

GRH Category

GEAR MOTORS

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GRH is specialized in providing hydraulic components and solutions for hydraulic systems. With continuous improvement and enthusiasm over the past 30 years, GRH has developed into an emerging power in the fluid power industry since it was established in 1986.

Research and development are the driving force that facilitates GRH's ability to create new products. Standards of TS16949 and ISO14000 are our guiding principles. Employees' capabilities and creativity are major factors that differentiate GRH from our competitors.

GRH designs and produces Hydraulic Gear Pumps & Motors, Monoblock Valves, Sectional Stack Valves, Proportional Valves and Flow Dividers. These products are used on industrial machinery, construction equipment, agricultural equipment and material handling applications. GRH is also willing to work with our customers to develop specialized products for their special needs. Our customers can count on GRH's extensive system design and application experience when they are designing their hydraulic systems. GRH has designed and developed a series of load sensing proportional stackable valves which provides an improvement in valve operating performance and system efficiency.

持续的改进和对液压领域的专注，超过三十年的设计及制造经验，GRH从1986年至今取得了引人注目的成就。产品的研发和技术创新是GRH前进的动力。TS16949和 ISO14000的标准是GRH遵守的程序化准则。员工的能力和创造性是GRH不同于竞争对手的主要因素。

GRH设计并生产：液压齿轮泵/片式多路阀/整体多路阀/比例多路阀（带负载敏感及压力补偿）/液压马达/液压分流马达；这些零部件主要应用于工业机械、物料搬运、工程机械、农业和工业领域。GRH充分意识到客户在设计阶段作出的贡献及其产品设计输入的重要性。除了供应GRH目录上的产品，GRH还与客户密切协作提供液压技术的系统解决方案。客户可以依靠GRH在液压元件及系统设计方面的经验及GRH技术专家去实现他们的设想。GRH已关注到电子控制与液压系统集成的重要性，为了优化设计及节约能源，GRH在系统的电子控制及集成化方面正在做出自己的努力。



Gear Motor 齿轮马达

Introduction of Gear Motor - 齿轮马达简介	1
Characteristic of Gear Motor - 齿轮马达特性	2 - 3
Characteristic Curve of Motor - 齿轮马达特性曲线	4 - 7
Ordering Code - 订单编码	8
1MF/1AMF Bi-direction Gear Motor - 1MF/1AMF双向齿轮马达	9
2MF Bi-direction Gear Motor - 2MF双向齿轮马达	10-11
2MF-B-0 Gear Motor With Outboard Bearing - 2MF-B-0带外支承齿轮马达	12-13
2.5MF/3MF Bi-direction Gear Motor - 2.5MF/3MF 双向齿轮马达	14
3.5MF Bi-direction Gear Motor - 3.5MF双向齿轮马达	15

Flow Divider 齿轮式分流器

Introduction of Flow Divider - 齿轮分流器简介	16
1FDF Flow Divider - 1FDF齿轮式分流器	17
1AFDF Flow Divider - 1AFDF齿轮式分流器	18
2FDF Flow Divider - 2FDF齿轮式分流器	19
3FDF Flow Divider - 3FDF齿轮式分流器	20

Introduction of GRH Gear Motor 齿轮马达简介

Gear motors from GRH 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.

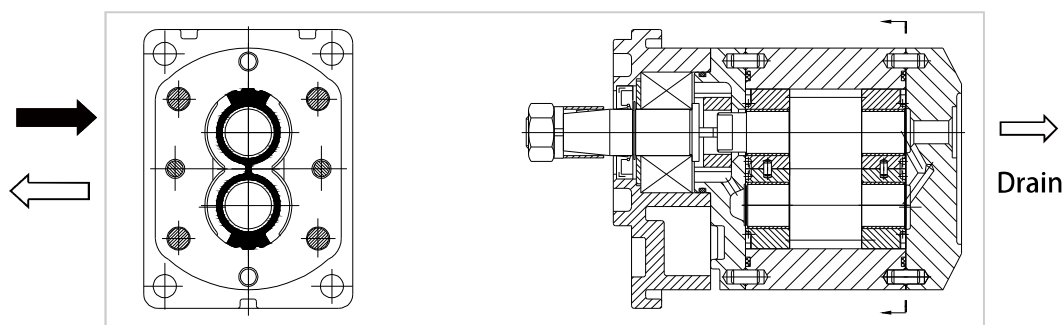
GRH has 5 series of gear motors-group 1、2、2.5、3 and 3.5. They can be divided into two types. One is the single direction gear motor, the other is the bi-direction gear motors. Normally the design of the single direction gear motor is similar to that of the single direction gear pump with some slight design differences. Therefore, all GRH 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 of GRH bi-direction gear motors.

齿轮马达是液压系统中的常用执行元件，它的特点是抗液压系统污染能力强，结构简单，可靠性高。GRH的齿轮马达均具有轴向间隙自动补偿功能，轴套独特的耐磨损配方，提供了长期的使用寿命，精心加工的齿轮保证了在低噪音条件下的使用，冷挤压型材泵体能承受超过30Mpa的压力。可广泛用于工业液压系统、工程机械液压系统、航空航天液压系统、船舶液压系统、海洋工程液压系统。

GRH有五个系列齿轮马达：1组、2组、2.5组、3组、3.5组，按照它的旋转方向，分为两个大类，一个大类是单向齿轮马达，另一个大类是双向齿轮马达，通常单向齿轮马达的结构与单向齿轮泵是类似的，只是在某些方面略有不同，因此，GRH所拥有的齿轮泵都有对应的单向齿轮马达，订货时请参见订单编码。

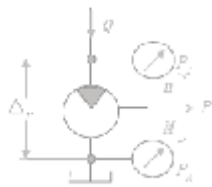
在此我们重点介绍的是双向齿轮马达，双向齿轮马达的密封结构与单向马达不同，如下图所示，对称的密封结构将高低压分开，因而保证了齿轮马达双向工作的可能性，内部泄漏的油液经一个泄油口返回油箱，这个泄油口的压力通常是2~3bar，这意味着轴油封可以承受2~3bar的压力，短时间内可以承受5bar。GRH双向齿轮马达高质量的轴套、轴承、密封件，保证了优异的马达性能。



Specification 性能参数

Series 系列号	Displacement 排量(ml/r)	Pressure 压力(bar)			Speed/转速 (r/min)		Total Efficiency 总体效率 (T>%)	Volumetric Efficiency 容积效率 (V>%)	Mechanical Efficiency 机械效率 (M>%)	Output Torque 输出扭矩 (N.m)
		P1 Rated 额定	P2 Intermittent 间断	P3 Peak 峰值	MAX 最高	Min 最低				
1MF/1AMF	1.1 to 5.1	200	230	250	4000	650	78	92	85	Refer to Below Formula 参考以下公式
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				

Formula 马达计算公式



$$Q = V \cdot n \cdot 10^3 / \eta_v$$

$$M = P \cdot V \cdot \eta_m / 62.83$$

$$P = P_1 \cdot V \cdot n \cdot \eta_t / 600 \cdot 1000$$

$$V [\text{cm}^3/\text{r}] \quad Q [\text{l}/\text{min}] \quad p [\text{bar}] \quad n [\text{r}/\text{min}] \quad P [\text{kW}] \quad M [\text{Nm}]$$

