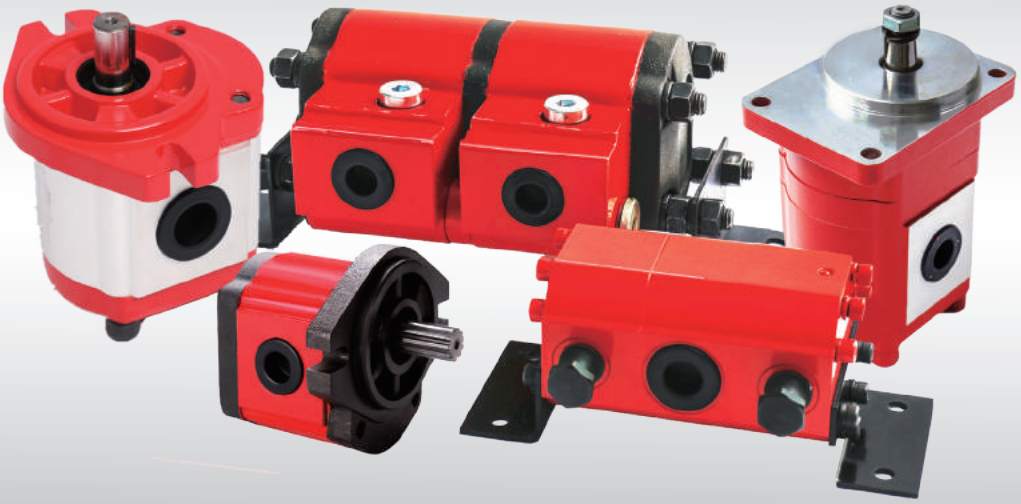
GUORUI HYDRAULICS
INNOVATION LEADS THE FUTURE

Technical Information

Flow Dividers and Gear Motors

1FDF / 1AFDF / 2FDF / 3FDF

1MF / 1AMF / 2MF / 2.5MF / 3MF / 3.5MF



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GUORUI HYDRAULICS

Keep the concept seeking excellence, GRH try our best
to create more value for you with products and service.

Guorui Hydraulics

About GRH

GRH was established in 1986, focusing on providing customers with quality hydraulic components and solutions to hydraulic system in the applications of engineering machinery, mobile industries, agricultural machinery, aviation, mining, and other fields. Main products include gear pump, gear motor, flow divider, orbital motor, load sensing proportional valve, monoblock valve, sectional valve, manifold assembly and hydraulic power unit as well.

Long-term development strategy

Reducing emissions by new energy is one of GRH's long-term strategies. GRH will be providing innovative technologies, products, and services for the global development of new energy, moving towards a century development strategy, and writing a century-new chapter in the hydraulic field.

Innovation leads the future

Through a few decades of development, GRH has built an intelligent manufacturing factory, gathering international R&D talents, accumulating rich R&D and manufacturing experience, possessing independent intellectual property rights, continuously providing customers with new products and technologies, and creating value for all of the customers.






Flow Dividers and Gear Motors

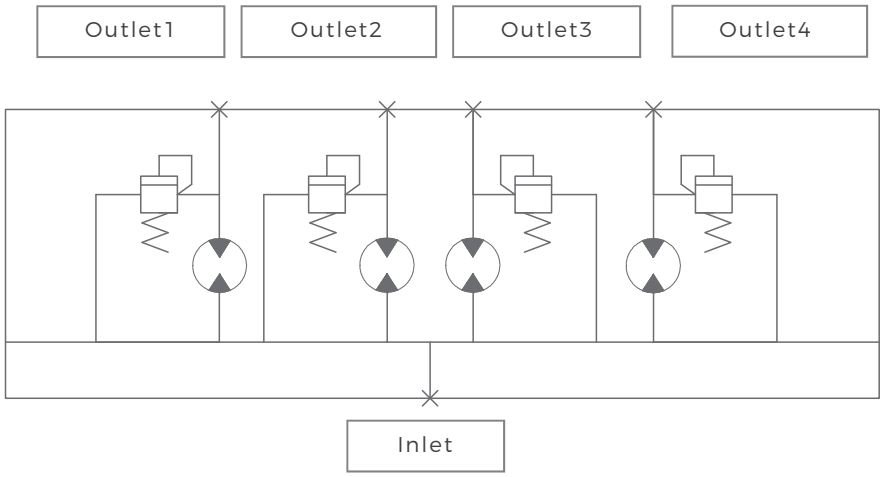
Flow Dividers

Introduction of Flow Dividers

Two or several gear motors can be combined into flow divider after being connected by coupling. It guatantees synchronous operation and accuracy of power element like cylinder (Its principle drawing is as follows), hydraulic liquid from the pipe is input into the inlet port and the same amount liquid is distributed to the outlet port by the rotation of gears that with same specification. Obviously, accuracy of flow divider is up to accuracy of gears and relative spare parts.
GRH has three series for flow divider 1FDF, 2FDF, 3FDF. Flow accuracy and pressure loss are as follows:

Type	Flow Accuracy	Pressure Drop
1FDF	±1.5%-±2%	16-19bar
2FDF	±1.5%-±2%	11-14bar
3FDF	±1.5%-±2%	11-14bar

It should be noted that flow accuracy is also related to the factors below: system pressure, viscosity of hydraulic liquid, load that each function unit bears and overall flow. These factors should be taken into account at time of application.
Flow divider can be integrated with relief valve, check valve and throttle valve, protecting system pressure and filling the oil. For specific requirements, please contact GRH.



Ordering Code

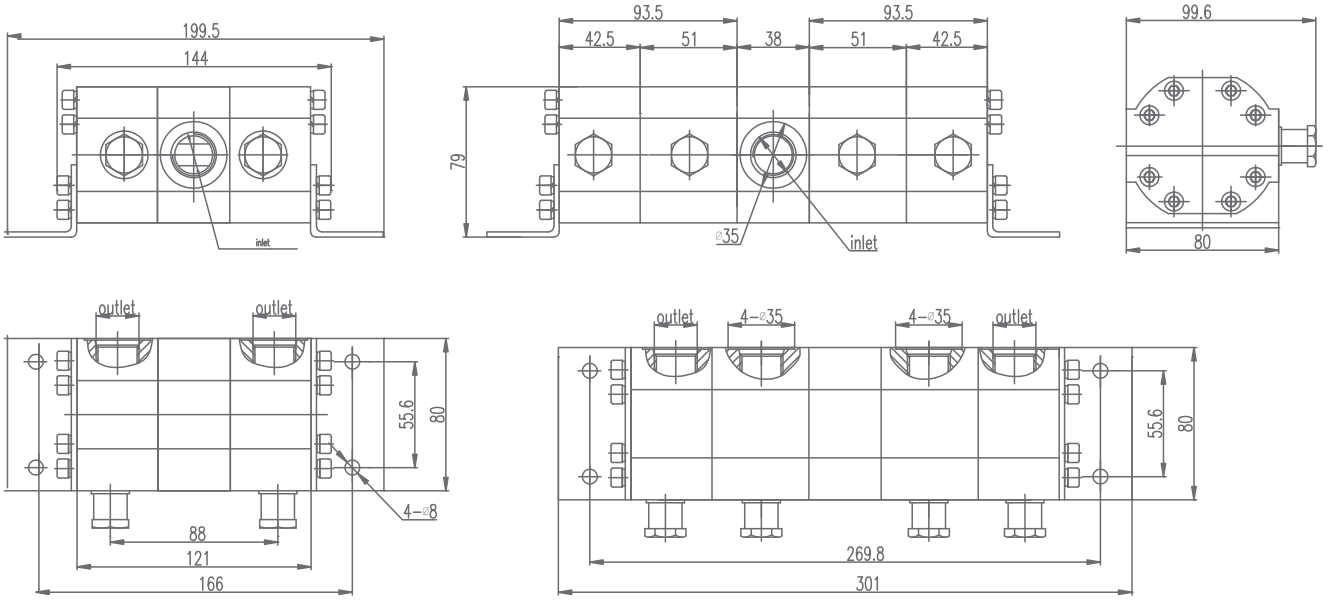
3	FD	F	60	L71	-4	-1
a	b	c	d	e	f	g

ⓐ Model: Group 1, 2, 3
ⓑ Function: Flow Divider
ⓒ Pressure Level: 16-25Mpa
ⓓ Displacement: 1.6-70ml/r
ⓔ Inlet/Outlet Combination
ⓕ Number of Section: 1-8
ⓖ Number of Inlet: 1-4

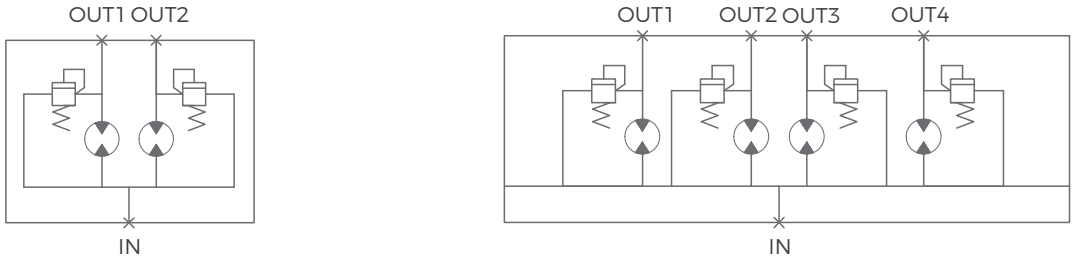
1FDF**L**-2/4 Flow Dividers

Displacement		Speed		Flowrange/Section				Min.system pressure		Max.pressure of oil outlet	
in³/r	ml/r	min. (rpm)	max. (rpm)	gpm		lpm		psi	bar	psi	bar
0.097	1.6	1000	3000	0.42	1.25	1.6	6.72	870	60	3480	240
0.122	2			0.52	2.2	2	8.4			3480	240
0.195	3.2			0.84	3.52	3.2	13.44			3480	240
0.244	4			1.05	4.41	4	16.8	580	40	3480	240
0.305	5			1.31	5.51	5	21			3480	240
0.366	6	3500		1.57	5.51	6	21			3480	240
0.427	7			1.84	6.43	7	24.5			3480	240
0.488	8			2.10	7.34	8	28			3480	240

