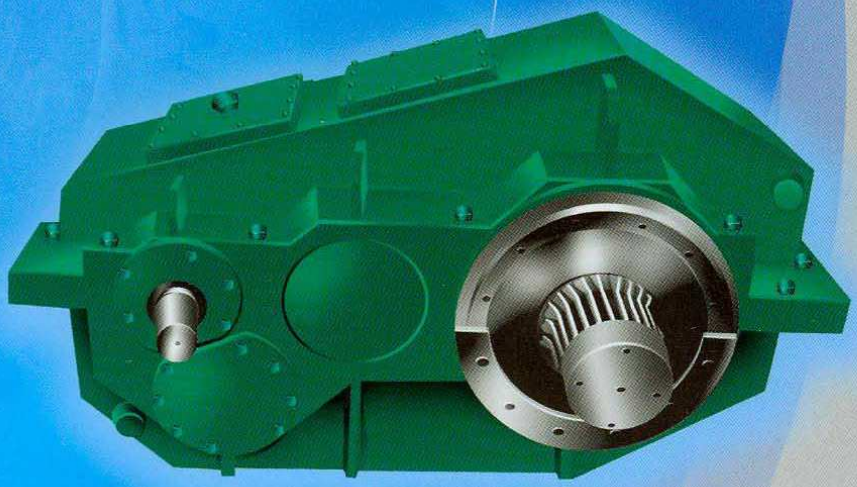
国家大型企业 NATIONAL LARGE ENTERPRISE

DQJ DQJD
点线啮合齿轮减速器
DQJ DQJD POINT-LINE MESHING GEAR REDUCERS



江 苏 泰 隆 机 械 集 团
JIANGSU TAILONG MACHINERY GROUP COMPANY
江苏泰隆减速机股份有限公司
JIANGSU TAILONG DECELERATOR MACHINERY CO.,LTD.

公司简介

泰隆集团地处扬子江畔的泰兴市区，是泰兴人引以为豪的国家大型企业。集团在全国优秀企业家、江苏省劳动模范董事长殷根章的领导下，经过20多年的悉心经营，昂首迈进了中国机械工业500强，成为全国减变行业龙头老大。

集团现拥有总资产5.8亿元，固定资产3.6亿元，占地面积60万平方米，员工近2612人，专业工程技术人员896人，年销售额15亿元。从美国、德国、日本、俄罗斯等国家引进的大型数控磨齿机、蜗杆磨床、加工中心、碳氮共渗炉等一批高精尖的生产设备和检测设备占48%。建立了全国同行业中检测功能最全、检测功率最大、仪器最先进的测试中心，创建了省级工程技术中心。公司产品在原有的平面二次包络蜗杆减速器、9000系列摆线针轮减速机、圆柱齿轮减速器、行星齿轮减速器等十几个系列，几十万种规格的基础上，采用先进的模块化、点线等技术开发出了TL模块化齿轮减速电机；TXP行星模块化减速器、重载模块式减速器、点线啮合减速器。多年来，起重机用硬齿面、中硬齿面减速器一直在为用户提供最佳的传动方案，在风力发电、水力发电领域捷足先登，做出了不菲的业绩。重载齿轮箱在建材行业、冶金行业成功得到了应用，开发出了建材行业的立式磨机及边缘传动磨机齿轮箱，冶金行业的开卷、卷取齿轮箱、三环减速器、星轮减速器。另外公司还为用户提供榨糖机齿轮箱、螺杆升降机、电动滚筒及各类非标齿轮箱。公司荣获“全国首批守合同重信用企业”，“全国重点高新技术企业”、“全国机械工业质量效益型先进企业”、“全国机械工业质量管理奖”、“全国用户满意服务”等殊誉，在同行业中率先通过质量、环境、安全三位一体认证及ISO10012计量体系确认。

泰隆人将遵循自己一贯的质量承诺、服务承诺和信誉承诺，把顾客满意当作我们的最高追求！

BRIEF INTRODUCTION

Tailong Group is located in Taixing urban area at the border of Yangtse River and it is a state-owned large-sized enterprise boasted by Taixing people. Under the leadership of Mr. Yin genzhang, a nationwide excellent entrepreneur and a model worker of Jiangsu Province, after more than twenty years of operation with concentrated efforts, has proudly marched into the Top 500 enterprises in Chinese Mechanical Industry and has become the industry leader.

At present, the group owns a total assets of RMB 580m, and fixed of RMB 360m, and it covers an area of 600,000 square meters and owns almost 2,612 employees, including 896 technicians, the annual turnover surpasses 1b RMB. The introduced large-sized numerical controlled gear grinding machine, worm grinder, machining center and carbonitriding kiln and etc. advanced, precise and leading manufacturing facilities and inspection apparatus from USA, Germany, Japan and Russia has taken part 48% share in all. At the same time, the group has established a test center with the most complete test functions, the biggest test power, the most advanced instrument and the provincial science & technology park. At the basis of the primary secondary envelope, 9000 series cycloid pinwheel reducer, cylindrical gear, planetary reducer and so on, more than ten series, and several ten thousands specifications, adopting the advanced modularization, point-line technique, ultimately develop TL modular reducer, TXP planetary modular reducer, heavy load modular and point-line meshing decelerator. Along many years, harden-faced reducer for crane, moderate rigid reducer provide the best transmission project for customer all the times; On the other hand, at the wind and water power area, we have taken the swift-footed arrive first, and taken out outstanding success. The heavy load gearboxes has successfully applied in architecture, metallurgy industry, and developed vertical grinder, marginal transmission grinder gearbox which fit for architecture industry, open, convolute gearbox, three-ring, star reducer which special for metallurgy. In addition, the company also supply sugar mill gearbox, worm lifter, electrical roller and various non-standard gearboxes.

The company has been awarded successively with such honorable titles as “National first batch of enterprise honoring contracts and keeping promises”, “National key new & hi-tech enterprise”, “National mechanical industry quality & benefit type enterprise”, “National mechanical industry QC award” and “National customer satisfaction service”. It has taken the lead in passing the quality, environment and security three in one system certification and ISO10012 metering system certification.

Tailong people will keep to its persistent quality guarantee, service guarantee and credit, satisfying customer as our topmost pursuit.

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1 概述

点线啮合齿轮传动是一种全新的传动型式，1999年9月被列为国家“九五”重点科技推广项目。点线啮合齿轮是继渐开线齿轮、圆弧齿轮以后出现的又一种新的齿轮。DQJ、DQJD系列点线啮合齿轮减速器，是我公司将点线啮合齿轮传动技术应用到中硬齿面的起重机减速器领域，根据JB/T10468-2004成功地研制开发出的上规模、上档次、高技术附加值的标准系列产品，其基本特点是：

1) 国际先进的技术水平；
2) 突出的优点；
3) 高的性能价格比；
4) 长使用寿命，高可靠性。

2 性能特点

点线啮合齿轮同时存在渐开线的线啮合和渐开线凸齿廓与过渡曲线凹齿廓接触的点啮合，因而这种减速器兼具渐开线齿轮和圆弧齿轮两种减速器的优点。

1) 承载能力高，比同样的渐开线齿轮减速器提高1-2倍，传递相同功率，规格可以小2档，重量可减少近一半。

2) 由于轮齿存在渐开线的线啮合和凹齿廓也是由展成生成，故齿轮具有可分性，中心距误差和切齿深度误差不影响传动和强度。该特性优于圆弧齿轮。

3) 强度高，在普通的制造精度下容易达到100%的齿宽接触：齿向载荷分布比较均匀，轮齿不会产生崩角折断，破坏性试验显示轮齿折断的型式是在30°切线处沿整个齿宽断裂。该性能优于渐开线齿轮和圆弧齿轮。

4) 噪声低，由于齿轮轮齿啮合同时存在端面重合度和轴向重合度，故总重合度大，接触精度高，运转平稳，噪声可比同精度的渐开线齿轮减速器低5-10dB(A)（可比6级精度磨齿的渐开线齿轮减速器还低）。且具有载荷越高，噪声越低的特点（满载可比轻载再低2-3dB(A)）。点线啮合齿轮噪声低的原因除了总重合度大外，还有啮合刚度低，啮合角小等因素。

5) 用于减速传动时容易形成油膜，工作状态下磨擦磨损小，使用寿命长。

6) 传动效率高，单级可达98%以上，二级可达97%以上。

DQJ(DQJD)系列减速器的外形安装尺寸和QJ(QJD)系列相同，从保守一点考虑按承载能力提高一档选取，传递同样功率，重量可减轻30%左右。同时，为了选用方便，公称传动比由原来的R10系列扩展为R20系列。

起重机提升机构减速器的输入、输出轴端在同一侧，分别与电动机和卷筒相联，减速器中心距不宜太小。当采用硬齿面减速器时，往往会造成承载能力和等价的浪费（结构不允许小），这时采用DQJ系列点线啮合齿轮减速器即可满足强度、寿命和可靠度要求，又可降低成本，不失为最佳选择。

3 应用范围

1) 齿轮圆周速度≤16m/s；
2)高速轴转速≤1500r/min；
3) 工作环境温度为-40℃～+50℃；
4) 可正反两向运转。

适用于起重运输、冶金、化工和轻工等各种机械设备的活动机构中。

1 Brief

Point-Line meshing gear reducers is a fire-new driving model. It is accepted National "nine five" inportant extendable intem of science and technology in september, 1999. Point-Line meshing gear is also a new gear appearing after involute cylindrical gear and circular arc gear. DQJ、DQJD series Point-Line meshing gear reducers is normal size products with over scale, over baddish, high technic anmex value to designing successfully according to JB/T 1048-2004 by our company which applies Point-Line meshing gear driving technic to the field of middle-hard tooth flank reducers for caranes.

Its basic fatures are:

1) A dvanced technic level of international
2) Out standing excellence
3) Higher capability price ratio
4) Longer services life and higher reliability

2 Characteristic features

Point-Line meshing gear is involute line-meshing and point-meshing of contacting between involute male tooth profile and transition curve female tooth profile. So it has execuence of the two reducers include involute gear and circular arc gear.

1) High load capacity. It is inproved one or two doubles in the same involute gear reducers. When is pass the same power, its sizes may be fell two size and its weight may be reduced about half as it pass the same power.

2) Gear have characteristic that is possible to detach, and center distance error and cutter depth error have not effect on driving and trength, because teeth including involute line-meshing and female tooth profile are made with generation. The characteristic is well than circular arc gear.

3) High strength. It can be easy to connect 100% with facewidth under the plain mading accuracy. It is optimum longitudinal load clistributions. Teeth does not avalanche angle and break. Breaking form of gear teeth in breaking test is breaking along total facewidth in 30 degree tangent. The characteristic is well than involute gear and circular arc gear.

4) Low noise. Since there both are transverse contact ratio and overlap ratio at the time of engagemegn of teeth, total contact ratio is large, meshing accuracy is high, driving is stable, noise is 5-10dB(A) lower than the involute gears reducers with the same accuracy. (It is lower than the involute gears reducers grinded with 6 class), As the load is higher, the noise is lower. (the noise is 2-3dB lower in full load than in light load.)

5) It is easy to form oil film, wearing little on the working state, service life is long when the reducer is used for decelating.

6) High efficiency of mechanical drive with single class up to 98% and double class up to 97%.

There are same outline and mounting sizes between the DQJ(DQJD) series reducers and QJ(QJD) series reducers. Thinking limitted that is selected by improing one size acording to load capacity. Weight can reduce about 30% as driving the same power. At one time, for selecting ezpediently, nominal transmission ratio is extended R20 series from the old R10 series.

Input and output shaft extension of the reducer for hoisting mechanism of crane is in the same side. It connects with motor and winding drum, center distance of reducers shouldn't too little. If reducers with hard tooth surface is selected, it makes waste of carrying capacity and the same price. (the structure donesn't allow little.)

Applied hear DQJ series Point-Line meshing gear reducers can meet request of strenght, service life, reliability and low cost, it is best selection.

3 Application

1) Circumferential speed of gear wheel $\leqslant$ 16m/s;
2) Rotation speed of high shaft $\leqslant$ 1500r/min;
3) Operating ambient temperature: -40℃ ~ +50℃;
4) Operable both forwards and backwards;

Applicable for the driving gear of mechanical equipment used in hoisting transportation, metallurgy, chemical industryand light industry.

4 型号、标记及型式尺寸 Models, earmark, form and size

4.1 型号 Models

减速器分为底座式和三支点支承式两大类，各有三种结构型式：

R 型——二级、S 型——三级和 RS 型——二、三级结合型，总计 6 个系列；

底座式：DQJRD、DQJSD、DQJRSD

三支点支承式：DQJR、DQJS、DQJRS

The reducer is devided into two types of foot mounted and three-point support, It has three frame models on each other;

Type R —— double stage, Type S —— three stage,

Type RS —— double stage combines three stage it is added up to six series;

Foot mounted: DQJRD、DQJSD、DQJRSD

Three-point support: DQJR、DQJS、DQJRS

4.2 标记示例 Example of earmark

□ □ – □ □ □ (□)

- 安装型式(W，L)，W 时允许省略 / Mounting form (W, L)
- 输出轴端型式(P，H，C) / Output shaft end mode (P, H, C)
- 装配型式(Ⅰ～Ⅸ) / Installing form (Ⅰ～Ⅸ)
- 公称传动比 / Nominal transmission ratio
- 规格，即名义中心距(输出级中心距) / Size, nominal center distance (output stage center distance)
- 结构型式(DQJR、DQJS、DQJRS、DQJRD、DQJSD、DQJRSD) / Structure model

示例 1. 三支点支承式减速器二级传动，名义中心距 a_1=560mm，公称传动比 i=20，第Ⅵ种装配型式，轴端型式为 C 型，安装型式为卧式，其标记为：

减速器 DQJR560-20 Ⅵ CW

示例 2. 底座式减速器三级传动，名义中心距 a_1=400mm，公称传动比 i=50，第Ⅲ种装配型式，轴端型式为 P 型，其标记为：

减速器 DQJSD400-50 Ⅲ P

Example 1: If double-stage drive of three-point support gearbox, the nominal center distance a_1=560mm, nominal transmission ratio i=20, the installing form is Ⅵ, C type shaft dege, the mounting form is horizontal, the type should be: decelerator DQJR560-20 Ⅵ CW

Example 2: If three stage drive of foot mouted gearbox, the nominal center distance a_1=400mm, nominal transmission ratio i=50, the installing form is Ⅲ, P type shaft edge, the type should be: decelerator DQJSD400-50 Ⅲ P

4.3 型式与尺寸 Form and size

4.3.1 装配型式见图 1。Installing form see figue1.

