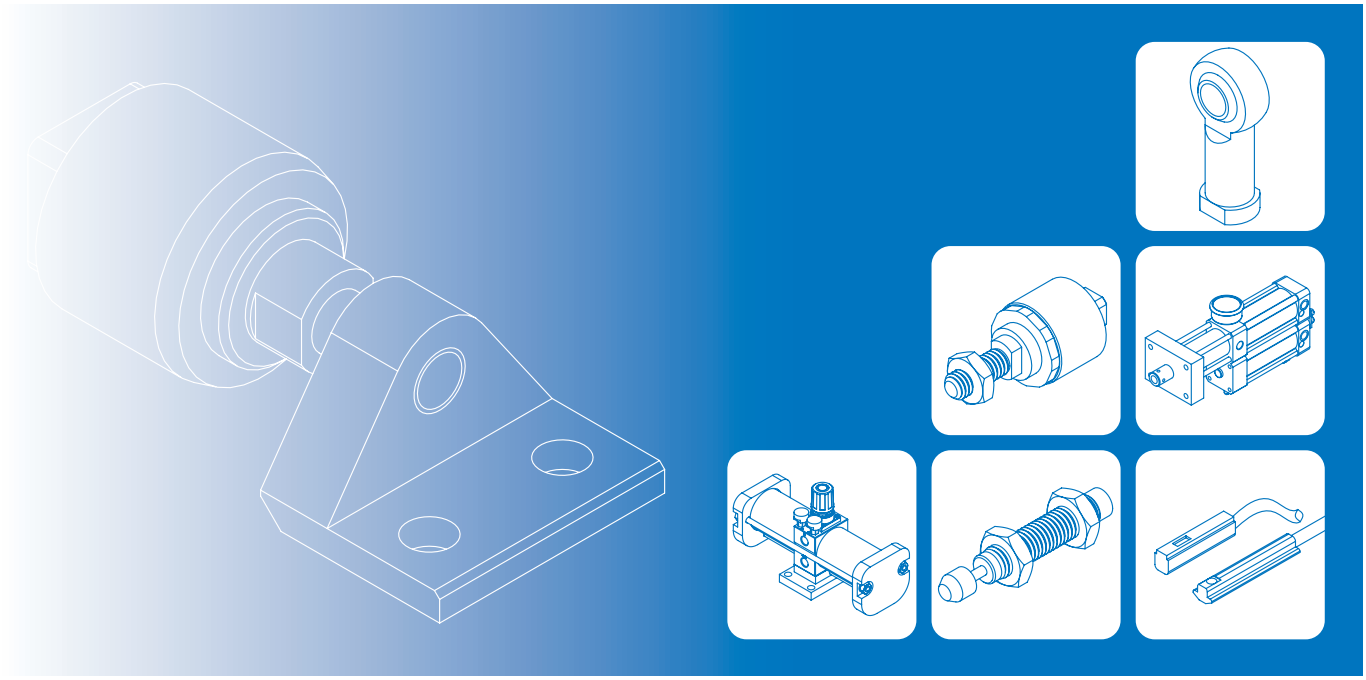
AUXILIARY EQUIPMENT



Features

- Can be used in many applications.
- Strong simple construction designed for repetitive high usage.
- Wide range available.
- Simple structure, high rigidity.
- Reduce the requirement of concentricity between the cylinder and the other connected component.

Cautions

- Do not use on universal joint.
- Do not disassemble.
- Lubricant required.
- Usage temperature +5~+60°C
- Do not use the end of the thread of the connecting rod.

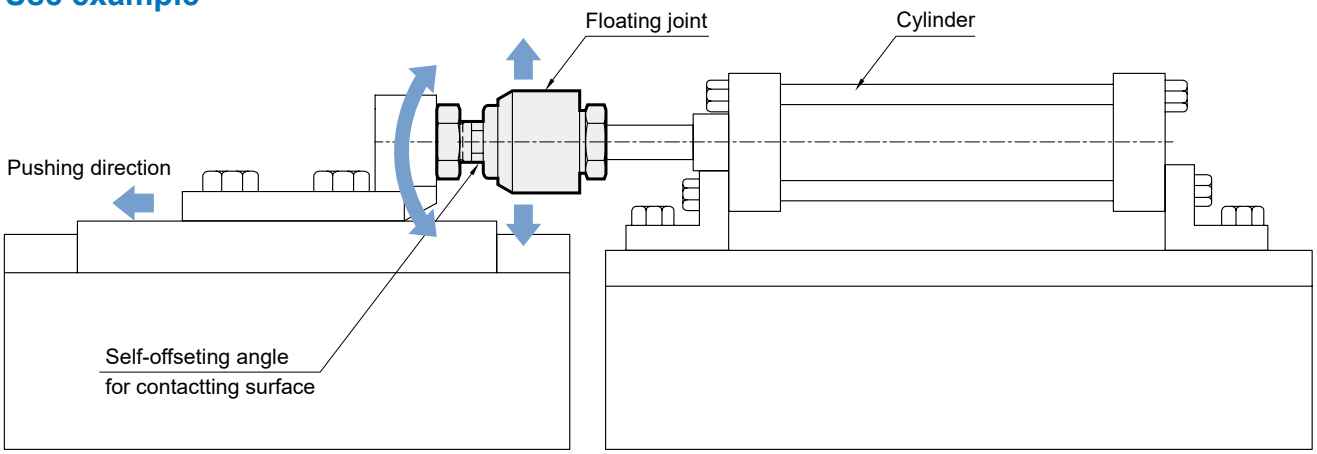
Order example

MFC — 1012 A — M12×1.25

* Thread size **M**.

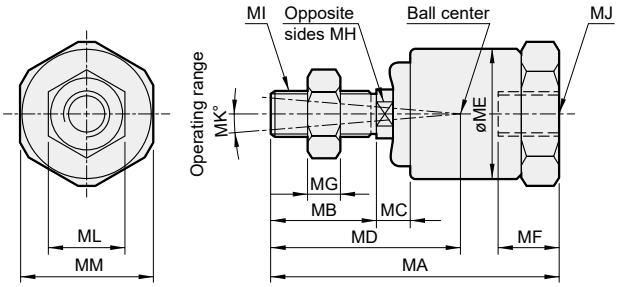
- MODEL
- THREAD SIZE
- TYPE
  - **A**: Standard A type
  - **T**: Standard T type
  - **S**: Short type
  - **F**: FAC type

Use example

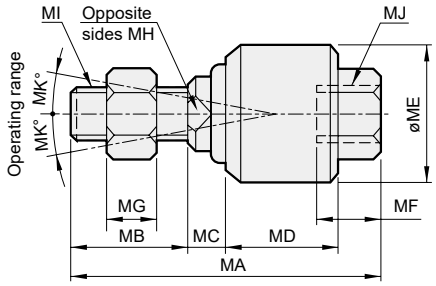


A

1003A ~ 1006A



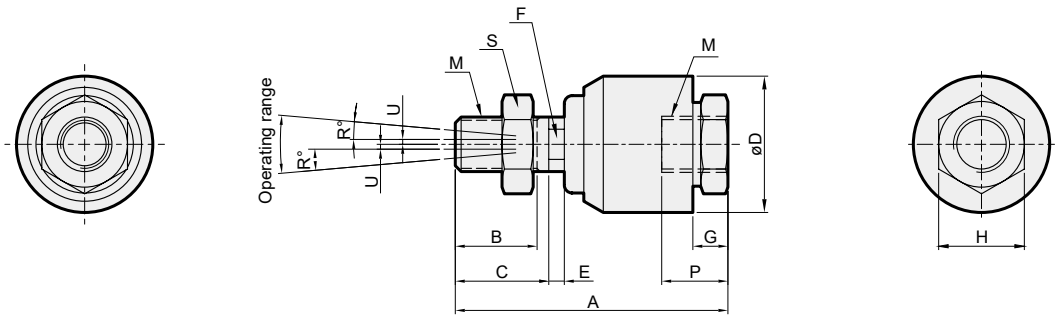
1008A ~ 1036A



Model	Applicable cyl. dia. (mm)	MA	MB	MC	MD	ME	MF	MG	MH	MI/MJ	ML	MM	Rot. angle	Radial compensation	Weight (g)
MFC-1003A	6	23.5	7.5	3	15	12.8	5.5	2.4	4	M3×0.5	5.5	12	±5°	0.5	–
MFC-1004A	8	26	9.5	3	17	12.8	6	3	4	M4×0.7	7	12	±5°	0.5	–
MFC-1005A	10,15	34.5	13.5	3.5	22.8	13.8	8	4	6	M5×0.8	8	14	±5°	0.5	20
MFC-1006A	15	34.5	13.5	3.5	22.8	13.8	8	4	6	M6×1.0	10	14	±5°	0.5	20

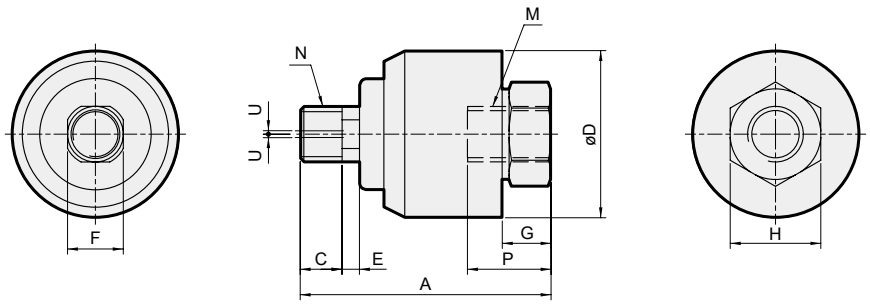
Model	Applicable cyl. dia. (mm)	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	Weight (g)
MFC-1008A	20	51	20	6	17	24	12.5	6	8	M8×1.25	M8×1.25	13	90
MFC-1010A	25,30	58	22	7	21	26	13	6	10	M10×1.25	M10×1.25	12	110
MFC-1012A	40	58	22	8	21	28	14	7	12	M12×1.25	M12×1.25	12	110
MFC-1014A	40	70	22.5	8.5	28	34.5	18.5	8	14	M14×1.5	M14×1.5	12	250
MFC-1016A	50,63	90	27	10	41	44.2	22	10	17	M16×1.5	M16×1.5	7	500
MFC-1018A	50,63	92	27	10	41	44.2	24	11	17	M18×1.5	M18×1.5	7	500
MFC-1020A	80	102	29	13	46	53.5	24	10	22	M20×1.5	M20×1.5	10	720
MFC-1022A	80	108	32	13	46	53.5	27	13	22	M22×1.5	M22×1.5	5	720
MFC-1026A	100	120	32	14.5	52.5	59.5	36	13	27	M26×1.5	M26×1.5	5	1300
MFC-1027A	125	136.5	40	14.5	52.5	59.5	44.5	13.5	27	M27×2.0	M27×2.0	5	1620
MFC-1030A	125,140	122	39	16	50	61	35	13.5	29	M30×1.5	M30×1.5	5	1610
MFC-1036A	140,160	194	60	20.5	77.5	84	54	18	36	M36×2.0	M36×2.0	5	–

T



Model	Applicable cyl. dia. (mm)	A		B		C	øD	E	F	G	H	M	P		R	S	Permissible U deviation	Rot. angle	Permissible pressure	Maximum operating tension and compression force (N)	Weight (g)
		DIM.	TOL.	DIM.	TOL.								DIM.	TOL.							
MFC-1024T	100	123	±2.0	38	±2.0	38	61	12	□26	19	41	M24×1.5	33	±2.0	5	M24×1.5×H11×B35.5	2.5	±5°	3.5 MPa (max.) Pneumatic / Hydraulic	28000	1300
MFC-1039T	140,160	184	±2.0	69	±2.0	70	75	20	□35	23	50	M39×1.5	42	±2.0	5	M39×1.5×H10×B50	4			71000	2820
MFC-1040T	160	194	±2.0	74	±2.0	74	85	15	□43	25	69	M40×1.5/2.0	40	±2.0	5	M40×1.5/2.0×H12×B65	5			71000	4300
MFC-1045T	160	194	±2.0	74	±2.0	74	85	15	□43	25	69	M45×1.5/2.0	40	±2.0	5	M45×1.5/2.0×H12×B65	5			71000	4300
MFC-1050T	160	210	±2.0	70	±2.0	70	105	16	□53	35	85	M50×2.0	55	±2.0	5	M50×2.0×H13×B65	6			80000	6980

S



Model	Applicable cyl. dia. (mm)	A		C		øD	E	F	G	H	P		M	N	Permissible U deviation	Rot. angle	Maximum operating tension and compression force (N)	Weight (g)
		DIM.	TOL.	DIM.	TOL.						DIM.	TOL.						
MFC-1008S	20	36	±1.0	6	±1.0	24	4	□8	6.5	13	12	±1.0	M8×1.0/1.25	M8×1.0/1.25	0.5	±0.5°	1100	60
MFC-1010S	25,30	48		9		26	5	□10	8	17	14		M10×1.25/1.5	M10×1.25/1.5	0.75		2500	97
MFC-1012S	40	46		9		28	5	□12	8	17	12		M12×1.25/1.5	M12×1.25/1.5			4400	100
MFC-1014S	40	59		11		35	7	□14	9	22	17		M14×1.5	M14×1.5	1		6000	220
MFC-1016S	50,63	77	±2.0	13	±2.0	45	9	□18	13	27	23	±2.0	M16×1.5	M18×1.5	1.25		11000	480
MFC-1018S	50,63	77		13		45	9	□18	13	27	23		M18×1.5	M18×1.5			11000	480
MFC-1020S	80	90		18		50	10	□22	16	32	27		M20×1.5	M20×1.5	2		18000	660
MFC-1022S	80	90		18		50	10	□22	16	32	27		M22×1.5	M20×1.5			18000	660
MFC-1024S	100	107		20		60	12	□26	19	41	33		M24×1.5	M26×1.5	2.5		28000	1190
MFC-1026S	100	107		20		60	12	□26	19	41	33		M26×1.5	M26×1.5			28000	1180
MFC-1027S	125	117		20		63.5	19	□29	20	41	33		M27×2.0	M30×1.5			28000	1380
MFC-1030S	125,140	117		20		63.5	19	□29	20	41	33		M30×1.5/2.0/3.5	M30×1.5/2.0/3.5			36000	1420
MFC-1036S	140,160	133		25		75	20	□35	22	50	40		M36×1.5/2.0	M36×1.5/2.0	3		55000	2800
MFC-1045S	140,160	147		29		85	15	□43	24.5	69	39		M45×1.5/2.0	M45×1.5/2.0			55000	4300

F

With **S** type floating joints.

Fig.1

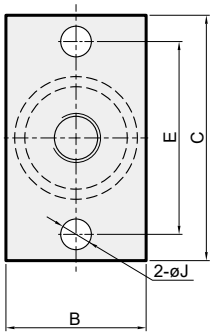
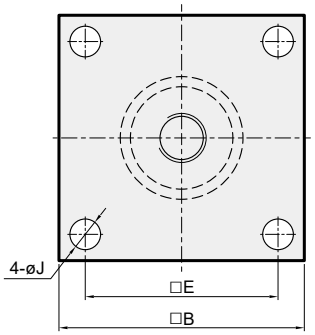
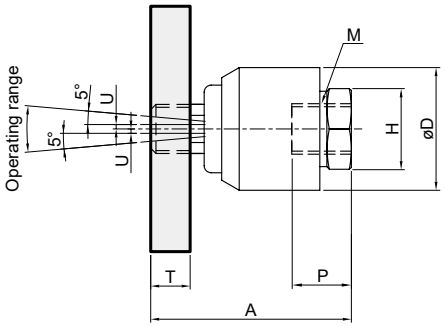
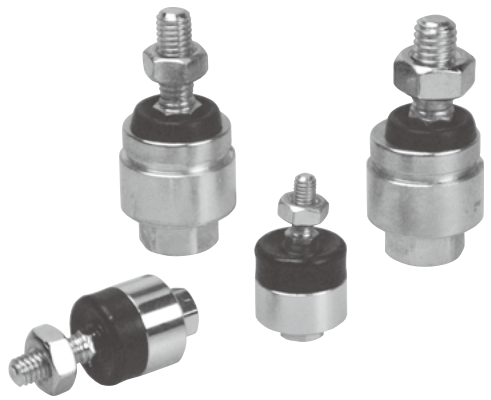


Fig.2





Model	A		B	C	øD	E	H	J	T	M	P		Illustration fig no.	Permissible U deviation	Rot. angle	Permissible pressure	Weight (g)
	DIM.	TOL.									DIM.	TOL.					
MFC-1008F	36	±1.0	25	52	24	40	13	6.6	6	M8×1.0/1.25	12	±1.0	Fig.1	0.5	±0.5°	3.5MPa (max.) Pneumatic / Hydraulic	130
MFC-1010F	48		32	56	26	44	17	6.6	9	M10×1.25/1.5	14			0.75			235
MFC-1012F	46		32	56	28	44	17	6.6	9	M12×1.25/1.5	12						240
MFC-1014F	59		38	80	35	60	22	11	11.6	M14×1.5	17			1			510
MFC-1016F	77	±2.0	74	–	45	45	27	11	15	M16×1.5	23	±2.0	Fig.2	1.25			1120
MFC-1018F	77		74	–	45	45	27	11	15	M18×1.5	23						1120
MFC-1020F	90		100	–	50	62	32	14	21	M20×1.5	27			2			2280
MFC-1022F	90		100	–	50	62	32	14	21	M22×1.5	27						2280
MFC-1024F	107		100	–	60	70	41	14	21	M24×1.5	33			2.5			2870
MFC-1026F	107		100	–	60	70	41	14	21	M26×1.5	33						2870
MFC-1027F	117		100	–	63.5	70	41	14	21	M27×2.0	33						3070
MFC-1030F	117		100	–	63.5	70	41	14	21	M30×1.5/2.0/3.5	33						3070
MFC-1036F	133		130	–	75	95	50	16	25	M36×1.5/2.0	40			3			5790
MFC-1045F	147		160	–	85	110	69	16	22	M45×1.5/2.0	39						8600



Features

- The minor error connects between two shafts can be removed.
- The machining accuracy can be neglected.
- The shaft alignment's time for the error tolerance connects between two shafts can be finished and installed easily, even the newcomer can do also.
- The abnormal noise can be prohibited.
- Small in dimension but can be loaded high tension & compression.
- Long time for the machine parts and the packing in the cylinder or the rod sealing's damage can be prohibited, reduced the producing's cost.
- The compression's decrease can be prohibited.

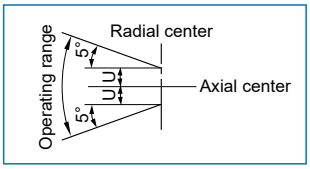
Order example

MFCS — 1004 T — M4×0.7

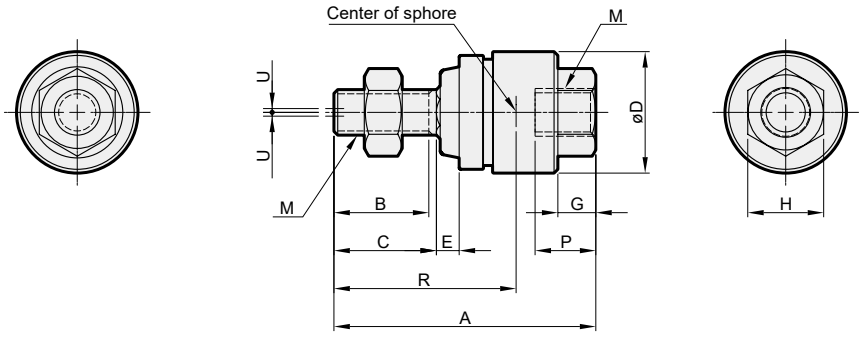
* Thread size **M**.

- MFCS — MODEL
- 1004 — THREAD SIZE
- T — TYPE
  T: Standard type

Operating range



T



Model	Cyl. dia	M	A	B	C	D	E	F	G	H	R	P	Permissible U deviation	Max. operating tension and compression force (N)	Weight	Rot. angle
MFCS-1003T	6	M3×0.5	23	7	8	12	2	3.8	3	5.5	15.5	6	0.5	19	5.5 g	±5°
MFCS-1004T	8	M4×0.7	26	9	10	12	2	4	4	6	18.5	7	0.5	54	10 g	
MFCS-1005T	10, 15	M5×0.8	34.5	12.5	13.5	16	3	6	5	10	24	8	0.5	123	20 g	
MFCS-1006T	16	M6×1.0	34.5	12.5	13.5	16	3	6	5	10	24	8	0.5	123	23 g	
MFCS-1008T	20	M8×1.25	46	20	21	21	5	7.8	5	13	31	7.5	0.5	1100	47 g	
MFCS-1010T	25, 32	M10×1.25	49.5	19.5	19.5	24	5	8	7	17	35.5	11	0.5	2500	72 g	

* Permissible pressure range: pneumatic pressure must below 1 MPa.

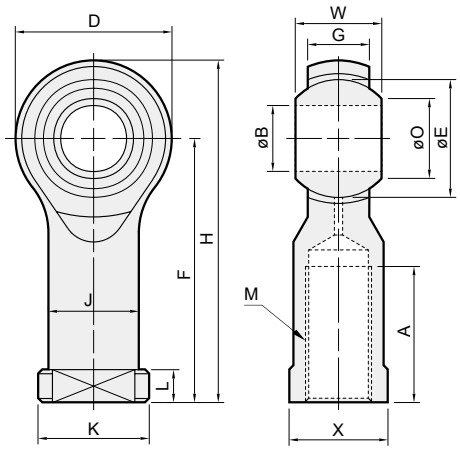
Features

- Copper lining structure embedded.
- Grease nipple as standard.
- Carbon steel body.
- High carbon chromium bearing steel.

Order example

PHS 25 — M24×1.5

MODEL — THREAD SIZE



Model	Dimensions (mm)														Static fracture minimal radial load (kgf)	Dynamic eff. load (kgf)		Weight (g)
	A	B	D	E	F	G	H	J	K	L	M	O	W	X		Radial	Axial	
PHS 5-M5×0.8	14	5	16	11.11	27	7	35	9	12	4	M5×0.8	7.71	8	9	930	620	230	18
PHS 6-M6×1.0	12	6	20	12.7	30	6.75	40	10	13	6.5	M6×1.0	8.96	9	11	1122	439	735	22
PHS 8-M8×1.25	16	8	24	15.875	36	9	48	12.5	16	7	M8×1.25	10.4	12	14	1633	735	1184	47
PHS 10EC-M10×1.25	20	10	26	19.05	43	11	56	15	19	8.5	M10×1.25*	12.9	14	17	2102	1020	1480	77
PHS 12EC-M12×1.25	22	12	32	22.225	50	12	66	17.5	22	10.5	M12×1.25*	15.4	16	19	2449	1367	1735	100
PHS 14EC-M14×1.5	25	14	36	25.4	57	13.5	75	20	25	10.5	M14×1.5*	16.9	19	22	3245	1735	2449	160
PHS 16EC-M16×1.5	28	16	40	28.575	64	15	84	22	27	11	M16×1.5*	19.4	21	24	3857	2204	2908	220
PHS 18-M18×1.5	32	18	46	31.75	71	16.5	94	25	31	13.5	M18×1.5	21.9	23	27	4694	2653	4337	320
PHS 20-M20×1.5	33	20	46	34.925	77	18	100	27.5	34	14	M20×1.5	24.4	25	30	5429	3214	4337	420
PHS 22-M22×1.5	43	22	50	38.1	84	20	109	30	37	12	M22×1.5	25.84	28	32	6100	4070	2290	475
PHS 25-M24×1.5	48	25	56	42.862	94	22	122	33.5	42	12	M24×1.5	29.6	31	36	7420	4950	2830	673
PHS 28-M27×2.0	53	28	67	47.625	110	26	143.5	40	50	15	M27×2.0	32.30	35	41	8870	5210	3240	875
PHS 30-M30×2.0	56	30	67	50.8	110	26	143.5	40	50	15	M30×2.0	34.81	37	41	11000	7370	3960	1050

* Different from the thread pitch commonly available on the market.

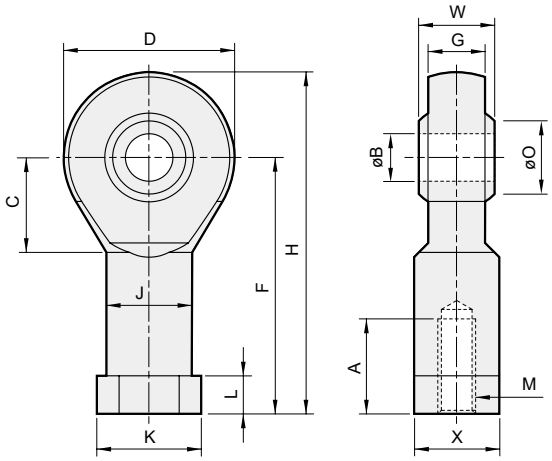
Features

- Embedded bearing structure.
- Stainless steel body.
- Sintered bronze bush.

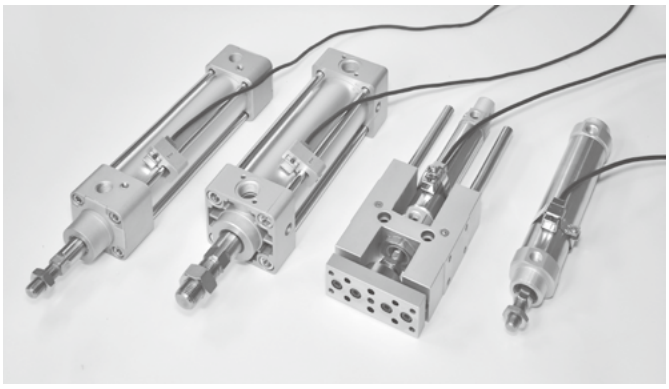
Order example

PHS — S20 — M20×1.5

MODEL	MATERIAL	SPEC.	THREAD SIZE
	S: SUS		



Code / Model	A	B	C	D	F	G	H	J	K	L	M	O	W	X	Weight (g)
PHS-S4-M4×0.7	12	4	7	14	24	5.25	31	8	9.5	4	M4×0.7	7.6	7	8	12
PHS-S6-M6×1	12	6	11	20	30	6.75	40	10	13	5	M6×1.0	8.9	9	11	27
PHS-S8-M8×1.25	16	8	13	24	36	9	48	12.5	16	5	M8×1.25	10.4	12	14	46
PHS-S10-M10×1.25	20	10	15	28	43	10.5	57	15	19	6.5	M10×1.25	12.9	14	17	77
PHS-S12-M12×1.25	22	12	17	32	50	12	66	17.5	22	6.5	M12×1.25	15.4	16	19	116
PHS-S16-M16×1.5	28	16	23	42	64	15	85	22	27	8	M16×1.5	19.3	21	22	203
PHS-S20-M20×1.5	33	20	27	50	77	18	102	27.5	34	10	M20×1.5	24.3	25	30	376



Order example
* Special order is available.

