

单轴执行器 Single axis Actuator

灵活可选执行器系列 Flex Actuator Series

Actuator
fLEX

精度(驱动丝杠)、速度(导程)、移动距离(行程)、负载(电机)的组合打造了丰富的产品系列的KSS灵活可选执行器系列。

Many variation of KSS Flex Actuator became reality. Various choices among accuracy(Drive Screw type), speed(Screw Lead), Travel length and power(Motor type) are available.



●特点

- 最大限度地发挥微型滚珠丝杠制造商的特点,设计出了终极紧凑型执行器。
- 根据执行器所使用的驱动丝杠的种类可在广范围内选择定位相关的精度。
- 每种驱动丝杠备有多种导程和行程,进给速度选择范围广。
- 以无电机型为标准,准备了几种电机作为选择方案。可根据使用条件安装相应规格的电机。
- 可与最适合所选电机的标准驱动器配套采购。
- 具有充实的外装光电传感器及刹车单元等可选功能。

●Features

- We make full use of features of Miniature Ball Screw manufacturer and super compact design Actuator can be achieved.
- Depending on kinds of Drive Screws, wide range of choices related to positioning accuracy are available.
- Several variations of Screw Lead & Travel for each Screw type are standardized. So wide variety of choice for speed is available.
- Motor-less type is our standard, but a couple of Motors are in stock as an option. Suitable Motor and Actuator would be assembled in accordance with your specifications.
- Recommended Motor Drivers for each Motors are also in stock.
- Accessories can be provided as special design, such as outside photo-sensor, Brake unit and so on.



丰富的产品系列
Wide range of choices



无电机型的标准品
Motor-less is standard

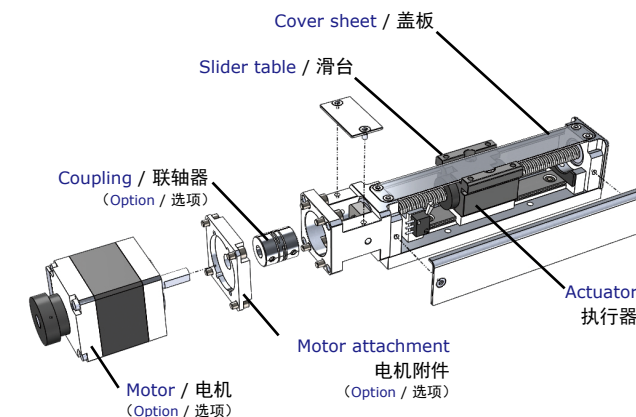


众多丝杠产品
Wide variety of Drive Screw type

●构造 / Structure

KSS灵活可选执行器系列是组合了微型驱动丝杠和导轨的台面型执行器。以无电机型作为标准形状,被设计成为根据使用条件能够安装最适合的电机。

KSS Flex Actuator is the slider type Actuator, which is built in small size Drive Screw and Slide Guide in it. KSS Flex Actuator series are standardized without Motor. It is designed to set the appropriate Motor easily based on the required specifications.



●种类与特点

根据所使用的驱动丝杠,KSS灵活可选执行器系列有以下种类。请根据所要求的精度选择驱动丝杠的种类。详情请参照规格一览表(表Q-3 第Q106页)。

1)冷轧滚珠丝杠型

采用了冷轧滚珠丝杠,因此确保了合理的价格和精度。

2)精密滚珠丝杠型

采用了精密滚珠丝杠,因此重复定位精度和空转都实现了高精度。

3)也可根据需要制作价廉物美的树脂导程丝杠(含油型),请垂询本公司。

●Variation & Features

There are several kinds of KSS Flex Actuators shown below. Each Actuator has a different kinds of Drive Screw inside. Please choose appropriate type Drive Screw depending on your required accuracy. For further information, please refer to Table Q-3 in page Q106.

1)Rolled Ball Screw type

Reasonable price and accuracy have been achieved by using Rolled Ball Screw.

2)Precision Ball Screw type

High accuracy in both Repeatability and Lost motion by using Precision Ball Screw.

3)Resin Lead Screw type is available for less-expensive application based on your request. Please ask KSS representative.

表 Q-1 : 驱动丝杠的定位精度

Table Q-1 : Positioning accuracy for each Drive Screw

Drive Screw type / 驱动丝杠种类	Repeatability 重复定位精度 (mm)	Lost motion 空转 (mm)
Rolled Ball Screw / 冷轧滚珠丝杠	±0.01 max.	0.01 max.
Precision Ball Screw / 精密滚珠丝杠	±0.005 max.	0.005 max.

注) 使用标准电机时的参考值。

Note) These numbers are obtained with standard Motor.

作为电机选项为KSS灵活可选执行器系列准备了以下选择方案。执行器和电机组合时的详细规格请参照第Q106页。

There are several choices of Motor as option shown below. Specifications for each combination of Actuator and Motor are shown in page Q106.

Motor type 电机种类	Manufacturer 电机制造商	Model number 电机型号	Rated Current 额定电流
2-phase / 2相 □25	Minebea Motor 美蓓亚电机	10PM-K202B Single shaft / 单轴	0.7A / Phase 0.7A / 相
5-phase / 5相 □28	Oriental Motor 东方马达	PK523HPB Double shaft / 双轴	0.75A / Phase 0.75A / 相

FA S - G 020 - 080 M N R SBU
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

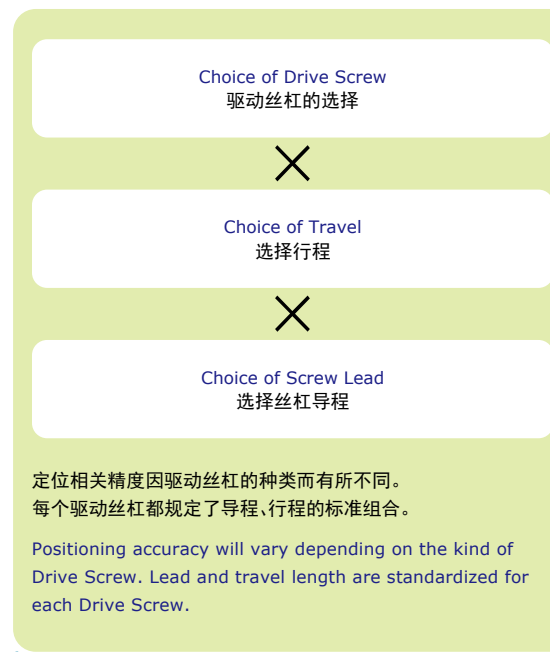
- ①系列符号
FA : KSS灵活可选执行器系列
- ②构造符号
S : 滑块型
- ③驱动丝杠种类
R : 冷轧滚珠丝杠
G : 精密滚珠丝杠
- ④导程 / 节距(mm) : 020表示2mm
- ⑤行程(mm) : 080表示80mm
- ⑥电机类型
无符号 : 无电机(标准品)
M : 美蓓亚电机制造 2相步进电机 (□25&0.7A / 相)
E : 东方马达制造 5相步进电机 (□28&0.75A / 相)
S : 其他
- ⑦连接器种类
N : 散线
H : 广濑RP17
E : EI连接器(TE Connectivity制造)
- ⑧导线方向
R : 右侧引线(从轴侧看是右侧)
L : 左侧引线
- ⑨选项符号
无符号 : 无选项
S : 外装光电传感器
B : 电磁刹车单元
U : 电机周边套件

- ①Series No.
FA : KSS Flex Actuator Series
- ②Actuator type
S : Slider type
- ③Drive Screw type
R : Rolled Ball Screw
G : Precision Ball Screw
- ④Lead / Pitch (mm) : 020 means 2mm
- ⑤Travel (mm) : 080 means 80mm
- ⑥Motor type
None : No Motor (Standard)
M : Minebea Motor 2-phase Stepping Motor (□25&0.7A / phase)
E : Oriental Motor 5-phase Stepping Motor (□28&0.75A / phase)
S : Other
- ⑦Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
- ⑧Direction of Motor leads
R : Right (from Shaft end side)
L : Left
- ⑨Option
None : no optional design
S : Photo micro Sensor outside
B : Solenoid Brake Unit
U : Side Motor mounting kit

KSS灵活可选执行器能够组合选择驱动丝杠的种类(定位精度)、丝杠导程以及行程。
 无电机型为标准品,但是作为选项准备了2种电机。由于这些组合,扩大了客户的选择余地,从而能够选定符合使用条件的执行器。
 驱动丝杠的种类与电机选择(选项)请参照以下组合一览表(表Q-2)。
 决定组合后,详细的尺寸与规格请参照各自刊登的页面。需要表Q-2以外组合的执行器时,请垂询本公司。

KSS Flex Actuator has a lot of combinations with Drive Screws (positioning accuracy), Screw Lead, and travel length. Motor-less type is our standard, but 2 types of Motor can be provided as an optional order. Standard combination and Motor choices make design flexibility enlarge widely based on your specifications. Combination of Drive Screw and Motor are shown in Table Q-2.
 The detail specifications and dimensions are described in each dimension table.
 If other combination in Table Q-2 is required, please ask KSS representative.

标准规格的组合 / Standard Combination



电机选项 / Motor Option



参照表Q-3
Refer to Table Q-3

决定组合后,详细尺寸请参照各自的页面。刊登页面一览表请参照表Q-2。
The detail specifications for each combination are shown in dimension Table. Page index is shown in Table below.

表Q-2 : 各组合的刊登页面一览表

Table Q-2 : Page index for each combination

Motor / 电机		Rolled Ball Screw 冷轧滚珠丝杠	Precision Ball Screw 精密滚珠丝杠
Standard 标准	Motor : None 无	See page Q107~Q108 参照第Q107~Q108页	See page Q109~Q110 参照第Q109~Q110页
Option 选项	M Minebea Motor / 美蓓亚电机制造 2-phase Stepping Motor(□25&0.7A / phase) 2相步进电机(□25&0.7A / 相) Bi-polar type / 双极	See page Q111~Q112 参照第Q111~Q112页	See page Q113~Q114 参照第Q113~Q114页
	E Oriental Motor / 东方马达制造 5-phase Stepping Motor(□28&0.75A / phase) 5相步进电机(□28&0.75A / 相)	See page Q115~Q116 参照第Q115~Q116页	See page Q117~Q118 参照第Q117~Q118页

●选定的标准

KSS灵活可选执行器的驱动丝杠的种类、丝杠导程、行程、电机的种类等组合特别丰富。鉴于此,有时选定合理的组合的流程会变得复杂。为了让客户便于选定执行器,在此刊登了从各种选择方案中选定的标准。

Drive Screw selection guide 选定驱动丝杠的标准	Positioning related accuracy 定位相关精度	Price 价格
Rolled Ball Screws 冷轧滚珠丝杠	Middle 中	Reasonable 一般
Precision Ball Screws 精密滚珠丝杠	High 高	Costly 高价

Screw Lead selection guide 选定导程的标准	Speed 进给速度	Resolution 分辨率	Load Capacity 可搬负载
1mm	Slow 慢	High 高	High 高
2mm	↑↓	↑↓	↑↓
6mm			
10mm	Fast 快	Low 低	Low 低

Motor selection guide 选定电机的标准	Fine step 微小进给	Acceleration 加速性	Rotational speed 转速	Price 价格
2-phase □25 2相 □25	Middle 中	Middle 中	Middle 中	Less expensive 低价
5-phase □28 5相 □28	Fine 微小	High 高	Low & high speed 涵盖低速和高速	Costly 高价

与KSS执行器相连时的性能,并非电机单体的性能。详情请参照下一页的规格一览表。
The table above shows the functional comments when the Motor is built in KSS Flex Actuators.
Please note that the table above is not the function of Motor itself. For more detail, please see the table of specifications in next page.

●Selection guide

KSS Flex Actuator has a lot of combinations with Drive screws, Screw Lead, Travel length and Motor as an option. Therefore, when you try to select the suitable combination, its procedure may be complicated. KSS shows the selection guide below from the various approach of choices.

表Q-3 : 规格一览表

Table Q-3 : Specifications for each combination

Drive Screw type / 驱动丝杠种类	Rolled Ball Screw 冷轧滚珠丝杠	Precision Ball Screw 精密滚珠丝杠
Repeatability / 重复定位精度(mm)	±0.01 max.	±0.005 max.
Lost motion / 空转(mm)	0.01 max.	0.005 max.
Permissible Moment / 允许负载偏心力矩(Nm) Mp(Pitching / 俯仰)	0.10 ** In case of no load in My & Mr direction **My、Mr方向没有负载时	
Permissible Moment / 允许负载偏心力矩(Nm) My(Yawing / 偏转)	0.09 ** In case of no load in Mp & Mr direction **Mp、Mr方向没有负载时	
Permissible Moment / 允许负载偏心力矩(Nm) Mr(Rolling / 侧滚)	0.23 ** In case of no load in Mp & My direction **Mp、My方向没有负载时	

