	AC	Electrical entry direction		0.5 (Nil)	3 (L)		ø10	ø16	ø20	ø25	
							Perpendicular	In-line								
Solid state switch	—	Grommet	Yes	3 wire (NPN)	24V	—	Y69A	Y59A	●	●	IC circuit	Relay, PLC	●	●	●	●
							F9NV	F9N	●	●	—		—	●	●	●
				3 wire (PNP)			Y7PV	Y7P	●	●	IC circuit		●	●	●	●
							F9PV	F9P	●	●	—		—	●	●	●
				2 wire			Y69B	Y59B	●	●			●	●	●	●
							F9BV	F9B	●	●	—		—	●	●	●
	Diagnostic indication (2 color indicator)			3 wire (NPN)			Y7NWV	Y7NW	●	●	IC circuit		—	—	●	●
							F9NWV	F9NW	●	●	—		—	—	●	●
				3 wire (PNP)			Y7PWV	Y7PW	●	●	IC circuit		—	—	●	●
							F9PWV	F9PW	●	●	—		—	—	●	●
				2 wire			Y7BWV	Y7BW	●	●			—	—	—	●
							F9BWV	F9BW	●	●	—		—	—	●	●

* Lead wire length symbols: 0.5m Nil (Example) F9N
3m L (Example) F9NL

Note 1) Use caution regarding hysteresis in the 2 color indicator type. When using this type, refer to Auto Switch Hysteresis on page 26

Specifications



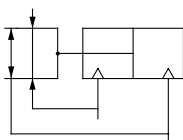
Fluid			Air
Operating pressure	Double acting		ø10: 0.2 to 0.7 MPa ø16 to ø25: 0.1 to 0.7MPa
	Single acting	Normally open	ø10: 0.35 to 0.7MPa ø16 to ø25: 0.25 to 0.7MPa
		Normally closed	
Ambient and fluid temperature			-10 to 60°
Repeatability			±0.01mm
Maximum operating frequency			180 c.p.m.
Lubrication			Non-lube
Action			Double acting, Single acting
Auto switch (option) ^{Note)}			Solid state switch (3wire, 2wire)

Note) Refer to pages 20 to 30 for details regarding auto switch specifications.

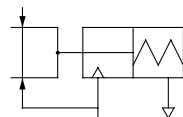
Models

Symbols

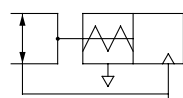
Double acting type



Single acting type, normally open



Single acting type, normally closed



Action		Model	Cylinder bore (mm)	Gripping force ^{Note 1)}		Closing stroke (both sides) mm	Note 2) Weight g
				Gripping force per finger Effective value N			
				External gripping force	Internal gripping force		
Double acting		MHZ2-10D (N)	10	9.8	17	4	55
		MHZ2-16D (N)	16	30	40	6	115
		MHZ2-20D (N)	20	42	66	10	235
		MHZ2-25D (N)	25	65	104	14	430
Single acting	Normally open	MHZ2-10S (N)	10	6.3		4	55
		MHZ2-16S (N)	16	24		6	115
		MHZ2-20S (N)	20	28		10	240
		MHZ2-25S (N)	25	45		14	435
	Normally closed	MHZ2-10C (N)	10		12	4	55
		MHZ2-16C (N)	16		31	6	115
		MHZ2-20C (N)	20		56	10	240
		MHZ2-25C (N)	25		83	14	430

Note 1) Values for pressure of 0.5MPa, gripping point L= 20mm, at center of stroke.

Note 2) Values excluding weight of auto switch.

Options

• Body options/End boss type

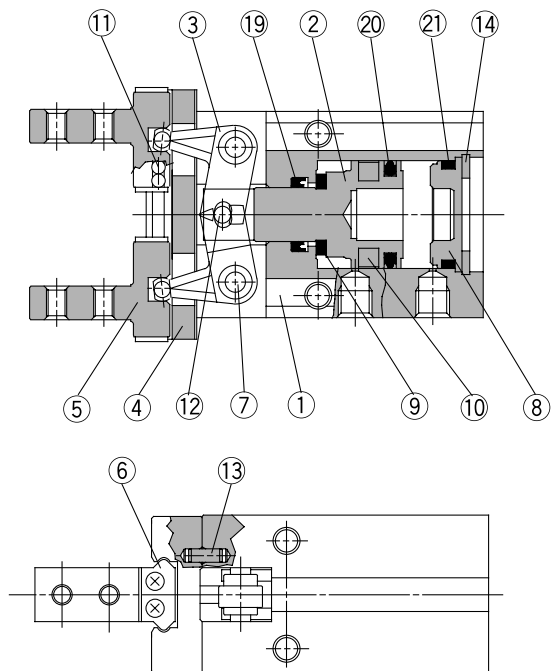
Piping port position	Type of piping port				Applicable model	
	MHZ2-10	MHZ2-16	MHZ2-20	MHZ2-25	Double acting	Single acting
Side ported	M3 x 0.5	M5 x 0.8			●	●
Axial port	With coaxial tube fitting				●	—
	With One-touch fitting				—	●
	M5 x 0.8				—	●

* For detailed body option specifications, refer to option specifications on pages 9 and 10.

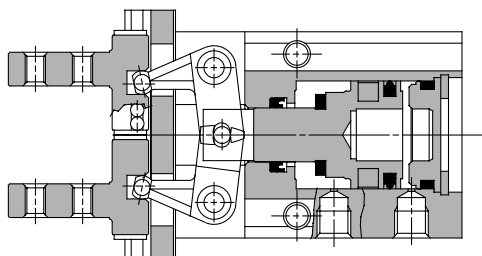
Series MHZ2

Construction

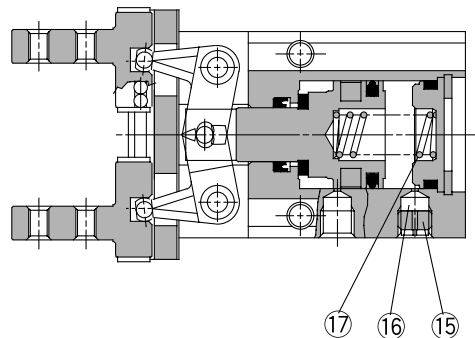
Double acting/with fingers open



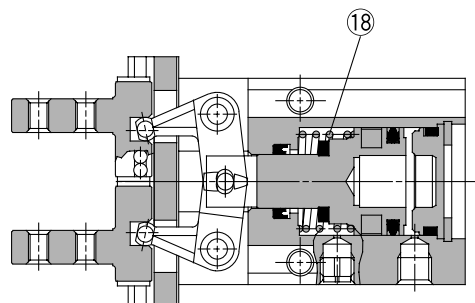
Double acting/with fingers closed



Single acting/normally open



Single acting/normally closed



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston	ø10, ø16: Stainless steel ø20, ø25: Aluminum alloy	ø20, ø25: Hard anodized
3	Lever	Stainless steel	Heat treated
4	Guide	Stainless steel	Heat treated
5	Finger	Stainless steel	Heat treated
6	Roller stopper	Stainless steel	
7	Lever shaft	Stainless steel	Nitrided
8	Cap	Synthetic resin	
9	Damper	Polyurethane rubber	
10	Rubber magnet	Synthetic rubber	

Parts list

No.	Description	Material	Note
11	Steel balls	High carbon chrome bearing steel	
12	Needle roller	High carbon chrome bearing steel	
13	Parallel pin	Stainless steel	
14	C type snap ring	Carbon steel	Nickel plated
15	Exhaust plug A	Brass	Electroless nickel plated
16	Exhaust filter A	Polyvinyl formal	
17	N.O. spring	Stainless steel spring wire	
18	N.C. spring	Stainless steel spring wire	
19	Rod seal	NBR	
20	Piston seal	NBR	
21	Gasket	NBR	

Replacement parts: Seal kits

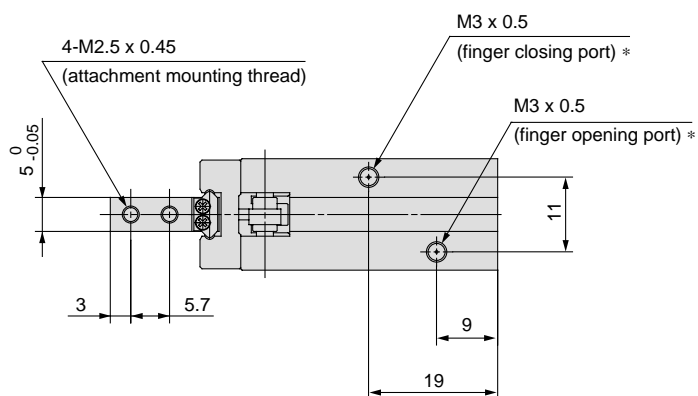
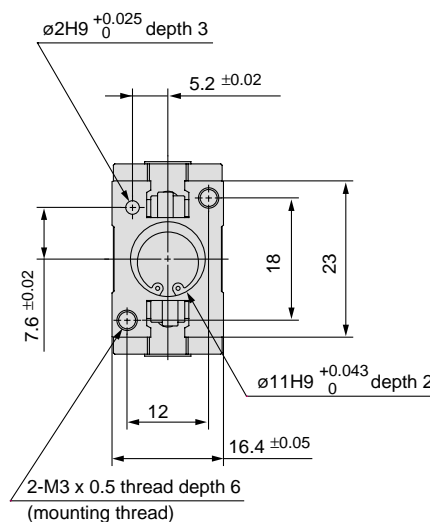
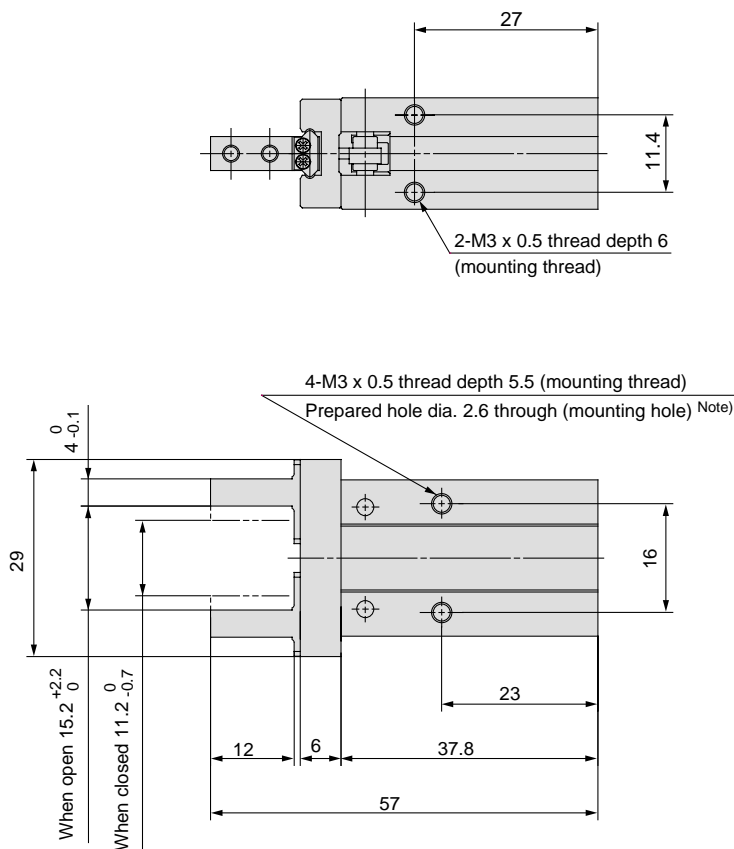
Seal kit No.				Description
MHZ2-10D	MHZ2-16D	MHZ2-20D	MHZ2-25D	Kits include items 19, 20 and 21 from the table above
MHZ10-PS	MHZ16-PS	MHZ20-PS	MHZ25-PS	

* Seal kits consist of items 19, 20 and 21 contained in one kit, and can be ordered using the seal kit number for each cylinder bore size.

Dimensions

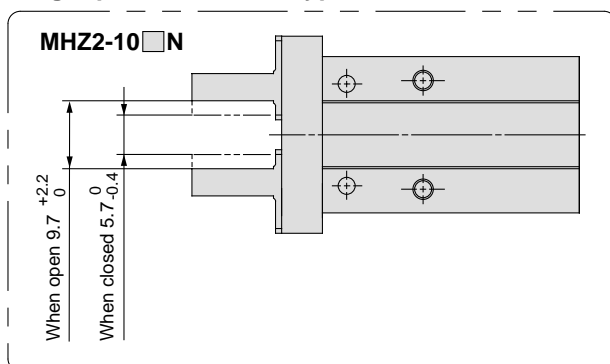
MHZ2-10□

Scale: 90%

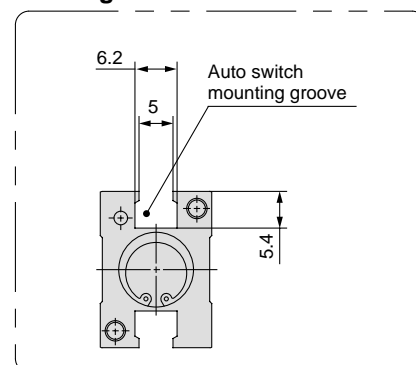


* In the case of single action, the port on one side is a breathing hole.

Finger position/Narrow type



Auto switch mounting groove dimensions



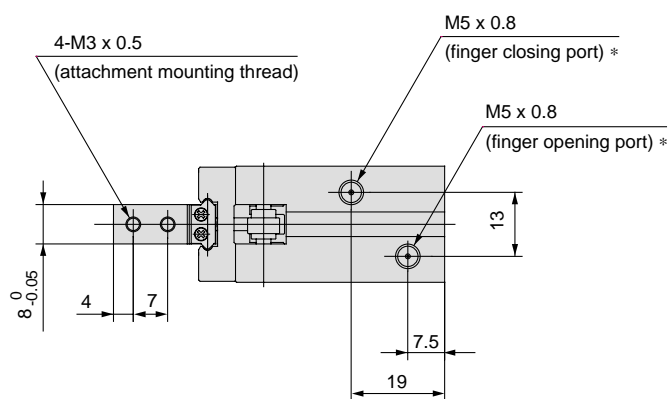
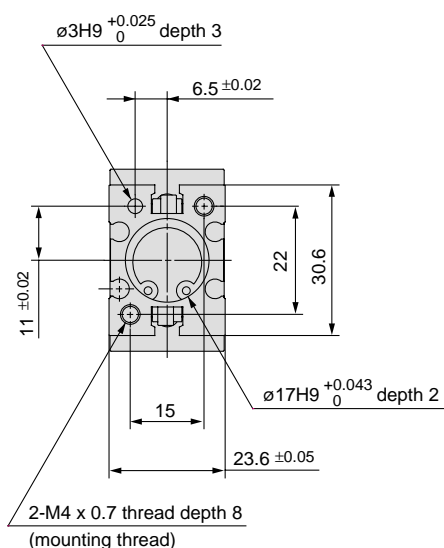
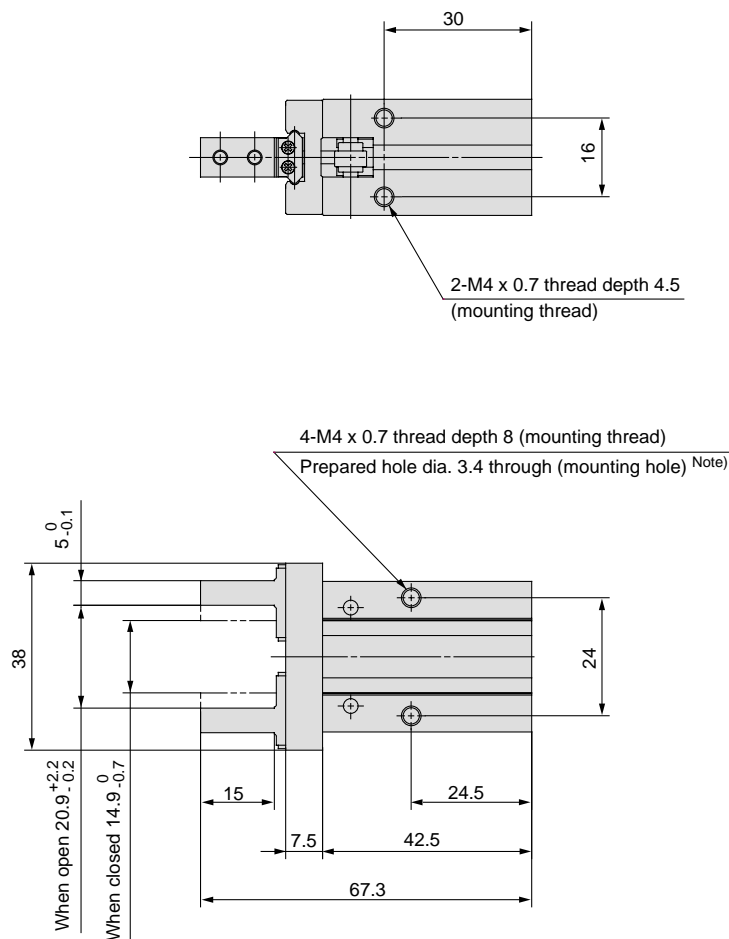
Note) When using D-Y59, D-Y69 and D-Y7 type auto switches, through hole mounting is not possible.

Series MHZ2

Dimensions

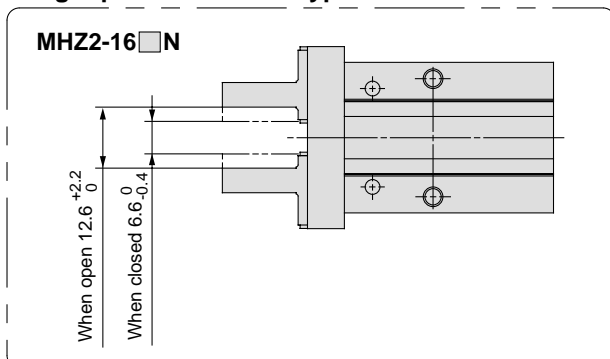
MHZ2-16□

Scale: 65%

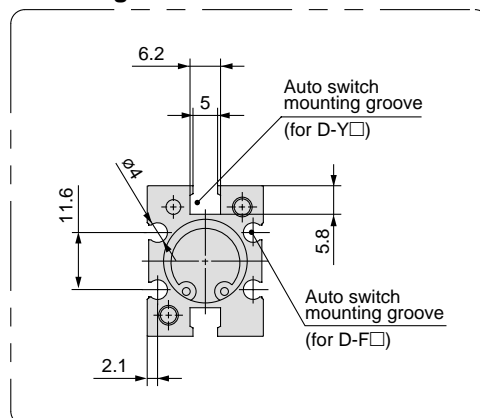


* In the case of single action, the port on one side is a breathing hole.

Finger position/Narrow type



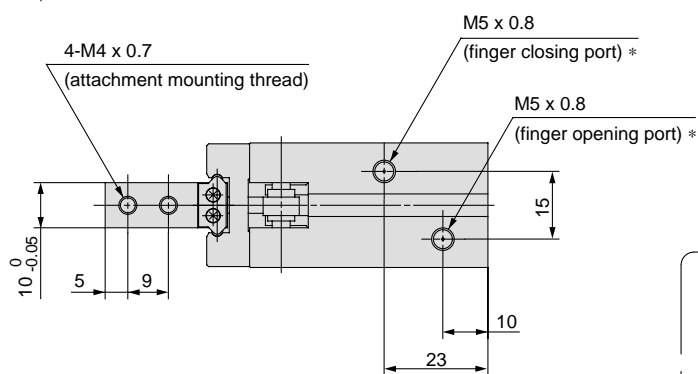
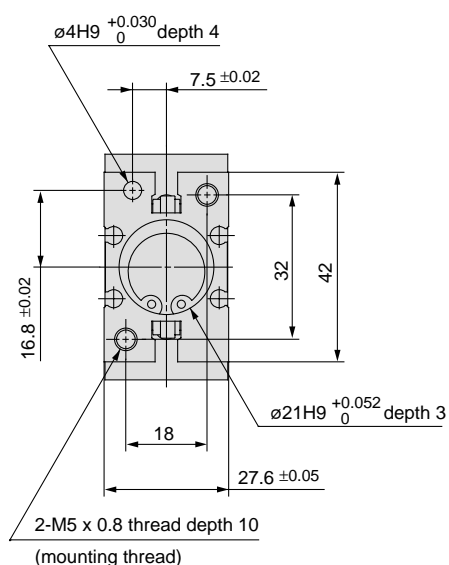
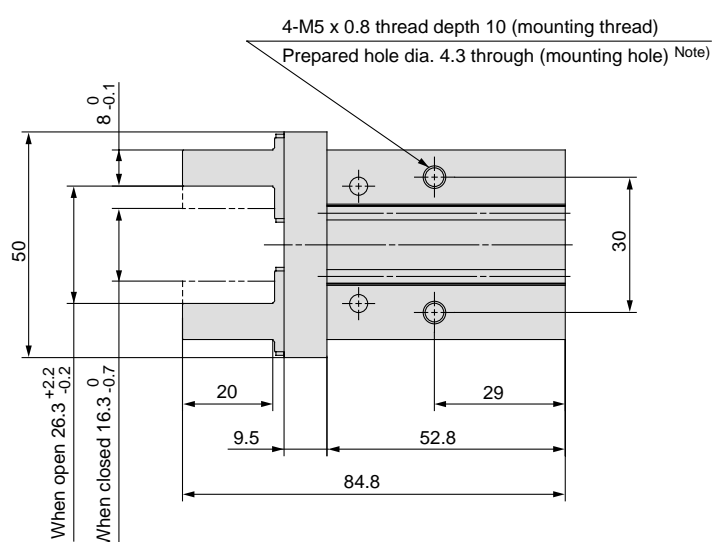
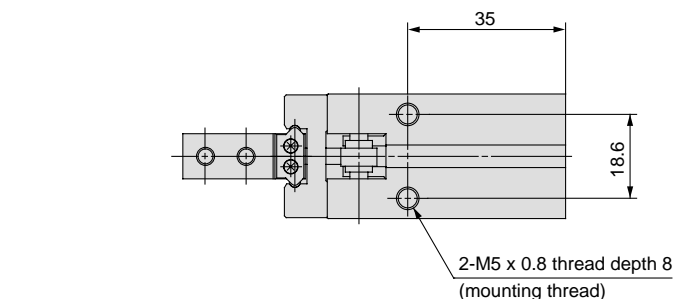
Auto switch mounting groove dimensions



Note) When using D-Y59, D-Y69 and D-Y7 type auto switches, through hole mounting is not possible.

