

VARIABLE VOLUME PISTON PUMPS

INDEX

CONTROL OPTIONS 01

MODEL 02

PRESSURE COMPENSATING TYPE



P08-A-TYPE 02
P16-A-TYPE / P22-A-TYPE / P36-A-TYPE / P46-A-TYPE 03



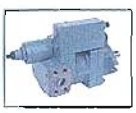
P70-A-TYPE / P100-A-TYPE 04

REMOTE PRESSURE CONTROL TYPE



P08-B-TYPE / P16-B-TYPE / P22-B-TYPE / P36-B-TYPE / P46-B-TYPE 05

TWO PRESSURE-TWO FLOW CONTROL TYPE



P16-C-TYPE / P22-C-TYPE / P36-C-TYPE / P46-C-TYPE 06

SOLENOID CUT-OFF CONTROL TYPE



P16-D-TYPE / P22-D-TYPE / P36-D-TYPE / P46-D-TYPE 07
P70-D-TYPE / P100-D-TYPE 08

TWO PRESSURE CUT-OFF CONTROL TYPE



P16-E-TYPE / P22-E-TYPE / P36-E-TYPE / P46-E-TYPE 09
P70-E-TYPE / P100-E-TYPE 10

LOAD SENSING CONTROL TYPE



P16-HL-TYPE / P22-HL-TYPE / P36-HL-TYPE / P46-HL-TYPE 11
P70-HL-TYPE / P100-HL-TYPE 12

DOUBLE PUMPS



PP16/22/36/46+P08/16/22-TYPE 13
PP70+P08/16/22/36/46-TYPE 14
PP100+P08/16/22/36/46-TYPE 15

CROSS SECTION DRAWING

P08-TYPE / P16/22/36/46-TYPE 16

P70/P100-TYPE 17

PRESSURE COMPENSATOR CROSS SECTION DRAWING

P08/P16/22/36/46-A-TYPE / P70/P100-ATYPE 17

PERFORMANCE DATA

P08-A*-F-01 / P16-A*-F-01 ..... 18/19

P22-A*-F-01 / P36-A*-F-01 ..... 20/21

P46-A*-F-01 / P70-A*-F-01 ..... 22/23

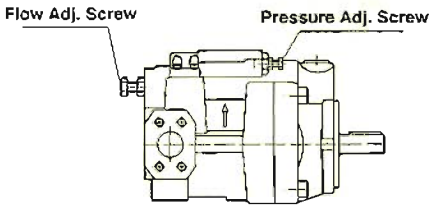
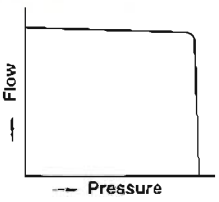
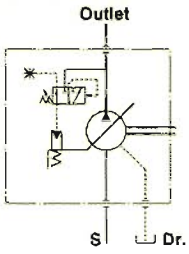
P100-A*-F-01 24

OPERATING DATE 25

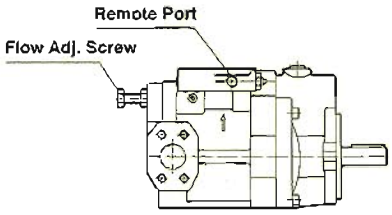
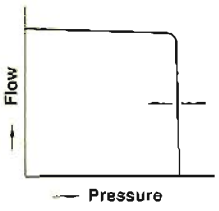
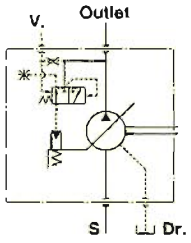
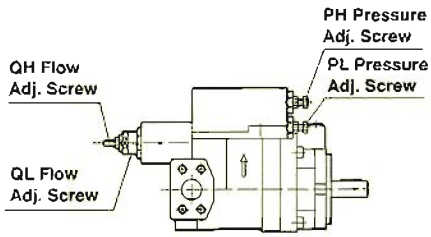
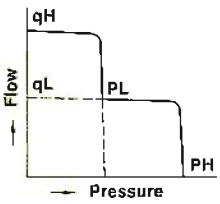
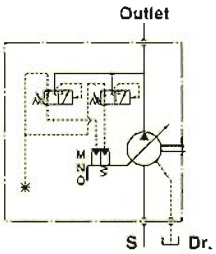
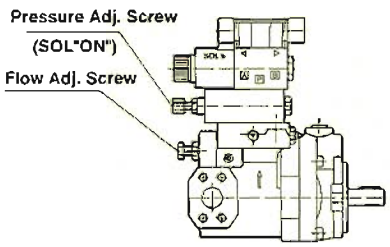
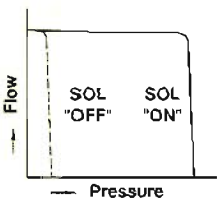
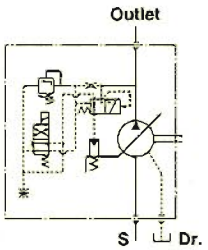
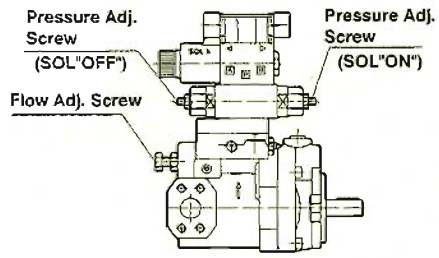
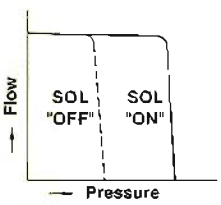
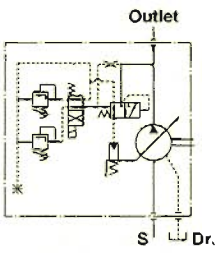
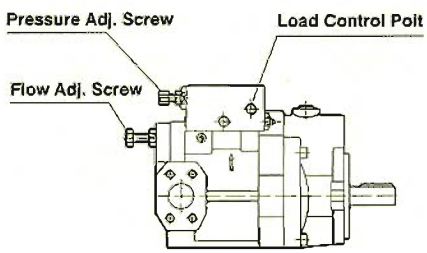
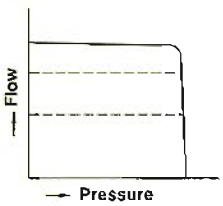
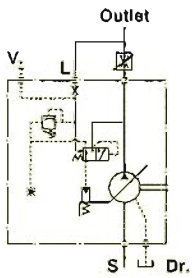
- Specifications and design characteristics are subject to change without prior notice.

Control types:

STANDARD TYPE

Symbol	External view	Performance Curves	Hydraulic Circuit	Description
A				**Pressure Compensating Type (Manual)** • When the pressure reaches the value set with the compensator, the flow is reduced automatically and the set pressure is maintained. • The pressure and flow are controlled manually.

OPTION TYPE

B				**Remote Pressure Control Type** • The pressure can be controlled according to the pilot pressure. • The flow can be controlled manually
C				**Two Pressure-Two Flow Control Type** • By means of the sequence valve, two stage flow rate can be obtained and each flow rate has the different pressure eventually enabling energy savings.
D				**Solenoid Cut-Off Control Type** • An unloading solenoid valve is used to minimize the lost energy when the pump output is not required. • Heat generated is very small
E				**Two Pressure Cut-Off Control Type** • By means of "ON" "OFF" control of solenoid valves, two different pressure compensating types can be obtained.
HL				**Load Sensing Control** • The "HL" compensator is used for load sensing circuits and is a true load sensor. This is the "B" compensator with a pin in the compensator spool The pin prevents pilot flow from entering the circuit which will eliminate creeping of the load. • The "HL" compensator will let the pump deliver a constant flow rate to the circuit by providing an adjustable △P across the customers orifice or valve. The pump will operate at 17.2~27.5 bar (250-400 psi) above "Load pressure".

Ordering Code:

P16-A3-F-R-S-01

1 2 3 4 5 6 7 8

1 Variable volume piston pump

2 Displacement
08, 16, 22, 36, 46, 70, 100, (cm³/rev)

3 Control options
(Standard type)
A : Pressure compensating type
(Option type)
B : Remote pressure control type
C : Two pressure-two flow control type
D : Solenoid cut-off control type
E : Two pressure cut-off control type
HL : Load sensing control type

4 Pressure adjusting range
0 : 1~4 Mpa (10~40 kgf/cm²)
1 : 2~7 Mpa (20~73 kgf/cm²)
2 : 3~14 Mpa (30~145 kgf/cm²)
3 : 3~21 Mpa (30~215 kgf/cm²)
4 : 3~28 Mpa (30~286 kgf/cm²)

5 Mounting
F : Flange mounting
L : Foot mounting

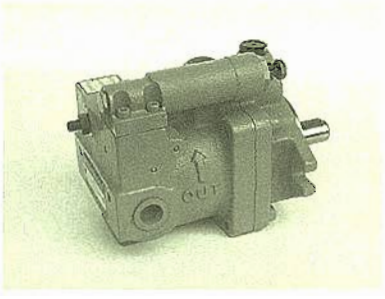
6 Rotation(Viewed from shaft end)
R : CW
L : CCW

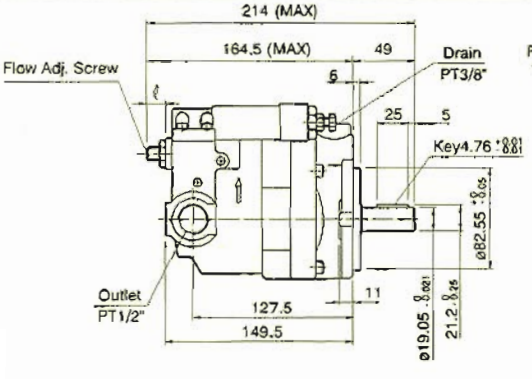
7 Shaft options
S : SAE Spline
Cylindric, Key (Code omited)

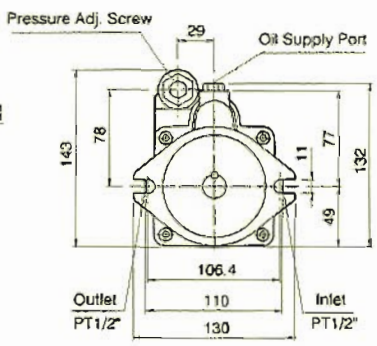
8 Design code

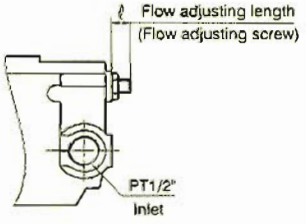
Model	Volume cm³/rev	Delivery at no load ℓ/min 1000 min⁻¹	1200 min⁻¹	1500 min⁻¹	1800 min⁻¹	Pressure adj. range Mpa (kgf/cm²)	Max setting pressure Mpa (kgf/cm²)	Drive speed min⁻¹ Min	Max	Mass kg
P08-A0-F-R-01						2~4 (20~40)				
1	8.0	8.0	9.6	12.0	14.4	2~7 (20~73)	25 (255)	500	2000	9
2						3~14 (30~145)				
3						3~21 (30~215)				
P16-A0-F-R-01						2~4 (20~40)				
1	16.5	16.5	19.8	24.7	29.7	2~7 (20~73)	25 (255)	500	2000	12
2						3~14 (30~145)				
3						3~21 (30~215)				
P22-A0-F-R-01						2~4 (20~40)				
1	22.0	22.0	26.4	33.0	39.6	2~7 (20~73)	25 (255)	500	2000	12
2						3~14 (30~145)				
3						3~21 (30~215)				
P36-A0-F-R-01						2~4 (20~40)				
1	36.0	36.0	43.2	54.0	64.8	2~7 (20~73)	25 (255)	500	2000	23
2						3~14 (30~145)				
3						3~21 (30~215)				
P46-A0-F-R-01						2~4 (20~40)				
1	46.0	46.0	55.2	69.0	82.8	2~7 (20~73)	25 (255)	500	2000	23
2						3~14 (30~145)				
3						3~21 (30~215)				
P70-A1-F-R-01						2~7 (20~73)				
3	70.0	70.0	84.0	105.0	126.0	3~21 (30~215)	28 (286)	500	1800	41
4						3~28 (30~286)				
P100-A1-F-R-01						2~7 (20~73)				
3	100.0	100.0	120.0	150.0	180.0	3~21 (30~215)	28 (286)	500	1800	60
4						3~28 (30~286)				

P08-A-TYPE / PRESSURE COMPENSATING TYPE

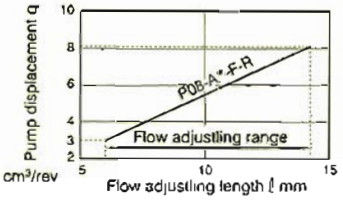






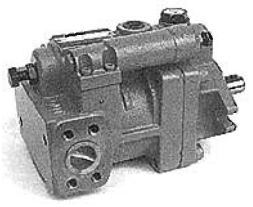


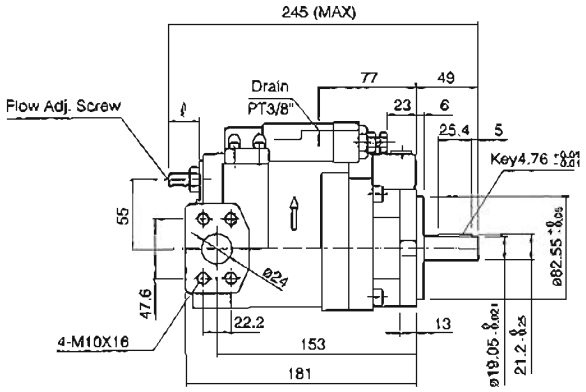
The relation between flow adjusting length (ℓ) and pump displacement (q)

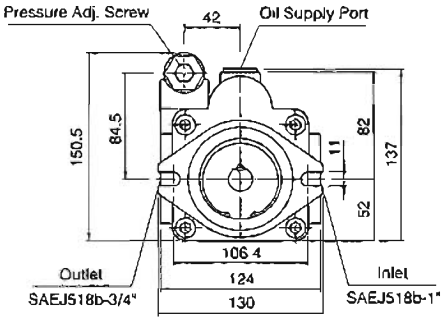


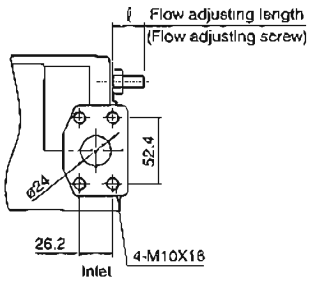
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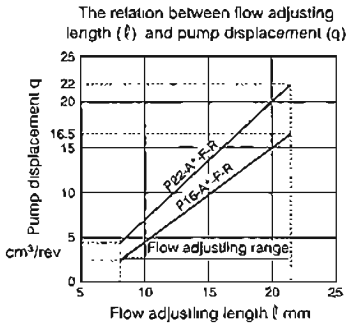
P16-A-TYPE / P22-A-TYPE