Characteristics 使用特性

Direction of rotation: bi-direction and single-direction 旋转方向: 双向和单向

Permissible ambient temperature range: min = -20 °C - max = + 60 °C 环境温度: min = -20 °C - max = + 60 °C

Operating pressures: input side P1 max = refer above data; outlet side P2 max = 3 bar 操作压力: 进油参考以上; 出油 P2 max = 3 bar

Drain pressure: pd max = 2 bar, Short time: pd max = 5 bar 泄油口压力: pd max = 2 bar 短时间: pd max = 5 bar

Fluid temperature range: max = 90 °C for NBR rotary shaft lip-type seal, 100 °C for FKM rotary shaft lip-type seal 液体温度范围: 90 °C 相对于丁腈橡胶轴油封, 100 °C 相对于氟橡胶轴油封

Viscosity range: min = 10 mm²/s - max = 600 mm²/s 粘度范围: min = 10 mm²/s - max = 600 mm²/s

Filtration 过滤:

Recommended: Viscosity range: V = 30...45 mm²/s 推荐粘度范围: V = 30...45 mm²/s

Recommended hydraulic fluids use: GB11118-94: L-HM46 or equate NFE-603/DIN51524 II-85 推荐液体: GB11118-94: L-HM46 or equate NFE-603/DIN51524 II-85

Characteristic curves refer to pages: page 4 to 7 特性曲线参考页: 4到7页

Characteristics 使用特性

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

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

所有马达均可以集成溢流阀，比例阀，速度调节阀。

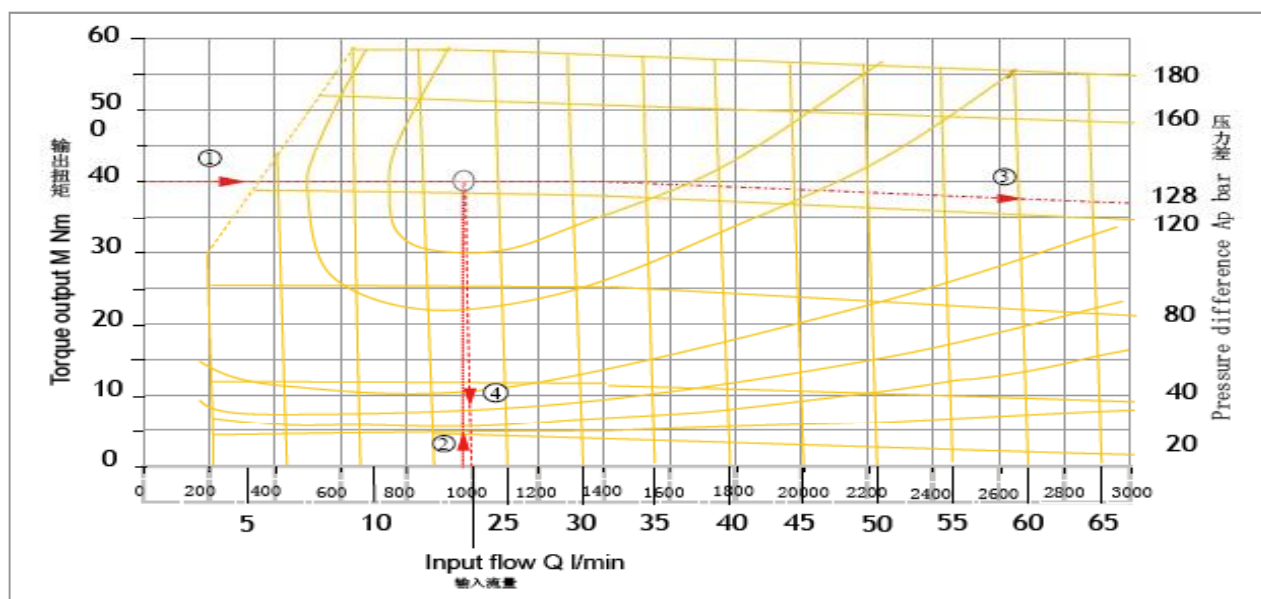
Guidance for Use of the Curves 曲线使用指南

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

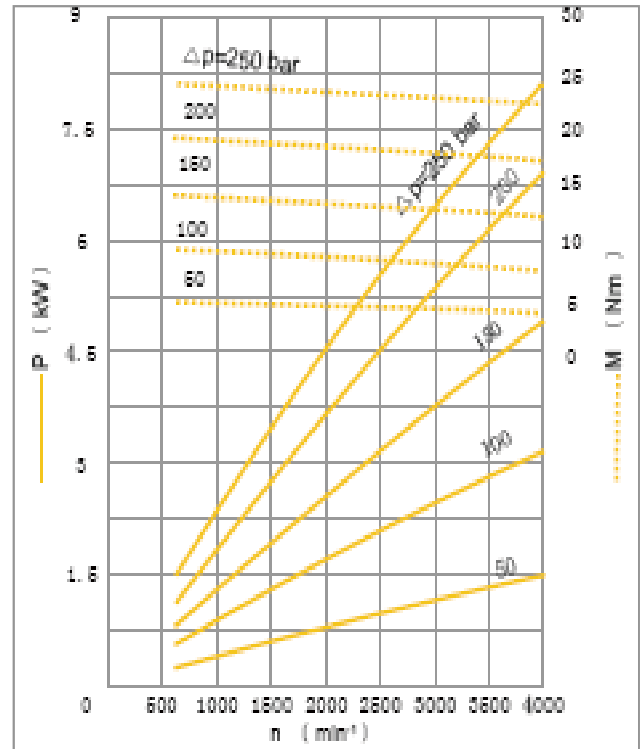
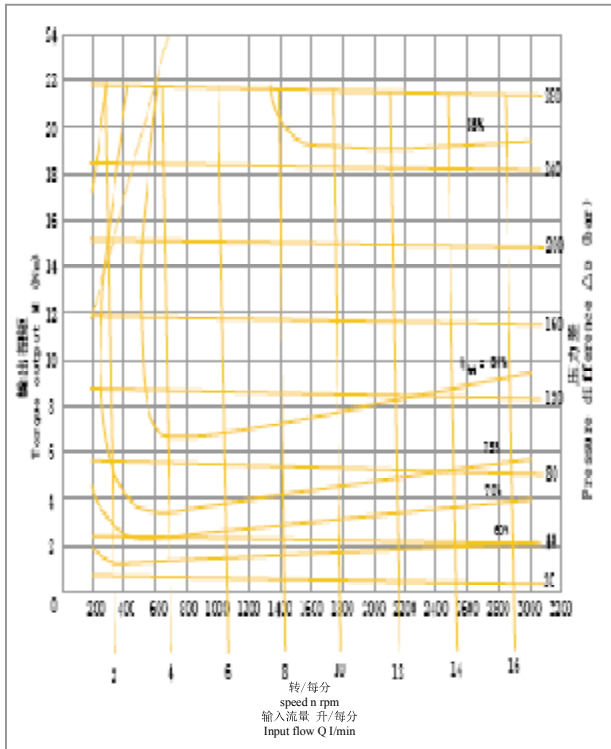
Input flow ; example: ①M = 40 Nm ; ②n = 1000 RPM ; the intersection of ① and ② is the motor operating point with: $\Delta p = 123 \text{ bar}$ ③Q = 21.3 l/min ④

