

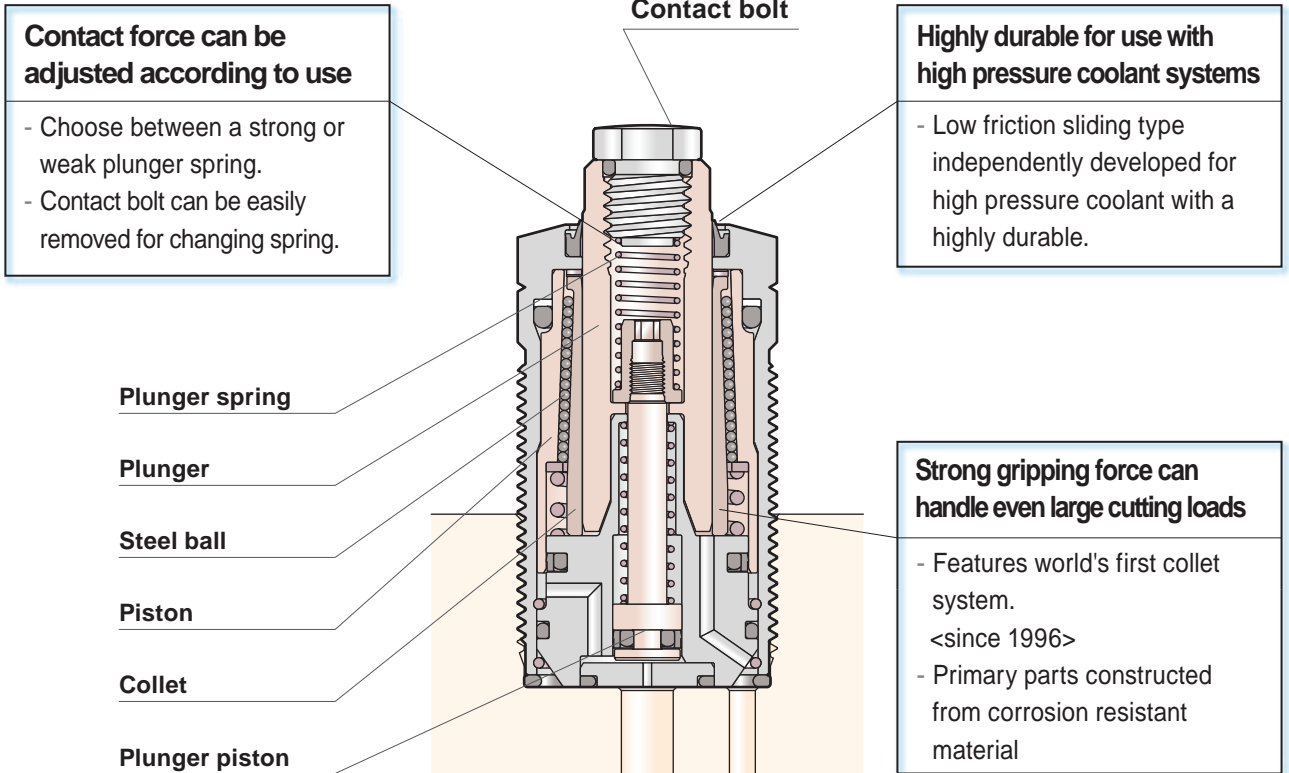
# 35MPa

## WORK SUPPORT





## Cross-sectional Structure

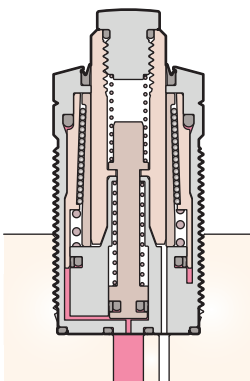


## Operating Instructions

### 1. Release position (initial position)

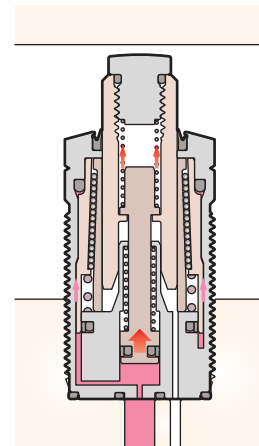
Plunger lowered by spring force

Work



### 2. Plunger rises (contact with workpiece)

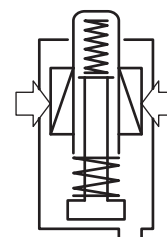
Plunger piston rises first when hydraulic pressure supplied. Plunger rises via spring force to the workpiece with this action.



