TAIYO Parker

10 MPa double-acting type hydraulic cylinder

100H-2 SERIES

Lightweight and compact body realized by conformity to ISO 10762/JIS B8367-5 standard.

- New floating cushion provides effective cushioning and quick start of each stroke.
- 10 MPa double acting hydraulic cylinders with bores from 32 mm to 125 mm
- Seals in sliding sections conform to ISO standards for packing groove

NEW CAT.A11-524a

NEW

Suggestion of new hydraulic cylinder era

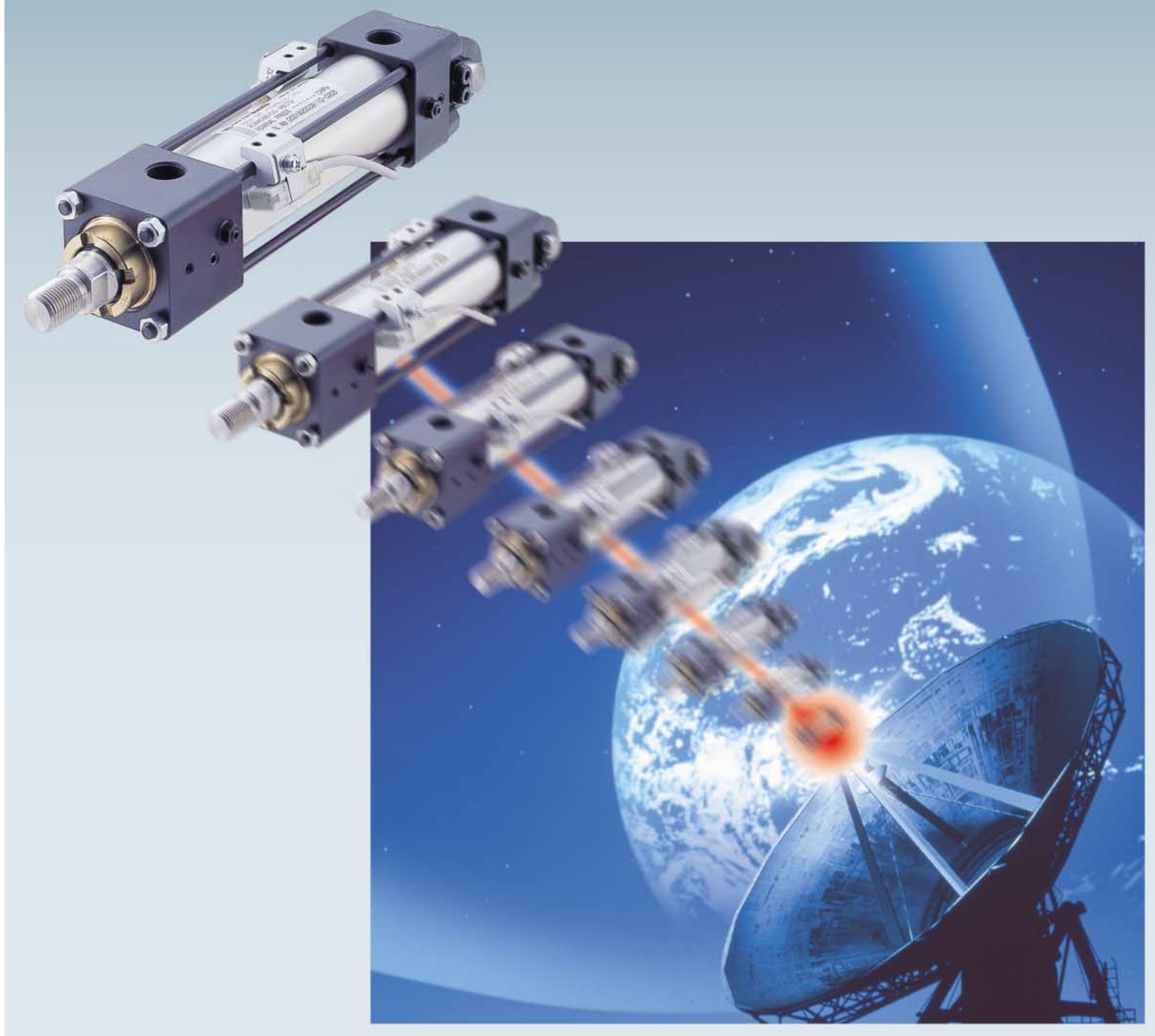
- Designed to ISO 10762
- New floating cushion
- High-performance cushion
- Various models
- Switches set

100H-2 SERIES

10 MPa double-acting type hydraulic cylinder with bores from 32 mm to 125 mm

Conformance to both ISO and JIS standards is enhanced, with the spread of global standards for hydraulic cylinders.

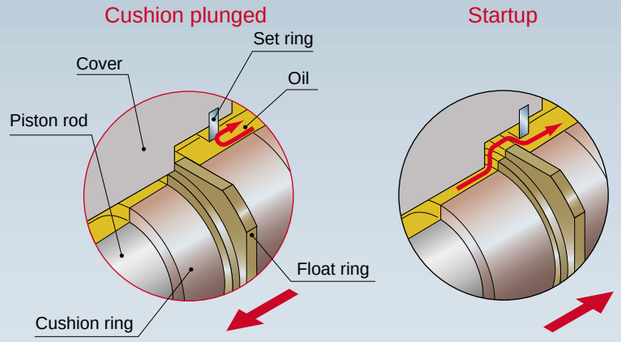
100H-2 Series cylinders conform to ISO 10762 (JIS B8367-5).



Features

■**Designed to ISO10762 (JIS B8367-5)**

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



■**Switches can be used to all bore sizes in standard, 32 mm to 125 mm.**

■**Seals in sliding sections were designed to ISO standard.**

■**Various models**

- 7 types of bores from 32 mm to 125 mm, 10 types of mounting styles
- Double-rod type is also available
- Rod B series
- Piping ports are applicable to Rc (tapered thread) and G (BSPP)
- Cylinders with boots or rod end attachment are available

■**Succeeded features of 140H-8 and 160H-1 Series**

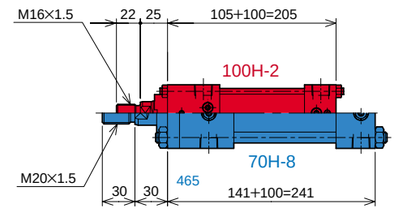
- High-performance cushion
- Cushion valve easy to adjust
- Small switches AX and AZ, with great variety and improved maintainability

■ Comparison to 70H-8 Series

1. Compact body

■SD type with 40 mm bore and 100 mm stroke

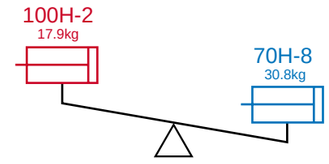
Mounting length: Reduced by 16%



2. Weight

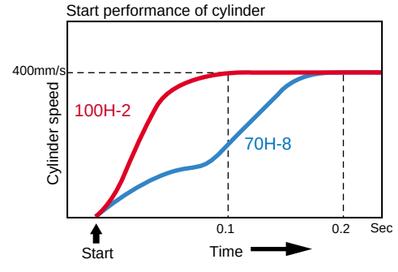
■SD type with 100 mm bore and 100 mm stroke

Weight: Reduced by 42%



3. Improved start performance by new floating cushion

■With 63 mm bore, 500 kg load



4. Output

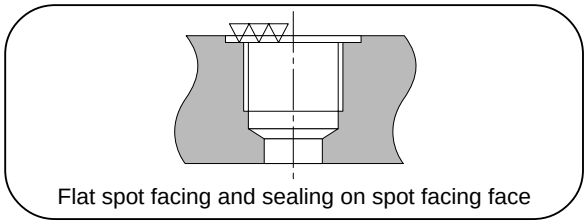
■Theoretical outputs when 10 MPa pressure is applied to 100H-2 and 7 MPa is applied to 70H-8

Output: Increased by 14%

1. General port G thread types

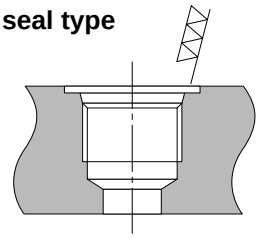
Two types of port G threads, flat surface type and corner O-ring seal type, are mainly used for hydraulic cylinders. We adopted the flat surface type as the standard type.

● **Flat surface type**



Flat spot facing and sealing on spot facing face

● **Corner O-ring seal type**



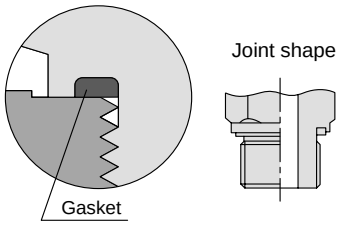
Tapering to fit O-ring and sealing with O-ring

2. Sealing methods and joint types

■ **Flat surface type**

● **Elastomer joint**

Sealing with using the gasket for the joint to be sealed on the end face.



● **O-ring seal joint**

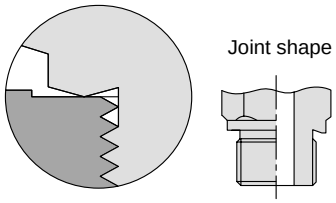
Sealing with using the O-ring. The metal ring is fitted to the O-ring on the outside. As for another type, the backup washer is fitted onto the O-ring, and tightened with the lock nut in order to change the angle of the joint.

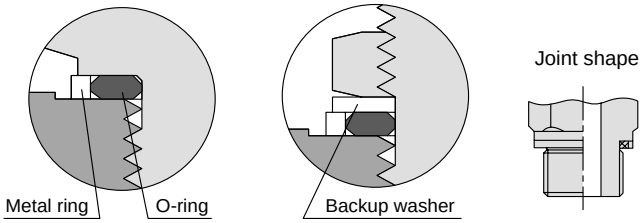
■ **Corner O-ring sealing type**

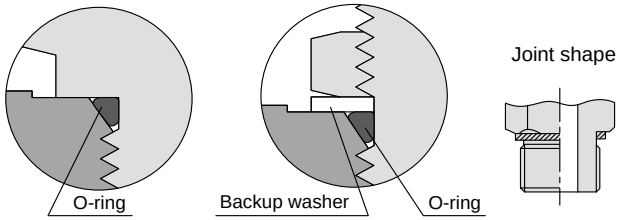
The O-ring is fitted to the tapered section for sealing. As for another type, the backup washer is fitted onto the O-ring, and tightened with the lock nut in order to change the angle of the joint.

● **Edge seal joint**

Sealing by tightening force with the metal surfaces come into contact with each other.





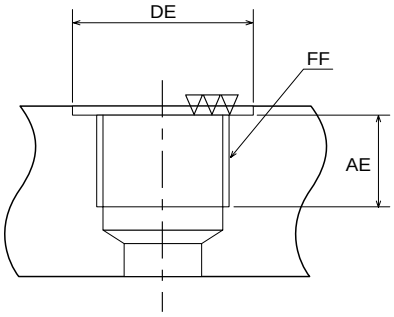


3. TAIYO standard G thread sizes

■ **All the joints for flat surfaces are usable.**

Unit : mm

FF port dia	DE	AE
G1/8	17.2	8
G1/4	21.5	12
G3/8	25.5	12
G1/2	30	14
G3/4	36.9	16
G1	46.1	18



4. Applicable series and port sizes

Unit : mm

Series	Bore (mm)											
	ϕ20	ϕ25	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125	ϕ140	ϕ150	ϕ160
100H-2	—	—	○	○	○	○	○	○	○	—	—	—
	—	—	G1/4	G3/8	G3/8	G1/2	G1/2	G3/4	G3/4	—	—	—

Note) ● Spacers for the rod side ports are provided for the 100H-2 with 32 mm bore. Be sure to use them for piping.

10 MPa double-acting hydraulic cylinder 100H-2 SERIES

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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

- High-pressure gas preservation law
- Labor safety and hygiene law
- Fire laws
- ISO 4413 : Hydraulic fluid power-General rules for the application of equipment to transmission and control systems
- ISO 7425-1 : Hydraulic fluid power-Housings for elastomer-energized, plastic-faced seals-Dimensions and tolerances- (applicable to the piston packings for 160H-1 Series)
- ISO 5597 : Hydraulic fluid power-Cylinders-Housings for piston and rod seals in reciprocating applications- Dimensions and tolerances- (applicable to the piston packings (U-packings) and rod packings for 160H-1 Series)
- ISO 6195 : Fluid power systems and components-Cylinders-Housing for rod wiper rings in reciprocating applications- Dimensions and tolerances (applicable to the wiper rings for 160H-1 Series)
- JIS B 8361 : General rules for hydraulic system
- JIS B 8367-5 : Hydraulic cylinder
- 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.

⚠ DANGER	Imminent hazardous situation. Unless the situation is avoided, loss of life or serious injury may occur.
⚠ WARNING	Potential hazardous situation. Unless the situation is avoided, loss of life or serious injury may occur.
⚠ CAUTION	Potential hazardous situation. Unless the situation is avoided, slight or medium injury, or physical damages may occur.
⚠ NOTES	Instructions which are required to be followed for appropriate use of the products.

■ 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 loosen the air vent valve excessively during air vent.
  Excessive loosening of the air vent valve may lead to coming-off or jumping of the air vent valve from the cylinder, causing spouted oil, leading to injury or malfunction 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. 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 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.

● If you have any question, contact us.

⚠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 disordered, 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 air vent and cushion)

- Excessive loosening of the air vent valve during air vent may lead to coming-off or jumping of the air vent valve 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 valve by one or two turns (counterclockwise) to vent air in the oil from the air vent valve.
  - For cylinders without air vent valves, install throttle valves to vent air.
- 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)

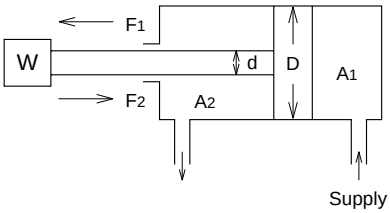
- If the connection distance is long, fix the cord every 20 cm to avoid a sag in the cord.
- When laying the cord on the floor, protect it by covering with metallic tubes to avoid direct treading on it or a crush under machines. Otherwise, the coating of the cord may be damaged, leading to the broken 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.

Selection of cylinder bore

The bore of a hydraulic cylinder depends on the required cylinder force.



- Push side cylinder force
- $F_1 = A_1 \times P \times \beta$ (N)

Pull side cylinder force

$F_2 = A_2 \times P \times \beta$ (N)

The hydraulic cylinder theoretical output table is based on the calculation results of the formula above.

A_1 : Out stroke piston pressurized area (mm^2) $A_1 = \frac{\pi}{4} D^2$

A_2 : Retract stroke piston pressurized area (mm^2) $A_2 = \frac{\pi}{4} (D^2 - d^2)$

D : cylinder bore (mm) d: piston rod dia. (mm)

P : set pressure (MPa)

β : load rate

When deciding the actual cylinder output, the resistance in the cylinder slipping part and the pressure loss in piping and machines must be considered.
The load rate is the ratio of the actual force loaded onto the cylinder to the theoretical force (theoretical cylinder force) calculated from the circuit set pressure. The general set points are shown below.

For low speed working ..... 60 to 80%
For high speed working ..... 25 to 35%

Theoretical output table at out stroke (load rate 100%)

Unit : kN (1kN ≒102kgf)

Bore mm	Pressurized area mm^2	Set pressure MPa						
		1.0	3.5	5.0	7.0	10.0	14.0	16.0
ϕ32	804	0.80	2.81	4.02	5.63	8.04	11.26	12.86
ϕ40	1257	1.26	4.40	6.28	8.80	12.57	17.59	20.11
ϕ50	1963	1.96	6.87	9.82	13.74	19.63	27.49	31.40
ϕ63	3117	3.12	10.91	15.59	21.82	31.17	43.64	49.88
ϕ80	5027	5.03	17.59	25.13	35.19	50.27	70.37	80.42
ϕ100	7854	7.85	27.49	39.27	54.98	78.54	109.96	125.66
ϕ125	12272	12.27	42.95	61.36	85.90	122.72	171.81	196.35

Theoretical output table at retract stroke (load rate 100%)

Unit : kN (1kN ≒102kgf)

Series type	Bore mm	Rod dia. mm	Pressurized area mm^2	Set pressure MPa						
				1.0	3.5	5.0	7.0	10.0	14.0	16.0
100H-2	ϕ32	ϕ18	550	0.55	1.92	2.75	3.85	5.50	7.70	8.80
	ϕ40	ϕ22	877	0.88	3.07	4.38	6.14	8.77	12.27	14.02
	ϕ50	ϕ28	1348	1.35	4.72	6.74	9.43	13.48	18.87	21.56
	ϕ63	ϕ36	2099	2.10	7.35	10.50	14.70	20.99	29.39	33.59
	ϕ80	ϕ45	3436	3.44	12.03	17.18	24.05	34.36	48.11	54.98
	ϕ100	ϕ56	5391	5.39	18.87	26.95	37.74	53.91	75.47	86.26
	ϕ125	ϕ70	8423	8.42	29.48	42.12	58.96	84.23	117.93	134.77

Notes)
- When deciding the actual cylinder output, consider the resistance in the cylinder slipping part and the pressure loss in piping and machines.
- Remember that the output at start may be decreased when the piston comes to a close contact status at the stroke end due to a load.

Calculation of cylinder buckling

1) Be sure to calculate the cylinder buckling.

2) In the case of using a hydraulic cylinder, the stress and buckling must be considered depending on the cylinder stroke.
The strength in the case that the piston rod is regarded as a long column, the buckling strength, cannot be enhanced by adopting highly tension-proof steel or heat treatment. The only way to improve the buckling strength of a cylinder is to widen the piston rod dia., and therefore, the selection of the piston rod is the very important point.
The buckling chart shown in the next page, based on the Euler's equation that is applicable to an upright long column, indicates the maximum safe L values against the piston rod dia. when the cylinder is used with the compressive load that is most frequently applied.

3) When buckling occurs to a cylinder, the cylinder rod may be bent, causing malfunctions or serious accidents.

Calculation method of cylinder buckling (use of buckling chart)

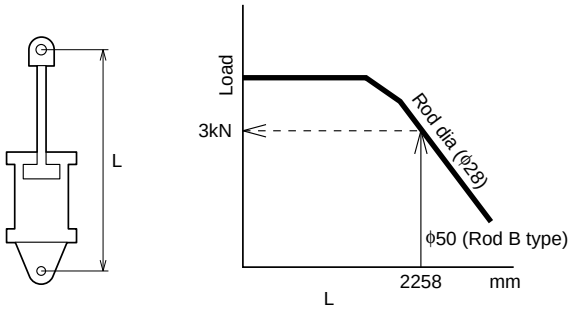
1. Find the L value (distance between the cylinder mounting position and load mounting position) with a cylinder fully extended.
2. Select any buckling chart depending on the mounting style, and find the maximum working load.

< Exercise >

Find the maximum working load for the 100H-2, ϕ50, rod B (rod dia. ϕ28), in case that the stroke is 1000 mm, CA type with the rod end eye.

< Answer >

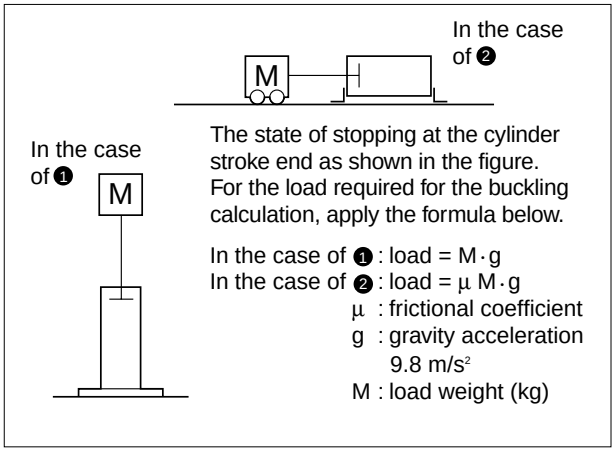
1. Find the L value with the cylinder fully extended.
From the dimensional drawings in this catalogue, the L value can be calculated by the formula below.
L = 158 + 67+ 1000 + 1000 = 2225 mm
2. From the buckling chart of the both ends pin joints, the load can be found as below.
W = 3 kN (≒306 kgf)



Notes on piston rod buckling

Prior to the calculation of the piston rod buckling, consider the cylinder stopping method. The stopping methods of a cylinder include the cylinder stopping method, in which a cylinder is stopped at the stroke end, and the external stopping method, in which a cylinder is stopped with the external stopper. The definition of load differs depending on the selection of the stopping method as shown below.

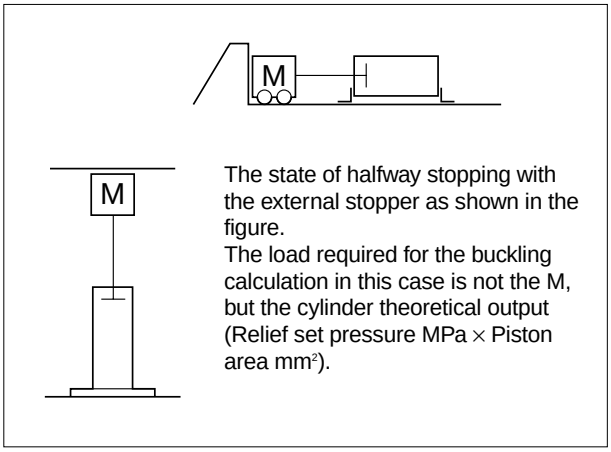
- Definition of a load when the cylinder stopping method is selected



The state of stopping at the cylinder stroke end as shown in the figure.
For the load required for the buckling calculation, apply the formula below.

In the case of ❶ : load = M · g
In the case of ❷ : load = μ M · g
μ : frictional coefficient
g : gravity acceleration 9.8 m/s²
M : load weight (kg)

- Definition of a load when the cylinder stopping method is selected



The state of halfway stopping with the external stopper as shown in the figure.
The load required for the buckling calculation in this case is not the M, but the cylinder theoretical output (Relief set pressure MPa × Piston area mm²).

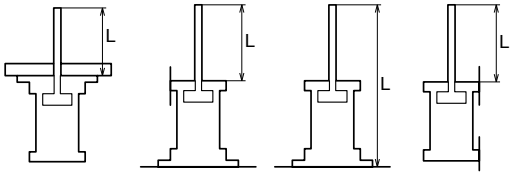
Rod diameter list

Unit: mm

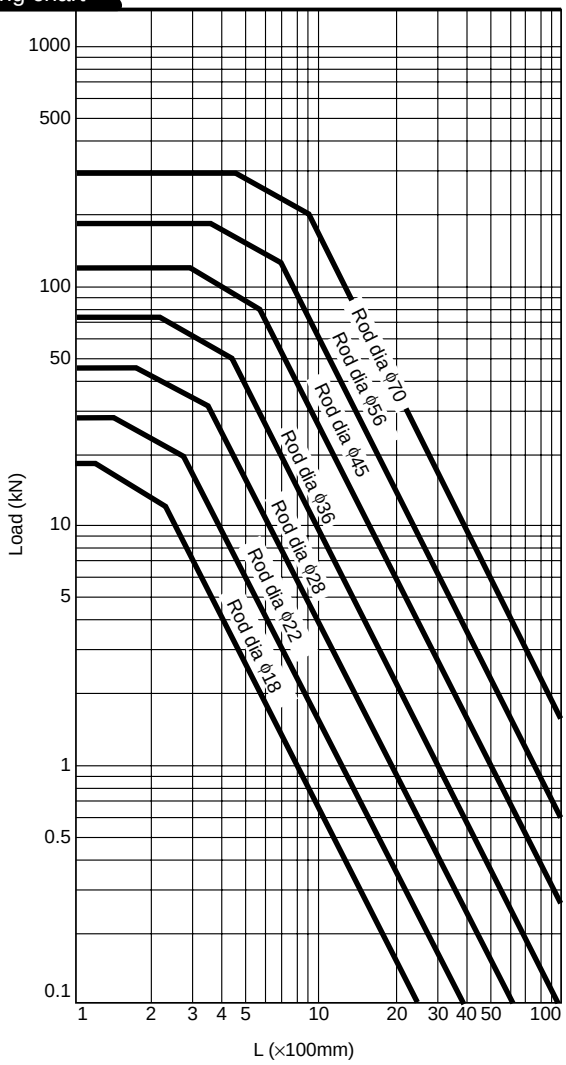
Cylinder bore / Series name	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
100H-2	ϕ18	ϕ22	ϕ28	ϕ36	ϕ45	ϕ56	ϕ70

Buckling chart by cylinder mounting style

Fixed cylinder, rod end free

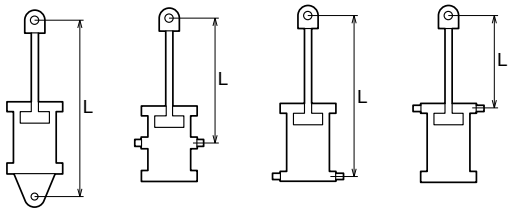


Buckling chart

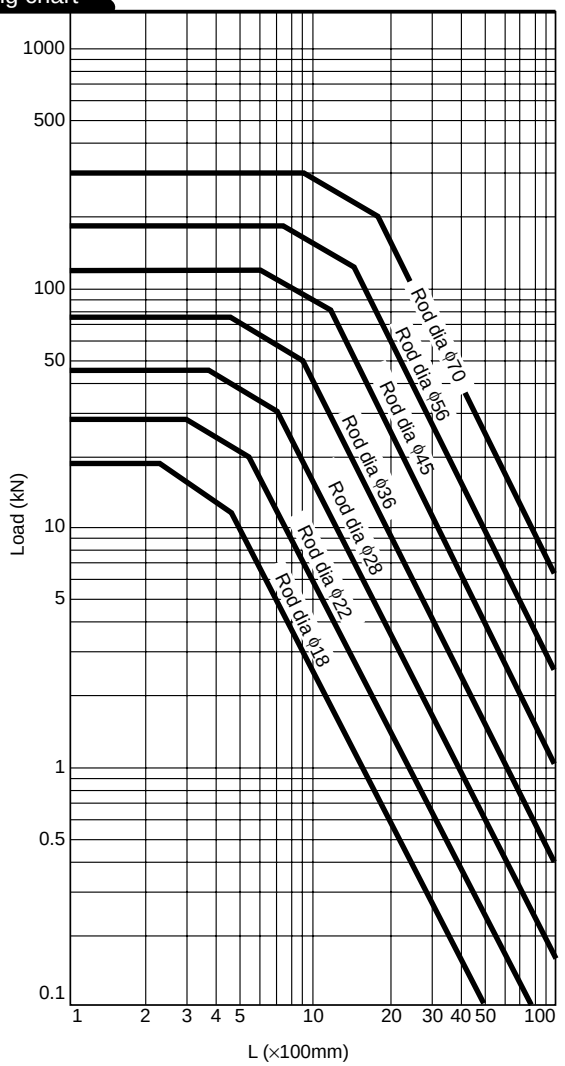


Buckling chart by cylinder mounting style

Both ends pin joints

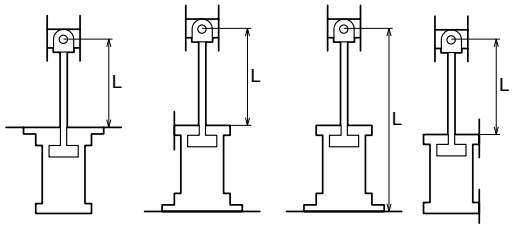


Buckling chart

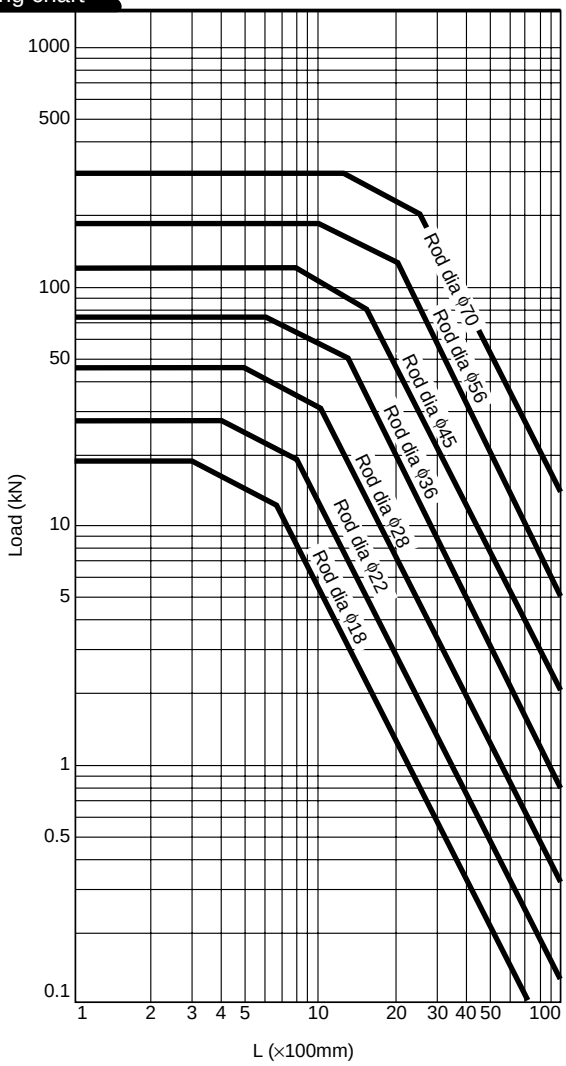


Buckling chart by cylinder mounting style

Fixed cylinder, rod end pin joint

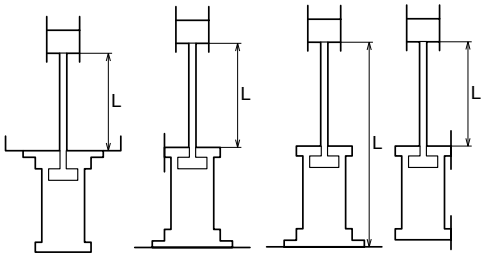


Buckling chart

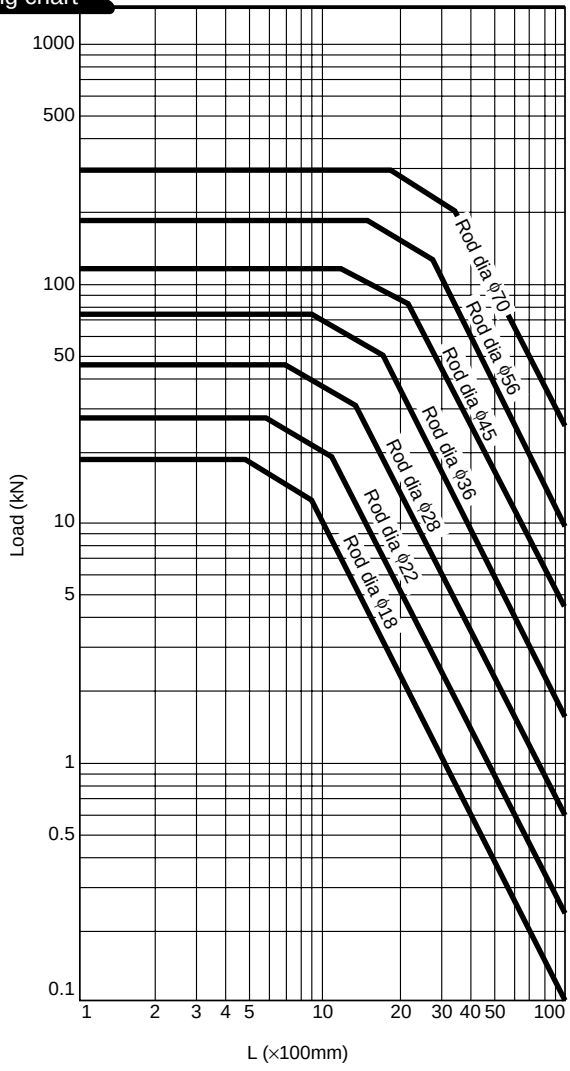


Buckling chart by cylinder mounting style

Fixed cylinder, rod end guide



Buckling chart



Selection of seal material

Prior to the selection of seal material, check the conditions below.

1. Oil temperature in a cylinder and ambient temperature
2. Type of working oil
3. Use freguency

Notes)
- Select the packing material suitable for the working oil used. The wrong material selection may lead to the inferiority of packing material, causing the damaged packings.
- The recommended cleanliness level of the working oil used is the NAS grade 12 or higher.
- DO NOT mix fluids of different types. Otherwise, the mixed fluids may be changed in quality, posing inferiority of the packings.
- In the case that working oil including water (water-glycol fluid, water in oil fluid, oil in water fluid, etc.) is used, and the cylinder tube is made of carbon steel for machine-structural use, it is recommended to plate the cylinder tube inside. When you request the plated cylinder tube,

Adaptability of seal material to working oil and working temperature range of seal material

Seal material	Applicable working oil					Oil temperature and ambient temperature (°C)
	Petroleum-based fluid	Waterglycol fluid	Phosphate ester fluid	W/O fluid	O/W fluid	-50 -10 0 50 80 100 120 150
Nitrile rubber	○	○	×	○	○	
Urethane rubber	◎	×	×	△	△	
Hydrogenated nitrile rubberr	○	◎	×	◎	◎	Notes)

Notes)
- The ◎ and ○-marked items are applicable, while the × -marked items are inapplicable. For the △-marked items, contact us.
- In case that the priority is given to the abrasion resistance, adopt the packing material of the ◎-marked combinations.
- In case that hydrogenated nitrile rubber is adopted for the use of water-glycol fluid, water in oil fluid, oil in water fluid, the oil temperature must be ranged from -10 to +100°C.
- The temperature range in the table above indicates the working temperature range of packing material, and it is not the working temperature range of the cylinder. For the use of a cylinder at high temperature, contact us.
- When using combined seals (code 8), refer to the notes on nitrile rubber.

Criteria for selection of urethane rubber and nitrile rubber

The material of the packing for standard cylinders includes urethane rubber and nitrile rubber. When selecting the material, refer to the criteria for selection in the table below.

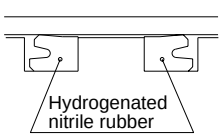
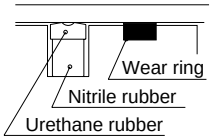
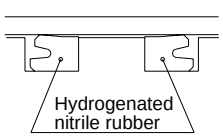
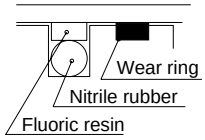
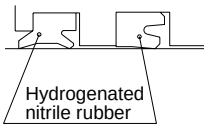
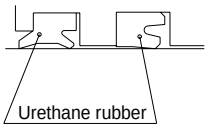
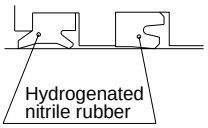
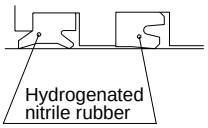
- Characteristics of urethane rubber
  Urethane rubber, having 2.5 times pull strength of nitrile rubber as shown in the table below, features the superior resistance against pressure and abrasion.
  However, urethane rubber may be changed in quality due to heat and inferiority in working oil in a long run (and the multiplier effect of oil temperature), and therefore, disassembly and inspection are required every year.
- Characteristics of nitrile rubber
  The influences of heat and inferiority in working oil on nitrile rubber is less than those on urethane rubber. Since the pull strength of nitrile rubber is less than that of urethane rubber, nitrile rubber is rather inferior to urethane rubber in the resistance against pressure and abrasion. Therefore, in case that the use frequency is low under low pressures and disassembly and inspection are not performed for two or three years, it is recommended to adopt nitrile rubber.
- Characteristics of hydrogenated nitrile rubber
  Hydrogenated nitrile rubber is most suitable for hot places or places where more reliable abrasion resistance than that of nitrile rubber is required at normal temperature.

