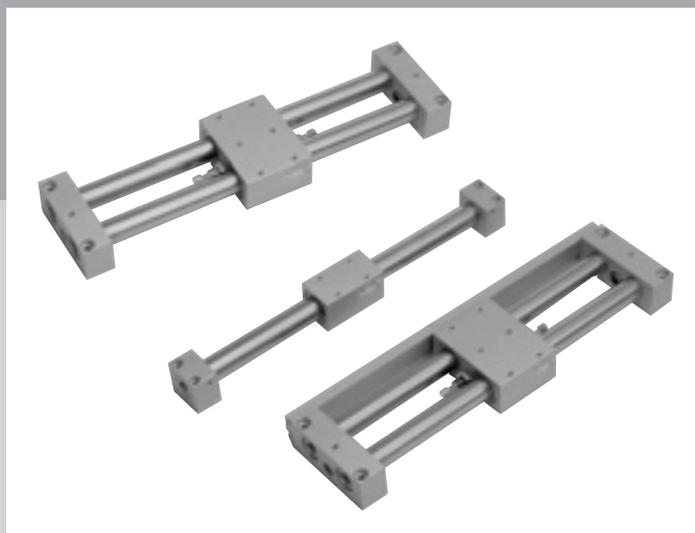


Rodless

MRL2

Magnetic rodless cylinder

ø6/ø10/ø16/ø20/ø25/ø32



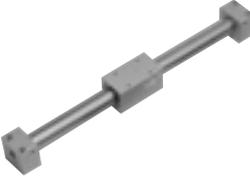
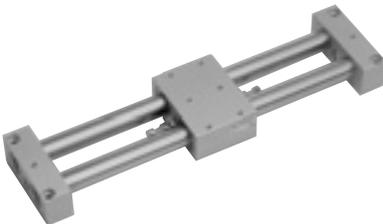
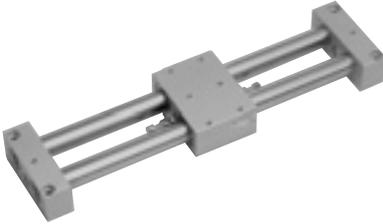
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SCPD3
SCM
SSD2
MDC2
SMG
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LCG
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STG
STR2
MRL2
GRC
Cylinder Switch
MN3E MN4E
4GA/B
M4GA/B
MN4GA/B
F.R. (module unit)
Clean F.R.
Precision R
Press gauge Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending

MRL2/MRL2-G/MRL2-W Series

● Points regarding selection guide

	Points regarding selection guide	Recommended model No.	
Basic (Guide combined)	<ul style="list-style-type: none"> • When combining use of a guide system apart from the cylinder. • When there are space limitations. 	MRL2 ø6, ø10, ø16, ø20, ø25, ø32 	
Simplified guide	<ul style="list-style-type: none"> • When securing the course of the slider. • When using for general transportation. • When the stacked load is large. • When stroke length adjustment is required. 	MRL2-G (simplified guide 1 piston) ø6, ø10, ø16, ø20, ø25, ø32 	
	<ul style="list-style-type: none"> • When securing the course of the slider. • When using for general transportation. • When the stacked load is large and a double thrust is required. • When stroke length adjustment is required. 	MRL2-W (simplified guide 2 piston) ø6, ø10, ø16, ø20, ø25, ø32 	

	Page
⚠ Safety precautions	279
Technical data	
MRL2-G/MRL2-W slider runout amount Rubber-air cushion comparison data (reference values)	278

Features	
	<ul style="list-style-type: none"> • Lube keeping structure is used to realize a long service life. • By selecting the rubber-air cushion, it is possible to realize a reduction in impact noise levels and a reduction in impact acceleration at the end of the stroke length. • Cylinder direct mounting is possible.
	<ul style="list-style-type: none"> • With the twin tube of the MRL2 Series, it is no longer necessary to separately install a guide system. • Space saving with a thin design having a low slide table height. • Single surface piping is possible with the common piping with switch.
	<ul style="list-style-type: none"> • With the twin tube of the MRL2 Series, it is no longer necessary to separately install a guide system. • With the twin piston, the generated thrust is 2-fold that of a single piston model. • Space saving with a thin design having a low slide table height. • Single surface piping is possible with the common piping with switch.

SCPD3
SCM
SSD2
MDC2
SMG
LCM
LCR
LCG
LCX
STM
STG
STR2
MRL2
GRC
Cylinder Switch
MN3E MN4E
4GA/B
M4GA/B
MN4GA/B
F.R.(module unit)
Clean F.R
Precision R
Press gauge Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending

Variation and option selection table

- ⊙ : Option variation (check category 2)
- : C5 compatible (check category 3)
- △ : Available depending on conditions (estimation)
- : Not available

			Clean room specifications	
			Exhaust treatment	Exhaust treatment
			P72	P52
Variation	Basic	Blank	⊙	○
	With cylinder switch	L	⊙	○
	Simplified guide 1-piston	G	⊙	○
	Simplified guide 2-piston	W	⊙	○
	Fine speed	F	■	■
Port thread	NPT (ø25, ø32)	N	○	○
	G (ø25, ø32)	G	○	○
Cushion	Rubber-air cushioned	C	○	○
Option	With shock absorber	C	■	■
	With scraper	S	*1	*1
	Centralized pipe laying equipped with switch	R	⊙	○

*1: The scraper comes with P72 and P52 as standard, and the code "S" is not required.

- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2**
- GRC
- Cylinder switch
- MN3E
MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R (module unit)
- Clean F.R
- Precision R
- Press gauge
Diff. press gauge
- Electro-pneumatic R
- Speed controller
- Auxiliary valve
- Fitting/tube
- Clean air unit
- Pressure sensor
- Flow rate sensor
- Valve for air blow
- Ending

MEMO

SCPD3

SCM

SSD2

MDC2

SMG

LCM

LCR

LCG

LCX

STM

STG

STR2

MRL2

GRC

Cylinder
Switch

MN3E
MN4E

4GA/B

M4GA/B

MN4GA/B

F.R. (module
unit)

Clean
F.R

Precision
R

Press gauge
Diff. press gauge

Electro-
pneumatic R

Speed
controller

Auxiliary
valve

Fitting/
tube

Clean
air unit

Pressure
sensor

Flow rate
sensor

Valve for
air blow

Ending



Magnet rodless cylinder

- Basic (combined guide) **MRL2 Series**
- Simplified guide 1 piston **MRL2-G Series**
- Simplified guide 2 piston **MRL2-W Series**

● Bore size: $\phi 6/\phi 10/\phi 16/\phi 20/\phi 25/\phi 32$

JIS symbol



Structure and material restriction

	Structure	Material restriction			Model No.
P7 Series	Low particle generation				P72
P5 Series (custom order product)	Low particle generation	Copper-based materials prohibited	Silicon-based materials prohibited	Halogen-based materials prohibited (fluorine, chlorine, bromine)	P52

Specifications

Descriptions	MRL2-(L)-P72/P52, MRL2-G(L)-P72/P52, MRL2-W(L)-P72/P52						
Bore size	mm	$\phi 6$	$\phi 10$	$\phi 16$	$\phi 20$	$\phi 25$	$\phi 32$
Actuation		Double acting					
Working fluid		Compressed air					
Max. working pressure	MPa	0.7					
Min. working pressure	MPa	0.3		0.2			
Proof pressure	MPa	1.05					
Ambient temperature	°C	-10 to 60 (no freezing)					
Port size		M5				Rc1/8	
Stroke tolerance	mm	$+1.5$ 0 (to 1000)			$+2.0$ 0 (to 1500)		
Working piston speed	mm/s	50 to 500					
Cushion		Rubber cushion					
Lubrication		Not available					
Magnet holding force (*1)	N	19	63	166	294	350	574
Adjustable stroke range (single side) (*2)	mm	3	4	6	8.5	10	10

*1: The simplified guide 2 piston will be a 2-fold value.

