KEC series

Features

- Addition of various mounting options for each model
- Smart profile body design
- Innovative internal structure
- Positioning of center trunnion and bottom foot
- Proximity sensor can be attached
- Direct connection tap can be installed on the bottom (bottom machining)
- Anti-rotation basic specification

How to Order

KEC ① - 60 ② - B1605 ③ - 200 ④ - C ⑤ H ⑥ P ⑦ M ⑧ C ⑨ - S1 ⑩

① Series

KEC	Rod type electrical cylinder

② Size

45	46 X 46 mm
60	64 X 64 mm
80	80 X 80 mm
120	130 X 130 mm
140	150 X 150 mm

③ Drive screw

Size	B (Ball Screw)	T (TM Screw)
45	B1204	T1202
	B1205	
	B1210	
60	B1605	T1804
	B1610	
	B1616	
	B1620	
80	B2505	T2805
	B2510	
	B2525	
120	B4005	T4508
	B4010	
	B4020	
	B4040	
140	B5005	T5008
	B5010	
	B5020	
	B5050	

E.g.) B1204 = Ball screw Ø16, 5Lead
E.g.) T1202 = TM screw Ø12, 2Lead

④ Stroke

45	500
60	800
80	1000
120	1000
140	1000

⑤ Rod material

C	S45 + Chrome plating
S	Stainless

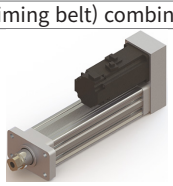
⑥ Prevent rod rotation

H	Prevent rod rotation(KS120, 140 not applicable)
N	Rod free rotation

⑦ Motor combination

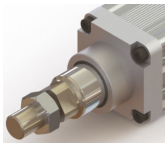
D	Motor series (coupling) combinations
P	Motor parallel (timing belt) combination

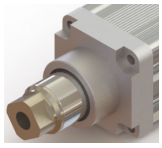

Serial [D]

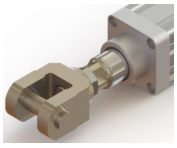

Parallel [P]

⑧ Rod end type

M	Male
F	Female
K	Knuckle joint
※ Cannot be attached to guide type (G)	


Male [M]

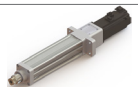

Female [F]

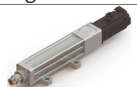

Knuckle joint [K]

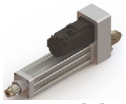
⑨ Cylinder mounting model

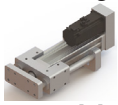
F	Shear flange
R	Rear end flange
B	Bottom foot
C	Clavis (not applicable to KS140)
G	Guide attached (120, 140 not applicable)
T	Trunnion
H	Bottom mounting


Shear flange [F]


Rear end flange [R]


Bottom foot [B]


Clavis [C]


Guide [G]


Trunnion [T]

⑩ Sensor type

Solid state auto switch (Ø4)			Proximity sensor (M5x0.5)		
Type	NC	NO	Type	NC	NO
Nil	-	-	Nil	-	-
S1	2	1	P1	2	1
S2	2	-	P2	2	-
S3	-	2	P3	-	2
S4	-	3	P4	-	3
S5	PNP(NO) 2		P5	PNP(NO) 2	
S6	PNP(NO) 3		P6	PNP(NO) 3	
※ Standard length: 2M					

Specifications

Type \ Product		KEC45				KEC60					KEC80			
Screw	[mm]	B1204	B1205	B1210	T1202	B1605	B1610	B1616	B1620	T1804	B2505	B2510	B2525	T2805
Screw pitch	[mm]	4	5	10	2	5	10	16	20	4	5	10	25	5
Screw outer diameter	[mm]	12	12	12	12	16	16	16	16	18	25	25	25	28
Standard thrust (Note 1)	[N]	931	1000	393	300	1212	1152	1298	959	1382	1650	2044	2086	2419
Max. Input rotational torque	[Nm]	1.2	1.6	1.3	0.9	1.9	3.7	6.6	6.1	5	2.6	6.5	16.6	8
Rod allowable lateral load	[N]	10				20					30			
Rod allowable rotational moment	[Nm]	10				10					10			
Repeat accuracy (Ball screw)	[mm]	Series ± 0.02 / Parallel : Max. 0.08				Series ± 0.02 / Parallel : Max. 0.08					Series ± 0.02 / Parallel : Max. 0.08			
Repeat precision (TM screw)	[mm]	Series ± 0.2 / Parallel Max. 0.8				Series ± 0.2 / Parallel Max. 0.8					Series ± 0.2 / Parallel Max. 0.8			

(Note 1) When using something other than "standard thrust (N)", please inquire separately as it depends on the usage environment such as used thrust (N), daily operation time (h), number of operations per minute, stroke, etc.

Type \ Product		KEC120					KEC140				
Screw	[mm]	B4005	B4010	B4020	B4040	T5008	B5005	B5010	B5020	B5050	T5008
Screw pitch	[mm]	5	10	20	40	8	5	10	20	50	8
Screw outer diameter	[mm]	40	40	40	40	50	50	50	50	50	50
Standard thrust (Note 1)	[N]	1999	6283	6224	7488	6733	2186	7035	9038	9192	6733
Max. Input rotational torque	[Nm]	3.2	20	39.6	95.4	67	3.5	22.4	57.6	146	67
Rod allowable lateral load	[N]	50					50				
Rod allowable rotational moment	[Nm]	10					10				
Repeat accuracy (Ball screw)	[mm]	Series ± 0.02 / Parallel : Max. 0.08					Series ± 0.02 / Parallel : Max. 0.08				
Repeat precision (TM screw)	[mm]	Series ± 0.2 / Parallel Max. 0.8					Series ± 0.2 / Parallel Max. 0.8				

(Note 1) When using something other than "standard thrust (N)", please inquire separately as it depends on the usage environment such as used thrust (N), daily operation time (h), number of operations per minute, stroke, etc.

Features

Drive screw
- Rolled ball screw C7 grade is applied as standard.
- Grinding ball screw can be applied for precision drive
- Applicable lead screw for general use
- Rotating structure for high-speed operation and guarantee of durability

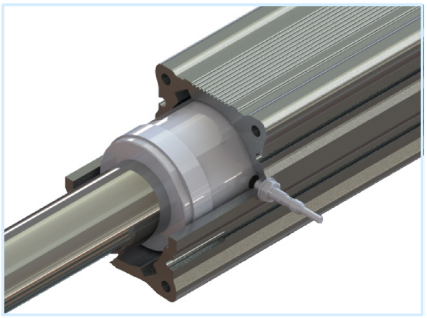
Rod housing
- 2 Rip scraper type rod packing installed
- Apply basic DU Bush
- Depending on the environment, Teflon or synthetic bush can be applied
- Rotating structure for high-speed operation and guarantee of durability

Piston housing
- Double polymer anti-rotation mechanism
- Equipped with 2 or 4 layers of special synthetic wear rings
- Assembly structure for rod concentricity
- Rod lateral load structure

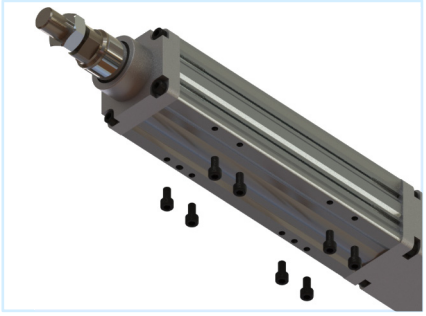
Profile shape
- 2x2 sensor rail formation
- Internal pressure circulation type slot groove formation
- Machining surface formation for bottom mounting or center trunnion assembly
- Formation for all product LM Guide table mounting
- Smart cross-sectional shape for attaching various options

Screw bearing housing
- 3-line structure bearing unit
- Composition of separate mechanism for constant bearing preload
- Structure formation to suppress screw vibration
- Sub-assembly structure for easy maintenance

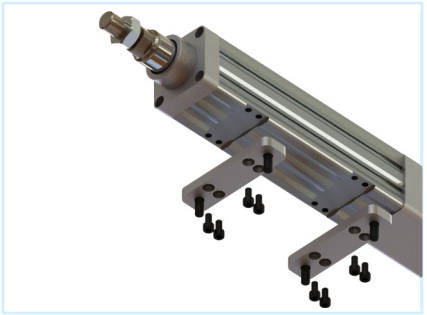
Convenience
- Basic application of series coupling viewing window
- Proximity sensor can be applied
- Stroke production designated by the company
- Basic application of hard anodizing



