Valve Mounted Cylinder

Series CV/MVGQ

ø10, ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

Series Variations

Series	Action		Standard variations: Built-in magnet	With air cushion	Built-in One-touch fitting	With auto switch	With strong scraper	Bore size (mm)	Page
Series CVJ5 	Double acting		●			●		10 16	10-15-4
Series CVJ3 	Single acting (Spring return) (Spring extend)		●			●		10 16	10-15-10
Series CVM5/CVM5K 	Double acting	Standard	●		●	●	●	20 25 32 40	10-15-16 10-15-26
		Non-rotating rod	●		●	●	●		
Series CVM3/CVM3K 	Single acting (Spring return) (Spring extend)	Standard	●		●	●	●	20 25 32 40	10-15-31 10-15-44
		Non-rotating rod	●		●	●	●		
Series CV3/CV3K 	Double acting	Standard	●	●		●	●	40, 50 63, 80 100	10-15-50
		Non-rotating rod	●	●		●	●	40, 50 63	10-15-63
Series CVS1/CVS1K 	Double acting	Standard	●	●		●	●	40, 50 63, 80 100	10-15-67
		Non-rotating rod	●	●		●	●	40, 50 63	10-15-78
Series MVGQ 	Double acting		●			●		12, 16 20, 25 32, 40 50, 63 80, 100	10-16-1

RE A B
REC
C□X
C□Y
MQ Q M
RHC
MK(2)
RS Q G
RS H A
RZQ
MI W S
CEP1
CE1
CE2
ML2B
C J G 5-S
CV
MVGQ
CC
RB
J
D-
-X
20-
Data

Series CV Valve Mounted Cylinder
Precautions

Be sure to read before handling. Refer to pages 10-24-3 to 10-24-6 for Safety Instructions and Actuator Precautions on the products mentioned in this catalog, and refer to main text for more detailed precautions on every series.

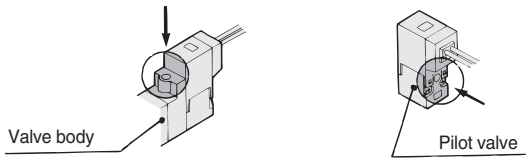
Applicable Series: CVJ5, CVJ3

Manual Operation

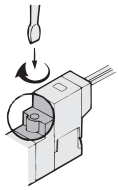
⚠ Warning

● Manual overrides are provided on two locations, one on the pilot valve, and the other on the valve body. Operate either one to effect manual operation.

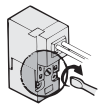
■ **Non-locking push type**
Push in the direction the arrow indicates.



■ **Locking slotted type**



Press it to enable manual operation and turn it in the direction of the arrow to lock it.
If this is not turned, it can be used in the same way as the non-locking type.



Simply turn in the direction of the arrow.

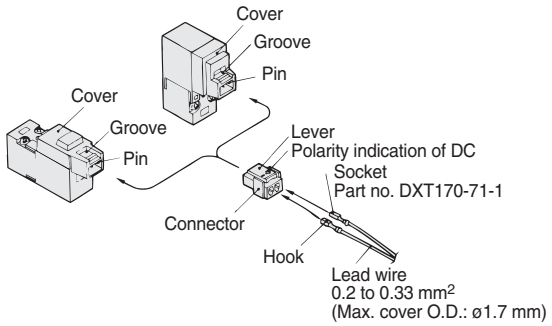
Since the devices in connection are operated by manual override, make sure that there is no danger.

Plug Connector

⚠ Caution

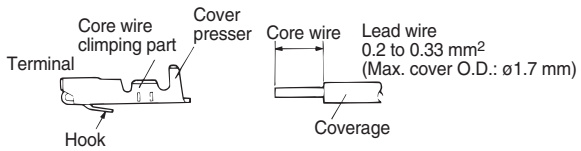
1. Connector installation and removal

- To install the connector, squeeze the lever and the connector body with your fingers, slide the connector straight over the pin, and lock it in place by pushing the tab of the lever into the groove in the cover.
- To remove the connector, press the lever with your thumb to disengage the tab from the groove, and pull the connector straight out.