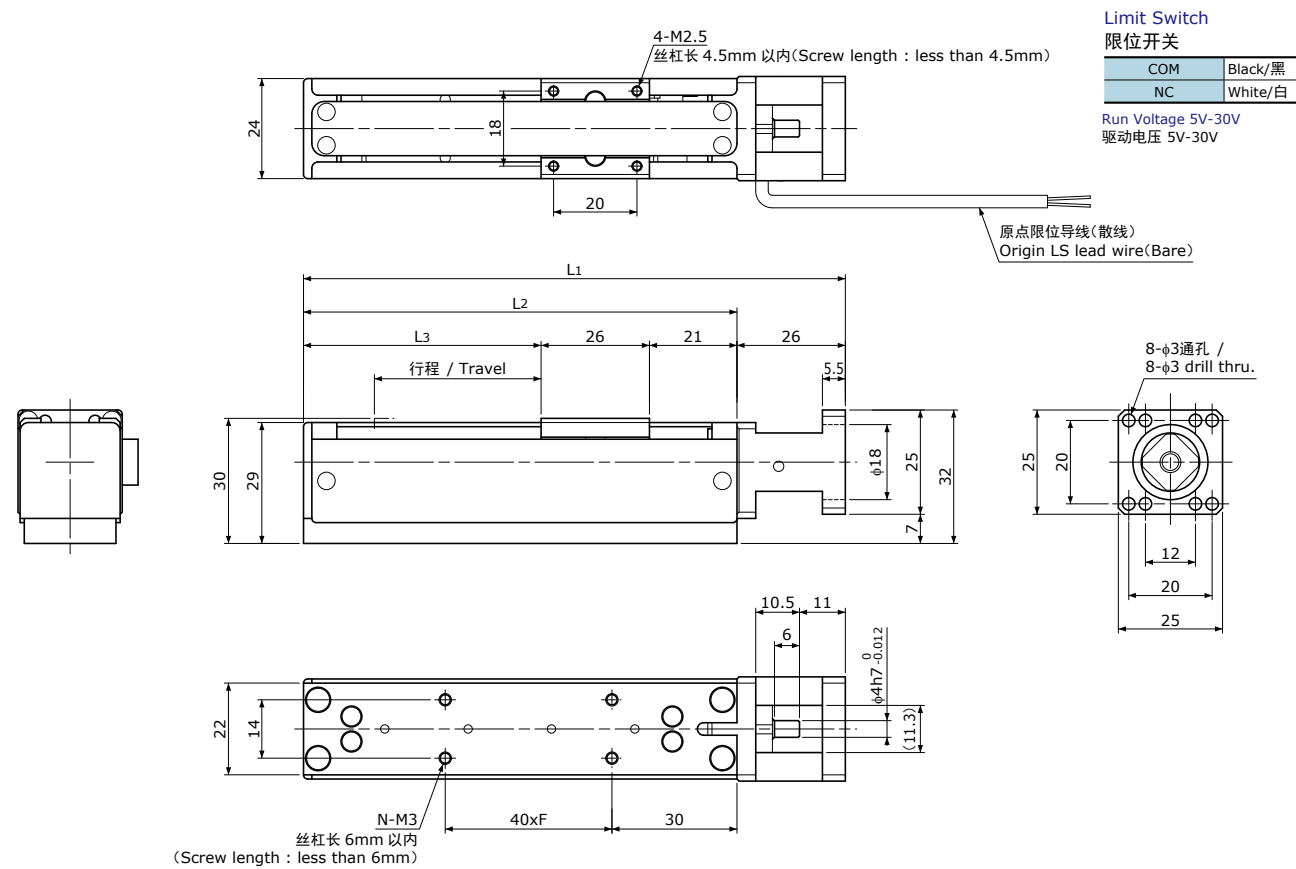
Spec. for each Motor / 按电机规格一览表			Rolled Ball Screw 冷轧滚珠丝杠				Precision Ball Screw 精密滚珠丝杠			
Motor 电机	Lead / 导程(mm)		1	2	6	10	1	2	6	10
	H:Horizontal / 水平 V:Vertical / 垂直									
Standard 标准	Max. Load Capacity(N) 最大可搬负载(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	9.8	4.9	19.6	19.6	9.8	4.9
Motor-less 无电机	Permissible speed(mm / sec) 许用转速(mm / sec)		0~25	0~50	0~150	0~250	0~25	0~50	0~150	0~250
Motor : M 2-phase / 2相 □25 0.7A / phase	Max. Load Capacity(N) 最大可搬负载(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	2.94	2.94	19.6	19.6	2.94	2.94
Motor : E 5-phase / 5相 □28 0.75A / phase	Max. Load Capacity(N) 最大可搬负载(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	4.9	4.9	19.6	19.6	4.9	4.9
**Motor mounting is option **带电机为选项。	Travel / 行程 (mm)	20	○				○			
		40	○	○	○	○	○	○	○	○
		80	○	○	○	○	○	○	○	○
		120			○	○			○	○
		160			○	○			○	○
		200			○	○			○	○

注1) 无电机时重复定位精度、空转为参考值;许用转速、可搬负载为推荐值。
注2) 详情请参照尺寸表。
Note 1) In case of Standard (Motor-less), Repeatability & Lost motion are reference value, Permissible speed & Load Capacity are recommended value.
Note 2) For more detail, please refer to dimension table.

Flex Actuator 灵活可选执行器

Motor-less type(Standard) Rolled Ball Screw type Actuator

无电机型(标准品) 冷轧滚珠丝杠型执行器



注释

- 1)使用时不得出现结露现象。
- 2)允许力矩是其他方向没有负载时的值。
- 3)扭矩值为参考值。
- 4)无电机时,重复定位精度及空转为参考值。
- 5)无电机时,许用转速及可搬负载为推荐值。
- 6)必要扭矩为最大垂直可搬负载作用时的所需扭矩。
- 7)推荐联轴器
 - 酒井制作所 : LAS-12C-4×(3 or 4 or 5)
 - 锅屋BITECH : MWS-12C-4×(4 or 5)
 - 锅屋BITECH : MOS-12C-4×(3 or 4 or 5)
 - MISUMI : CPSCN12-4 ×(4 or 5)

Note

- 1)There should be no condensation when using.
- 2)Permissible Moment is the number when no load in other direction.
- 3)Please consider Torque as reference number.
- 4)In case of Motor-less type, Repeatability & Lost motion are reference number.
- 5)In case of Motor-less type, Permissible speed & Load Capacity are recommended number.
- 6)Required Torque is under maximum vertical Load Capacity.
- 7)Recommended Coupling
 - SAKAI SEISAKUSYO : LAS-12C-4×(3 or 4 or 5)
 - NBK : MWS-12C-4×(4 or 5)
 - NBK : MOS-12C-4×(3 or 4 or 5)
 - MISUMI : CPSCN12-4 ×(4 or 5)

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Motor Required Torque 电机所需扭矩 (Nm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直		
FAS-R010-020	20	1	0.009	110	84	37	1	4	29.4	19.6	0 ~ 25	160
FAS-R010-040		1	0.009	130	104	57	1	4	29.4	19.6	0 ~ 25	
FAS-R020-040		2	0.011						29.4	19.6	0 ~ 50	
FAS-R060-040		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-040	40	10	0.015	170	144	97	2	6	19.6	4.9	0 ~ 250	180
FAS-R010-080		1	0.009						29.4	19.6	0 ~ 25	
FAS-R020-080		2	0.011						29.4	19.6	0 ~ 50	
FAS-R060-080		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-080	80	10	0.015	210	184	137	3	8	19.6	4.9	0 ~ 250	225
FAS-R060-120		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-120		10	0.015						19.6	4.9	0 ~ 250	
FAS-R060-160		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-160	160	10	0.015	250	224	177	4	10	19.6	4.9	0 ~ 250	265
FAS-R060-200		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-200	200	10	0.015	290	264	217	5	12	19.6	4.9	0 ~ 250	310
FAS-R060-200		6	0.017						19.6	9.8	0 ~ 150	
FAS-R100-200	200	10	0.015	290	264	217	5	12	19.6	4.9	0 ~ 250	350
FAS-R060-200		6	0.017						19.6	9.8	0 ~ 150	

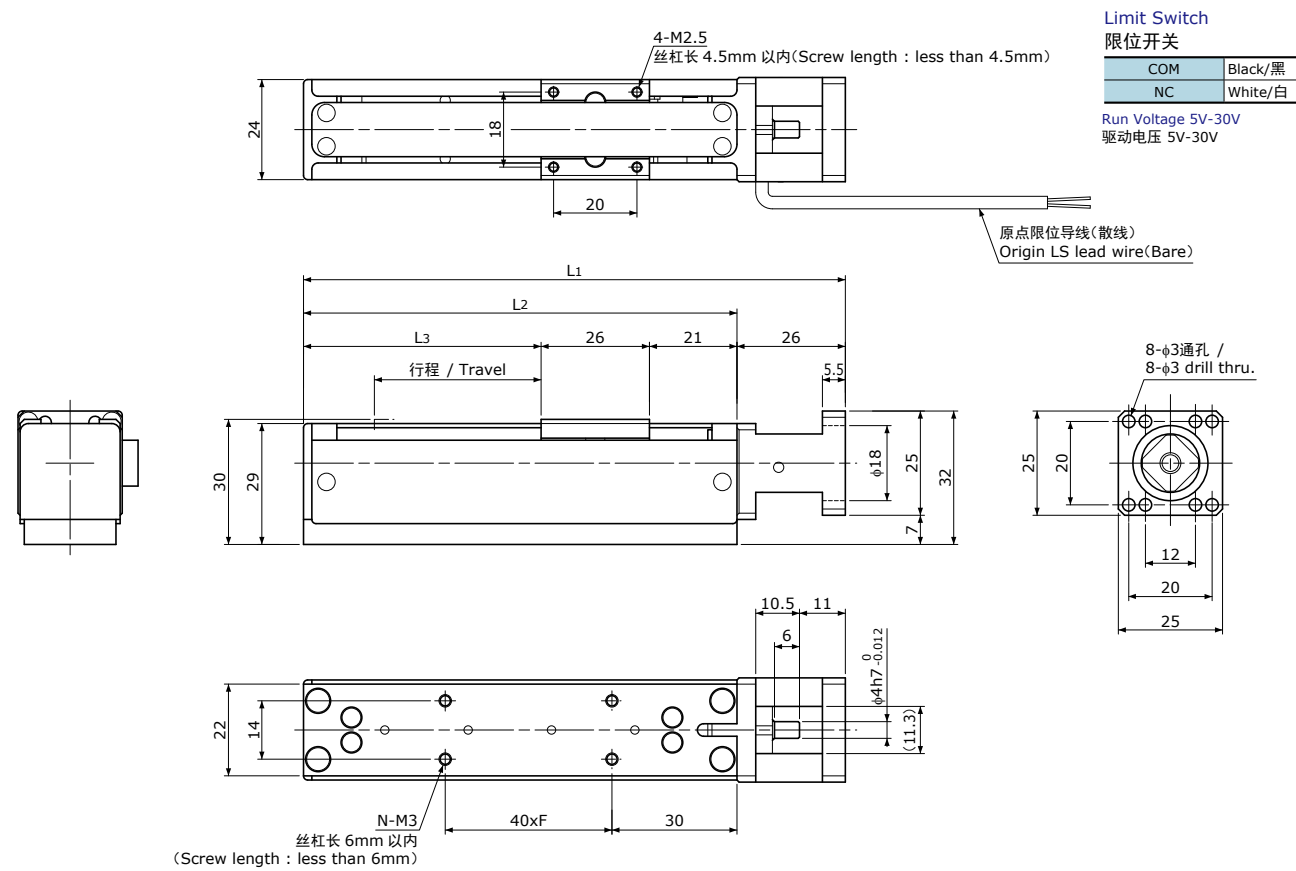
Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.01mm
Lost Motion 空转	Max. 0.01mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. ±0.01mm
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	Grease 油脂 MSG No.2(KSS)
Operating Temp. 使用温度范围	0 ~ 40°C

执行器安装基准面请参照技术解说第S106页。
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Flex Actuator 灵活可选执行器

Motor-less type(Standard) Precision Ball Screw type Actuator

无电机型(标准品) 精密滚珠丝杠型执行器



注释

- 1)使用时不得出现结露现象。
- 2)允许力矩是其他方向没有负载时的值。
- 3)扭矩值为参考值。
- 4)无电机时,重复定位精度及空转为参考值。
- 5)无电机时,许用转速及可搬负载为推荐值。
- 6)必要扭矩为最大垂直可搬负载作用时的所需扭矩。
- 7)推荐联轴器
 - 酒井制作所 : LAS-12C-4×(3 or 4 or 5)
 - 锅屋BITECH : MWS-12C-4×(4 or 5)
 - 锅屋BITECH : MOS-12C-4×(3 or 4 or 5)
 - MISUMI : CPSCN12-4 ×(4 or 5)

Note

- 1)There should be no condensation when using.
- 2)Permissible Moment is the number when no load in other direction.
- 3)Please consider Torque as reference number.
- 4)In case of Motor-less type, Repeatability & Lost motion are reference number.
- 5)In case of Motor-less type, Permissible speed & Load Capacity are recommended number.
- 6)Required Torque is under maximum vertical Load Capacity.
- 7)Recommended Coupling
 - SAKAI SEISAKUSYO : LAS-12C-4×(3 or 4 or 5)
 - NBK : MWS-12C-4×(4 or 5)
 - NBK : MOS-12C-4×(3 or 4 or 5)
 - MISUMI : CPSCN12-4 ×(4 or 5)

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Motor Required Torque 电机所需扭矩 (Nm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直		
FAS-G010-020	20	1	0.009	110	84	37	1	4	29.4	19.6	0 ~ 25	160
FAS-G010-040		1	0.009						29.4	19.6	0 ~ 25	
FAS-G020-040	40	2	0.011	130	104	57	1	4	29.4	19.6	0 ~ 50	180
FAS-G060-040		6	0.017						19.6	9.8	0 ~ 150	
FAS-G100-040		10	0.015						19.6	4.9	0 ~ 250	
FAS-G010-080	80	1	0.009	170	144	97	2	6	29.4	19.6	0 ~ 25	225
FAS-G020-080		2	0.011						29.4	19.6	0 ~ 50	
FAS-G060-080		6	0.017						19.6	9.8	0 ~ 150	
FAS-G100-080		10	0.015						19.6	4.9	0 ~ 250	
FAS-G060-120	120	6	0.017	210	184	137	3	8	19.6	9.8	0 ~ 150	265
FAS-G100-120		10	0.015						19.6	4.9	0 ~ 250	
FAS-G060-160	160	6	0.017	250	224	177	4	10	19.6	9.8	0 ~ 150	310
FAS-G100-160		10	0.015						19.6	4.9	0 ~ 250	
FAS-G060-200	200	6	0.017	290	264	217	5	12	19.6	9.8	0 ~ 150	350
FAS-G100-200		10	0.015						19.6	4.9	0 ~ 250	

Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.005mm
Lost Motion 空转	Max. 0.005mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. ±0.01mm
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	Grease 油脂 MSG No.2(KSS)
Operating Temp. 使用温度范围	0 ~ 40°C

