Innovation in Motion
TSUBAKI

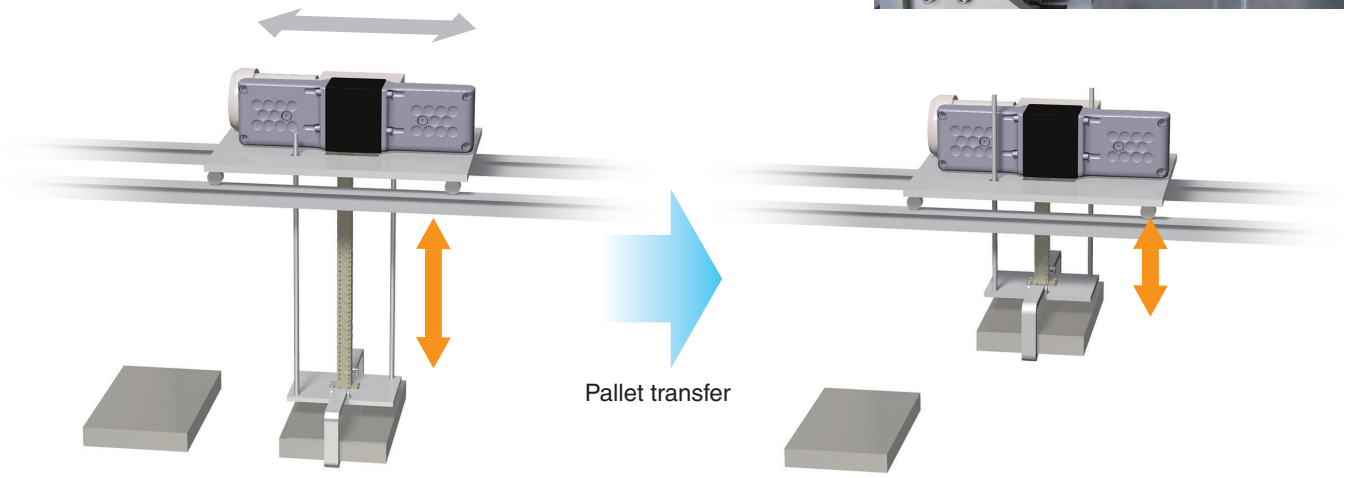
TSUBAKI
ZIP CHAIN ACTUATOR®

Applications

Feature 1

- Can be installed even in areas with little ceiling space
- High speed lifting and lowering means shorter conveyance takt times

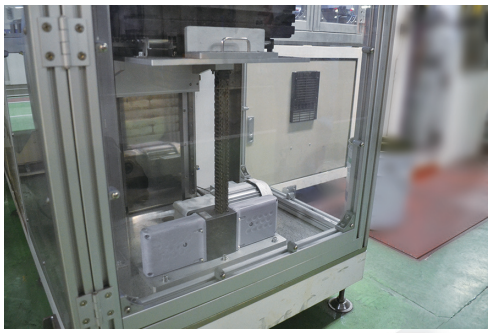
Ex.: Pallet transfer lift



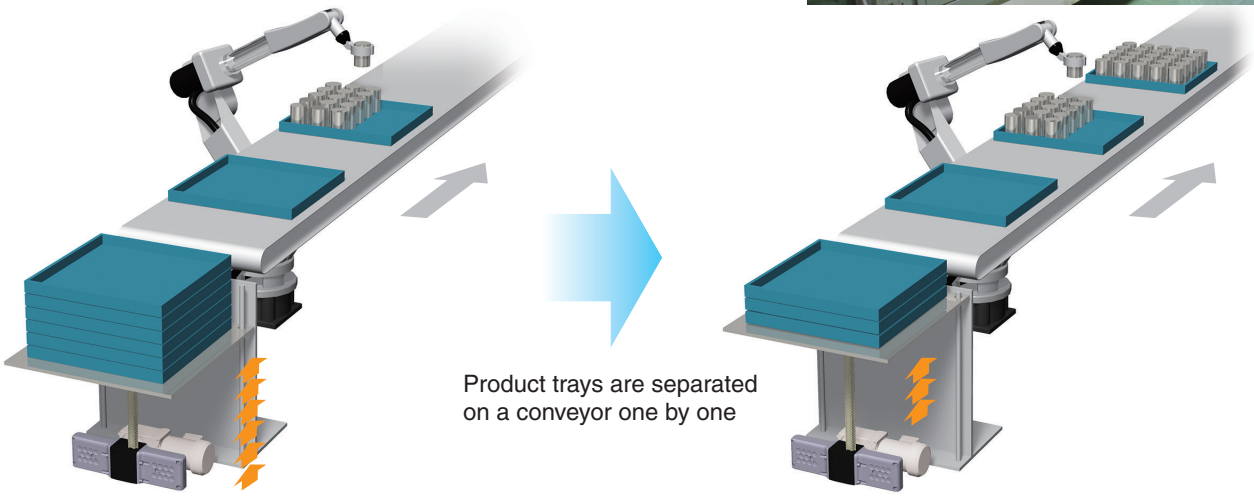
Zip Chain Actua

Feature 2

- Compact, with a low floor, so many trays can be loaded
- Can be stopped at multiple arbitrary positions with high precision to match the heights of a variety of trays

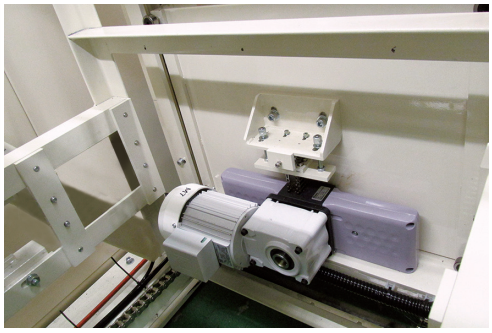


Ex.: Product tray depalletizer

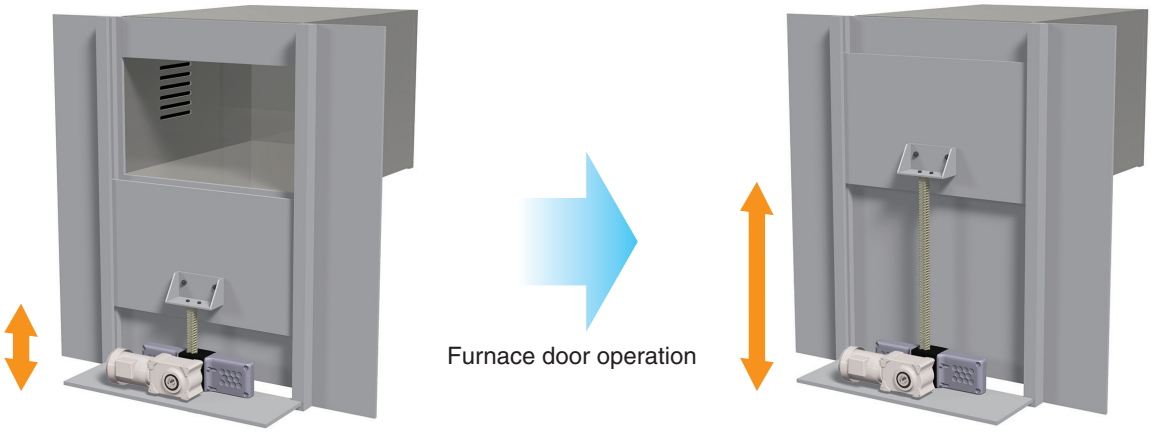


Feature 3

- Installation does not protrude from the equipment
- Quicker door operation minimizes changes to the furnace ambient temperature
- Quieter than pneumatic cylinders and oil-less operation makes it more environmentally friendly



Ex.: Furnace door operating mechanism

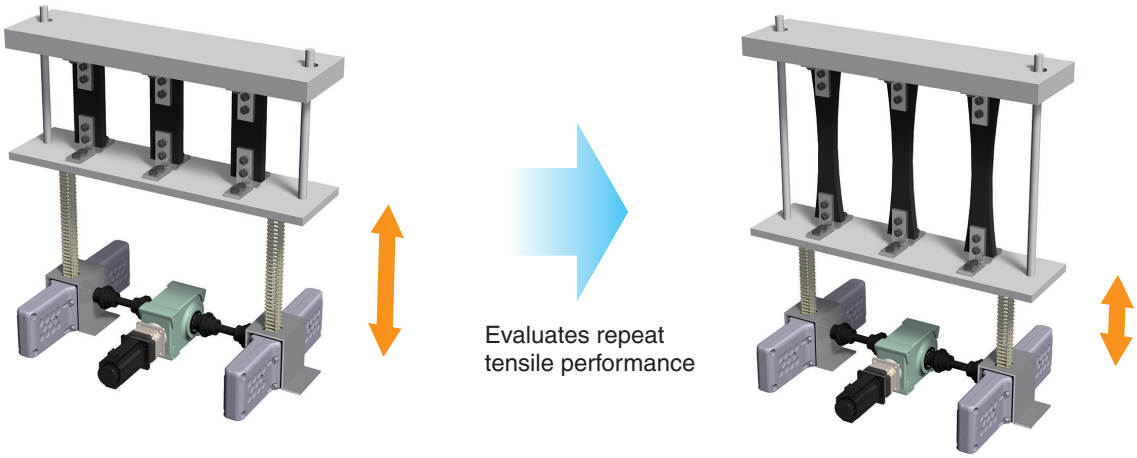


tor® Applications

Feature 4

- Enables a wide range of movement and high precision multipoint stopping
- Connecting to a servo motor enables high speed, high frequency testing
- Unlike hydraulic cylinders there are no oil leaks for eco-friendly operation

Ex.: Endurance tester



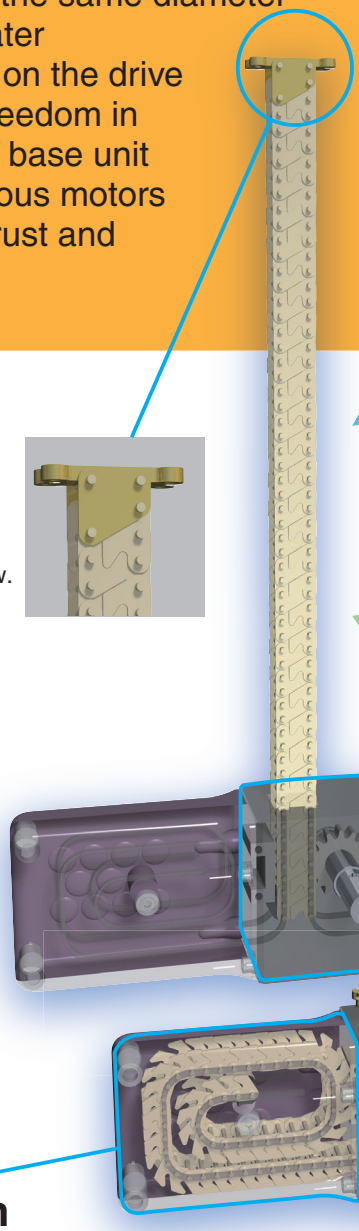
Zip Chain Actuator®

What are Zip Chains?

Zip Chains are two strands of chains that interlock in a zipper-like fashion to form a single, strong column that enables push/pull operation over long strokes. The unzipped chain can be compactly housed for far more space savings than with conventional pneumatic and hydraulic cylinders. Zip Chains have many features, including high speed/high frequency operation, multipoint stopping functions, high stopping precision, installation direction freedom, and eco-friendliness. They can be used in everything from small actuators to large lifters.

ZCA035 has been improved and rereleased as the ZCA135 – Now more user-friendly than ever!

- Improved functions for the drive section
- The input shaft for both the basic model and input shafts on the opposite side have the same diameter
- Bellows can be attached later
- Additional installation taps on the drive section side mean more freedom in installing or expanding the base unit
- Comes with a motor – various motors available to match user thrust and speed needs
- More options



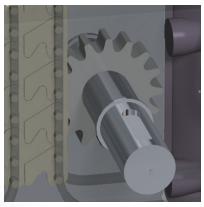
Chain

End fixture

is integrated with the chain.
Can be attached from above or below.

Drive Section

The engagement of the Zip Chain and Tsubaki's pin gear with special teeth transmit power efficiently.



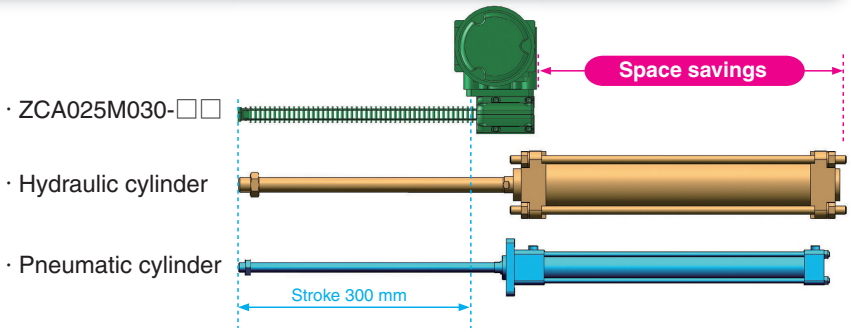
Housing section

The plastic housing enables smooth chain sliding and a compact form.

Features

1. Compact

Can be installed in tighter spaces than other linear actuators. (Superior space savings)



2. High speed

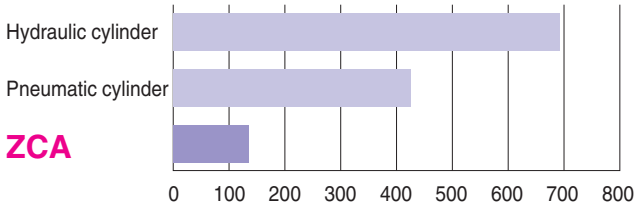
Much quicker operation compared to screw jacks and hydraulic/pneumatic cylinders. **(Max speed: 1000 mm/sec)**

3. Eco-friendly

Comparison of annual CO_2 emissions
ZCA:pneumatic cylinder:hydraulic cylinder: 1:3:5
Comparison of annual power consumption
ZCA:pneumatic cylinder:hydraulic cylinder: 1:5:14

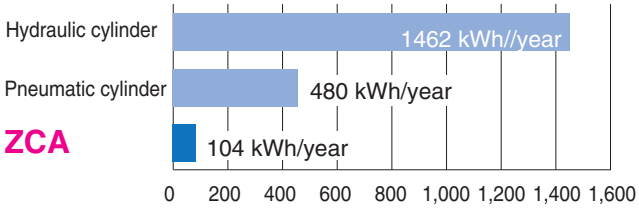
LCA Evaluation
*Calculated using Tsubaki's internal **LCA** evaluation.