Table of seal selection criteria

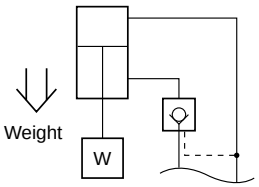
Items \ Packing material	Nitrile rubber	Urethane rubber	Hydrogenated nitrile rubber
Abrasion resistance	○	◎	◎
Life against inferiority of working oil	○	△	○
Life with high oil temperature	○	△	◎
Oil leak from rod	○ (JIS B type)	◎ (JIS A type)	○ (JIS B type)
High use frequency under high pressure	○	◎	◎
Low use frequency under low pressure	◎	○	◎
Pull strength (reference value) (MPa)	17	47	30

Note) ◎, ○, and △- marks indicate the priority of selection in this order.

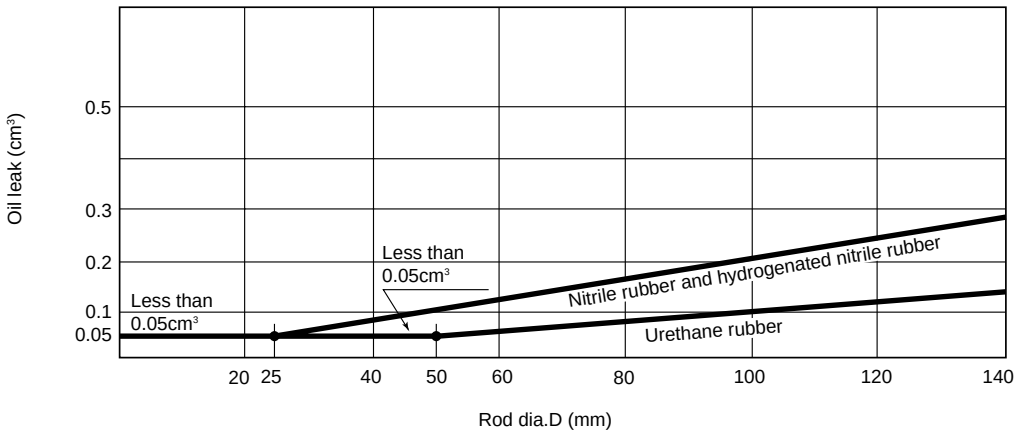
Structures and selection guidance of seals for 100H-2

Packing code		1	2	6	8
Name of type		Nitrile rubber type	Urethane rubber type	Hydrogenated nitrile rubber type	Combined seal type
Packing structure	Piston packing				
	Rod packing and wiper ring				
	Fixed section (including O-ring)	Nitrile rubber	Nitrile rubber	Hydrogenated nitrile rubber	Nitrile rubber

Notes on packings
- If any external force is applied to the cylinder as shown in the figure on the right, and the piston must be held at the fixed position, use of the nitrile rubber type or hydrogenated nitrile rubber type (code 1 or 6) U-packing as the piston packing is recommended.
- When the cylinder is operated at approximately 20 mm/s, stick-slip (crack) may occur to the nitrile rubber type, urethane rubber type, or hydrogenated nitrile rubber type packing depending on conditions (viscosity of fluid and hardness of machine). Combined seals are suitable for general use. For details, contact us.



Relation between external oil leak amount and rod dia.



External oil leak is the total of oil leak from the wiper ring with the piston moving distance of 100 m. (Refer to JIS B8367).

Selection of boots

If hydraulic cylinders are used in the places under unfavorable conditions, where are subjected to wind, wind and rain, and dusts, the piston rod especially needs to be protected. When selecting the boots, consider the environment conditions and temperature.

Boots type and resistible temperature

Symbols	Name	Material	Resistible temperature
J	Nylon tarpaulin	Vinyl-coated nylon cloth	80°C
JN	Chloroprene	Nylon cloth coated with chloroprene	130°C
JK	Conex	Silicon-coated Conex cloth	200°C

Note) 1. If the boots are provided, the length of extended cylinder rod is changed.
Note) 2. Remember that the resistible temperatures in the table above are for the boots, not for the cylinder.
Note) 3. Conex is the registered trademark of Teijin Ltd.

Check of port dia. depending on cylinder speed

Cylinder speed depends on the volume of oil fed into a cylinder.
The cylinder speed V can be obtained from the following formula:

$$V = 1.67 \times 10^4 \times Qc/A$$

V : cylinder speed (mm/s)
Qc : oil volume supplied into cylinder (L/min)
A : pressurized area of piston (mm^2)

The chart below shows the relation between the speed and the required flow rate for each size of standard hydraulic cylinders (cylinder inside) and that between the required flow rate and flow velocity in pipe for each port dia.

< Example >
In the case of the 100H-2 series with an 80 mm cylinder bore and 300 mm/s cylinder speed, is the standard port dia. applicable? Also, find the flow velocity in pipe.

< Answer >
In the chart below, find the cross point of the straight line from the point of 300 mm/s cylinder speed and the slant line of 63 mm cylinder bore, and draw a straight line parallel with the lateral axis until it reaches the slant line of the port dia. 1/2 (the standard port dia. for the 100H-2 series with a cylinder bore of 80 mm).
From the cross point on the slant port dia. line, draw a straight line parallel with the longitudinal axis until it reaches the lateral axis. From the cross point, the correspondig flow velocity in pipe is 5.2 m/s.
Since the cross point found based on the port diameter, cylinder speed, and bore is within the appropriate range, the standard port diameter is applicable.

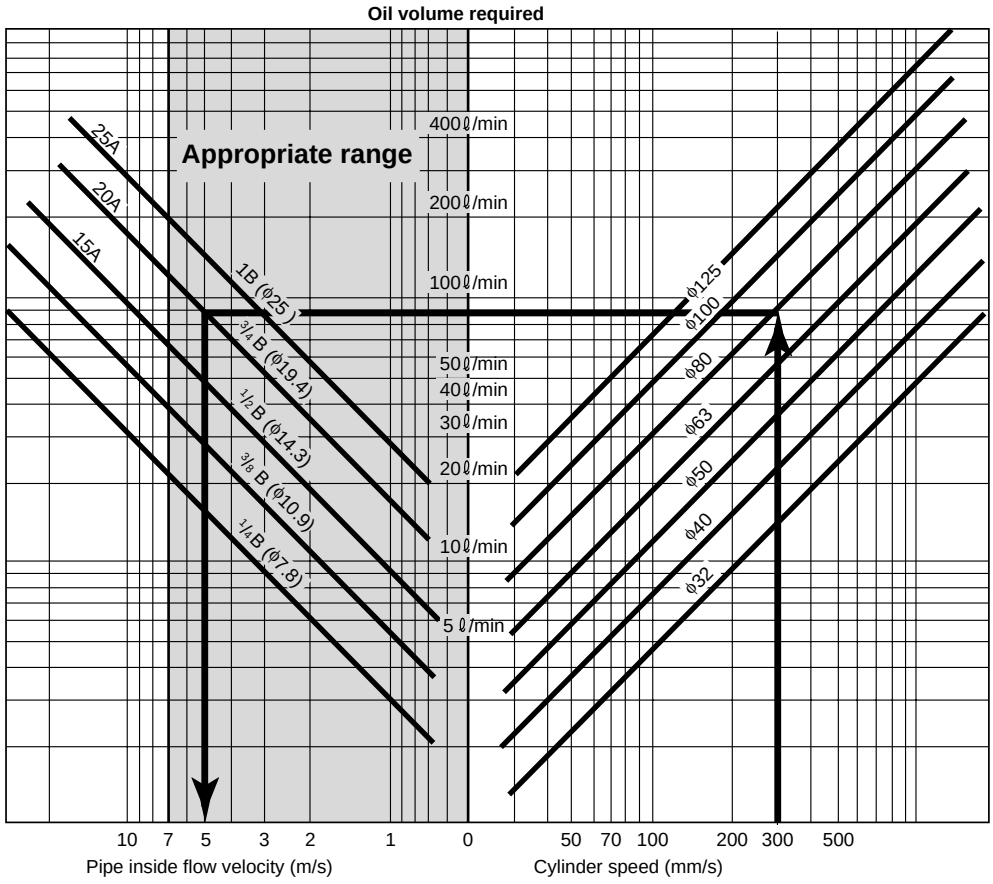


Chart of relation between cylinder speed, required flow rate, and flow velocity in pipe

Note)
The appropriate flow velocity in pipe for the appropriate range is 7 m/s or under. In general, if the flow velocity in pipe exceeds 7 m/s, the piping resistance and pressure loss are increased, causing less output during cylinder work and lower speed.
To reduce pressure loss, adopt piping with larger dia. of one grade to the cylinder port. The flow velocity is calculated with steel tube for piping S ch80.

100H-2 Series standard port diameter

Bore (mm)	φ32	φ40	φ50	φ63	φ80	φ100	φ125
Port dia. Rc, G	1/4	3/8	3/8	1/2	1/2	3/4	3/4

Note) Spacers for the rod side ports are provided for the 100H-2 with 32 mm bore. Be sure to use them for piping.

Maximum energy absorbed of cylinder cushion

The conditions of absorbed energy allowable for the cylinder cushion can be obtained from the formula below. If a load is moved horizontally and straight, see the simplified charts on the page for selection.

Inertia energy of load at the inrush into cushion
E_1
+
Energy generated by the external force applied to the cylinder at the inrush into cushion
E_2
≦
Maximum energy absorbed of the cylinder cushion
E_t

The procedures to find each item above are shown below.

Find the inertia energy of load at the inrush into cushion, E_1.
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 (rads)
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 E_1.
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 E_1.

↓

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.

↓

Find the maximum energy absorbed of the cylinder cushion, E_t.
Find it with the corresponding chart of the "Maximum energy absorbed".

↓

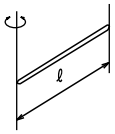
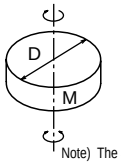
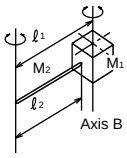
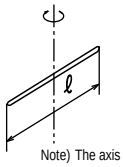
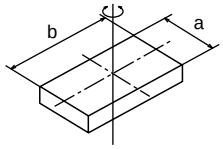
Ensure that $E_1 + E_2$ is same as the maximum energy absorbed E_t, or smaller.
If the following condition is satisfied, the cylinder is applicable: $E_1 + E_2 \leqq E_t$.
If the following condition is satisfied, the cylinder is inapplicable: $E_1 + E_2 > E_t$.
In such a case, perform the steps below, 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.

⚠ CAUTION

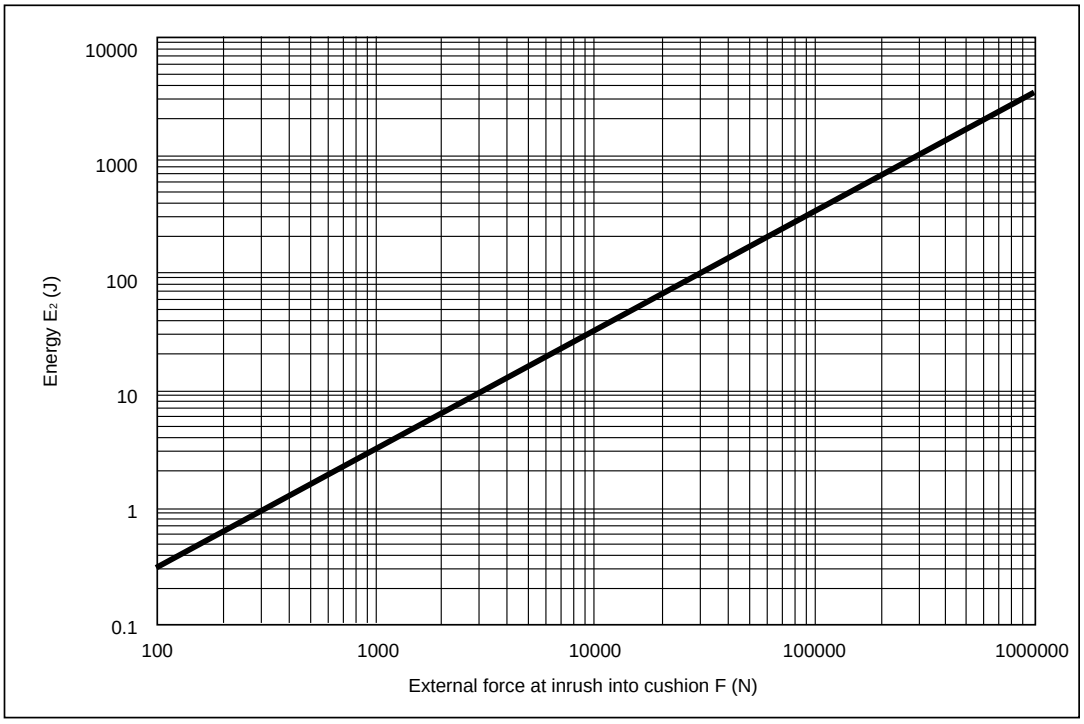
Be sure to use cylinders within the range of the maximum energy absorbed of the cylinder cushion.
Otherwise, the cylinder or the peripheral devices may be damaged, leading to serious accidents.

Inertia moment calculation table

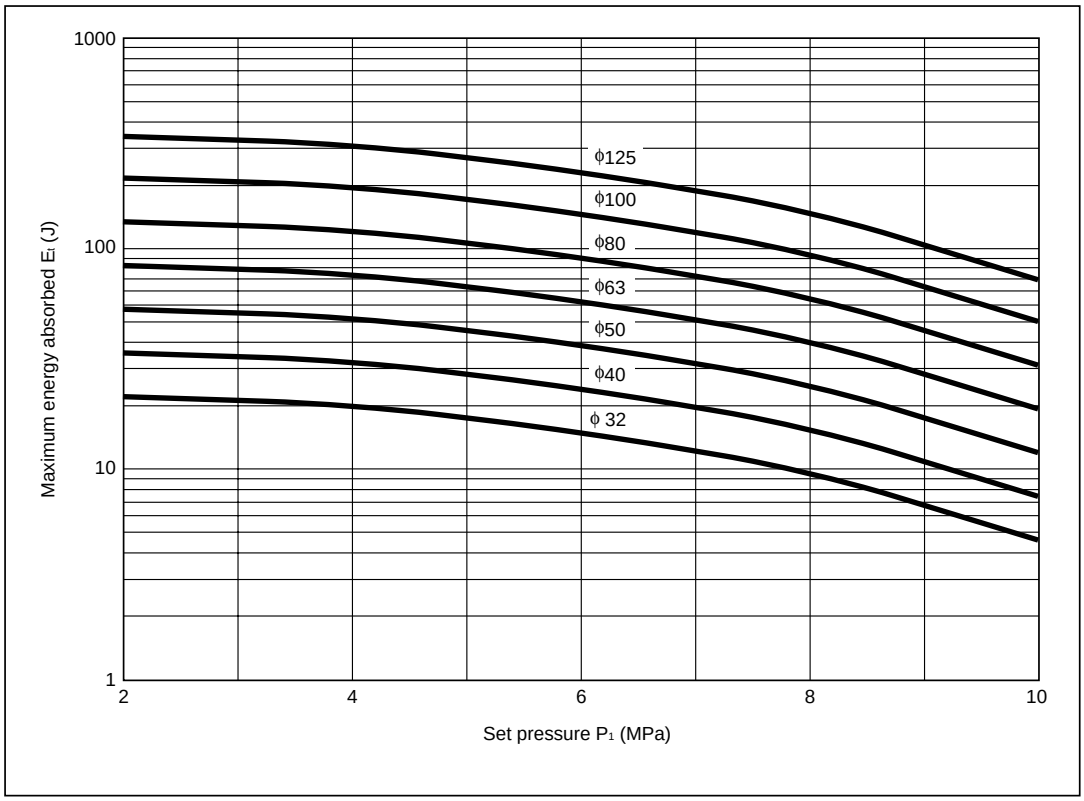
Outline	I: Inertia moment
● In the case of the axis at rod end 	$I = \frac{M\ell^2}{3}$
● In the case of a cylinder (including a disk)  Note) The axis passes through the center of gravity.	$I = \frac{MD^2}{8}$
● In the case of an arm (rotated around the axis A)  M_1: Weight of a weight M_2: Weight of an arm ℓ_1 : Distance from the axis A to the center of a weight ℓ_2: Arm length	$I = M_1\ell_1^2 + I_1 + \frac{M_2\ell_2^2}{3}$ I_1: The inertia moment of a weight when the axis passing through the center of the gravity of the weight (axis B) is the center.
● In the case of the axis in the middle of rod  Note) The axis passes through the center of gravity.	$I = \frac{M\ell^2}{12}$
● In the case of a rectangular parallelepiped  Note) The axis passes through the center of gravity.	$I = \frac{M}{12}(a^2+b^2)$

I (I_1): Inertia moment kg・m^2
M (M_1, M_2): Weight kg
ℓ , a, b: Length m
D: Diameter m

Chart of conversion of external force into energy at inrush into cushion of 100H-2



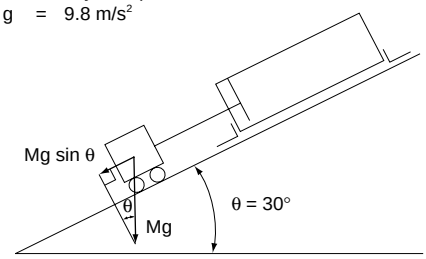
100H-2 Rod B Maximum energy absorbed



Example of calculation for selection

< Example 1 >

Cylinder	100H-2 rod B ϕ63
Set pressure	P_1 = 6 MPa
Load weight	M = 500 kg
Load speed	V = 0.3 m/s (the speed at the inrush into cushion is 300 mm/s)
Load moving direction	Downward θ = 30° (there is no external force applied to the cylinder other than gravity)
Working direction	Forward (the direction of the piston rod ejected from the cylinder)
Gravitational acceleration	g = 9.8 m/s^2

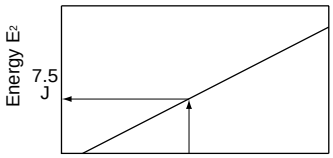


< Answer >

1. Find the inertia energy of load at the inrush into cushion, E_1.
   Inertia energy in the case of linear movement, E_1
   $E_1 = MV^2/2 = 500 \times 0.3^2/2 = 22.5J$

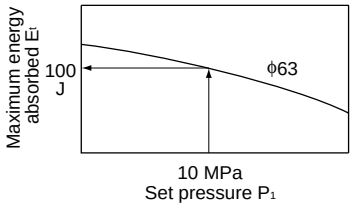
2. Find the E_2, energy generated by the external force F, applied to the cylinder at the inrush into cushion.
   2.1 Find the external force F, applied in the direction of the cylinder axis at the inrush into cushion.
   $F = Mg\sin\theta = 500 \times 9.8 \times \sin 30° = 2450N$

   2.2 Convert the external force F, found in the step 2.1, into the energy E_2.
   In the "Chart of conversion of external force into energy at the inrush into cushion of 100H-2", find the cross point of the straight line from the point of 2450 N on the lateral axis F and the slant line shown in the chart. Then, draw a straight line from the cross point on the slant line parallel with the lateral axis until it reaches the longitudinal axis of the chart. The cross point 7.5 J, indicates the energy applied by the external force.



   $E_2 = 7.5J$

   3. Find the maximum energy absorbed of the cylinder, E_t.
   In the right chart, find the cross point of the straight line from the point of 010 MPa on the lateral axis, the set pressure of the "Maximum energy absorbed of cushion" of the 100H-2 and the curve of ϕ63. Then, draw a straight line from the cross point on the curve parallel with the lateral axis until it reaches the longitudinal axis of the chart. The cross point, 62 J, indicates the maximum energy absorbed.



   $E_t = 62J$

4. Ensure that $E_1 + E_2$ is same as the maximum energy absorbed E_t, or smaller.
   $E_1 + E_2 = 22.5 + 7.5 = 30J$
   where, $E_t = 62J$
   Therefore, the following condition is satisfied: $E_1 + E_2 \leqq E_t$.
   As a result, the cylinder is applicable.

< Reference >

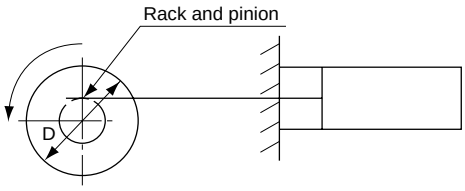
In case that the load moving direction is horizontal and there is no external force applied ($E_2 = 0$), from the set pressure, first find the maximum energy absorbed, E_t. Then, the allowable load weight and allowable load speed can be found.

To find the allowable load weight, M : $M = \frac{2E_t}{V^2}$
To find the allowable load speed, V : $V = \sqrt{\frac{2E_t}{M}}$

< Example 2 >

Cylinder	100H-2 rod B ϕ63
Set pressure	P_1 = 8 MPa
Load weight	M = 500 kg
Load dia.	D = 0.7 m (Uniform disk)
Angular velocity of load	ω = 1.5 rad/s (angular speed at the inrush into cushion)
Load moving direction	Horizontal (without external force applied to the cylinder)
Working direction	Forward (the direction of the piston rod ejected from the cylinder)

The weight of the rack and pinion is so light that it can be ignored.



< Answer >

1. Find the inertia energy of a load at the inrush into cushion, E_1.
   1.1 Find the inertia moment of a load, I.

   From the inertia moment calculation table, the I can be calculated as below.
   $I = MD^2/8 = 500 \times 0.7^2/8 = 30.6(kg \cdot m^2)$

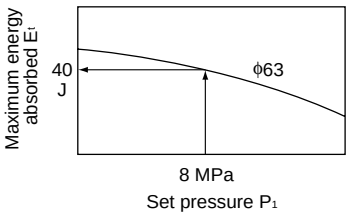
   1.2 Find the inertia energy of a load, E_1.
   $E_1 = I\omega^2/2 = 30.6 \times 1.5^2/2 = 34.4J$

2. Find the energy generated by the external force applied to the cylinder at the inrush into cushion, E_2.

   $E_2 = 0$, since there is no external force generated from the gravity of a load.

3. Find the maximum energy absorbed of the cylinder, E_t.
   In the right chart, find the cross point of the straight line from the point of 8 MPa on the lateral axis, the supply pressure of the "maximum energy absorbed of cushion" of the 100H-2 and the curve of ϕ63 bore. Then, draw a straight line from the cross point on the curve parallel with the lateral axis until it reaches the longitudinal axis of the chart. The cross point 40 J, indicates the maximum energy absorbed.

   $E_t = 40J$



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

   $E_1 + E_2 = 34.4 + 0 = 34.4$ J
   where, $E_t = 40J$
   Therefore, the following condition is satisfied: $E_1 + E_2 \leqq E_t$.
   As a result, the cylinder is applicable.

Note: Even if the cylinder speed is less than 0.08 m/s (80 mm/s), suppose it is 0.08 m/s, and find the angular velocity for calculation.

< Reference >

In case of the rotation movement, of which load moving direction is horizontal, without an external force ($E_2 = 0$), from the set pressure, first find the maximum energy absorbed, E_t. Then, the allowable inertia moment and allowable load angular velocity can be found.

To find the allowable load inertia moment, $I = \frac{2E_t}{\omega^2}$
To find the allowable load angular velocity, $\omega = \sqrt{\frac{2E_t}{I}}$

Use cylinders only under the operating conditions within the allowable range specified for each series. Otherwise, the performance may become unreliable as described below, or accidents may occur.

1. Pressure

The pressure supplied to cylinders, including surge pressure, must be lower than the maximum allowable level.
The use with the pressure exceeding the maximum allowable level may lead to galling in the slipping part or the damaged cylinder.

2. Speed

Use cylinders within the allowable working speed range. Otherwise, troubles below may occur.
When cylinders are used with the speed slower than the lower limit of the working speed range:

- Stick-slip (cracks)
- Unsmooth speed control

When cylinders are used with the speed faster than the upper limit of the working speed range:

- Damaged cylinder due to increased kinetic energy
- Damaged packings due to slipping heat
- Increased internal or external oil leak due to thickened oil film
- Higher flow velocity in the piping part, causing the lowered energy efficiency due to increased pressure loss

3. Environmental conditions

3-1) Temperature

Use cylinders only within the allowable working temperature range. Otherwise, troubles below may occur.
When cylinders are used at the temperature lower than the lower limit of the working temperature range:

- Brittle fracture due to lowered stretch of cylinder material
- Oil leak due to lowered elasticity of packings

When cylinders are used at the temperature higher than the upper limit of the working temperature range:

- Damage due to lowered strength of cylinder material
- Damaged packings
- Galling due to thermal expansion in the slipping part

3-2) Rust-proof measures

The use and storage of cylinders in the places where are highly humid, or are splashed with water or sea water require the consideration of rust-proof and anti-corrosion measures. In such a case, contact us.

3-3) Installing location

(1) Use cylinders only indoors.
(2) DO NOT use them in locations where dusts and vibration are excessive. Use of them under the environmental conditions shown below requires protection of the rod, rustproof measures, review of parts material, magnetic shield, and vibration-proof measures. If any countermeasure required for the cylinder side, contact us.

Working environmental conditions
Sands, dusts, soil, chips, welder spatter, etc.
Rain, water, sea water, oil, chemicals, etc.
Direct sunlight (ozone), humidity, etc.
High temperature, low temperature, freezing, etc.
Highly magnetic field
Vibrations

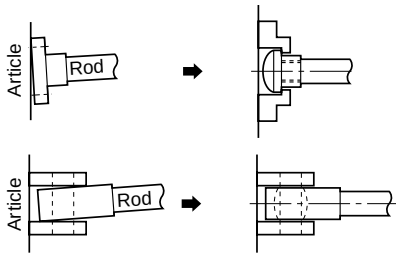
4. Mounting

⚠ CAUTION

- When mounting a cylinder, use bolts of the specified size, and fix it with the bolts of the specified strength class (strength class 10.9).
  In the case of rotary type, use pins of the specified size. Use of bolts or pins other than designated ones may cause looseness of or damage to screws due to cylinder driving force or its reaction force.
- When a cylinder is mounted with fixed, the performance of the cylinder largely depends on the hardness of the mounting material. Therefore, insufficient hardness of mounting material may lead to a warp in mounting material due to the driving force of the cylinder and the disordered piston rod and bush, causing premature wear and the damaged thread of the piston rod. Use the mounting material with sufficient hardness.

4-1) Mounting of rod end in the case of fixed type

(SD, EA, EB types)
The movement direction of articles moved by a cylinder must be always aligned with the axis center of the piston rod movement. If the axis center is runout, premature wear of the bush, baking or galling of the cylinder tube may occur. To check the runout of the axis center, be sure to measure the core deviation of mounting part of the article at the position where the piston rod is fully ejected, and align the core. Then, connect the cylinder with the article.



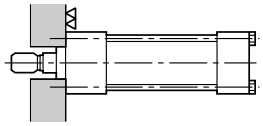
4-2) Mounting of cylinder

When mounting cylinders, consider the following points.
We cannot take responsibility for malfunctions due to wrong cylinder mounting.
(1) In the case of fixed type
① SD type

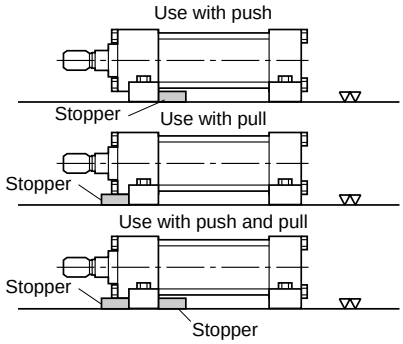
- Thread accuracy of tie rod : JIS 6g
- Clamping torque : tie rod clamping specified torque value

Specified tie rod tightening torque table

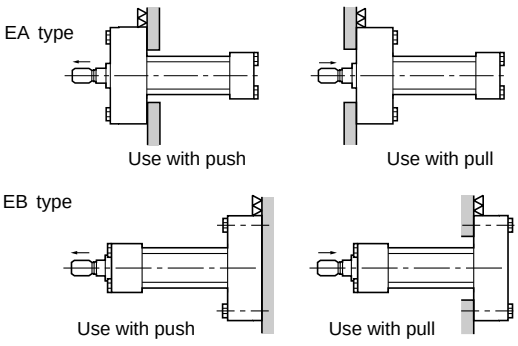
Bore	ϕ32	ϕ40	ϕ50・63	ϕ80	ϕ100	ϕ125
Tie rod thread	M6 × 1	M6 × 1	M8 × 1	M10 × 1.25	M14 × 1.5	M16 × 1.5
Tightening torque N·m	8	8	22	41	120	170



② LA type
To mount LA type, fix the attachments with clamping bolts. However, remember that this procedure is not perfect for the move in the axial direction when a load is applied. Therefore, install the stopper to the



③ EA, EB, FA and FB types
Fix cylinders as shown in the figures below.



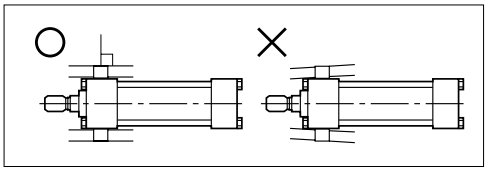
Note) When mounting the EA or EB type switch set cylinder, prevent the switch from interfering with the mounting plate.

(2) Rotary type
- For the cylinder of which mounting part moves inside a plane, be sure to connect the connection fittings of the rod end with pins, so that the mounting part can move inside the plane. For the plane and rectangular direction, perform centering similarly to the fixed type.
- Be sure to apply lubricant to the bearing part of the connection fittings.
- DO NOT use floating joints for rod end attachments.

① CA, CB, TA type attachments
- Use pins of the size specified in this catalogue.
- In the case of a long stroke (1000 mm or longer), avoid horizontal mounting. Otherwise, a lateral load is applied to the bush part due to the weight of the cylinder, causing uneven abrasion, substantially shorter service life, or galling.

② TA type attachments

Mount counterpart attachments so that they are vertical with the trunnion boss. If they are mounted slantingly, uneven abrasion may occur in the boss bearing area, causing a substantially shorter service life.



5. Piping
- Take sufficient care to avoid dusts and chips of pipes in the piping. Avoid any air accumulation in pipes.
- When piping, avoid any air accumulation in pipes.
- When connecting with a rubber hose, do not bend it with the bending radius smaller than the specified level.
- Be sure to perform piping flushing. After flushing is complete, connect to the cylinder. Otherwise, the cylinder may be malfunctioned or oil leak may occur due to dusts in the piping.

6. Other notes
- When welding near a cylinder, it may be subjected with spatters. Protect the cylinder rod to avoid spatters.
- When welding during mounting, take sufficient care to avoid an electric current in the cylinder. Any electric current in the cylinder may lead to arcs between the rod and bush or between the piston and tube, causing the damaged cylinder parts.
- After mounting is complete, be sure to perform air vent and cushion adjustment. For the adjustment methods, follow the descriptions in "7. Operation".

7. Operation

⚠ CAUTION

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

- Trial run (before operation)

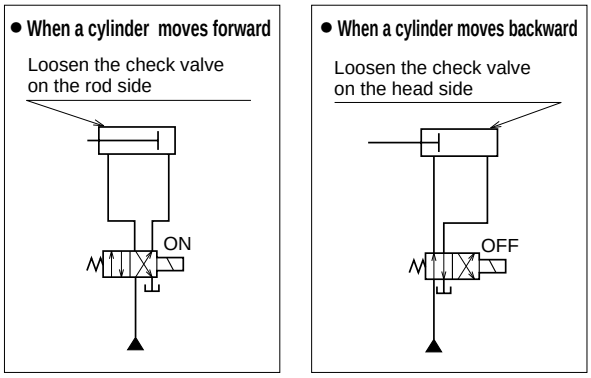
7-1) Air vent

⚠ CAUTION

Excessive loosening of the air vent valve during air vent may lead to coming-off of the air vent valve from the cylinder, causing spurted oil and serious accidents.

(1) Feed oil of low pressure (the pressure that the cylinder moves at a low speed, approx. 10 mm/s) to the cylinder, and vent air in oil from the air vent valve.
- At this time, if the check valve is excessively loosened, it may be come off from the cylinder, causing spouted oil and serious accidents.
- Repeat the step above until no air remains in the pipe.
- Exhaust air in the piping, as well as that in the cylinder. Any air remained may cause malfunctions below.

[Symptoms]
a) Stick-slip
b) Unsmooth speed control
c) Damaged packings due to increased temperature caused by adiabatic compression
d) Shock or vibration occurs to outside
e) Impossibility of set output



7-2) Adjustment of cushion needle

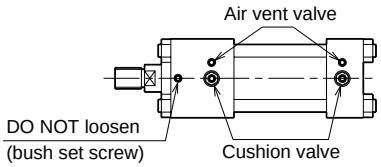
⚠CAUTION

Excessive loosening of the cushion needle & plug during cushion adjustment may cause oil leaking and serious accidents.

(Cylinder with cushion)
Increase the piston speed gradually from a low speed, 50 mm/s or lower, and adjust the cushion.

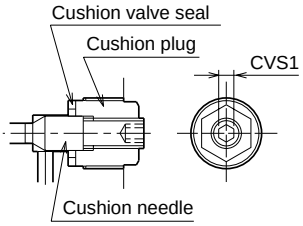
- The cushion must be adjusted, since it has not been adjusted at our factory.
- If the piston speed is fast from the beginning, abnormal surge pressure may occur, causing the damaged cylinder or machine.

Structure of cushion needle and air vent valve



Note) Cushion valve positions depend on the bore diameters.

Cushion valve structure

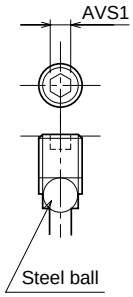


Type 1

Width across flats of Allen key wrench used

Bore	Rod B	
	Type	CVS1 size
ϕ32	1	2.5
ϕ40	1	2.5
ϕ50	1	2.5
ϕ63	1	2.5
ϕ80	1	3
ϕ100	1	3
ϕ125	1	3

Air vent valve structure

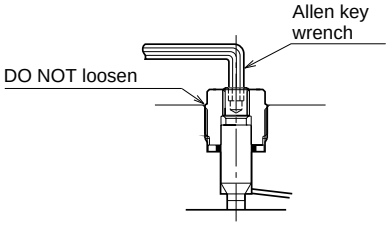


Type 1

Width across flats of Allen key wrench used

Bore	Rod B	
	Identical rod side and head side	
	Type	AVS1 size
ϕ32	1	3
ϕ40	1	3
ϕ50	1	3
ϕ63	1	3
ϕ80	1	4
ϕ100	1	4
ϕ125	1	4

- When adjusting cushion valves, use an Allen key wrench.
  a) Turn clockwise: Cushion stroke speed decreases.
  b) Turn counterclockwise: Cushion stroke speed increases.