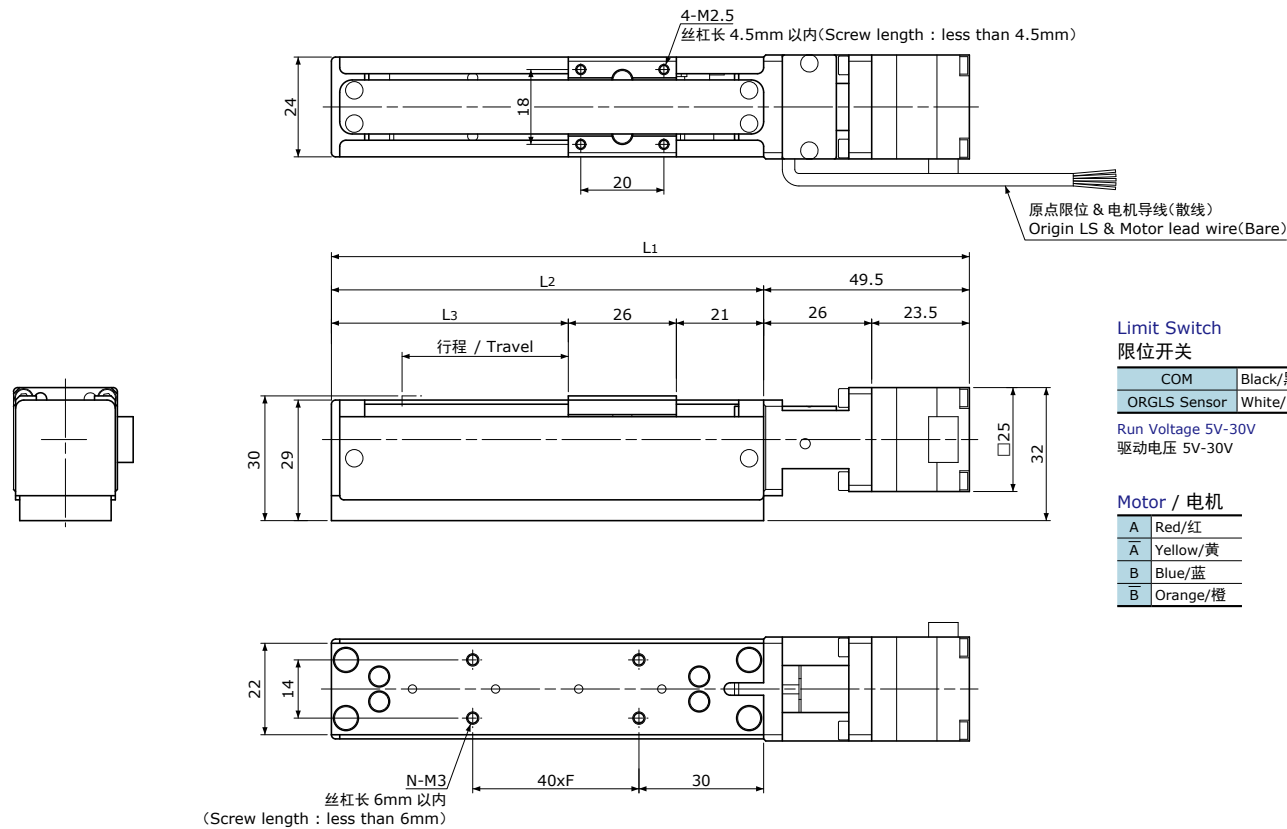
执行器安装基准面请参照技术解说第S106页。
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Flex Actuator 灵活可选执行器

2-phase Stepping Motor(Bi-polar 0.7A / phase & □25) with Rolled Ball Screw type Actuator

带2相步进电机(双极 0.7A / 相 □25) 冷轧滚珠丝杠型执行器

Motor Model / 电机型号 : 10PM-K202B(Single shaft / 单轴)
Minebea Motor / 美蓓亚电机
推荐驱动器 / Driver recommendation : SD4030B3



Limit Switch

限位开关

COM	Black/黑
ORGLS Sensor	White/白

Run Voltage 5V-30V
驱动电压 5V-30V

Motor / 电机

A	Red/红
A	Yellow/黄
B	Blue/蓝
B	Orange/橙

连接器选择方案

请从下面指定连接器种类。
没有指示的采用散线。

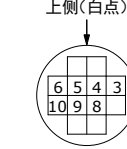
- 1)散线
- 2)广濑RP17-13J-12SC
- 3)EI-连接器(TE connectivity制造)
6芯(172211-6,电机)+4芯(172211-4,传感器)

Connector choice

Please designate connector type below.
No connector if there is no designation.

- 1)None(Bare)
 - 2)RP17-13J-12SC(HIROSE)
 - 3)EI-Connector(TE connectivity)
- 172211-6 pins for Motor +172211-4 pins for Sensor

Upper side(white dot)
上侧(白点)



RP17-13J-12SC
(female/插口)

HIROSE RP17 Connector 广濑RP17连接器规格

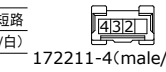
1	None 无
2	None 无
3	Stepping Motor A(Red/红)
4	Stepping Motor A(Yellow/黄)
5	Stepping Motor B(Blue/蓝)
6	Stepping Motor B(Orange/橙)
7	None 无
8	COM(Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(White/白)
11	None 无
12	None 无



172211-6(male/插头)

EI Connector EI连接器规格

1	None 无
2	None 无
3	Stepping Motor A(Red/红)
4	Stepping Motor A(Yellow/黄)
5	Stepping Motor B(Blue/蓝)
6	Stepping Motor B(Orange/橙)
7	None 无
8	COM(Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(White/白)
11	None 无
12	None 无



172211-4(male/插头)

注释

- 1)使用时不得出现结露现象。
- 2)允许力矩是其他方向没有负载时的值。
- 3)分辨率为整步时的值。
- 4)导线为散线及右侧引线时的型号。
- 5)低速时,原点复位时振动可能略有增大。

Note

- 1)There should be no condensation when using.
- 2)Permissible Moment is the number when no load in other direction.
- 3)Resolution represents the values for full step.
- 4)Model number is for no-connector and lead wire is set on right side on Motor.
- 5)Vibration may increase at low speed or zero return.

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (μm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Max. Acceleration 最大加速度 (m / sec ²)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直			
FAS-R010-020MNR	20	1	5	133.5	84	37	1	4	29.4	19.6	3 ~ 20	0.1	210
FAS-R010-040MNR		1	5										
FAS-R020-040MNR		2	10										
FAS-R060-040MNR		6	30										
FAS-R100-040MNR	40	10	50	153.5	104	57	1	4	19.6	2.94	18 ~ 120	0.6	230
FAS-R010-080MNR		1	5										
FAS-R020-080MNR		2	10										
FAS-R060-080MNR		6	30										
FAS-R100-080MNR	80	10	50	193.5	144	97	2	6	19.6	2.94	30 ~ 200	1.0	275
FAS-R060-120MNR		6	30										
FAS-R100-120MNR		10	50										
FAS-R060-160MNR		6	30										
FAS-R100-160MNR	120	10	50	233.5	184	137	3	8	19.6	2.94	18 ~ 120	0.6	315
FAS-R060-200MNR		6	30										
FAS-R100-200MNR		10	50										
FAS-R060-200MNR		6	30										
FAS-R100-200MNR	160	10	50	273.5	224	177	4	10	19.6	2.94	18 ~ 120	0.6	360
FAS-R100-200MNR		10	50										
FAS-R060-200MNR	200	6	30	313.5	264	217	5	12	19.6	2.94	18 ~ 120	0.6	400
FAS-R100-200MNR		10	50										

注) 有关与推荐驱动器(SD4030B3)的接线,请参照第Q129页。

Note) Refer to page Q129 for connection diagram of recommended Driver (SD4030B3).

执行器安装基准面请参照技术解说第S106页。

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

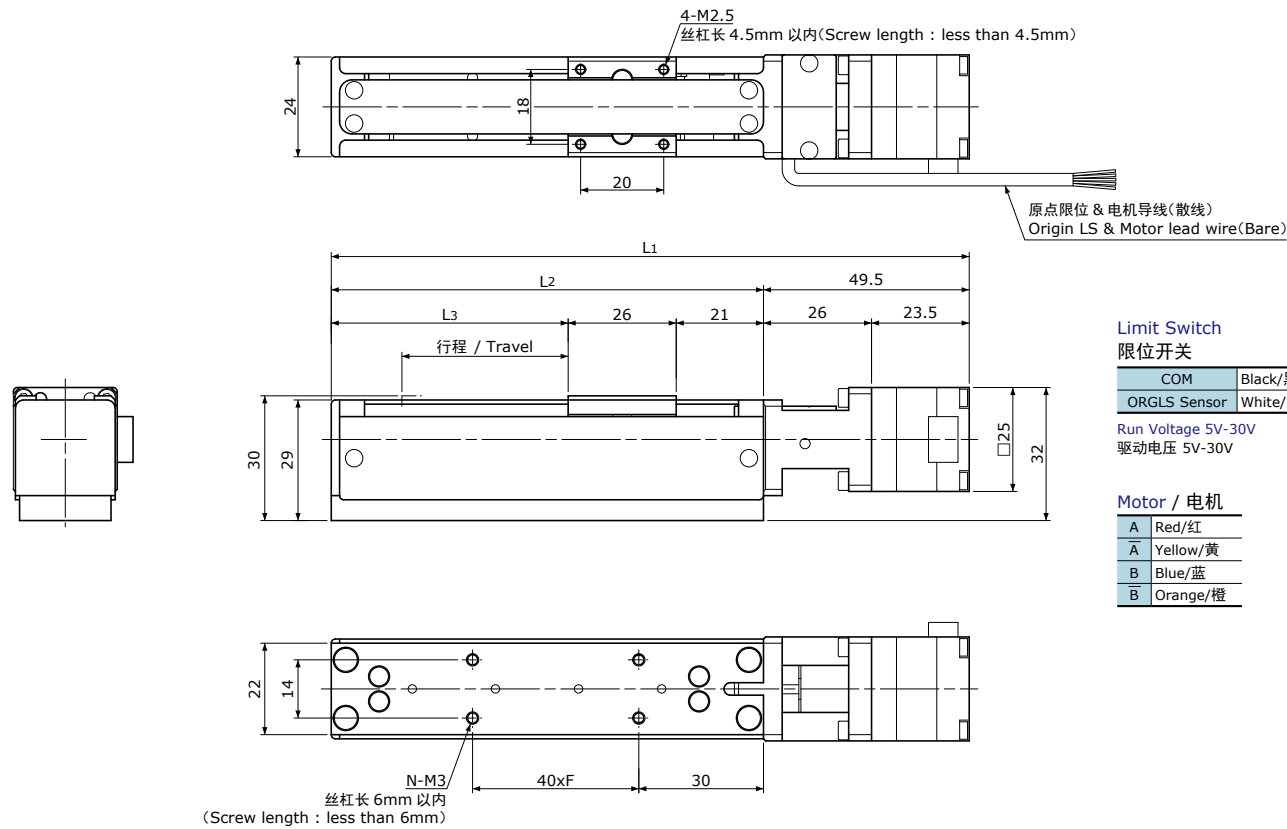
Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.01mm
Lost Motion 空转	Max. 0.01mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. ±0.01mm
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	Grease 油脂 MSG No.2(KSS)
Operating Temp. 使用温度范围	0 ~ 40°C

Flex Actuator 灵活可选执行器

2-phase Stepping Motor(Bi-polar 0.7A / phase & □25) with Precision Ball Screw type Actuator

带2相步进电机(双极 0.7A / 相 □25) 精密滚珠丝杠型执行器

Motor Model / 电机型号 : 10PM-K202B(Single shaft / 单轴)
Minebea Motor / 美蓓亚电机
推荐驱动器 / Driver recommendation : SD4030B3



Limit Switch

限位开关

COM	Black/黑
ORGLS Sensor	White/白

Run Voltage 5V-30V
驱动电压 5V-30V

Motor / 电机

A	Red/红
A	Yellow/黄
B	Blue/蓝
B	Orange/橙

连接器选择方案

请从下面指定连接器种类。
没有指示的采用散线。

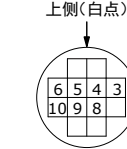
- 1) 散线
 - 2) 广濑RP17-13J-12SC
 - 3) EI-连接器 (TE connectivity制造)
- 6芯(172211-6, 电机)+4芯(172211-4, 传感器)

Connector choice

Please designate connector type below.
No connector if there is no designation.

- 1) None (Bare)
 - 2) RP17-13J-12SC (HIROSE)
 - 3) EI-Connector (TE connectivity)
- 172211-6 pins for Motor + 172211-4 pins for Sensor

Upper side (white dot)
上侧 (白点)



RP17-13J-12SC
(female/插口)

HIROSE RP17 Connector 广濑RP17连接器规格

1	None 无
2	None 无
3	Stepping Motor A (Red/红)
4	Stepping Motor A (Yellow/黄)
5	Stepping Motor B (Blue/蓝)
6	Stepping Motor B (Orange/橙)
7	None 无
8	COM (Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC (White/白)
11	None 无
12	None 无

172211-6 (male/插头)

172211-4 (male/插头)

EI Connector EI连接器规格

1	None 无
2	None 无
3	Stepping Motor A (Red/红)
4	Stepping Motor A (Yellow/黄)
5	Stepping Motor B (Blue/蓝)
6	Stepping Motor B (Orange/橙)
1	None 无
2	COM (Black/黑)
3	Short circuit with No.2 与2号短路
4	ORGLS Sensor/传感器 NC (White/白)

注释

- 1) 使用时不得出现结露现象。
- 2) 允许力矩是其他方向没有负载时的值。
- 3) 分辨率为整步时的值。
- 4) 导线为散线及右侧引线时的型号。
- 5) 低速时, 原点复位时振动可能略有增大。

Note

- 1) There should be no condensation when using.
- 2) Permissible Moment is the number when no load in other direction.
- 3) Resolution represents the values for full step.
- 4) Model number is for no-connector and lead wire is set on right side on Motor.
- 5) Vibration may increase at low speed or zero return.

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (μm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Max. Acceleration 最大加速度 (m / sec ²)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直			
FAS-G010-020MNR	20	1	5	133.5	84	37	1	4	29.4	19.6	3 ~ 20	0.1	210
FAS-G010-040MNR	40	1	5	153.5	104	57	1	4	29.4	19.6	3 ~ 20	0.1	230
FAS-G020-040MNR		2	10						29.4	19.6	6 ~ 40	0.2	
FAS-G060-040MNR		6	30						19.6	2.94	18 ~ 120	0.6	
FAS-G100-040MNR		10	50						19.6	2.94	30 ~ 200	1.0	
FAS-G010-080MNR	80	1	5	193.5	144	97	2	6	29.4	19.6	3 ~ 20	0.1	275
FAS-G020-080MNR		2	10						29.4	19.6	6 ~ 40	0.2	
FAS-G060-080MNR		6	30						19.6	2.94	18 ~ 120	0.6	
FAS-G100-080MNR		10	50						19.6	2.94	30 ~ 200	1.0	
FAS-G060-120MNR	120	6	30	233.5	184	137	3	8	19.6	2.94	18 ~ 120	0.6	315
FAS-G100-120MNR		10	50						19.6	2.94	30 ~ 200	1.0	
FAS-G060-160MNR	160	6	30	273.5	224	177	4	10	19.6	2.94	18 ~ 120	0.6	360
FAS-G100-160MNR		10	50						19.6	2.94	30 ~ 200	1.0	
FAS-G060-200MNR	200	6	30	313.5	264	217	5	12	19.6	2.94	18 ~ 120	0.6	400
FAS-G100-200MNR		10	50						19.6	2.94	30 ~ 200	1.0	

注) 有关与推荐驱动器 (SD4030B3) 的接线, 请参照第Q129页。

Note) Refer to page Q129 for connection diagram of recommended Driver (SD4030B3).

