技术用语--线性马达

Technical term-linear motor

持续推力Fc(N) Sustained thrust

定义为马达在环境温度 25°C 下，连续运动不休息所输出的推力，此连续推力对应施加给马达之连续电流 IC。

It is defined as the thrust output by the motor when it moves continuously without rest at the ambient temperature of 25 C. This continuous thrust corresponds to the continuous current IC applied to the motor.

连续电流Ic(Arms) Continuous current

定义为在环境温度 25°C 下，可连续供应给马达线圈的电流，亦为产生连续推力的电流。

It is defined as the current that can be continuously supplied to the motor coil at the ambient temperature of 25°C, and also the current that generates continuous thrust.

瞬间推力Fp(N) Instantaneous thrust

定义为马达在不超过一秒的时间可以输出的最大推力，一般用于加速或减速的目的。

It is defined as the maximum thrust that the motor can output in no more than one second, and is generally used for the purpose of acceleration or deceleration.

瞬间电流Ic(Arms) Instantaneous current

定义为马达达到瞬间推力下所对应之瞬间大电流，在正常操作范围，瞬间电流可允许供给一秒。

It is defined as the instantaneous large current corresponding to the instantaneous thrust of the motor. In the normal operating range, the instantaneous current can be allowed to supply for one second.

极限推力Fu(N) Ultimate thrust

定义为马达在极限电流 Iu下所对应的输出推力。

It is defined as the output thrust of the motor under the limit current Iu.

极限电流Iu(Arms) Limiting current

定义为马达连续电流 IC 的五倍;在此电流下，马达输出之推力在饱和 的非线性品内，推力常数会降低，输入此电流马达有过温风险，建议操作时间为 0.5 秒以下。

Defined as five times of the continuous current IC of the motor; Under this current, the thrust output by the motor is in a saturated nonlinear product, and the thrust constant will decrease. There is a risk of overtemperature in the motor input with this current. It is suggested that Operation time is less than 0.5 seconds.

推力常数Kf(N/Arms) Thrust constant

定义为马达在单位电流下(Arms)的输出推力，把此参数乘以电流即可得到推力:F=IxKf°

It is defined as the output thrust of the motor under unit current (Arms), and the thrust can be obtained by multiplying this parameter by the current: f = Ixkf°

动子与定子间吸引力Fa(N) Attraction between rotor and stator

定义在额定气隙下铁心式马达动子与定子之间的作用力，此力形成滑 块的预压，将由滑轨承受。

Define the acting force between the rotor and stator of core motor under rated air gap, which forms the preload of the slider and will be borne by the slide rail.

线圈最高温度TMAX(°C) Maximum coil temperature

定义为马达连续线圈允许的最高温度。马达的实际平衡温度会取决于 机构、冷却方式及运动规则等等因素，理论计算可能会有偏差，通常以实际测试为依据。

It is defined as the maximum allowable temperature of the continuous coil of the motor. The actual equilibrium temperature of the motor will depend on the mechanism, cooling mode, motion rules and other factors, and the theoretical calculation may be biased, usually based on the actual test.

电气时间常数Ke(ms) Electrical time constant

定义为供给马达的电流达到目标值 63%所需的时间，其值越小表示响应时间越快。

It is defined as the time required for the current supplied to the motor to reach 63% of the target value. The smaller the value, the faster the response time.

电阻 (线间,25°C)R25Ω Resistance (line to line, 25°C)

定义为马达在线圈温度25°C时所量测之线间电阻值;电阻值会随温度上升而提高。

It is defined as the line-to-line resistance value measured by the motor at the coil temperature 25°C; The resistance value will increase with the increase of temperature.

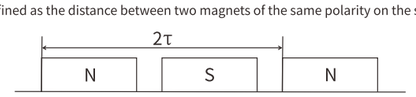
电感 (线间) L(mH) Inductance (line-to-line)

定义为马达所量测之线间电感值。Defines the line-to-line inductance value measured by the motor.

极对距2τ(mm) The polar distance is 2τ(mm)

定义为定子上两同极性磁铁之间的距离，即为 N→N 或 S→S.

Is defined as the distance between two magnets of the same polarity on the stator, i.e. N→N or S → S.