*2: The stroke length of MRL2 (basic) cannot be adjusted.

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Max. stroke with switch (mm)	Max. stroke length (mm) of centralized pipe laying with switch	Min. stroke length (mm)
$\phi 6$	50, 100, 150, 200	300	200	-	1
$\phi 10$	50, 100, 150, 200, 250, 300	500	300	300	
$\phi 16$	100, 150, 200, 250, 300, 400, 500	1000	500	500	
$\phi 20$	200, 250, 300, 350, 400, 500, 600, 700	1500	700	700	
$\phi 25$	200, 250, 300, 350, 400, 500, 600, 700	1500	700	700	
$\phi 32$	200, 250, 300, 350, 400, 500, 600, 700	1500	700	700	

■ The custom stroke length is available by 1 mm increments.

Number of installed T switches and the min. stroke length (mm)

Switch quantity	1				2				3				4			
Switch model No.	T*V	T*H	T*YV	T*YH												
Bore size (mm)																
$\phi 6$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160
$\phi 10$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160
$\phi 16$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160
$\phi 20$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160
$\phi 25$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160
$\phi 32$ equiv.	5	5	5	5	20	50	40	70	40	85	71	115	60	120	101	160

Switch specifications

- 1-color/2-color display

Descriptions	Proximity 2-wire				Proximity 3-wire			
	T1H/T1V	T2H/T2V	T2YH/T2YV	T2WH/T2WV	T3H/T3V	T3PH/T3PV	T3YH/T3YV	T3WH/T3WV
Applications	Programmable controller relay, small solenoid valve	Programmable controller			Programmable controller, relay			
Output method	-				NPN output	PNP output	NPN output	NPN output
Power supply voltage	-				10 to 28 VDC			
Load voltage	85 to 265 VAC	10 to 30 VDC		24 VDC ±10%	30 VDC or less			
Load current	5 to 100 mA	5 to 20 mA (*2)			100 mA or less		50 mA or less	
Indicator lamp	LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1 mA or less with 100 VAC 2 mA or less with 200 VAC	1 mA or less			10 µA or less			
Weight g	1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	1 m: 18 3 m: 49 5 m: 80	1 m: 33 3 m: 87 5 m: 142	1 m: 18 3 m: 49 5 m: 80	

*1: Refer to page 309 for detailed switch specifications and Dimensions.

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

Cylinder weight

Unit (g)

Model No.	Without switch		With switch		common piping with switch.	
	Weight for 0 mm stroke length	Additional weight per S = 100 mm	Weight for 0 mm stroke length	Additional weight per S = 100 mm	Weight for 0 mm stroke length	Additional weight per S = 100 mm
MRL2-6	73	13	103	39	-	-
MRL2-10	143	28	169	48	-	-
MRL2-16	278	43	313	63	-	-
MRL2-20	542	85	587	105	-	-
MRL2-25	954	98	1017	128	-	-
MRL2-32	1230	195	1301	225	-	-
MRL2-G-6	193	28	223	54	-	-
MRL2-G-10	368	53	394	73	411	41
MRL2-G-16	635	85	670	105	691	41
MRL2-G-20	1197	155	1242	175	1269	41
MRL2-G-25	1852	196	1915	226	1997	93
MRL2-G-32	2297	390	2368	420	2455	93
MRL2-W-6	203	28	233	54	-	-
MRL2-W-10	398	53	424	73	441	41
MRL2-W-16	710	85	745	105	766	41
MRL2-W-20	1367	155	1412	175	1439	41
MRL2-W-25	2206	196	2269	226	2351	93
MRL2-W-32	2859	390	2930	420	3017	93

*1: The weight of the switch is not included in the product weight of the model equipped with a switch and the common piping with switch.

Theoretical thrust table

- MRL2, MRL2-G

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa					
		0.2	0.3	0.4	0.5	0.6	0.7
ø6	Push/Pull	-	8.48	11.3	14.1	17.0	19.8
ø10	Push/Pull	-	23.6	31.4	39.3	47.1	55.0
ø16	Push/Pull	40.2	60.3	80.4	1.01 × 10 ²	1.21 × 10 ²	1.41 × 10 ²
ø20	Push/Pull	62.8	94.2	1.26 × 10 ²	1.57 × 10 ²	1.88 × 10 ²	2.20 × 10 ²
ø25	Push/Pull	98.2	1.47 × 10 ²	1.96 × 10 ²	2.45 × 10 ²	2.95 × 10 ²	3.44 × 10 ²
ø32	Push/Pull	1.61 × 10 ²	2.41 × 10 ²	3.22 × 10 ²	4.02 × 10 ²	4.83 × 10 ²	5.63 × 10 ²

- MRL2-W

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa					
		0.2	0.3	0.4	0.5	0.6	0.7
ø6	Push/Pull	-	17.0	22.6	28.3	33.9	39.6
ø10	Push/Pull	-	47.1	62.8	78.5	94.2	1.10 × 10 ²
ø16	Push/Pull	80.4	1.21 × 10 ²	1.61 × 10 ²	2.01 × 10 ²	2.41 × 10 ²	2.81 × 10 ²
ø20	Push/Pull	1.26 × 10 ²	1.88 × 10 ²	2.51 × 10 ²	3.14 × 10 ²	3.77 × 10 ²	4.40 × 10 ²
ø25	Push/Pull	1.96 × 10 ²	2.95 × 10 ²	3.93 × 10 ²	4.91 × 10 ²	5.89 × 10 ²	6.87 × 10 ²
ø32	Push/Pull	3.22 × 10 ²	4.83 × 10 ²	6.43 × 10 ²	8.04 × 10 ²	9.65 × 10 ²	1.13 × 10 ³

SCPD3
SCM
SSD2
MDC2
SMG
LCM
LCR
LCG
LCX
STM
STG
STR2
MRL2
GRC
Cylinder Switch
MN3E
MN4E
4GA/B
M4GA/B
MN4GA/B
F.R. (module unit)
Clean F.R.
Precision R
Press gauge
Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending

MRL2/MRL2-G Series

How to order

Without switch (No magnet for switch)

MRL2-W - 10 C - 50 - P72

With switch (Magnet for switch incorporated)

MRL2-WL - 10 C - 50 - T2H - R - R P72

A Model No.