## Features

- Smooth operation and stable support force achieved with collet locking.
- Powerful support force prevents workpiece chatter caused by cutting load and vibration.
- The small body (four models from M26 to M45) allows for installation in narrow spaces.

## Symbol

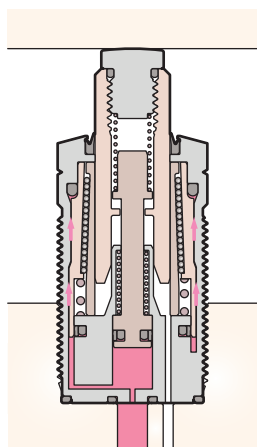


## Applications



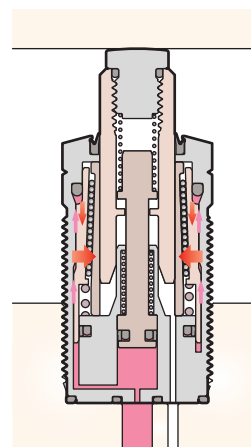
### 3. Plunger piston rises

Plunger piston rises to the upper limit even after contact bolt makes contact with work-piece.



### 4. Workpiece support operation complete

After the plunger piston reaches the upper limit, the piston begins to fall with hydraulic pressure. The taper action of the piston, collet, and steel balls clamp the plunger with a strong and constant locking force.



# Work Support

## Specifications

model		TNC0400	TNC0600	TNC1000	TNC1600
Support force (at 35 MPa) kN		4.4	7.1	11.7	16.3
Support force (formula) kN		$0.147 \times P - 0.733$	$0.237 \times P - 1.183$	$0.390 \times P - 1.950$	$0.543 \times P - 2.717$
Plunger stroke mm		6.5	8	10	12
Cylinder volume cm <sup>3</sup>		0.3	0.6	1.1	1.8
Plunger spring force	L	4.0 ~ 5.8	4.7 ~ 7.8	5.8 ~ 9.7	8.3 ~ 14.6
	H	5.6 ~ 8.0	6.2 ~ 11.0	7.8 ~ 13.5	10.1 ~ 22.0
MAX operating pressure MPa		35			
MIN operating pressure MPa		7			
Operating temperature °C		0 ~ 70			
Weight kg		0.15	0.2	0.3	0.75

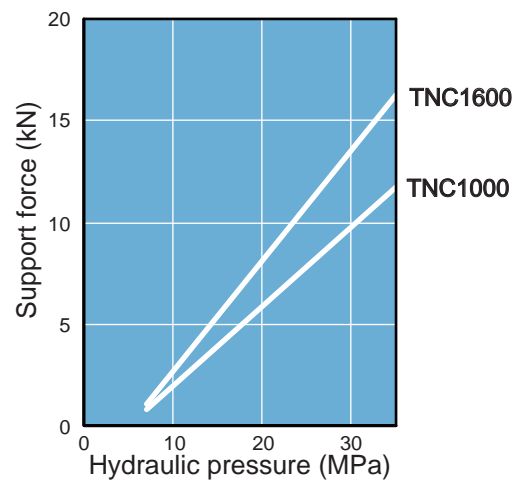
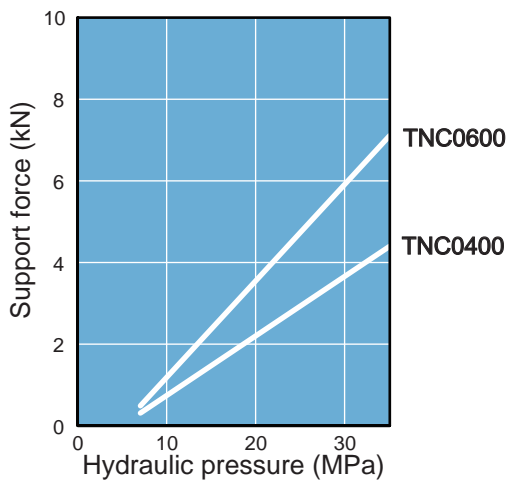
Remarks1. The symbol "P" for support force (formula) represents the supplied hydraulic pressure (MPa).