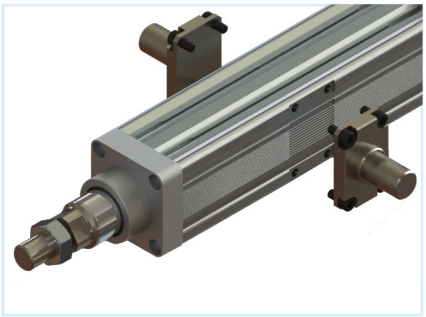
Piston housing
- Double polymer anti-rotation mechanism
- Equipped with 2 or 4 layers of special synthetic wear rings
- Assembly structure for rod concentricity
- Rod lateral load structure



Bottom direct attachment
- Formation of parallelism by bottom processing
- Compact mounting possible by bottom direct connection
- Bottom dowel hole formation
- Possible to manufacture side or symmetrical surfaces



Foot attachment
- Bottom foot attachment slot groove processing
- Prevention of deformation caused by thrust and shear stress of bolts
- Production at the location specified by the company
- Possible to manufacture side or symmetrical surfaces

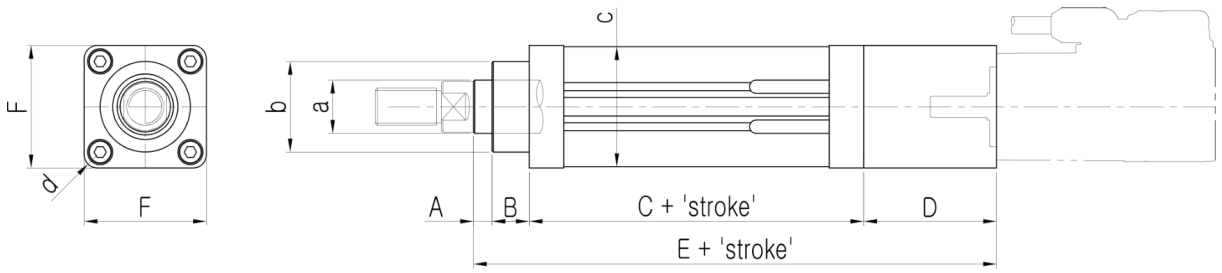


Center trunnion
- Separate slot groove processing for attachment
- Prevention of deformation caused by thrust and shear stress of bolts
- Production at the location specified by the company
- Machining integrated shape

Motor combination

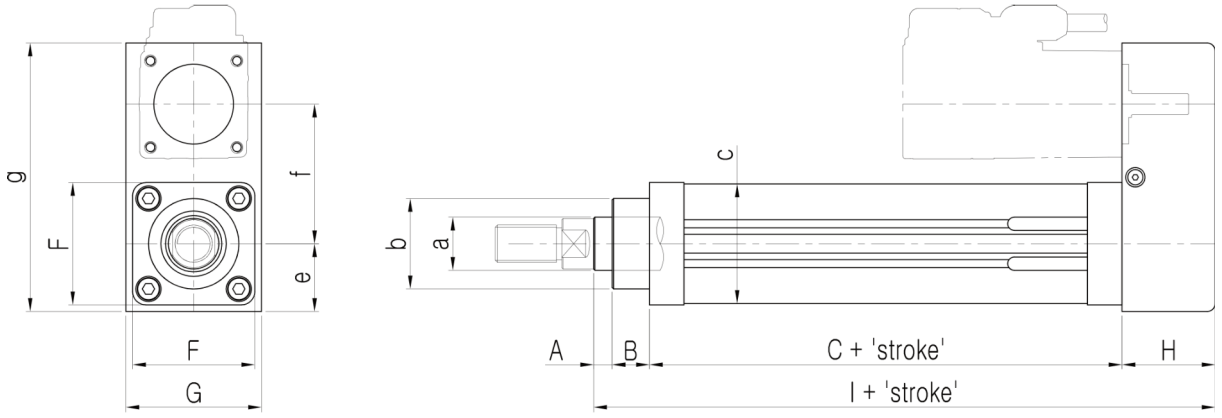
ORDER CODE **D**

Motor series (coupling) combinations



ORDER CODE **P**

Motor parallel (timing belt) combination

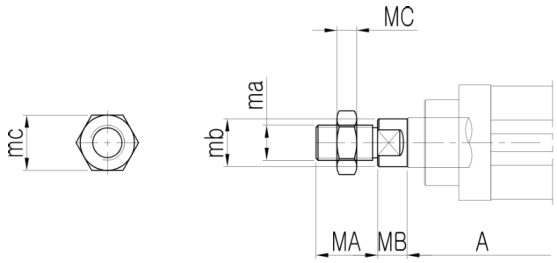


TYPE	A	B	C	D	E	F	G	H	I	a	b	c	d	e	f	g
KEC45	7	14	158	50	229	46	51	35	214	ø20	ø34	45	R5	25.5	52.5	101
KEC60	8	21	191	77	297	64	67	50	270	ø32	ø45	62	R7	33.5	67.5	135
KEC80	9	26	242	100	377	80	83	55	332	ø40	ø55	77	R8	41.5	95	178
KEC120	30	34	352	110	526	120	124	79	565	ø85	ø106	117	C7	62	140	264
KEC140	30	44	502	155	731	150	164	100	676	ø100	ø120	142	C9	81	200	324

Rod end type

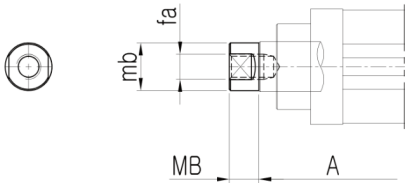
Male

ORDER CODE **M**



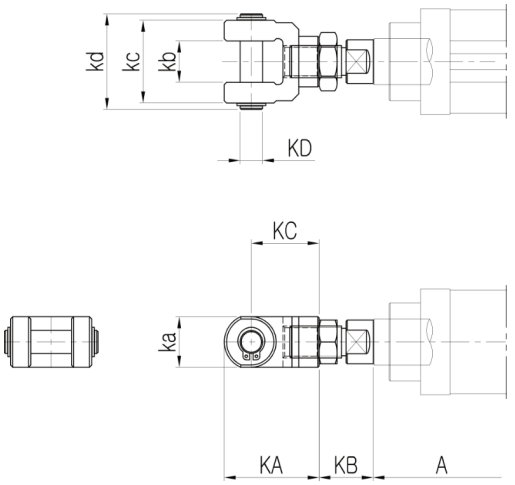
Female

ORDER CODE **F**



Knuckle joint

ORDER CODE **K**

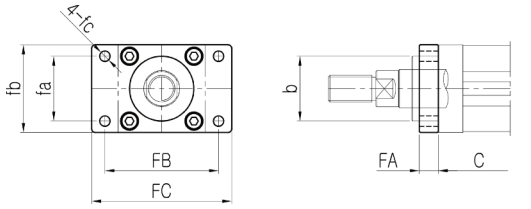


TYPE	MA	MB	MC	ma	mb	mc	fa	KA	KB	KC	KD(d9)	ka	kb	kc	kd
KEC45	25	12	8	M14x1.5	Ø19.6	22	M10x1.5 DP14	42	(24)	30	Ø10	22	18	36	41.6
KEC60	40	18	13	M22x1.5	Ø31	30	M14x2.0 DP20	71	(36)	50	Ø18	38	28	56	64
KEC80	50	25	16	M26x1.5	Ø35	41	M18x2.5 DP25	79	(50)	55	Ø22	44	32	64	72
KEC120	70	29	21	M36x1.5	Ø60	55	M24x3.0 DP40	144	(60)	110	Ø32	68	40	80	94.5
KEC140	100	40	27	M45x1.5	Ø80	70	M30x3.5 DP45	167.5	(97)	125	Ø40	92	50	100	115

Cylinder mount type (1)

