

Electric actuator KBZ series

KBZ SERIES

Performs high-precision locating
and allows combination
with KBB series!



Performs high-precision locating

Electric actuator

KBZ Series

Short cycle time

Operates at the maximum of 1000 mm/s.
(For limited stroke and load capacity. Contact our sales representative for details.)

Servo motor

A servo motor for a compact axis to allow high-speed operation, quick acceleration and deceleration, and high load capacity.

Absolute position system

No need for return-to-home routines.

Compact controller

Uncompromised downsizing and cost reduction.



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Axis features

- Resolver as a motor sensor
A brushless resolver serves as a motor sensor. It has excellent environmental durability (against high and low temperatures, vibrations, and physical shocks).
- Compact and high power servo motor
A compact servo motor allows high-speed operation, quick acceleration and deceleration, and high load capacity.
- Absolute position system
No need for time-consuming return-to-home routines; equipment start-up time can be shortened.
- 3 model types
Slider, table, and rod type axes are available.

Controller features

- Compact
It is as compact as 31 (W) x 146 (H) x 89 (D) mm (excluding screw heads).
- 24VDC power supply
Both the control and drive power supplies are 24VDC.
- Brake release switch as standard equipment
A brake release switch is provided on the front side of the controller.

Master controller

- Exclusive for a single axis
A controller and driver designed exclusively for a single axis.
- No programming required
Only parameter and table settings are required for execution of a desired operation.
- Torque control function as a standard feature; perfect for workpiece pushing operation
A robot can replace an air cylinder for workpiece pushing operations.
- Area entry signal output function as a standard feature
The output signal can be turned on or off while the axis is in motion.
- Acceleration and deceleration settings
Acceleration and deceleration can be set separately.

Slave controller

- A driver for controlling multiple axes; to be used in combination with a KBB series product
Connect to a KBB series product for controlling multiple axes.

Easy-to-select sets

This catalog introduces sets of products including an axis, controller, and controller cable. Products can also be selected individually from corresponding pages.

Performance

Easier to use with new functions!

Suitable for operations requiring high-precision positioning.

Realizes improvement in machining quality.

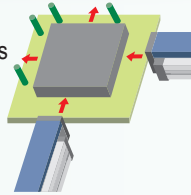


■ Application 1
Workpiece (pin) insertion

■ Advantage
Its high positioning accuracy allows to position an insert point more accurately (thereby resulting in stable products).

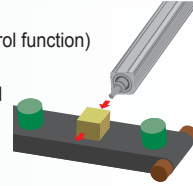
Introducing the new controller KCA-01 with brand-new features

Torque control function, area entry signal output, individual acceleration and deceleration settings



■ Application 1
Pushing of a workpiece (torque control function)

■ Advantage
Pushing force can be easily adjusted to prevent workpiece damage.
* The master controller offers this function.

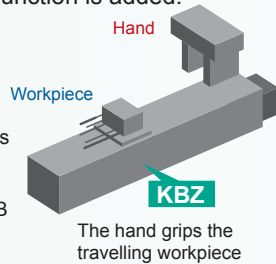


■ Application 2
Pushing and transportation of a workpiece while a robot is travelling (area entry signal output)

■ Advantage
Area entry signal output while a robot is travelling allows controlling of peripheral devices and hence improvement of cycle time.

Smaller than the conventional KBB series. Area entry signal output function is added.

- Lower cost
- Smaller controller
- An easy-to-use 24VDC controller
- Offers almost the same axis shape as the compact axis of the KBB series
- Can be controlled by a KBB product
- Improved user-friendliness with the new feature: area entry signal output

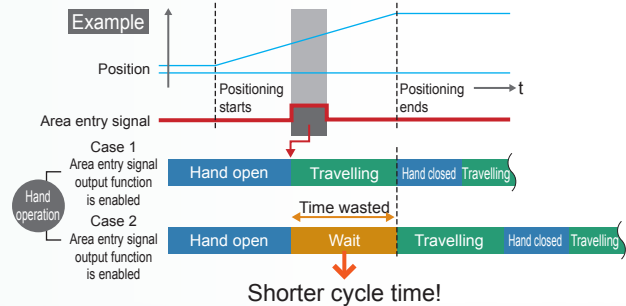


The hand grips the travelling workpiece

New

What is the area entry signal output function?

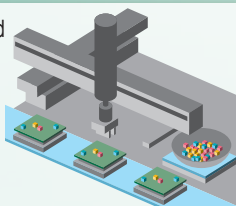
An I/O signal to indicate that a slider (or a rod) has entered a specified location (area).



More scalable and easier to use when used in combination with a KBB series product!

Improved scalability when used with a KBB series product

Improved scalability allows axis combinations such as X-Y, Y-Z, and X-Y-Z.



■ Application 1
KBZ can be applied to Z-axis of two X-Y axes

■ Advantage
Improved positioning accuracy and shorter cycle time



■ Application 2
Combination with a previous series (KBB) product

■ Advantage
Current development environment can be used as it is.

Example

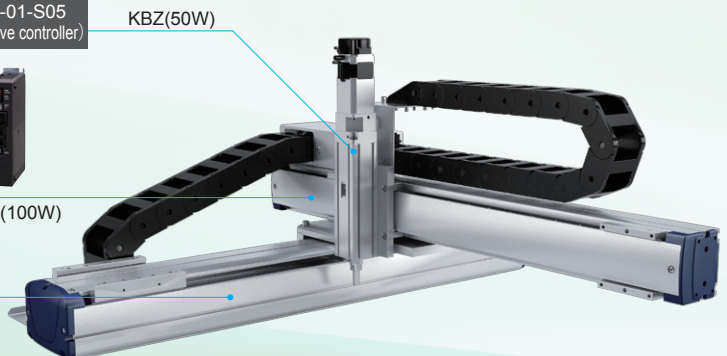
Controllers

KCA-20-M00 (High-function master controller) + KCA-20-S10 (100W/200W slave controller) + KCA-20-S10 (100W/200W slave controller) + KCA-01-S05 (KBZ slave controller)



KBB-10E(100W)

KBB-30F(200W)



KBB Series

Product lineup

[Single axis]

Catalog No.: CC-783A

Ball screw drive

KBB-10

Stroke: 100 to 1050 mm

Max. load capacity: 15 to 50 kg (horizontal)

Motor: 100 W



Ball screw drive

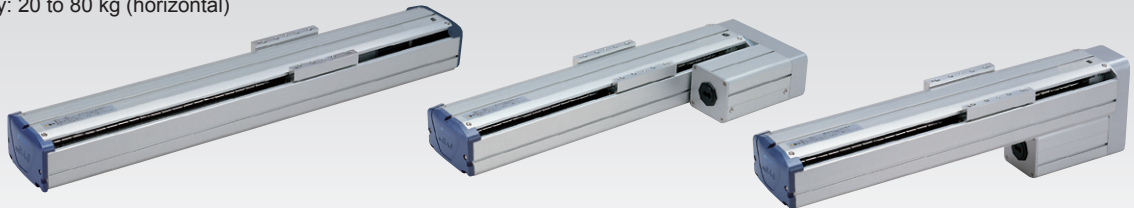
KBB-30

Stroke: 100 to 1050 mm

Max. load capacity: 20 to 80 kg (horizontal)

Motor: 100 W

200 W



Ball screw drive

KBB-50

Stroke: 200 to 1500 mm

Max. load capacity: 60 to 150 kg (horizontal)

Motor: 200 W

400 W



Timing belt drive

Stroke: 100 to 2500 mm

Max. load capacity: 10 to 40 kg (horizontal)

Motor: 100 W

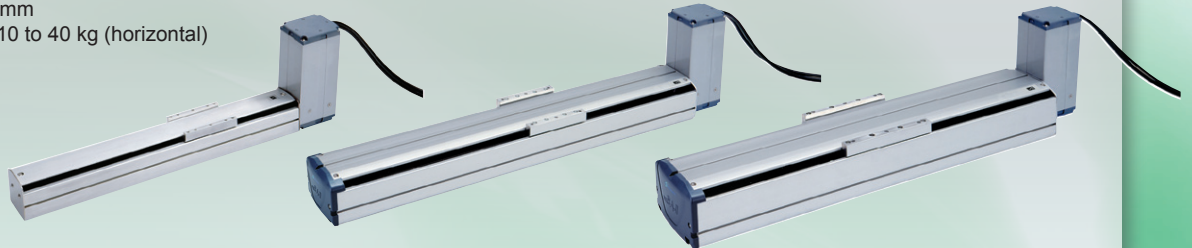
200 W

400 W

KBB-10

KBB-30

KBB-50



R axis

KBB-00D-RH

Rotation range: 360 degrees

Max. load capacity: 5 kg

Motor: 50 W

Harmonic drive



KBB-00D-RP

Rotation range: 360 degrees

Max. load capacity: 10 kg

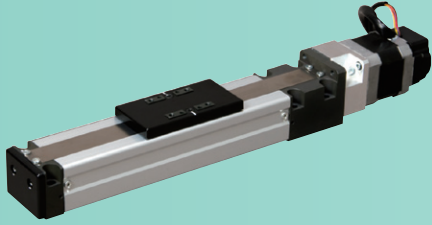
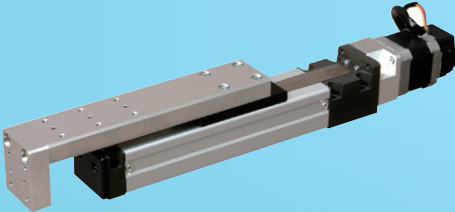
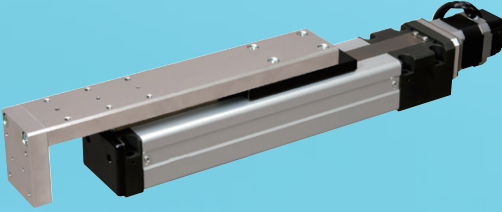
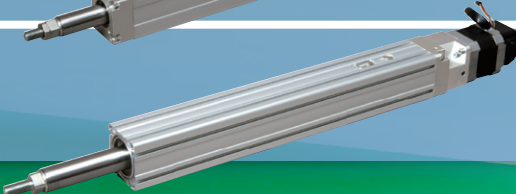
Motor: 50 W

Planetary gear



Specifications

Selection guide

	Model	Photo	Stroke (mm)
Slider Type	KBZ-5D		50 to 500 (in 50 mm increments)
	KBZ-7D		50 to 600 (in 50 mm increments) 700
Table Type	KBZ-5D		50 to 100 (in 50 mm increments)
	KBZ-7D		50 to 150 (in 50 mm increments)
Rod Type	KBZ-3D		50 to 150 (in 50 mm increments)
	KBZ-4D		50 to 200 (in 50 mm increments)



Lead (mm)

Maximum speed (mm/s)

Maximum load capacity (kg)

P2

P3

P4

P5

P6

P7

12

800



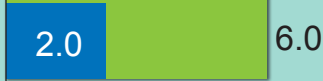
6

400



12

800



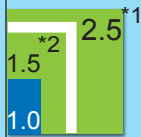
6

400



12

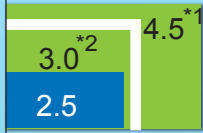
800



*1: Stroke is 50 mm or less
 *2: Stroke range is between 51 mm and 100 mm

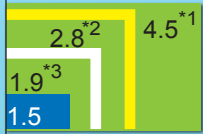
6

400



12

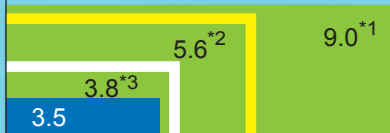
800



*1: Stroke is 50 mm or less
 *2: Stroke range is between 51 mm and 100 mm
 *3: Stroke range is between 101 mm and 150 mm

6

400



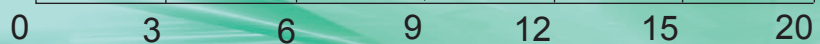
12

600



12

600





Safety precautions

Always read this section before starting use.

When designing and manufacturing devices using electric actuator, the manufacturer has an obligation to manufacture a safe device, and to check that the safety of the device's mechanical mechanism and the system operated by the electrical control that controls the device is secured.

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.

Observe warnings and precautions to ensure device safety.

Check that device safety is ensured, and manufacture a safe device.



WARNING

- 1** This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience in handling.
- 2** Use within the product's specification range.
This product must be used within its stated specifications. Do not attempt to modify or additionally machine the product.
This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.
(Note that this product can be used when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)
 - 1** Use for special applications including nuclear energy, railway, aircraft, marine vessel, vehicle, medical equipment, equipment, or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
 - 2** Use for applications where life or assets could be adversely affected, and special safety measures are required.
- 3** Observe corporate standards and regulations, etc., related to the safety of device design.
- 4** Do not remove devices until safety is confirmed.
 - 1** Inspect and service the machine and devices after securing the safety of all the systems related to this product.
 - 2** Exercise caution as high temperature and charged parts can be present even when operation is stopped.
 - 3** Before starting device inspection or maintenance, turn off the device power and other powers to related devices, release compressed air in the system, and check leakage current.
- 5** Observe warnings and cautions in the instruction manual of each product.
 - 1** Provide a safeguard to prevent entry to the movable scope of electric actuator.
In case of emergency, connect the controller's emergency stop push button switch and install it in a place facilitating operation.
Be sure that the emergency stop push button has a structure which will not allow automatic restoration or unsafe restoration by operator.
 - 2** Use the shaft with a built-in brake when the shaft is not installed horizontally.
If the servomotor is turned off (including emergency stop or alarm) or brakes are turned off, the actuator may fall and cause injury.
 - 3** Unexpected movement may occur during robot teaching or test operation, so keep hands, etc., away from the actuator. When conducting operation with the shaft not visible, be sure before starting operation that safety is ensured even if the actuator moves.
 - 4** The shaft with a built-in brake cannot completely clamp the actuator in all cases. When the slider is moved with unbalanced load during maintenance or the machine is stopped for a long time, it may not be sufficient to stop the shaft with the brakes alone for ensuring safety. Be sure that the equipment is in a balanced state or provide a mechanical locking mechanism.
 - 5** It may take several seconds to stop in an emergency, depending on rotation speed and load.
- 6** To prevent electric shock, observe warnings and cautions.
 - 1** Do not touch the heat sink, cement resistor and motor installed in the controller.
Failure to do so may cause burn because these parts are hot. Take sufficient time before conducting inspection and other operations.
Even immediately after the power is turned off, a high voltage is applied until the electric charge accumulated in the internal capacitor is discharged. Wait three minutes or so after turning the power off before touching these parts.
 - 2** Turn off the controller power source before conducting maintenance or inspection.
Electric shocks from high voltage may occur.
 - 3** Do not connect or disconnect connectors while power is on. Misoperation, faults, or electrical shock may occur.
- 7** Before restarting a machine or system, check that measures are taken so that parts do not come off.

8 Set up the overcurrent protection device.


In carrying out wiring to the controller, install over-current protective devices (such as wiring breaker and circuit protector) to the primary power supply for power (terminal block number L1, L2 and L3) and control (connector number CN3-24VDC) in accordance with "JIS B 9960-1:2008 Safety of machinery - Electrical equipment of machines - Part 1: General requirements".


(Excerpt from JIS B9960-1 7.2.1 General Requirements)


Overcurrent protection shall be provided where the current in a machine circuit can exceed either the rating of any component or the allowable current-carrying capacity of the conductors, whichever is the lesser value. The ratings or settings to be selected are specified in 7.2.10.

9 Observe the following cautions to prevent accidents.

The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

 **DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

 **WARNING:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

 **CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Notes for ordering

1 Warranty period

"Warranty Period" of this product is one (1) year from the first delivery to the place you specified.

2 Scope of warranty

In case of a fault which is proved to be the responsibility of the CKD during the above warranty period, we shall offer a replacement part or a spare part of this product free of charge or repair the part in our plant free of charge.

Note that the following faults are excluded from the warranty:

- ① Operation under the conditions or in the environment derailing from those specified in the product specifications.
- ② Failure caused by lack of attention or erroneous control.
- ③ Failure caused by other than the delivered product.
- ④ Failure caused by operation derailing from the purposes for which the product is designed.
- ⑤ Failure caused by modification in the structure, performance, specification or other features made by other than us after delivery, or failure caused by repairs done by other than our designated contractor.
- ⑥ Loss in our product assembled to your machine or equipment, which would be avoided if your machine or equipment were provided with general functions, structures or other features common in the industry.
- ⑦ Failure caused by reason that is unforeseeable with technology put into practical use at the time of delivery.
- ⑧ Failure caused by fire, earthquake, flood, lightning, or other acts of God, earth shock, pollution, salt hazard, gas intoxication, excessive voltage, or other external causes.

The warranty mentioned here covers the discrete delivered product. Only the scope of warranty shall not cover losses induced by the failure of the delivered product.

3 Warranty for exported products

- (1) Products returned to the CKD factory or to a company or factory designated by CKD shall be repaired. Work and cost necessary for transportation shall not be compensated for.
- (2) The repaired product shall be returned to a designated place in Japan with domestic packaging specifications. This warranty specifies basic conditions. If warranty details in individual specification drawings or specifications differ from these warranty conditions, specification drawings or specifications shall take priority.

4 Compatibility confirmation

In no event shall CKD be liable for merchantability or fitness for a particular purpose, notwithstanding any disclosure to CKD of the use to which the product is to be put.

5 Scope of service

Technician dispatch service expense is not included in the price of delivered products. We shall receive the expense separately in the following cases:

- (1) Installation adjustment instruction and presence in test operation
- (2) Maintenance, adjustment and repair
- (3) Technical guidance and technical training (operation, program, wiring method, safety education, etc.)



Safety precautions

Electric actuator: Warnings, Cautions

Always read this section before starting use.

For series-specific precautions and warnings, refer to sections of each series.

Danger

Design & Selection

- 1 Do not operate the product in flammable or explosive atmospheres.

Warning

Design & Selection

- 1 Use the product within the product-specific specification scope.
- 2 Install a protection cover in case of possible danger to the operator.
 - If the electric actuator's movable portions may pose danger to the operator, be sure that the actuator has a structure preventing the operator from entering its operation range or touching the movable portions directly.
 - Do not get close to the robot if you wear a medical device such as pacemaker. Strong magnet used in the robot may cause misoperation of the pacemaker and other devices.
- 3 Take possibility of power source failure into consideration.
 - In case of a failure in the power source, take countermeasures without causing trouble or damage to the operator or equipment.
- 4 Take the operation status during emergency stop into consideration.
 - In case the safety device stops the machine due to emergency stop, power outage or other system errors, the electric actuator must be designed so that its movement causes no damage to the operator and equipment.
- 5 Consider the operation status if the machine is reactivated after emergency stop or abnormal stop.
 - The machine must be designed so that reactivation causes no damage to the operator or equipment. If the electric actuator must be reset to the start position, be sure to provide the machine with safe control device.
- 6 Install the product away from rainwater, moisture and direct sun.
- 7 Do not operate the actuator in corrosive atmospheres.
 - Failure to do so may result in damage or faulty operation.
- 8 Do not use the actuator under shock or vibration conditions
- 9 Do not use the actuator in dusty places or places affected by water droplet and oil droplet.
- 10 Do not apply load exceeding the allowance specified in the selection document to the actuator.

Caution

Design & Selection

- 1 Do not hit the trolley table against the stroke end.
- 2 Specify the maintenance conditions in the equipment instruction manual.
 - Product functions may be deteriorated significantly due to usage, service conditions or maintenance. This may result in failure to ensure safety. Conducting maintenance with accuracy allows the product to fully exert its functions.
- 3 Read through the instruction manual to perform installation and adjustment properly.
- 4 The product is manufactured in conformity with the related standards. Never attempt to modify the product.

Caution

During Use & Maintenance

- 1 Read through the instruction manual before using the machine.
- 2 If any abnormality is found, contact our sales office nearest you.

Caution

Export

- 1 Export
 - ① As this product is applicable to the Article 1, Paragraph 16 of Export Trade Control Ordinance, it may be required to file an export license application to MITI when the product is exported.
The custom office may require us of explanation on classification during custom clearance, we request you for an itemized correlation table (for classification).
 - ② If the product is assembled in a different device, be sure to conform to the classification of the device.

Slider type

KBZ-5D	2
KBZ-7D	3

Table type

KBZ-5D	4
KBZ-7D	5

Rod type

KBZ-3D	6
KBZ-4D	7

Slider type

[How to order]

KBZ - 5D- ST - M 12 N - 50 - 1 3 - M

Lead 06: 6 mm 12: 12 mm	Brake N: no brake B: brake installed	Stroke Refer to "Indication in model no." in specifications	Master controller 0: no controller 1: KCA-01-M05	Cable length 3: 3 m 4: 4 m 5: 5 m	Axis options Blank: no option M: motor cover
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[Specifications]

Motor output	50W, AC servo motor (resolver)		
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 8mm		
Stroke (mm) in 50 mm increments	Internal slider	50 to 450	500
	Indication in model no.	05 to 45	50
Max. speed (mm/s)	6 mm lead	400	340
	12 mm lead	800	680
Max. load capacity (kg)	6 mm lead	When used horizontally: 6.0, when used vertically: (3.0), acceleration / deceleration time: 0.1 s or more	
Acceleration/deceleration time (sec)	12 mm lead	When used horizontally: 3.0, when used vertically: (1.5), acceleration / deceleration time: 0.2 s or more	
Positioning repeatability (mm)	±0.02		
Resolution (mm)	Lead / 2048		
Allowable static moment (N·m)	Internal slider: MR: 31, MP: 12, MY: 12		
Brake	Brake applied when the system is de-energized Voltage: 24VDC		
Master controller	KCA-01-M05		

<Note>* Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

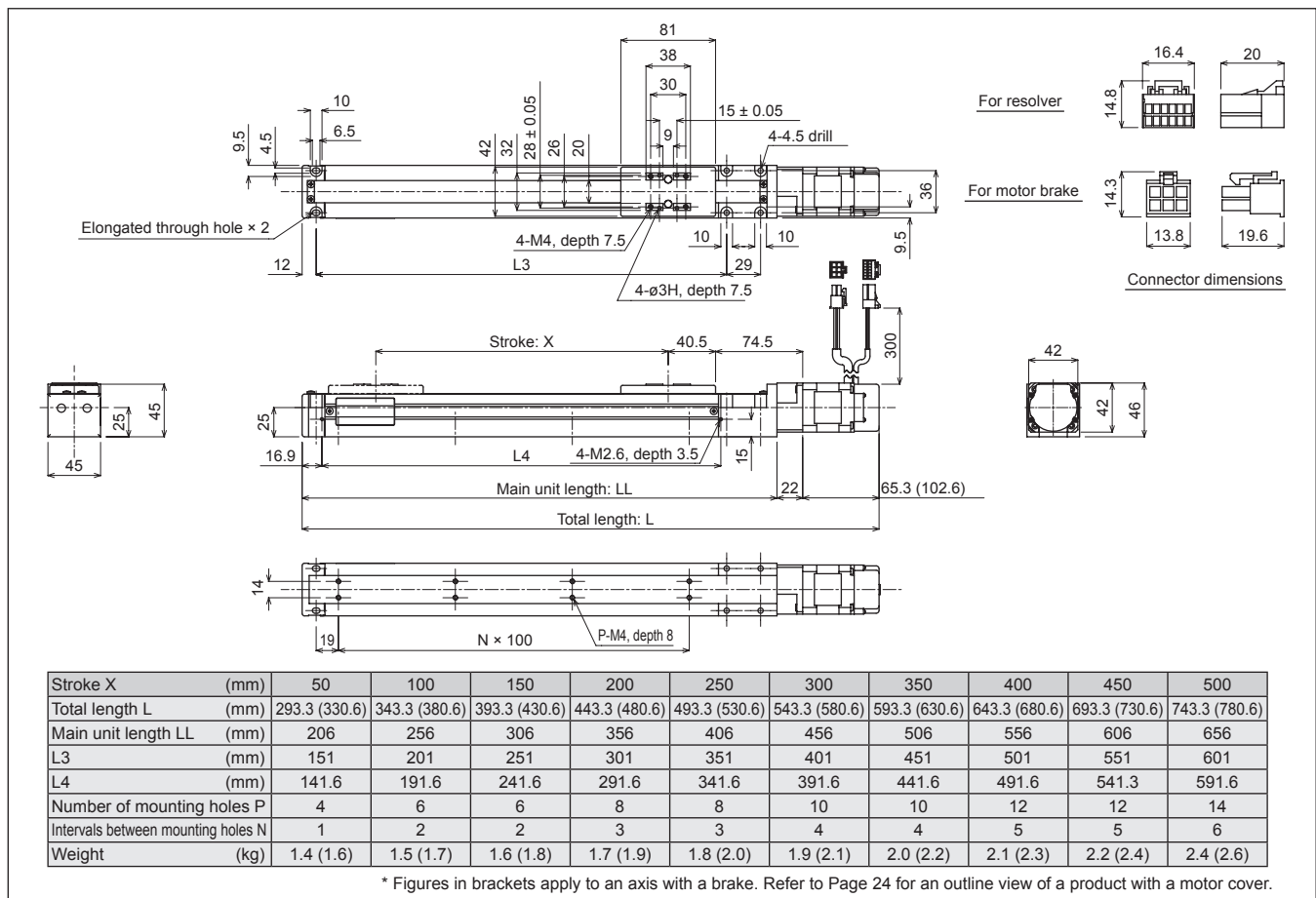
* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

[How to order]

KBZ - 5D- ST - M 12 N - 50 - M

Lead 06: 6 mm 12: 12 mm	Brake N: no brake B: brake installed	Stroke Refer to "Indication in model no." in specifications	Axis options Blank: no option M: motor cover
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* Figures in brackets apply to an axis with a brake. Refer to Page 24 for an outline view of a product with a motor cover.

