

Miniature Actuator

Flex Actuator Series

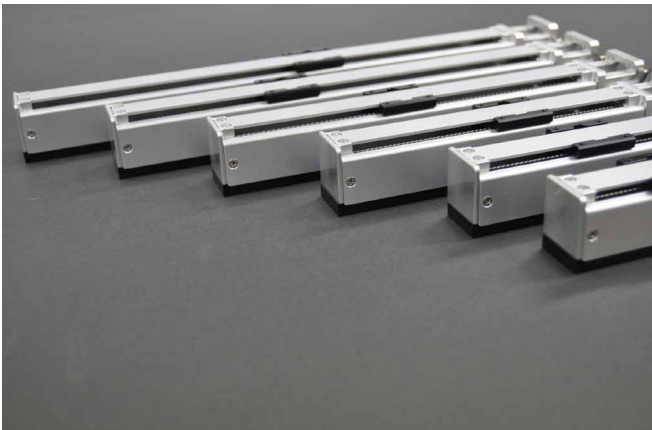


Many variation of KSS Flex Actuator became reality. Various choices among accuracy(Lead Screw type), speed(Screw Lead), Travel length and power(Motor type) are available.

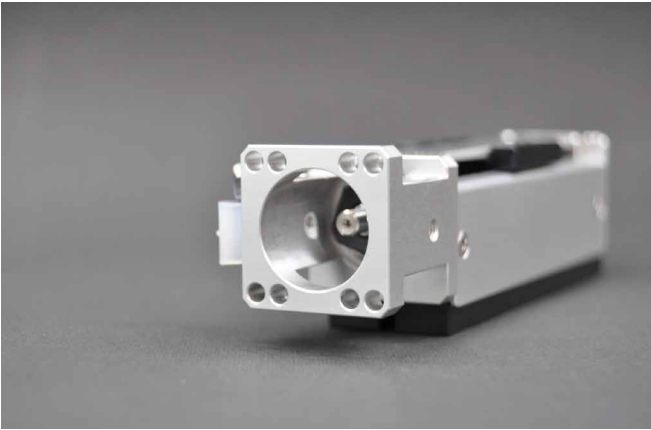


Features

- We make full use of features of Miniature Ball Screw manufacturer and super compact design Actuator can be achieved.
- Depending on kinds of Lead 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.



Wide range of choices



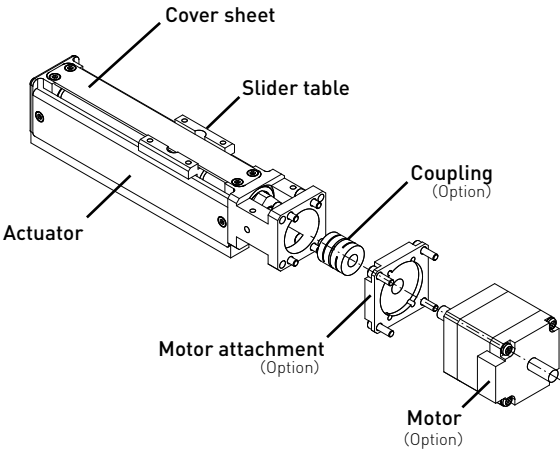
Motor-less is standard



Wide variety of Drive Screw type

Structure

KSS Flex Actuator is the slider type Actuator, which is built in small size Lead Screw / Ball 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.



Variation & Features

There are several kinds of KSS Flex Actuators shown below. Each Actuator has a different kinds of Ball Screw / Lead Screw inside. Please choose appropriate type depending on your required accuracy.
For further information, please refer to Table G-3 in page G106.

1)Resin Lead Screw type

High cost performance type Actuator installed Resin Lead Screw. It can be used without oiling in normal environment for long term, because lubricating agent is incorporated in Resin Nut.

2)Rolled Ball Screw type

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

3)Precision Ball Screw type

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

Table G-1 : Positioning accuracy for each Drive Screw

Drive Screw type	Repeatability (mm)	Lost motion (mm)
Resin Lead Screw	±0.05 max.	0.05 max.
Rolled Ball Screw	±0.01 max.	0.01 max.
Precision Ball Screw	±0.005 max.	0.005 max.

Note) These numbers are obtained with standard Motor.

There are several choices of Motor as option shown below.
Specifications for each combination of Actuator and Motor are shown in page G106.