Dimensions



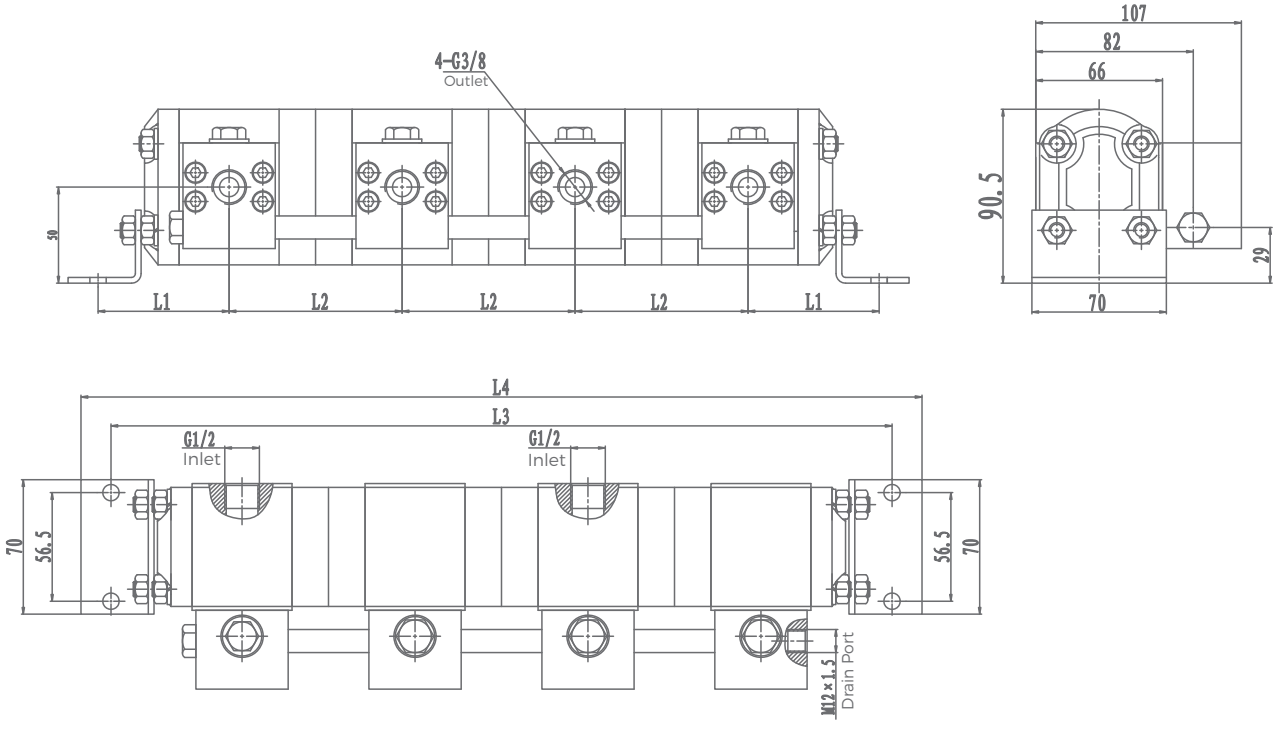
Schematic Diagrams



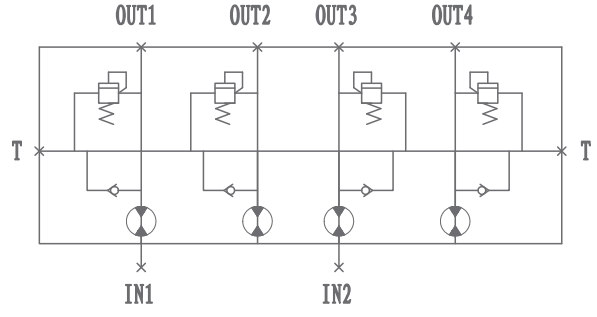
1AFDF**L**-Y-V Flow Dividers

Displacement		Speed		Flow range/Section				Min.system pressure		Max. pressure of oil outlet	
in³/r	ml/r	min. (rpm)	max. (rpm)	gpm		lpm		psi	bar	psi	bar
0.103	1.7	800	3000	0.35	1.33	1.36	5.1	1160	80	3480	240
0.122	2			0.42	1.57	1.6	6			3480	240
0.146	2.4			0.5	1.88	1.92	7.2			3480	240
0.164	2.7			0.56	2.12	2.16	8.1			3480	240
0.183	3			0.63	2.36	2.4	9			3480	240
0.207	3.4			0.71	2.68	2.72	10.2			3480	240
0.250	4.1			0.86	3.23	3.28	12.3	725	50	3480	240
0.311	5.1			1.07	4.01	4.08	15.3			3480	240
0.372	6.1			1.28	4.8	4.88	18.3			3480	240
0.433	7.1			1.49	5.59	5.68	21.3			3480	240
0.488	8			1.68	6.3	6.4	24			3480	240

Dimensions



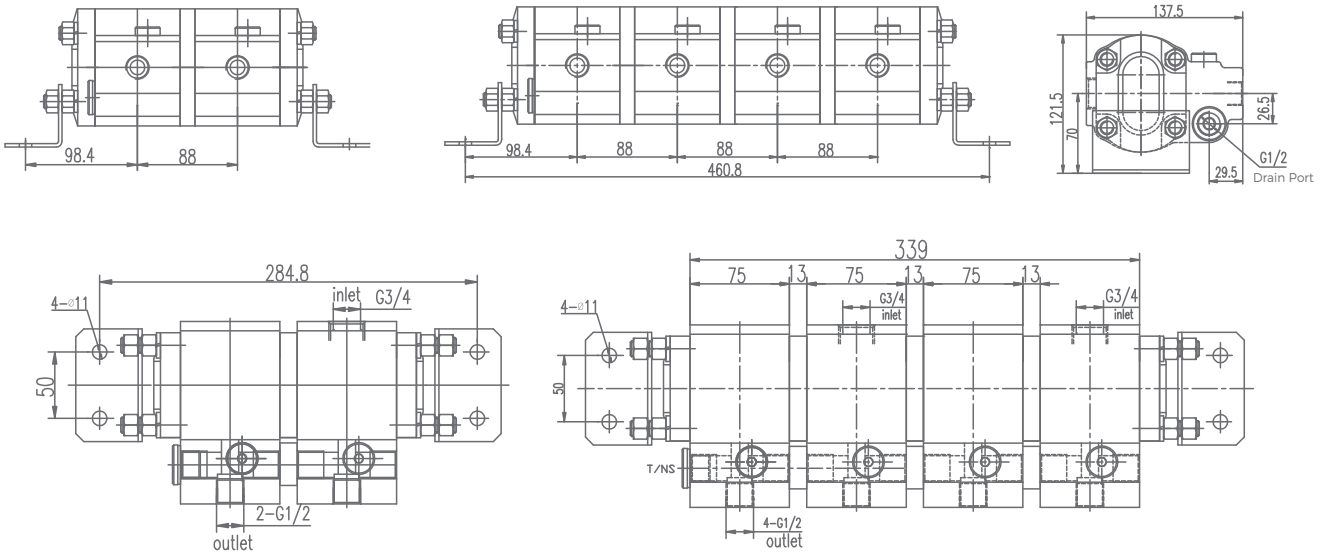
Schematic Diagram



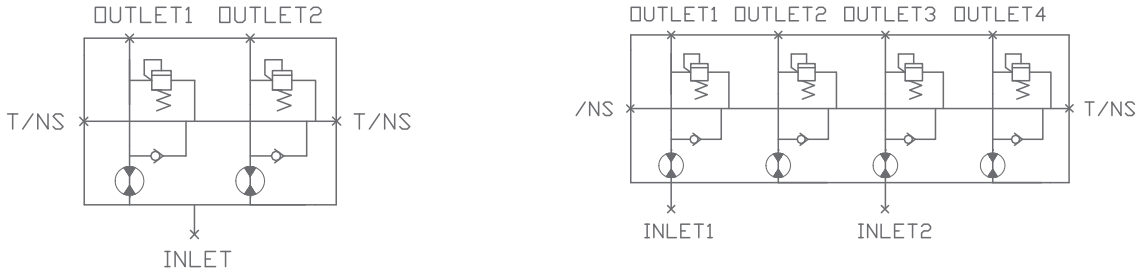
2FDF**L**-2/4 Flow Dividers

Displacement		Speed		Flow range/Section				Min.system pressure		Max. pressure of oil outlet	
in³/r	ml/r	min. (rpm)	max. (rpm)	gpm		lpm		psi	bar	psi	bar
0.366	6	800	3500	1.26	5.51	4.8	21	1160	80	3625	250
0.488	8			1.68	7.34	6.4	28			3625	250
0.671	11			2.31	10.1	8.8	38.5			3625	250
0.732	12			2.52	11.02	9.6	42	725	50	3190	220
0.854	14		3000	2.94	11.02	11.2	42			3190	220
1.037	17			3.57	13.38	13.6	51			3190	220
1.525	25		2500	5.25	16.39	20	62.5			3190	220
1.891	31			6.51	20.33	24.8	77.5			2610	180