RCA — □

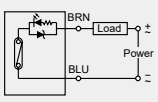
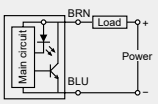
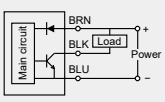
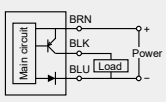
MODEL
RCA: Reed switch
RDA: Non-contact
RNA: NPN
RNAE: NPN
RPA: PNP
RPAE: PNP

WIRE LENGTH
2M: L=2000mm
3M: L=3000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector

Switch holder / band
HV1

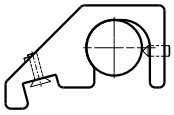
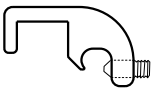
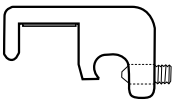
SWITCH HOLDER
HA*: for MCQA, MCQV
HV*: for MCQA, MCQV, MCQV3, MCQV3L, MCBQV, MCBQV3, MCQN
HS*: for MSB*-ø50
PN-A*: for MCKA
PM*: for MCQA, MCQV

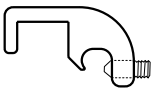
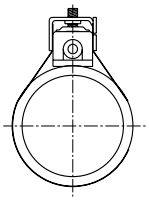
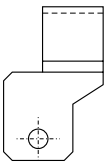
Specification

Model	RCA	RDA	RNA	RNAE	RPA	RPAE
Wiring method	2 wire		3 wire			
Switching logic	SPST N.O.	Solid state output, normally open				
Switch type	Reed switch	Non-contact	NPN current sinking		PNP current sourcing	
Operating voltage	5~240V DC/AC	5~30V DC				
Switching current	100mA max.	50mA max.	200mA max.			
Switching rating (*1)	10W max.	1.5W max.	6W max.			
Current consumption (*5)	—		15 mA@24V DC max.	6 mA@24V DC max.	15 mA@24V DC max.	6 mA@24V DC max.
Voltage drop (*5)	3.5V max.	3.7V max.	1.5V max.	0.5max.	1.5V max.	0.5max.
Leakage current (*5)	—	0.1mA(40uA) max.	0.01mA max.			
Indicator	Green LED	Red LED			Green LED	
Cable	ø4, 2C, PVC		ø4, 3C, PVC			
Temperature range	-10~+70°C (No freezing)					
Shock (*2)	30G	50G				
Vibration (*3)	9G					
Enclosure classification	IEC 60529 IP67					
Protection circuit (*4)	1	3,4	2,3,4	3,4	2,3,4	3,4
Weight	46 g (2m cable)					
Connect diagram						

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
* 6. Caution for safety .

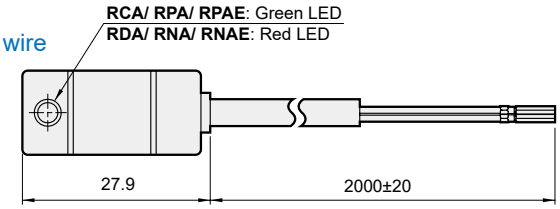
Assembling style

Cylinder type	MCQA					MCQV3 / MCBQV3			MCQV		
Mounting clamps	Hold					Hold					
Order	HV2	HV4	PM14	PM16	HA5	HV1	HV2	HV3	HV4	PM16	HA5
Cylinder tube I.D.	40,50,63	80,100	125	150	200	32,40	50,63	80,100	125	160	200
Pictures	HA*  HV*  PM* 										

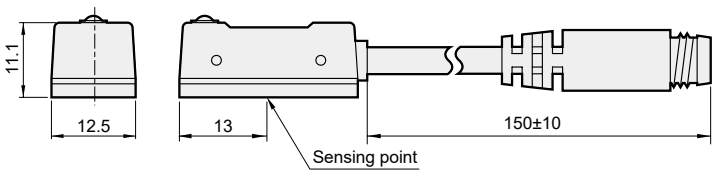
Cylinder type	MCBQV	MCQV3L		MCQN			MCKA	MSB* ø50
Mounting clamps	Hold	Hold		Hold			Band	Hold
Order	HV4	HV2	HV3	HV1	HV2	HV3	PN-A40	HS
Cylinder tube I.D.	125	63	80	40	50,63	80,100	40	50
Pictures	HV* 							

Dimension

Standard lead wire

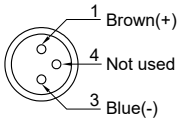


QD connector

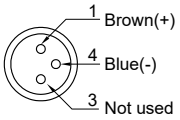


Wiring of the QD

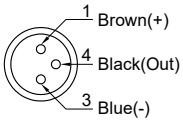
- 2 wire QD wiring



- 2 wire EQD wiring

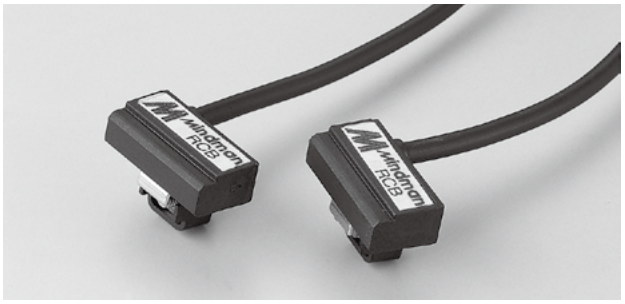


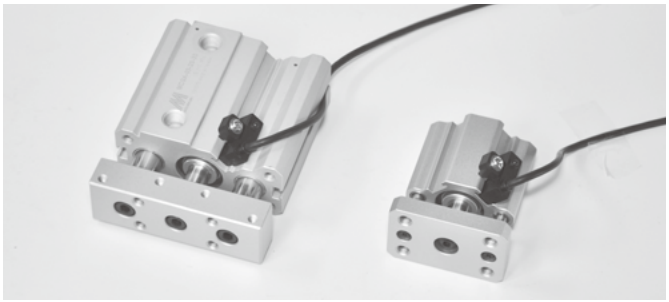
- 3 wire QD wiring



RCB series

SENSOR SWITCH





Order example

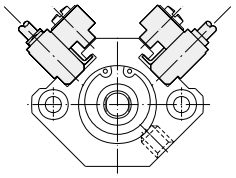
RCB – □

MODEL
RCB: Reed switch
RDB: Non-contact
RNB: NPN
RNBE: NPN
RPB: PNP
RPBE: PNP

WIRE LENGTH
1M: L=1000mm
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector

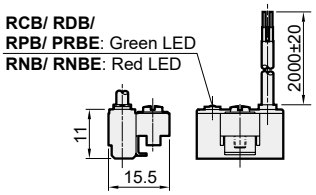
* Special order is available.

Assembling style

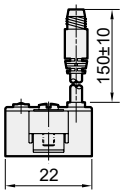
Cylinder type	Mounting clamp
MCJQ2, MCGA, MSB*	

Dimension

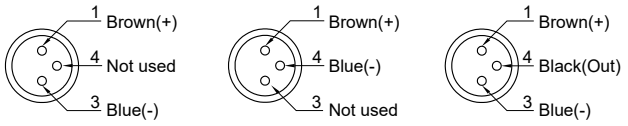
Standard lead wire



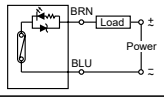
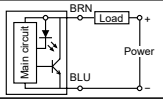
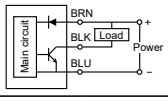
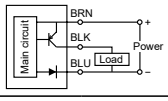
QD connector



Wiring of the QD



Specification

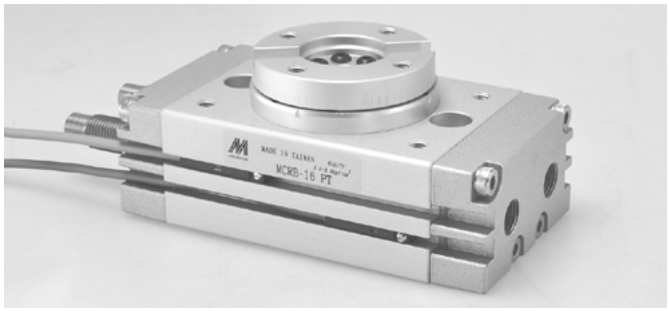
Model	RCB	RDB	RNB	RNBE	RPB	RPBE
Wiring method	2 wire		3 wire			
Switching logic	SPST normally open	Solid state output, normally open				
Switch Type	Reed switch	Non-contact	NPN current sinking		PNP current sourcing	
Operating voltage	5~240V DC/AC	5~30V DC				
Switching current	100mA max.	50mA max.	200mA max.			
Switching rating (*1)	10W max.	1.5W max.	6W max.			
Current consumption (*5)	–		22 mA@24V DC max.	6 mA@24V DC max.	20 mA@24V DC max.	6 mA@24V DC max.
Voltage drop (*5)	3.5V max.	3.7V max.	0.5V max.			
Leakage current (*5)	–	0.1mA(40uA) max.	0.01mA max.			
Indicator	Green LED		Red LED		Green LED	
Cable	ø3.3, 2C, PVC		ø3.3, 3C, PVC			
Temperature range	–10~+70°C (No freezing)					
Shock (*2)	30G	50G				
Vibration (*3)	9G					
Enclosure classification	IEC 60529 IP67					
Protection circuit (*4)	1	3,4				
Weight	33 g (2m cable)					
Connect diagram						

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
* 6. Caution for safety .

RCD series

SENSOR SWITCH

mindman



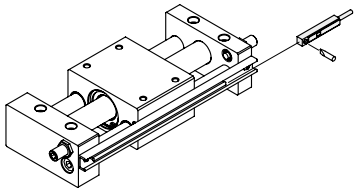
Order example

RCD – □

MODEL
RCD: Reed switch
RDD: Non-contact
RND: NPN
RNDE: NPN
RPD: PNP
RPDE: PNP

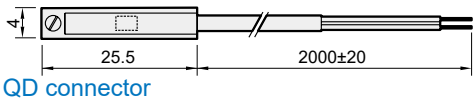
WIRE LENGTH
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector
* Special order is available.

Assembling style

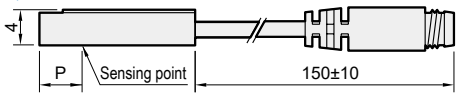
Cylinder type	Mounting clamp
MCRPMS, MCRB	

Dimension

Standard lead wire



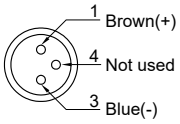
QD connector



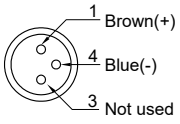
Code / Model	P
RCD	12
RDD	6
RND	7.5
RNDE	6
RPD	7.5
RPDE	6

Wiring of the QD

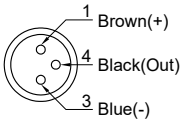
● 2 wire
QD wiring



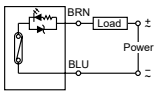
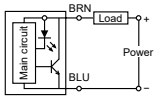
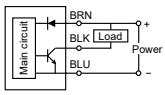
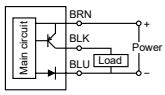
● 2 wire
EQD wiring



● 3 wire
QD wiring



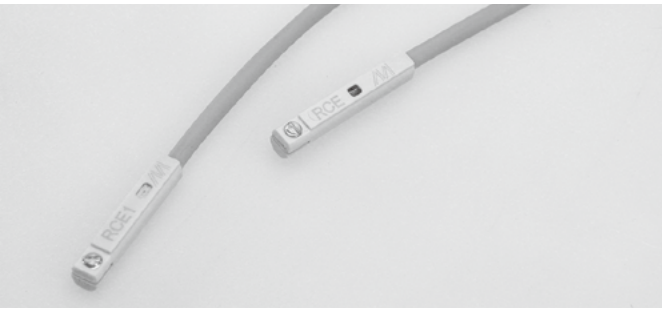
Specification

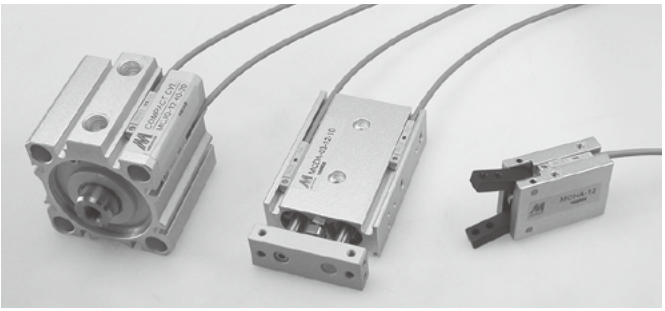
Model	RCD	RDD	RND	RNDE	RPD	RPDE
Wiring method	2 wire		3 wire			
Switching logic	SPST normally open	Solid state output, normally open				
Switch Type	Reed switch	Non-contact	NPN current sinking		PNP current sourcing	
Operating voltage	5~120V DC/AC	5~30V DC				
Switching current	100mA max.	50mA max.	200mA max.			
Contact rating (*1)	10W max.	1.5W max.	6W max.			
Current consumption (*5)	–		8 mA@24V DC max.	6 mA@24V DC max.	8 mA@24V DC max.	6 mA@24V DC max.
Voltage drop (*5)	3.5V max.	3.7V max.	1V@200mA max.	0.5V@200mA max.	1V@200mA max.	0.5V@200mA max.
Leakage current (*5)	–	0.1mA(40uA) Max	0.01mA Max			
Indicator	Red LED				Green LED	
Cable	ø2.8, 2C, PUR		ø2.8, 3C, PUR			
Temperature range	–10~+70°C (No freezing)					
Shock (*2)	30G	50G				
Vibration (*3)	9 G					
Enclosure classification	IEC 60529 IP67					
Protection circuit (*4)	1	3, 4	2, 3, 4	3, 4	2, 3, 4	3, 4
Weight	20 g (2m cable)					
Connect diagram						

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
* 6. Caution for safety .

RCE series

SENSOR SWITCH





Order example

* Special order is available.

RCE — □

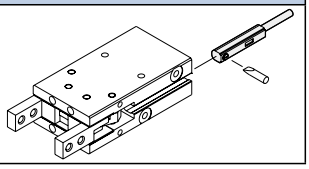
MODEL

RCE: Reed Switch
RDE: Non-contact
RDE-D: Non-contact, two indicators
RNEE: NPN
RPE: PNP
RPEE: PNP

WIRE LENGTH

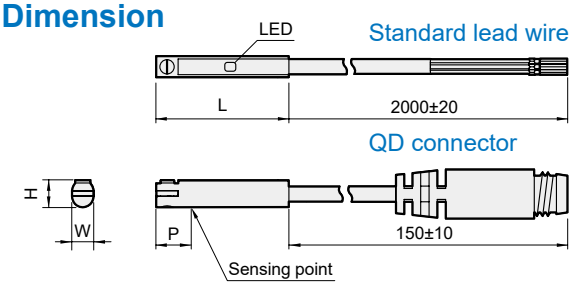
1M: L=1000mm
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector

Assembling style

Cylinder type	Mounting clamp
MCJA, MCJQ, MCKJQ, MCFA, MCGB, MCGS, MCGD, MCGJ, MCG3, MCDA, MCSH, MCSS, MCSQ, MCSF, MCRPMD, MCRA, MCKB, MCKC, MCHA, MCHB, MCHC, MSB*, MSL*	

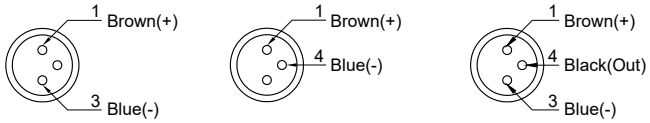
* **RDE** not applicable to **MCDA-12**, **MCSS-6/8**, **MCSQ**.

Dimension



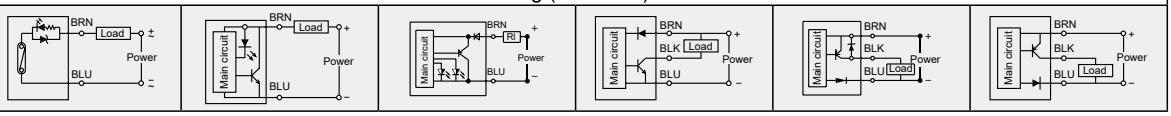
Wiring of the QD

● 2 wire QD wiring ● 2 wire EQD wiring ● 3 wire QD wiring



Code / Model	H	L	P	W
RCE	5	26	12.5	4
RDE, RDE-D	5	24	6	4
RPE	4.65	22	6	4.1
RNEE, RPEE	5	24	6	4

Specification

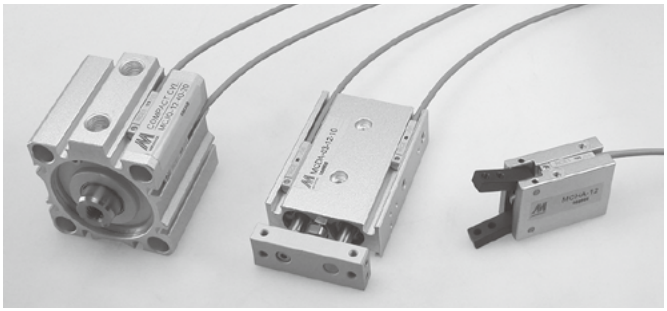
Model	RCE	RDE	RDE-D	RNEE	RPE	RPEE
Wiring method	2 wire			3 wire		
Switching logic	SPST N.O.	Solid state output, normally open				
Switch Type	Reed switch	Non-contact		NPN current sinking	PNP current sourcing	
Operating voltage	5~220V DC/AC	10~28V DC		5~30V DC		
Switching current	50mA max.	50mA max.	80mA max.	200mA max.	50mA max.	200mA max.
Switching rating (*1)	10W max.	1.5W max.	2W max.	6W max.	1.5W max.	6W max.
Current consumption (*5)	—			6 mA@24V DC max.	12 mA@24V DC max.	6 mA@24V DC max.
Voltage drop (*5)	3.5V max.		4V max.	0.5V @200mA max.	1.5V max.	0.5V @200mA max.
Leakage current (*5)	—	0.1mA max.	1mA max.	0.01mA max.		
Indicator (LED)	Red		Red/Green (*6)	Red	Green	
Cable	ø2.8,2C,PUR	ø2.8,2C,PUR		ø3, 3C, PU		
Temperature range	-10~+70°C (No freezing)					
Shock (*2)	30G	50G				
Vibration (*3)	9G					
Enclosure classification	IEC 60529 IP67					
Protection circuit (*4)	1	3,4	2,3,4	3,4		
Weight	20 g (2m cable)					
Connect diagram						

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Red LED: unstable sensing range; Green LED: stable sensing range.
*7. Caution for safety .

RCE1 series

SENSOR SWITCH

mindman



Order example

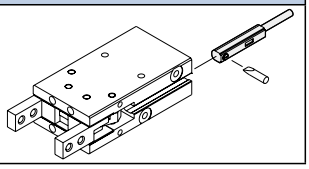
* Special order is available.

RCE1 — □

MODEL
RCE1: Reed Switch
RDE1E: Non-contact
RNE1E: NPN
RPE1E: PNP

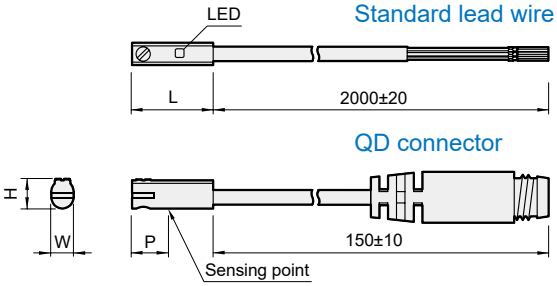
WIRE LENGTH
1M: L=1000mm
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector

Assembling style

Cylinder type	Mounting clamp
MCJA, MCJQ, MCKJQ, MCFA, MCGB, MCGS, MCGD, MCGJ, MCG3, MCDA, MCSH, MCSS, MCSQ, MCSF, MCRPMD, MCRA, MCKB, MCKC, MCHA, MCHB, MCHC, MSB*, MSL*	

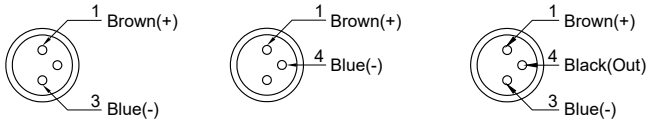
* **RNE1E** not applicable to **MCDA-12**.

Dimension



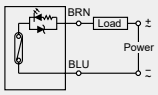
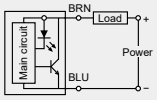
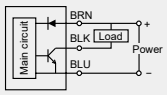
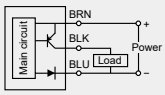
Wiring of the QD

● 2 wire QD wiring ● 2 wire EQD wiring ● 3 wire QD wiring

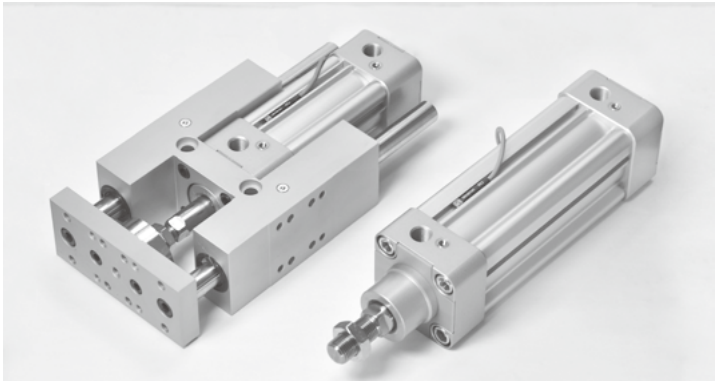


Code / Model	H	L	P	W
RCE1	4.65	22.0	12	4.1
RDE1E	5	14.2	6	4
RNE1E	5	14.2	6	4
RPE1E	5	14.2	6	4

Specification

Model	RCE1	RDE1E	RNE1E	RPE1E
Wiring method	2 wire		3 wire	
Switching logic	SPST normally open	Solid state output, normally open		
Switch Type	Reed switch	Non-contact	NPN current sinking	PNP current sourcing
Operating voltage	5~120V DC/AC	5~30V DC		
Switching current	100mA max.	50mA max.	80mA max.	
Switching rating (*1)	10W max.	1.5W max.	2.2W max.	
Current consumption (*5)	—		10 mA@24V DC max.	
Voltage drop (*5)	3.5V max.		0.5V@50mA max.	
Leakage current (*5)	—	0.1mA(40uA) max.	0.01mA max.	
Indicator (LED)	Red			
Cable	ø2.8,2C,PU	ø2.6,2C,PVC	ø2.6,3C,PVC	
Temperature range	-10~+70°C (No freezing)			
Shock (*2)	30G	50G		
Vibration (*3)	9G			
Enclosure classification	IEC 60529 IP67			
Protection circuit (*4)	1	3,4		
Weight	20 g (2m cable)			
Connect diagram				

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Caution for safety .



Order example

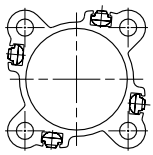
RCI — N — □

MODEL
RCI: Reed Switch
RCI-N: Reed Switch (NPN)
RCI-P: Reed Switch (PNP)
RNI: NPN
RPI: PNP

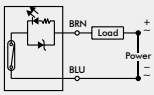
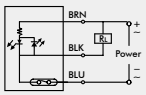
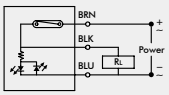
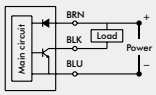
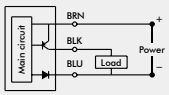
WIRE LENGTH
1M: L=1000mm
2M: L=2000mm
3M: L=3000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connect

* Special order is available.

Assembling style

Cylinder type	Mounting clamp
MCQI*, MCKQI*, MCBQI*, MCJI, MCGI, MGTB, MGTU, MGTX, METB	

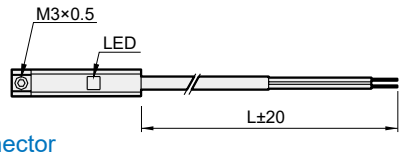
Specification

Model	RCI	RCI-N	RCI-P	RNI	RPI
Wiring	2 wire	3 wire		3 wire	
Switching logic	Normal open				
Switch Type	Reed switch	Reed switch NPN	Reed switch PNP	NPN current sinking	PNP current sourcing
Voltage range	5~240V DC/AC	10~30V DC		10~30V DC	
Current range	100mA max.	500mA max.		200mA max.	
Contact rating(*1)	10W max.			6W max.	
Current consumption	—	5 mA@24V DC max.		20 mA@24V DC max.	
Voltage drop	3.5V max.	0.1V@100mA max.		1.5V max.	
Leakage current	—	—	—	0.05mA max.	
Indicator	Red LED	Yellow LED		Red LED	Yellow LED
Cable	ø3,2C,PUR	ø3,3C,PUR		ø3,3C,PUR	
Temperature	-10~+70°C (No freezing)				
Shock (*2)	30G			50G	
Vibration (*3)	9G				
Protection classification	IEC 60529 IP67				
Protection circuit (*4)	1			2,3,4	
Weight	23 g (2m cable)				
Connect diagram					

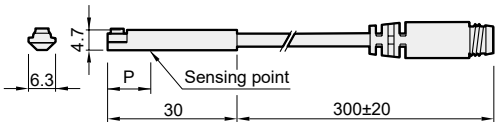
*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression
*5. Caution for safety .

Dimension

Standard lead wire

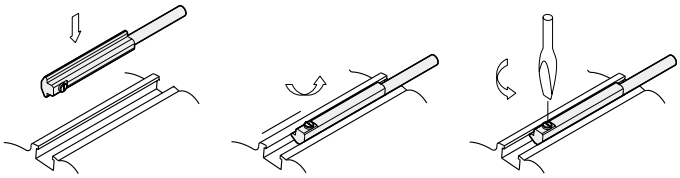


QD connector



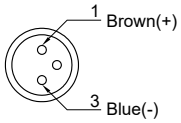
Code / Model	P
RCI	13
RCI-N, RCI-P	10
RNI, RPI	8

Mounting

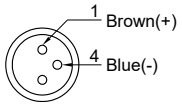


Wiring of the QD

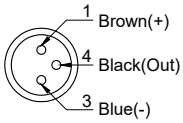
- 2 wire QD wiring

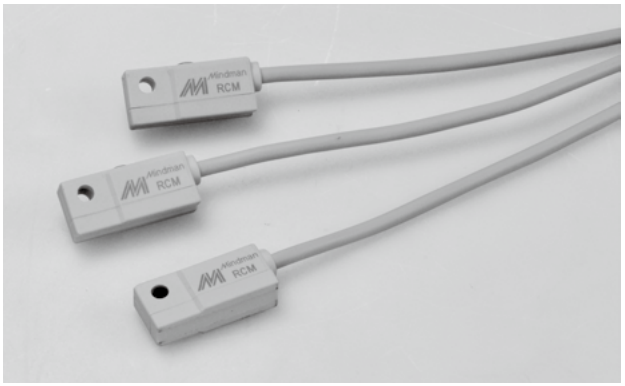


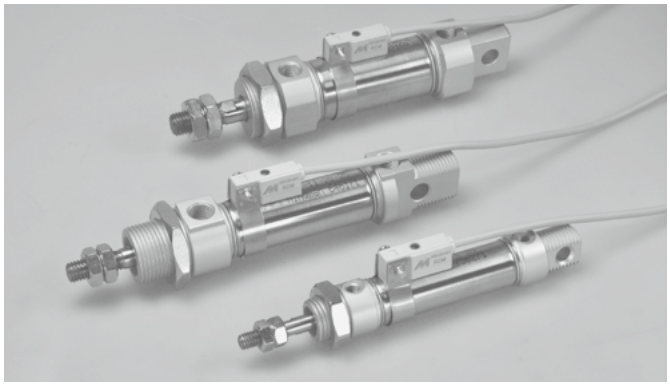
- 2 wire EQD wiring



- 3 wire QD wiring







Order example
* Special order is available.