Motor type	Manufacturer	Model number	Rated Current
2-phase □25	Minebea Motor	10PM-K202B Single shaft	0.7A / Phase
2-phase □28	TAMAGAWA SEIKI	TS3641N11E2 Double shaft	0.95A / Phase
5-phase □28	Oriental Motor	PK523HPB Double shaft	0.75A / Phase

FA **S** **—** **G** **020** **—** **080** **M** **N** **R** **SBU**

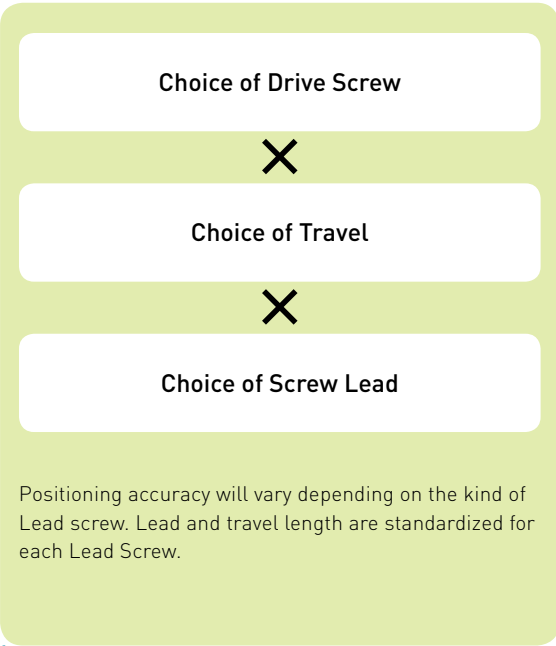
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

- ①Series No.
FA : KSS Flex Actuator Series
- ②Actuator type
S : Slider type
- ③Lead Screw / Ball Screw type
Re : Resin Lead Screw
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)
T : TAMAGAWA SEIKI 2-phase Stepping Motor (□28&0.95A / 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 (Tyco Electronics)
- 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

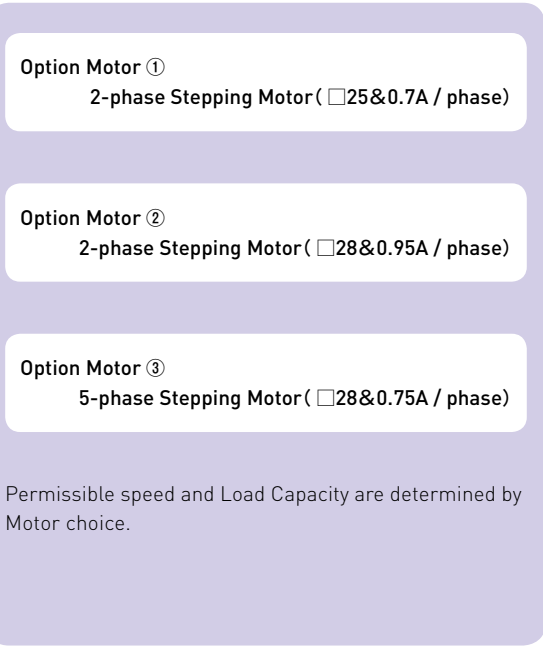


KSS Flex Actuator has a lot of combinations with Lead screws (positioning accuracy), Screw Lead, and travel length. Motor-less type is our standard, but 3 types of Motor can be provided as an optional order. Standard combination and Motor choices make design flexibility enlarge widely based on your specifications. Combination of Lead screw and Motor are shown in Table G-2. The detail specifications and dimensions are described in each dimension table. If other combination in Table G-2 is required, please ask KSS representative.

Standard Combination



Motor Option



Refer to Table G-3



The detail specifications for each combination are shown in dimension Table. Page index is shown in Table below.

Table G-2 : Page index for each combination

Motor		Resin Lead Screw	Rolled Ball Screw	Precision Ball Screw
Standard	Motor : None	See page G107~G108	See page G109~G110	See page G111~G112
Option	M Minebea Motor 2-phase Stepping Motor(□25&0.7A / phase) Bi-polar type	See page G113~G114	See page G115~G116	See page G117~G118
	T TAMAGAWA SEIKI 2-phase Stepping Motor(□28&0.95A / phase) Uni-polar type	See page G119~G120	See page G121~G122	See page G123~G124
	E Oriental Motor 5-phase Stepping Motor(□28&0.75A / phase)	See page G125~G126	See page G127~G128	See page G129~G130

●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.

Drive Screw selection guide	Positioning related accuracy	Price
Resin Lead Screws	Low	Less expensive
Rolled Ball Screws	Middle	Reasonable
Precision Ball Screws	High	Costly

Screw Lead selection guide	Speed	Resolution	Load Capacity
1mm	Slow	High	High
2mm	↕	↕	↕
6mm			
9mm or 10mm	Fast	Low	Low

Motor selection guide	Fine step	Acceleration	Rotational speed	Price
2-phase □25	Middle	Middle	Middle	Less expensive
2-phase □28	Middle	Middle	Relatively low speed is available	Reasonable
5-phase □28	Fine	High	Low & high speed	Costly

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.

