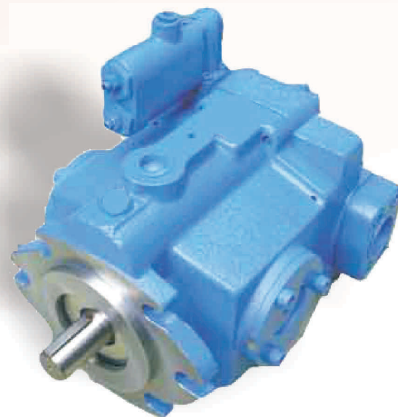
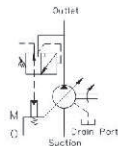
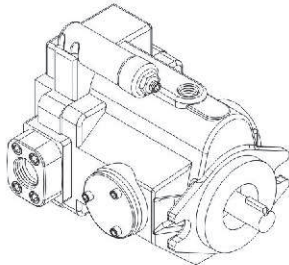


Piston Pumps



HV Series Variable Volume Piston Pumps



Feature:

1. Combining special internal designs and strict engineering disciplines has reduced noise level to new lows in whole pressure zones.
2. Depending on variety of application needs multiple optional unique control methods are available. It does not only reduce a number of unnecessary hoses, pipes and control valves but also increase efficiency and save horsepower, and cost.
3. Less capacity reservoirs can be selected and applied because of performances of low pressure loss and less head generation.
4. Wide application ranges: it is very suitable for machine tools, plastic injection molding machines, forging machines and other industrial machines etc..
5. Mounting flanges are made to SAE A or B 2-bolt (V15, 18, 38 types) and SAE-C 2 & 4-bolt (HV-50, HV-70 types).

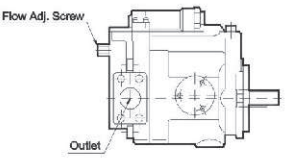
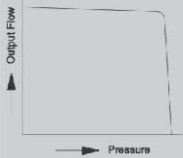
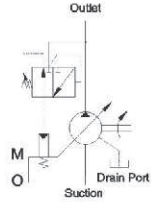
Ordering Code -HV Piston Pumps

HV	38	A	4	R	S	F	-20
Series No	Displacement cc/rev (in ³ /rev)	Control Types	Pressure Compensating range bar(PSI)	Rotation	Port Position	Mounting	Design No. Shaft Option Flange Option
HV: Variable Volume Piston Pump	15 (0.9) 18 (1.1) 23 (1.4) 38 (2.3) 50 (3.1) 70 (4.3)	Standard A : Pressure Compensating (Manual) Option B : Pressure Compensating Type Pilot (Remote Control) C : Two Pressure - Two Flow Control Type D : Solenoid Cut- Off Control Type Control Type E : Two Pressure Cut- Off Control Type F : Two-Pressure, Two-Flow Control Type by Solenoid Valve G : Two-Pressure, Two-Flow Control Type by Solenoid Valve H : Power Maching Control HL : Load Sensing Compensator HJ : Electro-Hydraulic Proportional Load Sensing Type DV Series, available in "A", "B", "D", "H" and "HL" type only.	1: 8~70(115~1000) 2: 15~140(210~2000) 3: 20~210(280~3000) 4: 20~250(280~3500)	R: Clockwise (CW) L: Counter- Clockwise (CCW) Viewed from Shaft End	S: Side Port R: Axial Port (Rear Port)	F: Flange Mounting L: Foot Mounting	Design No. 
DV: Variable Volume Piston Pump	15 (0.9) 18 (1.1) 23 (1.4) 38 (2.3)						20: PT(Rc) Flange Kits, Straight Key 2080: PF(G) Flange Kits, Straight Key 2090: NPT Flange Kits, Straight Key 30: PT(Rc) Flange Kits, SAE B (13 Tooth) 3080: PF(G) Flange Kits, SAE B (13 Tooth) 3090: NPT Flange Kits, SAE B (13 Tooth)

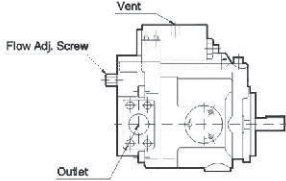
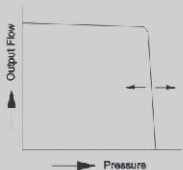
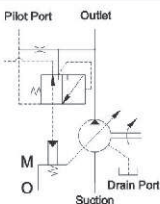
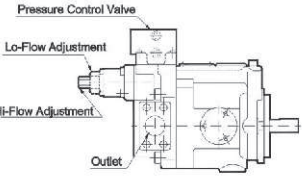
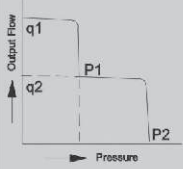
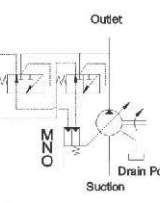
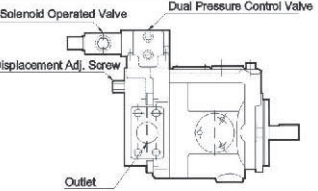
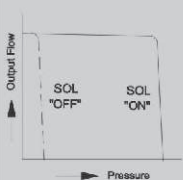
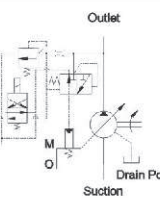
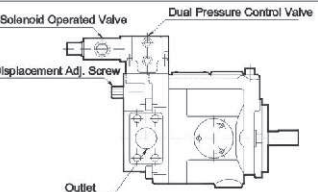
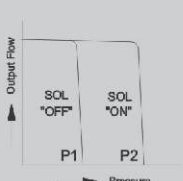
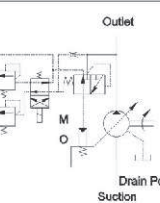
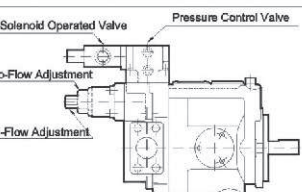
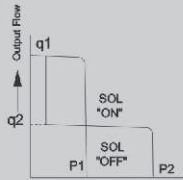
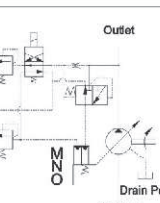
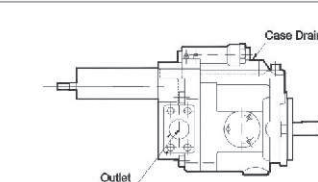
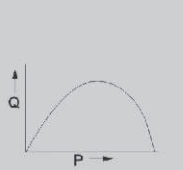
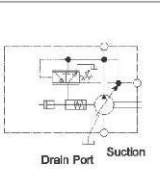
Ratings

Model	Max. Pressure bar(PSI)	Displacement cc/rev (in ³ /rev)	Displacement Under Unloading Conditions (lpm/USGpm)		Pressure Adj. Range bar(PSI)	Input Speed Range(rpm)		Weight kg(lb)
			1500rpm	1800rpm		Min	Max	
HV15	250(3500)	15(0.90)	22.5(5.78)	27.0(7.05)	1: 8~70(115~1000) 2: 15~140(210~2000) 3: 20~210(280~3000) 4: 20~250(280~3500)	500	1800	11.5(25.3)
HV18	140(2000)	17.8(1.09)	26.7(7.05)	32.0(8.45)				11.5(25.3)
HV23	250(3500)	23.0(1.4)	35.4(9.11)	41.4(10.94)				20.0(50.7)
HV38	250(3500)	37.8(2.31)	56.7(14.98)	68.0(17.96)				23.0(50.7)
HV50	250(3500)	51.5(3.14)	77.2(20.37)	92.7(24.49)				50.0(110)
HV70	250(3500)	69.7(4.25)	104.5(27.60)	125.4(33.13)				55.0(121)
HV15-15	250(3500)	15/15	22.5/22.5	27/27				24.0(52.8)
HV23-23	250(3500)	23/23	35.4/35.4	41.4/41.4				40.0(88.0)
HV15-38	250(3500)	15/37.8	22.5/34.5	27/68				36.5(80.3)
HV38-38	250(3500)	37.8/37.8	56.7/56.7	68/68				49.0(107)
HV15-70	250(3500)	15/69.7	22.5/104.5	27/125.4				69.5(153)
HV38-70	250(3500)	37.8/69.7	56.7/104.5	68/125.4				78.0(172)

**Control Type****■ Standard Type**

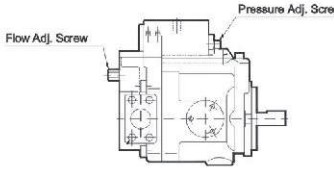
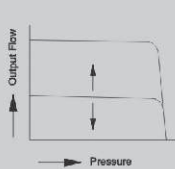
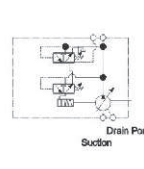
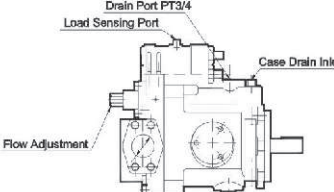
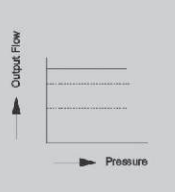
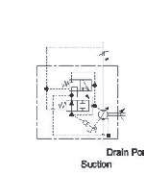
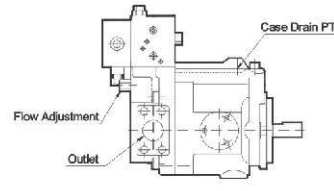
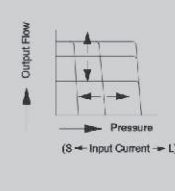
Symbol	Size	External View	Performance Curves	Hydraulic Circuit	Description
A	• 15				□ Pressure Compensating Type (Manual) When the pressure reaches the value set with the compensator, the flow is reduced automatically and the set pressure is maintained. The pressure and flow are controlled manually.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				