执行器安装基准面请参照技术解说第S106页。

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

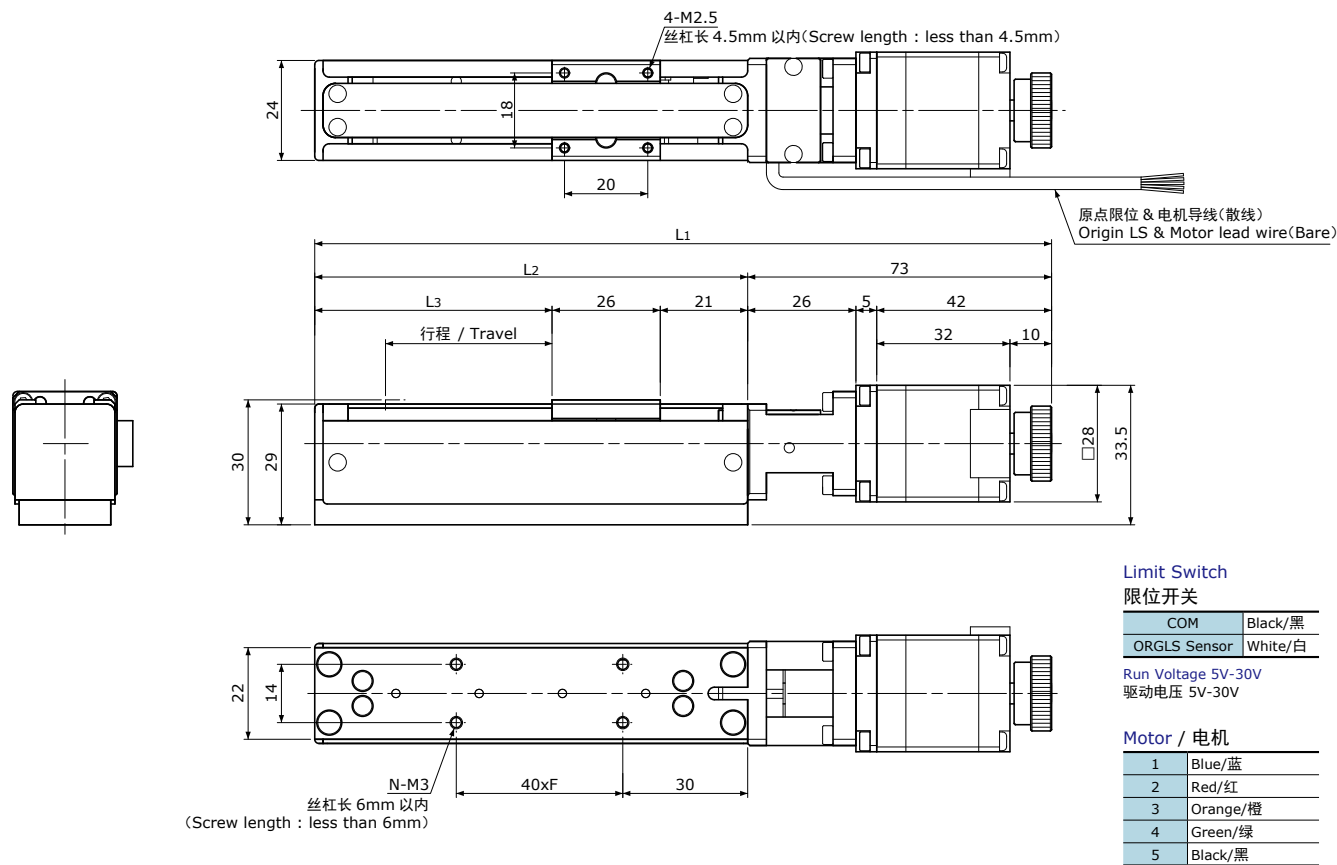
Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.005mm
Lost Motion 空转	Max. 0.005 mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨 (1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. ±0.01mm
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	Grease 油脂 MSG No.2 (KSS)
Operating Temp. 使用温度范围	0 ~ 40°C

Flex Actuator 灵活可选执行器

5-phase Stepping Motor(0.75A / phase & □28) with Rolled Ball Screw type Actuator

带5相步进电机(0.75A / 相 □28) 冷轧滚珠丝杠型执行器

Motor Model / 电机型号 : PK523HPB(Double shaft / 双轴)
 Oriental Motor / 东方马达
 推荐驱动器 / Driver recommendation : KR-A5CC KR-A55MC



连接器选择方案

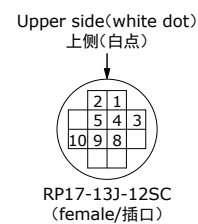
请从下面指定连接器种类。
 没有指示的采用散线。

- 1) 散线
- 2) 广濑RP17-13J-12SC
- 3) EI-连接器(TE connectivity制造)
 6芯(172211-6,电机)+4芯(172211-4,传感器)

Connector choice

Please designate connector type below.
 No connector if there is no designation.

- 1) None(Bare)
 - 2) RP17-13J-12SC(HIROSE)
 - 3) EI-Connector(TE connectivity)
- 172211-6 pins for Motor + 172211-4 pins for Sensor



HIROSE RP17 Connector 广濑RP17连接器规格

1	Stepping Motor(Blue/蓝)
2	Stepping Motor(Red/红)
3	Stepping Motor(Orange/橙)
4	Stepping Motor(Green/绿)
5	Stepping Motor(Black/黑)
6	None 无
7	None 无
8	COM(Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(White/白)
11	None 无
12	None 无

EI Connector EI连接器规格

1	Stepping Motor(Blue/蓝)
2	Stepping Motor(Red/红)
3	Stepping Motor(Orange/橙)
4	Stepping Motor(Green/绿)
5	Stepping Motor(Black/黑)
6	None 无
7	None 无
8	None 无
9	None 无
10	COM(Black/黑)
11	None 无
12	None 无

注释

- 1) 使用时不得出现结露现象。
- 2) 允许力矩是其他方向没有负载时的值。
- 3) 分辨率为整步时的值。
- 4) 导线为散线及右侧引线时的型号。

Note

- 1) There should be no condensation when using.
- 2) Permissible Moment is the number when no load in other direction.
- 3) Resolution represents the values for full step.
- 4) Model number is for no-connector and lead wire is set on right side on Motor

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (μm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Max. Acceleration 最大加速度 (m / sec ²)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直			
FAS-R010-020ENR	20	1	2	157	84	37	1	4	29.4	19.6	0 ~ 25	0.125	265
FAS-R010-040ENR	40	1	2	177	104	57	1	4	29.4	19.6	0 ~ 25	0.125	285
FAS-R020-040ENR		2	4						29.4	19.6	0 ~ 50	0.25	
FAS-R060-040ENR		6	12						19.6	4.9	0 ~ 150	0.75	
FAS-R100-040ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-R010-080ENR	80	1	2	217	144	97	2	6	29.4	19.6	0 ~ 25	0.125	330
FAS-R020-080ENR		2	4						29.4	19.6	0 ~ 50	0.25	
FAS-R060-080ENR		6	12						19.6	4.9	0 ~ 150	0.75	
FAS-R100-080ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-R060-120ENR	120	6	12	257	184	137	3	8	19.6	4.9	0 ~ 150	0.75	370
FAS-R100-120ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-R060-160ENR	160	6	12	297	224	177	4	10	19.6	4.9	0 ~ 150	0.75	415
FAS-R100-160ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-R060-200ENR	200	6	12	337	264	217	5	12	19.6	4.9	0 ~ 150	0.75	455
FAS-R100-200ENR		10	20						19.6	4.9	0 ~ 250	1.25	

注) 有关与推荐驱动器(KR-A5CC, KR-A55MC)的接线, 请参照第Q129、Q130页。

Note) Refer to page Q129 or Q130 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).

执行器安装基准面请参照技术解说第S106页。

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

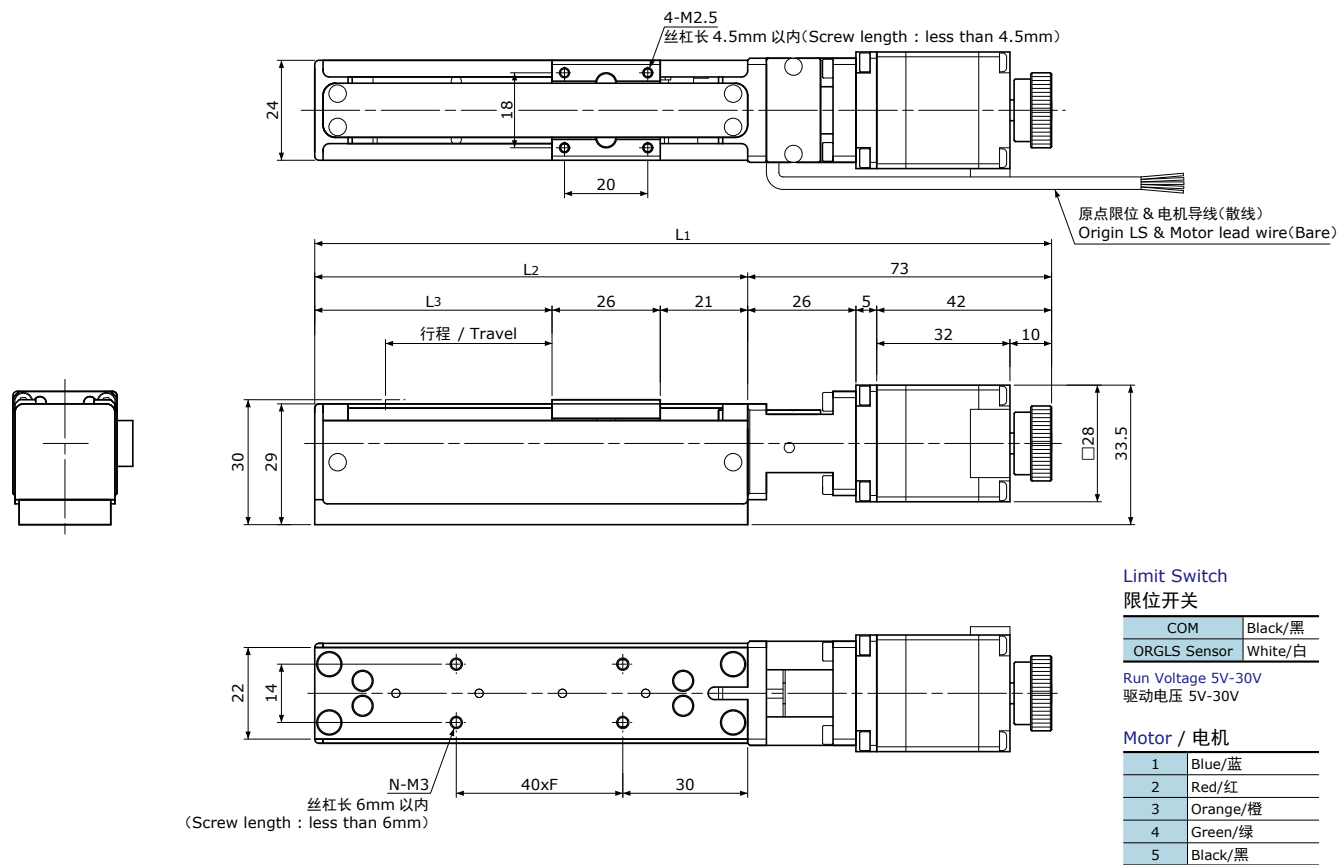
Common Specifications 通用规格	
Repeatability 重复定位精度	Max. $\pm 0.01\text{mm}$
Lost Motion 空转	Max. 0.01mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. $\pm 0.01\text{mm}$
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	
Grease 油脂	MSG No.2(KSS)
Operating Temp. 使用温度范围	
	0 ~ 40°C

Flex Actuator 灵活可选执行器

5-phase Stepping Motor(0.75A / phase & □28) with Precision Ball Screw type Actuator

带5相步进电机(0.75A / 相 □28) 精密滚珠丝杠型执行器

Motor Model / 电机型号 : PK523HPB(Double shaft / 双轴)
 Oriental Motor / 东方马达
 推荐驱动器 / Driver recommendation : KR-A5CC KR-A55MC



Limit Switch

限位开关

COM	Black/黑
ORGLS Sensor	White/白

Run Voltage 5V-30V
驱动电压 5V-30V

Motor / 电机

1	Blue/蓝
2	Red/红
3	Orange/橙
4	Green/绿
5	Black/黑

注释

- 1)使用时不得出现结露现象。
- 2)允许力矩是其他方向没有负载时的值。
- 3)分辨率为整步时的值。
- 4)导线为散线及右侧引线时的型号。

连接器选择方案

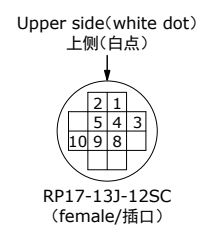
请从下面指定连接器种类。
没有指示的采用散线。

- 1)散线
- 2)广濑RP17-13J-12SC
- 3)EI-连接器(TE connectivity制造)
6芯(172211-6,电机)+4芯(172211-4,传感器)

Connector choice

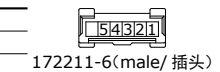
Please designate connector type below.
No connector if there is no designation.