Table G-3 : Specifications for each combination

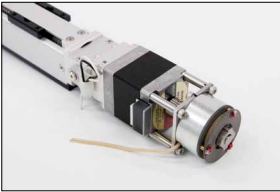
Drive Screw type	Resin Lead Screw	Rolled Ball Screw	Precision Ball Screw
Repeatability(mm)	±0.05 max.	±0.01 max.	±0.005 max.
Lost motion(mm)	0.05 max.	0.01 max.	0.005 max.
Permissible Moment(Nm) Mp(Pitching)	0.10 ** In case of no load in My & Mr direction		
Permissible Moment(Nm) My(Yawing)	0.09 ** In case of no load in Mp & Mr direction		
Permissible Moment(Nm) Mr(Rolling)	0.23 ** In case of no load in Mp & My direction		

Spec. for each Motor			Resin Lead Screw			Rolled Ball Screw				Precision Ball Screw			
Motor	Lead(mm)		2	6	9	1	2	6	10	1	2	6	10
	H:Horizontal V:Vertical												
Standard	Max. Load Capacity(N)	H	9.8	9.8	9.8	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	4.9	4.9	4.9	19.6	19.6	9.8	4.9	19.6	19.6	9.8	4.9
Motor-less	Permissible speed(mm / sec)		0~30	0~90	0~135	0~25	0~50	0~150	0~250	0~25	0~50	0~150	0~250
Motor : M 2-phase □25 0.7A / phase	Max. Load Capacity(N)	H	9.8	9.8	9.8	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	2.94	2.94	2.94	19.6	19.6	2.94	2.94	19.6	19.6	2.94	2.94
	Permissible speed(mm / sec)		6~20	18~60	30~90	3~20	6~40	18~120	30~200	3~20	6~40	18~120	30~200
Motor : T 2-phase □28 0.95A / phase	Max. Load Capacity(N)	H	9.8	9.8	9.8	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	4.9	4.9	4.9	19.6	19.6	9.8	4.9	19.6	19.6	9.8	4.9
	Permissible speed(mm / sec)		4~30	12~90	20~135	2~25	4~50	12~150	20~250	2~25	4~50	12~150	20~250
Motor : E 5-phase □28 0.75A / phase	Max. Load Capacity(N)	H	9.8	9.8	9.8	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	4.9	4.9	4.9	19.6	19.6	4.9	4.9	19.6	19.6	4.9	4.9
	Permissible speed(mm / sec)		0~30	0~90	0~135	0~25	0~50	0~150	0~250	0~25	0~50	0~150	0~250
**Motor mounting is option		20				○				○			
		40	○	○	○	○	○	○	○	○	○	○	○
		80	○	○	○	○	○	○	○	○	○	○	○
		120		○	○			○	○			○	○
		160		○	○			○	○			○	○
		200		○	○			○	○			○	○

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.

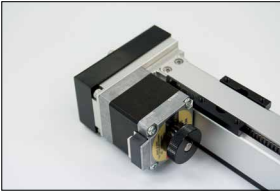
[Solenoid Brake Unit]

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.



[Motor side mounting kit]

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.



[Photo-micro sensor]

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.



[Grease]

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.



[Stepping Motor Driver]

KSS provides Standard Stepping Motor Driver and Extension Cable for Flex Actuators in order to make it easy to use.

KR-A5CC

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

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)



KS9110

This is recommended 2-phase stepping Motor Driver for TAMAGAWA SEIKI with □28 size. It can be selected for Full-step or Half-step by Dip switch. (page V107)



SD4030B2

This is recommended 2-phase stepping Motor Driver for Minebea Motor with □25 size. It has Micro-Step function with 8-step angle. (page V108)



[Extension Cable]

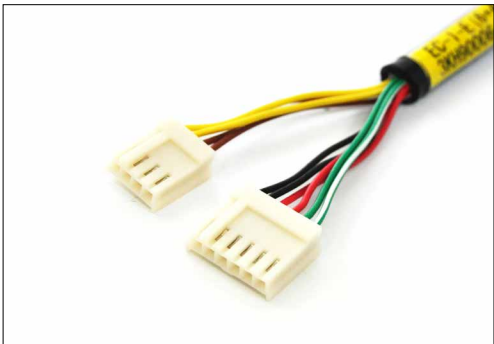
Extension Cable between KSS Flex Actuators and KSS recommended Stepping Motor Driver. Please designate Cable type, Cable length and Connector type in accordance with the example below. Please note that one side of Extension Cable is cut end only (no connector).

