

Round type tiny bore hydraulic cylinder with cushion

- 10 MPa tiny bore hydraulic cylinders, bore sizes $\phi 20$, $\phi 25$ and $\phi 32$
- Cushion adjustable to all the bores is adopted.
- Floating system cushion mechanism improves start performance.
- Newly designed cushion valve allows easier cushion adjustment.
- Applicable to high speed (maximum operating speed: 500 mm/s).
- Standard adoption of new-type compact switch in varieties with the improved maintainability.



Standard specifications

Types	Standard type	Switch set
Nominal pressure	10 MPa	
Maximum allowable pressure	12 MPa	
Proof test pressure	15 MPa	
Minimum working pressure	0.3 MP or lower	
Operating speed range	8 - 500 mm/s (Cushion is not included) (From 8 to 100 mm/s, when the cylinder is equipped with no cushion) Note 1)	
Temperature range (Ambient temperature and oil temperature)	-10 - +80°C Note 2) (free of freeze)	-10 - +70°C (free of freeze)
Structure of cushioning	Metal fitting type (Floating cushion)	
Adaptable working oil	Petroleum-based fluid (For other fluids, contact us)	
Tolerance of thread	JIS 6g/6H	
Tolerance of stroke	100 mm or lower ${}^{+0.8}_0$ 101 - 250 mm ${}^{+1.0}_0$ 251 - 500 mm ${}^{+1.25}_0$ 501 - 850 mm ${}^{+1.4}_0$	
Mounting type	SD, LB, FA, and CA types	
Accessories	Rod end attachment	Rod end eye (T-end), rod end clevis (Y-end) with pin, and floating joint (F-end)

Terminologies

Nominal pressure

Pressure applied to a cylinder for convenience of naming.

It is not always the same as the operating pressure (rated pressure) that guarantees performance under the specified conditions.

Maximum allowable pressure

The maximum allowable pressure generated in a cylinder (surge pressure, etc.)

Proof test pressure

Test pressure against which a cylinder can withstand without unreliability performance at the return to nominal pressure.

Minimum working pressure

The minimum pressure that the cylinder placed horizontally without a load can work.

- The hydraulic pressure generated in a cylinder due to the inertia of load must be lower than the maximum allowable pressure.
- For the internal structure, refer to the sectional drawings in the end of this catalogue.

Note 1)

Use the cylinder with the inertia force of load within the allowable range of inertial force shown in the selection materials.

Note 2)

Operating temperature range depends on materials of packings.

For details, refer to the next page.

Allowable stroke as standard

Unit: mm

Bore	Stroke
$\phi 20$	800 max.
$\phi 25$	800 max.
$\phi 32$	850 max.

- The above strokes indicate the maximum available strokes for standard type.
- For buckling of the rod, check with the buckling chart of the selection materials.

Min. stroke for switch mounting

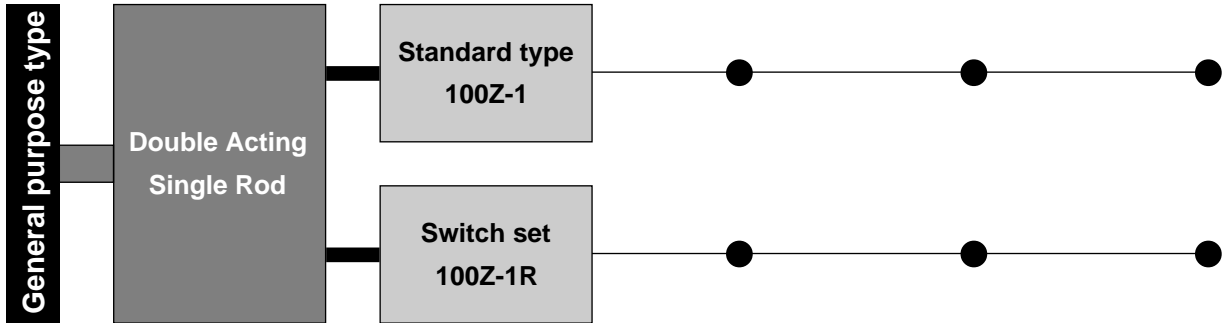
Unit: mm

Bore	With a switch	With two switches
$\phi 20$	15	25
$\phi 25$		
$\phi 32$		

Lines

Unit: mm

Structure	Type	φ20	φ25	φ32
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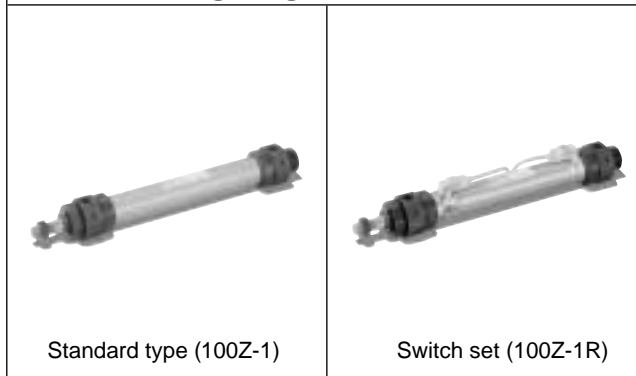


- Notes)
- When using a switch, use the switch set cylinder.
 - No switch can be installed to the standard type cylinder.

Double Acting Single Rod

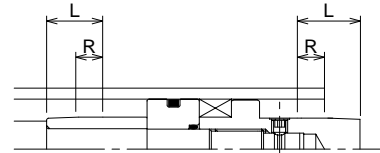
Cushion stroke length

Unit: mm



Bore	Cushion ring effective length L	Cushion ring parallel part length φ	Cushion type
φ20 • φ25 • φ32	13	5	Adjustable cushion

- The cushion stroke lengths in case of cylinders used up to the stroke end.
- In case that cylinders are not used up to the stroke end, and they are stopped 2 mm or more before the stroke end, the cushioning effect will be weakened. In such a case, contact us.