8. Maintenance (maintenance and inspection)

To use cylinders without an accident for a long time, daily and regular inspections are required.

1) Daily inspection

For the daily inspection, check the points described below.

(1) Check that the cylinder set bolts and nuts are not loosened.
(2) Check that the working conditions are normal.
(3) Check that there is no external leakage.
(4) Check that there is no abnormality in other parts of the cylinder (tie rod, flange, etc.)

2) Regular inspection (disassembly inspection)

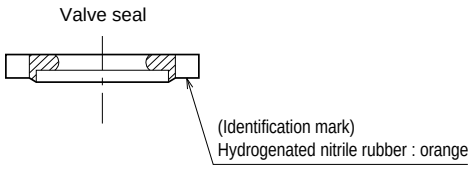
Decide the interval of the regular inspection depending on the working conditions and requirement, and perform according to the decided schedule. It is recommended to perform it once a year.

- Replace packings and gaskets with fresh ones at regular inspections.
- Do not use packings which have been stored for two years or more.
- Notes on fitting of valve seals

  Valve seals must be fit in the specified direction and sequence. Wrong fitting direction and sequence will lead to the damaged packings, causing oil leak.

  Fitting sequences
  - Check the direction of a valve seal. The marked side must be faced inside (refer to Fig.1).
  - Fit the valve seal to the shaft of the cushion valve in the correct fitting direction (refer to Fig.2).
  - Take care to prevent the valve seal from being dropped, and screw it in (refer to Fig.3).

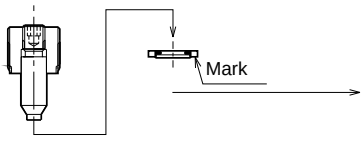
Fig.1



Fit with the marked side facing inside of the cylinder.

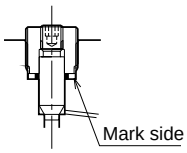
Fig.2

Cushion needle



(Valve seal fitting sequence)

Fig.3

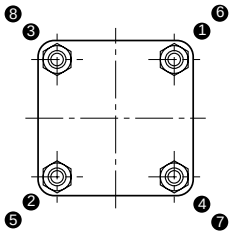


Note If the seal is first fit in the cover hole, and then, it is screwed in, it may be damaged.

- Notes on tie rod tightening torque at assembly

1) Assembly instruction manual for disassembly inspection of the TC type is available. Contact us.
2) For other types, refer to the "Specified tie rod tightening torque table" of "4-2) Installation of cylinder".

When tightening the tie rods, DO NOT tighten only a tie rod at a time, but tighten them gradually in order as shown in the figure below. Uneven tightening of the tie rods may lead to malfunction or cracks.



9. Storage

1) Notes on storage

When storing cylinders, take countermeasures against the following:

(1) Rusts
(2) Permanent warp and inferiority of packings

2) Storage location

(1) Store cylinders in cool and dark place (max. temperature: 37°C), and protect them from direct sunlight and humidity. Place them higher than 30 cm from the floor.
(2) DO NOT apply vibrations or shocks to the stored cylinders. The cylinder parts may be damaged.

3) Control and inspection during storage

(1) Pack working oil (including rust preventive oil) in cylinders, and plug the port part.
- If the port part is unplugged during storage, change working oil with fresh one, and plug again. Failure to perform this step may cause rusts on tube inside.

(2) It is recommended to turn the stored cylinder 90° every three months to let packed oil flow and reduce permanent warp of packings.
- If there is any abnormality in the working condition of the cylinder that has been stored for a long time, replace packings.
- If the storage period is a year or longer, it is recommended to perform the internal inspection of the stored cylinder.

(3) Repeat of rust preventive treatment

After the purchase of cylinders, repeat rust preventive treatment every year.
- Internal rust-proof measures (rust-proof measures for cylinder inside) Change working oil (including rust preventive oil) in the cylinder.
- External rust-proof measures (for machined face, exposed part) Apply rust preventive oil to mounting faces to machines and machined faces, such as a rod end screw part. Also, apply grease to the rod slipping part and the dust seal part, and protect with oil paper.

10. Disposal

1) Disassemble cylinders, sort the disassembled components by material (iron, copper, aluminum, resin, rubber, waste oil, etc.), and then, dispose of them.
2) Piston rods are hard chrome plated. When disposing of them, consult with a disposal company.
3) Dispose of resin base and rubber base components as nonflammable wastes.
4) When disposing of waste oil, conform to related laws and rules.

10 MPa double-acting hydraulic cylinder with size conforming to ISO standards

- 10 MPa double-acting hydraulic cylinder with bores from 32 mm to 125 mm.
- Designed to ISO 10762 cylinder (conforming to JIS B8367-5).
- Adoption of floating cushion allows smooth start.
- High-performance cushion.
- Packing grooves in sliding sections conform to ISO standards

Standard specifications

Types	Standard type, switch set
Nominal pressure	10 MPa
Maximum allowable pressure	Types other than TC type: 10 MPa TC type: 10 MPa (ϕ63 or less), 7MPa (ϕ80 or more)
Proof test pressure	15MPa
Minimum working pressure	Head side: 0.3 MPa or less Rod side: 0.45 MPa or less
Operating speed range	ϕ32 - ϕ63 : 8 - 400 mm/s ϕ80 - ϕ125 : 8 - 300 mm/s
Temperature range (ambient temperature)	Standard type : -10 - + 80°C Switch set : -10 - + 70°C (Free from freezing)
Structure of cushioning	Metal fitting system
Adaptable working oil	Petroleum-based fluid (When using other fluids, refer to the table showing applicability of fluids.)
Tolerance of thread	JIS 6g/6H
Tolerance of stroke	250 mm or less $^{+1.0}_{0}$ 251 - 1000 mm $^{+1.4}_{0}$ 1001 - 2000 mm $^{+1.8}_{0}$
Mounting type	SD • FA • FB • EA • EB • LA • CA • CB • TA • TC
Rod series	Rod B
Accessories	● Rod end eye (T-end) ● Rod end clevis (Y-end) with pin ● Lock nut ● Boots : Nylon tarpaulin : Chloroprene : Conex

- The maximum allowable pressures for the TC type are applicable when load is applied to only one side with the TC positioned in the center.

Terminologies

Nominal pressure
Pressure given for 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.

Notes)
- The cylinder with 32 mm bore conforms to JIS B8367-6.
- Rod series B and port Rc conform to JIS B8367 (not included in ISO 10762 standards for body).
- Appropriate temperature range depends on the packing material. For details, refer to the selection materials.
- In case that the lock nut is attached to the piston rod end thread part, lengthen the thread length (dimension A).
- Mounting dimensions of the CA mounting style cylinder differ from those of the standard type.
- As for the EA mounting style cylinder with 63 mm bore, only the length of centering guide (dimension F) differs from that of the standard type.
- Conex, material of the boots, is the trademark of Teijin, Ltd.

- Models and mounting dimensions shown below are not specified in JIS B8367-5.
  - Double rod type (100H-2D, 100H-2RD)
  - Cutting oil proof type (100HW-2, 100HW-2R)
  - Mounting styles SD, FA, and FB

Lines

Unit : mm

Structure	Type	Rod dia.	φ32	φ40	φ50	φ63	φ80	φ100	φ125
General purpose type: Double Acting Single Rod	Standard type 100H-2	Rod B	●	●	●	●	●	●	●
	Switch set 100H-2R	Rod B	●	●	●	●	●	●	●
General purpose type: Double Acting Double Rod	Standard type 100H-2D	Rod B	●	●	●	●	●	●	●
	Switch set 100H-2RD	Rod B	●	●	●	●	●	●	●
Cutting oil proof type: Double Acting Single Rod	Switch set 100HW-2	Rod B	●	●	●	●	●		
	Switch set 100HW-2R	Rod B	●	●	●	●	●		

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

Double Acting Single Rod

Standard type
(100H-2 · 100HW-2)

Switch set
(100H-2R · 100HW-2R)

Double Acting Double Rod

Standard type
(100H-2D)

Switch set
(100H-2RD)

Standard stroke fabrication range

Unit : mm

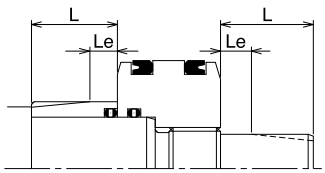
Bore	Stroke
φ32 · φ40	- 1200
φ50 · φ63	-1400
φ80	- 1600
φ100	- 1800
φ125	- 2000

- The strokes above indicate the maximum available strokes for the standard type. If you request larger strokes than those in the table above, contact us.
- For the rod buckling, check with the buckling chart in the selection materials.

Cushion stroke length

Unit : mm

Bore	Cushion ring length L	Cushion ring parallel part length Le
φ32	21	6
φ40 · φ50	23	6
φ63 - φ125	25	6



- Figures shown in the table above indicate the cushion stroke lengths in the case of cylinders used up to the stroke end.
- In the case that a cylinder is not used up to the stroke end, and if it is stopped 5 mm or more before the stroke end, the cushioning effect will be weakened. In such a case, contact us.

100H-2

10 MPa double-acting type hydraulic cylinder

How to order

General purpose type

The items in broken lines in the codes below need not to be entered, if unnecessary. Semi-standard specification

	Series ❶	Packing material ❷	Mounting type ❸	Cylinder bore ❹	Rod type ❺	Cushion type ❻	Stroke ❼	Port specification ❽	Port position ❾	Cushion valve position ❿	Switch code ⓫	Switch quantity ⓬	Rod end attachment ⓭	Lock nut ⓮	Boots ⓯
• Standard type	100H-2	2	LA	50	B	B	100	– G	A	B			– T	K	– J
• Switch set	100H-2R	2	LA	50	B	B	100	– G	A	B	AH	2	– T	K	– J

Double-Acting Single Rod

100H-2 : Standard type
100H-2R : Switch set

Double-Acting Double Rod

100H-2D : Standard type
100H-2RD : Switch set

- 1 Nitrile rubber
- 2 Urethane rubber
- 6 Hydrogenated nitrile rubber
- 8 Combined seal

● For packing configuration, refer to the selection materials at the beginning of this catalogue.

Mounting type

Cylinder bore (mm)

ϕ32 • ϕ40 • ϕ50 • ϕ63 • ϕ80 • ϕ100 • ϕ125

B Rod B

- B with cushions on both ends
- R with cushion on the rod side
- H with cushion on the head side
- N without cushion

Cylinder stroke (mm)

- None Rc thread
- G G thread

Port position (A, B, C, D)

Cushion valve position (A, B, C, D, 0)

Switch code

Note) Select applicable switches out of the Switch List

❶ **Notes on order for switch sets**

● If a switch is unnecessary, enter the switch code ⓫ and the switch quantity ⓬ of 0.

Switch quantity (1, 2, to n)

- T T-end (rod end eye)
- Y Y-end (rod end clevis)

- J Nylon tarpaulin
- JN Chloroprene
- JK Conex

K Long thread with lock nut

● For thread length, refer to the "Thread length with lock nut".

Cutting oil proof type

• Standard type	100HW-2	6	LA	50	B	B	100	– G	A	B				– T	L		
• Switch set	100HW-2R	6	LA	50	B	B	100	– G	A	B	5	2	– T	L			

Double-Acting Single Rod

100HW-2 : Standard type
100HW-2R : Switch set

Hydrogenated nitrile rubber

Cylinder bore (mm)

ϕ32 - ϕ80

Contact
- 5 WR505 (with 5 m cord)
- 7 WR505F (with 5 m cord/flexible tube attached)
- 6 WR515 (with 5 m/cord type)

No contact
- 2 WS215 (with 5 m cord)
- 4 WS215F (with 5 m cord/flexible tube attached)
- 3 WS225 (with 5 m/cord type)

Note) As for the descriptions on the types other than the above, refer to the descriptions on the general purpose type.

Switches

Kind	Switch symbol	Load voltage range	Load current range	Maximum open/close capacity	Protective circuit	Indicating lamp	Wiring method	Cord 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 (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, rear wiring	1.5m	Small relay programmable controller
	AG AX105							5m	
	AH AX111				Present			1.5m	
	AJ AX115							5m	
	AE AX125	DC:30V or less AC:120V or less	DC:40mA or less AC:20mA or less		None	No		5m	
	AK AX11A	AC:5 - 120V	5 - 20mA	2VA	Present	LED (Lights up in red during ON)	4-pin connector type, rear wiring	0.5m	
	AL AX11B	DC:5 - 30V	5 - 40mA	1.5W				0.5m	
	AP AZ101	DC:5 - 30V AC:5 - 120V	DC:5 - 40mA AC:5 - 20mA	DC:1.5W AC:2VA	None	LED (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, upper wiring	1.5m	
	AR AZ105							5m	
	AS AZ111				Present			1.5m	
	AT AZ115							5m	
	AN AZ125	DC:30V or less AC:120V or less	DC:40mA or less AC:20mA or less		None	No		5m	
	AU AZ11A	AC:5 - 120V	5 - 20mA	2VA	Present	LED (Lights up in red during ON)	4-pin connector type, upper wiring	0.5m	
	AW AZ11B	DC:5 - 30V	5 - 40mA	1.5W				0.5m	
	5 WR505	DC:5 - 50V AC:5 - 120V	DC:3 - 40mA AC:3 - 20mA	DC:1.5W AC:2VA	None	LED (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, rear wiring	5m	
	7 WR505F							5m	
	6 WR515							5m	
No contact	BE AX201	DC:5 - 30V	5 - 40mA	—	Present	LED (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, rear wiring	1.5m	Small relay programmable controller
	BF AX205							5m	
	CE AX211					LED (2-lamp type, red/green)		1.5m	
	CF AX215							5m	
	CH AX21C						4-pin connector type, rear wiring	0.5m	
	CJ AX21D							1m	
	BM AZ201					LED (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, upper wiring	1.5m	
	BN AZ205							5m	
	CM AZ211					LED (2-lamp type, red/green)		1.5m	
	CN AZ215							5m	
	2 WS215	DC:10 - 30V	6 - 70mA	—	Present	LED (Lights up in red during ON)	0.3 mm², 2-core, outer dia. 4 mm, rear wiring	5m	
	4 WS215F							5m	
	3 WS225							5m	
No contact (CE coformed)	CT AX211CE	DC:5 - 30V	5 - 40mA	—	Present	LED (2-lamp type, red/green)	0.3 mm², 2-core, outer dia. 4 mm, rear wiring	1.5m	Small relay programmable controller
	CU AX215CE							5m	
	CV AX21BCE						4-pin connector type, rear wiring	0.5m	
	CW AZ211CE						0.3 mm², 2-core, outer dia. 4 mm, upper wiring	1.5m	
	CX AZ215CE							5m	
	CY AZ21BCE						4-pin connector type, upper wiring	0.5m	

Notes) ● For the switches without a protective circuit, be sure to provide the protective circuit (SK-100) with load devices when using induction load devices (relay, etc.).
● For the handling of switches, be sure to refer to the switch specifications in the end of this catalogue.
● For the 200 V AC type, contact us.
● We recommend AND UNIT (AU series) for multiple switches connected in series.

● General purpose type

AX type (Rear wiring)

AZ type (Upper wiring)

● Cutting oil proof type

WR・WS type switches

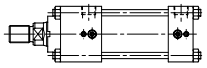
● For the switch code ⓫, pay attention to the points shown below when ordering the cutting oil proof type switches, WR and WS types.

5	WR505	The switch and straight box connector (F-SB) are combined [the flexible tube (F-05: 4.8 m) is required].
2	WR215	
7	WR505F	The flexible tube (F-05: 4.8 m) is attached to the switch and straight box connector (F-SB).
4	WS215F	

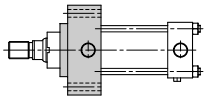
Mounting type

Codes in the < > marks below are names called in ISO 10762.

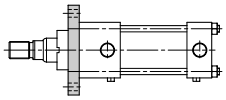
SD SD type (Basic type)



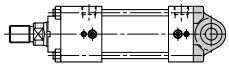
EA EA type (Rectangular rod cover attached) <ME5>



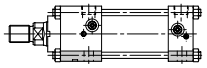
FA FA type (head rectangular flange mounting)



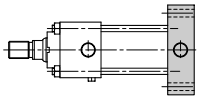
CA CA type (Eye mounting)



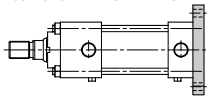
LA LA type (Side lugs mounting) <MS2>



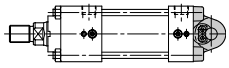
EB EB type (Rectangular head cover attached) <ME6>



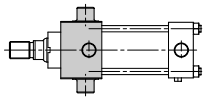
FB FB type (cap rectangular flange mounting)



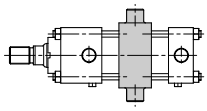
CB CB type (Clevis mounting) <MP1>



TA TA type (head trunnion mounting) <MT1>



TC TC type (intermediate trunnion mounting) <MT4>



Note) SD, FA, and FB types are not included in ISO standards.

Adaptability of working oil to seal 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	○	○	×	○	○
2 Urethane rubber	◎	×	×	△	△
6 Hydrogenated nitrile rubber	○	◎	×	◎	◎
8 Combined seal	○	○	×	○	○

- The ◎ and ○-marked items are applicable, while the △-marked items are inapplicable.
- For the △-marked items, contact us before usage.
- The ◎-marked items are the recommended packing materials in the case of giving the first priority to wear resistance.
- For the working temperature range, refer to the selection materials.

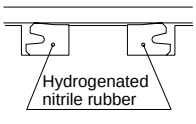
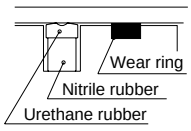
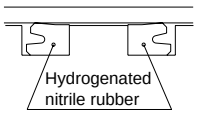
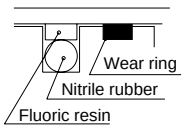
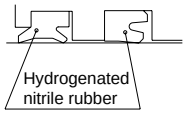
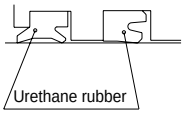
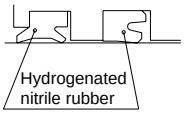
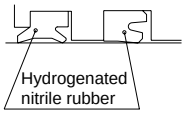
Cutting oil proof type/Adaptability of seal materials to cutting oil

Packing material	Nonaqueous cutting oil		Aqueous cutting oil
	Type 1	Type 2	
6 Hydrogenated nitrile rubber	○	×	○

○ : Applicable × : Inapplicable

For the working temperature range of packing materials, refer to the selection materials in the beginning of this catalogue.

Seal structures and selection guidelines

Packing code		1	2	6	8
Name of type		Nitrile rubber type	Urethane rubber type	Hydrogenated nitrile rubber type	Combined seal type
Packing structure	Piston packing				
	Rod packing and wiper ring				
	Fixed section (including O-ring)	Nitrile rubber	Nitrile rubber	Hydrogenated nitrile rubber	Nitrile rubber

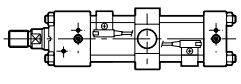
Switch mounting minimum allowable stroke

Unit : mm

Mounting style	Types other than TC type		TC type	
Switch type	AX type	WR • WS type	AX type	WR • WS type
ϕ32	30 (40)	55 (75)	115	170
ϕ40	30	55	115	170
ϕ50	30	55	125	175
ϕ63	30	55	130	180
ϕ80	30	55	140	190
ϕ100	25	50	150	200
ϕ125	20	50	160	210

● Figures in the parentheses on the line of 32 mm bore indicate the minimum strokes when the rod side detector switch and the head side detector switch are mounted on the same surface.

Notes)
- The minimum stroke is identical whether only one switch (one-side stroke end detector) or two switches (double end detector) mounted.
- For the TC type, the figures are applicable when the TC fitting is in the center, and the switch can be installed to both the rod side and the head side.

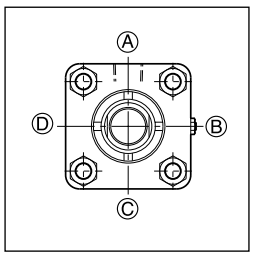


Port position and cushion needle position

● Standard type: With both end cushions
Standard port position, cushion valve position

Mounting style	Order symbol		Rod cover		Head cover	
	Port position	Valve position	Port position	Valve position	Port position	Valve position
SD · LA · CA · CB · FA · FB · TC	A (B · C · D)	B (C · D · A)	A (B · C · D)	B (C · D · A)	A (B · C · D)	B (C · D · A)
EB	A	B	A	B	A	C
EA · TA	A	C	A	C	A	B

● The symbols Ⓐ shown in the table above indicate the standard port positions of types other than EA, EB, and TA, and symbols Ⓑ indicate the standard cushion valve positions. When changing any position, write down symbols shown in dimensional drawings.



(Example)

100H-2R 2CA50BB100- B A AH2

Port position (A, B, C, D)

Cushion valve position (A, B, C, D, 0)

● **Specification of change in positions of head side port and cushion valve**
(Example)

100H-2 2CA50BB100-AB-X PPC

Rod side port and cushion valve position

Head side port and cushion position change specification symbol

Position specification: PC-BA

Head side port and cushion valve position

● Order symbols and port and cushion valve positions shown above are applicable to the EA, EB, and TA types.
When changing any position, specify the position on the rod side or the head side.
As for the TA type rod cover, neither port nor cushion valve can be provided on the Ⓑ or Ⓓ side.
As for the EA type rod cover, cushion valves cannot be provided on the Ⓑ or Ⓓ side.
As for the EB type head cover, cushion valves cannot be provided on the Ⓑ or Ⓓ side.
● If the cylinder has no cushion, cushion valve position is indicated as "0".
● If the ports are located on the Ⓑ or Ⓓ side of the LA type cylinder and general piping joints are used, they may interfere with the cylinder mounting bolts.
● Air vents are located on the same side as that the cushion valves are installed.
If the cylinder has no cushion, they are located on the Ⓑ side (Ⓒ side, in the case of the EA or TA type rod cover).

Port G thread (BSPP) type

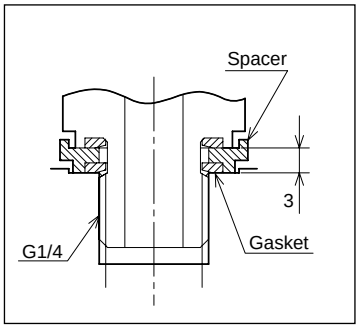
● **As for the port G thread type, add "G" ahead of the port position symbol.**
(Example)

100H-2R 2CA50BB100 - G A B

Port G thread type

Port position

Cushion valve position



● Spacers for the rod side ports are provided for the 100H-2 with 32 mm bore. Be sure to use them for piping.
(If no spacer is attached to it, the joint may interfere with the parts in the cylinder.)

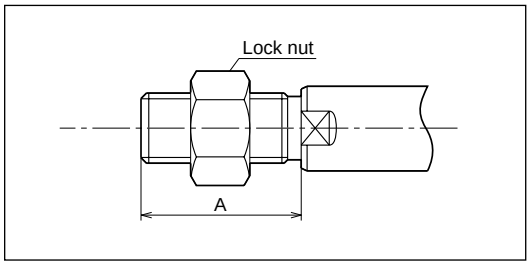
Notes on order of cylinder with lock nut

- The rod end thread length (A) must be longer when a lock nut [K] is attached to the rod end.

(Example)

100H-2R 2LA50BB200- ABAH2 -[K]

Long thread with lock nut



A without lock nut
A=28
↓
A of long thread
with lock nut
A=40

Note) When a lock nut is attached to the rod end, length "A" shown in the figure above must be the same as that of the long thread with lock nut type or longer. For details, refer to "Thread length with lock nut".

Delivery of rod end attachment (T-end and Y-end)

Delivery specifications of the cylinder with lock nut and rod end attachment differ from those of the cylinder with rod end attachment only (without lock nut). For details, refer to the dimensional drawing of rod end attachment.

Semi-standard fabrication range

- Change in piston rod end
  (Size symbol: WF (W), A, KK)
- Plated cylinder tube
  (Hard chrome plated 2/100 mm)
- With boots

Weight table

Unit: kg

Bore mm	Basic weight (SD type)		Additional weight per 1 mm stroke		Mounting accessories weight									Rod end attachment weight		
	Single rod type	Double rod type	Single rod type	Double rod type	LA	EA	EB	FA	FB	CA	CB	TA	TC	Rod end eye (T-end)	Rod end clevis (Y-end)	Lock nut
ϕ32	1.31	1.73	0.0062	0.0082	0.26	—	—	0.32	0.28	0.15	0.19	0.04	0.16	0.31	0.38	0.03
ϕ40	1.96	2.50	0.0062	0.0092	0.24	0.43	0.43	0.45	0.37	0.22	0.29	0.06	0.56	0.38	0.54	0.03
ϕ50	3.18	4.06	0.0103	0.0151	0.25	0.64	0.62	0.75	0.68	0.31	0.36	0.11	0.97	0.50	0.62	0.05
ϕ63	4.99	6.32	0.0144	0.0224	0.32	0.72	0.91	1.26	1.11	0.88	1.07	0.22	1.39	1.25	1.86	0.09
ϕ80	8.65	11.24	0.0227	0.0351	0.68	1.26	1.33	2.16	1.86	1.22	1.40	0.49	2.66	1.66	2.08	0.13
ϕ100	14.27	17.66	0.0362	0.0554	1.13	1.31	1.99	3.15	2.81	2.15	2.65	0.82	3.85	2.98	3.98	0.23
ϕ125	22.91	28.22	0.0547	0.0848	1.40	1.51	2.86	5.53	4.98	4.88	6.09	1.30	6.97	6.78	9.25	0.31

Switch additional weight

Unit: kg

Switch / Bore (mm)	AX type			WR・WS type
	Cord length 1.5 m	Cord length 5 m	Connector type	
ϕ32 - ϕ80	0.05	0.13	0.04	0.5
ϕ100 - ϕ125	0.07	0.15	0.06	0.5

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

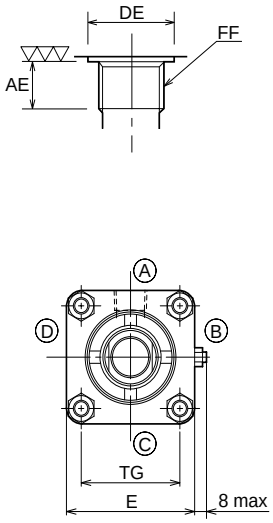
Calculation example: 100H-2R, bore ϕ80, cylinder stroke 200 mm, LA type, 2 pcs. of AX215

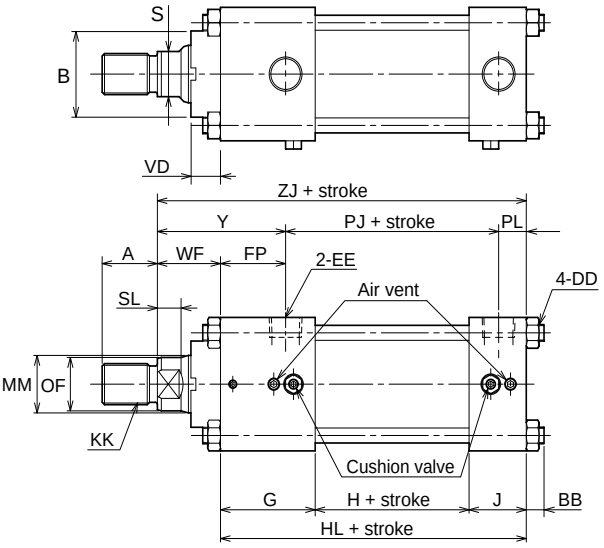
8.65 + (0.0227 × 200) + 0.68 + (0.13 × 2) = 14.13 kg

SD

100H-2 | 2 | SD | Bore | B | B | Stroke | – | A | B

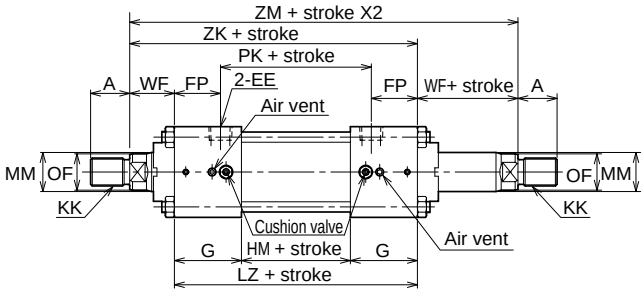
Port G thread (BSPP) type





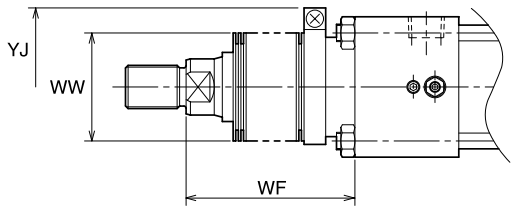
- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- For the use of the SD type, be sure to refer to the "Precautions for use, 4. Mounting" in the beginning of this catalogue.
- When you want to change the length of the projected rod, specify the "WF".

Double-acting double rod



- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ32·ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

- When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	BB	DD	DE	E	EE	FF	FP	G	H	HL
ϕ32	12 Note)	7	M6 ×1	ϕ21.5	□45	Rc1/4	G1/4	35	49	28	103
ϕ40	12	7	M6 ×1	ϕ25.5	□52	Rc3/8	G3/8	33	48	28	105
ϕ50	12	9	M8 ×1	ϕ25.5	□65	Rc3/8	G3/8	33	48	28	105
ϕ63	14	9	M8 ×1	ϕ30 or more	□76	Rc1/2	G1/2	35	53	30	117
ϕ80	14	11	M10 ×1.25	ϕ30 or more	□94	Rc1/2	G1/2	42	62	34	131
ϕ100	16	14	M14 ×1.5	ϕ36.9 or more	□114	Rc3/4	G3/4	38	61	40	143
ϕ125	16	16	M16 ×1.5	ϕ36.9 or more	□140	Rc3/4	G3/4	39	62	47	151

Symbol / Bore	HM	J	LZ	PJ	PK	PL	TG	WF	Y	ZJ	ZK	ZM
ϕ32	38	26	136	56	66	12	33.2	25	60	128	161	186
ϕ40	38	29	134	58	68	14	40	25	58	130	159	184
ϕ50	38	29	134	58	68	14	50	32	65	137	166	198
ϕ63	40	34	146	66	76	16	58	34	69	151	180	214
ϕ80	44	35	168	74	84	15	75	35	77	166	203	238
ϕ100	50	42	172	86	96	19	90	41	79	184	213	254
ϕ125	57	42	181	93	103	19	112	41	80	192	222	263

Notes) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

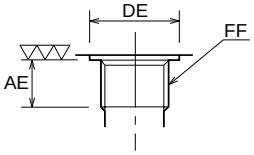
With boots

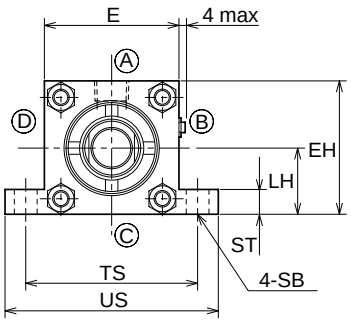
Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89
YJ	ϕ65	ϕ70	ϕ75	ϕ83	ϕ93	ϕ105	ϕ120

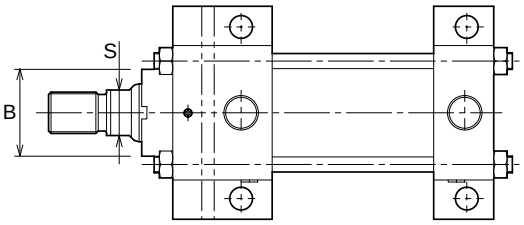
LA

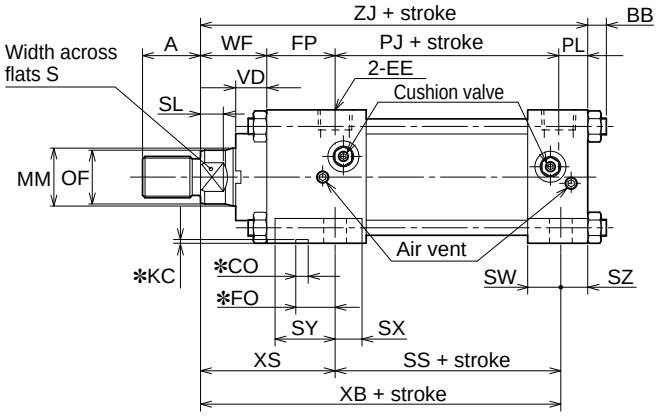
100H-2 | 2 | LA | Bore | B | B | Stroke | – | A | B

Port G thread (BSPP) type



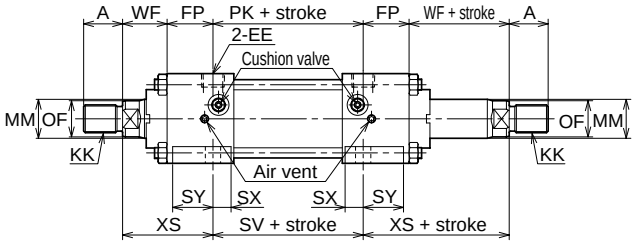






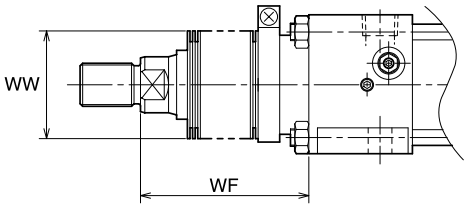
- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment".
- Notes on mounting bolts
  Use bolts with hexagonal hole as the mounting bolts for cylinders other than the cylinder with 32 mm bore.
  If hexagonal bolts are used, bolt heads may interfere with the cover or spot facing, causing failure in mounting.
- The CO, FO, and KC are key groove (optional) dimensions.
- When you want to change the length of the projected rod, specify the "WF".

Double-acting double rod (Rod B)



- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin	ϕ32·ϕ40	1/3	Stroke+X
Chloroprene	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

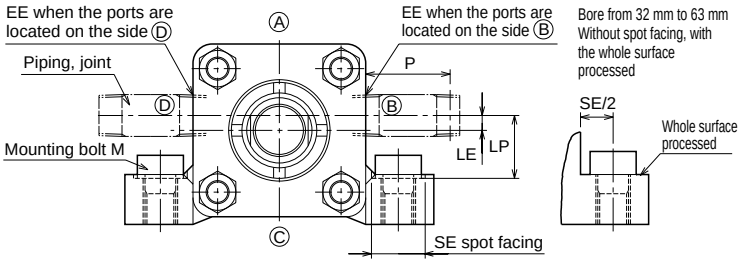
- When the calculated WF has decimals, raise them to the next whole number.