EC R - 2 - E(6)
① ② ③ ④

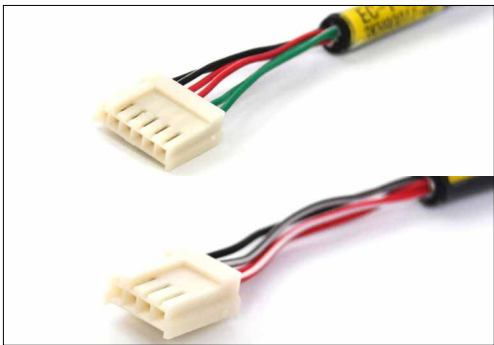
- ①Extension Cable
 - ②Cable type
 - None:Normal type
 - R :Robot cable type
 - ③Cable length (m)
 - ④Connector type at both end
 - N : No connector (Cut only)
 - H : HIROSE RP17
 - E(6) : EI connector 6-pins (for Motor only)
 - E(4) : EI connector 4-pins (for Sensor only)
 - E(6+4) : EI connector 6+4-pins (for Motor & Sensor)
 - E(4)+SP4461 : EI connector 4-pins (for Sensor)
+Sensor Amplifier Board (Light-on)
- Note) EI connector by Tyco Electronics



H : HIROSE RP17



E(6+4) : EI connector 6+4-pins



E(6) : EI connector 6-pins
E(4) : EI connector 4-pins



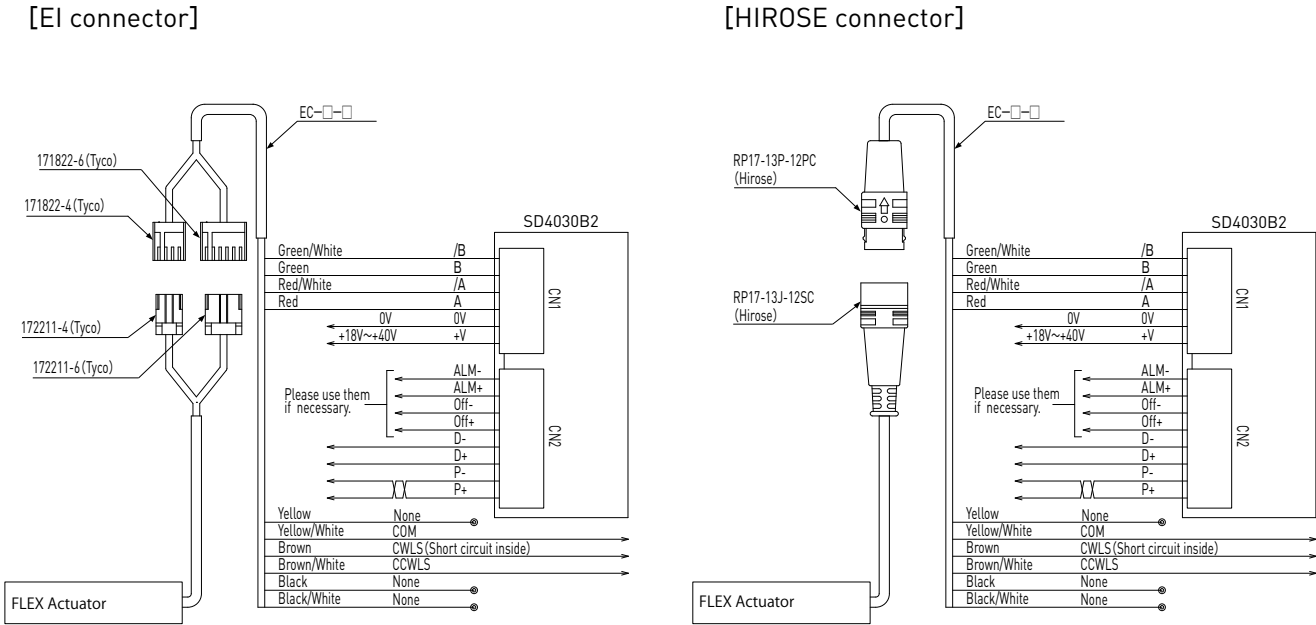
E(4) + SP4461 :
EI connector -4pins & Sensor Amplifier Board

Note) Sensor Amplifier Board is necessary, if you use sensor at 24V.

