

100Z-1 Series

10 MPa round type tiny bore hydraulic cylinder with high-performance cushion

- 10 MPa tiny bore hydraulic cylinders, bore sizes ϕ 20, ϕ 25 and ϕ 32.
- ◆ Exclusive with the new Taiyo adjustable floating cushion for increased performance.
- Hydrogenated nitrile rubber is used as the material of seals for bearing surface, widens the applicable range of hydraulic fluid.
- Completely interchangeable as previous 70Z-1 Series
- New compact type switches AX and AZ





Renewed 70Z-1 Series

Standard type

Tiny bore round type hydraulic cylinder 100Z-1 Series

10 MPa tiny bore round type hydraulic cylinders with bores **\$20**, **\$25** and **\$32**

Completely interchangeable as previous 70Z-1 Series Dimension of cushion needle has been reduced drastically from cover face.

Switch

New floating cushion for improved performance and productivity.

Cushion valve

1. Adjustable cushion to all bore sizes.

2. Long cushioning stroke.

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D20B150-AH2

Dara	100	Z-1	70Z-1		
Bore	Cushion length	Parallel section length	Cushion length	Parallel section length	
¢20			. 8	3	
¢25	13	5	Fixed cushion on rod side	Fixed cushion on rod side	
ф 3 2			10	5	

3. New floating cushion provides effective cushioning and quick start of each stroke.

4. Cushion valve

- New design of cushion valve unable to come off from both covers for improved safety.
- New design of cushion valves make precise adjustment quick and easy.

Wide variation, easy maintenance with good design, also compact design switches AX and AZ as standard.

Switch set



AX211CE, AX215CE, AX21BCE, AZ211CE, AZ215CE, and AZ21BCE, conforming to CE, are also available. For details, contact us,

Suggestion of new hydraulic cylinder innovation

10 MPa type • Compact hydraulic cylinder (with our standard dimensions) • Standard built-in high-performance cushion Adoption of floating cushion • Enhanced safety countermeasures

Mounting is completely identical to that of 70Z-1 Series.





Comparison with 70Z-1 Series

1. Adoption of floating cushion improves start stroke performance



- 2. Adoption of cushion adjustable to all the bores
- 3. Output
 - Theoretical outputs when 10 MPa pressure is applied to 100Z-1 or 7 MPa is applied to 70Z-1

Output: Increased by 42%

Inappropriate handling of the products may lead to the unreliable performance or serious accidents. In order to prevent any accident, be sure to read carefully this catalogue, and fully understand the contents for safe handling.

Remember that your special attention must be paid to the messages with the words "DANGER", "WARNING", "CAUTION", and "NOTES". Non-observance of these messages may pose dangers to operators or machines. These are important safety messages and require your strict observance, adding to ISO4413, JIS B 8361 and other safety rules.

Related laws and rules

- ISO 4413 : Hydraulic fluid power-General rules for the application of equipment to transmission and control systems
- · JIS B 8361 : General rules for hydraulic system
- JIS B 8367 : Hydraulic cylinder
- High-pressure gas preservation law
- Labor safety and hygiene law
- · Fire laws
- JIS B 8243: Structure of pressure container
- NAS 1638 : Classification of contamination particles levels

Instructions in this catalogue

The instructions in this catalogue are classified into "DANGER", "WARNING", "CAUTION", and "NOTES", according to the degree of risk and hindrance.



These products have been designed and manufactured as a general industrial machine component.

🕂 Warning

Operators with sufficient knowledge and experiences should operate the equipment.

The assembly, operation, and maintenance of machines and devices using hydraulic equipment must be performed by only the persons with sufficient knowledge and experiences.

- Keep away from fire.
- Since highly ignitable working oil is used for hydraulic equipment, the possibility of fires is inevitable.
- Do not handle the machines and devices or remove the hydraulic cylinder until safety is confirmed.
 - Prior to removal of hydraulic cylinders, ensure that safety countermeasures are provided, the hydraulic power supply is stopped, and the pressure in the hydraulic circuit is lost.
 - Ensure the safety of prevention against the drop of matters to be driven before maintenance and service of machines and devices.
 - The temperature of a cylinder is very high right after operation is stopped. Ensure that the temperature of the cylinder and oil is low before removing the cylinder.
- When restarting the machines and devices, ensure that there is no abnormality in the bolts and other components, and slowly increase the pressure of the hydraulic source from low pressure to the set pressure.
- Mount protect covers if any danger may occur to operator's body. If there is any danger to operator's body by matters to be driven or the movable part of the cylinder, try to consider the structure so that any part of operator's body cannot touch them.
- Deceleration circuit or shock absorber may be required.
- When the speed of matters to be driven is excessively high, or the weight of them is excessively heavy, shock absorption by only the cylinder cushion may be difficult. In such a case, the provision of the deceleration circuit in front of the cushion or the external shock absorber is required as countermeasures against shocks. Also, take the hardness of machines and devices into consideration.
- Securely connect so that the fixed part and connecting part of the cylinder will not be loosened.
 - Use the bolts with the specified size and strength class for fixing the cylinder attachments, and clamp them with the specified clamping

torque. For rotary attachments, use the pin of the specified size. If the connection is inappropriate or the bolts or the pin with the size other than the specified may lead to the slackened or damaged bolts due to the driving force and reaction force of the cylinder.