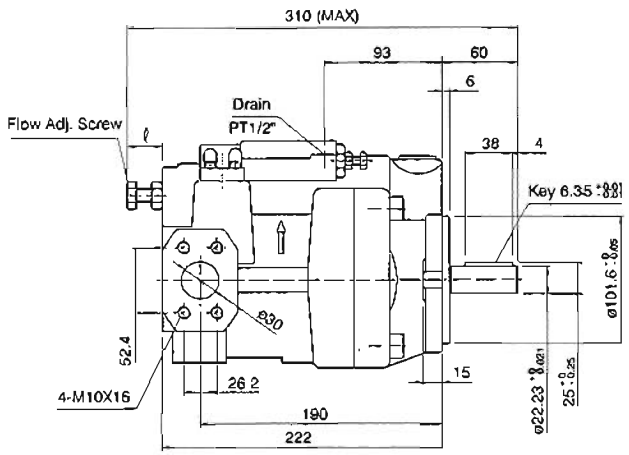


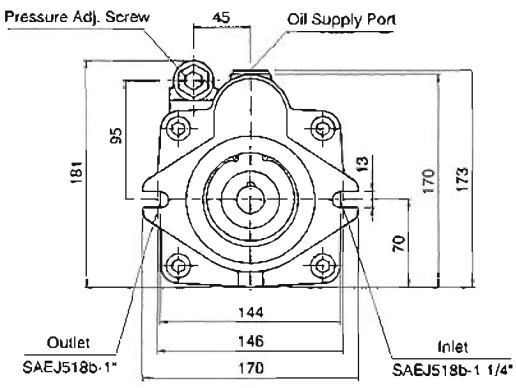


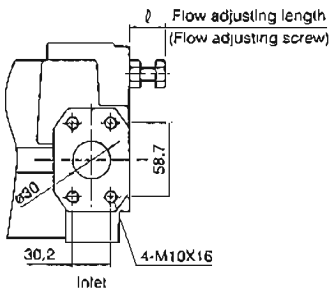


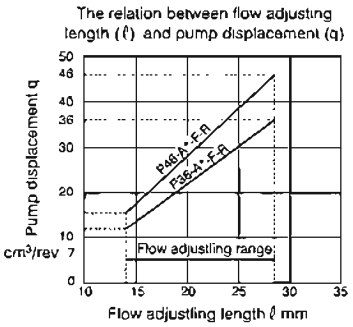


P36-A-TYPE / P46-A-TYPE



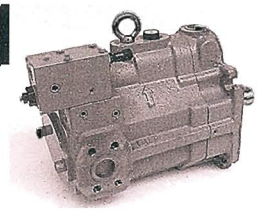


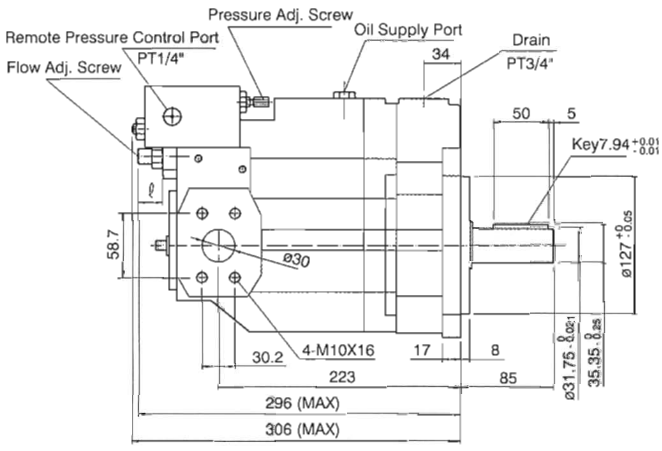


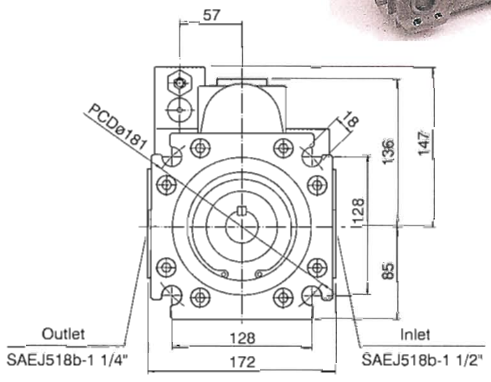


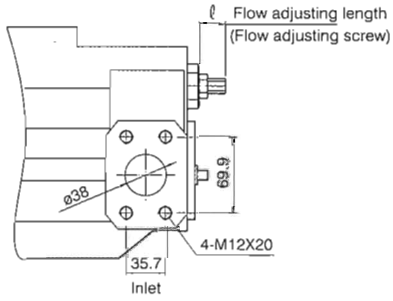
PRESSURE COMPENSATING TYPE

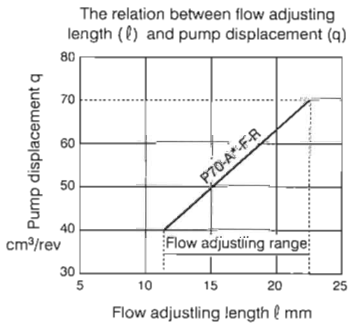
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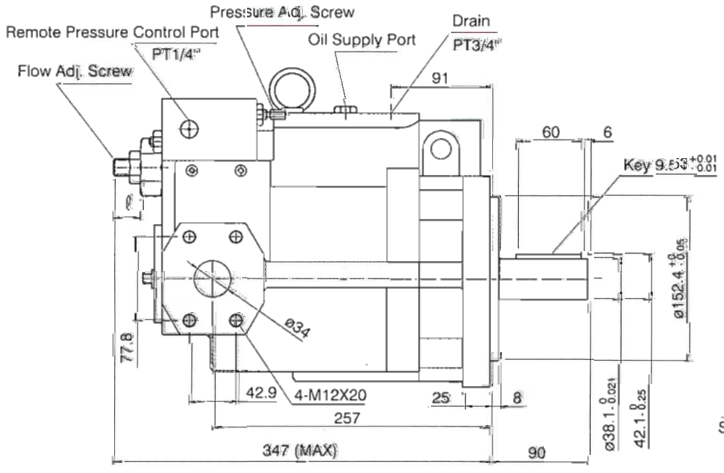


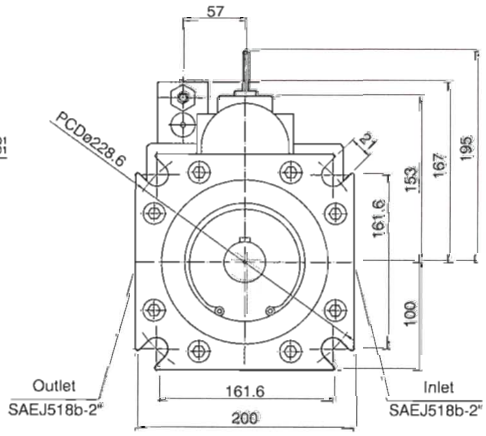


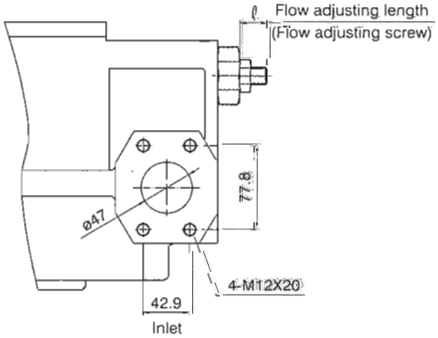


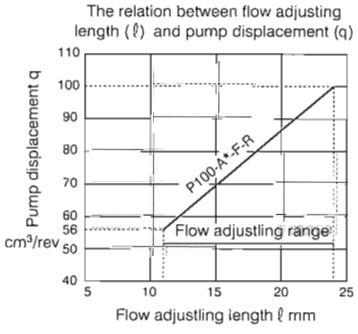


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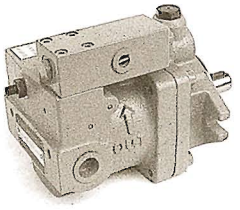


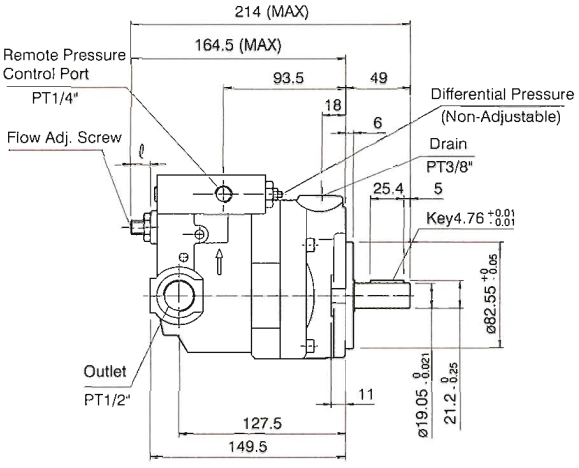


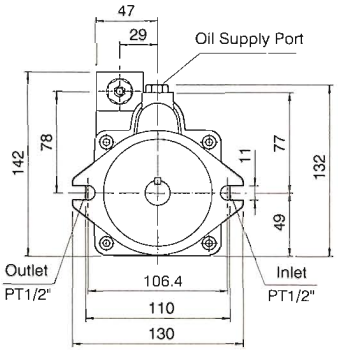


REMOTE PRESSURE CONTROL TYPE

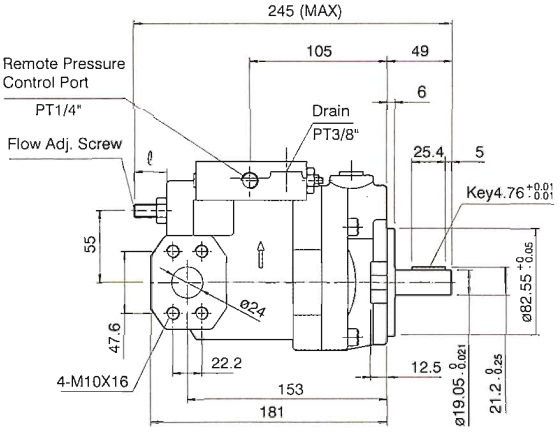
P08-B-TYPE

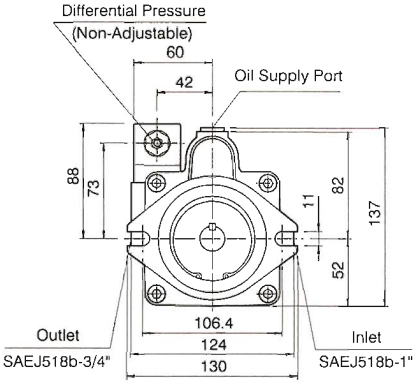




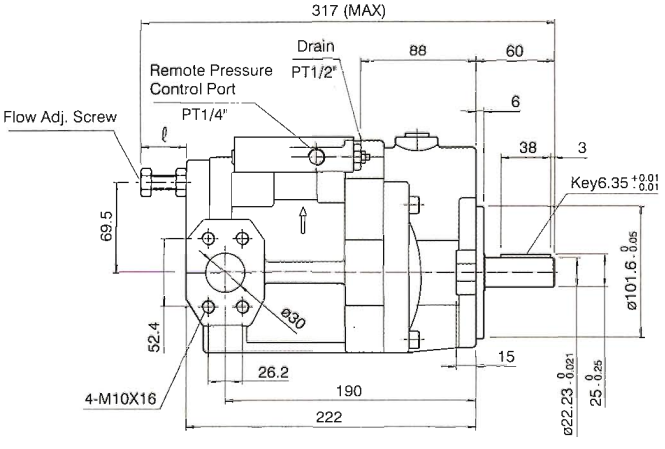


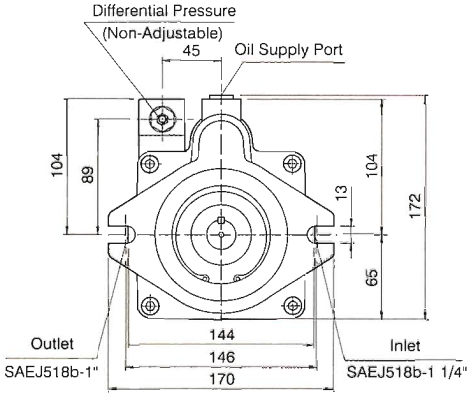
P16-B-TYPE / P22-B-TYPE





P36-B-TYPE / P46-B-TYPE

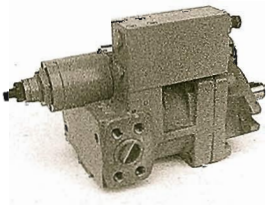




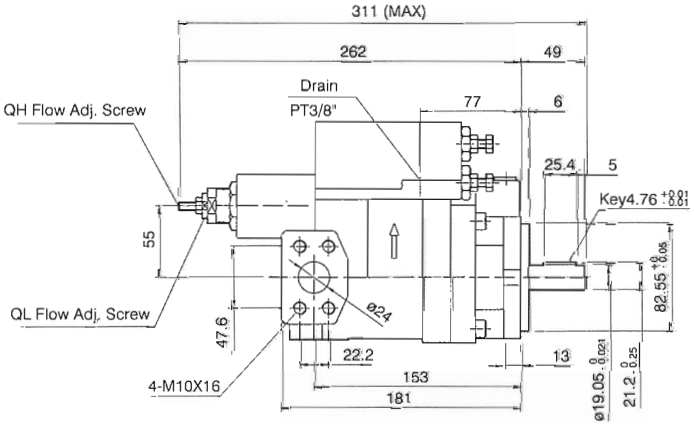
TWO PRESSURE-TWO FLOW CONTROL TYPE

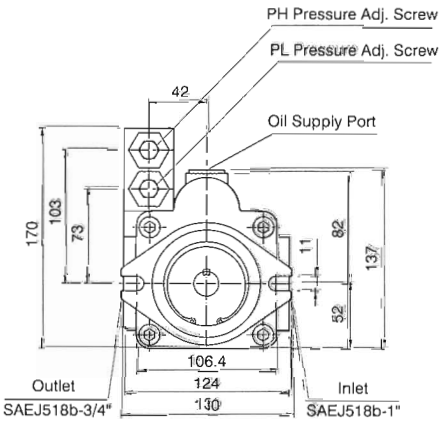
P16-C1 A3-F-R-01

Design code		
Rotation	R : Clockwise(CW)	
Mounting	F : Flange mounting	L : Foot mounting
PH Pressure adj. range	A2 : 30~145kgf/cm²	A3 : 30~215kgf/cm²
PL Pressure adj. range	C0 : 20~40kgf/cm²	C1 : 20~73kgf/cm²
Displacement	16, 22, 36, 46, (cm³/rev)	