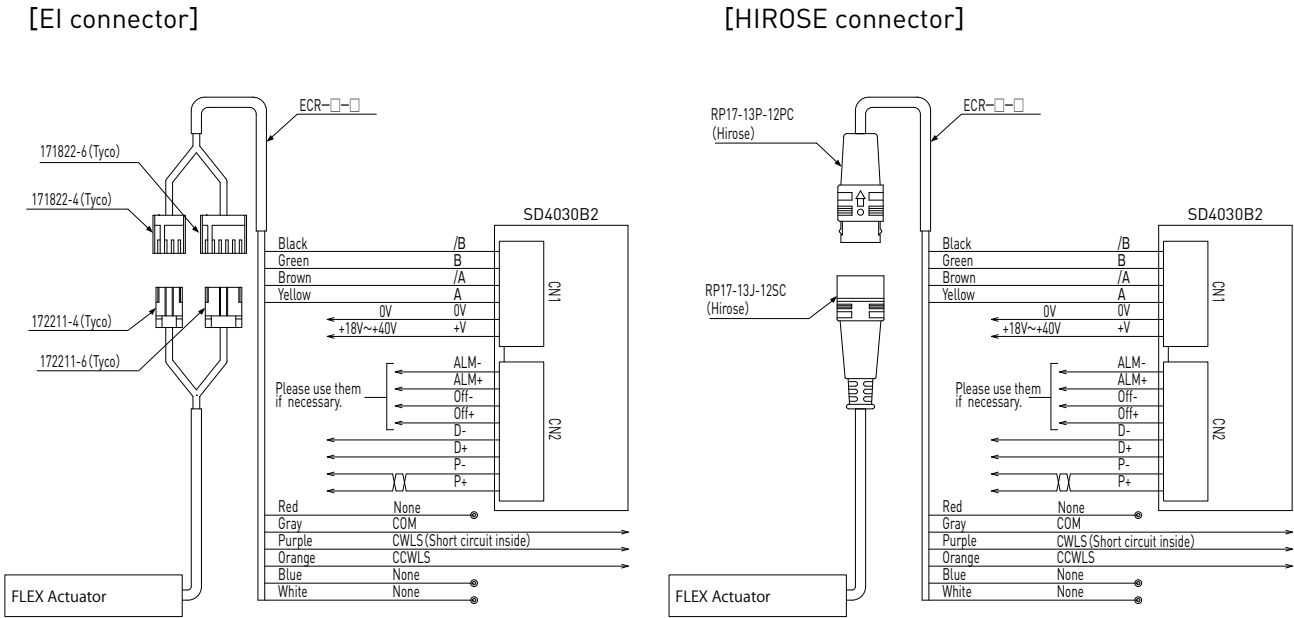
[SD4030B2 Connection diagrams]

