Contents

Flow Dividers and Gear Motors

04–08 Flow Dividers

Gear Motors 10–23

Flow Dividers

04 Introduction of Flow Dividers

Ordering Code 04

05 1FDF Flow Dividers

1AFDF Flow Dividers 06

07 2FDF Flow Dividers

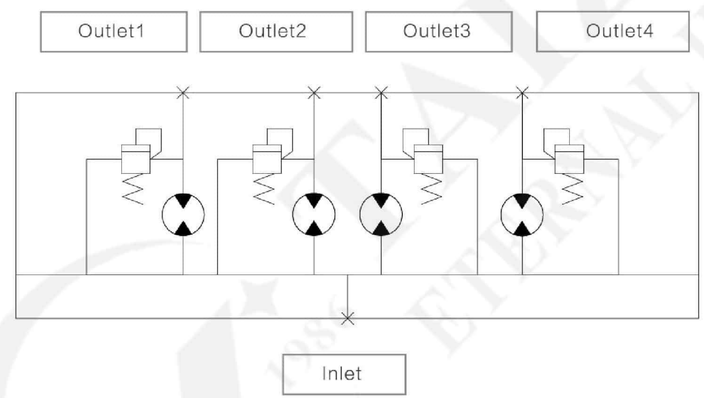
3FDF Flow Dividers 08

Introduction of Flow Dividers

Two or several gear motors can be combined to 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.
Two series for flow divider 1FDF and 2FDF. 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

It should be noted that flow accuracy is also related to the factors below: System pressure, viscosity of hydraulic liquid, load that each power 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 governor valve, protecting system pressure and filling the oil.



Ordering Code

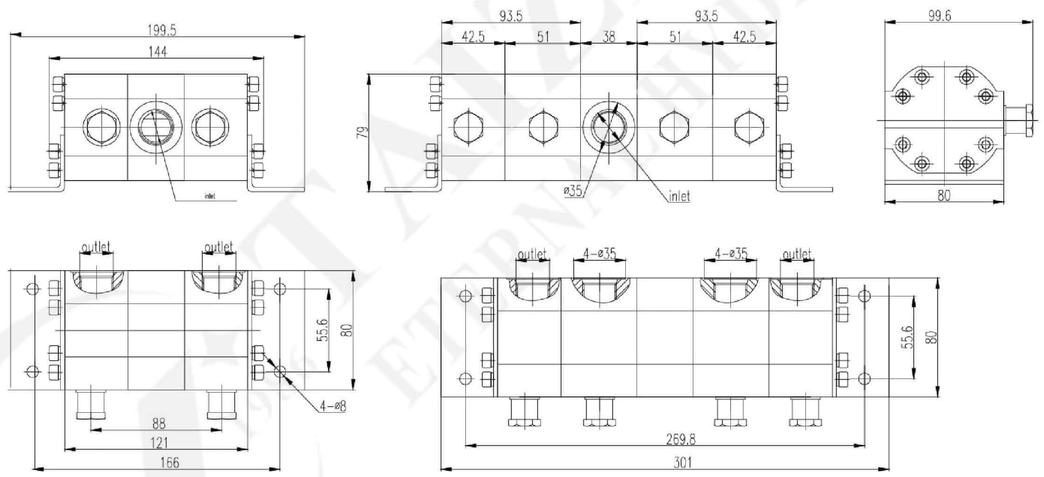
3	FD	F	60	L71	-4	-1
a	b	c	d	e	f	g

ⓐ 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

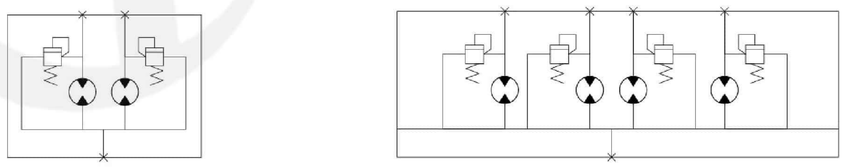
1FDF**L**-2/4 Flow Dividers

Displacement		SAE Port		Minimum Flow (sec)		Maximum Flow (sec)		Cont. Diff Between Pressure Inlet (outlet)		Maximum Outlet Pressure Each Section	
in³	cm³	inlet	outlet	gpm	lpm	gpm	lpm	psi	bar	psi	bar
0.097	1.60	sae6	sae6	0.8	3.0	1.7	6.40	1800	124	3500	240
0.129	2.13	sae8	sae8	1.2	4.5	2.5	9.50	1800	124	3500	240
0.194	3.18	sae8	sae6	1.7	6.4	4.5	13.2	1800	124	3500	240
0.258	4.24	sae10	sae10	2.5	9.5	5.0	18.9	1800	124	3500	240
0.323	5.29	sae10	sae10	3.0	11.4	6.0	22.7	1800	124	3500	240
0.388	6.36	sae10	sae10	3.5	13.2	7.0	26.5	1600	110	3500	240
0.453	7.42	sae10	sae10	4.0	15.1	8.0	30.3	1300	90	3500	240
0.517	8.42	sae10	sae10	4.5	17.0	9.0	34.1	1200	83	3500	240