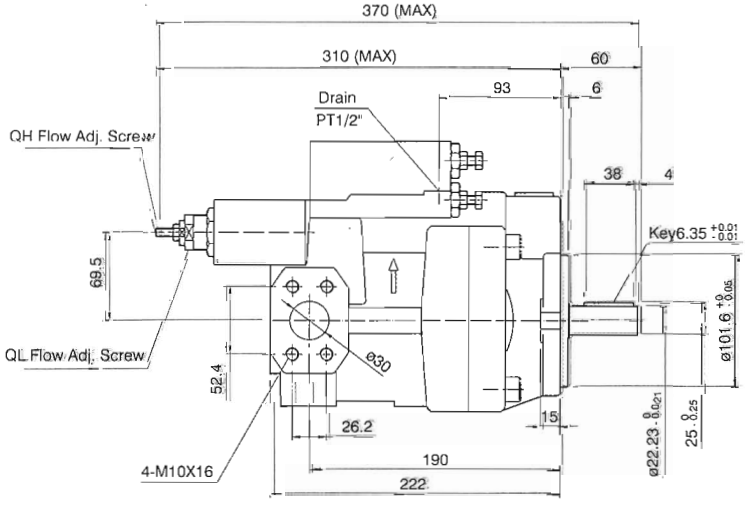


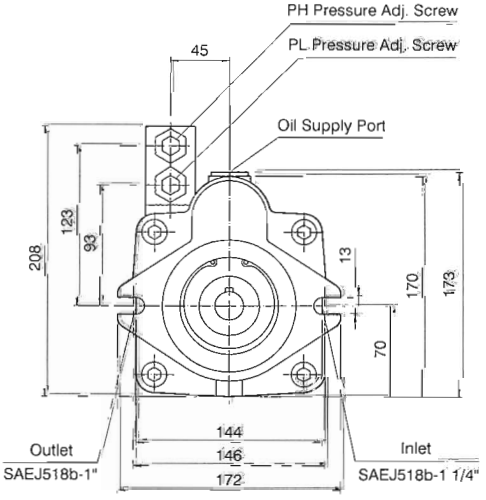
P16-C-TYPE / P22-C-TYPE





P36-C-TYPE / P46-C-TYPE

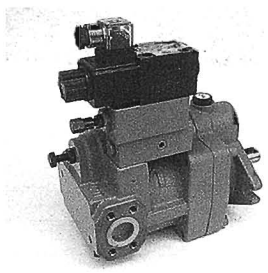




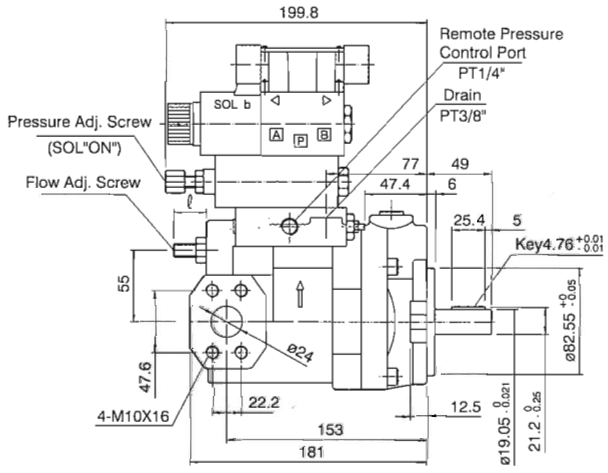
SOLENOID CUT-OFF CONTROL TYPE

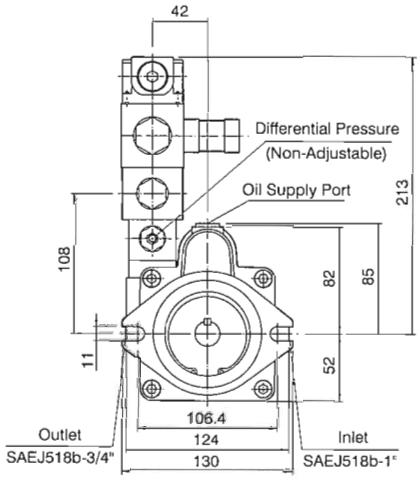
P16-D3-F-R-01

Design code		
Rotation	R : Clockwise(CW)	
Mounting	F : Flange mounting	L : Foot mounting
Pressure adj. range	2 : 30~145 kgf/cm²	3 : 30~215 kgf/cm²
Solenoid cut-off control type		
Displacement	08,16, 22, 36, 46, 70, 100, (cm³/rev)	

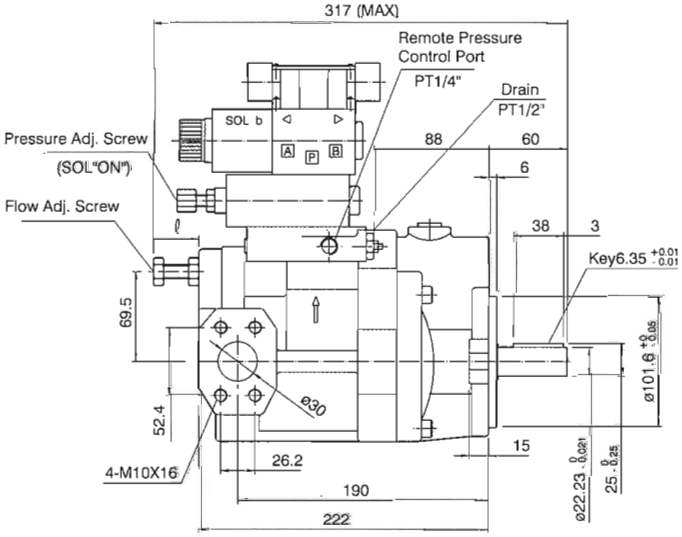


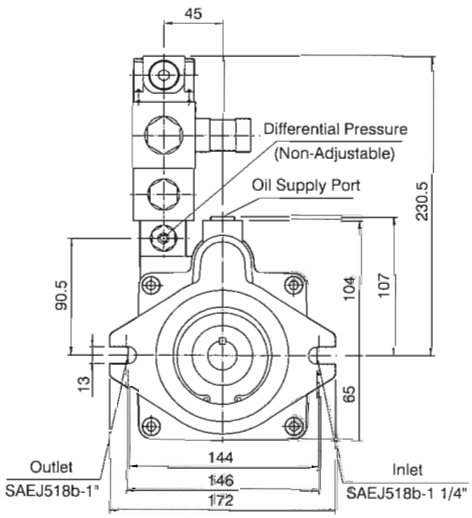
P16-D-TYPE / P22-D-TYPE





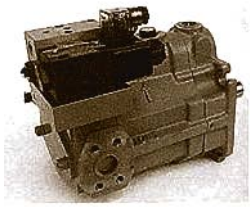
P36-D-TYPE / P46-D-TYPE

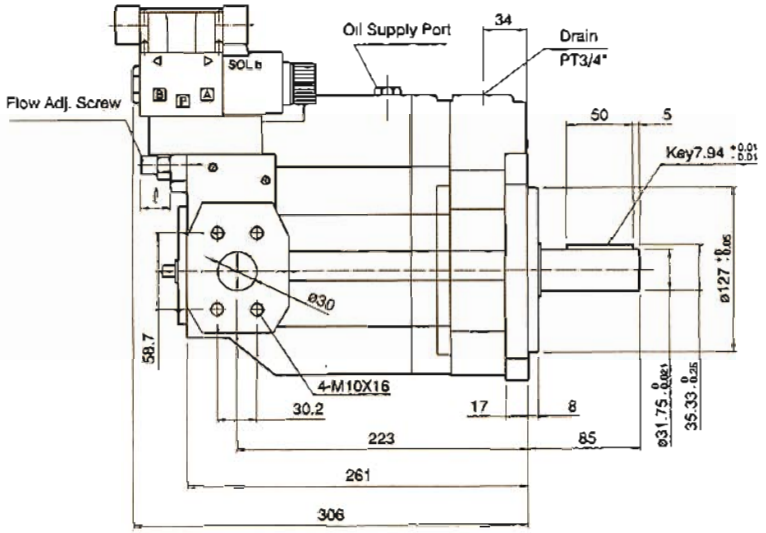


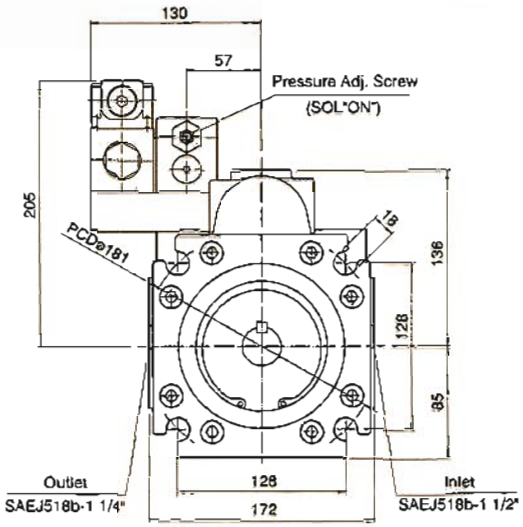


SOLENOID CUT-OFF CONTROL TYPE

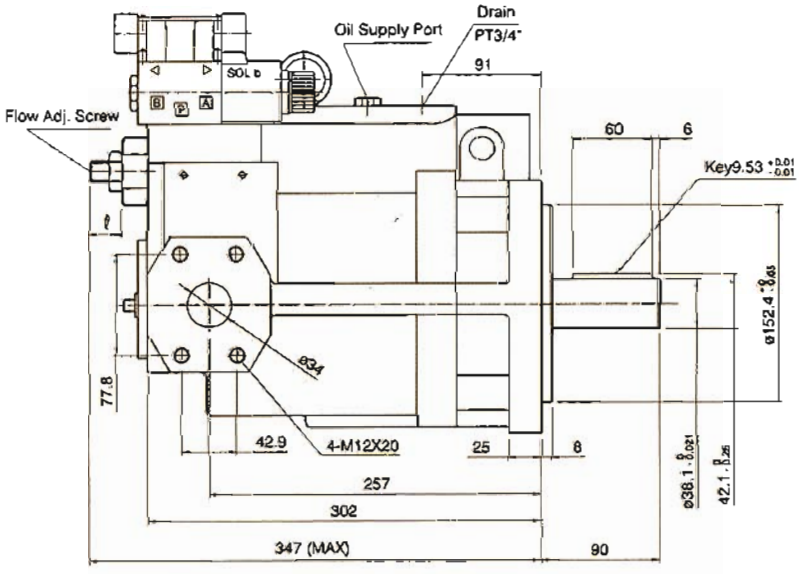
P70-D-TYPE

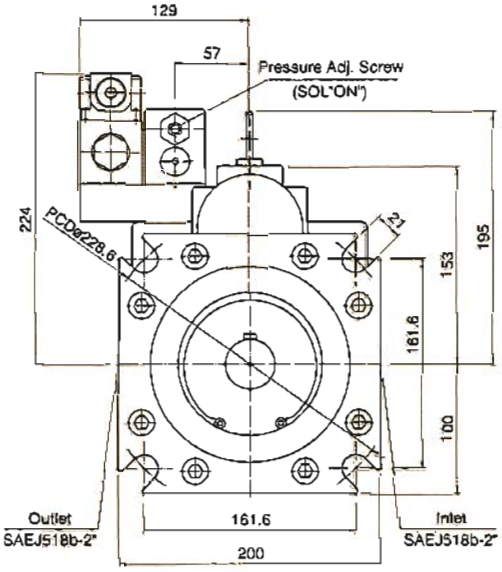






P100-D-TYPE

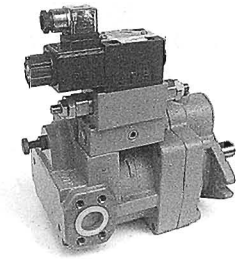




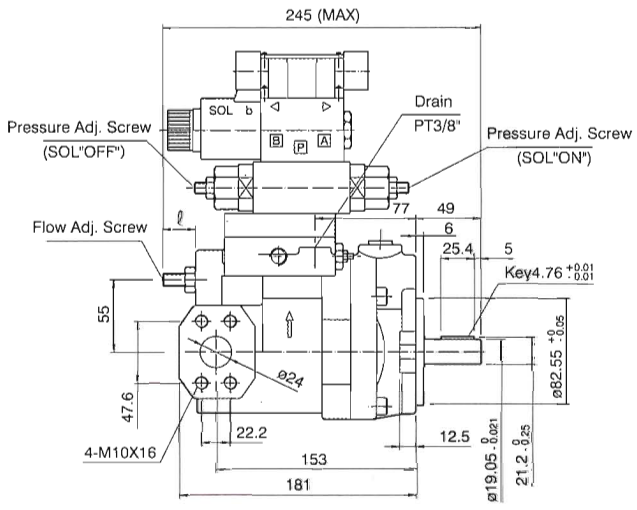
TWO PRESSURE CUT-OFF CONTROL TYPE

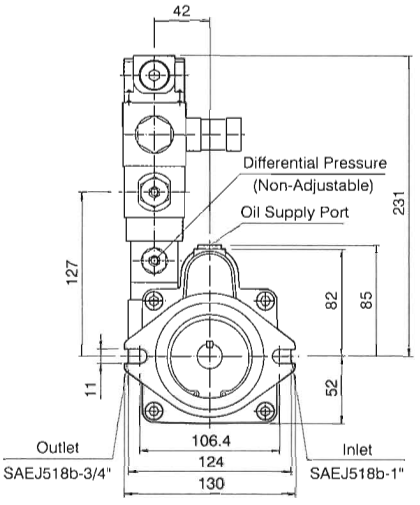
P16-E3-F-R-01

Design code		
Rotation	R : Clockwise(CW)	
Mounting	F : Flange mounting	L : Foot mounting
Pressure adj. range	2 : 30~145 kgf/cm²	3 : 30~215 kgf/cm²
Two pressure cot-off control type		
Displacement	08,16, 22, 36, 46, 70, 100, (cm³/rev)	