Slider type

[How to order]

KBZ - 7D- ST - M 12 N - 50 - 1 3 - M

Lead 06: 6 mm 12: 12 mm	Brake N: no brake B: brake installed	Stroke Refer to "Indication in model no." in specifications	Master controller 0: no controller 1: KCA-01-M05	Cable length 3: 3 m 4: 4 m 5: 5 m	Axis options Blank: no option M: motor cover
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[Specifications]

Motor output	50W, AC servo motor (resolver)			
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 12 mm			
Stroke (mm) in 50 mm increments	Internal slider	50 to 550	600	700
	Indication in model no.	05 to 55	60	70
Max. speed (mm/s)	6 mm lead	400	340	250
	12 mm lead	800	680	500
Max. load capacity (kg)	6 mm lead	When used horizontally: 12.0, when used vertically: (4.0), acceleration / deceleration time: 0.1 s or more		
Acceleration/deceleration time (sec)	12 mm lead	When used horizontally: 6.0, when used vertically: (2.0), acceleration / deceleration time: 0.2 s or more		
Positioning repeatability (mm)	±0.02			
Resolution (mm)	Lead / 2048			
Allowable static moment (N·m)	Internal slider: MR: 58, MP: 25.7, MY: 25.7			
Brake	Brake applied when the system is de-energized Voltage: 24VDC			
Master controller	KCA-01-M05			

<Note>* Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

[How to order]

KBZ - 7D- ST - M 12 N - 50 - M

Lead 06: 6 mm 12: 12 mm	Brake N: no brake B: brake installed	Stroke Refer to "Indication in model no." in specifications	Axis options Blank: no option M: motor cover
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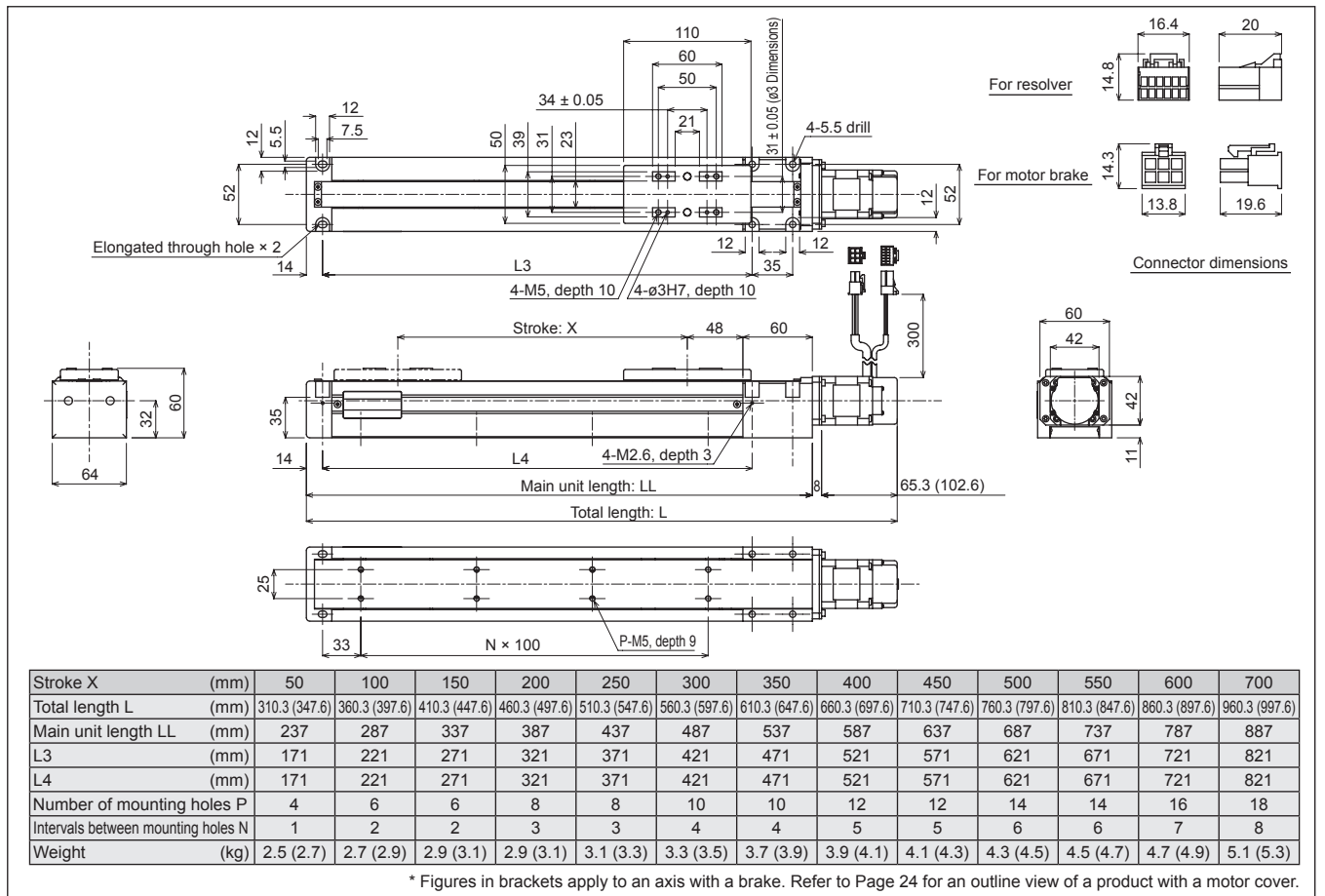


Table type

[How to order]

KBZ - 5D- ST - T 12 N - 10 - 1 3 - M

Lead	Brake	Stroke	Master controller	Cable length	Axis options
06: 6 mm 12: 12 mm	N: no brake B: brake installed	Refer to "Indication in model no." in specifications	0: no controller 1: KCA-01-M05	3: 3 m 4: 4 m 5: 5 m	Blank: no option M: motor cover

[Specifications]

Motor output	50W, AC servo motor (resolver)		
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 8mm		
Stroke (mm) in 50 mm increments	Table	50	100
	Indication in model no.	05	10
Max. speed (mm/s)	6 mm lead	400	
	12 mm lead	800	
Max. load capacity (kg) Acceleration/deceleration time (sec)	Lead: 6 mm	When used horizontally: 4.5	When used horizontally: 3.0
	Acceleration deceleration time: 0.1 s or more	When used vertically: (2.5)	
		Lead: 12 mm	When used horizontally: 2.5
	Acceleration deceleration time: 0.1 s or more	When used vertically: (1.0)	
Positioning repeatability (mm)	±0.02		
Resolution (mm)	Lead / 2048		
Allowable static moment (N·m)	Stroke: 50 mm	Table: MR: 4.4, MP: 1.9, MY: 1.9	
	Stroke: 100 mm	Table: MR: 4.4, MP: 1.2, MY: 1.2	
Brake	Brake applied when the system is de-energized Voltage: 24VDC		
Master controller	KCA-01-M05		

<Note>* Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

[How to order]

KBZ - 5D- ST - T 12 N - 10 - M

Lead	Brake	Stroke	Axis options
06: 6 mm 12: 12 mm	N: no brake B: brake installed	Refer to "Indication in model no." in specifications	Blank: no option M: motor cover

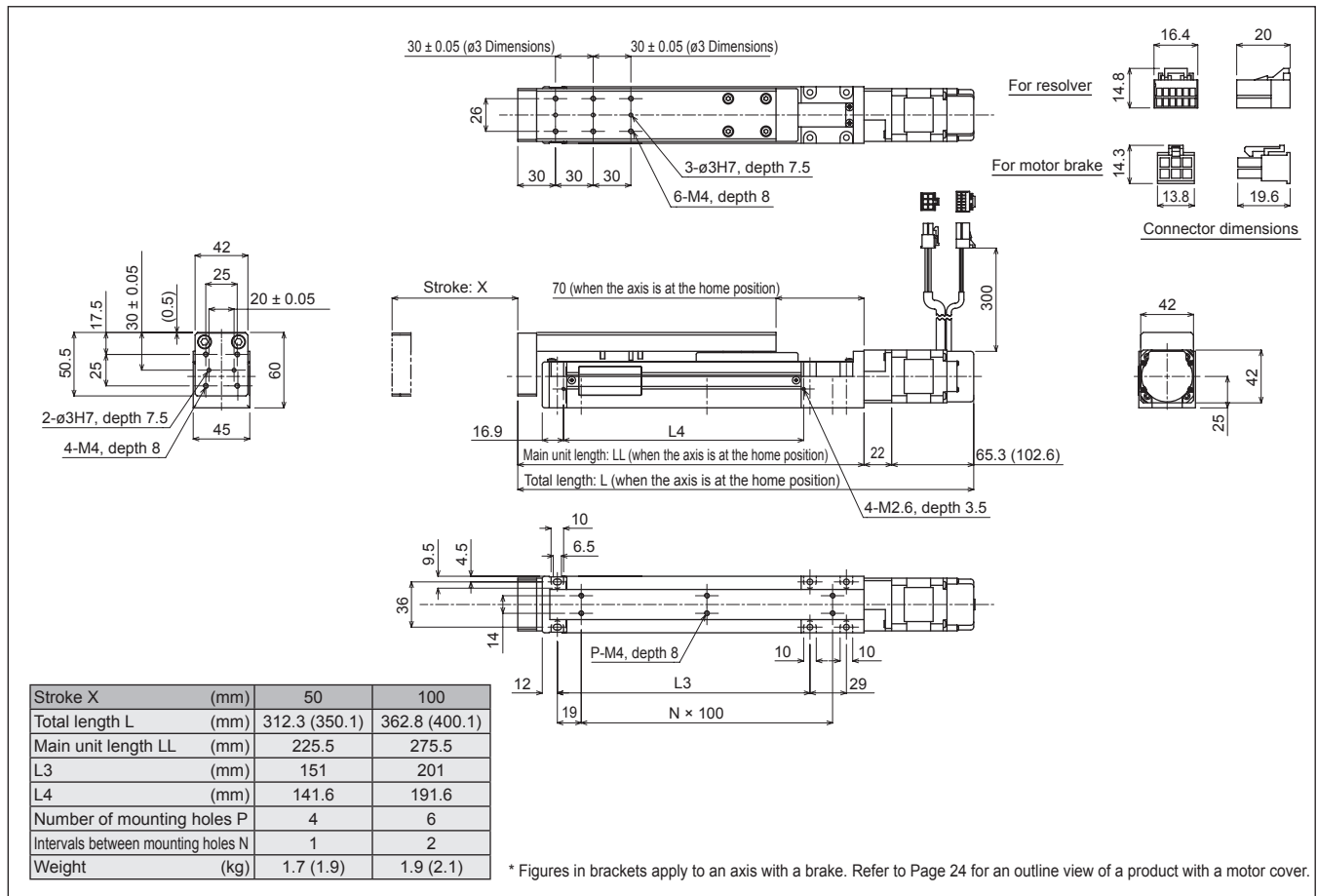


Table type

[How to order]

KBZ - 7D- ST - T 12 N - 10 - 1 3 - M

Lead	Brake	Stroke	Master controller	Cable length	Axis options
06: 6 mm 12: 12 mm	N: no brake B: brake installed	Refer to "Indication in model no." in specifications	0: no controller 1: KCA-01-M05	3: 3 m 4: 4 m 5: 5 m	Blank: no option M: motor cover

[Specifications]

Motor output	50W, AC servo motor (resolver)			
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 12 mm			
Stroke (mm) in 50 mm increments	Table	50	100	150
	Indication in model no.	05	10	15
Max. speed (mm/s)	6 mm lead	400		
	12 mm lead	800		
Max. load capacity (kg)	Lead: 6 mm	When used horizontally: 9.0	When used horizontally: 5.6	When used horizontally: 3.8
	Acceleration/deceleration time: 0.1 s or more	When used vertically: (3.5)		
Acceleration/deceleration time (sec)	Lead: 12 mm	When used horizontally: 4.5	When used horizontally: 2.8	When used horizontally: 1.9
	Acceleration/deceleration time: 0.1 s or more	When used vertically: (1.5)		
Positioning repeatability (mm)	±0.02			
Resolution (mm)	Lead / 2048			
Allowable static moment (N·m)	Stroke: 50 mm	Table: MR: 11.7, MP: 3.8, MY: 3.8		
	Stroke: 100 mm	Table: MR: 11.7, MP: 2.3, MY: 2.3		
	Stroke: 150 mm	Table: MR: 11.7, MP: 1.7, MY: 1.7		
Brake	Brake applied when the system is de-energized Voltage: 24VDC			
Master controller	KCA-01-M05			

<Note> * Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

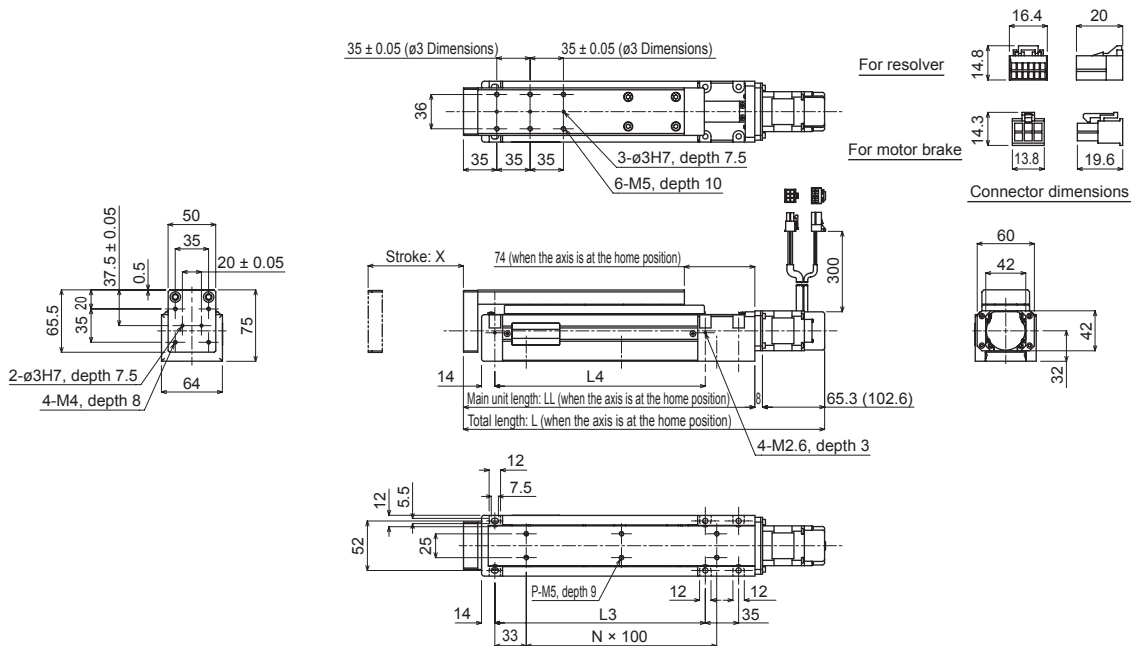
* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

[How to order]

KBZ - 7D- ST - T 12 N - 10 - M

Lead	Brake	Stroke	Axis options
06: 6 mm 12: 12 mm	N: no brake B: brake installed	Refer to "Indication in model no." in specifications	Blank: no option M: motor cover



Stroke X	(mm)	50	100	150
Total length L	(mm)	329.3 (366.6)	379.3 (416.6)	429.3 (466.6)
Main unit length LL	(mm)	256	306	356
L3	(mm)	171	221	271
L4	(mm)	171	221	271
Number of mounting holes P		4	6	6
Intervals between mounting holes N		1	2	2
Weight	(kg)	3.0 (3.2)	3.3 (3.5)	3.6 (3.8)

* Figures in brackets apply to an axis with a brake.

* Refer to Page 25 for an outline view of a product with a motor cover.

Rod type

[How to order]

KBZ - 3D- ST - C 12 N - 15 - 1 3 - M

Brake	Stroke	Master controller	Cable length	Axis options
N: no brake B: brake installed	Refer to "Indication in model no." in specifications	0: no controller 1: KCA-01-M05	3: 3 m 4: 4 m 5: 5 m	Blank: no option M: motor cover

[Specifications]

Motor output	50W, AC servo motor (resolver)		
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 8 mm		
Stroke (mm) in 50 mm increments	Cylinder	50 to 150	
	Indication in model no.	05 to 15	
Max. speed (mm/s)	12 mm lead	600	
Max. load capacity (kg)	When used horizontally: 3.0 When used vertically: (1.5)		
Acceleration/deceleration time (sec)	Acceleration / deceleration time: 0.15s or more		
Positioning repeatability (mm)	±0.02		
Resolution (mm)	Lead / 2048		
Allowable static moment (N*m)	Load moment cannot be applied to a rod		
Brake	Brake applied when the system is de-energized Voltage: 24VDC		
Master controller	KCA-01-M05		

<Note>* Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

* Load capacity value for a horizontally installed system applies when an external guide mechanism is used in combination with this product.

* Load moment cannot be applied to this product. Use it in combination with an external guide mechanism.

[How to order]

KBZ - 3D- ST - C 12 N - 15 - M

Brake	Stroke	Axis options
N: no brake B: brake installed	Refer to "Indication in model no." in specifications	Blank: no option M: motor cover

For resolver

For motor brake

Connector dimensions

Stroke X (mm)	50	100	150
Total length L (mm)	305.3 (342.6)	355.3 (392.6)	405.3 (442.6)
Main unit length LL (mm)	215	265	315
Number of mounting holes P	6	8	10
Intervals between mounting holes N	2	3	4
Weight (kg)	1.3 (1.5)	1.4 (1.6)	1.5 (1.7)

* Figures in brackets apply to an axis with a brake.
* Refer to Page 25 for an outline view of a product with a motor cover.

Rod type

[How to order]

KBZ - 4D- ST - C 12 N - 15 - 1 3 - M

Brake	Stroke	Master controller	Cable length	Axis options
N: no brake B: brake installed	Refer to "Indication in model no." in specifications	0: no controller 1: KCA-01-M05	3: 3 m 4: 4 m 5: 5 m	Blank: no option M: motor cover

[Specifications]

Motor output	50W, AC servo motor (resolver)		
Drive system	Rolled ball screw (class 7 equivalent); outside diameter: 8mm		
Stroke (mm) in 50 mm increments	Cylinder	50 to 200	
	Indication in model no.	05 to 20	
Max. speed (mm/s)	12 mm lead	600	
Max. load capacity (kg)	When used horizontally: 5.2 When used vertically: (2.2)		
Acceleration/deceleration time (sec)	Acceleration / deceleration time: 0.15s or more		
Positioning repeatability (mm)	±0.02		
Resolution (mm)	Lead / 2048		
Allowable static moment (N·m)	Load moment cannot be applied to a rod		
Brake	Brake applied when the system is de-energized Voltage: 24VDC		
Master controller	KCA-01-M05		

<Note>* Select a product with a brake if it is to be used as a vertical axis.

* Max. load capacity is the value measured when a load is placed directly above the slider.

* The value inside the bracket for the max. load capacity applies when a regenerative discharging resistor (KCA-CAR-0500) or a regenerative discharging unit (KCA-CAR-UN50) is used.

* The acceleration / deceleration time means the time required to reach a programmed speed.

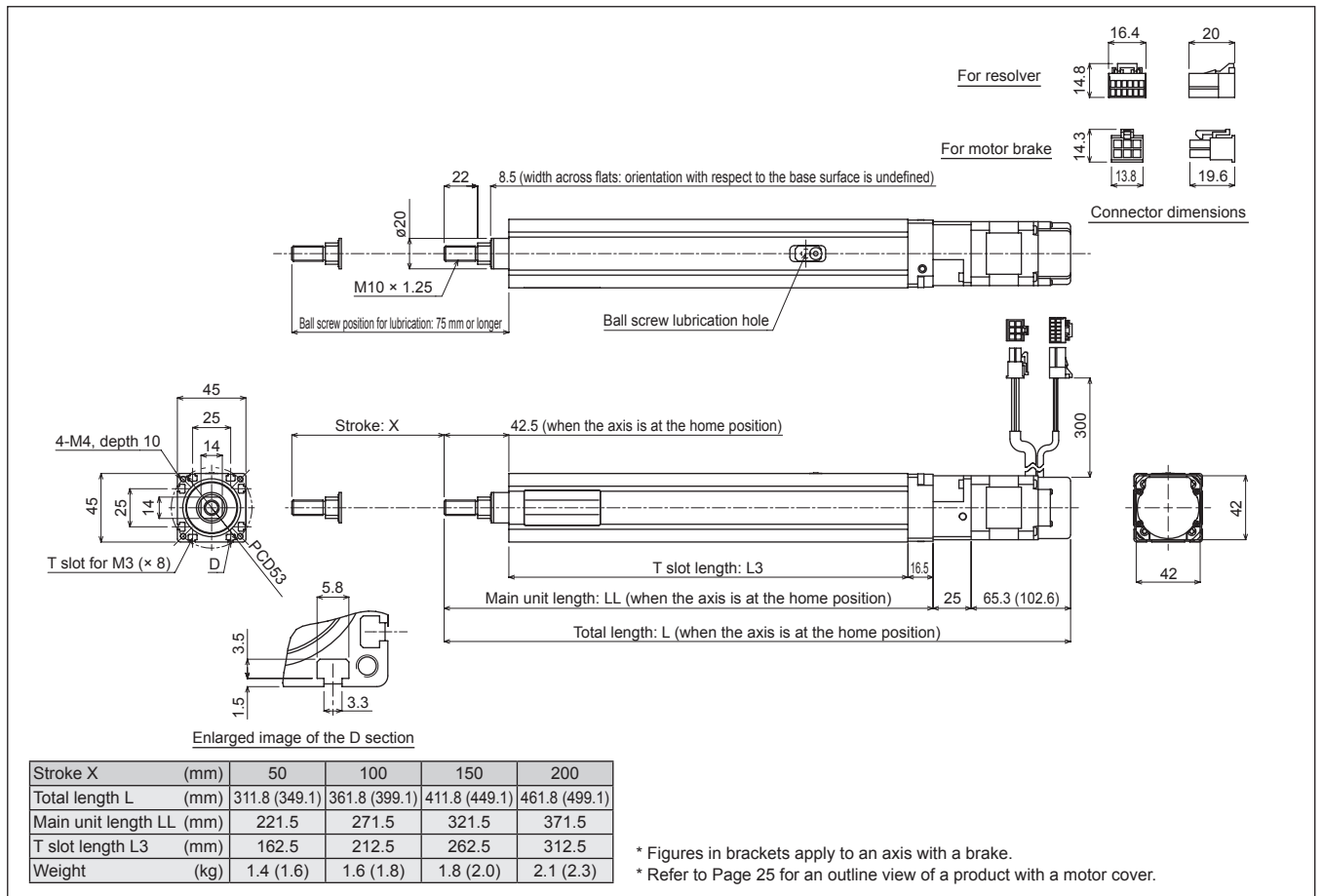
* Load capacity value for a horizontally installed system applies when an external guide mechanism is used in combination with this product.

* Load moment cannot be applied to this product. Use it in combination with an external guide mechanism.

[How to order]

KBZ - 4D- ST - C 12 N - 15 - M

Brake	Stroke	Axis options
N: no brake B: brake installed	Refer to "Indication in model no." in specifications	Blank: no option M: motor cover



[Common specifications]

Ambient conditions	Operation temperature range	0 to 40°C
	Operation humidity range	30 to 90% (No condensation)
	Operation temperature range	-10 to 50°C
	Operation humidity range	80% or less (No freezing and condensation)

Control System Parts

Controller

Master Controller.....	10
Highly-Functional Master Controller.....	13
Slave Controller	19

Parts

Controller Cable	22
------------------------	----

Optional Parts

Axis with a Motor Cover	24
Regenerative Resistor	26
Teach Pendant.....	28
PC Software	28
Communication Cable (RS-232C)	29
Input / Output Cable	29
Resolver ABS Backup (for Maintenance) ...	30

Master Controller

[Main features]

- * This is a single-axis controller designed exclusively for the KBZ series.
- * Specify a point table using 4 input signals and turn on a start signal to start operation.
- * The point table consists of 12 types of data such as coordinates, speed table number, acceleration / deceleration table number, and torque-controlled operation table number.
- * Parameter setting such as gain adjustment is automatic; just input the robot type.
- * Input signal can trigger JOG move (coordinates can be changed using this signal).
- * Three colors of LED indicate different error statuses.
- * A brake release switch is built in the controller for safety reasons.

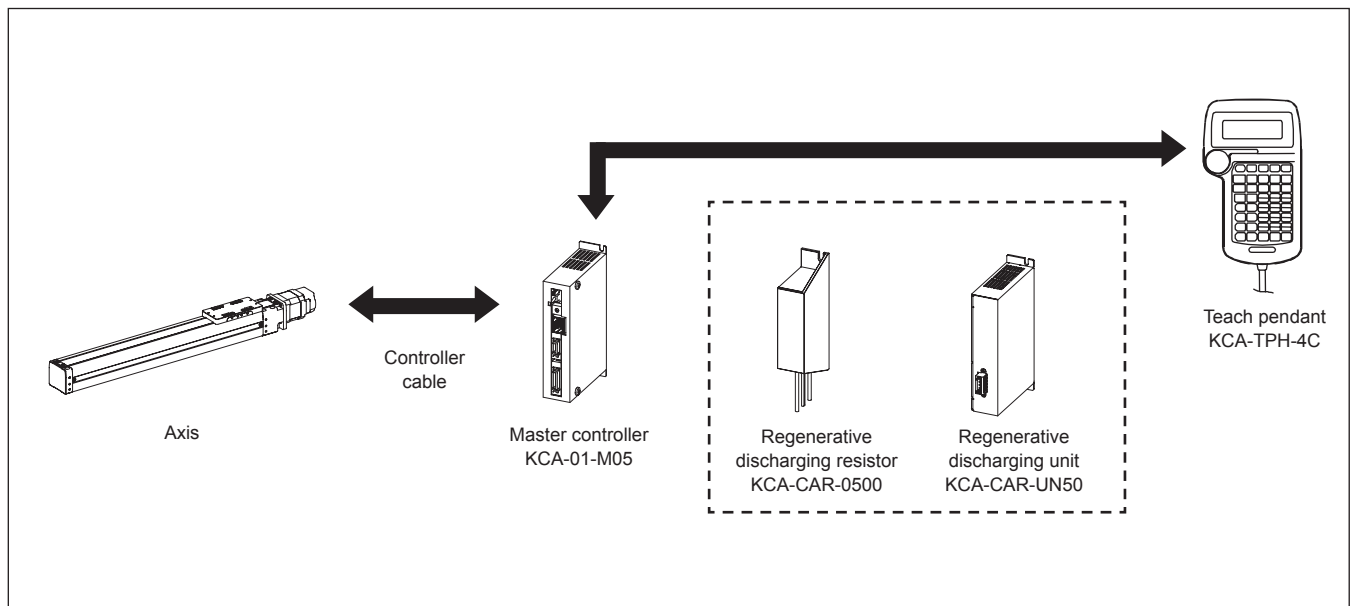
[Model No.]

