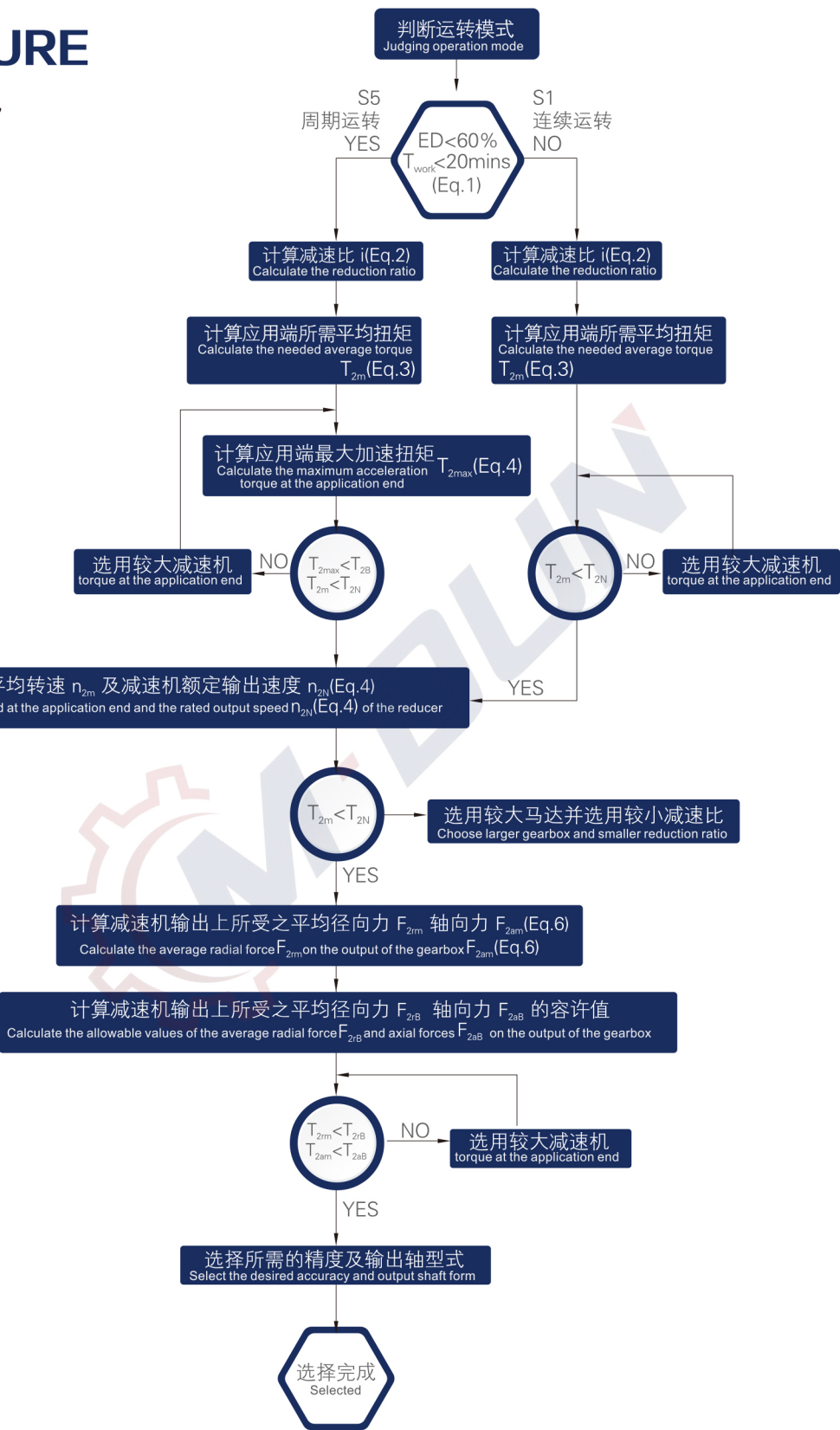


INTERNAL
STRUCTURE

如何选用减速机
Installation and usage



S5 周期运转之建议事项
一般的应用惯量须符合以下公式:

最适当的应用惯量须符合以下公式:

$\frac{J_L}{i^2} \leq 4 \times J_m$

$\frac{J_L}{i^2} \cong J_m$

J_L: 负载惯量 J_m: 马达惯量

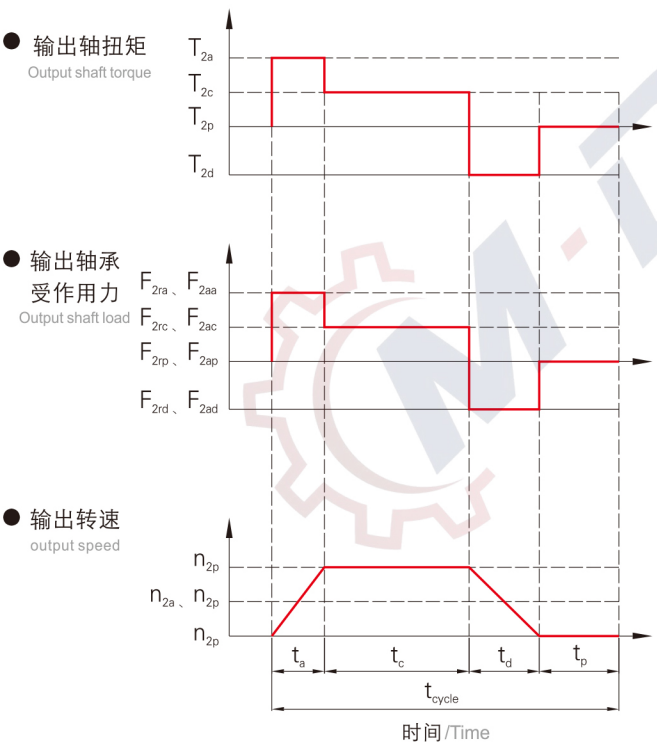
S5 suggestions for cycle operation
General application inertia must conform to the following formula

The most appropriate application inertia must conform to the following formula

$\frac{J_L}{i^2} \leq 4 \times J_m$

$\frac{J_L}{i^2} \cong J_m$

J_L: Load inertia J_m: Motor inertia



1 $ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%$, $t_{work} = t_a + t_c + t_d$

下标说明 Subscript description:
a. 加速, c. 等速, d. 减速, p. 停止
a. accelerate, c. constant, d. decelerate, p. stop

(Eq.1)

2 $i \cong \frac{n_m}{n_{work}}$

n_m: 马达输出速度 n_{work}: 实际应用速度
n_m: Motor output speed n_{work}: Actual application speed

(Eq.2)

3 $T_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

(Eq.3)

4 $T_{2max} = T_{mB} \times i \times k_s \times \eta$

Ks	Ks	周期次数 / 小时
负载系数	1.0	0~1000
	1.1	1000~1500
	1.3	1500~2000
	1.6	2000~3000
	1.8	3000~5000

T_{mB} 马达最大输出扭矩 Motor maximum output torque
η 减速机运转效率 Gearbox operating efficiency

(Eq.4)

5 $n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$

$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{T_a + t_c + t_d}$

$n_{2N} = \frac{n_{1N}}{i}$

(Eq.5)

6 $F_{2rm} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2ra}^3 + n_{2c} \times t_c \times F_{2rc}^3 + n_{2d} \times t_d \times F_{2rd}^3}{N_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

$F_{2am} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

(Eq.6)

★ 行星减速机-工艺优势/planetary gearbox-technology advantage

零背隙傳動

輸入軸夾緊套創新設計，經動平衡測試，確保同軸度和零背隙傳動

Innovative design of input shaft clamping sleeve, through dynamic balance test, ensure the coaxiality and zero backlash drive

HRC62硬度

輪採用低碳合金鋼、經正火熱處理,再滲碳淬將齒輪的表面硬度達到HRC62

The gear is made of low carbon alloy steel, and then carburized to quench the surface hardness of the gear achieve HRC62

嚙合率高

減速機構採用螺旋齒輪設計，其齒形嚙合率為一般正齒輪的二倍以上

The gear reducer is designed with helical gear, and its tooth meshing rate is two of the general spur gear more than double

IP65防護

使用全合成油脂，防護等級達到國際標準IP65，防塵防水，潤滑油不泄露免維護

All synthetic grease is used, the protection grade reaches international standard IP65, dustproof and waterproof, the lubricating oil is non-leak and maintenance free

高結構剛性

齒輪的傳動介面採用不含保持架器之滿針滾針軸承，增加接觸面積以提高結構剛性及輸出扭矩

The transmission interface of the gear adopts full needle roller bearing without retainers to increase the contact area to improve the rigidity of the structure and output torque

一體式結構

臂架與輸出軸採用一體式的結構設計，確保最大的扭轉剛性

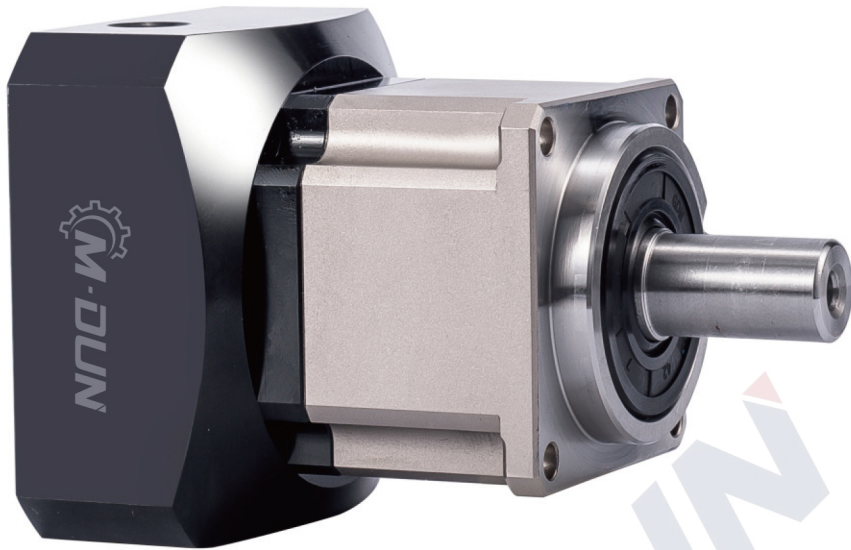
The boom and output shaft are integrated to ensure maximum torsional rigidity



MAB Series planetary gearbox 系列行星减速机

PRODUCT FEATURES
产品特点

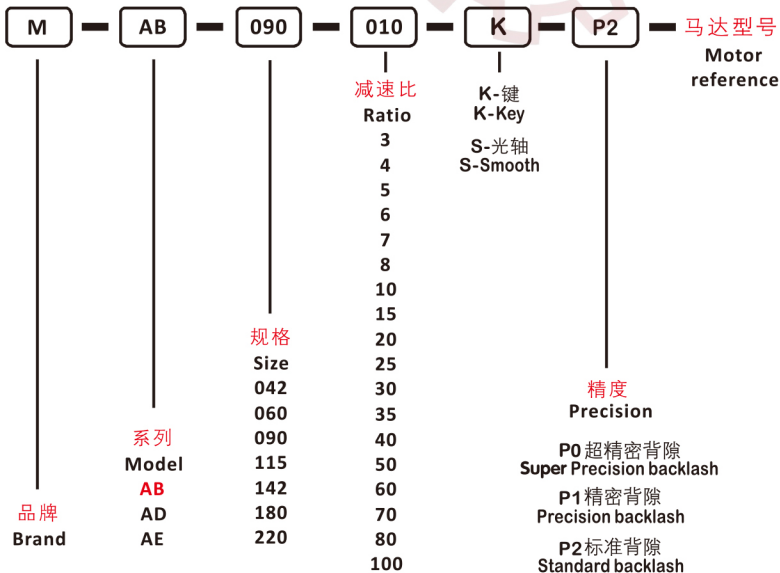
- ☆ 行星臂架与输出轴采用一体式结构设计，确保最大的扭转刚性。
- ☆ 行星轮采用满滚针设计，增加接触面积以提高结构刚性与输出扭矩。
- ☆ 齿轮采用低碳钢表面渗碳淬火到HRC62，以获得最佳的耐磨及冲击韧性。
- ☆ 齿形引用国外进口软件辅助设计，以获得最佳的齿形降低噪音。
- ☆ 输入端与马达轴连接采用双边抱紧方式，以获取最大的夹紧力和零背隙的动力传递。
- ☆ Planetary boom and output shaft are integrated structure designed to ensure maximum torsional rigidity.
- ☆ Planetary wheel with full needle design, increase the contact area to improve the rigidity and output torque.
- ☆ The gears are carburized and quenched to the HRC62 with low carbon steel surface for optimum wear and impact toughness.
- ☆ Gears refer to foreign imported software-assisted design to obtain the best tooth shape to reduce noise.
- ☆ The input terminal is connected to the motor shaft in a double-tight manner to obtain the maximum clamping force and zero backlash power transmission.



INDICATION FOR MODEL

SELECTION

机种型号表示



GENERAL NOTICES

订货须知

- 机种、型号、扭矩
- 减速比或出力轴转速
- 工况及连接方式
- 数量及安装的机械名称
- 入力方式和入力转速
- 马达厂牌型号或法兰及马达轴尺寸
- Type, model and torque
- Ratio or output speed
- Working conditions and connection methods
- Quantity and installed machine name
- Input mode and input speed
- Motor brand model or flange and motor shaft size

PLANETARY GEARBOX

减速机性能资料 /Performance

规格 Specification	单位 Unit	节数 Stage	减速比 Ratio	MAB042	MAB060	MAB090	MAB115	MAB142	MAB180	MAB220
额定出力矩 Rated output torque T_{2N}	Nm	1	3	20	55	130	208	342	588	1140
			4	19	50	140	290	542	1050	1700
			5	22	60	160	330	650	1200	2000
			6	20	55	150	310	600	1100	1900
			7	19	50	140	300	550	1100	1800
			8	17	45	120	260	500	1000	1600
			10	14	40	100	230	450	900	1500
			15	20	55	130	208	342	588	1140
			20	19	50	140	290	542	1050	1700
		2	25	22	60	160	330	650	1200	2000
			30	20	55	150	310	600	1100	1900
			35	19	50	140	300	550	1100	1800
			40	17	45	120	260	500	1000	1600
			50	22	60	160	330	650	1200	2000
			60	20	55	150	310	600	1100	1900
			70	19	50	140	300	550	1100	1800
			80	17	45	120	260	500	1000	1600
			100	14	40	100	230	450	900	1500
急停扭矩 /Emergency stop torque T_{2NOT}	Nm	1,2	3 ~ 100	三倍额定出力矩 /Triple rated output torque						
额定输入转速 /Rated input speed n_{1N}	rpm	1,2	3 ~ 100	5000	5000	4000	4000	3000	3000	2000
最大输入转速 /Maximum iutput speed n_{1B}	rpm	1,2	3 ~ 100	10000	10000	8000	8000	6000	6000	4000
超精密背隙 /Super precision backlash P_0	arcmin	1	3 ~ 10	≤1	≤1	≤1	≤1	≤1	≤1	≤1
		2	15 ~ 100	≤3	≤3	≤3	≤3	≤3	≤3	≤3
精密背隙 /Precision backlash P_1	arcmin	1	3 ~ 10	≤3	≤3	≤3	≤3	≤3	≤3	≤3
		2	15 ~ 100	≤5	≤5	≤5	≤5	≤5	≤5	≤5
标准背隙 /Standard backlash P_2	arcmin	1	3 ~ 10	≤5	≤5	≤5	≤5	≤5	≤5	≤5
		2	15 ~ 100	≤8	≤8	≤8	≤8	≤8	≤8	≤8
扭转刚性 /Torsional rigidity	Nm/arcmin	1,2	3 ~ 100	3	7	14	25	50	145	225
容许径向力 /Allowable radial force F_{2aB}	N	1,2	3 ~ 100	780	1530	3250	6700	9400	14500	50000
容许轴向力 /Allowable axial force F_{2aB}	N	1,2	3 ~ 100	390	765	1625	3350	4700	7250	25000
使用寿命 /Lifespan	hr	1,2	3 ~ 100	20000						
效率 /Efficiency	%	1	3 ~ 10	≥97%						
		2	15 ~ 100	≥94%						
重量 /Weight	kg	1	3 ~ 10	0.6	1.3	3.7	7.8	14.5	29	48
		2	15 ~ 100	0.8	1.5	4.1	9	17.5	33	60
使用温度 /Working temperature	℃	1,2	3 ~ 100	-10℃ ~ 90℃						
润滑 /Lubricating		1,2	合成润滑油脂 /Synthetic lubricating grease							
防护等级 /IP Grade		1,2	3 ~ 100	IP65						
安装方向 /Installation direction		1,2	3 ~ 100	任意方向 /In any direction						
噪音值 (n1=3000rpm, 无负载) Noise level (n1=3000rpm, off load)	dB(A)	1,2	3 ~ 100	≤56	≤58	≤60	≤63	≤65	≤67	≤70

ROTATIONAL INERTIA OF REDUCER

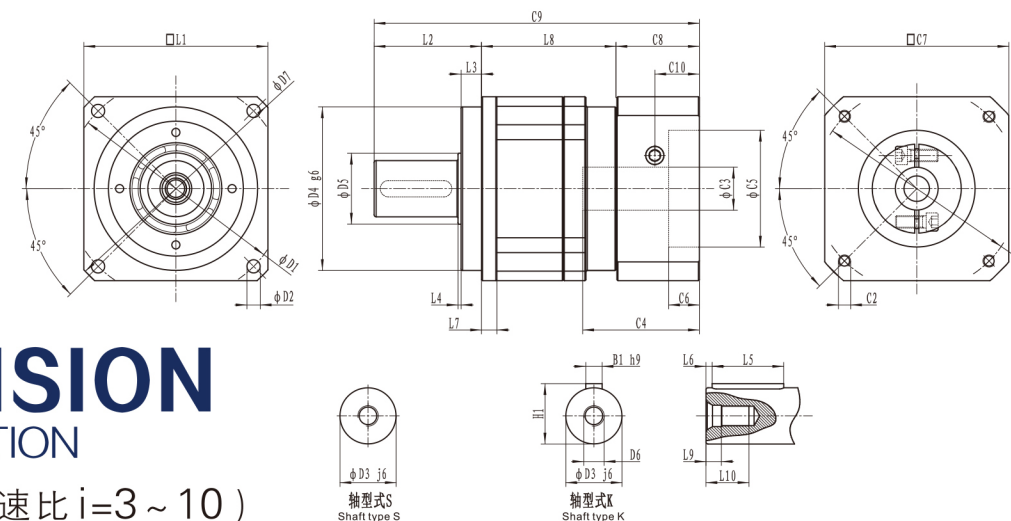
● 减速机转动惯量

规格 Specification	单位 Unit	节数 Stage	减速比 Ratio	MAB042	MAB060	MAB090	MAB115	MAB142	MAB180	MAB220
转动惯量J1 Rotational inertia J1	kg · cm²	1	3	0.03	0.16	0.61	3.25	9.21	28.98	69.61
			4	0.03	0.14	0.48	2.74	7.54	23.67	54.37
			5	0.03	0.13	0.47	2.71	7.42	23.29	53.27
			6	0.03	0.13	0.45	2.65	7.25	22.75	51.72
			7	0.03	0.13	0.45	2.62	7.14	22.48	50.97
			8	0.03	0.13	0.44	2.58	7.07	22.59	50.84
			10	0.03	0.13	0.44	2.57	7.03	22.51	50.56
			15	0.03	0.03	0.13	0.47	2.71	7.42	23.29
		2	20	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			25	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			30	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			35	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			40	0.03	0.03	0.13	0.47	2.71	7.42	23.29
			50	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			60	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			70	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			80	0.03	0.03	0.13	0.44	2.57	7.03	22.51
			100	0.03	0.03	0.13	0.44	2.57	7.03	22.51

1. 減速比 ($i = N_{in}/N_{out}$)

2. 最大加速力矩 $T_{2B} = 60\%$ of T_{2NOT}
2. Maximum acceleration torque $T_{2B} = 60\%$ of T_{2NOT}

3. 输出转速 100rpm ,作用于输出轴中心位置
3. Output speed 100rpm, acting on the center of the output shaft

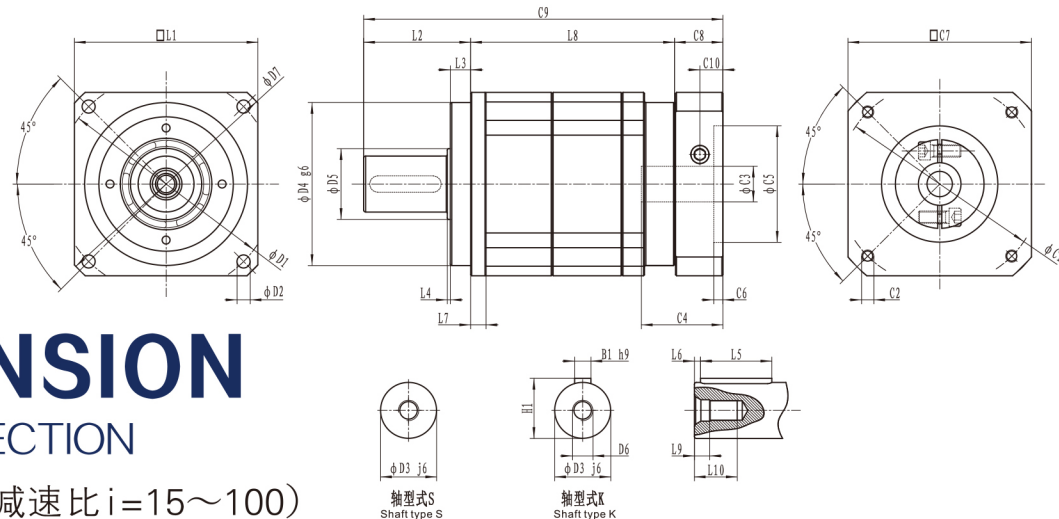


DIMENSION

SINGLE SECTION

- 尺寸 (单节, 减速比 $i=3 \sim 10$)
Dimension (single stage, Ratio $i=3 \sim 10$)

尺寸/Dimension	MAB042	MAB060	MAB090	MAB115	MAB142	MAB180	MAB220
D1	50	70	100	130	165	215	250
D2	3.5	5.5	6.6	9	11	13	17
D3 j6	13	16	22	32	40	55	75
D4 g6	35	50	80	110	130	160	180
D5	15	18	30	40	50	70	85
D6	M4*0.7P	M5*0.8P	M8*1.25P	M12*1.75P	M16*2.0P	M20*2.5P	M20*2.5P
D7	56	80	116	152	185	240	292
L1	42	60	90	115	142	180	220
L2	26	37	48	65	97	105	138
L3	5.5	7	10	12	15	20	30
L4	1	1.5	1.5	2	3	3	3
L5	16	25	32	40	63	70	90
L6	2	2	3	5	5	6	7
L7	4	6	8	10	12	15	20
L8	39.5	39.5	78.5	102	124.5	131.5	151.5
L9	4.5	4.8	7.2	10	12	15	15
L10	10	12.5	19	28	36	42	42
C1	46	70	90	145	200	200	235
C2	M4*0.7P	M4*0.7P	M5*0.8P	M8*1.25P	M12*1.75P	M12*1.75P	M12*1.75P
C3	8	≤14/≤16	≤19/≤24	≤28	≤35/≤42	≤42	≤42/≤55
C4	26	35	46.5	67	81	114	117
C5	30	50	70	110	114.3	114.3	200
C6	3.5	3.5	6	14	19	24	20
C7	42	60	80	130	180	180	220
C8	19.5	46	30	45.5	57.5	81.5	87.5
C9	86	122.5	156.5	212.5	279	318	377
C10	10.5	10.5	14.5	27	32	43.5	49.5
B1 h9	5	5	6	10	12	16	20
H1	15	18	24.5	35	43	59	79.5



DIMENSION

DOUBLE SECTION

尺寸 (双节, 减速比 $i=15\sim100$)

Dimension(double stage,Ratio $i=15\sim100$)

尺寸/Dimension	MAB042	MAB060	MAB090	MAB115	MAB142	MAB180	MAB220
D1	-	70	100	130	165	215	250
D2	-	5.5	6.6	9	11	13	17
D3 j6	-	16	22	32	40	55	75
D4 g6	-	50	80	110	130	160	180
D5	-	18	30	40	50	70	85
D6	-	M5*0.8P	M8*1.25P	M12*1.75P	M16*2.0P	M20*2.5P	M20*2.5P
D7	-	80	116	152	185	240	292
L1	-	60	90	115	142	180	220
L2	-	37	48	65	97	105	138
L3	-	6	10	12	15	20	30
L4	-	1.5	1.5	2	3	3	3
L5	-	25	32	40	63	70	90
L6	-	2	3	5	5	6	7
L7	-	7	8	10	12	15	20
L8	-	71.5	116	147	185.5	200	220
L9	-	4.8	7.2	10	12	15	15
L10	-	12.5	19	28	36	42	42
C1	-	70	90	145	145	200	200
C2	-	M4*0.7P	M5*0.8P	M8*1.25P	M8*1.25P	M12*1.75P	M12*1.75P
C3	-	$\leq 14/\leq 16$	$\leq 16/\leq 19$	$\leq 19/\leq 24$	$\leq 24/\leq 28$	≤ 35	≤ 42
C4	-	35	46.5	67	66	80	114
C5	-	50	70	110	110	114.3	114.3
C6	-	3.5	6	14	10	9	24
C7	-	60	80	130	130	180	180
C8	-	48	30	45.5	42.5	47.5	81.5
C9	-	154.5	194	257.5	340	352.5	441.5
C10	-	10.5	14.5	27	27	22.5	43.5
B1 h9	-	5	6	10	12	16	20
H1	-	18	24.5	35	43	59	79.5

MAD Series planetary gearbox

系列行星减速机

PRODUCT FEATURES

产品特点

- ☆ 行星臂架与输出轴采用一体式结构设计，确保最大的扭转刚性。
- ☆ 行星轮采用满滚针设计，增加接触面积以提高结构刚性与输出扭矩。
- ☆ 齿轮采用低碳钢表面渗碳淬火到HRC62，以获得最佳的耐磨及冲击韧性。
- ☆ 齿形引用国外进口软件辅助设计，以获得最佳的齿形降低噪音。
- ☆ 输入端与马达轴连接采用双边抱紧方式，以获取最大的夹紧力和零背隙的动力传递。
- ☆ Planetary boom and output shaft are intergrated structure designed to ensure maximum torsional rigidity.
- ☆ Planetary wheel with full needle design,increase the contact area to improve the rigidity and output torque.
- ☆ The gears are carburized and quenched to the HRC62 with low carbon steel surface for optimum wear and impact toughness.
- ☆ Gears refer to foreign imported software-assisted design to obtain the best tooth shape to reduce noise.
- ☆ The input terminal is connected to the motor shaft in a double-tight manner to obtain the maximum clamping force and zero backlash power transmission.