Dimensions



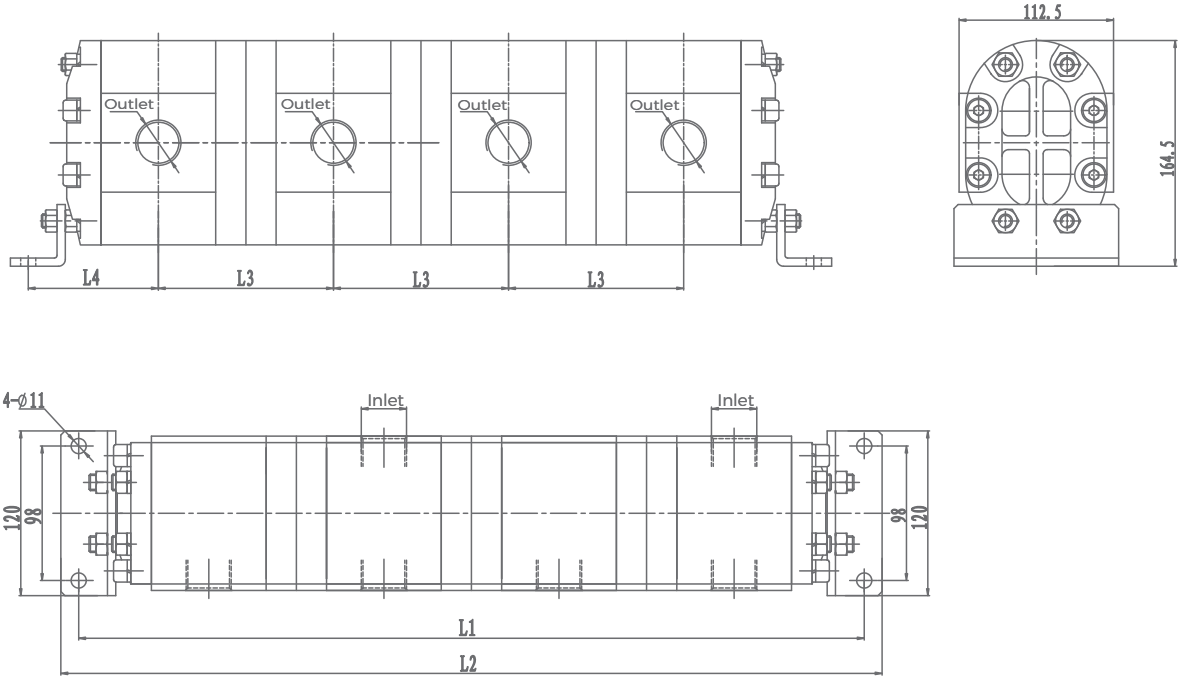
Schematic Diagrams



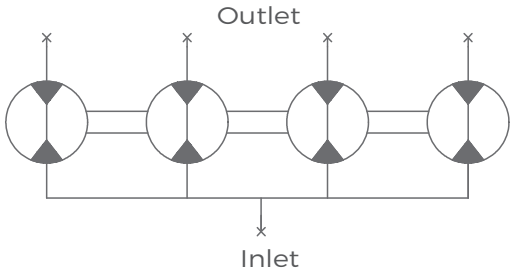
3FDF**L**-*Flow Dividers

Displacement		Speed		Flow range/Section				Min.system pressure		Max.pressureof oil outlet	
in³/r	ml/r	min. (rpm)	max. (rpm)	gpm		lpm		psi	bar	psi	bar
1.22	20	800	2500	4.2	13.12	16	50	870	60	3480	240
1.647	27			5.67	17.71	21.6	67.5			3480	240
1.83	30			6.3	19.67	24	75			3480	240
2.379	39			8.18	25.57	31.2	97.5			3480	240
3.05	50			10.49	32.79	40	125	725	50	3480	240
3.355	55			11.54	36.07	44	137.5			3335	230
3.66	60			12.59	39.35	48	150			2900	200
4.27	70			14.69	45.9	56	175			2610	180

Dimensions



Schematic Diagrams



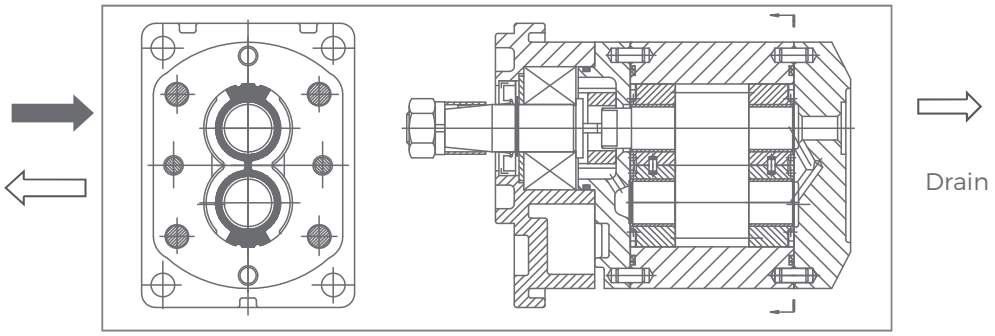
Gear Motors

Introduction of GRH Gear Motors

Gear motors from Guorui Hydraulics have a floating bushing feature with automatic axial clearance compensation. The bushings are made with special abrasion resistant material providing improved service life. Precisely machined gears ensure the excellent characteristics under low noise condition. Our cold extrusion motor bodies can endure pressure above 30 MPa. High strength cast iron front & rear covers also enhance our reliability. Our gear motors are widely used in the industrial, mobile, marine and aerospace industries.

GRH has 5 series of gear motors: group 1, 2, 2.5, 3 and 3.5. They can be divided into two types. One is the single direction gear motor, the other is the bi-direction gear motors. Normally the design of the single direction gear motor is similar to that of the single direction gear pump with some slight design differences. Therefore, every GRH gear motor has the corresponding single direction gear motors. When placing your order, please refer to the ordering code.

We now focus on the bi-direction gear motors. This motor has a different sealing structure to the single direction motor. The symmetrical sealing (refer to the following drawing) separating high pressure from low pressure thus allowing bi-direction operation. The oil from internal leakage returns to tank through the drain port. Normal case drain pressure is limited to 2 bar, but 5 bar is allowed for intermittent operation. High quality of the bushings, bearings and seals adds to the outstanding performance of GRH bi-direction gear motors.



Characteristics

Direction of rotation: bi-direction and single-direction
Permissible ambient temperature range: min. -20˚C - max. 60˚C
Operating pressures: input side P1 max = refer above data; outlet side P2 max. 3 bar
Drain pressure: max. 2 bar, Short time: max. 5bar
Fluid temperature range: max. 90˚C for NBR rotary shaft lip-type seal, 100˚C for FKM rotary shaft lip-type seal
Viscosity range: min. 10mm²/s - max. 600mm²/s

Filtration

Recommended Viscosity range: V= 30-45mm²/s

Recommended hydraulic fluids use: GB11118-94, L-HM46 or equate NFE-603/DIN515524 II-85

Characteristic curves refer to pages: page 22 to 23

Characteristics

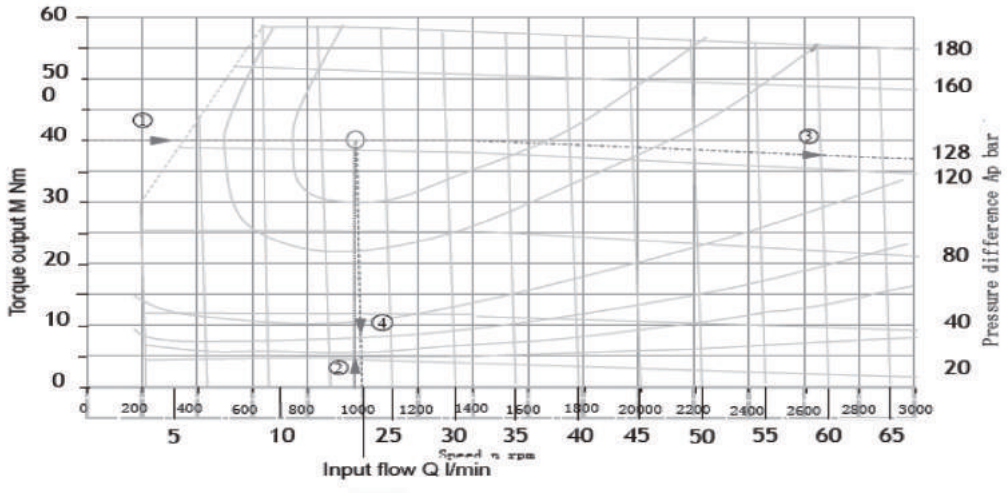
Pressure / Standard	P≤2000PSI(14MPa)	2000PSI(14MPa)<P<3050PSI(21MPa)	P≥3050PSI(21MPa)
NAS1638	10	9	8
ISO4406	19/16	18/15	17/14
Filter	25μm	20μm	10μm

All motor can be combined with relief valve, proportional valve, thermostatic valve.