B Bore size

C Cushion
*1

D Stroke length
*2

E Switch model No.
The symbol "***" indicates the lead wire length.
*3

⚠ Precautions for model No. selection

- *1: In the case of MRL2-G, W with the "C" rubber-air cushion, the stopper is protruding from the end plate by approximately 1 mm when being shipped. Further note that care must be taken as moving the stopper and adjusting the stroke length may cause the rubber-air cushion to become ineffective.
- *2: Refer to the following table for max. stroke length with switch.
- *3: Switches other than **E** switch model No. are available. Custom order: Refer to Ending 309 for details.
- *4: "P52" is a custom order product.
- *5: **When selecting a centralized pipe laying type with an "R" switch, select the model No. with a switch (MRL2-L).**

Bore size (mm)	Max. stroke length with switch (mm)
ø6	200
ø10	300
ø16	500
ø20	700
ø25	700
ø32	700

[Example of model No.]

MRL2-WL-10-50-T2H-R-RP72

Model: Rodless cylinder

- A** Model No. : Simplified guide 2 piston
- B** Bore size : ø10 mm
- C** Cushion : Rubber cushioned
- D** Stroke length : 50 mm
- E** Switch model No. : Proximity T2H switch
- F** Switch quantity : 1 on R-side
- G** Option : Common piping with switch.
- H** Clean room specifications : Low dust specifications

Code	Content	
A Model No.		
Basic	MRL2	Without switch
	MRL2-L	With switch
Simplified guide 1 piston	MRL2-G	Without switch
	MRL2-GL	With switch
Simplified guide 2 piston	MRL2-W	Without switch
	MRL2-WL	With switch

B Bore size (mm)

6	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32

C Cushion

Blank	Rubber cushion
C	Rubber-air cushion

D Stroke length (mm)

Bore size	Stroke length	Custom stroke length
ø6	1 to 300	By 1 mm increments
ø10	1 to 500	
ø16	1 to 1000	
ø20 to ø32	1 to 1500	

E Switch model No.

Lead wire straight	Lead wire L-shaped	Contact	Voltage		Display	Lead wire	
			AC	DC			
T1H*	T1V*	Proximity	●	□	1-color display	2 wires	
T2H*	T2V*		□	●			2-color display
T3H*	T3V*		□	●		1-color display (custom order)	
T2WH*	T2WV*		□	●	2-color display		
T2YH*	T2YV*		□	●			
T3WH*	T3WV*		□	●			
T3YH*	T3YV*	□	●				
T3PH*	T3PV*	□	●				

* Lead wire length

Blank	1m (standard)
3	3 m (option)
5	5 m (option)

F Switch quantity

R	1 on R side
L	1 on L side
D	2
T	3
4	4 (indicate switch quantity for more than 4 switches.)

G Option

R	Centralized pipe laying type with switch (The basic and ø6 cannot be selected.)
----------	---

H Clean room specifications

	Structure	Material restriction
P72	Low dust specifications	-
P52	Low dust specifications	Copper-based/silicon-based/halogen-based materials (fluorine, chlorine, bromine) are prohibited

F Switch quantity

G Option
Note 5

H Clean room specifications
*4

SCPD3

SCM

SSD2

MDC2

SMG

LCM

LCR

LCG

LCX

STM

STG

STR2

MRL2

GRC

Cylinder
SwitchMN3E
MN4E

4GA/B

M4GA/B

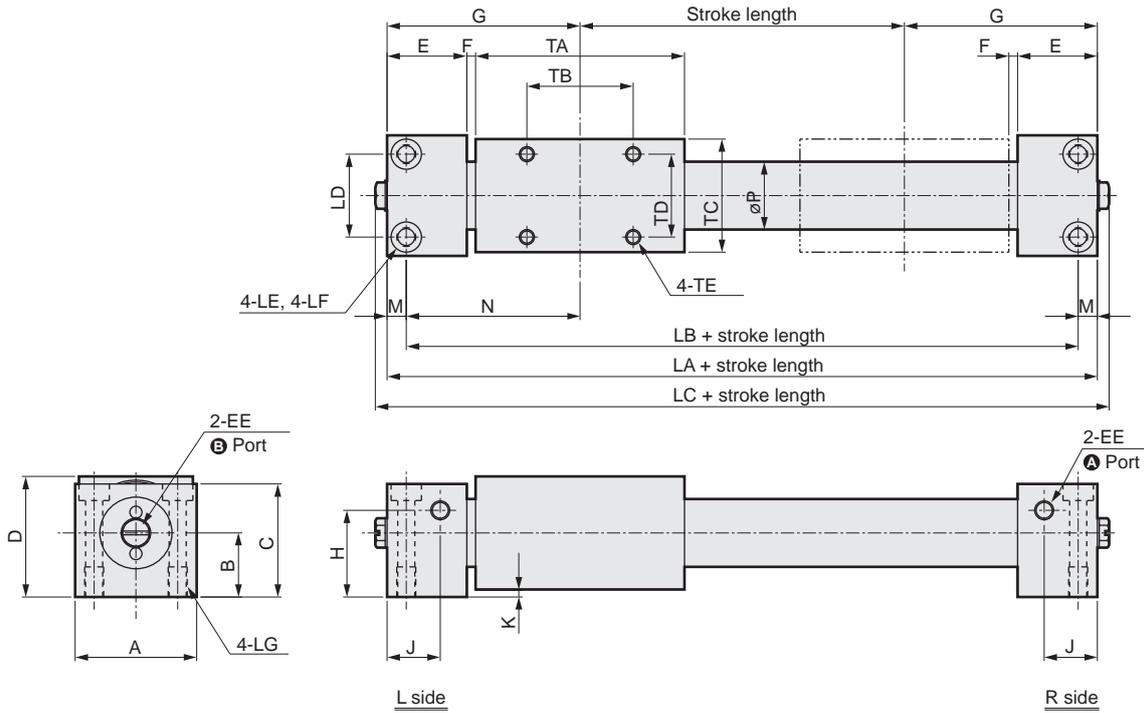
MN4GA/B

F.R. (module
unit)Clean
F.RPrecision
RPress gauge
Diff. press gaugeElectro-
pneumatic RSpeed
controllerAuxiliary
valveFitting/
tubeClean
air unitPressure
sensorFlow rate
sensorValve for
air blow

Ending

Dimensions: MRL2 (basic)

• MRL2 (basic) without switch



Note: It is possible to select **A**, **B** for the air piping port.
 The unit will be shipped with the plug assembled onto port **B**.
 • $\phi 6$ to $\phi 20$: Plug (FPL-M5)
 • $\phi 25$, $\phi 32$: Hexagon socket head tapered screw plug

Code	Dimensions					Installation dimensions								
	LA	LC	A	C	D	LB	LD	LE	LF	LG	TB	TD	TE	
Bores size (mm)														
$\phi 6$	74	80.2	20	16.5	20	68	14	$\phi 3.5$	-	M4 depth 6	20	12	M3 depth 4.5	
$\phi 10$	80	86.2	26	24	26	72	18	$\phi 3.5$	$\phi 6.5$ spot face depth 3.3	M4 depth 8	20	18	M3 depth 4.5	
$\phi 16$	102	108.2	32	30	32	92	22	$\phi 4.5$	$\phi 8$ spot face depth 4.4	M5 depth 8	28	22	M4 depth 6	
$\phi 20$	128	134.2	38	36	38	116	26	$\phi 5.5$	$\phi 9.5$ spot face depth 5.4	M6 depth 12	44	26	M4 depth 6	
$\phi 25$	130	132.2	52	45	48	118	40	$\phi 5.5$	$\phi 9.5$ spot face depth 5.4	M6 depth 12	40	30	M6 depth 6	
$\phi 32$	138	140.2	60	53	56	124	46	$\phi 6.9$	$\phi 11$ spot face depth 6.5	M8 depth 12	40	40	M6 depth 9	
Code	General dimensions													
	B	E	EE	F	G	H	J	K	M	N	P	TA	TC	
Bores size (mm)														
$\phi 6$	11	15	M5 depth 4	2	37	9	9.5	2	3	34	7.6	40	18	
$\phi 10$	14	18	M5 depth 4	2	40	5.5	10	2	4	36	12	40	24	
$\phi 16$	17	21	M5 depth 4	2.5	51	23	14	2	5	46	18	55	30	
$\phi 20$	20	24	M5 depth 4	3	64	28	15.5	2	6	58	23	74	36	
$\phi 25$	25.5	27	Rc1/8	3	65	29	17	3	6	59	28	70	45	
$\phi 32$	29.5	27	Rc1/8	3	69	37	17	3	7	62	35	78	53	