■ Option

B	• 15				□ Pressure Compensating Type (Pilot) The pressure can be controlled according to the pilot pressure. The flow can be controlled manually.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				
C	• 15				□ 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.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				
D	• 15				□ 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.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				
E	• 15				□ Two Pressure cut-off Control Type By means of "ON" "OFF" control of solenoid valves, two different pressure compensating types can be obtained.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				
F	• 15				□ Two-Pressure, Two Flow Control Type by Solenoid Valve Actuators can be shifted slowly (high pressure low flow) and quickly (low pressure high flow) by switching directions of solenoid control valve. This type is applied to actuator requiring operations to shift speed from high to low or low to high. Pressure "P1, P2" and flow "q1, q2" can be adjusted optionally.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				
G1	• 15				□ Multi-stage Flow & Single stage Pressure Control Type (With Cylinder) Actuators can be shifted slowly (high pressure low flow) and quickly (low pressure high flow) by switching directions of solenoid control valve.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
	• 100				

Control Type

■ Option

Symbol	Size	External View	Performance Curves	Hydraulic Circuit	Description
H	• 15				□ POWER MATCHING CONTROL An ideal energy conservation system, "Power matching system", can be directional control valves with this control system.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
HL	• 100				
	• 15				□ Load Sensing Compensator 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 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 ΔP across the customer's orifice or valve. The pump will operate at 17.2-27.5 bar (250-400 PSI) above "Load Pressure".
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				
HJ	• 100				
	• 15				□ Electro-Hydraulic Proportional Load Sensing Type This is an energy-saving type control which regulates the pump flow and load pressure to be at absolute minimum necessary level to operate the actuator. Pump flow rate and cut-off pressure are controlled proportional to the input current to the control device on the pump and the input current is regulated by the specific amplifier.
	• 18				
	• 23				
	• 38				
	• 50				
	• 70				

HV Operating Data

• Fluid Recommendations

- In case hydraulic pressure is under 70 bar, use hydraulic oil which is corresponding to ISO VG32-60 in viscosity grade or wear resisting hydraulic oil.
- In case hydraulic pressure is over 70 bar, use wear resisting hydraulic oil which is corresponding to ISO VG32-68 in viscosity grade.

• Viscosity and Operating Temperature

- Oil viscosity ranging from 15 cSt to 400 cSt and oil temperature from 0°C to 60°C are recommended.

• Installation and Mounting

- Eccentricity between the driving shaft and pump shaft should be under 0.05 TIR, and operate the pump in such a way that the pump shaft is not subjected to orthogonal force. If centering between the driving shaft and pump shaft is incorrect, the bearing and oil seal may be damaged, noise and vibration may occur, which cause trouble with the pump.
- Avoid driving the pump in the lateral direction by belt, chain or gears. (This may cause noise and damage the bearing.)
- The pump can be operated with its shaft mounted perpendicularly.

• Piping Work

- Use parallel thread pipe joints for the suction inlet and discharge outlet. Do not use taper thread piping joints or air may intrude or abnormal noise be produced.
- In case where steel pipes are used, lay the piping with care so as not to put force on the pump.
- Eccentricity of a pump being forced by piping may cause serious trouble with noise.

• Drain Piping

- Lay the drain piping independently not joined with other return lines, in such a way that the pump internal pressure is under 0.35 bar.
- Lay the oil return piping under the oil level of the tank and as far as possible from suction piping. (refer under table)

• Start-Up

- Before starting the pump, fill the pump case with hydraulic oil using the drain charging port on the pump body.
- Do not operate the pump at full speed right away. Instead, turn the motor input switch on and off several times so as to extract air from the piping, then operate it continuously.
- At the start, be sure to reduce the pressure or operate it unloaded.

• Shaft Rotation

- Shaft rotation is clockwise viewed from the end of pump shaft. In case revolution is required, indicate it by Model No.

• Suction Pressure

- Adjust suction pressure to within - 125mmHg.
- High suction pressure may cause cavitation, damage of parts, noise and vibration which greatly shorten the life of pumps.

• Filtration

- Deterioration of the hydraulic oil may cause trouble with the pump and shorten its life. Carefully control the quality of the oil so as to maintain the deterioration of the oil within Grade NAS 9.
- Be sure to attach a suction filter of 150 mesh to the suction side and a line filter of 25 to the return line of the discharge side.

• Max. Working Pressure

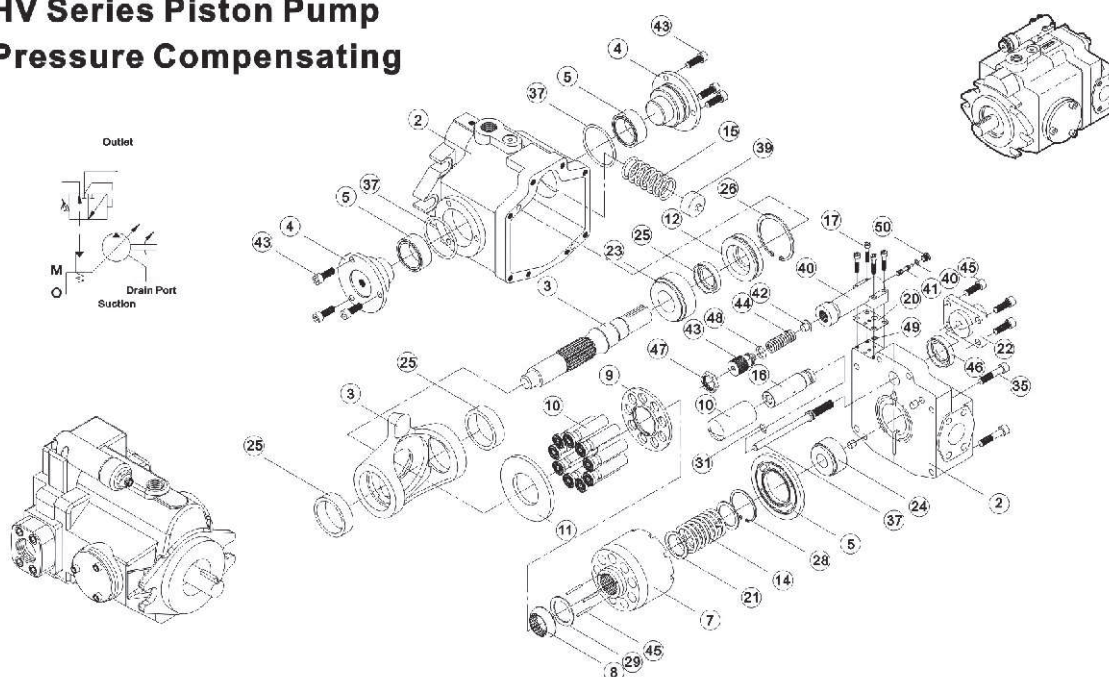
- Operation period at maximum working pressure should be under 10% of one cycle and the retaining period should be under 6 seconds.

• Recommended Drain Piping Size

MODEL	HV-15, 18	HV-23, 38	HV-50, 70
Pipe connection size	3/8 (I.D. 8.5 or more)	1/2 (I.D. 12 or more)	3/4 (I.D. 16 or more)
Pipe Inner Dia	Dia. 12 or more	Dia. 15 or more	Dia. 19 or more
Drain Pipe Length	Less than 1 m (3.28 ft)	Less than 1 m (3.28 ft)	Less than 1 m (3.28 ft)

STANDARD PUMP ASSEMBLY AND PARTS LIST

HV Series Piston Pump Pressure Compensating

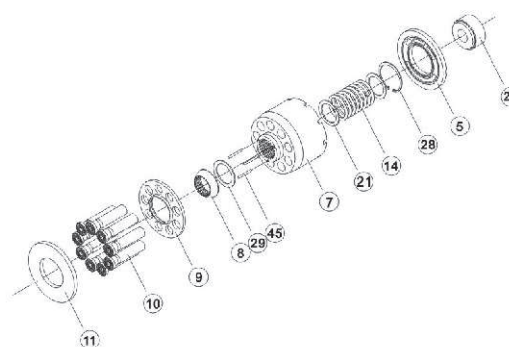


■ Ordering Code -HV Piston Pumps Cartridge Kits

HV	38	R	KW	Detail Part No. and Q'ty
Series No	Displacement	Rotation	Kits Code	
Variable Volume Piston Pump	15 cc/rev	R: Clockwise	KT	#(5)x1
	16 cc/rev		KU	#(6,7) x 9, (8)x1
	23 cc/rev	L: Counter-Clockwise	KV	#(4),(9),(14),(21),(28)x1
	38 cc/rev		KW	#(21) x 2, #(18) x 3, #(6,7) x 9,
	50 cc/rev			#(4),(5),(8),(9),(14),(21),(28)x1
	70 cc/rev			#(21) x 2, #(18) x 3, #(6,7) x 9,
	100 cc/rev			#(6,7) Size 8 x 7 pcs, Size 16~36 x 9pcs, Size 46~100 x 11pcs