RCM — □

MODEL
RCM: Reed switch
RDM: Non-contact
RNM: NPN
RNME: NPN
RPM: PNP
RPME: PNP

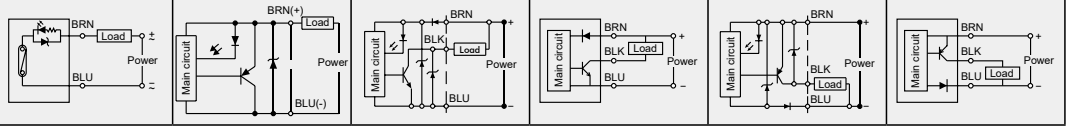
WIRE LENGTH
1M: L=1000mm
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connector

Order example of band

BM16

SWITCH BAND	TUBE I.D.
BM	**6~40**
BMG	**20~100**

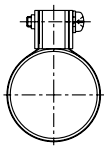
Specification

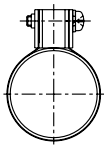
Model	RCM	RDM	RNM	RNME	RPM	RPME
Wiring method	2 wire		3 wire			
Switching logic	SPST N.O.	Solid state output, normally open				
Switch Type	Reed switch	Non-contact	NPN current sinking		PNP current sourcing	
Operating voltage	5~240V DC/AC	10~30V DC	5~28V DC	5~30V DC	5~28V DC	5~30V DC
Switching current	100mA max.	50mA max.	50mA max.	200mA max.	50mA max.	200mA max.
Switching rating (*1)	10W max.	1.5W max.	1.5W max.	6W max.	1.5W max.	6W max.
Current consumption (*5)	—		10 mA@24V DC max.	6 mA@24V DC max.	10 mA@24V DC max.	6 mA@24V DC max.
Voltage drop (*5)	3.5V max.	3.7V max.	1.5V max.	0.5V max.	1.5V max.	0.5V max.
Leakage current (*5)	—	0.1mA max.	0.01mA max.			
Indicator	Red LED				Green LED	
Cable	ø3.3, 2C, PVC		ø3.3, 3C, PVC			
Temperature range	-10~+70°C (No freezing)					
Shock (*2)	30G	50G				
Vibration (*3)	9G					
Enclosure classification	IEC 60529 IP67					
Protection circuit (*4)	1	3,4				
Weight	33 g (2m cable)					
Connect diagram						

* 1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
* 2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
* 3. Double amplitude 1.5mm/10Hz~55Hz~10Hz(Sweep 1min)/X.Y.Z. 3 directions/1 hour each time.
* 4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
* 5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.

*6. Caution for safety .

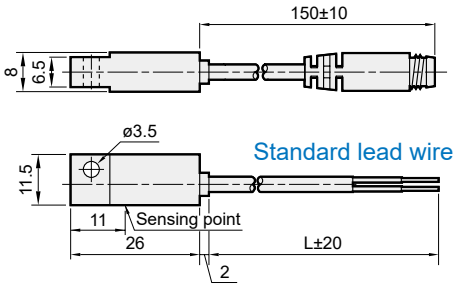
Assembling style

Picture	Model / Band & Tube I.D.		MCMA	MCMB MCKMB	MCMBR*	MCMBL	MCMI	MCMIS	MCKMI	MCMJ	MCBMI MGT*	MSLL
	BM6	6								●		
	BM8	8					●					
	BM10	10					●	●		●		
	BM12	12					●	●				
	BM16	16	●				●	●	●	●		
	BM20	20	●	●	●		●	●	●		●	
	BM25	25	●	●	●		●	●	●		●	
	BM32	32	●	●	●	●	●					
	BM40	40	●	●	●	●	●					●

Picture	Model / Band & Tube I.D.		MCCG	MCCN	MCCH
	BMG20	20	●	●	
	BMG25	25	●	●	●
	BMG32	32	●	●	●
	BMG40	40	●	●	
	BMG50	50	●	●	
	BMG63	63	●	●	
	BMG80	80	●		
	BMG100	100	●		

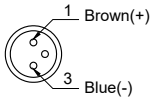
Dimension

QD connector

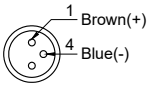


Wiring of the QD

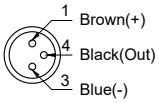
● 2 wire
QD wiring

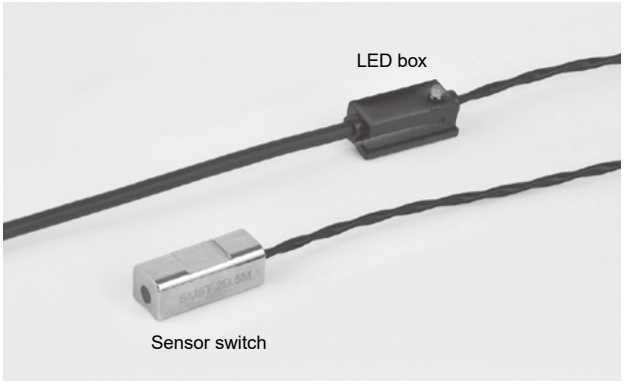


● 2 wire
EQD wiring



● 3 wire
QD wiring





Feature

- AISI 316 stainless steel
  Fits the chemical, food and pharmaceutical environment.
- The switch holds up to corrosive enviroments, high temperature and shock.

Order example of sensor switch

RCV — 5M

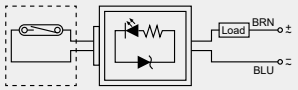
MODEL: RCV
WIRE LENGTH: **5M**: L=5000mm

Switch band

BV125

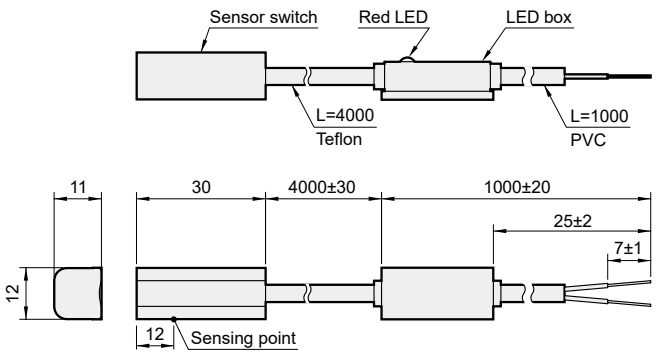
SWITCH BAND
for ø32 ~ø125

Specification

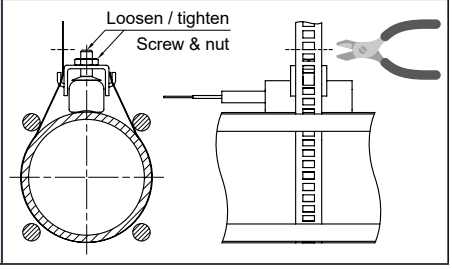
Model		RCV
Wiring method		2 wire
Switching logic		SPST N.O.
Switch type		Reed switch
Operating voltage		5~240V DC/AC
Switching current		100mA max.
Switching rating (*1)		10W max.
Voltage drop (*2)		3.5V max.
Indicator		Red LED
Housing switch material	Sensor switch	AISI 316
	LED box	ABS
Cable	Black Teflon	ø4, L=4000mm
	PVC	ø3, L=1000mm
Temperature range		-10~+140°C (Sensor switch only)
Enclosure classification		IEC 529 IP67
Weight		91 g (2m cable)
Connect diagram		

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*3. Caution for safety.

Dimension



Assembling style

Cylinder type	Mounting clamp
MCQVS	

Order example

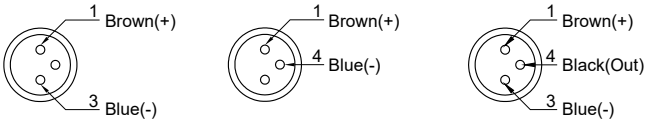
RDC V – □

Model	Auto switch type	Wire length
RDC: Non-contact **RQC**: NPN & PNP configurations*	Blank: Straight cable	**2M**: L=2000mm **QD**: M8, 3 Pin connector **EQD**: M8, 3 Pin connector (Only for RDC)
	V: Angle cable	**2M**: L=2000mm

* Selects the mode based on NPN or PNP wiring configuration.
Always turn off power before wiring; never work on live wires.

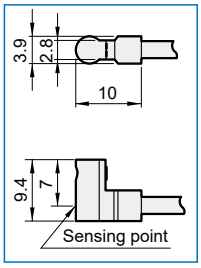
Wiring of the QD

- 2 wire QD wiring
- 2 wire EQD wiring
- 3 wire QD wiring



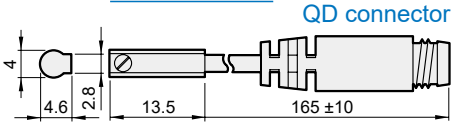
Dimension

Angle cable



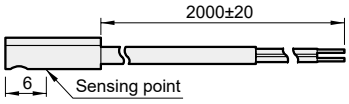
Straight cable

QD connector

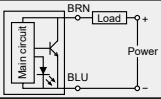
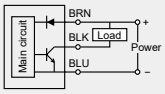
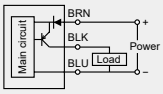


WIRE LENGTH

Standard lead wire

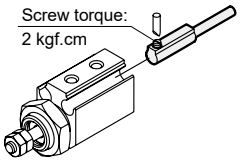


Specification

Model	RDC / RDCV	RQC / RQCV	
Wiring method	2 wire	3 wire	
Switching logic	Normally open		
Switch Type	Non-contact	NPN current sinking	PNP current sourcing
Operating voltage	5~30V DC		
Switching current	50mA max.	80mA max.	
Contact rating(*1)	1.5W max.	2.4W max.	
Current consumption (*5)	—	2mA @24V DC max.	
Voltage drop (*5)	4.0V@50mA max.	1.2V @ 80mA max.	
Leakage current (*5)	0.1mA max.	0.01mA max.	
Magnet requirement (*5,6)	40~1000 Gauss		
Indicator	Red LED		
Cable	ø2.6, 27AWG, Black, PVC		
Operating Frequency	1000 Hz		
Temperature range	–10~+70°C (No freezing)		
Shock (*2)	50G		
Vibration (*3)	9G		
Enclosure classification	IEC 60529 IP67		
Protection circuit (*4,7)	3, 4, 5	2, 3, 4	
Weight	17 g (2m cable)	19 g (2m cable)	
Connect diagram			

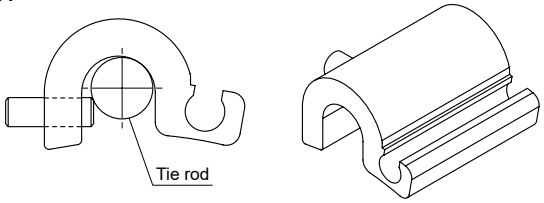
*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression / 5=Sensor thermal protection.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Measuring standard target : ø15.5 × ø8 × 5t (Anisotropy rubber magnet)
*7. The LED will flash when short-circuit or sensor thermal protection is ON.
*8. Please turn off the power before installing or changing the output contact, and ensure the load is installed according to the wiring diagram to prevent abnormal operation or product malfunction.
*9. Caution for safety.

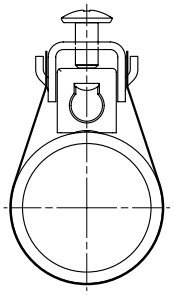
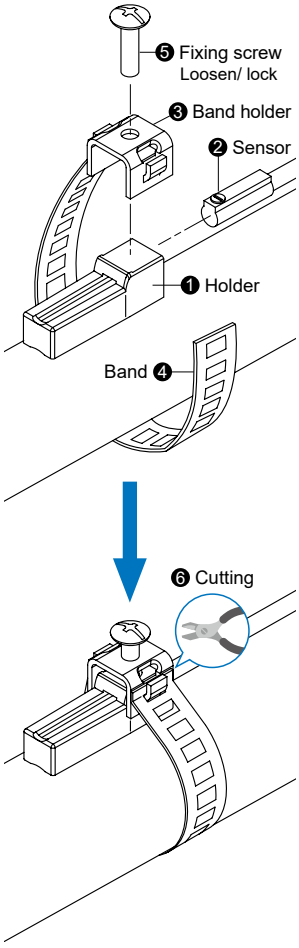
Assembling style

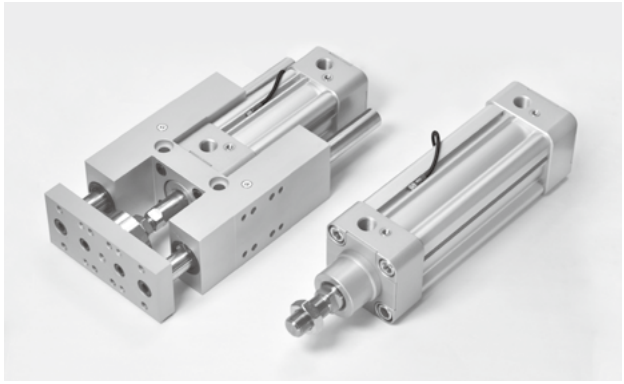
Cylinder model
MAM*, MCJQ3, MCJQ3-3, MCKJQ3, MCJU, MCFA2, MCFB, MCMJP, MCGS2, MCGM2, MCDJ, MGT*-32~63, MCSS2, MCSQ2, MCSF-5, MCSH2, MCRPM-20~40, MCRPMD-10, MCRPMS, MSBE, MCRJ-S, MCRC, MCKC2, MCHB2, MCHCJ, MCHC2, MCHD, MCHH, MCHX, MCHG2, MCHA2, MCHY2, METI, MEQI, MEGT, MEJQ, MESF2, MESBE
Direct mounting


Model	Tube I.D.	Holder	Tie rod
MCQA	40	**DT7-1**	ø7.1
	50		
	63		
	80	**DT7-3**	ø10.8
	100		
	125		ø12.9
	150		ø15
MCQN	40	**DT7-1**	ø6
	50		ø7.1
	63		
	80	**DT7-2**	ø8.9
	100		
MCQV3 MCBQV3	32	**DT7-1**	ø5.3
	40		
	50		ø7.1
	63		
	80	**DT7-2**	ø8.9
	100		
MCQV3L	63	**DT7-1**	ø7.1
	80	**DT7-2**	ø8.9
MCQV	125	**DT7-3**	ø10.8
	160		ø15
	200		
MCBQV	125	**DT7-2**	ø10.8

DT7-*



Model	Tube I.D.	Holder with band
MCMA	16	**BKC-1** (Not applicable for Angle cable(V))  **Mounting steps** 
	20	
	25	
	32	
	40	
MCMB MCMBR*	20	
	25	
	32	
	40	
MCKMB	20	
	25	
	32	
	40	
MCMBL	32	
	40	
MCMI	8	
	10	
	12	
	16	
	20	
	25	
	32	
	40	
MCBMI MGTK/ B/ U	20	
	25	
MCMIS	10	
	12	
	16	
	20	
	25	
MCKMI	16	
	20	
	25	
MCMJ	6	
	10	
	16	
MCCG MCCN	20	
	25	
	32	
	40	
	50	
	63	
MCCH	25	
	32	
MCKA	40	



Order example

RDT – □

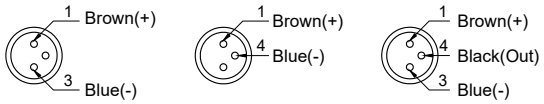
MODEL
RDT: Non-contact
RQT: NPN & PNP configurations*

WIRE LENGTH
2M: L=2000mm
QD: M8, 3 Pin connector
EQD: M8, 3 Pin connect (EQD only for RDT)

* Selects the mode based on NPN or PNP wiring configuration.
Always turn off power before wiring; never work on live wires.

Wiring of the QD

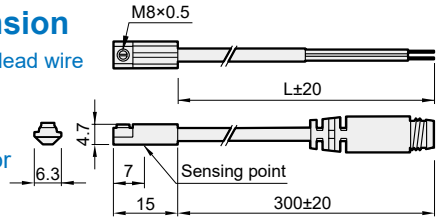
● 2 wire QD wiring ● 2 wire EQD wiring ● 3 wire QD wiring



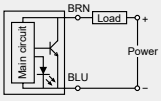
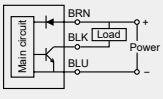
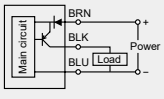
Dimension

Standard lead wire

QD connector



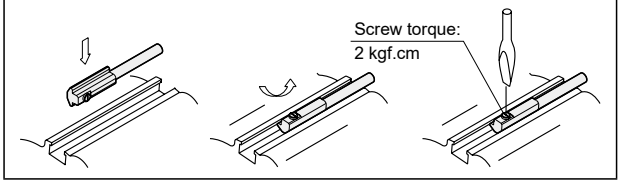
Specification

Model	RDT	RQT	
Wiring	2 wire	3 wire	
Switching logic	Normally open		
Switch type	Non-contact	NPN current sinking	PNP current sourcing
Voltage range	5~30V DC		
Switching current	50mA max.	80mA max.	
Contact rating (*1)	1.5W max.	2.4W max.	
Current consumption (*5)	—	2 mA@24V DC max.	
Voltage drop (*5)	4.0V @50mA max.	1.2V@80mA max.	
Leakage current (*5)	0.1mA max.	0.01mA max.	
Magnet requirement (*5,6)	40~1000 Gauss		
Indicator	Red LED		
Cable	ø2.8, 27AWG, Black PVC		
Operating frequency	1000 Hz		
Temperature	-10~+70°C (No freezing)		
Shock (*2)	50G		
Vibration (*3)	9G		
Protection classification	IEC 60529 IP67		
Protection circuit (*4,7)	3, 4, 5	2, 3, 4	
Weight	19.5g (2m cable)	21.5g (2m cable)	
Connect diagram			

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression /5=Sensor thermal protection.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Measuring standard target : ø15.5 × ø8 × 5t (Anisotropy rubber magnet)
*7. The LED will flash when Short-circuit or Sensor Thermal Protection is ON.
*8. Please turn off the power before installing or changing the output contact, and ensure the load is installed according to the wiring diagram to prevent abnormal operation or product malfunction.
*9. Caution for safety.

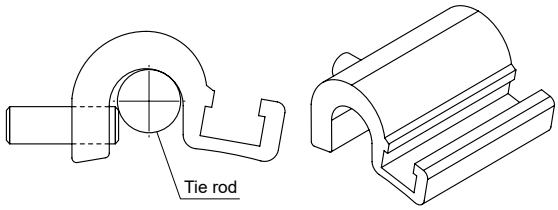
Assembling style

Cylinder model
MCQI3, MCKQI3, MCBQI3, MCJI, MCGI, MGTB, MGTU, MGTX, MCRPL2-32~40, MCRPLF2-32~63, METB
Direct mounting

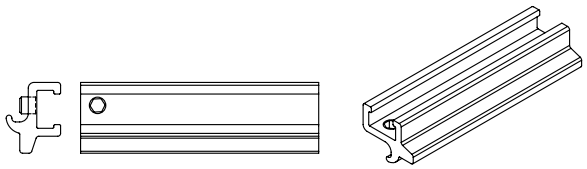


Model	Tube I.D.	Holder	Tie rod
MCQA	200	**DT-5**	ø19
MCQV	125	**DT-3**	ø10.8
	160		ø15
	200		
MCQV3 MCBQV3	32	**DT-1**	ø5.3
	40		
	50		ø7.1
	63		
	80	**DT-2**	ø8.9
	100		
MCQV3L	63	**DT-1**	ø7.1
	80	**DT-2**	ø8.9
MCBQV	125	**DT-3**	ø10.8
MCRPL2 MCRPLF2	16	**HPL2**	–
	25	**HPL2**	

DT-*

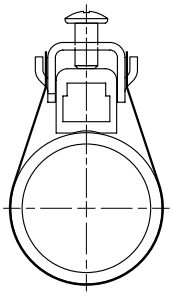


HPL2

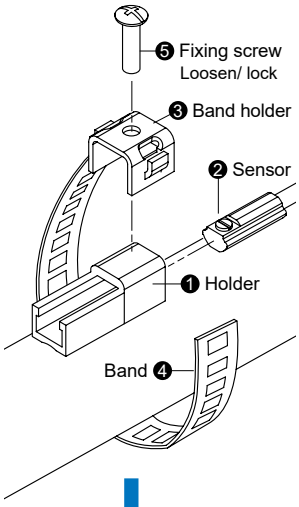


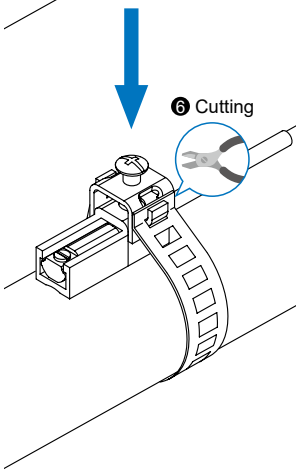
Model	Tube I.D.
MCBMI	20
	25
MCMI	8
	10
	12
	16
	20
	25
	32
	40
MCMIS	10
	12
	16
	20
	25
MCKMI	16
	20
	25
MGTK/ B/ U	20
	25

BKT-1



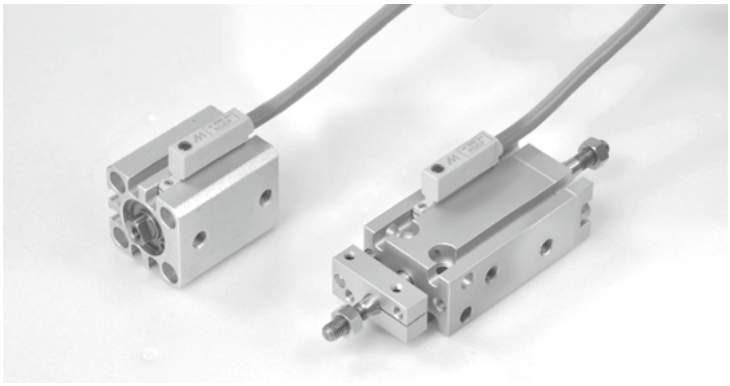
Mounting steps





RDEP series

SENSOR SWITCH



Application environment

- **RDEP** can be applied in the strong magnetic field environment such as automotive manufacturing or areas near welding machine.
- When **RDEP** detects the magnetic AC field (50 or 60Hz) it will keep the status of output and will not be effected.

Order example

RDEP — □

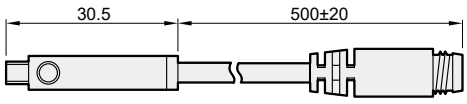
MODEL

WIRE LENGTH

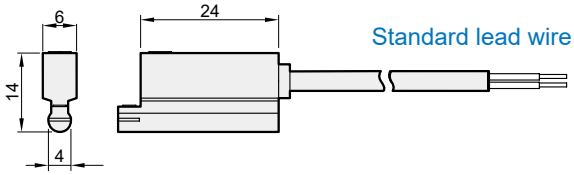
3M: 3000mm
QD: M12, 4 Pin connector

Dimension

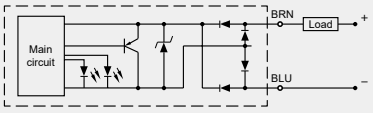
QD connector



Standard lead wire



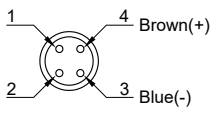
Specification

Model	RDEP
Wiring method	2 wire
Switching logic	Solid state output, normally open
Switch type	Current sourcing
Operating voltage	10~28V DC
Switching current	5~50mA max.
Switching rating (*1)	1.5W max.
Current consumption (*5)	–
Voltage drop (*5)	5V max.
Leakage current (*5)	1mA max.
Indicator (Sensing range)	Red LED: Unstable; Green LED: Stable
Cable	ø4.8, 2C, PVC
Temperature range	-10°C~+60°C (No freezing)
Shock (*2)	50G
Vibration (*3)	9G
Enclosure classification	IEC 60529 IP67
Protection circuit (*4)	3, 4
Weight	100 g (3m cable)
Connect diagram	

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Caution for safety .

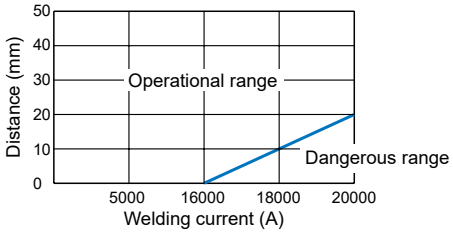
Wiring of the QD

- 2 wire

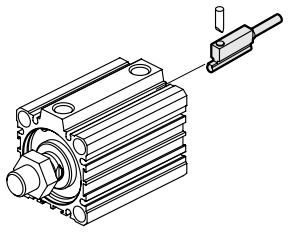


Weld-field immune

The operational distance can be 0mm between sensor and welding gun (welding conductor or cable) when the welding current less than 16000A.



Assembling style

Cylinder type	Mounting clamp
MCJA, MCJQ, MCKJQ, MCFA, MCGB, MCGS, MCGD, MCGJ, MCG3, MCDA, MCSS, MCSH, MCSQ, MCRA, MCKB, MCKC, MSB*, MSL*	

RDFE series

SENSOR SWITCH

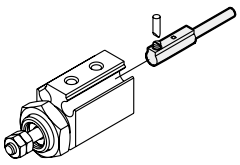
Order example

* Special order is available.

RDFE V – □

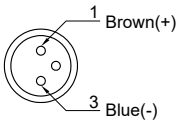
MODEL	AUTO SWITCH TYPE	WIRE LENGTH
RDFE: Non-contact **RNFE**: NPN **RPFE**: PNP	Blank: Straight cable **V**: Angle cable	**1M**: L=1000mm **2M**: L=2000mm **QD**: M8, 3 Pin connector **EQD**: M8, 3 Pin connector

Assembling style

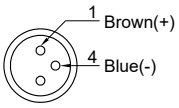
Cylinder type	Mounting clamp
MAM*, MCJU, MCFB, MCMJP, MCDJ, MCSF-5, MCRPMS, MSBE, MCRJ-S, MCRQ, MCRQ-S, MCHC-6/32/40, MCHD, MCHH, MCHU, MCHS, MCHX, MCHG2, MCHJ, MCHY, MCRT, MEQI, MESF2, MESBE	

Wiring of the QD

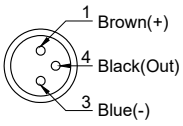
● 2 wire QD wiring



● 2 wire EQD wiring

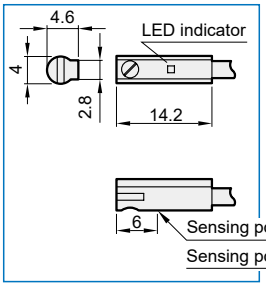


● 3 wire QD wiring



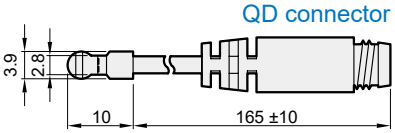
Dimension

Straight cable

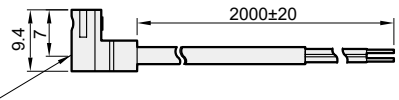


Angle cable

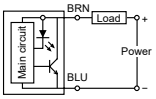
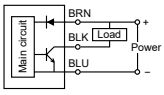
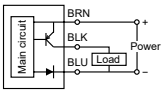
QD connector



Standard lead wire



Specification

Model	RDFE / RDFEV	RNFE	RNFEV	RPFE	RPFEV
Wiring method	2 wire	3 wire			
Switching logic	Solid state output, Normally open				
Switch Type	Non-contact	NPN current sinking		PNP current sourcing	
Operating voltage	5~30V DC	5~30V DC		5~30V DC	
Switching current	50mA max.	50mA max.	80mA max.	50mA max.	80mA max.
Contact rating(*1)	1.5W max.	1.5W max.	2.2W max.	1.5W max.	2.2W max.
Current consumption (*5)	—	10mA @24V DC max.	6mA @24V DC max.	10mA @24V DC max.	6mA @24V DC max.
Voltage drop (*5)	3.5V max.	0.5V @ 50mA max.			
Leakage current (*5)	0.1mA(40uA) max.	0.01mA max.			
Indicator	Red LED				
Cable	ø2.6, 2C, PVC	ø2.6, 3C, PVC			
Operating Frequency	1000 Hz				
Temperature range	–10~+70°C (No freezing)				
Shock (*2)	50G				
Vibration (*3)	9G				
Enclosure classification	IEC 60529 IP67				
Protection circuit (*4)	3, 4				
Weight	12.8 g (1m cable) / 23.8 g (2m cable)				
Connect diagram					

*1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
*2. Sin wave / X.Y.Z. 3 directions / 3 times each direction / 11ms each time.
*3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) / X.Y.Z. 3 directions / 1 hour each time.
*4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
*6. Caution for safety.