CO_2 emissions of various linear actuators [kg-CO_2]



Annual power consumption

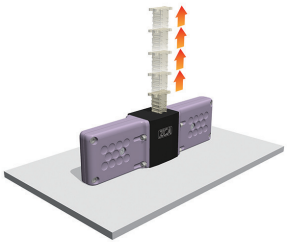
The ZCA uses 1/14 the power of a hydraulic cylinder.



- Comparison conditions
  Thrust: 1 kN
  Speed: 200 m/s
  Stroke: 500 mm
  1 cycle/min. x 12 hrs x 250 days/year Includes various drives (induction motor, pneumatic/hydraulic units)
- For comparison purposes. Conveyor disposal/recycling are considered equal and have been omitted from the LCA evaluation.
- Reference: Japan Environmental Management Association for Industry
  MiLCA Ver. 1.20, Tsubaki catalogs, etc.

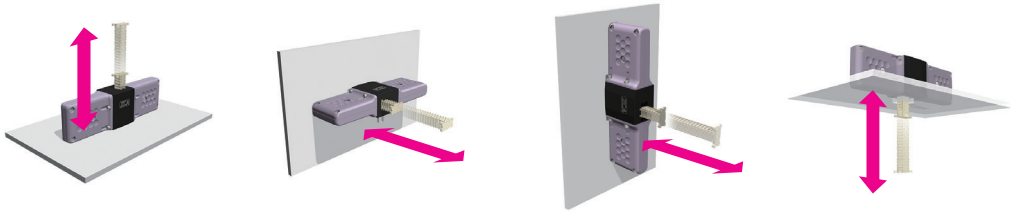
4. Multipoint stopping

Can be stopped at multiple arbitrary positions with high precision.



5. Installation freedom

Lifting installation | Horizontal installation | Horizontal installation | Hanging installation



Install a linear guide along the direction of travel.
For hanging installations, you will need to confirm the safety of the installation.

Model Numbering

ZCA 135 M 050 - 2G

Zip Chain Actuator

Model no.

0	Housing number 25
1	Housing number 35

Housing no.

25
35

Motor

M	With motor (200 V class)
N	Without motor

400 V class motors made-to-order.
See pg. 14 for motor voltage.

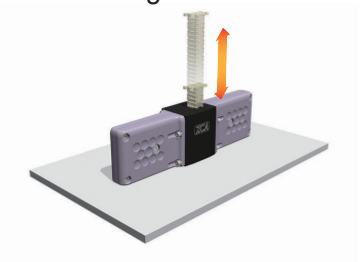
Stroke

Housing no.	Code	Allowable stroke mm
25	030	300
35	050	500
	075	750
	100	1000

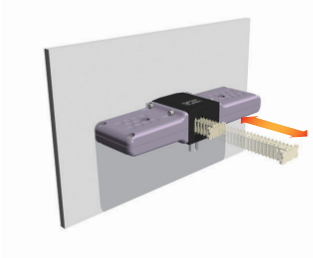
Motor capacity, reduction ratio
Select the model number form the characteristic table on pg. 14.

Installation direction When selecting options you will need to indicate U, Y, or D.

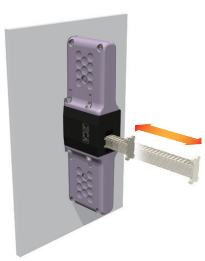
U: Lifting installation



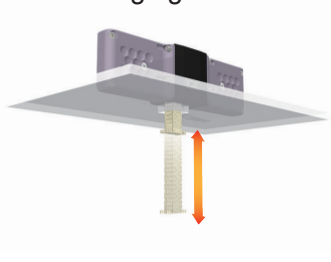
Y: Horizontal installation



Y: Horizontal installation



D: Hanging installation



■Model Numbering Example

ZCA025N030 (basic model)
- ZCA025
- No motor
- Allowable stroke 300 mm

ZCA135M050-1CDBJ
- ZCA135
- With motor (200 V class)
- Allowable stroke 500 mm
- Motor capacity 0.1 kW
- Reduction ratio 1/10
- Hanging installation
- Mounting base
- Bellows

List of Models

Models without motor

Model number*1	Basic capacity*2 N{kgf}	Allowable stroke*3 mm	Maximum speed*4 mm/s	Maximum input rotation speed r/min	Allowable input shaft torque N·m{kgf·m}	Zip Chain movement amount per input shaft rotation mm	Approximate mass kg
ZCA025N030	400 {40.8}	300	1000	630	9.41 {0.96}	95.3	1.9
ZCA135N050	1000 {102}	500	1000	420	34.7 {3.53}	142.9	5.1
ZCA135N075	1000 {102}	750					6.5
ZCA135N100	600 {61.2}	1000					7.5

*1 Model numbers indicated in bold letters are stocked products.
*2 Values represent basic capacities with an end fixture attached. Contact a Tsubaki representative regarding any other installation fixture requirements. Values are obtained when operated at a maximum 0.35 G (upper limit) acceleration. These values are applicable regardless of the type of installation (vertical, horizontal, hanging).
However, be advised that for ZCA025 units with input shafts on the opposite side, the basic capacity and allowable input shaft torque will differ depending on conditions. See page 8.
*3 Use the unit within the allowable stroke range. Also, be sure to always attach a linear guide in the direction of travel.
*4 Zip Chain speed at maximum input rotation speed.

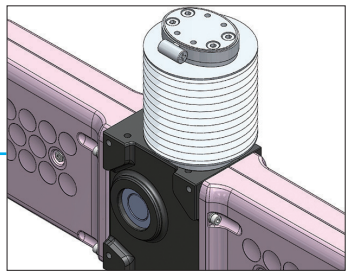
Option codes

U B R J T C F P

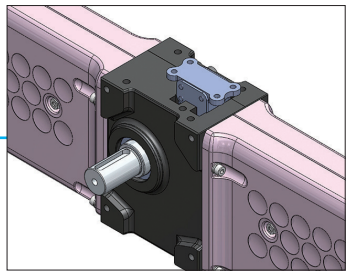
Options not shown are made-to-order.

Options (for both ZCA025 and ZCA135)

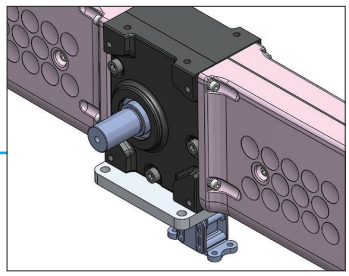
J: Bellows
(for lifting and hanging installations)



R: Input shaft on the opposite side

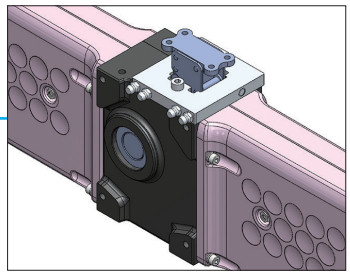


B: Mounting base
(for hanging installations)

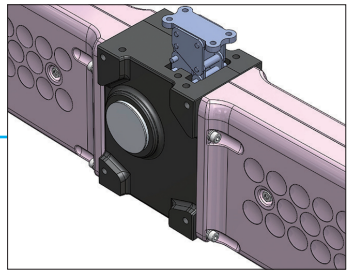


Options (for ZCA135 only)

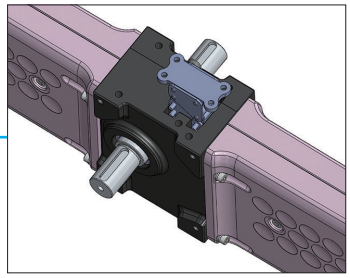
F: Grease plates



C: Cap



T: Dual shafts



Options shown for ZCA135.
When combing a motor with dual shafts or input shafts on the opposite sides, see page 15 for motor installation directions.

Specifications

Drive section	Material	Alloy steel (ZCA025) Forged steel (ZCA135)	
	Coating color	Black, Munsell N2.0 equivalent	
Housing section	Material	Polyacetal	
	Color	ZCA025□030 ZCA135□050	Purple grey Munsell 0.8P6.3/3.0 equivalent (molded)
		ZCA135□075 ZCA135□100	White (machined)
Lubricant	Grease		

Dimensional outline drawings are for models with molded housings.
Models with machined housings have different designs.

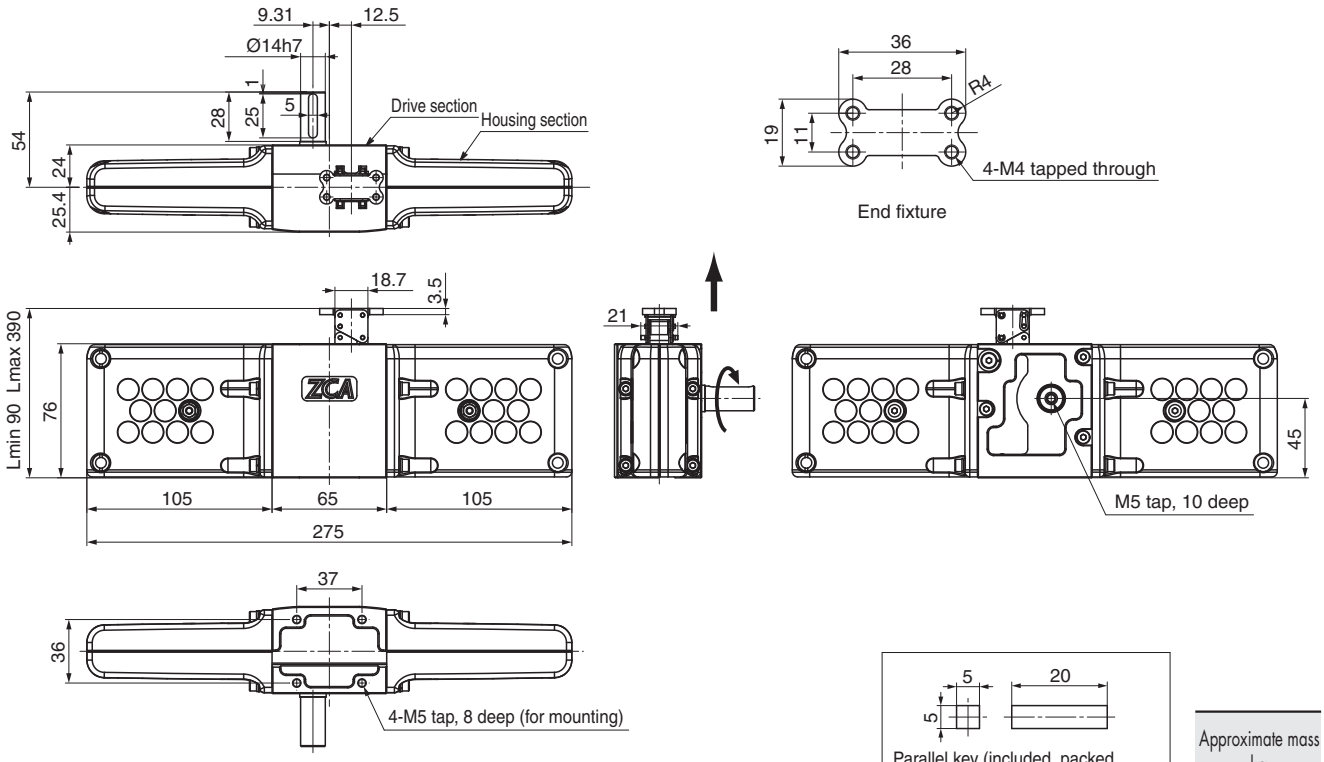
Operating Environment Requirements

Operating temperature	Without motor	0 to 60°C
	With motor	0 to 40°C
Relative humidity	85% or less (no condensation)	
Altitude*	1000 m or less above sea level	
Ambient atmosphere	Typical rain-free indoor environment with the amount of dust kept at a general factory level.	
Installation direction	The unit can be hung or mounted vertically or horizontally. However, regardless of the installation direction, be sure to mount a linear guide in the direction of travel. A mounting base is required to hang the unit. (Model no. code: B)	

* For models with motors.