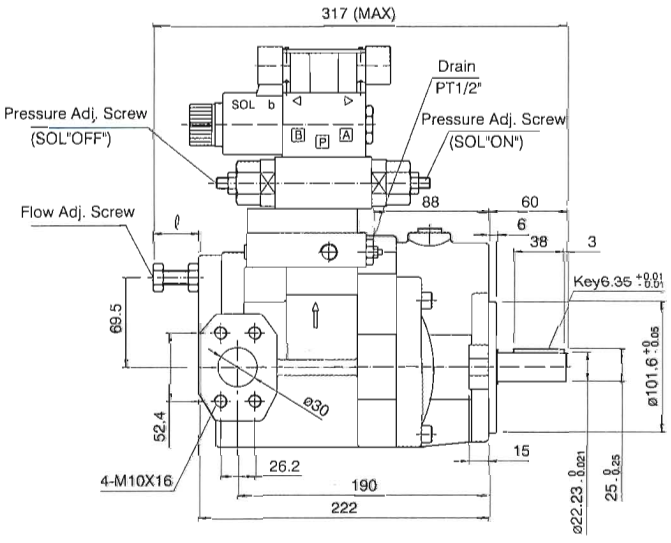


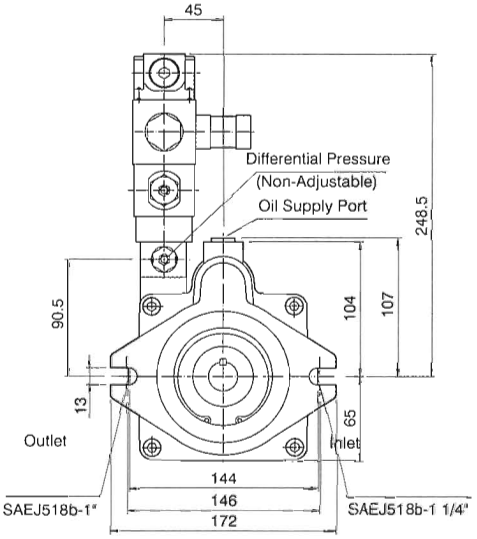
P16-E-TYPE / P22-E-TYPE





P36-E-TYPE / P46-E-TYPE

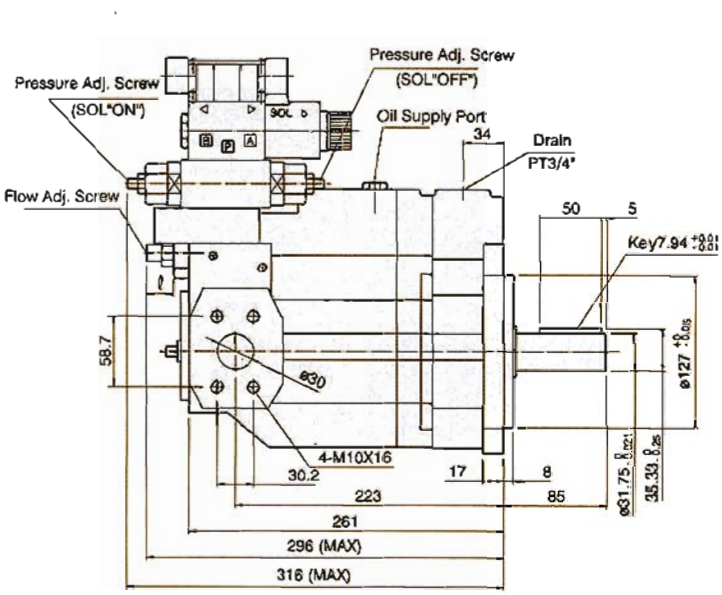


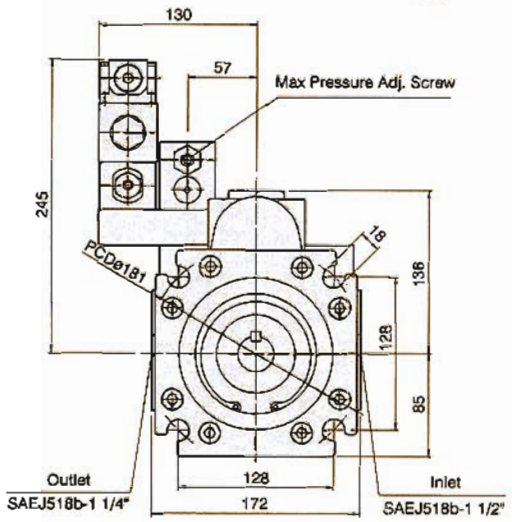


TWO PRESSURE CUT-OFF CONTROL TYPE

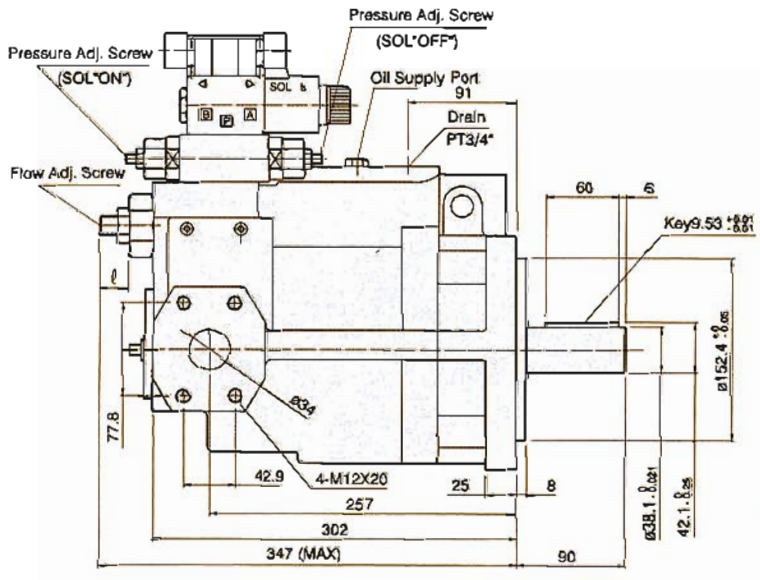
P70-E-TYPE

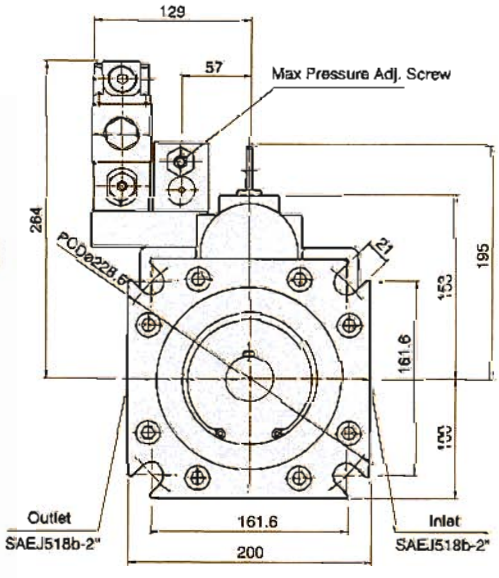






P100-E-TYPE

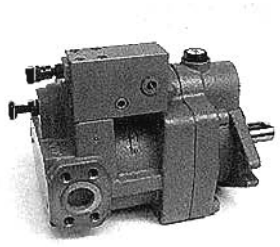




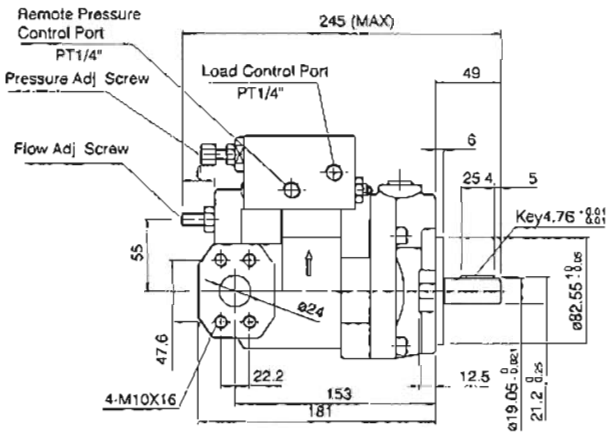
LOAD SENSING CONTROL TYPE

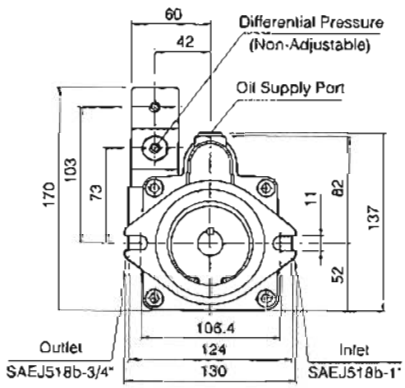
P16-HL3-F-R-01

Design code			
Rotation	R : Clockwise(CW)		
Mounting	F : Flange mounting	L : Foot mounting	
Pressure adj. range	2 : 30~145 kgf/cm²	3 : 30~215 kgf/cm²	
Load sensing control type			
Displacement	08,16, 22, 36, 46, 70, 100, (cm³/rev)		

