High Thrust Air Cylinder

PNEUMATIC POWER CYLINDER

Substantially increased thrust achieved by integrating a hydraulic cylinder and an air–hydro booster into a single unit.

HIROTAKA MFG. CO.,LTD.

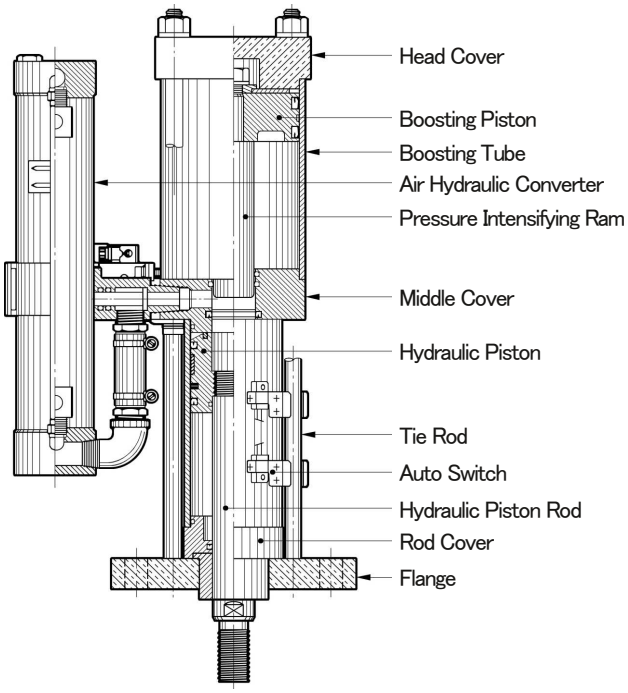
High Thrust Air Cylinder

PNEUMATIC POWER CYLINDER

Achieve high-power output exceeding 20 tons with an air-only supply.
Our unique internal design enables high speed operation.

Overview

The Pneumatic Power Cylinder is a booster-integrated air cylinder that combines rapid operation with high thrust performance, utilizing an original air hydraulic conversion mechanism powered by compressed air.
The cylinder operates at high speed with thrust equivalent to a standard pneumatic cylinder during non-loading strokes.
For working strokes, it delivers high-power operation with thrust ranging from 5 to 440 kN.
Systems for press-fitting, clinching, cutting, crimping, bending, marking, punching, and clamping can be easily constructed using a simple pneumatic circuit.

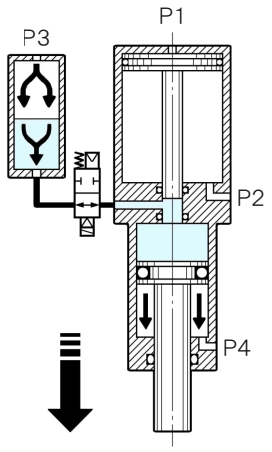


Feature

❶ Delivers high thrust from 1 to 440 kN powered solely by compressed air.
❷ Custom long stroke can be manufactured to meet your needs. (100 mm or more)
❸ Our unique internal design enables high speed operation. (200 mm at 0.5 seconds or less)
❹ Simple structure ensures trouble free operation.
❺ Can be controlled using only pneumatic valves.
❻ Thrust can be adjusted steplessly by changing the air pressure.
❼ Auto Switch equipped model
(Symbol : PCMW, PCSW, PCHW)
While the standard model uses proximity sensors or limit switches for position detection, the auto switch equipped model simplifies this process with auto switches mounted directly on the hydraulic cylinder.
❽ Solenoid valve equipped model
(Symbol : PCMV∗, PCSV∗, PCHV∗)
Equipped with solenoid valves, the unit only requires a compressed air supply for operation, significantly
❾ reducing installation time and effort.
Solenoid valve and auto switch equipped model
(Symbol : PCMV∗W, PCSV∗W, PCHV∗W)
The integration of solenoid valves and auto switches
❿ makes this unit extremely easy to operate and install.
Optional attachments for control valve models include spacer type regulators for thrust control
⓫ and safety valves to prevent dropping upon loss of air pressure.
Stop valve equipped model (Symbol : V∗)
Capable of instant mid stroke stopping for emergency stop and inching operation.
(Compatible with top dead center adjustments and high thrust stroke cycling.)

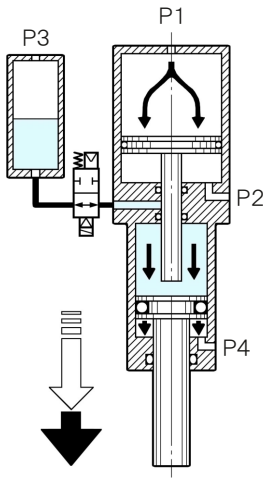
Structure and Operating Principle

Pneumatic Thrust Stroke



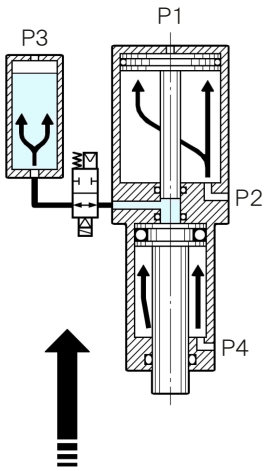
When air is supplied to the P3 port, the oil inside the air–hydro converter reaches the same pressure as the air, and the hydraulic piston moves forward at rapid.

High Thrust Stroke



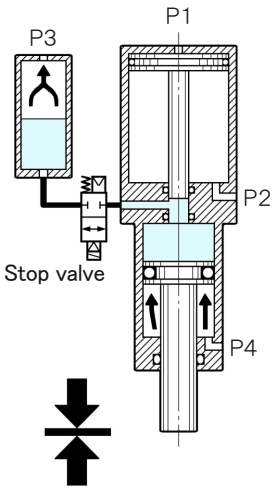
When air is supplied to the P1 port, the hydraulic pressure is boosted based on Pascal's Principle, driving the hydraulic piston forward with high thrust. The high thrust stroke can be switched at any position. For the models in Table 2, switch to high thrust only after the pneumatic stroke exceeds the specified value.

Return Stroke



When air is supplied to the P2 and P4 ports and other ports are exhausted, as the booster piston returns, the hydraulic piston simultaneously retracts at rapid return.

Intermediate Stop



If the stop valve is closed during rapid forward movement while simultaneously supplying air to P4 and exhausting P 3, the hydraulic piston will stop instantly. Simply closing the stop valve during rapid return will stop the hydraulic piston.

Applications
Emergency Stop / Inching
Changing the Top Dead Center

Scope of Standard Models

Table 1 All models are rod side flange mounting.
(Symbols : ○ = Standard model, △ = Semi-standard model)

		Total stroke	50 mm				100 mm				150 mm				200 mm				300 mm			
		High thrust stroke(mm)	5	10	15	20	5	10	15	20	5	10	15	20	5	10	15	20	5	10	15	20
		Maximum thrust																				
Miniature type	PCM −005	0.5 ton	○	○	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCMW−005	0.5 ton	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCM−01	1 ton	○	△	△	△	○	○	△	△	○	○	○	△	○	○	○	○	○	○	○	○
	PCS−02	2 ton	○	○	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCS−04	4 ton	○	△	△	△	○	○	△	△	○	○	○	△	○	○	○	○	○	○	○	○
Standard type	PCH−03	3 ton	△	△	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−06	6 ton	△	△	△	△	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−08	8 ton	△	△	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−13	13 ton	△	△	△	△	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−17	17 ton	△	△	△	△	○	○	△	△	○	○	○	△	○	○	○	○	○	○	○	○
	PCH−24	24 ton	△	△	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−35	35 ton	△	△	△	△	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	PCH−44	44 ton	△	△	△	△	○	○	○	△	○	○	○	○	○	○	○	○	○	○	○	○

Table 2 Minimum starting position of the high thrust stroke from the piston rod retracted position.

High thrust stroke		5 mm	10 mm	15 mm	20 mm
Miniature type	PCM−005	11	31	51	71
	PCM−01	32	73	114	155
	PCMW−005	0	11	31	51
	PCMW−01	12	53	94	135
	PCS−02	10	30	50	70
	PCS−04	30	70	100	140
Standard type	PCH−03	0	1	21	41
	PCH−06	0	36	72	108
	PCH−13	0	25	65	105
	PCH−17	10	60	110	160

Note

① Total stroke refers to the full operational range, including both the pneumatic thrust stroke and the high thrust stroke.

② The high thrust stroke can be switched at any position within the total stroke.
For the types listed in Table 2, the pneumatic thrust stroke must exceed the values specified in the table from the retracted position before switching to the high thrust stroke.
(To ensure the high thrust stroke)

Models other than those listed in the table.

PCH−35−1020	70 mm
PCH−35−1520	20 mm
PCH−44−1015	50 mm
PCH−44−1520	125 mm
PCH−44−2020	75 mm

③ Custom strokes are also available.
Contact us for further information.

④ As the overall length and other dimensions of semi-standard models differ from standard models, please refer to the tables in the external dimension drawings (P. 6–P. 10).

Specifications

Maximum thrust		0.5 ton	1 ton	2 ton	4 ton	3 ton	6 ton	8 ton	13 ton	17 ton	24 ton	35 ton	44 ton
Model		PCM005	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
Ram diameter		ϕ20	ϕ14	ϕ25	ϕ18	ϕ40	ϕ30	ϕ25	ϕ45	ϕ40	ϕ34	ϕ34	ϕ30
Pressure boosting ratio		1:6.25	1:12.7	1:16	1:30	1:9.76	1:17.3	1:25	1:16	1:20	1:28	1:28	1:36
Hydrauli cylinder diameter		ϕ40	ϕ40	ϕ50	ϕ50	ϕ80	ϕ80	ϕ80	ϕ125	ϕ125	ϕ125	ϕ150	ϕ150
Fluid		Air											
Proof pressure		1.5 MPa											
Operating pressure		Pneumatic thrust stroke : 0.3 to 0.7 MPa, Hgh thrust stroke : 0.1 to 0.7 MPa											
* Piston speed mm/s	Rapid 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

* Piston speed is measured at 0.5 MPa, with no load, during forward.
* Any brand of mineral based hydraulic oil can be used. (ISO VG 22 or VG 32)
* As with conventional hydraulic cylinders, avoid applying eccentric loads to the piston rod.
* Due to the design of air–hydro cylinders, a trace amount of oil seepage may occur during operation.
  Since leaked hydraulic oil is exhausted through ports P3 and P4, the installation of an exhaust cleaner is recommended for pneumatic valve exhaust.
  (Refer to page 13 for products with rod oil film remover specifications.)