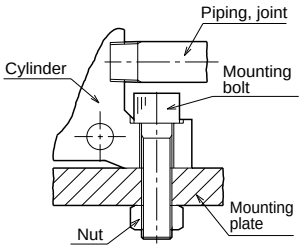
● Notes on LA type with ports on lateral side (Ⓑ or Ⓓ side)

- The port G thread type is not the standard type. (Position on the Ⓐ or Ⓒ side is the same as that of the standard type.)
- Positions of the ports are deviated from the cylinder center by the distance LE.
- Take into consideration the interference of the piping and joint with the mounting bolts (including handling of tightening tools), referring to the table on the right.
- When the cylinder bore is 32 mm, mounting with hexagonal bolts is recommended.
- When the cylinder bore is 40 mm or longer, hexagonal bolts cannot be used (because the head of a hexagonal bolt may interfere with the cover or spot facing). Thus, in such a case, use bolts with hexagonal hole, and mount the cylinder by tightening nuts on the back of the mounting plate (refer to the drawing on the right side).

Symbol / Bore	Port EE	LE	LP	Mounting bolt M	Spot facing dia. SE	P Note1
ϕ32	1/4	5.5	15	8	18	20
ϕ40	3/8	6.5	20	10	18	20
ϕ50	3/8	10	30	10	18	20
ϕ63	1/2	11	37	10	19	20
ϕ80	1/2	14	43.5	12	24	27
ϕ100	3/4	16	48	16	28	33
ϕ125	3/4	20	58.5	20	32	38

Note1. When determining the length P, interference of joints with mounting bolts must be taken into consideration.





Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	BB	DE	E	EE	EH	FF	FP	LH	PJ	PK	PL	SB	SS	ST	SV	SW	SX	SY	SZ	TS	US	WF
ϕ32	12 (Note)	7	ϕ21.5	45	Rc1/4	44.5	G1/4	35	22h10	56	66	12	ϕ9	73	12.5	96	16	29	20	10	63	84	25
ϕ40	12	7	ϕ25.5	52	Rc3/8	51.5	G3/8	33	25.5h10	58	68	14	ϕ11	59	12	68	16	15	33	13	70	90	25
ϕ50	12	9	ϕ25.5	65	Rc3/8	64.5	G3/8	33	32h10	58	68	14	ϕ11	59	12	68	16	15	33	13	83	103	32
ϕ63	14	9	ϕ30 or more	76	Rc1/2	76	G1/2	35	38h10	66	76	16	ϕ11	68	12	78	19	19	34	15	95	115	34
ϕ80	14	11	ϕ30 or more	94	Rc1/2	94.5	G1/2	42	47.5h10	74	84	15	ϕ14	74	18	84	20	17	39	13	121	147	35
ϕ100	16	14	ϕ36.9 or more	114	Rc3/4	114	G3/4	38	57h10	86	96	19	ϕ18	86	25	96	23	20	35	16	145	179	41
ϕ125	16	16	ϕ36.9 or more	140	Rc3/4	139.5	G3/4	39	69.5h10	93	103	19	ϕ22	95	31	105	24	21	35	17	175	216	41

Key groove (optional)

Symbol / Bore	XB	XS	ZJ	CO	FO	KC
ϕ32	118	45	128	6N9	14	1.8 +0.3/0
ϕ40	117	58	130	6N9	18	1.8 +0.3/0
ϕ50	124	65	137	6N9	19	1.8 +0.3/0
ϕ63	136	68	151	12N9	21	3.3 +0.3/0
ϕ80	151	77	166	14N9	30	3.8 +0.3/0
ϕ100	165	79	184	14N9	30	3.8 +0.3/0
ϕ125	174	79	192	14N9	30	3.8 +0.3/0

Notes) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

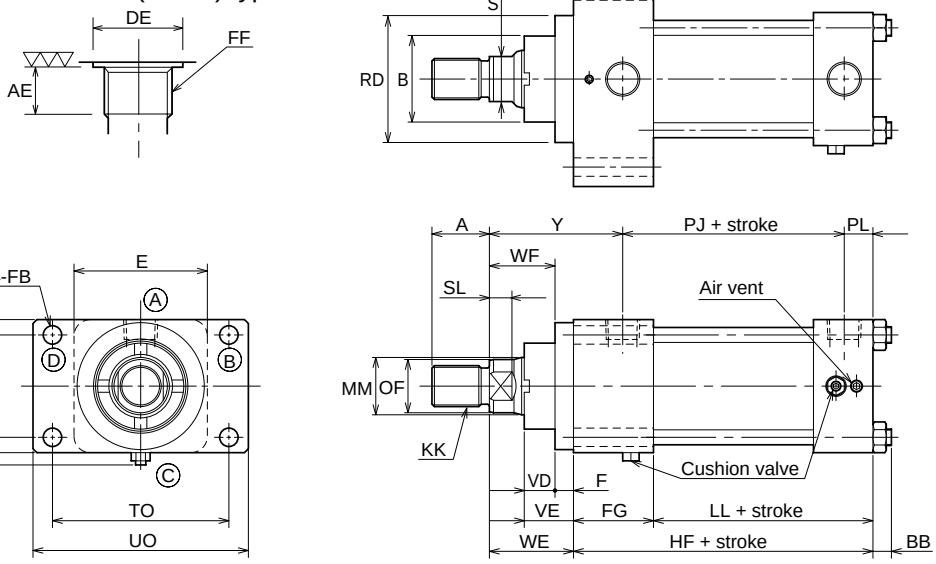
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

EA

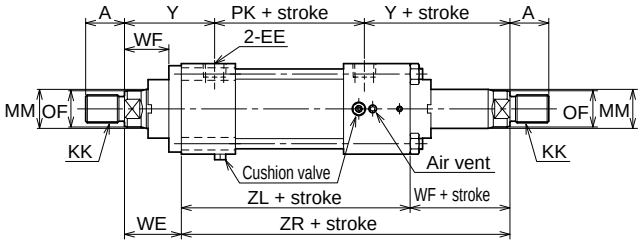
100H-2 | 2 | EA | Bore | B | B | Stroke | – | A | C

Port G thread (BSPP) type



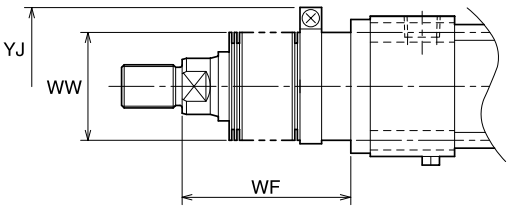
- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- If the mounting plate is located on the cylinder tube side of the switch set cylinder, take into consideration the interference of the switch with the mounting plate.
- When you want to change the length of the projected rod, specify the "WF".
- The symbols (A) and (C) shown in the figure above indicate the standard positions of port and cushion valve. (Rod side: (A) (C), Head side: (A) (B))
  When changing any position, be sure to specify the port positions and cushion positions on the rod side or head side.

Double-acting double rod



- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

- When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	RD	S	SL	VD	VE
		Standard type	Cutting oil proof type								
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	ϕ51f8	17	9	12	22
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	ϕ62f8	22	11	15	24
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	ϕ72f8	30	14	15	29
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	ϕ92f8	38	17	8	24
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	ϕ110f8	50	21	16	32
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	ϕ130f8	60	24	13	29

Symbol / Bore	AE	BB	DE	E	EE	F	FB	FF	FG	HF	LL
ϕ40	12	7	ϕ25.5	□52	Rc3/8	10	ϕ6.6	G3/8	38	95	57
ϕ50	12	9	ϕ25.5	□65	Rc3/8	9	ϕ9	G3/8	39	96	57
ϕ63	14	9	ϕ30 or more	□76	Rc1/2	14 (Note 1)	ϕ9	G1/2	39	103	64
ϕ80	14	11	ϕ30 or more	□94	Rc1/2	16	ϕ11	G1/2	46	115	69
ϕ100	16	14	ϕ36.9 or more	□114	Rc3/4	16	ϕ13.5	G3/4	45	127	82
ϕ125	16	16	ϕ36.9 or more	□140	Rc3/4	16	ϕ17.5	G3/4	46	135	89

Symbol / Bore	PJ	PK	PL	R	TO	UO	WE	WF	Y	ZL	ZR
ϕ40	58	68	14	40	70	86	35	25	58	124	149
ϕ50	58	68	14	50	86	105	41	32	65	125	157
ϕ63	66	76	16	56	98	118	48	34	69	132	166
ϕ80	74	84	15	70	119	142	51	35	77	152	187
ϕ100	86	96	19	90	138	161	57	41	79	156	197
ϕ125	93	103	19	110	168	194	57	41	80	165	206

Note 1) ● According to the standard (JIS B8367-5), the maximum is 10.
● Allowance of MM is f8.

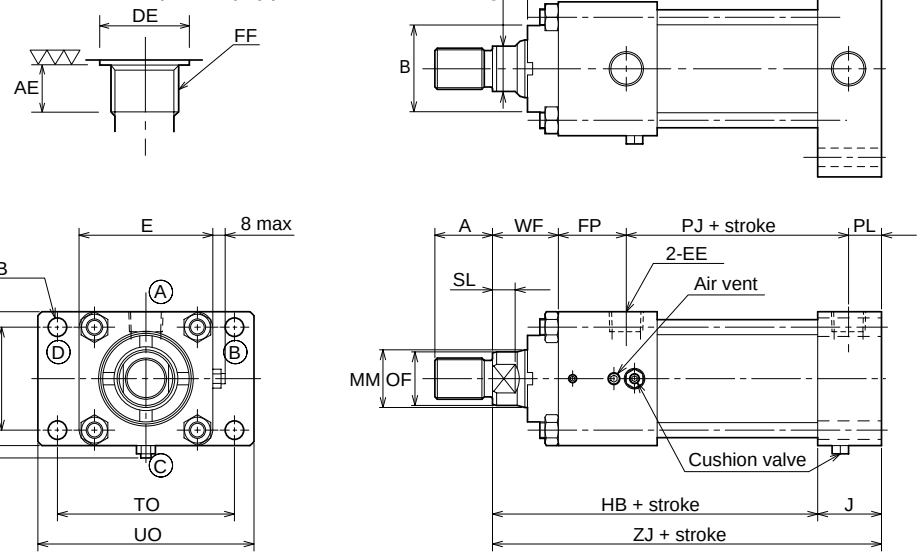
With boots

Bore / Symbol	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
XX	56	58	71	73	75	89
YJ	ϕ70	ϕ75	ϕ83	ϕ93	ϕ105	ϕ120

EB

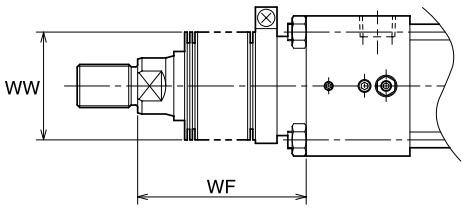
100H-2 | 2 | EB | Bore | B | B | Stroke | – | A | B

Port G thread (BSPP) type



- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- If the mounting plate is located on the cylinder tube side of the switch set cylinder, take into consideration the interference of the switch with the mounting plate.
- When you want to change the length of the projected rod, specify the "WF".
- The symbols (A) and (C) shown in the figure above indicate the standard positions of port and cushion valve. (Rod side: (A) (C), Head side: (A) (B))
  When changing any position, be sure to specify the port positions and cushion positions on the rod side or head side.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes) ● Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Ltd.
● The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

● When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	DE	E	EE	FB	FF	FP	HB	J	PJ	PK
ϕ40	12	ϕ25.5	□52	Rc3/8	ϕ6.6	G3/8	33	101	31	58	68
ϕ50	12	ϕ25.5	□65	Rc3/8	ϕ9	G3/8	33	108	31	58	68
ϕ63	14	ϕ30 or more	□76	Rc1/2	ϕ9	G1/2	35	117	36	66	76
ϕ80	14	ϕ30 or more	□94	Rc1/2	ϕ11	G1/2	42	131	37	74	84
ϕ100	16	ϕ36.9 or more	□114	Rc3/4	ϕ13.5	G3/4	38	142	45	86	96
ϕ125	16	ϕ36.9 or more	□140	Rc3/4	ϕ17.5	G3/4	39	150	46	93	103

Symbol / Bore	PL	R	TO	UO	WF	ZJ
ϕ40	16	40	70	86	25	132
ϕ50	16	50	86	105	32	139
ϕ63	18	56	98	118	34	153
ϕ80	17	70	119	142	35	168
ϕ100	22	90	138	161	41	187
ϕ125	23	110	168	194	41	196

● Allowance of MM is f8.

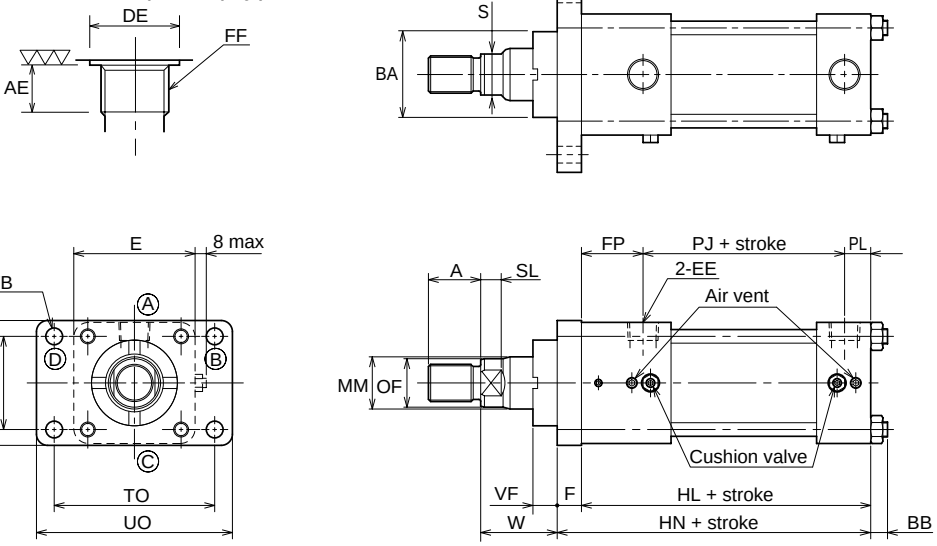
With boots

Bore / Symbol	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	58	71	73	75	89

FA

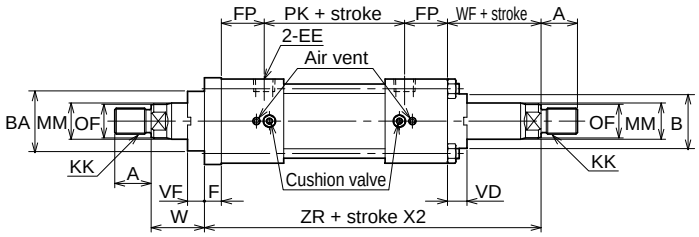
100H-2 | 2 | FA | Bore | B | B | Stroke | – | A | B

Port G thread (BSPP) type



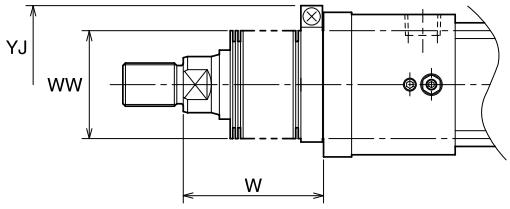
- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- When you want to change the length of the projected rod, specify the "W".

Double-acting double rod



- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

W

Nylon tarpaulin Chloroprene	ϕ32·ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

- When the calculated W has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		BA	KK	MM	OF	S	SL	VD	VF
		Standard type	Cutting oil proof type								
ϕ32	18	ϕ30f9	ϕ34f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10	13
ϕ40	22	ϕ34f9	ϕ40f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12	13
ϕ50	28	ϕ42f9	ϕ46f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15	13
ϕ63	36	ϕ50f9	ϕ55f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15	13
ϕ80	45	ϕ60f9	ϕ65f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8	13
ϕ100	56	ϕ72f9	–	ϕ77f9	M42 ×2	ϕ56	ϕ54	50	21	16	13
ϕ125	63	ϕ88f9	–	ϕ92f9	M48 ×2	ϕ70	ϕ68	60	24	13	13

Symbol / Bore	AE	BB	DE	E	EE	F	FB	FE	FF	FP	HL	HN
ϕ32	12 (Note 1)	7	ϕ21.5	□45	Rc1/4	11	ϕ6.6	47	G1/4	35	103	114
ϕ40	12	7	ϕ25.5	□52	Rc3/8	11	ϕ6.6	54	G3/8	33	105	116
ϕ50	12	9	ϕ25.5	□65	Rc3/8	13	ϕ9	67	G3/8	33	105	118
ϕ63	14	9	ϕ30 or more	□76	Rc1/2	16	ϕ9	78	G1/2	35	117	133
ϕ80	14	11	ϕ30 or more	□94	Rc1/2	18	ϕ11	96	G1/2	42	131	149
ϕ100	16	14	ϕ36.9 or more	□114	Rc3/4	20	ϕ13.5	116	G3/4	38	143	163
ϕ125	16	16	ϕ36.9 or more	□140	Rc3/4	24	ϕ17.5	142	G3/4	39	151	175

Symbol / Bore	PJ	PK	PL	R	TO	UO	W	WF	ZR
ϕ32	56	66	12	33	58	70	35	25	172
ϕ40	58	68	14	40	70	86	35	25	170
ϕ50	58	68	14	50	86	105	41	32	179
ϕ63	66	76	16	56	98	118	48	34	196
ϕ80	74	84	15	70	119	143	51	35	221
ϕ100	86	96	19	90	138	162	57	41	233
ϕ125	93	103	19	110	168	194	57	41	246

Note 1) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

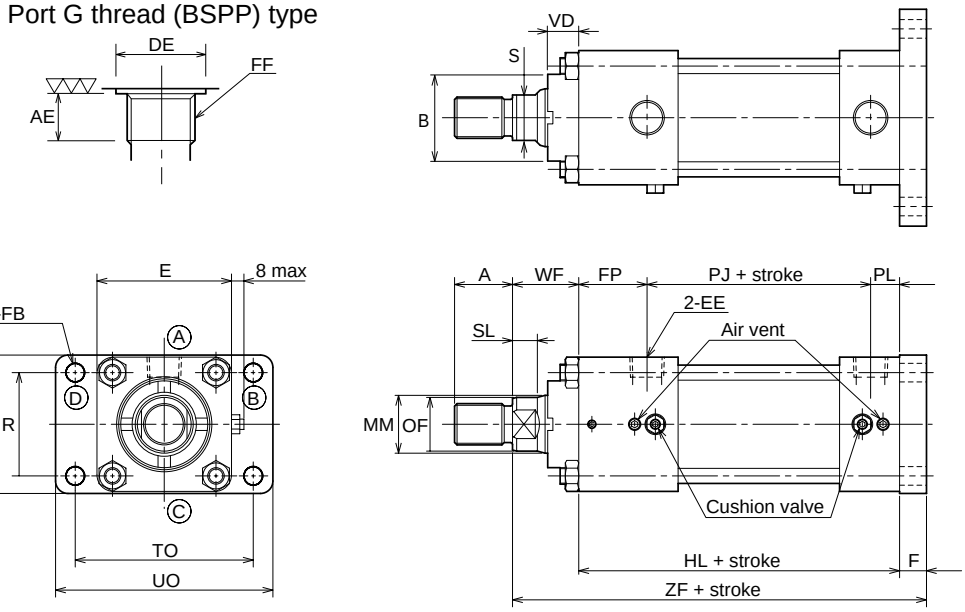
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	45	45	45	55	55	55	65
YJ	ϕ65	ϕ70	ϕ75	ϕ83	ϕ93	ϕ105	ϕ120

FB

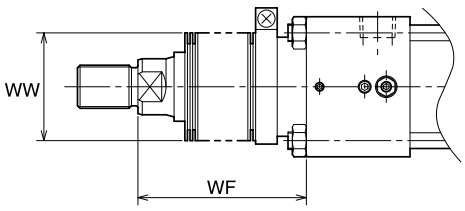
100H-2 | 2 | FB | Bore | B | B | Stroke | – | A | B

Port G thread (BSPP) type



- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- When you want to change the length of the projected rod, specify the "WF".
- For the G thread type, the FB attachment may interfere with the joint when the joint is screwed into the head side port, depending on the joint type. Refer to the PL, and check the size of the joint to be used.
  Contact us if any interference occurs.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ32·ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

- When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	DE	E	EE	F	FB	FE	FF	FP	HL	PJ
ϕ32	12 (Note 1)	ϕ21.5	□45	Rc1/4	11	ϕ6.6	47	G1/4	35	103	56
ϕ40	12	ϕ25.5	□52	Rc3/8	11	ϕ6.6	54	G3/8	33	105	58
ϕ50	12	ϕ25.5	□65	Rc3/8	13	ϕ9	67	G3/8	33	105	58
ϕ63	14	ϕ30 or more	□76	Rc1/2	16	ϕ9	78	G1/2	35	117	66
ϕ80	14	ϕ30 or more	□94	Rc1/2	18	ϕ11	96	G1/2	42	131	74
ϕ100	16	ϕ36.9 or more	□114	Rc3/4	20	ϕ13.5	116	G3/4	38	143	86
ϕ125	16	ϕ36.9 or more	□140	Rc3/4	24	ϕ17.5	142	G3/4	39	151	93

Symbol / Bore	PK	PL	R	TO	UO	WF	ZF
ϕ32	66	12	33	58	70	25	139
ϕ40	68	14	40	70	86	25	141
ϕ50	68	14	50	86	105	32	150
ϕ63	76	16	56	98	118	34	167
ϕ80	84	15	70	119	143	35	184
ϕ100	96	19	90	138	162	41	204
ϕ125	103	19	110	168	194	41	216

Note 1) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

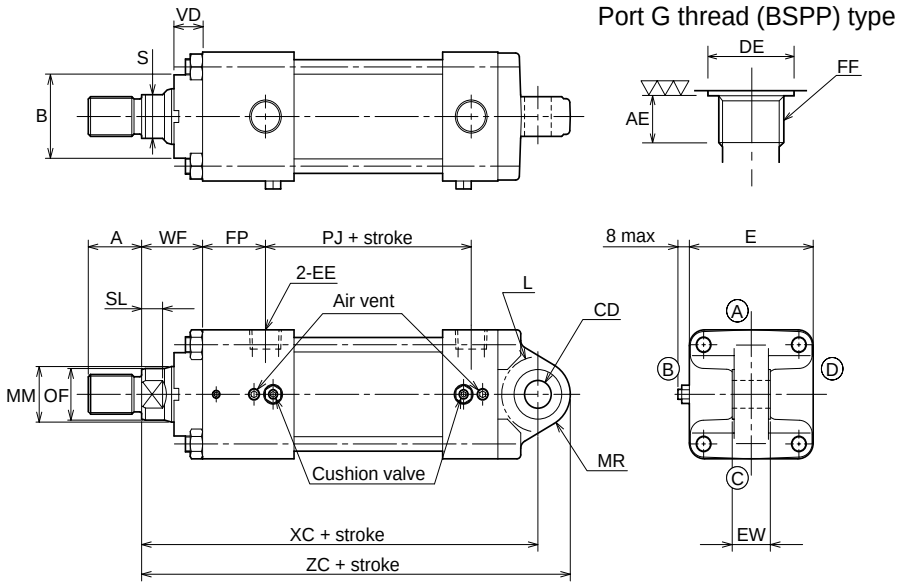
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

CA

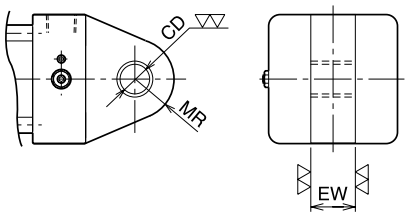
100H-2 | 2 | CA | Bore | B | B | Stroke | – | A | B

● Bore from 40mm to 100mm

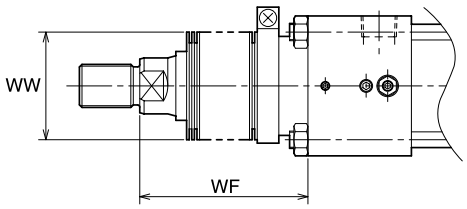


- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/ Rod end thread length with lock nut".
- When you want to change the length of the projected rod, specify the "WF".

● Bore 32 mm, 125 mm



With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ32·ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

● When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	CD	DE	E	EE	EW	FF	FP	L	MR	PJ	WF
ϕ32	12 Note)	ϕ12H9	ϕ21.5	□45	Rc1/4	16h14	G1/4	35	R19	R17	56	25
ϕ40	12	ϕ14H9	ϕ25.5	□52	Rc3/8	20h14	G3/8	33	R19	R17	58	25
ϕ50	12	ϕ14H9	ϕ25.5	□65	Rc3/8	20h14	G3/8	33	R19	R17	58	32
ϕ63	14	ϕ20H9	ϕ30 or more	□76	Rc1/2	30h14	G1/2	35	R32	R29	66	34
ϕ80	14	ϕ20H9	ϕ30 or more	□94	Rc1/2	30h14	G1/2	42	R32	R29	74	35
ϕ100	16	ϕ28H9	ϕ36.9 or more	□114	Rc3/4	40h14	G3/4	38	R39	R34	86	41
ϕ125	16	ϕ36H9	ϕ36.9 or more	□140	Rc3/4	50h14	G3/4	39	R54	R50	93	41

Symbol / Bore	XC	ZC
ϕ32	147	164
ϕ40	151	168
ϕ50	158	175
ϕ63	185	214
ϕ80	200	229
ϕ100	226	260
ϕ125	250	300

Notes) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

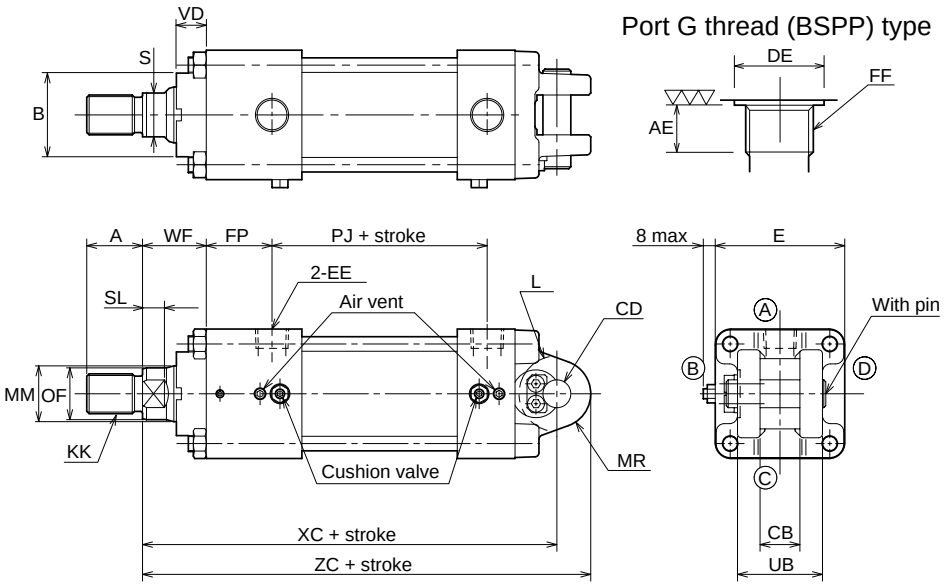
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

CB

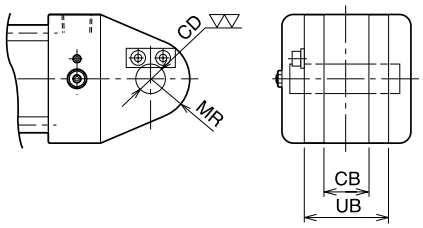
100H-2 | 2 | CB | Bore | B | B | Stroke | – | A | B

● Bore from 40mm to 125mm

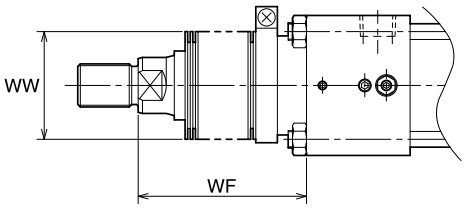


- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- When you want to change the length of the projected rod, specify the "WF".

● Bore 32 mm



With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin	ϕ32·ϕ40	1/3	Stroke+X
Chloroprene	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

● When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	CB	CD	DE	E	EE	FF	FP	L	MR	PJ
ϕ32	12 (Note 1)	16A16	ϕ12 H9/f8	ϕ21.5	□ 45	Rc1/4	G1/4	35	R19	R17	56
ϕ40	12	20A16	ϕ14 H9/f8	ϕ25.5	□ 52	Rc3/8	G3/8	33	R19	R17	58
ϕ50	12	20A16	ϕ14 H9/f8	ϕ25.5	□ 65	Rc3/8	G3/8	33	R19	R17	58
ϕ63	14	30A16	ϕ20 H9/f8	ϕ30 or more	□ 76	Rc1/2	G1/2	35	R32	R29	66
ϕ80	14	30A16	ϕ20 H9/f8	ϕ30 or more	□ 94	Rc1/2	G1/2	42	R32	R29	74
ϕ100	16	40A16	ϕ28 H9/f8	ϕ36.9 or more	□ 114	Rc3/4	G3/4	38	R39	R34	86
ϕ125	16	50A16	ϕ36 H9/f8	ϕ36.9 or more	□ 140	Rc3/4	G3/4	39	R54	R50	93

Symbol / Bore	UB	WF	XC	ZC
ϕ32	32	25	147	164
ϕ40	43	25	151	168
ϕ50	43	32	158	175
ϕ63	65	34	185	214
ϕ80	65	35	200	229
ϕ100	83	41	226	260
ϕ125	103	41	250	300

Note 1) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

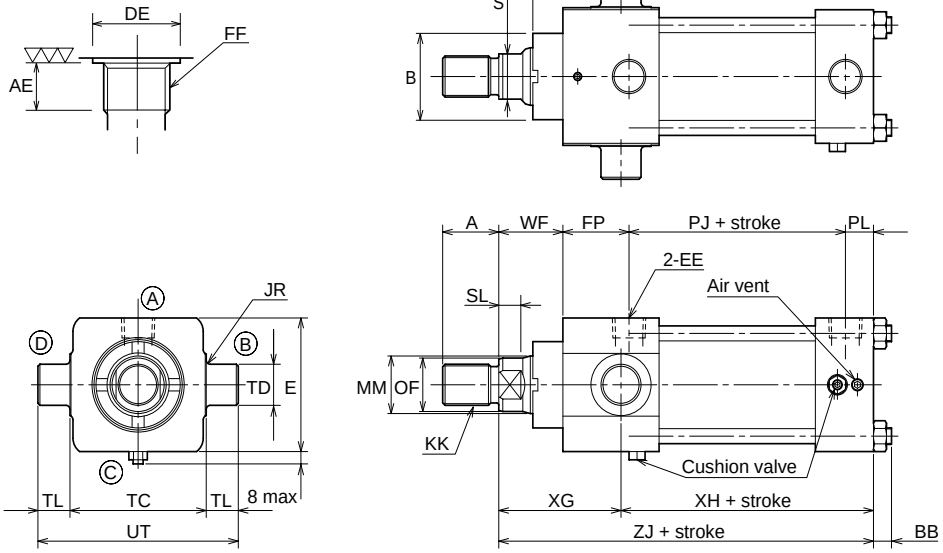
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

TA

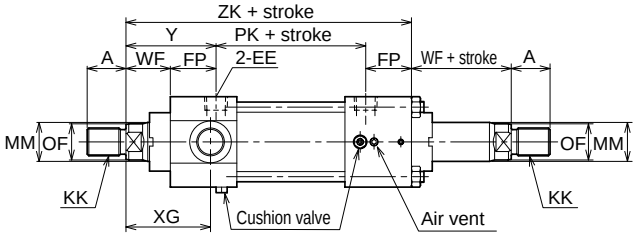
100H-2	2	TA	Bore	B	B	Stroke	–	A	C

Port G thread (BSPP) type



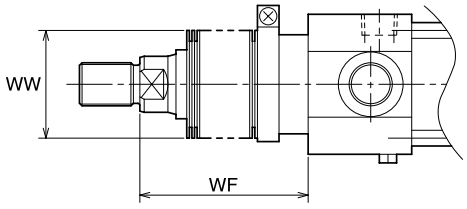
- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- If the stroke is short, pay attention to prevent the cushion valve from interfering with the mounting bracket.
- When you want to change the length of the projected rod, specify the "WF".

Double-acting double rod



- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes)
- Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
- Conex is the registered trademark of Teijin Ltd.
- The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin	ϕ32·ϕ40	1/3	Stroke+X
Chloroprene	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X
Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

- When the calculated WF has decimals, raise them to the next whole number.

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	BB	DE	E	EE	FF	FP	JR	PJ	PK	PL	TC
ϕ32	12 (Note 1)	7	ϕ21.5	□ 45	Rc1/4	G1/4	35	R2	56	66	12	44h14
ϕ40	12	7	ϕ25.5	□ 52	Rc3/8	G3/8	33	R2	58	68	14	55h14
ϕ50	12	9	ϕ25.5	□ 65	Rc3/8	G3/8	33	R2	58	68	14	68h14
ϕ63	14	9	ϕ30 or more	□ 76	Rc1/2	G1/2	35	R2.5	66	76	16	80h14
ϕ80	14	11	ϕ30 or more	□ 94	Rc1/2	G1/2	42	R2.5	74	84	15	100h14
ϕ100	16	14	ϕ36.9 or more	□ 114	Rc3/4	G3/4	38	R3	86	96	19	120h14
ϕ125	16	16	ϕ36.9 or more	□ 140	Rc3/4	G3/4	39	R3	93	103	19	145h14

Symbol / Bore	TD	TL	UT	WF	XG	XH	ZJ	ZK
ϕ32	ϕ16f8	12	68	25	54	74	128	161
ϕ40	ϕ16f8	12	79	25	54	76	130	159
ϕ50	ϕ20f8	16	100	32	61	76	137	166
ϕ63	ϕ25f8	20	120	34	67	84	151	180
ϕ80	ϕ32f8	25	150	35	73	93	166	203
ϕ100	ϕ40f8	32	184	41	79	105	184	213
ϕ125	ϕ50f8	40	225	41	71	121	192	222

Note 1) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

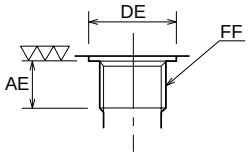
With boots

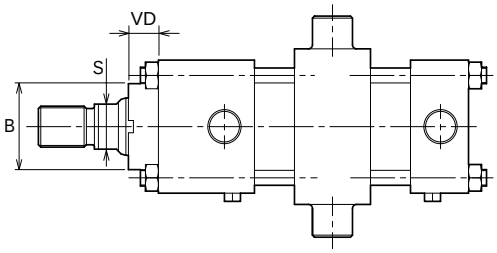
Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

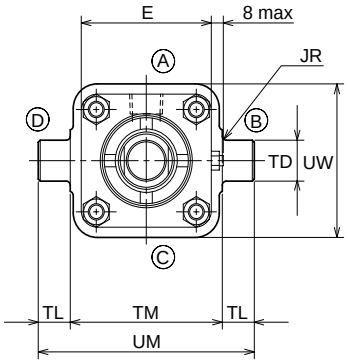
TC

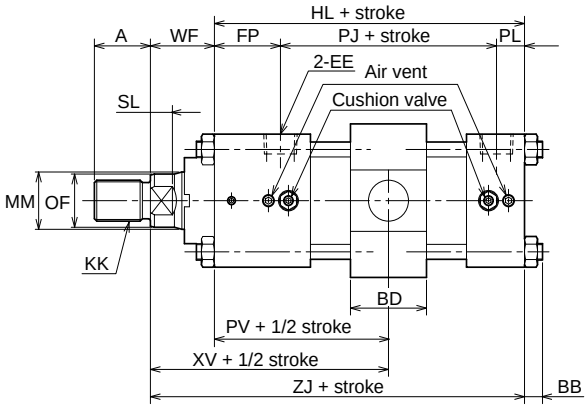
100H-2 | 2 | TC | Bore | B | B | Stroke | – | A | B

Port G thread (BSPP) type



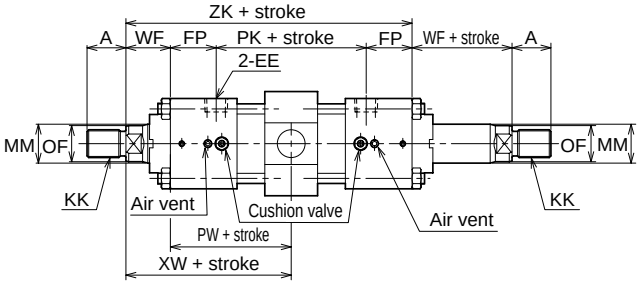






- Positions of the cushion needles and air vents depend on the cylinder bore.
- Rod end thread length (A) must be longer when a lock nut is attached to the rod end. Refer to "Rod end attachment/Rod end thread length with lock nut".
- If the stroke is short, pay attention to prevent the cushion valve from interfering with the mounting bracket.
- When you want to change the length of the projected rod, specify the "WF". ("WF" is necessary for specifying XV and XW.)
- The TC attachment must be normally positioned in the center. When changing the position, contact us.