- 1)None(Bare)
- 2)RP17-13J-12SC(HIROSE)
- 3)EI-Connector(TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor



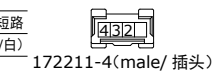
HIROSE RP17 Connector 广濑RP17连接器规格

1	Stepping Motor(Blue/蓝)
2	Stepping Motor(Red/红)
3	Stepping Motor(Orange/橙)
4	Stepping Motor(Green/绿)
5	Stepping Motor(Black/黑)
6	None 无
7	None 无
8	COM(Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(White/白)
11	None 无
12	None 无



EI Connector EI连接器规格

1	Stepping Motor(Blue/蓝)
2	Stepping Motor(Red/红)
3	Stepping Motor(Orange/橙)
4	Stepping Motor(Green/绿)
5	Stepping Motor(Black/黑)
6	None 无
7	None 无
8	COM(Black/黑)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(White/白)
11	None 无
12	None 无



Note

- 1)There should be no condensation when using.
- 2)Permissible Moment is the number when no load in other direction.
- 3)Resolution represents the values for full step.
- 4)Model number is for no-connector and lead wire is set on right side on Motor

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (μm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Max. Acceleration 最大加速度 (m / sec ²)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直			
FAS-G010-020ENR	20	1	2	157	84	37	1	4	29.4	19.6	0 ~ 25	0.125	265
FAS-G010-040ENR	40	1	2	177	104	57	1	4	29.4	19.6	0 ~ 25	0.125	285
FAS-G020-040ENR		2	4						29.4	19.6	0 ~ 50	0.25	
FAS-G060-040ENR		6	12						19.6	4.9	0 ~ 150	0.75	
FAS-G100-040ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-G010-080ENR	80	1	2	217	144	97	2	6	29.4	19.6	0 ~ 25	0.125	330
FAS-G020-080ENR		2	4						29.4	19.6	0 ~ 50	0.25	
FAS-G060-080ENR		6	12						19.6	4.9	0 ~ 150	0.75	
FAS-G100-080ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-G060-120ENR	120	6	12	257	184	137	3	8	19.6	4.9	0 ~ 150	0.75	370
FAS-G100-120ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-G060-160ENR	160	6	12	297	224	177	4	10	19.6	4.9	0 ~ 150	0.75	415
FAS-G100-160ENR		10	20						19.6	4.9	0 ~ 250	1.25	
FAS-G060-200ENR	200	6	12	337	264	217	5	12	19.6	4.9	0 ~ 150	0.75	455
FAS-G100-200ENR		10	20						19.6	4.9	0 ~ 250	1.25	

注) 有关与推荐驱动器(KR-A5CC, KR-A55MC)的接线, 请参照第Q129、Q130页。

Note) Refer to page Q129 or Q130 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).

执行器安装基准面请参照技术解说第S106页。

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.005mm
Lost Motion 空转	Max. 0.005mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)
Sensor 传感器	Limit switch 限位开关
Accuracy of Zero pt. return 原点复位精度	Max. ±0.01mm
Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.10Nm
Yawing 偏转 My	0.09Nm
Rolling 侧滚 Mr	0.23Nm
Lubrication 润滑	Grease 油脂 MSG No.2(KSS)
Operating Temp. 使用温度范围	0 ~ 40°C

□14紧凑型执行器 Compact Actuator NEMA 6 size

CAS 系列 Series

KSS最小的单轴执行器,配备了尺寸为□14的2相步进电机。
The most compact single axis Actuator in KSS with NEMA 6 size of 2 phase stepping Motor.

●特点
采用KSS独有的不需要联轴器的方式与□14步进电机连接,不只是外形宽度,执行器总长也实现了小型化。

●Features
Realized compactness not only the body width, but total length of the Actuator by combining NEMA 6 Stepping Motor using our unique coupling-less connection.



●规格 / Specifications

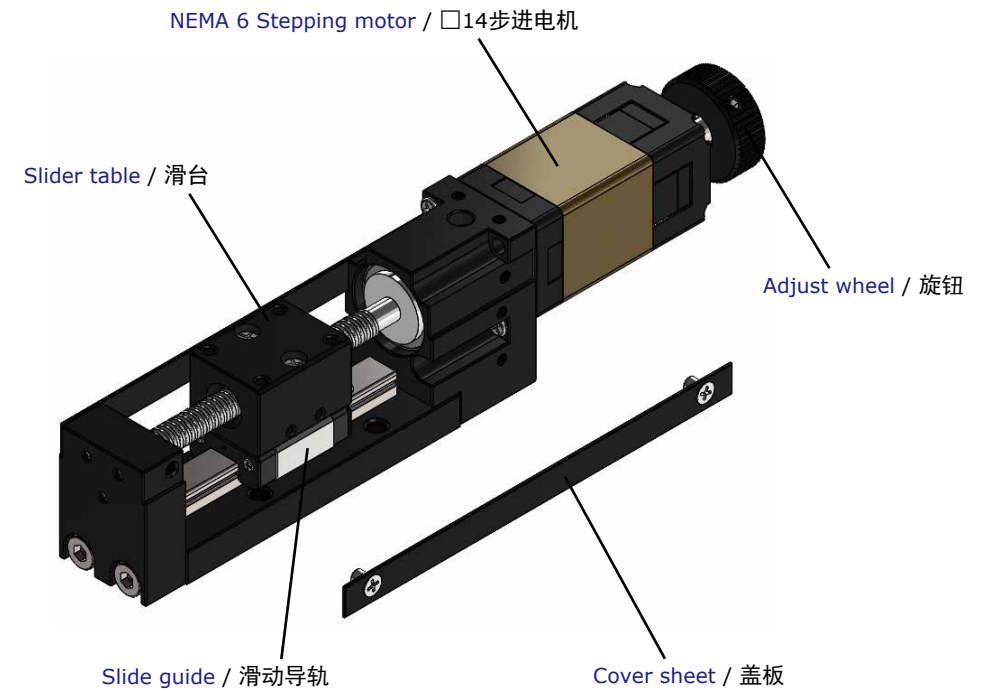
	Lead / 导程1mm	Lead / 导程2mm
Travel / 行程(mm)	20,40	
Drive Screw / 驱动丝杠	Rolled Ball Screw / 冷轧滚珠丝杠	
Resolution / 分辨率(mm)	0.005	0.01
Repeatability (mm) 重复定位精度(mm)	Max. ±0.010	
Lost motion / 空转(mm)	Max. 0.010	
Horizontal Load Capacity (N) 水平可搬质量(N)	Max. 10	Max. 5
Vertical Load Capacity (N) 垂直可搬质量(N)	Max. 5	Max. 3
Permissible speed (mm / sec) 许用转速(mm / sec)	Max. 20	Max. 40
Maximum acceleration (m / sec ²) 最大加速度(m / sec ²)	0.1	0.2
Permissible Moment Mp (Nm) 允许负载偏心力矩Mp (Nm) (Pitching / 俯仰)	0.14	
Permissible Moment My (Nm) 允许负载偏心力矩My (Nm) (Yawing / 偏转)	0.12	
Permissible Moment Mr (Nm) 允许负载偏心力矩Mr (Nm) (Rolling / 侧滚)	0.22	

Recommended Drivers
推荐驱动器

SD4015B3

Note) Refer to page Q130 for connection diagram of recommended Drivers.
注) 有关与推荐驱动器的接线,请参照第Q130页。

●构造 / Structure



●公称型号 / Model number notation

CAS 14 - R 010 - 020 H R S

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ①系列符号
CAS : KSS紧凑型执行器系列
- ②电机框架尺寸
14 : □14尺寸
- ③驱动丝杠种类
R : 冷轧滚珠丝杠
- ④导程 / 节距(mm) : 010表示1mm
- ⑤行程(mm) : 020表示20mm
- ⑥连接器种类
N : 散线
H : 广濑RP17
E : EI连接器 (TE Connectivity制造)
S : 其他
- ⑦导线方向
R : 右侧引线(从轴侧看)
L : 左侧引线
T : 上侧引线
B : 下侧引线
- ⑧选项符号
S : 传感器外装

- ①Series No.
CA : KSS Compact Actuator Series
- ②Motor Frame Size
14 : NEMA 6
- ③Drive Screw type
R : Rolled Ball Screw
- ④Lead / Pitch (mm) : 010 means 1mm
- ⑤Travel (mm)020 means 20mm
- ⑥Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
S : Others
- ⑦Direction of Motor leads
R : Right (from shaft end side)
L : Left
T : Top
B : Bottom
- ⑧Option
S : Sensor outside

冷轧滚珠丝杠+2相步进电机 / Rolled Ball Screw + 2-phase Stepping Motor

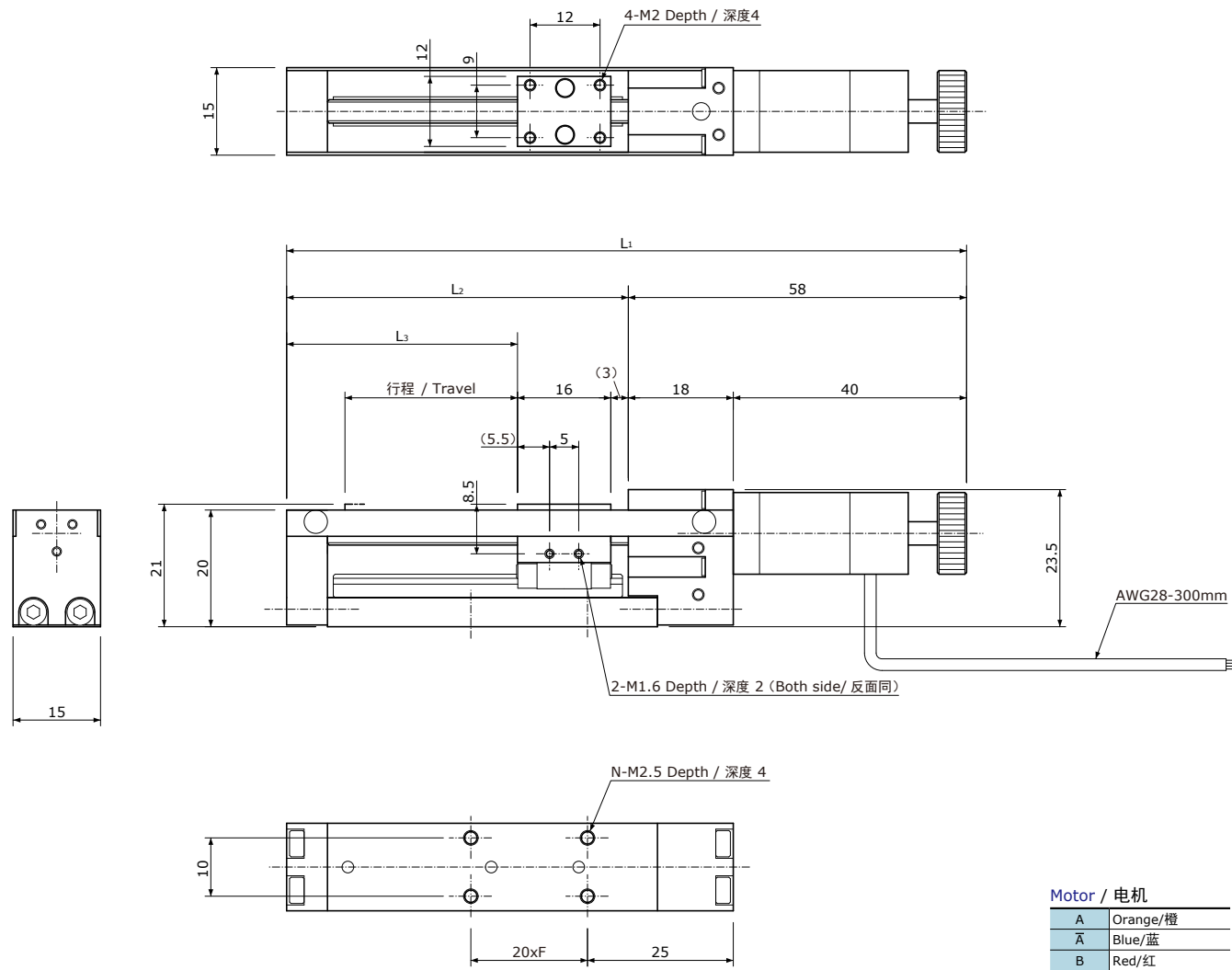
CAS□14 / CAS NEMA 6

Shaft dia.(轴径)f4

Motor Model / 电机型号 : SH2141-5511(Double Shaft / 双轴)

Sanyo Denki / 山洋电气

Driver recommendation / 推荐驱动器 : SD4015B3



Motor / 电机	
A	Orange/橙
Ā	Blue/蓝
B	Red/红
B̄	Yellow/黄

注释

- 1)使用时不得出现结露现象。
- 2)允许力矩是其他方向没有负载时的值。
- 3)分辨率为整步时的值。
- 4)导线为散线及右侧引线时的型号。
- 5)低速时,原点复位时振动可能略有增大。

连接器选择方案

请从下面指定连接器种类。
没有指示的采用散线。

- 1)散线
- 2)广濑RP17-13J-12SC
- 3)EI-连接器(TE connectivity制造)
6芯(172211-6,电机)+4芯(172211-4,传感器)

HIROSE RP17 Connector
广濑RP17连接器规格

Upper side (white dot) 上侧(白点)	
1	None 无
2	None 无
3	Stepping Motor A(Orange/橙)
4	Stepping Motor Ā(Blue/蓝)
5	Stepping Motor B(Red/红)
6	Stepping Motor B̄(Yellow/黄)
7	None 无
8	None 无
9	None 无
10	None 无
11	None 无
12	None 无

RP17-13J-12SC (female/插口)

EI Connector
EI连接器规格

1	None 无
2	None 无
3	Stepping Motor A(Orange/橙)
4	Stepping Motor Ā(Blue/蓝)
5	Stepping Motor B(Red/红)
6	Stepping Motor B̄(Yellow/黄)

172211-6(male/插头)

Connector choice

Please designate connector type below.
No connector if there is no designation.

- 1)None(Bare)
 - 2)RP17-13J-12SC(HIROSE)
 - 3)EI-Connector(TE connectivity)
- 172211-6 pins for Motor +172211-4 pins for Sensor

When Sensor option is selected
选择传感器选项时

Upper side (white dot) 上侧(白点)	
1	None 无
2	None 无
3	Stepping Motor A(Orange/橙)
4	Stepping Motor Ā(Blue/蓝)
5	Stepping Motor B(Red/红)
6	Stepping Motor B̄(Yellow/黄)
7	+5~24V(Blown/褐)
8	COM(Blue/蓝)
9	Short circuit with No.8 与8号短路
10	ORGLS Sensor/传感器 NC(Black/黑)
11	None 无
12	None 无

RP17-13J-12SC (female/插口)

When Sensor option is selected
选择传感器选项时

1	+5~24V(Blown/褐)
2	COM(Blue/蓝)
3	Short circuit with No.2 与2号短路
4	ORGLS Sensor/传感器 NC(Black/黑)

172211-4 (male/插头)

Note

- 1)There should be no condensation when using.
- 2)Permissible Moment is the number when no load in other direction.
- 3)Resolution represents the values for full step.
- 4)Model number is for no-connector and lead wire is set on right side on Motor.
- 5)Vibration may increase at low speed or zero return.

