Arc Welding Process Equipment

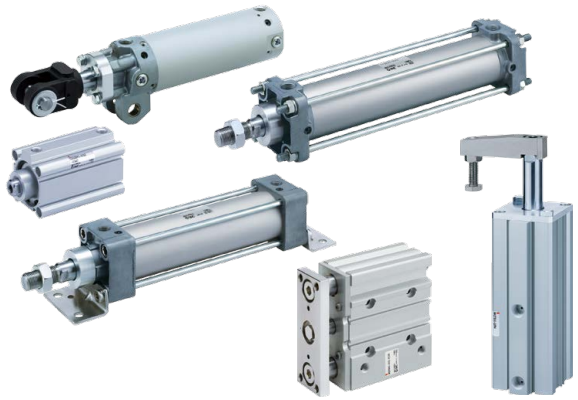


SMC

C-E17-2

Introduction of Arc Welding

Spatter Resistant Cylinders for Arc Welding

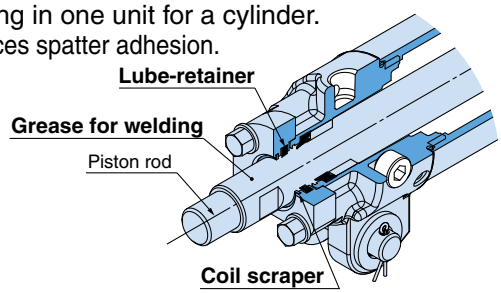


XC88/XC89	CKG, CDQ2, CA2, MB, MGPM, MK2T-XC88/XC89 p. 5

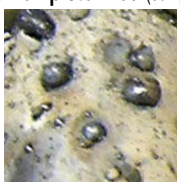
Long Service Life

Spatter Resistant Cylinders for Arc Welding

- Achieves long service life by the use of the three roles of the coil scraper, Lube-retainer and grease for welding in one unit for a cylinder.
- Reduces spatter adhesion.

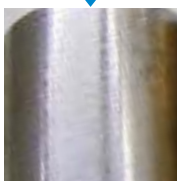


Spatter adhesion condition on piston rod (compared with coil scraper type (-XC35))

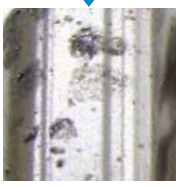


Spatter adhesion condition

After 1 operation



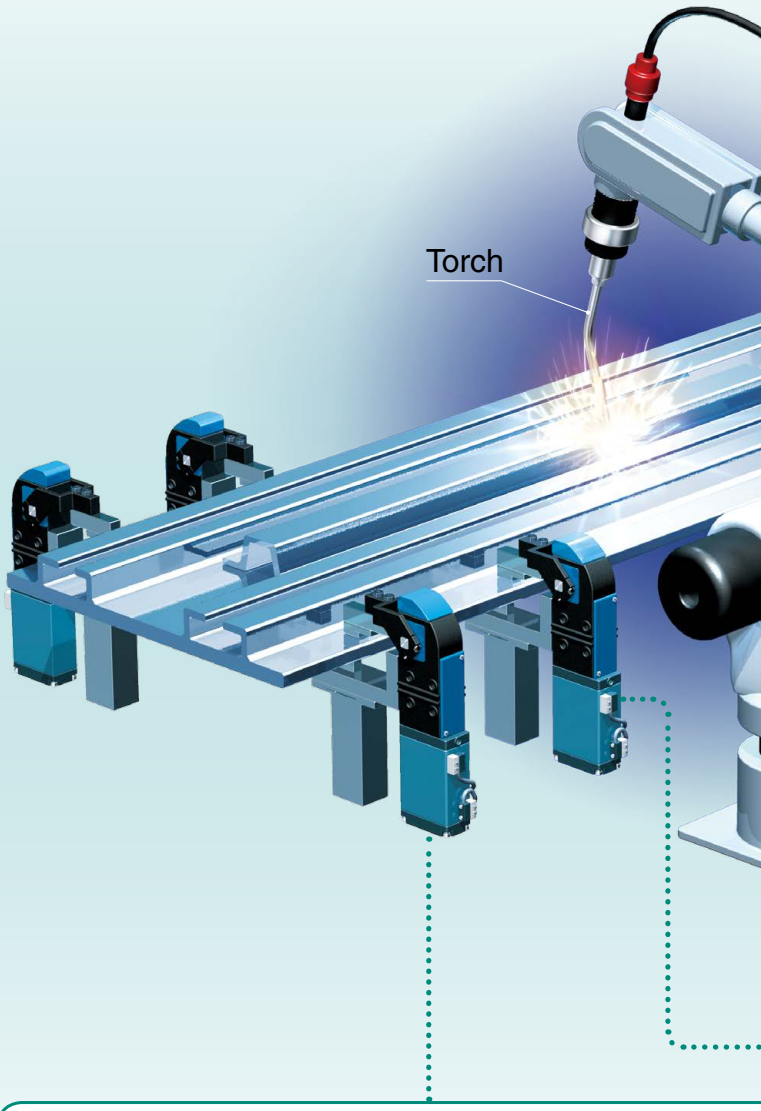
Spatter resistant cylinder for arc welding



With coil scraper (-XC35)

XC91	CKG, CDQ2, CA2, MB, MGPM, MK2T-XC91 p. 6

- Improves spatter resistance by coil scraper and grease for welding (compared with coil scraper type)
- Dimensions are the same as with coil scraper type (-XC35) and mounting is interchangeable. Possible to replace cylinders in existing equipment.



Specialty Actuators

Pin Shift Cylinder for High Precision Positioning p. 84
CKQG-X2370

- Rod end deflection: ±0.1 mm or less



Offset Pin Shift Cylinder p. 91
CDQ2B-X2839

- With plate extended: Deflection of ±0.1 mm or less

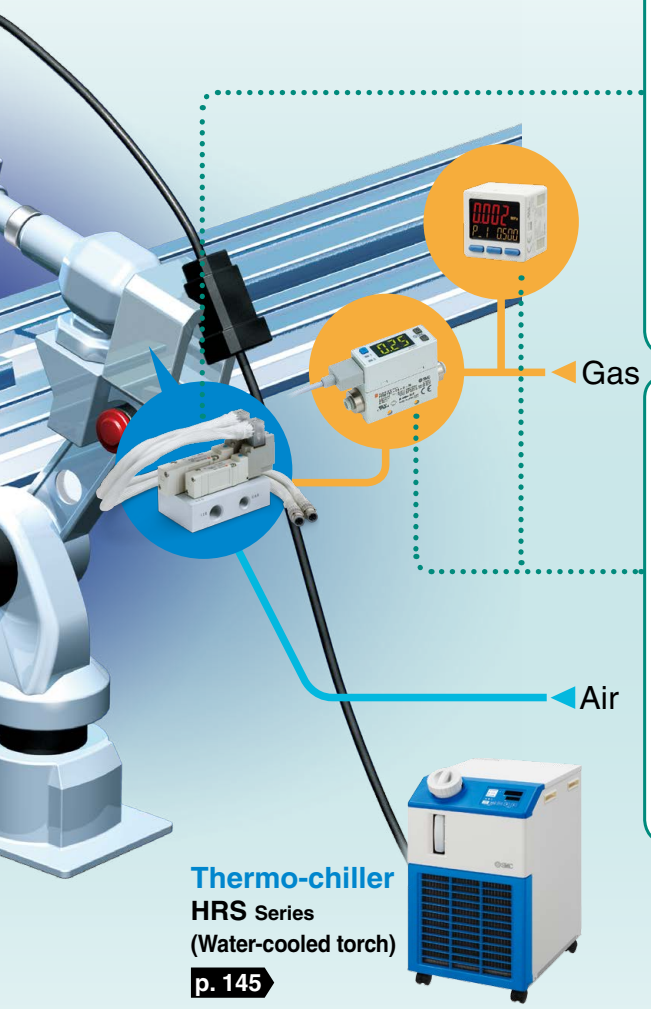


Slim-line Power Clamp Cylinder p. 97
CKZ2N-X2346

- A high clamping force is obtained through the toggle mechanism.



Process Equipment



Gas/Air Switching Valve

SS5Y7-X424-Q p. 123

Improved nozzle service life, reduction of the number of replacements and the tip costs

- Tip service life can be extended by blowing the air after arc welding.
- Shield gas valve and air blow valve are integrated.



Detection Switches

Digital Flow Switch p. 125

PFM7 Series

- Allows flow rate control and value management of shielding gas.
- Compatible with the mixed gas (Ar + CO_2)



High-Precision Digital Pressure Switch p. 134

ISE20B Series

- Allows pressure control and value management of shielding gas.



Thermo-chiller

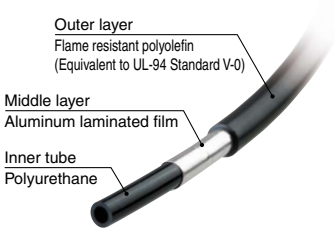
HRS Series
(Water-cooled torch)
p. 145

Tubing/Fittings/Flow Control Equipment

FR Three-layer Polyurethane Tubing p. 139

TRTU Series

- Spatter resistance is improved by installing an aluminum layer between the outer layer and inner tube.



Metal One-touch Fittings p. 141

KQB2 Series

- All metal except seal parts



Speed Controller p. 143, 144

AS-X737
AS Series

- All metal except seal parts



Spatter Cover p. 143

KQB2-X1124

- Prevents adhesion and entry of welding spatters.
- Silicone rubber



Frame Clamp Cylinder p. 105

WRF100

- High output 20000 N at max.



Compact Clamp Unit p. 112

CDQ2B20-DCT1710T
CDQ2B32-DCR0859R

- Compact clamp unit based on the compact cylinder



Center Lock Unit p. 117

MA331-X441

- Can switch from center lock (for locating) to free (for releasing workpiece)



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Spatter Resistant Cylinders for Arc Welding ..... p. 5



Clamp Cylinder CKG1-XC88/XC89/XC91 ..... p. 7

Clamp Cylinder CKGA-XC88/XC89/XC91 ..... p. 14

Compact Cylinder: Standard CDQ2-XC88/XC89/XC91 ..... p. 17



Compact Cylinder: Long Stroke CDQ2-XC88/XC89 ..... p. 27

Compact Cylinder: Anti-lateral Load CDQ2□S-XC88/XC89 ..... p. 33



Compact Cylinder with Double Clevis, Double Knuckle Joint: Standard CQ2D-XC26□ ..... p. 39

Compact Cylinder with Double Clevis, Double Knuckle Joint: Long Stroke CQ2D-XC26□ ..... p. 42

Compact Cylinder with Double Clevis, Double Knuckle Joint: Anti-lateral Load CQ2DS-XC26□ ..... p. 44



Air Cylinder CA2-XC88/XC89/XC91 ..... p. 49

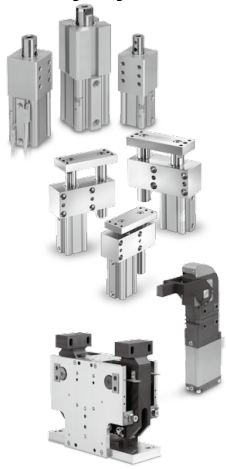
Air Cylinder MB-XC88/XC89/XC91 ..... p. 59



Compact Guide Cylinder MGPM-XC88/XC91/XC88W/XC89W/XC91W ..... p. 68

Rotary Clamp Cylinder MK2T-XC89/XC91 ..... p. 78

Specialty Cylinders ..... p. 84



Pin Shift Cylinder for High Precision Positioning CKQG-X2370 ..... p. 84

Offset Pin Shift Cylinder CDQ2B-X2839 ..... p. 91

Slim-line Power Clamp Cylinder CKZ2N-X2346 ..... p. 97

Frame Clamp Cylinder WRF100 ..... p. 105



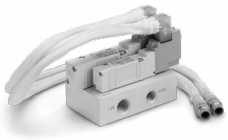
Compact Clamp Unit CDQ2B20-DCT1710T/CDQ2B32-DCR0859R ..... p. 112

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Magnet Gripper MHM-X6400 ..... p. 120

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Gas/Air Switching Valve SS5Y7-X424-Q ..... p. 124

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Digital Flow Switch (Compatible with Argon (Ar), Carbon Dioxide (CO_2) and the Mixed Gas (Ar + CO_2))
PFM7 Series ..... p. 125



High-Precision Digital Pressure Switch ISE20B Series ..... p. 134

Tubing/Fittings/Flow Control Equipment ..... p. 138



Flame Resistant FR Three-layer Polyurethane Tubing TRTU Series ..... p. 139



Metal One-touch Fittings (Metric size, Inch size/Connection thread: M, R, Rc, UNF, NPT, G)
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All Metal Exterior Speed Controller with One-touch Fitting AS-X737 ..... p. 143



Spatter Cover KQB2-X1124 ..... p. 143



Speed Controller: Elbow Type (Metal Body) AS Series ..... p. 144

Proposal for Thermo-chiller ..... p. 145

Thermo-chiller Variations ..... p. 146

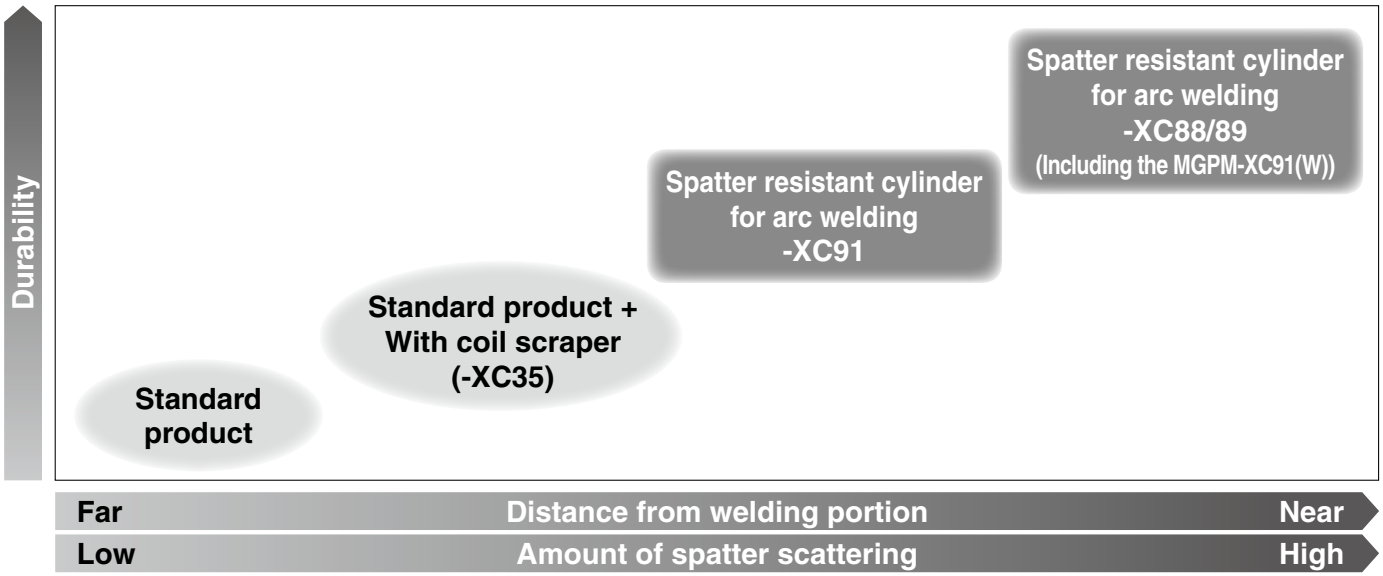
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Spatter Resistant Cylinders for Arc Welding

CKG, CDQ2, CA2, MB, MGPM, MK2T-XC88/XC89/XC91

<Guide of Usage Range>

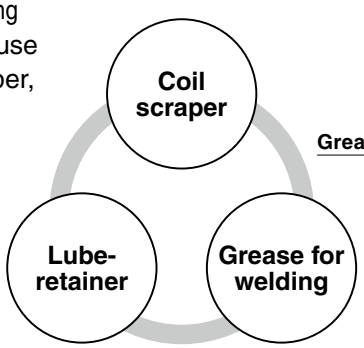


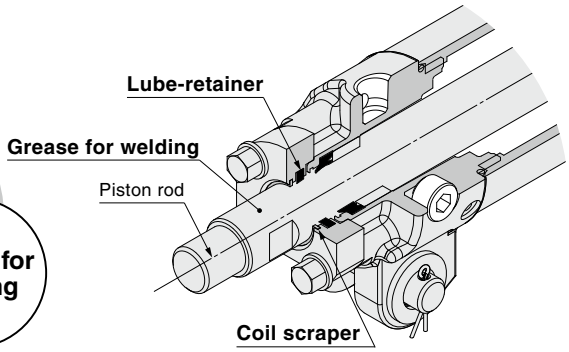
XC88/XC89

Drastically reduces spatter adhesion by the use of three roles in one unit.

Spatter Resistant Cylinders for Arc Welding

- Achieves long service life by the use of the three roles of the coil scraper, Lube-retainer and grease for welding in one unit for a cylinder.
- Reduces spatter adhesion.

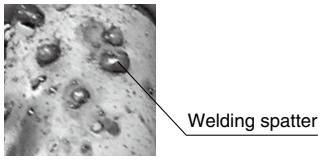




Improved cylinder durability

Spatter does not easily adhere to the piston rod of the spatter resistant cylinders for arc welding, which improves durability.

Spatter adhesion condition on piston rod
(compared with coil scraper type)
∗ Piston rod (S45C)



Surface condition after one operation



Spatter resistant cylinder for arc welding (-XC89)



With coil scraper (-XC35)

Welding Condition
Iron welding: CO_2 welding
Welding distance: 150 mm (Continuous welding distance)
Welding position: Upper part (150 mm)

XC88/XC89

Reduces cylinder maintenance labor.

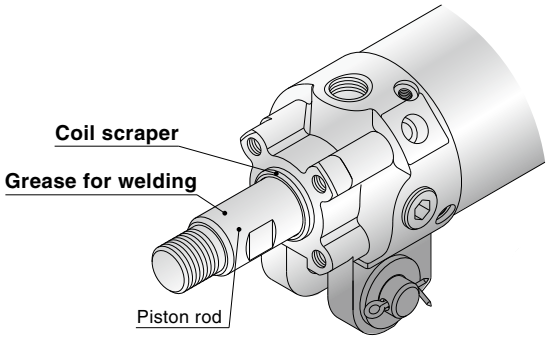
Improved durability reduces the maintenance frequency, number of replacements and man hours.

Piston rod/guide rod materials can be selected for the welding conditions and environment.

Part no.	Piston rod/guide rod material (Hard chrome plating)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●

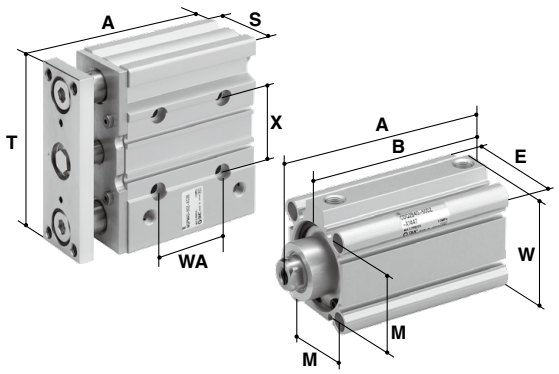
XC91

Improved spatter resistance with coil scraper and welding grease



Part no.	Piston rod/guide rod material (Hard chrome plating)	Coil scraper	Grease for welding
	S45C		
-XC91	●	●	●
-XC35	●	●	—

External and mounting dimensions are compatible with coil scraper type (-XC35).



∗ Dimension symbols are the same as those of each series.

Reduces cylinder maintenance labor.

Improved durability reduces the maintenance frequency, number of replacements and man hours.

Applicable Cylinders

Clamp Cylinder
CKG-XC88/XC89/XC91
p. 7



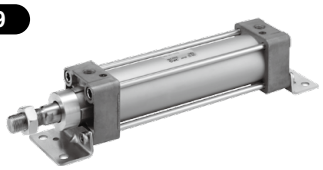
Compact Cylinder
CDQ2-XC88/XC89/XC91
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Air Cylinder
CA2-XC88/XC89/XC91
p. 49



Air Cylinder
MB-XC88/XC89/XC91
p. 59



Compact Guide Cylinder
MGPM-XC88(W)/XC89W/XC91(W)
p. 68



Rotary Clamp Cylinder
Double Guide Type
MK2T-XC89/XC91
p. 78



Spatter Resistant Cylinder for Arc Welding
Clamp Cylinder/Magnetic Field Resistant Auto Switch (Rod Mounting Type)
CKG1-XC88/XC89 -XC91
ø40, ø50, ø63

RoHS

How to Order

Built-in auto switch magnet

Rod material

XC88	Stainless steel 304
XC89	S45C

CKG1 A 50 □ – 100 Y Z – P3DWASC □ – XC89 □

CKG1 A 50 □ – 100 Y Z – P3DWASC □ – XC91 □

Clevis width

A	16.5 mm
B	19.5 mm
C	12.5 mm

Bore size

40	40 mm
50	50 mm
63	63 mm

Thread type

Nil	Rc1/4
TN	NPT1/4
TF	G1/4

Cylinder stroke (mm)

40	50, 75, 100, 125, 150
50	50, 75, 100, 125, 150, 200
63	50, 75, 100, 125, 150, 200

End bracket

Nil	None
Y	Double knuckle joint (M6 without tap)
YA	Double knuckle joint (M6 with tap)

Note) A knuckle pin, cotter pins and flat washers are provided.

Auto switch

Nil	Without auto switch (built-in magnet) Without switch mounting rod
P	Without auto switch (built-in magnet) With switch mounting rod

Note) Select applicable auto switch models from the table below.

Rod material

XC91	S45C

Number of auto switches

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

Cushion

Nil	With air cushion on the unclamped side (head end) (Standard)
W	With air cushion on both ends

Note) The dimensions of the product with the air cushion on both ends are the same as those of the product with the air cushion on the unclamped side (head end).

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

Built-in Auto Switch Magnet Cylinder Part No.

1) Built-in auto switch magnet type without auto switch, without switch mounting rod

Symbol for the auto switch type is "Nil" as shown below.
(Example) CKG1A50-50YZ-XC89

2) Built-in auto switch magnet type without auto switch, with switch mounting rod

Symbol for the auto switch type is "P" as shown below.
(Example) CKG1A50-50YZ-P-XC89

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

Type	Special function	Auto switch model	Applicable magnetic field	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	Magnetic field resistant (2-color indicator)	**P3DWASC**	AC magnetic field (Single-phase AC welding magnetic field)	Pre-wired connector	2-color display	2-wire (3–4)	24 VDC	0.3 m	Relay, PLC
		P3DWASE				2-wire (1–4)			
		P3DWA		Grommet		2-wire		0.5 m	
		P3DWAL						3 m	
		P3DWAZ						5 m	
		P4DWSC		Pre-wired connector		2-wire (3–4)		0.3 m	
		P4DWSE				2-wire (1–4)			
		P4DWL		Grommet		2-wire		3 m	
		P4DWZ						5 m	

Note 1) Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.
Note 2) Refer to page 12 when ordering the auto switch mounting bracket assembly or switch mounting rod assembly.
Note 3) For the D-P3DWA□, the auto switch and auto switch mounting bracket are packed together, (but not assembled).

Spatter Resistant Cylinder for Arc Welding

Clamp Cylinder/General Purpose Auto Switch (Band Mounting/Rod Mounting Type)

CKG1-XC88/XC89 -XC91

ø40, ø50, ø63

RoHS

How to Order

Built-in auto switch magnet

Auto switch mounting type

Nil	Band mounting
P	Rod mounting

Rod material

XC88	Stainless steel 304
XC89	S45C

CKG1 A 50 □ – 100 Y Z – M9BW □ – □ – XC89 □

CKG1 A 50 □ – 100 Y Z – M9BW □ – XC91 □

Clevis width

A	16.5 mm
B	19.5 mm
C	12.5 mm

Bore size

40	40 mm
50	50 mm
63	63 mm

Thread type

Nil	Rc1/4
TN	NPT1/4
TF	G1/4

Cylinder stroke (mm)

40	50, 75, 100, 125, 150
50	50, 75, 100, 125, 150, 200
63	50, 75, 100, 125, 150, 200

End bracket

Nil	None
Y	Double knuckle joint (M6 without tap)
YA	Double knuckle joint (M6 with tap)

Note) A knuckle pin, cotter pins and flat washers are provided as a standard for Y and YA.

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For applicable auto switches, refer to the table below.
∗ Auto switches are shipped together, (but not assembled).

Rod material

XC91	S45C

Cushion

Nil	With air cushion on the unclamped side (head end) (Standard)
W	With air cushion on both ends

Note) The dimensions of the product with the air cushion on both ends are the same as those of the product with the air cushion on the unclamped side (head end).

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

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

Applicable cylinder series	Type	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model	Lead wire length (m)				Applicable load	
					DC		AC		0.5 (Nil)	1 (M)	3 (L)	5 (Z)		
CKG1	Solid state auto switch	Grommet	Yes	2-wire	24 V	5 V, 12 V	—	M9B	●	●	●	○	—	Relay, PLC
								M9BW	●	●	●	○		
								M9BA	○	○	●	○		
	Reed auto switch	Grommet	Yes	2-wire	24 V	12 V	100 V	A93	●	●	●	●		

Note 1) Lead wire length symbol: 0.5 m..... Nil M9BW
1 m..... M M9BWM
3 m..... L M9BWL
5 m..... Z M9BWZ

Note 2) Auto switches marked with "○" are produced upon receipt of order.
Note 3) Refer to page 13 when ordering the auto switch mounting bracket assembly.



Specifications

Bore size (mm)	40	50	63
Fluid	Air		
Proof pressure	1.5 MPa		
Maximum operating pressure	1.0 MPa		
Minimum operating pressure	0.05 MPa		
Ambient and fluid temperatures	–10°C to +60°C (No freezing)		
Piston speed	50 to 500 mm/s		
Cushion Note 1)	Unclamped side (head end): With air cushion		
Speed controller	Equipped on both ends		
Lubrication	Non-lube		
Stroke length tolerance	$^{+1.0}_{0}$		
Mounting Note 2)	Double clevis		

Note 1) The model with air cushion on both ends (Symbol: W) is also available.
Note 2) A clevis pin, cotter pins, flat washers are equipped as a standard.

Clevis width	16.5 mm	CKG1A
	19.5 mm	CKG1B
	12.5 mm	CKG1C

Standard Strokes

Bore size (mm)	Standard stroke (mm)
40	50, 75, 100, 125, 150
50, 63	50, 75, 100, 125, 150, 200

End Bracket/Options

Symbol	Description		Part no.		
			CKG1A series	CKG1B series	CKG1C series
Y	Double knuckle joint (A knuckle pin, cotter pins, flat washers are equipped.)	M6 without tap	CKA-Y04	CKB-Y04	CKC-Y04
YA		M6 with tap	CKA-YA04	CKB-YA04	CKC-YA04

Weight (Basic weight includes the switch mounting rod. At 0 stroke)

Unit: kg

Bore size (mm)	40	50	63
Basic weight	0.76	0.98	1.18
Additional weight per 25 mm of stroke	0.11	0.12	0.14
Double knuckle joint (A knuckle pin, cotter pins, flat washers are equipped.)	0.34		

Calculation
Example) **CKG1□50-100YZ-P-XC88**
- Basic weight ····· 1.03 (ø50)
- Additional weight ····· 0.12/25 mm
- Cylinder stroke ····· 100 mm
- Double knuckle joint ····· 0.34 (Y)

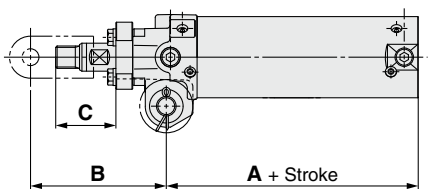
1.03 + 0.12 x 100/25 + 0.34 = 1.85 kg

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)			
				0.3	0.4	0.5	0.6
40	20	OUT	1260	378	504	630	756
		IN	943	283	377	472	566
50	20	OUT	1960	588	784	980	1180
		IN	1650	495	660	825	990
63	20	OUT	3120	934	1250	1560	1870
		IN	2800	840	1120	1400	1680

Comparison of the Dimensions of Each Series



(mm)

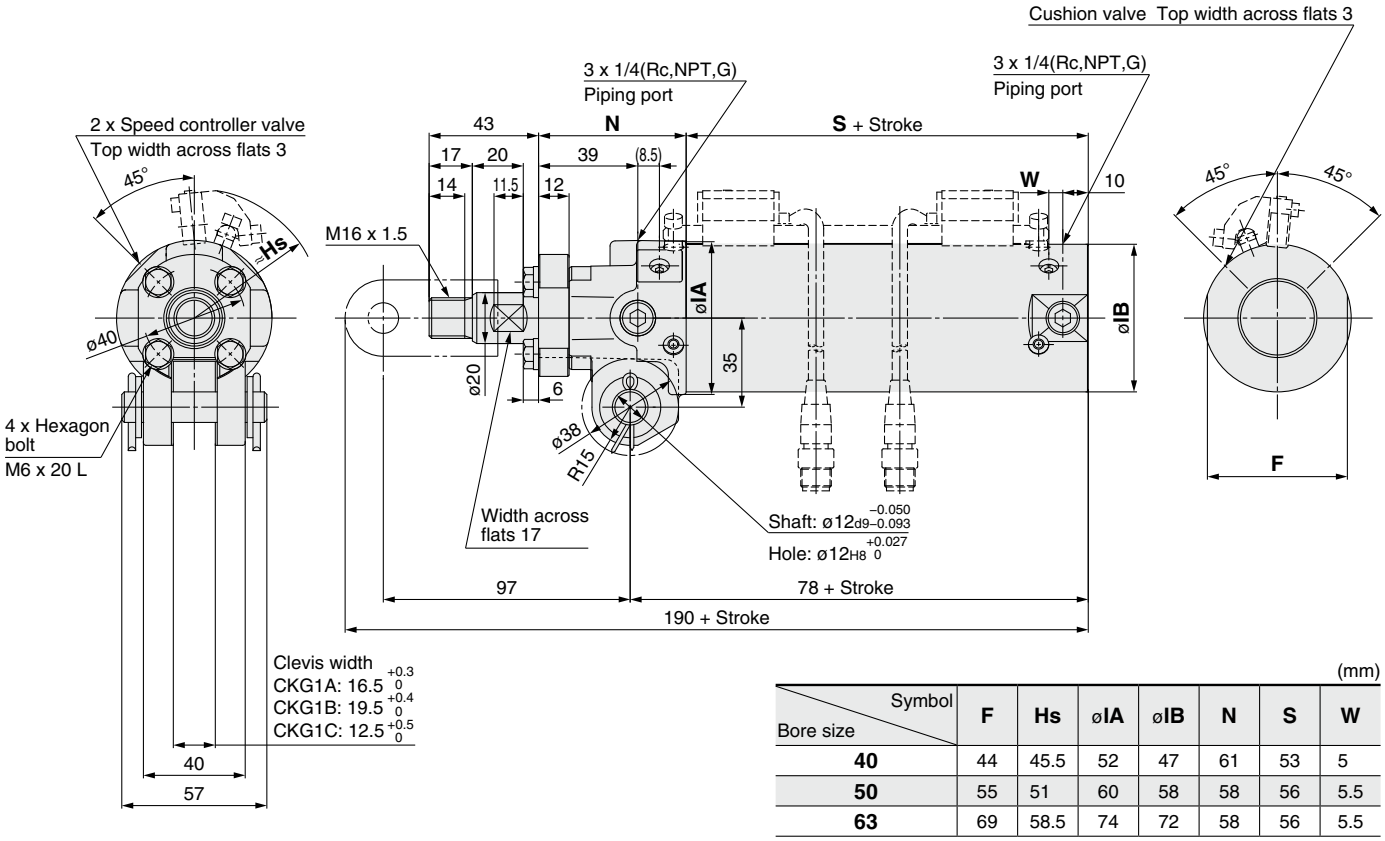
Bore size (mm)	XC88, 89			XC91			Standard		
	A	B	C	A	B	C	A	B	C
40	78	97	43	78	97	52	78	97	52
50	78	97	43	78	97	52	78	97	52
63	78	97	43	78	97	52	78	97	52

∗ At 0 stroke

Bore Size

ø40 to ø63

CKG1□40, 50, 63-XC88□ -XC89□ With auto switch (D-P4DWS□)

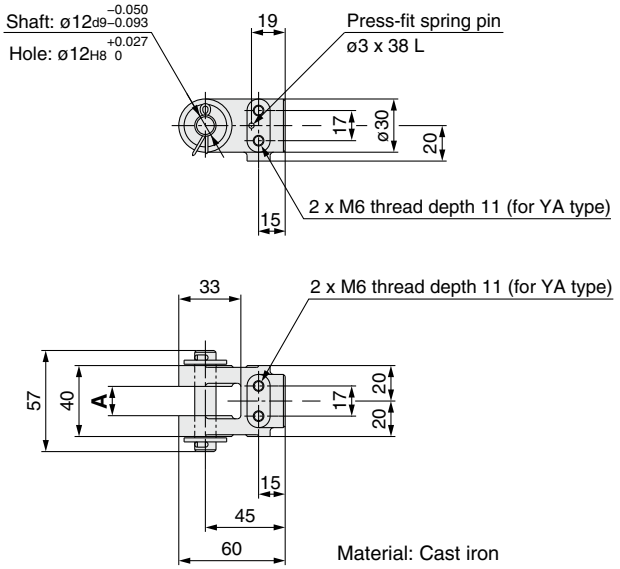


(mm)

Bore size \ Symbol	F	Hs	øIA	øIB	N	S	W
40	44	45.5	52	47	61	53	5
50	55	51	60	58	58	56	5.5
63	69	58.5	74	72	58	56	5.5

End Bracket

Double knuckle joint



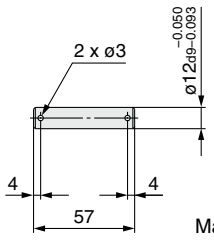
Material: Cast iron

(mm)

Part no.	End bracket symbol	A	Applicable clamp cylinder
CKA-Y04	Y (M6 without tap)	16.5 +0.3 0	CKG1A series
CKA-YA04	YA (M6 with tap)		
CKB-Y04	Y (M6 without tap)	19.5 +0.4 0	CKG1B series
CKB-YA04	YA (M6 with tap)		
CKC-Y04	Y (M6 without tap)	12.5 +0.3 0	CKG1C series
CKC-YA04	YA (M6 with tap)		

Note 1) A knuckle pin, cotter pins, flat washers and a spring pin are attached to the double knuckle joint.

Pin



Material: Carbon steel

Part no.	Application
CK-P04	Knuckle pin Clevis pin

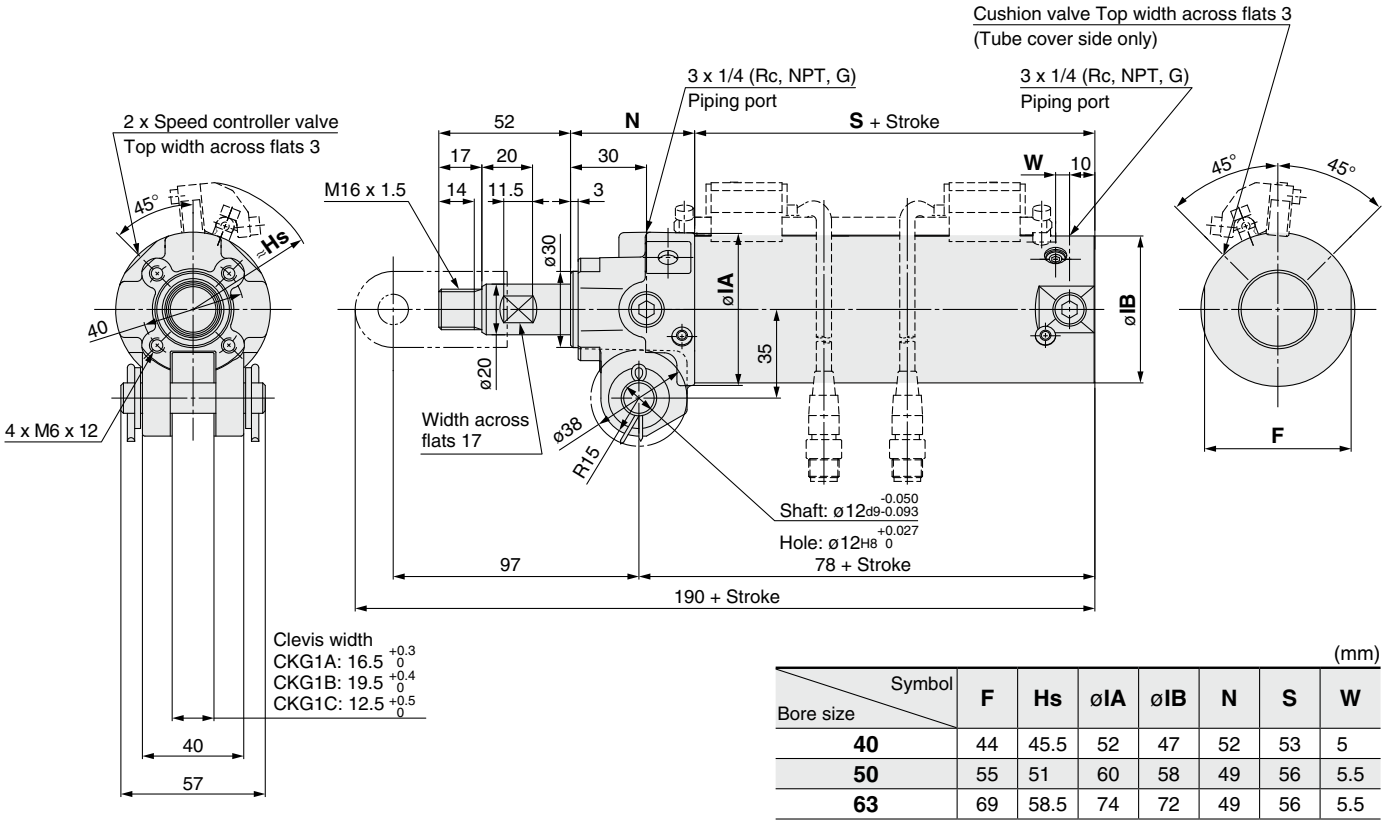
Note) Cotter pins and flat washers are attached to the pin.

CKG1-XC91

Bore Size

ø40 to ø63

CKG1□40, 50, 63-XC91□ With auto switch (D-P4DWS□)



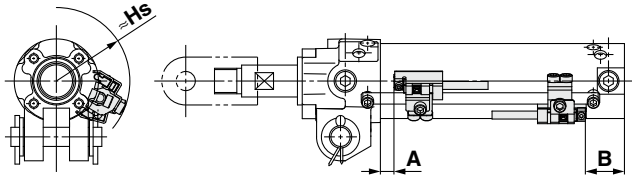
(mm)

Bore size \ Symbol	F	Hs	øIA	øIB	N	S	W
40	44	45.5	52	47	52	53	5
50	55	51	60	58	49	56	5.5
63	69	58.5	74	72	49	56	5.5

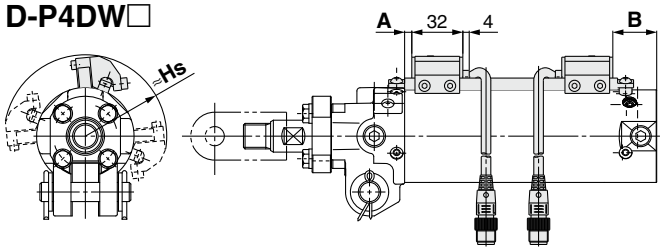
CKG1-XC88/XC89 -XC91
Magnetic Field Resistant Auto Switch Mounting

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

Rod mounting
D-P3DWA□



D-P4DW□



Auto Switch Mounting Position and Mounting Height

Unit: mm

Auto switch model	Symbol	Auto switch set value and mounting height		
		ø40	ø50	ø63
D-P3DWA□	A	8.5	6	6
	B	23.5	29	29
	Hs	46.5	52	59
D-P4DW□	A	8	4.5	4.5
	B	20.5	27.5	27.5
	Hs	45.5	51	58.5

Note 1) The mounting position should be referred for reference only for the auto switch mounting position at the stroke end detection. Adjust the auto switch after confirming the operation to set actually.
Note 2) A/B dimensions are the distance from the standard position (left drawing) to the end surface of the auto switch.
Note 3) The auto switch mounting position is temporarily set at the time of shipping from our factory. Change it to the desired position in accordance to your facility.

Minimum Stroke for Auto Switch Mounting

Unit: mm

Auto switch model	With 1 pc.	With 2 pcs.	
		Different surfaces	Same surface
D-P3DWA□	50	50	
D-P4DW□			

Note) When two D-P3DWA□ are mounted to the cylinder with stroke 50 mm, mount them on different surfaces.

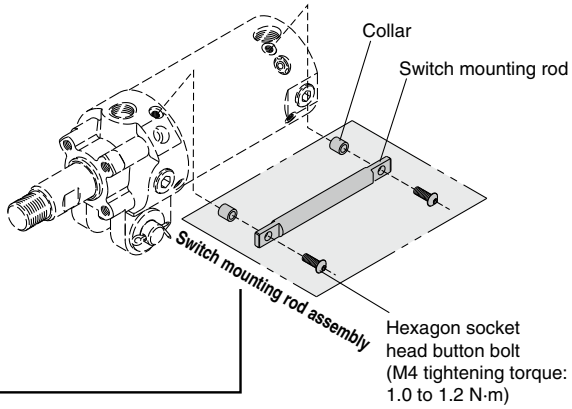
Operating Range

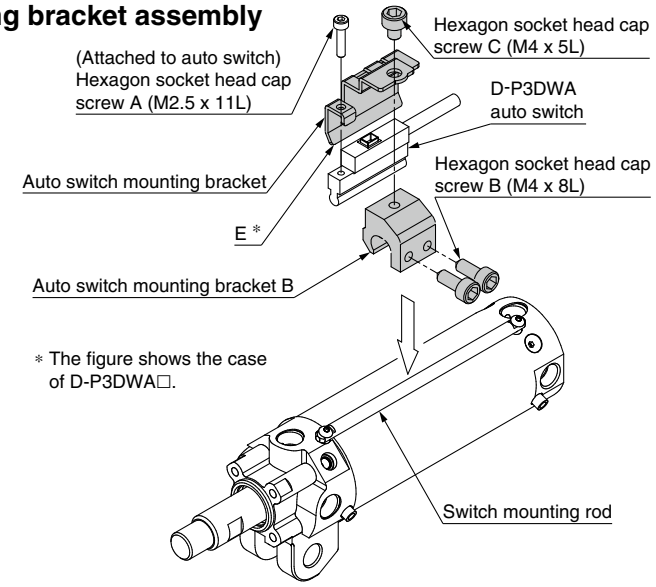
Unit: mm

Auto switch model	Bore size		
	40	50	63
D-P3DWA□	5.5	5.5	5.5
D-P4DW□	4	4	4.5

Auto Switch Mounting Bracket/Part No.

Switch mounting rod assembly/Auto switch mounting bracket assembly





Switch Mounting Rod Assembly/Part No.

Applicable series	Applicable clamp cylinder	Part no.
CKG1□40/50/63 series	CKG1□40-50 CKG1□50-50/CKP1□50-50 CKG1□63-50/CKP1□63-50	CKG40-RZ050
	CKG1□40-75 CKG1□50-75/CKP1□50-75 CKG1□63-75/CKP1□63-75	CKG40-RZ075
	CKG1□40-100 CKG1□50-100/CKP1□50-100 CKG1□63-100/CKP1□63-100	CKG40-RZ100
	CKG1□40-125 CKG1□50-125/CKP1□50-125 CKG1□63-125/CKP1□63-125	CKG40-RZ125
	CKG1□40-150 CKG1□50-150/CKP1□50-150 CKG1□63-150/CKP1□63-150	CKG40-RZ150

* Mount the part E of the auto switch mounting bracket so that it is in contact with the cylinder tube.
Note 1) The tightening torque for a hexagon socket head cap screw (M2.5) is 0.2 to 0.3 N·m. Hold the shorter side of a hexagon wrench, and turn it to tighten. (Too much tightening may break the switch)
Note 2) Tighten the hexagon socket head cap screws B and C (M4) with a tightening torque of 1 to 1.2 N·m.

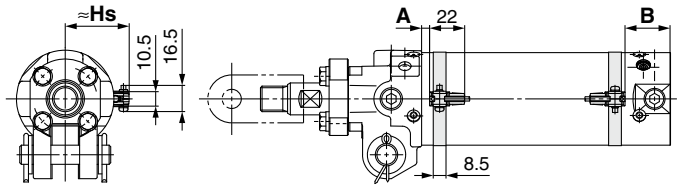
Auto Switch Mounting Bracket Assembly/Part No.

Applicable cylinder series	Applicable auto switch model	Auto switch mounting bracket part no.		
		40	50	63
CKG1 series	D-P3DWA□	BK7-040S		
	D-P4DW□	BK1T-040		

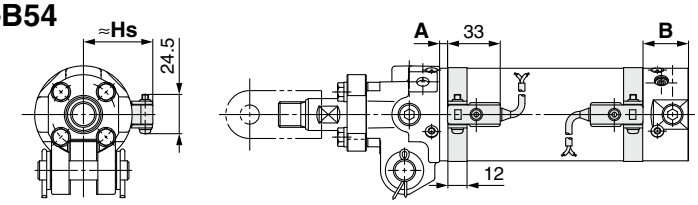
CKG1-XC88/XC89 -XC91
General Purpose Auto Switch Mounting

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

Band mounting
D-M9B/A93(W)



D-B54



⚠ Caution

For the precautions on the auto switches, product specifications, refer to the Web Catalog.

Minimum Stroke for Auto Switch Mounting (mm)

Auto switch model	With 1 pc.	With 2 pcs. (Different surfaces)	With 2 pcs. (Same surface)
D-M9B D-M9BW D-M9BA D-A93	50	50	50
D-B54	50	50	75

Auto Switch Mounting Position and Mounting Height (mm)

Auto switch model	Symbol	Auto switch set value and mounting height		
		ø40	ø50	ø63
D-M9B	**A**	15	11.5	11.5
D-M9BW	**B**	27.5	34.5	34.5
D-M9BA	**Hs**	35.5	41	48
D-A93	**A**	11	7.5	7.5
	B	23.5	30.5	30.5
	Hs	35.5	41	48
D-B54	**A**	5.5	2	2
	B	18	25	25
	Hs	38	43.5	50.5

Note 1) The mounting position should be referred for reference only for the auto switch mounting position at the stroke end detection. Adjust the auto switch after confirming the operating conditions in the actual setting.

Note 2) A/B dimensions are the distance from the standard position (left drawing) to the end surface of the auto switch.

Note 3) The auto switch mounting position is temporarily set at the time of shipping from our factory. Change it to the desired position in accordance to your facility.

Auto Switch Mounting Bracket Assembly/Part No.

Auto switch model	Bore size (mm)		
	ø40	ø50	ø63
D-M9B D-M9BW D-M9BA D-A93	Note) BMA3-040	Note) BMA3-050	Note) BMA3-063
D-B54	BA-04	BA-05	BA-06

Note) This is the set part number for the auto switch mounting band (BMA2-□□□A) and holder set (BJ5-1/switch bracket: transparent). The switch bracket (nylon) cannot be used in environments exposed to alcohol, chloroform, methylamines, hydrochloric acid and sulfuric acid, as this part will deteriorate.
Please consult with SMC regarding other chemicals.

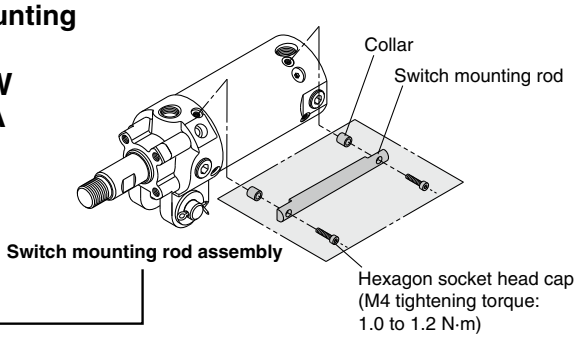
Operating Range

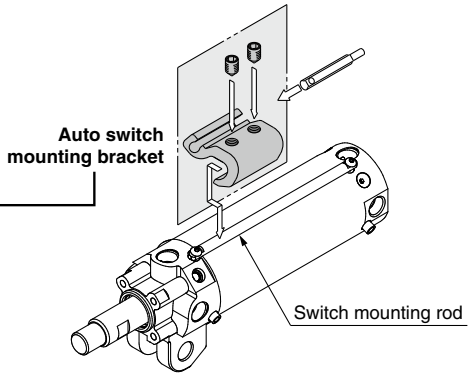
(mm)

Auto switch model	Bore size		
	40	50	63
D-M9B D-M9BW D-M9BA	5.5	6.5	7
D-A93	8	8	9
D-B54	10	10	11

∗ Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.

Rod mounting
D-M9B
D-M9BW
D-M9BA
D-A93





• Switch Mounting Rod Assembly/Part No.

Applicable series	Applicable clamp cylinder	Part no.
CKG1□40/50/63 series	CKG1□40-50Z/CKG1□50-50Z CKG1□63-50Z	CKG40-RZ050
	CKG1□40-75Z/CKG1□50-75Z CKG1□63-75Z	CKG40-RZ075
	CKG1□40-100Z/CKG1□50-100Z CKG1□63-100Z	CKG40-RZ100
	CKG1□40-125Z/CKG1□50-125Z CKG1□63-125Z	CKG40-RZ125
	CKG1□40-150Z/CKG1□50-150Z CKG1□63-150Z	CKG40-RZ150
	CKG1□50-200Z/CKG1□63-200Z	CKG40-RZ200

• Auto Switch Mounting Brackets/Part No.

Applicable cylinder series	Applicable auto switch model	Part no.		
		40	50	63
CKG1 series	D-P3DWA□	BK7-040S		
	D-P4DW□	BK1T-040		
	D-M9□ D-A9□	BA7-040		

SMC

Spatter Resistant Cylinder for Arc Welding
Clamp Cylinder (Rod Mounting Type)
CKGA-XC88/XC89 -XC91
ø80, ø100

RoHS

How to Order

Bore size

80	80 mm
100	100 mm

Cylinder stroke (mm)

80	50, 75, 100, 125, 150, 175, 200
100	50, 75, 100, 125, 150, 175, 200

Rod material

XC88	Stainless steel 304
XC89	S45C

CKGA 80 – 100 Y – P3DWASC □ – XC89

CKGA 80 – 100 Y – P3DWASC □ – XC91

Built-in auto switch magnet

Clevis width: 28 mm

End bracket

Nil	None
Y	Double knuckle joint (with tap)

Note) A knuckle pin, cotter pins and flat washers are provided for Y.

Auto switch

Nil	Without auto switch (Built-in magnet) Without switch mounting rod
P	Without auto switch (Built-in magnet) With switch mounting rod

Note) Select applicable auto switch models from the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.

Rod material

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

Built-in Auto Switch Magnet Cylinder Part No.

1) Built-in auto switch magnet type without auto switch, without switch mounting rod
Symbol for the auto switch type is "Nil" as shown below.
(Example) CKGA80-50Y-XC89

2) Built-in auto switch magnet type without auto switch, with switch mounting rod
Symbol for the auto switch type is "P" as shown below.
(Example) CKGA80-50Y-P-XC89

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

Type	Special function	Auto switch model	Applicable magnetic field	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	Magnetic field resistant (2-color indicator)	**P3DWASC**	AC magnetic field (Single-phase AC welding magnetic field)	Pre-wired connector	2-color display	2-wire (3–4)	24 VDC	0.3 m	Relay, PLC
		P3DWASE				2-wire (1–4)			
		P3DWA		Grommet		2-wire		0.5 m	
		P3DWAL						3 m	
		P3DWAZ						5 m	
		P4DWSC		Pre-wired connector		2-wire (3–4)		0.3 m	
		P4DWSE				2-wire (1–4)			
		P4DWL		Grommet		2-wire		3 m	
		P4DWZ						5 m	

Note 1) Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.
Note 2) Refer to page 12 when ordering the auto switch mounting bracket assembly or switch mounting rod assembly.
Note 3) For D-P3DWA□, the auto switch and auto switch mounting bracket are packed together (not assembled).

Specifications

Bore size (mm)	**80**	**100**
Fluid	Air	
Proof pressure	1.5 MPa	
Maximum operating pressure	1.0 MPa	
Minimum operating pressure	0.05 MPa	
Ambient and fluid temperatures	–10°C to +60°C (No freezing)	
Piston speed	50 to 500 mm/s	
Cushion	With air cushion on both ends	
Speed controller	Equipped on both ends	
Lubrication	Non-lube	
Stroke length tolerance	$^{+1.0}_{0}$	
Mounting Note)	Double clevis	

Note) A clevis pin, cotter pins and flat washers are provided.

Clevis width	28 mm	CKGA

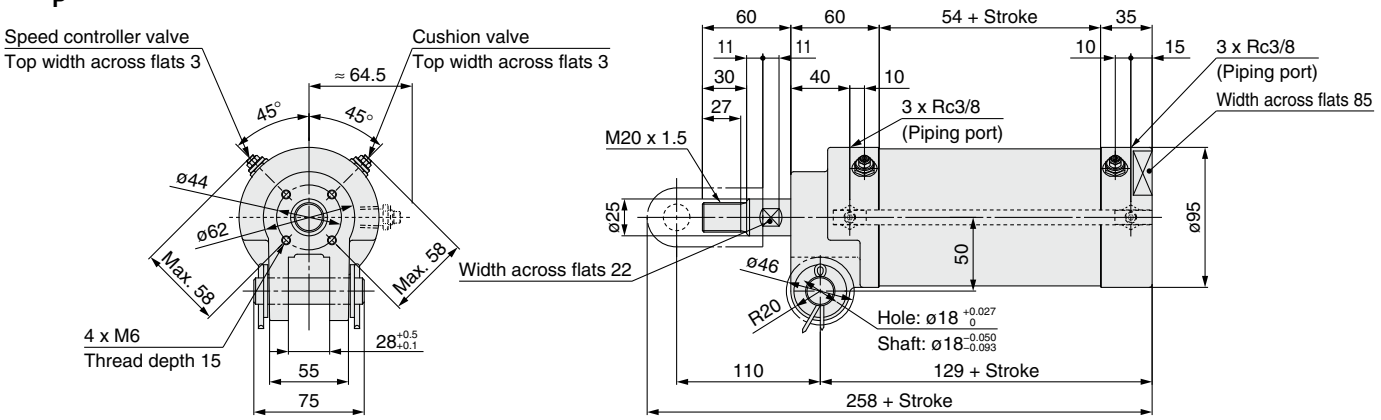
Comparison of the Dimensions of Each Series

The -XC88/XC89/XC91 and standard product have the same dimensions.

Bore Size

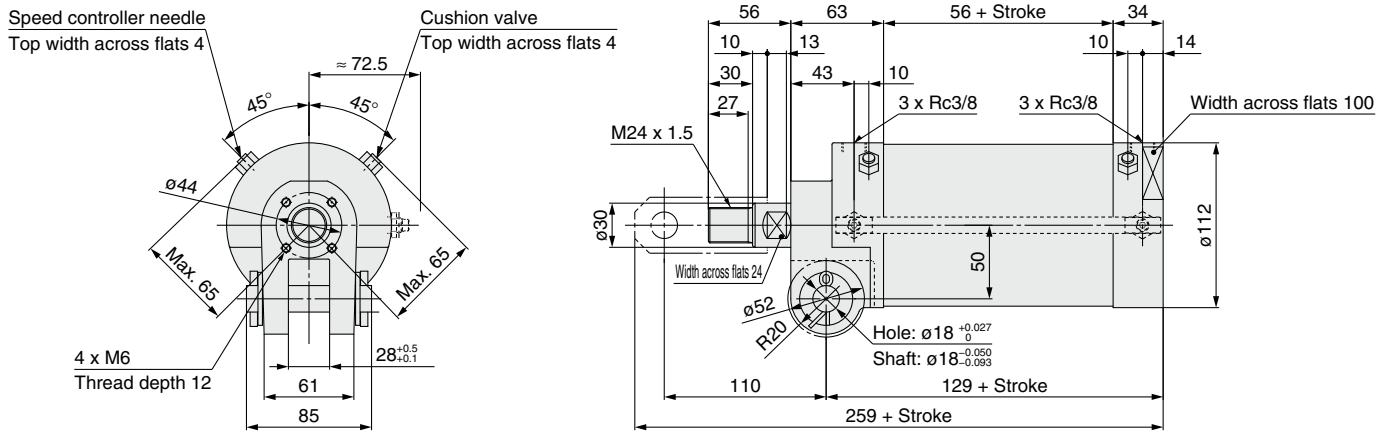
ø80, ø100

CK$^{G}_{P}$A80



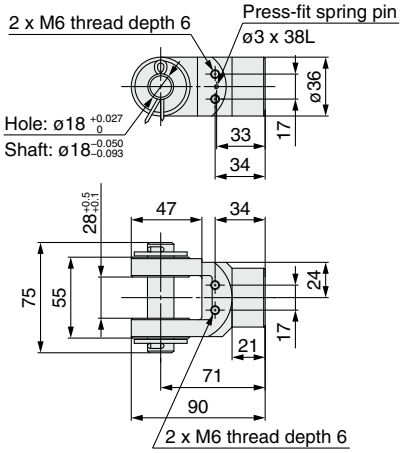
∗ Minimum stroke available with two auto switches is 50 mm.

CK$^{G}_{P}$A100

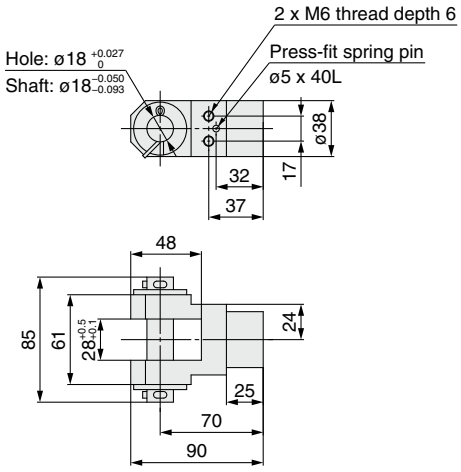


Double knuckle joint

ø80



ø100



Clamp Cylinder Bracket Order No.

■ Double knuckle joint

Applicable cylinder	Parts no.
CKGA80/CKPA80	C1K80-18-9261P-R
CKGA100/CKPA100	C1KA0-18-9262P-R

∗ Knuckle pin, cotter pin, flat washer, and spring pin are attached to the double knuckle joint as a standard.

■ Pin

Applicable cylinder	Parts no.
CKGA80/CKPA80	C1K80-23-9034P-R
CKGA100/CKPA100	C1KA0-23-9035P-R

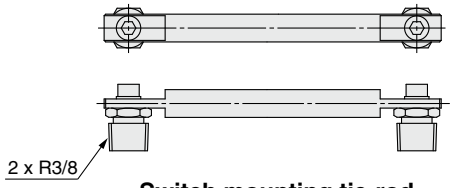
∗ Cotter pin and flat washer are provided as a standard.

Auto Switch Mounting Brackets/Part No.

■ Switch Mounting Rod Assembly/Part No.

Applicable cylinder	Parts no.
CKGA80-50 **CKPA80-50**	C1K80E-B0467-050-R
CKGA80-75 **CKPA80-75**	C1K80E-B0467-075-R
CKGA80-100 **CKPA80-100**	C1K80E-B0467-100-R
CKGA80-125 **CKPA80-125**	C1K80E-B0467-125-R
CKGA80-150 **CKPA80-150**	C1K80E-B0467-150-R
CKGA100-50 **CKPA100-50**	CK-A0E-B4657-050-R
CKGA100-75 **CKPA100-75**	CK-A0E-B4657-075-R
CKGA100-100 **CKPA100-100**	CK-A0E-B4657-100-R
CKGA100-125 **CKPA100-125**	CK-A0E-B4657-125-R
CKGA100-150 **CKPA100-150**	CK-A0E-B4657-150-R

∗ Mounting plugs, hexagon socket head cap screws, spring washers, and flat washers are provided as a standard. (2 pcs. each)



Switch mounting tie-rod

■ Auto Switch Mounting Brackets/Part No.

Applicable cylinder	Applicable auto switch	Mounting bracket part no.
CKGA80/CKGA100	D-P3DWA□	BK7-080S
CKGA80/CKGA100	D-P4DW□	BK9-080
CKPA80/CKPA100	D-P79WSE D-P74L/Z	BK10-080

Spatter Resistant Cylinder for Arc Welding
Compact Cylinder: Standard, Double Acting, Single Rod
CDQ2-XC88/XC89 -XC91
ø32, ø40, ø50, ø63, ø80, ø100

RoHS

How to Order

Built-in auto switch magnet

Rod material

XC88	Stainless steel 304
XC89	S45C

CDQ2 B 32 □ – 30 D □ Z – M9BW □ – XC89

CDQ2 B 32 □ – 30 D □ Z – M9BW □ – XC91

Mounting

B	Through-hole (Standard)
A	Both ends tapped
L	Foot
F	Rod flange
G	Head flange
D	Double clevis

∗ Mounting brackets are shipped together (but not assembled).

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 18 for standard strokes and intermediate strokes.

Action

D	Double acting

Body option

Nil	Standard (Rod end female thread)
F	With boss on head end
C	With rubber bumper
M	Rod end male thread

∗ Combination of body options ("CM", "FC", "FM", "FCM") is available.

Auto switch mounting groove

Z	4 surfaces

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Number of auto switches

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

Rod material

XC91	S45C

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

Built-in Auto Switch Magnet Cylinder Model

If a built-in auto switch magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDQ2L32-25DZ-XC89

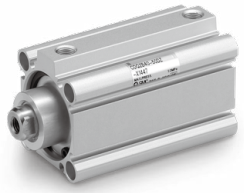
Applicable Auto Switches/Refer to the **Web Catalog** for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV	M9PA	○	○	●	○	—	○		
				2-wire	12 V		M9BAV	M9BA	○	○	●	○	—	○	—	
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		—	P3DWA	●	—	●	●	—	●		
							—	P4DW	—	—	●	●	—	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	100 V	A93V∗1	A93	●	●	●	—	—	—	—	Relay, PLC
					5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.



Specifications

Pneumatic type

Bore size (mm)		32	40	50	63	80	100
Action		Double acting, Single rod					
Fluid		Air					
Proof pressure		1.5 MPa					
Maximum operating pressure		1.0 MPa					
Minimum operating pressure		0.05 MPa					
Ambient and fluid temperatures		–10 to 60°C (No freezing)					
Lubrication		Not required (Non-lube)					
Piston speed		50 to 500 mm/s					
Allowable kinetic energy (J)	**Standard**	0.15	0.26	0.46	0.77	1.36	2.27
	With rubber bumper	0.29	0.52	0.91	1.54	2.71	4.54
Stroke length tolerance		$^{+1.0\ mm\ Note)}_{0}$					

Note) Stroke length tolerance does not include the amount of bumper change.

Standard Strokes

Pneumatic type

(mm)

Bore size	Standard stroke
32, 40	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
50 to 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

• For long strokes exceeding the standard stroke range, refer to page 27.
• For intermediate strokes, refer below.

Mounting Brackets/Part No.

Bore size (mm)	Model	Foot Note 1)	Flange	Double clevis
32	CDQ2□□-□DZ	CQ-L032-XC35	CQ-F032-XC35	CQ-D032
40	CDQ2□□-□DZ	CQ-L040	CQ-F040	CQ-D040
50	CDQ2□□-□DZ	CQ-L050	CQ-F050	CQ-D050
63	CDQ2□□-□DZ	CQ-L063	CQ-F063	CQ-D063
80	CDQ2□□-□DZ	CQ-L080	CQ-F080	CQ-D080
100	CDQ2□□-□DZ	CQ-L100	CQ-F100	CQ-D100

Note 1) Order two foot brackets per cylinder. (except ø32)
For ø32 type, order 1 piece per cylinder. (Part number for a set of 2 foot brackets)
Note 2) Parts belonging to each bracket are as follows.
Foot or Flange: Body mounting bolts
Double clevis: Clevis pin, Type C retaining rings for axis, Body mounting bolts

Manufacture of Intermediate Strokes

Spacer-installed type: Standard model number

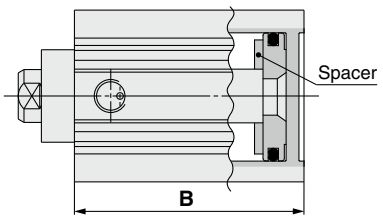
- **A spacer is installed on the standard strokes.**
- **Available in 1 mm increments**
- **A spacer is installed on tubes with a stroke longer than the specified stroke (◆).**

◆: Standard stroke

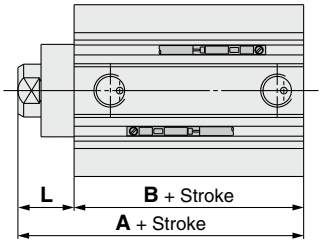
Bore size (mm)	Stroke range	Type	Stroke																																
			5	10	15	20	25	30	35	40	45	50	75	100																					
32, 40	1 to 99	Spacer-installed type 1	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆
50 to 100	1 to 99		◎	◎	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆	◎	◆

Ordering example: ø32-57 mm stroke, with through-hole and without auto switch

Type		Spacer-installed type 1
Part no.		Standard model number
Ordering example	Order no.	**CDQ2B32-57DZ-XC89**
	Description	• Uses a standard stroke (75 mm) tube. • Makes 57 mm stroke with 18 mm spacer inside. • The B dimension is 108 mm.



Comparison of the Dimensions of Each Series



(mm)

Bore size (mm)	XC88, 89			XC91			XC35			Standard		
	A	**B**	**L**	**A**	**B**	**L**	**A**	**B**	**L**	**A**	**B**	**L**
32	50	33	17	45	33	12	45	33	12	40	33	7
40	56.5	39.5	17	51.5	39.5	12	51.5	39.5	12	46.5	39.5	7
50	58.5	40.5	18	53.5	40.5	13	53.5	40.5	13	48.5	40.5	8
63	64	46	18	59	46	13	59	46	13	54	46	8
80	73.5	53.5	20	68.5	53.5	15	68.5	53.5	15	63.5	53.5	10
100	85	63	22	80	63	17	80	63	17	75	63	12

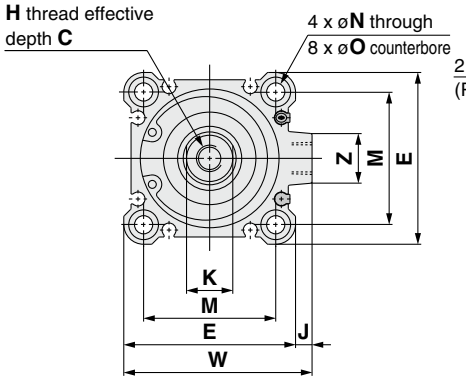
∗ At 0 stroke

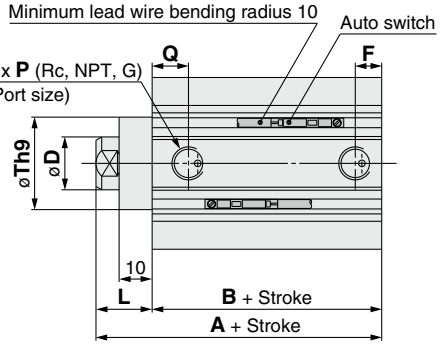
Bore Size

ø32 to ø50

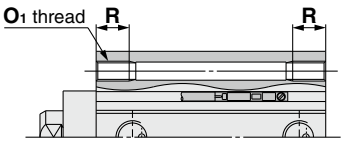
CDQ2□-XC88 -XC89

Through-hole (Standard): CDQ2B





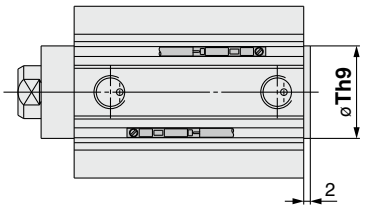
Both ends tapped: CDQ2A



Both Ends Tapped (mm)

Bore size (mm)	O_1	R
32	M6 x 1.0	10
40	M6 x 1.0	10
50	M8 x 1.25	14

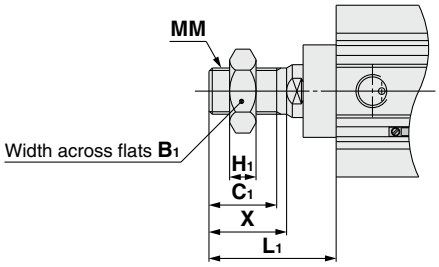
With boss on head end



With Boss on Head End (mm)

Bore size (mm)	Th9
32	$21^{\ 0}_{-0.052}$
40	$28^{\ 0}_{-0.052}$
50	$35^{\ 0}_{-0.062}$

Rod end male thread



Rod End Male Thread (mm)

Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
32	22	20.5	8	38.5	M14 x 1.5	23.5
40	22	20.5	8	38.5	M14 x 1.5	23.5
50	27	26	11	43.5	M18 x 1.5	28.5

Standard

(mm)

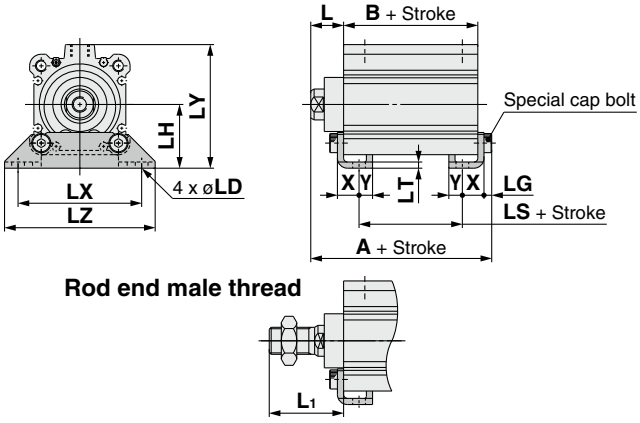
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	P	Q	Th9	W	Z
32	5 to 50, 75, 100	50	33	13	16	45	7.5	M8 x 1.25	4.5	14	17	34	5.5	9 depth 7	1/8	10	$23^{\ 0}_{-0.052}$	49.5	14
40	5 to 50, 75, 100	56.5	39.5	13	16	52	7.5	M8 x 1.25	5	14	17	40	5.5	9 depth 7	1/8	12.5	$28^{\ 0}_{-0.052}$	57	15
50	10 to 50, 75, 100	58.5	40.5	15	20	64	10.5	M10 x 1.5	7	17	18	50	6.6	11 depth 8	1/4	10.5	$35^{\ 0}_{-0.062}$	71	19

Note 1) The external dimensions with rubber bumper are same as those of the standard, as shown above.

