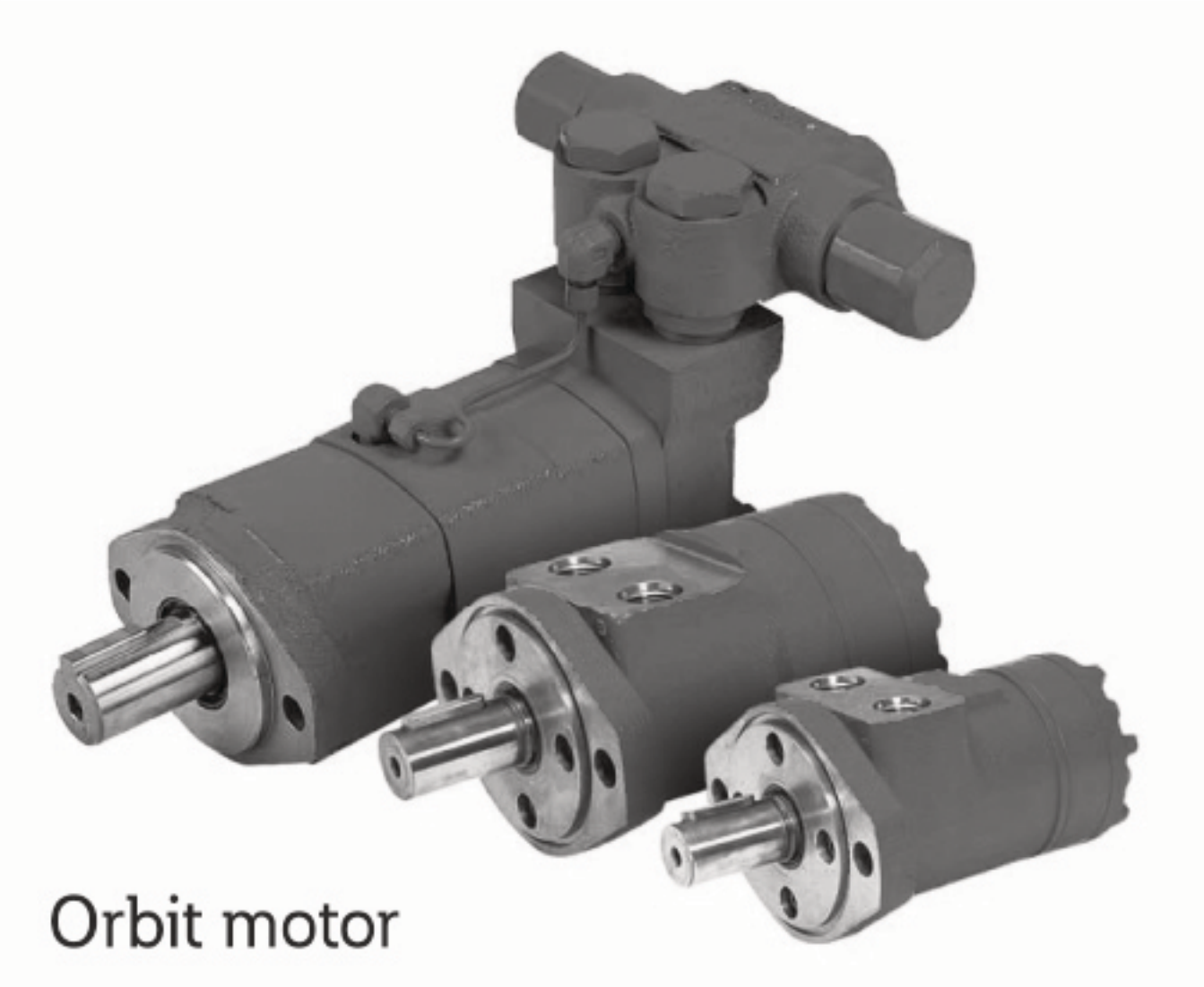
Danfoss
Technical information
Low speed, high torque motors



BC435972720220en-000101

Table of Contents

H & S Series

Features

- Complete with a distinct reducing mechanism of its own based on Gerotor/Geroler, the motors of this series deliver high output torque throughout their speed range.
- No additional speed reducer isneeded because of low-speed High-torque performance.
- It is possible to install the motors into the small space because of small and compact size.
- The motors operate smoothly in any installation points.
- The torque which occurs irrespective of the direction of rotation is the same. Also, it is possible to reverse, being immediate.
- The rotation speed can be easily and smoothly controlled by crossing in the wide range.
- Irrespective of the load, the rotation speed can be kept constant.

Model code procedure

① **Series**
- **H** = H series
- **S** = S series

② **Displacement**

③ **Port**
- **A** = G1/2 O-Ring ports
- **B** = Manifold mount
- **C** = 1/2NPTF ports
- **D** = Rc1/2 ports

④ **Shaft**
- **B** = SAE Splined shaft
- **C** = Ø1" Straight with Woodruff key
- **D** = Ø25 Straight with Parallel key, 8mm

⑤ **Flange mounting**
- **2** = 2 Bolt
- **4** = 4 Bolt

⑥ **Special features (none of standard motor)**
- **B** = Special seal for Phosphate Ester Fluid
- **D** = Integral check valves (H series only)
- **F** = Free running (H series only)
- **M** = Metric mounting holes

⑦ **Drain port**
- **–** = Without drain port (H series only)
- **×** = With drain port (H series; option, S series; standard)

⑧ **Design code**
- **H Series J** = Model 9
- **S Series M** = Model 12

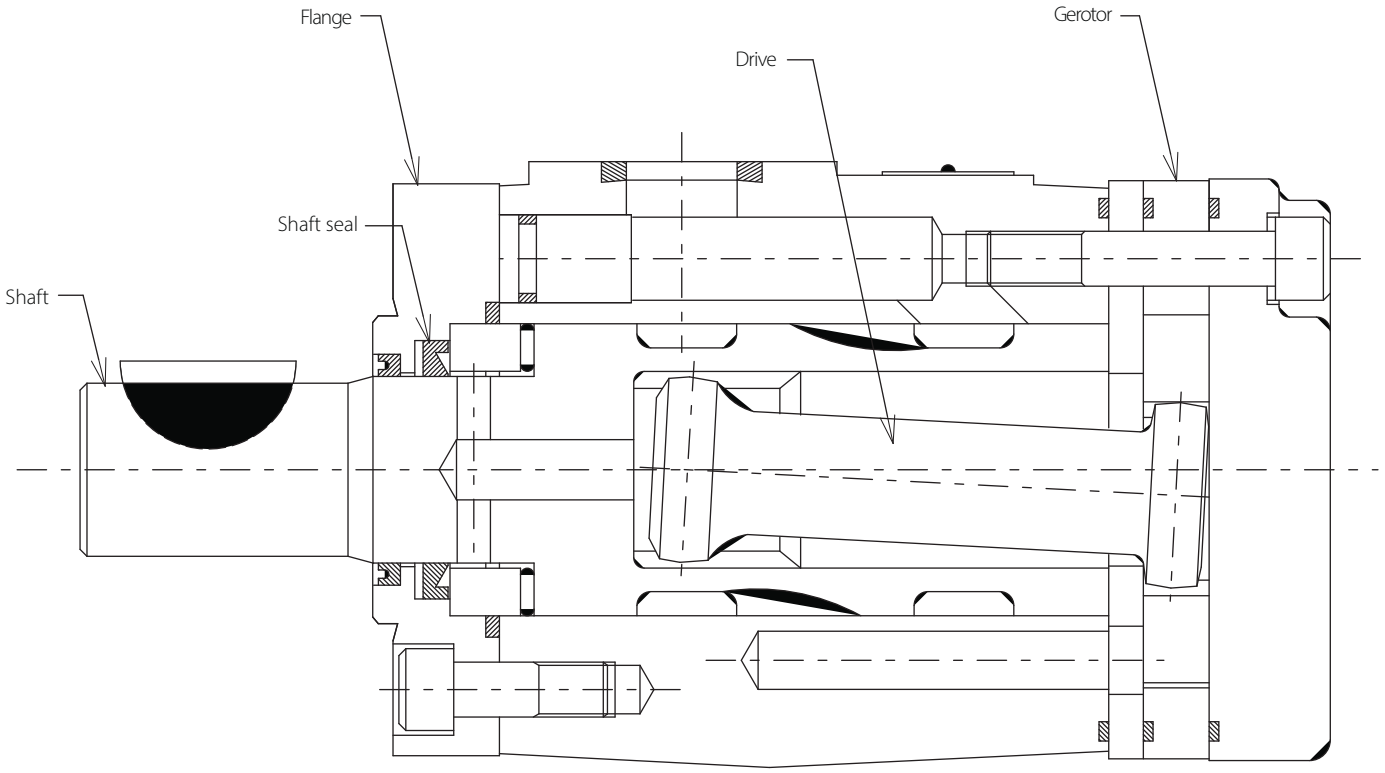
H Series

Specifications

Model	*Displacement*	*Continuous Speed*	*Intermittent Speed*	*Continuous Torque*	*Intermittent Torque*	*Continuous Pressure*	*Intermittent Pressure*	*PeakBack Pressure*	*Weight*
	cm^3/rev	**rpm**	**rpm**	**N-m (kgf-m)**	**N-m (kgf-m)**	**MPa (kgf/cm^2)**	**MPa (kgf/cm^2)**	**MPa (kgf/cm^2)**	**Kg**
H-040	40	930	1000	59 (6.0)	83 (8.5)	12.3 (125)	16.7 (170)	10.2 (105)	5.4
H-050	51	910	980	79 (8.0)	108 (11.0)	12.3 (125)	16.7 (170)	10.2 (105)	5.4
H-070	69	770	880	108 (11.0)	147 (15.0)	12.3 (125)	16.7 (170)	10.2 (105)	5.5
H-100	96	560	670	147 (15.0)	206 (21.0)	12.3 (125)	16.7 (170)	10.2 (105)	5.6
H-130	129	420	560	206 (21.0)	265 (27.0)	12.3 (125)	16.7 (170)	10.2 (105)	5.7
H-170	159	340	450	226 (23.0)	304 (31.0)	11.3 (115)	15.2 (155)	10.2 (105)	5.9
H-200	184	290	390	255 (26.0)	343 (35.0)	10.8 (110)	14.7 (150)	10.2 (105)	6.1
H-240	230	240	320	285 (29.0)	402 (41.0)	9.8 (100)	13.7 (140)	10.2 (105)	6.3
H-290	277	200	260	334 (34.0)	412 (42.0)	9.3 (95)	11.7 (120)	10.2 (105)	6.4
H-390	369	150	200	392 (40.0)	461 (47.0)	8.3 (85)	9.8 (100)	10.2 (105)	7.0

Note: 1. Intermittent Torque, Pressure and Speed : Intermittent operation, 10% of every minute. A simultaneous Intermittent Torque and Intermittent Speed condition must not occur.
2. Maximum pressure at the motor inlet port of 17.2MPa (175kgf/cm^2)
3. Splined shafts are recommended whenever operating above 350Nmof torque.

Sectional view



Performance data

The performance data on this catalogue show the typical Torque Efficiency and Volume Efficiency of H series motors at each pressure at 37 cSt.

Nth = Theoretical Speed (rpm)

q = Displacement (cm^3/rev)

ηv = Volumetric Efficiency

N = Speed (rpm)

ΔP = Pressure Difference between inlet port and outlet port (MPa)

Tth = Theoretical Torque (N-m)

Q = Inlet Flow (l/min)

ηT = Torque Efficiency

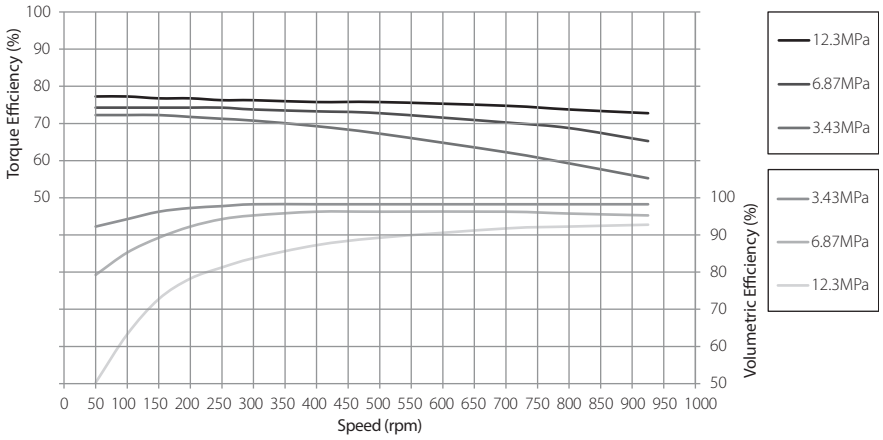
T = Actual Torque (N-m)

$Nth = Q \times 10^3/q \quad N = Nth \times \eta V$

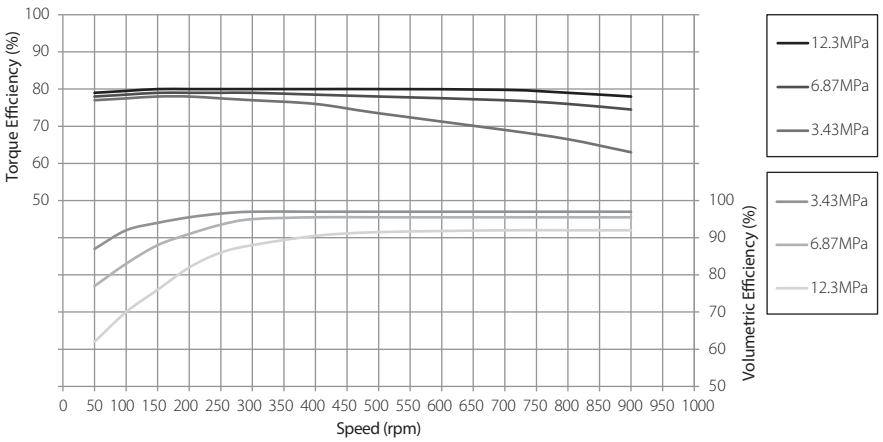
$Tth = \Delta P \times q/2\pi \quad T = Tth \times \eta T$

Note: These data are not guaranteed data.

H - 040 ($40cm^3$/rev)

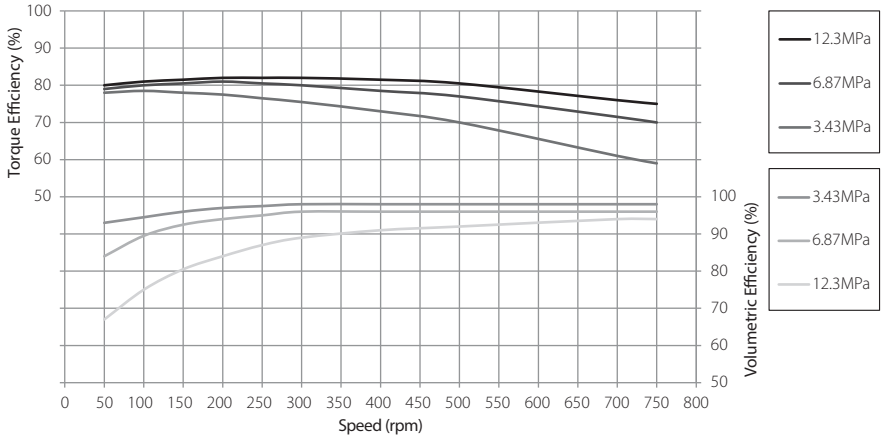


H - 050 ($51cm^3$/rev)

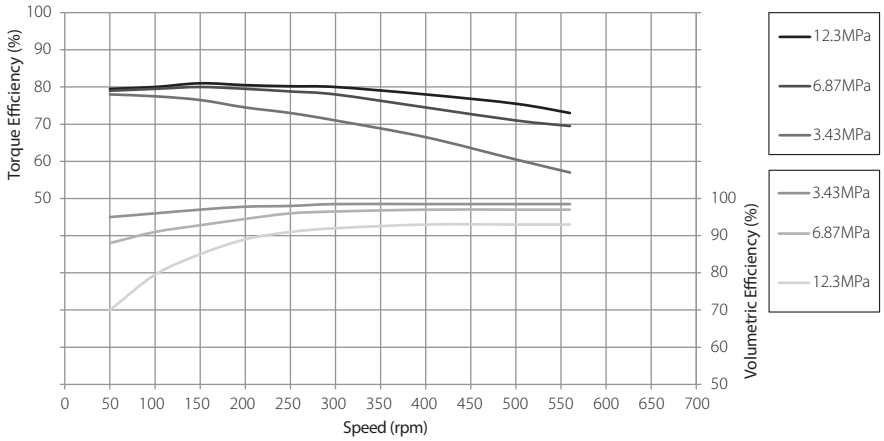


H Series

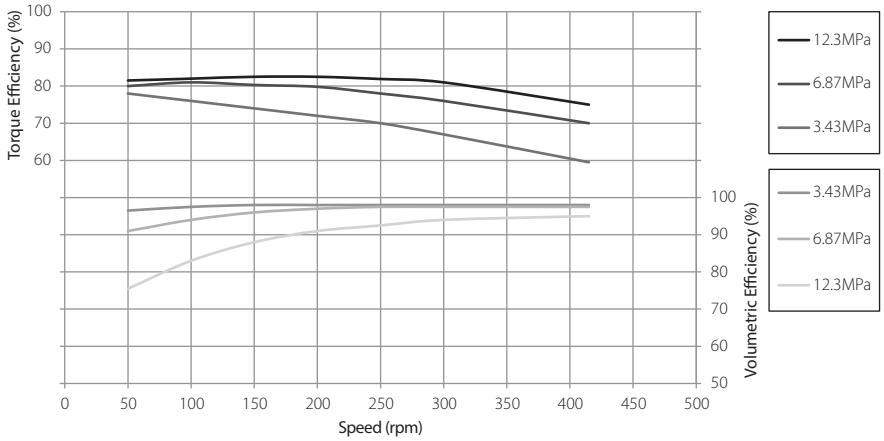
H - 070 (69cm³/rev)



H - 100 (96cm³/rev)

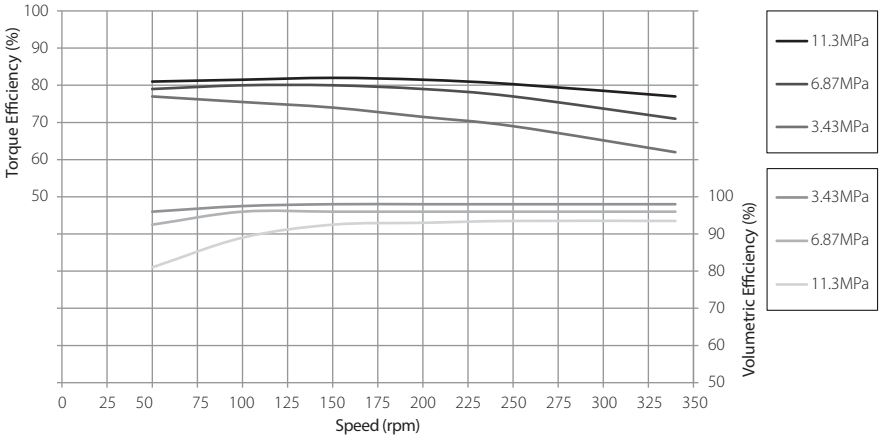


H - 130 (129cm³/rev)

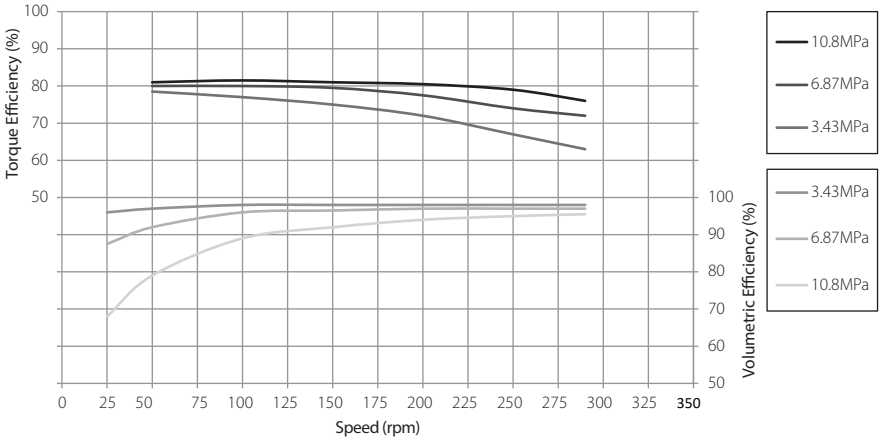


H Series

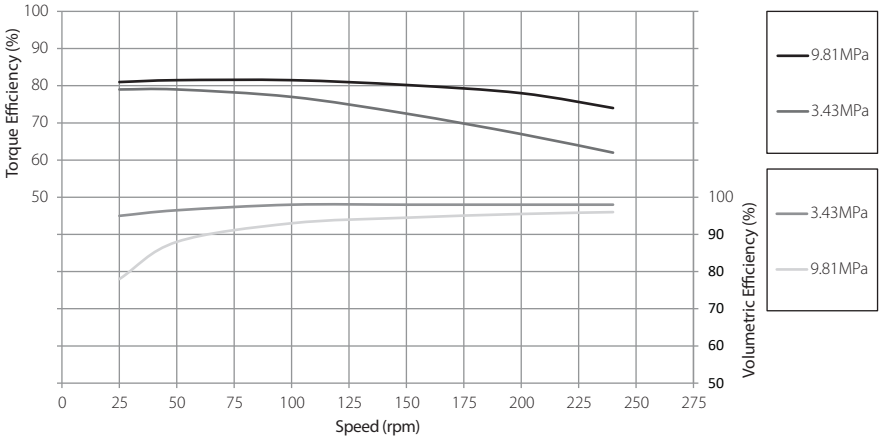
H - 170 (159cm³/rev)