2. The value for plunger spring force shows the design value.

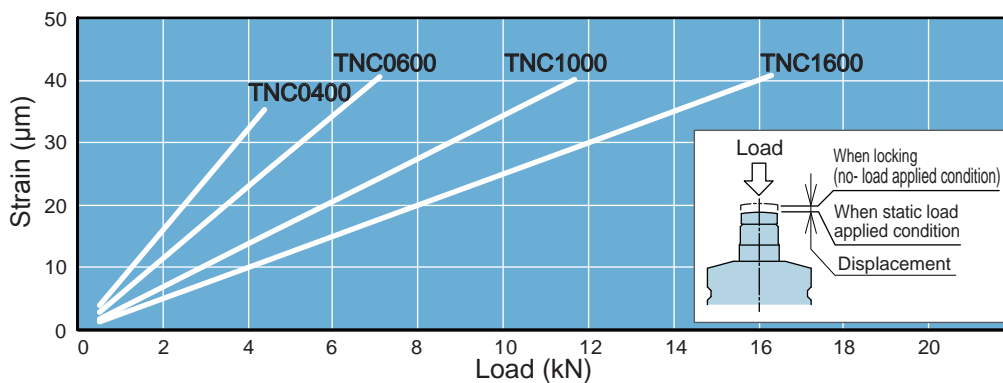
It will differ according to the sliding resistance of the plunger and the characteristics of the spring, so use it as a reference value for the workpiece contact force.

## Performance Curve

Support Performance Curve (This graph shows the support force under static load conditions.)



Load/Displacement Diagram (This graph shows the static load displacement at hydraulic pressure of 35 MPa.)



## ● Model Code

TNC 040 0 - L

1      2      3

**1** Support force

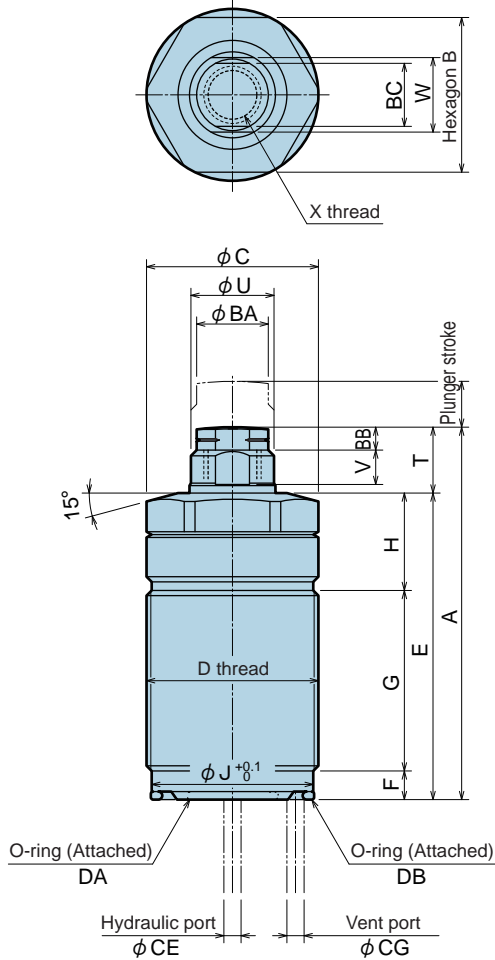
**2** Design No.

**3** Plunger spring force

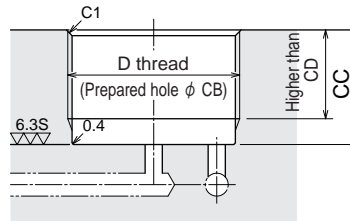
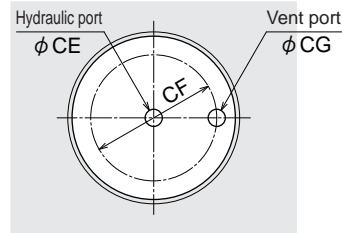
L : Weak spring  
H : Strong spring

## Outline dimensions

\* This drawing shows the system in release position (when hydraulic pressure is lowered).