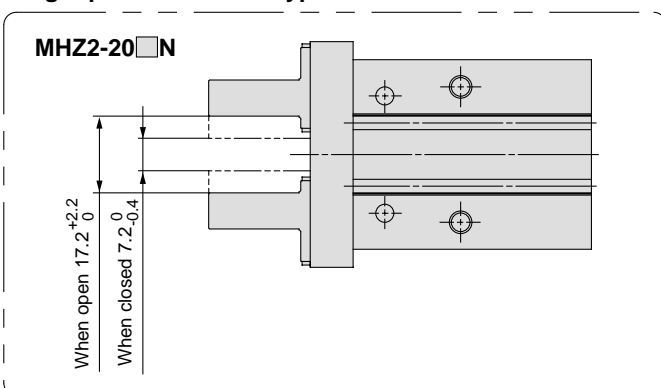
MHZ2-20□

Scale: 60%

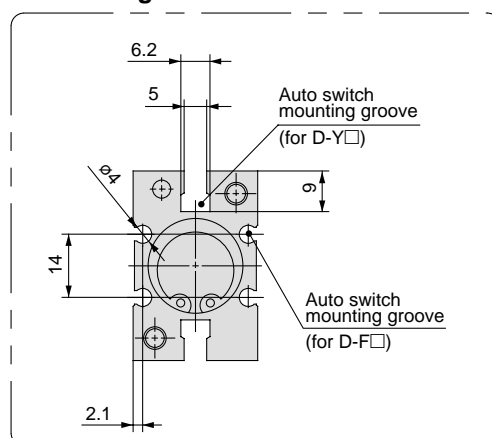


* In the case of single action, the port on one side is a breathing hole.

Finger position/Narrow type



Auto switch mounting groove dimensions



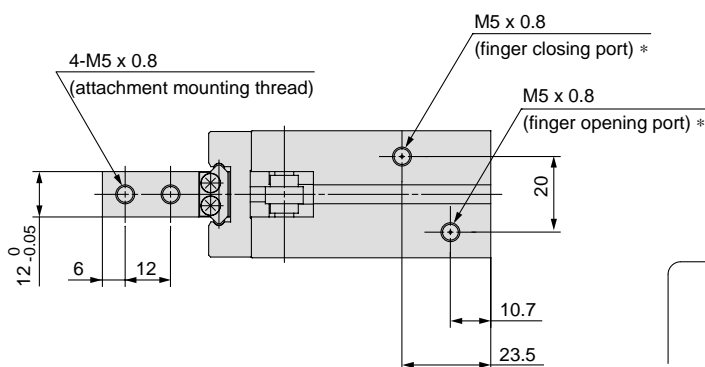
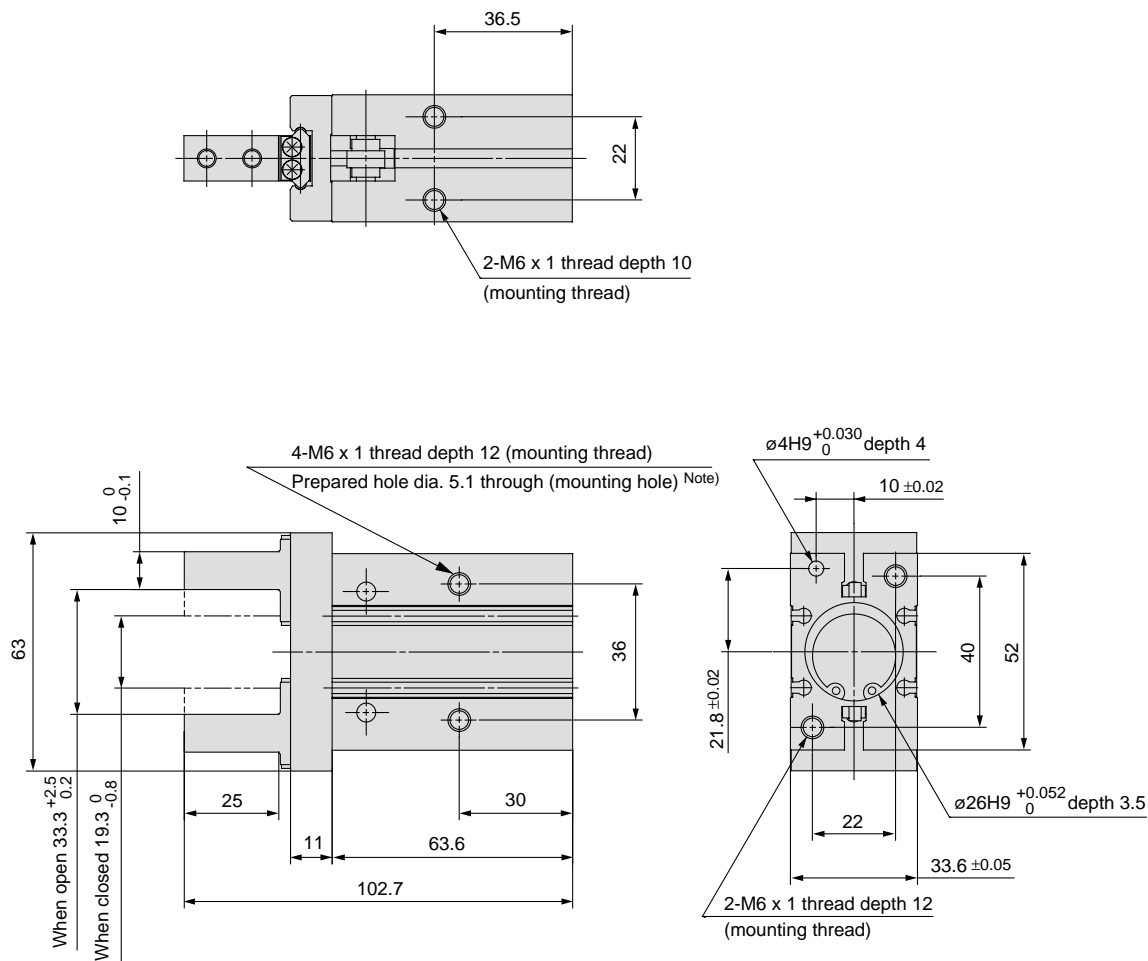
Note) When using D-Y59, D-Y69 and D-Y7 type auto switches, through hole mounting is not possible.

Series MHZ2

Dimensions

MHZ2-25□

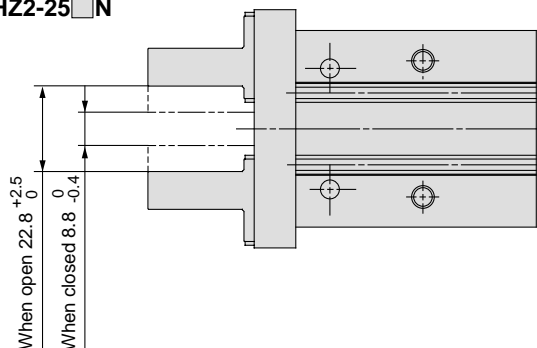
Scale: 50%



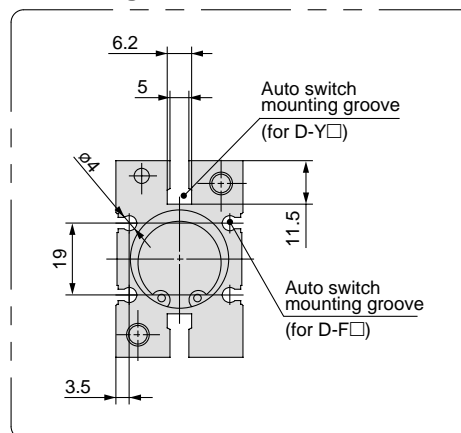
* In the case of single action, the port on one side is a breathing hole.

Finger position/Narrow type

MHZ2-25□N



Auto switch mounting groove dimensions

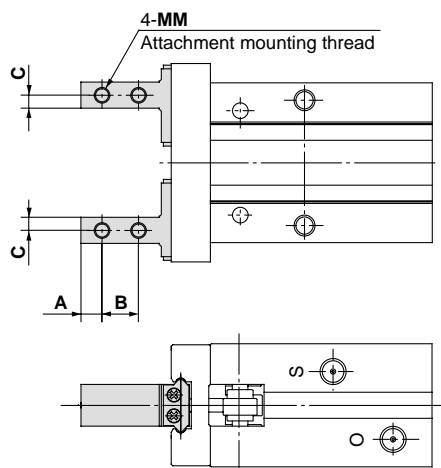


Note) When using D-Y59, D-Y69 and D-Y7 type auto switches, through hole mounting is not possible.

Standard Type/Series *MHZ2*

Finger Position/Options

Side Tap Mounting Type [1·N1]

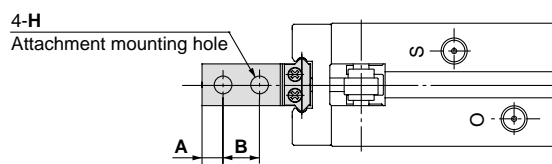
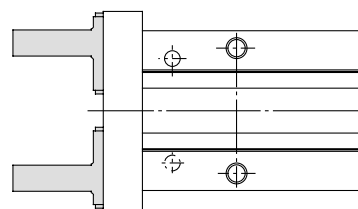


Unit: mm

Model	A	B	C	MM
MHZ2-10 □ ¹ _{N1} □	3	5.7	2	M2.5 x 0.45
MHZ2-16 □ ¹ _{N1} □	4	7	2.5	M3 x 0.5
MHZ2-20 □ ¹ _{N1} □	5	9	4	M4 x 0.7
MHZ2-25 □ ¹ _{N1} □	6	12	5	M5 x 0.8

* Specifications and dimensions other than the above are the same as the basic type (including narrow type).

Through Hole in Opening/Closing Direction [2·N2]

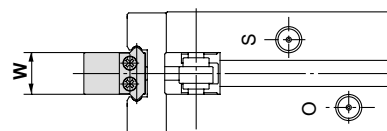
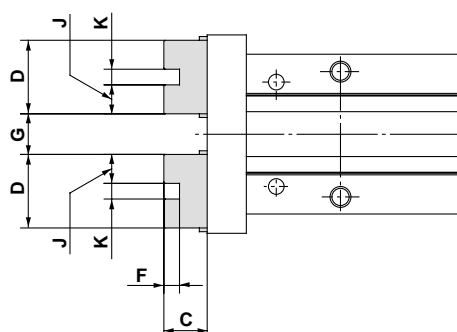
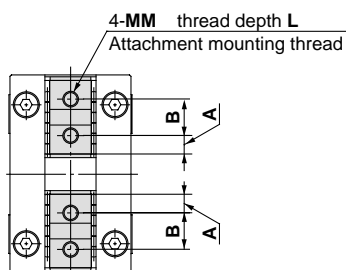


Unit: mm

Model	A	B	H
MHZ2-10 □ ² _{N2} □	3	5.7	2.9
MHZ2-16 □ ² _{N2} □	4	7	3.4
MHZ2-20 □ ² _{N2} □	5	9	4.5
MHZ2-25 □ ² _{N2} □	6	12	5.5

* Specifications and dimensions other than the above are the same as the basic type (including narrow type).

Flat Finger Type [3]



Unit: mm

Model	A	B	C	D	F	G		J	K	MM	L	W	Weight g
						Open	Closed						
MHZ2-10 □ ³ □	2.45	6	5.2	10.9	2	5.4 ^{+2.2} ₀	1.4 ⁰ _{-0.2}	4.45	2H9 ^{+0.025} ₀	M2.5 x 0.45	5	5 ⁰ _{-0.05}	55
MHZ2-16 □ ³ □	3.05	8	8.3	14.1	2.5	7.4 ^{+2.2} ₀	1.4 ⁰ _{-0.2}	5.8	2.5H9 ^{+0.025} ₀	M3 x 0.5	6	8 ⁰ _{-0.05}	115
MHZ2-20 □ ³ □	3.95	10	10.5	17.9	3	11.6 ^{+2.3} ₀	1.6 ⁰ _{-0.2}	7.45	3H9 ^{+0.025} ₀	M4 x 0.7	8	10 ⁰ _{-0.05}	235
MHZ2-25 □ ³ □	4.9	12	13.1	21.8	4	16 ^{+2.5} ₀	2 ⁰ _{-0.2}	8.9	4H9 ^{+0.030} ₀	M5 x 0.8	10	12 ⁰ _{-0.05}	420

Note 1) Specifications and dimensions other than the above are the same as the basic type (including narrow type).

Note 2) The overall length is the same as the MHQ(G) flat finger type.

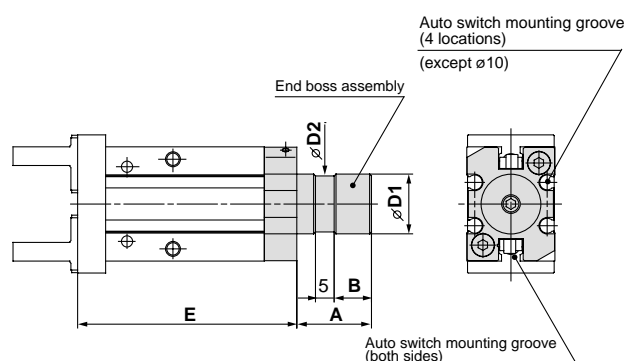
Standard Type/Series *MHZ2*

Body Options: End Boss Type

Applicable Models

Symbol	Configuration	Type of piping port				Applicable model		
		MHZ2-10	MHZ2-16	MHZ2-20	MHZ2-25	Double acting	Single acting	
							Normally open	Normally closed
E	Side ported	M3 x 0.5	M5 x 0.8			●	●	●
W	Axial port	With One-touch fitting for coaxial tube				●	—	—
K		With one-touch fitting				—	●	●
M		M5 x 0.8				—	●	●

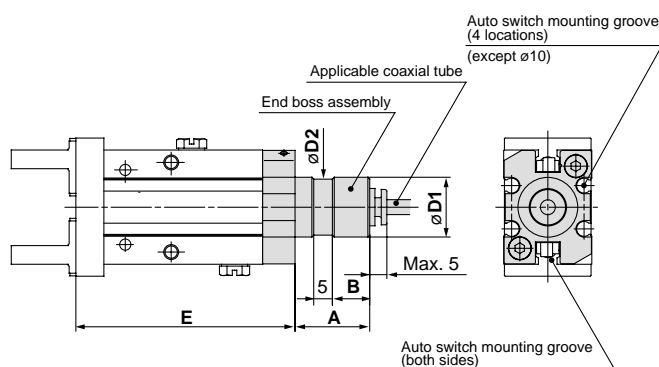
Side Ported [E]



* Refer to the dimension table.

* When auto switches are used, side mounting with through holes is not possible.

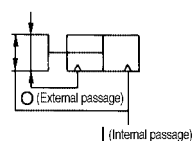
Axial Port (One-Touch Fitting for Coaxial Tube) [W]



* Refer to the dimension table.

* When auto switches are used, side mounting with through holes is not possible.

Reference symbol

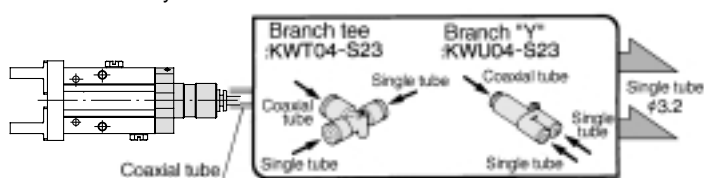


Applicable coaxial tubing

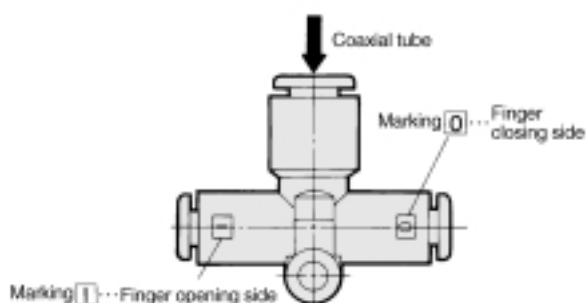
Specifications	Model	TW04B-20
Outside diameter		4mm
Max. operating pressure		0.6MPa
Min. bend radius		10mm
Operating temperature		-20 to 60 °C
Material		Nylon 12

Changing from Coaxial to Single Tubing

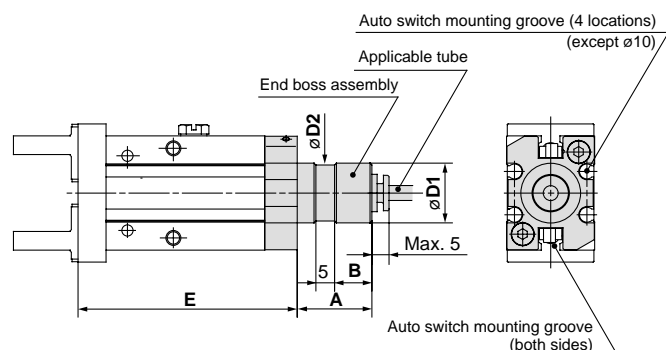
Changing to single tubing is possible by using a branch "Y" or branch tee fitting. In this case particularly, single tube fittings and tubing for $\phi 2$ and 3 will be necessary.



Branch tee, Different dia. tee, Branch "Y", Male run tee



Axial Port (with One-Touch Fitting) [K]



* Refer to the dimension table.

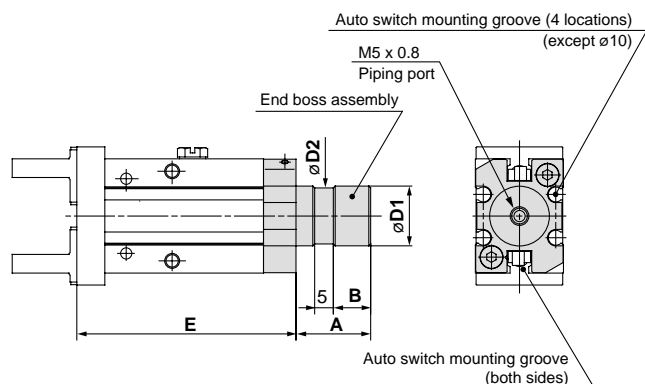
* When auto switches are used, side mounting with through holes is not possible.

Applicable tubing

Description Model	Nylon tubing	Soft nylon tubing	Polyurethane tubing	Polyurethane coiled tubing
	T0425	TS0425	TU0425	TCU0425B-1
Outside diameter mm	4	4	4	4
Max. operating pressure MPa	1.0	0.8	0.5	0.5
Min. bend radius mm	13	12	10	—
Operating temperature °C	−20 to 60	−20 to 60	−20 to 60	−20 to 60
Material	Nylon 12	Nylon 12	Polyurethane	Polyurethane

Refer to SMC's catalog CAT. 501-B "Air Fittings and Tubing" regarding One-touch fittings and tubing.

Axial Port (with M5 Port) [M]



* Refer to the dimension table.

* When auto switches are used, side mounting with through holes is not possible.

Dimension table

Unit: mm

Model	A	B	D1	D2	E
MHZ2-10□□	15	7	12f8 ^{-0.016} _{-0.043}	11	52.8
MHZ2-16□□	20	10	16f8 ^{-0.016} _{-0.043}	15	58.7
MHZ2-20□□	22	12	20f8 ^{-0.020} _{-0.053}	19	70.5
MHZ2-25□□	25	15	25f8 ^{-0.020} _{-0.053}	24	82.9

Other dimensions and specifications correspond to the standard type.

