

# 转矩电动机 TORQUE MOTOR

## 特征 Feature

- 具有垂下特征，可调速范围宽大 The Speed Can Vary Widely, Depending on the Sloping Characteristics

转矩电动机由于起动转矩大，具有垂下的特征，因此，能够通过改变电压进行调速。（电动机的转矩与电压的平方成正比）

Torque motors have a high starting torque and Torque motors have a high starting torque and sloping characteristics, allowing easy speed control simply by changing the voltage of the power supply. (The motor torque changes approximately proportion to the square of the voltage.)

- 适用于卷取作业 Suitable For Winding Applications

以固定的张力连续卷取定速运转的物体时，若卷轴机直径增大至2倍，则电动机的输出转矩亦增大至2倍，而电动机转速则减半。作业时须保持这一比例关系。

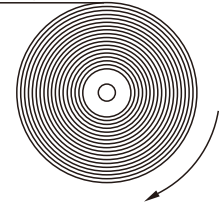
In an application where an object is released continuously at a constant speed and wound up with constant tension, the torque must be doubled and the speed must be halved if the diameter of the winding spool is doubled.

- 可作为制动使用 Use As A Brake

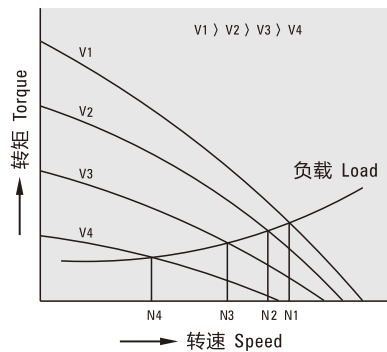
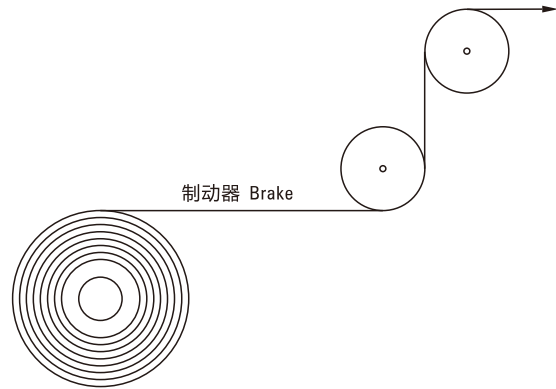
电动机在转速-转矩特性的制动领域，可作为制动来使用。此外，也可以通过直流励磁进行固定张力控制。

By using the motor in the braking region of the speed-torque characteristics, it can serve as a brake. Constant tension operation can be achieved by applying a DC voltage.

恒定张力卷绕  
Constant Tension Wind Up



制动器 Brake



## 转速-转矩特性图的阅读方法 How To Read Speed - Torque Characteristics

转矩电动机的转矩几乎与电压的平方成正比变化。通过改变电动机通电电压，就能够得到各电压下分别具有垂下特性的转速-转矩特性曲线。

The motor torque changes approximately proportion to the square of the voltage. When the voltage supplied to the motor is changed, speed - torque curves with a sloping characteristics (torque is highest at zero speed and decreases steadily with increasing speed) shifts to that of the corresponding voltage.

负载转矩为T0时，将电压调整为100V、80V、60V的话，电动机分别以N1、N2、N3转速旋转。如上所述，通过改变电压，能够很简单地改变转速。

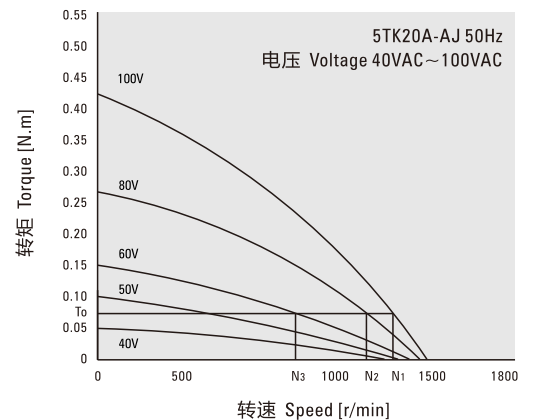
When the voltage is changed to 100 VC, 80 VC and 60 VC while the load torque is T0, the motor rotates at the speeds N1, N2 and N3 respectively. Thus, the speed can be changed easily by varying the voltage.

使用转矩电动机时，请了解必需的转矩和转速，根据是连续使用还是短时间使用，参照转速-转矩特性作出选择。在堵转状态下使用时，选择基准只考虑转矩。

When choosing a torque motor, first determine the required torque and speed. Then select a motor using the speed - torque characteristics curves to determine whether the motor should be operated under continuous duty or limited duty. When used under locked rotor conditions, only the torque factor is considered.