Dimensions



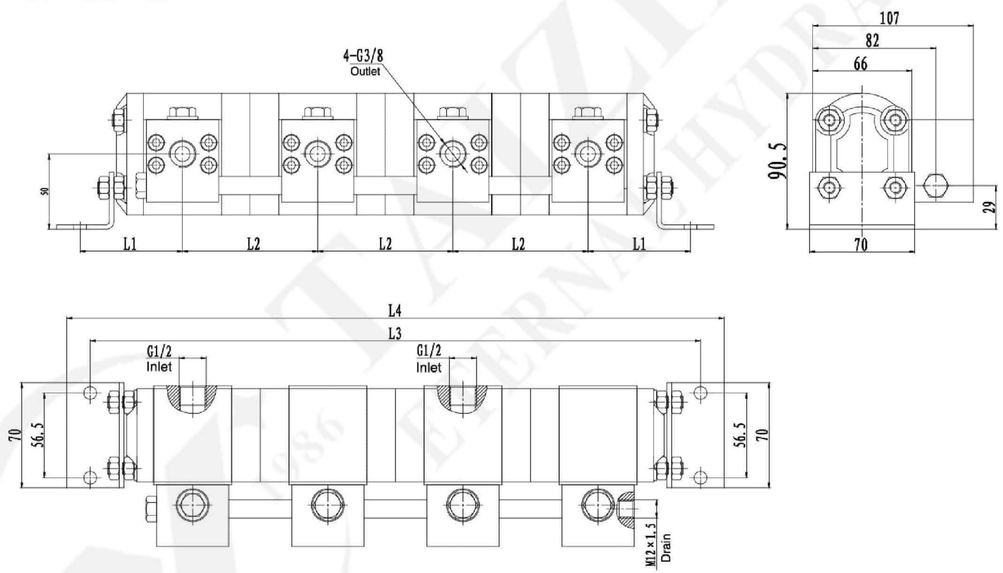
Schematic Diagrams



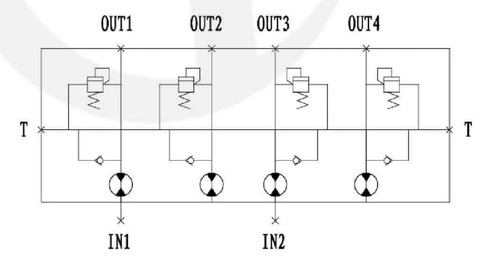
1AFDF** L**- Y-V Flow Dividers

Displacement	SAE Port		Minimum Flow	Maximum Flow	Cont. Diff Between Pressure Inlet/Outlet
	Inlet	Outlet			
2.0	G1/2	G3/8	1.0	4.0	200
3.0	G1/2	G3/8	1.5	6.0	200
4.1	G1/2	G3/8	2.1	8.2	200
5.1	G1/2	G3/8	2.55	10.2	200
6.1	G1/2	G3/8	3.05	12.2	200
7.0	G1/2	G3/8	3.50	14.0	200

Dimensions



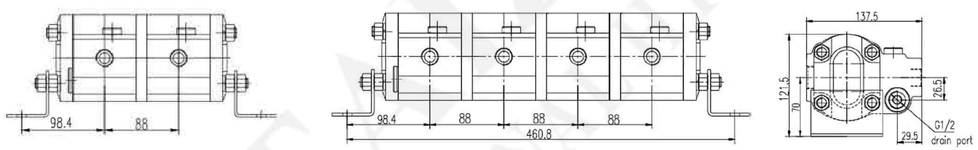
Schematic Diagram

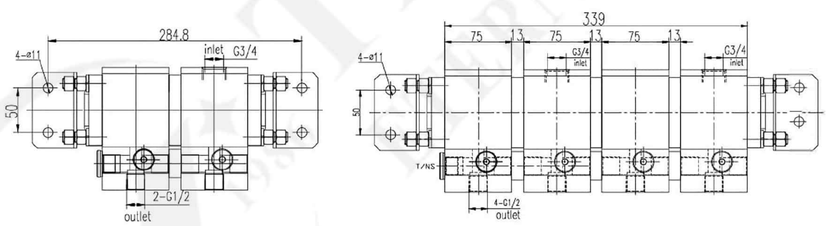


2FDF**L**-2/4 Flow Dividers

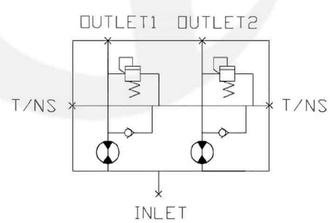
Displacement		SAE Port			Minimum Flow (sec)		Maximum Flow (sec)		Cont. Diff Between Pressure Inlet/Outlet		Maximum Outlet Pressure Each Section	
in³	cm³	inlet	outlet	drain	GPM	LPM	GPM	LPM	PSI	BAR	PSI	BAR
0.366	6	G3/8	G1/2	G3/8	0.8-4.2	3.0-	4.8	18	3142	220	3571	250
0.488	8	G3/8	G1/2	G3/8	1.1-5.0	4.0- 5.5-	5.8 7.1	22	3142	220	3571	250
0.671	11	G3/8	G1/2	G3/8	1.5-6.6			27	3142	220	3571	250
0.854	14	G3/8	G1/2	G3/8	1.8-8.4	7.0-32	9.0	34	2857	200	3142	220
1.037	17	G3/8	G1/2	G3/8	2.2-9.0	8.5-34	9.8	37	2857	200	3142	220
1.525	25	G3/8	G1/2	G3/8	3.1-12.7	12-48	14.0	53	2857	200	3142	220
1.891	31	G3/8	G1/2	G3/8	3.7-15.9	14-60	18.5	70	2286	160	2571	180

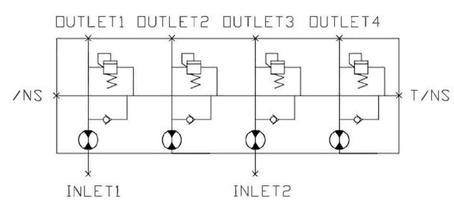
Dimensions





Schematic Diagrams



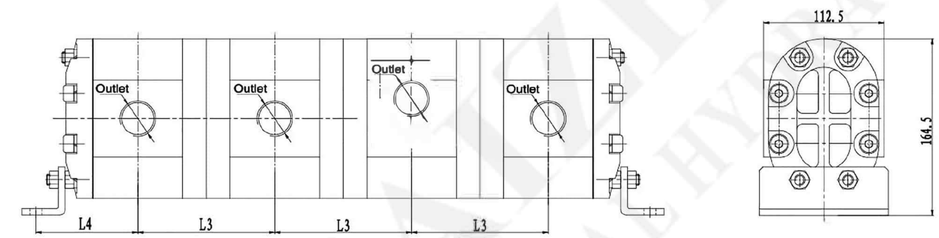


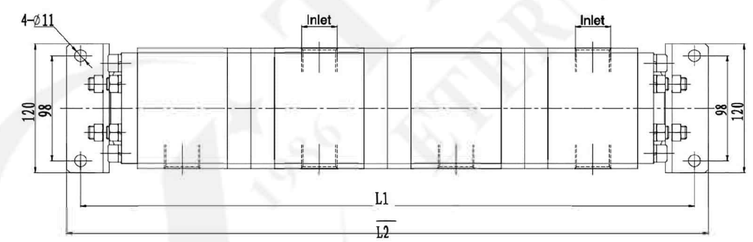
齿轮分流器
Flow Dividers
TAIZHOU ETERNAL HYDRAULIC