Applicable Motor
Minebea Moter 10PM-K202B

■Nomal Cable



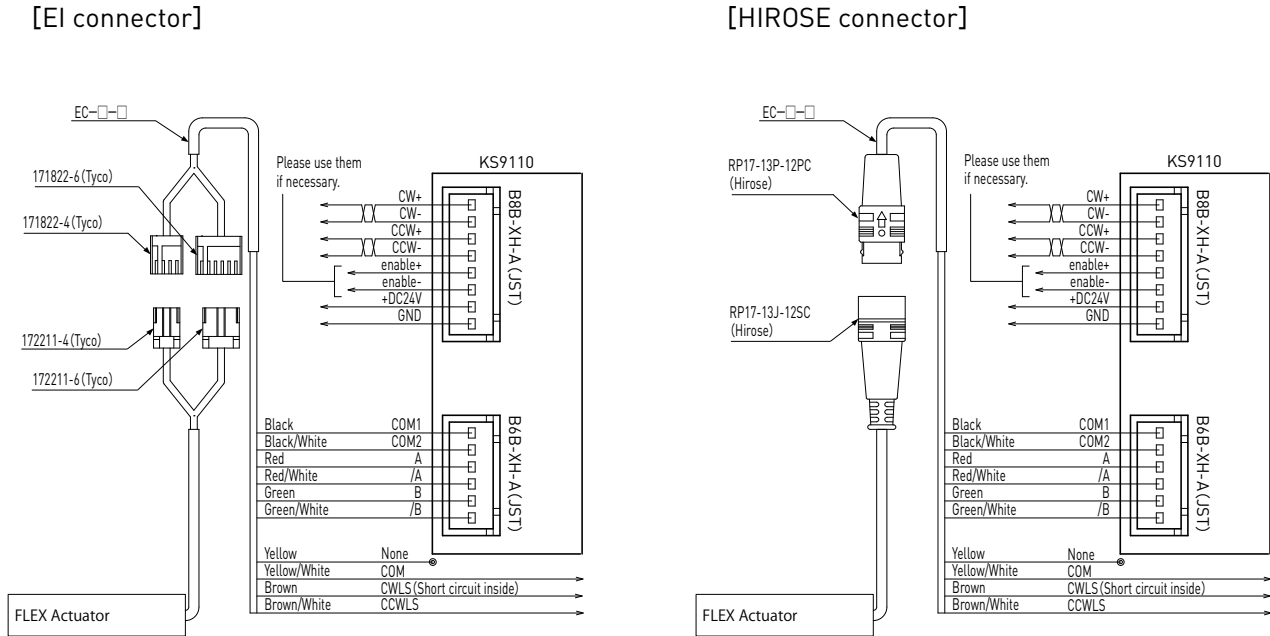
■Robot Cable



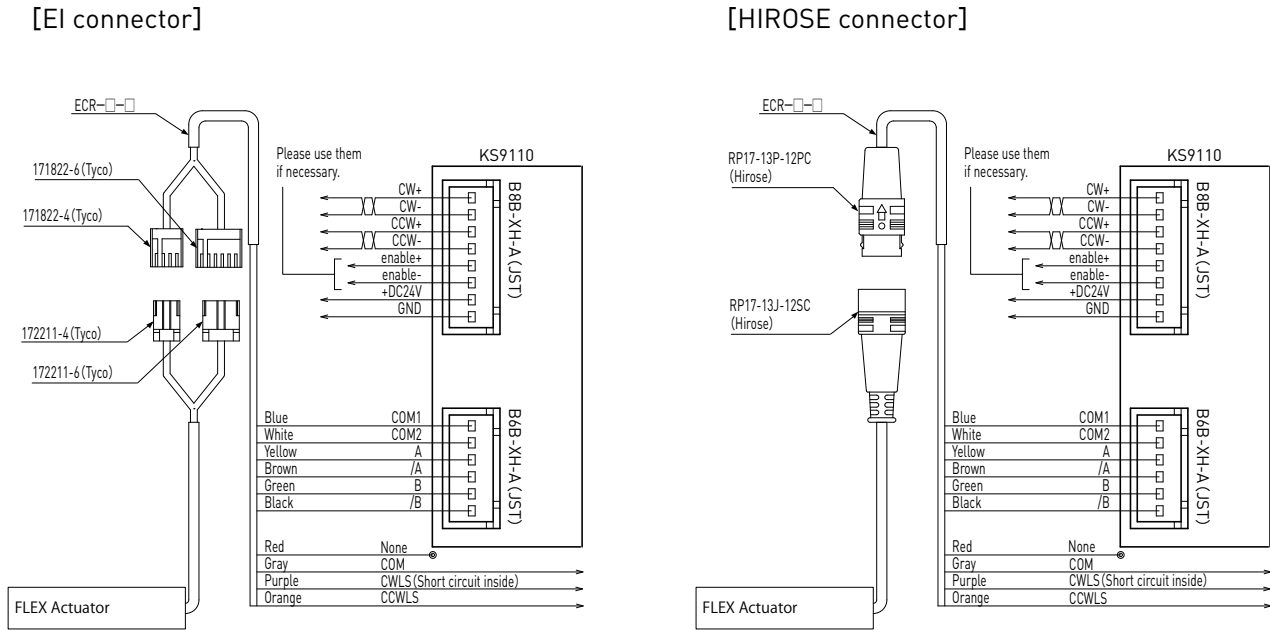
[KS9110 Connection diagrams]

Applicable Motor
TAMAGAWA SEIKI TS3641N11E2

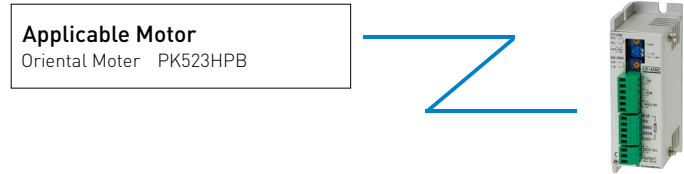
■Nomal Cable



■Robot Cable

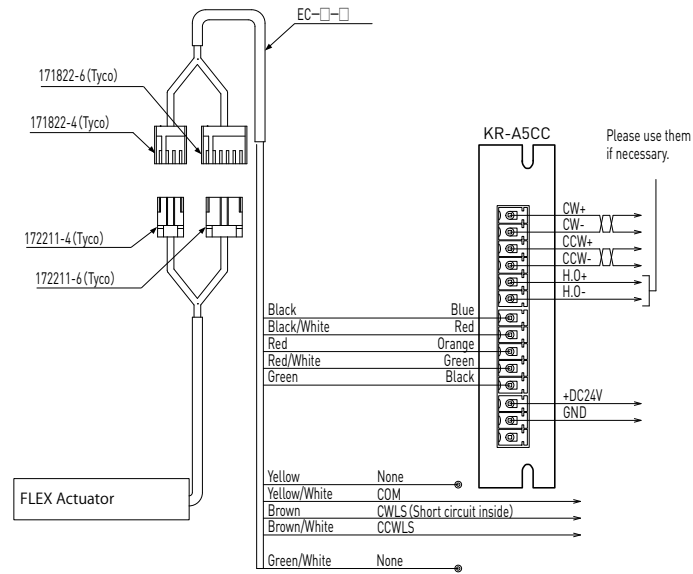


[KR-A5CC Connection diagrams]