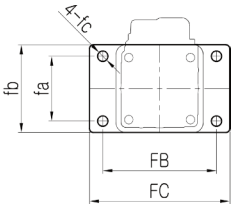
Shear flange

ORDER CODE **F**



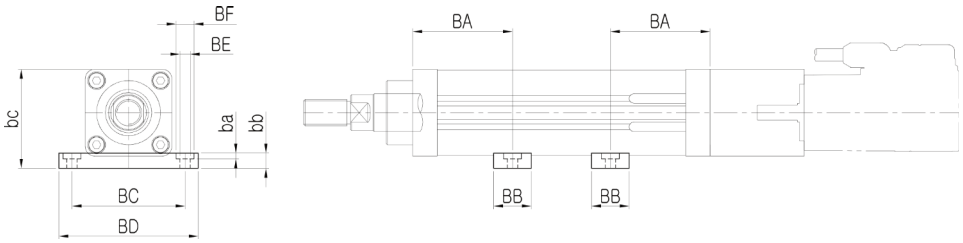
Rear end flange

ORDER CODE **R**



Bottom foot

ORDER CODE **B**



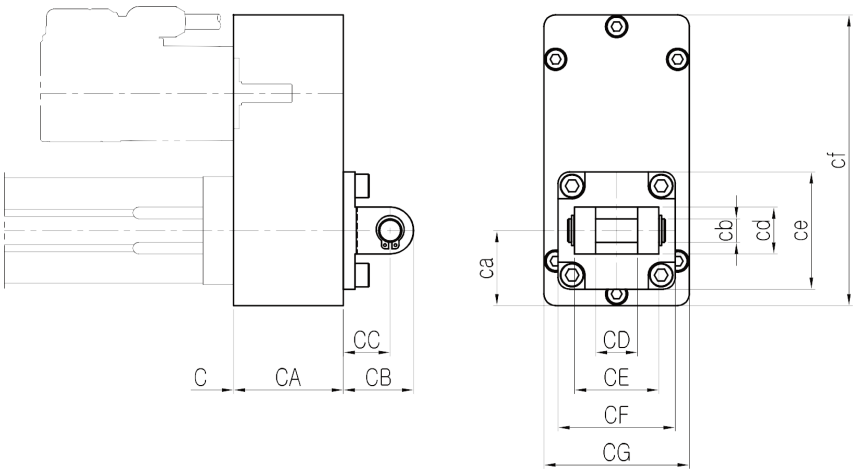
TYPE	FA	FB	FC	fa	fb	fc	RA	BA	BB	BD	BC	BE	BF	ba	bb	bc
KEC45	10	60	74	34	46	Ø5.5 THRU	13	53	20	74	60	Ø5.5 THRU	Ø9.5	3	8	52.5
KEC60	16	86	110	44	64	Ø9 THRU	18	68	28	110	86	Ø9 THRU	Ø14	4	12	74
KEC80	20	104	134	50	80	Ø11 THRU	25	85	42	128	104	Ø11 THRU	Ø17.5	6	16	93.5
KEC120	28	158	194	84	130	Ø16 THRU	82	120	46	184	148	Ø16 THRU	Ø23	15.2	28	151.5
KEC140	36	200	252	100	162	Ø20 THRU	100	157.5	50	245	210	Ø20 THRU	Ø29	19.5	36	189

Cylinder mount type (2)

ORDER CODE

C

Clevis



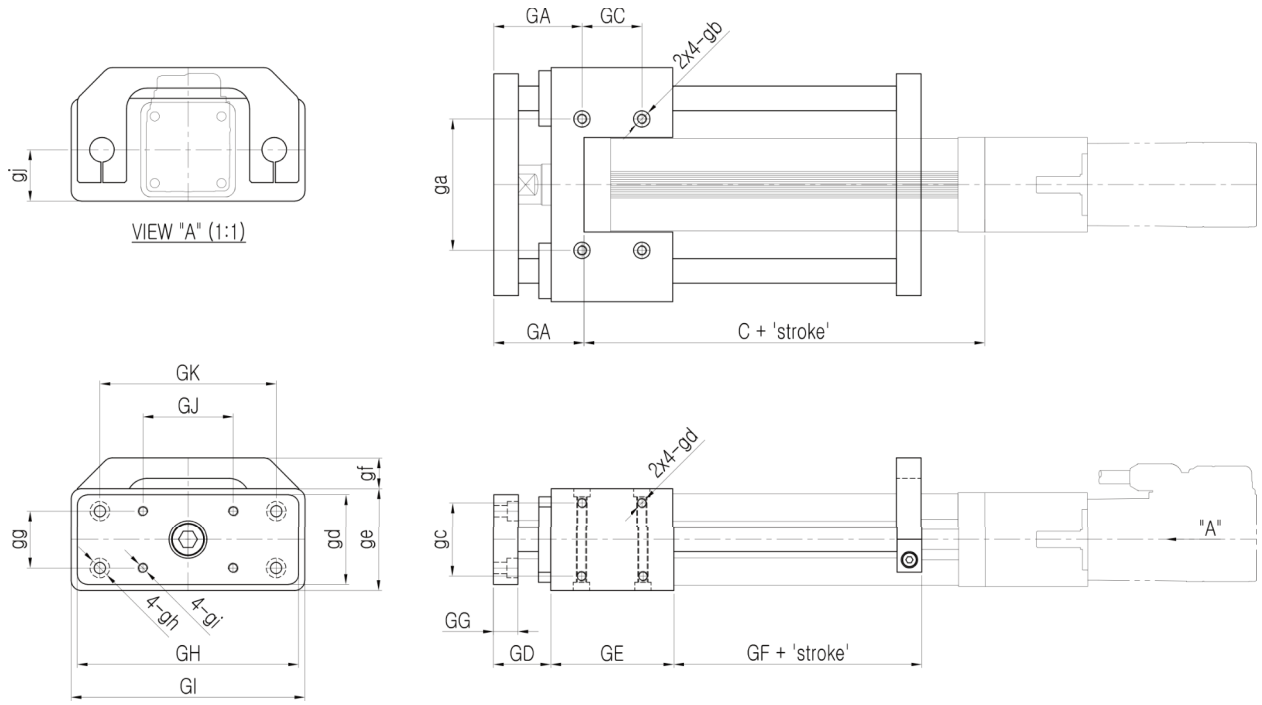
TYPE	CA	CB	CC	CD	CE	CF	CG	ca	cb(d9)	cd	ce	cf
KEC45	45	30	20	18	36	50	67	32	Ø10	20	50	127
KEC60	55	56	38	28	56	68	71	36.5	Ø18	36	68	154
KEC80	70	67	45	32	64	80	83	41.5	Ø22	44	80	178
KEC120	90	100	66	40	80	120	124	62	Ø32	68	120	259

Cylinder mount type (3)

ORDER CODE

G

With guide (ball bushing)

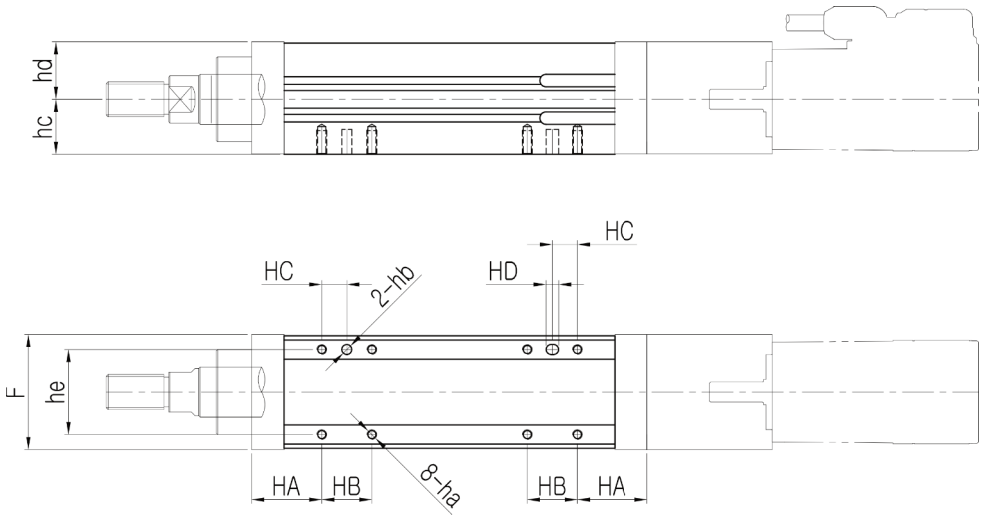


TYPE	GA	GC	GD	GE	GF	GG	GH	GI	GJ	GK	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj
KEC45	43	30	28	60	37	12	108	114	44	86	56	Ø8 DP4.4 M5 DP10 (Ø4.1 THRU)	36	44	50	15	28	Ø9.5 DP5.4 Ø5.5 THRU	M5 DP12	25
KEC60	58	50	38	90	50	20	154	162	60	120	78	Ø11 DP6.5 M8 DP16 (Ø6.8 THRU)	50	62	70	22	40	Ø14 DP8.6 Ø9 THRU	M8 DP20	35
KEC80	62	70	42	110	55	24	190	200	70	150	98	Ø14 DP8.6 M10 DP20 (Ø8.4 THRU)	60	74	84	28	48	Ø17.5 DP10.8 Ø11 THRU	M10 DP24	42