反电动势常数Kv[Vrms/(m/s)] Back electromotive force constant

定义为马达在磁石温度 25°C时，单位速度所产生的感应电动势。发生于线圈感应到磁场变化时，反抗电流通过电动势。

It is defined as the induced electromotive force generated by the unit speed of the motor when the magnet temperature is 25°C. hair When the coil senses the change of the magnetic field, it resists the current passing through the electromotive force.

马达常数Km(N/√W) Motor constant

定义为线圈以及磁石温度 25°C 时马达输出推力对消耗功率开根号的比值，越高的马达常数代表马达在输出特定推力时会有越低的功率损失，为判定马达效率的指标之一。

It is defined as the ratio of the output thrust of the motor to the open root number of the consumed power when the temperature of the coil and magnet is 25 C. The higher the motor constant, the lower the power of the motor when it outputs a specific thrust. Loss is one of the indexes to judge the motor efficiency.

热阻RTH(°C/W) Heat resistance

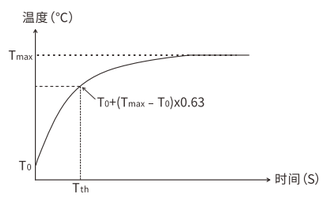
定义为热量从马达线圈内到散热环境所受到之阻力，热阻越小表叔相 同热量输入下，线圈与散热环境的温差越小，亦表示散热效果越好。

It is defined as the resistance of heat from the motor coil to the heat dissipation environment. The smaller the thermal resistance, the smaller the temperature difference between the coil and the heat dissipation environment under the same heat input, which also indicates the better heat dissipation effect.

热时间常数tTH(s) Thermal response time

定义为马达在供给连续电流下，线圈初始温度升至与线圈最高温度温 差 63%所需的时间。

It is defined as the time required for the initial temperature of the coil to rise to 63% temperature difference from the highest temperature of the coil when the motor is supplied with continuous current.



技术用语--线性马达

Technical term-linear motor

最小流量(L/min) Minimum flow

定义为冷却液在额定水冷温度下，马达要达到水冷连续推力 Fc(wc) 需要的最小流量。
It is defined as the minimum flow rate required by the motor to achieve the water-cooling continuous thrust Fc(wc) at the rated water-cooling temperature.

水冷温度(°C) Water cooling temperature

定义为在最小流量下，马达冷却液需在此温度才能达到水冷连续推力 Fc(wc)。
It is defined that at the minimum flow rate, the motor coolant must reach the water-cooled continuous thrust Fc(wc) at this temperature.

压降△P(bar) Pressure drop

定义为冷却液在最小流量下的进出水口压力差。
Define the pressure difference between inlet and outlet of coolant at the minimum flow rate.

瞬间推力最高速度$V_{MAX,FP}$(W) Instantaneous thrust maximum speed

定义为在瞬间推力下，马达所能达到的最高速度:此参数需取决于最大操作电压。
It is defined as the highest speed that the motor can reach under instantaneous thrust: this parameter depends on the maximum operating voltage.

最大输入功率 $P_{EL,MAX}$(W) Maximum input power

定义为马达操作在瞬间推力最高速度 与最大热损失 条件下所需要的输入功率。
It is defined as the input power required for motor operation under the conditions of instantaneous thrust maximum speed and maximum heat loss.

最大热损失$Q_{P,H,MAX}$(W) Maximum heat loss

定义为马达在线圈最高温度时线圈产生的热损失。
It is defined as the heat loss generated by the coil when the motor is at the highest temperature of the coil.

堵转电流Io(ARms) Blocked current

定义为马达在环境温度 25°C与堵转条件下，所能供给之电流上限，其值与散热条件有关。
It is defined as the upper limit of the current that the motor can supply at the ambient temperature of 25°C and the locked-rotor condition, and its value is related to the heat dissipation condition.

堵转力Fo(N) Blocking force

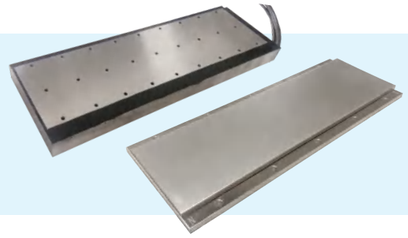
定义为马达在环境温度 25°C与堵转条件下，所能供给之推力上限，其值与散热条件有关。
It is defined as the upper limit of the thrust that the motor can supply under the conditions of ambient temperature of 25°C and locked rotor, and its value is related to the heat dissipation condition.

