Round small-bore hydraulic cylinders with cushion

- Small-bore hydraulic cylinders for 10 MPa with bores of 20, 25 and 32 mm.
- The cylinders with any of these bores are provided with variable cushions.
- Floating cushion realizes smooth startup.
- Newly designed cushion valve allows easy cushion adjustment.
- Applicable to increased speed (max. working speed: 500 mm/s)
- Wide variety of new-type small sensors for better maintainability.

Standard Specifications

Type	Standard type	Switch Set
Nominal pressure	10 MPa	
Maximum allowable pressure	12 MPa	
Proof test pressure	15 MPa	
Minimum operating pressure	0.3 MPa or less	
Working speed range	8 to 500 mm/s (excluding cushion) (Cylinders without cushion: 8 to 100 mm/s) Note 1)	
Working temperature range (ambient/fluid temperature)	−10 to +80℃ Note 2) (No freezing)	−10 to +70℃ (No freezing)
Structure of cushioning	Metal fitting system (floating cushion)	
Adaptable fluid	Petroleum-based fluid (When using another fluid, refer to the table of fluid adaptability.)	
Tolerance for thread	JIS 6g/6H	
Tolerance of stroke	0 to 100 mm $^{+0.8}_{0}$ 101 to 250 mm $^{+1.0}_{0}$ 251 to 500 mm $^{+1.25}_{0}$ 501 to 850 mm $^{+1.4}_{0}$	
Mounting style	SD, LB, FA, CA	
Accessories / Rod end attachments	Rod eye (T-end), rod clevis (Y-end) with pin, floating joint (F-end)	

Terminologies

Nominal pressure
Pressure given to a cylinder for convenience of naming.
It is not always the same as the working pressure (rated pressure) that guarantees

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

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

Minimum operating pressure
Minimum pressure at which cylinder installed horizontally operates under no load.

- 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 at the end of this catalog.

Note 1) Use the cylinder at an inertia force lower than the allowable inertia force shown in the selection materials.
Note 2) The working temperature range varies depending on the seal material.
For details, refer to the following page.

Standard Stroke Range

Unit: mm

Bore	Stroke
ϕ20	800
ϕ25	800
ϕ32	850

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

Sensor Mountable Minimum Stroke

Unit: mm

Bore	With one sensor	With two sensors
ϕ20	15	25
ϕ25		
ϕ32		

Product Lineup

Unit: mm

Series Variation	Type	ϕ20	ϕ25	ϕ32
General purpose type / Double acting single rod	Standard type 100Z-1	●	●	●
	Switch Set 100Z-1R	●	●	●

Notes) ● When using a sensor, use a Switch Set Cylinder.
● No sensor can be mounted onto the standard type cylinder.

Double acting single rod

Standard type(100Z-1)

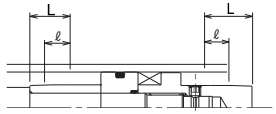
Switch Set(100Z-1R)

Cushion Stroke Length

Unit: mm

Bore	Cushion ring effective length L	Cushion ring parallel part length ℓ	Cushioning
ϕ20・ϕ25・ϕ32	13	5	Variable cushion

- The cushion stroke lengths in case of cylinders used up to the stroke end.
- In the case that a cylinder is not used up to the stroke end, and it is stopped 5 mm or more before the stroke end, the cushioning effect will be weakened. In this case, consult us.



Adaptability of Fluid to Seal Material and Working Temperature Range

Symbol	Seal material	Adaptable fluid: Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
1	Nitrile rubber	○	○	×	○	○
6	HNBR	◎	◎	×	◎	◎

Fluid temp. and ambient temp. (℃): −50, −10, 0, 50, 80, 100, 120, 150

Notes) ● ◎○: Applicable ×: Inapplicable
● The ◎-marked items are recommended seal materials in case of giving the first priority to abrasion resistance.
● When HNBR is used for water-glycol fluid, water in oil fluid, or oil in water fluid, use the cylinder in a fluid temperature range from −10 to +100℃.
● The working temperature ranges of the seal materials are shown above. The temperature ranges differ from the cylinder working temperature ranges. If the cylinder is used at a higher temperature, contact us.

Weight Table

Unit: kg

Bore mm	Standard type/Switch Set 100Z-1・100Z-1R: Basic weight SD style	Basic weight CA style	Additional weight per mm of stroke	Sensor additional weight AX type: Cord length 1.5 m	Cord length 5 m	Connector type	Mounting accessory weight: LB	FA	Rod end attachment weight: Rod eye (T-end)	Rod clevis (Y-end) with pin	Floating joint (F-end)
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 mm of stroke)
+(sensor additional weight×sensor quantity)+mounting accessory weight+rod end attachment weight

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

How to order

General Purpose Type

The item enclosed by broken line needs not to be entered, if unnecessary.

