

电位器使用注意事项

Potetiometers Usage Announcements



为了在最稳定的条件下使用电位器，请注意以下因素对电位器的影响:

环境的影响:

1、环境温度

当电位器周围环境温度高于70℃时，电位器的定额功率将大幅度下降。

电位器的旋转（或滑动）操作力矩（或操作力）会随温度的升高而变轻，随温度的降底而变紧。如需在低温下使用，请与我们联系，我们备有适当的润滑脂，可使旋转力矩要低温时正常化。

2、化学品

由于聚碳酸脂等合成植脂在电位器中的应用，请不要将电位器与以下物品接触：氨水、碱水溶液芳香族碳氢化合物、卤素族碳氢化合物、酮类、脂类及其他强烈化学品等。

3、腐蚀性气体

尽量避免在有害气体中使用电位器，例如SO2、NH3，等，这些气体会引起塑料或金属的腐蚀。

4、结露

电位器表面应避免结露或有水滴存在，请勿在潮湿或易使电阻体等零件表面结露的地方使用电位器，否则，可能会引起绝缘劣化或短路。

1、焊接作业时，若焊接温度过高或时间过长，可能对电位器造成损坏。推荐的焊接条件为：温度260±10℃，5±0.5s内完成，焊接处离电位器本体1.5mm以上，若采用烙铁焊接，请尽量考虑采用较低功率的电烙铁，且在2秒钟内完成。

2、尽量采用从PC板背面（电位器安装面的反面）焊接，焊接时注意不要让焊接锡流穿线路板，以避免传热过快，对电位器造成损坏（见图1）。

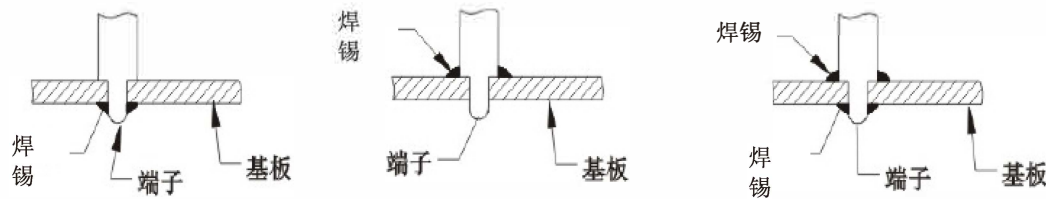


图1A正确

图1B不好

图1C不好

3、请注意避免助焊剂浸入电位器内部，否则将造成电刷与电阻体接触不良，产生INT、杂音不良等现象。因此，若采用波峰焊，请在焊接前考虑适当的保护措施。

4、应避免使用水溶性助焊剂，否则将可能助长金属氧化与材料发霉。

避免使用劣质焊锡，焊锡不良可能造成上锡困难，导致接触不良或断路。

安装方法的影响：

1、当电位器是用螺母安装于面板时，锁紧螺母时应非常小心，锁紧力矩不宜过紧，以避免破坏螺母。

2、当需用螺钉安装铁壳型直滑电位器时，避免使用过长螺钉，否则有可能妨碍滑柄的运动，甚至直接损坏电位器本身。

3、在焊接或安装进程中，不要对端子施加过大的力，否则可能引起接触不良或机械损伤。尽量避免来回弯折端子，端子可能由于弯折两周以上而折断。

当给电位器套上旋钮时，不要对轴施加过大的轴向推/拉力，其推/拉力不应超过产品《规格书》中所规定的轴的推/拉力参数指标。

存储条件

1、禁止存放于高温及腐蚀性气体中。

2、当您需长期存放时，不要开封。

3、保持先进先出原则。

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关于线路设计及布局结构设计的几点建议：

1、由于电阻值的存在，电位器在外加负荷下会产生一定的热量。在您设计时请加以考虑。

2、最好能将电位器当作四端组件作调整电压的分压器使用且接线方式宜选择“1”端接地同时电位器的负载电阻RL应不小于电位器公称阻值Rt的10倍。（见图2A）

除为了特别设计的需要，应避免将电位器当作二端组件作变阻器使用。因为电阻体与接触片间的接触电阻不利大电流的通过，同时，由于仅使用了有效行程的一部分，如果动触点电流过大，可能造成局部过载而失效。