用于连续运转等会造成温度上升问题的场合时，可通过选用较大输出功率的产品以调整电压方式控制转速、转矩。

The temperature rise of the motor may cause a problem during continuous operation. In this case, choose a motor with an output power large enough for continuous operation and adjust the voltage to control the torque and speed.



### 转矩电动机电压控制方法 Voltage Control Of Torque Motors

电压控制的一般方法是，使用双向可控硅中等的相位控制方式。是一种如图所示，通过改变触发双向可控硅的相位角 $\alpha$ ，使输入电压像斜线部分那样变化的控制方法。

The method most commonly used to control voltage is by phase control using a triac. As shown in Fig. 1, by changing the phase angle  $\alpha$  at which the triac switches, the input voltage is controlled as represented by the phase angle areas of the graph.

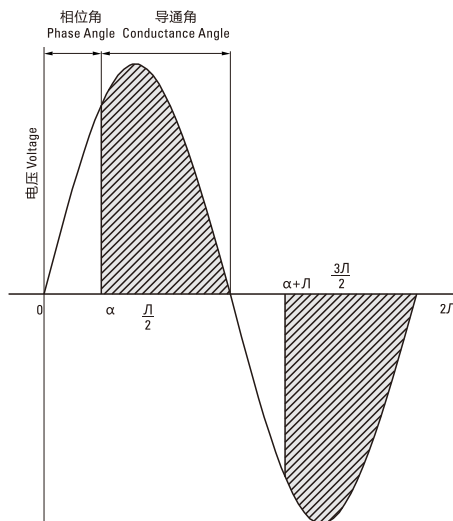


图-1 相位控制  
Fig.1 Phase Control

### 装有减速器时的输出转矩 Gear Motor – Torque Table

由于具有垂下特性，因此，转矩电动机可以实现从停止状态到最高转速之间的任一转速。装有减速器-中间减速器时的容许转矩，请参照转速转矩特性曲线图，根据所使用的转速和转矩，按照下面的公式算出。

$$\text{减速器输出轴转速} NG = \text{电动机转速} * 1 / \text{减速器减速比}$$

$$\text{减速器输出轴转矩} TG = \text{电动机转矩} * \text{减速器减速比} * \text{减速器传动效率}$$

Due to the sloping characteristics, torque motors can be operated over a wide speed range, from locked rotor condition to the maximum speed. The permissible torque when a gearhead and a decimal gearhead are directly connected can be calculated according to the following formula, using the speed and torque determined from the speed – torque characteristics.

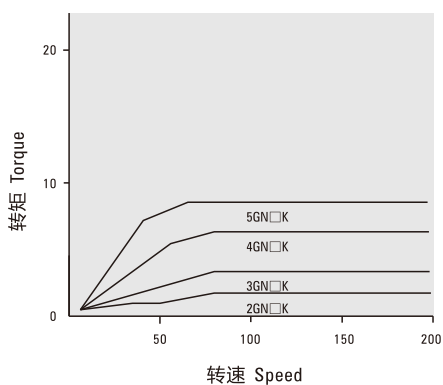
$$\text{Speed of gearhead output shaft} NG = \text{Motor speed} * 1 / \text{gearhead gear ratio}$$

$$\text{Output torque of gearhead} TG = \text{Motor torque} * \text{Gearhead gear ratio} * \text{Gearhead efficiency}$$

### 请注意，减速器的输出轴转矩不可大于减速器的最大的最大容许转矩

Please note, the output torque of the gearhead must be lower than the maximum permissible torque

#### ● 减速器的最大容许转矩 Maximum Permissible Torque Of Gearheads



减速器型号 Gearhead Model	减速器减速比 Gearhead Gear Ratio	减速器传动效率 Gearhead Efficiency
2GN□K	3~18	81%
3GN□K	25~36	73%
4GN□K	50~200	66%

- 减速器、中间减速器另售。  
Gearheads and decimal gearheads are sold separately.
- 减速器型号的□中为减速比的数值  
Enter the gear ratio in the box ( □ ) within the model name