## Machining dimensions for mounting



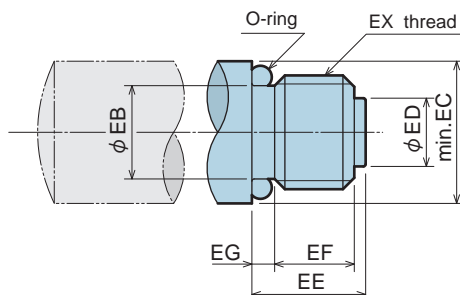
model	TNC0400	TNC0600	TNC1000	TNC1600
A	60	65	76.5	88
B	24	27	32	41
C	26	30	36	45
D(Nom.xPitch)	M26×1.5	M30×1.5	M36×1.5	M45×1.5
E	48.5	53.5	64.5	71.5
F	5	5	5	6
G	27.5	31.5	51.2	55.2
H	16	17	8.3	10.3
J	24.2	28.2	34.2	43.2
T	11.5	11.5	12	16.5
U	12	15	18	22
V	6	6	6.5	9
W	10	13	14	19
X(Nom.xDepth)	M8×12	M10×11	M10×11	M12×13
BA	11.5	12.5	12.5	16.5
BB	4	4	4	6
BC	10	11	11	14
CB	24.5	28.5	34.5	43.5
CC	13 ~ 32	13 ~ 36	15 ~ 55	18 ~ 60
CD	CC-4.5	CC-4.5	CC-4.5	CC-5.5
CE	max. 8	max. 10	max. 10	max. 12
CF	p.c.d. 19	p.c.d. 22	p.c.d. 26	p.c.d. 30
CG	max. 2.5	max. 3	max. 5	max. 6
DA	AS568-013(90°)	AS568-014(90°)	AS568-015(90°)	AS568-017(90°)
DB	AS568-020(90°)	AS568-022(90°)	AS568-026(90°)	AS568-030(90°)
Plunger stroke	6.5	8	10	12
Recommended mounting torque	31.5 N·m	50 N·m	63 N·m	80 N·m

### [Cautions]

- 1) Use the recommended mounting torque in the chart above when mounting to the unit. If the torque exceeds the recommended amount, the body can become deformed leading to malfunction. If the torque is too small it could produce looseness resulting in damage to the O-ring leading to oil leaks.

## Contact bolt design dimensions

\* Use as a reference when designing and manufacturing contact bolts.



Compatible Modes	TNC0400	TNC0600	TNC1000	TNC1600
EB	5.4	7.4	7.4	9.4
EC	10	12.5	12.5	16.5
ED	5	6	6	7.5
EE	10	10	10	12
EF	7.3	7.3	7.3	8.7
EG	1.7	1.7	1.7	2.3
EX	M8	M10	M10	M12
O ring	AS568-009(70°)	AS568-010(70°)	AS568-010(70°)	AS568-012(70°)

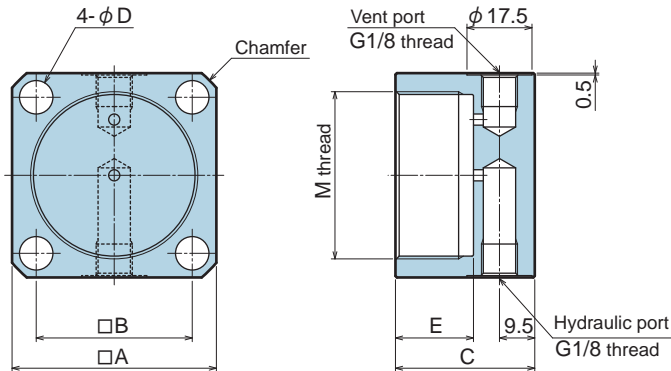
### [Cautions]

- 1) Design and manufacture in consideration of the contact bolt's weight and the plunger's spring force.
- 2) If contact bolts are designed and manufactured with different specs than the above chart, the plunger spring force will differ from the catalog and could result in damage to the plunger spring and cause it to malfunction.

## Options

Expands range of mounting methods.  
Use it to simplify machining on the mounting side and reduce the number of parts to machine.