3FDF**L**-* Flow Dividers

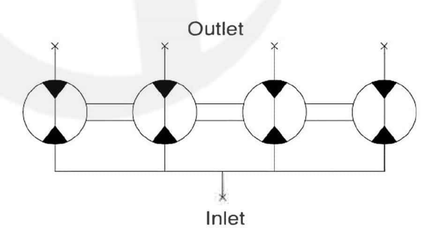
Displacement (ml/r)	L1(mm)	L2(mm)	L3(mm)	L4(mm)
20	552.4	578.4	122.5	92.3
30	582.4	608.4	130.0	96.0
40	610.4	636.4	137.0	99.5
50	636.4	662.4	143.5	102.8
60	668.4	694.4	151.5	106.8
70	696.4	722.4	158.5	110.3

Dimensions





Schematic Diagram



Gear Motors

Introduction 10
12 Specifications
Ordering Code 13
14 1MF/1AMF Bi-direction
2MF Bi-direction 15
17 2.5MF/3MF Bi-direction
3.5MF Bi-direction 18
19 With Outboard Bearing
Load of Outboard Bearing 21
22-23 Performance Curves

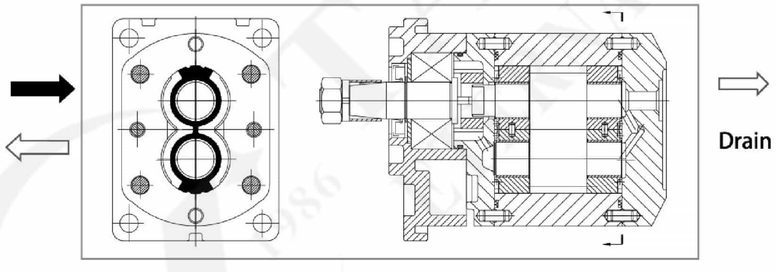
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

Introduction

Gear motors from Eternal Hydraulic 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 our units provide excellent low noise characteristics. Our cold extrusion motor bodies can endure pressures above 30Mpa. High strength cast iron front & rear covers also enhance our reliability. Our units are widely used in the industrial, mobile, marine and aerospace industries.

Eternal has 5 series 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, Eternal pumps have a corresponding single direction gear motor. 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 bottom drawings) separate 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.



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=10 mm^2/s-max=600 mm^2/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

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

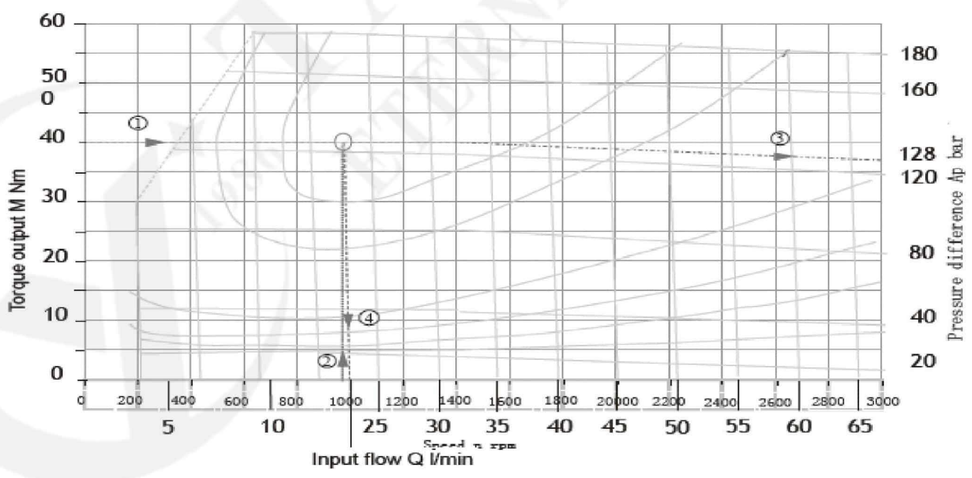
All motor can be combined with relief valve, proportional valve, thermostatic valve.

Guidance for Use of the Curve

In most cases, known: torque output M at speed n, unknown: pressure difference Δp and the required Input flow ;

Example

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



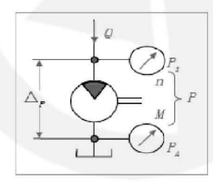
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

Specifications

Series	Displacement (ml/r)	Pressure (bar)			Speed (r/min)		Total Efficiency (T>%)	Volumetric Efficiency (V>%)	Mechanical Efficiency (M>%)	Output Torque (N.m)
		P1 Rated	P2 Intermittent	P3 Peak	MAX	Min				
1MF/1AMF	1.1 to 5.1	200	230	250	4000	650	78	92	85	Refer to Below Formula
1MF/1AMF	5.1 to 8. 5	200	230	250	3600	650				
2MF	4 to 8	200	230	250	4000	600	80	94	85	
2MF	8 to 15	200	250	280	3500	600				
2MF	15 to 20	200	250	280	3000	600				
2MF	20 to 26	200	250	280	2500	500				
2MF	26 to 30	200	250	280	2000	500				
2.5MF	10 to 20	200	230	250	3600	500	80	94	85	
2.5MF	20 to 30	200	230	250	3600	500				
2.5MF	30 to 40	180	230	250	3000	500				
3MF	22 to 43	200	230	250	3000	400	82	95	86	
3MF	43 to 70	200	230	250	2500	400				
3MF	70 to 89	200	230	250	2200	400				
3.5MF	52 to 73	170	200	210	3600	500	82	95	86	
3.5MF	73 to 100	150	165	180	3000	500				
3.5MF	100 to 115	120	130	140	2500	500				

Calculated Formulas

Displacement	Flow	Pressure	Speed	Power	Torque	Volumetric Efficiency	Mechanical Efficiency	Total Efficiency
(cm^3/r)	(l/min)	(bar)	(r/min)	(kw)	(Nm)	98%	93%	91%
V	Q	p	n	P	M	ηv	ηm	ηt