	❶ Type	❷ Seal material	❸ Mounting style	❹ Cylinder bore	❺ Cushioning	❻ Stroke	❼ Sensor symbol	❽ Sensor quantity	❾ Rod end attachment
●Standard type	100Z-1	1	LB	20	B	200			– Y
●Switch Set	100Z-1R	1	LB	20	B	200	– AH	2	– Y

❷ Seal material
- 1 Nitrile rubber
- 6 HNBR

❸ Mounting style

❹ Bore (mm)
ϕ20、ϕ25、ϕ32

❺ Cushioning
- B With cushion on both ends
- R With cushion on rod side
- H With cushion on cap side
- N No cushion

❻ Cylinder stroke (mm)

❼ Sensor symbol
Note) Select applicable sensors out of the Sensor List.

❽ Sensor quantity (1, 2, to n)

❾ Rod end attachment
- T Rod eye (T-end)
- Y Rod clevis (Y-end)
- F Floating joint (F-end)

Notes on ordering Switch Set
- When no sensor is required, specify 0 for the sensor symbol ❼ and the sensor quantity ❽.
- Sensors are not mounted on cylinders at delivery.

Standard specifications
- Both ends cushioned
- Seal material

Rod seal and dust wiper: HNBR
Piston seal: HNBR
Securing O-ring: Nitrile rubber or HNBR (Note)
(Note) When the seal material symbol is 6, the securing O-ring made of HNBR is used.

Semi-standard range
- Cutting oil proof sensors WR and WS
- Change of rod end shape and size
- Water-glycol fluid

End Lock Nut Part Number

Bore	Part number
ϕ20	LNH-10F-H
ϕ25	LNH-12F-H
ϕ32	LNH-16F-H

Sensor Mountable Minimum Stroke

Unit: mm

Bore	With one sensor	With two sensors
ϕ20	15	25
ϕ25		
ϕ32		

Standard Stroke Range

Unit: mm

Bore	Stroke
ϕ20	800
ϕ25	800
ϕ32	850

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

Adaptability of Fluid to Seal Material

Seal material	Adaptable fluid				
	Petroleum-based fluid	Water-glycol fluid	Phosphate ester fluid	Water in oil fluid	Oil in water fluid
1 Nitrile rubber	○	○	×	○	○
6 HNBR	◎	◎	×	◎	◎

Notes) 1. ◎○: Applicable ×: Inapplicable
2. The ◎-marked items are recommended seal materials in case of giving the first priority to abrasion resistance.

Sensor List

Type	Sensor symbol	Load voltage range	Load current range	Max. switching capacity	Protective circuit	Indicating lamp	Wiring method	Cord length	Applicable load
Reed sensor	AF AX101CE	DC: 5 to 30 V AC: 5 to 120 V	DC: 5 to 40 mA AC: 5 to 20 mA	DC: 1.5W AC: 2VA	None	LED (Lights in red when sensing)	0.3 mm², 2-core, outer dia. ϕ4 mm, rear wiring	1.5 m	Small relay, programmable controller
	AG AX105CE							5 m	
	AH AX111CE				Provided			1.5 m	
	AJ AX115CE							5 m	
	AE AX125CE	DC: 30 V or less AC: 120 V or less	DC: 40 mA or less AD: 20 mA or less		None	None		5 m	
	AK AX11ACE	AC: 5 to 120 V	AC: 5 to 20 mA	2 VA	Provided	LED (Lights in red when sensing)	4-pin connector type, rear wiring	0.5 m	
	AL AX11BCE	DC: 5 to 30 V	DC: 5 to 40 mA	1.5 W				0.5 m	
	AP AZ101CE	DC: 5 to 30 V AC: 5 to 120 V	DC: 5 to 40 mA AC: 5 to 20 mA	DC: 1.5 W AC: 2 VA	Provided	LED (Lights in red when sensing)	0.3 mm², 2-core, outer dia. ϕ4 mm, upper wiring	1.5 m	
	AR AZ105CE							5 m	
	AS AZ111CE				Provided			1.5 m	
	AT AZ115CE							5 m	
	AN AZ125CE	DC: 30 V or less AC: 120 V or less	DC: 40 mA or less AD: 20 mA or less		None	None		5 m	
	AU AZ11ACE	AC: 5 to 120 V	AC: 5 to 20 mA	2 VA	Provided	LED (Lights in red when sensing)	4-pin connector type, upper wiring	0.5 m	
	AW AZ11BCE	DC: 5 to 30 V	DC: 5 to 40 mA	1.5 W				0.5 m	
	AM AX135CE	AC/DC:90 to 240V	5 to 300 mA	B contact output		LED (Lights in red when not sensing)	0.3 mm², 2-core, outer dia. ϕ4 mm, rear wiring	5 m	
	AY AZ135CE						0.3 mm², 2-core, outer dia. ϕ4 mm, upper wiring	5m	
Solid state sensor	BE AX201CE-1	DC: 5 to 30V	5 to 40 mA	—	Provided	LED (Lights in red when sensing)	0.3 mm², 2-core, outer dia. ϕ4 mm, rear wiring	1.5m	Small relay, programmable controller
	BF AX205CE-1							5 m	
	CE AX211CE-1					LED (2-LED type in red/green)		1.5 m	
	CF AX215CE-1							5 m	
	CH AX21CCE-1						4-pin connector type, rear wiring	0.5 m	
	CJ AX21DCE-1							1 m	
	BM AZ201CE-1					LED (Lights in red when sensing)	0.3 mm², 2-core, outer dia. ϕ4 mm, upper wiring	1.5 m	
	BN AZ205CE-1							5 m	
	CM AZ211CE-1					LED (2-LED type in red/green)		1.5 m	
	CN AZ215CE-1							5 m	
	CT AX211CE-1					LED (2-LED type in red/green)	0.3 mm², 2-core, outer dia. ϕ4 mm, rear wiring	1.5 m	
	CU AX215CE-1							5 m	
	CV AX21BCE-1						4-pin connector type, rear wiring	0.5 m	
	CW AZ211CE-1						0.3 mm², 2-core, outer dia. ϕ4 mm, upper wiring	1.5 m	
	CX AZ215CE-1							5 m	
	CY AZ21BCE-1						4-pin connector type, upper wiring	0.5 m	