### Piping block: TNZ-S



model	TNZ0400-S	TNZ0600-S	TNZ1000-S	TNZ1600-S
Compatible Models	TNC0400	TNC0600	TNC1000	TNC1600
A	35	38	45	55
B	26	29	35	42
C	32.5	33.5	34.5	37.5
D	5.5	5.5	6.8	9
E	16	17	18	21
M(Nom.xPitch)	M26x1.5	M30x1.5	M36x1.5	M45x1.5
Chamfer	C3	C3	C3	C4

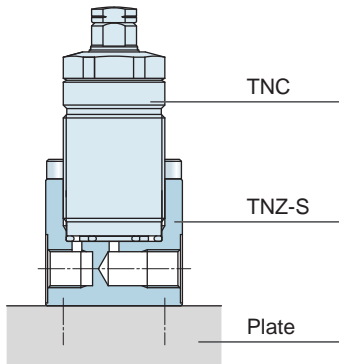
#### [Cautions]

- 1) Mounting bolts not supplied.  
Prepare mounting bolts according to the mounting height using the C dimensions as a reference.

## Applications

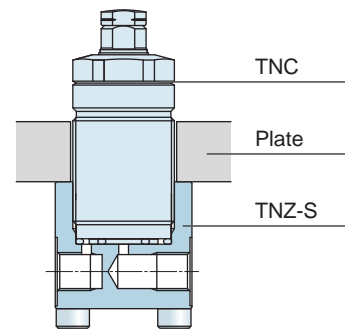
### Bottom flange-type

Mounting is possible by machining a small diameter tapped hole.  
Can be used as a bottom flange pipe type.



### Low type

Protrusion of workpiece support itself can be kept to a minimum because it is fastened in place at the bottom of the plate.

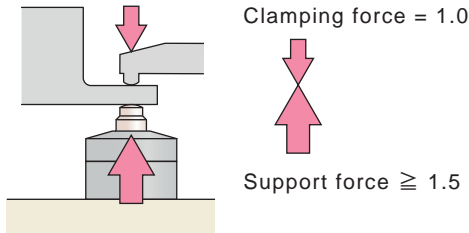


# Work Support

## Cautions for Design

### 1) Check the specifications

- The maximum hydraulic pressure is 35 MPa and the minimum 7 MPa.
- When using a work support opposite a clamp, set the support force at more than 1.5 times the clamping force.



### 2) Considerations when designing the circuit

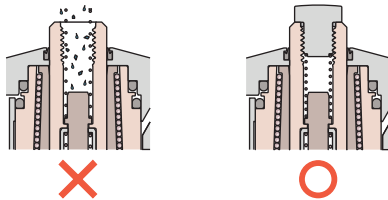
- When designing the hydraulic pressure circuit, read "Hydraulic Pressure Cylinder Speed Control Circuit and Notes," and design the circuit accordingly. If the circuit design is flawed, the equipment could be damaged or malfunction. (See page 10)

### 3) Install temporary stopper for workpiece if necessary

- When multiple work supports are used for a light workpiece, the plunger spring force may be higher than the weight of the workpiece causing it to lift the workpiece.

### 4) Contact bolt or attachment required for the plunger

- Always use contact bolt or attachment with the plunger.
- With contact bolt or attachment removed, cutting fluid or other foreign material will get in easily, causing malfunction.

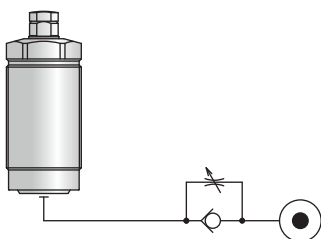


### 5) When using it on a welding jig or other such equipment, protect the plunger surface

- If spattered substances get on the plunger it will affect the sliding and prevent proper support.

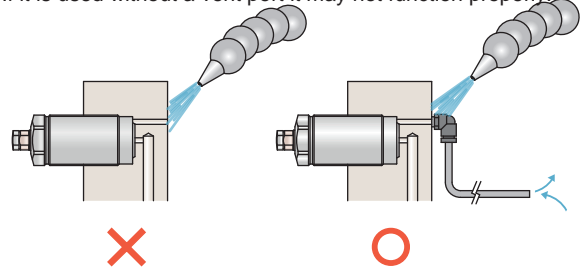
### 6) Adjust plunger operation time with flow rate

- A rough guideline for the full stroke is between 0.5 and 1 second.
  - As with single-action cylinders, use a flow regulating valve with a check valve (meter-in) in consideration of the decreasing speed at release.
  - Use a flow regulating valve with check valve that has 0.1 MPa or less of cracking pressure.
- If the cracking pressure is too high the plunger will not move at the time of release.