Model Number 执行器型号	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (μm)	Length 长度尺寸 (mm)					Max. Load Capacity 最大可搬负载 (N)		Permissible speed 许用转速 (mm / sec)	Mass 质量 (g)
				L ₁	L ₂	L ₃	F	N	Hor. 水平	Vert. 垂直		
CAS14-R010-020	20	1	0.005	107	49	30	1	4	10	5	20	88
CAS14-R010-040	40	1	0.005	127	69	50	2	6	10	5	20	96
CAS14-R020-020	20	2	0.01	107	49	30	1	4	5	3	40	88
CAS14-R020-040	40	2	0.01	127	69	50	2	6	5	3	40	96

Permissible Moment 允许偏心力矩	
Pitching 俯仰 Mp	0.14Nm
Yawing 偏转 My	0.12Nm
Rolling 侧滚 Mr	0.22Nm

Lubrication 润滑	Grease 油脂 MSG No.2 (KSS)
Operating Temp. 使用温度范围	0~40°C

Common Specifications 通用规格	
Repeatability 重复定位精度	Max. ±0.01mm
Lost Motion 空转	Max. 0.01mm
Body Material 主体材质	Aluminum 铝
Sliding guide 导向结构	Slide Guide rail 滑动导轨(1列)

Motor Specifications 电机参数	
Driving method 励磁方式	2-phase Bi-polar 2相双极方式
Rated Voltage 额定电压	6.3V(DC)
Rated current 额定电流	0.3A/phase(※) 0.3A/相(※)
Winding resistance 绕组电阻	21Ω
Insulation Class 绝缘等级	Class B(130°C) B级(130°C)

※推荐使用组合驱动器SD4015B3(Vanguard Systems公司)。
使用时请将驱动电流设定为0.4A。
※SD4015B3 (Vanguard Systems Co., Ltd.) is recommended for driver.
Please use Run current 0.4A setting.

执行器安装基准面请参照技术解说第S106页。
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

MoBo执行器(MA系列)

MoBo Actuator (MA Series)

MoBo Actuator

使用External滚珠丝杠型(MoBo)的执行器。
按客户订单接单生产。

External Ball Screw type(MoBo) is built in this series, what we call MoBo Actuators.
All of MoBo Actuators are produced as customized products, in accordance with customer's order.



●特点

使用电机直连型滚珠丝杠,可实现长边方向尺寸的小型化。

●种类

根据所使用的进给丝杠,MoBo执行器有以下种类。

1) 精密滚珠丝杠型

采用了精密滚珠丝杠,因此重复定位精度和空转都实现了高精度。

2) 冷轧滚珠丝杠型

采用了冷轧滚珠丝杠,因此确保了合理的价格和精度。

3) 树脂螺母滑动丝杠型

采用价廉物美的树脂导程丝杠(含油型),在通常的使用环境下可以免维护使用。

●公称型号的构成 / Model number notation

MA S - G 020 - 015 N R

① ② ③ ④ ⑤ ⑥ ⑦

- ①系列符号
MA : MoBo执行器系列
- ②构造符号
S : 滑块型
- ③进给丝杠种类
G : 精密滚珠丝杠
R : 冷轧滚珠丝杠
Re : 树脂螺母滑动丝杠
- ④导程 / 节距(mm) : 020表示2mm
- ⑤行程(mm) : 015表示15mm
- ⑥连接器种类
N : 散线
H : 广濑RP17
E : EI连接器 (TE Connectivity制造)
- ⑦导线方向
R : 右侧引线(从轴端侧看是右侧)
L : 左侧引线

- ①Series No.
MA : MoBo Actuator Series
- ②Actuator type
S : Slider type
- ③Lead Screw / Ball Screw
G : Precision Ball Screw
R : Rolled Ball Screw
Re : Resin Lead Screw
- ④Lead / Pitch (mm) : 020 means 2mm
- ⑤Travel (mm) : 015 means 15mm
- ⑥Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
- ⑦Direction of Motor leads
R : Right (from Shaft end side)
L : Left

●Features

More compact design of Unit products in longitudinal dimension became reality by using Direct Motor Drive Ball Screws / Resin Lead Screws.

●Variation

There are several kinds of MoBo Actuator shown below. Each Actuator has a different kinds of Ball Screw / Lead Screw inside.

1) Precision Ball Screw type

High accuracy in both Repeatability and Lost motion by using Precision Ball Screw.

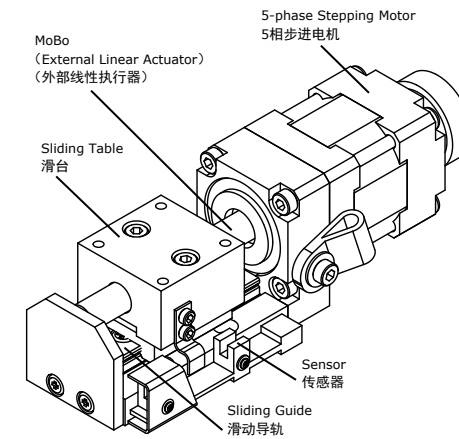
2) Rolled Ball Screw type

Reasonable price and accuracy have been achieved by using Rolled Ball Screw.

3) Resin Lead Screw type

It can be used without oiling in normal environment, because lubricating agent is incorporated in Resin Nut.

●构造 / Structure



●规格 Specifications

MoBo执行器的大致规格一览表如下所示。
详情请参照尺寸表。

Overall specifications for MoBo Actuators are shown in Table below.
For further information, please see dimension Table.

Model / 型号	MAS-G010-015	MAS-G010-030	MAS-R010-015	MAS-R010-030	MAS-Re020-015	MAS-Re020-030
Travel / 行程	15mm	30mm	15mm	30mm	15mm	30mm
Drive Screw 驱动丝杠	Precision Ball Screw 精密滚珠丝杠 Lead / 导程 = 1mm		Rolled Ball Screw 冷轧滚珠丝杠 Lead / 导程 = 1mm		Resin Lead Screw 树脂螺母滑动丝杠 Lead / 导程 = 2mm	
Sliding Guide / 导轨	Slide Guide rail / 滑动导轨					
Body Material 主体材质	Aluminum / 铝					
Mass / 质量	200g	210g	200g	210g	200g	210g
Resolution / 分辨率	0.002mm		0.002mm		0.004mm	
Repeatability 重复定位精度	Max. ±0.005mm		Max. ±0.01mm		Max. ±0.05mm	
Lost motion 空转	Max. 0.005mm		Max. 0.01mm		Max. 0.05mm	
Horizontal Load Capacity 水平可搬负载	Max. 29.4N		Max. 29.4N		Max. 9.8N	
Vertical Load Capacity 垂直可搬负载	Max. 19.6N		Max. 19.6N		Max. 4.9N	
Permissible speed 许用转速	0.4~20mm/sec		0.4~20mm/sec		0.8~15mm/sec	
Maximum acceleration 最大加速度	0.1m/sec ²					
Permissible Moment 允许偏心力矩 Mp(Pitching / 俯仰)	0.16Nm	** In case of no load in My & Mr direction **My,Mr方向没有负载时				
Permissible Moment 允许偏心力矩 My(Yawing / 偏转)	0.10Nm	** In case of no load in Mp & Mr direction **Mp,Mr方向没有负载时				
Permissible Moment 允许偏心力矩 Mr(Rolling / 侧滚)	0.20Nm	** In case of no load in Mp & My direction **Mp,My方向没有负载时				
Operating Temp. 使用环境温度	0~40°C(without any due condensation / 无结露)					
Lubrication / 润滑	Ball Screw : KSS MSG No.2 Sliding Guide : KSS MSG No.2 滚珠丝杠 : KSS MSG No.2 滑动导轨 : KSS MSG No.2				Lead Screw : Sumitec Liquid H20 Sliding Guide : KSS MSG No.2 滑动丝杠 : Sumitec Liquid H20 滑动导轨 : KSS MSG No.2	

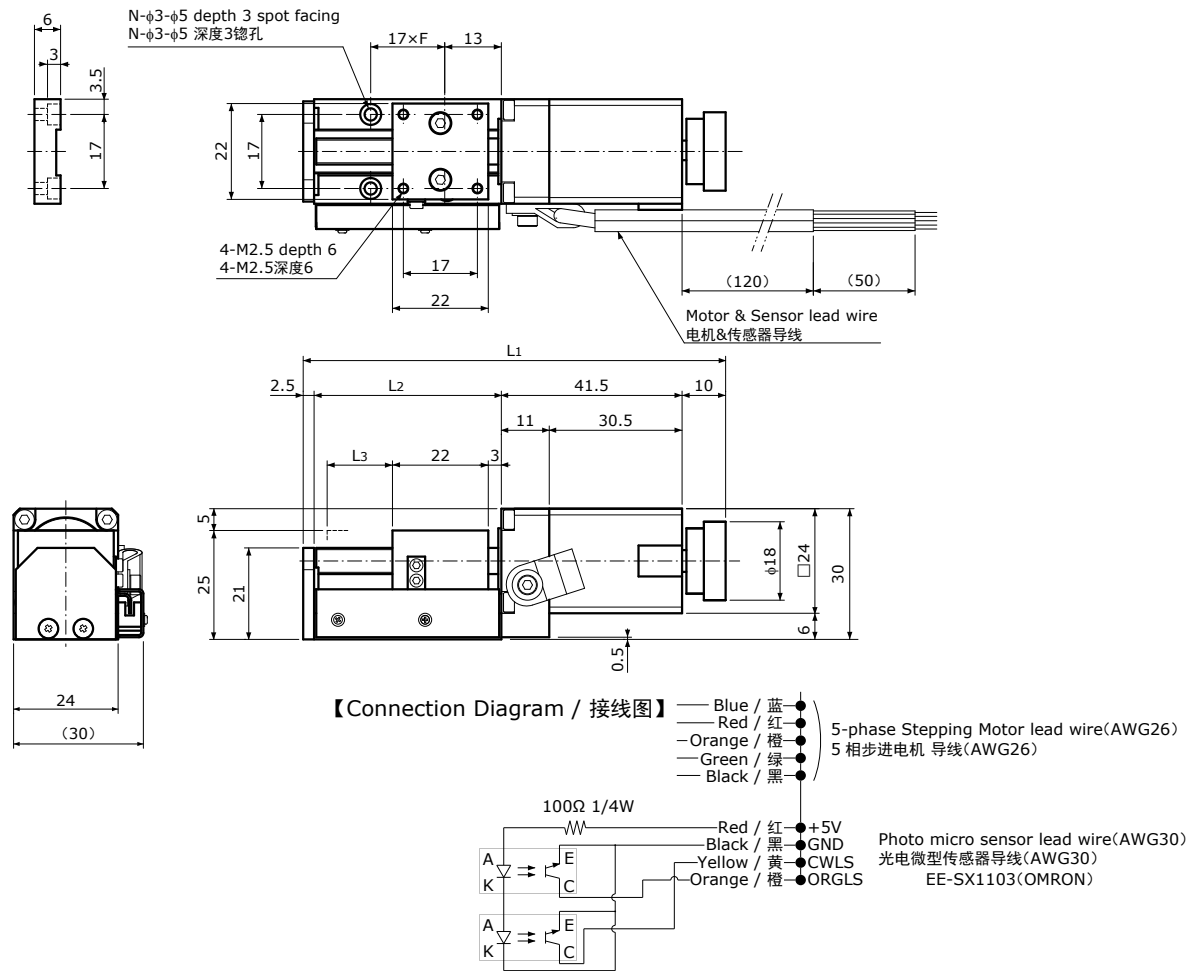
- Motor : 5-phase Stepping Motor □24(NEMA 10) , 0.75A/phase
- Photo Micro sensor : EE-SX1103(Omron) , DC5V 50mA (Motor side and Travel end)

- 使用电机 : 5相步进电机24见方,0.75A/相
- 光电微型传感器 : 欧姆龙EE-SX1103,DC5V 50mA(电机侧、电机对侧2处)

驱动滚珠丝杠+5相步进电机 / Drive Ball Screw + 5-phase Stepping Motor

MAS□24 / MAS NEMA 11

Shaft dia.(轴径)f6



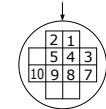
【连接器选择方案 / Connector choice】

请从下面指定连接器种类。
没有指示的采用散线。
Please designate connector type below.
No connector if there is no designation.

- 1) 散线
 - 2) 广濂RP17-13J-12SC
 - 3) EI-连接器 (TE connectivity 制造)
6芯 (172211-6、电机)+4芯 (172211-4、传感器)
- 1) None (Bare)
 - 2) RP17-13J-12SC (HIROSE)
 - 3) EI-Connector (TE connectivity):
172211-6 pins for Motor + 172211-4 pins for Sensor

【HIROSE RP-Connector / 广濂RP17连接器规格】

Upper side (white dot)
上侧 (白点)



RP17-13J-12SC (female / 插口)

1	Stepping Motor (Blue / 蓝)
2	Stepping Motor (Red / 红)
3	Stepping Motor (Orange / 橙)
4	Stepping Motor (Green / 绿)
5	Stepping Motor (Black / 黑)
6	None / 无
7	5V (Red / 红)
8	GND (Black / 黑)
9	CWLS Sensor (Yellow / 黄)
10	ORGLS Sensor (Orange / 橙)
11	None / 无
12	None / 无

【EI-Connector / EI连接器规格】



172211-6 (male / 插头)

1	Stepping Motor (Blue / 蓝)
2	Stepping Motor (Red / 红)
3	Stepping Motor (Orange / 橙)
4	Stepping Motor (Green / 绿)
5	Stepping Motor (Black / 黑)
6	None / 无



172211-4 (male / 插头)

1	5V (Red / 红)
2	GND (Black / 黑)
3	CWLS Sensor (Yellow / 黄)
4	ORGLS Sensor (Orange / 橙)

Common Specifications / 通用规格	
Motor 使用电机	5-phase Stepping Motor 5相步进电机 □24, 0.75A / phase
Body Material 主体材质	Aluminum / 铝
Sliding guide 导向结构	Slide Guide rail (Single) 滑动导轨 (1列)
Photo Sensor (Motor side & travel end) 光电传感器 (电机侧、电机对侧 2处)	Omron : EE-SX1103 欧姆龙 : EE-SX1103 ※Light-on / 受光时ON
Permissible Moment / 允许偏心力矩	
Pitching / 俯仰 Mp	0.16Nm
Yawing / 偏转 My	0.10Nm
Rolling / 侧滚 Mr	0.20Nm
Lubrication / 润滑	
MSG No.2 (KSS original Grease / KSS 原装油脂) **Sumitec Liquid H20 for Resin Lead Screw **仅树脂螺母滑动丝杠为Sumitec Liquid H20	
Operating Temp. / 使用温度范围	
0~40°C **无结露 **No due condensation	