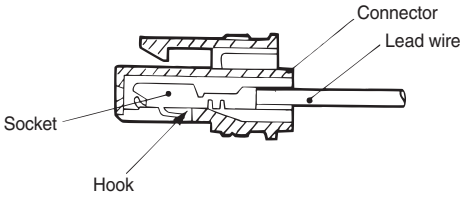
2. Crimping the lead wire into the socket

- Peel approximately 3.2 to 3.7 mm of insulation from the tip of the lead wire, make sure that the ends of the core wire are even, insert the wire into the socket, and crimp it with a crimping tool. At this time, make sure that the insulation of the lead wire does not enter the area in which the core wire is crimped. (Please contact SMC for details on the special crimping tool.)



3. Installation and removal of the sockets containing lead wires

- Installation:
  Insert the sockets into the square holes of the connector (marked + and –, respectively), pinch the lead wires to push them in entirely, allowing the hook on each socket to engage with the seat of the connector, thus locking the socket in place. (Because the hook is open, it locks automatically when the socket is pushed in.) Then, lightly pull on the lead wires to verify that the sockets have been properly locked.
- Removal:
  To pull the sockets out of the connector, use a rod with a small tip (approximately 1 mm) to press the hook of the socket and pull the lead wire out. To reuse the socket, expand the hook outward.

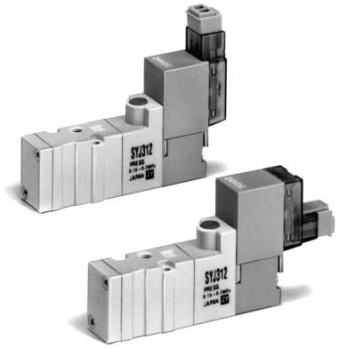


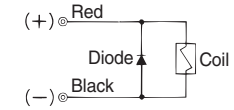
Surge Voltage Suppressor

⚠ Caution

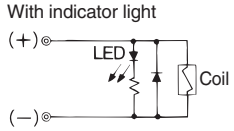
For DC:
Connect the wires by matching their polarities to the + and – marks.
Be very careful to not interchange the polarities as this could cause the diodes or the switching elements to burn.
If the lead wires are connected beforehand, the red wire is +, and the black wire is –.

For AC:
A rectifier assembly is used for preventing the generation of surge voltage.





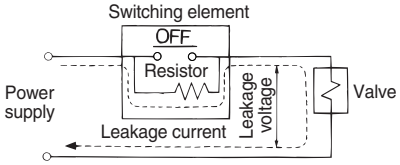
With indicator light



Leakage Voltage

⚠ Caution

Be aware that there is an increase in the leakage voltage particularly if a C-R element (surge voltage protector) is used for protecting the switching element, because the leakage current flows through the C-R element.



The residual leakage voltage must be kept as follows:
With a DC coil, 3% of the rated voltage or below
With an AC coil, 8% of the rated voltage or below.

Valve Mounted Cylinder
Single Acting, Single Rod, Spring Return/Extend
Series CVJ3
ø10, ø16

How to Order

Stroke (mm)

ø10	15, 30, 45, 60
ø16	15, 30, 45, 60

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector

Bore size

10	10 mm
16	16 mm

Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (No polarity)
U	With light/surge voltage suppressor (No polarity)

∗ Type "R", "U": DC only
∗ In the case of AC, since the rectifier prevents the production of surge voltage, there is no type "S".

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style

Without auto switch **CVJ3** **L** **16** — **60** **S** — **5** **L** □

With auto switch **CDVJ3** **L** **16** — **60** **S** — **5** **L** □ — **J79W** □

Built-in magnet

Action

S	Single acting, Spring return
T	Single acting, Spring extend

Number of auto switches

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

Built-in Magnet Cylinder Model

Suffix the symbol "-A" (Rail mounting style) or "-B" (Band mounting style) to the end of the w/ auto switch cylinder part number.