Air Consumption

Unit : L

Maximum thrust	Model	Total stroke					High thrust stroke			
		50 mm	100 mm	150 mm	200 mm	300 mm	5 mm	10 mm	15 mm	20 mm
0.5 ton	PCM-005	1.3	2.0	2.6	3.3	4.6	1.1	1.5	2.0	2.4
1 ton	PCM-01	1.3	2.0	2.6	3.3	4.6	1.6	2.5	3.4	4.4
2 ton	PCS-02	1.8	2.8	3.8	5.3	7.3	4.9	6.7	8.5	10.3
4 ton	PCS-04	1.8	2.8	3.8	5.3	7.3	6.8	10.5	14.1	17.8
3 ton	PCH-03	4.7	7.3	9.9	12.6	17.8	8.8	11.5	14.3	17.1
6 ton	PCH-06	4.7	7.3	9.9	12.6	17.8	11.7	16.8	21.9	27.0
8 ton	PCH-08	4.7	7.3	9.9	12.6	17.8	16.7	24.5	32.4	40.2
13 ton	PCH-13	10.7	17.1	23.6	30.0	42.9	28.4	40.1	51.8	63.5
17 ton	PCH-17	10.7	17.1	23.6	30.0	42.9	34.4	49.2	63.9	78.6
24 ton	PCH-24	10.7	17.1	23.6	30.0	42.9	40.6	61.4	82.1	103.0
35 ton	PCH-35	15.2	23.8	32.4	41.0	58.2	58.5	88.1	118.0	148.0
44 ton	PCH-44	15.2	23.8	32.4	41.0	58.2	68.5	106.0	143.0	180.0

Note)
These values represent the theoretical air consumption converted to atmospheric pressure for one full cycle at a supply pressure of 0.5 MPa.

Example)
The air consumption for PCH-03-1005
Model : PCH-03
Total stroke 100 mm : 7.3 L
High thrust stroke 5 mm : 8.8 L

Therefore, the total air consumption for one full cycle : 7.3 L + 8.8 L = 16.1 L

Thrust Table

Unit : N
(Theoretical value)

Thrust	Direction	Air Pressure (MPa)	Miniature type				Standard type							
			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 thrust	Forward	0.3	370	370	580	580	1,500	1,500	1,500	3,680	3,680	3,680	5,300	5,300
		0.4	500	500	780	780	2,010	2,010	2,010	4,900	4,900	4,900	7,060	7,060
		0.5	620	620	980	980	2,510	2,510	2,510	6,130	6,130	6,130	8,830	8,830
		0.6	750	750	1,170	1,170	3,010	3,010	3,010	7,360	7,360	7,360	10,600	10,600
		0.7	870	870	1,370	1,370	3,510	3,510	3,510	8,590	8,590	8,590	12,370	12,370
	Return	0.3	280	280	440	440	1,130	1,130	1,130	2,830	2,830	2,830	3,390	3,390
		0.4	370	370	580	580	1,500	1,500	1,500	3,770	3,770	3,770	4,520	4,520
		0.5	470	470	730	730	1,880	1,880	1,880	4,720	4,720	4,720	5,650	5,650
		0.6	560	560	880	880	2,260	2,260	2,260	5,660	5,660	5,660	6,780	6,780
		0.7	650	650	1,030	1,030	2,630	2,630	2,630	6,610	6,610	6,610	7,910	7,910
High thrust	Forward only	0.1	780	1,600	3,140	6,060	4,900	8,720	12,560	19,630	24,850	34,390	49,520	63,610
		0.2	1,570	3,200	6,280	12,120	9,810	17,450	25,130	39,260	49,700	68,790	99,050	127,230
		0.3	2,350	4,800	9,420	18,180	14,720	26,170	37,690	58,900	74,550	103,180	148,580	190,850
		0.4	3,140	6,410	12,560	24,240	19,630	34,900	50,260	78,530	99,400	137,580	198,110	254,460
		0.5	3,920	8,010	15,700	30,300	24,540	43,630	62,830	98,170	124,250	171,970	247,640	318,080
		0.6	4,710	9,610	18,840	36,360	29,450	52,350	75,390	117,800	149,100	206,370	297,170	381,700
		0.7	5,490	11,210	21,990	42,420	34,360	61,080	87,960	137,440	173,950	240,760	346,700	445,320

Note 1) For vertical operation, ensure that the weight of jigs, dies, or other loads is kept below 50% of the Pneumatic thrust (Extension or Retraction) value, depending on the rod's direction of movement, to maintain stable operation and speed.
Note 2) To ensure stable operation and speed, the high thrust load should be kept below 70% of the High thrust value.
Note 3) For the model with Rod oil film scraper (Symbol : B), subtract 70 from the thrust values shown in the table.

How to Order

PCS V1 W - 02 - 05 05 - 3 - H2ME - V1 - B - R T - G - S2

Symbol	Series
PCM	Miniature type
PCS	
PCH	Standard type

Symbol	Operating valve
Nil	Without valve
V1	With 100 VAC
V2	With 200 VAC
V3	With 24 VDC

PCH-35/44
Without valve only.

Symbol	With auto switch (Built-in magnet)
Nil	Without magnet
W	Magnet sensing

Symbol	Maximum thrust (at 0.7 MPa)
PCM	
005	0.5 ton
01	1 ton
PCS	
02	2 ton
04	4 ton
PCH	
03	3 ton
06	6 ton
08	8 ton
13	13 ton
17	17 ton
24	24 ton
35	35 ton
44	44 ton

Symbol	Total stroke
05	50 mm
10	100 mm
15	150 mm
20	200 mm
30	300 mm

Symbol	High thrust stroke
05	5 mm
10	10 mm
15	15 mm
20	20 mm

Symbol	Number of Auto switches
1	1 pc.
2	2 pcs.
3	3 pcs.
N	"N" pcs.

Symbol	Rod oil film scraper
Nil	Without scraper
B	With scraper

Symbol	Stop valve
Nil	Without stop valve
V1	With 100 VAC
V2	With 200 VAC
V3	With 24 VDC

Symbol	Auto switch types
Nil	Read auto switch
H2ME	Solid state auto switch

Symbol	Regulator for high thrust
Nil	Without regulator
R	With regulator

Only selectable model with operating valve. Selectable for all PCM models.

Symbol	Speed controller
S2	High thrust speed
S3	Return speed
S4	Rapid forward speed

Only selectable model with operating valve.
Multiple selection available
Example : S 234

Symbol	Oil pressure gauge
Nil	Without pressure gauge
G	MPa indication
GX	MPa-kN indication

For hydraulic pressure sensors, see "Accessories" on the separate sheet.

Symbol	Drop prevention valve
Nil	Without valve
T	With valve

Only selectable model with operating valve. Cannot be selected for PCM type.

How to Select the Model

❶ Determine the model that provides the required high thrust.
Example: If a thrust of 43,000 N is required at 0.5 MPa, refer to the thrust table and select PCH-08, which outputs 62,830 N at 0.5 MPa.

❷ Determine the total stroke required for the operation.
Example: If a 70 mm clearance is required between the punch and the workpiece for loading and unloading, set the total stroke to 100 mm to provide an adequate safety margin.

❸ Determine the high thrust stroke.
Example: For a bushing press fitting operation with a height of 2 mm, set the stroke to 3 mm (allowing for a 50% margin) and select the closest available stroke of 5 mm.
As a result, the selected model code is PCH-08-1005.

Required Oil Quantity

Unit : liter

Model	Total stroke	Required quantity
PCM-005, 01	05	0.20
	10	0.30
	15	0.40
	20	0.45
	30	0.55
PCH-03, 06, 08	10	1.00
	15	1.60
	20	1.90
	30	2.50
PCH-13, 17, 24	10	2.70
	15	3.40
	20	4.10
	30	6.20
PCH-35, 44	10	3. 80
	15	4.70
	20	5.60
	30	7.40

Model	Total stroke	Required quantity
PCS-02, 04	05	0.35
	10	0.45
	15	0.55
	20	0.75
	30	0.95

◆ Hydraulic fluid

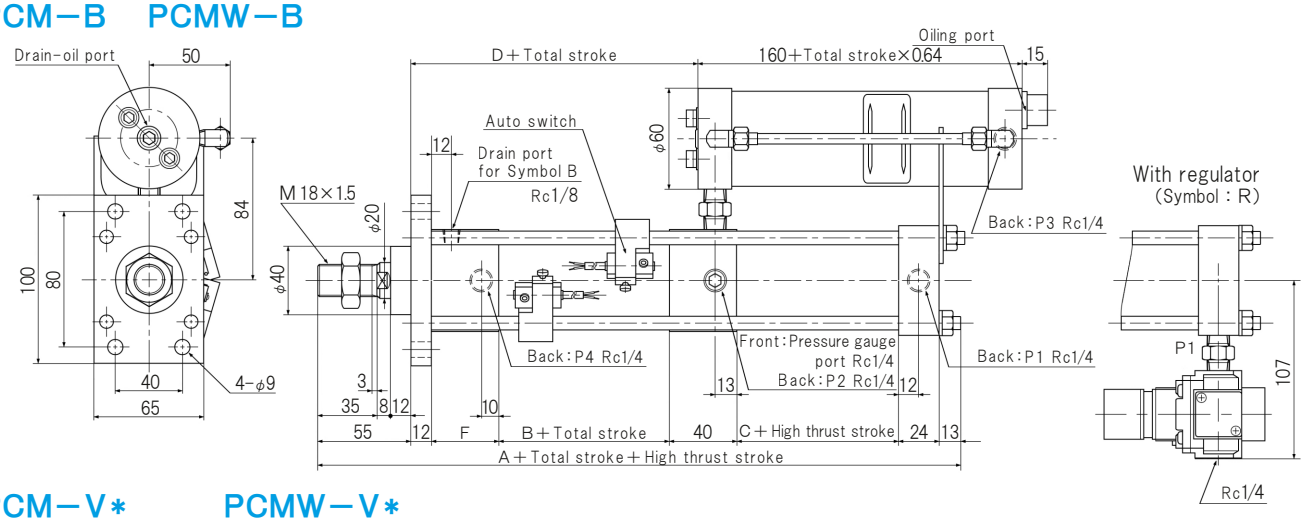
Oil brand, Model and Viscosity

Oil brand	Model ・ Viscosity
Royal Dutch Shell	Tellus S2V 22 or 32
Exxon Mobil	DTE 22 or 24