■ Parts-List

50	Plug	25	Oil seal
49	O-ring	24	Needle bearing
48	O-ring	23	Ball bearing
47	O-ring	22	Plug
46	Nut	21	Retainer
45	Pressure Adjusting Bolt	20	Nut
44	Retainer	19	Key
43	Spring	18	Needle
42	Plunger	17	Guide
41	Holder	16	Control Piston
40	Spool	15	Spring S
39	Body	14	Spring C
38	Hexagon Socket Head Screw	13	Gasket
37	Spring Holder	12	Seal holder
36	Flow Adjusting Bolt	11	Thrust bush
35	Hexagon Socket Head Screw	10	Swash plate
34	Machine screw	9	Barrel holder
33	Expander plug	8	Shoe holder
32	Pin	7	Shoe
31	Oil-ring	6	Piston
30	Oil-ring	5	Valve Plate
29	Oil-ring	4	Cylinder barrel (Cylinder block)
28	Snap Ring	3	Shaft
27	Snap Ring	2	Rear Cover
26	Snap Ring	1	Pump Housing
No.	Part Name	No.	Part Name



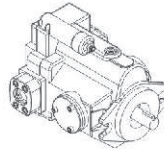
• Cartridge Kits

• Cartridge kits (piston, swash plate, valve plate, shoe plate, ball guide, cylinder barrel, head block...) are interchangeable with CATERPILLAR, DAIKEN, DEIJIN SEIKI, HITACHI, HYDROMATIC, KAYABA, KOMATSU, KAWASAKI, KOMATSU, LINDE, NACHI, MITSUBISHI, PARKER, SHIBAURA, SUNDSTRAND, REXROTH, UCHIDA, VICKERS, ...and others.

PERFORMANCE DATA

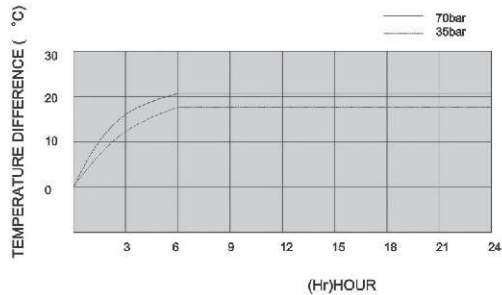
HV-15-A4-**-20

Theoretical displacement	14.8	cc/rev
Rated pressure	175 (2500)	bar(PSI)
Max. operating pressure	250 (3575)	bar(PSI)
Max. input speed	1800	rpm
Displacement adjusting range	5.6 ~ 26.6 lpm	(at 1800 rpm)



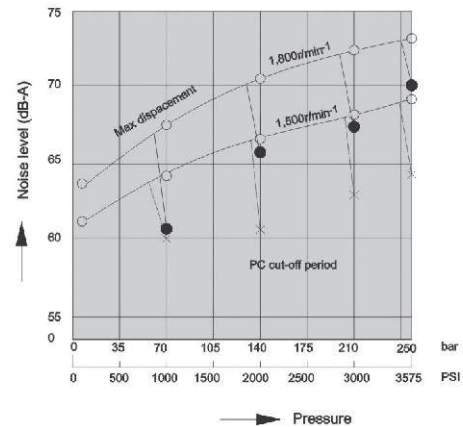
CONDITIONS:

Drive speed : 1800 rpm
Fluid temperature: 50°C (122°F)
Hydraulic Oil: ISO VG32

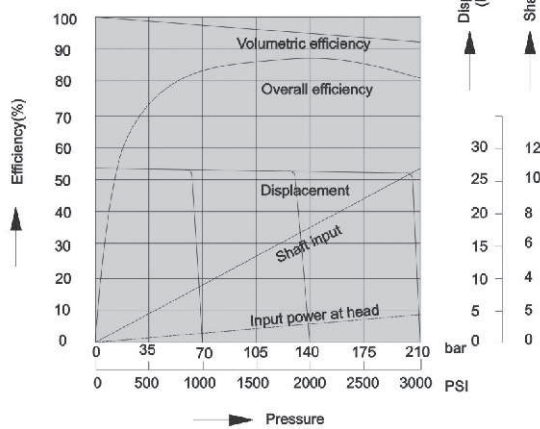


● ... 1800 rpm PC Cut-off period
× ... 1500 rpm PC Cut-off period

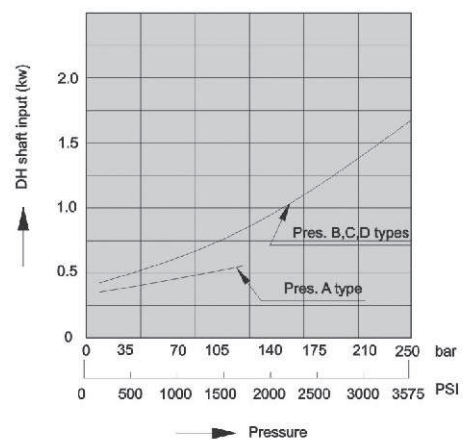
NOISE LEVEL



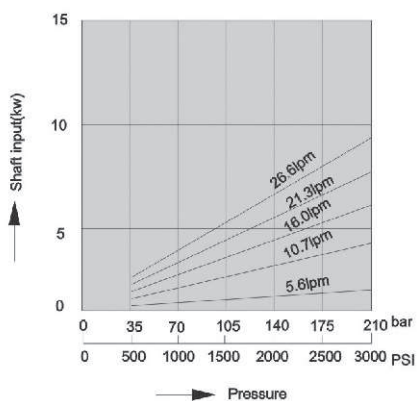
Efficiency Curves



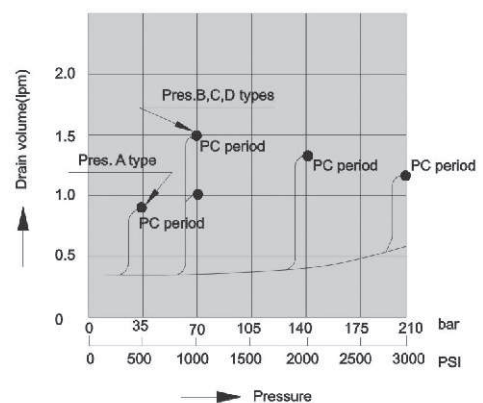
Input Power at Full Cut-off



Input Power Curves



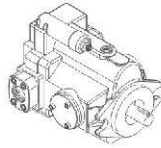
Drain Curve



A5

PERFORMANCE DATA

HV-23-A4-**-20



Theoretical displacement	23.0	cc/rev
Rated pressure	175 (2500) bar(PSI)	
Max. operating pressure	250 (3575) bar(PSI)	
Max. input speed	1800	rpm
Displacement adjusting range	11 ~ 41.4 lpm	(at 1800 rpm)

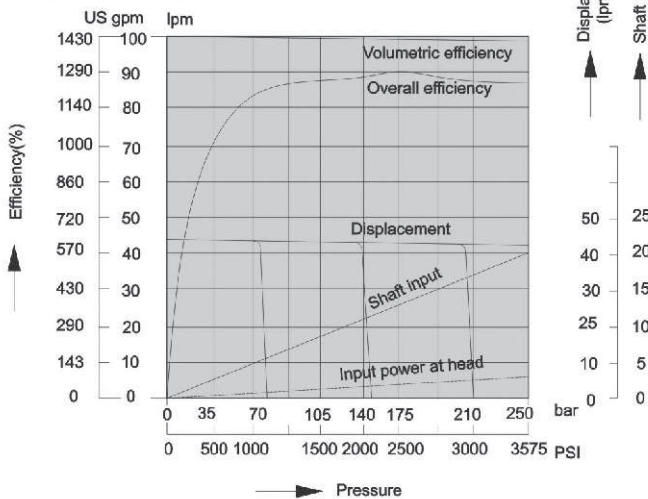
CONDITIONS:

Drive speed : 1800 rpm

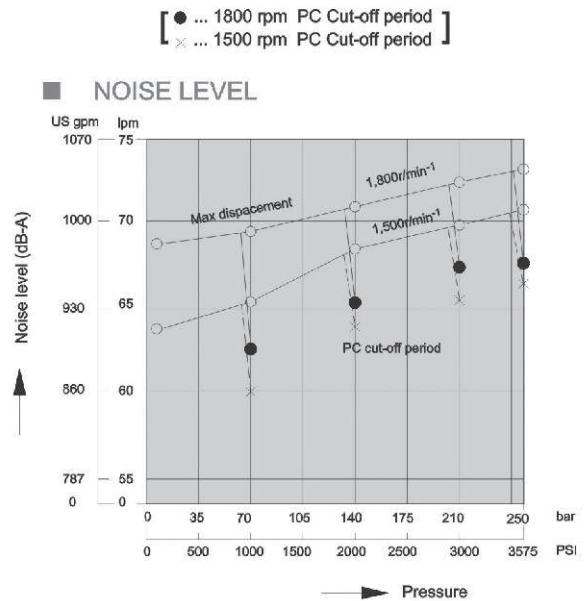
Fluid temperature: 50°C (122°F)

Hydraulic Oil: ISO VG32

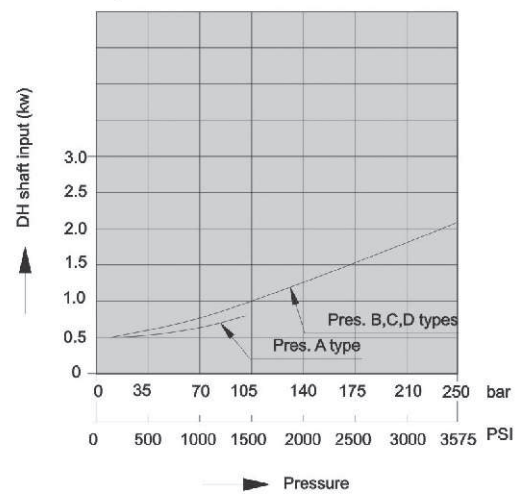
Efficiency Curves



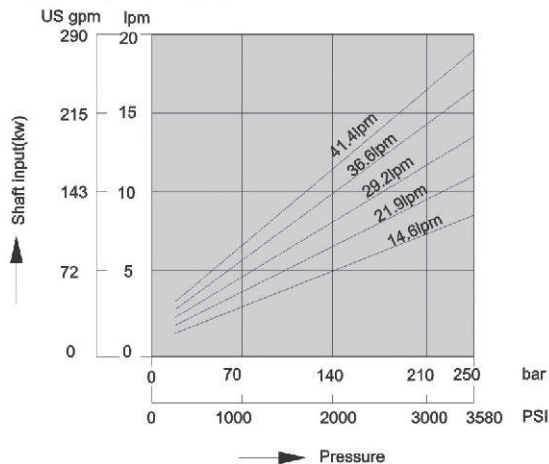
NOISE LEVEL



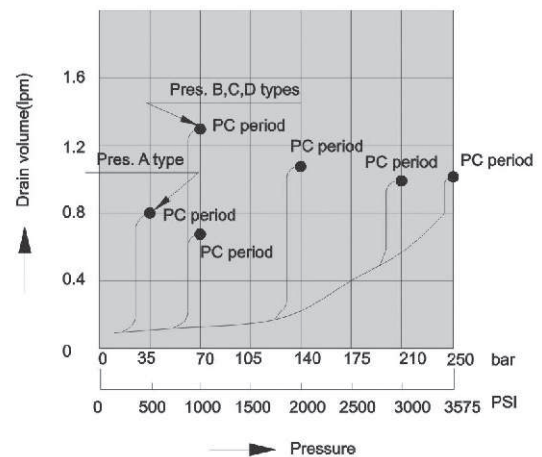
Input Power at Full Cut-off



Input Power Curves



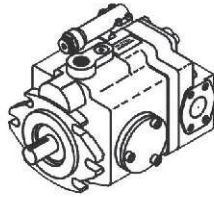
Drain Curve



A5

PERFORMANCE DATA

HV-38-A4-**-20

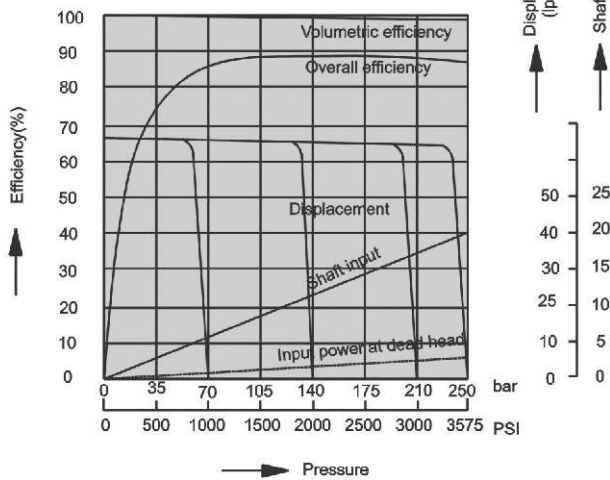


Theoretical displacement	37.7	cc/rev
Rated pressure	175 (2500)	bar(PSI)
Max. operating pressure	250 (3575)	bar(PSI)
Max. input speed	1800	rpm
Displacement adjusting range	28 ~ 68 lpm	(at 1800 rpm)

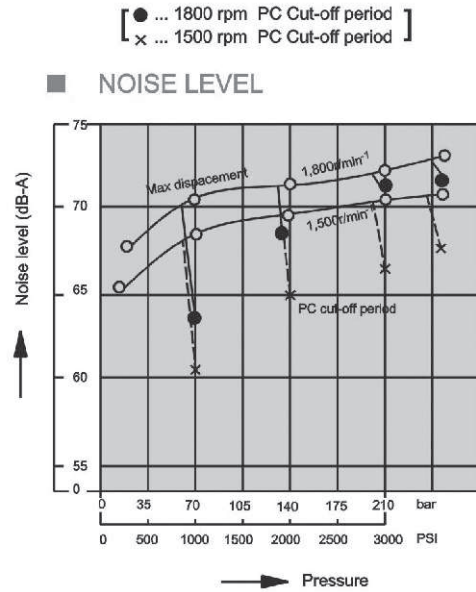
CONDITIONS:

Drive speed : 1800 rpm
Fluid temperature: 50 °C (122 °F)
Hydraulic Oil: ISO VG32

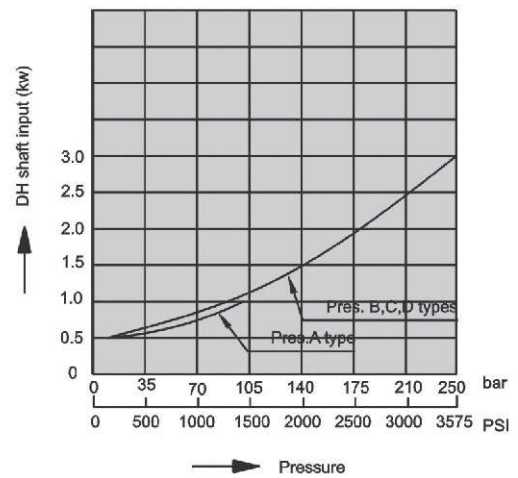
Efficiency Curves



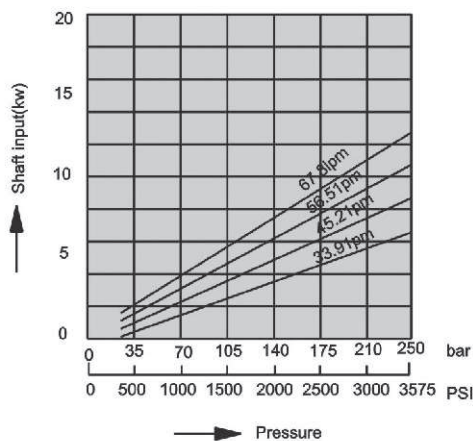
NOISE LEVEL



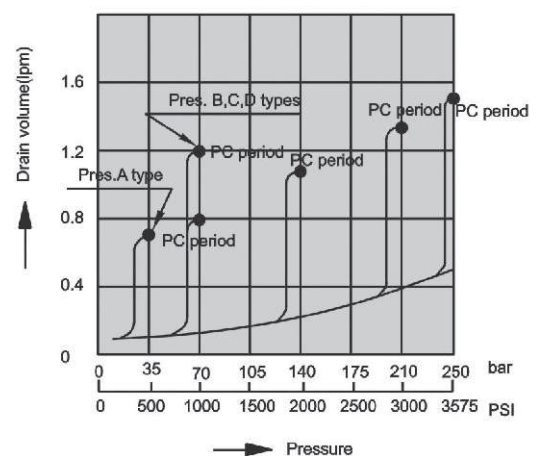
Input Power at Full Cut-off



Input Power Curves



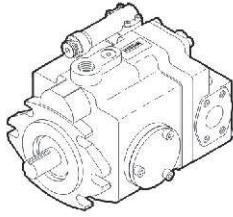
Drain Curve



A5

PERFORMANCE DATA

HV-50-A4-**-20



Theoretical displacement	51.6	cc/rev
Rated pressure	140 (2000)	bar(PSI)
Max. operating pressure	210 (3000)	bar(PSI)
Max. input speed	1800	rpm
Displacement adjusting range	0 ~ 93 lpm (at 1800 rpm)	