Order example

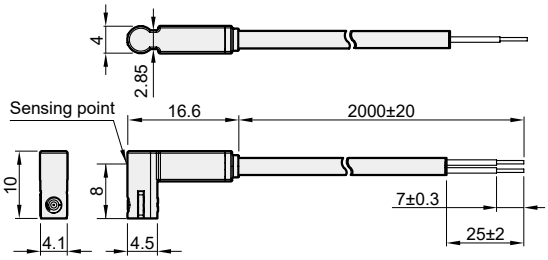
RDGV – □

- SWITCH TYPE
  - **D**: Non-contact
  - **N**: NPN
  - **P**: PNP
- AUTO SWITCH TYPE
  - **V**: Angle cable
- WIRE LENGTH
  - **1M**: L=1000mm
  - **2M**: L=2000mm
  - **QD**: M8, 3 Pin connector
  - **EQD**: M8, 3 Pin conncetor

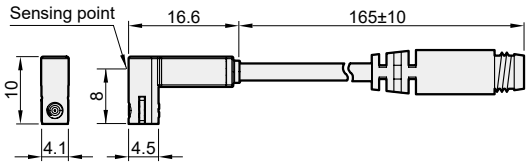
* Special order is available.

Dimension

RDGV / RNGV / RPGV

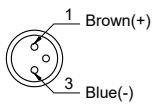


RDGV-QD / RNGV-QD / RPGV-QD

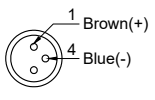


Wiring of the QD

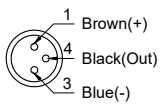
- 2 wire QD wiring



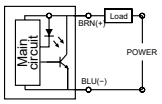
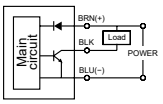
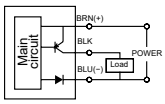
- 2 wire EQD wiring



- 3 wire QD wiring

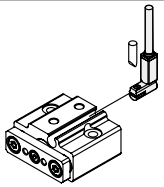


Specification

Model	RDGV	RNGV	RPGV
Wiring method	2 wire	3 wire	
Switching logic	Solid state output, Normally open		
Switch type	Non-contact	NPN current sinking	PNP current sourcing
Operating voltage	10~28V DC	5~28V DC	
Switching current	4~20mA max.	50mA max.	
Contact rating (*1)	0.6W max.	1.5W max.	
Current consumption (*5)	—	10mA @24V DC max.	
Voltage drop (*5)	3.5V max.	0.5V @ 50mA max.	
Leakage current (*5)	0.8mA max.	0.01mA max.	
Indicator	Red LED		
Cable	ø2.6, 2C, PVC	ø2.6, 3C, PVC	
Operating Frequency	1000 Hz		
Temperature range	-10°C~+70°C (No freezing)		
Shock (*2)	50G		
Vibration (*3)	9G		
Enclosure classification	IEC 60529 IP67		
Protection circuit (*4)	4	3, 4	
Weight	23 g (2m cable)		
Connect diagram			

* 1. Warning: Never exceed rating (watt=voltage×amperage). Permanent damage to sensor will occur.
* 2. Sin wave / X.Y.Z. 3 Directions / 3 Times each direction / 11ms each time.
* 3. Double amplitude 1.5mm / 10Hz~55Hz~10Hz(Sweep 1min) /X.Y.Z. 3 Directions / 1 Hour each time.
* 4. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
* 5. It bases on conditions of voltage 24V DC, ambient temp. 25°C and cable 2M length. Voltage drop increases in pace with cable length.
* 6. Caution for safety .

Assembling style

Cylinder type	Mounting clamp
MCJU, MCFB, MCMJP, MCGS, MCDJ	

Order example

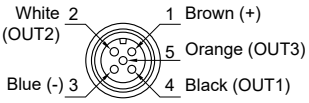
RLG — 3N — □

- RLG — MODEL
- 3N — **3N**: 3 NPN, **3P**: 3 PNP
- □ — WIRE LENGTH
  - **2M**: L=2000mm
  - **QD**: M12, 5 Pin connector

* Special order is available.

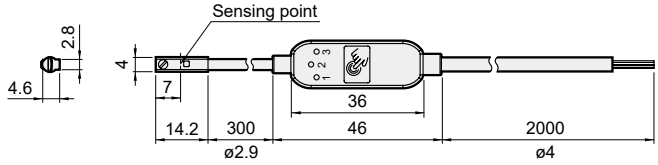
Wiring of the QD

• 5 wire QD wiring

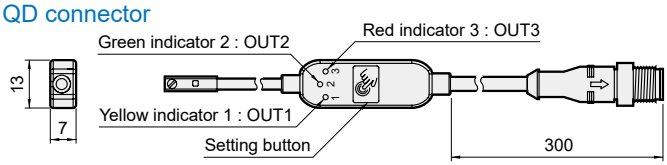


Dimension

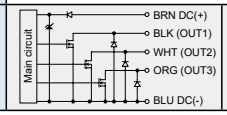
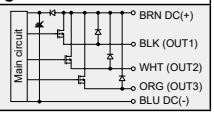
Standard lead wire



QD connector



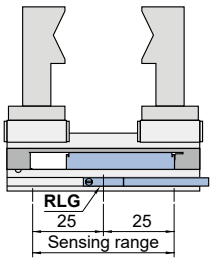
Specification

Model	RLG-3N	RLG-3P
Measuring range (*1)	50 mm	
Switching logic	Solid state output, normally open / normally close switchable	
Switch type	3 NPN current sinking	3 PNP current sourcing
Operating voltage	5 ~ 30 V DC	
Switching current (*2)	150 mA max.	
Power supply voltage (*2)	30 V DC	
Contact rating (*2)	4.5 W max.	
Current consumption	20 mA @ 24 V DC max.	
Voltage drop (*2)	1.5 V max. (with resistive load)	
Leakage current	0.01 mA max.	
Repeatability	≤ 0.01 mm	
Indicator	Yellow LED, Green LED, Red LED	
Cable	ø4 PVC - 26 AWG (0.15mm²) - 5 cores	
Operating frequency	50 Hz	
Magnet requirement (*3)	40 ~ 1000 Gauss	
Temperature range	-10 ~ 70 °C	
Shock (*4)	50 G	
Vibration (*5)	9 G	
Enclosure classification	IEC 60529 IP69	
Protection circuit (*6)	2, 3, 4	
Weight	54 g	
Connect diagram		

*1. The difference of magnetism, environment, and interference of magnetic field can cause the deviation of measurement.
*2. The standard is for each output.
*3. Measuring standard target: ø15.5 × ø8 × 5t (Anisotropy rubber magnet)
*4. Sin wave / X , Y , Z 3 directions / 3 times each direction / 11 ms each time.
*5. Double amplitude 1.5 mm / 10 Hz ~ 55 Hz ~ 10 Hz (Sweep 1 min) / X , Y , Z 3 directions / 1 hour each time.
*6. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.

Setting example

State 1
Gripper open

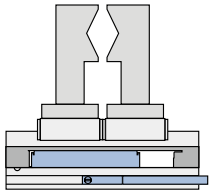


Setting procedure example for state 3

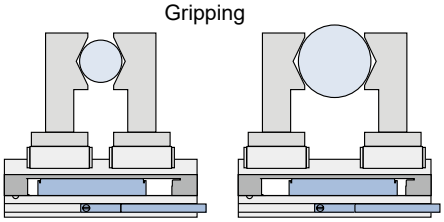
1. Press button once, then long press until three indicators flash.
2. Keep press button till indicator 3 flashes, then adjust gripper to gripping position.
3. Long press button to finish.

* Check manual for more details.

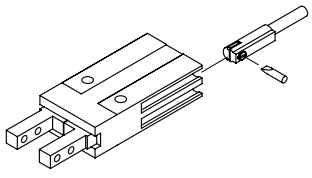
State 2
Gripper close



State 3
Gripping



Assembling style

Cylinder type	Mounting clamp
MCJU, MCFB, MCMJP, MCGS2, MCDJ, MCSF-5, MSBE, MCRJ-S*, MCRQ*, MCRQ-S, MCHC2-6, MCHD*, MCHH, MCHU, MCHS, MCHX, MCHG2, MCHJ, MCHY2, MCRT, MEQI	

* To ensure good repeatability MCRJ-S,MCRQ-12,MCHD require special specification orders, must use single magnet specification,refer to order example of special cylinder when ordering.

Order example of special cylinder

Standard model no. — XZ1

- XZ1 — Suitable for RLG series

* Special cylinder, please contact us

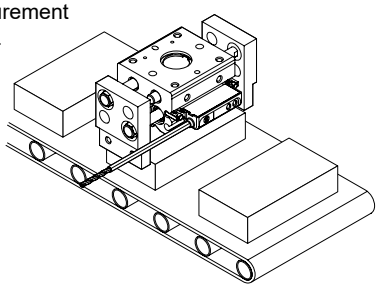
Order example

RLZ – C040 – QD

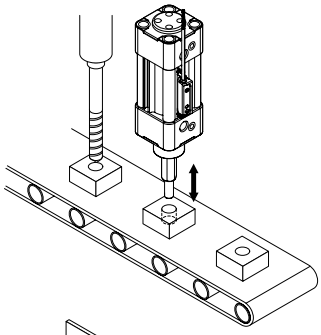
MODEL	GROOVE TYPE	MEASURING RANGE	WIRE LENGTH
	C: C type **T**: T type	**040**: 40mm	**2M**: L=2000mm **QD**: M8, 3Pin male connector

Applicable

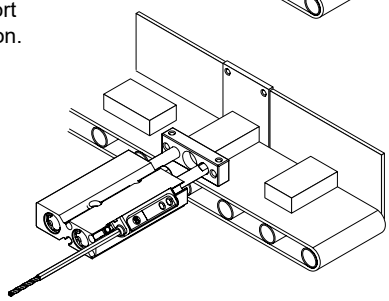
For the measurement of dimensions.



Used to check machined holes.



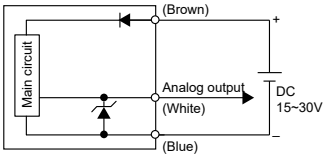
For long/short side detection.



Features

- Repeatability ± 0.01 mm
- Analog output invertible (0~10V⟷10~0V)(4~20mA⟷20~4mA)
- Sampling time ≤ 0.3 ms
- Voltage / current output switchable
- Freely set measuring range

Specification

Model		RLZ
Measuring range		40±1 mm
Power supply voltage		15 ~ 30 V DC, Ripple (P-P) ≤ 10 %
Current consumption		≤ 15 mA (with no load)
Displacement resolution *1		0.001 mm
Linearity error *1		± 0.2 mm @ 25 °C
Repeatability *1		± 0.01 mm @ 25 °C
Sampling time		≤ 0.3 ms
Analog voltage output *2		Voltage Output : 0 ~ 10 V Min. Load Impedance : 2 KΩ Linearity : ± 0.05 % F.S. @ 25 °C Sensitivity : 0.25 mV/μm
Analog current output *2		Current Output : 4 ~ 20 mA Max. Load Impedance : 500 Ω Linearity : ± 0.05 % F.S. @ 25 °C Sensitivity : 0.4 μA/μm
Magnetic field strength*1,3		20 ~ 200 Gauss
Environment	Enclosure	IP69 IEC 60529
	Ambient temp. Range	Operation : 0 ~ 50 °C, Storage : -10 ~ 60 °C (No condensation or freezing)
	Ambient humidity range	Operation / Storage : 35 ~ 85 % RH (No condensation)
	Withstand voltage	1000 V AC in 1-min (between case and lead wire)
	Insulation resistance	≥ 50 MΩ (at 500 V DC, between case and lead wire)
	Shock *4	30 G
	Vibration *5	10 G
Lead wire		ø2.9 PUR - 26 AWG (0.15mm^2) - 3 cores
Protection circuit		Power source reverse polarity, Surge suppression
Weight (with 2M lead wire)		Approx. 33 g (C type), Approx. 37 g (T type)
Connect diagram		

*1. Measuring standard target : ø15.5 × ø8 × 5t (The movement of anisotropy rubber magnet and piston are from same direction.)
*2. Only one of analog output can be selected while setting.
*3. The difference of magnetism, environment, and interference of magnetic field can cause the deviation of measurement.
*4. Sin wave / X , Y , Z 3 directions / 3 times each direction / 11 ms each time.
*5. Double amplitude 1.5 mm or 10 G / 10 Hz ~ 55 Hz ~ 10 Hz (Sweep 1 min) / X, Y, Z 3 directions / 2 hours each time.
*6. Caution for safety.

⚠ Caution

* The repeatability of sensor will be affected by the operational condition and environment.
* Avoid piston and magnet of cylinder spin to cause inaccuracy.
* To ensure good repeatability, models marked with ◉ require special specification orders.

● Standard cylinder
◉ Special cylinder

	Model	Stroke / Tube I.D.	5	10	15	20	25	30	40	50	60	80	100	150	200	250	300	400	500
Mini	**MCMJP** (C type)	10					●	●											
		16					◉	◉	◉										
Guide cylinder	**MCGI** (T type)	20,25				◉	◉	◉	◉	◉	◉	◉	◉						
		32,40			◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉				
		50			◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉		
		63,80,100		◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉		
	MCDJ (C type)	6				◉		◉	◉	◉									
		10		◉		◉		◉	◉	◉									

	Model	Tube I.D. / Spec.	6	8	10	12	16	20	25	32	40	50	63	80	100	125	160	200	300
Cylinder	**MCKQI3** (T type)									◉	◉								
	MGTB/U/X *1 (T type)									◉	◉								
Rotary actuator	**MCRJ-S** (C type)	90°																	
		180°	●	●															
	MCRQ (C type)					◉	●	●	●	●									
	MCRQ-S (C type)	90°					●	●	●										
		180°					●	●	●										
Gripper	**MCHD** (C type) *2	Short				◉	◉	◉											
		Medium		◉ *3		◉	◉	◉											
		Long		◉		◉	◉	◉											
	MCHU (C type)					●	●	●											
	MCHS (C type)																●	●	●
	MCHX (C type)				◉		◉	◉	◉	◉	◉								
	MCHY2 (C type)				◉		◉	◉	◉										

*1. The cylinders for MGTB/U/X are MCKQI3.
*2. MCHD must use single magnet specification.
*3. Please install the sensor in the middle of MCHD-8 medium stroke (as shown in Figure 2).
*4. The built-in magnets must be glued except *2.
*5. RLZ is also applicable to the models marked with ◉ in standard specification if good repeatability is not required. (except MCHD and MCRQ-12 series)
*6. Please contact us if required models not found in the table.

Order example of special cylinder

Standard model no. — XZ1

Suitable for RLZ series
* Special cylinder, please contact us

Installation

Move the sensor to the required position, then tighten the screw by hexagon wrench 2.0 mm with tightening torque 0.2 ~ 0.4 Nm (as shown in Figure 1).

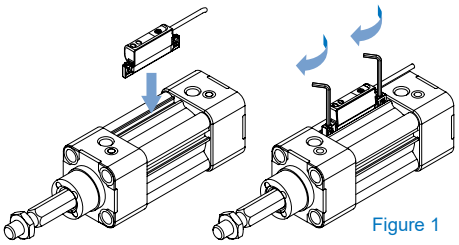


Figure 1

⚠ Precautions (Read before installing)

- Be sure to tighten within the recommended tightening torque when mounting the actuator position sensor.
- According to the installation condition, the cylinder may not operate even when mounted appropriately. If the sensor doesn't work, try following solutions:1. Restart the power. 2. Operate the cylinder for several times.
- Turn off power before connecting wiring. Wrong wiring or short circuit will damage and / or cause malfunction.

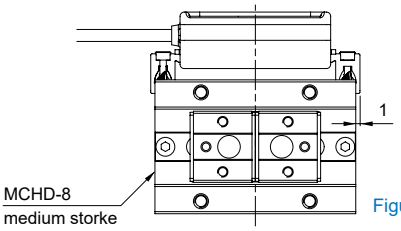
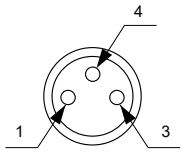


Figure 2

Wiring of the QD

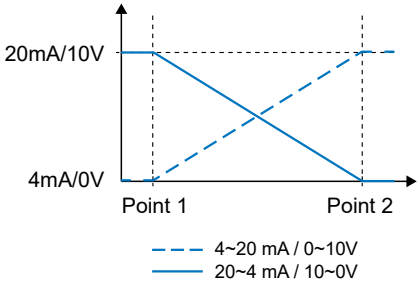
- 3 wire QD wiring



1 Brown(+)
3 Blue(-)
4 White (analog output)

Analog output function

- Analog voltage / current output can be switched.
- Analog output can be inverted.

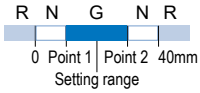


Information indicator LED color description

Please ensure that the required measurement range of the cylinder is within the measurement range of RLZ.

Default setting

Resetting

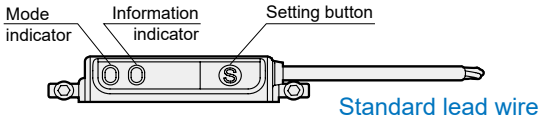


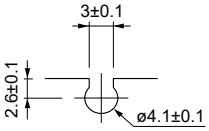
Description	
G (Green)	Within the setting range
N (Non)	Within the measuring range, but outside the setting range.
R (Red)	Outside the measuring range

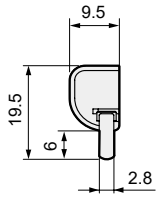
Dimensions

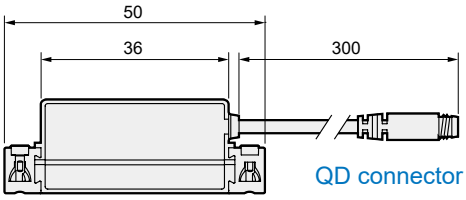
RLZ-C

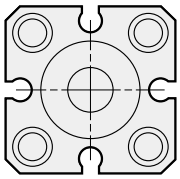
C type





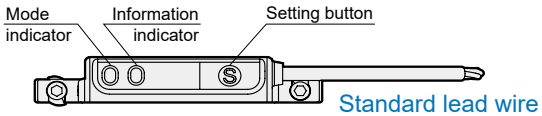


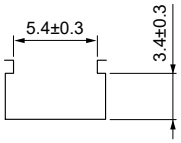


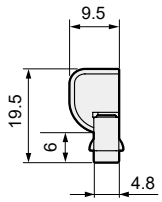


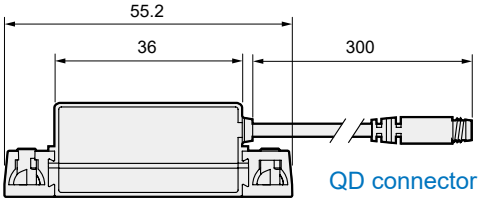
RLZ-T

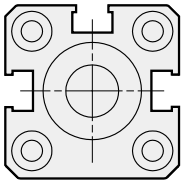
T type



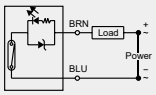
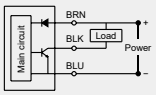
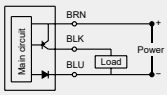








Specification

Model	LN0*A	LN0*A-N	LN0*A-P
Wiring method	2 wire	3 wire	
Switching logic	Normally open	Solid state output, normally open	
Switch Type	Reed switch	NPN current sinking	PNP current sourcing
Operating voltage	5~240V DC/AC	10~30V DC	
Switching current	100mA max.	200mA max.	
Switching rating(*1)	10W max.	6W max.	
Current consumption	—	OFF:7mA(24V) ON:20mA(24V) max.	
Voltage drop	3V max.	0.5V@200mA max.	
Indicator	Red LED		Green LED
Cable	ø3.3, 2C, PVC	ø3.3, 3C, PVC	
Temperature range	-10~+70°C (No freezing)		
Enclosure classification	IEC 60529 IP67		
Protection circuit (*2)	1	3, 4	
Symbol			

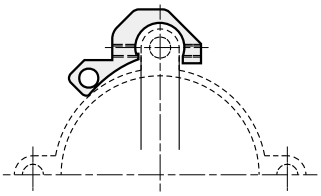
*1. Warning: Never exceed rating (watt=voltage×amperage).
*2. 1=None / 2=Short-circuit / 3=Power source reverse polarity / 4=Surge suppression.
*3. Caution for safety.

Order example

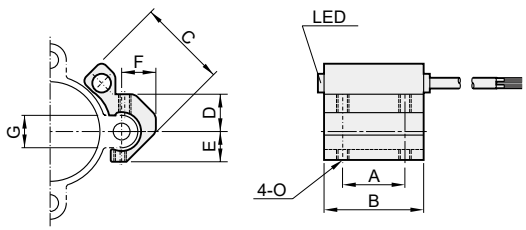
LN01A — P — □

- MODEL
  - LN01A
  - LN02A
  - LN03A
- SWITCH TYPE
  - Blank: Reed switch
  - **N**: NPN
  - **P**: PNP
- Blank: Lead wire
  QD: Connector

Assembling style

Cylinder type	MHBS / MHBD		
Order	LN02A	LN03A	
Intensified pressure ratio	078	110	250
Mounting clamp			

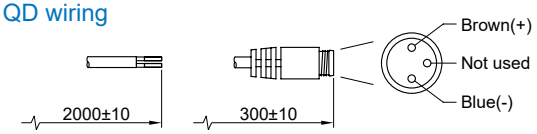
Dimension



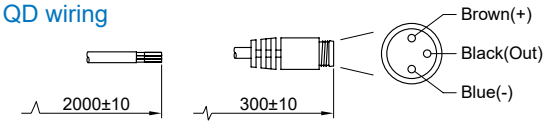
Model	A	B	C	D	E	F	G	O
LN01A	20	32	28.5	12	9.8	11	10.5	M4
LN02A	20	32	37.5	15	13.5	12	13.5	M4
LN03A	20	32	56	18	15	14	17	M4

Wiring of the QD

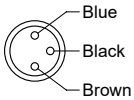
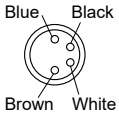
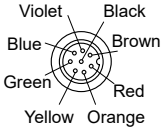
- 2 wire QD wiring



- 3 wire QD wiring



Specification

Model	M83R / M83RL		M84R / M84RL		M88R
Female pin out					
Number of contacts	3		4		8
Rated voltage	60V DC/AC				30V DC
Rated current	3A				1.5
Contact material	Gold plated brass				
Contact bearer material	PA				
Housing material	PP				PA
Housing color	Black				
Cable material	ø4.5 PVC	ø4.5 PUR	ø4.5 PVC	ø4.5 PUR	ø5 PVC
Cable color	Gray	Black	Gray	Black	Black
Temperature	-20°C~+80°C (No freezing)				
Cable conductor	24AWG				26AWG
Protection class	IEC60529 IP 67				

Order example

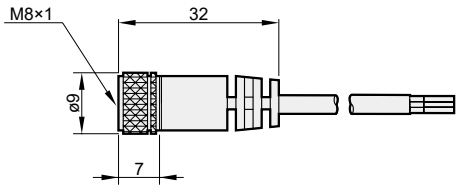
M83 R – PVC – □

Model		Connector	Cable material	Cable length
M83	M8, 3 Pin	**R**: Straight cable socket **RL**: Angle cable socket	**PVC**: ø4.5 PVC cable **PUR**: ø4.5 PUR cable	Blank: 2000 mm **5M**: 5000 mm
M84	M8, 4 Pin			
M88	M8, 8 Pin	**R**: Straight cable socket	**PVC**: ø5 PVC cable	**0.45M**: 450 mm

Dimension

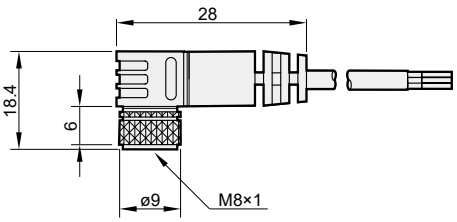
- Straight cable socket (**R**)

M83/M84

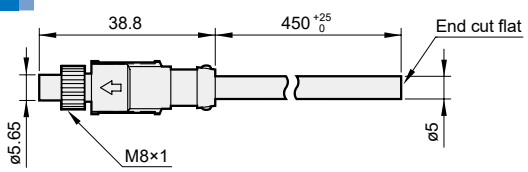


- Angle cable socket (**RL**)

M83/M84



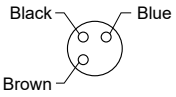
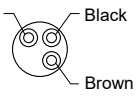
M88



M83R-F series

CABLE WITH **CONNECTOR** / M8 (MALE) – M8 (FEMALE)

Specification

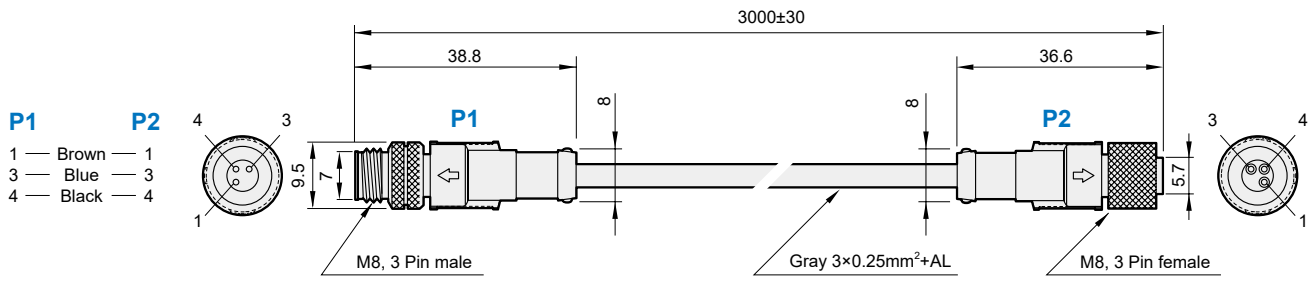
Model	M83R-F	
Male / Female pin out		
Number of contacts	3	3
Rated voltage	125V DC/AC	
Rated current	3A	
Contact material	Brass (Au plating)	
Contact bearer material	PVC	
Housing color	Gray	
Cable material	ø3.5, PVC	
Cable color	Gray	
Temperature	-20°C~+60°C (No freezing)	
Cable conductor	0.25mm^2 / 24AWG	
Protection class of contact	IP 67	

Order example

M83R — F — PVC — 3M

- MODEL — **M83**: M8, 3 Pin
- CONNECTOR — **R**: Straight cable socket
- **F**: M8 (male) – M8 (female)
- CABLE MATERIAL — **PVC**: ø3.5 PVC cable
- CABLE LENGTH — **3M**: 3000 mm

Dimension



Optional accessories

Formulas & Examples

Hydraulic industrial shock absorbers

Select the correct shock absorber and it will reduce shock vibration and noise. It will improve efficiency and extend machine life.

The function of shock absorber is to convert the kinetic energy of the moving object into heat and dissipate it into the atmosphere. It can stop a moving object smoothly and quietly before heavy impact occurs.

In order to save cost solid buffers such as polyurethane and rubber are often used. These cause noise and transient shock. The use of shock absorbers alleviates this resulting in both increased reliability and production. Additionally the noise reduction means they are environmentally friendly.

MDSC series: Non-adjustable shock absorbers.
Surface treatment: nickel plated: MDSC-0806, MDSC-1008, MDSC-1210; others are black anodized.

MDFC series: Adjustable shock absorbers.