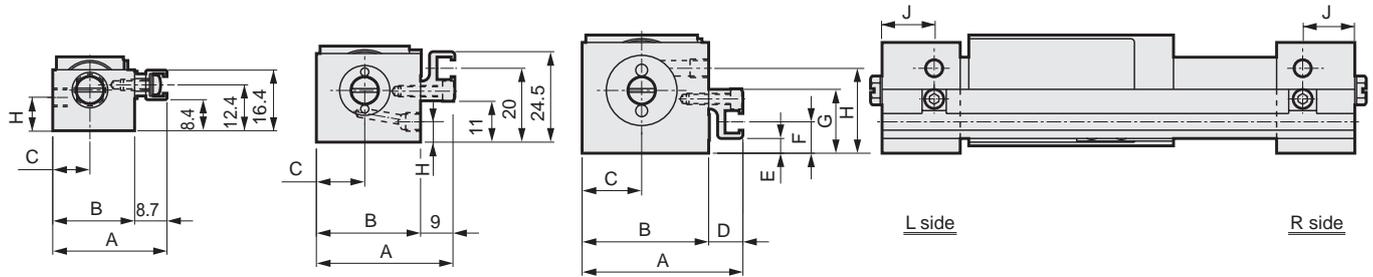
Dimensions: MRL2 (basic)

● MRL2-L (basic) with switch

● For $\varnothing 6$

● For $\varnothing 10$

● For $\varnothing 16$ to $\varnothing 32$



Code	A	B	C	D	E	F	G	H	J
Bore size (mm)									
$\varnothing 6$	30.7	22	10	–	–	–	–	9	9.5
$\varnothing 10$	37	28	13	–	–	–	–	5.5	10
$\varnothing 16$	43	34	16	9.0	4	8.5	17.3	23	14
$\varnothing 20$	49	40	19	9.0	9	13.5	22.3	28	15.5
$\varnothing 25$	60.7	52	26	8.7	2	7.5	21	29	17
$\varnothing 32$	68.7	60	30	8.7	10	15.5	29	37	17

SCPD3

SCM

SSD2

MDC2

SMG

LCM

LCR

LCG

LCX

STM

STG

STR2

MRL2

GRC

Cylinder

Switch

MN3E

MN4E

4GA/B

M4GA/B

MN4GA/B

F.R. (module

unit)

Clean

F.R

Precision

R

Press gauge

Diff. press gauge

Electro-

pneumatic R

Speed

controller

Auxiliary

valve

Fitting/

tube

Clean

air unit

Pressure

sensor

Flow rate

sensor

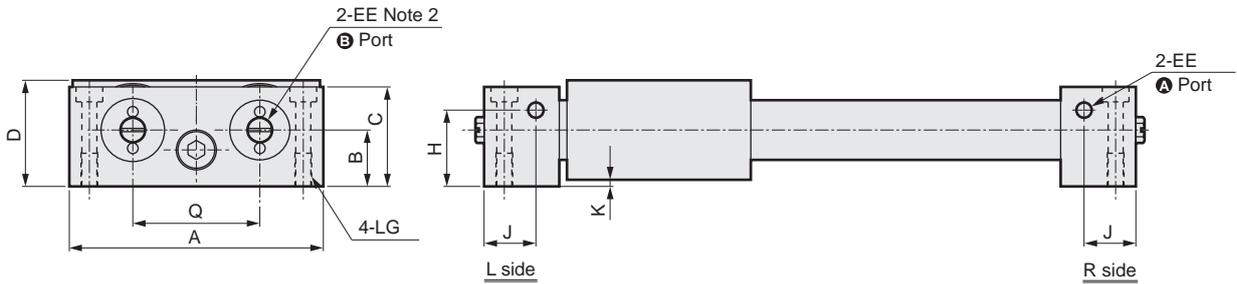
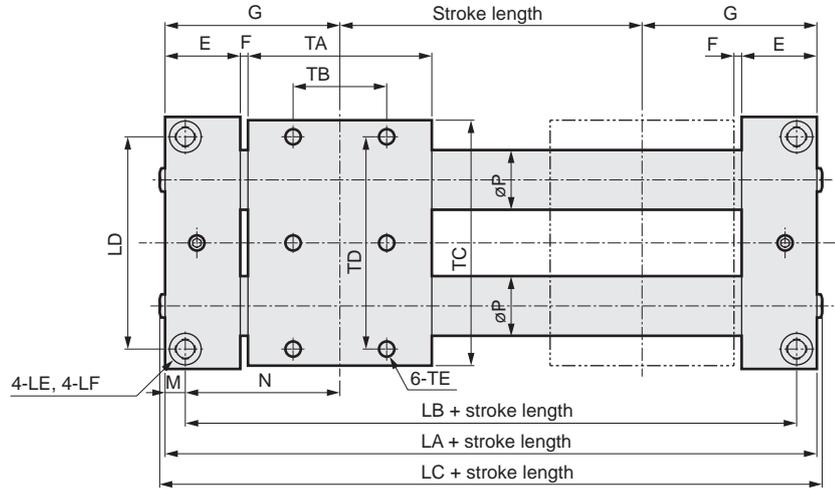
Valve for

air blow

Ending

Dimensions: MRL2-G (simplified guide 1 piston)/MRL2-W (simplified guide 2 piston)

- MRL2-G (simplified guide 1 piston) without switch
- MRL2-W (simplified guide 2 piston) without switch



Note 1: It is possible to select **A**, **B** for the air piping port.
 The unit will be shipped with the plug assembled onto port **B**.
 • $\phi 6$ to $\phi 20$: Plug (FPL-M5)
 • $\phi 25$, $\phi 32$: Hexagon socket head tapered screw plug

Note 2: MRL2-W will be "4-EE".