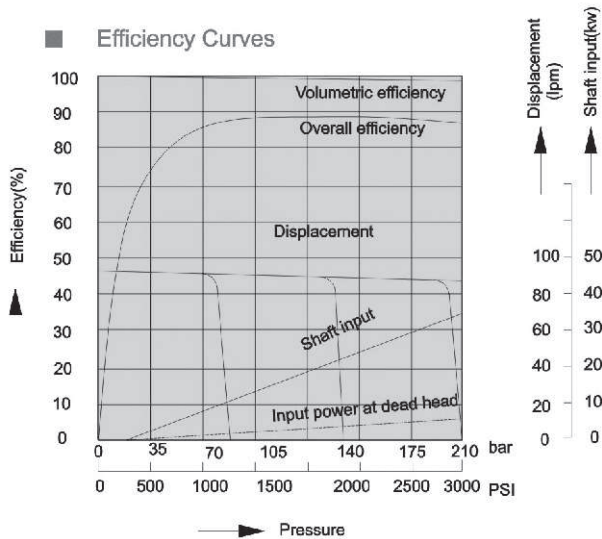
CONDITIONS:

Drive speed : 1800 rpm

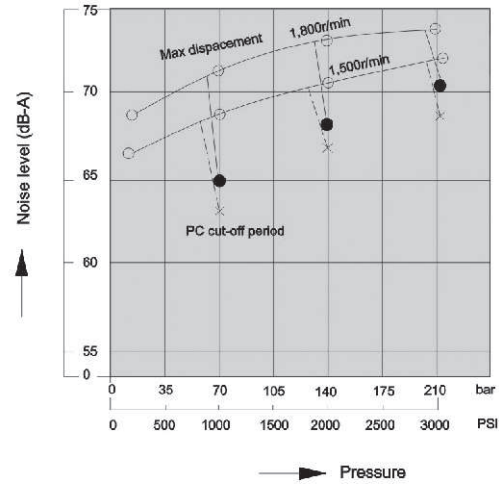
Fluid temperature: 50°C (122°F)

Hydraulic Oil: ISO VG32

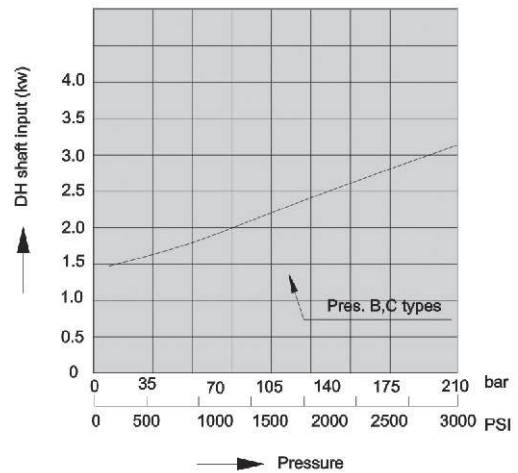
Efficiency Curves



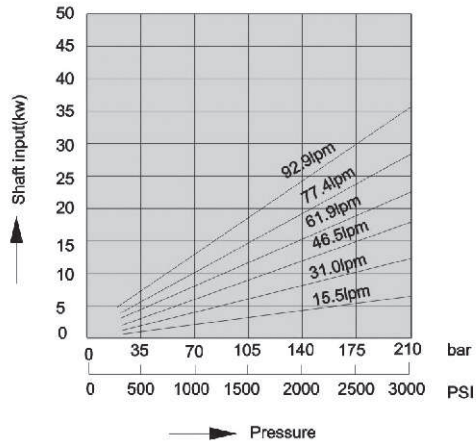
NOISE LEVEL



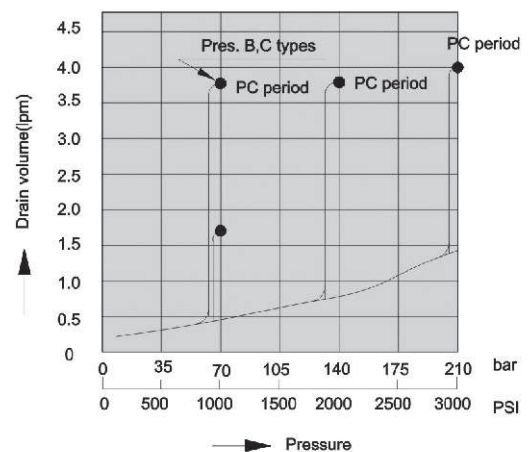
Input Power at Full Cut-off



Input Power Curves



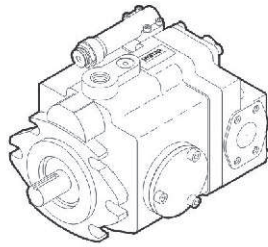
Drain Curve



A5

PERFORMANCE DATA

HV-70-A4-**-20

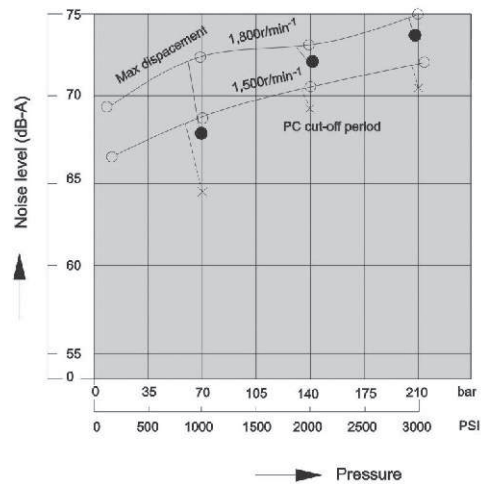


Theoretical displacement	69.8	cc/rev
Rated pressure	140 (2000)	bar(PSI)
Max. operating pressure	210 (3000)	bar(PSI)
Input speed	500 ~ 2200	rpm
Displacement adjusting range	20 ~ 126 lpm	(at 1800 rpm)

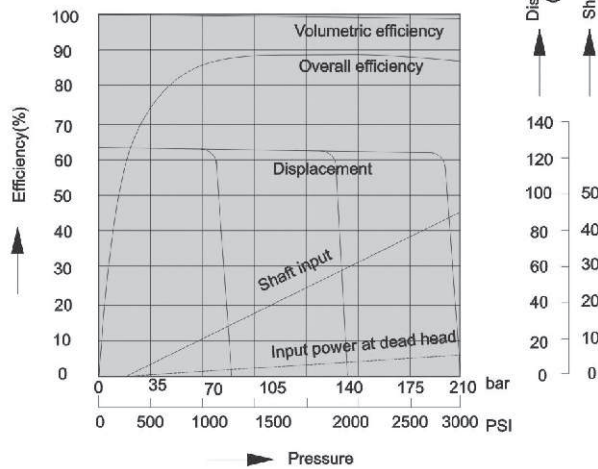
CONDITIONS:

Drive speed : 1800 rpm
Fluid temperature: 50 °C (122 °F)
Hydraulic Oil: ISO VG32

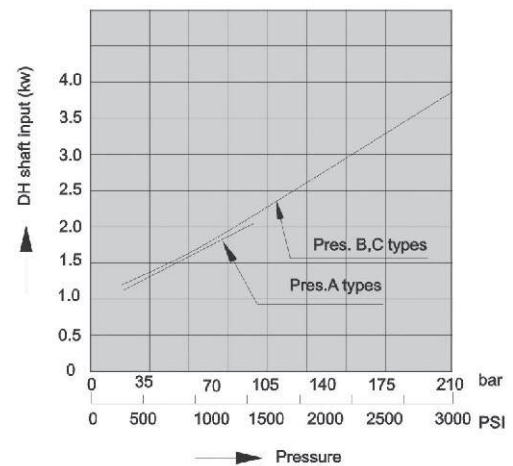
NOISE LEVEL



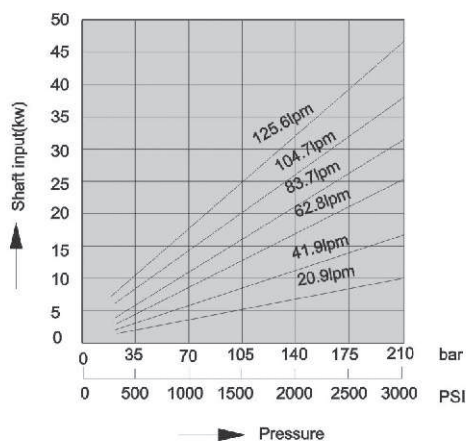
Efficiency Curves



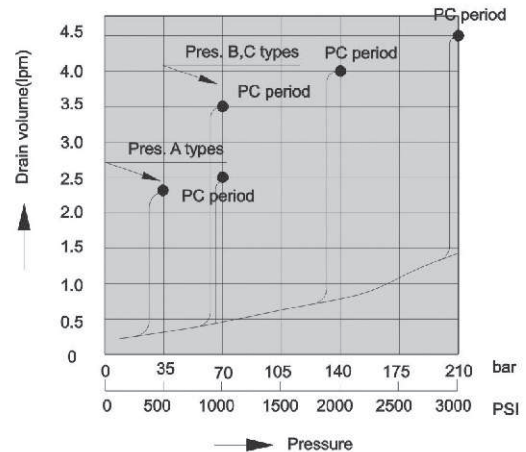
Input Power at Full Cut-off



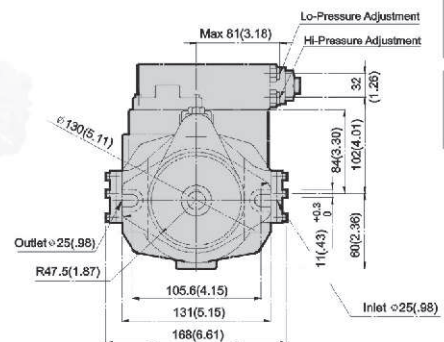
Input Power Curves



Drain Curve



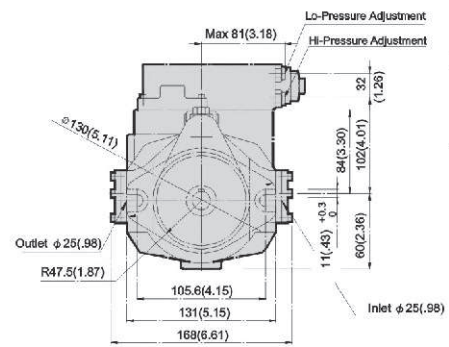
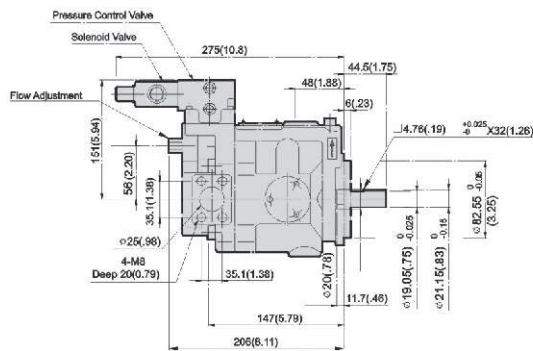
A5



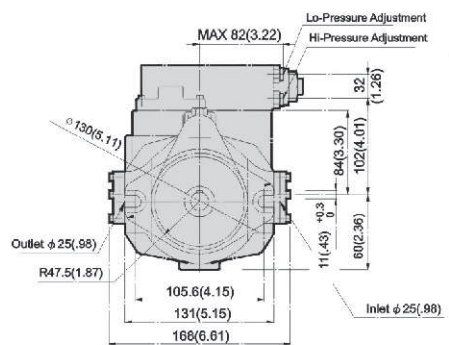
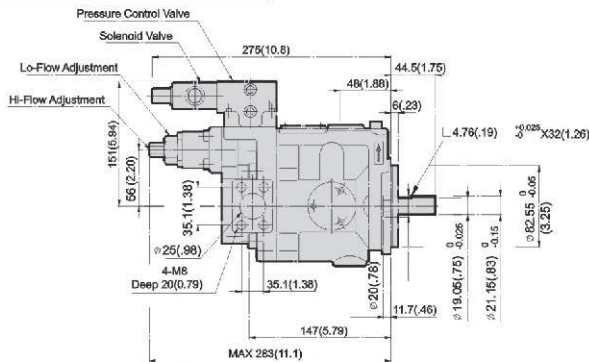
DIMENSIONS

MILLIMETERS(INCHES)

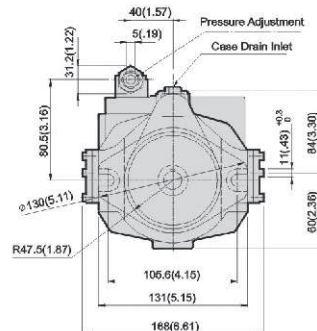
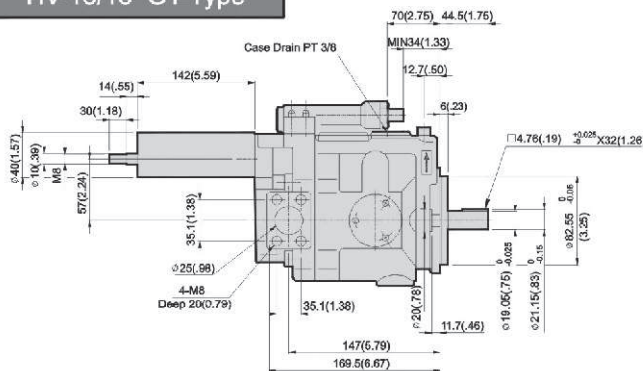
HV-15/18 E-Type



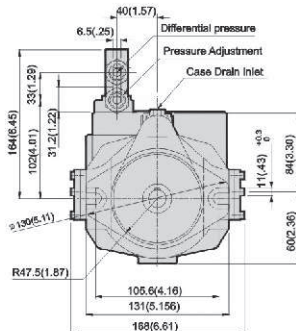
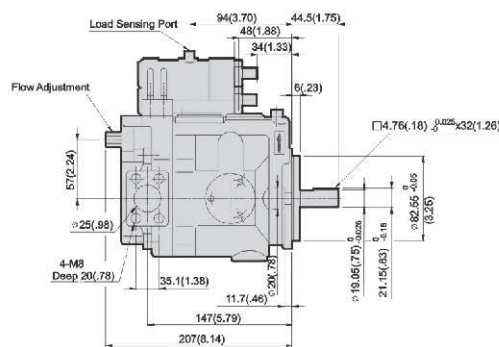
HV-15/18 F-Type



HV-15/18 G1-Type



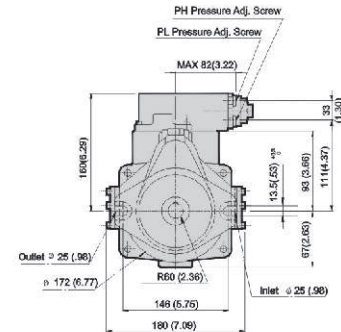
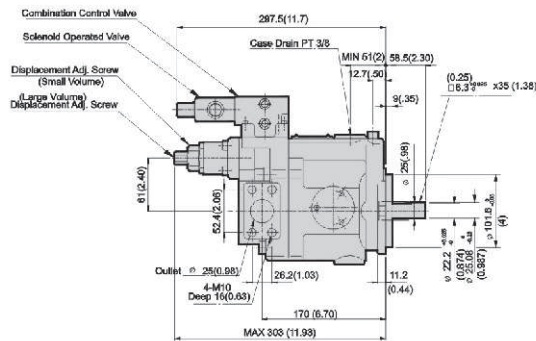
HV-15/18 HL-Type



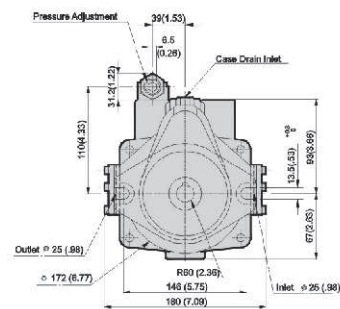
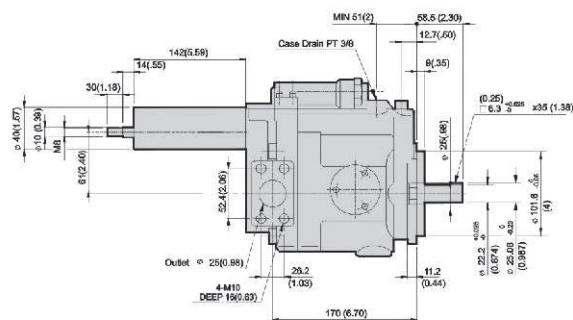
DIMENSIONS

MILLIMETERS(INCHES)

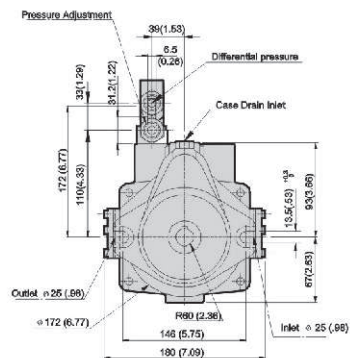
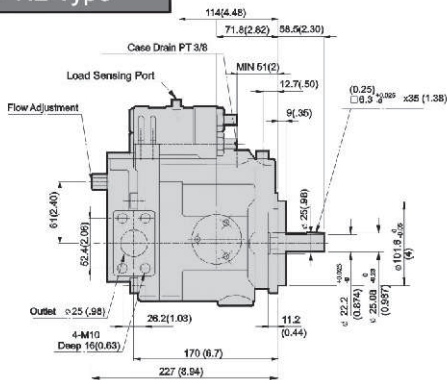
HV-23 F-Type