- Use mounting components made of the material with sufficient hardness.
 DO NOT excessively loosen the air vent plug when venting air.
- The excessive loosening of the air vent plug may lead to coming-off or jumping of the plug from the cylinder, causing spouted oil, injury of operator, or misoperation of the cylinder.
- Consider the movements at an emergency stop.
- Consider the design without a risk of injuries of the operator or damages on machines and devices due to the cylinder movement, preparing for the case that the safety device is actuated to stop the machines at the emergency stop or system abnormalities due to power suspension.
- Check the specifications.
- The products in this catalogue have been designed and manufactured as general industrial machine components or steel working machinery components. DO NOT use them under the pressure, temperature, or operating environment out of the specified range. Otherwise, the breakage or malfunctions of the machines may occur.
- For electric components, such as switches, carefully check the specifications, including those of load current, temperature, and shocks. Otherwise, malfunction, breakage, or inflammable damages may occur.
- DO NOT make any modification on the products.
- Otherwise, injury, electric shocks, fires due to malfunctions may occur. • Take safety countermeasures into consideration, and contact us before
- using the products under the conditions and environment shown below. • The use of the products under the environment or conditions other than
- The use of the products under the environment of conditions other than specified and the use of them outdoors.
- Applications related to public safety (Ex.: machines or devices used for atomic, railway, aeronautics, car, medical, and entertainment industries, emergency shutdown circuit, brake circuit, and machines and devices which contact drinks and foods)
- Use in safety equipment.
- Applications requiring reliable safety.

\land Caution

(General precautions)

- When the weight of the cylinder exceeds 15 kg, use a lifting tool or a carrier.
- Keep good arrangement and cleanliness of the working site. The slippage due to oil leak may lead to a turnover. Keep clean, and try to find oil leak soon.
- When mounting a cylinder, be sure to perform centering. Otherwise, the rod and tube may be dis-ordered, causing the wear and breakage of the tube inside, surfaces of bush or rod, and packings. The rod may not move smoothly, causing stick slip or noise.
- When using the external guide, adjust it so that it is not disordered in any position of the stroke, or connect considering the connection of the rod end and loads.
- Use the working oil applicable to the material of the packings for the cylinder, and DO NOT mix working oil of other types. The recommended cleanliness of working oil is the grade NAS 12 or higher.

(Piping)

• Perform flushing before piping to reduce chips, cutting oil, dusts in the pipes.

Remove the cylinder before flushing to avoid the ingress of flushing fluid into the cylinder.

Application of sealing tape

When connecting pipings with sealing tape, apply the tape with one or two threads on the thread tip left.

When screwing pipings and fittings in, take care to avoid the ingress of chips or sealing material of the piping screw into the piping. When applying liquid packing to the fittings, similarly pay attention. Scraps of sealing tape or chips may cause oil leak or other malfunctions.

- When piping, take care to avoid air accumulation.
- When using steel pipe for piping, select proper size and avoid rusts and corrosion.
- If welding is required for piping, ground in other safety location to avoid ground current in the cylinder. The ground current between the bush and rod, cylinder tube and piston may lead to a spark, causing the damages on surfaces and malfunctions.

(Adjustment of cushion and air vent)

- Excessive loosening of the air vent plug during air vent may lead to coming-off or jumping of the air vent plug from the cylinder, causing spouted oil.
 - Feed oil under a low pressure (such that the cylinder can move at a low speed of approximately 10 mm/s), and loosen the air vent plug by one or two turns (counterclockwise) to vent air in the oil from the air vent valve.
- The initial increase of the piston speed during the cushion adjustment may lead to abnormal surge pressures, causing the damaged cylinder or machines.
 - Slowly increase the piston speed from the low speed of approx. 50 mm/s or lower to adjust the cushion.
 - When adjusting the cushion, adjust depending on matters to be driven (loads).
 - If the cushioning is excessive, the cylinder may not reach the stroke end due to the contained oil in the cushion.

(Notes on trial run and operation)

- Ensure that the machines and devices are correctly mounted. DO NOT start without the confirmation of no oil leak.
- Run with the minimum pressure to start the piston rod (the piston speed must be approx. 50 mm/s or lower), and ensure that it is worked smoothly.

(Maintenance and service)

- Perform maintenance and service (daily and regular inspection) to use cylinders safely for a long period.
- Prior to the maintenance and service, be sure to shut down the pressure source. Completely relieve the pressure in a cylinder.
- When relieving the pressure in a cylinder after shutting down the pressure source, the rod may be actuated with a load. Pay attention to the unexpected movement, and try to provide reliable safety countermeasures against it.

