

MSD/MSDG

Small compact cylinder

Space saving structure

ø6/ø8/ø12/ø16

Overview

Small bore size series for compact cylinder (SSD) Bore size is from ø6 to ø16. Type with high precision guide (MSDG) is also available.

Features

Axial direction length is reduced.

Mounting space is reduced.

Design with long service life 4 times greater than conventional.

Abrasion resistance is improved.

Oil-impregnated copper alloy bearing is adopted for bearing section.

Piping can be selected from 2 directions of body side surface and bottom surface.

Can be mounted directly from 3 directions.



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SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

**MSD/
MSDG**

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending

Axial space saving equipped with high precision guide.

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/
COVPIN2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/
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FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd
Contr
Ending

● Axial space saving

Axial direction length is reduced.
Mounting space can be reduced.

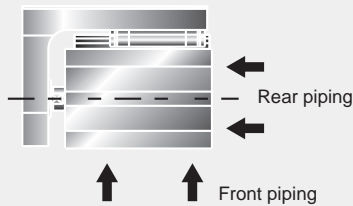
● Design with long service life (approx. 4 times greater than the conventional)

Oil-impregnated copper alloy bearing is adopted for rod bearing section to increase abrasion resistance.

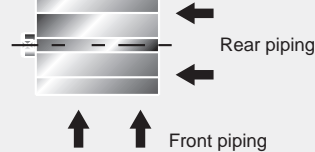
● Piping direction can be selected

Piping can be selected from 2 directions: body side surface and bottom surface (rear common port).

● MSDG



● MSD



● Equipped with F Series with miniature switch

With a compact size of $\phi 6/\phi 8$, with switch is realized.

● Direct mounting from 3 faces

As a square body is adopted, it can be directly mounted from any direction. Mounting to the body top surface and bottom surface can be done with through bolt and tapped hole. In addition, body side surface mounting is now also possible through the adoption of a rear common port.

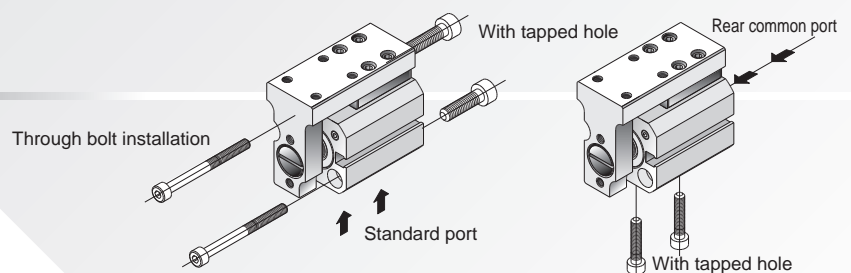
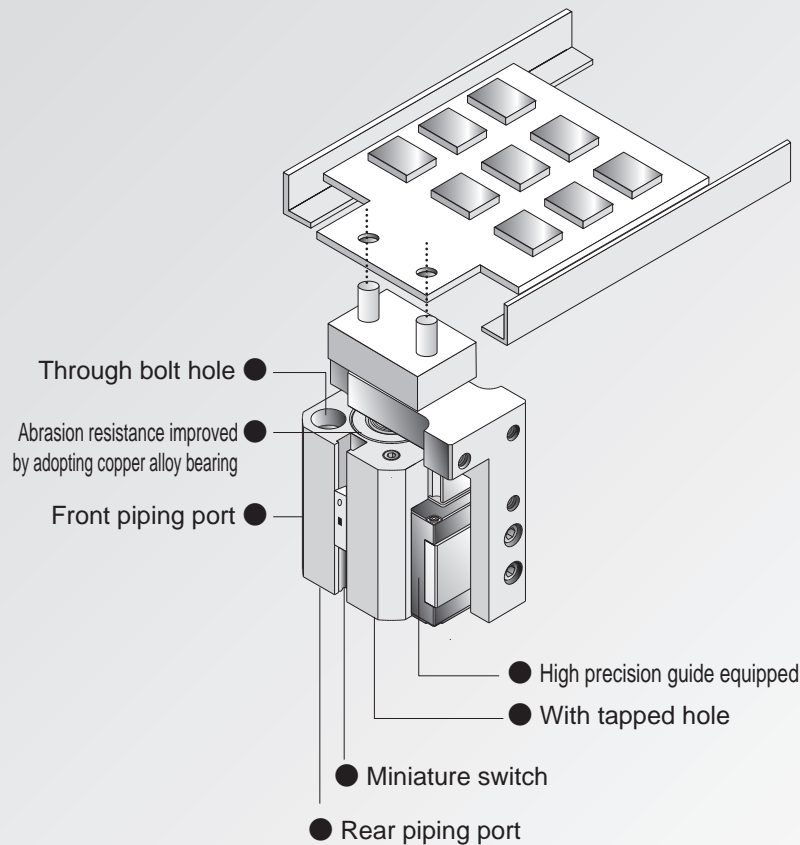
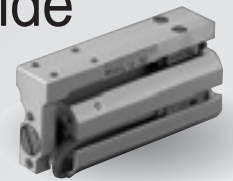
High precision/high rigidity achieved by saving space

With high precision guide

MSDG Series

● Axial space saving with guide

Short axial length MSD Series equipped with high precision guide. Caters to the high-precision/high-rigidity needs of confined spaces.



ø6,ø8 added to conventional compact cylinder

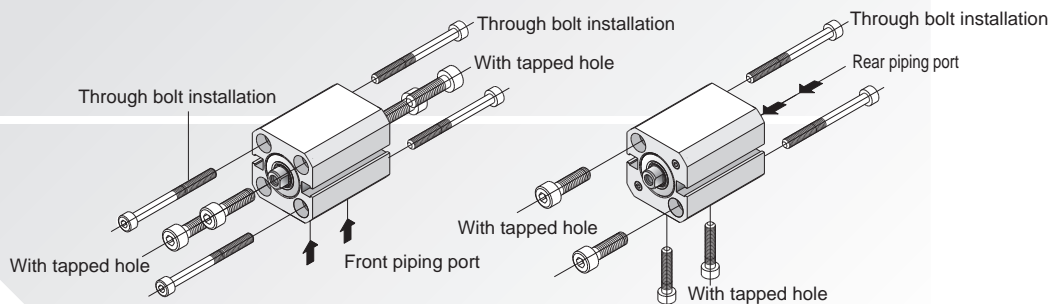
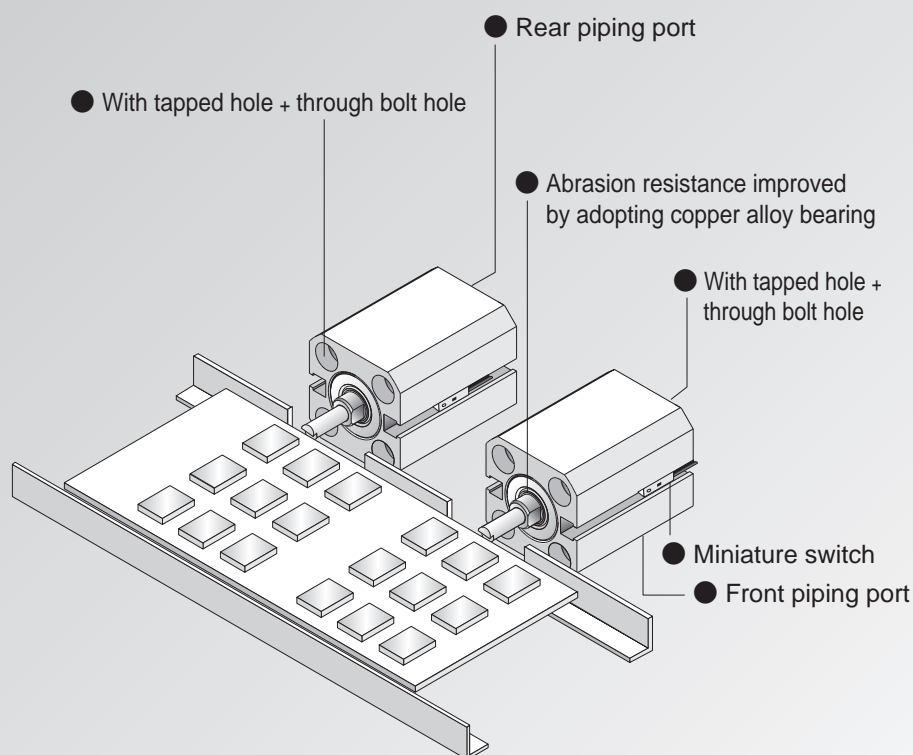
Small compact cylinder MSD series, further equipped with a high precision guide

New MSG Series of compact cylinders with small guides

ø6, ø8 added to
the compact cylinder

MSD Series

● Axial space saving achieved



SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

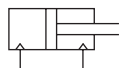
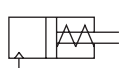






Ending

Series variation



Small compact cylinder MSD/MSDG Series

- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/
COVPIN2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC
- SMG
- MSD/
MSDG**
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd
Contr
- Ending

Variation	Model No.	Bore size (mm)	Standard stroke (mm)					
			5	10	15	20	25	30
Double acting/ single rod with switch	MSD MSD-L 	ø6/ø8	●	●	●	●	●	●
Single acting/ push with switch	MSD-X MSD-XL 	ø6/ø8	●	●				
Single acting/ pull with switch	MSD-Y MSD-YL 	ø6/ø8	●	●				
Double acting/ high load with switch	MSD-K MSD-KL 	ø6/ø8 ø12/ø16	●	●	●	●	●	●
Double acting/single rod fine speed with switch	MSD-F MSD-LF 	ø6/ø8	●	●	●	●	●	●
High load/ fine speed with switch	MSD-KF MSD-KLF 	ø6/ø8	●	●	●	●	●	●
		ø12/ø16	●	●	●	●	●	●
Double acting/ guided	MSDG-L 	ø6/ø8 ø12/ø16	●	●	●	●	●	●
Double acting/ guided/ fine speed	MSDG-LF 	ø12/ø16	●	●	●	●	●	●

●: Standard, ◎: Option, ■ : Not available

	Min. stroke (mm)	Max. stroke (mm)	Option	Switch	Page
			Rear piping		
			R		
	5	30	◎	◎	1422
	5	10	◎	◎	1430
	5	10	◎	◎	1430
	5	30	◎	◎	1440
	5	30	■	◎	1450
	5	30	■	◎	1450
	5	30	◎	◎	1452
	5	30	◎	◎	1462

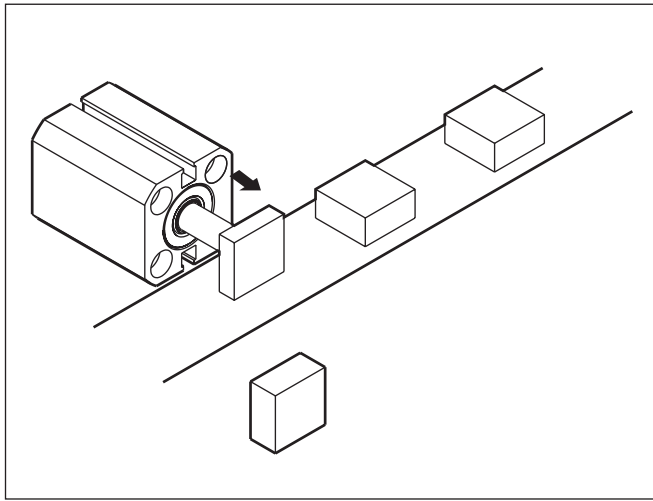
SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
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SMG
MSD/ MSDG
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SRM3
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Spd Contr
Ending

MSD/MSDG Series

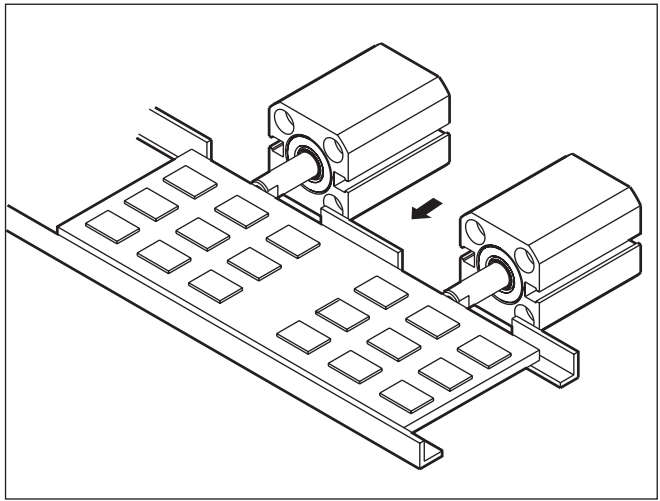
Applications

- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/
COVPIN2
- SSD2
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MSDG**
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Contr
- Ending

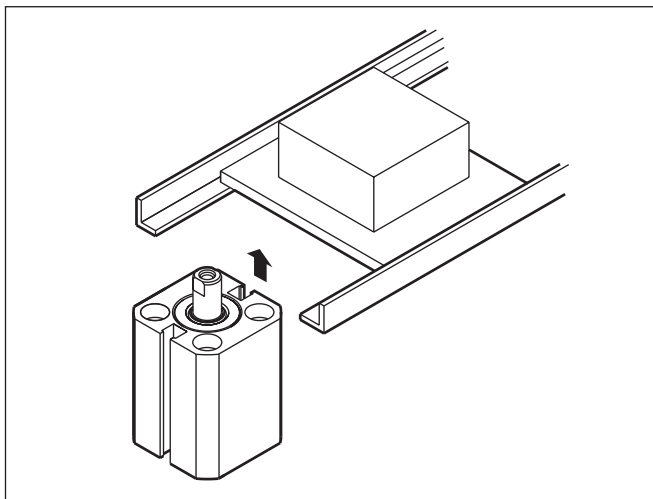
Sorting of good/defective products



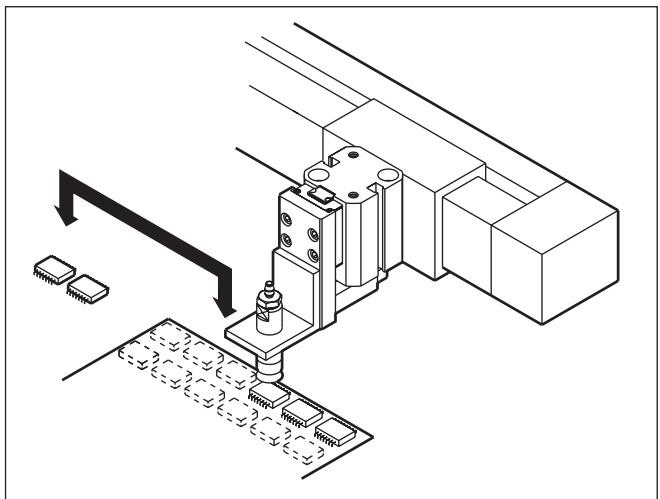
Clamp



Positioning of pallet/stopper

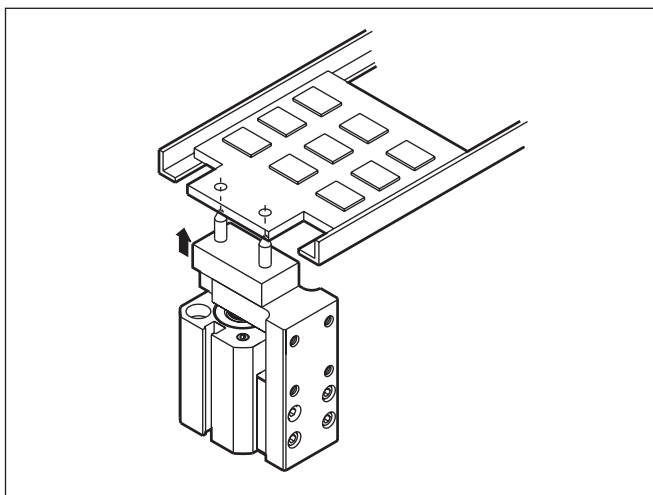


Conveying workpieces

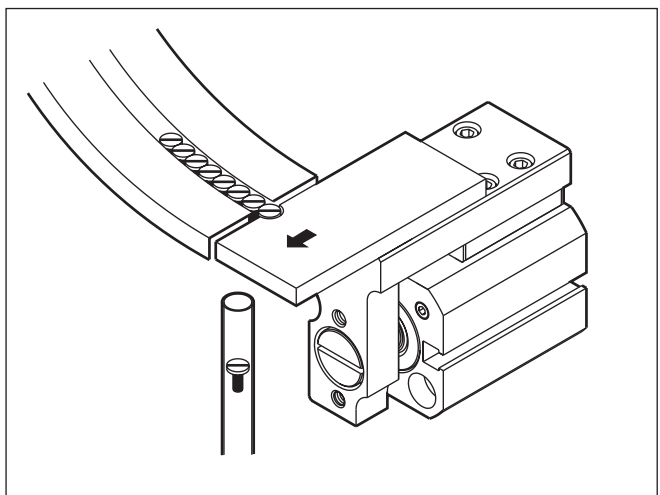


Note: Consult with CKD when using the product as stopper.

Positioning using pin hole



Compact parts-feeding



Variation and option combination selection table

● MSD Series

- ⊙: Option
- : Available (made-to-order product)
- △: Available depending on conditions
- x: Not available

Category	Code	Category	Variation							Option
		None	Double acting/single rod	High load	Single acting/push	Single acting/pull	With cylinder switch	Fine speed	Rear piping	
Variation	Double acting/single rod	Blank								⊙
	High load	K			x	x	⊙	⊙	⊙	
	Single acting/push	X				x	⊙	x	⊙	
	Single acting/pull	Y					⊙	x	⊙	
	With cylinder switch	L						⊙	⊙	
	Fine speed	F							⊙	
Accy. Option	Rear common port	R								
	Cylinder switch	Listed separately	⊙	⊙	⊙	⊙	⊙	⊙	⊙	

● Guided MSDG series

- ⊙: Option
- : Available (made-to-order product)
- △: Available depending on conditions
- x: Not available

Category	Code	Category	Variation	Port thread	Option		
		None	Double acting/single rod	Fine speed	NPT	G	Rear piping
Variation	Double acting/single rod	Blank			x	x	⊙
	Fine speed	F			x	x	⊙
Port thread	NPT	N				x	x
	G	G					
Accy. Option	Rear common port	R					
	Cylinder switch	Listed separately	⊙	⊙	x	x	⊙

SCP*3

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SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

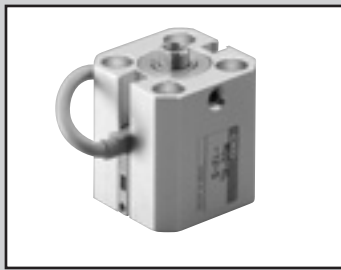
ShkAbs

FJ

FK

Spd
Contr

Ending



Small compact cylinder double acting/single rod

MSD Series

● Bore size: $\phi 6/\phi 8$

JIS symbol



Double acting



Specifications

Item	MSD MSD-L (with switch)
Bore size mm	$\phi 6, \phi 8$
Actuation	Double acting
Working fluid	Compressed air
Max. working pressure MPa	1.0 (≈ 150 psi, 10 bar)
Min. working pressure MPa	0.15 (≈ 22 psi, 1.5 bar)
Proof pressure MPa	1.6 (≈ 230 psi, 16 bar)
Ambient temperature $^{\circ}\text{C}$	-10 (14°F) to 60 (140°F) (no freezing)
Port size	M3
Stroke tolerance mm	+0.5
	0
Working piston speed mm/s	50 to 500
Cushion	None
Lubrication	Not required (use turbine oil ISO VG32 if necessary for lubrication)
Allowable absorbed energy J	This product cannot absorb the energy generated by an external load mounted on the cylinder. When using the product with no load, separately provide a shock absorber on the outside.

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10/15/20/25/30	30	10	5(10)	5	5
$\phi 8$	5/10/15/20/25/30	30	10	5(10)	5	5

*1: Products with stroke other than standard stroke are not available.

*2: For F2Y, F3Y or F3P, the min. stroke will be the dimensions in ().

Switch specifications

Item	2-wire reed		2-wire proximity		3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC	10 to 30 VDC	24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less		0.5 V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μA or less			
Lead wire length	Standard 1 m (oil resistant vinyl cabtyre cable 2-conductor 0.15 mm ²)				Standard 1 m (oil resistant vinyl cabtyre cable 3-conductor 0.15 mm ²)			
Shock resistance	294 m/s ²		980 m/s ²					
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60 $^{\circ}\text{C}$							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight g	1 m:10 3 m:29							

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25 $^{\circ}\text{C}$. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25 $^{\circ}\text{C}$. (5 to 10 mA at 60 $^{\circ}\text{C}$)

*4: The F-switch uses a bend-resistant lead wire.

Cylinder weight table

(Unit: g)

Stroke (mm)	5		10		15		20		25		30		Weight per switch
Bore size (mm)	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	
ø6	22	24	25	27	27	29	30	32	33	35	36	38	Refer to the weight in the switch specifications.
ø8	23	26	28	31	33	36	38	41	42	45	47	50	

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa									
		0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	Push	4.24	5.65	8.48	11.3	14.1	17.0	19.8	22.6	25.4	28.3
	Pull	2.36	3.14	4.71	6.28	7.85	9.42	11.0	12.6	14.1	15.7
ø8	Push	7.54	10.1	15.1	20.1	25.1	30.2	35.2	40.2	45.2	50.3
	Pull	4.59	6.13	9.19	12.3	15.3	18.4	21.4	24.5	27.6	30.6

- SCP*3
- CMK2
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Contr
- Ending

MSD Series

How to order

● No switch (without magnet for switch)



● With switch (built-in magnet for switch)



A Model No.

B Bore size

C Stroke

D Switch model No.

*1

E Switch quantity

F Option

*2

⚠ Precautions for model No. selection

*1 : For $\phi 6$ or $\phi 8$ with switch, use a non-magnetic (stainless steel, etc.) mounting bolt.*2 : For rear piping, body side installation is possible. Note that 2 bolts are used for rod side installation and head side installation.

[Example of model No.]

MSD-L-6-5-F0H-R-R

- A Model No. : Double acting/single rod with switch
- B Bore size : $\phi 6$ mm
- C Stroke : 5 mm
- D Switch model No. : Reed F0H switch, lead wire 1 m
- E Switch quantity : 1 on rod side
- F Option : Rear piping

How to order switch



Switch model No.
(Item D above)

Code	Description	
A Model No.		
MSD	Double acting/single rod	No switch
MSD-L		With switch

B Bore size (mm)	
6	$\phi 6$
8	$\phi 8$

C Stroke (mm)	
5	5
10	10
15	15
20	20
25	25
30	30

D Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
F0H*	F0V*	Reed		●	1-color LED	2-wire
-	F2S*			●		
F2H*	F2V*			●		
-	F3S*	Proximity		●	1-color LED (PNP output) (custom)	3-wire
F3H*	F3V*			●		
F3PH*	F3PV*			●		
F2YH*	F2YV*			●		
F3YH*	F3YV*			●	2-color LED	3-wire

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)

E Switch quantity	
R	1 on rod side
H	1 on head side
D	2

F Option	
Blank	Front piping
R	Rear piping

Specifications for rechargeable battery

(Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process

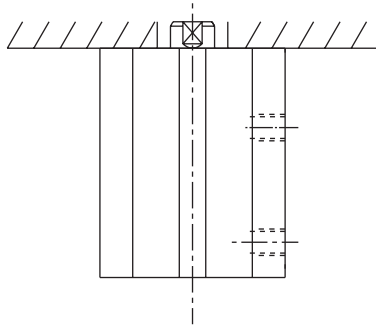
MSD - - P4*

Switch selection table

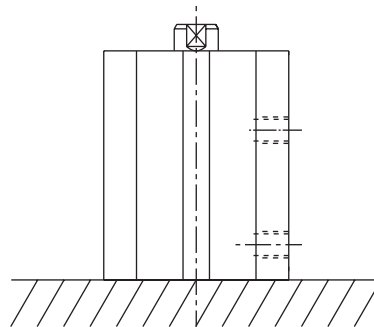
Switches may not be installable depending on relations between cylinder installation and stroke.
Refer to the table below to select a switch.