Weight table

Unit: g

Model	End boss type (symbol)			
	E	W	K	M
MHZ2-10□□	65	64	66	65
MHZ2-16□□	148	147	148	147
MHZ2-20□□	277	277	277	277
MHZ2-25□□	495	495	496	494

Parallel Type Air Gripper

With Dust Cover

Series *MHZJ2*

How to Order

MHZJ2-16 D F9PV

Number of fingers

2	2 fingers
---	-----------

Cylinder bore

10	10mm
16	16mm
20	20mm
25	25mm

Action

D	Double acting
S	Single acting (normally open)
C	Single acting (normally closed)

Auto switch type

Nil	Without auto switch (built-in magnet)
S	1 pc.

* Select an applicable auto switch model from the table below.

Body option

Nil: Basic type

E: End boss type
Side ported (double acting/single acting)

W: End boss type
Axial port with One-touch fitting for coaxial tube (double acting)

K: End boss type
Axial port with One-touch fitting (single acting)

M: End boss type
Axial M5 port (single acting)

Dust cover type

Nil	Chloroprene rubber (CR)
F	Fluoro rubber (FKM)
S	Silicon rubber (Si)

Applicable auto switch models/

* Switch types D-Y5/6 and D-Y7 cannot be mounted when equipped with dust cover/MHZJ2.
* Refer to pages 20 through 30 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch part no.		Lead wire length (m)*		Applicable load	Applicable model			
					DC	AC	Electrical entry direction		0.5 (Nil)	3 (L)		ø10	ø16	ø20	ø25
Solid state switch	—	Grommet	Yes	3wire (NPN)	24V	12V	—	F9NV	F9N	●	●	●	●	●	●
				3wire (PNP)				F9PV	F9P	●	●	●	●	●	●
				2wire				F9BV	F9B	●	●	●	●	●	●
				3wire (NPN)				F9NVV	F9NV	●	●	—	—	●	●
	Diagnostic indication (2 color indicator)	Grommet	Yes	3wire (PNP)				F9PWV	F9PW	●	●	—	—	●	●
				2wire				F9BWV	F9BW	●	●	—	—	●	●
	Improved water resistance (2 color indicator)	Grommet	Yes	2wire				—	F9BA	—	●	●	●	●	●
				2wire				—	F9BA	—	●	●	●	●	●

* Lead wire length symbols: 0.5m Nil (Example) F9N

3m L (Example) F9NL

Note 1) Use caution regarding hysteresis in the 2 color indicator type. When using this type, refer to Auto Switch Hysteresis on page 26.

Specifications



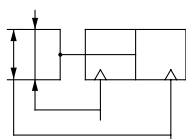
Fluid			Air
Operating pressure	Double acting		ø10: 0.2 to 0.7 MPa ø16 to ø25: 0.1 to 0.7MPa
	Single acting	Normally open	ø10: 0.35 to 0.7MPa ø16 to ø25: 0.25 to 0.7MPa
		Normally closed	
Ambient and fluid temperature			-10 to 60°
Repeatability			±0.01mm
Maximum operating frequency			180 c.p.m.
Lubrication			Non-lube
Action			Double acting, Single acting
Auto switch (option) ^{Note)}			Solid state switch (3wire, 2wire)

Note) Refer to pages 20 to 30 for details regarding auto switch specifications.

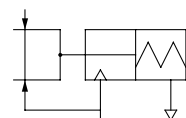
Models

Symbols

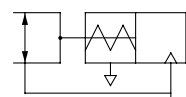
Double acting type



Single acting type, normally open



Single acting type, normally closed



Action		Model	Cylinder bore (mm)	Gripping force ^{Note 1)}		Closing stroke (both sides) mm	^{Note 2)} Weight g
				Gripping force per finger Effective value N			
				External gripping force	Internal gripping force		
Double acting		MHZJ2-10D	10	9.8	17	4	60
		MHZJ2-16D	16	30	40	6	130
		MHZJ2-20D	20	42	66	10	250
		MHZJ2-25D	25	65	104	14	460
Single acting	Normally open	MHZJ2-10S	10	6.3		4	60
		MHZJ2-16S	16	24		6	130
		MHZJ2-20S	20	28		10	255
		MHZJ2-25S	25	45		14	465
	Normally closed	MHZJ2-10C	10		12	4	60
		MHZJ2-16C	16		31	6	130
		MHZJ2-20C	20		56	10	255
		MHZJ2-25C	25		83	14	460

Note 1) Values for pressure of 0.5MPa, gripping point L= 20mm, at center of stroke.

Note 2) Values excluding weight of auto switch.

Options

• Body options/End boss type

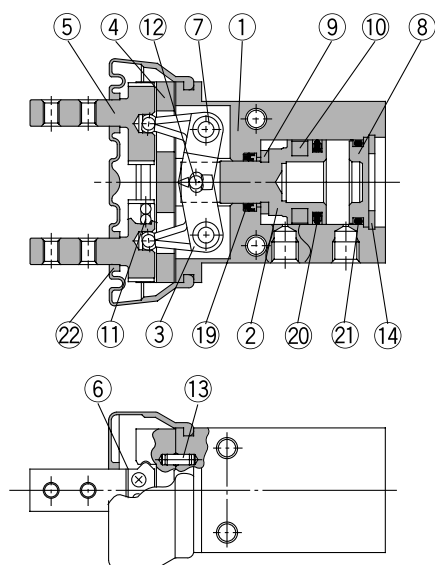
Piping port position	Type of piping port				Applicable model	
	MHZJ2-10	MHZJ2-16	MHZJ2-20	MHZJ2-25	Double acting	Single acting
Side ported	M3 x 0.5	M5 x 0.8			●	●
Axial port	With coaxial tube fitting				●	—
	With One-touch fitting				—	●
	M5 x 0.8				—	●

* For detailed body option specifications, refer to option specifications on pages 18 and 19.

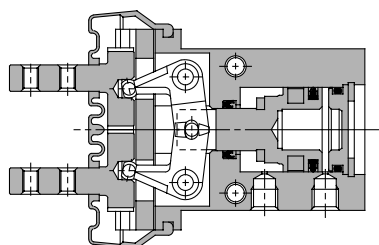
Series MHZJ2

Construction

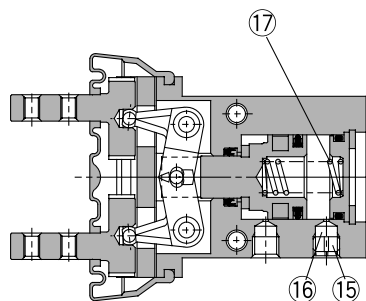
Double acting/with fingers open



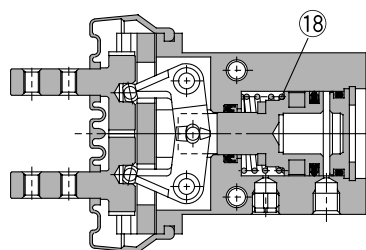
Double acting/with fingers closed



Single acting/normally open



Double acting/normally closed



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Hard anodized
2	Piston	ø10, ø16 stainless steel ø20, ø25 Aluminum alloy	ø20, ø25: Hard anodized
3	Lever	Stainless steel	Heat treated
4	Guide	Stainless steel	Heat treated
5	Finger	Stainless steel	Heat treated
6	Roller stopper	Stainless steel	
7	Lever shaft	Stainless steel	Nitrided
8	Cap	Aluminum alloy	Hard anodized
9	Damper	Polyurethane rubber	
10	Rubber magnet	Synthetic rubber	
11	Steel balls	High carbon chromium bearing steel	
12	Needle roller	High carbon chromium bearing steel	
13	Parallel pin	Stainless steel	
14	C type snap ring	Carbon steel	Nickel plated
15	Exhaust plug A	Brass	Electroless nickel plated
16	Exhaust filter A	Polyvinyl formal	
17	N.O. spring	Stainless steel spring wire	
18	N.C. spring	Stainless steel spring wire	
19	Rod seal	NBR	
20	Piston seal	NBR	
21	Gasket	NBR	
22	Dust cover	CR ^{Note 1)}	
		FKM ^{Note 1)}	
		Si ^{Note 1)}	

Note 1) CR: Chloroprene rubber, FKM: Fluoro rubber, Si: Silicon rubber

Replacement parts: Seal kits

Seal kit No.				Description
MHZJ2-10□	MHZJ2-16□	MHZJ2-20□	MHZJ2-25□	Kits include ^{Note)} items 19, 20, and 21 from the table on the left
MHZJ10-PS	MHZJ16-PS	MHZJ20-PS	MHZJ25-PS	

* Seal kits consist of items 19, 20 and 21 contained in one kit, and can be ordered using the seal kit number for each cylinder bore size.

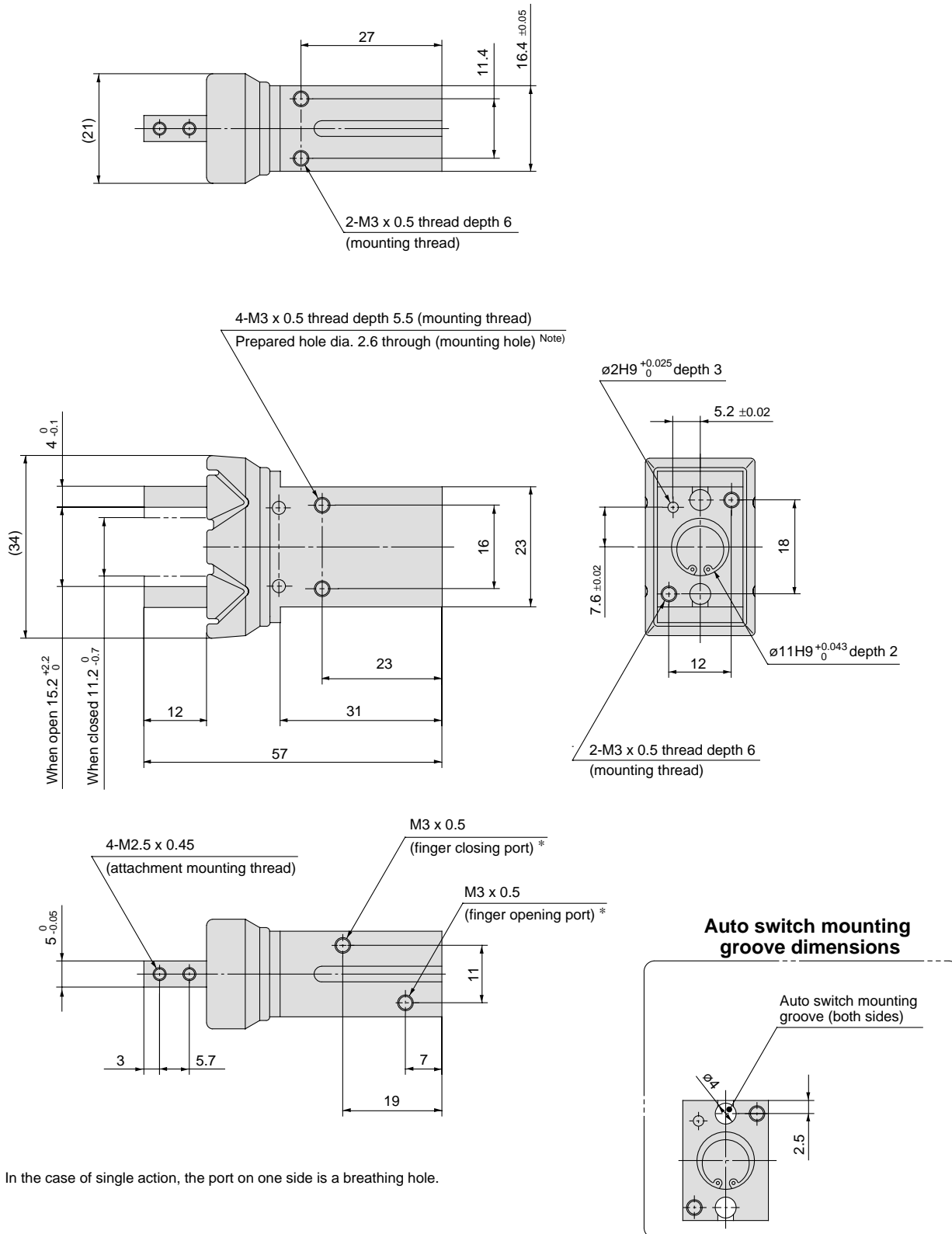
Replacement parts/Dust cover

Material	Part No.			
	MHZJ2-10□	MHZJ2-16□	MHZJ2-20□	MHZJ2-25□
CR	MHZJ2-J10	MHZJ2-J16	MHZJ2-J20	MHZJ2-J25
FKM	MHZJ2-J10F	MHZJ2-J16F	MHZJ2-J20F	MHZJ2-J25F
Si	MHZJ2-J10S	MHZJ2-J16S	MHZJ2-J20S	MHZJ2-J25S

Dimensions

MHZJ2-10□

Scale: 90%



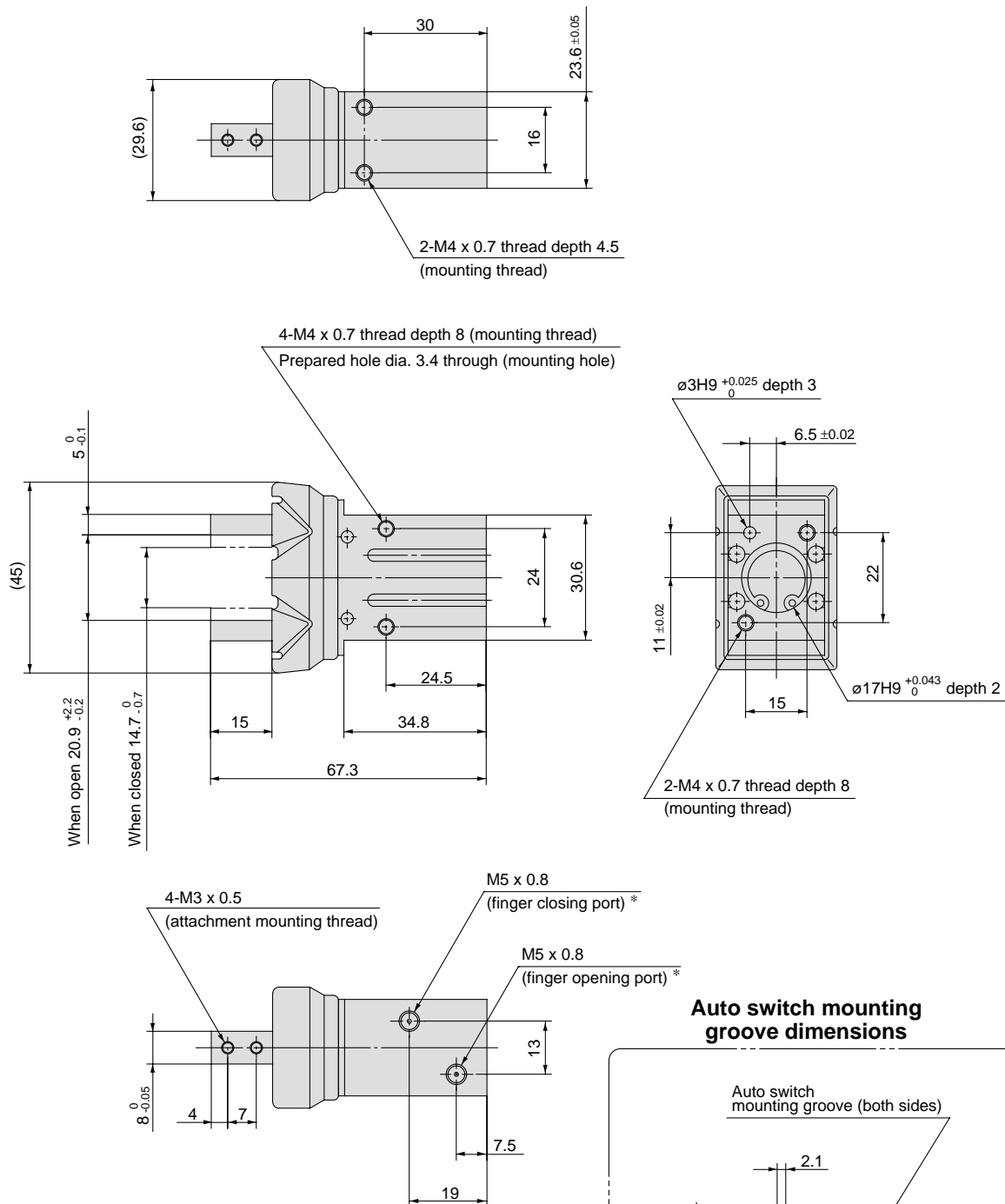
* In the case of single action, the port on one side is a breathing hole.

Series MHZJ2

Dimensions

MHZJ2-16□

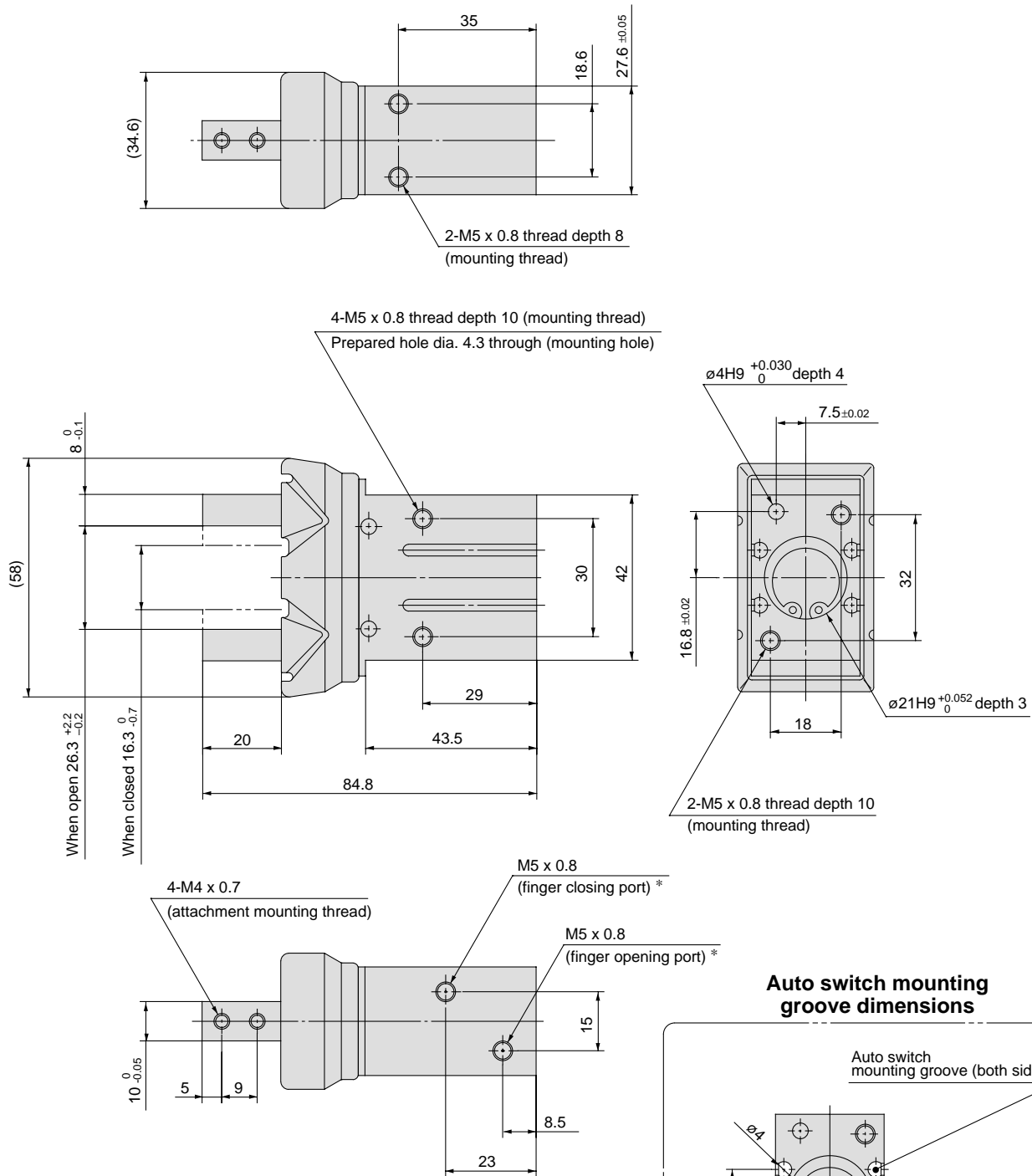
Scale: 60%



* In the case of single action, the port on one side is a breathing hole.