(Storage)

- DO NOT pile up cylinders. If any vibration is applied to the piled cylinders, they
 may become unfastened, causing an extreme danger and the damaged parts.
- DO NOT apply a vibration nor a shock to the stored cylinders, causing the damaged parts.
- Provide rust preventive measures to avoid rust occurrence to the stored cylinders.

(Wiring and connection)

 Prior to wiring, be sure to shut down the power supply to the electric circuit of the connection side.

Otherwise, the operator may get an electric shock during working, or the switches or load devices may be damaged.

 Pay attention to avoid bending, pulling, twist of the switch cord, causing broken wires.

Especially, provide appropriate measures to avoid any load applied to the end of the switch cord, including the fixing of the switch cord. When fixing the cord, do not clamp the cord excessively. Otherwise, the cord may be damaged, causing broken wires (of the cord).

Any load applied to the end of the cord may lead to the damaged electric circuit boards in the switches.

• The larger bending radius is better. If it is excessively small, the cord may be damaged. The recommended bending radius is twice of the cord dia. or larger.

(Wiring)

- If the connection distance is long, fix the cord every 20 cm to avoid a sag in the cord.
- When laying the cord on the floor, protect it by covering with metallic tubes to avoid direct treading on it or a crush under machines. Otherwise, the coating of the cord may be damaged, leading to the broken wires or short-circuit.
- The distance between the switches and load devices or power supply must be 10 m or shorter.

Otherwise, inrush current may occur to the switches during operation, causing the damaged switches.

 DO NOT bind the cord with high-voltage cables for other electric appliances, the power supply, nor with the power supply cord. NEVER perform wiring near these cables.

Otherwise, noises may enter the switch cord from the high-voltage cables and power source or power supply cable, causing the malfunctioned switches or load devices. It is recommended that the cord is protected with a shield tube.

(Connection)

- DO NOT directly connect the switches to the power supply. Be sure to connect them with the specified load devices, such as small relays and programmable controllers. Otherwise, short-circuit may occur, causing the inflammable damage of the switches.
- Carefully check the switches used, voltage of power supply and load devices, and current specifications.
 Inappropriate voltage or current specifications may lead to the malfunctioned or damaged switches.
- Perform wiring correctly according to the colors of lead wires. Prior to wiring, be sure to shut down the power supply to the electric circuit of the connection side.

Operation, wrong wiring, and short-circuit of load devices with electric current supplied may lead to the damaged switches and electric circuit in the load devices. Even if the short-circuit is momentary, it causes the inflammable damage of the main circuit or output circuit.

Adjustment of cushion



Adjust the cushion while gradually increasing the piston speed from a low speed not more than 50 mm/s.

≜CAUTION

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

- 1) Turn the cushion valve only with an Allen key wrench (2.5 mm) to adjust the speed.
 - Turn clockwise: Cushion stroke speed is decreased.
 - Turn counterclockwise: Cushion stroke speed is increased.

Excessive turn of the cushion valve counterclockwise may lead to failure in cushioning performance, while the same clockwise may lead to excessive cushioning performance, causing failure in full-stroke operation of the piston, or abnormal surge pressure causing damage to the cylinder.

The structure of cushioning, built in the cylinder, is equipped to prevent it from being damaged. As for the inertia force that cannot be absorbed by the structure of cushioning, install the inertia force absorber, or provide measurers in the hydraulic circuit.

Precautions for mounting

- DO NOT use the width across flats of the ring nut for mounting. Otherwise, threaded sections of the cover and ring nut may be slackened.
 Use the cover cushion valve and width across flats without port for mounting.
- When using the lock nuts for mounting accessories, tighten them with the specified torques shown below. Otherwise, they may be loosened.

Bore (mm)	¢20	¢25	¢32
Mounting lock nut	M24×1.5	M27×1.5	M36×1.5
Mounting lock nut width across flats (mm)	32	36	46
Tightening torque N•m	70	90	120





Precautions for assembly

- The piston rod and piston cannot be disassembled.
- When disassembling the cylinder, replace all the seals (packing and O-ring) with fresh ones.
- When assembling the cylinder, pay attention to prevent ingress of foreign matters including dusts and iron powders into the cylinder.
- When tightening the ring nuts, apply a moderate amount of adhesive of low adhesive strength (Three Bond 1342) to threaded sections, and tighten them with the specified torque.

Bore (mm)	¢20	¢25	¢32
Ring nut	M30×1.5	M35×1.5	M45×1.5
Ring nut width across flats (mm)	34	39	50
Tightening torque N•m	55	80	110

Precautions for use

- When initially operating the cylinder, be sure to vent air under a low pressure. After finishing air vent, operate the cylinder with the pressure decreased, and gradually increase the pressure to the operating pressure. Note that the piston speed must be kept approximately 50 mm/s.
- If the cylinder is equipped with the cushion, adjust the cushion while increasing the piston speed gradually. (The cushion has not been adjusted before delivery.)