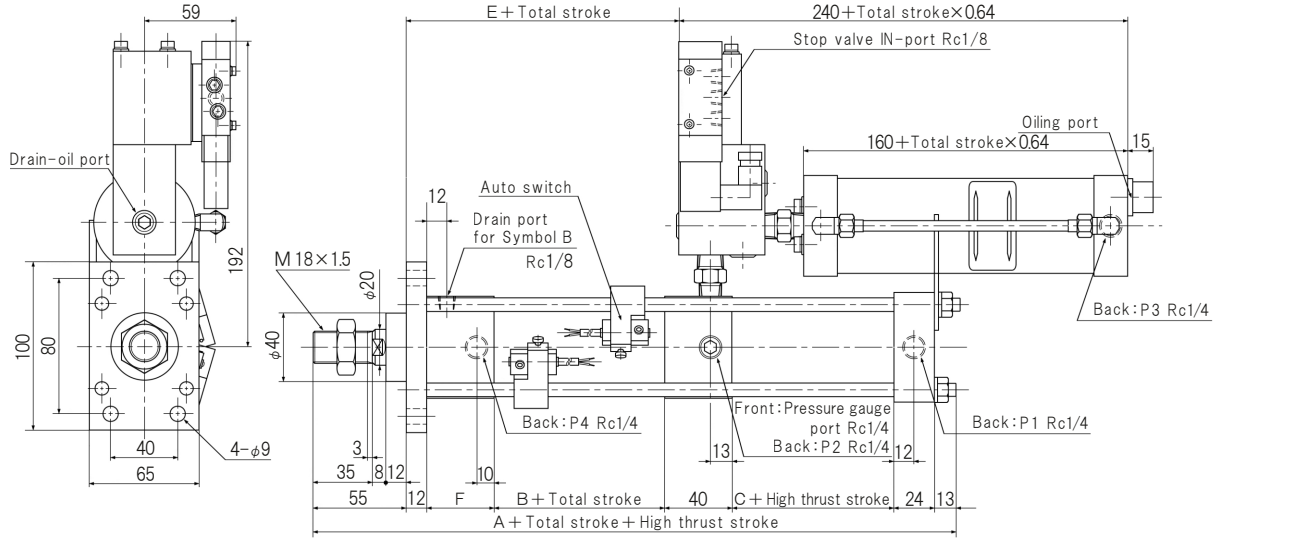
Hydraulic fluid : Standard mineral hydraulic fluid
ISO viscosity grade : VG 22 or 32
Note) The product is shipped without oil.
Please prepare the specified oil separately.
However, oil is pre-filled only for PCM and PCS models.

Dimensions

PCM　PCMW
PCM−B　PCMW−B



PCM−V∗　PCMW−V∗
PCM−V∗−B　PCMW−V∗−B



(Unit:mm)

Model \ Symbol	A	B	C	D	E	F
PCM −005	253	31	55	83	73	23
PCMW−005	273	51	55	103	93	23
PCM −005−B	270	31	55	100	90	40
PCMW−005−B	290	51	55	120	110	40

(Unit:mm)

Model \ Symbol	A	B	C	D	E	F
PCM −01	253	31	55	83	73	23
PCMW−01	273	51	55	103	93	23
PCM −01−B	270	31	55	100	90	40
PCMW−01−B	290	51	55	120	110	40

Replace "Stroke" in the dimensions with the values listed below. (Unit:mm)

Model \ Symbol	Total stroke					High thrust stroke			
	05	10	15	20	30	05	10	15	20
PCM−005	50	100	150	200	300	20	40	60	80
PCM−01	50	100	150	200	300	41	82	123	164

Note)
PCM−005 and 01 models come equipped with a rod end nut.

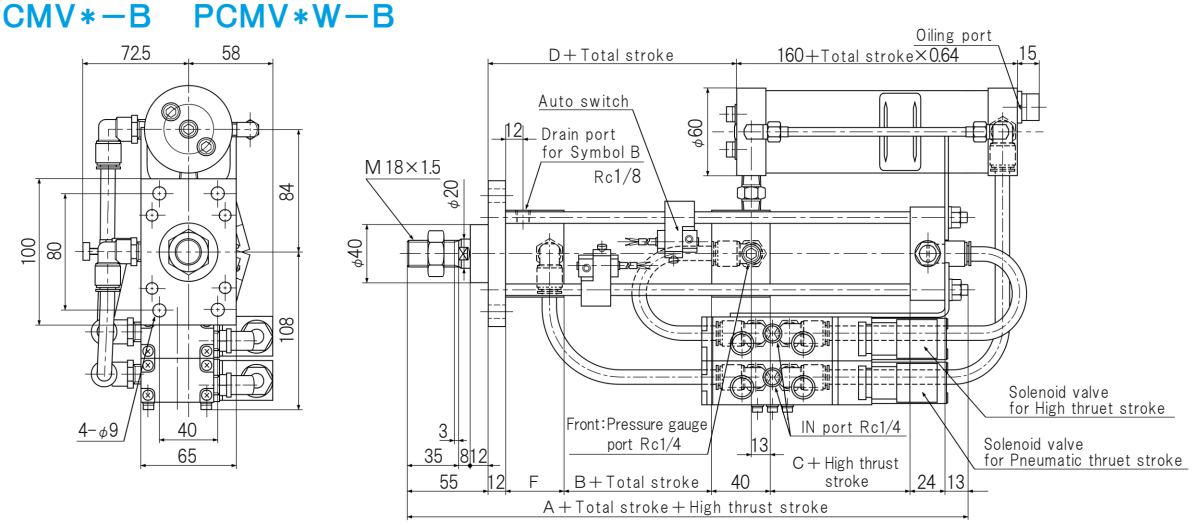
Overall length dimensions for semi-standard models and minimum starting position of the high thrust stroke from the piston rod retracted position.

The following semi-standard models have the same overall length as the standard models with the same total length.
The pneumatic thrust stroke must exceed the values specified in the table from the retracted position before switching to the high thrust stroke.

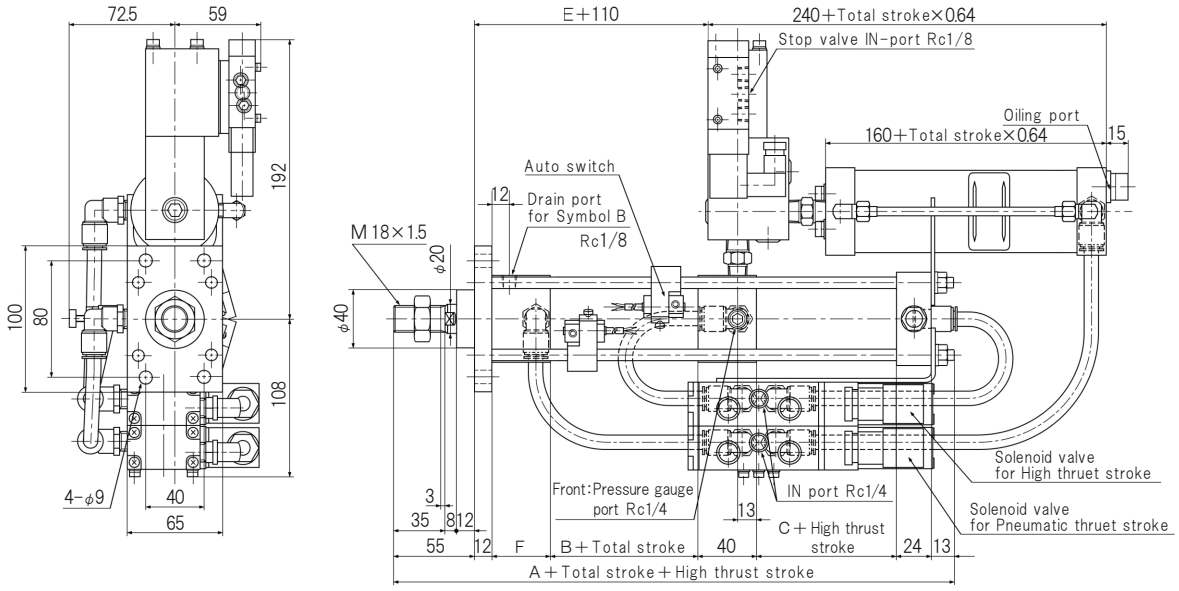
Model	005-0515	005-0520	01-0510	01-0515 01-1015	01-0520 01-1020 01-1520	W-005-0520	W-01-0510	W-01-0515 W-01-1015	W-01-0520 W-01-1020 W-01-1520
Same overall length model	005-1015	005-1020	01-1010	01-1515	01-2020	W-005-1020	W-01-1010	W-01-1515	W-01-2020
Pneumati thrust stroke	1	21	23	14 64	5 55 105	1	3	0 44	0 35 85

Dimensions

PCMV* PCMV*W
PCMV*−B PCMV*W−B



PCMV*−V* PCMV*W−V*
PCMV*−V*−B PCMV*W−V*−B



(Unit : mm)

Model \ Symbol	A	B	C	D	E	F
PCMV* −005	253	31	55	83	73	23
PCMV*W−005	273	51	55	103	93	23
PCMV* −005−B	270	31	55	100	90	40
PCMV*W−005−B	290	51	55	120	110	40

(Unit : mm)

Model \ Symbol	A	B	C	D	E	F
PCMV* −01	253	31	55	83	73	23
PCMV*W−01	273	51	55	103	93	23
PCMV* −01−B	270	31	55	100	90	40
PCMV*W−01−B	290	51	55	120	110	40

Replace "Stroke" in the dimensions with the values listed below. (Unit : mm)

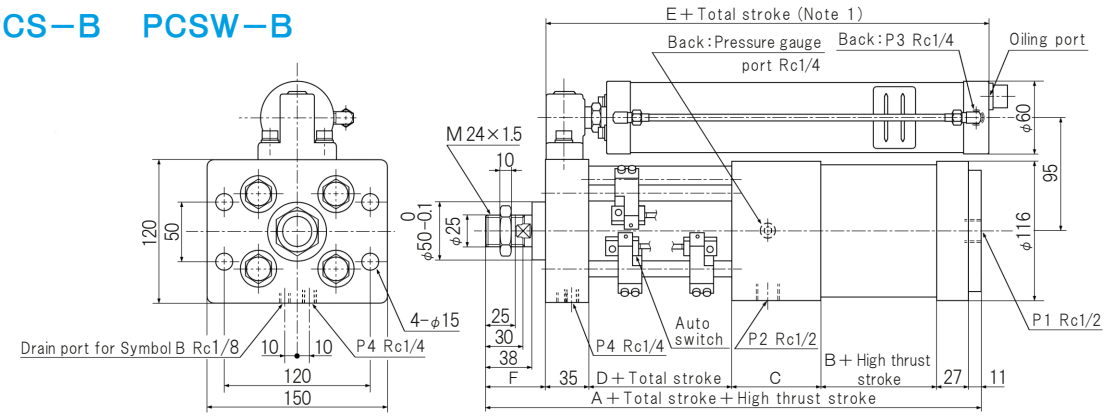
Model \ Symbol	Total stroke					High thrust stroke			
	05	10	15	20	30	05	10	15	20
PCM−005	50	100	150	200	300	20	40	60	80
PCM−01	50	100	150	200	300	41	82	123	164

Note) For semi−standard products, the overall length and the minimum high thrust switching position are consistent with the table on page 6.

