MANUAL

PNEUMATIC BOOSTER

HIROTAKA MFG. CO.,LTD.

The notes for Using

Be sure to read this before handling.

CAUTION

1. Piping

Before installing the piping, blow compressed air to prevent dirt from entering the piping. Due to the structure of the pneumatic booster, oil may be discharged from each air port due to wear or damage to the seals. We recommend installing an exhaust cleaner in the exhaust port of the valve.

2. Air supply

Using the compression air with dry via filter. The operating pressure is 0.7 MPa or less.

3. Hydraulic fluid (ISO VG22 Standard mineral hydraulic fluid)

If the hydraulic fluid has drain or dirt mixed in with it, or if it has deteriorated or discolored, replace it with new hydraulic fluid. Also, use the same old and new hydraulic oil. Recommended to replace once a year.

4. Quantity of oil

The oil level tube is located on the side of the pneumatic booster. While the pneumatic booster is operating, always replenish the oil level so that it stays within the oil level range.
Also, the hydraulic oil may turn black at the beginning of use, but this is due to initial wear of the packing. There are no negative effects with continued use.

5. Mounting direction

Mount the minimum oil level of the pneumatic booster in the position higher as possible than hydraulic cylinder. (for air release inside oil)
However, if the capacity of the hydraulic piping connecting the pneumatic booster and the hydraulic cylinder is 50% or less of the fast feed stroke capacity of the hydraulic cylinder, the booster can be installed on the lower side. (part of the oil that has entered the hydraulic cylinder returns to the pneumatic booster each time the hydraulic cylinder reciprocates, so air can be releaced.) Refer to page 10.

Capacity of oil (inside of Pneumatic Booster) Unit : liter

Model		PB-50	PB-100	PB-160	PB-200	PB-300
Symbol of fast feed oil capacity	05	0.15	0.7	2.2	4.8	Inquiry
	10	0.25	1.1	3.1	6.3	
	15	0.35	1.5	4.1	7.8	
	20	0.45	1.9	5.0	9.3	
	25	0.55	2.3	6.0	10.8	
Symbol of high thrust feed oil capacity	05	0.1	0.2	0.3	0.4	
	10	0.1	0.2	0.4	0.5	
	15	0.1	0.2	0.5	0.6	
	20	0.1	0.2	0.6	0.7	
	25	0.1	0.2	0.7	0.8	

References : Prepare the oil inside the piping and hydraulic cylinder other than the quantity of the list.

Example : Part number PB-100-1015-28
Symbol of fast feed oil capacity (10) = 1.1 liter
Symbol of high thrust oil capacity (15) = 0.2 liter
Capacity of oil (inside of Pneumatic booster) 1.1 + 0.2 = Total 1.3 liter

Preparations before the use

Oiling

① Supply a compressed air to P2 of the pneumatic booster and retract side port of hydraulic cylinder, make situation that returned hydraulic cylinder and a booster.

② Remove the plug from the oiling port and put oil. While watching the oil level tube, add oil to about the middle of the oil level tube.

③ After oiling, attach the plug to the oiling port and fast feed and fast return the valve manually or automatically. After returning to the backward end position, wait about 5 seconds to release the air in the oil in the pneumatic booster.

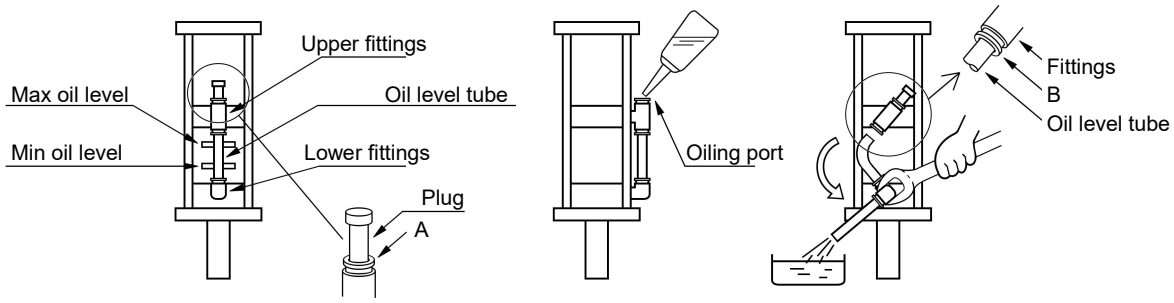
④ Do this action about 5 times. When the air is released and the oil level drops, add oil to the appropriate amount.After air releacing, attach the plug to the oiling port.