Double-acting double rod



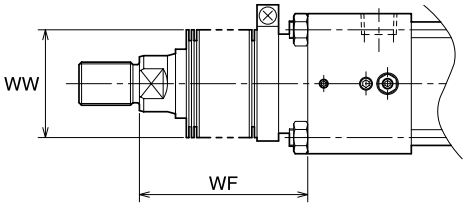
- Distance between the covers of the double rod type cylinder is longer than that of the single rod type cylinder by 10 mm.

Minimum stroke of TC type

Bore	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
Minimum stroke	10	50	50	50	100	100	100

Note) ● As for the minimum stroke with the switch set, refer to the page including the model codes.

With boots



	Standard	Semi-standard	
Material	Nylon tarpaulin	Chloroprene	Conex
Resistible temperature	80°C	130°C	200°C

Notes) ● Remember that the resistible temperatures shown in the table above are for the boots, not for the cylinder.
● Conex is the registered trademark of Teijin Ltd.
● The boots have been mounted at our factory prior to delivery.

WF

Nylon tarpaulin Chloroprene	ϕ32·ϕ40	1/3	Stroke+X
	ϕ50	1/3.5	Stroke+X
	ϕ63 - ϕ100	1/4	Stroke+X
	ϕ125	1/5	Stroke+X

Conex	ϕ32	1/2	Stroke+X
	ϕ40·ϕ50	1/2.5	Stroke+X
	ϕ63 - ϕ100	1/3	Stroke+X
	ϕ125	1/3.5	Stroke+X

● When the calculated WF has decimals, raise them to the next whole number.

Maximum allowable pressure of TC type

The TC attachment is at the normal position (center), and load is applied on the one side only.

Bore	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
Maximum allowable pressure (MPa)	10	10	10	10	7	7	7

Dimensional table

Symbol / Bore	A	B		KK	MM	OF	S	SL	VD
		Standard type	Cutting oil proof type						
ϕ32	18	ϕ30f9	ϕ34f9	M14 ×1.5	ϕ18	ϕ17	14	10	10
ϕ40	22	ϕ34f9	ϕ40f9	M16 ×1.5	ϕ22	ϕ21	17	9	12
ϕ50	28	ϕ42f9	ϕ46f9	M20 ×1.5	ϕ28	ϕ26	22	11	15
ϕ63	36	ϕ50f9	ϕ55f9	M27 ×2	ϕ36	ϕ34	30	14	15
ϕ80	45	ϕ60f9	ϕ65f9	M33 ×2	ϕ45	ϕ43	38	17	8
ϕ100	56	ϕ72f9	–	M42 ×2	ϕ56	ϕ54	50	21	16
ϕ125	63	ϕ88f9	–	M48 ×2	ϕ70	ϕ68	60	24	13

Symbol / Bore	AE	BB	BD	DE	E	EE	FF	FP	HL	JR	PJ	PK	PL
ϕ32	12 Note)	7	30	ϕ21.5	□ 45	Rc1/4	G1/4	35	103	R2	56	66	12
ϕ40	12	7	30	ϕ25.5	□ 52	Rc3/8	G3/8	33	105	R2	58	68	14
ϕ50	12	9	38	ϕ25.5	□ 65	Rc3/8	G3/8	33	105	R2	58	68	14
ϕ63	14	9	43	ϕ30 or more	□ 76	Rc1/2	G1/2	35	117	R2.5	66	76	16
ϕ80	14	11	53	ϕ30 or more	□ 94	Rc1/2	G1/2	42	131	R2.5	74	84	15
ϕ100	16	14	63	ϕ36.9 or more	□ 114	Rc3/4	G3/4	38	143	R3	86	96	19
ϕ125	16	16	73	ϕ36.9 or more	□ 140	Rc3/4	G3/4	39	151	R3	93	103	19

Symbol / Bore	PV	PW	TD	TL	TM	UM	UW	WF	XV	XW	ZJ	ZK
ϕ32	63	68	ϕ16f8	12	55h14	79	55	25	88	93	128	161
ϕ40	62	67	ϕ16f8	12	63h14	87	63	25	87	92	130	159
ϕ50	62	67	ϕ20f8	16	76h14	108	75	32	94	99	137	166
ϕ63	68	73	ϕ25f8	20	88h14	128	88	34	102	107	151	180
ϕ80	79	84	ϕ32f8	25	114h14	164	107	35	114	119	166	203
ϕ100	81	86	ϕ40f8	32	132h14	196	126	41	122	127	184	213
ϕ125	85.5	90.5	ϕ50f8	40	165h14	245	157	41	126.5	131.5	192	222

Notes) ● For the cylinder with 32 mm bore and the G thread port, the thread length adjuster spacer is installed on the rod side.
● Allowance of MM is f8.

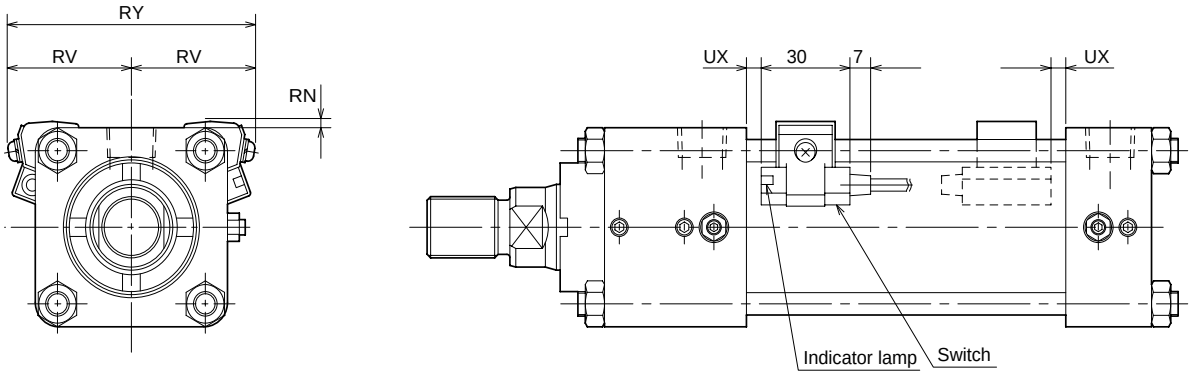
With boots

Bore / Symbol	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
WW	ϕ40	ϕ50	ϕ50	ϕ71	ϕ80	ϕ100	ϕ100
X	56	56	58	71	73	75	89

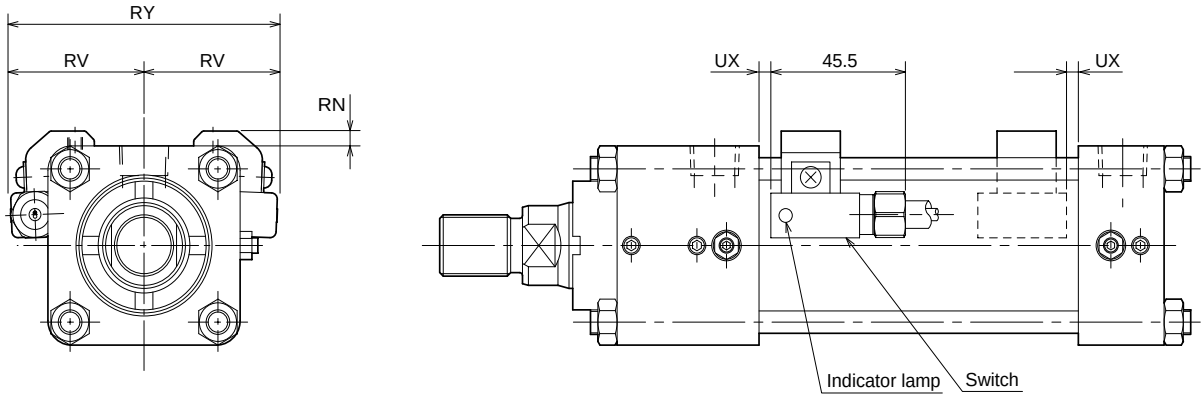
Switch set

100H-2R	2	SD	Bore	B	B	Stroke	–	A	B	Switch symbol	Switch quantity

AX type • AZ type (Contact, no contact)



WR type (Contact) • WS type (No contact/Two-wire two-lamp type) (Cutting oil proof type)



Dimensional table

Symbol / Bore	RN		RV		RY		UX (single rod)			UX (double rod)		
	AX type	WR・WS type	AX type	WR・WS type	AX type	WR・WS type	AX type	WR type	WS type	AX type	WR type	WR・WS type
ϕ32	4	6	33	39	66	78	4	2	4	9	7	9
ϕ40	4	5	37	40	74	80	5	2	4	10	7	9
ϕ50	3	5	42	46	84	92	5	2	4	10	7	9
ϕ63	1	4	46	51	92	102	6	3	5	11	8	10
ϕ80	2	3	55	58	110	116	8	5	7	13	10	12
ϕ100	3	5	65	70	130	140	11	8	10	16	13	15
ϕ125	4	1	76	80	152	160	14	11	13	19	16	18

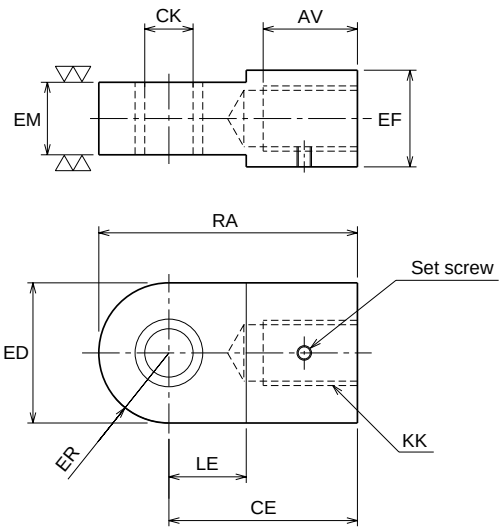
Note) ● Figures on the previous page show the AX type switch (rear wiring). As for the AZ type switch (upper wiring), take into consideration the bending radius of cord.
● The dimension UX indicates the optimum switch mounting position at the detection of the stroke end.

Working range and difference

Bore mm	Contact				No contact			
	AX1✻✻		WR type		AX2✻✻		WS type	
	Working range	Difference	Working range	Difference	Working range	Difference	Working range	Difference
ϕ32	4 - 14	2 or smaller	5 - 10	2 or smaller	3 - 8	1 or smaller	6 - 16	1or smaller
ϕ40	5 - 10		6 - 9		3 - 6		12 - 14	
ϕ50								
ϕ63	7 - 11		8 - 10		3 - 7		10 - 12	
ϕ80								
ϕ100	5 - 12		9 - 11					
ϕ125	8 - 17		10 - 17		4 - 10		15 - 25	

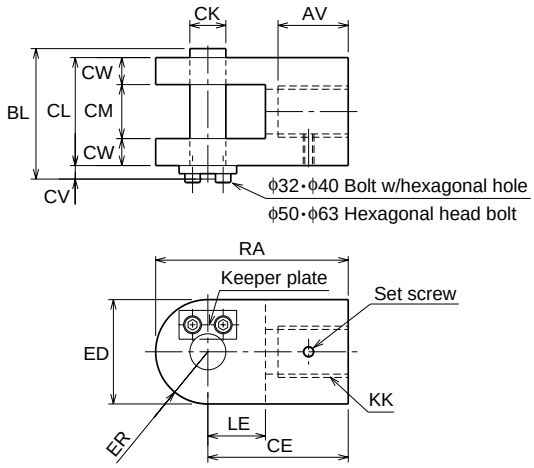
Rod end attachment

● Rod end eye (T-end)

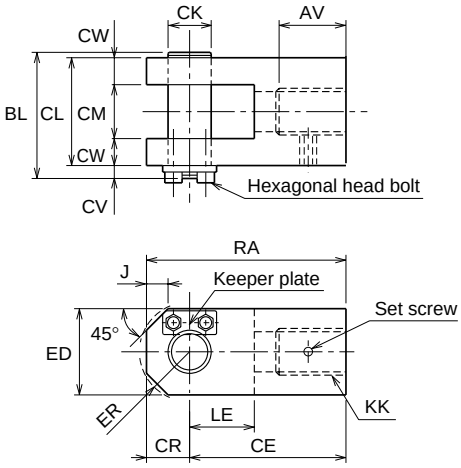


● Rod end clevis (Y-end)

Bore from 32 mm to 80 mm



Bore from 100 mm to 125 mm

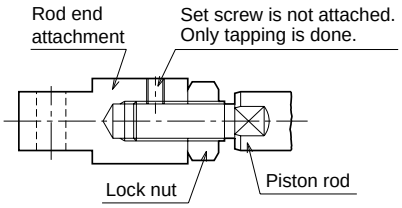


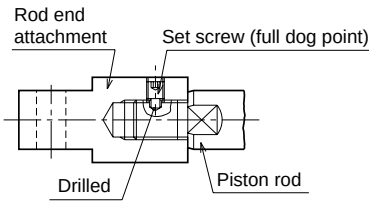
● Delivery of rod end attachment (T-end, Y-end)

(1) In the case that the lock nut and rod end attachment are additionally ordered
The rod end attachment and lock nut are temporarily assembled to the piston rod for delivery. Since the lock nut is not tightened, tighten it after the position of the rod end attachment is adjusted. No set screw is included.

(2) In the case that only the rod end attachment is additionally ordered (without lock nut)
The rod end attachment is tightened to the piston rod, and a drill hole is made on the piston rod for delivery.

If a drill hole is unnecessary, advise us.





Dimensional table/rod end eye (T-end)

Symbol / Bore	Part code	AV	CE	EF	KK	RA	Set screw
ϕ 32	RTH-14-H	21	50	25	M14 × 1.5	67	M6
ϕ 40	RTH-16-3-H	25	55	30	M16 × 1.5	72	M6
ϕ 50	RTH-20-4-H	31	67	35	M20 × 1.5	84	M6
ϕ 63	RTH-27-H	39	78	40	M27 × 2	107	M6
ϕ 80	RTH-33-1-H	48	94	50	M33 × 2	123	M6
ϕ 100	RTH-42-1-H	59	112	65	M42 × 2	146	M8
ϕ 125	RTH-48-4-H	66	135	75	M48 × 2	185	M10

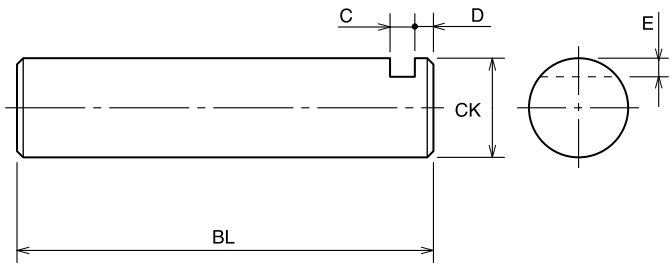
Symbol / Bore	CK	ED	EM	ER	LE
ϕ 32	ϕ12H9	34	$16\ ^{0}_{-0.27}$	R17	19
ϕ 40	ϕ14H9	34	$20\ ^{0}_{-0.33}$	R17	19
ϕ 50	ϕ14H9	34	$20\ ^{0}_{-0.33}$	R17	19
ϕ 63	ϕ20H9	58	$30\ ^{0}_{-0.33}$	R29	32
ϕ 80	ϕ20H9	58	$30\ ^{0}_{-0.33}$	R29	32
ϕ 100	ϕ28H9	68	$40\ ^{0}_{-0.39}$	R34	39
ϕ 125	ϕ36H9	100	$50\ ^{0}_{-0.39}$	R50	54

Dimensional table/rod end clevis (Y-end)

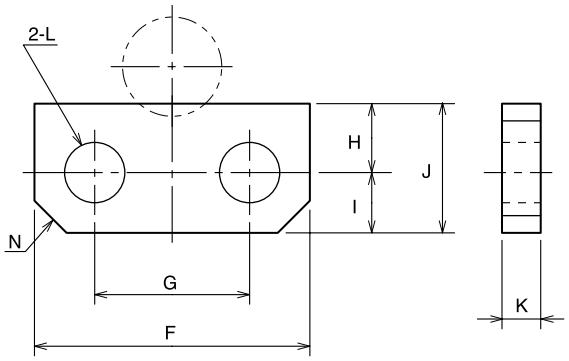
Symbol / Bore	Part code	AV	CE	KK	RA	Set screw
ϕ 32	RYH-14-H	21	50	M14 × 1.5	67	M6
ϕ 40	RYH-16-3-H	25	55	M16 × 1.5	72	M6
ϕ 50	RYH-20-4-H	31	67	M20 × 1.5	84	M6
ϕ 63	RYH-27-H	39	78	M27 × 2	107	M6
ϕ 80	RYH-33-1-H	48	94	M33 × 2	123	M6
ϕ 100	RYH-42-1-H	59	112	M42 × 2	143	M8
ϕ 125	RYH-48-4-H	66	135	M48 × 2	178	M10

Symbol / Bore	BL	CK	CL	CM	CR	CV	CW	ED	ER	J	LE
ϕ 32	42	ϕ12H9/f8	32	$16\ ^{+0.69}_{+0.29}$	–	8	8	34	R17	–	19
ϕ 40	50	ϕ14H9/f8	40	$20\ ^{+0.70}_{+0.30}$	–	8	10	34	R17	–	19
ϕ 50	50	ϕ14H9/f8	40	$20\ ^{+0.70}_{+0.30}$	–	8	10	34	R17	–	19
ϕ 63	72	ϕ20H9/f8	60	$30\ ^{+0.70}_{+0.30}$	–	10	15	58	R29	–	32
ϕ 80	72	ϕ20H9/f8	60	$30\ ^{+0.70}_{+0.30}$	–	10	15	58	R29	–	32
ϕ 100	92	ϕ28H9/f8	80	$40\ ^{+0.91}_{+0.31}$	31	10	20	65	R33	22	39
ϕ 125	115	ϕ36H9/f8	100	$50\ ^{+0.92}_{+0.32}$	43	13	25	90	R48	24	54

● Parallel pin



● Keeper plate



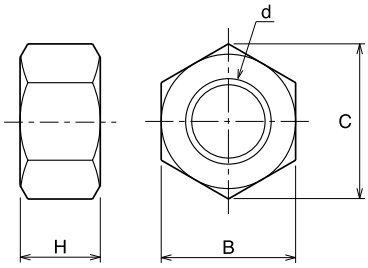
Dimensional table/Parallel pin

Symbol / Bore	Rod B				
	BL	C	CK	D	E
ϕ 32	42	4	ϕ12f8	4	2
ϕ 40	50	4	ϕ14f8	4	2
ϕ 50	50	4	ϕ14f8	4	2
ϕ 63	72	5.5	ϕ20f8	4.5	3
ϕ 80	72	5.5	ϕ20f8	4.5	3
ϕ 100	92	5.5	ϕ28f8	4.5	4
ϕ 125	115	7	ϕ36f8	6	5

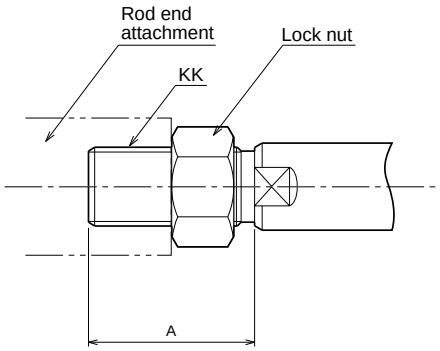
Dimensional table/Keeper plate

Symbol / Bore	Rod B								Mounting bolt
	F	G	H	I	J	K	L	N	
ϕ 32	19	10	5.5	4.5	10	3	ϕ 5.5	C2.5	M5
ϕ 40	19	10	5.5	4.5	10	3	ϕ 5.5	C2.5	M5
ϕ 50	19	10	5.5	4.5	10	3	ϕ 5.5	C2.5	M5
ϕ 63	32	17	8	8	16	4.5	ϕ 6.6	C4	M6
ϕ 80	32	17	8	8	16	4.5	ϕ 6.6	C4	M6
ϕ 100	38	23	7	8	15	4.5	ϕ 6.6	C4	M6
ϕ 125	44	24	11	11	22	6	ϕ 9	C3	M8

● Lock nut



● Thread length with lock nut



The standard fitting length of the rod end attachment and piston rod is approximately 80% of the thread diameter. When using a lock nut, it is required to lengthen the thread length (A) as shown in the figure above. If you order a cylinder with lock nut attached (symbol: K), the thread length (A) is as shown in the table on the next page.

Dimensional table/Lock nut

Symbol / Bore	Rod B				
	Parts model	B	C	d	H
ϕ 32	LNH-14F-H	22	25.4	M14 × 1.5	11
ϕ 40	LNH-16F-1-H	24	27.7	M16 × 1.5	13
ϕ 50	LNH-20F-2-H	30	34.6	M20 × 1.5	16
ϕ 63	LNH-27F-H	41	47.3	M27 × 2	22
ϕ 80	LNH-33F-H	50	57.7	M33 × 2	26
ϕ 100	LNA-42F-1-H	65	75.0	M42 × 2	34
ϕ 125	LNA-48F-2-H	75	86.5	M48 × 2	38

Dimensional table/A when lock nut is used (long thread)

Symbol / Bore	Rod B	
	A	KK
ϕ 32	28	M14 × 1.5
ϕ 40	32	M16 × 1.5
ϕ 50	40	M20 × 1.5
ϕ 63	54	M27 × 2
ϕ 80	66	M33 × 2
ϕ 100	84	M42 × 2
ϕ 125	96	M48 × 2

Special specification at the rod end **For rod size B**

(Please cosult us in case of 'A rod' or the case that doesn't go for 'A01' or 'A00' below.)

■ 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.)

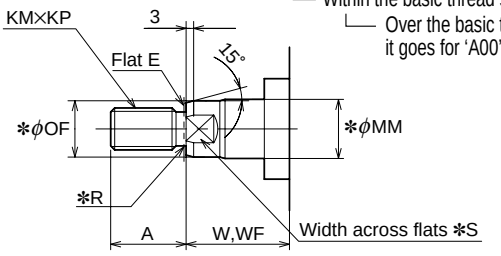
How to order Series | Model number | – X | Semi-standard symbols | Dimensional parameters

Semi-standard symbols: **A01** — Parameter KM and KP need to be specified as a pair.

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

Within the basic thread size

Over the basic thread size, it goes for 'A00'



The basic dimension table (=100H-2 Standard dimension)

Bore	A	KM	KP	✻MM	✻OF	✻R	✻S	W (FA type)	WF (Others)
ϕ32	18	14	1.5	ϕ18	ϕ17	1	14	35	25
ϕ40	22	16	1.5	ϕ22	ϕ21	1.6	17	35	25
ϕ50	28	20	1.5	ϕ28	ϕ26	1.6	22	41	32
ϕ63	36	27	2	ϕ36	ϕ34	2	30	48	34
ϕ80	45	33	2	ϕ45	ϕ43	2	38	51	35
ϕ100	56	42	2	ϕ56	ϕ54	2	50	57	41
ϕ125	63	48	2	ϕ70	ϕ68	2	60	57	41

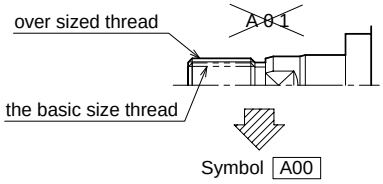
Occasion

■Slight dimension change on the basis of 100H-2 series standard thread size.

Note

■A01's basic dimension shows the original 100H-2's standard itself. Don't use semi-standard symbols to avoid confusion in such a case.

■**In case of over sized thread, the symbol should be 'A00' , not 'A01'.**



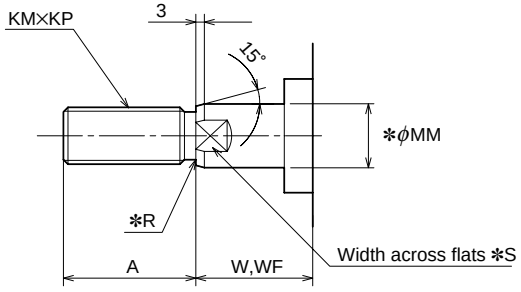
ex.

• bore:40mm, rod:B, thread size:M16×2, WF:80mm
(order) 100H-2 1CA40BB250-AB-X A01
KM-16, KP-2, WF-80
(manufacturing) rod end style A=22, KM=16, KP=2, WF=80, ϕMM=ϕ22, ϕOF=ϕ21, R=1.6, S=17

• bore:100mm, rod:B, thread size:M45×1.5
'A01' can't be used. Refer to the symbol 'A00'.

Semi-standard symbols: **A00** — Parameter KM and KP need to be specified as a pair.

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



The basic dimension table (Standard dimension)

Bore	A	KM	KP	✻MM	✻R	✻S	W (FA type)	WF (Others)
ϕ32	25	16	1.5	ϕ18	1	14	35	25
ϕ40	30	20	1.5	ϕ22	1	19	35	25
ϕ50	35	24	1.5	ϕ28	1	24	41	32
ϕ63	45	30	1.5	ϕ36	1.6	30	48	34
ϕ80	60	39	1.5	ϕ45	1.6	41	51	35
ϕ100	75	48	1.5	ϕ56	1.6	50	57	41
ϕ125	95	64	2	ϕ70	2	65	57	41

Occasion

■**In case of ordering over sized thread**
■**In case of applying the standard thread size of 70/140H-8 series**

Note

■**On this symbol 'A00' the basic dimension is completely different from that of 'A01'. A00's basic is originally based on the standard of 70/140H-8.**

ex.

• bore:63mm, rod:B, 'A00' basic dimensions
(order) 100H-2R 2FA63BB300-BC-X A00
(manufacturing) rod end style A=45, KM=30, KP=1.5, W=48, ϕMM=ϕ36, R=1.6, S=30

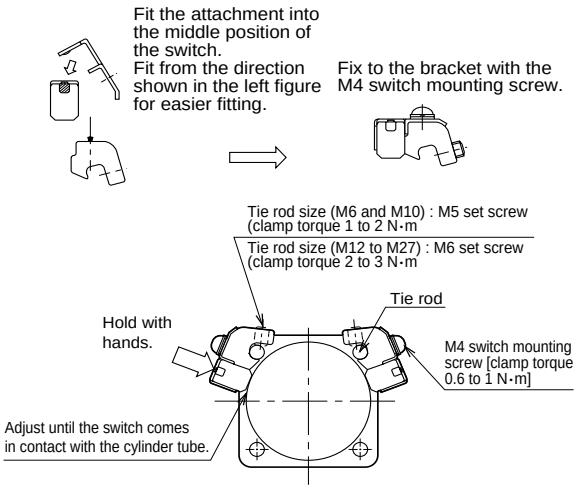
• bore:100mm, rod=B, thread size M45×1.5, other dimensions from 'A01' basic
(order) 100H-2 2CB100BR500-AB-X A00
KM-45, KP-1.5, A-56
(manufacturing) rod end style A=56, KM=45, KP=1.5, WF=41, ϕMM=ϕ56, R=1.6, S=50

• bore:50mm, rod:B, thread size:M22×1.5, WF:100mm, other dimensions from the basic
(order) 100H-2 2CA50BB500-AB-X A00
KM-22, KP-1.5, WF-100
(manufacturing) rod end style A=35, KM=22, KP=1.5, WF=100, ϕMM=ϕ28, R=1, S=24

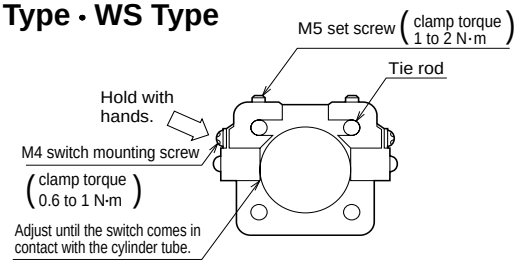
• Dimensions indicated by ✻Mark are fixed as our semi-standard.
• You are requested to consult us if you would like to change fixed dimensions.

Setting method of switch detecting position

AX Type • AZ Type



WR Type • WS Type

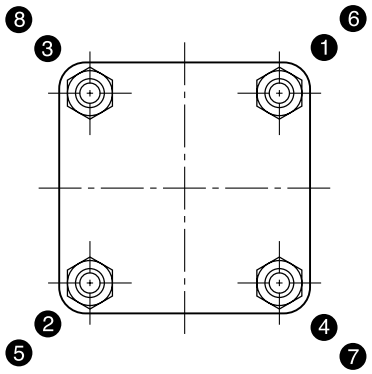


1. Loosen the two set screws with an Allen wrench, and move them along with the tie rod.
2. Adjust the detecting position (for the 2-lamp type, the position that the green lamp lights up) 2 to 5 mm (about half of the working range is appropriate) before the required position that the switch indicator lamp starts to light up (ON). Then, gently hold the top of the switch so that the cylinder tube contacts the detecting face of the switch, and clamp the set screw with the appropriate clamp torque.
   Note) Inappropriate clamp torque may cause the off-center of the switch position.
3. The indicator lamp lights up when the switch is set to the ON position.
4. Switches can be mounted to any of four tie rods and on the most suitable position depending on the mounting space of the cylinder and wiring method.
5. Mount a switch to the most suitable position to detect the stroke end with the “Switch mounting dimension” (dimension UX).

Notes on assembly

Fastening of tie rod

- Apply lubrication oil (fluid is applicable) to the nut bearing surface and the thread surface before fastening the tie rods. Fastening with dry surfaces may cause failure in appropriate tie rod axial tension.
- When fastening the tie rods, DO NOT fasten only one tie rod at once, but fasten them gradually in the order shown in the right diagram. Uneven fastening of them may cause malfunctions or cracks of cylinders.



Specified tie rod tightening torque table (Note:Molybdenous Grease should be used.)

Bore (mm)	ϕ32	ϕ40	ϕ50	ϕ63	ϕ80	ϕ100	ϕ125
Tie rod thread	M6 × 1	M6 × 1	M8 × 1	M8 × 1	M10 × 1.25	M14 × 1.5	M16 × 1.5
Tightening torque N•m	8	8	22	22	41	120	170

Switch specifications

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Important precautions

⚠Caution

- Supply voltage, current, load capacity
  Avoid the voltage and current out of the specifications of the switches, and the load exceeding the contact open/close capacity. DO NOT apply AC voltage to the switches applicable to DC voltage. Application of wrong voltage or current may lead to malfunctions, breakage, or inflammable damages of the switches.
- Shutdown of power supply
  Prior to wiring and connection, be sure to shut down the power supply. Otherwise, the operator may get an electric shock.
- Wrong wiring
  Perform wiring correctly according to the colors of lead wires.
  If wiring is performed incorrectly, the inflammable damage or breakage of the switch will occur, even if the wrong wiring is momentary.

2-wire type switch	(+)	Brown	or	White	3-wire type switch	(Power supply)	Brown	or	Red
						(Output)	Black		White
	(–)	Blue		Black		(GND)	Blue		Black

- No load connection
  DO NOT connect the switches direct to the power supply.
  Be sure to connect them through load devices, such as relays and programmable controllers.
  If the switches are connected direct to the power supply, the switches or load devices will be damaged or inflammable damages will occur, even if the connection is momentary.

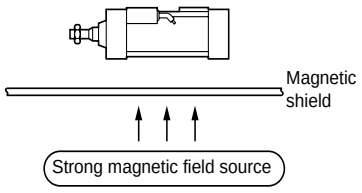
Correct use (common to all switches)

1. Selection

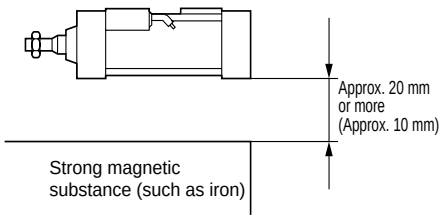
When selecting switches, be sure to follow the sequences in the “Switch selection materials”.

2. Working environmental conditions

1) These products do not have explosion-protected structure. DO NOT use them in the places where dangerous materials, including firing and ignitable objects, are present.
2) Use the switches indoors only.
3) Use the switches within the temperature range shown in the specifications of the switches. In the case of a hydraulic cylinder, the temperature of oil in it may be increased depending on the working conditions. Provide countermeasures in a hydraulic circuit, or install an oil cooler.
4) Use the switches within the allowable range of vibrations and shocks shown in the specifications.
5) DO NOT use the switches in the atmosphere of chemicals.
6) DO NOT use the switches in the places where the cylinders or switches are subjected to chips, cutting oil, and water. Otherwise, cords may be damaged or the switches may be malfunctioned.
7) Pay close attention to approach of cylinders.
   - When two or more switch set cylinders placed parallel and closely are used, the switch may be malfunctioned due to mutual magnet interference. Thus, keep one cylinder tube from the other by 50 mm or more. If allowable distances are specified for respective cylinder series, observe them.
   - Be sure to check the operation of the switches before actual use.
8) Strong magnetic field
   - Prior to the use of the switches near a strong magnetic field, install the magnetic shield with steel plates (install it 20 mm or more distant from the cylinders and switches).
   - Otherwise, the switches may work incorrectly due to the influence of the magnetic field.

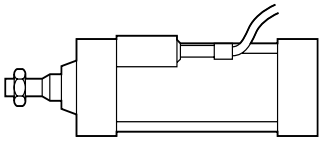


9) Strong magnetic substance
   - Keep away strong magnetic substances (such as iron) from cylinders outside and switches. Separate them by approx. 20 mm or more (as a guide). For compact cylinders, separate them by approx. 10 mm or more (KR and ZR type switches, etc.).
   - Otherwise, the switches may work incorrectly due to the influence of the magnetic field.