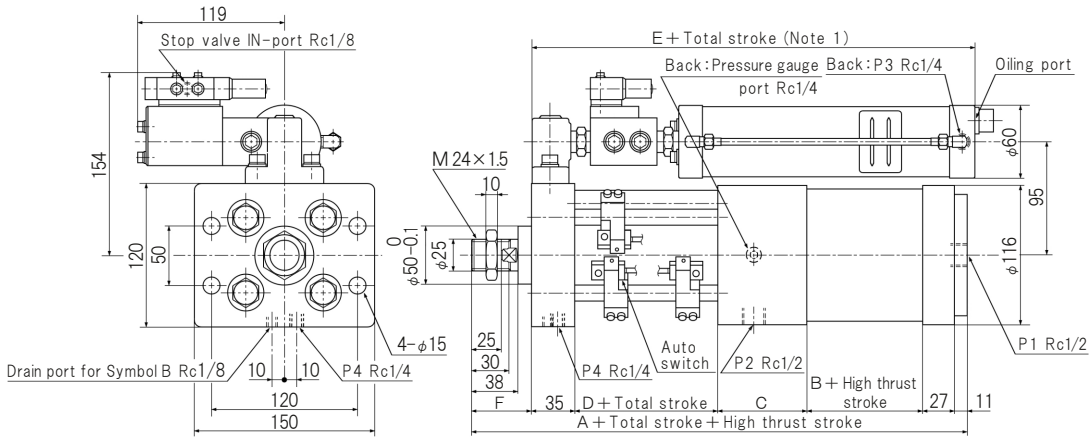
Note)
PCM−005 and 01 models come equipped with a rod end nut.

Dimensions

PCS　PCSW
PCS−B　PCSW−B



PCS−V*　PCSW−V*
PCS−V*−B　PCSW−V*−B



(Unit:mm)

Model \ Symbol	A	B	C	D	E	F
PCS −02	265	47	75	20	247	50
PCS −02−B	279	47	75	20	247	64
PCSW−02	315	47	75	70	247	50
PCSW−02−B	329	47	75	70	247	64
PCS −02−V*	265	47	75	20	327	50
PCS −02−V*−B	279	47	75	20	327	64
PCSW−02−V*	315	47	75	70	327	50
PCSW−02−V*−B	329	47	75	70	327	64

(Unit:mm)

Model \ Symbol	A	B	C	D	E	F
PCS −04	255	47	65	20	247	50
PCS −04−B	269	47	65	20	247	64
PCSW−04	305	47	65	70	247	50
PCSW−04−B	319	47	65	70	247	64
PCS −04−V*	255	47	65	20	327	50
PCS −04−V*−B	269	47	65	20	327	64
PCSW−04−V*	305	47	65	70	327	50
PCSW−04−V*−B	319	47	65	70	327	64

Replace "Stroke" in the dimensions with the values listed below. (Unit:mm)

Model \ Symbol	Total stroke					High thrust stroke			
	05	10	15	20	30	05	10	15	20
PCS−02	50	100	150	200	300	20	40	60	80
PCS−04	50	100	150	200	300	40	80	120	160

Note 1)
If the total stroke is 20 or more, it is calculated as (E + total stroke + 100).

Note)
PCS−02 and 04 models come equipped with a rod end nut.

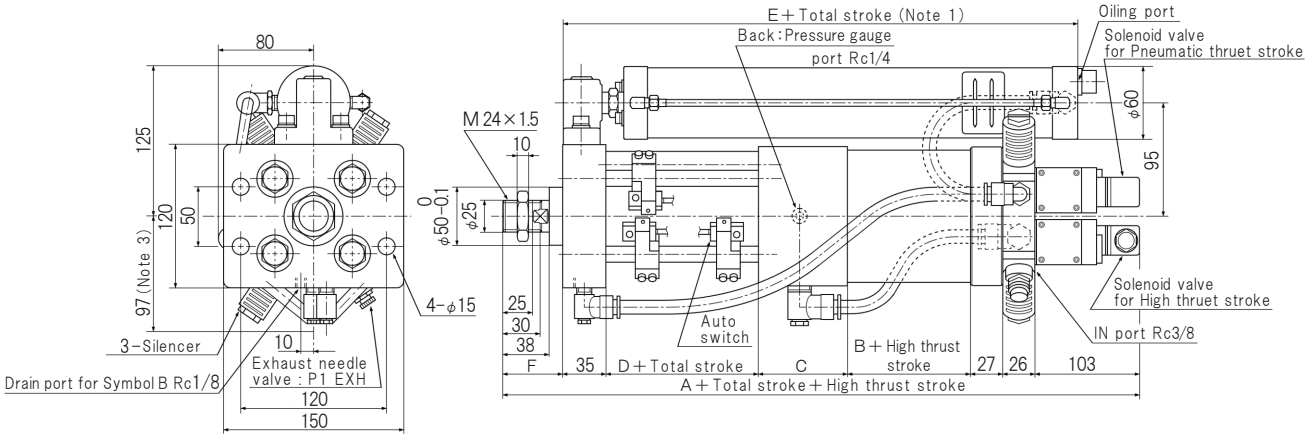
Overall length dimensions for semi-standard models and minimum starting position of the high thrust stroke from the piston rod retracted position.

The following semi-standard models have the same overall length as the standard models with the same total length.
The pneumatic thrust stroke must exceed the values specified in the table from the retracted position before switching to the high thrust stroke.

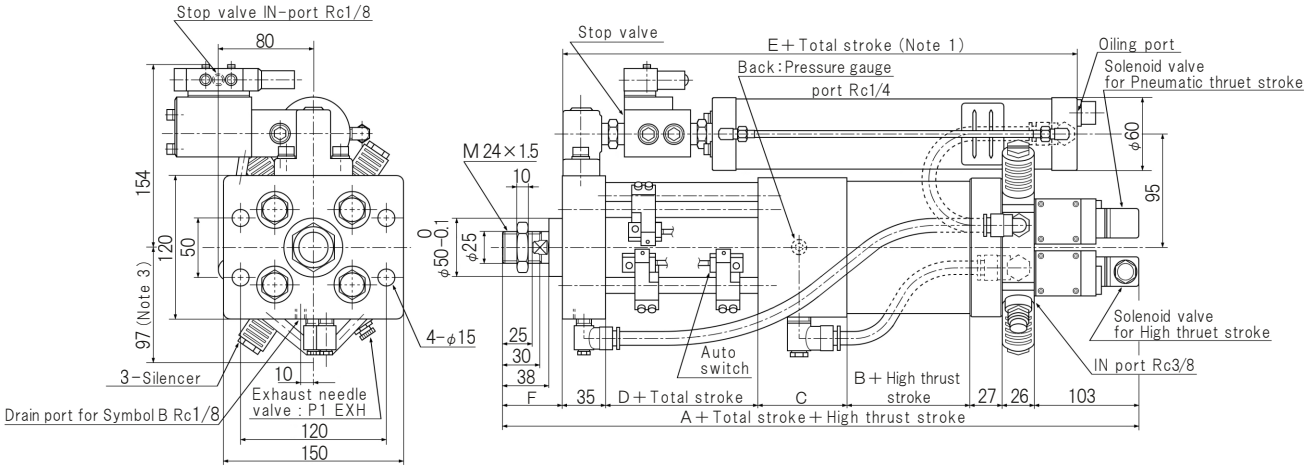
Model	02-0515	02-0520	04-0510	04-0515 04-1015	04-0520 04-1020 04-1520
Same overall length model	02-1015	02-1020	04-1010	04-1515	04-2020
Pneumati thrust stroke	0	20	20	0 50	0 40 90

Dimensions

PCSV∗　PCSV∗W
PCSV∗−B　PCSV∗W−B

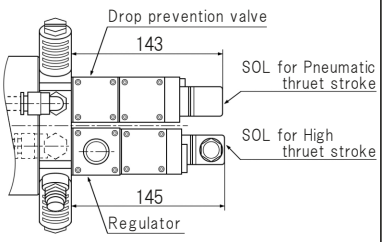


PCSV∗−V∗　PCSV∗W−V∗
PCSV∗−V∗−B　PCSV∗W−V∗−B



With drop prevention valve
(Symbol : T)

With regulator
(Symbol : R)



(Unit : mm)

Model \ Symbol	A	B	C	D	E	F
PCSV∗ −02	383	47	75	20	247	50
PCSV∗ −02−B	397	47	75	20	247	64
PCSV∗W−02	433	47	75	70	247	50
PCSV∗W−02−B	447	47	75	70	247	64
PCSV∗ −02−V∗	383	47	75	20	327	50
PCSV∗ −02−V∗−B	397	47	75	20	327	64
PCSV∗W−02−V∗	433	47	75	70	327	50
PCSV∗W−02−V∗−B	447	47	75	70	327	64

(Unit : mm)

Model \ Symbol	A	B	C	D	E	F
PCSV∗ −04	373	47	65	20	247	50
PCSV∗ −04−B	387	47	65	20	247	64
PCSV∗W−04	423	47	65	70	247	50
PCSV∗W−04−B	437	47	65	70	247	64
PCSV∗ −04−V∗	373	47	65	20	327	50
PCSV∗ −04−V∗−B	387	47	65	20	327	64
PCSV∗W−04−V∗	423	47	65	70	327	50
PCSV∗W−04−V∗−B	437	47	65	70	327	64

Replace "Stroke" in the dimensions with the values listed below. (Unit : mm)

Model \ Symbol	Total stroke					High thrust stroke			
	05	10	15	20	30	05	10	15	20
PCS−02	50	100	150	200	300	20	40	60	80
PCS−04	50	100	150	200	300	40	80	120	160

Note) For semi−standard products, the overall length and the minimum high thrust switching position are consistent with the table on page 8.