Adaptability of fluid to seal material and operating temperature range.

Code	Seal material	Adaptable working oil					Oil temperature and ambient temperature (°C)								
		Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	W/O Water in oil fluid	O/W Oil in water fluid	-50	-10	0	50	80	100	120	150	
1	Nitrile rubber	○	○	×	○	○									
6	Hydrogenated nitrile rubber	◎	◎	×	◎	◎									

- Notes)
- The◎and○-marked items are applicable, while the × -marked items are inapplicable.
 - The◎-marked items are the recommended packing materials in the case of giving the first priority to heat resistance.
 - When using hydrogenated nitrile rubber with water-glycol fluid, water in oil fluid, or oil in water fluid, the oil temperature must range between -10°C and +100°C.
 - The temperature ranges shown above indicate the operating temperature ranges, not the operating temperature range of the cylinder. Contact us before using the cylinder at a high temperature.

Weight list

Unit: kg

Bore mm	Standard type • Switch set 100Z-1 • 100Z-1R			Switch additional weight			Weight of mounting accessories		Rod end attachment weight		
	Basic weight		Additional weight per 1 mm stroke	Cord length 1.5m	Cord length 5m	Connector type			Rod end eye (T-end)	Rod end clevis (Y-end) with pin	Floating joint (F-end)
	SD type	CA type									
φ20	0.79	0.76	0.0022	0.05	0.11	0.04	0.28	0.13	0.08	0.10	0.11
φ25	1.05	1.00	0.0033				0.28	0.19	0.13	0.10	0.19
φ32	1.80	1.72	0.0056				0.69	0.31	0.20	0.28	0.39

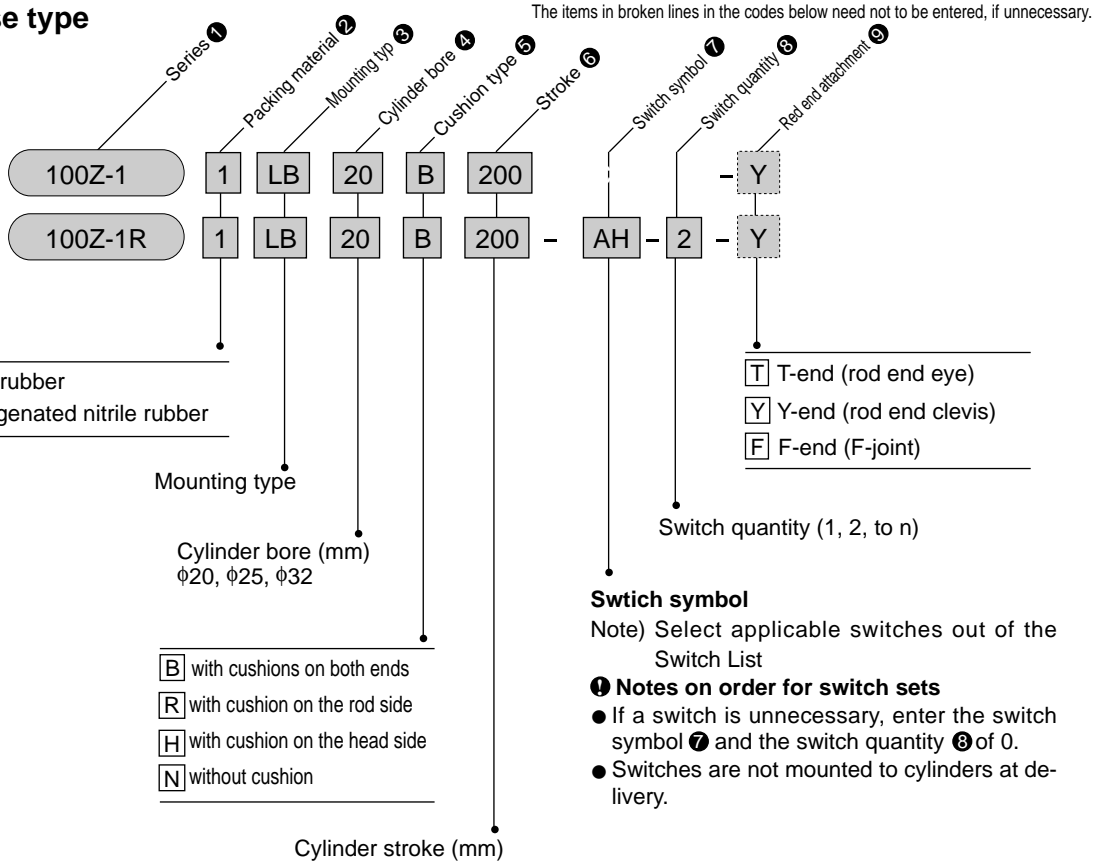
Calculation formula) cylinder weight (kg) = basic weight + (cylinder stroke mm × additional weight per 1 mm stroke) + (switch additional weight × switch quantity) + mounting accessories weight + rod end attachment weight

Calculation example) 100Z-1R Bore φ32, cylinder stroke 200 mm, AX111 (cord length 1.5 m) 2 pcs., LB type, rod end eye (T-end)
 1.80 + (200 × 0.0056) + (0.05 × 2) + 0.69 + 0.20 = 3.91kg

100Z-1

General purpose type

- Standard type
- Switch set



★ Standard type

- With both end cushioned
- Packing material

Rod packing and dust wiper: Hydrogenated nitrile rubber

Piston packing: Hydrogenated nitrile rubber

Fixing O-ring: Nitrile rubber or hydrogenated nitrile rubber (Note)

(Note) If the packing material code is ⑥, material of the fixing O-ring is hydrogenated nitrile rubber.

★ Semi-standard fabrication range

- Cutting fluid proof type WR and WS switches
- Rod end shape A70
- Water-glycol base fluid

Rod end lock nut types

Bore	Type
φ20	LNA-10F-H
φ25	LNA-12F-H
φ32	LNA-16F-H

Allowable stroke as standard

Unit: mm

Bore	Stroke
φ20	800 max.
φ25	800 max.
φ32	850 max.