If the piston speed is fast from the beginning, abnormal surge pressure may occur, causing damage to the cylinder or the machine.

When disassembling the cylinder, replace all the seals (packing and O-ring) with fresh ones.

Air vent

Excessive loosening of the air vent plug during air vent may lead to coming-off or jumping of the air vent plug from the cylinder, causing spouted oil.



• Feed oil under a low pressure (such that the cylinder can move at a low speed of approximately 10 mm/s), and loosen the air vent plug by one or two turns (counterclockwise) to vent air in the oil from the air vent valve while the cylinder piston is forwarded. In a similar manner, loosen the air vent plug on

the head cover side to vent air while the piston is reversed.
If air is trapped in the cylinder, white cloudy fluid

 If air is trapped in the cylinder, white cloudy fluid is bled from the air vent plug. Repeat air vent until bled fluid is clean. After venting air, tighten the air vent plug (with tightening torque from 4 to 5 N•m), and check for oil leak.





• Vent air trapped in the piping, as well as air trapped in the cylinder. Any trapped air may cause malfunctions shown below.

Malfunctions

- Stick slip may occur.
- Speed may not be controlled smoothly.
- Packing may be damaged due to increase in temperature caused by adiabatic compression.
- Shocks and vibrations may occur to the outside.

Maximum energy absorbed of cylinder cushion

The conditions of absorbed energy allowable for the cylinder cushion can be obtained from the formula below.

Inertia energy of load at the inrush into cushion E1	+	Energy generated by the external force applied to the cylinder at the inrush into cushion E2	Ś	Maximum energy absorbed of the cylinder cushion Et
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The procedures to find each item above are shown below.

Find the inertia energy of load at the inrush into cushion, E1. In the case of linear movement:					
$E_1 = MV^2/2$ (J)	M : load weight (kg)				
	V : load speed at the inrush into cushion (m/s)				
In the case of rotation	movement:				
$E_1 = I\omega^2/2 (J)$	I : inertia moment of load (kg • m ²)				
	ω : angular velocity of load at the inrush into cushion (rad/s)				
Notes: If the cylinder speed is less than 0.08 m/s (80 mm/s), the cushioning effect is weakened. Even if the cylinder speed is less than 0.08 m/s (80 mm/s), suppose it is 0.08 m/s to find the E1. In the case of rotation movement, even when the cylinder speed is 0.08 m/s or lower, similarly suppose it is 0.08 m/s, and calculate the angular velocity ω to find the E1.					
	\downarrow				
Find the energy generated by the external force applied to the cylinder at the inrush into cushion, E ₂ . The forces acting in the direction of the cylinder axis at the inrush into cushion are shown below. • The force applied to the cylinder by the gravity of load					

- The force applied by other cylinders
- The force applied to the cylinder by springs

Find the external force F, which is applied to the cylinder at the inrush into cushion, and the energy E_2 by using the "Chart of conversion of external force into energy at the inrush into cushion". In case that such an external force is not applied, the following condition is satisfied: $E_2 = 0$. For the selection of cushion, suppose that the frictional resistance of load is 0.

Ţ

Find the maximum energy absorbed of the cylinder cushion, Et.

Find it with the corresponding chart of the "Maximum energy absorbed". Remember that the maximum energy absorbed of the cylinder moving forward (the ejected direction of the piston rod from the cylinder) and that of the cylinder moving backward are identical.

Ensure that $E_1 + E_2$ is same as the maximum energy absorbed E_t , or smaller.

If the following condition is satisfied, the cylinder is applicable: E1 + E2 \leq Et.

If the following condition is satisfied, the cylinder is inapplicable: $E_1 + E_2 \ge E_t$. In such a case, perform the steps below, and then, select again.

- Decrease the inertia force of load.
- Decrease the external force applied to the cylinder.
- Lower the set pressure.
- Widen the cylinder bore.
- Install a shock absorber.

When installing a shock absorber, refer to the "TAIYO Shock absorber general catalogue".

DO NOT use the cylinder cushion together with a shock absorber. Otherwise, the inertia force of load may be applied to either of them due to the difference of cushioning characteristics.

Be sure to use cylinders within the range of the maximum energy absorbed of the cylinder cushion. Otherwise, the cylinder or the peripheral devices may be damaged, leading to serious accidents.

Chart of conversion of external force into energy at inrush into cushion of 100Z-1



100Z-1 Maximum energy absorbed



Line graph of allowable speed and load of 100Z-1 without cushion

If any load is provided for the end of the cylinder rod and stopped at the stroke end, inertia force of the load is applied to the cylinder. Allowable inertia force of the cylinder is shown below. Use the cylinder so that the inertia force does not exceed the allowable range.