3. Wiring

1) Prior to wiring, be sure to shut down the power supply.
   - Otherwise, the operator may get an electric shock during working, or the switches or load devices may be damaged.
2) Pay attention to avoid bending, pulling, twist of the switch cord. Especially, provide appropriate measures to avoid any load applied to the end of the switch cord, including the fixing of the switch cord to the tie rod.



   - Otherwise, the cord may be damaged, causing broken wires. Especially, any load applied to the end of the cord may lead to the damaged electric circuit boards in the switches.
   - When fixing the cord to the tie rod, do not clamp the cord excessively. Otherwise, the cord may be damaged, causing broken wires.
3) The larger bending radius (twice of the cord dia. or larger) is better for the cord.
   - Otherwise, the cord may be damaged, causing broken wires.
4) If the connection distance is long, fix the cord every 20 cm to avoid a sag in the cord.
5) When laying the cord on the floor, protect it by covering with metallic tubes.
   - Otherwise, the coating of the cord may be damaged, leading to the broken wires or short-circuit.
6) 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. For the countermeasures against inrush current, refer to the “Precautions for contact protection”.
7) 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 malfunctions of the switches or load devices. It is recommended that the cord is protected with a shield tube.

4. Mounting

1) Tighten the switch mounting screws with the specified clamp torque.
   If the clamp torque exceeds the specified torque, the switch may be damaged.
   If the clamp torque is smaller than the specified torque, the switch may be loosened.
2) Adjust the switch position until the switch detecting position is centered on the switch working range.

5. Maintenance and inspection

For stable working of the switches for a long period, perform maintenance and inspection of the items shown below similarly to general electric appliances.
DO NOT disassemble the switches.

1) Off-center of switch mounting position and looseness of mounting screws
2) Working statuses of indicator lamps and load devices
3) Abnormalities in environmental conditions (vibrations, shocks, temperature, etc.)
4) Attachment of metallic dusts and chips
5) Presence of cutting oil and water
6) Abnormalities in wiring, wired parts, and cords.

6. Storage

1) Prior to storage, consider the storage temperature, and provide countermeasures against rusts, inferiority in cords, vibrations, and shocks.
2) Store the switches in cool and dark (–10 ~ 25°C) places.

7. Disposal

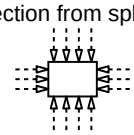
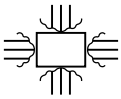
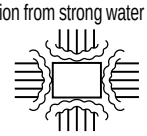
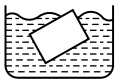
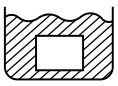
1) DO NOT put them into fire. Otherwise, poisonous gas may be generated.
2) Dispose of them as nonflammable wastes.

Protective structure

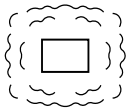
■ IEC (International Electrotechnical Commission) standards (IEC529)

IP-6□

Grade of protection from ingress of water

Grades	Contents of protection		Test methods
4	Protection from splashes 	No detrimental influence occurs even if water is splashed from any direction.	Splash water from all the directions for 10 minutes.
5	Protection from water injection 	No detrimental influence occurs even if water is injected direct from any direction.	Inject water from all the directions for 15 minutes in total.
6	Protection from strong water injection 	No ingress of water occurs even if water is strongly injected direct from any direction.	Inject water from all the directions for 15 minutes in total.
7	Protection from a soak 	No ingress of water occurs even if the object is soaked in water under the specified pressure and for the specified period.	Soak in 1 m from the water surface for 30 minutes.
8	Protection from submergence 	The object can be used with submerged.	Individually specified.

Grade of protection of human body and from solid foreign matters

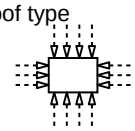
Grades	Contents of protection	
6	Dusts proof type 	No ingress of dusts occur.

(International Protection)

■ JEM (The Japan Electrical Manufacturers' Association) standards

IP-6□G

Grade of protection from ingress of oil

Grades	Contents of protection	
G	Oil proof type 	No ingress of oil drops or splashes from any direction occurs.

Grade of protection from ingress of water — Same as IEC529

Grade of protection of human body and from solid foreign matters — Same as IEC529

General comparison of contact type with no contact type

Items \ Contact type	Contact	No contact
Reliability	Low, due to the mechanical contacts	High, due to the non-presence of the mechanical contacts
Number of working time (durability)	Several millions to ten millions times	Semi-eternal
Chattering	Yes	No
Responsibility	Slow	Fast
Vibration and shock resistance	Low	High
Difference	Large	Small
Number of lead wires	2	2 or 3
Price	Low	High

Switch terminologies

Power supply voltage
The voltage to actuate the switch main circuit.
(3-wire no contact type)

Load voltage (working voltage)
The voltage applicable to switches.
(For the 3-wire no contact type, the voltage applicable to the output part.)

Load current (working current)
The current applicable to switches.
(For the 3-wire no contact type, the current flowing in the output part.)

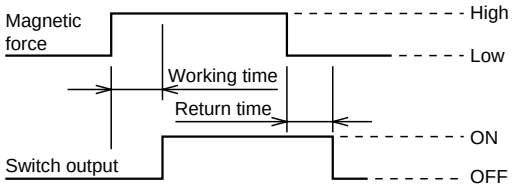
Consumption current
The current flowing in the switch main circuit.
(3-wire no contact type)

Inner drop voltage
The voltage generated between the poles of a switch, + and –, (for the 3-wire no contact type, between the output and the GND) when a switch is set to the ON position. Thus, the voltage applied to load devices when the switch is set to the ON position decreases according to the inner drop voltage.

Leakage current
The current flowing between the poles of a switch, + and –, (for the 3-wire no contact type, between the output and the GND) when a switch is set to the OFF position.

Working time, return time
Working time: the time required for a switch to enter the ON status from the OFF status after a magnetic force reaches the level required for the switch to enter the ON status.

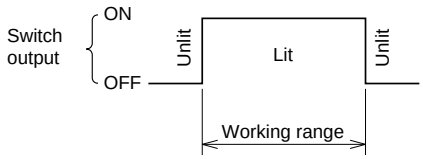
Return time: the time required for a switch to enter the OFF status from the ON status after a magnetic force reaches the level required for the switch to enter the OFF status.

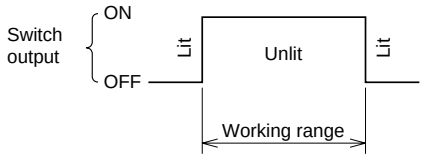


Response time
This term means both of the working time and return time. Since they are almost same in the case of the no contact type, this term is used for indicating both of them.

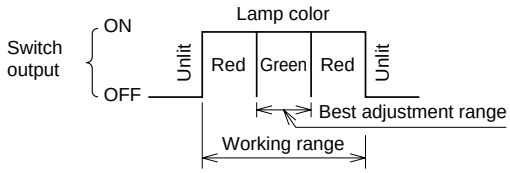
Types of switch indicator lamp

1) 1-lamp type
   a) Lights with switch ON
      The indicator lamp lights up when the switch detects the piston position to indicate that the switch enters the ON status. While the piston position is not detected, the indicator lamp remains unlit to indicate that the switch is in the OFF status.
   b) Lights with switch OFF
      The indicator lamp becomes unlit when the switch detects the piston position to indicate that the switch enters the ON status. While the piston position is not detected, the indicator lamp remains lit to indicate that the switch is in the OFF status.



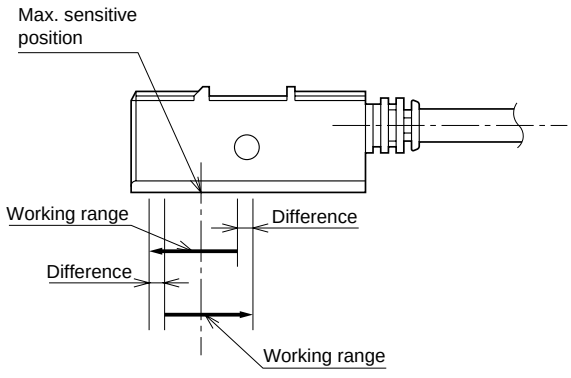


2) 2-lamp type
   The indicator lamp lights up when the switch detects the piston position to indicate that the switch enters the ON status. At that time, either of the red or green indicator lamps lights up according to the detected piston position. The range within which the green indicator lamp remains lit is called the best adjustment range.
   When mounting a switch, adjust the mounting position so that the detecting position of the switch is centered on the best adjustment range.

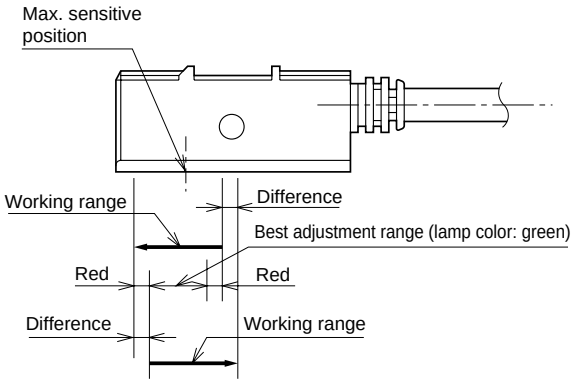


The max. sensitive position and working range/difference of switch

[1-lamp type]



[2-lamp type]



- When mounting a switch, adjust the mounting position so that the detecting position of the switch is centered on the working range (for the 2-lamp type, the center of the range within which the green indicator lamp remains lit).
- In case of the position detection at both ends of the cylinder stroke, mount the switch at the “Most suitable setting position of switch” (refer to the catalogue of each cylinder) to center the detecting position of the switch on the working range.

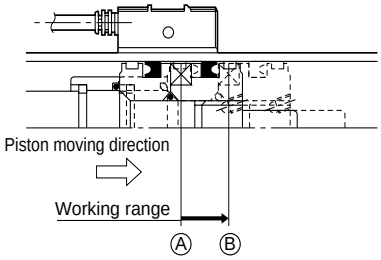
Notes) • For the max. sensitive position of each switch, refer to the dimensional drawings of each switch.
• For the working range and difference of each switch, refer to the catalogue of the applicable cylinder.

Theory of operation

1) Magnetic proximity type working

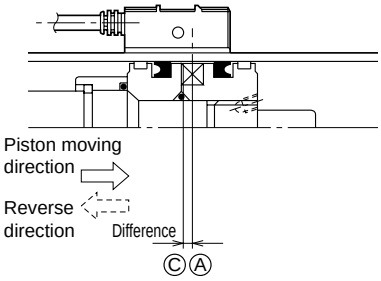
The piston position is detected when the piston with a magnet equipped passes under the magnetic proximity switch mounted on the periphery of the tube. The cylinder stroke position can be externally detected without contact.

Fig. A



If the piston moves toward the ⇨ direction, the switch enters the ON status when the magnet reaches the position Ⓐ.
The ON status continues from when the magnet reaches the position Ⓐ until it reaches the Ⓑ. The period is called the working range.

Fig. B



If the piston is moved toward the ⇨ direction, the switch enters the ON status when it reaches the position Ⓐ. When the piston is moved in the reverse ⇦ direction, the ON status continues until it reaches the position Ⓒ.
The period required for moving between the Ⓐ and Ⓒ is called a difference.
It occurs at the both ends of the working range.

Note) The figures above show the AX type switch.

Check of conditions when selecting switches

Items	Contents
1. Series of cylinder	The applicable shape of a switch differs depending on the cylinder series.
2. Type of load device	Small relay, programmable controller, small solenoid, etc.
3. Working voltage and working current of load device	Stationary voltage value, surge voltage value, stationary current value, inrush current value
4. Actuating voltage and actuating current, and return voltage and return current of load device	Check the adaptability of electrical specifications of a switch.
5. Working time of load device (ms)	The time when a load device is actuated after receiving the input from a switch
6. Cylinder working speed (mm/S)	Required for detection at the intermediate stroke.
7. Working frequency of switch (number of times/period)	The number of working times indicating durability of the contact type differs from that of the no contact type.
8. Control system	The sequence circuit of a switch against the motion of a cylinder. Especially, check for the connection in series and the connection in parallel.
9. Environmental conditions	Temperature, vibrations, shocks, splashing condition of cutting fluid and water, strength of neighboring magnetic field, presence of strong magnetic substance (iron and chips), presence of power source of other electric appliances (motor, etc.)

Switch selection procedures

When selecting a switch, the items below need to be decided.

Check	Selection item	Selection method
□1	Selection of cylinder	Select a cylinder, referring to the cylinder selection materials. Select appropriate switches among the switches applicable to the selected cylinder (referring to the switch specifications of each series).
□2	Selection of load device type	Select the type of load devices required for control, referring to the specifications of loads applicable to each switch (IC circuit, small relay, programmable controller, small solenoid, etc.).
□3	Selection of power supply to control circuit	DC (voltage value, voltage fluctuations, current capacity) AC (voltage value, voltage fluctuations, current capacity, etc.)
□4	Selection of working voltage and working current of switch	Select the working voltage and working current of a switch so that the voltage value (for AC and DC) and current value during the stationary state are within the working voltage (current) range of the switch. For the contact type, select so that they do not exceed the max. open/close capacity (voltage X current). Check the adaptability to load devices, referring to the inner drop voltage value, leakage current value, consumption current value, etc.
□5	Selection of contact (output) protective circuit	When using induction load devices (small relay, small solenoid) or capacity load devices (cable extension of 10 m or more, condenser, programmable controller of AC input type, etc.), surge voltages and inrush current will occur when the switch is set to the ON or OFF position. Prior to the use of them, provide the contact (output) protection (refer to the specifications of switches and the handling instructions of each switch). When using induction load devices, it is recommended to use the induction load devices incorporating the protective circuit for surge voltages on the load side.
□6	Selection of contact type or no contact type	If high durability is required due to high use frequency, select the no contact type. When selecting, refer to the table of the comparison of the contact and no contact types.
□7	Selection depending on environmental conditions	Select referring to the table in the next page.
□8	Check of response speed	Check the working status of the load devices with the working time, return time, and response speed of the switch, and the working time of the load devices, referring to the descriptions in the next page.
□9	Cord length	The types of 1.5 m and 5 m have been standardized (excepting cords for some switches). For details, refer to the catalogue of each cylinder.

Environmental conditions

1) Working temperature
Use switches within the ambient temperature range described in the specifications of each switch.
For hydraulic cylinders, oil temperature may be increased depending on the working conditions.
Provide some countermeasures in the hydraulic circuit or install an air conditioner.

2) Criteria for selection in case that switches are splashed with cutting fluid or water

Conditions	Criteria for selection
When switches are splashed with cutting fluid or water always or frequently	Use the cutting fluid proof type switches (WR, WS types) even if cutting fluid or water is mist, or they are splashed only several times a day. However, in the case of the use of switches in the places where are splashed with nonaqueous cutting fluid of the type 2, contact us.
In cutting fluid or water	DO NOT use even if momentarily.

3) Other environmental conditions

The places where dangerous materials, including firing and ignitable objects, are present
The places where the atmosphere of chemicals, etc. is present
⇨ DO NOT use under these conditions.

The places where are subjected to chips
The places where strong magnetic fields are generated
When strong magnetic substances (iron, etc.) approach switches or cylinder
⇨ Provide countermeasures referring to the recommended mounting locations specified in the handling instructions of the switches.

The places where are subjected to vibrations and shocks
⇨ Refer to the vibration and shock resistance specifications of each switch.

The places where are subjected to direct sunlight (outdoor)
⇨ Use only indoors.
In the places where are subjected to direct sunlight, provide covers.

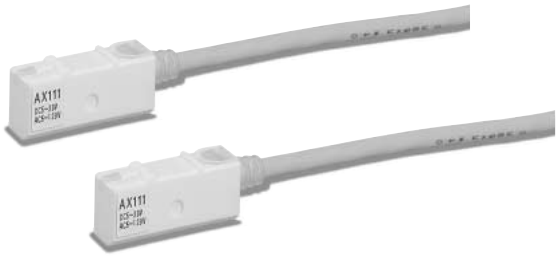
Detectable cylinder piston speed

- When mounting the switch on the intermediate position, be sure to adjust the maximum cylinder speed to 300 mm/s or slower on account of the response speed of the load relays, etc.
- If the piston speed is excessively high, the switch working time becomes shorter, although the switch works, and load devices including relays may not work.
Determine the detectable cylinder piston speed, referring to the formula below.

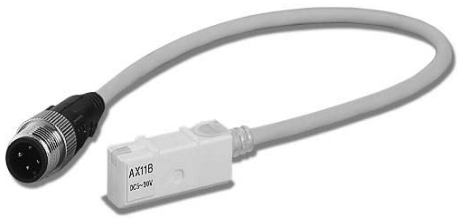
$$\text{Detectable piston speed (mm/s)} = \frac{\text{working range of switch (mm)}}{\text{working time of load device (ms)}} \times 1000$$

Notes)
- Refer to the materials related to the working time of load devices including relays of each manufacturer.
- Apply the minimum value to the working range of a switch, and apply the maximum value to the working time of a load device.

Magnetic proximity type (with contact)

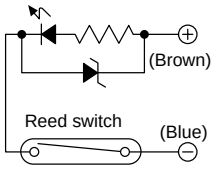
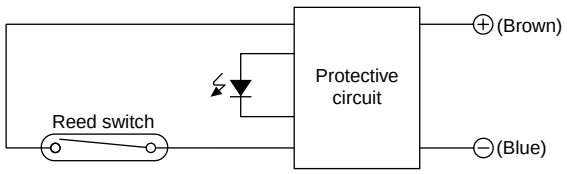
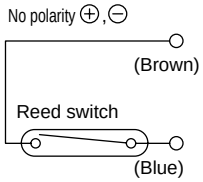


With cord



With connector

Specifications

Code	With cord (1.5m)	AX101	AX111	—	—	—
	With cord (5m)	AX105	AX115	—	—	AX125
	With connector (AC type)	—	—	AX11A	—	—
	With connector (DC type)	—	—	—	AX11B	—
Load voltage range		AC : 5 - 120V DC : 5 - 30V		AC : 5 - 120V	DC : 5 - 30V	AC: 120 V or less DC: 30 V or less
Load current range		AC : 5 - 20mA DC : 5 - 40mA		5 - 20mA	5 - 40mA	AC: 20 mA or less DC: 40 mA or less
Maximum open/ close capacity		AC : 2VA DC : 1.5W				
Inner drop voltage		2V (at 10mA) 3V or less (at 40mA)				0V
Current leak		0μA	10μA or less			0μA
Working time		1ms or less				
Return time		1ms or less				
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)				
Voltage-proof		AC1500V 1 min (between case and cord)				
Shock resistance		294m/s^2 (Non-repetition)				
Vibration-proof		Total amplitude 1.5mm, 10 - 55Hz (1 sweep, 1 min) 2 hours in X, Y, and Z directions				
Ambient temperature		–10 - +70°C (at non-freezing condition)				-10 - +100°C (at non-freezing condition)
Wiring method		0.3mm^2 2-core Outer diameter 4mm Oil-proof cabtyre cord				
Protective structure		IP67 (IEC standards), JIS C0920 (dusts-proof, immersion-proof type)				
Contact protective circuit		Note) None	Equipped			Note) None
Indicating lamp		LED (red lamp lights up during ON)				None
Electric circuit						
Applied load		Small relay • Programmable Controller				IC circuit, small relay, programmable controller

Notes) ● When using induction load devices (small relay, etc.), be sure to provide the protective circuit (SK-100).
● For the cord length and connector pin position of the connector type, refer to the dimensional drawings.
● When using the AC voltage input programmable controller as a load, select the switch with contact protective circuit.

Applicable hydraulic cylinder

Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

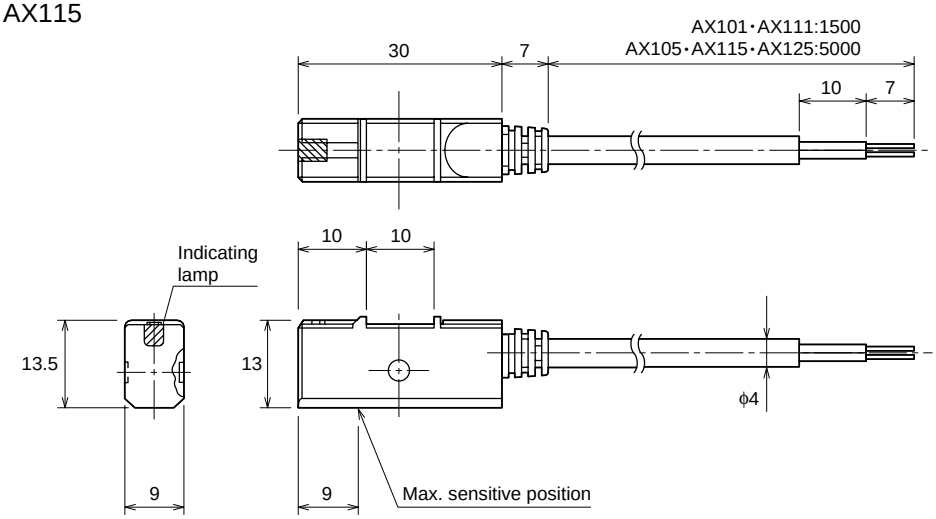
Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

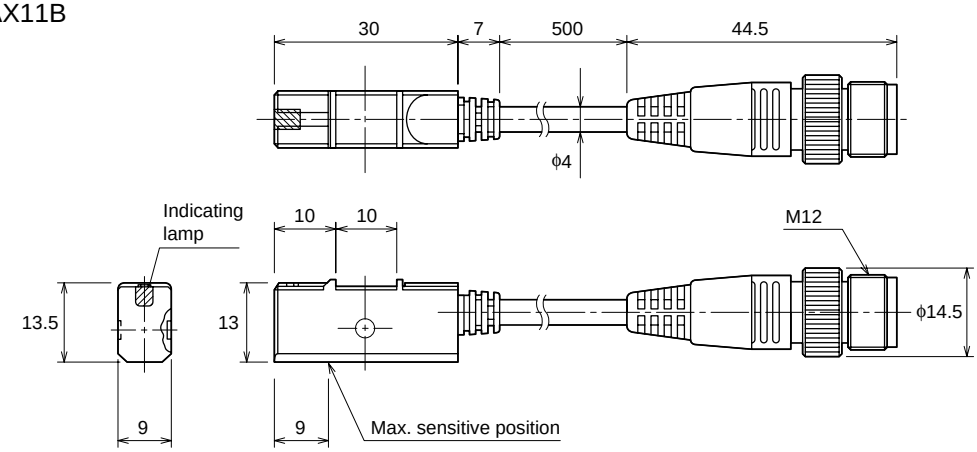
Unit: mm

Dimensional Drawing

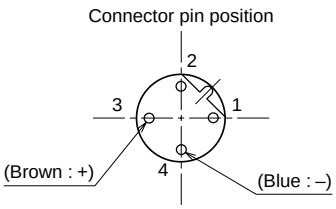
● Cord type
AX101・AX105
AX111・AX115
AX125



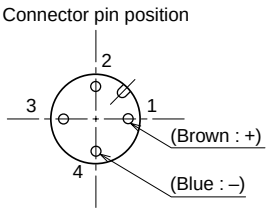
● Connector type
AX11A・AX11B



AX11A (AC type)



AX11B (DC type)



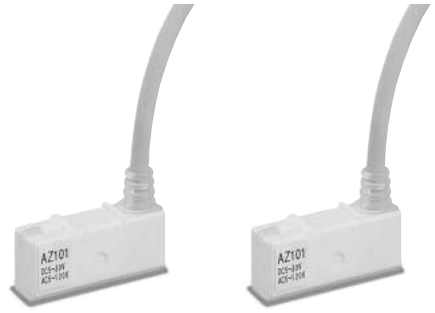
Applicable counter connectors

Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

● No. of connector standards
Models M12X1 screw locking
- IEC 947-5-2
- DIN/VDE 0660 part 208 A2
- NECA (The Japan Electric Control Equipment Industry Association) 4202
  Connector for FA sensor

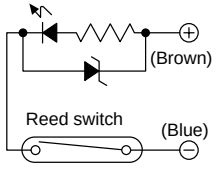
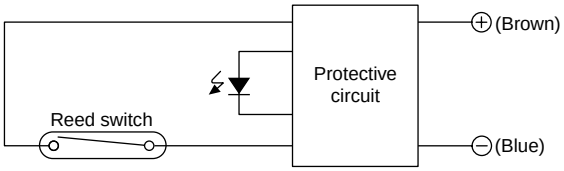
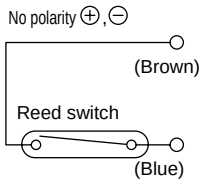
Magnetic proximity type (with contact)



With cord

With connector

Specifications

Code	With cord (1.5m)	AZ101	AZ111	—	—	—
	With cord (5m)	AZ105	AZ115	—	—	AZ125
	With connector (AC type)	—	—	AZ11A	—	—
	With connector (DC type)	—	—	—	AZ11B	—
Load voltage range		AC : 5 - 120V DC : 5 - 30V		AC : 5 - 120V	DC : 5 - 50V	AC: 120 V or less DC: 30 V or less
Load current range		AC : 5 - 20mA DC : 5 - 40mA		5 - 20mA	5 - 40mA	AC: 20 mA or less DC: 40 mA or less
Maximum open/ close capacity		AC : 2VA DC : 1.5W				
Inner drop voltage		2V (at 10mA) 3V or less (at 40mA)				0V
Current leak		0μA	10μA or less			0μA
Working time		1ms or less				
Return time		1ms or less				
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)				
Voltage-proof		AC1500V 1 min (between case and cord)				
Shock resistance		294m/s^2 (30G) (Non-repetition)				
Vibration-proof		Total amplitude 1.5mm, 10 - 55Hz (1 sweep, 1 min) 2 hours in X, Y, and Z directions				
Ambient temperature		–10 - +70°C (at non-freezing condition)				
Wiring method		0.3mm^2 2-core Outer diameter 4mm Oil-proof cabtyre cord				-10 - +100°C (at non-freezing condition)
Protective structure		IP67 (IEC standards), JIS C0920 (dusts-proof, immersion-proof type)				
Contact protective circuit		Note) None	Equipped			Note) None
Indicating lamp		LED (red lamp lights up during ON)				None
Electric circuit						
Applied load		Small relay • Programmable Controller				IC circuit, small relay, programmable controller

Notes) ● When using induction load (including a small relay) for the switch without contact protective circuit, be sure to provide the protective circuit (SK-100) for the load.
● For the cord length and connector pin position of the connector type, refer to the dimensional drawings.
● When using the AC voltage input programmable controller as a load, select the switch with contact protective circuit.

Applicable hydraulic cylinder

Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

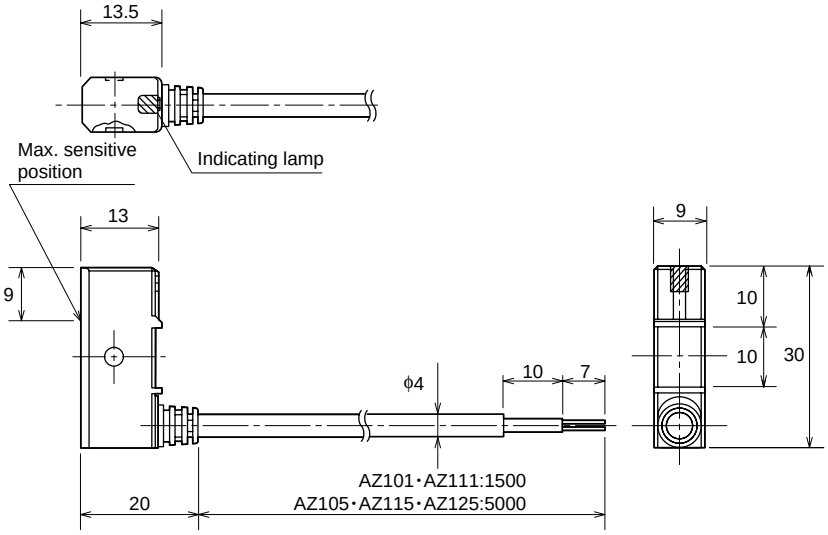
Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

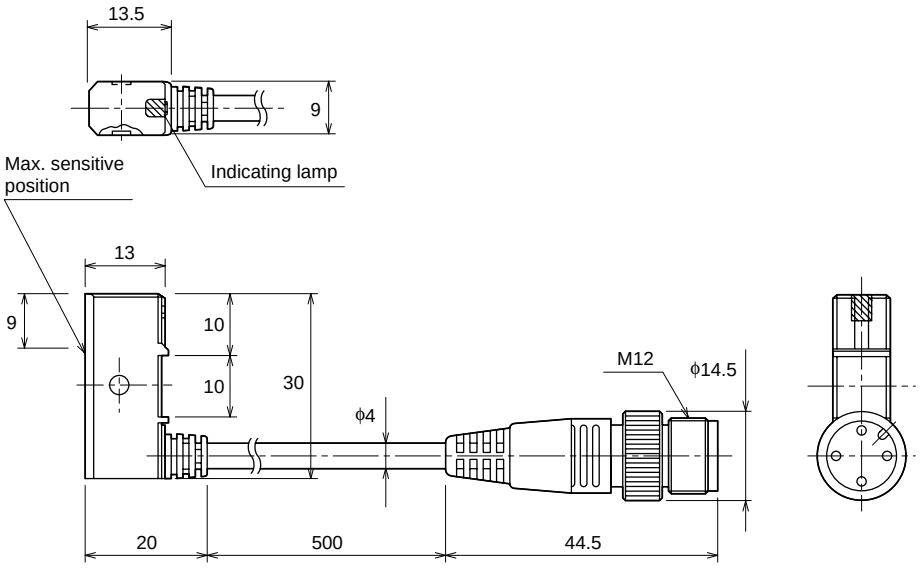
Unit: mm

Dimensional Drawing

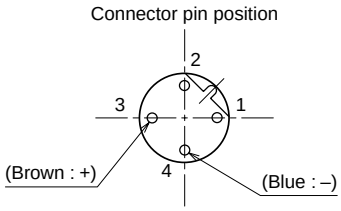
● Cord type
AZ101・AZ105
AZ111・AZ115
AZ125



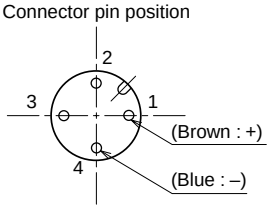
● Connector type
AZ11A・AZ11B



AZ11A (AC type)



AZ11B (DC type)



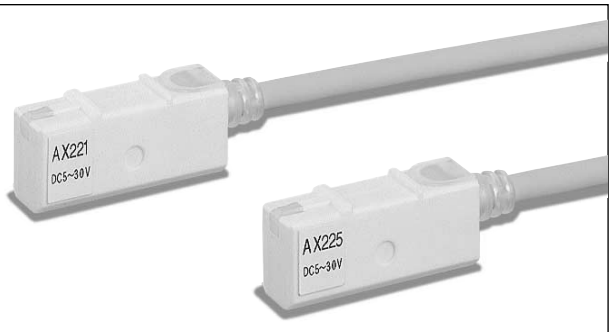
Applicable counter connectors

Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

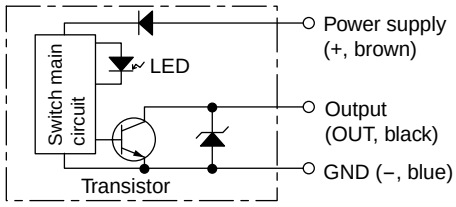
● No. of connector standards
Models M12X1 screw locking
- IEC 947-5-2
- DIN/VDE 0660 part 208 A2
- NECA (The Japan Electric Control Equipment Industry Association) 4202
  Connector for FA sensor

Magnetic proximity type (No contact/Three-wire one-lamp type)



With cord

Specifications

Code		
	With cord (1.5m)	AX221
	With cord (5m)	AX225
Wiring direction		Rear wiring
Power supply voltage range		DC : 5 - 30V
Load voltage range		DC : 30 V or less
Load current		Max. 200mA (NPN open collector output)
Consumption current		Max. 15mA
Inner drop voltage		At 200 mA, 0.6 V max.
Leak current		At 30 V DC, 10μA max.
Working time		1 ms or shorter
Return time		1 ms or shorter
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)
Voltage-proof		AC 1500 V, 1 min (between case and cord)
Shock resistance		490m/s^2 (Non-repetition)
Vibration-proof		Total amplitude 0.6 mm, 10 Hz to 200 Hz (log sweep 1 hour) in X, Y, and Z directions
Ambient temperature		-10°C to +70°C (at non-freezing condition)
Wiring method		0.3 mm^2 3-core Outer diameter 4 mm Oil-proof cabtyre cord
Protective structure		IP67 (IEC standards), JIS C0920 (dust-proof, immersion-proof type)
Protective circuit		Equipped
Indicating lamp		LED (red lamp lights up during ON)
Electric circuit		
Applied load		IC circuit, small relay, programmable controller

Applicable hydraulic cylinder

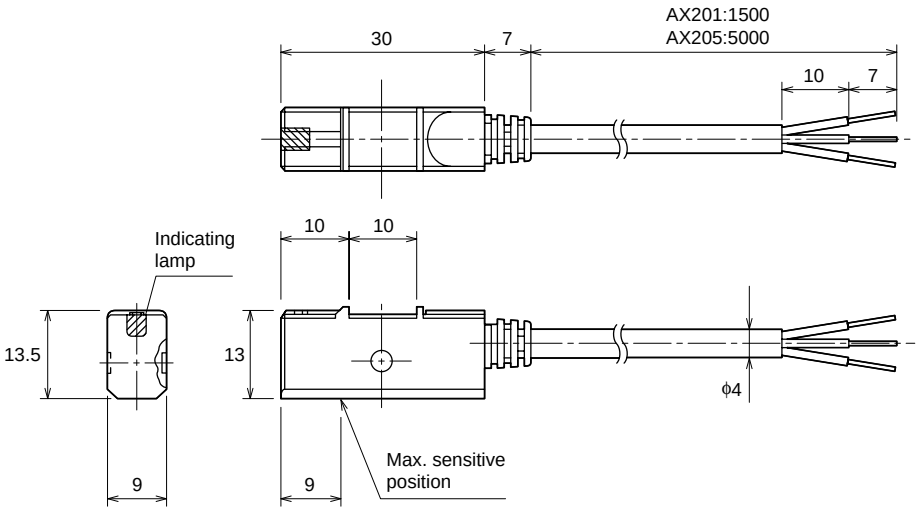
Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125

Dimensional Drawing

● Cord type
AX221・AX225

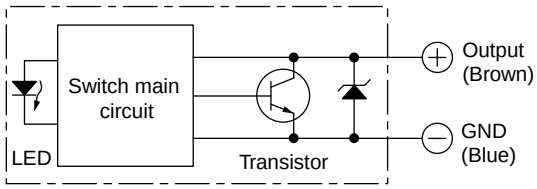


Magnetic proximity type (No contact/Two-wire one-lamp type)