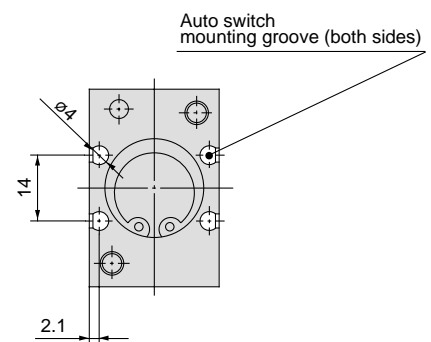
MHZJ2-20 □

Scale: 60%



* In the case of single action, the port on one side is a breathing hole.

Auto switch mounting groove dimensions

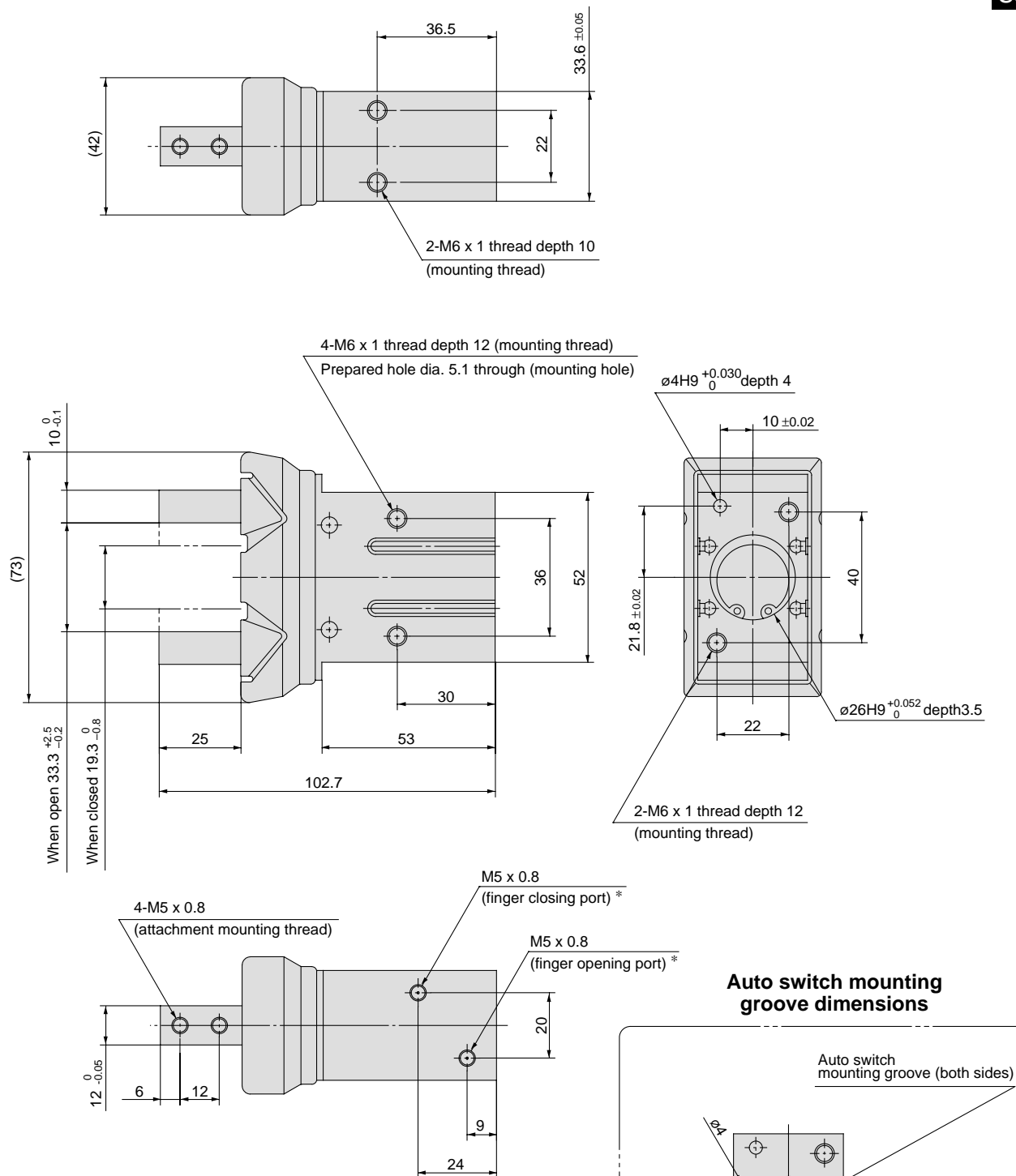


Series MHZJ2

Dimensions

MHZJ2-25□

Scale: 50%



* In the case of single action, the port on one side is a breathing hole.

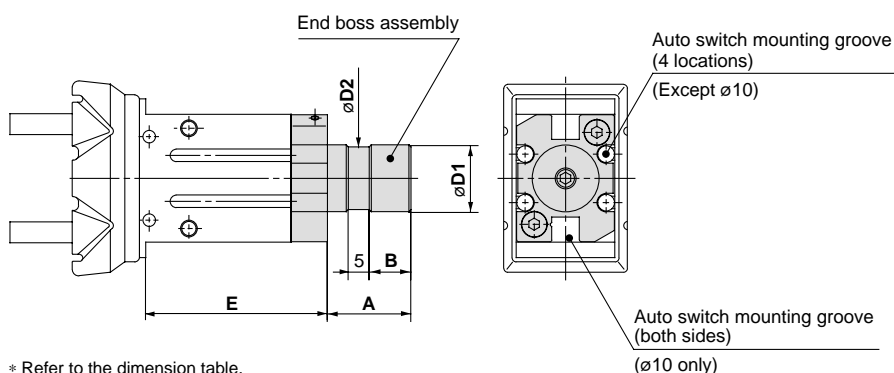
With Dust Cover/Series **MHZJ2**

Body Options: End Boss Type

Applicable Models

Symbol	Configuration	Type of piping port				Applicable model		
		MHZJ2-10	MHZJ2-16	MHZJ2-20	MHZJ2-25	Double acting	Single acting	
							Normally open	Normally closed
E	Side ported	M3	M5			●	●	●
W	Axial port	With One-touch fitting for coaxial tube				●	—	—
K		With One-touch fitting				—	●	●
M		M5				—	●	●

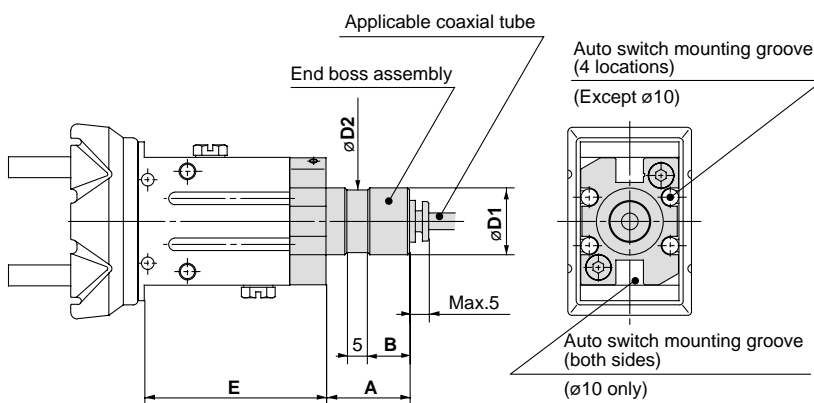
Side Ported [E]



* Refer to the dimension table.

* When auto switches are used on ø10, side mounting with through holes is not possible.

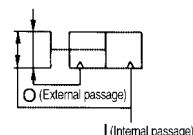
Axial Port (One-Touch Fitting for Coaxial Tube) [W]



* Refer to the dimension table.

* When auto switches are used on ø10, side mounting with through holes is not possible.

Reference symbol

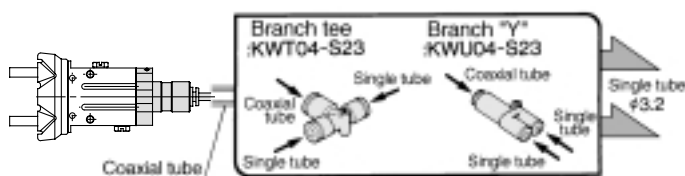


Applicable coaxial tubing

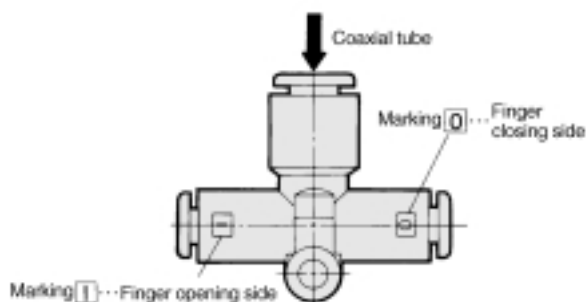
Specifications	Model	TW04B-20
Outside diameter		4mm
Max. operating pressure		0.6MPa
Min. bend radius		10mm
Operating temperature		-20 to 60°C
Material		Nylon 12

Changing from Coaxial to Single Tubing

Changing to single tubing is possible by using a branch "Y" or branch tee fitting. In this case particularly, single tube fittings and tubing for ø2 and 3 will be necessary.



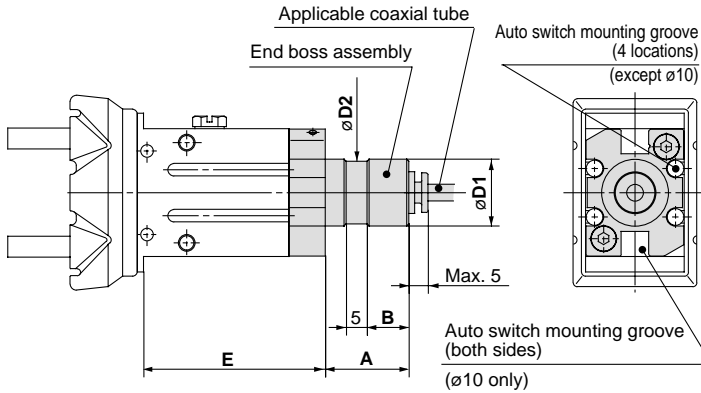
Branch tee, Different dia. tee, Branch "Y", Male run tee



With Dust Cover/Series **MHZJ2**

Body Options: End Boss Type

Axial Port (with One-Touch Fitting) [K]



* Refer to the dimension table.

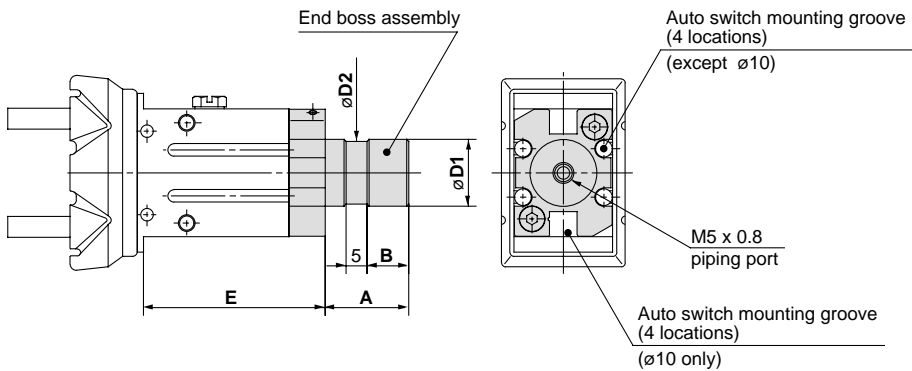
* When auto switches are used on ø10, side mounting with the through holes is not possible.

Applicable tubing

Description Model	Nylon tubing	Soft nylon tubing	Polyurethane tubing	Polyurethane coiled tubing
Specifications	T0425	TS0425	TU0425	TCU0425B-1
Outside diameter mm	4	4	4	4
Max. operating pressure MPa	1.0	0.8	0.5	0.5
Min. bend radius mm	13	12	10	—
Operating temperature °C	−20 to 60	−20 to 60	−20 to 60	−20 to 60
Material	Nylon 12	Nylon 12	Polyurethane	Polyurethane

Refer to SMC's catalog CAT. 501-B "Air Fittings and Tubing" regarding One-touch fittings and tubing.

Axial Port (with M5 Port) [M]



* Refer to the dimension table.

* When auto switches are used on ø10, side mounting with the through holes is not possible.

Dimension table

Unit: mm

Model	A	B	D1	D2	E
MHZJ2-10□□	15	7	12f8 -0.016 -0.043	11	40
MHZJ2-16□□	20	10	16f8 -0.016 -0.043	15	43.5
MHZJ2-20□□	22	12	20f8 -0.020 -0.053	19	51.7
MHZJ2-25□□	25	15	25f8 -0.020 -0.053	24	61.3

Other dimensions and specifications are the same as the standard type.

Weight table

Unit: g

Model	End boss type (symbol)			
	E	W	K	M
MHZJ2-10□□	70	70	70	70
MHZJ2-16□□	165	165	165	165
MHZJ2-20□□	290	290	290	290
MHZJ2-25□□	525	525	525	525

Series MHZ2/MHZJ2

Auto Switch Common Specifications

Auto Switch Common Specifications

Type	Solid state switch
Operating time	1ms or less
Impact resistance	1000m/s ²
Insulation resistance	50MΩ or more at 500VDC (between lead wire and case)
Withstand voltage	1000VAC for 1min. (between lead wire and case)
Ambient temperature	−10 to 60°C
Enclosure	IEC529 standard IP67, JISC0920 watertight construction

Lead Wire Length

Indication of lead wire length

(Example)

D-F9P **L**

● Lead wire length

Nil	0.5m
L	3m
Z	5m

- Note 1) Lead wire length Z: Auto switch with 5m length
Solid state: All models produced upon receipt of order (standard procedure).
- Note 2) The standard lead wire length is 3m for water resistant 2 color indicator solid state switches. (0.5m is not available.)
- Note 3) For solid state with flexible wire specifications, enter −61 after the lead wire length.

(Example)

D-F9PL-**61**

● Flexible specifications

Lead Wire Color Changes

Lead wire colors of SMC auto switches have been changed in order to meet standard IEC947-5-2 for production beginning September, 1996 and thereafter, as shown in the tables below.

Take special care regarding wire polarity during the time that the old colors still coexist with the new colors.

2 wire

	Old	New
Output (+)	Red	Brown
Output (−)	Black	Blue

3 wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

Solid state with latch type diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

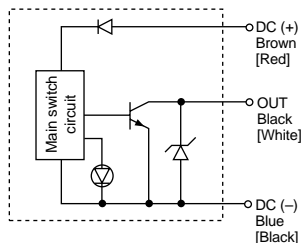
Solid State Switches/Direct Mounting Type D-Y59^A_B, D-Y69^A_B, D-Y7P(V)

Grommet

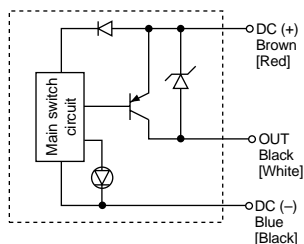


Auto switch internal circuits
Lead wire colors inside [] are those prior to conformity with IEC standards.

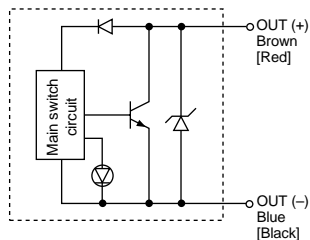
D-Y59A, D-Y69A



D-Y7P (V)



D-Y59B, D-Y69B



Auto Switch Specifications

D-Y5, D-Y6, D-Y7P, D-Y7PV (with indicator light)						
Auto switch part no.	D-Y59A	D-Y69A	D-Y7P	D-Y7PV	D-Y59B	D-Y69B
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring	3 wire				2 wire	
Output	NPN type		PNP type		—	
Applicable load	IC circuit, Relay, PLC				24VDC relay, PLC	
Power supply voltage	5, 12, 24VDC (4.5 to 28VDC)				—	
Current consumption	10mA or less				—	
Load voltage	28VDC or less		—		24VDC (10 to 28VDC)	
Load current	40mA or less		80mA or less		5 to 40mA	
Internal voltage drop	1.5V or less (0.8V or less at a load current of 10mA)		0.8V or less		4V or less	
Leakage current	100μA or less at 24VDC				0.8mA or less at 24VDC	
Indicator light	Red LED lights up when ON					

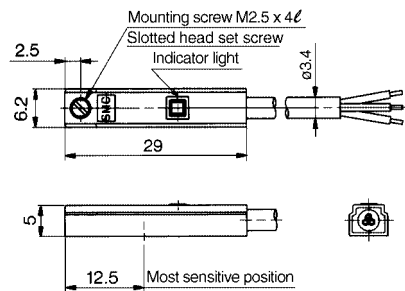
• Lead wires—Heavy duty oil resistant flexible vinyl cord, ø3.4, 0.15mm², 3 wire (Brown, Black, Blue [Red, White, Black]), 2 wire (Brown, Blue [Red, Black]), 0.5m
Note 1) Refer to page 20 for solid state switch common specifications.
Note 2) Refer to page 20 for lead wire length.

Auto Switch Weight Table

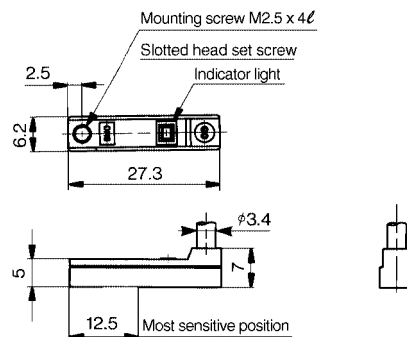
				Unit: g
Model	D-Y59A/Y69A	D-Y59B/Y69B	D-Y7P/Y7PV	
Lead wire length 0.5m	10	9	10	
Lead wire length 3m	53	50	53	

Auto Switch Dimensions

D-Y59A, D-Y7P, D-Y59B



D-Y69A, D-Y7PV, D-Y69B



Solid State Switches/Direct Mounting Type D-F9N(V), D-F9P(V), D-F9B(V)

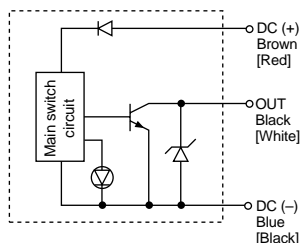
Grommet



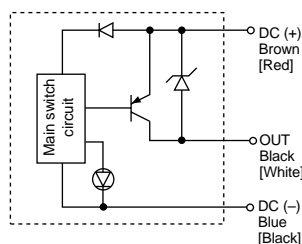
Auto switch internal circuits

Lead wire colors inside [] are those prior to conformity with IEC standards.

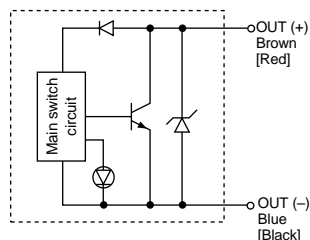
D-F9N(V)



D-F9P(V)



D-F9B(V)



Auto Switch Specifications

D-F9□, D-F9□V (with indicator light)						
Auto switch part no.	D-F9N	D-F9NV	D-F9P	D-F9PV	D-F9B	D-F9BV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring	3 wire				2 wire	
Output	NPN type		PNP type		—	
Applicable load	IC circuit, Relay, PLC				24VDC relay, PLC	
Power supply voltage	5, 12, 24VDC (4.5 to 28VDC)				—	
Current consumption	10mA or less				—	
Load voltage	28VDC or less		—		24VDC (10 to 28VDC)	
Load current	40mA or less		80mA or less		5 to 40mA	
Internal voltage drop	1.5V or less (0.8V or less at a load current of 10mA)		0.8V or less		4V or less	
Leakage current	100μA or less at 24VDC				0.8mA or less	
Indicator light	Red LED lights up when ON					

• Lead wires—Heavy duty oil resistant vinyl cord, ø2.7, 3 wire (Brown, Black, Blue [Red, White, Black]), 0.18mm², 0.5m (Brown, Blue [Red, Black]), 0.18mm², 0.5m

Note 1) Refer to page 20 for solid state switch common specifications.

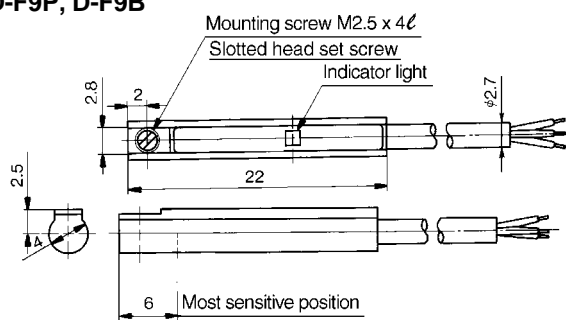
Note 2) Refer to page 20 for lead wire length.