Example	Rail mounting style	CDVJ5B15-60-A
	Band mounting style	CDVJ5B10-45-B

Solenoid valve voltage

DC specifications

5	24 VDC
6	12 VDC
V	6 VDC
S	5 VDC
R	3 VDC

AC specifications (50/60 Hz)

1	100 VAC
2	200 VAC
3	110 VAC [115 VAC]
4	220 VAC [230 VAC]

Auto switch
Magnet installed even without auto switch

Symbol	Auto switch mounting
A	Rail mounting style
B	Band mounting style

∗ For the applicable auto switch model, refer to the table below.
∗ Auto switches for rail mounting style are shipped together (but not assembled).

Applicable Auto Switch/Refer to page 10-20-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Band mounting	Rail mounting: Perpendicular	Rail mounting: In-line	Lead wire length (m) ∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**C76**	**—**	**A76H**	●	●	—	—	—	IC circuit	—
				2-wire		—	200 V	**—**	**A72**	**A72H**	●	●	—	—	—	—	Relay, PLC
					24 V	12 V	100 V	**C73**	**A73**	**A73H**	●	●	●	—	—		
		Connector				12 V	—	**C73C**	**A73C**	**—**	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet				—		**—**	**A79W**	**—**	●	●	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**H7A1**	**F7NV**	**F79**	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				**H7A2**	**F7PV**	**F7P**	●	●	○	—	○		
				2-wire		12 V		**H7B**	**F7BV**	**J79**	●	●	○	—	○	—	
		Connector						**H7C**	**J79C**	**—**	●	●	●	●	○		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**H7NW**	**F7NWV**	**F79W**	●	●	○	—	○	IC circuit	
				3-wire (PNP)				**H7PW**	**—**	**F7PW**	●	●	○	—	○		
				2-wire		12 V		**H7BW**	**F7BWV**	**J79W**	●	●	○	—	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**H7NF**	**—**	**F79F**	●	●	○	—	○	IC circuit	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) C73C
3 m ····· L (Example) C73CL
5 m ····· Z (Example) C73CZ
None ····· N (Example) C73CN

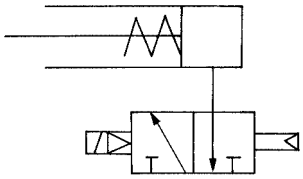
∗ Solid state switches marked with "○" are produced upon receipt of order.

• Since there are other applicable auto switches than listed, refer to page 10-15-12 for details.
• For details about auto switches with pre-wire connector, refer to page 10-20-66.

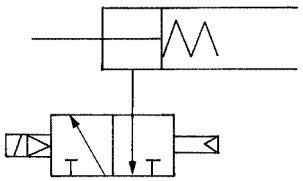
An auto switch cylinder with the switch installed can also be manufactured.

JIS Symbol

Single acting,
Spring return



Single acting,
Spring extend



Made to Order Specifications (For details, refer to page 10-21-1.)

Symbol	Specifications
-XA□	Change of rod end shape

Specifications

Action	Single acting, Single rod, Spring return/Spring extend
Type	Non-lube
Fluid	Air
Proof pressure	1.05 MPa
Maximum operating pressure	0.7 MPa
Minimum operating pressure	0.15 MPa
Ambient and fluid temperature	–10 to 50°C (No freezing)
Cushion	Rubber bumper
Lubrication	Not required (Non-lube)
Thread tolerance	JIS Class 2
Stroke length tolerance	$^{+1.0}_{0}$
Applicable bore size (mm)	10, 16
Effective area of valve (Cv factor)	1.8 mm^2 (0.1)
Port size	M5 x 0.8
Mounting	Basic style, Axial foot style, Rod side flange style
Piston speed	ø10: 50 to 750 mm/s, ø16: 50 to 350 mm/s