Notes)
- For the sensors without a protective circuit, be sure to provide a protective circuit (SK-100) with the load when using any induction load (relay, etc.).
- The output logic of AX and AZ135CE is B contact. When the piston is detected, the sensor contact turns off (the lamp turns on).
- For handling of sensors, be sure to see the sensor specifications at the end of this catalog.
- All AX type sensors can be mounted. For types other than the above, see the sensor specifications at the end of this catalog.
- The sensor AX125 is a heat proof type. It can be used at an ambient temperature of up to 100℃.
- We recommend AND Unit (AU series) for multiple sensors connected in series. For details, refer to AND Unit at the end of this catalog.

AX type (rear wiring)

Cord type

Connector type

AZ type (upper wiring)

Cord type

Connector type

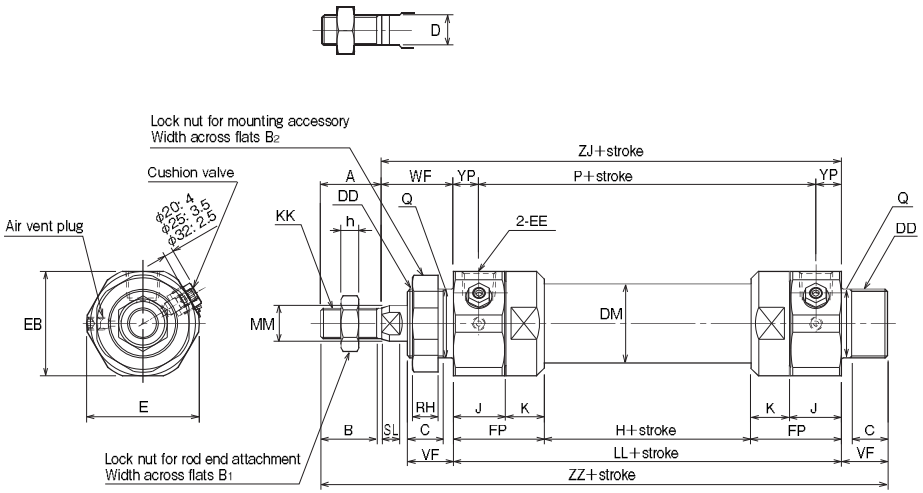
Mounting Style

SD SD style (basic style) LB LB style (end angles) FA FA style (rod flange) CA CA style (cap eye)

100Z-1/TQHZ1 Bore CAD/DATA is available.

SD

100Z-1 1 SD Bore B Stroke



● For the mounting of sensors, refer to the dimensional drawings of Switch Set.