- The above strokes indicate the maximum available strokes for standard type.
- For buckling of the rod, check with the buckling chart of the selection materials.

Min. stroke for switch mounting

Unit: mm

Bore	With a switch	With two switches
φ20	15	25
φ25		
φ32		

Adaptability of working oil to packing material

Packing material	Adaptable working oil				
	Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	W/O Water in oil fluid	O/W Oil in water fluid
① Nitrile rubber	○	○	×	○	○
⑥ Hydrogenated nitrile rubber	◎	◎	×	◎	◎

- Notes) 1. The ◎ and ○ -marked items are applicable, while the × -marked items are inapplicable.
2. The ◎ -marked items are the recommended packing materials in the case of giving the first priority to heat resistance.

Switch List

Kind	Switch symbol	Load voltage range	Load current range	Maximum open/close capacity	Protective circuit	Indicating lamp	Wiring method	Code length	Applicable load device
Contact	AF AX101	DC:5 - 30V AC:5 - 120V	DC:5 - 40mA AC:5 - 20mA	DC:1.5W AC:2VA	None	LED (red light lights up during ON)	0.3mm ² 2-core, outside diameter ϕ 4mm Rear wiring	1.5m	Small relay programmable controller
	AG AX105							5m	
	AH AX111				5m				
	AJ AX115								
	AE AX125	DC:30V or less AC:120V or less	DC:40mA or less AC:20mA or less	2VA	None	None	5m		
	AK AX11A	AC:5 - 120V	5 - 20mA		1.5W	Present	LED (red light lights up during ON)	4-pin connector type Rear wiring	
	AL AX11B	DC:5 - 30V	5 - 40mA	0.5m					
	AP AZ101	DC:5 - 30V AC:5 - 120V	DC:5 - 40mA AC:5 - 20mA	DC:1.5W AC:2VA	None	LED (red light lights up during ON)	0.3mm ² 2-core, outside diameter ϕ 4mm Upper wiring	1.5m	
	AR AZ105							5m	
	AS AZ111				5m				
	AT AZ115								
	AN AZ125	DC:30V or less AC:120V or less	DC:40mA or less AC:20mA or less	2VA	None	None	5m		
	AU AZ11A	AC:5 - 120V	5 - 20mA		1.5W	Present	LED (red light lights up during ON)	4-pin connector type Upper wiring	
	AW AZ11B	DC:5 - 30V	5 - 40mA	0.5m					
No contact	BE AX201	DC:5 - 30V	5 - 40mA	—	Present	LED (red light lights up during ON)	0.3mm ² 2-core, outside diameter ϕ 4mm Rear wiring	1.5m	Small relay programmable controller
	BF AX205							5m	
	CE AX211					LED (2-lamp type in red/green)	4-pin connector type Rear wiring	1.5m	
	CF AX215							5m	
	CH AX21C					LED (red light lights up during ON)	0.3mm ² 2-core, outside diameter ϕ 4mm	0.5m	
	CJ AX21D							1m	
	BM AZ201					LED (2-lamp type in red/green)	0.3mm ² 2-core, outside diameter ϕ 4mm Upper wiring	1.5m	
	BN AZ205							5m	
	CM AZ211					5m			
	CN AZ215								
No contact (CE conformed)	CT AX211CE	DC:5 - 30V	5 - 40mA	—	Present	LED (2-lamp type in red/green)	0.3mm ² 2-core, outside diameter ϕ 4mm Rear wiring	1.5m	Small relay programmable controller
	CU AX215CE						5m		
	CV AX21BCE						4-pin connector type Rear wiring	0.5m	
	CW AZ211CE						0.3mm ² 2-core, outside diameter ϕ 4mm	1.5m	
	CX AZ215CE						Upper wiring	5m	
	CY AZ21BCE						4-pin connector type Upper wiring	0.5m	

- Notes
- For the switch without a protective circuit, be sure to provide the protective circuit (SK-100) with load devices when using induction load devices (relays).
 - For the handling of switches, be sure to refer to the switch specifications in the end of 70/140H-8 series catalogue.
 - All the AX type switches can be mounted. For the types other than the above, refer to the switch specifications in the general catalogue of hydraulic equipment.
 - For 200 VAC type, contact us.
 - AX125 switch withstands high ambient temperature, up to 100°C.
 - We recommend AND UNIT (AU series) for multiple switches connected in series.

AX type (rear wiring)

Cord type



Connector type

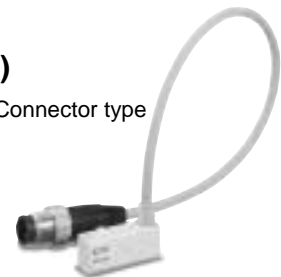


AZ type (upper wiring)

Cord type

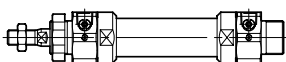


Connector type

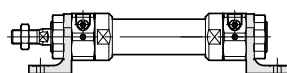


Mounting type

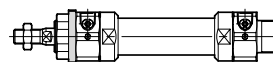
SD SD type (Basic type)



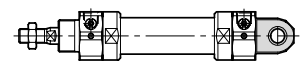
LB LB type (End angles mounting)



FA FA type (Head flange mounting)