The graph shown below is applicable when the load moves horizontally. If it moves in other directions (vertically or slantingly), decreased the speed by approximately 30 percent.



Be sure to check the allowable inertia force. Otherwise, inertia force of load generated by motion may cause serious damage to the cylinder. At this time, the cylinder may be damaged, leading to serious accidents. If the inertial force of load exceeds the allowable range, change the bore drastically and perform judgment again, or provide the external stopper to receive the inertia force of load.



Round type tiny bore hydraulic cylinder with cushion

- 10 MPa tiny bore hydraulic cylinders, bore sizes \$\$\\$20, \$\$\\$25 and \$\$\$22
- 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

100Z-1

Types	Standard type	Switch set			
Nominal pressure	10 M	ИРа			
Maximum allowable pressure	12 M	MPa			
Proof test pressure	15 N	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				
Talaranaa of atraka	100 mm or lower +0	^{0.8} 101 - 250 mm +1.0			
Interance of stroke	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)
- Note 2)

Operating temperature range depends on materials of packings.

For details, refer to the next page.

Allowable stroke as standard

Min. stroke for switch mounting

Unit: mm

ches

Bore	Stroke	Bore	With a switch	With two swite
¢20	800 max.	¢20		
¢25	800 max.	¢25	15	25
\$32	850 max.	\$32		

Unit: mm

• 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.

Lines **¢20** ф25 φ32 Structure Туре Standard type 100Z-1 **Double Acting** Single Rod Switch set 100Z-1R

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

Double Acting Single Rod

General purpose typ

Double Acting Single	Cushion strok	Unit: mm			
		Bore	Cushion ring effective length L	Cushion ring parallel part length Q	Cushion type
		¢20• ¢25• ¢32	13	5	Adjustable cushion
:00	:00	 The cushion stroke len In case that cylinders stopped 2 mm or more weakened. In such a 	gths in case of cy are not used up to e before the strok case, contact us.	linders used up to th o the stroke end, and e end, the cushionin	ie stroke end. J they are g effect will be
Standard type (100Z-1)	Switch set (100Z-1R)		→ R	R	

Cushion stroke length

Adaptability of fluid to seal material and operating temperature range.

e	Soal		Adap	table work	ing oil		Oil temperature and ambient temperature ($^{\circ}$ C)					2)
Cod	material	Petroleum- based fluid	Water-glycol fluid	Phosphate ester fluid	W/O Water in oil fluid	O/W Oil in water fluid	-5	50 –10 0	50	80 1	00 120	150
1	Nitrile rubber	0	0	×	0	0						
6	Hydrogenated nitrile rubber	O	0	×	0	0					Notes)	

Notes) • The \bigcirc and \bigcirc -marked items are applicable, while the \times -marked items are inapplicable.

 $1.80 + (200 \times 0.0056) + (0.05 \times 2) + 0.69 + 0.20 = 3.91$ kg

• The O-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

	Standard type • Switch set		Switch additional weight					Red and attachment weight				
Bore	Bore 100Z-1 • 100Z-1R		100Z-1R	AX type			Weight of mounting		Rod end allachment weight			
mm	Basic	weight	Additional weight	Cord length Cord length		Connector type	accessories		Rod end eye	Rod end clevis	Floating joint	
	SD type	CA type	per 1 mm stroke	1.5m	5m		LB	FA	(T-end)	(Y-end) with pin	(F-end)	
¢20	0.79	0.76	0.0022				0.28	0.13	0.08	0.10	0.11	
¢25	1.05	1.00	0.0033	0.05	0.11	0.04	0.28	0.19	0.13	0.10	0.19	
¢32	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 100Z-1R Bore \$32, cylinder stroke 200 mm, AX111 (cord length 1.5 m) 2 pcs., LB type, rod end eye (T-end)

Calculation example

100Z-1



100Z-1



Standard type

- With both end cushioned
- Packing material

Rod packing and dust wiper: Hydrogenated nitrile rubber Piston packing: Hydrogenated nitrile rubber Nitrile rubber or hydrogenated nitrile rubber (Note) Fixing O-ring: (Note) If the packing material code is 6, material of the fixing O-ring is hydrogenated nitrile rubber.

Unit: mm

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	Туре
¢20	LNA-10F-H
¢25	LNA-12F-H
¢32	LNA-16F-H

Allowable stroke as standard

Bore	Stroke
¢20	800 max.
¢25	800 max.
¢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

1	Ini	t٠	m	m

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

Adaptability of working oil to packing material

		Adapta	able work	king oil	
Packing material	Petroleum- based fluid	Water- glycol fluid	Phosphate ester fluid	W/O Water in oil fluid	O/W Oil in water fluid
1 Nitrile rubber	0	0	×	0	0
6 Hydrogenated nitrile rubber	O	O	×	O	O

Notes) 1. The \odot and \bigcirc -marked items are applicable, while the \times -marked items are inapplicable.