KCA - 01 - M 05



[System configuration]

↔ Basic unit [---] Expansion unit



[General specifications]

Applicable robot	KBZ Series	
Controller model	KCA-01-M05	
Number of axes subject to control	1 axis	
Motor capacity	50W	
Control method	Semi-closed loop control	
Teaching method	Remote teaching Direct teaching, or MDI	
Speed setting	8 steps (variable)	
Acceleration/deceleration setting	8 steps (variable)	
Number of point tables	15 tables	
Storage method	EEPROM (Can be rewritten 1 million times)	
Transfer mode	Point mode	
Special function	Torque control function	
Emergency stop input	Available	
Home position sensor input	Available	
Regenerative function	Available (external regenerative resistor)	
Dynamic brake function	N/A	
Mechanical brake drive output	24VDC-0.4A or less (for a holding brake applied when the system is de-energized) The brake release switch (SW1) for force-releasing of the brake	
Protective function	Hardware error	Sensor error, drive power supply error, EEPROM error, overheating, and so on
	Software error	Over-speed, overload, extensive position error, and so on
	Warning	Drive power disconnection
Dimensions	31 (W) × 146 (H) × 89 (D) (excluding screw heads)	

Status display	Display on the status LED (LED1) Servo is off: green (on) Servo is on: green (flashing) Normal mode Drive power supply is off: orange (on) (set SW2 to 0) Battery power is low: orange (flashing) Power supply disconnection request is off: red (on) Error: red and green (flashing)	
System input	24V, 7mA, 10 points	
System output	30V max, 100mA max, 8 points	
Communication function	RS-232C × 1 channel (9600bps) for PC software SF-98D	
Control power supply voltage	24VDC ± 10%	
Drive power supply voltage	24VDC ± 10%	
Control power supply	0.25 A	
Drive power supply	Depends on the model of a combined axis; rating: 3 A (max. 9 A)	
Ambient conditions	Operating temperature range	0 to 40°C
	Operating moisture range	90% or lower (no condensation)
	Storage temperature range	-10 to 85°C
	Storage moisture range	90% or lower (no condensation)
	Environment	Indoor (no direct sunlight) No dirt, dust, corrosive gases, flammable gases Max. altitude of 1000 m or lower
	Noise / shock	4.9 m/s ² or less / 19.6 m/s ² or less
Weight	Approx.0.25 kg	

[Input and output specifications]

Input specifications	
Input rating	24VDC, 7mA
Insulation method	Photocoupler
Power supply	Supplied externally (24VDC)

Output specifications	
Output method	Transistor output (open collector)
Output capacitance	System output MAX100mA/1 point * No general purpose output

* Refer to Page 37 and 38 Details on System Input and Output for details on signals.
* Refer to Page 39 for an emergency stop input and input / output connection method

[Input / output pin numbers and signal names]

Pin No.	Input No.	Signal	Description
1	-	+COM	Positive common mode
2	-	+COM	Positive common mode
3	IN1 (*1)	START	Axis start
		+JOG	+JOG move
4	IN2 (*1)	STOP	Stop input
		-JOG	-JOG move
5	IN3	SVON	Servo ON
6	IN4	WRITE	Write
7	IN5	ALRST	Error reset
8	IN6	RTSEL	Switch between operation / teaching
9	IN7	PIN1	Command point number
10	IN8	PIN2	
11	IN9	PIN3	
12	IN10	PIN8	
13	-	Emergency stop input (+)	

Pin No.	Input No.	Signal	Description
14	OUT1	RUN	Robot in operation
15	OUT2 (*2) OUT3	ERROR	Error detected
		RDY/ERR	System in the READY state or an error detected
16	OUT3	POSI	Positioning complete
17	OUT4	AREA	Slider in designated area
18	OUT5 (*3)	POUT1	Completion point number
		TQCON	Torque-controlled operation in process
19	OUT6 (*3)	POUT2	Completion point number
		TQLOAD	Torque load
20	OUT7 (*3)	POUT4	Completion point number
		TQLIM	Torque limit
21	OUT8 (*3)	POUT8	Completion point number
		TQLOCK	Slider locked
22	-	-COM	Negative common mode
23	-	-COM	Negative common mode
24	-	N.C.	
25	-		
26	-		
			Emergency stop input (-)

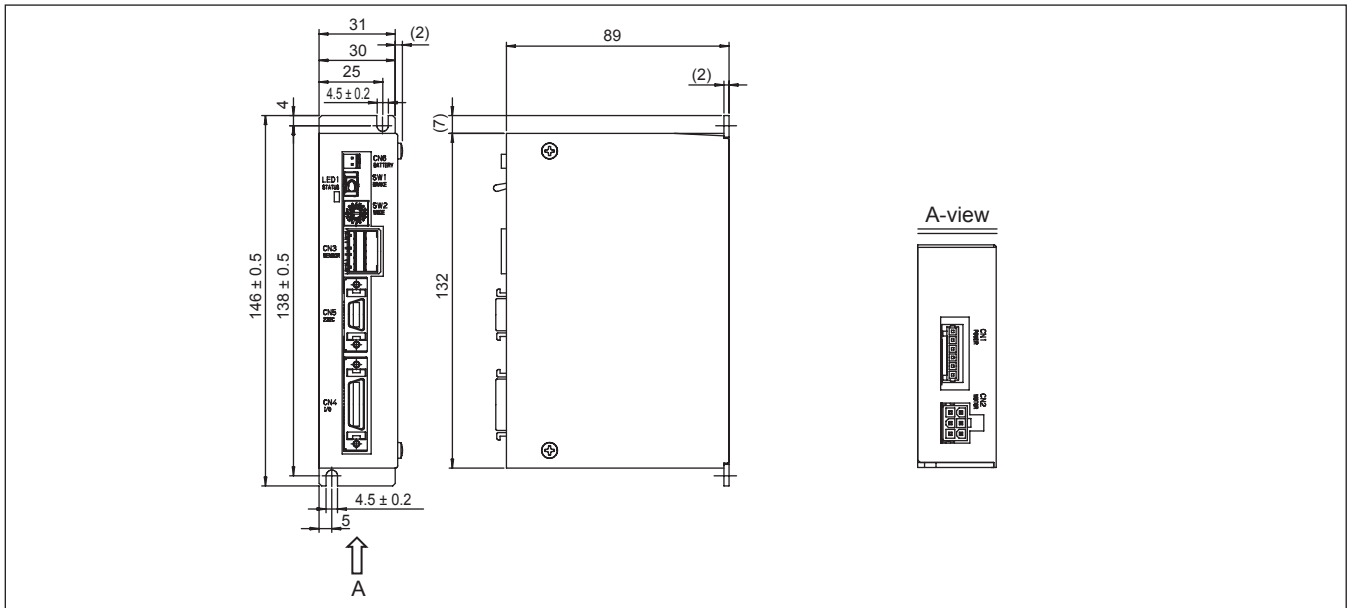
(*1) The top line shows the signal during operation and the bottom line shows the signal during teaching.

(*2) Select one using Parameter M13.

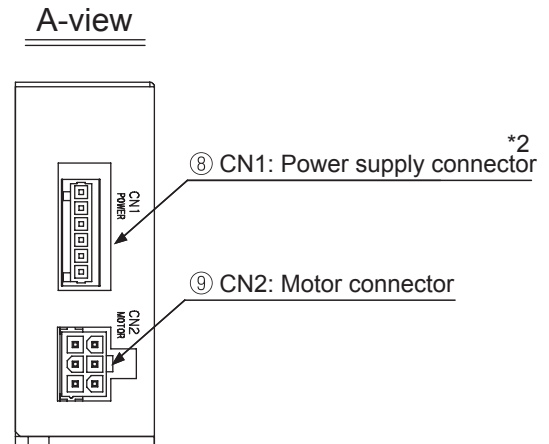
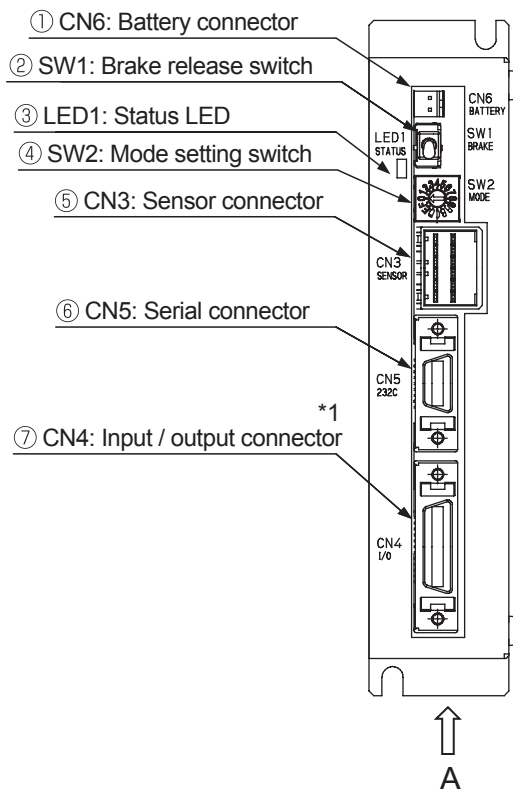
(*3) The top line shows the signal for normal operation and teaching, and the bottom line shows the signal during torque-controlled operation.

[Dimensions]

Master controller



[Parts name]



- ① CN6: Battery connector
A connector for the resolver ABS backup battery.
- ② SW1: Brake release switch
A momentary switch for force-releasing the brake.
The brake is released while the lever is lifted. The brake control resumes when the lever is released.
- ③ LED1: Status LED
It indicates the controller status using three different colors.
- ④ SW2: Mode setting switch
A switch for making operation mode setting.

*1 A plug and a junction shell are attached.

*2 A plug and a connection lever are attached.

- ⑤ CN3: Sensor connector
A motor sensor cable connector.
- ⑥ CN5: Serial connector
An RS-232C connector for connecting a teach pendant or a PC communication cable (optional).
- ⑦ CN4: Input / output connector
A connector used for system input / output as well as emergency stop input. A cable is connected to a sequencer to realize external robot control.
- ⑧ CN1: Power supply connector
A connector for inputting control power and motor power.
- ⑨ CN2: Motor connector
A motor cable connector.

Highly-Functional Master Controller KCA-20-M00

[Features of KCA-20-M00]

Connectable to all KBB series and KBZ series

- * Capable of controlling four axes simultaneously at maximum.
- * CC-Link and DeviceNet can be used as an interface to external devices.
- * Capable of doing input and output and communicating data of coordinate table, status and JOG operation through the CC-Link interface.
- * Capable of input and output and communicating JOG operation data through the DeviceNet interface.
- * Featuring two- and three-dimensional linear interpolation and circular interpolation and pass function, the unit can perform locus-oriented operation.
- * Capable of turning on and off the general-purpose output control at the specified coordinates while a robot is travelling (Instruction word: OUTS)
- * Capable of changing the target location based on the coordinate data received from RS232C communication while the robot is travelling to the specified coordinate (Instruction word: RSMV)
- * Equipped with a multi task function capable of controlling four tasks of input and output at max. in the sequential mode (only one task with respect to the axis operation)
- * KCA-TPH-4C is used as a teach pendant.

[Model No.]

KCA - 20 - M 00 - 0 0

Control form	Fieldbus interface
M: Master controller	0: No interface C: CC-Link D: DeviceNet

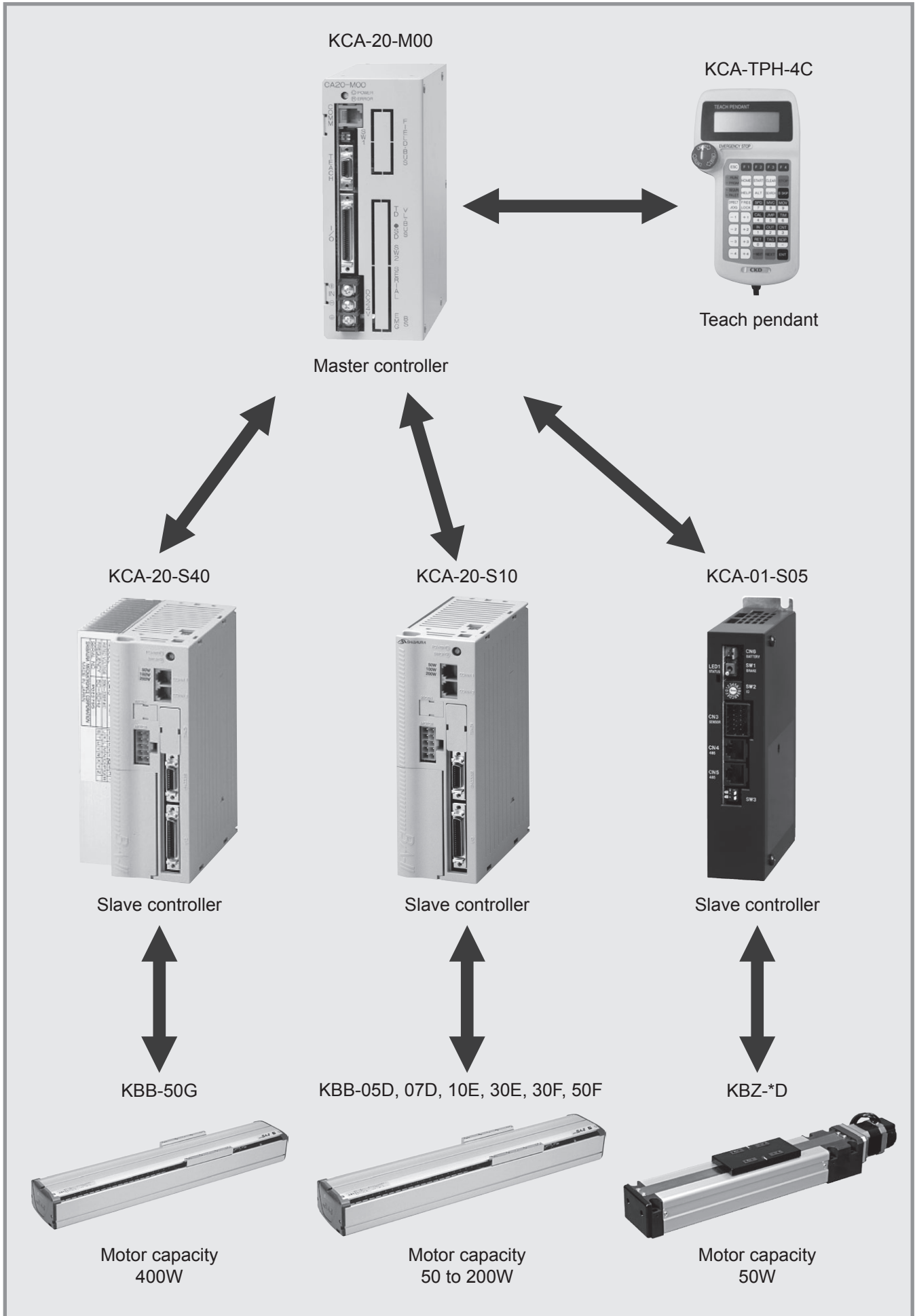
KCA-20-M00-00



KCA-20-M00-C0



[KCA-20-M00 System configuration]



[General specifications]

Controller model	KCA-20-M00
Number of axes subject to control	One to four axes can be controlled synchronously with the slave controller connected.
Control method	CP control, PTP control Semi-closed loop control
Interpolation function	Three-dimensional linear interpolation, three-dimensional circular interpolation
Encoder signal	Line driver communication method
Teaching method	Remote teaching, direct teaching, or MDI
Speed/acceleration	Speed: 10 steps (variable) Acceleration: 20 steps (variable)
Operation method	Stepping, continuous, independent
Operation mode	Sequential (multi task) (Note 1), Palletizing, easy, External point designation
Number of programs	Sequential 16, palletizing 16, easy 8
Number of steps	2500 steps at max. (Note 2)
Coordinate table	For each task 999
Number of counters	99
Number of timers	9
Memory method	FRAM
CPU type	32 bit (RISC•CPUSH7085)
Power supply voltage	24VDC \pm 10% 0.5A (supplied externally)

Self-diagnosis function	Watchdog timer checks for CPU error, memory error, driver error, power supply voltage error, program error, etc.
Error display	Error indicator lamp (front panel) Teach pendant display
External input	System input: 4 points General-purpose input: 20 points (Note 3)
External output	System output: 4 General-purpose output: 12 points (Note 3)
Communication function	Dedicated to ICH (RS232C) teach pendant
External drive power	No output power (supplied externally)
Emergency stop input and output	No-voltage input (interface input), Relay C interface output
Noise immunity	1500Vp-p pulse duration 1 μ S (Depending on noise simulator)
Environmental condition	Indoor installation location temperature: 0 to 40°C Humidity: 30 to 90% RH, No condensation No corrosive gas.
Dimensions	65 (W) \times 170 (H) \times 150 (D) Excluding fittings
Weight	1.2 kg (excluding optional substrate)

(Note 1) Multitasking can perform 4 tasks at max. (Number of axes subject to control is one task).

(Note 2) Variable depending on the mode in use.

(Note 3) Refer to the interface specifications on Page 16 and 17 when Fieldbus interface specifications are selected.

[Input / output specifications]

Input specifications	
Input rating	24VDC, 7mA / 1 point
Insulation method	Photocoupler
Power source	Supplied externally (24VDC)

Output specifications	
Output form	Transistor output (open collector)
Output capacitance (24VDC)	Max. system output: 20mA / 1 point Max. general-purpose output: 300mA / 1 point

[Input / output pin numbers and signal names]

Panel side connector pin layout	No.	Signal name	No.	Signal name
<p>(BOTTOM VIEW)</p>	1	+COM1 (Note 1)	26	General-purpose input port 1-1
	2	General-purpose output port 1-1	27	General-purpose input port 1-2
	3	General-purpose output port 1-2	28	General-purpose input port 1-3
	4	General-purpose output port 1-3	29	General-purpose input port 1-4
	5	General-purpose output port 1-4	30	General-purpose input port 1-5
	6	General-purpose output port 1-5	31	General-purpose input port 1-6
	7	General-purpose output port 1-6	32	General-purpose input port 1-7
	8	General-purpose output port 1-7	33	General-purpose input port 1-8
	9	General-purpose output port 1-8	34	General-purpose input port 2-1
	10	General-purpose output port 2-1	35	General-purpose input port 2-2
	11	General-purpose output port 2-2	36	General-purpose input port 2-3
	12	General-purpose output port 2-3	37	General-purpose input port 2-4
	13	General-purpose output port 2-4	38	General-purpose input port 2-5
	14	-COM1 (Note 1)	39	General-purpose input port 2-6
	15	-COM1 (Note 1)	40	General-purpose input port 2-7
	16	+COM2 (Note 1)	41	General-purpose input port 2-8
	17	Output during operation	42	General-purpose input port 3-1
	18	Error detected output	43	General-purpose input port 3-2
	19	Positioning complete output	44	General-purpose input port 3-3
	20	Zero point return complete output	45	General-purpose input port 3-4
	21	Zero point return input	46	Emergency stop input
	22	Start input	47	Emergency stop input
	23	Stop input	48	Emergency stop output (N.O)
	24	Reset input	49	Emergency stop output (COM)
	25	-COM2 (Note 1)	50	Emergency stop output (N.C)

(Note 1): +COM1, +COM2 and -COM1 and -COM2 are not connected internally.

* A plug for connecting the input and output connector is supplied but the input and output cable with plug is available as an option.

[CC-Link interface specifications]

Item	Specifications
Transmission specifications	CC-Link Ver 1.10
Communication speed	10M/5M/2.5M/625K/156kbps (Settings are made using parameters)
Station type	Remote device station
Number of possessed station	Four stations are fixed (128 points for RX/RX each, 16 points for RWw/RWr each)
Station number setting	1 to 61 (Settings are made using parameters)
Number of input and output points	System input: 4 points / System output: 4 points
	General-purpose input: 64 points / General-purpose output: 64 points
	JOG input: 8 points / JOG output: 8 points
	Handshake input: 1 point / Handshake output: 2 points
Data option input: 4 points / Data option confirmation output: 4 points	
Data communication function	Coordinate table transmit/receive, current location monitor, error code request, status request, etc.

* Input/output direction is seen from the robot controller side.

[Input and output signal list]

Signal direction CC-Link master station ← KCA-20-M00		Signal direction CC-Link master station → KCA-20-M00	
Device No. (input)	Signal name	Device No. (output)	Signal name
RXn0	Robot in operation output	RYn0	Zero point return input (*2)
RXn1	Error detected output	RYn1	Start input (*2)
RXn2	Positioning complete output	RYn2	Stop input (*2)
RXn3	Zero point return complete output	RYn3	Reset input (*2)
RXn4 to RXn7	Disabled	RYn4 to RYn7	Disabled
RXn8 to RXnF	General-purpose output port 1-1 to 8	RYn8 to RYnF	General-purpose input port 1-1 to 8 (*2)
RX(n+1)0 to RX(n+1)7	General-purpose output port 2-1 to 8	RY(n+1)0 to RY(n+1)7	General-purpose input port 2-1 to 8 (*2)
RX(n+1)8 to RX(n+1)F	General-purpose output port 3-1 to 8	RY(n+1)8 to RY(n+1)F	General-purpose input port 3-1 to 8 (*2)
RX(n+2)0 to RX(n+2)7	General-purpose output port 4-1 to 8	RY(n+2)0 to RY(n+2)7	General-purpose input port 4-1 to 8
RX(n+2)8 to RX(n+2)F	General-purpose output port 5-1 to 8	RY(n+2)8 to RY(n+2)F	General-purpose input port 5-1 to 8
RX(n+3)0 to RX(n+3)7	General-purpose output port 6-1 to 8	RY(n+3)0 to RY(n+3)7	General-purpose input port 6-1 to 8
RX(n+3)8 to RX(n+3)F	General-purpose output port 7-1 to 8	RY(n+3)8 to RY(n+3)F	General-purpose input port 7-1 to 8
RX(n+4)0 to RX(n+4)7	General-purpose output port 8-1 to 8	RY(n+4)0 to RY(n+4)7	General-purpose input port 8-1 to 8
RX(n+4)8 to RX(n+4)F	JOG output	RY(n+4)8 to RY(n+4)F	JOG input
RX(n+5)0 to RX(n+5)7	Reserved	RY(n+5)0 to RY(n+5)7	Reserved
RX(n+5)8 to RX(n+5)F		RY(n+5)8 to RY(n+5)F	
RX(n+6)0 to RX(n+6)7		RY(n+6)0 to RY(n+6)7	
RX(n+6)8	Command processing complete (*1)	RY(n+6)8	Command processing complete (*1)
RX(n+6)9	Command error (*1)	RY(n+6)9	Disabled
RX(n+6)A to RX(n+6)B	Disabled	RY(n+6)A to RY(n+6)B	Disabled
RX(n+6)C to RX(n+6)F	Data option confirmation output	RY(n+6)C to RY(n+6)F	Data option input
RX(n+7)0 to RX(n+7)7	Disabled	RY(n+7)0 to RY(n+7)7	Disabled
RX(n+7)8 to RX(n+7)F	Disabled	RY(n+7)8 to RY(n+7)F	Disabled

n: Address given to the master controller based on the station number setting.

(*1) Data communication handshake signal

(*2) The use of system input and general-purpose input ports 1 to 3 are selected using the parameters.

[CC-Link status display LED]

Name	Color	Lit / Unlit	Contents
RUN	Green	Lit	Under normal operation
		Unlit	Under time-out or network outage
ERR	Red	Lit	CRC error, speed error, station number setting error
		Unlit	Under normal operation
SD	Green	Lit	Data in transmission
		Unlit	Unsent data
RD	Green	Lit	Data in receiving
		Unlit	Unreceived data

[DeviceNet interface specifications]

Item	Specifications		
Communication protocol	In compliant with DeviceNet		
Support connection	I/O connection (boring)		
Communication speed	125k/250k/500kbps (Settings are made using parameters)		
Station number setting	0 to 63 (Settings are made using parameters)		
Cable length	Communication speed	Thick cable	Thin cable
	125k	500 m	100 m
	250k	250 m	
	500k	100 m	
Number of possessed points	Transmission: 128 points Reception: 128 points		
Number of input and output points	System input: 4 points / System output: 4 points		
	General-purpose input: 64 points / General-purpose output: 64 points		
	JOG input: 8 points / JOG output: 8 points		
Device type	0 (Generic Device)		

* Input/output direction is seen from the robot controller side.

[Input and output signal list]

Signal direction DeviceNet master station ← KCA-20-M00	Signal direction DeviceNet master station → KCA-20-M00 (*1)		
Input device No. (offset *2)	Signal name	Output device No. (offset *2)	Signal name
+0	Robot in operation output	+0	Zero point return input (*3)
+1	Error detected output	+1	Start input (*3)
+2	Positioning complete output	+2	Stop input (*3)
+3	Zero point return complete output	+3	Reset input (*3)
+4 to +7	Disabled	+4 to +7	Disabled
+8 to +15	General-purpose output port 1-1 to 8	+8 to +15	General-purpose input port 1-1 to 8 (*3)
+16 to +23	General-purpose output port 2-1 to 8	+16 to +23	General-purpose input port 2-1 to 8 (*3)
+24 to +31	General-purpose output port 3-1 to 8	+24 to +31	General-purpose input port 3-1 to 8 (*3)
+32 to +39	General-purpose output port 4-1 to 8	+32 to +39	General-purpose input port 4-1 to 8
+40 to +47	General-purpose output port 5-1 to 8	+40 to +47	General-purpose input port 5-1 to 8
+48 to +55	General-purpose output port 6-1 to 8	+48 to +55	General-purpose input port 6-1 to 8
+56 to +63	General-purpose output port 7-1 to 8	+56 to +63	General-purpose input port 7-1 to 8
+64 to +71	General-purpose output port 8-1 to 8	+64 to +71	General-purpose input port 8-1 to 8
+72 to +79	JOG output	+72 to +79	JOG input
+80 to +127	Reserve	+80 to +127	Reserve

(*1) If the DeviceNet communication is disrupted, stop input will be set to 1 or reset to 0 otherwise.

However, stop input will be reset to 0 during T/P operation.

(*2) Offset amount from the first device (Unit: bit)

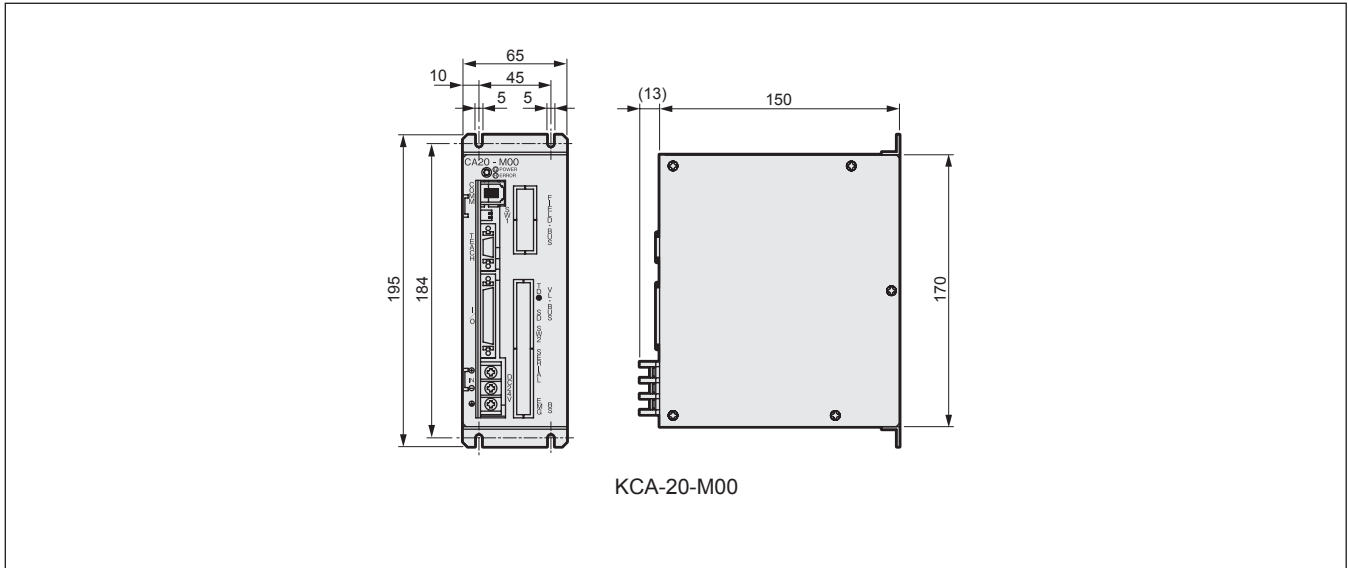
(*3) The use of system input and general-purpose input ports 1 to 3 is selected using the parameters.