External Dimensional Diagram ZCA025N (without motor) Main Unit

■ ZCA025N030 (Basic model)

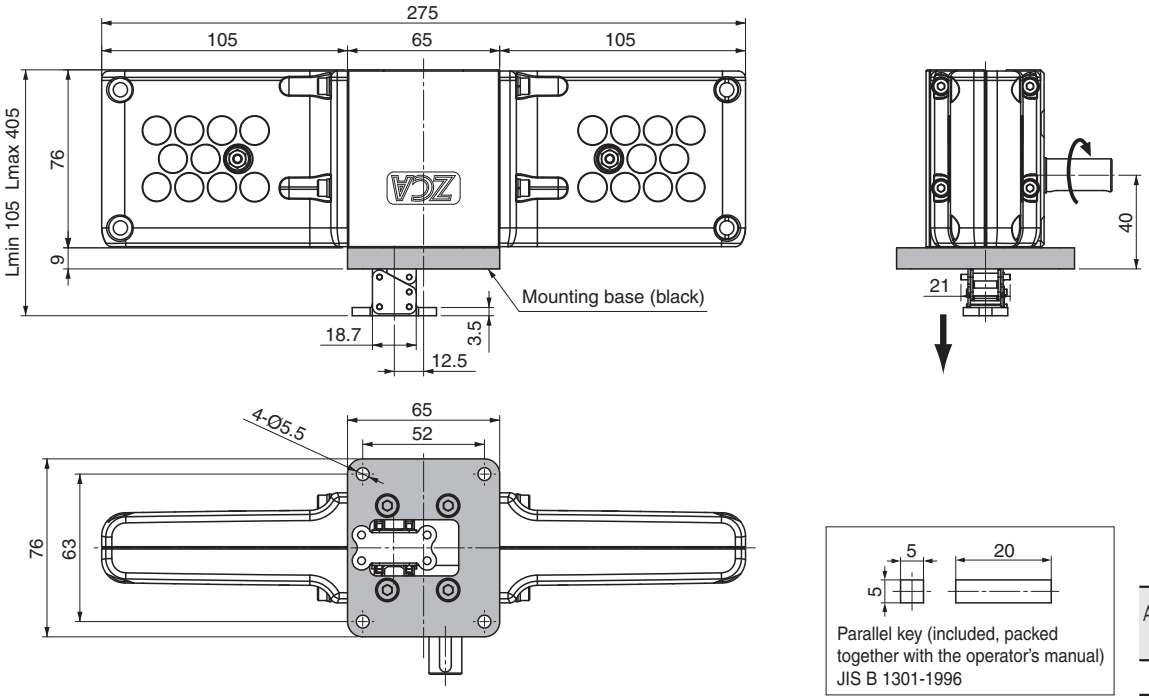


Parallel key (included, packed together with the operator's manual) JIS B 1301-1996

Approximate mass kg
1.9

External Dimensional Diagram ZCA025N (without motor) Optional Part

■ ZCA025N030-□B (Mounting Base)

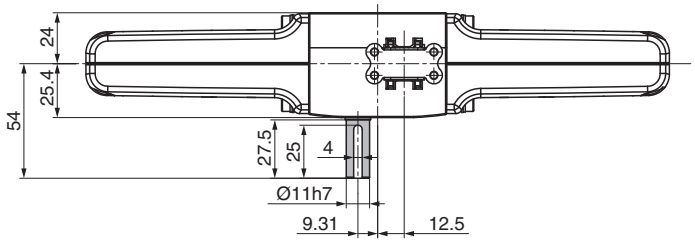


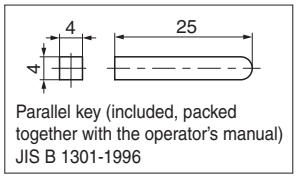
Parallel key (included, packed together with the operator's manual) JIS B 1301-1996

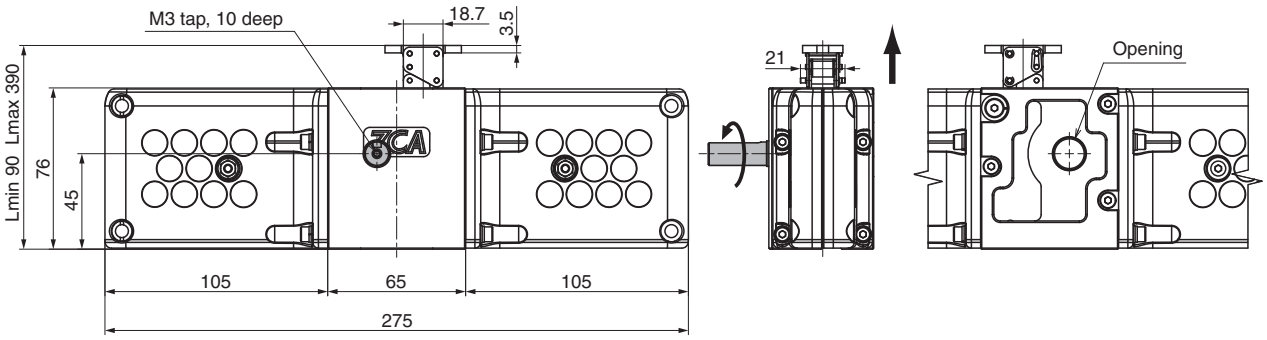
Approximate mass kg
2.0

■ ZCA025N030-□R (Input shaft on the opposite side)

Has a different shaft diameter from the basic ZCA025.







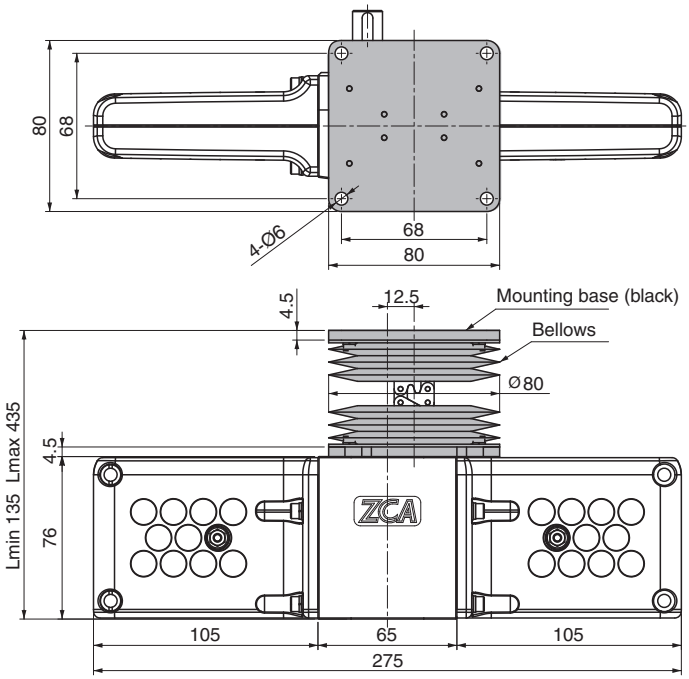
The mounting taps on the drive section base are the same as with the basic model.

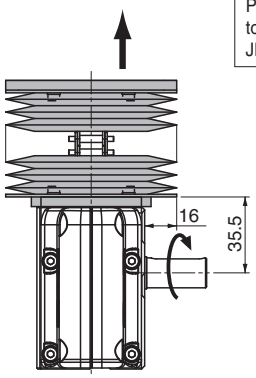
Model number	Basic capacity N {kgf}		Allowable input shaft torque N·m{kgf·m}		Allowable overhand load N {kgf}	Approximate mass kg
	Condition A	Condition B	Condition A	Condition B	Condition A	
ZCA025N030-□R	208 {21.2}	400 {40.8}	5.18 {0.53}	9.41 {0.96}	260 {26.6}	2.0

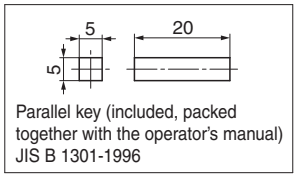
Compared with the basic type, this model has a smaller basic capacity, allowable input shaft torque, and overhang load.
Condition A: When overhang load acts on the output shaft (when driven by a chain, belt, or the like)
Condition B: When overhang load does not act on the output shaft (when driven by a coupling or the like)

■ ZCA025N030-□J (Bellows)

Dimensional outline drawing of a model with bellows intended for lifting installations.
Bellows cannot be installed later.
Bellows shape and mounting method differs for the ZCA135.
A mounting base is attached to bellows for hanging installations so the dimensions will differ.







Bellows	Material	Thermoformed polyurethane
	Color	Black

The mounting taps on the drive section base are the same as with the basic model.
Bellows for horizontal installations (Y) are manufactured separately. Contact a Tsubaki representative for more information.

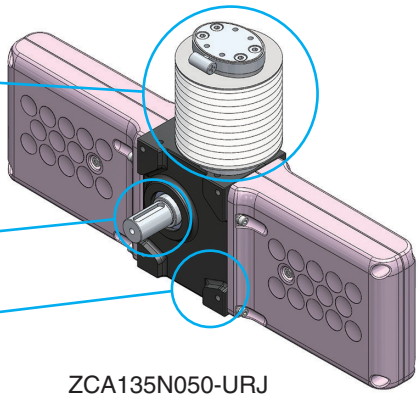
Approximate mass kg
2.5

■ New features on the improved ZCA135

Bellows
- Bellows shape and installation method have been changed to allow for later installation. (With lifting/hanging installations) Installing bellows later will shorten the allowable stroke.
- The addition of a stainless steel band makes installation/removal during maintenance easier.

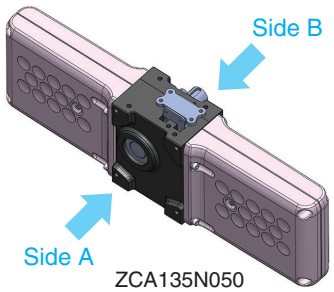
Input shaft
- The basic model, input shafts on opposite sides, and dual shafts have the same shaft diameter.

Installation
- Mounting taps have been added to the drive section face for increased freedom in mounting or expanding the unit.

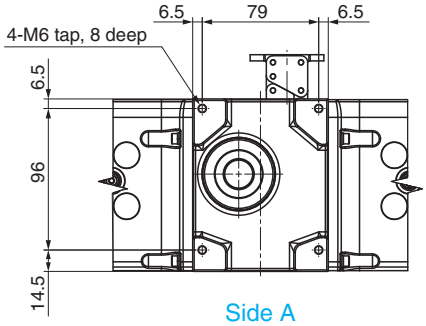


ZCA135N050-URJ

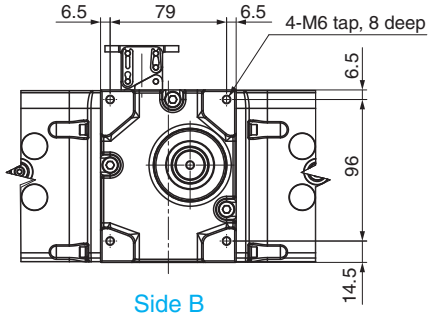
Mounting dimensions of the drive section side



ZCA135N050



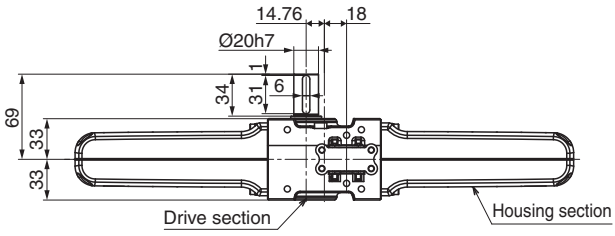
Side A

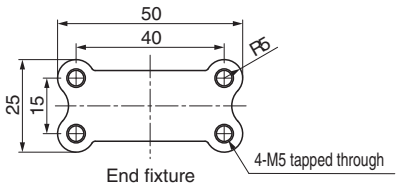


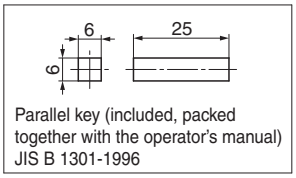
Side B

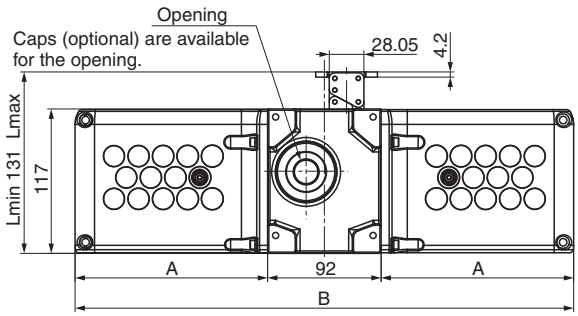
External Dimensional Diagram ZCA135N (without motor) Main Unit

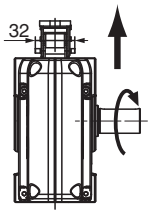
■ ZCA135N050 075 100 (Basic model)

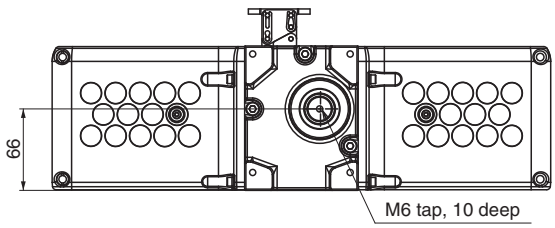


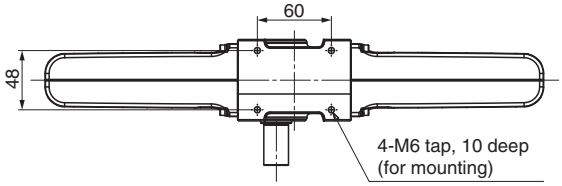










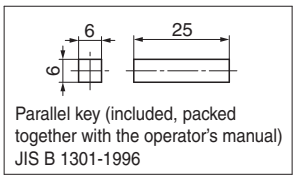


External dimensional diagram is for ZCA135N050.
The shape of the 075 and 100 housing sections differ.
See page 15 for option combinations.

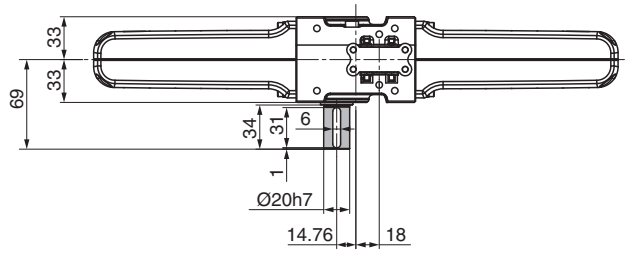
Model number	A mm	B mm	Lmax mm	Allowable stroke mm	Approximate mass kg
ZCA135N050	156	404	631	500	5.1
ZCA135N075	218.5	529	881	750	6.5
ZCA135N100	281	654	1131	1000	7.5

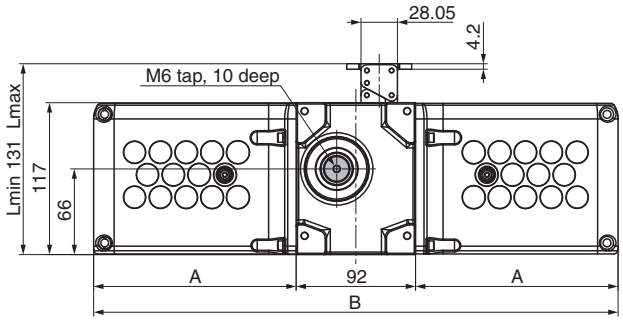
■ ZCA135N050 075 100-□R (Input shaft on the opposite side)

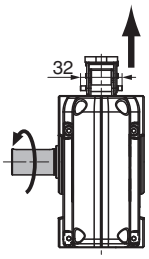
The mounting taps on the drive section base are the same as with the basic model.

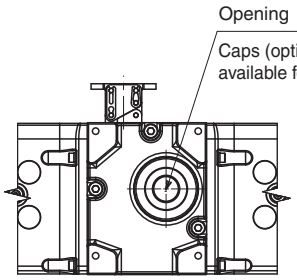


Parallel key (included, packed together with the operator's manual)
JIS B 1301-1996







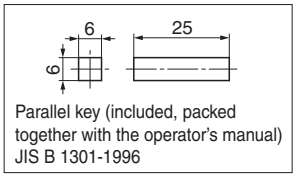


External dimensional diagram is for ZCA135N050-□R.
The shape of the 075 and 100 housing sections differ.
See page 15 for option combinations.