Dimensional Table

Symbol / Bore	A	B	B1	B2	C	D	DD	DM	E	EB	EE	FP	H	h	J	K	KK
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

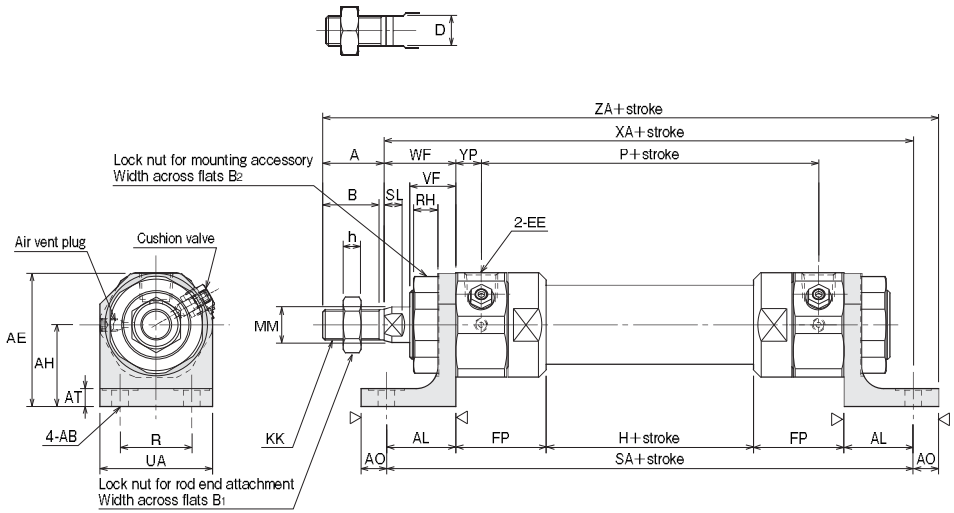
Symbol / Bore	LL	MM	P	Q	RH	SL	VF	WF	YP	ZJ	ZZ
φ20	94	φ12	78	φ24f8	8	7	16	26	8	120	158
φ25	102	φ14	82	φ27f8	10	7	18	28	10	130	172
φ32	107	φ18	87	φ36f8	10	10	21	34	10	141	194

● The tolerance of MM is f8.

100Z-1/TQHZ1 Bore CAD/DATA is available.

LB

100Z-1 1 LB Bore B Stroke



● For the mounting of sensors, refer to the dimensional drawings of Switch Set.

Dimensional Table

Symbol / Bore	A	AB	AE	AH	AL	AO	AT	B	B1	B2	D	EE	FP	H	h	KK
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

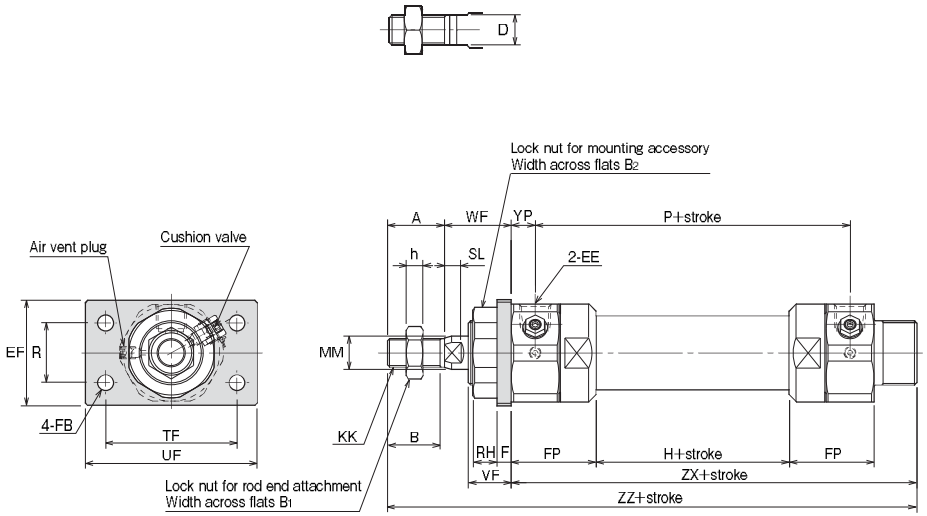
Symbol / Bore	MM	P	R	RH	SA	SL	UA	VF	WF	XA	YP	ZA
φ20	φ12	78	25	7.5	144	7	41	16	26	145	8	177
φ25	φ14	82	28	9.5	156	7	44	18	28	157	10	191
φ32	φ18	87	33	9.5	177	10	54	21	34	176	10	220

● The tolerance of MM is f8.

100Z-1/TQHZ1 Bore CAD/DATA is available.

FA

100Z-1 1 FA Bore B Stroke



● For the mounting of sensors, refer to the dimensional drawings of Switch Set.

