SERVICE MANUAL

Need to read before using, for a factory manager.

PNEUMATIC POWER CYLINDER

PCHSTYLE **PCS**STYLE **PCM**STYLE

HIROTAKA MFG CO.,LTD

The notes for Using

1. Piping CAUTION

Blow out air supply lines before connection. Ensure lines are free of all contaminants. Due to the construction of the product, by some possibility the pneumatic power cylinder is leaking that each exhaust port for the reason that wear and damage of seals, etc. So, it is advisable to install exhaust cleaner on exhaust port.

2. Air Supply CAUTION

Using the compression air with dry via filter.

3. Hydraulic Fluid(ISO VG##22 Standard mineral hydraulic fluid) CAUTION

Change the hydraulic fluid case of mixed drain and substance in the hydraulic fluid and ancient and discoloration. The hydraulic fluid used same oil that old and new.

4. Quantity of Oil CAUTION

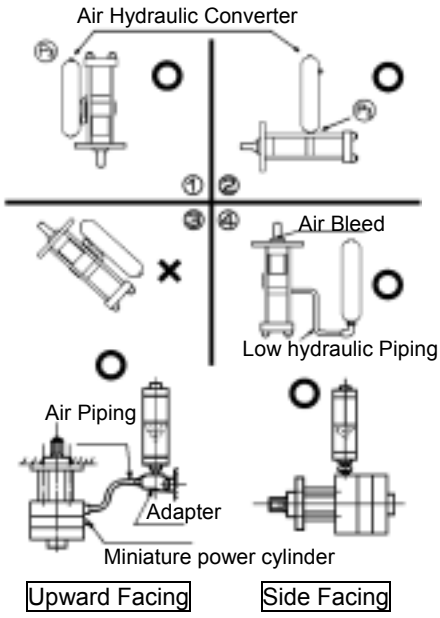
When it was low level condition, supply the oil that the level of oil be situated side of air-hydraulic converter. When machine condition is stopping(pneumatic power cylinder is returned), put confirmation of the oil level in practice.

5. Installation Orientation CAUTION

Due to the construction of the product, the pneumatic power cylinder must be installed in the orientation shown in the illustration. The bubbles cannot be bled if the product installed in the improper orientation.

The air hydraulic converter must always be installed in an upward facing orientation. Fig. (2) is achieved by connecting (P3) and the power cylinder unit using the position shown in Fig. (1). The new port (P3) should be used where the unit was connected.

Fig. (4) is achieved via external piping of the power cylinder and port (P3) using the position shown in Fig. (1). (This applies an oil pressure equivalent to the air pressure.) The new port (P3) should be used where the unit was connected. For such applications, an air bleed should be installed on the tip of the rod, and the air should be bled every one or two months. (If an upward facing application is specified at the time of ordering, the unit will be pre-installed with an air bleed.)



Capacity of oil Unit : liter

Model No.	Total Stroke	Capacity	Model No.	Total Stroke	Capacity
PCM-005～01	05	0.20	PCH-13～24	10	2.70
	10	0.30		15	3.40
	15	0.40		20	4.10
PCS-02～04	05	0.35		30	6.20
	10	0.45			
	15	0.55	PCH-35～44	10	3.80
PCH-03～08	10	1.00		15	4.70
	15	1.60		20	5.60
	20	1.90		30	7.40
	30	2.50			

Specifications

Maximum Thrust (Type)		0.5Ton	1 Ton	2 Ton	4 Ton	3 Ton	6 Ton	8 Ton	13 Ton	17 Ton	24 Ton	35 Ton	44 Ton
Model No.		PCM-005	PCM-01	PCS-02	PCS-04	PCH-03	PCH-06	PCH-08	PCH-13	PCH-17	PCH-24	PCH-35	PCH-44
Pneumatic Cylinder Diameter		ϕ50	ϕ50	ϕ100	ϕ100	ϕ125	ϕ125	ϕ125	ϕ180	ϕ180	ϕ180	ϕ180	ϕ180
Pressure Intensifying Ram Diameter		ϕ20	ϕ14	ϕ25	ϕ18	ϕ40	ϕ30	ϕ25	ϕ45	ϕ40	ϕ34	ϕ34	ϕ30
Pressure Intensifying Ratio		1:6.25	1:12.7	1:16	1:30	1:976	1:17.3	1:25	1:16	1:20	1:28	1:28	1:36
Hydraulic Cylinder Diameter		ϕ40	ϕ40	ϕ50	ϕ50	ϕ80	ϕ80	ϕ80	ϕ125	ϕ125	ϕ125	ϕ150	ϕ150
Working Fluid		Air											
Withstand Pressure		1.5MPa											
Working Pressure		Fast Feed: 0.3 to 0.7 MPa Pressure Intensifying Feed: 0.1 to 07 MPa											
*Piston Speed (mm/sec)	Fast Feed	300	300	300	300	280	280	280	200	200	200	150	150
	High Thrust Feed	30	29	27	27	25	22	20	16	13	10	10	8

PCSV*
PCSW
PCSV*W
} Same specifications as PCS.

*The piston speed is based on 0.5 MPa, no load, during advancing.