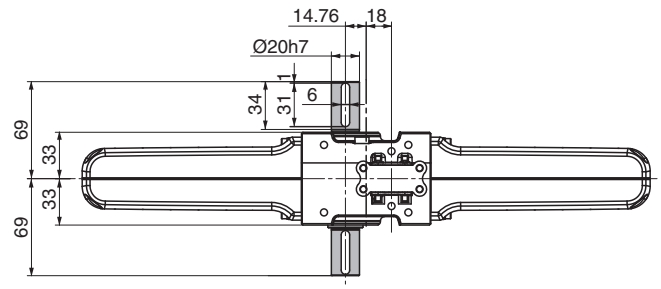
Model number	A mm	B mm	Lmax mm	Allowable stroke mm	Basic capacity N {kgf}	Allowable input shaft torque N·m {kgf·m}	Allowable overhang load N {kgf}	Approximate mass kg
ZCA135N050-□R	156	404	631	500	1000 {102}	34.7 {3.53}	946 {96.4}	5.1
ZCA135N075-□R	218.5	529	881	750				6.5
ZCA135N100-□R	281	654	1131	1000	600 {61.2}			7.5

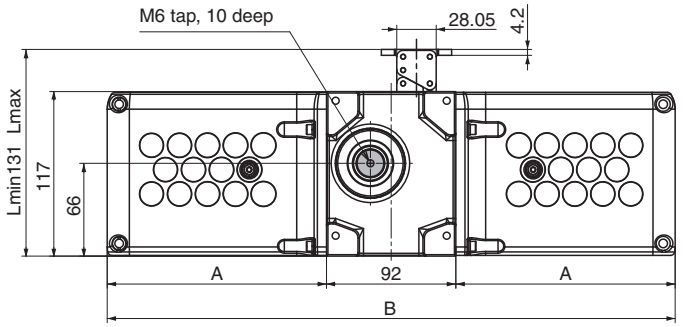
■ ZCA135N050 075 100-□T (Dual Shafts)

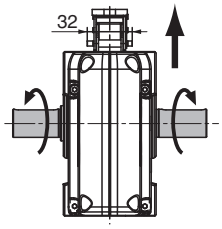
The mounting taps on the drive section base are the same as with the basic model.



Parallel key (included, packed together with the operator's manual)
JIS B 1301-1996





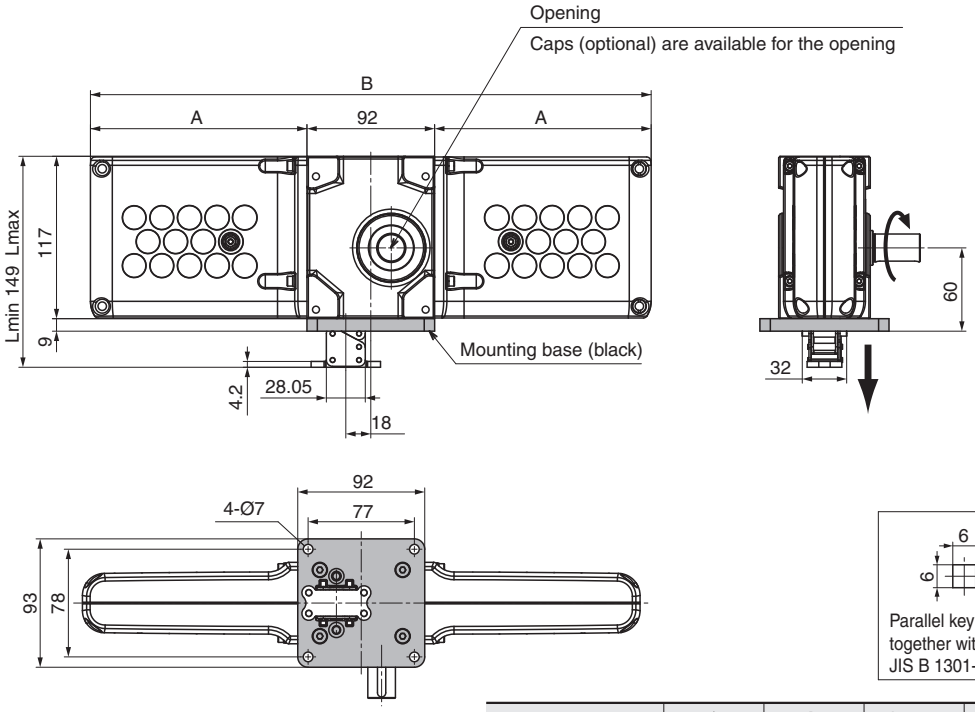


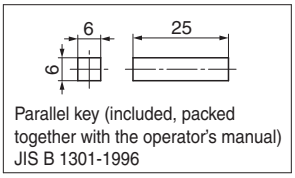
External dimensional diagram is for ZCA135N050-□T.
The shape of the 075 and 100 housing sections differ.
See page 15 for option combinations.

Model number	A mm	B mm	Lmax mm	Allowable stroke mm	Basic capacity N {kgf}	Allowable input shaft torque N·m {kgf·m}	Allowable overhang load N {kgf}	Approximate mass kg
ZCA135N050-□T	156	404	631	500	1000 {102}	34.7 {3.53}	946 {96.4}	5.5
ZCA135N075-□T	218.5	529	881	750				7.0
ZCA135N100-□T	281	654	1131	1000	600 {61.2}			8.0

Pay special attention to the input torque when the ZCA is connected in parallel by means of a shaft (see page 20).

■ ZCA135N050 075 100-□B (Mounting Base)



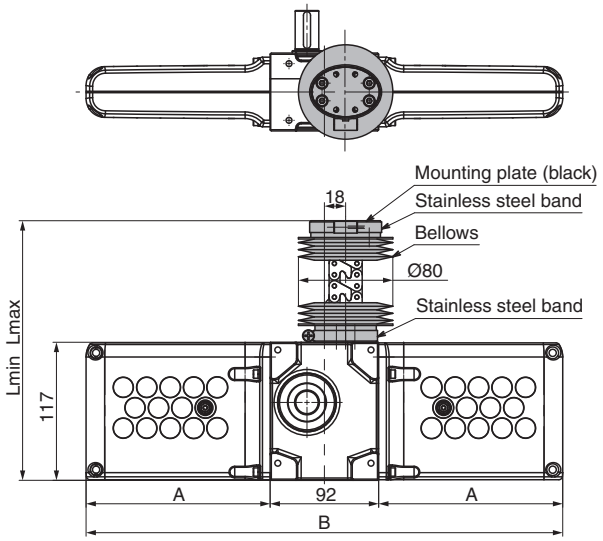


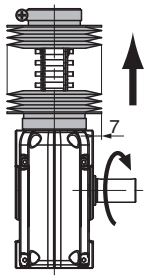
External dimensional diagram is for ZCA135N050-□B.
The shape of the 075 and 100 housing sections differ.
See page 15 for option combinations.

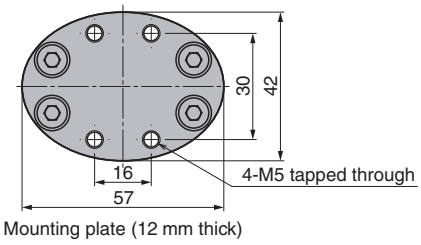
Model number	A mm	B mm	Lmax mm	Allowable stroke mm	Approximate mass kg
ZCA135N050-□B	156	404	649	500	5.5
ZCA135N075-□B	218.5	529	899	750	7.0
ZCA135N100-□B	281	654	1149	1000	8.0

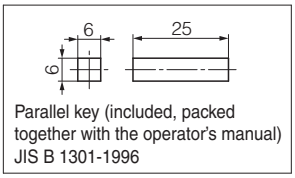
■ ZCA135N050 075 100-□J (Bellows)

External dimensional diagram for bellows for lifting installations.
Bellows shape and installation method differs from the ZCA025.
Bellows can only be installed later with lifting/hanging installations.
The allowable stroke will change if bellows are attached later.
Bellows for hanging installations are paired with a mounting base.
Contact a Tsubaki representative regarding external dimensional drawings.









External dimensional diagram is for ZCA135N050-□J.
The shape of the 075 and 100 housing sections differ.
See page 15 for option combinations.
The mounting taps on the drive section base are the same as with the basic model.

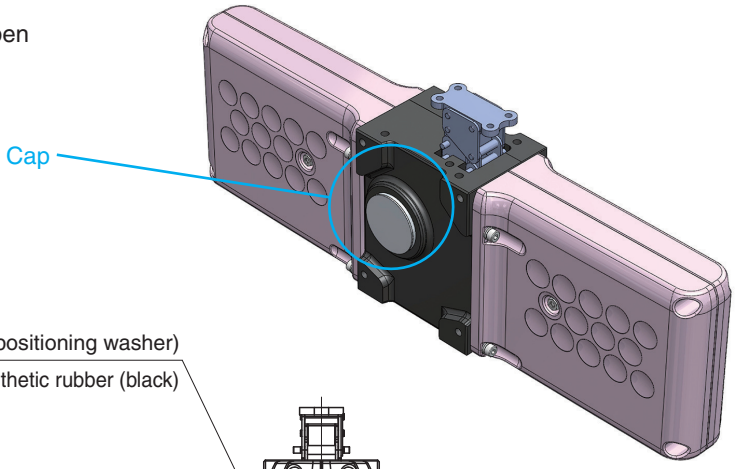
Bellows	Material	Thermoformed polyurethane
	Color	Black

Bellows using different material are made-to-order.
Bellows for horizontal installations (Y) are manufactured separately.
Contact a Tsubaki representative for more information.

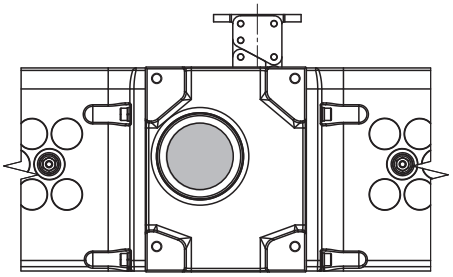
Model number	A mm	B mm	Lmin mm	Lmax mm	Allowable stroke mm	Approximate mass kg
ZCA135N050-□J	156	404	220	720	500	5.5
ZCA135N075-□J	218.5	529	250	1000	750	7.0
ZCA135N100-□J	281	654	270	1270	1000	8.0

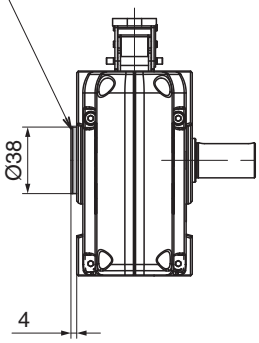
Cap

Caps are available for the opening.
The drive section side opposite the shaft is open unless using dual shafts.



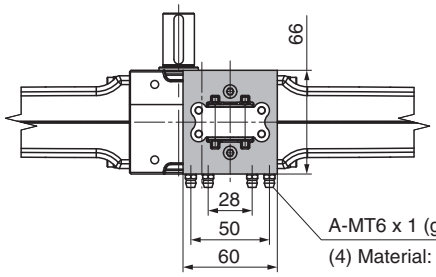
Dimensions with caps

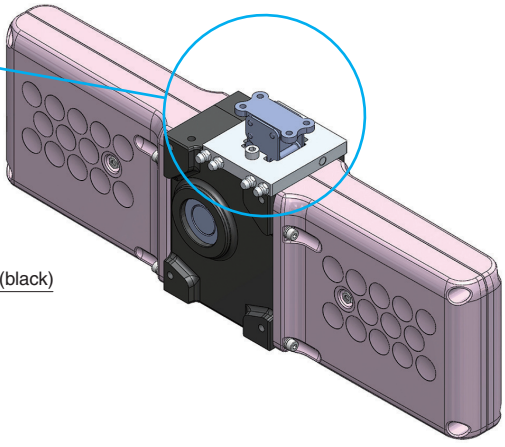


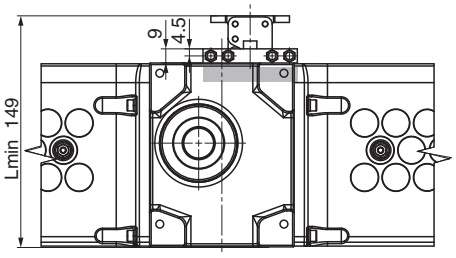


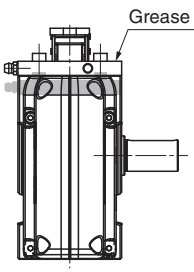
Caps available for ZCA135 only.
Caps are made from metal parts and special synthetic rubber.

Grease Plate

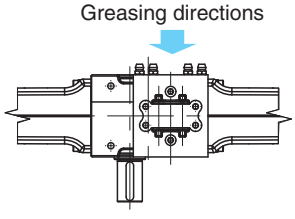
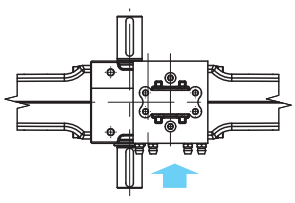






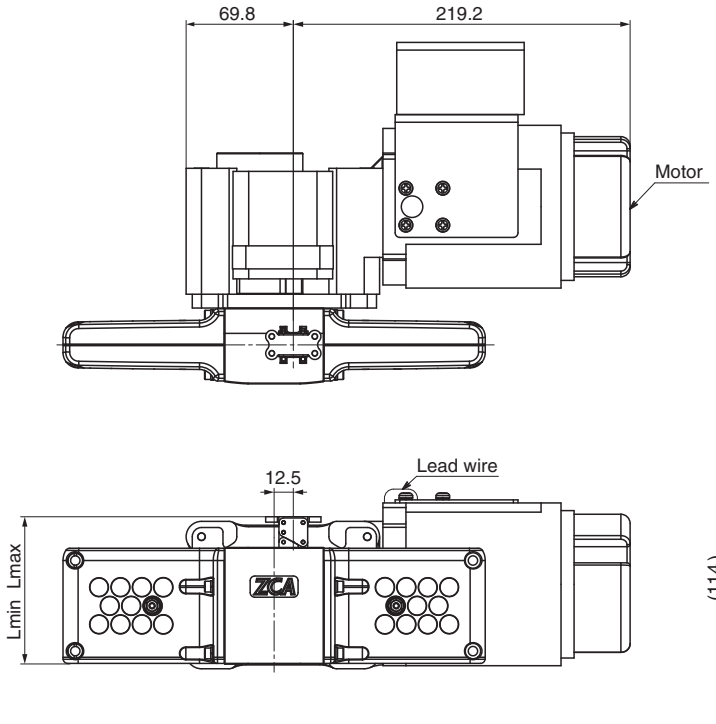


Grease plates available for ZCA135 only.
Plates cannot be attached later.
Can be combined with bellows and mounting bases.
(Contact a Tsubaki representative when using together with a mounting base.)
Grease plates come with grease nipples.
Grease plates that can be attached on either side are made-to-order.
Grease plates aid in chain lubrication.
Grease the plates using all four grease nipples.
Refer to the operator's manual for greasing methods.
Has the same allowable stroke as the ZCA135N (basic model).