Dimensional Table

Bore \ Symbol	A	B	B1	B2	D	EE	EF	F	FB	FP	H	h	KK	MM
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

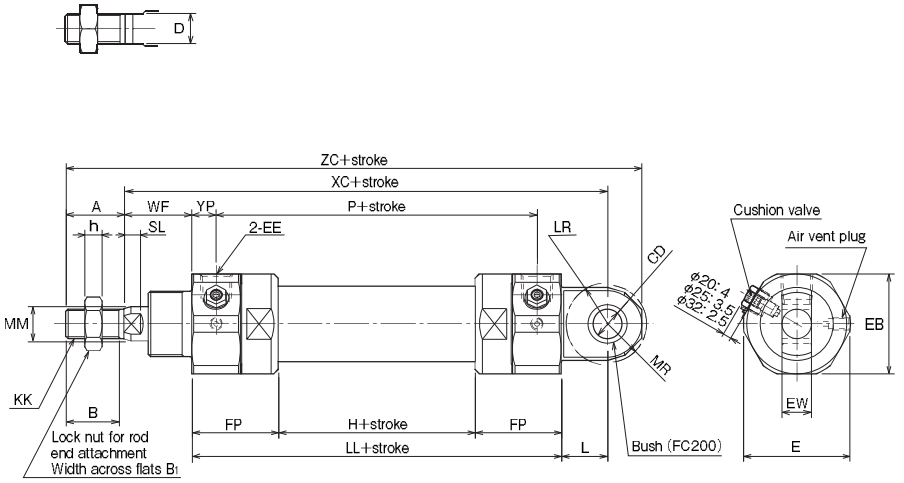
Bore \ Symbol	P	R	RH	SL	TF	UF	VF	WF	YP	ZX	ZZ
ϕ20	78	25	8	7	50	65	16	26	8	110	158
ϕ25	82	25	10	7	55	72	18	28	10	120	172
ϕ32	87	25	10	10	84	104	21	34	10	128	194

● The tolerance of MM is f8.

100Z-1/TQHZ1 Bore CAD/DATA is available.

CA

100Z-1 1 CA Bore B Stroke



● For the mounting of sensors, refer to the dimensional drawings of Switch Set.

Dimensional Table

Bore \ Symbol	A	B	B1	CD	D	E	EB	EE	EW	FP	H	h	KK	L
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

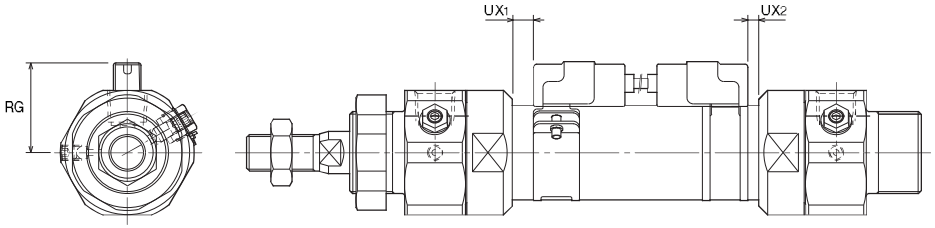
Bore \ Symbol	LL	LR	MM	MR	P	SL	WF	XC	YP	ZC
ϕ20	94	R15	ϕ12	R14	78	7	26	137	8	171
ϕ25	102	R17	ϕ14	R16	82	7	28	149	10	187
ϕ32	107	R20	ϕ18	R19	87	10	34	163	10	211

● The tolerance of MM is f8.

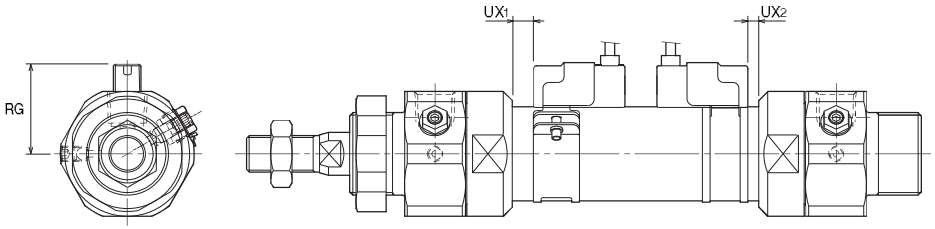
Switch Set

100Z-1R | 1 | Mounting style | Bore | B | Stroke | – | Sensor symbol | Sensor quantity

AX type



AZ type



Dimensional Table

Symbol / Bore	RG	Reed sensor		Solid state sensor	
		UX_1	UX_2	UX_1	UX_2
	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) Dimension UX indicates the optimum sensor mounting position for detection of stroke end.