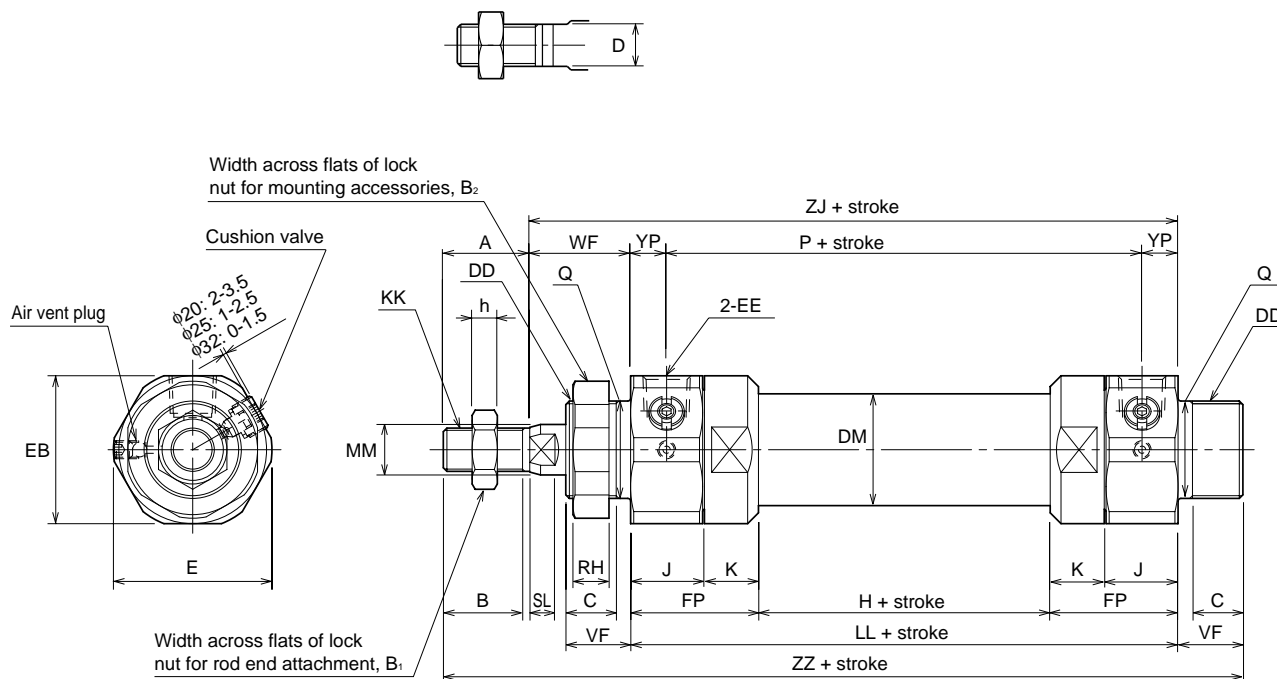
CA CA type (Eye mounting)



SD

100Z-1 1 SD Bore B Stroke

100Z-1



- As for mounting of switches, refer to the switch set dimension drawings.

Dimensional table

Symbol	A	B	B ₁	B ₂	C	D	DD	DM	E	EB	EE	FP	H	h	J	K	KK
Bore																	
φ20	22	20	17	32	12	10	M24 × 1.5	φ25	φ38	36	Rc1/8	31.5	31	6	16	15.5	M10 × 1.25
φ25	24	22	19	36	14	12	M27 × 1.5	φ31	φ44	41	Rc1/4	35.5	31	7	20	15.5	M12 × 1.25
φ32	32	30	22	46	17	16	M36 × 1.5	φ40	φ53	50	Rc1/4	37	33	10	20	17	M16 × 1.5

Symbol	LL	MM	P	Q	RH	SL	VF	WF	YP	ZJ	ZZ
Bore											
φ20	94	φ12	78	φ24f8	8	7	16	26	8	120	158
φ25	102	φ14	82	φ27f8	10	7	18	28	10	130	172
φ32	107	φ18	87	φ36f8	10	10	21	34	10	141	194

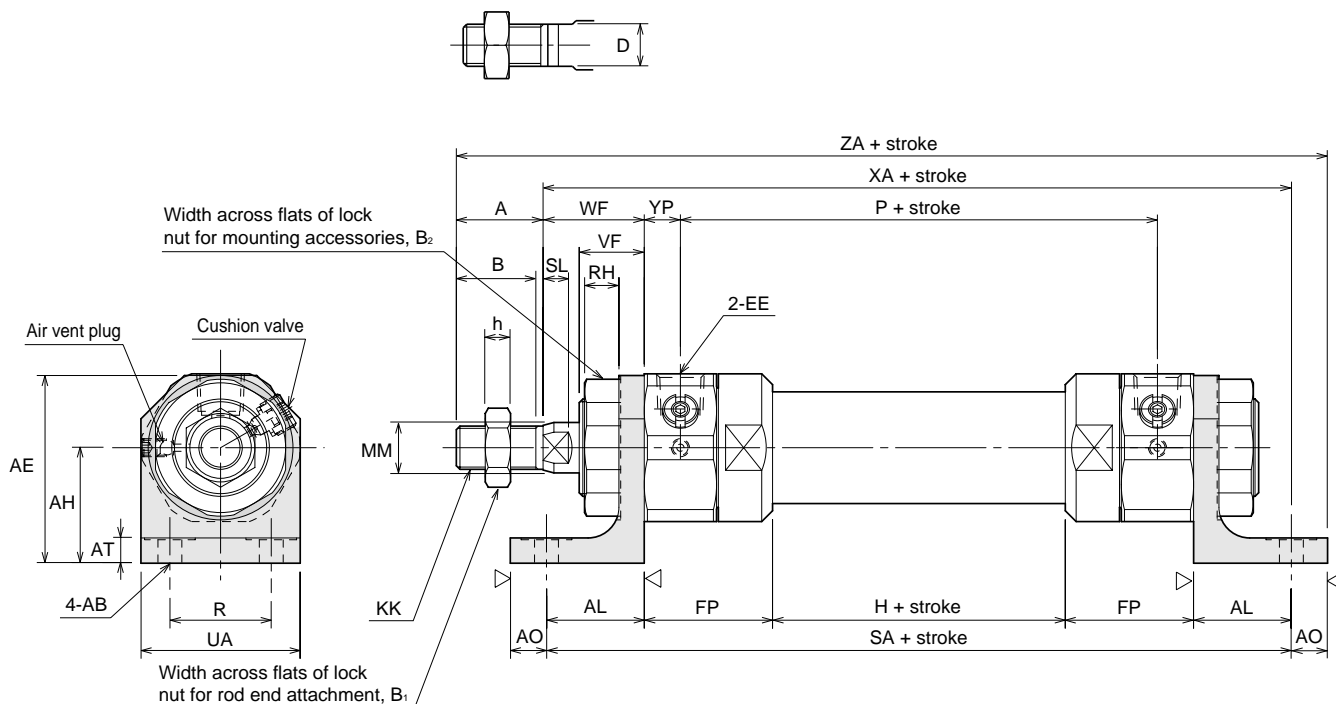
- Tolerance of MM is f8.