PB-50

（There must be no residual pressure in the P1 and P3 ports during oiling and oil drain.）

Oiling : While pressing down on part A of the upper fittings, pull out the plug and oiling.

Draining oil : Pull out the tube while pressing the B part of the upper fittings upward, rotate the lower fittings, and drain the oil. After draining the oil, reset the tube.



① Oil level and oil level tube

②Remove an oiling plug, and put oil.

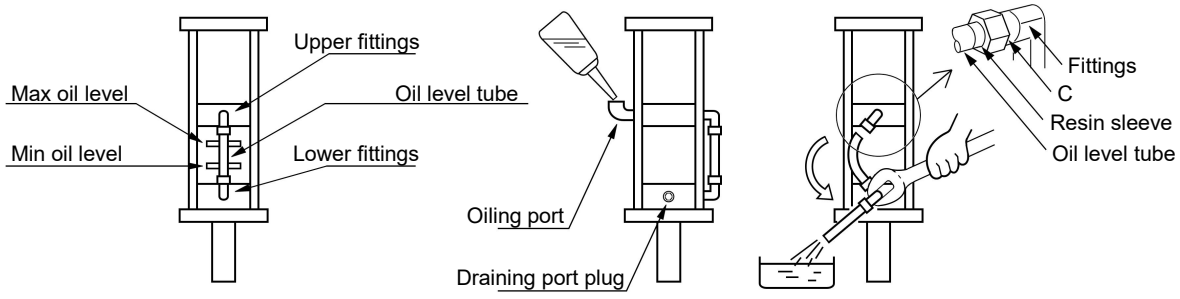
③To drain the oil, pull out the tube while pressing part B.

PB-100, 160, 200, 300

（There must be no residual pressure in the P1 and P3 ports during oiling and oil drain.）

Oiling : Remove the plug from the oiling port and oiling while watching the oil level tube.

Draining oil : Either remove the C nut on the upper fittings and pull out the oil level tube, or cut the top of the oil level tube and rotate the lower fittings to drain the oil. After draining the oil, replace the oil level tube and fitting with new ones and tighten them to prevent oil leakage. Use a bite type fittings with thread size R1/4.



① Oil level and oil level tube

②Remove an oiling plug, and put oil.

③Remove part C and pull out the oil level tube, or cut the top of the tube to drain the oil.

Speed adjustment method

All speed adjustments controls by pneumatic circuits. Adjust by install a meter-out speed controller in each part. If it throttle the speed controller, the speed of the hydraulic cylinder slow down.

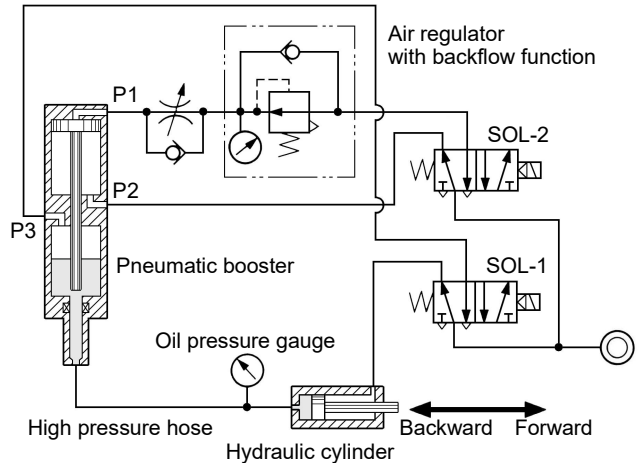
	Speed controller (Meter-out type) Installation part	Remarks
Fast feed speed	Hydraulic cylinder return port	
High thrust feed speed	Pneumatic booster P2 port	
Return speed of high thrust feed	Pneumatic booster P1 port	To prevent negative pressure in oil.
Fast return speed	Pneumatic booster P3 port	

Thrust adjustment method

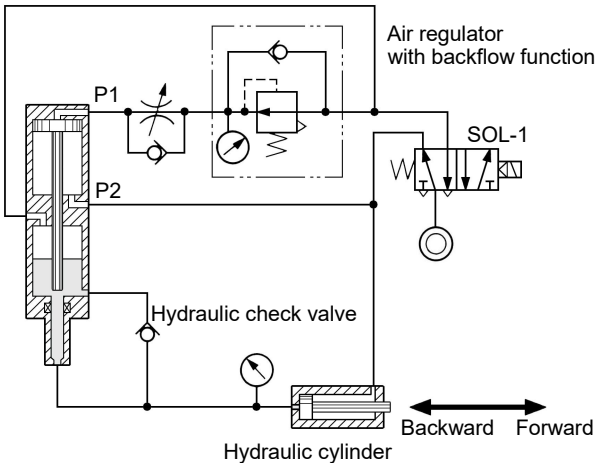
All thrust adjustments controls by pneumatic circuits. Adjust by install a regulator in each part.