Operating Range and Hysteresis

Symbol / Bore	Reed sensor		Solid state sensor	
	AX1＊＊・AZ1＊＊		AX2＊＊・AZ2＊＊	
	Operating range	Hysteresis	Operating range	Hysteresis
ϕ20	5 to 11	2 or less	4 to 7	1 or less
ϕ25	7 to 12			
ϕ32	8 to 14			

Setting method of sensor detecting position

AX/AZ type

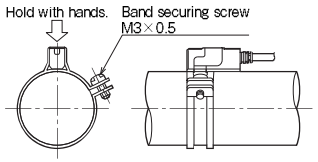
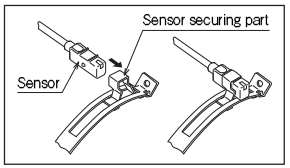


Fig. 1

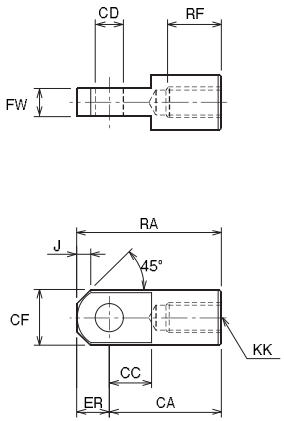


1. AX/AZ type: As shown in Fig. 1, insert the sensor to the sensor securing part on the band.
2. Loosen the band securing screw (M3), and slide the band on the tube.
3. Keep pressing the sensor upper surface at the detecting position, and tighten the band securing screw to secure the band.
   Tightening torque: Approx. 0.3 N·m
   Note) Tighten the securing screw to the appropriate tightening torque. Inappropriate tightening torque may cause the off-center of the sensor position.
   When a 2-LED sensor is used, ensure that the green lamp of the sensor lights up at the desired position.
4. The lamp lights up when the sensor is set to the ON position.
5. Mount a sensor to the most suitable position to detect the stroke end with the "sensor mounting dimension" (dimension UX).

100Z-1/TQHZ1 Bore CAD/DATA is available.

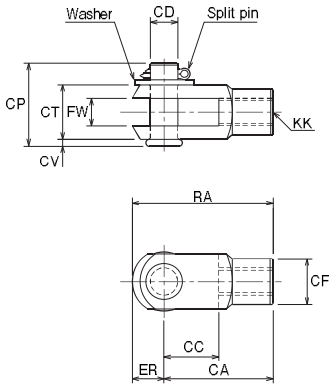
Rod End Attachment

●Rod eye (T-end)

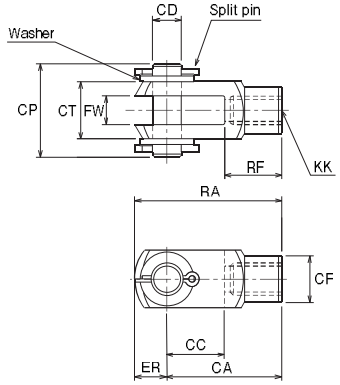


●Rod clevis (Y-end) with pin

●ϕ20・ϕ25

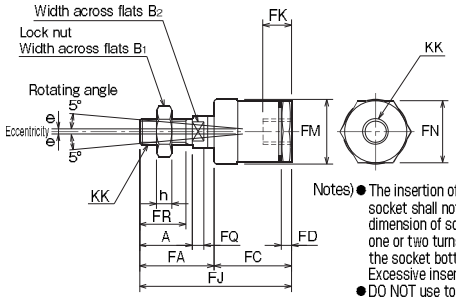


●ϕ32

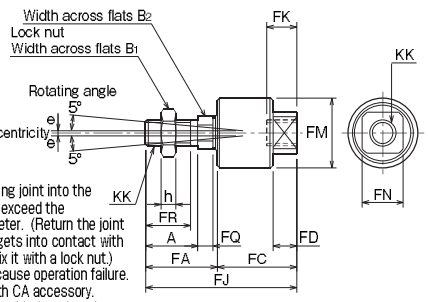


●Floating joint (F-end)

●ϕ20



●ϕ25・ϕ32



Notes) ● The insertion of the floating joint into the socket shall not equal or exceed the dimension of screw diameter. (Return the joint one or two turns after it gets into contact with the socket bottom, and fix it with a lock nut.) Excessive insertion can cause operation failure.
● DO NOT use together with CA accessory.
● The lock nut is indispensable in using the floating joint.
Please don't miss to order the lock nut with the floating joint.