Cylinder mount type (4)

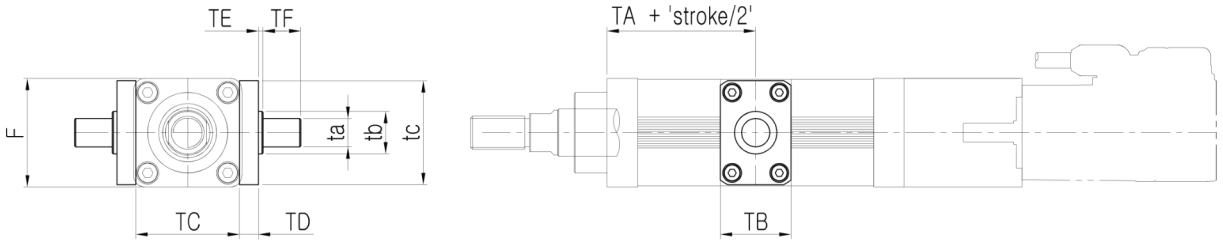
ORDER CODE **H**

Mounted on the bottom of the cylinder



ORDER CODE **T**

Trunnion



TYPE	HA	HB	HC	HD	ha	hb	hc	hd	he	TA	TB	TC	TD	TE	TF	ta(h7)	tb	tc
KEC45	48	20	10	5	M4 DP8	ø4 DP8	22	23	34	79	30	43	8	2	16	ø12	18	44
KEC60	61	30	15	7	M6 DP10	ø6 DP8	30.5	32	50	95.5	40	60	10	5	24	ø20	29	61
KEC80	75	40	20	10	M8 DP8	ø8 DP10	38	38.5	60	121	50	75	12	5	24	ø25	32	76
KEC120	147	60	30	14	M12 DP24	ø12 DP14	60	61	94	132	73	120	20	8	28	ø35	43	118

Design considerations 1

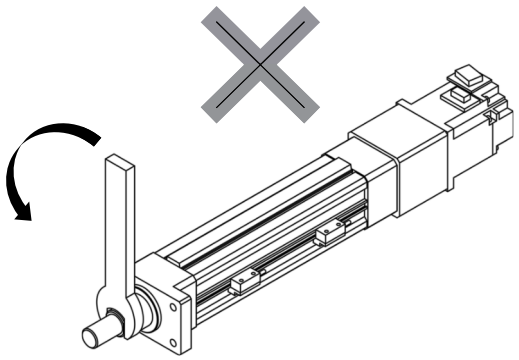
Design considerations

(1) Use the working load within the specified range.
Payload may vary depending on product size and screw specifications, and may fluctuate depending on speed.
In case of application of speed, payload and lateral load exceeding the standard, vibration may occur due to damage to screws and nuts.
This may cause deterioration of precision or noise, and may affect the operating life.
(2) Do not apply impact or impact lateral load during rod operation.
If an impact is applied, it may cause a failure or decrease in life due to damage to the screw nut and damage to the bearing.

Precautions for use

(1) The working load of the electric cylinder fluctuates depending on the speed and screw specifications.
Please refer to the product specification table and product performance curve table.
Also, if the motor capacity is smaller than the screw thrust, the thrust may fluctuate according to the motor capacity.
(2) Do not apply impact or impact lateral load during rod operation.
During jog operation and return to origin, be careful not to apply shock to the bearing and rod cover beyond the stroke limit.
Use a limit sensor if possible, and set the torque load factor of the origin mode to the minimum when returning to the damper origin.

Carelessness in items (1) and (2) may cause failure and reduced service life.
(3) When using the non-rotating rod type, be careful not to apply rotational torque to the rod.
The rod anti-rotation type is a mechanism to prevent the rod from rotating in a free state.
The anti-rotation mechanism may be damaged if a rotational torque or impact exceeding the specified value is applied.
(4) In the case of the non-rotating rod type, when attaching a metal fitting or a workpiece to the threaded part of the rod tip, use a spanner on the back side (socket) of the tip to prevent the rod from rotating.
If a rotational torque higher than the specified value is transmitted, the anti-rotation mechanism may be damaged, resulting in an increase in operating resistance or abnormal noise, which may cause a failure or decrease in life.



Design considerations 2

Design considerations

(5) Deflection occurs when the forward plate is installed horizontally
When the forward plate is installed horizontally, vibration and noise may occur due to deflection (L) of the product. Depending on the degree of deflection,
Accuracy may deteriorate and product life may be affected.
(6) In case a lateral load occurs on the cylinder rod, a separate guide must be installed to prevent the cylinder rod from transmitting any lateral load.
When a lateral load is applied, deformation of the rod can cause screw and nut damage, performance degradation, and abnormal noise, which can have a fatal effect on the service life.
(7) Adjust the acceleration/deceleration range during high-speed operation.
During high-speed operation (more than 2,000 rpm), vibration and noise may occur due to screw resonance depending on the lead value of the screw.
(8) When installing the product, make sure that the center of the rod and the center of the object match.
When assembling an electric cylinder, if the center of the rod operating range and the center of the workpiece are eccentric/deviated, it may cause product failure, and noise and motor load rate increase due to eccentricity/deviation.

maintenance check

(1) When performing maintenance on the product, perform safety measures such as power supply and work fixing.
Injury to the rotating body and personal injury due to the fall of the workpiece or instrument may occur.

(2) Execution of periodic maintenance inspection

(3) Other inspection items
In the case of parallel electric cylinders, precision deterioration and noise may occur due to belt tension and belt wear, so please check them frequently and replace the belt if necessary.

Maintenance cycle	Check list	
Frequently	Exterior	Scratches, rust, loose fixing bolts, condition of cables, wear, etc.
	Noise	Motor operation noise, ball screw operation noise, abnormal belt noise
6 months or 300km operation	Belt	Belt clearance, belt wear, etc.

Design considerations 3

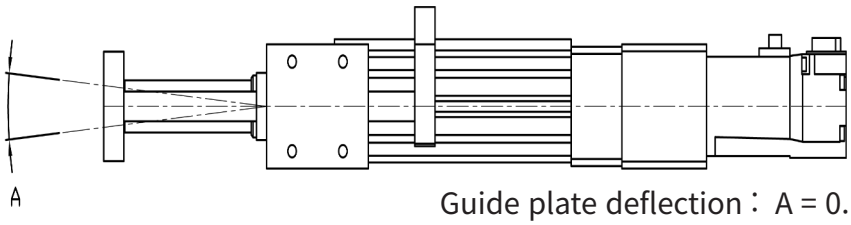
Considerations when designing an electric cylinder

■ Electric cylinders should be used only for simple thrust.
1) Since there is no LM or guide mechanism attached inside the electric cylinder, straightness and lateral load should not be depended on the electric cylinder.
2) Be sure to install LM or GUIDE on the work part at the end of the rod.
3) When used only as an electric cylinder, internal parts or mechanisms may be damaged due to rod deflection.

■ Resonance or noise may occur during high-speed operation.
1) The electric cylinder is a linear motion mechanism using the rotational force of the ball screw. Due to its internal structure, resonance or vibration noise may occur when the ball screw rotates at high speed.
2) If high-speed operation and environmental regulations are required, be sure to consult in advance.

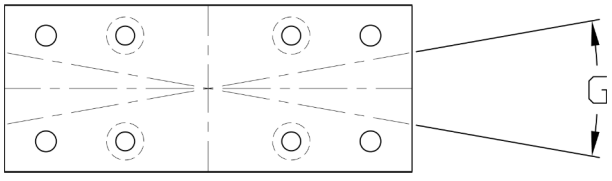
■ Precautions when selecting anti-rotation option
1) When selecting the anti-rotation option, a decrease in precision may occur depending on the rod clearance (rotation angle).
2) Since the anti-rotation mechanism is structured with keys and key grooves, variations in clearance may occur depending on clearance and usage conditions.
3) The anti-rotation mechanism is suitable for general purpose, not precision equipment, and it is desirable to select the guide option when used for precision equipment.

■ Things to keep in mind when selecting a guide option
1) Guide plate deflection



Guide plate deflection : A = 0.15°

2) Guide plate non-rotation accuracy



Guide plate non-rotation accuracy : G = ±0.1°

3) Allowable rotational moment of guide plate

Model	Rotational moment (Nm)
KEC 45	0.5
KEC 60	1
KEC 80	1.5
KEC 120	4

Check if the electric cylinder is broken

■ In case of abnormal noise
1) Check if the center of the electric cylinder and the center of the workpiece assembly match.
(If the centers do not match, noise inside the electric cylinder may occur due to ball screw bending)
2) When assembling the electric cylinder rod, assemble it with the workpiece in the backward state as much as possible, and check that the center of the electric cylinder and the center of the rod maintain a straight line when moving forward.