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.

Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



Rod end male thread

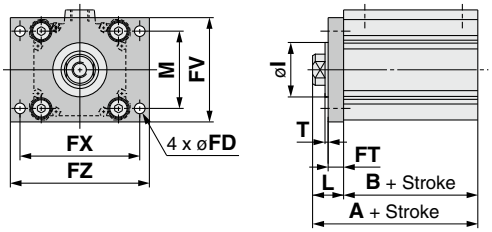
Foot

(mm)

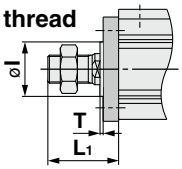
Bore size (mm)	A	B	LS	L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
32	57.2	33	17	17	38.5	6.6	4	30	3.2	57	57	71	11.2	5.8
40	63.7	39.5	23.5	17	38.5	6.6	4	33	3.2	64	64	78	11.2	7
50	66.7	40.5	17.5	18	43.5	9	5	39	3.2	79	78	95	14.7	8

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2F



Rod end male thread



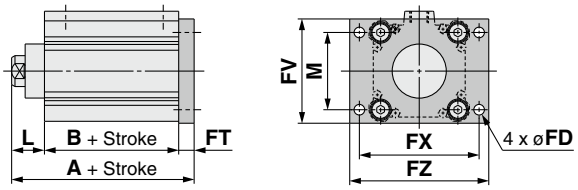
Rod Flange

(mm)

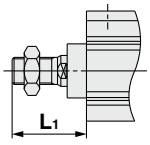
Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L1	M	I	T
32	50	33	5.5	8	48	56	65	17	38.5	34	23	2
40	56.5	39.5	5.5	8	54	62	72	17	38.5	40	28	2
50	58.5	40.5	6.6	9	67	76	89	18	43.5	50	35	1

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2G



Rod end male thread



Head Flange

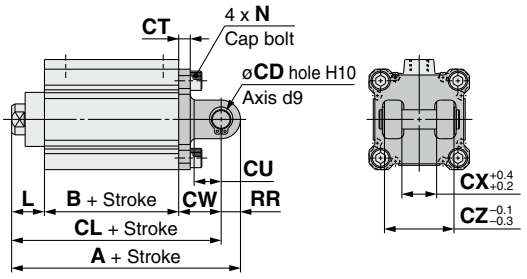
(mm)

Bore size (mm)	A
32	58
40	64.5
50	67.5

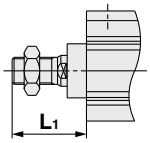
Flange bracket material: Carbon steel
Surface treatment: Nickel plating

∗ The dimensions except A are the same as those of the rod flange.

Double clevis: CDQ2D



Rod end male thread



Double Clevis

(mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L1	N	RR
32	80	33	70	10	5	14	20	18	36	17	38.5	M6 x 1.0	10
40	88.5	39.5	78.5	10	6	14	22	18	36	17	38.5	M6 x 1.0	10
50	100.5	40.5	86.5	14	7	20	28	22	44	18	43.5	M8 x 1.25	14

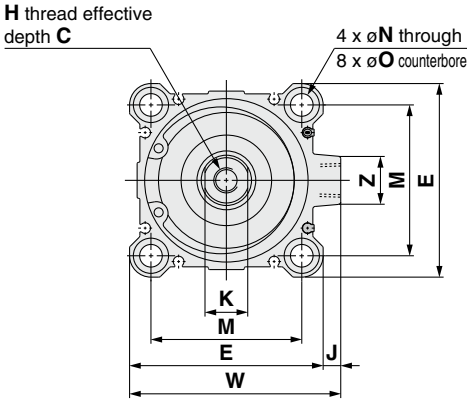
Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

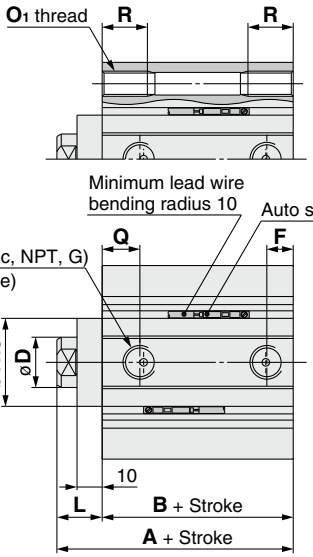
ø63 to ø100

CDQ2□-XC88 -XC89

Through-hole (Standard): CDQ2B



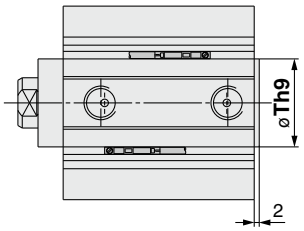
Both ends tapped: CDQ2A



Both Ends Tapped (mm)

Bore size (mm)	O_1	R
63	M10 x 1.5	18
80	M12 x 1.75	22
100	M12 x 1.75	22

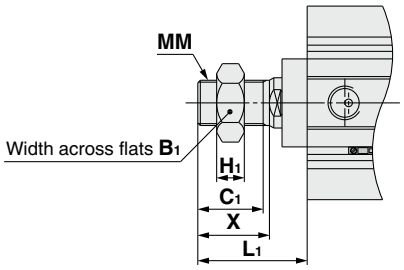
With boss on head end



With Boss on Head End (mm)

Bore size (mm)	Th9
63	$35^{\ 0}_{-0.062}$
80	$43^{\ 0}_{-0.062}$
100	$59^{\ 0}_{-0.074}$

Rod end male thread



Rod End Male Thread (mm)

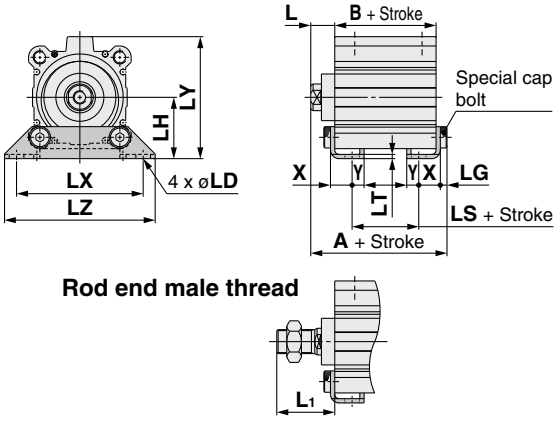
Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
63	27	26	11	43.5	M18 x 1.5	28.5
80	32	32.5	13	53.5	M22 x 1.5	35.5
100	41	32.5	16	53.5	M26 x 1.5	35.5

Standard (mm)

Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	P	Q	Th9	W	Z
63	10 to 50, 75, 100	64	46	15	20	77	10.5	M10 x 1.5	7	17	18	60	9	14 depth 10.5	1/4	15	$35^{\ 0}_{-0.062}$	84	19
80	10 to 50, 75, 100	73.5	53.5	21	25	98	12.5	M16 x 2.0	6	22	20	77	11	17.5 depth 13.5	3/8	16	$43^{\ 0}_{-0.062}$	104	25
100	10 to 50, 75, 100	85	63	27	30	117	13	M20 x 2.5	6.5	27	22	94	11	17.5 depth 13.5	3/8	23	$59^{\ 0}_{-0.074}$	123.5	25

Note 1) The external dimensions with rubber bumper are same as those of the standard, as shown above.
∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



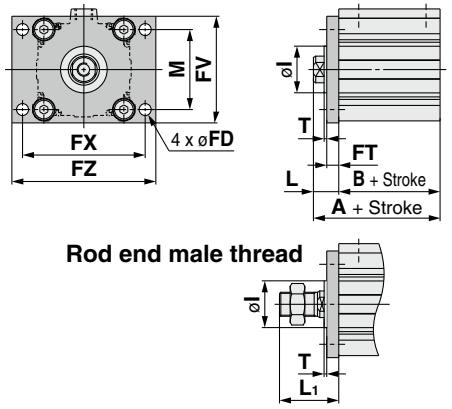
Foot

(mm)

Bore size (mm)	A	B	LS	L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
63	72.2	46	20	18	43.5	11	5	46	3.2	95	91.5	113	16.2	9
80	85	53.5	23.5	20	53.5	13	7	59	4.5	118	114	140	19.5	11
100	98	63	29	22	53.5	13	7	71	6	137	136	162	23	12.5

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2F



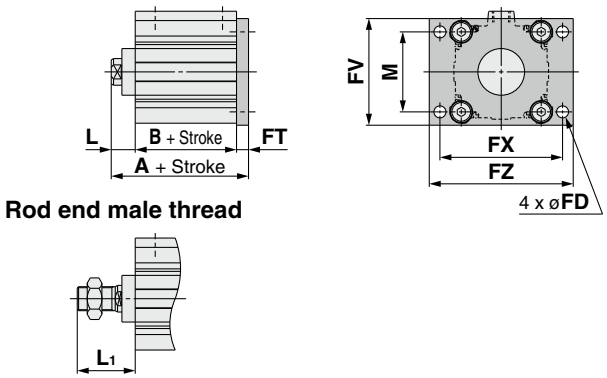
Rod Flange

(mm)

Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L1	M	I	T
63	64	46	9	9	80	92	108	18	43.5	60	35	1
80	73.5	53.5	11	11	99	116	134	20	53.5	77	—	—
100	85	63	11	11	117	136	154	22	53.5	94	—	—

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2G



Head Flange

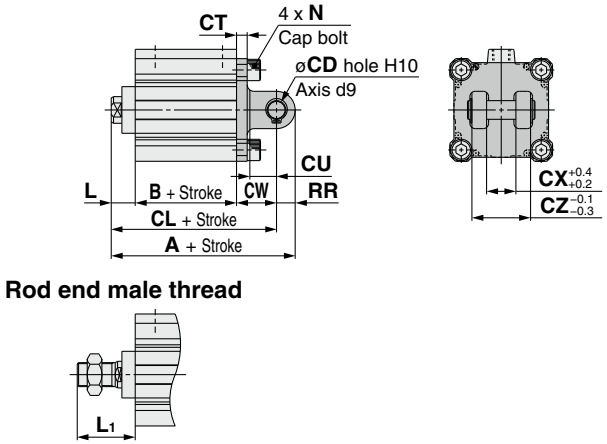
(mm)

Bore size (mm)	A
63	73
80	84.5
100	96

∗ The dimensions except A are the same as those of the rod flange.

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Double clevis: CDQ2D



Double Clevis

(mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L1	N	RR
63	108	46	94	14	8	20	30	22	44	18	43.5	M10 x 1.5	14
80	129.5	53.5	111.5	18	10	27	38	28	56	20	53.5	M12 x 1.75	18
100	152	63	130	22	13	31	45	32	64	22	53.5	M12 x 1.75	22

Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

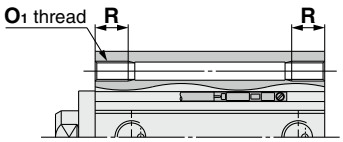
CDQ2-XC91

Bore Size

ø32 to ø50

CDQ2□-XC91

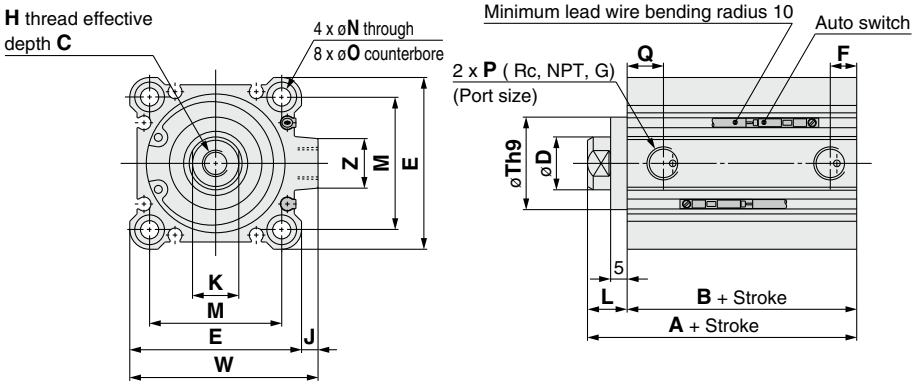
Both ends tapped: CDQ2A



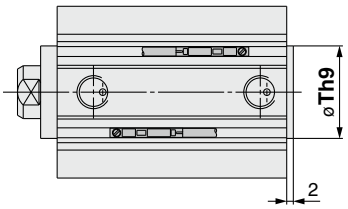
Both Ends Tapped (mm)

Bore size (mm)	O_1	R
32	M6 x 1.0	10
40	M6 x 1.0	10
50	M8 x 1.25	14

Through-hole (Standard): CDQ2B



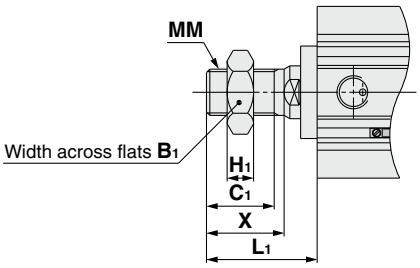
With boss on head end



With Boss on Head End (mm)

Bore size (mm)	Th9
32	$21^{\ 0}_{-0.052}$
40	$28^{\ 0}_{-0.052}$
50	$35^{\ 0}_{-0.062}$

Rod end male thread



Rod End Male Thread (mm)

Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
32	22	20.5	8	38.5	M14 x 1.5	23.5
40	22	20.5	8	38.5	M14 x 1.5	23.5
50	27	26	11	43.5	M18 x 1.5	28.5

Standard

(mm)

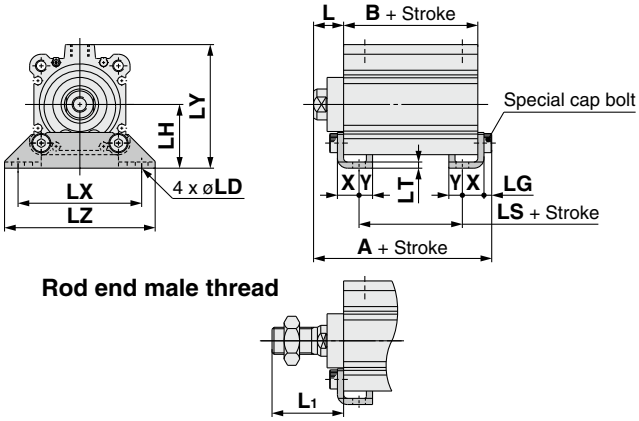
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	P	Q	Th9	W	Z
32	5 to 50, 75, 100	45	33	13	16	45	7.5	M8 x 1.25	4.5	14	12	34	5.5	9 depth 7	1/8	10	$23^{\ 0}_{-0.052}$	49.5	14
40	5 to 50, 75, 100	51.5	39.5	13	16	52	7.5	M8 x 1.25	5	14	12	40	5.5	9 depth 7	1/8	12.5	$28^{\ 0}_{-0.052}$	57	15
50	10 to 50, 75, 100	53.5	40.5	15	20	64	10.5	M10 x 1.5	7	17	13	50	6.6	11 depth 8	1/4	10.5	$35^{\ 0}_{-0.062}$	71	19

Note 1) The external dimensions with rubber bumper are same as those of the standard, as shown above.

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.

Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



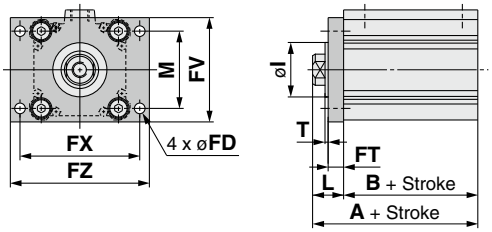
Rod end male thread

Foot (mm)

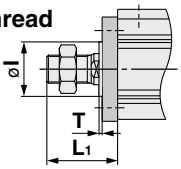
Bore size (mm)	A	B	LS	L	L_1	LD	LG	LH	LT	LX	LY	LZ	X	Y
32	52.2	33	17	12	38.5	6.6	4	30	3.2	57	57	71	11.2	5.8
40	58.7	39.5	23.5	12	38.5	6.6	4	33	3.2	64	64	78	11.2	7
50	61.7	40.5	17.5	13	43.5	9	5	39	3.2	79	78	95	14.7	8

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2F



Rod end male thread

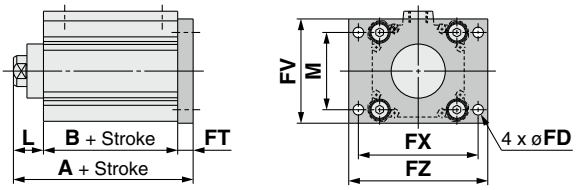


Rod Flange (mm)

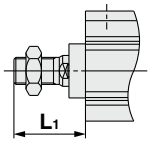
Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L_1	M	I	T
32	45	33	5.5	8	48	56	65	12	38.5	34	23	2
40	51.5	39.5	5.5	8	54	62	72	12	38.5	40	28	2
50	53.5	40.5	6.6	9	67	76	89	13	43.5	50	35	1

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2G



Rod end male thread



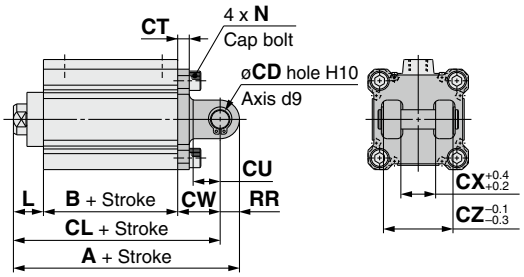
Head Flange (mm)

Bore size (mm)	A
32	53
40	59.5
50	62.5

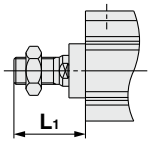
Flange bracket material: Carbon steel
Surface treatment: Nickel plating

∗ The dimensions except A are the same as those of the rod flange.

Double clevis: CDQ2D



Rod end male thread



Double Clevis (mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L_1	N	RR
32	75	33	65	10	5	14	20	18	36	12	38.5	M6 x 1.0	10
40	83.5	39.5	73.5	10	6	14	22	18	36	12	38.5	M6 x 1.0	10
50	95.5	40.5	81.5	14	7	20	28	22	44	13	43.5	M8 x 1.25	14

Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

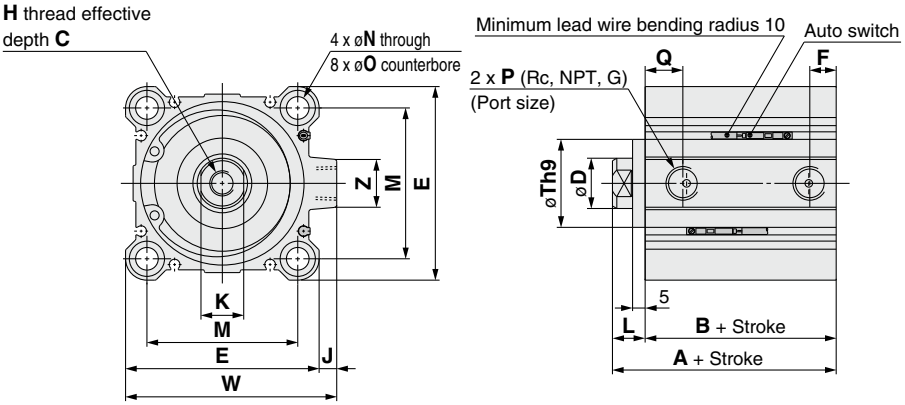
CDQ2-XC91

Bore Size

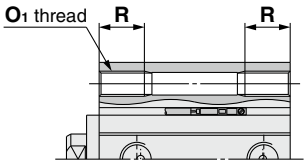
ø63 to ø100

CDQ2□-XC91

Through-hole (Standard): CDQ2B



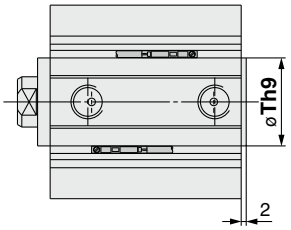
Both ends tapped: CDQ2A



Both Ends Tapped (mm)

Bore size (mm)	O_1	R
63	M10 x 1.5	18
80	M12 x 1.75	22
100	M12 x 1.75	22

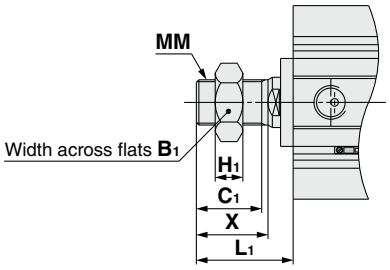
With boss on head end



With Boss on Head End (mm)

Bore size (mm)	Th9
63	$35^{\ 0}_{-0.062}$
80	$43^{\ 0}_{-0.062}$
100	$59^{\ 0}_{-0.074}$

Rod end male thread



Rod End Male Thread (mm)

Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
63	27	26	11	43.5	M18 x 1.5	28.5
80	32	32.5	13	53.5	M22 x 1.5	35.5
100	41	32.5	16	53.5	M26 x 1.5	35.5

Standard

(mm)

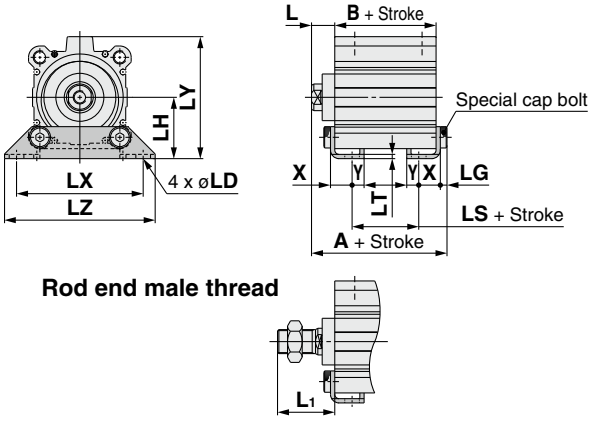
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	P	Q	Th9	W	Z
63	10 to 50, 75, 100	59	46	15	20	77	10.5	M10 x 1.5	7	17	13	60	9	14 depth 10.5	1/4	15	$35^{\ 0}_{-0.062}$	84	19
80	10 to 50, 75, 100	68.5	53.5	21	25	98	12.5	M16 x 2.0	6	22	15	77	11	17.5 depth 13.5	3/8	16	$43^{\ 0}_{-0.062}$	104	25
100	10 to 50, 75, 100	80	63	27	30	117	13	M20 x 2.5	6.5	27	18	94	11	17.5 depth 13.5	3/8	23	$59^{\ 0}_{-0.074}$	123.5	25

Note 1) The external dimensions with rubber bumper are same as those of the standard, as shown above.

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.

Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



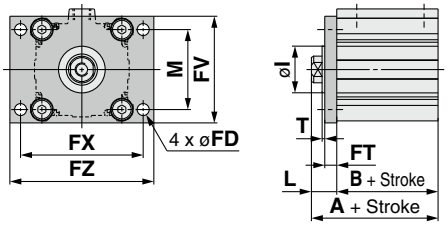
Rod end male thread

Foot (mm)

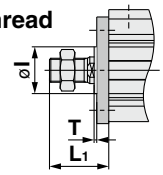
Bore size (mm)	A	B	LS	L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
63	67.2	46	20	13	43.5	11	5	46	3.2	95	91.5	113	16.2	9
80	80	53.5	23.5	15	53.5	13	7	59	4.5	118	114	140	19.5	11
100	93	63	29	17	53.5	13	7	71	6	137	136	162	23	12.5

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2F



Rod end male thread

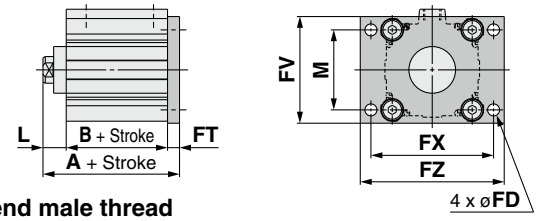


Rod Flange (mm)

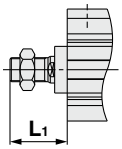
Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L1	M	I	T
63	59	46	9	9	80	92	108	13	43.5	60	35	1
80	68.5	53.5	11	11	99	116	134	15	53.5	77	—	—
100	80	63	11	11	117	136	154	17	53.5	94	—	—

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2G



Rod end male thread



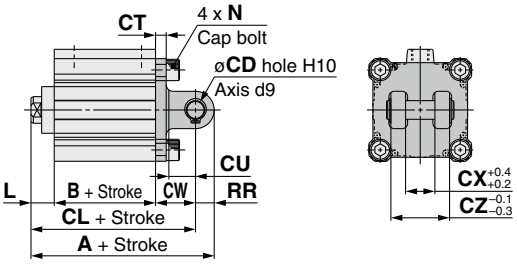
Head Flange (mm)

Bore size (mm)	A
63	68
80	79.5
100	91

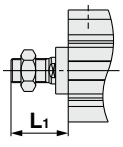
∗ The dimensions except A are the same as those of the rod flange.

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Double clevis: CDQ2D



Rod end male thread



Double Clevis (mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L1	N	RR
63	103	46	89	14	8	20	30	22	44	13	43.5	M10 x 1.5	14
80	124.5	53.5	106.5	18	10	27	38	28	56	15	53.5	M12 x 1.75	18
100	147	63	125	22	13	31	45	32	64	17	53.5	M12 x 1.75	22

Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

Spatter Resistant Cylinder for Arc Welding
Compact Cylinder: Long Stroke, Double Acting, Single Rod
CDQ2-XC88 -XC89
ø32, ø40, ø50, ø63, ø80, ø100

RoHS

How to Order

CDQ2 A 32 □ – 200 DC □ Z – M9BW □ – XC89

Built-in auto switch magnet

Mounting

A	Both ends tapped
L	Foot
F	Rod flange
G	Head flange
D	Double clevis

∗ Mounting brackets are shipped together, (but not assembled).

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 28 for standard strokes.

Action

D	Double acting

Cushion

C	Rubber bumper

Body option

Nil	Standard (Rod end female thread)
M	Rod end male thread

Auto switch mounting groove

Z	4 surfaces

Auto switch

Nil	Without auto switch

∗ Refer to the below table for applicable auto switches.

Number of auto switches

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

Rod material

XC88	Stainless steel 304
XC89	S45C

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●

Built-in Auto Switch Magnet Cylinder Model

If a built-in auto switch magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDQ2L40-200DCZ-XC89

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	—	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	—	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	—	○		
				2-wire		12 V		M9BAV	M9BA	○	○	●	○	—	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—		—	P3DWA	●	—	●	●	—	●	—	
								—	P4DW	—	—	●	●	—	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	—	—	—	—	Relay, PLC
						5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Maximum operating pressure	1.0 MPa					
Minimum operating pressure	0.05 MPa					
Ambient and fluid temperatures	–10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Piston speed	50 to 500 mm/s					
Allowable kinetic energy (J)	0.29	0.52	0.91	1.54	2.71	4.54
Stroke length tolerance	$^{+1.4}_{0}$ mm Note)					

Note) Stroke length tolerance does not include the amount of bumper change.

Standard Strokes

(mm)

Bore size	Standard stroke
32, 40, 50 63, 80, 100	125, 150, 175, 200, 250, 300

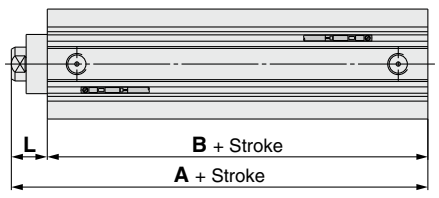
Manufacture of Intermediate Strokes

Type	A spacer is installed in the standard stroke body.	
Part no.	Refer to “How to Order” for the standard model number. (Page 27)	
Description	Strokes in 1 mm increments are available by installing a spacer in the standard stroke cylinder.	
Stroke range	Bore size	Stroke range
	32 to 100	101 to 299
Example	Part no.: CDQ2A50-166DCZ-XC89 CDQ2A50-175DCZ-XC89 with 9 mm width spacer inside The B dimension is 235.5 mm.	

Type

Bore size (mm)				32	40	50	63	80	100
Pneumatic	Built-in magnet for auto switch			●	●	●	●	●	●
	Piping	Pipe thread	—	Rc1/8	Rc1/8	Rc1/4	Rc1/4	Rc3/8	Rc3/8
			TN	NPT1/8	NPT1/8	NPT1/4	NPT1/4	NPT3/8	NPT3/8
			TF	G1/8	G1/8	G1/4	G1/4	G3/8	G3/8
	Rod end male thread			●	●	●	●	●	●

Comparison of the Dimensions of Each Series



(mm)

Bore size (mm)	XC88, 89			Standard		
	A	**B**	**L**	**A**	**B**	**L**
32	67.5	50.5	17	62.5	45.5	17
40	77	60	17	72	55	17
50	78.5	60.5	18	73.5	55.5	18
63	80	62	18	75	57	18
80	91	71	20	86	66	20
100	102.5	80.5	22	97.5	75.5	22

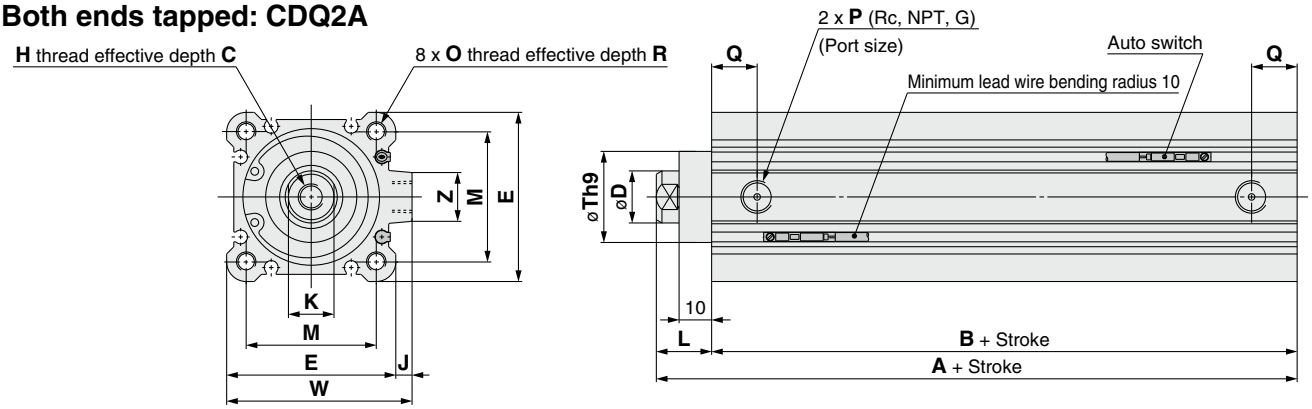
∗ At 0 stroke

Bore Size

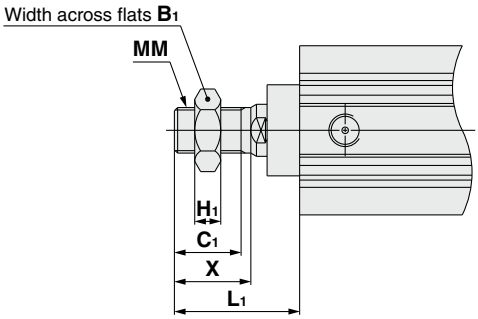
ø32 to ø50

CDQ2□-XC88 -XC89

Both ends tapped: CDQ2A



Rod end male thread



Rod End Male Thread

(mm)

Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
32	22	20.5	8	38.5	M14 x 1.5	23.5
40	22	20.5	8	38.5	M14 x 1.5	23.5
50	27	26	11	43.5	M18 x 1.5	28.5

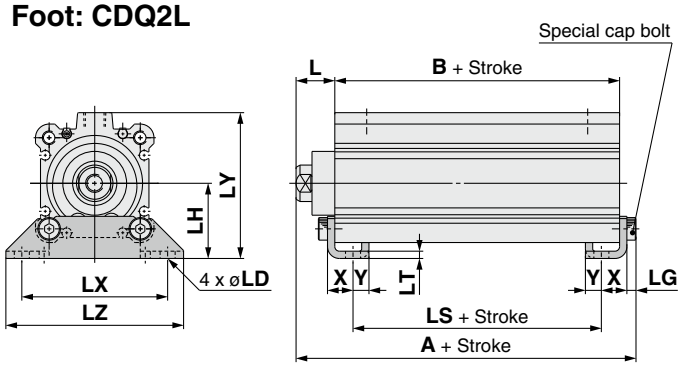
Both Ends Tapped

(mm)

Bore size (mm)	Stroke range (mm)	A	B	C	D	E	H	J	K	L	M	O	P	Q	R	Th9	W	Z
32	125 to 200 Note 1) 250, 300	67.5	50.5	13	16	45	M8 x 1.25	4.5	14	17	34	M6 x 1.0	1/8	10	10	$23^{0}_{-0.052}$	49.5	14
40		77	60	13	16	52	M8 x 1.25	5	14	17	40	M6 x 1.0	1/8	12.5	10	$28^{0}_{-0.052}$	57	15
50		78.5	60.5	15	20	64	M10 x 1.5	7	17	18	50	M8 x 1.25	1/4	14	14	$35^{0}_{-0.062}$	71	19

Note 1) For 125 to 200 strokes, strokes are available in 25 mm increments.
Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



Foot

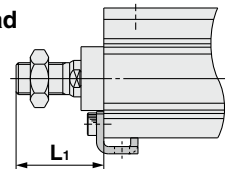
(mm)

Bore size (mm)	A	B	L	L_1	LD	LG	LH	LS	LT	LX	LY	LZ	X	Y
32	74.7	50.5	17	38.5	6.6	4	30	34.5	3.2	57	57	71	11.2	5.8
40	84.2	60	17	38.5	6.6	4	33	44	3.2	64	64	78	11.2	7
50	86.7	60.5	18	43.5	9	5	39	37.5	3.2	79	78	95	14.7	8

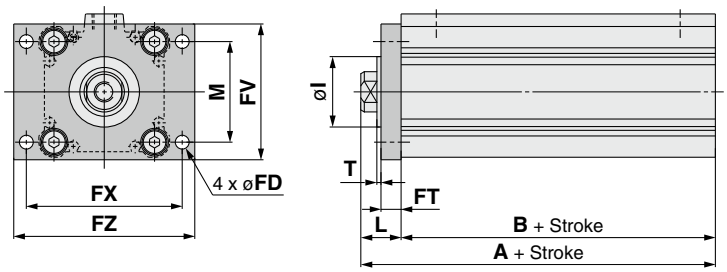
Foot bracket material: Carbon steel
Surface treatment: Nickel plating

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.

Rod end male thread



Rod flange: CDQ2F



Rod Flange

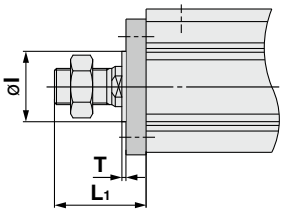
(mm)

Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L_1	M
32	67.5	50.5	5.5	8	48	56	65	17	38.5	34
40	77	60	5.5	8	54	62	72	17	38.5	40
50	78.5	60.5	6.6	9	67	76	89	18	43.5	50

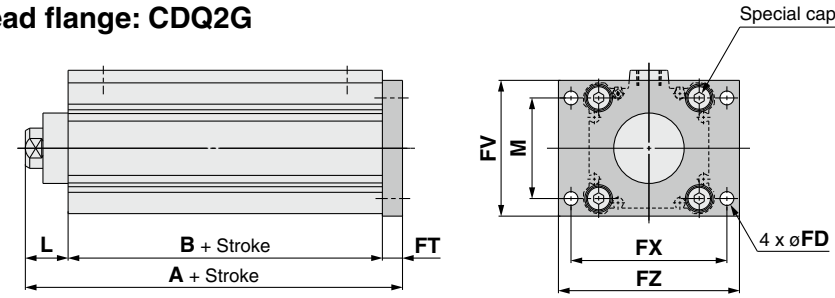
Bore size (mm)	I	T
32	23	2
40	28	2
50	35	1

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Rod end male thread



Head flange: CDQ2G



Head Flange

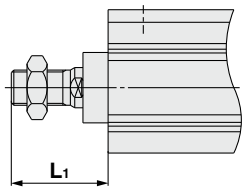
(mm)

Bore size (mm)	A
32	75.5
40	85
50	87.5

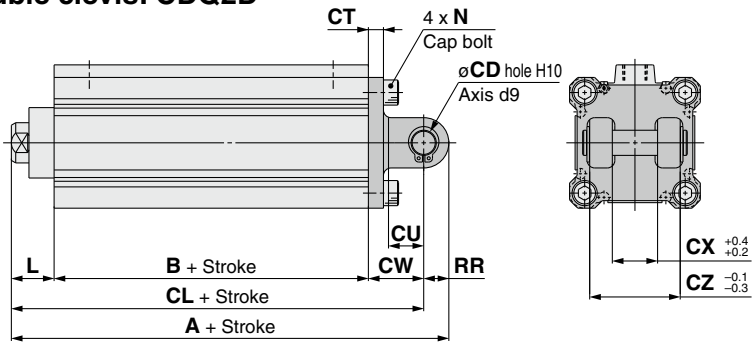
Flange bracket material: Carbon steel
Surface treatment: Nickel plating

∗ The dimensions except A are the same as those of the rod flange.

Rod end male thread



Double clevis: CDQ2D



Double Clevis

(mm)

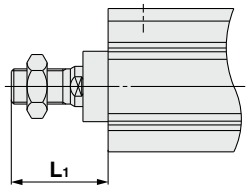
Bore size (mm)	A	B	CD	CL	CT	CU	CW	CX	CZ
32	97.5	50.5	10	87.5	5	14	20	18	36
40	109	60	10	99	6	14	22	18	36
50	120.5	60.5	14	106.5	7	20	28	22	44

Bore size (mm)	L	L_1	N	RR
32	17	38.5	M6 x 1.0	10
40	17	38.5	M6 x 1.0	10
50	18	43.5	M8 x 1.25	14

Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

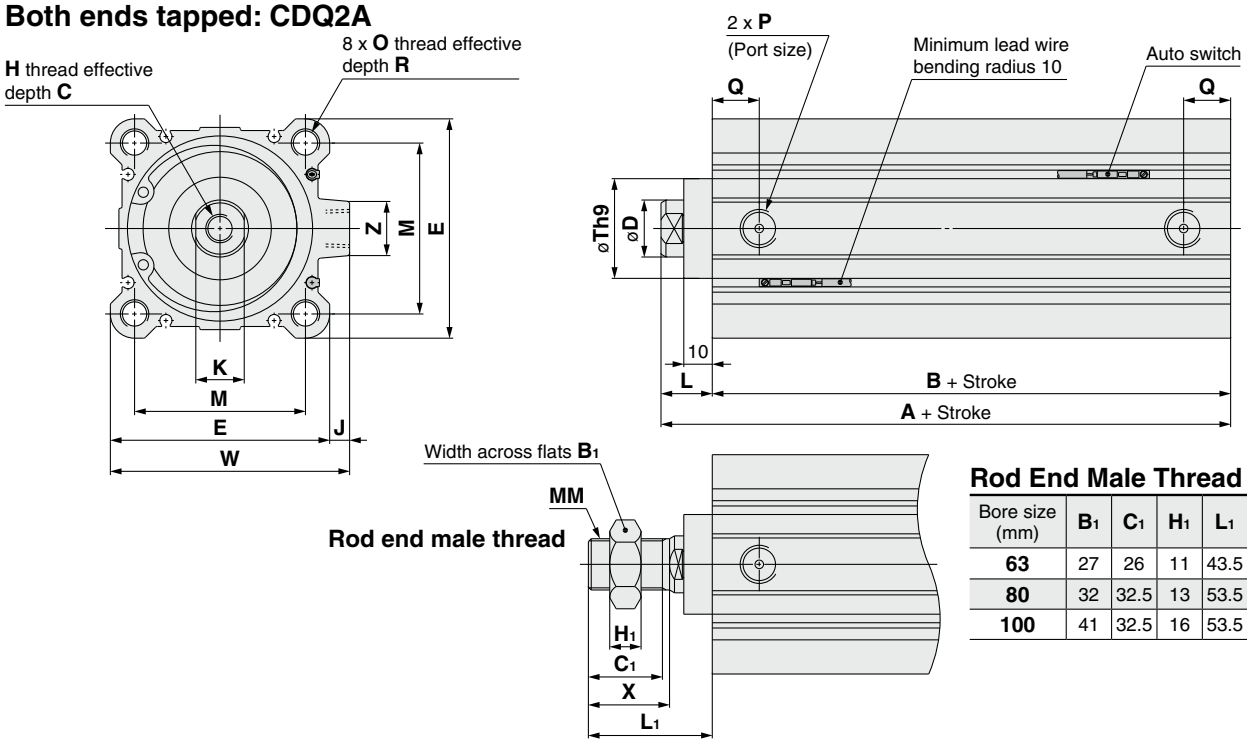
Rod end male thread



ø63 to ø100

CDQ2□-XC88 -XC89

Both ends tapped: CDQ2A



Rod End Male Thread

(mm)

Bore size (mm)	B_1	C_1	H_1	L_1	MM	X
63	27	26	11	43.5	M18 x 1.5	28.5
80	32	32.5	13	53.5	M22 x 1.5	35.5
100	41	32.5	16	53.5	M26 x 1.5	35.5

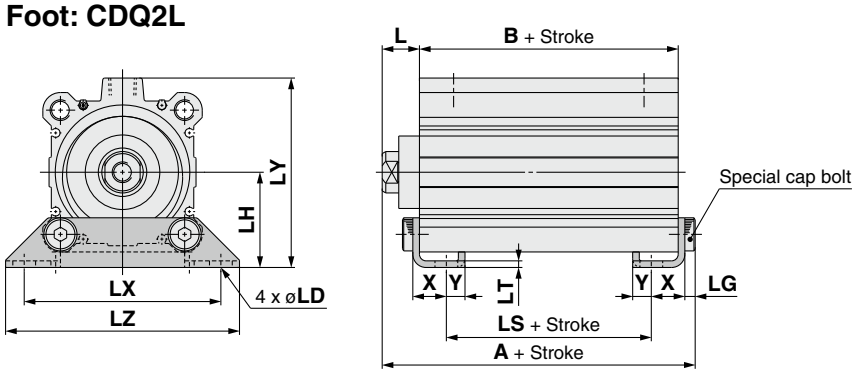
Both Ends Tapped

(mm)

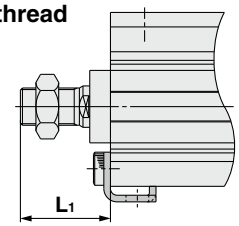
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	H	J	K	L	M	O	P	Q	R	Th9	W	Z
63	125 to 200 Note 1), 250, 300	80	62	15	20	77	M10 x 1.5	7	17	18	60	M10 x 1.5	1/4	16.5	18	$35^{0}_{-0.062}$	84	19
80		91	71	21	25	98	M16 x 2.0	6	22	20	77	M12 x 1.75	3/8	19	22	$43^{0}_{-0.062}$	104	25
100		102.5	80.5	27	30	117	M20 x 2.5	6.5	27	22	94	M12 x 1.75	3/8	23	22	$59^{0}_{-0.074}$	123.5	25

Note 1) For 125 to 200 strokes, strokes are available in 25 mm increments.
Note 2) For calculation on the longitudinal dimension of intermediate strokes, refer to page 18.

Foot: CDQ2L



Rod end male thread



Foot

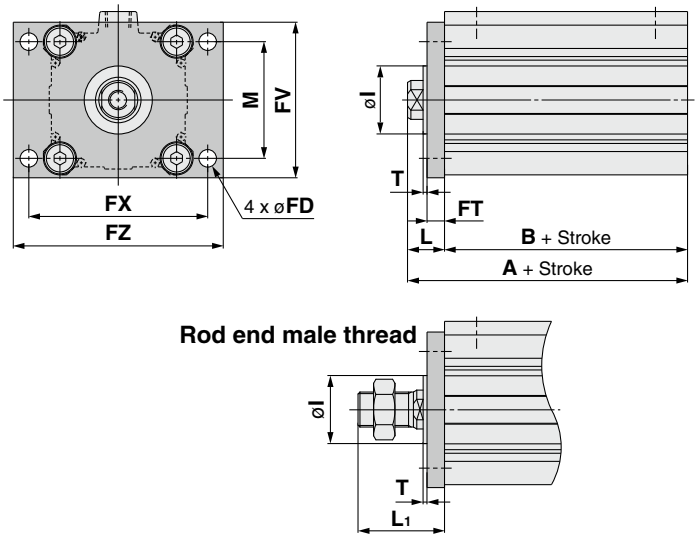
(mm)

Bore size (mm)	A	B	L	L_1	LD	LG	LH	LS	LT	LX	LY	LZ	X	Y
63	88.2	62	18	43.5	11	5	46	36	3.2	95	91.5	113	16.2	9
80	102.5	71	20	53.5	13	7	59	41	4.5	118	114	140	19.5	11
100	115.5	80.5	22	53.5	13	7	71	46.5	6	137	136	162	23	12.5

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.

Rod flange: CDQ2F



Rod Flange

(mm)

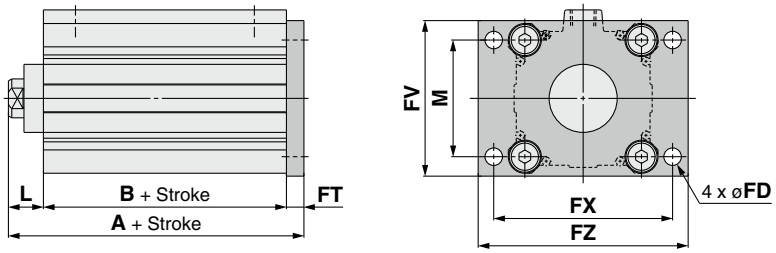
Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L_1	M
63	80	62	9	9	80	92	108	18	43.5	60
80	91	71	11	11	99	116	134	20	53.5	77
100	102.5	80.5	11	11	117	136	154	22	53.5	94

Flange bracket material: Carbon steel
Surface treatment: Nickel plating

Bore size (mm)	I	T
63	35	1
80	—	—
100	—	—

Rod end male thread

Head flange: CDQ2G



Head Flange

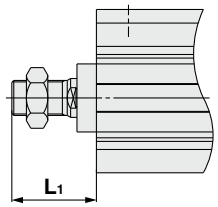
(mm)

Bore size (mm)	A
63	89
80	102
100	113.5

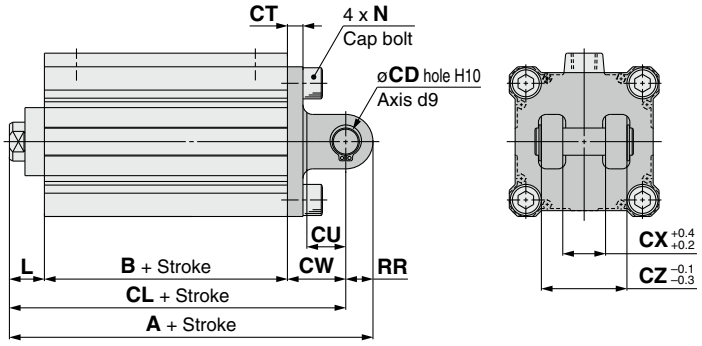
Flange bracket material: Carbon steel
Surface treatment: Nickel plating

∗ The dimensions except A are the same as those of the rod flange.

Rod end male thread



Double clevis: CDQ2D



Double Clevis

(mm)

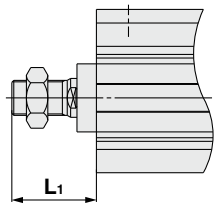
Bore size (mm)	A	B	CD	CL	CT	CU	CW	CX	CZ
63	124	62	14	110	8	20	30	22	44
80	147	71	18	129	10	27	38	28	56
100	169.5	80.5	22	147.5	13	31	45	32	64

Bore size (mm)	L	L_1	N	RR
63	18	43.5	M10 x 1.5	14
80	20	53.5	M12 x 1.75	18
100	22	53.5	M12 x 1.75	22

Double clevis bracket material: Cast iron
Surface treatment: Nickel plating

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

Rod end male thread



Spatter Resistant Cylinder for Arc Welding
Compact Cylinder: Anti-lateral Load

CDQ2□S-XC88 -XC89

ø32, ø40, ø50, ø63, ø80, ø100

RoHS

How to Order

CDQ2 B S 32 □ – 30 D □ C □ Z – M9BW □ – XC89

Built-in auto switch magnet

Mounting

B	Through-hole (Standard)
A	Both ends tapped
L	Foot
F	Rod flange
G	Head flange
D	Double clevis

∗ Mounting brackets are shipped together, (but not assembled).

Type

S	Anti-lateral load

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)

Refer to page 34 for standard strokes.

Action

D	Double acting

Body option 1

Nil	Standard
F	With boss on head end

Cushion

C	Rubber bumper

Body option 2

Nil	Standard (Rod end female thread)
M	Rod end male thread

Auto switch mounting groove

Z	4 surfaces

Auto switch

Nil	Without auto switch

∗ Refer to the below table for applicable auto switches.

Number of auto switches

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

Rod material

XC88	Stainless steel 304
XC89	S45C

Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●

Built-in Auto Switch Magnet Cylinder Model

If a built-in auto switch magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDQ2LS40-30DCZ-XC89

Applicable Auto Switches

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	—	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	—	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	—	○		
				2-wire		12 V		M9BAV	M9BA	○	○	●	○	—	○	—	
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—		—	P3DWA	●	—	●	●	—	●	—	
								—	P4DW	—	—	●	●	—	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	—	—	—	—	Relay, PLC
						5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Maximum operating pressure	1.0 MPa					
Minimum operating pressure	0.05 MPa					
Ambient and fluid temperatures	–10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Piston speed	50 to 500 mm/s					
Allowable kinetic energy (J)	0.29	0.52	0.91	1.54	2.71	4.54
Stroke length tolerance	$^{+1.0\ \text{mm Note)}}_{0}$					

Note) Stroke length tolerance does not include the amount of dumper change.

Standard Strokes

(mm)

Bore size	Standard stroke
32, 40	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100
50, 63, 80, 100	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100

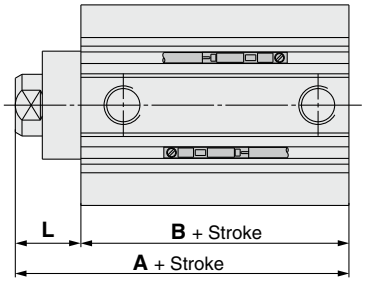
Manufacture of Intermediate Strokes

Type	A spacer is installed in the standard stroke body.	
Part no.	Refer to “How to Order” for the standard model number. (Page 33)	
Description	Strokes in 1 mm increments are available by installing a spacer in the standard stroke cylinder.	
Stroke range	Bore size	Stroke range
	32 to 100	1 to 99
Example	Part no.: CDQ2BS50-57DCZ-XC89 CDQ2BS50-75DCZ-XC89 with 18 mm width spacer inside The B dimension is 125.5 mm.	

Type

Bore size (mm)			32	40	50	63	80	100
Pneumatic	Mounting	Through-hole (Standard)	●	●	●	●	●	●
		Both ends tapped	●	●	●	●	●	●
	Built-in magnet for auto switch		●	●	●	●	●	●
	Piping	Pipe thread	Rc1/8	Rc1/8	Rc1/4	Rc1/4	Rc3/8	Rc3/8
			NPT1/8	NPT1/8	NPT1/4	NPT1/4	NPT3/8	NPT3/8
			G1/8	G1/8	G1/4	G1/4	G3/8	G3/8
	Rod end male thread		●	●	●	●	●	●
	With rubber bumper (Standard)		●	●	●	●	●	●
	With boss on head end		●	●	●	●	●	●

Comparison of the Dimensions of Each Series



(mm)

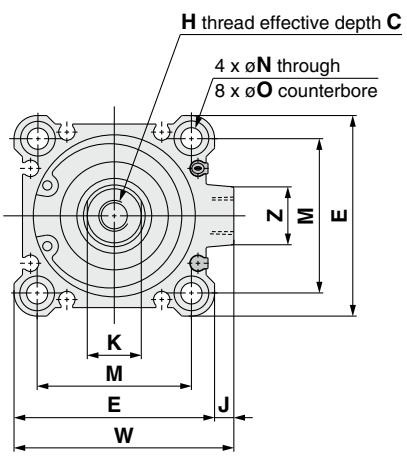
Bore size (mm)	XC88, 89			Standard		
	A	**B**	**L**	**A**	**B**	**L**
32	60	43	17	50	43	17
40	66.5	49.5	17	56.5	49.5	17
50	68.5	50.5	18	58.5	50.5	18
63	74	56	18	64	56	18
80	83.5	63.5	20	73.5	63.5	20
100	95	73	22	85	73	22

∗ At 0 stroke

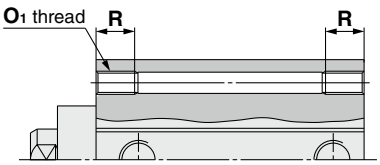
ø32 to ø50

CDQ2□S-XC88 -XC89

Through-hole (Standard): CDQ2BS

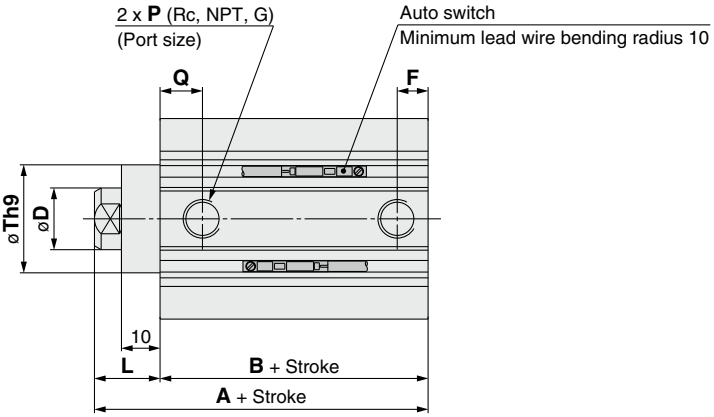


Both ends tapped: CDQ2AS

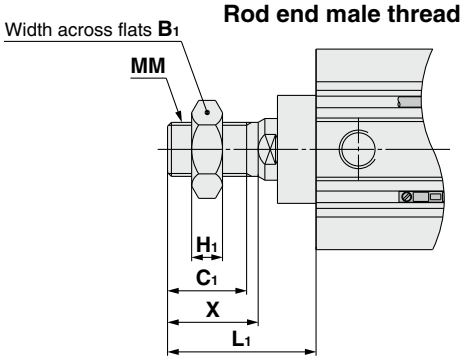


Both Ends Tapped (mm)

Bore size (mm)	O1	R
32	M6 x 1.0	10
40	M6 x 1.0	10
50	M8 x 1.25	14



Rod end male thread



Rod End Male Thread (mm)

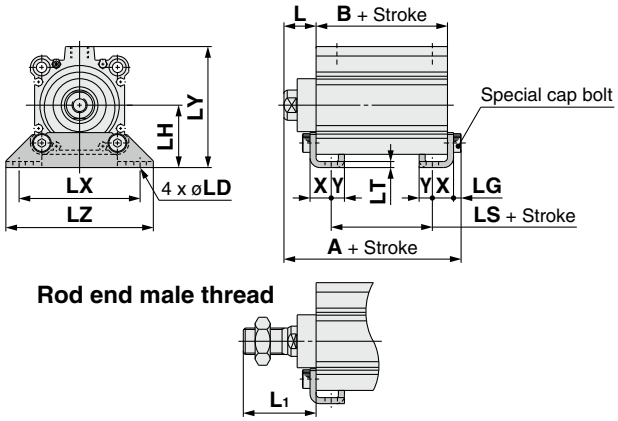
Bore size (mm)	B1	C1	H1	L1	MM	X
32	22	20.5	8	38.5	M14 x 1.5	23.5
40	22	20.5	8	38.5	M14 x 1.5	23.5
50	27	26	11	43.5	M18 x 1.5	28.5

The dimensions with boss on head end are equivalent to those of the CDQ2 series, double acting, single rod. Refer to page 19.

(mm)

Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	Th9	P	Q	W	Z
32	5 to 50, 75, 100	60	43	13	16	45	7.5	M8 x 1.25	4.5	14	17	34	5.5	9 depth 7	$23^{0}_{-0.052}$	1/8	10	49.5	14
40	5 to 50, 75, 100	66.5	49.5	13	16	52	7.5	M8 x 1.25	5	14	17	40	5.5	9 depth 7	$28^{0}_{-0.052}$	1/8	12.5	57	15
50	10 to 50, 75, 100	68.5	50.5	15	20	64	10.5	M10 x 1.5	7	17	18	50	6.6	11 depth 8	$35^{0}_{-0.062}$	1/4	10.5	71	19

Foot: CDQ2LS



Rod end male thread

Foot

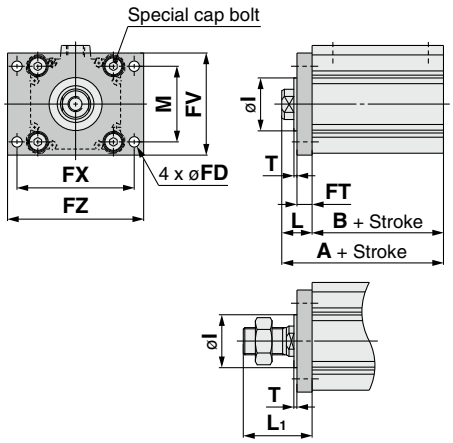
(mm)

Bore size (mm)	A	B	LS	L	L1	LD	LG	LH	LT	LX	LY
32	67.2	43	27	17	38.5	6.6	4	30	3.2	57	57
40	73.7	49.5	33.5	17	38.5	6.6	4	33	3.2	64	64
50	76.7	50.5	27.5	18	43.5	9	5	39	3.2	79	78

Bore size (mm)	LZ	X	Y
32	71	11.2	5.8
40	78	11.2	7
50	95	14.7	8

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2FS



Rod Flange

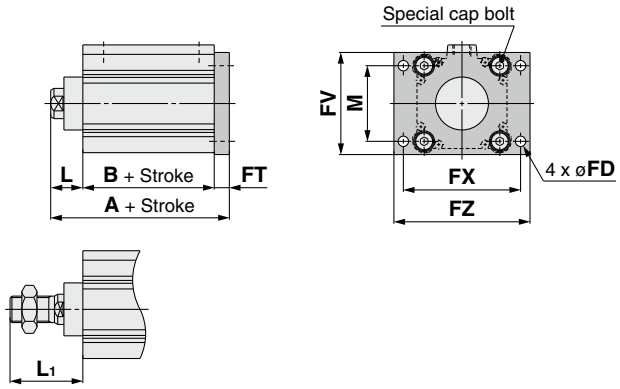
(mm)

Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L1	M
32	60	43	5.5	8	48	56	65	17	38.5	34
40	66.5	49.5	5.5	8	54	62	72	17	38.5	40
50	68.5	50.5	6.6	9	67	76	89	18	43.5	50

Bore size (mm)	I	T
32	23	2
40	28	2
50	35	1

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2GS



Head Flange

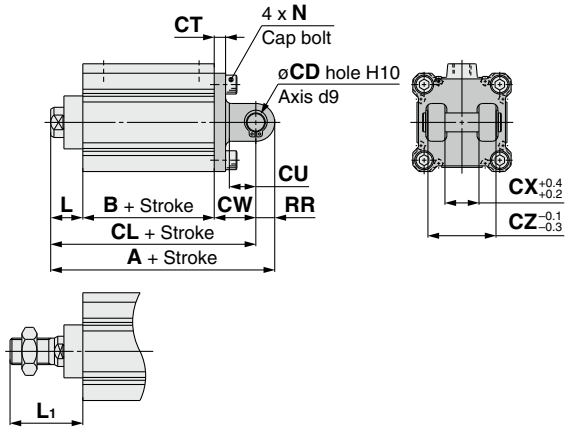
(mm)

Bore size (mm)	A
32	68
40	74.5
50	77.5

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

(* The dimensions except A are the same as those of the rod flange.)

Double clevis: CDQ2DS



Double Clevis

(mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L1
32	90	43	80	10	5	14	20	18	36	17	38.5
40	98.5	49.5	88.5	10	6	14	22	18	36	17	38.5
50	110.5	50.5	96.5	14	7	20	28	22	44	18	43.5

Bore size (mm)	N	RR
32	M6 x 1.0	10
40	M6 x 1.0	10
50	M8 x 1.25	14

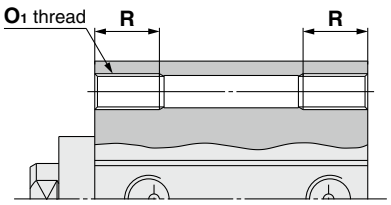
Double clevis bracket material: Cast iron
Surface treatment: Painted

* For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
* A double clevis pin and retaining rings are included.

CDQ2□S-XC88 -XC89

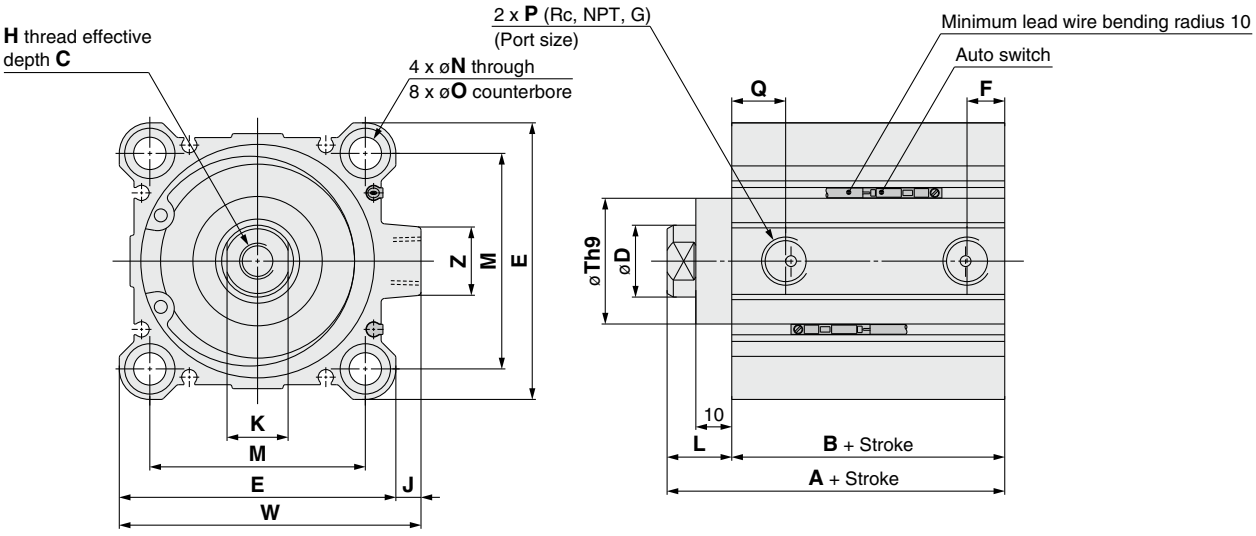
Through-hole (Standard): CDQ2BS

Both ends tapped: CDQ2AS

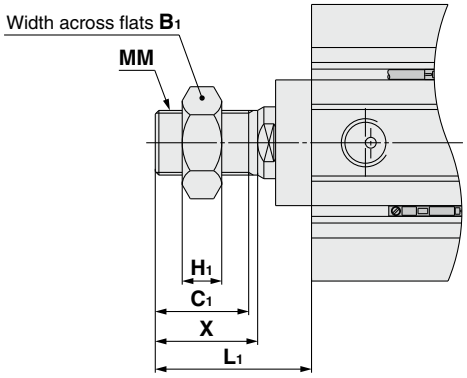


Both Ends Tapped (mm)

Bore size (mm)	O1	R
63	M10 x 1.5	18
80	M12 x 1.75	22
100	M12 x 1.75	22



Rod end male thread



Rod End Male Thread (mm)

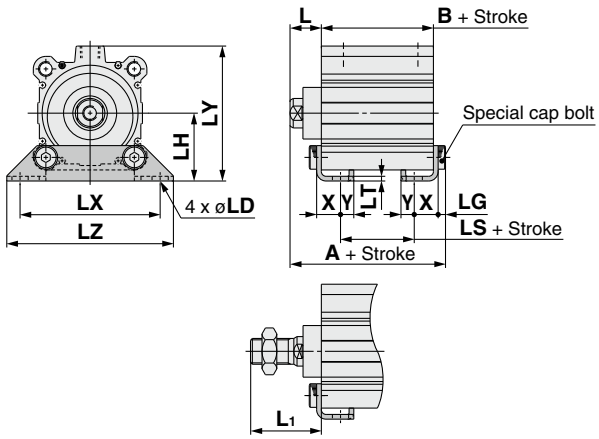
Bore size (mm)	B1	C1	H1	L1	MM	X
63	27	26	11	43.5	M18 x 1.5	28.5
80	32	32.5	13	53.5	M22 x 1.5	35.5
100	41	32.5	16	53.5	M26 x 1.5	35.5

The dimensions with boss on head end are equivalent to those of the CDQ2 series, double acting, single rod. Refer to page 21.

(mm)

Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	O	P	Q	Th9	W	Z
63	10 to 50, 75, 100	74	56	15	20	77	10.5	M10 x 1.5	7	17	18	60	9	14 depth 10.5	1/4	15	$35^{0}_{-0.062}$	84	19
80	10 to 50, 75, 100	83.5	63.5	21	25	98	12.5	M16 x 2.0	6	22	20	77	11	17.5 depth 13.5	3/8	16	$43^{0}_{-0.062}$	104	25
100	10 to 50, 75, 100	95	73	27	30	117	13	M20 x 2.5	6.5	27	22	94	11	17.5 depth 13.5	3/8	23	$59^{0}_{-0.074}$	123.5	25

Foot: CDQ2LS



Foot

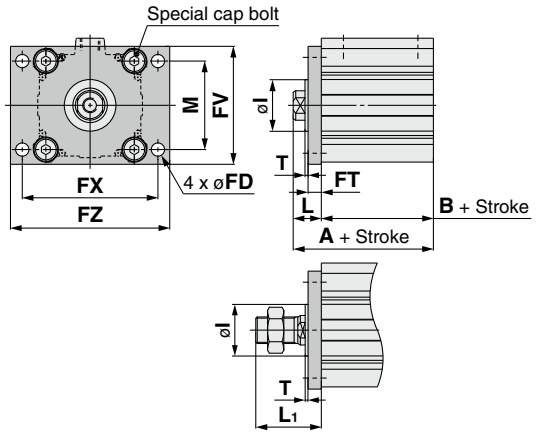
(mm)

Bore size (mm)	A	B	LS	L	L1	LD	LG	LH	LT	LX	LY
63	82.2	56	30	18	43.5	11	5	46	3.2	95	91.5
80	95	63.5	33.5	20	53.5	13	7	59	4.5	118	114
100	108	73	39	22	53.5	13	7	71	6	137	136

Bore size (mm)	LZ	X	Y
63	113	16.2	9
80	140	19.5	11
100	162	23	12.5

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Rod flange: CDQ2FS



Rod Flange

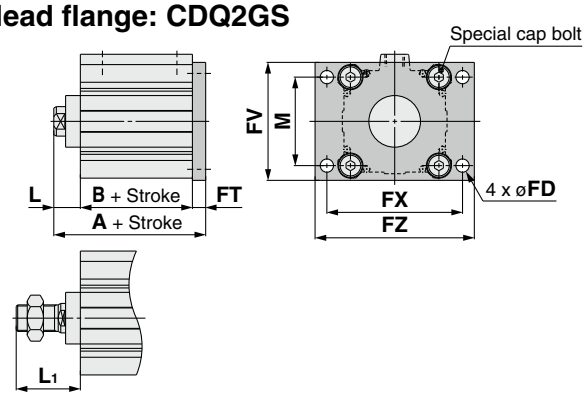
(mm)

Bore size (mm)	A	B	FD	FT	FV	FX	FZ	L	L1	M
63	74	56	9	9	80	92	108	18	43.5	60
80	83.5	63.5	11	11	99	116	134	20	53.5	77
100	95	73	11	11	117	136	154	22	53.5	94

Bore size (mm)	I	T
63	35	1
80	—	—
100	—	—

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Head flange: CDQ2GS



Head Flange

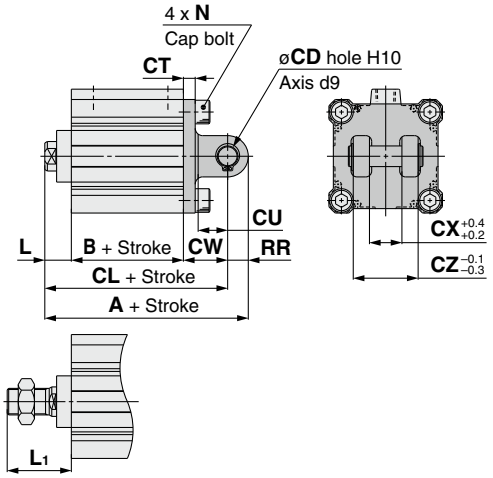
(mm)

Bore size (mm)	A
63	83
80	94.5
100	106

∗ The dimensions except A are the same as those of the rod flange.