最大操作电压(V_{DC}) Maximum operating voltage

定义为马达在正常工作环境所能使用的最大操作电压。
Defines the maximum operating voltage that the motor can use in normal working environment.

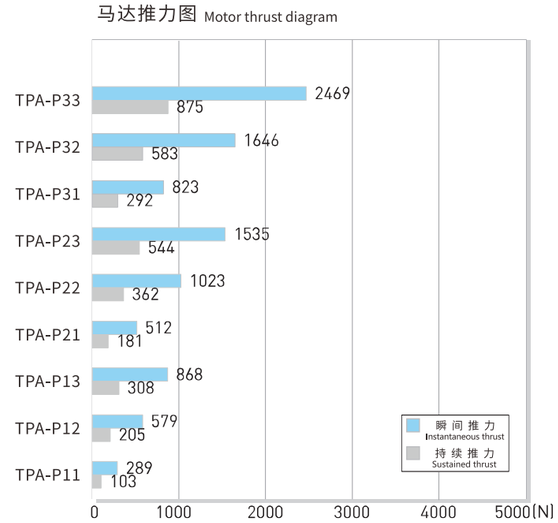
TPA-P系列线性马达 TPA-P series linear motors

TPA同步线性马达TPA-P系列是属于线性驱动产品中推力较大的一型。它的特色在于高推力密度与低顿力。
此三项马达是由铁心构成的一次侧[动子]与永久磁铁构成的二次侧[定子]组成。由于定子可无限延长，所以行程将不受限制。
TPA linear motor LMSA is one of the linear drive products with high thrust. It is characterized by high thrust density and low stopping force.
The three motors are composed of a primary side (Mover) composed of an iron core and a secondary side (stator) composed of a permanent magnet. Since the stator can be extended indefinitely, the stroke will be unlimited.



- ◇ 高动态响应 High dynamic response
- ◇ 低安装高度 Low installation height
- ◇ UL与CE认证 UL and CE certification
- ◇ 持续推力范围103N至1579N The sustained thrust range is 103N to 1579N
- ◇ 瞬间推力范围289N至4458N Instantaneous thrust range 289N to 4458N
- ◇ 安装高度34mm,36mm The mounting height is 34mm and 36mm