（见图2B）

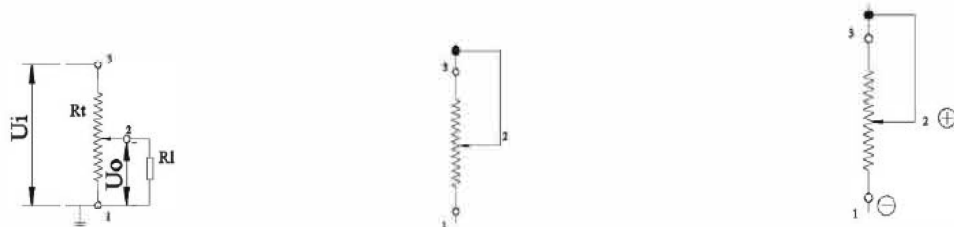


图2A推荐

图2B不推荐

图2C不推荐

3、当电位器在直流电路中作为电流调节使用时，将有直流电流通过电位器的滑动臂。此时由于阳极氧化的原因会导致电阻值异常增加。在这种情况下，建议将电阻体的引出端子接负极，将滑动臂的引出端子接正极。（见图3）

4、尽管电阻体两极是印刷银层，但为了提高抗硫化的可靠性，通常在电阻体的两极覆盖一层碳膜，此时其中端电阻可能会偏高，如果希望低终端电阻，请与我们联系。

5、对电位器旋转止档施加过大的扭力可能会引起机械性损坏，因此，对于旋转类电位器请尽量配备外径较小的旋钮，以使止档受到的力矩尽量减小。

6、对于转轴类电位器，请适当考虑当使用者调节电位器时能用拇指与食指从两个方向捏住电位器轴柄上的旋钮进行旋转。因为旋转时柄受力越均匀，则轴的晃动越小，电刷与电阻体间的接触也越可靠。（见图4）

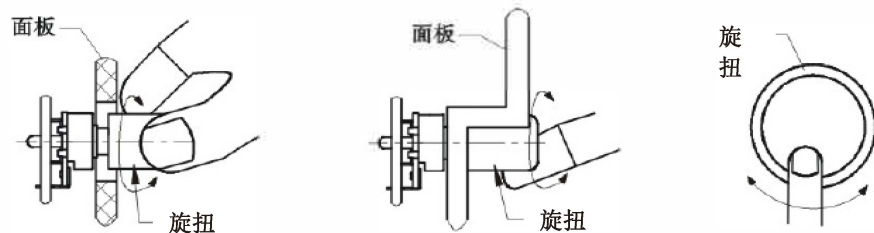


图4A作分压器（推荐）

图4B作变阻器（不推荐）

图4C正极接电刷

7、面壳上为电位器调节旋钮而预留的安装孔的直径，在设计时请留够的配合间隙，因为旋钮的同轴度偏差及电位器轴柄晃动量的影响，若配合过于紧密，易产生旋钮与面壳刮擦的现象。（见图5）

8、直滑电位器的滑柄长度或旋转类电位器的轴柄长度，在选择时，如果条件许可，尽可能采用较短的滑柄（或转轴），滑柄（或转轴）越短则手感越稳定，滑柄（或转轴）摇晃也越小。（见图6）

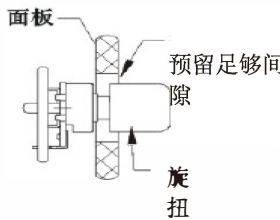


图5 注意旋钮与面刮擦

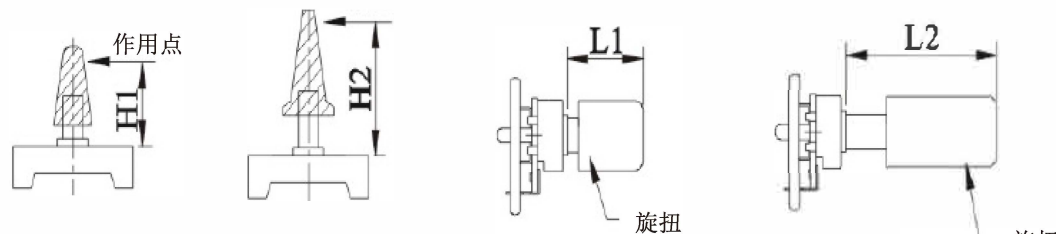


图6A晃动小

图6B晃动大

图6C晃动小

图6D晃动大

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9、直滑电位器的滑柄驱动机构，若操作作用点偏离滑柄之中心线是不适宜的。距离L越短所获得的滑动手感则越好。请尽量考虑采用使驱动件的中心线与重合的机构。（见图7）