Foot bracket material: Carbon steel
Surface treatment: Nickel plating

Double clevis: CDQ2DS



Double Clevis

(mm)

Bore size (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L1
63	118	56	104	14	8	20	30	22	44	18	43.5
80	139.5	63.5	121.5	18	10	27	38	28	56	20	53.5
100	162	73	140	22	13	31	45	32	64	22	53.5

Bore size (mm)	N	RR
63	M10 x 1.5	14
80	M12 x 1.75	18
100	M12 x 1.75	22

Double clevis bracket material: Cast iron
Surface treatment: Painted

∗ For details about the rod end nut and accessory brackets, refer to the **Web Catalog**.
∗ A double clevis pin and retaining rings are included.

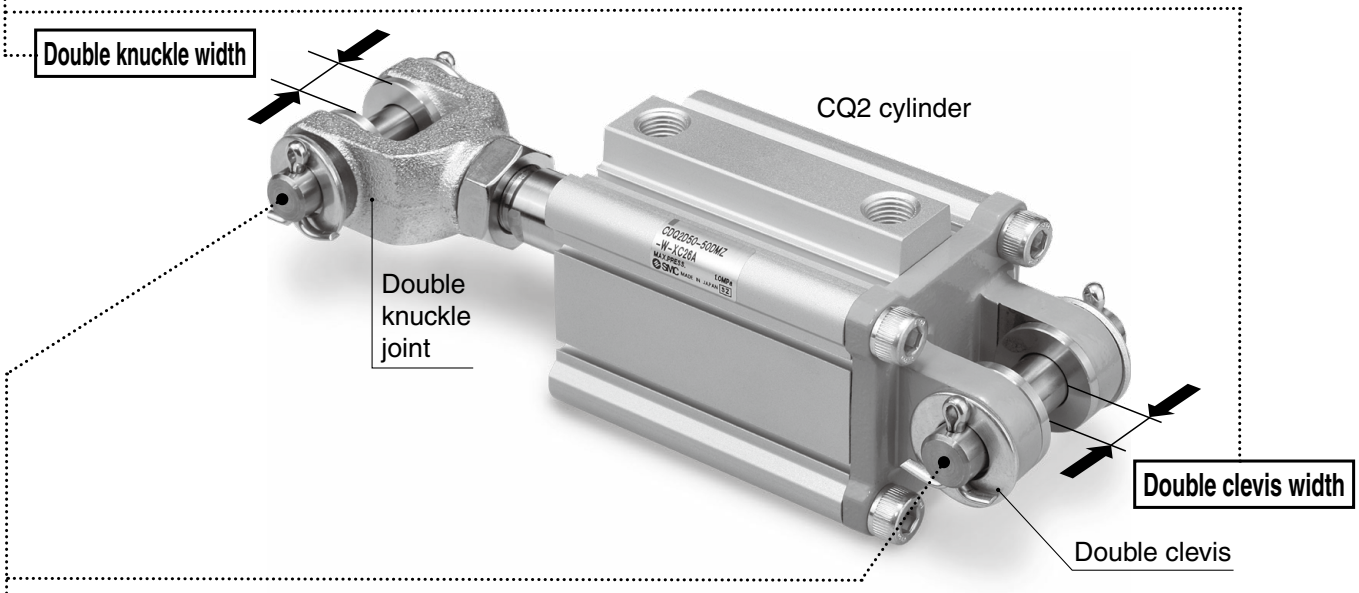
Double Clevis Width
Double Knuckle Width **12.5 mm** **16.5 mm** **19.5 mm**

Compact Cylinder with Double Clevis, Double Knuckle Joint

CQ2D-XC26□

3 types of double clevis width double knuckle width 12.5 mm, 16.5 mm, 19.5 mm

Lighter installation, reduction in design labor and design in a suitable size
A product lineup similar to the clamp cylinder CK□1 and CLK2 series



Split pins adopted for pin fixing

The part number with double knuckle joint is available.

Not necessary to order a bracket for the applicable cylinder separately

Ordering Example of Cylinder Assembly <Standard>

CDQ2D40-30DMZ-W-M9BW-XC26A

- D: Double clevis
- W: With double knuckle joint
- A: Double clevis width / Double knuckle width 16.5 mm

Applicable Series

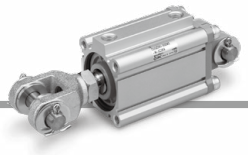
Type	Series	Action	Bore size [mm]	Made to Order		
				With coil scraper **XC35**	Spatter resistant specification for arc welding **XC88/XC89**	Spatter resistant specification for arc welding **XC91**
Standard	**CQ2**	Double acting, Single rod	**32, 40, 50, 63**	○	○	○
Long stroke	**CQ2**			○	○	—
Anti-lateral load	**CQ2□S**			—	○	—

Double Clevis Width
Double Knuckle Width 12.5 mm, 16.5 mm, 19.5 mm: With Double Clevis, Double Knuckle Joint

Compact Cylinder: Standard

CQ2D-XC26□

ø32, ø40, ø50, ø63



How to Order

CQ2 D 40 □ – 30 D M Z – W – XC26A □

CDQ2 D 40 □ – 30 D M Z – W – M9BW □ – XC26A □

Built-in magnet for auto switch

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm

Port thread type

Nil	Rc	ø32 to ø63
TN	NPT	
TF	G	

∗ For cylinders without magnet for auto switch, M threads are compatible only for ø32-5 mm stroke.

Mounting

D	Double clevis

∗ Mounting brackets are shipped together, (but not assembled).

Cylinder stroke [mm]

Bore size	Standard stroke
32	5, 10, 15, 20, 25, 30, 35
40	40, 45, 50, 75, 100
50	10, 15, 20, 25, 30, 35
63	40, 45, 50, 75, 100

Action

D	Double acting

Body option

Nil	Standard (Rod end female thread)
C	With rubber bumper
M	Rod end male thread

∗ Double knuckle joint cannot be mounted for the rod end female thread.
∗ Combination of body options (CM) is available.

Auto switch mounting groove

Z	4 surfaces

Rod end bracket

Nil	None
W	Double knuckle joint

∗ Double knuckle joint cannot be mounted for the rod end female thread.
∗ Rod end bracket is shipped together.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Made to Order 1

Symbol	Double clevis width Double knuckle width
XC26A∗	16.5 mm
XC26B∗	19.5 mm
XC26C	12.5 mm

∗ Not available for bore size 32 mm

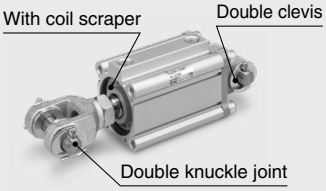
Made to Order 2

Symbol	Specification	Piston rod material (Hard chrome plated) S45C	Piston rod material (Hard chrome plated) Stainless steel 304	Coil scraper	Lube-retainer	Grease for welding
Nil	None	—	—	—	—	—
XC35	With coil scraper	●	—	●	—	—
XC88∗	Spatter resistant spec. for arc welding	—	●	●	●	●
XC89∗	Spatter resistant spec. for arc welding	●	—	●	●	●
XC91∗	Spatter resistant spec. for arc welding	●	—	●	—	●

∗ Only available for cylinders with built-in magnet for auto switch

Ordering Example of Cylinder Assembly

When arranging Made to Order 1 and 2 at the same time
Cylinder model: CDQ2D40-30DMZ-W-M9BW-XC26AC35



Mounting D: Double clevis
Rod end bracket W: Double knuckle joint
Made to Order 1 : XC26A
(Double clevis/knuckle width: 16.5 mm)
Made to Order 2 : XC35
(With coil scraper)
Auto switch D-M9BW: 2 pcs.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length [m] 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV	M9PA	○	○	●	○	—	○		
				2-wire	12 V		M9BAV	M9BA	○	○	●	○	—	○	—	
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		—	P3DWA	●	—	●	●	—	●		
							—	P4DW	—	—	●	●	—	●		
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	●	—	●	—	—	—	IC circuit	—
			Yes	2-wire	24 V	12 V	100 V	A93V∗1	●	●	●	●	—	—	—	Relay, PLC
			No			5 V,12 V	100 V or less	A90V	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

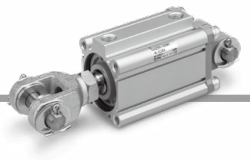
∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NW
1 m·····M (Example) M9NWM
3 m·····L (Example) M9NWL
5 m·····Z (Example) M9NWZ

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

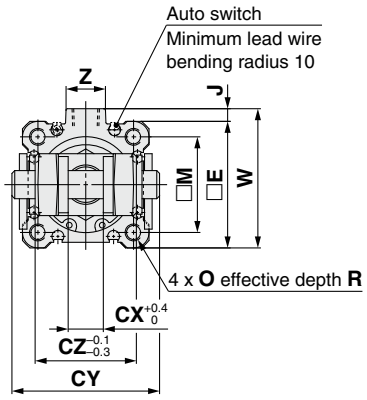
CQ2D-XC26□

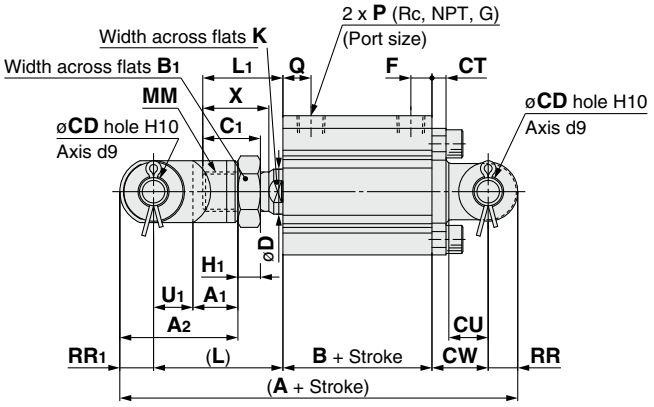
Bore Size

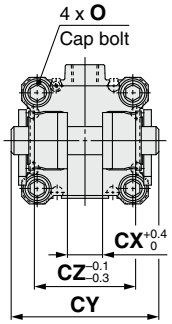
ø32 to ø63 Standard



C(D)Q2D□-XC26$^{A}_{B}{}^{}_{C}$







Note 1) Intermediate strokes (1 to 99 mm) are available in 1 mm increments.
For intermediate strokes, the dimensions are the same as a standard stroke one size larger than this intermediate stroke.
Note 2) For 5 mm stroke with bore size 32 and without magnet for auto switch, F dimension is 5.5 and P dimension is M5 x 0.8.
Note 3) For models with a rubber bumper, the stroke length tolerance does not include the deflection of the bumper.
Note 4) Flat washers and split pins are included with the double clevis and double knuckle joint of this cylinder.
Note 5) Double clevis and double knuckle joint are shipped together with the product.

[mm]

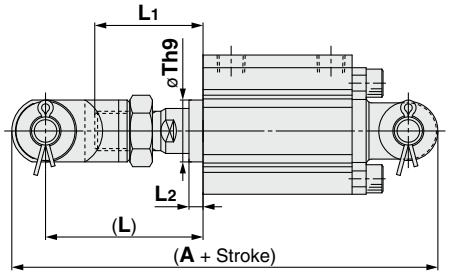
Bore size	Stroke range	Without magnet for auto switch		Built-in magnet for auto switch		CD	CT	CU	CW	CX			CY	CZ	D	E	F	J
		A	B	A	B					XC26A	XC26B	XC26C						
32	50 or less	111	23	121	33	10	5	14	20	—	—	12.5	52.5	36	16	45	7.5	4.5
	75, 100	121	33															
40	50 or less	119.5	29.5	129.5	39.5	10	6	14	22	16.5	19.5	12.5	52.5	36	16	52	7.5	5
	75, 100	129.5	39.5															
50	50 or less	147.5	30.5	157.5	40.5	14	7	20	28	16.5	19.5	12.5	66	44	20	64	10.5	7
	75, 100	157.5	40.5															
63	50 or less	155	36	165	46	14	8	20	30	16.5	19.5	12.5	66	44	20	77	10.5	7
	75, 100	165	46															

Bore size	K	L	M	O	P	Q	R	RR	RR1	U1	W	Z	A1	A2	B1	C1	H1	L1	MM	X
32	14	46	34	M6 x 1.0	1/8	10	10	10	12	14	49.5	14	16	42	22	20.5	8	28.5	M14 x 1.5	23.5
40	14	46	40	M6 x 1.0	1/8	12.5	10	10	12	14	57	15	16	42	22	20.5	8	28.5	M14 x 1.5	23.5
50	17	59	50	M8 x 1.25	1/4	10.5	14	14	16	20	71	19	20	56	27	26	11	33.5	M18 x 1.5	28.5
63	17	59	60	M10 x 1.5	1/4	15	18	14	16	20	84	19	20	56	27	26	11	33.5	M18 x 1.5	28.5

Made to Order (Dimensions other than those shown below are the same as those shown above.)

■With coil scraper: C(D)Q2D□-XC26□**C35**

■Spatter resistant specification for arc welding: CDQ2D□-XC26□**C88/C89/C91**



[mm]

Bore size	Stroke range	XC35/XC91						XC88/XC89				
		A		L	L1	L2	Th9	A	L	L1	L2	Th9
		Without magnet for auto switch	Built-in magnet for auto switch					Built-in magnet for auto switch				
32	50 or less	116	126	51	33.5	5	$23^{0}_{-0.052}$	131	56	38.5	10	$23^{0}_{-0.052}$
	75, 100	126										
40	50 or less	124.5	134.5	51	33.5	5	$28^{0}_{-0.052}$	139.5	56	38.5	10	$28^{0}_{-0.052}$
	75, 100	134.5										
50	50 or less	152.5	162.5	64	38.5	5	$35^{0}_{-0.062}$	167.5	69	43.5	10	$35^{0}_{-0.062}$
	75, 100	162.5										
63	50 or less	160	170	64	38.5	5	$35^{0}_{-0.062}$	175	69	43.5	10	$35^{0}_{-0.062}$
	75, 100	170										

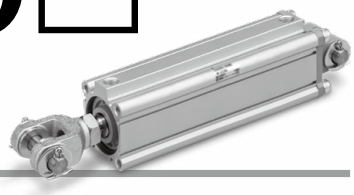
∗ XC91 is only available for cylinders with built-in magnet for auto switch.

Double Clevis Width
Double Knuckle Width 12.5 mm, 16.5 mm, 19.5 mm: With Double Clevis, Double Knuckle Joint

Compact Cylinder: Long Stroke

CQ2D-XC26□

ø32, ø40, ø50, ø63



How to Order

CQ2 D 40 □ – 200 D C M Z – W – XC26A □

CDQ2 D 40 □ – 200 D C M Z – W – M9BW □ – XC26A □

Built-in magnet for auto switch

Mounting

D	Double clevis

∗ Mounting brackets are shipped together, (but not assembled).

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke [mm]

Bore size	Standard stroke
32	125, 150, 175, 200, 250, 300
40	
50	
63	

Action

D	Double acting

Cushion

C	Rubber bumper

Body option

Nil	Standard (Rod end female thread)
M	Rod end male thread

Auto switch mounting groove

Z	4 surfaces

Rod end bracket

Nil	None
W	Double knuckle joint

∗ Double knuckle joint cannot be mounted for the rod end female thread.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Made to Order 1

Symbol	Double clevis width Double knuckle width
XC26A∗	16.5 mm
XC26B∗	19.5 mm
XC26C	12.5 mm

∗ Not available for bore size 32 mm

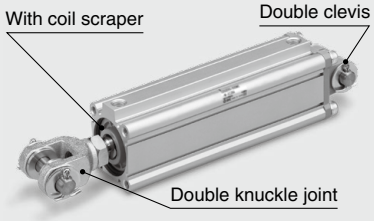
Made to Order 2

Symbol	Specification	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
		S45C	Stainless steel 304			
Nil	None	—	—	—	—	—
XC35	With coil scraper	●	—	●	—	—
XC88∗	Spatter resistant spec. for arc welding	—	●	●	●	●
XC89∗	Spatter resistant spec. for arc welding	●	—	●	●	●

∗ Only available for cylinders with built-in magnet for auto switch

Ordering Example of Cylinder Assembly

When arranging Made to Order 1 and 2 at the same time
Cylinder model: CDQ2D40-200DCMZ-W-M9BW-XC26AC35



Mounting D: Double clevis
Rod end bracket W: Double knuckle joint
Made to Order 1 : XC26A
(Double clevis/knuckle width: 16.5 mm)
Made to Order 2 : XC35
(With coil scraper)
Auto switch D-M9BW: 2 pcs.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length [m] 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV	M9PA	○	○	●	○	—	○		
				2-wire	12 V		M9BAV	M9BA	○	○	●	○	—	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		—	P3DWA	●	—	●	●	—	●	—	
							—	P4DW	—	—	●	●	—	●		
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			Yes	2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	●	—	—	—	Relay, PLC
			No			5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

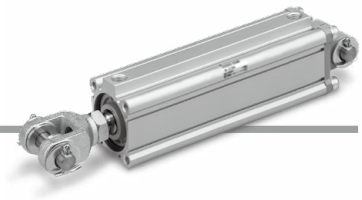
∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NW
1 m·····M (Example) M9NWM
3 m·····L (Example) M9NWL
5 m·····Z (Example) M9NWZ

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

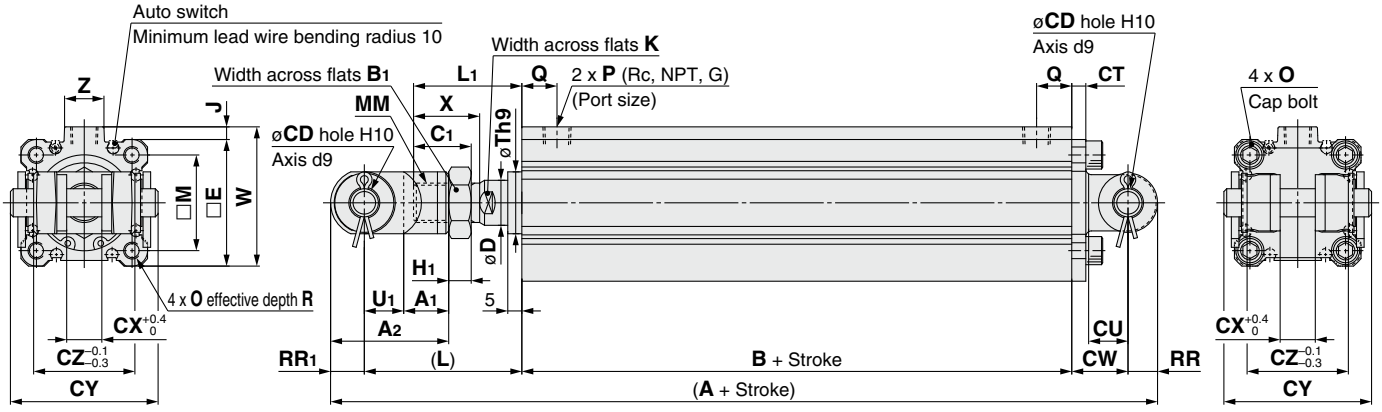
CQ2D-XC26□

Bore Size

ø32 to ø63 Long Stroke



C(D)Q2D□-XC26$^{A}_{B}{}^{}_{C}$



Note 1) Intermediate strokes (1 to 99 mm) are available in 1 mm increments.
For intermediate strokes, the dimensions are the same as a standard stroke one size larger than this intermediate stroke.
Note 2) Stroke length tolerance does not include the deflection of the bumper.
Note 3) Flat washers and split pins are included with the double clevis and double knuckle joint of this cylinder.
Note 4) Double clevis and double knuckle joint are shipped together with the product.

[mm]

Bore size	Stroke range	A	B	CD	CT	CU	CW	CX			CY	CZ	D	E	J	K	L	M
								XC26A	XC26B	XC26C								
32	125, 150, 175, 200, 250, 300	143.5	45.5	10	5	14	20	—	—	12.5	52.5	36	16	45	4.5	14	56	34
40		155	55	10	6	14	22	16.5	19.5	12.5	52.5	36	16	52	5	14	56	40
50		182.5	55.5	14	7	20	28	16.5	19.5	12.5	66	44	20	64	7	17	69	50
63		186	57	14	8	20	30	16.5	19.5	12.5	66	44	20	77	7	17	69	60

Bore size	O	P	Q	R	RR	RR1	Th9	U1	W	Z	A1	A2	B1	C1	H1	L1	MM	X
32	M6 x 1.0	1/8	10	10	10	12	$22^{0}_{-0.052}$	14	49.5	14	16	42	22	20.5	8	38.5	M14 x 1.5	23.5
40	M6 x 1.0	1/8	12.5	10	10	12	$28^{0}_{-0.052}$	14	57	15	16	42	22	20.5	8	38.5	M14 x 1.5	23.5
50	M8 x 1.25	1/4	14	14	14	16	$35^{0}_{-0.062}$	20	71	19	20	56	27	26	11	43.5	M18 x 1.5	28.5
63	M10 x 1.5	1/4	16.5	18	14	16	$35^{0}_{-0.062}$	20	84	19	20	56	27	26	11	43.5	M18 x 1.5	28.5

Made to Order (Dimensions other than those shown below are the same as those shown above.)

■With coil scraper: C(D)Q2D□-XC26□**C35**
■Spatter resistant specification for arc welding: CDQ2D□-XC26□**C88/C89**



[mm]

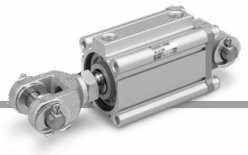
Bore size	Stroke range	XC35					XC88/XC89				
		A	L	L1	L2	Th9	A	L	L1	L2	Th9
32	125, 150, 175, 200, 250, 300	143.5	56	38.5	5	$23^{0}_{-0.052}$	148.5	56	38.5	10	$23^{0}_{-0.052}$
40		155	56	38.5	5	$28^{0}_{-0.052}$	160	56	38.5	10	$28^{0}_{-0.052}$
50		182.5	69	43.5	5	$35^{0}_{-0.062}$	187.5	69	43.5	10	$35^{0}_{-0.062}$
63		186	69	43.5	5	$35^{0}_{-0.062}$	191	69	43.5	10	$35^{0}_{-0.062}$

Double Clevis Width
Double Knuckle Width **12.5 mm, 16.5 mm, 19.5 mm: With Double Clevis, Double Knuckle Joint**

Compact Cylinder: Anti-lateral Load

CQ2DS-XC26□

ø32, ø40, ø50, ø63



How to Order

CQ2 D S 40 □ – 30 D C M Z – W – XC26A

CDQ2 D S 40 □ – 30 D C M Z – W – M9BW □ – XC26A □

Built-in magnet for auto switch

Type

S	Anti-lateral load

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm

Mounting

D	Double clevis

∗ Mounting brackets are shipped together, (but not assembled).

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke [mm]

Bore size	Standard stroke
32	5, 10, 15, 20, 25, 30, 35
40	40, 45, 50, 75, 100
50	10, 15, 20, 25, 30, 35
63	40, 45, 50, 75, 100

Action

D	Double acting

Cushion

C	Rubber bumper

Body option

Nil	Standard (Rod end female thread)
M	Rod end male thread

Auto switch mounting groove

Z	4 surfaces

Rod end bracket

Nil	None
W	Double knuckle joint

∗ Double knuckle joint cannot be mounted for the rod end female thread.

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Made to Order 1

Symbol	Double clevis width Double knuckle width
XC26A∗	16.5 mm
XC26B∗	19.5 mm
XC26C	12.5 mm

∗ Not available for bore size 32 mm

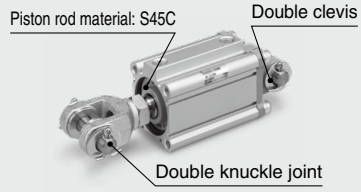
Made to Order 2

Symbol	Specification	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
		S45C	Stainless steel 304			
Nil	None	—	—	—	—	—
XC88∗	Spatter resistant spec. for arc welding	—	●	●	●	●
XC89∗	Spatter resistant spec. for arc welding	●	—	●	●	●

∗ Only available for cylinders with built-in magnet for auto switch

Ordering Example of Cylinder Assembly

When arranging Made to Order 1 and 2 at the same time
Cylinder model: CDQ2DS40-30DCMZ-W-M9BW-XC26AC89



Mounting D: Double clevis
Rod end bracket W: Double knuckle joint
Made to Order 1 : XC26A
(Double clevis/knuckle width: 16.5 mm)
Auto switch D-M9BW: 2 pcs.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length [m] 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V		M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV	M9PA	○	○	●	○	—	○		
				2-wire	12 V		M9BAV	M9BA	○	○	●	○	—	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		—	P3DWA	●	—	●	●	—	●	—	
							—	P4DW	—	—	●	●	—	●		
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	●	—	—	—	Relay, PLC
						5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

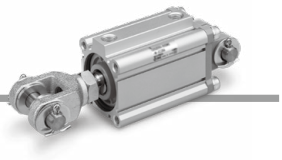
∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NW
1 m·····M (Example) M9NWM
3 m·····L (Example) M9NWL
5 m·····Z (Example) M9NWZ

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

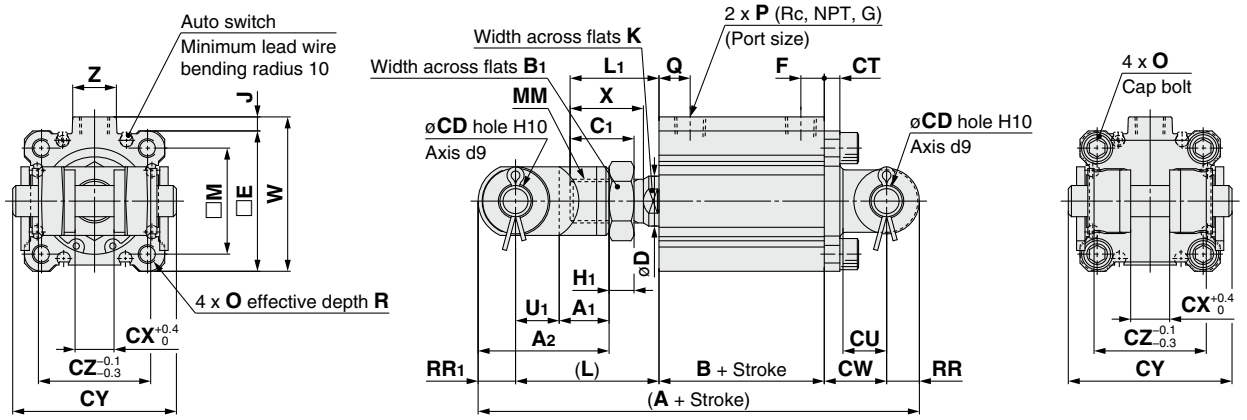
CQ2DS-XC26□

Bore Size

ø32 to ø63 Anti-lateral Load



C(D)Q2DS□-XC26$^{A}_{B}$$_{C}$



Note 1) Intermediate strokes (1 to 99 mm) are available in 1 mm increments.
For intermediate strokes, the dimensions are the same as a standard stroke one size larger than this intermediate stroke.
Note 2) Stroke length tolerance does not include the deflection of the bumper.
Note 3) Flat washers and split pins are included with the double clevis and double knuckle joint of this cylinder.
Note 4) Double clevis and double knuckle joint are shipped together with the product.

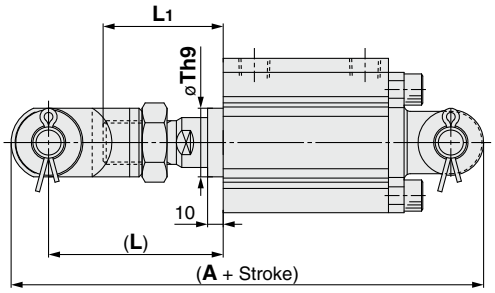
[mm]

Bore size	Stroke range	Without magnet for auto switch		Built-in magnet for auto switch		CD	CT	CU	CW	CX			CY	CZ	D	E	F	J
		A	B	A	B					XC26A	XC26B	XC26C						
32	50 or less	121	33	131	43	10	5	14	20	—	—	12.5	52.5	36	16	45	7.5	4.5
	75, 100	131	43															
40	50 or less	129.5	39.5	139.5	49.5	10	6	14	22	16.5	19.5	12.5	52.5	36	16	52	7.5	5
	75, 100	139.5	49.5															
50	50 or less	157.5	40.5	167.5	50.5	14	7	20	28	16.5	19.5	12.5	66	44	20	64	10.5	7
	75, 100	167.5	50.5															
63	50 or less	165	46	175	56	14	8	20	30	16.5	19.5	12.5	66	44	20	77	10.5	7
	75, 100	175	56															

Bore size	K	L	M	O	P	Q	R	RR	RR1	U1	W	Z	A1	A2	B1	C1	H1	L1	MM	X
32	14	46	34	M6 x 1.0	1/8	10	10	10	12	14	49.5	14	16	42	22	20.5	8	28.5	M14 x 1.5	23.5
40	14	46	40	M6 x 1.0	1/8	12.5	10	10	12	14	57	15	16	42	22	20.5	8	28.5	M14 x 1.5	23.5
50	17	59	50	M8 x 1.25	1/4	10.5	14	14	16	20	71	19	20	56	27	26	11	33.5	M18 x 1.5	28.5
63	17	59	60	M10 x 1.5	1/4	15	18	14	16	20	84	19	20	56	27	26	11	33.5	M18 x 1.5	28.5

Made to Order (Dimensions other than those shown below are the same as those shown above.)

■Spatter resistant specification for arc welding: CDQ2DS□-XC26□C88/C89



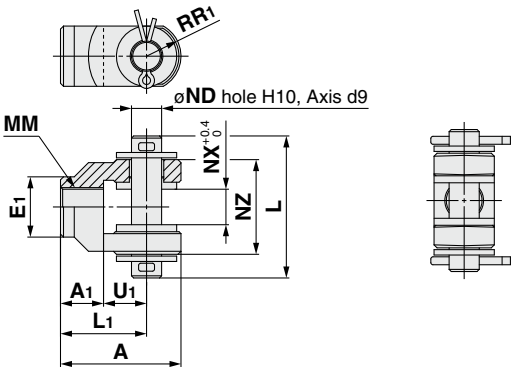
[mm]

Bore size	Stroke range	XC88/XC89			
		A	L	L1	Th9
32	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	141	56	38.5	$23^{0}_{-0.052}$
40		149.5	56	38.5	$28^{0}_{-0.052}$
50	10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100	177.5	69	43.5	$35^{0}_{-0.062}$
63		185	69	43.5	$35^{0}_{-0.062}$

Accessories

Double knuckle joint



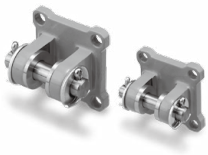


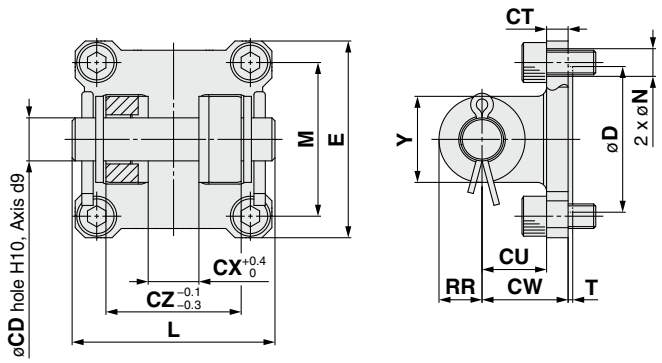
[mm]

Part no.	Applicable bore size	A	A1	E1	L1	MM	RR1	U1	ND	NX	NZ	L
Y-G04-XC26A	32, 40	42	16	ø22	30	M14 x 1.5	12	14	10	16.5	36	52.5
Y-G04-XC26B										19.5		
Y-G04-XC26C										12.5		
Y-G05-XC26A	50, 63	56	20	ø28	40	M18 x 1.5	16	20	14	16.5	44	66
Y-G05-XC26B										19.5		
Y-G05-XC26C										12.5		

Note) A knuckle joint pin, 2 flat washers and 2 split pins are included.

Double clevis





[mm]

Part no.	Applicable bore size	D	E	M	N	T	CD	CT	CU	CW	CX	CZ	RR	L	Y
CQ-D032-XC26C	32	30.7	45	34	6.6	1	10	5	14	20	12.5	36	10	52.5	20
CQ-D040-XC26A	40	39.1	52	40	6.6	1	10	6	14	22	16.5	36	10	52.5	20
CQ-D040-XC26B											19.5				
CQ-D040-XC26C											12.5				
CQ-D050-XC26A	50	48.5	64	50	9	1.5	14	7	20	28	16.5	44	14	66	28
CQ-D050-XC26B											19.5				
CQ-D050-XC26C											12.5				
CQ-D063-XC26A	63	61.3	77	60	11	2	14	8	20	30	16.5	44	14	66	28
CQ-D063-XC26B											19.5				
CQ-D063-XC26C											12.5				

Note) A clevis pin, 2 flat washers, 2 split pins and 4 hexagon socket head cap screws are included.

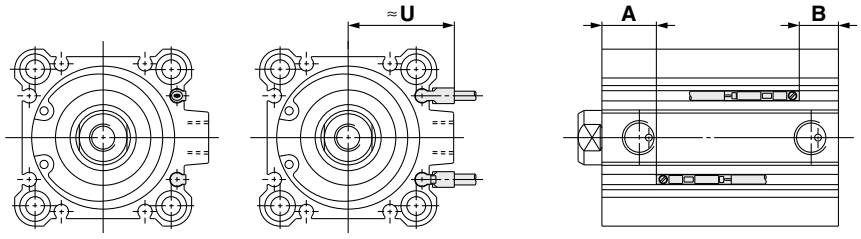
CDQ2 Series
With Auto Switch

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

Applicable Cylinder Series: CDQ2 (Standard), CDQ2 (Long stroke), CDQ2□S (Anti-lateral load)

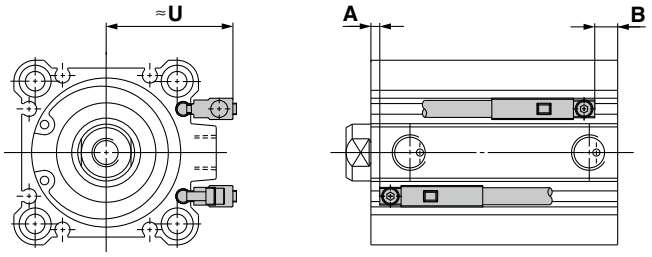
D-M9□
D-M9□W
D-M9□A
D-A9□V
D-M9□V
D-M9□WV
D-M9□AV
D-A9□

ø32 to ø100



D-P3DWA

ø32 to ø100



Auto Switch Proper Mounting Position

Applicable Cylinder Series: CDQ2 (Standard) (mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-P3DWA	
	A	B	A	B	A	B
32	12	9	8	5	7.5	4.5
40	16	11.5	12	7.5	11.5	7
50	14	14.5	10	10.5	9.5	10
63	16.5	17.5	12.5	13.5	12	13
80	19.5	22	15.5	18	15	17.5
100	24	27	20	23	19.5	22.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Applicable Cylinder Series: CDQ2 (Long stroke) (mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-P3DWA	
	A	B	A	B	A	B
32	12.5	20.5	8.5	16.5	8	16
40	16	26.5	12	22.5	11.5	22
50	14	29.5	10	25.5	9.5	25
63	16.5	28.5	12.5	24.5	12	24
80	19.5	34.5	15.5	30.5	15	30
100	22.5	41	18.5	37	18	36.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Applicable Cylinder Series: CDQ2□S (Anti-lateral load) (mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-P3DWA	
	A	B	A	B	A	B
32	18	13	14	9	13.5	8.5
40	21.5	16	17.5	12	17	11.5
50	19	19.5	15	15.5	14.5	15
63	21.5	22.5	17.5	18.5	17	18
80	24.5	27	20.5	23	20	22.5
100	27.5	33.5	23.5	29.5	23	29

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

Applicable Cylinder Series: CDQ2 (Standard) CDQ2 (Long stroke) CDQ2□S (Anti-lateral load) (mm)

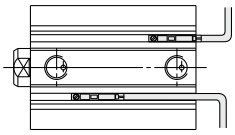
Auto switch model / Bore size	D-M9□V	D-A9□V	D-P3DWA
	U	U	U
32	30	27.5	35.5
40	32	30	38
50	37.5	35	43
63	42.5	40.5	48
80	51	49	56.5
100	59	57	65

Minimum Stroke for Auto Switch Mounting

Applicable Cylinder Series: CDQ2 (Standard), CDQ2 (Long stroke), CDQ2□S (Anti-lateral load)

(mm)

Number of auto switches	D-M9□V	D-A9□V	D-A9□	D-M9□WV D-M9□AV	D-M9□	D-M9□W D-M9□A	D-P3DWA
With 1 pc.	5	5	10(5)	10	15(5)	15(10)	15
With 2 pcs.	5	10	10	15	15(5)	15	15



Note) The dimension stated in ( ) shows the minimum stroke for the auto switch mounting when the auto switch does not project from the end surface of the cylinder body and hinder the lead wire bending space. (Refer to the figure above.)
The auto switch and auto switch mounting bracket should be ordered separately.

Operating Range

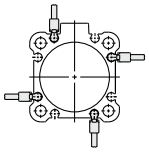
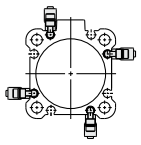
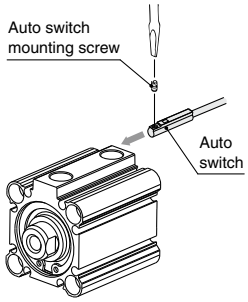
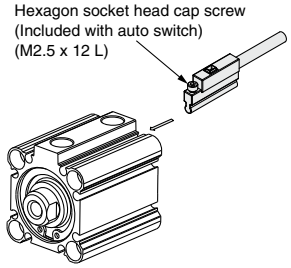
Applicable Cylinder Series: CDQ2 (Standard), CDQ2 (Long stroke), CDQ2□S (Anti-lateral load) (mm)

Auto switch model	Bore size					
	32	40	50	63	80	100
D-M9□(V) D-M9□W(V) D-M9□A(V)	5	5	6	6.5	7	7.5
D-A9□(V)	9	9.5	9.5	11	10.5	10.5
D-P3DWA	6	6	7	7.5	7.5	7.5

∗ Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.

Auto Switch Mounting Brackets/Part No.

Applicable Cylinder Series: CDQ2 (Standard), CDQ2 (Long stroke), CDQ2□S (Anti-lateral load)

Applicable auto switch	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9AV D-A9□/A9□V	D-P3DWA
Bore size (mm)	ø32 to ø100	ø32 to ø100
Auto switch mounting surface	Surfaces with auto switch mounting slot ø32 to ø100 	Surfaces with auto switch mounting slot 
Mounting of auto switch	 ● When tightening the auto switch mounting screw, use a watchmakers' screwdriver with a handle 5 to 6 mm in diameter. **Tightening torque for auto switch mounting screw** (N·m)	① Insert the mounting bracket into the mating groove of the cylinder tube. ② Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screw (M2.5 x 12 L). ③ If the detecting position is changed, go back to step ①. Note 1) Ensure that the auto switch is covered with the mating groove to protect the auto switch. Note 2) The tightening torque for the hexagon socket head cap screw (M2.5 x 12 L) is 0.2 to 0.3 N·m. 

Auto switch model	Tightening torque
D-M9□(V) D-M9□W(V) D-M9□A(V)	0.05 to 0.15
D-A9□(V)	0.10 to 0.20

Note) Auto switch mounting brackets and auto switches are enclosed with the cylinder for shipment.

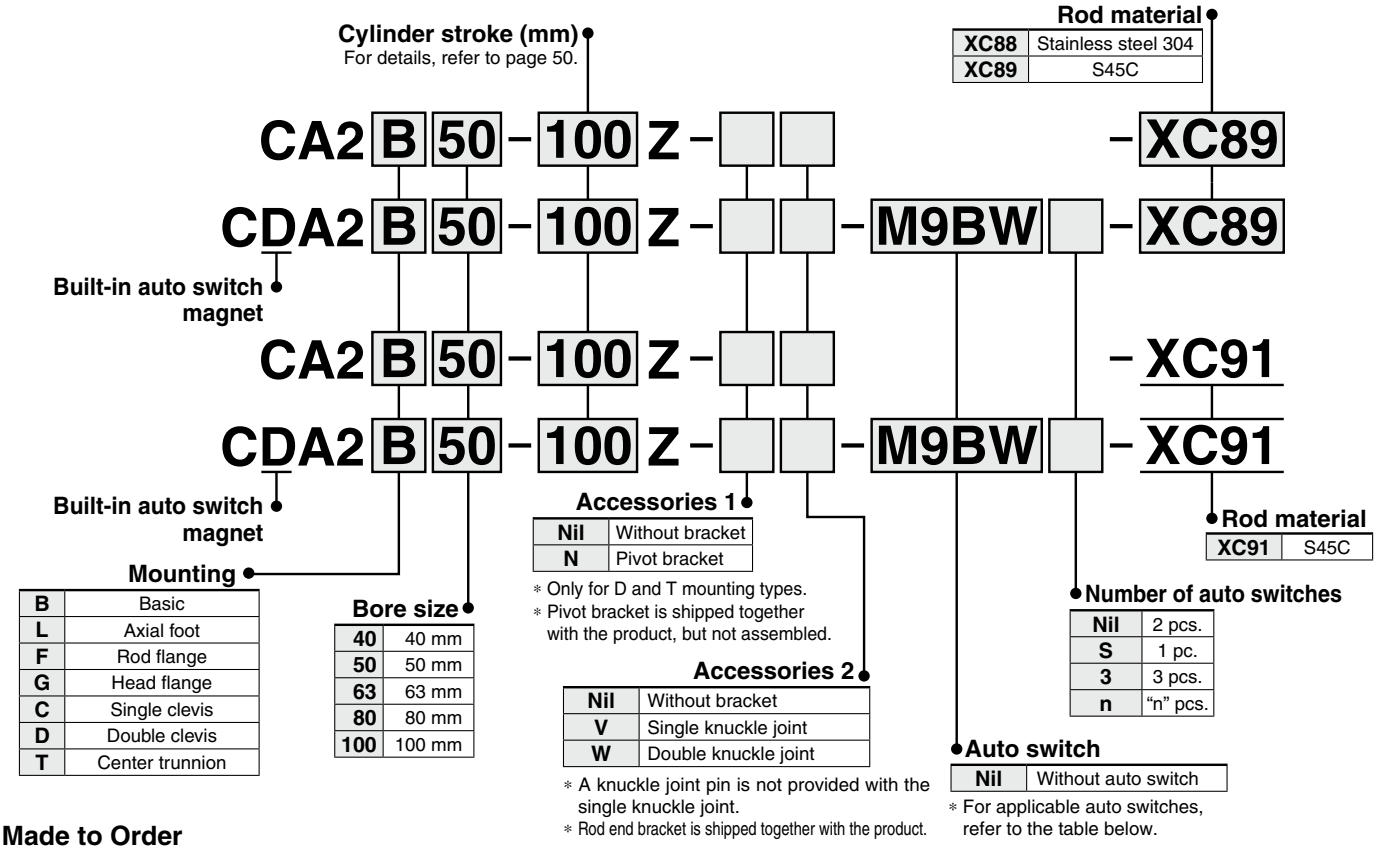
(mm)

Auto switch model	Bore size					
	32	40	50	63	80	100
D-P4DW□	BQ7-032		BQ7-050			

Spatter Resistant Cylinder for Arc Welding
Air Cylinder: Single Rod
CA2-XC88/XC89 -XC91
ø40, ø50, ø63, ø80, ø100

RoHS

How to Order



Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

Built-in Auto Switch Magnet Cylinder Model

If a built-in auto switch magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDA2L40-100Z-XC89

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V,12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	○		
				2-wire	12 V		M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V,12 V		M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	○		
				2-wire	12 V		M9BW	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V,12 V		M9NA	○	○	●	○	○	IC circuit	
				3-wire (PNP)			M9PA	○	○	●	○	○		
				2-wire	12 V		M9BA	○	○	●	○	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		P3DWA	●	—	●	●	●	—	
							P4DW	—	—	●	●	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	A93	●	●	●	●	—	—	Relay, PLC
						100 V or less	A90	●	—	●	—	—	IC circuit	

∗ Lead wire length symbols: 0.5 m····· Nil (Example)M9NW
1 m····· M (Example)M9NWM
3 m····· L (Example)M9NWL
5 m····· Z (Example)M9NWZ

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.
∗ The D-A9□/M9□□□/P3DWA auto switches are shipped together, (but not assembled). (However, auto switch mounting brackets are assembled for the D-A9□/M9□□□ before shipment.)



Specifications

Bore size (mm)		40	50	63	80	100
Fluid		Air				
Action		Double acting				
Proof pressure		1.5 MPa				
Maximum operating pressure		1.0 MPa				
Ambient and fluid temperatures		Without auto switch: –10 to 70°C Note 1) With auto switch: –10 to 60°C Note 1)				
Minimum operating pressure		0.05 MPa				
Piston speed		50 to 500 mm/s				
Cushion		Air cushion				
Stroke length tolerance		Up to 250st: $^{+1.0}_{0}$ 251 to 1000st: $^{+1.4}_{0}$				
Lubrication		Not required (Non-lube)				
Mounting		Basic, Foot, Rod flange, Head flange Single clevis, Double clevis, Center trunnion				
Allowable kinetic energy (J) Note 2)	When air cushion is activated	2.8	4.6	7.8	16	29
	When air cushion is not activated	0.33	0.56	0.91	1.50	2.68

Note 1) With no freezing
Note 2) Activate the air cushion when operating the cylinder. If this is not done, the piston rod assembly or the tie-rods will be damaged when the allowable kinetic energy exceeds the values shown in the table above.

Standard Strokes

(mm)

Bore size	Standard stroke Note 1)	Max. manufacturable stroke Note 2)
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	1000
50, 63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80, 100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700	1000

Note 1) Intermediate strokes not listed above are produced upon receipt of order.
Note 2) For details about applicable maximum stroke, refer to the model selection table (**Web Catalog**).

Minimum Stroke for Auto Switch Mounting

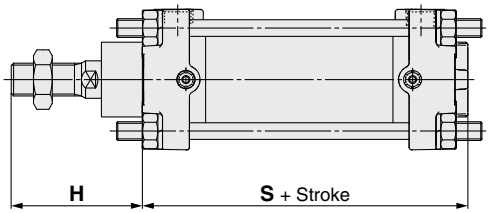
⚠Caution

1. **The minimum stroke for mounting varies with the auto switch type and cylinder mounting type. In particular, the center trunnion type needs careful attention.** (For details, refer to the **Web Catalog**.)

Accessories

Mounting		Basic	Axial foot	Rod flange	Head flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●	●

Comparison of the Dimensions of Each Series



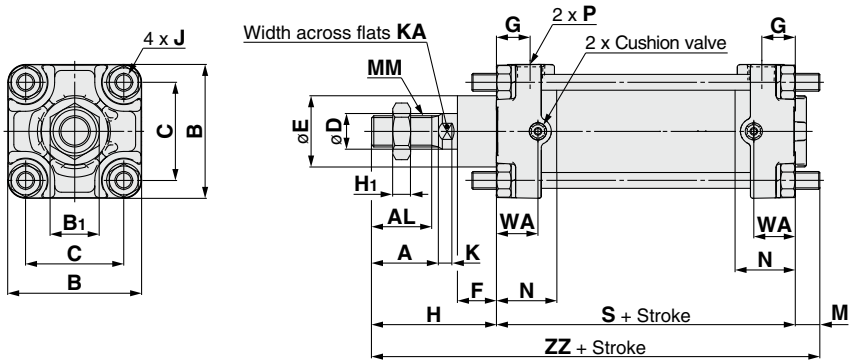
(mm)

Bore size (mm)	XC88, 89		XC91		XC35		Standard	
	H	S	H	S	H	S	H	S
40	56	95	51	95	51	95	51	95
50	60	101	58	101	58	101	58	101
63	60	112	58	112	58	112	58	112
80	73	133	71	133	71	133	71	133
100	74	143	72	143	72	143	72	143

∗ At 0 stroke

C□A2□-XC88 -XC89

Basic: CA2B

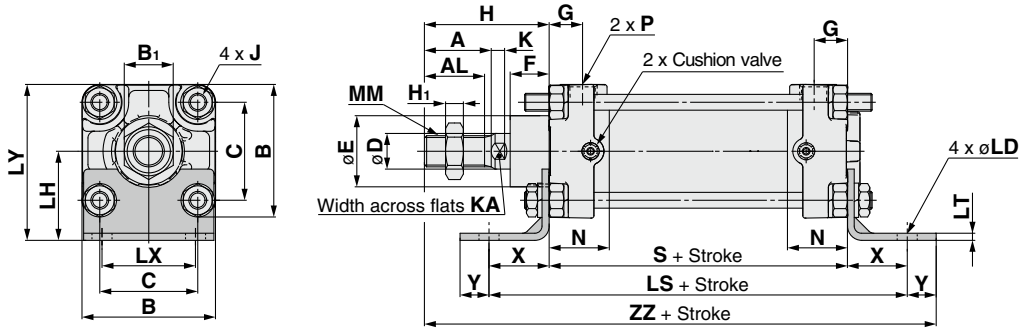


(mm)

Bore size (mm)	A	AL	B	B_1	C	D	E	F	G	H_1	J	K	KA	M	MM
40	30	27	60	22	44	16	32	17.5	15	8	M8 x 1.25	6	14	11	M14 x 1.5
50	35	32	70	27	52	20	40	15	17	11	M8 x 1.25	7	18	11	M18 x 1.5
63	35	32	85	27	64	20	40	15	17	11	M10 x 1.25	7	18	14	M18 x 1.5
80	40	37	102	32	78	25	52	19	21	13	M12 x 1.75	10	22	17	M22 x 1.5
100	40	37	116	41	92	30	52	19	21	16	M12 x 1.75	10	26	17	M26 x 1.5

Bore size (mm)	N	P	S	WA	H	ZZ
40	27	1/4	84	18.5	56	151
50	30	3/8	90	18.5	60	161
63	31	3/8	98	23	60	172
80	37	1/2	116	28.5	73	206
100	40	1/2	126	28.5	74	217

Axial foot: CA2L

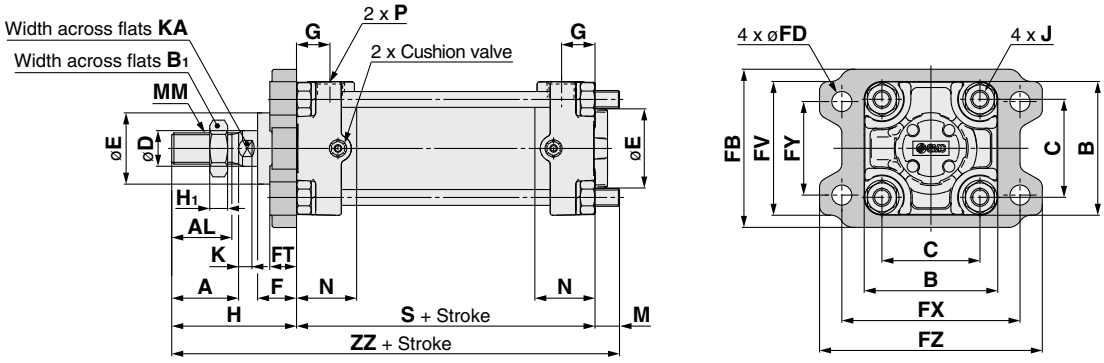


(mm)

Bore size (mm)	A	AL	B	B_1	C	D	E	F	G	H_1	J	K	KA	LD	LH	LS	LT	LX	LY
40	30	27	60	22	44	16	32	17.5	15	8	M8 x 1.25	6	14	9	40	138	3.2	42	70
50	35	32	70	27	52	20	40	15	17	11	M8 x 1.25	7	18	9	45	144	3.2	50	80
63	35	32	85	27	64	20	40	15	17	11	M10 x 1.25	7	18	11.5	50	166	3.2	59	93
80	40	37	102	32	78	25	52	19	21	13	M12 x 1.75	10	22	13.5	65	204	4.5	76	116
100	40	37	116	41	92	30	52	19	21	16	M12 x 1.75	10	26	13.5	75	212	6	92	133

Bore size (mm)	MM	N	P	S	X	Y	H	ZZ
40	M14 x 1.5	27	1/4	84	27	13	56	180
50	M18 x 1.5	30	3/8	90	27	13	60	190
63	M18 x 1.5	31	3/8	98	34	16	60	208
80	M22 x 1.5	37	1/2	116	44	16	73	249
100	M26 x 1.5	40	1/2	126	43	17	74	260

Rod flange: CA2F

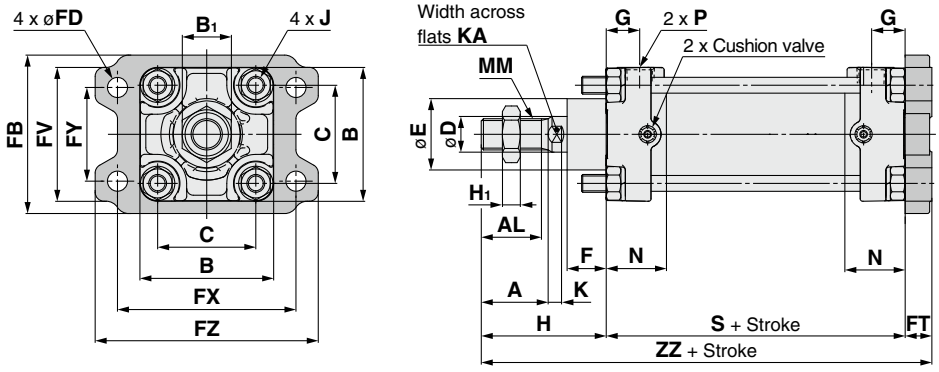


(mm)

Bore size (mm)	A	AL	B	B1	C	D	E	F	FB	FD	FT	FV	FX	FY	FZ	G	H1	J	K
40	30	27	60	22	44	16	32	17.5	71	9	12	60	80	42	100	15	8	M8 x 1.25	6
50	35	32	70	27	52	20	40	15	81	9	12	70	90	50	110	17	11	M8 x 1.25	7
63	35	32	85	27	64	20	40	15	101	11.5	15	86	105	59	130	17	11	M10 x 1.25	7
80	40	37	102	32	78	25	52	19	119	13.5	18	102	130	76	160	21	13	M12 x 1.75	10
100	40	37	116	41	92	30	52	19	133	13.5	18	116	150	92	180	21	16	M12 x 1.75	10

Bore size (mm)	KA	M	MM	N	P	S	H	ZZ
40	14	11	M14 x 1.5	27	1/4	84	56	151
50	18	11	M18 x 1.5	30	3/8	90	60	161
63	18	14	M18 x 1.5	31	3/8	98	60	172
80	22	17	M22 x 1.5	37	1/2	116	73	206
100	26	17	M26 x 1.5	40	1/2	126	74	217

Head flange: CA2G



(mm)

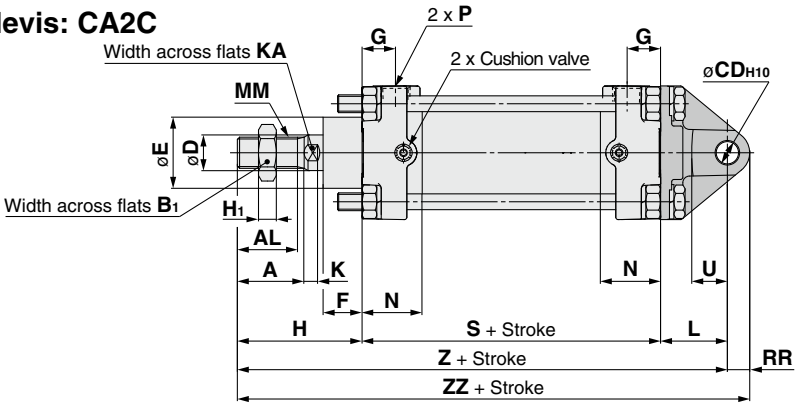
Bore size (mm)	A	AL	B	B1	C	D	E	F	FB	FD	FT	FV	FX	FY	FZ	G	H1	J
40	30	27	60	22	44	16	32	17.5	71	9	12	60	80	42	100	15	8	M8 x 1.25
50	35	32	70	27	52	20	40	15	81	9	12	70	90	50	110	17	11	M8 x 1.25
63	35	32	85	27	64	20	40	15	101	11.5	15	86	105	59	130	17	11	M10 x 1.25
80	40	37	102	32	78	25	52	19	119	13.5	18	102	130	76	160	21	13	M12 x 1.75
100	40	37	116	41	92	30	52	19	133	13.5	18	116	150	92	180	21	16	M12 x 1.75

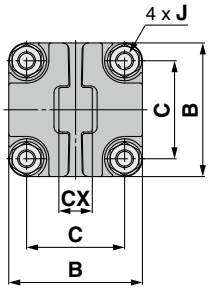
Bore size (mm)	K	KA	MM	N	P	S	H	ZZ
40	6	14	M14 x 1.5	27	1/4	84	56	152
50	7	18	M18 x 1.5	30	3/8	90	60	162
63	7	18	M18 x 1.5	31	3/8	98	60	173
80	10	22	M22 x 1.5	37	1/2	116	73	207
100	10	26	M26 x 1.5	40	1/2	126	74	218

ø40 to ø100

C□A2□-XC88
-XC89

Single clevis: CA2C



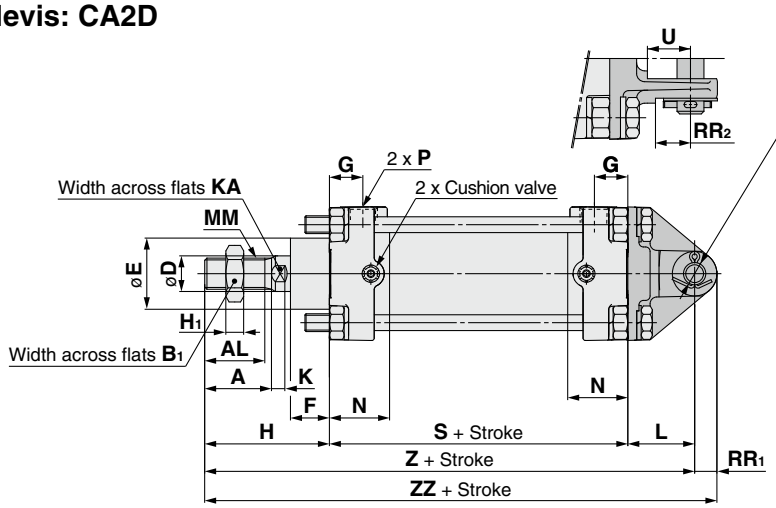


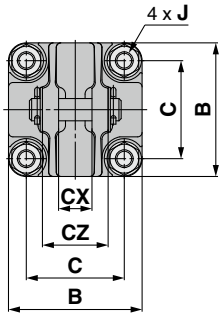
(mm)

Bore size (mm)	A	AL	B	B1	C	CDH10	CX	D	E	F	G	H1	J	K	KA	L
40	30	27	60	22	44	$10^{+0.058}_{0}$	$15^{-0.1}_{-0.3}$	16	32	17.5	15	8	M8 x 1.25	6	14	30
50	35	32	70	27	52	$12^{+0.070}_{0}$	$18^{-0.1}_{-0.3}$	20	40	15	17	11	M8 x 1.25	7	18	35
63	35	32	85	27	64	$16^{+0.070}_{0}$	$25^{-0.1}_{-0.3}$	20	40	15	17	11	M10 x 1.25	7	18	40
80	40	37	102	32	78	$20^{+0.084}_{0}$	$31.5^{-0.1}_{-0.3}$	25	52	19	21	13	M12 x 1.75	10	22	48
100	40	37	116	41	92	$25^{+0.084}_{0}$	$35.5^{-0.1}_{-0.3}$	30	52	19	21	16	M12 x 1.75	10	26	58

Bore size (mm)	MM	N	P	RR	S	U	H	Z	ZZ
40	M14 x 1.5	27	1/4	10	84	16	56	170	180
50	M18 x 1.5	30	3/8	12	90	19	60	185	197
63	M18 x 1.5	31	3/8	16	98	23	60	198	214
80	M22 x 1.5	37	1/2	20	116	28	73	237	257
100	M26 x 1.5	40	1/2	25	126	36	74	258	283

Double clevis: CA2D





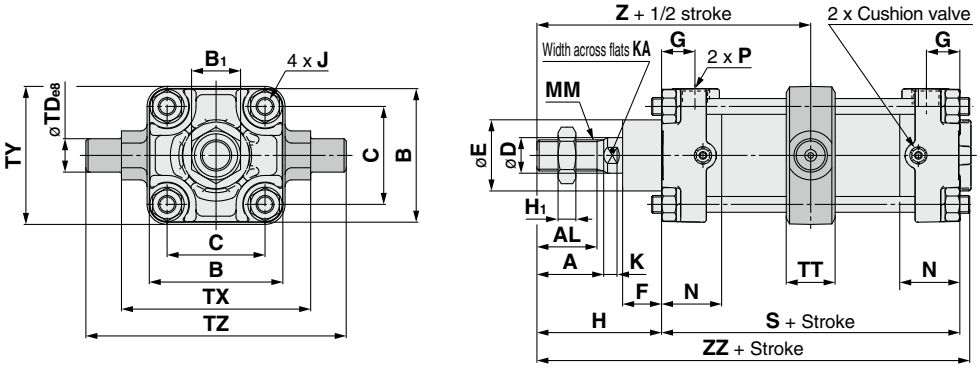
(mm)

Bore size (mm)	A	AL	B	B1	C	CDH10	CX	CZ	D	E	F	G	H1	J	K	KA	L
40	30	27	60	22	44	$10^{+0.058}_{0}$	$15^{+0.3}_{+0.1}$	29.5	16	32	17.5	15	8	M8 x 1.25	6	14	30
50	35	32	70	27	52	$12^{+0.070}_{0}$	$18^{+0.3}_{+0.1}$	38	20	40	15	17	11	M8 x 1.25	7	18	35
63	35	32	85	27	64	$16^{+0.070}_{0}$	$25^{+0.3}_{+0.1}$	49	20	40	15	17	11	M10 x 1.25	7	18	40
80	40	37	102	32	78	$20^{+0.084}_{0}$	$31.5^{+0.3}_{+0.1}$	61	25	52	19	21	13	M12 x 1.75	10	22	48
100	40	37	116	41	92	$25^{+0.084}_{0}$	$35.5^{+0.3}_{+0.1}$	64	30	52	19	21	16	M12 x 1.75	10	26	58

Bore size (mm)	MM	N	P	RR1	RR2	S	U	H	Z	ZZ
40	M14 x 1.5	27	1/4	10	16	84	16	56	170	180
50	M18 x 1.5	30	3/8	12	19	90	19	60	185	192
63	M18 x 1.5	31	3/8	16	23	98	23	60	198	214
80	M22 x 1.5	37	1/2	20	28	116	28	73	237	257
100	M26 x 1.5	40	1/2	25	23.5	126	36	74	258	283

∗ A clevis pin, flat washers and split pins are included.

Center trunnion: CA2T



(mm)

Bore size (mm)	A	AL	B	B_1	C	D	E	F	G	H_1	J	K	KA	MM	N	P	S
40	30	27	60	22	44	16	32	17.5	15	8	M8 x 1.25	6	14	M14 x 1.5	27	1/4	84
50	35	32	70	27	52	20	40	15	17	11	M8 x 1.25	7	18	M18 x 1.5	30	3/8	90
63	35	32	85	27	64	20	40	15	17	11	M10 x 1.25	7	18	M18 x 1.5	31	3/8	98
80	40	37	102	32	78	25	52	19	21	13	M12 x 1.75	10	22	M22 x 1.5	37	1/2	116
100	40	37	116	41	92	30	52	19	21	16	M12 x 1.75	10	26	M26 x 1.5	40	1/2	126

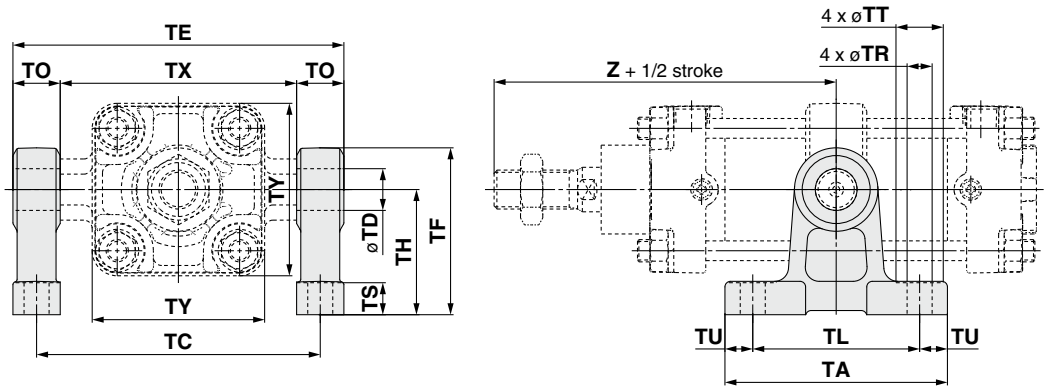
Bore size (mm)	TD_{e8}	TT	TX	TY	TZ	H	Z	ZZ
40	$15^{-0.032}_{-0.059}$	22	85	62	117	56	98	145
50	$15^{-0.032}_{-0.059}$	22	95	74	127	60	105	156
63	$18^{-0.032}_{-0.059}$	28	110	90	148	60	109	164
80	$25^{-0.040}_{-0.073}$	34	140	110	192	73	131	196
100	$25^{-0.040}_{-0.073}$	40	162	130	214	74	137	208

∗ Do not disassemble the trunnion type, as it is extremely difficult to align the axial center of the trunnion with the axial center of the cylinder. (Refer to the **Web Catalog**.)

Pivot Bracket/Trunnion and Double Clevis Pivot Bracket

● Strength is the same as cylinder brackets.

Trunnion pivot bracket

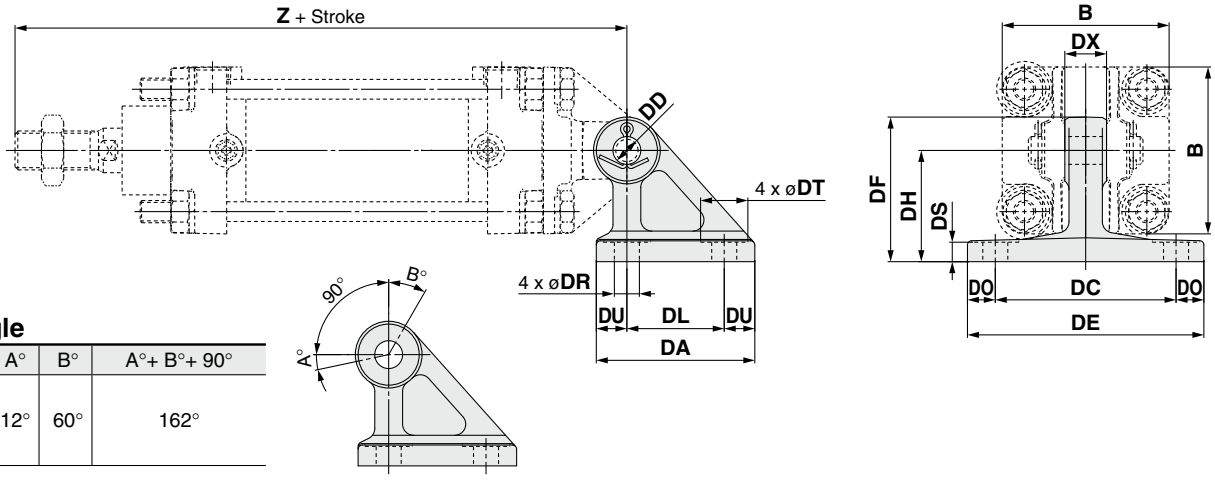


Material: Cast iron (mm)

Part no.	Bore size (mm)	TA	TL	TU	TC	TX	TE	TO	TR	TT	TS	TH	TF	TY	Z	TD-H10 (Hole)
CA2-S04	40	80	60	10	102	85	119	17	9	17	12	45	60	62	98	$15^{+0.070}_{0}$
	50	80	60	10	112	95	129	17	9	17	12	45	60	74	105	$15^{+0.070}_{0}$
CA2-S06	63	100	70	15	130	110	150	20	11	22	14	55	73	90	109	$18^{+0.070}_{0}$
MB-S10	80	120	90	15	166	140	192	26	13.5	24	17	75	100	110	131	$25^{+0.084}_{0}$
	100	120	90	15	188	162	214	26	13.5	24	17	75	100	130	137	$25^{+0.084}_{0}$

∗ Order 2 trunnion pivot brackets per cylinder.