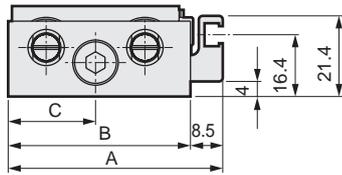
Code	Dimensions					Installation dimensions								
	LA	LC	A	C	D	LB	LD	LE	LF	LG	TB	TD	TE	
Bores size (mm)														
$\phi 6$	74	80.2	46	20	24	68	40	$\phi 3.5$	-	M4 depth 6	20	38	M3 depth 4.5	
$\phi 10$	83	87.2	64	24	26	74	54	$\phi 4.5$	$\phi 8$ spot face depth 4.4	M5 depth 10	20	55	M4 depth 6	
$\phi 16$	105	109.2	76	30	32	93	64	$\phi 5.5$	$\phi 9.5$ spot face depth 5.4	M6 depth 12	28	64	M5 depth 8	
$\phi 20$	131	135.2	90	36	38	119	77	$\phi 6.9$	$\phi 11$ spot face depth 6.5	M8 depth 12	44	78	M5 depth 8	
$\phi 25$	136	138	108	45	48	122	90	$\phi 6.9$	$\phi 11$ spot face depth 6.5	M8 depth 12	40	90	M6 depth 9	
$\phi 32$	144	146	126	53	56	130	108	$\phi 6.9$	$\phi 11$ spot face depth 6.5	M8 depth 12	40	104	M6 depth 9	
Code	General dimensions													
	B	E	EE	F	G	H	J	K	M	N	P	Q	TA	TC
Bores size (mm)														
$\phi 6$	13	15	M5 depth 4	2	37	9	9.5	2	3	34	7.6	26	40	44
$\phi 10$	14	19.5	M5 depth 4	2	41.5	5.5	11.5	2	4.5	37	12	34	40	62
$\phi 16$	17	22.5	M5 depth 4	2.5	52.5	23	15.5	2	6	46.5	18	38	55	74
$\phi 20$	20	25.5	M5 depth 4	3	65.5	28	17	2	6	59.5	23	46	74	88
$\phi 25$	25.5	30	Rc1/8	3	68	29	20	3	7	61	28	50	70	101
$\phi 32$	29.5	30	Rc1/8	3	72	37	20	3	7	65	35	60	78	119

Dimensions: MRL2-G (simplified guide 1 piston)/MRL2-W (simplified guide 2 piston)

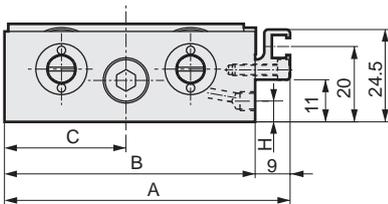
- MRL2-GL (simplified guide 1 piston) with switch
- MRL2-WL (simplified guide 2 piston) with switch



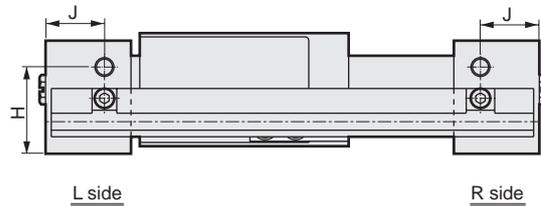
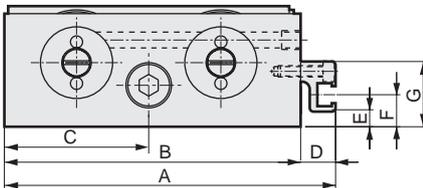
- For $\phi 6$



- For $\phi 10$



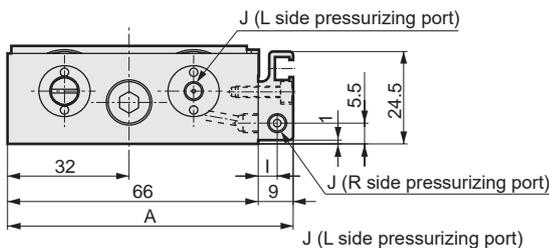
- For $\phi 16$ to $\phi 32$



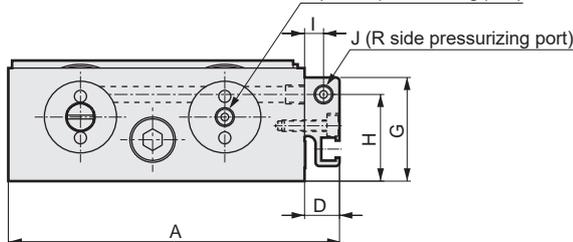
Code	A	B	C	D	E	F	G	H	J
Bore size (mm)									
$\phi 6$	56.5	48	23	-	-	-	-	9	9.5
$\phi 10$	75	66	32	-	-	-	-	5.5	11.5
$\phi 16$	87	78	38	9	4	8.5	17.3	23	15.5
$\phi 20$	101	92	45	9	9	13.5	22.3	28	17
$\phi 25$	116.7	108	54	8.7	2	7.5	21	29	20
$\phi 32$	134.7	126	63	8.7	10	15.5	29	37	20

- MRL2-GL-*R (simplified guide 1 piston) common piping with switch.
- MRL2-WL-*R (simplified guide 2 piston) common piping with switch.

- For $\phi 10$



- For $\phi 16$ to $\phi 32$



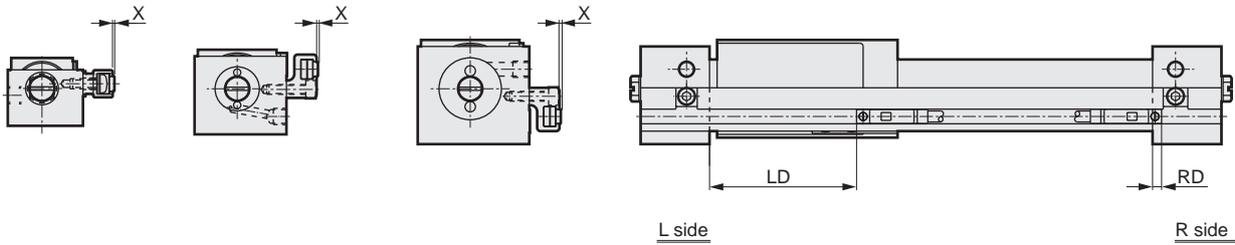
Code	A	D	G	H	I	J
Bore size (mm)						
$\phi 10$	75	-	-	-	5	M5 depth 4
$\phi 16$	87	9	27.5	23	5	M5 depth 4
$\phi 20$	101	9	32.5	28	5	M5 depth 4
$\phi 25$	122	14	45	29	7.5	Rc1/8
$\phi 32$	140	14	53	37	7.5	Rc1/8

- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2**
- GRC
- Cylinder Switch
- MN3E
- MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R. (module unit)
- Clean F.R
- Precision R
- Press gauge
- Diff. press gauge
- Electro-pneumatic R
- Speed controller
- Auxiliary valve
- Fitting/ tube
- Clean air unit
- Pressure sensor
- Flow rate sensor
- Valve for air blow
- Ending

Switch mounting position dimensions

● MRL2-L-* (switch: T2^{H/V}, T3^{H/V}, T2W^{H/V}, T3W^{H/V})
GL
WL

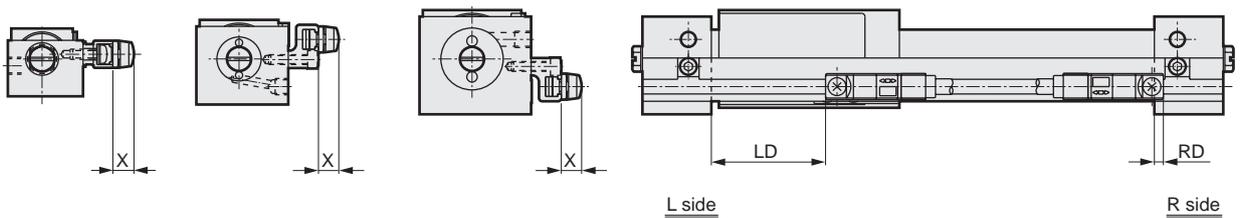
● For ø6 ● For ø10 ● For ø16 to ø32



Code	T2 ^{H/V} , T3 ^{H/V}			T2W ^{H/V} , T3W ^{H/V}		
	Bore size (mm)	LD	RD	X	LD	RD
ø6	27	3.5	0.5	29	1.5	0.5
ø10	27	2.5	0.5	29	0.5	0.5
ø16	44	2.5	0.5	46	0.5	0.5
ø20	63.5	1	0.5	65.5	-1	0.5
ø25	58	2	0.5	60	0	0.5
ø32	67.5	1.5	0.5	69	-0.5	0.5