马达推力图 Motor thrust diagram



TPA-P系列规格

TPA-P series specifications

性能参数 Performance parameter	符号 Symbol	单位 Unit	TPA-P11	TPA-P12	TPA-P13	TPA-P21	TPA-P22	TPA-P23	TPA-P31	TPA-P32	TPA-P33
持续推力 Sustained thrust	F_c	N	103	205	308	181	362	544	292	583	875
连续电流 Continuous current	I_c	A_{rms}	2.1	4.2	6.3	2.0	3.9	5.9	2.0	4.0	13.4
瞬间推力(1s) Instantaneous thrust	F_p	N	289	579	868	512	1023	1535	823	1646	2469
瞬间电流(1s) Instantaneous current	I_p	A_{rms}	6.3	12.7	19.0	5.9	11.8	17.6	6.0	12.0	40.2
极限推力(0.5s) Ultimate thrust force	F_u	N	379	759	1138	670	1341	2011	1079	2157	3236
极限电流(0.5s) Limiting current	I_u	A_{rms}	10.6	21.1	31.7	9.8	19.6	29.4	10.0	20.0	67.0
推力常数 Thrust constant	k_f	N/A_{rms}	48.6	48.6	48.6	92.5	92.5	92.5	145.8	145.8	65.2
动子与定子间吸力 Suction between rotor and stator	F_a	N	481	963	1444	963	1926	2888	1444	2888	4333
线圈最高温度 Maximum coil temperature	T_{max}	°C	120								
电气时间常数 Electrical time constant	k_e	ms	4.4	4.5	4.4	4.6	4.9	4.9	4.9	4.9	5.0
电阻(线间,25°C) Resistance (line to line, 25°C)	R_{25}	Ω	8.4	4.1	2.8	13.8	6.8	4.6	19.2	9.6	1.3
电阻(线间,120°C) Resistance (line to line, 120°C)	R_{120}	Ω	11.6	5.7	3.9	19.0	9.4	6.3	26.5	13.2	1.8
电感 Inductance	L	mH	37.1	18.5	12.4	64.0	33.0	22.4	94.1	47.1	6.5
极对距 Polar distance	2τ	mm	30								
马达线绕曲半径 Wire winding radius of motor	R_{bend}	mm	69								
反电动势常数(线间) Back EMF constant (line-to-line)	K_v	$V_{rms}/(m/s)$	28.1	28.1	28.1	53.4	53.4	53.4	84.2	84.2	37.7
马达常数(25°C) Motor constant (25°C)	K_m	$N/\sqrt{W}$	13.7	19.6	23.7	20.3	28.9	35.2	27.2	38.4	46.7
热阻 Heat resistance	R_{TH}	°C/W	1.23	0.63	0.41	0.87	0.44	0.29	0.60	0.30	0.20
热时间常数 Thermal response time	t_{TH}	s	1830	2720	4210	2830	4060	5080	4540	5740	5580
热感测开关 Thermal sensing switch	–	–	3 PTC SNM120 In Series								
最大操作电压 Maximum operating voltage	–	V_{dc}	600								
动子质量 Moving mass	M_f	kg	0.7	1.4	2.1	1.1	2.2	3.3	1.9	3.8	5.7
定子单位质量 Unit mass of stator	M_s	kg/m	2.7	2.7	2.7	4.8	4.8	4.8	8.5	8.5	8.5
定子宽度 Stator width	W_s	mm	52	52	52	86	86	86	116	116	116
定子长度/数值N Stator length/value N	L_s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5								
定子固定孔位 Fixed stator hole position	W_{s1}	mm	42	42	42	74	74	74	104	104	104
总安装高度 Total installation height	H	mm	34	34	34	34	34	34	36	36	36

注:1、本表数据为无强制冷却下的值。
Note: 1. The data in this table are values without forced cooling.

2、除了尺寸规格以外,其余规格有±10%的误差范围。
2. Except the size specification, the other specifications have an error range of 10%.

3、本公司保有变更的权利,请以客户确认图为主。
3. Our company reserves the right to make changes. Please give priority to the customer confirmation chart.