Auto Switch Weight Table

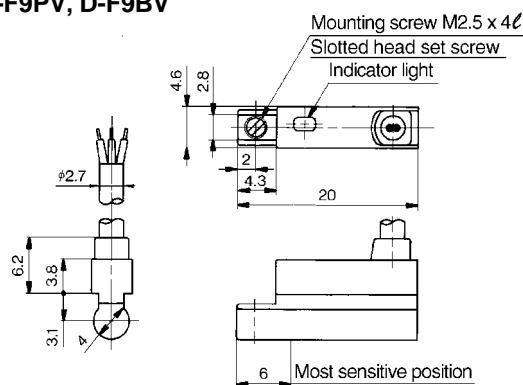
Unit: g						
Model	D-F9N	D-F9P	D-F9B	D-F9NV	D-F9PV	D-F9BV
Lead wire length 0.5m	7	7	6	7	7	6
Lead wire length 3m	37	37	31	37	37	31

Auto Switch Dimensions

D-F9N, D-F9P, D-F9B



D-F9NV, D-F9PV, D-F9BV



2 Color Indicator Type Solid State Switches /Direct Mounting Type D-Y7NW(V), DY7PW(V), D-Y7BW(V)

Grommet

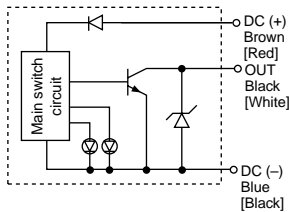
The optimum operating position can be determined by the color of the light.
(Red→Green←Red)



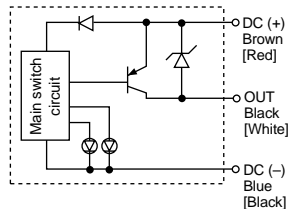
Auto switch internal circuits

Lead wire colors inside [] are those prior to conformity with IEC standards.

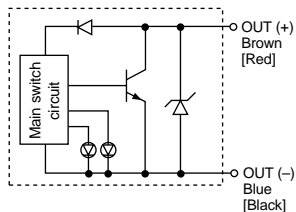
D-Y7NW(V)



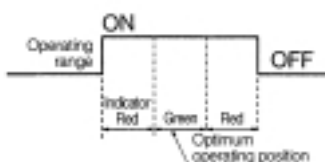
D-Y7PW(V)



D-Y7BW(V)



Indicator light/Display method



Auto Switch Specifications

D-Y7□W, D-Y7□WV (with indicator light)						
Auto switch part no.	D-Y7NW	D-Y7NWV	D-Y7PW	D-Y7PWV	D-Y7BW	D-Y7BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring	3 wire				2 wire	
Output	NPN type		PNP type		—	
Applicable load	IC circuit, Relay, PLC				24VDC relay, PLC	
Power supply voltage	5, 12, 24VDC (4.5 to 28VDC)				—	
Current consumption	10mA or less				—	
Load voltage	28VDC or less		—		24VDC (10 to 28VDC)	
Load current	40mA or less		80mA or less		5 to 40mA	
Internal voltage drop	1.5V or less (0.8V or less at a load current of 10mA)		0.8V or less		4V or less	
Leakage current	100μA or less at 24VDC				0.8mA or less at 24VDC	
Indicator light	Operating position Red LED lights up Optimum operating position Green LED lights up					

• Lead wires—Heavy duty oil resistant flexible vinyl cord, $\phi 3.4$, 0.15mm², 3 wire (Brown, Black, Blue [Red, White, Black]), 2 wire (Brown, Blue [Red, Black]), 0.5m

Note 1) Refer to page 20 for solid state switch common specifications.

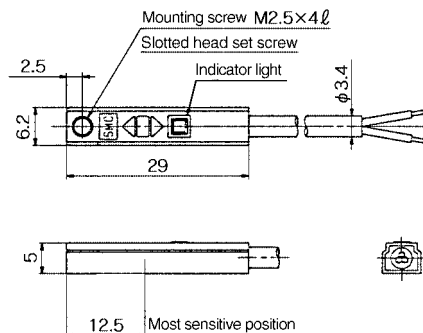
Note 2) Refer to page 20 for lead wire length.

Auto Switch Weight Table

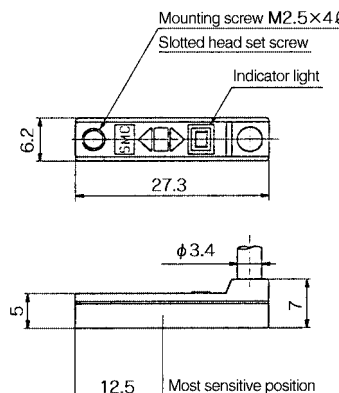
Model	Unit: g		
	D-Y7NW	D-Y7PW	D-Y7BW
Lead wire length 0.5m	11	11	11
Lead wire length 3m	54	54	54

Auto Switch Dimensions

D-Y7□W



D-Y7□WV



2 Color Indicator Type Solid State Switches /Direct Mounting Type D-F9NW(V), D-F9PW(V), D-F9BW(V)

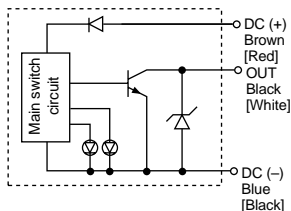
Grommet



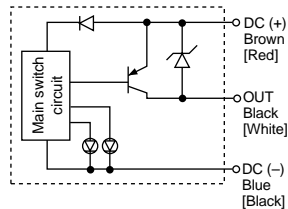
Auto switch internal circuits

Lead wire colors inside [] are those prior to conformity with IEC standards.

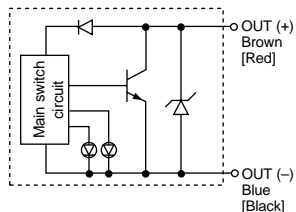
D-F9NW(V)



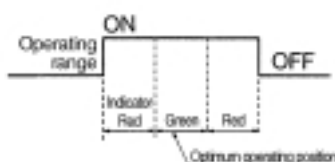
D-F9PW(V)



D-F9BW(V)



Indicator light/Display method



Auto Switch Specifications

D-F9□W, D-F9□ WV (with indicator light)						
Auto switch part no.	D-F9NW	D-F9NWV	D-F9PW	D-F9PWV	D-F9BW	D-F9BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring	3 wire				2 wire	
Output	NPN type		PNP type		—	
Applicable load	IC circuit, Relay, PLC				24VDC relay, PLC	
Power supply voltage	5, 12, 24VDC (4.5 to 28VDC)				—	
Current consumption	10mA or less				—	
Load voltage	28VDC or less		—		24VDC (10 to 28VDC)	
Load current	0.4mA or less		80mA or less		5 to 40mA	
Internal voltage drop	1.5V or less (0.8V or less at a load current of 10mA)		0.8V or less		4V or less	
Leakage current	100μA or less at 24VDC				0.8mA or less	
Indicator light	Operating position Red LED lights up Optimum operating position Green LED lights up					

* Lead wires—Heavy duty oil resistant vinyl cord, ø2.7, 3 wire (Brown, Black, Blue [Red, White, Black]), 0.15mm², 2 wire (Brown, Blue [Red, Black]), 0.18mm², 0.5m

Note 1) Refer to page 20 for solid state switch common specifications.

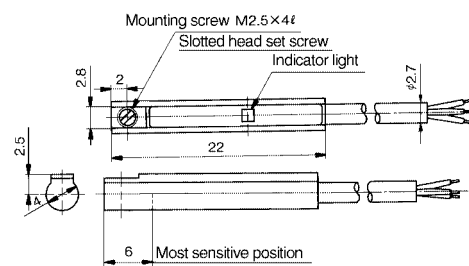
Note 2) Refer to page 20 for lead wire length.

Auto Switch Weight Table

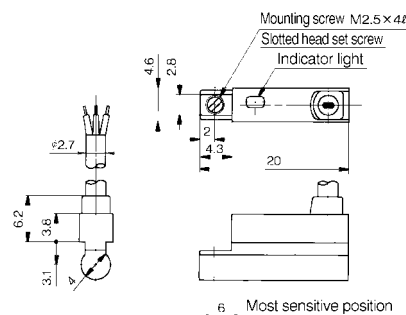
Unit: g						
Model	D-F9NW	D-F9NWV	D-F9PW	D-F9PWV	D-F9BW	D-F9BWV
Lead wire length 0.5m	7	7	7	7	7	7
Lead wire length 3m	34	34	34	34	32	32

Auto Switch Dimensions

D-F9NW, D-F9PW, D-F9BW



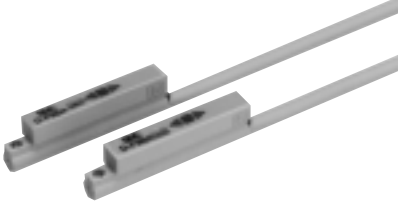
D-F9NWV, D-F9PWV, D-F9BWV



Water Resistant 2 Color Indicator Type Solid State Switches/Direct Mounting Type D-F9BAL

Grommet

Improved water (coolant)
resistant type



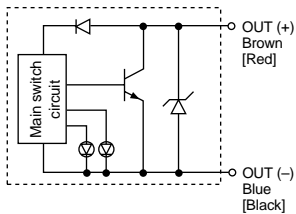
⚠ Caution

Precautions on Usage

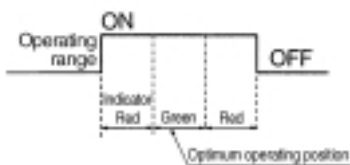
Contact SMC if solutions other than water will be used.

Auto switch internal circuits

Lead wire colors inside [] are those prior to conformity with IEC standards.



Indicator light/Display method



Auto Switch Specifications

D-F9BAL (with indicator light)	
Auto switch part no.	D-F9BAL
Wiring	2 wire
Output	—
Applicable load	24VDC relay, PLC
Power supply voltage	—
Current consumption	—
Load voltage	24VDC (10 to 28VDC)
Load current	5 to 30mA
Internal voltage drop	5V or less
Leakage current	1mA or less at 24VDC
Indicator light	Operating position Red LED lights up Optimum operating position Green LED lights up

• Lead wires—Heavy duty oil resistant vinyl cord, $\phi 2.7$, 2 wire (Brown, Blue [Red, Black]), 0.18mm², 0.5m

Note 1) Refer to page 20 for solid state switch common specifications.

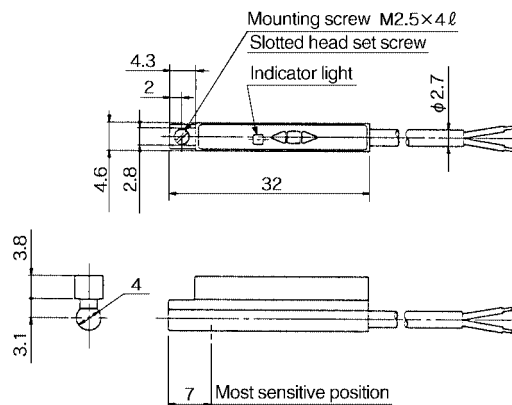
Note 2) Refer to page 20 for lead wire length.

Auto Switch Weight table

Unit: g

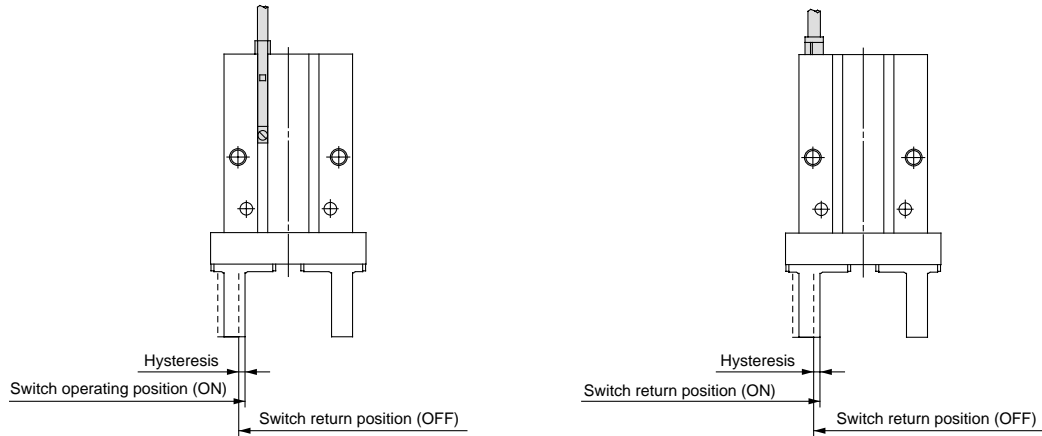
Model	D-F9BAL
Lead wire length 3m	37

Auto Switch Dimensions



Auto Switch Hysteresis

Auto switches have hysteresis similar to micro switches. The adjustment of switch positions should be performed using the table below as a standard.

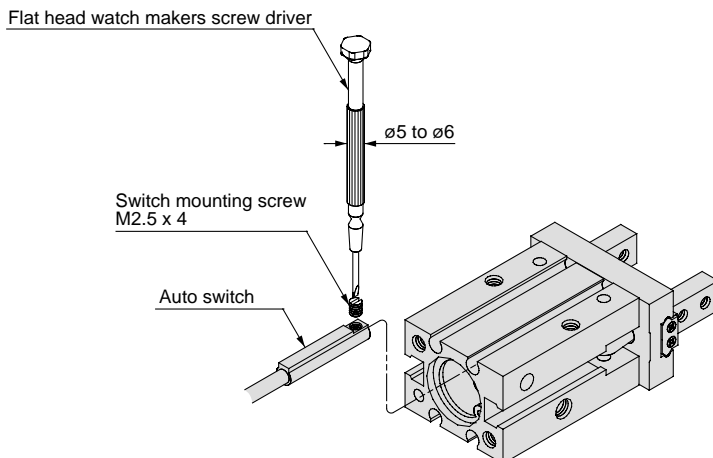


Auto switch Model	Maximum hysteresis (mm)							
	D-Y59 ^A _B D-Y69 ^A _B D-Y7P (V)	D-F9 ^A (V)	D-Y7 ^A W (V)		D-F9 ^A W (V)		D-F9BAL	
			ON position set when red light is turned on	ON position set when green light is turned on	ON position set when red light is turned on	ON position set when green light is turned on	ON position set when red light is turned on	ON position set when green light is turned on
MHZ2-10□	0.4	—	—	—	—	—	—	
MHZ2-16□	0.4	0.5	—	—	—	—		
MHZ2-20□	0.4	0.5	0.5	1	0.5	1		
MHZ2-25□	0.4	0.5	0.5	1	0.5	1		
MHZJ2-10□	—	0.5	—		—	—	0.4	0.8
MHZJ2-16□		0.5			—	—	0.4	0.8
MHZJ2-20□		0.5			0.5	1	0.4	0.8
MHZJ2-25□		0.5			0.5	1	0.4	0.8

Note) Auto switches are not applicable to blank sections in the table.

Mounting of Auto Switches

When attaching an auto switch, insert it into one of the air gripper's switch mounting grooves from the direction shown in the figure below. After setting in the desired mounting position, tighten the switch mounting screw, which is included, using a flat head watch makers screw driver.



Note) When tightening the auto switch mounting screw, use a watchmakers screw driver with a handle diameter of about 5 to 6mm. The tightening torque should be about 0.05 to 0.1N·m. As a rule, it should be turned about 90° beyond the point at which tightening can be felt.

Series MHZ2/MHZJ2

Amount of Auto Switch Protrusion from the Body End Surface

- The amount of auto switch protrusion from the body's end surface is as shown in the table below.
- Use this as a standard when mounting, etc.

Standard body

Lead wire type		In-line					Perpendicular			
Model	Explanatory drawing									
	Finger position									
		D-Y59□ D-Y7P	D-Y7□W	D-F9□	D-F9□W	D-F9BAL	D-Y69□ D-Y7PV	D-Y7□WV	D-F9□V	D-F9□WV
MHZ2-10□	Open	1	No setting	No setting	No setting	No setting	—	No setting	No setting	No setting
	Closed	7.5					6.5			
MHZ2-16□	Open	—	No setting	1	No setting	No setting	—	No setting	—	No setting
	Closed	6					5			
MHZ2-20□	Open	—	—	—	—	No setting	—	—	—	—
	Closed	4					3			
MHZ2-25□	Open	—	—	—	—	No setting	—	—	—	—
	Closed	1					—			
MHZJ2-10□	Open	No setting	No setting	5	No setting	12	No setting	No setting	3	No setting
	Closed			7		16			5	
MHZJ2-16□	Open			2	—	9			—	—
	Closed			5		14.5			3	
MHZJ2-20□	Open			—	3	3			—	—
	Closed			3		11			1	
MHZJ2-25□	Open			—	—	—			—	—
	Closed			2		9.5			—	

Note) "—" in the table indicates a skip with no dimension.

End boss type

Lead wire type		In-line					Perpendicular			
Model	Explanatory drawing									
	Finger position									
		D-Y59□ D-Y7P	D-Y7□W	D-F9□	D-F9□W	D-F9BAL	D-Y69□ D-Y7PV	D-Y7□WV	D-F9□V	D-F9□WV
MHZ2-10□□□	Open	—	No setting	No setting	No setting	No setting	—	No setting	No setting	No setting
	Closed	—					—			
MHZ2-16□□□	Open	—	No setting	—	No setting	No setting	—	No setting	—	No setting
	Closed	—					—			
MHZ2-20□□□	Open	—	—	—	—	No setting	—	—	—	—
	Closed	—					—			
MHZ2-25□□□	Open	—	—	—	—	No setting	—	—	—	—
	Closed	—					—			
MHZJ2-10□□□	Open	No setting	No setting	—	No setting	4	No setting	No setting	—	No setting
	Closed			—		8			—	
MHZJ2-16□□□	Open			—	—	1			—	—
	Closed			—		6.5			—	
MHZJ2-20□□□	Open			—	—	—			—	—
	Closed			—		3			—	
MHZJ2-25□□□	Open			—	—	—			—	—
	Closed			—		1.5			—	

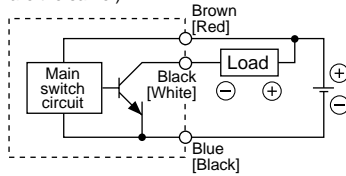
Note) "—" in the table indicates a skip with no dimension.

Series MHZ2/MHZJ2 Auto Switches Connections and Examples

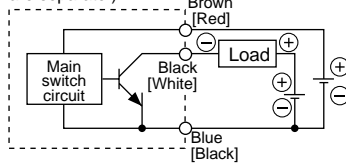
Basic Wiring

Solid state 3 wire, NPN

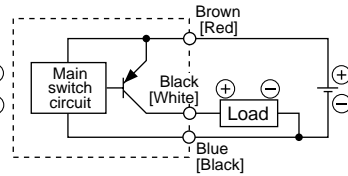
(Power supply for switch and load are the same.)



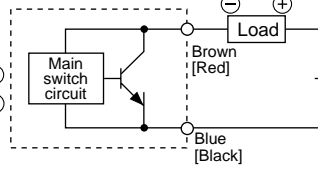
(Power supply for switch and load are separate.)



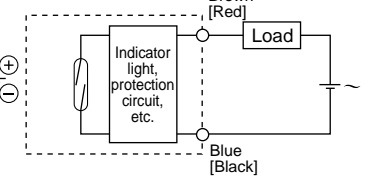
Solid state 3 wire, PNP



2 wire <Solid state>



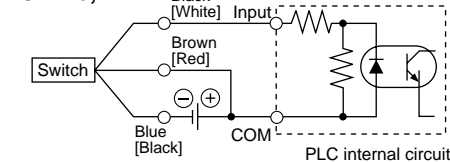
2 wire <Reed switch>



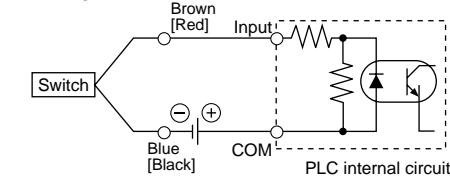
Examples of Connection with PLC

Sink input specifications

3 wire, NPN

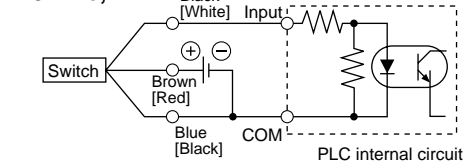


2 wire

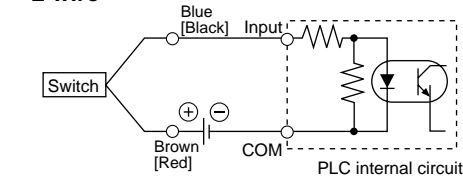


Source input specifications

3 wire, PNP



2 wire

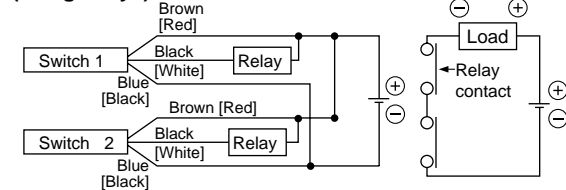


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

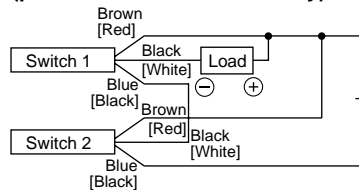
Connection Examples for AND (Series) and OR (Parallel)

3 wire

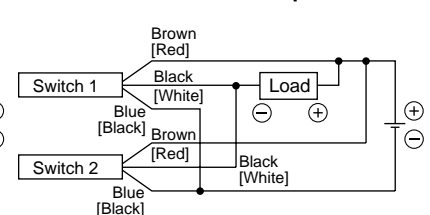
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

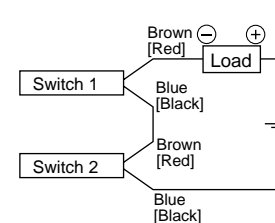


OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

2 wire with 2 switch AND connection

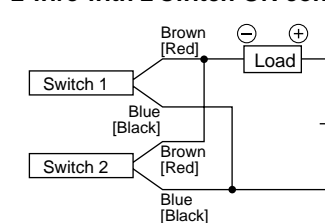


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24\text{V} - 4\text{V} \times 2 \text{ pcs.} \\ &= 16\text{V} \end{aligned}$$

Example: Power supply is 24VDC
Voltage decline in switch is 4V

2 wire with 2 switch OR connection



<Solid state>

When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

<Reed switch>

Because there is no current leakage, the load voltage will not increase when turned OFF, but due to the number of switches in the ON state, the indicator lights will sometimes get dark or not light up, because of dispersion and reduction of the current flowing to the switches.