Double clevis pivot bracket



Rotating Angle

Bore size (mm)	A°	B°	A°+ B°+ 90°
40 to 100	12°	60°	162°

Material: Cast iron (mm)

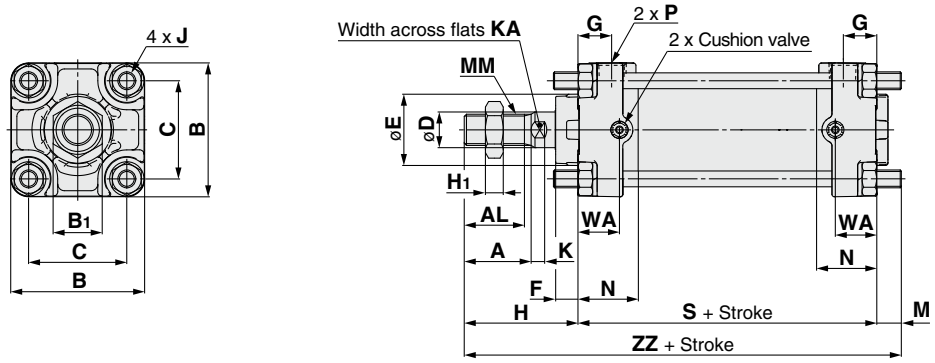
Part no.	Bore size (mm)	DA	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	DF	B	Z	DDH10 (Hole)
CA2-B04	40	57	35	11	65	15	85	10	9	17	8	40	52	60	170	$10^{+0.058}_{0}$
CA2-B05	50	57	35	11	65	18	85	10	9	17	8	40	52	70	185	$12^{+0.070}_{0}$
CA2-B06	63	67	40	13.5	80	25	105	12.5	11	22	10	50	66	85	198	$16^{+0.070}_{0}$
CA2-B08	80	93	60	16.5	100	31.5	130	15	13.5	24	12	65	90	102	237	$20^{+0.084}_{0}$
CA2-B10	100	93	60	16.5	100	35.5	130	15	13.5	24	12	65	90	116	258	$25^{+0.084}_{0}$

Bore Size

ø40 to ø100

C□A2□-XC91 ∗ Dimensions are the same as the standard product (CA2 series).

Basic: CA2B



(mm)

Bore size (mm)	A	AL	B	B_1	C	D	E	F	G	H_1	J	K	KA	M
40	30	27	60	22	44	16	32	10	15	8	M8 x 1.25	6	14	11
50	35	32	70	27	52	20	40	10	17	11	M8 x 1.25	7	18	11
63	35	32	85	27	64	20	40	10	17	11	M10 x 1.25	7	18	14
80	40	37	102	32	78	25	52	14	21	13	M12 x 1.75	10	22	17
100	40	37	116	41	92	30	52	14	21	16	M12 x 1.75	10	26	17

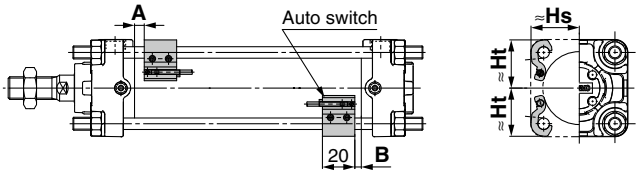
Bore size (mm)	MM	N	P	S	WA	H	ZZ
40	M14 x 1.5	27	1/4	84	18.5	51	146
50	M18 x 1.5	30	3/8	90	18.5	58	159
63	M18 x 1.5	31	3/8	98	23	58	170
80	M22 x 1.5	37	1/2	116	28.5	71	204
100	M26 x 1.5	40	1/2	126	28.5	72	215

CA2 Series
Auto Switch Mounting

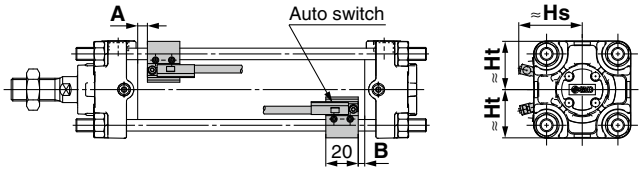
Auto Switch Proper Mounting Position (Detection at stroke end) and Mounting Height

<Tie-rod mounting>

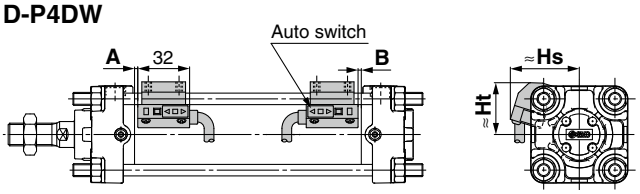
D-M9□
D-M9□W
D-M9□A
D-A9□



D-P3DWA



D-P4DW



Auto Switch Proper Mounting Position (mm)

Auto switch model / Bore size	D-M9□ D-M9□W D-M9□A		D-A9□		D-P3DWA		D-P4DW	
	A	B	A	B	A	B	A	B
40	9	9	5	5	4.5	4.5	2	2
50	9.5	8.5	5.5	4.5	5	4	2.5	1.5
63	12.5	11.5	8.5	7.5	8	7	5.5	4.5
80	16.5	13.5	12.5	9.5	12	9	9.5	6.5
100	18	16	14	12	13.5	11.5	11	9

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height (mm)

Auto switch model / Bore size	D-M9□ D-M9□W D-M9□A D-A9□		D-P3DWA		D-P4DW	
	Hs	Ht	Hs	Ht	Hs	Ht
40	30	30	37.5	35	42.5	33
50	34	34	41.5	39	46.5	37.5
63	41	41	50	41	52	43
80	49.5	49	58	49	58.5	51.5
100	56.5	56	66	56	66	58.5

Minimum Stroke for Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	Number of auto switches	Brackets other than center trunnion	Center trunnion				
			ø40	ø50	ø63	ø80	ø100
D-M9□ D-M9□W	2 (Different surfaces, same surface) 1	15	80		85	90	95
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)		$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)
D-M9□A	2 (Different surfaces, same surface) 1	15	80		85	95	100
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)		$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)
D-A9□	2 (Different surfaces, same surface) 1	15	75		80	85	90
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)		$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)
D-P3DWA	2 (Different surfaces, same surface) 1	15	85				
	n	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$85 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)				
D-P4DW	2 (Different surfaces, same surface) 1	15	120		130	140	
	n	$15 + 65\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$120 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)		$130 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	$140 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 2)	

Note 1) When "n" is an odd number, an even number that is one larger than the odd number is to be used for the calculation.
Note 2) When "n" is an odd number, a multiple of 4 that is larger than the odd number is to be used for the calculation.

Operating Range

(mm)

Auto switch model	Bore size				
	40	**50**	**63**	**80**	**100**
D-M9□ **D-M9□W** **D-M9□A**	4.5	5	5.5	5	6
D-A9□	7.5 (7)	8.5 (—)	9.5 (9)	9.5 (9)	10.5 (9)
D-P3DWA	4.5	4.5	5.5	5.5	5.5
D-P4DW	4	4	4.5	4	4.5

∗ Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30 dispersion) and may change substantially depending on the ambient environment.

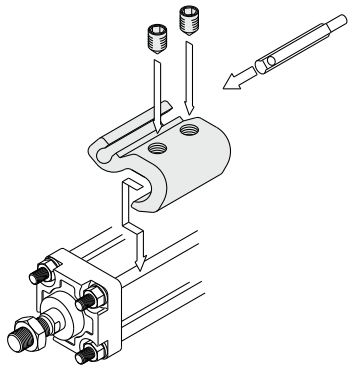
Note 1) ( ): For CDA2□H and CDA2W□H series

Note 2) D-A9□ and D-A9□V types cannot be mounted on ø50 of the CDA2□H and CDA2W□H series.

Auto Switch Mounting Brackets/Part No.

<Tie-rod mounting>

Auto switch model	Bore size (mm)				
	40	**50**	**63**	**80**	**100**
D-M9□ **D-M9□W** **D-M9□A** **D-A9□**	BA7-040	BA7-040	BA7-063	BA7-080	BA7-080
D-P3DWA	BK7-040S	BK7-040S	BA10-063S	BA10-080S	BA10-080S
D-P4DW	BAP2-040	BAP2-040	BAP2-063	BAP2-080	BAP2-080

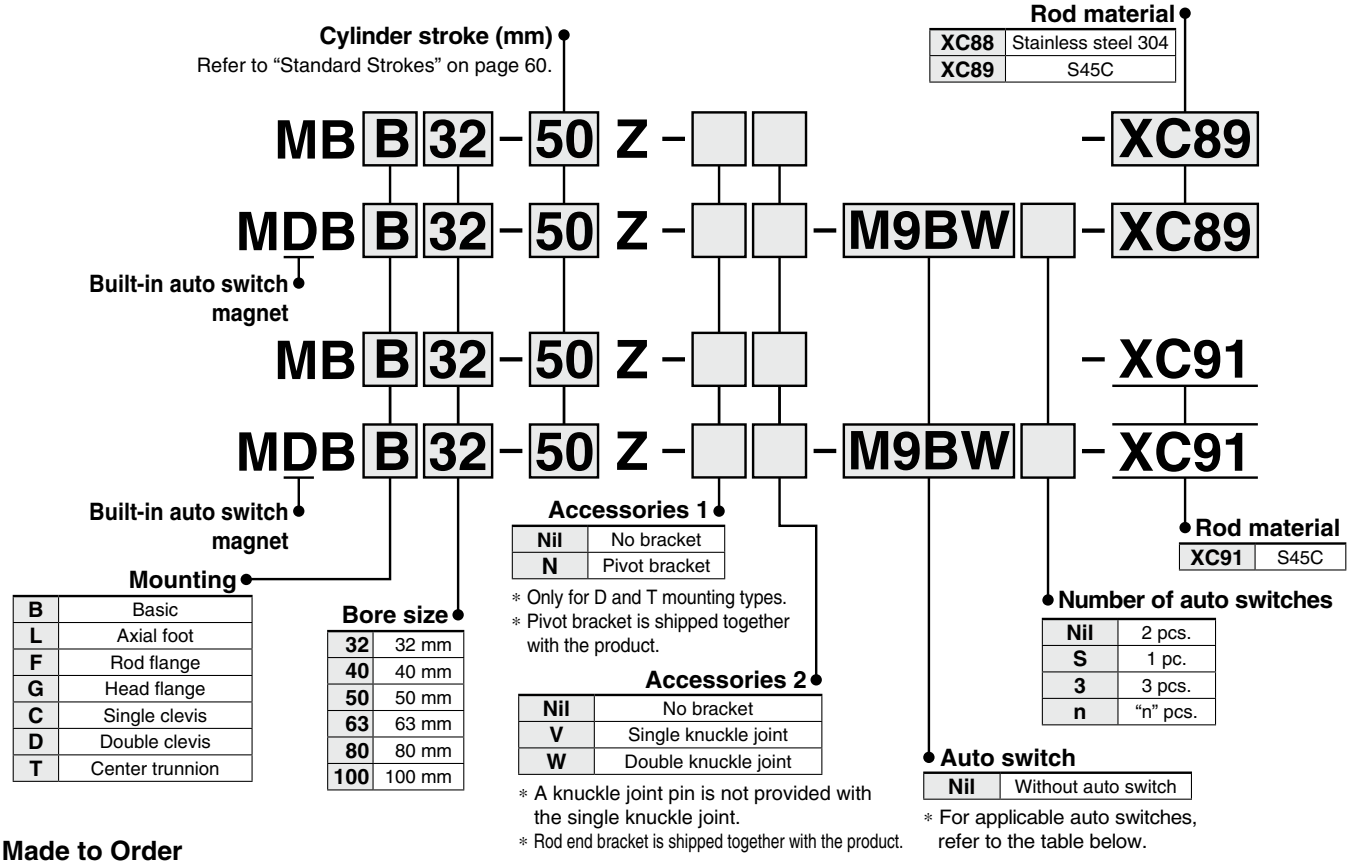


· The figure shows the mounting example for the D-M9□, M9□W, A9□ types.

Spatter Resistant Cylinder for Arc Welding
Air Cylinder: Single Rod
MB-XC88/XC89 -XC91
ø32, ø40, ø50, ø63, ø80, ø100

RoHS

How to Order



Made to Order

Part no.	Piston rod material (Hard chrome plated)		Coil scraper	Lube-retainer	Grease for welding
	S45C	Stainless steel 304			
-XC88	—	●	●	●	●
-XC89	●	—	●	●	●
-XC91	●	—	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

Built-in Auto Switch Magnet Cylinder Model

If a built-in auto switch magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBB40-100Z-XC89

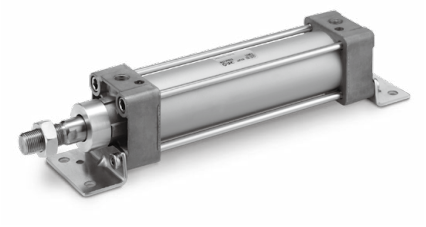
Applicable Auto Switches/Refer to the **Web Catalog** for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Tie-rod mounting	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	5 V,12 V	—	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	○		
				2-wire	12 V		M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)	5 V,12 V		M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	○		
				2-wire	12 V		M9BW	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)	5 V,12 V		M9NA	○	○	●	○	○	IC circuit	
				3-wire (PNP)			M9PA	○	○	●	○	○		
				2-wire	12 V		M9BA	○	○	●	○	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)	—		P3DWA	●	—	●	●	●	—	
							P4DW	—	—	●	●	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	●	●	●	—	—	—	Relay, PLC
							100 V or less	A90	●	—	●	—	—	IC circuit	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ For P4DW, ø40 to ø100 are available.

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.
∗ The D-A9□/M9□□□/P3DWA auto switches are shipped together, (but not assembled).
(However, auto switch mounting brackets are assembled for the D-A9□/M9□□□ before shipment.)



Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.05 MPa					
Ambient and fluid temperatures	Without auto switch: –10 to 70°C (No freezing)					
	With auto switch: –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$					
Cushion	Air cushion					
Port size (Rc)	1/8	1/4		3/8		1/2
Mounting	Basic, Foot, Rod flange, Head flange, Single clevis, Double clevis, Center trunnion					

Standard Strokes

Bore size (mm)	Standard stroke (mm)	Max. stroke
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000

Manufacture of intermediate strokes is possible. (Spacers are not used.) Produced upon receipt of order.

Accessories

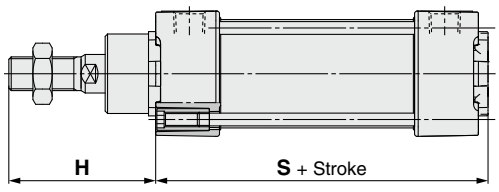
Mounting		Basic	Axial foot	Rod flange	Head flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●

Mounting Brackets/Part No.

Bore size (mm)	32	40	50	63	80	100
Axial foot Note 1)	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) Order two axial foot brackets per cylinder.
Note 2) Accessories for each mounting bracket are as follows:
Axial foot, flange, single clevis/body mounting bolt,
double clevis/body mounting bolt, clevis pin, flat washers and split pins.

Comparison of the Dimensions of Each Series



(mm)

Bore size (mm)	XC88, 89		XC91		XC35		Standard	
	H	S	H	S	H	S	H	S
32	50	88	47	88	47	88	47	88
40	61	88	58	88	58	88	51	88
50	67	98	67	98	67	98	58	98
63	67	98	67	98	67	98	58	98
80	82	118	81	118	81	118	72	118
100	82	118	81	118	81	118	72	118

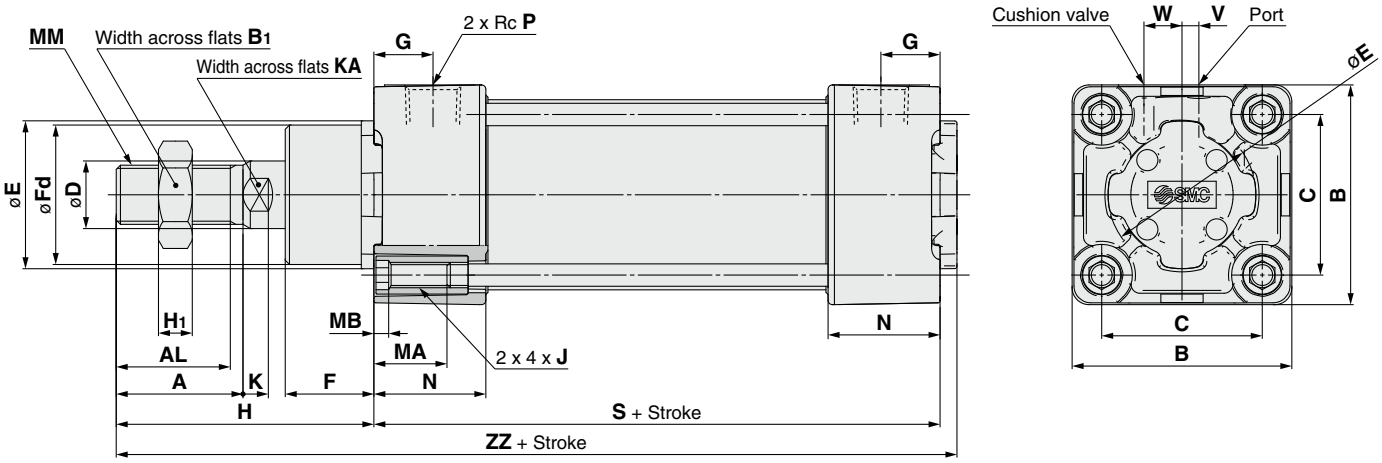
∗ At 0 stroke

Bore Size

ø32 to ø100

**M□B□-XC88
-XC89**

Basic: MBB



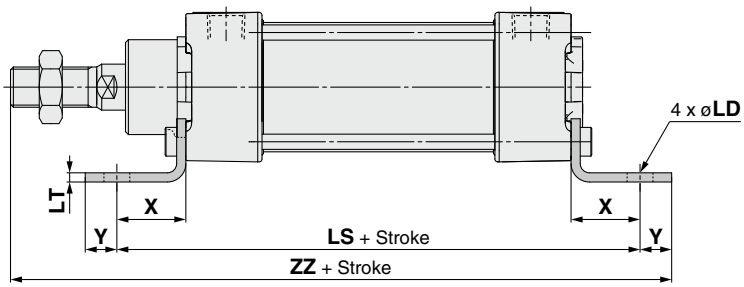
Dimensions

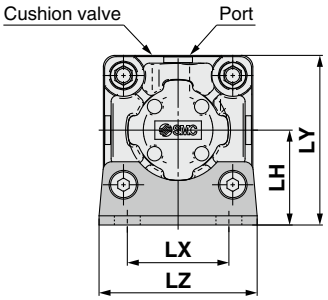
(mm)

Bore size (mm)	A	AL	B	B_1	C	D	E	F	Fd	G	H	H_1	J	K	KA	MA	MB	MM	N	P	S	V	W	ZZ
32	22	19.5	46	17	32.5	12	30	21	28	13	50	6	M6 x 1	6	10	16	4	M10 x 1.25	27	1/8	84	4	6.5	138
40	30	27	52	22	38	16	35	23.5	33	14	61	8	M6 x 1	6	14	16	4	M14 x 1.5	27	1/4	84	4	9	149
50	35	32	65	27	46.5	20	40	23	39.5	15.5	67	11	M8 x 1.25	7	18	16	4	M18 x 1.5	31.5	1/4	94	5	10.5	165
63	35	32	75	27	56.5	20	45	23	39.5	16.5	67	11	M8 x 1.25	7	18	16	4	M18 x 1.5	31.5	3/8	94	9	12	165
80	40	37	95	32	72	25	45	29	44.5	19	82	13	M10 x 1.5	10	22	16	5	M22 x 1.5	38	3/8	114	11.5	14	200
100	40	37	114	41	89	30	55	29	54	19	82	16	M10 x 1.5	10	26	16	5	M26 x 1.5	38	1/2	114	17	15	200

∗ Refer to Basic (B) for other dimensions.

Axial foot: MBL

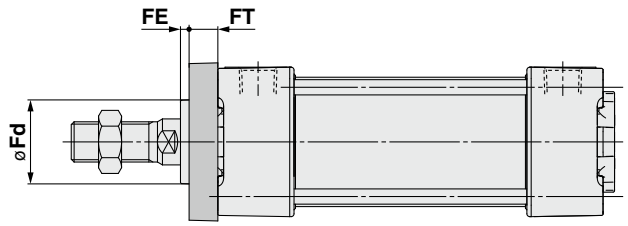


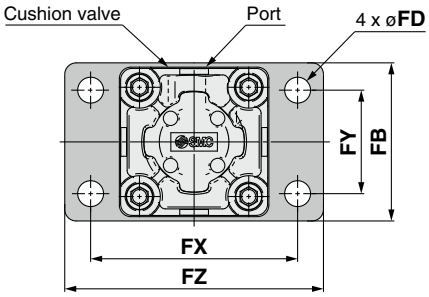


Axial Foot (mm)

Bore size (mm)	LD	LH	LS	LT	LX	LY	LZ	X	Y	ZZ
32	7	30	128	3.2	32	53	50	22	9	165
40	9	33	132	3.2	38	59	55	24	11	180
50	9	40	148	3.2	46	72.5	70	27	11	199
63	12	45	148	3.6	56	82.5	80	27	14	202
80	12	55	174	4.5	72	102.5	100	30	14	240
100	14	65	178	4.5	89	122	120	32	16	243

Rod flange: MBF

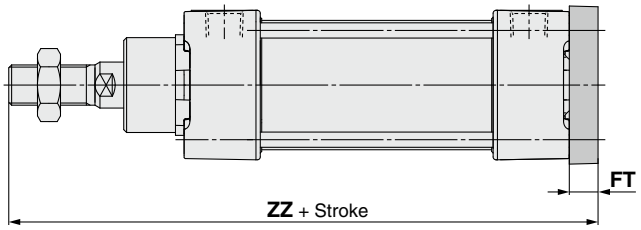


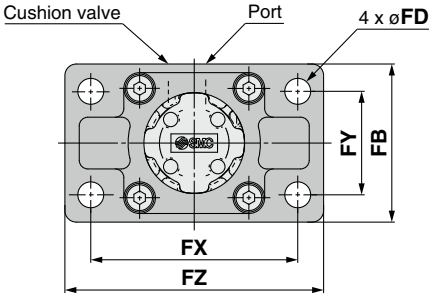


Rod Flange (mm)

Bore size (mm)	FB	FD	FE	FT	FX	FY	FZ	Fd
32	50	7	11	10	64	32	79	28
40	55	9	13.5	10	72	36	90	33
50	70	9	11	12	90	45	110	39.5
63	80	9	11	12	100	50	120	39.5
80	100	12	13	16	126	63	153	44.5
100	120	14	13	16	150	75	178	55

Head flange: MBG





Head Flange (mm)

Bore size (mm)	FB	FD	FT	FX	FY	FZ	ZZ
32	50	7	10	64	32	79	144
40	55	9	10	72	36	90	155
50	70	9	12	90	45	110	173
63	80	9	12	100	50	120	173
80	100	12	16	126	63	153	212
100	120	14	16	150	75	178	212

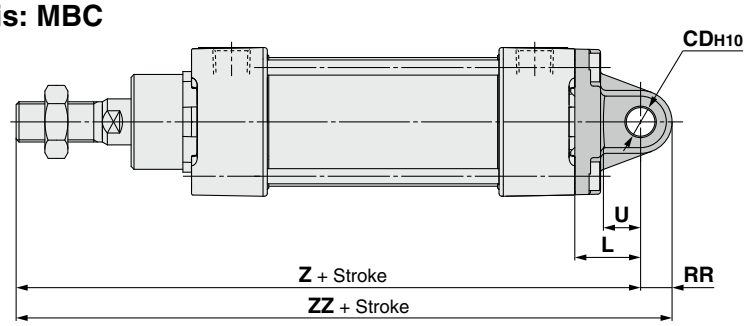
Bore Size

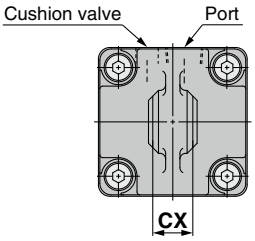
ø32 to ø100

∗ Refer to Basic (B) for other dimensions.

**M□B□-XC88
-XC89**

Single clevis: MBC

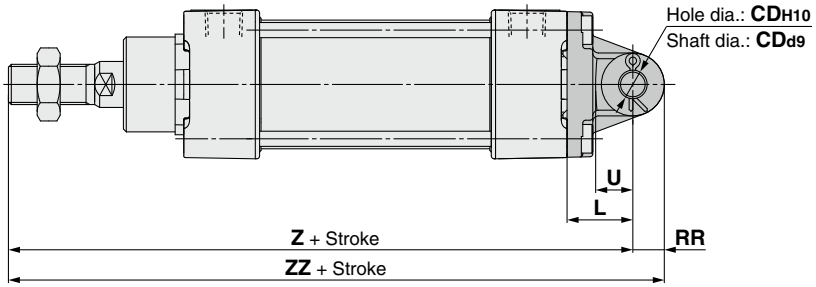


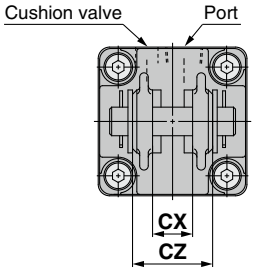


Single Clevis (mm)

Bore size (mm)	CD_{H10}	CX	L	RR	U	Z	ZZ
32	$10^{+0.058}_{0}$	$14^{-0.1}_{-0.3}$	23	10.5	13	157	167.5
40	$10^{+0.058}_{0}$	$14^{-0.1}_{-0.3}$	23	11	13	168	179
50	$14^{+0.070}_{0}$	$20^{-0.1}_{-0.3}$	30	15	17	191	206
63	$14^{+0.070}_{0}$	$20^{-0.1}_{-0.3}$	30	15	17	191	206
80	$22^{+0.084}_{0}$	$30^{-0.1}_{-0.3}$	42	23	26	238	261
100	$22^{+0.084}_{0}$	$30^{-0.1}_{-0.3}$	42	23	26	238	261

Double clevis: MBD

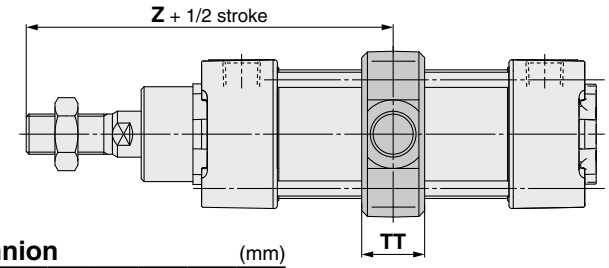


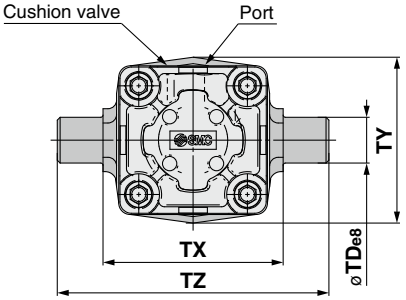


Double Clevis (mm)

Bore size (mm)	CD_{H10}	CD_{d9}	CX	CZ	L	RR	U	Z	ZZ
32	$10^{+0.058}_{0}$	$10^{-0.040}_{-0.076}$	$14^{+0.3}_{+0.1}$	28	23	10.5	13	157	167.5
40	$10^{+0.058}_{0}$	$10^{-0.040}_{-0.076}$	$14^{+0.3}_{+0.1}$	28	23	11	13	168	179
50	$14^{+0.070}_{0}$	$14^{-0.050}_{-0.093}$	$20^{+0.3}_{+0.1}$	40	30	15	17	191	206
63	$14^{+0.070}_{0}$	$14^{-0.050}_{-0.093}$	$20^{+0.3}_{+0.1}$	40	30	15	17	191	206
80	$22^{+0.084}_{0}$	$22^{-0.065}_{-0.117}$	$30^{+0.3}_{+0.1}$	60	42	23	26	238	261
100	$22^{+0.084}_{0}$	$22^{-0.065}_{-0.117}$	$30^{+0.3}_{+0.1}$	60	42	23	26	238	261

Center trunnion: MBT



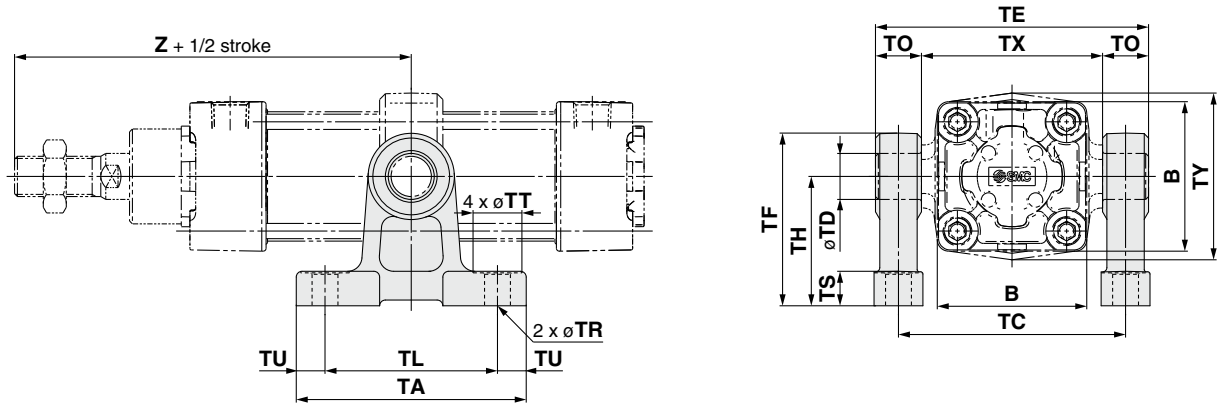


Center Trunnion (mm)

Bore size (mm)	TD_{e8}	TT	TX	TY	TZ	Z
32	$12^{-0.032}_{-0.059}$	17	50	49	74	92
40	$16^{-0.032}_{-0.059}$	22	63	58	95	103
50	$16^{-0.032}_{-0.059}$	22	75	71	107	114
63	$20^{-0.040}_{-0.073}$	28	90	87	130	114
80	$20^{-0.040}_{-0.073}$	34	110	110	150	139
100	$25^{-0.040}_{-0.073}$	40	132	136	182	139

Pivot Bracket/Trunnion and Double Clevis Pivot Bracket

Trunnion pivot bracket

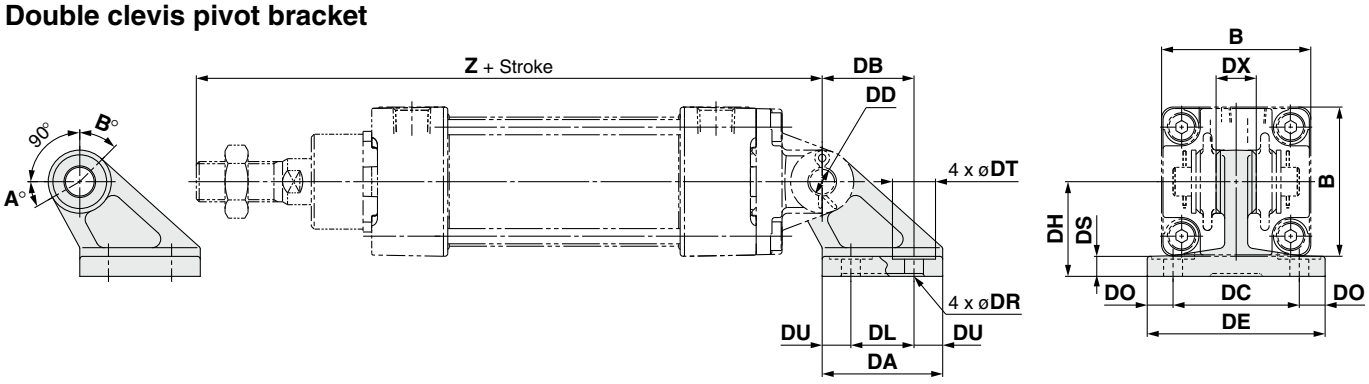


(mm)

Part no.	Bore size (mm)	B	TA	TL	TU	TC	TX	TE	TO	TR	TT	TS	TH	TF	Z	TD_{H10}
MB-S03	32	46	62	45	8.5	62	50	74	12	7	13	10	35	47	92	$12^{+0.070}_{0}$
MB-S04	40	52	80	60	10	80	63	97	17	9	17	12	45	60	103	$16^{+0.070}_{0}$
	50	65	80	60	10	92	75	109	17	9	17	12	45	60	114	$16^{+0.070}_{0}$
MB-S06	63	75	100	70	15	110	90	130	20	11	22	14	60	80	114	$20^{+0.084}_{0}$
	80	95	100	70	15	130	110	150	20	11	22	14	60	80	139	$20^{+0.084}_{0}$
MB-S10	100	114	120	90	15	158	132	184	26	13.5	24	17	75	100	139	$25^{+0.084}_{0}$

Note) Order 2 trunnion pivot brackets per cylinder.

Double clevis pivot bracket



(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z	DD_{H10}
MB-B03	32	46	42	32	22	10	44	14	62	9	6.6	15	7	33	157	$10^{+0.058}_{0}$
	40	52	42	32	22	10	44	14	62	9	6.6	15	7	33	168	$10^{+0.058}_{0}$
MB-B05	50	65	53	43	30	11.5	60	20	81	10.5	9	18	8	45	191	$14^{+0.070}_{0}$
	63	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	191	$14^{+0.070}_{0}$
MB-B08	80	95	73	64	45	14	86	30	111	12.5	11	22	10	65	238	$22^{+0.084}_{0}$
	100	114	73	64	45	14	86	30	111	12.5	11	22	10	65	238	$22^{+0.084}_{0}$

Rotating Angle

Bore size (mm)	A°	B°	A°+ B°+ 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°

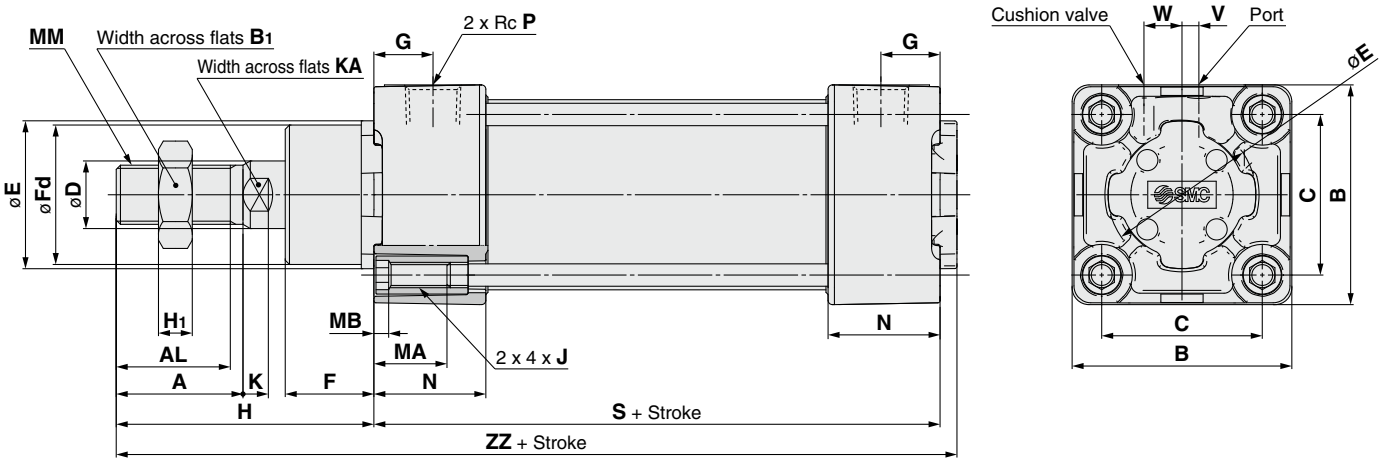
MB-XC91

Bore Size

ø32 to ø100

M□B□-XC91

Basic: MBB



Dimensions

(mm)

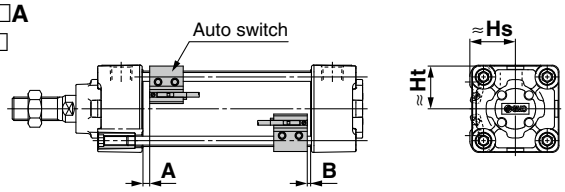
Bore size (mm)	Stroke range	A	AL	B	B_1	C	D	E	F	Fd	G	H	H_1	J	K	KA	MA	MB	MM	N	P	S	V	W	ZZ
32	Up to 1000	22	19.5	46	17	32.5	12	30	13	28	13	47	6	M6 x 1	6	10	16	4	M10 x 1.25	27	1/8	84	4	6.5	135
40	Up to 1000	30	27	52	22	38	16	35	13	33	14	58	8	M6 x 1	6	14	16	4	M14 x 1.5	27	1/4	84	4	9	146
50	Up to 1000	35	32	65	27	46.5	20	40	14	39.5	15.5	67	11	M8 x 1.25	7	18	16	5	M18 x 1.5	31.5	1/4	94	5	10.5	165
63	Up to 1000	35	32	75	27	56.5	20	45	14	39.5	16.5	67	11	M8 x 1.25	7	18	16	5	M18 x 1.5	31.5	3/8	94	9	12	165
80	Up to 1000	40	37	95	32	72	25	45	20	44.5	19	81	13	M10 x 1.5	10	22	16	5	M22 x 1.5	38	3/8	114	11.5	14	199
100	Up to 1000	40	37	114	41	89	30	55	20	54	19	81	16	M10 x 1.5	10	26	16	5	M26 x 1.5	38	1/2	114	17	15	199

Auto Switch Mounting

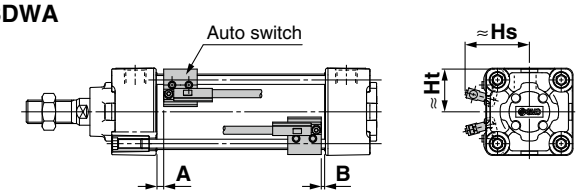
Auto Switch Proper Mounting Position (Detection at stroke end) and Mounting Height

<Tie-rod mounting>

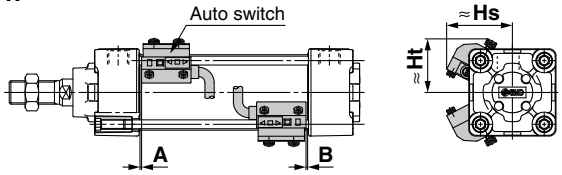
D-M9□
D-M9□W
D-M9□A
D-A9□



D-P3DWA



D-P4DW



Auto Switch Proper Mounting Position (mm)

Auto switch model / Bore size	D-M9□ D-M9□W D-M9□A		D-A9□		D-P3DWA		D-P4DW	
	A	B	A	B	A	B	A	B
32	10	8	6	4	5.5	3.5	3	1
40	9	9	5	5	4.5	4.5	2	2
50	10	9	6	5	5.5	4.5	3	2
63	10	9	6	5	5.5	4.5	3	2
80	14.5	11.5	10.5	7.5	10	7	7.5	4.5
100	14	12	10	8	9.5	7.5	7	5

∗ Models with rubber bumper have different dimensions for auto switch proper mounting positions (A and B). Add the following values to both A and B: 3 mm (ø32 and 40), 4 mm (ø50 and 63), 5 mm (ø80 and 100).

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height (mm)

Auto switch model / Bore size	D-M9□ D-M9□W D-M9□A D-A9□		D-P3DWA		D-P4DW	
	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	38	31	38	31
40	28.5	25.5	39	25.5	42	33
50	33.5	31	43	31	46.5	39
63	38.5	36	48	36	51.5	44
80	46.5	45	56.5	45	58	51.5
100	54	53.5	64.5	53.5	65.5	60.5

Minimum Stroke for Auto Switch Mounting

Mounting Brackets Except Center Trunnion

n: Number of auto switches (mm)

Auto switch model	Number of auto switches	ø32, ø40, ø50, ø63	ø80, ø100
D-M9□ D-M9□W D-M9□A	2 (Different surfaces, same surface) 1	15	
	n	$15+40\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)Note 1)	
D-A9□	2 (Different surfaces, same surface) 1	15	
	n	$15+40\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)Note 1)	
D-P3DWA	2 (Different surfaces, same surface) 1	15	
	n	$15+50\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)Note 1)	
D-P4DW	2 (Different surfaces, same surface) 1	15	
	n	$15+65\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)Note 1)	

Note 1) When "n" is an odd number, an even number that is one larger than the odd number is to be used for the calculation.

Minimum Stroke for Auto Switch Mounting

Center Trunnion

n: Number of auto switches (mm)

Auto switch model	Number of auto switches	ø32	ø40	ø50	ø63	ø80	ø100
D-M9□ D-M9□W	2 (Different surfaces, same surface) 1	75	80		85	90	95
	n	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)
D-M9□A	2 (Different surfaces, same surface) 1	80	85		90	95	100
	n	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)
D-A9□	2 (Different surfaces, same surface) 1	70	75		80	85	95
	n	$70 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)
D-P3DWA	2 (Different surfaces, same surface) 1	80	85		90		95
	n	$80 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)	$85 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$95 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16...) Note 2)
D-P4DW	2 (Different surfaces, same surface) 1	120		130		140	
	n	$120 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$130 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)		$140 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16…) Note 2)	

Note 2) When "n" is an odd number, a multiple of 4 that is larger than the odd number is to be used for the calculation.

Auto Switch Mounting Brackets/Part No.

Auto switch model	Bore size (mm)					
	ø32	ø40	ø50	ø63	ø80	ø100
D-M9□ D-M9□W D-M9□A D-A9□	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063
D-P3DWA	BA10-032S	BA10-040S	BA10-050S	BA10-050S	BA10-063S	BA10-063S
D-P4DW	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080

[Stainless Steel Mounting Screw]

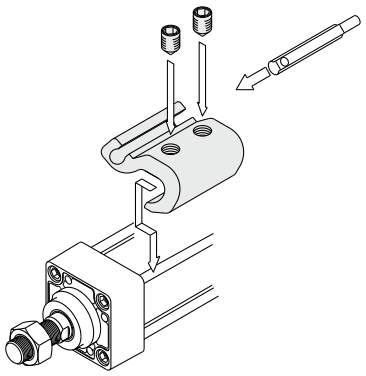
The following stainless steel mounting screw kit (including set screws) is available. Use it in accordance with the operating environment. (Since the auto switch mounting bracket is not included, order it separately.)

BBA1: For D-A5/A6/F5/J5 types

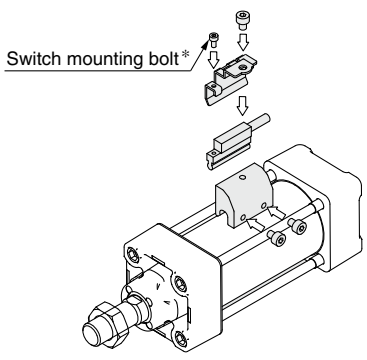
Note 1) Refer to the **Web Catalog** for details on the BBA1.

Note 2) When using the D-M9□A(V), do not use the steel set screws which are included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□).
Order a stainless steel screw kit (BBA1) separately, and use the M4 x 6 L stainless steel set screws included in the BBA1.

· The figure shows the mounting example for the D-M9□, M9□W, A9□ types.



<Mounting example for ø32, D-P3DWA>



* The switch mounting bolt is supplied with the switch.

Operating Range

(mm)

Auto switch model	Bore size					
	32	40	50	63	80	100
D-M9□ D-M9□W D-M9□A	4	4.5	4.5	4.5	5	6
D-P3DWA	3	4.5	4.5	5	5	5.5
D-P4DW	4	4	4	4.5	4	4.5
D-A9□	7	7.5	8.5	9.5	9.5	10.5

* Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.

Spatter Resistant Cylinder for Arc Welding
Compact Guide Cylinder

MGPM -XC88/XC91 -XC88W/XC89W/XC91W

ø32, ø40, ø50, ø63, ø80, ø100

RoHS

How to Order

Compact guide cylinder (Built-in auto switch magnet)

Rod material

XC88	Stainless steel 304
XC91	S45C

MGP M 32 □ – 50 Z – M9BW □ – XC88

MGP M 32 □ – 50 Z – M9BW □ – XC88W

Bearing type

M	Slide bearing

Bore size

32	32 mm	**63**	63 mm
40	40 mm	**80**	80 mm
50	50 mm	**100**	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Rod material

XC88W	Stainless steel 304
XC89W	S45C
XC91W	S45C

Number of auto switches

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

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For applicable auto switches, refer to the table below.

Cylinder stroke (mm)

25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400

Made to Order

Part no.	Piston rod/Guide rod material (Hard chrome plating)		Coil scraper		Lube-retainer		Grease for welding
	S45C	Stainless steel 304	Rod side	Head side	Rod side	Head side	
-XC88	—	●	●	—	●	—	●
-XC91	●	—	●	—	●	—	●
-XC88W	—	●	●	●	●	●	●
-XC89W	●	—	●	●	●	●	●
-XC91W	●	—	●	●	●	—	●

∗ The current product MGP-XC89 is equivalent to -XC91.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V,12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V,12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V,12 V		M9NAV	M9NA	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	○		
				2-wire		12 V		M9BAV	M9BA	○	○	●	○	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—		—	P3DWA	●	—	●	●	●	—	
								—	P4DW	—	—	●	●	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	●	—	—	Relay, PLC
							100 V or less	A90V	A90	●	—	●	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m····· Nil (Example) M9NW
1 m····· M (Example) M9NWM
3 m····· L (Example) M9NWL
5 m····· Z (Example) M9NWZ

∗ Auto switches are shipped together, (but not assembled).

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

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.

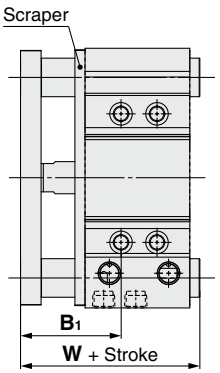


Specifications

Bore size		ø32	ø40	ø50	ø63	ø80	ø100
Action		Double acting					
Fluid		Air					
Proof pressure		1.5 MPa					
Maximum operating pressure		1.0 MPa					
Minimum operating pressure	**XC88, XC91**	0.12 MPa					
	XC88W, XC89W, XC91W	0.14 MPa					
Ambient and fluid temperatures		–10°C to 60°C (No freezing)					
Cushion		Rubber bumper on both ends					
Lubrication		Not required (Non-lube)					
Stroke length tolerance		$^{+1.5}_{0}$ mm					

Comparison of the Dimensions of Each Series

Single side scraper (-XC88, -XC91)

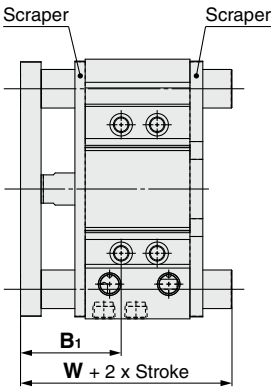


(mm)

Bore size (mm)	XC88		XC91		XC35		Standard	
	B1	**W** Note)	**B1**	**W** Note)	**B1**	**W** Note)	**B1**	**W** Note)
32	53	85	53	85	53	85	43	75
40	54	85	54	85	54	85	44	75
50	62	98.5	62	98.5	62	98.5	52	88.5
63	62	98.5	62	98.5	62	98.5	52	88.5
80	78	114.5	78	114.5	78	114.5	68	104.5
100	71	136.5	71	136.5	71	136.5	61	126.5

∗ At 0 stroke
Note) W dimensions are for 50 stroke or less.

Both sides scraper (-XC88W, -XC89W, -XC91W)



(mm)

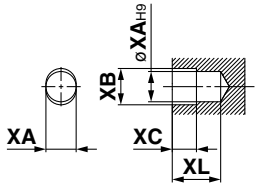
Bore size (mm)	XC88W XC89W		XC91W		XC35W	
	B1	**W**	**B1**	**W**	**B1**	**W**
32	53	82.5	53	82.5	53	82.5
40	54	89	54	89	54	89
50	62	95	62	95	62	95
63	62	100	62	100	62	100
80	78	120.5	78	120.5	78	120.5
100	71	143	71	143	71	143

∗ At 0 stroke

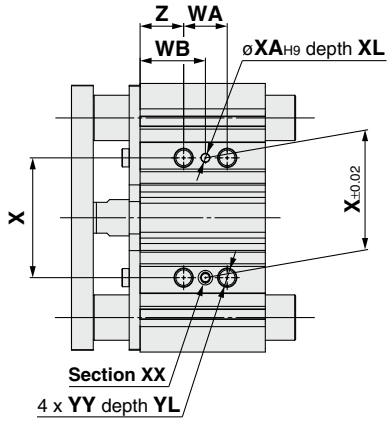
Bore Size

ø32 to ø63

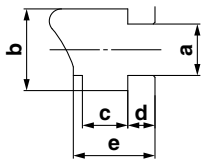
MGPM-XC88 -XC91



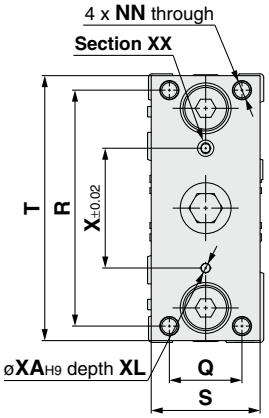
Detailed figure of section XX

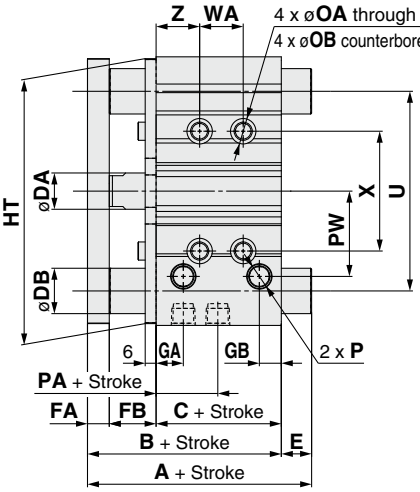


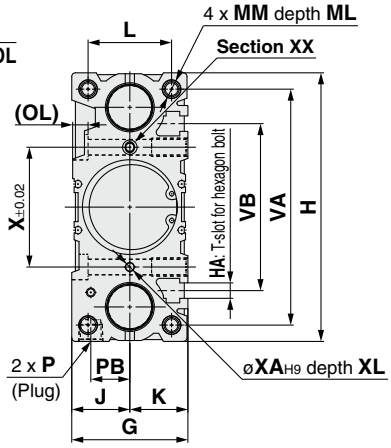
Bottom view



T-slot dimensions







(mm)

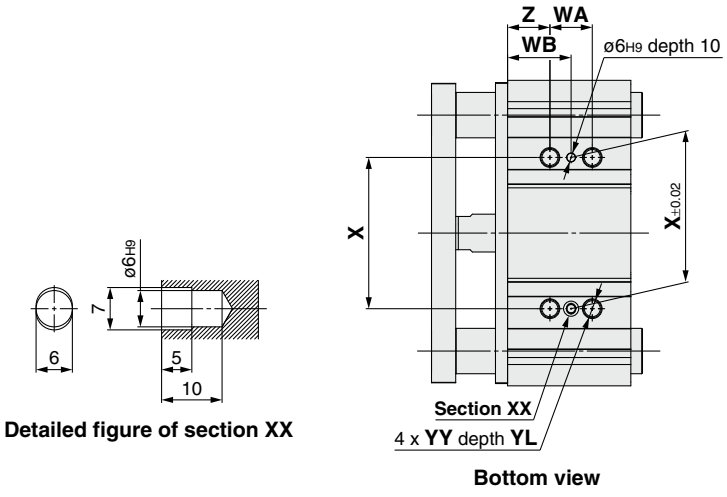
Bore size (mm)	Standard stroke	A			B	C	DA	DB	E			FA	FB	G	GA	GB	H
		50 st or less	Over 50 st 200 st or less	Over 200 st					50 st or less	Over 50 st 200 st or less	Over 200 st						
32	25, 50, 75, 100 125, 150, 175, 200 250, 300, 350, 400	85	103.5	139.5	69.5	37.5	14	20	15.5	34	70	10	22	48	12	9	112
40		85	103.5	139.5	76	44	14	20	9	27.5	63.5	10	22	54	15	12	120
50		98.5	119.5	160.5	82	44	20	25	16.5	37.5	78.5	12	26	64	15	12	148
63		98.5	119.5	160.5	87	49	20	25	11.5	32.5	73.5	12	26	78	15.5	13.5	162

Bore size	HA	HT	J	K	L	MM	ML	NN	OA	OB	OL	P			PA	PB	PW	Q
												Nil	TN	TF				
32	M6	110	24	24	34	M8 x 1.25	20	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	6.5	16	35.5	30
40	M6	118	27	27	40	M8 x 1.25	20	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	13	18	39.5	30
50	M8	146	32	32	46	M10 x 1.5	22	M10 x 1.5	8.6	14	9	Rc1/4	NPT1/4	G1/4	9	21.5	47	40
63	M10	160	39	39	58	M10 x 1.5	22	M10 x 1.5	8.6	—	9	Rc1/4	NPT1/4	G1/4	13	28	58	50

Bore size	R	S	T	U	VA	VB	WA					WB					X	XA	XB
							25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st			
32	96	44	110	78	98	63	24	48	124	200	300	33	45	83	121	171	42	4	4.5
40	104	44	118	86	106	72	24	48	124	200	300	34	46	84	122	172	50	4	4.5
50	130	60	146	110	130	92	24	48	124	200	300	36	48	86	124	174	66	5	6
63	130	70	158	124	142	110	28	52	128	200	300	38	50	88	124	174	80	5	6

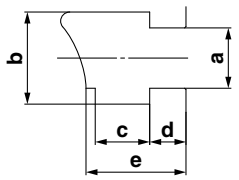
Bore size	XC	XL	YY	YL	Z	a	b	c	d	e
32	3	6	M8 x 1.25	16	21	6.5	10.5	5.5	3.5	9.5
40	3	6	M8 x 1.25	16	22	6.5	10.5	5.5	4	11
50	4	8	M10 x 1.5	20	24	8.5	13.5	7.5	4.5	13.5
63	4	8	M10 x 1.5	20	24	11	17.8	10	7	18.5

MGPM-XC88 -XC91

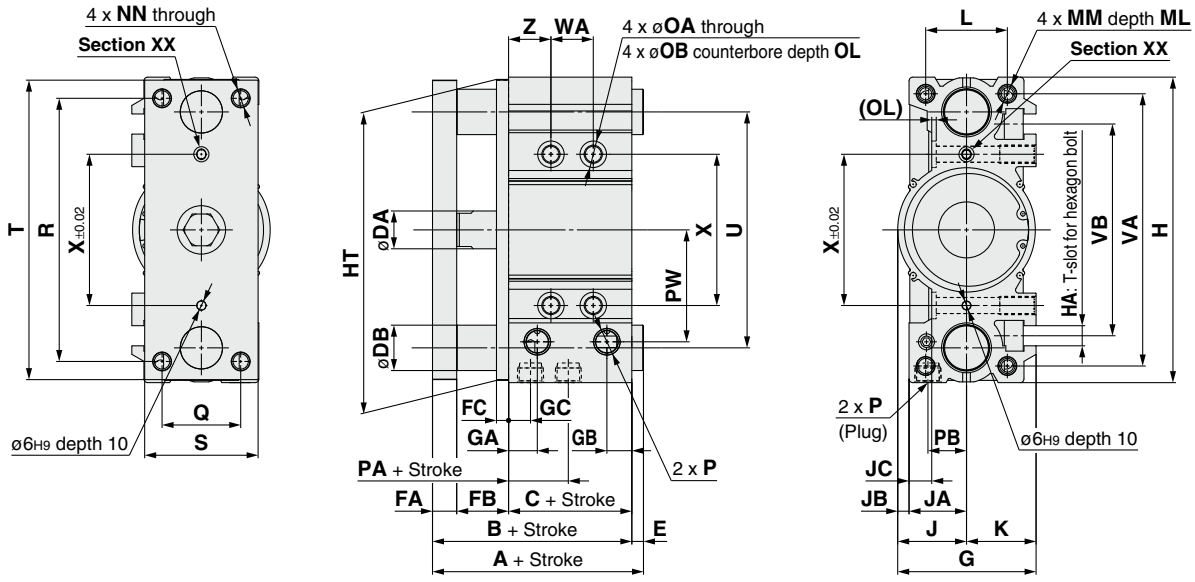


Detailed figure of section XX

Bottom view



T-slot dimensions



(mm)

Bore size	Standard stroke	A			B	C	DA	DB	E			FA	FB	FC	G
		50 st or less	Over 50 st 200 st or less	Over 200 st					50 st or less	Over 50 st 200 st or less	Over 200 st				
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400	114.5	141.5	190.5	106.5	56.5	25	30	8	35	84	16	34	8	91.5
100		136.5	161.5	200.5	126	66	30	36	10.5	35.5	74.5	19	41	9	111.5

Bore size	GA	GB	GC	H	HA	HT	J	JA	JB	JC	K	L	MM	ML	NN	OA	OB	OL
80	19	16.5	14.5	202	M12	199	45.5	38	7.5	15	46	54	M12 x 1.75	25	M12 x 1.75	10.6	17.5	3
100	22.5	20.5	18	240	M14	236	55.5	45	10.5	10	56	62	M14 x 2	31	M14 x 2	12.5	20	8

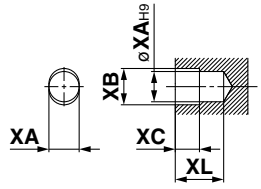
Bore size	P			PA	PB	PW	Q	R	S	T	U	VA	VB	WA				
	Nil	TN	TF											25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st
80	Rc3/8	NPT3/8	G3/8	14.5	25.5	74	52	174	75	198	156	180	140	28	52	128	200	300
100	Rc3/8	NPT3/8	G3/8	17.5	32.5	89	64	210	90	236	188	210	166	48	72	148	220	320

Bore size	WB					X	YY	YL	Z	a	b	c	d	e
	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st									
80	42	54	92	128	178	100	M12 x 1.75	24	28	13.3	20.3	12	8	22.5
100	35	47	85	121	171	124	M14 x 2	28	11	15.3	23.3	13.5	10	30

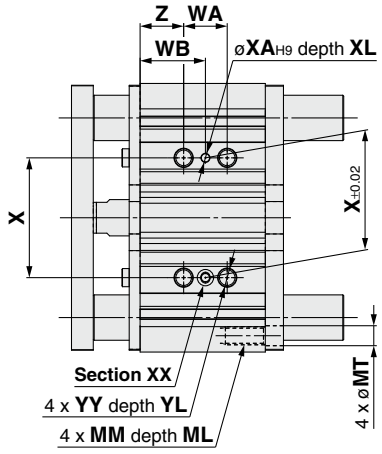
Bore Size

ø32 to ø63

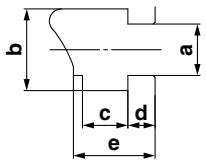
MGPM-XC88W
-XC89W



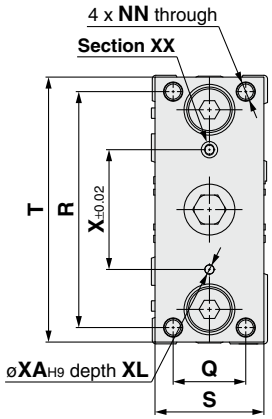
Detailed figure of section XX

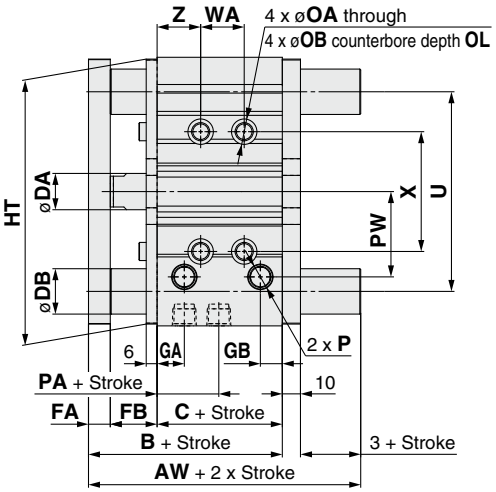


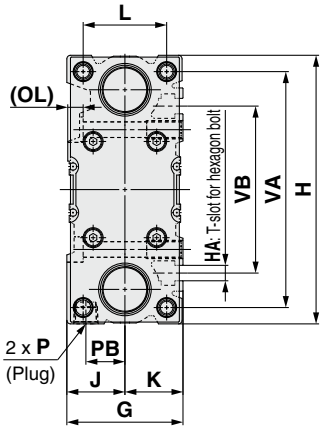
Bottom view



T-slot dimensions







(mm)

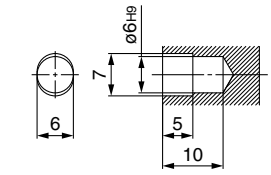
Bore size	Standard stroke	AW	B	C	DA	DB	FA	FB	G	GA	GB	H	HA	HT	J	K	L
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400	82.5	69.5	37.5	14	20	10	22	48	12	9	112	M6	110	24	24	34
40		89	76	44	14	20	10	22	54	15	12	120	M6	118	27	27	40
50		95	82	44	20	25	12	26	64	15	12	148	M8	146	32	32	46
63		100	87	49	20	25	12	26	78	15.5	13.5	162	M10	160	39	39	58

Bore size	MM	ML	MT	NN	OA	OB	OL	P			PA	PB	PW	Q	R	S	T	U
								Nil	TN	TF								
32	M8 x 1.25	20	9	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	6.5	16	35.5	30	96	44	110	78
40	M8 x 1.25	20	8.5	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	13	18	39.5	30	104	44	118	86
50	M10 x 1.5	22	11	M10 x 1.5	8.6	14	9	Rc1/4	NPT1/4	G1/4	9	21.5	47	40	130	60	146	110
63	M10 x 1.5	22	11	M10 x 1.5	8.6	—	9	Rc1/4	NPT1/4	G1/4	13	28	58	50	130	70	158	124

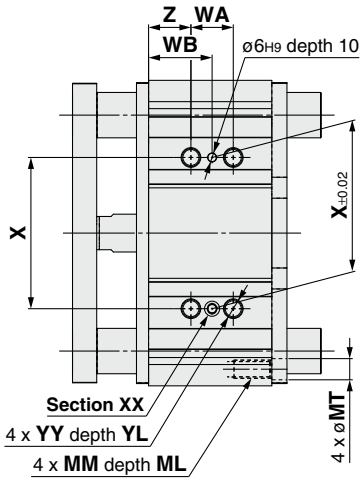
Bore size	VA	VB	WA					WB					X	XA	XB	XC	XL
			25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st					
32	98	63	24	48	124	200	300	33	45	83	121	171	42	4	4.5	3	6
40	106	72	24	48	124	200	300	34	46	84	122	172	50	4	4.5	3	6
50	130	92	24	48	124	200	300	36	48	86	124	174	66	5	6	4	8
63	142	110	28	52	128	200	300	38	50	88	124	174	80	5	6	4	8

Bore size	YY	YL	Z	a	b	c	d	e
32	M8 x 1.25	16	21	6.5	10.5	5.5	3.5	9.5
40	M8 x 1.25	16	22	6.5	10.5	5.5	4	11
50	M10 x 1.5	20	24	8.5	13.5	7.5	4.5	13.5
63	M10 x 1.5	20	24	11	17.8	10	7	18.5

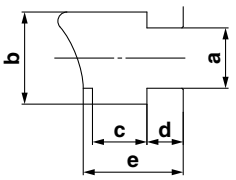
MGPM-XC88W -XC89W



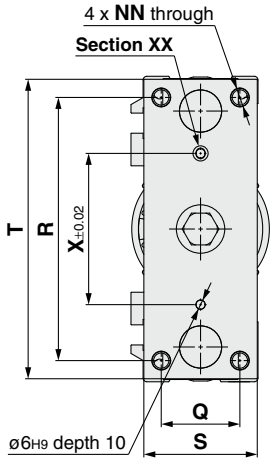
Detailed figure of section XX

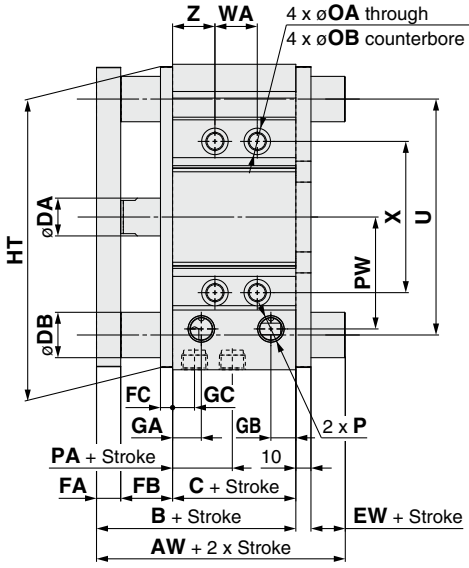


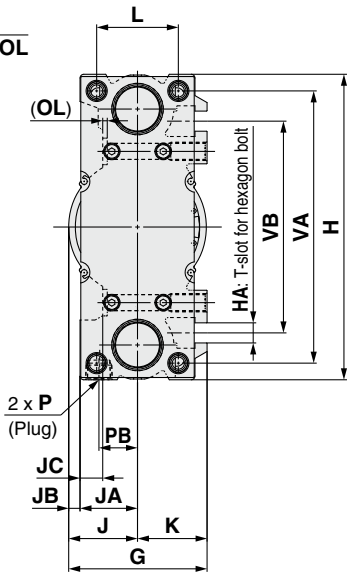
Bottom view



T-slot dimensions







(mm)

Bore size	Standard stroke	AW	B	C	DA	DB	EW	FA	FB	FC	G	GA	GB	GC	H	HA
80	25, 50, 75, 100, 125, 150, 175 200, 250, 300, 350, 400	120.5	106.5	56.5	25	30	4	16	34	8	91.5	19	16.5	14.5	202	M12
100		143	126	66	30	36	7	19	41	9	111.5	22.5	20.5	18	240	M14

Bore size	HT	J	JA	JB	JC	K	L	MM	ML	MT	NN	OA	OB	OL	P			PA
															Nil	TN	TF	
80	199	45.5	38	7.5	15	46	54	M12 x 1.75	25	14	M12 x 1.75	10.6	17.5	3	Rc3/8	NPT3/8	G3/8	14.5
100	236	55.5	45	10.5	10	56	62	M14 x 2	31	16	M14 x 2	12.5	20	8	Rc3/8	NPT3/8	G3/8	17.5

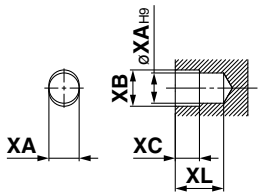
Bore size	PB	PW	Q	R	S	T	U	VA	VB	WA				
										25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st
80	25.5	74	52	174	75	198	156	180	140	28	52	128	200	300
100	32.5	89	64	210	90	236	188	210	166	48	72	148	220	320

Bore size	WB					X	YY	YL	Z	a	b	c	d	e
	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st									
80	42	54	92	128	178	100	M12 x 1.75	24	28	13.3	20.3	12	8	22.5
100	35	47	85	121	171	124	M14 x 2	28	11	15.3	23.3	13.5	10	30

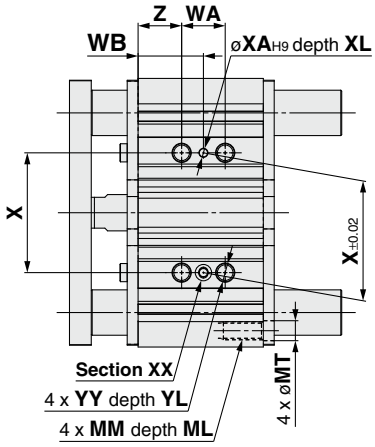
Bore Size

ø32 to ø63

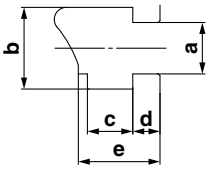
MGPM-XC91W



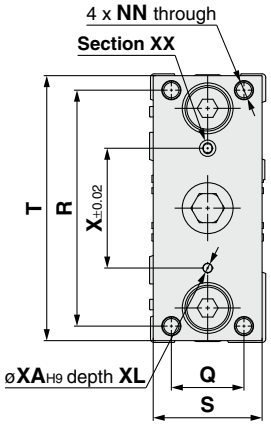
Detailed figure of section XX

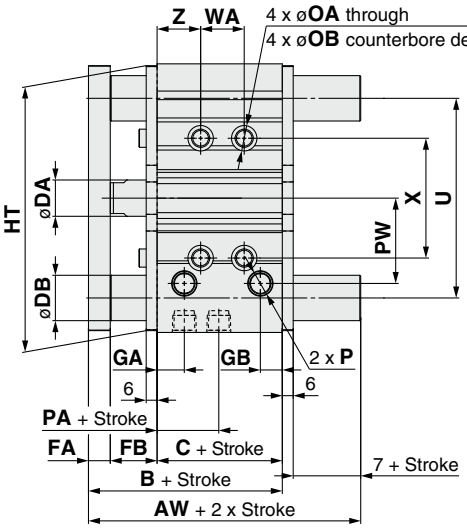


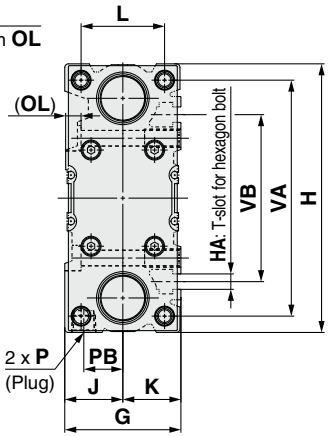
Bottom view



T-slot dimensions







(mm)