H - 200 (184cm³/rev)

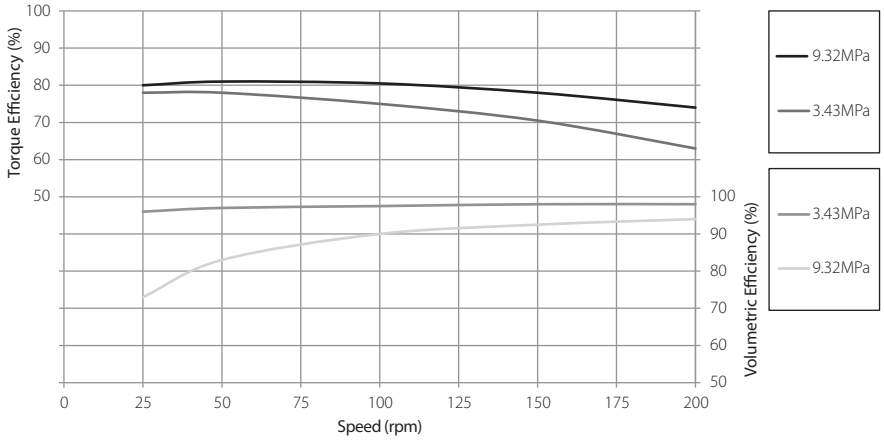


H - 240 (230cm³/rev)

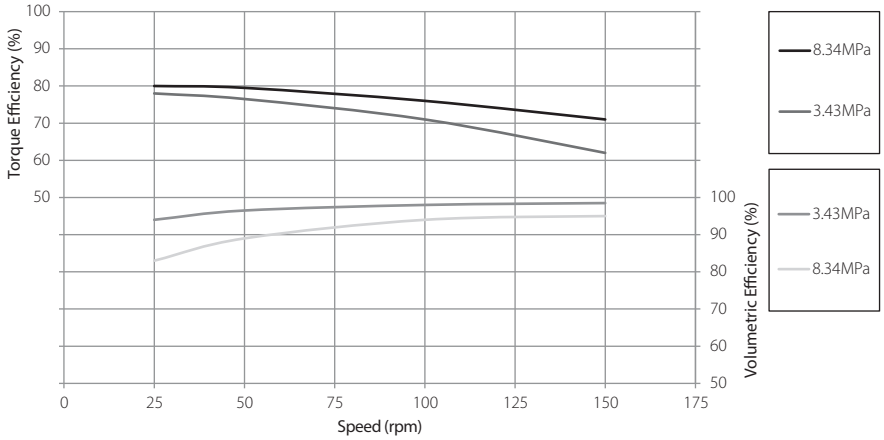


H Series

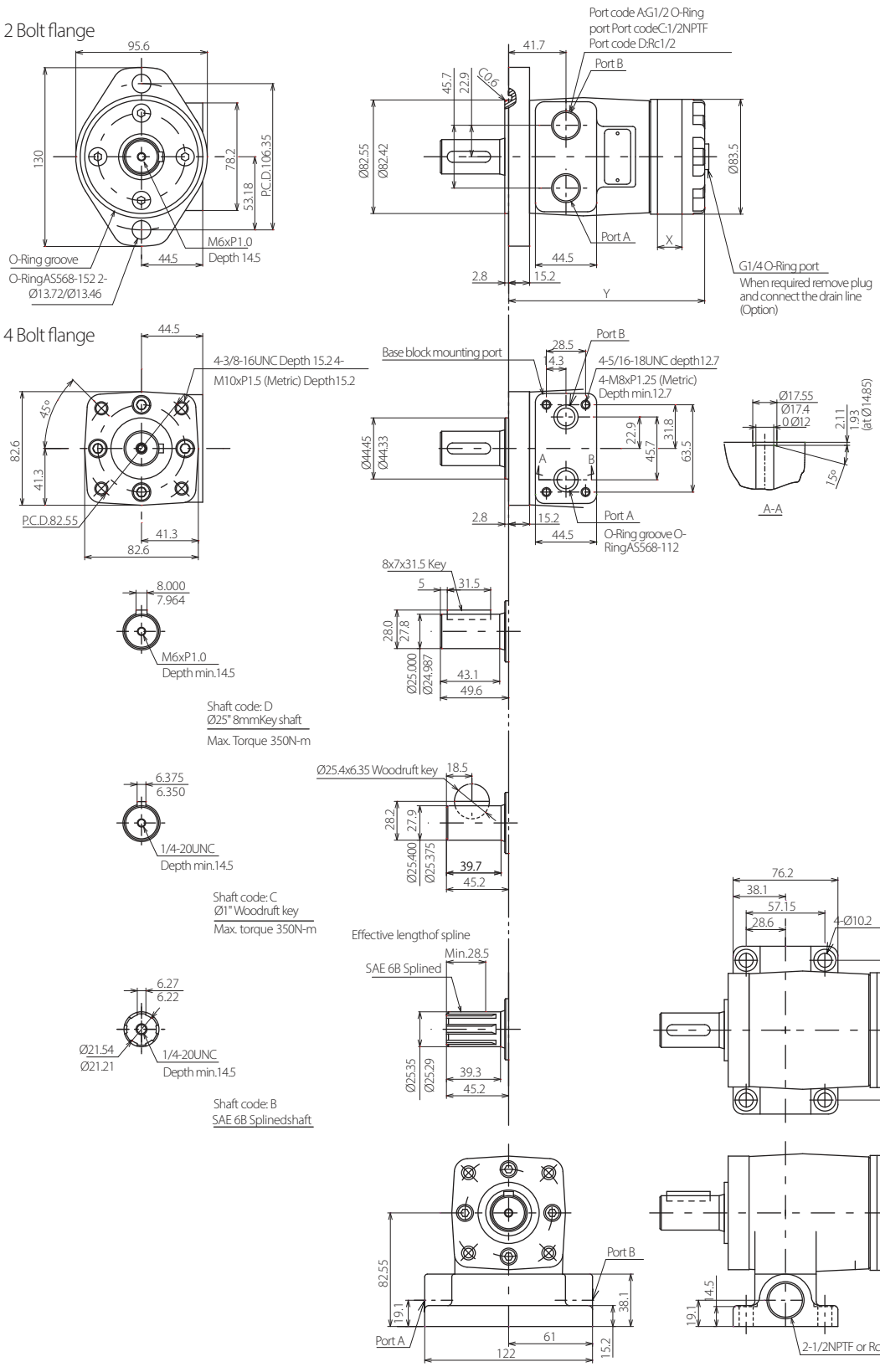
H - 290 (277cm³/rev)



H - 390 (369cm³/rev)



Dimensions and mount data



Rotation: Viewed from shaft end

- CW: Port A pressurized
- CCW: Port B pressurized

Model	X :Gerotor Width	Y: Length
H-040	7.0	131.7
H-050	7.0	131.7
H-070	9.5	134.2
H-100	13.2	137.9
H-130	17.8	142.5
H-170	21.9	146.6
H-200	25.4	150.1
H-240	31.8	156.5
H-290	38.1	162.8
H-390	50.8	175.5

Base Blok Mounting Kits

Kit no.	123-1007-001	123-1007-001-S3
Port block (1)	833-1 (1/2NPTF)	833-4 (Rc1/2)
Screw cap (4)	21046S-4 (5/16UNC)	21046S-5 (M8)
O-Ring (2)	15058	15058
Mass	1.4kg	1.4kg
Motor port thread size	Need to select 5/16UNC	Need to select Metric M8xP1.25

(Optional on motor with manifold mount only.)

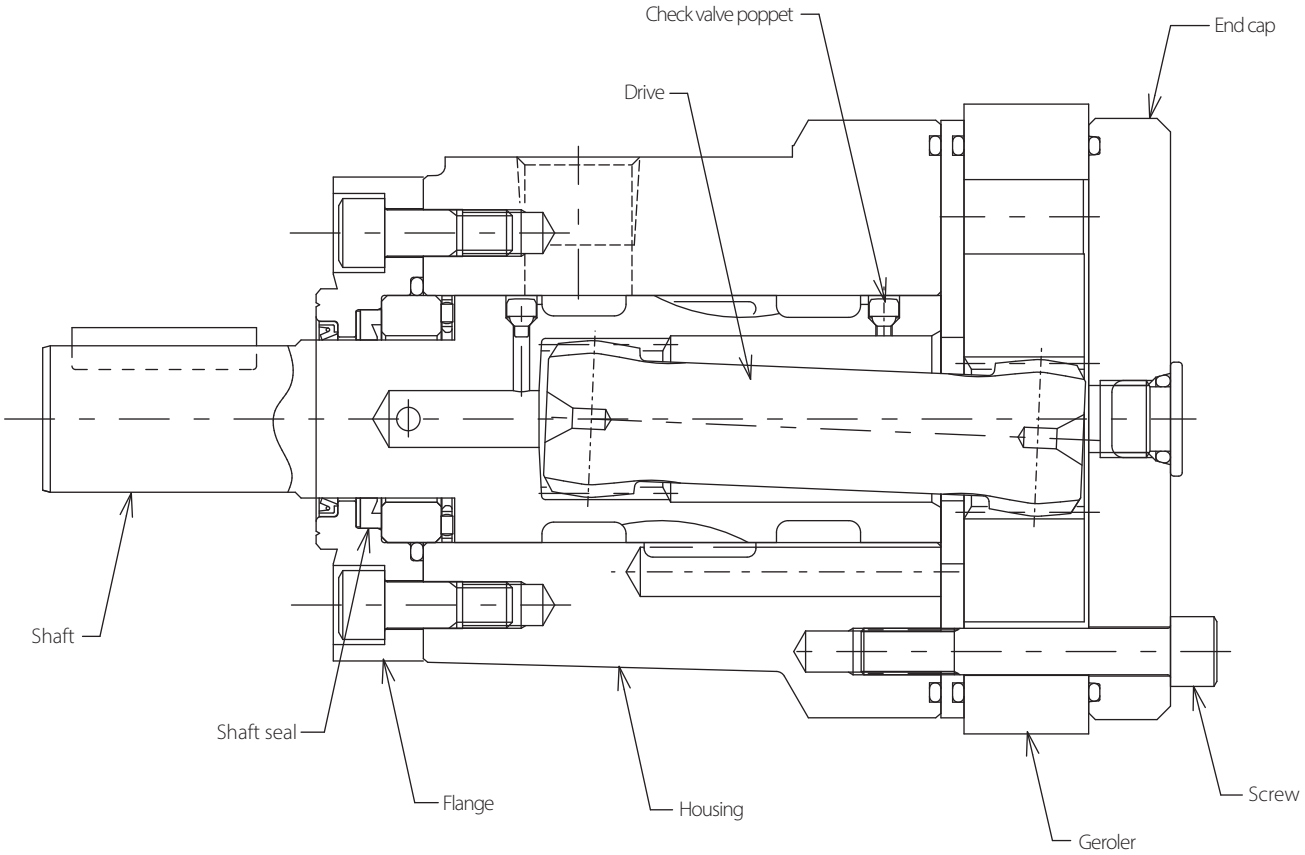
S Series

Specifications

Model	Displacement	Continuous Speed	Continuous Inlet Flow	Intermittent Inlet Flow	Continuous Torque	Intermittent Torque	Continuous Pressure	Intermittent Pressure	PeakBack Pressure	Weight
	cm^3/rev	rpm	L/min	L/min	N-m (kgf-m)	N-m (kgf-m)	MPa (kgf/cm^2)	MPa (kgf/cm^2)	MPa (kgf/cm^2)	Kg
S-050	58	963	57	68	106 (10.8)	133 (13.6)	13.8 (140)	17.2 (175)	10.3(105)	6.6
S-070	76	742	57	76	139 (14.2)	175 (17.9)	13.8 (140)	17.2 (175)	10.3(105)	6.7
S-100	93	607	57	76	174 (17.7)	216 (22.0)	13.8 (140)	17.2 (175)	10.3(105)	7.0
S-120	120	472	57	76	224 (22.8)	279 (28.5)	13.8 (140)	17.2 (175)	10.3(105)	7.2
S-140	144	394	57	76	258 (26.3)	319 (32.5)	13.1 (133)	16.2 (165)	10.3(105)	7.3
S-160	165	343	57	76	296 (30.2)	359 (36.6)	13.1 (133)	15.9 (162)	10.3(105)	7.4
S-190	186	304	57	76	326 (33.3)	395 (40.3)	12.8 (130)	15.5 (158)	10.3(105)	7.6
S-220	224	253	57	76	359 (36.6)	435 (44.4)	11.7 (120)	14.1 (144)	10.3(105)	7.9
S-300	299	190	57	76	422 (43.0)	507 (51.7)	10.3 (105)	12.4 (126)	10.3(105)	8.4
S-380	371	153	57	76	457 (46.6)	523 (53.3)	9.0 (92)	10.3 (105)	10.3(105)	8.8

Note: 1. Intermittent Torque, Pressure, Flow and Speed : Intermittent operation, 10% of every minute. A simultaneous Intermittent Torque and Intermittent Speed and Flow condition must not occur.
2. Maximum pressure at the motor inlet port of 17.2MPa (175kgf/cm^2)
3. Splined shafts are recommended whenever operating above 350N-mof torque.

Sectional view



Performance data

The performance data on this catalogue show the typical Torque Efficiency and Volume Efficiency of S series motors at each pressure at 37 cSt.

Nth = Theoretical Speed (rpm)

q = Displacement (cm^3/rev)

ηv = Volumetric Efficiency

N = Speed (rpm)

ΔP = Pressure Difference between inlet port and outlet port (MPa)

Tth = Theoretical Torque (N-m)

Q = Inlet Flow (l/min)

ηT = Torque Efficiency

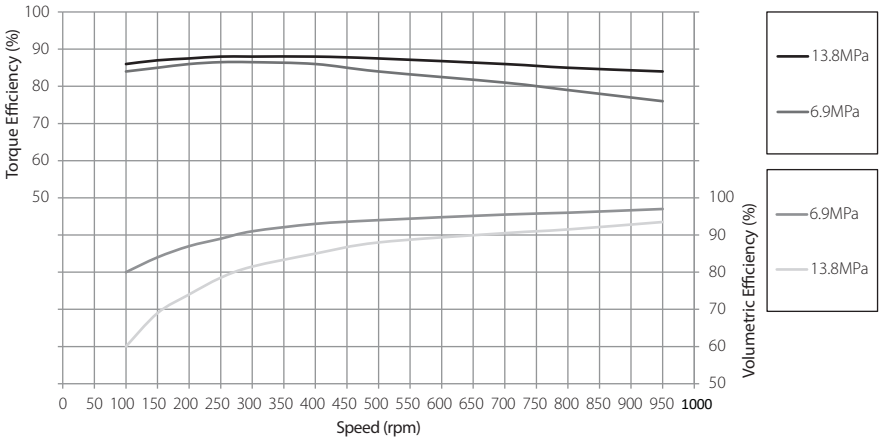
T = Actual Torque (N-m)

$Nth = Q \times 10^3/q \quad N = Nth \times \eta V$

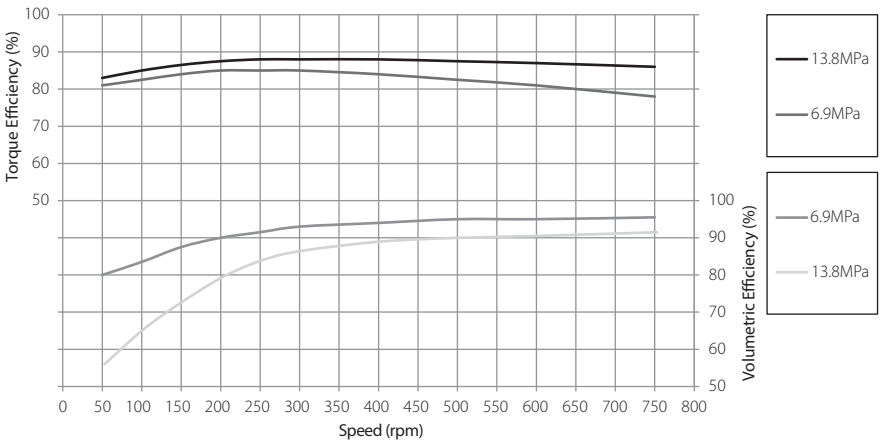
$Tth = \Delta P \times q/2\pi \quad T = Tth \times \eta T$

Note: These data are not guaranteed data.

S - 050 (58cm^3/rev)

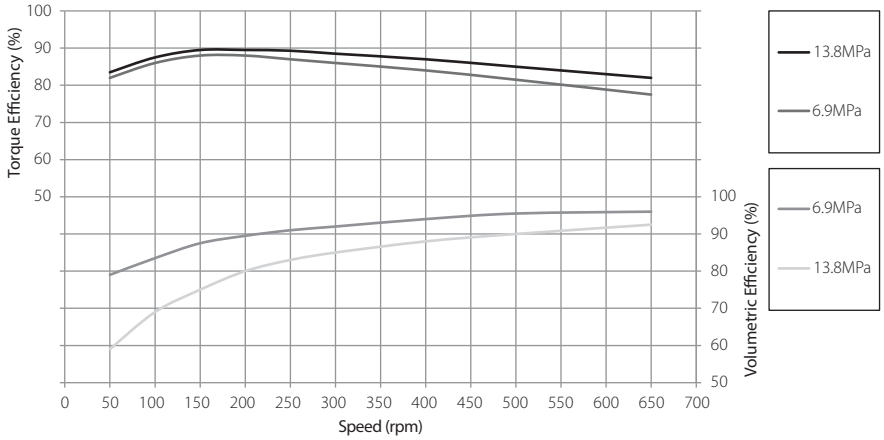


S - 070 (76cm^3/rev)

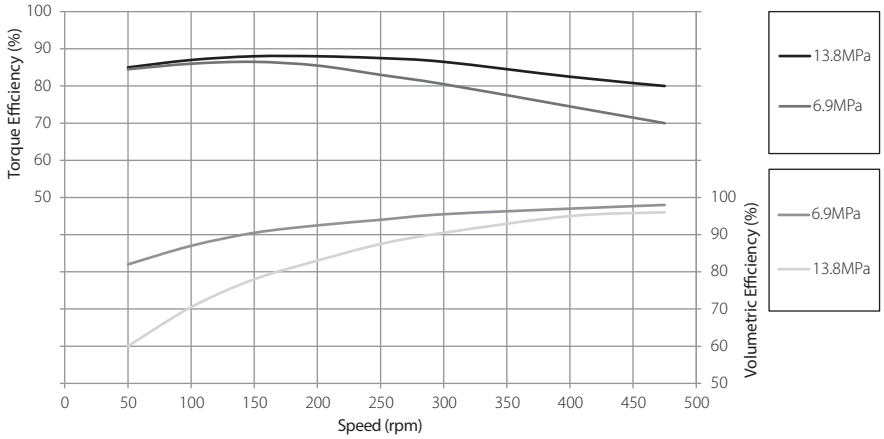


S Series

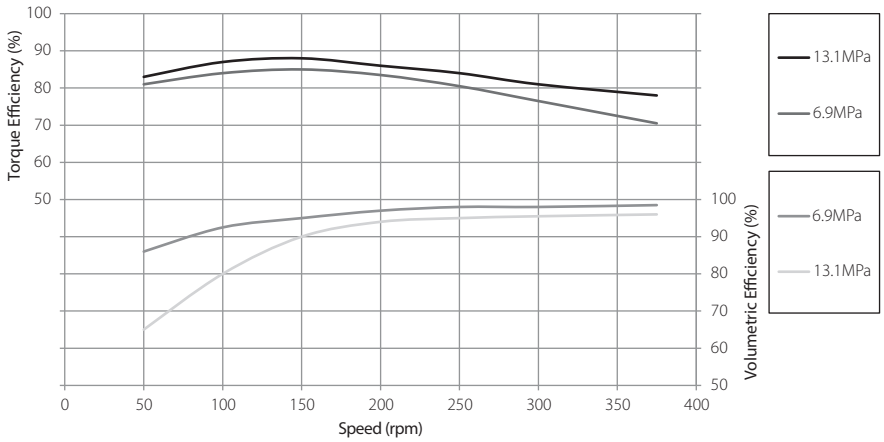
S - 100 (93cm³/rev)



S - 120 (120cm³/rev)

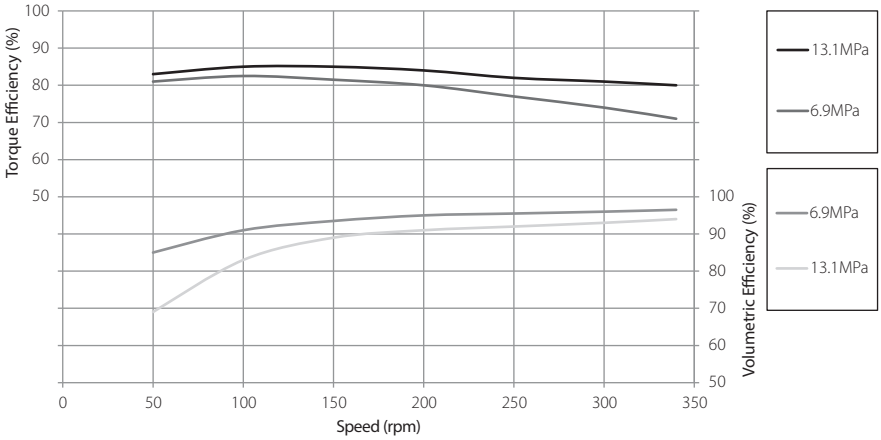


S - 140 (144cm³/rev)