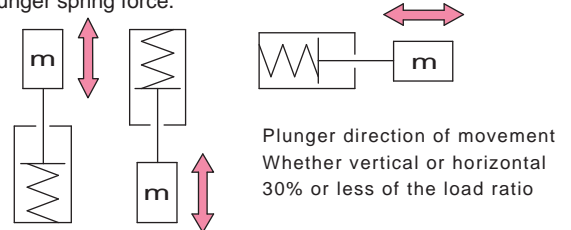
### 7) Appropriate measures for the vent port

- The work support, although only slightly, breathes like a single-action cylinder. Take the environment where it is used into consideration to avoid taking in cutting fluid or other foreign materials.
- If it is used without a vent port it may not function properly.



### 8) Keep the right weight when designing and manufacturing attachments

- Make sure the weight of attachments is 30% or less of the plunger spring force.



- Example) The plunger spring force for TNC0400-L is 4.0-5.8 N. Therefore,

the maximum weight of the contact bolt is  $4.0 \times 0.3 / 9.807 = 0.12 \text{ kg}$ . However, this may vary according to the sliding resistance of the plunger and the characteristics of the spring, so it is recommended that you use the lightest weight possible.

- Manufacture the mounting screws according to the contact bolt design dimensions listed on each product page.
- The threads also serve to fasten the plunger spring, so if different dimensions are used altered spring force or other damage could lead to malfunction.



## Cautions for Mounting

### 1) Check the fluid to use

- Make sure to use the Hydraulic Fluid List to choose the appropriate fluid.

### 2) Cautions for installing piping

- Flush the pipes, joints and jig oil holes to make sure they are clean.
- Chips and foreign material in the circuit will lead to leaks and malfunction.
- There is no function provided with this product to prevent foreign materials and contaminants from getting into the hydraulic system and pipes.

### 3) Using the sealing tape

- Leave 1 or 2 turns on the joint thread and wrap it.
- Pieces of the sealing tape can lead to leaks and malfunction.
- When installing the piping, do so in a clean working environment and follow directions faithfully so that foreign materials do not get into the equipment.

### 4) Mounting the Unit

- Be careful not to scratch or damage the O-ring used to seal the bottom and tighten according to the torque shown in the following chart.

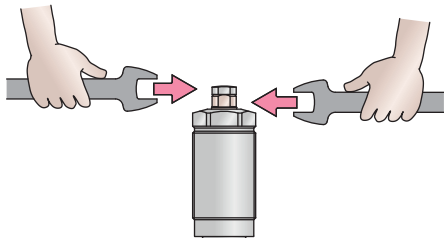
model	Thread size	Tightening torque (Nm)
TNC0400	M26×1.5	31.5
TNC0600	M30×1.5	50.0
TNC1000	M36×1.5	63.0
TNC1600	M45×1.5	80.0

- Apply an adequate amount of grease to the O-ring.
- If the O-ring is installed without grease it is likely to be deformed or damaged.
- If more than the prescribed amount of torque is used it will lead to malfunction.

### 5) Mounting Attachments

- Use a wrench to hold the end of the plunger and tighten it according to the torque in the following chart.

model	Front end thread size	Tightening torque (Nm)
TNC0400	M8	10
TNC0600	M10	16
TNC1000	M10	16
TNC1600	M12	40



### 6) Air bleeder in the hydraulic pressure circuit

- Using the hydraulic pressure circuit with a large amount of air still in it will cause operations to take an abnormally long time. After installing the piping or if air is fed into the hydraulic tank of the pump while it is empty, make sure to perform the following procedures to bleed the air.

### -Hydraulic Fluid List

ISO viscosity grade: ISO-VG-32

Manufacturer	Abrasion resisting hydraulic oil	General purpose oil
Showa Shell Sekiyu	Tellus Oil 32	Tellus Oil C32
Idemitsu Kosan	Daphne Super Hydraulic 32A	Super Multi 32
Eneos	Super Highland 32	Super Mulpus 32
Cosmo Oil	Cosmo Hydro AW32	Cosmo New Mighty Super 32
JOMO	Hydrax 32	Lathus 32
Esso	Nuto H32	Nuto 32
Mobil	Mobil DTE24	Mobil DTE24 Light
Kygnus	Unit Oil WR32	Unit Oil P32
Fuji Kosan	Fukkol Super Hydrol 32	Fukkol Hydrol DX32
Matsumura Oil	Hydrol AW32	
Sunoco	Sunvis 832	Sunvis 932
Mitsui Oil	Hi-Tech AW32	Hydrax 32
Castrol	Hyspin AWS32	

Cautions: Some of the products in the chart are difficult to obtain overseas, so if you are going to purchase them overseas contact the manufacturer.