Operating principles of shock absorbers

Shock Absorber's main structure to combine with body, rod, bearing, inner tube, piston, fluid, spring. On impact the piston rod moves into the shock absorber and the hydraulic fluid is push into accumulator to produce resistant force, the pressure in the inner tube remains constant throughout the entire impact stroke. Shock Absorbers providing a linear deceleration and brings the impacting object to stop smoothly and quietly. At the end of the impact stroke, the return spring pushes the piston to its original position for next cycle

Order example

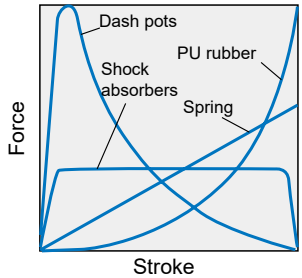
MDSC – 1415 – 1 – □ – M14×1.5

- MDSC: Non-adjustable / MDFC: Adjustable
- TUBE O.D. (mm)
- STROKE (mm)
- Select damping constant from graph
  - 1: Hight impact speed
  - 2: Medium impact speed
  - 3: Low impact speed
- Blank: With impact head / N: Without impact head
- THREAD

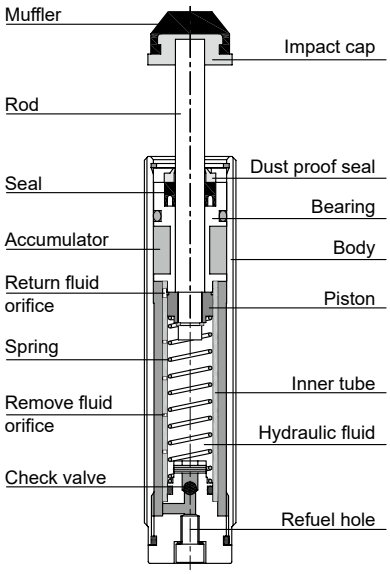
Comparison of shock absorbing of dash pots, PU rubbers, springs and shock absorbers

The springs and PU Rubbers are widespread to use in earlier period, but due to provide non-linear deceleration and to result in strong resistance, all the kinetic energy of moving objects is not absorption and produce counter pressure, this is in low efficiency.

If linear deceleration is necessary for a moving object. Mindman Shock Absorber is your best choice.

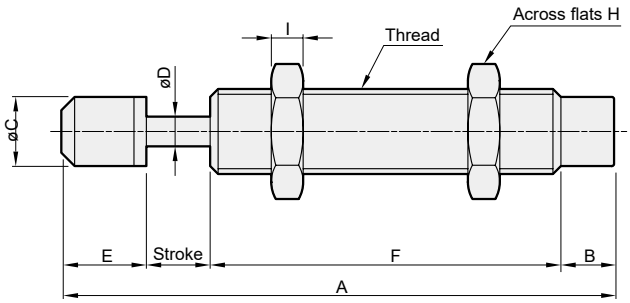


Main structures

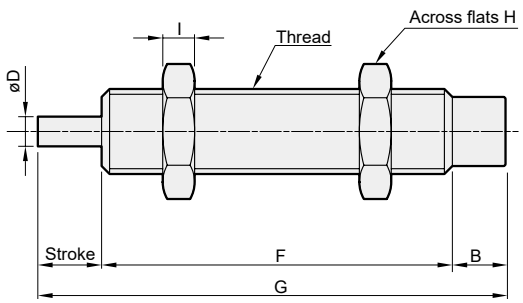


Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Effective max. weight (kg)	Max. impact speed (m/s)	Max. Nm per hour (Nm)	Operating temp. (°C)
MDSC-0806-1	6	1.8	0.9 ~ 5.6	2.0	2,400	-10~+70 (No freezing)
MDSC-0806-2	6	1.8	2.5 ~ 10	1.2	2,400	-10~+70 (No freezing)
MDSC-0806-3	6	1.8	5.6 ~ 22.5	0.8	2,400	-10~+70 (No freezing)
MDSC-1008-1	8	3.2	0.9 ~ 4.4	2.6	5,760	-10~+70 (No freezing)
MDSC-1008-2	8	3.2	2.8 ~ 10	1.5	5,760	-10~+70 (No freezing)
MDSC-1008-3	8	3.2	10 ~ 40	0.8	5,760	-10~+70 (No freezing)
MDSC-1210-1	10	6	1.8 ~ 12	2.6	10,800	-10~+70 (No freezing)
MDSC-1210-2	10	6	5.3 ~ 18.7	1.5	10,800	-10~+70 (No freezing)
MDSC-1210-3	10	6	12 ~ 75	0.8	10,800	-10~+70 (No freezing)
MDSC-1412-1	12	16	4.7 ~ 32	2.6	28,800	-10~+70 (No freezing)
MDSC-1412-2	12	16	14 ~ 50	1.5	28,800	-10~+70 (No freezing)
MDSC-1412-3	12	16	56 ~ 200	0.8	28,800	-10~+70 (No freezing)
MDSC-1415-1	15	20	5.9 ~ 27.8	2.6	36,000	-10~+70 (No freezing)
MDSC-1415-2	15	20	17.8 ~ 62.5	1.5	36,000	-10~+70 (No freezing)
MDSC-1415-3	15	20	62.5 ~ 250	0.8	36,000	-10~+70 (No freezing)
MDSC-1425-1	25	28	4.6 ~ 25	3.5	58,800	-10~+70 (No freezing)
MDSC-1425-2	25	28	14 ~ 87.5	2.0	58,800	-10~+70 (No freezing)
MDSC-1425-3	25	28	25 ~ 350	1.5	58,800	-10~+70 (No freezing)



N type

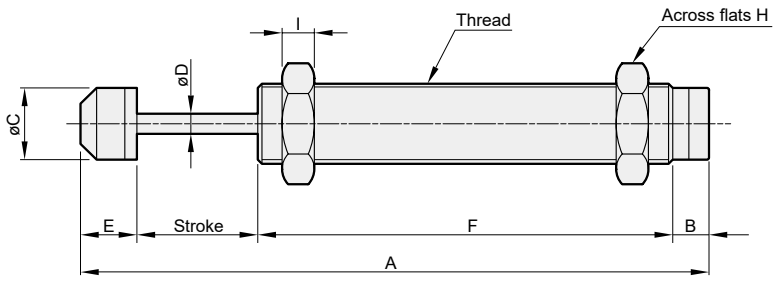


Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MDSC-0806	M8×1.0	6	53	5	6.5	2.8	8.5	33.5	—	11	3	12
MDSC-0806-N	M8×1.0	6	—	5	—	2.8	—	33.5	44.5	11	3	11
MDSC-1008	M10×1.0	8	62	5	8.5	3	8.5	40.5	—	12.7	3	20
MDSC-1008-N	M10×1.0	8	–	5	—	3	—	40.5	53.5	12.7	3	19
MDSC-1210	M12×1.0	10	72	4.5	10.5	3	9.5	48	—	14	4	36
MDSC-1210-N	M12×1.0	10	—	4.5	—	3	—	48	62.5	14	4	34
MDSC-1412	M14×1.5	12	92.7	8	12.2	3.5	13.4	59.3	—	19	6	66
MDSC-1412-N	M14×1.5	12	—	8	—	3.5	—	59.3	79.3	19	6	63
MDSC-1415	M14×1.0/1.5	15	103.4	8	12.2	3.5	13.4	67	—	19	6	79
MDSC-1415-N	M14×1.0/1.5	15	—	8	—	3.5	—	67	90	19	6	76
MDSC-1425	M14×1.0/1.5	25	133.4	8	12.2	3.5	13.4	87	—	19	6	90
MDSC-1425-N	M14×1.0/1.5	25	—	8	—	3.5	—	87	120	19	6	86

Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Effective max. weight (kg)	Max. impact speed (m/s)	Max. Nm per hour (Nm)	Operating temp. (°C)
MDSC-2020-1	20	35	6.8 ~ 27	3.2	42,000	-10~+70 (No freezing)
MDSC-2020-2	20	35	17.5 ~ 70	2.0	42,000	-10~+70 (No freezing)
MDSC-2020-3	20	35	48.6 ~ 777	1.2	42,000	-10~+70 (No freezing)
MDSC-2030-1	30	46	9 ~ 36	3.2	55,200	-10~+70 (No freezing)
MDSC-2030-2	30	46	23 ~ 92	2.0	55,200	-10~+70 (No freezing)
MDSC-2030-3	30	46	64 ~ 575	1.2	55,200	-10~+70 (No freezing)
MDSC-2050-1	50	62	10.1 ~ 124	3.5	63,240	-10~+70 (No freezing)
MDSC-2050-2	50	62	18.3 ~ 253	2.6	63,240	-10~+70 (No freezing)
MDSC-2050-3	50	62	55 ~ 496	1.5	63,240	-10~+70 (No freezing)



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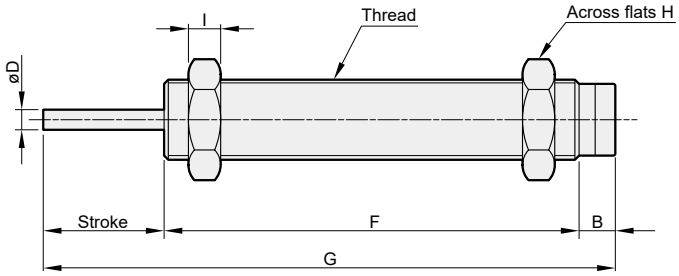


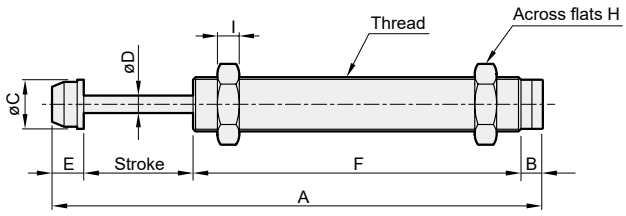
Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MDSC-2020	M20×1.5	20	130	9	17.8	5	16	85	—	26	8	200
MDSC-2020-N	M20×1.5	20	—	9	—	5	—	85	114	26	8	196
MDSC-2030	M20×1.5	30	158	9	17.8	5	16	103	—	26	8	221
MDSC-2050	M20×1.5	50	222.5	9	17.8	5	16	147.5	—	26	8	293

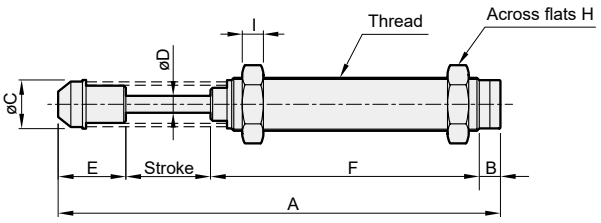
Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Effective max. weight (kg)	Max. impact speed (m/s)	Max. Nm per hour (Nm)	Operating temp. (°C)
MDSC-2525-1	25	78	15 ~ 69	3.2	70,200	-10~+70 (No freezing)
MDSC-2525-2	25	78	39 ~ 433	2.0	70,200	-10~+70 (No freezing)
MDSC-2525-3	25	78	108 ~ 1733	1.2	70,200	-10~+70 (No freezing)
MDSC-2540-1	40	122	20 ~ 108	3.5	87,840	-10~+70 (No freezing)
MDSC-2540-2	40	122	50 ~ 381	2.2	87,840	-10~+70 (No freezing)
MDSC-2540-3	40	122	244 ~ 1991	1.0	87,840	-10~+70 (No freezing)
MDSC-2550-1	50	140	20 ~ 124	3.7	100,800	-10~+70 (No freezing)
MDSC-2550-2	50	140	48 ~ 438	2.4	100,800	-10~+70 (No freezing)
MDSC-2550-3	50	140	194 ~ 2286	1.2	100,800	-10~+70 (No freezing)
MDSC-2580-1	80	198	24.7 ~ 99	4	118,800	-10~+70 (No freezing)
MDSC-2580-2	80	198	44 ~ 396	3.0	118,800	-10~+70 (No freezing)
MDSC-2580-3	80	198	176 ~ 1584	1.5	118,800	-10~+70 (No freezing)
MDSC-2725-1	25	78	15 ~ 69	3.2	70,200	-10~+70 (No freezing)
MDSC-2725-2	25	78	39 ~ 433	2.0	70,200	-10~+70 (No freezing)
MDSC-2725-3	25	78	108 ~ 1733	1.2	70,200	-10~+70 (No freezing)
MDSC-3660-1	60	260	57 ~ 231	3.0	124,800	-10~+70 (No freezing)
MDSC-3660-2	60	260	130 ~ 813	2.0	124,800	-10~+70 (No freezing)
MDSC-3660-3	60	260	520 ~ 3250	1.0	124,800	-10~+70 (No freezing)

MDSC-2525
MDSC-2550
MDSC-2725



MDSC-2540
MDSC-3660



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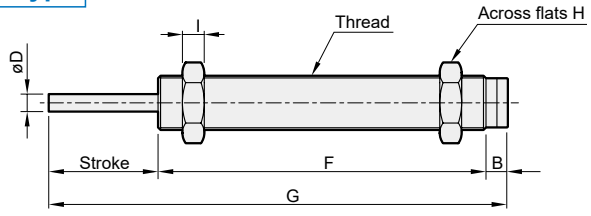
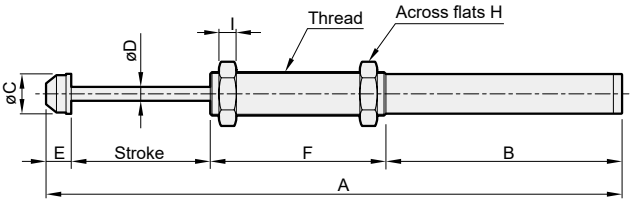


MDSC-2580

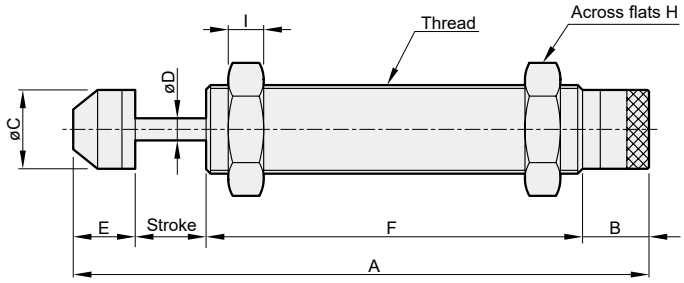


Dimensions

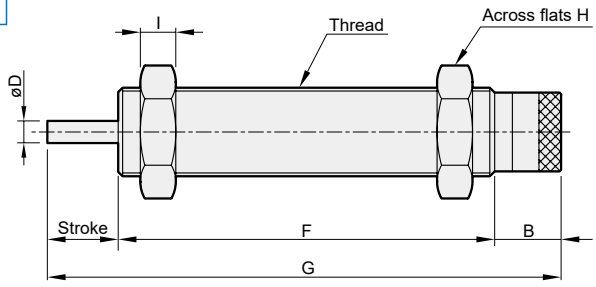
Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MDSC-2525	M25×1.5/2.0	25	152.6	10	23	8	16.6	101	—	32	10	341
MDSC-2525-N	M25×1.5/2.0	25	—	10	—	8	—	101	136	32	10	336
MDSC-2540	M25×1.5/2.0	40	211	10	23	8	34	127	—	32	10	430
MDSC-2550	M25×1.5/2.0	50	226.6	10	23	8	16.6	150	—	32	10	430
MDSC-2580	M25×1.5/2.0	80	333.6	137	23	8	16.6	100	—	32	10	578
MDSC-2725	M27×3.0/1.5	25	152.6	10	23	8	14.5	101	—	32	10	335
MDSC-2725-N	M27×3.0/1.5	25	—	10	—	8	—	101	136	32	10	330
MDSC-3660	M36×1.5	60	247	11	36	10	22.5	153.5	—	46	15	1074

Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Effective max. weight (kg)	Max. impact speed (m/s)	Max. Nm per hour (Nm)	Operating temp. (°C)
MDFC-1410	10	15	2.9 ~ 120	3.2	27,000	-10~+70 (No freezing)
MDFC-2016	16	28	5.4 ~ 224	3.2	33,600	-10~+70 (No freezing)
MDFC-2020	20	35	6.8 ~ 280	3.2	42,000	-10~+70 (No freezing)
MDFC-2525	25	78	15 ~ 624	3.2	70,200	-10~+70 (No freezing)
MDFC-2550	50	140	27 ~ 1,120	3.2	100,800	-10~+70 (No freezing)
MDFC-2725	25	78	15 ~ 624	3.2	70,200	-10~+70 (No freezing)



N type



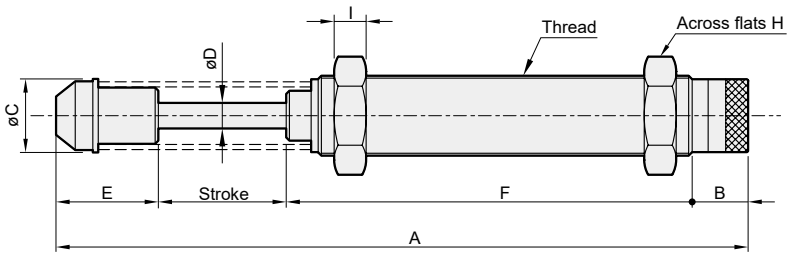
Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	H	I	Weight (g)
MDFC-1410	M14×1.0 / 1.5	10	101.9	11.5	12.2	3.5	13.4	67	19	6	81
MDFC-1410-N	M14×1.0 / 1.5	10	88.5	11.5	–	3.5	–	67	19	6	78
MDFC-2016	M20×1.5	16	132	15	17.8	5	16	85	26	8	218
MDFC-2016-N	M20×1.5	16	116	15	–	5	–	85	26	8	214
MDFC-2020	M20×1.5	20	136	15	17.8	5	16	85	26	8	219
MDFC-2020-N	M20×1.5	20	120	15	–	5	–	85	26	8	215
MDFC-2525	M25×1.5 / 2.0	25	158.1	15.5	23	8	16.6	101	32	10	361
MDFC-2525-N	M25×1.5 / 2.0	25	141.5	15.5	–	8	–	101	32	10	356
MDFC-2550	M25×1.5 / 2.0	50	232.1	15.5	23	8	16.6	150	32	10	470
MDFC-2725	M27×1.5 / 3.0	25	158.1	15.5	23	8	16.6	101	32	6.5	355
MDFC-2725-N	M27×1.5 / 3.0	25	141.5	15.5	–	8	–	101	32	6.5	350

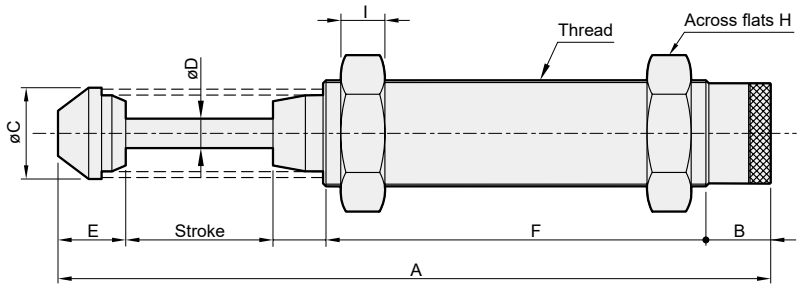
Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Effective max. weight (kg)	Max. impact speed (m/s)	Max. Nm per hour (Nm)	Operating temp. (°C)
MDFC-2540	40	122	23.8 ~ 976	3.2	87,840	-10~+70 (No freezing)
MDFC-3625	25	110	21 ~ 880	3.2	52,800	-10~+70 (No freezing)
MDFC-3650	50	220	43 ~ 1,760	3.2	105,600	-10~+70 (No freezing)

MDFC-2540



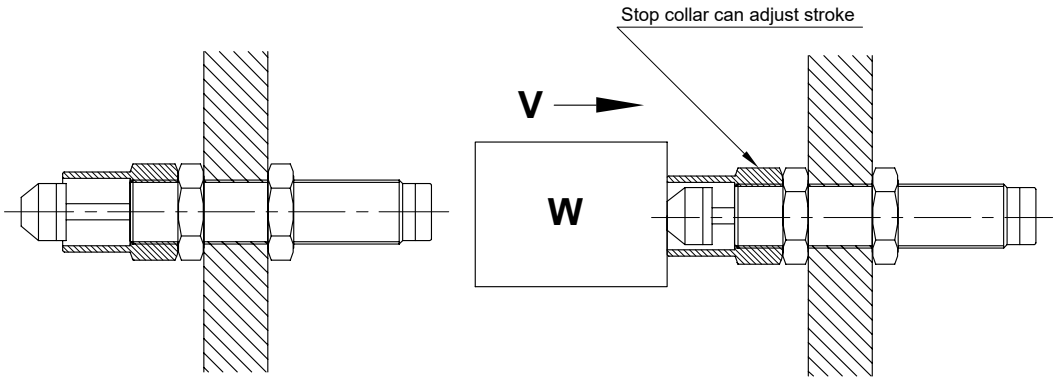
MDFC-3625
MDFC-3650



Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MDFC-2540	M25×1.5/2.0	40	216.5	15.5	23	8	34	127	–	32	10	460
MDFC-3625	M36×1.5	25	186	18	36	10	22.5	106.5	14	46	15	974
MDFC-3650	M36×1.5	50	248	18	36	10	22.5	138	19.5	46	15	1144

Installation of stop collar and nut



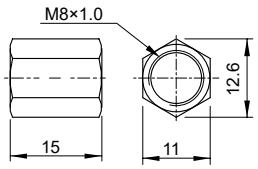
Before Impact

After Impact

Accessories

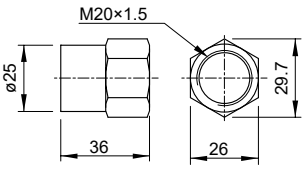
STC-08

Match
MDSC-0806



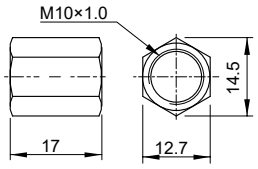
STC-20

Match
MDSC-2020
MDSC-2050
MDFC-2016
MDFC-2020



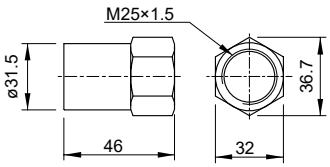
STC-10

Match
MDSC-1008



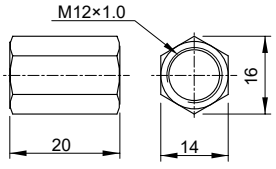
STC-25

Match
MDSC-2525
MDFC-2525



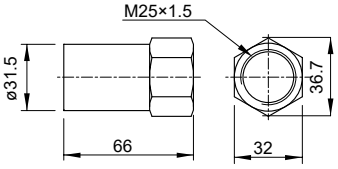
STC-12

Match
MDSC-1210



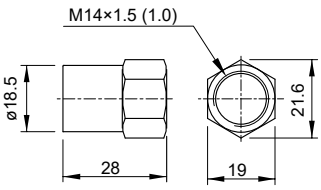
STC-25L

Match
MDSC-2540
MDSC-2550
MDSC-2580
MDFC-2540
MDFC-2550



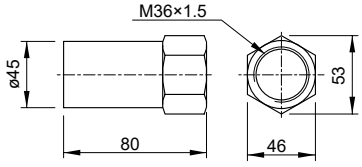
STC-14

Match
MDSC-1412
MDSC-1415
MDFC-1410



STC-36

Match
MDSC-3660
MDFC-3625
MDFC-3650



Four parameters are required to precisely determine the dimension of shock absorbers

- Mass to be decelerated m (kg)
- Impact velocity v (m/s)
- Propelling or driving force F (N)
- Number of impact cycles per hour C (/hr)

Some useful calculation formulas

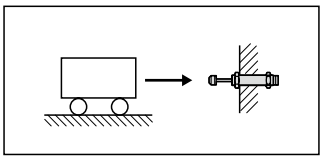
- Kinetic energy: $E_K = mv^2/2$
- Drive energy: $E_D = F \times S$
- Free fall velocity: $v = \sqrt{2g \times h}$
- Pneumatic or hydraulic cylinder driving forces.
  $F = 0.00785\ Pd^2$
- Maximum shock force (approximate).
  $Fm = 1.2\ E_T/S$
- Propelling force generated by electric motors.
  $F = 3000\ kW/v$
- Total energy absorbed per hour.
  $E_{TC} = E_T \times C$

Symbols	Unit	Description
μ		Coefficient of friction
α	(rad)	Angle of incline
θ	(rad)	Side load angle
ω	(rad/s)	Angular velocity
A	(m)	Width
B	(m)	Thickness
C	(/hr)	Impact cycles per hour
d	(mm)	Cylinder bore diameter
E_D	(Nm)	Drive energy per cycle
E_K	(Nm)	Kinetic energy per cycle
E_T	(Nm)	Total energy per cycle
E_{TC}	(Nm)	Total energy per hour
F	(N)	Propelling force
F_m	(N)	Maximum shock force
g	(m/s^2)	Acceleration due to gravity (9.81 m/s)
h	(m)	Height
HM		Arresting torque factor for motors (normally 2.5)
kW	(kW)	Electric motor power
m	(kg)	Mass to be decelerated
M_e	(kg)	Effective mass
P	(bar)	Operation pressure
R	(m)	Radius
R_s	(m)	Shock absorber mounting distance from rotation center
S	(m)	Stroke
T	(Nm)	Driving torque
t	(s)	Deceleration time
v	(m/s)	Velocity of impact mass
v_s	(m/s)	Impact velocity at shock absorber

Example 1. Horizontal impact

Application data

m = 300 kg
v = 1.0 m/s
S = 0.05 m
C = 300 /hr



Formulas and calculation

$$E_K = \frac{mv^2}{2} = \frac{300 \times 1.0^2}{2} = 150\ Nm$$

$$E_T = E_K = 150\ Nm$$

$$E_{TC} = E_T \times C = 150 \times 300 = 45000\ Nm/hr$$

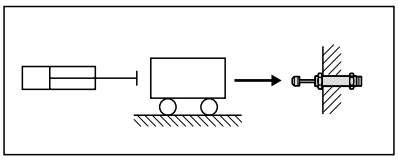
$$M_e = \frac{2E_T}{V^2} = \frac{2 \times 150}{1.0^2} = 300\ kg$$

Choose from calculation: MDFC-3650 is adequate.

Example 2. Horizontal impact with propelling force

Application data

m = 50 kg
v = 1.0 m/s
S = 0.04 m
F = 1000 N
C = 500 /hr



Formulas and calculation

$$E_K = \frac{mv^2}{2} = \frac{50 \times 1.0^2}{2} = 25\ Nm$$

$$E_D = F \times S = 1000 \times 0.04 = 40\ Nm$$

$$E_T = E_K + E_D = 25+40 = 65\ Nm$$

$$E_{TC} = E_T \times C = 65 \times 500 = 32500\ Nm/hr$$

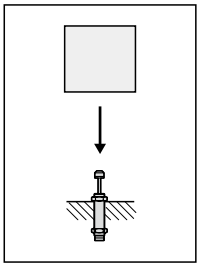
$$M_e = \frac{2E_T}{V^2} = \frac{2 \times 65}{1.0^2} = 130\ kg$$

Choose from calculation: MDFC-2540 is adequate.

Example 3. Free fall impact

Application data

m = 30 kg
h = 0.5 m
S = 0.08 m
C = 300 /hr



Formulas and calculation

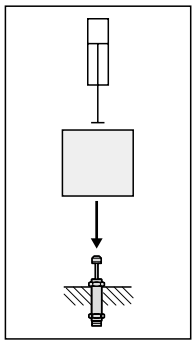
v	$= \sqrt{2g \times h}$	$= \sqrt{2 \times 9.81 \times 0.5}$		$= 3.1$ m/sec
E_K	$= mg \times h$	$= 30 \times 9.81 \times 0.5$		$= 147$ Nm
E_D	$= mg \times s$	$= 30 \times 9.81 \times 0.08$		$= 23.5$ Nm
E_T	$= E_K + E_D$	$= 147 + 23.5$		$= 170.5$ Nm
E_{TC}	$= E_T \times C$	$= 170.5 \times 300$		$= 51150$ Nm/hr
M_e	$= \frac{2E_T}{V^2}$	$= \frac{2 \times 170.5}{3.1^2}$		$= 35.5$ kg

Choose from calculation: MDSC-2580-1 is adequate.