Input shaft on the opposite side	Dual Shafts
Greasing directions 	 Greasing directions

When attaching grease plates to input shafts on the opposite side or dual shafts, use the grease nipples as shown above. Grease in the direction of the arrows.

■ ZCA025M030-□□ (Basic model)

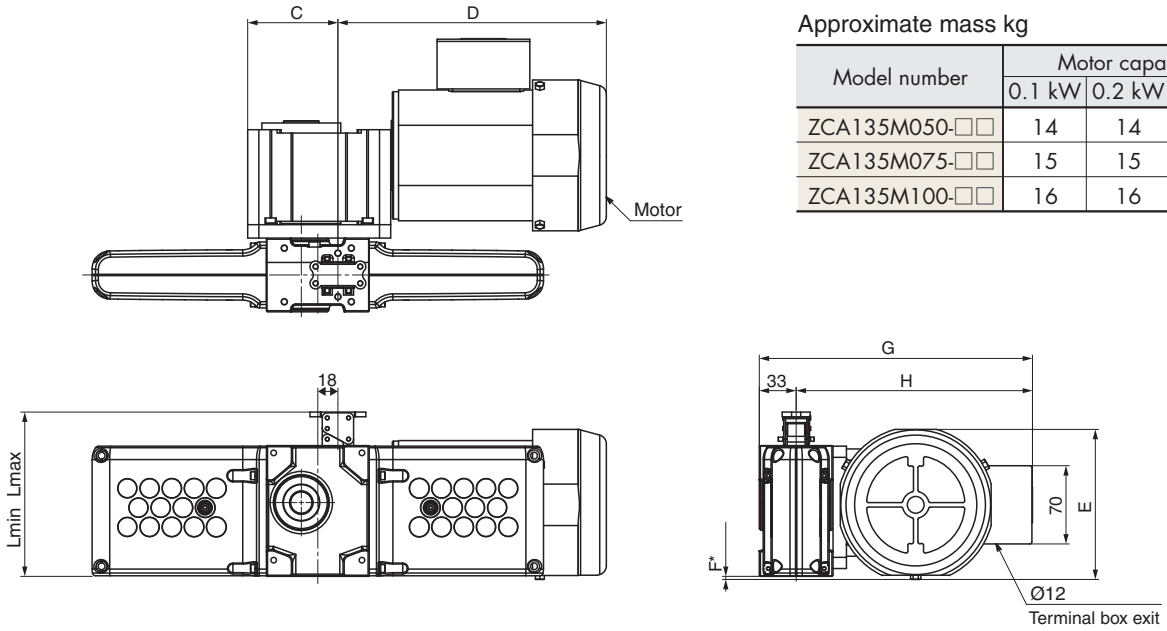


Approximate mass kg

Model number	Motor capacity	
	60 W	90 W
ZCA025M030-□□	10	10.5

The mounting taps on the drive section base are the same as with the basic model.
*Be aware that the motor unit is larger than the drive section base.
Lmin, Lmax dimensions are the same as with the ZCA025N (without motor) basic model.

■ ZCA135M050 075 100-□□ (Basic model)



Approximate mass kg

Model number	Motor capacity		
	0.1 kW	0.2 kW	0.4 kW
ZCA135M050-□□	14	14	18
ZCA135M075-□□	15	15	19
ZCA135M100-□□	16	16	20

The position of the terminal box can be changed.
(Position can be changed on the ZCA135 only.)

The mounting taps on the drive section base are the same as with the basic model.
*Be aware that the motor unit is larger than the drive section base.
Lmin, Lmax dimensions are the same as with the ZCA135N (without motor) basic model.

Motor capacity kW	C mm	D mm	E mm	F mm	G mm	H mm
0.1	80.8	223.2	134.5	3.5	244.5	211.5
0.2	80.8	240.2	134.5	3.5	244.5	211.5
0.4	91.8	274.7	134.5	11.5	248.5	215.5

Note: Mounting bases and bellows are available for ZCA units with motors. However, the dimensions will be different from ZCA units without motors. Contact a Tsubaki representative for more information.

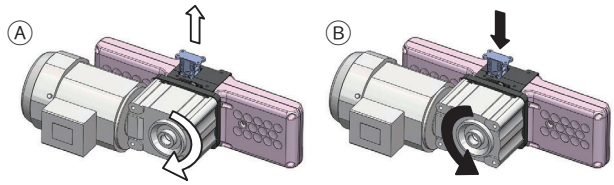
Motor Specifications and Features

Motor Specifications

Model number	ZCA025M	ZCA135M
Output	3-phase: 60 W 90 W	3-phase: 0.1 kW 0.2 kW 0.4 kW
Power source	200/200/220 V 50/60/60 Hz	
Number of poles	4	
Type of protection	Totally enclosed	
Rating	Continuous	
Insulation class	E	
Type of brake	Power-off type, DC electromagnetic brake	
Speed reducer lubrication	Grease lubrication	
Coating color	Light grey (Munsell N7.5 equivalent)	

- Operation using an inverter
  The motor for the ZCA025M is not microsurge resistant.
  A 200 V-class motor can be driven from the inverter unless it is operated at low-frequencies or a frequency of 60 Hz or higher.
  (400 V-class motors cannot be driven from the inverter regardless of operating conditions.)
  When applying brakes, be sure to keep the frequency below 60 Hz (1800 rpm).
- ZCA units with inverter motors and encoders are made-to-order.
- Refer to the Tsubaki small gear motor 40 W – 5.5 kW.
- ZCA units with 400V-class motors are made-to-order.

Motor direction of rotation (↻ · ↺) and chain direction of travel (⇧ · ⇩)
(when a motor is attached to the ZCA basic model)



With in-phase connection　　With in-phase connection

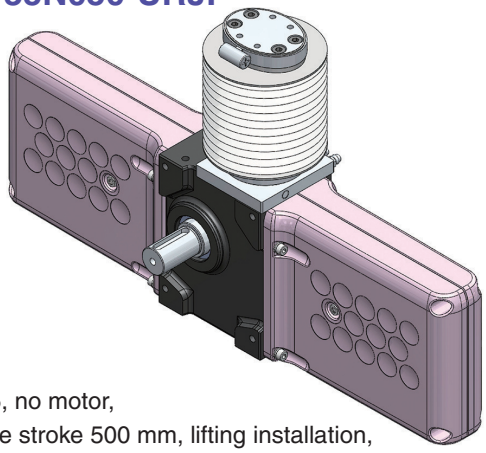
ZCA (with motor) characteristics

Model type	Motor: Model number		Motor: Motor capacity	Motor: Reduction ratio	Thrust N{kgf}: 50 Hz		Thrust N{kgf}: 60 Hz		Speed mm/sec: 50 Hz	Speed mm/sec: 60 Hz	Allowable start-up frequency times/min.: 50 Hz	Allowable start-up frequency times/min.: 60 Hz	Chain direction of travel (see above)
ZCA025	6	B	60 W	1/8	88	{9.0}	69	{7.0}	303	365	10	10	⇧ Ⓐ
		C		1/10	127	{13.0}	98	{10.0}	243	292	10	10	
		D		1/15	216	{22.0}	167	{17.0}	162	195	10	10	
		E		1/20	294	{30.0}	245	{25.0}	122	145	10	10	
		F		1/25	382	{39.0}	314	{32.0}	97	117	10	10	
		G		1/30	*400	{*40.8}	382	{39.0}	82	97	10	10	
		H		1/40	*400	{*40.8}	*400	{*40.8}	60	73	10	10	
		J		1/50	*400	{*40.8}	*400	{*40.8}	48	58	9	10	
		K		1/60	*400	{*40.8}	*400	{*40.8}	40	48	8	9	
		L		1/80	*400	{*40.8}	*400	{*40.8}	30	37	6	7	⇩ Ⓑ
	9	A	90 W	1/5	78	{8.0}	59	{6.0}	485	583	4	10	⇧ Ⓐ
		B		1/8	157	{16.0}	127	{13.0}	303	365	10	10	
		C		1/10	216	{22.0}	167	{17.0}	243	292	10	10	
		D		1/15	343	{35.0}	274	{28.0}	162	195	10	10	
		E		1/20	*400	{*40.8}	382	{39.0}	122	145	10	10	
		F		1/25	*400	{*40.8}	*400	{*40.8}	97	117	10	10	
		G		1/30	*400	{*40.8}	*400	{*40.8}	82	97	10	10	
ZCA135	1	B	0.1 kW	1/7.5	88	{9.0}	59	{6.0}	487	584	10	10	⇩ Ⓑ
		C		1/10	137	{14.0}	98	{10.0}	365	438	10	10	
		D		1/12.5	186	{19.0}	147	{15.0}	292	351	10	10	
		E		1/15	235	{24.0}	186	{19.0}	243	292	10	10	
		F		1/20	333	{34.0}	274	{28.0}	183	219	10	10	
		G		1/25	431	{44.0}	363	{37.0}	146	175	10	10	
		H		1/30	539	{55.0}	431	{44.0}	122	146	10	10	
		J		1/40	*755	{*77.0}	*617	{*63.0}	91	110	9	10	
		K		1/50	*941	{*96.0}	*804	{*82.0}	73	88	7	8	
		L		1/60	*1000	{*102.0}	*902	{*92.0}	61	73	6	7	
		M		1/80	*1000	{*102.0}	*1000	{*102.0}	46	55	5	6	⇧ Ⓐ
		N		1/100	*1000	{*102.0}	*1000	{*102.0}	37	44	4	5	
		P		1/120	*1000	{*102.0}	*1000	{*102.0}	31	37	3	4	
	2	A	0.2 kW	1/5	137	{14.0}	98	{10.0}	730	876	3	7	⇩ Ⓑ
		B		1/7.5	235	{24.0}	186	{19.0}	487	584	8	10	
		C		1/10	343	{35.0}	274	{28.0}	365	438	10	10	
		D		1/12.5	451	{46.0}	363	{37.0}	292	351	10	10	
		E		1/15	529	{54.0}	431	{44.0}	243	292	10	10	
		F		1/20	*755	{*77.0}	*617	{*63.0}	183	219	10	10	
		G		1/25	*960	{*98.0}	*794	{*81.0}	146	175	10	10	
		H		1/30	*1000	{*102.0}	*911	{*93.0}	122	146	10	10	⇧ Ⓐ
		J		1/40	*1000	{*102.0}	*1000	{*102.0}	91	110	10	10	
		K		1/50	*1000	{*102.0}	*1000	{*102.0}	73	88	8	10	
		L		1/60	*1000	{*102.0}	*1000	{*102.0}	61	73	7	8	
	4	A	0.4 kW	1/5	333	{34.0}	274	{28.0}	730	876	0.5	0.5	⇩ Ⓑ
		B		1/7.5	539	{55.0}	431	{44.0}	487	584	1	2	
		C		1/10	*755	{*77.0}	*617	{*63.0}	365	438	3	5	
		D		1/12.5	*921	{*94.0}	*794	{*81.0}	292	351	8	10	
		E		1/15	*921	{*94.0}	*941	{*96.0}	243	292	10	10	
		F		1/20	*951	{*97.0}	*1000	{*102.0}	183	219	10	10	
		G		1/25	*990	{*101.0}	*1000	{*102.0}	146	175	10	10	
		H		1/30	*1000	{*102.0}	*1000	{*102.0}	122	146	10	10	

Models marked with " * " have torque limits. The motor output shaft torque exceeds the upper limits of ZCA thrust.
ZCA135N050 and 075 are limited to a maximum thrust of 1000 N{102 kgf} or less.
ZCA135N100 is limited to a maximum thrust of 600 N{61.2 kgf} or less.

Examples of Optional Part Combinations

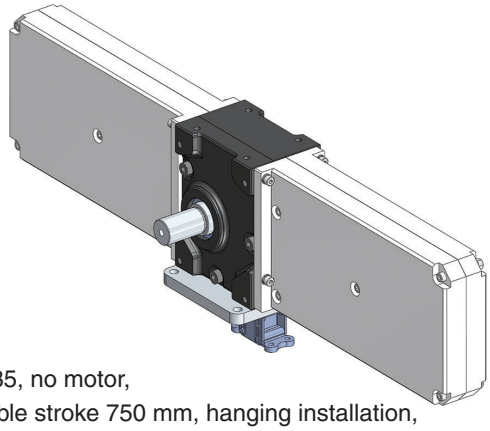
ZCA135N050-URJF



ZCA135, no motor,
allowable stroke 500 mm, lifting installation,
input shaft on the opposite side, bellows, grease plate

The combination of the above optional parts will give this unit a different Lmin from the ZCA135N050-□J.

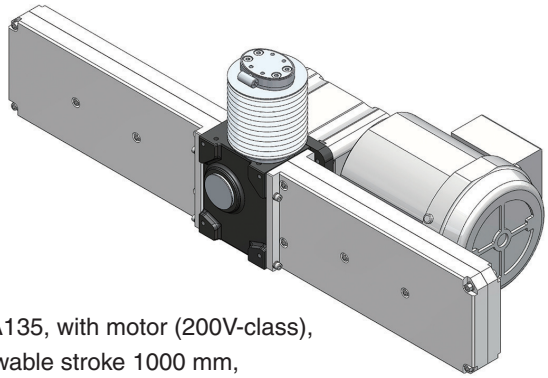
ZCA135N075-DBT



ZCA135, no motor,
allowable stroke 750 mm, hanging installation,
mounting base, dual shafts

The shape of the housing unit for a 750 mm stroke is shown above.