	Regulator with backflow function Installation part	Remarks
Adjustment of the high thrust	Between SOL-2 and P1 port	Primary side of SOL-2 : No backflow function required.
Adjustment of the fast feed thrust	Between SOL-1 and P3 port	Primary side of SOL-1 : Installation is not recommended.

Standard air circuit



High thrust feed air circuit at start



Drop prevention method

If the hydraulic cylinder is installed vertically and the air supply to the solenoid valve is lost, the piston rod may move down due to the weight of the mold, etc. In order to prevent this kind of own weight drop, it is necessary to maintain the upward thrust without discharging the compressed air in the return port of the hydraulic cylinder (upward direction). To do so, install a pilot check valve on the return side port of the hydraulic cylinder, or select SOL-1 as a 3-position closed center type or 2-position perfect type. However, it is not possible to hold the stopped position for a long time. If it is necessary to hold the position for a long time, use a mechanical holding method.

Intermediate stop (Emergency stop) method

Install the stop valve (Model : STV) in the middle of the hydraulic piping. Shut off the oil and chage the pneumatic circuit to the return side. It is possible to use only SOL-1 (closed center type), but there will be a lot of overrun.

Hydraulic cylinder

A hydraulic cylinder (actuator) operated by a pneumatic booster must be able to operate smoothly even with air pressure. We recommend a minimum operating pressure of 0.15MPa or less for a hydraulic cylinder, and a workpiece weight load factor of 50% or less for vertical operation (50% or less of the differential pressure between supply air pressure and minimum operating pressure).

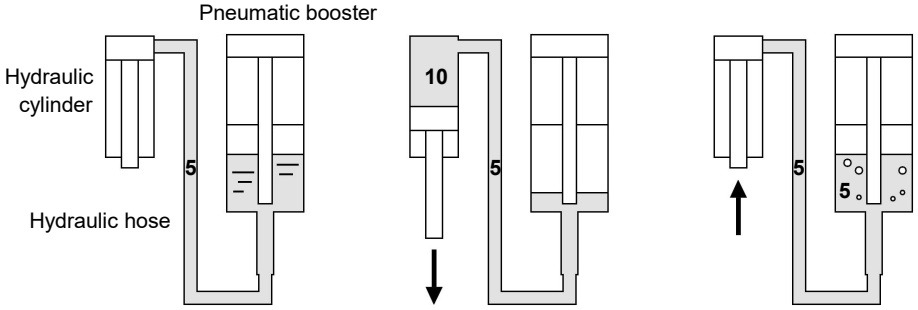
Cushion of hydraulic cylinder

Since fast feed and fast return are operated by air pressure, the speed will be slow during the cushion stroke. To reduce resistance, open the cushion valve as much as possible (with cushion type).