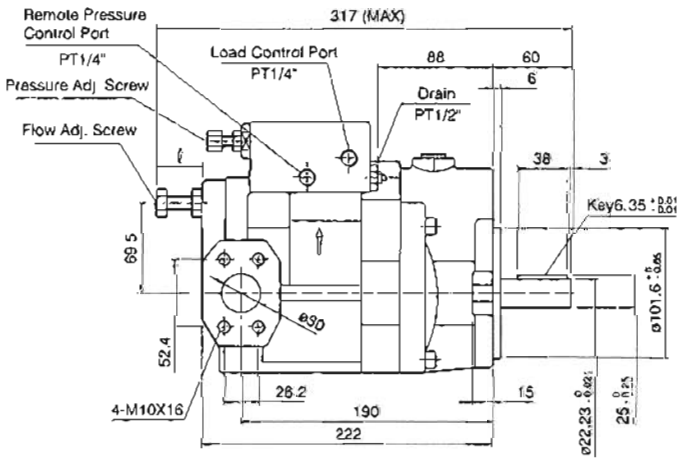


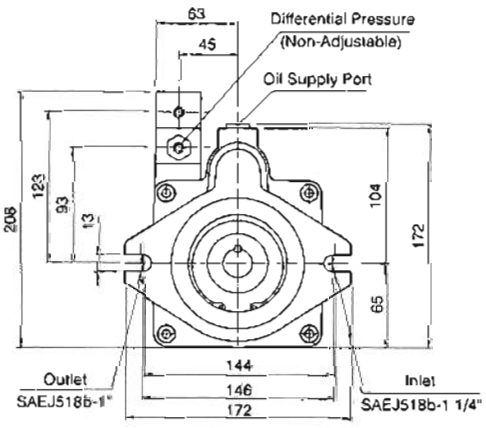
P16-HL-TYPE / P22-HL-TYPE





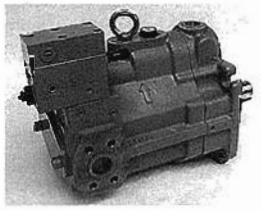
P36-HL-TYPE / P46-HL-TYPE

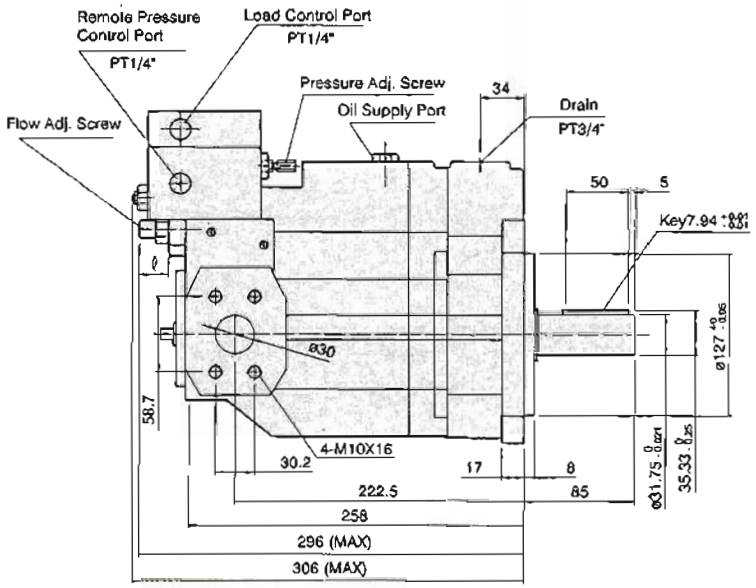


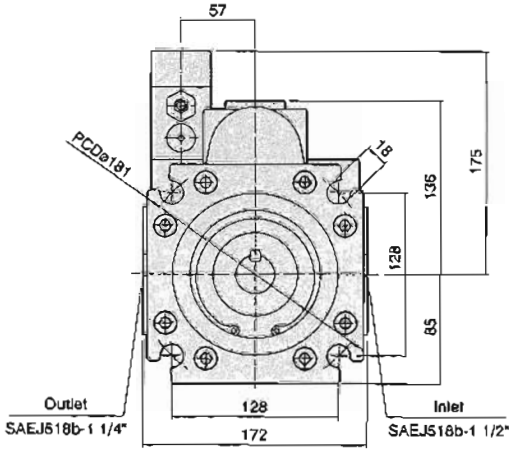


LOAD SENSING CONTROL TYPE

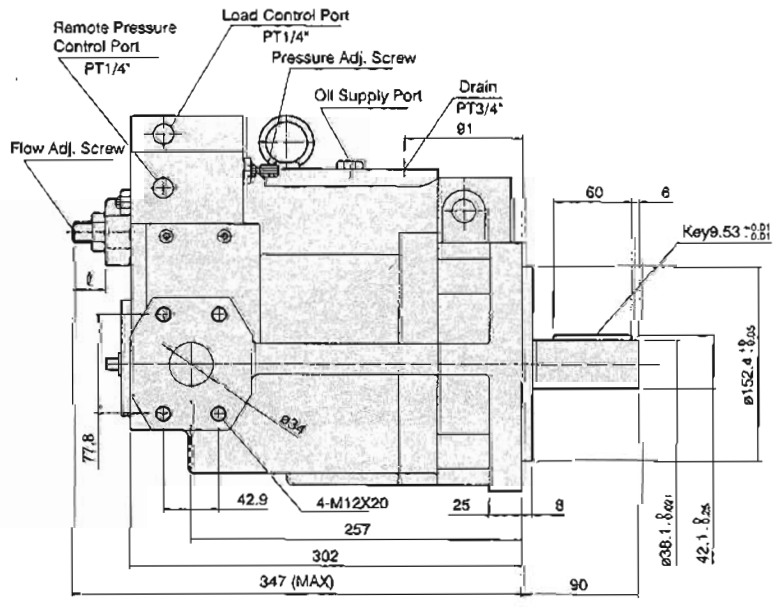
P70-HL-TYPE

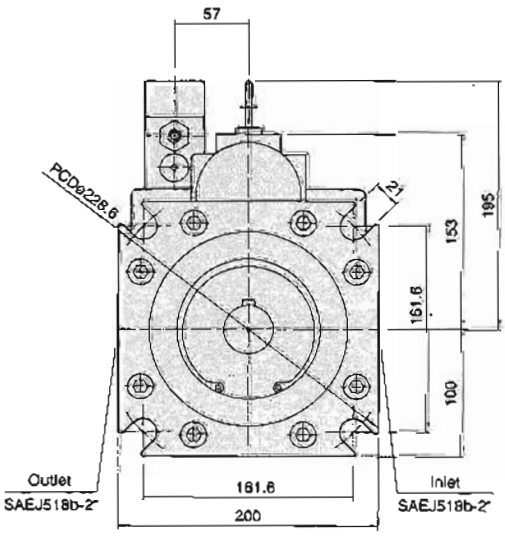






P100-HL-TYPE





DOUBLE PUMPS

Shaft end pump model

PP36-A3-F-R-2A

1 2 3 4 5 6 7

1 Variable volume piston pump-Double Pump

2 Geometric displacement
Shaft end pump(Ref Model Number)

3 Control options

A : Pressure compensating type

B : Remote pressure control type

D : Solenoid cut-off control type

E : Two pressure cut-off control type

HL : Load sensing control type

4 Pressure adjusting range

1 : 20~73 kgf/cm²

2 : 30~145 kgf/cm²

3 : 30~215 kgf/cm²

5 Mounting

F: Flange mounting L: Foot mounting

6 Rotation

R : Clockwise(Viewed from shaft end)

7 Thru-drive

2A:SAE A ø82.55

2B:SAE B ø101.6
(PP70+P36/46, PP100+P36/46)

Cover end pump model

P16-A3-S

1 2 3

1 Variable volume piston pump
(Cover end pump)

2 Geometric displacement
Cover end pump(Ref Model Number)

3 Control options

A : Pressure compensating type

B : Remote pressure control type

D : Solenoid cut-off control type

E : Two pressure cut-off control type

HL : Load sensing control type

4 Pressure adjusting range

1 : 20~73 kgf/cm²

2 : 30~145 kgf/cm²

3 : 30~215 kgf/cm²

5 Type of Shaft

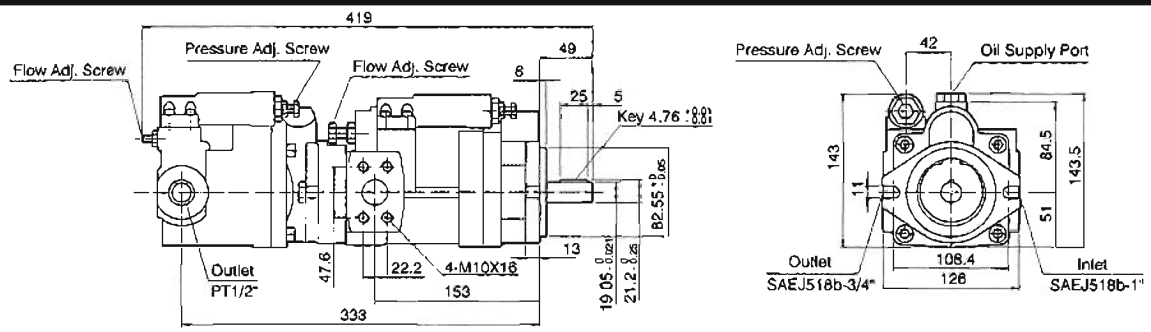
S : SAE A Spline

K : Cylindric, key
(PP70+P36/46, PP100+P36/46)

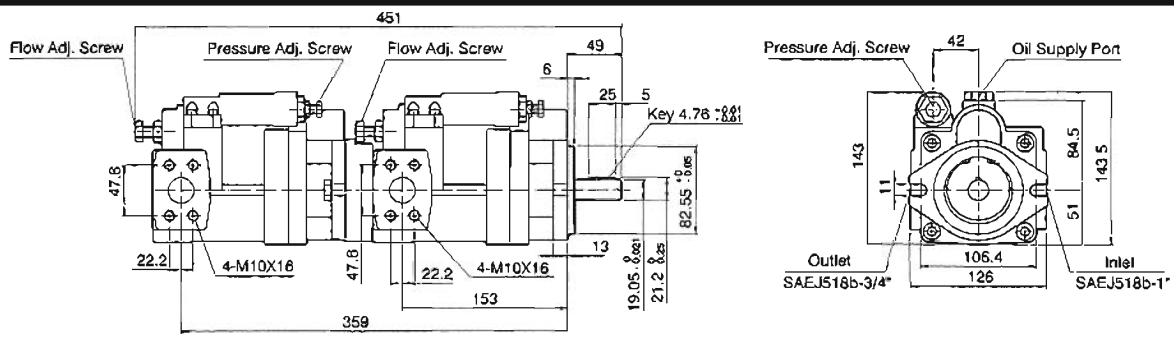
Model number :

Shaft end pump / Cover end pump	PP16	PP22	PP36	PP46	PP70	PP100
P08	●	●	●	●	●	●
P16	●	●	●	●	●	●
P22		●	●	●	●	●
P36					●	●
P46					●	●