> 2. The O -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
	AF AX101				Nono	. ==		1.5m	
	AG AX105	DC:5 - 30V	DC:5 - 40mA		None	LED (red light lights	0.2mm ² 2.00 ro	5m	
	AH AX111	AC:5 - 120V	AC:5 - 20mA	DC:1.5W	Present	up during ON)	outside diameter	1.5m	
	AJ AX115			AC:2VA	1100011		¢4mm	5m	
	AF AX125	DC:30V or less	DC:40mA or less		None	None	Rear wiring	5m	
		AC:120V or less	AC:20mA or less		None	None		om	
÷	AK AX11A	AC:5 - 120V	5 - 20mA	2VA	Present	LED (red light lights	4-pin connector type	0.5m	Small relay
ntac	AL AX11B	DC:5 - 30V	5 - 40mA	1.5W	11000111	up during ON)	Rear wiring	0.5m	programmable
CO	AP AZ101				None			1.5m	controller
	AR AZ105	DC:5 - 30V	DC:5 - 40mA			(red light lights	0.3mm ² 2-core.	5m	
	AS AZ111	AC:5 - 120V	AC:5 - 20mA	DC:1.5W	Present	up during ON)	outside diameter	1.5m	
	AT AZ115			AC:2VA			¢4mm Upper wiring	5m	
	AN AZ125	DC:30V or less	DC:40mA or less		None	None	oppor mining	5m	
		AC:120V or less	AC:20mA or less						
	AU AZ11A	AC:5 - 120V	5 - 20mA	2VA	Present	(red light lights	4-pin connector type	0.5m	
	AW AZ11B	DC:5 - 30V	5 - 40mA	1.5W		up during ON)	Upper wiring	0.5m	
	BE AX201					(red light lights	0.3mm ² 2-core,	1.5m	
	BF AX205					up during ON)	outside diameter	5m	
	CE AX211						04mm Rear wiring	1.5m	
act	CF AX215					(2-lamp type in		5m	0
conte	CH AX21C	DC:5 - 30V	5 - 40mA		Present	red/green)	4-pin connector type	0.5m	programmable
90	CJ AX21D						Rear Wiring	1m	controller
_	BM AZ201					(red light lights	0.3mm ² 2-core,	1.5m	
	BN AZ205					up during ON)	outside diameter	5m	
	CM AZ211					(2-lamp type in	Upper wiring	1.5m	
	CN AZ215					red/green)	0.3mm ² 2-core	5m	
÷	CT AX211CE						outside diameter	1.5m	
act mec	CU AX215CE					LED	Rear wiring	5m	Small relay
Sont	CV AX21BCE	DC:5 - 30V	5 - 40mA		Present	(2-lamp type in	Rear wiring	0.5m	programmable
Nосо	CW AZ211CE					red/green)	outside diameter 04mm	1.5m	controller
-0	CX AZ215CE						Upper wiring	5m	
	CY AZ21BCE						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.



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

Dimensional t	able
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Symbol Bore	A	в	B1	B2	с	D	DD		DM	E	EB	E	E	FP	н	h	J	к	КК
¢20	22	20	17	32	12	10	$M24 \times$	1.5	ф25	¢38	36	Rc	1/8	31.5	31	6	16	15.5	$\text{M10}\times\text{1.25}$
¢25	24	22	19	36	14	12	$M27 \times$	1.5	¢31	¢44	41	Rc	1/4	35.5	31	7	20	15.5	$M12 \times 1.25$
¢32	32	30	22	46	17	16	$M36 \times$	1.5	 \$40	¢53	50	Rc	1/4	37	33	10	20	17	M16 × 1.5
Symbol Bore	LL	ММ	Р		Q	RH	SL	VF	w	FY	P	ZJ	z	Z					
φ 2 0	94	φ12	78	φ.	24f8	8	7	16	26	6	8	120	15	58					
¢25	102	¢14	82	\$	27f8	10	7	18	28	3 1	0	130	17	72					
¢32	107	φ18	87	φ	36f8	10	10	21	34	1	0	141	19	94					

• Tolerance of MM is f8.



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

Symbol Bore	А	AB	AE	AF	1	AL	AO	AT	в	B1	B2	D	EE	FP	н	h	КК
ф20	22	 \$7	48	30±0).25	25	10	7	20	17	32	10	Rc1/8	31.5	31	6	M10 imes 1.25
ф 2 5	24	φ7	52.5	32±0	0.25	27	10	7	22	19	36	12	Rc1/4	35.5	31	7	M12 × 1.25
¢32	32	φ9	66	40±0	0.25	35	12	10	30	22	46	16	Rc1/4	37	33	10	M16 × 1.5
Symbol																	
Bore	MM	Р	R	RH	SA	SL	UA	VF	WF	XA	YP	ZA					
φ 2 0	¢12	78	25	7.5	144	7	41	16	26	145	8	177	,				
ф 2 5	¢14	82	28	9.5	156	7	44	18	28	157	10	191					
¢32	 \$18	87	33	9.5	177	10	54	21	34	176	10	220)				

Dimensional table

• Tolerance of MM is f8.