■ When the position value fluctuates more than 1mm
1) Check for loosening of the rod end.
2) When a rod free rotation type is selected, if a joint is installed at the end of the rod, the position value may fluctuate as the rod rotates freely.
(The rod free rotation type must be fixed so that the rod does not rotate)

■ Electric cylinder cannot operate
1) Check motor overload. Check the motor load ratio on the motor driver when driving the motor. (Normal: less than 100%)
2) Check the assembly state of the coupling between the motor and electric cylinder. In case of parallel connection, remove the pulley cover and check the state of the pulley.
3) Check whether the ball screw is damaged due to collision during trial operation

■ Occurrence of auto switch malfunction or signal failure
1) When the auto switch is energized, the energized current on the output side must be less than 50mA.
2) Check if noise or magnetic field is formed in the operating environment.
(cause of malfunction)
3) If the auto switch lead wire is long (more than 5m), install a filter, etc.

■ Repeatable displacement generation
1) Check the deflection and vibration when the electric cylinder is installed horizontally.
(Repeatability is displaced by vibration and inertia when long stroke is operated at high speed)
2) Check if noise or magnetic field is formed in the operating environment.
(cause of malfunction)

Auto switch reference 1

Auto switch technical terms

■ Switch sensing distance

When the magnet moves, it refers to the distance traveled from when the switch is turned ON to when it is turned OFF.

Or, when a switch is moved near a fixed magnet, it refers to the period from when the switch is turned on to when it is turned off.

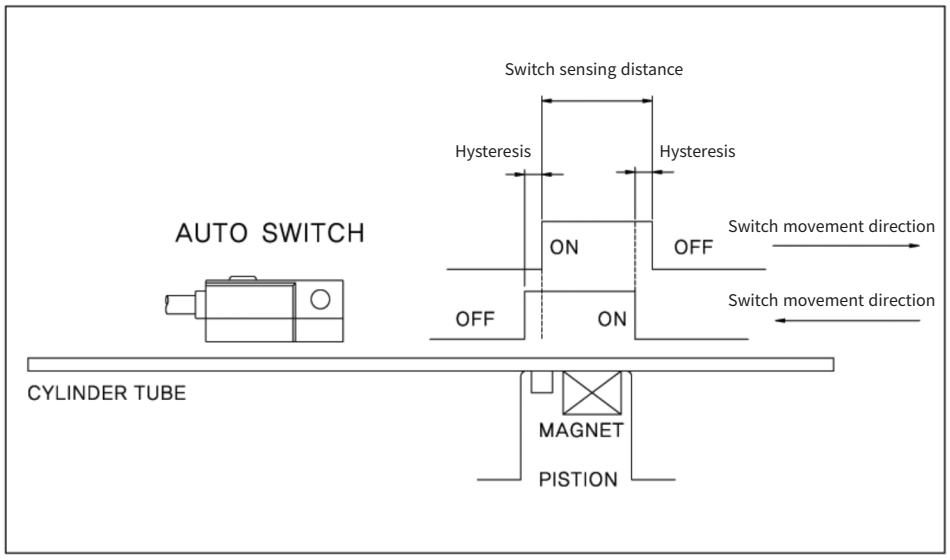
The sensing distance of the switch is determined by the amount of Gauss of the magnet detected on the surface of the cylinder, so it varies depending on the type of cylinder and usually falls within the following range

* NPN non-contact 3-wire auto switch : 4mm~7mm Hysteresis

The distance from the position where the auto switch turns ON to the position where it turns OFF by moving the switch is called the sensing distance, and the distance from the point where the switch turns ON by moving in the opposite direction from the OFF state is called hysteresis.

The hysteresis distance varies slightly depending on the type of switch, but usually falls within the following range.

* Auto switch: 2mm or less



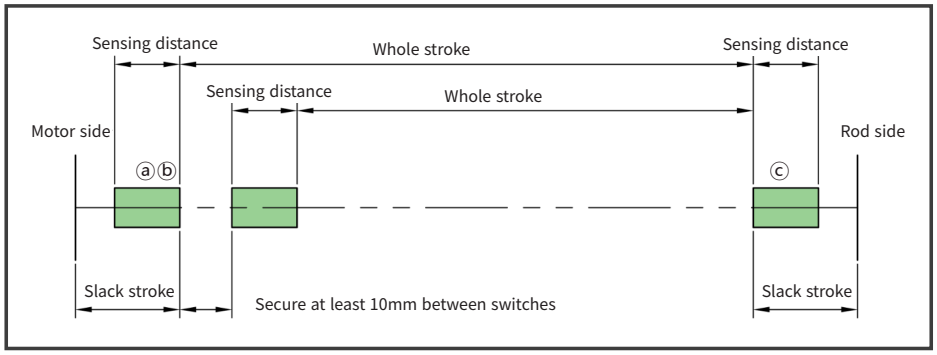
■ Motion Gauss domain

The operating area of the switch is indicated by the strength of the magnetic field. The strength of the magnetic field is called magnetic flux density, and Gauss or Tesla is used as a unit. It is mainly used to indicate a strong magnetic field, and G is used to indicate a weak magnetic field.

Normally, the lowest detection Gauss region and the highest detection Gauss region are set separately so that the switch can operate stably, and these are collectively called the operating Gauss region.

In addition, since the operation Gauss range differs slightly by distinguishing the switches combined by cylinder type, a separate review is required for mixed use other than the specified product.

Auto switch reference 2



■ Attachment order

1) Motor-side limit switch setting
Jog the rod to the motor side, stop it at the damper clearance stroke point, attach a switch, detect the sensing position while moving in the rod side direction, and then fix it.
* Default setting at the time of shipment.

2) Switch setting for start
Users are requested to fix it in an arbitrary location.
At least 10mm must be secured between the sensors.

3) Load-side limit switch setting
Jog the rod to the rod side, stop it at the damper clearance stroke point, attach a switch, detect the sensing position while moving in the motor side direction, and then fix it.
* Default setting at the time of shipment.

One side clearance stroke	
Model	mm
KEC45 / KEC60 / KEC80	5
KEC120 / KEC140	10

Appendix
Glossary of electrical terms

■ Operating voltage
Auto switch is a position detection sensor that detects the moving magnet inside the electric cylinder.
The operating voltage is the voltage that can be applied to the auto switch. It refers to the voltage applied to the auto switch power terminal.

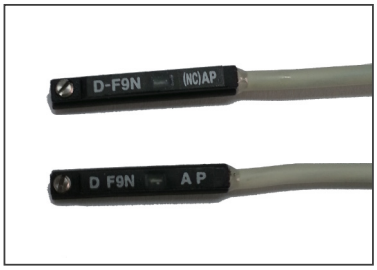
■ Current used
Operating current refers to the maximum current that can flow through an auto switch.
If more current than the specified value is passed, the auto switch is damaged, and if less current is passed, it does not operate.

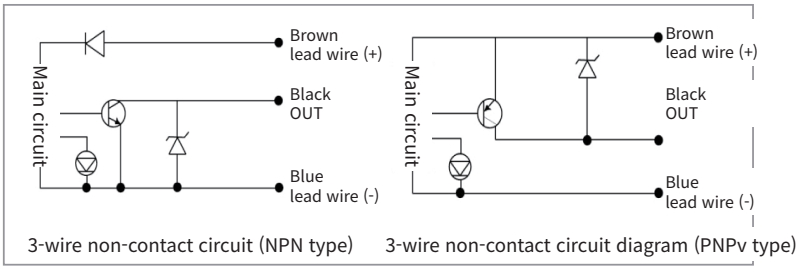
■ Strengthen internal load voltage
Internal voltage drop refers to the voltage across the auto switch lead wire when the auto switch is in the ON state.
If the auto switch is composed of multiple AND circuits, the load may not operate due to internal voltage drop.
In the OR circuit, the internal voltage drop does not occur depending on the number of auto switches, and only one internal voltage drop occurs, so it is okay to connect multiple switches.

■ Current consumption
This refers to the current consumed by the switch itself when the auto switch is in the ON state.
If DC24V is 3A, about 300 auto switches can be used at the input.