Guidance for Use of the Curve

In most cases, with the data of torque output M at speed n, and to get the data of pressure difference Δp and the required Input flow, for example:

①M = 40 Nm; ②n = 1000 rpm; the intersection of ① and ② is the motor operating point with; ③Δp = 123 bar; ④Q = 21.3 l/min

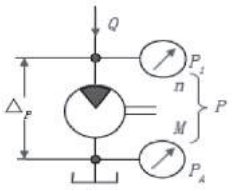


Specifications

Series	Displacement (ml/r)	Pressure (bar)			Speed (r/min)		Volumetric Efficiency (%)	Mechanical Efficiency (%)	Output Torque (N.m)
		Rated	Int.	Peak	Max.	Min.			
1MF	1.1 - 5.1	200	230	250	4000	650	90	85	2.97 - 13.8
1MF	5.1 - 8.5	200	230	250	3600	650			13.8 - 23
2MF	4 - 8	200	250	280	4000	600	92	85	2.97 - 13.8
2MF	8 - 15	200	250	280	3500	600			10.8 - 40.6
2MF	15 - 20	200	250	280	3000	600			40.6 - 54.1
2MF	20 - 26	200	250	280	2500	500			54.1 - 70.3
2MF	26 - 30	180	210	250	2000	500			63.3 - 73.1
2.5MF	10 - 20	200	230	250	3600	500	92	85	27.1 - 54.1
2.5MF	20 - 30	200	230	250	3000	500			54.1 - 81.2
2.5MF	30 - 40	180	210	250	3000	400			73.1 - 97.4
3MF	22 - 43	200	230	250	3000	400	93	86	60.3 - 117.7
3MF	43 - 70	200	230	250	2500	400			117.7 - 191.7
3MF	70 - 89	200	230	250	2200	400			191.7 - 243.7
3.5MF	52 - 73	170	200	210	3600	500	93	86	121.1 - 169.9
3.5MF	73 - 100	150	165	180	3000	500			149.9 - 205.4
3.5MF	100 - 115	120	130	140	2500	500			164.3 - 188.9

Calculated Formulas

Displacement	Flow	Pressure	Speed	Power	Torque	Volumetric Efficiency	Mechanical Efficiency	Total Efficiency
cm^3/r	l/min	bar	r/min	kW	N.m	90%	85%	80%
V	Q	$\triangle p$	n	P	M	ηv	ηm	ηt



$Q = V.n \cdot 10^{-3} / \eta v$

$M = \triangle p \cdot V \cdot \eta m / 62.83$

$P = 2\pi \cdot n \cdot M / 60000$

Ordering Code

2	A	M	F	8	F06	T24	S7	B	-BB	-O	-I	-F
a	b	c	d	e	f	g	h	i	j	k	l	m

ⓐ 2=Group 2

ⓑ Covers

A=Cast iron cover

Omit=Aluminum cover

ⓒ M=Gear motor

ⓓ Continous operate pressure

F=200bar

G=250bar

ⓔ Motor displacement

4, 6, 8, 10, 12, 14, 16, 18, 20, 23, 25

ⓕ Inlet/Outlet combination

F06=Inlet(Φ40/M8/Φ20) Outlet(Φ30/M6/Φ13)

F85=Inlet(Φ35/M6/Φ15) Outlet(Φ35/M6/Φ15)

F52=Inlet(Φ35/M6/Φ15) Outlet(Φ40/M6/Φ20)

L04=Inlet(G1/2) Outlet(G1/2)

L46=Inlet(G3/4) Outlet(G3/4)

L76=Inlet(1-5/8-12UN-2B) Outlet(7/8-14UNF-2B)

ⓖ Drive shaft extension and flange combination

T24=1: 8 shaft

S13=SAE 16/32 spline 9 tooth

F32=5/8 key shaft SAE A flange

S46=SAE 16/32 spline 11 tooth SAE A flange

S35=SAE 16/32 spline 10 tooth

F36=3/4 key shaft

ⓗ Flange combination

S7=Europe rectangle flange

D9=SAE A flange

D19=SAE A flange

D10=SAE A flange

ⓘ Rotation direction

B=Bi-direction

L=CCW

R=CW

ⓙ Inlet/Outlet position combination

BF=Back inlet and front outlet

BB=Back inlet and back outlet

BS=Back inlet and side outlet

SB=Side inlet and back outlet

SF=Side inlet and front outlet

SS=Side inlet and side outlet

ⓚ Outboard bearing

O=Outboard bearing

Omit=Without outboard bearing

ⓛ Mode of drain

I=Inner drain

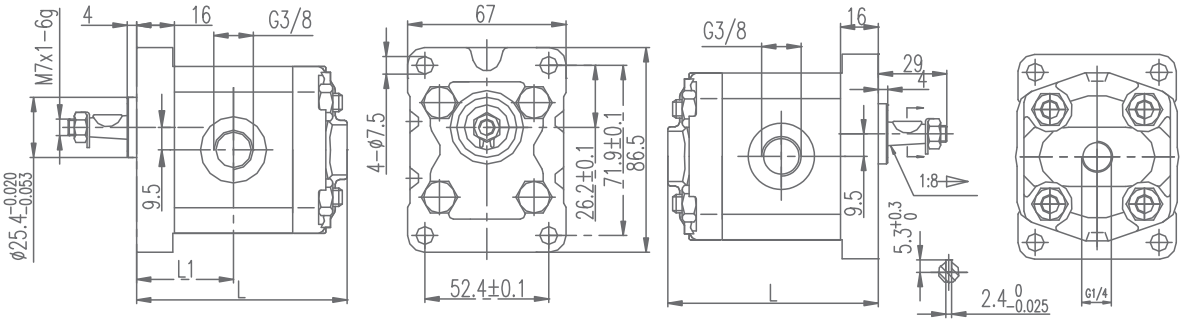
Omit=Outside drain

ⓜ Seals

F=FKM seal

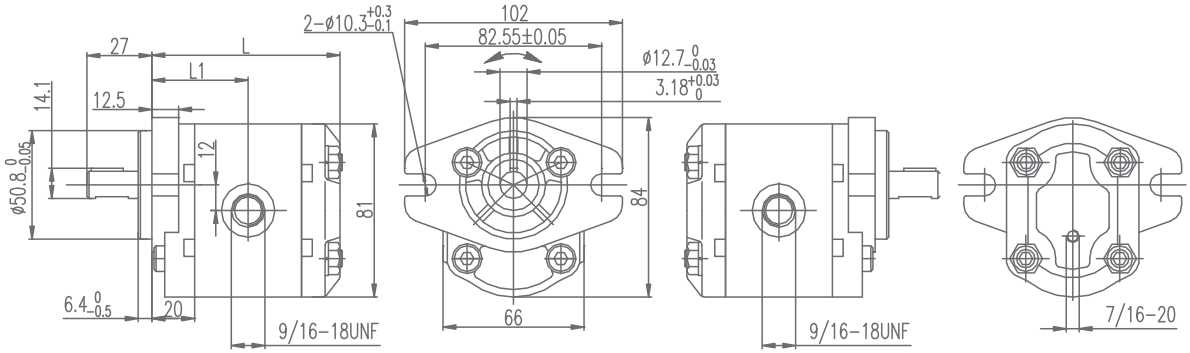
Omit=NBR seal

1MF**L69T3S5-B



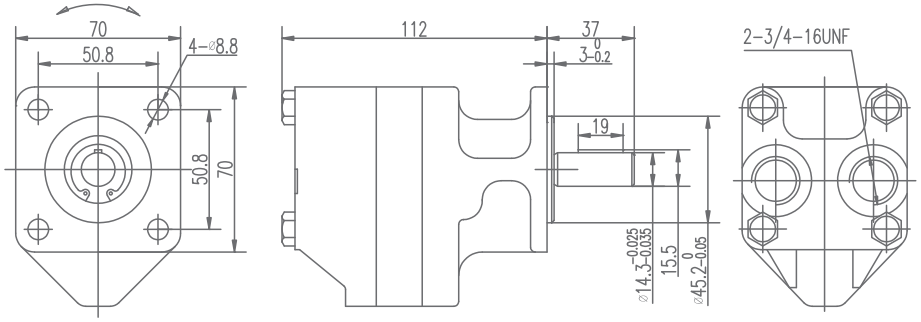
Displacement (ml/r)	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.8	5.8	6.5	8.0
L1	33	35	36	37	38	39	40	41	43	44	47
L	75	78	79	81	83	85	87	89	93	95	101

1AMF**L**F16D2-B



Displacement (ml/r)	1.3	2.0	2.7	3.4	4.1	5.1	6.1	6.5	7.0	7.5	8.5
L1	42	43	43	45	46	47.5	49	49.5	50	50.5	52
L	82	84	86	88	90	93	96	98	100	102	103

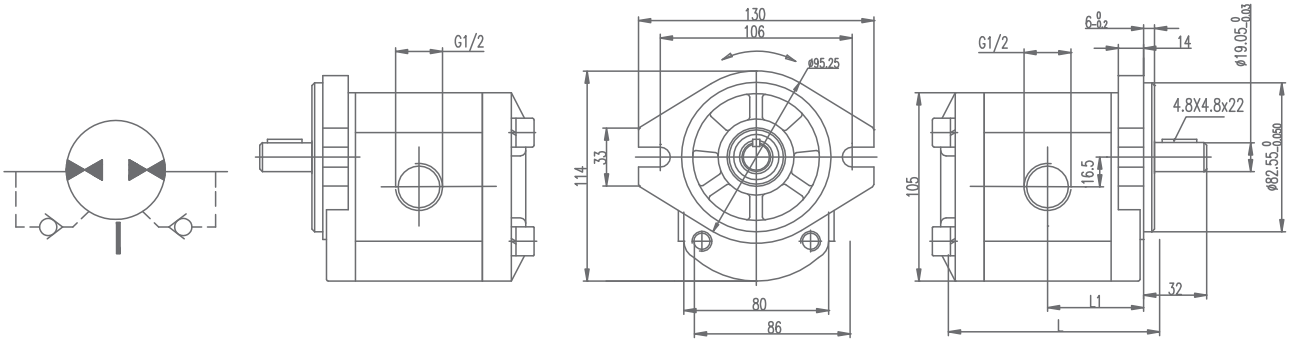
1DMF6.1LJ86F108S20B-BB



Displacement (ml/r)	Working Pressure (bar)	Max Speed (rpm)	Torque (Nm)	Direction
6.2	70	5000	5.78	Bi-direction