About Valves

PCSV* (Drive Valve)
PCHV* (Drive Valve)

Valve Specification

Working Fluid	Compressed air
Working Pressure Range	0.1 to 0.97MPa
Working Temperature Range	5 to 60℃
Lubrication	Non-lubricating
Operational System	Pilot (soft spool)
Manual Device	Push type (reciprocating type)

Solenoid Specification

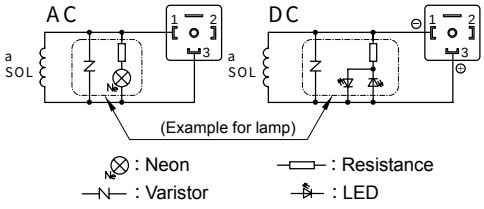
Voltage Rating V (Frequency)	AC100(50/60Hz)	AC200(50/60Hz)	DC24
Starting Current A	0.056/0.044	0.028/0.022	0.075
Holding Current A	0.028/0.022	0.014/0.011	
Power Consumption W	1.8(50Hz)・1.4(60Hz)		1.8
Insulation Type	Grade B Mold		

Connection Precautions

Improper connection of terminals can lead to problems such as the malfunctioning of solenoid valves. Carefully study the following diagram before connection.

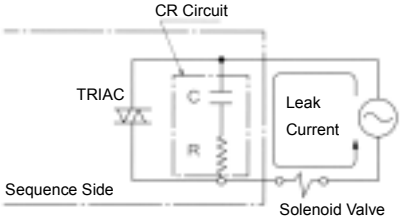
Connection Diagram

Single Solenoid



Restriction of Leak Current

When a sequencer or similar item is used to absorb the surge voltage in the CR circuit and protect the switching terminal, a leak current flows through the CR terminal. This leak current can negatively affect the operation of the product.



Size of remaining leak current should be restricted as follows:
AC200V 1.5 mA or less
AC100V 3 mA or less
DC 1.8 mA or less

PCH……V*(Stop Valve)
PCS……V*(Stop Valve)

Valve Specification

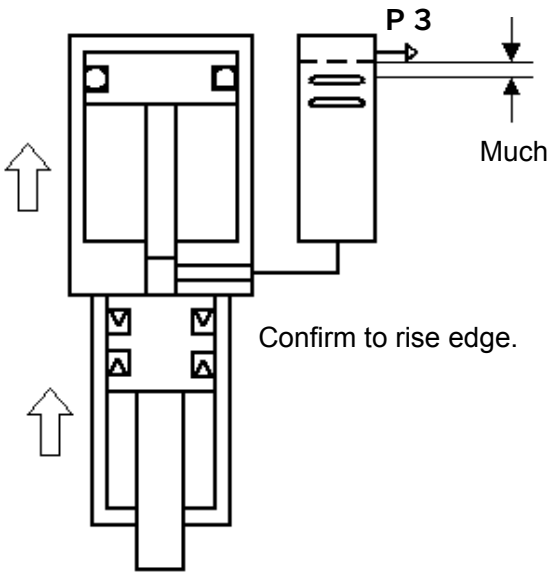
Working Fluid	Air, inactive gas
Working Pressure	0.15 to 0.8MPa
Working Temperature	Environment: 5 to 50°C Fluid: 5 to 50°C
Valve Construction	5 port pilot type soft seal spool
Piping Connection Method	Direct piping type
Piping Bore	Rc1/8
Pilot Exhaust	Separate exhaust
Effective Cross-Section Area (CV value)	12mm^2(0.66)
Lubrication	Not required
Manual Operation	Push type (reciprocating type)

Solenoid Specification

Voltage Types	1 AC100V 50/60Hz 2 AC200V 50/60Hz 3 DC24V
Allowable Voltage Range	Within +/-10%
Power Consumption	AC50Hz : 2.1VA 60Hz : 1.8VA DC : 1.6VA
Insulation Grade	Grade B
Wiring Method	DIN connector
Energizing Indicating Lamp	AC: Neon lamp DC: LED
Surge Killer	ZNR: Flywheel diode

Trouble Shooting List

Trouble			Cause	Action
Operation	The piston speed is slow(the cycle time is long).	The speed is slow in both strokes.	The piping bore is small.	Use larger bore piping.
			The volume of air supplied is insufficient.	Use larger bore piping between the air source and the machine.
				Use a large capacity compressor.
		The speed is slow in upward stroke.	The work is heavy.	Assist for the cylinder and the spring.
				Increase the air pressure.
			The speed control valves at the P1 and the P3 are excessively closed.	Open or remove the speed control valves.
			The machine and cylinder are out of alignment.	Align the machine with the cylinder.
	The piston comes to a stop in the middle of stroke.	The piston comes to a stop in the middle of downward stroke.	A high thrust feed signal is given earlier than a fast feed signal.	Examine the electric control system.
			A high thrust feed signal is given in the middle of fast feed.	Delay the high thrust feed signal timing.
		The piston comes to a stop in the middle of upward stroke.	The machine and the cylinder are out of alignment.	Align the machine with the cylinder.
			The fast feed valve is malfunctioning.	Replace the valve.
			The packing is defective.	Replace the valve.
	The piston rises, lowers, and again rises in returning (upward stroke).		The timing of air supply to the P4 (the P3 is exhausting at this time) is delayed.	Replace the manifold type valve with single valves.
				Examine the electric control system.
				Use the P1 for exhaust throttling.
			The work is heavy.	Reinforce the cylinder and the spring.
				Increase the air pressure.
	The piston does not move at all.		The control system is malfunctioning.	Examine the control system.
			The mechanical system is malfunctioning.	Examine the mechanical system.
			The cylinder is malfunctioning.	Dismantle and check the cylinder.
High thrust	High thrust is not produced.		A high thrust feed signal is given in the middle of quick feed, causing insufficient stroke.	Delay the high thrust feed signal timing.
			The oil contains bubbles.	Check the oil level, and refill it.
				Throttle exhaust from the P1 (this should be done for heavy works).
				Replace the valve.
			The high thrust valve is malfunctioning.	
	Too much high thrust is produced.		The pressure in the whole cylinder is high because the work is heavy.	Install a check valve–equipped regulator between the P1 and the valve to reduce the pressure at the P1.
Oil leakage	Oil spouts from the valve exhaust ports.	From all exhaust ports.	The oil in the air-operated valve used spouts.	Remove the oil from the air-operated valve.
		From P2	The packing inside the intermediate cover is defective.	Replace the packing.
		From P3	Too much oil is supplied.	Discharge the oil to the proper level.
			The oil is insufficient.	Refill the oil to the proper level.
			The packing of the hydraulic piston is defective.	Replace the packing.
			The boosting part returns early.	Throttle exhaust from the P1.
		From P4	The packing of the hydraulic piston is defective.(The oil spouts from the P3 at the same time).	Replace the packing.
	Oil leakage from cylinder to outside.		The locking packing is defective.	Replace the packing.