Switches cannot be used for side mounting in the following combinations.

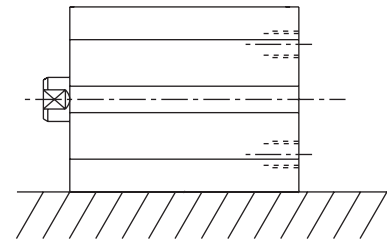
- Combinations in which F2YH/V, F3YH/V or F3PH/V is mounted at the switch mounting position H with stroke 5 mm
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke 10 mm
(Refer to page 1422 for the min. stroke with switch)



For rod side installation



For head side installation



For side installation

● For rod side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position	
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	○	○	○	○	○	○	○	×	○	○	○	×	○	×
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø8	5	○	○	○	○	○	○	○	×	○	○	○	×	○	×
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○

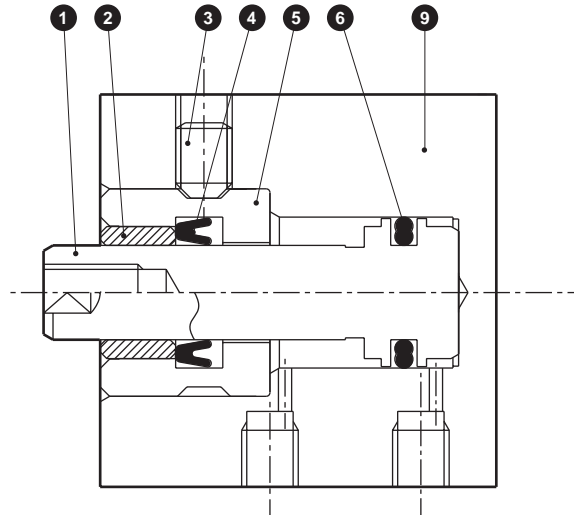
● For head side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position	
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	×	×	○	○	○	○	×	○	○	○	×	×	○	×
	10	○	×	○	○	○	○	×	○	○	○	×	○	○	○
	15	○	×	○	○	○	○	○	○	○	○	×	○	○	○
	20 to	○	×	○	○	○	○	○	○	○	○	○	○	○	○
ø8	5	×	×	○	○	○	○	×	○	○	○	×	×	○	×
	10	○	×	○	○	○	○	×	○	○	○	×	○	○	○
	15	○	×	○	○	○	○	○	○	○	○	×	○	○	○
	20 to	○	×	○	○	○	○	○	○	○	○	○	○	○	○

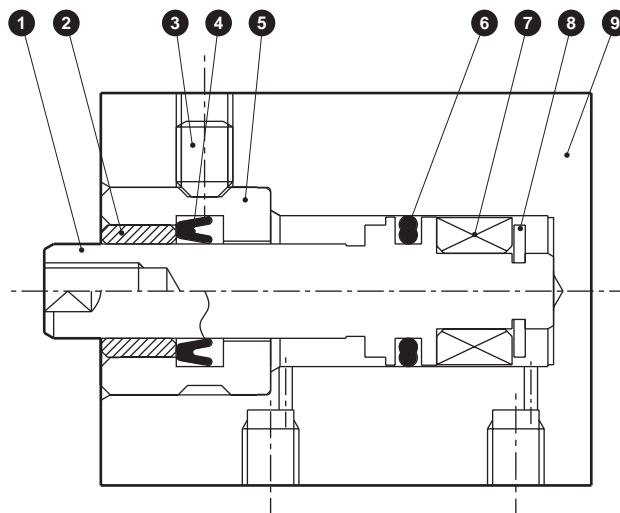
SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending

Internal structure and parts list

● MSD-6/8



● MSD-L-6/8

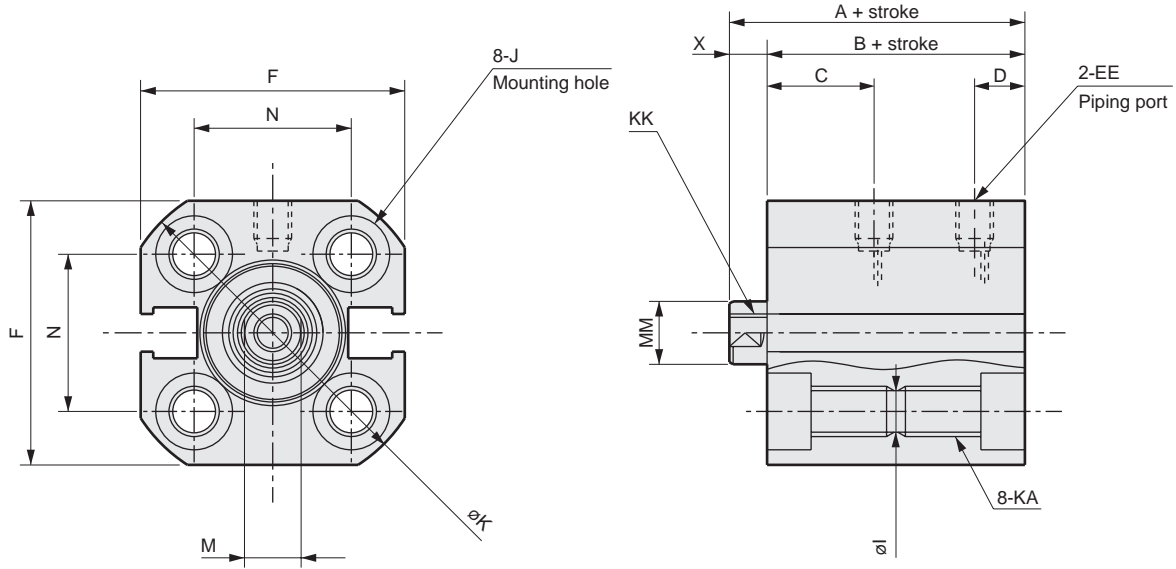


Cannot be disassembled

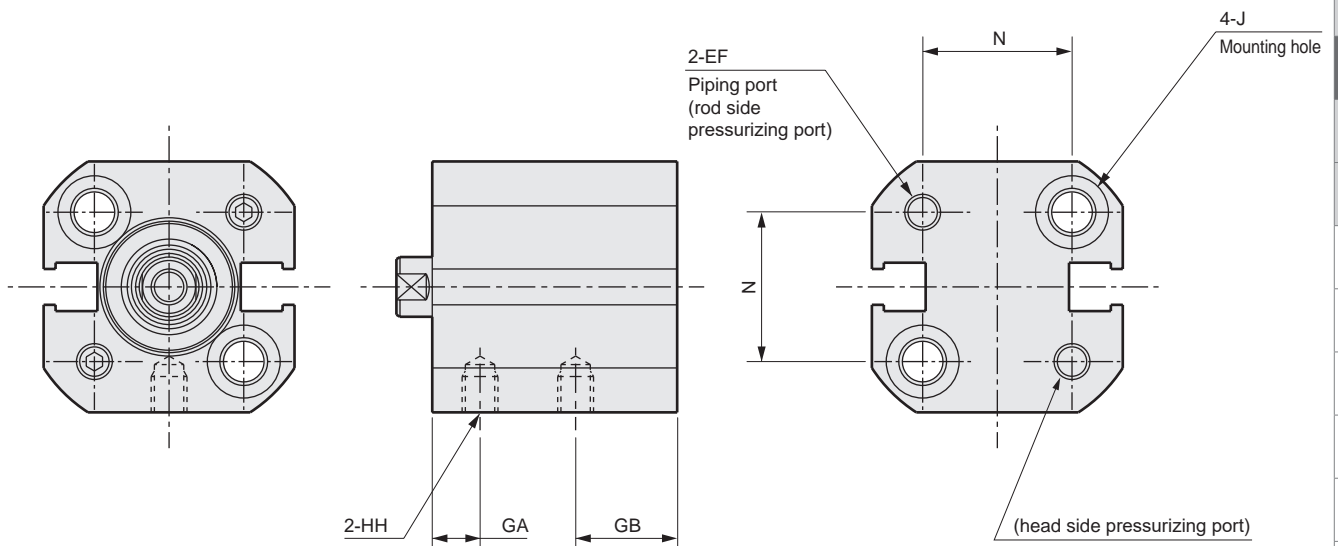
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		6	Piston packing	Nitrile rubber	
2	Bush	Oil-impregnated copper alloy		7	Magnet	Plastic	
3	Hexagon socket set screw	Stainless steel		8	E type snap ring	Stainless steel	
4	Rod packing	Nitrile rubber		9	Body	Aluminum alloy	Hard alumite
5	Rod metal	Stainless steel					

Dimensions

● MSD-(L)-6/8



● MSD-(L)-6/8*-R (rear piping)



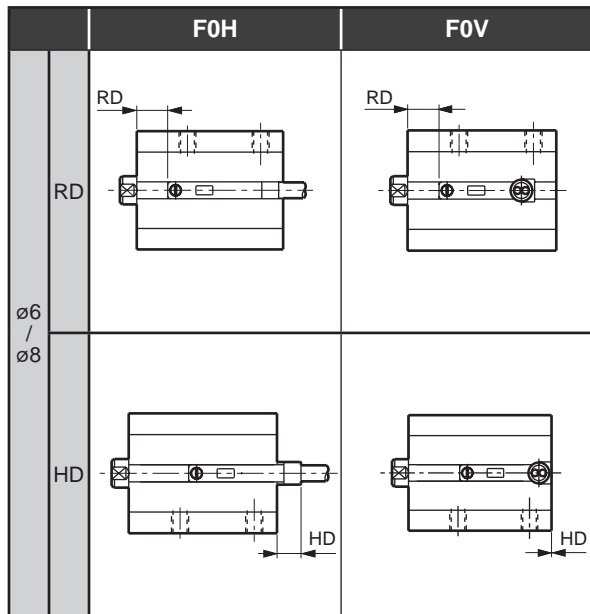
Bore size (mm)	No switch		With switch		Common dimensions for types with/without switches												
	A	B	A	B	C	D	EE	EF	F	GA	GB	HH	I	J	K	KA	
ø6	17.5	14.5	22.5	19.5	7.5	4	M3	M3	19	3	8.5	M3 depth 3	3.2	Spot face ø6.1 depth 3.5	22.5	M4 depth 6	
ø8	19	16	24	21	9	4	M3	M3	21	4.5	8.5	M3 depth 3	3.2	Spot face ø6.1 depth 3.5	25	M4 depth 6	

Bore size (mm)	Common parts for types with/without switches				
	KK	M	MM	N	X
ø6	M2.5 depth 4	3.5	4	11	3
ø8	M3 depth 5	4.5	5	12.5	3

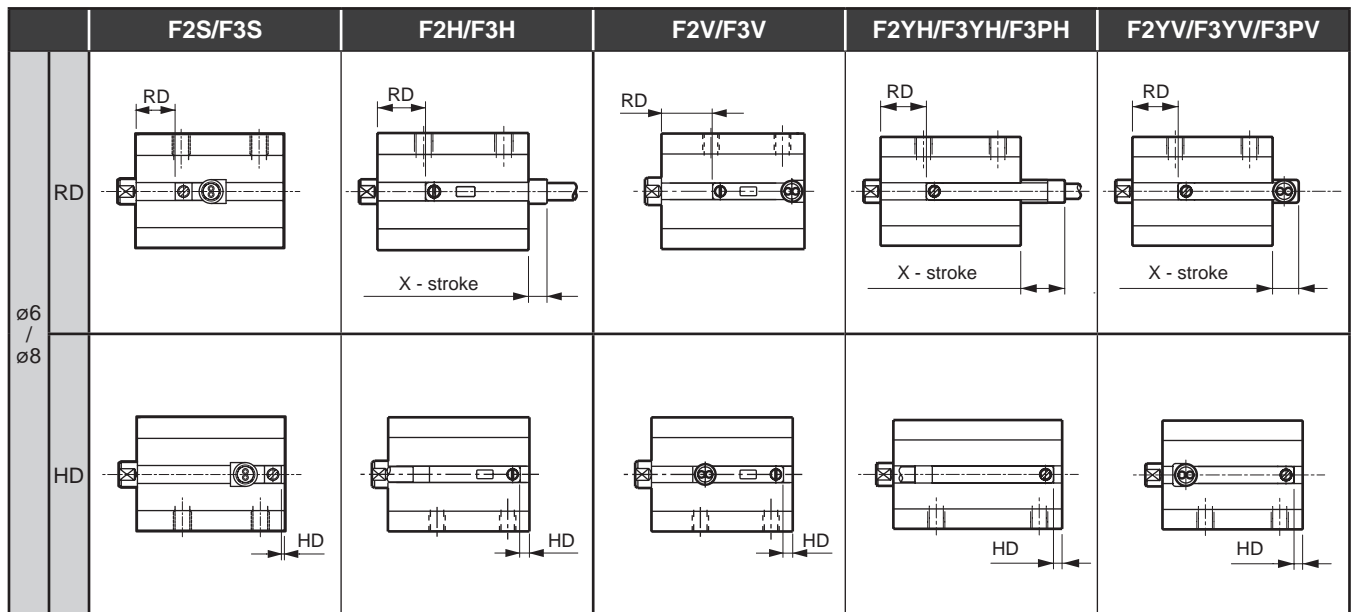
SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending

Switch mounting position

● Reed switch



● Proximity switch



Switch mounting position dimensions

(Unit: mm)

Model	Bore size (mm)	Reed switch				Proximity switch												
		F0H		F0V		F2S/F3S		F2H/F3H			F2V/F3V		F2YH/F3YH/F3PH			F2YV/F3YV/F3PV		
		RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)
MSD-L	ø6	3.5	3.5	3.5	0.0	6.5	0.5	7.5	1.5	7.7	7.5	1.5	7.5	1.5	12.2	7.5	1.5	9.2
	ø8	5.5	4.0	5.5	0.0	8.5	0.0	9.5	1.0	8.2	9.5	1.0	9.5	1.0	12.7	9.5	1.0	9.7

*1: X dimensions indicate the switch protrusion from the body end surface. When the X-stroke is negative, there is no protrusion from the body end surface.

MEMO

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

**MSD/
MSDG**

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending

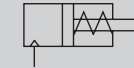


Small compact cylinder single acting/push
single acting/pull

MSD-^X_Y Series

● Bore size: $\phi 6/\phi 8$

JIS symbol



Single acting/push



Single acting/pull



Specifications

Item	MSD-X MSD-XL (with switch)		MSD-Y MSD-YL (with switch)	
	$\phi 6$	$\phi 8$	$\phi 6$	$\phi 8$
Bore size mm	$\phi 6$	$\phi 8$	$\phi 6$	$\phi 8$
Actuation	Single acting/push		Single acting/pull	
Working fluid	Compressed air			
Max. working pressure MPa	1.0 (≈ 150 psi, 10 bar)			
Min. working pressure MPa	0.3 (≈ 44 psi, 3 bar)		0.4 (≈ 58 psi, 4 bar)	0.3 (≈ 44 psi, 3 bar)
Proof pressure MPa	1.6 (≈ 230 psi, 16 bar)			
Ambient temperature $^{\circ}\text{C}$	-10 (14°F) to 60 (140°F) (no freezing)			
Port size	M3			
Stroke tolerance mm	+0.5			
Working piston speed mm/s	0			
Cushion	50 to 500			
Lubrication	None			
Allowable absorbed energy J	Not required (use turbine oil ISO VG32 if necessary for lubrication)			
	This product cannot absorb the energy generated by an external load mounted on the cylinder. When using the product with no load, separately provide a shock absorber on the outside.			

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10	10	10	5(10)	5	5
$\phi 8$	5/10	10	10	5(10)	5	5

*1: Products with stroke other than standard stroke are not available.

*2: For F2Y, F3Y or F3P, the min. stroke will be the dimensions in ().

Switch specifications

Item	2-wire reed		2-wire proximity		3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC	10 to 30 VDC	24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less		0.5 V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μA or less			
Lead wire length	Standard 1 m (oil resistant vinyl cabtyre cable 2-conductor 0.15 mm ²)				Standard 1 m (oil resistant vinyl cabtyre cable 3-conductor 0.15 mm ²)			
Shock resistance	294 m/s ²	980 m/s ²						
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60 $^{\circ}\text{C}$							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight g	1 m:10 3 m:29							

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25 $^{\circ}\text{C}$. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25 $^{\circ}\text{C}$.
(5 to 10 mA at 60 $^{\circ}\text{C}$)

*4: The F-switch uses a bend-resistant lead wire.

Cylinder weight table

● MSD-X/MSD-XL

(Unit: g)

Stroke (mm)	5		10		Weight per switch
Bore size (mm)	No switch	With switch	No switch	With switch	
ø6	23	25	28	30	Refer to the weight in the switch specifications.
ø8	24	27	33	36	

● MSD-Y/MSD-YL

(Unit: g)

Stroke (mm)	5		10		Weight per switch
Bore size (mm)	No switch	With switch	No switch	With switch	
ø6	25	27	31	33	Refer to the weight in the switch specifications.
ø8	28	31	38	41	

Spring load

(Unit: N)

Bore size (mm)	Stroke (mm)	Spring load	
		Set	Operating
ø6	5	1.59	4.90
	10		
ø8	5	3.19	6.86
	10		

Theoretical thrust table

● MSD-X

(Unit: N)

Bore size (mm)	Working pressure MPa							
	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	3.58	6.41	9.24	12.1	14.9	17.7	20.5	23.4
ø8	8.22	13.2	18.3	23.3	28.3	33.4	38.4	43.4

● MSD-Y

(Unit: N)

Bore size (mm)	Working pressure MPa							
	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	-	1.38	2.95	4.52	6.10	7.67	9.24	10.8
ø8	2.33	5.39	8.46	11.5	14.6	17.6	20.7	23.8

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending

MSD-X Y Series

How to order

● No switch (without magnet for switch)



● With switch (built-in magnet for switch)



A Model No.

B Bore size

C Stroke

D Switch model No.

*1

E Switch quantity

F Option

⚠ Precautions for model No. selection

*1 : For $\phi 6$ or $\phi 8$ with switch, use a non-magnetic (stainless steel, etc.) mounting bolt.*2 : For rear piping, body side installation is possible. Note that 2 bolts are used for rod side installation and head side installation.

[Example of model No.]

MSD-XL-6-5-F0H-R-R

A Model No. : Single acting/push with switch

B Bore size : $\phi 6$ mm

C Stroke : 5 mm

D Switch model No. : Reed F0H switch, lead wire 1 m

E Switch quantity : 1 on rod side

F Option : Rear piping

How to order switch



Switch model No.
(Item **D** above)

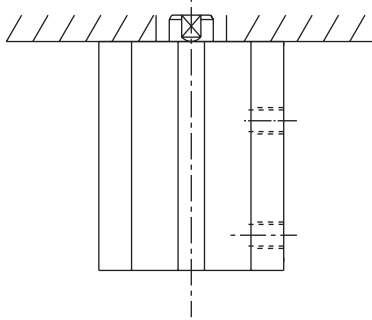
Code	Description					
A Model No.						
MSD-X	Single acting/push	No switch				
MSD-Y	Single acting/pull					
MSD-XL	Single acting/push	With switch				
MSD-YL	Single acting/pull					
B Bore size (mm)						
6	$\phi 6$					
8	$\phi 8$					
C Stroke (mm)						
5	5					
10	10					
D Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
F0H*	F0V*	Reed		●	1-color LED	2-wire
-	F2S*			●		
F2H*	F2V*			●		
-	F3S*			●		
F3H*	F3V*	Proximity		●	1-color LED (PNP output) (Made to order)	3-wire
F3PH*	F3PV*			●		
F2YH*	F2YV*			●		
F3YH*	F3YV*			●	2-color LED	3-wire
* Lead wire length						
Blank	1 m (standard)					
3	3 m (option)					
E Switch quantity						
R	1 on rod side					
H	1 on head side					
D	2					
F Option						
Blank	Front piping					
R	Rear piping					

Switch selection table

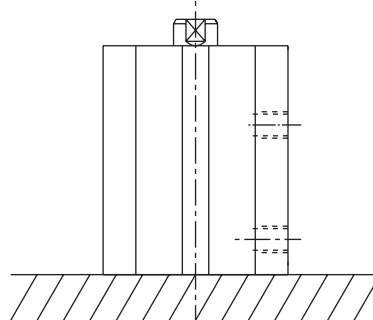
Switches may not be installable depending on relations between cylinder installation and stroke.
Refer to the table below to select a switch.

Switches cannot be used for side mounting in the following combinations.