2MF**L04F63D9-B-I

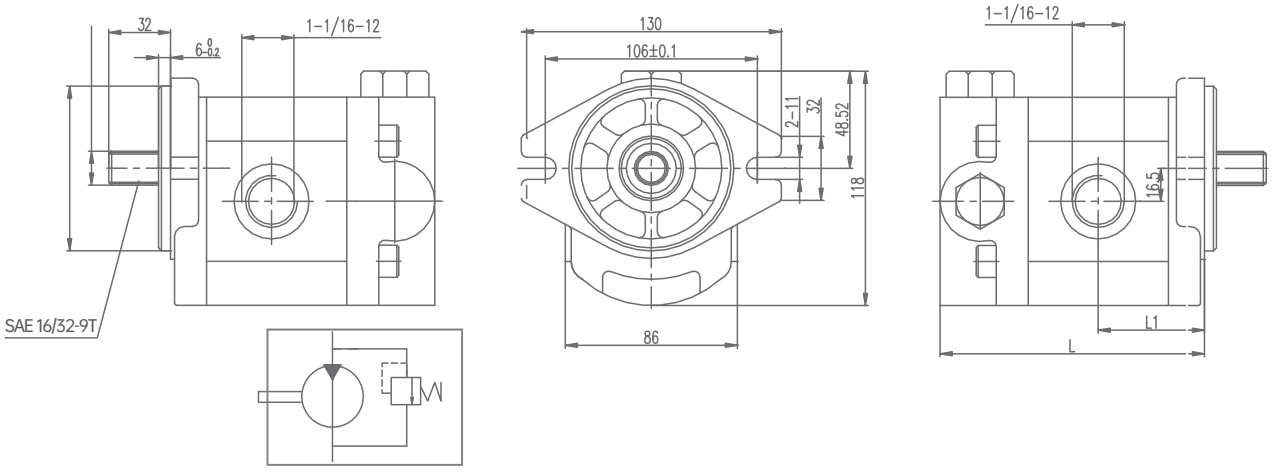
This motor is internal drain port structure. Two check valves guarantee its bi-directional fuction and have the oil of internal leakage return to inlet port. The function symbols are as follows:



Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	44	45	47	48	50	51	53	55	56	58	60
L	96	98	102	104	108	108	114	117	120	123	128

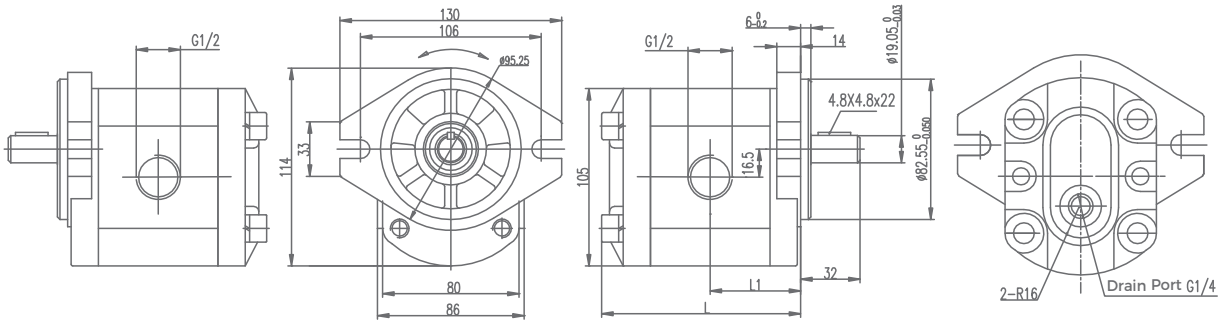
2MF**F**S13D9-R-V

The motor is with the relief valve of which the highest working pressure is same as that of the motor inlet port. The function symbols are as follows:



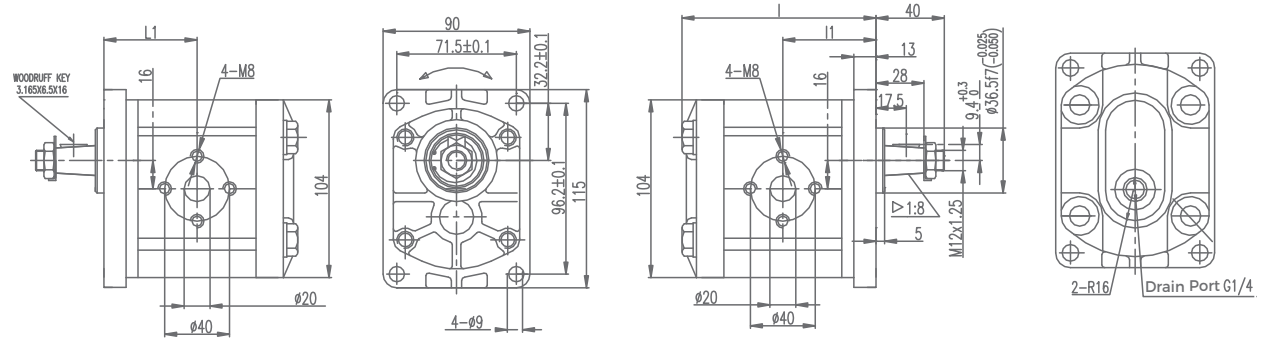
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	39	40	41	43	44	46	48	49	51	54	57
L	111	112	115	118	120	125	128	132	137	139	141

2MF**L04F63D9-B



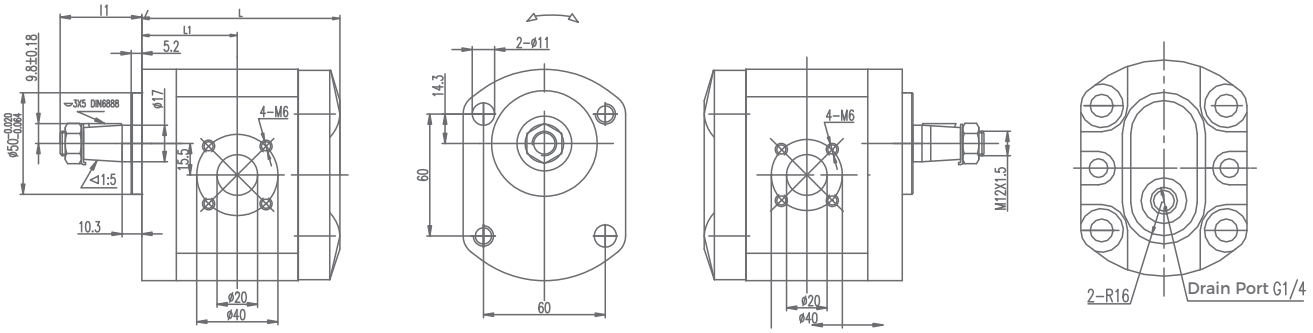
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	44	45	47	48	50	51	53	55	56	58	60
L	96	98	102	104	108	108	114	117	120	123	128

2MF**F**T24S7-B



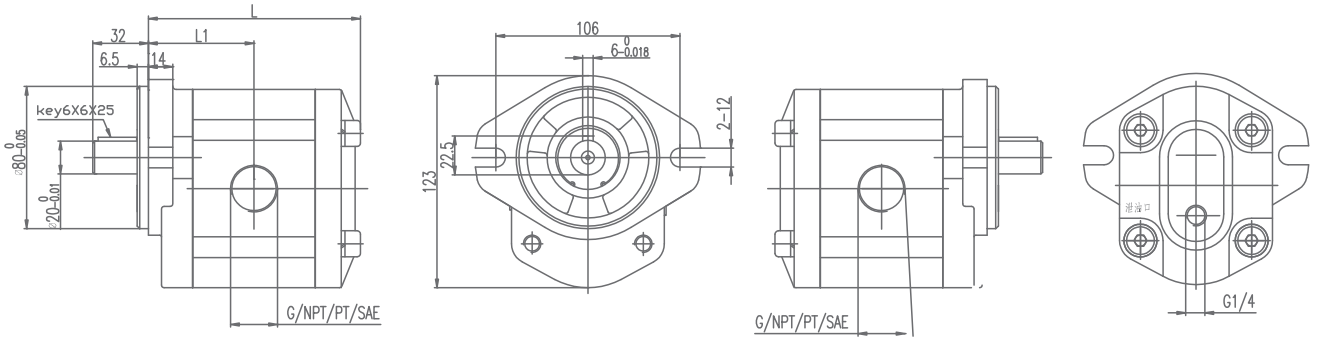
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	46	47	49	50	52	53	55	57	58	60	62
L	98	100	104	106	110	112	116	119	122	125	130

2MF**F**T20O8-B



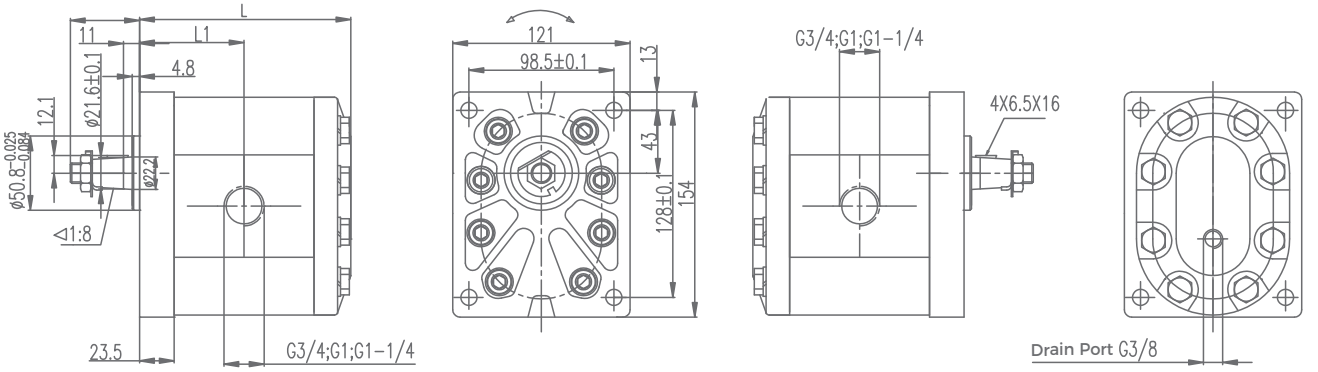
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