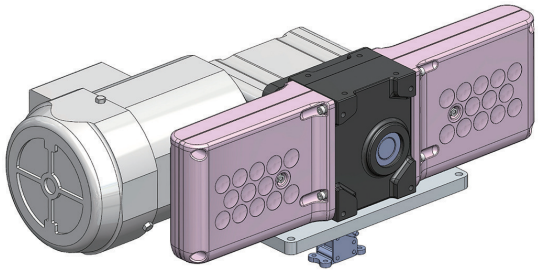
ZCA135M100-1HUJC



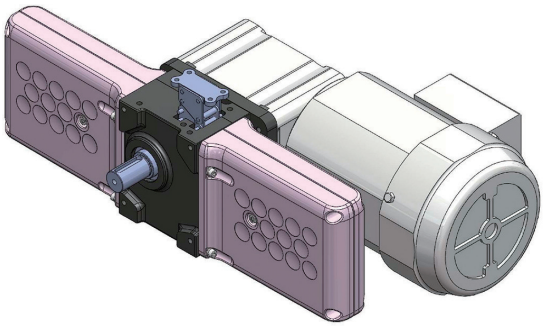
ZCA135, with motor (200V-class),
allowable stroke 1000 mm,
Motor capacity 0.1 kW, reduction ratio 1/30,
lifting installation, bellows, cap

The shape of the housing unit for a 1000 mm stroke is shown above.

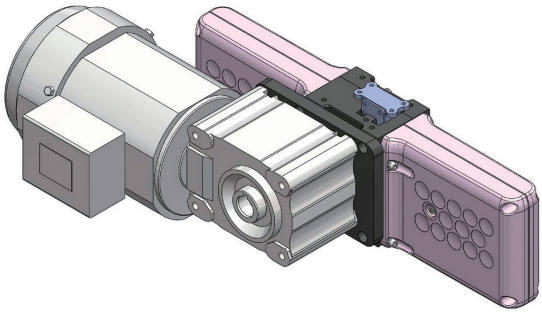
ZCA135M050-2DDB



ZCA135, with motor (200V-class),
allowable stroke 500 mm,
Motor capacity 0.2 kW, reduction ratio 1/12.5,
hanging installation, mounting base
(shape differs from ZCA units without motors)



Motor installation direction when motors are combined with dual shafts



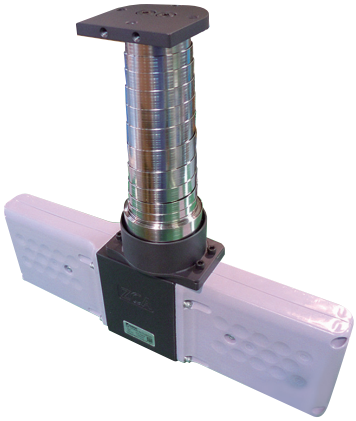
Motor installation direction when motors are combined with input shafts on the opposite side.

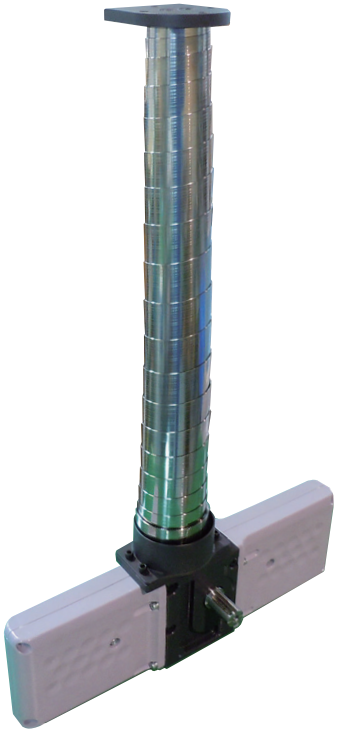
The motor will be installed in the direction shown in the diagrams when motors are combined with dual shafts or input shafts on the opposite side. Motor installation directions not shown above are available on a made-to-order basis.
(The dimensions of the motor fan cover base and drive section base will differ depending on the installation direction.)

Examples of Made to Order Units

1. Telescoping Cover

Features: Protects the chain from hot chips
on machining centers and the like.



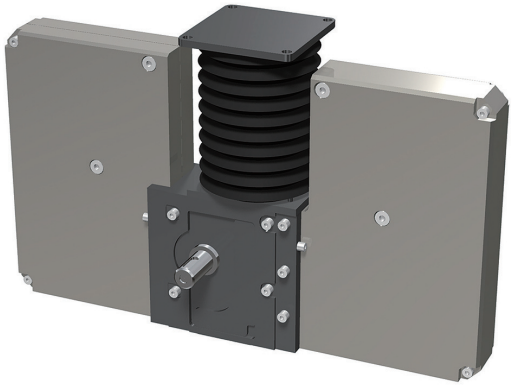


2. Steel Housing Specifications

Features: Protects the chain from hot chips
on machining centers and the like.

3. Special Housing Shape

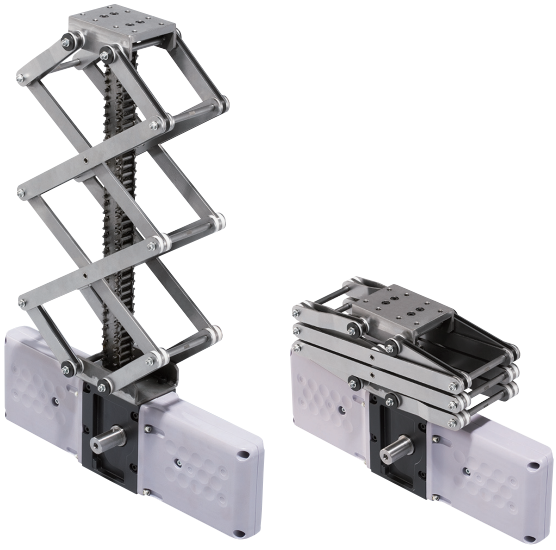
Special housing shapes to match
your needs.



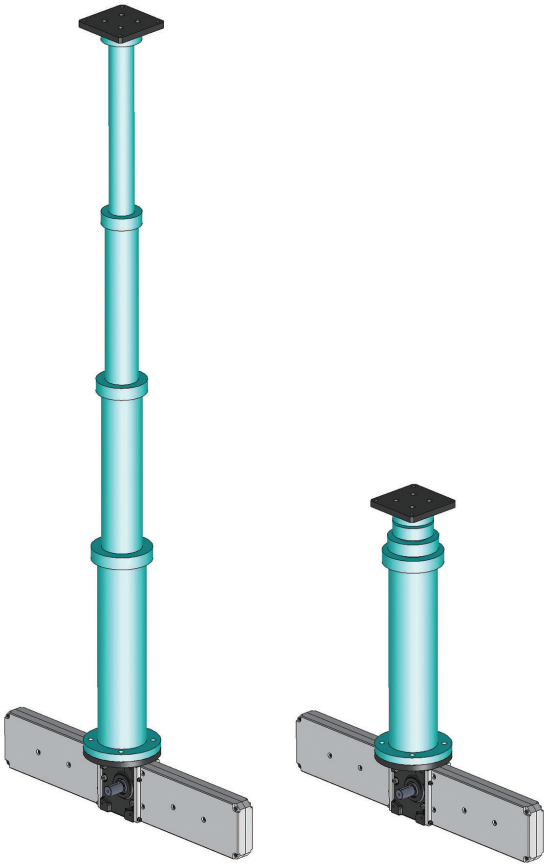
Special Applications

4. Integrated Guide Type

Features: ZCA unit and guide are integrated.
Can save users the trouble of designing and assembling guides.



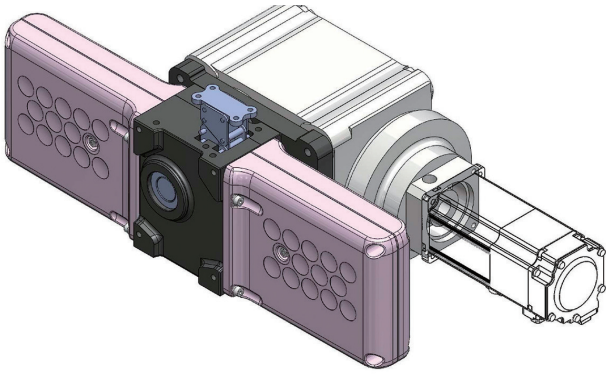
With scissor guide



With telescoping guide

5. With Tsubaki Reducer for Servo Motors

Features: Lightweight, compact. Enables high frequency operation and precise positioning



Tsubaki Reducer for Servo Motors

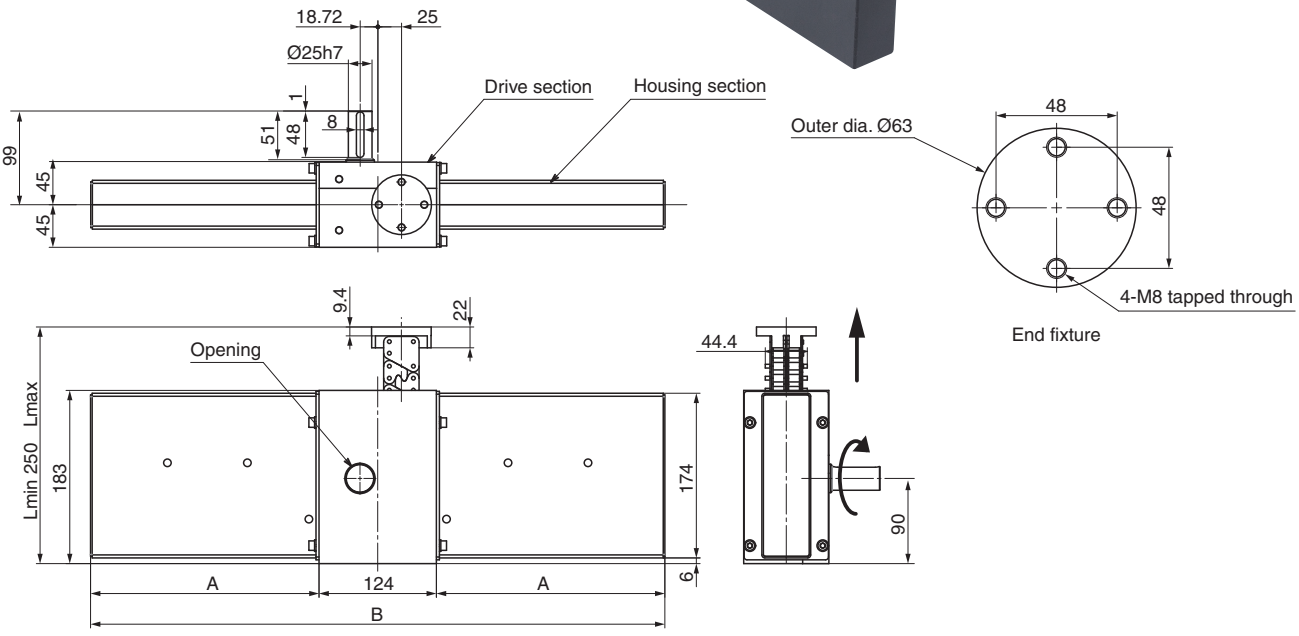
Tsubaki is not responsible for servo motor unit selection or installation.
Refer to the Tsubaki Reducer for Servo Motors catalog.

6. Stainless Steel Chain Type: Thrust and other operating conditions are limited. Contact a Tsubaki representative for more information.

7. Contact a Tsubaki representative regarding the use of special greases or corrosion resistant specifications.

8. ZCA045 (basic type) Unit

Features: Longer stroke than the ZCA135
(max. stroke: 2000 mm).
Higher thrusts possible
(max. thrust: 2.0 kN)



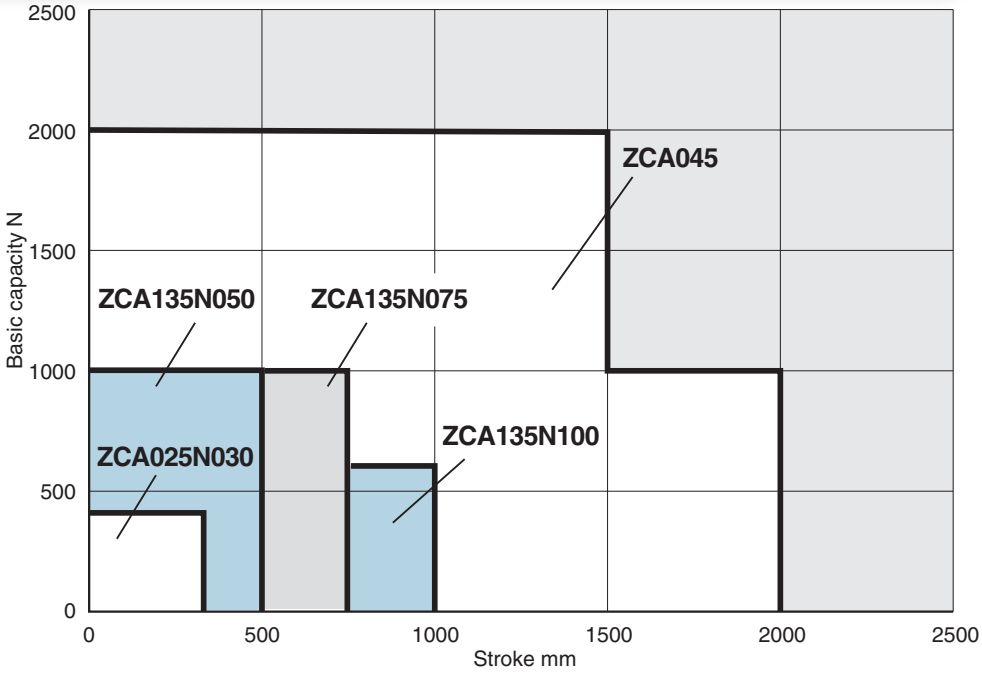
The above show reference dimensions.
There are limits to stroke length when mounted horizontally.
Bellows, input shaft on the opposite side, dual shafts,
and other options available.
Note: The model number has changed from ZCA040 to ZCA045.

Stroke mm	A mm	B mm	Lmax mm	Approximate mass kg
1000	242	608	1250	26
1500	344	812	1750	32
2000	446	1016	2250	38

9. Contact a Tsubaki representative regarding other special applications.

Selection Graph

The chart to the right presents the relationship between stroke and basic capacity.
Select a suitable model by confirming the required thrust per ZCA and stroke in the chart. If more detailed examination is necessary, check if your selection suits your application using the calculations shown below.