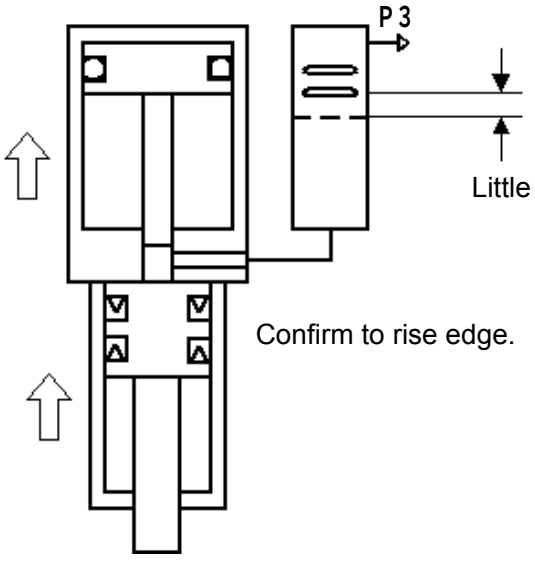


Illustration－1

CAUTION

Trouble
If it pour in the oil above the oil level, oil spouts from P3.

Action
Discharge the oil to the proper level.

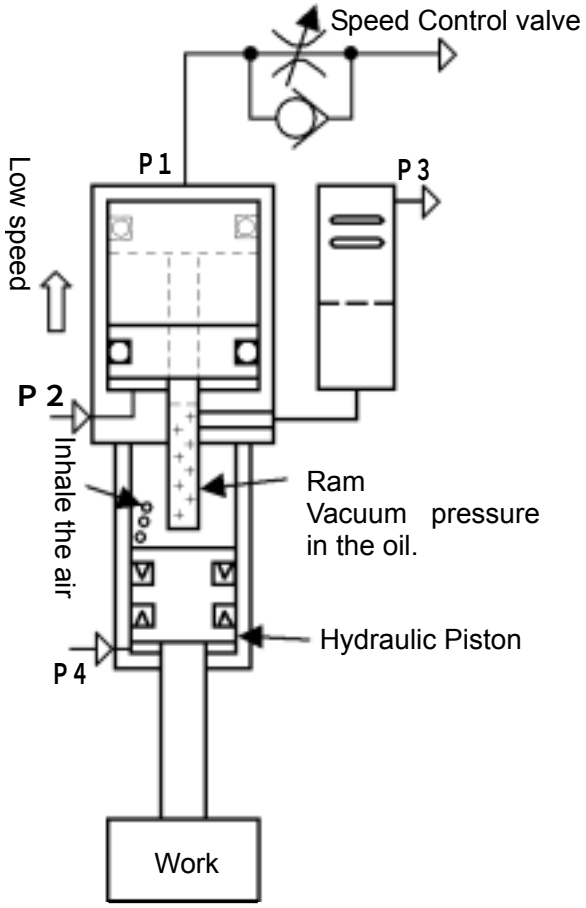


Illustration－2

CAUTION

Trouble
If oil little than the lower limit of oil level, oil spouts from P3 by oil contains bubbles.
Maybe high thrust is not produced because squeeze the bubbles while high thrust feed.

Action
Check the oil level, and refill it.



Illustration－3

CAUTION

Trouble

When the high thrust feed return, switch to the valves return at the same time too the fast feed. If P1 exhaust is quick, oil become for vacuum pressure to ram return speed fast than the hydraulic piston. In this case, oil spouts from P3 by oil contains bubbles to inhale the air inside of P4.

Maybe high thrust is not produced because squeeze the bubbles while high thrust feed.

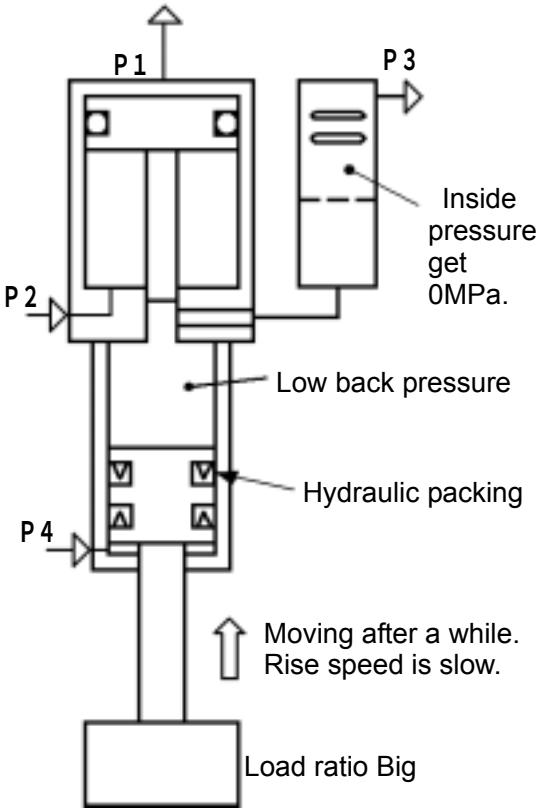
Action

Use the P1 for exhaust throttling with speed control valve.