Example 4. Free fall impact with propelling

Application data

m = 40 kg
h = 0.3 m
S = 0.025 m
P = 5 bar
d = 50 mm
C = 200 /hr
v = 1.0 m/sec



Formulas and calculation

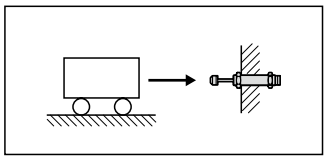
E_K	$= \frac{mv^2}{2}$	$= \frac{40 \times 1.0^2}{2}$		$= 20$ Nm
E_D	$= F \times S$	$= (mg + 0.0785Pd^2) \times S$		
	$= (40 \times 9.81 + 0.0785 \times 5 \times 50^2) \times 0.025$			$= 34.3$ Nm
E_T	$= E_K + E_D$	$= 20 + 34.3$		$= 54.3$ Nm
E_{TC}	$= E_T \times C$	$= 54.3 \times 200$		$= 10860$ Nm/hr
M_e	$= \frac{2E_T}{V^2}$	$= \frac{2 \times 54.3}{1.0^2}$		$= 108.6$ kg

Choose from calculation: MDFC-2525 is adequate.

Example 5. Horizontal impact with motor driving

Application data

m = 50 kg
v = 1.5 m/s
W = 2 kW
HM = 2.5
S = 0.06 m
C = 100 /hr



$\frac{300 \times 1.0^2}{2}$

Formulas and calculation

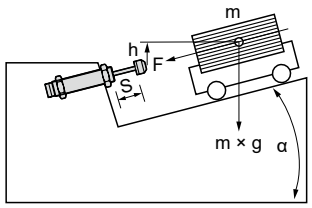
E_K	$= \frac{mv^2}{2}$	$= \frac{300 \times 1.0^2}{2}$		$= 150$ Nm
E_D	$= F \times S$	$= \frac{kW \times HM}{v} \times S$	$= \frac{2000 \times 2.5}{1.5} \times 0.06$	$= 200$ Nm
E_T	$= E_K + E_D$	$= 56.25 + 200$		$= 256.25$ Nm
E_{TC}	$= E_T \times C$	$= 256.25 \times 100$		$= 25625$ Nm/hr
M_e	$= \frac{2E_T}{V^2}$	$= \frac{2 \times 256.25}{1.5^2}$		$= 227$ kg

Choose from calculation: MDSC-3660-2 is adequate.

Example 6. Inclined impact

Application data

m = 30 kg
h = 0.25 m
S = 0.04 m
α = 30°
C = 250 /hr



Formulas and calculation

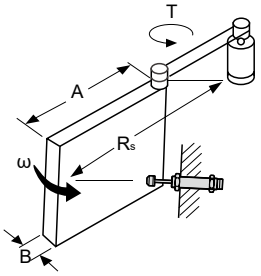
v	$= \sqrt{2g \times h}$	$= \sqrt{2 \times 9.81 \times 0.5}$		$= 2.2$ m/sec
E_K	$= \frac{mv^2}{2}$	$= \frac{30 \times 2.2^2}{2}$		$= 72.6$ Nm
E_D	$= F \times S$	$= m \times g \times S \times \sin\alpha$		
	$= 30 \times 9.81 \times 0.04 \times \sin 30° = 5.9$ Nm			
E_T	$= E_K + E_D$	$= 72.6 + 5.9$		$= 78.5$ Nm
E_{TC}	$= E_T \times C$	$= 78.5 \times 250$		$= 19625$ Nm/hr
M_e	$= \frac{2E_T}{V^2}$	$= \frac{2 \times 78.5}{2.2^2}$		$= 32$ kg

Choose from calculation: MDSC-2540-1 is adequate.

Example 7. Horizontal rotating door

Application data

m = 20 kg
ω = 2.0 rad/s
T = 20 Nm
R_S= 0.8 m
A = 1.0 m
B = 0.05 m
S = 0.016 m
C = 100 /hr



Formulas and calculation

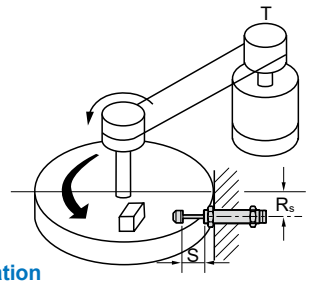
I	=	$\frac{m(4A^2+B^2)}{12}$	=	$\frac{20(4 \times 1.0^2+0.05^2)}{12}$	=	6.67 kg•m²
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{6.67 \times 2.0^2}{2}$	=	13.34 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.04}{0.8}$	=	0.05 rad
E_D	=	T × θ	=	20 × 0.05	=	1.0 Nm
E_T	=	E_K+E_D	=	13.34+1.0	=	14.34 Nm
E_{TC}	=	E_T × C	=	14.34 × 100	=	1434 Nm/hr
v	=	ω × R_S	=	2.0 × 0.8	=	1.6 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 14.34}{1.6^2}$	=	11.20 kg

Choose from calculation: MDFC-2016 is adequate.

Example 8. Rotary index table with propelling force

Application data

m = 200 kg
ω = 1.0 rad/s
T = 100 Nm
R = 0.5 m
R_S= 0.4 m
S = 0.04 m
C = 100 /hr



Formulas and calculation

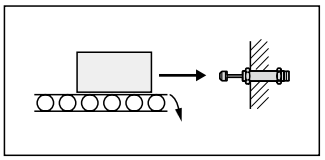
I	=	$\frac{mR^2}{2}$	=	$\frac{200 \times 0.5^2}{2}$	=	25 kg•m²
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{25 \times 1.0^2}{2}$	=	12.5 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.04}{0.4}$	=	0.1 rad
E_D	=	T × θ	=	100 × 0.1	=	10 Nm
E_T	=	E_K+E_D	=	12.5+10	=	22.5 Nm
E_{TC}	=	E_T × C	=	22.5 × 50	=	1125 Nm/hr
v	=	ω × R_S	=	1.0 × 0.4	=	0.4 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 22.5}{0.4^2}$	=	281 kg

Choose from calculation: MDFC-2540 is adequate.

Example 9. Horizontal mass on driven rollers

Application data

m = 150 kg
v = 0.5 m/s
μ = 0.25
S = 0.02 m
C = 120 /hr



Formulas and calculation

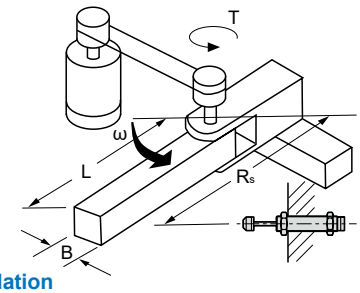
E_K	=	$\frac{mv^2}{2}$	=	$\frac{150 \times 0.5^2}{2}$	=	18.75 Nm
E_D	=	F × S = mgμ × S = 150 × 9.81 × 0.25 × 0.02 = 7.35 Nm				
E_T	=	E_K+E_D =		18.73+7.35	=	26.1 Nm
E_{TC}	=	E_T × C =		26.1 × 120	=	3132 Nm/hr
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 26.1}{0.5^2}$	=	208.8 kg

Choose from calculation: MDSC-2020-3 is adequate.

Example 10. Rotating beam with driving force

Application data

m = 40 kg
A = 0.5 m
B = 0.05 m
ω = 2.0 rad/s
T = 10 Nm
R_S= 0.4 m
S = 0.05 m
C = 50 /hr



Formulas and calculation

I	=	$\frac{m(4A^2+B^2)}{12}$	=	$\frac{40(4 \times 0.5^2+0.05^2)}{12}$	=	3.34 kg•m²
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{3.34 \times 2.0^2}{2}$	=	6.7 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.05}{0.4}$	=	0.125 rad
E_D	=	T × θ	=	10 × 0.125	=	1.25 Nm
E_T	=	E_K+E_D	=	6.7+1.25	=	8 Nm
E_{TC}	=	E_T × C	=	8 × 50	=	400 Nm/hr
v	=	ω × R_S	=	2.0 × 0.4	=	0.8 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 8}{0.8^2}$	=	25 kg

Choose from calculation: MDSC-2050-1 is adequate.

Order example

MAC — 0806 — 1 — □ — M8×1.0
* Thread size

- MAC: **MAD**: Adjustable; **MAC**: Self-compensated; **MACD**: Dual-side buffering
- TUBE O.D. (mm): 0806
- STROKE (mm): 0806
- Select damping constant from graph: **1**: High impact speed; **2**: Medium impact speed; **3**: Low impact speed; **S**: MAC-S series; **K**: MAC-K series
- Blank: With impact head; **N**: Without impact head

Why do we need shock absorbers?

The simplest method to increase productivity is to raise machine operation speed. It often accompanies with excessive vibration and noise, damage to machines and products and decreasing in machine life. Most important of all, safety has to be sacrificed to a certain degree because of large shock forces generated.

MINDMAN shock absorbers are developed to provide linear deceleration and therefore solve these problems. They can stop or change direction of moving objects smoothly and quietly without any compromising in safety. MINDMAN shock absorbers are ideal for energy absorption and are being used whenever shock forces occur.

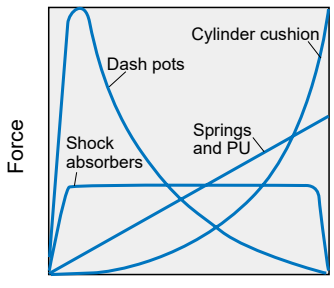
The advantages of using shock absorbers include

1. To increase production rate.
2. To extend machine life.
3. To simplify equipment design.
4. To reduce maintenance cost.
5. To reduce vibration and noise levels.

Comparison of shock absorbing of dash pots, rubber materials springs, cylinder cushion and shock absorbers

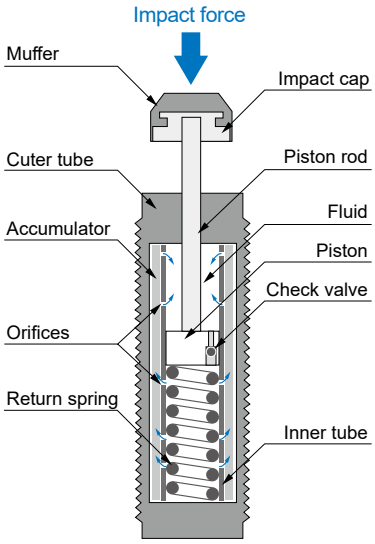
In case of MINDMAN shock absorbers compared with other buffering devices, such as spring, dash pots, air buffers, or rubber materials, resistant forces are different from one another. Only MINDMAN shock absorbers can stop a moving object smoothly and quietly from the beginning to the end of impact stroke. Figure 1 shows a scheme of comparing shock forces generated by different cushioning materials. Through special design of fluid metering system, MINDMAN shock absorbers can provide a constant resistant force or linear deceleration throughout the entire impact stroke, all the kinetic energy of the moving object is converted into heat and dissipated into the air.

Springs, air buffers and rubber materials only dissipate a small portion of the kinetic energy and store the remaining in elastic energy form. Therefore, large resistant forces and rebounding forces are inevitable near the end of the impact stroke. Without a delicate metering system, a dash pot will produce a large peak force at the beginning of the impact stroke.



Operating principles of shock absorbers

All series of MINDMAN shock absorbers are of such construction as shown in the following drawing. On impact the piston rod moves into the shock absorber and the hydraulic fluid is pushes into accumulator to produce resistant force. Owing to special spacing and sizing of orifices, the pressure in the inner tube remains constant throughout the entire impact stroke. By providing a linear deceleration, a MINDMAN shock absorber brings the impacting object to stop smoothly and quiet. At the end of the impact stroke, the return spring pushes the piston to its original piston for next cycle.



Construction of a shock absorber

Considerations for selecting shock a absorbers

1. Moving direction. (in horizontal, free fall or rotary motion)
2. Total weight of impacting object.
3. Propelling force. (pneumatic / hydraulic cylinder, motor etc.)
4. Impact Velocity.
5. Number of impact per hour.
6. Applicable quantity of shock absorbers in impacting direction.

Functions of hydraulic shock absorbers

1. Eliminating vibration and absorbing striking energy in a short time.
2. Reducing operating noise and offering a quiet working environment.
3. Accelerating machine operation and elevating production capacity.
4. Extending machine life time and reducing after sale service.
5. Improving quailty of products.

Applications

Robots for plastic injection moulding machine, pick and place robots, feeding equipment, screen print machines, conveyors, air cylinders, vibration conveyor systems, rolling doors, medical equipment, foundry industries, rodless cylinders, package machines, machine tools, rubber/ plastic machines, woodworking machines, aircraft industries, military equipment, education researches and automotive transfer lines.

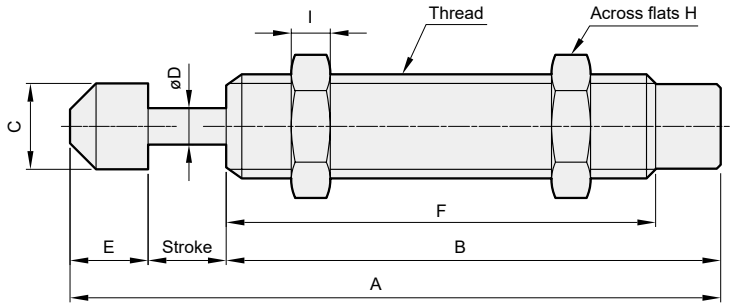
* Customer's own specification is welcome.
* The specifications are subject to change without advance notice.

MAC series
Mini type - M8, M10, M12

Our miniature shock absorbers MAC Series- M8, M10, M12 provide great effect for shock impact and come to stop smoothly and are Ideal for light loads.

Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MAC-0806-1	6	2	8800	0.5	2.0	○	○	-10~+80	SC-08
MAC-0806-2	6	2	8800	2	1.0	○	○	-10~+80	SC-08
MAC-0806-3	6	2	8800	6	0.5	○	○	-10~+80	SC-08
MAC-1005-1	5	3	10800	1	3.0	○	○	-10~+80	SC-10
MAC-1005-2	5	3	10800	3	1.5	○	○	-10~+80	SC-10
MAC-1005-3	5	3	10800	7	0.8	○	○	-10~+80	SC-10
MAC-1008-1	8	4	15200	2	3.0	○	○	-10~+80	SC-10
MAC-1008-2	8	4	15200	4	1.5	○	○	-10~+80	SC-10
MAC-1008-3	8	4	15200	9	0.8	○	○	-10~+80	SC-10
MAC-1210-1	10	5	17640	5	3.0	○	○	-10~+80	SC-12
MAC-1210-2	10	5	17640	10	1.5	○	○	-10~+80	SC-12
MAC-1210-3	10	5	17640	30	0.8	○	○	-10~+80	SC-12



Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	H	I	Weight (g)
MAC-0806-1	M8×1.0/0.75	6	50	38	6.6	3	6	33	11	3	11
MAC-0806-2	M8×1.0/0.75	6	50	38	6.6	3	6	33	11	3	11
MAC-0806-3	M8×1.0	6	50	38	6.6	3	6	33	11	3	11
MAC-1005-1	M10×1.0	5	38.7	27.7	8.6	2.8	6	22.9	12.7	3	14
MAC-1005-2	M10×1.0	5	38.7	27.7	8.6	2.8	6	22.9	12.7	3	14
MAC-1005-3	M10×1.0	5	38.7	27.7	8.6	2.8	6	22.9	12.7	3	14
MAC-1008-1	M10×1.0	8	57	43	8.6	3	6	38	12.7	3	20
MAC-1008-2	M10×1.0	8	57	43	8.6	3	6	38	12.7	3	20
MAC-1008-3	M10×1.0	8	57	43	8.6	3	6	38	12.7	3	20
MAC-1210-1	M12×1.0	10	69.5	50	10.3	3	9.5	45.5	14	4	31.5
MAC-1210-2	M12×1.0	10	69.5	50	10.3	3	9.5	45.5	14	4	31.5
MAC-1210-3	M12×1.0	10	69.5	50	10.3	3	9.5	45.5	14	4	31.5

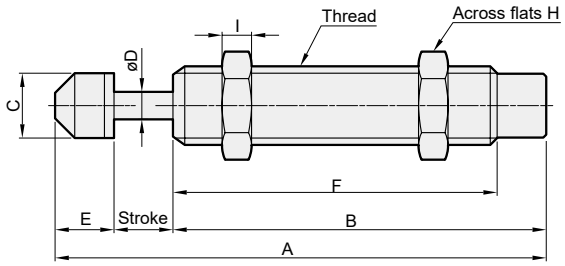
MAC series

Porous fixed type - M14, M20

MAC series is of fixed structure. Through special design and experimented oil hole and arrange method, linear deceleration on the object in motion is achieved. From high speed light load to low speed heavy load, appropriate energy can be absorbed without any adjustment. After the load is removed, reset spring will push the axie center to its original location. For MAC series, it has three models of high speed, medium speed and low speed to satisfy your different needs.

Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MAC-1412-1	12	15	30000	8	3.0	○	○	-10~+80	SC-14
MAC-1412-2	12	15	30000	50	1.5	○	○	-10~+80	SC-14
MAC-1412-3	12	15	30000	100	0.8	○	○	-10~+80	SC-14
MAC-1416-1	16	20	35000	10	3.0	○	○	-10~+80	SC-14
MAC-1416-2	16	20	35000	70	1.5	○	○	-10~+80	SC-14
MAC-1416-3	16	20	35000	150	0.8	○	○	-10~+80	SC-14
MAC-1420-1	20	20	35000	10	3.0	○	○	-10~+80	SC-14
MAC-1420-2	20	20	35000	70	1.5	○	○	-10~+80	SC-14
MAC-1420-3	20	20	35000	150	0.8	○	○	-10~+80	SC-14
MAC-1425-1	25	28	37000	20	3.0	○	○	-10~+80	SC-14
MAC-1425-2	25	28	37000	150	1.5	○	○	-10~+80	SC-14
MAC-1425-3	25	28	37000	250	0.8	○	○	-10~+80	SC-14
MAC-2020-1	20	40	40000	30	3.5	○	○	-10~+80	SC-20
MAC-2020-2	20	40	40000	200	2.0	○	○	-10~+80	SC-20
MAC-2020-3	20	40	40000	700	1.0	○	○	-10~+80	SC-20
MAC-2030-1	30	50	48000	30	3.5	○	○	-10~+80	SC-20
MAC-2030-2	30	50	48000	200	2.0	○	○	-10~+80	SC-20
MAC-2030-3	30	50	48000	700	1.0	○	○	-10~+80	SC-20



Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	H	I	Weight (g)
MAC-1412-1	M14×1.0/1.5	12	99.2	76	12	4	11.2	67	19	5	80
MAC-1412-2	M14×1.0/1.5	12	99.2	76	12	4	11.2	67	19	5	80
MAC-1412-3	M14×1.0/1.5	12	99.2	76	12	4	11.2	67	19	5	80
MAC-1416-1	M14×1.0/1.5	16	122.2	95	12	4	11.2	86	19	5	85
MAC-1416-2	M14×1.0/1.5	16	122.2	95	12	4	11.2	86	19	5	85
MAC-1416-3	M14×1.0/1.5	16	122.2	95	12	4	11.2	86	19	5	85
MAC-1420-1	M14×1.5	20	126.2	95	12	4	11.2	86	19	5	95
MAC-1420-2	M14×1.5	20	126.2	95	12	4	11.2	86	19	5	95
MAC-1420-3	M14×1.5	20	126.2	95	12	4	11.2	86	19	5	95
MAC-1425-1	M14×1.0/1.5	25	146.2	110	12	4	11.2	101	19	5	105
MAC-1425-2	M14×1.0/1.5	25	146.2	110	12	4	11.2	101	19	5	105
MAC-1425-3	M14×1.0/1.5	25	146.2	110	12	4	11.2	101	19	5	105
MAC-2020-1	M20×1.5/2.0	20	145.3	110	17.8	6	15.3	101	26	7	215
MAC-2020-2	M20×1.5	20	145.3	110	17.8	6	15.3	101	26	7	215
MAC-2020-3	M20×1.5	20	145.3	110	17.8	6	15.3	101	26	7	215
MAC-2030-1	M20×1.5/2.0	30	158.3	113	17.8	6	15.3	104	26	7	220
MAC-2030-2	M20×1.5/2.0	30	158.3	113	17.8	6	15.3	104	26	7	220
MAC-2030-3	M20×1.5	30	158.3	113	17.8	6	15.3	104	26	7	220

MAC series

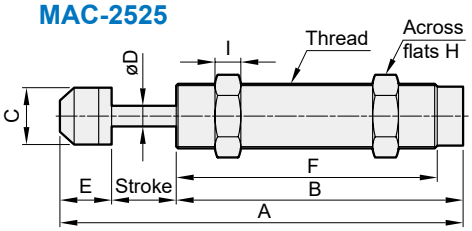
Porous fixed type - M20, M25

Model M20, M25 are applicable for high impact and high effectiveness.

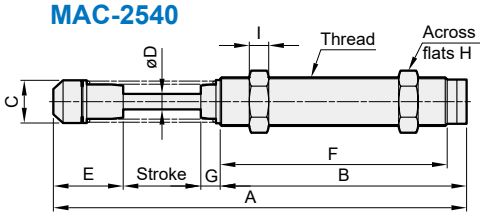
Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MAC-2050-1	50	60	60000	60	3.5	○	○	-10~+80	SC-20
MAC-2050-2	50	60	60000	400	2.0	○	○	-10~+80	SC-20
MAC-2050-3	50	60	60000	1200	1.0	○	○	-10~+80	SC-20
MAC-2525-1	25	80	54000	200	4.0	○	○	-10~+80	SC-25
MAC-2525-2	25	80	54000	800	2.5	○	○	-10~+80	SC-25
MAC-2525-3	25	80	54000	1500	1.0	○	○	-10~+80	SC-25
MAC-2540-1	40	120	75000	300	4.0	—	○	-10~+80	SC-25
MAC-2540-2	40	120	75000	1200	2.5	—	○	-10~+80	SC-25
MAC-2540-3	40	120	75000	2000	1.0	—	○	-10~+80	SC-25
MAC-2550-1	50	135	90000	200	4.0	○	○	-10~+80	SC-25
MAC-2550-2	50	135	90000	900	2.5	○	○	-10~+80	SC-25
MAC-2550-3	50	135	90000	1680	1.0	○	○	-10~+80	SC-25
MAC-2580-1	80	150	120000	150	4.0	○	○	-10~+80	SC-25
MAC-2580-2	80	150	120000	600	2.5	○	○	-10~+80	SC-25
MAC-2580-3	80	150	120000	1200	1.0	○	○	-10~+80	SC-25

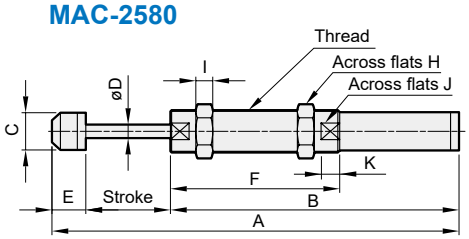
MAC-2050
MAC-2525



MAC-2540



MAC-2550
MAC-2580



Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	J	K	Weight (g)
MAC-2050-1	M20×1.5/2.0	50	232.8	167	17.8	6	15.8	158	—	26	7	—	—	300
MAC-2050-2	M20×1.5	50	232.8	167	17.8	6	15.8	158	—	26	7	—	—	300
MAC-2050-3	M20×1.5	50	232.8	167	17.8	6	15.8	158	—	26	7	—	—	300
MAC-2525-1	M25×1.5/2.0	25	155	111	22	8	19	101	—	32	9	—	—	330
MAC-2525-2	M25×1.5/2.0	25	155	111	22	8	19	101	—	32	9	—	—	330
MAC-2525-3	M25×1.5/2.0	25	155	111	22	8	19	101	—	32	9	—	—	330
MAC-2540-1	M25×1.5/2.0	40	214	127	22	8	37	117	10	32	9	—	—	430
MAC-2540-2	M25×1.5/2.0	40	214	127	22	8	37	117	10	32	9	—	—	430
MAC-2540-3	M25×1.5/2.0	40	214	127	22	8	37	117	10	32	9	—	—	430
MAC-2550-1	M25×1.5/2.0	50	239.5	170.5	22	8	19	100	—	32	9	22.8	11	435
MAC-2550-2	M25×1.5/2.0	50	239.5	170.5	22	8	19	100	—	32	9	22.8	11	435
MAC-2550-3	M25×1.5/2.0	50	239.5	170.5	22	8	19	100	—	32	9	22.8	11	435
MAC-2580-1	M25×1.5/2.0	80	336	237	22	8	19	100	—	32	9	22.8	11	535
MAC-2580-2	M25×1.5/2.0	80	336	237	22	8	19	100	—	32	9	22.8	11	535
MAC-2580-3	M25×1.5/2.0	80	336	237	22	8	19	100	—	32	9	22.8	11	535

MAC series

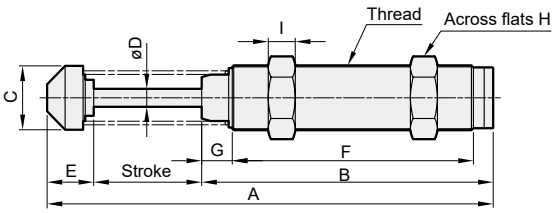
Porous fixed type - M36

MAC series is self-compensating, and ideal for energy absorption in high speed, medium speed and low speed impact. MAC series can stop moving objects smoothly and quietly.

Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)	Flange (F)
MAC-3660-1	60	250	120000	400	4.0	—	○	-10~+80	SC-36	F36
MAC-3660-2	60	250	120000	1500	2.5	—	○	-10~+80	SC-36	F36
MAC-3660-3	60	250	120000	2400	1.0	—	○	-10~+80	SC-36	F36

MAC-3660



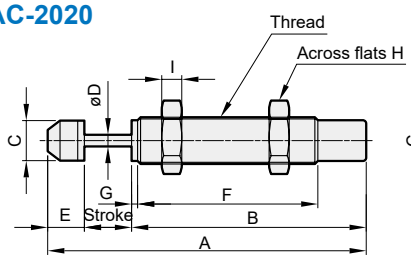
Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MAC-3660-1	M36×1.5	60	248	162	35.5	10	26	134	17	46	15	1030
MAC-3660-2	M36×1.5	60	248	162	35.5	10	26	134	17	46	15	1030
MAC-3660-3	M36×1.5	60	248	162	35.5	10	26	134	17	46	15	1030

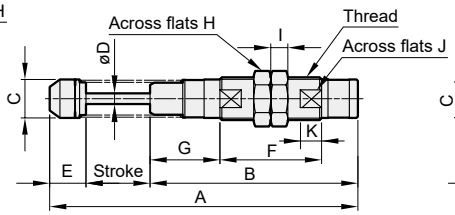
Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MAC-1415-6K	15	9.8	35280	30	1.0	—	○	-10~+80	SC-14
MAC-1415-7K	15	9.8	35280	15	1.5	—	○	-10~+80	SC-14
MAC-2020-2K	20	36	22000	27	2.0	—	○	-10~+80	SC-20
MAC-2030-5K	30	44	26460	60	1.2	—	○	-10~+80	SC-20
MAC-2030-6K	30	44	26460	30	1.7	—	○	-10~+80	SC-20
MAC-2030-7K	30	44	26460	15	2.4	—	○	-10~+80	SC-20
MAC-2030-8K	30	44	26460	8	2.8	—	○	-10~+80	SC-20
MAC-2030-16K	30	44	26460	5	4.2	—	○	-10~+80	SC-20
MAC-2030-18K	30	44	26460	3	6.0	—	○	-10~+80	SC-20
MAC-2050-10K	50	59	35280	30	2.0	—	○	-10~+80	SC-20
MAC-2050-11K	50	59	35280	30	2.0	—	○	-10~+80	SC-20
MAC-2050-12K	50	59	35280	15	2.8	—	○	-10~+80	SC-20
MAC-2050-13K	50	59	35280	8	3.8	—	○	-10~+80	SC-20
MAC-2050-16K	50	59	35280	5	5.0	—	○	-10~+80	SC-20
MAC-2050-17K	50	59	35280	3	6.8	—	○	-10~+80	SC-20

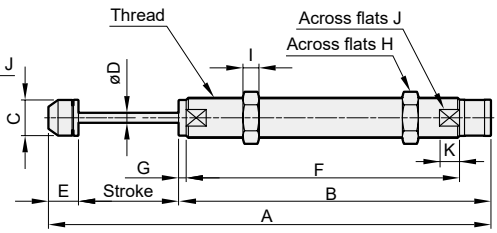
MAC-1415
MAC-2020



MAC-2030



MAC-2050



MAC-K series

Porous fixed type

MAC-K series can effectively absorb the vibration and noise generated from high motion and can turn the kinetic energy into thermal energy and release it into the air. Therefore, in each action, it can stop the object stably can effectively. When our shock absorber is selected, disadvantage caused by bad shock absorber can be effectively solved, consequently, the machine efficiency can be enhanced, the production capacity can be increased, and the usage lifetime of the machine can be lengthened. MAC-K and MACD are all appropriate for high speed impact sites, the ends of long stroke moving device, and most of them are used for robot arms.

Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	J	K	Weight (g)
MAC-1415-6K	M14×1.5	15	95.6	69.4	12	4	11.2	52.7	2	19	5	—	—	80
MAC-1415-7K	M14×1.0/1.5	15	95.6	69.4	12	4	11.2	52.7	2	19	5	—	—	80
MAC-2020-2K	M20×1.5	20	128.8	93	17.8	5	15.8	74.5	3.8	26	7	—	—	170
MAC-2030-5K	M20×1.5	30	133.7	86	17.8	5	17.7	48	21	26	7	18.2	10	185
MAC-2030-6K	M20×1.5	30	133.7	86	17.8	5	17.7	48	21	26	7	18.2	10	185
MAC-2030-7K	M20×1.5	30	133.7	86	17.8	5	17.7	48	21	26	7	18.2	10	185
MAC-2030-8K	M20×1.5	30	133.7	86	17.8	5	17.7	48	21	26	7	18.2	10	185
MAC-2030-16K	M20×1.5	30	146.5	97.8	17.8	5	18	48	32.8	26	7	18.2	10	205
MAC-2030-18K	M20×1.5	30	146.5	97.8	17.8	5	18	48	32.8	26	7	18.2	10	205
MAC-2050-10K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250
MAC-2050-11K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250
MAC-2050-12K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250
MAC-2050-13K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250
MAC-2050-16K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250
MAC-2050-17K	M20×1.5	50	221.8	156	17.8	5	15.8	136.5	4	26	7	18.2	10	250

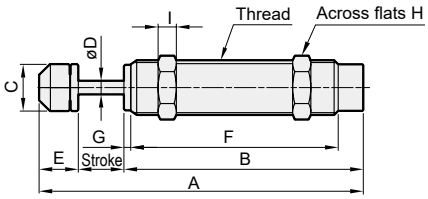
Specification

Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MAC-0806-S	6	3	7000	6	0.3~2.5	○	○	-10~+80	SC-08
MAC-1007-S	7	6	12400	12	0.3~3.5	○	○	-10~+80	SC-10
MAC-1210-S	10	12	22500	22	0.3~4.0	○	○	-10~+80	SC-12
MAC-1412-S	12	20	33000	40	0.3~5.0	○	○	-10~+80	SC-14
MAC-2015-S	15	59	38000	120	0.3~5.0	○	○	-10~+80	SC-20
MAC-2525-S	25	80	60000	180	0.3~5.0	○	○	-10~+80	SC-25
MAC-2725-S	25	147	72000	270	0.3~5.0	○	○	-10~+80	SC-27

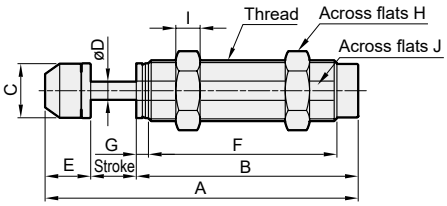
MAC-S series

MAC-S series, as compared to MAC series, has smaller installation length, higher usage frequency, larger energy absorption, more secure product structure, and higher safety. It is applicable to equipment of compact size or of small space, and there is straight slot or milled edge to facilitate the installation.

MAC-0806-S
MAC-1007-S
MAC-1210-S

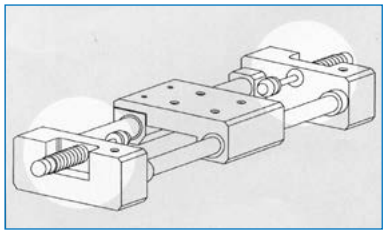


MAC-1412-S
MAC-2015-S
MAC-2525-S
MAC-2725-S

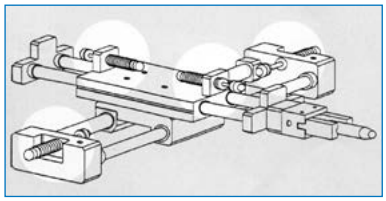


Application example

Slide unit cylinder



Slide unit



Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	J	Weight (g)
MAC-0806-S	M8×1.0	6	55.2	40.6	6.6	2.9	8.6	33.6	2	11	3	—	17
MAC-1007-S	M10×1.0	7	62.6	47	8.6	3	8.6	39	3	12.7	3	—	28
MAC-1210-S	M12×1.0	10	71.3	52.5	10.3	3	8.8	44	3	14	4	—	32
MAC-1412-S	M14×1.5	12	90.2	67	12	4	11.2	58	4	19	5	12.1	70
MAC-2015-S	M20×1.5	15	103.3	73	17.8	6	15.3	62	4	26	7	18	160
MAC-2525-S	M25×1.5	25	136	92	22	8	19	82	—	32	9	23	295
MAC-2725-S	M27×1.5	25	143	99	22	8	19	86	5	32	6	25	375

Specification

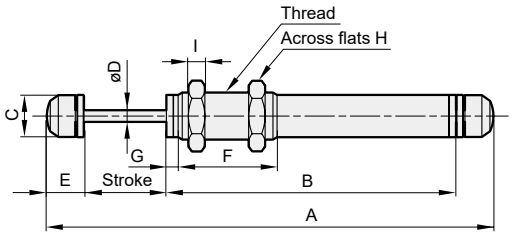
Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)
MACD-2030-1	30	45	55000	40	3.5	—	○	-10~+80	SC-20
MACD-2030-2	30	45	55000	80	2.0	—	○	-10~+80	SC-20
MACD-2030-3	30	45	55000	450	1.0	—	○	-10~+80	SC-20
MACD-2035-1	35	52	63000	40	3.5	—	○	-10~+80	SC-20
MACD-2035-2	35	52	63000	200	2.0	—	○	-10~+80	SC-20
MACD-2035-3	35	52	63000	450	1.0	—	○	-10~+80	SC-20
MACD-2050-1	50	60	68000	60	3.5	—	○	-10~+80	SC-20
MACD-2050-2	50	60	68000	210	2.0	—	○	-10~+80	SC-20
MACD-2050-3	50	60	68000	480	1.0	—	○	-10~+80	SC-20

MACD series

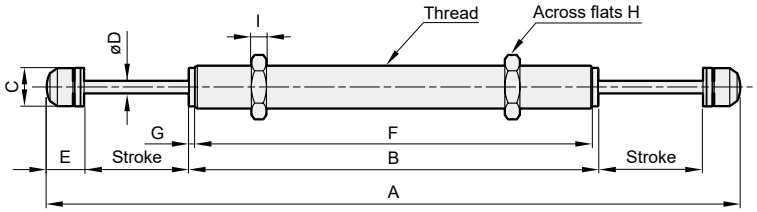
Double cushion

MACD series has adopted dual-buffering structure, and different buffering effects are installed at both ends. It is applicable to high speed site and commonly used for robot arm. It can reduce the noise and vibration of the equipment to increase greatly the operation speed of the robot arm.

MACD-2035
MACD-2030



MACD-2050



Dimensions

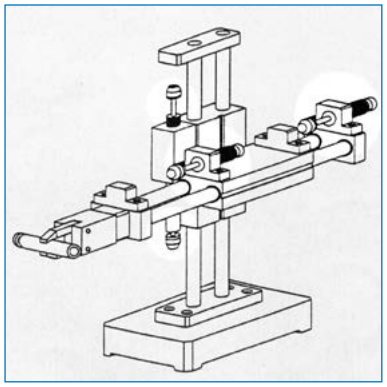
Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	Weight (g)
MACD-2030-1	M20×1.5	30	184.6	123	17.8	6	15.8	44	3	26	7	320
MACD-2030-2	M20×1.5	30	184.6	123	17.8	6	15.8	44	3	26	7	320
MACD-2030-3	M20×1.5	30	184.6	123	17.8	6	15.8	44	3	26	7	320
MACD-2035-1	M20×1.5	35	224.6	123	17.8	5	15.8	42	5	26	7	350
MACD-2035-2	M20×1.5	35	224.6	123	17.8	5	15.8	42	5	26	7	350
MACD-2035-3	M20×1.5	35	224.6	123	17.8	5	15.8	42	5	26	7	350
MACD-2050-1	M20×1.5	50	276.6	145	17.8	6	15.8	134	3	26	7	470
MACD-2050-2	M20×1.5	50	276.6	145	17.8	6	15.8	134	3	26	7	470
MACD-2050-3	M20×1.5	50	276.6	145	17.8	6	15.8	134	3	26	7	470

Specification

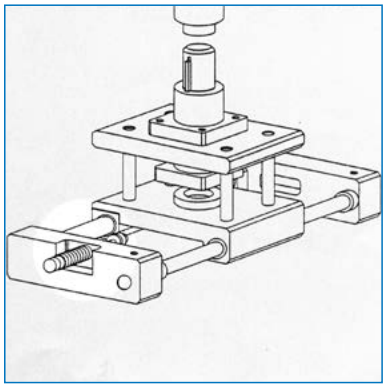
Model	Stroke (mm)	Max. Nm per cycle (Nm)	Max. Nm per hour (Nm)	Max. effective mass (kg)	Max. impact speed (m/s)	Without impact head	With impact head	Operating temp. (°C) (No freezing)	Stop collar (SC)	Flange (F)
MAD-1410	10	20	25000	80	3.0	○	○	-10~+80	SC-14	—
MAD-1415	15	24	26000	100	3.0	○	○	-10~+80	SC-14	—
MAD-1425	25	28	27500	140	3.0	○	○	-10~+80	SC-14	—
MAD-1612	12	22	27500	130	3.0	○	○	-10~+80	—	—
MAD-2016	16	28	27500	200	3.0	○	○	-10~+80	SC-20	—
MAD-2020	20	34	29000	298	3.5	○	○	-10~+80	SC-20	—
MAD-2025	25	39	30000	312	3.5	○	○	-10~+80	SC-20	—
MAD-2050	50	69	52000	420	3.5	○	○	-10~+80	SC-20	—
MAD-2525	25	85	54000	400	3.5	○	○	-10~+80	SC-25	—
MAD-2530	30	95	60000	480	3.5	○	○	-10~+80	SC-25	—
MAD-2540	40	100	80000	700	3.5	×	○	-10~+80	SC-25	—
MAD-2550	50	120	90000	720	4.0	○	○	-10~+80	SC-25	—
MAD-2580	80	150	120000	800	4.0	○	○	-10~+80	SC-25	—
MAD-2725	25	85	54000	400	3.5	○	○	-10~+80	SC-27	—
MAD-3625	25	150	81000	1400	3.0	×	○	-10~+80	SC-36	F36
MAD-3650	50	300	100000	2400	3.0	×	○	-10~+80	SC-36	F36
MAD-4225	25	260	125000	3000	3.5	×	○	-10~+80	—	F42
MAD-4250	50	500	150000	4000	4.5	×	○	-10~+80	—	F42
MAD-4275	75	750	180000	6000	4.5	×	○	-10~+80	—	F42
MAD-64050	50	1200	150500	12727	1.5	×	○	-10~+80	—	F64
MAD-64100	100	2400	200000	18181	1.5	×	○	-10~+80	—	F64
MAD-64150	150	3600	250000	23636	1.5	×	○	-10~+80	—	F64

Application example

Pick and place robot



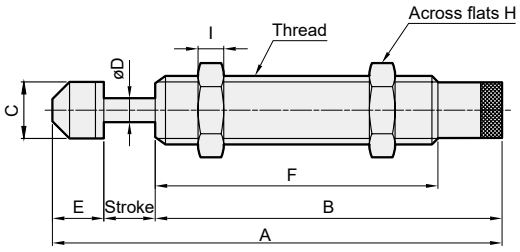
Press feed



MAD series

Adjustable

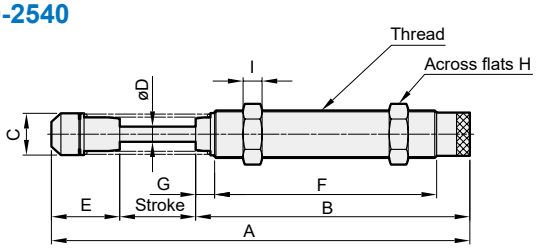
MAD series is of adjustable structure. When facing with different loads and different impact speeds, the adjustment knobs can be adjusted to appropriate scale to absorb perfectly the energy generated by the object. As compared to MAC series MAD series has higher energy absorption and wider applicable scope.



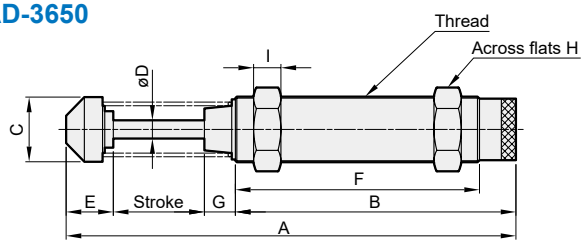
Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	H	I	J	K	Weight (g)
MAD-1410	M14×1.0/1.5	10	109.7	88.5	12	4	11.2	72.5	19	5	—	—	90
MAD-1415	M14×1.0/1.5	15	128.2	102	12	4	11.2	86	19	5	—	—	120
MAD-1425	M14×1.0/1.5	25	153.2	117	12	4	11.2	101	19	5	—	—	194
MAD-1612	M16×1.0/1.5	12	99.7	76.5	14	4	11.2	54.9	19	6	—	—	200
MAD-2016	M20×1.5/2.0	16	148.3	117	17.8	6	15.3	101	26	7	—	—	230
MAD-2020	M20×1.5	20	152.3	117	17.8	6	15.3	101	26	7	—	—	235
MAD-2025	M20×1.5	25	157.3	117	17.8	6	15.3	101	26	7	—	—	240
MAD-2050	M20×1.5	50	239.3	174	17.8	6	15.3	158	26	7	—	—	330
MAD-2525	M25×1.5/2.0	25	162.5	118.5	22	8	19	101	32	9	—	—	350
MAD-2530	M25×1.5/2.0	30	167.5	118.5	22	8	19	101	32	9	—	—	365
MAD-2725	M27×1.5/3.0	25	162.5	118.5	22	8	19	101	32	9	—	—	403

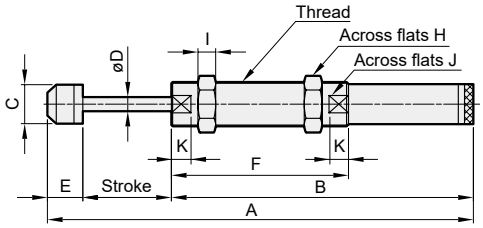
MAD-2540



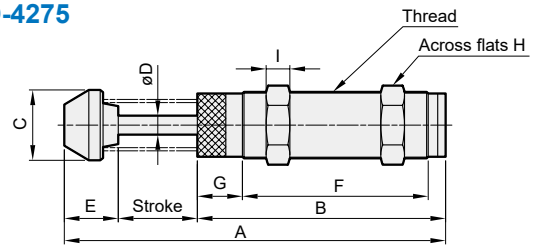
MAD-3625
MAD-3650



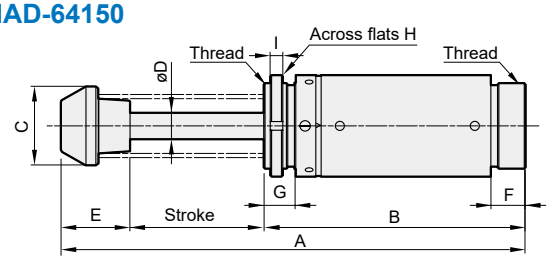
MAD-2550
MAD-2580



MAD-4225
MAD-4250
MAD-4275



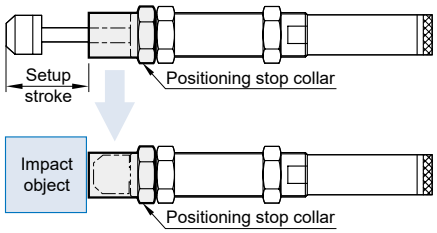
MAD-64050
MAD-64100
MAD-64150



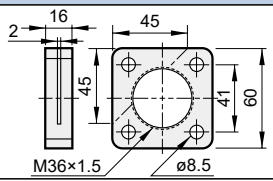
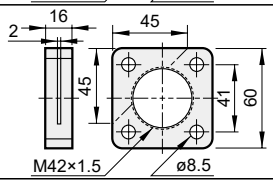
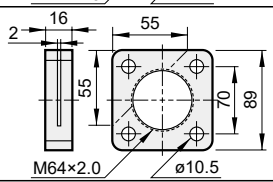
Dimensions

Model	Thread	Stroke (mm)	A	B	C	D	E	F	G	H	I	J	K	Weight (g)
MAD-2540	M25×1.5/2.0	40	221.5	144.5	22	8	37	117	10	32	9	—	—	455
MAD-2550	M25×1.5/2.0	50	247	178	22	8	19	100	—	32	9	22.8	11	455
MAD-2580	M25×1.5/2.0	80	343.5	244.5	22	8	19	100	—	32	9	22.8	11	585
MAD-3625	M36×1.5	25	184	133	35.5	10	26	103	10	46	15	—	—	955
MAD-3650	M36×1.5	50	247	171	35.5	10	26	134	17	46	15	—	—	1100
MAD-4225	M42×1.5	25	186.5	127.5	44.5	12	34	88	28.5	50	15	—	—	1280
MAD-4250	M42×1.5	50	241	157	44.5	12	34	117.5	28.5	50	15	—	—	1490
MAD-4275	M42×1.5	75	301.5	187.5	44.5	12	39	148	28.5	50	15	—	—	1710
MAD-64050	M64×2.0	50	247.8	146	59	20	51.8	26	24	76.2	9.4	—	—	4115
MAD-64100	M64×2.0	100	347.8	196	59	20	51.8	26	24	76.2	9.4	—	—	5280
MAD-64150	M64×2.0	150	467.8	256	59	20	61.8	26	24	76.2	9.4	—	—	6785

How to set stop collar



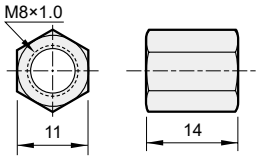
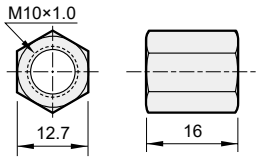
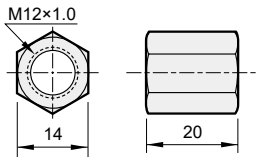
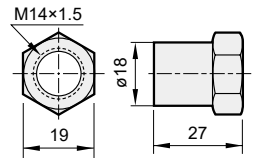
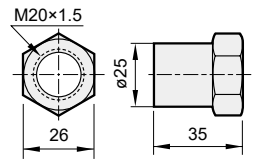
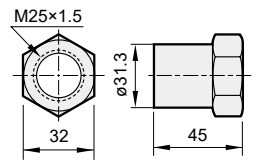
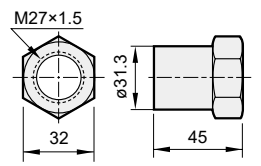
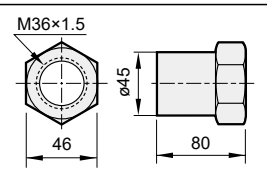
Flanges - F series

Model	Dimensions	Applicable for shock absorber model	Weight (g)
F36		MAC-3660 MAD-3625 MAD-3650	282
F42		MAD-4225 MAD-4250 MAD-4275	236
F64		MAD-64050 MAD-64100 MAD-64150	540

SC series – stop collars

Shock absorbers stop collars are available from M8×1.0 to M36×1.5 and suitable for shock absorbers with or Without impact head. They also can be used for adjusting and fixing position.

Optional accessories

Model	Dimensions	Applicable for shock absorber model
SC-08		MAC-0806
SC-10		MAC-1005 MAC-1007
SC-12		MAC-1210 MAD-1210
SC-14		MAC-1412 MAD-1410 MAC-1415 MAD-1415 MAC-1416 MAD-1425 MAC-1420 MAC-1425
SC-20		MAC-2015 MAD-2020 MAC-2020 MAD-2025 MAC-2025 MAD-2050 MAC-2030 MACD-2030 MAC-2050 MACD-2035 MAC-2065 MACD-2050
SC-25		MAC-2525 MAD-2525 MAC-2540 MAD-2530 MAC-2550 MAD-2540 MAD-2550 MAD-2580
SC-27		MAC-2725 MAD-2725
SC-36		MAC-3660 MAD-3625 MAD-3650

Four parameters are required to precisely determine the dimension of shock absorbers

- Mass to be decelerated m (kg)
- Impact velocity v (m/s)
- Propelling or driving force F (N)
- Number of impact cycles per hour C (/hr)

Some useful calculation formulas

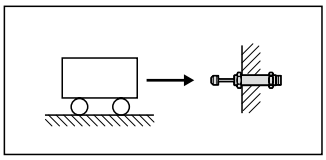
- Kinetic energy: $E_K = mv^2/2$
- Drive energy: $E_D = F \times S$
- Free fall velocity: $v = \sqrt{2g \times h}$
- Pneumatic or hydraulic cylinder driving forces.
  $F = 0.00785\ Pd^2$
- Maximum shock force (approximate).
  $Fm = 1.2\ E_T/S$
- Propelling force generated by electric motors.
  $F = 3000\ kW/v$
- Total energy absorbed per hour.
  $E_{TC} = E_T \times C$

Symbols	Unit	Description
μ		Coefficient of friction
α	(rad)	Angle of incline
θ	(rad)	Side load angle
ω	(rad/s)	Angular velocity
A	(m)	Width
B	(m)	Thickness
C	(/hr)	Impact cycles per hour
d	(mm)	Cylinder bore diameter
E_D	(Nm)	Drive energy per cycle
E_K	(Nm)	Kinetic energy per cycle
E_T	(Nm)	Total energy per cycle
E_{TC}	(Nm)	Total energy per hour
F	(N)	Propelling force
F_m	(N)	Maximum shock force
g	(m/s^2)	Acceleration due to gravity (9.81 m/s)
h	(m)	Height
HM		Arresting torque factor for motors (normally 2.5)
kW	(kW)	Electric motor power
m	(kg)	Mass to be decelerated
M_e	(kg)	Effective mass
P	(bar)	Operation pressure
R	(m)	Radius
R_s	(m)	Shock absorber mounting distance from rotation center
S	(m)	Stroke
T	(Nm)	Driving torque
t	(s)	Deceleration time
v	(m/s)	Velocity of impact mass
v_s	(m/s)	Impact velocity at shock absorber

Example 1. Horizontal impact

Application data

m = 300 kg
v = 1.0 m/s
S = 0.05 m
C = 300 /hr



Formulas and calculation

$$E_K = \frac{mv^2}{2} = \frac{300 \times 1.0^2}{2} = 150\ Nm$$

$$E_T = E_K = 150\ Nm$$

$$E_{TC} = E_T \times C = 150 \times 300 = 45000\ Nm/hr$$

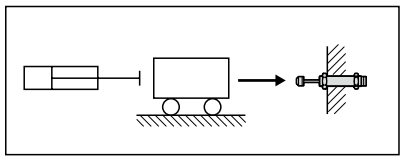
$$M_e = \frac{2E_T}{V^2} = \frac{2 \times 150}{1.0^2} = 300\ kg$$

Choose from calculation: MAD-3650 is adequate.

Example 2. Horizontal impact with propelling force

Application data

m = 300 kg
v = 1.2 m/s
S = 0.05 m
P = 40 N/cm^2
F = 1000 N
C = 500 /hr



Formulas and calculation

$$E_K = \frac{mv^2}{2} = \frac{300 \times 1.0^2}{2} = 216\ Nm$$

$$E_D = F \times S = 0.00785\ Pd^2 \times S$$

$$= 0.00785 \times 40 \times 100^2 \times 0.05 = 157\ Nm$$

$$E_T = E_K + E_D = 216+157 = 373\ Nm$$

$$E_{TC} = E_T \times C = 373 \times 300 = 111900\ Nm/hr$$

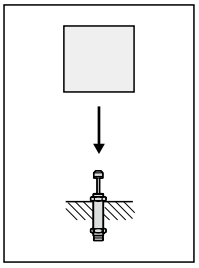
$$M_e = \frac{2E_T}{V^2} = \frac{2 \times 373}{1.2^2} = 518\ kg$$

Choose from calculation: MAD-4250 is adequate.

Example 3. Free fall impact

Application data

m = 40 kg
h = 0.4 m
S = 0.06 m
C = 200 /hr



Formulas and calculation

$v = \sqrt{2g \times h} = \sqrt{2 \times 9.81 \times 0.4} = 2.8$ m/sec

$E_K = \frac{mv^2}{2} = \frac{40 \times 2.8^2}{2} = 157$ Nm

$E_D = F \times S = 40 \times 9.81 \times 0.06 = 23.5$ Nm

$E_T = E_K + E_D = 157 + 23.5 = 180.5$ Nm

$E_{TC} = E_T \times C = 180.5 \times 200 = 36100$ Nm/hr

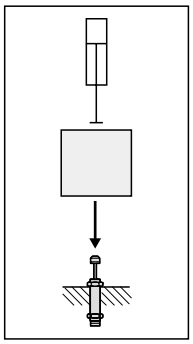
$M_e = \frac{2E_T}{V^2} = \frac{2 \times 180.5}{2.8^2} = 46$ kg

Choose from calculation: MAC-3660-1 is adequate.

Example 4. Free fall impact with propelling

Application data

m = 40 kg
h = 0.3 m
S = 0.025 m
P = 5 bar
d = 50 mm
C = 200 /hr
v = 1.0 m/sec



Formulas and calculation

$E_K = \frac{mv^2}{2} = \frac{40 \times 1.0^2}{2} = 20$ Nm

$E_D = F \times S = (mg+0.0785Pd^2) \times S$
$= (40 \times 9.81+0.0785 \times 5 \times 50^2) \times 0.025 = 34.3$ Nm

$E_T = E_K+E_D = 20+34.3 = 54.3$ Nm

$E_{TC} = E_T \times C = 54.3 \times 200 = 10860$ Nm/hr

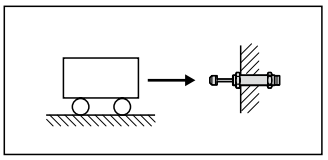
$M_e = \frac{2E_T}{V^2} = \frac{2 \times 54.3}{1.0^2} = 108.6$ kg

Choose from calculation: MAD-2525 is adequate.

Example 5. Horizontal impact with motor driving

Application data

m = 400 kg
v = 1.0 m/s
W = 1.5 kW
HM = 2.5
S = 0.075 m
C = 60 /hr



Formulas and calculation

$E_K = \frac{mv^2}{2} = \frac{300 \times 1.0^2}{2} = 150$ Nm

$E_D = F \times S = \frac{kW \times HM}{v} \times S = \frac{1500 \times 2.5}{1.0} \times 0.075 = 281$ Nm

$E_T = E_K+E_D = 200 + 281 = 481$ Nm

$E_{TC} = E_T \times C = 481 \times 60 = 25860$ Nm/hr

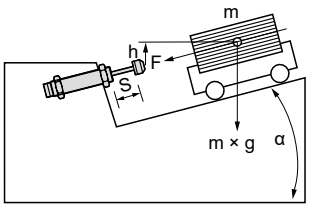
$M_e = \frac{2E_T}{V^2} = \frac{2 \times 481}{1.0^2} = 962$ kg

Choose from calculation: MAD-4275 is adequate.