Model Number 执行器型号	Drive Screw type 进给丝杠型	Travel 行程 (mm)	Screw Lead 丝杠导程 (mm)	Resolution 分辨率 (mm)	Length / 长度 (mm)					Repeatability 重复定位精度 max./最大 (mm)	Lost Motion 空转 max./最大 (mm)	Load Capacity 可搬负载 max. (N/kgf)		Maximum Acceleration 最大加速度 (m/sec ²)	Permissible speed 许用转速 (mm/sec)	Mass 质量 (g)	Model Number 执行器型号
					L1	L2	L3	F	N			Hor. 水平	Vert. 垂直				
MAS-G010-015NR	Precision Ball Screw 精密滚珠丝杠	15	1	0.002	97	43	15	1	4	±0.005	0.005	29.4/3.0	19.6/2.0	0.1	0.4~20	200	MAS-G010-015NR
MAS-R010-015NR	Rolled Ball Screw 冷轧滚珠丝杠		1	0.002	97	43	15	1	4	±0.01	0.01	29.4/3.0	19.6/2.0	0.1	0.4~20	200	MAS-R010-015NR
MAS-Re020-015NR	Resin Lead Screw 树脂螺母滑动丝杠		2	0.004	97	43	15	1	4	±0.05	0.05	9.8/1.0	4.9/0.5	0.1	0.8~15	200	MAS-Re020-015NR
MAS-G010-030NR	Precision Ball Screw 精密滚珠丝杠	30	1	0.002	112	58	30	2	6	±0.005	0.005	29.4/3.0	19.6/2.0	0.1	0.4~20	210	MAS-G010-030NR
MAS-R010-030NR	Rolled Ball Screw 冷轧滚珠丝杠		1	0.002	112	58	30	2	6	±0.01	0.01	29.4/3.0	19.6/2.0	0.1	0.4~20	210	MAS-R010-030NR
MAS-Re020-030NR	Resin Lead Screw 树脂螺母滑动丝杠		2	0.004	112	58	30	2	6	±0.05	0.05	9.8/1.0	4.9/0.5	0.1	0.8~15	210	MAS-Re020-030NR

注1) 导线为散线及右侧引线时的型号。
注2) 允许偏心力矩是其他方向没有负载时的值。
注3) 上述为KSS标准规格品, 特殊规格品请垂询本公司。需要特殊规格品时, 请垂询本公司。
注4) 有关与推荐驱动器 (KR-A5CC、KR-A55MC) 的接线, 请参照第Q131页。
注5) 执行器安装基准面请参照技术解说第S106页。

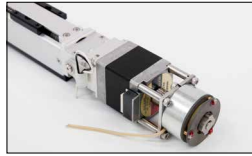
Note 1) Model Number above is for no-connector and lead wire is set on right side on Motor.
Note 2) Permissible moment is based on no load in other direction.
Note 3) Dimension above is our model case, if you need special specifications, please ask KSS representative.
Note 4) Refer to page Q131 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).
Note 5) Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

●单轴执行器 选项 / Options for Single axis Actuator

【电磁刹车单元 / Solenoid Brake Unit】(仅限Flex系列 / Only for Flex series)

在竖轴上使用,当切断电源后,滚珠丝杠或者滑动丝杠有可能因为自重而下落。与电磁刹车单元并用可保持中间位置。

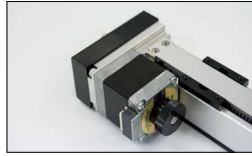
If Flex Actuators are operated in vertical position, Ball Screw / Lead Screw may fall down when its power is off. Solenoid Brake Unit is effective to maintain intermediate position.



【电机周边套件 / Motor side mounting kit】(仅限Flex系列 / Only for Flex series)

想要缩短纵向尺寸时,可使用周边套件。这是由电机座、正时带轮、正时齿带、固定螺丝等组成的套件。在KSS完成组装。

This kit can shorten the Actuator length with side mounting Motor shown in Photo right. Motor mount, timing pulley, timing belt and set screws are included in this kit. KSS can assemble in accordance with your request.



【外装光电微型传感器 / Photo-micro sensor】(仅限Flex系列 / Only for Flex series)

执行器上能够安装外装光电微型传感器。这是由传感设备、传感器导轨、光电传感器、安装盘、固定螺丝等组成的套件。在KSS完成组装。

Sensor accessories for the purpose of putting sensor outside Actuator. Sensor dog, sensor rail, photo sensor, sensor plate and set screws are included in this kit.

KSS can assemble in accordance with your request.



【油脂 / Grease】

用于执行器(滑动丝杠型除外)的KSS原装油脂(MSG No.2)。不会损伤微型滚珠丝杠的运作性,且润滑性能出色的油脂。请在油脂维护时使用。

KSS original Grease (MSG No.2) is used for KSS Flex Actuator series, except Lead Screw type. This Grease has high lubrication performance without deteriorating Ball Screw smooth movement. It would be useful for Grease maintenance to keep long term operation.



●推荐驱动器 / Recommended Driver

为使客户更方便地使用单轴执行器,本公司准备了标准驱动器、连接线等可供选配。

KSS provides Standard Stepping Motor Driver and Extension Cable as an option for Single axis Actuators in order to make it easy to use.

【标准驱动器 / Stepping Motor Driver】

KR-A5CC

DC24V 5相步进电机用驱动器。可以实现整步、半步切换。兼具电流自动下降功能(第V102页)。

This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function(page V102).



KR-A55MC

DC24V 5相步进电机用驱动器。可设定16种步角,最大分割数为250的微型步进驱动器(第V103~V104页)。

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set with up to 250 divisions(page V103~V104).



SD4015B3

适用于0.25~1.5A的2相步进电机的微型步进驱动器。可设定8种步角(第V107页)。

This is recommended 2-phase stepping Motor Driver for 0.25~1.5 A. It has Micro-Step function with 8-step angle(page V107).



SD4030B3

适用于0.5~3.0A的2相步进电机的驱动器。可设定8种步角(第V108页)。

This is recommended 2-phase stepping Motor Driver for 0.5~3.0A. It has Micro-Step function with 8-step angle(page V108).



●连接线 / Extension Cable

KSS单轴执行器和KSS推荐驱动器的专用电缆。

请按照下面的例子指定电缆种类、电缆长度和连接器形状。单侧为散线,敬请注意。

Extension Cable between KSS Single axis Actuators and KSS recommended Stepping Motor Driver.

Please designate Cable type, Cable length and Connector type in accordance with the example below.

Please note that one side of Extension Cable is cut endge only (no connector).

EC R - 2 - E(6)
1 2 3 4

①连接线符号

②电缆种类

R:耐弯曲电缆

③电缆长度(m)

④连接器形状

N : 散线

H : 广濂RP17

E(6) : EI 连接器 6芯(电机用)

E(4) : EI 连接器 4芯(传感器用)

E(6+4) : EI 连接器 6+4芯(电机+传感器用)

①Extension Cable

②Cable type

R:Robot cable type

③Cable length (m)

④Connector type at both end

N : No connector (Bare)

H : HIROSE RP17

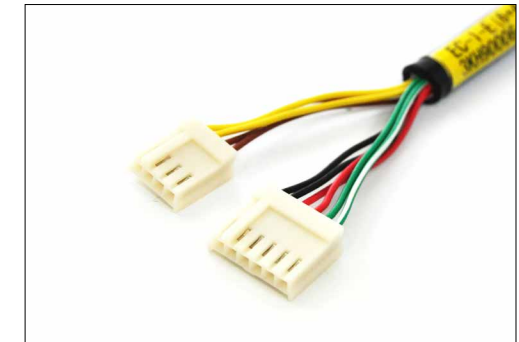
E(6) : EI connector 6-pins (for Motor only)

E(4) : EI connector 4-pins (for Sensor only)

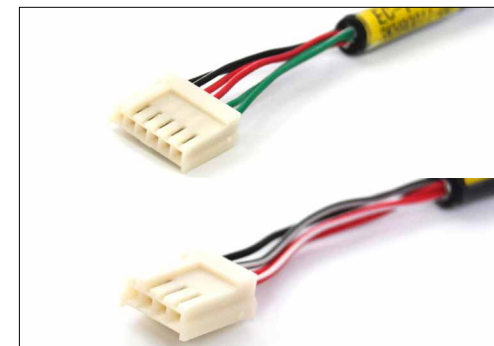
E(6+4) : EI connector 6+4-pins (for Motor & Sensor)



H : HIROSE RP17 / 广濂RP17



E(6+4) : EI connector 6+4-pins / EI连接器(6+4芯)
(TE Connectivity)



E(6) : EI connector 6-pins / EI连接器6芯
E(4) : EI connector 4-pins / EI连接器4芯
(TE Connectivity)

驱动器接线图 / Connection diagrams

●Flex系列 / For Flex series

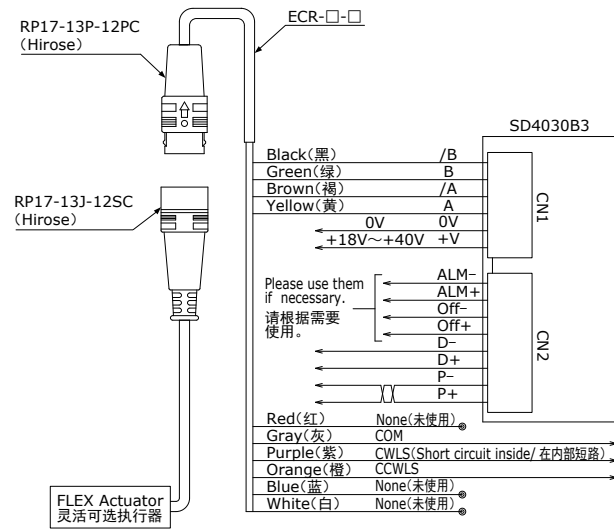
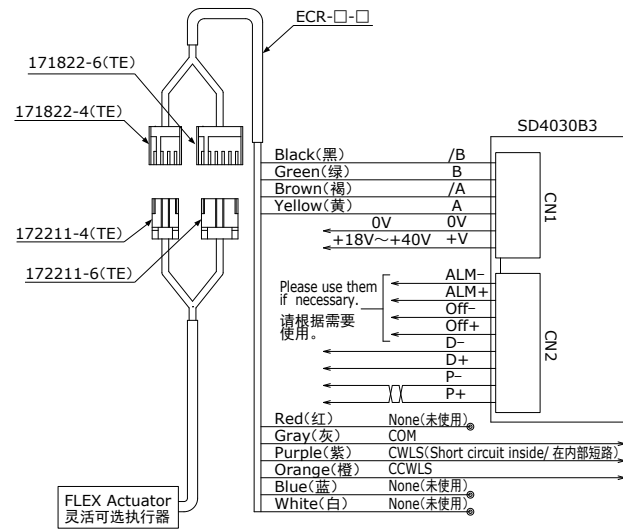
【SD4030B3 接线图 / SD4030B3 Connection diagrams】

适用电机 / Applicable Motor
美蓓亚电机公司 10PM-K202B
Minebea Moter 10PM-K202B



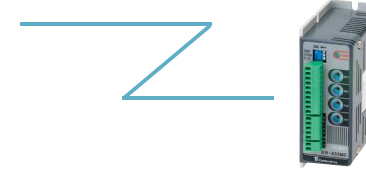
【EI连接器/EI connector】

【广濑连接器/HIROSE connector】



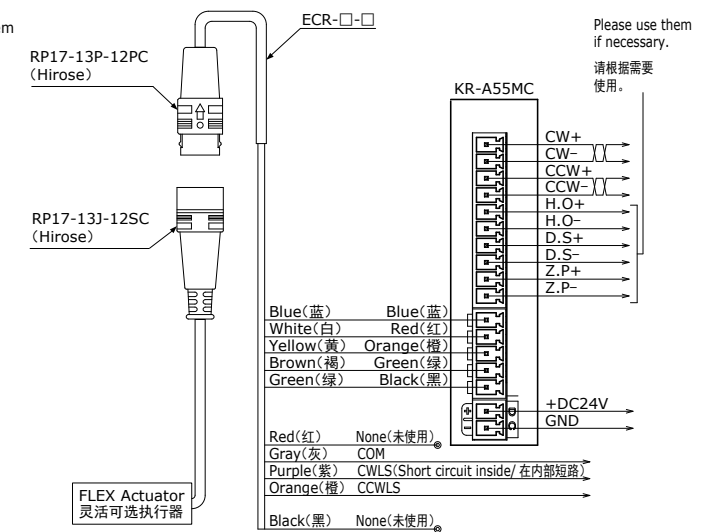
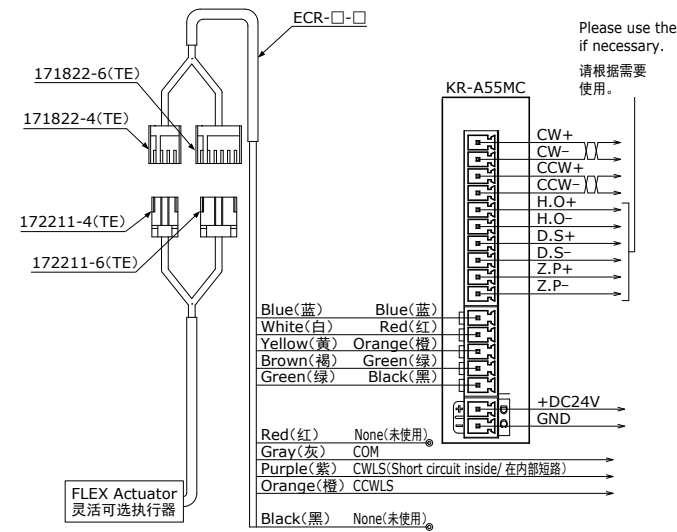
【KR-A55MC 接线图 / KR-A55MC Connection diagrams】