Dimensional Table: Rod eye (T-end)

Symbol / Bore	Part number	CA	CC	CD	CF	ER	FW	J	KK	RA	RF
ϕ20	RTH-10-H	40	16	ϕ10H9	ϕ20	12	$10^{-0.1}_{-0.4}$	5	M10×1.25	52	17
ϕ25	RTH-12-H	48	18	ϕ12H9	ϕ24	14	$12^{-0.1}_{-0.4}$	6	M12×1.25	62	23
ϕ32	RTH-16-2-H	64	21	ϕ16H9	ϕ30	16	$16^{-0.1}_{-0.4}$	7	M16×1.5	80	28

Dimensional Table: Rod clevis (Y-end) with pin

Symbol / Bore	Part number	CA	CC	CD	CF	CP	CT	CV	ER	FW	KK	RA	RF
ϕ20	RYH-10-H	40	20	$\phi10^{H8}_{f8}$	ϕ18	30	□20	2.5	12	$10^{+0.4}_{+0.1}$	M10×1.25	52	—
ϕ25	RYH-12-H	48	24	$\phi12^{H8}_{f8}$	ϕ20	36.5	□24	3	14	$12^{+0.4}_{+0.1}$	M12×1.25	62	—
ϕ32	RYH-16-2-H	64	32	$\phi16^{H8}_{f8}$	ϕ26	52	□32	—	18	$16^{+0.4}_{+0.1}$	M16×1.5	82	28

Dimensional Table: Floating joint (F-end)

Symbol / Bore	Part number	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

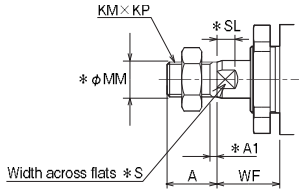
Change of rod end shape

■You can specify the shape and dimension of the rod end as shown below using the semi-standard symbols and dimension symbols. (No need to specify the dimension symbol if you order a cylinder with the basic dimension. Specify only the semi-standard symbol.)

How to order: Series | Model number | −× | Semi-standard symbol | Dimension symbol (Specify only when the dimension differs from the basic dimension.)

Semi-standard symbol: A54 (KM and KP need to be specified as a pair.)

Applicable dimension symbols: A KM KP WF



■The ＊-marked dimensions are fixed.
■If you want to change any fixed dimension, consult us.

Note 1)
The standard dimensions of A54 are the same as those of 100Z-1. When ordering a cylinder with the basic dimensions, the semi-standard symbol and dimension symbol are unnecessary.

Note 2)
When screw diameter (KM) and pitch (KP) are changed, the lock nut is not supplied.

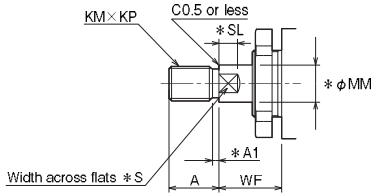
Table of Basic Dimensions (Standard dimensions)

Bore	A	＊A1	KM	KP	＊MM	＊S	＊SL	WF	Remarks
φ20	22	2	10	1.25	φ12	10	7	26	Even if KM or KP is changed, dimension A1 is 2.
φ25	24	2	12	1.25	φ14	12	7	28	
φ32	32	2	16	1.5	φ18	16	10	34	

Example)
Bore φ32, rod end shape: same as the standard (drilled), screw: M12×1.5, WF=60, and other dimensions are the same as the basic dimensions.
100Z-1 6LB32B200-X A54
KM12, KP-1.5, WF-60

Semi-standard symbol: A70 (KM and KP need to be specified as a pair.)

Applicable dimension symbols: A KM KP WF



■The ＊-marked dimensions are fixed.
■If you want to change any fixed dimension, consult us.

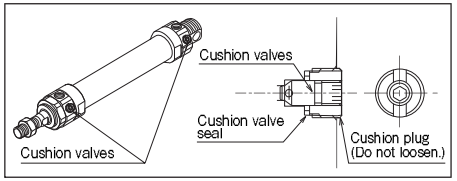
Note)
When this shape is specified, the rod end lock nut is not supplied.

Table of Basic Dimensions (Standard dimensions)

Bore	A	＊A1	KM	KP	＊MM	＊S	＊SL	WF	Remarks
φ20	15	3	10	1.25	φ12	10	7	26	Even if KM or KP is changed, dimension A1 is kept as shown right.
φ25	18	3	12	1.25	φ14	12	7	28	
φ32	25	4	16	1.5	φ18	16	10	34	

Example)
Bore φ25, rod end shape: A70, screw: M12×1.25, A=50, WF=40, and other dimensions are the same as the basic dimensions.
100Z-1R 6LB25B100-X A70
A-50, WF-40

How to adjust cushion



Adjust the cushion while gradually increasing the piston speed from a speed lower than 50 mm/s.

⚠CAUTION

The cushion has not been adjusted before shipment. Be sure to adjust it.

1) Turn only the cushion valve with a hex. wrench (2.5 mm) to adjust the speed.
- Turn clockwise, and the piston speed will be decreased.
- Turn counterclockwise, and the piston speed will be increased.

⚠CAUTION

If the valve is excessively turned counterclockwise, the cushion will not be effective. If it is excessively turned clockwise, the cushion will work so effectively that the piston may not operate full stroke. In addition, abnormal surge pressure may occur and damage the cylinder.