Unit: mm



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

Symbol Bore	A	В	B1	B2	[5	EE	EF	F	FB	FP	Н	h	КК	MM
ф20	22	20	17	32	1	0 F	Rc1/8	38	6	¢6.6	31.5	31	6	M10×1.25	¢12
ф25	24	22	19	36	1	2 F	Rc1/4	44	6	¢6.6	35.5	31	7	M12 × 1.25	¢14
¢32	32	30	22	46	1	6 F	Rc1/4	50	9	φ9	37	33	10	M16 × 1.5	 \$18
Symbol Bore	Ρ	R	RH	SL	TF	UF	VF	WF	YP	zx	ZZ				
ф20	78	25	8	7	50	65	16	26	8	110	158				
ф25	82	25	10	7	55	72	18	28	10	120	172				
¢32	87	25	10	10	84	104	21	34	10	128	194				

Dimensional table

• Tolerance of MM is f8.

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

Symbol Bore	A	В	Bı	CD	D		E	EB	EE	EW	FP	Н	h	КК	L
ф 2 0	22	20	17	\$10H	9 10)	38	36	Rc1/8	10 -0.22	31.5	31	6	M10 × 1.25	17
ф 2 5	24	22	19	\$12H	9 12	2 ¢4	44	41	Rc1/4	12 -0.27	35.5	31	7	M12 imes 1.25	19
¢32	32	30	22	¢16H	9 16	5 	53	50	Rc1/4	16 - _{0.27}	37	33	10	M16 imes 1.5	22
Symbol Bore	LL	LR	MM	MR	Ρ	SL	WF	F XO	C YP	ZC					
Symbol Bore ¢20	LL 94	LR R15	MM ¢12	MR R14	P 78	SL 7	WF 26	F X0	C YP 7 8	ZC 171					
Symbol Bore ¢20 ¢25	LL 94 102	LR R15 R17	MM ¢12 ¢14	MR R14 R16	P 78 82	SL 7 7	WF 26 28	F X0 6 13 3 14	C YP 7 8 9 10	ZC 171 187					

Dimensional table

• Tolerance of MM is f8.





AZ type



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Dimensional table

Symbol	PC	Con	tact	No contact				
	KG	UX ₁	UX ₂	UX ₁	UX ₂			
Bore	AX type	AX1 **	AX1 **	AX2**	AX2**			
[¢] 20	27	10	3.5	10	3.5			
¢25	30	10	4	10	4			
¢32	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	Cont	act	No contact					
	AX1 ** •	AZ1 **	AX2** •AZ2**					
Bore	Working range	Difference	Working range	Difference				
¢20	5-11							
ф 25	7-12	2 or smaller	4-7	1 or smaller				
¢32	8-14							

Installation to detecting position of switch

AX and AZ types





- 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.
- 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).

RF

Rod end attachment

• Rod end eye (T-end)





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• Rod end clevis (Y-end) with pin







• Floating joint (F-end)



Dimensional table/rod end eye (T-end)

Symbol Bore	Part code	СА	сс	CD	CF	ER	FW	J	КК	RA	RF
¢20	RTH-10-H	40	16	¢10Н9	20	12	$10 \ ^{-0.1}_{-0.4}$	5	M10 × 1.25	52	17
¢25	RTH-12-H	48	18	ф12Н9	24	14	12 ^{-0.1} -0.4	6	M12 × 1.25	62	23
¢32	RTH-16-2-H	64	21	ф16Н9	30	16	$16 \ ^{-0.1}_{-0.4}$	7	M16 imes 1.5	80	28

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

Symbol Bore	Part code	CA	сс	CD	CF	СР	СТ	CV	ER	FW	КК	RA	RF
¢20	RYH-10-H	40	20	ф10 <u>Н8</u>	ф18	30	□20	2.5	12	10 ^{+0.4} +0.1	M10 imes 1.25	52	—
¢25	RYH-12-H	48	24	ф12 <u>Н8</u>	¢20	36.5	□24	3	14	12 +0.4 +0.1	M12 imes 1.25	62	—
¢32	RYH-16-2-H	64	32	ф16 <u>Н8</u>	ф26	52	□32		18	16 ^{+0.4} +0.1	M16 × 1.5	82	28

Dimensional table/floating joint (F-end)

Symbol Bore	Part code	A	B1	B2	е	FA	FC	FD	FJ	FK	FM	FN	FQ	FR	h	KK
¢20	RFH-10	20.5	17	10	1	29	30	4	59	11	¢25	24	4.5	18	6	M10 × 1.25
¢25	RFH-12	24	19	13	1	33	36.5	9	69.5	13.5	¢32	19	7	20.5	7	M12 imes 1.25
¢32	RFH-16	32	22	17	1.5	43	46	13	89	16	¢40	24	8	28	10	M16 imes 1.5

• Dimensions indicated by *Mark are fixed as our

· You are requested to consult us if you would like

semi-standard.