Auto switch reference 3

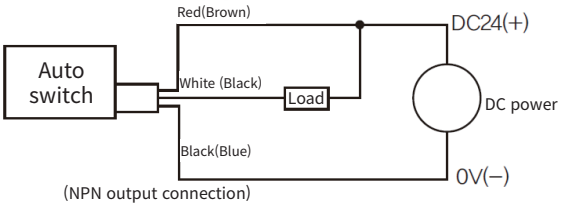
■ Auto switch internal circuit diagram



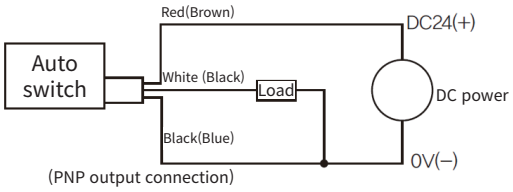


3-wire non-contact circuit (NPN type)　3-wire non-contact circuit diagram (PNPv type)

■ Auto switch



(NPN output connection)



(PNP output connection)

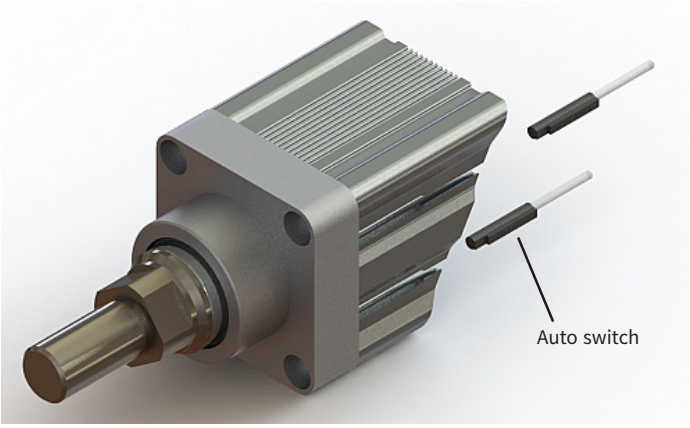
Caution　The energized current inside the auto switch must be 50 mA or less in any case. (Auto switch malfunction and damage)

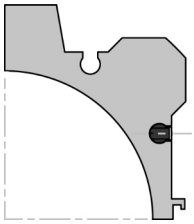
■ Auto switch specifications

Type	N/O (D-F9N-AP)	N/C (D-F9N-(N/C)AP)	PNP (D-F9N-AP)
Wiring & output method	NPN non-contact 3-wire (Normal Open)	NPN non-contact 3-wire (Normal Closed)	PNP non-contact 3-wire (Normal Open)
SIZE	Outer diameter DIA. 4		
Purpose	Relay, sequence controller		
Load voltage	DC 24V		
Load current	50 mA or less		
Contact protection circuit	Included		
Lead wire direction	Horizontal		
Indicator LAMP	Green LEAD on	Red LEAD on	
Attachment	Fix screw on S/W		
Internal voltage drop	1.5V or less		
Leakage current	50 mA or less		
Consumption current	5mA or less		
Operation time	1.2ms or less		
Lead wire	Oil resistant vinyl cabtyre cord		
Shock resistance	30G		
Insulation resistance	Over 50MΩ at DC500V		
Withstand voltage	AC1500V for 1 minute		
Ambient temperature	-10 ~ 60°C		

Auto switch reference 4

■ Switch components and mounting methods





■ Switch mounting precautions

1) When installing the switch
When installing multiple switches, consider maintaining the distance between switches. (Refer to “Product Handling Precautions”)
If the switch is installed within the switch detection range, the detection signal may be duplicated and a control error may occur.
2) When the switch is fixed
When assembling the switch fixing screw, the screw thread is damaged due to excessive force or the position is changed during operation due to weak tightening.
There is a risk of failure and damage to the electric cylinder due to shock at the end of the rod and position control error.
3) Precautions for handling the switch
Be careful of external shocks.
Operational errors may occur due to damage to the internal circuit of the sensor due to dropping or external impact during handling.

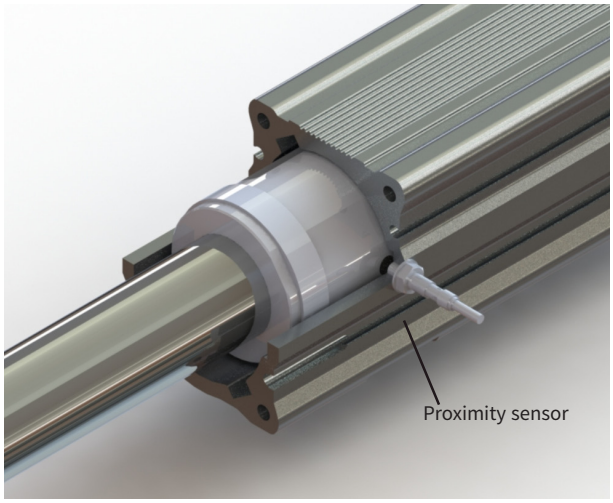
Proximity sensor resources 1

■ Proximity sensor specifications

Type	N/O (E2E-S05S12-C1)	N/C (E2E-S05S12-C2)	PNP (E2E-S05S12-B1)
Wiring & output method	NPN type 3-wire (Normal Open)	NPN type 3-wire (Normal Closed)	PNP type 3-wire (Normal Open)
SIZE	M5 X 0.5 pich		
Detect object	Magnetic metal		
Power supply voltage	DC 10 ~ 30V		
Consumption current	10mA or less		
Protection circuit	Power reverse connection protection, surge absorption, load short circuit protection, output reverse connection protection		
Ambient temperature range	Operation, storage: each -25 ~ +70°C		
Ambient humidity range	Operation, Storage: 35 ~ 95% RH each		

Proximity sensor resources 2

■ How to mount the sensor



Electric cylinder related technical data 1

Electric cylinder selection formula

■ Motor rated torque (Nm) formula

$$\text{Rated motor torque (Nm)} = \frac{\text{Applied load (N) x Ball screw lead (m)}}{\text{2 x 3.14 x Efficiency (0.5)}} \;/\; \text{Reducer ratio}$$

■ Electric cylinder thrust (N) formula

$$\text{Electric cylinder thrust (N)} = \frac{\text{Rated Motor Torque (Nm)}}{\text{Ball screw lead (m)}} \text{ x2 x3.14 x Efficiency (0.5) x Reducer ratio}$$

■ Speed (mm/s) formula

$$\text{Speed (mm/s)} = \frac{\text{Motor rotation speed (rpm) x Ball screw lead (mm)}}{60}$$

Electric cylinder technical data 2

How to inject grease

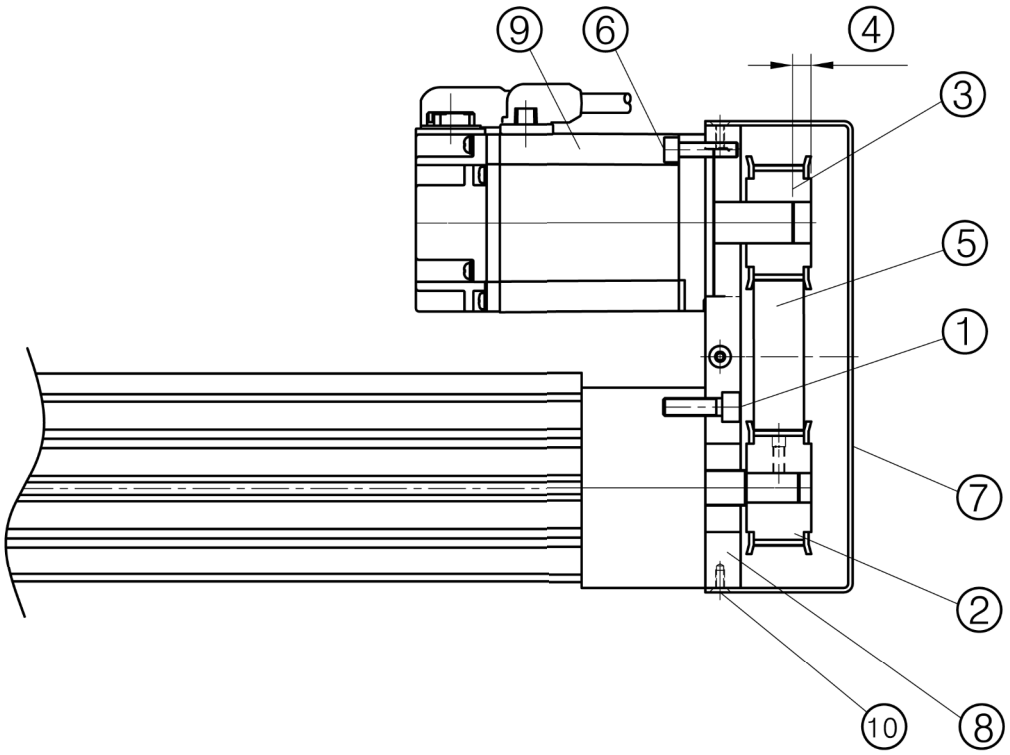
■ Due to the sealed structure, the electric cylinder does not have a grease injection pipe installed.
It is used semi-permanently with sufficient application amount at the time of shipment.
If you want to inject additional grease during use, you must order a special product equipped with a nipple.