Hydraulic hose length

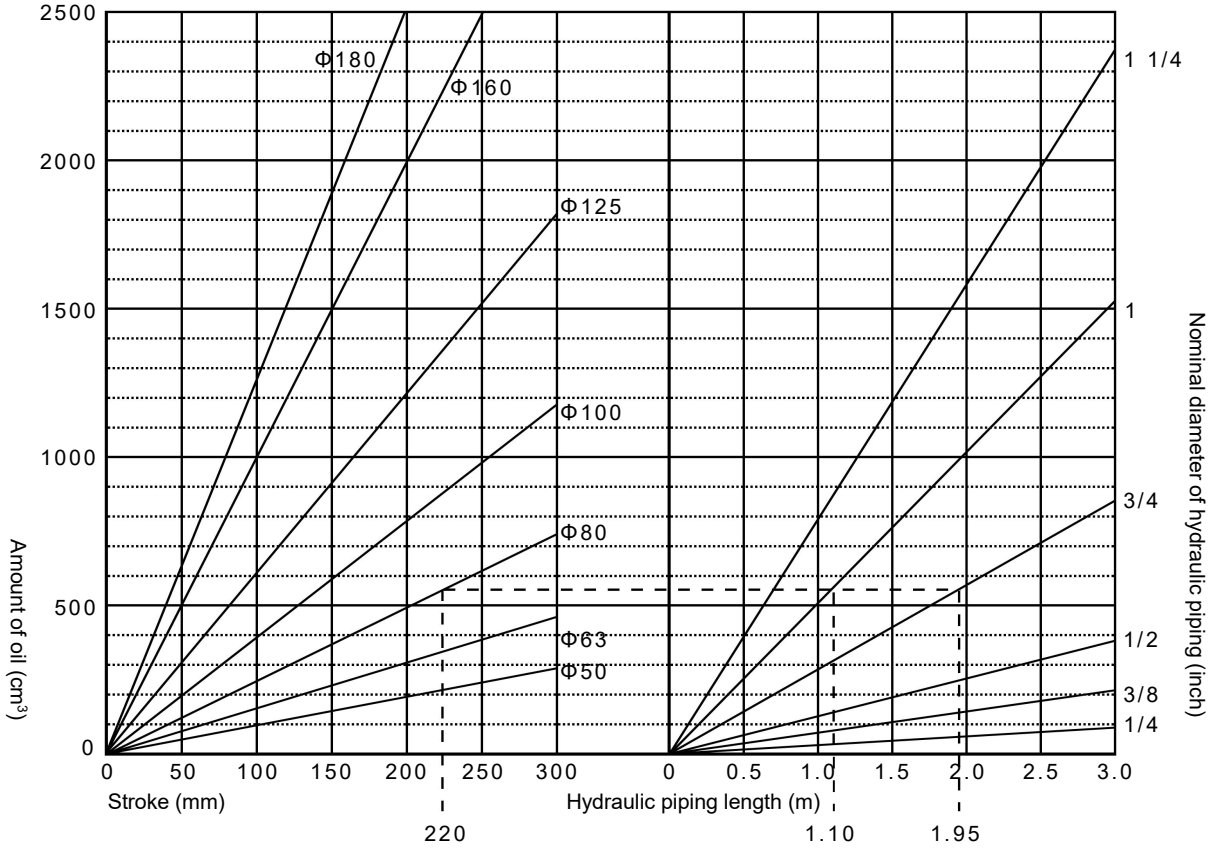
Since the oil and air come into contact with each other inside the pneumatic booster, a small amount of air gets mixed into the oil every time the hydraulic cylinder operates. This air (bubbles) can cause problems due to oil compression loss, so it is necessary to air release inside the pneumatic booster. To achieve this, more than half of the amount of oil sent into the hydraulic cylinder is returned to the pneumatic booster, and air is automatically air release after each operation to ensure stable operation. Therefore, the length of the hydraulic hose is limited so that the volume inside the hydraulic hose is less than half the amount of oil sent to the hydraulic cylinder.

"The amount of oil sent to the hydraulic cylinder" means
amount of oil for the stroke that operates in fast feed stroke of the hydraulic cylinder.



If 10 of oil enters the hydraulic cylinder during fast feed stroke,
5 of oil will return to the pneumatic booster with each operation.

Hydraulic piping length limit table for hydraulic cylinder inner diameter



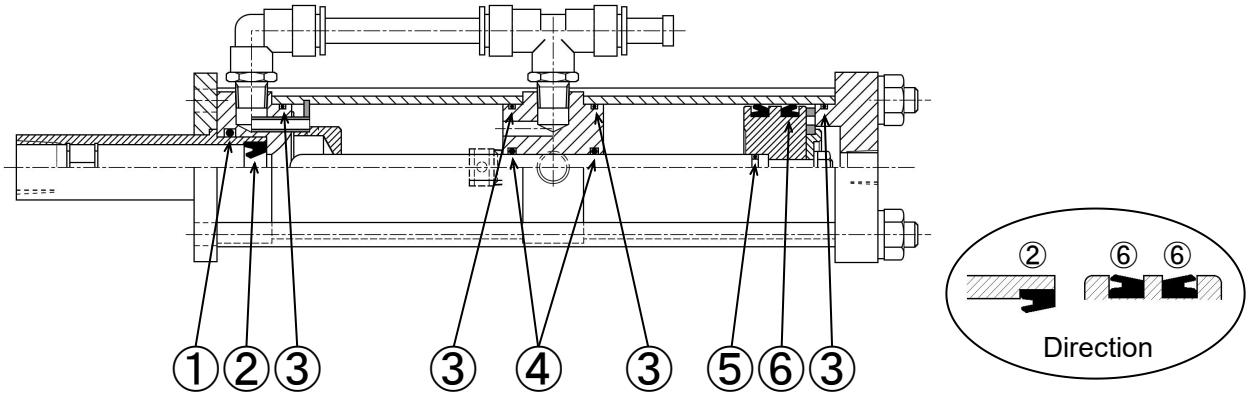
The amount of oil is 1/2 of the capacity calculated from the inner diameter and stroke of the hydraulic cylinder.(In the case of supplying oil to the head side)