## 规格Specifications

● 3W、6W、10W、20W

型号Model · 类型 Type 导线型 Lead Wire Type		使用额定 (堵转) Rating at Locked Rotor	电压 Voltage V	频率 Frequency Hz	起动转矩 Starting Torque mN.m	最大输出 功率 Max. Output Power W	最大输出功 率时转速 Speed at Max. OutputPower r/min	最大输出功 率时转矩 Torque at Max. OutputPower mN.m	电容器容量 Capacitor μF
齿轮轴型 Pinion Shaft	圆轴型 Round Shaft								
2TK3GN-A	2TK3A-A	5MIN 连续CONT	110	50	69	3.2	750	41	7.0/250
			60		25	1.3		16	
		5MIN 连续CONT	110	60	69	3.2	900	37	
			60		25	1.3		11	
2TK3GN-C	2TK3A-C	5MIN 连续CONT	220	50	69	3.2	750	41	1.5/450
			140		25	1.2		16	
		5MIN 连续CONT	220	60	69	3.2	900	37	
			140		25	1.2		11	
3TK6GN-A	3TK6A-A	5MIN 连续CONT	110	50	134	6.0	750	80	8.0/250
			60		68	2.5		36	
		5MIN 连续CONT	110	60	134	6.5	900	74	
			60		68	2.8		30	
3TK6GN-C	3TK6A-C	5MIN 连续CONT	220	50	134	6.0	750	80	2.0/450
			140		68	2.5		36	
		5MIN 连续CONT	220	60	134	6.5	900	74	
			140		68	2.8		30	
4TK10GN-A	4TK10A-A	5MIN 连续CONT	110	50	235	10	750	127	10.0/250
			60		74	3.0		46	
		5MIN 连续CONT	110	60	25	10	900	127	
			60		69	3.0		38	
4TK10GN-C	4TK10A-C	5MIN 连续CONT	220	50	265	10	750	127	2.5/450
			140		98	3.0		46	
		5MIN 连续CONT	220	60	225	10	900	127	
			140		90	3.0		38	
5TK20GN-A	5TK20A-A	5MIN 连续CONT	110	50	363	20	750	224	15.0/250
			60		137	6.0		76	
		5MIN 连续CONT	110	60	294	26	900	216	
			60		108	6.0		64	
5TK20GN-C	5TK20A-C	5MIN 连续CONT	220	50	363	20	750	224	3.5/450
			140		137	6.0		76	
		5MIN 连续CONT	220	60	294	26	900	216	
			140		108	6.0		64	

●各种安全规格以电动机铭牌上的型号取得认证。

When the motor is approved under various safety standards, the model name on the nameplate is the approved model name.

种类 Type

● 电动机 Motor

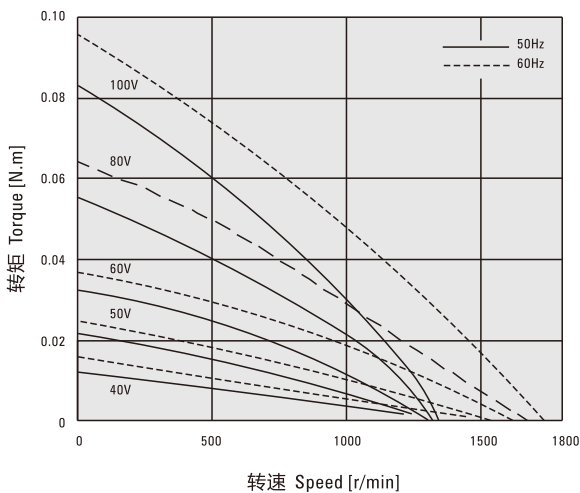
机型 Type	型号Model	
	齿轮轴型 Pinion Shaft	圆轴型 Round Shaft
3W	2TK3GN-A	2TK3A-A
	2TK3GN-C	2TK3A-C
6W	3TK6GN-A	3TK6A-A
	3TK6GN-C	3TK6A-C
10W	4TK10GN-A	4TK10A-A
	4TK10GN-C	4TK10A-C
20W	5TK20GN-A	5TK20A-A
	5TK20GN-C	5TK20A-C

适用电动机输出功率 (齿轮轴) Applicable Motor Output Power (Pinion Shaft Type)	减速器型号 Gearhead Model	减速比 Gear Ratio
3W	2GN□K	3、3.6、5、6、7.5、9、 12.5、15、18、25、30、 36、50、60、75、90、 100、120、150、180、200
	2GN10XK (中间减速器 Decimal Gearhead)	
6W	3GN□K	3、3.6、5、6、7.5、9、 12.5、15、18、25、30、 36、50、60、75、90、 100、120、150、180、200
	3GN10XK (中间减速器 Decimal Gearhead)	
10W	4GN□K	3、3.6、5、6、7.5、9、 12.5、15、18、25、30、 36、50、60、75、90、 100、120、150、180、200
	4GN10XK (中间减速器 Decimal Gearhead)	
20W	5GN□K	3、3.6、5、6、7.5、9、 12.5、15、18、25、30、 36、50、60、75、90、 100、120、150、180、200
	5GN10XK (中间减速器 Decimal Gearhead)	