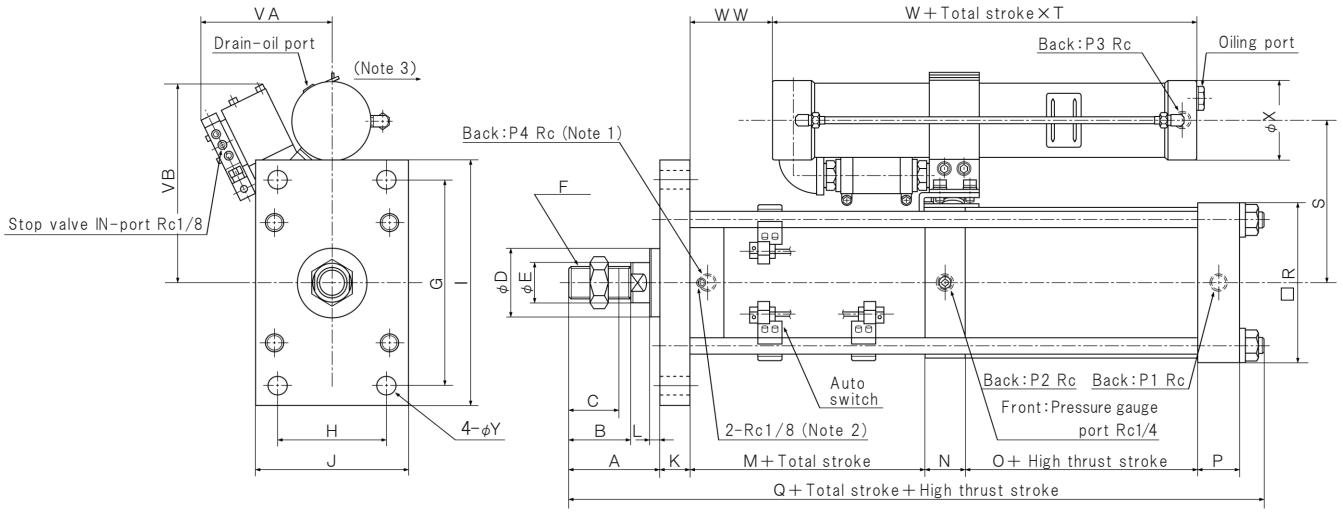
Note 1)
If the total stroke is 20 or more, it is calculated as (E + total stroke + 100).

Note 3)
Maximum 111 mm with speed controller.

Note)
PCS−02 and 04 models come equipped with a rod end nut.

Dimensions

PCH　PCHW　PCH−V∗　PCHW−V∗
PCH−B　PCHW−B　PCH−V∗−B　PCHW−V∗−B



(Unit:mm)

Model \ Symbol	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
PCH−03	90	60	50	70 $^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45	105	32	461	150	154	1.4
PCH−06	90	60	50	70 $^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45	108	32	463	150	154	1.4
PCH−08	90	60	50	70 $^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45	123	32	478	150	154	1.4
PCH−13	110	70	65	100 $^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40	130	50	587	220	205	1.5
PCH−17	110	70	65	100 $^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40	140	50	597	220	205	1.5
PCH−24	110	70	65	100 $^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40	149	50	609	220	205	1.5
PCH−35	160	120	110	130 $^{-0.05}_{-0.1}$	90	M80×2.0	320	180	400	260	50	20	230	50	168	65	768	260	220	1.5
PCH−44	160	120	110	130 $^{-0.05}_{-0.1}$	90	M80×2.0	320	180	400	260	50	20	230	50	176	65	776	260	220	1.5

Model \ Symbol	VA	VB	W	WW	X	Y	Rc
PCH−03	129	187	280	60	80	19	1/2
PCH−06	129	187	280	60	80	19	1/2
PCH−08	129	187	280	60	80	19	1/2
PCH−13	143	219	325	80	110	32	3/4
PCH−17	143	219	325	80	110	32	3/4
PCH−24	143	219	325	80	110	32	3/4
PCH−35	130	230	345	125	130	45	1
PCH−44	130	230	345	125	130	45	1

Replace "Stroke" in the dimensions with the values listed below.

(Unit:mm)

Model \ Symbol	Total stroke				High thrust stroke			
	10	15	20	30	05	10	15	20
PCH−03	100	150	200	300	20	40	60	80
PCH−06	100	150	200	300	36	72	108	144
PCH−08	100	150	200	300	55	110	165	220
PCH−13	100	150	200	300	40	80	120	160
PCH−17	100	150	200	300	50	100	150	200
PCH−24	100	150	200	300	70	140	210	280
PCH−35	100	150	200	300	100	200	300	400
PCH−44	100	150	200	300	125	250	375	500

Note 1) Only the P4 port on models PCH−03 through 08 is Rc 3/8.

Note 2) Drain port of Rod oil film scraper. (Symbol : B)

Note 3) On models PCH (W)−35 and 44−V (with stop valve), the air−hydro unit moves 34 mm in the direction of the arrow. Also, the WW dimension will be 150 mm. There is no change to the VA dimension.

Note) PCH−03 through 08 models come equipped with a rod end nut.

Overall length dimensions for semi−standard models and minimum starting position of the high thrust stroke from the piston rod retracted position.

The following semi−standard models have the same overall length as the standard models with the same total length.

The pneumatic thrust stroke must exceed the values specified in the table from the retracted position before switching to the high thrust stroke.

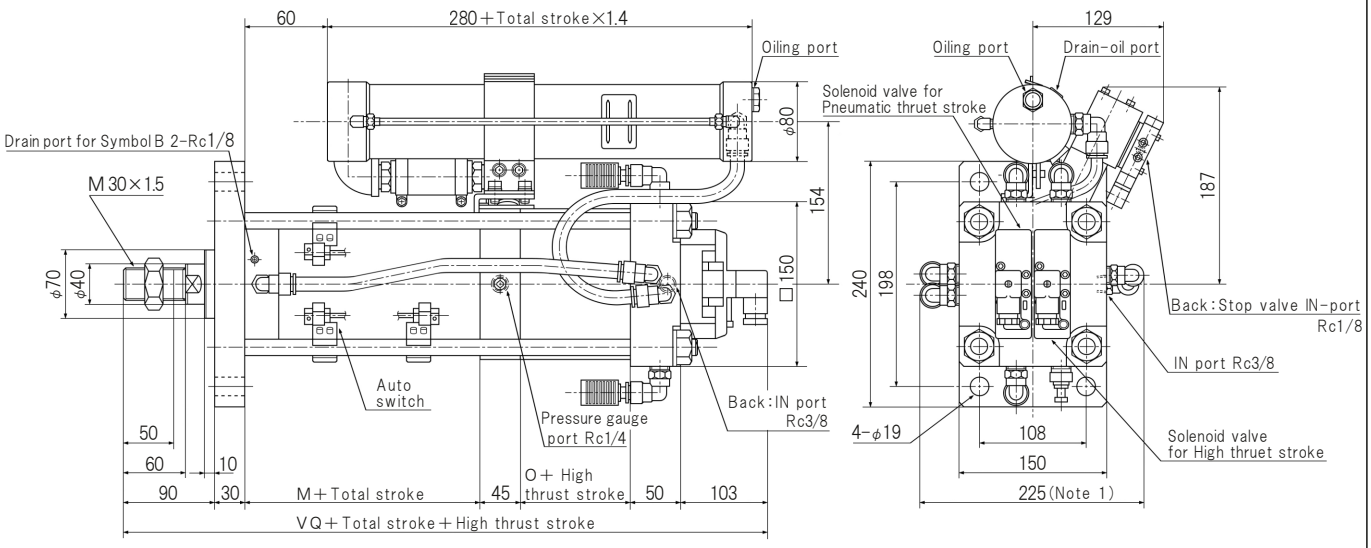
Model	03-0505	03-0510	03-0515	03-0520	06-0505	06-0510	06-0515	06-0520 06-1020	08-0505	08-0510	08-0515	08-0520
Same overall length model	03-1005	03-1010	03-1015	03-1020	06-1005	06-1010	06-1015	06-1520	08-1005	08-1010	08-1015	08-1020
Pneumati thrust stroke	0	0	0	0	0	0	22	8 58	0	0	0	0

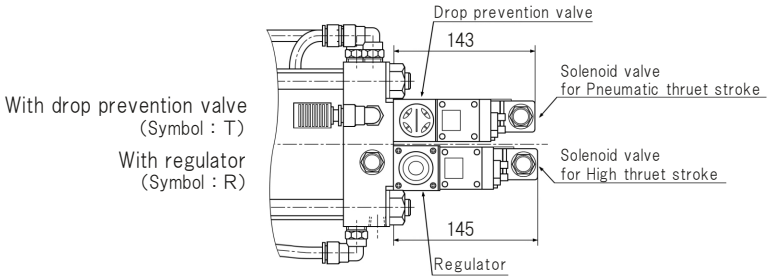
Model	13-0505	13-0510	13-0515	13-0520 13-1020	17-0505	17-0510	17-0515	17-0520	17-1015	17-1020 17-1520	24-0505	24-0510	24-0515	24-0520
Same overall length model	13-1005	13-1010	13-1015	13-1520	17-1005	17-1010	17-1515	17-2020	17-1515	17-2020	24-1005	24-1010	24-1015	24-1020
Pneumati thrust stroke	0	0	15	5 55	0	10	10	10	60	60 110	0	0	0	0

Model	35-0505	35-0510	35-0515	35-0520	44-0505	44-0510	44-0515	44-0520	44-1020
Same overall length model	35-1005	35-1010	35-1015	35-1520	44-1005	44-1010	44-1515	44-2520	44-2020
Pneumati thrust stroke	0	0	0	10	0	0	0	18	68

Dimensions

PCHV∗-03～08　PCHV∗W-03～08　PCHV∗-03～08-V∗　PCHV∗W-03～08-V∗
PCHV∗-03～08-B　PCHV∗W-03～08-B　PCHV∗-03～08-V∗-B　PCHV∗W-03～08-V∗-B





(Unit:mm)

Model \ Symbol	A	B	C	D	E	F	G	H	I	J	K	L	M	N
PCH-03	90	60	50	$70^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45
PCH-06	90	60	50	$70^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45
PCH-08	90	60	50	$70^{-0.02}_{-0.1}$	40	M30×1.5	198	108	240	150	30	10	130	45

Model \ Symbol	O	P	Q	R	S	T	VQ
PCH-03	97	50	461	150	154	1.4	545
PCH-06	100	50	463	150	154	1.4	548
PCH-08	115	50	478	150	154	1.4	563

Note 1) Maximum 230 mm with speed controller.
Note) PCH-03 through 08 models come equipped with a rod end nut.

Replace (Stroke) in the dimensions with the values listed below.