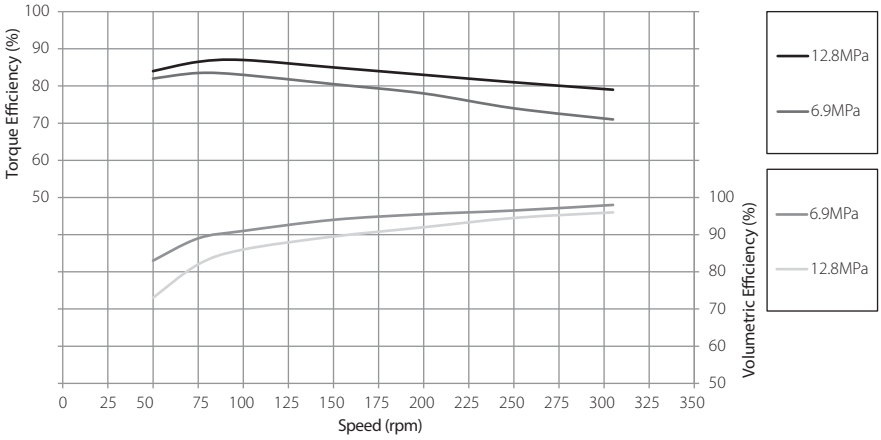


S Series

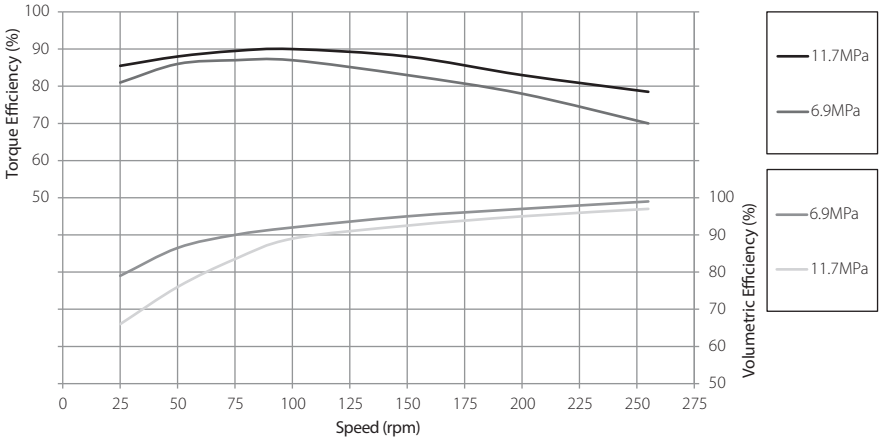
S - 160 (165cm³/rev)



S - 190 (186cm³/rev)

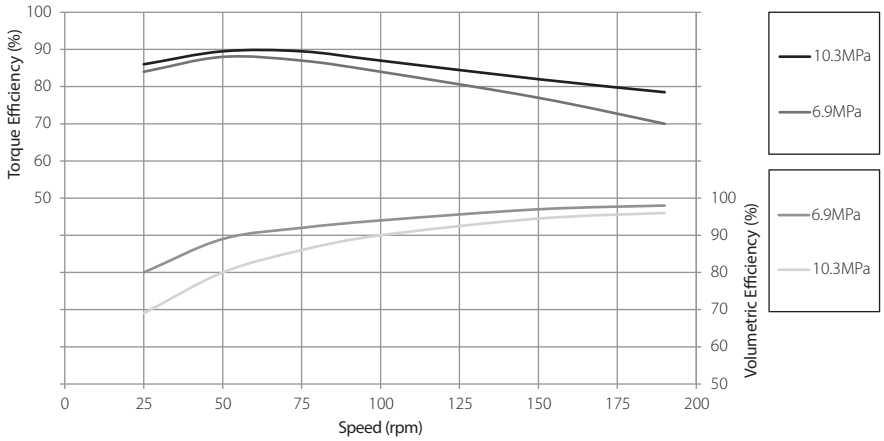


S - 220 (224cm³/rev)

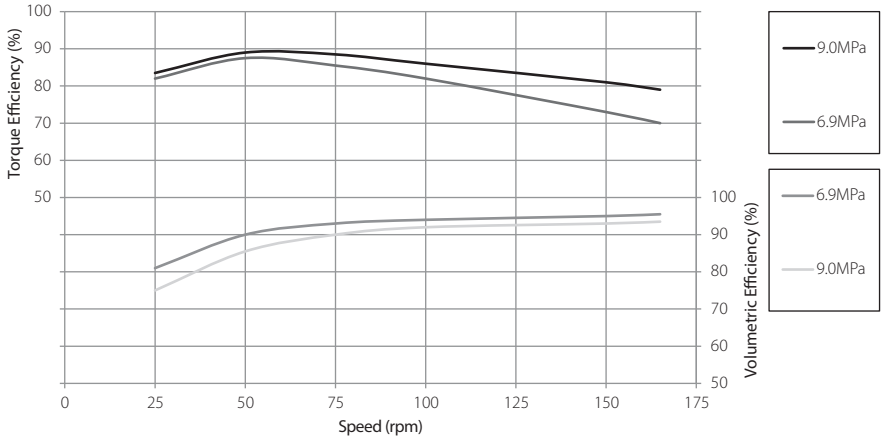


S Series

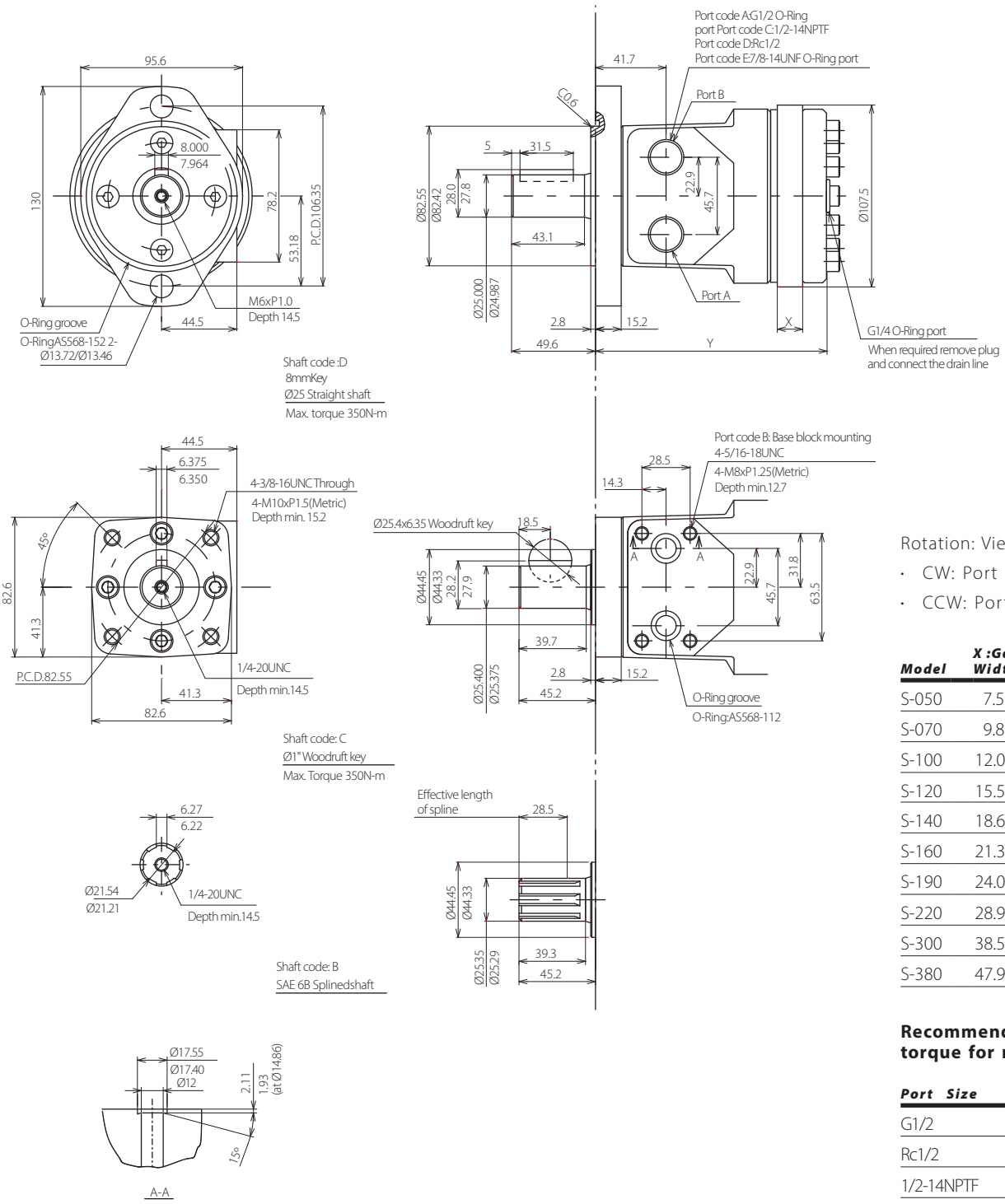
S - 300 (299cm³/rev)



S - 380 (371cm³/rev)



Dimensions and mount data



Rotation: Viewed from shaft end

- CW: Port A pressurized
- CCW: Port B pressurized

Model	X :Gerotor Width	Y: Length
S-050	7.5	136.8
S-070	9.8	139.1
S-100	12.0	141.3
S-120	15.5	144.7
S-140	18.6	147.8
S-160	21.3	150.5
S-190	24.0	153.2
S-220	28.9	158.1
S-300	38.5	167.8
S-380	47.9	177.1

Recommended tightening torque for motor mounting

Port Size	Tightening Torque
G1/2	59 N-m(6kgf-m)
Rc1/2	59 N-m(6kgf-m)
1/2-14NPTF	59 N-m(6kgf-m)
G3/8	39 N-m(4kgf-m)
G1/4	24.5 N-m(2.5kgf-m)

Instruction for use

Permissible back pressure and case pressure

- In case of series connection or closed circuit (HS T circuit), a case drain isnecessary.
- The permissible case pressure in the chart shows the permissible case pressure at each motor shaft speed.

(1) S Series Motor has internal check valve, and the back pressure (return pressure) is permissible to the pressure in the chart.

Pc = P2…… ..... (1)

(2) H Series Motor doesn't have internal check valve. The case pressure operates to shaft seal. Use for the case pressure which is calculated by the following formula to become under than the chart pressure.

Pc = Case Pressure (MPa) Pc = 0.6ΔP + P2……(2)

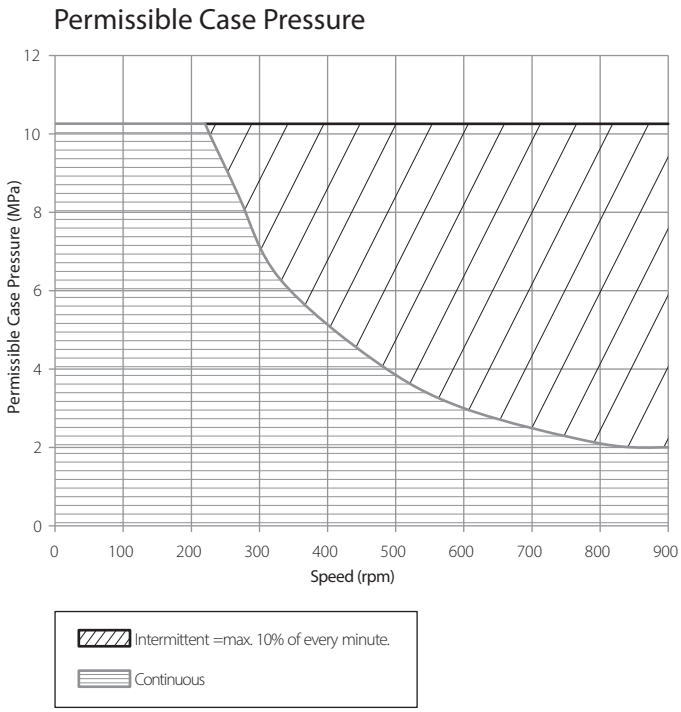
ΔP = P1 - P2 : Pressure Difference between inlet port and outlet port (MPa)

P1: Inlet Port Pressure (MPa)
P2: Outlet Port Pressure (Back Pressure) (MPa)

(3) In case of the pressure which was calculated in (1) or (2) exceeds the permission case pressure of the chart, the case drain is necessary.

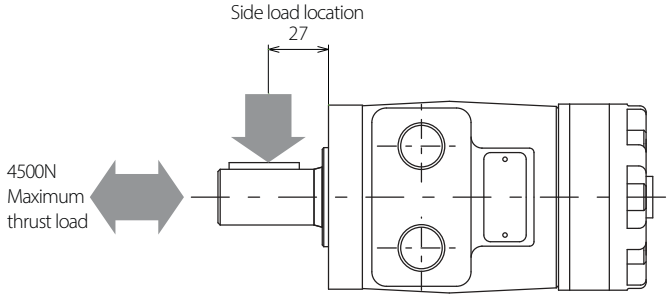
Note:

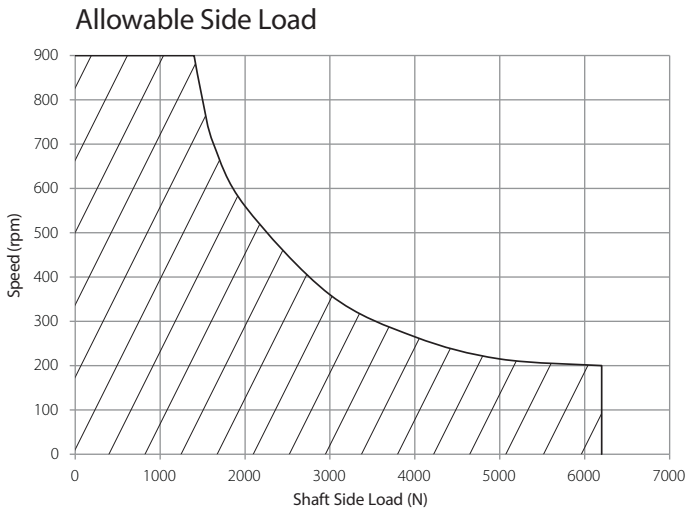
1. The standard type H motor doesn't have a drain port. In case of needing a case drain, select a H motor with the drain port from the model numbering procedure.
2. H Series Motor has the special specification which has a check valve. Special features symbol is "D"



Side load capacity

- These charts are based on the load being applied at the location shown. Side load capacity decreases when load is applied at distances greater than shown.
- This side load chart showsrelation between the shaft speed and the permission side load when the load acts on the 27 mm position from the flange mounting surface. The side load when the load position is different iscalculated by the following formula.





Instruction

Fr : Side load from the chart (N)

Fro: Permission side load at the load point

X : The distance from rated side load point (27mm from flange mounting surface).
The side of the end of the shaft is "+" and the side of the flange is "**–**".
Fro = 130Fr/(130+x)

External thrust load can be applied by maximum 4500N either direction simultaneously.

<Calculation Example>

① Motor Shaft Speed 350rpm, Distance from flange mounting surface 40mm

From the chart Fr = 3000N X = +13mm

Fro = 130Fr /(130+X) = 130/143 ×3000 = 2700N

② Motor Shaft Speed 350rpm, Distance from flange mounting surface 17mm

From the chart Fr = 3000N X = -10mm

Fro = 130Fr /(130+X) = 130/120 ×3000 = 3250N

Hydraulic fluid

Recommended Fluid; Mineral based Anti-Wear Hydraulic Fluid ISO VG32, VG46, VG56, VG68, or equivalent fluid

Allowable Fluid Temperature Range; from -30 to +80 degrees

C. Recommended Viscosity Range; from 24 to 50 cSt

The allowable lowest viscosity; 13 cSt (for H series; 20 cSt)

The allowable highest viscosity; 2158 cSt

Recommended Filtration; 10 micron or finer

Fluid Cleanness; ISO 18/13 or finer

Note: If the motor is used with special fluid such as flame-resistant fluid, please contact Danfoss because special seals etc. are needed.

Inertia load application, etc.

When the motor is used in the inertia load application such as swing drive, it is necessary to use the brake valve in order to protect the motor and its shaft.

When the motor acts as a pump in the winch drive application or down-slope travel application, it is often necessary to use the counter balance valve in order to prevent the circuit cavitation or reckless driving by the self-weight.

In these cases, please contact Danfoss for details.

Valves for H and S Series

VSE Brake valve for direct connection

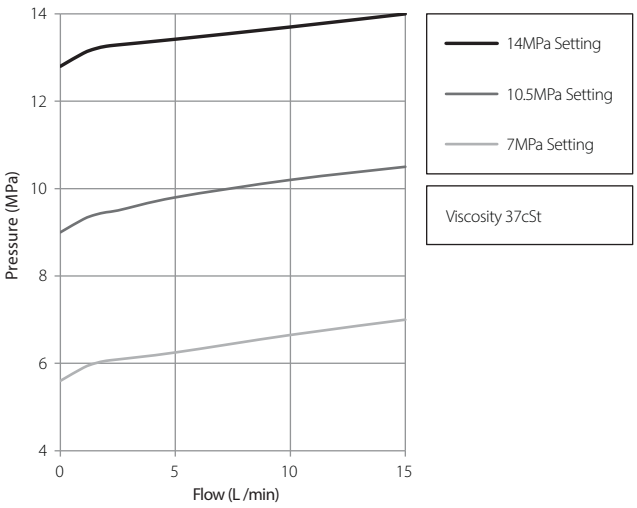
<Features> Total system will be designed economically because this can be connected directly with H/S series motor. This valve prevents an irregular high pressure by inertia load at accelerating, decelerating and stopping and then safe operation is ensured.

<Specifications> Rated Flow: 15l/min

Pressure Range: 6.9~13.7MPa (70~140kgf/cm^2)

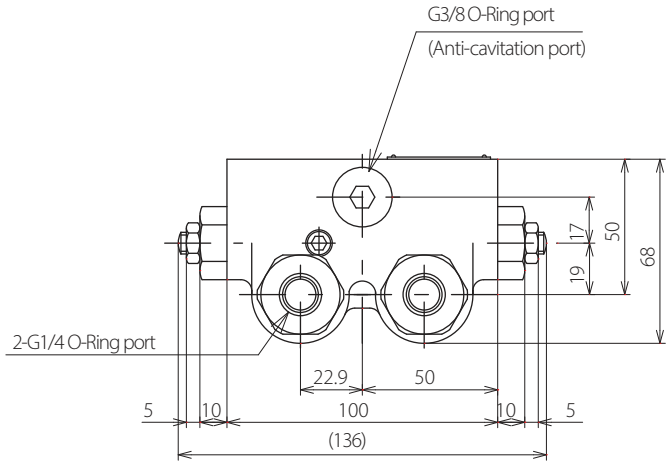
Weight: 1.9kg

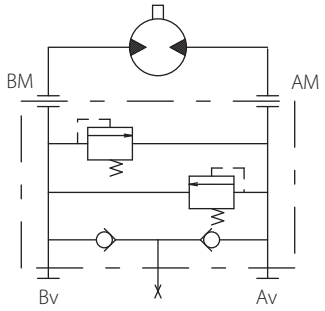
VSE Pressure Override Performance

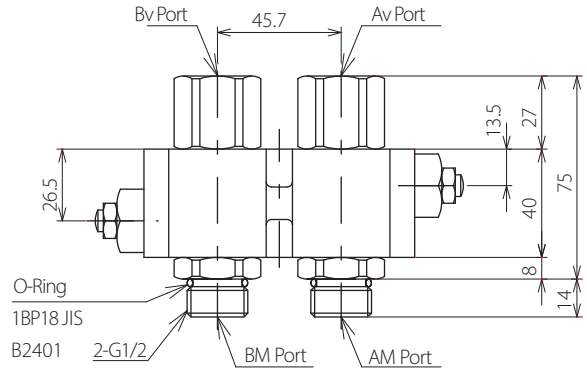


VSE □ □ □ A3 □ □ B

- B — Design code
- □ □ — Flow rate at set pressure (l/min)
- A3 — Port code
- □ □ □ — Relief set pressure (kgf/cm^2)
- VSE — Brake valve for H/S series motor (15 l/min)



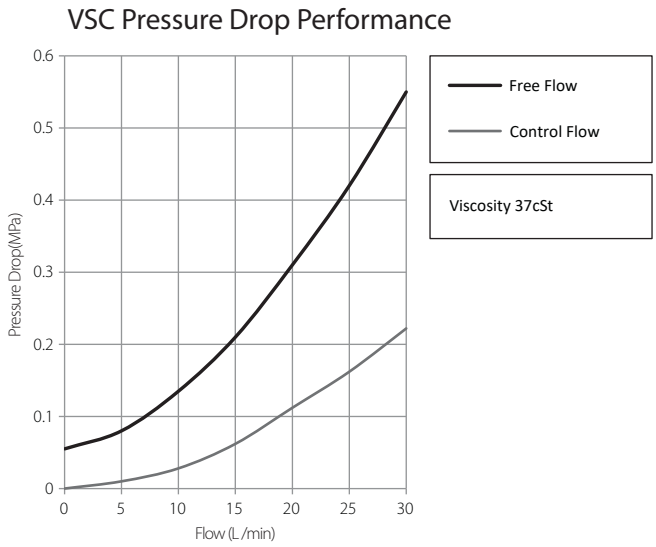




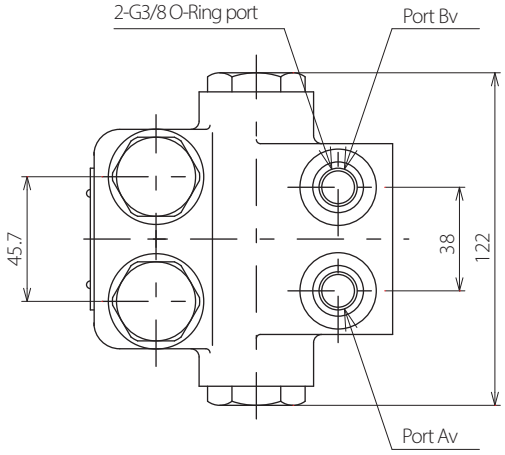
VSC Counter balance valve for direct connection

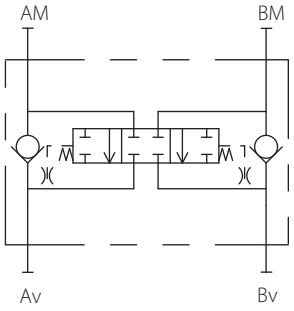
<Features> Total system will be designed economically because this can be connected directly with H/S series motor. This can be connected directly with direct connected brake valve. The circuit
cavitation or reckless driving by the self-weight can be prevented.