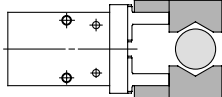
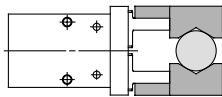
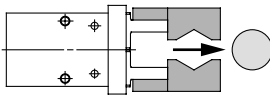












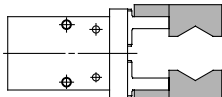
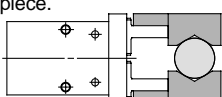
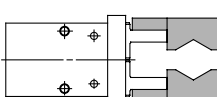
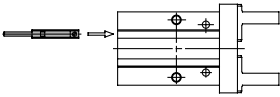
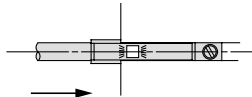
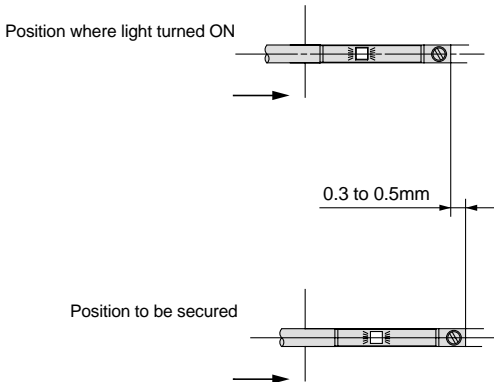
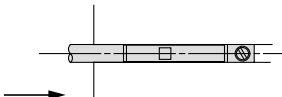
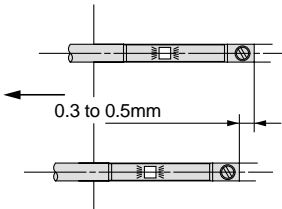
$$\begin{aligned} \text{Load voltage at OFF} &= \text{leakage current} \times 2 \text{ pcs.} \times \text{load impedance} \\ &= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega \\ &= 6\text{V} \end{aligned}$$

Example: Load impedance is 3kΩ
Leakage current from switch is 1mA

Series MHZ2/MHZJ2 Auto Switch Positioning and Examples

Various auto switch applications are possible through different combinations of auto switch quantity and detecting positions.

1) Detection for external gripping of work piece

Detection example		1. To detect that fingers have returned	2. To detect that work piece has been gripped	3. To detect that work piece has not been gripped
Position to be detected		Position of fingers fully opened 	Position when gripping work piece 	Position of fingers fully closed 
Operation of auto switch		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping work piece. (Light ON)	When gripping work piece (normal): Switch OFF (Light OFF) When not gripping work piece (abnormal): Switch ON (Light ON)
Detection combinations	Capable with one auto switch			
				
	Two auto switches are necessary			
				
How to determine the auto switch installation position "Set up as directed with power connected under no pressure or low pressure."		Step 1) Fully open fingers. 	Step 1) Position fingers for gripping work piece. 	Step 1) Fully close fingers. 
		Step 2) Insert the auto switch into the auto switch mounting groove in the direction of the arrow as shown in the figure. 		
		Step 3) Move the auto switch in the direction of the arrow indicated below until indicator light turns ON. 	Step 3) Move the auto switch in the direction of the arrow and secure the auto switch at a position 0.3 to 0.5mm in the direction of the arrow beyond the position where the indicator light turned ON. 	
		Step 4) Keep moving in the direction of the arrow and confirm that the indicator light has turned OFF. 		
		Step 5) Move the auto switch in the opposite direction, and secure it at a position 0.3 to 0.5mm in the direction of the arrow beyond the position where the indicator light turned ON. 		

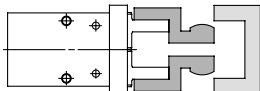
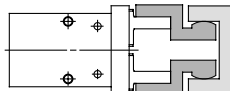
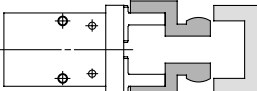









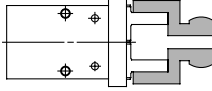
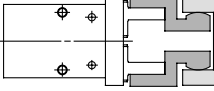
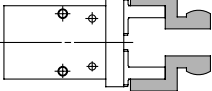
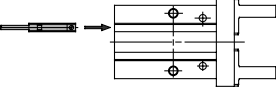
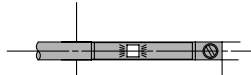
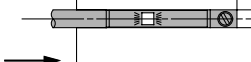
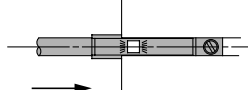
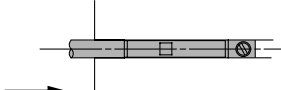
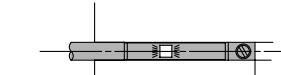
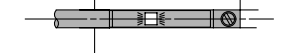
Notes) • It is recommended that gripping of the work piece be performed close to the center of the finger stroke.

• The detection combinations shown above may be limited when gripping of the work piece is performed at the end of the opening/closing stroke of the fingers, due to hysteresis of the auto switch.

Series MHZ2/MHZJ2 Auto Switch Positioning and Examples

Various auto switch applications are possible through different combinations of auto switch quantity and detecting positions.

2) Detection for internal gripping of work piece

Detection example		1. To detect that fingers have returned	2. To detect that work piece has been gripped	3. To detect that work piece has not been gripped
Position to be detected		Position of fingers fully closed 	Position when gripping work piece 	Position of fingers fully opened 
Operation of auto switch		Switch turned ON when fingers return. (Light ON)	Switch turned ON when gripping work piece. (Light ON)	When gripping work piece (normal): Switch OFF (Light OFF) When not gripping work piece (abnormal): Switch ON (Light ON)
Detection combinations	Capable with one auto switch			
				
	Two auto switches are necessary			
How to determine the auto switch installation position "Set up as directed with power connected under no pressure or low pressure."		Step 1) Fully close fingers. 	Step 1) Position fingers for gripping work piece. 	Step 1) Fully open fingers. 
		Step 2) Insert the auto switch into the auto switch mounting groove in the direction of the arrow as shown in the figure. 		
		Step 3) Move the auto switch in the direction of the arrow, and secure it at a position 0.3 to 0.5mm in the direction of the arrow beyond the position where the indicator light turned ON. Position where light turned ON  0.3 to 0.5mm Position to be secured 	Step 3) Move the auto switch in the direction of the arrow indicated below until the indicator light turns ON.  Step 4) Keep moving in the direction of the arrow and confirm that the indicator light has turned OFF.  Step 5) Move the auto switch in the opposite direction, and secure it at a position 0.3 to 0.5mm in the direction of the arrow beyond the position where the indicator light turned ON.  0.3 to 0.5mm 	

(Notes) • It is recommended that gripping of the work piece be performed close to the center of the finger stroke.

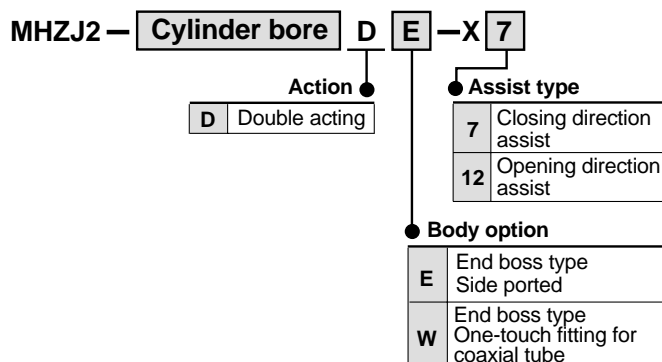
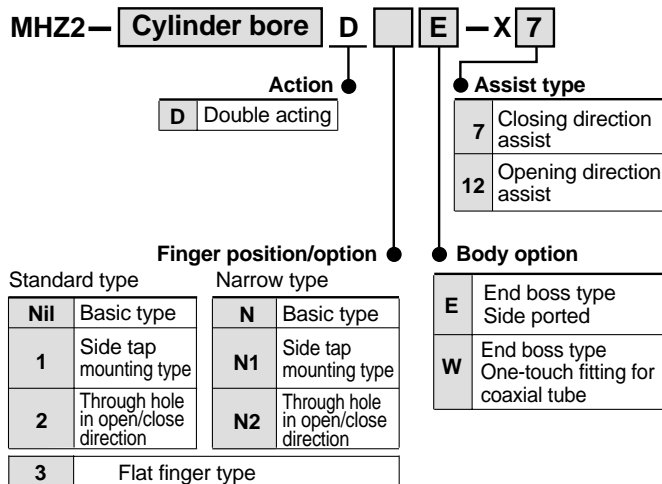
• The detection combinations shown above may be limited when gripping of the work piece is performed at the end of the opening/closing stroke of the fingers, due to hysteresis of the auto switch.

Series MHZ2/MHZJ2 Order Made Specifications

Contact SMC for detailed dimensions, specifications and lead times.

1 Spring Assisted Type—^{X7}_{X12}

The dropping of work pieces when pressure falls is prevented by installing a spring for single action in the double acting type.



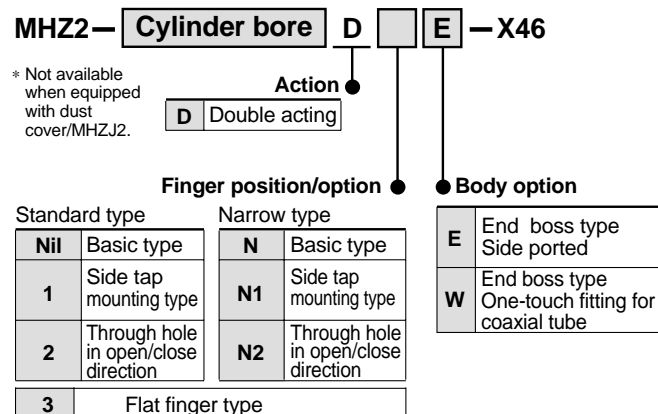
Specifications

Type	Spring assisted type
Cylinder bore	10, 16, 20, 25
Action	Double acting
Fluid	Air

Note) Dimensions are the same as the standard type.

2 With Needle (with Variable Throttle)—X46

A variable throttle is installed, allowing adjustment of the finger opening/closing speed.

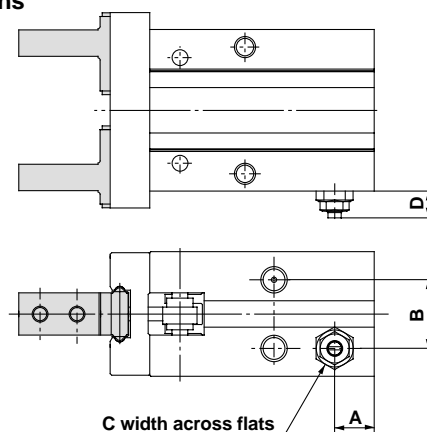


* Not available when equipped with dust cover/MHZJ2.

Specifications

Type	With needle
Cylinder bore	10, 16, 20, 25
Action	Double acting
Fluid	Air

Dimensions



Model	A	B	C	D *
MHZ2-10D□□-X46	9	11	4.5	5.2
MHZ2-16D□□-X46	7.5	13	7	5.8
MHZ2-20D□□-X46	10	15	7	6
MHZ2-25D□□-X46	10.7	20	7	6.2

Refer to pages 4 through 7 for the standard type dimensions, which are the same except for those shown above.

* Reference value to establish criteria for needle adjustment.

Adjust so that the finger opening/closing speed will be no greater than necessary. If the finger opening/closing speed is greater than necessary, impact forces acting on the fingers and other parts will increase. This can cause a loss of repeatability when gripping work pieces and have an adverse effect on the life of the unit.

Guide for internal needle adjustment

Model	Number of turns from needle fully closed ^{Note 1)}
MHZ2-10D□□-X46	1/4 to 1/2
MHZ2-16D□□-X46	1/2 to 1
MHZ2-20D□□-X46	1 to 1 1/2
MHZ2-25D□□-X46	1 1/2 to 2

Note 1) The needle is tightened gently until it stops.

3 MHQ2/MHQG2 Compatible Flat Finger Type –X51

The flat finger type can be selected depending on the intended application.

MHZ2— **Cylinder bore** **D** **E** **—X51**

Action	
D	Double acting
S	Single acting (normally open)
C	Single acting (normally closed)

Finger position	
Nil	MHQG2 compatible type
N	MHQ2 compatible type

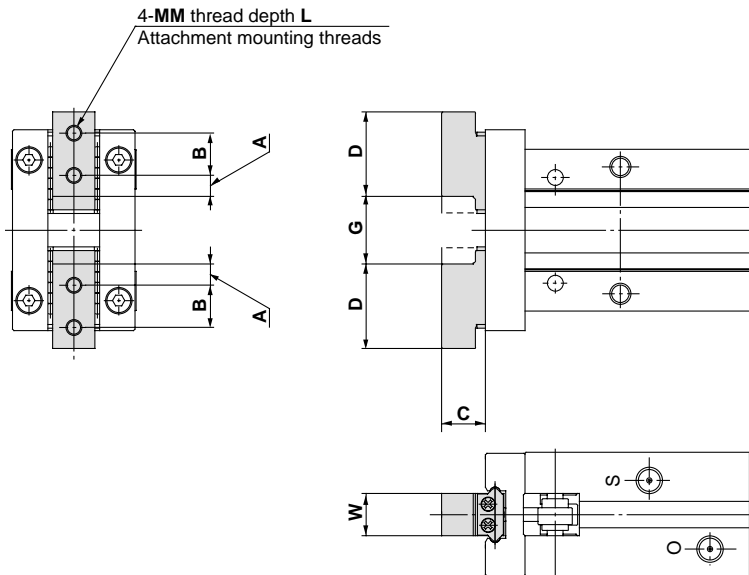
Body option	
E	End boss type Side ported
W	End boss type One-touch fitting for coaxial tube
K	End boss type One-touch fitting
M	End boss type with M5 port

* Not available when equipped with dust cover/MHZJ2.

Specifications

Type	Flat finger type
Cylinder bore	10, 16, 20, 25
Action	Double acting, Single acting (normally open, normally closed)
Fluid	Air

Dimensions



Unit: mm

Model		A	B	C	D	G		MM	L	W
						Open	Closed			
MHZ2-10 □□□□-X51	MHQG2 compatible	3	6	5.2	12	9.7 ^{+2.2} ₀	5.7 ⁰ _{-0.4}	M2 x 0.4	3.6	5 ⁰ _{-0.05}
	MHQ2 compatible	2	5	5.2	9	9.7 ^{+2.2} ₀	5.7 ⁰ _{-0.4}	M2 x 0.4	3.6	5 ⁰ _{-0.05}
MHZ2-16 □□□□-X51	MHQG2 compatible	4	8	8.3	16	12.6 ^{+2.2} ₀	6.6 ⁰ _{-0.4}	M3 x 0.5	6	8 ⁰ _{-0.05}
	MHQ2 compatible	2.5	7	8.3	12	12.6 ^{+2.2} ₀	6.6 ⁰ _{-0.4}	M3 x 0.5	6	8 ⁰ _{-0.05}
MHZ2-20 □□□□-X51	MHQG2 compatible	5	10	10.5	20.8	17.2 ^{+2.2} ₀	7.2 ⁰ _{-0.4}	M4 x 0.7	8	10 ⁰ _{-0.05}
	MHQ2 compatible	3.3	9	10.5	15.5	17.2 ^{+2.2} ₀	7.2 ⁰ _{-0.4}	M4 x 0.7	8	10 ⁰ _{-0.05}
MHZ2-25 □□□□-X51	MHQG2 compatible	6.5	12	13.1	25	22.8 ^{+2.5} ₀	8.8 ⁰ _{-0.4}	M5 x 0.8	10	12 ⁰ _{-0.05}
	MHQ2 compatible	3.5	12	13.1	19	22.8 ^{+2.5} ₀	8.8 ⁰ _{-0.4}	M5 x 0.8	10	12 ⁰ _{-0.05}

Refer to pages 4 through 7 for the standard type dimensions, which are the same except for those shown above.

Model Selection Method

Model Selection

Selection procedure

Step 1 Confirm gripping force

Step 2 Confirm gripping point

Step 3 Confirm external force on fingers

Step 1 Confirmation of gripping force

Confirmation of conditions

Calculation of required gripping force

Selection of model from gripping force graph

Example Work piece weight: 0.1kg

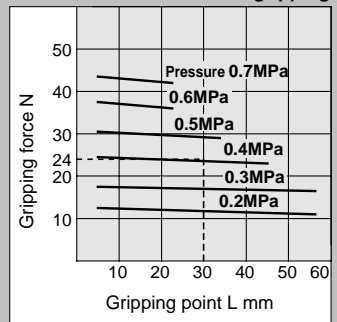
Gripping method: External gripping

Model selection criteria with respect to work piece weight

- Although differences will exist depending upon factors such as shape and the coefficient of friction between the attachments and the work pieces, a model should be selected which will provide a gripping force at least 10 to 20 times ^{Note)} greater than the work piece weight.
- Note) For further details, refer to the model selection explanatory drawing.
- Furthermore, in cases where high acceleration or impact, etc. will occur, it is necessary to allow an even greater margin.

Example: When it is desired to set the gripping force at 20 times or more above the work piece weight.
Required gripping force = 0.1kg x 20 x 9.8m/s² (approx.) 19.6N or more

MHZ□2-16 External gripping

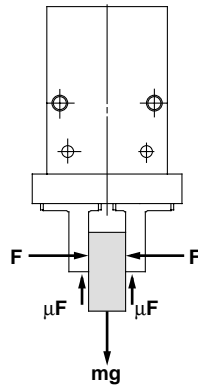


- When the MHZ□2-16D is selected. A gripping force of 24N is obtained from the intersection point of gripping point distance L = 30mm and pressure of 0.4MPa.
- The gripping force is 24.5 times greater than the work piece weight, and therefore satisfies a gripping force setting value of 20 times or more.

Gripping point distance: L=30mm

Operating pressure: 0.4MPa

Model selection explanatory drawing



"Gripping force at least 10 to 20 times the work piece weight"

The "10 to 20 times or more of the work piece weight" recommended by SMC is calculated with the safety margin of a=4, which allows for impacts that occur during normal transportation, etc.

When $\mu = 0.2$	When $\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4$	$F = \frac{mg}{2 \times 0.1} \times 4$
$= 10 \times mg$	$= 20 \times mg$

10 x work piece weight

20 x work piece weight

Note) Even in cases where the coefficient of friction is greater than $\mu = 0.2$, for reasons of safety, a gripping force should be selected which is at least 10 to 20 times greater than the work piece weight, as recommended by SMC. It is necessary to allow a greater margin for high accelerations and strong impacts, etc.

When gripping a work piece as in the figure to the left, and with the following definitions,

F: Gripping force (N)

μ : Coefficient of friction between the attachments and the work piece

m: Work piece mass (kg)

g: Gravitational acceleration (= 9.8m/s²)

mg: Work piece weight (N)

the conditions under which the work piece will not drop are

$$2 \times \mu F > mg$$

Number of fingers

and therefore,

$$F > \frac{mg}{2 \times \mu}$$

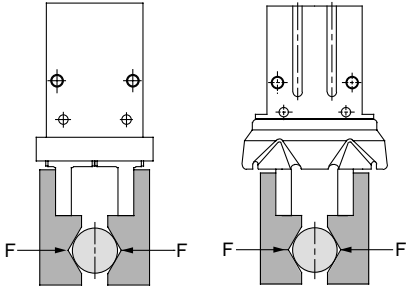
With "a" representing the extra margin, F is determined by the following formula:

$$F = \frac{mg}{2 \times \mu} \times a$$

Step 1 Effective gripping force: Series MHZ□2 Double acting

- Expressing the effective gripping force. The effective gripping force shown in the graphs to the right is expressed as F , which is the impellent force of one finger, when both fingers and attachments are in full contact with the work piece as shown in the figure below.