[DeviceNet status display LED]

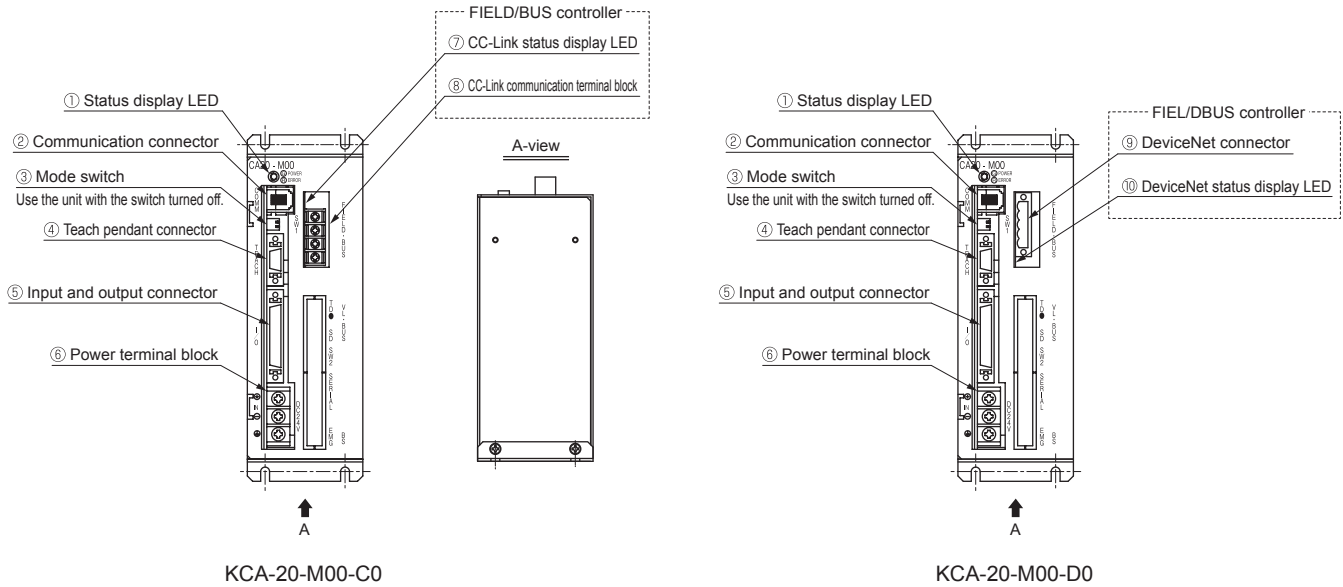
Name	Color	Lit/Unlit	Causes and remedies	
MS	Green	● Lit	Normal	Normal status
		★ Flashing	Unset	An error occurred in the master controller setting. Check the setting and restart the master controller. Or the master controller is in a standby status. Check whether the master controller is normally restarted.
	Red	● Lit	Fatal failure	A hardware error has occurred. (Error in DPRAM, internal ROM, internal RAM, EEPROM, CAN, WDT, etc.) Restart the controller. If an error occurs again, replace the controller.
		★ Flashing	Minor failure	A user setting error and interruption time-out at users' end occurred. Check the setting and restart the unit.
	Green/Red	○ Unlit	No power supply	The power is not supplied because initialization is executed, etc. Check the power supply.
NS	Green	● Lit	Normal	One or more connection is established (operated) in online status.
		★ Flashing	Waiting for connection	The master controller is not started normally. (Master controller I/O area configuration error is included) Check whether the master controller is started normally.
	Red	● Lit	Fatal communication error	There occurred a communication error. (Node address duplication, busoff detection, communication speed mismatch, etc.) Check the connection status, noise status, node address setting, and communication speed setting and restart the unit.
		★ Flashing	Minor communication error	Timeout occurred in the communication with the master controller. Check the master controller status, connection status, noise status, node address setting, communication speed setting and the like before restarting the master controller.
	Green/Red	○ Unlit	No power supply	No power is supplied, or there occurred a WDT error, or baud rate check or node address duplication check is being carried out. Check for power supply.

* LED turns on and off at a time interval of 0.5 seconds.

[Dimensions]



[Parts name]



- ① Status display LED
Indicates the controller status. It turns green when the power is turned on and turns red if an error occurs.
- ② Communication connector
Connects the link cable for connecting the slave controller.
- ③ Mode switch
Not used in this unit. Turn off the switch when the unit is used.
- ④ Teach pendant connector
Connects the teach pendant or communication cable for PC connection (option).
- ⑤ Input and output connector
Connects external control equipment (sequencer, etc.).
- ⑥ Power terminal block
Provided with power input terminal and FG (frame ground) terminal.

- ⑦ CC-Link status display LED (option)
CC-Link status is displayed.
- ⑧ CC Link communication terminal block (option)
Connects the CC-Link cable for data link.
- ⑨ DeviceNet connector (option)
Connects the DeviceNet cable for data link.
- ⑩ DeviceNet status display LED (option)
Indicates the DeviceNet status.

Slave Controller

[Main features]

* Slave controller can be connected to a KBB series controller.

[Model No.]

KCA - 01 - S 05

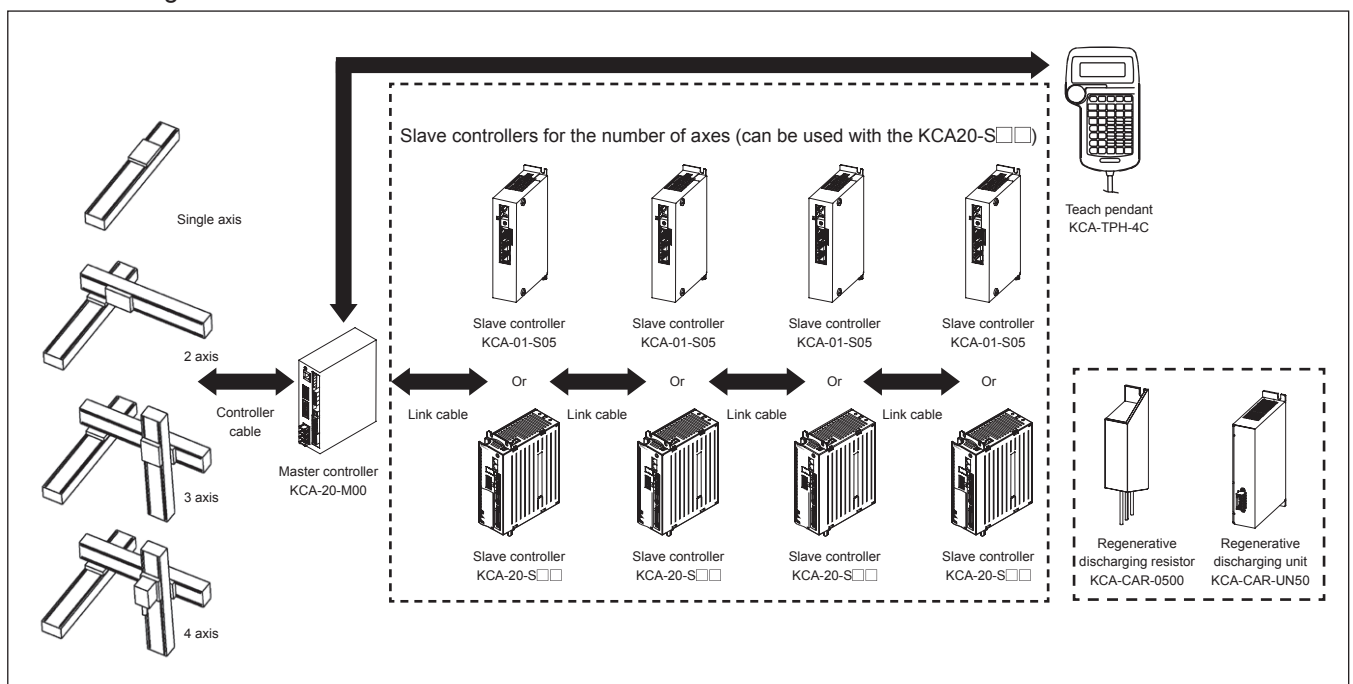


KCA-01-S05

[System configuration]

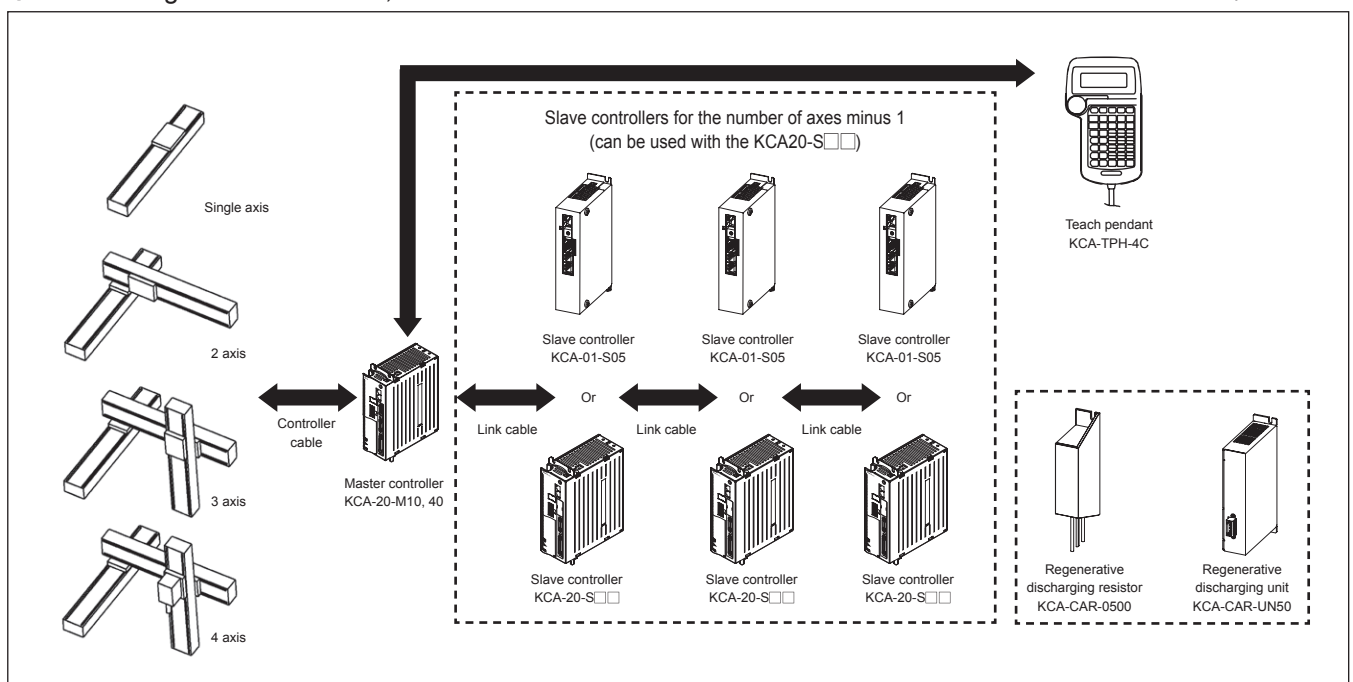
● When using the KCA-20-M00

↔ Basic unit [---] Expansion unit



● When using the KCA-20-M10, M40

↔ Basic unit [---] Expansion unit



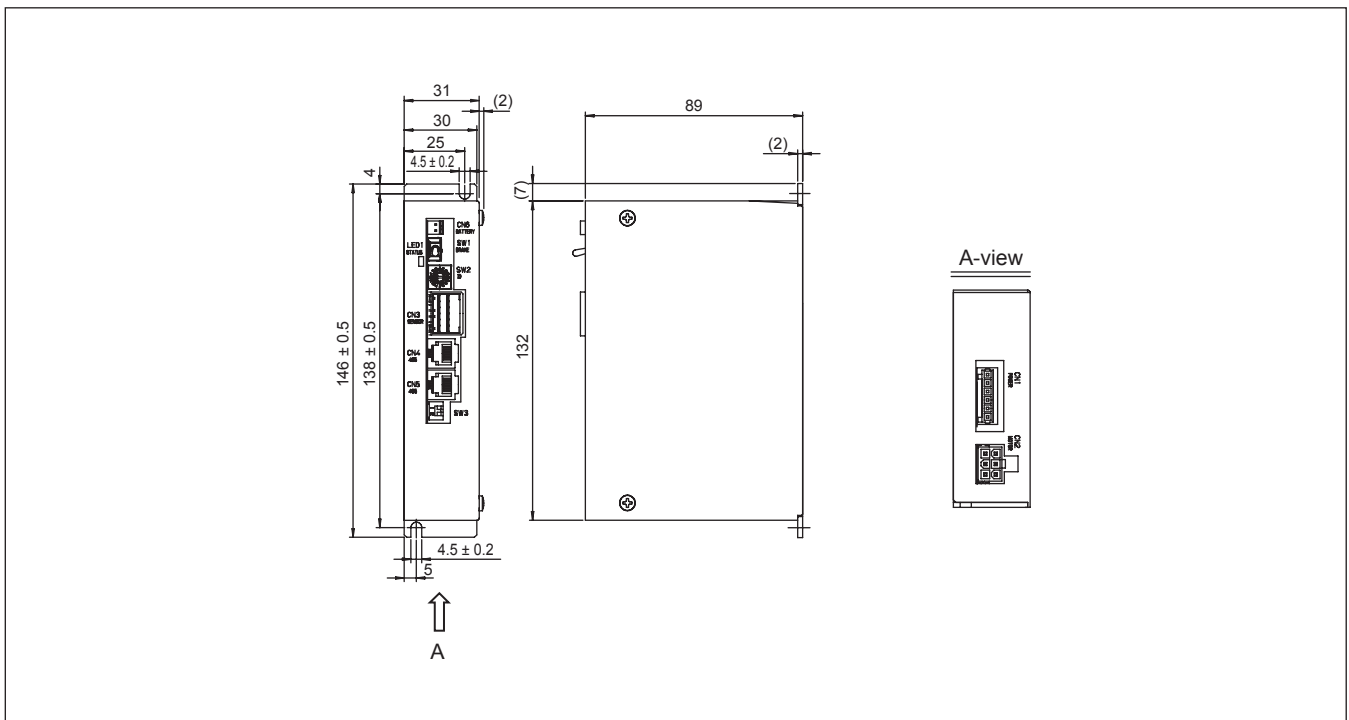
[General specifications]

Applicable robot	KBZ Series	
Controller model	KCA-01-S05	
Number of axes subject to control	1 axis (connection to the master controller required)	
Motor capacity	50W	
Error indication	An error indicator lamp (front panel) Teach pendant (connected to the master controller)	
Home position sensor input	Available	
Regenerative function	Available (external regenerative resistor)	
Dynamic brake function	N/A	
Mechanical brake drive output	24VDC-0.4A or lower (for a holding brake applied when the system is de-energized) The brake release switch (SW1) for force-releasing of the brake	
Protective function	Hardware error	Sensor error, drive power supply error, non-volatile memory error, and so on
	Software error	Over-speed, overload, extensive position error, and so on
	Warning	Low battery voltage
Status display	Green when power is on. Turns red when an error occurs.	

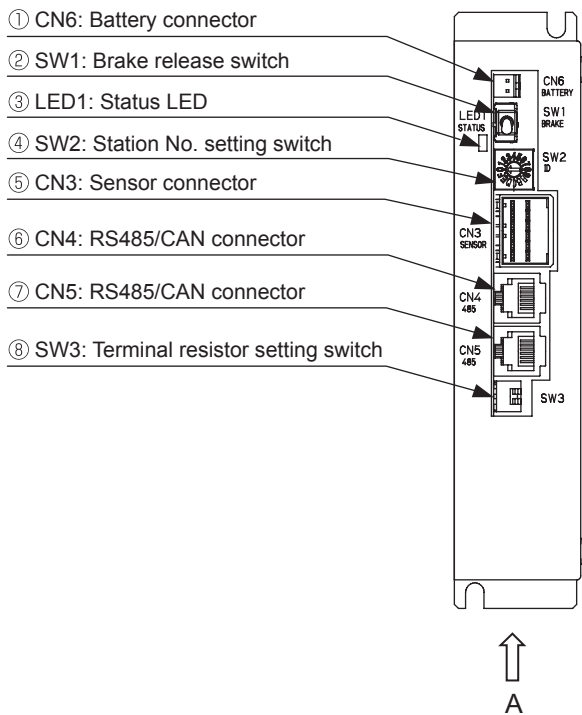
Control power supply voltage	24VDC \pm 10%	
Drive power supply voltage	24VDC \pm 10%	
Control power supply	0.25A	
Drive power supply	Depends on the model of a combined axis; rating: 3A (max. 9A)	
Ambient conditions	Operating temperature range	0 to 40°C
	Operating moisture range	90% or less (no condensation)
	Storage temperature range	-10 to 85°C
	Storage moisture range	90% or less (no condensation)
	Environment	Indoor (no direct sunlight) No dirt, dust, corrosive gases, flammable gases Max. altitude of 1000m or lower
	Noise / shock	4.9m/s ² or lower / 19.6m/s ² or lower
Dimensions	31 (W) \times 146 (H) \times 89 (D) (excluding screw heads)	
Weight	Approx. 0.25 kg	

[Dimensions]

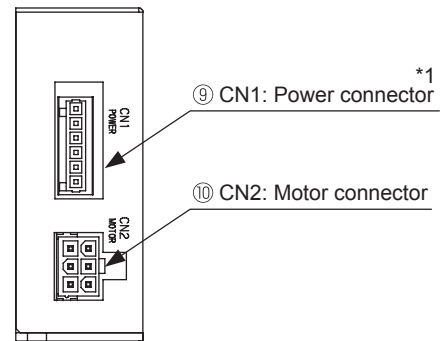
Slave controller



[Parts name]



A-view



- ① CN6: Battery connector
A connector for the resolver ABS backup battery.
- ② SW1: Brake release switch
A momentary switch for force-releasing the brake. The brake is released while the lever is lifted. The brake control resumes when the lever is released.
- ③ LED1: Status LED
This LED shows the controller status. It turns green when the power turns on. It becomes red when an error occurs.
- ④ SW2: Station No. setting switch
This switch is for setting its own slave controller number when connected to the master controller for controlling multiple axes. Set it to F when updating the firmware.
- ⑤ CN3: Sensor connector
A motor sensor cable connector.
- ⑥ CN4: RS485 / CAN connector
A communication cable connector for connecting a slave controller (optional).
- ⑦ CN5: RS485 / CAN connector
A communication cable connector for connecting a slave controller (optional).
- ⑧ SW3: Terminal resistor setting switch
A switch for connecting a communication terminal resistor to be connected to the slave controller (optional).
- ⑨ CN1: Power connector
Inputs the control power and the drive power.
- ⑩ CN2: Motor connector
Connects the motor cable.

*1 A plug and a connection lever are attached.

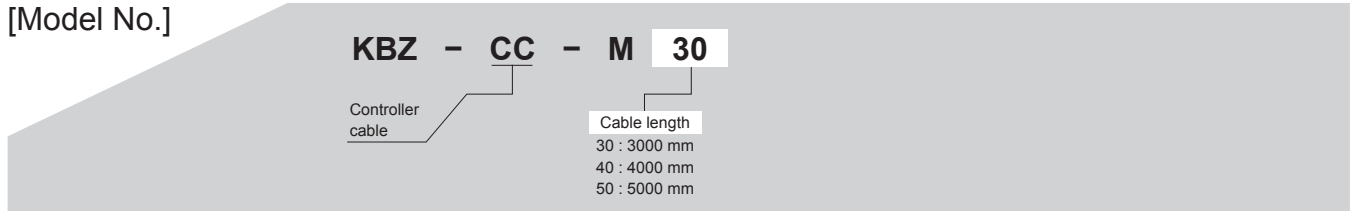
Controller Cables

[Application]

The controller cables are a set of two flexible cables that connect an axis to a controller. The set consists of a motor line and a resolver signal line.

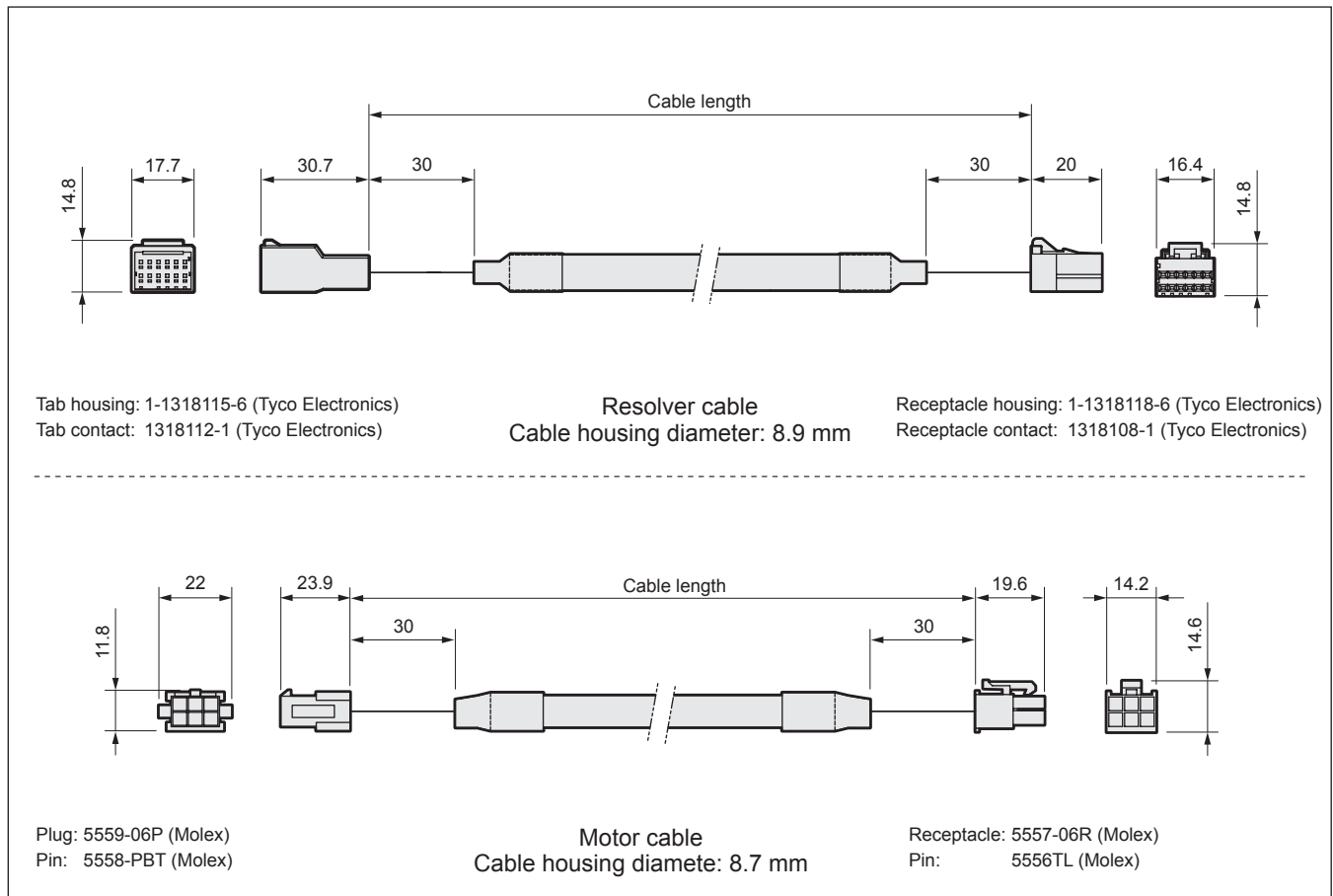
These cables are designed exclusively for use with an axis.

[Model No.]



* The controller cable set consists of a motor line and a resolver signal line.

[Dimensions]

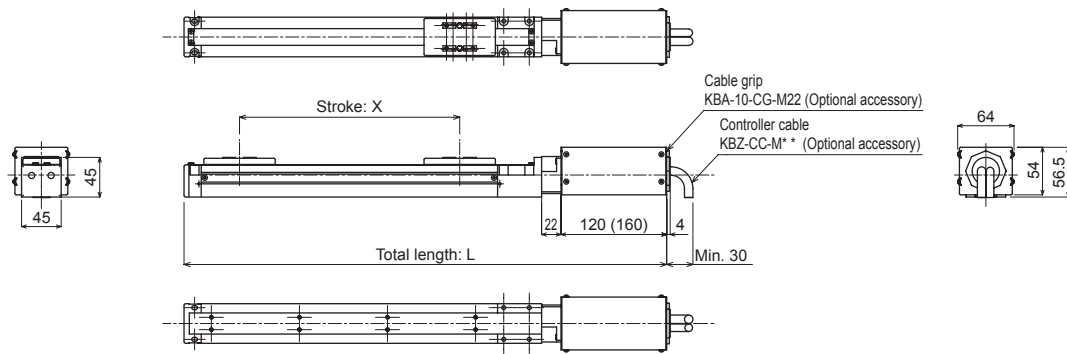


MEMO

Axis with a Motor Cover

[Dimensions]

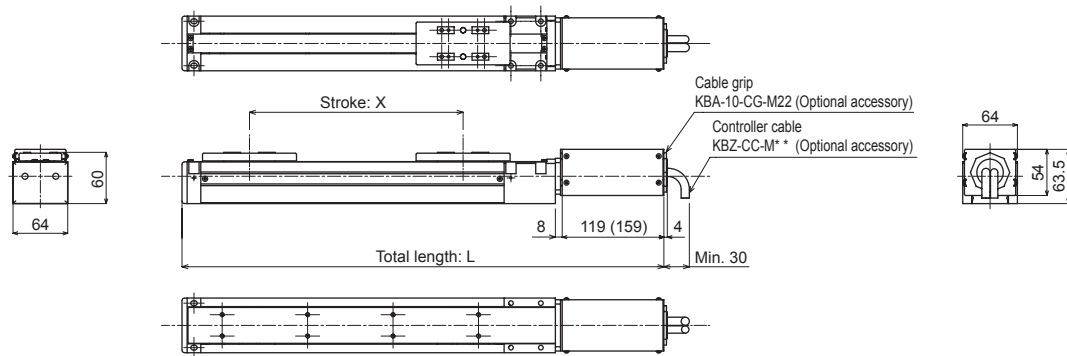
KBZ-5D-ST-M***-**-M



Stroke: X (mm)	50	100	150	200	250	300	350	400	450	500
Total length: L (mm)	348 (388)	398 (438)	448 (488)	498 (538)	548 (588)	598 (638)	648 (688)	698 (738)	748 (788)	798 (838)

Note: Values in parentheses are applied to axes with brake.

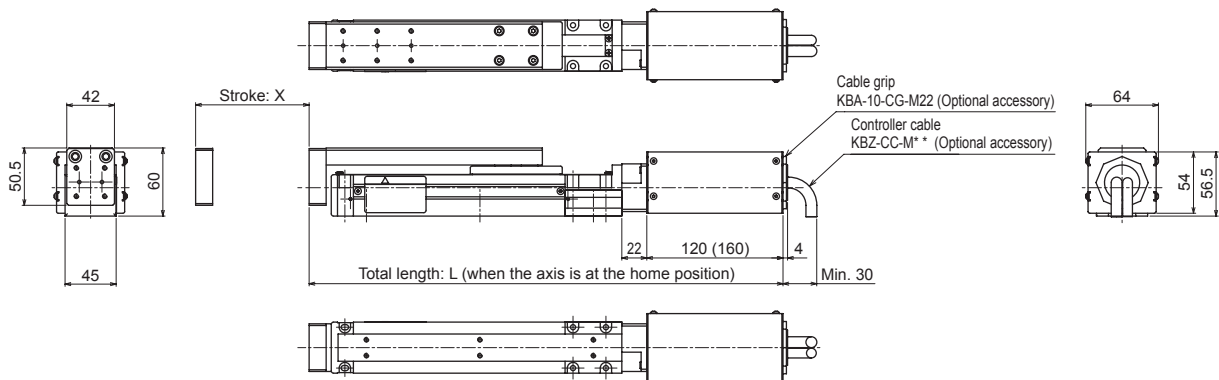
KBZ-7D-ST-M***-**-M



Stroke: X (mm)	50	100	150	200	250	300	350	400	450	500	550	600	700
Total length: L (mm)	364 (404)	414 (454)	464 (504)	514 (554)	564 (604)	614 (654)	664 (704)	714 (754)	764 (804)	814 (854)	864 (904)	914 (954)	1014 (1054)

Note: Values in parentheses are applied to axes with brake.