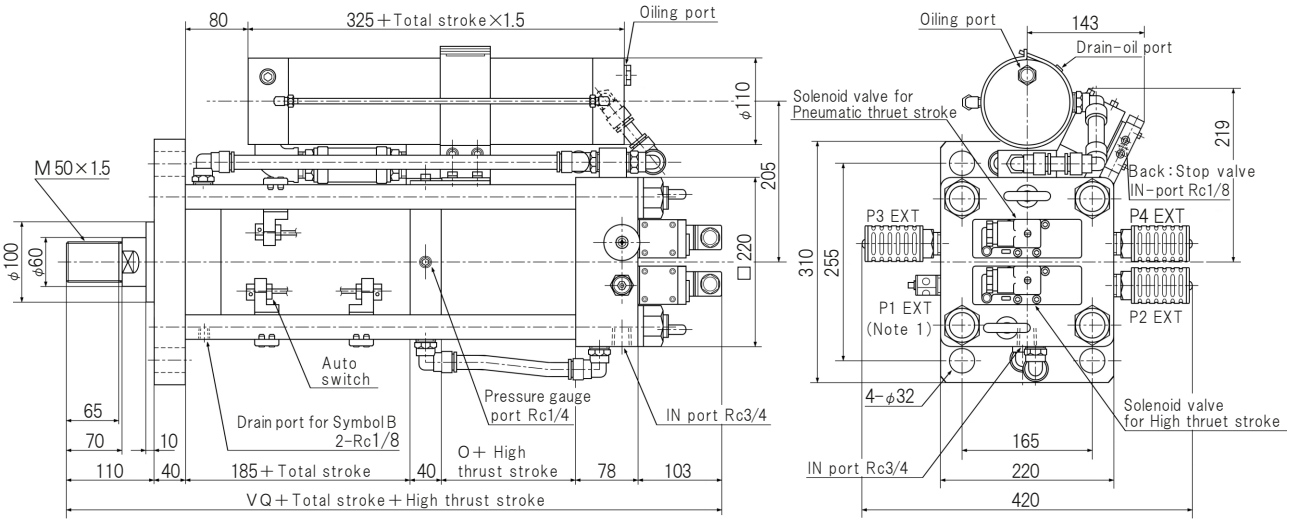
(Unit:mm)

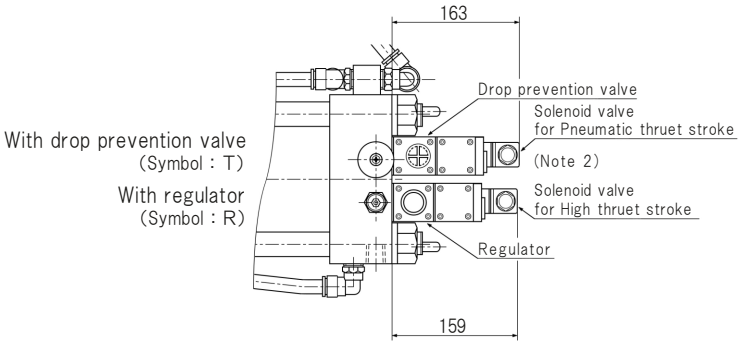
Model \ Symbol	Total stroke				High thrust stroke			
	10	15	20	30	05	10	15	20
PCH-03	100	150	200	300	20	40	60	80
PCH-06	100	150	200	300	36	72	108	144
PCH-08	100	150	200	300	55	110	165	220

Note) For semi-standard products, the overall length and the minimum high thrust switching position are consistent with the table on page 10.

Dimensions

PCHV∗-13～24　PCHV∗W-13～24　PCHV∗-13～24-V∗　PCHV∗W-13～24-V∗
PCHV∗-13～24-B　PCHV∗W-13～24-B　PCHV∗-13～24-V∗-B　PCHV∗W-13～24-V∗-B





(Unit : mm)

Model \ Symbol	A	B	C	D	E	F	G	H	I	J	K	L	M	N
PCH-13	110	70	65	$100^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40
PCH-17	110	70	65	$100^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40
PCH-24	110	70	65	$100^{-0.02}_{-0.1}$	60	M50×1.5	255	165	310	220	40	10	185	40

Model \ Symbol	O	P	Q	R	S	T	VQ
PCH-13	130	78	587	220	205	1.5	686
PCH-17	140	78	597	220	205	1.5	696
PCH-24	149	78	609	220	205	1.5	705

Note 1) Models equipped with a speed controller include a silencer with a throttle valve, identical to the P1 exhaust.

Note 2) For models PCH-13 through 24, the operating valve, regulator, and drop prevention valve are shipped unassembled. Install these components onto the cylinder body upon delivery.

Replace (Stroke) in the dimensions with the values listed below.

(Unit : mm)

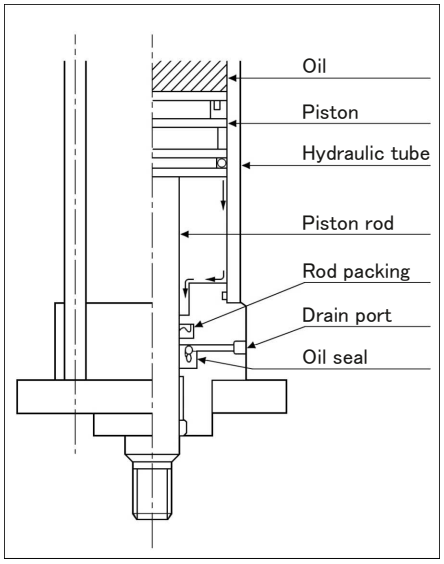
Model \ Symbol	Total stroke				High thrust stroke			
	10	15	20	30	05	10	15	20
PCH-13	100	150	200	300	40	80	120	160
PCH-17	100	150	200	300	50	100	150	200
PCH-24	100	150	200	300	70	140	210	280

Note) For semi-standard products, the overall length and the minimum high thrust switching position are consistent with the table on page 10.

Rod Oil Film Scraper

PCM-B
PCS-B
PCH-B

A slight oil film on the piston rod surface resulting from normal sliding of standard seals is not considered "leakage." However, in processes such as electronic component molding or clinching, even a single drop of oil can lead to defective products.
The Rod oil film scraper minimizes oil discharge from the piston rod sliding surface to near zero, protecting your components from oil contamination.



Internal Structure

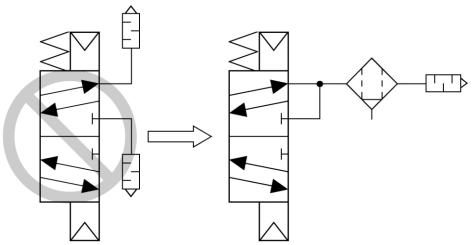
As the piston slides, oil adhering to the inner surface of the hydraulic tube forms a thin film and flows toward the rod packing. As the rod seal is specifically designed for air pressure sealing, it cannot completely remove the oil film, which then travels along the rod surface to the exterior. The oil seal scrapes off the oil film before it can escape to the exterior, directing it to the drain port for discharge.

Regarding use in oil-sensitive environments (e.g., cleanrooms)

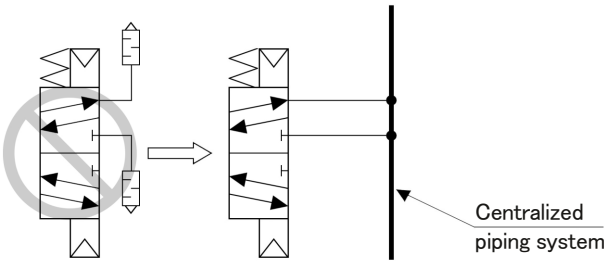
The "Rod Oil Film Scraper" is designed solely to address oil film on the piston rod surface.
Implement separate oil countermeasures for the solenoid valve's exhaust and drain ports.

Exhaust the solenoid valve through a mist separator as shown in the diagram.
(This diagram supplements the "Example of Air Circuit" on pages 14 and 15.)

Recommended product : Exhaust Cleaner
Maker : SMC, CKD, etc

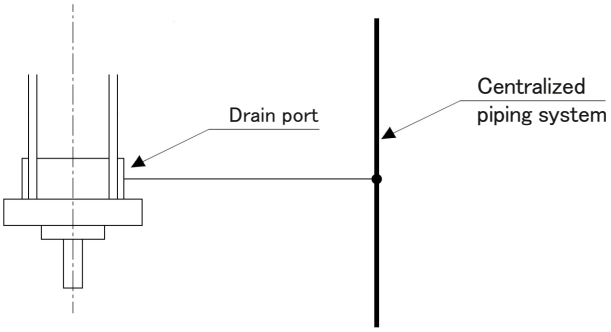


Alternatively, pipe the exhaust to a centralized piping system and discharge it outdoors.



Drain port

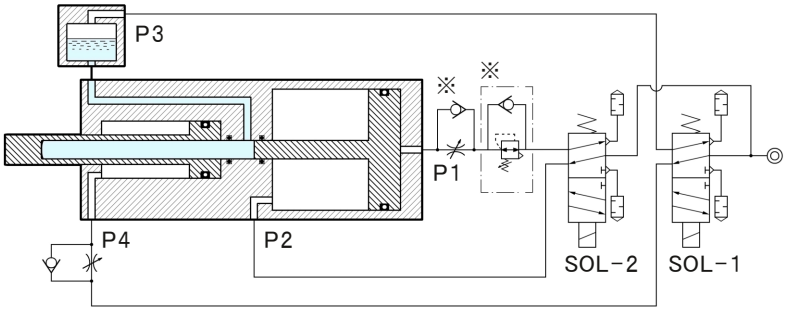
As shown in the diagram, pipe the exhaust to a centralized piping system and discharge it outdoors.



Basic Pneumatic Circuit

The type without operating valves

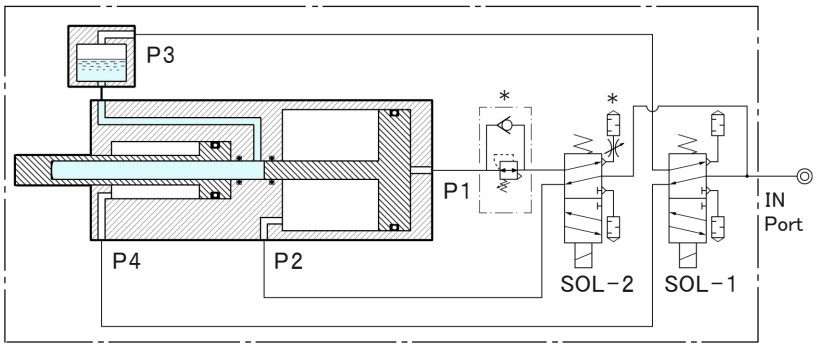
PCM
PCS
PCH



* Install the regulator at the position shown in the diagram when adjusting high thrust to a lower level.
  (To prevent a reduction in cylinder return thrust)
* Install the speed controller in the direction shown in the diagram to prevent negative pressure in the oil. (P1)

The type with operating valves

PCMV∗
PCSV∗
PCHV∗



* Install the regulator at the position shown in the diagram when adjusting high thrust to a lower level.
  (To prevent a reduction in cylinder return thrust)
  An optional spacer−type regulator can be installed.
* The silencer with throttle valve is included at the position shown to prevent negative pressure in the oil.
  For the PCM series, it is included at the P1 port.

Circles (○) indicate air supply, and crosses (×) indicate air exhaust.

Operating condition	SOL−1	SOL−2	P1	P2	P3	P4	Progress
Stop	OFF	OFF	×	○	×	○	As shown in the figure
Pneumatic thrust stroke	ON	OFF	×	○	○	×	Rapid forward
High thrust stroke	ON	ON	○	×	○	×	High thrust forward
Return stroke	OFF	OFF	×	○	×	○	High speed return

How to Adjust Cylinder Speed.

Cylinder speed can be adjusted by installing meter−out type speed controllers on each port.