■ Grease type

Type	Base oil	Thickener	Product name	Manufacturer
General	High quality synthetic oil	Lithium based	LGEP	SKF
Clean	High quality synthetic oil	AFE-CA	AFF	THK

Electric cylinder technical data 1

How to assemble a parallel motor



■ Assembly sequence

1) Apply loctite to the ① bolts for the ⑧ motor bracket and assemble them temporarily (⑧ the motor bracket must move up and down).

2) ② Assemble the body-side pulley (set screw) and assemble the ⑨ motor and ③ motor pulley according to ④ the clearance.

3) Insert ⑨③ with ⑤ belt and fasten ⑥ bolt.

4) After properly adjusting the belt tension, fully tighten the ① bolt.

Caution Check that the bolts are fully tightened.

Electric cylinder technical data 2

■ Ball screw life

When the ball screw moves while receiving an external load, continuous cyclic stress acts on the raceway or balls, so when the limit is reached, the raceway is fatigue-damaged and part of the surface peels off in a scale-like pattern.
This is called flaking.
The service life of a ball screw refers to the total number of revolutions until the first flaking of the raceway or balls occurs due to rolling fatigue of the material.
The service life of a ball screw shows a big difference even if it is manufactured in the same way and used under the same operating conditions.
For this reason, the nominal life defined as follows is used as a criterion for determining the service life of the Ball Screw.
Nominal life refers to the total number of revolutions that 90% of the Ball Screws can achieve without causing flaking when they are individually operated under the same conditions.

■ Calculation of nominal life

The rated life of the Ball Screw is obtained from the following equation (1) using the basic dynamic load rating (Ca) and the applied axial load.

> Nominal life (total revolutions)

$$L=\left(\frac{Ca}{fw\ xF\ a}\right)^3 X1\ 0^6 \quad \cdots\cdots \quad (1\ )$$

L : Nominal life (total revolutions) (rev)
Ca : Basic dynamic load rating (N)
Fe : Applied axial load (N)
fw : Load factor (see Table 1)

Vibration / shock	speed (V)	fw
Slightness	In case of slowness	1.2
	V ≤ 0.25 m/s	
Low	In case of low speed	1.5
	0.25 < V ≤ 1 m/s	
Medium	In case of medium speed	2
	1 < V ≤ 2 m/s	
High	In case of high speed	3.5
	V > 2 m/s	

* The basic dynamic load rating (Ca) is used to calculate the service life of the Ball Screw when it operates under a load.
The basic dynamic load rating refers to a load that does not fluctuate in direction and size, and the rated life is L=10 rotations when the same Ball Screw is operated individually.
(Basic dynamic load rating is listed in “Continuous feed load” in “Specification table”.

* The rated life is calculated by calculating the load on the premise that good lubrication is ensured and assembly is performed under ideal mounting conditions. Deformation of the mounting part (alignment, etc.) may affect the service life.

Electric cylinder technical data 3

■ Life time

When the number of revolutions per minute is determined, the life time is obtained by the following equation (2) using the nominal life (L).

$$Lh = \left(\frac{}{} \right) = \frac{Lx \cdot ph}{xn \cdot ls} \quad \cdots\cdots \cdot (2)$$

L : life time (h)
N : RPM (min-1)
n : Round trips per minute (min-1)
ph : Ball screw lead (mm)
ls : Stroke length (mm)

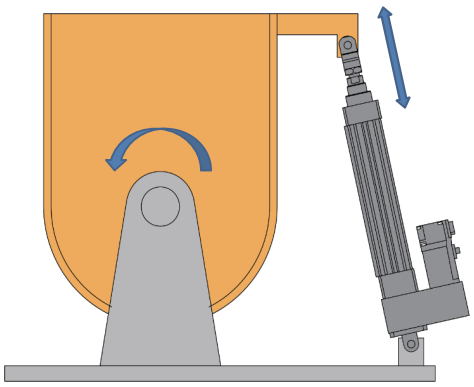
■ Mileage life

The mileage life is obtained by the following equation (3) using the rated life (L) and the ball screw lead.

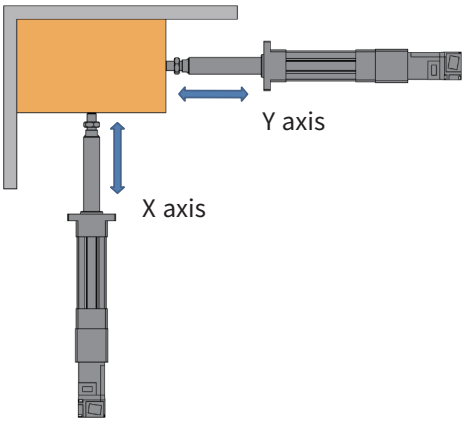
$$Ls = \left(\frac{Lx}{Ph} \right) \quad \cdots\cdots \quad (3)$$

Ls : 10^6 Mileage life (km)
Ph : Ball screw lead (mm)

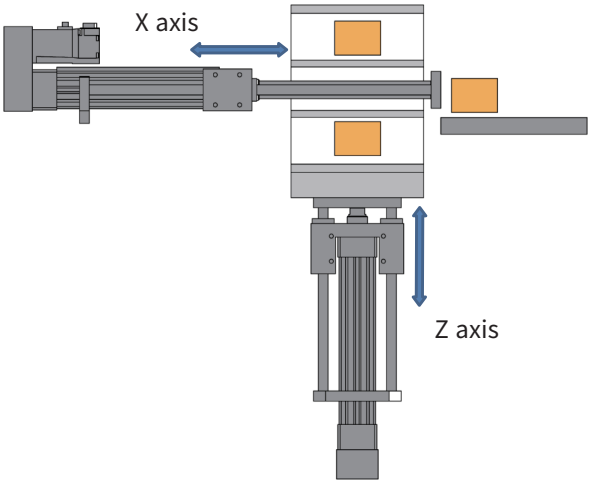
Application example 1



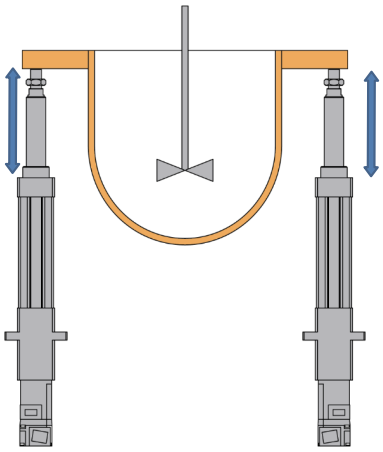
■ Mixing container: applied electric cylinder for tilting



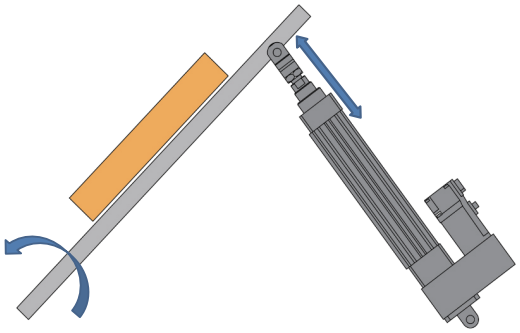
■ Centering : Application of X, Y axis electric cylinder



■ Cassette logistics: Z-axis position control and X-axis
Application of electric cylinder for discharge