● MRL2-L-* (switch: T1^{H/V}, T2Y^{H/V}, T3Y^{H/V})
GL
WL

● For ø6 ● For ø10 ● For ø16 to ø32



Code	LD	RD	X
Bore size (mm)			
ø6	26	4.5	6 (11.5)
ø10	26	3.5	6 (11.5)
ø16	43	3.5	6 (11.5)
ø20	62.5	2	6 (11.5)
ø25	57	3	6 (11.5)
ø32	66	2.5	6 (11.5)

Note 1: The values within the brackets are for T1^{H/V}.

MRL2 Series selection guide

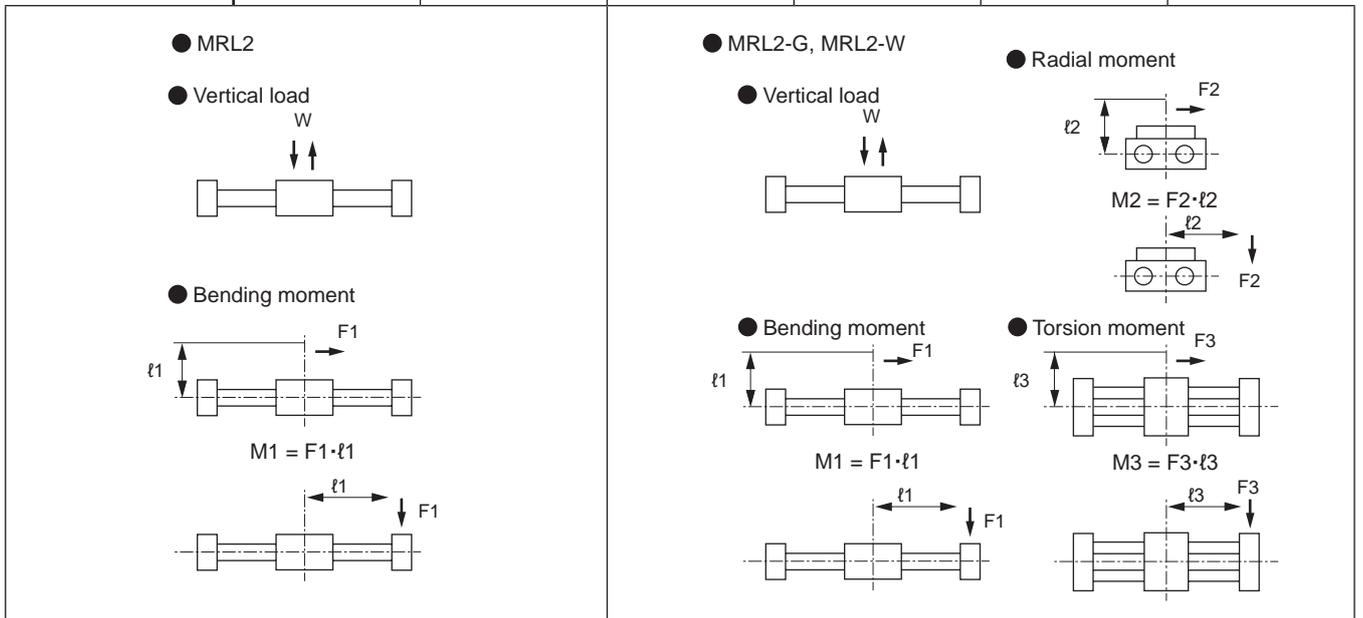
STEP-1 Determination of allowable load

- (1) Calculate all load (W) and moment (M1, M2, and M3) per load.
- (2) Divide each load by the max. value shown in the table below to find load/moment ratio, and confirm that the total is 1.0 or less.

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

Max. allowable load weight

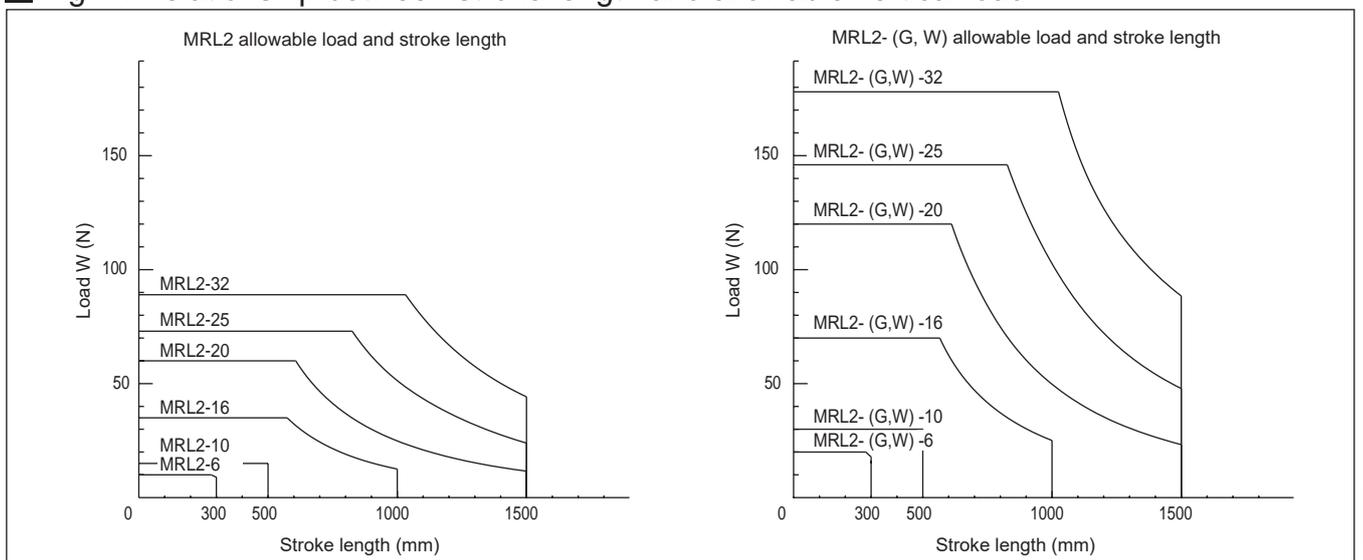
Descriptions	MRL2		MRL2-G/MRL2-W			
	Vertical load W (N)	Bending moment M1 (N·m)	Vertical load W (N)	Bending moment M1 (N·m)	Radial moment M2 (N·m)	Torsion moment M3 (N·m)
ø6	10	0.1	20	0.2	0.1	0.2
ø10	15	0.3	30	0.6	0.2	0.6
ø16	35	1.2	70	2.4	0.5	2.4
ø20	60	2.5	120	5.0	1.0	5.0
ø25	73	3.3	146	6.6	3.7	6.6
ø32	89	4.5	178	9.0	5.3	9.0



Note: Give sufficient consideration to inertia when the load moves or stops.