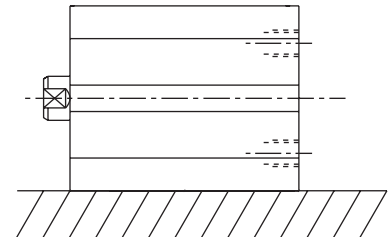
- Combinations in which F2YH/V, F3YH/V or F3PH/V is mounted at the switch mounting position H with X type or Y type stroke 5 mm
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with X type stroke 10 mm
(Refer to page 1430 for the min. stroke with switch)



For rod side installation



For head side installation



For side installation

● For MSD-XL rod side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S, F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position		
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	○	○	○	○	○	○	○	×	○	○	○	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø8	5	○	○	○	○	○	○	○	×	○	○	○	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○

● For MSD-XL head side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S, F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position		
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	×	×	○	○	○	○	×	○	○	○	×	×	×	○
	10	○	×	○	○	○	○	×	○	○	○	×	○	○	○
ø8	5	×	×	○	○	○	○	×	○	○	○	×	×	×	○
	10	○	×	○	○	○	○	×	○	○	○	×	○	○	○

● For MSD-YL rod side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S, F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position		
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	○	○	○	○	○	○	○	×	○	○	○	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø8	5	○	○	○	○	○	○	○	×	○	○	○	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○

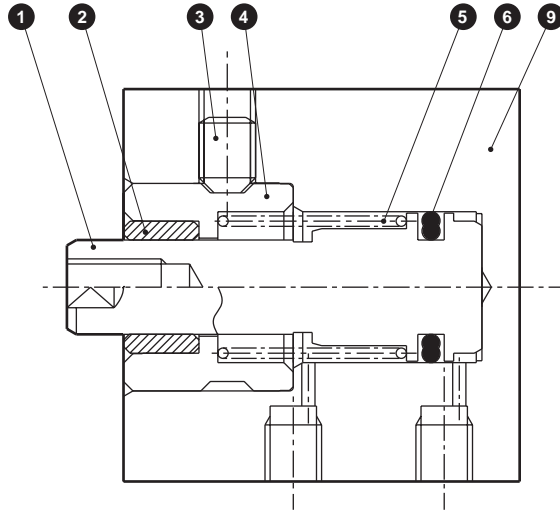
● For MSD-YL head side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S, F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position	Switch position		
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	○	○	○	○	○	○	×	○	○	○	×	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	×	○	○	○
ø8	5	○	○	○	○	○	○	×	○	○	○	×	×	○	×
	10	○	○	○	○	○	○	○	○	○	○	×	○	○	○

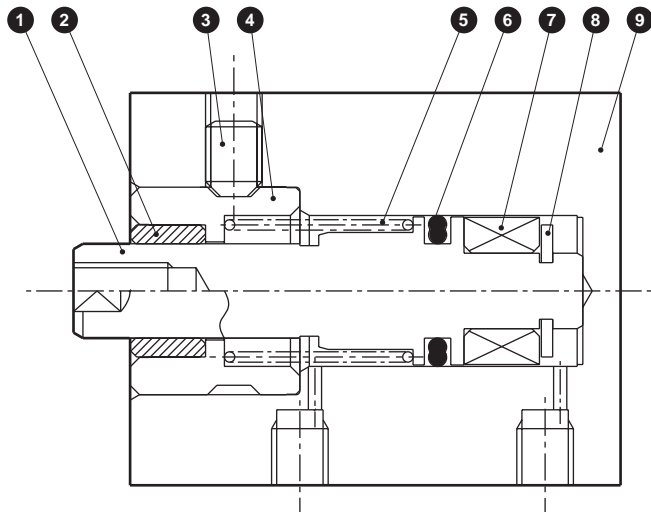
SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/
COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/
MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd
Contr
Ending

Internal structure and parts list

● MSD-X-6/8



● MSD-XL-6/8

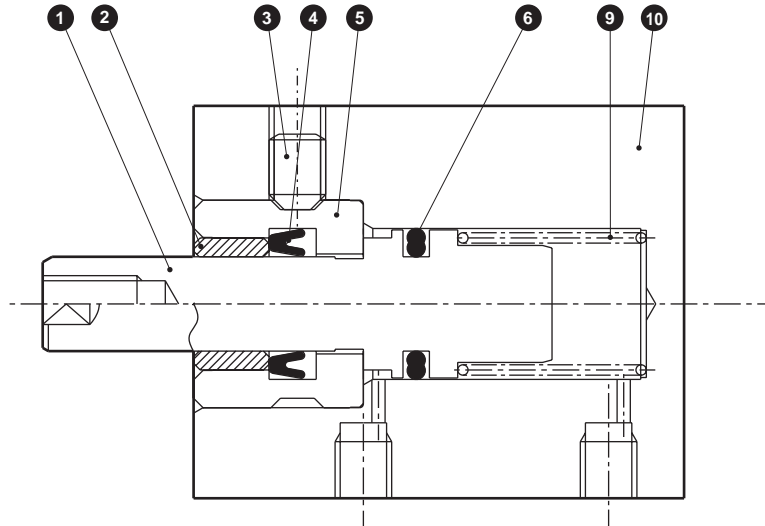


Cannot be disassembled

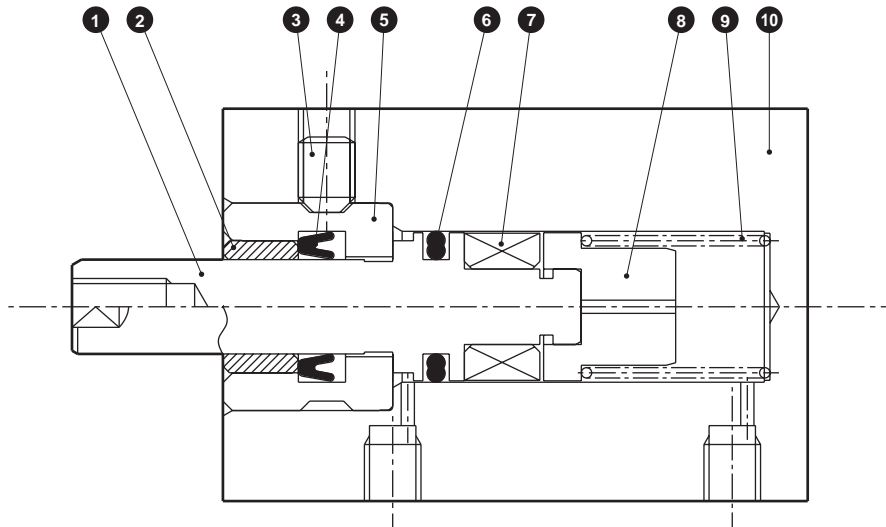
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		6	Piston packing	Nitrile rubber	
2	Bush	Oil-impregnated copper alloy		7	Magnet	Plastic	
3	Hexagon socket set screw	Stainless steel		8	E type snap ring	Stainless steel	
4	Rod metal	Stainless steel		9	Body	Aluminum alloy	Hard alumite
5	Coil spring	Steel	Electrodeposition				

Internal structure and parts list

● MSD-Y-6/8



● MSD-YL-6/8



Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		6	Piston packing	Nitrile rubber	
2	Bush	Oil-impregnated copper alloy		7	Magnet	Plastic	
3	Hexagon socket set screw	Stainless steel		8	Spring holder	Stainless steel	
4	Rod packing	Nitrile rubber		9	Coil spring	Steel	Electrodeposition
5	Rod metal	Stainless steel		10	Body	Aluminum alloy	Hard alumite

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

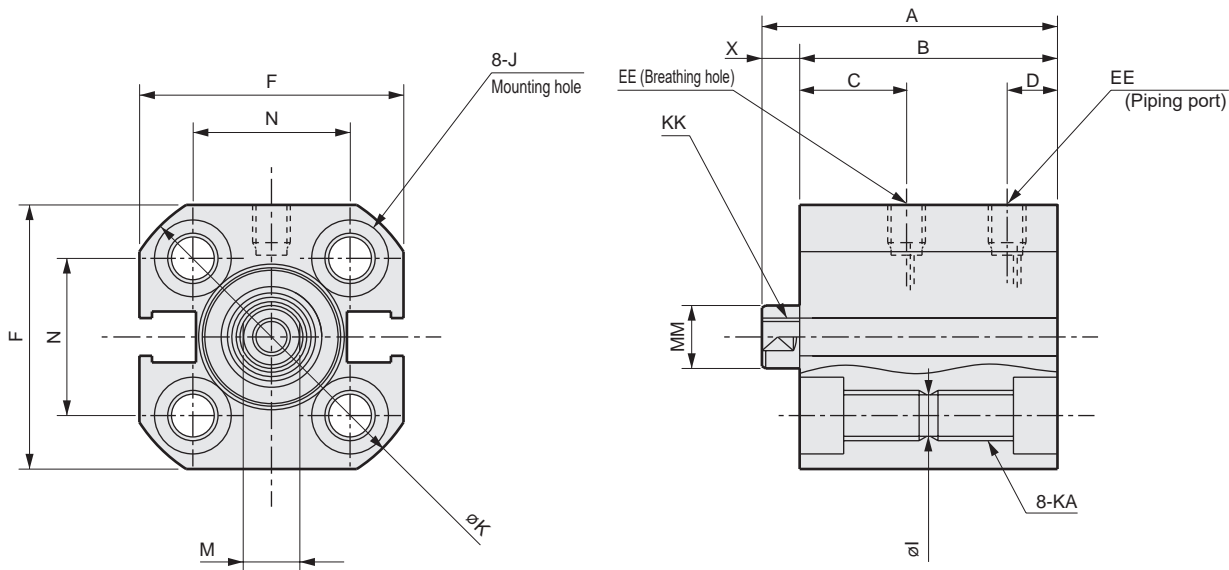
Ending

MSD-^X/_Y Series

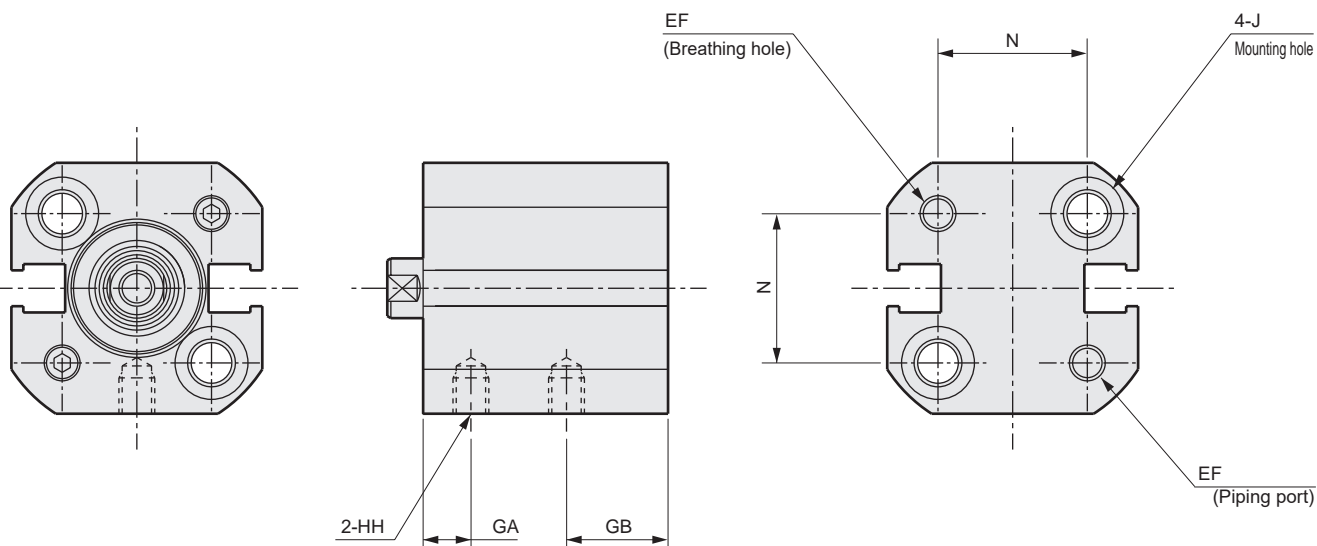
Dimensions



● MSD-X (L)-6/8



● MSD-X(L)-6/8-*-R (rear piping)

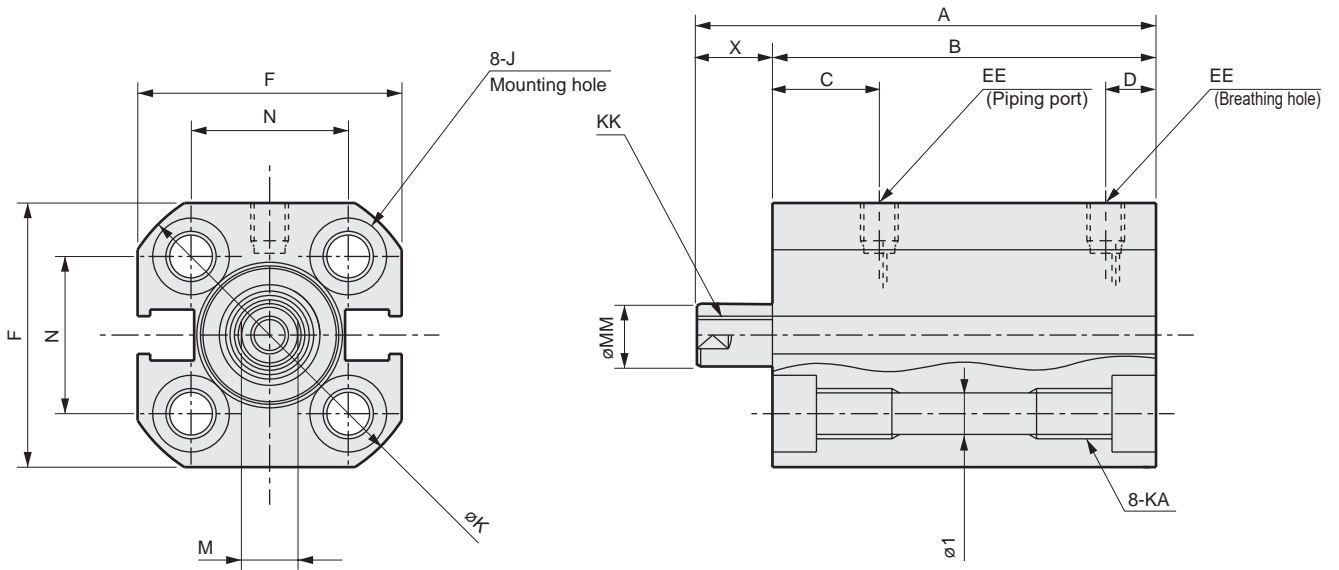


Code	No switch		With switch		Common dimensions for types with/without switches																		
	Bore size (mm)		A	B	A	B	C	D	EE	EF	F	GA	GB	HH	I	J	K	KA	KK	M	MM	N	X
Spd Contr	ø6	Stroke 5 mm	22.5	19.5	27.5	24.5	7.5	4	M3	M3	19	3	8.5	M3 Depth 3	3.2	Spot face ø6.1 depth 3.5	22.5	M4 Depth 6	M2.5 Depth 4	3.5	4	11	3
		Stroke 10 mm	32.5	29.5	37.5	34.5																	
Ending	ø8	Stroke 5 mm	24	21	29	26	9	4	M3	M3	21	4.5	8.5	M3 Depth 3	3.2	Spot face ø6.1 depth 3.5	25	M4 Depth 6	M3 Depth 5	4.5	5	12.5	3
		Stroke 10 mm	34	31	39	36																	

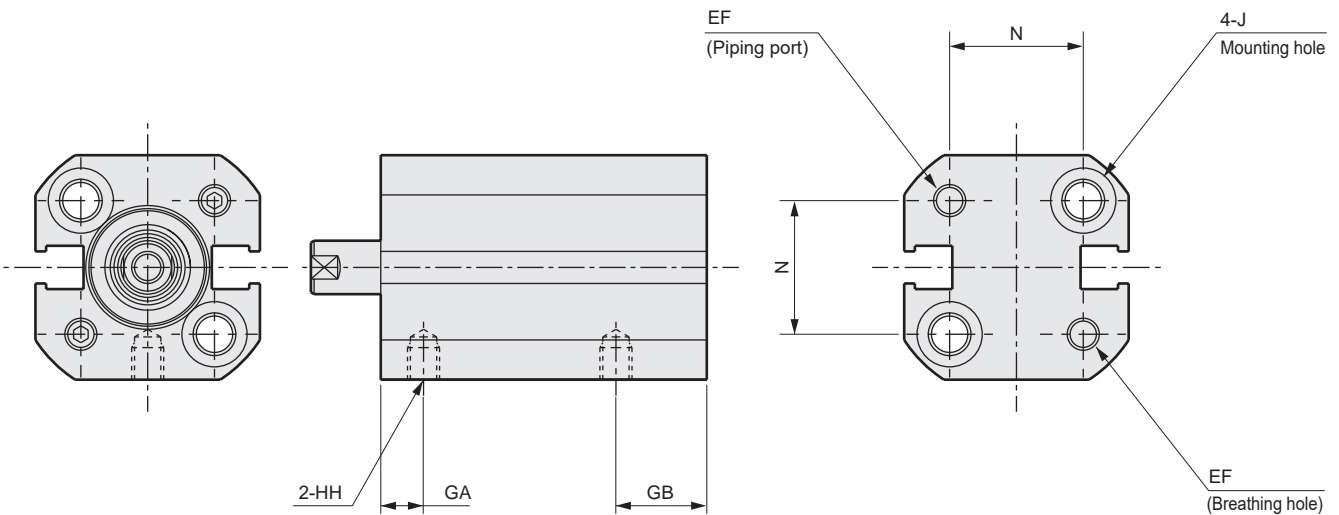
Dimensions



● MSD-Y (L)-6/8



● MSD-Y(L)-6/8-*R (rear piping)

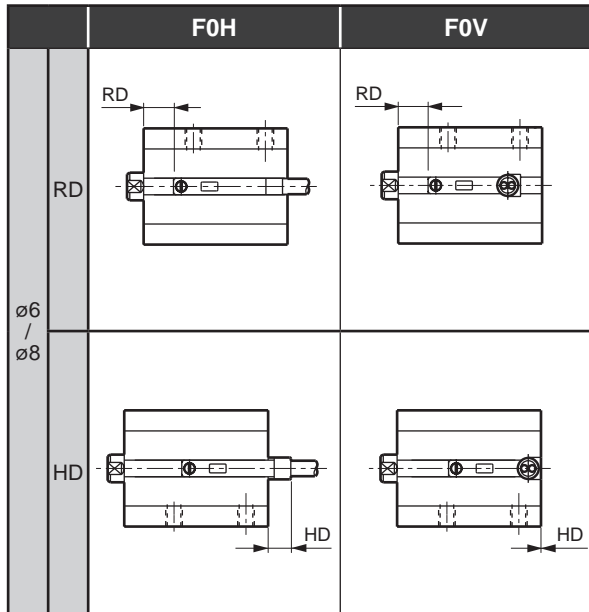


Code		No switch		With switch		Common dimensions for types with/without switches																	
Bore size (mm)		A	B	A	B	C	D	EE	EF	F	GA	GB	HH	I	J	K	KA	KK	M	MM	N	X	
ø6	Stroke mm	5	32.5	24.5	37.5	29.5	7.5	4	M3	M3	19	3	8.5	M3 Depth 3	3.2	Spot face ø6.1 depth 3.5	22.5	M4 Depth 6	M2.5 Depth 4	3.5	4	11	8
		10	47.5	34.5	52.5	39.5																	13
ø8	Stroke mm	5	34	26	39	31	9	4	M3	M3	21	4.5	8.5	M3 Depth 3	3.2	Spot face ø6.1 depth 3.5	25	M4 Depth 6	M3 Depth 5	4.5	5	12.5	8
		10	49	36	54	41																	13

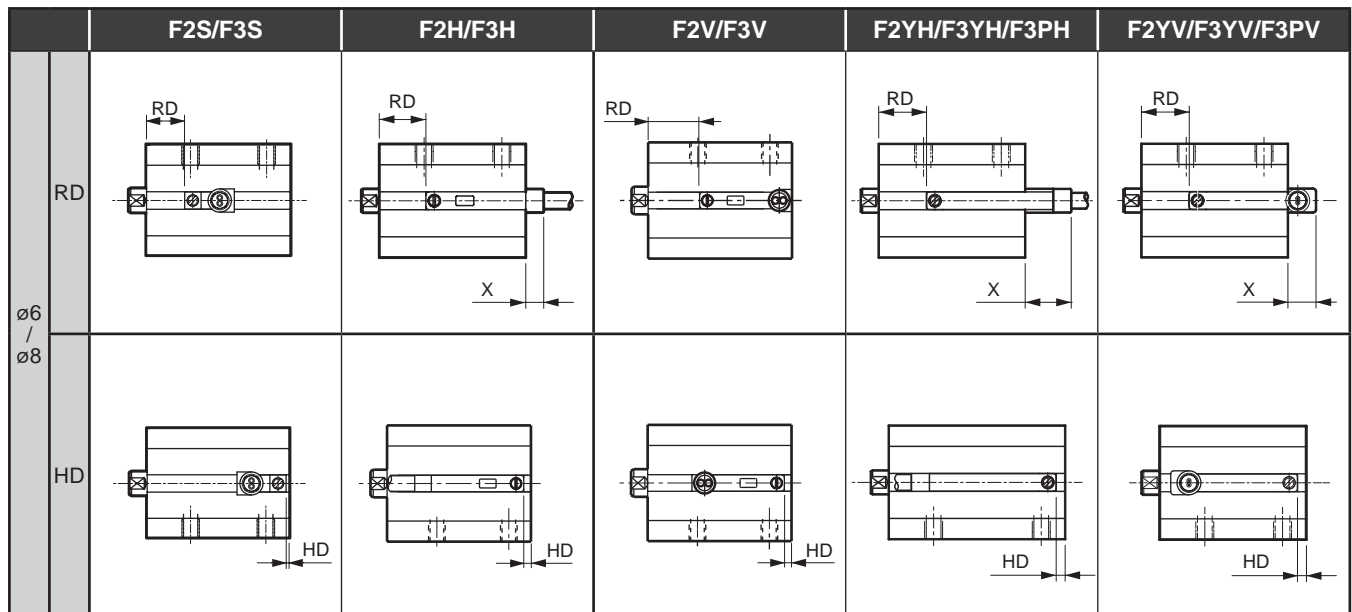
- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/
COVP/N2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC
- SMG
- MSD/
MSDG**
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd
Contr
- Ending

MSD-XL Switch mounting position

● Reed switch



● Proximity switch



Switch mounting position dimensions

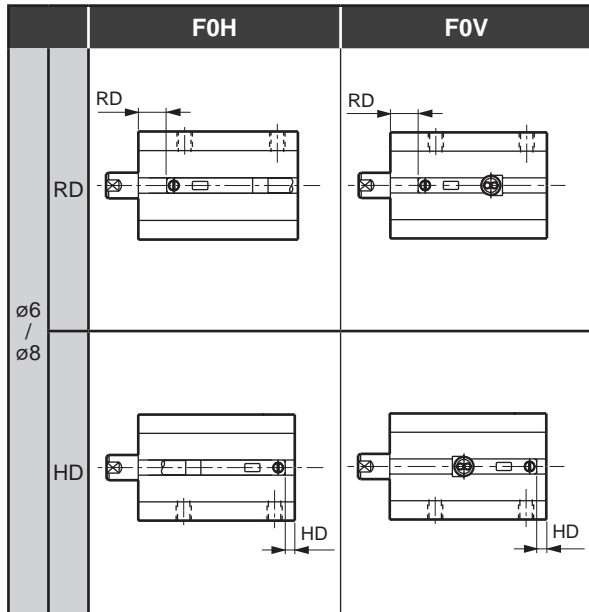
(Unit: mm)

Bore size	Stroke	Switch model No. Max. sensitivity position	Reed switch				Proximity switch													
			F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV					
			RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)	
MSD-XL	ø6	5	4.0	4.0	4.0	0	6.5	0.5	7.5	1.5	3.0	7.5	1.5	7.5	1.5	7.5	1.5	7.5	1.5	4.5
		10	9.0	4.0	9.0	0	11.5	0.5	12.5	1.5	-	12.5	1.5	12.5	1.5	-	12.5	1.5	-	
	ø8	5	5.5	4.0	5.5	0	8.0	0.5	9.0	1.5	3.0	9.0	1.5	9.0	1.5	7.5	9.0	1.5	4.5	
		10	10.5	4.0	10.5	0	13.0	0.5	14.0	1.5	-	14.0	1.5	14.0	1.5	-	14.0	1.5	-	

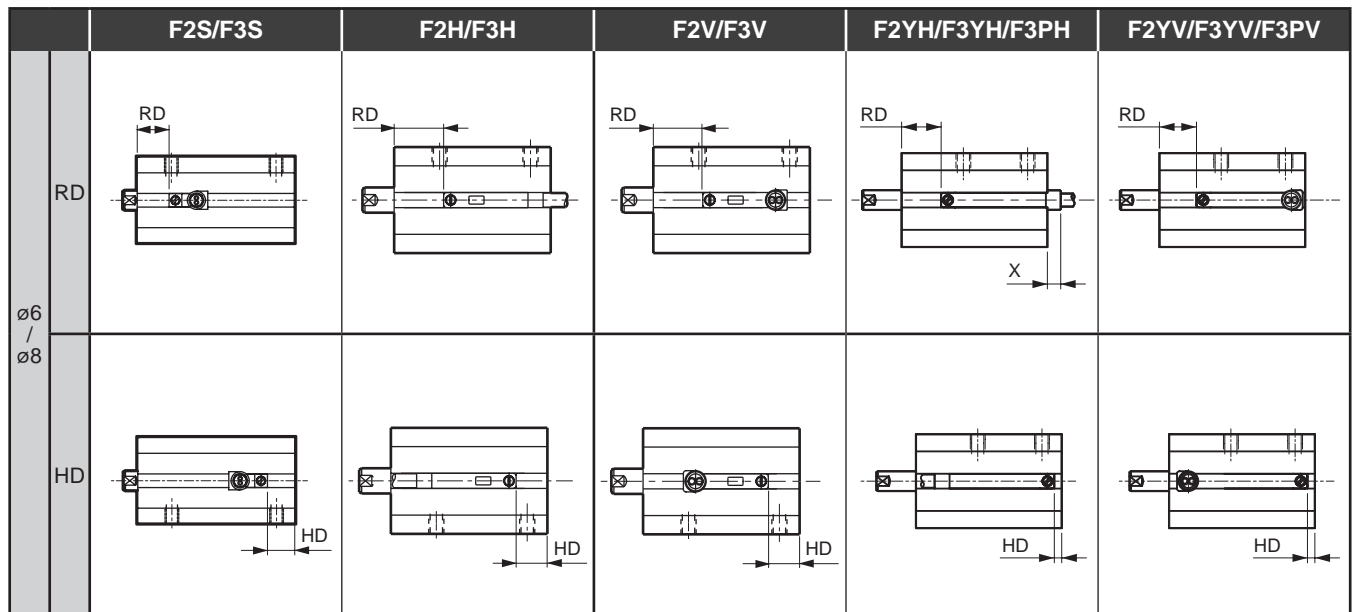
*1: X dimensions indicate the switch protrusion from the body end surface. When the X dimensions are not indicated, there is no protrusion from the body end surface.