Bore size	Standard stroke	AW	B	C	DA	DB	FA	FB	G	GA	GB	H	HA	HT	J	K	L
32	25, 50, 75, 100, 125, 150, 175 200, 250, 300, 350, 400	82.5	69.5	37.5	14	20	10	22	48	12	9	112	M6	110	24	24	34
40		89	76	44	14	20	10	22	54	15	12	120	M6	118	27	27	40
50		95	82	44	20	25	12	26	64	15	12	148	M8	146	32	32	46
63		100	87	49	20	25	12	26	78	15.5	13.5	162	M10	160	39	39	58

Bore size	MM	ML	MT	NN	OA	OB	OL	P			PA	PB	PW	Q	R	S	T	U
								Nil	TN	TF								
32	M8 x 1.25	20	9	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	6.5	16	35.5	30	96	44	110	78
40	M8 x 1.25	20	8.5	M8 x 1.25	6.7	11	7.5	Rc1/8	NPT1/8	G1/8	13	18	39.5	30	104	44	118	86
50	M10 x 1.5	22	11	M10 x 1.5	8.6	14	9	Rc1/4	NPT1/4	G1/4	9	21.5	47	40	130	60	146	110
63	M10 x 1.5	22	11	M10 x 1.5	8.6	—	9	Rc1/4	NPT1/4	G1/4	13	28	58	50	130	70	158	124

Bore size	VA	VB	WA					WB					X	XA	XB	XC	XL
			25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st					
32	98	63	24	48	124	200	300	33	45	83	121	171	42	4	4.5	3	6
40	106	72	24	48	124	200	300	34	46	84	122	172	50	4	4.5	3	6
50	130	92	24	48	124	200	300	36	48	86	124	174	66	5	6	4	8
63	142	110	28	52	128	200	300	38	50	88	124	174	80	5	6	4	8

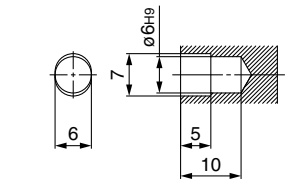
Bore size	YY	YL	Z	a	b	c	d	e
32	M8 x 1.25	16	21	6.5	10.5	5.5	3.5	9.5
40	M8 x 1.25	16	22	6.5	10.5	5.5	4	11
50	M10 x 1.5	20	24	8.5	13.5	7.5	4.5	13.5
63	M10 x 1.5	20	24	11	17.8	10	7	18.5

MGPM-XC91W

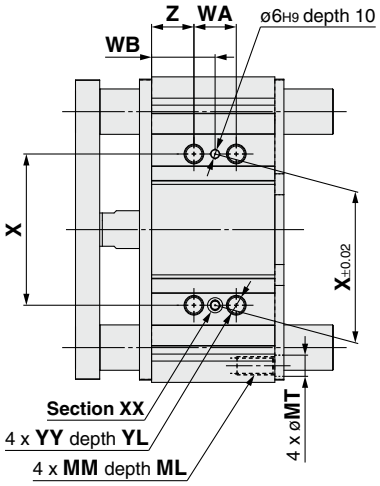
Bore Size

ø80, ø100

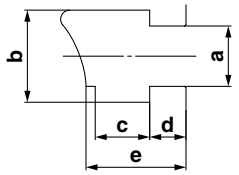
MGPM-XC91W



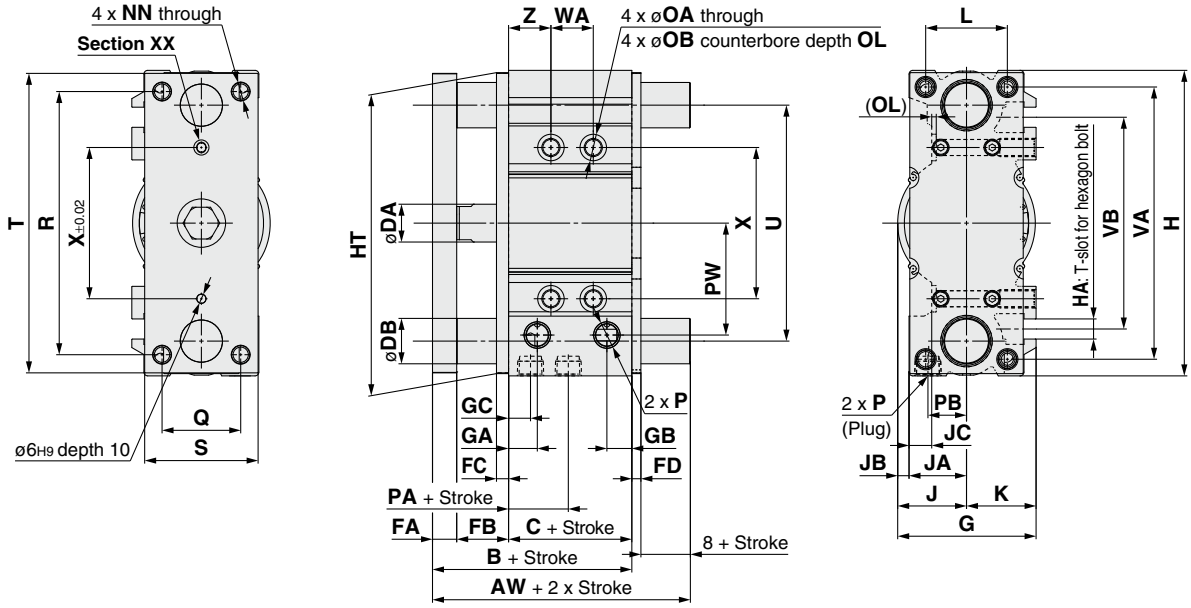
Detailed figure of section XX



Bottom view



T-slot dimensions



(mm)

Bore size	Standard stroke	AW	B	C	DA	DB	FA	FB	FC	FD	G	GA	GB	GC	H	HA	HT
80	25, 50, 75, 100, 125, 150, 175	120.5	106.5	56.5	25	30	16	34	8	6	91.5	19	16.5	14.5	202	M12	199
100	200, 250, 300, 350, 400	143	126	66	30	36	19	41	9	9	111.5	22.5	20.5	18	240	M14	236

Bore size	J	JA	JB	JC	K	L	MM	ML	MT	NN	OA	OB	OL	P			PA	PB
														Nil	TN	TF		
80	45.5	38	7.5	15	46	54	M12 x 1.75	25	14	M12 x 1.75	10.6	17.5	3	Rc3/8	NPT3/8	G3/8	14.5	25.5
100	55.5	45	10.5	10	56	62	M14 x 2	31	16	M14 x 2	12.5	20	8	Rc3/8	NPT3/8	G3/8	17.5	32.5

Bore size	PW	Q	R	S	T	U	VA	VB	WA					WB				
									25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st	25 st or less	Over 25 st 100 st or less	Over 100 st 200 st or less	Over 200 st 300 st or less	Over 300 st
80	74	52	174	75	198	156	180	140	28	52	128	200	300	42	54	92	128	178
100	89	64	210	90	236	188	210	166	48	72	148	220	320	35	47	85	121	171

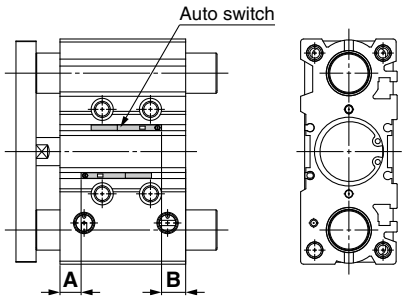
Bore size	X	YY	YL	Z	a	b	c	d	e
80	100	M12 x 1.75	24	28	13.3	20.3	12	8	22.5
100	124	M14 x 2	28	11	15.3	23.3	13.5	10	30

MGPM -XC88/XC91 -XC88W/XC89W/XC91W
Auto Switch Mounting

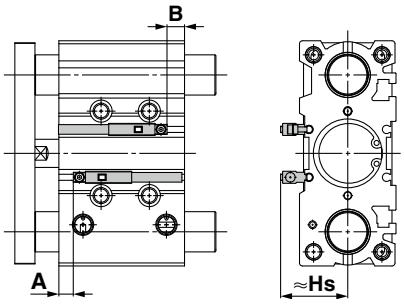
Auto Switch Proper Mounting Position (Detection at stroke end) and Mounting Height

D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-A9□/A9□V

ø32 to ø100

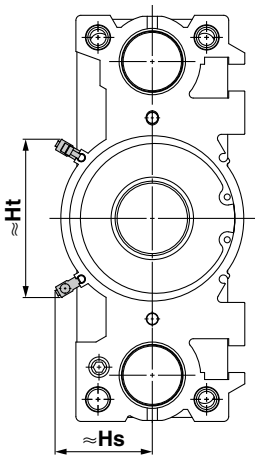


ø32 to ø63



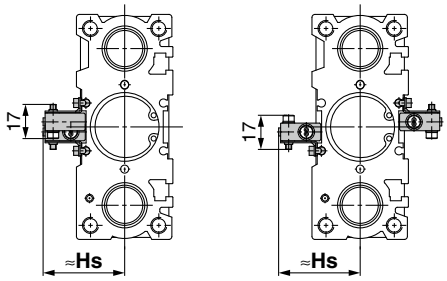
D-P3DWA

ø80, ø100



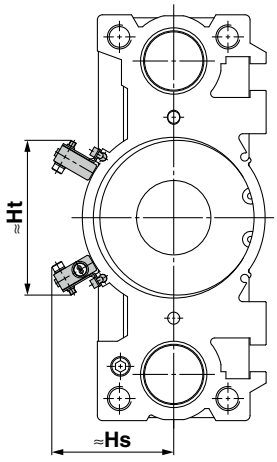
D-P4DW

ø32 to ø63



Less than 25 to 75 strokes
∗ For bore sizes ø40 through 63 with two auto switches, one switch is mounted on each side.

ø80, ø100



Auto Switch Proper Mounting Position
Applicable Cylinder Series: MGP

(mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-P3DWA		D-P4DW□	
	A	B	A	B	A	B	A	B
32	12.5	13	8.5	9	8	8.5	5.5	6
40	15.5	16.5	11.5	12.5	11	12	8.5	9.5
50	14.5	17	10.5	13	10	12.5	7.5	10
63	16.5	20	12.5	16	12	15.5	9.5	13
80	18	26	14	22	13.5	21.5	11	19
100	21.5	32.5	17.5	28.5	17	28	14.5	25

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Proper Mounting Height

(mm)

Auto switch model / Bore size	D-M9□V D-M9□WV D-M9□A D-M9□AV		D-A9□V		D-P3DWA		D-P4DW□	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	29	—	26.5	—	35	—	41.5	—
40	33	—	30.5	—	39	—	44.5	—
50	38.5	—	36	—	44.5	—	50	—
63	45.5	—	43	—	59.5	—	57	—
80	45	74	43	71.5	48.5	84	61	84.5
100	55	85.5	53	83	58.5	95	71	96.5

Minimum Stroke for Auto Switch Mounting

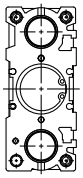
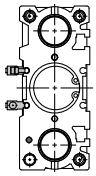
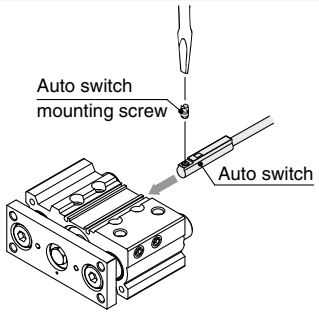
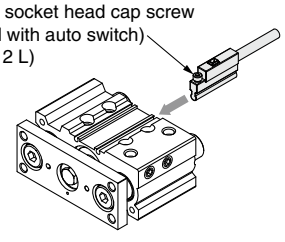
(mm)

Auto switch model	Number of auto switches	ø32	ø40	ø50	ø63	ø80	ø100
D-M9□V	With 1 pc.	5					
	With 2 pcs.	5					
D-M9□	With 1 pc.	5					
	With 2 pcs.	10					
D-M9□W	With 1 pc.	5 Note 2)					
	With 2 pcs.	10					
D-M9□WV D-M9□AV	With 1 pc.	5 Note 2)					
	With 2 pcs.	10					
D-M9□A	With 1 pc.	5 Note 2)					
	With 2 pcs.	10 Note 2)					
D-A9□	With 1 pc.	5					
	With 2 pcs.	10					
D-A9□V	With 1 pc.	5					
	With 2 pcs.	10					
D-P3DWA	With 1 pc.	15					
	With 2 pcs.	15					
D-P4DW□	With 1 pc.	5 Note 2) 3)					
	With 2 pcs., Different surfaces	10 Note 2) 3)					
	With 2 pcs., Same surface	75				10	

Note 1) Confirm that it is possible to secure the minimum bending radius of 10 mm of the auto switch lead wire before use.
Note 2) Confirm that it is possible to securely set the auto switch(es) within the range of indicator green light ON range before use.
For in-line entry type, also consider Note 1) shown above.
Note 3) The minimum bending radius of the D-P4DW□ is 25 mm.

Auto Switch Mounting Brackets/Part No.

Applicable Cylinder Series: MGPM-XC88(W), -XC89W, -XC91(W)

Applicable auto switches	D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV D-A9□/A9□V	D-P3DWA
Bore size (mm)	ø32 to ø100	ø32 to ø100
Auto switch mounting surface	Surfaces with auto switch mounting slot 	Surfaces with auto switch mounting slot 
Mounting of auto switch	 ● When tightening the auto switch mounting screw, use a watchmakers' screwdriver with a handle 5 to 6 mm in diameter. **Tightening Torque for Auto Switch Mounting Screw** (N·m) Auto switch model: Tightening torque D-M9□(V), D-M9□W(V): 0.05 to 0.15 D-A9□(V): 0.10 to 0.20	① Insert the mounting bracket into the mating groove of the cylinder tube. ② Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screw (M2.5 x 12 L). ③ If the detecting position is changed, go back to step ①. Note 1) Ensure that the auto switch is covered with the mating groove to protect the auto switch. Note 2) The tightening torque for the hexagon socket head cap screw (M2.5 x 12 L) is 0.2 to 0.3 N·m. Hexagon socket head cap screw (Included with auto switch) (M2.5 x 12 L) 

Note) Auto switch mounting brackets and auto switches are enclosed with the cylinder for shipment.

Auto switch model	Bore size
	ø32 to ø100
D-P4DW□	BMG7-032

Operating Range

Auto switch model	Bore size					
	32	40	50	63	80	100
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	6	6	6	6.5	6	7
D-A9□/A9□V	9.5	9.5	9.5	11	10.5	10.5
D-P3DWA	6	6	6	6	6	7
D-P4DW□	5	5	5	5.5	6	6.5

∗ Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.

Spatter Resistant Cylinder for Arc Welding
Rotary Clamp Cylinder: Double Guide Type
MK2T -XC89 -XC91
ø32, ø40, ø50, ø63

RoHS

How to Order

Rod material

XC89	S45C

MK2T **B** **32** □ – **10** **R** □ – **M9BW** □ – **XC89**

MK2T **B** **32** □ – **10** **R** □ – **M9BW** □ – **XC91**

Rotary clamp cylinder
Double guide type
(Built-in auto switch magnet)

Mounting bracket

B	Through-hole/Both ends tapped common (Standard)
G	Head flange

Bore size

32	32 mm	50	50 mm
40	40 mm	63	63 mm

Cylinder port

Nil	Rc
TN	NPT
TF	G

Clamp stroke

	Clamp stroke	Rotary stroke	Applicable bore size
10	10 mm	29 mm	ø32, ø40
20	20 mm		
20	20 mm	33 mm	ø50, ø63
50	50 mm		

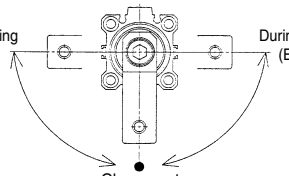
Rotary direction (Unclamp → Clamp)

R	Clockwise
L	Counterclockwise

∗ Direction of rotation viewed from the rod end when the rod is retracting.

L type
During unclamping (Extension end)
85° to 95° (90°±5°)

R type
During unclamping (Extension end)
85° to 95° (90°±5°)



Clamp part
Non-rotating accuracy ±0.5° to 1.0°
During clamping (Retraction end)

Body option

Nil	Standard (Female thread)
N	With arm

∗ Arms are included when shipped, (but not assembled).

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.

Rod material

XC91	S45C

Made to Order

Part no.	Piston rod material (Hard chrome plating)	Coil scraper	Lube-retainer	Grease for welding
	S45C			
-XC89	●	●	●	●
-XC91	●	●	—	●

Note) Use the -XC91 in a place where the distance from the welding portion is far and the spatter scattering is minimized.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	—	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	—	●	○	—	○		
				2-wire		12 V		M9BV	M9B	●	—	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	—	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	—	○		
				2-wire		12 V		M9BAV	M9BA	○	○	●	○	—	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—	—	P3DWA	●	—	●	●	—	●	—	
								P4DW**	—	—	●	●	—	●		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V*1	A93	●	●	●	●	—	—	—	Relay, PLC
						5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m····· Nil (Example) M9NW
1 m····· M (Example) M9NWM
3 m····· L (Example) M9NWL
5 m····· Z (Example) M9NWZ

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗∗ For D-P4DW, ø40 to ø63 are available.
∗∗ Only D-P4DW type is assembled at the time of shipment.

∗ Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.
∗ When D-M9□(V)/M9□W(V)/M9□A(V)/A9□(V) types are mounted on a side other than the port side, order auto switch mounting brackets separately. Refer to page 83 for details.
∗ Auto switches are shipped together, (but not assembled).



Specifications

Bore size (mm)	32	40	50	63
Action	Double acting			
Rotation angle Note 1)	90° ±5°			
Rotary direction Note 2)	Clockwise, Counterclockwise			
Rotary stroke (mm)	29		33	
Clamp stroke (mm)	10, 20		20, 50	
Theoretical clamp force (N) Note 3)	300	525	825	1300
Fluid	Air			
Proof pressure	1.5 MPa			
Operating pressure range	0.1 to 1 MPa			
Ambient and fluid temperatures	Without auto switch: –10 to 70°C (No freezing)			
	With auto switch: –10 to 60°C (No freezing)			
Lubrication	Non-lube			
Piping port size	Rc1/8, NPT1/8, G1/8		Rc1/4, NPT1/4, G1/4	
Mounting	Through-hole/Both ends tapped common, Head end flange			
Cushion	Rubber bumper			
Stroke length tolerance	$^{+1.0}_{0}$			
Piston speed	50 to 200 mm/s			
Non-rotating accuracy (Clamp part)	±0.5°			

Note 1) Refer to "Rotary Angle" figure in the **Web Catalog**.
Note 2) Direction of rotation viewed from the rod end when the piston rod is retracting.
Note 3) At 0.5 MPa.

Theoretical Output

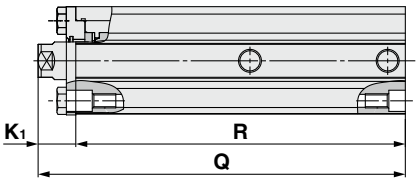
Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (cm^2)	Operating pressure (MPa)			
				0.3	0.5	0.7	1.0
32	16	R	6	182	300	418	600
		H	8	243	400	557	800
40	16	R	10.5	319	525	731	1050
		H	12.5	380	625	870	1250
50	20	R	16.5	502	825	1149	1648
		H	19.6	596	980	1365	1961
63	25	R	26	780	1300	1820	2600
		H	31.2	948	1560	2172	3121

Note) Theoretical output (N) = Pressure (MPa) x Piston area (cm^2) x 100

Operating direction
R: Rod end (Clamp)
H: Head end (Unclamp)

Comparison of the Dimensions of Each Series



(mm)

Bore size (mm)	XC89			XC91			Standard		
	K_1	**Q**	**R**	**K_1**	**Q**	**R**	**K_1**	**Q**	**R**
32	16	176	160	8	168	160	8	168	160
40	16.5	180.5	164	7.5	171.5	164	7.5	171.5	164
50	23.5	202.5	179	12	191	179	12	191	179
63	23	205	182	10	192	182	10	192	182

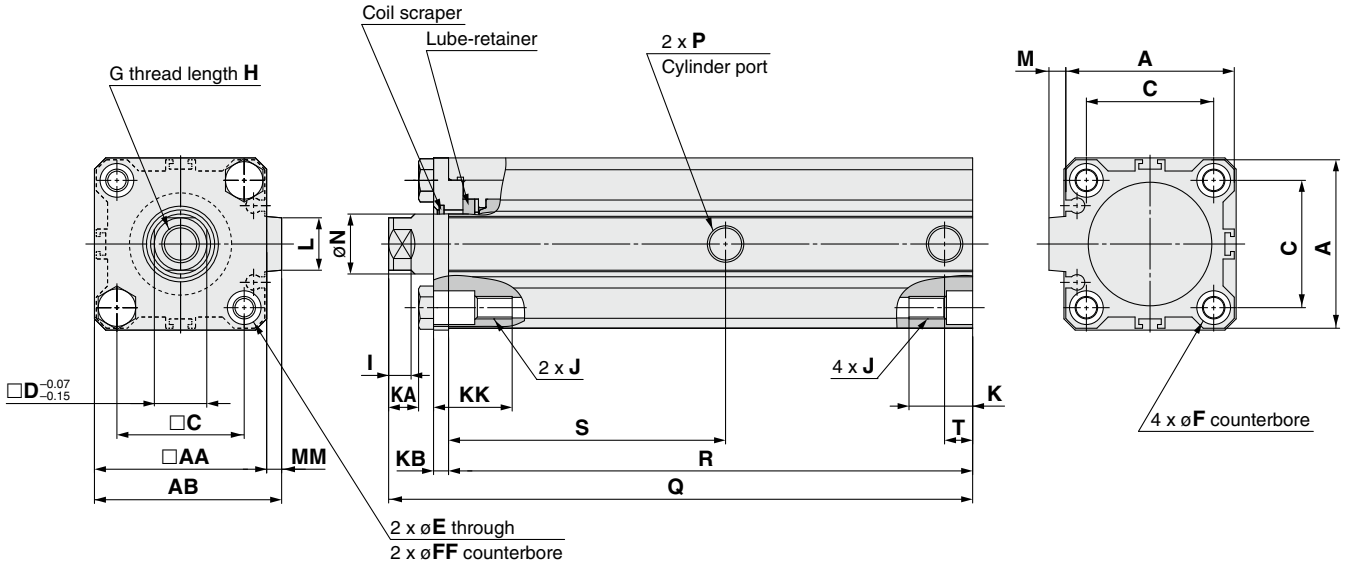
∗ When the clamp stroke is 20 mm

Bore Size

ø32 to ø63

MK2T□-XC89

Through-hole/Both ends tapped (Standard): MK2TB

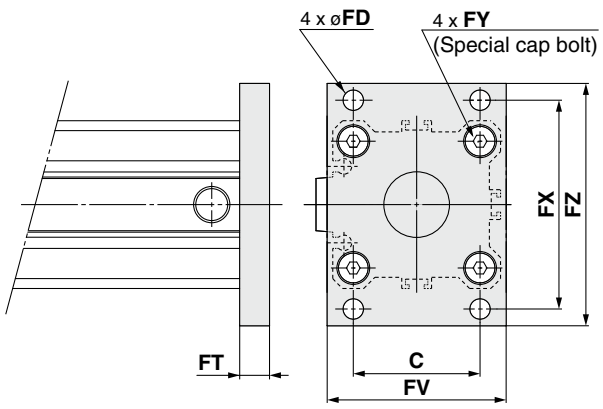


Bore size (mm)	AA	AB	A	C	D	E	FF	F	G	H	I	J	KK	K	KA	KB	L	MM	M	øN
32	46	50	45	34	14 −0.07 −0.15	5.5	9 depth 11	9 depth 7	M10 x 1.5	12	6	M6 x 1.0	21	17	8	4	14	4	4.5	16
40	52	57	52	40	14 −0.07 −0.15	5.5	9 depth 12	9 depth 7	M10 x 1.5	12	6	M6 x 1.0	22	17	7.5	5	14	5	5	16
50	64	71	64	50	17 −0.07 −0.15	6.6	11 depth 14	11 depth 8	M12 x 1.75	15	7	M8 x 1.25	28	22	12	6	19	7	7	20
63	77	84	77	60	22 −0.07 −0.15	9	14 depth 16.5	14 depth 10.5	M16 x 2	21	8	M10 x 1.5	34.5	28.5	10	6	19	7	7	25

Bore size (mm)	P			Clamp stroke: 10 mm				Clamp stroke: 20 mm				Clamp stroke: 50 mm			
	Nil	TN	TF	Q	R	S	T	Q	R	S	T	Q	R	S	T
32	Rc1/8	NPT1/8	G1/8	156	140	74	7.5	176	160	84	7.5	—	—	—	—
40	Rc1/8	NPT1/8	G1/8	160.5	144	75	8	180.5	164	85	8	—	—	—	—
50	Rc1/4	NPT1/4	G1/4	—	—	—	—	202.5	179	91.5	12.5	266	242.5	121.5	14
63	Rc1/4	NPT1/4	G1/4	—	—	—	—	205	182	93	10.5	269	246	123	15

Note 1) The cylinder rod is retracted.
Note 2) The overall length when the rod is extended is the value that the clamp stroke and rotary stroke are added to the dimension Q.

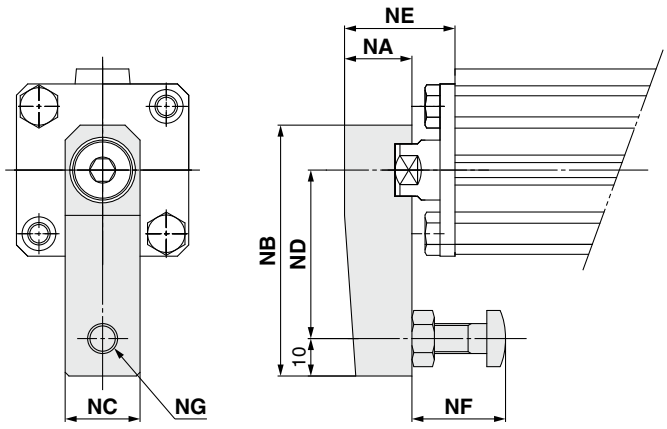
Head flange: MK2TG



Bore size (mm)	Flange part no.	C	FD	FT	FV	FX	FY	FZ
32	**MK2T-F032**	34	5.5	8	48	56	M6 x 1.0	65
40	**MK2T-F040**	40	5.5	8	54	62	M6 x 1.0	72
50	**MK2T-F050**	50	6.6	9	67	76	M8 x 1.25	89
63	**MK2T-F063**	60	9	9	80	92	M10 x 1.5	108

∗ Dimensions other than the above are the same as standard.
∗ Accessories: hexagon socket head cap screw

With arm



Bore size (mm)	Arm part no.	NA	NB	NC	ND	NE	NF	NG
32	**MK-A032Z**	18	67	20	45	29.5	15 to 25	M8 x 1.25
40		18	67	20	45	30	15 to 25	M8 x 1.25
50	**MK-A050Z**	22	88	22	65	41	20 to 40	M10 x 1.5
63	**MK2T-A063**	32	91	32	65	47.5	20 to 40	M10 x 1.5

∗ Accessories: clamp bolt, hexagon socket head cap screw, hexagon nut, spring washer

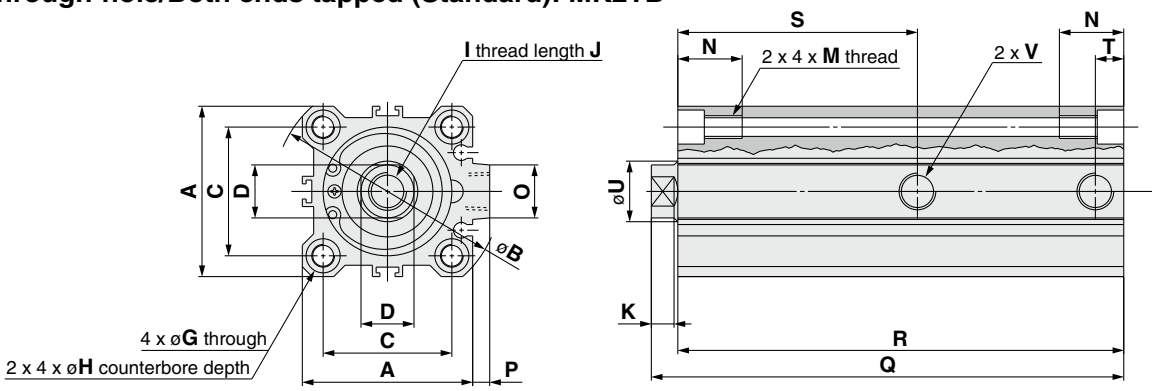
MK2T-XC91

Bore Size

ø32 to ø63

MK2T□-XC91 ∗ Dimensions are the same as the standard product (MK2T series).

Through-hole/Both ends tapped (Standard): MK2TB



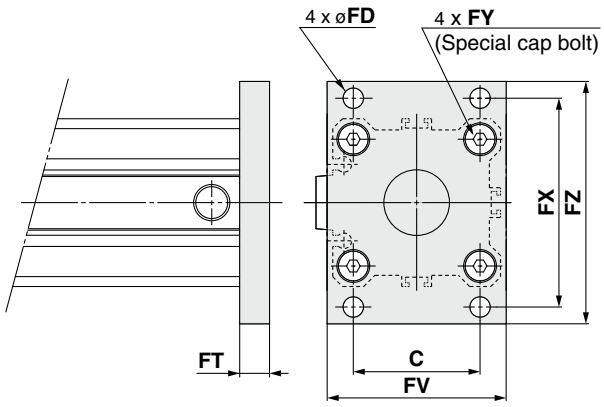
Through-hole/Both Ends Tapped Common (Standard)

(mm)

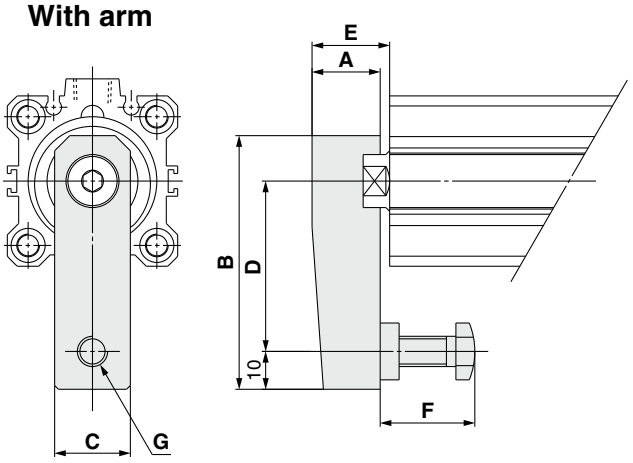
Bore size	A	øB	C	D	G	H	I	J	K	M	N	O	P	øU	V		
															Nil	TN	TF
32	45	60	34	$14^{-0.07}_{-0.15}$	5.5	9 depth 7	M10 x 1.5	12	6	M6 x 1.0	17	14	4.5	16	Rc1/8	NPT1/8	G1/8
40	52	69	40	$14^{-0.07}_{-0.15}$	5.5	9 depth 7	M10 x 1.5	12	6	M6 x 1.0	17	14	5	16	Rc1/8	NPT1/8	G1/8
50	64	86	50	$17^{-0.07}_{-0.15}$	6.6	11 depth 8	M12 x 1.75	15	7	M8 x 1.25	22	19	7	20	Rc1/4	NPT1/4	G1/4
63	77	103	60	$22^{-0.07}_{-0.15}$	9	14 depth 10.5	M16 x 2	21	8	M10 x 1.5	28.5	19	7	25	Rc1/4	NPT1/4	G1/4

Bore size	Clamp stroke 10 mm				Clamp stroke 20 mm				Clamp stroke 50 mm			
	Q	R	S	T	Q	R	S	T	Q	R	S	T
32	148	140	74	7.5	168	160	84	7.5	—	—	—	—
40	151.5	144	75	8	171.5	164	85	8	—	—	—	—
50	—	—	—	—	191	179	91.5	12.5	254.5	242.5	121.5	14
63	—	—	—	—	192	182	93	10.5	256	246	123	15

Head flange: MK2TG



With arm



Bore size (mm)	Flange part no.	C	FD	FT	FV	FX	FY	FZ
32	**MK2T-F032**	34	5.5	8	48	56	M6 x 1.0	65
40	**MK2T-F040**	40	5.5	8	54	62	M6 x 1.0	72
50	**MK2T-F050**	50	6.6	9	67	76	M8 x 1.25	89
63	**MK2T-F063**	60	9	9	80	92	M10 x 1.5	108

(mm)

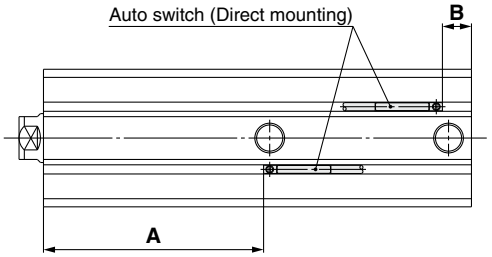
Model	A	B	C	D	E	F	G
MK2T□32□-□□N	18	67	20	45	21.5	15 to 25	M8 x 1.25
MK2T□40□-□□N	18	67	20	45	21	15 to 25	M8 x 1.25
MK2T□50□-□□N	22	88	22	65	29.5	20 to 40	M10 x 1.5
MK2T□63□-□□N	32	91	32	65	34.5	20 to 40	M10 x 1.5

∗ Dimensions other than the above are the same as standard.
∗ Accessories: hexagon socket head cap screw

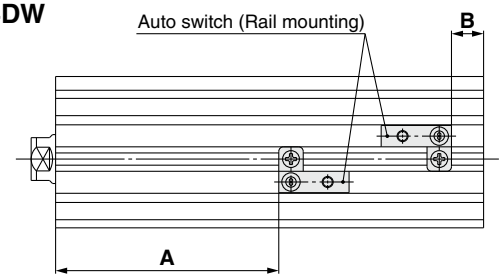
MK2T Series
Auto Switch Mounting

Auto Switch Proper Mounting Position (Detection at stroke end)

ø32 to ø63
D-M9□
D-M9□V
D-M9□W
D-M9□WV
D-M9□A
D-M9□AV
D-A9□
D-A9□V



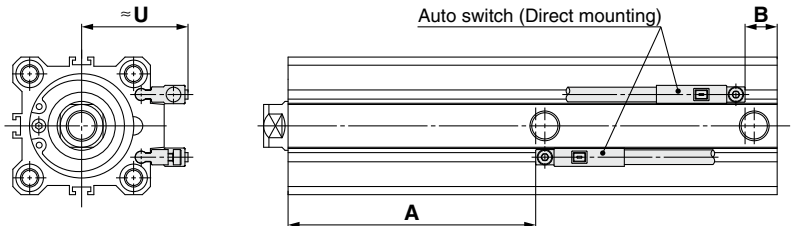
ø32 to ø63
D-P4DW



Mounting	Rail mounting		Direct mounting			
Model	**D-P4DW**		**D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV**		**D-A9□ D-A9□V**	
	A	**B**	**A**	**B**	**A**	**B**
MK2T32	—	—	76	13.5	72	9.5
MK2T40	70	9	77	16	73	12
MK2T50-20st	85.5	14.5	92.5	21.5	88.5	17.5
MK2T50-50st	115.5	18	122.5	25	118.5	21
MK2T63-20st	87.5	15.5	94.5	22.5	90.5	18.5
MK2T63-50st	117.5	19.5	124.5	26.5	120.5	22.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

ø32 to ø63
D-P3DWA



Bore size \ Auto switch model	D-P3DWA		
	A	**B**	**U**
32	71.5	9	35.5
40	72.5	11.5	39
50-20st	88	17	45
50-50st	118	20.5	45
63-20st	90	18	48.5
63-50st	120	22	48.5

Note) For bore sizes ø32 to ø50, the D-P3DWA is mountable only on the port side.

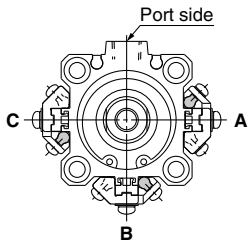
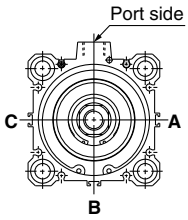
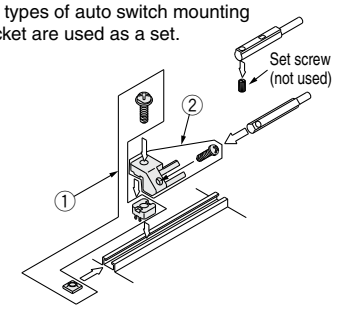
Operating Range

Operating Range (Dimensions) (mm)

Auto switch model	Bore size			
	32	40	50	63
D-M9□/M9□V	4.5	4.5	5	5
D-M9□W/M9□WV D-M9□A/M9□AV	6.5	5.5	6.5	6.5
D-A9□/A9□V	9	9.5	9.5	11
D-P3DWA	6	6	6.5	6.5
D-P4DW	—	5	5	5

* Values which include hysteresis are for reference purposes only. They are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment.
* Figures for models D-M9□(V), M9□W(V), and A9□(V) with ø32 or more indicate the operating range when using the current auto switch mounting groove, without using auto switch mounting bracket (BQ2-012).

Auto Switch Mounting Brackets/Part No.

Auto switch mounting surface / Auto switch model	Bore size (mm)	
	ø32, ø40, ø50	ø63
		
	Auto switch mounting surface	Auto switch mounting surface
	Port side	A, B, C sides	Port, A, B, C sides
D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV D-A9□ D-A9□V	No auto switch mounting bracket necessary.	①BQ-2 ②BQ2-012 Two types of auto switch mounting bracket are used as a set. 	No auto switch mounting bracket necessary.
D-P3DWA		—	

Note 1) For ø32 to ø50 of each cylinder series, when mounting compact auto switches on one of the three sides other than the port side (above A, B, C side) in the figure above, a separate auto switch mounting bracket is necessary as shown in the table above, so please order one separately from the cylinder.
(The same is true when mounting compact auto switches with the auto switch mounting rail, not using the compact auto switch mounting groove, for diameters ø63.)
Example
MK2TB32-10R-M9BW·····1 unit
BQ-2·····2 pcs.
BQ2-012·····2 pcs.

Note 2) When the cylinder is shipped, an auto switch mounting bracket and auto switch are included in the shipment.

Auto switch model	Bore size (mm)			
	32	40	50	63
D-P4DW	—	BQP1-050		

Note 3) When the cylinder is shipped, an auto switch mounting bracket and auto switch are included in the shipment. However, ø40 to ø63 with the D-P4DW are assembled at the time of shipment.

Auto Switch Mounting Bracket Weight

Mounting bracket part no.	Weight (g)
BQ-1	1.5
BQ-2	1.5
BQ2-012	5
BQP1-050	16

Pin Shift Cylinder for High Precision Positioning

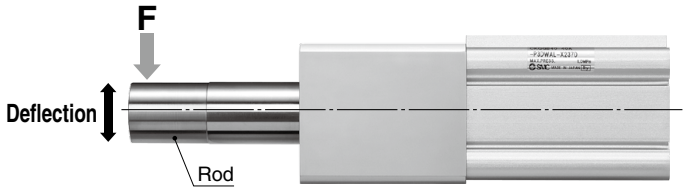
CKQG-X2370

ø32, ø40, ø50

High precision

Rod end deflection ±0.1 mm or less

Rod end deflection of ±0.1 mm or less is achieved when a load is applied to the rod at its extension end.



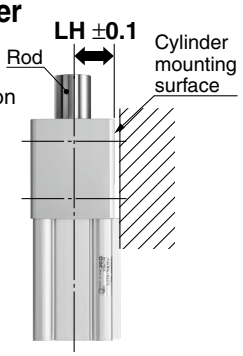


Position reproducibility

Mounting surface ⇔ Rod center

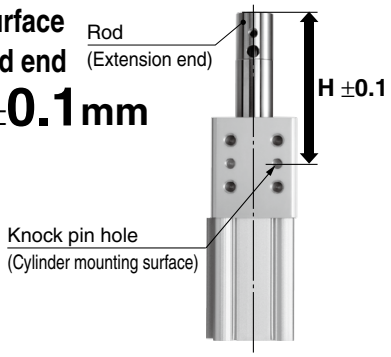
Distance accuracy ±0.1mm

∗ For details, refer to "Caution on Design" on page 86.



Cylinder mounting surface knock pin hole ⇔ Rod end

Distance accuracy ±0.1mm

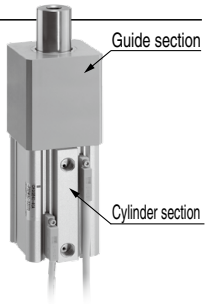


Pin for positioning the workpiece provided by the customer can be directly mounted.



Reduces labor time by integrating the cylinder and guide.

- Reduction in design labor
- Reduction in assembly labor



Magnetic field resistant auto switches are mountable.

- Solid state auto switch D-P3DWA□ /D-P4DW□
- General purpose auto switch D-M9□, D-A9□



The D-P3DWA is mountable on 4 surfaces.

∗ The D-P4DW□ is mountable on 3 surfaces.



Built-in coil scraper

Removes welding spatters, foreign matter, cutting chips, etc. sticking to the piston rod.

Pin Shift Cylinder for High Precision Positioning

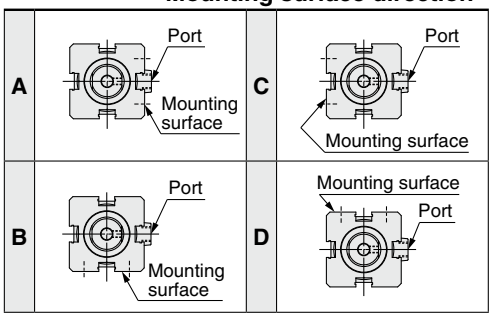
CKQG-X2370

How to Order

CKQG D 32 – 25 – P3DWAL – X2370
CKQG D 40 – 25 – P3DWAL – X2370
CKQG D 50 – 30 – P3DWAL – X2370

Built-in auto switch magnet

Mounting surface direction



Bore size

Cylinder stroke

Bore size (mm)	Stroke (mm)			
	25	30	40	50
32	○	—	○	—
40	○	—	○	—
50	—	○	—	○

Auto switch
Select applicable auto switch models from the table below.

Nil	Without auto switch (Built-in magnet)

Piston rod end hole size

Nil	ø8
A	ø10

Number of auto switches

Nil	2 pcs.
S	1 pc.

Applicable Switch Models/Refer to the **Web Catalog** for further information on auto switches.

Magnetic Field Resistant Auto Switches

Type	Special function	Auto switch model	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	**Magnetic field resistant (2-color indicator)**	**P3DWASC**	Pre-wired connector	Yes	2-wire (3-4)	24 VDC	0.3 m	Relay, PLC
		P3DWASE			2-wire (1-4)			
		P3DWA	Grommet		2-wire		0.5 m	
		P3DWAL					3 m	
		P3DWAZ					5 m	
		P4DWSC	Pre-wired connector		2-wire (3-4)		0.3 m	
		P4DWSE			2-wire (1-4)			
		P4DWL	Grommet		2-wire		3 m	
		P4DWZ					5 m	

General Purpose Auto Switches

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load	
					DC		AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9NV**	**M9N**	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9PV**	**M9P**	●	●	●	○	○		
				2-wire		12 V		**M9BV**	**M9B**	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NAV**	**M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PAV**	**M9PA**	○	○	●	○	○		
				2-wire		12 V		**M9BAV**	**M9BA**	○	○	●	○	○	—	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
			Yes	2-wire	24 V	12 V	100 V	**A93V***1	**A93**	●	●	●	●	—	—	Relay, PLC
			No			5 V, 12 V	100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ Auto switches and mounting brackets are shipped together, (but not assembled).
∗1 The 1 m lead wire is only applicable to the D-A93.

∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NWV
1 m·····M (Example) M9NWVM
3 m·····L (Example) M9NWVL
5 m·····Z (Example) M9NWVZ



Specifications

Model	CKQG-X2370		
Bore size (mm)	**32**	**40**	**50**
Maximum operating pressure	1.0 MPa		
Proof pressure	1.5 MPa		
Minimum operating pressure	0.2 MPa		
Ambient temperature	–10 to 60°C (No freezing)		
Operating air temperature			
Cushion	None		
Applicable auto switches	D-P3DWA□ D-P4DW□		

Theoretical Output

(N)

Bore size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)					
			0.2	0.3	0.4	0.5	0.6	1.0
ø32	OUT	804	160	241	321	402	482	804
	IN	490	98	147	196	245	294	490
ø40	OUT	1256	251	378	502	628	753	1256
	IN	765	153	229	306	382	459	764
ø50	OUT	1964	392	589	785	982	1178	1964
	IN	1256	251	378	502	628	753	1256

Weight

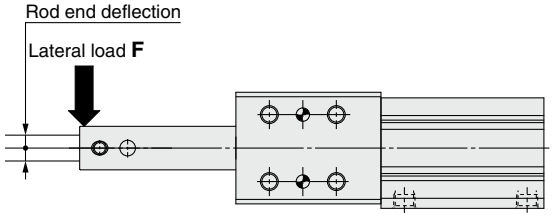
(kg)

Model	Bore size (mm)	Stroke (mm)			
		25	**30**	**40**	**50**
CKQG-X2370	**32**	0.95	—	1.02	—
	40	1.31	—	1.4	—
	50	—	2.1	—	2.3

Rod End Deflection

(mm)

Bore size (mm)	Stroke (mm)	Lateral load **F** (N)		
		98	196	294
50	**30**	±0.1 or less		
	50			
40	**25**			
	40			
32	**25**			
	40			



Caution on Design

⚠ Caution

For position reproducibility, a distance accuracy of ±0.1 mm from the mounting surface to the rod center (when the piston rod is retracted) is calculated with the root mean square method.

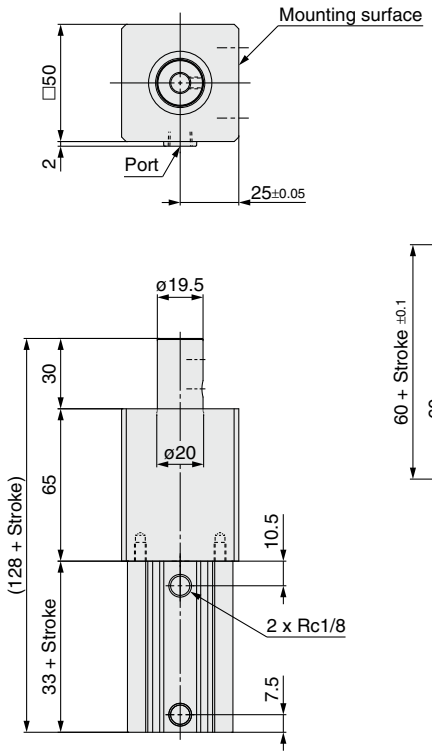
CKQG-X2370

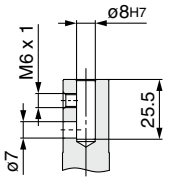
Bore Size

ø32 to ø40

CKQG□32-X2370

∗ The figures below indicate the CKQGD32-□-□□-X2370.

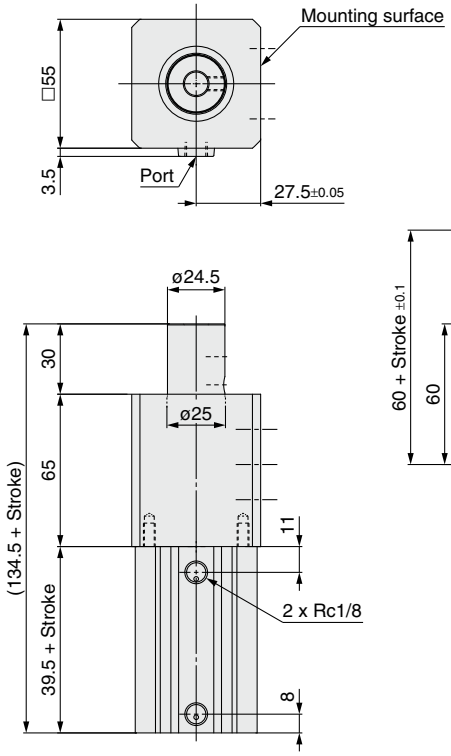


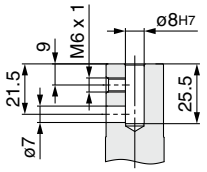


Piston rod end shape

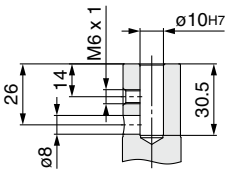
CKQG□40-X2370

∗ The figures below indicate the CKQGD40-□□-□□-X2370.





Piston rod end hole size For ø8



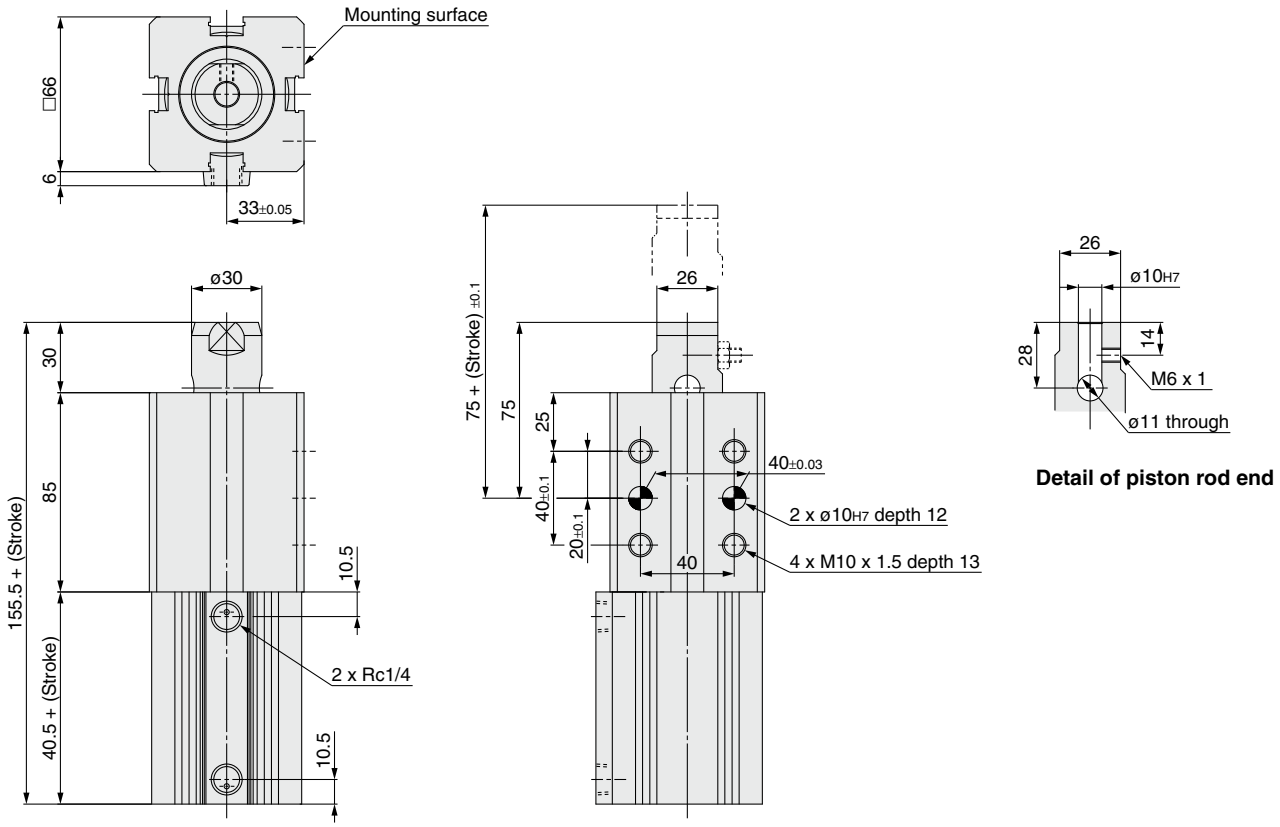
Piston rod end hole size For ø10

Bore Size

ø50

CKQG□50-X2370

∗ The figures below indicate the CKQGD50-□-□□-X2370.



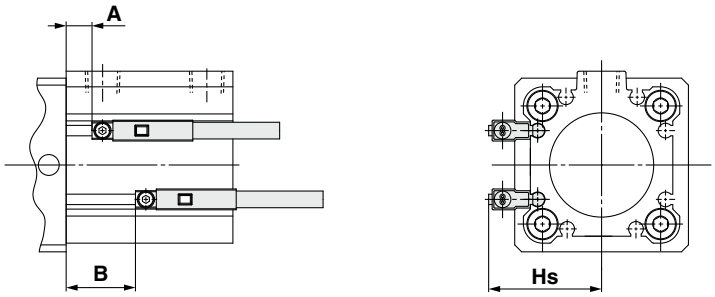
Detail of piston rod end

CKQG-X2370
Auto Switch Mounting

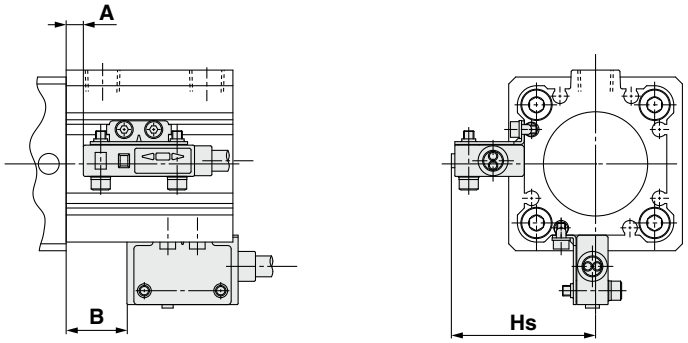
Auto Switch Proper Mounting Position (Detection at stroke end) and Mounting Height

[CKQG-X2370]

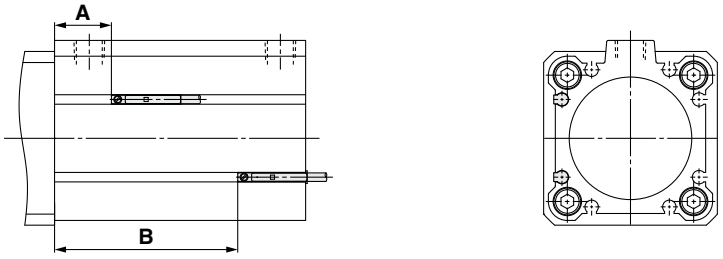
D-P3DWA□



D-P4DW□



D-M9□(V)
D-M9□W(V)
D-M9□A(V)
D-A9□(V)



Auto Switch Proper Mounting Position

(mm)

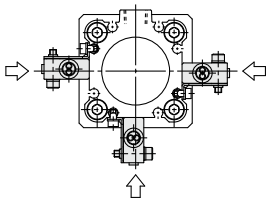
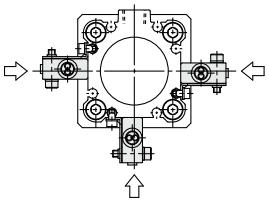
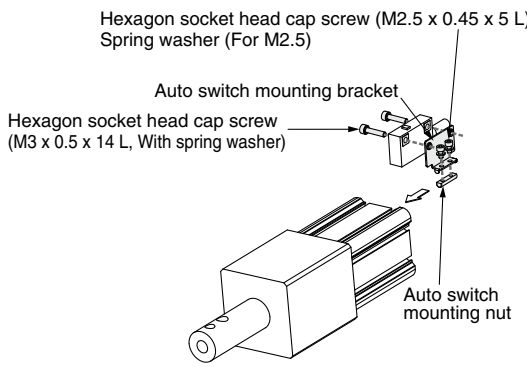
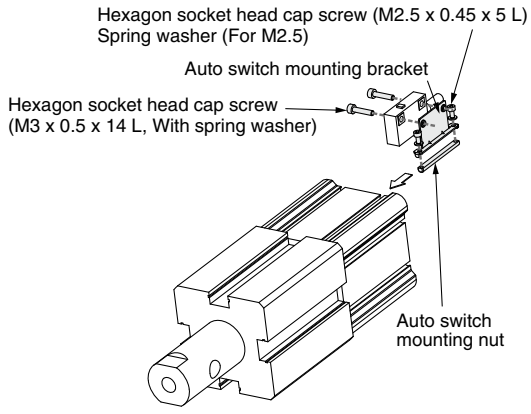
Auto switch model / Bore size	D-P3DWA□			D-P4DW□			D-M9□(V) D-M9□W(V) D-M9□A(V)			D-A9□(V)		
	A	B	Hs	A	B	Hs	A	B	Hs	A	B	Hs
32	8.5	8.5 + Stroke	34	6	6 + Stroke	41.3	13	13 + Stroke	—	9	9 + Stroke	—
40	13	13 + Stroke	37.2	10.5	10.5 + Stroke	44.6	18	18 + Stroke	—	14	14 + Stroke	—
50	10.5	10.5 + Stroke	42	9	9 + Stroke	50.3	16	16 + Stroke	—	12	12 + Stroke	—

Mounting

When installing the cylinders with auto switches, pay attention to the bending radius of the auto switch lead wire.
For details, refer to the **Web Catalog** and the Operation Manual.

Auto Switch Mounting Bracket Part No./Mounting Method

Applicable cylinder	**CKQG-X2370**		
Applicable auto switch	**D-P3DWA□**	**D-M9□, D-A93□**	**D-A9□** (Excluding the D-A93)
Bore size (mm)	**ø32, ø40, ø50**		
Auto switch mounting bracket part no.	No mounting bracket required as the auto switch is directly mounted.		
Auto switch tightening torque	0.2 to 0.3 N·m	0.05 to 0.15 N·m	0.1 to 0.2 N·m

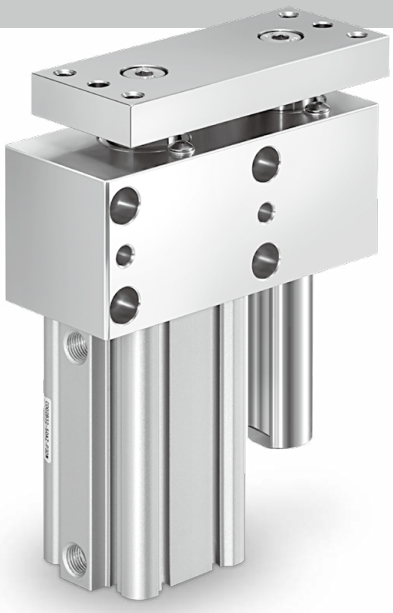
Applicable cylinder	**CKQG-X2370**	
Applicable auto switch	**D-P4DW□**	
Bore size (mm)	**ø32, ø40**	**ø50**
Auto switch mounting bracket part no.	BQ7-032	BQ7-050
Auto switch mounting bracket fitting parts lineup/ weight	● Auto switch mounting bracket ● Auto switch mounting nut ● Hexagon socket head cap screw (M3 x 0.5 x 14 L, With spring washer) ● Hexagon socket head cap screw (M2.5 x 0.45 x 5 L) ● Spring washer (For M2.5) Weight = 8.5 g	● Auto switch mounting bracket ● Auto switch mounting nut ● Hexagon socket head cap screw (M3 x 0.5 x 14 L, With spring washer) ● Hexagon socket head cap screw (M2.5 x 0.45 x 5 L) ● Spring washer (For M2.5) Weight = 12 g
Auto switch mounting surface	Surfaces with auto switch mounting slot 	Surfaces with auto switch mounting slot 
Mounting of auto switch	1. Fix the auto switch and the auto switch mounting bracket temporarily with the hexagon socket head cap screws (M3 x 14 L). 2. Insert the hexagon socket head cap screws (M2.5 x 5 L) into the spring washers (for M2.5), and tighten the auto switch mounting bracket and auto switch mounting nut temporarily. 3. Insert the temporarily fixed auto switch mounting nut into the mating groove of the cylinder tube. 4. Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screws (M2.5 x 5 L, M3 x 14 L). Note 1) The tightening torque for the hexagon socket head cap screw (M3 x 14 L) is 0.5 to 0.6 N·m. Note 2) The tightening torque for the hexagon socket head cap screw (M2.5 x 5 L) is 0.25 to 0.35 N·m. 	1. Fix the auto switch and the auto switch mounting bracket temporarily with the hexagon socket head cap screws (M3 x 14 L). 2. Insert the hexagon socket head cap screws (M2.5 x 5 L) into the spring washers (for M2.5), and tighten the auto switch mounting bracket and auto switch mounting nut temporarily. 3. Insert the temporarily fixed auto switch mounting nut into the mating groove of the cylinder tube. 4. Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screws (M2.5 x 5 L, M3 x 14 L). Note 1) The tightening torque for the hexagon socket head cap screw (M3 x 14 L) is 0.5 to 0.6 N·m. Note 2) The tightening torque for the hexagon socket head cap screw (M2.5 x 5 L) is 0.25 to 0.35 N·m. 

Offset Pin Shift Cylinder

CDQ2B-X2839

ø32, ø40, ø50

With high rigidity offset load capacity

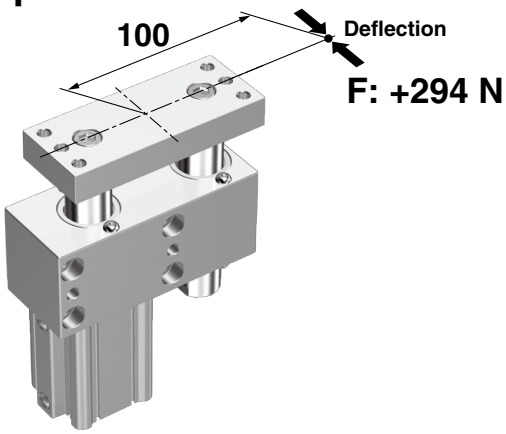


■ High rigidity, High precision

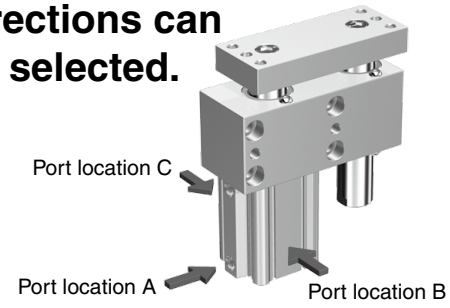
With plate extended:

Deflection of ±0.1 mm or less

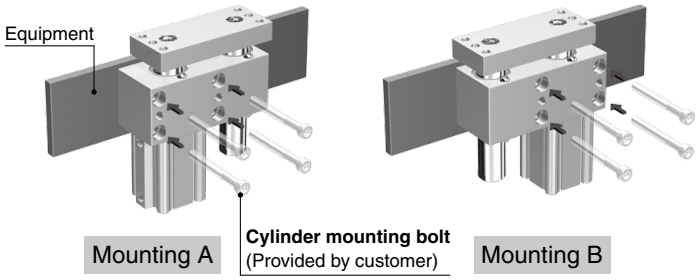
(For ø50, 25 mm stroke, when allowable moment 29.4 N·m is applied)



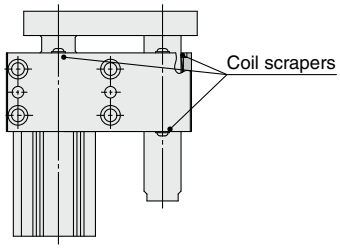
■ 3 different port location directions can be selected.



■ Can be mounted from 2 directions



■ Coil scrapers equipped as standard

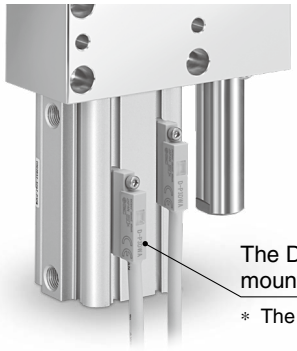


■ Auto switches are mountable.

Applicable Auto Switches:

- Magnetic field-resistant solid state auto switch: D-P3DWA□, D-P4DW□
- General purpose auto switch: D-M9□, D-A9□

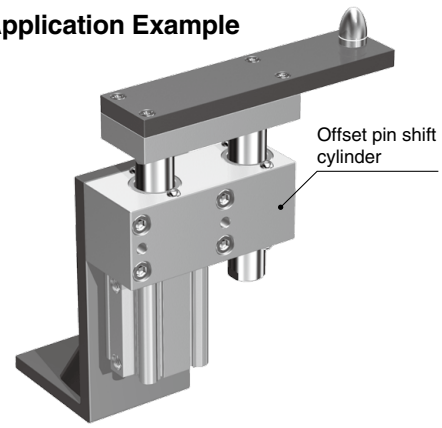




The D-P3DWA□, D-M9□, and D-A9□ are mountable on 3 surfaces.

∗ The D-P4DW□ is mountable on 2 surfaces.

Application Example



Offset Pin Shift Cylinder
CDQ2B-X2839
ø32, ø40, ø50

How to Order

C D Q2B 40 – 50 A Z – P3DWA ☐ – X2839

Built-in magnet for auto switch

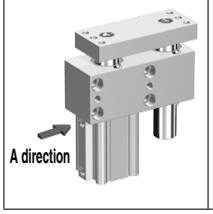
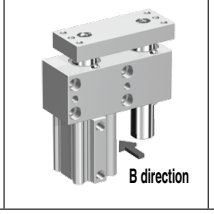
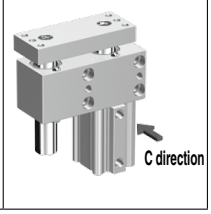
Bore size

32	32 mm
40	40 mm
50	50 mm

Stroke [mm]

Bore size	Stroke
32	25, 50
40	25, 50, 75
50	25, 50, 75

Port location

A	B	C
		

Number of auto switches

Nil	2
S	1

Auto switch

Nil	Without auto switch

Select applicable auto switch models from the table below.

Offset pin shift cylinder

Auto Switch Models: Refer to the **Web Catalog** for further information on auto switches.

Magnetic Field-resistant Auto Switches

Type	Auto switch model	Applicable magnetic field	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	**P3DWASC**	AC magnetic field (Single-phase AC welding magnetic field)	Pre-wired connector	2-color indicator	2-wire (3–4)	24 VDC	0.3 m	Relay, PLC
	P3DWASE				2-wire (1–4)			
	P3DWA		Grommet		2-wire		0.5 m	
	P3DWAL						3 m	
	P3DWAZ						5 m	
	P4DWSC		Pre-wired connector		2-wire (3–4)		0.3 m	
	P4DWSE				2-wire (1–4)			
	P4DWL		Grommet		2-wire		3 m	
	P4DWZ						5 m	

General Purpose Auto Switches

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length [m]: 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9NV**	**M9N**	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9PV**	**M9P**	●	●	●	○	○		
				2-wire		12 V		**M9BV**	**M9B**	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NAV**	**M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PAV**	**M9PA**	○	○	●	○	○		
				2-wire		12 V		**M9BAV**	**M9BA**	○	○	●	○	○	—	
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	**A93V**∗1	**A93**	●	●	●	●	—	—	Relay, PLC
			No			5 V, 12 V	100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

∗1 The 1 m lead wire is only applicable to the D-A93.

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

∗ Auto switches and mounting brackets are shipped together, but not assembled.

∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NWV
1 m····· M (Example) M9NWVM
3 m····· L (Example) M9NWVL
5 m····· Z (Example) M9NWVZ

CDQ2B-X2839



Specifications

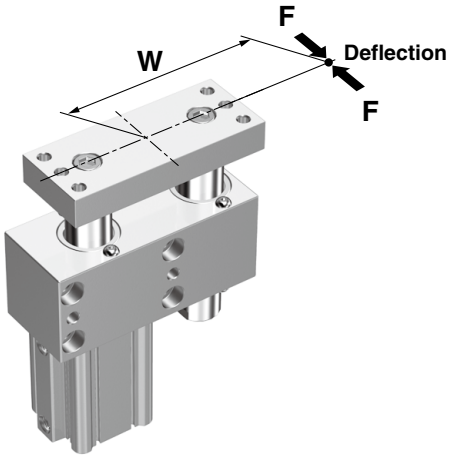
Bore size		32	40	50
Maximum operating pressure		1.0 MPa		
Proof pressure		1.5 MPa		
Minimum operating pressure		0.2 MPa		
Ambient temperature		−10 to 60°C (No freezing)		
Cushion		Head end: Rubber bumper, Rod end: None		
Allowable kinetic energy	**Extended**	0.15 J	0.26 J	0.46 J
	Retracted	0.29 J	0.52 J	0.91 J

Weight

[kg]

Bore size	Stroke [mm]		
	25	**50**	**75**
32	1.5	1.6	—
40	3.3	3.5	3.7
50	5.4	5.7	6.0

Deflection



Bore Size: 32 [mm]

Stroke	Offset **W**	Lateral load **F** [N]	
		98	196
25	0	±0.1 or less	±0.1 or less
	50		
	100		
	150		±0.2 or less
50	0	±0.1 or less	±0.2 or less
	50		
	100		
	150	±0.2 or less	

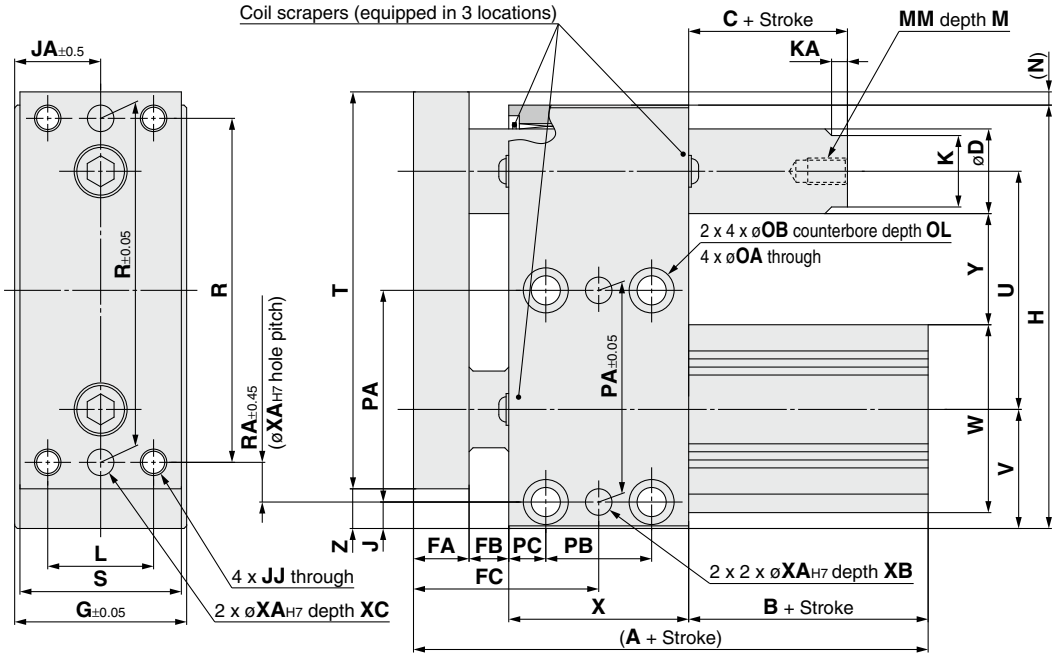
Bore Size: 40 [mm]

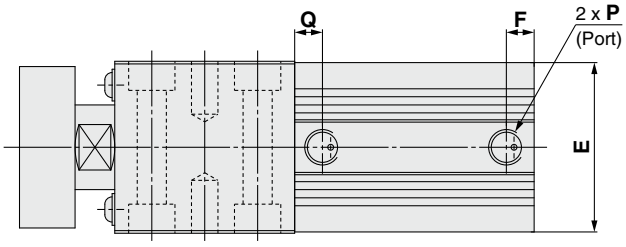
Stroke	Offset **W**	Lateral load **F** [N]		
		98	196	294
25	0	±0.1 or less	±0.1 or less	±0.1 or less
	50			
	100			
	150		±0.2 or less	±0.2 or less
50	0	±0.1 or less	±0.1 or less	±0.2 or less
	50			
	100		±0.2 or less	
	150	±0.2 or less		
75	0	±0.1 or less	±0.2 or less	±0.2 or less
	50			
	100	±0.2 or less		—
	150		—	

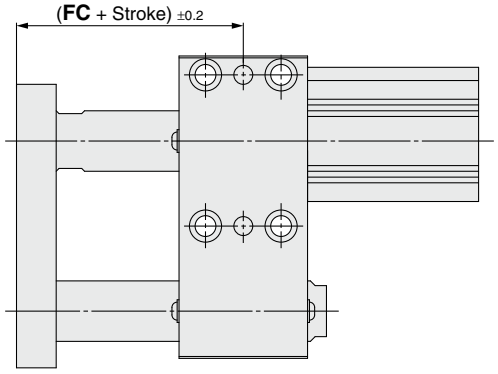
Bore Size: 50 [mm]

Stroke	Offset **W**	Lateral load **F** [N]		
		98	196	294
25	0	±0.1 or less	±0.1 or less	±0.1 or less
	50			
	100			
	150			±0.2 or less
50	0	±0.1 or less	±0.1 or less	±0.1 or less
	50			
	100			±0.2 or less
	150	±0.2 or less	±0.2 or less	
75	0	±0.1 or less	±0.1 or less	±0.2 or less
	50			
	100	±0.2 or less	±0.2 or less	—
	150		—	

Dimensions







The above figure shows the condition when a stroke is extended.

[mm]

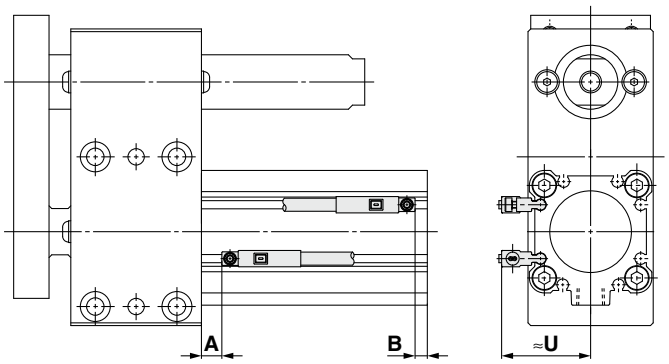
Bore size	Stroke	A	B	C	D	E	F	FA	FB	FC	G	H	J	JA	JJ	K	KA	L	M	MM	N
32	25, 50	102	33	10	20	45	7.5	13	8	45	46	109	7	23	M6 x 1.0	17	4.5	30	12	M8 x 1.25	5
40	25, 50, 75	128.5	39.5	10	25	52	7.5	18	11	60	53	137	8.5	26.5	M8 x 1.25	22	5	34	15	M10 x 1.5	5
50		144.5	40.5	10	32	64	10.5	21	15	70	65	160	10	32.5	M10 x 1.5	27	6	40	15	M10 x 1.5	5

Bore size	Stroke	OA	OB	OL	P	PA	PB	PC	Q	R	RA	S	T	U	V	W	X	XA	XB	XC	Y	Z
32	25, 50	6.4	11	16.5	Rc1/8	55	30	9	10	90	10	44	104	55	34.5	49.5	48	6	12	8	22.5	10
40	25, 50, 75	9	14	8.6	Rc1/8	70	40	11	12.5	110	15	51	127	75	41	57	60	8	15	10	36.5	15
50		11	17	11	Rc1/4	80	40	14	10.5	130	15	61	150	90	45	71	68	10	20	12	42	15

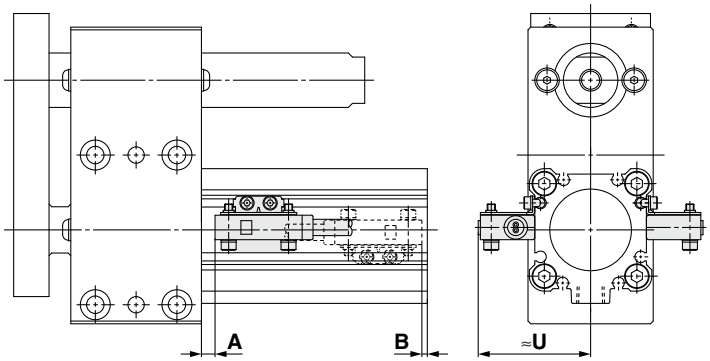
CDQ2B-X2839
Auto Switch Mounting

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

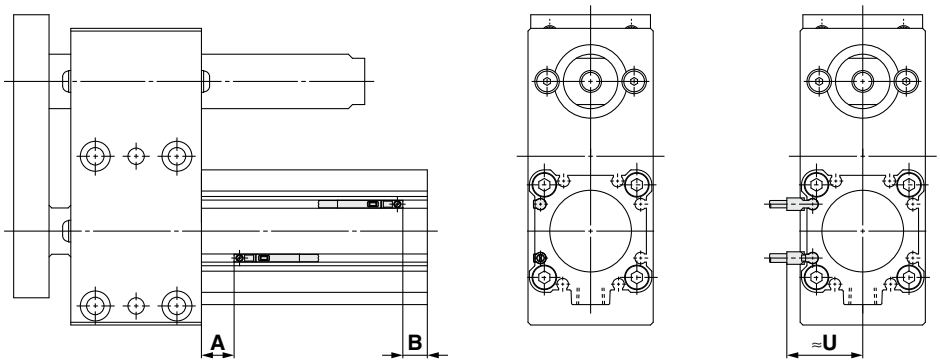
D-P3DWA□



D-P4DW□



D-M9□(V)
D-M9□W(V)
D-M9□A(V)
D-A9□(V)



Auto Switch Proper Mounting Position

Auto switch model / Bore size	D-P3DWA		D-P4DW		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V	
	A	B	A	B	A	B	A	B
32	7.5	4.5	5	2	12	9	8	5
40	11.5	7	9	4.5	16	11.5	12	7.5
50	9.5	10	9.5	10.5	14	14.5	10	10.5

Auto Switch Proper Mounting Height

Auto switch model / Bore size	D-P3DWA	D-P4DW	D-M9□V	D-A9□V
	U	U	U	U
32	35.5	41.5	30	27.5
40	38	45	32	30
50	43	50	37.5	35

Minimum Stroke for Auto Switch Mounting

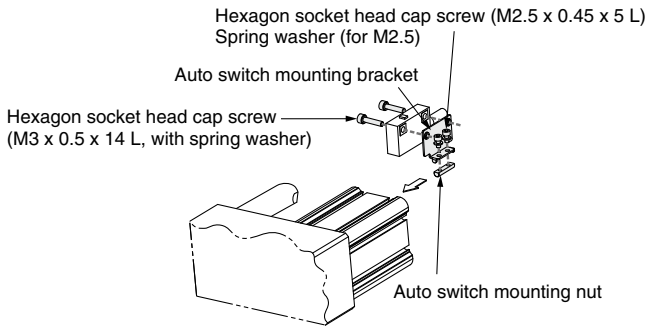
Number of auto switches	D-P3DWA D-M9□□ D-A9□□	D-P4DW
1	25	25
2	25	75

Mounting

When installing the cylinders with auto switches, pay attention to the bending radius of the auto switch lead wire. For details, refer to the Operation Manual.

Auto Switch Mounting Bracket Part Nos./Mounting Method

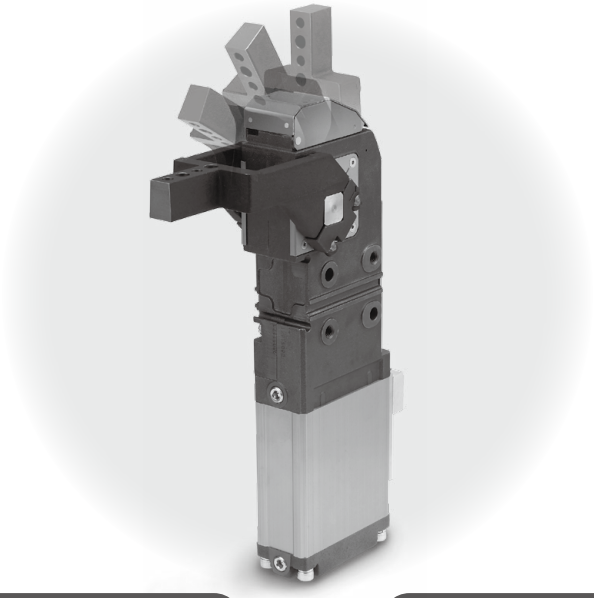
Applicable auto switch	**D-P3DWA□, D-M9□(V), D-M9□W(V), D-M9□A(V), D-A9□(V)**
Bore size [mm]	**ø32, ø40, ø50**
Auto switch mounting bracket part no.	No mounting bracket required as the auto switch is directly mounted.
Auto switch tightening torque	0.2 to 0.3 N·m

Applicable auto switch	**D-P4DW□**	
Bore size [mm]	**ø32, ø40**	**ø50**
Auto switch mounting bracket part no.	BQ7-032	BQ7-050
Auto switch mounting bracket fitting parts lineup/weight	• Auto switch mounting bracket • Auto switch mounting nut • Hexagon socket head cap screw (M3 x 0.5 x 14 L, with spring washer) • Hexagon socket head cap screw (M2.5 x 0.45 x 5 L) • Spring washer (for M2.5) Weight = 8.5 g	• Auto switch mounting bracket • Auto switch mounting nut • Hexagon socket head cap screw (M3 x 0.5 x 14 L, with spring washer) • Hexagon socket head cap screw (M2.5 x 0.45 x 5 L) • Spring washer (for M2.5) Weight = 12 g
Mounting of auto switch	1. Fix the auto switch and the auto switch mounting bracket temporarily with the hexagon socket head cap screws (M3 x 14 L). 2. Insert the hexagon socket head cap screws (M2.5 x 5 L) into the spring washers (for M2.5), and tighten the auto switch mounting bracket and auto switch mounting nut temporarily. 3. Insert the temporarily fixed auto switch mounting nut into the mating groove of the cylinder tube. 4. Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screws (M2.5 x 5 L, M3 x 14 L). * The tightening torque for the hexagon socket head cap screw (M3 x 14 L) is 0.5 to 0.6 N·m. * The tightening torque for the hexagon socket head cap screw (M2.5 x 5 L) is 0.25 to 0.35 N·m.  	

Slim-line Power Clamp Cylinder

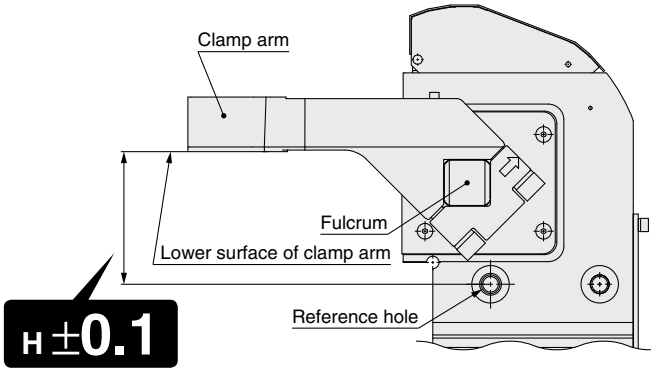
CKZ2N-X2346

ø50, ø63, ø80



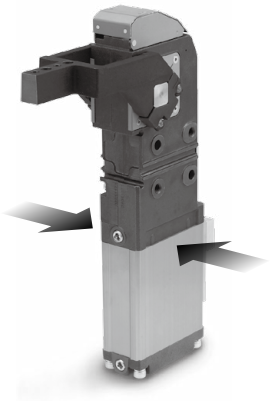
Mounting reproducibility

- Distance accuracy from the reference hole to the lower surface of the clamp arm is assured in a range of ±0.1 mm.
- A hard stop such as V catcher is not required.



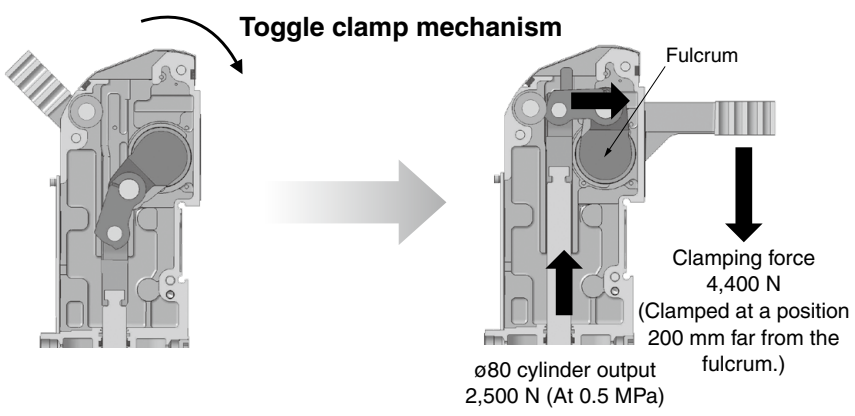
Compact

- Use of plate cylinder (flat piston) makes it possible to achieve the space saving.
- Torch can enter easily.



High clamping force

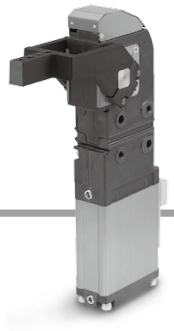
A high clamping force is generated through the toggle mechanism.



Slim-line Power Clamp Cylinder

CKZ2N-X2346

ø50, ø63, ø80



How to Order

CKZ2N 63 – 120 – P4DWSC [ ] – X2346

Bore size

50	50 mm equivalent
63	63 mm equivalent
80	80 mm equivalent

Arm opening angle

30	30°
45	45°
60	60°
75	75°
90	90°
105	105°
120	120°
135	135°

Applicable auto switch

Nil	Without auto switch (Without switch mounting bracket)
P4DW	D-P4DW
P4DWL	D-P4DWL
P4DWZ	D-P4DWZ
P4DWSC	D-P4DWSC
P4DWSE	D-P4DWSE

Number of auto switches

Nil	2 pcs.
S	1 pc.

X part no.

X2346	• Clamp arm (fixed on the product) accuracy adjustment spec. • Applicable to magnetic field resistant auto switches • Toggle angle: 2° short of the dead point • With metal cover

Maximum Clamping Moment

Unit: N·m

Equivalent bore size (mm)	Max. clamping moment					
	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa	0.8 MPa
50	100	130	160	190	220	250
63	300	350	400	450	500	550
80	560	720	880	1040	1200	1360

Cylinder Specifications

Equivalent bore size	**50**	**63**	**80**
Arm opening angle	30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°		
Cushion	Unclamping side rubber bumper		
Max. operating pressure	0.8 MPa		
Operating pressure range	0.3 to 0.8 MPa		
Operating temperature range	–10 to 60°C (No freezing)		
Operating time	1 sec. or more to clamp or unclamp		

Switch Mounting Bracket

Equivalent bore size (mm)	Set part no.
50	CKZ50-42ADCL218CL-R
63	CKZ63-42ADCL517AL-R
80	CKZ80-42ADCL518AL-R

∗ Screws are included with the switch mounting bracket.
∗ Auto switches and spatter covers should be ordered separately.

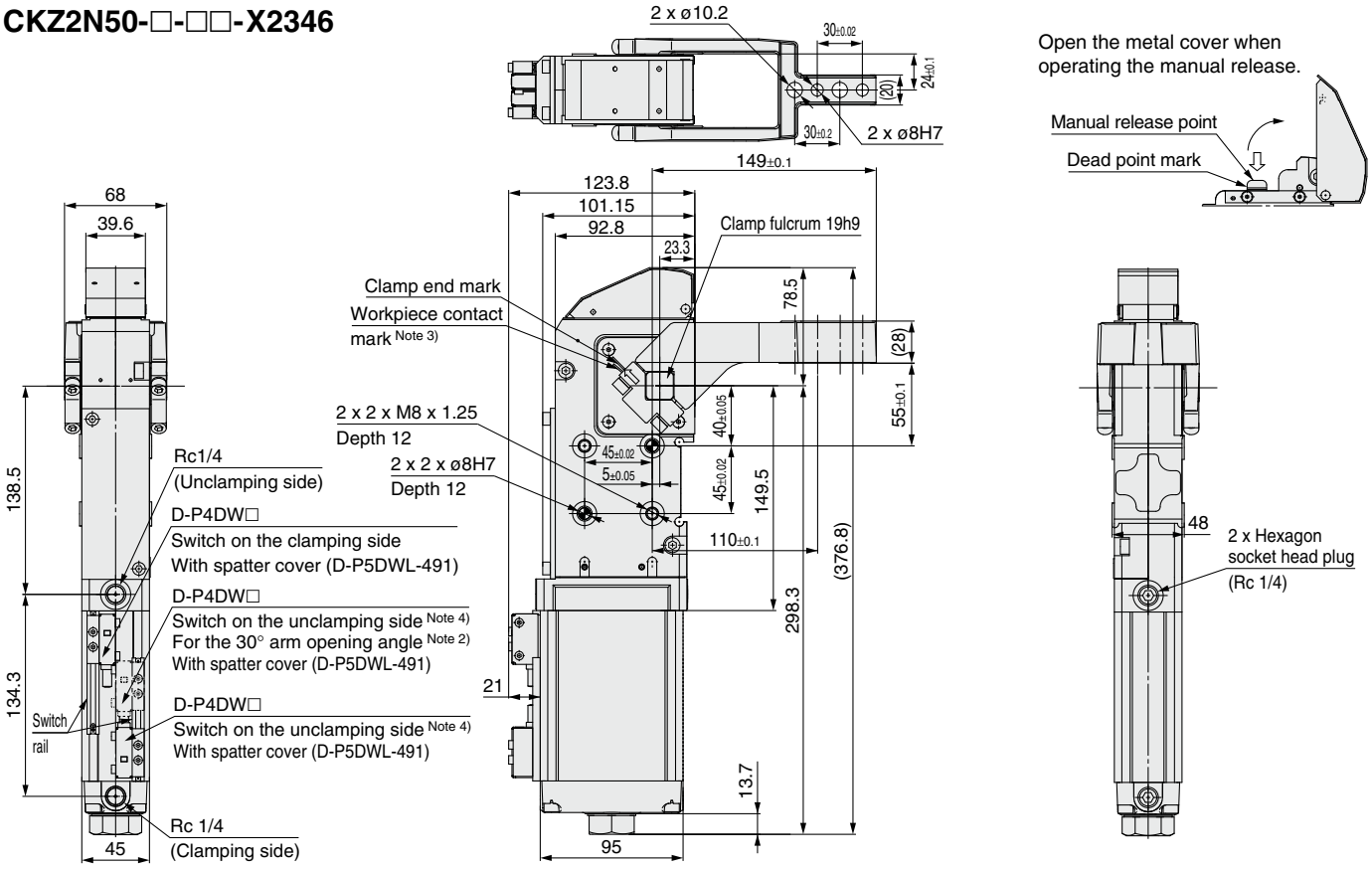
Magnetic Field Resistant Auto Switches/Refer to the **Web Catalog** for further information on auto switches.

Type	Special function	Auto switch model	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	Magnetic field resistant (2-color indicator)	**P4DWSC**	Pre-wired connector	Yes	2-wire (3–4)	24 VDC	0.3 m	Relay, PLC
		P4DWSE			2-wire (1–4)			
		P4DWL	Grommet		2-wire		3 m	
		P4DWZ					5 m	

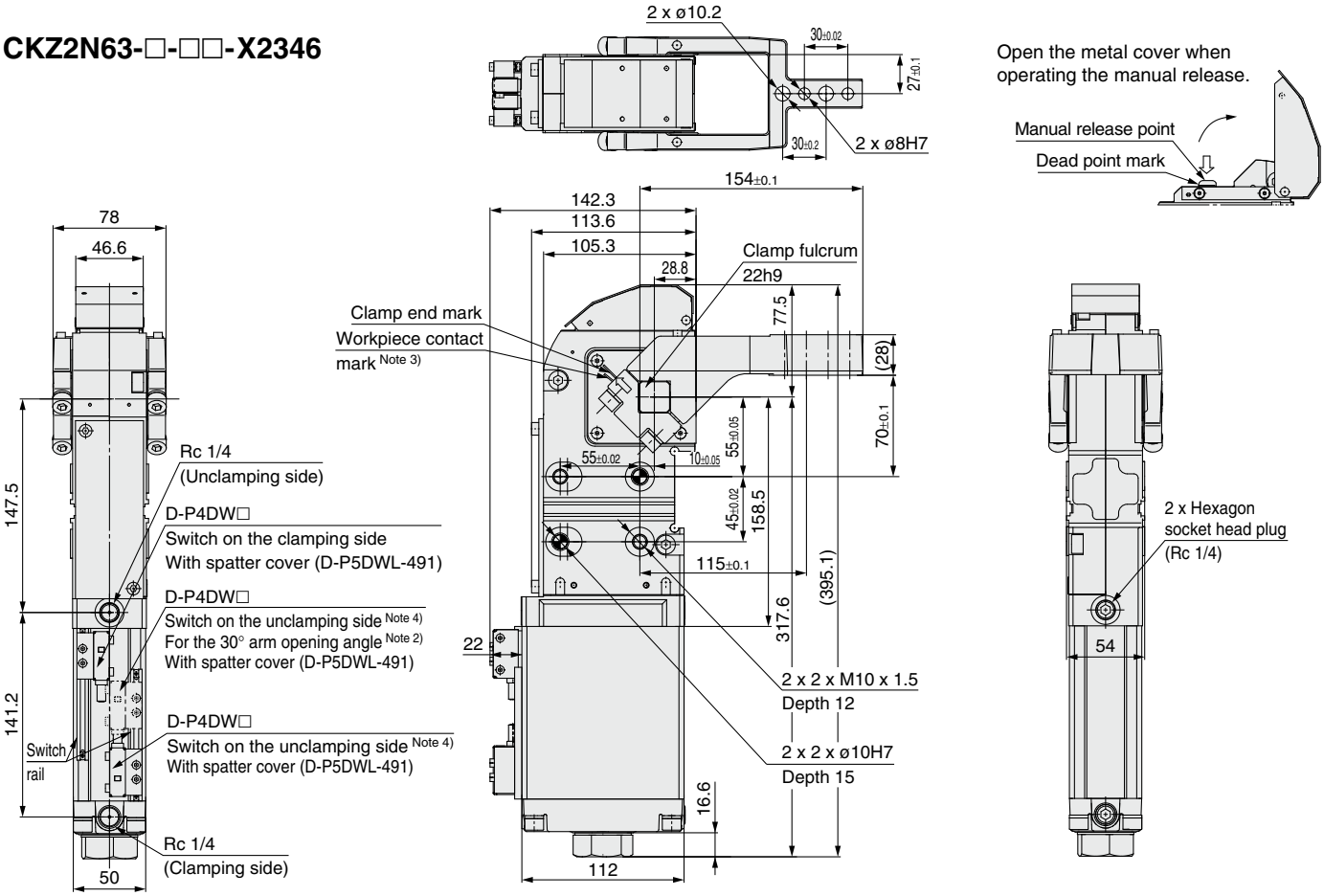
Note 1) When only one switch is provided, it is mounted on the unclamping side.
Note 2) Please contact SMC for auto switches, auto switch proper mounting positions and operating ranges other than the above.

Dimensions

CKZ2N50-□-□□-X2346



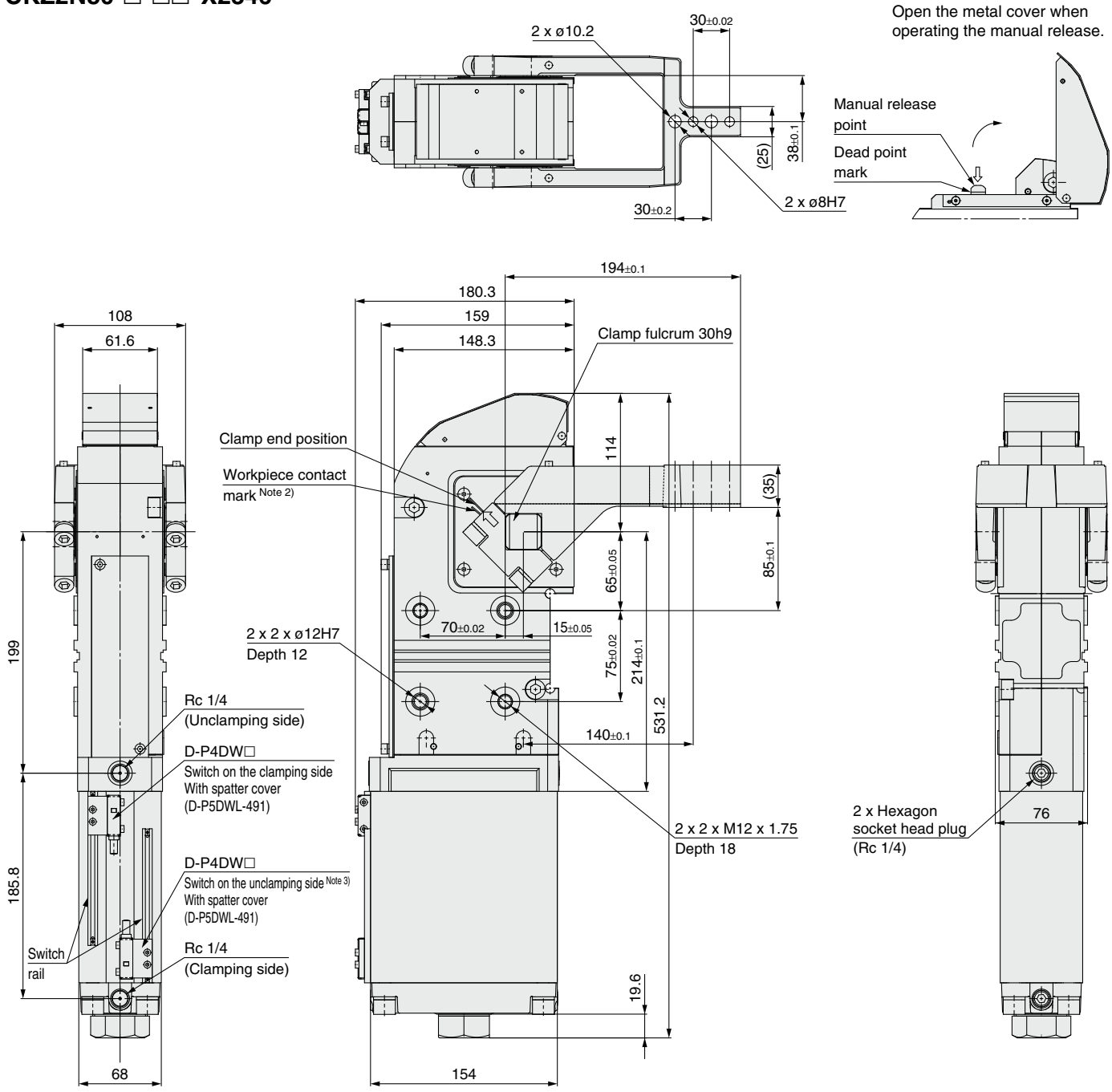
CKZ2N63-□-□□-X2346



Note 1) Since this product is set so that the toggle angle is 2° short of the dead point at the clamp end, it does not lock when the air is exhausted.
Note 2) For the 30° arm opening angle, the electrical entry direction of the auto switch is different.
Note 3) When setting up the product, set the position of where the clamp arm is in contact with the workpiece on the clamping side so that the arrow mark is located between the workpiece contact mark and clamp end mark.
Note 4) When only one auto switch is provided, it is mounted on the unclamping side.

Dimensions

CKZ2N80-□-□□-X2346



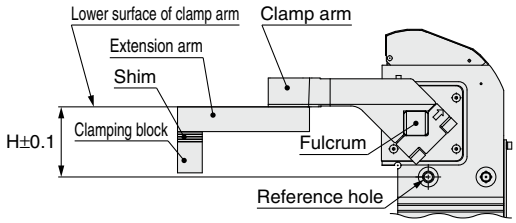
Note 1) Since this product is set so that the toggle angle is 2° short of the dead point at the clamp end, it does not lock when the air is exhausted.
Note 2) When setting up the product, set the position of where the clamp arm is in contact with the workpiece on the clamping side so that the arrow mark is located between the workpiece contact mark and clamp end mark.
Note 3) When only one auto switch is provided, it is mounted on the unclamping side.

Slim-line Power Clamp Cylinder

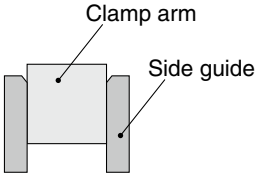
CKZ2N-X2346

Setup Procedure

Precautions ∗ In this cylinder, the shim is pulled out to increase the clamping force.

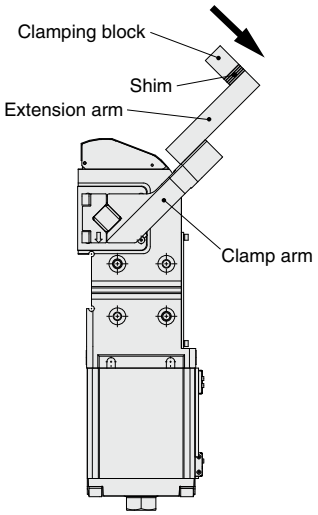


1. Since the distance accuracy from the reference hole to the lower surface of the clamp arm is ±0.1 mm at the stroke end as shown in the figure on the left side, a hard stop is not required on the clamping side. When a clamp arm deflection lock is required, install the side guides.
2. For clamping force adjustment, be sure to install a shim around 3 mm in size.
3. Even when the clamp arm operates to the clamp end, the internal toggle mechanism does not enter the dead point (2° short of the dead point). Therefore, clamping cannot be held during air exhaust.

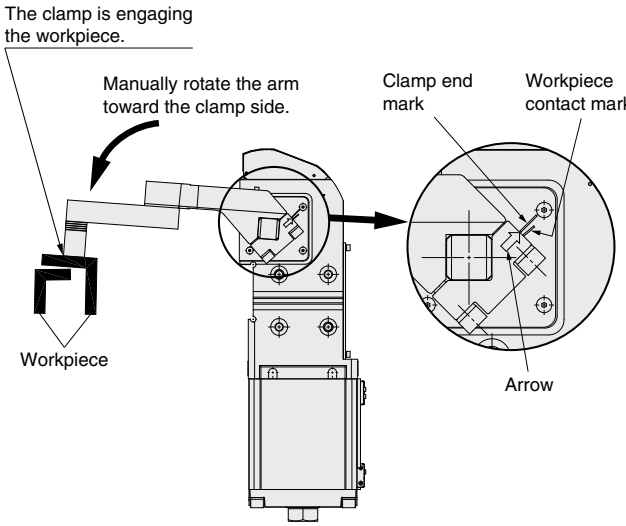


Setup procedure

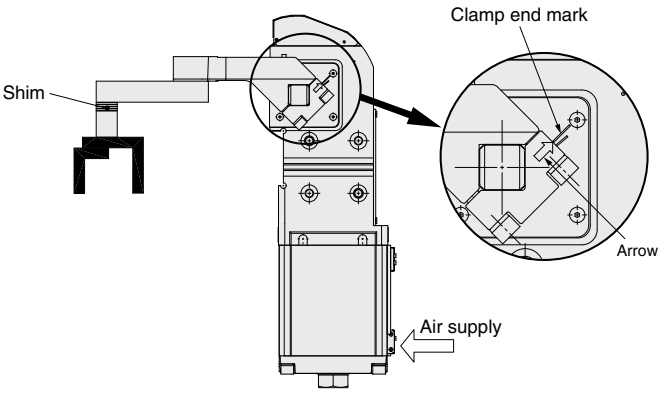
Step 1 Exhaust the air to switch to the unclamped state.



Step 2 Manually place the arm on workpieces.
Adjust with the shim so that the arrow is located between the workpiece contact mark and clamp end mark.



Step 3 Supply air to the clamp side and adjust with the shim so that the arrow mark is located at a position close to the clamp end mark.

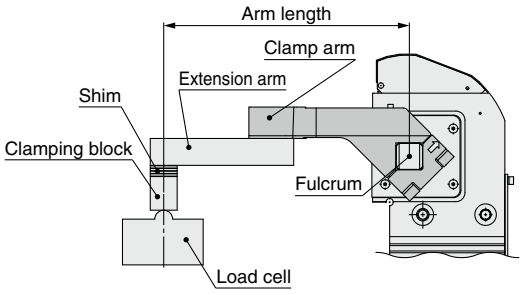


⚠Caution

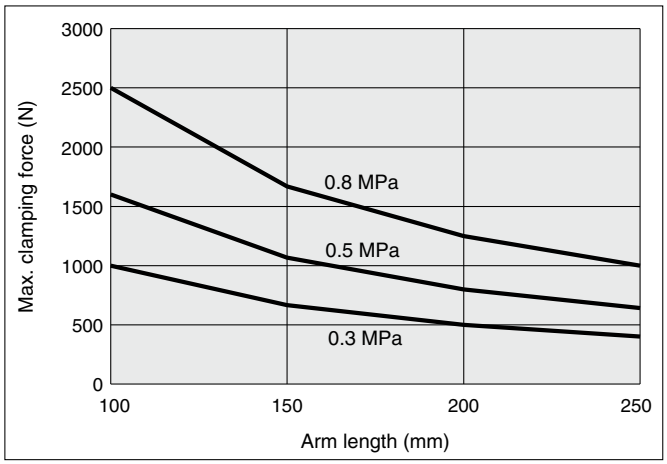
Be sure to install a speed controller and adjust it so that it takes **at least 1 second** to clamp or unclamp. (Operating the cylinder in less than 1 second may cause damage to the product.)

Clamping force characteristics

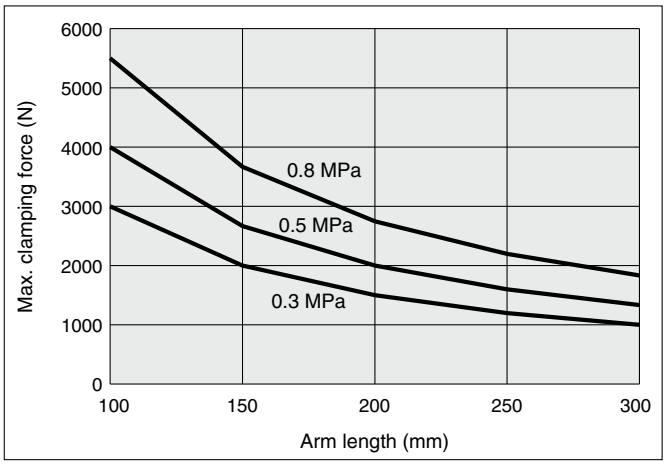
Clamping force characteristics by bore size, arm length, and operating pressure



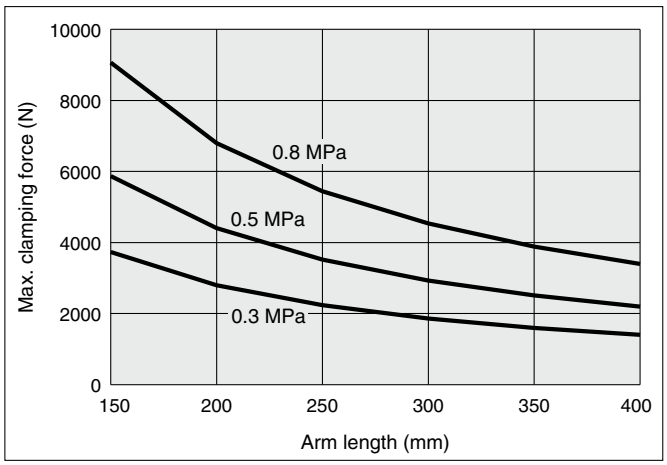
ø50



ø63



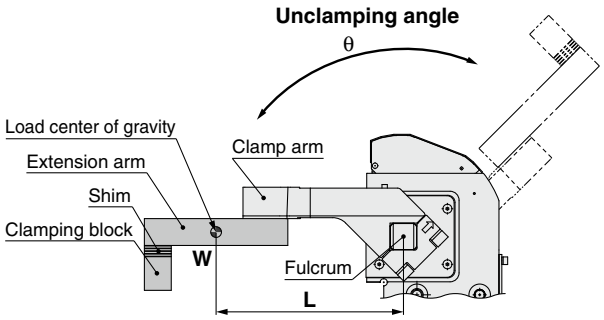
ø80



Allowable load mass

The allowable load mass of the extension arm and clamping block to be mounted on the clamp arm may vary depending on the unclamping angle. Be sure to use the product within the allowable values in the graphs shown below.

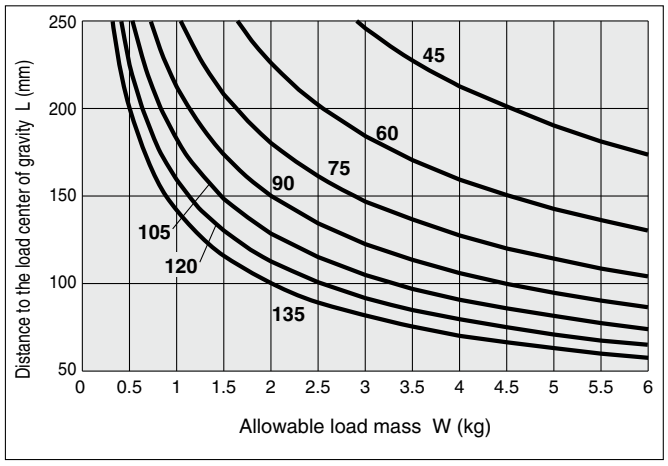
∗ The load indicates the total weight of the extension arm and clamping block.



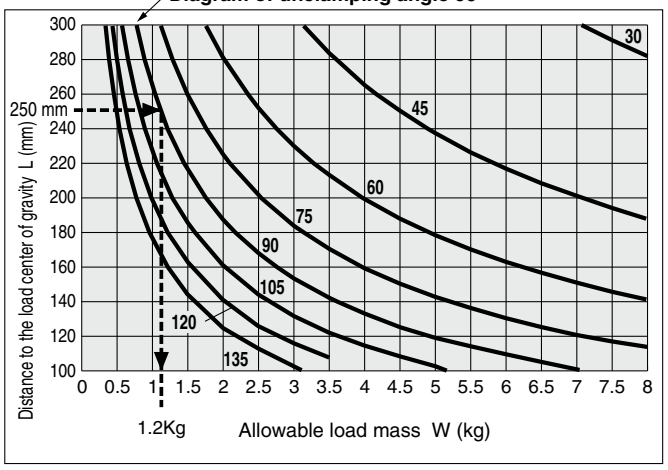
Calculation procedure of allowable load mass

1. Calculate the distance **L** from the fulcrum to the center of gravity of the extension arm + clamping block.
2. Check the unclamping angle of the product.
3. Obtain the allowable load mass from the graph, and use the product within the allowable range.

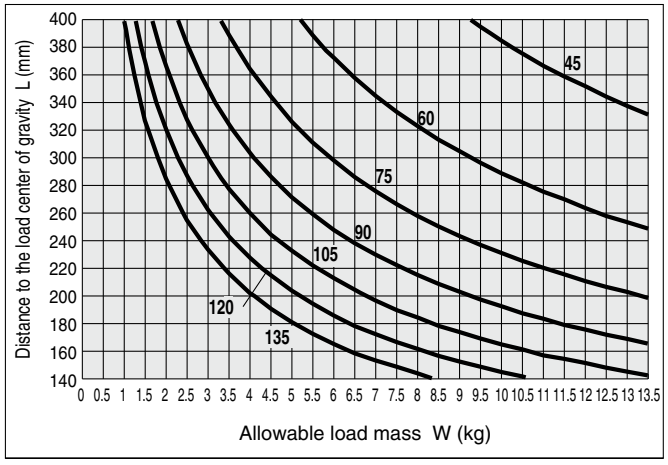
ø50



ø63



ø80



Calculation example For bore size 63, when the unclamping angle is 90° and the load center of gravity position of the extension arm + clamping block is 250 mm.

When the center of gravity position of the load mass of the extension arm + clamping block is 250 mm on the diagram at an unclamping angle of 90° in the size ø63 graph, the total allowable load mass of the extension arm + clamping block is to 1.2 kg.

Related Products
Power Clamp Cylinder Variations
CKZ Series

Micro Clamp Cylinder: CKZM16-X2800/X2900



- Compact: Width 20 mm, Lightweight: 250 g
- Maximum clamping force: 200 N, Maximum holding force: 300 N
- Flat clamping characteristics
  Outputs constant clamping force for workpiece thicknesses up to 3.5 mm
- Reduction of design/assembly labor by unitization
  Arm assembly and mounting assembly have been added to the clamp cylinder.

Type	Series	Action	Bore size (mm)
Base type	**CKZM16-X2800**	Double acting	16
Tandem type	**CKZM16-X2900**	Double acting	16

Power Clamp Cylinder Compact Type: CKZT-X2797/X2798□



- Lightweight Weight: 580 g (ø25)
- Compact Width: 34 mm, Height: 192.4 mm (ø25, Arm opening angle: 90°)
- Clamping force: 1100 N (ø32, Arm length: 50 mm, 0.5 MPa pressure)
- Force amplification with a toggle mechanism and lock function
- Spatter-proof construction
- Equipped with a proximity switch that can be used in welding magnetic fields
- A model with a manually operated handle is available.

Series	Arm opening angle	Switch	Bore size (mm)
CKZT-X2797 **Base type**	90°, 105°	SENSTRONIC	25, 32
CKZT-X2798□ **With manually operated handle**	90°, 105°	SENSTRONIC	25, 32

Power Clamp Cylinder: CKZ3T-X2734/X2568□



- Simple switch adjustment greatly reduces work hours.
  Switch can be adjusted easily when changing the arm opening angle.
- With metal switch cassette cover
- Weight reduced by up to 39%
- High clamping force: 4000 N
- Spatter-proof construction
- Select from 2 types of top cover
- A model with a manually operated handle is available.

Series	Arm opening angle	Switch	Bore size (mm)
CKZ3T-X2734 **Base type**	15°, 30°, 45°, 60°, 75° 90°, 105°, 120°, 135°	TURCK/P&F	50, 63
CKZ3T-X2568□ **With manually operated handle**	15°, 30°, 45°, 60°, 75° 90°, 105°, 120°, 135°	TURCK/P&F	50, 63

NAAMS Standards Compliant Power Clamp Cylinder: CKZ3N-X2742A/X2568□



- Weight reduced by up to 38%
- Simple switch adjustment greatly reduces work hours.
  Switch can be adjusted easily when changing the arm opening angle.
- High clamping force: 4000 N
- Spatter-proof construction
- Metal switch cassette cover (Option)
- Select from 2 types of top cover
- A model with a manually operated handle is available.

Series	Arm opening angle	Switch	Bore size (mm)
CKZ3N-X2742A **Base type**	15°, 30°, 45°, 60°, 75° 90°, 105°, 120°, 135°	TURCK/P&F	50, 63
CKZ3N-X2568□ **With manually operated handle**	15°, 30°, 45°, 60°, 75° 90°, 105°, 120°, 135°	TURCK/P&F	50, 63

Power Clamp Cylinder: CKZT



- Spatter-proof construction

Series	Arm opening angle	Switch	Bore size (mm)
CKZT	30°, 45°, 60°, 75°, 90° 105°, 120°, 135°	TURCK/P&F	40, 50, 63, 80

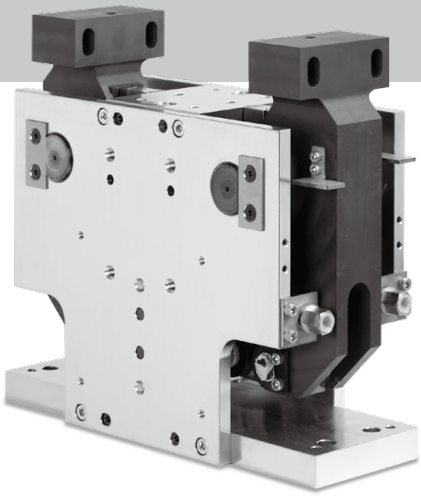
NAAMS Standards Compliant Power Clamp Cylinder: CKZ2N



- Spatter-proof construction

Series	Arm opening angle	Switch	Bore size (mm)
CKZ2N	30°, 45°, 60°, 75°, 90° 105°, 120°, 135°	TURCK/P&F	50, 63, 80

Frame Clamp Cylinder
WRF100



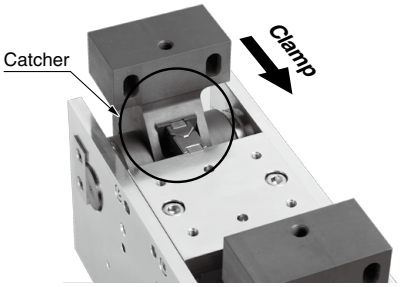
High output

Max. clamping force: **20,000 N** or more
(Operating pressure: At 0.5 MPa)

High clamping force makes it suitable for a broad range of applications

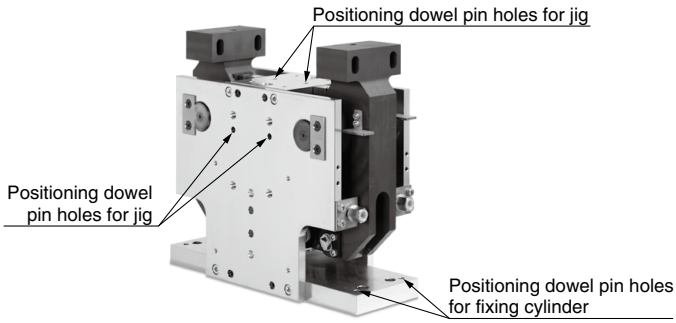
Stable repeatability

Catcher (detented positioning structure) is a standard feature for repeatable positioning.



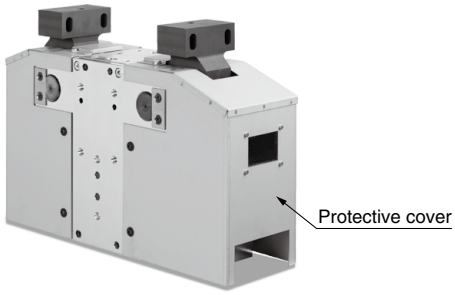
Dowel pin holes for repeatable positioning when reassembling

Allows for repeatable mount positioning in reassembly.



Optional spatter protective cover available

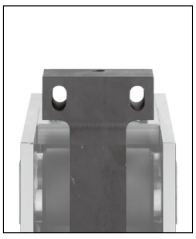
Modular structure allows easy assembly even after the cylinder is installed.



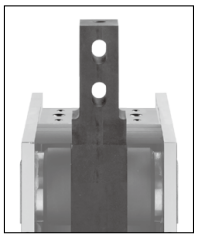
Standardized T-type arms and S-type arms

Shape selectable to meet specifications/application.

- T-type arm width: 200, 240, 270 mm
- S-type arm width: 200, 240 mm



T-type arms



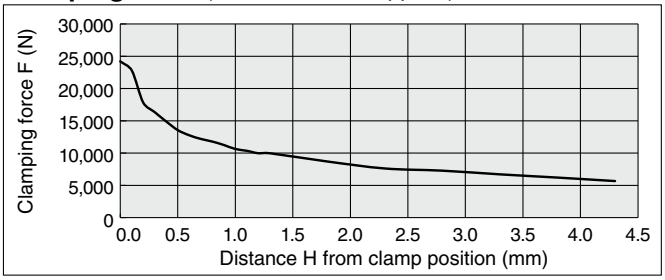
S-type arms

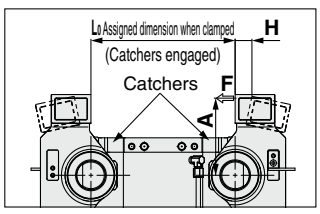
Clamping force characteristics

<Relationship between clamp position and clamping force>

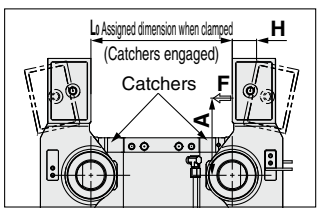
Refer to the following graph for the relationship between a distance H from a clamp position when the mutually acting catchers are engaged and a clamping force F.

Clamping force (when 0.5 MPa supplied)





T-type arms



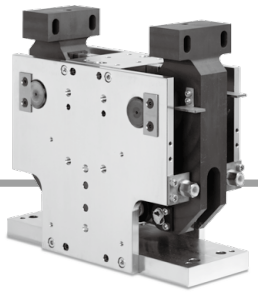
S-type arms

Generated position of clamping force F (mm)

Arm type	A
T200, T240, T270	107
S200, S240	

SMC

Frame Clamp Cylinder
WRF100



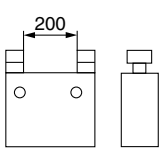
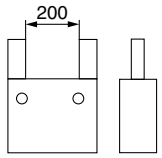
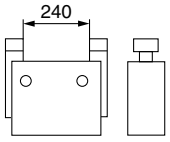
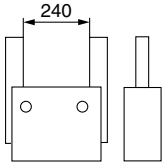
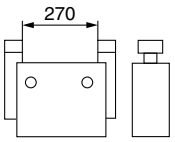
How to Order

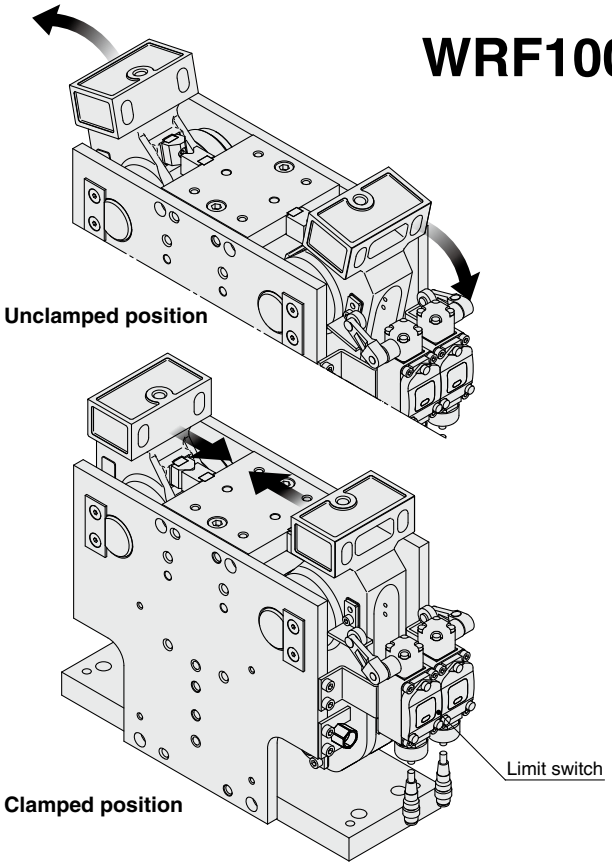
WRF100 – T200 C

Protective cover

Nil	Without cover
C	With cover

Clamp arm

Symbol	T-type arms	Symbol	S-type arms
T200		**S200**	
T240		**S240**	
T270		—	—



Note) This product does not include the limit switch.
(The limit switch should be prepared by the customer.)
Applicable limit switches have part numbers listed on the right.
For mounting the limit switch, order the limit switch mounting bracket (WRF-BK) separately.
For details, refer to page 110.

<Applicable limit switch part numbers>
OMRON Corp.: WLG2-LDAS-DGJS03T
Azbil Corp.: 1LS74-JWC-P025

Specifications

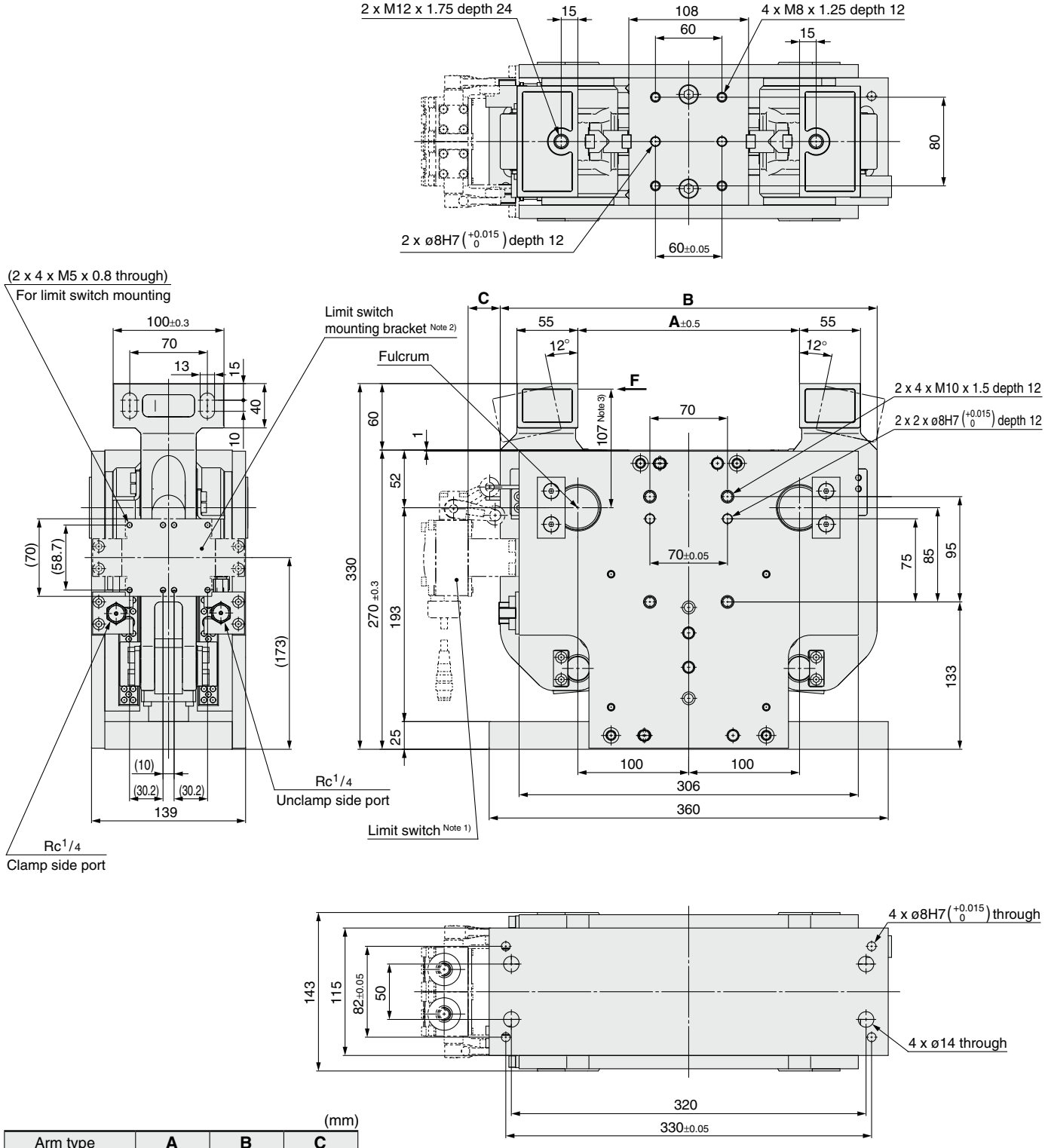
Bore size	100 mm
Stroke	48 mm
Fluid	Air
Proof pressure	0.8 MPa
Maximum operating pressure	0.5 MPa
Minimum operating pressure	0.2 MPa
Ambient and fluid temperatures	–10 to 60°C (No freezing)
Cushion	Clamp side : None Unclamp side: Rubber bumper
Lubrication	Non-lube
Operating time	1.0 s or more (Both clamp and unclamp)
Arm opening angle	24° (12° each side)
Clamping force	20,000 N or more (At 0.5 MPa) Note)
Weight	47 kg (WRF100-T200)
	47 kg (WRF100-S200)

Note) For the position where the clamping force is generated, refer to the dimensions on pages 107 and 108.

Dimensions

WRF-T□/T-type clamp arms (Without protective cover)

WRF100-T200/T240/T270



(mm)

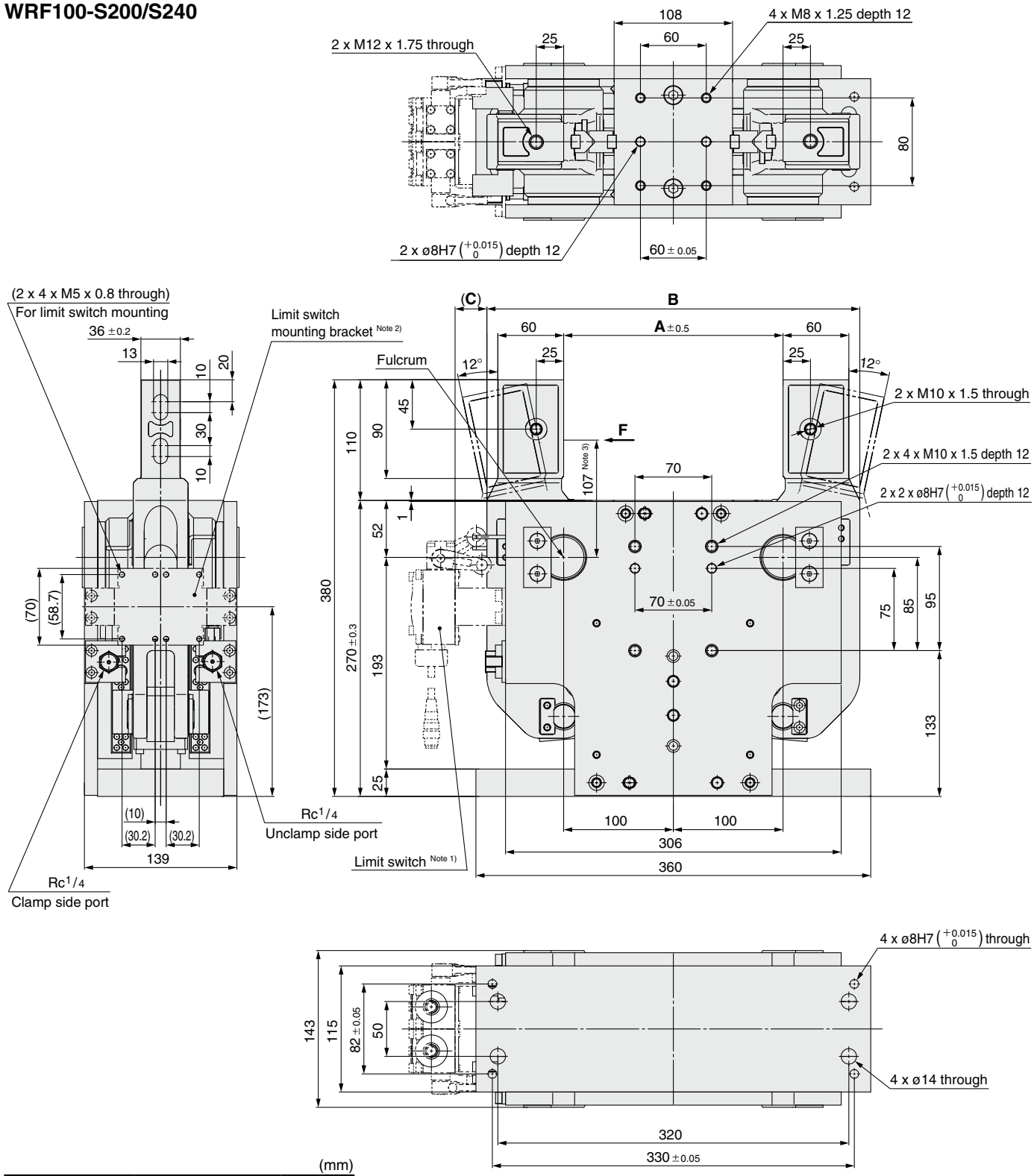
Arm type	A	B	C
T200	200	340	29
T240	240	360	19
T270	270	380	9

Note 1) This product does not include the limit switch.
Note 2) For mounting the limit switch, order the limit switch mounting bracket (WRF-BK) separately. The limit switch mounting bracket is optional. For details, refer to page 110.
Note 3) The symbol F in the dimensions indicates the position where the clamping force is generated defined by the product specifications.

Dimensions

WRF-S□/S-type clamp arms (Without protective cover)

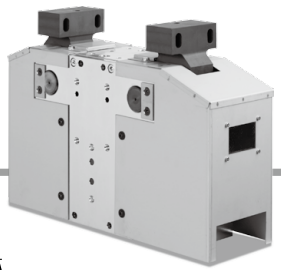
WRF100-S200/S240



(mm)

Arm type	A	B	C
S200	200	340	29
S240	240	360	19

Note 1) This product does not include the limit switch.
Note 2) For mounting the limit switch, order the limit switch mounting bracket (WRF-BK) separately. The limit switch mounting bracket is optional. For details, refer to page 110.
Note 3) The symbol F in the dimensions indicates the position where the clamping force is generated defined by the product specifications.

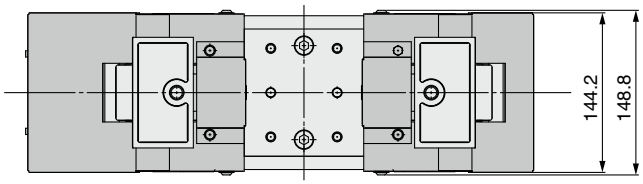


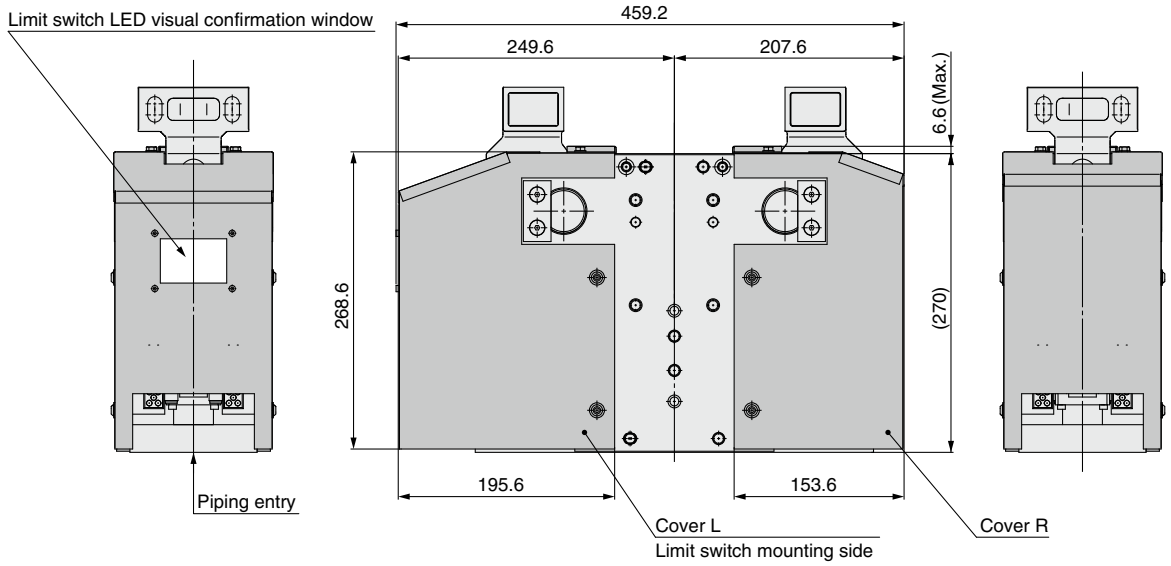
Dimensions

WRF-$^{T}_{S}$□C/With protective cover

WRF100-T200C

Protective cover dimensions shown in the figures are the same even if arm types are different.

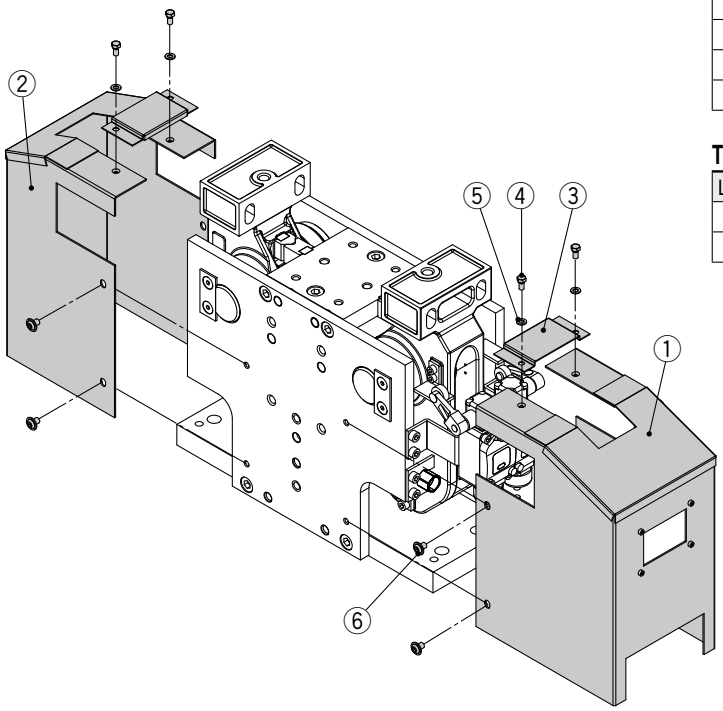




Protective Cover Kit (Option)

A protective cover can be retrofitted.

Fixing method for protective covers



Applicable product	Protective cover kit part no.	Contents
WRF100-T200	WRF-C200	① Cover L (1 pc.) ② Cover R (1 pc.) ③ Top covers (2 pcs.) ④ Hexagon head bolts (4 pcs.) ⑤ Flat washers (4 pcs.) ⑥ Cover mounting bolts (8 pcs.)
WRF100-S200		
WRF100-T240	WRF-C240	
WRF100-S240		
WRF100-T270	WRF-C270	

Tightening torque for cover mounting bolts

Location	Tightening torque (N·m)
④	3.0 to 4.0
⑥	5.0 to 7.0

<Mounting procedure>

1. Confirm that all air has been exhausted from inside the cylinder before mounting.
2. Mount the cover L (①) and cover R (②) on the cylinder body.
   Mount the cover L (①) on the side where a limit switch is mounted.
3. Mount the top covers (③) to the cover L (①) and cover R (②).