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

$M = P \cdot V \cdot \eta m / 62.83$

$P = P.V.n. \eta t / 600 \cdot 1000$

Ordering Code

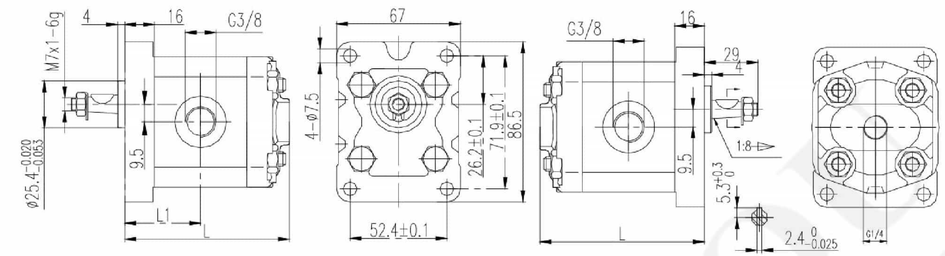
2	A	M	F	8	F06	Z03	B	-BB	-O	-I	-F
a	b	c	d	e	f	g	h	i	j	k	l

ⓐ 2=Group 2
ⓑ Covers
A=Cast Iron Cover
Omit=Aluminum Cover
ⓒ M=Gear Motor
ⓓ Continous Work 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)
MF52=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)
ⓖ Shaft Extension and Flange Combination
T24S7=1:8 Shaft + Europe rectangle flange
S13D9=SAE 16/32 Spline 9 tooth + SAE - A flange
F32D9=5/8 Key Shaft + SAE - A flange
S46D9=SAE16-32 Spline 11 tooth + SAE - A flange
S35D19=SAE16-32 Spline 10 tooth + SAE - A flange
F36D10=3/4 Key Shaft + SAE-A flange

ⓗ Rotation Direction
B=Bi-direction
L=CCW
R=CW
ⓘ Inlet/Outlet Position Combination
Back Inlet and Front Outlet
Back Inlet and Back Outlet
Back Inlet and Side Outlet
Side Inlet and Back Outlet
Side Inlet and Front Outlet
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

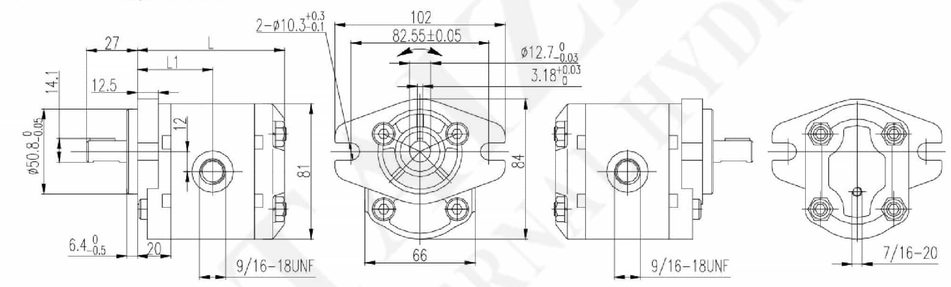
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

1MF**L69T3S5BB



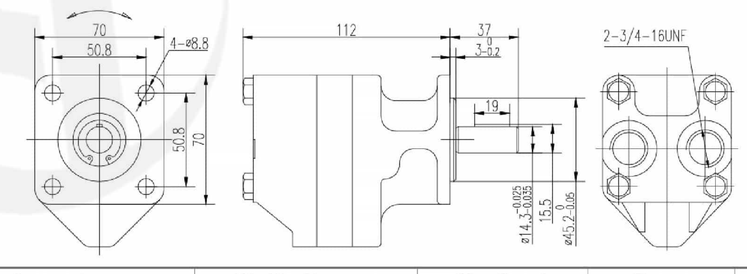
Displacement(ml/r)	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.8	5.8	6.5	8.0
L1	33	35	36	37	38	39	40	41	43	44	47
L	75	78	79	81	83	85	87	89	93	95	101

1AMF**L**F16D2BB



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

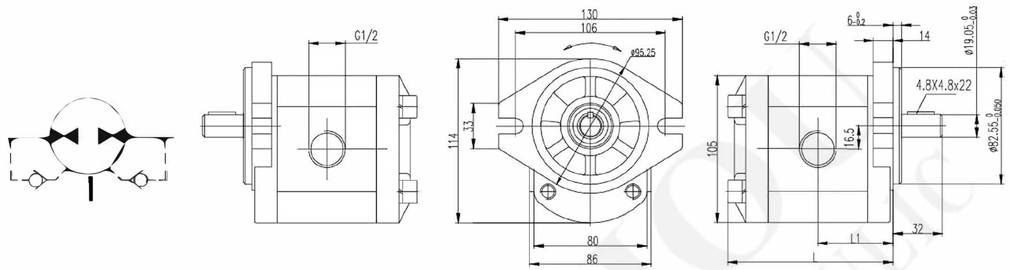
1DMF6.1LJ86F108S20B-BB



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

2MF**L04F32D9-B-I

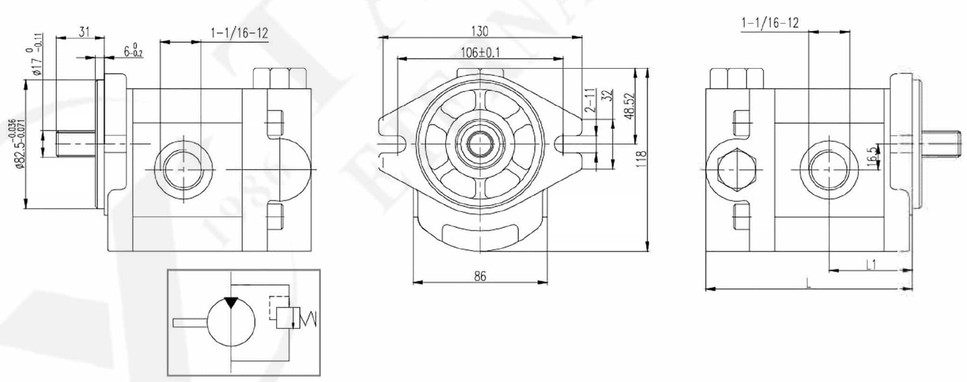
This motor is of internal drainage port structure. Two check valves guarantee its bi-directional fuction and have the oil of internal leakage return to inlet port. The function symbols are as follows:



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**S13D10-R-V

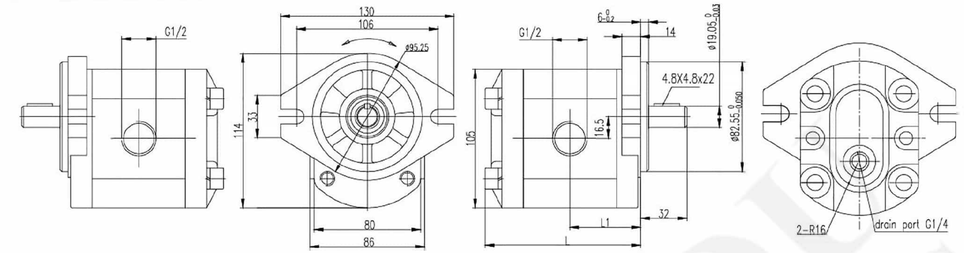
The motor is with the relief valve of which the highest working pressure is same as that of the motor inlet port. The function symbols are as follows:



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

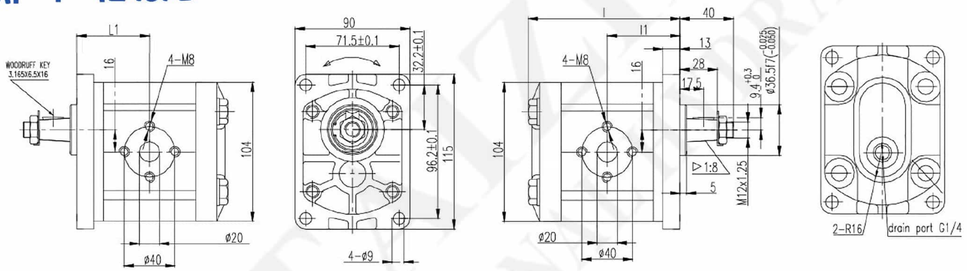
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

2MF**L04F32D9B



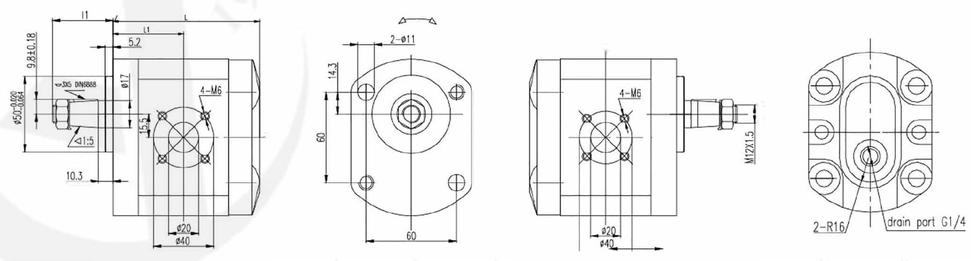
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	44	45	47	48	50	51	53	55	56	58	60
L	96	98	102	104	108	108	114	117	120	123	128

2MF**F**T24S7B



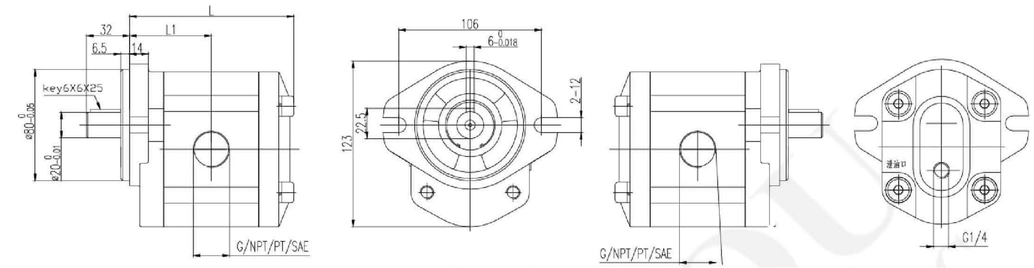
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	46	47	49	50	52	53	55	57	58	60	62
L	98	100	104	106	110	112	116	119	122	125	130

2MF**F**T20O8B



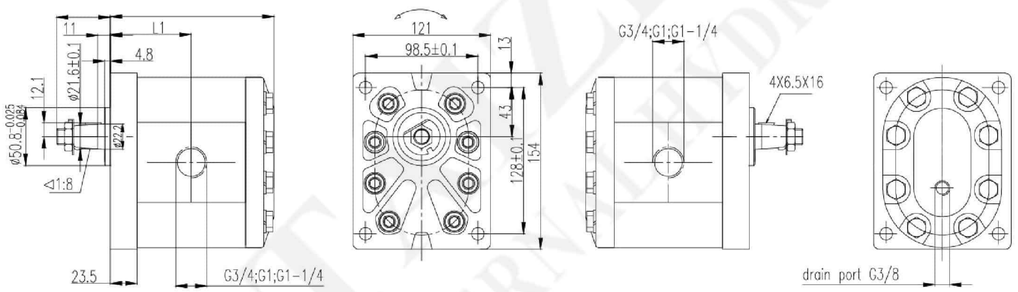
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

2.5MF**L**F77D20B



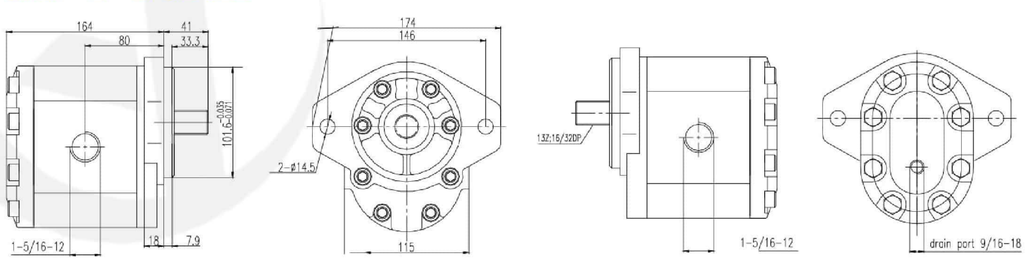
Displacement (ml/r)	10	16	20	25	27	30	32	36	40
L1	44	45	60	62	63	65	66	68	70
L	96	98	125	130	132	137	139	144	148