The amount of oil in the hydraulic pipe calculated from the inner diameter and length of the hydraulic pipe

Example : In the case of the hydraulic cylinder inner diameter 80mm, rapid traverse stroke 220mm.
Piping length 1.95 m or less for 3/4 inch inner diameter piping
Piping length 1.10 m or less for 1 inch inner diameter piping

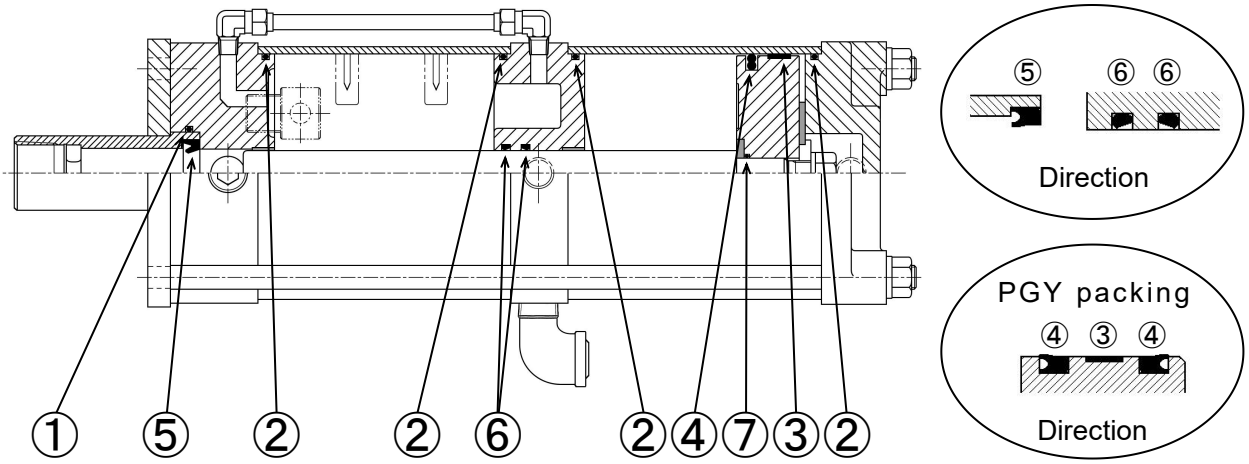
Seal List

PB－50



No.	1	2	3	4	5	6
Part no.	P24	IDI 10.20.8	S46	P10A	P7	PGY50
Q'ty	1	1	4	2	1	2

PB－100、160、200、300



Model	No.	1	2	3	4	5	6	7
	Pressure intensifying ratio	O ring	O ring	wearing	Piston packing	Y packing	Penta seal	O ring
PB-100	16 times	G40	G95	SWB100	※ PGY100	ISI 25. 33. 5	PS25	P14
	28 times	G35	G95	SWB100	※ PGY100	IDI 18. 28. 8	PS18	P14
PB-160	16 times	G55	1517#36	SWA160	PSD160	ISI 40. 50. 6	PS40	P20
	28 times	G55	1517#36	SWA160	PSD160	IDI 30. 45. 10	PS30	P20
PB-200	25 times	G75	1517#42	SWA200	※ PGY200	IDI 40. 56. 12	PS40	P20
PB-300	29 times	G100	G290	—	P285	IDI 55. 71. 12	PS55	G45
Q'ty		1	4	1	1	1	2	1

※ The quantity of No.4 "PGY" packing is two pieces.

How to order seal kit : "Seal kit for PB-〇〇 (part no.)" or "Seal kit for PB-〇〇 (model) 〇〇times"

The notes at the time of seal replacement.

All parts of the pneumatic booster can be disassembled by removing the 4 hexagon nuts that tighten the 4 tie rods. After disassembly, thoroughly wash each part, blow compressed air on the area where the packing is to be installed, and insert the packing. Adhesion of dust may damage the packing. When installing the packing, be careful not to damage it by applying sufficient grease.

－MEMO－

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