Allowable Kinetic Energy

(J)

Bore size (mm)	**10**	**16**
Allowable kinetic energy	0.035	0.090

Solenoid Valve Specifications

Applicable solenoid valve model			SYJ319
Electrical entry			Grommet (G)/(H), L plug connector (L), M plug connector (M)
Coil rated voltage (V) (1)	DC		24, 12, 6, 5, 3
	AC 50/60 Hz		100, 110, 200, 220
Allowable voltage			±10% of the rated voltage
Power consumption (W) (2)	DC		0.5 (With indicator light: 0.55)
Apparent power (VA)	AC	100 V	0.9 (With indicator light: 1.0)
		110 V [115 V]	1.0 (With indicator light: 1.1) [1.1 (With indicator light: 1.2)]
		200 V	1.8 (With indicator light: 1.9)
		220 V [230 V]	1.9 (With indicator light: 2.0) [2.2 (With indicator light: 2.3)]

Note 1) 110 VAC and 115 VAC types and 220 VAC and 230 VAC types are common respectively.
Note 2) At the rated voltage.

Standard Stroke

Bore size (mm)	Standard stroke
10	15, 30, 45, 60
16	15, 30, 45, 60

Spring Back Force

(N)

Bore size (mm)	Retracted side	Extended side
10	6.9	3.5
16	14.2	6.9

Minimum Stroke for Auto Switch Mounting (mm)

Auto switch mounting	Auto switch model	No. of auto switches mounted		
		2 (Same side)	2 (Different sides)	1
Band mounting style	**D-C7□/C80**	50	15	10
	D-H7□/H7□W **D-H7NF**	60	15	10
	D-C73C/C80C **D-H7C**	65 Note)	15	10
Rail mounting style	**D-A7□/A80** **D-A7□H/A80H** **D-A73C/A80C**	10	—	5
	D-F7□/J79 **D-F7□V** **D-J79C**	5	—	5
	D-A79W/F7□W **D-J79W** **D-F7□WV/F79F**	15	—	10

Note) A type for 65 stroke is not available.

Mounting Style and Accessory

(For details , refer to page 10-15-9.)

Mounting		Basic style	Axial foot style	Rod side style Flange side style
Standard equipment	Mounting nut	●	●	●
	Rod end nut	●	●	●
Option	Single knuckle joint	●	●	●
	Double knuckle joint (With pin) *	●	●	●

* Knuckle pin and set ring are shipped together.

Accessory

Accessories of Series CVJ3 are the same specifications as those of series CVJ5. Refer to page 10-15-9.

Mounting Bracket Part No.

Bore size (mm)	10	16
Foot	CJ-L010B	CJ-L016B
Flange	CJ-F010B	CJ-F016B

Auto Switch Mounting Bracket Part No. (Band mounting style)

Bore size (mm)	Part no.	Note
10	BJ2-010	Common for the types of D-C7/C8 and D-H7
16	BJ2-016	

Weight

Spring Return (g)

Bore size (mm)		10	16
Basic weight *	15 stroke	80	121
	30 stroke	88	140
	45 stroke	98	164
	60 stroke	110	189
Mounting bracket weight	Axial foot style	7	19
	Rod side flange style	5	13

* Mounting nut and rod end nut are included in the basic weight.
Calculation: (Example) CVJ3L10-45S
- Basic weight ····· 94 (g) (ø10-45 stroke)
- Mounting bracket weight ····· 7 (g) (Axial foot)

98 + 7 = 105 g

Spring Extend (g)

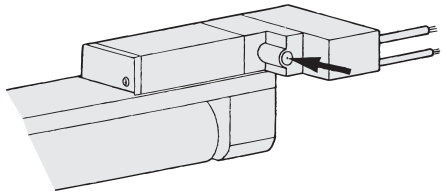
Bore size (mm)		10	16
Basic weight *	15 Stroke	76	116
	30 Stroke	83	134
	45 Stroke	94	156
	60 Stroke	104	180
Mounting bracket weight	Axial foot style	7	19
	Rod side flange style	5	13