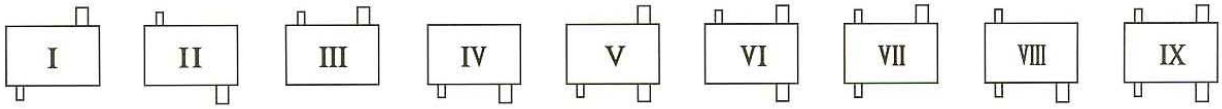

图 1 Figure 1

4.3.2 安装型式 Mounting form

DQJRD、DQJSD、DQJRSD 型采用地脚安装。

DQJR、DQJS、DQJRS 型采用三支点支承安装，允许有卧式 W 和立式 L 两种方式，见图 2。

DQJRD、DQJSD、DQJRSD reducers are foot mounting type.

DQJR、DQJS、DQJRS reducers are three-point supporting type. It is permitted two form of horizontal W or vertical L.

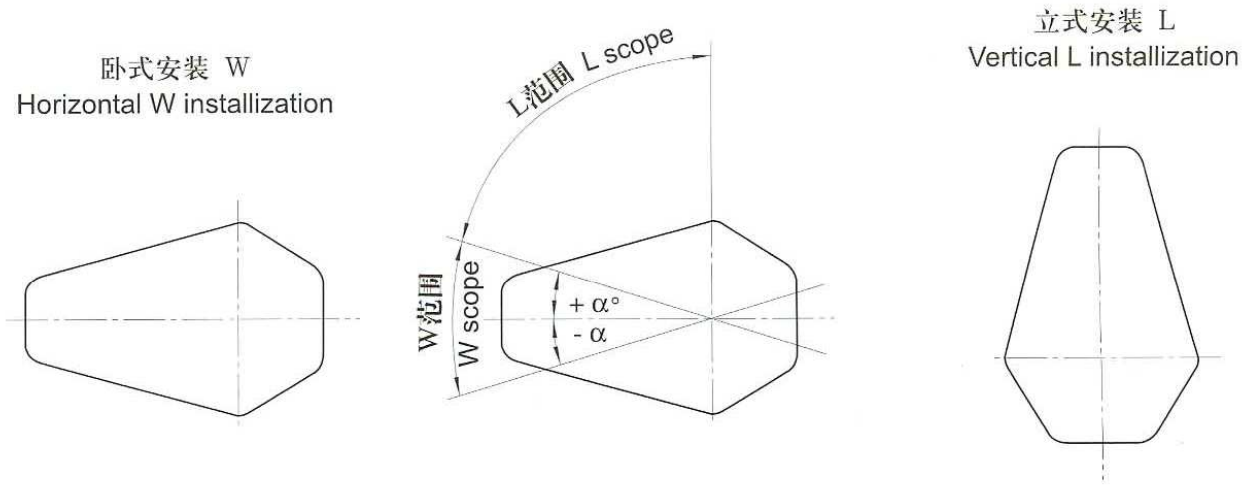

图 2 Figure 2

注：1、W 范围内（偏转角 ± α° ）为卧式安装，L 范围内为立式安装。

2、α 角的度数与传动比有关，当减速器倾斜角度时，对二级减速器，应保证第一级大齿轮浸油 1～2 个齿高深度；对三级减速器，应保证第二级大齿轮浸油 1～2 个齿高深度。

Note: 1. When defle ction angle ranging form ±α° , horizontal installization is applied. When deflection angle ranging form L scope, vertical installization is applied.

2. The volue of angle α is relevant ot the transmission ratio. When reducer has an angle of indicatoin, It's necessary to guarantee one or two gear height into the oil of first big gear for double-stage reducers. It's necessary to guarantee one or two gear height into the oil of second-stage big gear for three stage reducers.

减速器三支点支承安装型式见图 3。
The mounting form of three-point support see talbe 3.

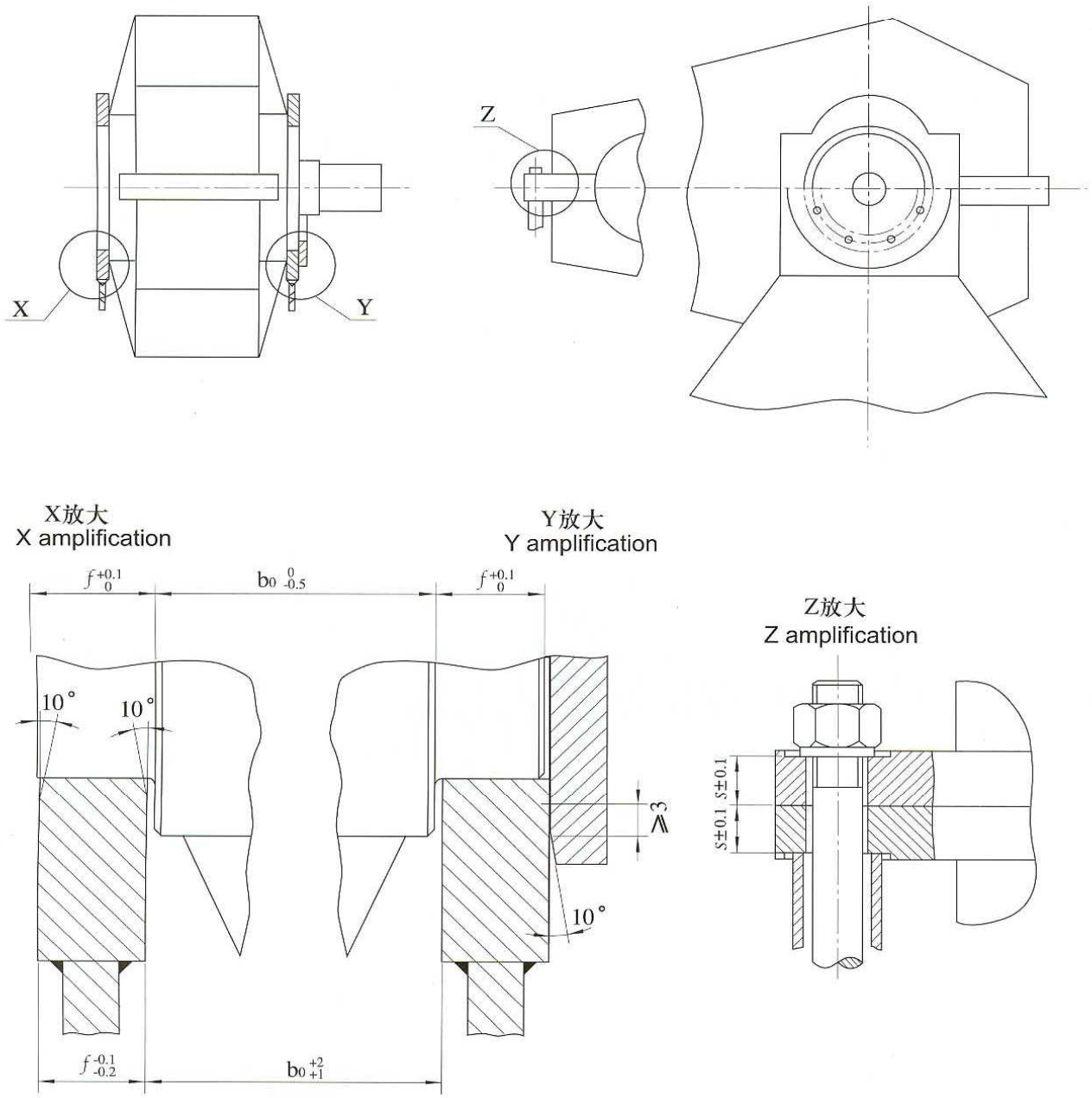

图 3 Figure 3

4.3.3 轴端型式及尺寸 Type and size of shaft edge

高速轴采用圆柱轴伸平键联接。输出轴端有三种型式，见图 4。

P 型，圆柱形轴伸。

H 型，渐开线花键轴伸。

C 型，渐开线齿轮轴伸（仅用于名义中心距为 236～1000mm 的减速器）

High-speed shaft with cylinder shaft extension is linked by square. There are three type on output shaft edge, see figue 4.

P type, cylinder shaft extension.

H type, involute spline shaft extension.

C type, involute gear shaft extension (Applicable only for the reducers which noimal center distance is 236～1000mm.)

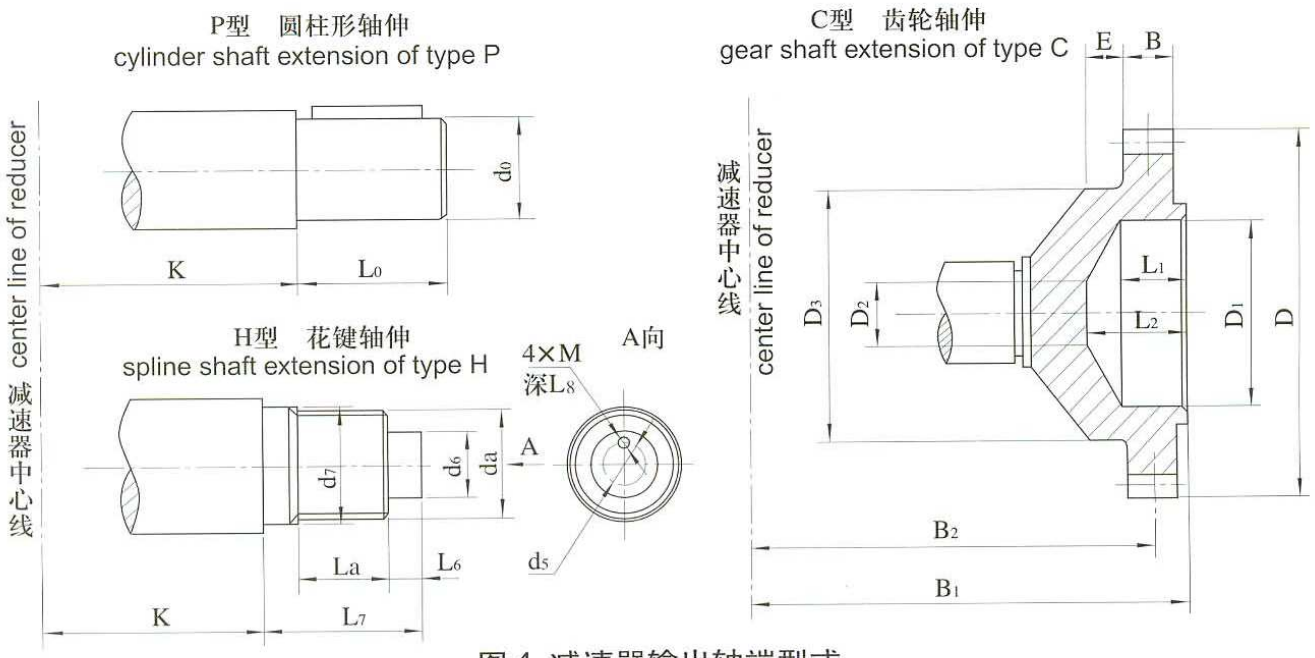

图 4 减速器输出轴端型式
Figure 4 Type of output shaft extension

减速器输出轴端尺寸参数见表 1。 Size of output shaft extension see table 1.

表 1 减速器输出轴端尺寸参数 Table 1 size of output shaft extension mm

名义中心距 Nominal center distance a_1	k	P型		H型									
		d_0	L_0	m X z	d_a (h11)	L_a	d_5	M	d_6 (k6)	L_6	d_7 (k6)	L_7	L_8
140	130	48	82	3X15	48	35	25	6	40	23	50	78	12
170	140	55	82	3X18	57	35	30	6	50	27	60	82	12
200	195	65	105	3X22	69	40	40	8	60	30	70	90	16
236	225	80	130	3X27	84	45	50	8	70	30	85	95	16
280	250	90	130	5X18	95	55	60	8	80	35	100	125	16
335	280	110	165	5X22	115	60	70	10	100	40	120	135	20
400	340	130(140)	200	5X26	135	75	90	10	120	45	140	155	20
450	365	150	200	5X30	155	80	100	12	140	50	160	165	25
500	410	170(180)	240	5X34	175	90	120	12	160	55	180	180	25
560	445	190(200)	280	5X38	195	100	140	12	180	55	200	190	25
630	495	220	280	8X26	216	110	160	12	190	60	222	205	25
710	565	250(260)	330	8X30	248	125	180	16	220	60	254	220	32
800	615	280	380	8X34	280	140	200	16	250	60	286	235	32
900	670	320	380	8X38	312	155	220	20	280	70	318	260	40
1000	740	360	450	8X44	360	175	250	20	320	75	366	285	40

续表 1　table 1　mm

名义中心距 Nominal center distance a_1	C型										
	m X z	D	D_1 (h7)	D_2	D_3	B_1	B_2	B	E	L_1	L_2
236	3X56	174	90	40	135	279.5	253	25	25	45	60
280	4X56	232	120	40	170	302.5	271	35	25	50	75
335	4X56	232	120	40	170	339.5	308	35	25	50	75
400	6X56	348	170	45	260	402	370	40	32	76	100
450	6X56	348	170	45	260	429	397	40	32	76	100
500	8X54	448	200	105	260	482	442	50	32	78	100
560	10X48	500	200	105	280	570	505	60	35	78	110
630	10X54	560	250	140	380	620	550	65	40	80	120
710	12X48	600	270	150	420	700	620	75	45	95	130
800	12X54	672	290	170	480	776	696	75	45	95	130
900	12X58	720	310	180	560	850	770	85	60	105	140
1000	12X64	792	380	230	620	970	895	100	80	140	180

注：P 型轴端配键按 GB/T 1095。　Note: Square of type P shaft extension is on the basis of GB/T1095.

4.3.4 减速器的外形及安装尺寸　Outline and mouting size of reducer

1) DQJR 减速器的外形及安装尺寸见图 5 和表 2；
2) DQJS 减速器的外形及安装尺寸见图 6 和表 3；
3) DQJRS 减速器的外形及安装尺寸见图 7 和表 4；
4) DQJRD 减速器的外形及安装尺寸见图 8 和表 5；
5) DQJSD 减速器的外形及安装尺寸见图 9 和表 6；
6) DQJRSD 减速器的外形及安装尺寸见图 10 和表 7。

1) Outline and mounting size for DQJR reducer see figure 5 and table 2;
2) Outline and mounting size for DQJS reducer see figure 6 and table 3;
3) Outline and mounting size for DQJRS reducer see figure 7 and table 4;
4) Outline and mounting size for DQJRD reducer see figure 8 and table 5;
5) Outline and mounting size for DQJSD reducer see figure 9 and table 6;
6) Outline and mounting size for DQJRSD reducer see figure 10 and table 7;

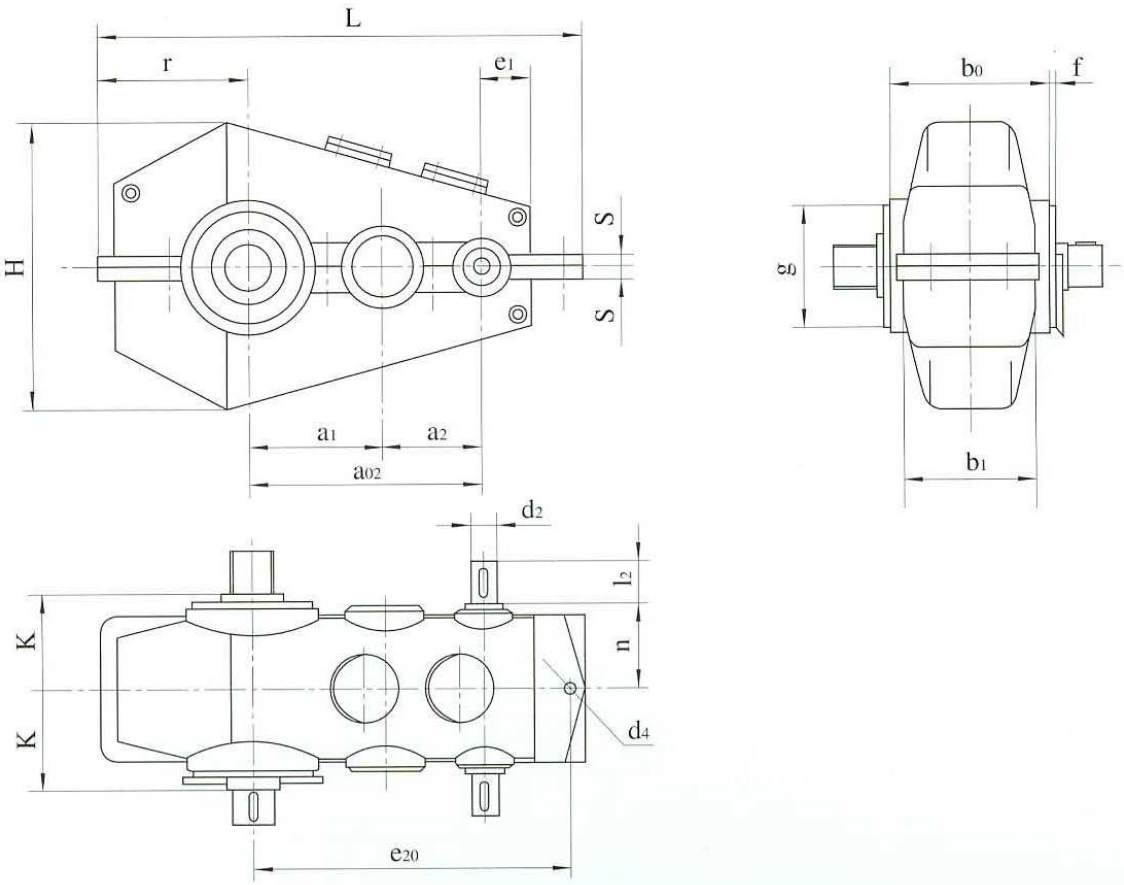

图 5　DQJR 型减速器外形及安装尺寸

Figue 5　Outline and mounting sizes for type DQJR

表 2　DQJR 型减速器外形及安装尺寸　　mm

Table 2　Outline and mounting sizes for type DQJR　　mm

名义中心距 Nominal center distance a_1	a_2	a_{02}	i_N= 10-16		i_N= 18-31.5		L	H	N	K	b_0 $(^{0}_{-0.5})$	f $(^{+0.1}_{0})$	g (h9)	d_4	e_{20}	S	r	e_1	参考质量 reference quality kg
			d_2	l_2	d_2	l_2													
140	100	240	28	60	22	50	505	320	120	130	190	16	130	12	320	12	170	50	59
170	118	288	32	80	28	60	600	386	135	140	215	18	150	15	380	14	202	60	85
200	140	340	38	80	32	80	707	455	180	195	250	20	170	18	450	17	232	70	133
236	170	406	48	110	38	80	828	518	210	225	300	20	200	18	530	17	272	85	240
280	200	480	55	110	48	110	974	584	235	250	335	25	240	22	630	22	314	100	350
335	236	571	65	140	55	110	1156	735	255	280	400	25	270	26	750	27	375	120	590
400	280	680	80	170	65	140	1387	867	285	340	475	30	320	33	900	27	447	140	850
450	315	765	90	170	80	170	1547	990	310	365	530	30	360	33	1000	32	506	160	1300
500	355	855	100	210	90	170	1720	1130	350	410	600	40	400	39	1120	32	554	180	1760
560	400	960	110	210	100	210	1922	1270	385	445	670	40	430	39	1250	37	626	200	2600
630	450	1080	120	210	110	210	2156	1380	425	495	750	40	480	45	1400	37	704	225	3550
710	500	1210	130	250	120	210	2433	1540	450	565	850	50	530	45	1600	42	781	250	4900
800	560	1360	150	250	130	250	2739	1712	490	615	950	50	580	52	1800	42	880	280	6600
900	630	1530	170	300	150	250	3043	1910	540	670	1060	50	650	62	2000	47	978	320	9200
1000	710	1710	190	350	170	300	3384	2150	610	740	1180	60	720	70	2240	55	1074	360	12000

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

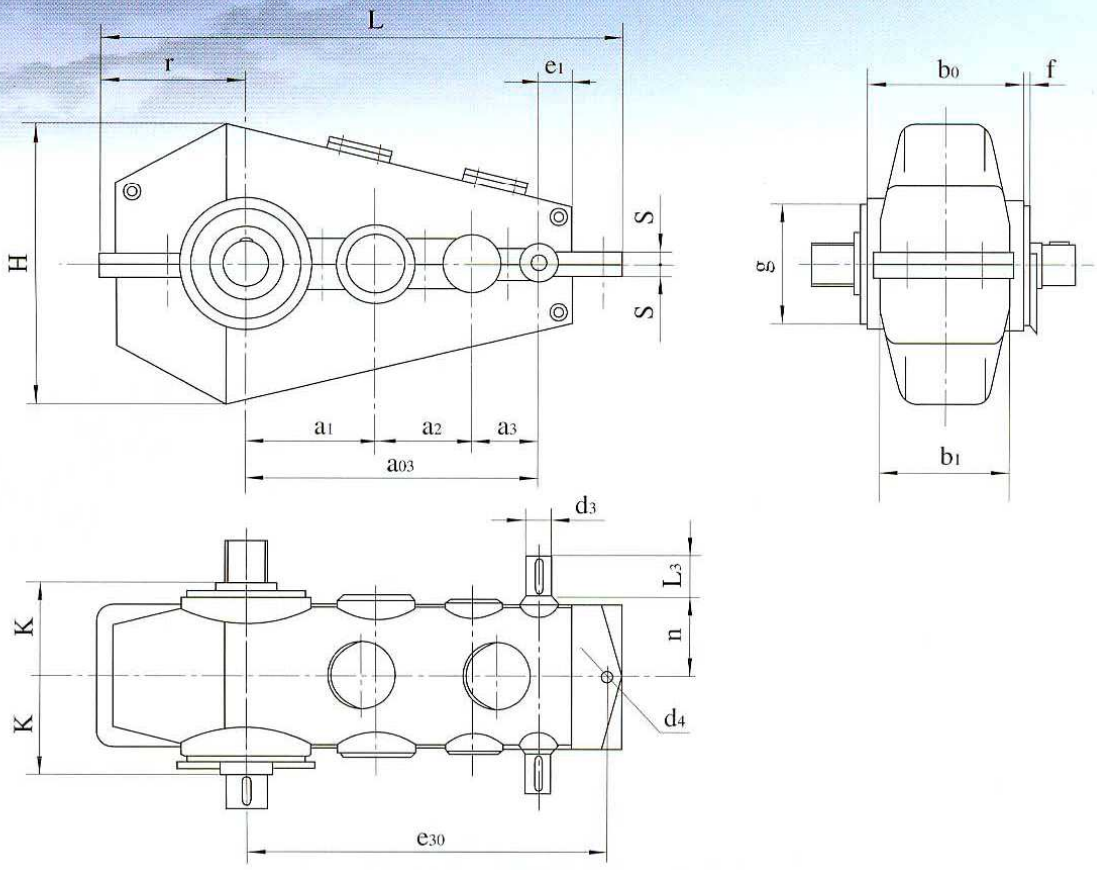

图 6　DQJS 型减速器外形及安装尺寸

Figue 6 Outline and mounting sizes for type DQJS

表 3　DQJS 型减速器外形及安装尺寸　　mm

Table 3 Outline and mounting sizes for type DQJS　　mm

名义中心距 Nominal center distance a_1	a_2	a_3	a_{03}	i_N= 35.5-71		i_N= 80-200		L	H	N	K	b_0 ($^{0}_{-0.5}$)	f ($^{+0.1}_{0}$)	g (h9)	d_4	e_{30}	S	r	e_1	参考质量 reference quality kg
				d_3	l_3	d_3	l_3													
140	100	71	311	22	50	18	40	567	320	120	130	190	16	130	12	380	12	170	40	64
170	118	85	373	28	60	22	50	673	386	135	140	215	18	150	15	450	14	202	48	95
200	140	100	440	32	80	28	60	793	455	180	195	250	20	170	18	530	17	232	56	170
236	170	118	524	38	80	32	80	928	518	210	225	300	20	200	18	630	17	272	67	270
280	200	140	620	45	110	38	80	1104	584	235	250	335	25	240	22	750	22	314	80	390
335	236	170	741	50	110	45	110	1301	735	255	280	400	25	270	26	900	27	375	95	660
400	280	200	880	55	110	50	110	1559	867	285	340	475	30	320	33	1060	27	447	112	940
450	315	224	989	60	140	55	110	1736	990	310	365	530	30	360	33	1180	32	506	125	1400
500	355	250	1105	70	140	60	140	1930	1130	350	410	600	40	400	39	1320	32	554	140	1880
560	400	280	1240	80	170	70	140	2162	1270	385	445	670	40	430	39	1500	37	626	160	2800
630	450	315	1395	90	170	80	170	2455	1380	425	495	750	40	480	45	1700	37	704	180	3700
710	500	355	1565	100	210	90	170	2738	1540	450	565	850	50	530	45	1900	42	781	200	5200
800	560	400	1760	110	210	100	210	3084	1712	490	615	950	50	580	52	2120	42	880	225	6960
900	630	450	1980	130	250	110	210	3423	1910	540	670	1060	50	650	62	2360	47	978	250	9860
1000	710	500	2210	150	250	130	250	3804	2150	610	740	1180	60	720	70	2650	55	1074	280	13000

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

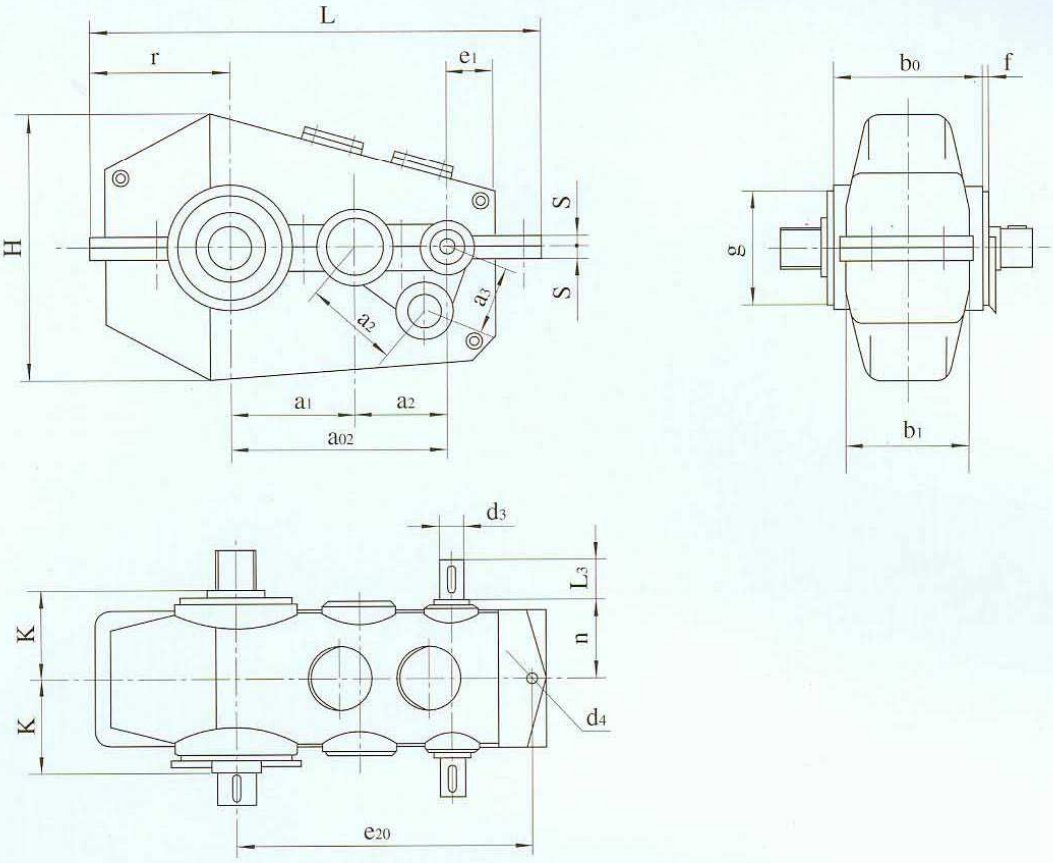

图 7　DQJRS 型减速器外形及安装尺寸

Figue 7　Outline and mounting sizes for type DQJRS

表 4　DQJRS 型减速器外形及安装尺寸　　mm

Table 4　Outline and mounting sizes for type DQJRS　　mm

名义中心距 Nominal center distance a_1	a_2	a_3	a_{02}	i_N= 35.5-71		i_N= 80-200		L	H	N	K	b_0 $(^{0}_{-0.5})$	f $(^{+0.1}_{0})$	g (h9)	d_4	e_{20}	S	r	e_1	参考质量 reference quality kg
				d_3	l_3	d_3	l_3													
140	100	71	240	22	50	18	40	505	298	120	130	190	16	130	12	320	12	170	50	64
170	118	85	288	28	60	22	50	600	375	135	140	215	18	150	15	380	14	202	60	94
200	140	100	340	32	80	28	60	707	400	180	195	250	20	170	18	450	17	232	70	170
236	170	118	406	38	80	32	80	828	500	210	225	300	20	200	18	530	17	272	85	260
280	200	140	480	45	110	38	80	974	562	235	250	335	25	240	22	630	22	314	100	380
335	236	170	571	50	110	45	110	1156	710	255	280	400	25	270	26	750	27	375	120	650
400	280	200	680	55	110	50	110	1387	836	285	340	475	30	320	33	900	27	447	140	930
450	315	224	765	60	140	55	110	1547	980	310	365	530	30	360	33	1000	32	506	160	1400
500	355	250	855	70	140	60	140	1720	1060	350	410	600	40	400	39	1120	32	554	180	1820
560	400	280	960	80	170	70	140	1922	1240	385	445	670	40	430	39	1250	37	626	200	2780
630	450	315	1080	90	170	80	170	2156	1370	425	495	750	40	480	45	1400	37	704	225	3560
710	500	355	1210	100	210	90	170	2433	1530	450	565	850	50	530	45	1600	42	781	250	5040
800	560	400	1360	110	210	100	210	2739	1691	490	615	950	50	580	52	1800	42	880	280	6760
900	630	450	1530	130	250	110	210	3043	1900	540	670	1060	50	650	62	2000	47	978	320	9560
1000	710	500	1710	150	250	130	250	3384	2070	610	740	1180	60	720	70	2240	55	1074	360	12600

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

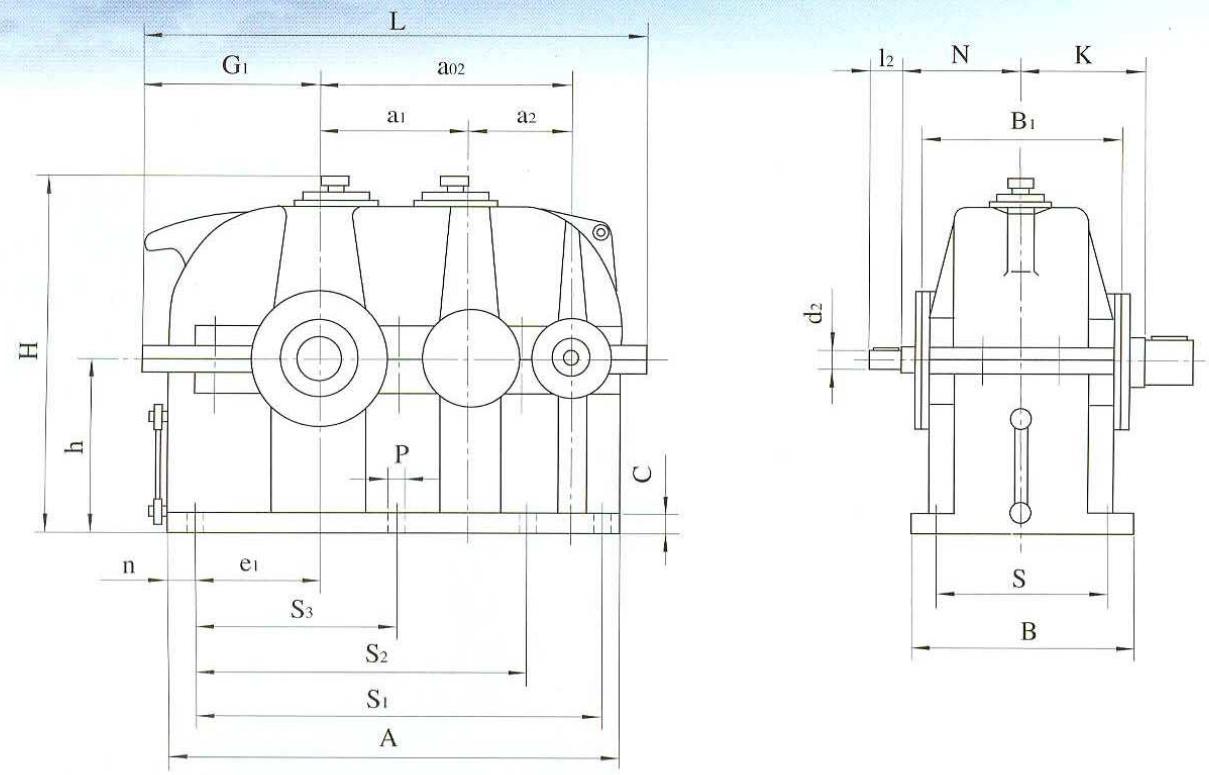

图 8　DQJRD 型减速器外形及安装尺寸

Figue 8　Outline and mounting sizes for type DQJRD

表 5　DQJRD 型减速器外形及安装尺寸　　mm

Table 5　Outline and mounting sizes for type DQJRD　　mm

名义中心距 Nominal center distance a_1	a_2	a_{02}	外形尺寸			中心高 h	N	i_N= 10-16		i_N= 18-31.5		地脚安装尺寸							A	B_1	n	G_1	e_1	参考质量 reference quality (kg)
			L	H	B			d_2	l_2	d_2	l_2	S	S_1	S_2	S_3	C	P	孔数						
140	100	240	494	305	220	140	120	28	60	22	50	175	380		190	22	18	6	430	190	25	172	115	85
170	118	288	577	365	250	170	135	32	80	28	60	205	460		230	25	18	6	513	215	27	197	138	135
200	140	340	664	425	270	200	180	38	80	32	80	230	550		275	25	18	6	600	250	25	222	165	230
236	170	406	796	497	330	236	210	48	110	38	80	280	660		330	28	23	6	716	300	30	265	195	350
280	200	480	925	585	360	280	235	55	110	48	110	310	780		390	30	23	6	845	340	33	303	230	540
335	236	571	1100	695	430	335	255	65	140	55	110	370	940		450	35	27	6	1006	400	35	362	280	915
400	280	680	1380	830	510	400	285	80	170	65	140	450	1100		550	40	27	6	1195	490	50	422	325	1270
450	315	765	1462	930	590	450	310	90	170	80	170	490	1240	1000	600	40	33	8	1350	550	55	481	370	1760
500	355	855	1622	1030	640	500	350	100	210	90	170	540	1390	1120	670	45	33	8	1510	620	60	531	415	2390
560	400	960	1822	1160	710	560	385	110	210	100	210	600	1550	1250	750	50	39	8	1690	690	70	596	460	3560
630	450	1080	2037	1300	770	630	425	120	210	110	210	650	1750	1410	850	55	39	8	1905	770	80	666	520	4740
710	500	1210	2278	1460	860	710	450	130	250	120	210	740	1960	1580	950	60	45	8	2130	868	85	744	585	6530
800	560	1360	2538	1640	980	800	490	150	250	130	250	830	2195	1770	1060	65	45	8	2390	980	100	824	650	8260
900	630	1530	2860	1840	1100	900	540	170	300	150	250	950	2480	2000	1200	70	52	8	2700	1130	110	930	740	12600
1000	710	1710	3200	2040	1200	1000	610	190	350	170	300	1050	2750	2220	1320	75	52	8	3020	1220	135	1040	815	16900

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

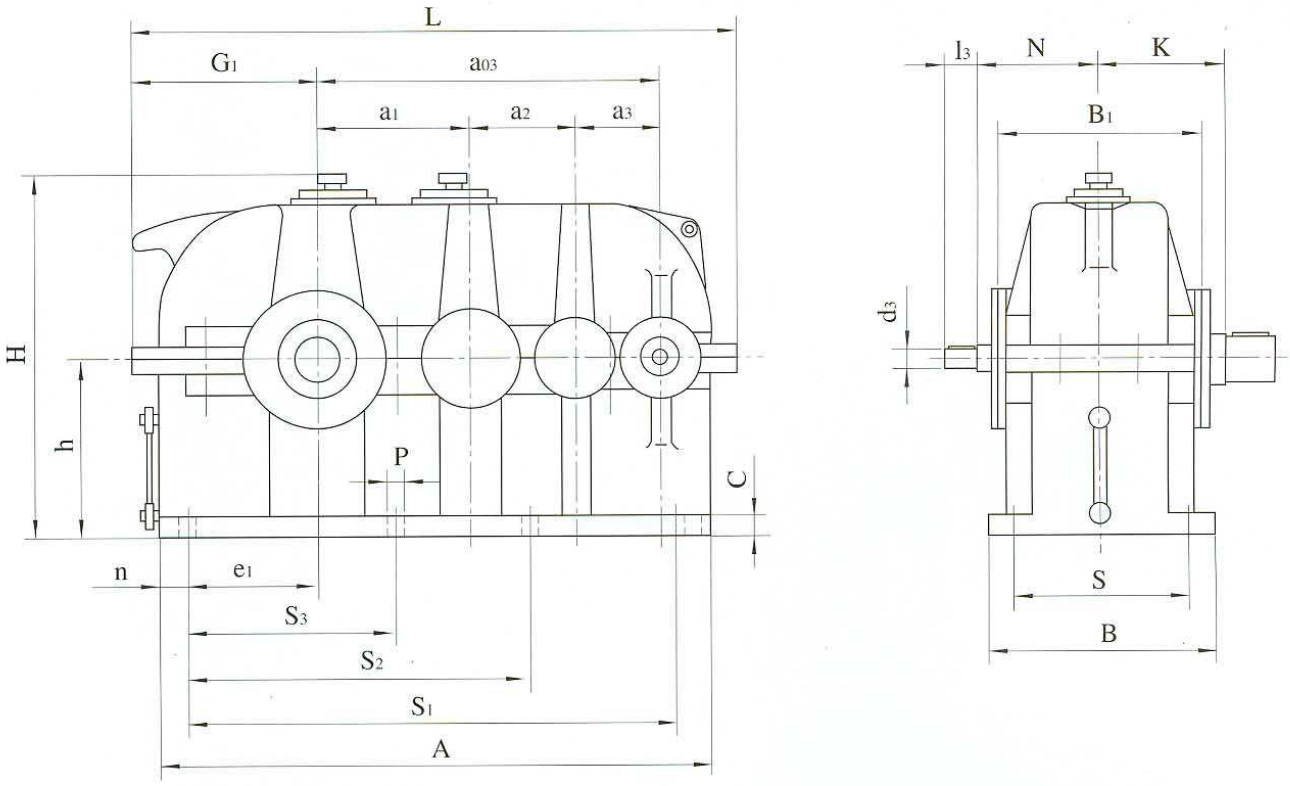

图 9　DQJSD 型减速器外形及安装尺寸

Figue 9　Outline and mounting sizes for type DQJSD

表 6　DQJSD 型减速器外形及安装尺寸　　mm

Table 6　Outline and mounting sizes for type DQJSD　　mm

名义中心距 Nominal center distance a_1	a_2	a_3	a_{03}	外形尺寸			中心高 h	N	i_N= 35.5-71		i_N= 80-200		地脚安装尺寸							A	B_1	n	G_1	e_1	参考质量 reference quality (kg)
				L	H	B			d_3	l_3	d_3	l_3	S	S_1	S_2	S_3	C	P	孔数						
140	100	71	311	560	305	220	140	120	22	50	18	40	175	450		200	22	18	6	496	190	25	172	117	93
170	118	85	373	652	365	250	170	135	28	60	22	50	205	535		235	25	18	6	588	215	27	197	138	149
200	140	100	440	750	425	275	200	180	32	80	28	60	230	635		275	25	18	6	686	250	25	222	165	250
236	170	118	524	896	497	330	236	210	38	80	32	80	280	750		330	28	23	6	816	300	30	265	195	390
280	200	140	620	1045	585	360	280	235	45	110	38	80	310	900		390	30	23	6	965	340	33	303	230	660
335	236	170	741	1245	695	430	335	255	50	110	45	110	370	1050	750	450	35	27	6	1151	400	35	362	280	1096
400	280	200	880	1461	830	510	400	285	55	110	50	110	450	1270	900	550	40	27	6	1367	490	50	422	325	1580
450	315	224	989	1651	930	590	450	310	60	140	55	110	490	1425	1000	600	40	33	8	1539	550	55	481	370	1960
500	355	250	1105	1832	1030	640	500	350	70	140	60	140	540	1600	1120	670	45	33	8	1720	620	60	531	415	2980
560	400	280	1240	2062	1160	710	560	385	80	170	70	140	600	1780	1250	750	50	39	8	1930	690	70	596	460	4180
630	450	315	1395	2307	1300	770	630	425	90	170	80	170	650	2010	1410	850	55	39	8	2175	770	80	666	520	5350
710	500	355	1565	2583	1460	860	710	450	100	210	90	170	740	2265	1580	950	60	45	8	2435	868	85	744	585	7440
800	560	400	1760	2883	1640	980	800	490	110	210	100	210	830	2535	1770	1060	65	45	8	2735	980	100	824	650	9090
900	630	450	1980	3240	1840	1100	900	540	130	250	110	210	950	2860	2000	1200	70	52	8	3080	1130	110	930	740	13800
1000	710	500	2210	3620	2040	1200	1000	610	150	250	130	250	1050	3170	2220	1320	75	52	8	3440	1220	135	1040	815	19300

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

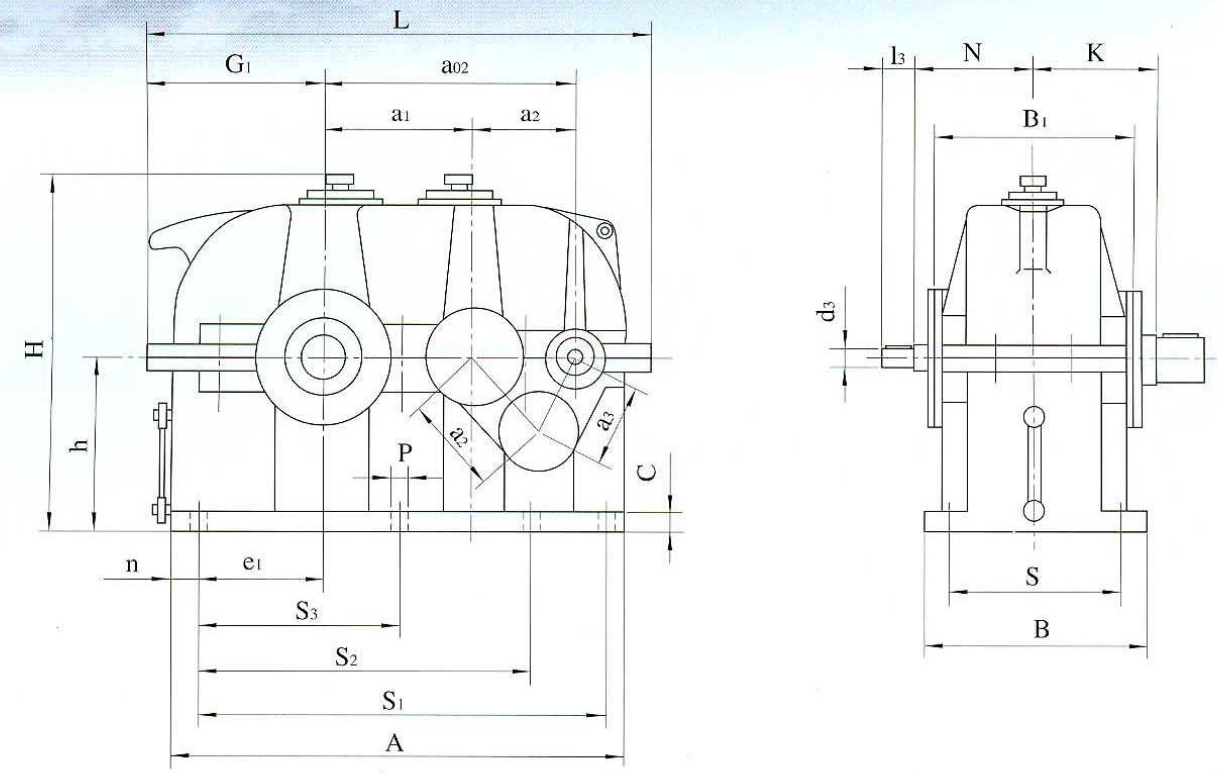

图 10　DQJRSD 型减速器外形及安装尺寸

Figue 10　Outline and mounting sizes for type DQJRSD

表 7　DQJRSD 型减速器外形及安装尺寸　　mm

Table 7　Outline and mounting sizes for type DQJRSD　　mm

名义中心距 Nominal center distance a_1	a_2	a_3	a_{02}	外形尺寸			中心高 h	N	i_N= 35.5-71		i_N= 80-200		地脚安装尺寸							A	B_1	n	G_1	e_1	参考质量 reference quality (kg)
				L	H	B			d_3	l_3	d_3	l_3	S	S_1	S_2	S_3	C	P	孔数						
140	100	71	240	494	305	220	140	120	22	50	18	40	175	380		190	22	18	6	430	190	25	172	115	89
170	118	85	288	577	365	250	170	135	28	60	22	50	205	460		230	25	18	6	513	215	27	197	138	145
200	140	100	340	664	425	275	200	180	32	80	28	60	230	550		275	25	18	6	600	250	25	222	165	246
236	170	118	406	796	497	330	236	210	38	80	32	80	280	660		330	28	23	6	716	300	30	265	195	380
280	200	140	480	925	585	360	280	235	45	110	38	80	310	780		390	30	23	6	845	340	33	303	230	640
335	236	170	571	1100	695	430	335	255	50	110	45	110	370	940		450	35	27	6	1006	400	35	362	280	1050
400	280	200	680	1289	830	510	400	285	55	110	50	110	450	1100		550	40	27	6	1195	490	50	422	325	1470
450	315	224	765	1462	930	590	450	310	60	140	55	110	490	1240	1000	600	40	33	8	1350	550	55	481	370	1890
500	355	250	855	1622	1030	640	500	350	70	140	60	140	540	1390	1120	670	45	33	8	1510	620	60	531	415	2920
560	400	280	960	1872	1160	710	560	385	80	170	70	140	600	1550	1250	750	50	39	8	1690	690	70	596	460	4080
630	450	315	1080	2037	1300	770	630	425	90	170	80	170	650	1750	1410	850	55	39	8	1905	770	80	666	520	5100
710	500	355	1210	2278	1460	860	710	450	100	210	90	170	740	1960	1580	950	60	45	8	2130	868	85	744	585	6970
800	56	400	1360	2538	1640	980	800	490	110	210	100	210	830	2195	1770	1060	65	45	8	2390	980	100	824	650	8910
900	630	450	1530	2860	1840	1100	900	540	130	250	110	210	950	2480	2000	1200	70	52	8	2700	1130	110	930	740	13150
1000	710	500	1710	3200	2040	1200	1000	610	150	250	130	250	1050	2750	2220	1320	75	52	8	3020	1220	135	1040	815	18600

注：高速轴端配键按 GB/T 1095。　Note: Square of high-speed shaft extension is on the basis of GB/T1095.

5 传动比 Transmission ratio

表 8 公称传动比与实际传动比
Table 8 Nominal ratio and actual reato

中心距 center distance a_1(mm)	DQJR、DQJRD型公称传动比 i_N Nominal transmission ratio										
	10	11.2	12.5	14	16	18	20	22.4	25	28	31.5
	DQJR、DQJRD型实际传动比 $i_{实}$ actual transmission ratio										
140	10.125	10.957	12.031	13.965	16.540	17.786	20.357	21.884	25.877	28.044	30.906
170	9.901	10.783	12.231	13.985	16.151	17.438	20.561	22.143	24.231	28.275	30.941
200	9.750	11.316	12.246	13.533	15.675	18.505	20.168	22.088	24.232	26.974	32.348
236	9.665	11.025	12.688	13.665	16.013	17.438	20.561	22.500	24.281	27.058	31.353
280	9.667	11.000	12.630	13.588	15.889	17.286	19.333	21.923	24.167	27.560	30.381
335	10.000	10.774	12.469	13.759	15.891	17.321	20.230	22.121	24.327	27.232	31.250
400	9.688	11.118	12.031	14.250	15.615	18.125	19.442	21.647	25.852	27.326	31.214
450	9.805	11.211	12.022	13.453	15.453	17.594	19.239	21.763	24.304	26.904	30.859
500	9.759	10.880	12.196	13.762	15.658	18.000	19.391	22.768	24.643	26.892	32.083
560	9.625	10.818	12.250	14.000	15.400	17.445	19.221	22.000	24.410	27.657	30.338
630	9.910	11.134	12.152	13.519	15.368	17.654	20.404	22.055	25.195	27.233	31.848
710	9.861	11.116	12.622	13.494	15.609	17.982	19.391	21.551	24.667	26.944	31.010
800	9.947	11.270	12.031	13.806	16.024	17.356	19.476	21.835	24.333	28.779	31.118
900	9.923	11.146	12.343	13.747	15.420	17.469	19.762	22.594	24.141	27.974	30.302
1000	9.725	10.936	12.384	13.975	15.900	17.381	19.691	21.579	24.785	27.128	31.059

续表 8　Table 8

中心距 center distance a_1(mm)	DQJS、DQJRS、DQJSD、DQJRSD型公称传动比 i_N Nominal transmission ratio															
	35.5	40	45	50	56	63	71	80	90	100	112	125	140	160	180	200
	DQJS、DQJRS、DQJSD、DQJRSD型实际传动比 $i_{实}$ actual transmission ratio															
140	34.777	39.132	42.969	48.758	54.018	61.296	72.600	77.629	89.571	96.737	114.376	129.973	139.720	153.188	179.143	192.060
170	33.923	38.648	55.466	47.949	55.466	60.198	70.055	76.289	85.936	97.918	107.531	124.341	136.548	158.773	178.427	192.782
200	34.125	39.607	42.861	49.750	53.997	59.922	69.705	78.667	85.791	100.842	108.405	126.773	138.838	152.316	184.615	192.789
236	35.042	38.987	42.859	49.839	53.808	60.258	68.327	80.567	87.013	95.463	111.031	121.500	143.654	157.084	172.753	200.174
280	34.118	38.183	43.405	47.958	53.181	61.387	67.667	76.612	85.446	97.120	108.037	119.567	135.988	152.914	172.969	196.676
335	35.368	38.659	44.100	50.750	54.662	61.215	69.750	76.327	88.442	97.125	108.231	123.231	137.722	154.167	183.814	202.344
400	34.263	39.339	45.397	49.000	53.842	61.250	71.094	77.000	89.375	96.078	108.172	122.207	136.067	162.500	171.023	200.000
450	34.753	39.860	43.332	47.832	54.080	61.212	67.894	78.156	87.364	95.834	108.164	119.727	133.563	155.618	171.941	191.748
500	34.604	38.888	43.389	49.479	53.240	61.711	69.079	79.412	86.055	99.539	107.629	126.434	137.296	163.422	177.633	194.030
560	34.074	39.102	42.910	48.077	55.250	60.093	68.047	76.752	87.290	100.308	109.010	119.567	135.484	152.000	176.000	193.063
630	33.811	39.048	42.904	48.201	54.558	59.956	67.487	77.098	85.570	96.319	106.579	119.892	134.329	152.952	173.233	198.992
710	33.875	38.317	43.547	47.921	53.441	59.935	68.494	77.311	86.818	96.996	106.773	122.210	133.365	154.704	184.021	203.357
800	33.957	38.166	43.217	48.648	55.598	63.111	67.757	77.715	85.547	97.378	107.124	121.084	133.985	153.110	179.412	195.599
900	34.457	38.378	43.117	47.538	53.217	60.234	68.509	76.842	86.928	95.251	106.425	121.445	133.276	152.594	171.387	194.163
1000	34.029	37.988	42.717	47.795	54.144	61.047	69.796	79.442	85.464	98.248	106.456	118.762	134.545	155.118	171.370	189.823

6 减速器的承载能力 Carrying capacity of reducer

1) 减速器用于通用减速器时承载能力见表 9。
2) 减速器用于起重机工作级别 M5 时的承载能力见表 10。
3) 输出轴端允许的最大径向载荷见表 11。
1) Carrying capacity for reducer used in current reducer see talble 9;
2) Carrying capacity for reducer used in classification group of M5 see table 10;
3) Allowed max. radial load on output shaft extension see table 11.

表 9 Table 9

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio										
			10	11.2	12.5	14	16	18	20	22.4	25	28	31.5
			DQJR型、DQJRD型额定功率 P_{IN} (kW) Rated power of type DQJR, DQJRD										
		750	10.9	9.7	8.2	7.3	6.6	5.8	5.4	4.8	4.1	3.6	3.3
140	1420	1000	14.6	13.0	11.5	10.3	9.1	8.1	7.3	6.5	5.7	5.1	4.6
		1500	21.8	19.5	16.4	14.6	13.1	11.6	10.7	9.6	8.2	7.3	6.6
		750	18.2	16.3	14.6	13.0	11.1	9.8	8.6	7.7	7.3	6.5	5.7
170	2410	1000	24.6	21.9	19.1	17.1	15.3	13.6	11.8	10.6	9.8	8.7	7.6
		1500	36.4	32.6	29.2	26.0	22.2	19.6	17.2	15.4	14.6	13.0	11.4
		750	32.8	29.2	25.5	22.8	20.0	17.8	15.9	14.2	11.8	10.6	9.6
200	4230	1000	43.7	39.0	34.6	30.8	27.3	24.3	21.8	19.5	17.3	15.5	13.7
		1500	65.6	58.4	51.0	45.6	40.0	35.6	31.8	28.4	23.6	21.2	19.2
		750	51.0	45.5	41.0	36.6	31.9	28.3	25.0	22.4	20.0	17.8	15.8
236	6825	1000	68.3	61.0	53.7	48.0	42.8	38.0	33.7	30.0	27.3	24.4	21.4
		1500	102	91.0	82.0	73.2	63.8	56.6	50.0	44.8	40.0	35.6	31.6
		750	91.0	81.3	69.2	61.8	53.7	47.7	45.5	40.6	34.6	30.8	26.4
280	11920	1000	117	105	96.5	86.1	76.4	68.0	61.0	54.4	49.1	43.9	39.1
		1500	182	163	138	124	107	95.4	91.0	81.2	69.2	61.6	52.8
		750	144	128	113	101	88.3	78.4	71.9	64.2	57.3	51.2	44.6
335	19290	1000	193	172	153	137	118	106	96.5	86.1	76.4	68.3	61.0
		1500	288	257	226	202	177	157	144	128	115	102	89
		750	237	211	182	163	140	125	118	106	91.0	81.3	75.5
400	30850	1000	319	285	253	226	199	178	153	137	122	109	100
		1500	473	422	364	326	280	249	237	211	182	163	151
		750	328	292	255	228	205	182	164	147	127	114	102
450	42770	1000	437	390	347	309	277	246	218	195	173	155	140
		1500	656	584	510	456	410	364	328	294	254	228	204
		750	473	420	369	339	298	278	264	236	216	193	168
500	69615	1000	632	569	493	455	398	375	356	318	282	252	228
		1500	946	841	739	679	595	555	528	471	431	386	337
		750	737	658	592	528	462	411	367	328	291	260	232
560	95550	1000	956	854	774	691	619	550	482	430	387	346	300
		1500	1474	1316	1184	1056	924	822	734	656	582	520	464

续表 9　　Table 9

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio									
			10	11.2	12.5	14	16	18	20	22.4	25	28	31.5
			DQJR型、DQJRD型额定功率 P_{IN} (kW) Rated power of type DQJR, DQJRD										
		750	956	854	761	679	601	534	478	427	380	339	300
630	124670	1000	1283	1146	1026	916	806	717	632	564	513	459	403
		1500	1912	1708	1522	1358	1202	1068	956	854	760	678	600
		750	1415	1263	1121	1001	874	776	708	632	561	501	437
710	184730	1000	1866	1665	1487	1328	1183	1052	928	829	743	664	592
		1500	2830	2526	2242	2002	1748	1552	1416	1264	1122	1002	874
		750	1911	1706	1520	1357	1199	1067	956	854	760	679	600
800	249340	1000	2507	2239	2749	1826	1603	1425	1235	1103	1005	897	802
		1500	3822	3412	3040	2714	2398	2134	1912	1708	1520	1358	1200
		750	2251	2054	1836	1629	1429	1356	1292	1231	1092	975	865
900	357630	1000	3012	2749	2457	2185	1913	1775	1652	1543	1379	1231	1101
		1500	4503	4108	3673	3258	2857	2712	2584	2462	2184	1949	1729
		750	3097	2971	2875	2567	2284	2030	1793	1601	1433	1279	1138
1000	464100	1000	3961	3849	3756	3353	2915	2591	2321	2072	1822	1627	1458
		1500	6193	5942	5749	5134	4568	4060	3585	3201	2867	2559	2277

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio														
			35.5	40	45	50	56	63	71	80	90	100	112	125	140	160	180	200
			DQJS、DQJSD、DQJRS、DQJRSD型额定功率 P_{IN} (kW) Rated power of type DQJS、DQJSD、DQJRS、DQJRSD														
		750	3.0	2.6	2.4	2.2	1.9	1.6	1.5	1.3	1.1	1.1	1.0	0.8	0.7	0.7	0.6	0.5
140	1420	1000	4.1	3.6	3.3	2.9	2.6	2.3	2.0	1.8	1.6	1.5	1.3	1.1	1.0	1.0	0.9	0.7
		1500	6.0	5.3	4.7	4.4	3.8	3.3	2.9	2.5	2.2	2.2	2.0	1.6	1.5	1.4	1.3	1.0
		750	5.1	4.6	4.0	3.5	3.2	2.9	2.5	2.3	2.0	1.7	1.5	1.4	1.2	1.0	0.9	0.9
170	2410	1000	6.8	6.1	5.5	4.9	4.4	3.8	3.4	3.1	2.7	2.5	2.2	1.9	1.7	1.5	1.4	1.2
		1500	10.2	9.1	8.0	7.1	6.4	5.8	5.1	4.6	4.0	3.5	3.1	2.7	2.4	2.0	1.8	1.7
		750	8.8	7.8	6.9	6.1	5.5	4.8	4.3	3.9	3.5	3.0	2.6	2.4	2.1	1.9	1.7	1.5
200	4230	1000	11.8	10.5	9.3	8.6	7.7	6.7	6.0	5.4	4.7	4.2	3.7	3.2	2.8	2.6	2.4	2.1
		1500	17.7	15.7	13.8	12.2	10.9	9.6	8.6	7.8	6.9	6.0	5.3	4.7	4.2	3.8	3.5	2.9
		750	14.4	12.7	11.3	10.0	8.9	7.9	7.0	6.4	5.6	5.0	4.5	3.9	3.5	3.1	2.7	2.4
236	6825	1000	19.1	16.9	15.0	13.7	12.2	10.9	9.6	8.5	7.6	6.7	6.0	5.3	4.7	4.2	3.7	3.3
		1500	28.8	25.5	22.6	20.0	17.8	15.8	14.0	12.7	11.3	10.0	8.9	7.8	6.9	6.2	5.5	4.7
		750	23.8	21.1	18.7	17.1	15.3	13.2	11.7	10.5	9.3	8.6	7.6	6.6	5.9	5.5	4.8	4.2
280	11920	1000	33.9	30.0	26.7	22.3	19.9	17.7	15.7	14.1	12.6	11.1	9.9	8.9	8.0	7.3	6.5	5.9
		1500	47.5	42.2	37.5	34.2	30.6	26.4	23.5	20.9	18.6	17.1	15.3	13.3	11.8	10.9	9.6	8.4
		750	41.0	36.4	32.4	28.7	25.6	22.8	20.2	18.2	16.2	14.6	13.0	10.9	9.7	9.1	8.1	7.1
335	19290	1000	54.3	48.2	42.9	38.2	34.1	29.6	26.2	24.6	21.8	20.0	17.8	15.9	14.2	11.8	10.6	9.6
		1500	82.1	72.8	64.8	57.3	51.1	45.5	40.4	36.4	32.4	29.1	26.0	21.8	19.5	18.2	16.2	14.2
		750	64.6	57.3	51.0	41.9	37.4	34.6	30.7	26.4	23.5	21.8	19.5	17.3	15.5	12.7	11.3	10.9
400	30850	1000	89.2	79.2	70.3	63.7	56.9	50.1	44.4	39.1	34.8	31.9	28.5	25.5	22.8	19.1	17.0	15.5
		1500	129	115	102	83.7	74.8	69.2	61.3	52.8	47.0	43.7	38.9	34.6	30.9	25.5	22.6	21.8

续表 9　　Table 9

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio														
			35.5	40	45	50	56	63	71	80	90	100	112	125	140	160	180	200
			DQJS、DQJSD、DQJRS、DQJRSD型额定功率 P_{IN} (kW) Rated power of type DQJS、DQJSD、DQJRS、DQJRSD														
		750	87.2	77.4	68.8	63.7	56.9	51.0	45.2	38.2	33.9	31.9	28.5	25.5	22.8	19.1	17.0	15.5
450	42770	1000	124	110	97.4	86.5	77.2	70.1	62.2	54.6	48.5	41.9	37.4	33.7	30.0	26.8	23.8	20.9
		1500	174	155	138	127	114	102	90.5	76.4	67.9	63.7	57.0	51.0	45.5	38.2	34.0	30.9
		750	142	123	111	98.3	89.4	81.9	72.7	63.7	56.6	50.1	44.7	40	35.8	30.9	27.5	24.6
500	69615	1000	191	164	148	132	128	109	96.5	86.5	76.8	68.3	61	54.6	48.8	41.9	37.2	31.9
		1500	284	246	222	197	179	164	145	127	113	100	89.4	80.1	71.5	61.9	55	49.1
		750	206	183	162	144	128	109	96.5	86.5	76.8	67.3	60.2	53.7	48.0	41.9	37.2	33.7
560	95550	1000	277	426	218	191	170	155	137	118	105	92.8	82.9	73.7	65.8	56.4	50.1	45.5
		1500	411	366	324	288	257	218	193	173	154	135	120	107	95.9	83.7	74.4	67.3
		750	261	232	206	187	167	147	129	110	97.4	89.2	79.6	71.0	63.3	53.7	47.7	44.6
630	124670	1000	359	319	283	255	228	200	177	157	138	121	107	96.5	86.1	74.6	66.3	58.2
		1500	522	464	411	375	333	293	258	220	195	178	159	142	127	107	95.4	89.2
		750	373	331	294	261	233	205	181	166	147	130	116	102	91.0	82.8	73.6	64.6
710	184730	1000	522	464	412	373	333	292	258	229	204	177	158	137	121	114	101	87
		1500	746	662	588	522	466	410	362	331	293	260	231	204	182	166	147	129
		750	522	464	412	375	334	298	265	232	206	184	164	147	130	116	102	90
800	249340	1000	700	622	552	500	446	396	351	314	278	246	219	196	175	156	138	125
		1500	1045	928	824	750	668	597	530	464	411	368	328	293	260	231	204	180
		750	769	683	606	546	487	410	363	346	307	273	243	214	190	168	149	132
900	357630	1000	984	874	776	692	617	546	484	410	364	341	304	268	239	209	186	164
		1500	1538	1365	1212	1092	974	819	726	692	613	546	486	428	380	337	298	264
		750	1009	896	796	719	642	571	506	450	400	350	312	273	243	217	192	164
1000	464100	1000	1335	1185	1053	924	824	733	650	573	510	460	410	355	317	278	247	220
		1500	2018	1793	1593	1438	1283	1141	1012	901	801	701	624	546	486	433	384	328

表 10　起重机工作级别 M5 时减速器的承载能力

Table 10 Carrying capacity for reducer used in classification group of M5

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio									
			10	11.2	12.5	14	16	18	20	22.4	25	28	31.5
			DQJR型、DQJRD型额定功率 P_{IN} (kW)　Rated power of type DQJR, DQJRD										
		570	9.5	8.5	7.6	6.8	6.0	5.3	4.6	4.1	3.8	3.4	3.0
140	1560	710	12.0	10.7	9.0	8.0	7.2	6.4	5.9	5.3	4.5	4.0	3.6
		950	16.0	14.3	12.6	11.3	10.0	8.9	8.0	7.1	6.3	5.6	5.0
		570	16.3	14.6	12.5	11.2	10.0	8.9	8.1	7.2	6.4	5.7	5.1
170	2650	710	20	17.9	16	14.3	12.2	10.8	9.5	8.5	8.0	7.1	6.3
		950	27	24.1	21	18.8	16.8	14.9	13	11.6	10.8	9.6	8.4
		570	28.5	25.4	23	20.5	18.0	16.0	14	12.5	11	9.8	9
200	4650	710	36	32.1	28	25.0	22	19.6	17.5	15.6	13	11.6	10.6
		950	48	42.9	38	33.9	30	26.7	24	21.4	19	17.0	15

续表 10　　Table 10

中心距 Center distance (mm)	输出转矩 Outer torque (N.m)	输入转速 Input rotate speed (r/min)	公称传动比 Nominal transmission ratio										
			10	11.2	12.5	14	16	18	20	22.4	25	28	31.5
			DQJR型、DQJRD型额定功率 P_{IN} (kW) Rated power of type DQJR, DQJRD										
		570	45	40.2	36	32.1	28	24.9	22.5	20.1	18	16.1	14.4
236	7500	710	56	50.0	45	40.2	35	31.1	27.5	24.6	22	19.6	17.4
		950	75	67.0	59	52.7	47	41.8	37	33.	30	26.8	23.5
		570	78	69.6	61	54.5	51	45.3	40	35.7	32	28.6	24
280	13100	710	100	89.3	76	67.9	59	52.4	50	44.6	38	33.9	29
		950	129	115	106	94.6	84	74.7	67	59.8	54	48.2	43
		570	127	113	100	89.3	80	71.1	64	57.1	50	44.6	41
335	21200	710	158	141	124	111	97	86.2	79	70.5	63	56.3	49
		950	212	189	168	150	130	116	106	94.6	84	75.0	67
		570	210	188	155	138	132	117	105	93.8	84	75.0	66
400	33900	710	260	232	200	179	154	137	130	116	100	89.3	83
		950	351	313	278	248	219	195	168	150	134	120	110
		570	287	256	230	205	182	162	143	128	116	104	90
450	47000	710	360	321	280	250	225	200	180	161	140	125	112
		950	480	429	381	340	304	270	240	214	190	170	154
		570	418	372	326	300	263	245	235	210	190	170	150
500	76500	710	520	462	406	373	327	305	290	259	237	212	185
		950	695	625	542	500	437	412	391	349	310	277	250
		570	652	582	520	464	408	363	323	288	260	232	206
560	105000	710	810	723	650	580	508	452	403	360	320	286	255
		950	1050	938	850	759	680	604	530	473	425	380	330
		570	843	753	670	598	530	471	421	376	335	299	265
630	137000	710	1050	938	836	746	660	587	525	469	418	373	330
		950	1410	1259	1128	1007	886	788	694	620	564	504	443
		570	1250	1116	990	884	780	693	625	558	495	442	390
710	203000	710	1555	1388	1232	1100	960	853	778	695	616	550	480
		950	2050	1830	1634	1459	1300	1156	1020	911	817	730	650
		570	1684	1504	1340	1196	1058	940	842	752	670	598	529
800	274000	710	2100	1875	1670	1491	1318	1172	1050	938	835	746	659
		950	2755	2460	2248	2007	1762	1566	1357	1212	1104	986	881
		570	1986	1812	1620	1440	1260	1205	1150	1090	977	872	775
900	393000	710	2474	2257	2018	1790	1570	1490	1420	1353	1200	1071	950
		950	3310	3021	2700	2401	2102	1950	1815	1696	1515	1353	1210
		570	2732	2620	2530	2259	1981	1761	1585	1415	1265	1130	1006
1000	510000	710	3403	3265	3159	2821	2510	2231	1970	1759	1575	1406	1251
		950	4353	4230	4127	3685	3203	2847	2550	2277	2002	1788	1602

续表 10　　Table 10

中心距 center distance (mm)	输出转矩 outer torque (N.m)	输入转速 input rotate speed (r/min)	公称传动比 Nominal transmission ratio															
			35.5	40	45	50	56	63	71	80	90	100	112	125	140	160	180	200
			DQJS、DQJSD、DQJRS、DQJRSD型额定功率 P_{IN} (kW) Rated power of type DQJS、DQJSD、DQJRS、DQJRSD															
		570	2.7	2.4	2.1	1.9	1.7	1.5	1.3	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.5
140	1560	710	3.3	2.9	2.6	2.4	2.1	1.8	1.6	1.4	1.2	1.2	1.1	0.9	0.8	0.75	0.7	0.55
		950	4.5	4.0	3.6	3.2	2.9	2.5	2.2	2.0	1.8	1.6	1.4	1.25	1.1	1.1	1.0	0.8
		570	4.5	4.0	3.6	3.2	2.9	2.5	2.2	2.0	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.9
170	2650	710	5.6	5.0	4.4	3.9	3.5	3.2	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1	1.0	0.95
		950	7.5	6.7	6.0	5.4	4.8	4.2	3.7	3.4	3.0	2.7	2.4	2.1	1.9	1.7	1.5	1.3
		570	7.8	6.9	6.1	5.6	5.0	4.5	4.0	3.4	3.0	2.8	2.5	2.2	2.0	1.7	1.5	1.3
200	4650	710	9.7	8.6	7.6	6.7	6.0	5.3	4.7	4.3	3.8	3.3	2.9	2.6	2.3	2.1	1.9	1.6
		950	13.0	11.5	10.2	9.5	8.5	7.4	6.6	5.9	5.2	4.6	4.1	3.5	3.1	2.9	2.6	2.3
		570	12.7	11.3	10.0	9.0	8.0	7.2	6.4	5.6	5.0	4.4	3.9	3.5	3.1	2.7	2.4	2.1
236	7500	710	15.8	14	12.4	11.0	9.8	8.7	7.7	7.0	6.2	5.5	4.9	4.3	3.8	3.4	3.0	2.6
		950	21.0	18.6	16.5	15.0	13.4	12	10.6	9.3	8.3	7.4	6.6	5.8	5.2	4.6	4.1	3.6
		570	21.4	19	16.9	15.0	13.4	11.8	10.5	9.5	8.4	7.7	6.9	6.2	5.5	4.8	4.3	3.8
280	13100	710	26.1	23.2	20.6	18.8	16.8	14.5	12.9	11.5	10.2	9.4	8.4	7.3	6.5	6.0	5.3	4.6
		950	37.2	33	29.3	24.5	21.9	19.5	17.3	15.5	13.8	12.2	10.9	9.8	8.8	8.0	7.1	6.5
		570	36.1	32	28.4	26	23.2	20.3	18.0	17	15.1	12.8	11.4	10.2	9.1	8	7.1	6.7
335	21200	710	45.1	40	35.6	31.5	28.1	25	22.2	20	17.8	16	14.3	12.0	10.7	10	8.9	7.8
		950	59.7	53	47.1	42	37.5	32.5	28.8	27	24.0	22	19.6	17.5	15.6	13	11.6	10.6
		570	58.6	52	46.2	42	37.5	34	30.2	26	23.1	20.5	18.3	16.5	14.7	13	11.6	11
400	33900	710	71.0	63	56.0	46	41.1	38	33.7	29	25.8	24	21.4	19	17.0	14	12.4	12
		950	98.0	87	77.3	70	62.5	55	48.8	43	38.2	35	31.3	28	25.0	21	18.7	17
		570	82.3	73	64.9	58	51.8	45	39.9	36	32.0	29	25.9	22	19.6	18	16.0	14
450	47000	710	95.8	85	75.6	70	62.5	56	49.7	42	37.3	35	31.3	28	25.0	21	18.7	17
		950	136	121	107	95	84.8	77	68.3	60	53.3	46	41.1	37	33.0	29.5	26.2	23
		570	126	108	98	86	83.0	73	64.8	58	51.6	45	40.2	34	30.4	28	24.9	21
500	76500	710	156	135	122	108	98.2	90	79.9	70	62.2	55	49.1	44	39.3	34	30.2	27
		950	210	180	163	145	141	120	106	95	84.4	75	67.0	60	53.6	46	40.9	35
		570	180	160	142	125	111	100	88.7	78	69.3	60	53.6	48	42.9	38	33.8	29.5
560	10500	710	226	201	178	158	141	120	106	95	84.4	74	66.1	59	52.7	46	40.9	37
		950	304	270	240	210	187	170	150	130	115	102	91.1	81	72.3	62	55.1	50
		570	236	210	186	168	150	130	115	101	89.8	80	71.4	62	55.4	50	44.4	39
630	137000	710	287	255	226	206	183	161	142	121	107	98	87.5	78	69.6	59	52.4	49
		950	394	350	311	280	250	220	195	172	152	133	118	106	94.6	82	72.9	64
		570	349	310	275	240	214	190	168	145	128	115	102	93	83.0	74	65.8	59
710	203000	710	410	364	323	287	256	225	199	182	161	143	127	112	100	91	80.9	71
		950	574	510	453	410	366	321	284	252	224	195	174	150	133	125	111	96
		570	473	420	373	330	294	263	233	209	185	165	147	131	117	102	90.7	82
800	274000	710	574	510	453	412	367	328	291	255	226	202	180	161	143	127	112	99
		950	769	683	607	549	490	435	386	345	306	270	241	215	192	171	152	137

续表 10　　Table 10

中心距 center distance (mm)	输出转矩 outer torque (N.m)	输入转速 input rotate speed (r/min)	公称传动比 Nominal transmission ratio															
			35.5	40	45	50	56	63	71	80	90	100	112	125	140	160	180	200
			DQJS型、DQJSD型、DQJRS型、DQJRSD型额定功率 P_{IN} (kW) Rated power of type DQJS、DQJSD、DQJRS、DQJRSD															
900	393000	570	676	600	533	450	401	380	337	300	266	240	214	185	165	145	128	115
		710	845	750	666	600	535	450	399	380	337	300	267	235	209	185	164	145
		950	1081	960	853	760	678	600	532	450	400	375	334	295	263	230	204	180
1000	510000	570	892	792	704	634	566	500	443	390	346	305	272	240	214	185	161	142
		710	1109	985	875	790	705	627	556	495	440	385	343	300	267	238	211	180
		950	1467	1302	1157	1015	906	805	714	630	560	506	451	390	348	305	271	242

表 11　输出轴端允许的最大径向载荷

Table 11　Allowed max. radial load on output shaft extension

名义中心距 a1 (mm) Nominal center distance		140	170	200	236	280	335	400	450	500	560	630	710	800	900	1000
最大允许径向载荷 Allowed max. radial load (KN)	二级减速器 double-stage reducer	5	7	9	15	21	28	35	55	60	75	100	107	120	150	200
	三级减速器 three-stage reducer	5	8	10	15	30	37	55	64	93	120	150	170	200	240	270

注：载荷作用位置对P型、H型轴伸为轴身中部，对C型轴伸齿宽中部。减速器输出轴端的瞬时允许转矩为额定转矩的2.7倍。

Note: Loading location for the shaft extension of type P, H is in the middle of shaft extension, for type C is in the middle of facewidth.

Allowed instantaneously torque for output shaft extension of reducer is 2.7 double of rated torque.

7 减速器的选用

7.1 选用方法 1（减速器用于冶金、矿山、化工、轻工等机构时）

减速器应根据传动比和使用要求确定类型，根据机械强度确定规格，并校核许用热功率及轴伸部位允许承受的径向载荷。

1) 根据机械强度确定减速器的规格

表 9 中减速器的额定功率 P_{IN} 是工况系数 K_A=1 时的值。当载荷性质不同时，用工况系数 K_A 修正。

减速器的计算功率 P_C 应满足：

$P_C=P_2K_A \leqslant P_{IN}$

式中：P_2——工作机功率，kW；

K_A——工况系数（见表 12）。

2) 热功率校核

表 13 中减速器的许用热功率 P_1 适用于环境温度 20℃，每小时 100% 连续运转的情况，情况不同时，用环境温度系数 K_T、运转周期系数 K_W 进行修正。

减速器的计算热功率 P_{CT} 应满足：

$P_{CT}=P_2K_TK_W \leqslant P_T$

式中：P_2——工作机功率，kW；

K_T——环境温度系数（见表 14）；

K_W——运转周期系数（见表 15）。

3) 校核轴伸部位承受的径向载荷

减速器的输出轴轴伸中间部位承受的径向载荷 Fr 应低于表 11 中规定的数值。

4) 选用示例

选一台链条输送机用圆柱齿轮减速器，已知：电动机功率 P_1=150kW，输入转速 n_1=1500r/min，链务输送机功率 P_2=120kW，公称传动比 i_N=12.5，环境温度 50℃，每小时运转周期为 100%，装配型式为 I 型，输出轴端为圆柱轴伸，输出轴轴伸中部的径向力为 14kN，减速器安装在室外。

选用步骤：

a 确定减速器的规格

由表 16 查得链条输送机载荷类别为 M，查表 12，K_A=1.25

因此，$P_C=P_2K_A$=120 × 1.25=150 (kW)

查表 9，减速机中心距为 335 时的额定功率 P_{IN}=226kW > P_C

b 校核热功率

查表 14，K_T=1.65

查表 15，K_W=1

因此，$P_{CT}=P_2K_TK_W$=120 × 1.65 × 1=198 (kW)

查表 13，减速机中心距为 335 时的许用热功率 P_T=235kW > P_{CT}，满足散热要求。

c 校核输出轴伸承受的径向载荷

查表 11，减速机中心距为 335 时，输出轴端允许的最大径向载荷为 28kN > 14kN

d 最后选定减速机的代号为 DQJRD335-12.5 IP。

7.2 选用方法 2（减速器用于起重机各机构时）

减速机用于起重机各机构时，应按起重机的工作级别进行选用。根据 GB/T3811 中的规定，起重机各机构按利用等级和载荷状态的不同分为 M1～M8 八种工作级别。本样本表 10 中所列的承载能力为 M5 工作级别的功率值，若用在其他工作级别时应按下式进行折算。

$P_{M5}=P_{Mi} \times 1.12^{(i-5)}$

7 减速器的选用 Decelerator selection

7.1 Select procedure 1 (Decelerator applicable for the mechansism of metallurgy, mine, chemical industry, and light industry.

The decelerator type can be selected on transmission ratio and use demand, the size can be selected on mechanical strength and check for the thermal power rating and radial load acting on shaft extension.

1) The decelerator size can be selected on mechanical strength

The decelerator nominal power in table 9 is the value of service factor K_A=1. When the load character diffient, service factor is used to correct.

The decelerator calculated power P_C should be need:

$P_C=P_2K_A \leqslant P_{IN}$

Where: P_2 —— Driven machine power, kW

K_A —— Service factor (see table 12)

2) Check for thermal power

The rated thermal power P_1 of decelerator in table 13 is the same with an ambient temperature 20℃, an operating cycle of 100% per hour, outherwise they must be corrected with anbient temperature K_T and factor for operation cycle K_W.

Decelerator caculated thermal power P_{CT} should be need:

$P_{CT}=P_2K_TK_W \leqslant P_T$

Where: P_2 —— Driven machine power, kW

K_T —— Factor for ambient temperature (see table 14)

K_W —— Factor for operation cycle (see table 15)

3) Check radial load on shaft extension

The overhang radial farce Fr on output shaft should not execcded the set values listed in table 11.

4) Selection example

Required: a cylindrical gear reducer for the drive of a chain conveyor. Given: Electric motor "Power" P_1=150kW, motor speed n_1=1500r/min, chain conveyor P_2=120kW, transmission ratio i_N=12.5, ambient temperature is 50℃, operating cycle per hour is 100%, assemble style: I, cylindrical shaft extension for output shaft, overhang radial load on output shaft: 14kN. It is installed outdoor.

Select step:

a. Determine decelerator size,

Form table 16, the load aymbol is M for chain conveyor, from table 12. K_A=1.25

Thus, $P_C=P_2K_A$=120 × 1.25=150 (kW)

By entering table 9, the norminal power for decelerator center distance 335 is P_{IN}=226kW > P_C

b. Check for thermal power

From table 14, K_T=1.65, from table 15, K_W=1, thus, $P_{CT}=P_2K_TK_W$=120 × 1.65 × 1=198 (kW)

Form table 13, the thermal power rated for decelerator center distance 335 is P_T=235kW > P_{CT}, so sufficient elimination of heat.

c. Check for overhand radial load on output shaft

From table 11, the largest allowed radial load on output shaft for decelerator center space 335 is 28kN > 14kN

d. Finally, type DQJRD335-12.5 IP decelerator is chosen.

7.2 Selection procedure 2 (Decelerator applicable for the mechansism of crane)

When decelerator is applied in craning mechansisms, it should be selected according to classification group. According to GB/T3811, there are M1～M8 8 types of wording series for each device of the crane on basic of different series utilized or load state. The loading capacity listed in table 10 is the power of M5. If other series is applied, the followed formula is applied,

$P_{M5}=P_{Mi} \times 1.12^{(i-5)}$

表 12　工况系数 K_A　Table 12　Service factors K_A

原动机 Prime mover	每天工作小时数 Daily service hours	工作机载荷类别* Load type for the driver machine		
		U	M	H
		工况系数K_A Service factor K_A		
电动机 Eleceric motors 涡轮机 Turbines 液压马达 Hydrailic motor	≤3	0.8	1	1.5
	>3～10	1	1.25	1.75
	>10	1.25	1.5	2
4～6缸活塞发动机 Piston engines 4-6 cy1	≤3	1	1.25	1.75
	>3～10	1.25	1.5	2
	>10	1.5	1.75	2.25
1～3缸活塞发动机 Piston engines 1-3 cy1	≤3	1.25	1.5	2
	>3～10	1.5	1.75	2.25
	>10	1.75	2	2.5

表 13　减速器许用热功率 P_T　Table 13　Allowed thermal power P_T

规 格 Size	DQJRD			DQJSD、DQJRSD		
	厂房小 Small space	厂房大 Large room	室外 Outdoor	厂房小 Small space	厂房大 Large room	室外 Outdoor
	空气流速 Air current speed ≥0.5m/s	空气流速 Air current speed ≥1.4m/s	空气流速 Air current speed ≥3.7m/s	空气流速 Air current speed ≥0.5m/s	空气流速 Air current speed ≥1.4m/s	空气流速 Air current speed ≥3.7m/s
140	22	35	47	18	27	35
170	33	47	63	26	38	50
200	46	65	85	36	53	70
236	67	99	126	51	75	99
280	98	114	177	70	100	132
335	128	180	235	100	143	188
400	182	260	345	130	190	245
450	225	320	420	158	226	305
500	285	395	538	213	292	391
560	345	485	650	250	360	470
630	430	630	810	318	446	595
710	550	765	1040	400	568	745
800	685	950	1280	500	710	950
900	867	1200	1620	633	900	1200
1000	1080	1500	2020	788	1120	1500

表 14　环境温度系数 K_T　Table 14　Factor for ambient temperature K_T

环境温度Ambient temperature，℃	10	20	30	40	50
环境温度系数 Factor for ambient temperature K_T	0.85	1.00	1.15	1.35	1.65

表 15　运转周期系数 K_W　Table 15　Operating cycle factor K_W

每小时运转周期 Operating cycle per hour %	100	80	60	40	20
运转周期系数 Operating cycle factor K_W	1.0	0.94	0.86	0.74	0.56

表 16　工作机载荷类别　　Table 16 Classification of reducer load

工作机 Working machine	载荷分类 Classification
风机 BLOWERS, VENTILATORS	
风机（轴向和径向） Blowers(axial and radial)	U
冷却塔风机 Cooling tower fans	M
引风机 Induced draught fans	M
螺旋活塞鼓风机 Rotary piston blowers	M
透平鼓风机 Turbo blowers	U
建筑机械 BUILDING MSCHINERY	
混凝土搅抖机 Concrete mixers	M
起重机 Hoists	M
路面建筑机械 Road construction machinery	M
化工机械 CHEMICAL INDUSTRY	
搅拌机（液状物） Agitators(liquid material)	U
搅拌机（半液状物） Agitaors(semi-liquid material)	M
离心机（重型） Centrifuges(heavy)	M
离心机（轻型） Centrifuges(light)	U
冷却滚筒 * Cooling drums	M
干燥滚筒 * Drying drums	M
搅拌机 Mixers	M
压缩机 COMPRESSORS	
活塞式压缩机 Piston compressors	H
涡轮式压缩机 Turbo compressors	M
传送运输机类 CONVEYORS	
板式输送机 Spron conveyors	M
压载升降机 Ballast elevators	M
袋式输送机 Band oicjet cibvetirs	M
皮带式运输机（散状物） Belt conveyors (bulk material)	M
皮带式运输机（块状物） Belt conveyors (piece goods)	M
粉料链门提升机 Bucket conveyors for flour	U
链条输送机 Chain conveyors	M
回旋输送机 Circular conveyors	M
运货升降机 Goods lifts	M
卷扬机 * Hoists	H
倾斜绞车 * Lnclined hoists	H
链条输送机 Link conveyors	M
（乘客）电梯 Passenger lifts	M
螺旋输送机 Screw conveyors	M
钢带输送机 Steel belt conveyors	M
槽式链条输送机 Trough chain conveyors	M
拖泄式绞车 Winches hauling	M

工作机 Working machine	载荷分类 Classification
挖掘机 DREDGERS	
门式提升机 Bucket conveyors	H
戽轮铲 Bucket wheels	H
铲 子 Cutter heads	H
机动绞车 Manoeuvring Winches	M
泵 Pumps	M
回转式起重机 Slewing gear	M
行走机构（链轨） Travelling gear (caterpil)	H
行走机构（铁轨） Travelling gear (rails)	M
食品机械 FOOD INDUSTRY MACHINERY	
灌瓶机和装箱机 Bottiing and container filling machines	U
甘蔗压榨机 * Cane crushers	M
甘蔗切割器 * Cane knives	M
甘蔗碾磨机 Cane mills	H
捏和机 Kneding machines	M
结晶器，搅拌器 Mash tubs,Crystallizers	M
打包机 Packaging machines	U
甜菜切碎机 Sugar beet crtters	M
甜菜清洗机 Sugar beet washing machines	M
发电机，变换器 GENERATORS、TRANSDORMERS	
频率变换器 Frequency transformers	H
发动机 Generators	H
电焊发电机 Welding generators	H
洗衣机类 LANUDRY	
干燥机 Tumblers	M
清洗机 Washing machines	M
金属滚轧机 METAL ROLLING MILLS	
钢坏剪断机 * Billet shears	H
链式输送机 * Chain transfers	M
冷轧机 * Cold rolling mills	H
连续铸造设备 * Continuous casting plant	H
冷床 * Cooling beds	M
剪料头机 * Cropping shears	H
横向输送设备 * Cross transters	M
除鳞机 * Descaling machines	H
中型板轧机 * Heavy and medium plate mills	H
钢锭初轧机 * Ingot and blooming mills	H
钢锭装卸机械 * Ingot bandling machinery	H
推锭机 * Ingot pushers	H
机械手 * Manipulators	H

续表 16

工作机 Working machine	载荷分类 Classification
剪板机 * Plate shears	H
板材翻转装置 * Plate titers	M
轧辊调整装置 * Roller adjustment drives	M
辊式矫直线 * Roller straighteners	M
辊道（重型）* Roller tables (heavy)	H
辊道（轻型）* Roller tables (light)	M
薄板轧机 * Sheet mills	H
修整剪切机 * Trinning shears	M
焊管机 Tube welding machines	H
绕线机(带材和线材) Winding machines(strip and wire)	M
拉线机 Wire drawing benches	M
金属加工机床 METSL WORKING MACHINES	
副轴（天轴）Counterhafts, line shafts	U
锻造机 Forging presses	H
锻锤 * Hammers	H
机床及辅助装置 Machine tools auxiliary drives	U
机床及主传动装置 Machine tools,main drives	M
金属刨床 Metal planing machines	H
板材矫直线 Piate straighting machines	H
压机 Presses	H
冲压机 Punch presses	H
剪切机 Shears	M
金属板折弯机 Sheet metal bending machines	M
石油工业机械类 OIL INDUSTRY	
管线泵 * Pipeline pumps	M
旋转式钻孔设备 Rotary drlling equipnebt	H
制纸机 PAPER MACHINES	
压光机 * Calenders	H
币板层叠机 * Couches	H
干燥滚筒 * Drying cylinders	H
上光滚筒 * Giazing cylinders	H
碎浆机 * Pulpers	H
木浆研磨机 * Pulp trinders	H
吸水辊 * Sictopm presses	H
吸水滚压机 * sucting presses	H
币板机 * Wet presses	H
威罗机 * Willows	H

工作机 Working machine	载荷分类 Classification
泵 PUMPS	
离心泵（轻液）Centrifudal pumps(light liquids)	U
离心泵（半液体）Centritugal pumps(semli-liquids)	M
活塞泵 * Piston pumps	H
柱塞泵 * Plunger pumps	H
压必泵 * Pressure pumps	H
塑料工业机械 ASTOC OMDISTRU ACROMERU	
压延机 * Calenders	M
挤压机 * Crushers	M
挤塑机 * Extriders	M
搅拌机 * Micers	M
橡胶机械类 RUBBER MACHINERY	
压延机 * Calenders	M
挤压机 * Extruders	H
揉和机 * Mixers	M
搅拌机 * Pug mills	H
滚轧机 * Rolling mills	H
石料及粘土加工机 STONE AND CLAYWORKING MACHINES	
球磨机 * Ball mills	H
冲击式碾磨机 * Beater mills	H
破碎机 Breakers	H
压砖机 Brick presses	H
锤磨机 * Hammer mills	H
旋转炉 * Rotary ovens	H
管磨机 * Tube mills	H
纺织机床类 TEXTILE MSCHINES	
送料机 Batchers	M
织布机 Looms	M
印染机 Printing and dyeing machines	M
揉瓮 Tanning vats	M
威罗机 Willows	M
软水处理 WATER TREATMENT	
松砂机 * Aerators	M
螺杆泵 Screw pumps	M
木工机床 WOOD WOEKING MSCHINES	
剥皮机 Barkers	H
刨床 Planing machines	M
锯床 * Saw frames	H
木工机床 Wood woeking mschines	U

注 1 U 为均匀载荷，M 为中等冲击载荷，H 为强冲击载荷
注 2 标“*”者表示仅用于 24h 工作制

Note1 U —— stable load, M —— middle load, H —— high load
Note2 “*” only on the basis of 24hrs daily service.

式中，P_{M5}——功率表（表 10）所列的许用功率值，kW；

i——工作级别 M（1～8）；

P_{Mi}——相对 Mi 工作级别的功率值，kW。

1) 起重机各机构疲劳计算基本载荷 Mmax

a 起升和非平衡变幅机构

$Mmax=\Phi_6 \times Mn$

式中，Φ_6——动载系数；

Mn——电机额定转矩；

$\Phi_6=0.5(1+\Phi_2)$

Φ_2——起升载荷系数按表 17 进行计算。

Where, P_{M5}—— noimal power listed in power table (table 10). kW;

i—— classification group M(1～8);

P_{Mi}—— the power of Mi series. kW

1) The basic leak calculation load of craning mechansisms. Mmax

a) lifting and unbalanced mechansisms

$Mmax=\Phi_6 \times Mn$

Where, Φ_6—— load factor;

Mn—— motor rated torque;

$\Phi_6=0.5(1+\Phi_2)$

Φ_2—— lifting load facter calculated according to table 17

表 17 起升载荷系数 Φ_2 Table 17 Lifting load factor Φ_2

起重机类别 Crane type	Φ_2的计算式 Formula	适用的例子 Example
1	1+0.17V	作安装用的、使用轻闲的臂架起重机 Jib type crane used for installing with free.
2	1+0.35V	作安装用的桥式起重机，作一般装卸用的吊钩式臂架起重机 Overhead travelling crane used for installing, hook jib type crane used for load and unload commonly.
3	1+0.70V	在机加工车间和仓库中用的吊钩式起重机，港口抓斗门座起重机 Hook crane used in machining workshop and storage, port grabbing portal crane.
4	1+1.00V	抓斗和电磁桥式起重机 Grabbing carne and overhead crane with magnet.

注：V——起升速度，m/s。 Note: V----lifting speed

b 运行和回转机构

$Mmax=\Phi_5 \times \Phi_8 \times Mn$

式中 Φ_5——考虑弹性振动的力矩增大系数，对突然起动的机构，$\Phi_5=1.5～1.7$，对较平稳起动的机构，$\Phi_5=1.1～1.5$。系统的弹性阻尼大者取小值。对 M1～M5 工作级别，取 $\Phi_5=1$。

Φ_8——刚性动载系数，与电动机驱动特性和计算零件两侧的转动惯量的比值有关，$\Phi_8=1.2～2.0$。

C 平衡变幅机构

疲劳计算基本载荷取为该零件承受的等效变幅静阻力矩，其它零件取为电动机额定转矩传到该计算零件力矩的 1.3～1.4 倍。

当最大工作载荷低于 2.7 倍的额定力矩时可不进行静强度校核，当最大工作载荷超过 2.7 倍的额定力矩时应验算零件的静强度或者选大一号机座的减速器。

D 根据疲劳计算基本载荷和转速换算出功率值 P_{Mi}。

$P_{Mi}=Mmax \cdot n/9550$

式中：Mmax——疲劳计算基本载荷，N · m；

n——减速器输入轴转速，r/min。

如果工作级别不是M5，按式A3进行换算至M5工作级别时的功率P_{M5}，然后再根据输入转速n及公称传动比i_N选择减速器。

2) 选用举例

选用一台起重量为32t，跨度过为25.5m的桥式起重机，其起升机构的电机额定功率为63kW，转速为731r/min，起升速度为8m/min，机构工作级别为M7，减速器的传动比为40，要求第III种装配型式，齿轮轴端，卧式安装。

选用计算：电机的额定转矩：

Mn=9550P/N=9550 × 63/750=802 (Nm)

起升载荷系数：

ϕ_2=1+0.70V=1+0.70 × 8/60=1.093

式中：V——起升速度m/s

动载系数：

ϕ_6=1/2 ×(1+ϕ_2)=(1+1.093)/2=1.047

疲劳计算基本载荷：Mmax=ϕ_6 × Mn=1.047 × 802=840(Nm)

相对于M7工作级别的功率：

P_{M7}=Mmax × n/9550=840 × 750/9550=65.97(kW)

再折合成M5时的功率：

$P_{M5}=P_{M7} \times 1.12^{[7-5]}$=82.75(kw)

当n=710r/min，i=40时查表10，高速轴许用功率为85kW相对应的减速器中心距为450，最后选定：DQJS450-40 III C。

如果选用的是带底座式起重机减速器，则选定：DQJSD-40 III C。

b) Traversing and slewing mechansism

Mmax=$\Phi_5 \times \Phi_8 \times$ Mn

Where, Φ_5——stretching vibrant arising factor.

for the mechansisms start-up suddenly. Φ_5=1.5～1.7

for the mechansisms start-up smoothly. Φ_5=1.1～1.5

It should be low of the damp stretch is big.

for classification group of M1～M5, Φ_5=1

Φ_8——rigid loading factor it is related to driving characteristic and ratio calculated inertia both sides of part.

c) Balance changing mechansisms

In leak calculation the basic load is determined by loaded resistance torque of the parts. for other parts, the basic load is 1.3～1.4 times of torque from motor rated torque to this related parts. You can check under silent intensyty should be checked and larger type of decelerator should be selected.

d) The retated power of this series can be calculated according to basic leak load and torque.

P_{Mi}=Mmax · n/9550

Where, Mmax——the basic leak calculation load

n——input shaft rotating speed

If the series isn't M5, the series power P_{M5} can be calculated according to formula*, and

the reducer can be selected on P_{M5}, input rotating speed i and nominal transmission ratio n.

2) Selecting example

Over head travelling crane with weight of 32ton and span of 25.5m, the hoisting mechanism rated power is 63kW, the rotating speed is 731r/min, the lifting speed is 8m/min, the classification group is M7, the transmission ratio is 40, the installing form is Ⅲ, gear shaft extension, horizontal installization, the related reducer should be selected.

Calculating for selecting: Rated torque:

$Mn=9550P/N=9550 \times 63/750=802$ (Nm)

Lifting load factor:

$\phi_2=1+0.70V=1+0.70 \times 8/60=1.093$

Where, V —— lifting speed, m/s

Dynanic loading factor:

$\phi_6=1/2 \times (1+\phi_2)=(1+1.093)/2=1.047$

The basic leak calculation load: $Mmax=\phi_6 \times Mn=1.047 \times 802=840$(Nm)

Calculated power for M7 classification group:

$P_{M7}=Mmax \times n/9550=840 \times 750/9550=65.97$(kW)

Related power for M5

$P_{M5}=P_{M7} \times 1.12^{[7-5]}=82.75$(kw)

When n=710r/min, i=40, check table 10, the allowed high-speed shaft power is 85kW, the related reducer is: DQJS450-40 Ⅲ C.

If the type is foot mounted gearboxes for cranes, the related reducer is: DQJSD-40Ⅲ C.

8 减速器的润滑 Reducer lubrication

1) 三支点支承式减速器卧式安装时采用油池飞溅润滑。当环境温度低于0℃时，应有润滑加热装置。采用油池飞溅润滑时，启动油温应高于0℃；采用循环油喷油润滑时，启动油温应高于5℃。

2) 润滑油必须选用GB/T5903-1995中的重载荷工业齿轮油L-CKD320、L-CKD220，南方地区采用L-CKD320，北方地区采用L-CKD220。

3) 轴承采用飞溅油润滑，所用润滑油品与齿轮润滑油品相同。

1) Oil sump slashing is used to lubricate horizontal reducer of three-point support gearboxes. If ambient temperature is lower 0℃, it should have the lubrication heat the device. If oil sump slashing is used for lubrication, reducer is started only when oil temperature above 0℃. If circulation the oil is used for lubrication, reducer is started only when oil temperature above 5℃.

2) L-CKD320, L-CKD220 of heavy load industry gear oil is selected from GB/T5903-1995, L-CKD320 is selected in the Southern regin, L-CKD220 is selected in the Northern region.

3) Oil sump slashing is used to lubricate for bearings, and all lubricants article with same wheel gear lubricant article.


发明专利证书

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发明人：[illegible]、王秀芝、罗齐汉、王均荣

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局长 王景川


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齐齐哈尔铁路车辆集团十一辊矫平机减速器


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