P2 : High Thrust Stroke Speed

P3 : Return Stroke Speed

P4 : Pneumatic Thrust Stroke Speed

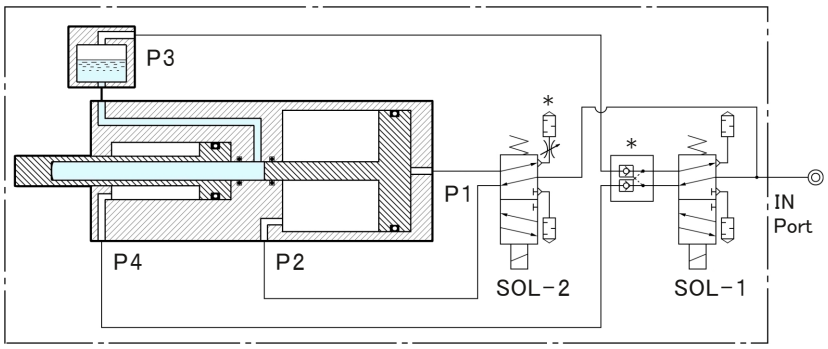
Drop prevention measures during air supply loss.

Installing a pilot check valve on the P4 port and using the supply air as pilot air prevents the cylinder from dropping own weight.

Note : The piston rod may gradually drop over time due to air leakage. When exhausting residual pressure, there is a risk of sudden movement due to the cylinder's own weight. Ensure safety measures, such as using safety blocks, are in place before operation.

The type with drop prevention valve

PCSV∗-T PCHV∗-T



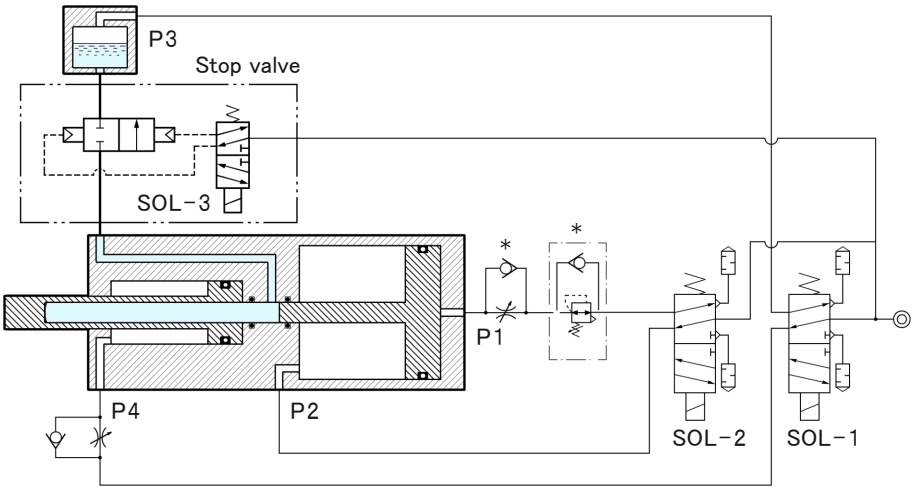
* The drop prevention valve is used to prevent the piston rod from falling due to its own weight at the stroke end or at an intermediate stop position when the air supply is cut off.

  Note : The piston rod may gradually drop over time due to air leakage.
  When exhausting residual pressure, there is a risk of sudden movement due to the cylinder's own weight. Ensure safety measures, such as using safety blocks, are in place before operation.
* The silencer with throttle valve is included at the position shown to prevent negative pressure in the oil.

Basic Pneumatic Circuit

The type with stop valve

PCM····V＊ PCS····V＊ PCH····V＊



＊ Install the regulator at the position shown in the diagram when adjusting high thrust to a lower level.
(To prevent a reduction in cylinder return thrust)

＊ Install the speed controller in the direction shown in the diagram to prevent negative pressure in the oil. (P1)

＊ When using the model with a stop valve, use 2 position single type operating valve. Such as 2 position double or 3 position closed center, the internal air pressure of the cylinder may be insufficient. As a result, the emergency stop or intermediate stop may fail to function, or there may be a delay before the operation comes to a stop.

How to Intermediate Stop (Emergency stop, Inching)

Circles (○) indicate air supply, and crosses (×) indicate air exhaust.

Operating condition	SOL-1	SOL-2	SOL-3	P1	P2	P3	P4	Progress
Stop	OFF	OFF	OFF	×	○	×	○	As shown in the figure
Pneumatic thrust stroke	ON	OFF	ON	×	○	○	×	Rapid forward
Intermediate stop	OFF	OFF	OFF	×	○	×	○	Intermediate stop
High thrust stroke	ON	ON	ON	○	×	○	×	High thrust forward
Return stroke	OFF	OFF	ON	×	○	×	○	High speed return

However, during high thrust stroke operation, the unit will stop after returning to the high thrust start position.

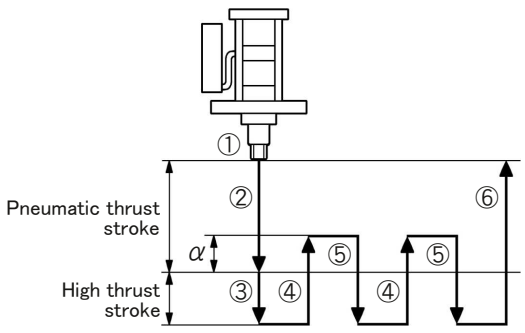
How to continuous operation for high thrust stroke drive only

Circles (○) indicate air supply, and crosses (×) indicate air exhaust.

	Operating condition	SOL-1	SOL-2	SOL-3	P1	P2	P3	P4	Progress	
①	Stop	OFF	OFF	OFF	×	○	×	○	As shown in the figure	
②	Pneumatic thrust stroke	ON	OFF	ON	×	○	○	×	Rapid forward	
③	High thrust stroke	ON	ON	ON	○	×	○	×	High thrust forward	
④	High thrust return stroke	OFF	OFF	OFF	×	○	×	○	High thrust + α stroke return	(Note 1)
⑤	High thrust stroke	OFF	ON	OFF	○	×	×	○	α stroke + High thrust forward	(Note 1)
⑥	Return stroke	OFF	OFF	ON	×	○	×	○	High speed return	

(Note 1) α stroke refers to an extra retraction that returns α mm further than the starting position of the high thrust stroke. High thrust is not applied during the α stroke forward. The table below shows the α stroke for each model.

Model	α stroke (mm)
PCS-02-V＊	Approx. 5.5
PCS-04-V＊	Approx. 3.1
PCH-03-V＊	Approx. 2.1
PCH-06-V＊	Approx. 3.6
PCH-08-V＊	Approx. 2.8
PCH-13-V＊	Approx. 2.0
PCH-17-V＊	Approx. 1.8
PCH-24-V＊	Approx. 1.4
PCH-35-V＊	Approx. 4.5
PCH-44-V＊	Approx. 1.8

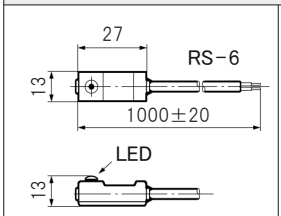


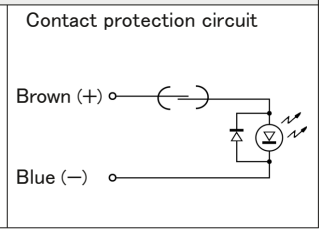
Auto Switch

Read auto switch		
Auto switch model	RS-6	
Voltage	24 VDC	100 V/200 VAC
Max. switching current	20 mA	20 mA
Max. switching capacity	5 W	5 VA
Average operating time	1 m SEC	
Insulation resistance	100 MΩ or more (at 500 VDC)	
Impact resistance	30 G	
Ambient temperature	−10 to 60℃ (Non-freezing)	
Lead wire	2 cores cable, 1 m	
Indicator light	Red LED illuminates when turned ON	

Read auto switch

Dimentions and internal circuit

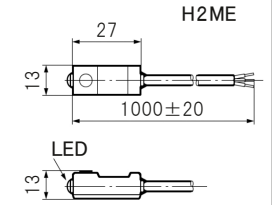


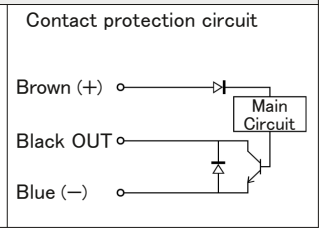


Solid state auto switch	
Auto switch model	H2ME
Output type	NPN
Voltage	5, 12, 24 VDC
Max. load current	5 mA (5 VDC),10 mA (12 VDC),20 mA (24 VDC)
Max. switching current	100 mA (5 VDC), 200 mA (24 VDC)
Internal voltage drop	0.6 V or less (24 VDC)
Max. leakage current	0.1 mA or less (24 VDC)
Impact resistance	30 G
Ambient temperature	−10 to 60℃ (Non-freezing)
Lead wire	3 cores cable, 1 m
Indicator light	Red LED illuminates when turned ON

Solod state auto switch

Dimentions and internal circuit



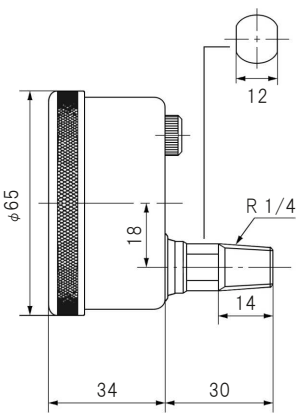


Mounting bracket compatibility : The same mounting bracket is used for both Read auto switch (RS-6) and Solid state auto switch (H2ME).

Oil Pressure Gauge

Pressure gauge model	2315-63-25B	GX-0204	GX-0308	GX-1324	GX-3544
Pressure range	0 to 25 MPa				
Indication	MPa	MPa and kN			
Accuracy	±1.6% or less of full scale				
Ambient and fluid temperatures	−5 to 45℃				
Glycerine filling	This pressure gauge is filled with pure glycerine.				
Temperature characteristic	Accuracy varies by ±0.3% for every 10℃ change from the reference temperature of 20℃.				