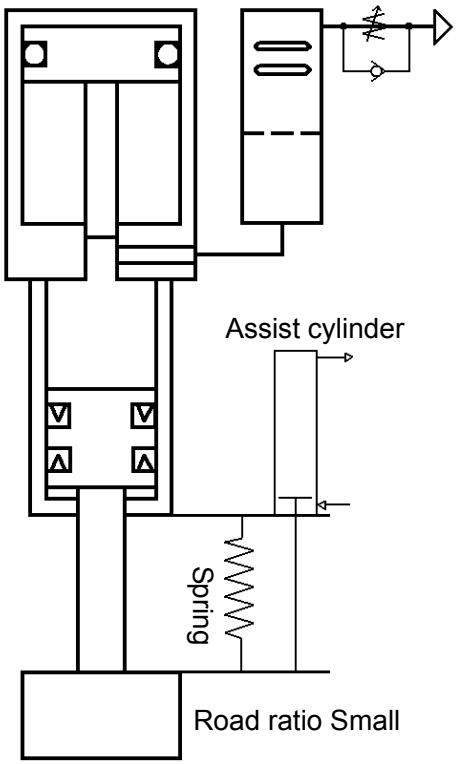
Adjustment(return drive)

When cylinder return to press the speed control valve, high thrust stroke is slowly. After that cylinder return fast. Open the speed control valve little and little from this condition, high thrust feed return fast little and little. So speed of high thrust feed and fast feed are same speed condition, it is a maximum open for speed control valve.

Don’t open more than this condition, oil become for vacuum pressure.



Illustration－4



Illustration－5

CAUTION

Trouble

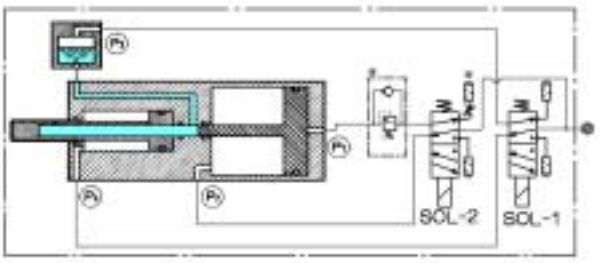
When rise speed is slow or moving after a while to big load ratio, low back pressure in the oil by exhausted inside P3.So oil spouts from P4 to hydraulic packing week strain.

Action(Illustration-5 reference)

1. Down for load ratio.
2. Rise with spring or assist cylinder.
3. Higher supply air.

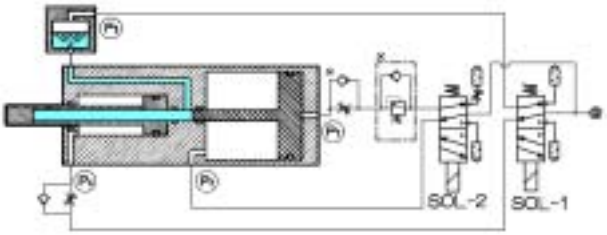
Air Piping Application Examples

PCSV*
PCHV*



*To use a reduced high thrust, install a pressure reducing valve. (This prevents a drop in the return thrust.) A sandwich regulator can be pre-installed and should be specified at the time of ordering.
*The silencer with needle valve is installed at the position shown in the illustration, in order to prevent a vacuum from being generated inside the oil.

PCM
PCS
PCH



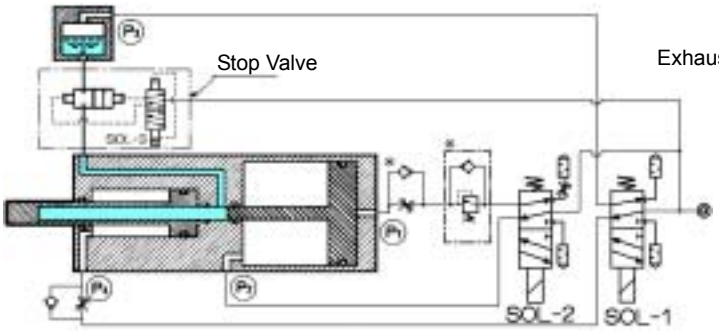
*To use a reduced high thrust, install a pressure reducing valve. (This prevents a drop in the return thrust.)
*The speed controller is installed in the orientation shown in the illustration, in order to prevent a vacuum from being generated inside the oil.

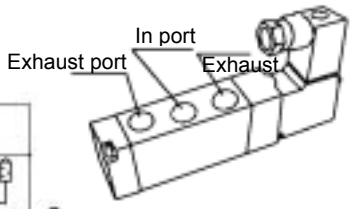
("circle mark" indicates supply, "cross mark" indicates exhaust.)