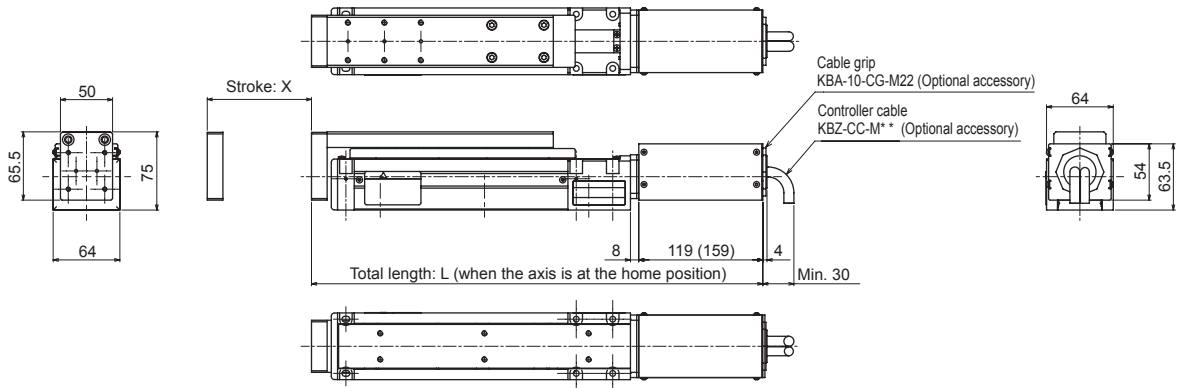
KBZ-5D-ST-T***-**-M



Stroke: X (mm)	50	100
Total length: L (mm)	367.5 (407.5)	417.5 (457.5)

Note: Values in parentheses are applied to axes with brake.

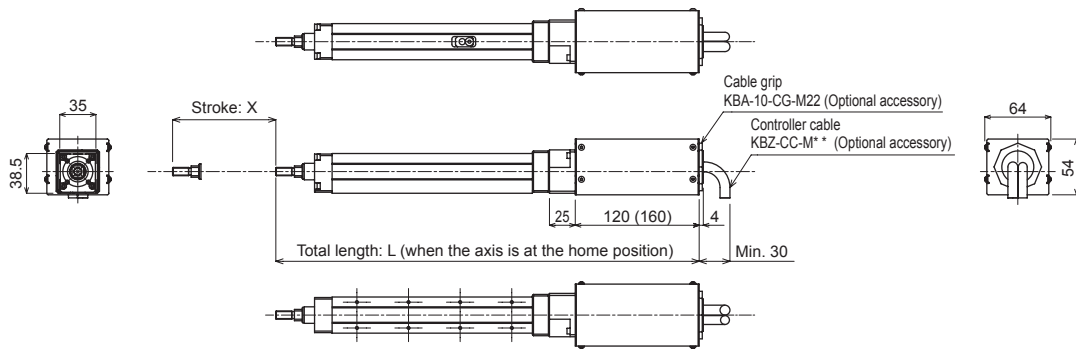
KBZ-7D-ST-T* * * - * * -M



Stroke: X (mm)	50	100	150
Total length: L (mm)	383 (423)	433 (473)	483 (523)

Note: Values in parentheses are applied to axes with brake.

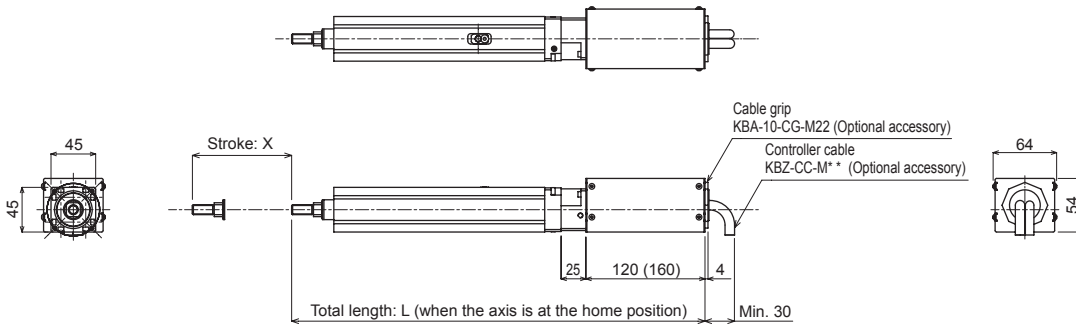
KBZ-3D-ST-C12* * * -M



Stroke: X (mm)	50	100	150
Total length: L (mm)	360 (400)	410 (450)	460 (500)

Note: Values in parentheses are applied to axes with brake.

KBZ-4D-ST-C12* * * -M



Stroke: X (mm)	50	100	150	200
Total length: L (mm)	366.5 (406.5)	416.5 (456.5)	466.5 (506.5)	516.5 (556.5)

Note: Values in parentheses are applied to axes with brake.

Regenerative Resistor

[Application]

The regenerative resistor absorbs energy generated during deceleration of an axis motor. Use it when the load inertia exceeds its allowable value or when a heavy load is brought down by the Z-axis in a long stroke (resulting in high power generation).

(The regenerative resistor prevents generation of an excessive voltage in the controller.)

- * It is available with (KCA-CAR-UN50) or without (KCA-CAR-0500) a cover.
- * All discharged energy is converted into heat.
- * A contact output (N.C) occurs when the resistor generates an unusual amount of heat.
- * This unit supports one axis only.

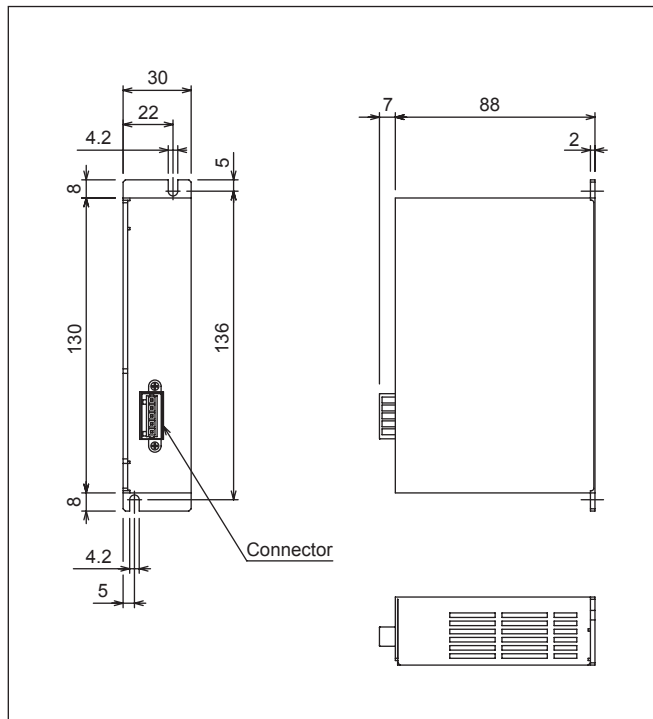
[Model No.]

KCA - CAR - UN50 (Regenerative discharging unit)

KCA - CAR - 0500 (Regenerative discharging resistor)

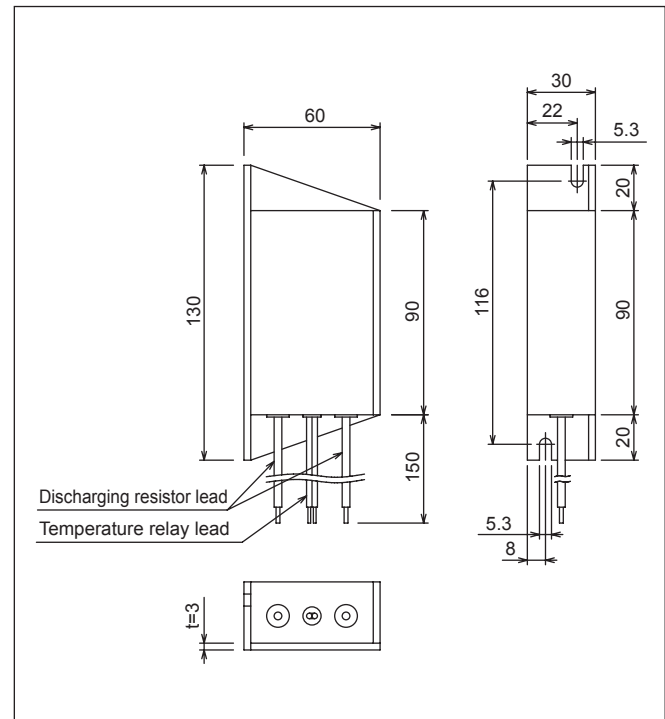
[Dimensions]

KCA-CAR-UN50



Accessory: connector and a connection lever

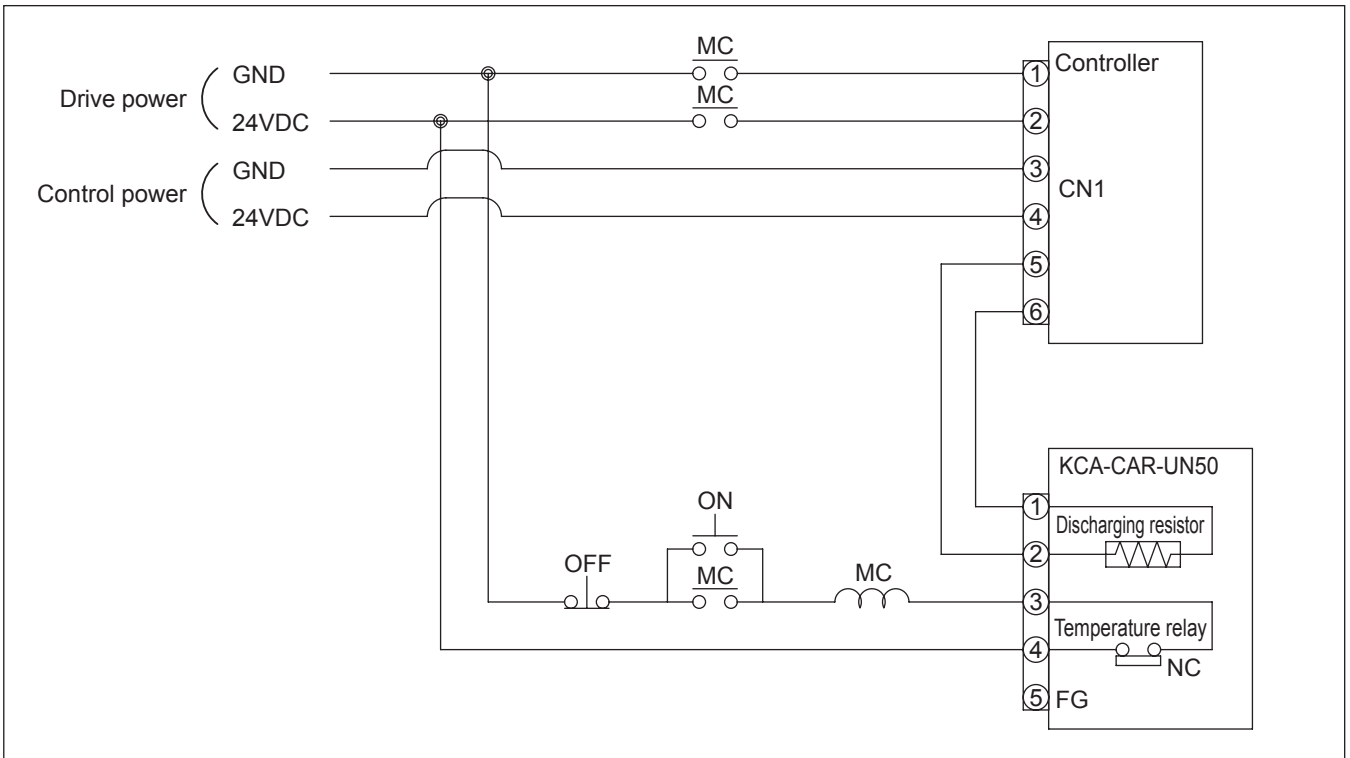
KCA-CAR-0500



Accessory: relay connector × 2

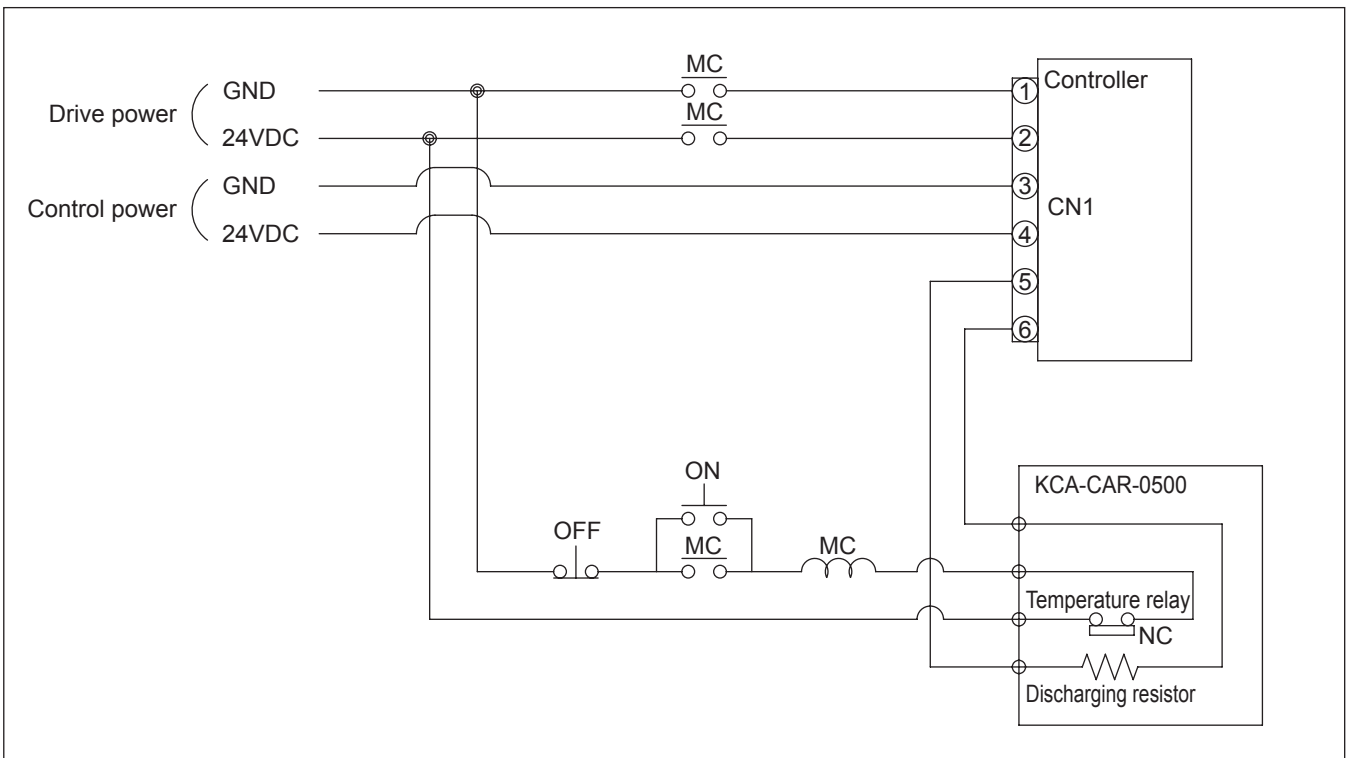
[Connection example]

KCA-CAR-UN50



- The KCA-CAR-UN50 has a built-in temperature relay which will be activated at 120°C.
- When this temperature relay is activated, its output becomes an open circuit.
- When including this temperature relay in the system configuration, create a sequence in which the controller drive power supply is normally off.

KCA-CAR-0500



- The KCA-CAR-0500 has a built-in temperature relay which will be activated at 135°C.
- When this temperature relay is activated, its output becomes an open circuit.
- When including this temperature relay in the system configuration, create a sequence in which the controller drive power supply is normally off.

Teach Pendant

[Application]

The teach pendant connected to a controller serves as a program or parameter input device. In addition, it issues commands to find the home position, start robot operation, stop robot operation, execute JOG move, and activate an emergency stop. It also shows an abnormal or error status, and can cancel it afterwards



[Model No.]

KCA - TPH - 4C

* Supports the software version 2.25 or later.

PC Software

[Application]

The PC software KCA-SF-98D uses a PC as a host computer and supports programming for the KBZ and KBB series. It sends robot controller program data to or receives such data from the PC, and also edits or saves the program data. In addition, it can control monitoring of I/O and coordinates as well as execution of JOG move and return-to-home operation.

[Model No.]

KCA - SF - 98D

* Supports the software version 3.0.0 or later.

[Specifications]

Package content		CD-ROM × 1 and Installation Manual × 1 (communication cable PCBL-31 is sold separately)
Required system	PC	An IBC PC / AT compatible with a serial communication port (D-sub 9-pin) and a CD-ROM drive. Requires available memory of 12 MB or more and available hard disk space of 10 MB or more.
	Compatible OS	WindowsXP (Japanese version), Windows7, or Vista.
	Display	SVGA or higher (resolution of 800 × 600 pixels or higher)
	Printer	A printer that can be connected to a PC and can print out from a Windows OS.
	Communication cable	A communication cable that connects a PC and the controller. Use the PCBL-31.

* Microsoft Windows, Microsoft Windows NT, and Windows logos are registered trademarks or trademarks of Microsoft Corporation in the United States of America.

[Features]

- Its multi-window screen editor facilitates editing of a table or a parameter.
- It sends / receives table or parameter data to / from the controller. It can also save the data as a file.
- It controls axis operations such as teaching and programming.
- It can add titles or comments to tables or parameters upon print out (output to the printer) to facilitate debugging or checking.

Communication Cable (RS-232C)

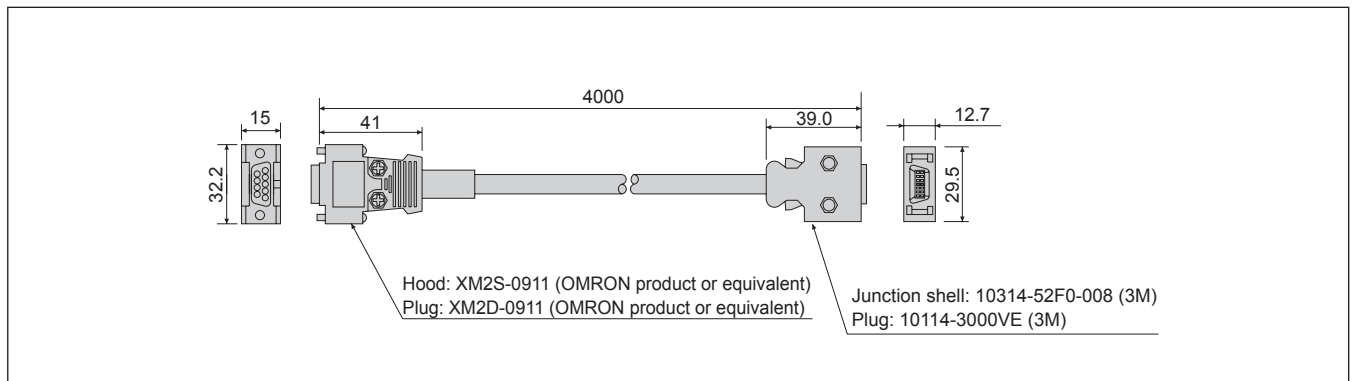
[Application]

This communication cable connects the controller to a PC (IBM / PC compatible).
Use this cable when using the PC software.

[Model No.]

KCA - PCBL - 31

[Dimensions]



Input / Output Cable

[Application]

Connected to the input/output port of the master controller, it transfers signals to / from an external operation panel or control device. The plug on one of the cable ends allows direct connection to the controller.

To connect to an external device, use the color on the core wire and the symbol chart as guides. Crimp the terminal in advance.



[Model No.]

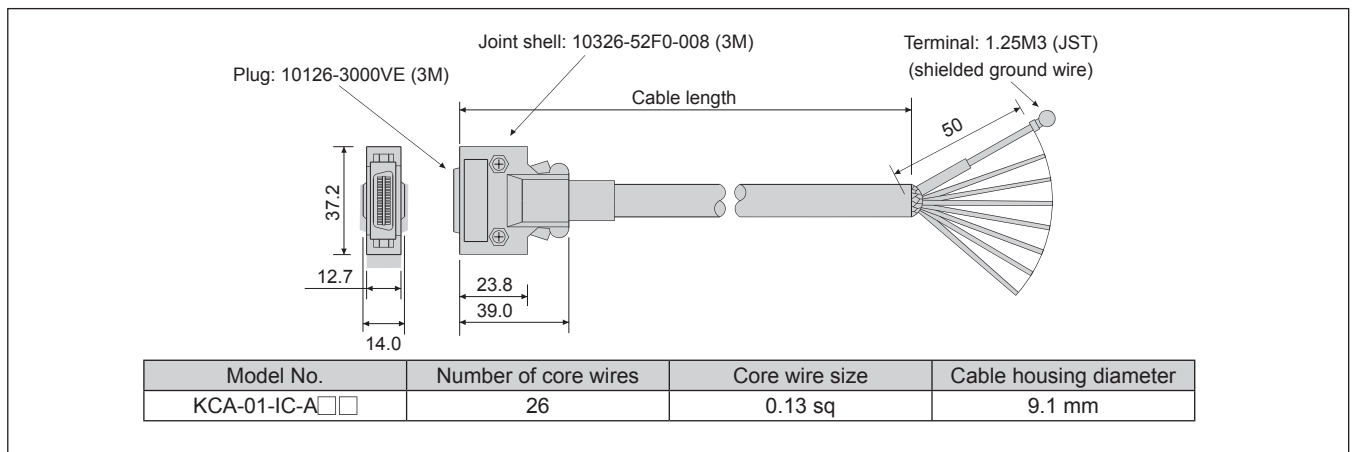
KCA - 01 - IC - A 30 □ □

Input / Output cable

Cable length
30 : 3000 mm
50 : 5000 mm

Version
N/A

[Dimensions]



Resolver ABS Backup Battery (for Maintenance)

[Application]

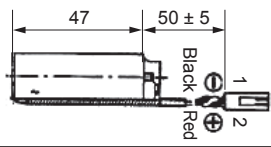
A battery installed to the controller as a backup power for the resolver ABS.

A battery is supplied with the master controller KCA-0I-M05 and slave controller KCA-01-S05 each as a standard accessory.

[Model No.]

KCA - 10 - EB - 05

● Lithium battery specification

Item		Description	Remarks	
Part name		Lithium battery	Thionyl chloride lithium battery	
Model No.		ER17500V C	Manufactured by TOSHIBA	
Specifications	Nominal voltage and capacitance	3.6V 2700mAh		
	Contour	Battery body		∅17 × 47 mm (excluding protrusion)
		Harness length		50 ± 5 mm (excluding connector portion)
	Weight			About 20 g
Backup duration (Note 1)		About one year (Note 2)	At 25°C with a backup current of 260 μA	

(Note 1) Cumulative time while the controller body power is turned off.

(Note 2) Battery duration varies depending on the temperature. Use the values as a guide.

Axes

Durability 32

Allowable Moment

• Allowable static moment 32

• Allowable dynamic moment 33

Control System

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System Input and Output

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• Example of input and output signal connection 39

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• Torque-controlled operation 42

• Return-to-home operation 48

• Area entry signal output 49

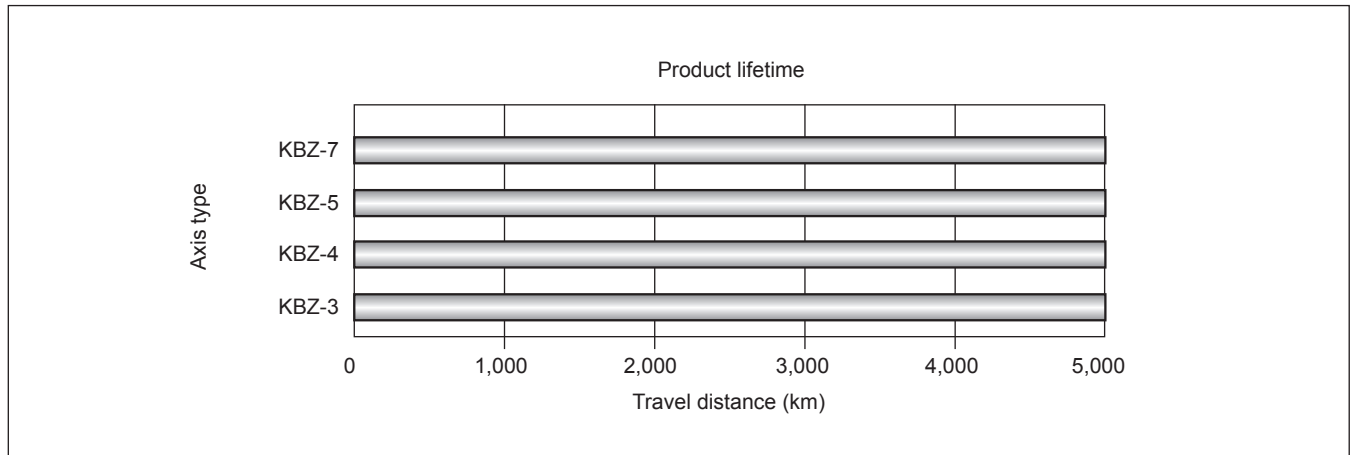
Cycle Time Calculation 50

Relationship between Acceleration /

Deceleration and Load 51

Durability

The max. load capacity and the allowable moment that appear in this catalog have been calculated based on the guide and ball screw lifetimes. The same max. load capacity and the allowable moment apply to the slider, table, and rod types.



Allowable Moment

The moment caused by the load on the robot axis has a great impact on the axle bearing of the slider. Therefore, follow the instructions below

* Do not put on a load that exceeds the max. load capacity

The max. load capacity value is obtained using the servo motor capacity; it changes with acceleration / deceleration time.

* Do not let the moment exceed the allowable static moment

The allowable static moment is the moment generated when the robot is not moving. It is necessary to plan carefully the reactive force generated during workpiece insertion using a cylinder attached to the slider. Do not give a shock load to the axis.

* Do not let the moment exceed the allowable dynamic moment

The allowable dynamic moment is the moment generated due to acceleration or deceleration. It changes with the size of load, arm length, and arm direction; therefore, it needs to be calculated in each case.

The chart below is provided as a guide.