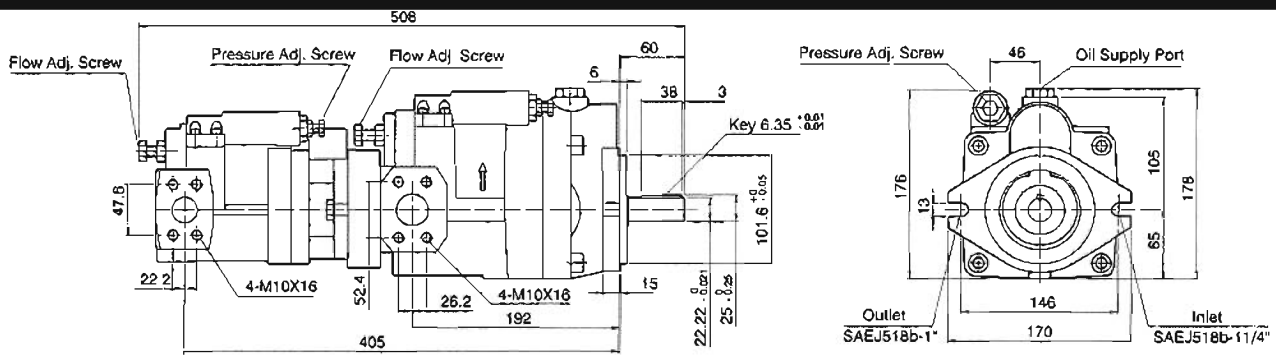
PP16/22-A*-F-R-2A+P08-A*-S



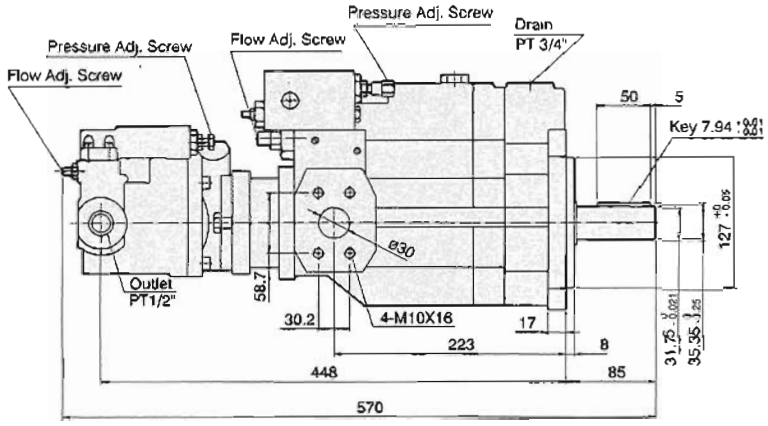
PP16/22-A*-F-R-2A+P16/22-A*-S

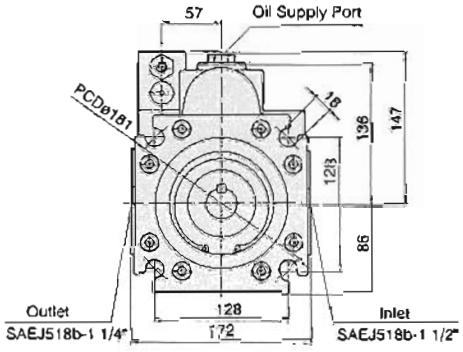


P36/46-A*-F-R-2A+P16/22-A*-S

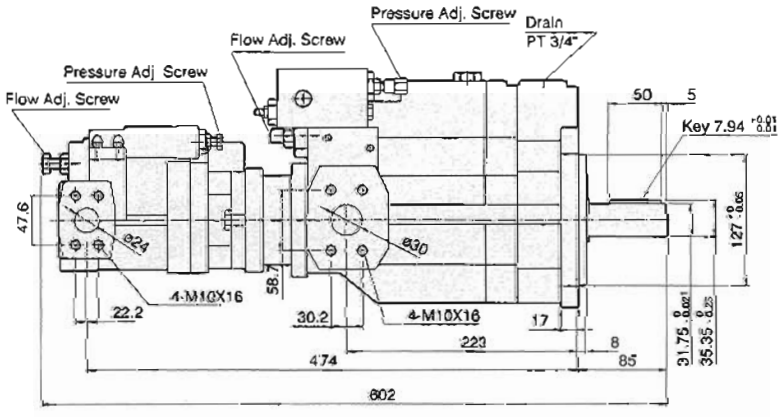


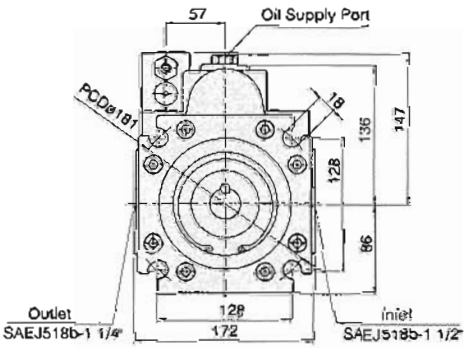
PP70-A*-F-R-2A+P08-A*-S



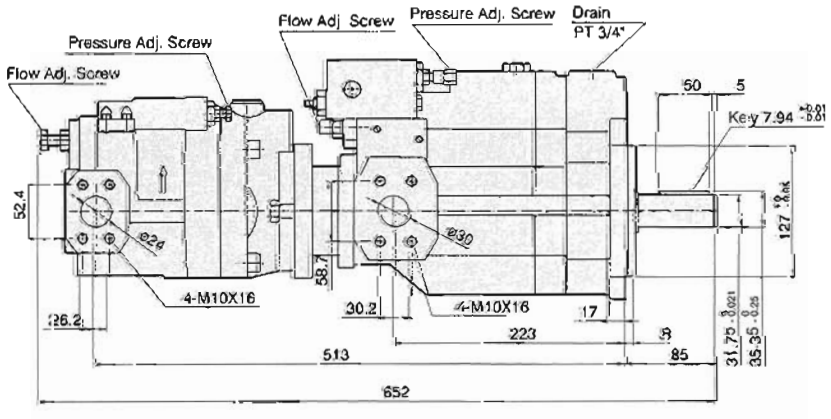


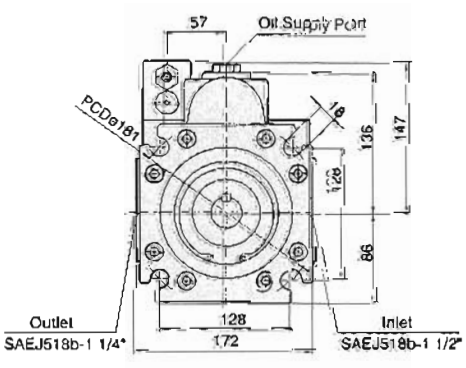
PP70-A*-F-R-2A+P16/22-A*-S





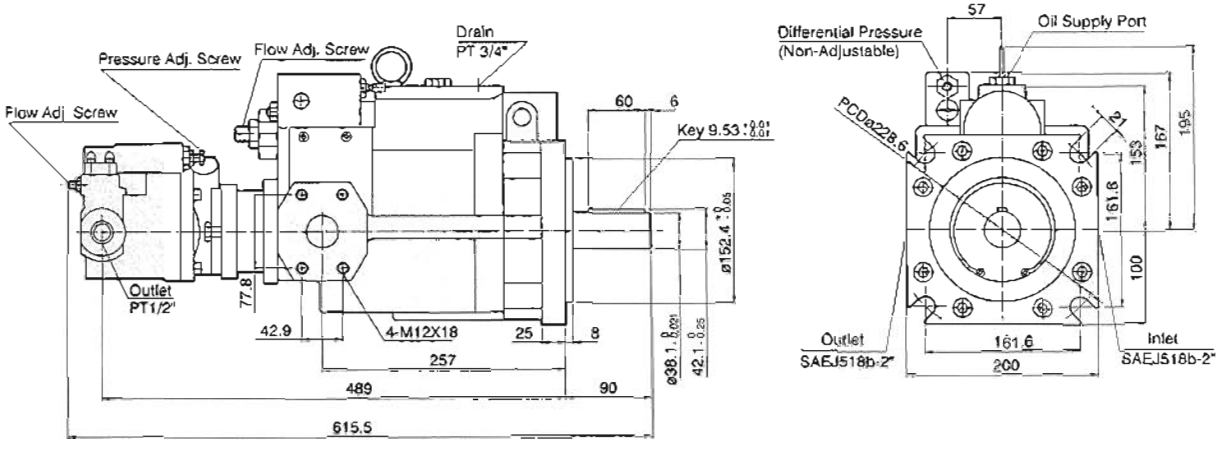
PP70-A*-F-R-2B+P36/46-A*-K



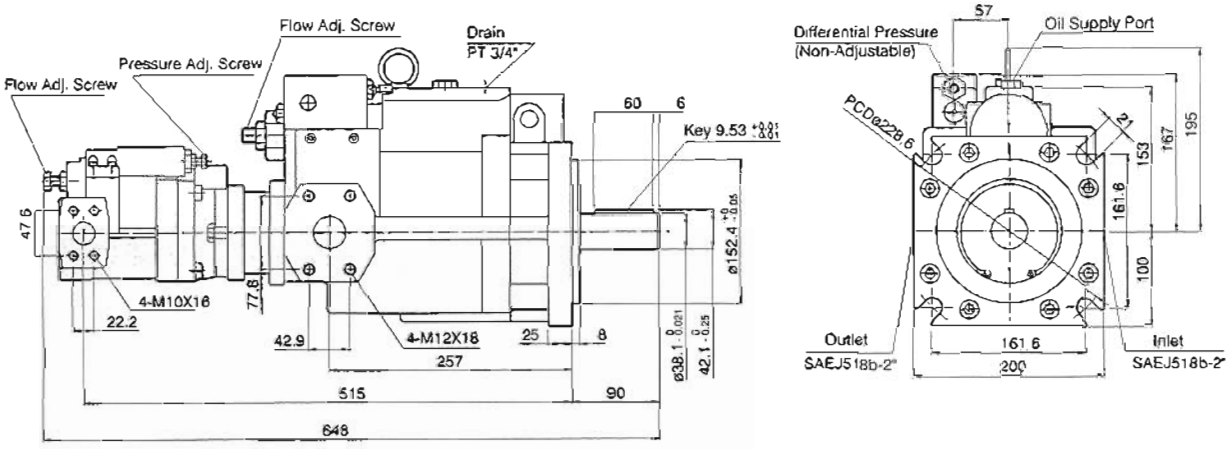


DOUBLE PUMPS

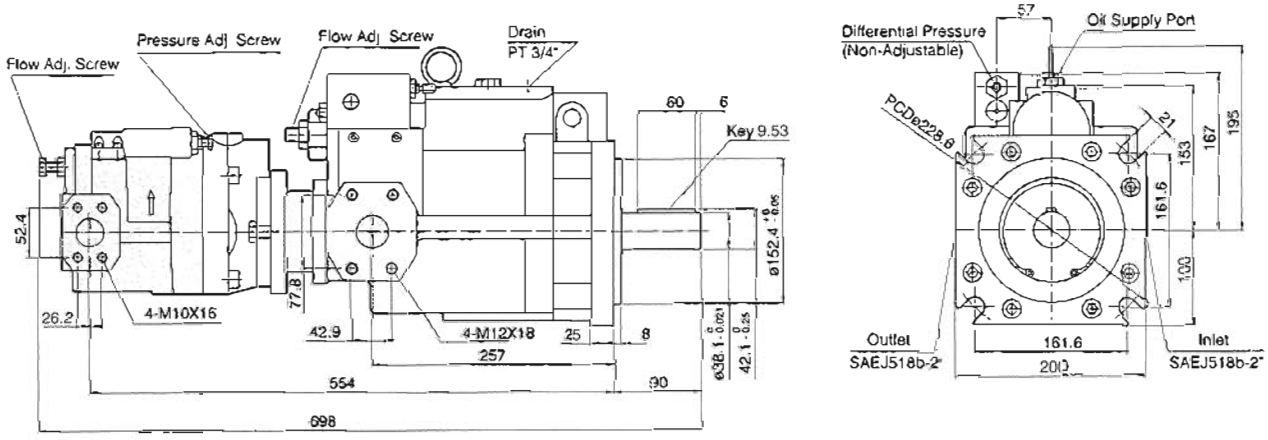
PP100-A*-F-R-2A+P08-A*-S



PP100-A*-F-R-2A+P16/22-A*-S

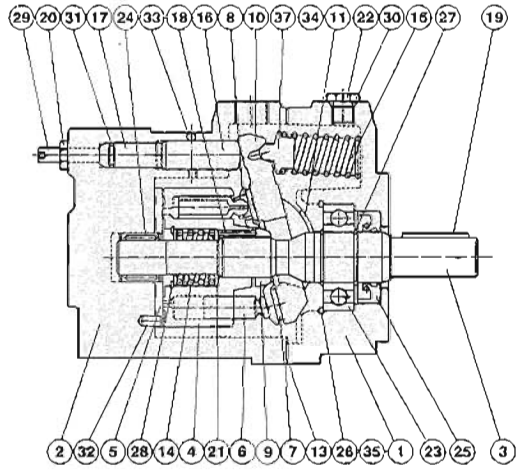


PP100-A*-F-R-2B+P36/46-A*-K



CROSS SECTION DRAWING

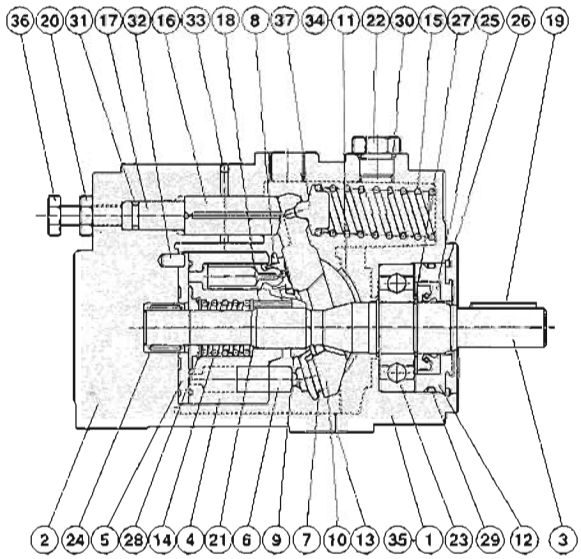
P08-TYPE



P08-TYPE

Part No.	Part Name	Size	Q"ty
13	Gasket	—	1
23	Ball Bearing	6205	1
24	Ball Bearing	TA 1720	1
25	Oil seal	TCN 25 45 11	1
30	Oil-ring	P11	1
31	Oil-ring	P9	1

P16/22/36/46-TYPE



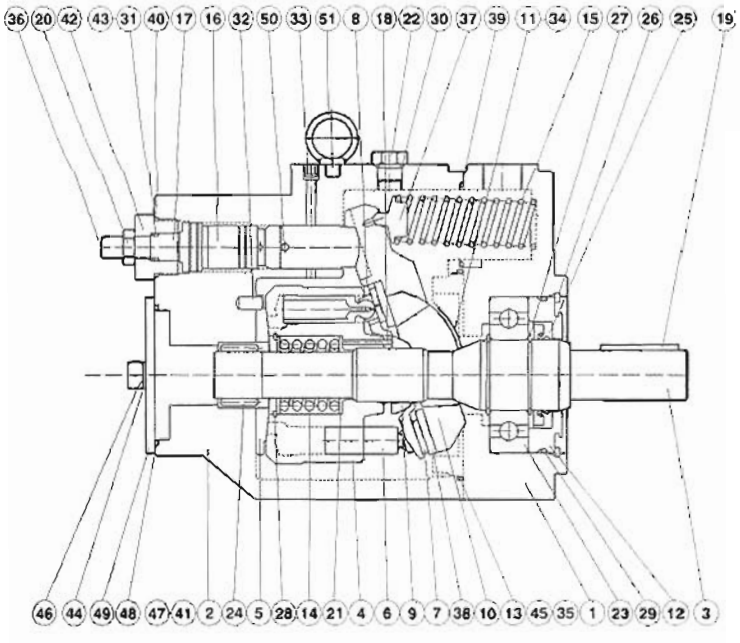
P16/22/36/46-TYPE

Part No.	Part Name	P16/22-TYPE Size	P36/46-TYPE Size	Q"ty
13	Gasket	—	—	1
23	Ball bearing	6305	6306	1
24	Needle Bearing	TA 1720	TA 2025	1
25	Oil seal	TCN 25 45 11	TCN 30 50 11	1
29	Oil-ring	G58	G70	1
30	Oil-ring	P14	P14	1
31	Oil-ring	P10A	P14	1

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Bady	9	Barrel holder	17	Guide	25	Oil seal	33	Expander plug
2	Case	10	Swash plate	18	Needle	26	Snap ring	34	Machine screw
3	Shaft	11	Thrust bush	19	Key	27	Snap ring	35	Machine screw
4	Cylinder barrel	12	Seal holder	20	Nut	28	Snap ring	36	Flow adj. screw
5	Valve plate	13	Gasket	21	Retainer	29	O-ring	37	Spring Holder
6	Piston	14	Spring	22	Plug	30	O-ring		
7	Shoe	15	Spring	23	Ball bearing	31	O-ring		
8	Shoe holder	16	Control Piston	24	Needle bearing	32	Pin		

CROSS SECTION DRAWING

P70/100-TYPE

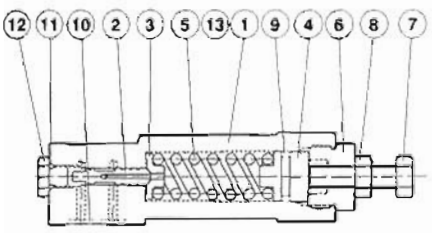


P70/100-TYPE

Part No.	Part Name	P16/22-TYPE Size	P36/46-TYPE Size	Q"ty
13	Oil-ring	G130	G155	1
23	Ball bearing	6309	6310	1
24	Needle bearing	RNA 6905	TR 35 48 30	1
25	Oil seal	TCN 45 68 12	TCN 50 72 12	1
29	Oil-ring	G95	G105	1
30	Oil-ring	P14	P14	1
31	Oil-ring	P14	P16	1
39	Oil-ring	G50	G50	1
40	Oil-ring	P34	P36	1
41	Oil-ring	P9	P9	1
48	Oil-ring	G85	G85	1

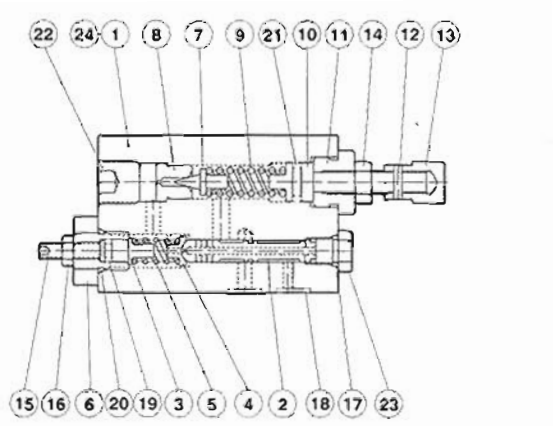
PRESSURE COMPENSATOR CROSS SECTION DRAWING

P08/16/22/36/46-A-TYPE



Part No.	Part Name	Size	Q"ty
9	Oil-ring	P14	1
10	Oil-ring	P6	3
11	Oil-ring	P6	1

P70/100-A-TYPE

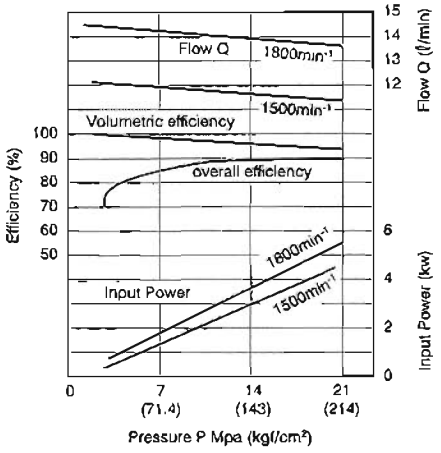


Part No.	Part Name	Size	Q"ty
17	Oil-ring	P8	1
18	Oil-ring	P9	3
19	Oil-ring	P5	1
20	Oil-ring	P12	1
21	Oil-ring	P10A	1