The value of the allowable vertical load W will vary depending on the stroke length. Make a selection so that the value falls within the graph of Fig. 1.

Fig. 1. Relationship between stroke length and allowable vertical load



- SCPD3
- SCM
- SSD2
- MDC2
- SMG
- LCM
- LCR
- LCG
- LCX
- STM
- STG
- STR2
- MRL2**
- GRC
- Cylinder Switch
- MN3E
MN4E
- 4GA/B
- M4GA/B
- MN4GA/B
- F.R. (module unit)
- Clean F.R
- Precision R
- Press gauge
Diff. press gauge
- Electro-pneumatic R
- Speed controller
- Auxiliary valve
- Fitting/tube
- Clean air unit
- Pressure sensor
- Flow rate sensor
- Valve for air blow
- Ending

STEP-2 Calculation of load factor

1. Depending on the size and direction of the load as well as the mounting orientation, calculate the required thrust while using the 2, 3 in the table below as a guide.

Table 2

	Vertical load	Bending moment	Radial moment	Torsion moment
Size and direction of load				
Mounting orientation	Horizontal	Vertical	Horizontal	Vertical
Required thrust	$F_N = 0.2 (W + W_0)$	$F_N = \frac{0.2 W l_1}{L_1} + W + W_0$	$F_N = 0.2 \left(\frac{W l_2}{L_2} + W + W_0 \right)$	$F_N = \frac{0.2 W l_3}{L_1} + W + W_0$

As the slider will rotate with the single it will not be possible to apply a radial moment or a torsion moment.

- F_N : Required thrust (N)
- W : Load (N)
- W_0 : Slider self-weight (N)
- l_n (n = 1, 2, 3) : Overhang (mm)
- L_1 : Slider bearing pitch (mm)
- L_2 : Pitch of guide (mm)

Table 3

Model No.	W_0	L_1	L_2
MRL2-6	0.4	27	—
10	0.6	27	—
16	1.2	39	—
20	2.4	58	—
25	3.8	70	—
32	5.2	78	—
MRL2-G-6	0.9	27	26
10	1.7	27	34
16	3.0	39	38
20	5.9	58	46
25	8.5	70	50
32	11.9	78	60

Calculate the load factor from the required thrust calculated in 2.1 and Table 4, Fig. 2. (Make sure that the load factor is less than or equal to approximately 50%.)

$$\text{Load factor } \alpha = \frac{F_N}{\frac{a}{100} \cdot A} \times 100$$

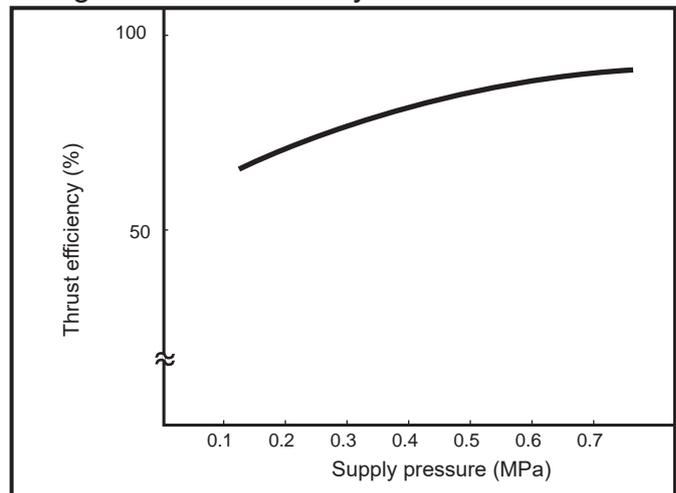
$$B = \frac{a}{100} \cdot A$$

F_N : Required thrust (N) a : Thrust efficiency (%)
 A : Theoretical thrust (N) B : Effective thrust (N)

Table 4 Theoretical thrust table

Model No.	Working pressure MPa					
	0.2	0.3	0.4	0.5	0.6	0.7
MRL2, MRL2-G-6	—	8	11	14	17	20
10	—	24	31	39	47	54
16	40	60	80	101	121	139
20	63	94	126	157	188	217
25	98	147	196	245	295	344
32	161	241	322	402	483	563
MRL2-W-6	11	17	23	28	34	39
10	31	47	63	79	94	108
16	80	121	161	201	241	277
20	126	188	251	314	377	434
25	196	294	392	490	590	688
32	322	482	644	804	966	1126

Fig. 2 Thrust efficiency



* Please be careful as the difference between the effectiveness thrust and theoretical thrust will be greater with a lower pressure due to the thrust efficiency being lower.

STEP-3 Formula for kinetic energy calculation

Calculate the kinetic energy from the load weight (m) and speed (V) and make sure that this is less than or equal to the allowed value listed in Table 5. When exceeding the allowable absorbed energy value, increase the cylinder size so that the value falls under the allowable absorbed energy or consider the use of an external shock absorber. This speed is the velocity just before cushion entry and not the average speed, if it is unknown, calculate the cushion entry velocity by using formula (1).

$$E = \frac{1}{2} mV^2$$

$$V_a = \frac{L}{t}$$

$$V = V_a \times \left(1 + 1.5 \frac{\alpha}{100}\right) \text{ --- (1)}$$

E : Kinetic energy (J)

m : Weight (kg)

V : Cushion entry speed (m/s)

V_a : Average speed (m/s)

L : Stroke length (m)

t : Moving time (s)

α : Load factor (%)

Table 5 Allowable absorbed energy value

Bore size	Allowable energy absorption (J)	
	MRL2	MRL2- ^G / _W
ø6	0.006	0.12
ø10	0.028	0.12
ø16	0.100	0.25
ø20	0.265	0.58
ø25	0.283	0.74
ø32	0.523	0.74

STEP-4 Confirmation of inertia load

Confirm that the weight (m), overhang (l_n (n = 1, 3)), and cushion entry speed (V) multiplied together and then divided by the value of A shown in the table below is less than or equal to 1.

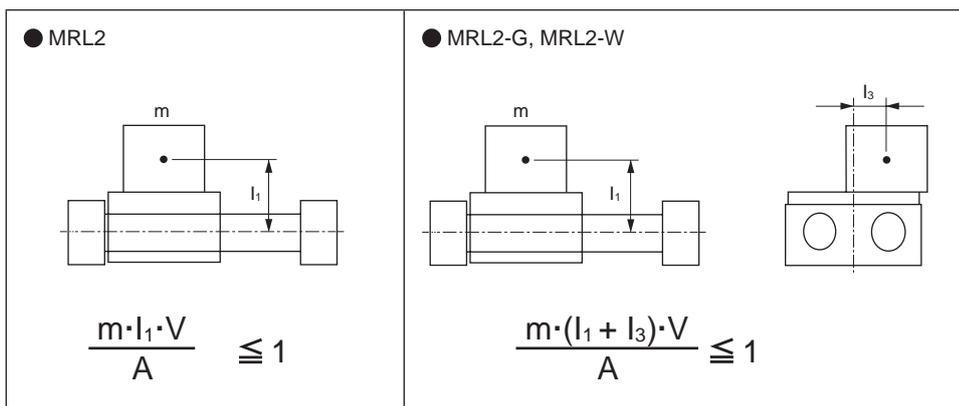
When this value exceeds 1, increase the cylinder size so that this value becomes 1 or less or review the usage conditions.