Drive Condition	SOL-1	SOL-2	P1	P2	P3	P4	Progress Condition
Stop	Non-Excitin g	Non-Excitin g	×	○	×	○	Condition shown in illustration.
Air Thrust Stroke Drive	Exciting	Non-Excitin g	×	○	○	×	Advance at fast speed.
High Thrust Stroke Drive	Exciting	Exciting	○	×	○	×	Advance at high thrust.

Air Piping Application Examples

With StopValve
PCH……V*　PCS……V*





*To use a reduced high thrust, install a pressure reducing valve. (This prevents a drop in the return thrust.)
*The speed controller is installed in the orientation shown in the illustration, in order to prevent a vacuum from being generated inside the oil.

Intermediate Stop Method (Emergency Stop, Inching)

("circle mark" indicates supply, "cross mark" indicates exhaust.)

Drive Condition	SOL-1	SOL-2	SOL-3	P1	P2	P3	P4	Progress Condition
Stop	Non-Exciting	Non-Exciting	Non-Exciting	×	○	×	○	Condition shown in illustration.
Air Thrust Stroke Drive	Exciting	Non-Exciting	Exciting	×	○	○	×	Advance at fast speed.
Intermediate Stop	Non-Exciting	Non-Exciting	Non-Exciting	×	○	×	○	Intermediate stop.
High Thrust Stroke Drive	Exciting	Exciting	Exciting	○	×	○	×	Advance at high thrust.
Return Drive	Non-Exciting	Non-Exciting	Exciting	×	○	×	○	Return at fast speed.

High thrust stroke will not stop.

Continuous Operating Method for High Thrust Stroke Only

("circle mark" indicates supply, "cross mark" indicates exhaust.)

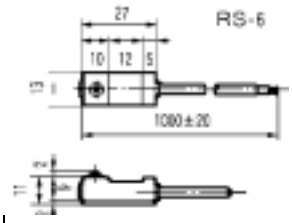
Drive Condition	SOL-1	SOL-2	SOL-3	P1	P2	P3	P4	Progress Condition
Machine Stop	Non-Exciting	Non-Exciting	Non-Exciting	×	○	×	○	Condition shown in illustration.
Air Thrust Stroke Drive	Exciting	Non-Exciting	Exciting	×	○	○	×	Advance at fast speed.
High Thrust Stroke Drive	Exciting	Exciting	Exciting	○	×	○	×	Advance at high thrust.
High Thrust Stroke Return Drive	Non-Exciting	Non-Exciting	Non-Exciting	×	○	×	○	High Thrust + α Stroke Advance[Note 1]
High Thrust Stroke Drive	Non-Exciting	Exciting	Non-Exciting	○	×	×	○	α + High Thrust Advance[Note 1]
Return Prior to Machine Stop	Non-Exciting	Non-Exciting	Exciting	×	○	×	○	Return to condition shown in illustration.

Switch

Contact Switch		
Model No.	RS-6	
Voltage	DC24V	AC100V／200V
Maximum Load Current	25mA	25mA
Maximum Contact Capacity	0.6W	5VA
Average Operating Time	1mSEC	
Contact Point Contact Resistance	150 m Ω or less (excluding leader resistance)	
Impact Resistance	30G	
Working Temperature Range	-10 to 65°C (freezing not allowed)	
Lead Wire	Two-core cable, 1 m (DC: Brown is positive (+), Blue is negative (-)	
Indicating Lamp	LED (Lit to indicate ON)	

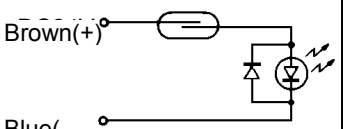
Handling Method for Contact Switch

Outside Shape Dimensions for Contact Switch, Contact Point Internal Circuit



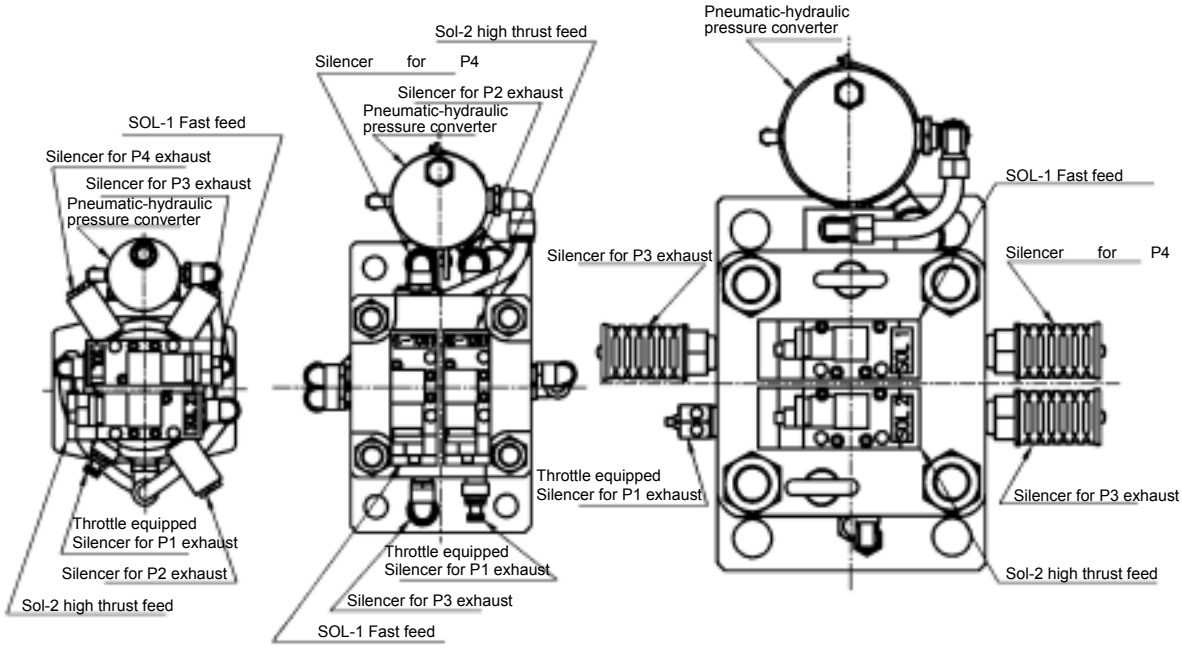
Contact Protection Circuit

RS-6 : AC100V,200V



Point for work PCHV*,PCSV* type (Solenoid valve equipped)