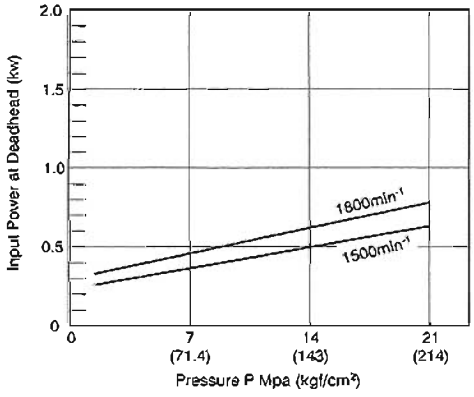
PERFORMANCE DATA

P08-A*-F-01 OIL VISCOSITY ISO VG32

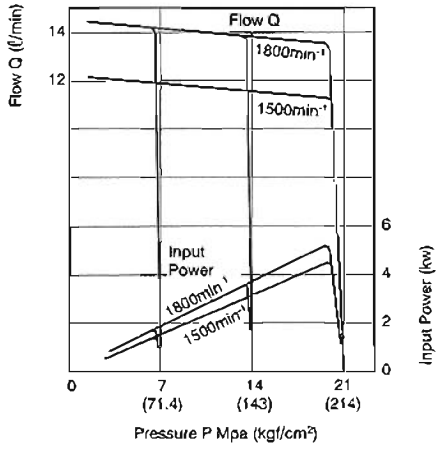
Efficiency Curves



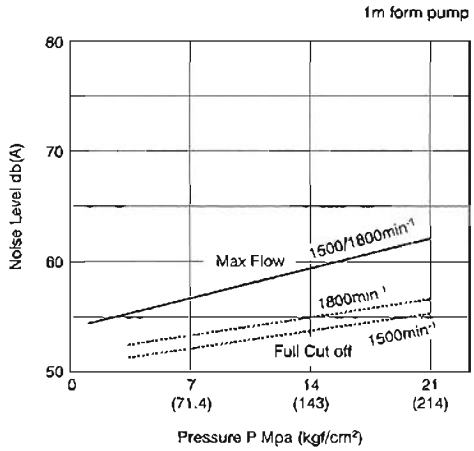
Input power at Deadhead



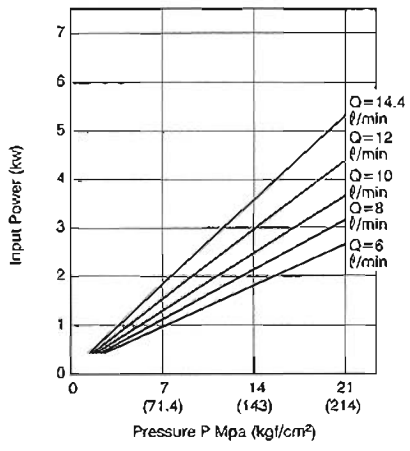
Pressure-Flow Curves



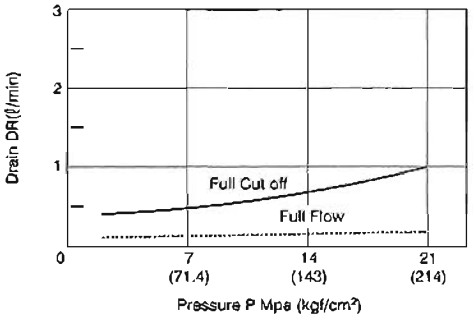
Noise Level



Input Power Curves



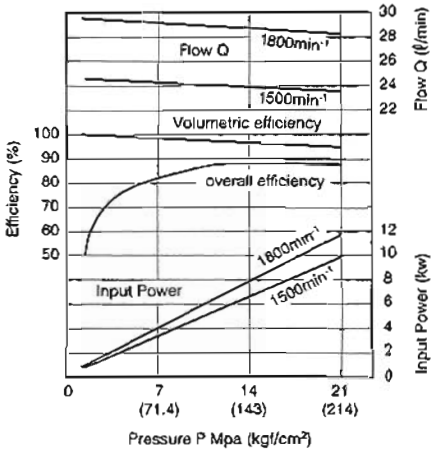
Drain curve



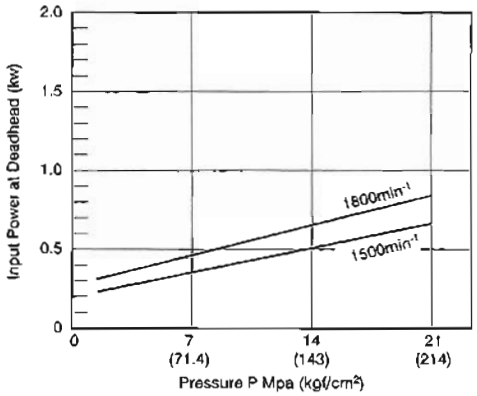
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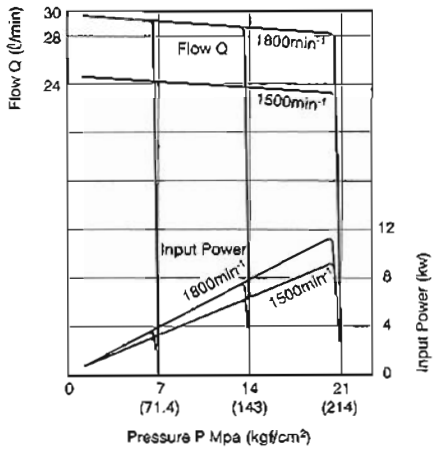
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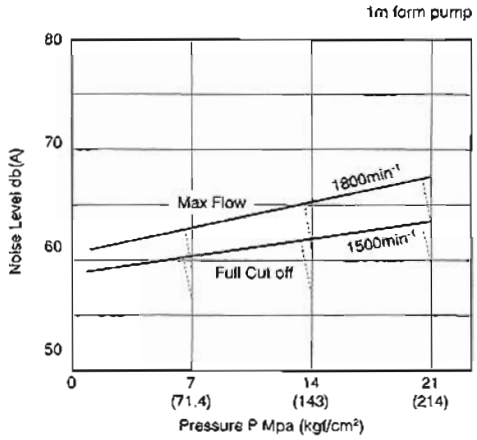
Input power at Deadhead



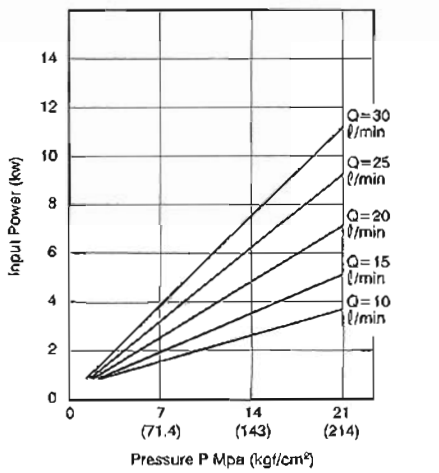
Pressure-Flow Curves



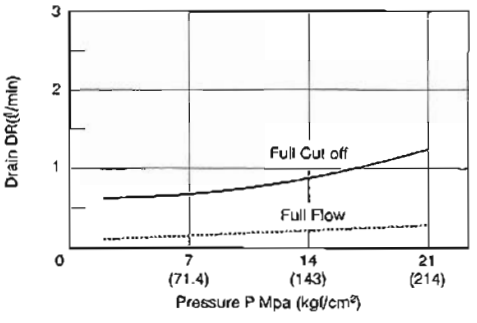
Noise Level



Input Power Curves



Drain curve

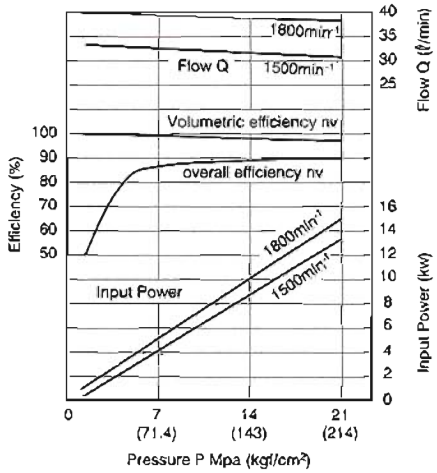


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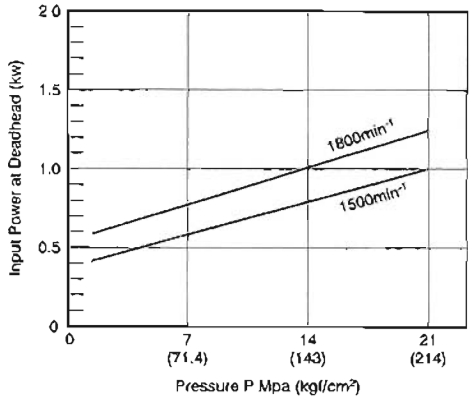
P22-A*-F-01

OIL VISCOSITY ISO VG32

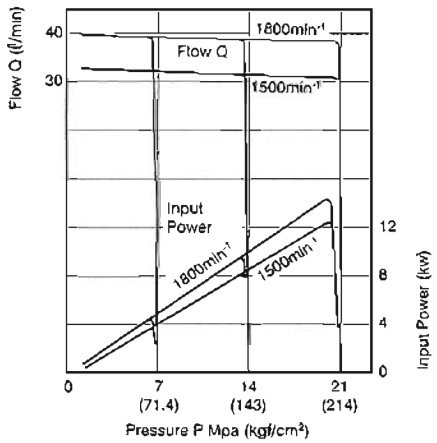
Efficiency Curves



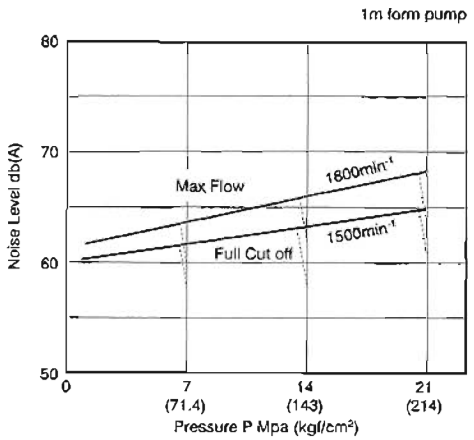
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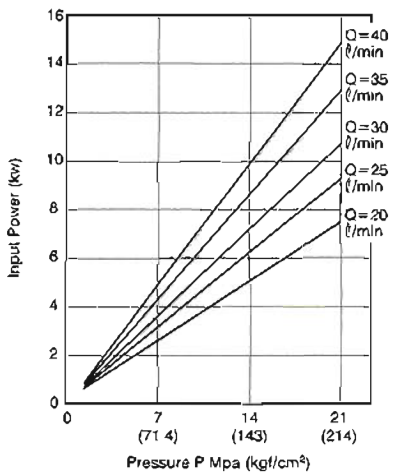
Pressure-Flow Curves



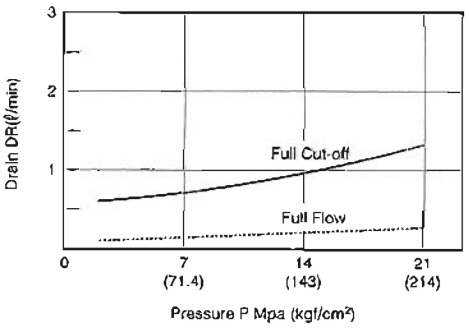
Noise Level



Input Power Curves



Drain curve

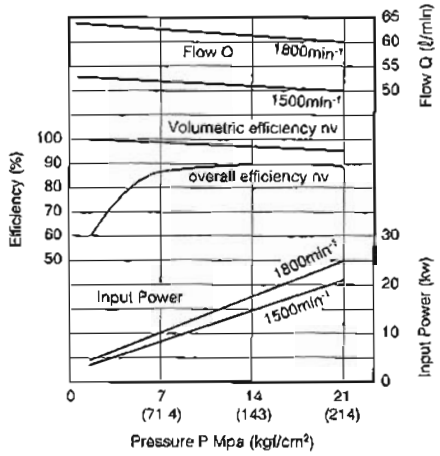


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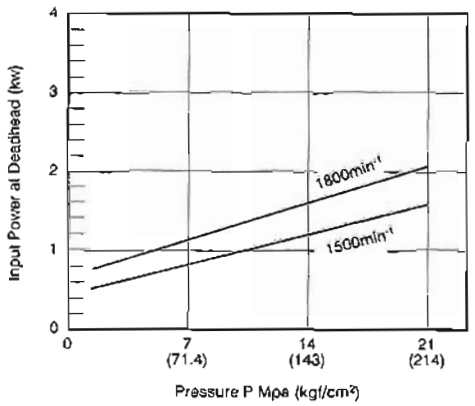
P36-A*-F-01

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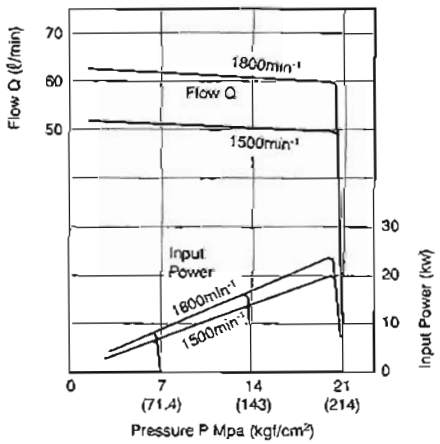
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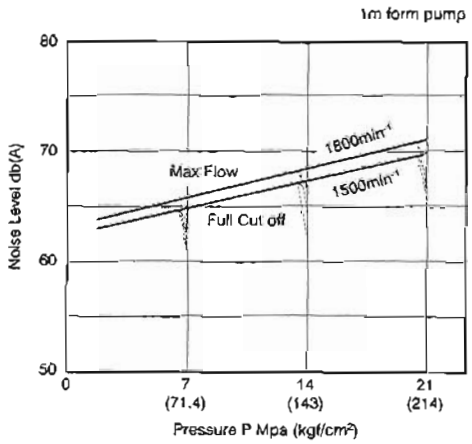
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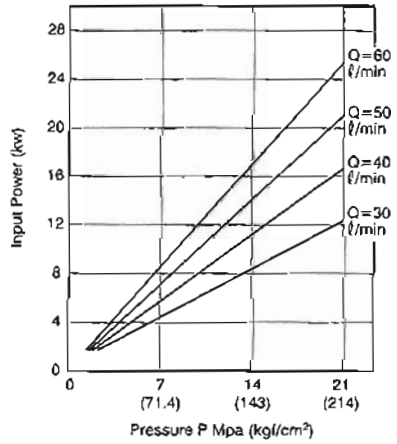
Pressure-Flow Curves