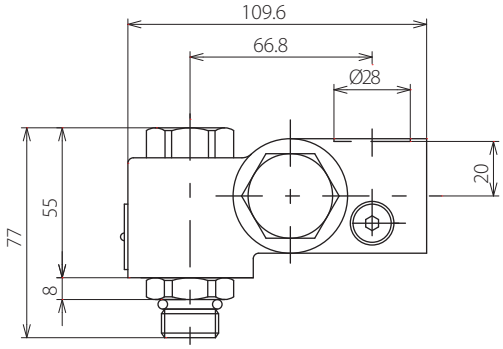
<Specifications> Max. Pressure: 17.2MPa (175kgf/cm²)
Rated Flow: 30l/min
Spool Cracking Pressure: 0.3MPa (3.5kgf/cm²)
Weight: 2.0kg

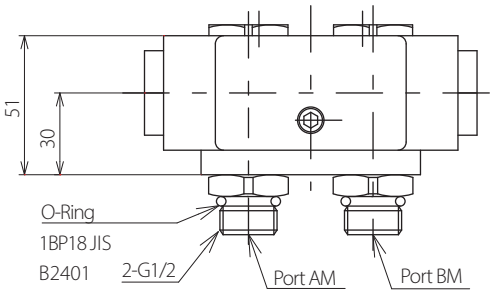


VSC A7 A
- Design code
- Port code
- Counter balance valve for H/S series motor (30 l/min)









Valves for H and S Series

VSA Counter balance valve for direct connection

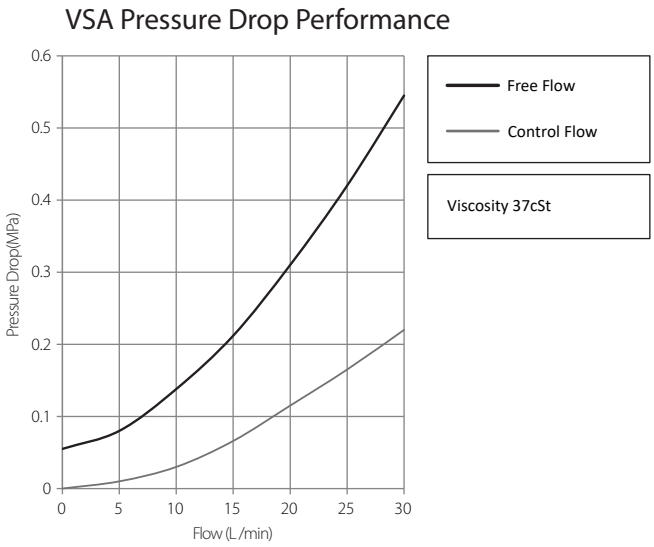
<Features> Total system will be designed economically because this can be connected directly with H/S series motor. The circuit cavitation or reckless driving by the self-weight can be prevented.

<Specifications> Max. Pressure: 17.2MPa (175kgf/cm²)

Rated Flow: 30l/min

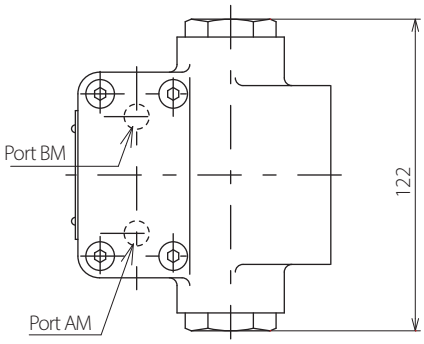
Spool Cracking Pressure: 0.3MPa (3.5kgf/cm²)

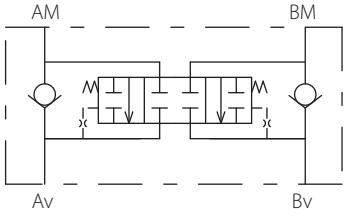
Weight: 2.0kg

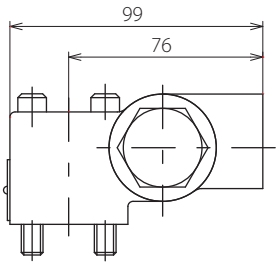


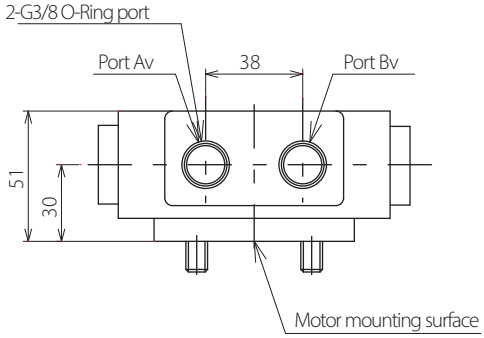
VSA A1 A

- Design code
- Port code
- Counter balance valve for H/S series motor (30 l/min)









Valves for H and S Series

VSW Integrated brake valve and counter balance valve for direct connection

<Features> Total system will be designed economically because this can be connected directly with H/S series motor. This valve prevents an irregular high pressure by inertia load at accelerating, decelerating
and stopping and then safe operation is ensured. The reckless driving by the self-weight can be prevented.

<Specifications> Max. Pressure: 17.2MPa (175kgf/cm^2)

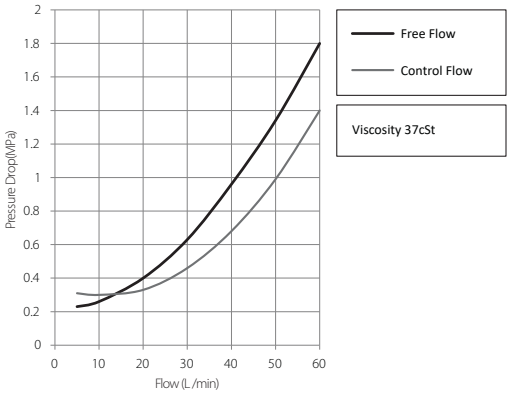
Max. Flow: 60l/min

Spool Cracking Pressure: 0.3MPa (3.5kgf/cm^2)

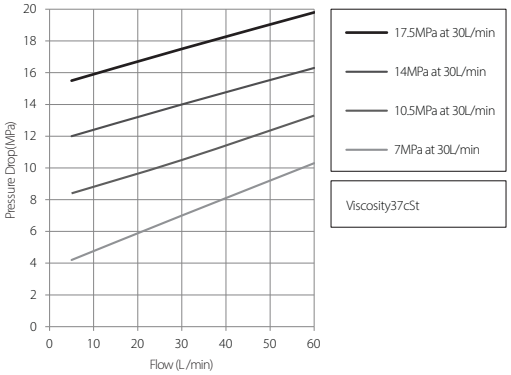
Pressure Range: 6.9~17.2MPa (70~175kgf/cm^2)

Weight: 3.8kg

VSW Pressure Drop Performance

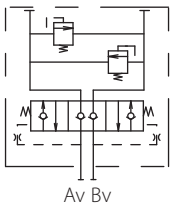


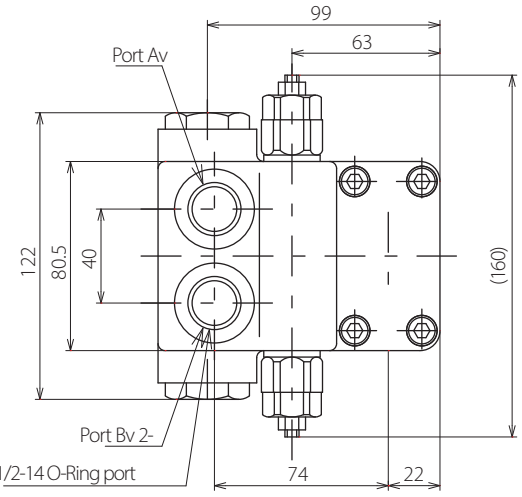
VSW Pressure Override Performance

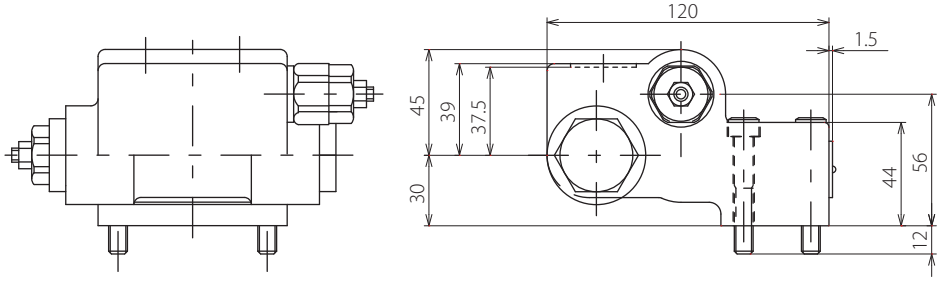


VSW □ □ □ D4 □ □ B

- Design code
- Flow rate at set pressure (l/min)
- Port code
- Relief set pressure (kgf/cm^2)
- Brake & counter valve for H/S series motor (60 l/min)







2000 Series

Features

- **The light-weight and compact low-speed high torque motor**

  Because Geroler does a planetary motion, the torque which is the same as the case to have decelerated the hydraulic motor of other types in 1/6 with the mechanical reduction gear is gotten. Because nine types displacement of 78-393cm^3/rev, even if it doesn't use a reduction gear, the motor which was fitted to the purpose can be selected.

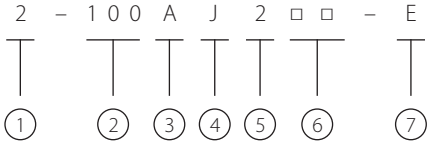
- **The high pressure rating**

  There are few internal oil leakage and they can be operated in rated pressure 20.6MPa (210kgf/cm^2), maximum pressure 30.9MPa (315kgf/cm^2), because it use of hydraulic pressure balanced type disk valve for the valve-mechanism and it is using high-precision geroler.

- **The accurate valve timing**

  Because the disc valve is built independent structurally from the drive transmitting mechanism-device into motor, ensures the accurate valve timing and the high performance that stays stable for long operation hours.

Model code procedure



① **Series**
- **2** = 2000 series

② **Displacement**

③ **Type of motor**
- **A** = Standard
- **B** = Wheel

④ **Shaft**
- **J** = Ø32 Straight with 10x8x31.5 key
- **B** = Ø1-1/4" Splined
- **C** = Ø1-1/4" Tapered
- **D** = Ø1-1/4" Straight with 5/16" Square key
- **E** Ø1" Straight with Woodruff key

⑤ **Flange mounting**
- **2** = 2 Bolt
- **4** = 4 Bolt
- **6** = 4 Bolt (unequally spaced)

⑥ **Special features (none of standard motor)**
- **None** = G1/2 O-Ring ports
- **A** = 7/8UNF Side ports
- **B** = Special seal for Phosphate Ester Fluid
- **C** = Rc1/2 Side ports
- **D** = 7/8UNF Rear ports
- **B8** = G1/2 Rear ports
- **U** = 7/8UNF Side ports (Pitch 50.8mm)
- **Y** = Manifold ports (Pitch 50.8mm)

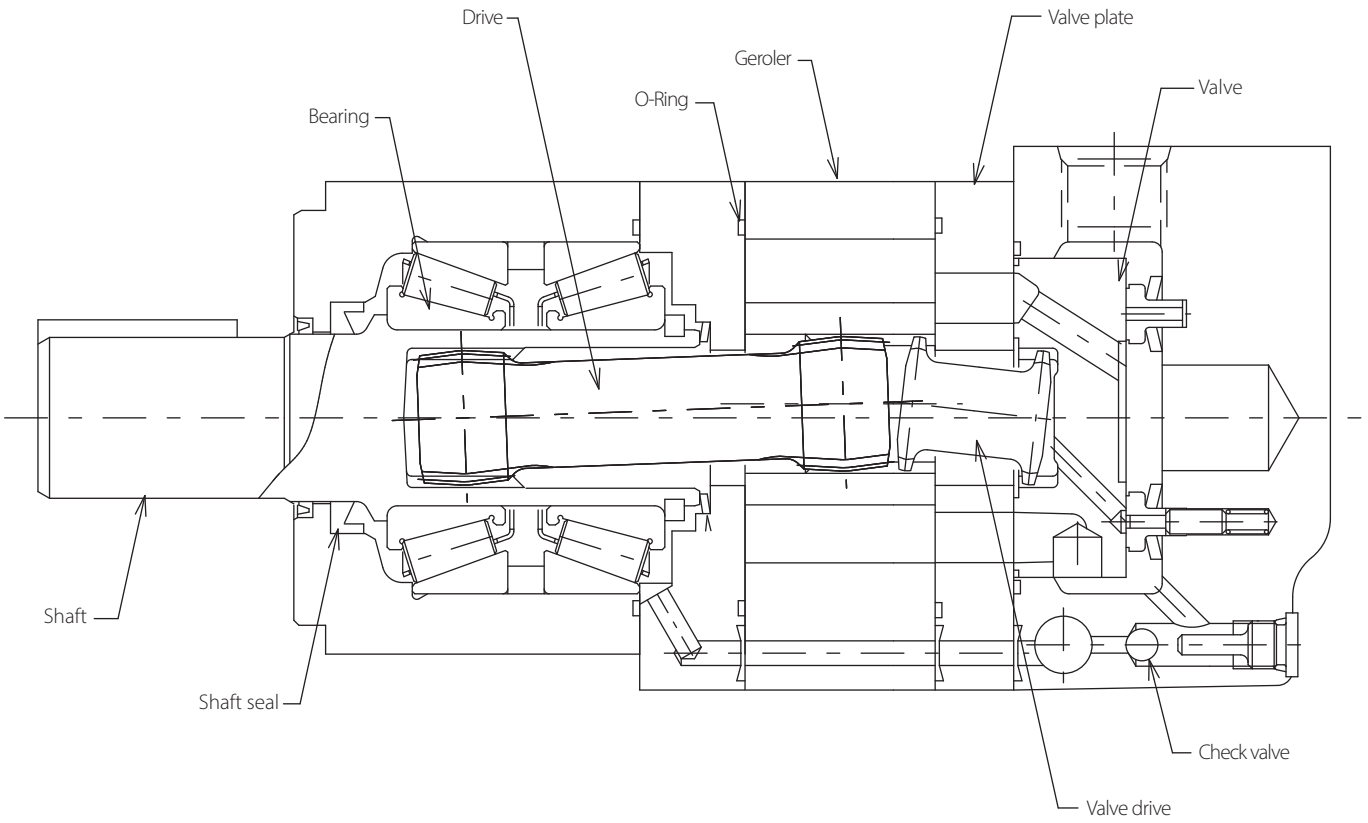
⑦ **Design code**
- **E** = Model 5

2000 Series

Model	Displacement	Continuous Speed	Intermittent Speed	Continuous Torque	Maximum Torque	Continuous Pressure	Maximum Pressure	PeakBack Pressure	Weight
	cm³/rev	rpm	rpm	N-m (kgf-m)	N-m (kgf-m)	MPa (kgf/cm²)	MPa (kgf/cm²)	MPa (kgf/cm²)	Kg
2-080	78	850	850	235 (24)	343 (35)	20.6 (210)	30.9 (315)	6.9 (70)	9.6
2-100	97	690	850	284 (29)	383 (39)	20.6 (210)	27.4 (280)	6.9 (70)	9.8
2-125	123	550	690	324 (33)	392 (40)	18.1 (185)	22.1 (225)	6.9 (70)	10.1
2-160	158	430	540	334 (34)	471 (48)	14.7 (150)	20.6 (210)	6.9 (70)	10.4
2-200	195	350	440	373 (38)	520 (53)	13.2 (135)	18.6 (190)	6.9 (70)	10.8
2-250	244	280	350	373 (38)	579 (59)	10.8 (110)	16.7 (170)	6.9 (70)	11.3
2-290	288	250	300	422 (43)	608 (62)	10.3 (105)	14.7 (150)	6.9 (70)	11.8
2-315	306	230	280	432 (44)	608 (62)	9.8 (100)	13.7 (140)	6.9 (70)	12.0
2-390	393	190	230	441 (45)	638 (65)	7.8 (80)	11.3 (115)	6.9 (70)	13.0

Note: 1. Intermittent: 10% of every minute, Maximum: 1% of every minute, operation available..
2. Continuous Pressure, Maximum Pressure: Show true pressure difference between motor inlet and out let ports. Maximum pressure at the motor inlet port of 30.9MPa (315kgf/cm²), out let port of 17.2MPa (175kgf/cm²)
3. Because there is a torque by each output shaft type, use within the torque.
4. A simultaneous Intermittent Speed and Maximum Pressure condition must not occur.
5. Weight: Show the weight of Standard Motor.

Sectional view

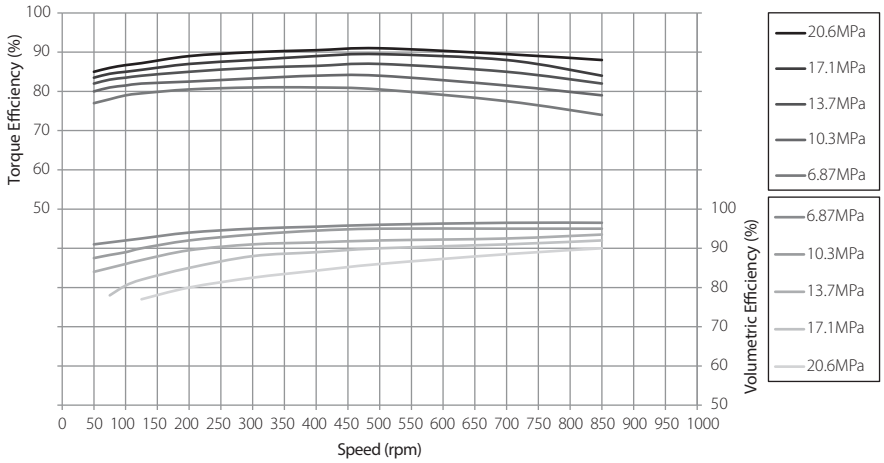


Performance data

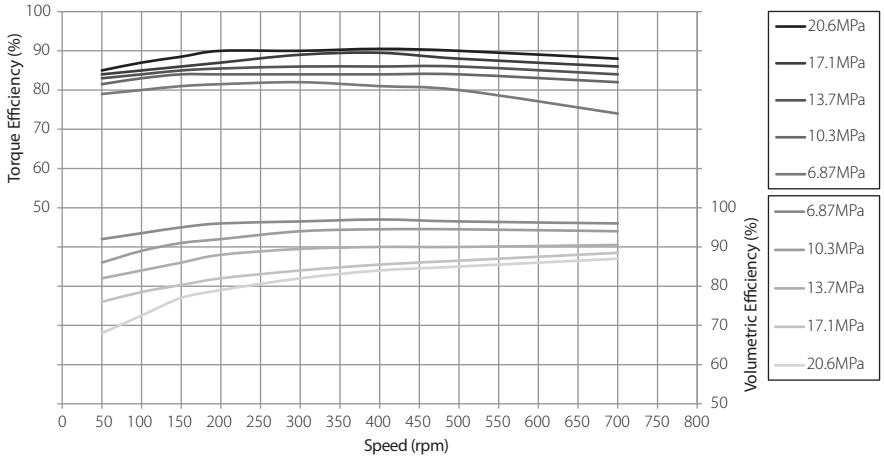
The performance data on this catalogue show the typical Torque Efficiency and Volume Efficiency of 2000 series motors at each pressure at 34 cSt.

Note: These data are not guaranteed data.