MSD-YL Switch mounting position

● Reed switch



● Proximity switch



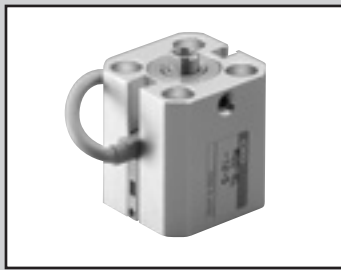
Switch mounting position dimensions

(Unit: mm)

<div style="display: flex; flex-direction: column; align-items: center;"> Bore size Stroke </div>		Switch		Reed switch				Proximity switch									
				F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH			F2YV/F3YV/F3PV
		Switch model No.	Max. sensitivity position	RD	HD	RD	HD	RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD
MSD-YL	∅6	5	3.5	2.5	3.5	2.5	7.0	6.0	8.0	7.0	8.0	7.0	8.0	7.0	2.7	8.0	7.0
		10	3.5	7.5	3.5	7.5	7.0	11.0	8.0	12.0	8.0	12.0	8.0	12.0	-	8.0	12.0
	∅8	5	5.5	2.0	5.5	2.0	9.0	5.0	10.0	6.0	10.0	6.0	10.0	6.0	3.2	10.0	6.0
		10	5.5	7.0	5.5	7.0	9.0	10.0	10.0	11.0	10.0	11.0	10.0	11.0	-	10.0	11.0

*1: X dimensions indicate the switch protrusion from the body end surface. When the X dimensions are not indicated, there is no protrusion from the body end surface.

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending

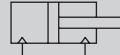


Small compact cylinder double acting/high load

MSD-K Series

● Bore size: $\phi 6/\phi 8/\phi 12/\phi 16$

JIS symbol



Double acting



Specifications

Item	MSD-K MSD-KL (with switch)			
	mm			
Bore size	$\phi 6$	$\phi 8$	$\phi 12$	$\phi 16$
Actuation	Double acting			
Working fluid	Compressed air			
Max. working pressure MPa	1.0 (≈ 150 psi, 10 bar)			
Min. working pressure MPa	0.15 (≈ 22 psi, 1.5 bar)		0.1 (≈ 15 psi, 1 bar)	
Proof pressure MPa	1.6 (≈ 230 psi, 16 bar)			
Ambient temperature $^{\circ}\text{C}$	-10 (14°F) to 60 (140°F) (no freezing)			
Connection	Front piping	M3		M5
	Rear piping	M3		M3
Stroke tolerance	+2.0 0			
Working piston speed	50 to 500 mm/s			
Cushion	With rubber cushion			
Lubrication	Not required (use turbine oil ISO VG32 if necessary for lubrication)			
Allowable absorbed energy J	0.004	0.014	0.044	0.110

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10/15/20/25/30	30	10	5(10)	5	5
$\phi 8$	5/10/15/20/25/30	30	10	5	5	5
$\phi 12$	5/10/15/20/25/30	30	10	5	5	5
$\phi 16$	5/10/15/20/25/30	30	10	5	5	5

*1: Products with stroke other than standard stroke are not available.

*2: For F2Y, F3Y or F3P, the min. stroke will be the dimensions in ().

Switch specifications

Item	2-wire reed	2-wire proximity			3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC		24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less	0.5V or less	0.5V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μA or less			
Lead wire length	Standard 1 m (Oil resistance a 0.15 mm ²)				Standard 1 m (oil resistant vinyl cabtyre cable 3-conductor 0.15mm ²)			
Shock resistance	294 m/s ²		980 m/s ²					
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60 $^{\circ}\text{C}$							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight	g		1 m:10 3 m:29					

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25 $^{\circ}\text{C}$. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25 $^{\circ}\text{C}$. (5 to 10 mA at 60 $^{\circ}\text{C}$)

*4: The F-switch uses a bend-resistant lead wire.

Cylinder weight table

(Unit: g)

Stroke (mm)	5		10		15		20		25		30		Weight per switch
Bore size (mm)	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	No switch	With switch	
ø6	27	29	30	32	32	34	35	37	38	40	41	43	Refer to the weight in the switch specifications.
ø8	29	32	34	37	39	42	44	47	48	51	53	56	
ø12	35	45	43	53	52	62	61	71	70	80	79	89	
ø16	54	70	66	82	79	95	92	108	104	120	117	133	

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	Push	-	4.24	5.65	8.48	11.3	14.1	17.0	19.8	22.6	25.4	28.3
	Pull	-	2.36	3.14	4.71	6.28	7.85	9.42	11.0	12.6	14.1	15.7
ø8	Push	-	7.54	10.1	15.1	20.1	25.1	30.2	35.2	40.2	45.2	50.3
	Pull	-	4.59	6.13	9.19	12.3	15.3	18.4	21.4	24.5	27.6	30.6
ø12	Push	11.3	17.0	22.6	33.9	45.2	56.5	67.9	79.2	90.5	1.02x10 ²	1.13x10 ²
	Pull	8.48	12.7	17.0	25.4	33.9	42.4	50.9	59.4	67.9	76.3	84.8
ø16	Push	20.1	30.2	40.2	60.3	80.4	1.01x10 ²	1.21x10 ²	1.41x10 ²	1.61x10 ²	1.81x10 ²	2.01x10 ²
	Pull	15.1	22.6	30.2	45.2	60.3	75.4	90.5	1.06x10 ²	1.21x10 ²	1.36x10 ²	1.51x10 ²

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending

MSD-K Series

How to order

● No switch (without magnet for switch)

MSD-K - 6 - 5 ————— **R**

● With switch (built-in magnet for switch)

MSD-KL - 6 - 5 - F0H - R - R

A Model No.

B Bore size

C Stroke

D Switch model No.

*1

*2

E Switch quantity

F Option

*3

⚠ Note on model No. selection

*1 : For $\phi 6$ or $\phi 8$ with switch, use a non-magnetic (stainless steel, etc.) mounting bolt. *2 :

For $\phi 12$ or $\phi 16$ with proximity switch, use a non-magnetic

[Example of model No.]

MSD-KL-6-5-F0H-R-R

A Model No. : Double acting/high load/with switch

B Bore size : $\phi 6$ mm

C Stroke : 5 mm

D Switch model No. : Reed F0H switch

E Switch quantity : 1 on rod side

F Option : Rear piping

How to order switch

SW - F0H

Switch model No.
(Item **D** above)

Code	Description	
A Model No.		
MSD-K	Double acting/high load	No switch
MSD-KL		With switch

B Bore size (mm)	
6	$\phi 6$
8	$\phi 8$
12	$\phi 12$
16	$\phi 16$

C Stroke (mm)	
5	5
10	10
15	15
20	20
25	25
30	30

D Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
F0H*	F0V*	Reed		●	1-color LED	2-wire
-	F2S*			●		
F2H*	F2V*			●		
-	F3S*			●		
F3H*	F3V*	Proximity		●	1-color LED (PNP output) (made to order)	3-wire
F3PH*	F3PV*			●		
F2YH*	F2YV*			●		
F3YH*	F3YV*			●	2-color LED	3-wire

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)

E Switch quantity	
R	1 on rod side
H	1 on head side
D	2

F Option	
Blank	Front piping
R	Rear piping

Specifications for rechargeable battery (Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process

MSD-K-.....- P4*

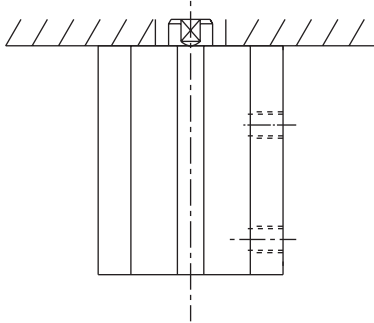
Switch selection table

Switches may not be installable depending on relations between cylinder installation and stroke.

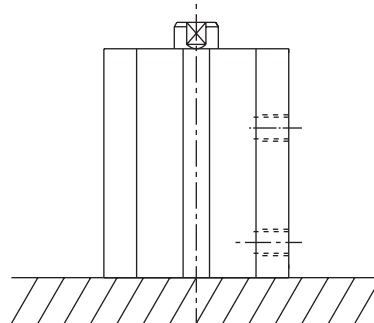
Refer to the table below to select a switch.

Switches cannot be used for side mounting in the following combinations.

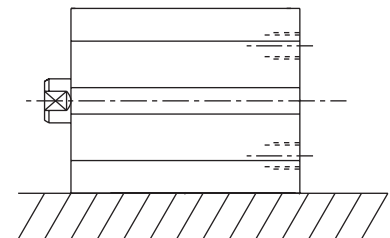
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke 5 mm for $\phi 8$
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke 5 mm for $\phi 8$ (Refer to page 1440 for the min. stroke with switch)



For rod side installation



For head side installation



For side installation

● For rod side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch										
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV		
		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		
		R	H	R	H	R	H	R	H	R	H	R	H	R	H	
$\phi 6$	5	○	○	○	○	○	○	○	○	○	○	○	○	×	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	×	○	○	○	○	○	○	○
$\phi 8$	5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	×	○	○	○	○	○	○	○
$\phi 12$	5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	×	○	○	○	○	○	○	○
$\phi 16$	5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	×	○	○	○	○	○	○	○

● For head side installation

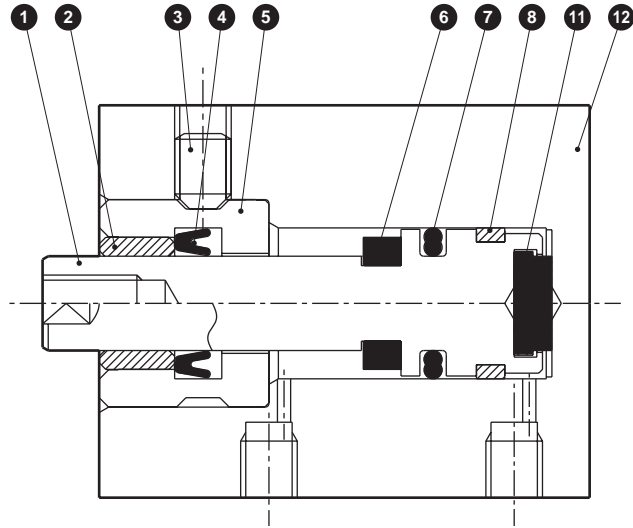
Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position	
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
$\phi 6$	5	×	○	○	○	○	○	×	○	○	○	×	×	○	○
	10	○	○	○	○	○	○	×	○	○	○	×	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
$\phi 8$	5	×	○	○	○	○	○	×	○	○	○	×	○	○	○
	10	○	○	○	○	○	○	×	○	○	○	×	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
$\phi 12$	5	×	○	○	○	○	○	×	○	○	○	×	○	○	○
	10	○	○	○	○	○	○	○	○	○	○	×	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
$\phi 16$	5	×	○	○	○	○	○	×	○	○	○	×	○	○	○
	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/
COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/
MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd
Contr
Ending

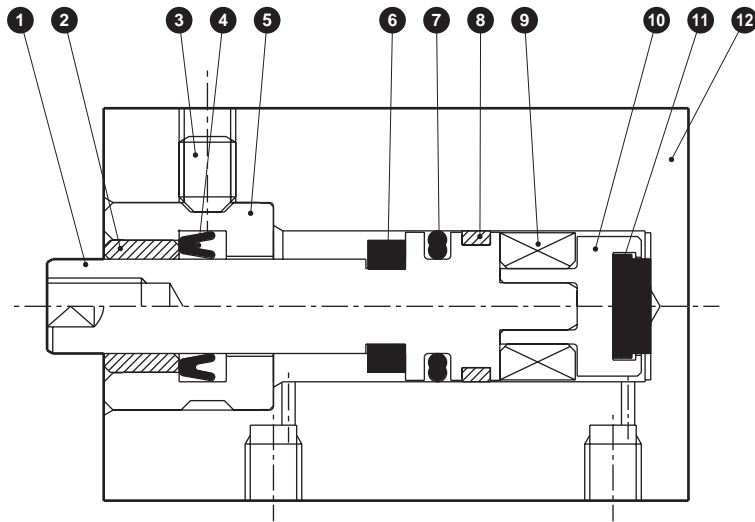
MSD-K Series

Internal structure and parts list

● MSD-K-6/8/12



● MSD-KL-6/8/12

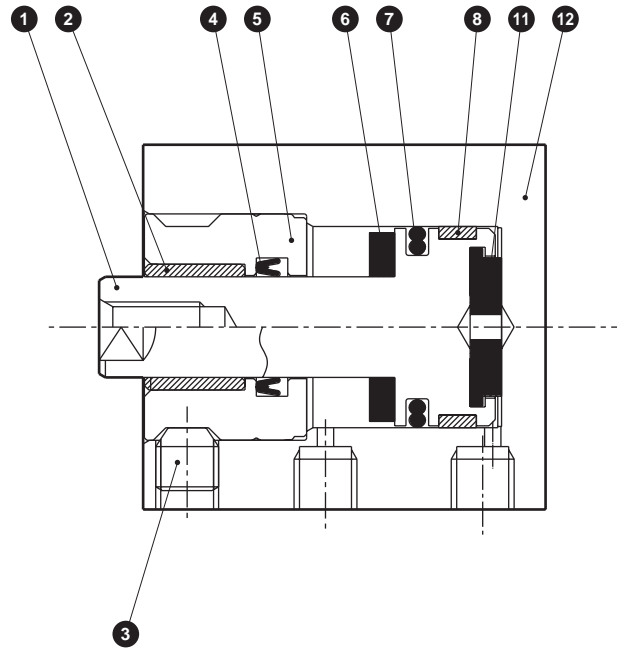


Cannot be disassembled

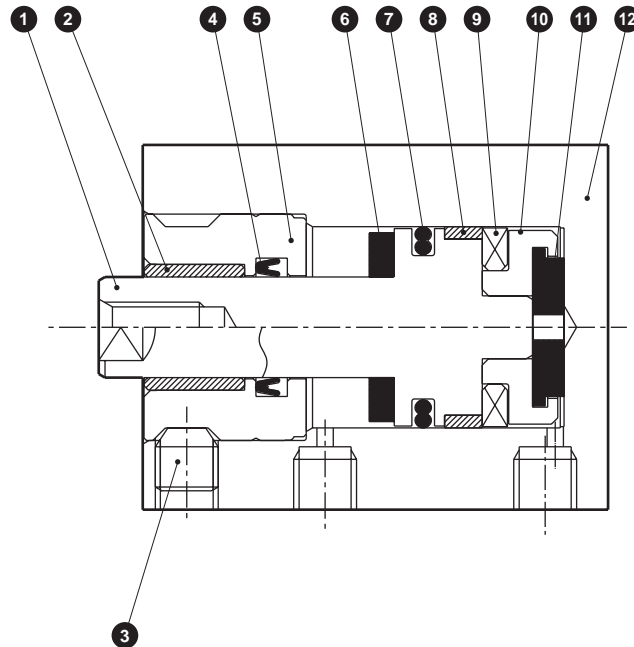
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		7	Piston packing	Nitrile rubber	
2	Bush	Oil-impregnated copper alloy		8	Wear ring	Acetal resin	
3	Hexagon socket set screw	Stainless steel		9	Magnet	Plastic	
4	Rod packing	Nitrile rubber		10	Adaptor	Aluminum alloy	
5	Rod metal	Stainless steel		11	Cushion rubber H	Urethane rubber	
6	Cushion rubber R	Urethane rubber		12	Body	Aluminum alloy	Hard alumite

Internal structure and parts list

● MSD-K-16



● MSD-KL-16



Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		7	Piston packing	Nitrile rubber	
2	Bush	Oil-impregnated copper alloy		8	Wear ring	Acetal resin	
3	Hexagon socket set screw	Stainless steel		9	Magnet	Plastic	
4	Rod packing	Nitrile rubber		10	Adaptor	Aluminum alloy	
5	Rod metal	Stainless steel		11	Cushion rubber H	Urethane rubber	
6	Cushion rubber R	Urethane rubber		12	Body	Aluminum alloy	Hard alumite

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

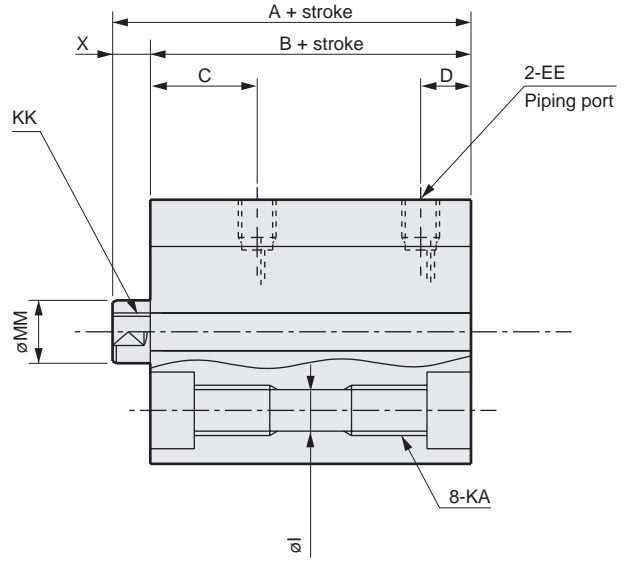
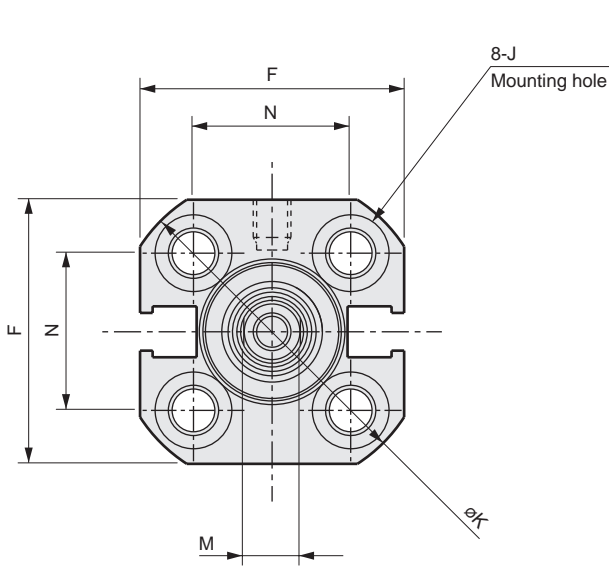
Ending

MSD-K Series

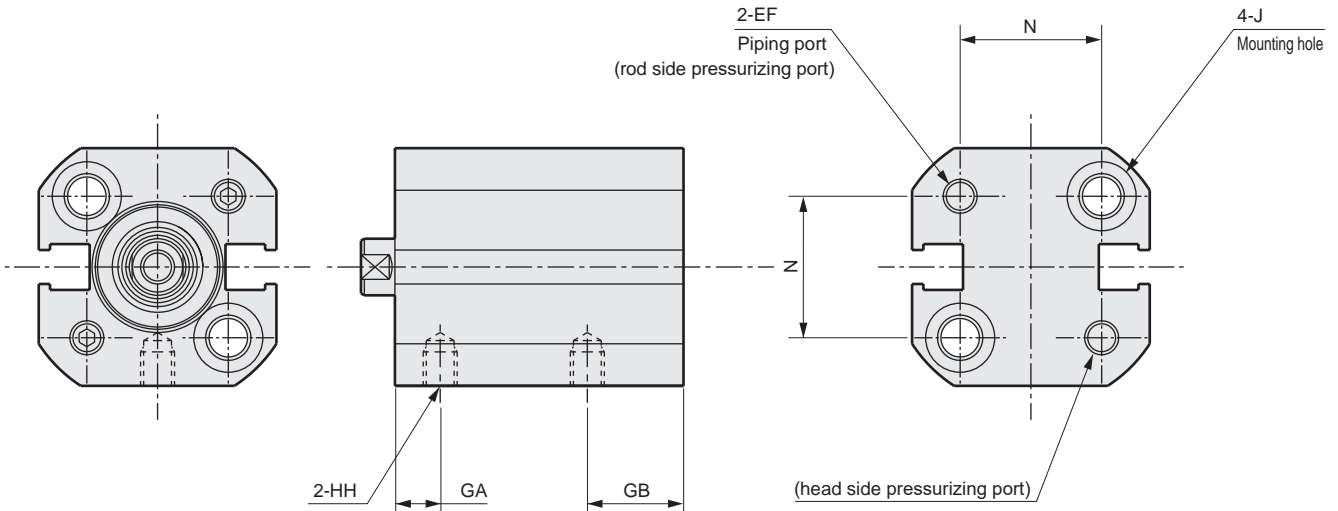
Dimensions



● MSD-K (L)-6/8/12



● MSD-K(L)-6/8/12-*-R (rear piping)