产品型号说明 Product model description

动子型号 Movermodel

T P A - P 1 1

- 品牌名称 Brand
- 动子型号 Mover model: P11 / P12 / P13

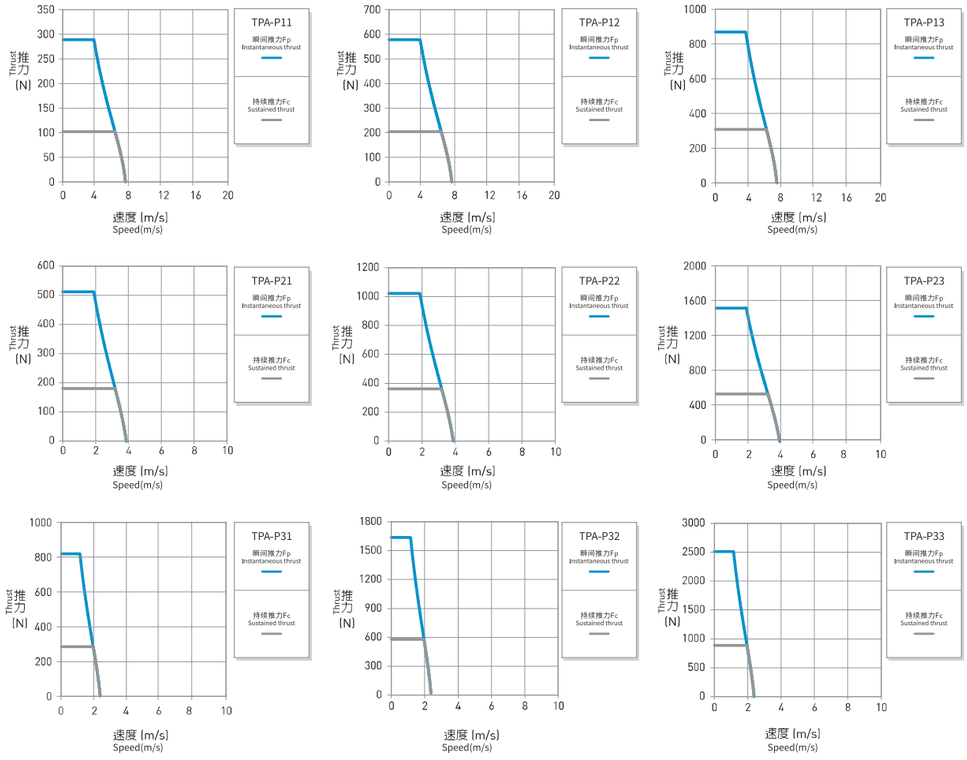
定子型号 Stator model

T P A - P S 1 1

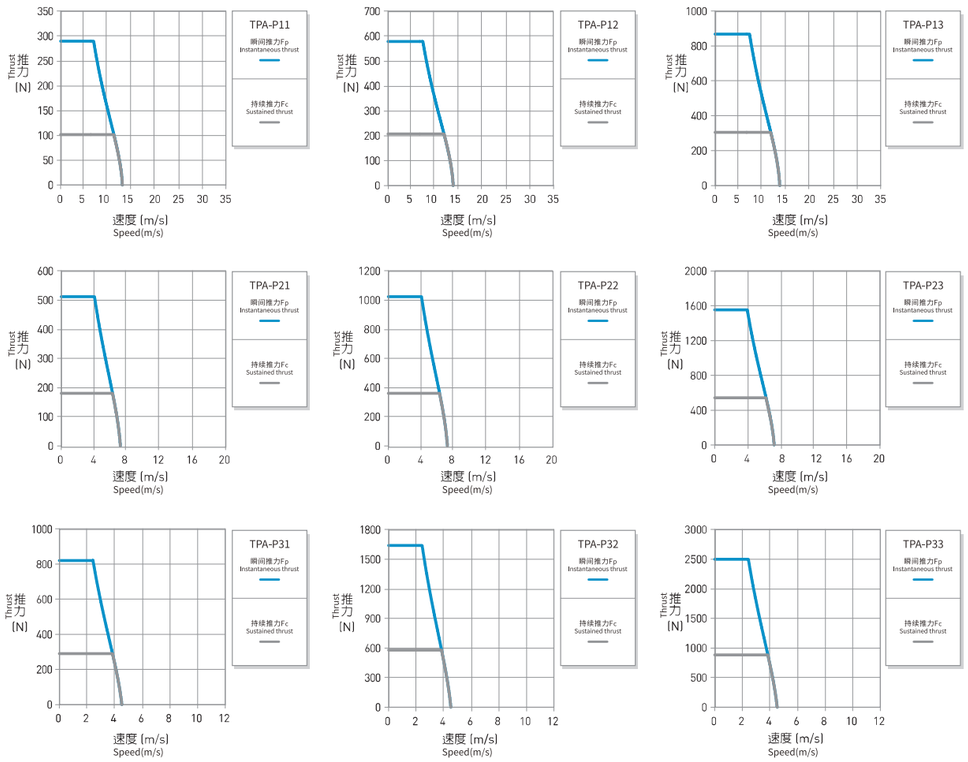
- 品牌名称 Brand
- 定子系列 Stator Model: PS11 / PS12 / PS13
- 长度 Length: 120mm / 180mm / 300mm

直线电机曲线图 Linear motor curve diagram

■ 推力与速度曲线图〔DC bus voltage=325VDC〕Graph of thrust and velocity [DC bus voltage = 325Vdc]



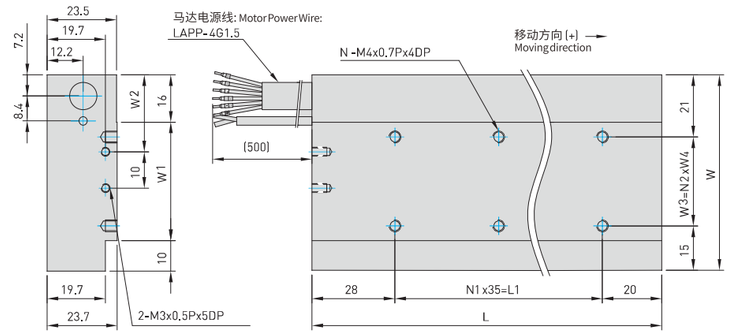
■推力与速度曲线图〔DC bus voltage=600VDC〕Graph of thrust and velocity [DC bus voltage = 600Vdc]