2 - 080 (78cm³/rev)

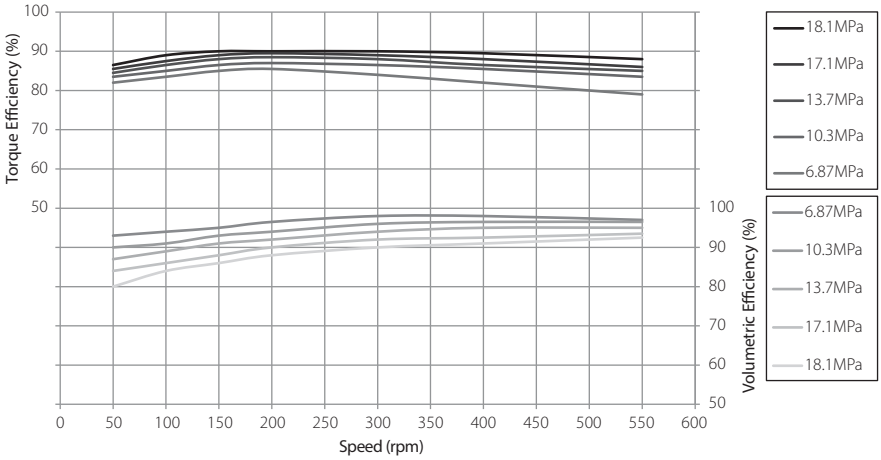


2 - 100 (97cm³/rev)

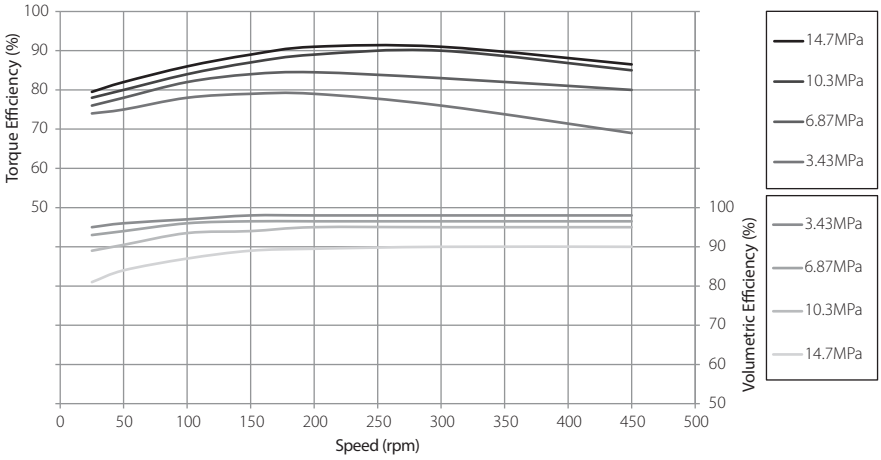


2000 Series

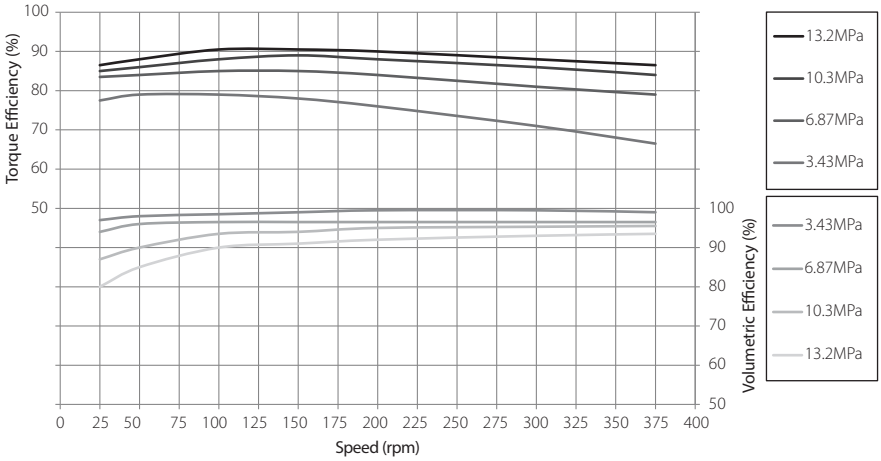
2 - 125 (123cm³/rev)



2 - 160 (158cm³/rev)

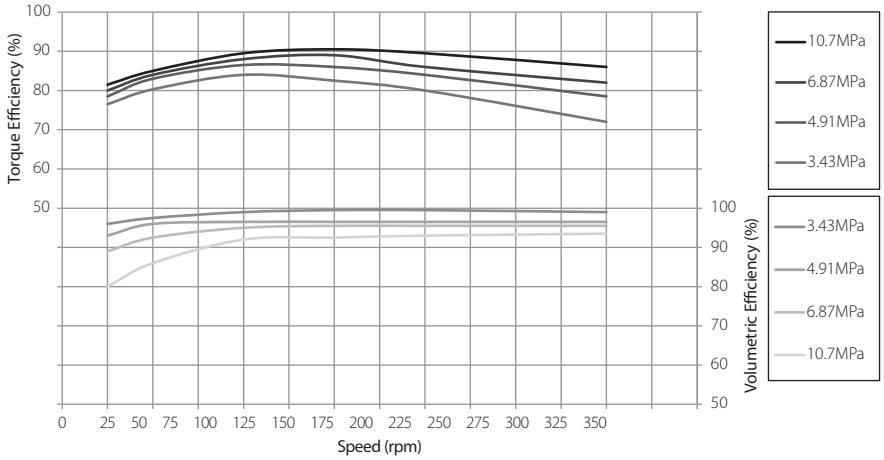


2 - 200 (195cm³/rev)

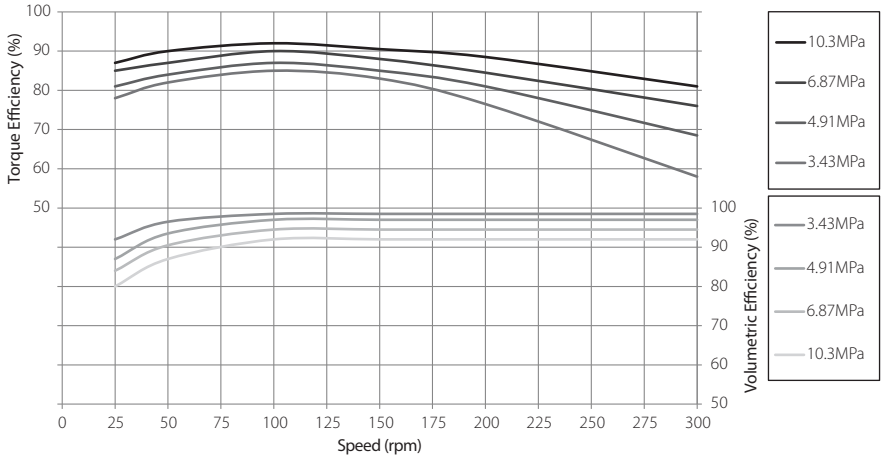


2000 Series

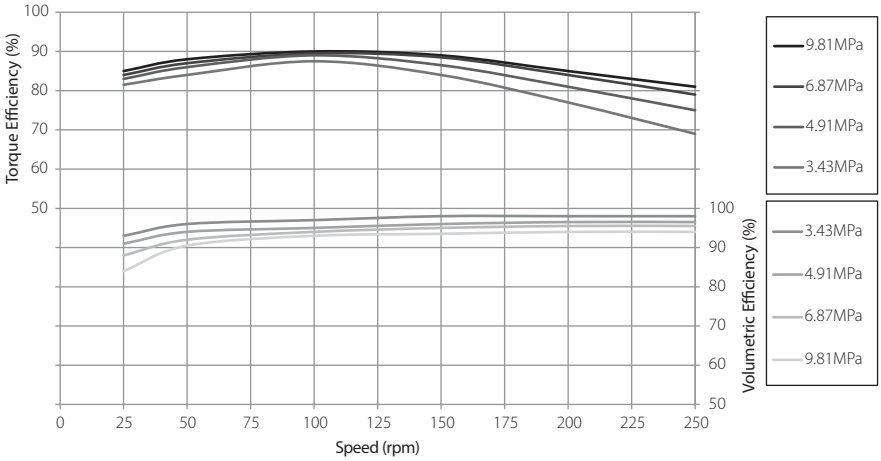
2 - 250 (244cm³/rev)



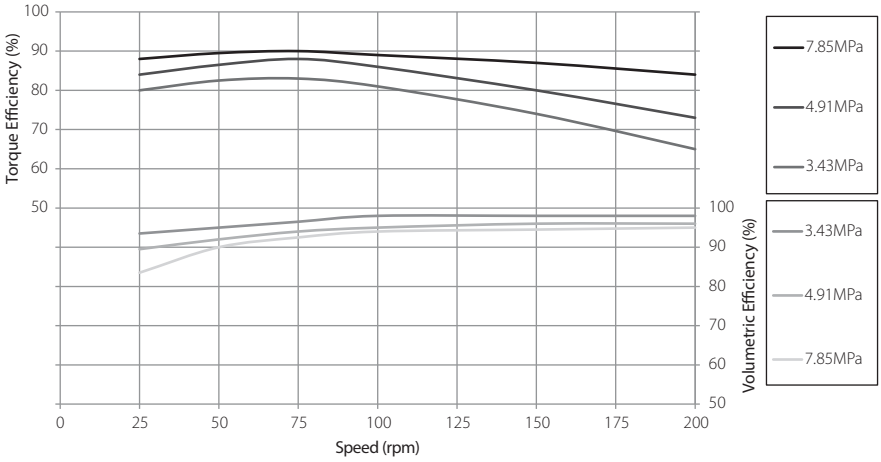
2 - 290 (288cm³/rev)



2 - 315 (306cm³/rev)



2 - 390 (393cm³/rev)

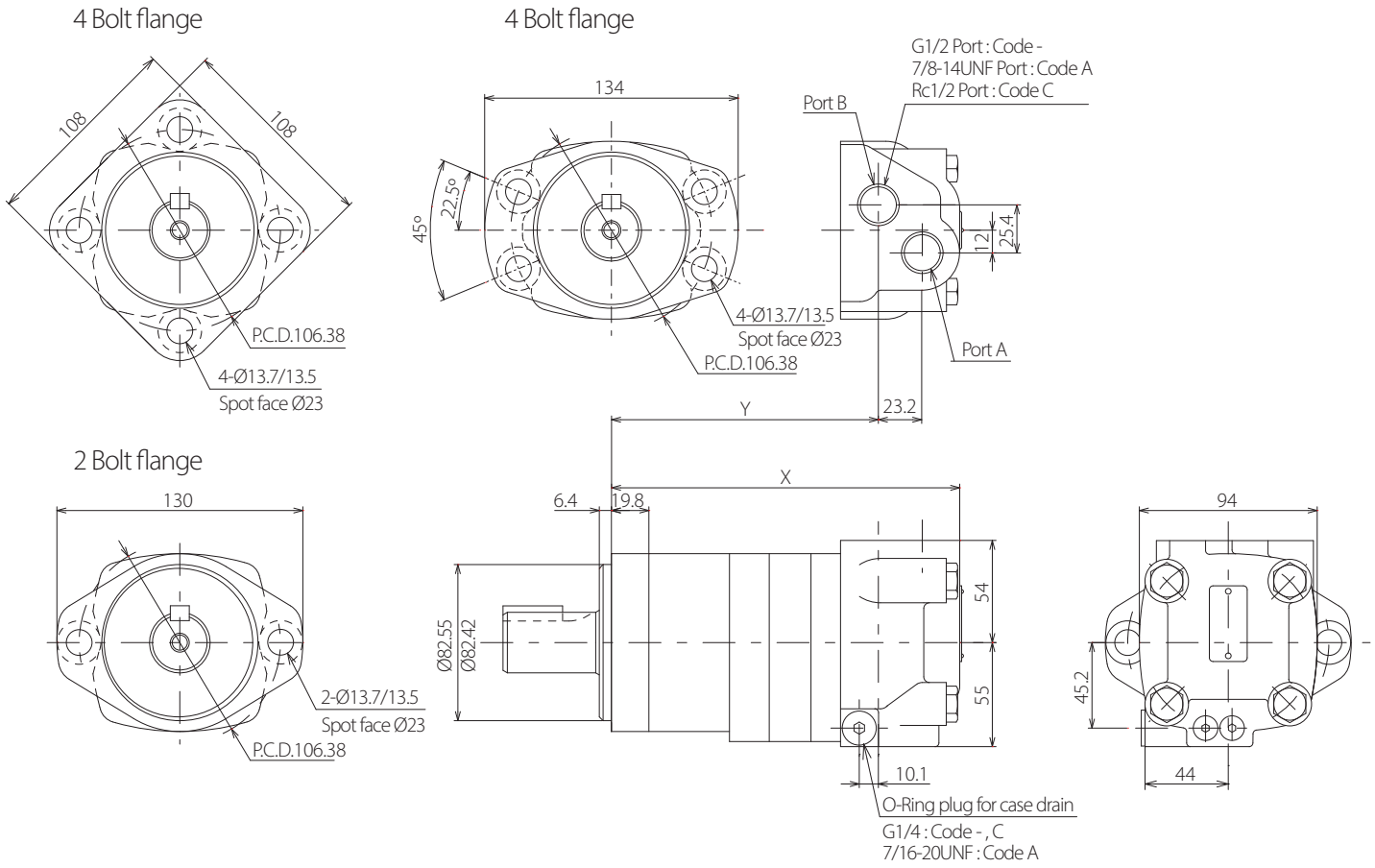


Dimensions and mounting data (side port)

Rotation: Viewed from shaft end

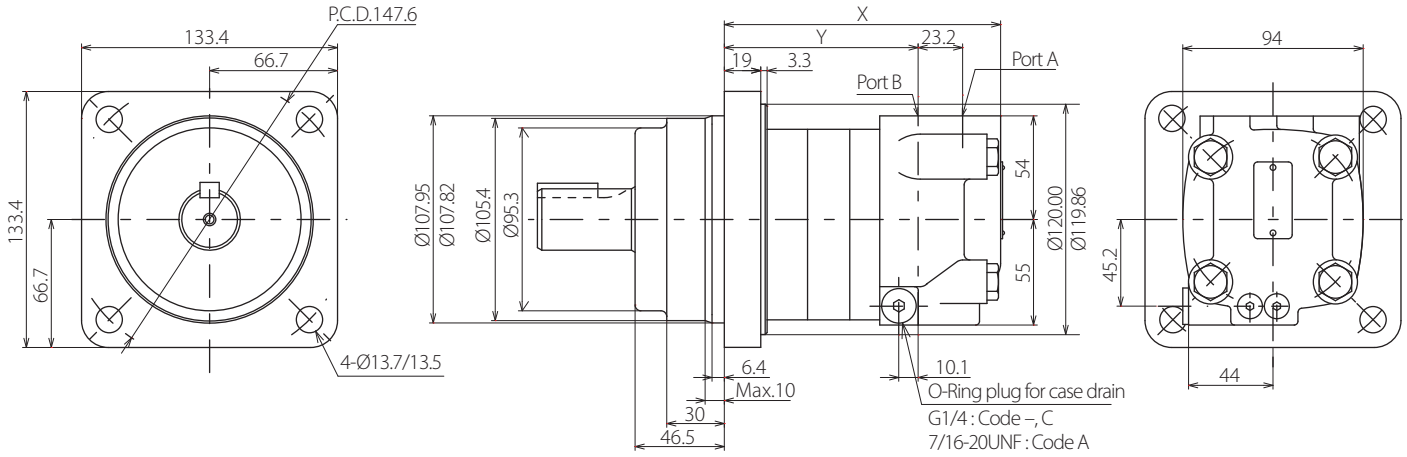
- CW: Port A pressurized
- CCW: Port B pressurized

Standard motor



Model	2-080	2-100	2-125	2-160	2-200	2-250	2-290	2-315	2-390
X	176	180	185	191	198	207	215	218	234
Y	133	137	142	148	155	164	172	175	191

Wheel motor



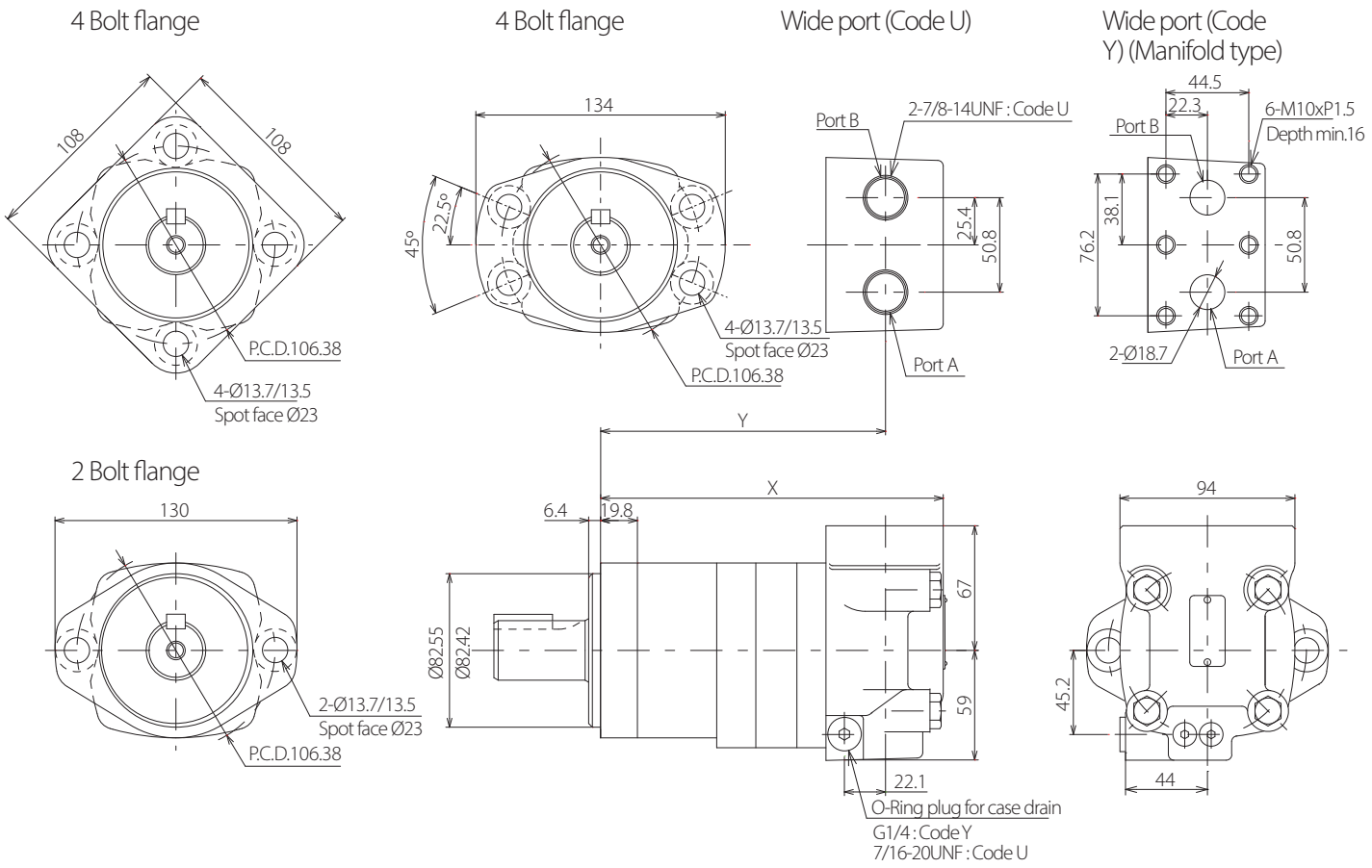
Model	2-080	2-100	2-125	2-160	2-200	2-250	2-290	2-315	2-390
X	136	140	144	151	157	167	175	178	194
Y	93	97	101	108	114	124	132	135	151

Dimensions and mounting data (wide side port)

Rotation: Viewed from shaft end

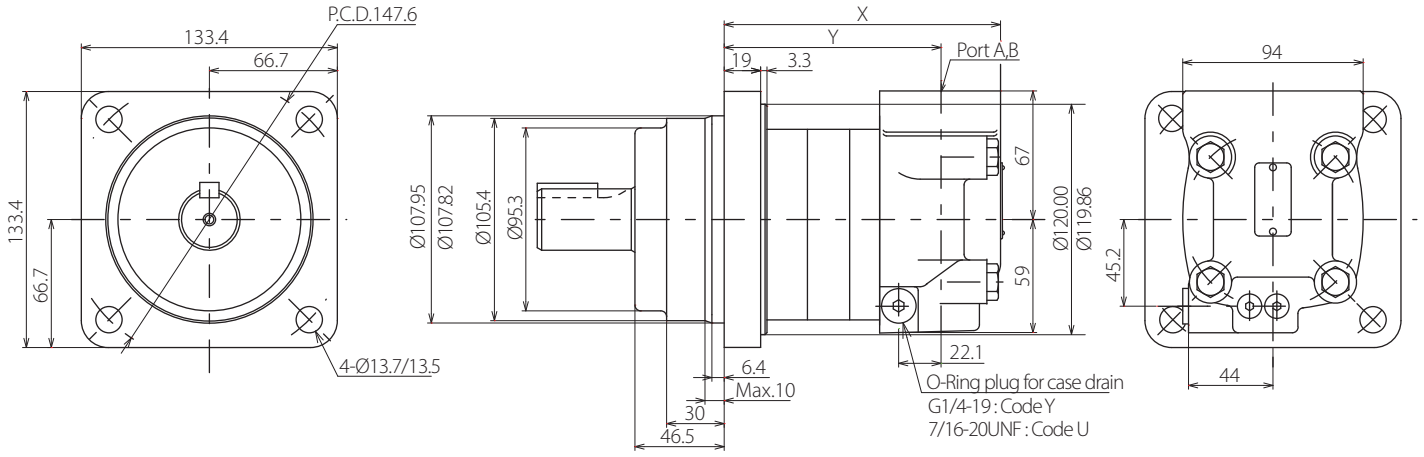
- CW: Port A pressurized
- CCW: Port B pressurized

Standard motor



Model	2-080	2-100	2-125	2-160	2-200	2-250		2-290	2-315	2-390
X	176	180	185	191	198	207	215	218	234	
Y	145	149	154	160	167	176	184	187	203	

Wheel motor



Model	2-080	2-100	2-125	2-160	2-200	2-250	2-290	2-315	2-390
X	136	140	144	151	157	167	175	178	194
Y	105	109	113	120	126	136	144	147	163

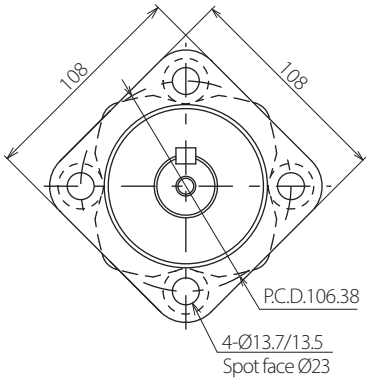
Dimensions and mounting data (rear port)