大多数应用场合,已知要得到的马达转速和相应输出扭矩M, 求压力差 Δp 和要求的输入流量Q

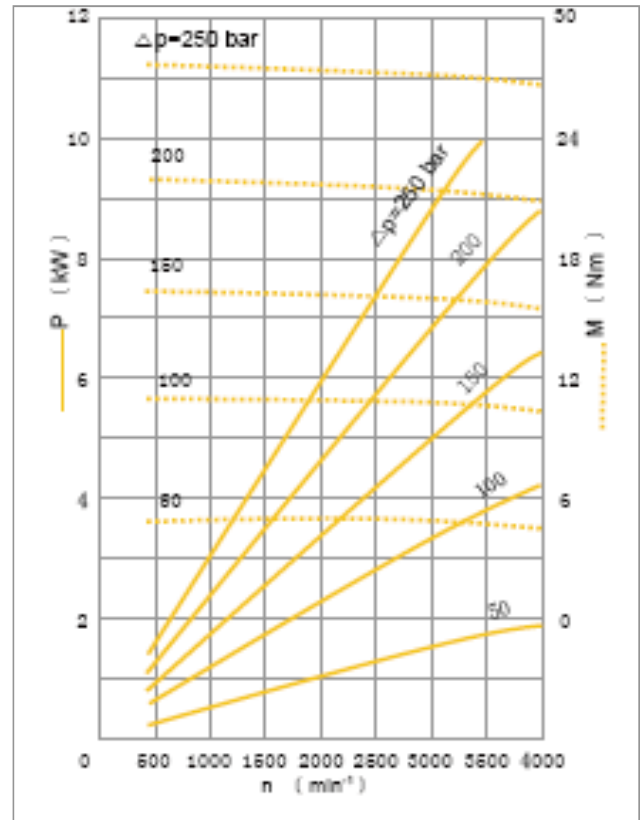
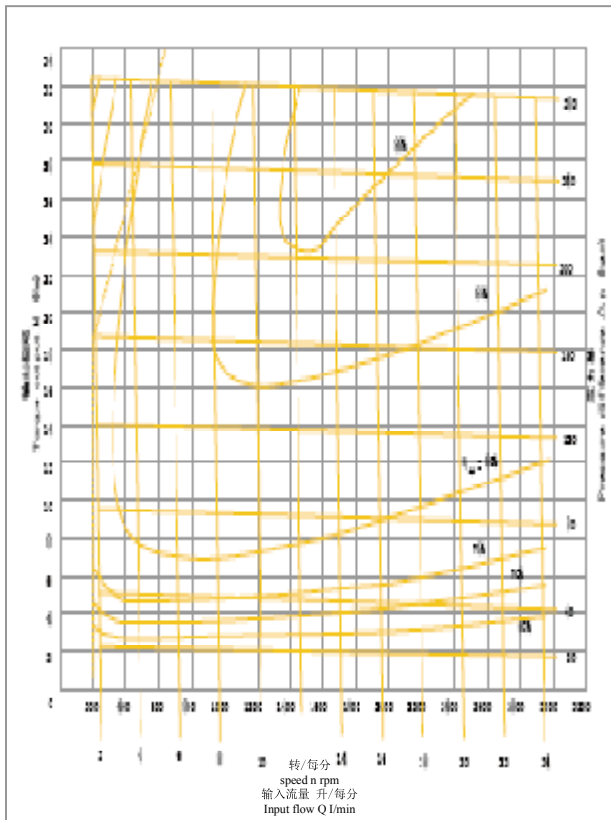
举例: 已知 ①M = 40 Nm ; ②n = 1000 RPM ; ①和②的交点O是马达运行点: $\Delta p = 123 \text{ bar}$ ③Q = 21.3 l/min④



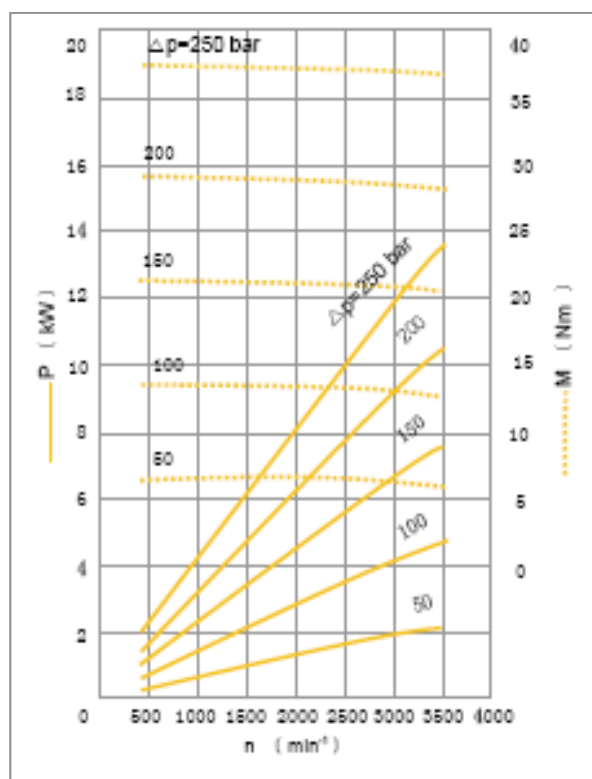
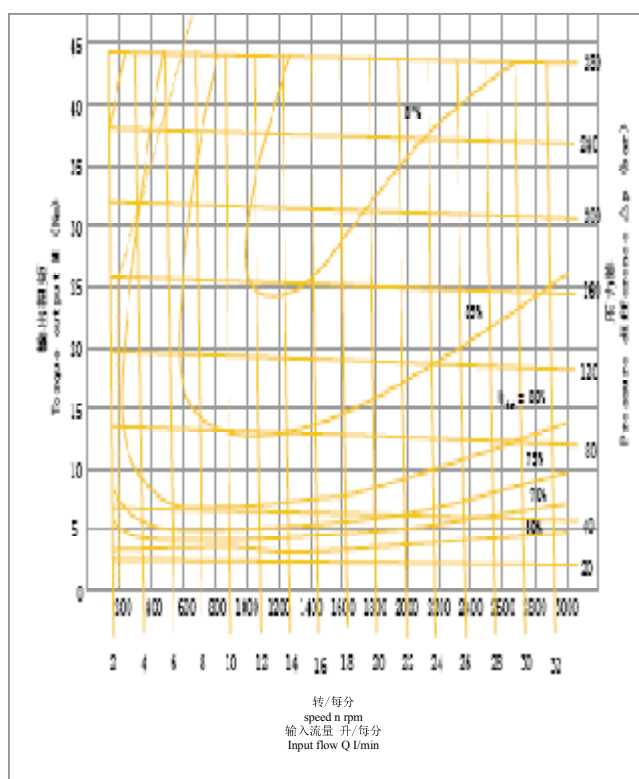
2MF6 Performance Curve 2MF6性能曲线