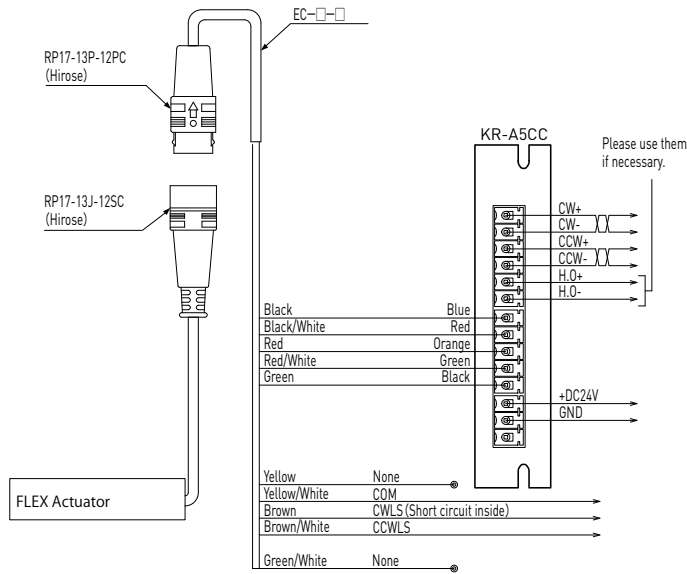


■Nomal Cable

[EI connector]

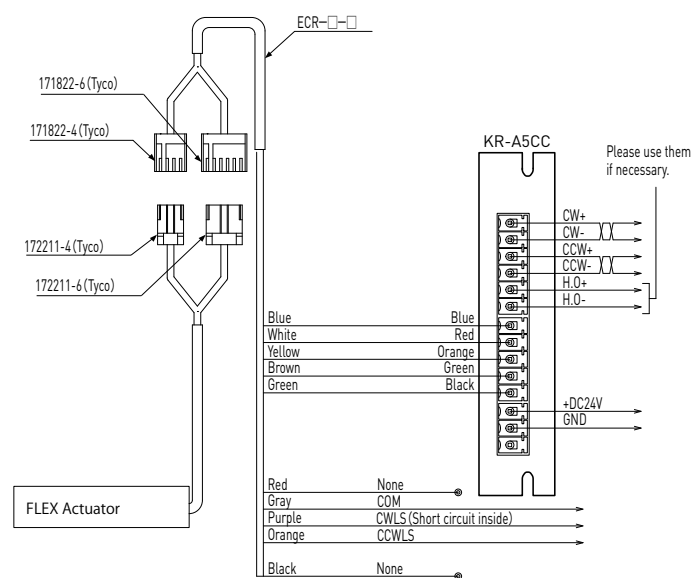


[HIROSE connector]

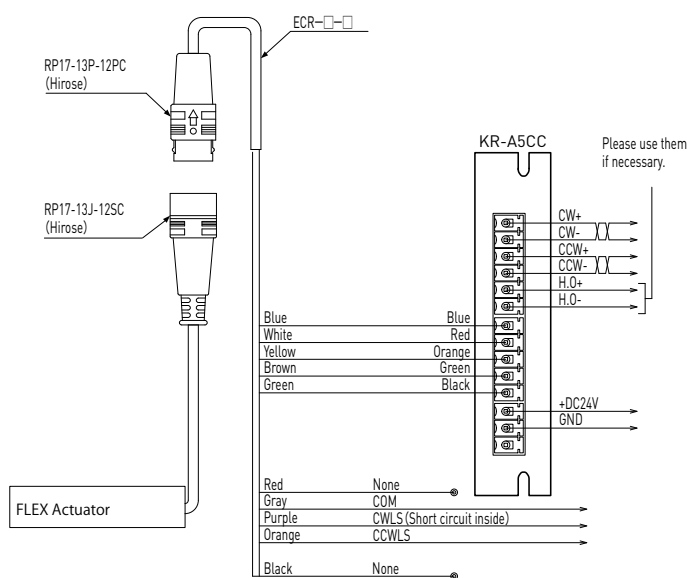


■Robot Cable

[EI connector]



[HIROSE connector]

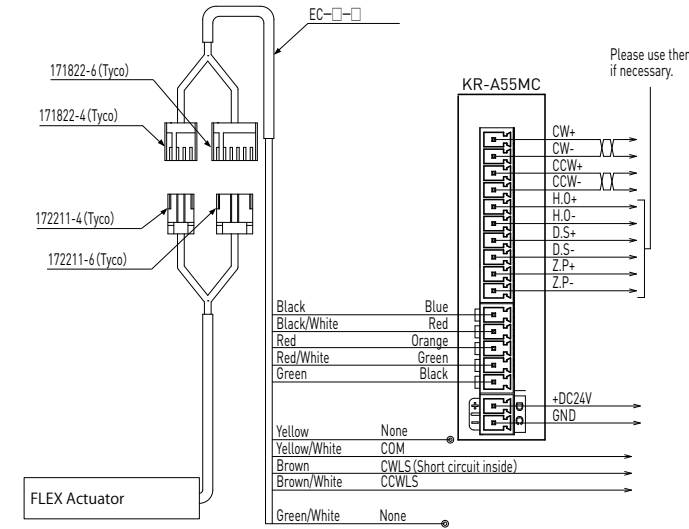


[KR-A55MC Connection diagrams]