With cord

With connector

Specifications

Code	With cord (1.5m)	AX201
	With cord (5m)	AX205
	With connector	AX20B
Wiring direction		Rear wiring
Load voltage range		DC : 5 - 30V
Load current range		DC : 5 - 40 mA
Inner drop voltage		3 V or less (at 40 mA)
Leak current		0.7 mA or less
Working time		1 ms or shorter
Return time		1 ms or shorter
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)
Voltage-proof		AC 1500 V, 1 min. (between case and cord)
Shock resistance		490m/s² (Non-repetition)
Vibration-proof		Total amplitude 0.6 mm, 10 Hz to 200 Hz (log sweep 1 hour) in X, Y, and Z directions
Ambient temperature		-10°C to +70°C (at non-freezing condition)
Wiring method		0.3 mm² 2-core Outer diameter 4 mm Oil-proof cabtyre cord
Protective structure		IP67 (IEC standards), JIS C0920 (dust-proof, immersion-proof type)\
Contact protective circuit		Equipped
Indicating lamp		LED (red lamp lights up during ON)
Electric circuit		
Applied load		Small relay, programmable controller

Applicable hydraulic cylinder

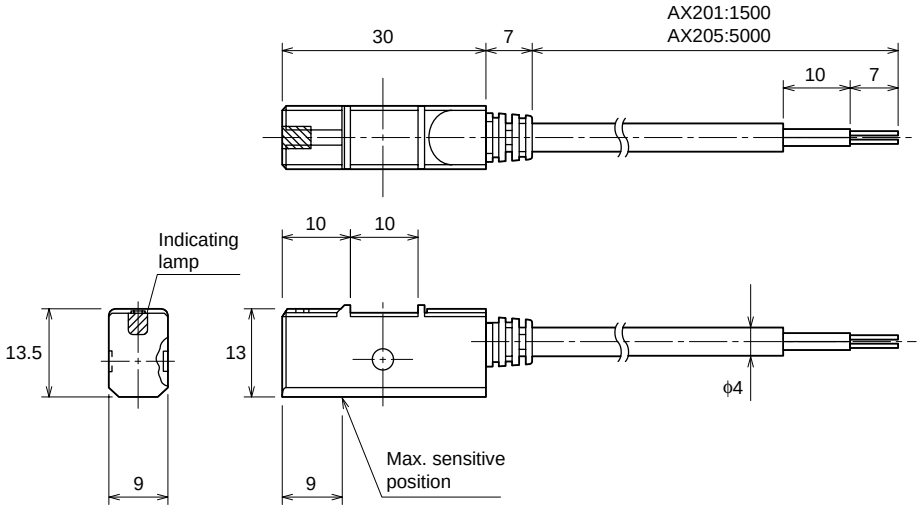
Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

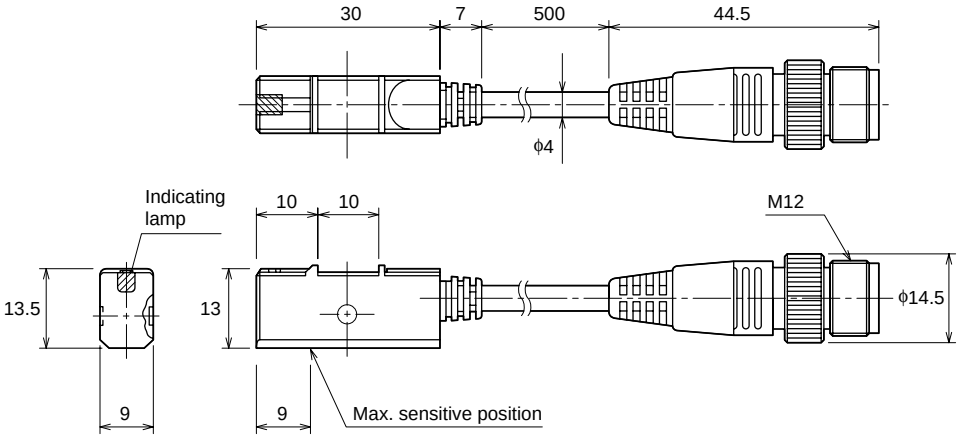
Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Dimensional Drawing

● Cord type
AX201・AX205

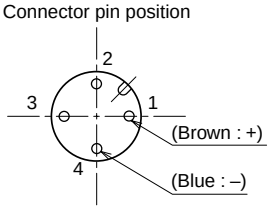


● Connector type
AX20B



AX20B (DC type)

Connector pin position



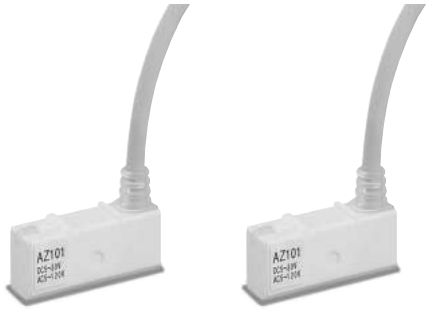
Applicable counter connectors

Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

● No. of connector standards
Models M12X1 screw locking
- IEC 947-5-2
- DIN/VDE 0660 part 208 A2
- NECA (The Japan Electric Control Equipment Industry Association) 4202
  Connector for FA sensor

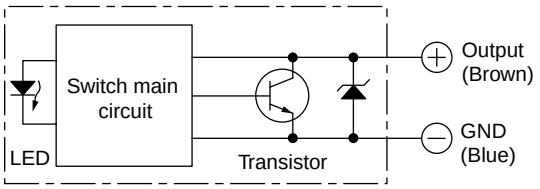
Magnetic proximity type (No contact/Two-wire one-lamp type)



With cord

With connector

Specifications

Code	With cord (1.5m)	AZ201
	With cord (5m)	AZ205
	With connector	AZ20B
Wiring direction		Upper wiring
Load voltage range		DC : 5 - 30V
Load current range		DC : 5 - 40 mA
Inner drop voltage		3 V or less (at 40 mA)
Leak current		0.7 mA or less
Working time		1 ms or shorter
Return time		1 ms or shorter
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)
Voltage-proof		AC 1500 V, 1 min. (between case and cord)
Shock resistance		490m/s^2 (Non-repetition)
Vibration-proof		Total amplitude 0.6 mm, 10 Hz to 200 Hz (log sweep 1 hour) in X, Y, and Z directions
Ambient temperature		-10°C to +70°C (at non-freezing condition)
Wiring method		0.3 mm^2 2-core Outer diameter 4 mm Oil-proof cabtyre cord
Protective structure		IP67 (IEC standards), JIS C0920 (dust-proof, immersion-proof type)
Contact protective circuit		Equipped
Indicating lamp		LED (red lamp lights up during ON)
Electric circuit		
Applied load		Small relay, programmable controller

Applicable hydraulic cylinder

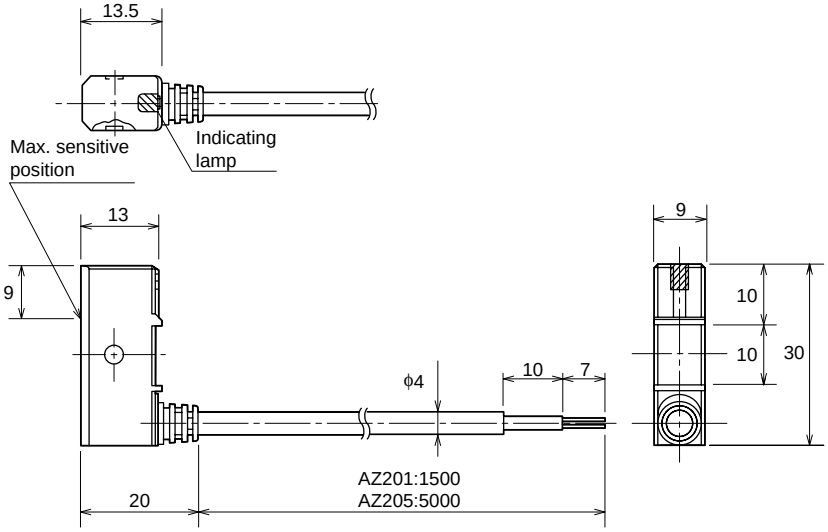
Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

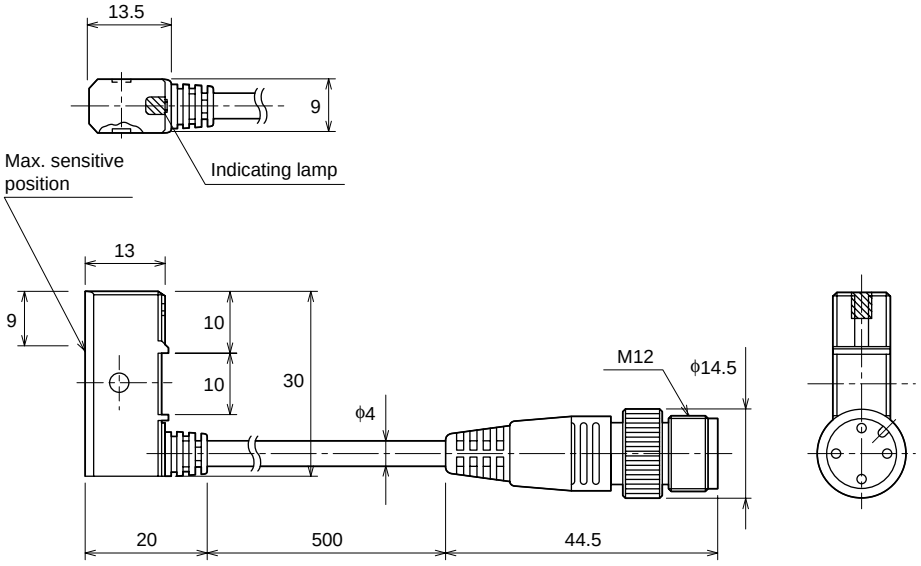
Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Dimensional Drawing

● Cord type
AZ201・AZ205

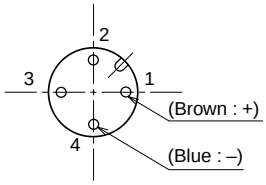


● Connector type
AZ20B



AZ20B (DC type)

Connector pin position



Applicable counter connectors

Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

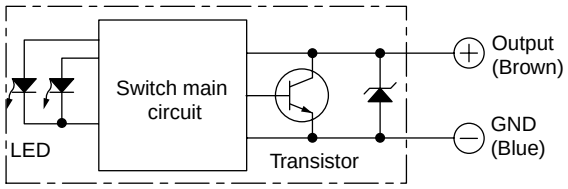
● No. of connector standards
Models M12X1 screw locking
- IEC 947-5-2
- DIN/VDE 0660 part 208 A2
- NECA (The Japan Electric Control Equipment Industry Association) 4202
  Connector for FA sensor

Magnetic proximity type (No contact/Two-wire two-lamp type)

With cord

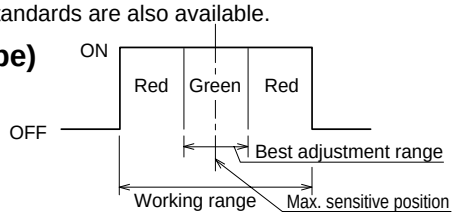
With connector

Specifications

Code	With cord (1.5m)	AX211
	With cord (5m)	AX215
	With connector	AX21C
		AX21D
Wiring direction		Rear wiring
Load voltage range		DC : 5 - 30V
Load current range		DC : 5 - 40 mA
Inner drop voltage		3 V or less (at 40 mA)
Leak current		0.7 mA or less
Working time		1 ms or shorter
Return time		1 ms or shorter
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)
Voltage-proof		AC 1500 V, 1 min. (between case and cord)
Shock resistance		490m/s^2 (Non-repetition)
Vibration-proof		Total amplitude 0.6 mm, 10 Hz to 200 Hz (log sweep 1 hour) in X, Y, and Z directions
Ambient temperature		-10°C to +70°C (at non-freezing condition)
Wiring method		0.3 mm^2 2-core Outer diameter 4 mm Oil-proof cabtyre cord
Protective structure		IP67 (IEC standards), JIS C0920 (dust-proof, immersion-proof type)
Contact protective circuit		Equipped
Indicating lamp		Working position: Red/green LED lights up Most suitable position: Green LED lights up
Electric circuit		
Applied load		Small relay, programmable controller

Note) AX211CE, AX215CE, and AX21BCE confirming to CE standards are also available.

LED indicating style (Two-wire, two-lamp type)



Applicable hydraulic cylinder

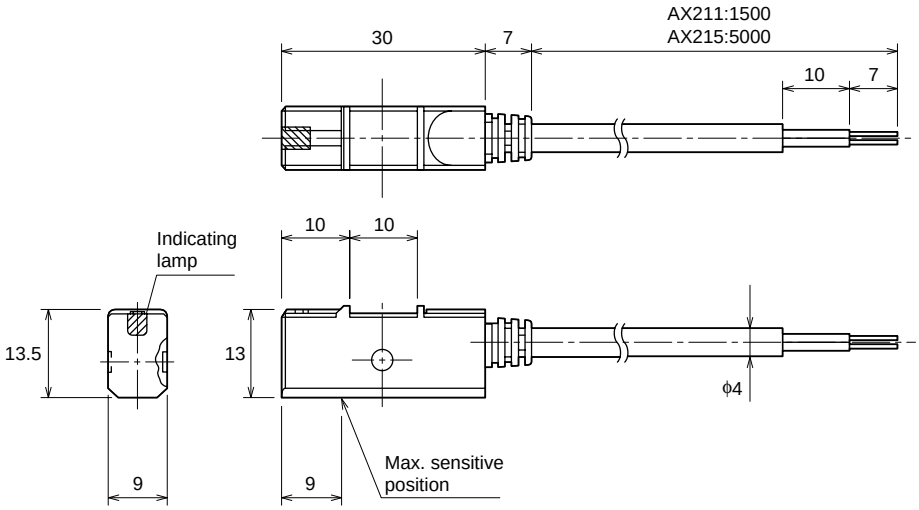
Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

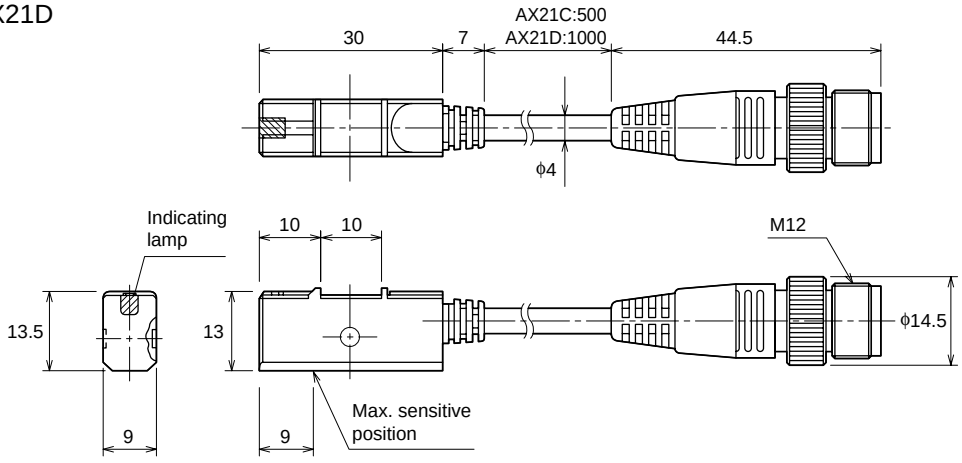
Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Dimensional Drawing

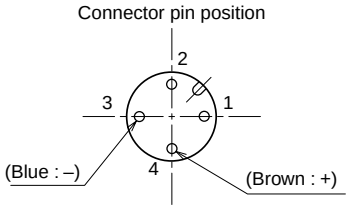
● Cord type
AX211・AX215



● Connector type
AX21C・AX21D



AX21C・AX21D (DC type)



Applicable counter connectors

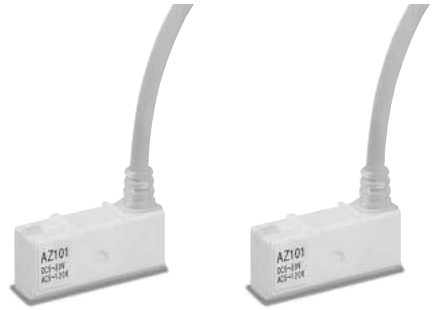
Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

● TMS standards conforming type

● As for the connector pin layout conforming to the IEC standards (1:+4:-), contact us.
● AX21B conforming to TMS standards is also available.

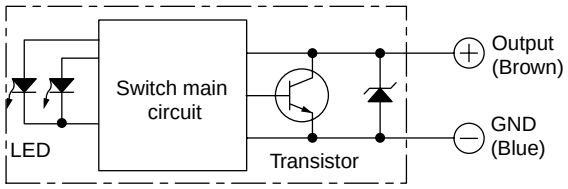
Magnetic proximity type (No contact/Two-wire two-lamp type)



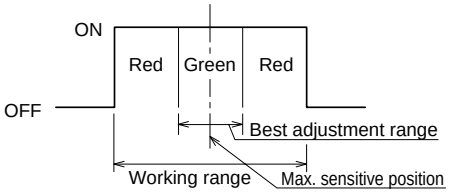
With cord

With connector

Specifications

Code	With cord (1.5m)	AZ211
	With cord (5m)	AZ215
	With connector	AZ21C
		AZ21D
Wiring direction		Upper wiring
Load voltage range		DC : 5 - 30V
Load current range		DC : 5 - 40 mA
Inner drop voltage		3 V or less (at 40 mA)
Leak current		0.7 mA or less
Working time		1 ms or shorter
Return time		1 ms or shorter
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)
Voltage-proof		AC 1500 V, 1 min. (between case and cord)
Shock resistance		490m/s^2 (Non-repetition)
Vibration-proof		Total amplitude 0.6 mm, 10 Hz to 200 Hz (log sweep 1 hour) in X, Y, and Z directions
Ambient temperature		-10°C to +70°C (at non-freezing condition)
Wiring method		0.3 mm^2 2-core Outer diameter 4 mm Outer diameter Oil-proof cabtyre cord
Protective structure		IP67 (IEC standards), JIS C0920 (dust-proof, immersion-proof type)
Contact protective circuit		Equipped
Indicating lamp		Working position: Red/green LED lights up Most suitable position: Green LED lights up
Electric circuit		
Applied load		Small relay, programmable controller

LED indicating style (Two-wire, two-lamp type)



Applicable hydraulic cylinder

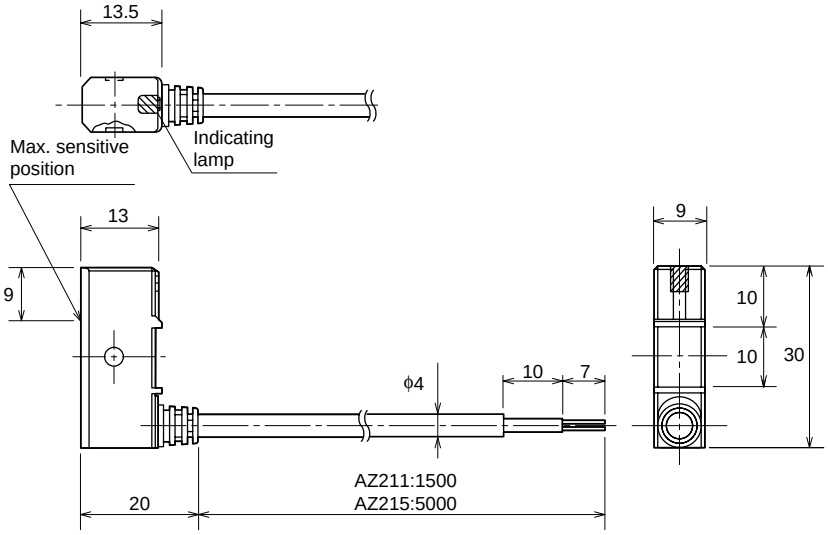
Series	Bore
35S-1R	ϕ20, ϕ25, ϕ32, ϕ40, ϕ50, ϕ63
HQS2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
100S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
160S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
210S-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80
35Z-1R	ϕ20, ϕ25, ϕ32
35H-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Series	Bore
100Z-1R	ϕ20, ϕ25, ϕ32
100H-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
70/140H-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140
160H-1R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125, ϕ140, ϕ160

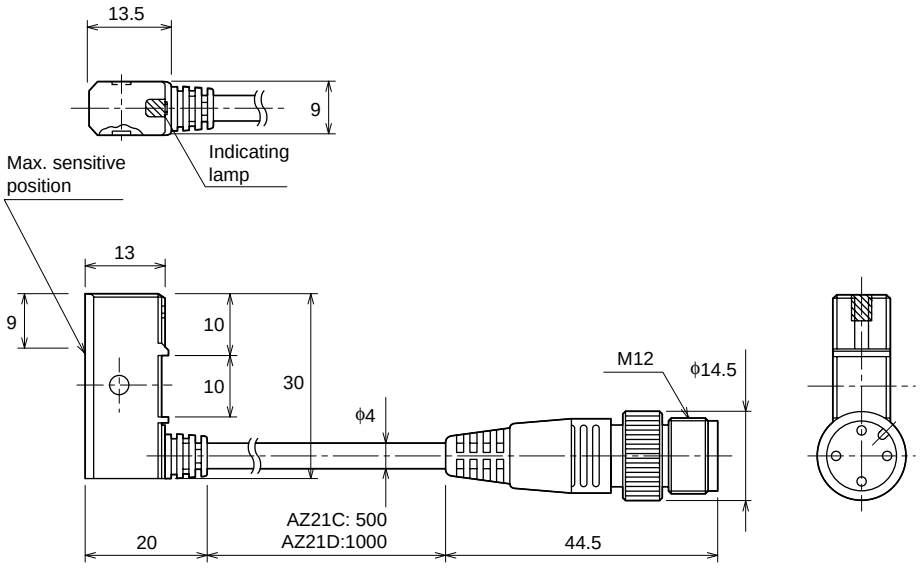
Series	Bore
210C-1R	ϕ40, ϕ50, ϕ63, ϕ80
70/140Y-2R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100, ϕ125
35P-3R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100
70/140P-8R	ϕ32, ϕ40, ϕ50, ϕ63, ϕ80, ϕ100

Dimensional Drawing

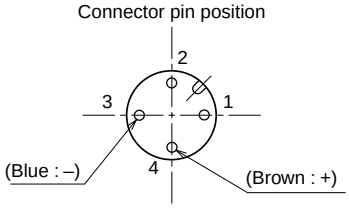
● Cord type
AZ211・AZ215



● Connector type
AZ21C・AZ21D



AZ21C・AX21D (DC type)



● TMS standards conforming type

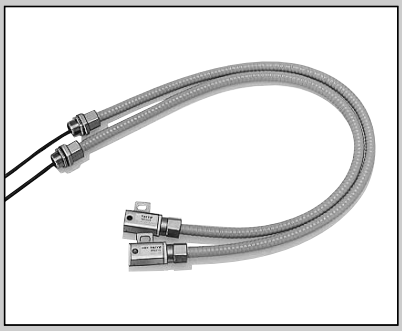
Applicable counter connectors

Manufacturers	Connector series name	
Correns Co., Ltd.	VA connector	VA-4DS, VA-4DL
Omron Corporation	XS2 sensor I/O connector	XS2
Hirose Electric Co., Ltd.	Connector for FA sensor	HR24

● For details, refer to the catalogues of the manufacturers' products.

Switch specifications
Magnetic proximity type
(Cutting oil proof type)

WR/WS type switches·····85

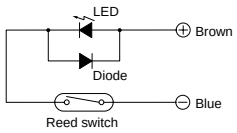
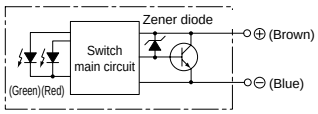


Magnetic proximity switch (Cutting oil proof type)

Reliable sealing performance even in environment directly subject to cutting oil.

- Protective structure IP67G.
- Standardized flexible tube for protection of cabtyre cords.
- Longer service life even in environment directly subject to cutting oil (approx. ten times longer than our conventional product).
- Oil proof type soft PVC used for coating of flexible tube.
- Upper wiring and cord type (without flexible tube) are added to allow selection appropriate for purposes.
- No contact type with two wires enables saving of wiring. Adoption of two lamps enables easier setting of the optimum fixing position.

Switch specifications

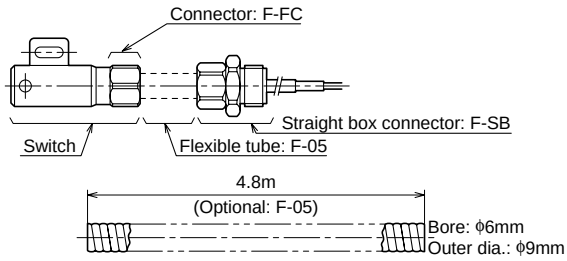
Contact type		Contact		No contact	
Type	w/ cord (5 m)	WR505, WR515, WR525, WR545	WR535, WR555	WS215, WS225, WS235, WS255	WS245, WS265
Wiring direction		Rear	Upper	Rear	Upper
Load voltage range		AC: 5 - 120V DC: 5 - 50V		DC10 - 30V	
Load current range		AC: 3 - 20mA DC: 3 - 40mA		6 - 70mA	
Inner drop voltage		2V or less		4V or less	
Max. load capacity		DC1.5W • AC2VA		–	
Leak current		0μA		1mA or less	
Working time		1ms or less			
Return time		1ms or less			
Insulation resistance		100 MΩ or more at 500 MV DC (between case and cord)			
Voltage-proof		AC 1500 V, 1 min. (between case and cord)			
Shock resistance		294m/s^2 (Non-repetition)		490m/s^2 (Non-repetition)	
Vibration-proof		Vibration width 1.5 mm, from 10 Hz to 55 Hz (1 sweep, 1 min.) 2 hours in X, Y, and Z directions		Vibration width 0.6 mm, from 10 Hz to 200 Hz, log sweep 1 hour in X, Y, and Z directions	
Ambient temperature		-10 to + 60°C (at non-freezing condition)			
Wiring method		0.3mm^2 2-core Outer diameter 4 mm Oil-proof cabtyre cord			
Protective structure		IP67G (JEN standards) (Oil proof type)			
Indicating lamp		Red LED lights up		Working position: Red/Green LED Optimum position: Green LED	
Electric circuit					
Applied load		Small relay, programmable controller			

Note) When using the induction load (small relay, etc.), be sure to install the protective circuit (SK-100) to the load.

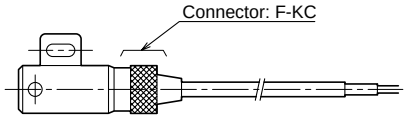
Structure of flexible tube

Unit: mm

- Switch type
  Flexible tube type
  Contact
  WR505, WR525, WR545 (Rear)
  WR535, WR555 (Upper)
  No contact
  WS215, WS235, WS255 (Rear)
  WS245, WS265 (Upper)



Cord type
Contact WR515
No contact WS225



- Flexible tube
  Code: F-05
  (Selling unit: 4.8 m)

✻Switch shapes depend on the models.

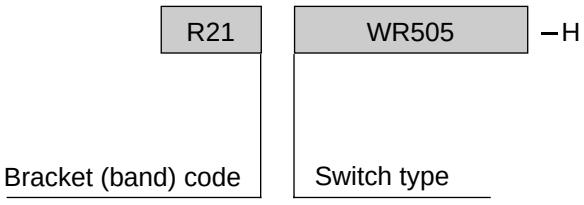
- For the flexible tube type, be sure to use the switch together with the flexible tube.
- For the flexible tube type, the straight box connector (F-SB) is normally equipped with the switch.
- Note that the flexible tube type (F-05) must be ordered separately.

Applicable actuator and mounting bracket list

Actuator series	Hydraulic actuator					
	35H-3R	100H-2R 100H-2RD 100HW-2R	70/140H-8R ✻70/140HW-8R 70/140Y-2R ✻70/140YW-2R	35S-1R 35SY-1R	HQS2R HQSW2R 100S-1R 100SW-1R	160S-1R ✻160SW-1R
Switch type	WR505 WS215 (Flexible tube type)			WR525 WS235 (Rear wiring)		
	WR515 WS225 (Cord type)			WR535 WS245 (Upper wiring)		
Bore						
ϕ20	—	—	—		—	—
ϕ25	—	—	—		—	—
ϕ32	R21WR (WS)□-H	R21WR (WS)□-H	R22WR (WS)□-H			
ϕ40						
ϕ50		R22WR (WS)□-H			T07WR (WS) □-H	
ϕ63	R22WR (WS)□-H		R23WR (WS)□-H			
ϕ80		R23WR (WS)□-H	R24WR (WS)□-H	—		
ϕ100	R23WR (WS)□-H	—	R25WR (WS)□-H	—		—
ϕ125	—	—	R26WR (WS)□-H	—	—	—
ϕ140	—		—	—	—	—
ϕ160			—	—	—	—

Notes) ● The ✻-marked actuators are of the cutting oil proof type. The WR and WS type switches can be provided for them as the standard outfits.
● As for the actuators other than the ✻-marked ones, the WR and WS type switches can be provided as the semi-standard outfits.
● Before using the WR or WS type switch for the actuators other than the ✻-marked ones, check the operating environment, and select appropriate switch.

<Code example>

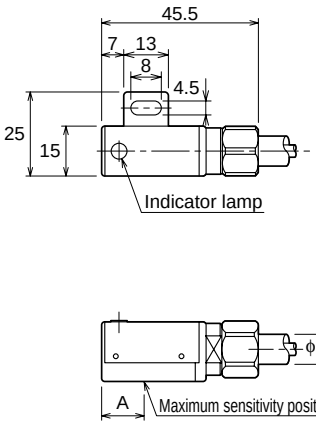


Dimensional drawings

Unit: mm

WR505 (Contact)
WS215 (No contact)

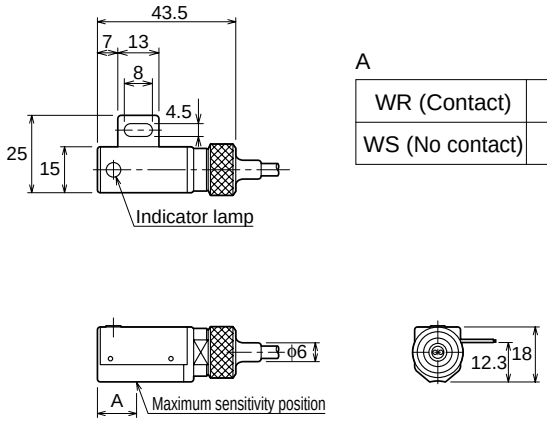
[Rear wiring]



A	
WR (Contact)	12
WS (No contact)	10

WR515 (Contact)
WS225 (No contact)

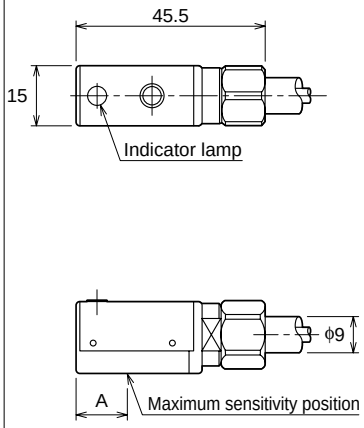
[Cord type]



A	
WR (Contact)	12
WS (No contact)	10

WR525 (Contact)
WS235 (No contact)

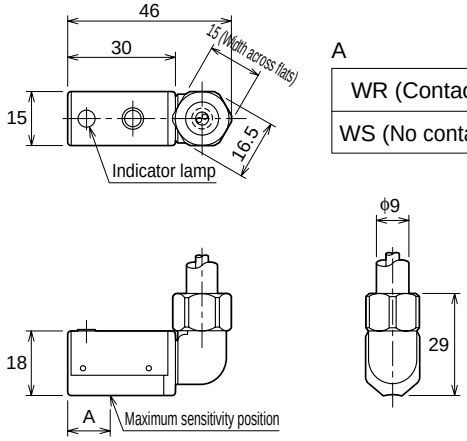
[Rear wiring]



A	
WR (Contact)	12
WS (No contact)	10

WR535 (Contact)
WS245 (No contact)

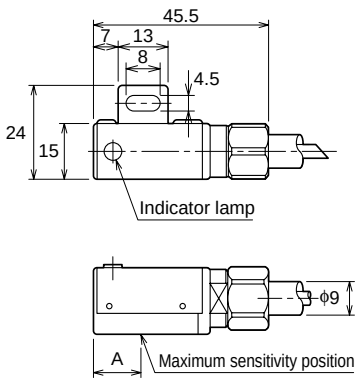
[Upper wiring]



A	
WR (Contact)	12
WS (No contact)	10

WR545 (Contact)
WS255 (No contact)

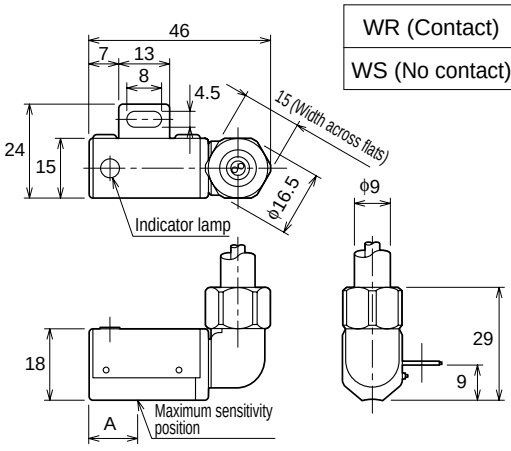
[Rear wiring]



A	
WR (Contact)	12
WS (No contact)	10

WR555 (Contact)
WS265 (No contact)

[Upper wiring]

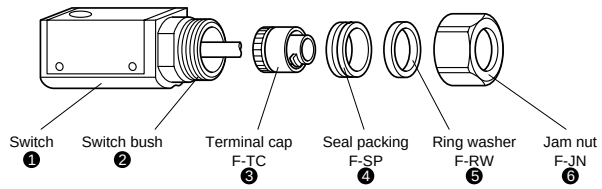


A	
WR (Contact)	12
WS (No contact)	10

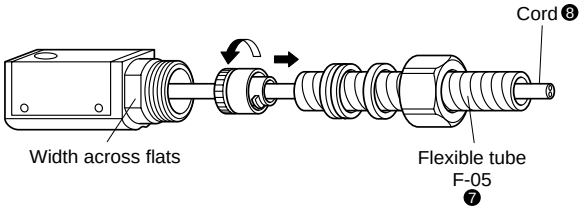
Handling instructions

Switch and flexible tube

● Connector parts configuration



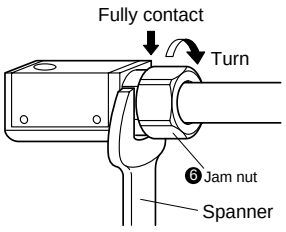
● Mounting to switch



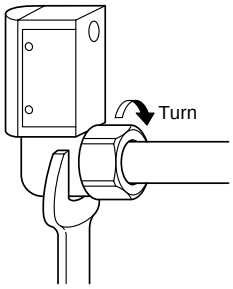
1. Cut the flexible tube ❼ at the required length (Avoid any burr and deformation on the cut surface. Otherwise, the terminal cap may not be able to be fit).
2. Insert the jam nut ❻, ring washer ❺ seal packing ❹, and terminal cap ❸ into the flexible tube ❼ in this order (Insert the terminal cap ❸ into the bore of the flexible tube ❼).
3. From the terminal cap ❸ side, pass the cord ❽ through the flexible tube with the parts from ❸ to ❻ inserted.
4. Insert the unit above into the switch bush ❷, and tighten the jam nut ❻ onto the threads of the switch bush ❷.
5. Tighten the jam nut ❻ until its end face comes in contact with the width across flats of the switch bush ❷ (in the arrow direction). Then, the mounting is complete.