* Mounting nut and rod end nut are included in the basic weight.
Calculation: (Example) CVJ3L10-45T
- Basic weight ····· 94 (g) (ø10-45 stroke)
- Mounting bracket weight ····· 7 (g) (Axial foot)

94 + 7 = 101 g

Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



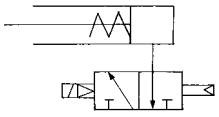
Other than the models listed in "How to Order", the following auto switches are applicable. For detailed specifications, refer to page 10-20-1.

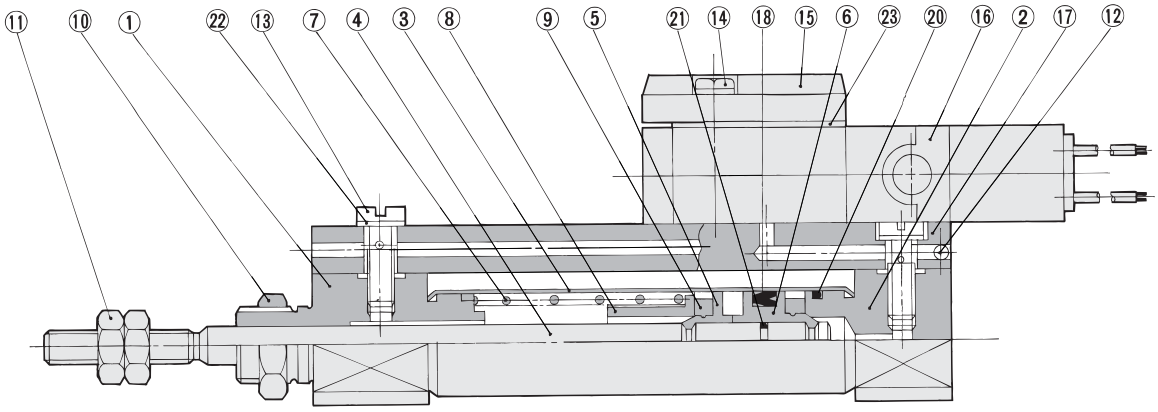
Type	Model	Electrical entry	Features
Reed switch	D-A80	Grommet	Without indicator light
	D-A80H		
	D-A80C	Connector	
	D-C80	Grommet	
	D-C80C	Connector	
Solid state switch	D-F7NTL	Grommet	With timer

* With pre-wire connector is available for D-F7NTL type, too. For details, refer to page 10-20-61.