Unit: mm

LB

100Z-1 1 LB Bore B Stroke

100Z-1



- As for mounting of switches, refer to the switch set dimension drawings.

Dimensional table

Symbol	A	AB	AE	AH	AL	AO	AT	B	B ₁	B ₂	D	EE	FP	H	h	KK
Bore																
φ20	22	φ7	48	30 ± 0.25	25	10	7	20	17	32	10	Rc1/8	31.5	31	6	M10 × 1.25
φ25	24	φ7	52.5	32 ± 0.25	27	10	7	22	19	36	12	Rc1/4	35.5	31	7	M12 × 1.25
φ32	32	φ9	66	40 ± 0.25	35	12	10	30	22	46	16	Rc1/4	37	33	10	M16 × 1.5

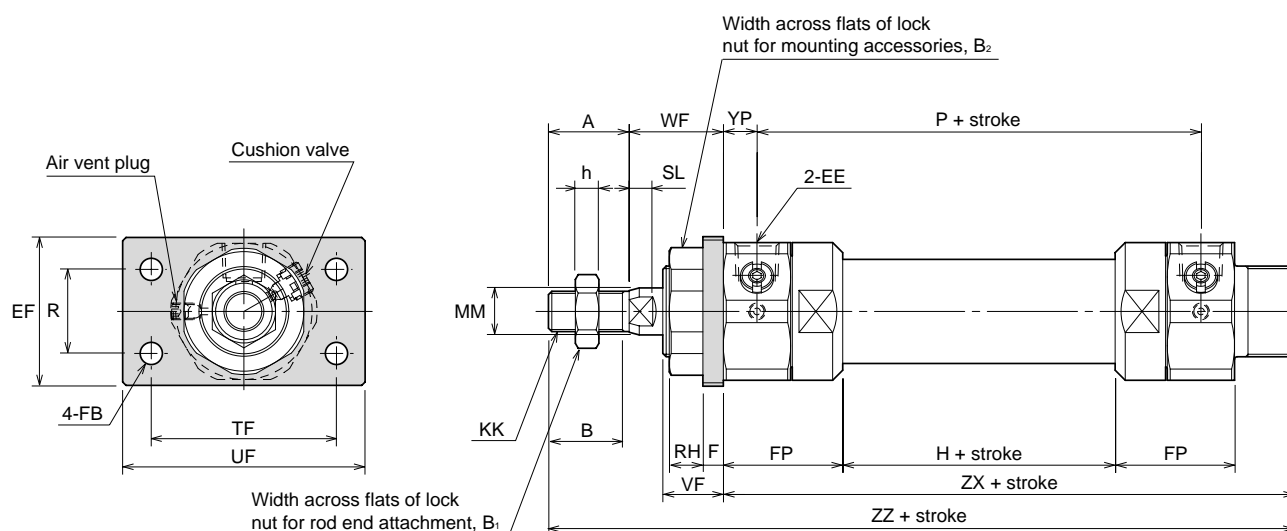
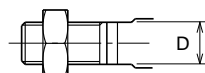
Symbol	MM	P	R	RH	SA	SL	UA	VF	WF	XA	YP	ZA
Bore												
φ20	φ12	78	25	7.5	144	7	41	16	26	145	8	177
φ25	φ14	82	28	9.5	156	7	44	18	28	157	10	191
φ32	φ18	87	33	9.5	177	10	54	21	34	176	10	220

- Tolerance of MM is f8.

FA

100Z-1 1 FA Bore B Stroke

100Z-1



- As for mounting of switches, refer to the switch set dimension drawings.

Dimensional table

Symbol	A	B	B ₁	B ₂	D	EE	EF	F	FB	FP	H	h	KK	MM
Bore														
φ20	22	20	17	32	10	Rc1/8	38	6	φ6.6	31.5	31	6	M10 × 1.25	φ12
φ25	24	22	19	36	12	Rc1/4	44	6	φ6.6	35.5	31	7	M12 × 1.25	φ14
φ32	32	30	22	46	16	Rc1/4	50	9	φ9	37	33	10	M16 × 1.5	φ18

Symbol	P	R	RH	SL	TF	UF	VF	WF	YP	ZX	ZZ
Bore											
φ20	78	25	8	7	50	65	16	26	8	110	158
φ25	82	25	10	7	55	72	18	28	10	120	172
φ32	87	25	10	10	84	104	21	34	10	128	194