2.5MF**L**F77D20-B



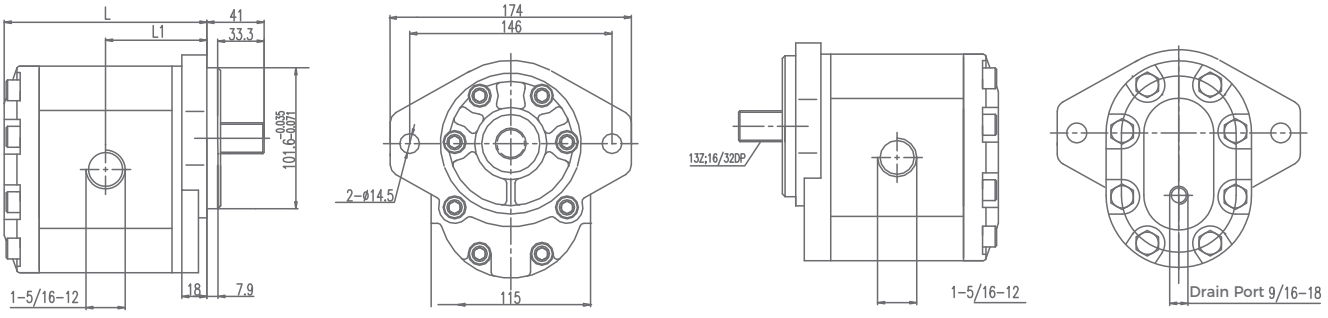
Displacement (ml/r)	10	16	20	25	27	30	32	36	40
L1	44	45	60	62	63	65	66	68	70
L	96	98	125	130	132	137	139	144	148

3MF**L**T11S14-B



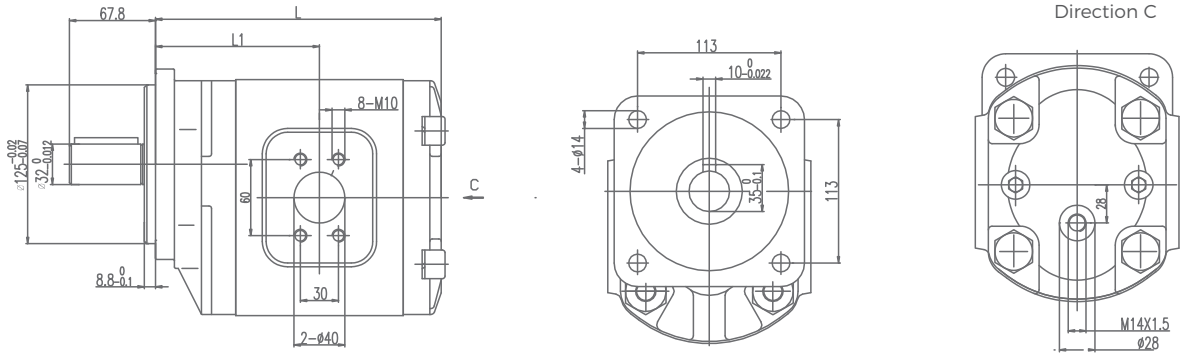
Displacement (ml/r)	22	26	34	39	43	51	60	70	78	89
L1	64	66	68	70	71	74	77	81	83	87
L	129	132	137	141	144	150	156	163	168	174

3MF**L**S70D12-B



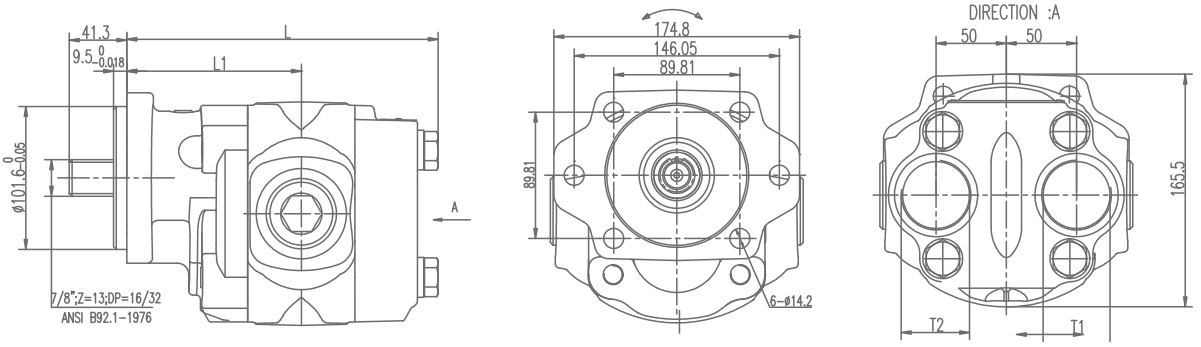
Displacement (ml/r)	22	26	34	39	43	51	60	70	78	89
L1	66	67	69	71	73	76	79	82	85	88
L	131	134	139	143	147	152	158	166	171	176

3.5BMF**F108F102S13-B



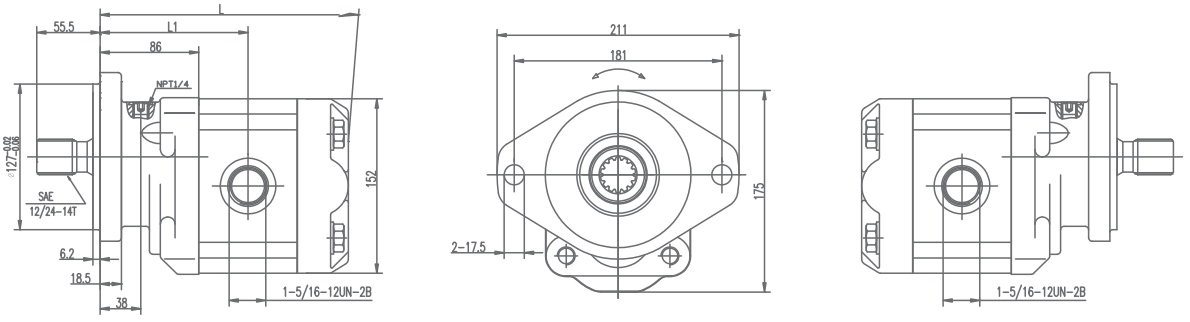
Displacement (ml/r)	63	80	100
L1	119	125	132
L	215	221	228

3.5MF**L**S84D14-B



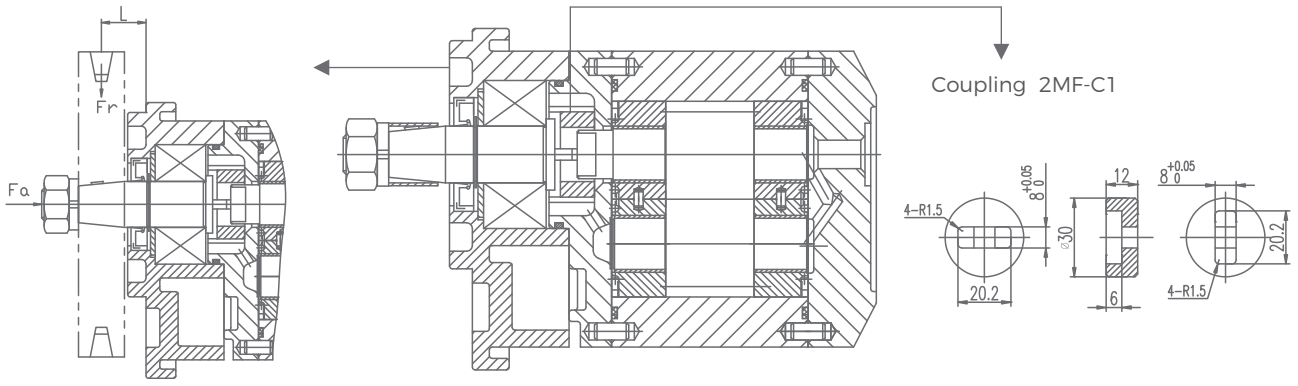
Displacement (ml/r)	52	63	73	85	93	104	115
L1	181	188	194	200	207	213	219
L	207	216	225	235	244	255	264

3.5MF**L**S95D17-B

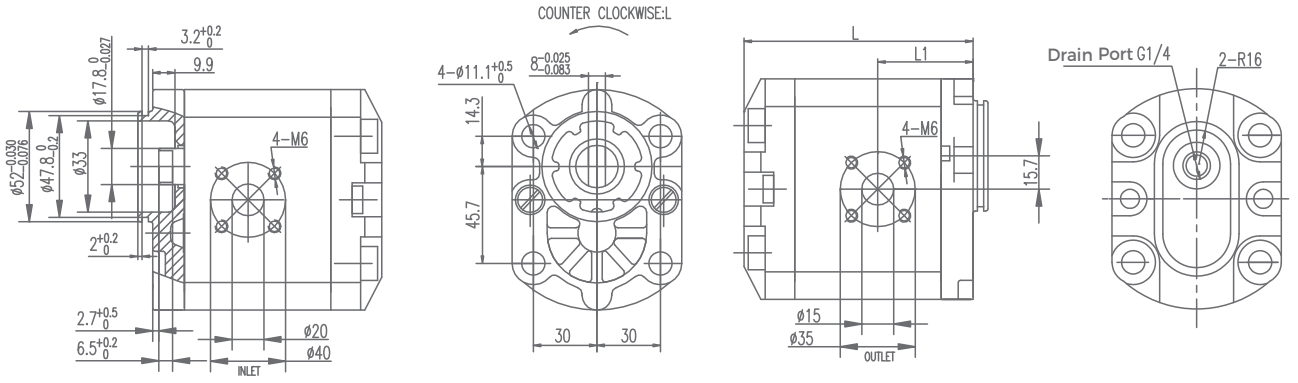


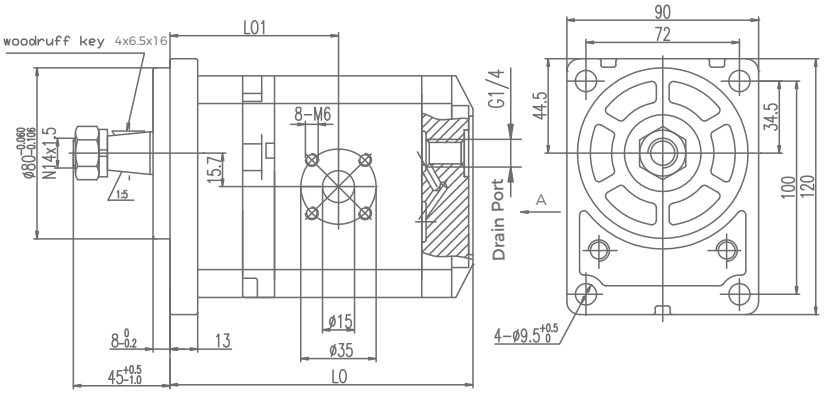
Displacement (ml/r)	52	63	73	85	93	104	115
L1	181	188	194	200	207	213	219
L	207	216	225	235	244	255	264