* When tightening the jam nut ❻, wrench the width across flats of the switch bush ❷ with a spanner.

Horizontal type

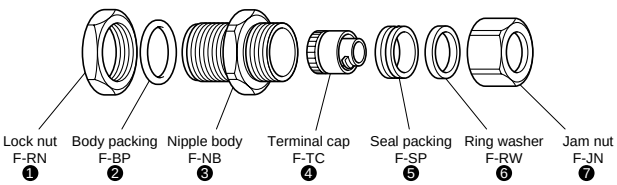


Vertical type

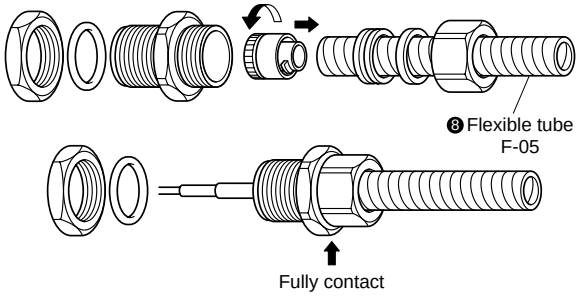


Straight box connector and flexible tube

● Parts of straight box connector (F-SB)

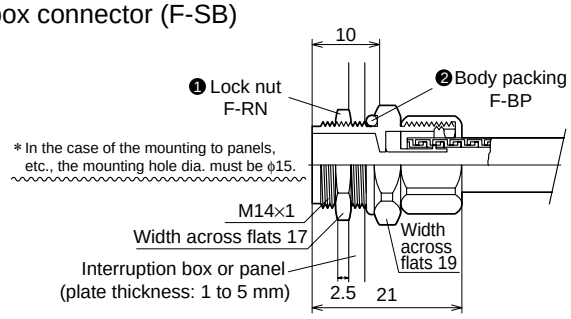


● Mounting to straight box connector (F-SB)



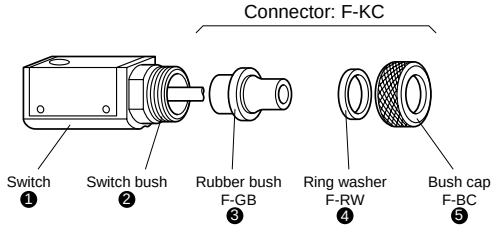
1. Insert the jam nut ❼, ring washer ❻, seal packing ❺, and terminal cap ❹ into the flexible tube ❽ in this order (screw the terminal cap ❹ into the bore of the flexible tube ❽).
2. Insert the end of the flexible tube ❽ with the parts from ❹ to ❼ inserted into the threads of the nipple body ❸, and tighten the jam nut ❼ onto the threads of the nipple body ❸.
3. Tighten the jam nut ❼ until its end face comes in contact with the end face of the width across flats of the nipple body ❸ (in the arrow direction). Then, the mounting is complete.

● Sectional drawing of completed mounting to straight box connector (F-SB)

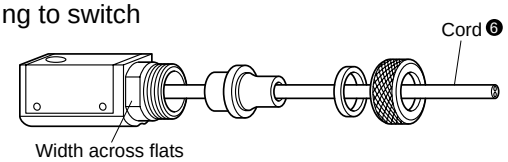


Cord type

● Connector parts configuration

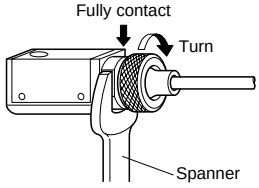


● Mounting to switch



1. Pass the cord ❻ through the rubber bush ❸, ring washer ❹, and bush cap ❺ in this order.
2. Insert the parts passed through the cord into the switch bush ❷, and tighten the bush cap ❺ onto the thread of the switch bush ❷.
3. Tighten the bush cap ❺ until its end face comes in contact with the end face of the width across flats of the switch bush ❷ (in the arrow direction). Then, the mounting is complete.

* When tightening the bush cap ❺, hold the width across flats of the switch bush ❷ with a spanner, and tighten with hands.



Switch and bracket assembly

Switch bracket assembly model code

- Code for order of switches and bracket assemblies

R32 — Bracket band symbol
AX111 — Switch type

- Code for order of switches

AX111 — Switch type

- Code for order of bracket bands

R32 — Bracket band symbol

10 MPa double-acting type hydraulic cylinder
100H-2R • 100HW-2R

Switch type	Bore	Assy type		Switch single unit type		Bracket type
		Contact	No contact	Contact	No contact	
AX type	ϕ32 • ϕ40	R32AX1✻✻	R32AX2✻✻	AX1✻✻	AX2✻✻	R32
	ϕ50 • ϕ63	R33AX1✻✻	R33AX2✻✻			R33
	ϕ80	R34AX1✻✻	R34AX2✻✻			R34
	ϕ100	R35AX1✻✻	R35AX2✻✻			R35
	ϕ125	R36AX1✻✻	R36AX2✻✻			R36
AZ type	ϕ32 • ϕ40	R32AZ1✻✻	R32AZ2✻✻	AZ1✻✻	AZ2✻✻	R32
	ϕ50 • ϕ63	R33AZ1✻✻	R33AZ2✻✻			R33
	ϕ80	R34AZ1✻✻	R34AZ2✻✻			R34
	ϕ100	R35AZ1✻✻	R35AZ2✻✻			R35
	ϕ125	R36AZ1✻✻	R36AZ2✻✻			R36
WR type • WS type	ϕ32 • ϕ40	R21WR✻✻✻-H	R21WS✻✻✻-H	WR✻✻✻-H	WS✻✻✻-H	R21-H
	ϕ50 • ϕ63	R22WR✻✻✻-H	R22WS✻✻✻-H			R22-H
	ϕ80	R22WR✻✻✻-H	R22WS✻✻✻-H			R22-H

Symbol/code for order of switches

■ Contact
General purpose type
Cord rear wiring
AF: AX101 (with 1.5 m cord)
AG: AX105 (with 5 m cord)
AH: AX111 (with 1.5 m cord)
AJ: AX115 (with 5 m cord)
AE: AX125 (with 5 m cord/no lamp)
AK: AX11A (connector type/AC)
AL : AX11B (connector type/DC)
Cord upper wiring
AP: AZ101 (with 1.5 m cord)
AR: AZ105 (with 5 m cord)
AS: AZ111 (with 1.5 m cord)
AT: AZ115 (with 5 m cord)
AN: AZ125 (with 5 m cord/no lamp)
AU: AZ11A (connector type/AC)
AW: AZ11B (connector type/DC)
Cutting oil proof type
5: WR505 (with 5 m cord)
7: WR505F (with 5 m cord/flexible tube attached)
6: WR515 (with 5 m cord)

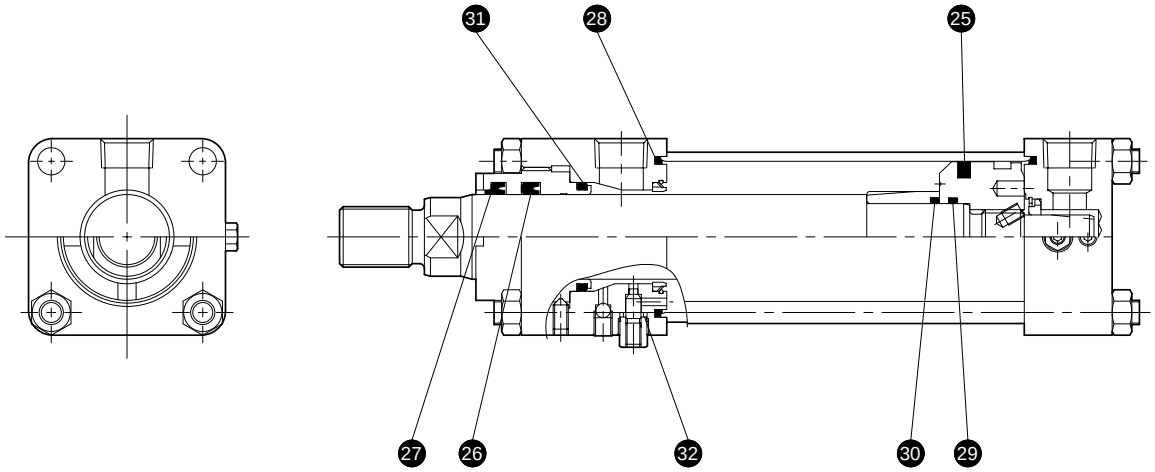
■ CE standard
■ No contact
General purpose type
●2-wire, 2-lamp type
Cord rear wiring
CT: AX211CE (with 1.5 m cord)
CU: AX215CE (with 5 m cord)
CV: AX21B (connector type/DC)
Cord upper wiring
CW: AZ211CE (with 1.5 m cord)
CX: AZ215CE (with 5 m cord)
CY: AZ21B (connector type/DC)

■ No contact
General purpose type
●2-wire, 1-lamp type
Cord rear wiring
BE: AX201 (with 1.5 m cord)
BF: AX205 (with 5 m cord)
Cord upper wiring
BM: AZ201 (with 1.5 m cord)
BN: AZ205 (with 5 m cord)
●2-wire, 2-lamp type
Cord rear wiring
CE: AX211 (with 1.5 m cord)
CF: AX215 (with 5 m cord)
Cord upper wiring
CM: AZ211 (with 1.5 m cord)
CN: AZ215 (with 5 m cord)
●3-wire, 1-lamp type
Cord rear wiring
BH: AX221 (with 1.5 m cord)
BJ: AX225 (with 5 m cord)
Cord upper wiring
BR: AZ221 (with 1.5 m cord)
BS: AZ225 (with 5 m cord)
Cutting oil proof type
2: WS215 (2-lamp type w/ 5 m cord)
4: WS215F (2-lamp type w/ 5 m cord/flexible tube attached)
3: WS225 (2-lamp type w/ 5 m cord)

List of seals

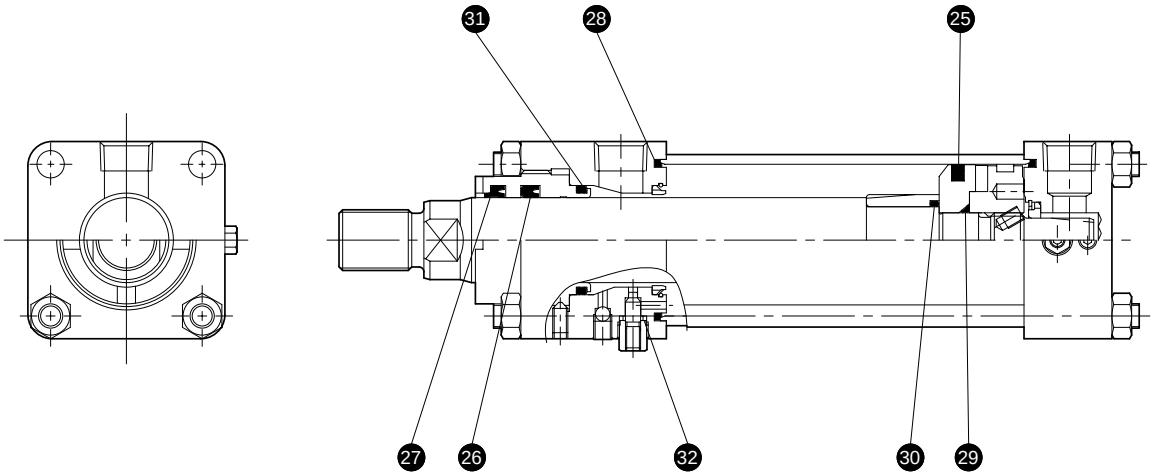
Double acting single rod/Standard type/100H-2

Seal material: 2 Urethane rubber, 8 combined seal



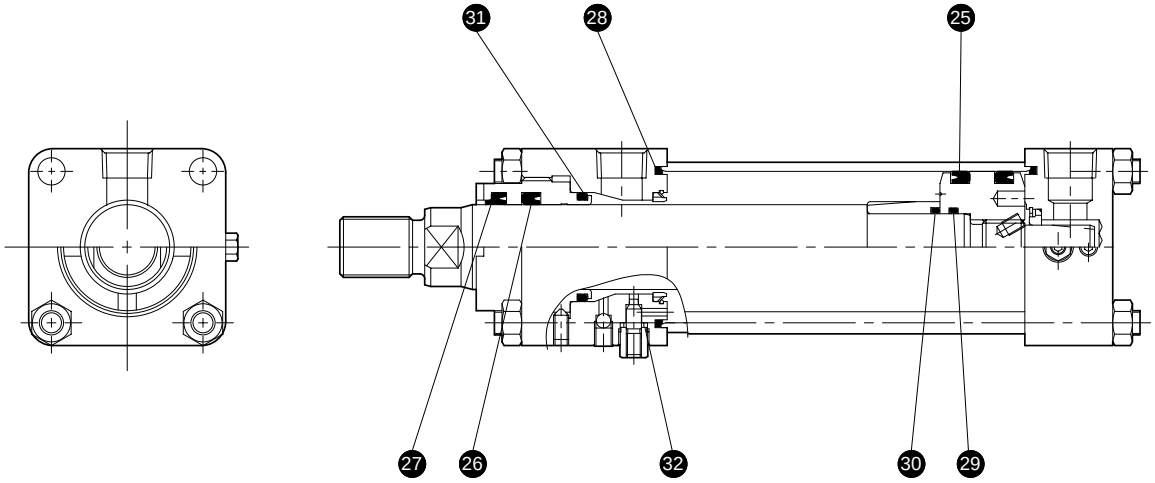
Double acting single rod/Switch set/100H-2R

Seal material: 2 Urethane rubber, 8 combined seal



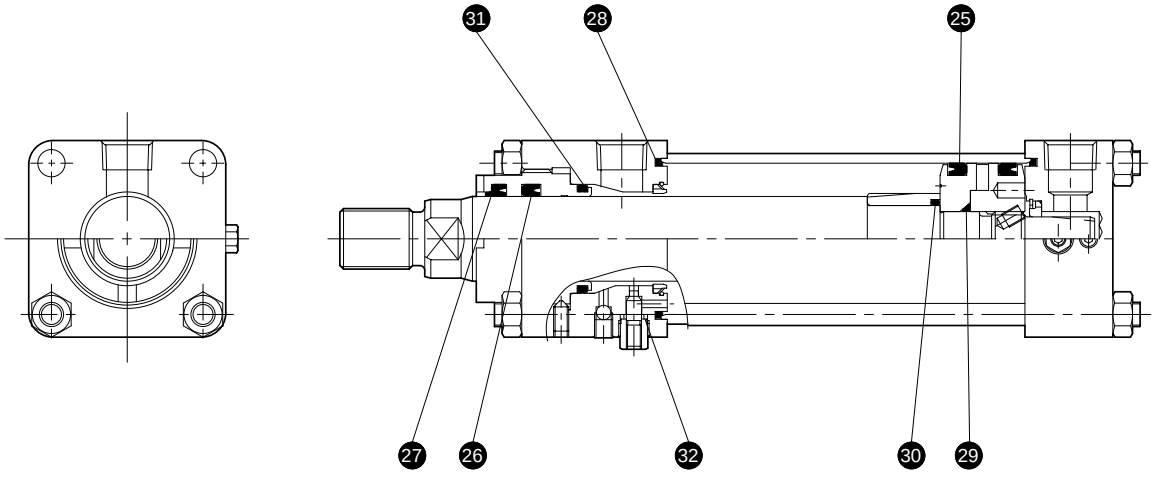
Double acting single rod/Standard type/100H-2

Seal material: 1 Nitrile rubber, 6 Hydrogenated nitrile rubber



Double acting single rod/Switch set/100H-2R

Seal material: 1 Nitrile rubber, 6 Hydrogenated nitrile rubber



Seal kit

1 Nitrile rubber/100H-2, 100H-2R

No.	Parts name		Material	Q'ty.	Parts code			
					ϕ32	ϕ40	ϕ50	ϕ63
㉕	Piston seal		Hydrogenated nitrile rubber	2	OUHR 32X25X5	OUHR 40X32X5.4	OUHR 50X42X5.4	OUHR 63X55X5.4
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH18X25 X5	IUH22X29 X5	IUH28X36 X5.4	IUH36X44 X5.4
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH18X24 X3.5X4.5	LBH22X28 X3.5X4.5	LBH28X36 X4.5X6	LBH36X44 X4.5X6
㉘	Cover seal		Nitrile rubber	2	TT-32	TT-40	TT-50	TX-63
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	S-12.5	P-18	P-22	G-30
		(w/ switch)	Nitrile rubber	1	P-15	P-15	P-18	G-25
㉚	O-ring for cushion ring		Nitrile rubber	1	S-15	S-18	P-22	G-30
㉛	O-ring for bush		Nitrile rubber	1	P-21	G-25	G-30	G-40
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H	CX-8H
Seal kit	100H-2 (standard type)			1 set	RH1/PKS1 -032B	QH2/PKS1 -040B	QH2/PKS1 -050B	QH2/PKS1 -063B
	100H-2R (switch set)			1 set	RH1R/PKS1 -032B	QH2R/PKS1 -040B	QH2R/PKS1 -050B	QH2R/PKS1 -063B

No.	Parts name		Material	Q'ty.	Parts code		
					ϕ80	ϕ100	ϕ125
㉕	Piston seal		Hydrogenated nitrile rubber	2	OUHR 80X70X6.5	OUHR 100X90X6.5	OUHR 125X110X9.6
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH45X53X 5.4	IUH56X66X 6.5	IUH70X80 X6.5
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH45X53 X4.5X6	LBH56X66 X5X6.5	LBH70X80 X5X6.5
㉘	Cover seal		Nitrile rubber	2	TX-80	TX-100	TX-125
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	G-40	G-50	G-65
		(w/ switch)	Nitrile rubber	1	G-35	G-45	G-55
㉚	O-ring for cushion ring		Nitrile rubber	1	G-40	G-50	G-65
㉛	O-ring for bush		Nitrile rubber	1	G-50	G-60	G-80
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-12H	CX-12H	CX-14H
Seal kit	100H-2 (standard type)			1 set	QH2/PKS1 -080B	QH2/PKS1 -100B	QH2/PKS1 -125B
	100H-2R (switch set)			1 set	QH2R/PKS1 -080B	QH2R/PKS1 -100B	QH2R/PKS1 -125B

● S-12.5 is made of hydrogenated nitrile rubber with hardness of 70. Other O-rings conform to JIS B 2401-1A.
Note) Nominal seal models are subject to change.

Seal kit

2 Urethane rubber/100H-2, 100H-2R

No.	Parts name		Material	Q'ty.	Parts code			
					ϕ32	ϕ40	ϕ50	ϕ63
㉕	Piston seal		Urethane rubber + Nitrile rubber	1	KR0032 00701	KR3040 00701	KR0050 00701	KR0063 00701
㉖	Rod seal		Urethane rubber	1	B31826 P5008	B32229 P5008	B32836 P5008	B33644 P5008
㉗	Wiper ring		Urethane rubber	1	AY1080 P5008	AY2020 P5008	AY2080 P5008	AY3060 P5008
㉘	Cover seal		Nitrile rubber	2	TT-32	TT-40	TT-50	TX-63
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	S-12.5	P-18	P-22	G-30
		(w/ switch)	Nitrile rubber	1	S-12.5	P-15	P-18	G-25
㉚	O-ring for cushion ring		Nitrile rubber	1	S-15	S-18	P-22	G-30
㉛	O-ring for bush		Nitrile rubber	1	P-21	G-25	G-30	G-40
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H	CX-8H
Seal kit	100H-2 (standard type)			1 set	RH1/PKS2 -032B	QH2/PKS2 -040B	QH2/PKS2 -050B	QH2/PKS2 -063B
	100H-2R (switch set)			1 set	RH1R/PKS2 -032B	QH2R/PKS2 -040B	QH2R/PKS2 -050B	QH2R/PKS2 -063B

No.	Parts name		Material	Q'ty.	Parts code		
					ϕ80	ϕ100	ϕ125
㉕	Piston seal		Urethane rubber + Nitrile rubber	1	KR4080 00701	KR0100 00701	KR0125 00701
㉖	Rod seal		Urethane rubber	1	B34050 P5008	B35666 P5008	B37079 P5008
㉗	Wiper ring		Urethane rubber	1	AY4045 P5008	AY5060 P5008	AY7000 P5008
㉘	Cover seal		Nitrile rubber	2	TX-80	TX-100	TX-125
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	G-40	G-50	G-65
		(w/ switch)	Nitrile rubber	1	G-35	G-45	G-55
㉚	O-ring for cushion ring		Nitrile rubber	1	G-40	G-50	G-65
㉛	O-ring for bush		Nitrile rubber	1	G-50	G-60	G-80
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-12H	CX-12H	CX-14H
Seal kit	100H-2 (standard type)			1 set	QH2/PKS2 -080B	QH2/PKS2 -100B	QH2/PKS2 -125B
	100H-2R (switch set)			1 set	QH2R/PKS2 -080B	QH2R/PKS2 -100B	QH2R/PKS2 -125B

● S-12.5 is made of hydrogenated nitrile rubber with hardness of 70. Other O-rings conform to JIS B 2401-1A.
Note) Nominal seal models are subject to change.

Seal kit

6 Hydrogenated nitrile rubber/100H-2, 100H-2R

No.	Parts name		Material	Q'ty.	Parts code			
					ϕ32	ϕ40	ϕ50	ϕ63
㉕	Piston seal		Hydrogenated nitrile rubber	2	OUHR 32X25X5	OUHR 40X32X5.4	OUHR 50X42X5.4	OUHR 63X55X5.4
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH18X25 X5	IUH22X29 X5	IUH28X36 X5.4	IUH36X44 X5.4
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH18X24 X3.5X4.5	LBH22X28 X3.5X4.5	LBH28X36 X4.5X6	LBH36X44 X4.5X6
㉘	Cover seal		Hydrogenated nitrile rubber	2	TT-32	TT-40	TT-50	TX-63
㉙	O-ring for piston rod	(w/o switch)	Hydrogenated nitrile rubber	1	S-12.5	P-18	P-22	G-30
		(w/ switch)	Hydrogenated nitrile rubber	1	P-15	P-15	P-18	G-25
㉚	O-ring for cushion ring		Hydrogenated nitrile rubber	1	S-15	S-18	P-22	G-30
㉛	O-ring for bush		Hydrogenated nitrile rubber	1	P-21	G-25	G-30	G-40
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H	CX-8H
Seal kit	100H-2 (standard type)			1 set	RH1/PKS6 -032B	QH2/PKS6 -040B	QH2/PKS6 -050B	QH2/PKS6 -063B
	100H-2R (switch set)			1 set	RH1R/PKS6 -032B	QH2R/PKS6 -040B	QH2R/PKS6 -050B	QH2R/PKS6 -063B

No.	Parts name		Material	Q'ty.	Parts code		
					ϕ80	ϕ100	ϕ125
㉕	Piston seal		Hydrogenated nitrile rubber	2	OUHR 80X70X6.5	OUHR 100X90X6.5	OUHR 125X110X9.6
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH45X53 X5.4	IUH56X66 X6.5	IUH70X80 X6.5
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH45X53 X4.5X6	LBH56X66 X5X6.5	LBH70X80 X5X6.5
㉘	Cover seal		Hydrogenated nitrile rubber	2	TX-80	TX-100	TX-125
㉙	O-ring for piston rod	(w/o switch)	Hydrogenated nitrile rubber	1	G-40	G-50	G-65
		(w/ switch)	Hydrogenated nitrile rubber	1	G-35	G-45	G-55
㉚	O-ring for cushion ring		Hydrogenated nitrile rubber	1	G-40	G-50	G-65
㉛	O-ring for bush		Hydrogenated nitrile rubber	1	G-50	G-60	G-80
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-12H	CX-12H	CX-14H
Seal kit	100H-2 (standard type)			1 set	QH2/PKS6 -080B	QH2/PKS6 -100B	QH2/PKS6 -125B
	100H-2R (switch set)			1 set	QH2R/PKS6 -080B	QH2R/PKS6 -100B	QH2R/PKS6 -125B

- Hardness of the O-ring S-12.5 is 70. For other O-rings, hardness is 90.

Note) Nominal seal models are subject to change.

Seal kit

8 Combined seal/100H-2, 100H-2R

No.	Parts name		Material	Q'ty.	Parts code			
					ϕ32	ϕ40	ϕ50	ϕ63
㉕	Piston seal		Fluoric resin + Nitrile rubber	1	OE032005200211B	OE040005200211B	OE050005200211C	OE063005200211C
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH18X25X5	IUH22X29X5	IUH28X36X5.4	IUH36X44X5.4
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH18X24X3.5X4.5	LBH22X28X3.5X4.5	LBH28X36X4.5X6	LBH36X44X4.5X6
㉘	Cover seal		Nitrile rubber	2	TT-32	TT-40	TT-50	TX-63
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	S-12.5	P-18	P-22	G-30
		(w/ switch)	Nitrile rubber	1	S-12.5	P-15	P-18	G-25
㉚	O-ring for cushion ring		Nitrile rubber	1	S-15	S-18	P-22	G-30
㉛	O-ring for bush		Nitrile rubber	1	P-21	G-25	G-30	G-40
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H	CX-8H
Seal kit	100H-2 (standard type)			1 set	RH1/PKS8-032B	QH2/PKS8-040B	QH2/PKS8-050B	QH2/PKS8-063B
	100H-2R (switch set)			1 set	RH1R/PKS8-032B	QH2R/PKS8-040B	QH2R/PKS8-050B	QH2R/PKS8-063B

No.	Parts name		Material	Q'ty.	Parts code		
					ϕ80	ϕ100	ϕ125
㉕	Piston seal		Fluoric resin + Nitrile rubber	2	OE080005200211C	OE100005200211D	OE125005200211D
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH45X53X5.4	IUH56X66X6.5	IUH70X80X6.5
㉗	Wiper ring		Hydrogenated nitrile rubber	1	LBH45X53X4.5X6	LBH56X66X5X6.5	LBH70X80X5X6.5
㉘	Cover seal		Nitrile rubber	2	TX-80	TX-100	TX-125
㉙	O-ring for piston rod	(w/o switch)	Nitrile rubber	1	G-40	G-50	G-65
		(w/ switch)	Nitrile rubber	1	G-35	G-45	G-55
㉚	O-ring for cushion ring		Nitrile rubber	1	G-40	G-50	G-65
㉛	O-ring for bush		Nitrile rubber	1	G-50	G-60	G-80
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-12H	CX-12H	CX-14H
Seal kit	100H-2 (standard type)			1 set	QH2/PKS8-080B	QH2/PKS8-100B	QH2/PKS8-125B
	100H-2R (switch set)			1 set	QH2R/PKS8-080B	QH2R/PKS8-100B	QH2R/PKS8-125B

● S-12.5 is made of hydrogenated nitrile rubber with hardness of 70. Other O-rings conform to JIS B 2401-1A.
Note) Nominal seal models are subject to change.

Seal kit

6 Cutting oil proof type/100HW-2, 100HW-2R

No.	Parts name		Material	Q'ty.	Parts code				
					ϕ32	ϕ40	ϕ50	ϕ63	ϕ80
㉕	Piston seal		Hydrogenated nitrile rubber	2	OUHR 32X25X5	OUHR 40X32X5.4	OUHR 50X42X5.4	OUHR 63X55X5.4	OUHR 80X70X6.5
㉖	Rod seal		Hydrogenated nitrile rubber	1	IUH18X25 X5	IUH22X29 X5	IUH28X36 X5.4	IUH36X44 X5.4	IUH45X53 X5.4
㉘	Cover seal		Hydrogenated nitrile rubber	2	TT-32	TT-40	TT-50	TX-63	TX-80
㉙	O-ring for piston rod	(w/o switch)	Hydrogenated nitrile rubber	1	S-12.5	P-18	P-22	G-30	G-40
		(w/ switch)	Hydrogenated nitrile rubber	1	P-15	P-15	P-18	G-25	G-35
㉚	O-ring for cushion ring		Hydrogenated nitrile rubber	1	S-15	S-18	P-22	G-30	G-40
㉛	O-ring for bush		Hydrogenated nitrile rubber	1	P-21	G-25	G-30	G-40	G-50
㉜	Valve seal		Canned hydrogenated nitrile rubber	2	CX-8H	CX-8H	CX-8H	CX-8H	CX-12H
Seal kit	100HW-2 (standard type)			1 set	RHW1/ PKS6-032B	QHW2/ PKS6-040B	QHW2/ PKS6-050B	QHW2/ PKS6-063B	QHW2/ PKS6-080B
	100HW-2R (switch set)			1 set	RHW1R/ PKS6-032B	QHW2R/ PKS6-040B	QHW2R/ PKS6-050B	QHW2R/ PKS6-063B	QHW2R/ PKS6-080B

- S-7 and S-12.5 are made of hydrogenated nitrile rubber with hardness of 70. Other O-rings conform to JIS B 2401-1A.
- The cutting oil proof type wiper ring is pressed into the bush to be incorporated into it. When replacing the wiper ring, replace it together with the bush.

Note) Nominal seal models are subject to change.

New Brand TAIYO Parker

New brand satisfying global standards

Hydraulic Cylinder 160H-1 Series

Conforming to ISO6020-2 (JIS B8367-2)

Features

- Seals in sliding sections conform to ISO standards groove size.
- Normally equipped switches for cylinders with bores from 32 mm to 160 mm.
  (CE mark switches are also available.)
- Adoption of the floating cushion unique to TAIYO (patent pending).
  - Improved start performance.
  - Cushion performance is hard to be affected by fluctuations in oil temperature.
    (Change in cushioning time is less to fluctuations in oil temperature.)
- Main specifications
  - Rod series: Two, A and B
  - Nine types of bores from 32 mm to 160 mm are available.
  - Ports are applicable to Rc (tapered thread) and G (straight thread).
- More compact and lightweight than our 140H-8.
- Normally equipped high-performance cushion
- Cushion valve easy to adjust.

Specifications

Bore (mm) : ϕ32 • ϕ40 • ϕ50 • ϕ63 • ϕ80 • ϕ100 • ϕ125 • ϕ140 • ϕ160
Nominal pressure : 16MPa
Mounting style : SD • FA • FB • EA • EB • FE • LA • CA • CB • TA • TC

Hydraulic Cylinder 210C-1/1R Series

The first 21 MPa new series with magnetic proximity switch (bore from 40 mm to 80 mm)

Features

- More lightweight, compact, and low-cost than 210H-3 Series.
- Double rod type and larger bore type (from 180 mm to 250 mm) are added.
- Meets request for space-saving design.
- Normally equipped high-performance cushion
- Rod A is also available in addition to standard rod.
- G thread type is also available.

Specifications

Bore (mm) : Standard type ϕ40 • ϕ50 • ϕ63 • ϕ80 • ϕ100 • ϕ125 • ϕ140 • ϕ160 • ϕ180 • ϕ200 • ϕ224 • ϕ250
Switch set ϕ40 • ϕ50 • ϕ63 • ϕ80
Nominal pressure : 21 MPa

Tiny-Bore Hydraulic Cylinder 100Z-1 Series

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

Features

- 10 MPa tiny-bore hydraulic cylinders with bores 20, 25, and 32 mm.
- Cushion adjustable to all the bores and floating cushion.
- Nitrile rubber and hydrogenated nitrile rubber are used as the materials of seals for sliding section, widen the applicable range of hydraulic fluid.
- Completely identical mounting dimensions to those of 70Z-1 Series.
- New small type switches AX and AZ.

Specifications

Bore (mm) : ϕ20 • ϕ25 • ϕ32
Nominal pressure : 10 MPa

Full line of equipment with various series to meet the needs of users

Compact Design Hydraulic Cylinder HQS2 Series

Depending on usage frequency, pressures up to 16 MPa can be used

Features

- Economical selection can be made based on usage frequency and operating pressure.
- Comforms to JIS B8367-6. Fatigue test class A1.
- Type of mounting, SD, LD, FA, FB.
- Interchangeable with the 100S-1 and 160S-1 series, our preceding model.
- The switch of CE standard is also prepared.

Specifications

Bore (mm) :	ϕ20・ϕ25・ϕ32・ϕ40・ϕ50・ϕ63・ϕ80・ϕ100
Rated pressuer :	16 MPa
Type:	General purpose, abrasive-fluid-resistant, double-acting single rod, double rod, standard, switch set

Compact Design Hydraulic Cylinder 100S-1 Series

Space saving/10 MPa compac design hydraulic cylinder

Features

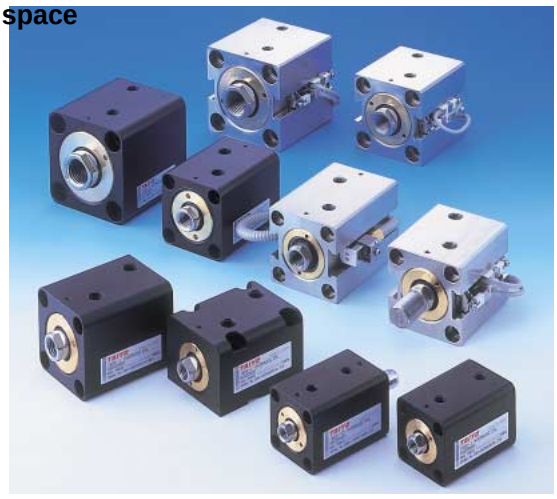
- Allows economical selection depending on use frequency and operating pressure.
- Conforms to JIS B8367. Fatigue test class A1.
- Great variety of mounting styles, SD, LD, FA, and FB.

Specifications

Bore (mm) :	ϕ20・ϕ25・ϕ32・ϕ40・ϕ50・ϕ63・ϕ80・ϕ100
Nominal pressure :	10 MPa
Type:	General purpose type/Cutting oil proof type Double-acting single rod/Double rod type Standard type/Switch set

Compact Design Hydraulic Cylinder 160S-1 Series

16 MPa compact design hydraulic cylinder requires less mounting space



Features

- Standardized cutting oil proof type.
- Can be disassembled for easier maintenance.
- Allows highly precise mounting.
- Standardized switch outfit type. (Magnetic proximity type and cutting oil proof type)
- Great variety of mounting styles, SD, LA, LD, FA, and FB.
- Dog limit switch outfit type is also available. (Semi-standard type)

Specifications

Bore (mm) :	ϕ20・ϕ25・ϕ32・ϕ40・ϕ50・ϕ63・ϕ80・ϕ100・ϕ125
Nominal pressure :	16 MPa
Type:	General purpose type/Cutting oil proof type Double-acting single rod/Double rod/Foot type Standard type/Switch set

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July 2003