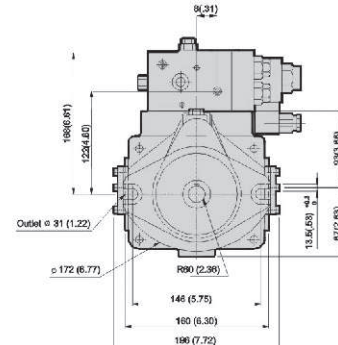
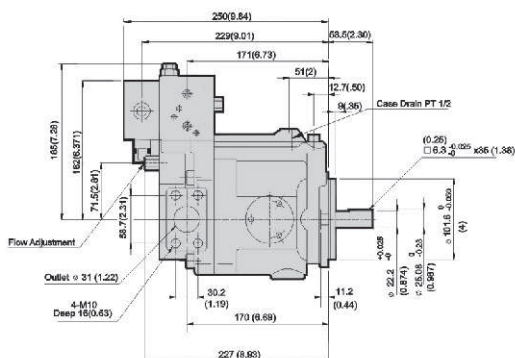
HV-23 G1-Type



HV-23 HL-Type



HV-23 HJ-Type

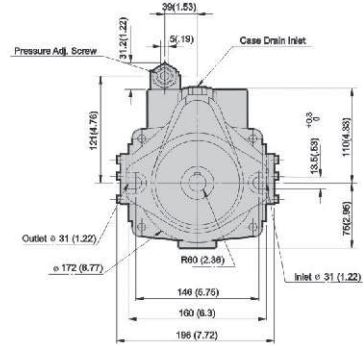
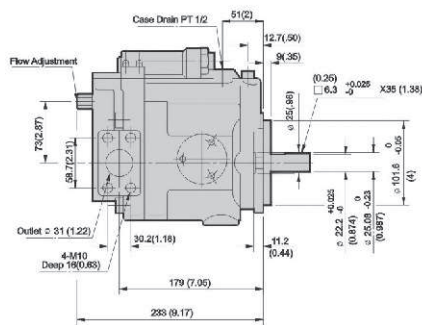


DIMENSIONS

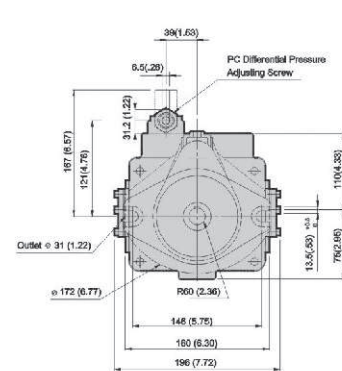
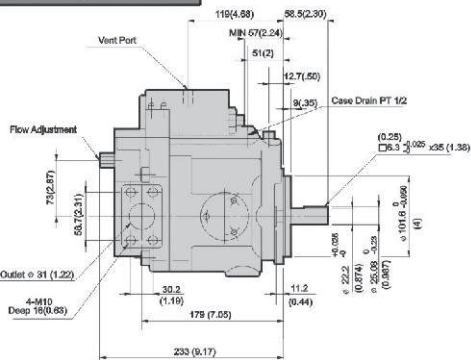
MILLIMETERS(INCHES)

HV-38 A-Type

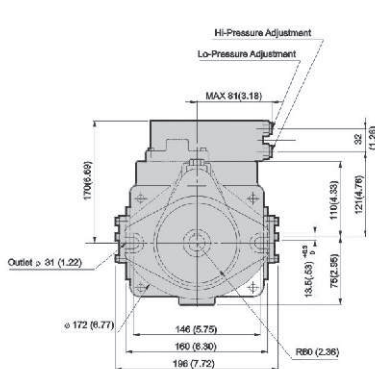
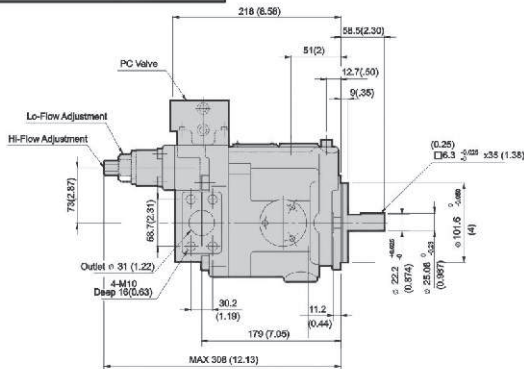
■ Side Port-Standard



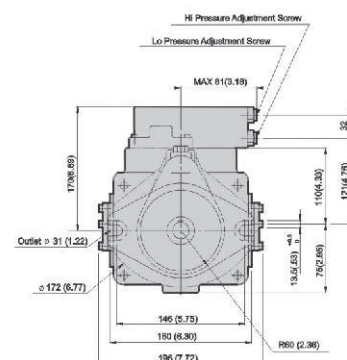
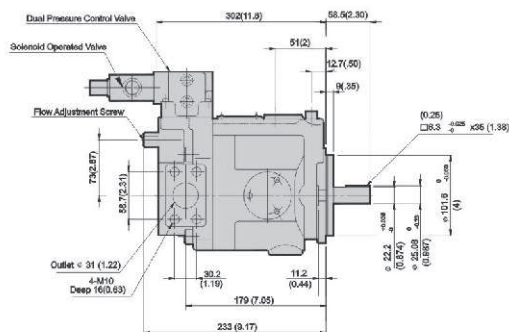
HV-38 B-Type

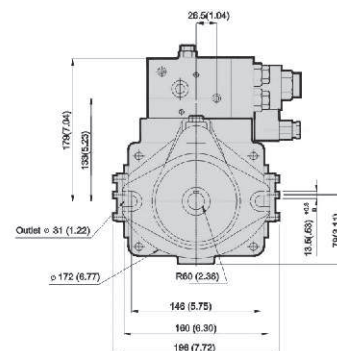


HV-38 C-Type



HV-38 D,E-Type



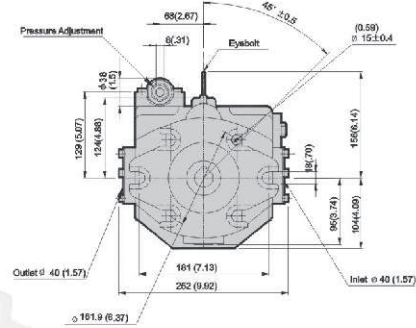
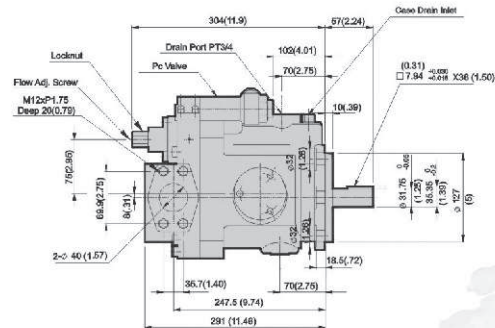


DIMENSIONS

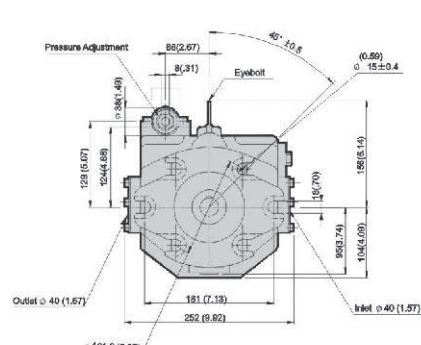
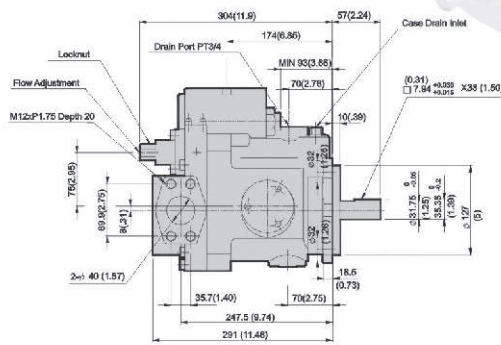
MILLIMETERS(INCHES)

HV-50 A-Type

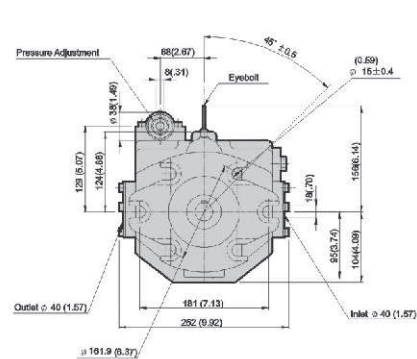
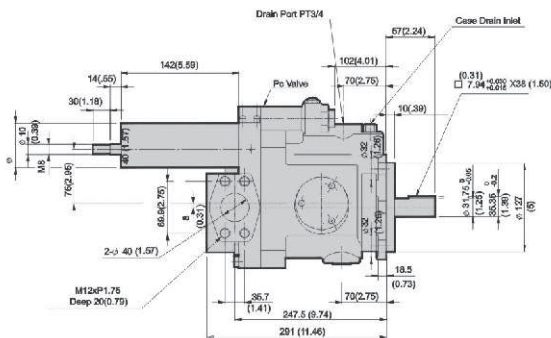
Side Port-Standard