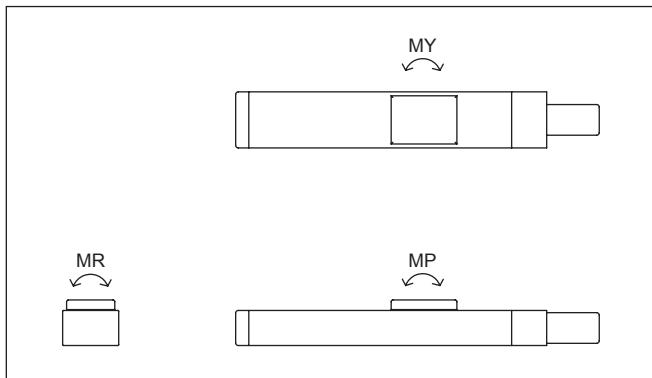
1. Allowable static moment

MR: rolling moment

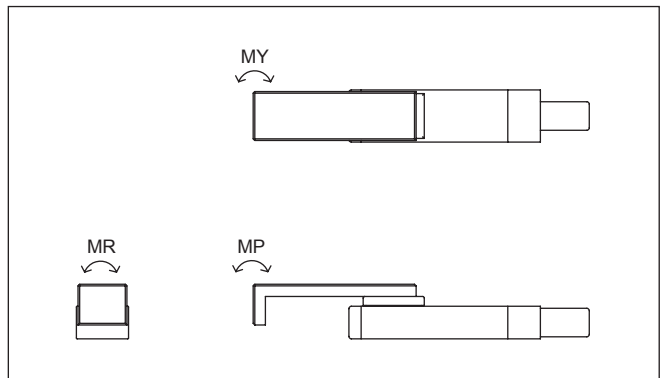
MP: pitching moment

MY: yawing moment

● Slider type: center of the slider



● Table type: positive stroke limit at the center of the table end



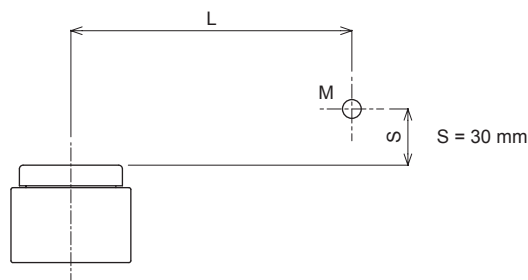
Allowable static moment N•m		MR		MP		MY	
How to order		KBZ-5D	KBZ-7D	KBZ-5D	KBZ-7D	KBZ-5D	KBZ-7D
Slider type		31	58	12	25.7	12	25.7
Table type	Stroke: 50 mm	4.4	11.7	1.9	3.8	1.9	3.8
	Stroke: 100 mm	4.4	11.7	1.2	2.3	1.2	2.3
	Stroke: 150 mm	-	11.7	-	1.7	-	1.7

2. Allowable dynamic moment

The dynamic moment of the axis has a great impact on the lifetime and performance of the product. It is therefore necessary to plan carefully the acceleration load, arm length, arm direction, arm speed, and arm stroke. This section provides the allowable dynamic moment tables. They show the relationships between the weight and allowable arm length to allow quick calculation of allowable dynamic moment. The tables show the load weight (kg) and the arm length to the center of gravity of the load (note that the values shown are not allowable moment values).

[Allowable dynamic moment tables] KBZ-5D, -7D: slider type

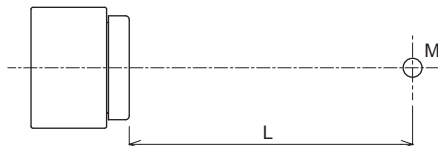
The tables show the load weight (kg) and the arm length to the center of gravity of the load (note that the values shown are not allowable moment values).



[Horizontally mounted axis]

KBZ-5D	Lead	Speed	M [kg]	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	6	400	L [mm]	950	510	350	260	210	175	145	125	110	95	85	75
	12	800	L [mm]	840	455	310	230	185	150	-	-	-	-	-	-

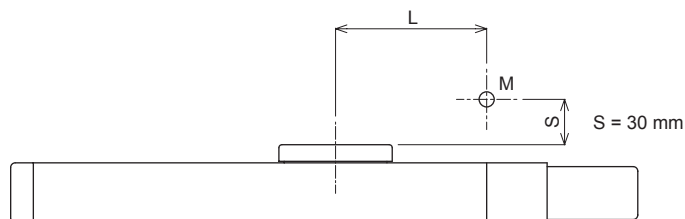
KBZ-7D	Lead	Speed	M [kg]	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	6	400	L [mm]	1100	610	420	310	240	200	160	140	120	105	95	85
	12	800	L [mm]	995	530	355	265	210	175	-	-	-	-	-	-



[Horizontal mounted axis] mounted on the wall

KBZ-5D	Lead	Speed	M [kg]	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	6	400	L [mm]	1290	620	405	295	230	185	155	130	115	100	85	75
	12	800	L [mm]	1230	600	390	285	220	175	-	-	-	-	-	-

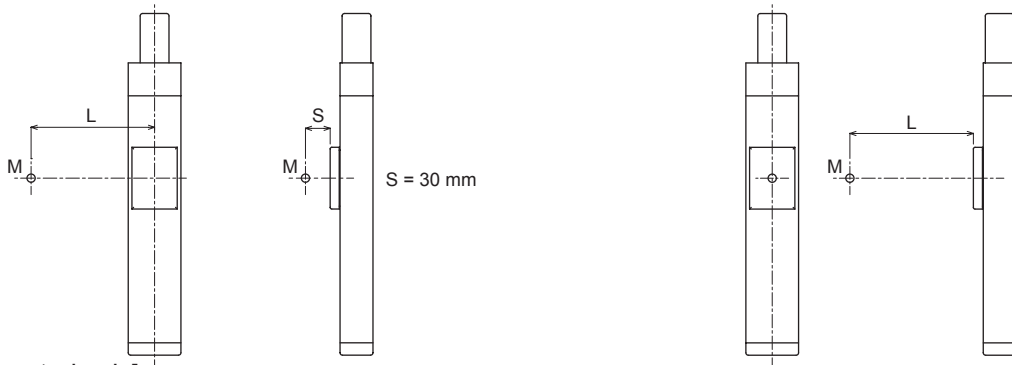
KBZ-7D	Lead	Speed	M [kg]	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	6	400	L [mm]	1440	705	460	335	260	215	180	150	130	115	100	90
	12	800	L [mm]	1425	695	455	330	260	215	-	-	-	-	-	-



[Horizontally mounted axis]

KBZ-5D	Lead	Speed	M [kg]	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	6	400	L [mm]	650	380	260	200	165	135	115	100	90	80	70	60
	12	800	L [mm]	580	335	235	175	145	120	-	-	-	-	-	-

KBZ-7D	Lead	Speed	M [kg]	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
	6	400	L [mm]	650	375	265	200	160	135	115	100	85	70	65	55
	12	800	L [mm]	575	330	230	175	140	115	-	-	-	-	-	-



[Vertically mounted axis]

KBZ-5D	Lead	Speed	M [kg]	0.5	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	700	330	200	140	100	75
	12	800	L [mm]	660	305	185	-	-	-

KBZ-5D	Lead	Speed	M [kg]	0.5	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	730	360	230	170	130	105
	12	800	L [mm]	690	330	215	-	-	-

KBZ-7D	Lead	Speed	M [kg]	1.0	2.0	3.0	4.0
	6	400	L [mm]	680	315	195	130
	12	800	L [mm]	600	300	-	-

KBZ-7D	Lead	Speed	M [kg]	1.0	2.0	3.0	4.0
	6	400	L [mm]	630	340	220	160
	12	800	L [mm]	630	330	-	-

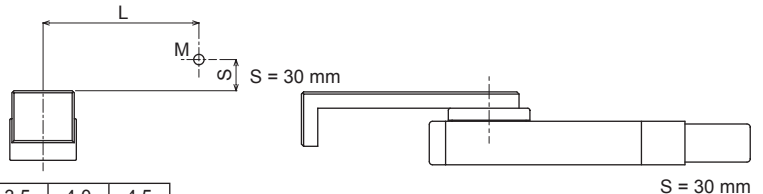
[Allowable dynamic moment tables] KBZ-5D, -7D, table type

The tables show the load weight (kg) and the arm length to the center of gravity of the load (note that the values shown are not allowable moment values).

[Horizontally mounted axis]

★ Stroke 100 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	185	60	-	-	-
	12	800	L [mm]	95	5	-	-	-



★ Stroke 50 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
	6	400	L [mm]	255	130	60	15	-	-	-	-
	12	800	L [mm]	190	85	25	-	-	-	-	-

★ Stroke 150 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	2.9	3.4	3.8
	6	400	L [mm]	450	230	130	20	-	-	-
	12	800	L [mm]	370	160	45	-	-	-	-

★ Stroke 100 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	2.8	3.3	3.8	4.3	4.8	5.3	5.6
	6	400	L [mm]	600	350	210	120	80	25	-	-	-	-	-
	12	800	L [mm]	500	280	150	65	20	-	-	-	-	-	-

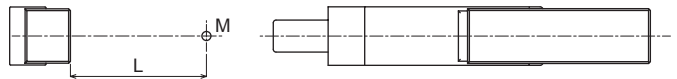
★ Stroke 50 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	
	6	400	L [mm]	700	450	305	210	145	95	55	20	-	-	-	-	-	-	-	-	-	-
	12	800	L [mm]	540	340	220	140	85	45	15	-	-	-	-	-	-	-	-	-	-	-

[Horizontal mounted axis] mounted on the wall

★ Stroke 100 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	340	130	30	-	-
	12	800	L [mm]	290	80	-	-	-



★ Stroke 50 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
	6	400	L [mm]	420	210	100	40	-	-	-	-
	12	800	L [mm]	390	180	70	0	-	-	-	-

★ Stroke 150 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	1.9	2.5	3.0	3.5	3.8
	6	400	L [mm]	950	500	310	160	70	-	-
	12	800	L [mm]	920	460	260	-	-	-	-

★ Stroke 100 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	2.8	3.5	4.0	4.5	5.0	5.5	5.6
	6	400	L [mm]	1060	600	370	230	170	90	40	-	-	-	-
	12	800	L [mm]	1040	570	330	190	120	-	-	-	-	-	-

★ Stroke 50 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	
	6	400	L [mm]	1170	700	450	310	220	150	100	60	30	-	-	-	-	-	-	-	-	-
	12	800	L [mm]	1150	670	430	290	190	120	65	20	-	-	-	-	-	-	-	-	-	-

[Horizontally mounted axis]

★ Stroke 100 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	95	30	-15	-40	-65
	12	800	L [mm]	60	5	-	-	-

★ Stroke 50 mm

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
	6	400	L [mm]	155	85	40	10	-10	-30	-45	-60
	12	800	L [mm]	125	60	20	-	-	-	-	-

★ Stroke 150 mm

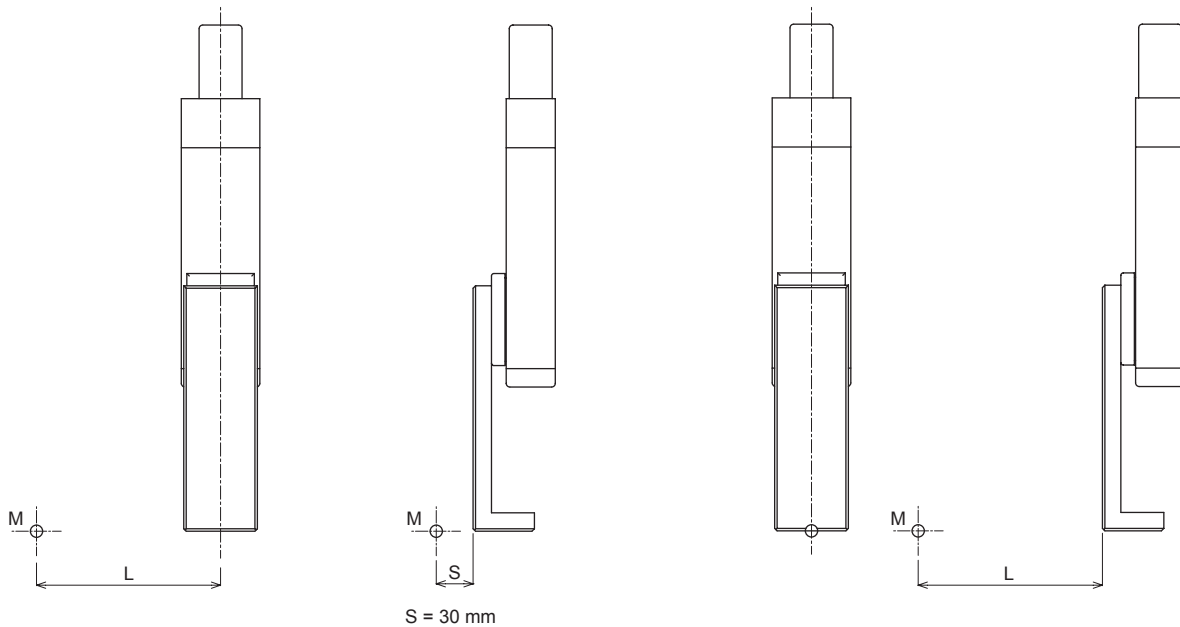
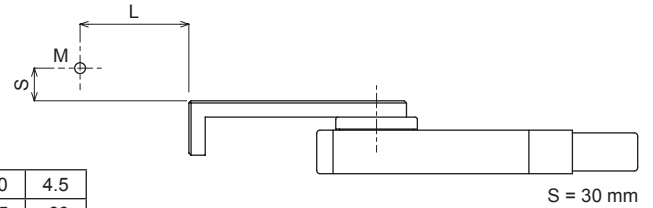
KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	3.8
	6	400	L [mm]	185	100	50	10	-25	-50	-70
	12	800	L [mm]	130	55	15	-	-	-	-

★ Stroke 100 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	2.8	3.5	4.0	4.5	5.0	5.5	5.6
	6	400	L [mm]	255	165	100	60	35	10	-15	-35	-50	-65	-75
	12	800	L [mm]	200	120	65	25	5	-	-	-	-	-	-

★ Stroke 50 mm

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
	6	400	L [mm]	300	230	160	115	80	50	30	10	-5	-20	-30	-40	-50	-60	-65	-70	-75
	12	800	L [mm]	270	180	120	80	50	25	5	-10	-	-	-	-	-	-	-	-	-



[Vertically mounted axis]

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	240	160	115	75	55
	12	800	L [mm]	270	-	-	-	-

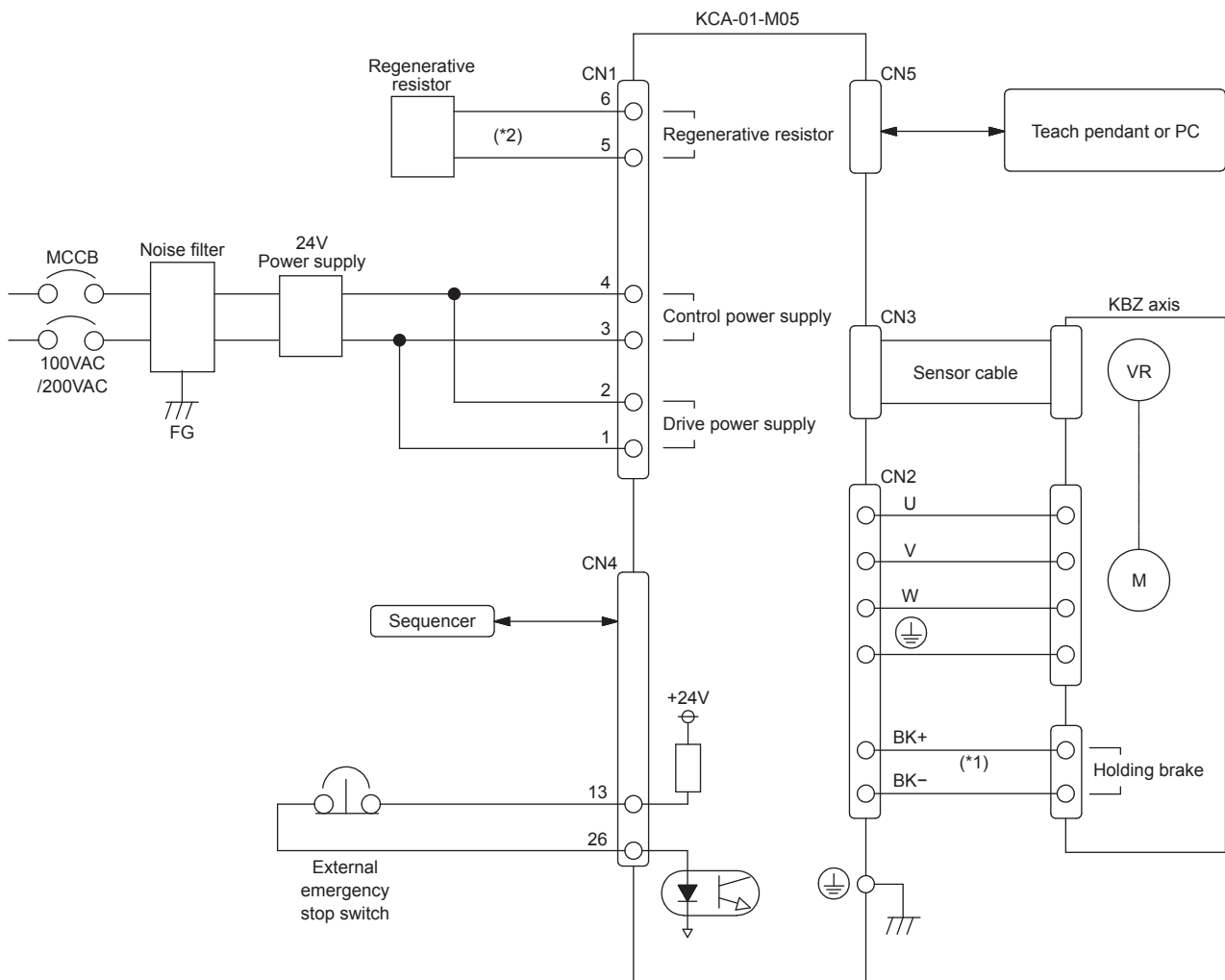
KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0
	6	400	L [mm]	570	315	245	200	165	135	110
	12	800	L [mm]	430	330	-	-	-	-	-

KBZ-5D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0
	6	400	L [mm]	270	190	145	105	85
	12	800	L [mm]	295	-	-	-	-

KBZ-7D	Lead	Speed	M [kg]	1.0	1.5	2.0	2.5	3.0	3.5	4.0
	6	400	L [mm]	440	340	275	195	200	165	140
	12	800	L [mm]	460	360	-	-	-	-	-

Controller KCA-01-M05

[Connection]



(*1) There is no wiring to the connector if a motor without a holding brake is used.

(*2) This connection is required when there is a large amount of regenerative energy.

System Input and Output

[System input]

Input No.	Signal	Description	Note
IN1	START	Axis start An input for starting axis operation.	The signal is detected at the rising edge.
	+JOG	+JOG move An input for starting a JOG move into the positive direction.	The robot moves when the signal is on and stops when it is off.
IN2	STOP	Stop input An input for terminating travel.	Signal level is detected.
	-JOG	-JOG move An input for starting a JOG move into the negative direction.	The robot moves when the signal is on and stops when it is off.
IN3	SVON	Servo ON An input for enabling servo locking.	Servo locking is enabled at the rising edge. The servo is released at the falling edge.
IN4	WRITE	Write An input for writing coordinates in the point table (T01).	
IN5	ALRST	Error reset An input for canceling the error state.	The signal is detected at the rising edge.
IN6	RTSEL	Switch between operation / teaching An input for switching between operation mode and teaching mode.	Operation mode is active when the signal is off, and teaching mode is active when it is on.
IN7	PIN1	Command point number An input for specifying a point table (T01) number. Turn on the start signal while signals from IN7 to IN10 are all set to ON to execute return-to-home operation.	
IN8	PIN2		
IN9	PIN4		
IN10	PIN8		

[System output]

Input No.	Signal	Description	Note
OUT1	RUN	Robot in operation This signal turns on while the robot is in operation. It also turns on during return-to-home operation and JOG move.	
OUT2	ERROR	Error detected This signal turns on when an error occurs.	Use Parameter M13 to select one as the OUT2 function.
	RDY/ERR	System in the READY state or an error detected This signal turns on after control power is turned on and then controller initialization is complete. The signal turns off when an error occurs.	
OUT3	POSI	Positioning complete This signal indicates that the robot at the target position finished positioning.	The signal stays off until return-to-home operation is complete, while the robot travels, and while the servo is free.
OUT4	AREA	Slider in designated area A specified output logic signal is output while the axis slider is within the specified coordinates.	This output signal is disabled until return-to-home operation is complete.

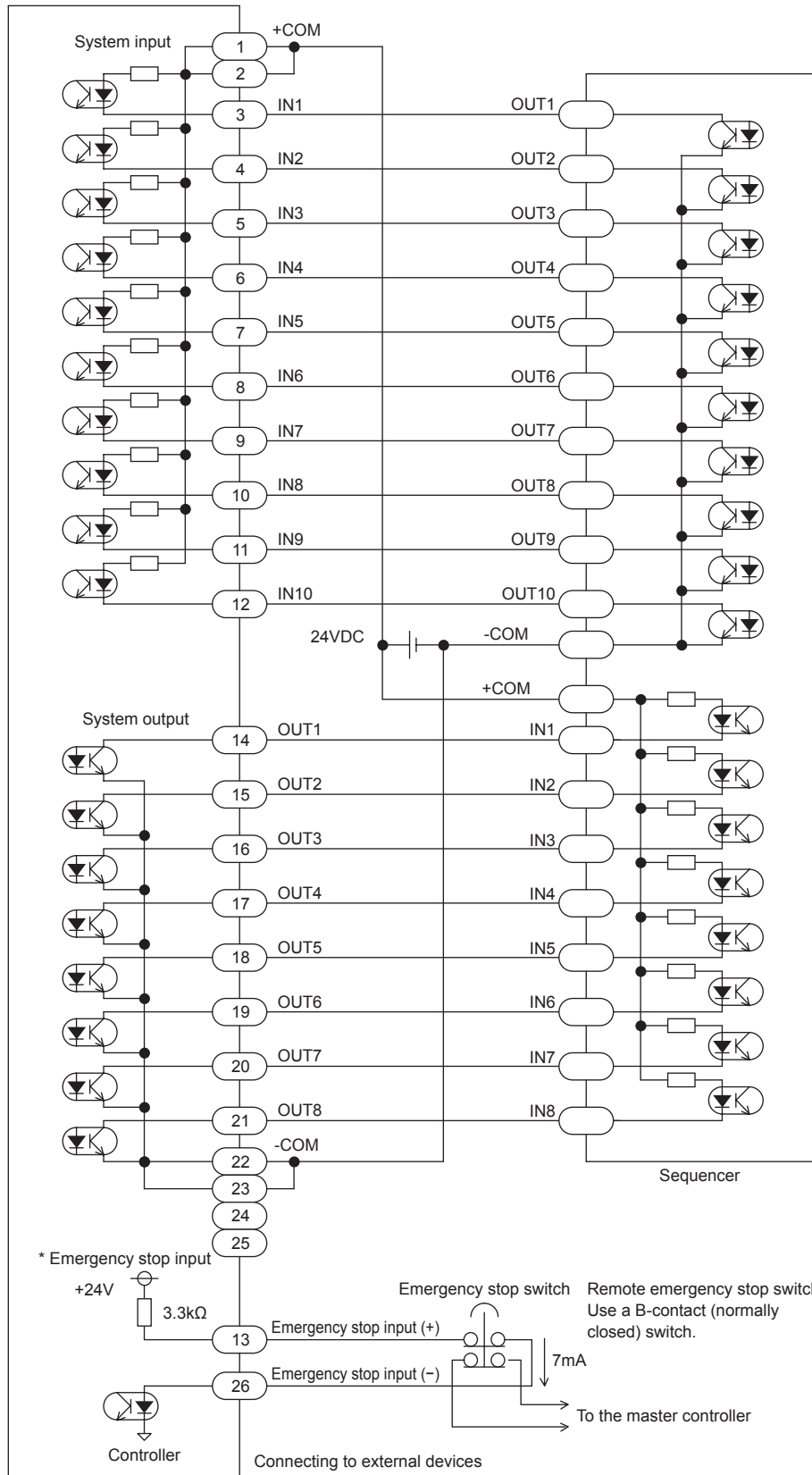
Normal operation

OUT5	POUT1	Completion point number After robot travel is complete, a point table number specified by IN7 to IN10 is output.	F (=1111) is output if the robot decelerates and stops due to a stop signal or if it stops due to an emergency stop signal. The value 0 (=0000) is output during return-to-home operation.
OUT6	POUT2		
OUT7	POUT4		
OUT8	POUT8		

Torque-controlled operation

OUT5	TQCON	Torque-controlled operation in process The signal turns on while torque-controlled operation is in process	
OUT6	TQLOAD	Torque load The signal turns on when the output torque exceeds the load output reference value for torque limit judgement time	The signal turns off if the output torque falls below the load output reference value.
OUT7	TQLIM	Torque limit The signal turns on when torque-controlled operation continues for torque limit judgement time or longer.	The signal turns off if the output torque falls below the torque limit.
OUT8	TQLOCK	Slider locked The signal turns on when the system detects that the slider is locked.	

[Example of input and output signal connection]



* [Emergency stop input]

This input signal activates an emergency stop for the controller. The controller remains in the emergency stop state if the emergency stop circuit is not connected.

(Note) This controller does not support outputting of an emergency stop signal. The emergency stop signal input status can be checked with the master controller. Use a 2B-contact emergency stop switch and connect one of the switch contacts to the master controller.

Operations

This section describes system input-based robot operation. The description applies to the robot operation and system outputs using the teach pendant and the PC software (KCA-SF-98D).

[Overview]

This controller requires no programming. Only parameter and table settings are required for execution of a desired operation.