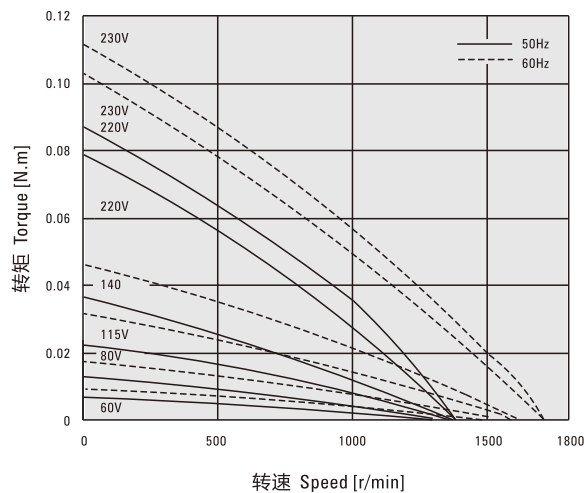
● 减速器型号的□中为减速比的数值  
Enter the gear ratio in the box ( □ ) within the model name

转速-转矩特性 (参考值) Speed - Torque Characteristics (Reference Values)

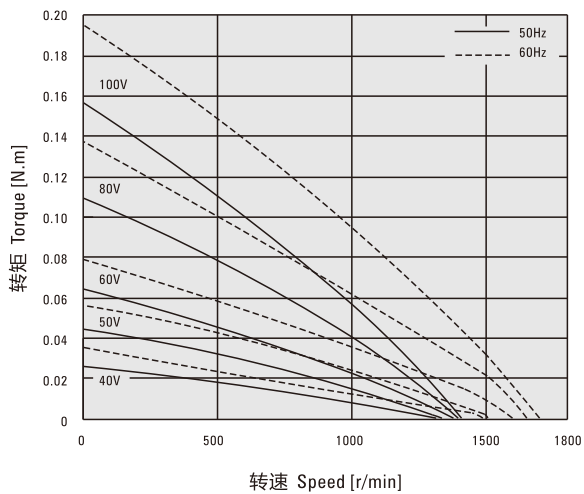
● 2TK3GN-A、2TK3A-A



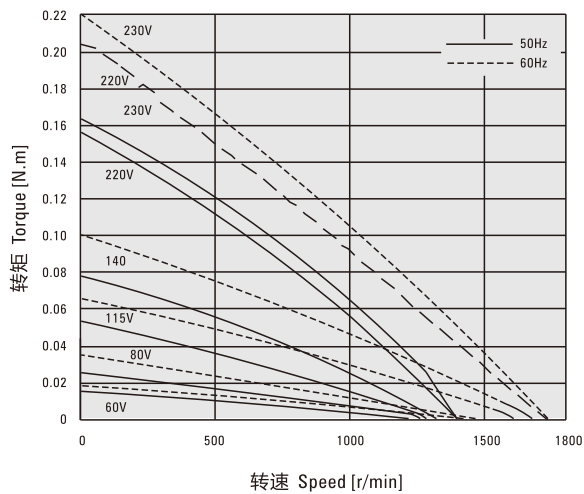
● 2TK3GN-C、2TK3A-C



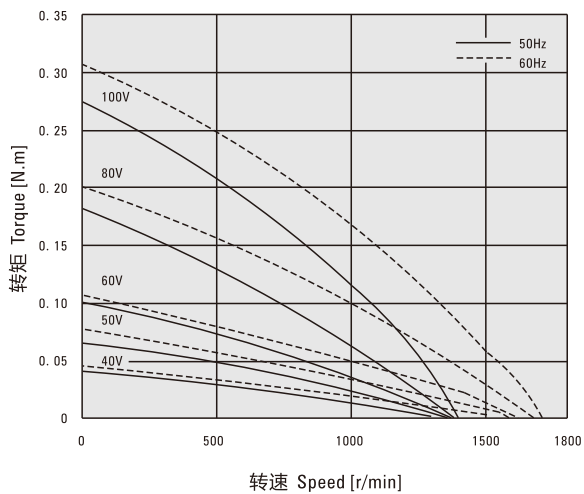
● 3TK6GN-A、3TK6A-A



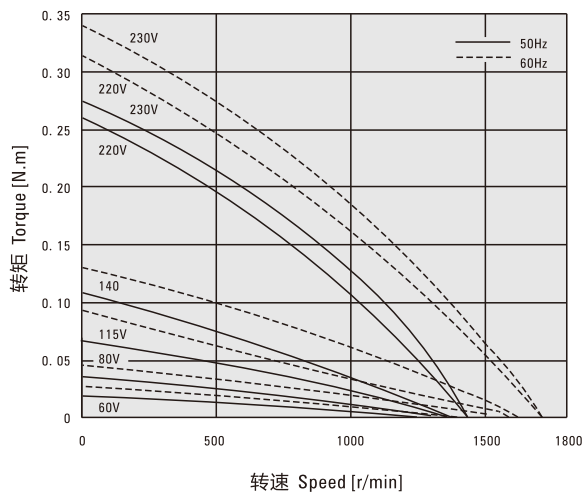
● 3TK6GN-C、3TK6A-C



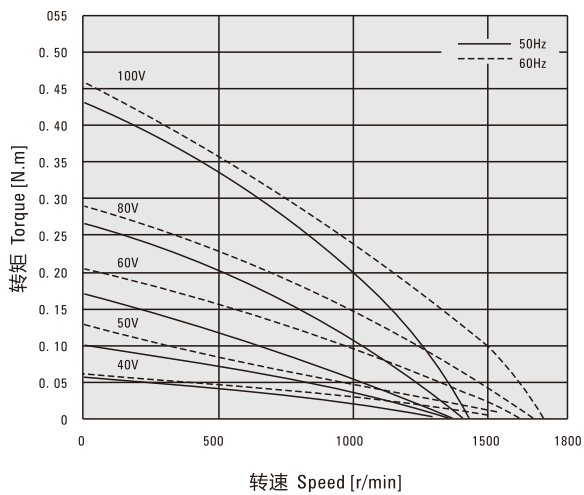
● 4TK10GN-A、4TK10A-A



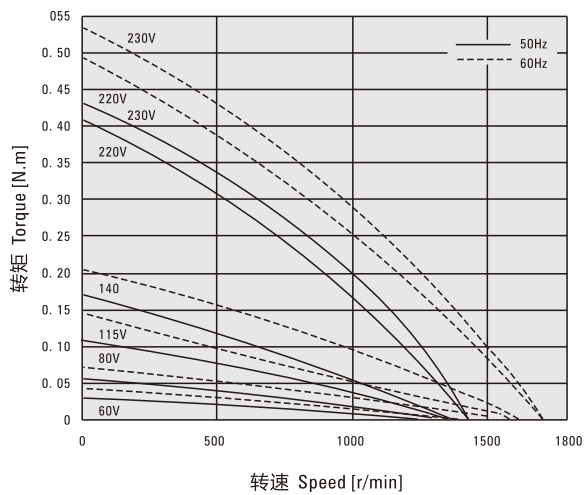
● 4TK10GN-C、4TK10A-C



● 5TK20GN-A、5TK20A-A



● 5TK20GN-C、5TK20A-C



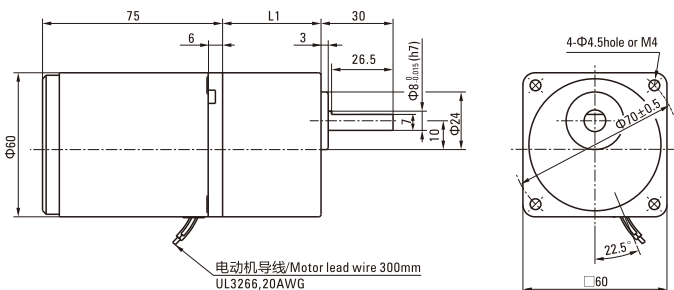