Selection Procedure

(1) Machine used with the unit ····· Machine structure, number of the ZCAs to be used, operating environment, etc.
(2) Load ····· Load characteristics, mass of load or workpiece, drive source, drive system, etc.
(3) Installation type ····· Mounting direction (lifting, horizontal, hanging), linear guide system
(4) Operating speed ····· Speed required for ZCA operation
(5) Stroke ····· Actual stroke to be used

1. Calculate the design load Fs

Consider the characteristics of the load, refer to the service factor (Table 1), and then calculate the design load (Fs).
Design load Fs N{kgf} =
Required thrust P N{kgf}) x Service factor Sf

■ **Table 1 Service factor Sf**

Load characteristics	Application example	Service factor
Smooth motion with no impact Load inertia: low	Switching a conveyor	1.0 to 1.3
Motion with light impact Load inertia: medium	Transfer equipment Raising and lowering lifters	1.3 to 1.5

2. Calculate the thrust required per unit Fs_1

Obtain the thrust required per unit (Fs_1) from the design load (Fs). If multiple units are operated simultaneously, calculate Fs_1 by referring to the multi-factor (Table 2).
Thrust per ZCA Fs_1 N{kgf} = Corrected load Fs N{kgf} ÷
(No. of units simultaneously operated x Multi-factor Fg)

■ **Table 2 Multi-factor**

No. of units operated simultaneously	1	2	4
Load sharing factor Fg	1.0	0.83	0.69

3. Select a model either with a motor or without a motor

4. Provisionally select model number

Consult the model list to confirm that the thrust per unit Fs_1 is below the basic capacity of ZCA.
When deciding the stroke, ensure some allowance with the actual stroke to be used.
[When "without motor" is selected]
Consult the model list and provisionally select a model according to the thrust per unit and the stroke. Then, move on to *5 and further.
[When "with motor" is selected]
Consult the model list and provisionally select a model that satisfies the requirements for the thrust per unit, the operating speed of chain, and the stroke. Then, move on to *9.

5. Maximum speed

Confirm that the operating speed of ZCA does not exceed the predetermined maximum speed.

6. Check required input rotation speed

Calculate the required input rotation speed from the operating speed.
N=Vx60/K N: Input rotation speed r/min V: Operating speed mm/sec K: Zip Chain travel distance per input shaft rotation mm (Table 3)

7. Check required input torque

Calculate the required input torque.

$$T = \frac{Fs_1 \times Dp}{2 \times 1000 \times \eta} + To$$

T: Required input torque N·m {kgf·m}
Dp: Sprocket pitch circle diameter mm (Table 3)
To: Mean unloaded operating torque N·m {kgf·m} (Table 3)
Fs_1: Required thrust per unit N {kgf}
η: ZCA overall efficiency (Table 3)

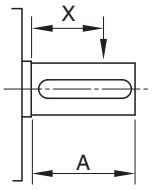
■ Table 3 Performance sheet

Model no.	ZCA025	ZCA135
Overall efficiency η	90%	90%
*Mean unloaded operating torque N·m{kgf·m}	0.62 {0.063}	1.63 {0.17}
Zip Chain travel distance per input shaft rotation K mm	95.3	142.9
Sprocket pitch circle diameter Dp mm	Ø30.92	Ø46.48

*Mean value of torque required to continuously rotate input shaft while the unit is unloaded
Torque varies pitch by pitch each time the chains engage with each other.

8. Consider allowable overhang load

If the input shaft is driven by a chain, gear, tooth belt, V-belt, etc., make sure that the overhang load is lower than the allowable value shown below.



■ Table 4 Transmission element factor (f)

Chain	Gear Tooth belt	V-belt
1.0	1.25	1.5

■ Table 5 Load position factor (Lf)

X/A	0.25	0.5	0.75	1.0
Lf	0.9	1.0	1.15	1.25

O.H.L.: Overhang load N {kgf}
f: Transmission element factor (Table 4)
Lf: Load position factor (Table 5)
T: Required input torque N·m {kgf·m}
D: Pitch circle diameter of sprocket, gear, pulley, etc. m

$$\text{Allowable O.H.L.} \geq \frac{2 \times T \times f \times Lf}{D}$$

■ Table 6 Allowable overhung load

Model number	ZCA025N□ (Basic type)	ZCA025N□-□R (Input shaft on opposite side)	ZCA135N□ (Basic type)	ZCA135N□-□R (Input shaft on opposite side)
Allowable overhang load N {kgf}	638 {65.0}	260 {26.6}	946 {96.4}	

9. Select optional accessories

Select optional accessories according to the operating conditions.

● **With mounting base** ● **Input shaft on opposite side** ● **With bellows** ● **Dual shafts** ● **Cap** ● **Grease plates**

10. Decide the model no.

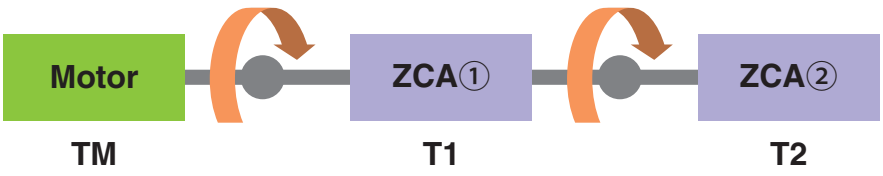
11. Calculate the required input capacity (for a model without motor)

Required input capacity P kW = T x N/9550

Note: When the mean unloaded operating torque makes up 25% or more of the required input torque, the torque fluctuation caused by engaging chains becomes larger. For smooth operation of the unit, select a model by increasing the mean unloaded operating torque (Table 3) by half.

Be careful when selecting required input torque

When ZCA units are arranged in parallel as shown below, confirm that the allowable input shaft torque is less than the required torque of the motor.

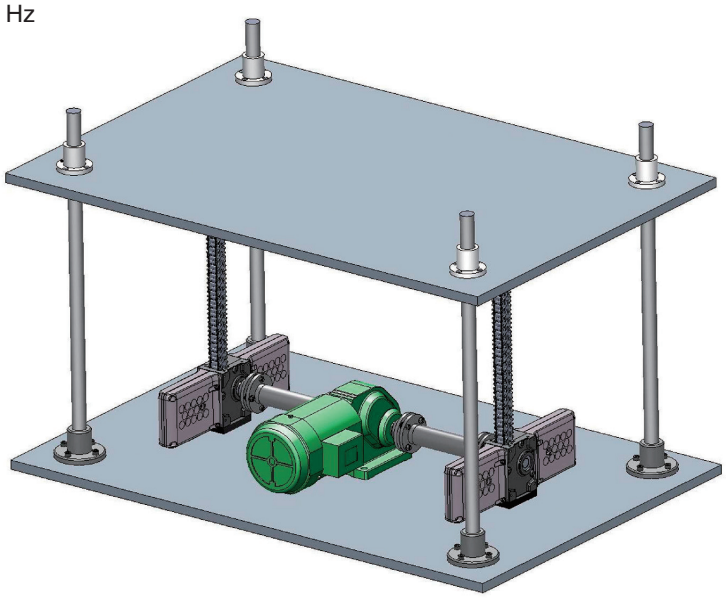


Two units' worth of required input torque is being transmitted to the input shaft on ZCA (①) on the motor side. Confirm that the two units' worth of torque falls below the allowable input shaft torque.

Required input torque for ZCA ① only: T1
Required input torque for ZCA ② only: T2
Motor required torque TM = T1 + T2 < Allowable input shaft torque

Selection Example

(1) Equipment..... Lifter using two ZCA units, indoor use (factory, ambient temperatures, no dust)
(2) Required thrust... Light impact, 1200 N{122 kgf}/2 units, gear motor with brake installed separately and connected by couplings
(3) Installation..... Four guide poles (lifting installation)
(4) Operating speed. 250 mm/sec (rated speed, acceleration not calculated)
(5) Stroke..... 450 mm
(6) Power..... 200 V/60 Hz



SI Units

• ZCA

1. Corrected load Fs (with service factor Sf = 1.3) is:
   Fs = 1200 × 1.3 = 1560 N
2. There are two units operating (Fg = 0.83),
   so thrust Fs_1 per unit is:
   Fs_1 = 1560 ÷ (2 × 0.83) = 939.8 N
3. A gear motor with brake is installed separately, so there is no motor on the ZCA.
4. Based on thrust and stroke per unit, we tentatively select ZCA135N050
   938.9 N < 1000 N (basic capacity of ZCA135N050)
5. The operating speed is 250 mm/sec < 1000 mm/sec, so the speed falls below the allowable speed.
6. Required input rpm is
   N = 250 × 60 ÷ 142.9 = 105 r/min
7. Required input torque per ZCA unit is
   T = 939.8 × 46.48 ÷ (2 × 1000 × 0.9) + 1.63
   = 25.9 N•m < 34.7 N•m (allowable input shaft torque)
   Required input capacity is
   P = 25.9 × 2 × 105 ÷ 9550 = 0.57 kW
8. The units are connected by couplings, so there is no need to confirm overhang load.
9. Selecting options
   Due to the layout, one ZCA has the input shaft on the opposite side (option).
10. From the above results, ZCA135N050 and ZCA135N050-□R are selected.

{Gravimetric Units}

• ZCA

1. Corrected load Fs (with service factor Sf = 1.3) is:
   Fs = 122 × 1.3 = 158.6 kgf
2. There are two units operating (Fg = 0.83),
   so thrust Fs_1 per unit is:
   Fs_1 = 158.6 ÷ (2 × 0.83) = 95.6 kgf
3. A gear motor with brake is installed separately, so there is no motor on the ZCA.
4. Based on thrust and stroke per unit, we tentatively select ZCA135N050
   95.6 kgf < 102 kgf (basic capacity of ZCA135N050)
5. The operating speed is 250 mm/sec < 1000 mm/sec, so the speed falls below the allowable speed.
6. Required input rpm is
   N = 250 × 60 ÷ 142.9 = 105 r/min
7. Required input torque per ZCA unit is
   T = 95.6 × 46.48 ÷ (2 × 1000 × 0.9) + 0.17
   = 2.64 kgf•m < 3.53 kgf•m (allowable input shaft torque)
   Required input capacity is
   P = 2.64 × 2 × 105 ÷ 974 = 0.57 kW
8. The units are connected by couplings, so there is no need to confirm overhang load.
9. Selecting options
   Due to the layout, one ZCA has the input shaft on the opposite side (option).
10. From the above results, ZCA135N050 and ZCA135N050-□R are selected.

SI Units

• Motor (60 Hz)

1. Reduction ratio
   From the hypoid motor catalog's characteristic table, we find that an output RPM close to 60 Hz and 105 rpm would be 120 rpm with a reduction ratio of 1/15.
2. Motor capacity selection
   P = 51.8 x 105 ÷ 9550 = 0.57
   (select a motor with more than 0.6 kW capacity)
   From the above, we select a 0.75 kW Tsubaki E&M hypoid motor with legs and brake, HMTA075-30L15TB.
   For more information, refer to information on the Tsubaki small size gear motor 40 W to 5.5 kW.

• Coupling

1. Coupling rpm is 105 rpm
2. Torque on coupling: 25.9 N•m
3. 25.9 x 2.5 (coupling service factor) = 64.8 N•m
   Since 64.8 N•m < 98 N•m
   (NEF10W-J allowable torque),
   Echt-Flex® Coupling NEF10W-J would be ideal.

{Gravimetric Units}

• Motor (60 Hz)

1. Reduction ratio
   From the hypoid motor catalog's characteristic table, we find that an output RPM close to 60 Hz and 105 rpm would be 120 rpm with a reduction ratio of 1/15.
2. Motor capacity selection
   P = 5.28 x 105 ÷ 974 = 0.57
   (select a motor with more than 0.6 kW capacity)
   From the above, we select a 0.75 kW Tsubaki E&M hypoid motor with legs and brake, HMTA075-30L15TB.
   For more information, refer to information on the Tsubaki small size gear motor 40 W to 5.5 kW.

• Coupling

1. Coupling rpm is 105 rpm
2. Torque on coupling: 2.64 kgf•m
3. 2.64 x 2.5 (coupling service factor) = 6.6 kgf•m
   Since 6.6 kgf•m < 10 kgf•m
   (NEF10W-J allowable torque),
   Echt-Flex® Coupling NEF10W-J would be ideal.

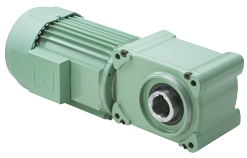
When position control is needed, use a motor with an encoder or a servo motor.
(Contact a Tsubaki representative regarding using a motor with an encoder.)
When using a servo motor, Tsubaki can install a Tsubaki gear reducer for servo motors. See pg. 17 for more information.

The selection example above is just an example. Refer to the appropriate catalog when selecting the coupling, miter gear box, and motor.

Motors

Gear motor

Hypoid motor



Gear Boxes

Miter gear box

Couplings

Echt-Flex*

Jaw-Flex*

Related Products

Zip Chain Lifter®

A Zip Chain Lifter uses lifting functions to directly transmit lifting thrust by using a Zip Chain.

Contact a Tsubaki representative with questions regarding guides, control units, and so on.

Installation Precautions

1. Since the ZCA uses grease for lubrication, it may spatter. Take all appropriate precautions to avoid any adverse effect on the usage environment. In particular, when using the ZCA in a hanging position (vertically hanging installation), grease may drip.
2. The ZCA can be installed in the vertical lifting or hanging directions or horizontally. However, when it is installed horizontally or in a hanging position, do not allow the weight of the unit and the weight of conveyed items to be placed on the mounting bolts. If the unit operates in such a condition, it may result in damage to the unit. Install the unit in a manner that prevents the mounting bolts from receiving any the load.(Figure 1)

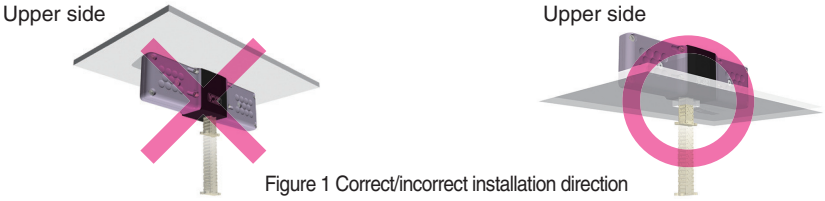


Figure 1 Correct/incorrect installation direction

3. When installing a model without a motor, prepare a pedestal to install a motor, speed reducer, and this unit on. The pedestal should be solid and rigid enough to sufficiently secure the alignment accuracy established during the installation even if the maximum load is applied. Install a separate mechanism to align the heights of the motor output shaft and ZCA input shaft centers. If the shaft center heights are misaligned, the force of the rotation bending will act on the motor output shaft and ZCA input shaft and lead to shaft damage.
4. If the input shaft is driven by a chain, belt, or the like, make sure that the overhang load acting on the shaft is kept within the allowable overhang load. (For details, see Selection Procedure on pages 19 and 20.)
5. Install the ZCA securely using four mounting holes tapped on the unit and the end bracket respectively. (The mounting bolts are not supplied with the ZCA.) Refer to Table 1 and use suitably-sized mounting bolts that have a rigidity of class 10.9 or higher (JIS B1051). Take into account the strength of fixing parts to decide appropriate screw-in depths.