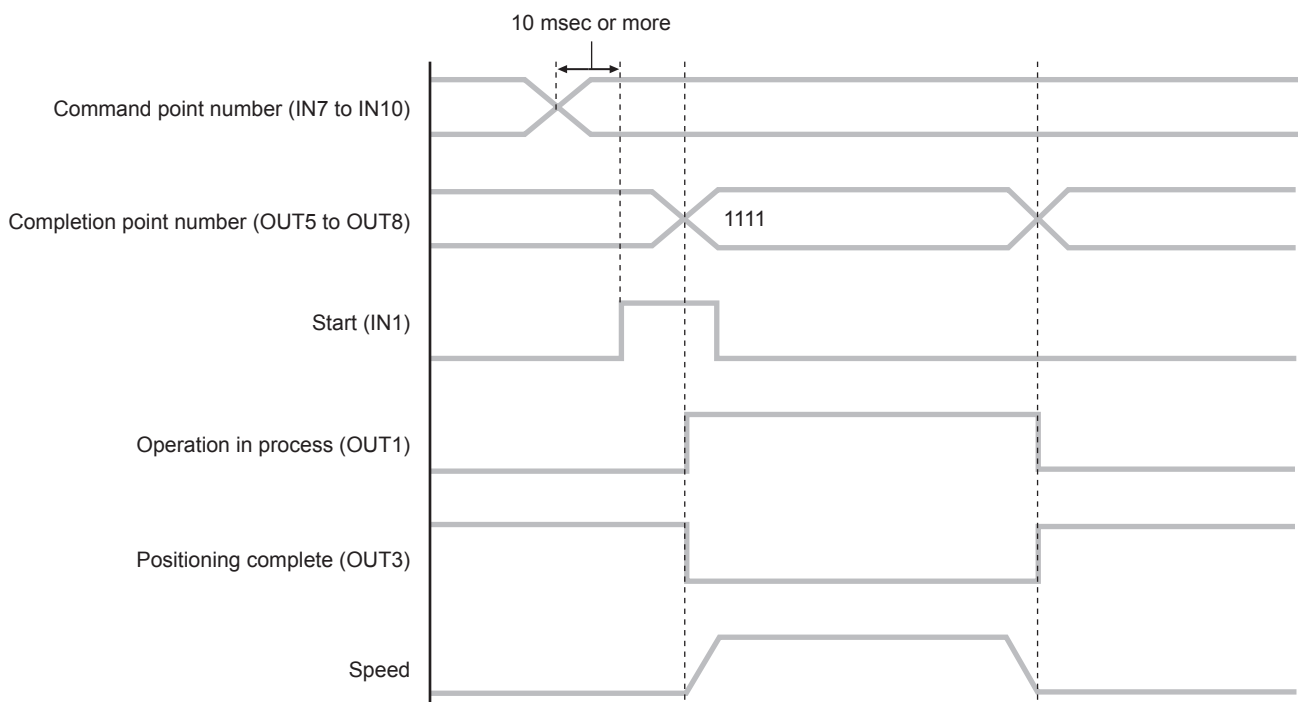
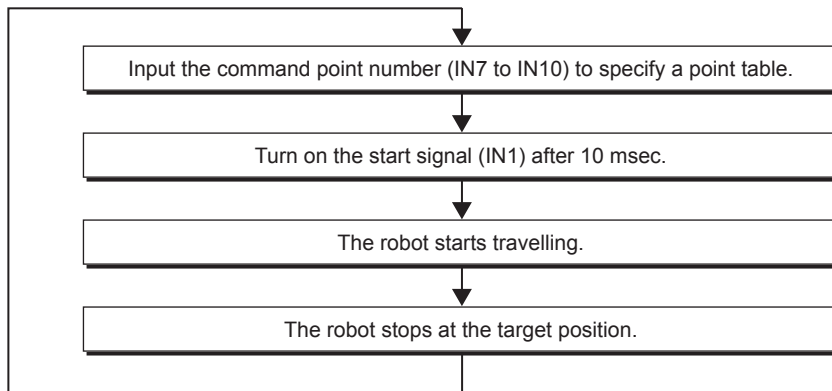
There are two types of operation: normal operation and torque-controlled operation.

In normal operation, the robot moves to the target position with no torque control.

In torque-controlled operation, the robot moves to a tentative target position with no torque control and then moves to the target position with its torque controlled in that direction. The torque-controlled operation is applied when a workpiece needs to be pushed or inserted without excessive force.

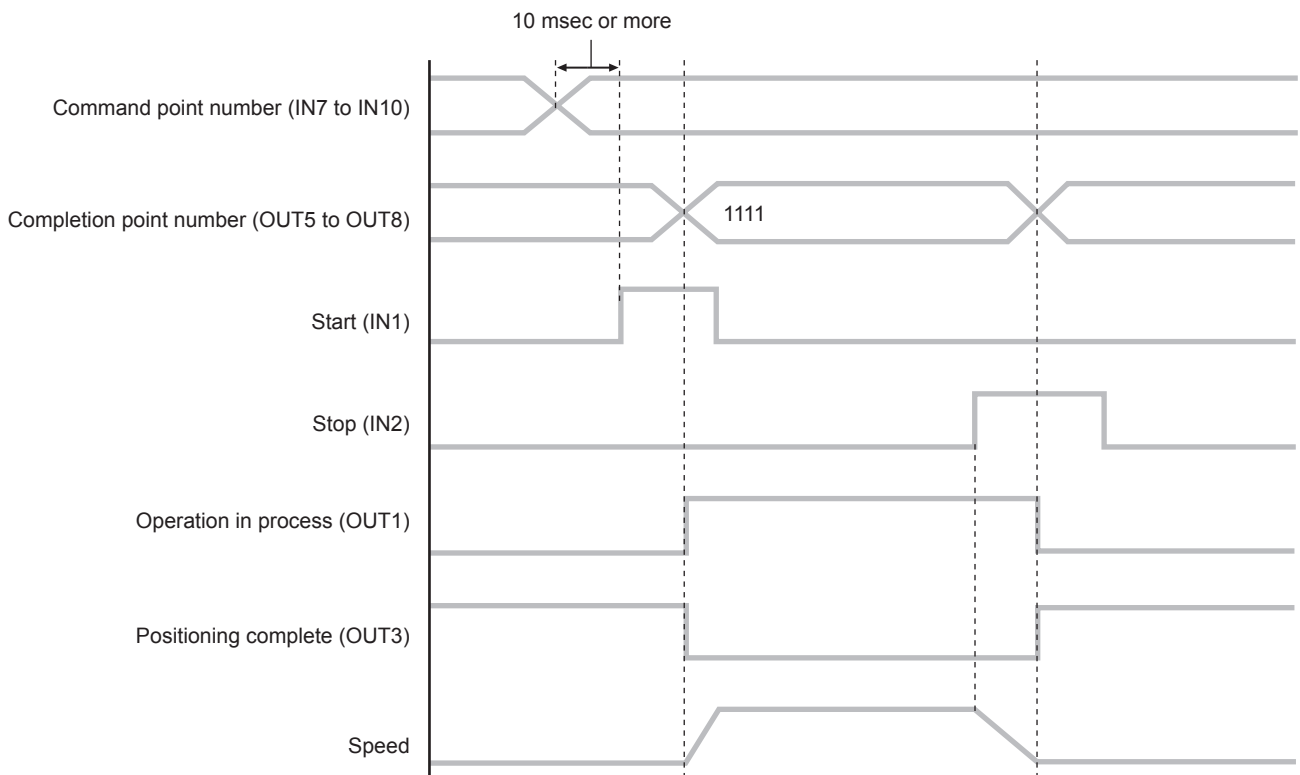
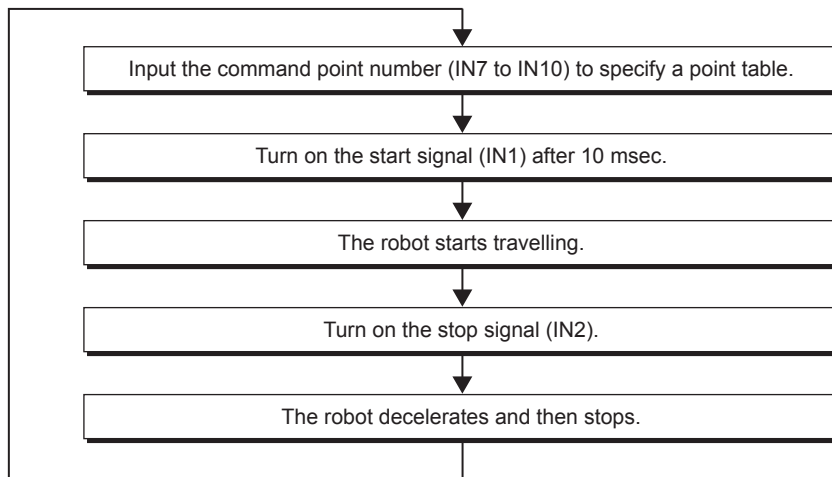
[Normal operation]

■ When the robot stops at the target position



■ When making the moving robot decelerate and stop

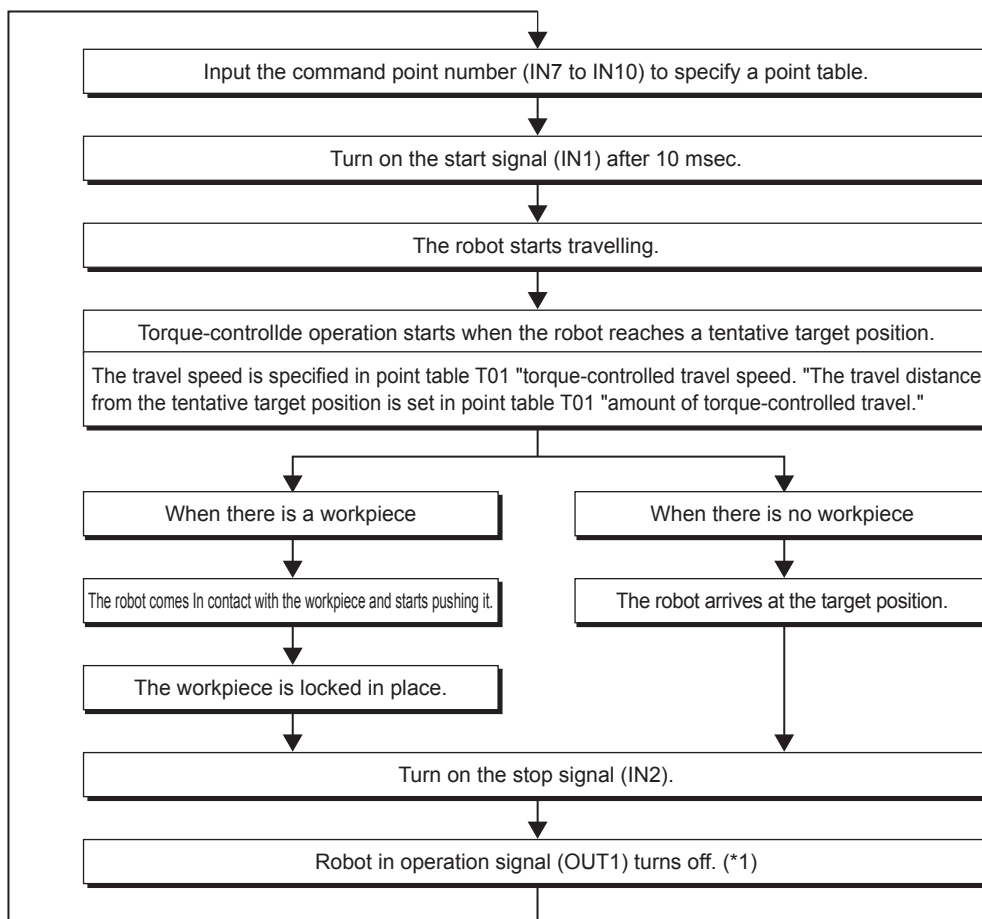
When the stop signal (IN2) is turned on while the robot is moving, the robot decelerates and then stops.



[Torque-controlled operation]

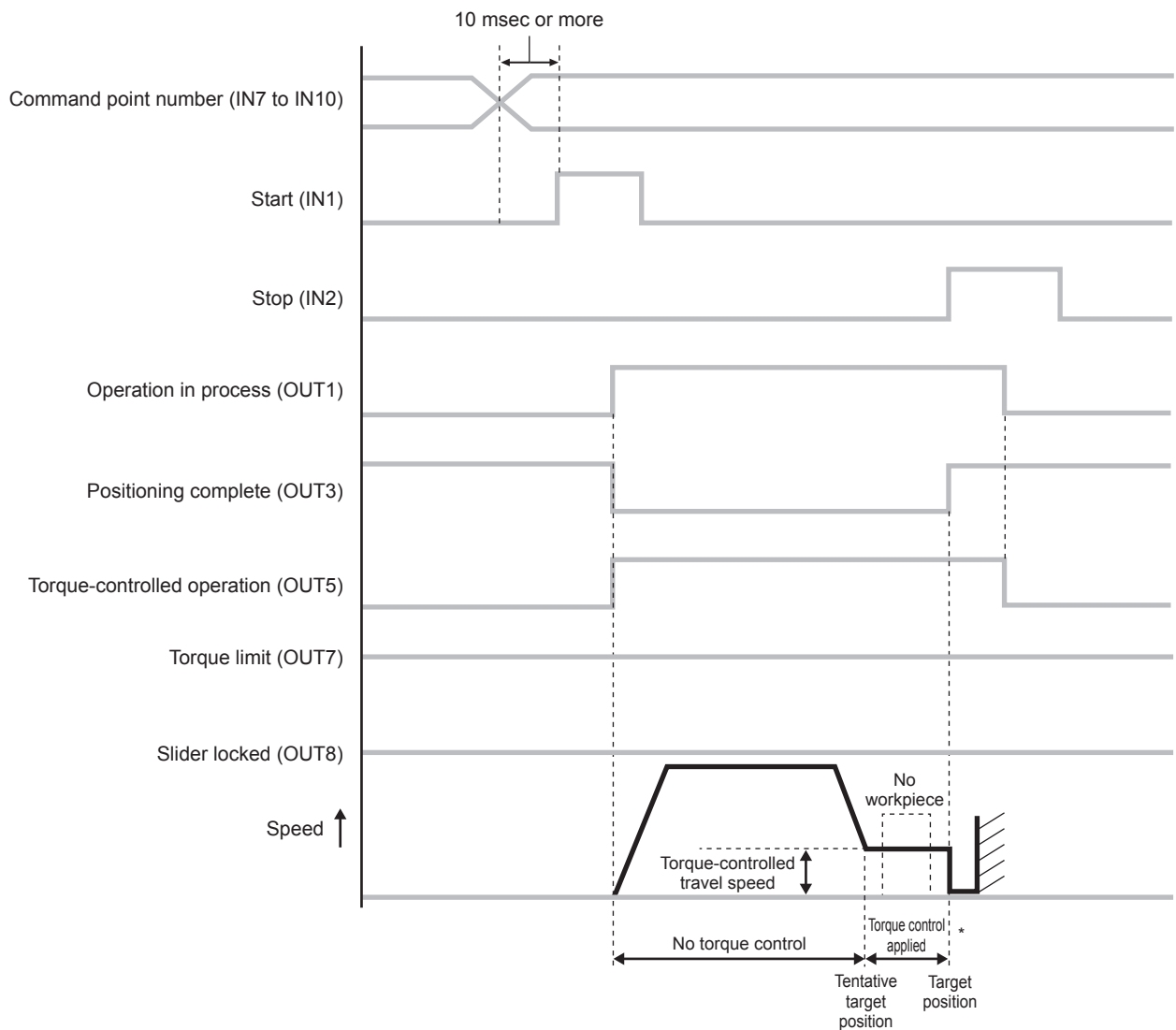
■ Using an external signal to end torque-controlled operation

Torque-controlled operation can be terminated using the master controller. Turn on the stop (IN2) signal. Receiving the status output from a controller, the master controller determines whether or not the torque-controlled operation can end. The master controller can also use its own information in this decision making, allowing for a more flexible process. Determine whether or not a workpiece is present based on the positioning complete (OUT3), torque limit (OUT7), and slider locked (OUT8) signal status. If necessary, the area entry signal output function can also be used to determine whether or not a workpiece is present.



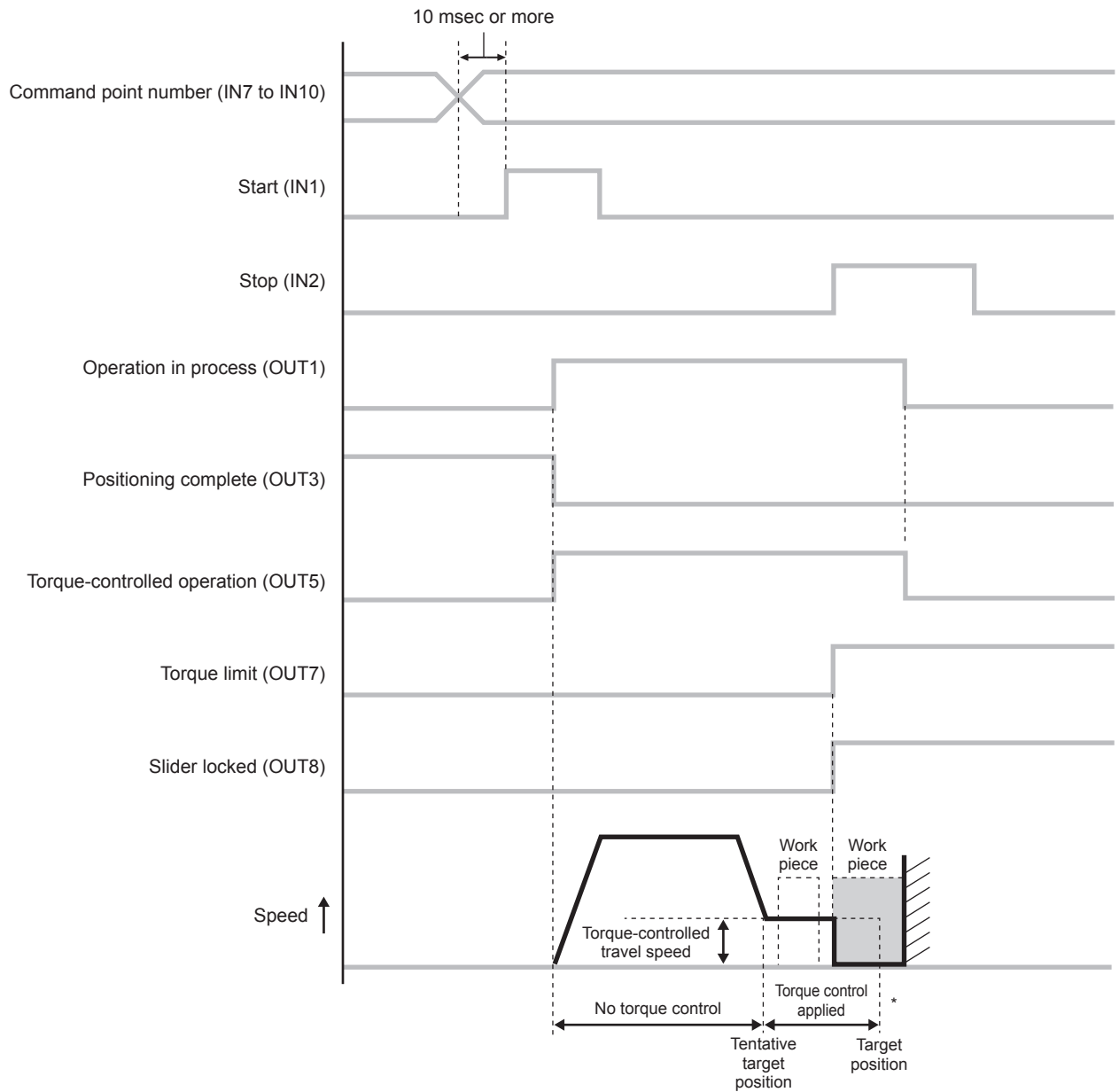
(*1) When a workpiece is present, the robot position control continues with the target position as the final destination. Meanwhile, torque-controlled operation also continues. Output torque control continues until the output torque is at the same level as the torque limit or lower in order to avoid physical shock to the workpiece.

[When there is no workpiece]



* In torque-controlled operation, the robot moves to a tentative target position with no torque control and then moves to the target position with its torque controlled in that direction. The torque-controlled operation is applied when a workpiece needs to be pushed or inserted without excessive force.

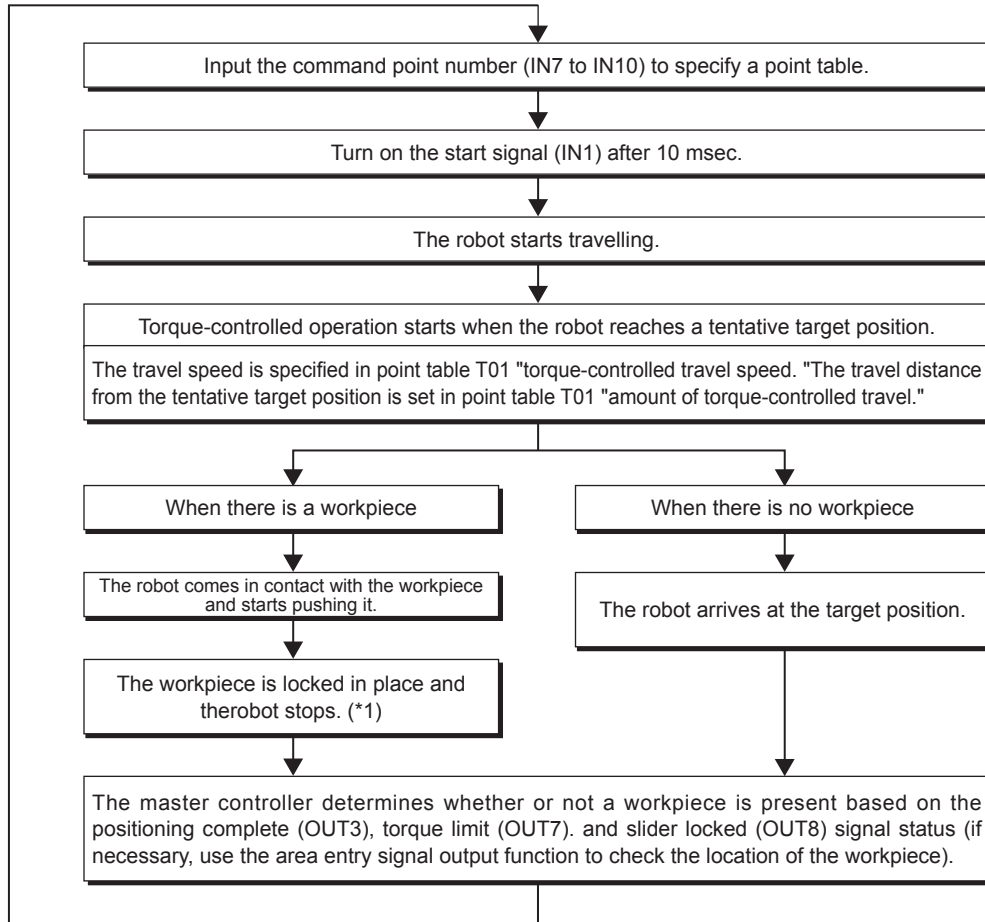
[When there is a workpiece]



* In torque-controlled operation, the robot moves to a tentative target position with no torque control and then moves to the target position with its torque controlled in that direction. The torque-controlled operation is applied when a workpiece needs to be pushed or inserted without excessive force.

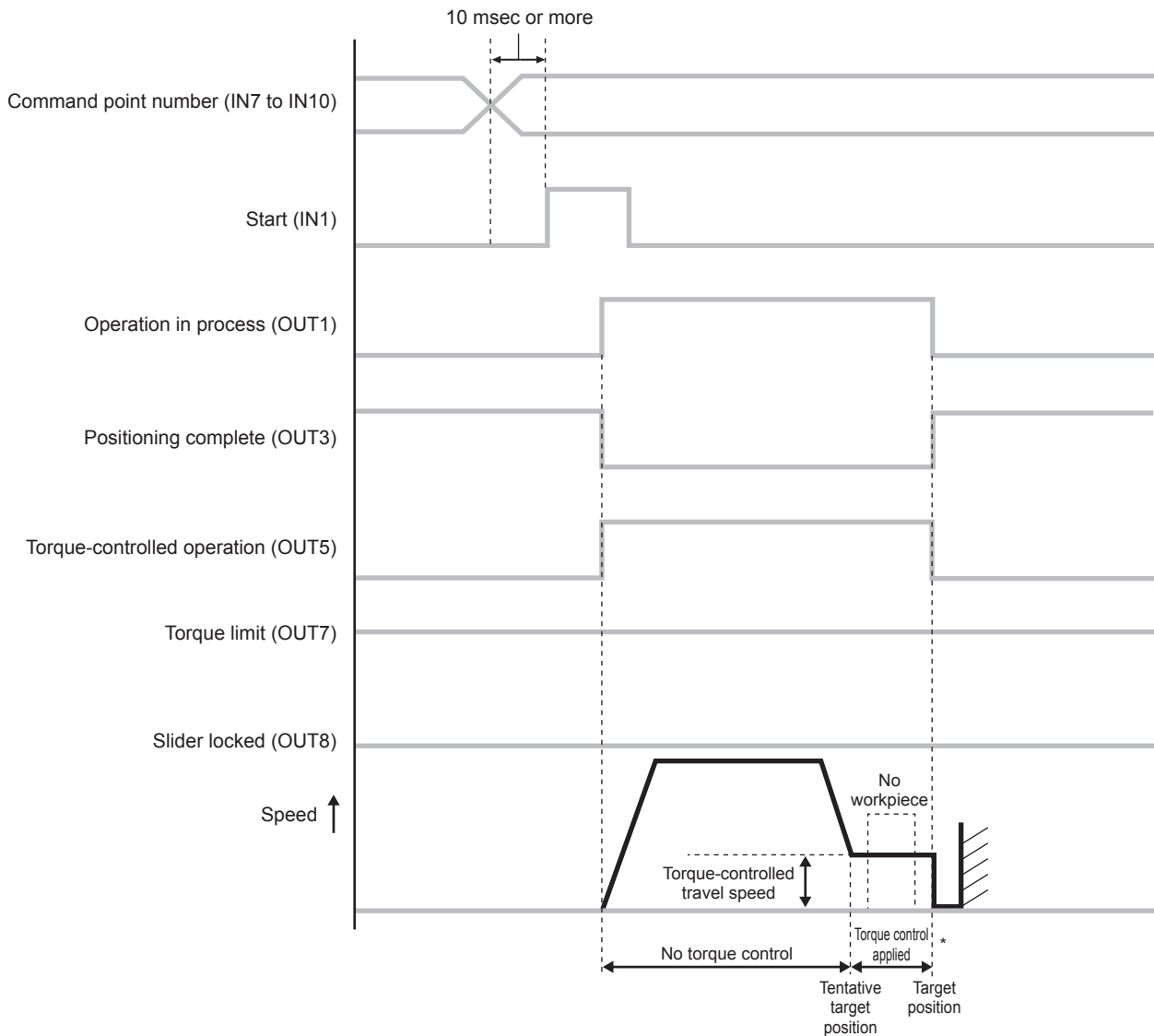
■ Automatic termination of torque-controlled operation

A controller can terminate torque-controlled operation automatically. Turn off the robot in operation signal (OUT1) so that the master controller recognizes that the torque-controlled operation finished. Determine whether or not a workpiece is present based on the positioning complete (OUT3), torque limit (OUT7), and slider locked (OUT8) signal status. If necessary, the area entry signal output function can also be used to determine whether or not a workpiece is present.