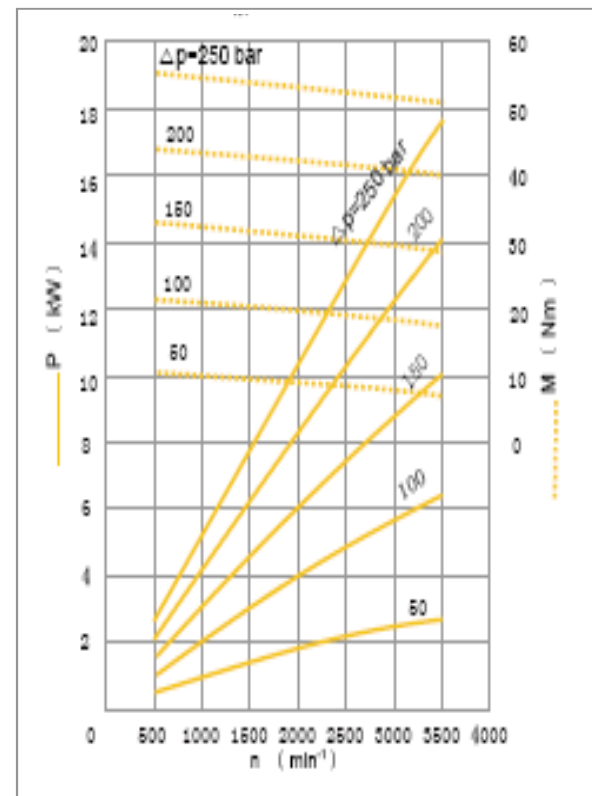
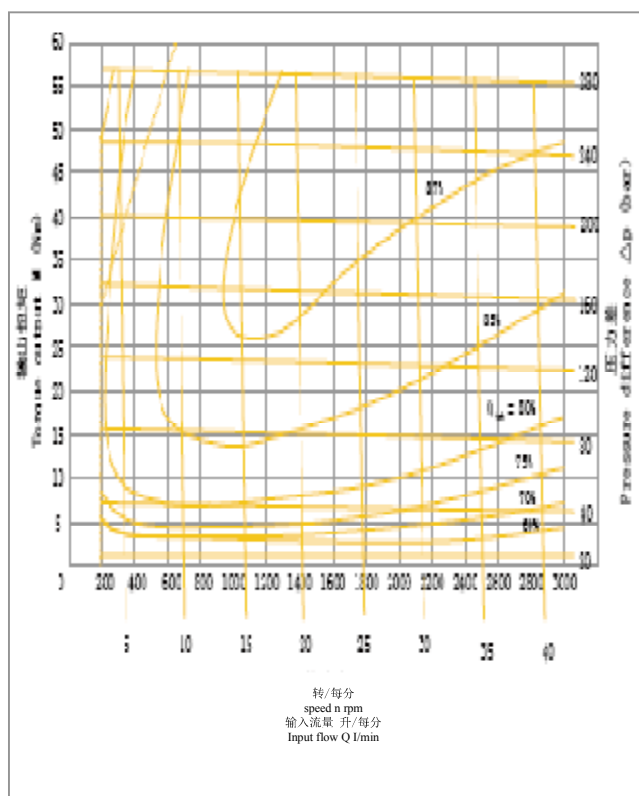
2MF8 Performance Curve 2MF8性能曲线



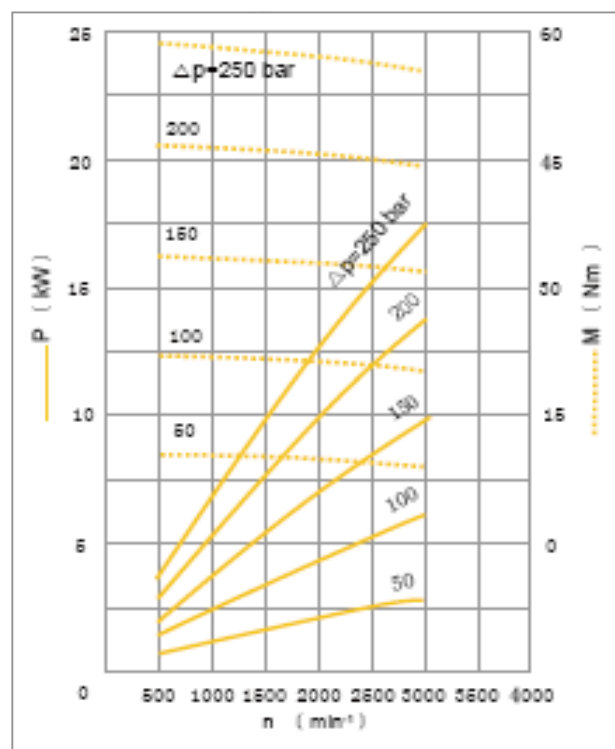
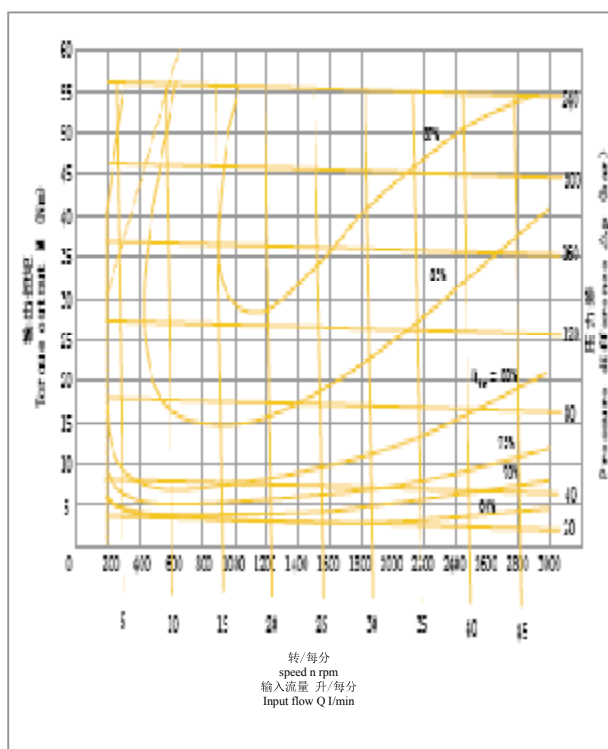
2MF11 Performance Curve 2MF11性能曲线



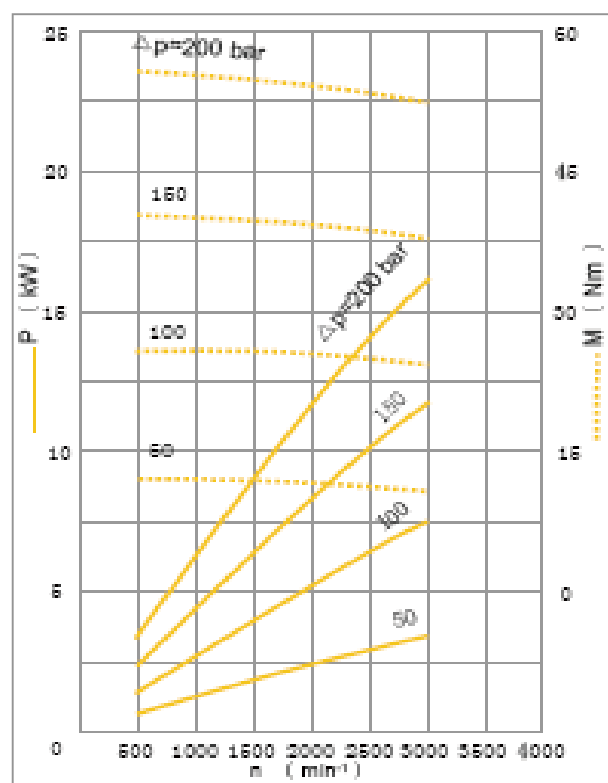
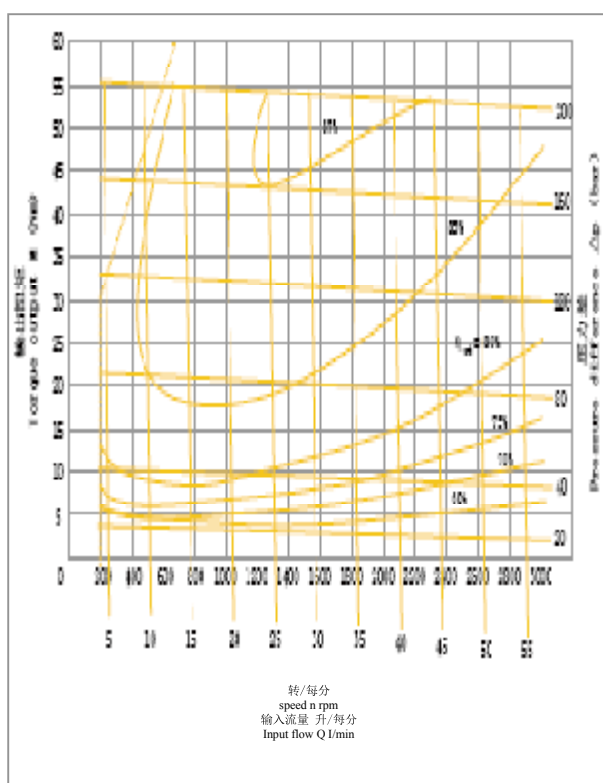
2MF14 Performance Curve 2MF14性能曲线



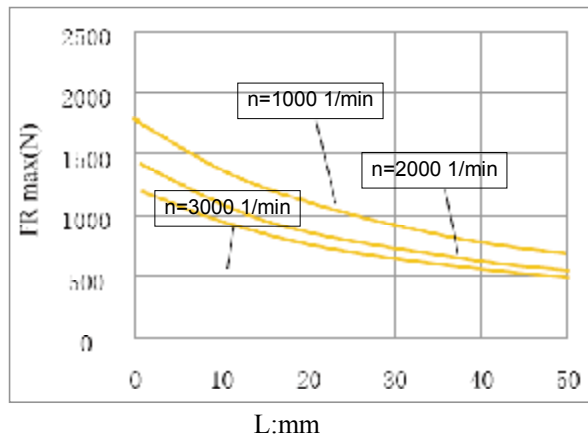
2MF16 Performance Curve 2MF16性能曲线



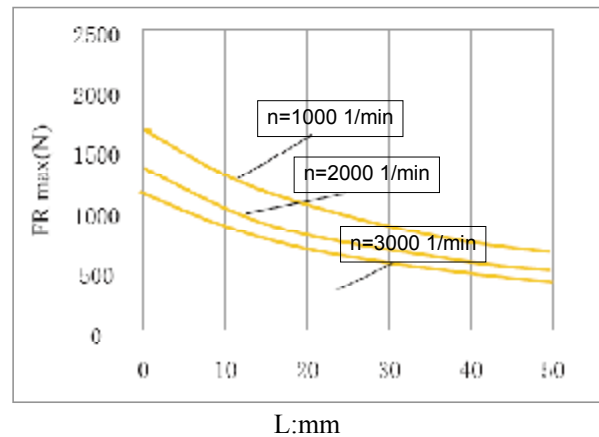
2MF19 Performance Curve 2MF19性能曲线



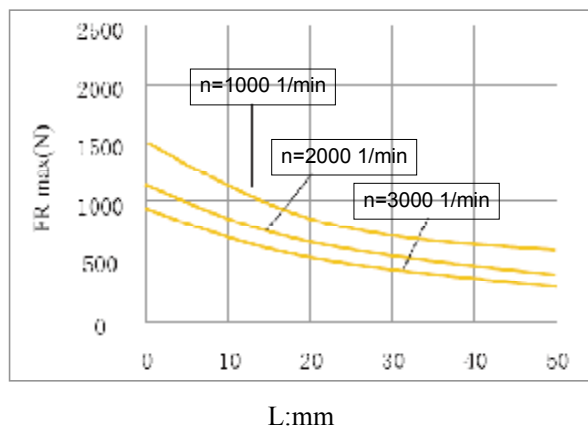
FO=0 N



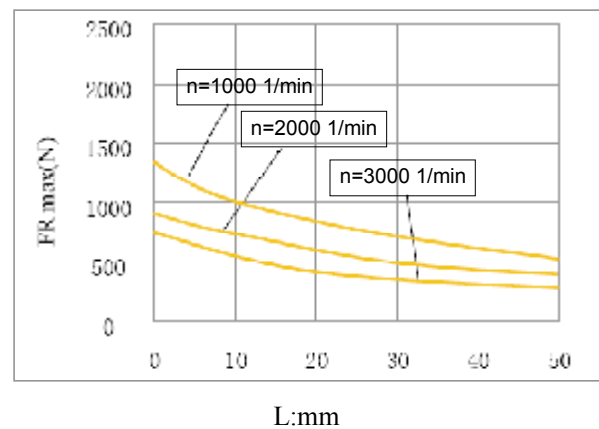
FO=200 N



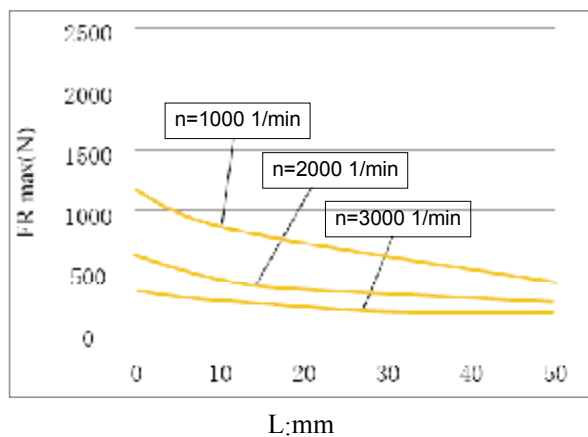
FO=400 N



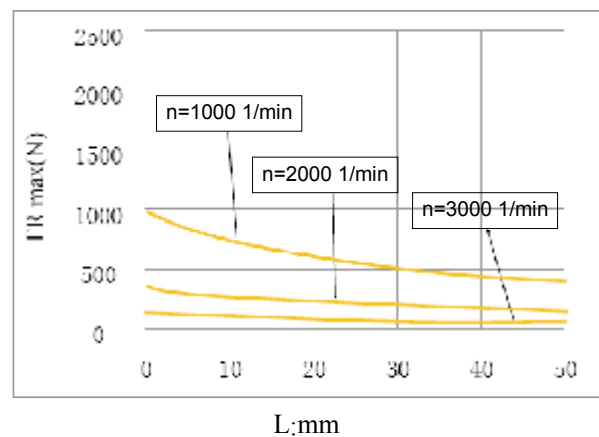
FO=600 N



FO=800 N



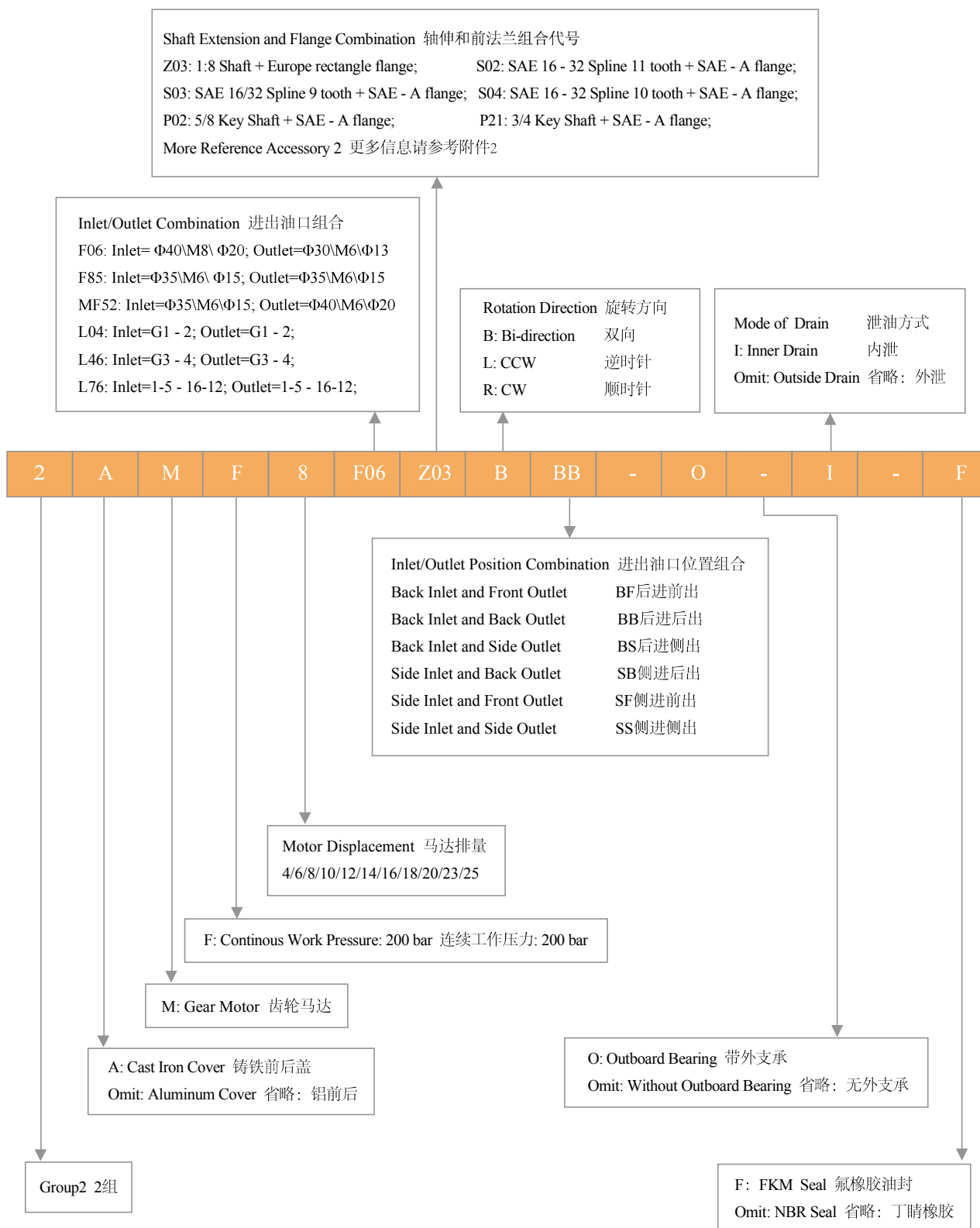
FO=900 N



2MF Bi-direction Gear Motor 双向齿轮马达



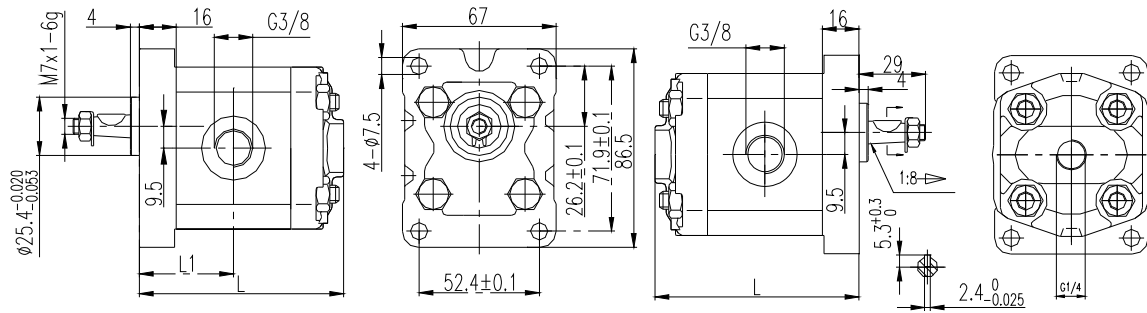
Ordering Code 订单编码



1MF/1AMF Bi-direction Gear Motor 双向齿轮马达

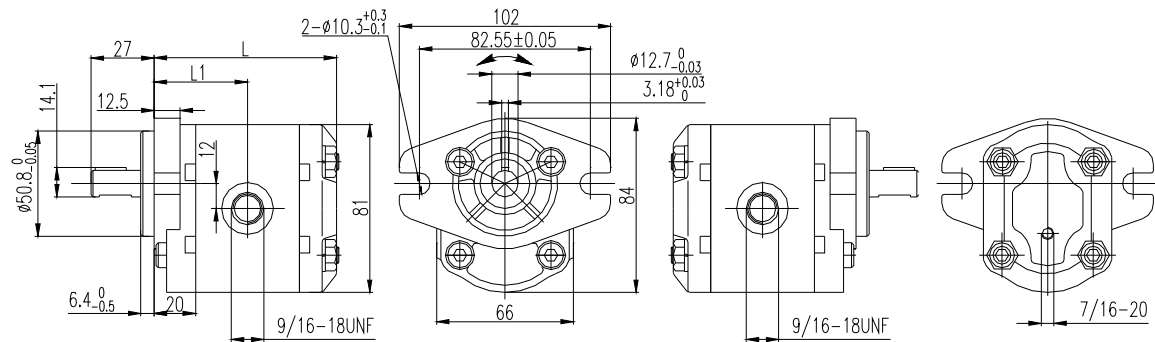


1MF**L69Z02BB



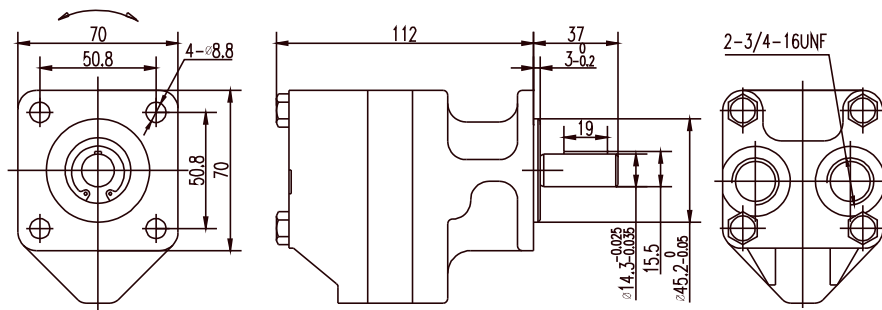
Displacement 排量(ml/r)	1.1	1.6	2.1	2.7	3.2	3.7	4.2	4.8	5.8	6.5	8.0
L1	33	35	36	37	38	39	40	41	43	44	47
L	75	78	79	81	83	85	87	89	93	95	101

1AMF**L**P01BB



Displacement 排量(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

1DMF6.1LJ86P68B-BB

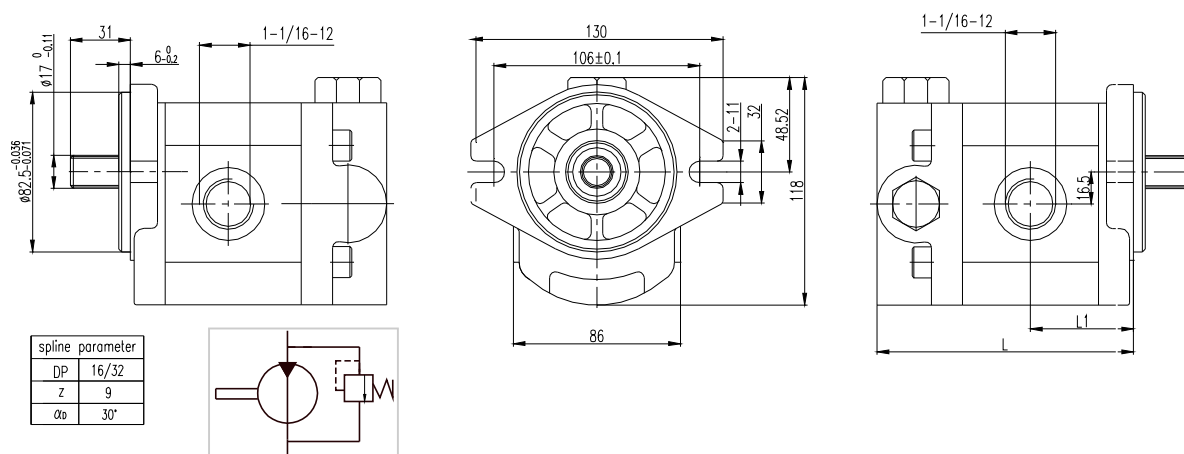


Displacement 排量(ml/r)	Working Pressure 工作压力(bar)	Max Speed 最高转速(rpm)	Torque 扭矩(N. m)	Direction 方向
6.2	70	5000	5.78	Bi-direction

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

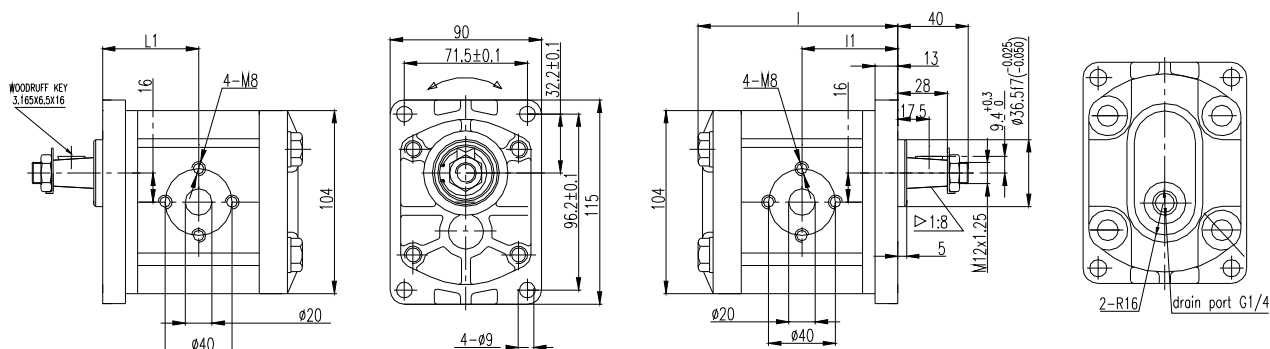
2MF**F**Z11-R-V

这个马达带有溢流阀，溢流阀压力为马达进油腔的最高工作压力。机能符号如下图：

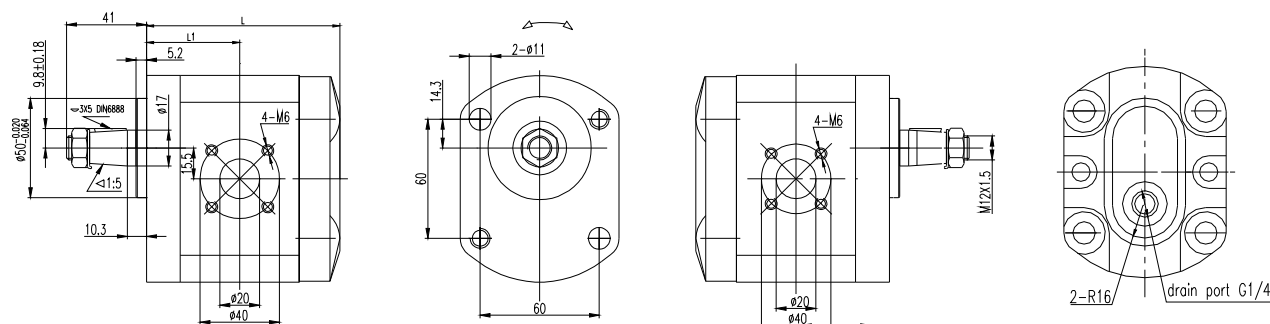


2MF Bi-direction Gear Motor 双向齿轮马达

Technical drawing of the 3000 series ball valve, showing four views: front, top, side, and end view. The drawing includes dimensions for various parts, such as G1/2, 130, 106, 114, 33, 80, 86, 105, 16.5, 1.1, 32, 6.3, 14, 4.8x4.8x22, 19.05, 0.003, 2-R16, and drain port G1/4.

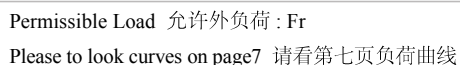
2MF**F**Z03B

2MF**F**Z11B



2MF BI-direction Gear Motor 双向齿轮马达

Outboard Bearing 外支承 2MF**F**Z**B-O



Note 注解

O: Outboard bearing 外支承

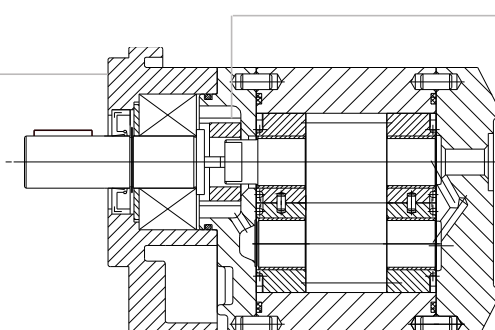
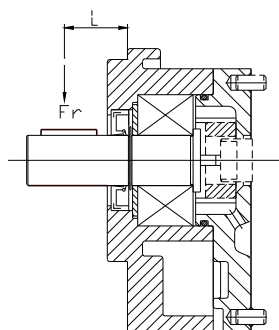
B: Bi-direction 双向

Displacement 排量(ml/r)	4	6	8	10	12	14	16	18	20	23	25
LO1	73	74	75	77	79	80	82	83	86	89	92
LO	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

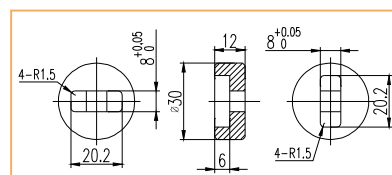
2MF-B-O Gear Motor With Outboard Bearing 带外支承齿轮马达



Outboard Bearing 外支承 2MF**L**P21B-O



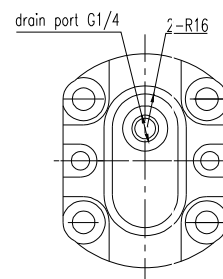
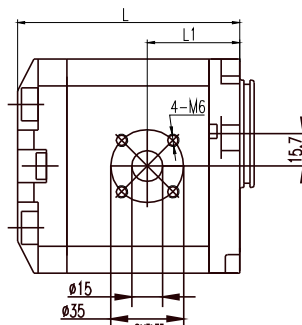
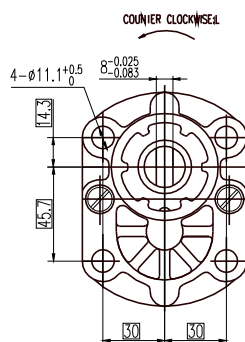
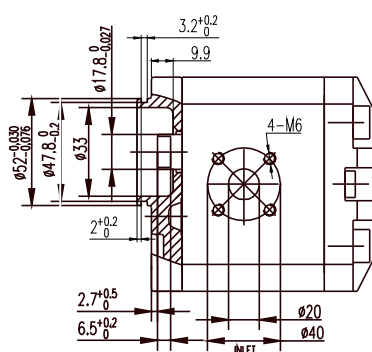
Coupling 联轴结 2MF-C1



Permissible Load 允许外负荷: Fr

Please to look curves on page7 请看第七页负荷曲线

2MF**F**B11B

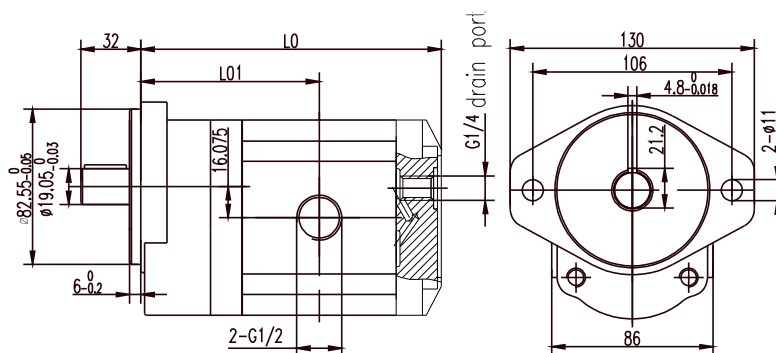


2MF**L**P21B-O

Note 注解:

O: Outboard bearing 外支承

B: Bi- direction 双向

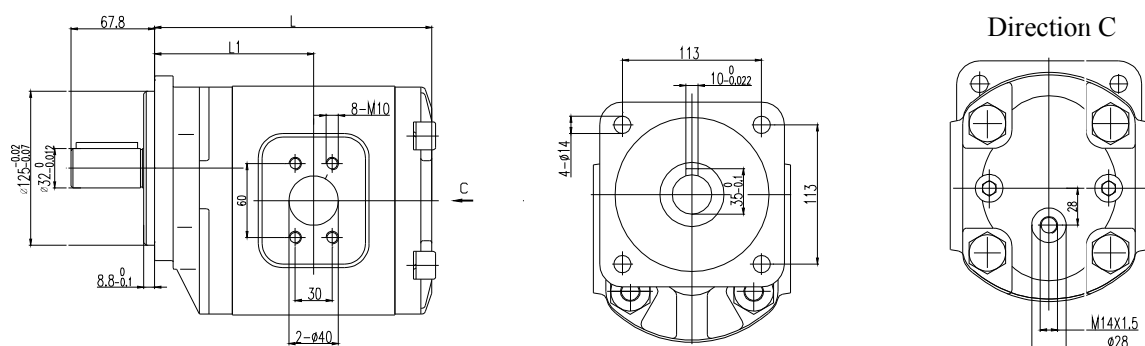


Displacement 排量(ml/r)	4	6	8	10	12	14	16	18	20	23	25
LO1	79	80.5	82	84	86	80	88	90	91	94	95
LO	131	134	137	140	144	137	150	153	156	160	163
L1	39	40	41	43	44	46	48	49	51	54	57
L	90	91	94	96.5	98.5	103.5	107	111	116	118	120

3.5MF Bi-direction Gear Motor 双向齿轮马达

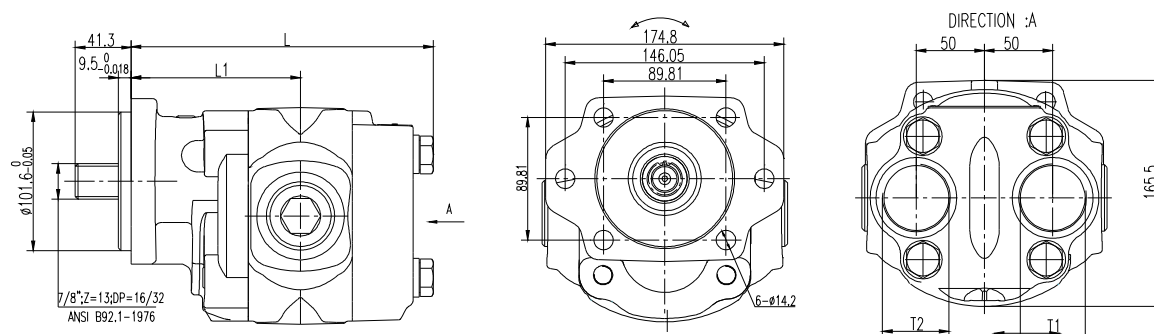


3.5BMF**F108P64B



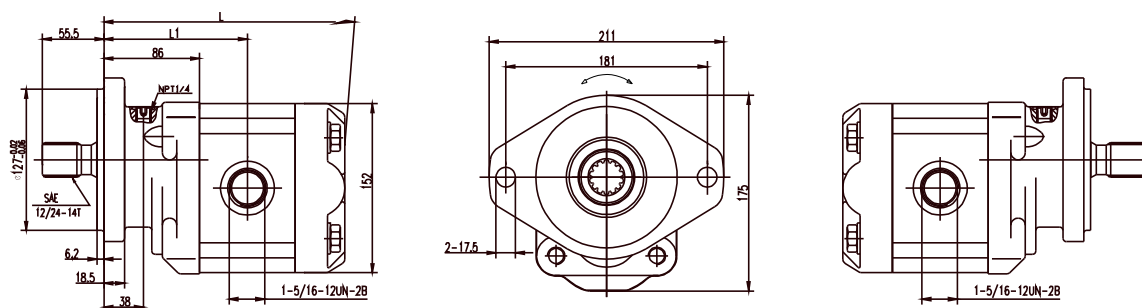
Displacement 排量(ml/r)	63	80	100
L1	119	125	132
L	215	221	228

3.5MF**L**S12B



Displacement 排量(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**S34B



Displacement 排量(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