Outboard Bearing 2MF**F*****B-O



Dimensions

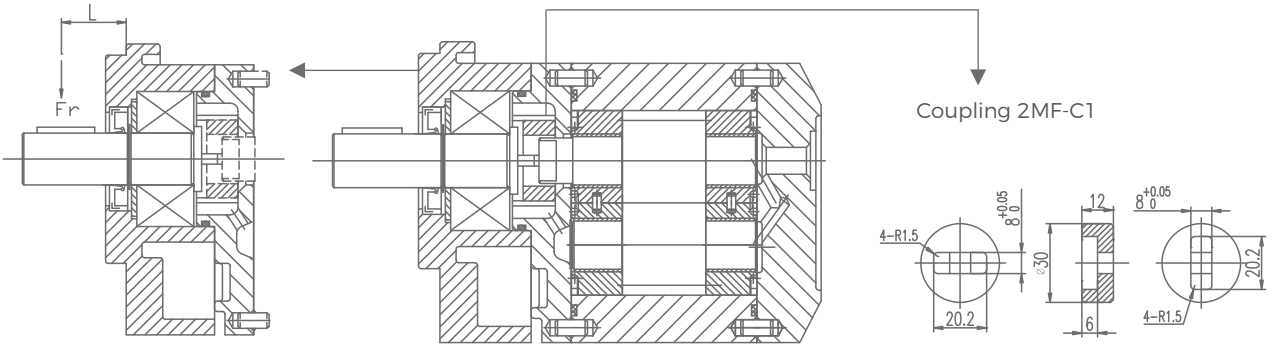


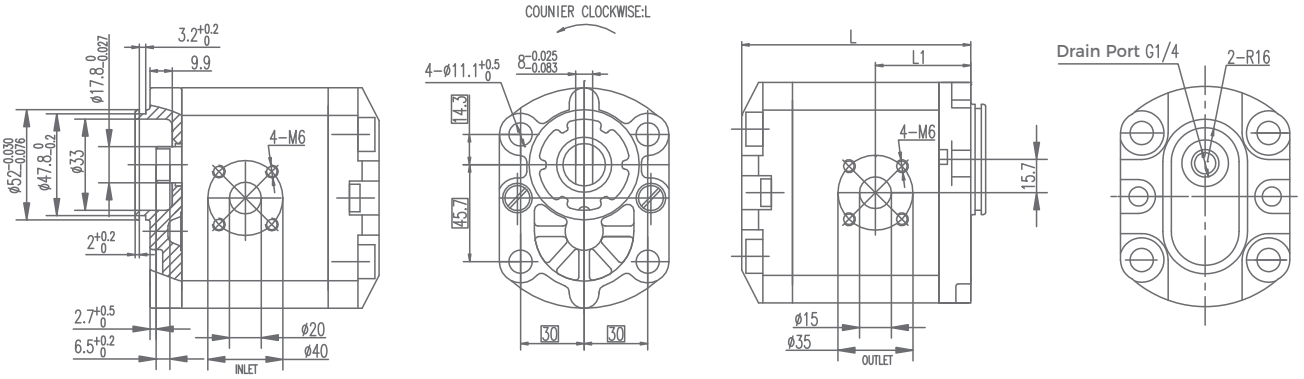


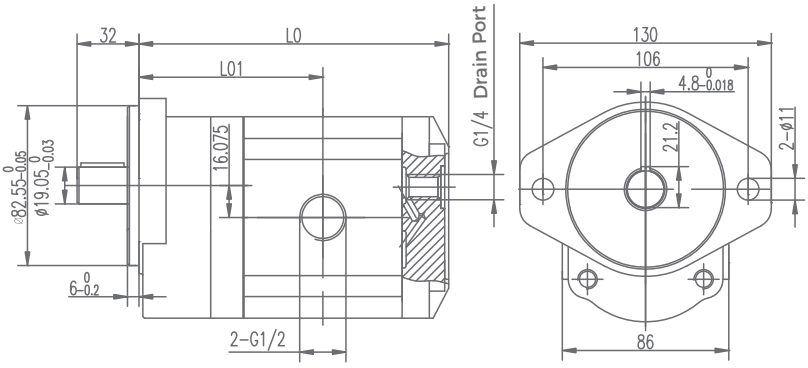
2MF**F**T37S9-B-O
O: Outboard bearing
B: Bi-direction

Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L01	73	74	75	77	79	80	82	83	86	89	92
L0	123	124	127	130	133	137	141	143	147	153	157
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

Outboard Bearing 2MF**L**F63D10-B-O





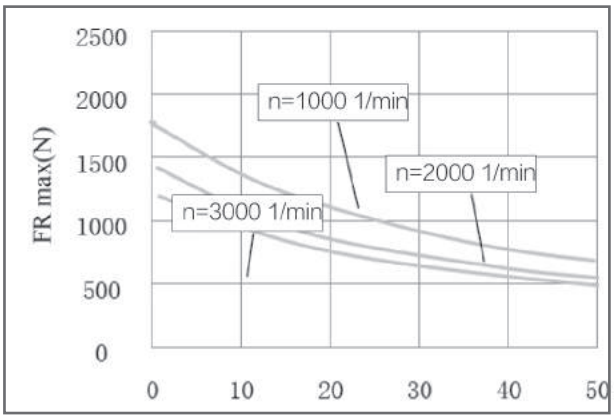


2MF**L**P36D10-B-O
O: Outboard bearing
B: Bi- direction

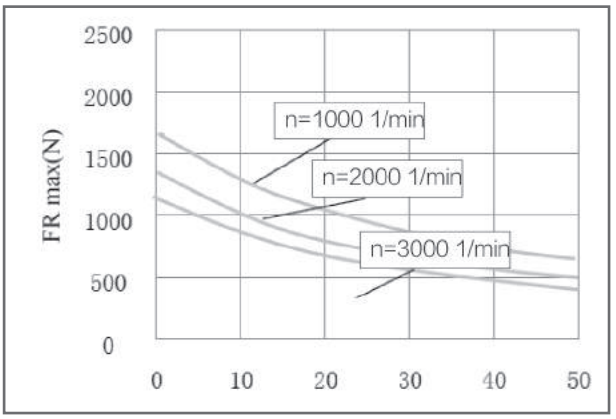
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L01	79	80.5	82	84	86	80	88	90	91	94	95
L0	131	134	137	140	144	137	150	153	156	160	163
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