Example 6. Inclined impact

Application data

m = 150 kg
h = 0.3 m
S = 0.075 m
α = 30°
C = 200 /hr



Formulas and calculation

$v = \sqrt{2g \times h} = \sqrt{2 \times 9.81 \times 0.3} = 2.43$ m/sec

$E_K = \frac{mv^2}{2} = \frac{150 \times 2.43^2}{2} = 443$ Nm

$E_D = F \times S = m \times g \times S \times \sin\alpha$
$= 50 \times 9.81 \times 0.075 \times \sin30° = 55.2$ Nm

$E_T = E_K+E_D = 433+55.2 = 498.2$ Nm

$E_{TC} = E_T \times C = 498.2 \times 200 = 99640$ Nm/hr

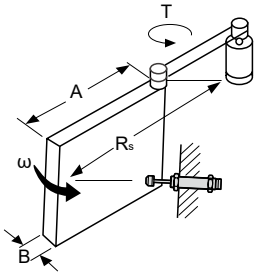
$M_e = \frac{2E_T}{V^2} = \frac{2 \times 498.2}{2.43^2} = 168.7$ kg

Choose from calculation: MAD-4275 is adequate.

Example 7. Horizontal rotating door

Application data

m = 20 kg
ω = 2.0 rad/s
T = 20 Nm
R_S= 0.8 m
A = 1.0 m
B = 0.05 m
S = 0.016 m
C = 100 /hr



Formulas and calculation

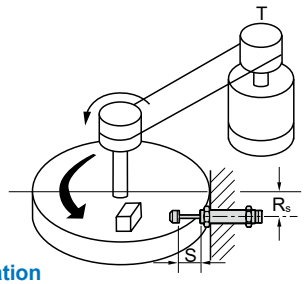
I	=	$\frac{m(4A^2+B^2)}{12}$	=	$\frac{20(4 \times 1.0^2+0.05^2)}{12}$	=	6.67 kg.m^2
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{6.67 \times 2.0^2}{2}$	=	13.34 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.04}{0.8}$	=	0.05 rad
E_D	=	T × θ	=	20 × 0.05	=	1.0 Nm
E_T	=	E_K+E_D	=	13.34+1.0	=	14.34 Nm
E_{TC}	=	E_T × C	=	14.34 × 100	=	1434 Nm/hr
v	=	ω × R_S	=	2.0 × 0.8	=	1.6 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 14.34}{1.6^2}$	=	11.20 kg

Choose from calculation: MAD-2016 is adequate.

Example 8. Rotary index table with propelling force

Application data

m = 200 kg
ω = 1.0 rad/s
T = 100 Nm
R = 0.5 m
R_S= 0.4 m
S = 0.04 m
C = 100 /hr



Formulas and calculation

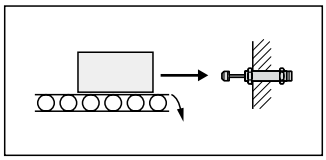
I	=	$\frac{mR^2}{2}$	=	$\frac{200 \times 0.5^2}{2}$	=	25 kg.m^2
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{25 \times 1.0^2}{2}$	=	12.5 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.04}{0.4}$	=	0.1 rad
E_D	=	T × θ	=	100 × 0.1	=	10 Nm
E_T	=	E_K+E_D	=	12.5+10	=	22.5 Nm
E_{TC}	=	E_T × C	=	22.5 × 50	=	1125 Nm/hr
v	=	ω × R_S	=	1.0 × 0.4	=	0.4 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 22.5}{0.4^2}$	=	281 kg

Choose from calculation: MAD-2540 is adequate.

Example 9. Horizontal mass on driven rollers

Application data

m = 150 kg
v = 0.5 m/s
μ = 0.25
S = 0.02 m
C = 120 /hr



Formulas and calculation

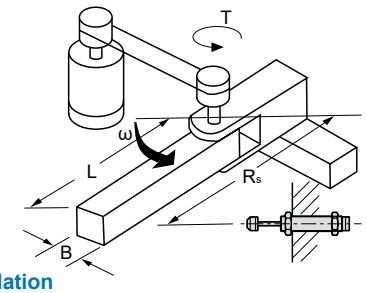
E_K	=	$\frac{mv^2}{2}$	=	$\frac{150 \times 0.5^2}{2}$	=	18.75 Nm
E_D	=	F × S = mgμ × S = 150 × 9.81 × 0.25 × 0.02 = 7.35 Nm				
E_T	=	E_K+E_D =		18.73+7.35	=	26.1 Nm
E_{TC}	=	E_T × C =		26.1 × 120	=	3132 Nm/hr
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 26.1}{0.5^2}$	=	208.8 kg

Choose from calculation: MAC-2020-3 is adequate.

Example 10. Rotating beam with driving force

Application data

m = 40 kg
A = 0.5 m
B = 0.05 m
ω = 2.0 rad/s
T = 10 Nm
R_S= 0.4 m
S = 0.05 m
C = 50 /hr



Formulas and calculation

I	=	$\frac{m(4A^2+B^2)}{12}$	=	$\frac{40(4 \times 0.5^2+0.05^2)}{12}$	=	3.34 kg.m^2
E_K	=	$\frac{I\omega^2}{2}$	=	$\frac{3.34 \times 2.0^2}{2}$	=	6.7 Nm
θ	=	$\frac{s}{R_S}$	=	$\frac{0.05}{0.4}$	=	0.125 rad
E_D	=	T × θ	=	10 × 0.125	=	1.25 Nm
E_T	=	E_K+E_D	=	6.7+1.25	=	8 Nm
E_{TC}	=	E_T × C	=	8 × 50	=	400 Nm/hr
v	=	ω × R_S	=	2.0 × 0.4	=	0.8 m/s
M_e	=	$\frac{2E_T}{V^2}$	=	$\frac{2 \times 8.05}{0.8^2}$	=	25 kg

Choose from calculation: MAD-2050 is adequate.

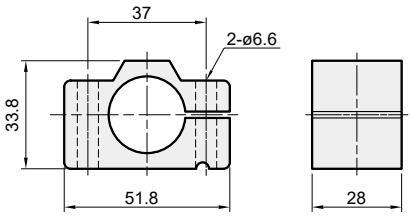
MHR series

HYDRAULIC SPEED CONTROLLER

- Used extensively for providing smooth consistent feed speed on machine tools.
- Construction incorporates double seal enabling unit to be used in dirty and dusty environments.
- Fully adjustable speeds can be quickly and simply selected.
- Compact size, ideal for use on robots, drills, conveyors, cut off machines and woodworking equipment.
- Can be used in conjunction with Pneumatic air cylinder in order to provide consistent movement.

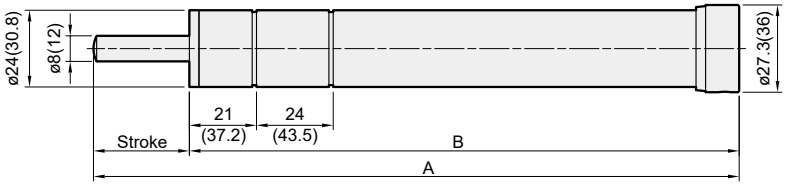
Specification

Order no.	Max. stroke (mm)	A	B	Operating temperature (°C)	Max. load (kgf)	Weight (g)
MHR-15	15	152	137	0-60	15~350	470
MHR-30	30	202	172	0-60	15~350	495
MHR-60	60	282.5	222.5	0-60	15~350	615
MHR-80	80	350	270	0-60	15~350	690
MHR-100	100	396	296	0-60	15~350	765
MHR-3160	60	331	271	0-60	30~420	1000
MHRT-60	60	317	258	0-60	15~350	1555
MHRT-100	100	389.5	289.5	0-60	15~350	1635

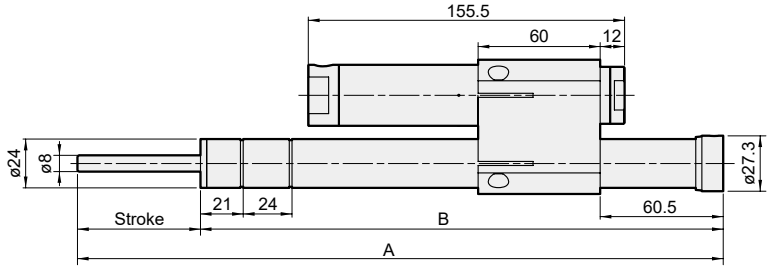


MHR

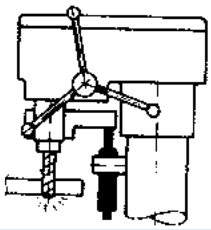
*(MHR3160)



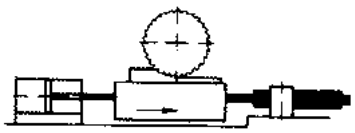
MHRT



Application example

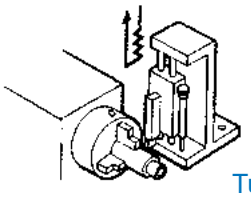


Drilling

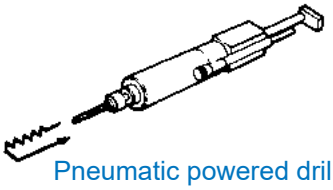


Disk sawing

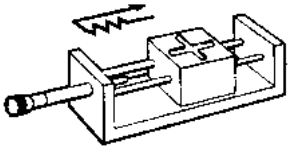
Horizontal drilling



Turning



Pneumatic powered drilling



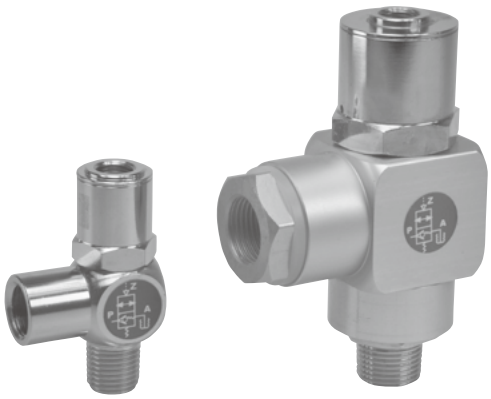
Linear motion slide

Features

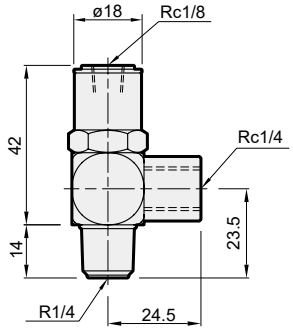
- Maintains pressure in event of air failure.
- Prevents leakage in an air system.
- Enable accurate holding of work-piece.

Specification

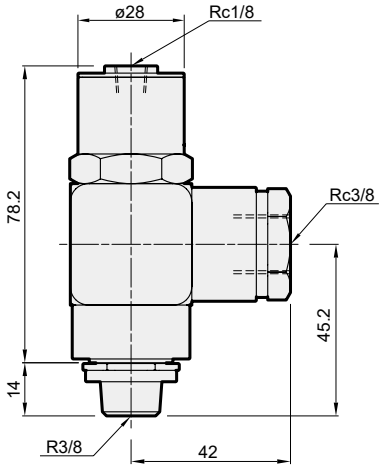
Order no.	Pressure (MPa)	Operation temperature (°C)	Orifice (mm^2)	Operation time (times/ min)	Weight (g)
MPC-02	0.05~0.95	-10~70 (No freezing)	24	60	100
MPC-04	0.05~0.95	-10~70 (No freezing)	79	40	340



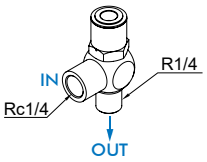
MPC-02



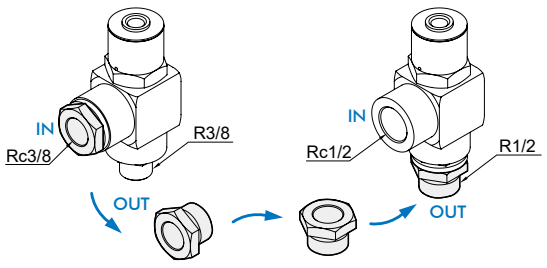
MPC-04

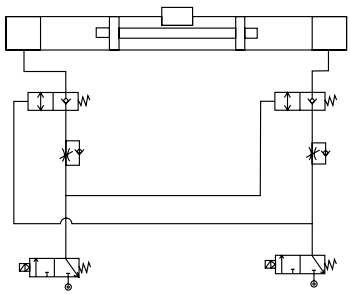


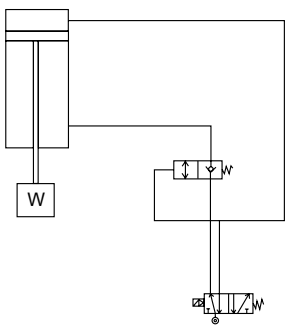
MPC-02

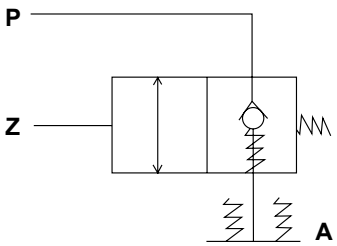


MPC-04



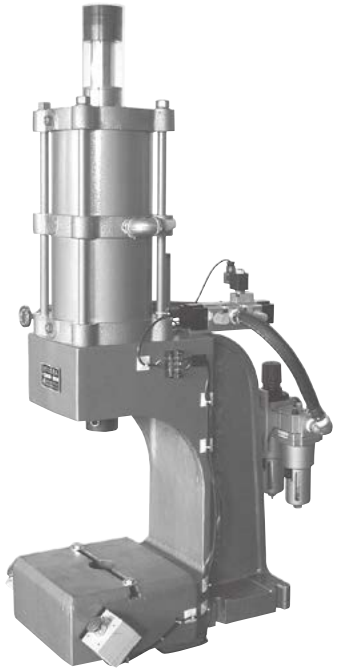






User maunal

Caution for safety
(Read beforeinstalling)



Features

- Simple design makes this press our most popular export unit.
- Strong and reliable in operation.
- Universal construction enables unit to meet the most demanding and varied applications.
- Safe in operation.

Features of design

- Open height: The distance between working table and cylinder spindle can be changed and adjusted according to the height of cylinder base so as to match for the height of the work pieces.
- Light weight: As light weight of this unit, it is easy to move without affecting to the working efficiency.

Operation & maintenance (for all series)

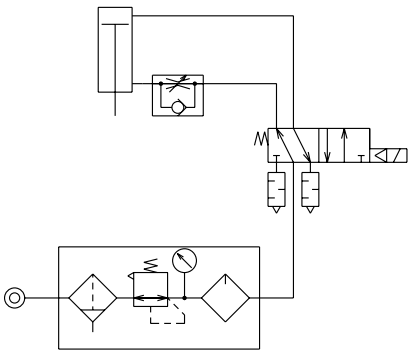
- The control knob can adjust the descending speed of die spindle. (Quicker speed for counter clockwise direction, but lower speed for clockwise direction.), if high speed descending is required, quick exhaust valve can be used.
- Please fill in lubricant with international recommended oil VG-32, adjust properly the oil capacity of the lubricator.
- When connecting of pneumatic hose, be sure to clean all impurities, such as: water, dust, etc.in the hose.
- The adjustment of output can be regulated by pressure reducing valve, and its pressure value will be shown as the pressure gauge.

Order example

MF101 — 100 — □

- MF101 — MODEL
- 100 — OUTPUT (kg)
- □ — OPTION
  - Blank: Twin button
  - **F**: With footvalve
  - **TC**: With timer, counter

Air press circuit (for all series)



Directions of operation

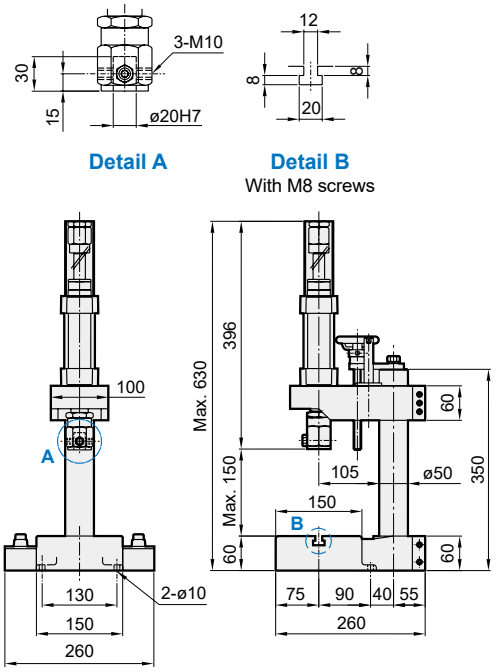
- After connect power and air compressor, be sure to have all circuits in the working condition.
- The hand pressed button switch (or foot switch), the shaft rod will be descending to carry out the pressing. When hand releases (or foot leaves), the shaft rod will be ascending.

Specification

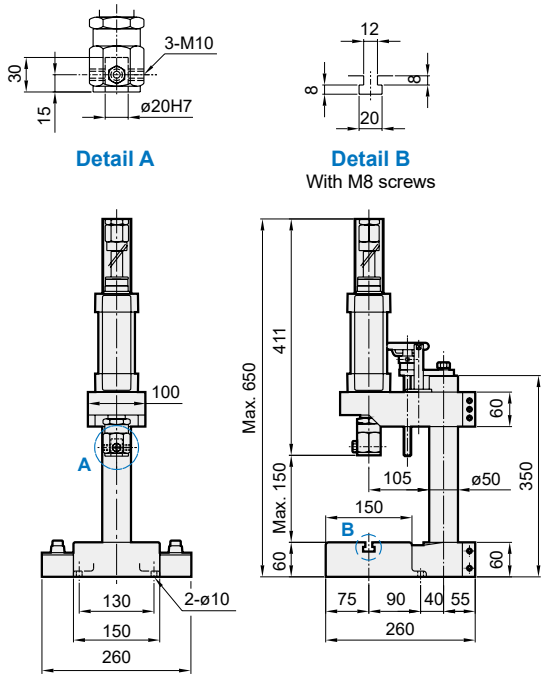
Item / Model	Output (kg)	Stroke (mm)	Cylinder dia. (mm)	Stroke adj. (mm)	Air consumption (ℓ/min)	Piping bore (Rc)	Open height (mm)	Weight (kg)
MF100-60	65	50	50	30	1.2	1/4	150	20
MF100-100	120	50	63	30	2	3/8	150	20.3
MF101-100	120	100	63	30	4	3/8	200	39
MF101-200	200	100	80	30	6	3/8	200	43
MF101-300	300	100	100	30	10	3/8	200	47
MF102-500	500	100	125	30	16	1/2	250	90
MF102-800	750	100	150	30	23	1/2	250	103
MF103-1500	1350	100	200	30	42	3/4	300	200
MF103-3000	2700	100	200×2	30	65	3/4	300	245

* The output value is measured at 5kg/cm^2 shown on the pressure gauge.

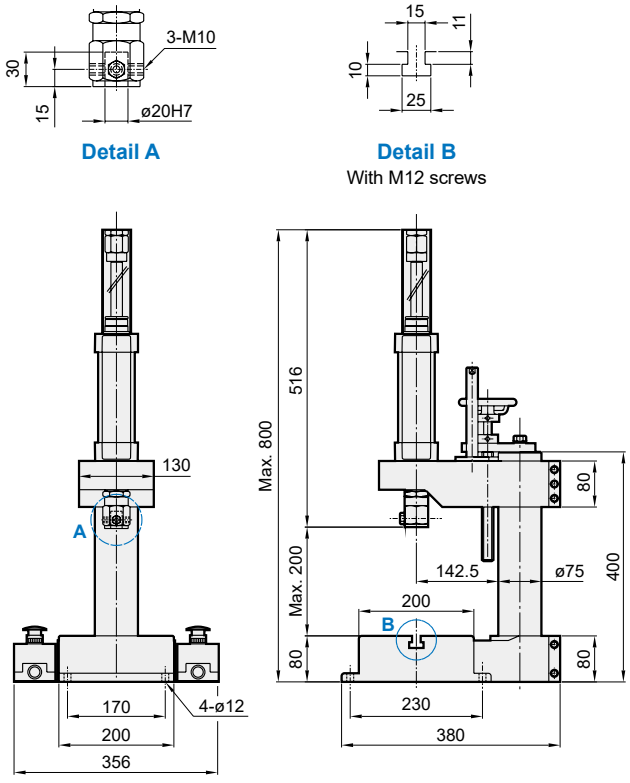
MF100-60



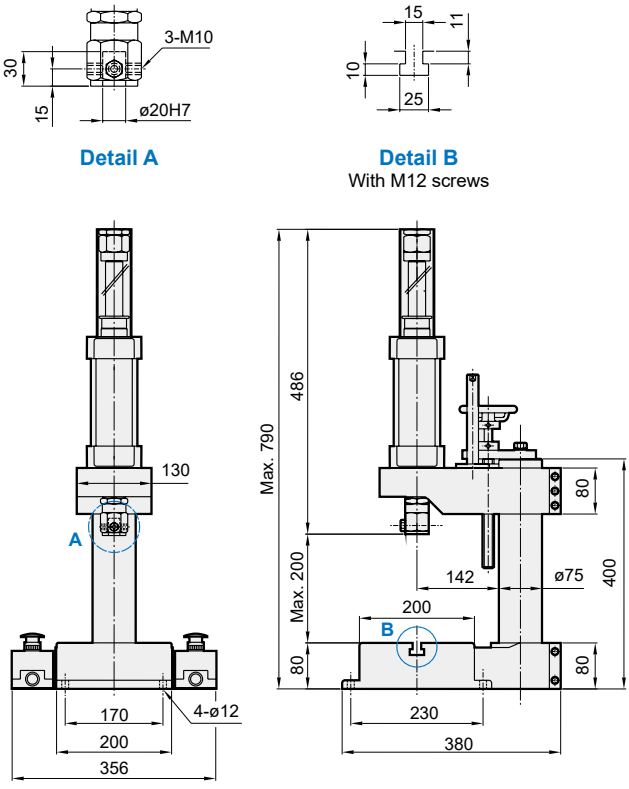
MF100-100



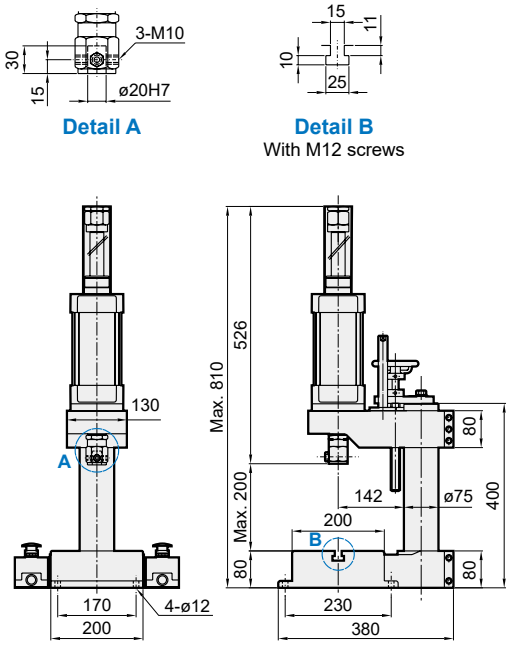
MF101-100



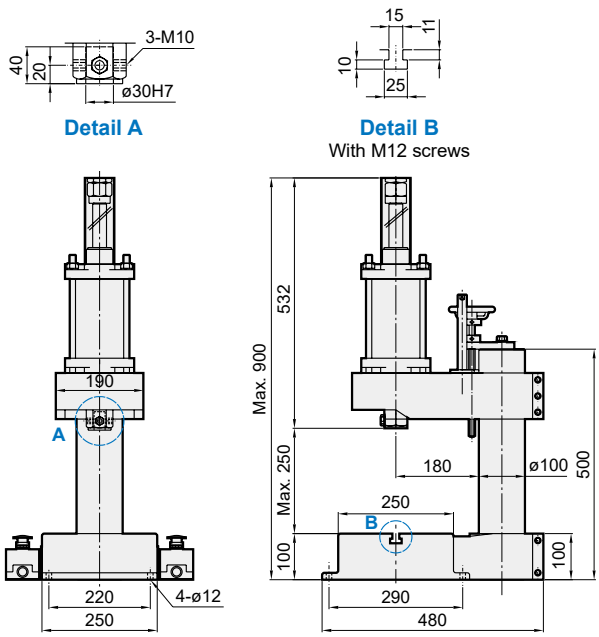
MF101-200



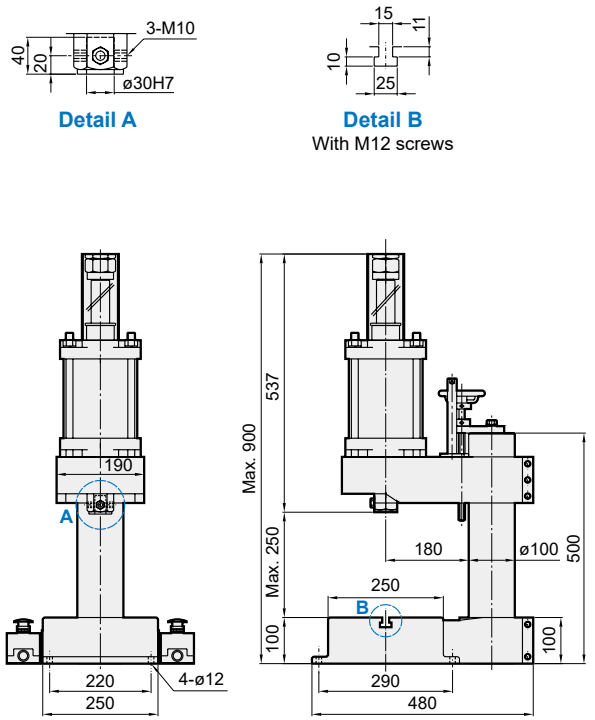
MF101-300



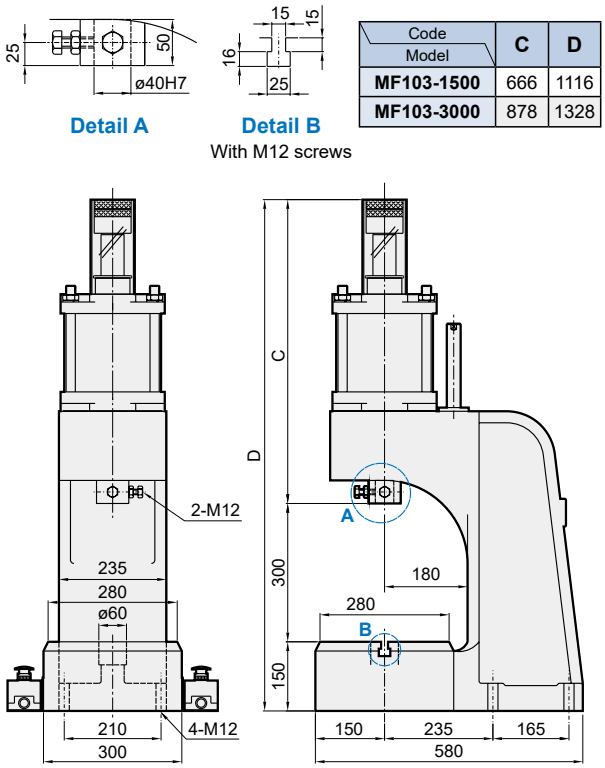
MF102-500



MF102-800



MF103-1500 MF103-3000



Code / Model	C	D
MF103-1500	666	1116
MF103-3000	878	1328