Rotation: Viewed from shaft end

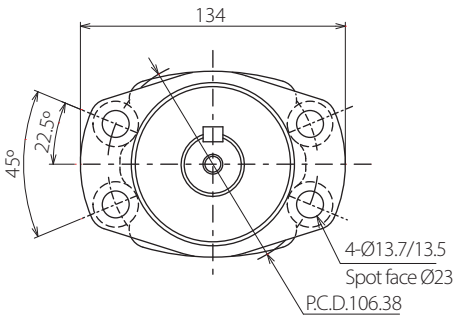
- CW: Port A pressurized
- CCW: Port B pressurized

Standard motor

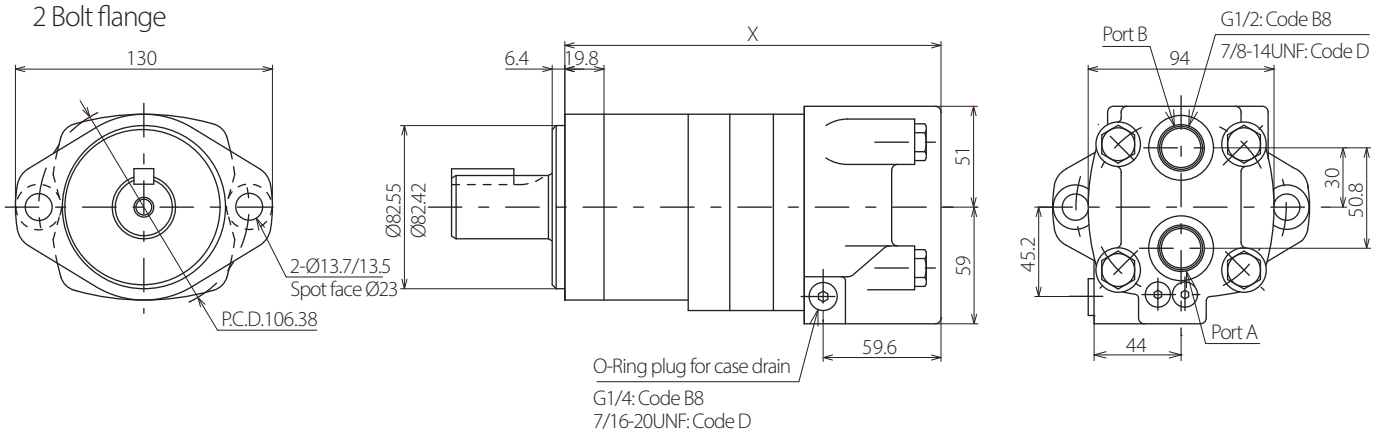
4 Bolt flange



4 Bolt flange

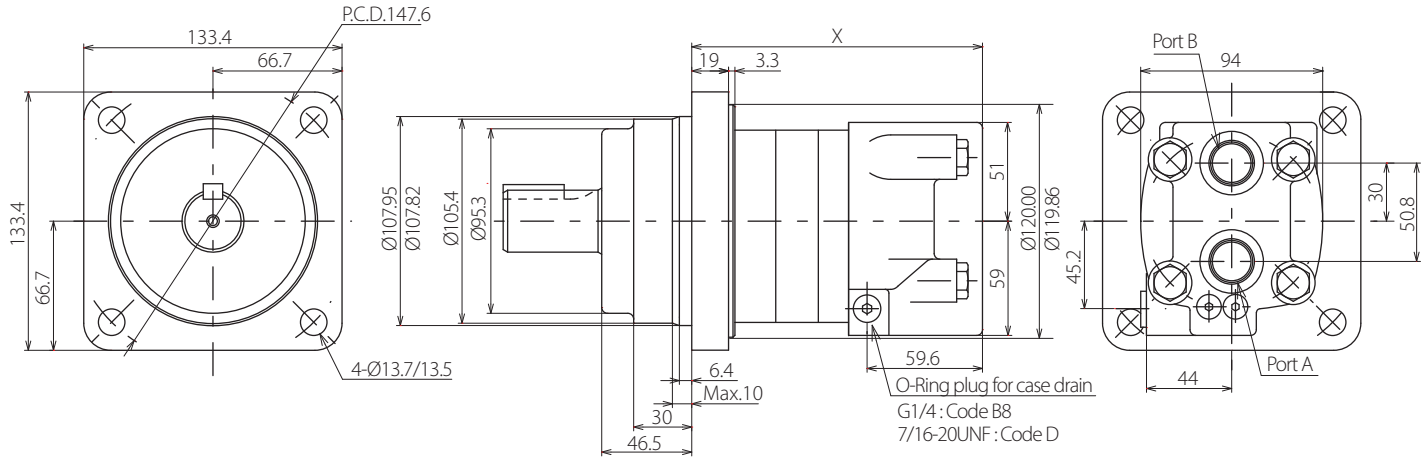


2 Bolt flange



Model	2-080	2-100	2-125	2-160	2-200	2-250	2-290	2-315	2-390
X	183	186	191	197	204	213	221	225	241

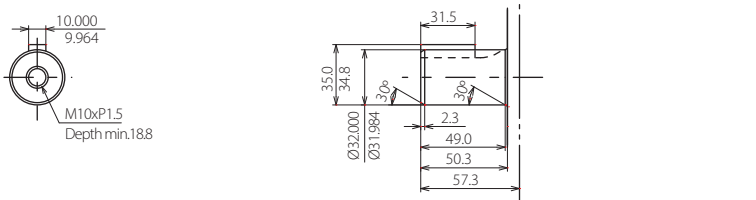
Wheel motor



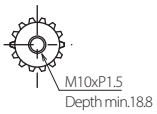
Model	2-080	2-100	2-125	2-160	2-200	2-250	2-290	2-315	2-390
X	143	146	151	157	164	173	181	184	200

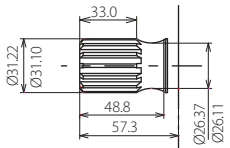
Dimension data for shaft

Shaft code: J
Ø32" Straight shaft

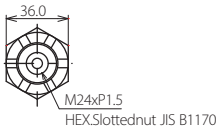


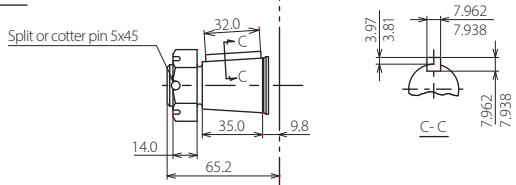
Shaft code: B
1-1/4" Involute splined shaft



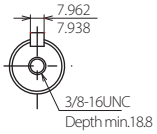


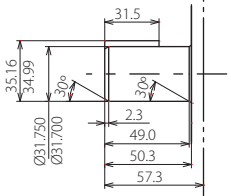
Shaft code: C 1-1/4"
Tapered shaft (SAE) Taper: 1.5/12

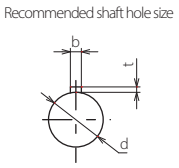




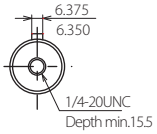
Shaft code: D 1-1/4"
Straight shaft

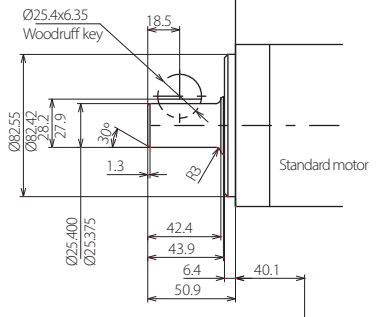


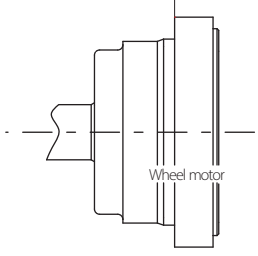




Shaft code: E
Ø1" Straight shaft (Max. Torque 395 N-m)







1-1/4" SAE Involute Spline (External)

D.P	12/24
Number of teeth	14
Pitch Dia.	29.634
Base Dia.	25.664
Pressure angle	30o
Type of fit	Side fit
Class of fit	II
Major Dia.	31.22/31.10
Minor Dia.	26.99/26.66
Form Dia.	Max. 27.488
Fillet radius	Max. 0.39
Dimension over two pins	35.797/35.750
Pin Dia.	4.064

Shaft	***d***	***b***	***t***
J	32.00 +0.025 0	10.000 ± 0.018	3.2 +0.2 0
B	Please reference internal spline		
C	—	7.962 +0.036 0	4.1 +0.2 0
D	31.75 +0.025 0	7.962 +0.036 0	3.6 +0.2 0
E	25.4 +0.021 0	6.375 +0.036 0	2.9 +0.2 0

SAE Involute Spline (Internal)

D.P	12/24
Number of teeth	14
Pitch Dia.	29.634
Base Dia.	25.664
Pressure angle	30o
Type of fit	Side fit
Major Dia.	32.08/31.75
Minor Dia.	27.72/27.59
Form Dia.	Min. 31.326
Dimension over two pins	24.407/24.342
Pin Dia.	3.6576

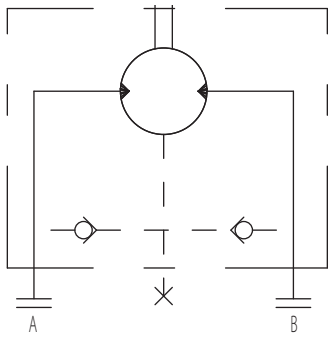
Instruction for use

Permissible back pressure

The motors have an internal check valve system, and it becomes the internal case drain. The case internal pressure becomes the same as either of A or B port low pressure. This pressure is the back pressure.

Use to maintain the life of shaft seal long under continuous pressure 1.96MPa (20kgf/cm^2) and peak maximum pressure 6.9MPa (70kgf/cm^2).

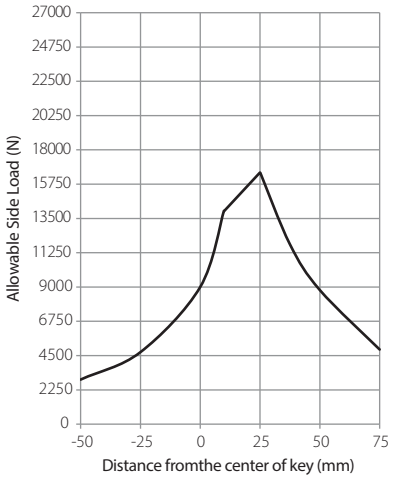
When using equal to or more than two motors in series, or the high back pressure operates like the meter out control, the external drain line is necessary.



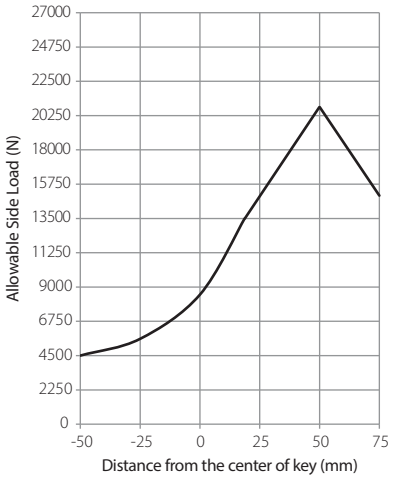
Radial load capacity

These curves indicate the radial load capacity of the 2000 Series Standard and Wheel Motor depending on the location of the radial load. The curves are based on 2000 hr. B-10 bearing life at 100rpm and at rated output torque. To determine the allowable radial load at speeds other than 100rpm, multiply the load values given on the bearing curves by the factors given in the chart. External thrust load can be applied by maximum 4500N either direction simultaneously.

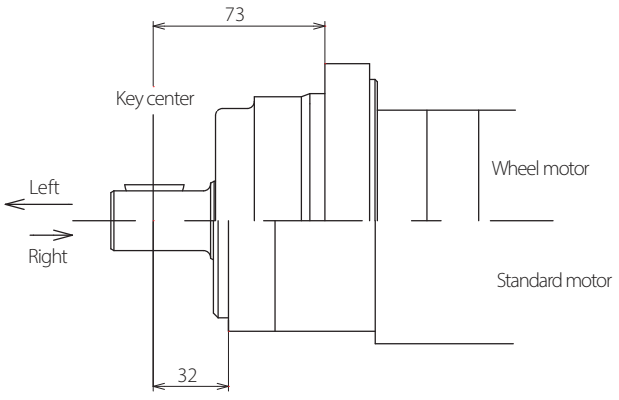
Allowable Side Load
(1" straight shaft)



Allowable Side Load (1-1/4",
32mm straight shaft)

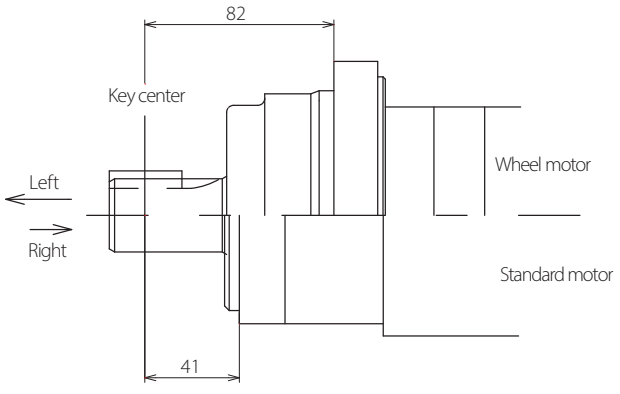


Distance from key center



Ø1" Straight shaft

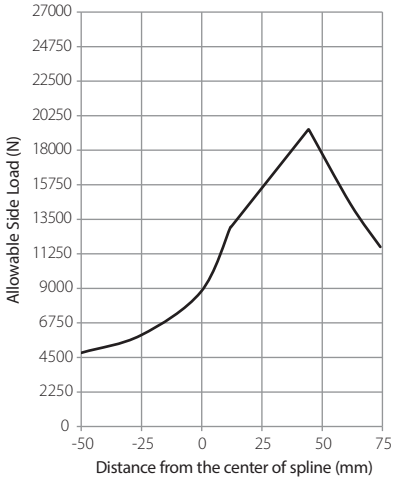
Distance from key center



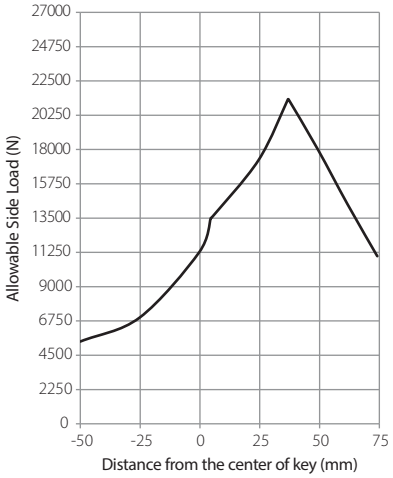
1-1/4",Ø32" Straight shaft

Instruction

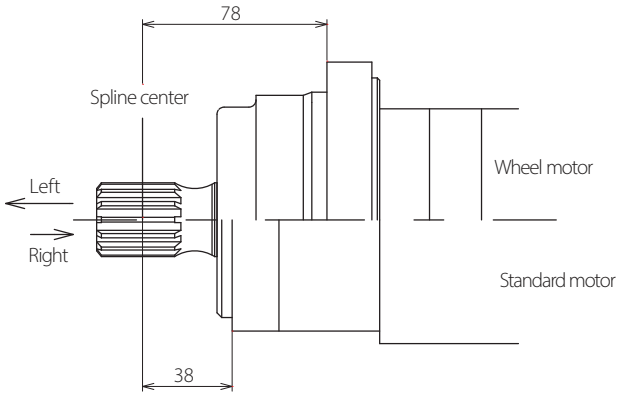
Allowable Side Load (1-1/4", Involute splined shaft)



Allowable Side Load (1-1/4", Tapered shaft)

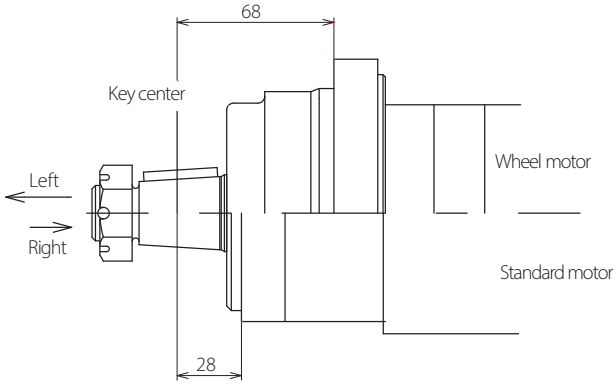


Distance from spline center



1-1/4" Involute splined shaft

Distance from key center



1-1/4" Tapered shaft

rpm	*Multiplication Factor*
050	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58
700	0.56
800	0.54

Instruction

Hydraulic fluid

Recommended Fluid; Mineral based Anti-Wear Hydraulic Fluid ISO VG32, VG46, VG56, VG68, or equivalent fluid

Allowable Fluid Temperature Range; from -30 to +80 degrees

C. Recommended Viscosity Range; from 24 to 50 cSt

The allowable lowest viscosity; 13 cSt (for H series; 20 cSt)

The allowable highest viscosity; 2158 cSt

Recommended Filtration; 10 micron or finer

Fluid Cleanness; ISO 18/13 or finer

Note: If the motor is used with special fluid such as flame-resistant fluid, please contact Danfoss because special seals etc. are needed.

Inertia load application, etc.

When the motor is used in the inertia load application such as swing drive, it is necessary to use the brake valve in order to protect the motor and its shaft.

When the motor acts as a pump in the winch drive application or down-slope travel application, it is often necessary to use the counter balance valve in order to prevent the circuit cavitation or reckless driving by the self-weight.

In these cases, please contact Danfoss for details.

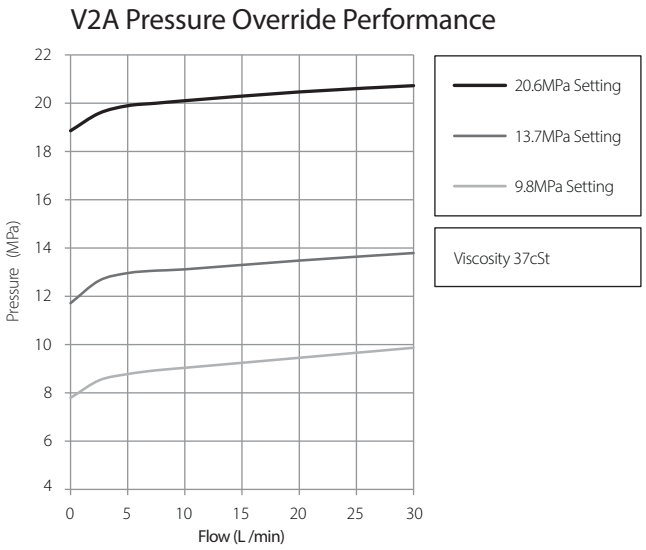
V2A Brake valve for direct connection (for side port)

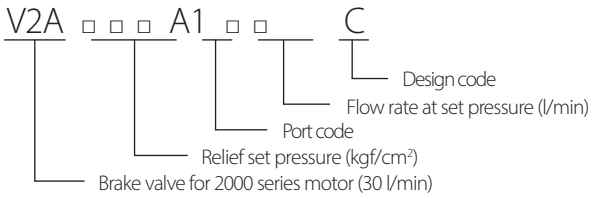
<Features> Total system will be designed economically because this can be connected directly with 2000 series motor. This valve prevents an irregular high pressure by inertia load at accelerating, decelerating and stopping and then safe operation is ensured.