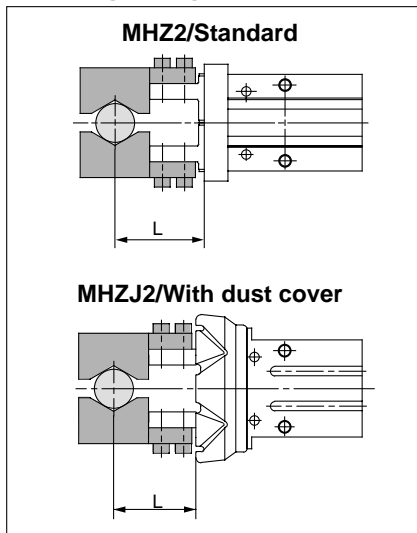
MHZ2/Standard MHZJ2/With dust cover



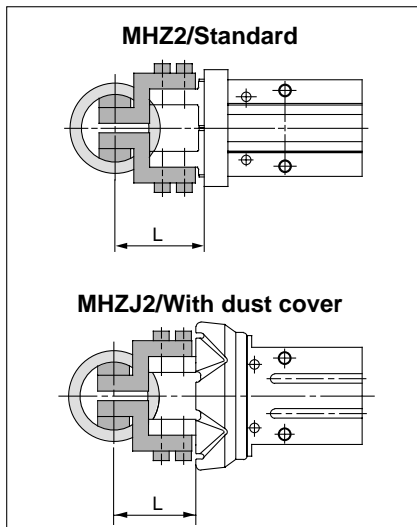
1N: approx. 0.102kgf
1MPa: approx. 10.2kgf/cm²

1N: approx. 0.102kgf
1MPa: approx. 10.2kgf/cm²

External gripping

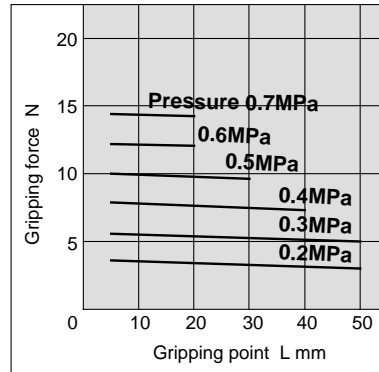


Internal gripping

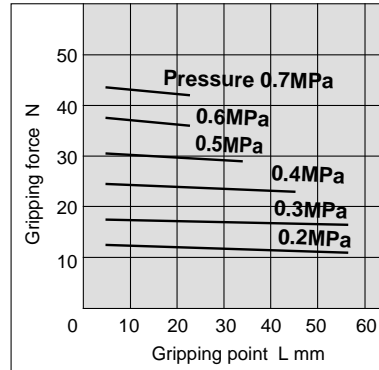


External gripping force

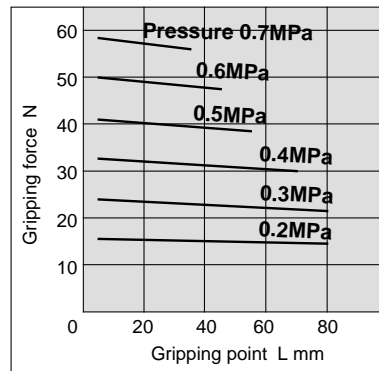
MHZ□2-10D



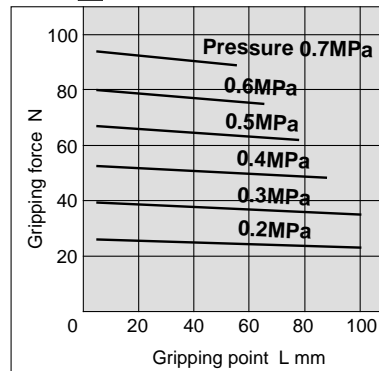
MHZ□2-16D



MHZ□2-20D

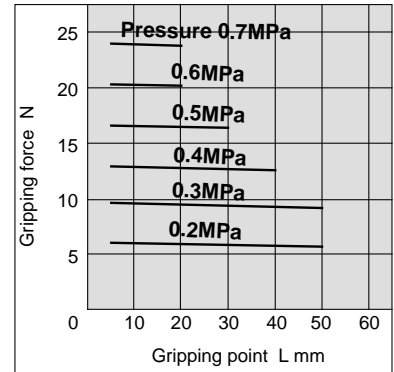


MHZ□2-25D

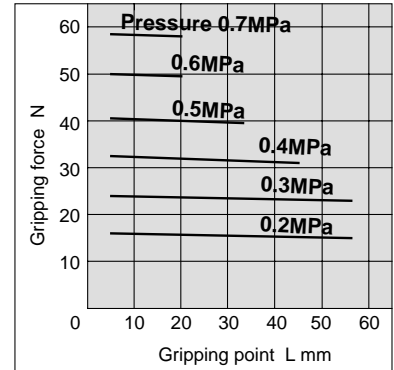


Internal gripping force

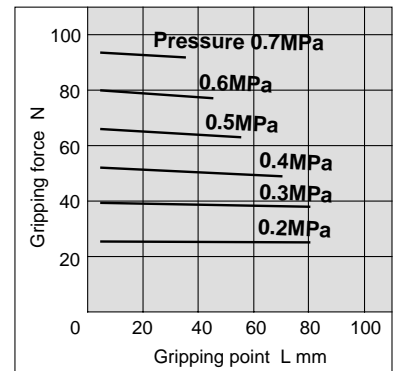
MHZ□2-10D



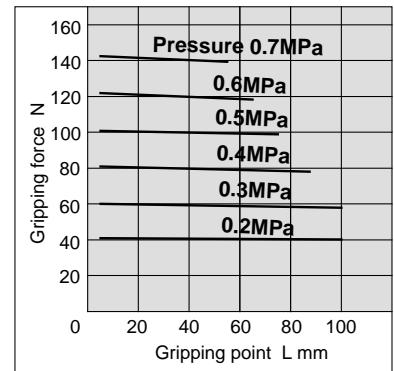
MHZ□2-16D



MHZ□2-20D



MHZ□2-25D



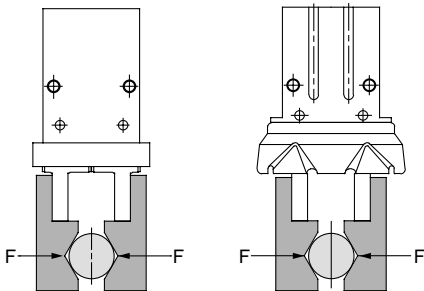
Series MHZ2/MHZJ2

Model Selection

Step 1 Effective gripping force: Series MHZ2 Single acting

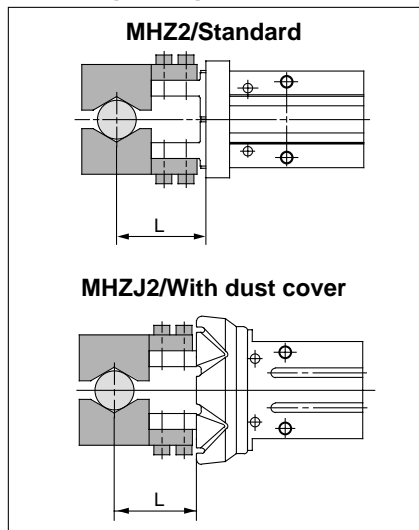
- Expressing the effective gripping force
The effective gripping force shown in the graphs to the right is expressed as F , which is the impellent force of one finger, when both fingers and attachments are in full contact with the work piece as shown in the figure below.

MHZ2/Standard MHZJ2/With dust cover

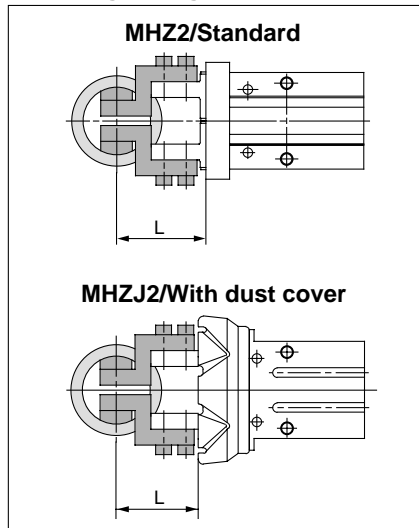


1N : approx. 0.102kgf
1MPa : approx. 10.2kgf/cm²

External gripping

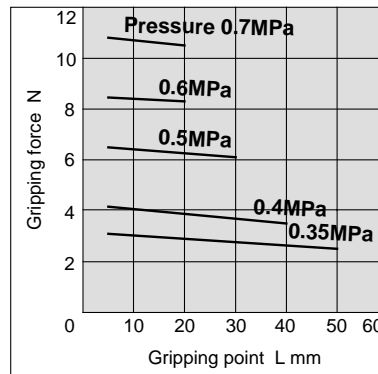


Internal gripping

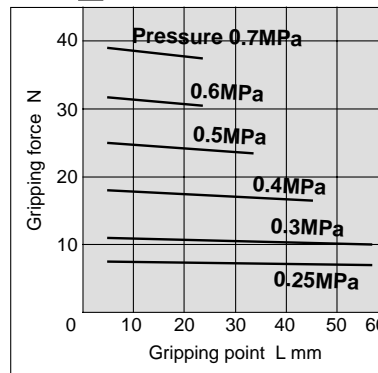


External gripping force

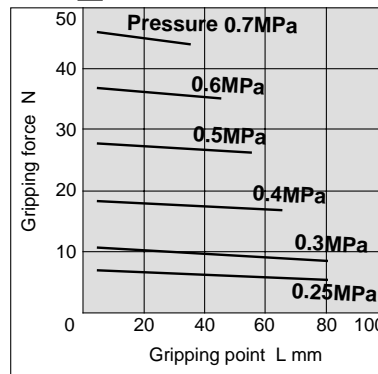
MHZ2-10S



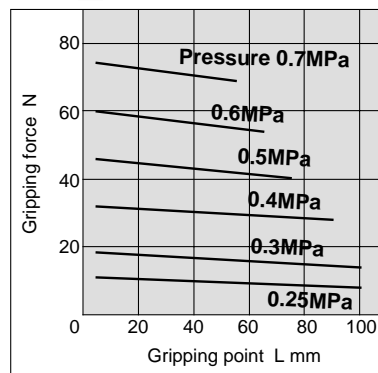
MHZ2-16S



MHZ2-20S

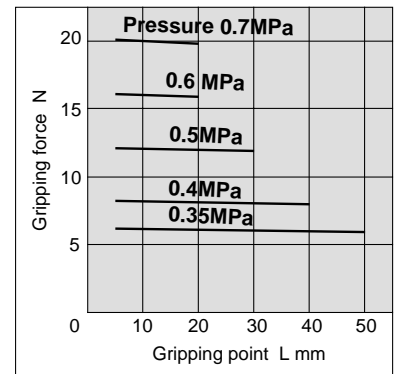


MHZ2-25S

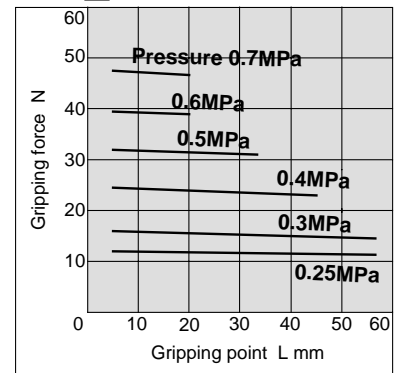


Internal gripping force

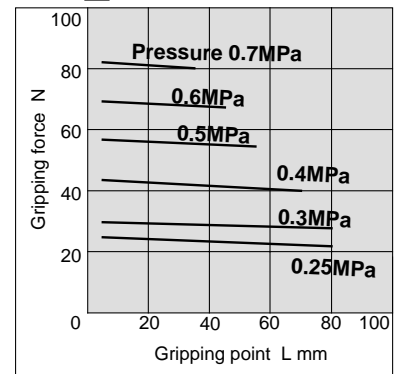
MHZ2-10C



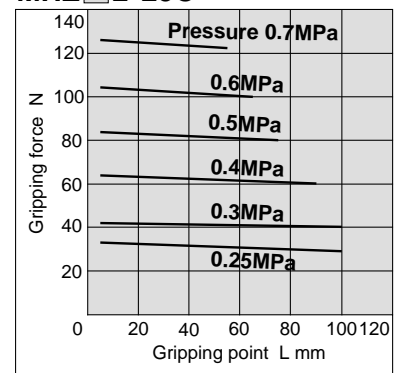
MHZ2-16C



MHZ2-20C

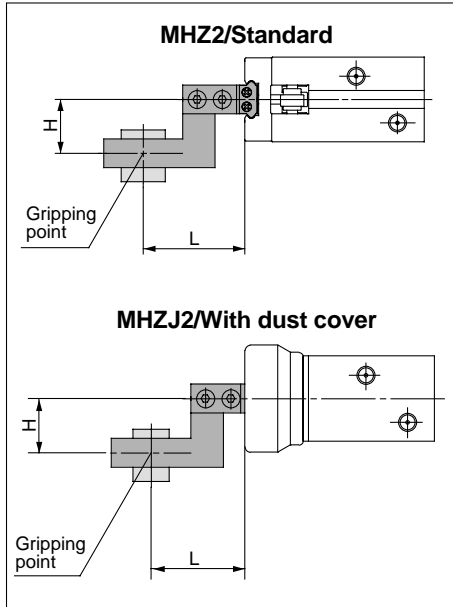


MHZ2-25C

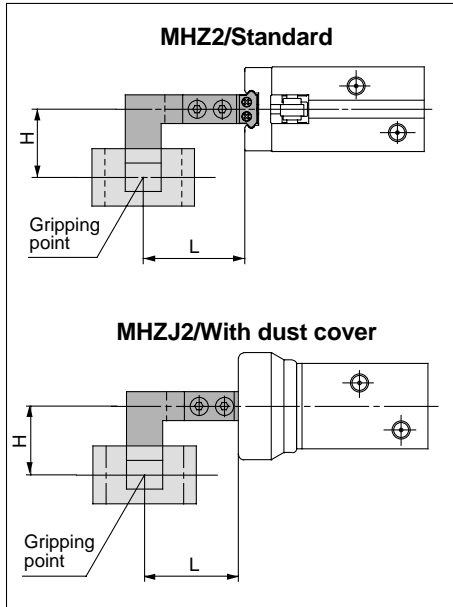


Step 2 Confirmation of gripping point: Series MHZ□2

External gripping



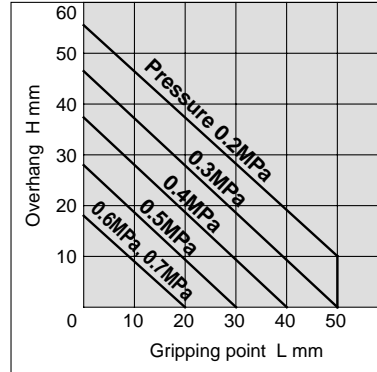
Internal gripping



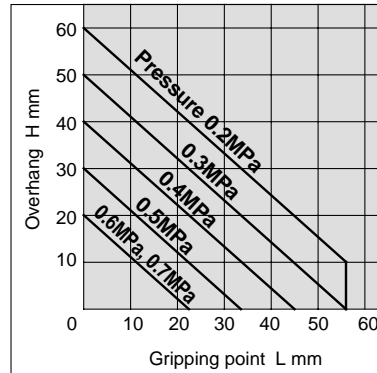
- The air gripper should be operated so that the work piece gripping point "L" and the amount of overhang "H" stay within the range shown for each operating pressure given in the graphs to the right.
- If the work piece gripping point goes beyond the range limits, this will have an adverse effect on the life of the air gripper.

External gripping

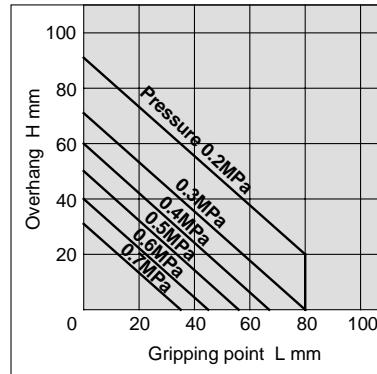
MHZ□2-10



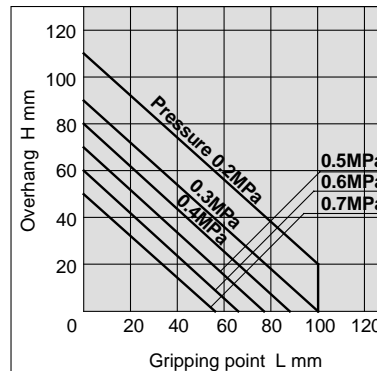
MHZ□2-16



MHZ□2-20

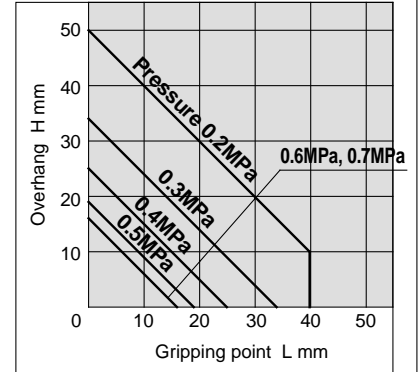


MHZ□2-25

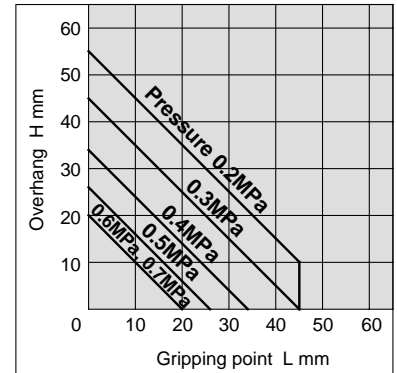


Internal gripping

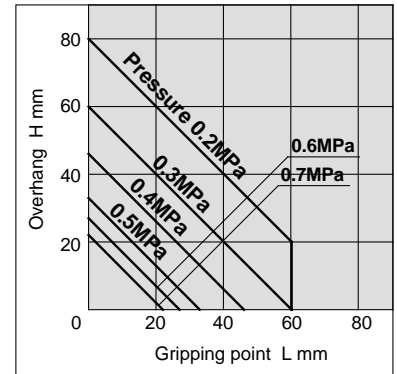
MHZ□2-10



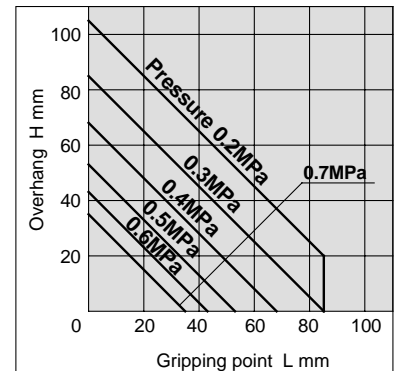
MHZ□2-16



MHZ□2-20



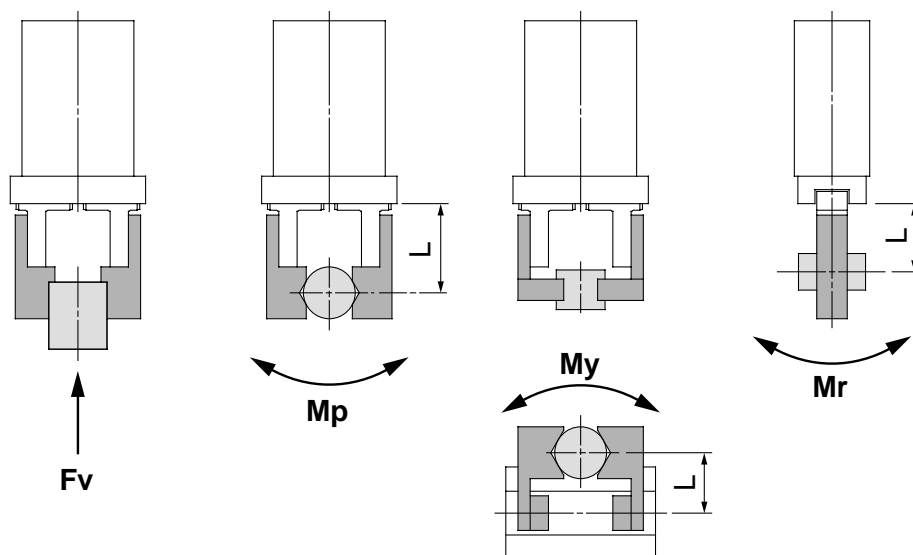
MHZ□2-25



Series MHZ2/MHZJ2

Model Selection

Step 3 Confirmation of external force on fingers: Series MHZ ☐ 2



L: Distance to the point at which the load is applied (mm)

Model	Allowable vertical load F (N)	Maximum allowable moment		
		Pitch moment: Mp (N·m)	Yaw moment: My (N·m)	Roll moment: Mr (N·m)
MHZ <input type="checkbox"/> 2-10	58	0.26	0.26	0.53
MHZ <input type="checkbox"/> 2-16	98	0.68	0.68	1.36
MHZ <input type="checkbox"/> 2-20	147	1.32	1.32	2.65
MHZ <input type="checkbox"/> 2-25	255	1.94	1.94	3.88

Note) The load and moment values in the table indicate static values.