外形图 (单位 mm) Dimensions(Unit mm)

减速器附有安装用螺丝Mounting screws are included with gearhead.

3W

电动机/减速器 Motor/Gearhead

重量 Weight : 电动机 Motor : 0.75kg      减速器 Gearhead : 0.4kg



电动机型号 Motor Model	减速器型号 Gearhead Model	减速比 Gear Ratio	L1
2TK3GN-A 2TK3GN-C	2GN□K	3~18	32
		25~200	41.5

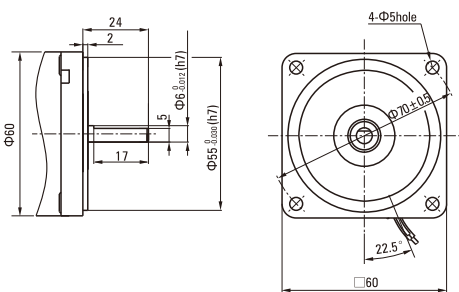
●减速器型号的□中为减速比的数值  
Enter the gear ratio in the box (□) within the model name

圆轴型的转轴部分 Shaft Section Of Round Shaft Type

2TK3A-A 2TK3A-C

除重量及轴部外电动机外形与齿轮轴型相同。

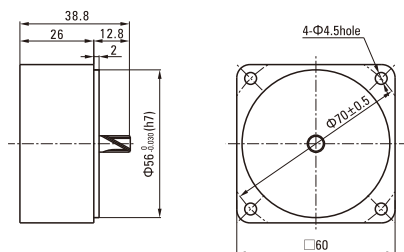
Excluding weight and the shaft section motor shape are the same as those of the pinion shaft type.



中间减速器 Decimal Gearhub

可安装2TK3GN型 Can be connected to 2TK3GN type  
2GN10XK

重量 Weight : 0.24kg



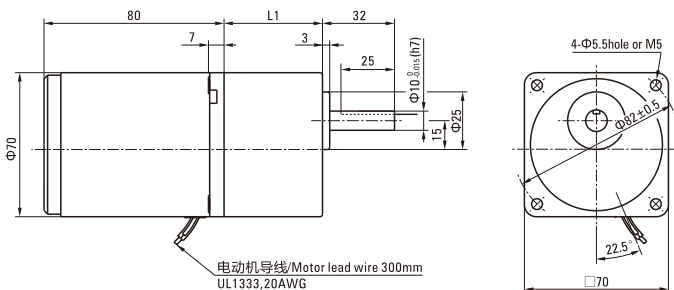
外形图 (单位 mm) Dimensions(Unit mm)

减速器附有安装用螺丝Mounting screws are included with gearhead.

6W

电动机/减速器 Motor/Gearhead

重量 Weight : 电动机 Motor : 1.1kg      减速器 Gearhead : 0.5kg

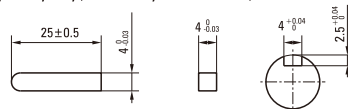


电动机型号 Motor Model	减速器型号 Gearhead Model	减速比 Gear Ratio	L1
3TK6GN-A 3TK6GN-C	3GN□K	3~18	32
		25~200	42

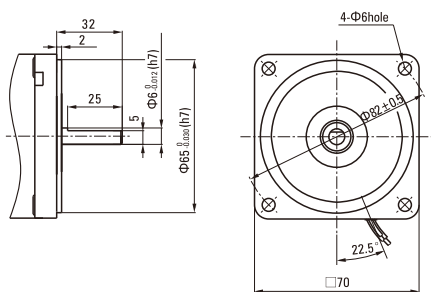
●减速器型号的□中为减速比的数值  
Enter the gear ratio in the box (□) within the model name

键·键槽 (减速器附件)

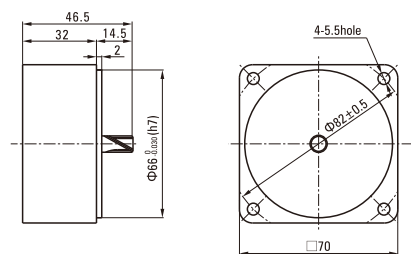
Key · keyway(Accessory of Gearhead)



● **圆轴型的转轴部分** Shaft Section Of Round Shaft Type  
 3TK6A-A 3TK6A-C  
 除重量及轴部外电动机外形与齿轮轴型相同。  
 Excluding weight and the shaft section motor shape are the same as those of the pinion shaft type.



● **中间减速器** Decimal Gearhead  
 可安装3TK6GN型Can be connected to 3TK6GN type  
 3GN10XK  
 重量 Weight : 0.31kg



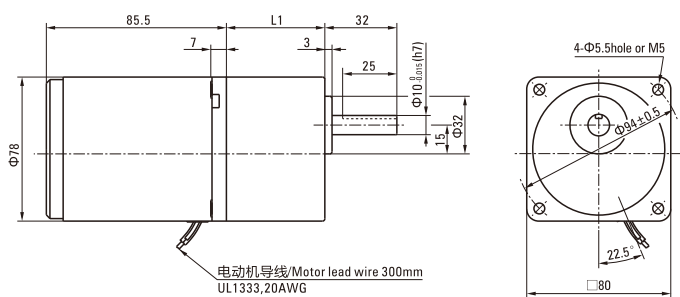
■ **外形图 (单位 mm) Dimensions(Unit mm)**

减速器附有安装用螺丝Mounting screws are included with gearhead.

● 10W

● **电动机/减速器** Motor/Gearhead

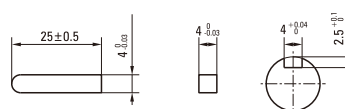
重量 Weight : 电动机 Motor : 1.6kg      减速器 Gearhead : 0.8kg



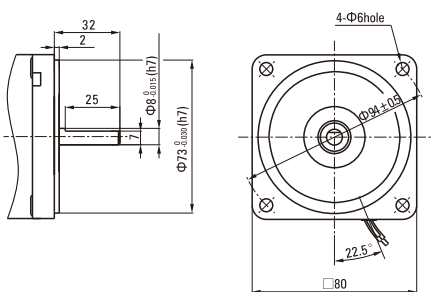
电动机型号 Motor Model	减速器型号 Gearhead Model	减速比 Gear Ratio	L1
4TK10GN-A 4TK10GN-C	4GN□K	3~18	32
		25~200	43.5

● 减速器型号的□中为减速比的数值  
 Enter the gear ratio in the box (□) within the model name

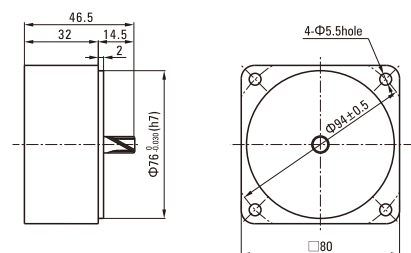
● **键·键槽 (减速器附件)**  
 Key · keyway(Accessory of Gearhead)



● **圆轴型的转轴部分** Shaft Section Of Round Shaft Type  
 4TK10A-A 4TK10A-C  
 除重量及轴部外电动机外形与齿轮轴型相同。  
 Excluding weight and the shaft section motor shape are the same as those of the pinion shaft type.



● **中间减速器** Decimal Gearhead  
 可安装4TK10GN型Can be connected to 4TK10GN type  
 4GN10XK  
 重量 Weight : 0.41kg



## 外形图 (单位 mm) Dimensions(Unit mm)

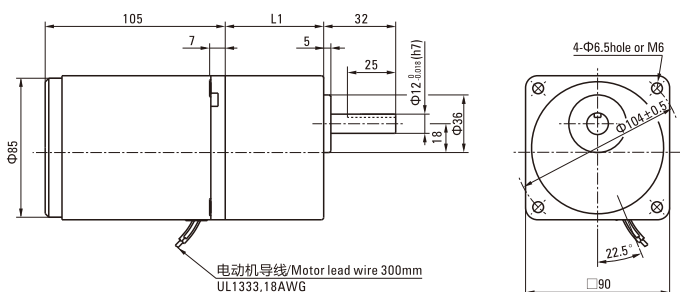
减速器附有安装用螺丝 Mounting screws are included with gearhead.

### 20W

#### 电动机/减速器 Motor/Gearhead

重量 Weight : 电动机 Motor : 2.4kg

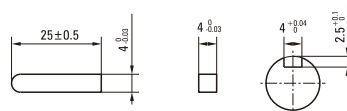
减速器 Gearhead : 1.35kg



电动机型号 Motor Model	减速器型号 Gearhead Model	减速比 Gear Ratio	L1
5TK20GN-A 5TK20GN-C	5GN□K	3~18	42
		25~200	60

● 减速器型号的□中为减速比的数值  
Enter the gear ratio in the box (□) within the model name

● 键·键槽 (减速器附件)  
Key · Keyway (Accessory Of Gearhead)

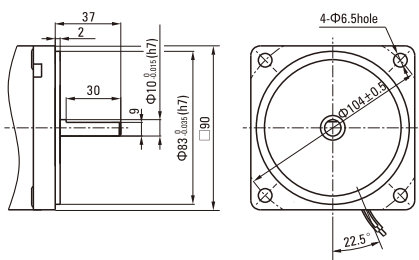


#### 圆轴型的转轴部分 Shaft Section Of Round Shaft Type

5TK20A-A 5TK20A-C

除重量及轴部外电动机外形与齿轮轴型相同。

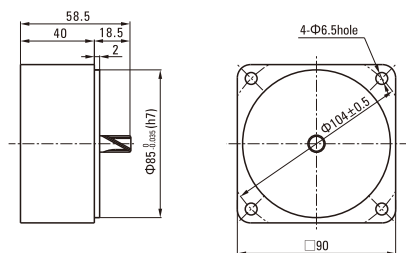
Excluding weight and the shaft section motor shape are the same as those of the pinion shaft type.



#### 中间减速器 Decimal Gearhead

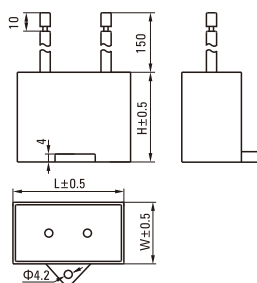
可安装5TK20GN型 Can be connected to 5TK20GN type 5GN10XK

重量 Weight : 0.6kg



## 电容器外形尺寸 Formal Dimension Of Capacitor

型号 Model		电容器型号 Capacitor Model	L	W	H
齿轮轴型 Pinion Shaft	圆轴型 Round Shaft				
2TK3GN-A	2TK3A-A	ZD70CFAUL	47	24	37
		ZD60CFAUL	48	23	32
3TK6GN-A	3TK6A-A	ZD80CFAUL	48	26.5	38
		ZD70CFAUL	47	24	37
4TK10GN-A	4TK10A-A	ZD100CFAUL	58	26	38
		ZD80CFAUL	48	26.5	38
5TK20GN-A	5TK20A-A	ZD150CFAUL	58	32	43
		ZD120CFAUL	58	30	40
2TK3GN-C	2TK3A-C	ZD15BFAUL	36	12.5	24
		ZD12BFAUL	36	12	22
3TK6GN-C	3TK6A-C	ZD20BFAUL	36	15	25
		ZD15BFAUL	36	12.5	24
4TK10GN-C	4TK10A-C	ZD25BFAUL	38	17	28
		ZD20BFAUL	36	15	25
5TK20GN-C	5TK20A-C	ZD35BFAUL	38	19.5	31
		ZD30BFAUL	38	18.5	29



● 常规电容器出线为引线,也可根据客户要求配置插片式187#

Note: Conventional capacitor is a lead wire type. Inserted 187# is optional

● 电动机型号的□中为表示带端子箱型的记号(T)

Enter the code that represents the terminal box type (T) in the box (□) within the model name



## ■ 连接图 Wiring Diagram

- 运转方向指从电动机轴看来的方向。CW表示顺时针方向，CCW表示逆时针方向。

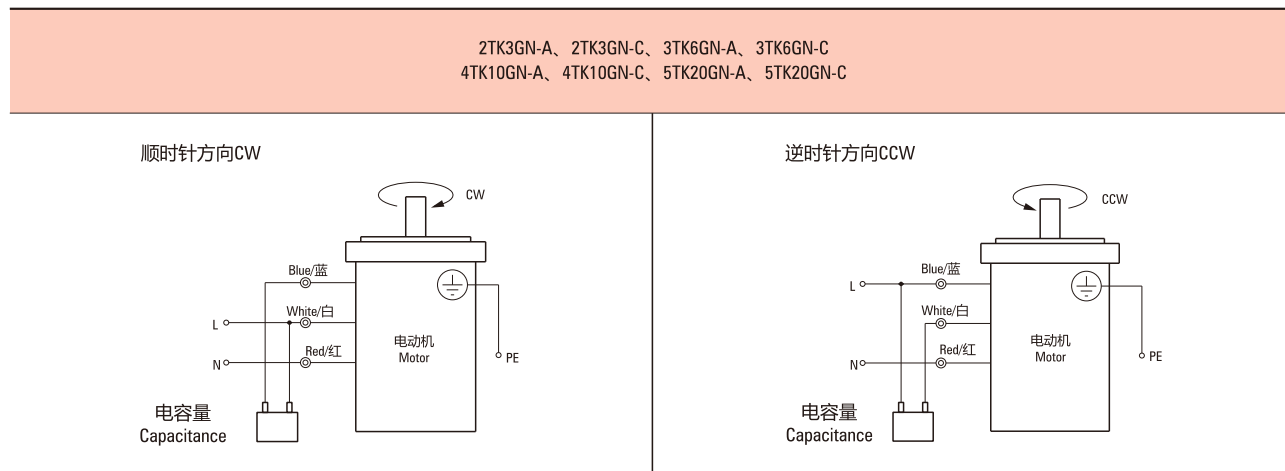
The direction of motor rotation is as viewed from the shaft end of motor. CW represents the clockwise direction, while CCW represents the counterclockwise direction.

- 表中所记品名为齿轮轴型，圆轴型亦同。

Name indicated in the list is pinion shaft type, also valid for the equivalent round shaft type.

- 品名的□中为附属电容器种类的J、U或E记号。

Specify the type of the capacitor to be included by entering J or E in the box (□) within the model name.



### 请注意 Note:

单相电动机运转方向的转换应在电动机停止后进行。

Change the direction of single-phase motor rotation only after bring the motor to a stop.

若在电动机运转时转换运转方向，可能发生无法转换运转方向或须费时较久的情况。

If an attempt is made to change the direction of rotation while the motor is rotating, motor may ignore reversing command or change its direction of rotation after some delay.