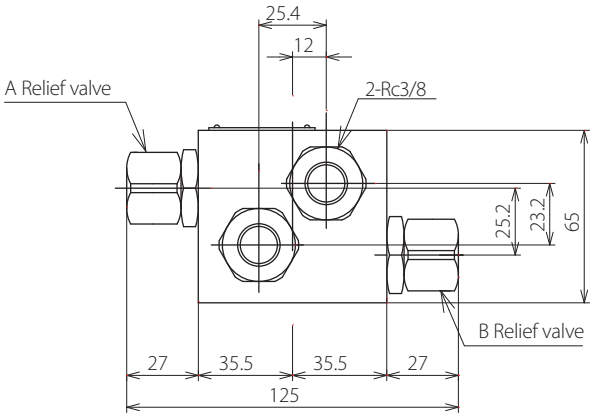
<Specifications> Rated Flow: 30l/min

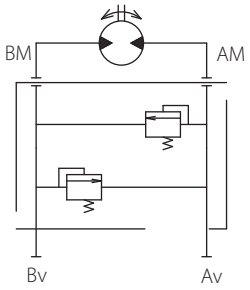
Pressure Range: 6.9~20.6MPa (70~210kgf/cm²)

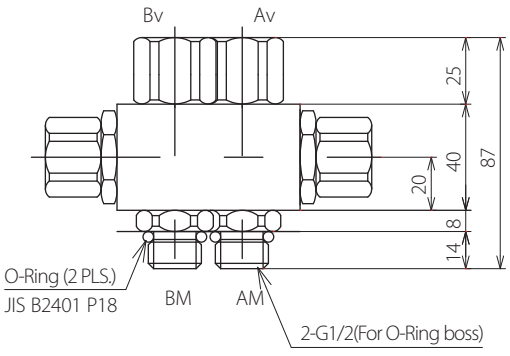
Weight: 1.4kg







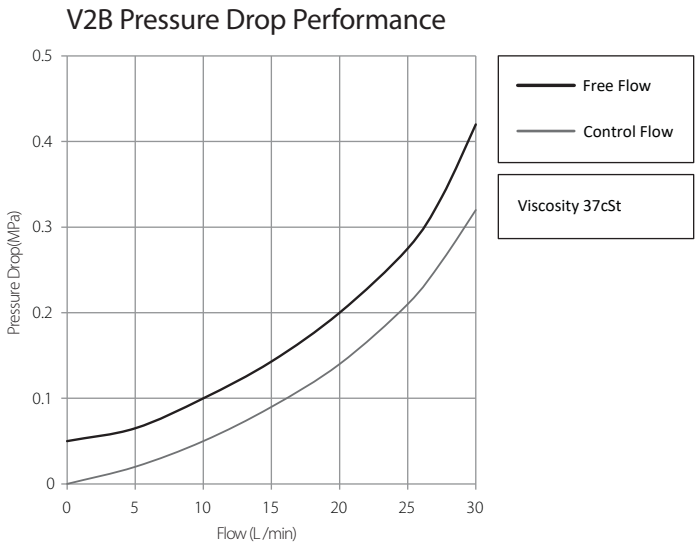




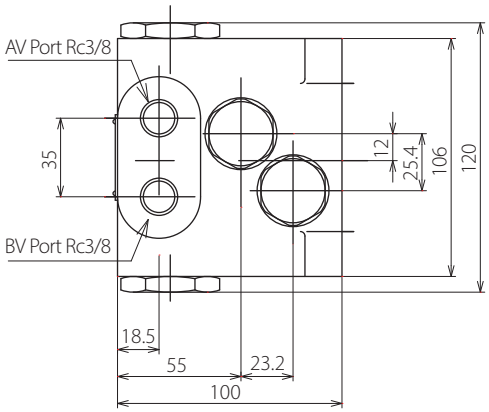
V2B Counter balance valve for direct connection (for side port)

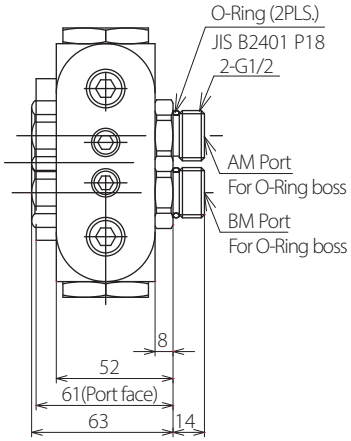
<Features> Total system will be designed economically because this can be connected directly with 2000 series motor. Thiscan be connected directly with direct connected brake valve. The circuit cavitation or reckless driving by the self-weight can be prevented.

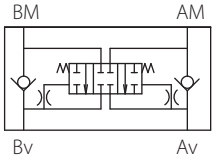
<Specifications> Max. Pressure: 20.6MPa (210kgf/cm²)
Rated Flow: 30l/min
Spool Cracking Pressure: 0.5MPa (5kgf/cm²)
Weight: 3.4kg



V2B A1 B
- Design code
- Port code
- Counter balance valve for 2000 series motor (30 l/min)







Valves for 2000 Series

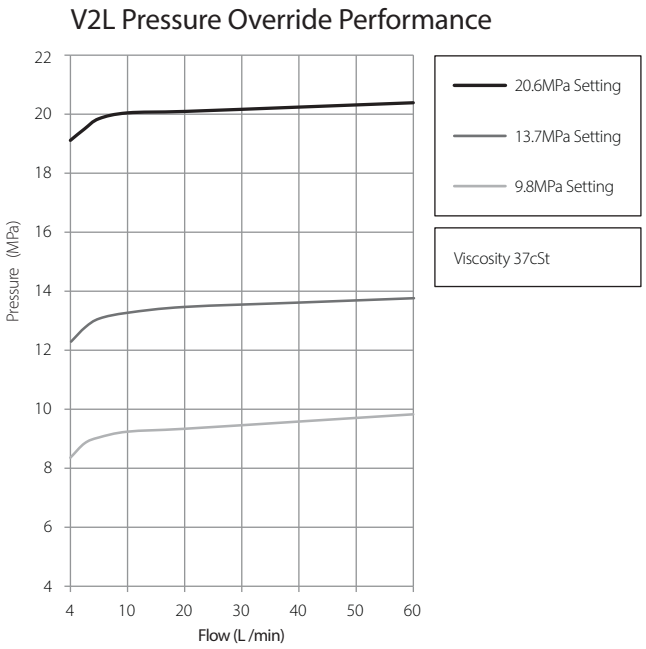
V2L Brake valve for direct connection

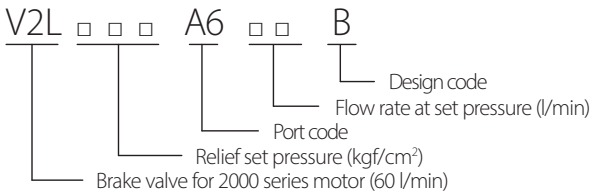
<Features> Total system will be designed economically because this can be connected directly with 2000 series motor. This valve prevents an irregular high pressure by inertia load at accelerating, decelerating and stopping and then safe operation is ensured.

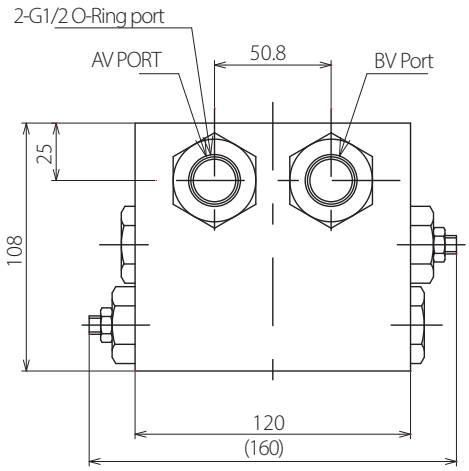
<Specifications> Rated Flow: 60l/min

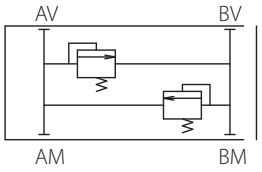
Pressure Range: 6.9~20.6MPa (70~210kgf/cm²)

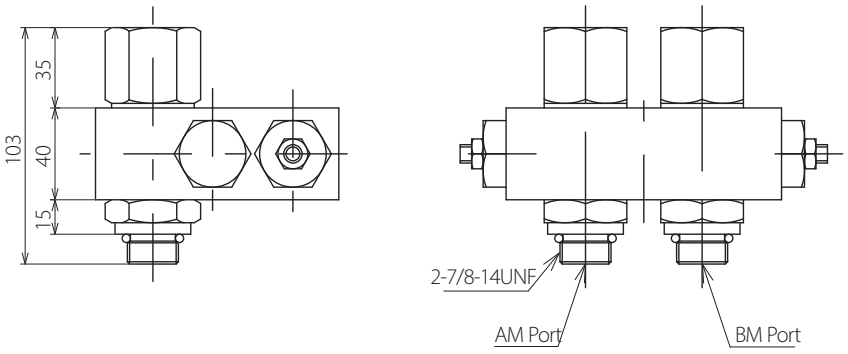
Weight: 4.4kg







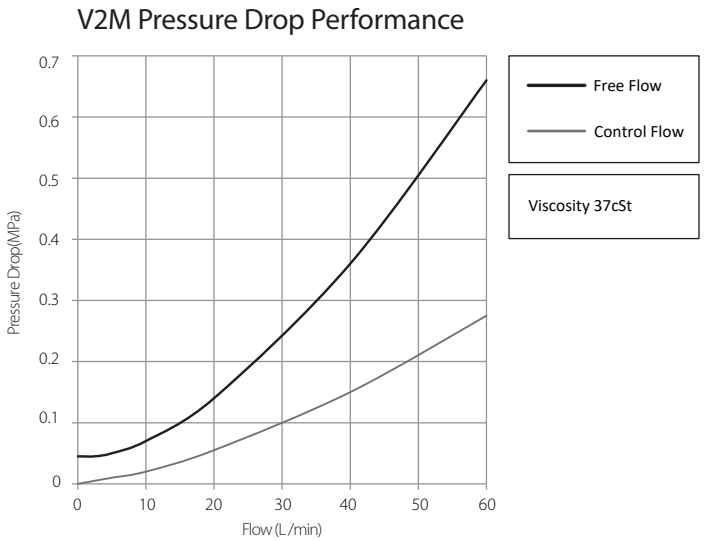




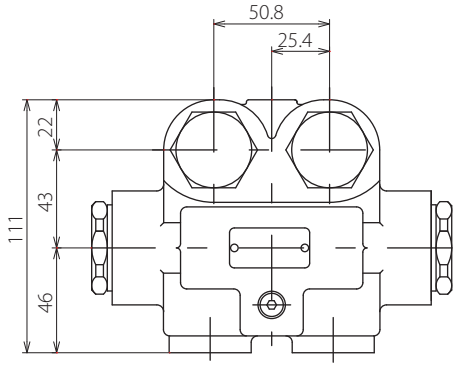
V2M Counter balance valve for direct connection (for side port)

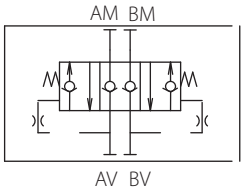
<Features> Total system will be designed economically because this can be connected directly with 2000 series motor. Thiscan be connected directly with direct connected brake valve. The circuit cavitation or reckless driving by the self-weight can be prevented.

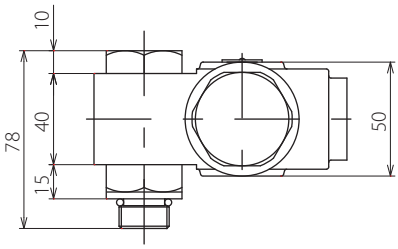
<Specifications> Max. Pressure: 20.6MPa (210kgf/cm²)
Rated Flow: 60l/min
Spool Cracking Pressure: 0.6MPa (6kgf/cm²)
Weight: 3.8kg

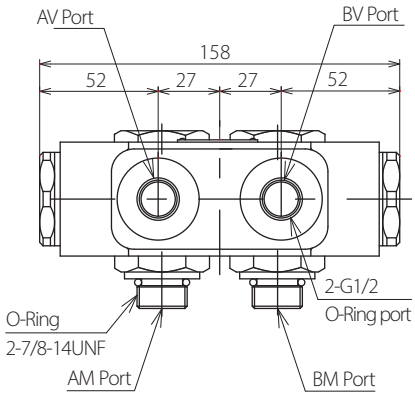


V2M A6 A
- Design code
- Port code
- Counter balance valve for 2000 series motor (60 l/min)









S Series Motor with Mechanical Brake

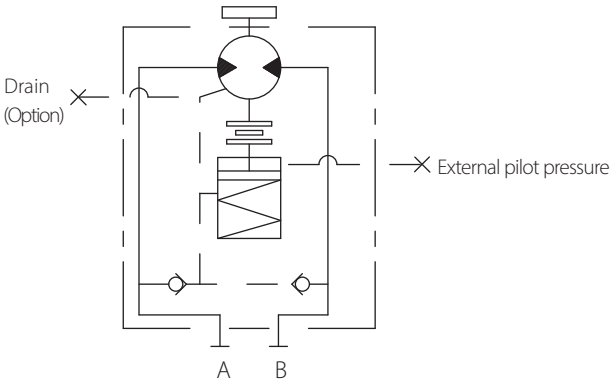
Features

S Series Motor with a compact type mechanical brake built-in. The motor can be used widely in the fields of construction machines, fishing machines, industrial vehicles, general industrials, etc.

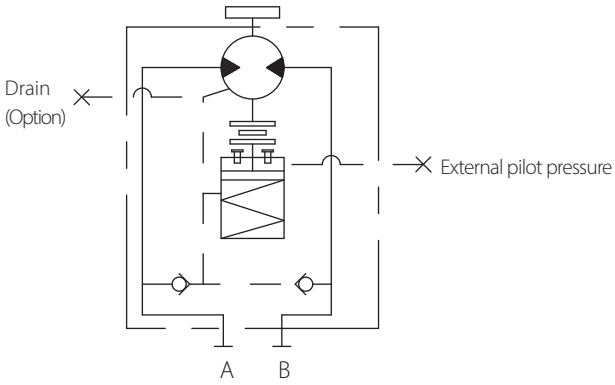
Braking can be applied when the pilot pressure is not supplied. In case of SBD and SBE, mechanical releasing of brake is possible.

- Brake releasing by pressure (SBA, SBD, SBE, SBF)

SBA,SBF Series



SBD,SBE Series



Specifications

Series	*Brake Torque*	*Brake Release Pressure*	*Brake Release System*
SBA	98N-m (10kgf-m)	1.0MPa (10kgf/cm^2)	External Pilot
SBD	98N-m (10kgf-m)	1.0MPa (10kgf/cm^2)	External Pilot + Mechanical System
SBE	157N-m (16kgf-m)	1.6MPa (16kgf/cm^2)	External Pilot + Mechanical System
SBF	157N-m (16kgf-m)	1.6MPa (16kgf/cm^2)	External Pilot

Note: 1. Other specifications are same as Standard S Series motor.
2. Fire resistant fluid need special specification motor. Please contact with our company.
3. This Brake can be used as a Parking Brake only. In case of dynamic brake application, please contact Danfoss.

S Series Motor with Mechanical Brake

Model code procedure

S B A 0 5 A D 2 □ □ □ □ X D

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① **Series**
SB = S Series motor with mechanical brake

② **Brake specifications**
A = External pilot, 98N-m
D = External pilot + Mechanical release system, 98N-m
E = External pilot + Mechanical release system, 158N-m
F = External Pilot, 158N-m

③ **Displacement (cm³/rev)**
05 = 58
07 = 76
10 = 93
12 = 120
14 = 144
16 = 165
19 = 186
22 = 224
30 = 299
38 = 371

④ **Port**
A = G1/2 O-Ring ports
B = Manifold mount
C = 1/2NPTF Ports
D = Rc1/2 Ports

⑤ **Shaft**
B = Ø1" SAE 6B Splined shaft
C = Ø1" Straight with Woodruff key
D = Ø25 Straight with Parallel key, 8mm

⑥ **Flange mounting**
2 = 2 Bolt
4 = 4 Bolt

⑦ **Special features (none of standard motor)**
B = Special seal for Phosphate ester fluid
M = Metric mounting holes

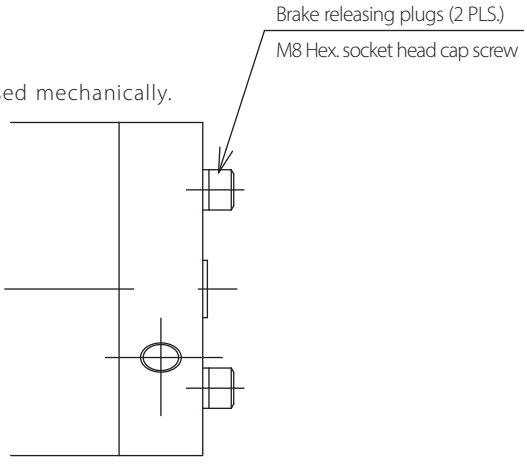
⑧ **Drain port**
× = Standard, with Drain port

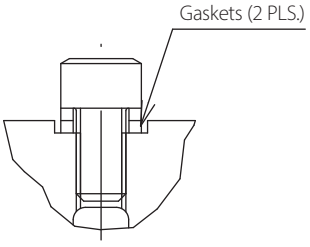
⑨ **Design code**
D = Model D

How to release the brake mechanically

The SBD and SBE Series are provided with a mechanical type brake releasing mechanism.

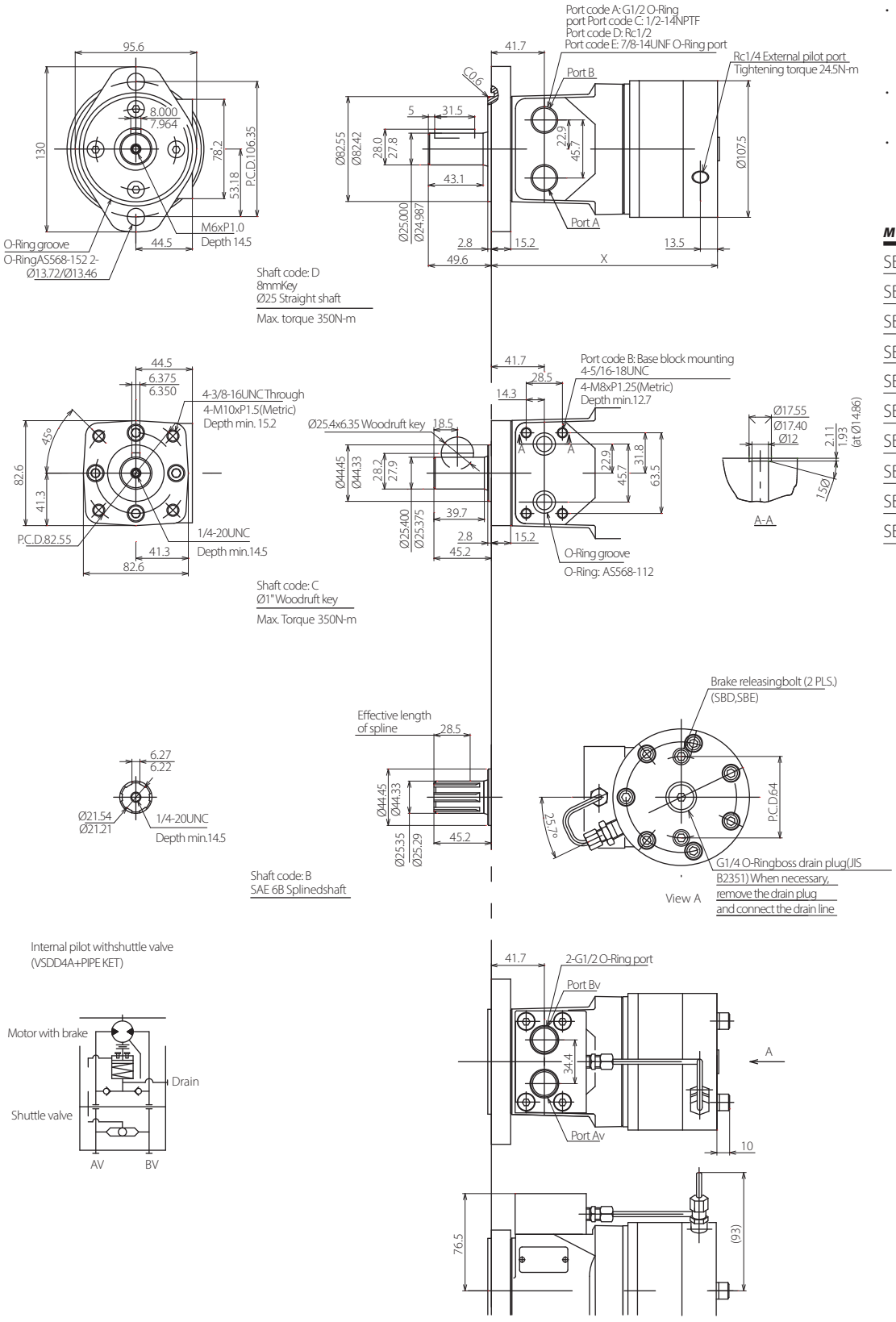
- Remove the (2) gaskets and alternately tighten two brake releasing plugs. The brake will be released mechanically.
- To restore braking, insert the gaskets and tighten the brake releasing plugs at a torque of 25.5~31.4N-m (At this time, clean thesurface of sealing).





S Series Motor with Mechanical Brake

Dimension and mounting data



- Rotation: Viewed from shaft end
  - CW: Port A pressurized
  - CCW: Port B pressurized
- Need to select the port code B with metric 4-M 8 thread
- A chang coupler of Rc3/8 is available(AH0039A)

Model	*X: Length*
SB□ 05	177.0
SB□ 07	179.3
SB□ 10	181.5
SB□ 12	184.9
SB□ 14	188.1
SB□ 16	190.7
SB□ 19	193.4
SB□ 22	198.3
SB□ 30	208.0
SB□ 38	217.3

2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m)

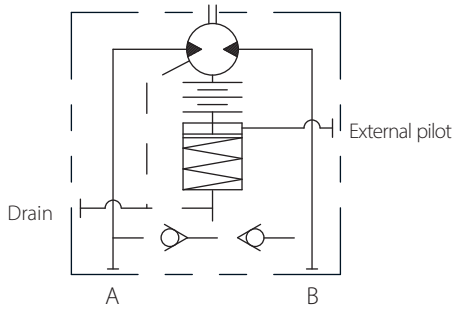
Features

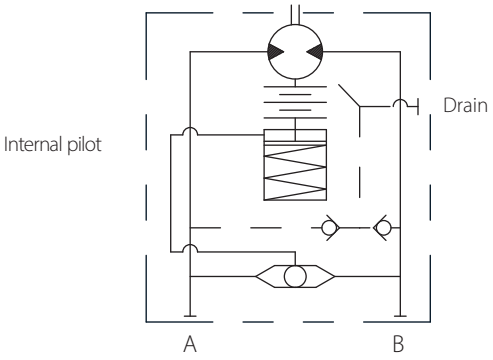
This Series has a pressure-release mechanical brake built in the motor. Secure control of start and stop is possible because the brake is applied when pilot pressure is not supplied. Applications: Fishing Machines, Various W inches, Industrial Vehicles, Various Industrial Machines.