Load of Outboard Bearing

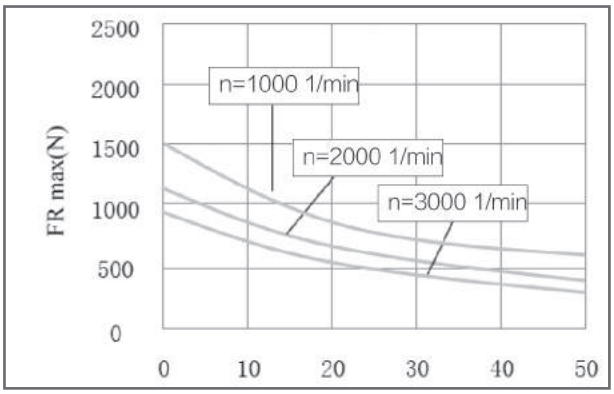
FO=0 N



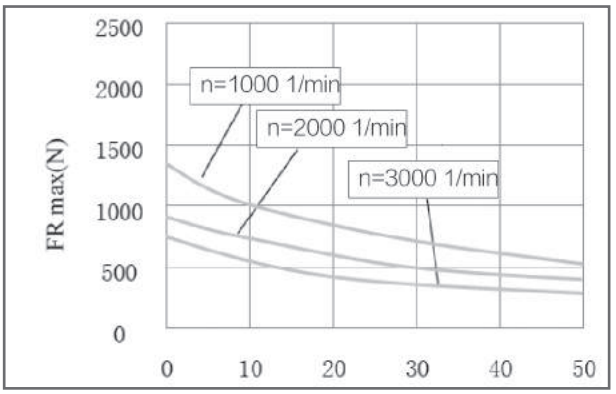
FO=200 N



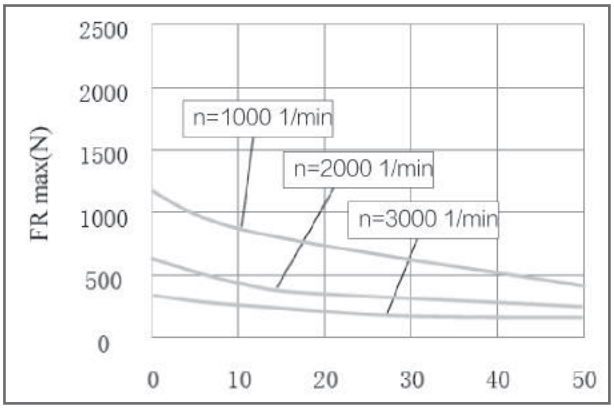
FO=400 N



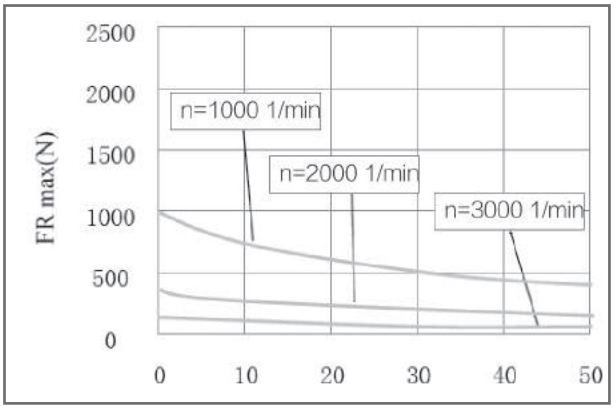
FO=600 N



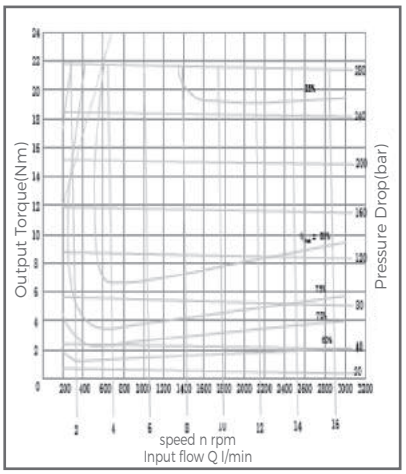
FO=800 N

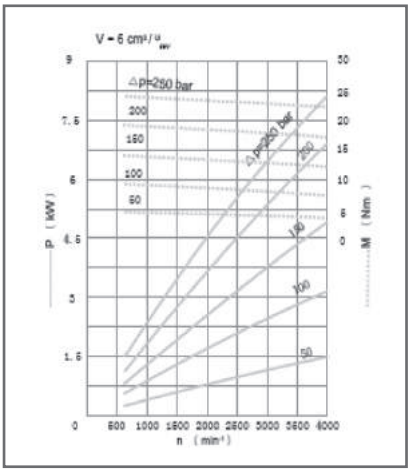


FO=900 N

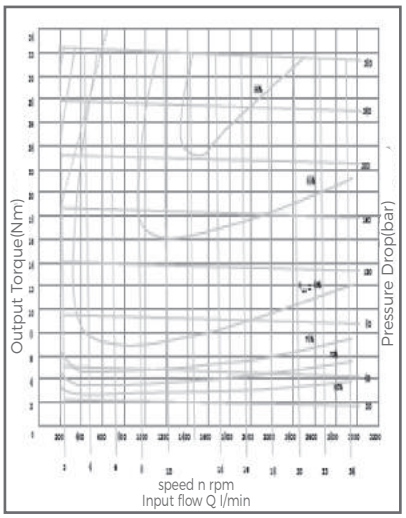


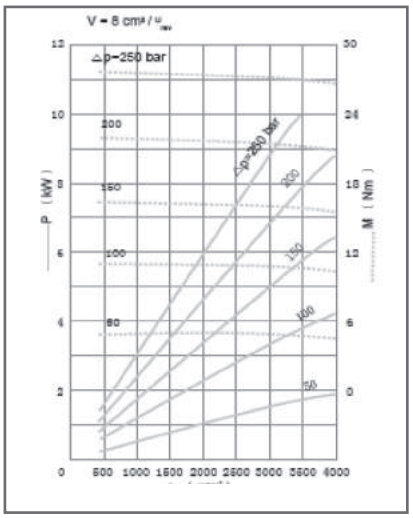
2MF6 Performance Curves



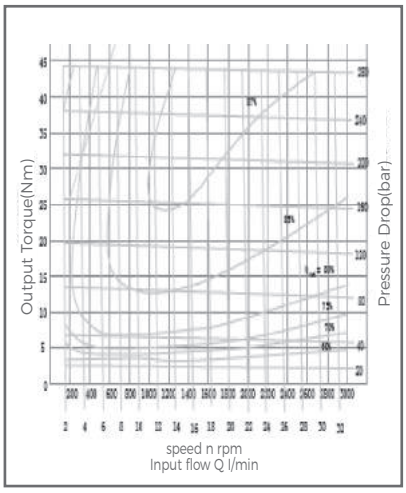


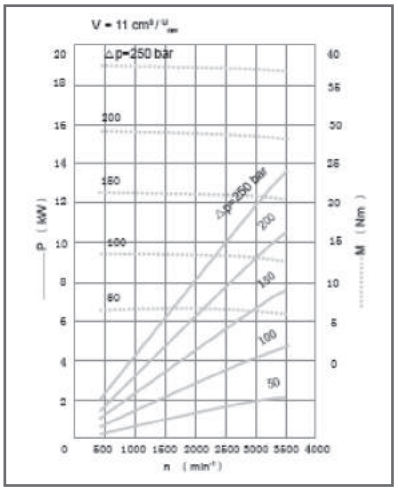
2MF8 Performance Curves



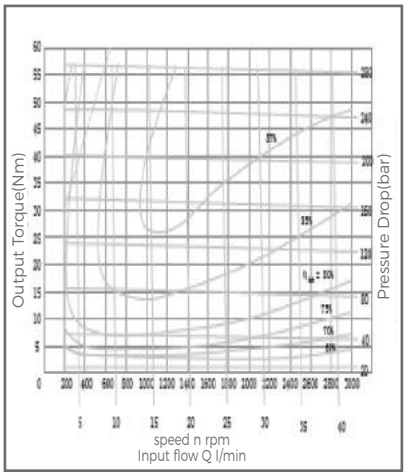


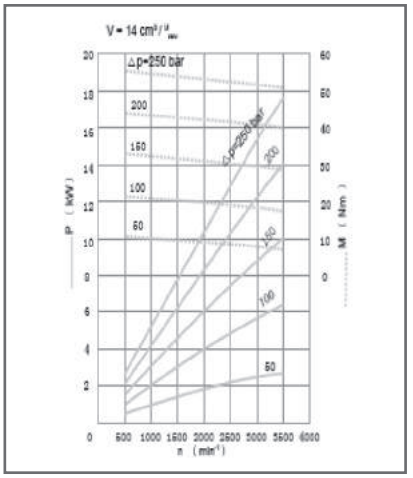
2MF11 Performance Curves



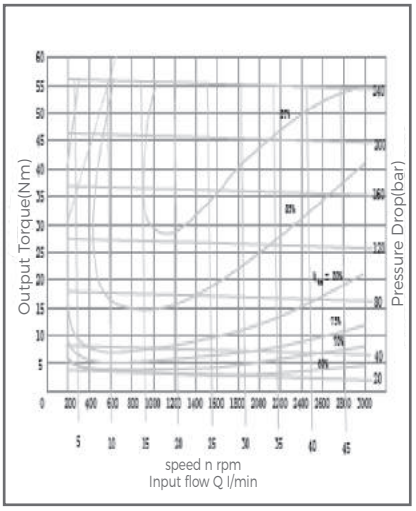


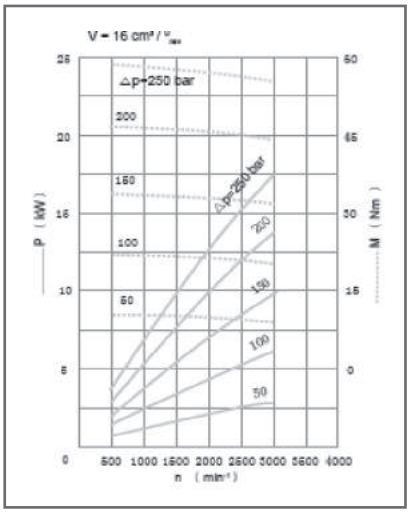
2MF14 Performance Curves



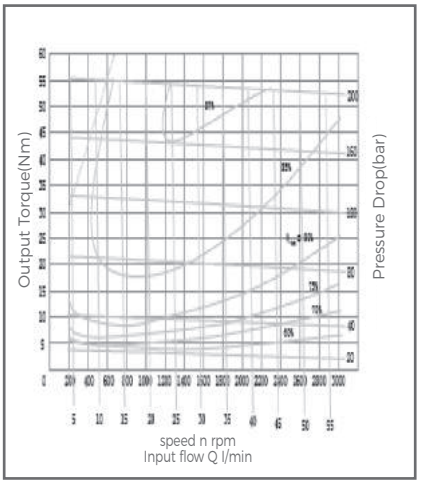


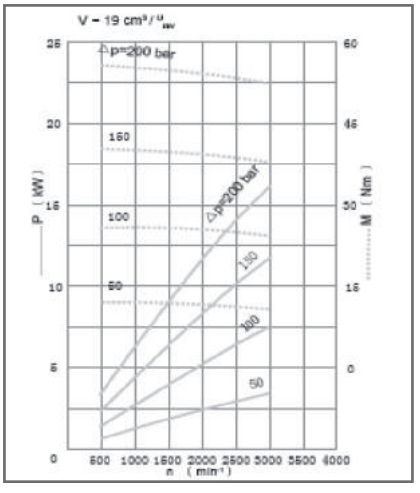
2MF16 Performance Curves





2MF19 Performance Curves





Shanghai Guorui Hydraulic Technology Co., Ltd

Add. Room 2201-2202, 1717 North Sichuan Road,
Hongkou Shanghai, China
P.C. 200080
Tel. +86-21-6218 3268
Mail. info@grhcn.com

Add. 666 West Shuanghu Road, Hi-tech Zone,
Jianhu Yancheng, Jiangsu, China
P.C. 224700
Tel. +86 0515-86316688 +86 400 188 1986
Mail. info@grhpro.com