适用电机 / Applicable Motor
东方马达 PK523HPB
Oriental Moter PK523HPB



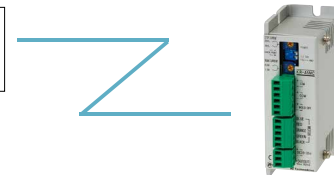
【EI连接器/EI connector】

【广濑连接器/HIROSE connector】



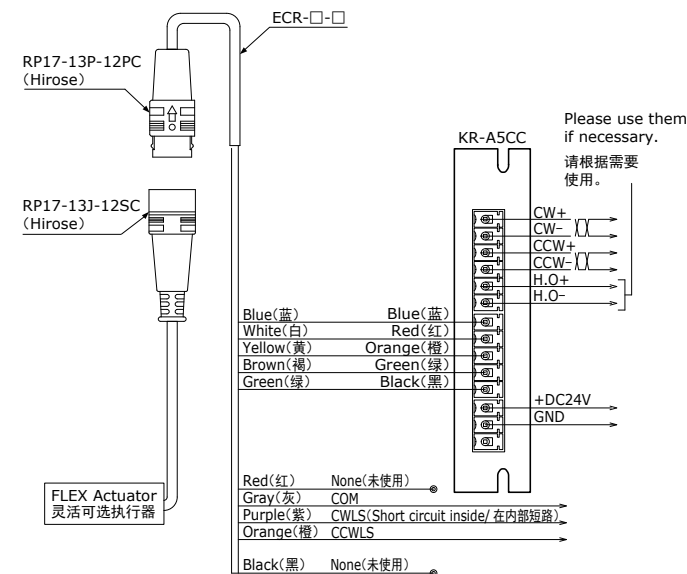
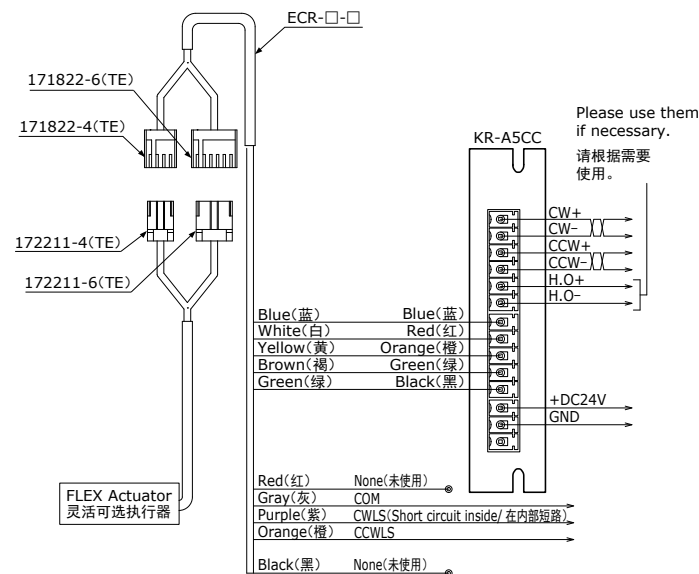
【KR-A5CC 接线图 / KR-A5CC Connection diagrams】

适用电机 / Applicable Motor
东方马达 PK523HPB
Oriental Moter PK523HPB



【EI连接器/EI connector】

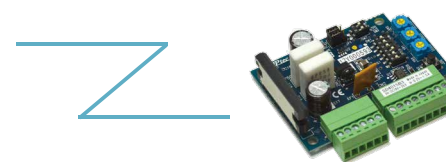
【广濑连接器/HIROSE connector】



●CAS系列 / For CAS series

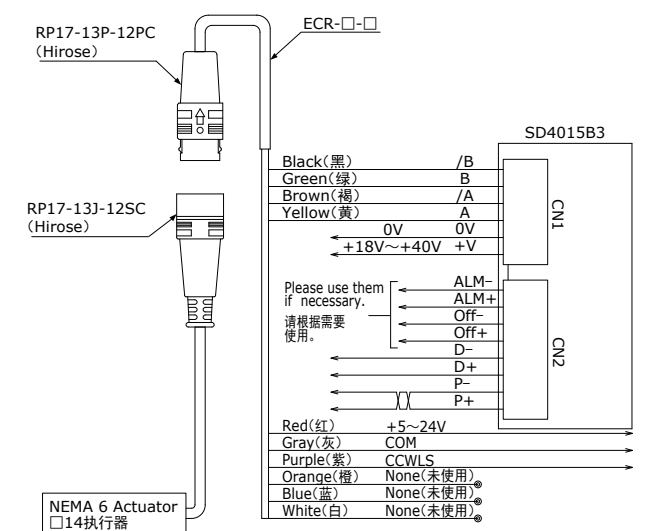
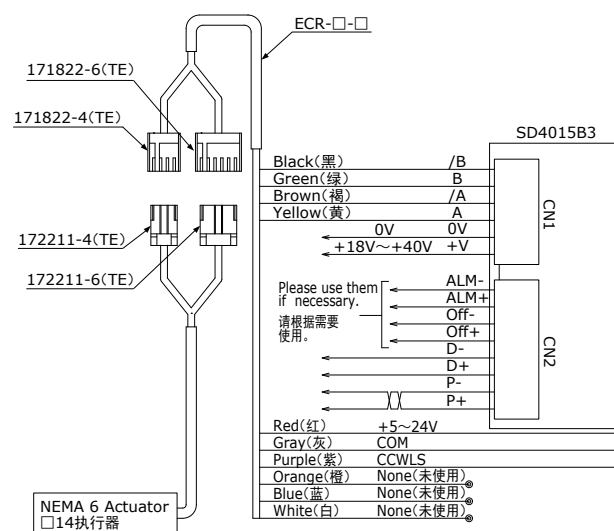
【SD4015B3接线图 / SD4015B3 Connection diagrams】

适用电机 / Applicable Motor
山洋电气 SH2141-551
Sanyo SH2141-551



【EI连接器/EI connector】

【广濑连接器/HIROSE connector】



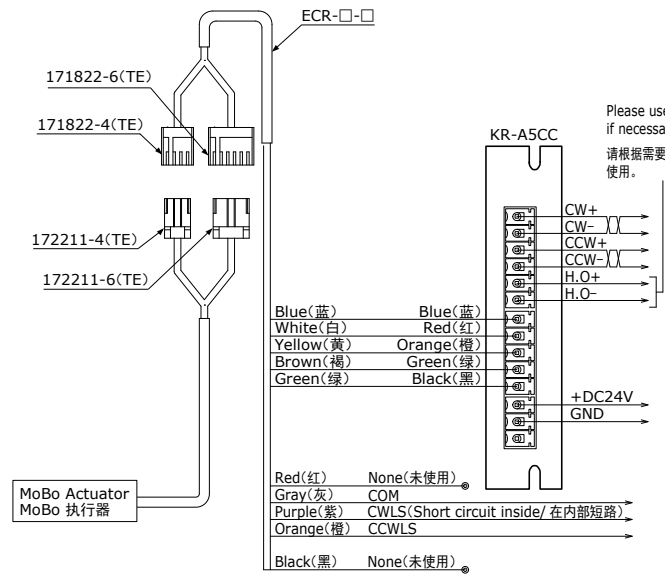
●MA系列 / For MA series

【KR-A5CC 接线图 / KR-A5CC Connection diagrams】

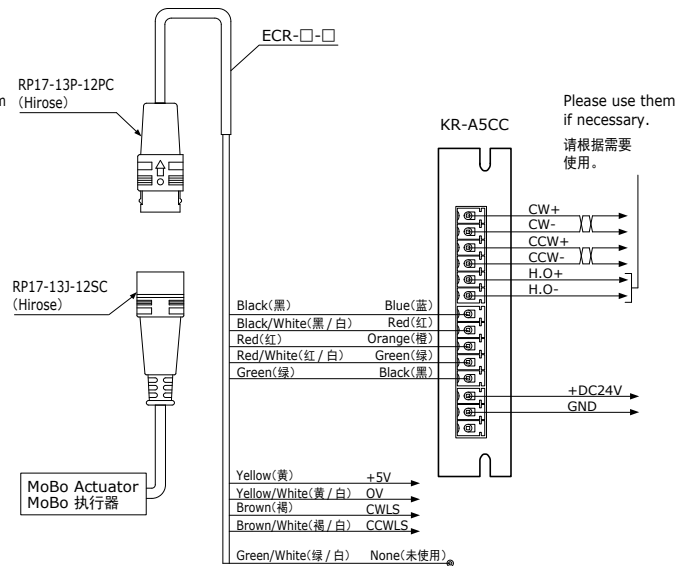
适用电机 / Applicable Motor
多摩川精机 线性执行器专用电机
TAMAGAWA SEIKI Dedicated Motor for Linear Actuator



【EI连接器/EI connector】



【广濑连接器/HIROSE connector】

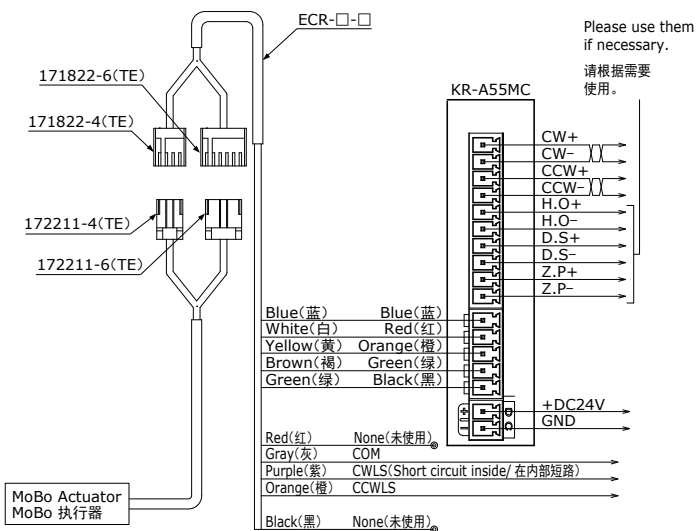


【KR-A55MC 接线图 / KR-A55MC Connection diagrams】

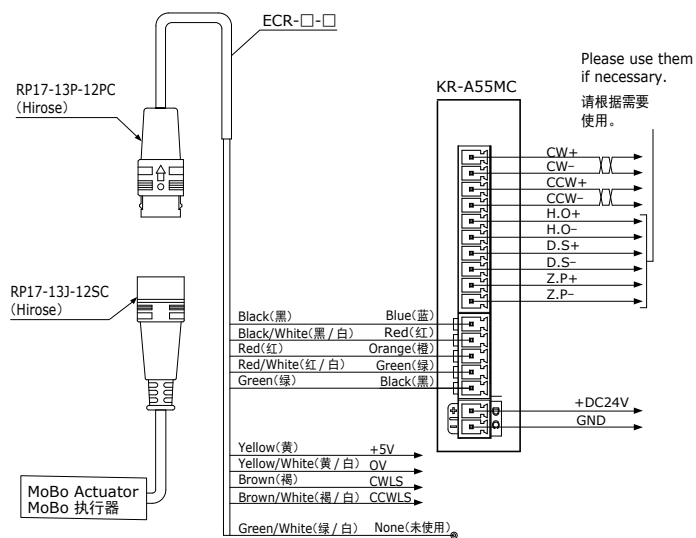
适用电机 / Applicable Motor
多摩川精机 线性执行器专用电机
TAMAGAWA SEIKI Dedicated Motor for Linear Actuator



【EI连接器/EI connector】



【广濑连接器/HIROSE connector】



●操作、使用注意事项

【使用注意事项】

- 1) 使用时请仔细阅读使用说明书,充分理解说明书内容,并务必严格遵守安全事项。
- 2) 敲击本产品、使产品下落或对其施加超过规定值的轴向负载、径向负载,可能会导致产品损坏,请谨慎操作。
- 3) 确认开包的产品有无异常或者是否为订购产品。
- 4) 禁止分解各部配件,否则会引起污渍侵入或者各部装配精度下降。
- 5) 防止污渍及碎粉侵入,否则异物侵入后会引起滚珠循环配件破损或缩短寿命、功能损失。
- 6) 在使用滚珠丝杠 / 滑动丝杠的过程中,遵照油脂维护周期每2~3个月注入1次润滑剂。
使用过程中油脂变质时,请擦去旧的油脂后涂抹新的规定油脂。
- 7) 负载或许用转数等,不得超过本公司规格使用。
- 8) 使用时请勿超过产品目录记载的最大加速度。
- 9) 禁止手持电机线和传感器线。切实固定后运行。
- 10) 远离磁性存储设备。

【安全注意事项】

- 1) 如果出现异味、噪音、烟雾、过热或振动,请立即停止操作并关闭电源。
- 2) 禁止使用超过额定电流的电源。
- 3) 电机可能因负载条件及使用的驱动器而异常发热。应确保电机表面温度不超过80°C。
- 4) 请勿强行弯曲、拉扯、夹住导线。
- 5) 动作中请勿触摸活动部位。
- 6) 维护、检查前,请切断驱动器的输入电源。

【使用环境】

- 1) 请勿在环境温度超过0~40°C、环境湿度超过20~80%RH、有结露、腐蚀性气体、易燃气体的场所使用。
- 2) 请勿在产生强电场、强磁场的场所使用。
- 3) 禁止在金属屑、粉尘、油雾、切削液、水分、盐、有机溶剂出现或飞散的场所使用。
- 4) 请勿在经常发生振动的场所以及冲击、真空等特殊环境下使用。

●Precaution of handling and operating

【Precaution for safety】

- 1) Before using these products, please read instruction manuals and follow the precautions below.
- 2) Do not hit or drop the Shaft, do not apply Axial or Radial load exceeding specifications, it may cause malfunction.
- 3) Before using, please check that the product has no defect, and product is the same as your order.
- 4) Do not disassemble each component, dust may get inside the product. It may deteriorate accuracy.
- 5) Please prevent contamination from dust or swarf. Dust or swarf may cause damage to Ball Screw/Lead Screw, which lead to deteriorating the function.
- 6) Single axis Actuator should be checked the lubricant condition every 2 to 3 months.
If Grease is contaminated, remove old Grease and replace with new one.
Grease should be the same as the original Grease, which is described in dimension table.
- 7) Do not use Single axis Actuator exceeding our specifications in Load or Speed.
- 8) Do not use Single axis Actuator beyond the Maximum Acceleration.
- 9) Do not hold the Motor leads and Sensor leads, this may result in damage to the device or injury.
The Motor lead wire should be fixed securely.
- 10) Keep away from Magnetic memory device.

【Precaution for safety】

- 1) If abnormal odor, noise, smoke overheating, or vibration occurs, stop operation immediately and turn the power off.
- 2) Do not use exceeding rated current.
- 3) The Motor may overheat depending on the load conditions or driver used.
Make sure that the Motor surface temperature does not exceed 80°C when in use.
- 4) Do not bend, pull or pinch the Motor lead wire.
- 5) Do not touch moving parts during operation.
- 6) Please switch off the Driver, when inspection or maintenance.

【Operating environment】

- 1) Operating environment should be 0~40°C in temperature and 20~80%RH in humidity.
Do not use these products under dew condensation, corrosive gas or inflammable gas environment.
- 2) Do not use these products under strong electric field, strong magnetic field.
- 3) Please prevent from swarf, oil mist, cutting fluid, Water/moisture, salt spray, organic solvent and other contamination.
- 4) Single axis Actuator cannot be used under the vibration, impact, vacuum, and other special environment.