Specifications

Model Code	Brake Torque	Brake Release Pressure	Brake Release System
2-□ □ □ K□ □ -E	98N-m (10kgf-m)	0.98MPa (10kgf/cm²)	External Pilot
2-□ □ □ M□ □ -E	196N-m (20kgf-m)	1.96MPa (20kgf/cm²)	External Pilot
2-□ □ □ L□ □ -E	98N-m (10kgf-m)	0.98MPa (10kgf/cm²)	Internal Pilot
2-□ □ □ N□ □ -E	196N-m (20kgf-m)	1.96MPa (20kgf/cm²)	Internal Pilot

Note: 1. Other specifications are same as Standard 2000 Series motor.
2. This Brake can be used as a Parking Brake only. In case of dynamic brake application, please contact Danfoss.





Model code procedure

2 – 160 K D 6 □ – E

① ② ③ ④ ⑤ ⑥ ⑦

① **Series**
- **2** = 2000 series

② **Displacement (cm³/rev)**

③ **Brake Torque**
- **K** = 98N-m, External pilot
- **M** = 196N-m, External pilot
- **L** = 98N-m, Internal pilot
- **N** = 196N-m, Internal pilot

④ **Shaft**
- **A** = Ø32 Straight with 10x8x31.5 Key
- **B** = Ø1-1/4" Splined
- **D** = Ø1-1/4" Straight with 5/16" Square key
- **F** = Ø1" Straight with 1/4" Key

⑤ **Flange mounting**
- **2** = 2 Bolt
- **6** = 4 Bolt (unequally spaced)

⑥ **Port connections**
- **None** = G1/2 O-Ring ports
- **A** = 7/8UNF Side ports
- **C** = Rc1/2 Side ports
- **U** = 7/8UNF Side ports (pitch 50.8mm)

⑦ **Design code**
- **E** = Model E

2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m)

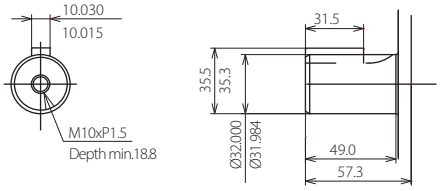
Dimension and mounting data

External pilot pressure

Rotation: Viewed from shaft end

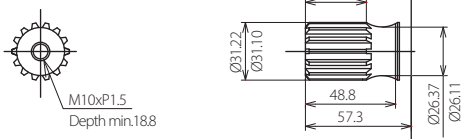
- CW: Port A pressurized
- CCW: Port B pressurized

Ø32 Straight shaft



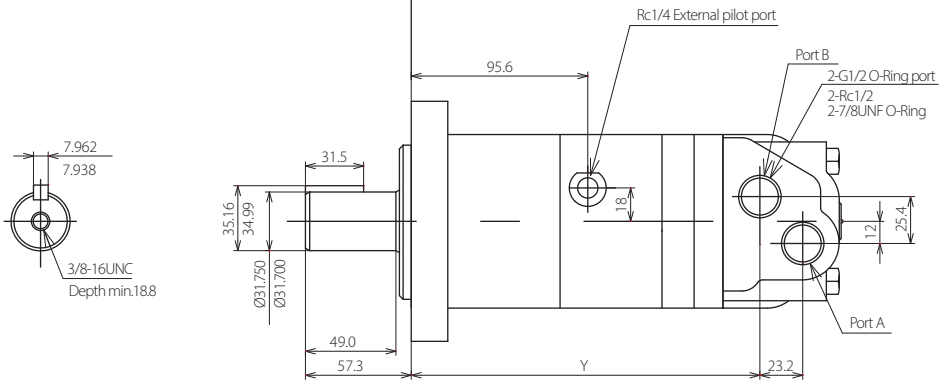
Model	X	Y
2-080	229	186
2-100	232	189
2-125	237	194
2-160	243	200
2-200	250	207
2-250	259	216
2-290	267	224
2-315	271	228
2-390	286	243

Ø1-1/4" Involute splined shaft



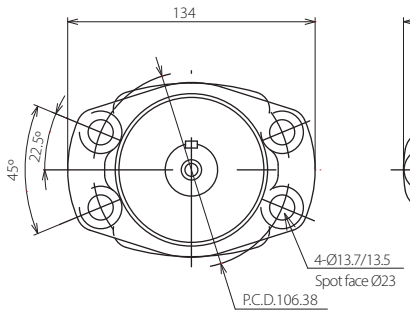
1-1/4" SAE Involute Spline (External)	
D.P	12/24
Number of teeth	14
Pitch Dia.	29.634
Base Dia.	25.664
Pressure angle	30o
Type of fit	Side fit
Class of fit	II
Major Dia.	31.22/31.10
Minor Dia.	26.99/26.66
Form Dia.	Max. 27.488
Fillet radius	Max. 0.39
Dimension over two pins	35.797/35.750
Pin Dia.	4.064

Ø1-1/4" Straight shaft

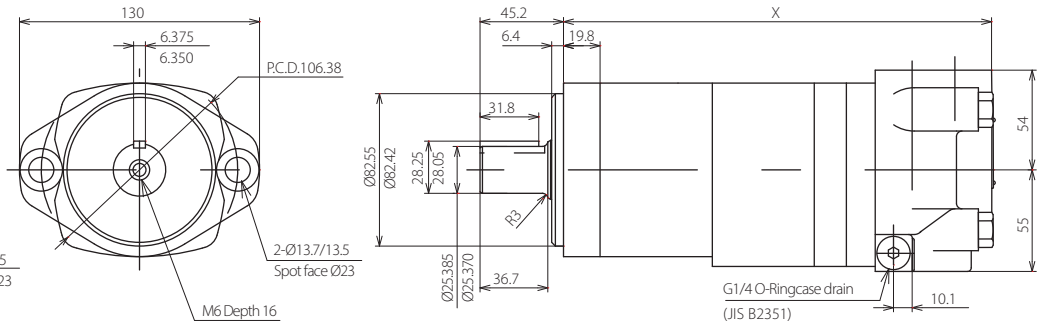


Ø1" Straight shaft

4 Bolt flange



2 Bolt flange



2000 Series Motor with Mechanical Brake (Brake Torque 98-196N-m)

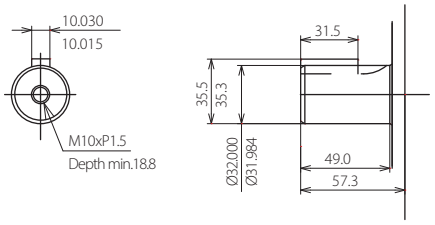
Dimension and mounting data

Internal pilot pressure

Rotation: Viewed from shaft end

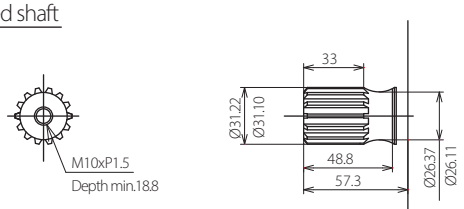
- CW: Port A pressurized
- CCW: Port B pressurized

Ø32 Straight shaft



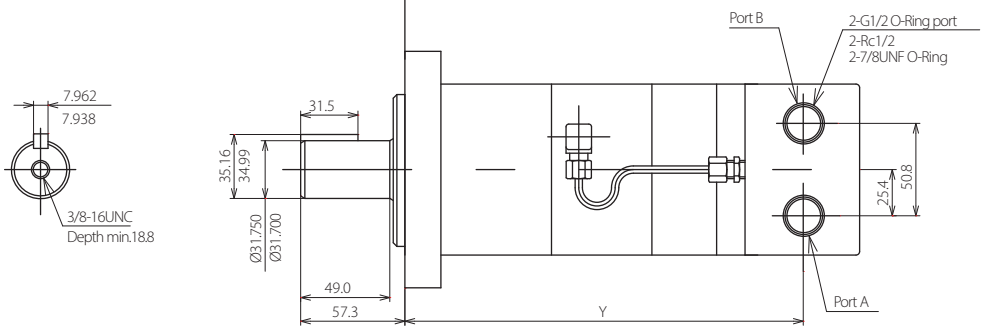
Model	X	Y
2-080	229	198
2-100	232	201
2-125	237	206
2-160	243	212
2-200	250	219
2-250	259	228
2-290	267	236
2-315	271	240
2-390	286	255

Ø1-1/4" Involute splined shaft



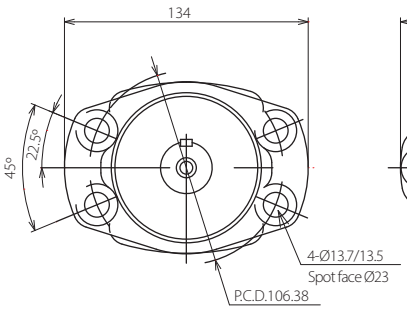
1-1/4" SAE Involute Spline (External)	
D.P	12/24
Number of teeth	14
Pitch Dia.	29.634
Base Dia.	25.664
Pressure angle	30o
Type of fit	Side fit
Class of fit	II
Major Dia.	31.22/31.10
Minor Dia.	26.99/26.66
Form Dia.	Max. 27.488
Fillet radius	Max. 0.39
Dimension over two pins	35.797/35.750
Pin Dia.	4.064

Ø1-1/4" Straight shaft

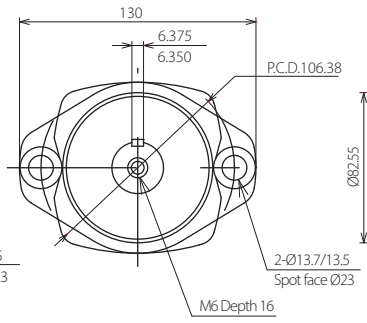


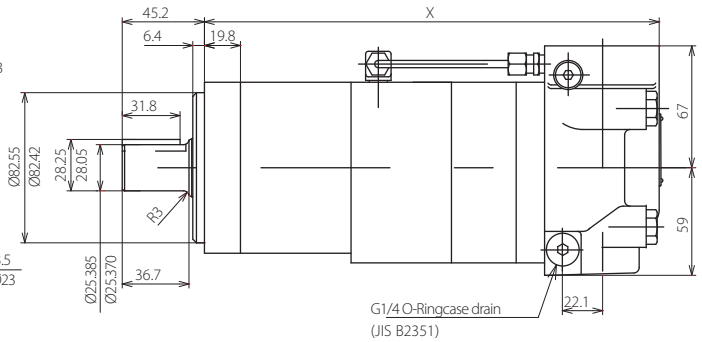
Ø1" Straight shaft

4 Bolt flange



2 Bolt flange





2000 Series Motor with Mechanical Brake (Brake Torque 294-392N-m)

Specifications

Model Code	Brake Torque	Brake Release Pressure	Brake Release System
2BE□ □ A□ 4□ -B	294N-m (30kgf-m)	2.0MPa (20kgf/cm²)	External Pilot
2BF□ □ A□ 4□ -B	392N-m (40kgf-m)	2.5MPa (26kgf/cm²)	External Pilot

Note: 1. This Brake can be used as a Parking Brake only. In case of dynamic brake application, please contact Danfoss.

Model code procedure

① **Series**
2B = 2000 Series with mechanical brake

② **Brake Torque**
E = 294N-m, External pilot
F = 392N-m, External pilot

③ **Displacement (cm³/rev)**
08 = 7 8
10 = 9 7
12 = 123
16 = 1 5 8
20 = 1 9 5
25 = 2 4 4
29 = 2 8 8
31 = 3 0 6
39 = 393

④ **Motor type**
A = Standard

⑤ **Shaft**
A = Ø32 Straight with 10x8x31.5 Key
B = Ø1-1/4" Splined
C = Ø1-1/4" Tapered
D = Ø1-1/4" Straight with 5/16" Square key

⑤ **Flange mounting**
4 = 4 Bolt (P.C.D. 127)

⑦ **Port connections**
None = G1/2 O-Ring ports
C = Rc1/2 Side ports

⑧ **Design code**
B = Model B

2000 Series Motor with Mechanical Brake (Brake Torque 294-392N-m)

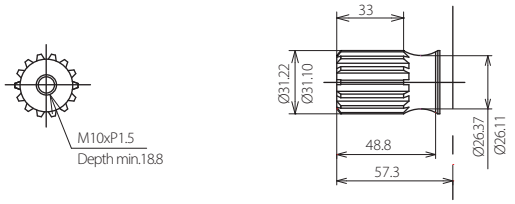
Dimension and mounting data

External pilot pressure

Rotation: Viewed from shaft end

- CW: Port A pressurized
- CCW: Port B pressurized

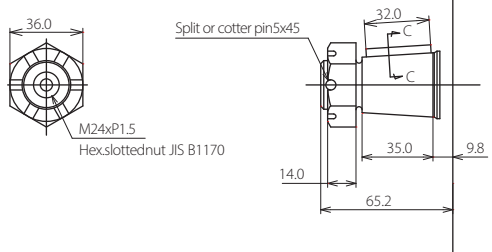
Ø1-1/4" Involute splined shaft

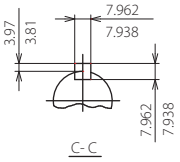


Model	X	Y
2BF08	208	165
2BF10	211	168
2BF12	216	173
2BF16	223	180
2BF20	229	186
2BF25	238	195
2BF29	246	203
2BF31	250	207
2BF39	266	223

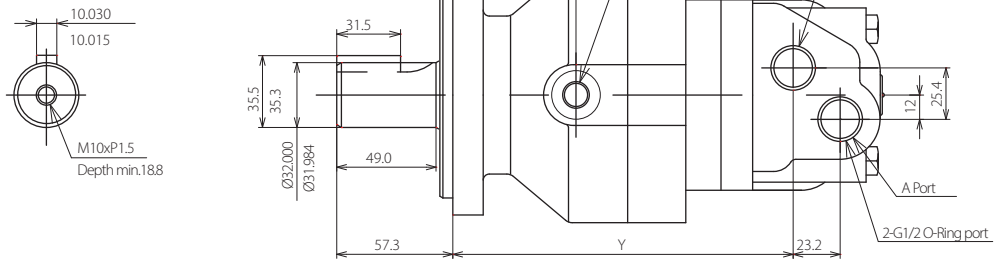
1-1/4" SAE Involute Spline (External)	
D.P	12/24
Number of teeth	14
Pitch Dia.	29.634
Base Dia.	25.664
Pressure angle	30o
Type of fit	Side fit
Class of fit	II
Major Dia.	31.22/31.10
Minor Dia.	26.99/26.66
Form Dia.	Max. 27.488
Fillet radius	Max. 0.39
Dimension over two pins	35.797/35.750
Pin Dia.	4.064

Ø1-1/4" Tapered shaft (SAE) Taper: 1.5/12

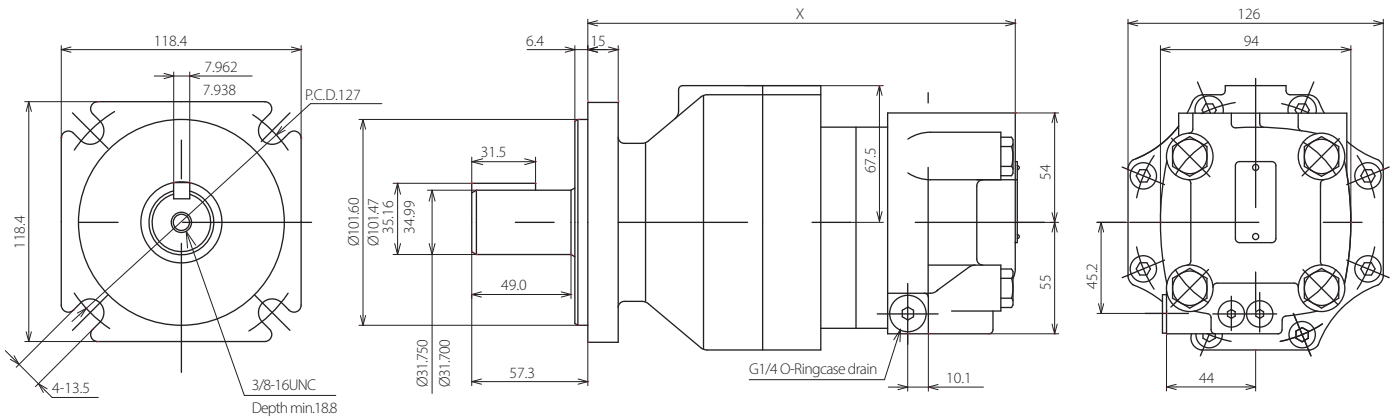




Ø32 Straight shaft



Ø1-1/4" Straight shaft



Orbit Motor, Optional Products

S Series motor with Pin brake

- The brake is of a simplified parking brake type, especially developed for use on track-mounted slewing cranes. Compared with conventional disk brake, the pin brake is much simple in construction and available with a low price.
- Applications : Construction Machine, Material Handling

S Series motor with rotation detecting shaft

- Because of their rotation detecting shaft, this series of Orbit Motors are suited to usage in combination with such as tachometers and encoders. We recommend them for use in injection molding machines needing rpm detection and in robot machines needing rpm-based control.
- Applications : Plastic Injection Machine, Industrial Machine and Mobile

2000 Series motor with rotation detecting shaft

- By the rotation detecting shaft, these motors are especially adapted to combination with tachometers, encoders and the like. In particular, Injection molding machines needing rpm detection will find the most convenient detecting in these motors.
- Applications : Plastic Injection Machine, Industrial Machine and Mobile

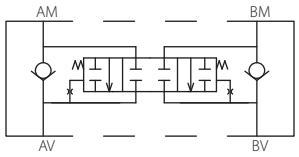
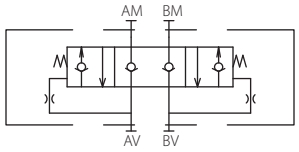
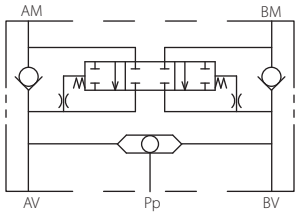
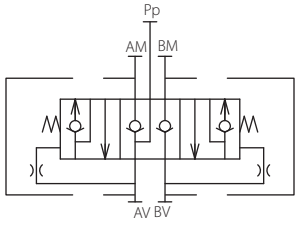
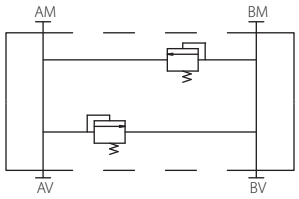
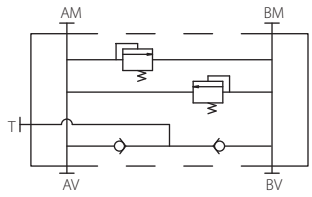
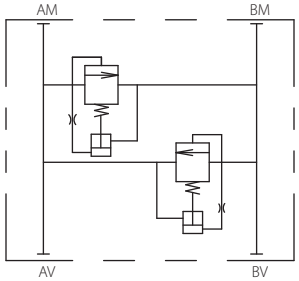
Orbit motor with GJ type planetary-gear reducer

- The motors of this series are combinations of H, S, 2000 Series Motor and planetary-gear reducer. The reducer shaft, not frame, is the driving member.
- Applications : Industrial Machines, Fishing Machines

Orbit motor with GW type planetary-gear reducer

- The motors of this series are intended for use driving traveling mechanism and winches, each being a combination of 2000 Series Motor and planetary-gear reducer. The reducer frame is the driving member.
- Applications : Construction Machines, Agricultural and Forestry Machines, Fishing Machines

Direct Mount Valves

Valve Type	Model	Rated Flow	Max. Working Pressure	Adjustable Pressure Range	Host Orbit Motor Series	Valve Circuit Diagram
		l/min	MPa (kgf/cm²)	MPa (kgf/cm²)		
Counter Balance Valve	VSAA1A	30	17.2 (175)	–	H/S	
	VSCA7A	30	17.2 (175)	–	H/S	
	V2CA3A	15	20.6 (210)	–	2000	
	V2BA1B	30	20.6 (210)	–	2000	
	V2MA6A	60	20.6 (210)	–	2000	
Counter Balance Valve with Shuttle Valve	VSCA4A+AC0578A -□ □ □	30	17.2 (175)	–	S	
	V2FA5D-P2LF□ □	30	20.6 (210)	–	2000	
	V2PA6A-P2LF□ □	60	20.6 (210)	–	2000	
Brake Valve	V2A□ □ □ A1□ □ C	30	20.6 (210)	6.9~20.6 (70~210)	2000	
	V2L□ □ □ A6□ □ B	60	20.6 (210)	6.9~20.6 (70~210)	2000	
Brake Valve with Anti-Cavitation Check Valve	VSE□ □ □ A3□ □ B	15	17.2 (175)	6.9~13.7 (70~140)	H/S	
Super Shockless Brake Valve	VNS□ □ □ A1□ □ A	30	20.6 (210)	6.9~20.6 (70~210)	2000	
	V4S□ □□ A1□ □ A	30	20.6 (210)	6.9~20.6 (70~210)	2000	

ENGINEERING
TOMORROW

Products we offer:

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software
- PLUS+1® software services, support and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics

Hydro-Gear
www.hydro-gear.com

Daikin-Sauer-Danfoss
www.daikin-sauer-danfoss.com

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the marine sector. Building on our extensive applications expertise, we work closely with you to ensure exceptional performance for a broad range of applications. We help you and other customers around the world speed up system development, reduce costs and bring vehicles and vessels to market faster.

Danfoss Power Solutions – your strongest partner in mobile hydraulics and mobile electrification.

Go to www.danfoss.com for further product information.

We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance. And with an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.

Local address:

Danfoss
Power Solutions (US) Company
2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

Danfoss
Power Solutions GmbH & Co. OHG
Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

Danfoss
Power Solutions ApS
Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

Danfoss
Power Solutions Trading (Shanghai) Co., Ltd.
Building #22, No. 1000 Jin Hai Rd
Jin Qiao, Pudong New District
Shanghai, China 201206
Phone: +86 21 2080 6201