(Unit : mm)



Solenoid Valve

Operating valve

PCMV*

Valve specifications	
Fluid	Air
Operating pressure	0.1 to 0.97 MPa
Ambient temperature	Ambient temp : −5 to 60°C, Fluid temp : 5 to 60°C
Action	Pilot operated
Effective sectional area	15 mm^2
Lubrication	No required
Manual operation	Locking type

Solenoid specifications			
Rated voltage	100 VAC (50/60 Hz)	200 VAC (50/60 Hz)	24 VDC
Starting current	0.170/0.140 A	0.090/0.070 A	0.250 A
Holding current	0.100/0.080 A	0.050/0.040 A	
Power consumption	5.0/4.0 W	5.0/4.0 W	6 W
Thermal class	B (Molded coil)		
Wiring method	DIN connector		

PCSV* PCHV*

Valve specifications	
Fluid	Air
Operating pressure	0.15 to 0.97 MPa
Ambient temperature	Ambient temp : −5 to 60°C, Fluid temp : 5 to 60°C
Action	Pilot operated
Effective sectional area	PCSV*, PCHV*03 to 08 : 33 mm^2 PCHV*13 to 24 : 65 mm^2
Lubrication	No required
Manual operation	Non−locking push type

Solenoid specifications			
Rated voltage	100 VAC (50/60 Hz)	200 VAC (50/60 Hz)	24 VDC
Starting current	0.056/0.044 A	0.034/0.026 A	0.042 A
Holding current	0.028/0.022 A	0.017/0.013 A	
Power consumption	1.8/1.4 W	2.1/1.6 W	1.2 W
Thermal class	B (Molded coil)		
Wiring method	DIN connector, with surge suppressor, lamp		

Stop valve

PCM····V* PCS····V* PCH····V*

Valve specifications	
Fluid	Air
Operating pressure	0.3 to 0.7 MPa
Ambient temperature	Ambient temp : −5 to 50°C, Fluid temp : 5 to 50°C
Action	Pilot operated
Port size	Rc 1/8
Effective sectional area	7 mm^2
Lubrication	No required
Manual operation	Non−locking type

Solenoid specifications			
Rated voltage	100 VAC (50/60 Hz)	200 VAC (50/60 Hz)	24 VDC
Starting current	0.056/0.044 A	0.028/0.022 A	0.075 A
Holding current	0.028/0.022 A	0.014/0.011 A	
Power consumption	1.8/1.5 W	1.8/1.5 W	2.0 W
Thermal class	B (Molded coil)		
Wiring method	DIN connector, with surge suppressor, lamp		

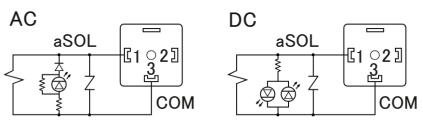
Wiring

Incorrect wiring of the terminals may cause malfunctions, such as improper solenoid valve operation.
Refer to the diagram below for terminal wiring.

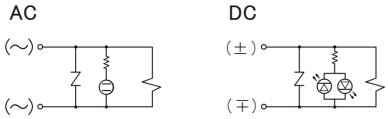
Wiring diagram

Operating valve PCMV*

PCSV* PCHV*

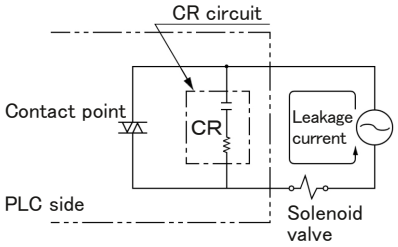


Stop valve PCM····V* PCS····V* PCH····V*



Restriction of leakage current

When using a Programmable Logic Controller (PLC), leakage current may prevent the solenoid valve from switching off, even when de−energized. Ensure that the leakage current is below the values specified in the table below.



AC100V	3.0 mA or less
AC200V	1.5 mA or less
DC24V	1.8 mA or less

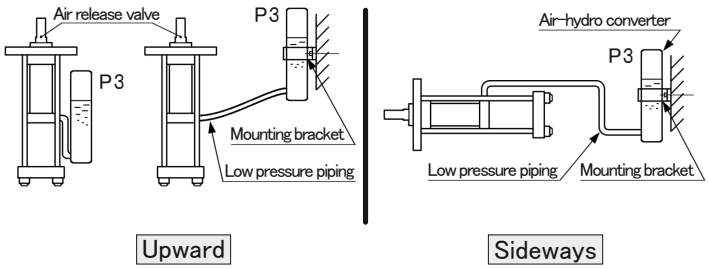
1 Installation Direction

Install the Pneumatic Power Cylinder with the piston rod facing downward. Upward or horizontal mounting is possible, but the standard type cannot be used in these orientations.
Please consult us during your planning stage. (Custom model)

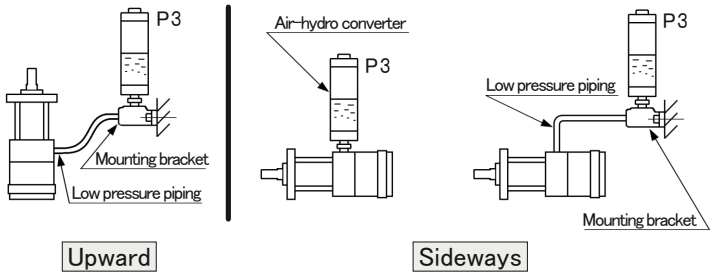
Installation of air–hydro converter.
When installing the air–hydro converter away from the cylinder body, install on the equipment side using the mounting brackets of each type of air–hydro converter.
PCM series air–hydro converter is easy to install using PCS series mounting bracket.
Connect the air–hydro converter and the Pneumatic Power Cylinder body using low–pressure hydraulic piping.

For the upward–facing PCH Series, some models feature an air release valve located the wrench flats of the piston rod. rod. Perform air bleeding once every one or two months.

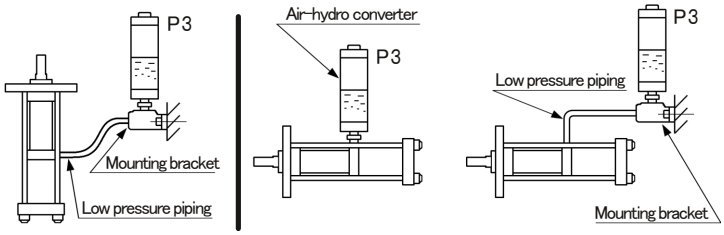
PCH



PCS



PCM



Install the air–hydro converter so that the P3 port is always positioned at the top, regardless of the mounting orientation of the pneumatic power cylinder body.

2 Checking the Hydraulic Oil Level

Oil level gauge is included on the side of the air–hydro converter. Refill the oil when the level falls below the MIN mark while the piston rod is fully retracted.

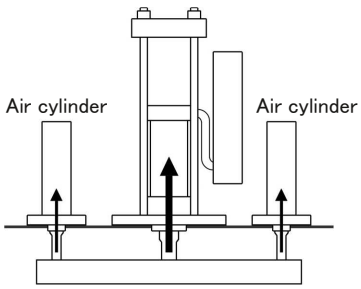
3 Use in Punching Applications

Since the Pneumatic Power Cylinder is air–operated, if the reaction force drops abruptly during pressurization—such as in punching applications—the piston rod and ram may accelerate rapidly after punching the workpiece.
Select a longer high thrust stroke and ensure that an external shock absorbing stopper, such as urethane rubber, is installed.
Examples: Deburring machine for castings, Destructive testing machine, Heavy plate punching machines, etc.

4 When using heavy jigs or dies

If the weight of the jig or die is too high relative to the cylinder's retraction thrust, it will affect operation, slow retraction speeds or a failure to retract.
In such cases, increasing the air supply pressure to the cylinder (P4 port) will increase the retraction thrust, which may improve the operation.

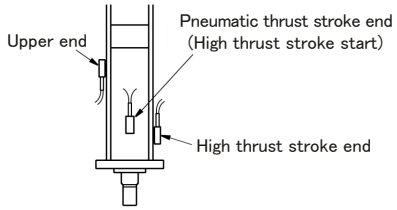
Additionally, by installing an auxiliary air cylinder to assist with the return stroke, you can increase the retraction thrust without changing the supply air pressure.
(Refer to the diagram on the right.)



Operation Position Signal

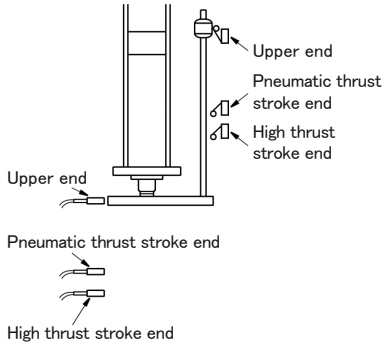
1

Using models with auto-switches, the solenoid valve is switched at each position.



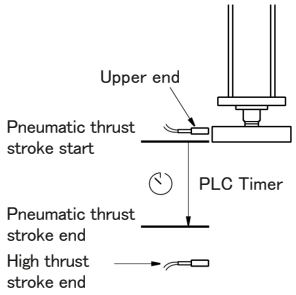
2

Uses proximity sensors or limit switches.



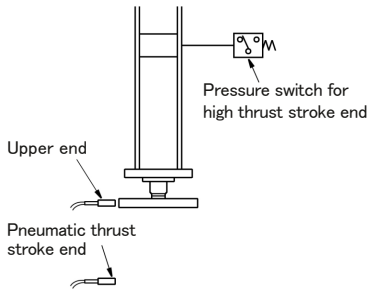
3

Switching to the high thrust stroke via a timer compensates for variations in workpiece height.



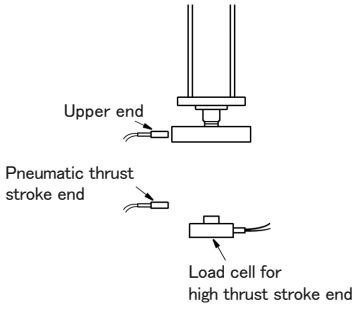
4

Monitoring the internal hydraulic pressure in addition to the position helps improve quality.



5

For even more precise quality control, the actual thrust value is measured using a load cell.



Mass

Unit : kg

Model	Basic weight	Total stroke Additional weight per each 10 mm of stroke	High thrust stroke Additional weight per each 1 mm of stroke
PCM PCM-B	4.0	0.20	0.1
PCMW PCMW-B	4.2	0.20	0.1
PCS -02 PCSW -02	12.8	0.25	0.1
PCS -04 PCSW -04	13.3	0.25	0.2
PCSV* -02 PCSV*W-02	14.5	0.25	0.1
PCSV* -04 PCSV*W-04	15.0	0.25	0.1

Unit : kg

Model	Basic weight	Total stroke Additional weight per each 10 mm of stroke	High thrust stroke Additional weight per each 1 mm of stroke
PCH-03	32	0.4	0.2
PCH-06	32	0.4	0.3
PCH-08	32	0.4	0.4
PCH-13	100	1.0	0.5
PCH-17	100	1.0	0.6
PCH-24	101	1.1	1.0
PCH-35	195	2.0	1.7
PCH-44	195	2.0	2.2

Example : PCH-08-1010

32+0.4×100/10+0.4×10=40 kg

Applications

- Press Fitting
- Riveting
- Punching Press
- Bending Process
- Workpiece Holding for Leak Testers
- Molding
- Cutting
- Auto Marking
- Thomson Die-Cutting
- Crimping
- Caulking
- Work Clamping
- Drawing Press
- Compression Press
- Deburring

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SEL NUT
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