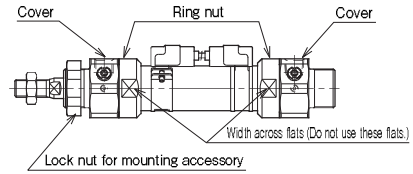
⚠CAUTION

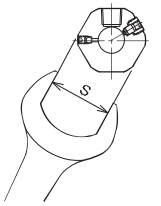
The cushioning mechanism in the cylinder is designed to prevent the cylinder being broken. For inertia force which cannot be absorbed by the cushioning mechanism, install an external inertia force absorbing device, or take measures on the hydraulic circuit.

Notes on installation

- When installing, do not use any width across flats of the ring nut. Doing so will loosen the threaded portions of the cover and ring nut.
  For installing, use cover width across flats without the cushion valve or the port.
- When the lock nut for mounting accessory is used for installation, tighten the lock nut applying the specified torque shown in the following table. If it is not tightened to the specified torque, it may become loose.

Bore (mm)	φ20	φ25	φ32
Mounting lock nut screw	M24×1.5	M27×1.5	M36×1.5
Width across flats of mounting lock nut (mm)	32	36	46
Tightening torque (N·m)	70	90	120





Width across flats of cover

Bore \ Symbol	S (mm)
φ20	36
φ25	41
φ32	50

Notes on assembly

- The piston rod and the piston cannot be disassembled.
- When overhauling the cylinder, replace all seals (seals and O-rings).
- When reassembling the cylinder, take care that dust and iron particles do not enter the cylinder.
- Before tightening the ring nuts, apply an appropriate amount of low-strength adhesive (ThreeBond 1342, etc.) to the threaded portions, and tighten them to the specified torque.

Bore (mm)	φ20	φ25	φ32
Ring nut screw	M30×1.5	M35×1.5	M45×1.5
Width across flats of ring nut (mm)	34	39	50
Tightening torque (N·m)	55	80	110

Precautions for use

- When operating the cylinder for the first time, take air bleeding from the cylinder at a low pressure. After air bleeding, run the cylinder at a reduced pressure, and gradually increase the pressure to the working pressure. However, keep the piston speed at 50 mm/s or so.
- When the cylinder has a cushion, adjust the cushion while gradually increasing the piston speed. (The cushion has not been adjusted before shipment.) If the piston speed is increased sharply at the start of operation, abnormal surge pressure will occur, and the cylinder or the machine may be damaged.

When disassembling the cylinder, replace all seals (gaskets).

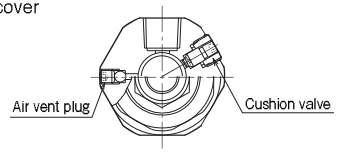
How to take air bleeding

⚠CAUTION

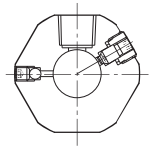
If the air vent plug is loosened excessively during air bleeding, the plug may come off the cylinder, and it may fly out or fluid may spout out.

[Positions of air vent plugs]

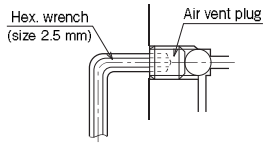
- Rod cover



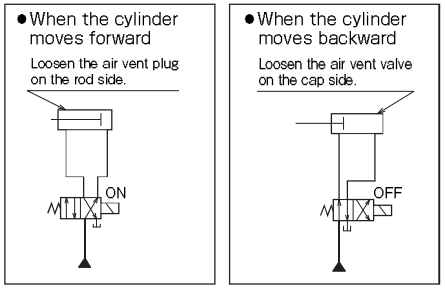
- Cap cover



[Detailed drawing of air vent plug]



- Feed the fluid at a low pressure (at which the cylinder operates at a low speed of about 10 mm/s) to the cylinder, and loosen (turn counterclockwise) the air vent plug on the rod cover side one or two turns to take air bleeding when the cylinder piston moves forward. When the piston moves backward, loosen the air vent plug on the cap cover side to take air bleeding.
- If air has accumulated in the cylinder, white turbid hydraulic fluid flows out of the air vent plugs. Air bleeding repeatedly until the white turbidity of the fluid is lost. After air bleeding, tighten the air vent plugs (tightening torque of 4 to 5 N·m), and make sure that the fluid does not leak.



- Air bleeding not only from the cylinder, but also from the piping. If free air is left in the piping, the following operation failures may occur.

Phenomena

- The cylinder causes stick-slip.
- Smooth speed control cannot be made.
- Temperature rise caused by adiabatic compression can damage the seals.
- Shock and vibration are given to the outside.