Calculation of allowable external force (when moment load is applied)	Calculation example
$\text{Allowable load } F \text{ (N)} = \frac{M \text{ (maximum allowable moment) (N·m)}}{L \times 10^{-3}}$ <p>(* Unit conversion constant)</p>	<p>When a load of $f = 10\text{N}$ is operating, which applies pitch moment to point $L = 30\text{mm}$ from the MHZ2-16D guide.</p> $\text{Allowable load } F = \frac{0.68}{30 \times 10^{-3}}$ $= 22.7 \text{ (N)}$ <p>Load $f = 10 \text{ (N)} < 22.7 \text{ (N)}$ Therefore, it can be used.</p>





Series **MHZ2/MHZJ2**

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414 : Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems

Note 2) JIS B 8370 : Pneumatic system axiom

Warning

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

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc. (Bleed air into the system gradually to create back-pressure.)

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Series MHZ2/MHZJ2 Air Gripper Precautions 1

Be sure to read before handling.

Precautions on Design

Warning

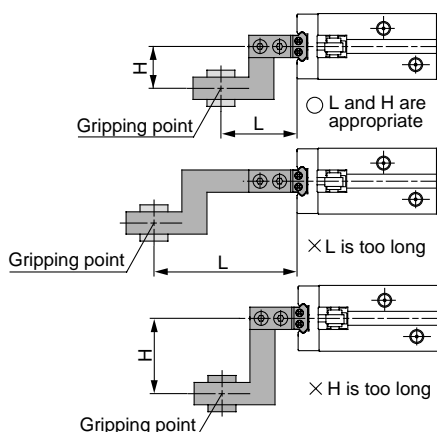
1. When moving work pieces pose a danger to personnel, or there is a danger of fingers being caught in a gripper, etc., implement safety measures such as mounting of protective covers.
2. If circuit pressure drops due to a power failure or trouble with the air supply, etc., there is a danger of work pieces dropping because of reduced gripping force. Implement drop prevention measures to avoid human injury and damage to machinery.

Selection

Warning

1. Keep the holding point within the limits of the specified gripping range.

When the gripping point distance becomes large, the finger attachments apply an excessively large load to the cross roller section, causing excessive play of the fingers and possibly leading to premature failure. Refer to the graph of the specified gripping distance range for each series.

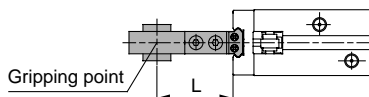


2. Design attachments to be as light and short as possible.

Selection

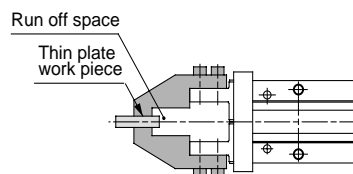
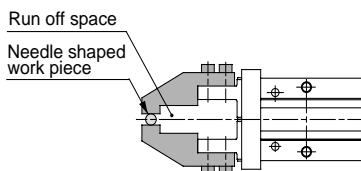
Warning

1. Long and heavy attachments increase the inertial force when opening and closing the fingers. This may cause unsteady movement of the fingers and have an adverse effect on product life.
2. Even with the gripping point within the limits of the range, make the attachment as light and short as possible.



3. Select a larger size gripper or use multiple grippers for handling long and large work pieces.
3. Provide run off space in the attachments when using for small or thin work pieces.

If run off space is not provided, gripping becomes unstable, and it may fail to grip or the position may slip, etc.



4. Select a model which has sufficient gripping force for the work piece weight.

Incorrect selection may lead to dropping of work, etc. Refer to the model selection criteria for each series pertaining to effective gripping force and work piece weight.

5. Do not use in applications where excessive external force or impact force will be applied to the gripper.

This may cause malfunction. Contact SMC for further information.

6. Select a model having a sufficient finger opening width for the work piece.

< In case of insufficient width >

1. Gripping becomes unstable due to variations in opening width or work piece diameter.
2. Causes detection failure when using an auto switch. Ensure a stroke sufficient to allow for hysteresis, after referring to

Selection

Warning

the information on auto switch hysteresis for each series.

Refer to auto switch hysteresis especially when using a water resistant 2 color indicator type auto switch, because the stroke may be limited by the light color setting at the time of detection.

7. Consult with SMC in case of a single acting type, gripping with spring force only.

This can cause unstable gripping in some cases or return malfunction, due to faulty operation, etc.

Mounting

Warning

1. Do not scratch or gouge the gripper by dropping or bumping it when mounting.

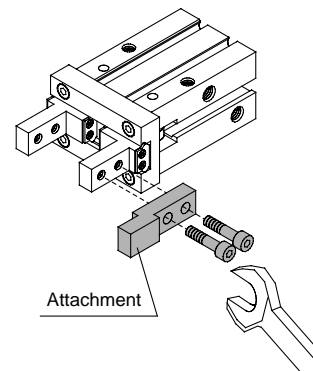
Even a slight deformation can cause inaccuracy or malfunction.

2. Tighten screws within the specified torque range when mounting the attachments.

Tightening with a higher torque than specified may cause malfunction, while tightening with a lower torque may allow slipping of the gripping position or dropping of work pieces.

Mounting attachments to the fingers

Mount attachments by inserting bolts, etc. into the female mounting threads on the fingers and tightening with the torque shown in the table below.



Model	Bolt	Maximum torque N·m
MHZ□2-10	M2.5 x 0.45	0.31
MHZ□2-16	M3 x 0.5	0.59
MHZ□2-20	M4 x 0.7	1.4
MHZ□2-25	M5 x 0.8	2.8



Series MHZ2/MHZJ2 Air Gripper Precautions 2

Be sure to read before handling.

Mounting

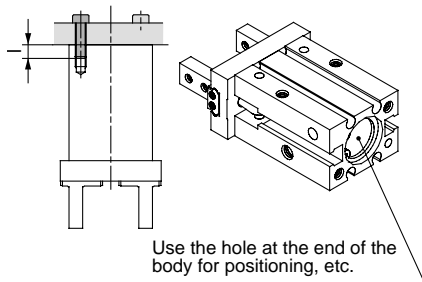
Warning

3. When mounting the air gripper, screws should be tightened properly at a torque value within the limits of the specified range.

Tightening at a torque above the limits of the range can cause malfunction, while tightening at a lower torque can cause slipping or dropping of work pieces, etc.

Mounting of air gripper

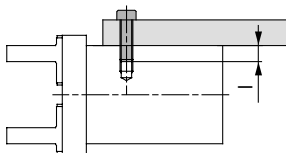
Axial mounting type (body tap)



Model	Bolts	Maximum torque N·m	Max. screw-in depth /mm
MHZ□2-10	M3 x 0.5	0.88	6
MHZ□2-16	M4 x 0.7	2.1	8
MHZ□2-20	M5 x 0.8	4.3	10
MHZ□2-25	M6 x 1	7.3	12

Model	Bore mm	Hole depth mm
MHZ□2-10	ø11H9 ₀ ^{+0.043}	2
MHZ□2-16	ø17H9 ₀ ^{+0.043}	2
MHZ□2-20	ø21H9 ₀ ^{+0.052}	3
MHZ□2-25	ø26H9 ₀ ^{+0.052}	3.5

Vertical mounting type (body tap)

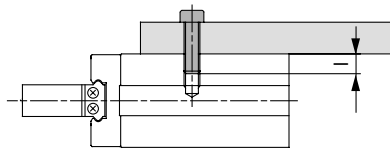


Model	Bolts	Maximum torque N·m	Max. screw-in depth /mm
MHZ□2-10	M3 x 0.5	0.9	6
MHZ□2-16	M4 x 0.7	1.6	4.5
MHZ□2-20	M5 x 0.8	3.3	8
MHZ□2-25	M6 x 1	5.9	10

Mounting of air gripper

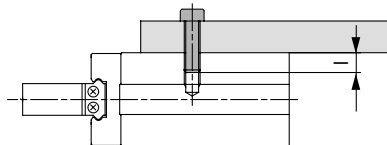
Side mounting type (body tap, body through hole)

- Using the body tap



Model	Bolts	Maximum torque N·m	Max. screw-in depth /mm
MHZ2-10	M3 x 0.5	0.69	5
MHZ2-16	M4 x 0.7	2.1	8
MHZ2-20	M5 x 0.8	4.3	10
MHZ2-25	M6 x 1	7.3	12

- Using the body through hole



Model	Bolts	Maximum torque N·m
MHZ□2-10	M2.5 x 0.45	0.49
MHZ□2-16	M3 x 0.5	0.88
MHZ□2-20	M4 x 0.7	2.1
MHZ□2-25	M5 x 0.8	4.3

Note) When mounting D-Y59, D-Y69 and D-Y7P type auto switches, only the body tap can be used.

The screw-in depth should follow the table below so that the end of the bolt does not press the body of the auto switch.

Model	Max. screw-in depth /mm
MHZ□2-10	5
MHZ□2-16	8
MHZ□2-20	10
MHZ□2-25	12

Caution

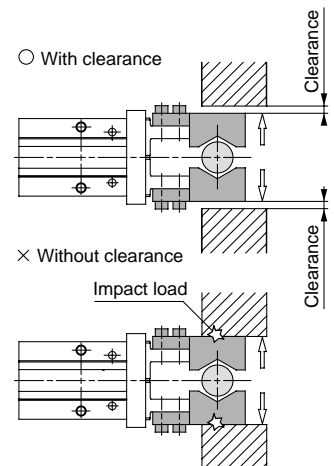
1. Avoid twisting the fingers when mounting the attachments.

Any deformation of fingers may cause malfunction and loss of accuracy.

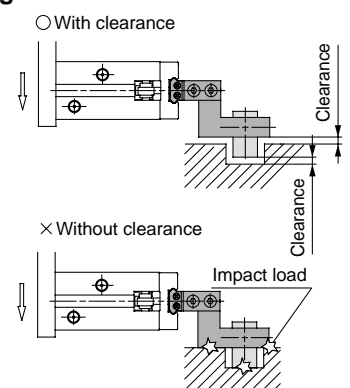
2. Adjust and confirm that external forces are not applied to the fingers.

Fingers may be damaged by continual lateral or impact load. Provide clearance to prevent the work piece or attachments from striking against any objects at the stroke end.

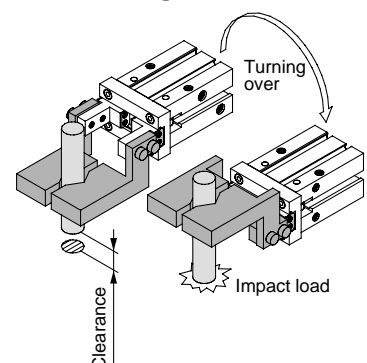
- 1) Stroke end with fingers open



- 2) Stroke end with air gripper moving



- 3) When turning over





Series MHZ2/MHZJ2 Air Gripper Precautions 3

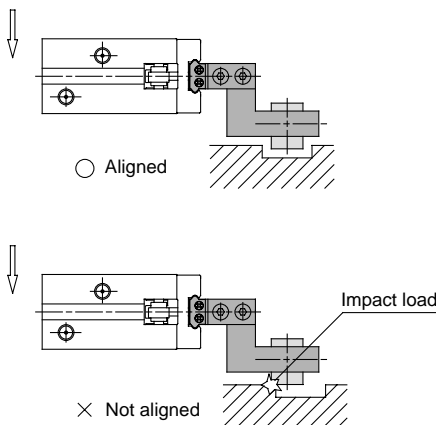
Be sure to read before handling.

Mounting

⚠ Caution

3. Perform thorough alignment so that excessive force is not applied to the fingers during the work piece gripping operation.

Particularly when performing a trial run, operation should be done manually or with low cylinder pressure and speed, while confirming that there is no impact or other unsafe conditions.



4. If the closing speed of the fingers is greater than necessary, rattling and damage can occur due to the inertia of the fingers and attachments. Therefore, a speed controller should be installed and adjusted so that there is no impact.

Applicable speed controllers

Air gripper direct
coupling type: AS1200-M5
AS2200-01, etc.

In-line type: AS1000 Series
AS1001F, AS2051F, etc.

Piping

⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of pipe tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the product.

Also, when pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of pipes, etc.

Operating Environment

⚠ Warning

1. In an environment where adverse effects appear to be especially likely, contact SMC before operating in a location having an atmosphere of corrosive gases, chemicals, sea water, water or water vapor, or where contact with any of these may occur.

There can be adverse effects on dust covers and seals, etc., causing malfunction or reducing the product's life. After confirming the nature of the environment, contact SMC regarding any questions which you may have.

2. Provide shading in locations which receive direct sunlight.
3. Do not use in locations where vibration or impact occurs.
4. Do not use in locations near heat sources or where radiated heat will be received.
5. Attach a cover or other protection in locations where there will be exposure to excessive amounts of dust or cutting oil.

Operating Environment

⚠ Warning

6. Contact SMC before using in an environment where adverse effects appear particularly likely.

Lubrication

⚠ Caution

1. The non-lube type air gripper is lubricated at the factory, and can be used without any further lubrication.

In the event that lubrication will be applied, use Class 1 turbine oil (without additives) ISO VG32. Moreover, once lubrication is applied, it must be continued.

If lubrication is later stopped, malfunction can occur due to loss of the original lubricant.

Maintenance

⚠ Warning

1. Do not allow people to enter or place objects, etc. into the carrying path of the air gripper.

This can cause injury or accidents, etc.

2. Do not put hands, etc. in between the air gripper fingers or attachments.

This can cause injury or accidents, etc.

3. When removing the air gripper, first confirm that no work pieces are being held and then release the compressed air before removing the air gripper.

If a work piece is still being held, there is a danger of it being dropped.



Series MHZ2/MHZJ2

Auto Switch Precautions 1

Be sure to read before handling.

Design and Selection

Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications for load current, voltage, temperature or impact.

2. Take precautions when multiple air grippers are used close together.

When multiple auto switch air grippers are used in close proximity, magnetic field interference may cause the switches to malfunction. Maintain a minimum air gripper separation of 40mm. (When the allowable separation is indicated for each air gripper series, use the specified value.)

3. Pay attention to the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V(\text{mm/s}) = \frac{\text{Auto switch operating range (mm)}}{\text{Time load applied (ms)}} \times 1000$$

4. Wiring should be kept as short as possible.

<Solid state switch>

Although wire length should not affect switch function, use a wire 100m or shorter.

5. Take precautions for the internal voltage drop of the switch.

<Solid state switch>

Generally, the internal voltage drop will be greater with a 2 wire solid state auto switch than with a reed switch.

- Take note that there will be a large voltage drop if auto switches are connected in series as shown below. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



- In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

Also, note that a 12VDC relay is not applicable.

6. Pay attention to leakage current.

<Solid state switch>

With a 2 wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3 wire switch if this specification will not be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Solid state switch>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch having a built-in surge absorbing element.

8. Cautions for use in an interlock circuit.

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch. Also perform periodic maintenance and confirm proper operation.

9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

Mounting & Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (1000m/s² or more for solid state switches) while handling.

Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper fastening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws, mounting bracket or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position. (Refer to page 26 regarding switch mounting, movement and fastening torque, etc.)

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken wires will result from applying repeated bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2 wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not run wiring near power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.



Series MHZ2/MHZJ2 Auto Switch Precautions 2

Be sure to read before handling.

Wiring

⚠ Warning

* Lead wire color changes

Lead wire colors of SMC switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.

Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

2 wire

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

Solid state with diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

3 wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid state with latch type diagnostic output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

5. Do not allow short circuit of loads.

<Solid state switch>

Models D-F9□(V), F9□W(V) and all models of PNP output type switches do not have built-in short circuit protection circuits. If loads are short circuited, the switches will be instantly damaged.

Take special care to avoid reverse wiring with the power supply line (brown) and the output line (black) on 3 wire type switches.

6. Avoid incorrect wiring.

<Solid state switch>

- 1) If connections are reversed on a 2 wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

Wiring

⚠ Warning

- 2) If connections are reversed (power supply line + and power supply line -) on a 3 wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (-) is connected to the black wire, the switch will be damaged.

Operating Environment

⚠ Warning

1. Never use in an atmosphere of explosive gases.

The structure of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside air grippers will become demagnetized.

3. Do not use in an environment where the auto switch will be continually exposed to water.

Although switches, except for a few models, conform to the IEC standard IP67 structure (JIS C 0920: watertight construction), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in an environment with oil or chemicals.

Consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Consult SMC if switches are used where there are temperature cycles other than normal air temperature changes, as they may be adversely affected.

Operating Environment

⚠ Warning

6. Do not use in locations where surge is generated.

<Solid state switch>

When there are units (solenoid type lifter, high frequency induction furnace, motor, etc.) which generate a large amount of surge in the area around air grippers with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and disorganized lines.

7. Avoid accumulation of iron powder or close contact with magnetic substances.

When a large amount of ferrous powder such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch air gripper, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the air gripper.

Maintenance

⚠ Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

- 1) Secure and tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

- 2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

- 3) Confirm the lighting of the green light on the 2 color indicator type switch.

Confirm that the green LED is on when stopped at the established position. If the red LED is on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

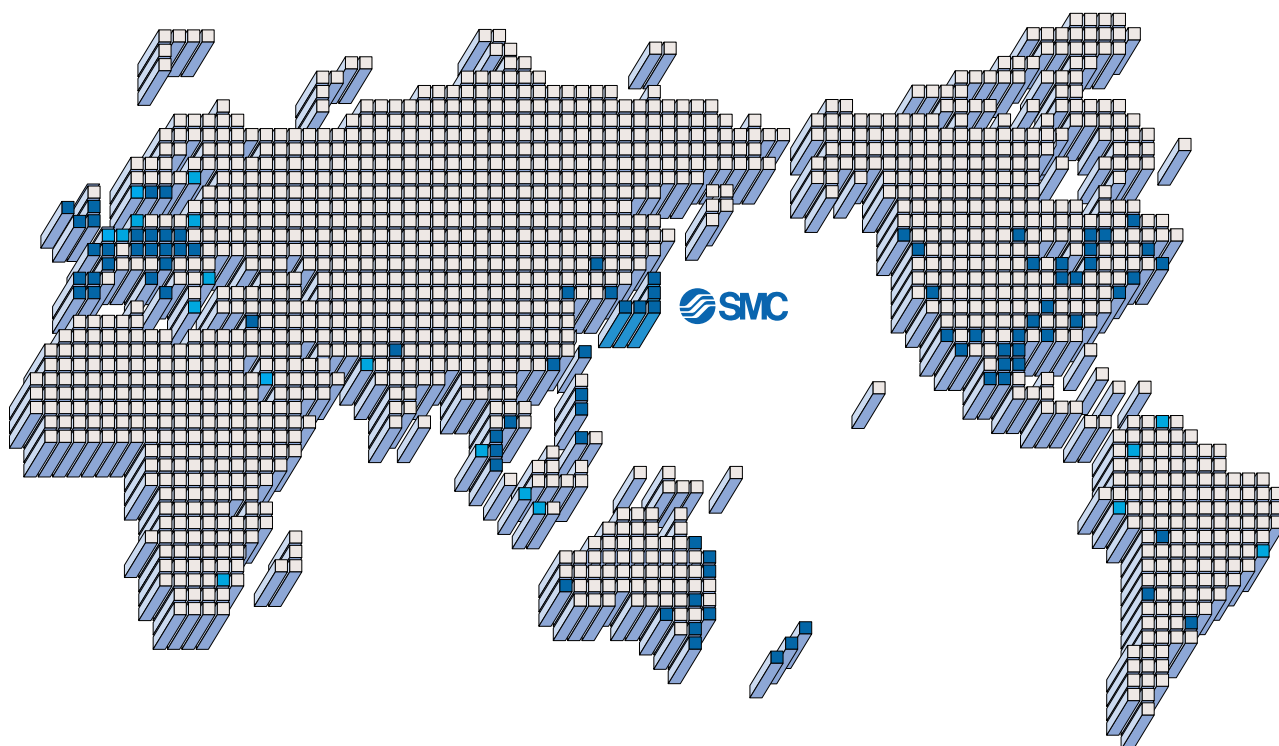
Other

⚠ Warning

1. Consult SMC concerning water resistance, elasticity of lead wires, and usage at welding sites, etc.



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