3MF**L**T40S14B



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

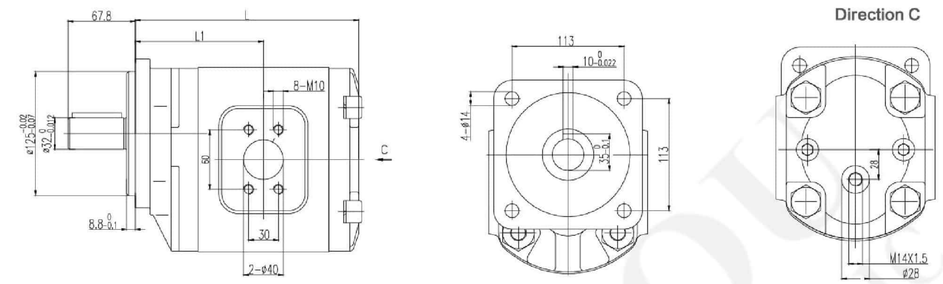
3MF**L**S70D12B



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

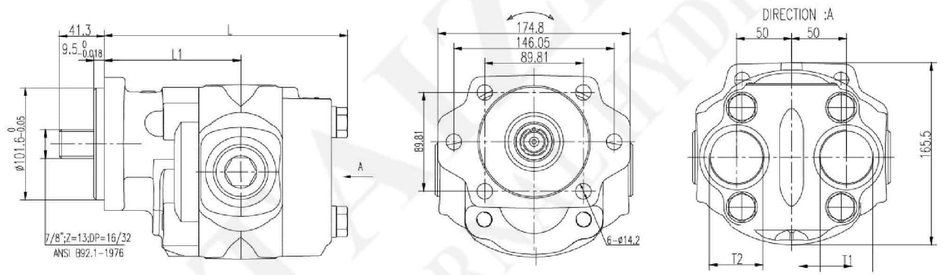
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

3.5BMF**F108F102S13B



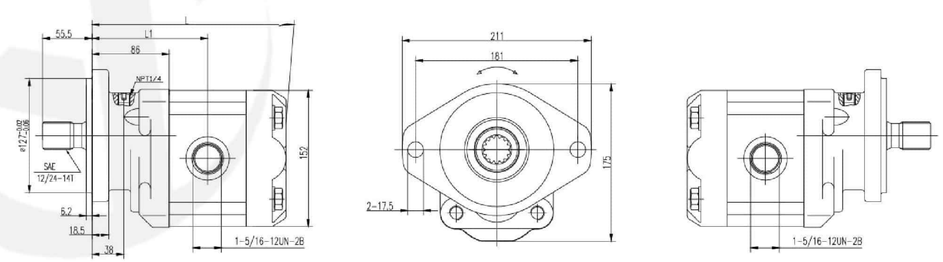
Displacement (ml/r)	63	80	100
L1	119	125	132
L	215	221	228

3.5MF**L**S84D14B



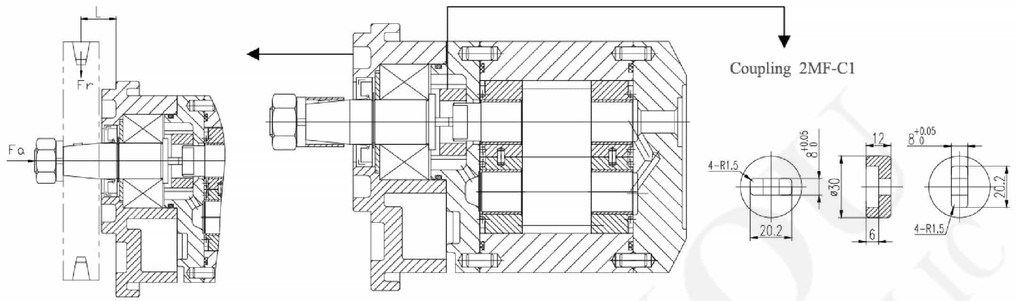
Displacement (ml/r)	52	63	73	85	93	104	115
L1	181	188	194	200	207	213	219
L	207	216	225	235	244	255	264

3.5MF**L**S95D17B

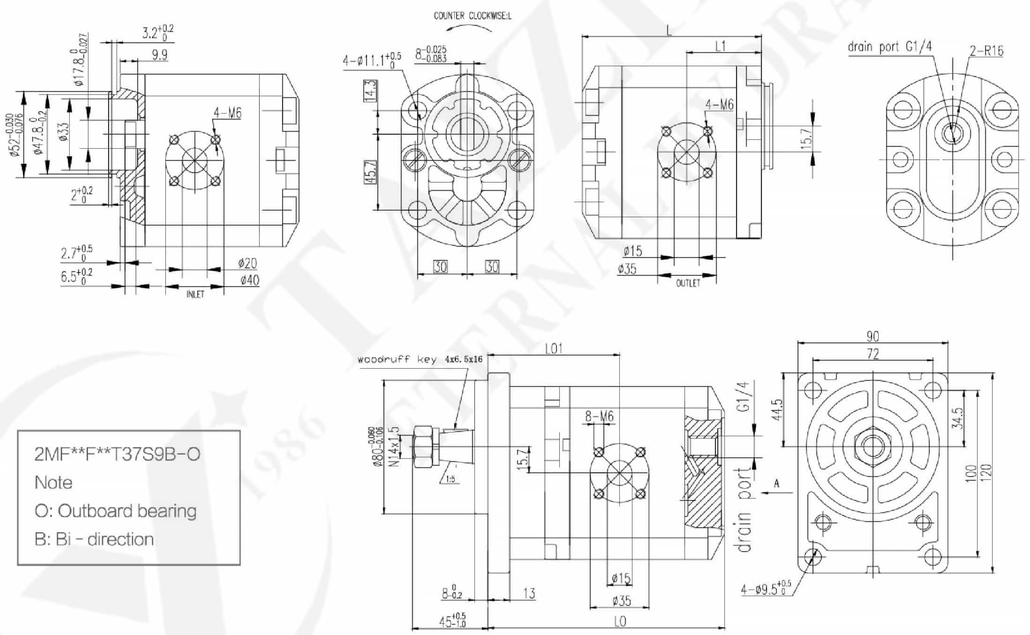


Displacement (ml/r)	52	63	73	85	93	104	115
L1	181	188	194	200	207	213	219
L	207	216	225	235	244	255	264