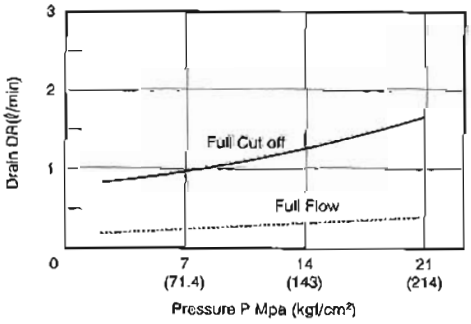
Noise Level



Input Power Curves



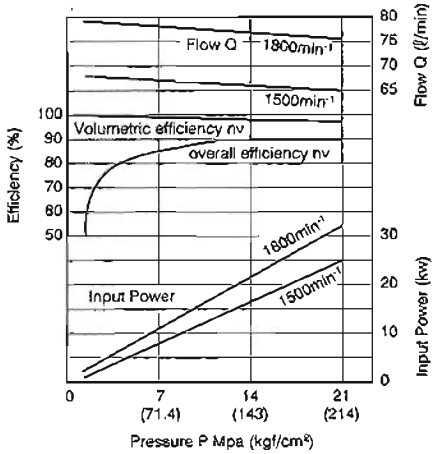
Drain curve



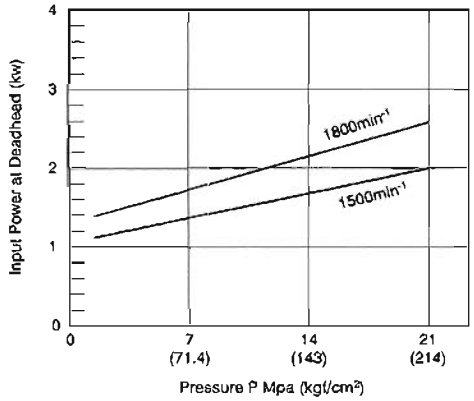
PERFORMANCE DATA

P46-A*-F-01 OIL VISCOSITY ISO VG32

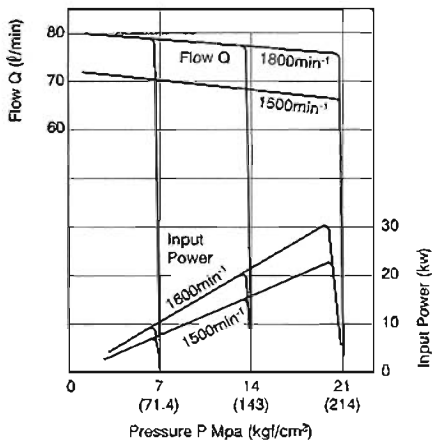
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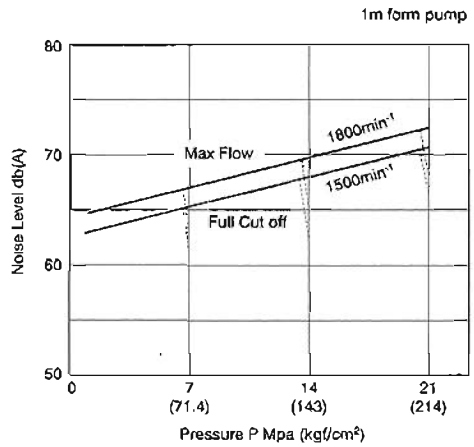
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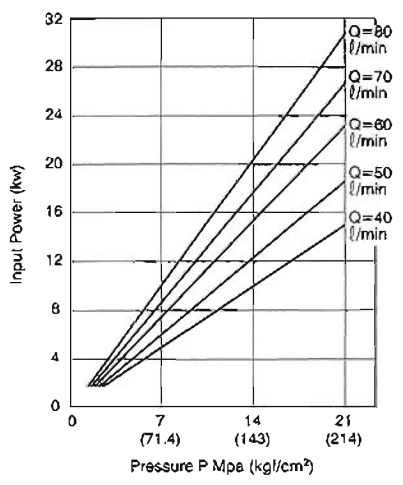
Pressure-Flow Curves



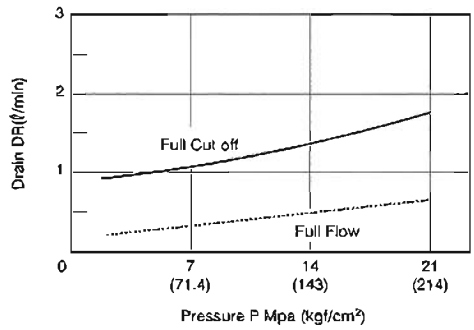
Noise Level



Input Power Curves



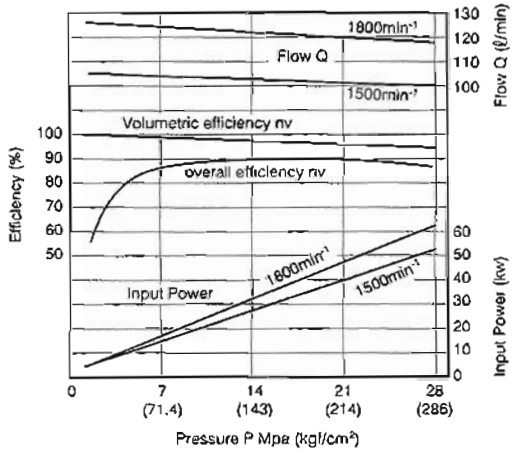
Drain curve



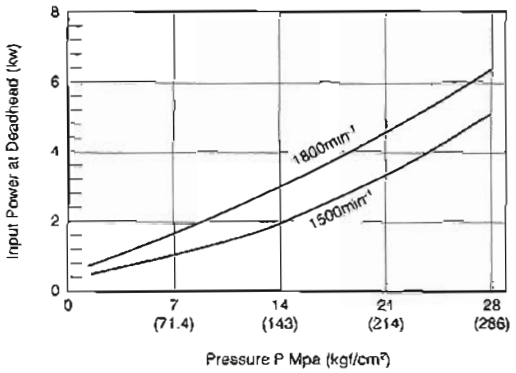
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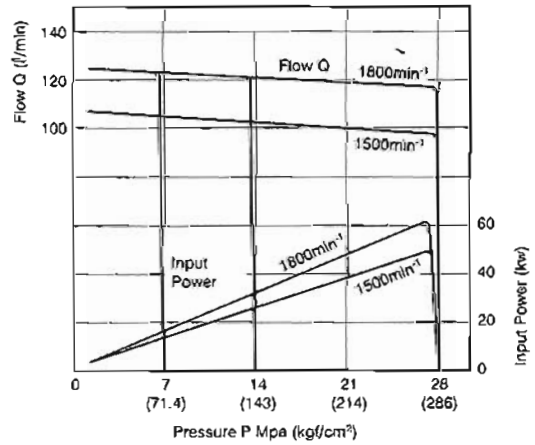
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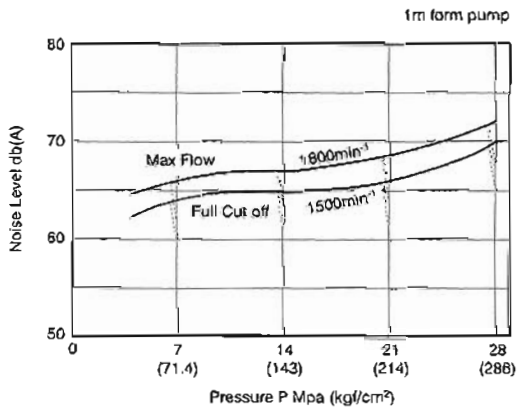
Input power at Deadhead



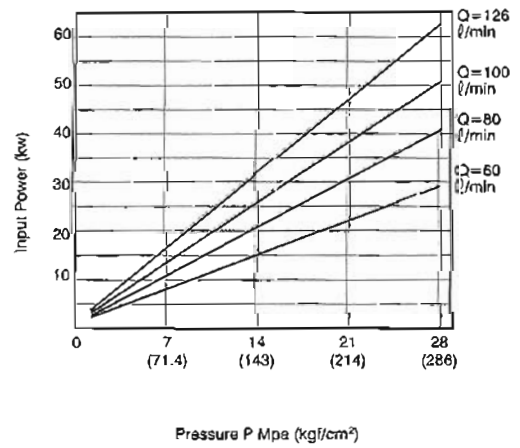
Pressure-Flow Curves



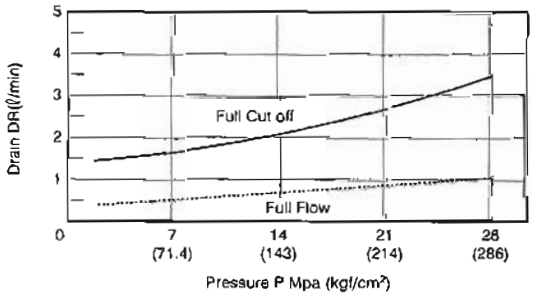
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Input Power Curves



Drain curve

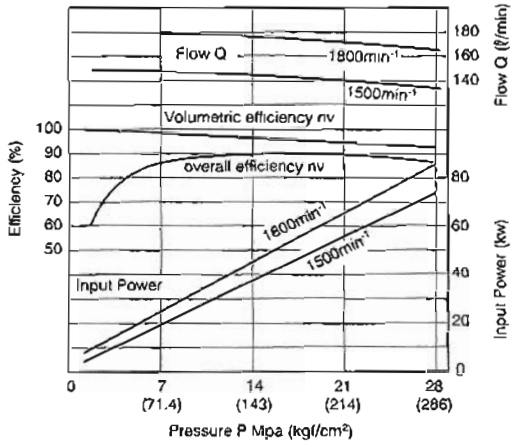


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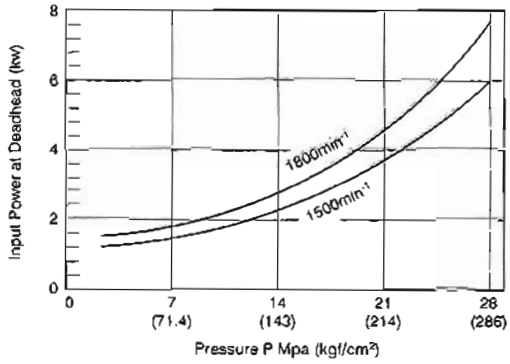
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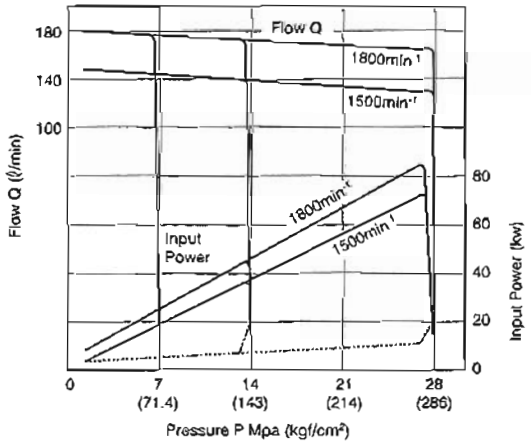
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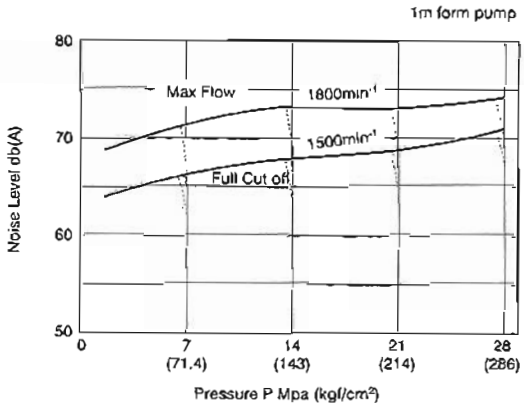
Input power at Deadhead



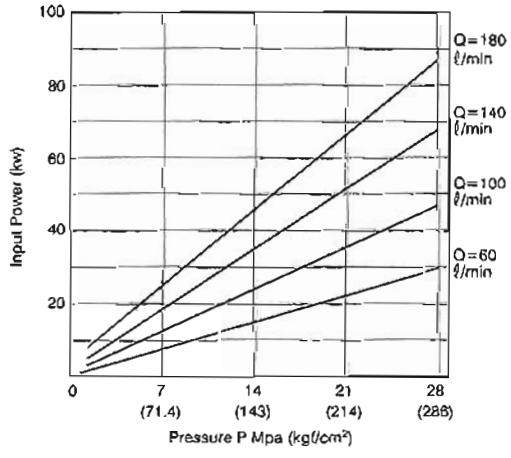
Pressure-Flow Curves



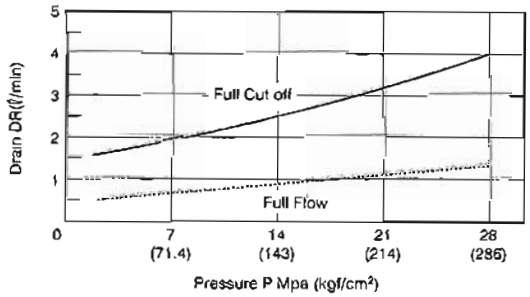
Noise Level



Input Power Curves



Drain curve



Operating Instruction:

NOTES ON PUMP INSTALLATION

1. Recommend a flexible coupling to connect the drive shaft and pump shaft so that minimum radial and thrust loads are applied to the pump shaft.
2. Use good quality petroleum fluid. The fluid viscosity should be 20~200cSt (98~900 SUS). For general use, R&O type and antiwear type of ISO VG32~68 are recommended. The optimum viscosity during operation is 20~50cSt(98~232 SUS).
3. Operating temperature range is 5~60°C(41~140°F). During start up at temperature below 0°(32°F),perform warmup operations at a low pressure and low speed until fluid temperature reaches 5°C(41°F)
4. The pump suction pressure should not exceed -0.3kgf/cm² (-4.3psi)(the suction port flow velocity less than 2m/sec(6.5ft/sec).
5. The alignment of the pump shaft with the drive shaft should be within 0.05mm(0.002inch). The eccentric angle should be within 1°.
6. Necessitate a suction strainer with a filtering level of 100μm(150 mesh). Necessitate a 20μm line and magnet filters to extend the life of the pump.
7. Always prevent metal powder or water etc from mixing with hydraulic oil, as such objects may deteriorate oil quality and shorten pump life . Note oil quality at all time. Oil contamination should be kept under NAS class10 。

NOTICES FOR TUBING AT OIL DRAIN PORT

The pump should be mounted with the drain port at a position to maintain fluid in the pump case.

The drain back pressure should be less than 1 kgf/cm² (14.3psi).

Drain tube length and inside dianeter shown on the right table.

RECOMMENDED DRAIN PIPING SIZE

MODEL	PIPE CONNECTION SIZE	PIPE INNER DIA	PIPE LENGTH
P08	More than 3/8"	More than Ø8.5	Less than 1M
P16, P22	More than 3/8"	More than Ø8.5	Less than 1M
P36, P46	More than 1/2"	More than Ø12	Less than 1M
P70	More than 3/4"	More than Ø19	Less than 1M
P100	More than 3/4"	More than Ø19	Less than 1M

NOTICES WHEN STARTING PUMP

1. Make certain the pump turns in the direction indicated by the arrow .
2. Before starting the pump, you need to fill oil into the inlet port of the pump body is fully filled with clean oil. Oil filling amounts are shown on the right table.
3. Entrained air in the pump and piping will cause vibrations. Before starting inch the pump without any load to purge the air.
4. If your circuit is difficult to purge the air at staring, we recommend to use the air bleed off valve in your circuit.

HYDRAULIC FLUID CASE CAPACITY

MODEL	AMOUNT (cm³)
P08	220
P16, P22	300
P36, P46	650
P70	1000
P100	1800

SETTING THE PRESSURE AND FLOW RATE

The flow rate is set at maximum and the pressure is set at minimum at the factory. If required to reset the flow rate and pressure use the following procedure.

PRESSURE ADJUSTMENT : Turn the pressure adjusting screw clockwise to increase pressure.

FLOW RATE ADJUSTMENT : Turn the flow adjusting screw clockwise to decrease the flow rate.