Limit Switch Mounting Bracket (Option)

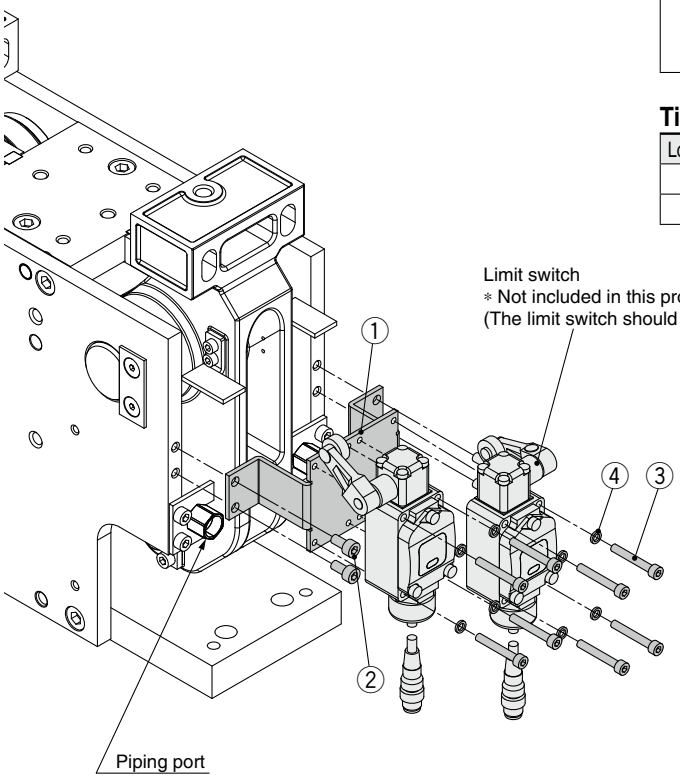
Bracket for attaching a limit switch

Applicable product	Limit switch mounting bracket part no.	Contents
Applicable to all types	WRF-BK	① Switch mounting bracket (1 pc.) ② Bracket mounting bolts (4 pcs.) ③ Switch mounting bolts (8 pcs.) ④ Flat washers (8 pcs.)

Tightening torque for mounting bolts of switch mounting bracket

Location	Tightening torque (N·m)
②	5.0 to 7.0
③	3.0 to 4.0

Fixing method for switch mounting brackets



<Applicable limit switch part numbers>
OMRON Corp.: WLG2-LDAS-DGJS03T
Azbil Corp.: 1LS74-JWC-P025

∗1 When mounting accessories, confirm that all air has been exhausted from inside the cylinder.
∗2 A limit switch can also be mounted on the side opposite to that with the piping port.

WRF100
Specific Product Precautions

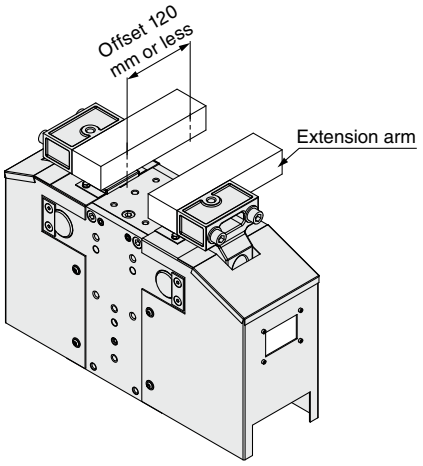
Be sure to read this before handling the products. Refer to page 147 for safety instructions. For actuator precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: http://www.smcworld.com

Design

⚠Warning

1. Ensure that the offset of the clamping position is 120 mm or less.

With a large offset, twisting forces will be applied to the cylinder. This twisting force can potentially accelerate wear and breakage of parts with the abrasion of sliding parts. In addition, changes in the force on the cylinder parts may cause dangerous movement to occur with forceful impact.



2. If there is a chance that the product will pose a hazard to operators, install a protective cover.

A large gripping force is generated during clamping. If there is a possible pinching hazard, design the structure to avoid direct contact with the operator.

3. Securely tighten all stationary parts and connected parts so that they will not become loose. Take special care when the cylinder is installed where there is a lot of vibration, ensure that all parts remain secure.

4. Consider a possible loss of power.

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

5. Consider emergency stops.

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or an operator's emergency stop.

6. Consider the action when operation is restarted after an emergency stop or abnormal stop.

Design the machinery so that human injury or equipment damage will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install manual safety equipment.

7. No self-locking mechanism

At air shutoff, there is no force generated to hold the workpiece. External forces will cause the workpiece to move out of place in the event that air is lost. Measures should be taken to protect against bodily injury with the hazard.

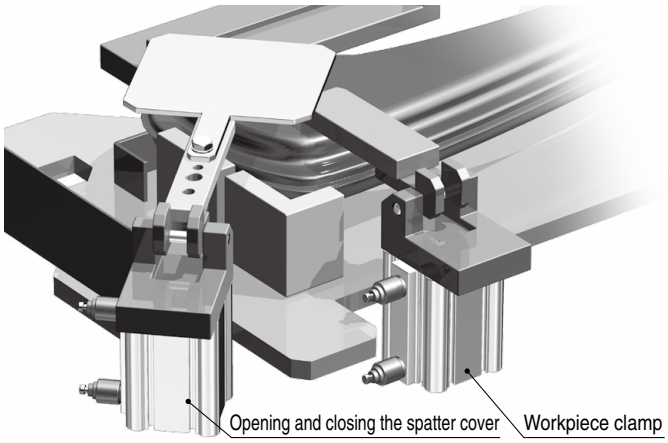
Compact Clamp Unit

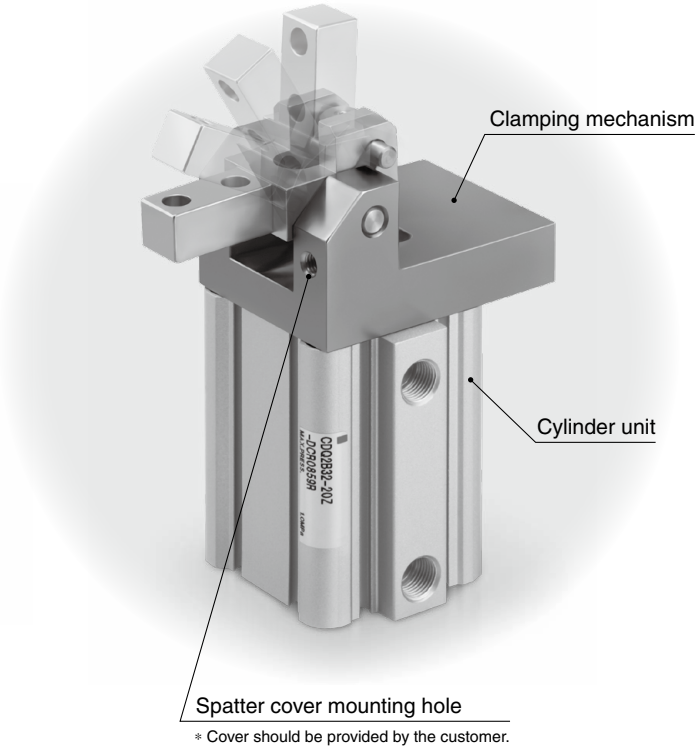
CDQ2B20-DCT1710T
CDQ2B32-DCR0859R

ø20, ø32

Space saving

Used to clamp the workpiece, and open or close the spatter cover of the workpiece.





∗ Cover should be provided by the customer.

Labor reduction

Reduces design and assembly labor by integrating the cylinder and clamping mechanism.

Compact

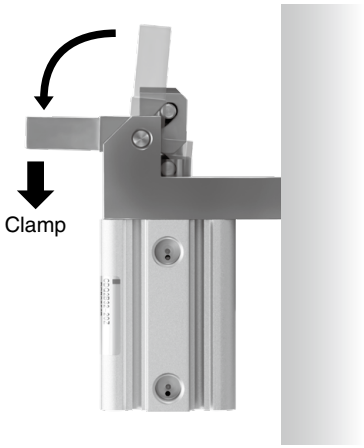
Compact clamp unit based on the compact cylinder

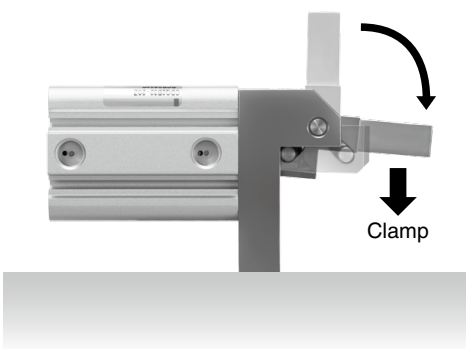
Clamp unit used in common

Both ø20 and ø32 clamp cylinders use the same clamp unit and only the clamp unit can be replaced. This contributes to reduction of spare parts.

Possible to clamp in both directions

Capable of clamping in both directions with an arm opening/closing angle of 90° or more

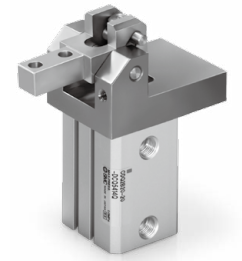




Compact Clamp Unit
CDQ2B20-DCT1710T
CDQ2B32-DCR0859R
ø20, ø32

RoHS

How to Order



ø20 **CDQ2B20 – 20 – DCT1710T – M9BW**

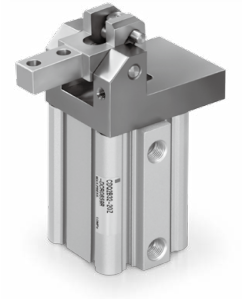
- **CDQ2B20**: Built-in auto switch magnet
- **20**: Bore size

20	20 mm

- **DCT1710T**: Compact clamp unit
- **M9BW**: Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.



ø32 **CDQ2B32 – 20Z – DCR0859R – M9BW**

- **CDQ2B32**: Built-in auto switch magnet
- **32**: Bore size

32	32 mm

- **DCR0859R**: Compact clamp unit
- **M9BW**: Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Specifications

Bore size	ø20	ø32
Stroke	20 mm	
Max. operating pressure	1.0 MPa	
Ambient temperature	–10°C to 60°C (No freezing)	
Cushion	Rubber bumper	
Mounting bracket	Rod flange	
Arm opening/closing angle	96°(Cylinder retracting side 5° Cylinder extending side 1°)∗	

∗ Refer to the dimensions for details.

Clamp Unit Part No.

Clamp unit part no.	Hexagon socket head cap screw for fixing clamp unit (included)
C2Q32-42-0895R-R	M5 x 55L (For ø20)∗
	M5 x 62L (For ø32)∗

∗ Two types of hexagon socket head cap screw for fixing the unit are included. Use them in accordance with the bore size.

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	—	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	—	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	—	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	—	○		
				2-wire		12 V		M9BAV	M9BA	○	○	●	○	—	○	—	
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—		—	P3DWA∗2	●	—	●	●	—	○		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	A93V∗1	A93	●	●	●	●	—	—	—	Relay, PLC
			No			5 V,12 V	100 V or less	A90V	A90	●	—	●	—	—	—	IC circuit	

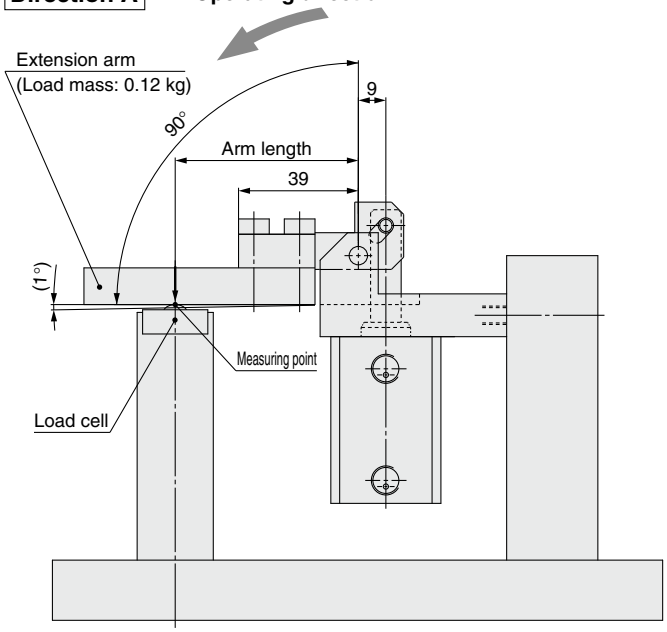
∗1 The 1 m lead wire is only applicable to the D-A93.
∗2 For D-P3DWA□, only ø32 is available.

∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NW
1 m·····M (Example) M9NWM
3 m·····L (Example) M9NWL
5 m·····Z (Example) M9NWZ

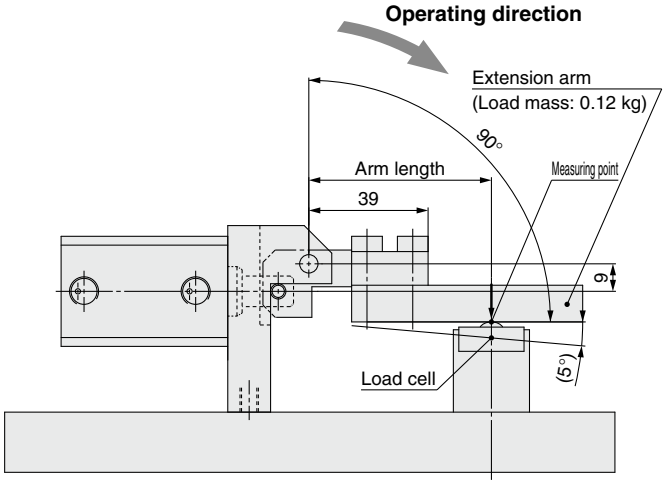
∗ Solid state auto switches marked with "○" are produced upon receipt of order.

Clamping Characteristics

Direction A

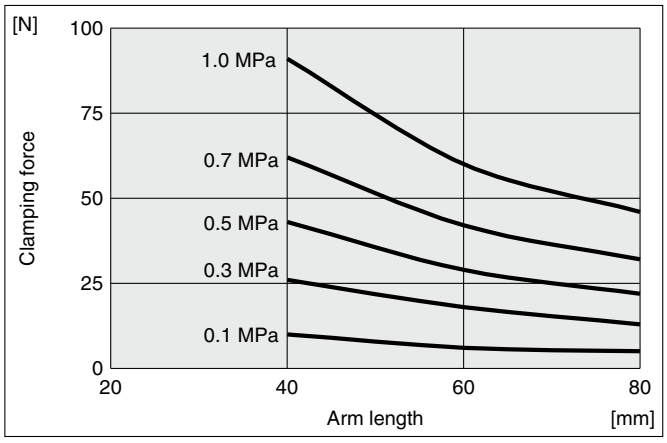


Direction B

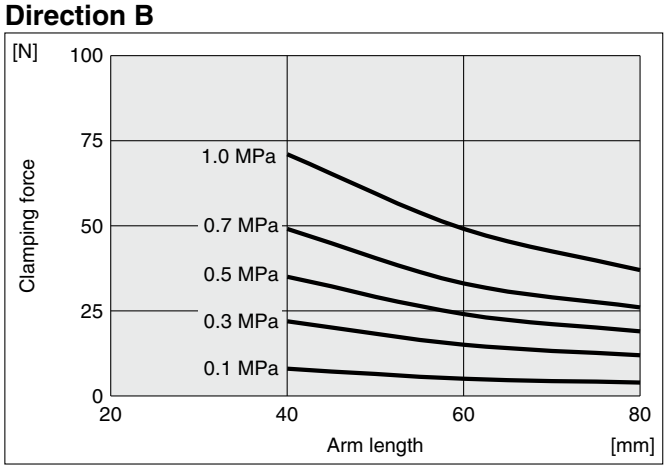


CDQ2B20-DCT1710T

Direction A

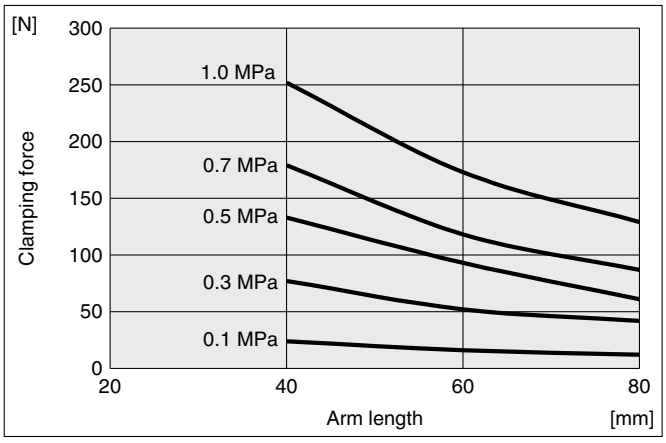


Direction B

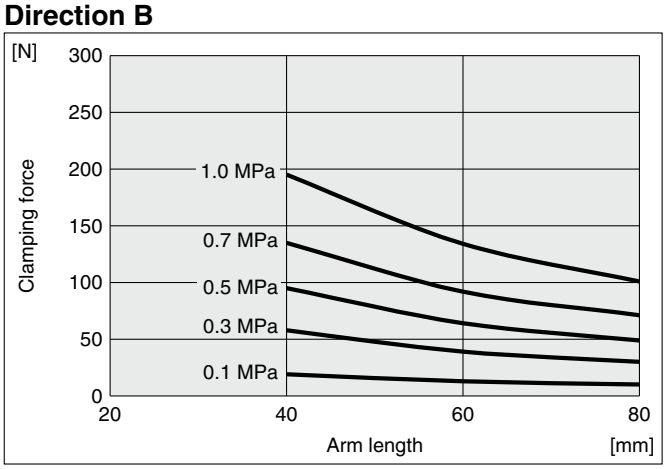


CDQ2B32-DCR0859R

Direction A

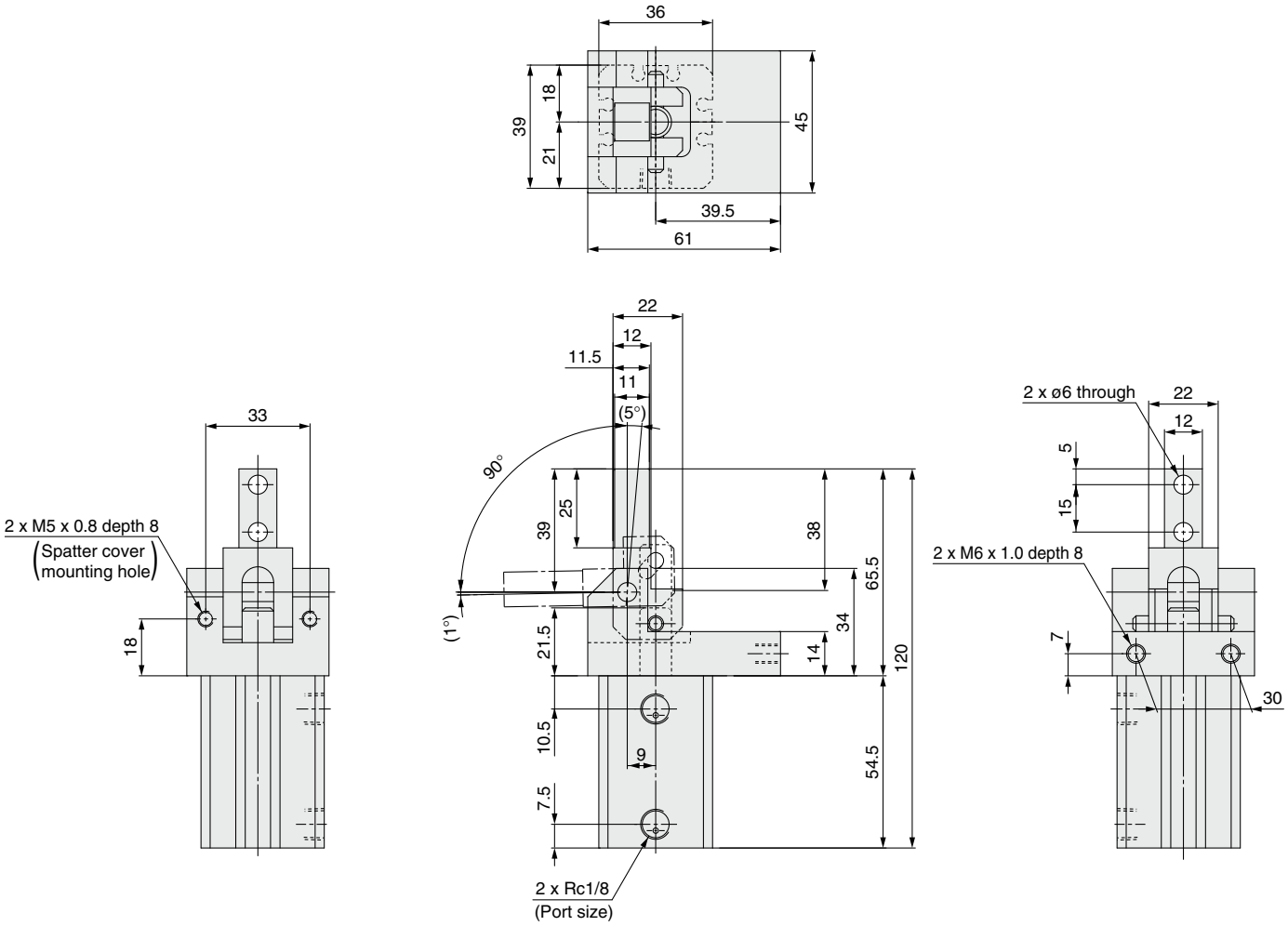


Direction B



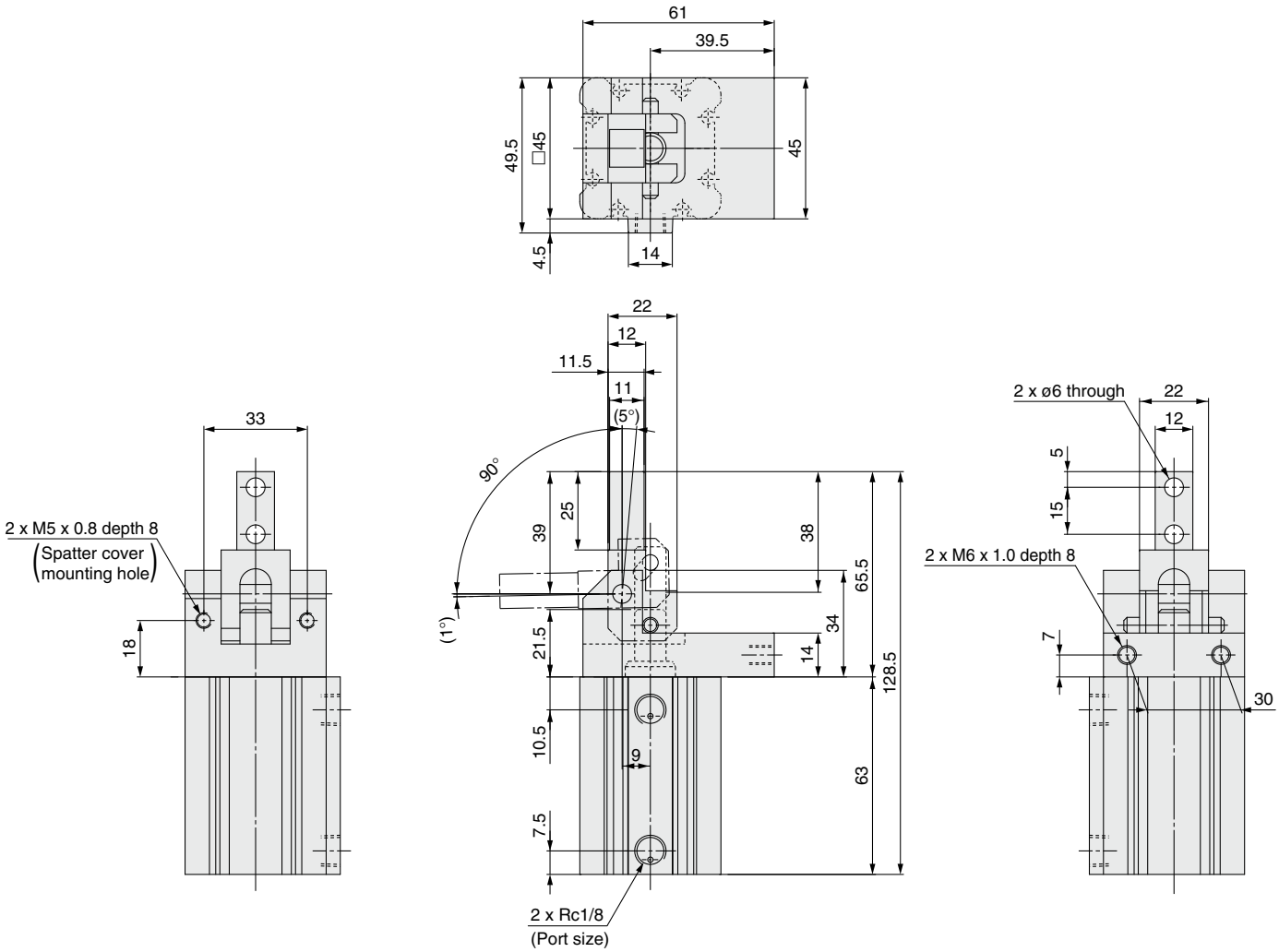
Dimensions

CDQ2B20-20-DCT1710T



Dimensions

CDQ2B32-20Z-DCR0859R



Center Lock Unit
MA331-X441

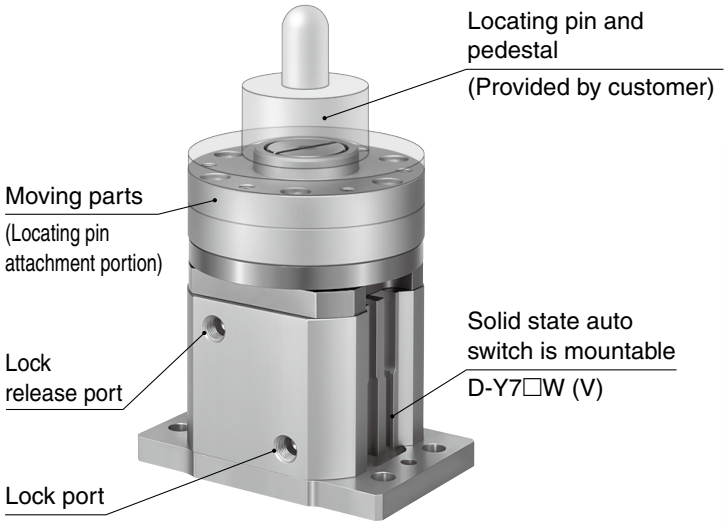
Locating pin workpiece contact portion can switch from center lock (for locating) to free (for releasing workpiece)

Even when the workpiece is distorted after welding, if the locating pin is set to free, the workpiece can be removed easily from the locating pin.

■ **The locating pin changes to center lock by pressurization of the lock port, and changes to free by pressurization of the lock release port.**

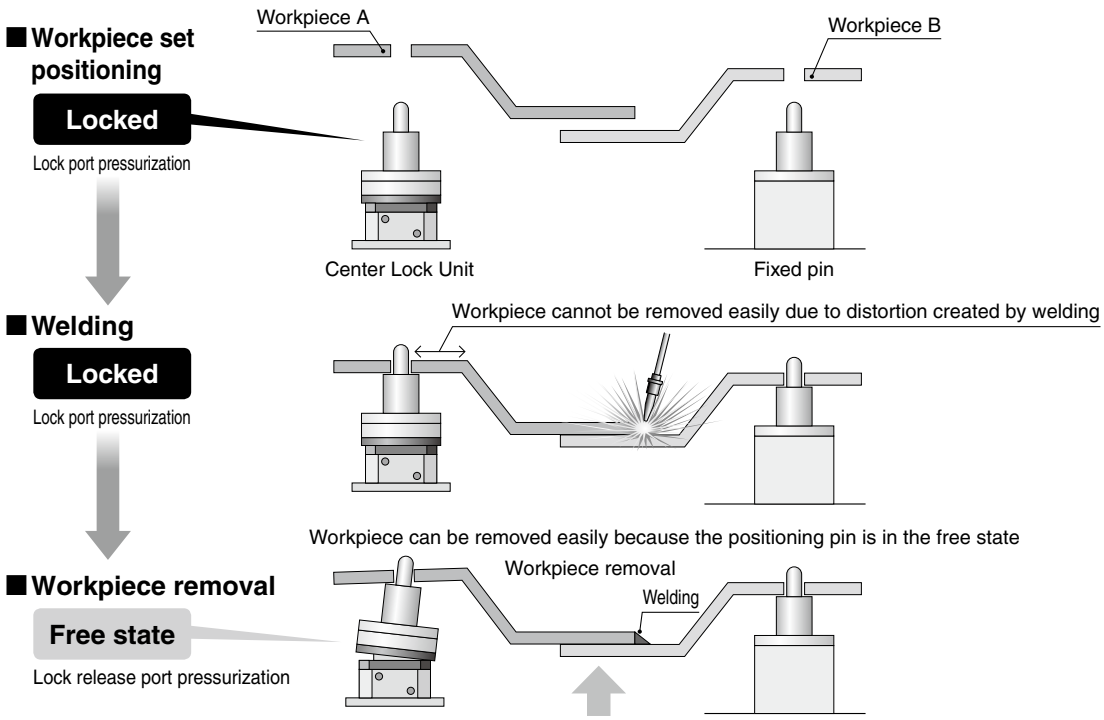
■ **Center lock positioning accuracy** **±0.1 mm** (α direction only)

■ **Locating pin swing angle and rotation angle** **α = 3° ±1°**, **θ = 3° ±1°**





Application Example Used as a pedestal for the locating pin in the welding process



SMC

Center Lock Unit
MA331-X441



How to Order

MA331 – F4 – Y7BW □ – X441

Auto switch

Nil	Without auto switch (Built-in magnet)

∗: For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
n	n

2-Color Indicator Auto Switches/Refer to the **Web Catalog** for further information on auto switches.

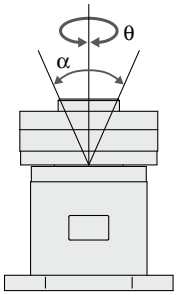
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length [m]				Pre-wired connector	Applicable load	
					DC		AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state auto switch	Diagnostic indication (2-color indicator)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**Y7NWV**	**Y7NW**	●	○	●	●	○	IC circuit	Relay, PLC
				3-wire (PNP)				**Y7PWV**	**Y7PW**	●	○	●	●	○		
				2-wire		12 V		**Y7BWV**	**Y7BW**	●	○	●	●	○	—	
	Water resistant (2-color indicator)							—	**Y7BA**	—	—	●	●	○		
	Magnetic field resistant (2-color indicator)			2-wire (Non-polar)		—		—	**Y7DWSC**∗1	—	—	—	—	○		

∗1: Lead wire length is 0.3 m, wiring (pin numbers used) consists of two wires (3-4).
∗: Solid state auto switches marked with "○" are produced upon receipt of order.
∗: For details about auto switches with pre-wired connectors, refer to the **Web Catalog**.
∗: Auto switches are shipped together, but not assembled.

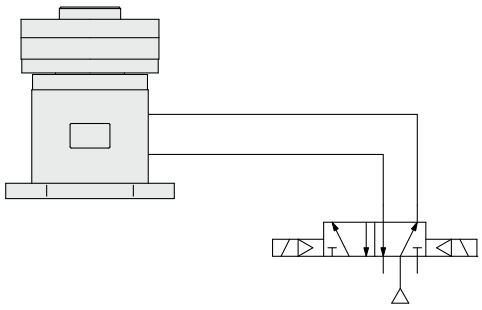
∗: Lead wire length symbols: 0.5 m·····Nil (Example) Y7NW
3 m····· L (Example) Y7NWL
5 m····· Z (Example) Y7NWZ

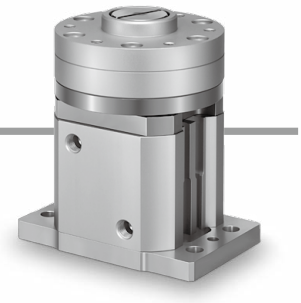
Specifications

Maximum load weight	20 kg
Handling	Double acting
Handling air pressure	0.2 to 0.7 MPa
Proof pressure	1.05 MPa
Ambient and fluid temperatures	0 to 60°C
Center lock positioning accuracy	±0.1 mm (α direction)
Moment resistance (Theoretical value)	117 N·m (at 0.5 MPa)
Torque resistance (Theoretical value)	6.3 N·m (at 0.5 MPa)
Swing angle (α) (See the figure below.)	3° ±1°
Rotation angle (θ) (See the figure below.)	3° ±1°
Weight	3100 g



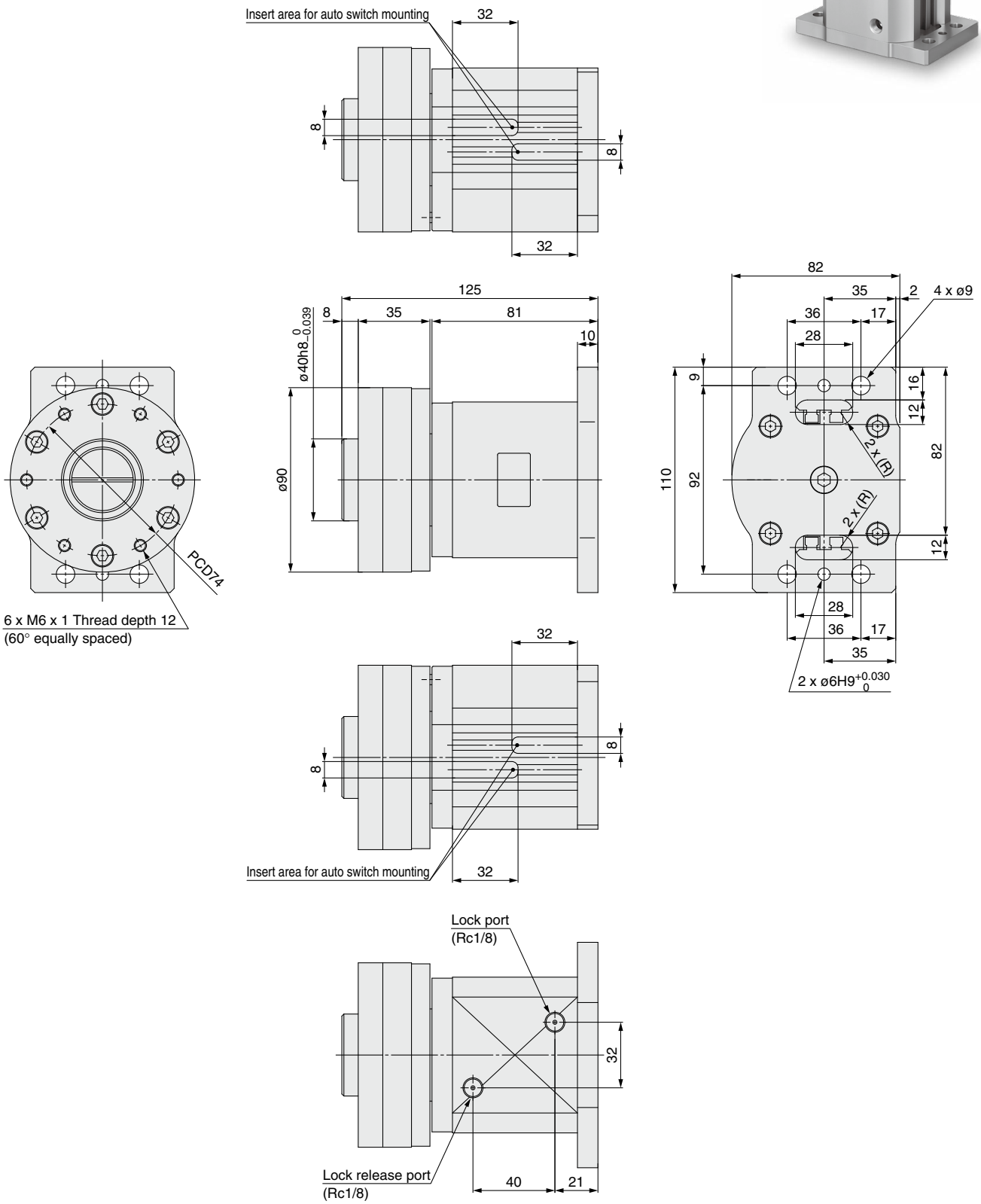
Circuit Diagram





Dimensions

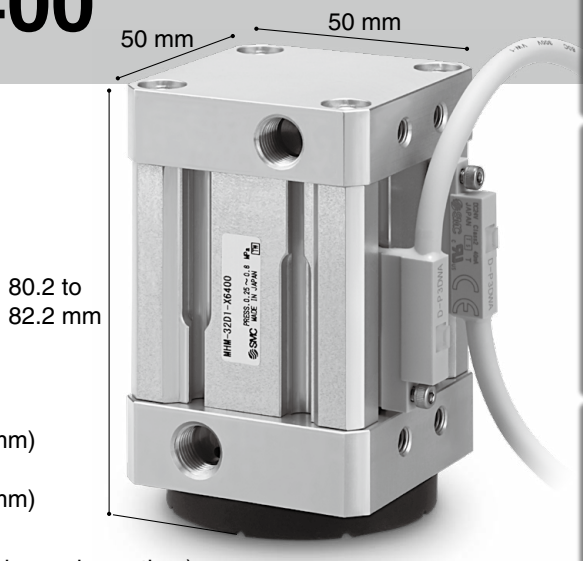
MA331-F4-X441



Adsorbs and Holds with a Magnet

Magnet Gripper

MHM-X6400



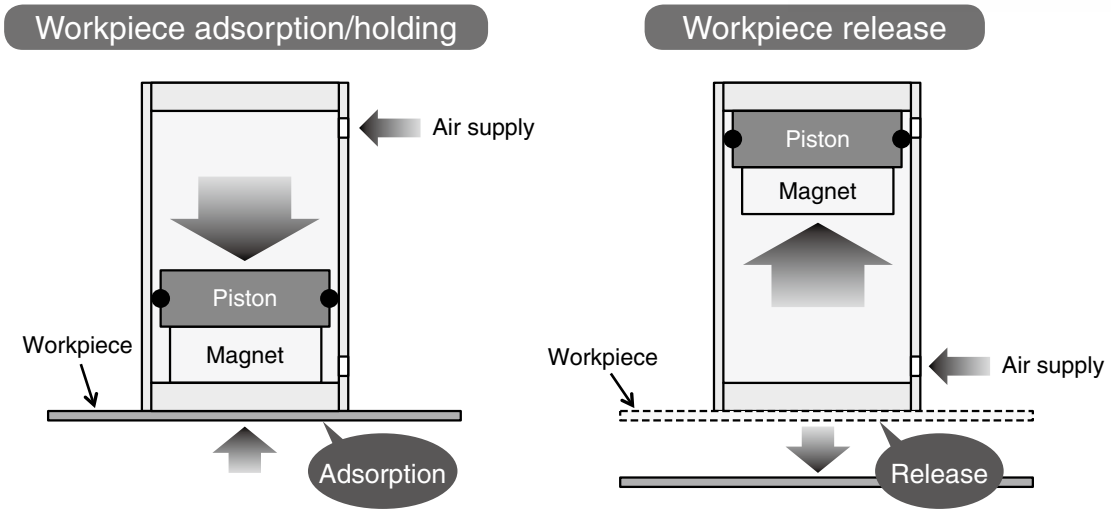
■Steel plates can be transferred without a vacuum.

Supports workpieces with holes and uneven surfaces where a vacuum pad cannot be used.

■Holds workpieces even when air is shut off.

■High holding force 80 N (Workpiece plate thickness: 0.6 mm)
120 N (Workpiece plate thickness: 1.4 mm)

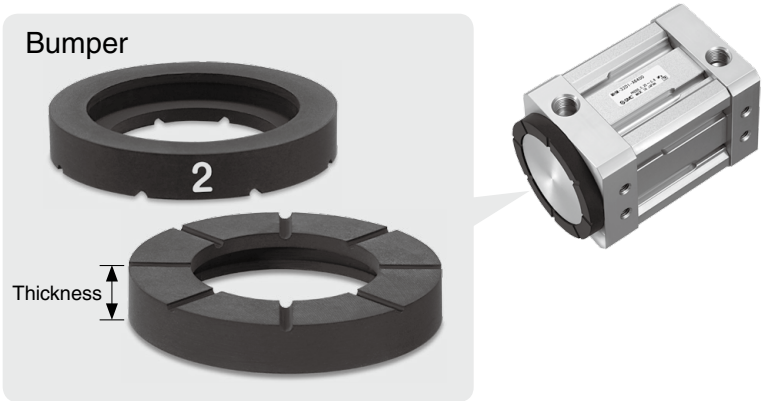
■Residual holding force 0.3 N or less (Reduces workpiece release time)



■Holding force can be adjusted with a bumper with 3 types of thicknesses.

Thickness	Holding force
6 mm	80 N
7 mm	50 N
8 mm	30 N

Prevents deformation of workpieces and accidental adsorption of a second piece. Fluororubber with excellent oil resistance is used. Has a contact surface structure which reduces sideslip. Bumper can be replaced without a tool.



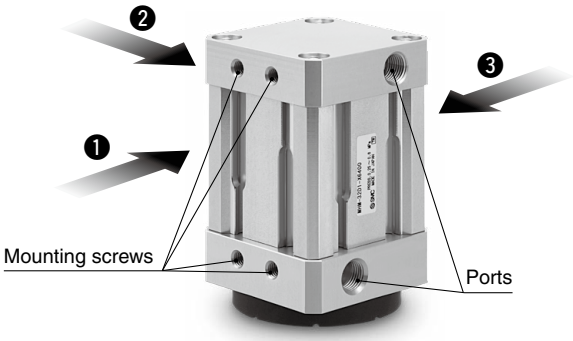
■Auto switches can be mounted on 4 surfaces.

Magnetic field resistant auto switch:
D-P3DWA

General purpose auto switch:
D-M9□V



■Mountable on 3 surfaces.



Magnet Gripper
MHM-X6400

How to Order

MHM − 32D [1] − [P3DWAL] − [ ] − X6400

Holding force

Symbol	Holding force
1	80 N
2	50 N
3	30 N

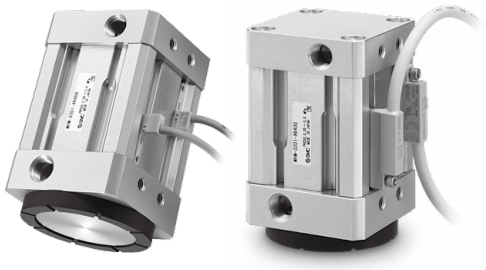
Number of auto switches

Nil	2
S	1

Auto switch

Nil	Without auto switch
P3DWA□	D-P3DWA□
M9□V	D-M9□V□

∗: For applicable auto switches, refer to the table below.



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

Magnetic Field Resistant Auto Switches

Type	Auto switch model	Applicable magnetic field	Electrical entry	Indicator light	Wiring (Pin no. in use)	Load voltage	Lead wire length	Applicable load
Solid state auto switch	**P3DWASC**	AC magnetic field (Single-phase AC welding magnetic field)	Pre-wired connector	2-color	2-wire (3–4)	24 VDC	0.3 m	Relay, PLC
	P3DWASE				2-wire (1–4)			
	P3DWA		Grommet		2-wire		0.5 m	
	P3DWAL						3 m	
	P3DWAZ						5 m	

General Purpose Auto Switches

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length [m] 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9NV**	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9PV**	●	●	●	○	○		
				2-wire		12 V		**M9BV**	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NWV**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NAV**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PAV**	○	○	●	○	○		
				2-wire		12 V		**M9BAV**	○	○	●	○	○	—	

∗: Solid state auto switches marked with "○" are produced upon receipt of order.
∗: For details about auto switches with pre-wired connectors, refer to the **Web Catalog**.
∗: Auto switches are shipped together, but not assembled.

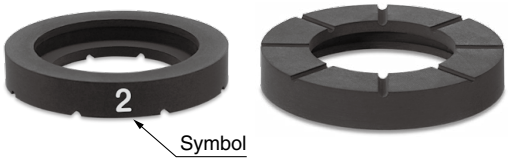
∗: Lead wire length symbols: 0.5 m ····· Nil (Example) M9NWV
1 m ····· M (Example) M9NWVM
3 m ····· L (Example) M9NWVL
5 m ····· Z (Example) M9NWVZ

Specifications

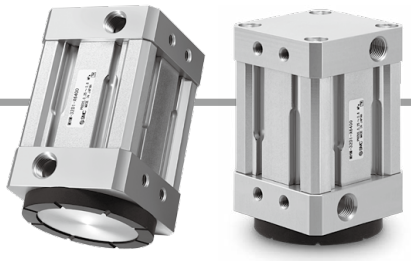
Action		Double acting
Fluid		Air
Operating pressure		0.25 to 0.6 MPa
Ambient and fluid temperatures		−10 to 60°C (No freezing)
Holding force (Workpiece thickness: 0.6 mm)	**MHM-32D1-X6400**	80 N
	MHM-32D2-X6400	50 N
	MHM-32D3-X6400	30 N
Residual holding force		0.3 N or less
Lubrication		Non-lube
Weight		475 g

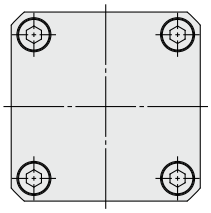
Bumper Order No.

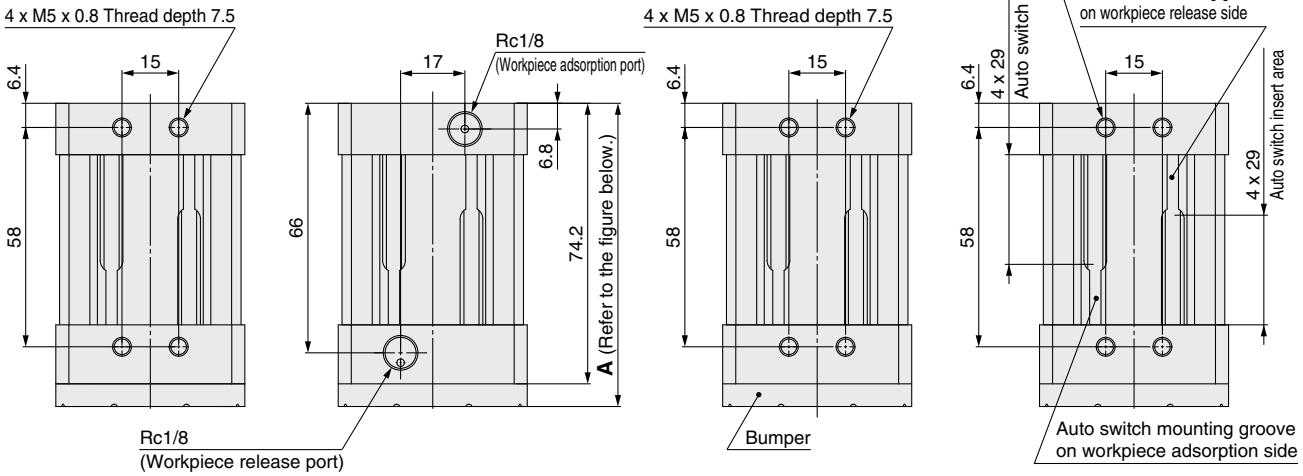
Symbol	Holding force	Model
1	**80 N**	MHM-A3201-1-X6400
2	**50 N**	MHM-A3201-2-X6400
3	**30 N**	MHM-A3201-3-X6400

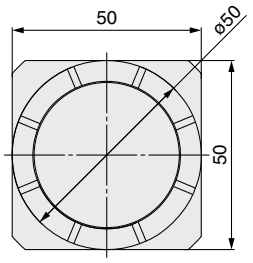


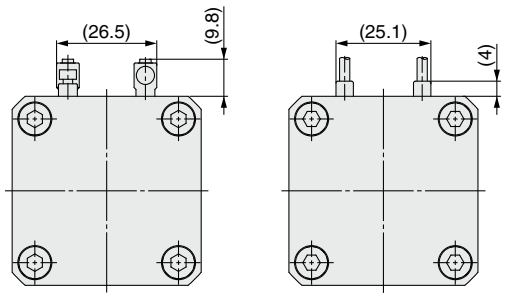
Dimensions





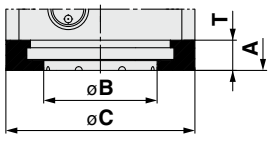






D-P3DWA **D-M9□V**

With auto switch



Symbol	Part number	A	øB	øC	T
1	**MHM-32D1-X6400**	80.2	39	50	(6)
2	**MHM-32D2-X6400**	81.2	30		(7)
3	**MHM-32D3-X6400**	82.2			(8)

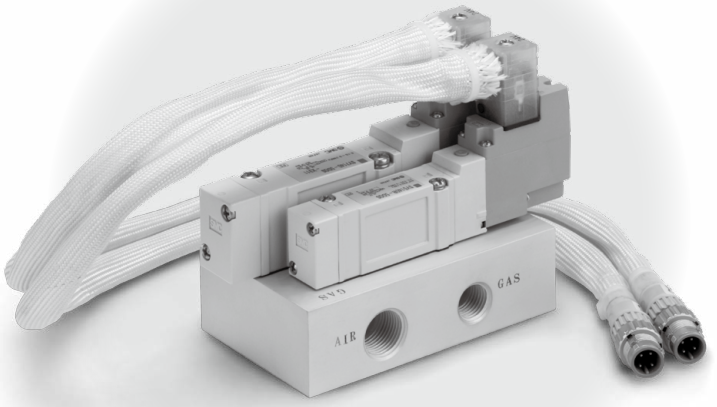
Bumper dimensions

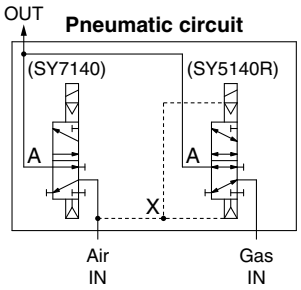
⚠ Caution

- Since a thin plate is used for the metal surface on the end, damage may occur when an impact load is applied due to contact with a workpiece. Be sure to attach a bumper before use, and check and adjust operation so that no impact load is applied to the metal surface.
- When operating an actuator with a small diameter and a short stroke at a high frequency, dew condensation (water droplets) may occur inside the piping depending on the conditions.
  Simply connecting the moisture control tube (IDK series) to the actuator will prevent dew condensation from occurring. For details, refer to the IDK series in the **Web Catalog**.

Gas/Air Switching Valve
SS5Y7-X424-Q

Shield gas valve and air blow valve are integrated.

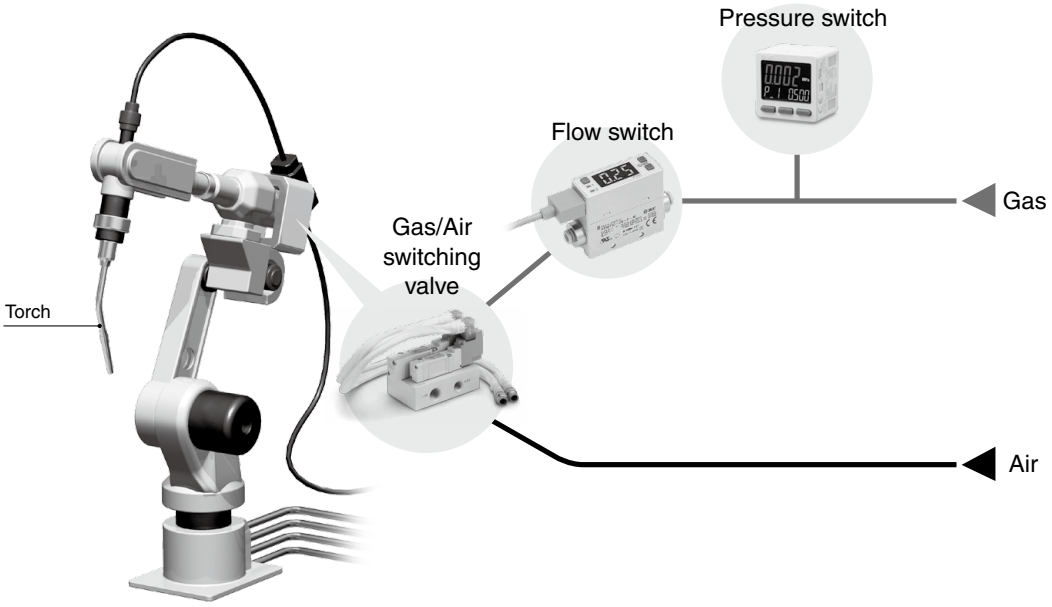




Tip service life extended

Service life can be extended by blowing the air to cool the tip after arc welding.
➡Tip service life is improved, and the number of tip replacements and the tip costs are reduced.

Space saving/Compact



Energy saving product

Power consumption **0.5 W**

Gas/Air Switching Valve

SS5Y7-X424-Q

How to Order

SS5Y7 – X424 – Q

X part no. ● ● CE marking

X424	Gas/Air switching valve With special connector assembly (Cable: Glass fiber heat resistant cover)

Specifications

Fluid	**SY7140-5DOS-X316-Q**	Air
	SY5140R-5DOS-Q	Inert gas
Operating pressure range	**SY7140-5DOS-X316-Q**	0.25 to 0.7 MPa
	SY5140R-5DOS-Q	–100 kPa to 0.7 MPa
Rated voltage		24 VDC
Power consumption		0.45 W
Allowable voltage fluctuation		±10% of rated voltage

[Special specifications]
1. Special manifold air circuit. (Refer to the figure on the right.)
2. With special connector assembly (Cable: Glass fiber heat resistant cover)

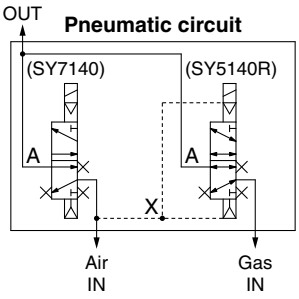
Note 1) Order no. "SS5Y7-X424-Q" includes the valve.
Note 2) Since SY7140 is internal pilot type, be careful not to drop the supply pressure from the minimum operating pressure.

Flow Rate Characteristics (Cv Factor)

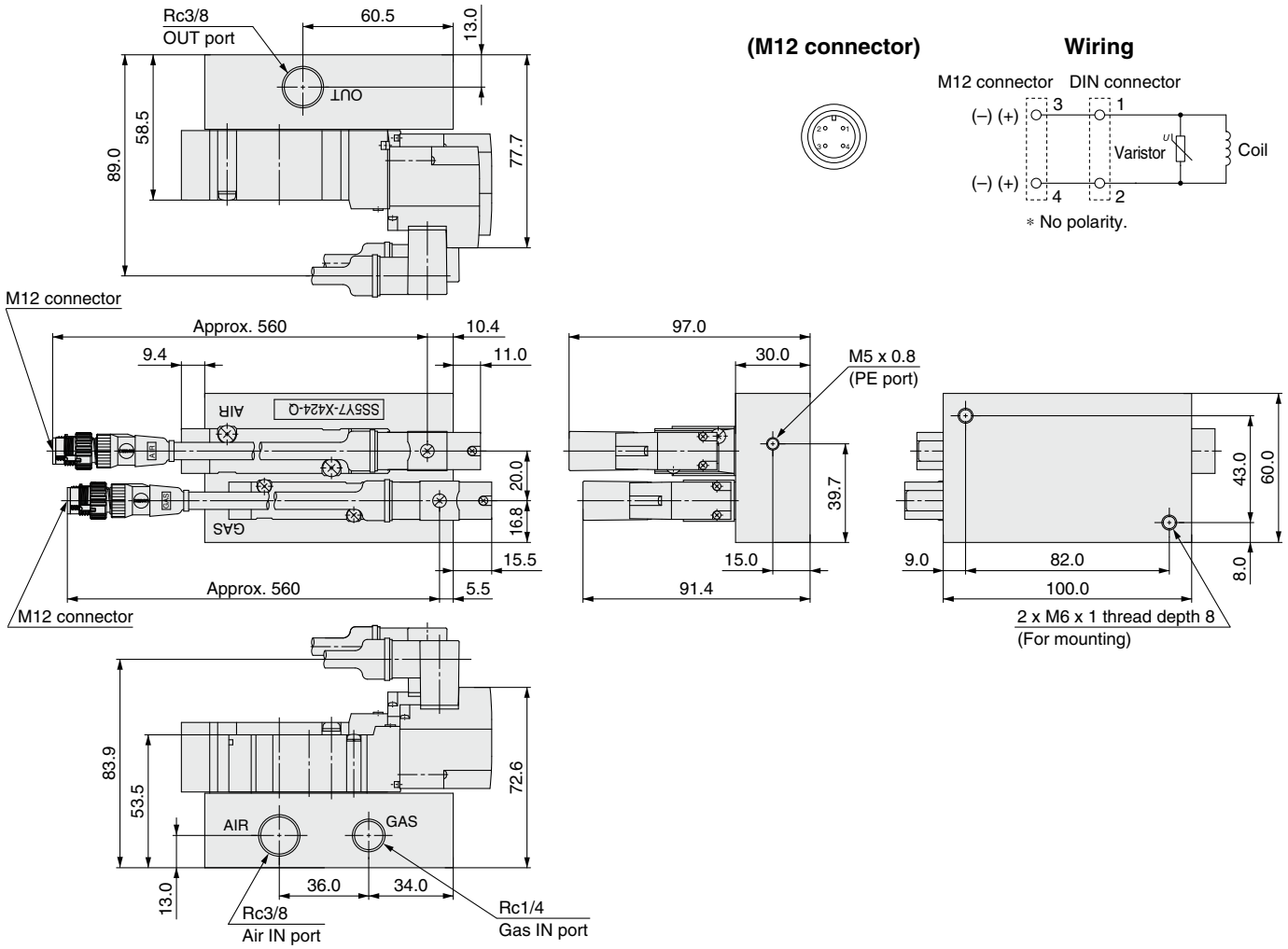
Passage	Valve	Cv
AIR→OUT	SY7140	0.63
GAS→OUT	SY5140R	0.40

Note 1) The flow rate characteristics show the flow rates when this special base is mounted.
Note 2) The flow rate is measured by means of the discharge method.

Pneumatic circuit



Dimensions



(M12 connector)

Wiring

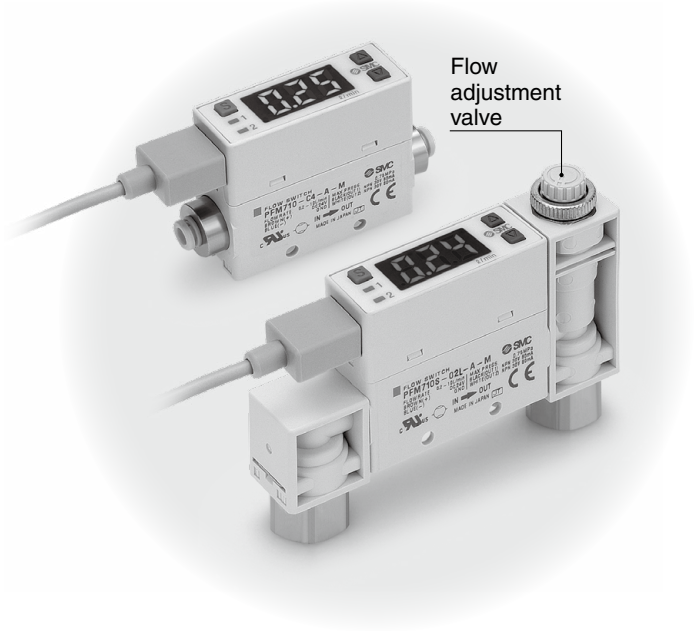
∗ No polarity.

Compatible with Argon (Ar), Carbon Dioxide (CO_2) and the Mixed Gas (Ar + CO_2)

Digital Flow Switch

PFM7 Series

Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.

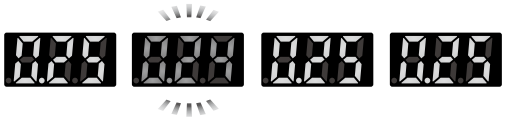


Fluid

Ar, CO_2
Ar + CO_2

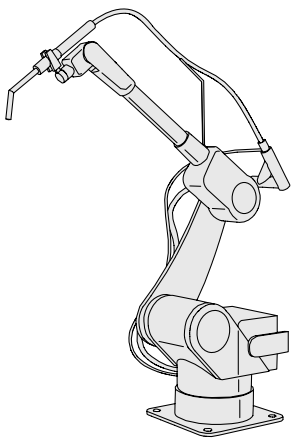
2-color display

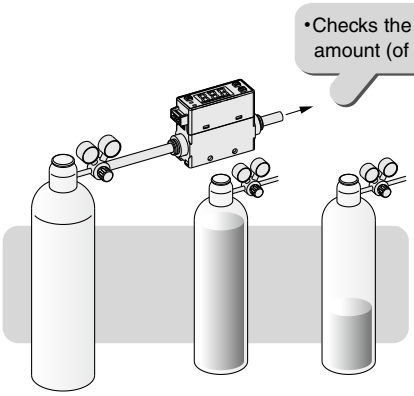
See abnormal values at a glance.



- **Allows flow rate control and value management of shielding gas**
- **Compatible with the mixed gas (Ar + CO_2)** (Gas ratio can be selected with **-X731**.)
- **Flow rate range: 10, 25, 50,100 L/min**
- **Smallest settable increment: 0.01 L/min** (0.1 L/min when the flow rate range is 25, 50, 100 L/min.)
- **Repeatability: ±1%F.S.**
- **Grease-free**
- **Flow adjustment valve is integrated.** (Reduced piping and space saving)
- **Response time: Either 50 ms, 0.5 s, 1 s or 2 s can be chosen.**

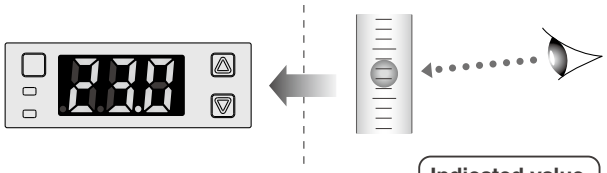
Applications





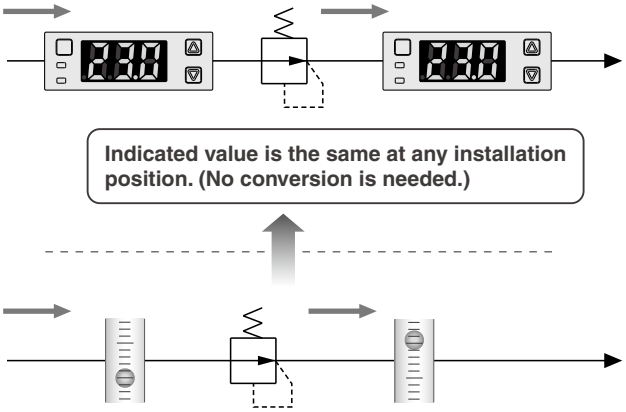
Comparison with Float Type Flow Meter

Digital display



Indicated value depends on the viewing angle.

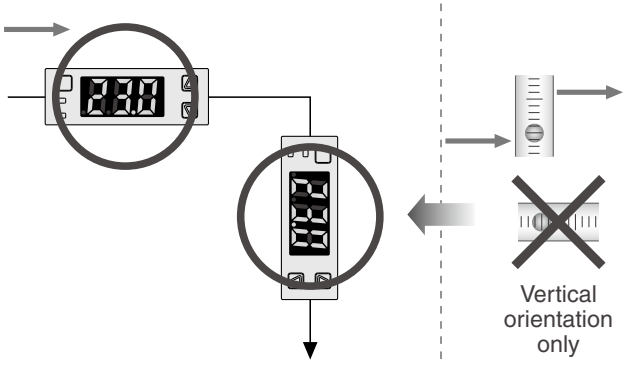
Not subject to pressure variations



Indicated value is the same at any installation position. (No conversion is needed.)

Indicated value depends on installation position. (Conversion is required.)

Free mounting orientation



Mounting orientation is not limited.

With switch output and analog output

Control by sensor output

Visual control

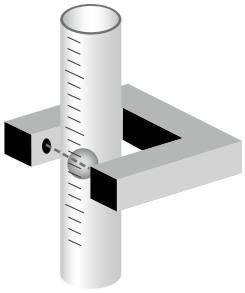


With switch output and analog output



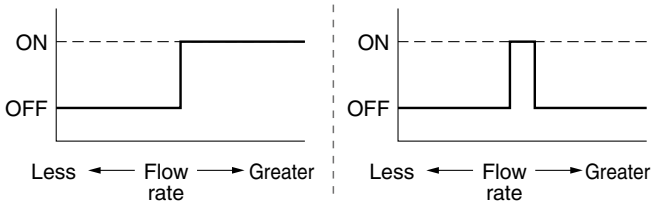
Without output function

A photoelectric switch, or similar, must be prepared separately.

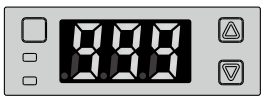


Can detect whether greater or less than set flow rate. The flow condition can be controlled all the time.

Can only detect when float passes. Cannot detect whether greater or less than set flow rate.



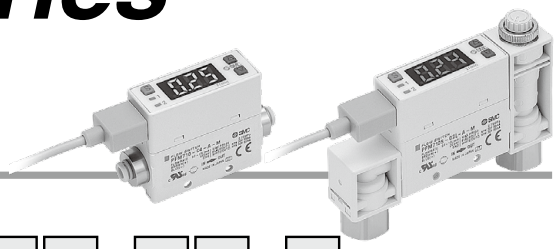
Accumulated flow display



Able to confirm the total air consumption per day (Max. 999999 L) Accumulated pulse output is also equipped.

Not displayable

Compatible with Argon (Ar), Carbon Dioxide (CO_2) and the Mixed Gas (Ar + CO_2)
Digital Flow Switch
PFM7 Series



How to Order

PFM7 10 □ – C4 □ – A – M □ □ – □ □ – □

Type
7	Integrated display

Rated flow range (Flow rate range)
10	0.2 to 10 (5) L/min
25	0.5 to 25 (12.5) L/min
50	1 to 50 (25) L/min
11	2 to 100 (50) L/min

∗ ( ): Fluid: CO_2
∗ When using argon (Ar), carbon dioxide (CO_2) and the mixed gas (Ar + CO_2), refer to page 131.

Flow adjustment valve
Nil	None
S	Yes

Port size
Symbol	Description	Flow rate range			
		10	25	50	11
01	Rc1/8	●	●	●	
02	Rc1/4				●
N01	NPT1/8	●	●	●	
N02	NPT1/4				●
F01	G1/8	●	●	●	
F02	G1/4				●
C4	ø4 (5/32") One-touch fitting	●			
C6	ø6 One-touch fitting	●	●	●	●
C8	ø8 (5/16") One-touch fitting		●	●	●
N7	ø1/4" One-touch fitting		●	●	●

Piping entry direction
Nil	Straight
L	Bottom

∗ Different combinations of piping entry directions for IN and OUT side are available as made-to-order.

Output specifications
A	2 NPN outputs
B	2 PNP outputs
C	1 NPN output + Analog (1 to 5 V)
D	1 NPN output + Analog (4 to 20 mA)
E	1 PNP output + Analog (1 to 5 V)
F	1 PNP output + Analog (4 to 20 mA)
G	1 NPN output + External input Note 3)
H	1 PNP output + External input Note 3)

Note 3) User can select from accumulated value external reset, auto-shift and auto-shift zero.

Unit specifications
M	Fixed SI unit Note 1)
Nil	With unit switching function Note 2)

Note 1) Fixed unit: Instantaneous flow rate: L/min
Accumulated flow: L
Note 2) Since the unit for Japan is fixed to SI due to new measurement law, this option is for overseas.

Operation manual
Nil	With operation manual (Japanese and English)
N	None

Calibration certificate
Nil	None
A	With calibration certificate

∗ The certificate is written in English and Japanese. Other languages are available as specials.

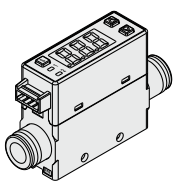
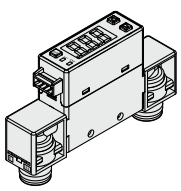
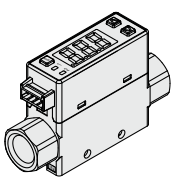
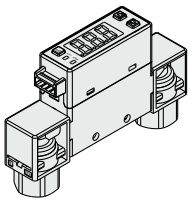
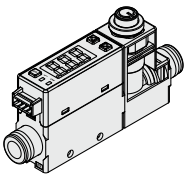
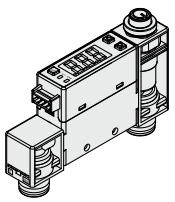
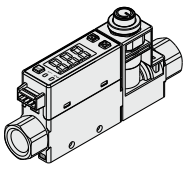
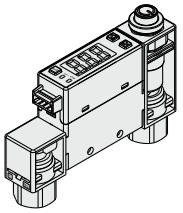
Made to Order
X731	Compatible with argon (Ar) and carbon dioxide (CO_2) mixed gas

(Refer to page 131.)