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



Dimensions



2MF**F**T37S9B-O
Note
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

齿轮泵
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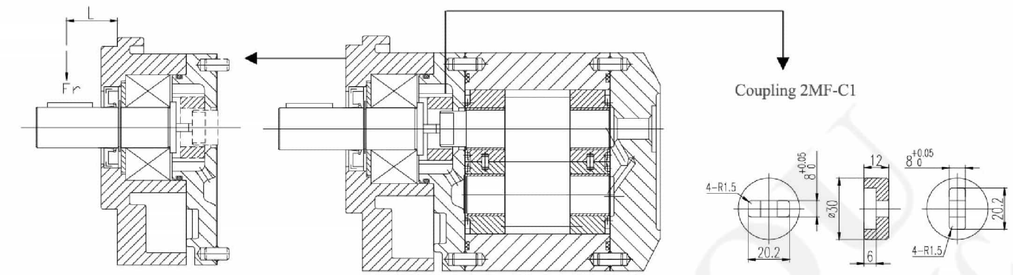
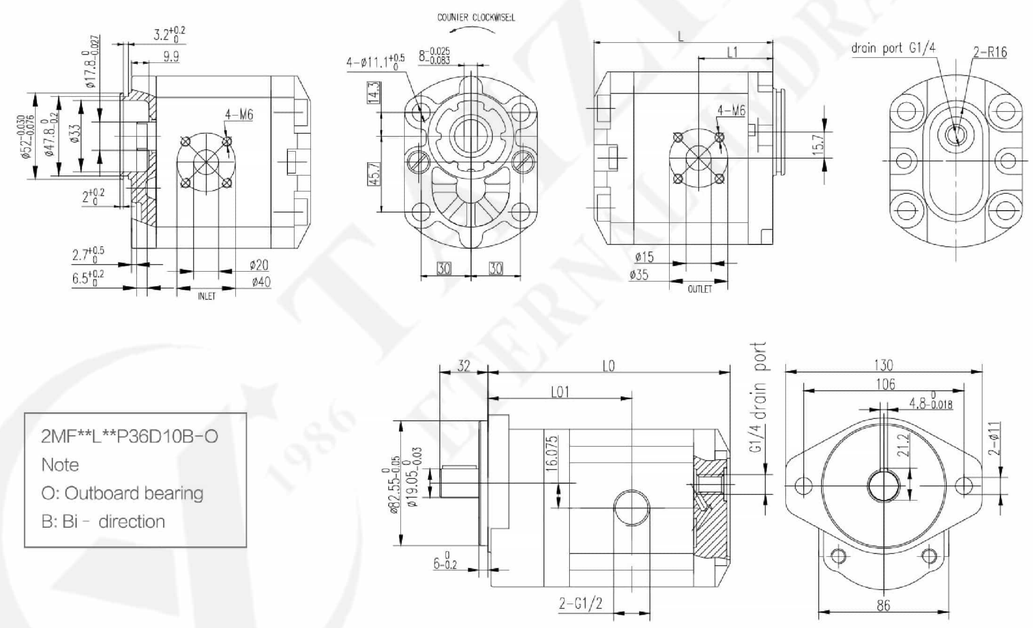
TAIZHOU ETERNAL HYDRAULIC

Outboard Bearing 2MF**L**F63D10B-O



Dimensions

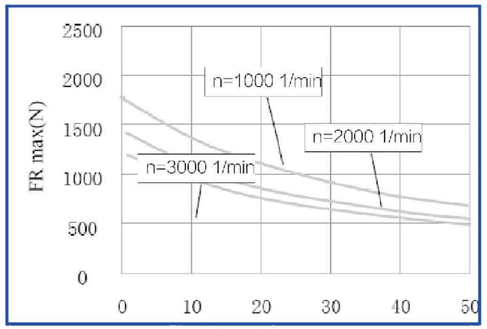


2MF**L**P36D10B-O
Note
O: Outboard bearing
B: Bi - direction

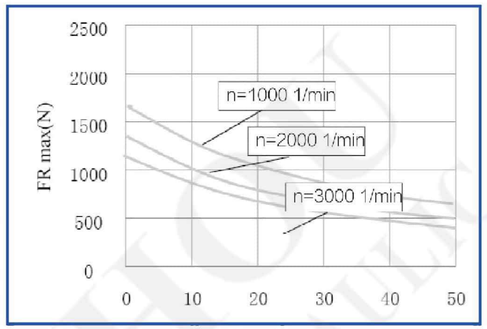
Displacement (ml/r)	4	6	8	10	12	14	16	18	20	23	25
L01	79	80.5	82	84	86	80	88	90	91	94	95
L0	131	134	137	140	144	137	150	153	156	160	163
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