Note 1)

to change fixed dimensions.

Lock nut is not attached in case of A70.

Special specification at the rod end

100Z-1

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



Bore *****A1 KM KP *MM *S *SL WF Remarks Α *ø*20 22 2 10 1.25 *ø*12 10 7 26 **Dimension A1** is fixed as 2mm *ø*14 *¢*25 24 2 12 1.25 12 7 26 to any KM and *ø*32 32 2 16 1.5 *ф*16 16 10 34 KP

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



The basic dimension table (Standard dimension)

Bore	А	* A1	KM	KP	*MM	*S	*SL	WF	Remarks
<i>φ</i> 20	15	3	10	1.25	<i>ø</i> 12	10	7	26	Dimension A1
<i>φ</i> 25	10	3	12	1.25	<i>ф</i> 14	12	7	26	is fixed as in the
<i>ø</i> 32	25	4	16	1.5	<i>ф</i> 18	16	10	34	and KP.

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



Parts list

Nie	Nomo	Metorial	Q'ty		
INO.	Name	IVIALEI IAI	w/cushion	w/o cushion	
1	Cylinder tube	Standard type: Carbon steel for machine structural use Switch set: Stainless steel	1	1	
2	Rod cover	Carbon steel for machine structural use	1	1	
3	Head cover	Carbon steel for machine structural use	1	1	
4	Piston nut	Stainless steel	1	1	
5	Piston	Special copper alloy	1	1	
6	Piston rod	Standard type: Carbon steel for machine structural use Switch set: Stainless steel	1	1	
7	Cushion ring	Stainless steel	1	0	
8	Float ring	Special copper alloy	2	0	
9	Centering ring	Special copper alloy	2	2	
10	Stop ring	Piano wire	2	2	
1	Ring nut	Carbon steel for machine structural use	2	2	
Ð	Lock nut for mounting accessories	General structural rolled steel	1	1	
13	Magnet	(Not attached to the standard type)	_	_	
14	Set screw	Chrome molybdenum steel	1	1	
15	Cushion valve	Chrome molybdenum steel	2	0	
16	Cushion plug	Carbon steel for machine structural use	2	0	
T	Air vent plug	Chrome molybdenum steel	2	2	
18	Check ball	High carbon chromium bearing steel	2	2	
19	O-ring for piston rod	Nitrile rubber	1	1	
20	Lock nut for rod end attachment	General structural rolled steel	1	1	
21	Switch		_	_	

• Since the piston nut (4), piston (5), and piston rod (6) are locked, the O-ring for piston rod (19) cannot be disassembled or replaced.

• The lock nut 20 is not provided for the rod end shape A70 type.

Packing list 1 Nitrile rubber/100Z-1, 100Z-1R

Na	Porto nomo	Matorial	O'ty	Parts code						
INO.	Faits hame	Material	Qty	¢20	¢25	¢32				
22	Piston packing	Hydrogenated nitrile rubber	1	NCHY-20	NCHY-25	NCHY-32				
23	Rod packing	Hydrogenated nitrile rubber	1	UHY-12	UHY-14	UHR-18				
24	Dust wiper	Hydrogenated nitrile rubber	1	LPH-12	LPH-14	DHS-18				
25	O-ring for cover	Nitrile rubber	2	S-18	S-22	S-29				
26	O-ring for centering ring	Nitrile rubber	2	S-22	S-26	S-34				
27	Cushion valve seal	Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H				
Packing set	Double acting single rod cylinder		1set	QZ1/PKS1-020	QZ1/PKS1-025	QZ1/PKS1-032				

6 Hydrogenated nitrile rubber (semi-standard)/100Z-1, 100Z-1R

Na	Derte norme	Motorial	0.4	Parts code						
INO.	lo. Parts name	Material	Qiy	¢20	¢25	¢32				
22	Piston packing	Hydrogenated nitrile rubber	1	NCHY-20	NCHY-25	NCHY-32				
23	Rod packing	Hydrogenated nitrile rubber	1	UHY-12	UHY-14	UHR-18				
24	Dust wiper	Hydrogenated nitrile rubber	1	LPH-12	LPH-14	DHS-18				
25	O-ring for cover	Hydrogenated nitrile rubber	2	S-18	S-22	S-29				
26	O-ring for centering ring	Hydrogenated nitrile rubber	2	S-22	S-26	S-34				
27	Cushion valve seal	Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H				
Packing set	Double acting single rod cylinder		1set	QZ1/PKS6-020	QZ1/PKS6-025	QZ1/PKS6-032				

Notes)

When replacing the cushion valve seal, remove the cushion plug with the attached hexagon head tool.
Nominal models of packings may subject to change.

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