Bore size	A	
	MRL2	MRL2- ^G / _W
ø6	5.6	11.2
ø10	17	34
ø16	68	136
ø20	142	284
ø25	187	374
ø32	255	510

m : Weight (kg)

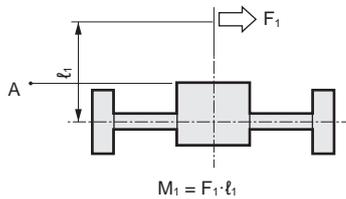
l_n (n = 1, 3) : Overhang (mm)

V : Cushion entry speed (m/s)

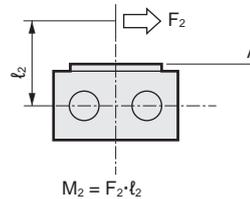


MRL2-G/MRL2-W slider runout amount

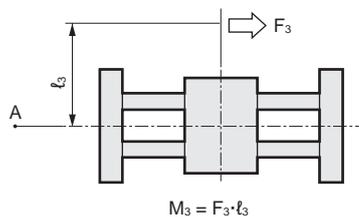
● Bending moment



● Radial moment



● Torsion moment



Port size	Moment load		Table runout amount at point A (± mm)		
	MRL2	MRL2-G, W	M1 direction	M2 direction	M3 direction
ø6	M1, M3: 0.2 N·m M2: 0.1 N·m		1.5	1.46	1.05
ø10	M1, M3: 0.6 N·m M2: 0.2 N·m		1.61	1.12	0.92
ø16	M1, M3: 2.5 N·m M2: 0.5 N·m		1.3	1.16	0.87
ø20	M1, M2, M3: 2.5 N·m		0.89	0.96	0.65
ø25	M1, M2, M3: 5 N·m		1.1	0.92	0.7
ø32	M1, M2, M3: 5 N·m		1.0	0.77	0.6

Note 1: Point A is a point that is 200 mm away from the center of the slider.

Rubber cushion and rubber-air cushion comparison data (reference values)

Measurement of the noise level (dB) generated when the piston collides at the end of the stroke length.

Measuring conditions

- Sample cylinder : MRL2 basic stroke length 200 mm
- Piston speed upon collision at end of stroke length : $V = 300 \text{ mm/S}$
- Distance between noise level meter and cylinder : 0.25 m
- Load : No load

Representative example

Unit: dB

Bore size	Rubber cushion	Rubber-air cushion
ø6	51.2	44.7
ø10	51.2	45.6
ø16	63.4	48.2
ø20	75.9	59.3



Safety Precautions

Be sure to read this section before use. Refer to page 2 for general information of the cylinder, and to page 320 for general information of the cylinder switch.

Magnet rodless cylinder MRL2 Series

Design & selection

1. Common

CAUTION

- Be careful of the gap between the end plate and the slider.

Please be careful when operating the cylinder as getting a hand or finger caught in the unit may lead to injury.

- Do not apply a load to the cylinder which is greater than or equal to the allowable load listed in the selection guide.

- Do not use the product with the slider fixed. Use the cylinder with the end plate fixed. Avoid use of the product with the slider fixed.

- When fixing the basic (guide combined) with switch with the guide, configure the rotational angle of the slider to be less than or equal to $\pm 1^\circ$.

- Mount so that the slider functions with the min. operating pressure value of all processes. When the flatness of the surface for cylinder installation is poor, the min. operating pressure will rise due to guide unit torsion and cause early wear of the bearing section. For this reason, install the unit so that the slider functions with the min. operating pressure value of all processes. Although mounting mating surfaces should be highly flat, adjust with shims when this cannot be confirmed.

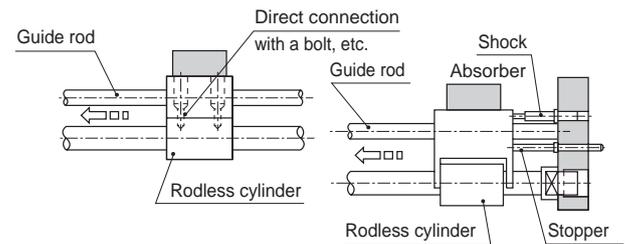
- Be careful to avoid scratching or denting the outer peripheral surface of the cylinder tube. This will cause damage to the lube keeping structure, scraper, and slider wear ring and may lead to defective operation.

- With the basic MRL2, be careful of the rotation of the slider. Either connect with an external bearing or consider the use of MRL2-G or MRL2-W.

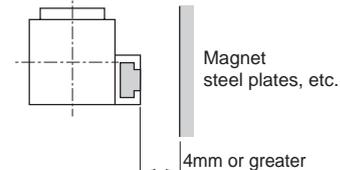
- Do not use the product in a state where the slider is displaced. If the slider becomes displaced due to an external force greater than the magnetic holding force, use your hand to push the stroke end back to its original position.

- Do not apply an eccentric load to the slider.

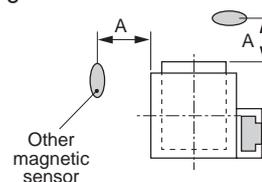
When the load and cylinder are direct mounted, their respective shaft center eccentricities cannot be absorbed, and lateral load applies, leading to misoperation (figure below left). Use with consideration for a connection method which enables absorption of this eccentricity and the self-weight deflection of the cylinder. The figure below right shows recommended mounting.



- The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Check that a distance of 4 mm is provided from the switch surface.



- When using cylinders adjacent with each other or when using other magnetic sensors nearby, in order to prevent malfunctioning due to the leaked magnetic field of the cylinder embedded magnet, keep the minimum distance from the surface of the slider to the other magnetic sensors as shown in the listed below.



Port size	A (mm)
ø6	10
ø10	20
ø16	20
ø20	37
ø25	50
ø32	80

When this distance is dimension A or less, malfunctions can be prevented by placing a magnetic substance (steel plate with thickness of 2 mm or more) between the slider and the others.

2. With rubber-air cushion MRL2-*C

- Note that because of its structure the stroke end position cannot be retained if the supply of air is stopped. When detecting the stroke end by switch, set the switch position with pneumatic pressure applied, as otherwise the position may be out of the detection range.

Use & maintenance

1. Common

WARNING

- The magnetic force of the embedded magnet is strong. Do not disassemble the product.

- With bore size of ø16 or less, because of changes in the cushion rigidity when left for long periods, the stroke length may become slightly shorter than the standard value with the low pressure setting. Perform a trial run, such as operating several times and performing back-and-forth operation at high supply pressure.

SCPD3
SCM
SSD2
MDC2
SMG
LCM
LCR
LCG
LCX
STM
STG
STR2
MRL2
GRC
Cylinder Switch
MN3E
MN4E
4GA/B
M4GA/B
MN4GA/B
F.R.(module unit)
Clean F.R
Precision R
Press gauge
Diff. press gauge
Electro-pneumatic R
Speed controller
Auxiliary valve
Fitting/tube
Clean air unit
Pressure sensor
Flow rate sensor
Valve for air blow
Ending