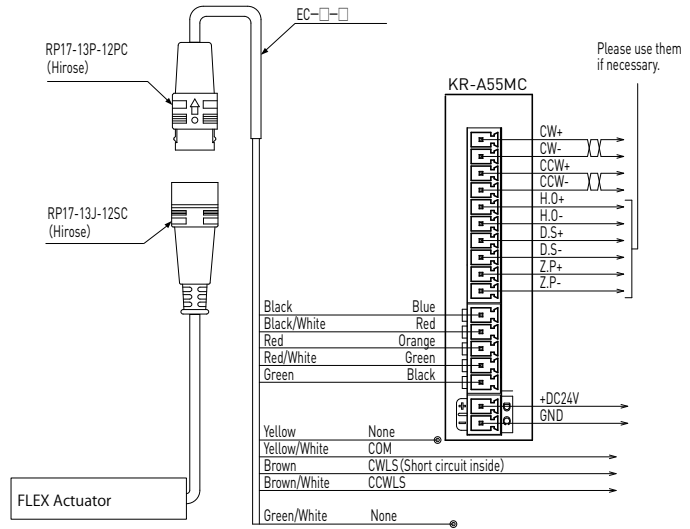


■Nomal Cable

[EI connector]

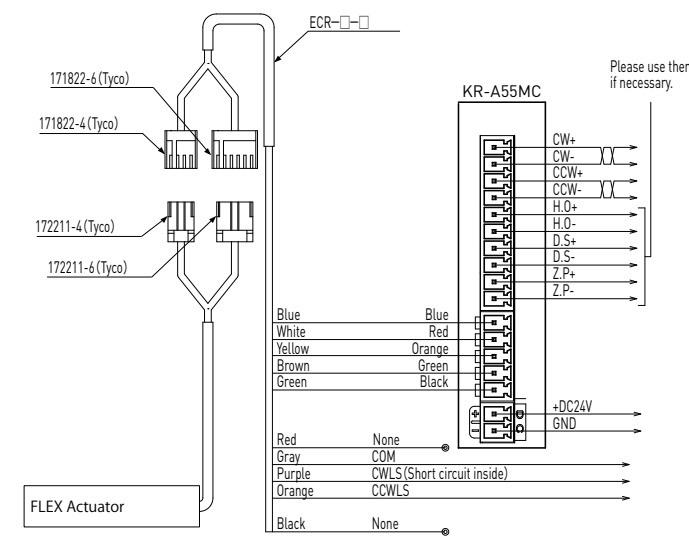


[HIROSE connector]

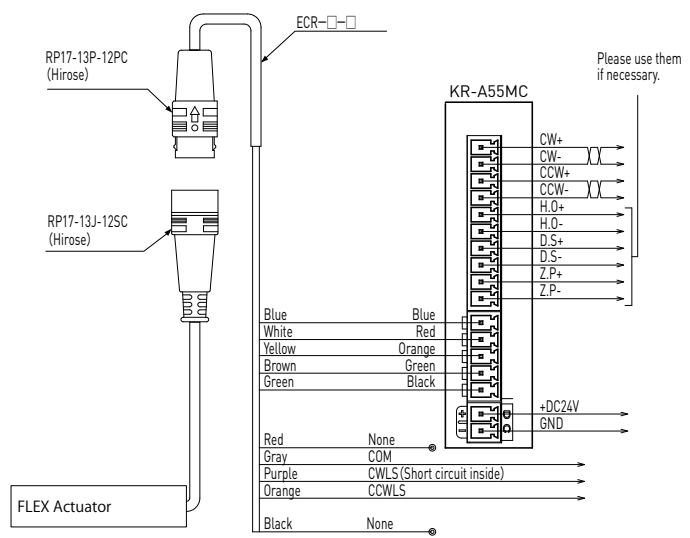


■Robot Cable

[EI connector]



[HIROSE connector]



●Precaution of handling and operating

[Precaution for operating]

- 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) Flex Actuators 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 specification table.
- 7) Do not use Flex Actuators exceeding our specifications in Load or Speed.
- 8) Do not hold the Motor leads and Motor shaft, this may result in damage to the device or injury. The Motor lead wire should be fixed securely.
- 9) 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) Flex Actuators cannot be used under the vibration, impact, vacuum, and other special environment.