Load of Outboard Bearing

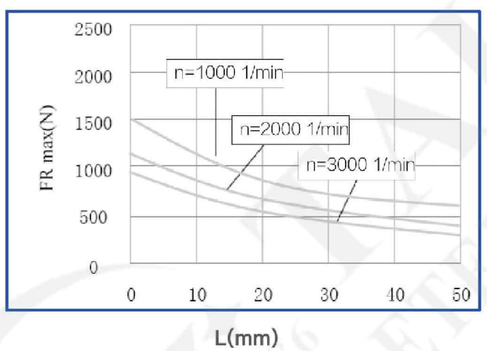
FO=0 N



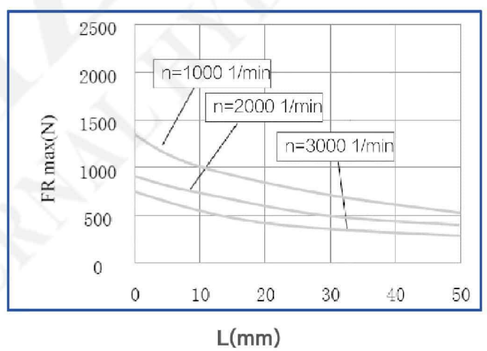
FO=200 N



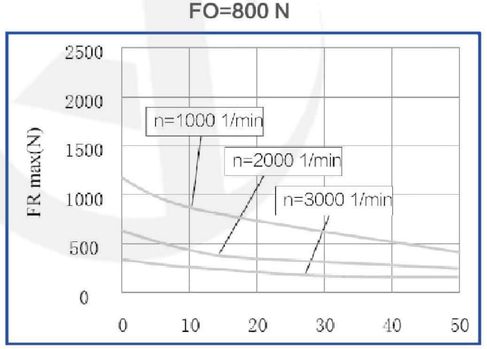
FO=400 N



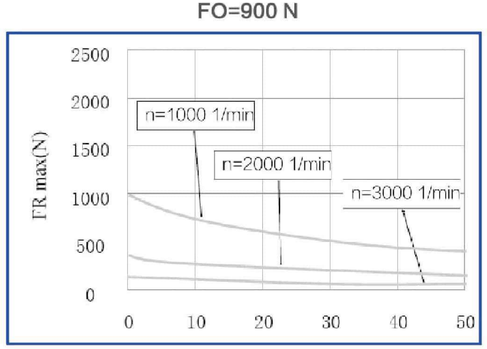
FO=600 N



FO=800 N



FO=900 N



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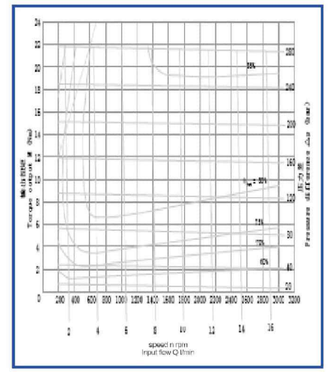
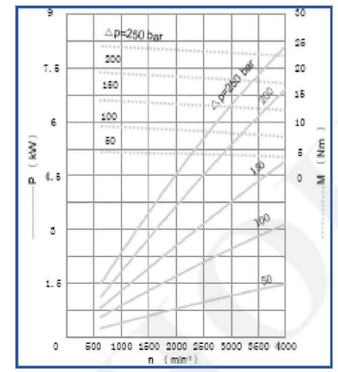
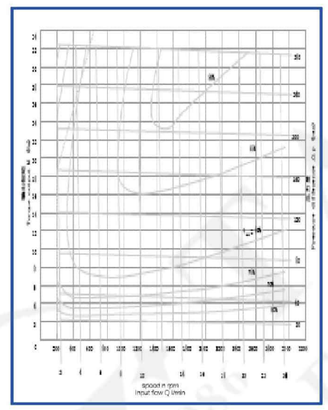
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

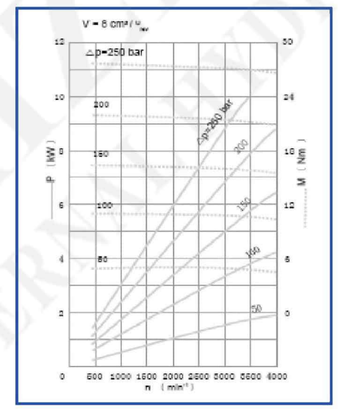
2MF6 Performance Curves



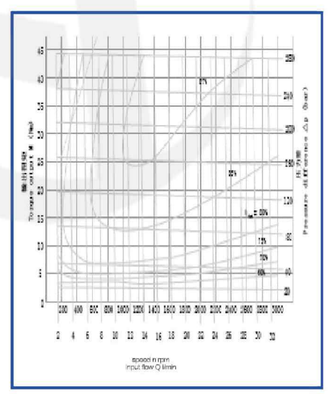


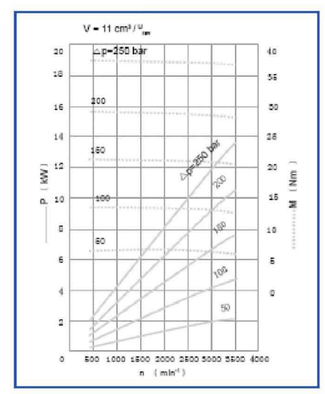
2MF8 Performance Curves





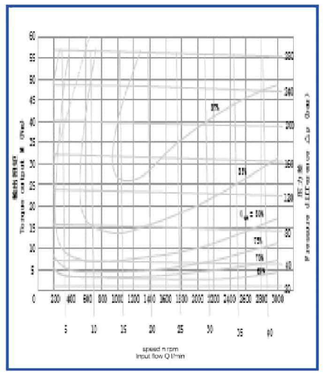
2MF11 Performance Curves

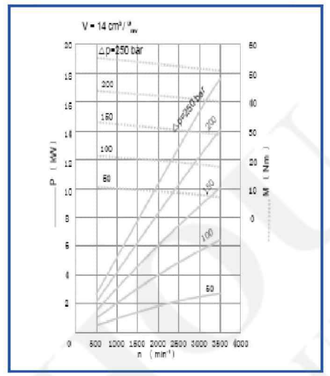




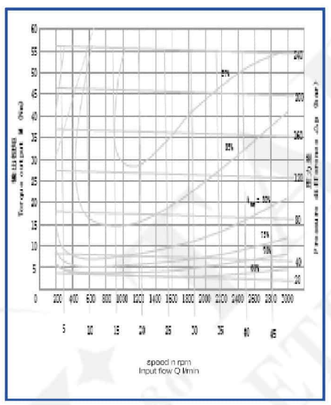
齿轮泵
Gear Motors
TAIZHOU ETERNAL HYDRAULIC

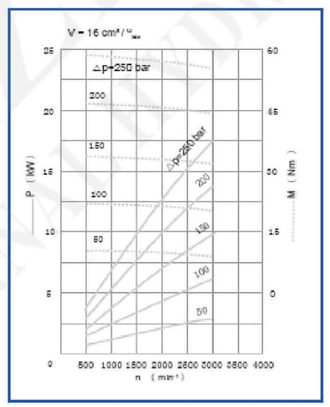
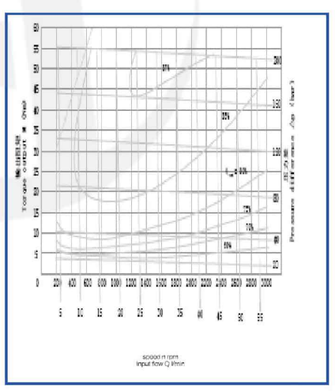
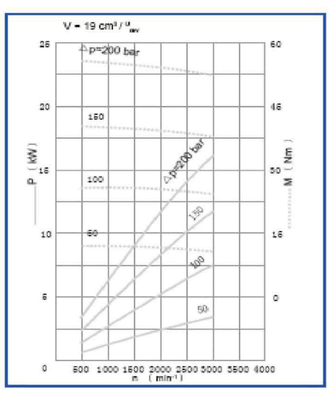
2MF14 Performance Curves





2MF16 Performance Curves





2MF19 Performance Curves