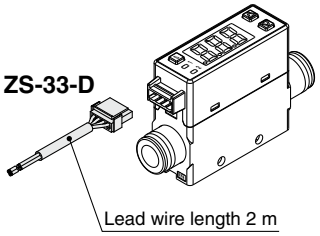
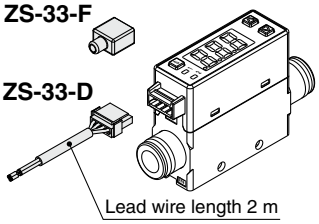
Option 1
(Refer to page 128.)

Option 2
(Refer to page 128.)

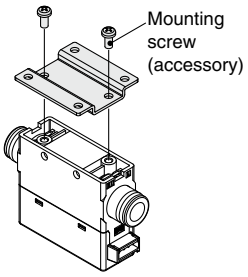
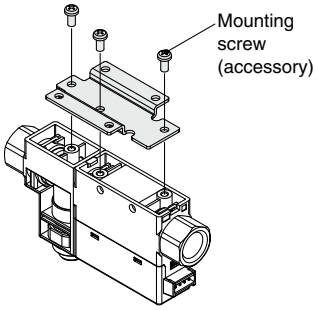
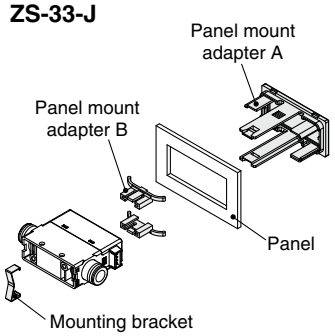
Piping Variations

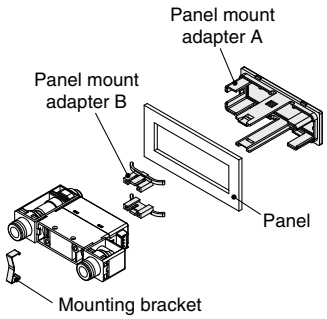
	With One-touch fittings (C4, C6, C8, N7)		Female thread (01, 02, N01, N02, F01, F02)	
	Straight (Nil)	Bottom (L)	Straight (Nil)	Bottom (L)
Without flow adjustment valve (Nil)				
With flow adjustment valve (S)				

Option 1

Nil	W	Z
With lead wire with connector (2 m) **ZS-33-D**  	With lead wire with connector (2 m) + Rubber cover for connector (silicon rubber) **ZS-33-F** **ZS-33-D**  	Without lead wire with connector

Option 2

Nil	R	S	T
None	Bracket (For without flow adjustment valve) **ZS-33-M**  	Bracket (For with flow adjustment valve) **ZS-33-MS**  Piping direction: Cannot be mounted with bottom piping type.	Panel mount adapter (For without flow adjustment valve) **ZS-33-J** 

V
Panel mount adapter (For with flow adjustment valve) **ZS-33-JS** 

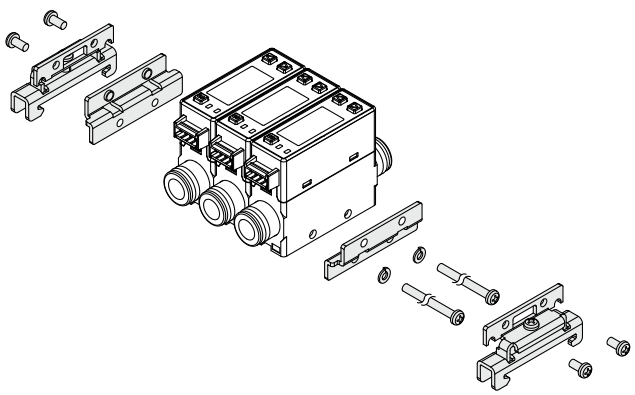
Each option is not assembled with the product, but shipped together.

DIN Rail Mounting Bracket (Order Separately)

ZS − 33 − R□

Stations

1	1 station
2	2 stations
3	3 stations
4	4 stations
5	5 stations



- DIN rail (supplied by customers)
- Port size F02: G1/4 cannot be mounted on the DIN rail.

Specifications

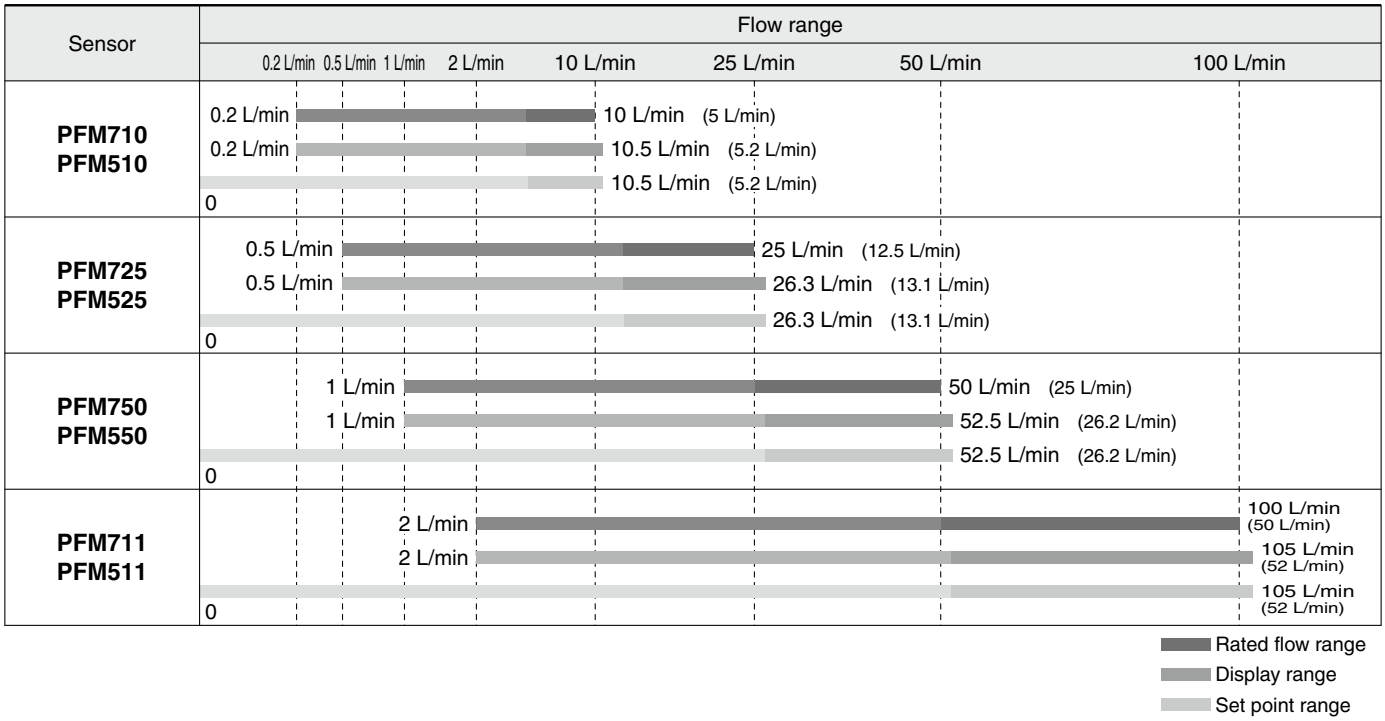
For details about the Flow Switch Precautions, refer to “Handling Precautions for SMC Products”.
For details about the Specific Product Precautions, refer to the Operation Manual at SMC website.

Model			PFM710	PFM725	PFM750	PFM711
Applicable fluid			Dry air, N_2, Ar, CO_2 (Air quality grade is JIS B8392-1, 1.1.2 to 1.6.2 and ISO8573-1, 1.1.2 to 1.6.2.)			
Rated flow range Note 8) (Flow rate range)		Dry air, N_2, Ar	0.2 to 10 L/min	0.5 to 25 L/min	1 to 50 L/min	2 to 100 L/min
		CO_2	0.2 to 5 L/min	0.5 to 12.5 L/min	1 to 25 L/min	2 to 50 L/min
Display range Note 1) Note 8)		Dry air, N_2, Ar	0.2 to 10.5 L/min	0.5 to 26.3 L/min	1 to 52.5 L/min	2 to 105 L/min
		CO_2	0.2 to 5.2 L/min	0.5 to 13.1 L/min	1 to 26.2 L/min	2 to 52 L/min
Set point range Note 1) Note 8)		Dry air, N_2, Ar	0 to 10.5 L/min	0 to 26.3 L/min	0 to 52.5 L/min	0 to 105 L/min
		CO_2	0 to 5.2 L/min	0 to 13.1 L/min	0 to 26.2 L/min	0 to 52 L/min
Smallest settable increment Note 2)			0.01 L/min	0.1 L/min	0.1 L/min	0.1 L/min
Accumulated pulse flow rate exchange value			0.1 L/pulse	0.1 L/pulse	0.1 L/pulse	1 L/pulse
Indication unit Note 3)			Instantaneous flow rate L/min, CFM x 10^{-2} Accumulated flow L, ft^3 x 10^{-1}			
Linearity			Display accuracy: ±3%F.S. (Fluid: Dry air) Analog output accuracy: ±5%F.S. (Fluid: Dry air)			
Repeatability			±1%F.S. (Fluid: Dry air) Analog output accuracy: ±3%F.S. (Fluid: Dry air)			
Pressure characteristics			±5%F.S. (0.35 MPa reference)			
Temperature characteristics			±2%F.S. (15 to 35°C) ±5%F.S. (0 to 50°C)			
Operating pressure range			–100 kPa to 750 kPa			
Rated pressure range			–70 kPa to 750 kPa			
Proof pressure			1 MPa			
Accumulated flow range			Max. 999999 L Note 4)			
Switch output			NPN or PNP open collector output			
	Maximum load current		80 mA			
	Maximum applied voltage		28 VDC (at NPN output)			
	Internal voltage drop		NPN output: 1 V or less (at 80 mA) PNP output: 1.5 V or less (at 80 mA)			
	Response time		1 s (50 ms, 0.5 s, 2 s can be selected.)			
	Output protection		Short-circuit protection			
Accumulated pulse output			NPN or PNP open collector output (Same as switch output)			
Analog output Note 5) Note 8)		Response time	1.5 s or less (90% response)			
		Voltage output	Voltage output: 1 to 5 V Output impedance: 1 kΩ			
		Current output	Current output: 4 to 20 mA Max. load impedance: 600 Ω, Min. load impedance: 50 Ω			
Hysteresis Note 6)		Hysteresis mode	Variable			
		Window comparator mode	Variable			
External input			No-voltage input (Reed or Solid state) Input 30 ms or more			
Display method			3-digit, 7-segment LED 2-color display (Red/Green) Renewed cycle: 10 times/s			
Status LED’s			OUT1: Lights up when output is turned ON (Green). OUT2: Lights up when output is turned ON (Red).			
Power supply voltage			24 VDC ±10%			
Current consumption			55 mA or less			
Environment	Enclosure		IP40			
	Operating fluid temperature		0 to 50°C (with no freezing and condensation)			
	Operating temperature range		Operating: 0 to 50°C Stored: –10 to 60°C (with no freezing and condensation)			
	Operating humidity range		Operating, Stored: 35 to 85%R.H. (with no condensation)			
	Withstand voltage		1000 VAC for 1 minute between terminals and housing			
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing			

Note 1) When the smallest settable increment, 0.01 L/min is selected for 10 L/min type, the indication upper limit will be [9.99 L/min].
When the smallest settable increment, 0.1 L/min is selected for 100 L/min type, the indication upper limit will be [99.9 L/min].
Note 2) User can select between 0.01 L/min and 0.1 L/min for the PFM710, and between 0.1 L/min and 1 L/min for the PFM711 respectively.
If the indication unit is selected to “CFM”, the smallest settable increment cannot be changed.
At the time of shipment from the factory, the smallest settable increment is set to 0.1 L/min for the PFM710 and 1 L/min for the PFM711 respectively.
Note 3) Set to “ANR” at the time of shipment from the factory.
“ANR” is used for standard conditions: 20°C, 1 atm and 65%R.H.
“NL/min” is used for normal conditions: 0°C and 1 atm.
When equipped with a unit switching function. (The SI unit (L/min or L) is fixed for types with no unit switching function.)
Note 4) Cleared when the power supply is turned off. Hold function can be selected. (Interval of 2 min or 5 min can be selected).
If the 5 min interval is selected, the life of the memory element (electronic part) is limited to 1 million cycles. (If energized for 24 hours, life is calculated as 5 min x 1 million = 5 million min = 9.5 years). Therefore, if using the hold function, calculate the memory life for your operating conditions, and use within this life.
Note 5) Set to 1.5 s (90%), can be changed to 100 ms.
Note 6) Set to hysteresis mode at the time of shipment from the factory. Can be changed to window comparator mode using push-buttons.
Note 7) For details about wiring and thread type, refer to the Operation Manual that can be downloaded from SMC website (http://www.smcworld.com).
Note 8) When using argon (Ar), carbon dioxide (CO_2) and the mixed gas (Ar + CO_2), refer to page 131.

Set Point Range and Rated Flow Range

Set the flow rate within the rated flow range.
The set point range is the range of flow rate that can be set in the switch.
The rated flow range is the range that satisfies the switch specifications (accuracy, linearity, etc.).
It is possible to set a value outside of the rated flow range if it is within the set point range, however, the satisfaction of specifications cannot be guaranteed.
The flow range if using CO_2 is given in brackets.
When using argon (Ar), carbon dioxide (CO_2) and the mixed gas (Ar + CO_2), refer to page 131.



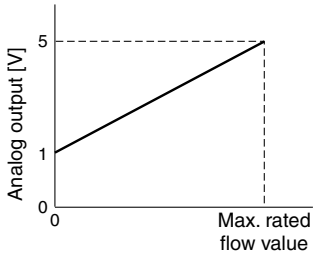
In the case of the PFM5 series, the display and set point ranges are the same as the PFM3 series flow monitor.

Piping Specifications/Weight

Part no.	01	02	N01	N02	F01	F02	C4	C6	C6	N7
Port size	Rc 1/8	Rc 1/4	NPT 1/8	NPT 1/4	G1/8	G1/4	ø4 (5/32") One-touch fitting	ø6 One-touch fitting	ø8 (5/16") One-touch fitting	ø1/4" One-touch fitting
Weight	Straight Without orifice: 95 g Bottom Without orifice: 105 g Straight With orifice: 135 g Bottom With orifice: 145 g					Straight Without orifice: 125 g Bottom Without orifice: 135 g Straight With orifice: 165 g Bottom With orifice: 175 g		Straight Without orifice: 55 g Bottom Without orifice: 65 g Straight With orifice: 95 g Bottom With orifice: 105 g		
Wetted parts material	LCP, PBT, Brass (Electroless nickel plating), HNBR (+ Fluoro coated), FKM (+ Fluoro coated), Silicon, Au, Stainless steel 304									

Analog Output

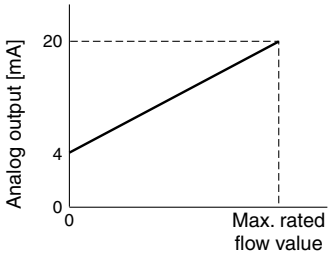
Note) Analog output at maximum rated flow rate when CO_2 is selected is 3 [V] for the voltage output type and 12 [mA] for the current output type.
Note) When using argon (Ar), carbon dioxide (CO_2) and the mixed gas (Ar + CO_2), refer to page 131.



Analog Voltage Output (1 to 5 V)

Model	Max. rated flow value [L/min]
PFM710-□-C/E	10 (5)
PFM725-□-C/E	25 (12.5)
PFM750-□-C/E	50 (25)
PFM711-□-C/E	100 (50)

∗ ( ): Fluid: CO_2



Analog Current Output (4 to 20 mA)

Model	Max. rated flow value [L/min]
PFM710-□-D/F	10 (5)
PFM725-□-D/F	25 (12.5)
PFM750-□-D/F	50 (25)
PFM711-□-D/F	100 (50)

∗ ( ): Fluid: CO_2

PFM7-X731
Digital Flow Switch
Made to Order

Please contact SMC for detailed specifications, lead times and prices.

Made to Order

Symbol

1 Compatible with Argon (Ar) and Carbon Dioxide (CO_2) Mixed Gas — X731

The argon–carbon dioxide gas ratio (Ar: CO_2) can be selected using the push-buttons from among the following: 92 : 8, 90 : 10, 80 : 20, 70 : 30, and 60 : 40. Dimensions are same as those of standard models.

PFM 7 □□-□□-□-□□□-X731

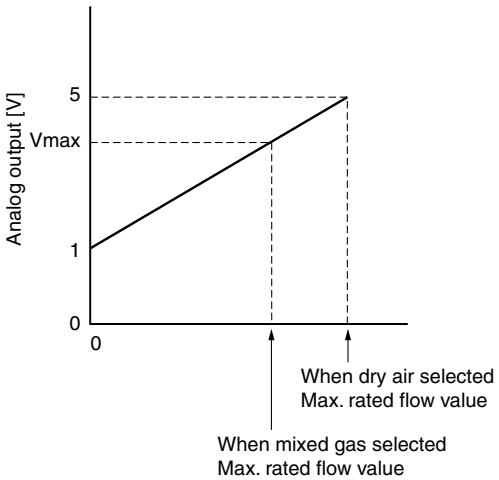
7	Integrated display

For details of How to Order, refer to page 127.

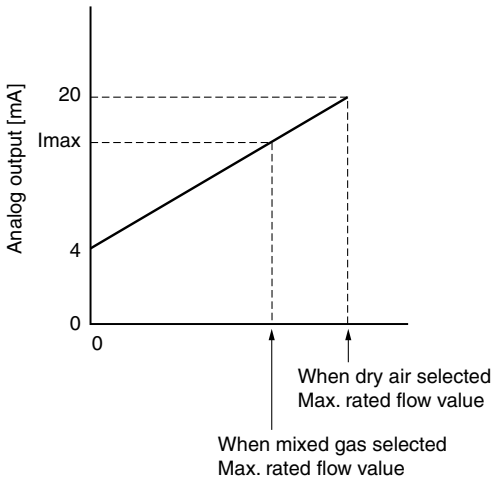
Model	Gas ratio		Rated flow range	Display range	Set point range	Max. analog output	
	Ar	CO_2				Voltage (Vmax)	Current (Imax)
PFM710	92%	8%	0.2 to 7.0 L/min	0.2 to 7.4 L/min	0 to 7.4 L/min	3.80 V	15.2 mA
	90%	10%					
	80%	20%					
	70%	30%					
	60%	40%					
PFM725	92%	8%	0.5 to 25.0 L/min	0.5 to 26.3 L/min	0 to 26.3 L/min	5.00 V	20.0 mA
	90%	10%					
	80%	20%	0.5 to 20.0 L/min	0.5 to 21.0 L/min	0 to 21.0 L/min	4.20 V	16.8 mA
	70%	30%					
	60%	40%					
PFM750	92%	8%	1.0 to 50.0 L/min	1.0 to 52.5 L/min	0 to 52.5 L/min	5.00 V	20.0 mA
	90%	10%					
	80%	20%	1.0 to 40.0 L/min	1.0 to 42.0 L/min	0 to 42.0 L/min	4.20 V	16.8 mA
	70%	30%					
	60%	40%					
PFM711	92%	8%	2 to 100 L/min	2 to 105 L/min	0 to 105 L/min	5.00 V	20.0 mA
	90%	10%					
	80%	20%	2 to 90 L/min	2 to 95 L/min	0 to 95 L/min	4.60 V	18.4 mA
	70%	30%	2 to 80 L/min	2 to 84 L/min	0 to 84 L/min	4.20 V	16.8 mA
	60%	40%					

Output characteristics using mixed gas

Analog voltage output (1 to 5 V)

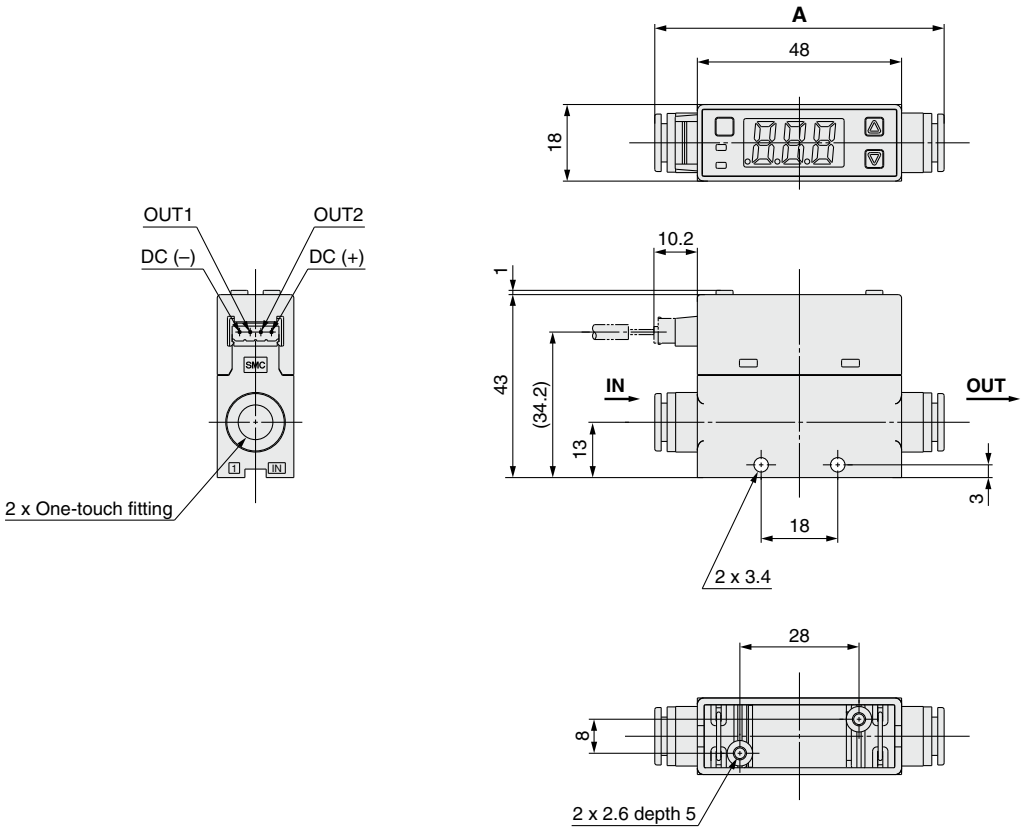


Analog current output (4 to 20 mA)



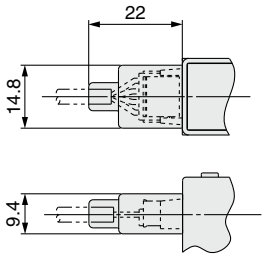
Dimensions

PFM7□□-C4/C6/C8/N7



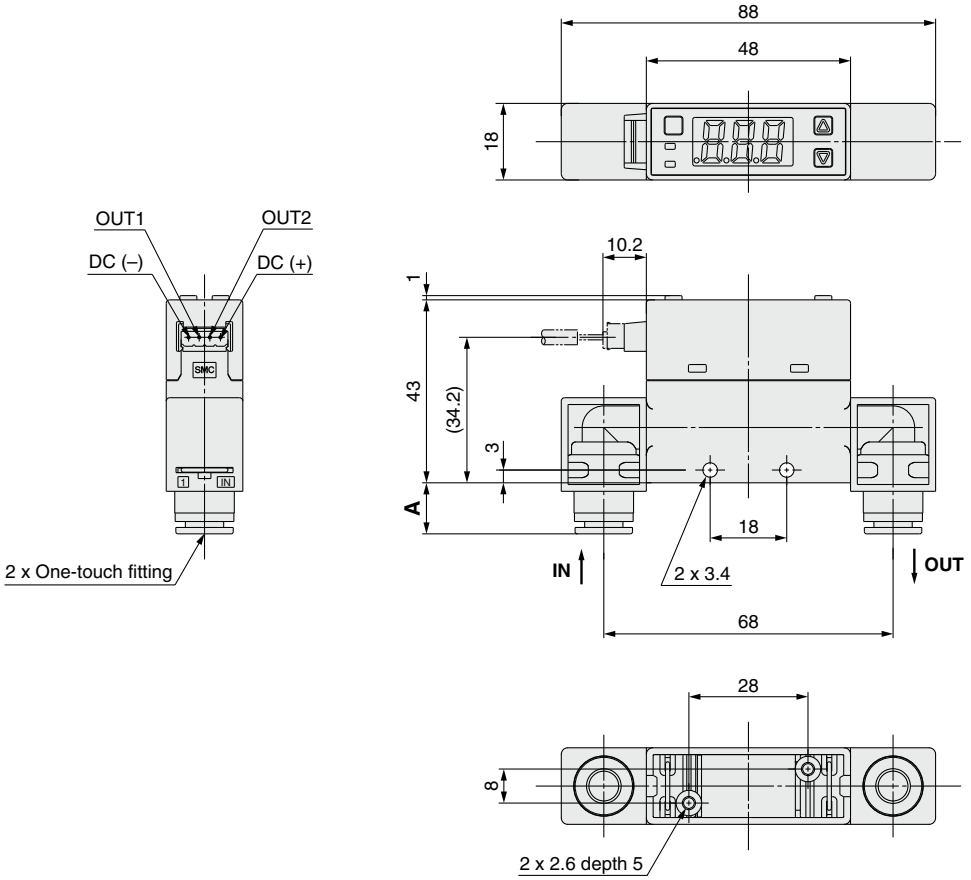
(mm)

One-touch fitting Applicable tube O.D.	A
ø4 (5/32")	64.2
ø6	64.6
ø8 (5/16")	68
ø1/4"	64.6



With rubber cover for connector

PFM7□□-C4L/C6L/C8L/N7L

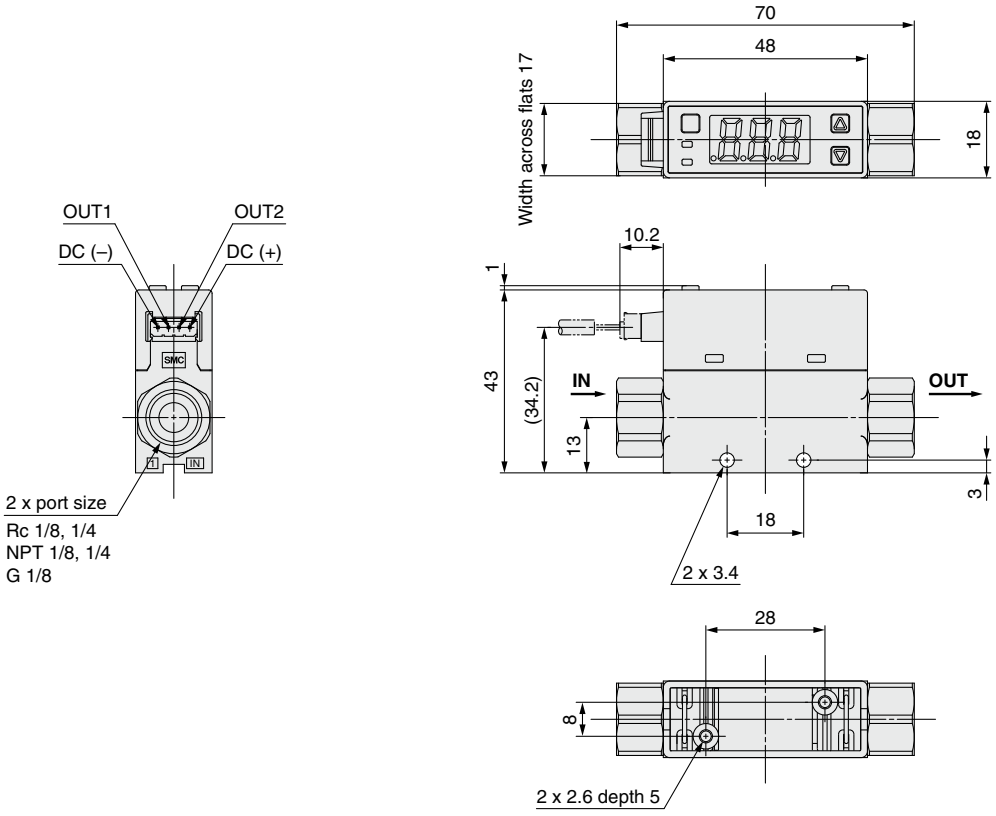


(mm)

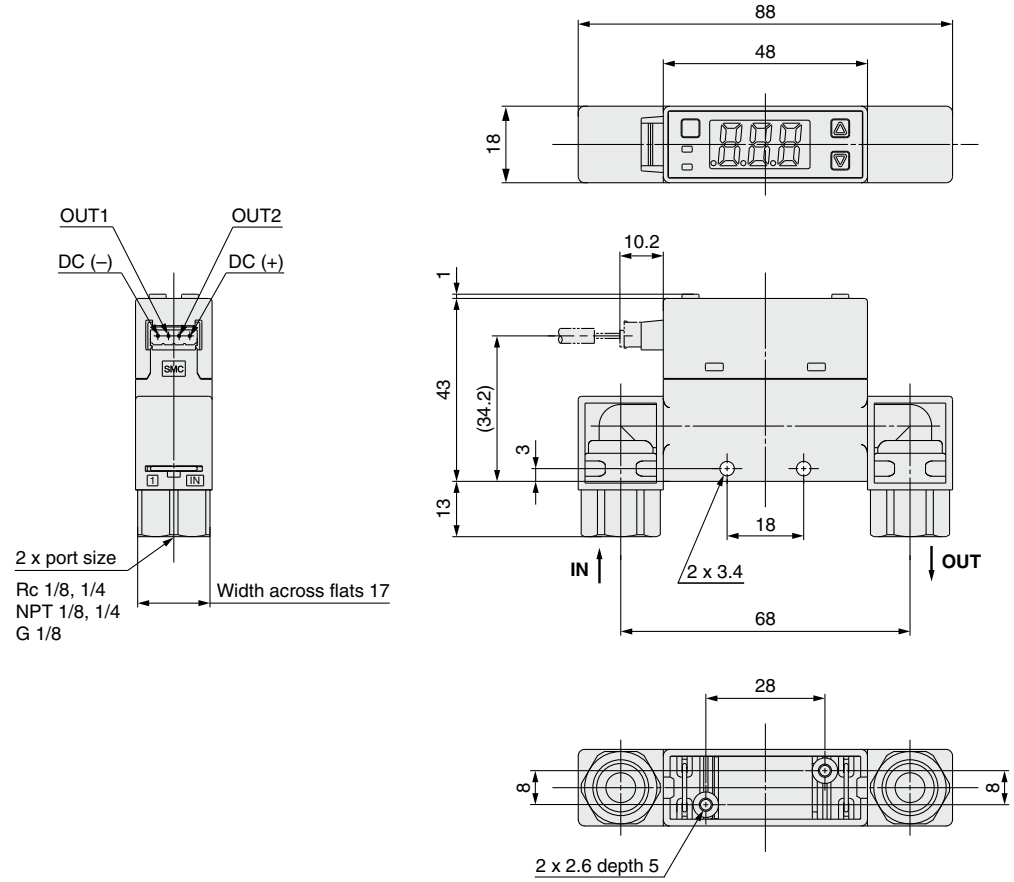
One-touch fitting Applicable tube O.D.	A
ø4 (5/32")	10.1
ø6	10.3
ø8 (5/16")	12
ø1/4"	10.3

Dimensions

PFM7□□-(N)01/(N)02/F01



PFM7□□-(N)01L/(N)02L/F01L



High-Precision Digital Pressure Switch

ISE20B Series

Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.

It is possible to change the settings while checking the measured value.

Main screen	Measured value (Current pressure value)
Sub screen	Label (Display item), Set value (Threshold value)

Visualization of Settings

Set value (Threshold value)	P_1
Hysteresis value	H_1
Delay time	dt1
Peak value	H_H1
Bottom value	H_Lo



Blue button: IP65

Allows pressure control and value management of shielding gas

Compatible with argon (Ar), carbon dioxide (CO_2) and the mixed gas (Ar + CO_2)

2 Outputs + Analog Output (Voltage/Current)

3-Screen Display High-Precision Digital Pressure Switch

ISE20B Series

RoHS

IP65

Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.



How to Order

Rated pressure range

ISE20B	−0.1 to 1 MPa

For positive pressure **ISE20B** − **X** − **M** − **M5** − ❶ ❷ ❸ ❹ ❺ ❻

❶ Output specification

Symbol	Description
R	NPN open collector 2 outputs + Analog voltage output*1
S	NPN open collector 2 outputs + Analog current output*1
T	PNP open collector 2 outputs + Analog voltage output*1
V	PNP open collector 2 outputs + Analog current output*1
X	NPN open collector 2 outputs + Copy function
Y	PNP open collector 2 outputs + Copy function

*1 Can be switched to auto-shift or copy function

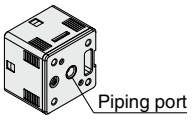
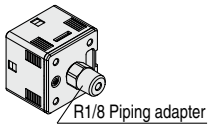
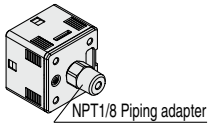
❷ Unit specification

Symbol	Description
Nil	Unit selection function*1
M	SI unit only*2
P	Unit selection function (Initial value psi)*1

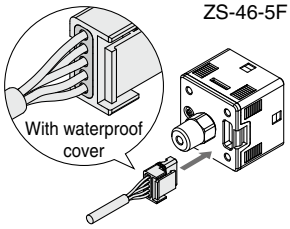
*1 Under the New Measurement Act, switches with the unit selection function are not permitted for use in Japan.

*2 Fixed unit: kPa, MPa

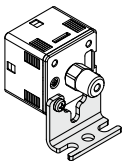
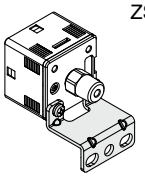
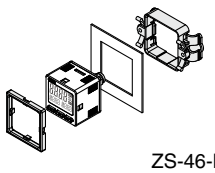
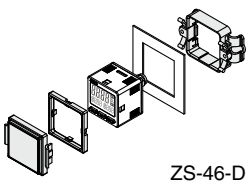
❸ Piping specification

Symbol	Description
M5	M5 female thread 
01	R1/8  ZS-46-N1
N01	NPT1/8  ZS-46-N2

❹ Option 1

Symbol	Description	
Nil	Without lead wire	
W	Lead wire with connector (5-core, 2 m, waterproof lead wire)	ZS-46-5F 

❺ Option 2

Symbol	Description	
Nil	None	
A1	Bracket A (Vertical mounting)	ZS-46-A1 
A2	Bracket B (Horizontal mounting)	ZS-46-A2 
B	Panel mount adapter	 ZS-46-B
D	Panel mount adapter + Front protection cover	 ZS-46-D

❻ Option 3

Symbol	Operation manual*1	Calibration certificate*1
Nil	○	—
Y	—	—
K	○	○
T	—	○

*1 All texts are in both English and Japanese.

Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Bracket A	**ZS-46-A1**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket B	**ZS-46-A2**	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Panel mount adapter	**ZS-46-B**	—
Panel mount adapter + Front protection cover	**ZS-46-D**	—
Lead wire with connector	**ZS-46-5F**	5-core, 2 m, Waterproof
Front protection cover	**ZS-27-01**	—
R1/8 piping adapter	**ZS-46-N1**	—
NPT1/8 piping adapter	**ZS-46-N2**	—

Specifications

Model			ISE20B (Positive pressure)
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas
Pressure	Rated pressure range		−0.100 to 1.000 MPa
	Display/Set pressure range		−0.105 to 1.050 MPa
	Minimum display unit/Smallest settable increment		0.001 MPa
	Withstand pressure		1.5 MPa
Power supply	Power supply voltage		12 to 24 VDC ±10%, Ripple (p-p) 10% or less
	Current consumption		35 mA or less
	Protection		Polarity protection
Accuracy	Display accuracy		±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)
	Repeatability		±0.2% F.S. ±1 digit
	Analog output accuracy		±2.5% F.S. (Ambient temperature of 25 ±3°C)
	Analog output linearity		±1% F.S.
	Temperature characteristics		±2% F.S. (25°C standard)
Switch output	Output type		NPN or PNP open collector 2 outputs
	Output mode		Hysteresis mode, Window comparator mode, Error output, Output OFF
	Switch operation		Normal output, Reversed output
	Max. load current		80 mA
	Max. applied voltage (NPN only)		28 V
	Internal voltage drop (Residual voltage)		1 V or less (at load current of 80 mA)
	Delay time*1		1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)
	Hysteresis	Hysteresis mode	Variable from 0*2
		Window comparator mode	
	Short circuit protection		Yes
Analog output	Voltage output	Output type	Voltage output: 0.6 to 5 V
		Output impedance	Approx. 1 kΩ
	Current output	Output type	Current output: 2.4 to 20 mA
		Load impedance	Maximum load impedance at power supply voltage of 12 V: 300 Ω at power supply voltage of 24 V: 600 Ω Minimum load impedance: 50 Ω
Auto-shift input	Input type		Non-voltage input: 0.4 V or less
	Input mode		Select from Auto-shift or Auto-shift zero.
	Input time		5 ms or more
Display	Unit*3		MPa, kPa, kgf/cm², bar, psi
	Display type		LCD
	Number of screens		3-screen display (Main screen, Sub screen x 2)
	Display color		1) Main screen: Red/Green 2) Sub screen: Orange
	Number of display digits		1) Main screen: 4 digits (7 segments) 2) Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)
	Indicator light		Lights up when switch output is turned ON. OUT1, OUT2: Orange
Digital filter*4			0, 10, 50, 100, 500, 1000, 5000 ms
Environment	Enclosure		IP65
	Withstand voltage		1000 VAC for 1 minute between terminals and housing
	Insulation resistance		50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing
	Operating temperature range		Operating: −5 to 50°C, Stored: −10 to 60°C (No condensation or freezing)
	Operating humidity range		Operating/Stored: 35 to 85%RH (No condensation)
Standards			UL/CSA (E216656), CE, RoHS
Length of lead wire with connector			2 m

∗1 Value without digital filter (at 0 ms)
∗2 If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.
∗3 Setting is only possible for models with the unit selection function. Only MPa or kPa is available for models without this function.
∗4 The response time indicates when the set value is 90% in relation to the step input.
∗ Products with tiny scratches, smears, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

Piping Specifications and Weights

Model		M5	01	N01
Port size		M5 x 0.8	R1/8	NPT1/8
Materials of parts in contact with fluid	Sensor pressure receiving area	Silicon		
	Piping port (Common)	PBT, CB156, Heat-resistant PPS, O-ring: HNBR		
	Piping port	—	C3604 (Electroless nickel plating), Stainless steel 304, NBR	
Weight	Body	24 g	34 g	36 g
	Lead wire with connector	+39 g		

Cable Specifications

Conductor area		0.15 mm² (AWG26)
Insulator	O.D.	1.0 mm
	Color	Brown, Blue, Black, White, Gray (5-core)
Sheath	Finished O.D.	ø3.5

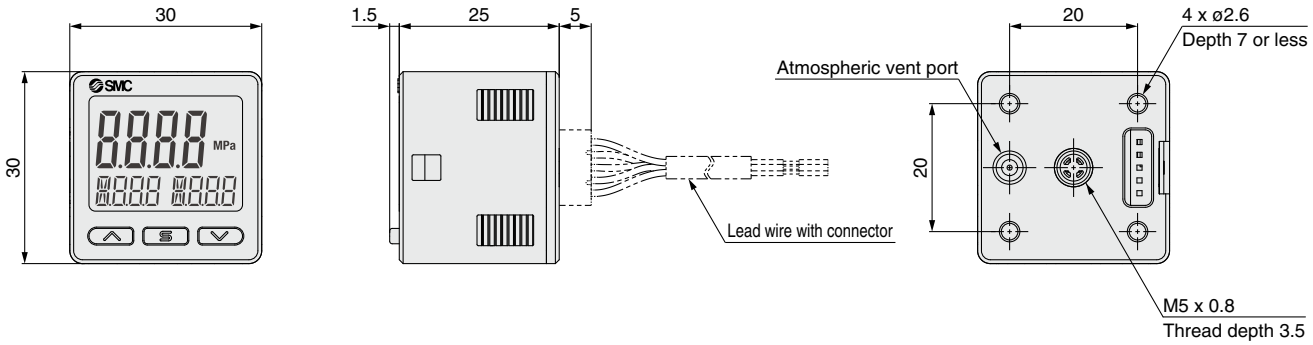
Dimensions

ISE20B −□−□−■−□□□

Piping specification

M5

M5 female thread



If there is a possibility that the atmospheric vent port of the switch will be exposed to water or dust, insert a tube into the atmospheric vent port and route the other end of the tube to a safe place away from water or dust. (Z/ISE20B)

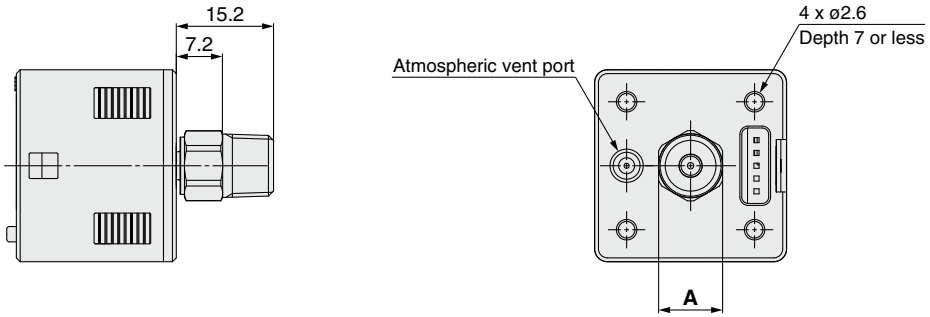
∗ For tubing, please use the SMC TU0425 (polyurethane, O.D. ø4, I.D. ø2.5) for the pressure switch.

01

R1/8

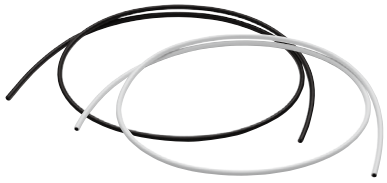
N01

NPT1/8



Piping specification	Port size	A
01	R1/8	Width across flats 10
N01	NPT1/8	Width across flats 12

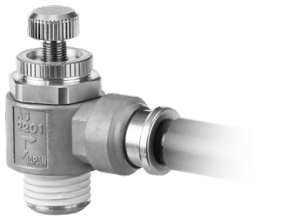
Tubing/Fittings/Flow Control Equipment



Flame Resistant FR Three-layer Polyurethane Tubing
TRTU Series ..... p. 139



Metal One-touch Fittings
(Metric size, Inch size/Connection thread: M, R, Rc, UNF, NPT, G)
KQB2 Series ..... p. 141



All Metal Exterior Speed Controller with One-touch Fitting
AS-X737 ..... p. 143



Spatter Cover
KQB2-X1124 ..... p. 143



Speed Controller: Elbow Type (Metal Body)
AS Series ..... p. 144

Flame Resistant (Equivalent to UL-94 Standard V-0)

FR Three-layer Polyurethane Tubing

TRTU Series

Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.

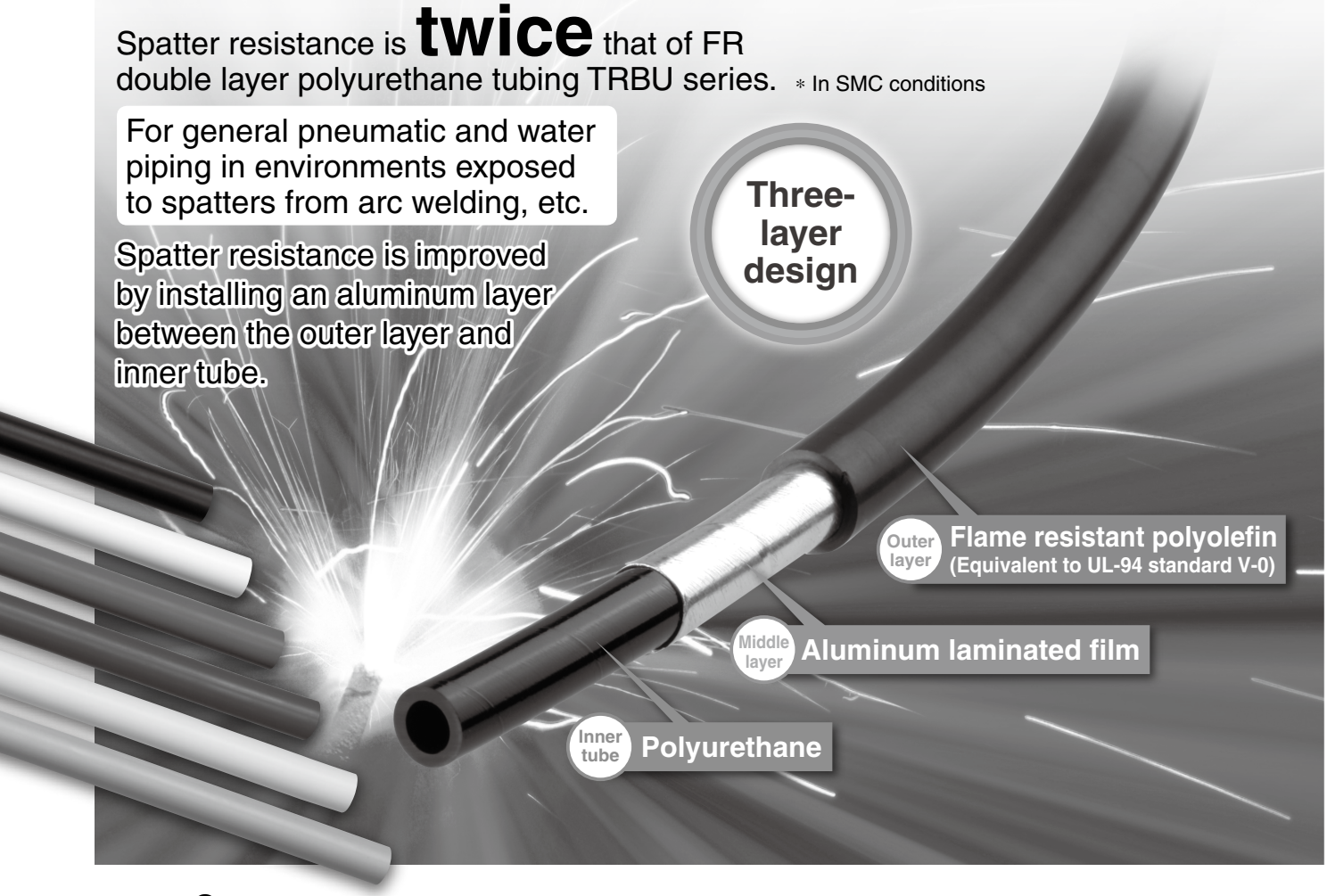
RoHS

Improved spatter resistance

Spatter resistance is **twice** that of FR double layer polyurethane tubing TRBU series. * In SMC conditions

For general pneumatic and water piping in environments exposed to spatters from arc welding, etc.

Spatter resistance is improved by installing an aluminum layer between the outer layer and inner tube.



6-color variations



Model

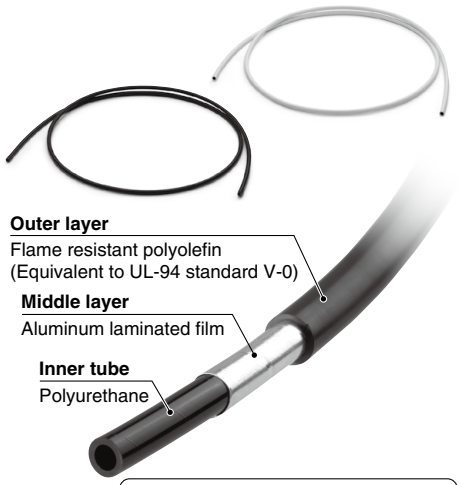
● — 20 m roll □ — 100 m reel

Model		TRTU0604	TRTU0805	TRTU1065	TRTU1208
Inner tube O.D. (mm)		6	8	10	12
Inner tube I.D. (mm)		4	5	6.5	8
Outer layer thickness (mm)		1	1	1	1
Outer layer color	Black (B)	●	●	●	●
	White (W)	●	●	●	●
	Red (R)	●	●	●	●
	Blue (BU)	●	●	●	●
	Yellow (Y)	●	●	●	●
	Green (G)	●	●	●	●

Flame Resistant (Equivalent to UL-94 Standard V-0) FR Three-layer Polyurethane Tubing

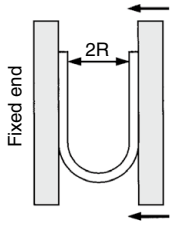
TRTU Series

RoHS



For general pneumatic and water piping in environments exposed to spatters from arc welding, etc.

How to measure the minimum bending radius



Bend the tube into a U shape at a temperature of 20°C. Fix one end and bend the loop gradually. Measure 2R when the deformed ratio of the tube diameter at bending reaches 5%.

Model

● — 20 m roll □ — 100 m reel

Model	TRTU0604	TRTU0805	TRTU1065	TRTU1208
Inner tube O.D. (mm)	6	8	10	12
Inner tube I.D. (mm)	4	5	6.5	8
Outer layer thickness (mm)	1	1	1	1
Note 3) Outer layer color: Black (B)	●	●	●	●
White (W)	●	●	●	●
Red (R)	●	●	●	●
Blue (BU)	●	●	●	●
Yellow (Y)	●	●	●	●
Green (G)	●	●	●	●

Specifications

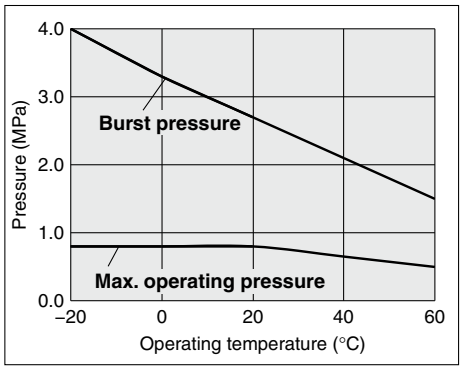
Fluid Note 1)		Air, Water			
Applicable fittings		FR One-touch fittings: KR-W2 series Metal One-touch fittings: KQB2 series			
Max. operating pressure	At 20°C	0.8 MPa			
	At 40°C	0.65 MPa			
	At 60°C	0.5 MPa			
Burst pressure		Refer to the burst pressure characteristics curve.			
Min. bending radius (mm) Note 2)		50	60	70	80
Ambient and fluid temperatures		–20 to 60°C, Water: 0 to 40°C (No freezing)			
Material	Inner tube	Polyurethane			
	Middle layer	Aluminum laminated film			
	Outer layer	Polyolefin (Equivalent to UL-94 standard V-0)			

Note 1) Applicable for general industrial water. Please consult with SMC if using for the other kind of fluid. Also, the surge pressure must be under the maximum operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubes.

Note 2) The minimum bending radius is the representative value measured as shown in the left figure. Allow extra length when piping since the tube may be bent if used under the minimum bending radius.

Note 3) The color of all inner tubes is black.

Burst Pressure Characteristics Curve and Operating Pressure



How to Order

TRTU1065 B – 20

Tubing model

Model	Inner tube O.D. x I.D. (mm)
TRTU0604	6 x 4
TRTU0805	8 x 5
TRTU1065	10 x 6.5
TRTU1208	12 x 8

Color

Symbol	Color
B	Black
W	White
R	Red
BU	Blue
Y	Yellow
G	Green

Length per roll

Symbol	Length
20	20 m roll
100	100 m reel

Metal One-touch Fittings

KQB2 Series

Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.

Compact and lightweight

RoHS

Configuration variations **17** models

Fluid temperature **–5** to **150**°c

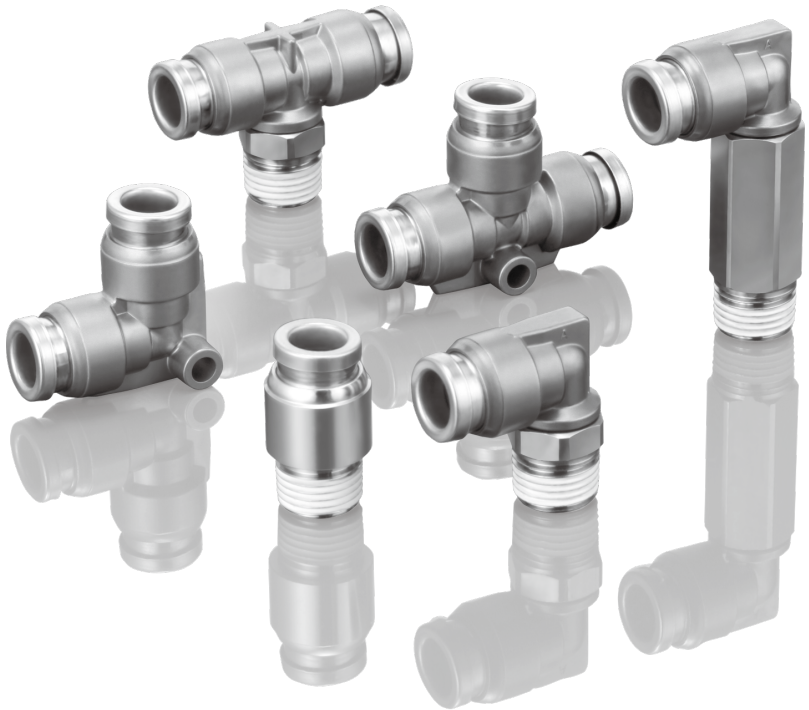
Connection thread M, R, Rc, UNF, NPT, G

- All metal except seal parts
- Material
  Metal parts: Brass, Stainless steel
  Seal parts: Special FKM

Variations

Connection thread	Applicable tubing O.D. (mm)					
	ø4	ø6	ø8	ø10	ø12	ø16
M5	●	●				
R1/8	●	●	●	●		
G1/8	●	●	●	●		
R1/4	●	●	●	●	●	
G1/4	●	●	●	●	●	
R3/8		●	●	●	●	●
G3/8		●	●	●	●	●
R1/2				●	●	●
G1/2				●	●	●
No thread	●	●	●	●	●	●

Connection thread	Applicable tubing O.D. (inch)					
	ø1/8"	ø5/32"	ø1/4"	ø5/16"	ø3/8"	ø1/2"
10-32 UNF	●	●	●			
NPT1/8	●	●	●	●	●	
NPT1/4	●	●	●	●	●	●
NPT3/8			●	●	●	●
NPT1/2					●	●
No thread	●	●	●	●	●	●



Variations

∗ For other details, refer to the **Web Catalog**.

Male Connector KQB2H



Hexagon Socket Head Male Connector KQB2S



Straight Union KQB2H



Male Elbow KQB2L



Male Branch Tee KQB2T



Union Elbow KQB2L



Bulkhead Union KQB2E



Union Tee KQB2T



Union "Y" KQB2U



Different Diameter Tee KQB2T



Plug-in Reducer KQB2R



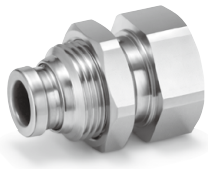
Different Diameter Straight KQB2H



Different Diameter Union "Y" KQB2U



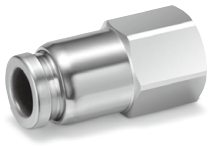
Bulkhead Connector KQB2E



Extended Male Elbow KQB2W



Female Connector KQB2F



Plug KQB2P



All Metal Exterior * Except sealant

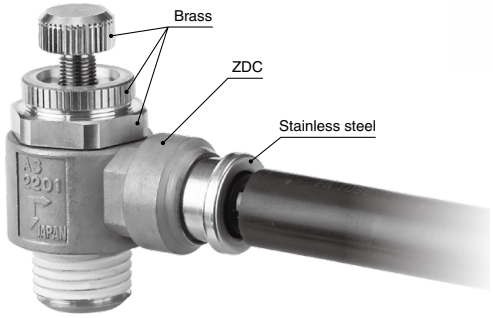
Speed Controller with One-touch Fitting

AS-X737

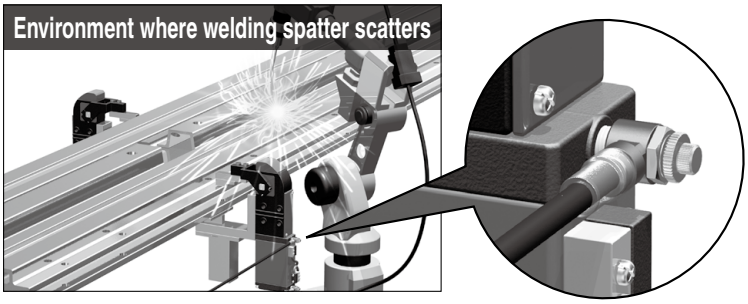
Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.



● Improved environmental resistance with the all metal exterior



● Application



How to Order

AS 3 2 0 1 – 03 – F 08 S – X737

Body size

2	1/8, 1/4 standard
3	3/8 standard

Control type

0	Meter-out
1	Meter-in

Thread size

01	R1/8
02	R1/4
03	R3/8

With One-touch fitting

Applicable tubing O.D.∗1

06	ø6
08	ø8
10	ø10

∗1 For selecting applicable tubing O.D., refer to the "Model."

All metal exterior

With sealant

Model

Model	Port size	Applicable tubing O.D.		
		6	8	10
AS22□1-01-F□S-X737	R1/8	●	●	
AS22□1-02-F□S-X737	R1/4	●	●	●
AS32□1-03-F□S-X737	R3/8		●	●

Specifications

Fluid	Air
Proof pressure	1.5 MPa
Max. operating pressure	1 MPa
Min. operating pressure	0.1 MPa
Ambient and fluid temperatures	–5 to 60°C (No freezing)
Applicable tubing material	Nylon, Soft nylon, Polyurethane, FR double layer, FR Three-layer, FR soft nylon

Meter-out and meter-in types can be visually differentiated by the lock nut.
The lock nut on the meter-out type is brass color, while the meter-in type is black.

Related Product

Spatter Cover/KQB2-X1124

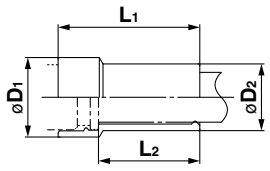
How to Order

KQB2 – 06 C – X1124

Applicable tubing O.D.

06	ø6
08	ø8
10	ø10

Dimensions

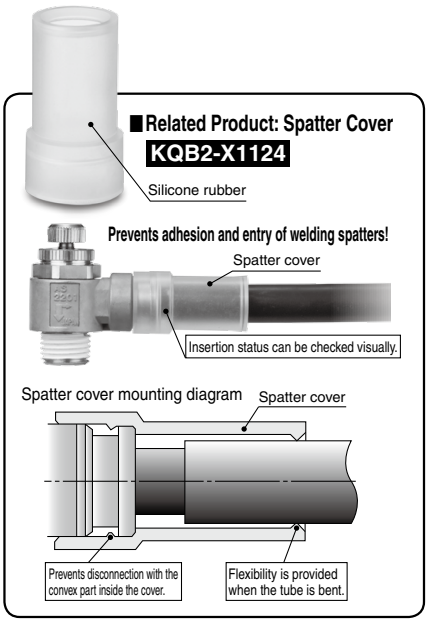


(mm)

Applicable tubing O.D.	L1	L2	øD1	øD2
6	24.6	16.6	13.5	11.6
8	30.2	20.6	16.4	14.2
10	34.4	24.6	19.3	16.2

Specifications

Applicable tubing		TRS, TRB, TRTU	
Applicable tubing O.D. (Inner tubing O.D.)		ø6, ø8, ø10	
Ambient and fluid temperatures		–5°C to 60°C	
Applicable fittings Applicable speed controllers	**ø6**	KQB2□06	AS□2□1-□-F06S-X737
	ø8	KQB2□08	AS□2□1-□-F08S-X737
	ø10	KQB2□10	AS□2□1-□-F10S-X737

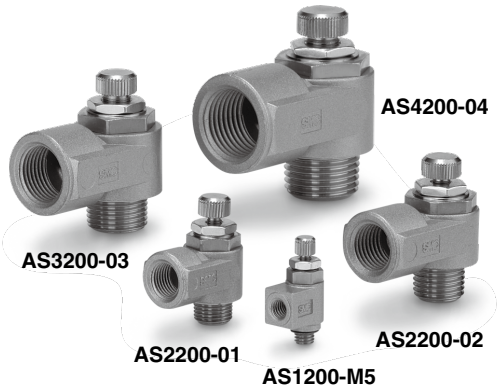


Speed Controller
Elbow Type (Metal Body)
AS Series

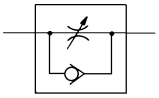
Only a limited number of the available variations, specifications, dimensions, etc., for this series are displayed. For complete details, refer to the **Web Catalog**.

RoHS

◎ All metal except seal parts



Symbol



Specifications

Specifications \ Model	AS12□0-M5	AS22□0-01	AS22□0-02	AS32□0-03	AS42□0-04
Port size	M5 x 0.8	1/8	1/4	3/8	1/2
Fluid	Air				
Proof pressure	1.5 MPa				
Max. operating pressure	1 MPa				
Min. operating pressure	0.1 MPa				
Ambient and fluid temperatures	–5 to 60°C (No freezing)				
Option	Round lock nut	With seal, Round lock nut			
Weight (g)	10	29	64	106	181
Controlled flow Free flow — **Flow rate L/min (ANR)**	105	230	460	920	1700
Controlled flow Free flow — Sonic conductance dm³/(s·bar)	0.32	0.7	1.4	2.8	5.2
Critical pressure ratio — **Controlled flow**	0.2	0.25	0.3	0.25	0.25
Critical pressure ratio — **Free flow**	0.4	0.2	0.3	0.2	0.3

Note 1) Flow rate values are measured at 0.5 MPa and 20°C.
Note 2) Distinction between meter-out/meter-in types by appearance.
Those are distinguished by the lock nut. The meter-out type is zinc chromated (the round lock nut is electroless nickel plated), while the meter-in type is black zinc chromate plated.

How to Order

AS 2 2 0 0 – □ 01 – S – □

Body size

1	M5 standard
2	1/8, 1/4 standard
3	3/8 standard
4	1/2 standard

Type

2	Direct cylinder elbow type

Control type

0	Meter-out
1	Meter-in

Thread type

Symbol	Cylinder side	Tube side
Nil	R	Rc
	Metric thread (M5)	
N	NPT	
F	G*	

* Male thread comes with R thread.

Port size

Symbol	Port size	Applicable series
M5	M5 x 0.8	AS12□0-M5
01	1/8	AS22□0-01
02	1/4	AS22□0-02
03	3/8	AS32□0-03
04	1/2	AS42□0-04

Option

Nil	None
S	With seal

Note) M5 size: S (with seal) is not necessary.

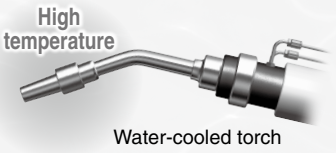
Lock nut option

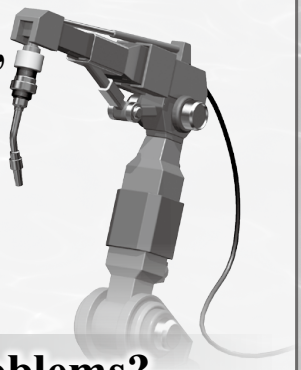
Nil	Hexagon lock nut
J	Round lock nut

Proposal for Thermo-chiller
Arc Welding Machines (Water-cooled Torch)

Solves problems caused by insufficient cooling of "welding torches."

When a welding torch reaches a high temperature, various problems may arise.





Have you experienced any of the following problems?

Effects of rising torch temperature

- Process becomes unstable, which causes wavy beads (weld marks), and generates bubbles.
- Requires work-hours for polishing due to excessive scattering of spatter to surroundings.
- Tip life deteriorates due to softening.



These problems can be solved by thermo-chillers!

Since the chiller supplies temperature controlled cooling water, the welding torch can always be maintained at a constant temperature.



Effects obtained by cooling and stabilizing the welding torch temperature

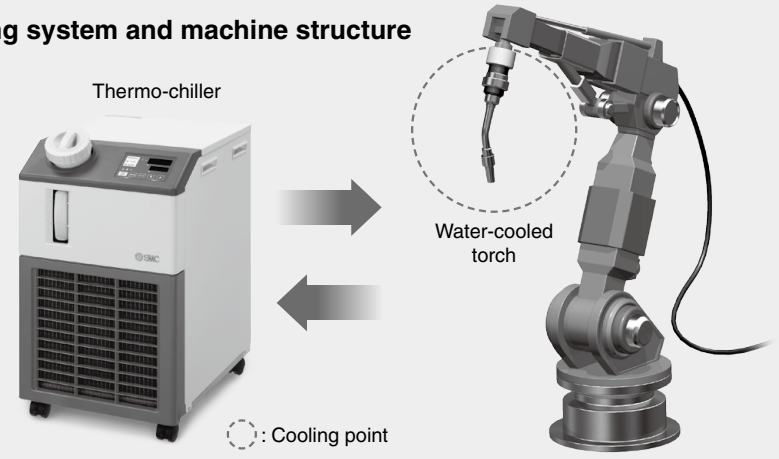
- Stable power supply produces stable beads (weld marks).
- Improved shielding reduces spatter scattering.
- Prevents softening of welding tips. Long life.

Triple effect!!

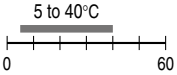
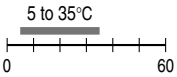
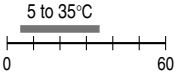
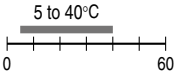
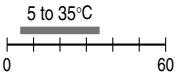
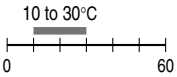
- Stable torch temperature improves operability of tip replacement.
- Can be used with large currents.

The use of a "Thermo-chiller" promotes improvement in both quality and operability. Reduce your costs and problems at once!

Main welding system and machine structure



Thermo-chiller Variations

Series	Features	Set temperature range	Cooling capacity	Cooling method	Temperature stability	Pump capacity	Pump type	Power supply	Circulating fluid
Thermo-chiller Standard type *HRS Series*  CE cMETus (Only 60 Hz)	● With this chiller, cooling water can be obtained anywhere it is necessary because of easy installation and easy operation. ● For a wide range of applications such as laser machine tool, analytical equipment, LCD manufacturing equipment, mold temperature control, etc. ● Compact: W 377 x H 615 x D 500 mm, 40 kg (HRS012/018/024) ● Timer operation function, Low level in tank, Power failure auto-restart, Anti-freezing operation function, etc. ● Self diagnosis function ● No heater required, circulating fluid is heated using heat exhausted by refrigerating circuit. ● Low-noise design: 70 dB(A) (HRS100/150) ● Outdoor installation: IPX4 (HRS100/150)		1.3 kW 1.9 kW 2.4 kW 3.2 kW 5.1 kW 5.9 kW (60 Hz)	Air-cooled Water-cooled	±0.1°C	42 L/min	Magnet pump (Mechanical seal pump for high pressure pump mounted type)	Single-phase 100 VAC (50/60 Hz) Single-phase 115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
Thermo-chiller Standard type *HRS090 Series*  CE (400 V as standard)			9 kW	Air-cooled Water-cooled	±0.5°C	68 L/min	Mechanical seal pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
Thermo-chiller Standard type *HRS100/150 Series*  CE (400 V as standard)			9.5 kW 14.5 kW (60 Hz)		±1.0°C	68 L/min			
Thermo-chiller Inverter type *HRSH090 Series*  CE ETL (400 V as standard)	● Power consumption reduced by 53% Outstanding energy saving due to the triple inverter! ● Compact, Space saving: W 377 x H 1080 x D 970 mm ● Low-noise design: Max. 66 dB ● Max. ambient temperature: 45°C		9.5 kW	Air-cooled Water-cooled	±0.1°C	60 L/min	Mechanical seal pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
Thermo-chiller Inverter type *HRSH Series*  CE cMETus (400 V as standard, 200 V as an option) (Only 200 V as an option)	● Outstanding energy saving due to the triple inverter! ● Outdoor installation: IPX4 ● Max. ambient temperature: 45°C ● Space saving, Lightweight: 280 kg (HRSH250/300)		10 kW 15 kW 20 kW 25 kW 28 kW	Air-cooled Water-cooled	±0.1°C	180 L/min	Immersion pump	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz)	Tap water Deionized water Ethylene glycol aqueous solution (15%)
Thermo-chiller Basic type *HRSE Series*  CE (Only 230 VAC type)	● Simple function and performance. Thermo-chiller of the basic type. ● Efficient energy saving due to the triple control! Power consumption reduced by 33% (Energy saving) ● Compact/Lightweight 32 kg (100 VAC) ● Maintenance free: Magnet pump ● Low-noise design: 55 dB (A)		1.2 kW 1.6 kW 2.2 kW (60 Hz)	Air-cooled	±2.0°C	25 L/min	Magnet pump	Single-phase 100 VAC (50/60 Hz) Single-phase 200 VAC (50/60 Hz) Single-phase 230 VAC (50/60 Hz)	Tap water Ethylene glycol aqueous solution (15%)

⚠ Safety Instructions

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

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

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

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

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

⚠Warning

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

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

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

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

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

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

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

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

Limited warranty and Disclaimer

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

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

Compliance Requirements

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

⚠Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

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

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Arc Welding Process Equipment

SMC Corporation

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and any obligation on the part of the manufacturer.

D-G

1st printing WT printing WT 3940KS Printed in Japan.