# Work Support

## Cautions for Use

- 1) The product should be operated by trained personnel.
  - Operation and maintenance of machines and systems which use hydraulic pressure equipment should be performed by persons with the necessary knowledge and experience.
- 2) Do not operate or remove equipment without first ensuring your safety.
  - (1) Perform inspections and maintenance of the machines and systems after making sure no objects will fall and the equipment will not accidentally operate.
  - (2) When removing equipment, check to make sure the Safety Notes mentioned above have been taken and then shut off the power source and the air to the hydraulic pressure source. Remove the equipment only after making sure no pressure remains in the hydraulic pressure circuit.

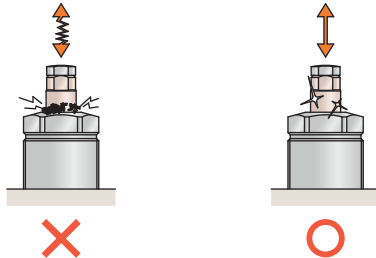
- (3) When removing equipment right after operation, the equipment may still be hot, so wait until it cools off.
- (4) When restarting the machine or system, make sure the bolts and parts are secure and in place first.



- 3) Do not touch the plunger while the work support is operating. Your hand could get stuck resulting in injury.
- 4) Do not take the equipment apart or modify it.
  - If the equipment is taken apart or modified the warranty will be void, even within the warranty period.

## Maintenance and inspection

- 1) Removing equipment and shutting off pumps.
  - When removing the equipment, make sure measures have been taken to prevent the driven objects from falling and to prevent accidental operation, then shut off the power source and the air to the hydraulic pressure source, and finally make sure no pressure remains in the hydraulic pressure circuit.
  - When restarting the equipment, first make sure all the bolts and parts are secure and in place.
- 2) Clean around the plunger periodically.
  - If used while the surface is dirty, sliding resistance will increase and prevent the workpiece from being supported in the proper place.



- 3) When a coupler is used to disconnect the equipment, if it is used for long periods of time air will enter the circuit, so be sure to release the air periodically.
- 4) Inspect the equipment periodically to make sure the pipes and mounting bolts are not loose.
- 5) Check to make sure the hydraulic fluid has not degraded.
- 6) Check to make sure operation is smooth without abnormal sounds.
  - In particular, if the equipment is not used for a long period of time, when it is used again for the first time make sure that it operates properly.
- 7) When storing the product, keep it out of direct sunlight in a cool location where it is protected from water.
- 8) For overhaul and repairs, please contact us.

## Warranty

- 1) Warranty period
  - The product warranty period is for 1.5 years after shipment from our plant or 1 year of use, whichever is shorter.
- 2) Warranty scope
  - If the product is damaged or malfunctions during the warranty period due to some fault of ours, we will replace or repair the defective part at our expense. However, defects or failures caused by the following are not covered:
    - (1) Proper maintenance and inspections were not performed
    - (2) The product was not properly designed by user or user's agent.
    - (3) The user did not use or handle the product properly (including damages caused by a third party)
    - (4) The cause was due to some factor other than our product
    - (5) The product was modified or repaired by another company or was modified or repaired without our approval or confirmation
    - (6) The damage or defect was caused by natural disaster or accident through no fault of our own
    - (7) Parts and replacements necessary due to wear and tear (rubber, plastic, sealant, certain electrical equipment, etc.)

Damages caused by defects in our products are not covered.

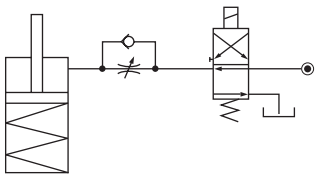
## Hydraulic Pressure Cylinder Speed Control Circuit and Cautions



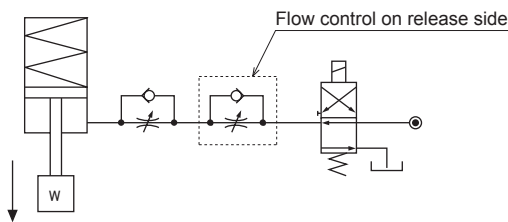
When controlling the operating speed of hydraulic cylinders, design the hydraulic pressure circuit taking the following points into consideration. If the circuit design is flawed, the equipment could be damaged or malfunction, so do a thorough review beforehand.