Since the PCHV* PCSV* type are equipped with two solenoid valves, they can operate simply by connecting the main pressure source and electric wires.

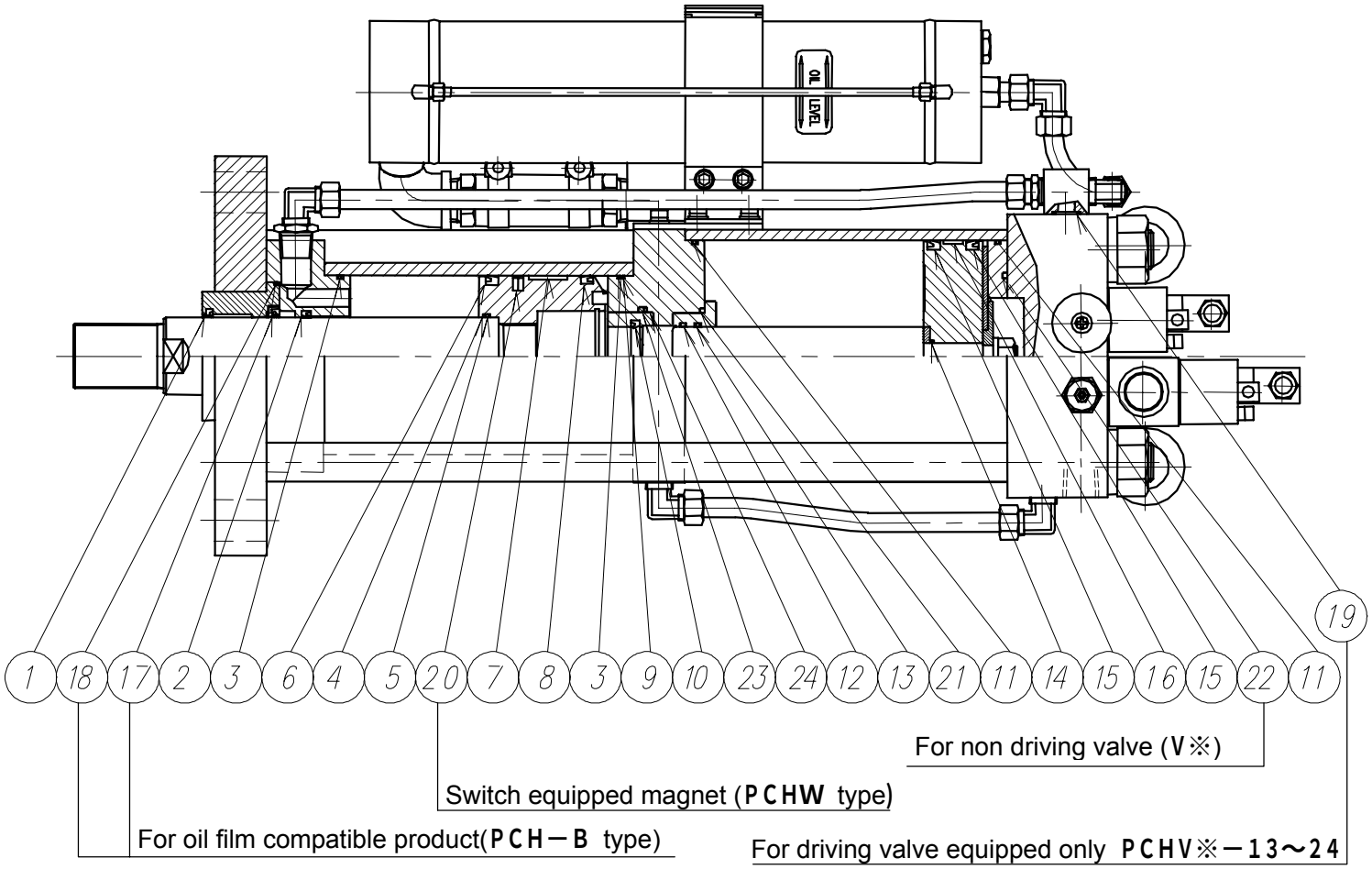


PCSV* See from upside

PCHV*－13～24 See from upside

PCHV*－03～08 See from upside

PCH Packing List

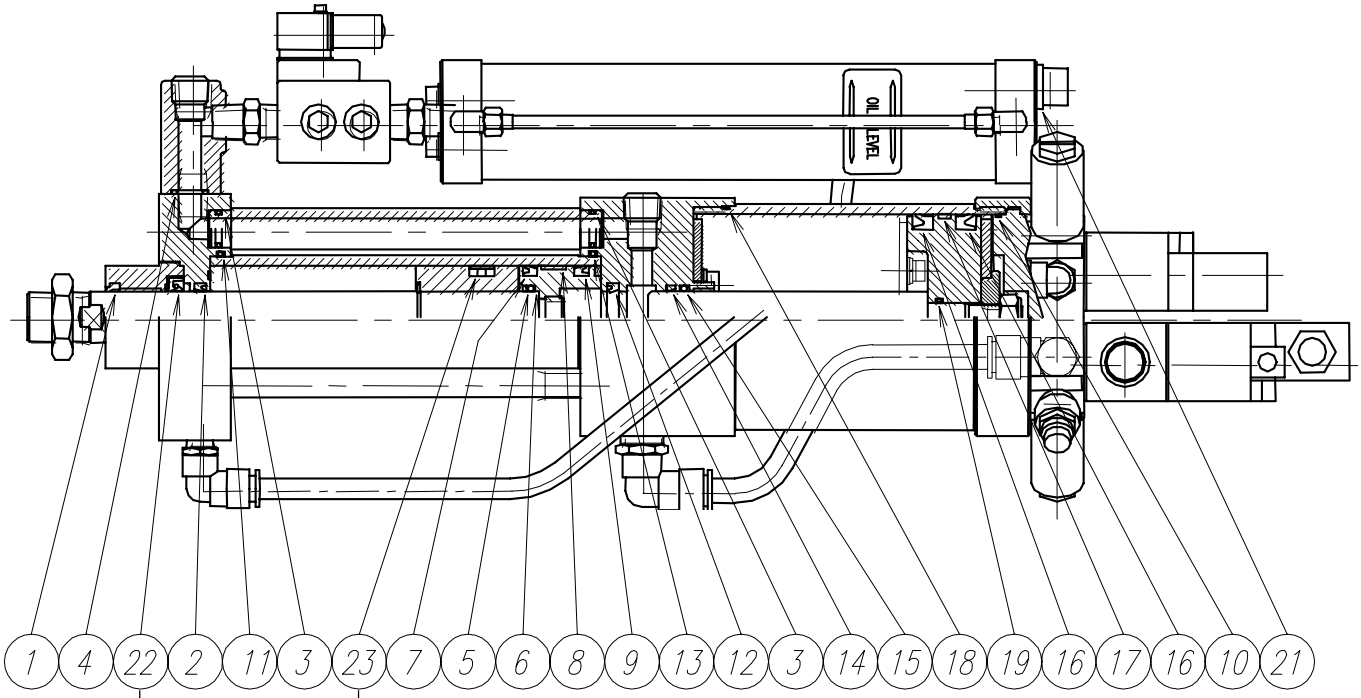


No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Name	Dust seal	Y packing	O ring	Back up ring	O ring	O ring	Wear ring	Y packing	Back up ring	Y packing	O ring	Penta seal	O ring	O ring	Y packing	Wear ring	Oil seal	O ring	O ring	magnet	O ring	O ring	O ring	Back up ring
PCH-03	LBI 40	ISI 40.50.6	G75	P40	P40	PGY 80	SW 80	UHP 80	G75	ISI 40.50.6	G120	PS-40	P40	P20	PSD 125	SWA 125	TB4 40.55.9	G75			G60	G70		
PCH-06	LBI 40	ISI 40.50.6	G75	P40	P40	PGY 80	SW 80	UHP 80	G75	ISI 30.40.6	G120	PS-30	P30	P20	PSD 125	SWA 125	TB4 40.55.9	G75			G60	G70	P-44	BR 44
PCH-08	LBI 40	ISI 40.50.6	G75	P40	P40	PGY 80	SW 80	UHP 80	G75	IDI 25.40.10	G120	PS-25	P25	P20	PSD 125	SWA 125	TB4 40.55.9	G75			G60	G70	P-44	BR 44