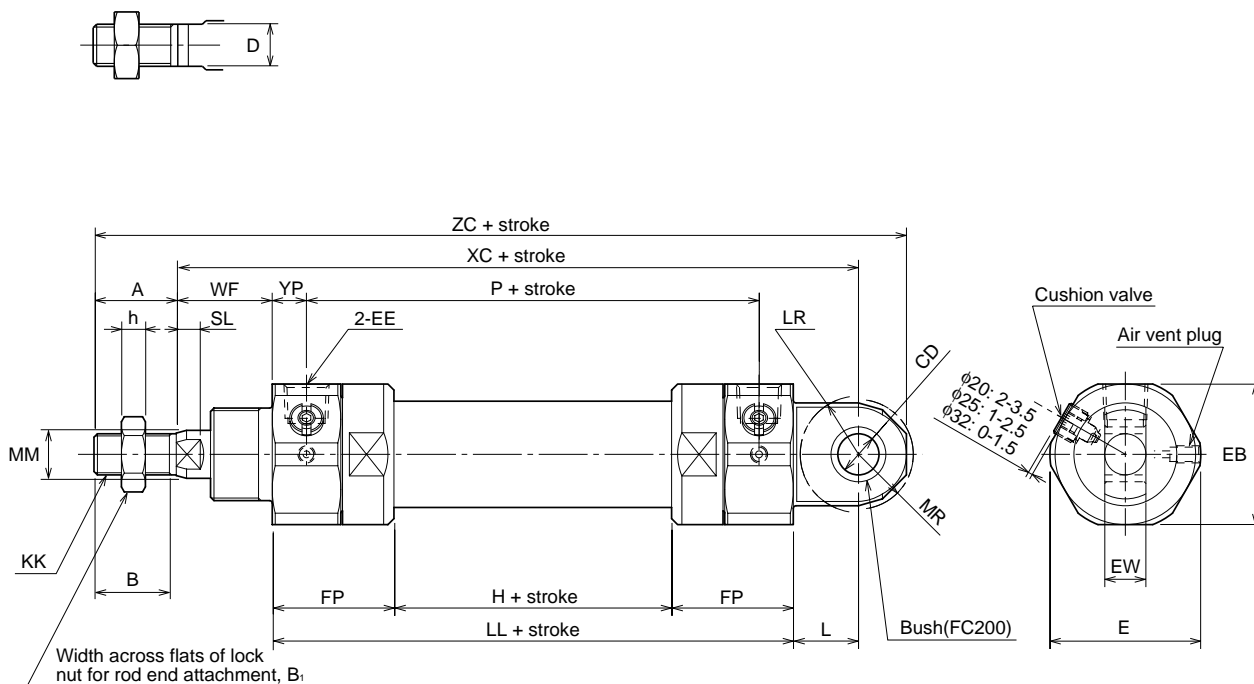
- Tolerance of MM is f8.

Unit: mm

CA

100Z-1 1 CA Bore B Stroke

100Z-1



- As for mounting of switches, refer to the switch set dimension drawings.

Dimensional table

Symbol	A	B	B ₁	CD	D	E	EB	EE	EW	FP	H	h	KK	L
Bore														
φ20	22	20	17	φ10H9	10	φ38	36	Rc1/8	10 ⁰ _{-0.22}	31.5	31	6	M10 × 1.25	17
φ25	24	22	19	φ12H9	12	φ44	41	Rc1/4	12 ⁰ _{-0.27}	35.5	31	7	M12 × 1.25	19
φ32	32	30	22	φ16H9	16	φ53	50	Rc1/4	16 ⁰ _{-0.27}	37	33	10	M16 × 1.5	22

Symbol	LL	LR	MM	MR	P	SL	WF	XC	YP	ZC
Bore										
φ20	94	R15	φ12	R14	78	7	26	137	8	171
φ25	102	R17	φ14	R16	82	7	28	149	10	187
φ32	107	R20	φ18	R19	87	10	34	163	10	211

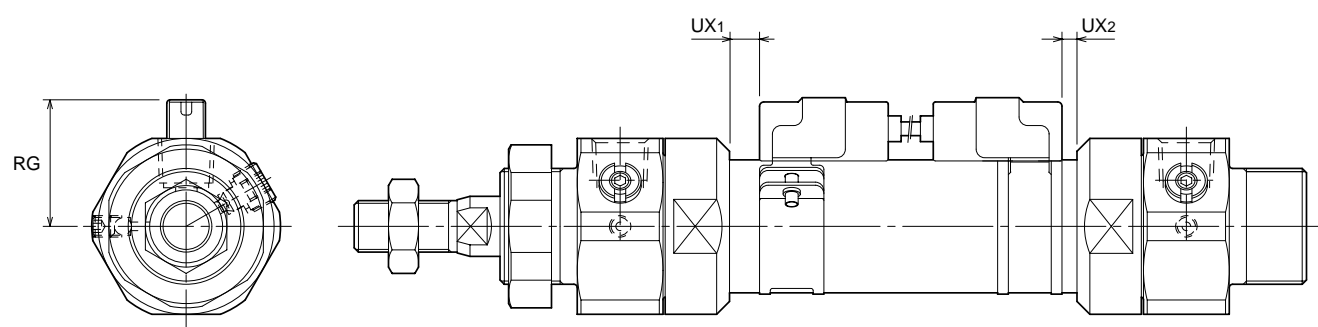
- Tolerance of MM is f8.

Switch set

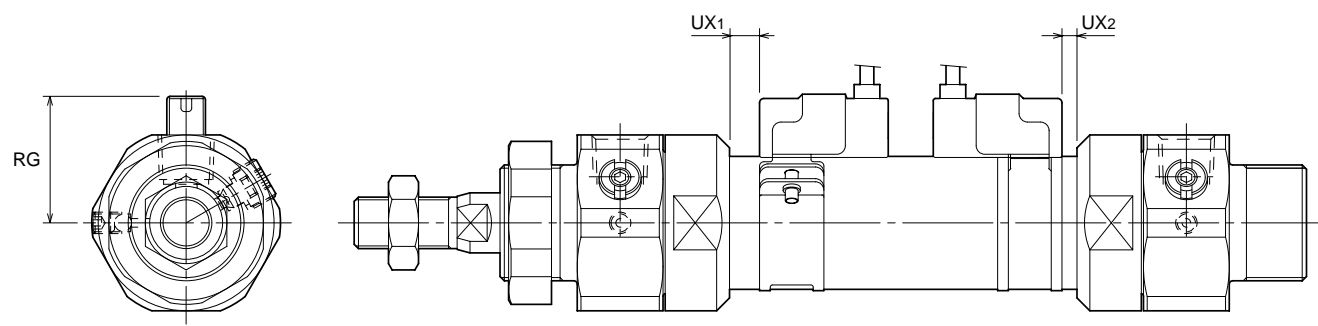
100Z-1R -

100Z-1

AX type



AZ type



Dimensional table

Symbol	RG	Contact		No contact	
		UX ₁	UX ₂	UX ₁	UX ₂
Bore	AX type	AX1**	AX1**	AX2**	AX2**
φ20	27	10	3.5	10	3.5
φ25	30	10	4	10	4
φ32	34	11	4	11	4

Note) The dimension UX indicates the optimum switch mounting position at the detection of the stroke end.