### -Speed control circuit for single-action cylinder

In a spring return type single-action cylinder, if the flow rate in the circuit is low at release the release operation can malfunction (sticking and stopping) or take a long time to complete. Use a flow regulating valve with check valve to control the flow rate during the locking operation. Also, as much as possible use a regulating valve on each cylinder to control cylinders with speed restrictions (swing clamps, work supports, etc.).



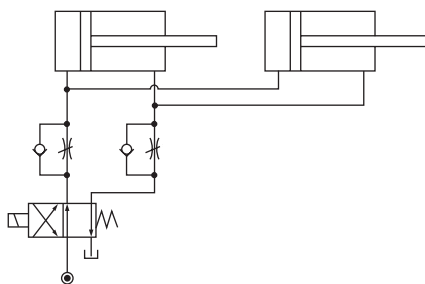
If there is concern that load may be placed on the cylinder in the direction of the release enough to break it during the release, use a flow regulating valve with check valve to control the flow rate on the release side as well (the same applies with swing clamps where the weight of the lever is put on the cylinder during release).



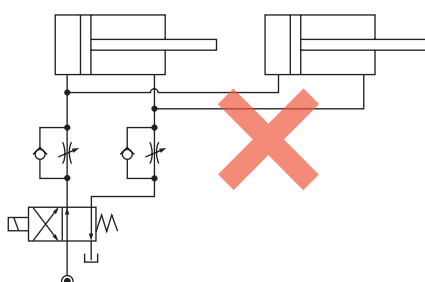
### -Speed control circuit for double-action cylinder

When controlling the speed of double-action cylinders, use a meter-out circuit for both the lock and release sides. With meter-in circuits air can get into the hydraulic pressure circuit and prevent speed control.

[meter-out circuit]



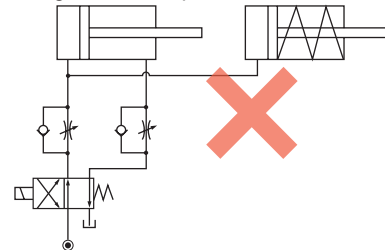
[meter-in circuit]



However, design meter-out circuits taking the following points into consideration.

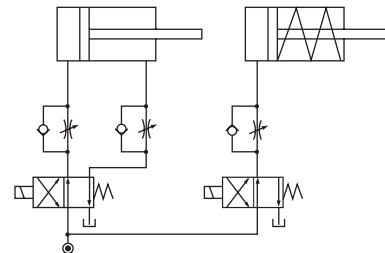
- (1) Generally speaking, in systems that use both double-action and single-action cylinders, the same circuit should not be used to control both.

The single-action cylinder release operation can malfunction or take a long time to complete.



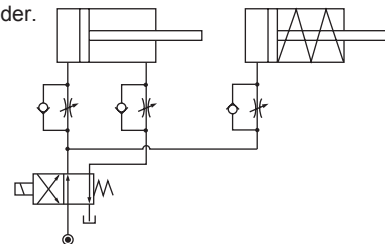
If both a single-action and double-action cylinder are used, refer to the following circuit.

- Separate the control circuits.

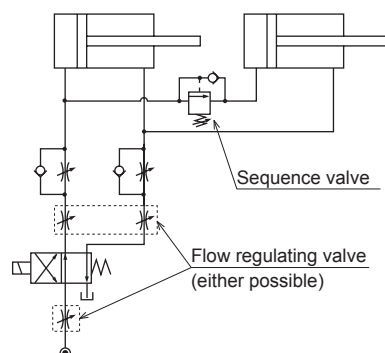


- Ensure that the double-action cylinder control circuit is not affected by the other.

However, depending on the tank line back pressure, the single-action cylinder may operate after the double-action cylinder.



- (2) With a meter-out circuit, depending on the flow rate the pressure within the circuit may rise when the cylinder operates. By using a flow regulating valve to keep the flow rate to the cylinder low, you can prevent the pressure within the circuit from rising. In particular, in systems with sequence valves and pressure switches if the pressure rises above the setting pressure the system will cease to function properly, so attention is required.





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