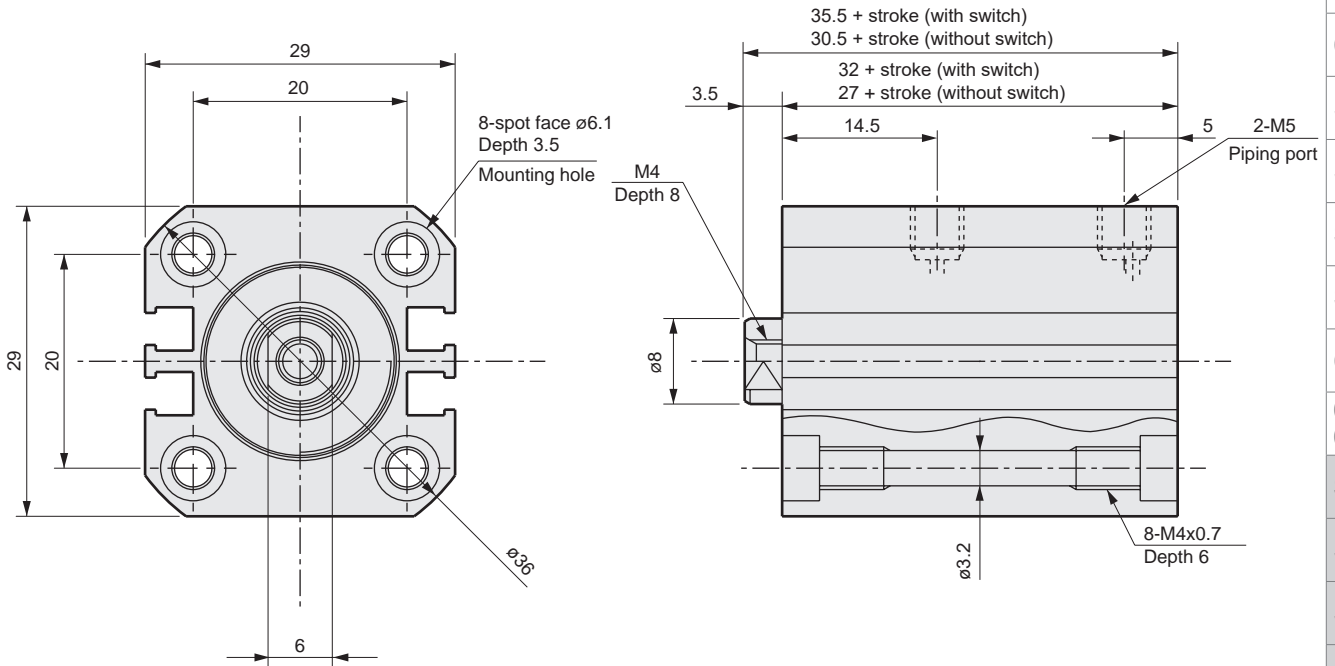


Bore size (mm)	No switch		With switch		Common dimensions for types with/without switches											
	A	B	A	B	C	D	EE	EF	F	GA	GB	HH	I	J	K	KA
$\phi 6$	22.5	19.5	27.5	24.5	7.5	4	M3	M3	19	3	8.5	M3 depth 3	3.2	Spot face $\phi 6.1$ Depth 3.5	22.5	M4 depth 6
$\phi 8$	24	21	29	26	9	4	M3	M3	21	4.5	8.5	M3 depth 3	3.2	Spot face $\phi 6.1$ Depth 3.5	25	M4 depth 6
$\phi 12$	25.5	22	30.5	27	11.5	5	M5	M3	25	4	10.5	M3 depth 3	3.2	Spot face $\phi 6.1$ Depth 3.5	31	M4 depth 6

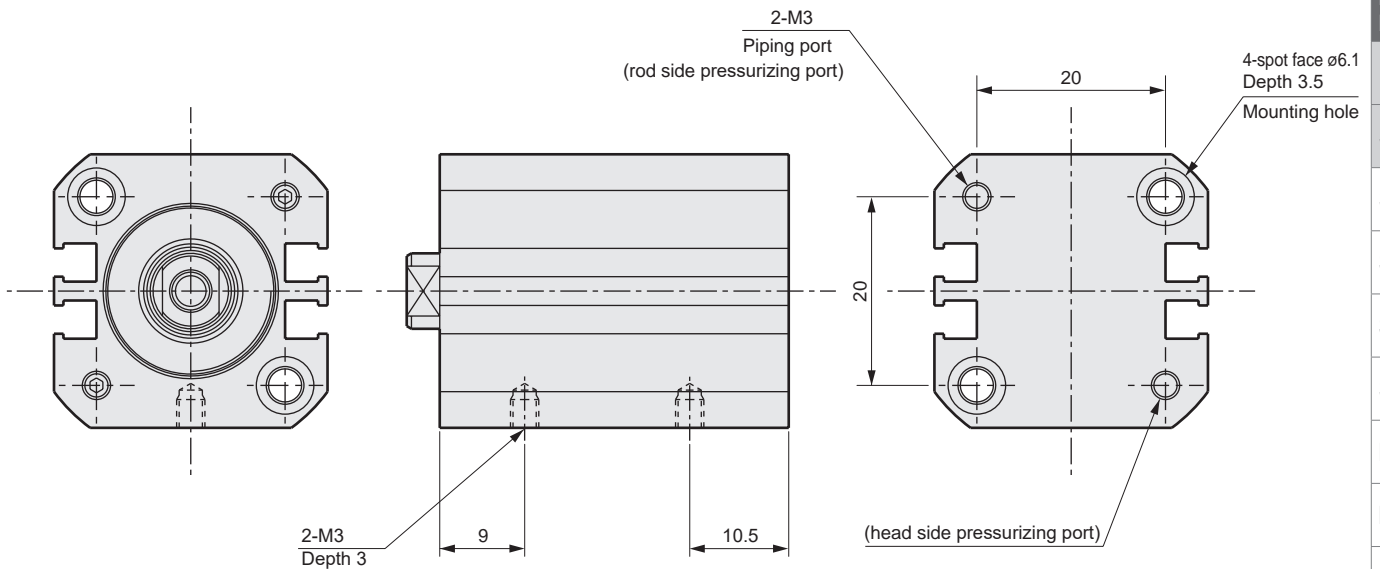
Bore size (mm)	Common dimensions for types with/without switches				
	KK	M	MM	N	X
$\phi 6$	M2.5 depth 4	3.5	4	11	3
$\phi 8$	M3 depth 5	4.5	5	12.5	3
$\phi 12$	M3 depth 6	5	6	15.5	3.5

Dimensions

● MSD-K(L)-16



● MSD-K(L)-16-*R (rear piping)

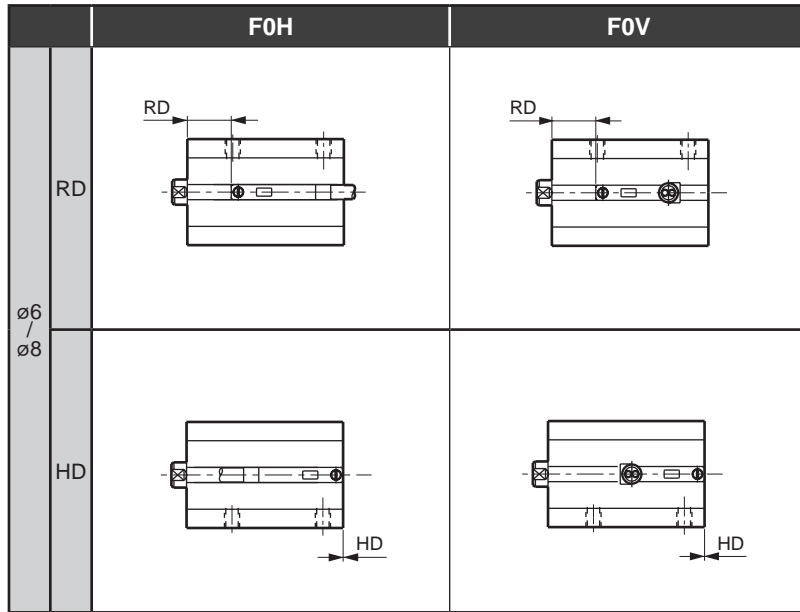


SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending

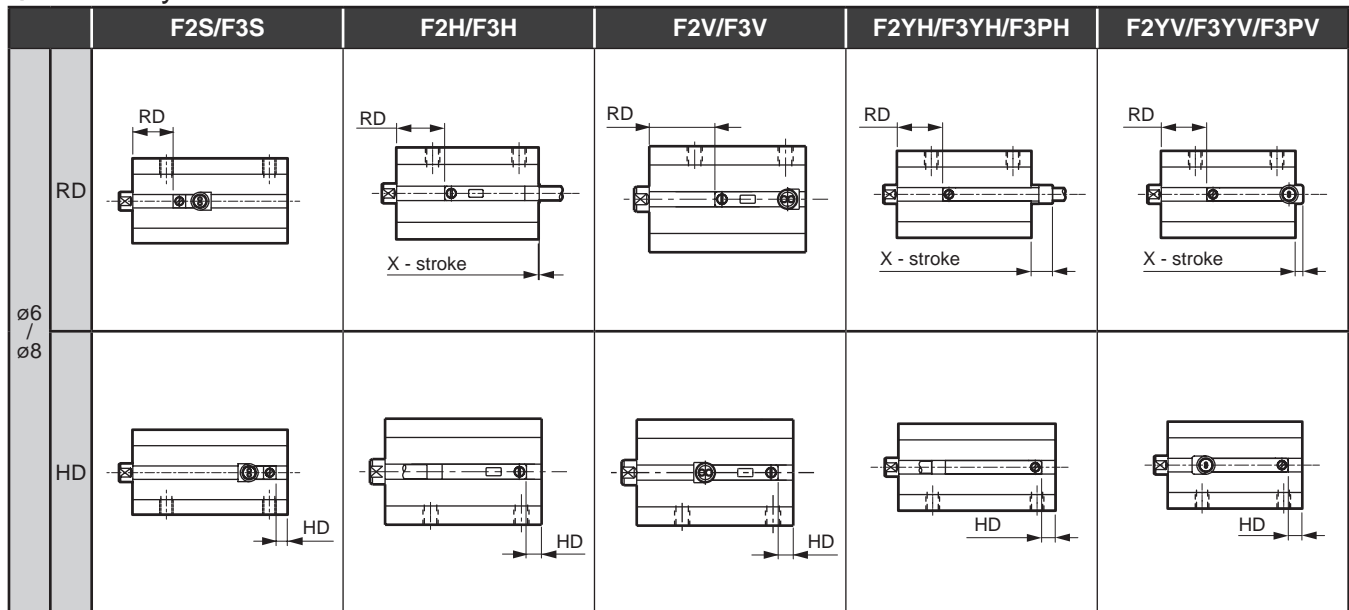
MSD-K Series

Switch mounting position ($\varnothing 6/\varnothing 8$)

● Reed switch



● Proximity switch



Switch mounting position dimensions

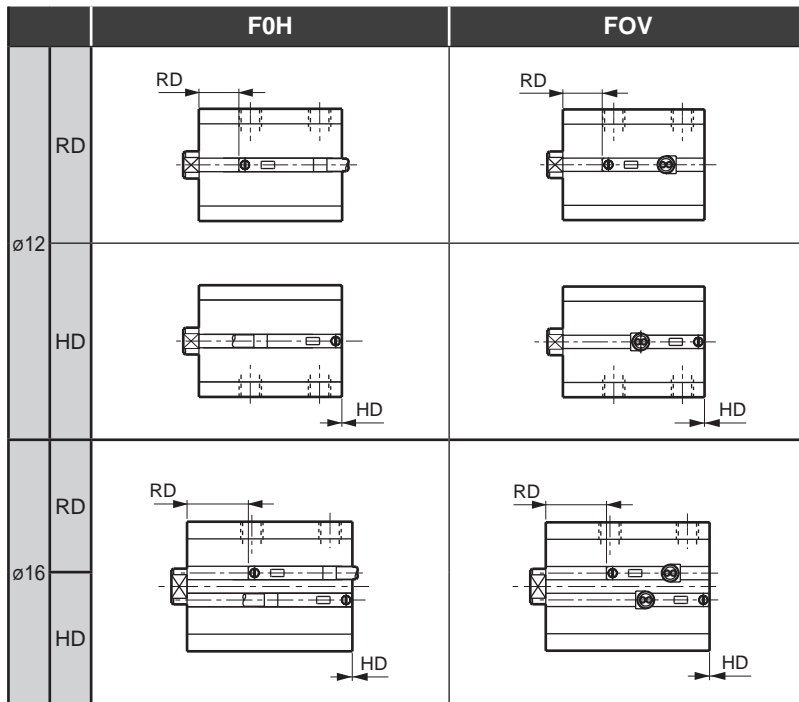
(Unit: mm)

Model	Bore size (mm)	Reed switch				Proximity switch												
		F0H		F0V		F2S/F3S		F2H/F3H			F2V/F3V		F2YH/F3YH/F3PH			F2YV/F3YV/F3PV		
		RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)
MSD-KL	$\varnothing 6$	6.0	0	6.0	0	9	2.5	10	3.5	5.2	10	3.5	10	3.5	9.7	10	3.5	6.7
	$\varnothing 8$	8.5	0	8.5	0	11.5	1.5	12.5	2.5	6.2	12.5	2.5	12.5	2.5	10.7	12.5	2.5	7.7

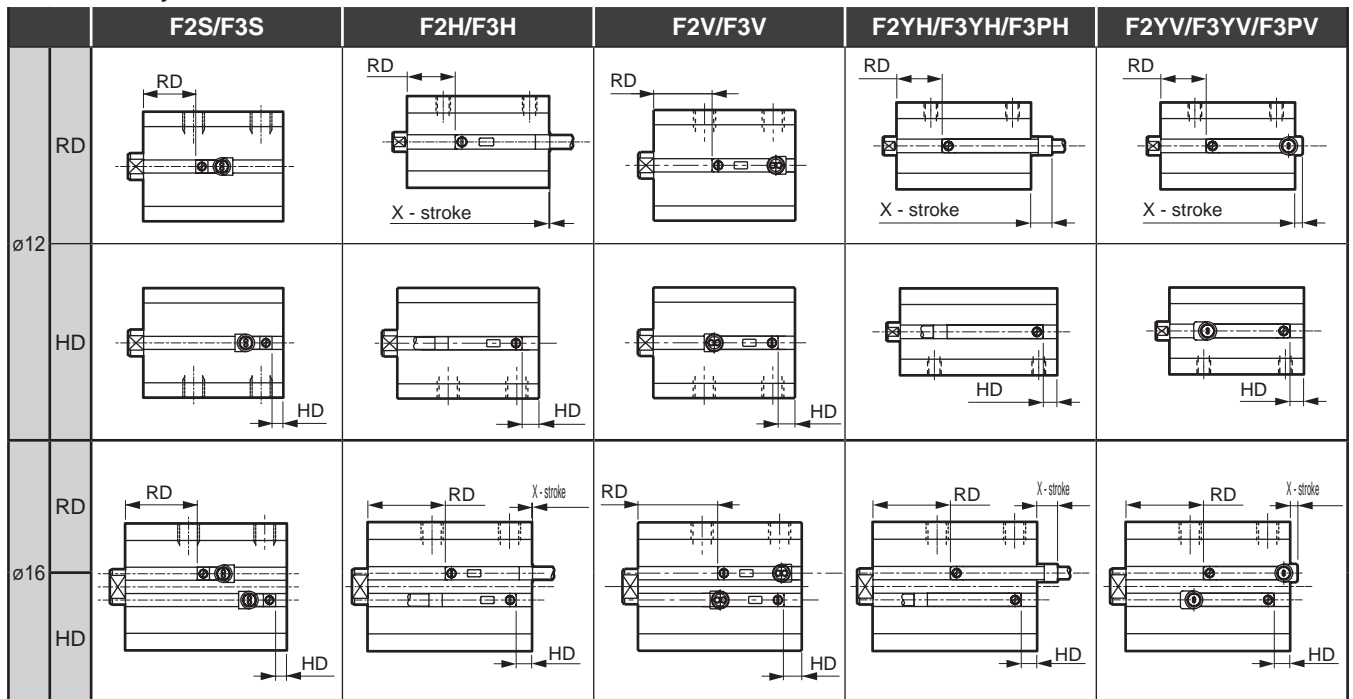
*1: X dimensions indicate the switch protrusion from the body end surface. When the X-stroke is negative, there is no protrusion from the body end surface.

Switch mounting position (ø12/ø16)

● Reed switch



● Proximity switch



Switch mounting position dimensions

(Unit: mm)

Model	Bore size (mm)	Reed switch				Proximity switch												
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V			F2YH/F3YH/F3PH			F2YV/F3YV/F3PV		
		RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)
MSD-KL	ø12	9.0	0	9.0	0	12	2.5	13	3.5	5.7	13	3.5	13	3.5	10.2	13	3.5	7.2
	ø16	14.0	0	14.0	0	16.5	2.5	17.5	3.5	5.2	17.5	3.5	17.5	3.5	9.7	17.5	3.5	6.7

*1: X dimensions indicate the switch protrusion from the body end surface. When the X-stroke is negative, there is no protrusion from the body end surface.

- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/COVP/N2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC
- SMG
- MSD/MSDG
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd Contr
- Ending



Small compact cylinder double acting/fine speed

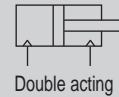
Single rod MSD-F Series

- Bore size: $\phi 6$, $\phi 8$

High load MSD-KF Series

- Bore size: $\phi 6$, $\phi 8$, $\phi 12$, $\phi 16$

JIS symbol



Double acting



Specifications

Item	MSD-F/MSD-LF (with switch)				MSD-KF/MSD-KLF (with switch)			
	mm		$\phi 6$	$\phi 8$	$\phi 6$	$\phi 8$	$\phi 12$	$\phi 16$
Bore size	mm		$\phi 6$	$\phi 8$	$\phi 6$	$\phi 8$	$\phi 12$	$\phi 16$
Actuation	Double acting/single rod							
Working fluid	Compressed air							
Max. working pressure	1.0 (≈ 150 psi, 10 bar)							
Min. working pressure	0.15 (≈ 22 psi, 1.5 bar)				0.15 (≈ 22 psi, 1.5 bar)			
Proof pressure	1.6 (≈ 230 psi, 16 bar)							
Ambient temperature	5 (41°F) to 60 (140°F)							
Port size	Body side surface port	M3			M3			M5
	Rear common port	—			—			M3
Stroke tolerance	mm		$+0.5$ 0		$+2.0$ 0			
Working piston speed	1 to 200 mm/s							
Cushion	None				With rubber cushion			
Lubrication	Lubrication not possible							
Allowable absorbed energy	J	This product cannot absorb the energy generated by an external load mounted on the cylinder. When using the product with no load, select high load or separately provide a shock absorber on the outside.			0.004	0.014	0.044	0.110

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10/15/20/25/30	30	10	5	5	5
$\phi 8$	5/10/15/20/25/30	30	10	5	5	5
$\phi 12$	5/10/15/20/25/30	30	10	5	5	5
$\phi 16$	5/10/15/20/25/30	30	10	5	5	5

Note: Products with stroke other than standard stroke are not available.

Switch specifications

Item	2-wire reed	2-wire proximity			3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC	10 to 30 VDC	24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less	0.5V or less	0.5V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μ A or less			
Lead wire length	Standard 1 m (oil resistant vinyl cabtyre cable 2-conductor 0.15 mm ²)				Standard 1 m (oil resistant vinyl cabtyre cable 3-conductor 0.15 mm ²)			
Shock resistance	294 m/s ²		980 m/s ²					
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60°C							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight	g 1 m:10 3 m:29							

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

*4: The F-switch uses a bend-resistant lead wire.

Cylinder weight table

Same as MSD Series (double acting/single rod) and MSD-K Series (double acting/high load). Refer to pages 1423 and 1441.

MSD-F/MSD-KF Series

How to order

How to order

- No switch (without magnet for switch)



- With switch (built-in magnet for switch)



A Model No.

B Bore size

C Stroke

D Switch model No.

*1

*2

⚠ Note on model No. selection

*1 : For $\phi 6$ or $\phi 8$ with switch, use a non-magnetic (stainless steel, etc.) mounting bolt.*2 : For $\phi 12$ or $\phi 16$ with proximity switch, use a non-magnetic (stainless steel, etc.) through bolt.*3 : For rear piping, body side installation is possible. Note that 2 bolts are used for rod side installation and head side installation.

[Example of model No.]

MSD-KLF-12-10-F0H-R-R

- A Model No. : Double acting/fine speed/high load with switch
- B Bore size : $\phi 12$ mm
- C Stroke : 10 mm
- D Switch model No. : Reed switch F0H, lead wire 1 m
- E Switch quantity : 1 on rod side
- F Piping port position: Rear piping

E Switch quantity

F Option *3

How to order switch



Switch model No. (Item D at right)

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$\phi 6$	Push	-	4.24	5.65	8.48	11.3	14.1	17.0	19.8	22.6	25.4	28.3
	Pull	-	2.36	3.14	4.71	6.28	7.85	9.42	11.0	12.6	14.1	15.7
$\phi 8$	Push	-	7.54	10.1	15.1	20.1	25.1	30.2	35.2	40.2	45.2	50.3
	Pull	-	4.59	6.13	9.19	12.3	15.3	18.4	21.4	24.5	27.6	30.6
$\phi 12$	Push	11.3	17.0	22.6	33.9	45.2	56.5	67.9	79.2	90.5	1.02x10 ²	1.13x10 ²
	Pull	8.48	12.7	17.0	25.4	33.9	42.4	50.9	59.4	67.9	76.3	84.8
$\phi 16$	Push	20.1	30.2	40.2	60.3	80.4	1.01x10 ²	1.21x10 ²	1.41x10 ²	1.61x10 ²	1.81x10 ²	2.01x10 ²
	Pull	15.1	22.6	30.2	45.2	60.3	75.4	90.5	1.06x10 ²	1.21x10 ²	1.36x10 ²	1.51x10 ²

Dimensions

Same as MSD Series (double acting/single rod) and MSD-K Series (double acting/high load). Refer to pages 1427, 1446 and 1447.

A Model No.	
Double acting/ single rod	Double acting/ high load
MSD-F MSD-LF	MSD-KF

Code	Description	MSD-F MSD-LF	MSD-KF
B Bore size (mm)			
6	$\phi 6$	●	●
8	$\phi 8$	●	●
12	$\phi 12$		●
16	$\phi 16$		●

C Stroke (mm)			
5	5	●	●
10	10	●	●
15	15	●	●
20	20	●	●
25	25	●	●
30	30	●	●

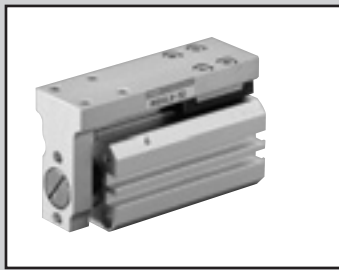
D Switch model No.									
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire			
			AC	DC					
F0H*	F0V*	Reed		●	1-color LED	2-wire	●		
-	F2S*			●			●		
F2H*	F2V*			●			●		
-	F3S*			●			●		
F3H*	F3V*	Prox.		●	1-color LED (PNP output) (custom)	3-wire	●		
F3PH*	F3PV*			●			●		
F2YH*	F2YV*			●			2-color LED	2-wire	●
F3YH*	F3YV*			●			2-color LED	3-wire	●

* Lead wire length			
Blank	1 m (standard)	●	●
3	3 m (option)	●	●

E Switch quantity			
R	1 on rod side	●	●
H	1 on head side	●	●
D	2	●	●

F Option						
Bore size (ϕ)		All bore sizes	6	8	12	16
Blank	Front piping port	●	●	●	●	●
R	Rear piping port				●	●

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending



Small guided compact cylinder
Double acting/guided/with switch

MSDG-L Series

● Bore size: $\phi 6/\phi 8/\phi 12/\phi 16$



Specifications

Item	MSDG-L (with switch)				
Bore size	mm	$\phi 6$	$\phi 8$	$\phi 12$	$\phi 16$
Actuation		Double acting			
Working fluid		Compressed air			
Max. working pressure	MPa	1.0 (≈ 150 psi, 10 bar)			
Min. working pressure	MPa	0.2 (≈ 29 psi, 2 bar)	0.15 (≈ 22 psi, 1.5 bar)	0.1 (≈ 15 psi, 1 bar)	
Proof pressure	MPa	1.6 (≈ 230 psi, 16 bar)			
Ambient temperature	$^{\circ}\text{C}$	5 (41 $^{\circ}\text{F}$) to 60 (140 $^{\circ}\text{F}$)			
Port size	Front piping	M3		M5	
	Rear piping	M3		M3	
Stroke tolerance	mm	+2.0			
		0			
Working piston speed	mm/s	50 to 500			
Cushion		With rubber cushion			
Lubrication		Not required (use turbine oil ISO VG32 if necessary for lubrication)			
Allowable absorbed energy	J	0.004	0.014	0.044	0.110

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10/15/20/25/30	30	10	5	5	5
$\phi 8$	5/10/15/20/25/30	30	10	5	5	5
$\phi 12$	5/10/15/20/25/30	30	10	5	5	5
$\phi 16$	5/10/15/20/25/30	30	10	5	5	5

Note: Products with stroke other than standard stroke are not available.