■ Table 1 Mounting bolt size

Model no.	Drive section (bottom)	Drive section (side)	End bracket
ZCA 025	M5	—	M4
ZCA 135	M6	M6	M5

Apply screw lock when installing.

6. Do not perform contact stopping at the stroke end under any circumstances. Doing so may cause serious damage to the inside of main body.
7. Install the unit so that the load put on the main body will act on the shaft placed in the same travelling direction as that of the Zip Chain. If the direction of action or position is not correct, the Zip Chain may receive bending loads or lateral loads and may be damaged. (Figure 2)
   Be sure to mount a linear guide in the direction of travel so that the Zip Chain is not subjected to direct lateral loads or bending, twisting moments.
8. A Zip Chain consists of two lengths of chain whose links engage each other to form a column. Some twisting or warpage may occur in this column.
9. Include leeway with the stroke used. If the actual stroke exceeds the determined range, it may damage the stopper, cause the chain to come off, or cause the end bracket to collide with the drive section, eventually damaging the unit.
10. Set the limit switch that is installed to control the stroke with inertia in mind.
11. Check the rotational direction of the input shaft and the traveling direction of the Zip Chain beforehand. (Refer to the outline dimensional drawings.)
    An incorrect rotational direction may damage the unit.
    When the unit is equipped with a motor, please note that the traveling direction of the chain in relation to the electrical wiring varies depending on speed.

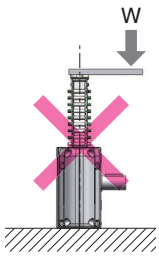


Figure 2

12. Ensure that foreign substances such as dust and hot chips do not attach to or enter the Zip Chain or the opening of the drive section. These substances will accelerate wear in the unit and may lead to serious trouble such as chain fracture or damage to moving parts.
13. If the ZCA is installed using the bottom surface of the drive section, then the keyway of the input shaft will face almost perfectly upward at the stroke lower limit (see Figure 3). However, if synchronized a small amount of displacement will occur due to individual differences in backlash and so on. To prevent this, separately install a mechanism that adjusts phase.
    Misaligned phase will result in increased load per ZCA unit, leading to chain buckling, shaft damage, and other problems. When aligning phase, use a Tsubaki Power-Lock® or similar item and align it with the height of the fixture with the Zip Chain at its lowest position.

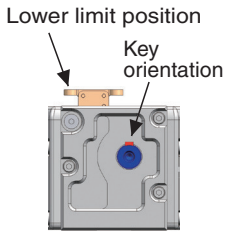


Figure 3

14. When a ZCA is used in equipment hung from above, install a safeguard and safety fence as a precautionary measure against chain fracture, and refrain from entering the area beneath the suspended objects.
    We will be unable to manufacture or sell ZCA units in situations where there is a risk of injury to people.
15. Using bellows intended for vertical lifting or handing installation with horizontal lateral installations (Y) or horizontal longitudinal installations (T) will shorten the service life of the bellows. If bellows are needed in horizontal lateral (Y) or longitudinal (T) installations, be sure to use bellows that incorporate special parts designed for this purpose.
16. Condensation, humidity, and so on may cause the grease to deteriorate prematurely and leak out.
17. Do not modify the Zip Chain Actuator.

Operating Precautions

1. Confirm that all the loads acting on the ZCA, regardless of whether they are static or dynamic, do not exceed the basic capacity, permissible input shaft torque, and allowable overhang load. (For details, refer to Selection Procedure on pages 19 and 20.)
2. Install a shock absorber if necessary to protect the unit from direct impacts.
3. A gear motor, servo motor, or the like can be used as the drive source. Since this unit has extremely high efficiency, the motor may reverse depending on the applied load. Be sure to use a brake or brake motor to prevent reversing caused by inertia or load. Use a highly-responsive brake with a braking torque over 150%.
4. When the mean unloaded operating torque makes up 25% or more of the required input torque, the torque fluctuation caused by chain engagement increases chains becomes larger. For smooth operation of the unit, select a model by increasing the mean unloaded operating torque by half.
5. Though the mean unloaded operating torque may become high for some time after the first use of the unit, this is part of the bedding-in process. Use the unit as it is. Meanwhile, the torque will gradually even out.
6. On a model without motor, the duty factor (%ED) [Operating time/(Operating time + Rest time)] conforms to the capabilities of the drive source since it is dependent on the motor or equipment providing input.
7. When using in equipment that will transport people, install a protection device on the equipment side to ensure safety.
   Operating the equipment recklessly may result in accidents resulting in injury or death, or damage to the equipment.
8. When using in lifting applications, install a safety device on the equipment side to prevent sudden drops.
   Sudden equipment drops may result in accidents resulting in injury or death, or damage to the equipment.
9. When using in hanging applications, always install a safety device in case the chain breaks. In addition to installing a safety fence, never pass underneath suspended items.

Maintenance Precautions

1. The Zip Chain and the drive section have been lubricated with grease in advance, and the unit is delivered ready to use. For maintenance, use the recommended grease shown in Table 2. The lubrication cycle in normal use is generally 1 year. However, this will differ according to frequency and conditions of use. Refer to Table 3 for a guide.
2. When lubricating the Zip Chain, first remove the old grease with a brush or the like, and then evenly apply grease directly to the entire Zip Chain also with a brush or the like.

■ Table 2 Recommended grease

Section to apply	Manufacturer	Grease name
Zip chain and drive section	Showa Shell Sekiyu K. K.	*Shell Alvania EP Grease 2
	Idemitsu Kosan Co., Ltd.	Daphne Eponex SR No.2
	Exxon Mobil Corporation	Mobilux EP 2
	JX Nippon Oil & Energy Corporation	EPNOC Ap(N)2

* This grease is applied before shipment.
★ The product names above are trademarks or registered trademarks of their respective companies.

■ Table 3 Lubrication cycle reference

Frequency of use per day	Lubrication cycle	
Model no.	**ZCA 025**	**ZCA 135**
2000 to 2700	6 months	4 months
1000 to 2000	8 months	5 months
1 to 1000	12 months	12 months

Based on the frequency of use, lubricate every 500,000 cycles for the ZCA025 and every 350,000 cycles for the ZCA135. Apply the grease according to either the lubrication cycle or the frequency of use, whichever comes first.

Zip Chain Actuator® Inquiry Sheet

Company		Country	
Contact name		Phone	
Address		Fax	
Postal code		E-mail	

Usage Conditions

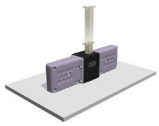
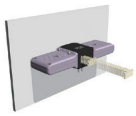
1. Equipment

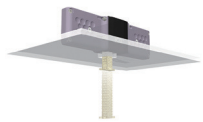
2. Operating environment
   Ambient temperature ____ °C Bellows (dust) Present / Absent

3. No. of Zip Chain Actuators (per machine)
   ____ /machine

4. Load characteristics
   Smooth motion with no impact | Motion with light impact

5. Installation direction
   Vertical lifting | Horizontal lateral (Y) | Horizontal longitudinal (T) | Vertical hanging (D)



For vertical hanging installation, be sure to install a safety device.

6. End bracket
   Fixed | Other (e.g. rotating)

7. Required thrust or load (per machine)
   ____ N or ____ kgf

8. Linear guide mechanism (Be sure to install a guide mechanism.)
   Please give a concrete description.

9. Operating speed
   ____ mm/sec

10. Stroke
    ____ mm

11. Frequency of use, number of start-ups
    ____ | ____ | ____ | ____ → ____ sec./cycle
    Extend Stop → Retract → Stop → (repeated)

    ____ times/min x ____ times/hr x ____ hours/day x ____ days/year

12. With/Without motor
    With / Without

Power source	3 phase 200 V	Other	
Frequency	50 Hz	60 Hz	Other

13. Notice regarding safety considerations (for customers using ZCA units in lifting/hanging applications)
    When using ZCA units in lifting/hanging applications, a Tsubaki representative will be contacting you for consultation to ensure that proper safety protocols are observed. Please check the following box before making your inquiry.

    Understood ☐

14. Requests

For safe use of the Zip Chain Actuator

WARNING

Observe the items below to prevent danger.

- Do not release the brake when the load is acting on the zip chain actuator under any circumstances. If the brake is released while the load is acting on the zip chain actuator, the supported object may fall or the moving sections may suddenly start to move.
- Do not use the zip chain actuator in an explosive atmosphere. Doing so may cause the unit to become flammable, explode or catch fire, or result in personal injury.
- When the zip chain actuator is used in personnel transport equipment, install protective equipment for safety on the transport equipment. There is a risk of injury to personnel by runaway equipment and of damage to the equipment.
- When the zip chain actuator is used in lifting equipment, install safety equipment on the lifting equipment to prevent falling. There is a risk of injury to personnel from the lifted object falling and of damage to the equipment.
- When the Zip Chain Actuator is used in equipment hung from above, install a safeguard and safety fence as a precautionary measure in case a chain should fracture, and refrain from entering the area beneath any suspended objects.
- This product can be operated at extremely high speeds. Keep hands and any other part of the body, clothes or accessories away from any movable parts in the equipment including the Zip Chain Actuator. Otherwise, they may be entangled or trapped in movable parts, resulting in personal injury or death and/or damage to the equipment.
- If a terminal box is used, do not operate the unit with the terminal box cover removed. When any work is performed on the terminal box, be sure to replace the cover after the work. Otherwise, it may result in electrical shock. Mount the cover securely.
- For transportation, installation, wiring, operation, maintenance and inspection of the unit:
  - Always work by following the instructions in the instruction manual.
  - Work must be performed by those who have specialized knowledge and skills. Otherwise explosion, ignition, fire, electrical shock, injury or damage to the equipment may result.
  - In the electrical wiring, always observe the precautions listed in the instruction manual as well as the regulations in the electrical equipment standards and indoor wiring regulations. Grounding in particular is important for preventing electrocution, so always ensure that the product is reliably ground.
  - Turn off the source power supply in advance and ensure that the switch cannot be unintentionally turned on. In the event of power stoppage, take the same action.
  - Wear clothing suited to the work and wear the appropriate protective gear (safety goggles, gloves, safety footwear, other necessary safety equipment).
- Do not modify the Zip Chain Actuator

CAUTION

Observe the items below to prevent accidents.

- Do not use the zip chain actuator outside of the specified range listed on the nameplate and external diagrams and in the catalog. There is a risk of injury and equipment damage.
- Use the zip chain actuator within the appropriate power supply voltage range. There is a risk of burning out the motor and of fire when using the zip chain actuator outside this range.
- Check the rotational direction before incorporating the unit into the other equipment. Mounting the Zip Chain Actuator against the correct rotational direction may result in personal injury and/or damage to the unit.
- Do not insert your fingers or objects into the zip chain actuator opening. There is a risk of injury and equipment damage.
- Functionality and performance may decrease because of part wear and the lifespan of parts. Perform periodic inspections according to the instruction manual. If the unit shows degraded functionality and performance or is damaged, immediately stop operation and contact your local supplier. Not doing so may result in electrical shock, injury or fire.
- During the operation, the motor and speed reducer heat up to a high temperature. Keep hands or any other part of body from coming in contact with them. Otherwise, it may result in burn injury.
- Do not operate the unit with a load higher than the rated load applied. Doing so may result in injury and/or damage to the unit.
- Do not remove the nameplate.
- The guarantee of quality is only valid when an actuator is used that satisfies the required capabilities in the selection criteria established by Tsubaki and when it is used at the stipulated environmental conditions and maintained state.
- Customer alterations of the zip chain actuator are outside the scope of the Tsubaki warranty. Therefore, Tsubaki assumes no responsibility for these alterations.

Warranty

1. LIMITED WARRANTY

Products manufactured by Seller; (a) conform to the design and specifications if any, expressly agreed to in writing by Seller; and (b) are free of defects in workmanship and materials at the time of shipment. The warranties set forth in the preceding sentence are exclusive of all other warranties, express or implied, and extend only to Buyer and to no other person. All WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED.

2. NON-RELIANCE

Buyer is not relying upon any advice, representations or warranties (except the warranties expressly set forth above) of Seller, or upon Seller's skill or judgment regarding the Seller's products. Buyer is solely responsible for the design and specifications of the products, including without limitation, the determination of suitability for Buyer's application of the products.

3. CLAIMS

(a) Any claim relating to quantity or type shall be made to Seller in writing within 7 days after receipt of the products; any such claim made thereafter shall be barred.

(b) Any claim under the above-stated Limited Warranty shall be made to Seller in writing within three (3) months after receipt of the products; any such claim made thereafter shall be barred.

(c) Seller's liability for breach of warranty or otherwise is limited to repair or replacement, at Seller's option of non-conforming or defective products. Buyer waives all other remedies, including but not limited to, all rights to consequential, special or incidental damages, including, but not limited to, damages resulting from personal injury, death or damage to or loss of use of property.

(d) Repair, alteration, neglect or misuse of the products shall void all applicable warranties.

4. INDEMNIFICATION

Buyer will indemnify, defend and hold Seller harmless from all loss, liability, damage and expense, including attorneys' fees, arising out of any claim (a) for infringement of any patent, trademark, copyright, misappropriation of trade secrets, unfair competition or similar charge by any products supplied by Seller in accordance with the design or specifications furnished by Buyer, or (b) arising out of or connected with the products or any items into which the products are incorporated, including, but not limited to, any claim for product liability (whether or not based on negligence or strict liability of Seller), breach of warranty, breach of contract or otherwise.

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