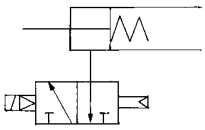
Construction/Component Parts

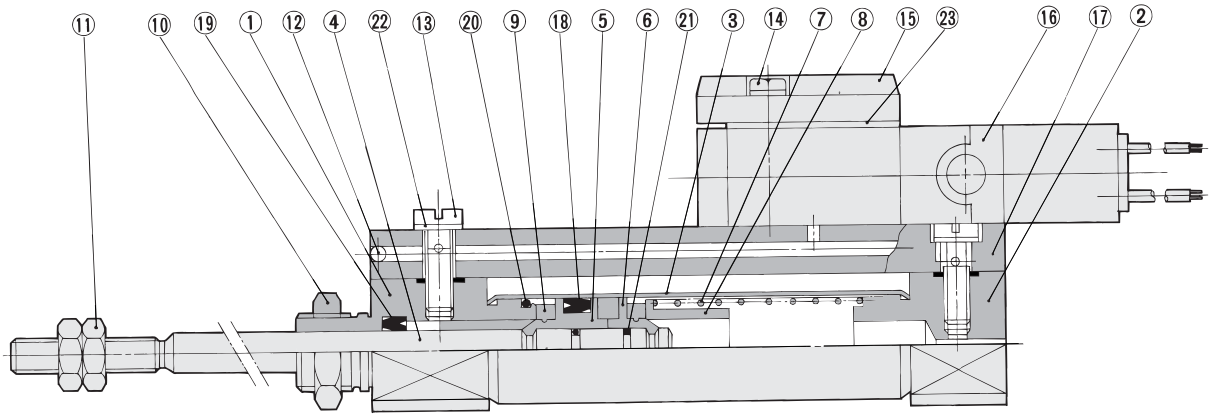
Single acting, Spring return





Single acting, Spring extend





Component Parts

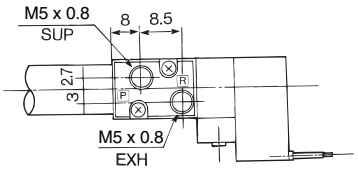
No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Clear anodized
②	Head cover	Aluminum alloy	Clear anodized
③	Cylinder tube	Stainless steel	
④	Piston rod	Stainless steel	
⑤	Piston A	Brass	
⑥	Piston B	Brass	
⑦	Return spring	Piano wire	
⑧	Spring seat	Brass	
⑨	Bumper	Urethane	
⑩	Mounting nut	Brass	Nickel plated
⑪	Rod end nut	Brass	Nickel plated
⑫	Steel ball	Carbon steel	

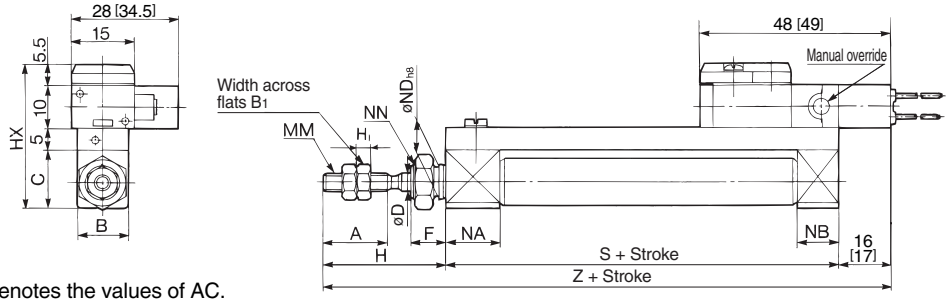
No.	Description	Material	Note
⑬	Stud	Brass	Electroless nickel plated
⑭	Phillips screw	Rolled steel	Black zinc chromated
⑮	Plate	Zinc alloy	
⑯	Solenoid valve	—	Refer to “How to Order” below.*
⑰	Pipe	Aluminum alloy	Clear anodized
⑱	Piston seal	NBR	
⑲	Rod seal	NBR	
⑳	Tube gasket	NBR	
㉑	Piston gasket	NBR	
㉒	Gasket	Resin	
㉓	Plate gasket	NBR	

* How to Order solenoid valves
SYJ319-[Voltage][Electrical entry]

Single Acting, Spring Return/Basic Style (B)