Working range and difference

Symbol	Contact		No contact	
	AX1** • AZ1**		AX2** • AZ2**	
	Working range	Difference	Working range	Difference
φ20	5-11	2 or smaller	4-7	1 or smaller
φ25	7-12			
φ32	8-14			

Installation to detecting position of switch

AX and AZ types

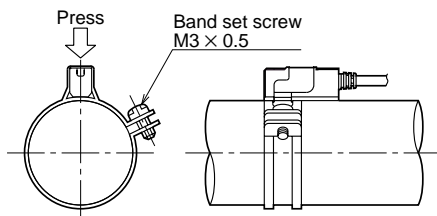
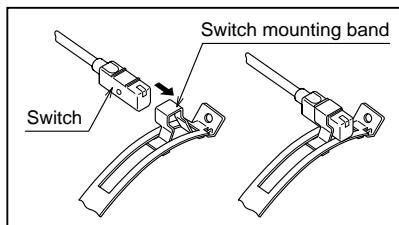


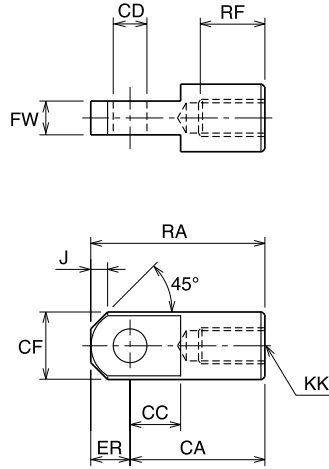
Fig. 1



1. AX and AZ types: When installing them, insert them into the switch fixing accessory on the band, as shown in the Fig.1.
 2. Loosen the band set screw (M3), and slide the band on the tube.
 3. Press and hold the top of the switch at the detecting position, and tighten the band set screw. Tightening torque: Approximately 0.3 N·m
- Note) (Tighten the set screw with appropriate tightening torque. If the tightening torque is inappropriate, the switch may not be installed to the right place.)
- As for the two-lamp type switch, install the switch so that the green indicator lamp of the switch lights up at your desired position.
4. The indicator lamp lights up when the switch is turned on.
 5. When installing the switch to the optimum position for detecting the stroke end, observe the "Switch mounting dimensions" (UX dimensions).

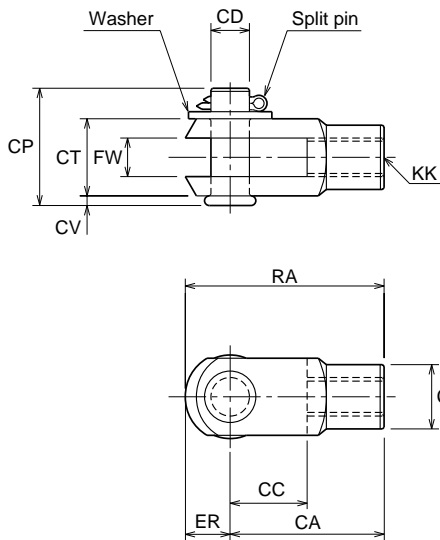
Rod end attachment

- Rod end eye (T-end)

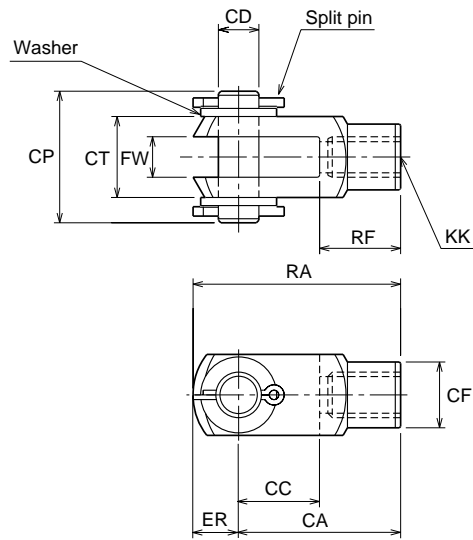


- Rod end clevis (Y-end) with pin

● $\phi 20 \cdot \phi 25$

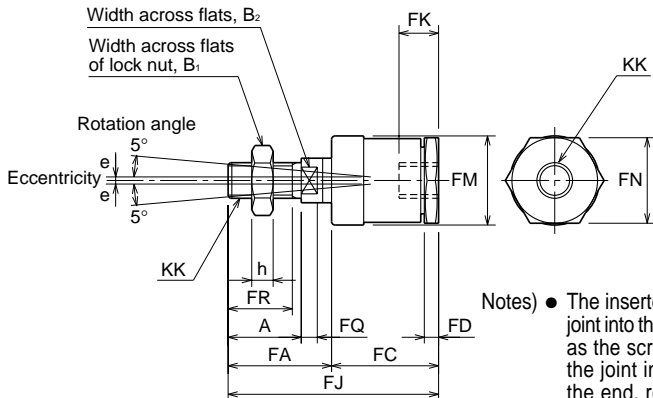


● $\phi 32$

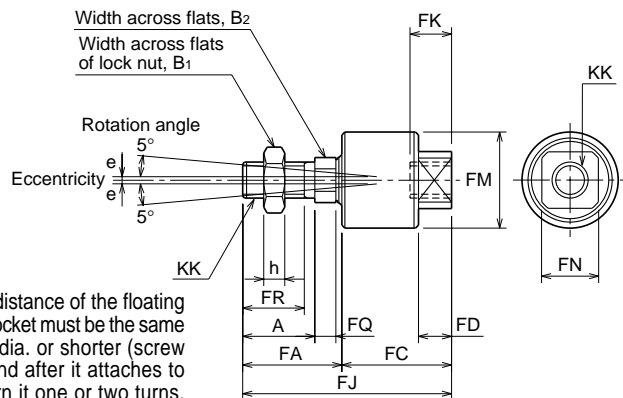


- Floating joint (F-end)