PCH-13	DR 60	ISI 60.70.6	G120	G60	G60	PGY 125	SW 125	UHP 125	G120	ISI 45.55.6	1517 #39	PS-45	P45	P20	PGY 180	SWA 180	TB4 60.78.9	G90	P18					
PCH-17	DR 60	ISI 60.70.6	G120	G60	G60	PGY 125	SW 125	UHP 125	G120	IDI 40.56.12	1517 #39	PS-40	P40	P20	PGY 180	SWA 180	TB4 60.78.9	G90	P18					
PCH-24	DR 60	ISI 60.70.6	G120	G60	G60	PGY 125	SW 125	UHP 125	G120	IDI 34.50.12	1517 #39	PS-34	P34	P20	PGY 180	SWA 180	TB4 60.78.9	G90	P18					
PCH-35	DSI 90.100.6	ISI 90.105.9	P140	G90	G90	PGY 150	SW 150	UHP 150	P140	IDI 34.50.12	1517 #39	PS-34	P34	P20	PGY 180	SWA 180	TB4 90.115.14	G125						
PCH-44	DSI 90.100.6	ISI 90.105.9	P140	G90	G90	PGY 150	SW 150	UHP 150	P140	IDI 30.45.10	1517 #39	PS-30	P30	P20	PGY 180	SWA 180	TB4 90.115.14	G125						
Pieces	1	1	2	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	2		1	1	1	1

1 pieces use for PCH-03～08 type

Note) Standard Packing Set is from No1 to No16. From No17 to No24 sell separate.