Switch specifications

Item	2-wire reed	2-wire proximity			3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 29 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC		24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less		0.5 V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μA or less			
Lead wire length	Standard 1 m (oil resistant vinyl cabtyre cable 2-conductor 0.15 mm 2)				Standard 1 m (oil resistant vinyl cabtyre cable 3-conductor 0.15 mm 2)			
Shock resistance	294 m/s 2	980 m/s 2						
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60 $^{\circ}\text{C}$							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight	g	1 m:10 3 m:29						

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25 $^{\circ}\text{C}$. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25 $^{\circ}\text{C}$. (5 to 10 mA at 60 $^{\circ}\text{C}$)

*4: The F-switch uses a bend-resistant lead wire.

Cylinder weight table

(Unit: g)

Stroke (mm)	5	10	15	20	25	30	Weight per switch
Bore size (mm)							
ø6	43	48	52	57	61	66	Refer to the weight in the switch specifications.
ø8	50	56	63	69	76	82	
ø12	76	88	100	112	124	136	
ø16	129	146	163	180	197	214	

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	Push	-	-	5.65	8.48	11.3	14.1	17.0	19.8	22.6	25.4	28.3
	Pull	-	-	3.14	4.71	6.28	7.85	9.42	11.0	12.6	14.1	15.7
ø8	Push	-	7.54	10.1	15.1	20.1	25.1	30.2	35.2	40.2	45.2	50.3
	Pull	-	4.59	6.13	9.19	12.3	15.3	18.4	21.4	24.5	27.6	30.6
ø12	Push	11.3	17.0	22.6	33.9	45.2	56.5	67.9	79.2	90.5	1.02x10 ²	1.13x10 ²
	Pull	8.48	12.7	17.0	25.4	33.9	42.4	50.9	59.4	67.9	76.3	84.8
ø16	Push	20.1	30.2	40.2	60.3	80.4	1.01x10 ²	1.21x10 ²	1.41x10 ²	1.61x10 ²	1.81x10 ²	2.01x10 ²
	Pull	15.1	22.6	30.2	45.2	60.3	75.4	90.5	1.06x10 ²	1.21x10 ²	1.36x10 ²	1.51x10 ²

- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/COVP/N2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC
- SMG
- MSD/MSDG
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd Contr
- Ending

MSDG-L Series

How to order

● With switch (built-in magnet for switch)

MSDG-L - 6 - 30 - F0H - D - R

Model No.

A Bore size

B Stroke

C Switch model No.

*1

*2

D Switch quantity

E Option

*3

⚠ Precautions for model No. selection

*1 : For ø6 or ø8 with switch, use a non-magnetic (stainless steel, etc.) mounting bolt.*2 : For ø12 or ø16 with proximity switch, use a non-magnetic (stainless steel, etc.) through bolt.*3 : For rear piping, body side installation is possible.

[Example of model No.]

MSDG-L-6-30-F0H-D-R

Model No.: Double acting/guided with switch

A Bore size : ø6 mm

B Stroke : 30 mm

C Switch model No. : Reed F0H switch

D Switch quantity : 2

E Option : Rear piping

How to order switch

SW - F0H

Switch model No.
(Item **C** above)

Code	Description
A Bore size (mm)	
6	ø6
8	ø8
12	ø12
16	ø16

B Stroke (mm)	
5	5
10	10
15	15
20	20
25	25
30	30

C Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
F0H*	F0V*	Reed		●	1-color LED	2-wire
-	F2S*	Proximity		●		
F2H*	F2V*			●		
-	F3S*			●		
F3H*	F3V*	Proximity		●	1-color LED (PNP output) (custom)	3-wire
F3PH*	F3PV*			●		
F2YH*	F2YV*			●	2-color LED	2-wire
F3YH*	F3YV*			●		3-wire

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)

D Switch quantity	
R	1 on rod side
H	1 on head side
D	2

E Option	
Blank	Front piping
R	Rear piping

Specifications for rechargeable battery (Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process

MSDG-L-.....- P4*

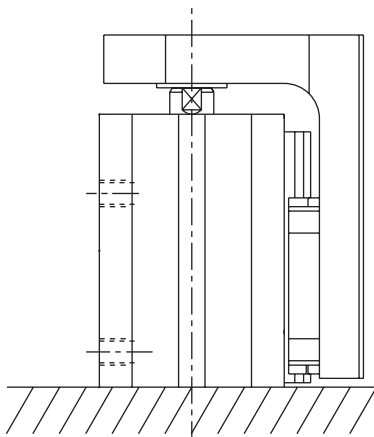
Switch selection table

Switches may not be installable depending on relations between cylinder installation and stroke.

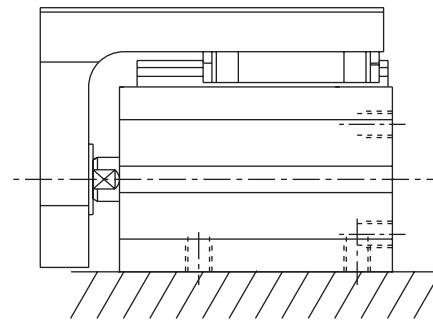
Refer to the table below to select a switch.

Switches cannot be used for side mounting in the following combinations.

- Combinations in which F2YH/V, F3YH/V or F3PH/V is mounted at the switch mounting position H with stroke 5 mm
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke 10 mm (Refer to page 1452 for the min. stroke with switch)



For head side installation



For side installation

● For head side installation

Bore size (mm)	Stroke (mm)	Reed switch				Proximity switch									
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V		F2YH/F3YH/F3PH		F2YV/F3YV/F3PV	
		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position		Switch position	
		R	H	R	H	R	H	R	H	R	H	R	H	R	H
ø6	5	x	○	○	○	○	○	x	○	○	○	x	x	○	○
	10	○	○	○	○	○	○	x	○	○	○	x	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø8	5	x	○	○	○	○	○	x	○	○	○	x	x	○	○
	10	○	○	○	○	○	○	x	○	○	○	x	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø12	5	x	○	○	○	○	○	x	○	○	○	x	○	○	○
	10	○	○	○	○	○	○	x	○	○	○	x	x	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ø16	5	x	○	○	○	○	○	x	○	○	○	x	○	○	○
	10	○	○	○	○	○	○	x	○	○	○	x	○	○	○
	15 to	○	○	○	○	○	○	○	○	○	○	○	○	○	○

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

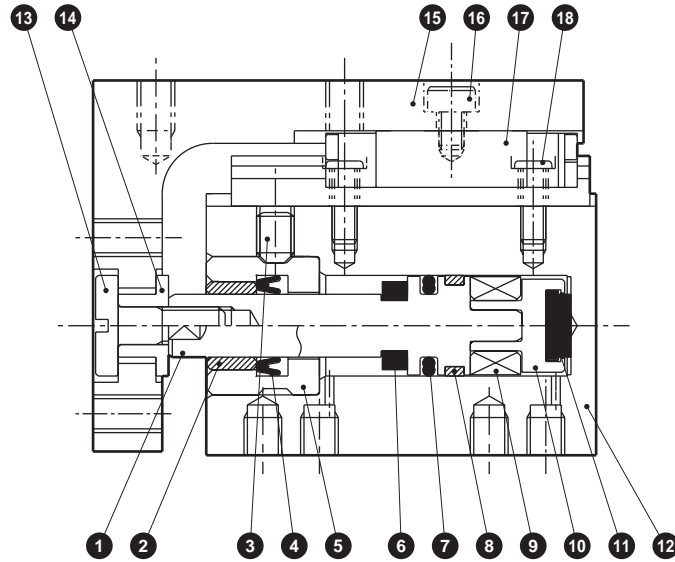
Spd
Contr

Ending

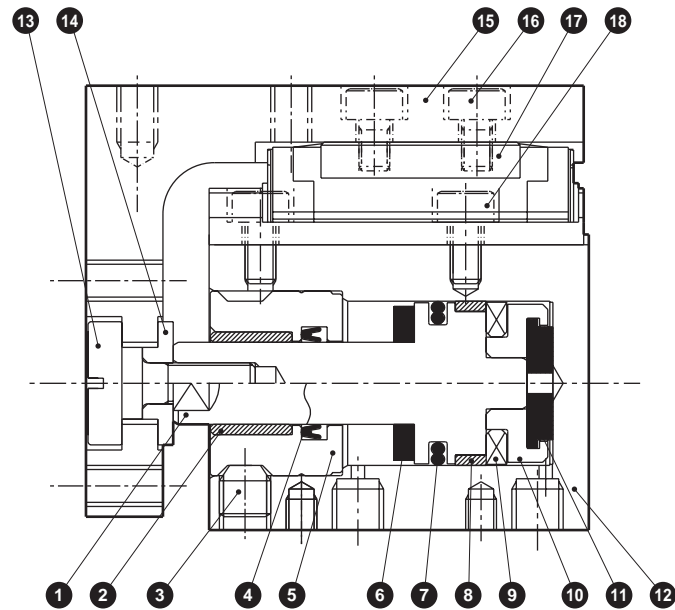
MSDG-L Series

Internal structure and parts list

● MSDG-L-6/8/12



● MSDG-L-16



Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Piston	Stainless steel		10	Adaptor	Aluminum alloy	
2	Bush	Oil-impregnated copper alloy		11	Cushion rubber H	Urethane rubber	
3	Hexagon socket set screw	Stainless steel		12	Body	Aluminum alloy	Hard alumite
4	Rod packing	Nitrile rubber		13	Floating bolt	Steel	Nickeling
5	Rod metal	Stainless steel		14	Floating bush	Stainless steel	
6	Cushion rubber R	Urethane rubber		15	Table	Aluminum alloy	Alumite
7	Piston packing	Nitrile rubber		16	Hexagon socket head cap screw	Stainless steel	
8	Wear ring	Acetal resin		17	High precision guide	Stainless steel	
9	Magnet	Plastic		18	Bolt	Stainless steel	

MEMO

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

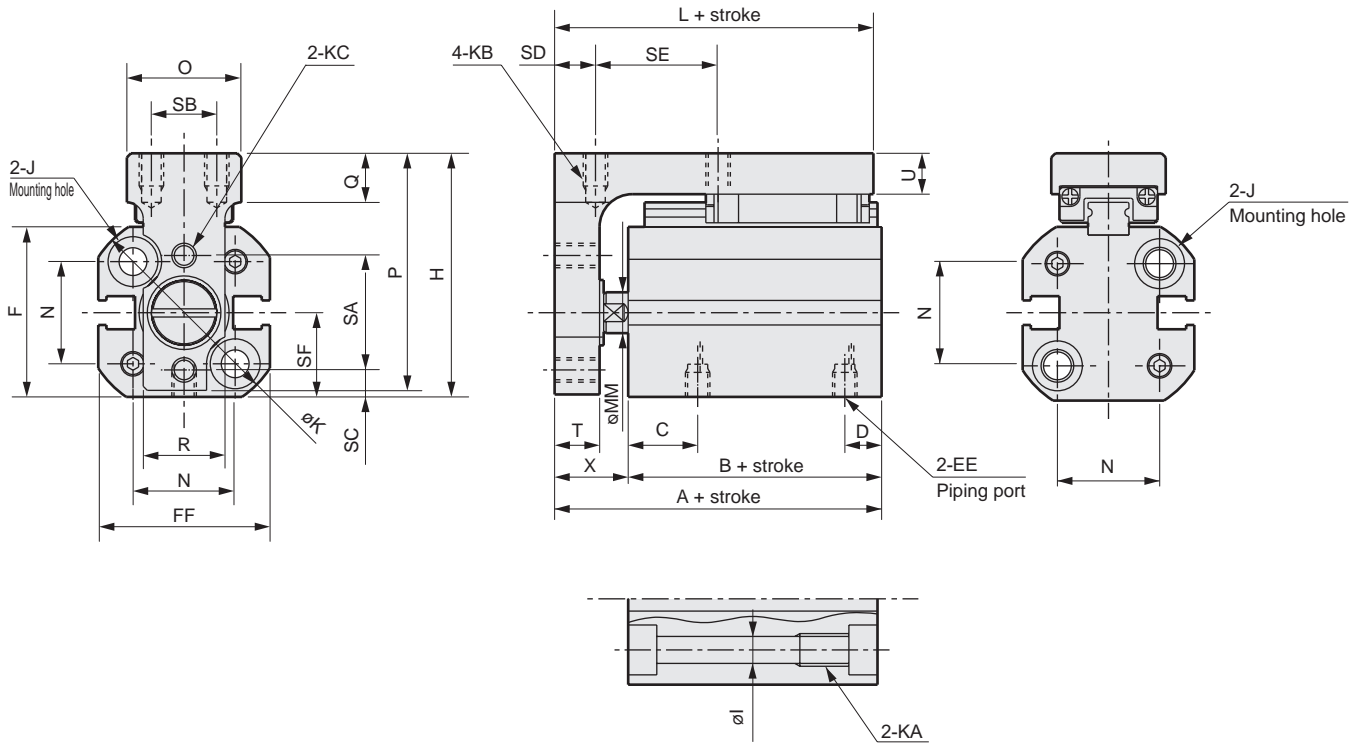
Ending

MSDG-L Series

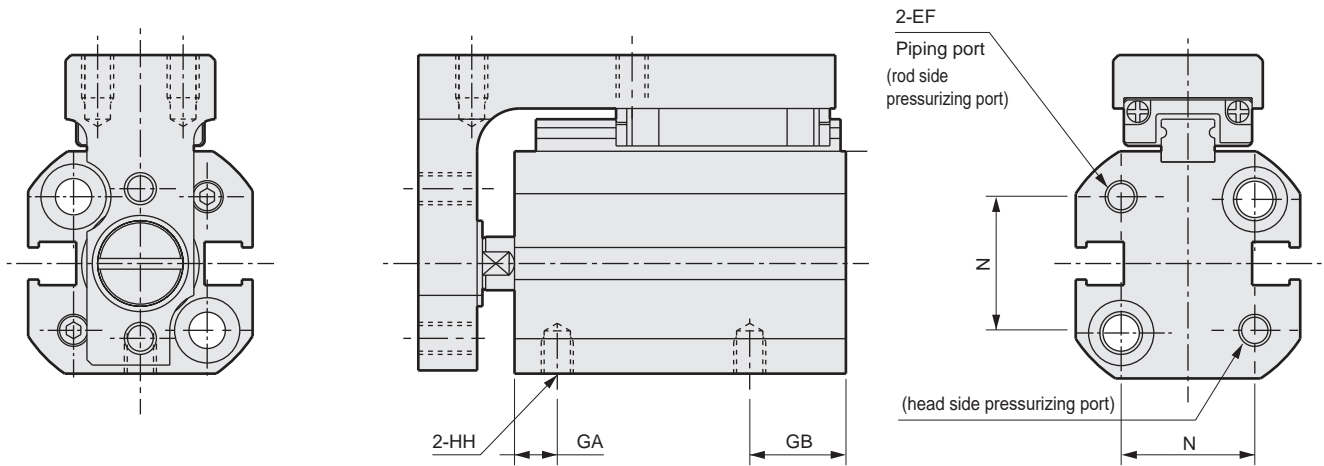
Dimensions



● MSDG-L-6/8/12



● MSDG-L-6/8/12-*R (Rear piping)



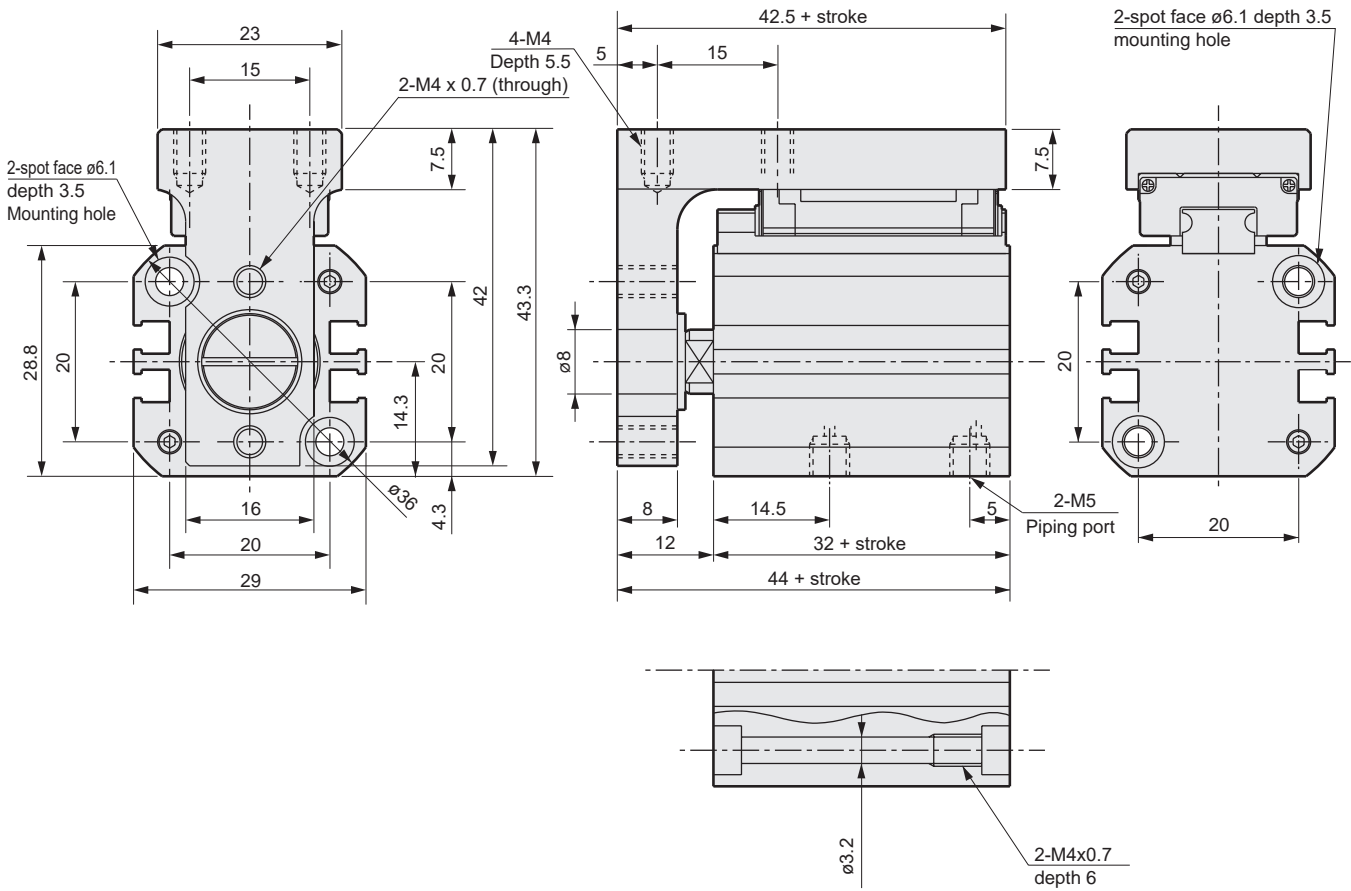
Code	A	B	C	D	EE	EF	F	FF	GA	GB	H	HH	I	J	K	KA	KB	KC
Bore size (mm)																		
ø6	33.5	24.5	7.5	4	M3	M3	18.8	19	3	8.5	27.8	M3 depth 3	3.2	Spot face ø1 depth 0.5	22.5	M4 depth 6	M3 depth 4	M3 (through)
ø8	35	26	9	4	M3	M3	20.8	21	4.5	8.5	29.8	M3 depth 3	3.2	Spot face ø1 depth 0.5	25	M4 depth 6	M3 depth 4	M3 (through)
ø12	38	27	11.5	5	M5	M3	24.8	25	4	10.5	36.3	M3 depth 3	3.2	Spot face ø1 depth 0.5	31	M4 depth 6	M3 depth 4.5	M3 (through)

Code	L	MM	N	O	P	Q	R	SA	SB	SC	SD	SE	SF	T	U	X
Bore size (mm)																
ø6	32	4	11	14	27	6	9.5	12	8	3.3	5	15	9.3	5.5	5	9
ø8	33.5	5	12.5	14	29	6	10	14	8	3.3	5	15	10.3	5.5	5	9
ø12	36.5	6	15.5	19	35	6.5	13	15.5	12	4.5	5	15	12.3	7	6.5	11

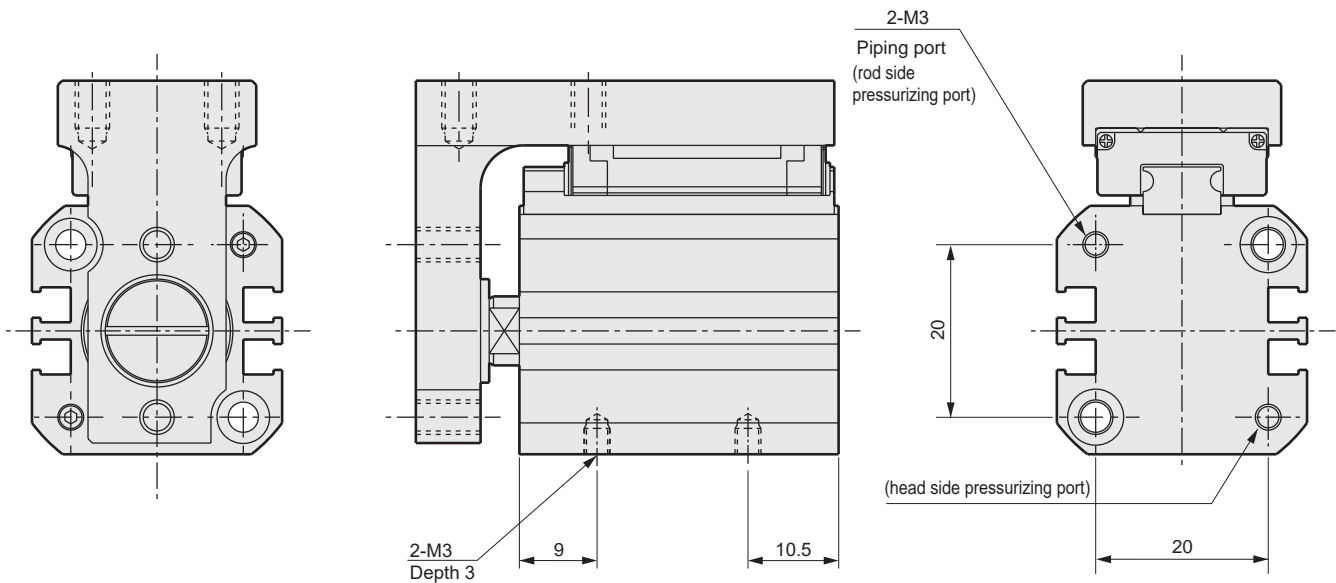
Dimensions



● MSDG-L-16



● MSDG-L-16*-R (Rear piping)



SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

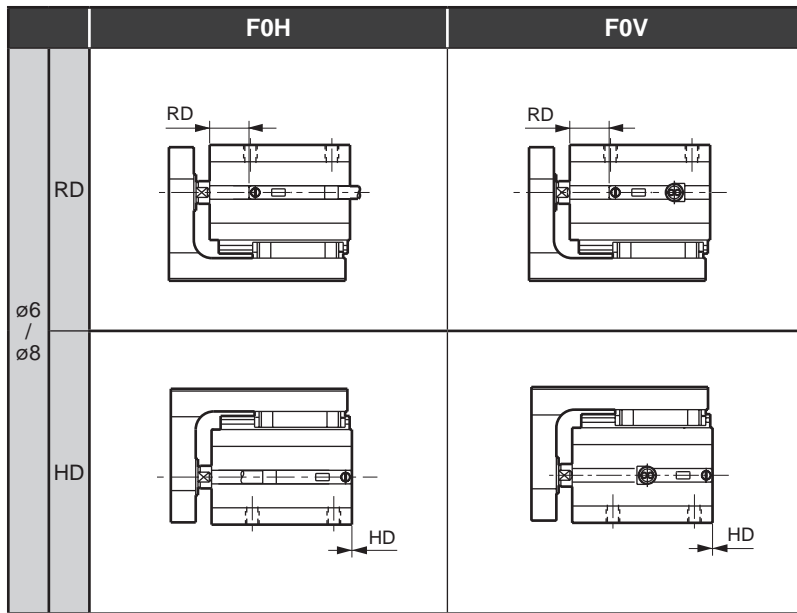
Spd
Contr

Ending

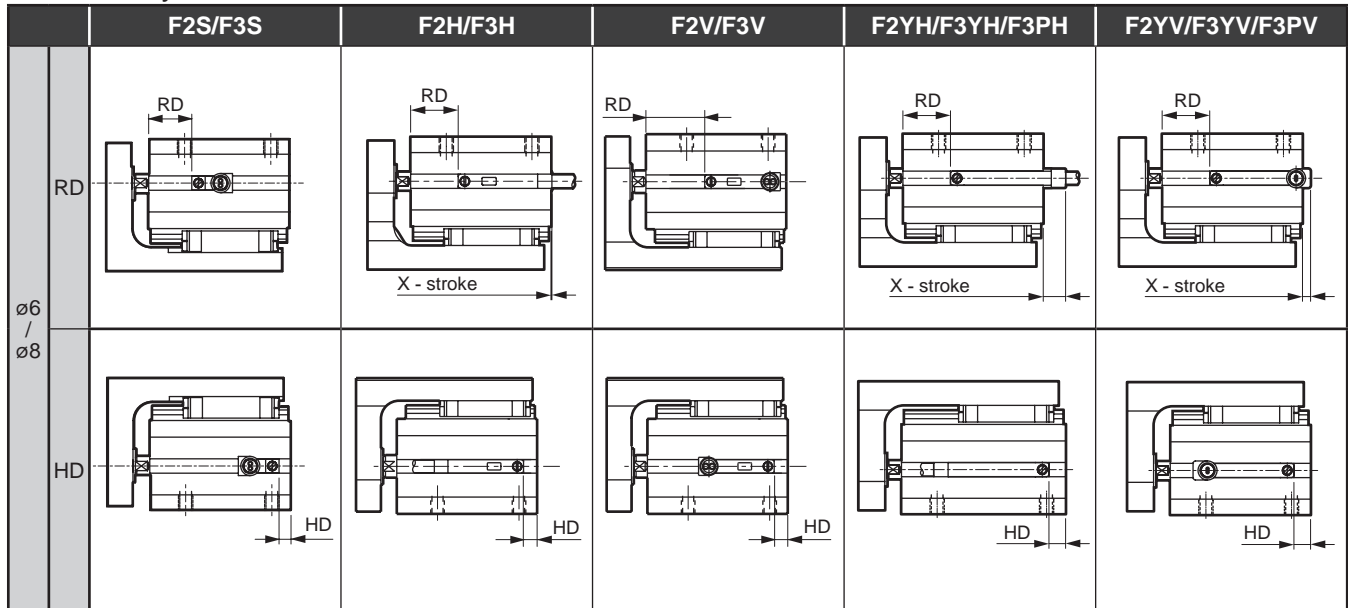
MSDG-L Series

Switch mounting position ($\phi 6/\phi 8$)

● Reed switch



● Proximity switch



Switch mounting position dimensions

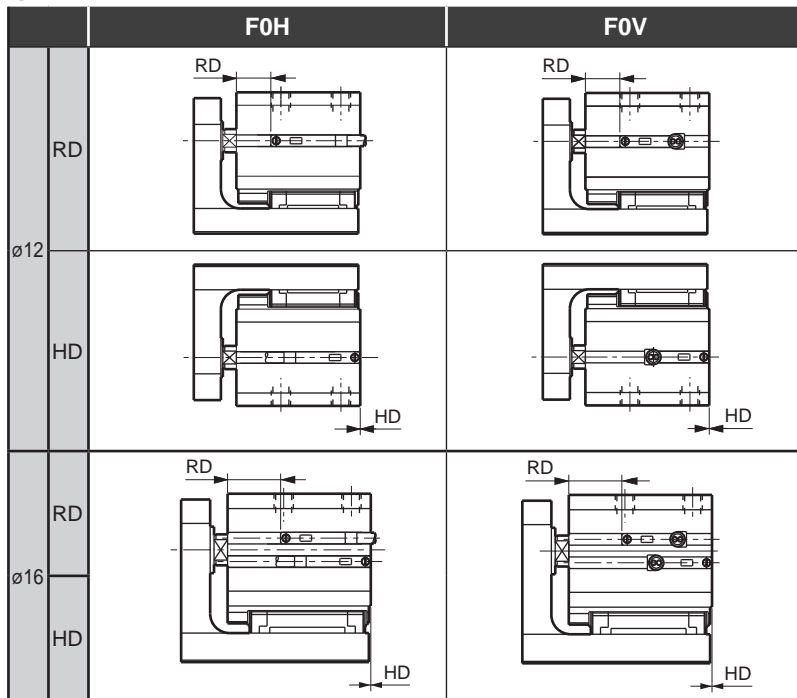
(Unit: mm)

Model	Bore size (mm)	Reed switch				Proximity switch												
		F0H		F0V		F2S/F3S		F2H/F3H		F2V/F3V			F2YH/F3YH/F3PH			F2YV/F3YV/F3PV		
		RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)
MSDG	$\phi 6$	6.0	0	6.0	0	9	2.5	10	3.5	5.2	10	3.5	10	3.5	9.7	10	3.5	6.7
-KL	$\phi 8$	8.5	0	8.5	0	11.5	1.5	12.5	2.5	6.2	12.5	2.5	12.5	2.5	10.7	12.5	2.5	7.7

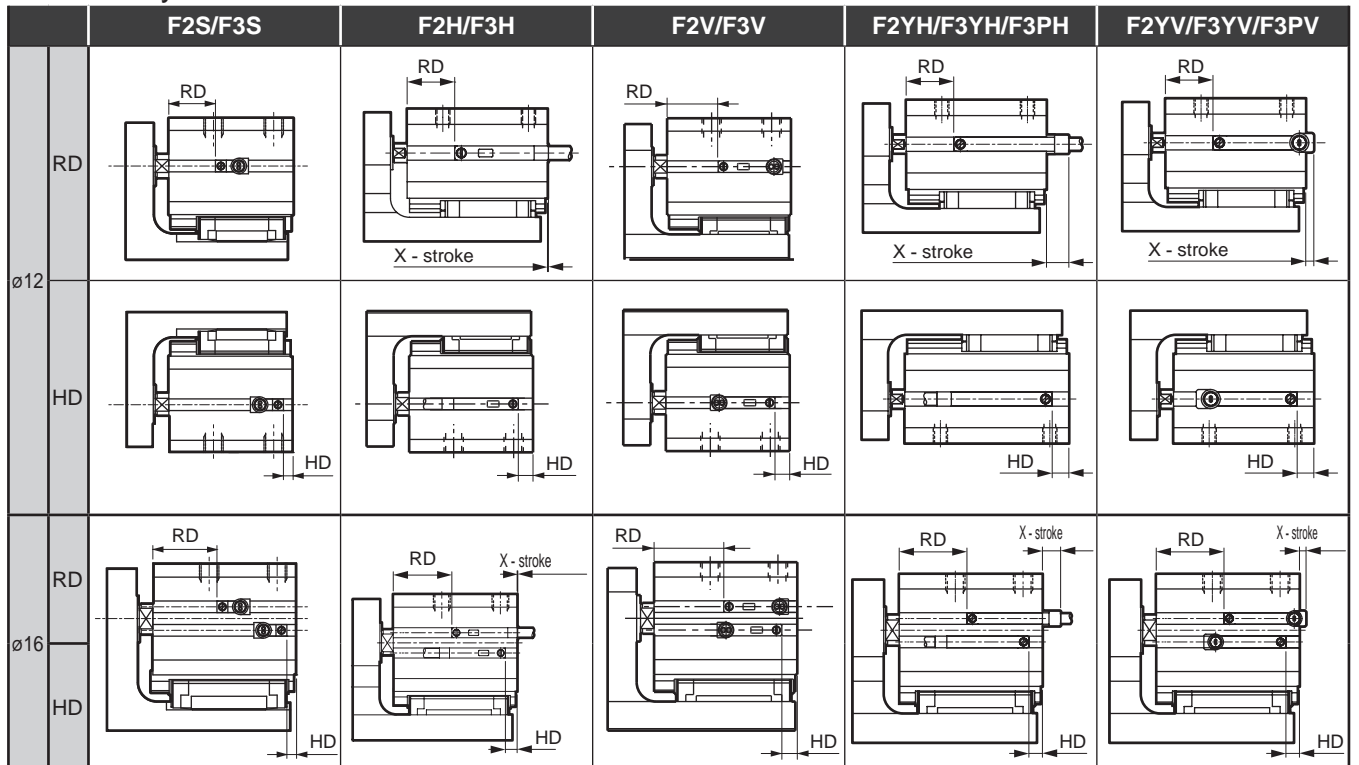
*1: X dimensions indicate the switch protrusion from the body end surface. When the X-stroke is negative, there is no protrusion from the body end surface.

Switch mounting position (ø12/ø16)

● Reed switch



● Proximity switch



Switch mounting position dimensions

(Unit: mm)

Model	Bore size (mm)	Reed switch				Proximity switch												
		F0H		F0V		F2S/F3S		F2H/F3H			F2V/F3V		F2YH/F3YH/F3PH			F2YV/F3YV/F3PV		
		RD	HD	RD	HD	RD	HD	RD	HD	X (*1)	RD	HD	RD	HD	X (*1)	RD	HD	X (*1)
MSDG -KL	ø12	9.0	0	9.0	0	12	2.5	13	3.5	5.7	13	3.5	13	3.5	10.2	13	3.5	7.2
	ø16	14.0	0	14.0	0	16.5	2.5	17.5	3.5	5.2	17.5	3.5	17.5	3.5	9.7	17.5	3.5	6.7

*1: X dimensions indicate the switch protrusion from the body end surface. When the X-stroke is negative, there is no protrusion from the body end surface.

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

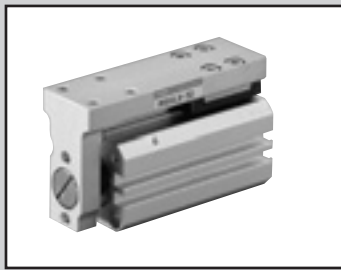
ShkAbs

FJ

FK

Spd
Contr

Ending



Small guided compact cylinder
Double acting/guided/with switch/fine speed

MSDG-LF Series

● Bore size: $\phi 12/\phi 16$



Specifications

Item	MSDG-LF	
	$\phi 12$	$\phi 16$
Bore size mm	$\phi 12$	$\phi 16$
Actuation	Double acting/guided	
Working fluid	Compressed air	
Max. working pressure MPa	1.0 (≈ 150 psi, 10 bar)	
Min. working pressure MPa	0.1 (≈ 15 psi, 1 bar)	
Proof pressure MPa	1.6 (≈ 230 psi, 16 bar)	
Ambient temperature $^{\circ}\text{C}$	5 (41 $^{\circ}\text{F}$) to 60 (140 $^{\circ}\text{F}$)	
Port size	Front piping	M5
	Rear piping	M3
Stroke tolerance mm	$^{+2.0}_0$	
Working piston speed mm/s	1 to 200	
Cushion	With rubber cushion	
Lubrication	Not available	
Allowable absorbed energy J	0.044	0.110

Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke (mm)	Min. stroke with two switches (mm)		Min. stroke with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 12$	5/10/15/20/25/30	30	10	5	5	5
$\phi 16$	5/10/15/20/25/30	30	10	5	5	5

Note: Products with stroke other than standard stroke are not available.

Switch specifications

Item	2-wire reed		2-wire proximity		3-wire proximity			
	FOH/V	F2H/V	F2S	F2YH/V	F3H/V	F3S	F3PH/V (Made to order)	F3YH/V
Applications	Dedicated for programmable controller				For programmable controller, relay			
Output method	-				NPN output	NPN output	PNP output	NPN output
Power supply voltage	-	-	-	-	10 to 28 VDC	10 to 28 VDC	4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC		24 VDC $\pm 10\%$	30 VDC or less			
Load current	5 to 20 mA (*3)				50 mA or less			
Current consumption	-	-	-	-	≤ 10 mA (ON) at 24 VDC	10 mA or less with 24 VDC		
Internal voltage drop	4V or less				0.5V or less		0.5 V or less at 30 mA	0.5V or less
Indicator	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	
Leakage current	1 mA or less				10 μA or less			
Lead wire length	Standard 1 m (oil resistant vinyl cable 2-conductor 0.15 mm 2)				Standard 1 m (oil resistant vinyl cable 3-conductor 0.15 mm 2)			
Shock resistance	294 m/s 2	980 m/s 2						
Insulation resistance	20 M Ω and over with 500 VDC megger							
Withstand voltage	No failure after 1 minute of 1,000 VAC application.							
Ambient temperature	-10 to +60 $^{\circ}\text{C}$							
Degree of protection	IEC Standard IP67, JIS C0920 (water-tight), oil resistance							
Weight g	1 m:10				3 m:29			

*1: Refer to Ending Page 1 for detailed switch specifications and dimensions.

*2: Switches other than the above models, such as switches with connectors, are also available. Refer to Ending Page 1.

*3: The max. load current is 20 mA at 25 $^{\circ}\text{C}$. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25 $^{\circ}\text{C}$. (5 to 10 mA at 60 $^{\circ}\text{C}$)

*4: The F-switch uses a bend-resistant lead wire.

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$\phi 12$	Push	11.3	17.0	22.6	33.9	45.2	56.5	67.9	79.2	90.5	1.02x10 2	1.13x10 2
	Pull	8.48	12.7	17.0	25.4	33.9	42.4	50.9	59.4	67.9	76.3	84.8
$\phi 16$	Push	20.1	30.2	40.2	60.3	80.4	1.01x10 2	1.21x10 2	1.41x10 2	1.61x10 2	1.81x10 2	2.01x10 2
	Pull	15.1	22.6	30.2	45.2	60.3	75.4	90.5	1.06x10 2	1.21x10 2	1.36x10 2	1.51x10 2

How to order

- With switch (built-in magnet for switch)

MSDG-LF - 12 - 10 - F2V - R - R

Model No.

A Bore size

B Stroke

C Switch model No.

*1

D Switch quantity

E Option

*2

⚠ Precautions for model No. selection

*1 : If with proximity switch and only when using through bolt, use the non-magnetic (stainless steel, etc.) mounting bolt.*2 : For rear piping, body side installation is possible.

[Example of model No.]

MSDG-LF-12-10-F0H-R-R

Double acting/guided/fine speed with switch

- A** Bore size : $\phi 12$ mm
- B** Stroke : 10 mm
- C** Switch model No. : Reed switch F0H, lead wire 1 m
- D** Switch quantity : 1 on rod side
- E** Piping port position : Rear common port

Code	Description					
A Bore size (mm)						
12	$\phi 12$					
16	$\phi 16$					
B Stroke (mm)						
5	5					
10	10					
15	15					
20	20					
25	25					
30	30					
C Switch model No.						
Axial lead wire	Radial lead wire	Contact	Voltage		Indicator	Lead wire
			AC	DC		
F0H*	F0V*	Reed		●	1-color LED	2-wire
-	F2S*			●		
F2H*	F2V*	Proximity		●		3-wire
-	F3S*			●		
F3H*	F3V*			●		
F3PH*	F3PV*		●	1-color LED (PNP output) (custom)	3-wire	
F2YH*	F2YV*		●	2-color LED	2-wire	
F3YH*	F3YV*		●		3-wire	
* Lead wire length						
Blank	1 m (standard)					
3	3 m (option)					
D Switch quantity						
R	1 on rod side					
H	1 on head side					
D	2					
E Option						
Blank	Front piping					
R	Rear piping					

How to order switch

SW - F0H

Switch model No.
(Item **C** above)

Dimensions

The same as double acting/guided MSDG-L series.
Refer to pages 1458 and 1459.

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

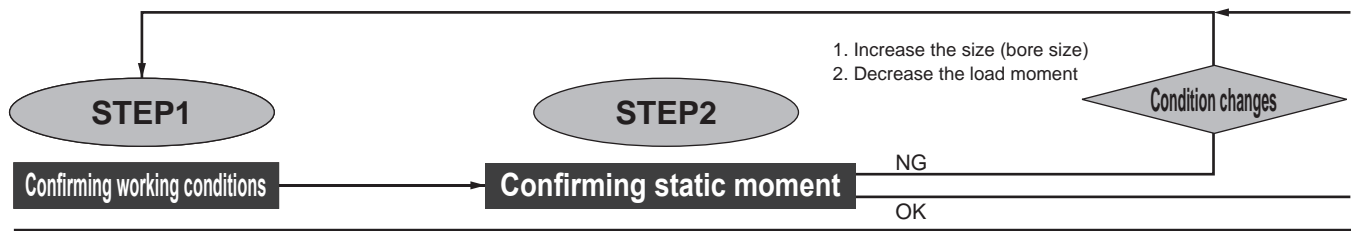
FK

Spd
Contr

Ending

MSD/MSDG Series

Selection guide



STEP1 Confirming working conditions

- | | |
|---|--|
| 1. Bore size : D (mm) | 6. Load moment : M1, M2, M3 direction (N·m) |
| 2. Stroke : St (mm) | 7. Load weight : m1, m2, m3(kg) |
| 3. Working pressure : P (MPa) | 8. Amount of overhang : L1, L2, L3(m) |
| 4. Travel time : t (s) | 9. Length from center of guide to table end : L(m) |
| 5. Cylinder travel direction : Vertical, horizontal | 10. Length from table end to load : A(m) |

STEP2 Confirming static moment

Depending on the mounting direction (M1/M2/M3 direction), the tolerance value of the moment varies. Calculate the value of moment to be applied by referring to the figure below.

- When there is only one load mounting direction
Check that the calculated value is within the tolerance value (Table 1).
- When there are more than one load mounting directions (complex moment)
Divide the value in each direction by the tolerance value of moment (Table 1) to obtain the moment ratio and check that the total value is 1.0 or less.

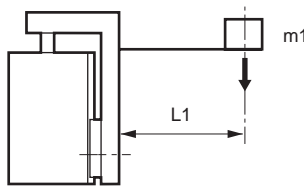
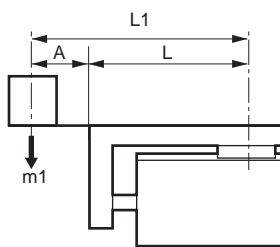
$$\frac{M1}{M1_{max}} + \frac{M2}{M2_{max}} + \frac{M3}{M3_{max}} \leq 1.0$$

Table 1 Allowable moment in operation (Unit: N·m)

Bore size (mm)	M1	M2	M3
ø6	0.16	0.24	0.16
ø8	0.16	0.24	0.16
ø12	0.27	0.55	0.27
ø16	0.57	1.16	0.57

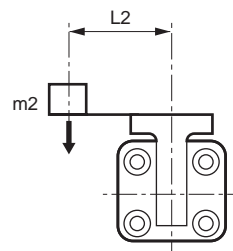
- Bending moment: M1

$$M1 (N·m) = 10 \times m1 (kg) \times L1 (m)$$



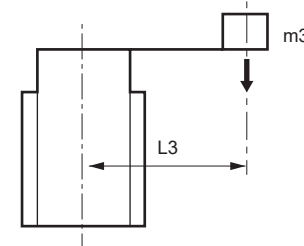
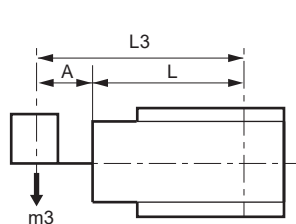
- Radial moment: M2

$$M2 (N·m) = 10 \times m2 (kg) \times L2 (m)$$



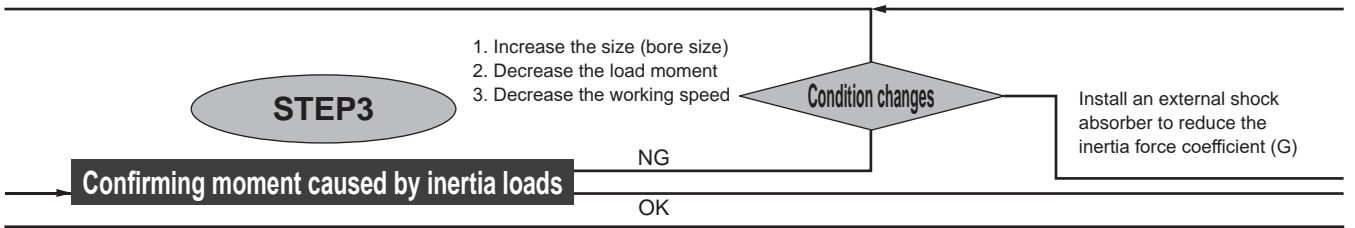
- Torsion moment: M3

$$M3 (N·m) = 10 \times m3 (kg) \times L3 (m)$$



L value (Unit: m)

Bore size (mm)	Stroke					
	5	10	15	20	25	30
ø 6	0.027	0.032	0.037	0.042	0.047	0.052
ø 8	0.028	0.033	0.038	0.043	0.048	0.053
ø12	0.031	0.036	0.041	0.046	0.051	0.056
ø16	0.033	0.038	0.043	0.048	0.053	0.058



STEP3 Confirming moment caused by inertia loads

Depending on the mounting direction (M1/M2/M3 direction), moment caused by inertia load may be applied. Calculate the value of moment caused by inertia load by referring to the figure below.