● $\phi 20$



● $\phi 25 \cdot \phi 32$



- Notes
- The inserted distance of the floating joint into the socket must be the same as the screw dia. or shorter (screw the joint in, and after it attaches to the end, return it one or two turns, and fix with the lock nut). Excessive insertion may lead to malfunctions.
 - DO NOT use with the CA type.
 - When using the floating joint (F-end), use lock nuts.

Dimensional table/rod end eye (T-end)

Symbol Bore	Part code	CA	CC	CD	CF	ER	FW	J	KK	RA	RF
φ20	RTH-10-H	40	16	φ10H9	20	12	10 ^{-0.1} _{-0.4}	5	M10 × 1.25	52	17
φ25	RTH-12-H	48	18	φ12H9	24	14	12 ^{-0.1} _{-0.4}	6	M12 × 1.25	62	23
φ32	RTH-16-2-H	64	21	φ16H9	30	16	16 ^{-0.1} _{-0.4}	7	M16 × 1.5	80	28

Dimensional table/rod end clevis (Y-end) with pin

Symbol Bore	Part code	CA	CC	CD	CF	CP	CT	CV	ER	FW	KK	RA	RF
φ20	RYH-10-H	40	20	φ10 ^{H8} _{f8}	φ18	30	□20	2.5	12	10 ^{+0.4} _{+0.1}	M10 × 1.25	52	—
φ25	RYH-12-H	48	24	φ12 ^{H8} _{f8}	φ20	36.5	□24	3	14	12 ^{+0.4} _{+0.1}	M12 × 1.25	62	—
φ32	RYH-16-2-H	64	32	φ16 ^{H8} _{f8}	φ26	52	□32	—	18	16 ^{+0.4} _{+0.1}	M16 × 1.5	82	28

Dimensional table/floating joint (F-end)

Symbol Bore	Part code	A	B ₁	B ₂	e	FA	FC	FD	FJ	FK	FM	FN	FQ	FR	h	KK
φ20	RFH-10	20.5	17	10	1	29	30	4	59	11	φ25	24	4.5	18	6	M10 × 1.25
φ25	RFH-12	24	19	13	1	33	36.5	9	69.5	13.5	φ32	19	7	20.5	7	M12 × 1.25
φ32	RFH-16	32	22	17	1.5	43	46	13	89	16	φ40	24	8	28	10	M16 × 1.5

Special specification at the rod end

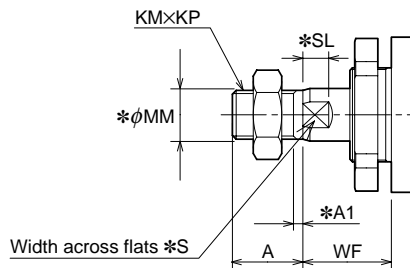
- You can easily order following categorized items using the Semi-standard symbols and dimensional parameters.
(No need to specify dimensional parameters if you would apply the basic dimensions.)

How to order

Series Model number – X Semi-standard symbols Dimensional parameters

Semi-standard symbols: **A54** Parameter KM and KP need to be specified as a pair.

Optional parameters: **A** **KM** **KP** **WF**



- Dimensions indicated by *Mark are fixed as our semi-standard.
- You are requested to consult us if you would like to change fixed dimensions.

Note 1)

A54's basic dimension shows the original 100Z-1's standard itself. Don't use semi-standard symbols to avoid confusion in such a case.

Note 2)

Lock nut is not attached in case of KM or KP changed.

The basic dimension table (Standard dimension)

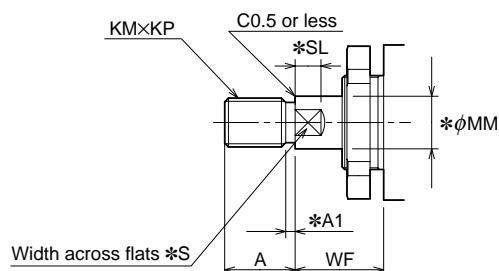
Bore	A	*A1	KM	KP	*MM	*S	*SL	WF	Remarks
φ20	22	2	10	1.25	φ12	10	7	26	Dimension A1 is fixed as 2mm to any KM and KP.
φ25	24	2	12	1.25	φ14	12	7	26	
φ32	32	2	16	1.5	φ16	16	10	34	

ex.)

A54, bore: 32mm, thread size: M12×1.5, WF: 60mm, others from the basic
100Z-1 6LB32B200-X A54
KM12, KP-1.5, WF-60

Semi-standard symbols: **A70** Parameter KM and KP need to be specified as a pair.

Optional parameters: **A** **KM** **KP** **WF**



- Dimensions indicated by *Mark are fixed as our semi-standard.
- You are requested to consult us if you would like to change fixed dimensions.

Note 1)

Lock nut is not attached in case of A70.

The basic dimension table (Standard dimension)

Bore	A	*A1	KM	KP	*MM	*S	*SL	WF	Remarks
φ20	15	3	10	1.25	φ12	10	7	26	Dimension A1 is fixed as in the table to any KM and KP.
φ25	10	3	12	1.25	φ14	12	7	26	
φ32	25	4	16	1.5	φ18	16	10	34	

ex.)

A70, bore:25mm, thread size:M12×1.25, A:50mm, WF:40mm, others from the basic
100Z-1R 6LB25B100-X A70
A-50, WF-40