PCS Packing List



Switch equipped magnet (PCSW type)

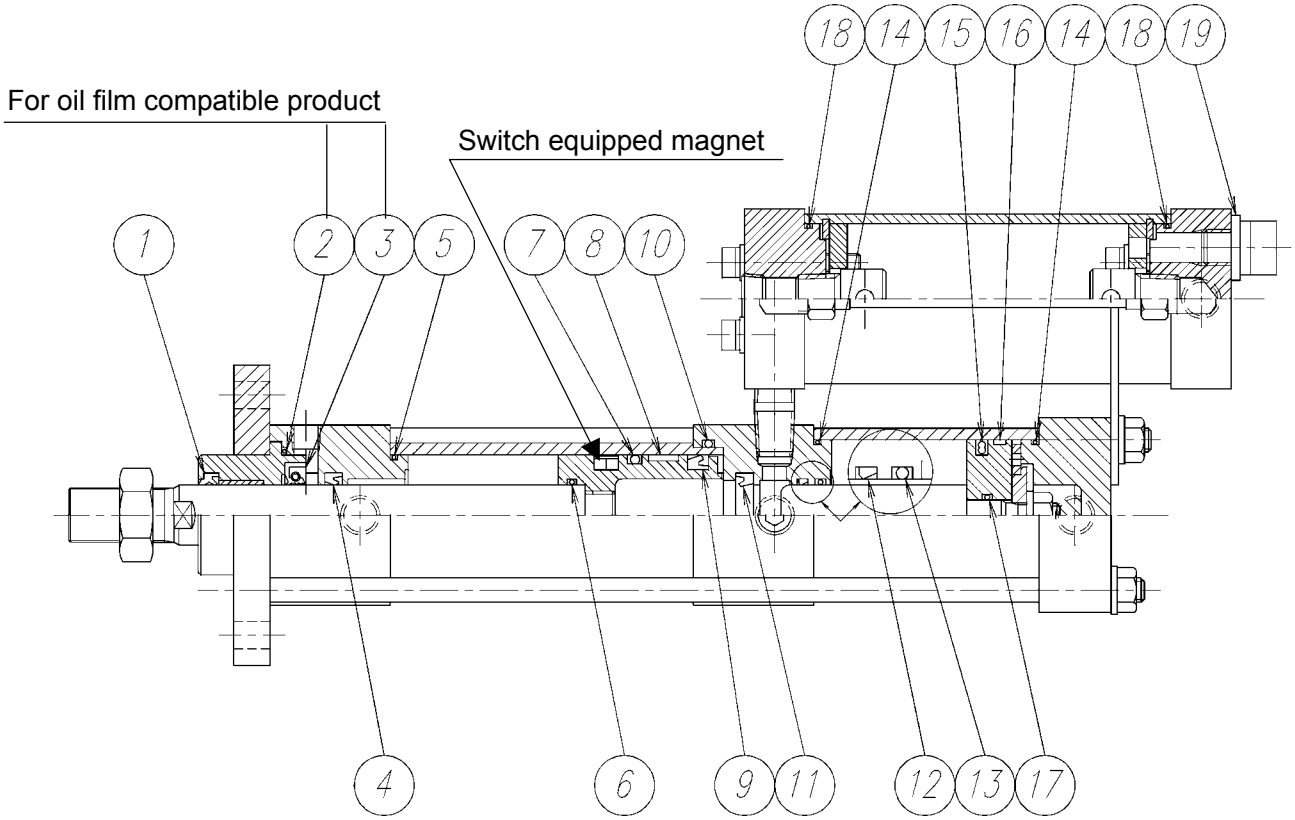
For oil film compatible product(PCS－B type)

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	22	23
Name	Dust seal	Y packing	O ring	O ring	Backup ring	O ring	Y packing	Wear ring	Y packing	O ring	O ring	Y packing	O ring	Penta seal	O ring	Piston packing	Wear ring	O ring	O ring	Seal washer	Oil seal	W type magnet
PCS－02	SFR 25	ISI 25.33.5	P－14	P－14	P－25	P－25	PGY 50	SW 50	UHP 50	S－95	G－60	ISI 25.33.5	G－60 90°	PS 25	P－25	PGY 100	SWB 100	S 105	P－14	TSW 12	TB4 25.40.8	
PCS－04	SFR 25	ISI 25.33.5	P－14	P－14	P－25	P－25	PGY 50	SW 50	UHP 50	S－95	G－60	ISI 18.26.5	G－60 90°	PS 18	P－18	PGY 100	SWB 100	S 105	P－14	TSW 12	TB4 25.40.8	
Pieces	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	

4 pieces use for driving valve equipped only （PCSV型）

Note) Standard Packing Set is from No1 to No19. No21 and No22 sell separate.

PCM Packing List



No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Name	Dust seal	O ring	Oil seal	Rod packing	O ring	O ring	O ring	Wear ring	Piston packing	O ring	Rod packing	Penta seal	O ring	O ring	Piston packing	Wear ring	O ring	O ring	Seal washer
PCM−005	SDR 20	S 20	TB4 20.35.7	PNY 20	S 36	P 20	P 34	SW 40	OSI 40.30.6	G 45	ISI 20.28.5	PS 20	P 20	S 46	PSD 50	SWB 50	P 10A	S 46	TSW 12
PCM−01	SDR 20	S 40	TB4 20.35.7	PNY 20	S 36	P 20	P 34	SW 40	OSI 40.30.6	G 45	IDI 14.22.5	PS 14	P 14	S 46	PSD 50	SWB 50	P 10A	S 46	TSW 12
Pieces	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1

If you have any questions or trouble with the performance or quality of products, please contact us or a sales agent.

Pneumatic Booster, Power Pack Cylinder, Rash Booster, Pneumatic Power Cylinder
Sel-Lock Cylinder, New Nonguide Cylinder, Reduction Valve, Auto Clamper, Swing Clamp

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