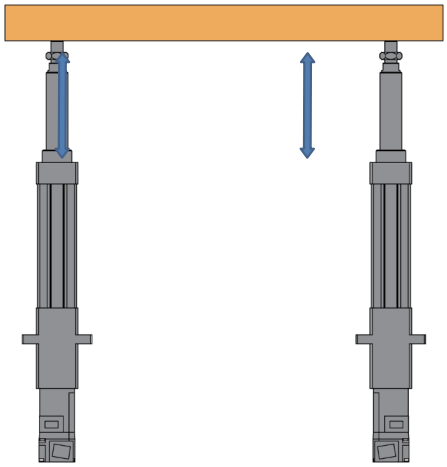


■ Industrial Mixer:
Application of electric cylinder for vertical mixing

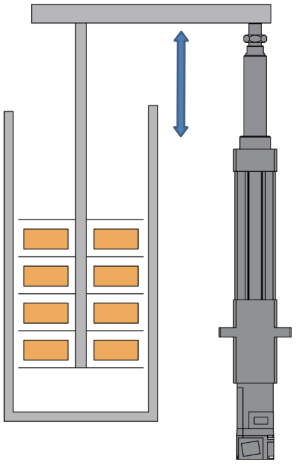


■ FPD inspection machine:
angle adjustment with electric cylinder for tilting

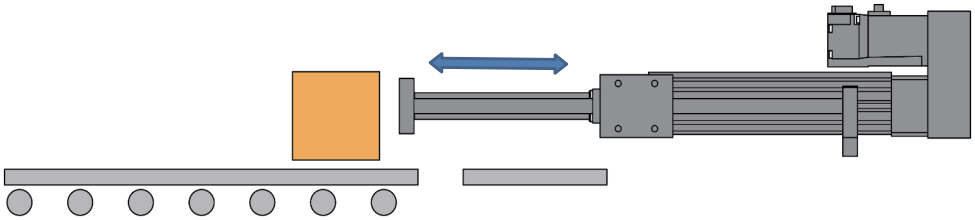
Application example 2



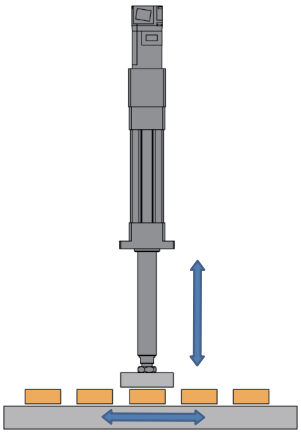
■ For horizontal control:
Adjusting the parallelism of workpieces with an electric cylinder



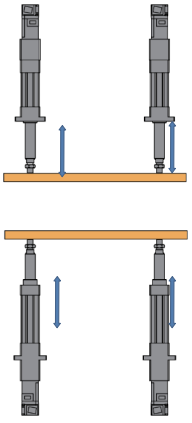
■ Dyeing/Painting Equipment:
Position Control of Electric Cylinder Vertical Use



■ Logistics line:
Application of electric cylinders for changing distribution lines or indexing

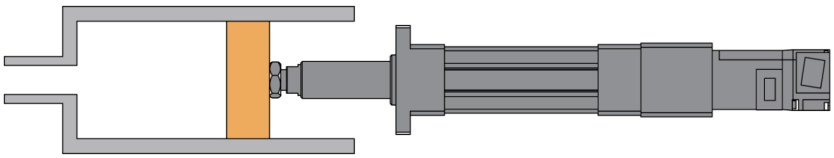


■ Small press and printing equipment:
Z-axis electric cylinder application

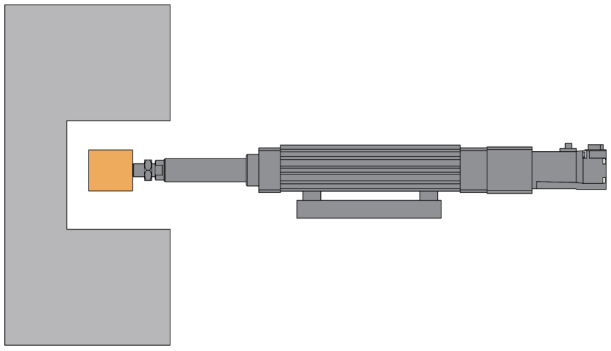


■ Press Crimping:
Application of electric cylinder such as ultrasonic welding machine

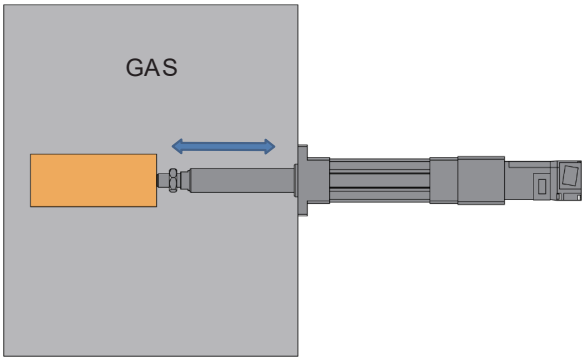
Application example 3



■ Applied electric cylinder for constant dispensing for food, cosmetics and chemicals

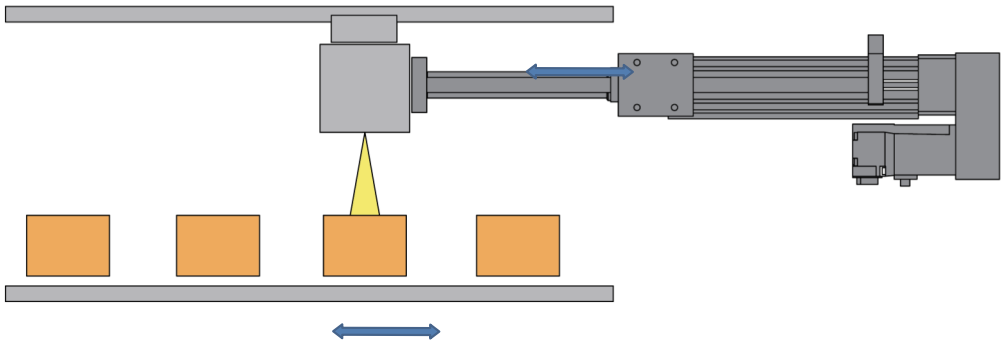


■ Machine center or high frequency heat treatment, etc. :
Application of electric cylinder for automatic loader / unloader

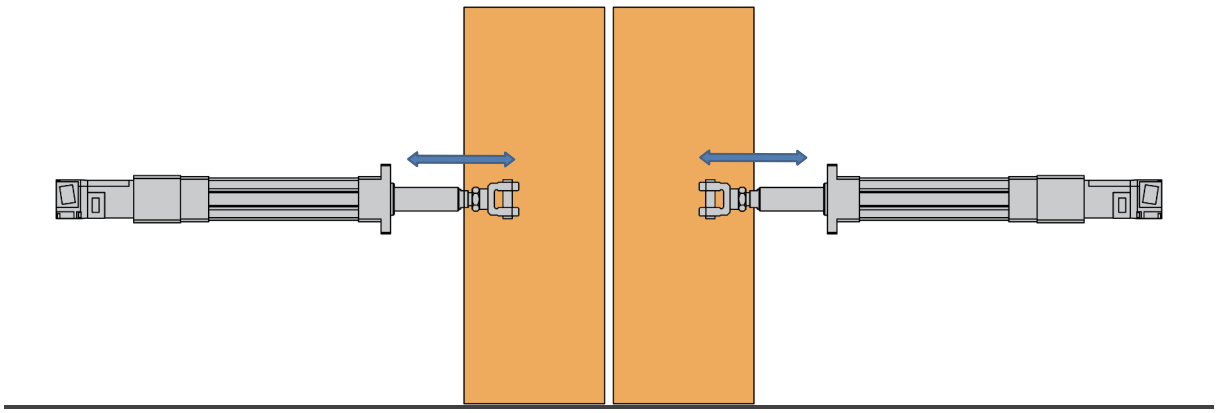


■ Work in the gas chamber:
Electric cylinder body is installed outside and only the rod is introduced into the room.

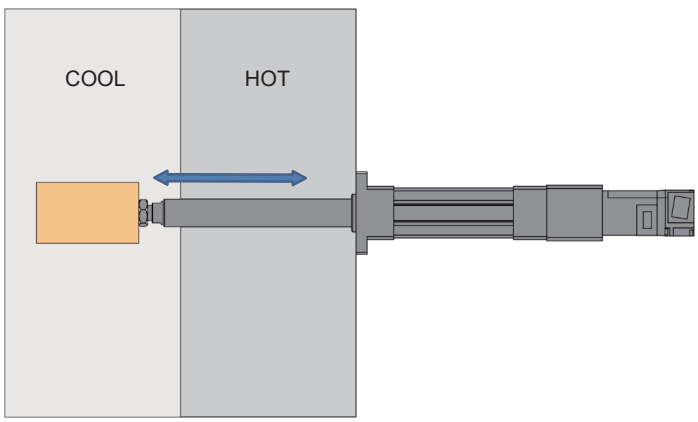
Application example 4



■ Laser printer and vision inspection equipment:
Application of electric cylinder using LM guide



■ Explosion-proof or remote door equipment:
Application of electric cylinder for automatic opening and closing



■ Experiment and reliability test equipment:
Application of electric cylinder for shuttle transfer between chambers