CVJ3B Bore size – Stroke S





Rod End Nut

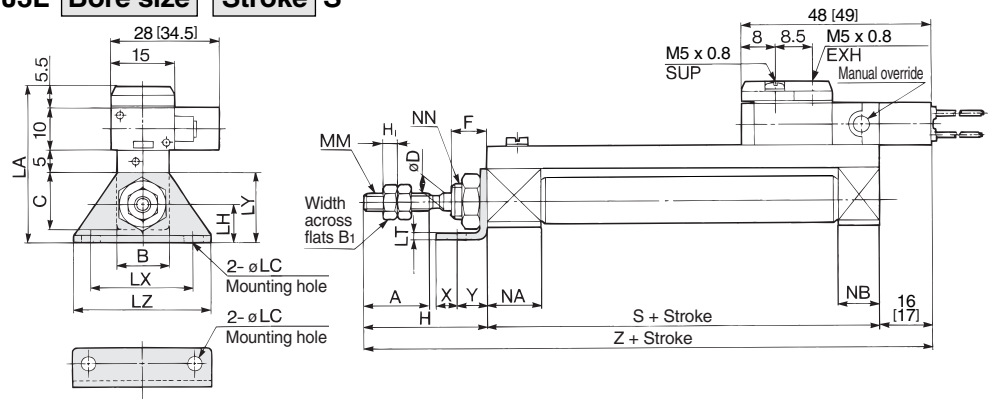
Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	H	HX	MM	NA	NB	ND	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
													S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	34.5	M4 x 0.7	12.5	9.5	$8^{\ 0}_{-0.022}$	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	40.5	M5 x 0.8	12.5	9.5	$10^{\ 0}_{-0.022}$	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Return/Axial Foot Style (L)

CVJ3L Bore size – Stroke S



Rod End Nut

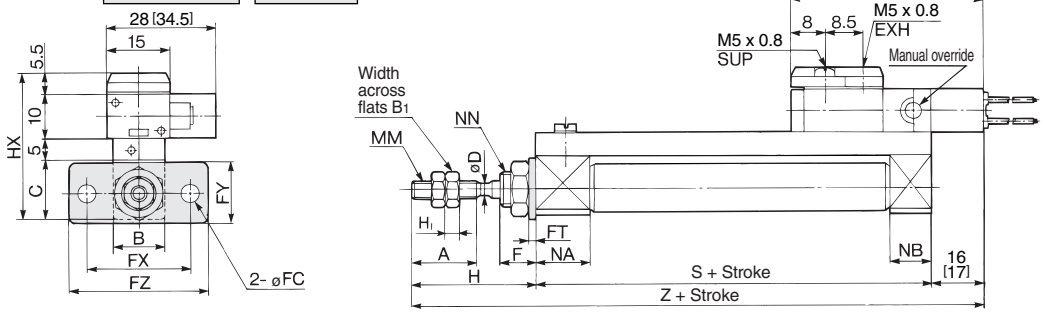
Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	H	LA	LB	LC	LH	LT	LX	LY	LZ	MM	NA	NB	NN	X	Y	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																					S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	37.5	15	4.5	9	1.6	24	16.5	32	M4 x 0.7	12.5	9.5	M8 x 1	5	7	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	45.5	23	5.5	14	2.3	33	25	42	M5 x 0.8	12.5	9.5	M10 x 1	6	9	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Return/Rod Side Flange Style (F)

CVJ3F Bore size – Stroke S



Rod End Nut

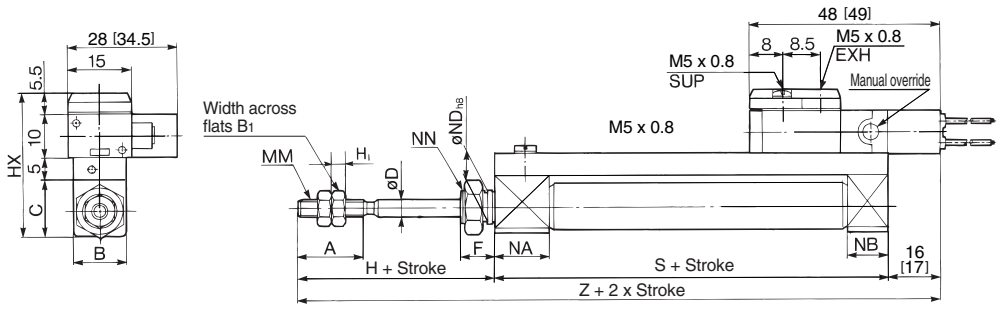
Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	FC	FT	FX	FY	FZ	H	HX	MM	NA	NB	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																	S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	4.5	1.6	24	14	32	28	34.5	M4 x 0.7	12.5	9.5	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	5.5	2.3	33	20	42	28	40.5	M5 x 0.8	12.5	9.5	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Basic Style (B)