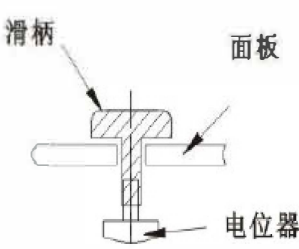


图7A 推荐

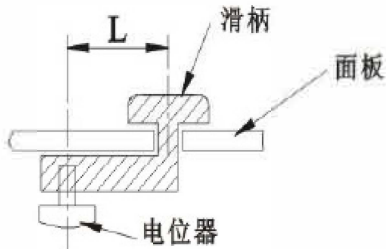


图7B 不推荐

10、对于带开关电位器，请在开关额定功率范围内使用，不要将大功率开关做小电流通，断开关来使用。例如：5A的开关不宜在1mA的工作电流中使用。建议用仪表实测或计算的方法来检查浪涌电流，如果浪涌电流太大，即使常规电流很小，也会出现融化或其他问题。

关于订货的建议：

当您选择电位器时，请注意以下几点：

- 1、外型尺寸或名称； 2、用途；
- 3、标称阻值及允许偏差； 4、电阻规律；
- 5、有无定位； 6、额定功率或最高工作电压；
- 7、由于持续改进或其他方面的原因，产品实物的名称、外型尺寸和性能指标等可能与此产品目录中所列有所不同，如有变更之处，请以送样时附送的《规格书》中的外型图和指标参数为准。

Usage Notice of Potentiometer

In order to use the potentiometer under the steady conditions. please pay attention to the influence of the following factors on the potentiometer:

Influence of the environment:

1. Ambient temperature

When the ambient temperature is over 70°C, the rated power of the potentiometer will drop remarkably. The turning/sliding operating torque/forcelessens with the rise of temperature and increases with the drop of it. If the potentiometer is to be used under low temperature, please contact us. We have special grease to normalize the turning torque under low temperature.

2. Chemicals

Since synthetic resins such as polycarbonate have been used in potentiometers, please keep the potentiometer away from the following substances: ammonia, alkaline solution, aromatic hydrocarbon, haloid hydrocarbon, ketone, lipid and other strong chemicals.

3. Corrosive gas

Avoid using the potentiometer in harmful gases such as SO₂, NH₃, which will lead to corrosion of plastics or metal.

4. Dew formation

Dew formation or water drops on the surface of the potentiometer should be avoided. Do not set the potentiometer in humid places or where moisture can easily condense on element surface, otherwise, insulation deterioration or short-circuiting will take place.

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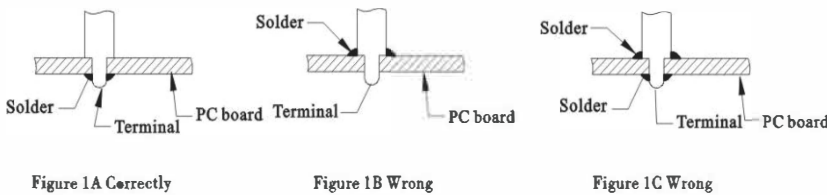
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Influence of soldering conditions and method

1. During soldering, the potentiometer may be damaged due to over temperature or long soldering time. The recommended soldering conditions are: temperature of 260±10°C, soldering time within 5S±0.5S seconds, and the soldering point should be at least 1.5mm from the main body of the potentiometer. If soldering iron is used, please choose electric soldering iron of lower power and finish soldering in 2 seconds.

2. Do the soldering from the back of the PC board, i.e. the back of the mounting side of the potentiometer; no solder should be allowed to flow through the circuit board in order to prevent the heat from transferring too quick and damaging the potentiometer (see figure 1).



3. Please pay attention that no soldering flux is allowed to infiltrate into the potentiometer, otherwise, there will be poor contact between brush and the resistor, and leading to INT damaging, noise, etc. Therefore, if wave soldering is employed, please adopt proper precautions.

4. Water-soluble soldering flux should be avoided. Otherwise, metal oxidation and mould development on materials will be aggravated.

5. Avoid using solder of poor quality which may lead to difficulty in applying the solder, and resulting in poor contact or open circuit.

Influence of mounting method:

- 1. When the potentiometer is fixed onto the board by nut, be careful when tightening the nut. The tightening torque should not be too high to prevent damaging the screw thread.
- 2. When screw is needed for mounting shell type sliding potentiometer, avoid screws of excessive length, otherwise the movement of the sliding bar may be hindered even the potentiometer be damaged.
- 3. Don't exert too much force on terminals during soldering or mounting, otherwise, poor contact even mechanical damage may be found. Avoid bending terminals back and forth because the terminal may break due to two circles of bending or more.
- 4. When assemble the knob, don't exert over axial pushing/pulling force on the shaft. The force must not exceed the shaft pushing/pulling force set in the Specification Table.

Storage conditions

- 1. High temperature, high humidity or corrosive gases are prohibited in storage.
- 2. Don't open the seal when long-term reservation is needed.
- 3. Keep the principle of "first come, first use".

电位器使用注意事项

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Suggestions on circuit design and layout :

1. Because of the existence of resistance value, the potentiometer will produce heat quantity under applied load. Please take this into account during design.
2. The best way is to use the potentiometer as a four-terminal element for adjusting voltage of voltage divider. For wiring, you'd better choose terminal "1" for grounding and R_l (the load resistance of the potentiometer) should be not smaller than ten times as R_r (the nominal resistance).

Except for special design requirement, the potentiometer shouldn't be used as a two-terminal rheostat. The Contact Resistance between the resistor and the contact piece will hinder the passing of big electric current, at the same time, the current at the moving contact may be too big since only part of the effective travel is in function and lead to local over loading then failure of the unit. (See figure 2B)

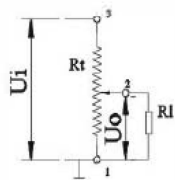


Figure 2A
used for voltage divider (recommended)



Figure 2B
used for rheostat (no recommended)

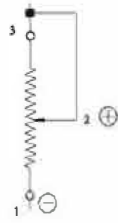


Figure 3C
The anode has been bonded with bush

3. When the potentiometer is used as current regulator in DC circuit, DC current will pass the sliding arm thus resistance value will rise abnormally because of anodic oxidation. In this case, it is recommended to connect the leading-out terminal of the resistor to the cathode and that of the sliding arm to anode. (See figure 3)

4. Although both poles of the resistor are covered by printed silver layer, normally a carbon film is applied on the pole in order to improve reliability of sulfide resistance, and causing a comparatively high terminal resistance. If lower terminal resistance is needed, please contact US.

5. Too much twisting force on the limit stop of the turning knob may give rise to mechanical damage. Therefore, please choose knob of smaller outside diameter to minimize torque on the stop.

6. For shaft type potentiometer, please make proper design to enable the user to turn the knob on shaft handle by hold the knob with thumb and forefinger from two different directions. The reason is that when force on the shaft handle is evenly applied, the shaft will be more steady and contact between the brush and the resistor will be more reliable. (See figure 4)

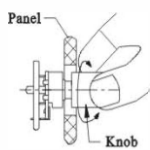


Figure 4A Recommended

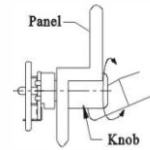


Figure 4B No recommended

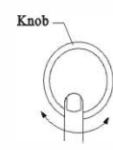


Figure 4C No recommended

7. Sufficient fitting clearance should be arranged when calculating the diameter of the mounting hole prepared for the actual products may be different from that in this catalogue. Knob in the panel. Too tight fitting together with deviation of knob center line and unsteadiness of the shaft handle will cause scraping and friction between the knob and the panel. (see figure 5)

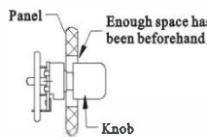


Figure 5 Prevent knob from scuffing panel

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8. When select the sliding handle for sliding type potentiometer or sbm handle for the tuning type, choose as short as possible. When the handle becomes shorter, the handling and the movement become steadier. (see figure 6)

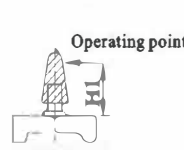


Figure 6A Less shaking

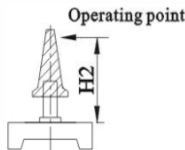


Figure 6B More shaking

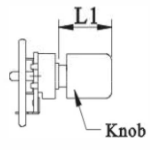


Figure 6C Less shaking

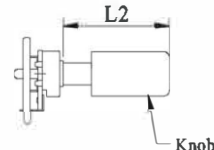


Figure 6D More shaking

9. For driving unit of the sliding handle in sliding type potentiometers, it is not proper to allow displacement between the contact spot and the centerline of the handle. The smaller distance L is, the better the sliding control by hand will be. You'd better use a driving unit in which the driving piece and the handle has the same centerline. (See figure 7)

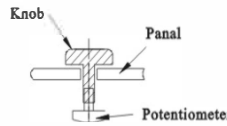


Figure 7A Recommended

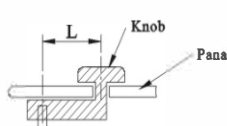


Figure 7B No recommended

10. For potentiometers with switches, please use it within the rated power of the switch. Don't use a high power switch as small current circulation and on-and-off switch. For example, switch of 5A is not suitable to be used under 1mA working current. It is recommended to check the surge current by actual measurement or calculation. If surge current is too big, problems such as melting will occur even the regular current is small.

Suggestions for order

When choosing potentiometers, please pay attention to the following items:

1. External dimensions and designation.
2. Usage.
3. Nominal resistance value and permissible deviation.
4. Regular pattern of resistance.
5. Whether soft positioning is provided.
6. Rated power or maximal operational voltage.
7. Because of constant improvement or other reasons, the designation, external dimensions and performance index of the actual products may be different from that in this catalogue. For any change, please see the external figure and parameters in the Specification Table attached to the sample.

电阻规律特性表
Resistance Taper Characteristics

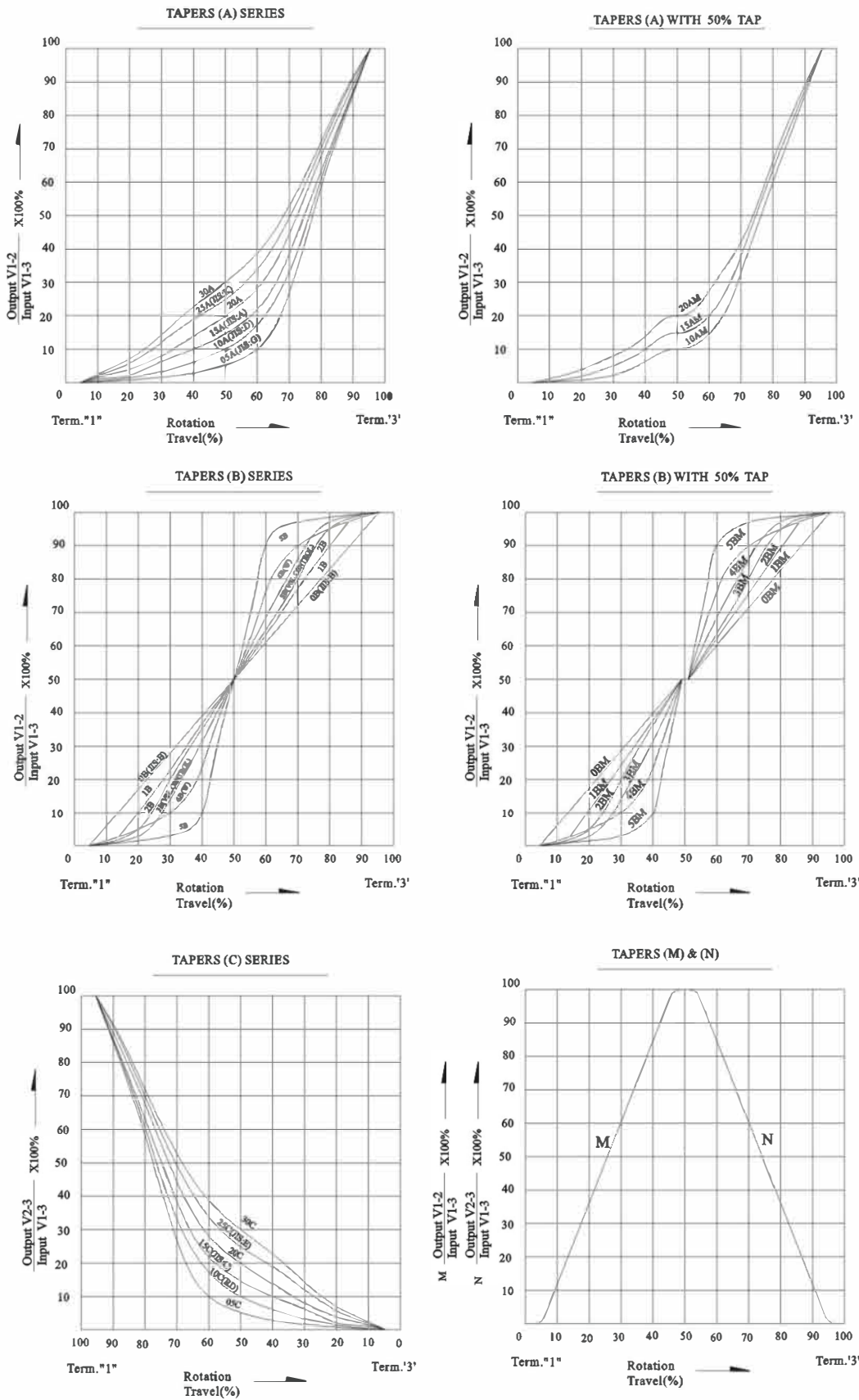


模组
Module

编码器
Encoder

开关
Switch

电位器
Potentiometer



电阻规律特性表
Resistance Taper Characteristics



模组
Module

编码器
Encoder

开关
Switch

电位器
Potentiometer

Type		JIS	Test point and output voltage proportion (%)							
			10	20	30	50	60	70	80	90
A	05A	G	—	—	—	2-10	—	—	—	—
	10A	D	—	—	—	6-15	—	—	—	—
	15A	A	—	—	—	10-22	15-30	—	—	—
	20A	—	—	—	—	15-27	—	—	—	—
	25A	K	—	—	—	19-33	—	—	—	—
	30A	—	—	—	—	24-38	—	—	—	—
B	0B	B	—	—	—	42-58	—	—	—	—
	1B	—	0.2-4	—	—	42-58	—	—	—	96-99.8
	2B	—	—	2-10	—	42-58	—	—	90-98	—
	3B	—	—	1-7	—	42-58	—	—	93-99	—
	4B	W	—	—	5-15	42-58	—	85-95	—	—
	5B	—	—	—	1-7	42-58	—	93-99	—	—
C	05C	—	—			2-10	—	—		
	10C	RD	—			6-15	—	—		
	15C	C	—			10-22	15-30	—		
	20C	—	—			15-27	—	—		
	25C	E	—			19-33	—	—		
	30C	—	—			24-38	—	—		

A B taper: $\frac{\text{Output V1-2}}{\text{Input V1-3}} \times 100\%$

C taper: $\frac{\text{Output V2-3}}{\text{Input V1-3}} \times 100\%$

- 关于电阻规律的说明Explanation of resistance taper
- 1、本产品说明书中所表述的电阻规律均以JIS为标准。
- 2、旧部标、IEC标准及日本JIS标准的电阻规律代号比较见下表：

- 1.In this products catalog, the resistance taper is in accordance with JIS standard.
2. For the contrast of the old ministry standard, IEC standard and JIS standard regarding resistance taper, see the table below.

旧部标 Old Ministry Standard	X	Z	D
IEC 标准 IEC Standard	B	A	C
JIS 标准 JIS Standard	A	B	C

电阻规律特性表

Resistance Taper Characteristics



模组
Module

编码器
Encoder

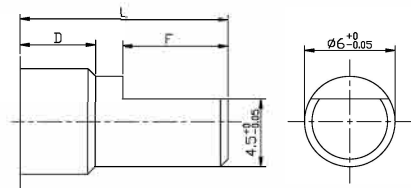
开关
Switch

电位器
Potentiometer

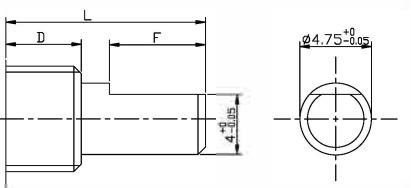
 NO: 单联 single-unit	 N1: 单联 single-unit	 N2: 单联 single-unit	 NT: 单联带抽头 single-unit with tap
 SN: 单联带旋转开关 single-unit with rotary switch	 PN: 单联带按压开关 single-unit with push switch	 G0: 双联 dual-unit	 G1: 双联 dual-unit
 G2: 双联 dual-unit	 GT: 双联带抽头 dual-unit with tap	 SN1: 单联带旋转开关 single-unit with rotary switch	 SG: 双联带旋转开关 dual-unit with rotary switch
 PG: 双联带按压开关 dual-unit with push switch	 EO: 三联 three-unit	 FO: 四联 fore-unit	 SF: 四联带旋转开关 fore-unit with rotary switch
 J0: 六联 six-unit		 SJ: 六联带旋转开关 six-unit with rotay switch	

轴芯类型表

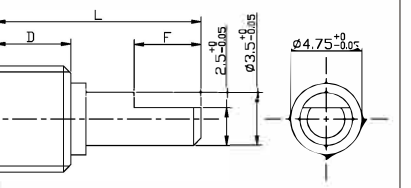
SHAFT TYPE



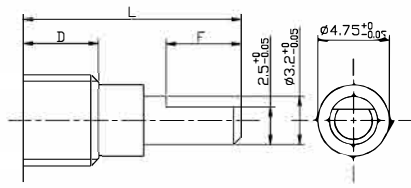
A-TYPE



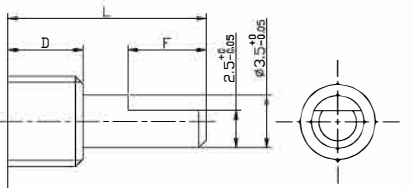
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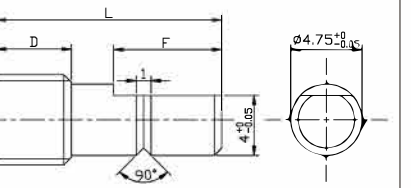
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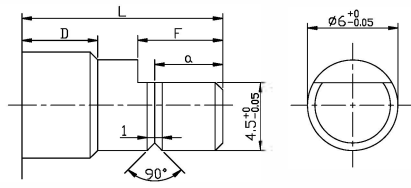
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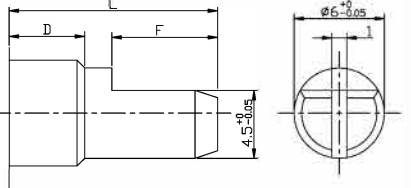
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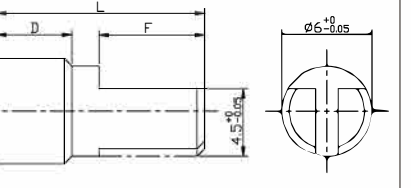
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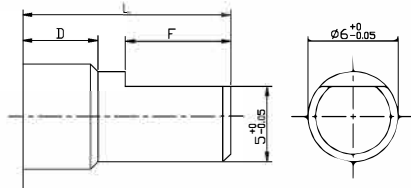
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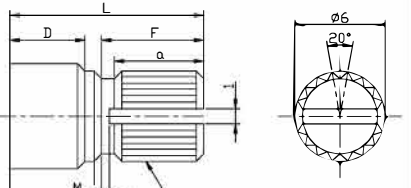
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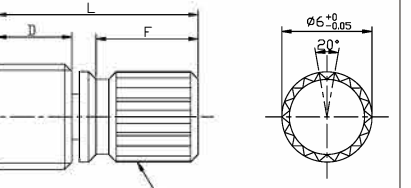
F-TYPE



FF-TYPE



K-TYPE

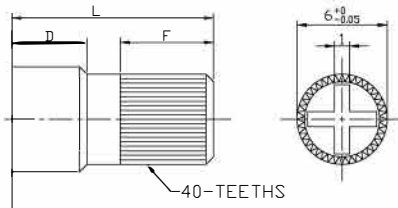


KF-TYPE

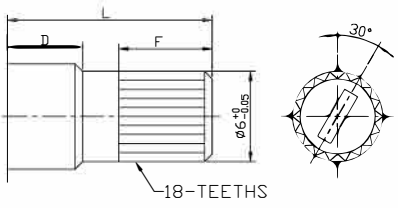
注明：如目录书与承认书规格参数、图纸有异，均以承认书为准。
Note: If any parameters or drawing of this catalog is different from "approval sheet", it's subject to the "approval sheet".

单位
UNIT: mm

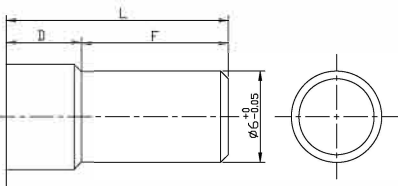
轴芯类型表
SHAFT TYPE



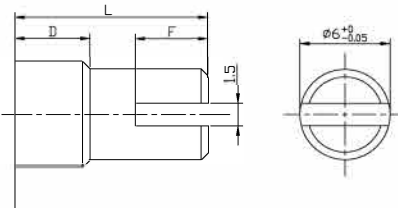
P-TYPE



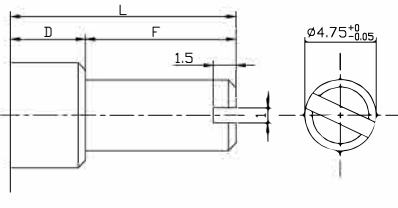
Q-TYPE



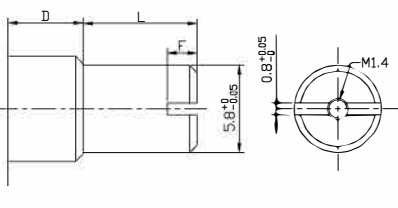
R-TYPE



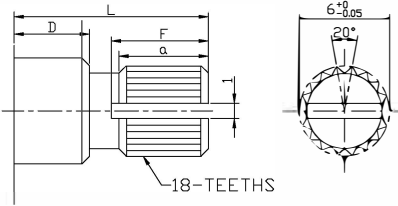
T-TYPE



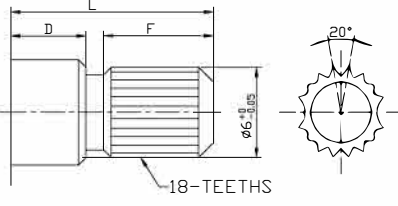
TE-TYPE



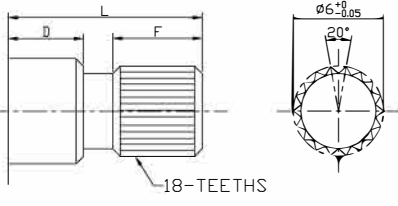
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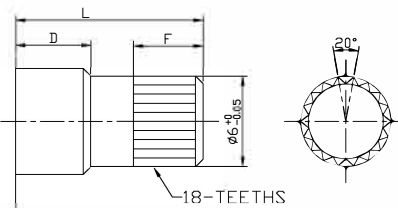
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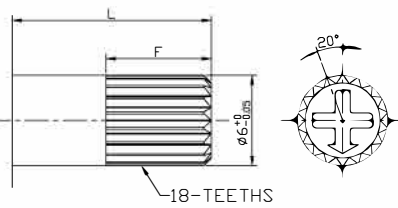
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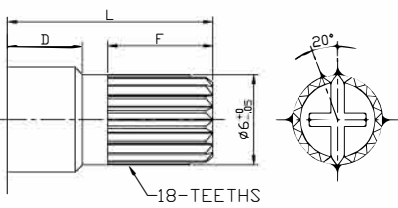
VE-TYPE



Y-TYPE



YQ-TYPE



YS-TYPE

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单位
UNIT: mm

模 组
Module

编码器
Encoder

开 关
Switch

电位器
Potentiometer