TPA 动 定子尺寸图
TPA Dimension diagram of Mover & stator

TPA 动子尺寸图 TPA Dimension diagram of Mover

单位:Unit: mm

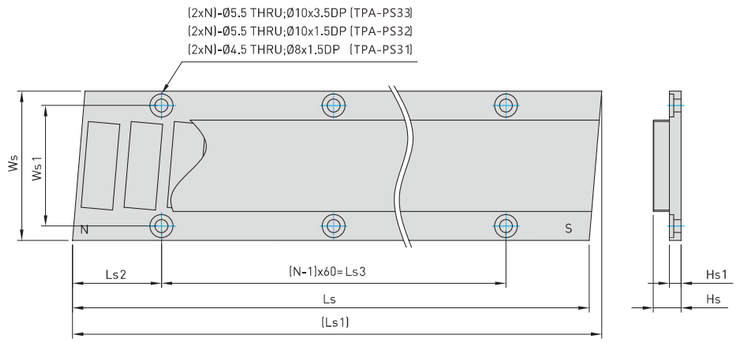


型号 Model	L	L1	w	w1	w2	w3	w4	N	N1	N2
TPA-P11	118	70	56	30	26	20	20	6	2	1
TPA-P12	223	175	56	30	26	20	20	12	5	1
TPA-P13	328	280	56	30	26	20	20	18	8	1
TPA-P21	118	70	86	60	41	50	50	6	2	1
TPA-P22	223	175	86	60	41	50	50	12	5	1
TPA-P23	328	280	86	60	41	50	50	18	8	1
TPA-P31	118	70	116	90	56	80	40	9	2	2
TPA-P32	223	175	116	90	56	80	40	18	5	2
TPA-P33	328	280	116	90	56	80	40	27	8	2

TPA 动 定子尺寸图
TPA Drawing of Mover & Stator

TPA 定子尺寸图 TPA Drawing of Mover & Stator

单位:Unit: mm



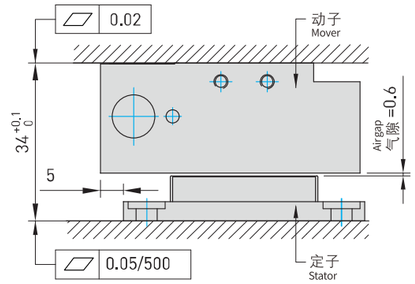
型号 Model	Ls	Ls1	Ls2	Ls3	Ws	Ws1	Hs	Hs1	N
TPA-PS11	120	124.36	31	60	52	42	9.7	4.1	2
TPA-PS12	180	184.36	31	120	52	42	9.7	4.1	3
TPA-PS13	300	304.36	31	240	52	42	9.7	4.1	5
TPA-PS21	120	122.7	30.57	60	86	74	9.7	4.1	2
TPA-PS22	180	182.7	30.57	120	86	74	9.7	4.1	3
TPA-PS23	300	302.7	30.57	240	86	74	9.7	4.1	5
TPA-PS31	120	123.04	30.37	60	116	104	11.7	6.1	2
TPA-PS32	180	183.04	30.37	120	116	104	11.7	6.1	3
TPA-PS33	300	303.04	30.37	240	116	104	11.7	6.1	5

TPA 组合尺寸图
TPA Combined dimension drawing

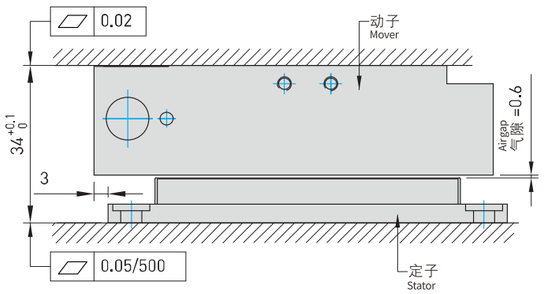
TPA 组合尺寸图 TPA Combined dimension drawing

单位:Unit: mm

TPA-P1系列
TPA -P1 Series



TPA-P2系列
TPA -P2 Series



TPA-P3系列
TPA -P3 Series