HV-50 B-Type



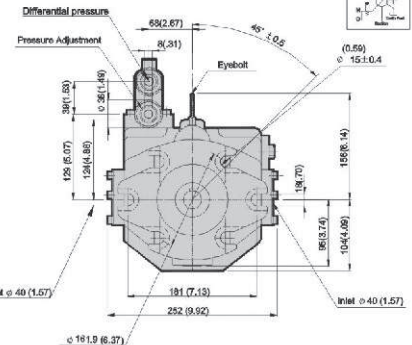
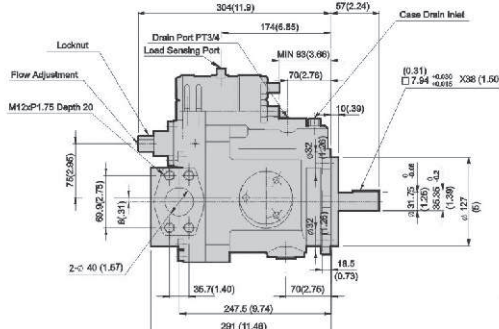
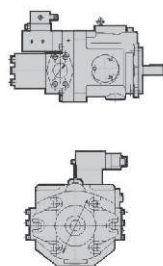
HV-50 G1-Type



HV-50 HJ/HL-Type

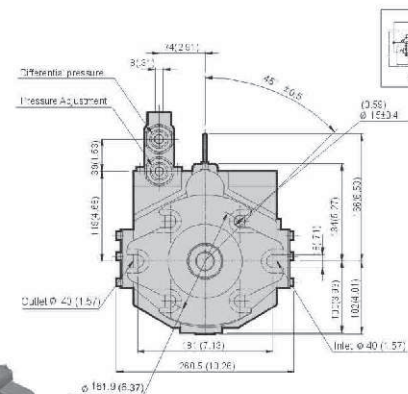
HV-50 HL-Type

HV-50 HJ-Type



A5

MILLIMETERS(INCHES)

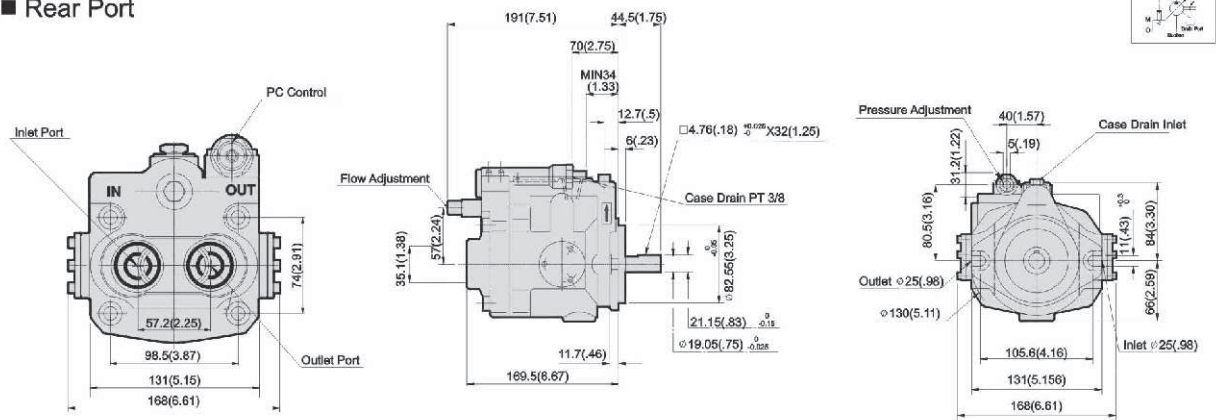


DIMENSIONS

MILLIMETERS(INCHES)

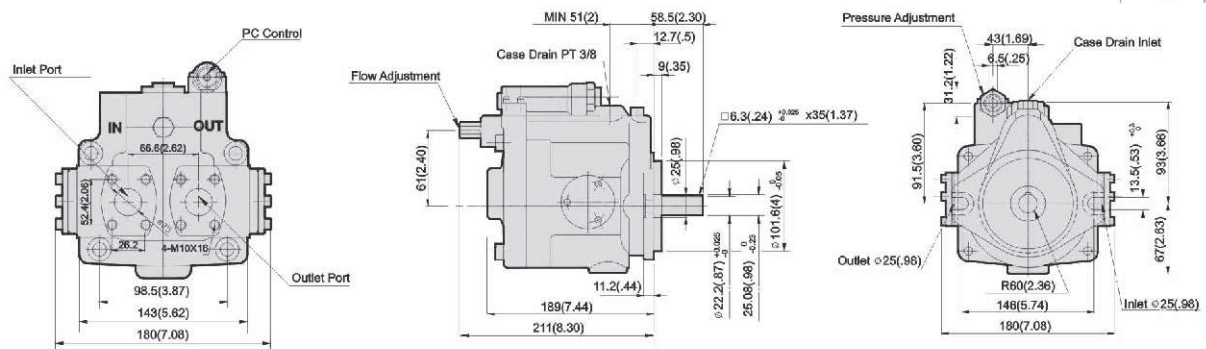
HV-15/18

■ Rear Port



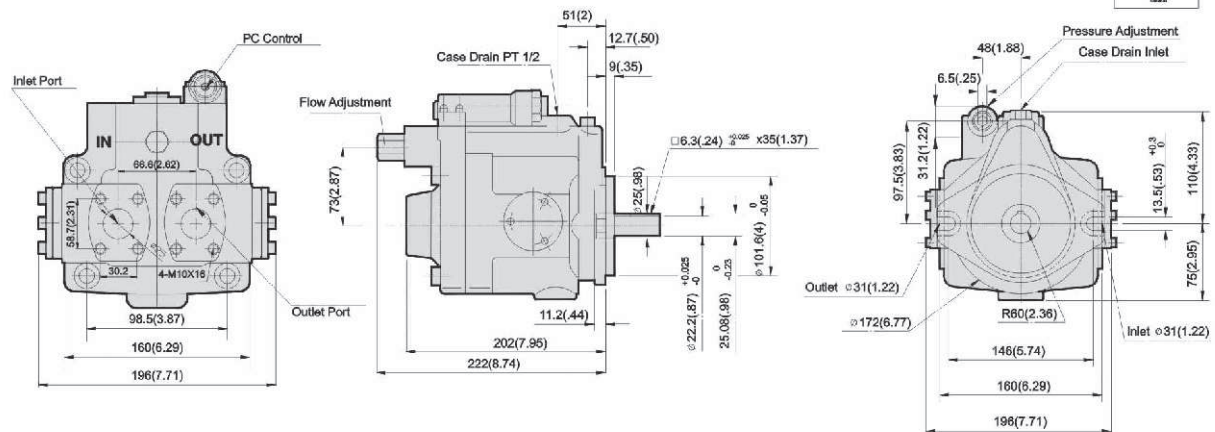
HV-23

■ Rear Port



HV-38

■ Rear Port



HV Double Piston Pump

MODEL	HV15+15	HV23+23	HV15+38	HV23+38	HV38+38	HV15+70	HV23+70	HV38+70
A	3/8- PT	3/8- PT	3/8- PT	3/8- PT	1/2- PT	3/8- PT	3/8- PT	1/2- PT
B	3/8- PT	3/8- PT	1/2- PT	1/2- PT	1/2- PT	3/4- PT	3/4- PT	3/4- PT
C	57	61	57	61	73	57	61	73
D	35.1	52.4	35.1	52.4	58.7	35.1	52.4	58.7
E	35.1	26.2	35.1	26.2	30.2	35.1	26.2	30.2
F	35.1	52.4	58.7	58.7	58.7	69.9	69.9	69.9
G	35.1	26.2	30.2	30.2	30.2	35.7	35.7	35.7
H	M8x20	M10x16	M8x20	M10x16	M10x16	M8x20	M10x16	M10x16
I	M8x20	M10x16	M10x16	M10x16	M10x16	M12x20	M12x20	M12x20
J	147	170	147	170	170	147	170	179
K	147	170	179	179	179	256.5	256.5	256.5
L	335	393	373	404	413	447	470	479
M	381	443	419	454	465	493	520	531
N	34	51	34	34	51	34	51	51
O	34	51	51	51	51	73	73	73
P	6	9	9	9	9	10	10	10
Q	4.76x32	6.5x35	6.5x35	6.5x35	6.5x35	7.94x38	7.94x38	7.94x38
R	13	13	13	13	13	18.5	18.5	18.5
S	∅19.05	∅22.22	∅22.22	∅22.22	∅22.22	∅31.75	∅31.75	∅31.75
T	21.15	25.08	25.08	25.08	25.08	35.35	35.35	35.35
U	∅82.55	∅101.6	∅101.6	∅101.6	∅101.6	∅127	∅127	∅127
V	∅24	∅25	∅31	∅31	∅31	∅40	∅40	∅40
W	∅24	∅25	∅31	∅31	∅31	∅40	∅40	∅40
X	106	146	146	146	146	181	181	181
Y	131	145.5	160	160	160	208	208	208
Z	168	180	196	196	196	260.5	260.5	260.5
AA	40	39	39	39	39	74	74	74
AB	31.2	31.2	31.2	31.2	31.2	40	40	40
AC	5	5	5	5	5	8	8	8
AD	80.5	110	121	121	121	119	119	119
AE	11	13.5	13.5	13.5	13.5	18	18	18
AF	44.5	58.5	58.5	58.5	58.5	57	57	57

DIMENSIONS

MILLIMETERS(INCHES)