Moment caused by inertia load (M1'/M3') can be obtained from load weight (m1, m2, m3), overhang length (L1, L2, L3, L1', L3') and inertia force coefficient (G).

Inertia force coefficient (G) can be obtained from the relation between inertia force coefficient and stroke end speed (Fig. 1).

Check that the calculated value is within the tolerance value (Table 2).

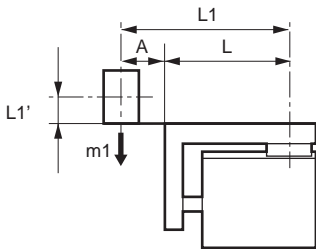
Table 2 Allowable moment when inertia load is applied (Unit: N·m)

Bore size (mm)	M1'	M2'	M3'
ø6	0.33	-	0.33
ø8	0.33	-	0.33
ø12	0.49	-	0.49
ø16	1.11	-	1.11

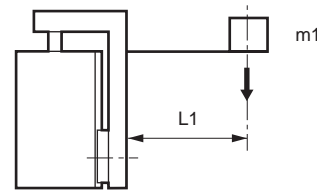
* Inertia load is not applied in M2 direction.

● Bending moment: M1

$$M1' = 10 \times m1 \times (L1 + G \times L1')$$

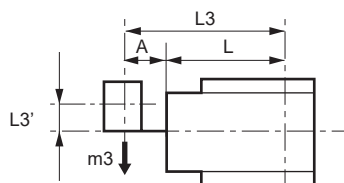


$$M1' = 10 \times m1 \times L1 \times (1 + G)$$

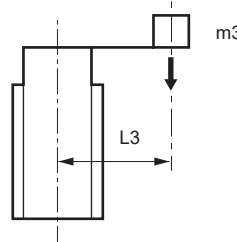


● Torsion moment: M3

$$M3' = 10 \times m3 \times (L3 + G \times L3')$$



$$M3' = 10 \times m3 \times L3 \times (1 + G)$$



$$M3' = 10 \times m2 \times G \times L2$$

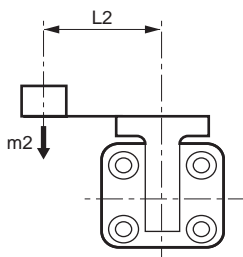
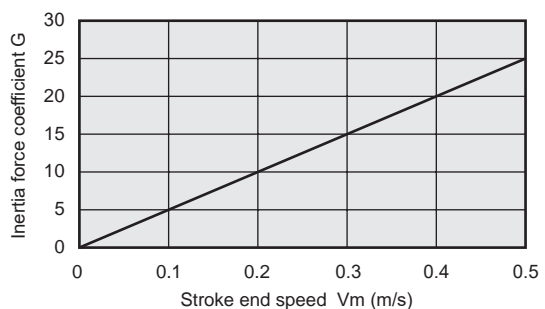


Fig. 1 Relation between inertia force coefficient and stroke end speed

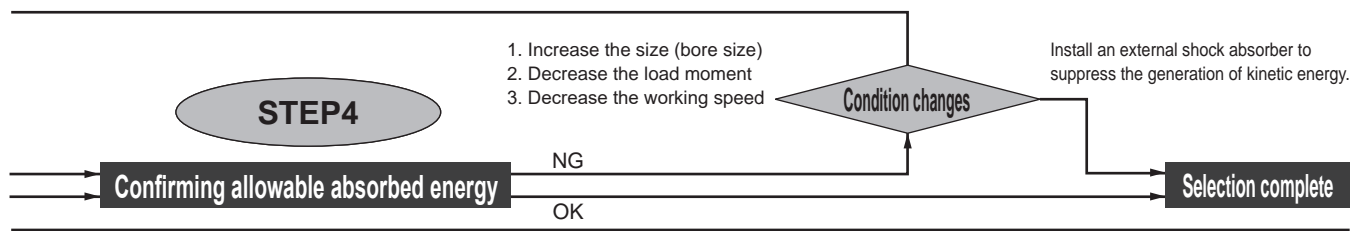


(Note) Calculate the stroke end speed Vm from STEP 4.

- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/COVP/N2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC
- SMG
- MSD/MSDG
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd Contr
- Ending

MSD/MSDG Series

Selection guide



STEP4 Confirming allowable absorbed energy

First, obtain the kinetic energy of cylinder.

$$E = \frac{1}{2} m v_m^2$$

$$v_m = \frac{Stx10^{-3}}{t} \times (1 + 1.5 \times \frac{\alpha}{100})$$

$$\alpha = \frac{F_n}{F} \times 100$$

$$F = F_0 \times \frac{\mu}{100}$$

E : Kinetic energy (J)
m : Load weight (kg)
v_m : Stroke end speed (m/s)
St : Stroke (mm)
t : Travel time (S)
α : Load factor (%)
F_n : Thrust required to move the workpiece (N)
F : Actual thrust (N)
F₀ : Theoretical thrust force (refer to Table 4) (N)
μ : Thrust efficiency (%)

Table 3 Required thrust force (Fn)

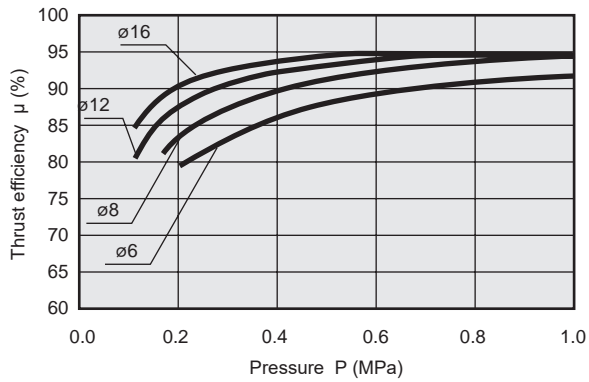
Cylinder movement direction	Horizontal direction	Vertical
Thrust	$F_n = 0.2 \times 10 \times m$	$F_n = 1.2 \times 10 \times m$

Table 4 Theoretical thrust table (F0)

(Unit: N)

Bore size	Operating direction	Working pressure MPa										
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
ø6	Push			6	8	11	14	17	20	23	25	28
	Pull			3	5	6	8	9	11	13	14	16
ø8	Push		8	10	15	20	25	30	35	40	45	50
	Pull		5	6	9	12	15	18	21	24	28	31
ø12	Push	11	17	23	34	45	57	68	79	90	102	113
	Pull	8	13	17	25	34	42	51	59	68	76	85
ø16	Push	20	30	40	60	80	100	121	141	161	181	201
	Pull	15	23	30	45	60	75	90	106	121	136	151

Fig. 2 Relation between thrust force efficiency and pressure



Check that the kinetic energy (E) is within the allowable absorbed energy value (E0).

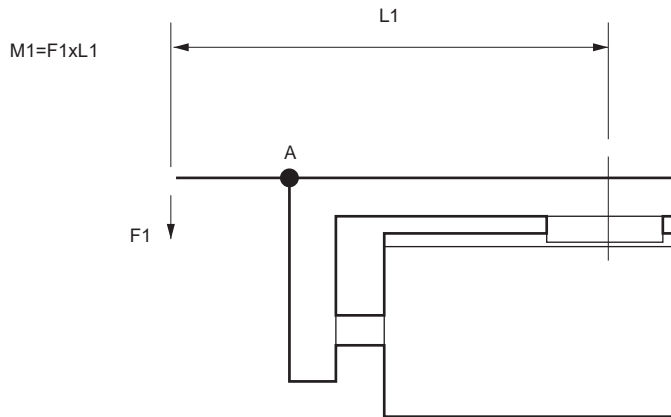
$E \leq E_0$

Table 5 Allowable absorbed energy value (E0)

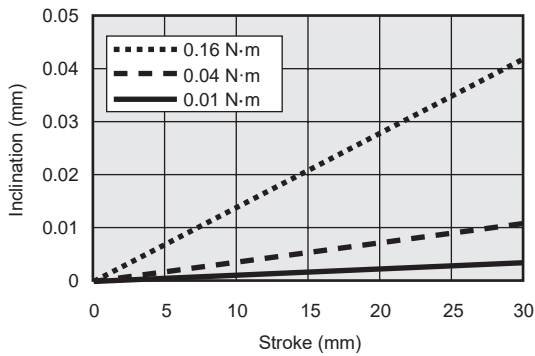
Bore size (mm)	Allowable absorbed energy E0(J)
ø6	0.004
ø8	0.014
ø12	0.044
ø16	0.110

Table inclination (reference value)

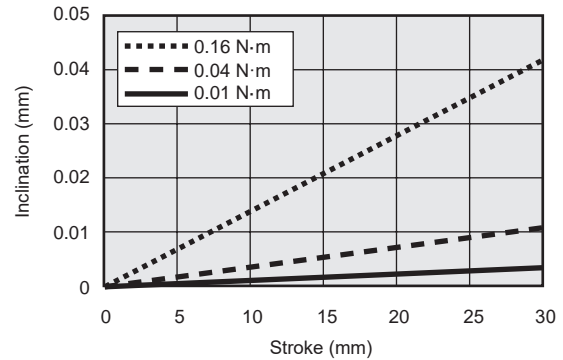
● Inclination at point A when M1 moment is applied



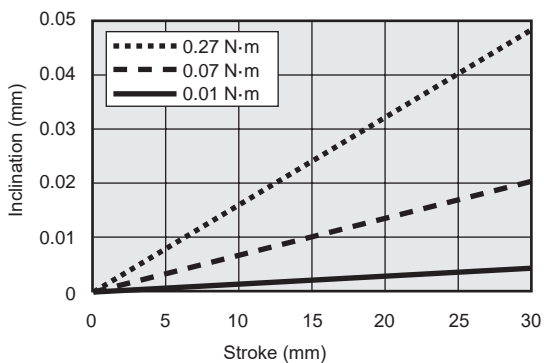
● MSDG-L-6



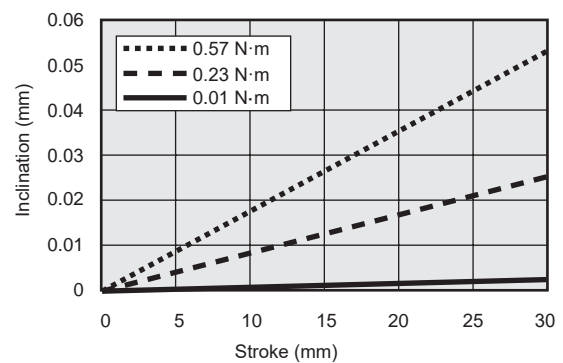
● MSDG-L-8



● MSDG-L-12



● MSDG-L-16



SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

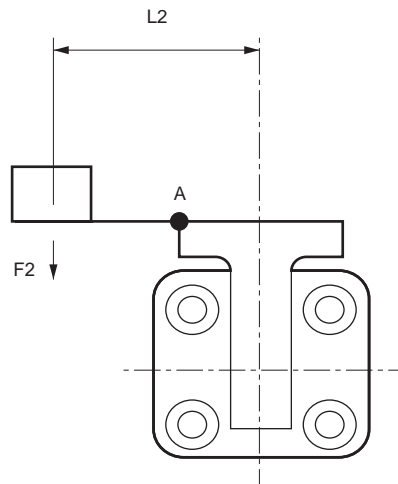
Spd
Contr

Ending

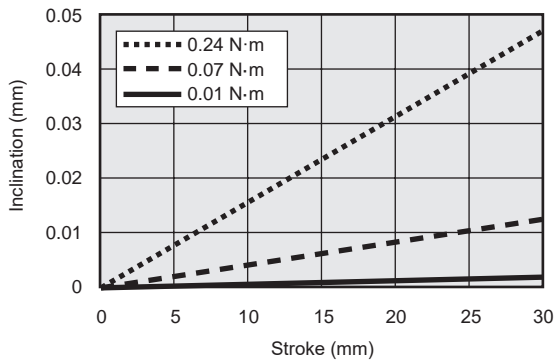
Table inclination (reference value)

● Inclination at point A when M2 moment is applied

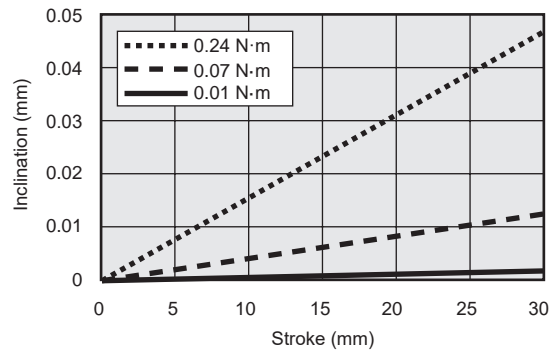
$$M2 = F2 \times L2$$



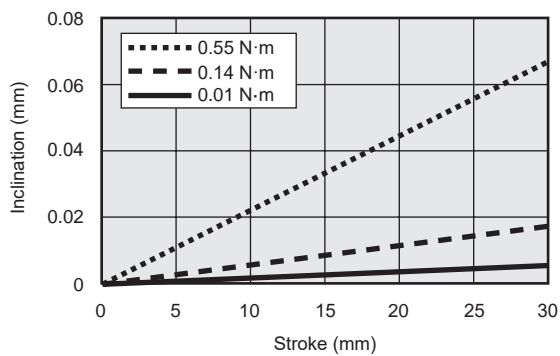
● MSDG-L-6



● MSDG-L-8



● MSDG-L-12



● MSDG-L-16

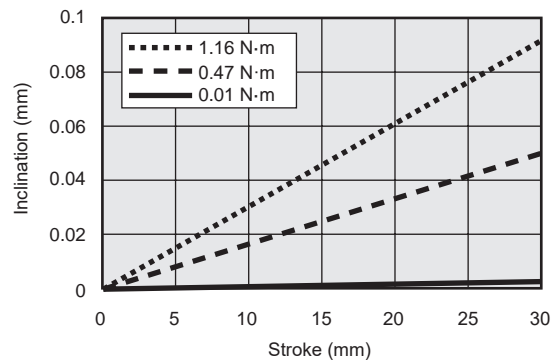
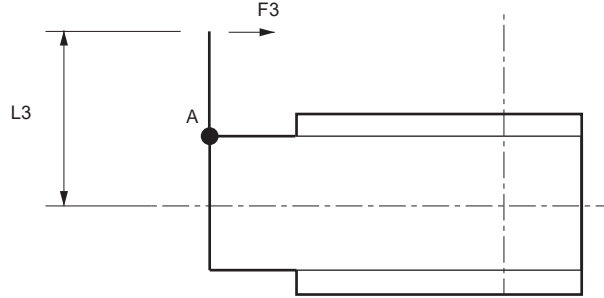


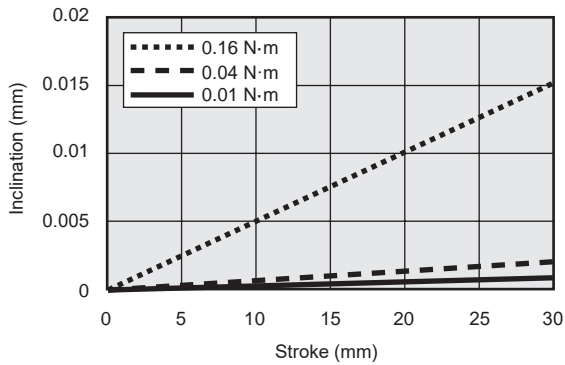
Table inclination (reference value)

● Inclination at point A when M3 moment is applied

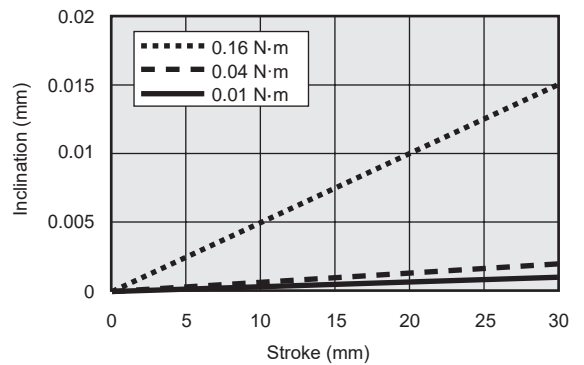
$M3 = F3 \times L3$



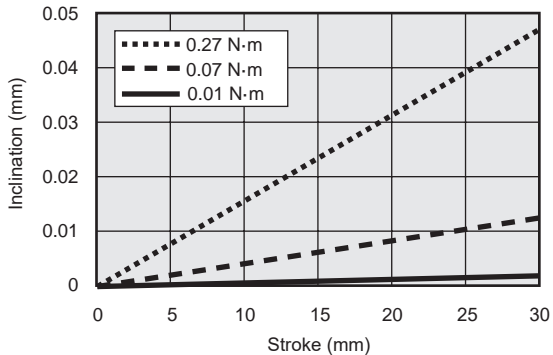
● MSDG-L-6



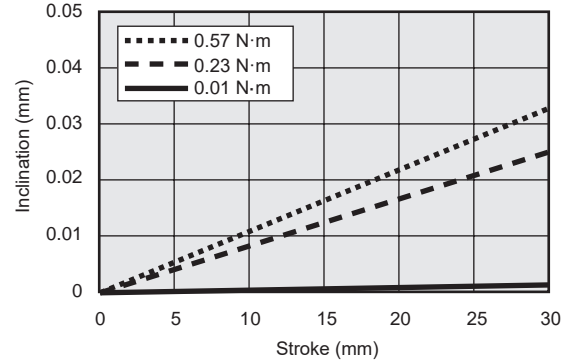
● MSDG-L-8



● MSDG-L-12



● MSDG-L-16



SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

**MSD/
MSDG**

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending



Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/
COVPIN2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/
MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd
Contr
Ending

Product-specific cautions: Small compact cylinder MSD/MSDG Series

Design/selection

1. Common

CAUTION

- When selecting a cylinder, follow the “Selection guide” on page 1464.
- Consult with CKD when using the cylinder as stopper.
- When selecting the cylinder switch, refer to the “Switch selection table” on pages 1425, 1433, 1443 and 1455.
- Observe tightening torque when mounting the switch. If the tightening torque range is exceeded, the mounting bolt, bracket, switch, etc., could be damaged. In addition, when tightening the set screw with a torque less than the tightening torque range, displacement of switch mounting position could occur.
Tightening torque: 29.4 (N•m)

2. Single acting MSD-X/Y

CAUTION

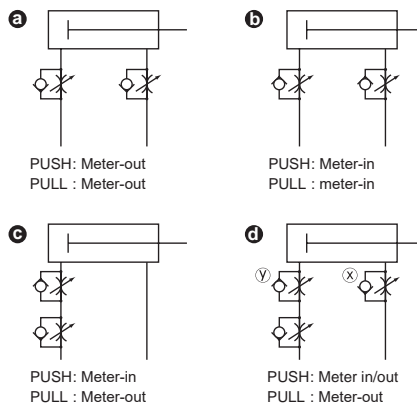
- Do not use the cylinder so as to apply load when the piston rod is pulled for the push type or when the piston rod is pushed for the pull type. Because the cylinder built-in cylindrical spring has only returning force for the piston rod, it cannot be returned to the stroke end when a load is applied.
- Take care when mounting so as not to block the breathing hole provided on the body. Otherwise, malfunctions may result.
- Do not leave in a pressurized state. If it is left pressurized for long periods, the piston rod may not return due to spring load when the pressure is released.

3. Fine speed MSD-(K) F/MSDG-LF

CAUTION

- Use without lubrication. Applying lubrication may cause changes in characteristics.
- Assemble the speed controller near the cylinder. When installed far from the cylinder, the speed becomes unstable. Use the SC-M3/M5-F, SC3W, or SCD-M3/M5-F series speed controller.

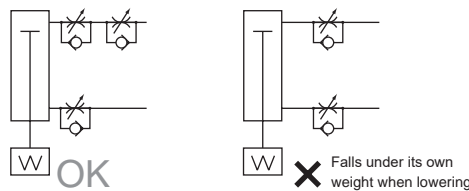
- In general, the speed is stabler at higher air pressure and lower load factor. Use at a 50% or less load factor.
- Stable speed control is achieved with a meter-out circuit. When fine speed activation is performed with operating direction PUSH for the single rod cylinder, the popping out phenomenon occurs when operation starts if the load resistance is low. For countermeasures, use the **b**, **c** or **d** circuit. Note that circuit **d** is the most stable.



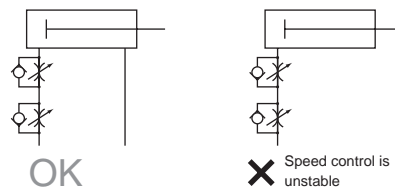
Speed adjustment method for PUSH operation of **d** circuit:
1. Set the speed with the speed controller x.
2. Restrict the speed with the speed controller y until there is no popping out.
3. Check the speed again.

(*1) When comparing **b**, **c**, **d**, the circuit **d** is the most stable.

(*2) For vertical mounting, combine the cylinder with a meter-out circuit, as it will fall under its own weight when a meter-in circuit is used.



(*3) Use the circuit shown in the figure below for the serial connection of the speed controllers.



(Guidelines for pop-out generation)

Popping out occurs in the following cases.

• Thrust > Resistance

* Resistance: Thrust caused by residual pressure on the exhaust side (in the fine speed, suction pressure = residual pressure) + { When using horizontally: frictional force caused by load
When using vertically: load self-weight

- Do not apply a lateral load to the cylinder.
With a lateral load, operation will become unstable.
- Avoid using this product where vibration is present.
The product will be adversely affected by vibration and operation will become unstable.

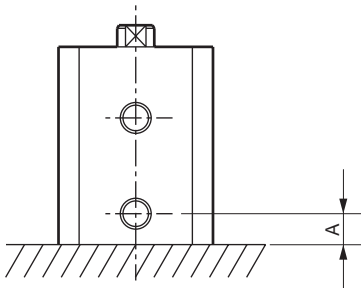
Mounting, installation and adjustment

1. Common

⚠ CAUTION

■ Piping

Cautions for piping speed controller/fitting
As compatible fittings are limited, refer to the table below to select a fitting.



Fitting selection table

Code Bore size (mm)	Port size	Port position dimension A	Available speed controller/fitting	Fitting O.D.
ø6 ø8	M3	4	SC3W-M3-3 SC3W-M3-4 SC3U-M3-3 SC3U-M3-4	ø8 or less
			GWS3-M3-S GWS4-M4-S	
			FTS4-M3	
ø12 ø16	M5	5	SC3W-M5-3 SC3W-M5-4 SC3W-M5-6 SC3U-M5-3 SC3U-M5-4 SC3U-M5-6	ø10 or less
			GWS4-M5-S GWS6-M5-S	
			FTS4-M5 FTS6-M5	

■ Installation

Do not damage the surface flatness by denting or scratching the body (tube) mounting surface or the table surface. Make sure that the flatness of the mating surface for table mounting is 0.05 mm or less.

2. Fine speed MSD-(K) F/MSDG-LF

⚠ CAUTION

- Perform adjustment such as centering so that a lateral load is not applied to the cylinder.
In addition, install and adjust the sliding guide so that it is not twisted.

When the load or the resistance fluctuates, operation becomes unstable. With a large difference between static friction and kinematic friction of the guide, operation becomes unstable.

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending