

摆线针轮减速机 Cycloid reducer

一、前言 FOREWORD

行星摆线针轮减速机，是一种应用行星传动原理，采用摆线针齿啮合，设计先进，结构新颖的减速机构。该减速机可以广泛应用于各种传动机械中的减速机构，如：起重、运输、矿山、冶金、石化、纺织、印染、轻工、制药、粮食、饲料、食品机械等等。

Planet cycloidal pin gear reducer is a speed reducing construction with advance design, novel structure adopting the principle of planet driving and the falling-in of cycloidal pin gear, This reducer can be widely applied to the speedreducing structure of various driving machineries, such as; lift, transportation, mine, metallurgy, petrolchemical, textile, prention, light industry, pharmacy, food, forage, food machinery, tec.

二、传动原理与结构 DRIVING PRINCIPLE & CONSTRUCTION

行星摆线针轮减速机的传动原理如图1所示：

输入轴1和转臂3一起绕中心Ob顺时针方向回转时，摆线轮2即随转臂一道绕中心Ob公转。由于固定在针齿壳5上的针齿的反作用使摆线轮绕其本身中心OC逆时针方向自转，并通过销套销轴将其自转等速传递给输出轴4，故输出轴就得到了与输入轴相反转向的运动（输入轴转动一周，输出轴摆线轮转动-1/Ec周），其减速比为：

The Driving Principle of Planet cycloidal pin gear reducer is showed in the diagram 1.

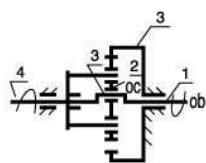
When input shaft 1 and rotating arm 3 are rotating around the OB Axis in chocdwise the cycloidal gear 2 will rotate around the Sxis OB togethert the rotating arm. The cycloidal gear will self-rotating around OC in countclockwise due to the counteraction of pin gear fixing in the pin gear shell 5, meanwhile, the self-rotation speed will be passed to output shaft 4 through pin shaft, as result, the output obtain the contrary movement against input shaft. (When input shaft rotate one cycle, the output cycloidal grat will rotate -1/EC cycle.), its velocity-reducing ratio is:

$i=(E_c-E_b)/E_c=-1/E_c$ 其中： $E_c-E_b=-1$ $i=(E_c-E_b)/E_c=-1/E_c$ among it: $E_c-E_b=-1$

E_c --摆线轮齿数 E_b --针齿齿数 E_c -Tooth No. If cycloidal gear, E_b -pin gear No.

由上式可知当输入轴转 E_c 转时输出轴则反向转1转

According to above formula, shen input shaft rotate E_c cycles, the output shaft will rotate one cycle in counterdirection.



- | | |
|-------|------------------|
| 1.输入轴 | 1.Input shaft |
| 2.摆线轮 | 2.Cycloidal gear |
| 3.转臂 | 3.Rotating arm |
| 4.输出轴 | 4.Output shaft |
| 5.针齿壳 | 5.Pin gear shell |

图1 传动原理 Siagram 1 Driving Principte

行星摆线针轮减速机全部传动装置可分为三部分：输入部分；减速部分；输出部分。

The entire Driving Assembly can be divided into three parts; input part; speed-reducing part; output part.

三、特点 CHARACTERISTICS

1、减速比大：一级减速时速比为1/11 - 1/87；二级减速时速比为1/121 - 1/5133；三级减速时速比为1/2057 - 1/446571；根据需要可以采用更多级组合。

2、传动效率高：由于该机啮合部位采用了滚动啮合，故效率可达90%以上。

1. Big Volecity-Reducing Ratio: for single-stage speed-reducing, the ratio is 1/11 - 1/87; double-stage speed-reducing, the ratio is 1/121 - 1/5133; three-stage speed reducing, the ratio is 1/2057 - 1/446571; we can adopt more-stages compound according the requirement.

2. High Driving efficiency: the driving efficiency can reach above 90% due to adopting rolling engagement in falling-in part.

3、体积小，重量轻：由于不仅采用了行星传动原理，输入轴和输出轴在同一轴线上，而且有与电动机直联呈一体的独特之处，因而本机具有结构紧凑，体积小，重量轻的特点。

4、故障少，寿命长：本机主要转动啮合件采用轴承钢制造，因此机械性能好，耐磨性好，再加采用滚动摩擦，故使之故障少，寿命长。

5、运转可靠平稳，本机传动过程中为多齿啮合，所以使之运转平稳可靠，噪声小。

6、拆装方便，容易维修：由于结构设计合理拆装简单便于维修。

7、本机还具有过载能力强，耐冲击、惯性力矩小、适用于起动频繁和正反转的特点。

3. Small volume, light weight: this machine has compacted structure, small volume and light weight because of adopting the principle of planet driving so that the input shaft and output shaft in the same axis, moreover, they will be integrated with the motor.

4. Few troubles, long life: this machine has good resistance to abrasion because the main driving engaging parts are made of bearing steel and applying rolling friction.

5. Stable Running: For most driving procedure, we adopt multi-teeth falling-in. so the running will be stable and little noise.

6. Convenient dismounting, easy maintenance: Due to reasonable structure and design.

7. This machine also has the characteristics such as strong overloading ability, anti-compact, Small inertial moment, which are suitable for frequently start and double-side rotation.

四、技术规格 TECHNICAL DATA

1、机型号：Frame size

按机型分为：Z系列X系列和B系列

按传动比分为：一级、二级、三级

一级Z系列X系列有11种：1、2、3、4、5、6、7、8、9、10、11；

B系列有9种：0、1、2、3、4、5、6、7、8；

两级有10种：42、53、63、74、84、85、95、106、116、117；

三级有10种：642、742、842、852、853、952、953、1063、1164、1174；

按结构型式分为：卧式、立式、双轴型、直联型四种。

以上是我公司生产的标准减速机，此外，为了满足用户需要还可以承接非标设计制造。

Divided into Z series, X series and B series according to Frame size.

Divided into single stage, double stage and three-stage according to Driving Ratio.

Among single stage Z series X series, they are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11;

B series they are: 0, 1, 2, 3, 4, 5, 6, 7, 8;

The double stage they are: 42, 53, 63, 74, 84, 85, 95, 106, 116, 117;

The three stage, they are: 642, 742, 842, 852, 853, 952, 953, 1063, 1164, 1174;

Divided into horizontal-type, vertical-type, double-shaft and direct-connection type according to their construction.

The above are the standard speed-reducer of our company, furthermore, customer's special order also can be accepted;

2、减速比：Drive ratio

一级减速比有：标准速比：11、17、23、29、35、43、59、71、87；

非标速比：9、13、15、25、46；

Single Stage Drive Ratio:

Standard ratio are: 11, 17, 23, 29, 35, 43, 59, 71, 87;

Non-standard ratio are: 9, 13, 15, 25, 46;

二级减速比有：121、187、289、391、473、493、595、731、841、1003、1225、1505、1849、2065、2537、3481、5133

三级减速比有：2055-446571

Double Stage Driver Ratio: 121, 187, 289, 391, 473, 493, 595, 731, 841, 1003, 1225, 1505, 1849, 2065, 2537, 3481, 5133.

The above are the standard speed-reducer of our factory, furthermore, customer's special order also can be accepted.

Three stage transmission ratio: 2055-446571

说明：

(1)型号表示方法示例中无字母“D或Y”者为双轴型，有字母“D或Y”者为电动机直联型。

(2)在两级和三级减速机中各级减速比的组合，原则上以第一级（高速端）为减速比小的一端，而第二级或第三级（即低速端）为减速比大的一端。

(3)Z系列X系列电动机功率表示在前，机型号表示在后，其他系列则相反。

Description:

(1) In the construction of model No. iDî or iYî denote the motor direct-connection type, non iDî or iYî denote the double shaft type.

(2) In the compound of driving ratio between Double stage and Three Stage, principally, the small ratio should be the first stage (high speed side), and the big ratio should be the second stage or third stage (low speed side).

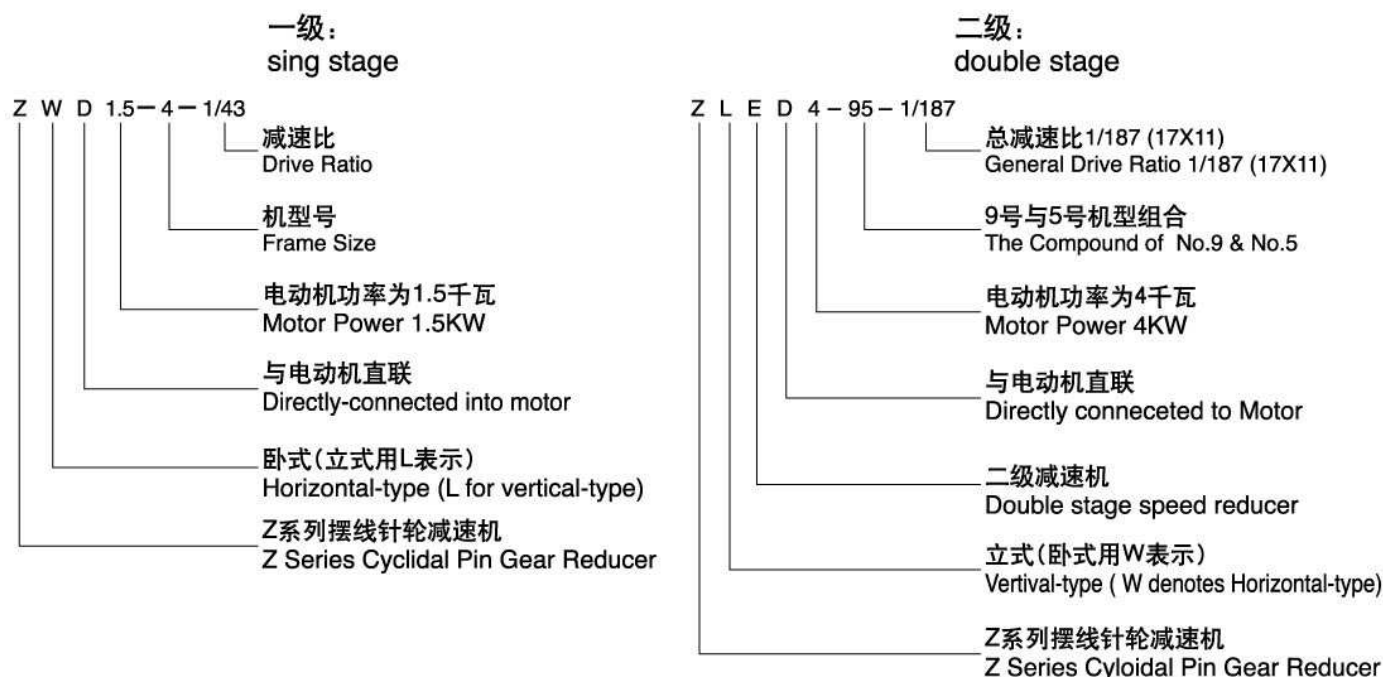
(3) For Z Series and X Series, the power denotes at front, the frame size at behind, for other series, contrary.

3、摆线针轮减速机动力源配置规定：Type of power Source to be equipped

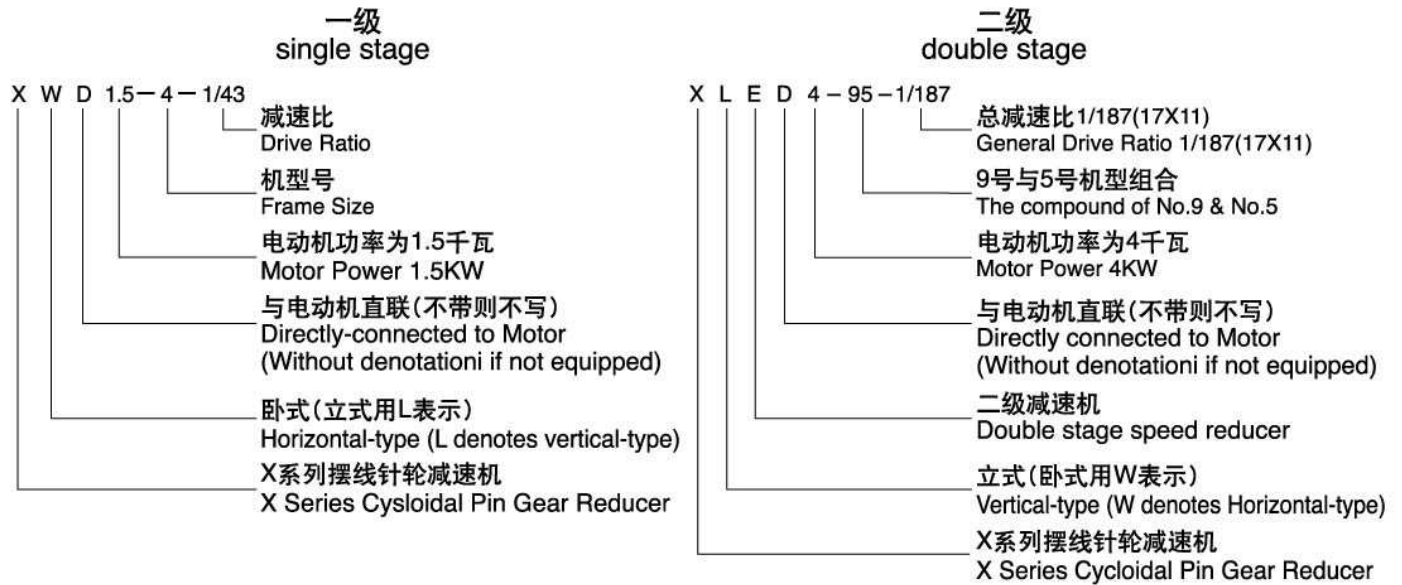
普通电动机-D Normal Motor-D	调速电机-T Speed-regulating Motor-T	油马达-M Oil Motor-M
防爆电机-B Anti-explosion Motor-B	制动电机-N Braking Motor-N	本公司目前生产的摆线减速机均采用Y系列电动机配套。 All the cycloidal speed reducer of our company are equipped by Y Series Motors.
直流电机-Z DC Motor-Z	低噪声电机-S Low-noise Motor-s	

4、型号表示方法：Construction of model

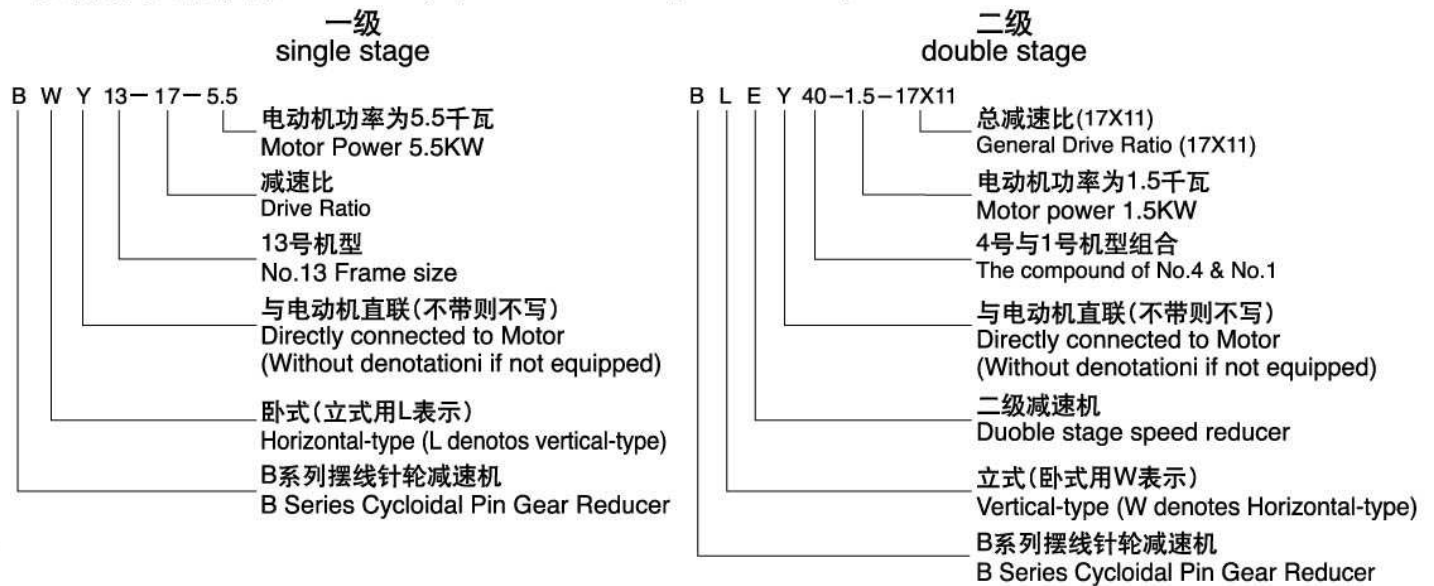
Z系列（等同国家标准）Z Series (equivalent to state standard)



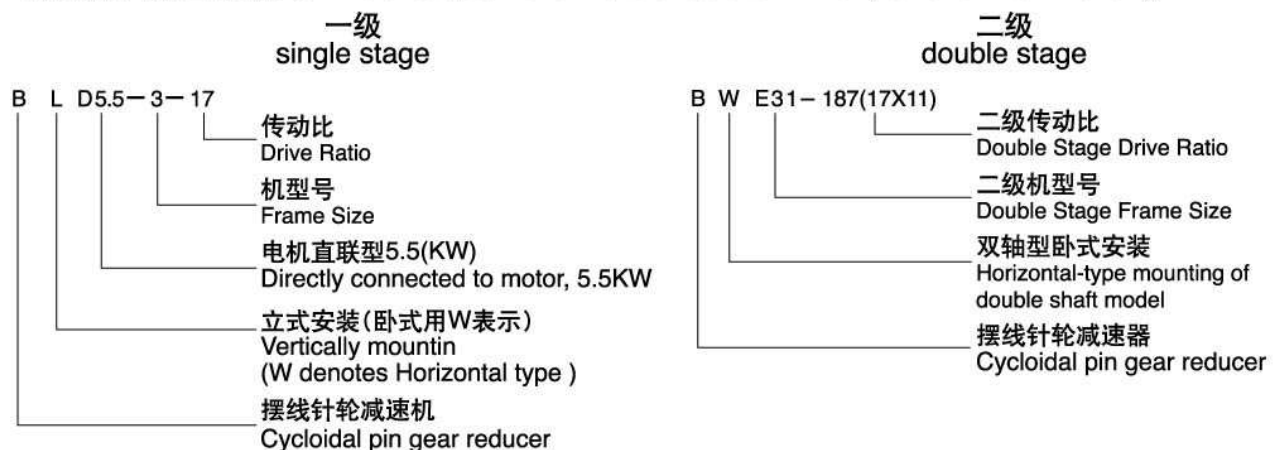
X系列(等同天津标准) X series (equivalent to Tianjin standard)



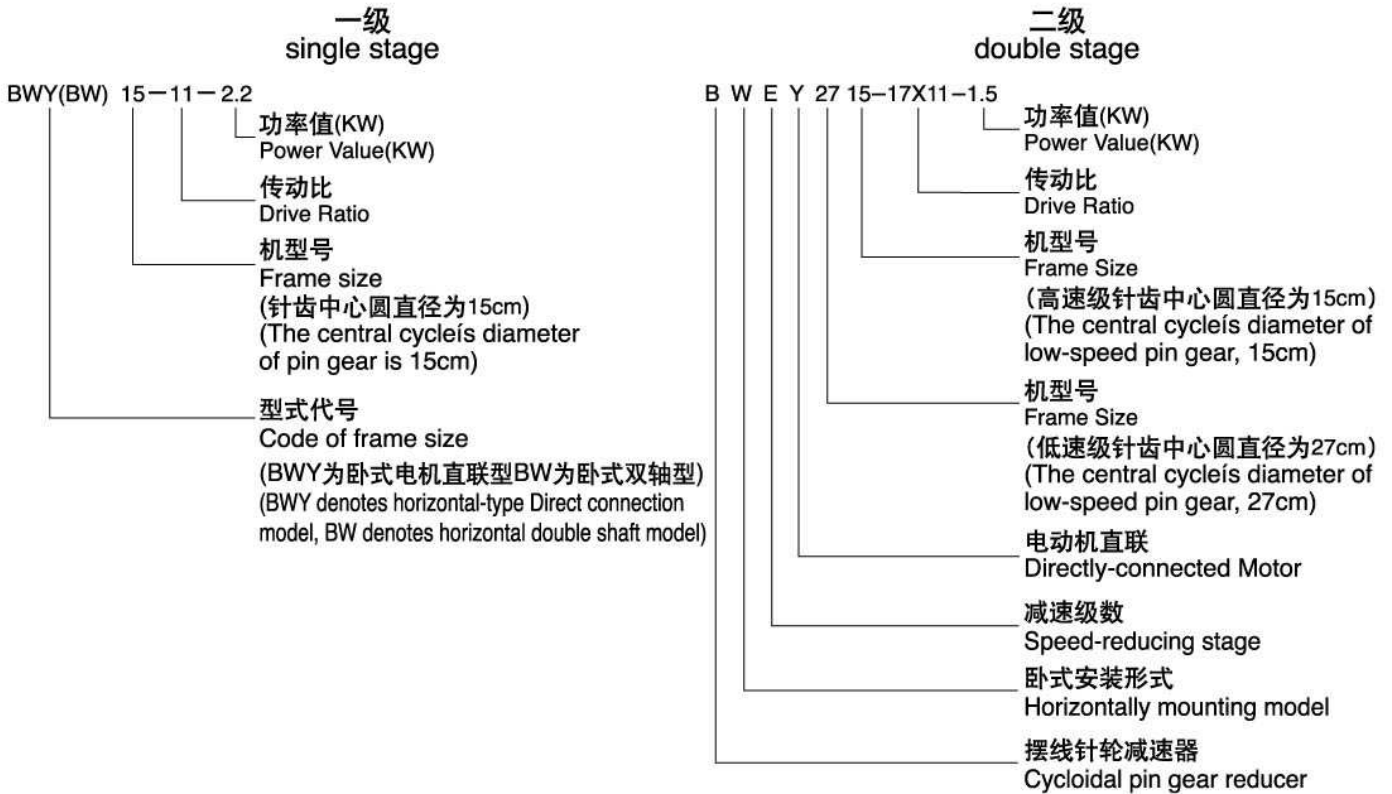
B系列(等同上海标准) B series (equivalent to Shanghai standard)



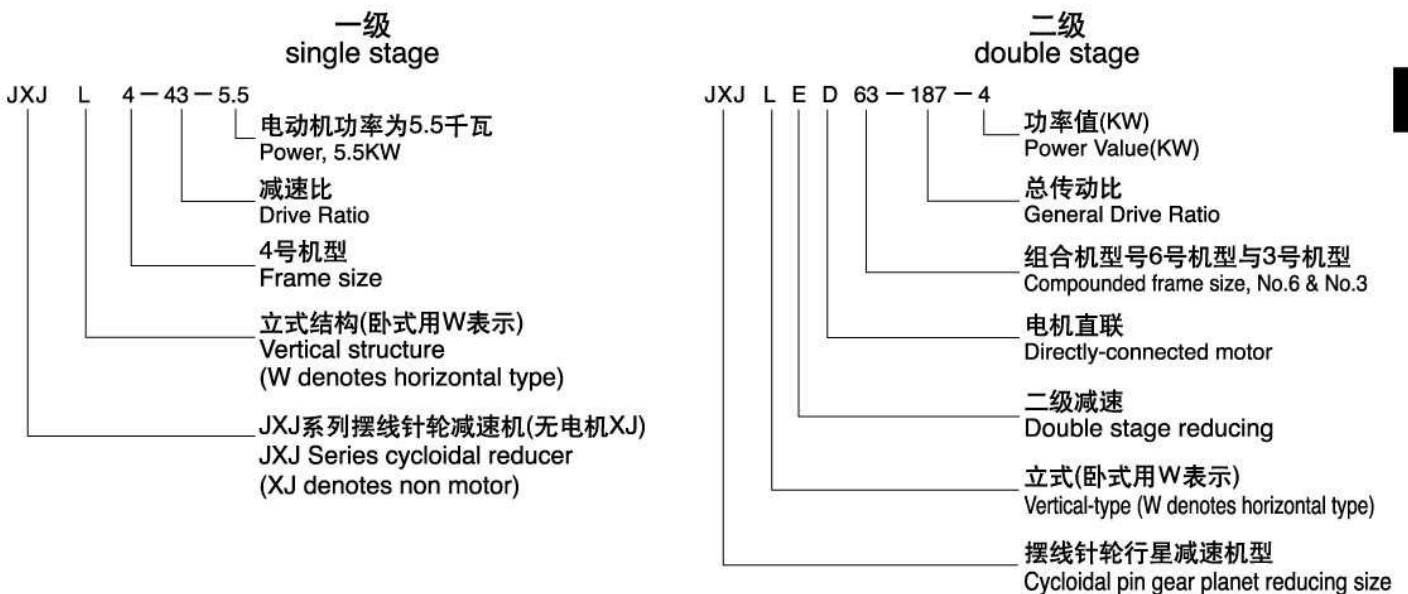
B系列(等同化工部标准) B series (equivalent to standard of Ministry of Chemical Industry)



B系列(等同机械部标准) B series (equivalent to Standard of Ministry of Machine-Building Industry)



JXJ系列(等同江门标准) JXJ series (equivalent to Jiangmen standard)



5、单级减速机的各系列机型对照及技术参数表

Single stage Reducer Contrast different Frame Size and technical data:

表一 Table 1

各系列机型对照 Contrast of different frame size	Z系列(等同国家标准) Z series (equivalent to State standard)	1	2	3	4	5	6	7	8	9	10	11
	X系列(等同天津标准) X series (equivalent to Tianjin standard)	1	2	3	4	5	6	7	8	9	10	11
	B系列(等同上海标准) B series (equivalent to Shanghai standard)	09	10	11	12	13	14		15	16	17	18
	B系列(等同化工部标准) B series (equivalent to Standard of Ministry of chemical Industry)		0	1	2	3	4		5	6	7	8
	B系列(等同机械部标准) B series (equivalent to Standard of Ministry of Machine-Building Industry)		12	15	18	22	27		33	39	45	55
	JXJ系列(等同江门标准) JXJ series (equivalent to Jiangmen standard)		0	1	2	3	4		5	6		
输入功率(KW) Input Power(KW) 最大许用转矩N.m Allowed Maximum torque N.m 输入轴转速(r/min) 4极/6极 Output shaft rotating speed(r/min) four poles/six poles 减速比 Drive Ratio		70	150	250	500	1000	2000	2300	3700	5700	12000	17000
11	136	0.55	0.75	2.2								
	91	0.25	0.55	1.5	4	7.5		15		22		55
17	88	0.55	0.75		3	5.5		11	18.5	18.5	45	45
	59	0.25	0.55	1.5			11		15		37	
23	60	0.37	0.75	1.1			7.5					45
	40	0.25	0.55		2.2	5.5						
29	52	0.25	0.55		1.5	4		11		18.5	30	37
	35			1.1				7.5	15	15	22	
35	43	0.25	0.55	0.75		4	7.5		11			
	29		0.37		1.5	3	5.5				22	37
43	38				1.1	3	5.5	7.5	11	15	18.5	30
	23					2.2	4	5.5	7.5	11		
59	25	0.25	0.25	0.55	1.1	2.2	4		7.5	11		30
	17				0.75	1.5	3	5.5	5.5	7.5	15	22
(71)	21						3	4		7.5	11	22
	14						2.2		5.5	5.5		18.5
87	17				0.75	1.5		4	4	5.5	11	18.5
	12						2.2	3	4	4		15

说明: 1.表中15千瓦以下的均用4极电动机(1500转/分), 18.5千以上的用6极电动机(1000转/分)。

2.非标减速机的输入功率, 靠近标准减速比配置。

Instruction:

1. Below 15KW using four-pole motor (1500r/min), above 18.5KW using six-pole motor (1000r/min).

2.The non-standardized reducer's input power should be equipped close the standardized reducer.