CVJ3B Bore size – Stroke T



Rod End Nut

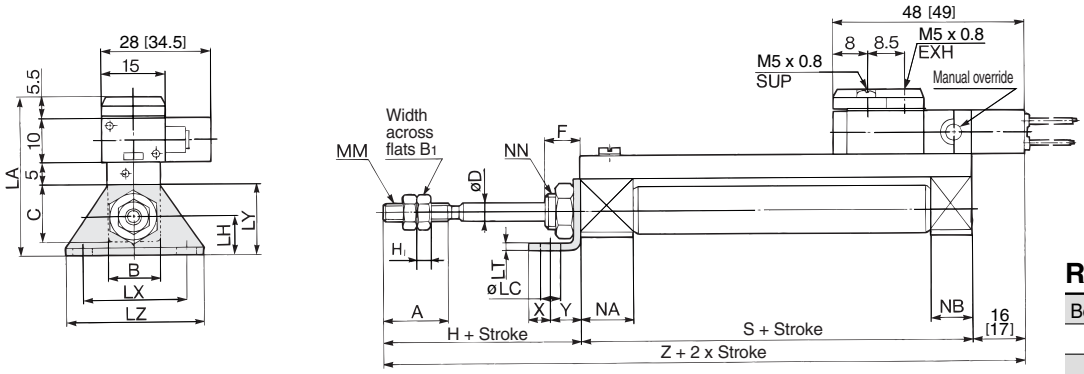
Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	H	HX	MM	NA	NB	ND	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
													S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	34.5	M4 x 0.7	12.5	9.5	$8^{\ 0}_{-0.022}$	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	40.5	M5 x 0.8	12.5	9.5	$10^{\ 0}_{-0.022}$	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Axial Foot Style (L)

CVJ3L Bore size – Stroke T



Rod End Nut

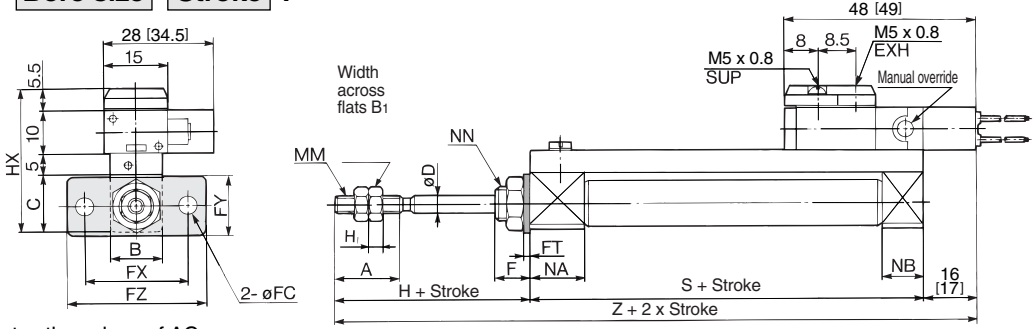
Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	H	LA	LB	LC	LH	LT	LX	LY	LZ	MM	NA	NB	NN	X	Y	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																					S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	37.5	15	4.5	9	1.6	24	16.5	32	M4 x 0.7	12.5	9.5	M8 x 1	5	7	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	45.5	23	5.5	14	2.3	33	25	42	M5 x 0.8	12.5	9.5	M10 x 1	6	9	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Rod Side Flange Style (F)

CVJ3F Bore size – Stroke T



Rod End Nut

Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

Bore size (mm)	A	B	C	D	F	FC	FT	FX	FY	FZ	H	HX	MM	NA	NB	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																	S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	4.5	1.6	24	14	32	28	34.5	M4 x 0.7	12.5	9.5	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	5.5	2.3	33	20	42	28	40.5	M5 x 0.8	12.5	9.5	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]