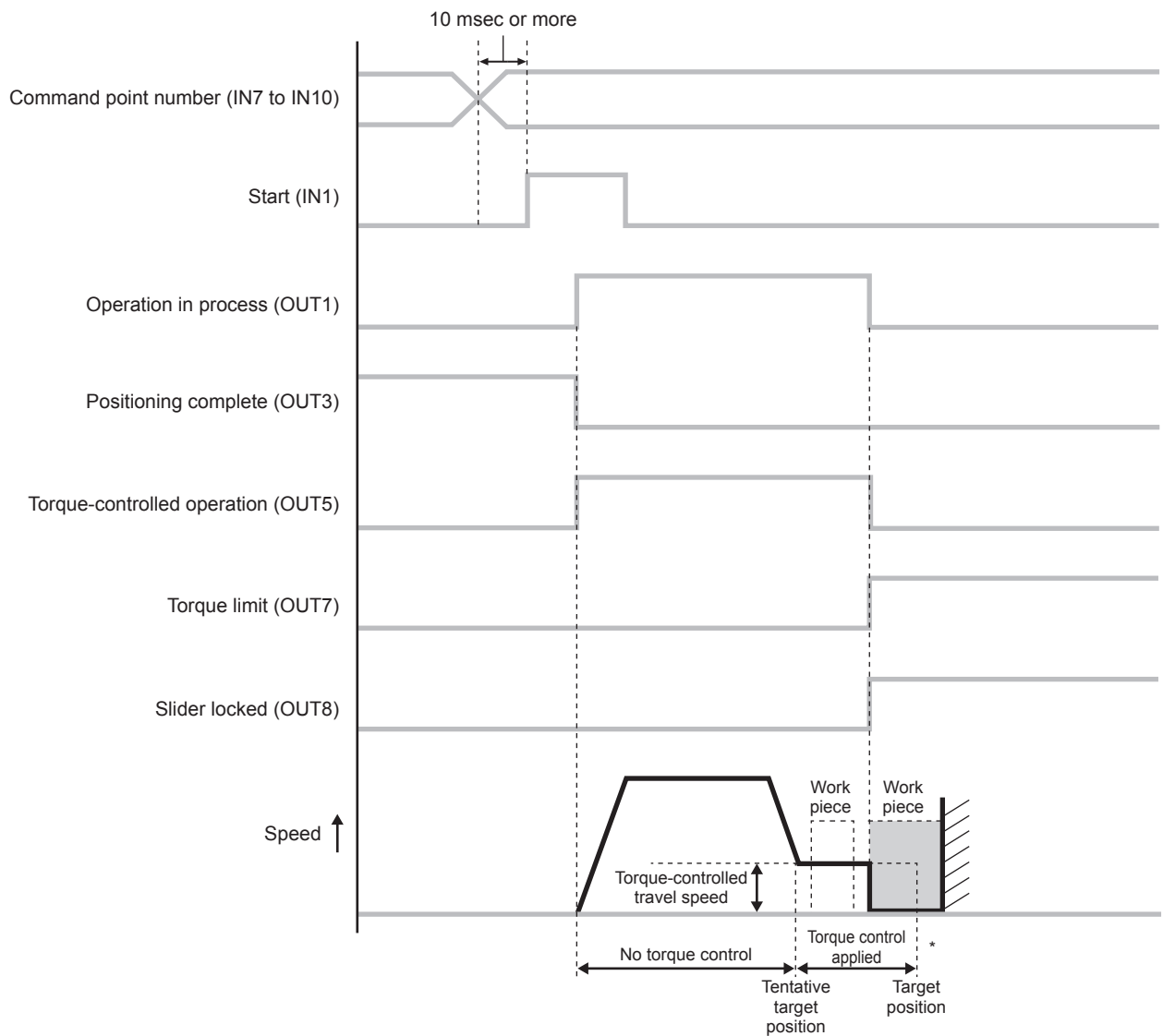
(*1) The robot position control continues with the target position as the final destination. Meanwhile, torque-controlled operation also continues. Output torque control continues until the output torque is at the same level as the torque limit or lower in order to avoid physical shock to the workpiece.

[When there is no workpiece]



* In torque-controlled operation, the robot moves to a tentative target position with no torque control and then moves to the target position with its torque controlled in that direction. The torque-controlled operation is applied when a workpiece needs to be pushed or inserted without excessive force.

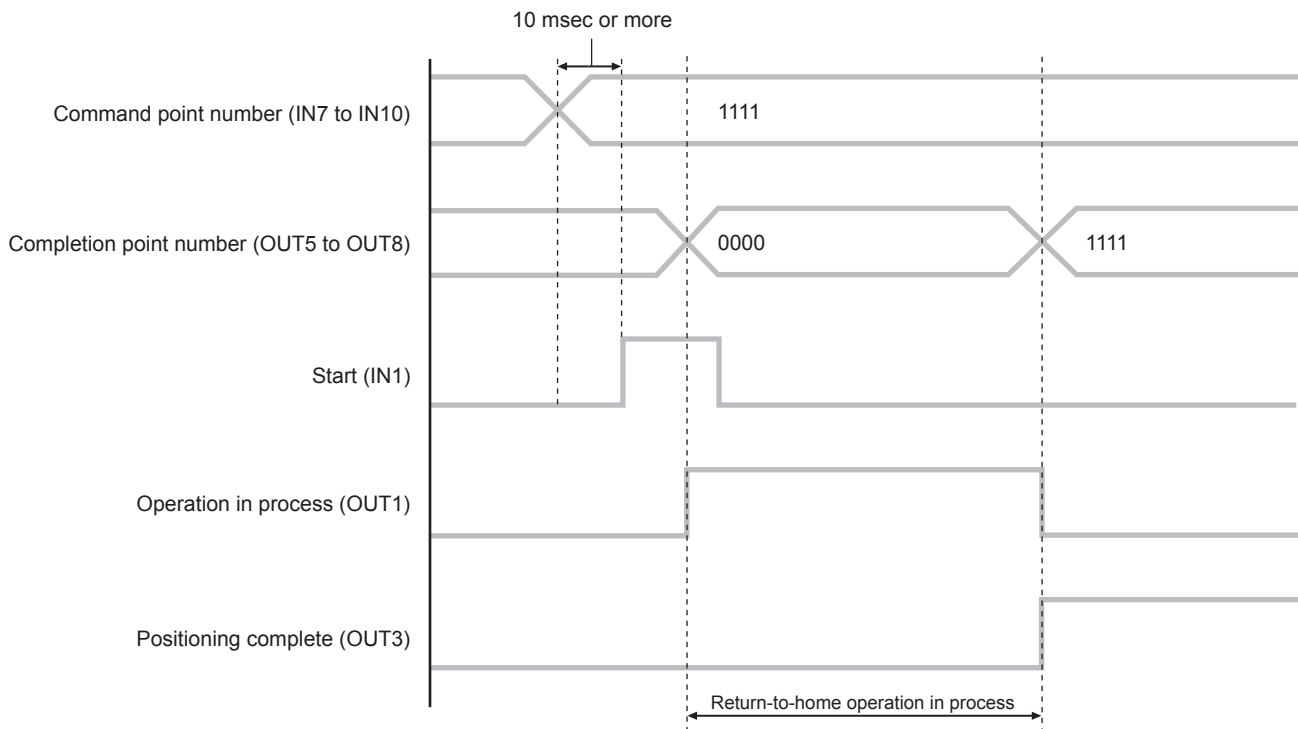
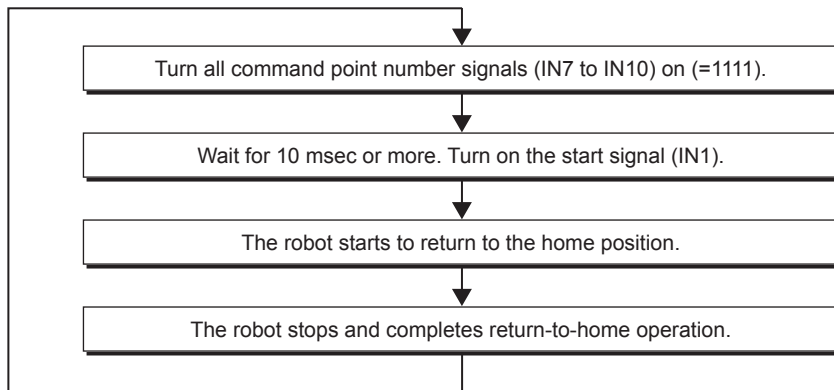
[When there is a workpiece]



* In torque-controlled operation, the robot moves to a tentative target position with no torque control and then moves to the target position with its torque controlled in that direction. The torque-controlled operation is applied when a workpiece needs to be pushed or inserted without excessive force.)

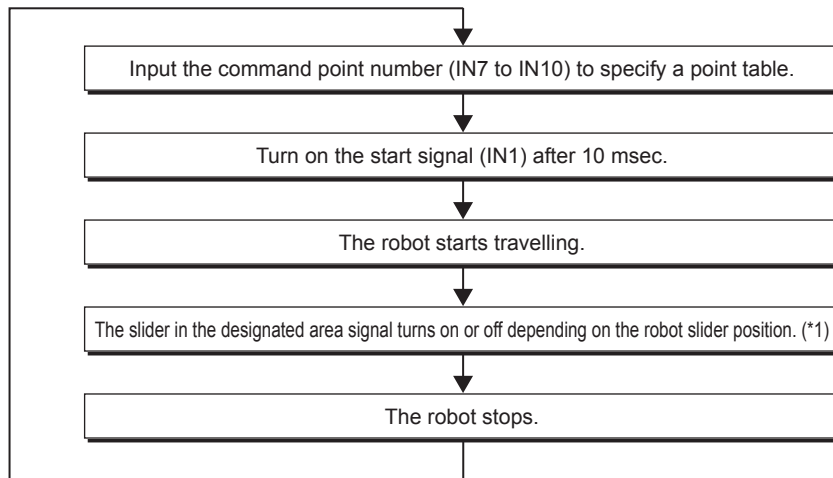
[Return-to-home operation]

Turn all command point number signals (IN7 to IN10) on (=1111), and turn on the start signal (IN1). The robot begins to return to the home position.



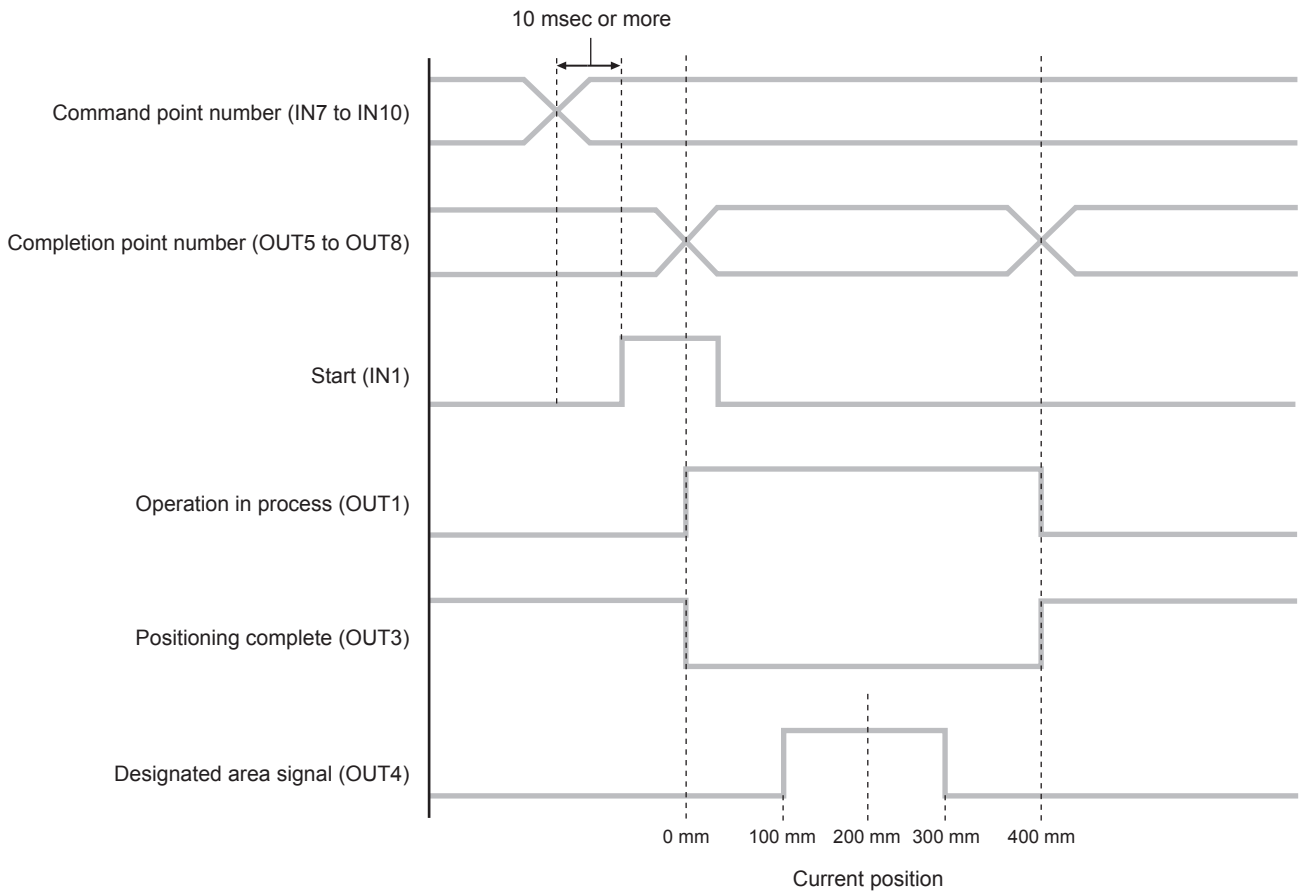
[Area entry signal output]

The slider in designated area signal (OUT4) changes when a robot slider enters the specified coordinates.



(*1) The slider in designated area signal (OUT4) also turns on or off in manual operation.

[The signal turns on when $100 \leq x1 \leq 300$]



Cycle Time Calculation

The cycle time of a robot controlled by the KCA-01-M05 can be obtained as described below.

The calculation result however will be slightly different from the actual value; therefore, use the result only as a guide.

There are two types of calculation: one is the case where there is a constant speed (example 1), and the other one is the case where deceleration starts during acceleration (example 2).

Select ① or ② depending on the travel distance, specified speed, and specified acceleration / deceleration time.

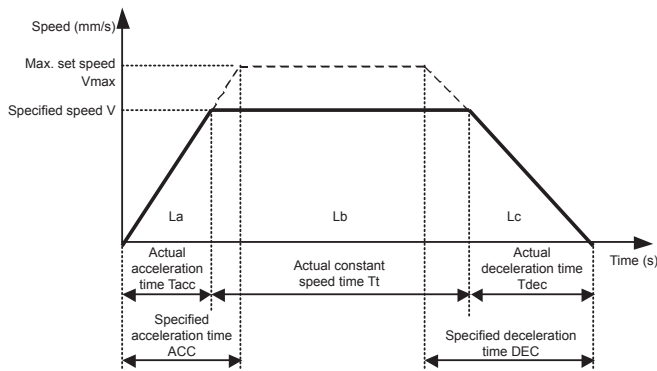
① When Travel distance (L) > $\frac{\text{specified speed [V]}^2 \times [\text{specified acceleration time (ACC)} + \text{specified deceleration time (DEC)}]}{2 \times \text{max. set speed (Vmax)}} \rightarrow \text{Example 1}$

② When Travel distance (L) $\leq \frac{\text{specified speed [V]}^2 \times [\text{specified acceleration time (ACC)} + \text{specified deceleration time (DEC)}]}{2 \times \text{max. set speed (Vmax)}} \rightarrow \text{Example 2}$

★ Refer to the Relationship between Acceleration / Deceleration and Load on the next page for a rough estimate of acceleration and deceleration time.

★ Refer to the specifications of the subject model for acceleration time, deceleration time, and max. speed for the max. load capacity.

Example 1



<Operating conditions>

Max. set speed: $V_{max} = 800 \text{ mm/s}$

Specified speed: $V = 600 \text{ mm/s}$

Specified acceleration time: $ACC = 0.2\text{s}$

Specified deceleration time: $DEC = 0.3\text{s}$

Travel distance: $L = 400 \text{ mm}$

T_{acc} = actual acceleration time (s)

T_{dec} = actual deceleration time (s)

T_t = actual constant speed time (s)

L_a = travel distance during acceleration (mm)

L_b = travel distance while the speed is constant (mm)

L_c = travel distance during deceleration (mm)

L = travel distance (mm) = $L_a + L_b + L_c$

$$T_{acc} = \frac{V}{V_{max}} \times ACC = \frac{600}{800} \times 0.2 = 0.15\text{s}$$

$$T_{dec} = \frac{V}{V_{max}} \times DEC = \frac{600}{800} \times 0.3 = 0.225\text{s}$$

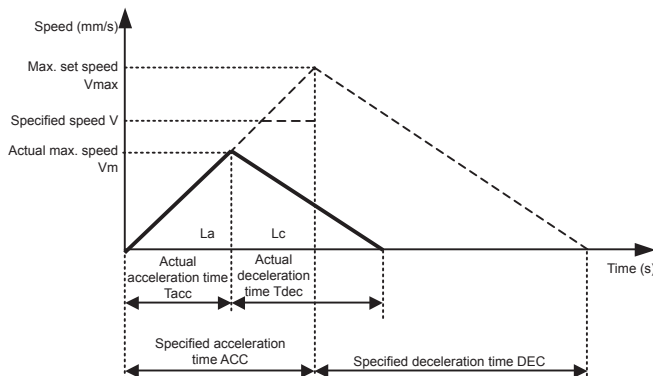
$$L_a = \frac{1}{2} \times V \times T_{acc} = \frac{1}{2} \times 600 \times 0.15 = 45 \text{ mm}$$

$$L_c = \frac{1}{2} \times V \times T_{dec} = \frac{1}{2} \times 600 \times 0.225 = 67.5 \text{ mm}$$

$$T_t = \frac{L - (L_a + L_c)}{V} = \frac{400 - (45 + 67.5)}{600} = 0.479\text{s}$$

$$\begin{aligned} \text{Cycle time} &= \text{actual acceleration time} + \text{actual constant speed time} + \text{actual deceleration time} \\ &= 0.15 + 0.479 + 0.225 \\ &= 0.854 \text{ sec} \end{aligned}$$

Example 2



<Operating conditions>

Max. set speed: $V_{max} = 800 \text{ mm/s}$

Specified speed: $V = 600 \text{ mm/s}$

Specified acceleration time: $ACC = 0.2\text{s}$

Specified deceleration time: $DEC = 0.3\text{s}$

Travel distance: $L = 100 \text{ mm}$

T_{acc} = actual acceleration time (s)

T_{dec} = actual deceleration time (s)

L_a = travel distance during acceleration (mm)

L_c = travel distance during deceleration (mm)

V_m = actual max. speed (mm/s)

L = travel distance (mm) = $L_a + L_c$

$$L_a = L \times \frac{ACC}{ACC+DEC} = \frac{0.2}{0.2+0.3} = 40 \text{ mm}$$

$$L_c = L \times \frac{DEC}{ACC+DEC} = \frac{0.3}{0.2+0.3} = 60 \text{ mm}$$

$$T_{acc} = \sqrt{\frac{2 \times L_a \times ACC}{V_{max}}} = \sqrt{\frac{2 \times 40 \times 0.2}{800}} = 0.141\text{s}$$

$$T_{dec} = \sqrt{\frac{2 \times L_c \times DEC}{V_{max}}} = \sqrt{\frac{2 \times 60 \times 0.3}{800}} = 0.212\text{s}$$

$$\begin{aligned} \text{Cycle time} &= \text{actual acceleration time} \\ &\quad + \text{actual deceleration time} \\ &= 0.141 + 0.212 \\ &= 0.353 \text{ sec} \end{aligned}$$

Relationship between Acceleration / Deceleration and Load

Horizontal use specifications

Load capacity (kg)

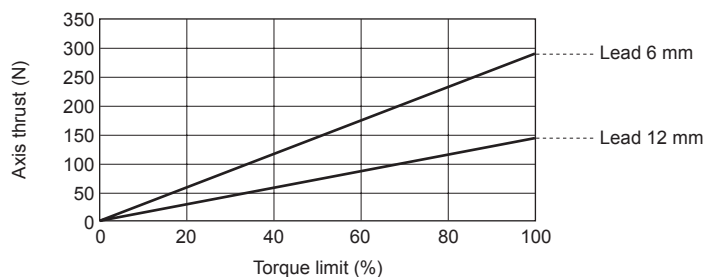
Type	Model No.	Set speed (mm/s)	Lead (mm)	Acceleration / deceleration time					
				0.05 sec	0.1 sec	0.15 sec	0.2 sec	0.3 sec	0.4 sec
Slider	KBZ-5D	800	12	-	1.5	2.2	3	3	3
		400	6	3	6	6	6	6	6
	KBZ-7D	800	12	-	3	4.5	6	6	6
		400	6	6	12	12	12	12	12
Table	KBZ-5D 50 mm	800	12	-	1.2	1.8	2.5	2.5	2.5
		400	6	2.2	4.5	4.5	4.5	4.5	4.5
	KBZ-5D 100 mm	800	12	-	0.7	1.1	1.5	1.5	1.5
		400	6	1.5	3	3	3	3	3
	KBZ-7D 50 mm	800	12	-	2.2	3.3	4.5	4.5	4.5
		400	6	4.5	9	9	9	9	9
	KBZ-7D 100 mm	800	12	-	1.4	2.1	2.8	2.8	2.8
		400	6	2.8	5.6	5.6	5.6	5.6	5.6
KBZ-7D 150 mm	800	12	-	0.9	1.4	1.9	1.9	1.9	
	400	6	1.9	3.8	3.8	3.8	3.8	3.8	
Rod	KBZ-3D	600	12	-	2	3	3	3	3
	KBZ-4D	600	12	-	3.4	5.2	5.2	5.2	5.2

Vertical use specifications

Load capacity (kg)

Type	Model No.	Set speed (mm/s)	Lead (mm)	Acceleration / deceleration time					
				0.05 sec	0.1 sec	0.15 sec	0.2 sec	0.3 sec	0.4 sec
Slider	KBZ-5D	800	12	-	0.7	1.3	1.5	1.5	1.5
		400	6	1.5	3	3	3	3	3
	KBZ-7D	800	12	-	1	1.8	2	2	2
		400	6	2	4	4	4	4	4
Table	KBZ-5D	800	12	-	0.5	0.9	1	1	1
		400	6	1.2	2.5	2.5	2.5	2.5	2.5
	KBZ-7D	800	12	-	0.7	1.3	1.5	1.5	1.5
		400	6	1.7	3.5	3.5	3.5	3.5	3.5
Rod	KBZ-3D	600	12	-	1	1.5	1.5	1.5	1.5
	KBZ-4D	600	12	-	1.4	2.2	2.2	2.2	2.2

Relationship between Axis Thrust and Torque Limit



Caution Accuracy cannot be guaranteed. Use it as a guide.

The smaller the torque limit, the larger the error becomes due to slide friction.

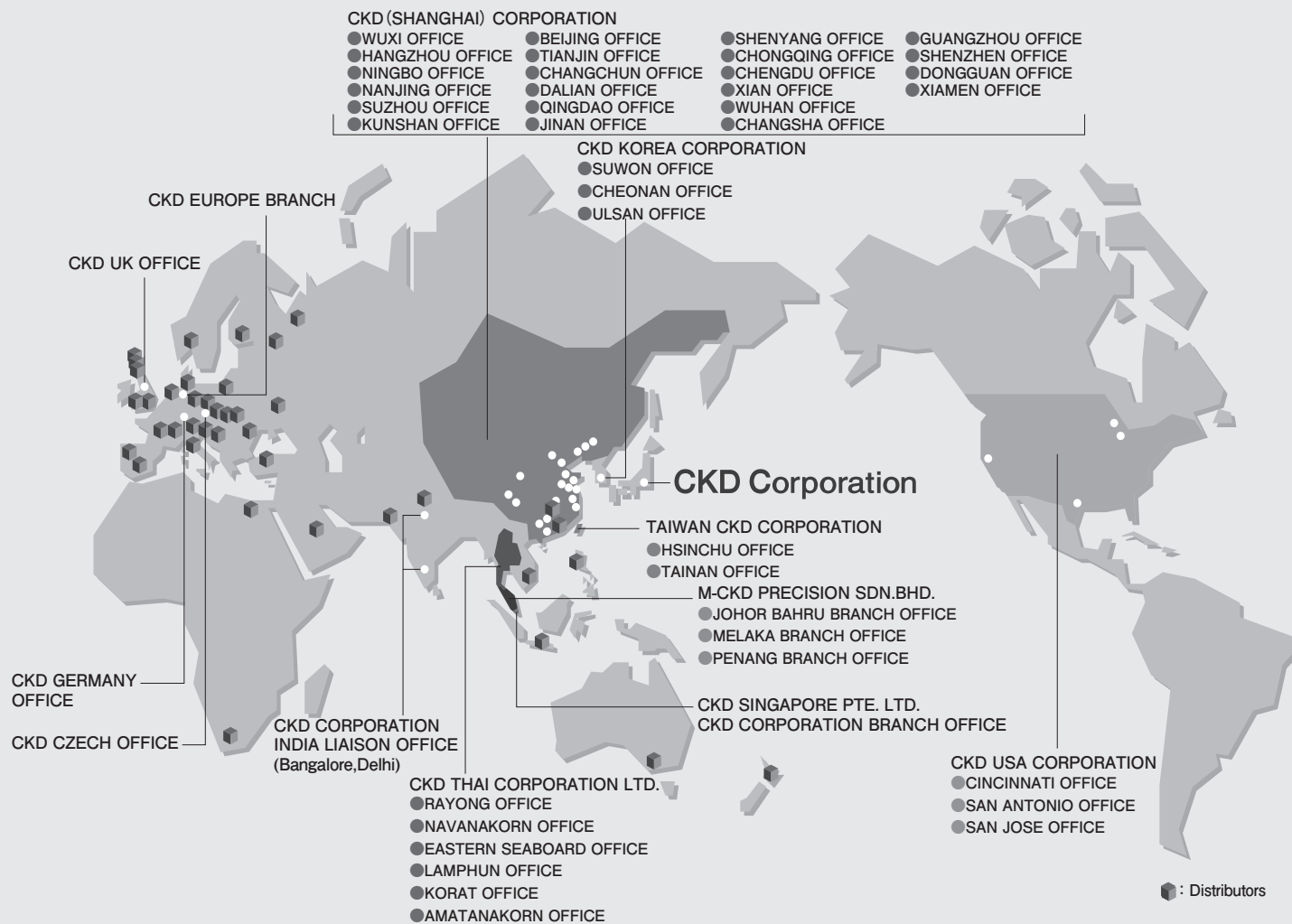
Continual output exceeding the rated torque of motor (about 33.0%) leads to overload error.

[KBZ SERIES] Product Selection Chart

Single axis (Refer to product introduction pages for details and select products)

No.	Unit	[Single axis] model no.	Quantity	[2 or 3 axis] model
1	Axis	KBZ - <input type="text"/> D - ST - <input type="text"/> <input type="text"/> <input type="text"/> - <input type="text"/>		*Contact CKD for details
2	Controller cable	KBZ - CC - M <input type="text"/>		
3	Controller	KCA - 01 - <input type="text"/> 05		
Option	4	Regenerative discharging unit	KCA - CAR - UN50	
	5	Regenerative discharging resistor	KCA - CAR - 0500	
	6	Teach pendant	KCA - TPH - 4C	
	7	PC software	KCA - SF - 98D	
	8	Communication cable (RS-232C)	KCA - PCBL - 31	
	9	Input / output cable	KCA - 01 - IC - A <input type="text"/>	
	10	Cable grip	KCA - 10 - CG - M22 *With motor cover KBZ - <input type="text"/> D - ST <input type="text"/> <input type="text"/> <input type="text"/> - <input type="text"/> -M	
	11	Resolver ABS backup battery	KCA - 10 - EB - 05	

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